

CYPERACEAE

莎草科 suo cao ke

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Herbs, annual or perennial, rhizomatous to stoloniferous. Culms (stems) simple, often 3-sided. Leaves basal and/or cauline, often 3-ranked, comprising a blade and sheath but sometimes only sheath present; sheath open or closed; ligule often present, sometimes on opposite side to leaf blade; leaf blade usually linear, grasslike, sometimes basally broader and constricted into a pseudopetiole. Involucral bracts 1 to several, leaflike or glumelike. Inflorescences unbranched and spicate or capitate, to branched and anthelate (umbel-like) or paniculate, comprising 1 to many ultimate inflorescence units, these either indeterminate and called spikelets or in a few genera determinate and called pseudospikelets (see explanation below). Spikelets with 1 to many glumes, sometimes reduced to a single flower and aggregated into unisexual spikes; glumes membranous to leathery, spirally arranged or 2-ranked, each subtending a single flower. Pseudospikelets comprising 2–12 membranous scalelike floral bracts on a much reduced axis; lowest 2 bracts opposite, keeled, pseudospikelet subtended and usually hidden by a glumelike bract; bracts spirally arranged and aggregated into spikeletlike spikes. Flowers bisexual or unisexual with plants monoecious or rarely dioecious. Perianth absent or reduced to bristles or scales. Stamens 1–3; anthers basifixed. Ovary 2- or 3-carpellate, unilocular, with a single ovule; style divided or rarely undivided, base sometimes persistent and variously shaped in fruit; stigmas 2 or 3. Fruit usually a hard 2- or 3-sided nutlet, rarely with a succulent or corky exocarp, surface smooth or variously minutely patterned, sometimes partially or completely enclosed by an enlarged basal prophyll (utricle).

One hundred and six genera and ca. 5,400 species: worldwide except Antarctica; 33 genera and 865 species (326 endemic, five introduced) in China.

Recent phylogenetic studies (e.g., D. A. Simpson et al., *Aliso* 23: 72–83. 2007; A. M. Muasya et al., *Bot. Rev. (Lancaster)* 75: 52–66. 2009) suggest that tribal and generic delimitation in Cyperaceae is likely to be modified in the future.

The closest relatives to Cyperaceae are Juncaceae and Thurniaceae (D. A. Simpson in P. Rudall, P. J. Cribb, D. F. Cutler & C. J. Humphries, eds., *Monocot. Syst. Evol.* 2: 497–509. 1995) in the order Poales. Poaceae, which shares some characteristics of Cyperaceae, such as wind pollination and reduced floral structure, has often been placed near to Cyperaceae but is now shown to be more distantly related (H. P. Linder & E. A. Kellogg in P. Rudall et al., loc. cit.: 473–496; D. A. Simpson in P. Rudall et al., loc. cit.: 497–509).

Inflorescence structure in Cyperaceae is notoriously difficult to interpret due to its highly reduced nature. Consequently, the terminology used in describing parts of the inflorescence can be confusing with several terms often being applied to the same structure. In addition, several terms are also used in the Poaceae, but they do not always relate to the same structure in both families. A laudable attempt to standardize terminology in Cyperaceae was made by I. Kukkonen (*Ann. Bot. Fenn.* 31: 37–43. 1994). In our treatment we have attempted to keep terminology as simple as possible.

Inflorescences are generally either unbranched or very shortly branched and spicate or capitate in appearance to prominently branched and paniculate or anthelate (umbel-like), with variations around these. The basic unit of the inflorescence in most Cyperaceae is the spikelet. This comprises a very short to elongated axis, which subtends one to many scalelike bracts, referred to here as glumes. Each glume subtends and partially hides a single very small, bisexual or unisexual flower, which may or may not have a perianth. The perianth, when present, is reduced to bristles or scales. There may be 1–3 stamens and a pistil comprising an ovary, style, and 2 or 3 stigmas. The ovary gives rise to a hard, 1-seeded nutlet (sometimes referred to as an achene). Spikelets tend to be aggregated into larger structures known as spikes. In the tribe Cariceae this basic structure is modified such that the spikelet is reduced to a single flower that is enclosed by a saclike structure known as a utricle, the latter being a modified prophyll at the base of the spikelet. The utricle is subtended by a glumelike bract, and the whole structure is again aggregated with others into spikes. Some confusion arises with caricoid spikes especially as the spikelets comprise only one flower and are subtended by a glumelike bract. This has meant that spikes are sometimes referred to as spikelets and the glumelike bracts as true glumes.

The spikelet is indeterminate, i.e., having no terminal flower. However, in *Hypolytrum*, *Lepironia*, and *Mapania*, the basic inflorescence unit has an apparently terminal female flower. To distinguish this type of unit, the term pseudospikelet is used here; some authors refer to it as a spicoid. Its structure is rather different to that of the spikelet, comprising 2–12 scalelike floral bracts on a very much reduced axis. The two lowest bracts are opposite, keeled, and often enclose the upper bracts (when the latter are present). The lower bracts subtend a male flower comprising a single stamen, the upper bracts usually being empty. The terminal flower, which is not subtended by a floral bract, is female. There are no perianth bristles or scales, and the whole structure is subtended and partially to fully hidden by a glumelike bract. These are again aggregated into spikes, but there is further

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confusion in terminology with the spikes sometimes being referred to as spikelets. The above interpretation of the pseudospikelet is widely accepted, although some workers have interpreted it as a single flower.

One of us (Dai) believes that if *Kyllinga* and *Pycneus* are treated as separate genera from *Cyperus*, as they are in this treatment, then *Juncellus* and *Mariscus* should also be separated from *Cyperus* on account of their distinct morphological characters.

Tang Tsin & Wang Fa-Tsuan. 1961. Cyperaceae (1). In: Tang Tsin & Wang Fa-Tsuan, eds., Fl. Reipubl. Popularis Sin. 11: i–xv, 1–261; Liang Song-yun, Dai Lun-kai, Tang Yan-cheng & Li Pei-chun. 2000. Cyperaceae (2). In: Dai Lun-kai & Liang Song-yun, eds., Fl. Reipubl. Popularis Sin. 12: i–xxii, 1–582.

Glossary

Within the definitions, *italics* indicate terms that are defined in this glossary.

- Amphicarpous** – applied to a small secondary inflorescence occurring at the base of the *culm* in certain genera, particularly *Schoenoplectus*.
- Androgynous** – having male and female flowers in the same structure such as a *spike* in *Carex*.
- Anthela** (plural *anthelae*, adjective *anthelate*) – an umbel-like inflorescence in which the primary branches ± arise from the same point, the inflorescence being subtended by 1 to several *involucral bracts*.
- Beak** – short extension at the apex of a *utricle* or *nutlet*.
- Biconvex** – 2-sided, the sides convex.
- Cancellate** – having the appearance of a lattice.
- Capitate** – headlike inflorescence, without any apparent branching.
- Cladoprophyll** – a sterile *utricle* found at the base of a *Carex spike*.
- Compound** – applied to an inflorescence or partial inflorescence where there are 2 orders of branching, i.e., primary and secondary.
- Compressed trigonous** – 3-sided, but distinctly flattened and thus appearing to be 2-sided.
- Conic** – cone-shaped, being wider at the base than the apex; here it is used as the 3-dimensional equivalent of lanceolate.
- Contraligule** – membranous, ligulelike structure at the apex of the leaf sheath on the side of the *culm* facing away from the leaf blade.
- Culm** – stem supporting the inflorescence.
- Decomound** – applied to an inflorescence or partial inflorescence where there are 3 or more orders of branching, i.e., primary, secondary, and tertiary.
- Determinate** – applied to an inflorescence with terminal flowers and therefore not capable of indefinite growth.
- Disk** – 3-lobed structure occurring at the base of the *nutlet* in *Scleria* and *Diplacrum*. In some species it may be indistinct, whereas in *Scleria sumatrensis* it is developed into a cuplike structure ± covering the *nutlet*.
- Distichous** (of *glumes* and *spikelets*) – arranged in 2 opposite rows down the *rachilla* or *rachis*.
- Glume** – membranous to leathery scalelike structure subtending individual flowers.
- Gynophore** – short stalk at the base of a *nutlet*.
- Indeterminate** – inflorescence which, in theory, is capable of indefinite growth.
- Involucral bract** – bract or bracts occurring at the point where the inflorescence arises from the *culm*. Vary from being leaflike to glumelike or *setaceous*.
- Isodiametric** – of equal size both horizontally and vertically.
- Keel** – used here for the midrib of a *glume* or scalelike bract.
- Lageniform** – urn-shaped with a constriction in the middle.
- Ligule** – membranous tissue or fringe of hairs occurring at the apex of the leaf sheath on the inner side at the point where it joins the leaf blade.
- Nutlet** – hardened, usually minute, 1-seeded fruit, the surface of which may be smooth to variously patterned and a diagnostic character for many species. Often called an achene in literature on Cyperaceae.
- Paniculate** – inflorescence comprising partial inflorescences arising at intervals along the main inflorescence axis.
- Partial inflorescence** – primary branches of an inflorescence.
- Perianth bristles** – small bristlelike or scalelike structures at the base of the *nutlet*. Presumed to be the remnants of a fully developed perianth.
- Prophyll** – 2-keeled structure at the base of a branch within an inflorescence. It may be glumelike or tubular or, in *Kobresia* and *Carex*, developed into a *utricle*.
- Pseudospikelet** – the ultimate inflorescence unit in *Hypolytrum*, *Lepironia*, and *Mapania*. Has a much reduced axis and appears flowerlike. Comprises 2–12 scalelike bracts each subtending a male flower. The whole structure is terminated by a female flower, thus making it determinate.
- Rachis** – the axis of a *spike*.
- Rachilla** – the axis of a *spikelet*.
- Ray** – branches of an *anthela*.
- Rhizome** – underground stem, which may be short, often giving the plant a tufted habit, or long creeping.
- Scalelike bract** – membranous scalelike structure in a *pseudospikelet* each of which subtends a male flower comprising a single stamen only. The lowest 2 floral bracts usually have a keel and are opposite.
- Scrobiculate** – having numerous minute pits or depressions.
- Septate** – partitioned. In some species, particularly in *Eleocharis*, the *culm* has a series of horizontal septa, which are best seen in dried material.
- Simple** – applied to an inflorescence or partial inflorescence where there is only one order of branching, i.e., primary branching.
- Spike** – an aggregation of *spikelets* or *pseudospikelets*; sometimes the whole structure is similar in appearance to a spikelet (in *Ascolepis* Nees ex Steudel, *Carex*, *Hypolytrum*, *Kobresia*, *Lepironia*, *Lipocarpa*, and *Mapania*).
- Spikelet** – the ultimate inflorescence unit in most genera of Cyperaceae. Has an elongated or reduced axis with 1 to many *glumes*, each *glume* subtending a bisexual or unisexual flower.
- Squarrose** – with tips spreading outward. In Cyperaceae usually applied to the apex of the *glumes*.
- Stipe** – short, narrowed extension to the base of the *nutlet*.
- Stolon** – in Cyperaceae this term is applied to a thin underground branch arising from the *rhizome* or base of the *culm*. Each stolon terminates in an aerial shoot.
- Style base** – a variously shaped portion at the base of the style which is persistent on the mature *nutlet* in some genera.
- Trabeculate** – having the appearance of minute girders.
- Trigonous** – 3-sided, with the margins blunt and rounded. Applied here to the *culm* and *nutlet*.
- Triquetrous** – 3-sided with the margins acute. Applied here to the *culm* and *nutlet*.
- Utricle** – a prophyll which has developed into a characteristic bottlelike structure and partially to completely surrounds the *nutlet* in *Kobresia* and *Carex*.

Systematic list of subfamilies, tribes, and genera

Cyperaceae is the third largest family in the Monocotyledons (after Orchidaceae and Poaceae). The largest genera in China are *Carex* (527 spp.), *Cyperus* (62 spp.), *Fimbristylis* (53 spp.), *Eleocharis* (35 spp.), and *Scleria* (24 spp.). In the present treatment we follow D. A. Simpson (Amer. J. Bot. 90: 1071–1087. 2003) for subfamily delimitation and Goetghebeur (in K. Kubitzki, Fam. Gen. Vasc. Pl. 4: 141–190. 1998) for tribal and generic delimitation and sequence. Two subfamilies and eight tribes of Cyperaceae occur in China with generic allocation as follows:

1. MAPANIOIDEAE

1. Hypolytreae

1. *Hypolytrum* (p. 168)
2. *Mapania* (p. 169)
3. *Lepironia* (p. 170)

2. CYPEROIDEAE

2. Scirpeae

4. *Scirpus* (p. 171)
5. *Eriophorum* (p. 174)
6. *Trichophorum* (p. 176)
7. *Fuirena* (p. 178)
8. *Bolboschoenus* (p. 179)
9. *Actinoscirpus* (p. 181)
10. *Schoenoplectus* (p. 181)

11. *Eleocharis* (p. 188)

3. Abildgaardieae

12. *Fimbristylis* (p. 200)
13. *Bulbostylis* (p. 218)

4. Cypereae

14. *Isolepis* (p. 219)
15. *Cyperus* (p. 219)
16. *Courtoisina* (p. 241)
17. *Remirea* (p. 241)
18. *Pycreus* (p. 242)
19. *Kyllinga* (p. 246)
20. *Lipocarpa* (p. 249)

5. Dulichieae

21. *Blysmus* (p. 251)

6. Schoeneae

22. *Actinoschoenus* (p. 252)
23. *Rhynchospora* (p. 253)
24. *Schoenus* (p. 256)
25. *Gahnia* (p. 257)
26. *Cladium* (p. 258)
27. *Machaerina* (p. 259)
28. *Lepidosperma* (p. 260)
29. *Tricostularia* (p. 260)

7. Sclerieae

30. *Scleria* (p. 260)
31. *Diplacrum* (p. 268)

8. Cariceae

32. *Kobresia* (p. 269)
33. *Carex* (p. 285)

Key to genera

For accurate identification of Cyperaceae good fruiting material should be used wherever possible. Indeed this is essential in certain genera, such as *Fimbristylis* and *Scleria*. It is also important to have underground parts as these may be diagnostic for some species. Care is needed when counting the number of stigmas as these are easily broken off. Several should be observed from the same specimen. Care is also needed when counting the stamens. Anthers break off easily leaving the filaments partially hidden within the glumes. Always check that filaments are present. Also, care should be taken to distinguish perianth bristles from filaments as the number of perianth bristles may be useful in separating taxa. The bristles will usually have antrorse or retrorse hairs on them.

- 1a. Inflorescence comprising small units (pseudospikelets) with 2 opposite, keeled, scalelike bracts at base often enclosing a further 2–10 scalelike bracts, each unit subtended and usually hidden by a glumelike bract.
 - 2a. Leaves without blades; culms with transverse septa 3. *Lepironia*
 - 2b. Leaves with blades fully developed; culms without septa.
 - 3a. Pseudospikelets with 5 or 6 scalelike bracts; stamens 3 per pseudospikelet 2. *Mapania*
 - 3b. Pseudospikelets with 2 scalelike bracts; stamens 2 per pseudospikelet 1. *Hypolytrum*
- 1b. Inflorescence not as above.
 - 4a. All flowers unisexual.
 - 5a. Female flowers and nutlets not hidden by a utricle.
 - 6a. Inflorescence made up of capitate clusters of spikelets arising along whole length of culm; nutlets tightly enclosed by 2 subtending glumes and shed with them 31. *Diplacrum*
 - 6b. Inflorescence paniculate or ± capitate, arising on upper part of culm; nutlets not tightly enclosed by 2 glumes 30. *Scleria*
 - 5b. Female flowers and nutlets hidden by a utricle.
 - 7a. Utricle ± open on one side; at least some spikelets bisexual with male flowers above female flower 32. *Kobresia*
 - 7b. Utricle completely closed except at apex; spikelets all unisexual with either 1 male or 1 female flower 33. *Carex*
 - 4b. At least some flowers bisexual.
 - 8a. Spikelets much reduced, with 0–2 glumes subtended by a glumelike spikelet bract, spikelets densely clustered into spikes or in a capitate inflorescence.
 - 9a. Perennial with long-creeping rhizome; sandy beaches near sea only 17. *Remirea*
 - 9b. Annual or perennial, without long-creeping rhizome; inland 20. *Lipocarpa*
 - 8b. Spikelets not as above, elongated, with spirally or distichously arranged glumes.
 - 10a. Spikelets usually with bisexual and male flowers.
 - 11a. Nutlets biconvex, with persistent style base; stigmas 2 or style undivided 23. *Rhynchospora*
 - 11b. Nutlets trigonous or obtuse trigonous-cylindric, without persistent style base; stigmas 3.
 - 12a. Glumes distichous, middle glumes with flowers, lowest empty 24. *Schoenus*
 - 12b. Glumes spirally arranged, rarely distichous, usually apex or near apex with flowers.
 - 13a. Leaves flat, midrib conspicuous or inconspicuous; inflorescence paniculate spreading and loose or small capitate; perianth bristles present or absent; nutlets beaked.

- 14a. Glumes spirally arranged; leaves dorsiventral 26. *Cladium*
 14b. Glumes \pm distichous; leaves unifacial 27. *Machaerina*
- 13b. Leaf midrib inconspicuous or terete; inflorescence densely narrowly paniculate,
 long and large and spreading, loose; perianth bristles present or absent; nutlets
 beakless.
 15a. Leaves linear or terete, involute on margins; perianth bristles absent 25. *Gahnia*
 15b. Leaves terete or flat; perianth bristles present.
 16a. Leaves terete; perianth connate at base, glabrous; nutlets smooth 28. *Lepidosperma*
 16b. Leaves flat; perianth separate, pubescent; nutlets with reticulate
 wrinkles 29. *Tricostularia*
- 10b. Spikelets usually with bisexual flowers only.
 17a. Glumes increasing in length toward apex of spikelet 22. *Actinoschoenus*
 17b. Glumes \pm equal in length (with 1–3 smaller glumes often at base of spikelet).
 18a. Style jointed with ovary and clearly demarcated from it.
 19a. Leaf blades absent; perianth bristles present 11. *Eleocharis*
 19b. Leaf blades usually present, if absent then style base not persistent on nutlet;
 perianth bristles absent.
 20a. Leaf sheath without long silky hairs at apex; nutlets without persistent
 style base 12. *Fimbristylis*
 20b. Leaf sheath with long silky hairs at apex; nutlets with persistent
 style base 13. *Bulbostylis*
- 18b. Style continuous with ovary and not demarcated from it.
 21a. Inflorescence spicate with few to many apparently distichous spikelets 21. *Blysmus*
 21b. Inflorescence not as above.
 22a. Glumes distichous.
 23a. Stigmas 3, rarely 2; nutlets trigonous, rarely biconvex with 1 side
 facing spikelet axis.
 24a. Annual or perennial; glumes not winged 15. *Cyperus*
 24b. Annual; glumes prominently winged 16. *Courtoisina*
 23b. Stigmas 2; nutlets 2-sided with 1 margin facing spikelet axis.
 25a. Spikelets with more than 2 glumes; spikelet axis and glumes
 persistent 18. *Pycreus*
 25b. Spikelets with 1 or 2 glumes; spikelet axis deciduous, spikelets
 falling whole 19. *Kyllinga*
- 22b. Glumes spirally arranged.
 26a. Perianth bristles present, 3 inner ones squamellate 7. *Fuirena*
 26b. Perianth bristles present but not as above, or absent.
 27a. Perianth bristles 10–30, elongating extremely after anthesis,
 smooth, silky 5. *Eriophorum*
 27b. Perianth bristles up to 6, elongating or not after anthesis, or
 absent.
 28a. Inflorescence paniculate.
 29a. Culms not nodose; leaves basal only 9. *Actinoscirpus*
 29b. Culms nodose; leaves basal and up to 8 cauline 4. *Scirpus*
 28b. Inflorescence a single spikelet, up to 3 spikelets, or capitate,
 if paniculate then longest inflorescence bract culmlike and
 apparently continuous with culm, inflorescence appearing
 to be lateral.
 30a. Inflorescence bract glumelike, shorter than
 inflorescence 6. *Trichophorum*
 30b. Inflorescence bracts leaflike or culmlike, longest
 exceeding inflorescence.
 31a. Spikelets up to 4 mm; perianth bristles absent;
 nutlet up to 0.9 mm (mostly ca. 0.5 mm) 14. *Isolepis*
 31b. Spikelets 4 mm or more; perianth bristles
 usually present; nutlet 1 mm or more.
 32a. At least 2 involucre bracts over 1.5 cm,
 longest involucre bract leaflike, erect
 to spreading 8. *Bolboschoenus*

- 32b. One involucre bract over 1.5 cm, longest involucre bract erect, culmlike and apparently continuous with culm, inflorescence appearing to be lateral 10. *Schoenoplectus*

1. *HYPOLYTRUM* Persoon, Syn. Pl. 1: 70. 1805.

割鸡芒属 *ge ji mang shu*

Dai Lunkai (戴伦凯); David A. Simpson, Gordon C. Tucker

Herbs, perennial, moderately robust to robust, rhizomatous [or stoloniferous]. Roots coarse. Culms central or lateral, if lateral then with cataphylls at base. Leaves 3-ranked, basal or cauline, ligulate; basal leaf sheath folded, adaxially open, cauline leaf sheath tubular; leaf blade leathery, glabrous. Involucral bracts leaflike or glumelike, basal bract usually longest. Inflorescence usually an open compound panicle or capitate, with 1 to many spikes. Spikes comprising many spirally imbricate glumelike bracts each subtending a bisexual spikeletlike unit with a much reduced axis (pseudospikelet). Pseudospikelets comprising a naked apparently terminal female flower and 2(or 3) glumes all subtending a male flower comprising 1 stamen; basal 2 glumes opposite, keeled. Perianth bristles absent. Stigmas 2 or 3. Nutlet with a sculptured hard outer surface, apex often conically rostrate or sometimes mucronate.

About 60 species: tropical and subtropical regions; four species (two endemic) in China.

- 1a. Culms central; inflorescences paniculate with many spikes; basalmost involucre bract 15–30 × 0.7–1.7 cm, much longer than inflorescence 1. *H. nemorum*
 1b. Culms lateral; inflorescences capitate, with 1 to many spikes; basalmost involucre bract 1.5–5 × ca. 5 cm, shorter to slightly longer than inflorescence.
 2a. Culms 30–45 cm; leaf blade 2–6 mm wide; spike 1(or 2) 4. *H. shurenii*
 2b. Culms 5–40 cm; leaf blade 1–2 cm wide; spikes few to many.
 3a. Culms 5–10 cm tall; spikes few; nutlet olivaceous, subglobose, ca. 2 mm, apex mucronate 2. *H. paucistrobiliferum*
 3b. Culms 30–40 cm tall; spikes many; nutlet brown, obovoid to ovoid, ca. 3 mm, apex conically rostrate 3. *H. hainanense*

1. *Hypolytrum nemorum* (Vahl) Sprengel, Syst. Veg. 1: 233. 1824.

割鸡芒 *ge ji mang*

Schoenus nemorum Vahl, Symb. Bot. 3: 8. 1794; *Hypolytrum formosanum* Ohwi; *H. latifolium* Persoon.

Roots few, hard, fibrous. Rhizomes short, slightly thick, woody, with dense reddish scales. Culms central, 30–90 cm tall, 3–4 mm thick, 3-angled, stiff. Leaves basal and 1 or 2 cauline, longer than culm; basal leaf sheath brownish, 5–15 cm, margin thickly membranous, basal few bladeless; leaf blade 35–120 × 0.8–2.6 cm or longer, flat, stiff, subleathery, base folded, margin scabrous near apex. Involucral bracts 3–5, leaflike, at base of inflorescence and branches, basalmost much longer than inflorescence, not sheathing. Inflorescences paniculate, ovoid-globose to subglobose, 3–7 × 4.5–6 cm, with many spikes; rachis and rachilla angles scabrous. Spikes obovoid, becoming globose when mature, 3–7 × 3–6 mm, with many glumelike bracts. Glumelike bracts brown, spirally and imbricately arranged, obovate, ca. 2 mm, mid-veined, each subtending a pseudospikelet, apex rounded and mucronate. Pseudospikelets ca. 1.5 mm, with 2 glumes, 2 male flowers, and 1 female flower; glumes brown, lateral and opposite, cymbiform, ca. 1.2 mm, membranous, keeled, connate on adaxial side, spinulose on keel, each with a male flower. Filaments slender; anthers narrowly oblong. Stigmas 2. Nutlet dark grayish brown, subglobose, 2–2.5 mm (including rostrum), compressed, longitudinally rugose, apex conically rostrate. Fl. and fr. Apr–Aug.

Wet places in forests or scrub, valleys; 100–1200 m. Fujian,

Guangdong, Guangxi, Hainan, Taiwan, Yunnan [Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa and America, NE Australia, Indian Ocean islands, Pacific islands].

2. *Hypolytrum paucistrobiliferum* Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 234. 1961.

少穗割鸡芒 *shao sui ge ji mang*

Roots few, thick, hard, fibrous. Rhizomes ± thick, woody. Culms purple, lateral, 5–10 cm tall, with several cataphylls toward base. Leaves basal, distichous; leaf sheath 1–1.8 cm, smooth, not closed, margin narrowly thickly membranous; leaf blade 55–105 × 1.5–2 cm, apically gradually narrowed, flat, papery, smooth, margin and abaxial midvein apically serrulate and scabrous. Involucral bracts 3–5, leaflike, 2–5 cm, basalmost bract equaling inflorescence, basally closed into sheath. Inflorescence a corymbose panicle congested into a head, with few spikes. Spikes with many glumelike bracts, each subtending a pseudospikelet. Pseudospikelets ca. 2 mm, with 2 glumes, 2 male flowers, and 1 female flower; glumes lateral and opposite, cymbiform, membranous, keeled, connate on adaxial side, hispidulous on keel, each with a male flower, margin hyaline. Anther linear; connective apex slightly prominent beyond anther. Stigmas 2, longer than style. Nutlet olivaceous, shortly stipitate, subglobose, ca. 2 mm, both lateral sides angular, abaxial and adaxial surfaces irregularly longitudinally rugose, apex mucronate. Fl. and fr. Aug–Sep.

• Dry places on hills; ca. 100 m. Hainan (Lingshui).

3. *Hypolytrum hainanense* (Merrill) Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 201. 1961.

海南割鸡芒 hai nan ge ji mang

Mapania hainanensis Merrill, Lingnan Sci. J. 9: 35. 1930.

Roots fibrous. Rhizomes stout, woody. Culms lateral, 30–40 cm tall, 3-angled, basally with several scales and bladeless sheaths. Basal scales broadly ovate. Bladeless sheaths dark grayish brown, densely spirally arranged. Leaves basal, tufted; leaf sheath reddish, to 14 cm, not closed, slightly folded, smooth, margin thickly membranous; leaf blade flat, ca. 1 m × 1–1.8 cm, apically gradually narrowed, papery, glabrous, margin and abaxial midvein serrulate. Involucral bracts 2 or 3, leaf-like, 1.5–5 cm, slightly longer than inflorescence; basalmost bract sheathing. Inflorescence a corymbose panicle congested into a head, 1.3–2 × 1.5–2.5 cm, with many spikes. Spikes narrowly ellipsoid, becoming globose in fruit, 5–6 mm in diam., with many glumelike bracts and pseudospikelets. Glumelike bracts yellowish brown, spirally and imbricately arranged, oblong-obovate, 2.5–3 mm, leathery, punctate, keeled, each subtending a pseudospikelet. Pseudospikelets ca. 2 mm, with 2 glumes, 2 male flowers, and 1 female flower; glumes dark grayish brown, lateral and opposite, narrowly elliptic and cymbiform, ca. 2.5 mm, keeled, membranous, connate on adaxial side, spinulose on keel, each with a male flower. Anther narrowly oblong; connective apex not prominent beyond anther. Stigmas 2. Nutlet dark grayish brown, broadly obovoid to ovoid, ca. 3 mm, biconvex, irregularly longitudinally rugose, apex with a conic beak. Fl. and fr. May–Aug.

Forests, dry places on mountain slopes; 100–300 m. Hainan, Hong Kong [Vietnam].

4. *Hypolytrum shurenii* D. A. Simpson & G. C. Tucker, sp. nov.

树仁割鸡芒 shu ren ge ji mang

Type: China. Hainan: Changjiang, 10 Dec 1933, *Liang Xiangri* 66046 (holotype, MO!).

Haec species Hypolytro humili Boeckeler affinis, sed ab eo culmis capillaribus, foliis 2–6 mm latis ad apicem caudatis, spicis 1 vel 2 atque nucula ellipsoideo-ovoidea differt.

Paratypes: Hainan: Ledong Li Autonomous County, 3 Jul 1936, *Liu Xinqi* 27397 (MO); Dongfang City, 10 Dec 1955, *Hainan Station* 237 (MO); Qiongzhou County, 11 Dec 1956, *Anonymous* 3677 (MO); Baisha County, 24 Feb 1936, *Liu Xinqi* 25437 (MO); Ya County (now Sanya), 28 Jul 1933, *Huang Zhi* 33414 (MO).

Perennials, 30–45 cm tall. Roots fibrous. Rhizomes to 1 cm thick, hardened, oblique to horizontal, covered with tough fibrous remnants of leaf sheaths. Culms lateral/axillary, (5–)10–20 cm tall, delicate, flexuose, smooth or scabridulous but scabrous on winged angles, basally flattened, apically becoming roundly 3-angled. Leaves basal, tufted; leaf sheath reddish, to 14 cm, not closed, slightly folded, smooth, margin thickly membranous; leaf blade linear, 15–30 cm × 2–6 mm, flat or slightly plicate, leathery, glabrous, margin and abaxial midvein serrulate, apex with a slender 3–6 cm cauda. Involucral bracts 2 (or 3), deltate, 2–3 mm, shorter than spike; basalmost bract with tubular or amplexicaul sheath to 1 mm. Inflorescences of 1 or 2 spikes (if 2 then proximal one stalked, subtended by a bladeless sheath up to 6 mm). Spikes ovoid, 4–5 mm, with 10–20 glumelike bracts and pseudospikelets. Glumelike bracts yellowish brown, spirally arranged and imbricate, ovate-deltate, 2.5–3 mm, leathery, ca. 7-veined, keeled, margin white membranous, apex rounded; basal 3 bracts sterile, apical ones each with a pseudospikelet. Pseudospikelets with 2 glumes, 3 male flowers, and 1 female flower, ca. 2 × 1 mm; glumes light brown, lateral and opposite, connate on adaxial (and ?abaxial) side, narrowly elliptic, cymbiform, ca. 2.5 mm, membranous, keeled, spinulose on keel especially distally, each with a male flower. Anther linear, ca. 0.7 mm; connective apex slightly prolonged beyond anther. Style ca. 0.5 mm; stigmas 2. Nutlet light brown, stipitate, ellipsoid-ovoid (widest at mid-length), ca. 2.3 × 1.1 mm, roundly 3-sided, irregularly rugose, apex apiculate. Fl. and fr. Dec–Jul.

• Open woods, clearings; 900–1400 m. Hainan.

2. MAPANIA Aublet, Hist. Pl. Guiane 1: 47. 1775.

播鼓蒨属 lei gu li shu

Dai Lunkai (戴伦凯); David A. Simpson, Gordon C. Tucker

Herbs, perennial, robust. Roots coarse. Rhizomes woody. Culms central or lateral (arising from basal leaf axils or below leaves), if lateral then with cataphylls at base. Leaves 3-ranked, basal or rarely cauline; basal leaf sheath folded, open adaxially; cauline leaf sheath tubular; ligule absent; leaf blade linear to oblong, leathery or subleathery. Involucral bracts leaflike or glumelike, basal bract longest. Inflorescences corymbose paniculate or capitate, with 1, few, or many spikes. Spikes comprising few to many spirally imbricate glumelike bracts, each subtending a bisexual spikeletlike unit with a much reduced axis (pseudospikelet). Pseudospikelets comprising an apparently terminal female flower and 5 or 6 scalelike glumes; basal 2 pseudospikelet glumes opposite and keeled; basal 3 pseudospikelet glumes subtending a male flower comprising 1 stamen, remaining glumes empty. Perianth bristles absent. Styles slender; stigmas [2 or]3. Nutlet with a hard or succulent outer surface, smooth or sculptured, lateral costae or furrows 0 or 2–4.

About 85 species: pantropical and extending into warm temperate regions; three species in China.

- 1a. Inflorescences corymbose paniculate; nutlet with 2–4 longitudinal furrows 1. *M. sumatrana*
 1b. Inflorescences capitate or with only a single spikelet; nutlet without longitudinal furrows.
 2a. Inflorescences capitate with up to 4 spikes, broadly ovoid, 1.8–2.5 × 1.5–1.8 cm 2. *M. silhetensis*
 2b. Inflorescence a single spike, ellipsoid to subobovoid, ca. 3 × 1.6–2 cm 3. *M. wallichii*

1. *Mapania sumatrana* (Miquel) Benth. subsp. ***pandanophylla*** (F. Mueller) D. A. Simpson, *Revis. Gen. Mapania*, 53. 1992.

露兜树叶野长蒲 lu dou shu ye ye chang pu

Hypolytrum pandanophyllum F. Mueller, *Fragm.* 9: 16. 1875; *Thoracostachyum pandanophyllum* (F. Mueller) Domin.

Rhizomes short or stolonlike. Culms central, ca. 1 m tall, 2–10 mm thick, straight, 3-angled, glabrous. Leaves basal and cauline, glabrous, basal leaves stipitate, cauline leaves sheathing; leaf sheath greenish to reddish brown, 7–24 cm; leaf blade to 2 m × 2.5–3 cm or longer, 3-angled, inverse W-shaped in cross section, 3-veined, margins scabrous or serrulate, apex flagelliform-acuminate. Involucral bracts 4 or 5, leaflike; basalmost bract to 70 × 1–2 cm or longer, much longer than inflorescence, not sheathing. Inflorescences corymbose paniculate, ca. 5 × 8 cm or longer; racemes several at apex of branches, with many spikes. Spikes 1 or 3–5 fascicled, ellipsoid, 5–6 mm, sessile, with many glumelike bracts subtending pseudospikelets. Glumelike bracts densely spirally and imbricately arranged, elliptic to broadly elliptic, ca. 2.5 mm, slightly shiny, glabrous, veins obsolete, apex rounded; basal 2 bracts empty, remainder each with a pseudospikelet. Pseudospikelets with 6 glumes, 3 male flowers, and 1 female flower; basal 2 glumes opposite, cymbiform, membranous to hyaline, keeled, ciliate on keel, each subtending 1 male flower; remaining 4 glumes linear-oblong, hyaline, outermost one subtending a male flower. Filaments to 3.7 mm; anthers linear to linear-oblong. Style ca. 1 mm; stigmas 3. Nutlet mid- to dark grayish brown, ovoid, 3–4 × 2.1–2.2 mm, outer surface hard, shiny, and with 2–4 longitudinal furrows. Fl. Mar–Apr.

Wet places in sparse forests or scrub; ca. 1100 m. Hunan, S Yunnan [Indonesia, Malaysia, Papua New Guinea; NE Australia, Pacific islands].

2. *Mapania silhetensis* C. B. Clarke in J. D. Hooker, *Fl. Brit. India* 6: 681. 1894.

华播鼓蒴 hua lei gu li

Mapania sinensis Uittien.

Rhizomes thick, woody. Culms lateral, 25–54 cm tall, ca. 3 mm thick, with several cataphylls toward base. Leaves basal, distichous; leaf sheath brownish, ca. 12 cm, margin thickly membranous; leaf blade ca. 1.3 m × 2.5–3.5 cm or longer, subleathery, smooth, 3-veined, apical margin and abaxial midvein serrulate, apex caudate-acuminate. Involucral bracts brown,

glumelike, ovate to ovate-deltate, 1.5–2.5 cm, shorter than inflorescence, leathery, apex acute. Inflorescences capitate, broadly ovoid, 1.8–2.5(–5) × 1.5–1.8 cm, with 4 spikes fascicled at apex of culm, with many glumelike bracts and pseudospikelets. Glumelike bracts straw-colored, spirally and imbricately arranged, narrowly oblong, ca. 1 cm, papery, apex obtuse. Pseudospikelets with 6 glumes, 3 male flowers, and 1 female flower; basal 2 glumes opposite, cymbiform, membranous, keeled, spinulose on apical part of keel, each subtending 1 male flower; remaining 4 bracts narrowly oblong, outermost one subtending a male flower. Filaments to 1.6 cm; anthers linear, 7–8 mm. Style ca. 6.5 mm; stigmas 3. Nutlet dark brown, obovoid, 4–4.5 mm, obtusely 3-sided, outer surface succulent, apex conically rostrate. Fl. and fr. Oct.

Forests; 600–700 m. Guangdong, Guangxi [Bangladesh, India, Vietnam].

3. *Mapania wallichii* C. B. Clarke in J. D. Hooker, *Fl. Brit. India* 6: 682. 1894.

单穗播鼓蒴 dan sui lei gu li

Mapania dolichopoda Tang & F. T. Wang.

Rhizomes thick, woody. Culms lateral, 20–70 cm tall, 2–4 mm thick, with several cataphylls toward base. Leaves basal, ± distichous; leaf sheath dark green, open, folded, overlapping each other, 7–12 cm, leathery; leaf blade ca. 1.2 m × 2–3.5 cm or longer, subleathery, margin and abaxial midvein serrulate, apically gradually narrowed into an acutely triquetrous and flagelliform apex. Involucral bracts yellowish green, glumelike, ovate-lanceolate, 1.5–2.5 cm, slightly shorter to nearly as long as inflorescence, leathery, midvein abaxially elevated, margin brown and thickly membranous. Inflorescence a single terminal spike, ellipsoid to subobovoid, 3–3.5 × 1.5–2 cm, with many glumelike bracts and pseudospikelets. Glumelike bracts yellowish, spirally and imbricately arranged, ovate-oblong, 1.2–1.5 cm, papery. Pseudospikelets with 6 glumes, 3 male flowers, and 1 female flower; basal 2 glumes opposite, cymbiform, membranous, keeled, spinulose on apical part of keel, each subtending 1 male flower; remaining 4 bracts narrowly oblong, outermost one subtending a male flower. Filaments to 1.5 cm; anthers linear, ca. 8 mm. Style ca. 9 mm; stigmas 3. Nutlet brown, shortly stipitate, subobovoid to ellipsoid, ca. 7.5 mm, obtusely 3-sided, outer surface succulent, apex conically rostrate. Fl. and fr. Oct–Nov.

River margins, dense forests, ditch margins in valleys; ca. 500 m. Fujian, Guangdong, Guangxi, Hainan [Indonesia, Malaysia].

3. LEPIRONIA Persoon, *Syn. Pl.* 1: 70. 1805.

石龙台属 shi long chu shu

Dai Lunkai (戴伦凯); Jeremy J. Bruhl, David A. Simpson

Perennials. Rhizomes woody. Culms erect, terete, with transverse septa. Leaves basal, without a leaf blade. Primary involucral bracts subulate, cylindrical, erect. Inflorescence a single spike, pseudolateral, with many spirally arranged imbricate glumelike bracts. Basal glumelike bracts empty, most subtending pseudospikelets. Pseudospikelets with 2 outer strongly keeled glumes and many non-keeled glumes, most subtending 1 stamen and a solitary apparently terminal female flower. Perianth bristles absent. Stigma 2, long, slender. Nutlet plano-convex, apex not beaked.

One species: tropical Asia, Australia, Madagascar, Pacific islands.

1. *Lepironia articulata* (Retzius) Domin, *Biblioth. Bot.* 85: 486. 1915.

石龙刍 shi long chu

Restio articulatus Retzius, *Observ. Bot.* 4: 14. 1786; *Lepironia compressa* Boeckeler; *L. mucronata* Persoon; *L. mucronata* var. *compressa* (Boeckeler) E. G. Camus.

Rhizomes creeping, covered by brown ovate scales. Culms 0.7–1.5(–2) m tall, 5–8 mm thick when dried, terete, with 3 or 4 leaf sheaths at base; sheaths open, brown to reddish, 10–30 cm, papery, margin thickly membranous. Involucral bract 3–7 cm. Spike brown to blackish, pseudolateral, ellipsoid to ovoid-ellipsoid, 1–2 × 0.6–1 cm, with many glumelike bracts. Glume-like bracts orange, dark brown, or black, ovate, broadly ovate, or obovate-oblong, 4–5 × 4.5–5 mm, concave, striate, apex rounded. Pseudospikelets with many brown glumes; basal 2

glumes lateral, narrowly spatulate and cymbiform, ca. 5 mm, membranous, keeled, with stout prickly hairs on keel, apex acute; middle glumes linear-lanceolate and cymbiform, slightly shorter, membranous, each with or without a single stamen, apex acuminate; central gynoeceum surrounded by empty glumes. Anther linear-oblong; connective apex ca. 0.5 mm, prominent beyond anther. Style white at anthesis, shorter than stigmas. Nutlet yellowish, maturing to dark gray brown, obovoid, ca. 4 × 3 mm, compressed, with 7–9 dark brown longitudinal striae on both sides, margins distally scaberulose. Fl. and fr. Feb–Jun.

Usually in coastal ponds, marshes, and streams; 100–200 m. Guangdong, Hainan, Taiwan [Cambodia, India, Indonesia, Japan (Ryukyu Islands), Laos, Malaysia, Papua New Guinea, Sri Lanka, Thailand, Vietnam; Australia, Madagascar, Pacific islands].

Lepironia articulata is used for making mats and baskets.

4. **SCIRPUS** Linnaeus, *Sp. Pl.* 1: 47. 1753, nom. cons.

蘆草属 biao cao shu

Liang Songyun (梁松筠 Liang Song-jun); Gordon C. Tucker

Herbs, perennials. Culms tufted, 3-angled to obtusely 3-angled, rarely terete, few to many nodose. Leaves basal and cauline; leaf blade linear, grasslike, ligulate, base sheathing. Involucral bracts leaflike, spreading. Inflorescence a terminal corymbiform anthera, with many spikelets. Spikelets ovoid to ellipsoid, generally rather small. Glumes spirally arranged, deciduous, each subtending a flower. Flowers bisexual. Perianth bristles 3–6, as long as to much longer than nutlet, deciduous with nutlet. Stamens 1–3. Style base not thickened, persistent; stigmas 2 or 3. Nutlet obovoid to ellipsoid, compressed 3-sided to biconvex, smooth, apex beaked.

About 35 species: mostly in temperate regions of N Hemisphere, greatest diversity in North America; 12 species (four endemic) in China.

- 1a. Involucral bracts spathe-like 11. *S. maximowiczii*
 1b. Involucral bracts leaflike.
 2a. Prophyll subtending a bisexual flower 12. *S. paniculato-corymbosus*
 2b. Prophyll absent.
 3a. Spikelets dark green (to grayish).
 4a. Perianth bristles erect, retrorsely scabrous, nearly as long as nutlet 1. *S. orientalis*
 4b. Perianth bristles prominently flexuose to contorted, retrorsely scabrous only near apex,
 2–4 × as long as nutlet 2. *S. radicans*
 3b. Spikelets ± reddish brown.
 5a. Spikelets narrowly ovoid; basal several glumes empty 9. *S. filipes*
 5b. Spikelets globose, ovoid, oblong, or ellipsoid; all glumes with a flower.
 6a. Perianth bristles basally glabrous and apically densely pubescent with long yellowish brown
 hairs 10. *S. hainanensis*
 6b. Perianth bristles antrorsely scabrous but not pubescent.
 7a. Glumes 1-veined, apex acuminate; perianth bristles flexuose, 1.5–4 × as long as nutlet;
 nutlet compressed 3-sided; stigmas 3.
 8a. Glumes lanceolate to ovate-lanceolate, 2.5–3 mm 3. *S. karuisawensis*
 8b. Glumes deltoid-ovate to oblong-ovate, 1.3–2 mm.
 9a. Spikelets globose-ellipsoid; glumes 1.3–1.5 mm, apex obtuse 4. *S. lushanensis*
 9b. Spikelets globose; glumes 1.8–2 mm, apex acute 5. *S. wichurae*
 7b. Glumes 1-, 3-, or 5-veined, apex obtuse; perianth bristles slightly flexuose, less than 1.5 ×
 as long as nutlet; nutlet biconvex; stigmas 2.
 10a. Spikelets 2–3 mm; glumes broadly ovate, ca. 1 mm, 3-veined 8. *S. rosthornii*
 10b. Spikelets 3–6 mm; glumes ± broadly ovate-orbicular, 1.2–1.5 mm, 1- or 5-veined.
 11a. Glumes ca. 1.2 mm, without brown short lines, 1-veined; nutlet 0.7–1 mm 6. *S. ternatanus*
 11b. Glumes ca. 1.5 mm, with brown short lines, 5-veined; nutlet ca. 1.5 mm 7. *S. chunianus*

1. *Scirpus orientalis* Ohwi, *Acta Phytotax. Geobot.* 1: 76. 1932.

东方蘆草 dong fang biao cao

Scirpus sylvaticus Linnaeus var. *maximowiczii* Regel; *S. sylvaticus* var. *subradicans* Kükenthal ex Tang.

Rhizomes short, stoloniferous. Culms 0.6–1.8 m tall, 7–12

mm thick, obtusely 3-angled, 5–7-nodose. Leaves cauline, as long as or shorter than inflorescence; leaf blade 4–15 mm wide, flat, abaxial midvein and margin usually scabrous. Involucral bracts 2–4, leaflike, much longer than inflorescence. Inflorescence a terminal large compound anthela; rays many, to 10 cm, apically scabrous. Spikelets usually solitary or in clusters of 2 or 3, dark gray, ovoid to narrowly ovoid to rarely ovoid, 4–6 × ca. 2 mm, many flowered. Glumes dark green, broadly ovate, ca. 1.5 mm, with 3 yellowish green veins, apex acute to subrounded. Perianth bristles 5 or 6, as long as or slightly longer than nutlet, erect, retrorsely scabrous. Stamens 3; anthers linear-oblong, ca. 1 mm; connective apex very short. Style slightly longer than nutlet; stigmas 3. Nutlet pale yellow, obovoid to ellipsoid, compressed 3-sided. Fl. Jun–Jul, fr. Aug. $2n = 60$.

Swampy places in woods, wet places; 400–2700 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Xinjiang [Japan, Korea, Mongolia, Russia (Far East, Siberia)].

2. *Scirpus radicans* Schkuhr, Ann. Bot. (Usteri) 4: 48. 1793.

单穗蔗草 dan sui biao cao

Nemocharis radicans (Schkuhr) Beurling; *Scirpus sylvaticus* Linnaeus var. *radicans* (Schkuhr) Willdenow; *Seidlia radicans* (Schkuhr) Opiz.

Rhizomes short. Culms slightly tufted, 0.7–1.5 m tall, obtusely 3-angled, 7- or 8-nodose, smooth but slightly scabrous near inflorescence. Leaves cauline, shorter than inflorescence; sheath ± long; leaf blade 7–10 mm wide, abaxial midvein and margin slightly scabrous. Involucral bracts 2 or 3, leaflike, overtopping inflorescence. Inflorescence a terminal large compound anthela, with many rays; first rays to 9 cm, glabrous. Spikelets solitary, oblong-ovoid to narrowly ovoid, 5–8 × ca. 2 mm, many flowered, apex acuminate. Glumes densely arranged, oblong, ca. 2 mm, membranous, both surfaces dark grayish black, midvein pale yellow, base sometimes straw-colored, margin apically ciliate, apex rounded. Perianth bristles 6, usually 2–4 × as long as nutlet, prominently flexuose, retrorsely scabrous only near apex. Anthers ca. 1 mm, linear-oblong. Style slightly short; stigmas 3. Nutlet pale yellow, obovoid, ca. 1 mm, compressed 3-sided. Fl. and fr. Jun–Sep. $2n = 56$.

In water, swampy places; 400–900 m. Heilongjiang, Jilin, Liaoning, Nei Mongol [Japan, Kazakhstan, Korea, Mongolia, Russia; Europe].

3. *Scirpus karuisawensis* Makino, Bot. Mag. (Tokyo) 18: 119. 1904.

华东蔗草 hua dong biao cao

Scirpus fuirenooides Maximowicz var. *jaluanus* Komarov; *S. jaluanus* (Komarov) Nakai ex Mori.

Rhizomes short. Culms 0.8–1.5 m tall, stout, rigid, obtusely 3-angled, 5–7-nodose, clothed at base with a few bladeless leaf sheaths. Leaves shorter than culm; sheath reddish brown; leaf blade linear, 4–10 mm wide, stiff. Involucral bracts 1–4, leaflike, overtopping inflorescence. Inflorescences consisting of a terminal and 2–4 lateral lax anthelae; lateral anthelae simple, with 5 or fewer ca. 7 cm rays; terminal decompound anthela with many rays. Spikelets in spherical clusters of 5–10,

oblong to ovoid, 5–9 × 3–4 mm, densely many flowered, apex obtuse. Glumes reddish brown, lanceolate to oblong-ovate, 2.5–3 mm, membranous, 1-veined, apex acute. Perianth bristles 6, white, 3–4 × as long as nutlet, basally flexuose, apically sparsely antrorsely scabrous. Anthers linear. Style of medium length; stigmas 3. Nutlet yellowish, oblong to obovoid, ca. 1 mm, compressed 3-sided, shiny, apex shortly beaked. Fl. and fr. Aug–Sep.

Wet places, swamps; 600–1200 m. Anhui, Guizhou, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jilin, Liaoning, Shaanxi, Shandong, Yunnan, Zhejiang [Japan, Korea].

4. *Scirpus lushanensis* Ohwi, Acta Phytotax. Geobot. 7: 134. 1938.

庐山蔗草 lu shan biao cao

Scirpus lineatus Michaux var. *lushanensis* (Ohwi) T. Koyama; *S. rongchenensis* F. Z. Li; *S. wichurae* Boeckeler var. *lushanensis* (Ohwi) T. Koyama.

Rhizomes short, stout. Culms 1–1.5 m tall, stout, erect, rigid, obtusely 3-angled, 5–8-nodose. Leaves shorter than culm; sheath usually reddish brown, 3–10 cm; leaf blade 0.5–1.5 cm wide, ± stiff. Involucral bracts 2–4, leaflike, usually shorter to rarely longer than inflorescence. Inflorescences terminal and lateral, a large compound or decompound anthela, with many rays; first ray to 20 cm, slender; rays and peduncles scabrous. Spikelets mostly solitary, sometimes in clusters of 2–8, globose-ellipsoid, 2.5–3.5 mm, densely many flowered, apex rounded. Glumes rust-colored (concolorous), deltoid-ovate to broadly ovate, 1.3–1.5 × 0.7–0.8 mm, membranous, with 1(–3) brown veins, apex acute. Perianth bristles 6, ca. 1.5 × as long as nutlet, basally flexuose, distally straight, apically antrorsely scabrous. Anthers linear-oblong. Style of medium length; stigmas 3. Nutlet pale yellow, ellipsoid, ca. 1.5 × 0.5 mm, compressed 3-sided, slightly exceeding subtending glume when mature. Fl. Jun–Jul, fr. Aug–Sep.

Moist grasslands, swamps, trail margins on slopes, stream margins; 300–2800 m. Anhui, S Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, SE Sichuan, SE Xizang, Yunnan, Zhejiang [NE India, Indonesia (Sumatra), Japan, Korea, Russia (Far East), Thailand, Vietnam].

5. *Scirpus wichurae* Boeckeler, Linnaea 36: 729. 1870 [“*wichurai*”].

球穗蔗草 qiu sui biao cao

Scirpus asiaticus Beetle; *S. lineatus* Michaux subsp. *wichurae* (Boeckeler) T. Koyama; *S. wichurae* var. *asiaticus* (Beetle) T. Koyama ex W. T. Lee.

Culms 60–100 cm tall, stout, 3-angled, several nodose. Leaves shorter than culm; basal sheaths blackish purple, shiny, apex with a distinct tongue; leaf blade usually shorter than culm, 0.5–1.5 m × 1–1.5 cm, flat, stiff, leathery, margin slightly scabrous. Involucral bracts 5 or 6, leaflike, basal 3 or 4 overtopping inflorescence. Inflorescence a large compound or decompound anthela, turbinate with concave center, 7–10 × 8–15 cm; rays 5 or more, to 9 cm, slender, spreading (often in same direc-

tion), pubescent. Spikelets sessile, in glomerules of 3–7, globose, 3–8 × 2.5–3.5 mm, many flowered, apex obtuse. Glumes rusty brown (concolorous), densely arranged, ovate to ovate-deltate, 1.8–2 × ca. 0.8 mm, membranous, with 1 pale brown vein, apex attenuate to mucronate and woolly at maturity from exerted bristle tips. Perianth bristles 6, 1.5–2 × as long as nutlet, erect, basally connate, apical half sparsely antrorsely scabrous. Style filiform, 1.2–1.5 mm. Nutlet pale yellowish brown, ellipsoid to obovoid, ca. 1.3 mm, 3-sided, apex subulate beaked. Fl. and fr. probably Jul–Oct.

Wet places, hillsides, valleys; 1800–2500 m. Guizhou, Liaoning, Qinghai, Shandong, Yunnan [Bangladesh, Bhutan, N India, Indonesia (Sumatra), Japan, Korea, N Thailand].

Scirpus wichurae and *S. lushanensis* were treated together as *S. asiaticus* by Tang and F. T. Wang (Fl. Reipubl. Popularis Sin. 11: 12. 1961), but we consider them to be quite distinct as can be seen from the key differences. If varieties are recognized for *S. wichurae*, plants from Japan are the typical variety, and plants from China and elsewhere in the range are *S. wichurae* var. *asiaticus*.

6. *Scirpus ternatanus* Reinwardt ex Miquel, Fl. Ned. Ind. 3: 307. 1856.

百穗蘆草 bai sui biao cao

Culms 60–100 cm tall, stout, 3-angled, several nodose. Leaves longer than culm; basal sheaths blackish purple, shiny; leaf blade 1–1.5 cm wide, flat, stiff, leathery, margin slightly scabrous. Involucral bracts 5 or 6, leaflike, basal 3 or 4 overtopping inflorescence. Inflorescence a large compound or decomposed anthela, 7–10 × 8–15 cm; rays 5 or more, to 9 cm, stout, spreading, smooth. Spikelets sessile, in headlike clusters of 4–10, ovoid, ellipsoid, or oblong, 3–8 × 2.5–3.5 mm, many flowered, apex obtuse. Glumes brown, densely arranged, broadly ovate to ovate-orbicular, ca. 1.2 mm, membranous, with 1 pale brown vein, apex obtuse to rounded. Perianth bristles 2 or 3, longer than nutlet, erect, apical half sparsely antrorsely scabrous. Style filiform, 1.2–1.5 mm; stigmas ??. Nutlet pale yellow, ellipsoid, obovoid, or subspherical, 0.7–1 mm, biconvex. Fl. and fr. (May–)Jun–Aug.

Wet places, hillsides, valleys; 300–1400(–1800) m. Anhui, Fujian, Guangdong, Guangxi, Hainan, Hubei, Hunan, Jiangxi, Shandong, Sichuan, Taiwan, SE Xizang, Yunnan [Bhutan, India, Indonesia, Japan, Myanmar, Papua New Guinea, Philippines, Thailand, Vietnam; Pacific islands].

7. *Scirpus chunianus* Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 221. 1961.

陈氏蘆草 chen shi biao cao

Culms 0.9–1.5 m tall, stout, obtusely 3-angled, acutely 3-angled just basal to inflorescence. Leaves longer than culm; sheath 5–7.5 cm; leaf blade 0.8–1.4 cm wide, flat, stiff, abaxial midvein and margin scabrous. Involucral bracts 7, leaflike, overtopping inflorescence, abaxial midvein and margin scabrous. Inflorescence a large terminal decomposed anthela; rays many, scabrous; first rays to 9 cm, stout, 3-angled. Spikelets sessile, in headlike clusters of 3–7, ellipsoid to oblong, 4–6 × 2–3 mm, many flowered, apex obtuse to rounded. Glumes brown with dark brown short lines, deltoid-ovate, ca. 1.5 mm, membranous,

5-veined, apex rounded. Perianth bristles 2 or 3, white, slightly longer than nutlet, erect, apically sparsely antrorsely scabrous. Stamens 2. Stigmas ??. Nutlet yellow, broadly ellipsoid to subspherical, ca. 1.5 mm, biconvex, densely minutely verruculose. Fl. and fr. Mar–Apr.

• Forests along valleys; 300–600 m. Guangdong, Guangxi, Hainan (Baoting), Hunan.

8. *Scirpus rosthornii* Diels, Bot. Jahrb. Syst. 29: 228. 1900.

百球蘆草 bai qiu biao cao

Rhizomes short. Culms 70–100 cm tall, stout, 3-angled, stiff, nodose. Leaves overtopping inflorescence; sheath 3–12 cm, with transverse veins; leaf blade 0.6–1.5 cm wide, ± stiff, abaxial midvein and margin scabrous. Involucral bracts 3–5, leaflike, usually overtopping inflorescence. Inflorescence a large terminal decomposed anthela; rays 6 or 7, to 12 cm, stout, scabrous. Spikelets sessile, in headlike clusters of 4–15, ovoid to ellipsoid, 2–3 × ca. 1.5 mm, many flowered, apex subrounded. Glumes straw-colored to brown but later becoming blackish brown, broadly ovate, ca. 1 mm, with 3 green veins, apex obtuse. Perianth bristles 2 or 3, longer than nutlet, erect, apical half antrorsely scabrous. Stigmas 2. Nutlet yellow, ellipsoid to subspherical, 0.6–0.7 mm, biconvex. Fl. and fr. May–Sep.

Forests, forest margins, slopes, trail margins, wet places, swamps; 300–2600 m. Anhui, Chongqing, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Shandong, Sichuan, Xizang, Yunnan, Zhejiang [Japan, Nepal].

9. *Scirpus filipes* C. B. Clarke, J. Linn. Soc., Bot. 36: 249. 1903.

细枝蘆草 xi zhi biao cao

Rhizomes short, woody. Culms 25–100 cm tall, 3-angled, stiff, scabrous, obscurely nodose, clothed at base with several pale brown leaf sheaths. Leaves shorter than culm; sheath very long; leaf blade 5–6 mm wide, stiff, veins and margin scabrous. Involucral bracts 1 or 2, leaflike, overtopping inflorescence, both surfaces and margin scabrous. Inflorescence a terminal simple anthela or pseudolateral head; rays 7–12, to 6 cm, ± slender. Spikelets solitary or in clusters of 2–6, brown, narrowly ovoid, 7–9 × 1.5–2 mm, ca. 10-flowered, basally several glumes empty. Glumes reddish brown, lanceolate-oblong to oblong-ovate, ca. 4 mm, with 1–3 dark yellow veins, apex acute to obtuse. Perianth bristles 6, longer than nutlet, antrorsely scabrous. Stamens 3; anthers linear, ca. 2.5 mm. Stigmas 3. Nutlet yellow, obovoid, less than 1/2 as long as subtending glume, compressed 3-sided. Fl. and fr. May–Jun.

• Forests, forest margins, slopes, trail margins, grassy slopes, wet places, stream margins, swamps, on rocks; 300–2400 m. Fujian, Guangdong, Guangxi.

- 1a. Culms 70–100 cm tall; inflorescence a terminal simple anthela; spikelets in clusters of 2–6 9a. var. *filipes*
- 1b. Culms ca. 25 cm tall; inflorescence a pseudolateral head; spikelets 1 or 2 9b. var. *paucispiculatus*

9a. *Scirpus filipes* var. *filipes*

细枝蕹草(原变种) xi zhi biao cao (yuan bian zhong)

Culms 70–100 cm tall. Inflorescence a terminal simple anthela. Spikelets in clusters of 2–6.

• Forests, forest margins, slopes, trail margins, grassy slopes, wet places, stream margins, swamps; 300–2400 m. Fujian, Guangdong, Guangxi.

9b. *Scirpus filipes* var. *paucispiculatus* Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 221. 1961.

少花细枝蕹草 shao hua xi zhi biao cao

Culms ca. 25 cm tall. Inflorescence a pseudolateral head. Spikelets 1 or 2.

• On rocks. Fujian (Nanping).

10. *Scirpus hainanensis* S. M. Huang, Fl. Hainan. 4: 538. 1977.

海南蕹草 hai nan biao cao

Rhizomes short or not. Culms tufted, 60–90 cm tall, slender, erect, terete, nodose, glabrous. Leaves basal or 3–5 on culm, shorter than culm; sheath brown, 1.5–3 cm, mouth obliquely truncate; leaf blade linear, 3–5 mm wide, flat, abaxial midvein and margin scabrous, apex acuminate. Involucral bracts leaf-like, usually shorter than inflorescence, sheathing. Inflorescences consisting of a terminal and 3–5 lateral anthelae; rays long, each with 3–12 spikelets. Spikelets solitary, sessile or pedunculate, oblong to ovoid-oblong, 5–7 × 2–3 mm, 10–15-flowered, sometimes spikelets bearing small plants. Glumes yellowish brown to pale yellow, ovate to oblong-ovate, 2–2.5 mm, membranous, both surfaces with dark brown short lines, with 1 yellowish green vein, apex acute to very shortly mucronate. Perianth bristles 6, ca. 1 mm, basally glabrous, apically densely yellowish brown long pubescent. Stamen 1; anther oblong, ca. 1 mm; connective apex short. Style ca. 1.5 mm, base slightly thickened; stigmas 3. Nutlet yellowish brown, obovoid to broadly obovoid, ca. 1.5 mm, 3-sided, shiny. Fl. and fr. Aug–Dec.

• Moist places, forests along valleys. Fujian, Hainan, Hong Kong, Jiangsu.

11. *Scirpus maximowiczii* C. B. Clarke, Bull. Misc. Inform. Kew, Addit. Ser. 8: 30. 1908.

佛焰苞蕹草 fo yan bao biao cao

Eriophorum japonicum Maximowicz; *E. maximowiczii* (C. B. Clarke) Beetle; *Scirpus japonicus* (Maximowicz) Fernald (1905), not (Miquel) Franchet & Savatier (1877).

Rhizomes oblique, stoloniferous. Culms solitary, 15–30 cm tall, 3-angled, nodose, basally clothed with leaf sheaths eventually disintegrating into fibers, apically slightly scabrous. Basal leaves shorter than culm; leaf blade broadly linear, 3–6 mm wide, flat, apically abruptly narrowed to 3-angled, abaxial midvein and margin slightly scabrous, apex obtuse. Cauline leaves 2 or 3; sheath green, nearly black at apex; leaf blade linear-lanceolate, 3–6 cm × 4–6 mm, flat or slightly plicate. Involucral bracts 1–3, spathe-like, suberect, base blackish brown. Inflorescence a terminal anthela; rays unequal in length, to 3 cm, each terminated by (1 or)2 or 3(or 4) spikelets, nodding on side, scabrous. Spikelets grayish brown, ellipsoid to ovoid, 5–7 mm, many flowered. Glumes elliptic to oblong, 3–4 × 1.2–1.5 mm, membranous, 1-veined, apex obtuse. Perianth bristles 6, 4–6 mm, flexuose, antrorsely scabrous at apex. Stamens 3; anthers 2–2.5 mm. Style slender; stigmas 3. Nutlet narrowly obovoid, 1.8–2 × ca. 1 mm, 3-sided. Fl. and fr. Jul–Sep. $2n = 64$.

Wet places, slopes, alpine frozen soil; 1800–2400 m. S Jilin (Changbai Shan) [Japan, Korea, Russia (Far East, E Siberia)].

12. *Scirpus paniculato-corymbosus* Kükenthal, Acta Horti Gothob. 5: 35. 1930.

高山蕹草 gao shan biao cao

Rhizomes 3–5 cm, slender, creeping. Culms 18–30 cm tall, slender, scattered, glabrous. Leaves shorter than culm; sheath reddish purple; leaf blade 4–5 mm wide, flat, abaxial midvein and margin scabrous. Inflorescence a large panicle, consisting of a terminal and 2 or 3 lateral anthelae; rays 3 or 4, 1.5–4 cm; prophyll subtending a bisexual flower at base, on opposite side of bractlet. Spikelets solitary at ends of rays or raylets (secondary rays), narrowly ovoid, 7–10 × 1.5–2.5 mm, 6–8-flowered. Glumes reddish purple, lanceolate, 5–7 mm (including awn), papery, with 3 green costae excurrent into a scabrous awn. Perianth bristles 6, very short, glabrous. Stamens 3; anthers linear. Style slender; stigmas 3, nearly as long as style. Nutlet narrowly obovoid, ca. 1.5 mm, 3-sided; persistent style base blackish purple. Fl. May, fr. Jun–Jul.

• Stream margins in grasslands; 2000–2800 m. W Sichuan.

5. ERIOPHORUM Linnaeus, Sp. Pl. 1: 52. 1753.

羊胡子草属 yang hu zi cao shu

Liang Songyun (梁松筠 Liang Song-jun); Gordon C. Tucker, David A. Simpson

Erioscirpus Palla.

Herbs, perennial. Rhizomes creeping. Culms tufted or nearly scattered, obtusely 3-angled, clothed at base with bladeless leaf sheaths. Leaves basal and cauline; leaf blade of basal leaves slender, elongate, flat or 3-angled; cauline leaves usually reduced to a sheath. Involucral bracts spathe-like or glumelike, rarely leaflike. Inflorescence a terminal simple or compound anthela or reduced to a single spikelet. Spikelets with few to many spirally arranged deciduous glumes. Glumes each subtending a bisexual flower. Perianth bristles 10–30, white or brownish red, elongating extremely after anthesis, smooth, silky. Stamens 3. Style base not distinct, not or slightly thickened; stigmas 3. Nutlet obovoid to oblong, 3-sided, smooth, apex beaked.

About 25 species: mostly in cool temperate, alpine, and arctic regions of N Hemisphere; seven species (one endemic) in China.

Eriophorum japonicum, recognized by Tang and F. T. Wang (Fl. Reipubl. Popularis Sin. 11: 36. 1961), is a synonym of *Scirpus maximowiczii* in this treatment (see p. 174).

- 1a. Spikelets solitary, terminal; involucre bracts glumelike.
 2a. Perianth bristles pale reddish brown to reddish; nutlet spinulate on apical margin 6. *E. russeolum*
 2b. Perianth bristles white or pure white; nutlet smooth.
 3a. Culms tufted; perianth bristles white; nutlet obovoid; anthers ca. 2 mm 5. *E. vaginatum*
 3b. Culms scattered; perianth bristles pure white; nutlet oblong; anthers ca. 1 mm 7. *E. scheuchzeri*
 1b. Spikelets many, arranged in a compound or single anthela; involucre bracts leaflike or spathe-like.
 4a. Spikelets arranged in a compound anthela; involucre bracts leaflike.
 5a. Spikelets many, densely congested capitate; glumes reddish brown with red lines, oblong 1. *E. transiens*
 5b. Spikelets solitary or a cluster of 2 or 3; glumes brown, ovate-lanceolate 2. *E. comosum*
 4b. Spikelets arranged in a simple anthela; involucre bracts spathe-like.
 6a. Glumes usually 1-veined; culms ± stout; leaf blade 3–5(–7) mm wide, flat but apex 3-angled 3. *E. angustifolium*
 6b. Glumes many veined; culms ± slender; leaf blade ca. 1 mm wide, compressed 3-angled 4. *E. gracile*

1. *Eriophorum transiens* Raymond, Naturaliste Canad. 86: 240. 1959.

中间羊胡子草 zhong jian yang hu zi cao

Culms tufted, 20–25 cm tall, ca. 1.6 mm thick, rigid, striate, clothed at base with dark reddish brown scabrous leaf sheaths. Basal leaves reddish brown-gray; leaf blade ca. 75 cm × 3–4 mm, leathery, margin scabrous, apex acuminate. Involucre bracts 5 or 6, leaflike, ± ascending, ca. 30 cm, overtopping inflorescence, base cymbiform; bractlets cymbiform, broad, dark reddish brown hyaline with fine red lines, apex acuminate and scabrous. Inflorescence a compound anthela, 3–4 cm; rays unequal, ± rigid; second anthela 6–8 mm, sessile or pedunculate. Spikelets 6–20, densely congested into capitate spherical clusters, 1–1.2 × 1.2–1.5 cm, many flowered. Glumes reddish brown with fine red lines, oblong, 3–3.5 mm, 1-veined costa excurrent into an erect short mucro. Perianth bristles many, white, flat, surpassing glume, often connate at base. Stamen 1; connective apex conic, long. Style long; stigmas 3, reddish brown. Nutlet immature, ca. 1.5 mm, oblong 3-sided, apex acuminate. Fl. and (immature) fr. May.

• Guizhou.

This species is known only from the type gathering.

2. *Eriophorum comosum* (Wallich) Nees in Wight, Contr. Bot. India, 110. 1834.

从毛羊胡子草 cong mao yang hu zi cao

Scirpus comosus Wallich in Roxburgh, Fl. Ind. 1: 234. 1820; *Erioscirpus comosus* (Wallich) Palla.

Rhizomes short, stout. Culms densely tufted, obtusely 3-angled or rarely cylindrical, 14–78 cm tall, 1–2 mm thick, smooth, clothed at base with black to brown leaf sheaths. Leaves many, overtopping inflorescence; leaf blade linear, 0.5–1 mm wide, margin involute and scabrous, gradually tapering and setaceous toward apex. Involucre bracts leaflike, overtopping inflorescence; bractlets lanceolate, margin scabrous, apically setaceous. Inflorescence a large compound or decomposed anthela, 6–22 cm. Spikelets many, solitary or a cluster of 2 or 3, oblong but ellipsoid at anthesis, 6–12 mm. Glumes

brown, ovate-lanceolate, 2.3–3 mm, membranous, keel green, excurrent into a mucro at acute to obtuse apex; basal 4 glumes empty. Perianth bristles many, surpassing glume at maturity, ca. 7 mm, smooth. Stamens 2; anthers purplish black, narrowly ovoid, apex mucronate. Style shorter than nutlet; stigmas 3. Nutlet narrowly oblong, ca. 2.5 × 0.5 mm (including beak), compressed 3-sided. Fl. and fr. May–Nov. $2n = 52$.

Crevice on rock or cliffs, grassland slopes; 500–2800 m. Chongqing, S Gansu, Guangxi, Guizhou, Hubei, NW Hunan, Sichuan, SE Xizang, Yunnan [Afghanistan, Bangladesh, Bhutan, N India, Indonesia (Java), Kashmir, N Myanmar, Nepal, Pakistan, Vietnam; SW Asia].

3. *Eriophorum angustifolium* Honckey, Verz. Gew. Teutschl. 153. 1782.

东方羊胡子草 dong fang yang hu zi cao

Rhizomes short; stolons slender, creeping. Culms scattered, 35–114 cm tall, subterete but apically 3-angled, smooth. Basal leaves shorter than culm; leaf blade 2–9 mm wide, flat, leathery, margin scabrous, apex long acuminate and 3-angled. Cauline leaves 1–3; sheath blackish purple, long, slightly inflated; leaf blade 3–5(–7) mm wide, plicate or flat, apex 3-angled. Involucre bracts 2 or 3, dark brown, spathe-like, erect, with leaflike blade to 12 cm, apex 3-angled and green. Inflorescence a simple anthela, with (1 or) 2–10 spikelets. Spikelets ovoid to ellipsoid, 10–15 × 5–7 mm; peduncles unequal, flattened, smooth or scabrous, often dropping. Glumes pale brownish gray, ovate to lanceolate, 5–5.5 × 1.8–2 mm, membranous, 1-veined but sometimes obscurely 3-veined at base, apex obtuse. Perianth bristles 10 or more, white, 3–4 mm, soft, unbranched at ends, apex acute. Stamens 3; anthers linear, (2–) 3–4(–5) mm. Style slender; stigmas 3. Nutlet black, narrowly obovoid, 2–3 × ca. 1 mm, compressed 3-sided, apex beaked. Fl. and fr. Jun–Aug. $2n = 58$.

Marshes, wet places; (100–) 400–800 m. Heilongjiang, Jilin, Liaoning, Nei Mongol, N Sichuan [Japan, Kazakhstan, Korea, Mongolia, Russia; Europe, North America].

In FRPS (11: 37, t. XV. 1961), the name *Eriophorum latifolium* Hoppe was misapplied to this species, following the usage in Fl. URSS (3: 29. 1935). The name *E. polystachion* Linnaeus, nom. utique rej., has often been applied to both species.

4. *Eriophorum gracile* W. D. J. Koch ex Roth, Catal. Bot. 2: 259. 1800.

细秆羊胡子草 xi gan yang hu zi cao

Eriophorum asiaticum V. N. Vassiljev; *E. coreanum* Palla; *Scirpus ardea* T. Koyama; *S. ardea* var. *coreanus* (Palla) T. Koyama.

Rhizomes long creeping, slender. Culms scattered, 25–50 cm tall, slender, ± 3-angled, smooth or sometimes scabrous below inflorescence. Basal leaves narrowly linear, ca. 1 mm wide, compressed 3-angled, channeled only in basal part. Cauline leaves ± short (apicalmost with blade shorter than sheath), 1.5–2.5 cm. Involucral bracts 1 or 2, dark green, sheathlike, ca. 1.5 cm, erect or oblique. Inflorescence a simple anthela with 2–4 spikelets. Spikelets obovoid, 6–10 mm in flower; peduncles unequal, ca. 2 cm, flattened, scabrous, yellow tomentose, partly dropping. Glumes dark black to gray, broadly ovate, 4.5–5 mm, many veined, keeled, margin hyaline, apex obtuse. Perianth bristles 10 or more, whitish, 1–1.5 cm. Stamens 3; anthers 2–3 mm. Style slender; stigmas 3. Nutlet yellowish brown, oblong, ca. 3 mm, compressed 3-sided. Fl. and fr. Jun–Jul. $2n = 60$.

Marshes, meadows; (below 100–)700–2200 m. Heilongjiang, Jilin, N Liaoning, NE Nei Mongol, N Sichuan, N Xinjiang, Yunnan (Tengchong) [Japan, Kazakhstan, Korea, Russia; Europe, North America].

5. *Eriophorum vaginatum* Linnaeus, Sp. Pl. 1: 52. 1753.

白毛羊胡子草 bai mao yang hu zi cao

Eriophorum fauriei E. G. Camus; *E. scabridum* Ohwi; *E. spissum* Fernald; *Scirpus fauriei* (E. G. Camus) T. Koyama.

Rhizomes short. Culms densely tufted, 15–80 cm tall, obtusely 3-angled, smooth but sometimes scabrous below inflorescence, clothed at base with brown leaf sheaths disintegrating into fibers. Basal leaves linear, shorter than culm; leaf blade ca. 1 mm wide, 3-angled, scabrous, apically narrowly tapering, apex obtuse to acute. Cauline leaves 1 or 2, often black, reduced to a bladeless sheath, 3–6 cm with apical one inflated, membranous, with finely transverse veins. Involucral bracts grayish black, glumelike, ovate-lanceolate, membranous, apex acuminate. Inflorescences terminal with only 1 spikelet, 1–3 cm, many flowered, with ca. 10 sterile basal glumes. Spikelet erect, grayish brown, obovoid-globose and ca. 1.5 cm in flower, subglobose and 2.5–3.5 × 2.5–3.5 cm in fruit. Glumes ovate-lanceolate to deltoid-lanceolate, thinly membranous, 1-veined, margin gray to dark gray with pale hyaline edge, apex acuminate. Perianth bristles 10 or more, white, 1.5–2.5 cm. Stamens 3; anthers linear, 2–2.5 mm. Stigmas 3. Nutlet brown, obovoid, 2–2.2[–3] × ca. 1 mm, compressed 3-sided, minutely apiculate, smooth. Fl. and fr. Jun–Sep. $2n = 26, 58, 60, 61, 83$.

Swamps, moist places; 1700–1800 m. Heilongjiang, Jilin, N Liaoning, NE Nei Mongol [Japan, Kazakhstan, Korea, Mongolia, Russia; SW Asia, Europe, North America].

6. *Eriophorum russeolum* Fries in Hartman, Handb. Skand. Fl., ed. 3, 13. 1838.

红毛羊胡子草 hong mao yang hu zi cao

Eriophorum mandshuricum Meinshausen; *E. russeolum* var. *majus* Sommier; *Scirpus russeolus* (Fries) T. Koyama var. *major* (Sommier) T. Koyama.

Rhizomes creeping. Culms erect, 30–60 cm tall, slender, terete. Basal leaves linear, ca. 1 mm wide, subterete, apex obtuse. Cauline leaves 1 or 2, reduced to bladeless leaf sheaths. Leaf sheaths grayish black with reddish fine transverse veins, cylindric, 6.5–7.5 cm, apically slightly inflated, apex obtuse. Involucral bracts grayish black, glumelike, ovate-lanceolate, 3–9-veined, apex acuminate. Inflorescences terminal with only 1 spikelet. Spikelet oblong-cylindric and 1.5–2.5 cm in flower, obovoid, fairly lax, and 2.5–4 cm in fruit. Glumes brownish gray, ovate-lanceolate, ca. 7 mm, thinly membranous, 1-veined, margin broadly whitish hyaline, apex obtuse. Perianth bristles 10 or more, usually pale reddish brown to reddish, ca. 3 mm. Stamens 3; anthers linear, 2–3 mm. Stigmas 3. Nutlet oblong-obovoid to obovoid, ca. 2.5 mm, compressed 3-sided, margin spinulate, apex beaked. Fl. and fr. Jun–Jul. $2n = 58, 60, 62$.

Marshes, moist places; below 100 m. Heilongjiang, Jilin, NE Nei Mongol [Japan, Korea, Mongolia, Russia; N Europe, North America].

7. *Eriophorum scheuchzeri* Hoppe, Bot. Taschenb. Anfänger Wiss. Apothekerkunst 11: 104. 1800.

羊胡子草 yang hu zi cao

Rhizomes long, slender. Culms solitary, scattered, erect, 8–30[–70] cm tall, ± stout, terete. Basal leaves with leaf blade narrowly linear, channeled at base. Apicalmost cauline leaf with a narrow sheath, slightly inflated in apical part and with a very short blade. Involucral bract glumelike, broadly ovate, larger than glumes, apex subobtuse to shortly acuminate. Inflorescences reduced to a single terminal erect spikelet. Spikelet broadly obovoid to subglobose and 0.8–1.2 cm in flower, compressed globose, very dense, and 2–2.5 cm in fruit. Glumes dark gray to blackish, narrowly lanceolate, margin usually whitish and narrow, apex long acuminate. Perianth bristles 10 or more, pure white, ca. 2 cm. Stamens 3; anthers 0.5–1.5 mm. Style slender; stigmas 3. Nutlet oblong, ca. 2 × 0.5 mm, apex with a subulate beak. Fl. and fr. Jun–Jul. $2n = 58$.

Swampy meadows; 2200–3000 m. Xinjiang [Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia; Europe, North America].

No specimen from China has been seen by the present authors.

6. TRICHOPHORUM Persoon, Syn. Pl. 1: 69. 1805, nom. cons.

针蔺属 zhen lin shu

Liang Songyun (梁松筠 Liang Song-jun); Gordon C. Tucker

Herbs, perennial. Culms tufted, naked but clothed at base with a few bladeless ligulate leaf sheaths. Leaf blade much reduced. Involucral bract 1, glumelike, suberect, apex mucronate or awned. Inflorescences reduced to a single terminal spikelet, rarely an anthela or capitate with a few spikelets. Spikelets ellipsoid. Glumes pale brown, spirally arranged, membranous, deciduous, all

bearing a bisexual flower in axil. Flower bisexual or unisexual. Perianth bristles 6, filiform, silky, usually much elongated after anthesis and overtopping subtending glume. Stamens 2 or 3 or 6. Style base not distinct, slightly thickened, \pm persistent. Nutlet obovoid, 3-sided or dorsiventrally compressed, smooth, apex slightly beaked.

About ten species: arctic and subarctic regions, alpine areas in temperate and tropical regions; six species (one endemic) in China.

- 1a. Perianth bristles absent; nutlet broadly obovoid or narrowly obovoid, ca. 0.9 mm wide; involucre bracts not awned.
- 2a. Flower bisexual; nutlet oblong-obovoid, ca. 1.5 mm, 3-sided; stigmas 3 5. *T. pumilum*
- 2b. Flower unisexual; nutlet broadly obovoid, ca. 2 mm, plano-convex; stigmas 2 6. *T. distigmaticum*
- 1b. Perianth bristles 6–9; nutlet ovoid or oblong, 0.6–0.7 mm wide; involucre bracts awned.
- 3a. Inflorescences consisting of 2–4 spikelet clusters (sometimes reduced to a single terminal spikelet in *T. mattfeldianum*); stolons absent.
- 4a. Culms 3-angled; stamens 6 1. *T. mattfeldianum*
- 4b. Culms terete; stamens 3 2. *T. subcapitatum*
- 3b. Inflorescences reduced to a single terminal spikelet; stolons present.
- 5a. Glumes 0.9–3.5 mm, apex obtuse and not awned; perianth bristles 4–6, less than $1.5 \times$ as long as nutlet, erect 3. *T. alpinum*
- 5b. Glumes 4–4.5 mm, apex with a scabrous awn; perianth bristles 7–9, ca. $3 \times$ as long as nutlet, curved 4. *T. schansiense*

1. *Trichophorum mattfeldianum* (Kükenthal) S. Yun Liang, Higher Pl. China 12: 270. 2009.

三棱针蔺 san leng zhen lin

Scirpus mattfeldianus Kükenthal, Repert. Spec. Nov. Regni Veg. 27: 108. 1929.

Roots slender, fibrous. Rhizomes short, woody. Culms densely tufted, 20–100 cm tall, 3-angled, rigid, smooth, clothed at base with 4–6 pale brown leaf sheaths. Apical leaves with mouth obliquely truncate; leaf blade pale green, setaceous or reduced to a mucro, 3–12 mm but apical one to 20 cm, margin scabrous. Involucre bracts lanceolate to oblong-ovate, glume-like, apex mucronate. Inflorescences consisting of 2–4 cincinni or reduced to a single terminal spikelet. Spikelets ellipsoid to oblong, $6\text{--}7 \times 2\text{--}3$ mm, several flowered. Glumes reddish brown to brown, laxly arranged, oblong-ovate, 3–4 mm, membranous, apex acute with a costa excurrent into a short mucro. Perianth bristles 6, longer than nutlet, apically sparsely antrorsely scabrous. Stamens 6; anthers linear, ca. 2 mm. Style slender; stigmas 3. Nutlet brown, oblong to oblong-obovoid, ca. 1.8 mm, 3-sided. Fl. and fr. Apr–May.

Wet places at forest margins; ca. 900 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Shanxi, Zhejiang [Vietnam].

2. *Trichophorum subcapitatum* (Thwaites & Hooker) D. A. Simpson, Kew Bull. 53: 227. 1998.

玉山针蔺 yu shan zhen lin

Scirpus subcapitatus Thwaites & Hooker, Enum. Pl. Zeyl. 351. 1864; *Baeothryon subcapitatum* (Thwaites & Hooker) Á. Löve & D. Löve; *S. morrisonensis* Hayata; *S. subcapitatus* var. *morrisonensis* (Hayata) Ohwi.

Rhizomes short. Culms densely tufted, 20–90 cm tall, 0.7–1 mm thick, subterete, smooth except below inflorescences becoming 3-angled and scabrous on angles, clothed at base with 5 or 6 bladeless leaf sheaths. Leaf sheath brown to cinnamon, 5–18 cm, tightly surrounding base of culm, membranous, mouth obliquely truncate and with a hyaline margin; leaf blade of apical sheaths pale green, setaceous, 0.5–1.5 cm, margin scab-

rous. Involucre bracts glume-like, ovate to oblong, 3–7 mm, apex obtuse and with a \pm long scabrous mucro. Inflorescence a terminal, umbelliform corymb, bearing 2–4(–6) spikelets. Spikelets ovoid to narrowly ovoid-oblong, $5\text{--}10 \times$ ca. 2 mm, 5–10-flowered; lateral spikelets with a short peduncle; terminal spikelet sessile. Glumes straw-colored to brown, laxly arranged, oblong to lanceolate-oblong, 3.5–4.5 mm, membranous, margin hyaline, apex acute to obtuse and with a costa sometimes excurrent into a mucro. Perianth bristles 6, as long as nutlet, apically antrorsely scabrous. Stamens 3; filaments long; anthers linear, ca. 2 mm. Style ca. 3 mm; stigmas 3, filiform. Nutlet yellowish brown, oblong to ellipsoid, 2–3 mm, 3-sided, apex apiculate. Fl. and fr. Mar–Jun.

Wet places, thickets, damp ledges in mountain woods; 600–2300 m. Anhui, Chongqing (Nanchuan), Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Taiwan, Zhejiang [India, Indonesia, Japan, Malaysia, Papua New Guinea, Philippines, Sri Lanka, N Thailand, Vietnam].

3. *Trichophorum alpinum* (Linnaeus) Persoon, Syn. Pl. 1: 70. 1805.

鳞苞针蔺 lin bao zhen lin

Eriophorum alpinum Linnaeus, Sp. Pl. 1: 53. 1753; *E. hudsonianum* Michaux; *Scirpus hudsonianus* (Michaux) Fernald; *Trichophorum alpinum* var. *hudsonianum* (Michaux) Persoon.

Rhizomes creeping, branched. Culms densely tufted, 20–30 cm tall, 3-angled, slightly scabrous, clothed at base with bladeless leaf sheaths. Leaf blade of apical leaf ca. 1 cm \times 0.3 mm. Involucre bracts glume-like, basalmost awned. Inflorescences reduced to a single terminal spikelet, oblong, $4.5\text{--}5 \times$ ca. 3 mm, few flowered. Glumes yellowish brown, oblong to narrowly ovate, ca. 3.5×0.9 mm, 1-veined, apex obtuse. Perianth bristles 4–6, white, to 2 cm in fruit, flattened, smooth, silky, eventually \pm crinkled. Stigmas 3. Nutlet dark brown, oblong-obovoid, 1–1.5 mm, apex shortly pointed. Fl. and fr. Jun–Aug.

Alpine tundra. Jilin [Japan, Korea, Russia; Europe, North America].

4. *Trichophorum schansiense* Handel-Mazzetti, Oesterr. Bot. Z. 85: 224. 1936.

太行山针蔺 tai hang shan zhen lin

Scirpus heleocharidioides F. T. Wang & Tang; *S. schansiensis* (Handel-Mazzetti) Tang & F. T. Wang.

Rhizomes creeping. Culms tufted, 5–40 cm tall, slender, nearly 4-angled, smooth, clothed at base with 2 or 3 leaf sheaths. Leaf sheaths to 2 cm, with a setaceous blade at apex. Involucral bract glumelike, as long as or shorter than spikelet, apex with a short scabrous awn. Inflorescences reduced to a single terminal spikelet, obovoid to oblong, 4–5 × ca. 2 mm, 5- or 6-flowered. Glumes straw-colored to reddish brown, laxly arranged, oblong, ovate, or oblong-ovate, 4–4.5 mm, apex with 3 costae excurrent into a short scabrous awn. Perianth bristles 7–9, white, ca. 3 × as long as nutlet, curved, smooth, apically antrorsely scabrous. Stamens 2 or 3; anthers linear; connective apex evident beyond anthers. Style slender; stigmas 3, filiform. Nutlet yellowish green, obovoid, ca. 1 mm, 3-sided, shiny. Fl. and fr. May.

• Rock crevices in valleys; below 700 m. Beijing (Fangshan), Shanxi (Yangcheng).

5. *Trichophorum pumilum* (Vahl) Schinz & Thellung, Vierteljahrsschr. Naturf. Ges. Zürich 6: 265. 1921.

矮针蔺 ai zhen lin

Scirpus pumilus Vahl, Enum. Pl. 2: 243. 1805; *Baeothryon pumilum* (Vahl) Á. Löve & D. Löve; *Isolepis pumila* (Vahl) Roemer & Schultes.

Rhizomes creeping, long, slender. Culms rather densely caespitose, 5–15 cm tall, slender, terete, grooved when dry. Leaves basal, semiterete, only apicalmost bearing a blade; leaf blade 0.7–1.6 cm, shorter than culm, very slender. Involucral bract glumelike, shorter than spikelet, apex mucronate. Inflores-

cences reduced to a single terminal spikelet, obovoid to ellipsoid, ca. 4.5 × 2.5 mm, few flowered. Glumes ovate to elliptic, ca. 2.5 mm, membranous, both surfaces yellowish brown, with 1 green vein, margin pale hyaline, apex obtuse; basal 2 glumes empty. Perianth bristles absent. Stamens 3; anthers linear-oblong; connective apex slightly evident beyond anthers. Style of medium length; stigmas 3. Nutlet blackish brown, obovoid, ca. 1.5 mm, 3-sided. Fl. and fr. May–Sep.

Stream margins in grasslands, moist places along valleys; 500–4700 m. Gansu, Hebei, Nei Mongol, Ningxia, NW Sichuan, Xinjiang, Xizang [Afghanistan, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Tajikistan, Uzbekistan; SW Asia, Europe, North America].

6. *Trichophorum distigmaticum* (Kükenthal) T. V. Egorova in Grubov, Rast. Tsentral. Azii 3: 14. 1967.

双柱头针蔺 shuang zhu tou zhen lin

Scirpus pumilus Vahl subsp. *distigmaticum* Kükenthal, Acta Horti Gothob. 5: 34. 1930; *Baeothryon distigmaticum* (Kükenthal) Y. C. Yang & M. Zhan; *S. distigmaticum* (Kükenthal) Tang & F. T. Wang.

Plants dioecious. Rhizomes creeping, long, slender. Culms 10–25 cm tall, slender, subterete, smooth. Leaf sheath brown, to 2.5 cm, longer than blade; leaf blade setaceous, to 1.8 cm but basal 2 or 3 bladeless. Inflorescences reduced to a single terminal spikelet, ovoid, ca. 5 × 2.5–3 mm, few flowered. Glumes straw-colored, ovate, ca. 3.5 mm, thinly membranous, shiny, margin sometimes basally white but apically brown, apex obtuse. Perianth bristles absent. Stamens 3, sterile on female flowers. Style long; stigmas 2. Nutlet black at maturity, broadly obovoid, ca. 2 mm, plano-convex. Fl. and fr. Jul–Sep.

Alpine grasslands, river margins; 2000–4600 m. Gansu, Ningxia, Qinghai, Shaanxi, Sichuan, NE Xizang, Yunnan [Africa, Australia, Europe].

7. **FUIRENA** Rottbøll, Descr. Icon. Rar. Pl. 70. 1773.

芙兰草属 fu lan cao shu

Liang Songyun (梁松筠 Liang Song-jun); Gordon C. Tucker, Jeremy J. Bruhl

Herbs, perennial or annual, sometimes with a creeping rhizome. Culms tufted or solitary, usually pubescent, nodose. Leaves mostly cauline, pubescent or glabrous; sheath usually completely surrounding culm; ligule tubular, hyaline; leaf blade usually elongate, linear to lanceolate. Involucral bracts leaflike, sheathing at base. Inflorescences paniculiform, with few to many glomerulate clusters or sessile spikelets at few to several nodes. Spikelets ovoid to ellipsoid, terete, many flowered, usually pubescent. Glumes spirally imbricately arranged, obovate, broadly elliptic, or oblong, each subtending a bisexual flower but basal 1 or 2 empty, apex obtuse and awned. Perianth bristles 3 or 6, 3 outer ones needlelike (sometimes reduced or absent), 3 inner ones squamellate and alternate with outer whorl. Stamens 3. Style not or hardly dilated at base, continuous with ovary, glabrous; stigmas 3. Nutlet ± stipitate, obovoid to ovoid, 3-sided, ± smooth or tuberculate.

About 30 species: warm regions of the world, most species in tropical Africa and tropical America; three species (one endemic) in China.

- 1a. Perianth bristles 3, all alike, obovate, subsessile, gradually narrowed at base; culms 60–120 cm tall; anthers 0.5–0.7 mm 1. *F. umbellata*
- 1b. Perianth bristles 6, of two types, outer ones needlelike and scaberulose or smooth, inner ones with a subquadrate or spatulate blade abruptly narrowed at base to a distinct ca. 0.3 mm stalk; culms 7–68 cm tall; anthers 0.2–0.3 mm.
- 2a. Annuals; inflorescences glomerulate clusters each with 3–15 spikelets; spikelets 2.5–3 mm wide; inner whorl of perianth bristles with subquadrate blades 2. *F. ciliaris*

2b. Perennials and rhizomatous; inflorescences glomerulate clusters each with 3–5 spikelets; spikelets

3.5–5 mm wide; inner whorl of perianth bristles with spatulate blades 3. *F. rhizomatifera*

1. *Fuirena umbellata* Rottbøll, Descr. Icon. Rar. Pl. 70. 1773.

芙兰草 fu lan cao

Perennials. Rhizomes horizontally creeping. Culms solitary, erect, 60–120 cm tall, acutely 5-angular, glabrous except below inflorescence, basalmost node bulbously thickened. Cauline leaves with sheath 1.2–6.5 cm, tightly surrounding culm; ligule rust-colored, hyaline, truncate; leaf blade pale green, lanceolate to linear-lanceolate, 10–20 × 0.9–1.9 cm, flat, ± rigid, usually glabrous but sometimes basally pubescent, 5-veined, apex acuminate. Involucral bracts leaflike; bractlets setaceous, sheathless. Inflorescences paniculiform, with 4–20 glomerulate clusters of spikelets; glomerules single or binate, 1.5–2.5 cm wide, bearing 6–15 spikelets; peduncles single or binate, occasionally branched, white villous. Spikelets brownish green to dark brownish green at maturity, ovoid to ovoid-ellipsoid, 7–12 × ca. 3 mm, many flowered, wholly covered with woolly hairs. Glumes brown, broadly elliptic to oblong, ca. 2 mm, membranous, apical ones abaxially sparsely pilose, apex emarginate and with a 3-veined costa ending in a short recurved puberulent 0.5–0.7 mm awn. Perianth bristles brown; outer bristles absent; 3 inner bristles obovate, subsessile, gradually narrowed to base, margin ciliate, apex emarginate and with 3 prominent veins, with 1 costa usually excurrent into a short curved awn. Stamens 3; anthers oblong, 0.5–0.7 mm. Stigmas 3, as long as style. Nutlet brown at maturity, shortly stipitate, obovoid, ca. 1 mm (including stipitate base), 3-sided, base cuneate. Fl. and fr. Jun–Dec. $2n = 48, 52$.

Wet grasslands, river margins, paddy fields; near sea level to 1000 m. Fujian, Guangdong, Guangxi, Hainan, Taiwan, SE Xizang, S Yunnan [Bangladesh, Cambodia, India, Indonesia, Japan (Ryukyu Islands), Laos, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa, America, and Australia, Pacific islands, South America].

2. *Fuirena ciliaris* (Linnaeus) Roxburgh, Fl. Ind. 1: 184. 1820.

毛芙兰草 mao fu lan cao

Scirpus ciliaris Linnaeus, Mant. Pl. Alt. 182. 1771; *Fuirena glomerata* Lamarck; *F. rotboellii* Nees.

Annuals. Rhizomes short. Culms tufted, 7–40 cm tall, 3-angled, striate-sulcate, pubescent, clothed at base with 1 or 2 bladeless pubescent leaf sheaths. Cauline leaves with sheath 1–3.5 cm; ligule rust-colored to reddish, 1–2 mm, membranous, mouth truncate; leaf blade linear, 5–15 × 3–7 mm, flat, soft, 3-costate, surfaces and margin ± pubescent, apex acuminate. Involucral bracts leaflike, surpassing inflorescence; bractlets set-

aceous, sheathless. Inflorescences with 1–3 clusters of spikelets, interrupted, glomerulate, 1–3 cm wide, bearing 3–15 spikelets; peduncles single, mostly enclosed in bractlet sheaths. Spikelets ovoid to oblong, 5–8 × 2.5–3 mm, many flowered, covered with woolly hairs. Glumes basally yellowish brown, apically grayish black, obovate, 1.2–2 mm, thinly membranous, abaxially pilose, apex obtuse, emarginate, and with a 3-veined costa excurrent into a recurved 1–1.5 mm awn. Perianth bristles 6; 3 outer bristles needlelike, occasionally much reduced, retrorsely scabrous; 3 inner bristles brownish, with subquadrate blades abruptly narrowed at base to a distinct ca. 0.3 mm stalk, apex mucronulate. Stamens 3; anthers oblong, 0.2–0.3 mm. Ovary white, oblong, 3-sided; style brownish, 3–4 × as long as ovary; stigmas 3, 1/3–1/2 as long as style. Nutlet brownish, shortly stipitate, obovoid, ca. 1 mm, 3-sided. Fl. and fr. Jul–Dec. $2n = 38$.

Wet places, often in paddy fields, river margins; near sea level to 200 m. Fujian, Guangdong, S Guangxi, Hainan, Hebei, Jiangsu, Shandong, Taiwan, S Yunnan [Bangladesh, Cambodia, India, Indonesia, Japan, Korea, Laos, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Africa, Australia].

3. *Fuirena rhizomatifera* Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 225. 1961 [*“rhizomatifer”*].

黔芙兰草 qian fu lan cao

Fuirena umbellata Rottbøll var. *angustifolia* Kükenthal.

Perennials. Rhizomes oblique; scales purplish brown, broadly ovate, apex acute. Culms laxly tufted, 35–68 cm tall, slender, subangular, striate-sulcate, clothed at base with 2 leaf sheaths. Cauline leaves with sheath 1–3 cm, glabrous; ligule reddish brown, 1–2 mm, membranous, mouth truncate; leaf blade 3–5 mm wide, flat, margin scabrous, apex acuminate. Involucral bracts leaflike, margin and sheath pubescent. Inflorescences with 3 glomerulate clusters of spikelets, each cluster bearing 3–5 spikelets; peduncles compressed, pubescent. Spikelets ovoid to spherical, 5.5–8 × 3.5–5 mm. Glumes brownish green to grayish black, broadly obovate, ca. 3 mm, pubescent, margin ciliate, apex rounded, emarginate, and with a 3-veined costa excurrent into a scabrous ca. 1 mm awn. Perianth bristles 6; 3 outer bristles brownish, needlelike, 1/2–2/3 as long as inner ones, squamellate, pubescent; 3 inner bristles with blades abruptly narrowed at base, distinctly stalked, margin ciliate, apex obtuse. Stamens 3; anthers oblong, 0.2–0.3 mm, apex obtuse. Stigmas 3, as long as style. Nutlet obovoid, ca. 1 mm, 3-sided. Fl. and fr. Jul–Nov.

• Swamps; ca. 800 m. SW Guangxi, Guizhou.

8. BOLBOSCHOENUS (Ascherson) Palla in Hallier & Brand, Syn. Deut. Schweiz. Fl., ed. 3, 3: 2531. 1905.

三棱草属 san leng cao shu

Liang Songyun (梁松筠 Liang Song-jun); Gordon C. Tucker, David A. Simpson

Scirpus [unranked] *Bolboschoenus* Ascherson, Fl. Brandenburg 1: 753. 1864.

Herbs, perennial. Rhizomes often forming hard ovoid tubers. Culms many nodose, base bulbously thickened. Leaves basal and

cauline; sheath tubular; ligule absent; leaf blades linear, flat. Involucral bracts leaflike, surpassing inflorescence, spreading. Inflorescence a terminal anthela or capitate with 1 to many spikelets. Spikelets with many spirally arranged deciduous glumes, each subtending a bisexual flower. Perianth bristles 3–6, shorter to longer than nutlet, deciduous with nutlet. Stamens 3. Style base not distinct, slightly thickened or not, persistent. Nutlet biconvex to 3-sided, smooth, apex beaked.

About eight species: mainly in North America and E Asia; four species in China.

A hybrid, *Scirpus × mariqueter* Tang & F. T. Wang (Fl. Reipubl. Popularis Sin. 11: 223. 1961), was originally described from Beijing. It was believed to be a hybrid of *Bolboschoenus planiculmis* and *Schoenoplectus triquetus*. Specimens have since been collected from Shanxi. Under current generic concepts, it is considered an intergeneric hybrid, *×Bolboschoenoplectus mariqueter* (Tang & F. T. Wang) Tatanov (Novosti Sist. Vyssh. Rast. 39: 154. 2007).

- 1a. Nutlet 3-sided; stigmas 3; perianth bristles almost as long as nutlet; inflorescence a simple anthela 1. *B. yagara*
 1b. Nutlet biconvex; stigmas 2; perianth bristles ca. 1/2 as long as nutlet; inflorescences capitate and rarely with short rays or reduced to a single spikelet.
 2a. Glumes pale yellow; anthers ca. 1 mm; nutlet 2–2.5 mm 3. *B. affinis*
 2b. Glumes bright orangish brown, brown, or dark brown; anthers 2–4 mm; nutlet 2.5–3.5 mm.
 3a. Glumes brown to dark brown; nutlet 3–3.5 mm 2. *B. planiculmis*
 3b. Glumes bright orangish brown; nutlet ca. 2.5 mm 4. *B. maritimus*

1. *Bolboschoenus yagara* (Ohwi) Y. C. Yang & M. Zhan, Acta Biol. Plateau Sin. 7: 14. 1988.

荆三棱 jing san leng

Scirpus yagara Ohwi, Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 18: 110. 1943; *S. fluviatilis* (Torrey) A. Gray var. *yagara* (Ohwi) T. Koyama.

Rhizomes long creeping, blackish brown, 3–6 mm thick, terminated by a tuber; tuber globose to depressed obovoid, 2–3 × 3–4 cm, woody, covered with blackish to purplish brown membranous broad scales. Culms solitary from a tuber, 0.6–1.5 m tall, sharply 3-angled, smooth. Leaves as long as or overtopping culm; sheath 5–20 cm, front with veins nearly to summit (i.e., lacking veinless area); blade broadly linear, 5–10 mm wide, ± stiff, margin scabrous. Involucral bracts 3 or 4, leaflike, usually longer than inflorescence. Inflorescence a simple anthela; rays 3–8, unequal, to 7 mm, smooth, each terminated by a single spikelet or a cluster of 2 or 3 (or 4) spikelets. Spikelets rust-colored brown, ovoid to oblong, 1–2 × 0.5–0.8(–1) cm, many flowered. Glumes rust-colored brown, densely imbricate, oblong, ca. 7 mm, membranous, abaxially minutely pubescent, 1-veined costa projected beyond apex forming a recurved 2–3 mm scabrous awn, apex 2-cleft and lacerate. Perianth bristles 6, almost as long as nutlet, retrorsely scabrous. Stamens 3; anthers linear, ca. 4 mm. Style slender; stigmas 3. Nutlet grayish brown, obovoid, 3-sided, base cuneate-attenuate, apex contracted to a conic short beak. Fl. and fr. May–Jul.

Lake margins, shallow water, marshes, wet places; near sea level to 200 m. Anhui, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jilin, Liaoning, NE Nei Mongol, Shandong, Xinjiang, Yunnan, Zhejiang [India, Japan, Kazakhstan, Korea, Russia, Vietnam; Europe].

2. *Bolboschoenus planiculmis* (F. Schmidt) T. V. Egorova in Grubov, Rast. Tsentral. Azii 3: 20. 1967.

扁秆荆三棱 bian gan jing san leng

Scirpus planiculmis F. Schmidt, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 12(2) [Reis. Amur-Land., Bot.]: 190. 1868.

Rhizomes creeping, terminated in a globose tuber. Culms

solitary from a tuber, 60–100 cm tall, usually ± slender, 3-angled, smooth. Leaves basal, shorter to slightly overtopping inflorescence; sheath brownish, 5–16 cm; leaf blade linear, 2–5 mm wide, flat, apex acuminate. Involucral bracts 1–3, leaflike, often surpassing inflorescence, margin scabrous. Inflorescences of 1–6 spikelets, capitate or simple paniculate; rays 1 to few, short, each terminated by 1 to few spikelets. Spikelets rust-colored brown, ovoid to oblong-ovoid, 10–16 × 4–8 mm, many flowered. Glumes brown to dark brown, oblong to elliptic, 6–8 mm, membranous, abaxially sparsely pubescent, 1-veined costa projected beyond apex forming an awn, apex lacerate. Perianth bristles 4–6, 1/2–2/3 as long as nutlet, retrorsely scabrous. Stamens 3; anthers linear, 3–4 mm; connective apex ca. 0.5 mm. Style slender; stigmas 2. Nutlet broadly obovoid to obovoid, 3–3.5 mm. Fl. May–Jan, fr. Jul–Sep. $2n = 50, 52, 56, 108$.

Wet places by lakes and riverbanks, swampy areas; near sea level to 2900 m. Anhui, Gansu, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Taiwan, Xinjiang, Yunnan, Zhejiang [India, Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Papua New Guinea, Philippines, Russia, Tajikistan; SW Asia, Europe].

3. *Bolboschoenus affinis* (Roth) Drobow, Trudy Bot. Muz. Imp. Akad. Nauk 16: 139. 1916.

球穗三棱草 qiu sui san leng cao

Scirpus affinis Roth in Roemer & Schultes, Syst. Veg. 2: 140. 1817; *Bolboschoenus popovii* T. V. Egorova; *B. strobilinus* (Roxburgh) V. I. Kreczetowicz; *S. maritimus* Linnaeus subsp. *affinis* (Roth) T. Koyama; *S. maritimus* var. *affinis* (Roth) C. B. Clarke; *S. strobilinus* Roxburgh.

Rhizomes creeping, terminated by a small ovoid tuber. Culms 10–50 cm tall, 3-angled, smooth. Leaf blade linear, 1–4 mm wide, flat, ± stiff, apical ones longer than or as long as culm. Involucral bracts 2 or 3, leaflike, overtopping inflorescence. Inflorescences of 1–10 spikelets, capitate, rarely with short rays. Spikelets ovoid, 10–16 × 3.5–7 mm, many flowered. Glumes pale yellow, oblong-ovate, 5–6 mm, membranous, abaxially ± pubescent, 1-veined costa excurrent into an awn, apex lacerate. Perianth bristles 6, ca. 1/2 as long as nutlet, retrorsely scabrous. Stamens 3; anthers linear-oblong, ca. 1 mm;

connective apex conic, ca. 0.5 mm. Style slender; stigmas 2. Nutlet yellowish white but becoming dark brown at maturity, broadly obovoid, ca. 2.5 mm, biconvex, shiny. Fl. and fr. Jun–Sep.

Lake margins, swampy places (often alkaline), wood margins; 1000–2900 m. Gansu, W Nei Mongol, Ningxia, Qinghai, Xinjiang [Afghanistan, Cambodia, India, Japan, Kazakhstan, Laos, Mongolia, Pakistan, Russia, Thailand, Turkmenistan, Uzbekistan, Vietnam; SW Asia, Europe].

This taxon is part of an inadequately studied worldwide complex centered around *Bolboschoenus maritimus*.

4. *Bolboschoenus maritimus* (Linnaeus) Palla in Hallier & Brand, Syn. Deut. Schweiz. Fl., ed. 3, 3: 2531. 1905.

海滨三棱草 hai bin san leng cao

Scirpus maritimus Linnaeus, Sp. Pl. 1: 51. 1753;
Schoenoplectus maritimus (Linnaeus) Lye.

Rhizomes creeping, terminated by a small ovoid tuber. Culms 25–50[–150] cm tall, 3-angled, smooth. Leaf sheath fronts with veinless triangular to rhombic area at summit; leaf

blade linear, 2–6[–12] mm wide, flat, ± stiff, apical ones longer than or as long as culm. Involucral bracts 2 or 3, leaflike, overtopping inflorescence. Inflorescences of 1–10 spikelets, capitate [rarely with short rays]. Spikelets ovoid to narrowly ovoid, 10–16 × 3.5–7 mm, many flowered. Glumes bright orangish brown to stramineous, oblong-ovate, 5–8 mm, membranous, abaxially ± pubescent, 1-veined costa excurrent into a 1–3 mm awn, apex 2-cleft. Perianth bristles 6, ca. 1/2 as long as nutlet, retrorsely scabrous, usually not persistent on nutlet. Stamens 3; anthers linear-oblong, 2–4 mm; connective apex conic, ca. 0.5 mm. Style slender; stigmas 2, ± as long as style. Nutlet dark brown, broadly obovoid, ca. 2.5 mm, biconvex [compressed 3-sided], shiny, apex rounded to truncate. Fl. and fr. Jun–Sep. $2n = 64$, 104, 112.

Coastal marshes; near sea level. Taiwan, Xinjiang [Afghanistan, India, Japan, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Turkmenistan, Uzbekistan; Africa, SW Asia, Atlantic Ocean islands, Europe, North and South America, Pacific islands].

This species is known in Taiwan from a single collection: Taiwan: "Takow," *A. Henry 1818* (MO).

9. ACTINOSCIRPUS (Ohwi) R. W. Haines & Lye, Bot. Not. 124: 481. 1971.

大蘆草属 da biao cao shu

Liang Songyun (梁松筠 Liang Song-jun); David A. Simpson, Gordon C. Tucker

Scirpus sect. *Actinoscirpus* Ohwi, Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 18: 98. 1943.

Herbs, perennial, robust. Rhizomes long creeping, slender, apex with a small tuber. Culms ± tall, inconspicuously septate. Leaves ligulate; leaf blade linear. Involucral bracts leaflike, exceeding inflorescence. Inflorescence a large terminal anthela, with many spikelets. Spikelets small. Glumes spirally imbricate, each subtending a bisexual flower, deciduous. Perianth bristles 5 or 6, mostly longer than nutlet, retrorsely scabrous, deciduous with nutlet. Stamens 3. Style base not distinct, not thickened, persistent; stigmas 3. Nutlet obovoid to subellipsoid, compressed 3-sided, smooth, apex beaked.

One species: E and S Asia, NE Australia, Pacific islands.

1. *Actinoscirpus grossus* (Linnaeus f.) Goetghebeur & D. A. Simpson, Kew Bull. 46: 171. 1991.

大蘆草 da biao cao

Scirpus grossus Linnaeus f., Suppl. Pl. 104. 1782;
Schoenoplectus grossus (Linnaeus f.) Palla.

Plants stoloniferous. Culms scattered, 1–2 m tall, 1–1.2 cm thick, acutely 3-angled, smooth, clothed at base with 1 or 2 spongy leaf sheaths which disintegrate into reticulate fibers. Leaves basal only (not cauline), shorter than culm; sheaths spongy; leaf blade 7–12 mm wide, margin scabrous. Involucral bracts 3 or 4, leaflike, basal 1–3 longer than inflorescence, margin apically scabrous. Inflorescence a terminal compound anthela, with over 10 rays and many spikelets; rays to 5 cm, scab-

rous. Spikelets solitary, rust-colored to dark brown, sessile or pedunculate, ovoid to ellipsoid, 4–5 × 2.5–3 mm, densely many flowered. Glumes elliptic to broadly ovate, ca. 2.5 mm, membranous, margin apically ciliolate, apex obtuse with a green costa excurrent into a mucro. Perianth bristles 6, longer than nutlet, retrorsely scabrous. Stamens 3; anthers linear; connective apex black, deltoid, very short. Style ± long; stigmas 3. Nutlet pale brownish yellow, obovoid to subellipsoid, ca. 1.5 mm, compressed 3-sided, apex beaked. Fl. and fr. Jul–Oct. $2n =$ ca. 88.

Moist places, shallow pools, swamps, paddy fields; below 100–900 m. Guangdong, Guangxi, Hainan, Taiwan, Yunnan [Cambodia, India, Indonesia, Japan, Laos, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; N Australia, Pacific islands].

10. SCHOENOPLECTUS (Reichenbach) Palla, Verh. K. K. Zool.-Bot. Ges. Wien 38 (Sitzungsber.): 49. 1888, nom. cons.

水葱属 shui cong shu

Liang Songyun (梁松筠 Liang Song-jun); Gordon C. Tucker, Tetsuo Koyama

Scirpus subg. *Schoenoplectus* Reichenbach, Icon. Fl. Germ. Helv. 8: 40. 1846; *Schoenoplectiella* Lye.

Herbs, annual or perennial, sometimes with creeping rhizomes. Culms tufted, not nodose above base. Leaves usually reduced to

a sheath or more rarely developing a ligulate blade. Involucral bracts culmlike, erect. Inflorescence a pseudolateral anthela or more frequently capitate with (1 or) few to many spikelets. Spikelets ovoid to ellipsoid. Glumes many, spiral (rarely pseudodistichous), deciduous or rarely persistent, often each subtending a bisexual flower. Perianth bristles 0–6, needlelike, shorter to longer than nutlet, smooth, scabrous, or plumose, deciduous with nutlet. Stamens 1–3. Style base not distinct, not thickened, persistent. Nutlet obovoid, \pm 3-sided or biconvex, smooth to rugose, apex beaked or not.

About 77 species: worldwide; 22 species (five endemic) in China.

- 1a. Perianth bristles plumosely fringed.
- 2a. Culms terete; perianth bristles longer than nutlet; stigmas 2 1. *S. subulatus*
- 2b. Culms 3-angled to obtusely 3-angled just below inflorescence; perianth bristles \pm as long as nutlet; stigmas 3 2. *S. litoralis*
- 1b. Perianth bristles retrorsely scabrous.
- 3a. Glumes apex emarginate and with a 1-veined costa excurrent into an awn; nutlet smooth; culms scattered; leaves developed.
- 4a. Involucral bracts much overtopping inflorescence, 1.5–2.5 cm; creeping rhizomes not red 3. *S. ehrenbergii*
- 4b. Involucral bracts usually shorter than inflorescence, 1.5–5.5 cm; creeping rhizomes red.
- 5a. Culms sharply 3-angled but sometimes basally terete and only 3-angled apically; creeping rhizomes slender 4. *S. triqueter*
- 5b. Culms terete; creeping rhizomes stout.
- 6a. Spikelets 4–7(–10) mm; glumes abaxially with reddish resinous spots; stigmas 2; nutlet plano-convex 5. *S. tabernaemontani*
- 6b. Spikelets 6–15 mm; glumes abaxially smooth; stigmas usually 3; nutlet compressed 3-sided 6. *S. lacustris*
- 3b. Glumes apex acute to obtuse and without an awn; nutlet mostly rugose; culms tufted (except *S. lineolatus*); leaves absent.
- 7a. Culms 3-angled (3–5-angled in *S. trapezoideus* and *S. monocephalus*), sometimes winged.
- 8a. Perianth bristles longer than nutlet, retrorsely scabrous; nutlet compressed 3-sided 7. *S. mucronatus*
- 8b. Perianth bristles shorter than nutlet, retrorsely scabrous or not; nutlet 3-sided or biconvex.
- 9a. Nutlet 3-sided; perianth bristles glabrous 8. *S. chuanus*
- 9b. Nutlet biconvex; perianth bristles retrorsely scabrous 9. *S. trapezoideus*
- 7b. Culms terete.
- 10a. Plants with a creeping rhizome; culms scattered.
- 11a. Glumes oblong to elliptic, margin not ciliate; perianth bristles as long to $2 \times$ as long as nutlet 10. *S. lineolatus*
- 11b. Glumes broadly ovate, margin ciliate; perianth bristles absent or 1–3 and very short 11. *S. monocephalus*
- 10b. Plants without a creeping rhizome; culms densely tufted.
- 12a. Culms 56–120 cm tall.
- 13a. Involucral bracts often deflexed; culms without transverse septa; stigmas 2 12. *S. clemensii*
- 13b. Involucral bracts erect; culms with many transverse septa; stigmas 3 13. *S. articulatus*
- 12b. Culms 15–30(–?40) cm tall.
- 14a. Nutlet 3-sided, distinctly rugulose; stigmas 3.
- 15a. Perianth bristles very well developed, slightly longer than nutlet, retrorsely scabrous 20. *S. chen-moui*
- 15b. Perianth bristles very short and glabrous or absent.
- 16a. Culms 2.5–3.5 mm thick; involucral bract 10–30 cm; perianth bristles very short, glabrous 21. *S. schoofii*
- 16b. Culms ca. 1 mm thick; involucral bract 1.5–12 cm; perianth bristles absent 22. *S. supinus*
- 14b. Nutlet biconvex, obscurely rugulose or smooth; stigmas 2.
- 17a. Glumes oblong, 2–3 mm; nutlet 1–1.5 mm.
- 18a. Spikelets yellow, 7–20 mm; glume margin apically ciliate; nutlet obscurely rugulose 18. *S. jingmenensis*
- 18b. Spikelets brownish green, 4–7 mm; glume margin entire; nutlet subsmooth 19. *S. komarovii*
- 17b. Glumes broadly ovate, oblong-ovate, or elliptic, 3.5–5.5 mm; nutlet 1.6–2.5 mm.
- 19a. Glumes pale green to brownish green, oblong-ovate, 4–5.5 mm, apex acuminate; nutlet broadly ellipsoid, ca. 2.5 mm; stigmas 2; perianth bristles 4, longer than nutlet 17. *S. wallichii*

- 19b. Glumes brown to dark brown, broadly ovate to ovate, 3.5–4 mm, apex acute; nutlet broadly obovoid to obovoid, 2–2.5 mm; stigmas 3; perianth bristles 5 or 6, shorter than or as long as nutlet.
- 20a. Culms spaced in row along rhizome; involucre bracts horizontal; glumes 3–3.2 mm 16. *S. fuscrobens*
- 20b. Culms tufted; involucre bracts ± erect; glumes to 4.5 mm.
- 21a. Culms 0.7–1 mm thick, rigid, shiny; spikelets ovoid, 4–6 mm wide; nutlets trigonous; stigmas 3 15. *S. hotarui*
- 21b. Culms 1.5–7 mm thick, subrigid, opaque; spikelets elliptic to subcylindric, 3.5–5 mm wide; nutlets plano-convex; stigmas 2 14. *S. juncooides*

1. *Schoenoplectus subulatus* (Vahl) Lye, Bot. Not. 124: 290. 1971.

钻苞水葱 zuan bao shui cong

Scirpus subulatus Vahl, Enum. Pl. 2: 268. 1805; *Schoenoplectus litoralis* (Schrader) Palla subsp. *subulatus* (Vahl) Soják; *S. litoralis* var. *subulatus* (Vahl) Chiovenda.

Rhizomes short. Culms 50–120 cm tall, 3–8 mm thick, terete, clothed at base with several bladeless leaf sheaths. Leaf sheaths to 20 cm, subpapery, membranous at mouth, disintegrating into fibers. Involucral bract 1, culmlike, longer to shorter than inflorescence, nearly subulate, stiff, hyaline margins basally ca. 1 mm wide. Inflorescence a pseudolateral simple or decompound anthela; rays 5–8, to 5 mm, compressed 3-angled, scabrous. Spikelets solitary or binate, ovoid to oblong-ovoid, 6–20 mm, many flowered. Glumes pale brown to yellowish brown, ovate-elliptic, 3–4 mm, membranous, 1-veined, margin white hyaline, apex obtuse to emarginate. Perianth bristles 4 or 5, longer than nutlet, plumosely fringed. Stamens 2; anthers linear; connective apex with a fimbriate appendage. Stigmas 2. Nutlet brown at maturity, broadly obovoid, ca. 2 mm, compressed biconvex. Fl. and fr. Jul–Oct.

Moist places. Hainan (Qiongsan) [India, Indonesia, Japan, Malaysia, Sri Lanka, Thailand; Pacific islands].

Tang and F. T. Wang (Fl. Reipubl. Popularis Sin. 11: 17. 1961) give a much wider distribution in China than indicated here, but the specimens outside of Hainan in China should be referred to *Schoenoplectus litoralis*.

2. *Schoenoplectus litoralis* (Schrader) Palla, Bot. Jahrb. Syst. 10: 299. 1888.

羽状刚毛水葱 yu zhuang gang mao shui cong

Scirpus litoralis Schrader, Fl. Germ. 1: 142. 1806.

Rhizomes short; stolons long creeping, slender. Culms erect, 50–120 cm tall, 3–10 mm thick, 3-angled to obtusely 3-angled just below inflorescence, glaucous. Leaves reduced to a bladeless or a shortly laminate sheath. Involucral bract 1, simulating a continuation of culm, 2–5(–10) cm, erect, rigid. Inflorescence a pseudolateral simple or compound anthela, 4–6 cm, with few to many spikelets; rays slender, smooth. Spikelets solitary, reddish brown, ovoid to oblong-ovoid, 6–12 × 1.5–3 mm, terete, densely many flowered, apex ± acute. Glumes broadly elliptic, 3.5–4 × ca. 2 mm, membranous, margin broadly white hyaline and apically minutely ciliate, apex obtuse to ± notched and with a prominent green vein excurrent into a short mucro.

Perianth bristles (3 or)4(or 5), rust-colored, ligulate-spatulate, ± as long as nutlet, antrorsely scabrous, apically plumosely fringed. Stamens (2 or)3; anthers 1.5–2 mm; connective apex with a fimbriate appendage. Stigmas 3. Nutlet dark reddish brown to blackish, broadly obovoid, ca. 2 × 1.3 mm, biconvex, smooth. Fl. and fr. Jul–Sep. $2n = 42, 78, 80, 84$.

Water margins, swampy places; ca. 600 m. Gansu, Ningxia, W Qinghai, Shanxi, Sichuan, Xinjiang [Afghanistan, India, Indonesia, Kazakhstan, Kyrgyzstan, W Mongolia, Pakistan, Papua New Guinea, Philippines, Tajikistan, Thailand, Turkmenistan, Uzbekistan, Vietnam; Africa, SW Asia, Australia, Europe, Indian Ocean islands, Madagascar, Pacific Ocean islands].

3. *Schoenoplectus ehrenbergii* (Boeckeler) Soják, Čas. Nár. Mus., Odd. Přír. 140: 127. 1972.

剑苞水葱 jian bao shui cong

Scirpus ehrenbergii Boeckeler, Linnaea 36: 712. 1870.

Plants stoloniferous. Culms 1–1.5 m tall, ca. 1 cm thick, sharply 3-angled, angles slightly winged, base clothed with long leaf sheaths. Leaf blade 40–60 × ca. 0.8 cm, abaxially ribbed, basally folded. Involucral bract 1, culmlike, to 25 cm, erect, greatly overtopping inflorescence, obtusely 3-angled. Inflorescence a pseudolateral head, ± dense, with 3–5 spikelets. Spikelets oblong to oblong-ovoid, 8–10 × 2–3 mm, 10-flowered. Glumes brown, broadly ovate to elliptic, ca. 5 mm, membranous, margin white hyaline, apex emarginate with a 1-veined costa excurrent into a short awn. Perianth bristles 6, longer than nutlet, retrorsely scabrous. Stamens 3; anthers linear, ca. 2 mm. Style slender; stigmas 3, shorter than style. Nutlet broadly ovoid, ca. 2 mm, plano-convex. Fl. and fr. Aug–Oct.

Near water margins. Gansu, Hebei, Ningxia, Shandong, Xinjiang [Kazakhstan, Russia; E Europe].

4. *Schoenoplectus triqueter* (Linnaeus) Palla, Verh. K. K. Zool.-Bot. Ges. Wien 38: 49. 1888.

三棱水葱 san leng shui cong

Scirpus triqueter Linnaeus, Syst. Nat., ed. 12, 2: 83; Mant. Pl. 29. 1767; *Schoenoplectus trisetosus* (Tang & F. T. Wang) S. Yun Liang; *Scirpus trisetosus* Tang & F. T. Wang.

Rhizomes long creeping, reddish brown, slender. Culms solitary, erect, 20–100 cm tall, 2–8 mm thick, 3-angled, subrigid, clothed at base with 2 or 3 leaf sheaths. Leaf sheath pale green, 5–15 cm, membranous, distinctly transversely septate, mouth obliquely truncate; leaf blade flat, 1.3–5.5(–8) cm × 1.5–2 mm. Involucral bract 1, culmlike, 1.5–7 cm, 3-angled, usually

shorter than inflorescence, apex subacute. Inflorescence a pseudolateral anthela, 3–6 cm, laxly bearing 3–20 spikelets or sometimes congested in a headlike cluster; rays to 5 cm, ± stout, scabrous. Spikelets oblong to ovoid-oblong, 6–12 × 3–7 mm, densely many flowered, apex obtuse. Glumes yellowish brown, elliptic, oblong, or broadly ovate, 3–4 mm, membranous, margin sparsely ciliate, apex emarginate to rounded with a green costa excurrent into a mucro. Perianth bristles 3–5, almost as long as nutlet, retrorsely scabrous. Stamens 3; anthers linear; connective apex dark brown, evident beyond anthers. Style short; stigmas 2. Nutlet brownish at maturity, obovoid, 2–3 mm, plano-convex, shiny. Fl. and fr. Jun–Oct. $2n = 40$, 42.

Wet places at river margins, ditches, pond margins, swamps; 100–2300 m. Anhui, Chongqing, Fujian, Gansu, Guangdong, N Guangxi, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jilin, Liaoning, Nei Mongol, Ningxia, E Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, S Xizang, Yunnan, Zhejiang [Afghanistan, India, Japan, Kazakhstan, Korea, Kyrgyzstan, Pakistan, Russia, Tajikistan, Uzbekistan; N Africa, SW Asia, Atlantic Ocean islands, Europe].

5. *Schoenoplectus tabernaemontani* (C. C. Gmelin) Palla, Verh. K. K. Zool.-Bot. Ges. Wien 38: 49. 1888.

水葱 shui cong

Scirpus tabernaemontani C. C. Gmelin, Fl. Bad. 1: 101. 1805; *Schoenoplectus validus* (Vahl) Á. Löve & D. Löve; *Scirpus lacustris* Linnaeus subsp. *validus* (Vahl) T. Koyama; *S. lacustris* var. *validus* (Vahl) Kükenthal; *S. validus* Vahl; *S. validus* var. *laevigulumis* Tang & F. T. Wang.

Rhizomes brown, horizontally creeping. Culms 1–2[–3] m tall, terete, smooth, clothed at base with 3 or 4 leaf sheaths. Leaf sheaths to 38 cm, membranous, apicalmost sheath with a blade; leaf blade linear, 1.5–11 cm. Involucral bract 1, culmlike, subulate, usually shorter to rarely slightly longer than inflorescence, erect. Inflorescence a pseudolateral simple or decomposed anthela; rays 4–13 or more, unequal in length, to 5 cm, concave to convex, scabrous. Spikelets solitary or in clusters of 2 or 3, ovoid to oblong, 4–10 × 2–3.5 mm, densely many flowered, apex acute to obtuse. Glumes brown to purplish brown, elliptic to broadly ovate, 2.5–3 mm, membranous, abaxially with reddish resinous spots on apical median part, margin broadly white hyaline and ciliate toward apex, apex obtuse to emarginate with a green costa excurrent into a mucro. Perianth bristles (2–)6, reddish brown, shorter than to equaling nutlet, retrorsely scabrous except at base. Stamens 3; anthers linear; connective apex evident beyond anthers. Style ca. 2 mm; stigmas 2(or 3, and 3rd when present shorter than other 2). Nutlet grayish, broadly obovoid to ellipsoid, 2–2.5 mm, subplano-convex, apically contracted into a 0.2–0.4 mm beak. Fl. and fr. Jun–Sep. $2n = 42$.

Lake margins, shallow water; (near sea level to) 300–3200 m. Gansu, Guangdong, Guizhou, Hebei, Heilongjiang, Hubei, Hunan, Jiangsu, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [Afghanistan, India, Japan, Kashmir, Kazakhstan, Korea, Kyrgyzstan, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Russia, Tajikistan, Turkmenistan, Uzbekistan, Vietnam; N Africa, SW Asia, Australia, Central, North, and South America, Europe, Pacific islands].

6. *Schoenoplectus lacustris* (Linnaeus) Palla, Verh. K. K. Zool.-Bot. Ges. Wien 38: 49. 1888.

沼生水葱 zhao sheng shui cong

Scirpus lacustris Linnaeus, Sp. Pl. 1: 48. 1753.

Rhizomes stout, horizontally creeping. Culms erect, green, 1–2.5 m tall, ca. 2(–3) cm thick, terete, smooth. Leaves mostly reduced to a sheath, glabrous; basal sheath brownish; apical 2 sheaths with leaf blades; leaf blade subulate to linear, 1–10 cm. Involucral bract 1, culmlike, subulate, as long as to slightly overtopping inflorescence. Inflorescence a pseudolateral simple or decomposed anthela; rays 2–8, unequal in length, 5–8 cm. Spikelets reddish brown, oblong to ovoid, 0.6–1.5 cm, apex acute. Glumes ovate, abaxially glabrous, margin ciliate, apex emarginate with a 1-veined costa excurrent into a short awn. Perianth bristles 5 or 6, slightly longer than nutlet, retrorsely scabrous. Stamens 3; anthers linear, 1.5–2 mm; connective apex with a pyramidal-ovoid bearded appendage. Stigmas 3. Nutlet grayish, obovoid, ca. 3 mm, compressed 3-sided (ridge evident on abaxial surface when immature). Fl. and fr. Jun–Aug. $2n = 38$, 42, 80.

Swamps, shallow water; ca. 1000 m. Xinjiang (Shawan) [Afghanistan, N India, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; N and S Africa, SW Asia, Europe].

7. *Schoenoplectus mucronatus* (Linnaeus) Palla subsp. **robustus** (Miquel) T. Koyama, Fl. Taiwan 5: 214. 1978.

水毛花 shui mao hua

Scirpus mucronatus Linnaeus var. *robustus* Miquel, Ann. Mus. Bot. Lugduno-Batavi 2: 143. 1865; *Schoenoplectus mucronatus* var. *robustus* (Miquel) T. Koyama; *S. triangulatus* (Roxburgh) Soják; *Scirpus acutus* J. Presl & C. Presl (1828), not Muhlenberg ex Bigelow (1814); *S. mucronatus* subsp. *robustus* (Miquel) T. Koyama; *S. mucronatus* var. *subleiocarpus* Franchet & Savatier; *S. preslii* A. Dietrich; *S. triangulatus* Roxburgh; *S. triangulatus* var. *sanguineus* Tang & F. T. Wang; *S. triangulatus* var. *trialatus* Tang & F. T. Wang; *S. triangulatus* var. *tripteris* Tang & F. T. Wang.

Rhizomes short. Culms deep green, slightly densely tufted, 45–130 cm tall, 5–11 mm thick, sharply 3-angled with shallowly concave sides, clothed at base with 2–4 leaf sheaths. Leaf sheaths brown, 7–25 cm, membranous to herbaceous, obliquely truncate at mouth. Involucral bract 1, culmlike, upright or obliquely bent, 2–10 cm. Inflorescence a pseudolateral hemispheric head, with (3–)5–20 spikelets. Spikelets brownish greenish, ovoid, oblong-ovoid, or narrowly ovoid, 10–20 × 4–6 mm, terete, densely many flowered, apex subacute. Glumes pale green and brownish tinged usually with reddish brown, broadly obovate, ovate, or broadly ovate, 3.8–5 × 2.5–3 mm, very concave, papery, margin apically minutely ciliate, apex with a green 1–3-veined costa excurrent into a mucro. Perianth bristles 6, 1.5–2 × as long as nutlet, retrorsely scabrous. Stamens 3; anthers linear, ca. 2.5 mm; connective apex slightly prominent beyond anthers. Style ca. 4 mm; stigmas 3. Nutlet blackish brown at maturity, obovoid to broadly obovoid, 2–2.5 × 1.5–2 mm,

compressed 3-sided, conspicuously or inconspicuously transversely wrinkled, \pm shiny, base contracted to cuneate, apex rounded to mucronate. Fl. and fr. May–Nov. $2n = 44$.

Pond and lake margins, swamps, grasslands in streambanks, paddy fields; 100–2700 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, SE Xizang, Yunnan, Zhejiang [India, Indonesia, Japan, Korea, Malaysia, Sri Lanka; Africa, S Europe, Madagascar].

Only specimens of *Schoenoplectus mucronatus* subsp. *robustus*, as interpreted here, have been seen from China by the present authors. If recognized at specific rank, this taxon would be correctly named *S. triangularis*. *Schoenoplectus mucronatus* subsp. *mucronatus* occurs in Europe and is naturalized in North America.

8. *Schoenoplectus chuanus* (Tang & F. T. Wang) S. Yun Liang & S. R. Zhang, *Novon* 20: 170. 2010.

曲氏水葱 qu shi shui cong

Scirpus chuanus Tang & F. T. Wang, *Fl. Reipubl. Popularis Sin.* 11: 222. 1961.

Rhizomes short, creeping. Culms laxly tufted, 66–76 cm tall, \pm stout, 3-angled, distinctly channeled, smooth, clothed at base with 2 or 3 leaf sheaths. Leaf sheaths to 25 cm; basal sheaths dark brown, with prominent transverse veins; apical sheaths green to greenish brown, mouth obliquely truncate with hyaline margin. Involucral bract 1, erect to obliquely spreading, culmlike, 5–9 cm, 3-angled, smooth. Inflorescence a pseudolateral head, with ca. 10 spikelets. Spikelets oblong to ellipsoid, 5–10 \times 3–5 mm, densely many flowered. Glumes brown with dark brown short lines, broadly ovate, 2.5–3 mm, concave, papery, many veined, margin hyaline, apex rounded with a yellowish green costa excurrent into a mucro. Perianth bristles 6, 1/4–1/3 as long as nutlet, glabrous. Stamens 3; anthers narrowly deltoid, apex obtuse; connective apex slightly dilated. Style short; stigmas 3, slender. Nutlet black at maturity, obovoid, 1.5–2 mm, 3-sided, shiny. Fl. and fr. Jul–Aug.

- Shallow water. Jiangsu (Nanjing).

9. *Schoenoplectus trapezoides* (Koidzumi) Hayasaka & H. Ohashi, *J. Jap. Bot.* 75: 224. 2000.

五棱水葱 wu leng shui cong

Scirpus trapezoides Koidzumi, *Bot. Mag. (Tokyo)* 39: 26. 1925; *S. erectus* Poir. var. *triangularis* Honda; *S. juncooides* Roxburgh var. *triangularis* (Honda) Ohwi.

Rhizomes short. Culms tufted, erect, 40–70 cm tall, \pm slender, 3–5-angled, clothed at base with bladeless leaf sheaths. Leaf sheaths pale brown at base, to 12 cm, oblique at mouth. Involucral bract 1, erect, culmlike, 5–15 cm. Inflorescence a pseudolateral head, with 2–9 spikelets. Spikelets sessile, pale rust-colored brown, oblong-ovoid to ovoid, 8–14 \times 4–6 mm. Glumes pale rust-colored brown, broadly elliptic, 3–4 mm, thinly leathery, with a green costa excurrent into a mucro, apex acute. Perianth bristles 6, ca. 2/3 as long as nutlet, retrorsely scabrous. Stamens 3; anthers 1.2–1.5 mm. Style ca. 3 mm; stigmas (2 or)3. Nutlet blackish brown, broadly obovoid to sub-

spherical, ca. 2 mm, biconvex or unequally biconvex, obscurely wrinkled. Fl. and fr. Aug–Oct.

Wet places, swamps by streams; 200–1000 m. Fujian, Guangxi, Hebei, Jilin, Shandong [Japan].

10. *Schoenoplectus lineolatus* (Franchet & Savatier) T. Koyama, *Fl. Taiwan* 5: 215. 1978.

细匍匐茎水葱 xi pu fu jing shui cong

Scirpus lineolatus Franchet & Savatier, *Enum. Pl. Jap.* 2: 545. 1878.

Rhizomes creeping, long, slender. Culms solitary at nodes of rhizome, distantly arranged in a row, dark green, 7–35 cm tall, 0.8–1.2 mm thick, terete, clothed at base with 1 or 2 bladeless short leaf sheaths. Leaf sheaths pale brown, 1–5 cm, hyaline, mouth obliquely truncate. Involucral bract 1, erect, culmlike, apex subulate. Inflorescence generally a single pseudolateral spikelet. Spikelet sessile, greenish straw-colored, oblong to broadly narrowly ovoid, 4–6 \times 2–3 mm, densely many flowered. Glumes pale yellow with some brown lines, oblong to elliptic, 4–4.5 \times 1.8–2 mm, membranous, keel green, margin white hyaline, apex acute to obtuse. Perianth bristles 4 or 5, as long to 2 \times as long as nutlet. Stamens 2 or 3; anthers linear, ca. 2.5 mm. Style 4–5 mm; stigmas 2. Nutlet black, obovoid to ellipsoid, 1.7–2.2 \times 1.2–1.8 mm, plano-convex, shiny. Fl. and fr. Jul–Oct. $2n = ca. 60$.

Marshy places; near sea level. Guangdong, Taiwan, Zhejiang [Japan, Russia (Far East)].

11. *Schoenoplectus monocephalus* (J. Q. He) S. Yun Liang & S. R. Zhang, *Novon* 20: 170. 2010.

单穗水葱 dan sui shui cong

Scirpus monocephalus J. Q. He, *Acta Phytotax. Sin.* 37: 291. 1999.

Rhizomes creeping, with several fusiform bulblets. Culms scattered, 10–20 cm tall, 0.5–1.5 mm thick, terete, channeled, smooth, clothed at base with 1 or 2 dark brown bladeless leaf sheaths. Leaf sheaths 1–3 cm, hyaline, mouth obliquely truncate. Involucral bract 1, erect, culmlike, 1–2.5 cm, apex subacute. Inflorescence generally a single pseudolateral spikelet. Spikelet sessile, oblong to ovoid, 4–10 \times 2–4 mm, densely 6–10-flowered. Glumes pale brown with minute brown spots, broadly ovate to ovate-oblong, 1–3.5 mm, veinless or 1-veined, apex obtuse. Perianth bristles absent or 1–3 unequal short bristles, when present 1/6–4/5 as long as nutlet, glabrous. Stamens 3; anthers linear, 1–1.5 mm. Style slender, ca. 3 mm; stigmas 2, ca. 1 mm. Nutlet brown, broadly ovoid, 1.5–2.5 mm, plano-convex, shiny, glabrous. Fl. and fr. Jun–Sep.

- Trail margins, wet places. Anhui (Fuyang).

12. *Schoenoplectus clemensii* (Kükenthal) G. C. Tucker, **comb. nov.**

佛海水葱 fo hai shui cong

Basionym: *Scirpus mucronatus* Linnaeus subsp. *clemensii* Kükenthal, *Bot. Jahrb. Syst.* 69: 259. 1938; *Schoenoplectus*

fohaiensis (Tang & F. T. Wang) Hayasaka; *S. mucronatus* (Linnaeus) Pallas subsp. *clemensii* (Kükenthal) Soják; *Scirpus clemensii* (Kükenthal) Ohwi; *S. fohaiensis* Tang & F. T. Wang.

Rhizomes short, without creeping stolons. Culms 60–120 cm tall, 5–8 mm thick, terete, smooth, clothed at base with 3 or 4 leaf sheaths. Leaf sheaths brown to greenish, mouth obliquely truncate and bladeless or sometimes setaceous. Involucral bract 1, culmlike, 2.5–5 mm, often deflexed, terete, apex acuminate. Inflorescence a pseudolateral head with many spikelets. Spikelets sessile, dark brown, ovoid to oblong, 4–5 × ca. 3 mm, many flowered. Glumes pale brown with dark brown lines, obovate to elliptic, 2–2.5 mm, membranous, margin ciliate, apex acute to obtuse with a costa excurrent into a mucro. Perianth bristles 5 or 6, as long as to slightly longer than nutlet, retrorsely scabrous. Stamens 3; anthers linear; connective apex evident beyond anthers. Style long; stigmas 2. Nutlet black at maturity, broadly obovoid to obovoid, ca. 1.2 mm, plano-convex, shiny. Fl. and fr. Mar–Jun.

Ponds; ca. 1600 m. Yunnan (Fuhai) [Papua New Guinea, Vietnam].

13. *Schoenoplectus articulatus* (Linnaeus) Palla, Bot. Jahrb. Syst. 10: 299. 1888.

节苞水葱 jie bao shui cong

Scirpus articulatus Linnaeus, Sp. Pl. 1: 47. 1753; *Schoenoplectiella articulata* (Linnaeus) Lye; *Schoenoplectus pseudoarticulatus* (L. K. Dai & S. M. Huang) S. Yun Liang & S. R. Zhang; *Scirpus pseudoarticulatus* L. K. Dai & S. M. Huang.

Plants 30–85 cm tall (including involucral bract). Rhizomes shortly creeping. Culms densely tufted, 12–30 cm tall, 5–7 mm thick, terete, transversely septate, clothed at base with 1 or 2 bladeless leaf sheaths. Leaf sheaths 10–25 cm, terete, obliquely truncate at mucronate mouth. Involucral bract 1, erect, culmlike, usually longer than culm, with many transverse septate nodes. Inflorescence a pseudolateral head with many spikelets. Spikelets sessile, ovoid, 7–9 × 4–4.5 mm, many flowered. Glumes brownish yellow with dark brown lines, deltoid-ovate, 5–5.5 mm, concave, thinly membranous, veins many and ± conspicuous, apex with a costa excurrent into a mucro. Perianth bristles absent. Stamens 3; stigmas 3. Nutlet yellowish gray at maturity, obovoid, 2–2.2 mm, 3-sided, smooth. Fl. and fr. May–Jul.

Moist places, pond margins; low elevations. S Hainan (Sanya) [India, Indonesia, Nepal, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Africa, N Australia, Indian Ocean islands, Madagascar].

This species is widely distributed and very variable in the size of its vegetative parts. The Hainan plants were separated (as *Scirpus pseudoarticulatus*) mainly by their taller culms and relatively more pointed spikelets, but such features certainly fall within the variation range of *Schoenoplectus articulatus*.

14. *Schoenoplectus juncooides* (Roxburgh) Palla, Bot. Jahrb. Syst. 10: 299. 1888.

萤蔺 ying lin

Scirpus juncooides Roxburgh, Fl. Ind. 1: 216. 1820; *Schoenoplectiella juncooides* (Roxburgh) Lye; *Scirpus juncooides*

var. *ohwianus* (T. Koyama) T. Koyama; *S. ohwianus* T. Koyama.

Roots many, fibrous. Rhizomes short. Culms tufted, 18–70 cm tall, 1.5–7 mm thick, slightly stiff, opaque, obtusely to faintly several angled, smooth, clothed at base with 2 or 3 bladeless leaf sheaths. Leaf sheaths pale green, 5–15 cm, obliquely truncate at mucronate mouth. Involucral bract 1, erect, pale green, culmlike, 3–15 cm. Inflorescence a pseudolateral head with (2 or)3–5(–9) spikelets. Spikelets brown to pale brown, oblong-ovoid, 8–17 × 3.5–5 mm, many flowered. Glumes brown or brown with brown lines, broadly ovate to ovate, 3–4 × 1.8–2 mm, membranous, apex with a 3-veined green costa excurrent into a mucro. Perianth bristles 5 or 6, equaling or shorter than nutlet, retrorsely scabrous except at base. Stamens 3; anthers oblong; connective apex evident beyond anthers. Style 2–2.2 mm; stigmas 2. Nutlet dark brown at maturity, broadly obovoid to obovoid, ca. 2 mm, plano-convex, obscurely transversely wrinkled, shiny. Fl. and fr. Aug–Nov.

Wetlands, paddy field margins; 800–2000 m. Anhui, Chongqing, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, S Xinjiang, SE Xizang, Yunnan, Zhejiang [Bhutan, India, Indonesia, Japan, Kashmir, Korea, Malaysia, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Tajikistan, Thailand, Uzbekistan; SW Asia, Australia, Indian Ocean islands, Madagascar, Pacific islands].

A putative hybrid between *Schoenoplectus juncooides* and *S. schoofii*, described from NE Yunnan (Dongchuan), was named *Scirpus ×intermedius* Tang & F. T. Wang (Fl. Reipubl. Popularis Sin. 11: 224. 1961), but that name is illegitimate because it is a later homonym of *S. intermedius* Thuillier (Fl. Env. Paris, ed. 2, 21. 1799).

15. *Schoenoplectus hotarui* (Ohwi) T. Koyama, Makinoa, n.s., 7: 58. 2008.

细秆萤蔺 xi gan ying lin

Scirpus hotarui Ohwi, Repert. Spec. Nov. Regni Veg. 36: 44. 1934; *Schoenoplectus juncooides* (Roxburgh) Palla subsp. *hotarui* (Ohwi) Soják; *Scirpus juncooides* Roxburgh var. *hotarui* (Ohwi) Ohwi.

Plants annual. Roots fibrous. Culms tufted, 13–40 cm tall, 0.7–1 mm thick, terete, slender, rigid, shiny, clothed at base with ca. 3 bladeless sheaths. Involucral bracts erect. Inflorescence a pseudolateral head with 1–3(or 4) spikelets. Spikelets ovoid, 6–14 × 4–6 mm, apex acute. Glumes ovate-orbicular, 3–4.5 mm, brownish tinged on both sides of green costa, apex rounded. Perianth bristles 6, ca. 1.5 × as long as nutlet. Stamens 3. Nutlets blackish at maturity, broadly ovate-orbicular, 2–2.5 mm, trigonous, transversely wrinkled.

Wet places; ca. 1200 m. Jilin, S Liaoning [Japan, Korea, N Myanmar, Russia (Far East)].

This species can be easily discerned by the slender, rigid, and spiny culms with only 1–3 spikelets in contrast to the thicker, subrigid, and opaque culms bearing 4–9 spikelets of *Schoenoplectus juncooides*. *Schoenoplectus hotarui*, unlike *S. juncooides*, is found growing more frequently in natural habitats rather than as a rice field weed and has a more northerly distribution.

16. *Schoenoplectus fuscrobens* (T. Koyama) T. Koyama in H. Hara, Stearn & L. H. J. Williams, Enum. Fl. Pl. Nepal 1: 118. 1978.

褐红鳞水葱 he hong lin shui cong

Scirpus fuscrobens T. Koyama, Willdenowia 5: 491. 1969.

Roots many, fibrous. Rhizomes elongated, bearing culms in a well-spaced row forming a single rank. Culms not tufted, 15–70 cm tall, 1–4 mm thick, slightly stiff, terete or obtusely several angled, smooth, clothed at base with 2 or 3 bladeless leaf sheaths. Leaf sheaths pale green, 5–15 cm, obliquely truncate at mucronate mouth. Involucral bract 1, pale green, looking like a continuation of culm, 3–15 cm, perpendicular to it. Inflorescence a pseudolateral head with 2–4 spikelets. Spikelets brown to pale brown, ovoid to oblong-ovoid, 3–6 × ca. 3 mm, several flowered. Glumes brown or brown with brown lines, broadly ovate to ovate, 3–3.2 × 1.8–2 mm, membranous, marked with dark purplish brown on margins (and sometimes on sides as well), apex mucronate. Perianth bristles 5 or 6, equaling or shorter than nutlet, retrorsely scabrous except at base. Stamens 3; anthers oblong; connective apex evident beyond anthers. Style 2–2.2 mm; stigmas 2 or 3. Nutlet dark brown at maturity, broadly obovoid to obovoid, ca. 2 mm, plano-convex or 3-sided, obscurely transversely wrinkled, shiny. Fl. and fr. Aug–Nov.

Damp meadows on mountains; 2000–2700 m. Guizhou, Xizang [Bhutan, Nepal].

17. *Schoenoplectus wallichii* (Nees) T. Koyama, Fl. Taiwan 5: 210. 1978.

猪毛草 zhu mao cao

Scirpus wallichii Nees in Wight, Contr. Bot. India, 112. 1834; *Schoenoplectiella wallichii* (Nees) Lye; *Scirpus erectus* Poiret var. *wallichii* (Nees) Beetle; *S. sasakii* Hayata.

Plants without a distinct rhizome. Culms tufted, 10–40 cm tall, smooth, clothed at base with 2–4 leaf sheaths. Leaf sheaths 2–10 cm, with basal ones straw-colored and apical ones pale green, mouth obliquely truncate and with a subulate ca. 0.8 mm appendage. Involucral bract 1, erect, culmlike, 4.5–16 cm, base dilated, apex acute. Inflorescence a pseudolateral head, with 1–3 spikelets. Spikelets pale green to pale brownish green, narrowly ovoid to oblong-ovoid, 7–20 × 3–6 mm, densely many flowered, apex acute. Glumes oblong-ovate, 4–5.5 × ca. 2.5 mm, thinly leathery, apex acuminate with a green costa excurrent into a mucro. Perianth bristles 4 (or 5), longer than nutlet, retrorsely scabrous except at base. Stamens 3; anthers oblong; connective apex slightly evident beyond anthers. Style 2–2.5 mm; stigmas 2. Nutlet blackish brown, broadly ellipsoid, ca. 2.5 mm, plano-convex, ± transversely wrinkled, shiny. Fl. and fr. Aug–Nov.

Wet places, stream margins, river margins, paddy fields; 800–1300 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Taiwan, Yunnan, Zhejiang [NE India, Japan, Korea, Malaysia, Myanmar, Philippines, Vietnam].

18. *Schoenoplectus jingmenensis* (Tang & F. T. Wang) S. Yun Liang & S. R. Zhang, Novon 20: 170. 2010.

荆门水葱 jing men shui cong

Scirpus jingmenensis Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 222. 1961.

Rhizomes short. Culms tufted, 10–32 cm tall, 2–3 mm thick, terete, smooth, clothed at base with 2 or 3 leaf sheaths. Leaf sheaths 1.5–9 cm, mouth obliquely truncate; apicalmost sheath usually with a slender 1–1.7 cm blade. Involucral bract 1, culmlike, 13–18 cm, sometimes longer than culm, subterete, base dilated, margin hyaline; bractlets pale brown, glumelike, ovate to broadly lanceolate, 4–10 mm. Inflorescence a pseudolateral head, with 5–10 spikelets. Spikelets sessile, oblong to narrowly ovoid, 7–20 × ca. 1 mm, many flowered. Glumes pale brown with brown lines, oblong, ca. 2 mm, membranous, deciduous at nutlet maturity, margin apically ciliate, apex rounded and with a 1–3-veined costa excurrent into a mucro. Perianth bristles 4–6, ± as long as nutlet, retrorsely scabrous. Stamens 1 or 2; anthers ellipsoid, short. Style long; stigmas 2, slender. Nutlet blackish brown, obovoid, ca. 1 mm, plano-convex, indistinctly transversely wrinkled, shiny. Fl. Sep.

• Hubei (Jingmen).

19. *Schoenoplectus komarovii* (Roshevitz) Soják, Čas. Nár. Mus., Odd. Přír. 140: 127. 1972.

吉林水葱 ji lin shui cong

Scirpus komarovii Roshevitz in Komarov, Fl. URSS 3: 579. 1935; *S. hondoensis* Ohwi var. *leiocarpus* (Komarov) Ohwi; *S. okuyamae* Ohwi; *S. sasakii* Hayata var. *leiocarpus* (Komarov) Kitagawa; *S. supinus* Linnaeus var. *leiocarpus* Komarov.

Rhizomes very short. Culms tufted, 10–50 cm tall, terete, smooth, clothed at base with 2 or 3 bladeless leaf sheaths. Leaf sheaths green, 1–10 cm, base sometimes pale brown, mouth obliquely truncate. Involucral bract 1, culmlike, 8–18 cm, base slightly dilated. Inflorescence a pseudolateral head, with 2–10 or more spikelets. Spikelets sessile, ovoid to oblong-ovoid, 4–7(–10) × 2–3 mm, many flowered. Glumes pale brown with dark brown lines, oblong, ca. 2 mm, membranous, veins obscure, with green 1-veined costa excurrent into a mucro at rounded apex. Perianth bristles 4, ± as long as nutlet, retrorsely scabrous. Stamens 3; anthers narrowly ovoid, short; connective apex slightly evident beyond anthers. Style long; stigmas 2. Nutlet blackish brown, broadly obovoid, 1–1.5 mm, compressed biconvex, obscurely transversely wrinkled, shiny. Fl. and fr. Jun–Oct.

Swamps, wet places, paddy fields; near sea level to 100 m. Heilongjiang, Jilin, Liaoning, NE Nei Mongol [Japan, Korea, Russia (Far East)].

20. *Schoenoplectus chen-moui* (Tang & F. T. Wang) Haya-saka, J. Jap. Bot. 84: 49. 2009 [“*chen-mouii*”].

陈谋水葱 chen mou shui cong

Scirpus chen-moui Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 223. 1961 [“*chen-mouii*”].

Roots fibrous. Culms 10–30 cm tall, ca. 1.5 mm thick, terete, smooth, clothed at base with 2–4 green to pale brown leaf sheaths. Leaf sheaths 1–10 cm, mouth obliquely truncate and sometimes with a setaceous ca. 1 cm blade. Involucral bract 1, erect, culmlike, 10–20 cm, subterete, smooth, base slightly dilated, margin membranous. Inflorescence a pseudolateral head, with 2–10 spikelets. Spikelets oblong-ovoid to oblong, 5–10 × ca. 3 mm, many flowered. Glumes yellow with brown lines, obovate to oblong, membranous, margin ciliate, apex with a green costa excurrent into a mucro. Perianth bristles (5 or)6, longer than nutlet, retrorsely scabrous. Stamens 3; anthers oblong, short; connective apex slightly evident beyond anthers. Style of medium length; stigmas 3. Nutlet yellow when young but turning black at maturity, obovoid to broadly obovoid, 1–1.2 mm, 3-sided, transversely wrinkled. Fl. and fr. Aug–Oct.

- Paddy fields; ca. 1800 m. W Yunnan (Dali).

21. *Schoenoplectus schoofii* (Beetle) Soják, Čas. Nár. Muz. Praze, Rada Přír. 148: 194. 1980.

滇水葱 dian shui cong

Scirpus schoofii Beetle, Amer. J. Bot. 29: 654. 1942.

Culms tufted, 30–60 cm tall, 2.5–3.5 mm thick, compressed terete to terete, smooth, clothed at base with 2 or 3 bladeless pale brown leaf sheaths. Leaf sheaths 2–16 cm, mouth obliquely truncate and with a mucro. Involucral bract 1, culmlike, 8–30 cm. Inflorescence a pseudolateral head, with 8–20 spikelets. Spikelets ovoid to oblong-ovoid, 3–10 × 2–3 mm, many flowered. Glumes brownish yellowish to brown, elliptic to subobovate, ca. 3 mm, membranous, obscurely many veined, margin ciliate, apex rounded and with a green 1–3-veined costa excurrent into a mucro. Perianth bristles very short, glabrous. Stamens 3; anthers nearly narrowly ovate, short; connective apex evident beyond anthers. Style of medium length; stigmas 3. Nutlet black at maturity, broadly obovoid, ca. 1 mm, 3-sided, densely transversely wrinkled. Fl. and fr. Aug–Sep.

- Wet places along lake margins; ca. 2300 m. Jiangsu, Yunnan.

22. *Schoenoplectus supinus* (Linnaeus) Palla, Bot. Jahrb. Syst. 10: 299. 1888.

仰卧秆水葱 yang wo gan shui cong

Scirpus supinus Linnaeus, Sp. Pl. 1: 49. 1753; *Schoenoplectiella supina* (Linnaeus) Lye.

Roots fibrous. Culms greenish, tufted, 4–30 cm tall, 1–1.7 mm thick, 3-angled or terete, clothed at base with 2 or 3 leaf sheaths. Leaf sheaths pale green, 2–6 cm, membranous, mouth obliquely truncate and with a mucro; leaf blade present or absent. Involucral bract 1, culmlike, 1.5–12 cm. Inflorescence a pseudolateral head or corymbose with 4 short rays. Spikelets 3–10, narrowly ovoid, ovoid, or oblong, 4–8 × 2–3 mm,

subdensely many flowered, apex subacute. Glumes elliptic and boat-shaped, 1.8–2.5 mm, with a prominent green 3-veined keel, margins membranous, apex ± obtuse and shortly mucronate. Perianth bristles absent or rarely rudimentary. Style ca. 1.5 mm; stigmas 3. Nutlet black at maturity, broadly obovoid, 1–1.3 mm, 3-sided, obscurely or distinctly transversely wrinkled, both ends suddenly contracted, apex mucronate. Fl. and fr. Jul–Sep or Nov–Jan.

Wet places, paddy fields, moist meadows along valleys; 600–2300 m. Anhui, Guangdong, Guangxi, Hainan, S Jiangsu, Taiwan, Xinjiang, Yunnan [Afghanistan, India, Indonesia, Kazakhstan, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Russia, Sri Lanka, Thailand, Uzbekistan, Vietnam; Africa, SW Asia, N Australia, Europe, Madagascar, South America].

Schoenoplectus supinus subsp. *supinus* occurs in N Africa, C and SW Asia, and S Europe.

- 1a. Culms 3-angled; basal leaf sheaths with a blade; nutlet sides obscurely transversely wrinkled 22a. subsp. *lateriflorus*
- 1b. Culms terete; basal leaf sheaths bladeless; nutlet sides distinctly transversely wrinkled 22b. subsp. *densicorrugatus*

22a. *Schoenoplectus supinus* subsp. *lateriflorus* (J. F. Gmelin) Soják, Čas. Nár. Mus., Odd. Přír. 141: 62. 1972.

稻田仰卧秆水葱 dao tian yang wo gan shui cong

Scirpus lateriflorus J. F. Gmelin, Syst. Nat. 1: 127. 1791; *Isolepis oryzetorum* Steudel; *Schoenoplectus lateriflorus* (J. F. Gmelin) Lye; *Scirpus erectogracilis* Hayata; *S. oryzetorum* (Steudel) Ohwi; *S. supinus* var. *lateriflorus* (J. F. Gmelin) T. Koyama.

Culms 7–30 cm tall, 3-angled. Basal leaf sheaths with a blade. Nutlet sides obscurely transversely wrinkled. Fl. and fr. Nov–Jan.

Wet places, paddy fields; ca. 1000 m. Anhui, Guangdong, Guangxi, S Jiangsu, Taiwan, Yunnan [Afghanistan, India, Indonesia, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam; Africa, N Australia, Madagascar].

22b. *Schoenoplectus supinus* subsp. *densicorrugatus* (Tang & F. T. Wang) S. Yun Liang & S. R. Zhang, Novon 20: 171. 2010.

多皱纹果仰卧秆水葱 duo zhou wen guo yang wo gan shui cong

Scirpus supinus var. *densicorrugatus* Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 223. 1961.

Culms 4–10 cm tall, terete. Basal leaf sheaths bladeless. Inflorescence a pseudolateral head. Spikelets 3–6 mm, in clusters of 2 or 3, sessile. Nutlet sides finely and densely transversely wrinkled. Fl. and fr. Jul–Sep.

- Moist meadows along valleys; 600–2300 m. Xinjiang.

11. ELEOCHARIS R. Brown, Prodr. 224. 1810.

荸荠属 bi qi shu

Dai Lunkai (戴伦凯); Mark T. Strong

Herbs, perennial or annual. Rhizomes short or absent; stolons usually present. Culms tufted or single. Leaves bladeless; sheath

apiculate or rarely with a scarious appendage at apex. Inflorescences reduced to a single terminal spikelet, erect, rarely proliferous (bearing plantlets) at base, with few to many bisexual flowers. Glumes spirally imbricate or rarely distichous, oblong, oblong-ovate, lanceolate, or subrounded, firm or membranous, glabrous, usually with a midvein although sometimes indistinct but with lateral veins, margin usually hyaline; basal 1 or 2 glumes usually empty. Perianth bristles (3–)6(–12) or rarely absent, retrorsely spinulose. Stamens 1–3. Style thin; stigmas 2 or 3. Nutlet obovoid, broadly obovoid, or globose-obovoid, 3-sided, biconvex, or plano-convex, smooth, reticulate, cancellate, or rarely pitted; persistent style base expanded, triangular, conic, or variously shaped, sometimes spongy-thickened.

About 250 species: worldwide; 35 species (nine endemic) in China.

- 1a. Spikelet usually cylindrical or narrowly ellipsoid, as wide as culms; culms usually stout, sometimes transversely septate with nodes evident on surface (in *E. dulcis*); leaf sheath mouth oblique; glumes firm, subcartilaginous, rarely subpapery or membranous, midvein obscure or indistinct but with 15 or more prominent to obscure close longitudinal veins.
- 2a. Culms with transverse septa, nodes evident on surface when dry; spikelet with basal 2 glumes empty, rarely 1 with a flower; nutlet surface essentially smooth 1. *E. dulcis*
- 2b. Culms without transverse septa, nodes not evident on surface when dry; spikelet with only basalmost glume empty; nutlet surface cancellate or reticulate.
- 3a. Culms terete 6. *E. ochrostachys*
- 3b. Culms 3-angled, rarely acutely 4- or 5-angled.
- 4a. Culms firm, with pith in center; glumes broadly ovate or subquadrate, as long as wide.
- 5a. Leaf sheath mouth with setaceous appendage; glumes densely imbricate, subquadrate, apex truncate; nutlet apex not constricted; perianth bristles as long as or shorter than nutlet 2. *E. spiralis*
- 5b. Leaf sheath mouth acute but without an appendage; glumes laxly imbricate, broadly ovate, apex rounded; nutlet apex constricted; perianth bristles ca. 2 × as long as nutlet 3. *E. trilateralis*
- 4b. Culms spongy, subhollow; glumes narrowly ovate or broadly lanceolate, ca. 2 × as long as wide.
- 6a. Culms 3-angled, (1–)3–4 mm thick; spikelet 1.5–4 cm × 3–5 mm; glumes broadly ovate, 3–3.5 mm wide, subleathery, apex rounded; nutlet surface shallowly pitted with 13–15 longitudinal rows of transversely oriented, oblong to linear epidermal cells 4. *E. acutangula*
- 6b. Culms acutely 4- or 5-angled, 1.5–2.5 mm thick; spikelet 2–5 cm × 2.5–3 mm; glumes broadly lanceolate, 1.5–2.5 mm wide, membranous, apex obtuse to slightly acute; nutlet surface deeply pitted with 15–20 longitudinal rows of hexagonal epidermal cells 5. *E. philippinensis*
- 1b. Spikelet ovoid to narrowly ovoid, rarely cylindrical, usually wider than culms; culms slender, nodes not evident on surface; leaf sheath mouth truncate or slightly oblique, rarely with a scarious appendage; glumes generally membranous, midvein distinct or rarely obscure.
- 7a. Persistent style base scarcely differentiated from nutlet apex and seemingly a continuation of it.
- 8a. Annuals, neither stoloniferous or rhizomatous; culms often recurved; persistent style base pyramidal-acuminate; nutlet narrowly winged on angles, reticulate to deeply pitted-reticulate with isodiametric epidermal cells 9. *E. retroflexa*
- 8b. Perennials, stoloniferous; culms erect to ascending; persistent style base triangular-subulate or subconic; nutlet not winged on angles, essentially smooth.
- 9a. Culms 1–7 cm tall; spikelets 2–4 mm, 6–10-flowered; persistent style base triangular-subulate; nutlet 0.9–1.5 mm, smooth 7. *E. parvula*
- 9b. Culms 3–30 cm tall; spikelets 4–7 mm, 2–7-flowered; persistent style base subconic to 3-angled-subulate; nutlet 1.9–2.5 mm, appearing smooth but finely cellular-reticulate 8. *E. quinqueflora*
- 7b. Persistent style base differentiated from nutlet apex by a constriction or articulation at junction with it.
- 10a. Stigmas 3.
- 11a. Culms short and very slender; spikelet few flowered; glumes subdistichous at base of spikelet; nutlet terete or nearly so, longitudinally ridged with ridges separated by numerous cross-walls (trabeculae) 10. *E. yokoscensis*
- 11b. Culms elongate and ± stout; spikelet many flowered; glumes spirally imbricate; nutlet 3-sided to compressed 3-sided, essentially smooth.
- 12a. Culms acutely (3 or)4(–6)-angled; spikelet not proliferous at base; nutlet brownish when mature.
- 13a. Glumes 3–4 × 1–1.5 mm, margin narrow and hyaline; nutlet 1.2–1.5 mm and as wide; perianth bristles laxly to densely retrorsely spinulose; persistent style base deltoid, 1/2–2/3 as long as nutlet 11. *E. tetraquetra*
- 13b. Glumes 4–6 × 2–2.5 mm, margin broad and hyaline; nutlet 1.5–2 mm and as wide; perianth bristles plumose with spreading hairs; persistent style base narrowly ovoid, as long and as wide as nutlet or nearly so 12. *E. wichurae*

- 12b. Culms terete; spikelet usually proliferous at base; nutlet olivaceous or yellowish when mature.
- 14a. Glumes ovate-lanceolate, 3–4 mm, apex acute; persistent style base narrowly 3-angled to conic, attenuate to a short caudal tip, ca. 1/2 as long as nutlet; rhizome decumbent or obliquely ascending 13. *E. yunnanensis*
- 14b. Glumes oblong, suboblong, ovate, or elliptic, 1.5–2.5 mm, apex obtuse or rounded; persistent style base 3-angled, pyramidal, deltoid, narrowly ovoid, or subconic, ca. 1/4 as long as nutlet; rhizome absent or present.
- 15a. Persistent style base depressed, deltoid-pyramidal, as wide as nutlet or nearly so 17. *E. attenuata*
- 15b. Persistent style base not depressed, deltoid, narrowly ovoid, or subconic, often shortly attenuate to apex, ca. 1/2 as wide as nutlet.
- 16a. Perianth bristles exceeding tip of style base 18. *E. congesta*
- 16b. Perianth bristles shorter than tip of style base.
- 17a. Annuals; spikelet narrowly ovoid, oblong-ovoid, cylindric, or rarely globose-ovoid, (3–)5–10 mm, several to many flowered; glumes oblong 14. *E. pellucida*
- 17b. Perennials; spikelet ovoid or ovoid-cylindric, 2.5–6 mm, few flowered; glumes ovate or elliptic.
- 18a. Perianth bristles 6, slightly shorter than nutlet; nutlet obovoid, ca. 1 mm 15. *E. maximowiczii*
- 18b. Perianth bristles 2–5, 1/4–1/2 as long as nutlet; nutlet oblong to oblong-obovoid, ca. 1.5 mm 16. *E. setulosa*
- 10b. Stigmas 2.
- 19a. Annuals; persistent style base not spongy-thickened; stolons absent; spikelet ovoid, subglobose, or oblong-ovoid, (2–)3–5(–8) mm.
- 20a. Persistent style base dorsiventrally compressed, deltoid; nutlet brownish at maturity 19. *E. ovata*
- 20b. Persistent style base depressed conic or saucer-shaped; nutlet black at maturity and lustrous.
- 21a. Nutlet 0.7–1.1 mm; perianth bristles 6–8, rust-colored; persistent style base depressed conic, slightly reflexed basally on both sides 20. *E. geniculata*
- 21b. Nutlet 0.3–0.6 mm; perianth bristles 4–6, colorless or white; persistent style base saucer-shaped, not reflexed basally 21. *E. atropurpurea*
- 19b. Perennials; persistent style base spongy-thickened but rarely obscurely so; stolons often present; spikelet narrowly ovoid, narrowly oblong-ovoid, or ellipsoid-cylindric, (3–)7–25 mm.
- 22a. Basalmost glume empty, suborbicular, spathiform, usually completely encircling base of spikelet.
- 23a. Persistent style base large, mitriform, cellular-spongy, ovoid, more than 2/3 to as long as nutlet 30. *E. kamschatica*
- 23b. Persistent style base conic, broadly ovoid, deltoid, 3-angled, or depressed, less than 1/2 as long as nutlet.
- 24a. Persistent style base depressed, subpatelliform (disk-shaped) 31. *E. fennica*
- 24b. Persistent style base shallowly conic-ovoid, obtusely 3-angled, low conic, or shortly 3-angled.
- 25a. Glumes oblong-ovate to oblong-lanceolate; persistent style base shallowly conic-ovoid, nearly as long as wide, nearly 1/2 as long as nutlet 32. *E. uniglumis*
- 25b. Glumes ovate; persistent style base obtusely 3-angled or low conic, shorter than or nearly as long as wide, 1/4–1/3 as long as nutlet.
- 26a. Persistent style base obtusely 3-angled, nearly as long as wide, ca. 1/3 as wide as nutlet; perianth bristles 4, slightly longer than nutlet 33. *E. penchaoi*
- 26b. Persistent style base low conic or shortly 3-angled, shorter than wide, ca. 1/2 as wide as nutlet; perianth bristles 4–6, slightly shorter to slightly longer than nutlet.
- 27a. Culms 8–25 cm tall; spikelet 3–4 mm wide; glumes ovate to broadly ovate, ca. 3 mm, apex acute; perianth bristles as long as or slightly longer than nutlet 34. *E. erhaiensis*

- 27b. Culms 25–30 cm tall; spikelet 2–3 mm wide; glumes ovate to oblong-ovate, ca. 4 mm, apex obtuse; perianth bristles slightly shorter than nutlet 35. *E. qinghaiensis*
- 22b. Basal 2 or 3 glumes empty, basalmost encircling 1/2 or less of spikelet base.
- 28a. Persistent style base oblong-ovoid to oblong-conic, much longer than wide 29. *E. palustris*
- 28b. Persistent style base shortly conic, globose-ovoid, broadly ovoid, subquadrate, or globose, as wide as or wider than long.
- 29a. Leaf sheaths scarious (at least apical ones), mouth with a deep sinus ventrally 26. *E. argyrolepis*
- 29b. Leaf sheaths herbaceous, mouth truncate to obliquely truncate.
- 30a. Spikelet broadly ovoid to oblong, 3–8 mm, few flowered 27. *E. abnormalis*
- 30b. Spikelet oblong to oblong-lanceolate, (7–)10–30 mm, many flowered.
- 31a. Glume apices obtuse to subrounded; persistent style base broadly ovoid, rounded-ovoid, subquadrate, or globose.
- 32a. Glumes ovate to oblong-ovate; nutlet globose-obovoid; persistent style base broadly ovoid 28. *E. valleculosa*
- 32b. Glumes oblong to linear-oblong; nutlet usually ellipsoid; persistent style base globose-ovoid to subquadrate 22. *E. liouana*
- 31b. Glume apices acute to subacute; persistent style base shortly conic, conic, or globose.
- 33a. Persistent style base globose or wider than long, mammiform or mitriform (cap-shaped) 25. *E. mitracarpa*
- 33b. Persistent style base shortly conic to conic.
- 34a. Glumes oblong-lanceolate; nutlet obovoid, 0.7–0.8 mm wide; persistent style base narrowly conic 23. *E. migoana*
- 34b. Glumes ovate to oblong-ovate or ovate-lanceolate; nutlet broadly obovoid to orbicular-obovoid, 1–1.3 mm wide; persistent style base depressed conic or shortly conic 24. *E. ussuriensis*

1. *Eleocharis dulcis* (N. L. Burman) Trinius ex Henschel, *Vita Rumphii*, 186. 1833.

荸荠 bi qi

Andropogon dulcis N. L. Burman, *Fl. Indica*, 219. 1768; *Eleocharis equisetina* J. Presl & C. Presl; *E. plantaginea* (Retzius) Roemer & Schultes; *E. plantagineiformis* Tang & F. T. Wang; *E. tuberosa* Schultes; *Scirpus plantagineus* Retzius; *S. tuberosus* Roxburgh (1819), not Desfontaines (1798).

Perennials. Stolons slender, often terminated by a tuber. Culms erect, grayish green, tufted, 15–60 cm tall, 1.5–3 mm thick, cylindrical, smooth, glabrous, surface with transverse septa, nodes evident when dry. Leaf sheaths 2 or 3, greenish yellow, purplish red, or brown, 2–20 cm, mouth obliquely truncate, apex acute. Spikelet pale green, cylindrical, 1.5–4 cm × 6–7 mm, many flowered. Basal 2 glumes empty, amplexicaul for whole spikelet base; fertile glumes grayish green, laxly imbricate, broadly oblong to ovate-oblong, 3–5 × 2.5–3.5(–4) mm, subleathery, pale brown punctulate and finely striate, margin pale yellow and membranous, apex obtuse. Perianth bristles 7, ca. 1.5 × as long as nutlet, retrorsely spinulose. Stigmas 3. Nutlet brown when mature, broadly obovoid, ca. 2.5 × 1.8 mm, biconvex, essentially smooth but faintly and finely cancellate with hexagonal to oblong hexagonal epidermal cells, apex not constricted but with an annular thickening; persistent style base triangular-attenuate, flattened, not spongy, base ca. 1/2 as wide as nutlet. Fl. and fr. May–Oct. $2n = 38$, ca. 108.

Field margins, lake margins, commonly cultivated; near sea level to 1500 m. Fujian, Guangdong, Guangxi, Hainan, Hubei, W Hunan, Jiangsu, Taiwan [India, Indonesia, Japan, Korea, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa, N Australia, Indian Ocean islands, Madagascar, Pacific islands].

The tuber (water chestnut) is eaten.

Although originating in the Old World tropics, because this species is commonly cultivated for its tubers, the actual distribution is uncertain. As a cultivated plant, it is grown throughout most of China.

2. *Eleocharis spiralis* (Rottbøll) Roemer & Schultes, *Syst. Veg.* 2: 155. 1817.

螺旋鳞荸荠 luo xuan lin bi qi

Scirpus spiralis Rottbøll, *Descr. Icon. Rar. Pl.* 45. 1773.

Perennials. Stolons slender. Culms erect, pale green, tufted, 50–60 cm tall, 3–4 mm thick, firm, 3-angled, without transverse septa and nodes. Leaf sheaths 3 or 4, 3–21 cm, smooth, slightly shiny; basalmost sheath purplish red to dark brown, ± short; cauline sheaths pale red, elongate, mouth obliquely truncate and parted, apex shortly acuminate with a setaceous appendage. Spikelet pale yellow, cylindrical, 1.5–3 cm × 5–6 mm, many flowered, apex acute to obtuse. Basalmost glume empty, broadly triangular, amplexicaul for whole spikelet base; fertile glumes densely imbricate, subquadrate, ca. 3 × 3 mm, pale and brownish red punctulate striate, medially leathery and with a midvein, margin hyaline and minutely brown punctulate, apex

truncate to subtruncate. Perianth bristles 6, reddish purple, as long as or shorter than nutlet, laxly retrorsely spinulose. Stigmas 3. Nutlet pale yellow turning dark brown when mature, obovoid to broadly obovoid, 1.2–1.5 × ca. 1 mm, compressed biconvex, obscurely cancellate with 17–20 rows of transversely oblong epidermal cells, margin narrow, apex not constricted but with an obscure annular thickening; persistent style base conic, basally gradually narrowed, base ca. 1/2 as wide as nutlet. Fl. and fr. Nov–Jan.

Wet places near seashores; near sea level. Guangdong, Hainan [Bangladesh, Cambodia, India, Indonesia, Malaysia, Myanmar, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa and Australia, Madagascar, Pacific islands].

3. *Eleocharis trilateralis* Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 225. 1961.

三面秆荸荠 san mian gan bi qi

Perennials. Stolons long, slender. Culms erect, grayish yellow, tufted, 30–75 cm tall, ca. 5 mm thick, firm, sharply 3-angled, narrowly winged on angles, smooth, glabrous, without transverse septa. Leaf sheaths 2, 5–18 cm; basalmost sheath dark purple, ± short; cauline sheath pale yellow, ± elongate, tubular, mouth obliquely truncate, apex acute. Spikelet pale brown, cylindric, 2–4 cm × ca. 5 mm, ± few flowered, apex obtuse. Basalmost glume empty, broadly ovate, amplexicaul for whole spikelet base, apex subrounded; fertile glumes pale brown, laxly imbricate, broadly ovate, ca. 5 × 5 mm, with many purple longitudinal striae, medially reddish brown punctulate, leathery, and with a single midvein, both sides thinner, margin hyaline, apex obtuse-rounded. Perianth bristles 6, pale brown, nearly 2 × as long as nutlet, retrorsely spinulose. Stigmas 3. Nutlet pale yellow, broadly obovoid, ca. 2.5 × 1.5 mm, biconvex, with transverse oblong reticulate striae, apex distinctly constricted into a neck; persistent style base dark brown, attenuate to subdeltoid, compressed, not spongy, base ca. 1/2 as wide as nutlet.

• Marshes; 1800–3300 m. Yunnan.

4. *Eleocharis acutangula* (Roxburgh) Schultes, Mant. 2: 91. 1824.

锐棱荸荠 rui leng bi qi

Scirpus acutangulus Roxburgh, Fl. Ind. 1: 216. 1820; *Eleocharis fistulosa* Schultes; *S. fistulosus* Poirlet (1805), not Forsskål (1775).

Perennials. Stolons slender. Culms erect, pale green, tufted, 30–75 cm tall, (1–)3–4 mm thick, sharply 3-angled, smooth, glabrous, without transverse septa. Leaf sheaths 2 or 3; basalmost sheath brown, glumelike; cauline sheaths tubular, 5–15 cm, base dark red to dark purple, mouth obliquely truncate, apex acute. Spikelet pale green, cylindric, 1.5–4 cm × 3–5 mm, many flowered, apex acuminate. Basalmost glume empty, broadly ovate, amplexicaul for whole spikelet base; fertile glumes laxly imbricate, broadly ovate, ca. 4.5 × 3.5 mm, purplish red punctulate, medially grayish yellow, subleathery, and with several veins including a conspicuous midvein, margin membranous, apex rounded. Perianth bristles 6, longest ca. 1.5

× as long as nutlet, retrorsely spinulose. Stigmas 3. Nutlet pale yellow, broadly obovoid to obovoid, ca. 2 × 1.5 mm, biconvex, shallowly pitted with 13–15 longitudinal rows of transversely oriented oblong to linear epidermal cells, apex slightly constricted and with a conspicuous annular thickening; persistent style base subdeltoid, not spongy, base ca. 3/5 as wide as nutlet. Fl. and fr. Jun–Sep.

Flooded fields, moist areas; 500–1800 m. Fujian, Guangxi, Hainan, Hong Kong, Taiwan [Cambodia, India, Indonesia, Japan, Laos, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa, America, and Australia, Madagascar].

5. *Eleocharis philippinensis* Svenson, Rhodora 31: 155. 1929.

菲律宾荸荠 fei lü bin bi qi

Perennials. Stolons slender. Culms erect, brown, tufted, 30–50 cm tall, 1.5–2.5 mm thick, acutely 4- or 5-angled. Leaf sheaths 2 or 3, reddish brown to dark brown, tubular, 2–8 cm, mouth obliquely truncate, apex acute. Spikelet cylindric, 1.5–4 cm × 2.5–3 mm. Basalmost glume empty; fertile glumes brownish green, laxly spiraled and in 4 rows, broadly lanceolate, 4–5 × 1.5–2.5 mm, membranous, abaxially purplish red punctulate medially, many veined and with a slightly conspicuous midvein, margin hyaline, apex obtuse to slightly acute. Perianth bristles 7, 3 on outer series as long as nutlet, 4 on inner series as long as style base, retrorsely spinulose. Stigmas 2. Nutlet yellowish brown, obovoid, 1.5–2 × 1–1.2 mm, biconvex, deeply pitted with 15–20 longitudinal rows of hexagonal epidermal cells, apex slightly constricted into a short neck and with a slightly annular thickening; persistent style base long pyramidal, apex attenuate. Fl. and fr. Sep–Oct.

Flooded fields, moist areas. Guangdong, Hainan [India, Indonesia, Malaysia, Papua New Guinea, Philippines, Thailand, Vietnam; N Australia, Pacific islands (New Caledonia)].

6. *Eleocharis ochrostachys* Steudel, Syn. Pl. Glumac. 2: 80. 1854.

假马蹄 jia ma ti

Eleocharis variegata (Poirlet) C. Presl var. *laxiflora* (Thwaites) Ridley; *Scirpus laxiflorus* Thwaites.

Perennials. Stolons slender. Culms straw-colored, tufted, 37–75 cm tall, 2–3 mm thick, terete but sometimes apically obscurely 3-angled, without transverse septa, longitudinally canaliculate on surface when dry. Leaf sheaths 2 or 3, purplish red, tubular, 6–18 cm, mouth obliquely truncate, apex acute. Spikelet pale, cylindric, 2–4 cm × ca. 4 mm, few flowered, apex rounded to obtuse. Basalmost glume empty, broadly ovate, amplexicaul for whole spikelet base; fertile glumes straw-colored to pale brown, laxly imbricate, broadly oblong, ca. 5 × 3 mm, subleathery, purple punctulate, many veined with an obscure midvein, margin hyaline, apex rounded to obtuse. Perianth bristles 6 or 7, ca. 2 × as long as nutlet, retrorsely spinulose. Stigmas (2 or)3. Nutlet pale yellow turning brown when mature, broadly obovoid, ca. 2 × 1.5 mm, compressed biconvex, longitudinally striate with 25–32 rows of transversely linear-oblong epidermal cells, apex not constricted but with an annular

thickening; persistent style base narrowly long pyramidal, base ca. 1/2 as wide as nutlet. Fl. and fr. Sep–Oct.

Paddy fields, pond margins, moist areas. Guangdong, Hainan, Taiwan [Cambodia, India, Indonesia, Japan (Ryukyu Islands), Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam; Pacific islands].

7. *Eleocharis parvula* (Roemer & Schultes) Link ex Bluff, Nees & Schauer, Comp. Fl. German., ed. 2, 1: 93. 1836.

矮秆荸荠 ai gan bi qi

Scirpus parvulus Roemer & Schultes, Syst. Veg. 2: 124. 1817.

Perennials, stoloniferous. Rhizomes often terminated by small fusiform tubers. Culms light green, tufted, 1–7 cm tall, capillary. Leaf sheaths 1 (or 2), tubular, short, hyaline, inconspicuous, mouth oblique at orifice, apex obtuse. Spikelet light green, ovoid to ovoid-ellipsoid, 2–4 × 1–2 mm, subcompressed, 6–10-flowered. Basalmost glume empty, ca. 1/2 as long to as long as spikelet, amplexicaul for ca. 2/3 of spikelet base; fertile glume straw-colored to reddish tinged, ovate, 1.4–2.7 mm, membranous, apex subacute to rounded. Perianth bristles 4–6 or rarely absent, usually equaling nutlet to slightly exceeding tubercle, sometimes of different lengths, some ca. 1/2 as long as nutlet, minutely retrorsely spinulose. Stigmas 3. Nutlet straw-colored to pale brown, obovoid to obpyriform, 0.9–1.5 × 0.6–1 mm, 3-sided with plane to concave faces, smooth, apex not constricted; persistent style base triangular-subulate, 0.1–0.3 mm. Fl. and fr. Jul–Oct.

Wet saline or brackish shores; near sea level. Hainan [Indonesia, Japan, Kazakhstan, W Malesia, Russia, Uzbekistan, Vietnam; N Africa, Central, North, and South America, Europe].

8. *Eleocharis quinqueflora* (Hartmann) O. Schwarz, Mitt. Thüring. Bot. Ges. 1: 89. 1949.

少花荸荠 shao hua bi qi

Scirpus quinqueflorus Hartmann, Prim. Lin. Inst. Bot., ed. 2, 85. 1767; *Eleocharis meridionalis* G. Zinserling; *E. pauciflora* (Lightfoot) Link; *S. pauciflorus* Lightfoot.

Perennials. Stolons ca. 1 mm thick. Culms erect, wavy, or rarely recurved, grayish green, tufted, 3–30 cm tall, ca. 0.5 mm thick, obtusely 5-angled. Leaf sheaths 1 or 2, reddish brown to brown, tubular, 1–4 cm, mouth truncate. Spikelet brownish, ovoid to globose, 4–7 mm, 2–7-flowered. Basalmost glume empty, ca. 1/2 as long to as long as spikelet, amplexicaul for whole spikelet base; fertile glumes brown to dark reddish brown, ovate-lanceolate, ca. 4.5 × 1.7 mm, margin broadly to narrowly hyaline, apex acute. Perianth bristles 0–6, of different lengths, usually ca. 1/2 as long as nutlet or rarely slightly longer, retrorsely spinulose. Stigmas 3. Nutlet yellowish gray, obovoid, 1.9–2.5 × ca. 1 mm, plano-convex, appearing smooth but finely cellular reticulate, apex not constricted; persistent style base not inflated, subconic to 3-angled-subulate, 1/5–1/4 as long as nutlet. Fl. and fr. Jun–Jul.

River and lake margins, marshy areas; 800–4700 m. Gansu, Nei Mongol, Shanxi, Xinjiang, Xizang [Afghanistan, NW India, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Tajikistan, Uzbeki-

stan; N Africa, SW Asia, Europe, North and South America].

9. *Eleocharis retroflexa* (Poiret) Urban, Symb. Antill. 2: 165. 1900.

贝壳叶荸荠 bei ke ye bi qi

Scirpus retroflexus Poiret, Encycl. 6(2): 753. 1804; *Eleocharis chaetaria* Roemer & Schultes.

Annuals. Roots fibrous. Rhizomes and stolons absent. Culms often recurved, tufted, 2–16 cm tall or rarely more, filiform, soft, 5- or nearly 4-angled. Leaf sheaths 1 or 2, pale red, tubular, 2–12 mm; basalmost sheath bladeless; cauline sheaths usually with a glumelike blade at apex. Spikelet purplish red, ovoid, ca. 4 × 2 mm, slightly compressed, few flowered, sometimes proliferous. Basalmost glume empty, subelliptic, amplexicaul for whole spikelet base; fertile glumes green, broadly ovate, 2.8–3 × 1.8–2 mm, herbaceous, with a median keel, edge membranous, margin hyaline, apex acute to obtuse. Perianth bristles 6, nearly as long as nutlet, one on outer series shorter than nutlet, retrorsely spinulose. Stigmas 3. Nutlet yellowish, broadly obovoid, ca. 1.5 × 1 mm, 3-sided, angles prominently costate, reticulate to deeply pitted-reticulate with isodiametric epidermal cells, apex broadly truncate and not constricted; persistent style base pyramidal-acuminate, base as wide as to slightly narrower than nutlet. Fl. and fr. Jul–Nov.

Moist areas in fields. Fujian, Guangdong, Hainan, Yunnan [Cambodia, India, Indonesia, Japan (Ryukyu Islands), Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Sri Lanka, N Thailand, Vietnam; Africa, tropical America, NE Australia, Pacific islands].

10. *Eleocharis yokoscensis* (Franchet & Savatier) Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 54. 1961.

牛毛毡 niu mao zhan

Scirpus yokoscensis Franchet & Savatier, Enum. Pl. Jap. 2: 543. 1878 [“*yokoscensis*”]; *Eleocharis acicularis* (Linnaeus) Roemer & Schultes var. *longiseta* Svenson; *E. acicularis* subsp. *yokoscensis* (Franchet & Savatier) T. V. Egorova; *E. svensoni* G. Zinserling.

Perennials. Stolons slender. Culms densely tufted, 2–12 cm tall, filiform. Leaf sheaths reddish, tubular, 0.5–1.5 cm. Spikelet pale purple, ovoid, ca. 3 × 2 mm, few flowered, apex obtuse. Glumes laxly imbricate, subdistichous at base of spikelet; basalmost glume empty, oblong, ca. 2 × 1 mm, 3-veined, amplexicaul for whole spikelet base, apex obtuse; fertile glumes greenish medially and purple on sides, ovate, ca. 1.8 × 1.2 mm, membranous, margin hyaline, apex acute. Perianth bristles 1–4, ca. 2 × as long as nutlet, retrorsely spinulose. Stigmas 3. Nutlet pale yellow, narrowly oblong, ca. 1 × 0.4–0.5 mm, obscurely 3-sided, longitudinally ridged, ridges separated by numerous cross-walls (trabeculae), apex contracted; persistent style base slightly inflated, conic, base ca. 1/3 as wide as nutlet. Fl. and fr. Apr–Nov.

Flooded fields, pond margins, moist and muddy soil; 300–3000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, N Xinjiang, Yunnan, Zhejiang [India, Indonesia (Sumatra), Japan, Korea, Mongolia, Myanmar, Philippines, Russia (Far East), Vietnam].

J. Kern (Fl. Males., Ser. 1, Spermat. 7(3): 535. 1974) included *Eleocharis yokoscensis* within the circumscription of *E. acicularis* (Linnaeus) Roemer & Schultes as a synonym of *E. acicularis* var. *longisetata*, but we have observed and compared the characters of *E. yokoscensis* and *E. acicularis* and find they differ distinctly in characteristics of the nutlet and perianth bristles. The nutlet of the former has few transverse trabeculae (cross-walls) on the surface, the style base is \pm long and narrow, and the perianth bristles are ca. $2 \times$ as long as the nutlet. The nutlet of the latter has many transverse trabeculae on the surface, the style base is \pm short and broad, and the perianth bristles are shorter than or as long as the nutlet, rarely slightly exceeding the nutlet.

11. *Eleocharis tetraquetra* Nees in Wight, Contr. Bot. India, 113. 1834.

龙师草 long shi cao

Perennials. Stolons short or absent. Culms tufted, 25–90(–100) cm tall, ca. 1 mm thick, sharply 4-angled, glabrous. Leaf sheaths 2 or 3, tubular, 7–10 cm, basally purplish red, apically grayish green, mouth truncate, apex shortly triangular and mucronate. Spikelet brownish green, oblong-ovoid, \pm narrowly ovoid, or oblong, 7–20 cm \times 3–5 mm, slightly oblique, many flowered, apex obtuse to acute. Basal 3 glumes empty; basalmost glume amplexicaul for whole spikelet base; fertile glumes green at middle and pale rust-colored on sides, tightly imbricate, oblong and boat-shaped, 3–4 \times 1–1.5 mm, papery, margin narrowly hyaline, apex obtuse. Perianth bristles 6, reddish to brownish, as long as nutlet (including style base), laxly to densely retrorsely spinulose. Stigmas 3. Nutlet pale brown when mature, with a short thick stipe, obovoid to broadly obovoid, ca. 1.2 \times 1.5 mm, compressed 3-sided; persistent style base laterally compressed, deltoid, 1/2–2/3 as long and ca. 3/4 as wide as nutlet, surface sometimes mammillate, apex acuminate. Fl. and fr. Sep–Nov.

Pond and ditch margins, riverbanks; 100–1900 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Heilongjiang, Henan, Hunan, Jiangsu Jiangxi, Liaoning, Sichuan, Taiwan, Yunnan, Zhejiang [Afghanistan, Bhutan, India, Indonesia, Japan, Nepal, Pakistan, Papua New Guinea, Philippines, Russia (Far East), Sri Lanka, Thailand, Vietnam; N Australia].

12. *Eleocharis wichurae* Boeckeler, Linnaea 36: 448. 1870.

羽毛荸荠 yu mao bi qi

Eleocharis petasata (Maximowicz) G. Zinserling; *Scirpus petasatus* Maximowicz.

Perennials. Stolons short or absent. Culms grayish green, tufted, 30–60 cm tall, slender, sharply 4-angled, smooth. Leaf sheaths 1 or 2, reddish to purplish, mouth very obliquely truncate. Spikelet brownish at first but becoming pale green, ovoid, narrowly ovoid, or oblong, 8–15 \times 3–5 mm, slightly oblique, many flowered, apex acute. Basal 2 glumes empty; basalmost glume amplexicaul for whole spikelet base; fertile glumes pale green medially and rust-colored striate on both sides, tightly spirally imbricate, oblong to elliptic and boat-shaped, 4–6 \times 2–2.5 mm, membranous, midvein thin and obscure, margin broadly hyaline, apex obtuse-rounded. Perianth bristles 6, rust-colored, as long as nutlet (including style base), plumose with spreading hairs. Stigmas 3. Nutlet pale olivaceous, turning brownish when mature, shortly stipitate, obovoid to broadly

obovoid, ca. 1.5 \times 2 mm, obtusely 3-sided, slightly compressed, both surfaces smooth, apex not constricted; persistent style base very inflated, narrowly ovoid, as long and as wide as nutlet or nearly so, laterally compressed, densely mammillate, apex acute to obtuse. Fl. and fr. Jul–Sep.

Shallow water in valleys, grasslands by water, marshy areas; 900–1700 m. Anhui, SE Gansu, W Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jilin, Liaoning, NE Nei Mongol, S Shaanxi, Shandong, Zhejiang [Japan, Korea, Russia (Far East, Siberia)].

13. *Eleocharis yunnanensis* Svenson, Rhodora 41: 559. 1939.

云南荸荠 yun man bi qi

Eleocharis pauciflora (Lightfoot) Link var. *rhizomatosa* Handel-Mazzetti.

Perennials. Rhizomes thick, decumbent to obliquely ascending. Culms laxly to densely tufted, 16–40 cm tall, ca. 1 mm thick, terete, longitudinally sulcate. Leaf sheaths 3, basalmost glumelike; cauline sheaths 2, tubular, 2–8 cm, basally purplish red to purple, apically green, mouth slightly obliquely truncate. Spikelet narrowly oblong to oblong, 6–8 \times 2–3 mm, few flowered. Basal 2 glumes opposite, 1/2 or more as long as spikelet; basalmost glume usually proliferous but without a flower and next one both proliferous and with a flower; fertile glumes blood-red, spirally imbricate, ovate-lanceolate, 3–4 \times ca. 1.3 mm, midvein conspicuous to obscure, margin pale blood-red and broadly hyaline, apex acute. Perianth bristles 6, pale rust-colored, as long as nutlet, densely retrorsely shortly spinulose. Stigmas 3. Nutlet yellowish green, obovoid, 1.2–1.5 \times 0.6–0.8 mm, obtusely 3-sided, sides slightly convex, apex constricted, \pm narrow, and as wide as base of style; persistent style base pale, narrowly 3-angled to conic, ca. 1/2 as long as nutlet, apex attenuate to a short caudal tip. Fl. and fr. Apr–Aug.

• River margins in valleys; 1800–3300 m. Yunnan.

14. *Eleocharis pellucida* J. Presl & C. Presl, Reliq. Haenk. 1: 196. 1828.

透明鳞荸荠 tou ming lin bi qi

Annual or short-lived perennials. Rhizomes absent. Culms tufted to densely tufted, 5–30 cm tall or more, 0.5–1 mm thick, soft, longitudinally sulcate. Leaf sheaths 2, basally \pm purplish and apically green, tubular, 1.5–4 cm, mouth truncate, apex deltoid dentate. Spikelet narrowly ovoid, oblong-ovoid, cylindrical, or rarely globose-ovoid, (3–)5–10 \times 1.5–3 mm, several to many flowered. Basalmost glume empty, amplexicaul for whole spikelet base; fertile glumes pale rust-colored, \pm laxly spirally imbricate, oblong to suboblong, ca. 2 \times 1 mm, midvein greenish, margin hyaline, apex obtuse to rounded. Perianth bristles 6, rust-colored, ca. 1.5 \times as long as nutlet or slightly shorter, densely or laxly retrorsely spinulose. Stigmas 3. Nutlet yellowish to olivaceous, obovoid, 0.8–1.2 \times 0.5–0.7 mm, 3-sided, sides convex, narrowly costate on angles; persistent style base pyramidal to conic, 1/4–1/2 as long and ca. 1/2 as wide as nutlet, sometimes spongy-thickened, apex acuminate. Fl. and fr. Mar–Nov.

Pond margins, shallow ponds, paddy fields, shallow water margins, lake banks; 200–1700 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning,

Shaanxi, Shanxi, Sichuan, Yunnan, Zhejiang [India, Indonesia, Japan, Korea, Malaysia, Myanmar, Philippines, Russia (Far East), Sri Lanka, N Thailand].

- 1a. Spikelet narrowly ovoid, oblong-ovoid, or rarely globose-ovoid, (3–)5–8 mm.
 2a. Perianth bristles ca. $1.5 \times$ as long as nutlet, densely retrorsely spinulose; nutlet ca. 1.2 mm 14a. var. *pellucida*
 2b. Perianth bristles shorter than nutlet, laxly retrorsely spinulose; nutlet 0.8–0.9 mm 14b. var. *japonica*
 1b. Spikelet cylindrical or globose-ovoid, 8–10 mm or ca. 3 mm.
 3a. Spikelet cylindrical, 8–10 mm; nutlet ca. 0.5 mm wide; persistent style base conic, ca. $1/2$ as long as nutlet, not spongy-thickened 14c. var. *sanguinolenta*
 3b. Spikelet globose-ovoid, ca. 3 mm; nutlet ca. 0.7 mm wide; persistent style base pyramidal, ca. $1/3$ as long as nutlet, spongy-thickened 14d. var. *spongiosa*

14a. Eleocharis pellucida var. *pellucida*

透明鳞荸荠(原变种) tou ming lin bi qi (yuan bian zhong)

Eleocharis afflata Steudel; *E. shimadae* Hayata; *Scirpus afflatus* (Steudel) Benth.

Culms 5–30 cm tall, 0.5–1 mm thick. Spikelet narrowly ovoid, oblong-ovoid, or rarely globose, (3–)5–8 mm. Perianth bristles ca. $1.5 \times$ as long as nutlet, densely retrorsely spinulose. Stigmas 3. Nutlet obovoid, ca. 1.2×0.7 mm; persistent style base pyramidal, ca. $1/4$ as long as nutlet, not spongy-thickened, apex attenuate. Fl. and fr. Apr–Nov.

Rice paddies, pond margins, lake banks; 300–1000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Shaanxi, Shanxi, Sichuan, Yunnan, Zhejiang [India Indonesia, Japan, Korea, Malaysia, Myanmar, Philippines, Russia (Far East), Sri Lanka].

14b. Eleocharis pellucida var. *japonica* (Miquel) Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 58. 1961.

稻田荸荠 dao tian bi qi

Eleocharis japonica Miquel, Ann. Mus. Bot. Lugduno-Batavi 2: 142. 1865; *Scirpus japonicus* (Miquel) Franchet & Savatier (1877), not (Maximowicz) Fernald (1905).

Culms usually very short, hairlike. Perianth bristles shorter than nutlet, laxly retrorsely spinulose. Nutlet 0.8–0.9 mm; persistent style base usually \pm elongate. Fl. and fr. Mar–Oct.

Paddy fields, shallow water margins; 200–1700 m. Anhui, Fujian, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Yunnan, Zhejiang [Japan, Korea, N Thailand].

14c. Eleocharis pellucida var. *sanguinolenta* Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 226. 1961.

血红穗荸荠 xue hong sui bi qi

Spikelet blood-red, cylindrical, 8–10 mm. Nutlet ca. 0.5 mm wide; persistent style base conic, ca. $1/2$ as long as nutlet.

- Shallow water margins. Guizhou.

14d. Eleocharis pellucida var. *spongiosa* Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 226. 1961.

海绵基荸荠 hai mian ji bi qi

Spikelet globose-ovoid, ca. 3 mm. Nutlet ca. 0.9×0.7 mm; persistent style base pyramidal, ca. $1/3$ as long as nutlet, spongy-thickened. Fl. and fr. Sep–Nov.

- Shallow ponds; 200–300 m. Jiangxi (Pingxiang).

15. Eleocharis maximowiczii G. Zinserling in Komarov, Fl. URSS 3: 588. 1935.

细秆荸荠 xi gan bi qi

Eleocharis pellucida J. Presl & C. Presl var. *maximowiczii* (G. Zinserling) Ohwi.

Perennials. Culms ascending or erect, pale green, densely tufted, 8–25 cm tall, thin, 4-angled, sulcate. Leaf sheaths reddish purple. Spikelet ovoid to ovoid-cylindrical, 2.5–6 mm, few flowered, sometimes bearing a second, sterile spikelet in basalmost glume, apex acute to rarely blunt. Basalmost glume empty, amplexicaul for more than $1/2$ of spikelet base; fertile glumes green in a broad medial band and dark brown on sides, laxly imbricate, ovate to elliptic, ca. 2 mm, margin broadly hyaline, apex obtuse. Perianth bristles 6, slightly shorter than nutlet, densely retrorsely spinulose. Stigmas 3. Nutlet olivaceous, obovoid, $0.9-1 \times$ ca. 0.5 mm, obtusely 3-sided, smooth; persistent style base deltoid to shortly conic, $1-2 \times$ ca. 3 mm. Fl. and fr. Jun–Jul.

Swamps, wet meadows, damp trail margins, paddy fields. Heilongjiang [Russia (Far East)].

16. Eleocharis setulosa P. C. Li, Acta Bot. Yunnan. 12: 11. 1990.

短刚毛针蔺 duan gang mao zhen lin

Perennials. Culms 7–11 cm tall, slender, smooth. Leaf sheaths 2, basally reddish brown and apically yellowish, 0.8–1.8 cm, mouth obliquely truncate, apex acuminate. Spikelet ovoid to \pm narrowly ovoid, 3–4 mm, 4–6-flowered. Basalmost glume empty, amplexicaul for $1/2$ or more of spikelet base; fertile glumes reddish brown, oblong, 1.9–2.1 mm, membranous, margin white and hyaline, apex obtuse. Perianth bristles 2–5, $1/4-1/2$ as long as nutlet, retrorsely spinulose. Stigmas 3. Nutlet straw-colored to green, oblong to obovoid-oblong, ca. 1.5 mm, obtusely 3-sided, with longitudinal rows of oblong epidermal cells; persistent style base straw-colored, deltoid, base ca. $1/2$ as wide as nutlet, apex attenuate.

- Alpine meadows; 3100–3200 m. NW Yunnan (Zhongdian).

17. Eleocharis attenuata (Franchet & Savatier) Palla, Monde Pl. 12: 40. 1910.

渐尖穗荸荠 jian jian sui bi qi

Perennials. Rhizomes decumbent or absent. Culms \pm laxly

to densely tufted, 20–50 cm tall or \pm short, ca. 1 mm thick, terete, longitudinally sulcate. Leaf sheaths 2, basally blood-red to pale blood-red and apically pale brownish yellow, 2.5–7 cm, mouth truncate, apex shortly aristate to mucronate. Spikelet ovoid, narrowly ovoid, or ellipsoid-ovoid, 6–10 \times ca. 3 mm or longer, densely many flowered, apex acute to obtuse. Basalmost glume empty, amplexicaul for whole spikelet base; fertile glumes pale to slightly rust-colored, tightly imbricate, oblong to suboblong, ca. 2.2 \times 1 mm, margin hyaline, apex rounded. Perianth bristles 6, rust-colored, as long as nutlet or slightly shorter, densely to laxly retrorsely shortly spinulose. Stigmas 3. Nutlet dark yellow, obovoid, ca. 1.2 \times 0.7 mm, 3-sided, sides convex, smooth; persistent style base depressed deltoid-pyramidal, 1/4–1/3 (to nearly 1/2) as long as nutlet, base cup-shaped and slightly narrower to as wide as nutlet, margin basally slightly involute, apex acute. Fl. and fr. May–Sep.

Paddy fields, pond margins, riverbanks, moist soil; 100–600 m. Anhui, Fujian, Guangxi, Henan, Hubei, Hunan, Jiangsu, Shaanxi, Sichuan, Zhejiang [Japan, S Korea, Papua New Guinea, Russia (Far East), Vietnam].

- 1a. Rhizomes decumbent; culms 20–50 cm tall or more; spikelet 6–10 mm or more; perianth bristles densely retrorsely spinulose 17a. var. *attenuata*
 1b. Rhizomes absent; culms \pm short; spikelet \pm short; perianth bristles laxly retrorsely spinulose 17b. var. *erhizomatosa*

17a. *Eleocharis attenuata* var. *attenuata*

渐尖穗荸荠(原变种) jian jian sui bi qi (yuan bian zhong)

Scirpus attenuatus Franchet & Savatier, Enum. Pl. Jap. 2: 543. 1878; *Eleocharis japonica* Miquel var. *major* Nakai; *E. laeviseta* Nakai var. *major* (Nakai) H. Hara.

Rhizomes decumbent. Culms 20–50 cm tall or more. Spikelet ovoid to narrowly ovoid, 6–10 mm or more. Perianth bristles densely retrorsely spinulose. Persistent style base 1/4–1/3 as long as nutlet, slightly narrower than width of nutlet. Fl. and fr. May–Sep.

Paddy fields, pond margins; 100–600 m. Anhui, Fujian, Guangxi, Henan, Hubei, Jiangsu, Shaanxi, Sichuan [Japan, S Korea, Papua New Guinea, Russia (Far East), Vietnam].

17b. *Eleocharis attenuata* var. *erhizomatosa* Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 226. 1961.

无根状茎荸荠 wu gen zhuang jing bi qi

Rhizomes absent. Culms usually \pm short. Spikelet ellipsoid-ovoid, ca. 6 mm. Perianth bristles laxly retrorsely spinulose. Persistent style base ca. 1/3 to nearly 1/2 as long as nutlet, nearly as wide as nutlet. Fl. and fr. Jun–Sep.

• Riverbanks, moist soil; 300–500 m. Fujian, Guangxi, Hunan, Zhejiang.

18. *Eleocharis congesta* D. Don, Prodr. Fl. Nepal. 41. 1825.

密花荸荠 mi hua bi qi

Eleocharis purpurascens Boeckeler.

Perennials. Rhizomes decumbent. Culms tufted, 10–40 cm tall, 1–1.5 mm thick, slightly firm, subterete, with several longitudinal thin ribs. Leaf sheaths 2; cauline sheaths blood-red but later becoming pale blood-red apically, 3–8 cm, mouth truncate, apex mucronate to aristate. Spikelet oblong to narrowly oblong-ovoid, 8–11 \times 3–4 mm, densely many flowered, sometimes proliferous at spikelet base, apex obtuse to acute. Basalmost glume empty, amplexicaul for whole spikelet base; fertile glumes blood-red but green medially, tightly imbricate, oblong, ca. 2.2 \times 0.9 mm, margin very narrowly hyaline, apex subrounded. Perianth bristles 6, longer than nutlet, slightly densely and shortly retrorsely spinulose. Stigmas 3. Nutlet yellowish to olivaceous, obovoid to ellipsoid, ca. 1 \times 0.7 mm, 3-sided, sides convex, angles narrowly costate; persistent style base white, half-oblong, 1/4–1/3 as long and ca. 1/2 as wide as nutlet, spongy initially but hardened when dry, base cap-shaped, apex rounded but becoming pyramidal and acute when dry. Fl. and fr. May–Aug.

Forest margins, pond margins, river margins; 1300–1400 m. Yunnan [Bhutan, India, Indonesia, Japan (Ryukyu Islands), Kashmir, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam; Pacific islands].

19. *Eleocharis ovata* (Roth) Roemer & Schultes, Syst. Veg. 2: 152. 1817.

卵穗荸荠 luan sui bi qi

Scirpus ovatus Roth, Tent. Fl. Germ. 2: 562. 1793; *Eleocharis soloniensis* (Dubois) H. Hara; *S. soloniensis* Dubois.

Annuals. Rhizomes and stolons absent. Culms densely tufted, 4–50 cm tall, slender, terete, smooth, with few longitudinal ribs. Leaf sheaths 1–3, basally slightly red and apically greenish to straw-colored, 0.5–3 cm, tubular, mouth obliquely truncate, apex acute to mucronate. Spikelet ovoid to broadly ovoid, 4–8 \times 3–4 mm, densely many flowered, apex acute. Basal 2 glumes empty; basalmost glume amplexicaul for nearly 3/4 to all of spikelet base; fertile glumes greenish medially and blood-red on sides, laxly imbricate, ovate, oblong-ovate, or broadly ovate, ca. 1.5 \times 0.5 mm, membranous, margin narrowly hyaline, apex acute to obtuse. Perianth bristles 6, ca. 1.5 \times as long as nutlet (including style base), retrorsely spinulose. Stigmas 2. Nutlet at first white but turning brownish at maturity, obovoid, ca. 0.8 \times 0.5 mm, conspicuously convex on dorsal side and slightly convex on ventral side, smooth; persistent style base deltoid, ca. 1/3 as long and ca. 1/2 as wide as nutlet, dorsiventrally compressed, not spongy, surface not mammillate, apex acuminate. Fl. and fr. Aug–Dec.

Marshy areas; 100–3600 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Yunnan [Japan, Kazakhstan, Russia; Europe, North America].

20. *Eleocharis geniculata* (Linnaeus) Roemer & Schultes, Syst. Veg. 2: 150. 1817.

黑籽荸荠 hei zi bi qi

Scirpus geniculatus Linnaeus, Sp. Pl. 1: 48. 1753; *Eleocharis capitata* R. Brown; *E. caribaea* (Rottbøll) S. F. Blake; *S. caribaeus* Rottbøll.

Annuals. Rhizomes and stolons absent. Culms tufted to densely tufted, 3–45 cm tall, ca. 0.5 mm thick, soft, with a few longitudinal ribs and sulcate. Leaf sheaths 2, basally reddish and apically straw-colored, 1–1.5 cm, mouth obliquely truncate, apex acuminate. Spikelet globose to ovoid, 3–5 × 3–3.5 mm, densely many flowered, apex obtuse. Basal 3 or 4 glumes empty; basal 2 glumes opposite, amplexicaul for ca. 1/2 of spikelet base; fertile glumes pale rust-colored becoming ± pale, broadly elliptic, 1.6–2 × 1–1.2 mm, midvein obscure, margin narrowly hyaline, apex rounded. Perianth bristles 6–8, rust-colored, slightly shorter than nutlet, laxly and shortly retrorsely spinulose. Stigmas 2. Nutlet dark purple, broadly obovoid to globose-ovoid, 0.7–1.1 × ca. 0.6 mm, biconvex, smooth and shiny; persistent style base pale, depressed conic, 1/5–1/4 as long and 1/7–1/4 as wide as nutlet, slightly reflexed basally on both sides. Fl. and fr. Jan–Apr. $2n = 30$.

Shallow water margins at trail edges, sandy coastal habitats; near sea level. Fujian, Guangdong, Hainan, Taiwan [Afghanistan, Bangladesh, India, Indonesia, Japan (Ryukyu Islands), Malaysia, Myanmar, Pakistan, Philippines, Sri Lanka, Thailand; Africa, SW Asia, Australia, Central, North, and South America, S Europe, Madagascar, Pacific islands].

21. *Eleocharis atropurpurea* (Retzius) J. Presl & C. Presl, Reliq. Haenk. 1: 196. 1828.

紫果蔺 *zi guo lin*

Scirpus atropurpureus Retzius, Observ. Bot. 5: 14. 1788.

Annuals. Rhizomes and stolons absent. Culms greenish, tufted, 2–15 cm tall, hairlike, erect, terete, obtusely longitudinally ribbed. Leaf sheaths 1 or 2, basally purplish red and apically greenish, tubular, 0.5–1.5 cm, mouth obliquely truncate, apex obtuse to acute. Spikelet ovoid, globose, or oblong-ovoid, 2–5.5 × 1.5–2.5 mm, many flowered, apex obtuse. Basal 2 glumes empty; basalmost glume amplexicaul for more than 1/2 of spikelet base; fertile glumes green at middle and blood-red on both sides, laxly imbricate, oblong to elliptic, ca. 1 × 0.5 mm, membranous, midvein obscure, margin narrowly hyaline, apex obtuse to subrounded. Perianth bristles 4(–6), colorless to white, slightly longer to shorter than nutlet, laxly retrorsely spinulose. Stigmas 2. Nutlet at first purplish red then becoming dark purple, obovoid to broadly obovoid, 0.3–0.6 × ca. 0.4 mm, biconvex, smooth and shiny; persistent style base patelliform, umbonate at middle, not reflexed basally, ca. 1/6 as long and ca. 1/4 as wide as nutlet. Fl. and fr. Jun–Oct. $2n = 20$.

Rice fields, field margins, moist areas; 200–1400 m. Anhui, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangsu, Shandong, Sichuan, Taiwan, Yunnan [Bhutan, India, Indonesia, Japan, Nepal, Pakistan, Papua New Guinea, Philippines, Vietnam; Africa, Australia, Central, North, and South America, Europe, Indian Ocean islands, Madagascar].

22. *Eleocharis liouana* Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 226. 1961.

刘氏荸荠 *liu shi bi qi*

Perennials, stoloniferous. Culms tufted, 14–36 cm tall, 1–3 mm thick, few ribbed and longitudinally sulcate. Leaf sheaths 2, basally dark blood-red, tubular, 4–7 cm, mouth truncate.

Spikelet oblong, narrowly oblong-ovoid, or sometimes ± narrowly ovoid, 10–20 × 4–5 mm, many flowered, apex obtuse at anthesis. Basal 2 glumes empty; basalmost glume amplexicaul for more than 1/2 of spikelet base; fertile glumes green at middle and dark blood-red on both sides, laxly imbricate, oblong to linear-oblong, ca. 4 × 2 mm or narrower, margin broadly hyaline, apex obtuse to subrounded. Perianth bristles 4(or 5), longer than nutlet, densely and shortly retrorsely spinulose, spinules spreading. Stigmas 2. Nutlet at first yellow then becoming dark brown, usually ellipsoid or sometimes obovoid to subglobose, 1.2–1.5 × 1–1.2 mm, biconvex, apex constricted and not overlain by style base; persistent style base globose-ovoid to subquadrate, ca. 1/3 as long and ca. 2/3 as wide as nutlet, spongy, base rounded, apex attenuate. Fl. and fr. May–Jul.

• Trail margins; ca. 1900 m. Yunnan.

23. *Eleocharis migoana* Ohwi & T. Koyama, Bull. Natl. Sci. Mus., Tokyo, n.s., 3: 27. 1956.

江南荸荠 *jiang nan bi qi*

Perennials, stoloniferous. Culms tufted to densely tufted, 20–50 cm tall, 1–2 mm thick, slightly soft, longitudinally ribbed and sulcate, conspicuously transversely septate, ± tuberculate when dry. Leaf sheaths 2, basally reddish brown to brown and apically green, tubular, 3–10 cm, mouth truncate. Spikelet narrowly oblong-ovoid, 10–18 × 3–4.5 mm, many flowered, apex obtuse to subacute. Basal 2 glumes empty; basalmost glume amplexicaul for 1/2 or more of spikelet base; fertile glumes ± pale at middle and blood-red on sides, slightly tightly imbricate, oblong-lanceolate, 3.5–4.5 × 1–1.5 mm, midvein greenish, margin narrowly hyaline, apex subacute. Perianth bristles 4, 1.5–2 × as long as nutlet (including style base), densely and shortly retrorsely spinulose. Stigmas 2. Nutlet yellow to yellowish, obovoid, 1–1.3 × 0.7–0.8 mm, biconvex, smooth; persistent style base narrowly conic, ca. 1/2 as long and ca. 1/3 as wide as nutlet, apex attenuate. Fl. and fr. Apr–Aug.

• Moist grasslands on mountain slopes. Anhui, Jiangsu, Jiangxi, Zhejiang.

24. *Eleocharis ussuriensis* G. Zinserling in Komarov, Fl. URSS 3: 581. 1935.

乌苏里荸荠 *wu su li bi qi*

Eleocharis mamillata H. Lindberg var. *cyclocarpa* Kitagawa; *E. mamillata* subsp. *ussuriensis* (G. Zinserling) T. V. Egorova.

Perennials, with rhizomes and slender stolons. Culms single or laxly to densely tufted, 7–70 cm tall, 2–4 mm thick, terete, longitudinally ribbed and subsulcate, obscurely transversely septate between longitudinal ribs. Leaf sheaths 1 or 2, basally purplish red, tubular, 5–10 cm, mouth obliquely to transversely truncate. Spikelet ovoid-cylindric to narrowly cylindric-ovoid, 10–20 × 2–6 mm, many flowered. Basal 2 glumes empty, each amplexicaul for ca. 1/2 of spikelet base; fertile glumes green medially and reddish brown to dark brown on sides, subtightly imbricate, becoming laxly imbricate, oblong-ovate to ovate-lanceolate, 3–4 × 1.3–1.5 mm, apical margin broadly hyaline, apex acute to subacute. Perianth bristles 4

or 5, longer than nutlet, densely spreading and curved retrorsely spinulose. Style less than 1 mm; stigmas 2. Nutlet yellowish initially then brownish when mature, broadly obovoid to globose-obovoid, 1–1.5 × 1–1.3 mm, biconvex, subsmooth, apex constricted; persistent style base submamiform, shortly conic, or depressed conic, slightly wider than long, ca. 1/4 as long and ca. 1/2 as wide as nutlet, subspongy. Fl. and fr. Jun–Jul.

Moist areas, marshes, meadows; 100–1800 m. Hebei, Heilongjiang, Jilin, Liaoning, NE Nei Mongol, Shanxi [Japan, Korea, Russia (Far East, Siberia)].

25. *Eleocharis mitracarpa* Steudel, Syn. Pl. Glumac. 2: 77. 1854.

槽秆荸荠 cao gan bi qi

Perennials. Rhizomes creeping. Culms grayish green, 30–100 cm tall, 2–5 mm thick, spongy, easily compressed, smooth, finely longitudinally ribbed and sulcate. Leaf sheaths basally purplish to reddish brown and apically yellowish brown to pale brown, tubular, 1–20 cm, scarious, mouth obliquely truncate. Spikelet oblong-ovoid to narrowly oblong-ovoid, 1.5–3 cm × 4–7 mm, many flowered. Glumes laxly imbricate; basal 2 glumes empty; basalmost glume encircling 1/2 or less of spikelet base, apex obtuse; remaining glumes fertile, greenish medially and sides brown to reddish brown, lanceolate, 3.5–4.5 × ca. 1.3 mm, margin broadly hyaline, apex subacute. Perianth bristles usually 4, pale brown, shorter than to equaling nutlet (including style base). Stigmas 2. Nutlet yellow to brown, 1.3–2 × 1–1.3 mm (excluding style base), obovoid, thickly biconvex, glossy and finely or obscurely reticulate, apex constricted; persistent style base 0.4–0.9 × 0.5–0.8 mm, globose or wider than long, mitriform, ca. 1/4 as long as nutlet body.

Shallow water at lake margins, marshes. Guizhou, Hebei, E Nei Mongol, Shandong, Shanxi, Yunnan [Afghanistan, Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Uzbekistan; SW Asia, E Europe].

26. *Eleocharis argyrolepis* Kierulff ex Bunge, Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans 7: 518. 1851.

银鳞荸荠 yin lin bi qi

Perennials, stoloniferous. Culms single to few tufted, 15–75 cm tall, 1–3 mm thick but to 4 mm thick at base, shiny, sharply ribbed, transversely septate between ribs and becoming tuberculate when dry. Leaf sheaths 1 or 2, purplish red, 1–8 cm, scarious, mouth obliquely truncate and with a deep slit on ventral side, apex obtuse. Spikelet narrowly cylindrical-ovate to cylindrical, 1–2.5 cm × 2–4 mm, many flowered, apex acuminate. Basal 2 glumes empty, opposite, amplexicaul for 1/2 or more of spikelet base; fertile glumes greenish medially and with a narrow blood-red band on sides, laxly imbricate, sublancoleate to ovate-lanceolate, ca. 3 × 1.5 mm, midvein obscure, margin broadly hyaline, apex acute. Perianth bristles 4, ± as long as nutlet, slightly curved, laxly retrorsely spinulose, sometimes spreading. Stigmas 2. Nutlet yellow, broadly obovoid to globose-obovoid, 1–1.3 × ca. 1 mm, biconvex, smooth; persistent style base shortly conic to half-oblong, as long as or slightly longer than wide, 1/3–1/2 as long and nearly as wide as nutlet, spongy, apex rounded. Fl. and fr. May–Jul.

Lake banks, marshes, meadows, reed thickets; 500–1000 m. Xin-

jiang [Afghanistan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

27. *Eleocharis abnormalis* Y. D. Chen, Bull. Bot. Res., Harbin 7(2): 124. 1987.

短刚毛荸荠 duan gang mao bi qi

Perennials. Stolons short to long. Culms tufted, 8–25 cm tall, ca. 1 mm thick, smooth, glabrous. Leaf sheaths 1 or 2, basally purplish brown, 1.2–3.5 cm, mouth obliquely truncate. Spikelet broadly ovoid to oblong, 3–8 × 3–4 mm, few flowered to not more than 10-flowered. Basalmost glume empty, amplexicaul for 1/2 or more of spikelet base; fertile glumes purplish brown, slightly laxly imbricate, ovate to broadly ovate, ca. 3.5 × 2 mm, margin hyaline, apex acuminate. Perianth bristles 4, shorter than nutlet, retrorsely spinulose. Stigmas 2. Nutlet yellowish brown, obovoid, ca. 1.5 × 1.4 mm, biconvex, smooth; persistent style base white basally and dark brown at apex, shortly conic, 1/4–1/3 as long and 1/3–1/2 as wide as nutlet, spongy, apex obtuse to nearly half-oblong. Fl. and fr. Jul–Aug.

• Shallow water at lake margins; ca. 3300 m. Qinghai (Qinghai Hu).

28. *Eleocharis vallecuculosa* Ohwi var. *setosa* Ohwi, Acta Phytotax. Geobot. 2: 29. 1933.

具刚毛荸荠 ju gang mao bi qi

Eleocharis vallecuculosa f. *setosa* (Ohwi) Kitagawa.

Perennials, with a rhizomes and stolons. Culms single or tufted, 6–50 cm tall, 1–3 mm thick, terete, with a few sharp ribs. Leaf sheaths 1 or 2, basally purplish red, tubular, 3–10 cm, mouth truncate. Spikelet oblong-ovoid to narrowly oblong-ovoid, rarely ellipsoid to oblong, 0.7–2 cm × 2.5–3.5 mm, many flowered. Basal 2 glumes empty, amplexicaul for 1/2–2/3 of spikelet base; fertile glumes greenish to pale medially and with a narrow pale blood-red band on sides, ovate to oblong-ovate, ca. 3 × 1.7 mm, margin broadly hyaline, apex obtuse. Perianth bristles 4, distinctly longer than nutlet, slightly curved and not spreading, densely retrorsely spinulose. Stigmas 2. Nutlet yellowish, globose-obovoid, ca. 1 × 1 mm, biconvex, smooth; persistent style base broadly ovoid, ca. 1/3 as long and ca. 1/2 as wide as nutlet, spongy. Fl. and fr. Jun–Aug.

Shallow water; 100–4300 m. Anhui, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Japan, Korea].

Eleocharis vallecuculosa var. *vallecuculosa* occurs in Japan and Korea and differs by lacking perianth bristles.

29. *Eleocharis palustris* (Linnaeus) Roemer & Schultes, Syst. Veg. 2: 151. 1817.

沼泽荸荠 zhao ze bi qi

Scirpus palustris Linnaeus, Sp. Pl. 1: 47. 1753; *Eleocharis eupalustris* H. Lindberg; *E. intersita* G. Zinslerling.

Perennials. Rhizomes creeping. Culms a few tufted, 10–100 cm tall, 2–3 mm thick, few ribbed and longitudinally sulcate, obscurely tuberculate. Leaf sheaths 1 or 2, basally blood-

red purple, tubular, 3–7 cm, mouth slightly obliquely truncate. Spikelet oblong, narrowly oblong, or ellipsoid, 0.6–2.5 cm × 3–5 mm, many flowered, apex obtuse-rounded. Basal 2 glumes empty; basalmost glume amplexicaul for 1/2 or more of spikelet base; fertile glumes with a narrow green band medially and dark blood-red on sides, ovate to ovate-lanceolate, 3–4 × 1–1.5 mm, membranous, margin broadly hyaline, apex obtuse. Perianth bristles 4–6, shorter to slightly longer than nutlet, slightly curved, spreading outward, densely retrorsely spinulose. Stigmas 2. Nutlet at first yellowish then becoming brownish, obovoid, broadly obovoid, or globose-ovoid, 1.2–1.4 × 0.8–1 mm, unequally biconvex, smooth or rarely slightly prominently reticulate; persistent style base ovoid-oblong to oblong-conic, much longer than wide, 1/2–3/5 as long and ca. 1/2 as wide as nutlet, spongy, apex obtuse to rounded. Fl. and fr. Jun–Jul. $2n = 15, 16$.

Shallow water margins in valleys, wet meadows, water of canals; 100–4000 m. Gansu, Hebei, Heilongjiang, Jilin, Nei Mongol, Ningxia, Qinghai, Shaanxi, Xinjiang [Afghanistan, Japan, Kazakhstan, Mongolia, Nepal, Russia; N Africa, SW Asia, Atlantic Ocean islands, Europe, North America].

30. *Eleocharis kamschatnica* (C. A. Meyer) Komarov, Fl. Kamschatka 1: 207. 1927.

大基荸荠 da ji bi qi

Scirpus kamschatnicus C. A. Meyer, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 1: 198. 1831; *Eleocharis kamschatnica* f. *reducta* Ohwi; *E. komarovii* G. Zinserling; *E. mitrata* Makino; *E. sachalinensis* (Meinshausen) Komarov; *E. savatieri* C. B. Clarke ex H. Léveillé; *S. mitratus* Franchet & Savatier (1878), not Grisebach (1864); *S. sachalinensis* Meinshausen.

Perennials. Rhizomes elongate. Culms 20–50 cm tall, 1.5–3 mm thick, terete, conspicuously obtusely ribbed and longitudinally sulcate, surface transversely septate when dry. Leaf sheaths 1 or 2, brownish, tubular, 6–7 cm or more, mouth slightly obliquely truncate, apex triangular mucronate. Spikelet ovoid to narrowly ovoid, 8–20 × 3–5 mm, many flowered, apex obtuse. Basalmost glume empty, amplexicaul for more than 1/2 of spikelet base; fertile glumes pale blood-red to straw-colored and ± with pale blood-red lines, tightly imbricate, oblong to ovate-oblong, ca. 4 × 1 mm, midvein obscure, margin broadly to narrowly hyaline, apex obtuse. Perianth bristles 4 or 5 but sometimes rudimentary or absent, slightly shorter than to as long as nutlet, densely retrorsely spinulose. Stigmas 2. Nutlet at first yellow then becoming tawny, obovoid, broadly obovate, or subglobose, 1–1.5 × ca. 1 mm, biconvex, smooth and shiny; persistent style base ovoid to mitriform, large, cellular spongy, 2/3 or more as long and nearly as wide as nutlet. Fl. and fr. Jul–Oct. $2n = 38–40, 44, 56$.

River margins, marshes, wet places, especially in coastal habitats. Hebei, S Liaoning, Sichuan [Japan, Korea, Russia (Far East, E Siberia); North America].

31. *Eleocharis fennica* Palla ex Kneucker & G. Zinserling, Allg. Bot. Z. Syst. 7: 212. 1901.

扁基荸荠 bian ji bi qi

Perennials. Rhizomes short. Culms green to grayish green, tufted, 10–50 cm tall, ca. 1 mm thick, few ribbed and longitudinally sulcate. Leaf sheaths 2, blood-red, tubular, 5–10 cm, mouth truncate, apex triangular dentate. Spikelet cylindrical to ovoid-cylindric, 7–15 × ca. 3 mm, many flowered. Basalmost glume empty, amplexicaul for whole or nearly whole of spikelet base; fertile glumes dark blood-red to dark brown, slightly laxly imbricate, ovate, ca. 3 × 1.5 mm, midvein obscure, margin broadly to narrowly hyaline, apex obtuse. Perianth bristles absent or 4 or 5 and longer than nutlet. Stigmas 2. Nutlet brownish yellow, obovoid to rarely globose, ca. 1.4 × 1 mm to nearly as long as wide, biconvex, smooth; persistent style base white, subpatelliform (disk-shaped), ca. 0.2 × 0.5–0.7 mm, depressed, spongy-thickened, apically slightly concave. Fl. and fr. May–Aug.

River margins, streams in valleys, wet places, coastal habitats, shallow water at lakeshores, swamps; near sea level to 3300 m. Heilongjiang, Nei Mongol, Qinghai, Xinjiang [Kazakhstan, Mongolia, Russia; Europe].

- 1a. Perianth bristles absent 31a. var. *fennica*
 1b. Perianth bristles 4 or 5 and longer than
 nutlet 31b. var. *sareptana*

31a. *Eleocharis fennica* var. *fennica*

扁基荸荠(原变种) bian ji bi qi (yuan bian zhong)

Eleocharis uniglumis (Link) Schultes subsp. *fennica* (Palla ex Kneucker & G. Zinserling) Vestergren.

Perianth bristles absent.

River margins, streams in valleys, wet places, coastal habitats; near sea level to 3100 m. Heilongjiang [Kazakhstan, Mongolia, Russia; Europe].

31b. *Eleocharis fennica* var. *sareptana* (G. Zinserling) G. Zinserling in Komarov, Fl. URSS 3: 87. 1935.

具刚毛扁基荸荠 ju gang mao bian ji bi qi

Eleocharis sareptana G. Zinserling, Trudy Glavn. Bot. Sada 40: 279. 1929; *E. fennica* f. *sareptana* (G. Zinserling) Tang & F. T. Wang; *E. paradoxa* Y. D. Chen.

Perianth bristles 4 or 5, longer than nutlet.

Shallow water at lakeshores; ca. 3300 m. Qinghai, Xinjiang [Kazakhstan, Mongolia, Russia; Europe].

32. *Eleocharis uniglumis* (Link) Schultes, Mant. 2: 88. 1824.

单鳞苞荸荠 dan lin bao bi qi

Scirpus uniglumis Link, Jahrb. Gewächsk. 1(3): 77. 1820; *Eleocharis euuniglumis* G. Zinserling; *E. kuoi* Y. D. Chen.

Perennials. Stolons long to short. Culms single or tufted, 10–15 cm tall, ca. 1 mm thick, few ribbed and longitudinally sulcate. Leaf sheaths 2 or 3, basally blood-red and apically yellowish green, 1–4 cm, mouth truncate to slightly obliquely truncate. Spikelet narrowly ovoid, ovoid, or oblong, 3–8 × 1.5–3 mm, 4–10-flowered. Basalmost glume empty, amplexicaul for whole of spikelet base; fertile glumes at first green then becoming brownish at middle and both edges purplish red, laxly

imbricate, oblong-ovate to oblong-lanceolate, ca. 4×2 mm, margin apically becoming broadly hyaline, apex obtuse. Perianth bristles 4–6, longer than nutlet, slightly curved, outwardly spreading, densely retrorsely spinulose. Stigmas 2. Nutlet at first yellow then becoming brown, obovoid to broadly ovoid, $1.4\text{--}1.7 \times$ ca. 1 mm, biconvex, ventral side conspicuously convex and dorsal side slightly convex, sometimes obtusely 3-sided, apex constricted and overlain by style base; persistent style base white, shallowly conic-ovoid, slightly elongate basally, nearly as long as wide, ca. $1/2$ as long and ca. $1/2$ as wide as nutlet, spongy, apex rounded to obtuse. Fl. and fr. Apr–Aug. $2n = 46$, 60–88.

Lake banks, swamps, meadows, shallow water margins; 100–3300 m. Gansu, Hebei, Nei Mongol, Qinghai, Shaanxi, Shanxi, Xinjiang, Yunnan [Afghanistan, India, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Uzbekistan; N Africa, SW Asia, Europe, North America].

33. *Eleocharis penchaoi* Y. D. Chen, Bull. Bot. Res., Harbin 7(2): 119. 1987.

本兆荸荠 ben zhao bi qi

Perennials. Rhizomes elongate. Culms tufted, erect, 25–35 cm tall, ca. 2 mm thick. Leaf sheaths 1(or 2), grayish brown, tubular, 5–7 cm, smooth, glabrous, mouth truncate. Spikelet oblong, ca. $8 \times 3\text{--}4$ mm, more than 10-flowered. Basalmost glume empty, amplexicaul for more than $1/2$ of spikelet base; fertile glumes brown, subclaxly imbricate, ovate to narrowly ovate, ca. 4×2 mm, margin \pm broadly hyaline, apex acute to obtuse. Perianth bristles 4, slightly longer than nutlet, retrorsely spinulose. Stigmas 2. Nutlet yellowish, obovoid, ca. 1.7×1.5 mm, biconvex, smooth, both sides narrowly margined, apex constricted; persistent style base white but dark brown at apex, obtusely 3-angled, nearly as long and ca. $1/3$ as wide as nutlet, spongy. Fl. and fr. Jul–Aug.

• Shallow water at lake margins; ca. 3300 m. Qinghai (Qinghai Hu).

34. *Eleocharis erhaiensis* Y. D. Chen, Bull. Bot. Res., Harbin 7(2): 122. 1987.

耳海荸荠 er hai bi qi

Eleocharis callosa Y. D. Chen.

Perennials. Stolons elongate. Culms tufted, erect, grayish green, 8–25 cm tall, ca. 1 mm thick, smooth, glabrous. Leaf sheaths 1 or 2, basally purplish red to purplish brown, tubular, 1.5–5 cm, mouth obliquely truncate. Spikelet oblong, $5\text{--}10 \times 3\text{--}4$ mm, 8–15-flowered. Basalmost glume empty, amplexicaul for more than $1/2$ to nearly whole spikelet base; fertile glumes brown to dark brown but sometimes basally pale, \pm tightly spirally imbricate, ovate to broadly ovate, ca. 3×2 mm, midvein thin or obscure, margin yellowish and broadly hyaline, apex acute. Perianth bristles 4–6, as long as or slightly longer than nutlet (excluding style base), laxly retrorsely spinulose. Stigmas 2. Nutlet yellowish brown, obovoid, $1.8\text{--}2 \times 1.5\text{--}1.7$ mm, biconvex, smooth; persistent style base dark brown when mature, shortly 3-angled, wider than long, ca. $1/3$ as long and more than $1/2$ as wide as nutlet, spongy. Fl. and fr. Jul–Aug.

• Marshes, shallow water, wet places; 3200–3300 m. Qinghai.

35. *Eleocharis qinghaiensis* Y. D. Chen, Bull. Bot. Res., Harbin 7(2): 117. 1987.

青海荸荠 qing hai bi qi

Perennials. Rhizomes present; stolons elongate. Culms tufted, erect, grayish green, 25–30 cm tall, ca. 1 mm thick, glabrous. Leaf sheaths 1 or 2, purplish red, 3–4 cm, smooth. Spikelet brown, oblong, $5\text{--}7 \times 2\text{--}3$ mm, few flowered. Basalmost glume empty, amplexicaul for whole spikelet base; fertile glumes dark brown, ovate to oblong-ovate, ca. 3.5×2.5 mm, margin broadly hyaline, apex obtuse. Perianth bristles 5–7, shorter than nutlet, retrorsely spinulose. Stigmas 2. Nutlet greenish yellow, obovoid, ca. 1.7×1.5 mm, biconvex, smooth, apex constricted; persistent style base shortly conic, wider than long, ca. $1/3$ as long and more than $1/2$ as wide as nutlet, spongy, apex obtuse to subrounded. Fl. and fr. Jul–Aug.

• Shallow water at lake margins; ca. 3300 m. Qinghai (Qinghai Hu).

12. FIMBRISTYLIS Vahl, Enum. Pl. 2: 285. 1805, nom. cons.

飘拂草属 piao fu cao shu

Zhang Shuren (张树仁), Liang Songyun (梁松筠 Liang Song-jun); Tetsuo Koyama, David A. Simpson

Abildgaardia Vahl; *Cyperus* subg. *Iria* Richard; *Iria* (Richard) R. Hedwig.

Herbs, annual or perennial, medium sized, often rhizomatous. Culms usually tufted, slender, 3- or 5-angled or flattened. Leaves basal, sometimes reduced to a bladeless sheath; ligule if present membranous or a fringe of hairs; leaf blade linear, filiform, or rarely ensiform, usually dorsiventrally compressed and canaliculate, often adaxially cellular-reticulate. Inflorescences terminal, a simple, compound, or decompound anthela, rarely capitate or reduced to 1 terminal spikelet. Spikelets solitary or fascicled, ovoid, ellipsoid, or subglobose, terete or flattened, with several to many flowers. Glumes spirally imbricate, distichous, or only basal ones distichous and apical ones spirally imbricate, often with 1 or more veins forming an abaxial keel and sometimes extending into an apical mucro or arista. Flowers bisexual. Perianth bristles absent. Stamens 1–3. Style not persistent on nutlet, basally enlarged. Nutlet sometimes stipitate, biconvex, 3-sided, or almost terete, either reticulate, verruculose, or both.

Over 200 species: worldwide but mostly subtropical and tropical with center of distribution in SE Asia; 53 species (ten endemic) in China.

Although J. Kern reported *Fimbristylis merrillii* J. Kern from S China (Blumea 8: 135. 1955), no specimen from China has been seen by the present authors, and we doubt that it actually occurs in China.

- 1a. Spikelets ± compressed; glumes distichous at least on basal part of spikelet.
- 2a. Inflorescences reduced to a single spikelet; involucre bracts glumelike.
- 3a. Nutlet obovoid, verruculose, stipes less than 0.5 mm; leaf blade 0.5–1 mm wide 52. *F. ovata*
- 3b. Nutlet globose, with few verrucae, stipes more than 1 mm; leaf blade ca. 0.5 mm wide 53. *F. longistipitata*
- 2b. Inflorescences with 2 to several spikelets; involucre bracts leaflike, setaceous, or very rarely glumelike.
- 4a. Glumes glabrous, not gland-dotted.
- 5a. Nutlet 1–1.2 mm; spikelets often paired or fascicled, rarely solitary at apex of inflorescence rays 44. *F. nigrobrunnea*
- 5b. Nutlet 0.7–0.9 mm; spikelets solitary.
- 6a. Glumes yellowish brown; spikelets 6–10 mm; basalmost involucre bract less than 2 × as long as spikelet; rhizome short 45. *F. eragrostis*
- 6b. Glumes reddish brown; spikelets 3–6 mm; basalmost involucre bract more than 3 × as long as spikelet; rhizome absent 46. *F. disticha*
- 4b. Glumes hairy or gland-dotted.
- 7a. Glumes densely gland-dotted, glabrous; spikelets with 2 or 3 flowers; rays and raylets very slender, glabrous.
- 8a. Leaf blade ca. 1 mm wide, hairy on both surfaces; ligule absent; involucre bracts surpassing inflorescence 47. *F. nanningensis*
- 8b. Leaf blade 3–6 mm wide, glabrous; ligule a fringe of short white hairs; involucre bracts shorter than inflorescence 48. *F. cinnamometorum*
- 7b. Glumes not gland-dotted, hairy; spikelets with more than 3 flowers; rays and raylets thicker, hairy.
- 9a. Glumes awned, awns excurved; stigmas 2 49. *F. kwantungensis*
- 9b. Glumes shortly tipped, tips not excurved; stigmas 3.
- 10a. Perennials; culms 20–40 cm tall; inflorescence a compound anthela; glumes 4–5 mm; nutlet attenuate to base, subsessile; style 4–5 mm 50. *F. fusca*
- 10b. Annuals; culms 5–13 cm tall; inflorescence a simple or rarely compound anthela; glumes 2.5–3 mm; nutlet truncate at base, shortly stipitate; style ca. 2 mm 51. *F. fimbristylodes*
- 1b. Spikelets terete; glumes spirally imbricate.
- 11a. Spikelet solitary; involucre bracts glumelike; leaves with only a bladeless sheath.
- 12a. Nutlet narrowly oblong, base with a ca. 0.7 mm stipe; culms 4-angled 40. *F. tetragona*
- 12b. Nutlet broadly obovoid, subsessile; culms flatly cylindrical, subcylindric, or slightly compressed.
- 13a. Stigmas 3; spikelets narrowly oblong to clavate-oblong, 3.5–4.5 × 1–1.5 mm; glumes pale with short rust-colored lines, oblong to oblong-ovate, apex not mucronate; nutlet white, with sparse verrucae and subhexagonal reticulation 41. *F. pauciflora*
- 13b. Stigmas 2; spikelets ovoid, narrowly ovoid, ellipsoid, or oblong-ovoid, 5–15 × 2–5 mm; glumes brown with short rust-colored lines or greenish white and sometimes laterally with brown specks, apex mucronate; nutlet yellowish white, with transverse wavy reticulation.
- 14a. Spikelets slightly nodding; involucre bracts 2–4.5 mm; glumes brown with short rust-colored lines; stamens 3; nutlet margin verruculose 42. *F. nutans*
- 14b. Spikelets erect; involucre bract absent; glumes greenish white and sometimes laterally with brown specks; stamens 2; nutlet margin not verruculose 43. *F. acuminata*
- 11b. Spikelets (1 or) 2 to many; involucre bracts not glumelike; leaves with a blade.
- 15a. Stigmas 2; style compressed, apically ciliate.
- 16a. Spikelets angular because of keeled glumes, 7 mm or less (but to 12 mm in *F. gracilentia*).
- 17a. Style base with sparse long hairs covering nutlet apex 35. *F. squarrosa*
- 17b. Style base glabrous.
- 18a. Glumes brown; nutlet 0.6–0.8 mm.
- 19a. Nutlet broadly obovoid, with transverse oblong reticulation; leaf sheath greenish yellow or with rust-colored flecks; leaf blade 0.7–1.5 mm wide .. 36. *F. bisumbellata*
- 19b. Nutlet obovoid, almost smooth but sometimes with very indistinct hexagonal reticulation; leaf sheath brown; leaf blade 0.5–1 mm wide 37. *F. aestivalis*
- 18b. Glumes pale brown; nutlet ca. 1 mm.
- 20a. Leaf blade ca. 1 mm wide; spikelet oblong, lanceolate, or linear-lanceolate, 1.5–2 mm wide; rhizomes absent 38. *F. gracilentia*
- 20b. Leaf blade 1.5–3 mm wide; spikelet ovate or narrowly ovate, 2–4 mm wide; rhizomes short 39. *F. simaoensis*
- 16b. Spikelets terete, at least some to 10 mm or more (but only to 8 mm in *F. polytrichoides*).

- 21a. Spikelets 1–3(–6).
- 22a. Nutlet grayish black, with an extremely short stipe, obovoid, with transversely oblong reticulation and verrucae; growing in sandy places; glumes pale white with short brown lines medially, sometimes slightly yellowish brown apically 34. *F. polytrichoides*
- 22b. Nutlet yellowish white or brown, with a distinct stipe, broadly obovoid, with hexagonal reticulation; not growing in sandy places; glumes yellowish white with short brown lines or brown with short rust-colored lines.
- 23a. Glumes yellowish white, ca. 3 mm; nutlet yellowish white, with a short yellowish white stipe 31. *F. schoenoides*
- 23b. Glumes brown, 5–7 mm; nutlet brown or yellowish brown, with a short brown stipe.
- 24a. Spikelets 1 or 2; bract 1 or absent, longer than inflorescence; rhizomes absent; leaf blade ca. 1 mm wide 32. *F. subbispicata*
- 24b. Spikelets 3–6; bract 1, shorter than inflorescence; rhizomes short; leaf blade 1.2–2 mm wide 33. *F. tristachya*
- 21b. Spikelets several to many (in *F. sieboldii* sometimes with only 1–3 spikelets, but glumes only 1-veined, and culm base with leafless sheaths).
- 25a. Spikelets very narrowly ovoid to linear; nutlet with linear-oblong reticulation; rhizome absent 30. *F. hookeriana*
- 25b. Spikelets ovoid, ellipsoid, oblong, oblong-ovoid, narrowly oblong, ovoid-ellipsoid, or narrowly oblong-ovoid; nutlet with subtransverse, oblong, hexagonal, or oblong-hexagonal reticulation or subsmooth; rhizome absent or present.
- 26a. Plants stoloniferous; nutlet with horizontally oblong reticulation, vertical ribs not obvious 28. *F. stolonifera*
- 26b. Plants not stoloniferous; nutlet with hexagonal reticulation (*F. dichotoma* with oblong reticulation, but vertical ribs obvious; in *F. sieboldii* reticulation not obvious).
- 27a. Culm bases with leafless sheaths; glumes 1-veined, apical part abaxially pubescent; leaf blade ca. 1 mm wide; nutlet almost smooth 29. *F. sieboldii*
- 27b. Culm bases without leafless sheaths; glumes with 3 or more veins, abaxially glabrous; leaf blade more than 1 mm wide; nutlet with evident reticulation.
- 28a. Inflorescences inclined to nodding 27. *F. subinclinata*
- 28b. Inflorescences erect.
- 29a. Rhizomes woody, horizontally elongated 26. *F. rigidula*
- 29b. Rhizomes not prominent.
- 30a. Nutlet with hexagonal reticulation, without obvious vertical ribs, not stipitate 25. *F. longispica*
- 30b. Nutlet with transversely oblong reticulation, vertical ribs obvious or not, with a short brown stipe at base.
- 31a. Nutlet obovoid, with obvious vertical ribs, not verruculose; inflorescences 5–9 cm 23. *F. dichotoma*
- 31b. Nutlet ovoid, without vertical ribs, sparsely verruculose; inflorescences 3–4 cm 24. *F. shimadana*
- 15b. Stigmas (2 or)3; style not compressed or rarely slightly compressed, apically not ciliate.
- 32a. Basal part of culms with 1–3 leafless sheaths.
- 33a. Leaf blade bilaterally compressed, ensiform; leaf sheaths compressed; spikelets spherical or subspherical; glumes 1–1.3 mm 16. *F. littoralis*
- 33b. Leaf blade (if present) dorsiventrally flattened but canaliculate, linear; leaf sheaths tubular; spikelets more elongated (but sometimes globose-ellipsoid in *F. umbellaris*); glumes 1.5–2.7 mm.
- 34a. Leaves reduced to a bladeless sheath 18. *F. salbundia*
- 34b. Leaves with a blade.
- 35a. Culms 3-angled to subterete 22. *F. umbellaris*
- 35b. Culms 4- or 5-angled to subterete.
- 36a. Anthelae simple or subcompound (rarely reduced to 1 spikelet); glumes without any dark brown lines 21. *F. diphylloides*

- 36b. Anthelae usually compound; glumes each with 1 or 2 dark brown lines.
- 37a. Glume apices obtuse to rounded and not mucronate or apiculate; nutlet 0.6–0.8 mm; spikelets 2.7–7 mm 17. *F. aphylla*
- 37b. Glume apices mucronate or apiculate or at least acute; nutlet ca. 0.8 mm (or sometimes longer in *F. quinquangularis*); spikelets 2–5 mm.
- 38a. Ligule absent; involucre bracts 4, setaceous; rays 4; nutlet obovoid; stamens 1 or 2 19. *F. quinquangularis*
- 38b. Ligule a fringe of pubescence; involucre bracts 5–7, leaflike; rays 5–7; nutlet broadly obovoid; stamens 3 20. *F. chingmaiensis*
- 32b. Culm leaves all with a leaf blade.
- 39a. Culms tufted; rhizomes absent.
- 40a. Nutlet oblong; glumes white, straw-yellow, or rust-colored.
- 41a. Glumes white to pale straw-yellow; nutlet papillate laterally but papillae later deciduous; leaf blade 0.2–0.5 mm wide 1. *F. dipsacea*
- 41b. Glumes rust-colored; nutlet not papillate; leaf blade 1–2.5 mm wide 2. *F. stantonii*
- 40b. Nutlet obovoid, broadly obovoid, or ellipsoid-obovoid; glumes usually yellowish green.
- 42a. Stigmas 2; involucre bracts longer or shorter than inflorescence 5. *F. henryi*
- 42b. Stigmas 3; involucre bracts shorter than inflorescence.
- 43a. Spikelets 3–6 × 1–1.5 mm; glumes 2–2.5 mm; nutlet broadly obovoid, 0.7–1 mm 3. *F. autumnalis*
- 43b. Spikelets 2–3 × 1–1.2 mm; glumes 1–1.2 mm; nutlet obovoid, 0.4–0.5 mm 4. *F. microcarpa*
- 39b. Culms not tufted; rhizomes short or plants stoloniferous.
- 44a. Nutlet purplish black, grayish black, or blackish purple (not seen for *F. psammocola*); stigmas 2 or 3.
- 45a. Whole plant covered with dense white silky hairs; rhizomes elongated, branched 12. *F. sericea*
- 45b. Plant glabrous; rhizomes short, not branched.
- 46a. Spikelets 10–20 mm; style 3-sided; stigmas 3 13. *F. insignis*
- 46b. Spikelets 3–10 mm; style slightly flat or flat; stigmas 2 or 3.
- 47a. Glumes 1.2–2 mm, apex obtuse; spikelets 3–6 × 1.5–2.5 mm 11. *F. cymosa*
- 47b. Glumes 4–5 mm, apex acute; spikelets 6–10 × 2.5–4 mm 15. *F. psammocola*
- 44b. Nutlet white, yellowish white, cream-colored, yellow, or brown; stigmas 3.
- 48a. Glumes densely gland-dotted, margin fimbriate-ciliate, apex often emarginate 14. *F. leptoclada*
- 48b. Glumes not gland-dotted, margin not fimbriate-ciliate, apex not emarginate.
- 49a. Plants stoloniferous; involucre bracts subulate or glumelike 10. *F. pierotii*
- 49b. Plants not stoloniferous; involucre bracts leaflike.
- 50a. Leaf sheaths not compressed; glumes 5–7-veined forming an abaxial obtusely angled keel; nutlet ca. 2 mm 6. *F. thomsonii*
- 50b. Leaf sheaths compressed; glumes 1–3-veined; nutlet 0.7–1.5 mm.
- 51a. Ligule absent; involucre bracts longer than inflorescence 9. *F. dura*
- 51b. Ligule ciliate; involucre bracts shorter than inflorescence
- 52a. Glumes 3–3.5 mm, herbaceous, 1-veined; nutlet 1–1.5 mm 7. *F. complanata*
- 52b. Glumes 2–2.5 mm, membranous, 3-veined; nutlet 0.7–0.8 mm 8. *F. tainanensis*

1. *Fimbristylis dipsacea* (Rottbøll) Benth., Gen. Pl. 3: 1049. 1883.

起绒飘拂草 *qi rong piao fu cao*

Annuals. Rhizomes absent. Culms tufted, 2.5–15 cm tall, slender, smooth. Leaves as long as or shorter than culm; sheath rust-colored, thinly membranous, glabrous, mouth obliquely split; leaf blade capillary, 2.5–15 cm × 0.2–0.5 mm, involute to nearly flat. Involucre bracts 3–10, setaceous, basal 1 or 2 some-

times surpassing inflorescence. Inflorescence a simple or subcompound anthela, with fewer to numerous spikelets; rays 3–10, slender, unequal, spreading. Spikelets solitary, rarely 2 clustered, oblong, oblong-ovoid, or subglobose, 3–6 × 2–6 mm, many flowered. Glumes white or pale straw-yellow, oblong, oblong-ovate, or elliptic, ca. 1 mm (excluding awn), thinly membranous, 1-veined forming an abaxial green keel, apex blunt and awned. Stamens 1 or 2; anthers narrowly ovoid to oblong. Style basally slightly thickened; stigmas 2. Nutlet brown, ob-

long, shiny, with transversely hexagonal reticulation or sublinear horizontal lines, each edge bearing 5–9 caducous clavate glandular cells. Fl. and fr. Mar–Nov.

Field margins, wet grassy places by rivers, swampy places, pond margins; below 100 m. Anhui, Guangdong, Guangxi, Hainan, Heilongjiang, Hunan, Yunnan, Zhejiang [India, Indonesia, Japan, Korea, Laos, Myanmar, Papua New Guinea, Philippines, Russia, Sri Lanka, Thailand, Vietnam; Africa, N Australia, South America].

- 1a. Glume apices with a long excurved awn 1a. var. *dipsacea*
 1b. Glume apices with a short straight awn 1b. var. *verrucifera*

1a. *Fimbristylis dipsacea* var. *dipsacea*

起绒飘拂草(原变种) qi rong piao fu cao (yuan bian zhong)

Scirpus dipsaceus Rottbøll, Descr. Icon. Rar. Pl. 56. 1773.

Leaves often as long as or shorter than culm. Glumes white, elliptic, apex with a long excurved awn. Stamens 1 or 2. Fl. and fr. Mar–Nov. $2n = 10$.

Field margins, wet grassy places by rivers, swampy places, pond margins; below 100 m. Guangdong, Guangxi, Hainan, Yunnan [India, Indonesia, Laos, Myanmar, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Africa, N Australia, South America].

1b. *Fimbristylis dipsacea* var. *verrucifera* (Maximowicz) T. Koyama, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 8: 118. 1961.

疣果飘拂草 you guo piao fu cao

Isolepis verrucifera Maximowicz, Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans 9 [Prim. Fl. Amur.]: 300. 1859; *Fimbristylis verrucifera* (Maximowicz) Makino.

Leaves shorter than culm. Glumes white to pale straw-yellow, oblong to oblong-ovate, apex with a short straight awn. Stamen 1. Fl. and fr. Aug–Nov.

Field margins, wet places, water margins. Anhui, Heilongjiang, Hunan, Zhejiang [Japan, Korea, Russia (Far East)].

2. *Fimbristylis stauntonii* Debeaux & Franchet, Actes Soc. Linn. Bordeaux 31: 31. 1877.

烟台飘拂草 yan tai piao fu cao

Annuals. Rhizomes absent. Culms tufted, 4–40 cm tall, erect or rarely curved, flatly 3-angled, striate, glabrous, with fewer leaves at base. Leaves shorter than culm; sheath pale brown, 0.5–7 cm, adaxially membranous, mouth obliquely split; ligule very short, ciliate, apex truncate; leaf blade 1–2.5 mm wide but apically attenuate, flat, glabrous, apex acute. Involucral bracts 2 or 3, leaflike, slightly longer to shorter than inflorescence; bractlets subulate or glumelike, base dilated, apex awned. Inflorescence a simple or compound anthela, 1–7 × 1.5–7 cm; rays few, 1–7 cm, slender, ± spreading. Spikelets solitary, broadly ovoid to oblong, 3–7 × 1.5–2.5 mm, many flowered, base cuneate, apex acute, obtuse, or rounded. Glumes rust-colored, oblong-lanceolate, membranous, 1-veined forming an abaxial green keel, apex with a straight mucro. Stamen 1; anther ca. 0.4 mm, apex apiculate. Style subcylindric, glabrous, basally slightly inflated to spherical; stigmas 2 or 3. Nutlet yellowish

white, oblong, ca. 1 mm, subterete, with transverse oblong reticulation. Fl. and fr. Jul–Oct.

Cultivated fields, wet sandy places, among grasses; near sea level to 700 m. Anhui, S Gansu, Hebei, Henan, Hubei, Hunan, Jiangsu, Liaoning, Shaanxi, Shandong, Sichuan, Zhejiang [Japan, Korea].

3. *Fimbristylis autumnalis* (Linnaeus) Roemer & Schultes, Syst. Veg. 2: 97. 1817.

秋飘拂草 qiu piao fu cao

Scirpus autumnalis Linnaeus, Mant. Pl. Alt. 180. 1771; *Fimbristylis wukungshanensis* Tang & F. T. Wang.

Annuals. Rhizomes absent. Culms tufted, 6–20 cm tall, 1.5–2 mm wide, 3-angled, striate, glabrous, with 1 or 2 leaves at base. Leaves shorter than culm; sheath membranous, tinged rusty brown on ventral side, mouth obliquely truncate; ligule truncate, ciliate; leaf blade 1–2.5 mm wide, glabrous, gradually narrowed to an acute apex. Involucral bracts subulate, shorter than inflorescence. Inflorescence a simple to decompound anthela, 2–7 cm, lax; rays 3–6, 0.6–4 cm, spreading. Spikelets solitary, narrowly ovoid to oblong-ovoid, 3–6 × 1–1.5 mm, 7–16-flowered. Glumes pale brownish to yellowish, lanceolate-ovate, 2–2.5 mm, margin broadly hyaline, strongly folded by a 3-veined keel with veins projecting into a mucro. Stamen 1. Stigmas 3. Nutlet broadly obovoid, 0.7–1 × ca. 0.5 mm, 3-sided, finely cancellate with transversely oblong epidermal cells, sparsely verruculose; persistent style base conic. Fl. and fr. Sep.

Cultivated ground, grasslands; below 600 m. Jiangxi (Wugong Shan), Liaoning, Taiwan [Japan; Central, North, and South America].

4. *Fimbristylis microcarya* F. Mueller, Fragm. 1: 200. 1859.

台北飘拂草 tai bei piao fu cao

Fimbristylis autumnalis (Linnaeus) Roemer & Schultes subsp. *taiwanica* (Ohwi) T. Koyama; *F. taiwanica* Ohwi.

Annuals. Culms densely tufted, 10–30 cm tall, 0.7–1.3 mm thick, flatly 3-angled, smooth. Leaves basal, few; sheath light straw-colored to pale brown; ligule ciliate; leaf blade linear, to 18 cm × 1.5–5 mm, flat, apical margin scabrid. Involucral bracts 3 or 4, basalmost leaflike and to 4 cm. Inflorescence a decompound anthela, 3–6 × 3–6 cm, lax; primary rays 2–5, 1–5 cm, unequal, apically scabrous. Spikelets numerous per inflorescence, solitary, rust-colored, narrowly ovoid, 2–3 × 1–1.2 mm, slightly angular, subclaxly 5–10-flowered, apex acute. Glumes numerous, spirally imbricate, light rust-colored with pale brownish margins, ovate, 1–2 mm, membranous, 3-veined forming an abaxial keel, apex mucronate. Stamens 1 or 2; anthers 0.2–0.3 mm. Style 3-sided, glabrous, basally dilated; stigmas 3. Nutlet sessile, light straw-colored, obovoid, 0.4–0.5 × 0.3–0.4 mm, ± smooth or with scattered verrucae and slightly cancellate with transversely oblong cells.

Open wet places. Taiwan [India, Indonesia, Kashmir, Papua New Guinea, Philippines, Vietnam; Africa, Australia].

5. *Fimbristylis henryi* C. B. Clarke, J. Linn. Soc., Bot. 36: 237. 1903.

宜昌飘拂草 yi chang piao fu cao

Fimbristylis unicolor Ohwi & T. Koyama.

Annuals. Rhizomes absent. Culms tufted, 3–20 cm tall, 3-angled, striate, glabrous, with ca. 2 leaves at base. Leaves longer than culm; sheath rust-colored, 1–3.5 cm, adaxially membranous, mouth obliquely split; ligule ciliate, apex truncate; leaf blade 1–3 mm wide but apically attenuate, flat, glabrous, apex acute. Involucral bracts 2 or 3 (or 4), leaflike, longer to shorter than inflorescence; bractlets subulate, broad at basal part, margin membranous. Inflorescence a simple, compound, or decomposed anthela, 1–5 cm in diam.; rays 2–4, 0.5–3 cm. Spikelets solitary, narrowly oblong, narrowly ellipsoid, or rarely ovoid, 3–8 × 1–1.5 mm, with 8–10 or more flowers, apex obtuse to subacute. Glumes yellowish green to pale brown, ovate to ovate-lanceolate, ca. 2 mm (including mucro), 3-veined forming an abaxial green keel, margin broadly hyaline. Stamen 1; anther oblong, ca. 0.5 mm, 1/5–1/4 as long as filament, apex apiculate. Style basally inflated to conic; stigmas 2, ca. 1/2 as long as style. Nutlet pale yellow, ellipsoid-obovoid, obovoid, or ellipsoid, less than 1 mm, flat-convex, with transversely oblong reticulation but not verruculose. Fl. and fr. Aug–Nov.

• Cultivated fields, on rocks, marshes, riversides; 100–2000 m. Anhui, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, SE Yunnan, Zhejiang.

6. *Fimbristylis thomsonii* Boeckeler, *Linnaea* 37: 37. 1871.

西南飘拂草 xi nan piao fu cao

Perennials. Rhizomes short. Culms tufted, (11–)25–70 cm tall, flatly and obtusely 3-angled, striate, with many leaves at base. Leaves slightly shorter than culms to 1/4–1/2 as long as culm; sheaths brown, abaxially membranous and rust-colored, apex truncate; leaf blade 2–4.5 mm wide, flat, stiff, margin finely toothed, apex acute. Involucral bracts 2 or 3, leaflike, much shorter than inflorescence; bractlets subulate, broader at base. Inflorescence a compound or decomposed anthela; rays 2–4, 0.7–3.5 cm, slightly compressed. Spikelets solitary, oblong-ovoid to ellipsoid, 5–10 × 2–3 mm, 7–10-flowered or more, apex acute. Glumes chestnut-brown, ovate, 2.2–3.5 mm, 5–7-veined forming an abaxial obtuse keel, midvein green and excurrent into a mucro, margin membranous, apex acute. Stamens 3; anthers narrowly oblong, ca. 2 mm, ca. 2 × as long as filaments. Ovary oblong, nearly 3-sided, base slightly narrowed; style 3-sided, not ciliate, basally inflated to oblong-conic; stigmas 3, slightly longer than style. Nutlet yellowish white to yellow, obovoid, ca. 2 mm, obtusely 3-sided, with transversely oblong reticulation and verrucae. Fl. and fr. May–Jun.

Grassy slopes; 100–3100 m. Guangdong, Guangxi, Hainan, Taiwan, S Yunnan [India, Indonesia, Japan, Laos, Malaysia, Myanmar, Philippines, Thailand, Vietnam].

7. *Fimbristylis complanata* (Retzius) Link, *Hort. Berol.* 1: 292. 1827.

扁鞘飘拂草 bian qiao piao fu cao

Perennials. Rhizomes long, short, or almost absent. Culms tufted, (10–)20–70 cm tall, flatly 3- or 4-angled, striate, sometimes apically winged, with many leaves at base. Leaves shorter than culm; sheath bilaterally compressed, abaxially membranous and rust-colored, adaxially keeled, mouth obliquely split

and ciliate; ligule very short, ciliate; leaf blade 1–5 mm wide, flat, thickly papery, margin apically finely serrulate, apex acute. Involucral bracts 2–4, suberect, much shorter than inflorescence; bractlets setaceous, broader at base. Inflorescence a simple, compound, or decomposed anthela, 7.5–10.5 × 4–7 cm; rays 3 or 4, 1–7 cm, compressed, scabrid. Spikelets many per inflorescence, solitary, oblong, ovoid, or narrowly ovoid, 5–9 × 1.2–2 mm, 5–13-flowered, apex acute. Glumes brown, ovate, ca. 3 mm, 1-veined forming an abaxial yellowish green keel excurrent into a mucro, apex acute. Stamens 3; anthers oblong, 1 mm or longer, ca. 1/4 as long as filament, apex acute. Ovary oblong, 3-sided; style 3-sided, glabrous, basally inflated to conic; stigmas 3, ± as long as style. Nutlet white or yellowish white, obovoid to broadly obovoid, ca. 1.5 mm, obtusely 3-sided, with transverse oblong reticulation. Fl. and fr. Jun–Oct.

Wet places in valleys, grasslands, streamsides, open fields, slopes, ditches, swampy places, along ravines; 100–3000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, S Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shandong, Sichuan, Taiwan, SE Xizang, Yunnan, Zhejiang [Bhutan, India, Indonesia, Japan, Korea, Malaysia, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa, SW Asia (Yemen), N Australia, Central and South America, Indian Ocean islands, Pacific islands].

- 1a. Culms 50–70 cm tall, robust; rhizomes long to short; leaf blade 3–5 mm wide; inflorescence a decomposed anthela 7a. var. *complanata*
 1b. Culms (10–)20–50 cm tall, slender; rhizomes short to almost absent; leaf blade 1–2.5 mm wide; inflorescence a simple or compound anthela 7b. var. *exaltata*

7a. *Fimbristylis complanata* var. *complanata*

扁鞘飘拂草(原变种) bian qiao piao fu cao (yuan bian zhong)

Scirpus complanatus Retzius, *Observ. Bot.* 5: 14. 1788.

Rhizomes long or short, sometimes nearly diageotropic. Culms 50–70 cm tall, robust. Leaf blade 3–5 mm wide. Inflorescence a decomposed anthela. Fl. and fr. Jul–Oct.

Wet places in valleys, grasslands, streamsides; 500–3000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, S Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shandong, Sichuan, Taiwan, SE Xizang, Yunnan, Zhejiang [Bhutan, India, Indonesia, Japan, Korea, Malaysia, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa, SW Asia (Yemen), N Australia, Central and South America, Indian Ocean islands, Pacific islands].

7b. *Fimbristylis complanata* var. *exaltata* (T. Koyama) Y. C. Tang ex S. R. Zhang & T. Koyama, *stat. nov.*

矮扁鞘飘拂草 ai bian qiao piao fu cao

Basionym: *Fimbristylis complanata* f. *exaltata* T. Koyama, *Bull. Arts Sci. Div. Ryukyuu Univ.* 3: 70. 1959.

Rhizomes short to almost absent, slender. Culms (10–)20–50 cm tall, slender. Leaf blade 1–2.5 mm wide. Inflorescence a nearly simple or compound anthela. Fl. and fr. Jun–Sep.

Streamsides, water margins, open fields, slopes, ditches, swampy places, along ravines; 100–800 m. Anhui, Fujian, Guangdong, Guangxi,

Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Shandong, Taiwan, Zhejiang [Japan, Korea].

The name *Fimbristylis complanata* var. *kraussiana* (Hochstetter ex Steudel) C. B. Clarke was used by Tang and F. T. Wang (Fl. Reipubl. Popularis Sin. 11: 81. 1961), but the type of the basionym, *F. kraussiana* Hochstetter ex Steudel, belongs to *F. consanguinea* Kunth, which does not occur in China. T. Koyama proposed the new name *F. complanata* f. *exaltata* based on a different type. Because of the morphological differences and the more northern distribution, we are raising this form to a variety.

8. *Fimbristylis tainanensis* Ohwi, J. Jap. Bot. 14: 547. 1938.

台南飘拂草 tai nan piao fu cao

Fimbristylis autumnalis (Linnaeus) Roemer & Schultes subsp. *tainanensis* (Ohwi) T. Koyama; *F. microcarya* F. Mueller var. *tainanensis* (Ohwi) H. Y. Liu.

Perennials. Rhizomes short, ascending. Culms laxly tufted, 40–60 cm tall, compressed 3-sided or apically ± 2-angled, basally leaved. Leaf sheath ± 2-ranked, pale or tinged brown, mouth obliquely truncate and with a fringe of short pubescence; ligule short, ciliate; leaf blade 3–5 mm wide, ± flat, subrigid, scabrous toward subabruptly acute apex. Involucral bracts 2–4, basal one linear and equaling inflorescence. Inflorescence a compound or in part decompound anthela, 3–4 cm, with many dense spikelets; rays many, 1–2 cm, compressed. Spikelets solitary or in groups of 2 or 3, chestnut-brown to light brown, oblong to narrowly ovoid, 4–6 × 1.5–2 mm, 5–10-flowered, apex subacute. Glumes pale brown with chestnut-brown striae on both surfaces, oblong to oblong-ovate, 2–2.5 × 1–1.2 mm, 3-veined, apex with an acute costa. Stamens 3. Nutlet pale yellow, obovoid to broadly ovoid, 0.7–0.8 × ca. 0.7 mm, 3-sided, indistinctly cancellate, verruculose; persistent style ca. 2 mm, base conically thickened.

- Lowland marshes, paddy fields. Taiwan.

9. *Fimbristylis dura* (Zollinger & Moritz) Merrill, Philipp. J. Sci., C, 11: 53. 1916.

类扁鞘飘拂草 lei bian qiao piao fu cao

Isolepis dura Zollinger & Moritz in Moritz, Syst. Verz. 97. 1846.

Perennials. Rhizomes short. Culms solitary or tufted, 45–75 cm, 2–4 mm wide, compressed, striate, apically scabrous. Leaves shorter than or as long as culm, subdistichous; sheath slightly bilaterally compressed, abaxially membranous and brown, mouth obliquely split; ligule absent; leaf blade linear, 3–8 mm wide, flat, margin apically scabrous, apex acute. Involucral bracts 3 or 4, linear, basal 1 or 2 longer than inflorescence. Inflorescence a compound anthela, to 20 × 10 cm, lax; rays many, to 10 cm, slightly compressed. Spikelets solitary, oblong to oblong-ovoid, 4–10 × 1–1.5 mm. Glumes brown, ovate to oblong-ovate, 1.5–2 mm, 3-veined forming an abaxial yellowish green keel excurrent into a mucro, apex acute; apical glumes often abnormal, to 4 × 1.5 mm. Stamens (2 or)3; anthers oblong. Style 0.5–1 mm, 3-sided, glabrous or apically slightly ciliate, basally inflated; stigmas 3. Nutlet yellowish white to grayish brown, ellipsoid to oblong-obovoid, ca. 1 × 0.5 mm, obtusely 3-sided, with distinct transverse oblong reticulation,

sparsely verruculose. Fl. and fr. autumn.

Riversides, shady moist places in woods. Hainan [India, Indonesia, Malaysia, Thailand, Vietnam].

10. *Fimbristylis pierotii* Miquel, Ann. Mus. Bot. Lugduno-Batavi 2: 145. 1865.

东南飘拂草 dong nan piao fu cao

Perennials. Rhizomes to 2 mm in diam., creeping, covered with ovate scales. Culms solitary, 13–35 cm tall, flatly 3-angled, apical part scabrid, with 4–6 leaves and 2 nearly leafless sheaths at base. Leaves shorter than to nearly as long as culm; sheath rust-colored, adaxially membranous, not ciliate, mouth obliquely split; ligule absent; leaf blade 1.2–2 mm wide, margin flat to incurved and finely serrulate, apex acute. Involucral bracts 1–3, subulate or glumelike, shorter than inflorescence, apex with a long awns. Inflorescence a simple anthela, 1.5–2.5 cm, with 2–7 spikelets. Spikelets oblong, ellipsoid, or ovoid, 6–10 × 2.5–4 mm, 9-flowered, apex acute. Glumes chestnut-brown, broadly ovate, ca. 4 mm, 3-veined forming an abaxial green keel, margin membranous and white, apex obtuse to subacute; basal 2 glumes with an apical short hard mucro. Stamens 3; anthers linear-oblong, ca. 2 mm, ca. 1/4 as long as filaments. Ovary oblong, 3-sided, basally slightly narrower; style 3-sided, not ciliate, basally conic; stigmas 3, nearly as long as style. Nutlet brown, broadly obovoid, ca. 1 mm or more, flat to convex, finely verruculose. Fl. and fr. May–Sep.

Roadsides, coniferous forests, sunny dry places on mountain summits; near sea level to 3000 m. Anhui, Fujian, SE Henan, Jiangsu, Shandong, Yunnan, Zhejiang [Japan, Kashmir, Korea, Nepal, Philippines].

11. *Fimbristylis cymosa* R. Brown, Prodr. 228. 1810.

黑果飘拂草 hei guo piao fu cao

Perennials. Rhizomes short. Culms tufted, 10–60 cm tall, flatly and obtusely 3-angled, sometimes thick at base, with many leaves. Leaf blade 1–4 mm wide, thick, flat, extremely rigid, margin finely serrulate, apex acute. Involucral bracts 1–3, shorter than inflorescence. Inflorescence a simple or decompound anthela, headlike with a few short rays or open with several elongated rays. Spikelets numerous, solitary or clustered, oblong to ovoid, 3–6 × 1.5–2.5 mm, densely many flowered, apex obtuse. Glumes brown, ovate to broadly ovate, 1.2–2 mm, membranous, abaxially 3-veined, margin broadly hyaline, apex obtuse. Stamens 3; anthers linear. Style slender, not ciliate, basally slightly thickened; stigmas 2 or 3. Nutlet purplish black when mature, obovoid to broadly obovoid, 0.7–1 mm, 3-sided or biconvex, indistinctly verruculose and with square or transversely oblong reticulation but sometimes subsmooth. Fl. and fr. Jun–Oct.

Dry sandy places along roads, coastal rocky places, gravelly places along rivers, sandy seashores; near sea level to 400 m. Fujian, Guangdong, Guangxi, Hainan, Nansha Qundao, Taiwan, Zhejiang [India, Indonesia, Japan, Laos, Malaysia, Sri Lanka, Thailand, Vietnam; Africa, Australia].

- 1a. Nutlet 3-sided; stigmas 3; anthelae headlike with a few short rays; spikelets many congested together 11a. var. *cymosa*

- 1b. Nutlet biconvex or rarely 3-sided; stigmas 2(or 3); anthelae open with several elongated rays; spikelets solitary or a few fascicled 11b. var. *spathacea*

11a. *Fimbristylis cymosa* var. *cymosa*

黑果飘拂草(原变种) *hei guo piao fu cao* (yuan bian zhong)

Culms flatly and obtusely 3-angled, thick at base. Leaves extremely rigid, 1.5–4 mm wide. Anthelae congested to a head with a few short rays. Spikelets clustered. Stigmas 3. Nutlet broadly obovoid, 3-sided. Fl. and fr. Jun–Sep. $2n = 10$.

Dry sandy places along roads, coastal rocky places; near sea level. Nansha Qundao, Taiwan [Indonesia, Japan; Australia].

11b. *Fimbristylis cymosa* var. *spathacea* (Roth) T. Koyama, J. Jap. Bot. 46(3): 66. 1971.

佛焰苞飘拂草 *fo yan bao piao fu cao*

Fimbristylis spathacea Roth, Nov. Pl. Sp. 24. 1821; *F. formosensis* C. B. Clarke; *F. kankaoensis* Hayata; *F. wightiana* Nees.

Culms obtusely 3-angled, not thick at base. Leaves rigid, 1–3 mm wide. Anthelae open with several elongated rays. Spikelet solitary or 2 or 3 clustered. Stigmas 2(or 3). Nutlet obovoid to broadly obovoid, biconvex or rarely 3-sided. Fl. and fr. Jul–Oct. $2n = 32$.

Gravelly places along rivers, sandy seashores; near sea level to 400 m. Fujian, Guangdong, Guangxi, Hainan, Nansha Qundao, Taiwan, Zhejiang [India, Japan, Laos, Malaysia, Sri Lanka, Thailand, Vietnam; Africa].

12. *Fimbristylis sericea* R. Brown, Prodr. 228. 1810.

绢毛飘拂草 *juan mao piao fu cao*

Fimbristylis decora Nees & Meyen.

Perennials. Rhizomes obliquely to horizontally elongated, branched, covered with often blackish brown fibers from old leaf sheaths. Culms widely spaced, 15–30 cm tall, obtusely 3-angled, with white silky hairs, bearing leaves at base. Leaf sheath adaxially membranous and rust-colored, mouth obliquely split; ligule absent; leaf blade 1.5–3.2 mm wide, curved, flat, both surfaces with dense white silky hairs, apex acute. Involucral bracts 2 or 3, leaflike, shorter than inflorescence, both surfaces with white silky hairs. Inflorescence a simple anthela; rays 2–4, 0.7–2.5 mm, sometimes extremely short, compressed, with white silky hairs. Spikelets 3–15 in capitate heads, oblong-ovoid to oblong, 6–10 × 2–3.5 mm, apex acute. Glumes ovate, ca. 3 mm, both surfaces with reddish purplish lines, midvein white pilose, margin broad and white, apex obtuse with a hard mucro. Stamens 3; anthers narrowly oblong, ca. 3 mm. Ovary oblong, biconvex; style slightly compressed, basally slightly inflated and hairy, apically slightly pubescent; stigmas 2, slightly shorter than style. Nutlet yellowish white to brown when young but blackish purple when mature, ellipsoid-obovoid to obovoid, ca. 1.5 mm, biconvex. Fl. and fr. Aug–Oct.

Sandy places, sand dunes along seashores; near sea level to 400 m. Fujian, Guangdong, S Guangxi, Hainan, Jiangsu, Taiwan, Zhejiang

[India, Indonesia, Japan, Korea, Malaysia, Thailand, Vietnam; Africa, Australia].

13. *Fimbristylis insignis* Thwaites, Enum. Pl. Zeyl. 349. 1864.

硬穗飘拂草 *ying sui piao fu cao*

Perennials. Rhizomes short. Culms 20–40 cm tall, ± stiff, cylindrical but sometimes slightly compressed on apical part, deeply striate, smooth, glabrous, basal sheaths bladed. Leaves 1/3–1/2 as long as culm; sheath less than 5 cm, leathery; ligule absent; leaf blade 1–2.5 mm wide, flat, subleathery, margin finely serrulate, apex acute to slightly obtuse. Involucral bracts 2 or 3, erect, leaflike, shorter than inflorescence, base slightly dilated. Inflorescence a simple or compound anthela, with 3–5 rays and 10 or more spikelets; rays flatly cylindrical, 2–4 cm, slightly rigid. Spikelets solitary, narrowly oblong-ovoid, 10–20 × ca. 4 mm, subterete, with basal 2 or 3 glumes empty, apex acute. Glumes densely spirally imbricate, oblong, ca. 6 mm, midvein distinct and forming an abaxial keel, apex mucronate. Stamens 3; anthers linear-oblong, ca. 2 mm. Style 4–5 mm, 3-sided, basally inflated, apically ciliate; stigmas 3. Nutlet grayish black when mature, broadly obcordate, ca. 1.5 mm, 3-sided, verruculose with hexagonal reticulation. Fl. and fr. Jun.

Dry slopes, poor soil. Guangdong, Hainan [Indonesia, Laos, Malaysia, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Australia].

14. *Fimbristylis leptoclada* Bentham, Fl. Hongk. 393. 1861.

细茎飘拂草 *xi jing piao fu cao*

Perennials, rhizomatous. Culms tufted, 15–60 cm tall, 0.2–1.5 mm thick, 3-angled, smooth to scabrid. Leaves basal, few; sheath pale hyaline to light brown, 1.5–4 cm, apex oblique; ligule absent; leaf blade filiform, 10–30 cm × 0.3–0.5 mm, margin ± incurved, apex obtuse. Involucral bracts 1–3, glumelike or setaceous, basalmost 0.5–2 cm. Inflorescence a simple anthela or capitate, 5–20 × 5–8 mm; rays (when present) to 2 cm. Spikelets 3–12 per inflorescence, in clusters of 2–8, ellipsoid, 2.2–3.5 × 1.5–2 mm. Glumes 10–15 per spikelet, spirally imbricate, brown, broadly ovate, 1–1.5 × 0.7–1.3 mm, densely gland-dotted, apically fimbriate ciliate, 3-veined forming an abaxial obtusely angled pale brown keel, margin membranous with a pale hyaline edge, apex rounded-truncate to shallowly emarginate and mucronulate. Stamens 1 or 2; anthers ca. 0.5 mm. Stigmas 3. Nutlet cream-colored, obovoid, 0.7–0.9 × 0.5–0.7 mm, 3-sided, verruculose. Fl. and fr. Jul–Oct.

Dry sandy places, grasslands along roads; near sea level. Fujian, Guangdong [Indonesia, Japan (Ryukyu Islands), Malaysia, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam].

15. *Fimbristylis psammocola* Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 227. 1961.

砂生飘拂草 *sha sheng piao fu cao*

Perennials. Rhizomes short, woody. Culms solitary, 5–16 cm tall, obtusely 3-angled to subterete, striate, basally leaved, base covered with blackish brown often fibrous old leaf sheaths. Leaves slightly shorter than to equaling culm; sheath adaxially membranous and brown, mouth obliquely split; ligule absent; leaf blade 1–2.5 mm wide, stiff, slightly scabrid, margin slightly

involute, apex acute. Involucral bracts 2–4, subulate, shorter to slightly longer than inflorescence. Inflorescence a simple or compound anthela, 2–4 × 1.2–2.5 cm, with 1–14 spikelets; rays 3–5, subcylindric, 0.6–2.5 mm. Spikelets solitary, narrowly ellipsoid, 6–10 × 2.5–4 mm, densely many flowered, apex acute. Glumes grayish green, triangular-ovate, 4–5 mm, abaxially slightly pubescent at middle, 3-veined forming an abaxial keel and excurrent into a hard mucro, midvein green, lateral veins brown, margin broadly hyaline, apex acute. Stamens 3; anthers linear, ca. 2.5 mm, ca. 1/2 as long as filaments, apex acute. Style ca. 2 mm, compressed, not ciliate, basally slightly inflated; stigmas ± as long as style. Nutlet not seen. Fl. May.

• Sandy places along rivers; 500–600 m. S Yunnan (Xishuangbanna).

16. *Fimbristylis littoralis* Gaudichaud, Voy. Uranie 10: 413. 1829.

水虱草 shui shi cao

Annuals or short-lived perennials. Rhizomes absent. Culms tufted, (1.5–)10–60 cm tall, flatly 4-angled, striate, bearing 1–3 bladeless sheaths at base. Basal leaf sheaths (1.5–)3.5–9 cm, sometimes setaceous, compressed bilaterally, attenuate apically, mouth obliquely split. Leaves shorter to longer than culm; sheath bilaterally compressed, abaxially with a membranous and rust-colored margin, adaxially keeled, mouth obliquely split; ligule absent; leaf blade ensiform, (1–)1.5–2 mm wide, bilaterally compressed, margin sparsely and finely serrulate, apically attenuate into a setaceous tip. Involucral bracts 2–4, setaceous, base dilated, margin rust-colored and membranous. Inflorescence a compound, decompound, or rarely simple anthela, subdense, with many spikelets; rays 3–6, 0.8–5 cm, slender, scabrid. Spikelets solitary, globose to subglobose, 1.5–5 × 1.5–3 mm, apex rounded. Glumes chestnut-brown or dark brown, ovate, 1–1.3 or 3.5–6 mm, membranous, 3-veined forming an abaxial keel, midvein green, lateral veins brown, apex obtuse. Stamens 2; anthers oblong, ca. 0.7 mm, ca. 1/2 as long as filaments, apex obtuse. Style 3-sided, not ciliate, basally slightly inflated; stigmas 3, ca. 1/2 as long as style. Nutlet straw-yellow, obovoid to broadly obovoid, ca. 1 mm, obtusely 3-sided, verruculose with transversely oblong reticulation. Fl. and fr. May–Oct.

Field margins, open slopes, muddy places near water, grasslands, paddy fields, paddy field margins; 100–2000 m. Anhui, Chongqing, Fujian, S Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, SE Qinghai, S Shaanxi, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [Afghanistan, Bhutan, India, Indonesia, Japan, Korea, Malaysia, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Vietnam; Africa, SW Asia, Australia, Central, North, and South America, Indian Ocean islands, Madagascar, Pacific islands].

1a. Glumes chestnut-brown, 1–1.3 mm 16a. var. *littoralis*

1b. Glumes dark brown, 3.5–6 mm 16b. var. *koidzumiana*

16a. *Fimbristylis littoralis* var. *littoralis*

水虱草(原变种) shui shi cao (yuan bian zhong)

Fimbristylis miliacea (Linnaeus) Vahl, nom. rej.; *Scirpus miliaceus* Linnaeus, nom. rej.

Glumes chestnut-brown, 1–1.3 mm. Fl. and fr. May–Oct.

Field margins, open slopes, muddy places near water, grasslands, paddy field margins; 100–2000 m. Anhui, Fujian, S Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, SE Qinghai, S Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Afghanistan, Bhutan, India, Indonesia, Japan, Korea, Malaysia, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Vietnam; Africa, SW Asia, Australia, Central, North, and South America, Indian Ocean islands, Madagascar, Pacific islands].

16b. *Fimbristylis littoralis* var. *koidzumiana* (Ohwi) T. Koyama, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 8: 108. 1961.

小泉氏飘拂草 xiao quan shi piao fu cao

Fimbristylis koidzumiana Ohwi, Acta Phytotax. Geobot. 1: 78. 1932; *F. miliacea* subsp. *koidzumiana* (Ohwi) T. Koyama.

Culms apically scabrous. Glumes dark brown, 3.5–6 mm.

Paddy fields. Taiwan [Japan, Vietnam; Pacific islands].

17. *Fimbristylis aphylla* Steudel, Syn. Pl. Glumac. 2: 114. 1855.

无叶飘拂草 wu ye piao fu cao

Fimbristylis aphylla var. *gracilis* Tang & F. T. Wang; *F. globulosa* (Retzius) Kunth var. *aphylla* (Steudel) Miquel.

Perennials. Rhizomes short, woody. Culms densely tufted, 30–100 cm tall, slender, 5-angled, smooth, bearing a few bladeless sheaths at base. Basal leaf sheaths cylindrical, margin brown and membranous, apically attenuate, mouth obliquely truncate. Leaves on vegetative shoots often with only blades; leaf blade linear, margins involute. Involucral bracts 3–5, needlelike, 0.6–2.5 cm, much shorter than inflorescence, margin scabrid. Inflorescence a decompound anthela, spreading; rays 5–8, to 7 cm, slender. Spikelets solitary, oblong to ellipsoid, 2.5–7 × 1.2–3 mm. Glumes densely spirally imbricate, rust-colored to yellowish brown, broadly ovate to subelliptic, ca. 2.5 mm, membranous, prominently 3-veined forming an abaxial keel, veins yellow to greenish yellow and often dark brown between lateral veins, margin paler, apex obtuse to rounded and apiculate. Stamens 3; anthers linear. Style short and flat, not ciliate, basally slightly inflated; stigmas 3, longer than style, densely ciliate. Nutlet pale brown, shortly stipitate, obovoid, 0.6–0.8 mm, 3-sided, transversely wavy verruculose. Fl. Jul, fr. Dec.

Swamps, wet places along streams or in valleys; 400–2400 m. Yunnan [India, Indonesia, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa].

18. *Fimbristylis salbundia* (Nees) Kunth, Enum. Pl. 2: 230. 1837.

芒苞飘拂草 mang bao piao fu cao

Trichelostylis salbundia Nees in Wight, Contr. Bot. India, 105. 1834; *Fimbristylis haspaniformis* T. Koyama.

Perennials, rhizomatous. Culms crowded along rhizome, 30–80 cm tall, 1–3 mm thick, acutely 4- or 5-angled, smooth. Leaves bladeless; sheath dusky or cinnamon brown, 1–17 cm, apex lanceolate; ligule absent. Involucral bracts 2–5, setaceous with lanceolate base, longest to 1.5 cm. Inflorescence a com-

pound or decompound anthela, 2–6 × 2–6 cm, open; primary rays 6–8, to 5 cm. Spikelets ovoid to ovoid-ellipsoid, 3–5 × ca. 2 mm. Glumes many, spirally imbricate, light brown, ovate, 2–2.3 × ca. 1.5 mm, membranous, margin hyaline, 1-veined forming an abaxial pale brown obtuse keel, apex obtuse. Stamens (2 or)3; anthers 0.7–1 mm. Stigmas 3. Nutlet whitish to yellowish brown, broadly obovoid, 0.8–1 × 0.6–0.8 mm, 3-sided, smooth to sparsely verruculose, with 9–14 longitudinal rows of epidermal cells on each side. Fl. and fr. Sep.

Swampy places; 1700–1800 m. Yunnan [India, Indonesia, Malaysia, Myanmar, Papua New Guinea, Philippines, Sri Lanka, N Thailand, Vietnam].

19. *Fimbristylis quinquangularis* (Vahl) Kunth, Enum. Pl. 2: 229. 1837.

五棱秆飘拂草 wu leng gan piao fu cao

Scirpus quinquangularis Vahl, Enum. Pl. 2: 279. 1805; *Fimbristylis fauriei* Ohwi; *F. quinquangularis* var. *bistaminifera* Tang & F. T. Wang; *F. quinquangularis* var. *elata* Tang & F. T. Wang.

Annuals or short-lived perennials. Rhizomes absent or very short. Culms tufted, 14–120 cm tall, 5-angled, bearing 0–3 bladeless sheaths. Basal leaf sheaths 3–17 cm, cylindrical, mouth oblique. Leaves on vegetative shoots with only blades, shorter than to subequaling culm; leaf blade 2–3 mm wide, flat. Involucral bracts 4, setaceous, much shorter than inflorescence, margin finely serrulate. Inflorescence a decompound anthela, 5–9 × 3–6 cm; rays 4, 1–4 cm, scabrid. Spikelets solitary, ovoid, 2–5 × 1.2–1.5 mm, apex acute to subobtusely. Glumes chestnut-brown, ovate, ca. 2 mm, 3-veined forming an abaxial keel, lateral 2 veins dark brown, margin paler, apex obtuse and apiculate. Stamens 1 or 2; anthers oblong, ca. 0.5 mm, ca. 1/3 as long as filament. Style 3-sided, basally slightly inflated, apically slightly pubescent; stigmas 3, slightly longer than style. Nutlet obovoid, 0.8 mm or longer, 3-sided, verruculose and with transverse linear reticulation. Fl. and fr. Aug–Oct. $2n = 10$.

Swamps; 800–2100 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Sichuan, Taiwan, SE Xizang, Yunnan, Zhejiang [Afghanistan, India, Indonesia, Kazakhstan, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Uzbekistan, Vietnam; Africa, SW Asia, Australia, Indian Ocean islands, Madagascar].

20. *Fimbristylis chingmaiensis* S. M. Huang, Fl. Hainan. 4: 536. 1977.

澄迈飘拂草 cheng mai piao fu cao

Annuals. Rhizomes absent. Culms tufted, 30–60 cm tall, 1–1.2 mm thick, slender, 5-angled, smooth, glabrous, bearing 1–3 bladeless sheaths at base. Leaves basal, shorter than culm; sheath pale brown, to 13 cm, margins membranous; ligule shortly ciliate; leaf blade linear, ca. 2 mm wide, midvein distinct, margins involute, apex acute. Involucral bracts 5–7, leaf-like, ca. 3 cm, apex acuminate. Inflorescence a compound anthela, 3–5 cm; rays 5–7, to 3.5 cm, slender, unequal, 5-angled. Spikelets solitary, ovoid to oblong-ovoid, 2–2.5 × 1–1.2 mm, 7–9-flowered, apex acute. Glumes 7–11, spirally imbricate, overall pale chestnut-brown, ovate to broadly ovate, ca. 1.5 × 1–1.2 mm, membranous, abaxially keeled, midvein distinct and yellowish green, each side of midvein dark brown, margin apically hyaline, apex acute or mucronate. Stamens 3; anthers oblong, ca. 0.5 mm. Style 3-sided, not ciliate, basally inflated; stigmas 3. Nutlet white or pale brown, shortly stipitate, broadly obovoid, ca. 0.8 mm, obtusely 3-sided, with indistinct transverse oblong reticulation. Fl. autumn.

lowish green, each side of midvein dark brown, margin apically hyaline, apex acute or mucronate. Stamens 3; anthers oblong, ca. 0.5 mm. Style 3-sided, not ciliate, basally inflated; stigmas 3. Nutlet white or pale brown, shortly stipitate, broadly obovoid, ca. 0.8 mm, obtusely 3-sided, with indistinct transverse oblong reticulation. Fl. autumn.

• Deserted paddy fields. Fujian, Hainan (Chengmai).

21. *Fimbristylis diphyloides* Makino in Makino & Nemoto, Fl. Jap. 1389. 1925.

拟二叶飘拂草 ni er ye piao fu cao

Annuals or short-lived perennials. Rhizomes absent or very short. Culms tufted, 15–50 cm tall, thin, flatly 4-angled, striate, bearing 1 or 2 bladeless sheaths at base. Basal leaf sheaths 2.5–6.5 cm, cylindrical, covered with fibers from old sheaths, mouth obliquely truncate, apex acute. Leaves shorter than to subequaling culm; sheath adaxially membranous and rust-colored, mouth obliquely split; ligule absent; leaf blade 1.2–2.2 mm wide, flat, margin finely toothed, apex acute. Involucral bracts 4–6, setaceous, much shorter than inflorescence, base dilated, margin finely serrulate. Inflorescence a simple or subcompound anthela, 1.5–6 × 2–6 cm; rays 4–8, 0.6–4 cm, scabrid. Spikelets solitary, obovoid to oblong-obovoid, 2.5–7.5 × 1.5–2.5(–3) mm, densely many flowered, apex obtuse to subacute. Glumes reddish brown or straw-yellow, broadly ovate or oblong-ovate, ca. 2 mm or slightly longer, membranous, 3-veined forming a slight abaxial keel, veins green, margin hyaline, apex extremely obtuse. Stamens 2; anthers oblong, ca. 0.8 mm, ca. 1/2 as long as filaments, apex obtuse. Style not ciliate, basally slightly inflated; stigmas 2 or 3, subequaling to slightly longer than style. Nutlet brown, broadly obovoid, ca. 1 mm, 3-sided or biconvex, with sparsely verruculose and with transversely oblong reticulation. Fl. and fr. Jun–Sep.

Paddy fields, streamsides, wet places in valleys, ponds; 100–2100 m. Anhui, Chongqing, Fujian, Guangdong, Guangxi, Guizhou, S Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shandong, Sichuan, Zhejiang [Japan, Korea].

1a. Glumes brown to reddish brown, broadly ovate, ca. 2 mm 21a. var. *diphyloides*

1b. Glumes straw-yellow, oblong-ovate, longer than 2 mm 21b. var. *straminea*

21a. *Fimbristylis diphyloides* var. *diphyloides*

拟二叶飘拂草(原变种) ni er ye piao fu cao (yuan bian zhong)

Fimbristylis brevicollis Kükenthal.

Glumes brown to reddish brown, broadly ovate, ca. 2 mm. Fl. and fr. Jun–Sep.

Paddy fields, streamsides, wet places in valleys, ponds; 100–2100 m. Anhui, Chongqing, Fujian, Guangdong, Guangxi, Guizhou, S Henan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Zhejiang [Japan, Korea].

21b. *Fimbristylis diphyloides* var. *straminea* Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 227. 1961.

黄鳞二叶飘拂草 huang lin er ye piao fu cao

Glumes straw-yellow, oblong-ovate, longer than 2 mm. Fl. and fr. Sep.

- Jiangxi (Lushan).

One of us (Simpson) questions whether these varieties should be recognized.

22. *Fimbristylis umbellaris* (Lamarck) Vahl, Enum. Pl. 2: 291. 1805.

伞形飘拂草 san xing piao fu cao

Scirpus umbellaris Lamarck, Tabl. Encycl. 1: 141. 1791; *Fimbristylis globulosa* (Retzius) Kunth; *F. globulosa* var. *austrojaponica* Ohwi; *F. globulosa* var. *torresiana* (Gaudichaud) C. B. Clarke; *F. torresiana* Gaudichaud; *Scirpus globulosus* Retzius.

Perennials. Rhizomes short, horizontal, covered with brownish scales. Culms densely tufted, 17–90 cm tall, 1–5 mm thick, obtusely 3-angled, smooth or striate, glabrous, with 2 or 3 bladeless sheaths at base. Leaves of vegetative shoot usually shortly bladed; sheaths cylindric, 2–19 cm, mouth obliquely truncate; ligule reduced to a circle of hairs or absent; blade linear, 7–25 cm × 1–2 mm. Involucral bracts 2 or 3, narrowly lanceolate to lanceolate, longest 5–11 mm, margin scabrid. Inflorescence a simple or compound anthela, 1.5–10 × 1.3–7 cm; primary rays 2–10, 0.7–5 cm, unequal. Spikelets 3–40 per inflorescence, solitary, ovoid, broadly ovoid, broadly ellipsoid, or globose-ellipsoid, 3–8 × 3–4 mm, terete, densely many flowered, apex obtuse. Glumes numerous, spirally imbricate, yellowish rust-colored, or brown, ovate to ovate-elliptic, 1.8–2.7 × 1–1.5 mm, membranous, 3-veined but abaxially scarcely keeled, apex obtuse to mucronate. Stamens 2 or 3; anthers ca. 0.5 mm. Style 3-sided or 3-cleft, glabrous, basally dilated; stigmas (2 or)3. Nutlet yellowish, shortly stipitate or sessile, obovoid to obovoid-globose, 0.8–1 × 0.5–0.7 mm, 3-sided to sometimes slightly compressed, obscurely cancellate with transversely oblong cells or rarely sparsely verruculose. Fl. and fr. Aug–Oct. $2n = 6$.

Marshy places, paddy fields, wet grasslands; 100–800 m. Guangdong, Guangxi, Hainan, Sichuan, Taiwan, Yunnan [India, Indonesia, Japan (Ryukyu Islands), Laos, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Pacific islands].

23. *Fimbristylis dichotoma* (Linnaeus) Vahl, Enum. Pl. 2: 287. 1805.

两歧飘拂草 liang qi piao fu cao

Annuals or short-lived perennials. Culms tufted, 5–50(–100) cm tall, glabrous or sparsely pubescent. Leaves slightly shorter to longer than culm; sheaths leathery, margin pale brown, broad, and membranous, apex subtruncate; leaf blade linear to setaceous, pubescent or glabrescent, apex acute to obtuse. Involucral bracts 3 or 4, leaflike, usually 1 or 2 longer than inflorescence, glabrous or hairy. Inflorescence a compound or rarely simple anthela, 5–9 × 3–6 cm, lax or compact. Spikelets solitary, ovoid, ellipsoid, or oblong, 4.5–14 × ca. 2.5 mm, many flowered. Glumes brown, ovate, oblong-ovate, or oblong, 2.2–4.2 mm for fertile ones, shiny, 3–5-veined, midvein excurrent into a mucro. Stamens 1 or 2; filament short. Style longer than stamen, compressed, apically ciliate; stigmas 2. Nutlet with brown stipe, obovoid to broadly so, globose, or ± obdel-

toid, 0.6–1.3 mm, biconvex, with 7–9 obvious vertical ribs, reticulation nearly transversely oblong. Fl. and fr. Jul–Oct.

Paddy fields, open grasslands, shallow water in marshes, farmlands, open wastelands; near sea level to 2100 m. Anhui, Chongqing, Fujian, S Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Xisha Qundao, SE Xizang, Yunnan, Zhejiang [Afghanistan, Bhutan, India, Indonesia, Japan, Korea, Kyrgyzstan, Malaysia, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Uzbekistan, Vietnam; Africa, SW Asia, Australia, Central, North, and South America, Indian Ocean islands, Madagascar, Pacific islands].

Fimbristylis depauperata R. Brown (*F. dichotoma* f. *depauperata* (R. Brown) Ohwi; *F. dichotoma* subsp. *depauperata* (R. Brown) J. Kern) has been mistakenly treated as a form or subspecies of *F. dichotoma* (Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 90. 1961; J. Kern, Fl. Males. 7: 576. 1974), but it is a distinct species that occurs in N Australia, W Indonesia, and Papua New Guinea.

- 1a. Spikelets 4.5–8.5 mm; fertile glumes 2.2–3 mm; nutlet obovoid to broadly so, 0.6–1.2 mm, with 5–11 vertical rows of transversely oblong epidermal cells, apex rounded to obtuse 23a. subsp. *dichotoma*
- 1b. Spikelets (8–)9–14 mm; fertile glumes 3.8–4.2 mm; nutlet obovoid, globose, or ± obdeltooid, 1.2–1.3 mm, with 15–24 vertical rows of transversely oblong-rectangular epidermal cells, apex obtuse to subtruncate 23b. subsp. *podocarpa*

23a. *Fimbristylis dichotoma* subsp. *dichotoma*

两歧飘拂草(原亚种) liang qi piao fu cao (yuan ya zhong)

Scirpus dichotomus Linnaeus, Sp. Pl. 1. 50. 1753; *Fimbristylis annua* (Allioni) Roemer & Schultes; *F. dichotoma* f. *annua* (Allioni) Ohwi; *F. dichotoma* var. *tikushiensis* (Hayata) T. Koyama; *F. dichotoma* f. *tomentosa* (Vahl) Ohwi; *F. diphylla* (Retzius) Vahl; *F. diphylla* var. *annua* (Allioni) C. B. Clarke; *F. tikushiensis* Hayata; *F. tomentosa* Vahl; *S. annuus* Allioni; *S. diphyllus* Retzius.

Culms (5–)15–50 cm. Leaves slightly shorter to sometimes slightly longer than culm; leaf blade linear, 1–2.5 mm wide. Inflorescence a compound or rarely simple anthela. Spikelets 4.5–8.5 mm. Fertile glumes 2.2–3 mm. Nutlet obovoid to broadly so, 0.6–1.2 mm, with 5–11 vertical rows of transversely oblong epidermal cells, apex rounded to obtuse. Fl. and fr. Jul–Oct. $2n = 10, 20$.

Paddy fields, open grasslands, shallow water in marshes; near sea level to 2100 m. Anhui, Chongqing, Fujian, S Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, E Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Xisha Qundao, SE Xizang, Yunnan, Zhejiang [Afghanistan, India, Japan, Korea, Kyrgyzstan, Nepal, Pakistan, Papua New Guinea, Sri Lanka, Thailand, Uzbekistan, Vietnam; Africa, SW Asia, Australia, Central, North, and South America, Indian Ocean islands, Madagascar, Pacific islands].

Within *Fimbristylis dichotoma* subsp. *dichotoma* two varieties could be recognized in China, i.e., *F. dichotoma* var. *dichotoma* and *F.*

dichotoma var. *tikushiensis*. The latter can be separated by its mostly single spikelets that are 7.5–8.5 mm in contrast to var. *dichotoma* with spikelets clustered and 5.5–8 mm. In var. *tikushiensis* styles of the fruiting state are elongated exposing them beyond the glume apex, but in var. *dichotoma* styles at the fruiting state are still enclosed by the subtending glume. In typical subsp. *dichotoma* plants tend to be biennials or short-lived perennials often with a very short rhizome, whereas in var. *tikushiensis* plants are typically annual without a rhizome.

In NE China, Korea, and Japan another annual phase of *Fimbristylis dichotoma* subsp. *dichotoma* occurs, in which spikelets are as a rule solitary and stems and leaves tend to be hairy and softer. This annual plant has been named *F. dichotoma* var. *tentsuki* T. Koyama and if recognized as a variety has often been misidentified as *F. annua* (e.g., by Nakai, Bot. Mag. (Tokyo) 36: 20. 1922; Kükenthal, Acta Horti Gothob. 5: 109. 1930) and also misidentified as *F. depauperata* as mentioned above. It is quite possible that this annual plant does not constitute a real taxon but may possibly be a fruiting plant of a first-year seedling of var. *dichotoma*. It appears in the northern part of the geographical area of subsp. *dichotoma*, where it cannot survive through the winter and only occurs as an annual. In southern areas it may become biennial or a short-lived perennial developing a short rhizome and is treated as subsp. *dichotoma* (*F. dichotoma* var. *floribunda* Miquel). For more exhaustive treatment of the nomenclature, as well as misapplication of the various names in Asia, see T. Koyama (J. Jap. Bot 63: 86–95, t. I-III. 1988).

23b. *Fimbristylis dichotoma* subsp. *podocarpa* (Nees) T. Koyama, Micronesica 1: 87. 1964.

绒毛飘拂草 rong mao piao fu cao

Fimbristylis podocarpa Nees in Wight, Contr. Bot. India, 98. 1834; *F. dichotomoides* Tang & F. T. Wang; *F. diphylla* var. *podocarpa* (Nees) Kükenthal.

Culms 5–100 cm tall, often densely pubescent. Leaves shorter than culm; leaf blade narrowly linear, 0.5–2 mm wide, both surfaces often pilose. Spikelets (0.8–)0.9–1.4 cm. Fertile glumes 3.8–4.2 mm. Nutlet obovoid, globose, or ± obdeltoid, 1.2–1.3 mm, cancellate with 15–24 vertical rows of transversely oblong-rectangular epidermal cells, apex obtuse to subtruncate. Fl. and fr. Jul. $2n = 30$.

Farmlands, shallow water, open wastelands, grasslands on slopes; 100–2100 m. Guangdong, Guangxi, Hainan, Jiangxi, Taiwan, Yunnan [Bhutan, India, Indonesia, Nepal, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa and Australia, Pacific islands].

24. *Fimbristylis shimadana* Ohwi, Acta Phytotax. Geobot. 5: 184. 1936.

白穗飘拂草 bai sui piao fu cao

Annuals or short-lived perennials, without a conspicuous rhizome. Culms tufted, 20–40 cm tall, angular, smooth but basally scabrid. Leaves equaling to slightly shorter than culm; sheath 2–5 cm, ventral side dark straw-colored and membranous, mouth obliquely truncate; ligule a fringe of short hairs; leaf blade linear, ± flat but margin slightly incurved, herbaceous, smooth except for scabrid apical margins, glabrous to sparsely pilose. Involucral bracts 3 or 4, basalmost leaflike and ± as long as inflorescence. Inflorescence a simple or compound anthela, 3–4 × 2.5–3 cm, lax; primary rays 1–3, 2–4 cm, flattened. Spikelets many per inflorescence, light rust-colored,

ovoid to oblong-ovoid, 5–10 × 2.2–2.5 mm, terete, slightly shiny, densely many flowered, apex acute. Glumes many per spikelet, pale and tinged rust-colored, broadly ovate, ca. 2 mm, membranous, 3-veined with lateral pair not reaching apex, apex obtuse. Anthers ca. 0.3 mm. Style flat, basally slightly dilated, apical margin ciliate; stigmas 2. Nutlet brownish, shortly stipitate, broadly ovoid, ca. 1 mm, biconvex, sparsely verruculose and finely cancellate with several rows of transversely oblong cells. Fl. and fr. Mar–Nov.

• Grassy vegetation at margin of evergreen broad-leaved forests, wet areas; below 100–200 m. Taiwan.

25. *Fimbristylis longispica* Steudel, Syn. Pl. Glumac. 2: 118. 1855.

长穗飘拂草 chang sui piao fu cao

Fimbristylis didrichsenii Boeckeler.

Perennials. Rhizomes short. Culms tufted, 25–60 cm tall. Leaves shorter than culm; leaf blade 1.5–2.5 mm wide, nearly glabrous, margins often involute, apex obtuse. Involucral bracts 2 or 3, leaflike, basalmost usually longer than inflorescence, apex obtuse. Inflorescence a compound, decomposed, or simple anthela; rays 3–6. Spikelets solitary, narrowly oblong, oblong, oblong-ovoid, or ovoid, 0.6–2 cm, apex acute to obtuse. Glumes broadly ovate and boat-shaped, ca. 3 mm, glabrous, with 3–5 brown to pale brown veins, apex mucronate. Stamens 3. Style slightly longer than nutlet, basally slightly broader, apically ciliate; stigmas 2. Nutlet pale brown to brown, sessile, globose-obovoid, 1.2–1.5 mm, biconvex, with hexagonal reticulation. Fl. and fr. Aug–Sep.

Wet places on seashores, base of hills; near sea level to 600 m. Fujian, Guangdong, Guangxi, Jiangsu, Liaoning, Shaanxi, Shandong, Yunnan, Zhejiang [Japan, Korea, Myanmar].

26. *Fimbristylis rigidula* Nees in Wight, Contr. Bot. India, 99. 1834.

结壮飘拂草 jie zhuang piao fu cao

Perennials. Rhizomes short, thick, woody, diageotropic. Culms sparsely tufted, 15–50 cm tall, flatly cylindrical, striate, thicker at base, often covered with old sheaths. Leaves shorter than culm; leaf blade grayish green, 2–3 mm wide, flat, both surfaces sparsely pubescent. Involucral bracts 3–5, leaflike, shorter than or rarely equaling inflorescence. Inflorescence a compound or rarely simple anthela; rays 3–6, longest to 3 cm, unequal. Spikelets solitary, ovoid to ellipsoid, 5–10 × 3–4 mm, many flowered, apex acute to obtuse. Glumes densely arranged, reddish brown, ovate to broadly ovate, ca. 4 mm, adaxially with several veins, apex obtuse and mucronate; basal 2 glumes empty, smaller than fertile glumes and with a slightly longer mucro. Stamens 3; anthers linear, ca. 1.5 mm. Style long and compressed, basally slightly broader, apically ciliate; stigmas 2. Nutlet broadly obovoid to subellipsoid, 1.2–1.5 mm, with fine hexagonal reticulation. Fl. and fr. Apr–Jun.

Slopes, roadsides, grasslands, forests; 300–2600 m. Anhui, N Guangdong, Guangxi, S Guizhou, Henan, Hubei, Hunan, S Jiangsu, N Jiangxi, S Sichuan, Yunnan, Zhejiang [Bangladesh, N India, Kashmir, Myanmar, Nepal, Pakistan, Philippines, Thailand, Vietnam].

27. *Fimbristylis subinclinata* T. Koyama, Bot. Mag. (Tokyo) 80: 353. 1967.

知本飘拂草 zhi ben piao fu cao

Perennials. Rhizomes short, sometimes subglobose. Culms tufted. Leaves clustered at base of culm; sheath brownish, mouth ciliate; ligule a fringe of short hairs; leaf blade linear, 5–15 cm × 1–2.5 mm, glaucous, apex mucronate. Involucral bracts 1 or 2, basalmost 1.5–4 cm, much shorter than inflorescence. Inflorescence a compound anthela, 3–7 cm, inclined to nodding, with 4–23 spikelets; primary rays 3–6, 1.5–5 cm. Spikelets yellowish brown, ovoid to ovoid-ellipsoid, 8–12 × 3–4 mm, terete. Glumes yellowish brown and brown striate, ovate to broadly elliptic, 2–3.2 × 1.7–2 mm, thinly papery, 1-veined or obscurely 3-veined, margin hyaline, apex acute and mucronate. Anthers ca. 1.3 mm. Style liguliform, flat, apical margin densely fimbriate; stigmas 2. Nutlet brownish when mature, globose-obovoid, ca. 3 × 3 mm, biconvex, slightly cancellate with ca. 20 rows of transversely oblong-hexagonal epidermal cells, apex rounded to subtruncate. Fl. and fr. Aug–Oct.

• Dry sandy grasslands along rivers; near sea level. E Taiwan.

28. *Fimbristylis stolonifera* C. B. Clarke in J. D. Hooker, Fl. Brit. India 6: 637. 1893.

匍匐茎飘拂草 pu fu jing piao fu cao

Perennials, stoloniferous. Culms 30–70 cm tall. Leaves ca. 1/3 as long as culm; leaf blade linear, 1.5–2 mm wide, flat, both surfaces hairy, midvein abaxially prominent, apex acute. Involucral bracts 2 or 3, leaflike, usually shorter than or rarely equaling inflorescence, apex acute. Inflorescence a simple or subcompound anthela; rays 3–6. Spikelets solitary, ovoid to oblong-ovoid, 7–13 × 3–4 mm, with basal 1 or 2 glumes empty. Fertile glumes chestnut-brown, oblong-ovate, 3–4 mm, shiny, abaxially with 5–7 veins, midvein excurrent into a mucro. Stamens 3. Style compressed, ciliate, basally slightly inflated; stigmas 3. Nutlet white or pale brown, obovoid, ca. 1.3 mm, biconvex, with transversely oblong reticulation, inconspicuous vertical ribs, and sometimes verruculose. Fl. and fr. Aug–Sep.

Ditch sides on slopes; ca. 1000 m. Chongqing, Guangdong, Guangxi, Guizhou, Hebei, Yunnan, Zhejiang [Bhutan, N India, Nepal].

29. *Fimbristylis sieboldii* Miquel ex Franchet & Savatier, Enum. Pl. Jap. 2: 118. 1877 [*“sieboldii”*].

锈鳞飘拂草 xiu lin piao fu cao

Perennials. Rhizomes short or well developed and horizontally creeping, woody. Culms grayish green, tufted, 10–65 cm tall, slender, flatly 3-angled, smooth, base thicker, with few leaves. Basal leaves with sheaths only and grayish brown. Leaves apically on culm with a blade, 1/3 or less as long as culm; leaf blade often linear, ca. 1 mm wide, folded. Involucral bracts 2 or 3, shorter to slightly longer than inflorescence, suberect, base slightly broader. Inflorescence a simple or rarely subcompound anthela; rays less than 10 mm. Spikelets solitary, oblong-ovoid, oblong, or narrowly oblong-ovoid, 10–17 × 3–4 mm, terete, densely many flowered, apex acute to rarely obtuse. Glumes grayish brown with dark brown lines at middle, ovate to elliptic, 3–4 mm, submembranous, apically with grayish

white hairs, abaxially prominently keeled, margin ciliate, apex obtuse and apiculate. Stamens 3; anthers linear. Style long and flat, basally broader; stigmas 2. Nutlet brown to blackish brown when mature, shortly stipitate, obovoid to broadly obovoid, 1.2–1.5 mm, flatly biconvex, subsmooth. Fl. and fr. Jun–Aug.

Seashores and sunny wet places at seashores, salty marshes; near sea level. Anhui, Fujian, Guangdong, Hainan, Jiangsu, Shandong, Taiwan, Xisha Qundao, Zhejiang [Japan, Korea].

Fimbristylis sieboldii has often been misidentified as *F. ferruginea* (Linnaeus) Vahl (e.g., D. A. Simpson & T. Koyama, Fl. Thailand 6(4): 317. 1998) or treated as a variety of *F. ferruginea* (e.g., Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 93. 1961). *Fimbristylis ferruginea*, originally described from Jamaica, differs from *F. sieboldii* by having ovoid spikelets, broader nutlets, and distribution in the tropics.

- 1a. Leaves with a blade 29a. var. *sieboldii*
 1b. Leaves mostly reduced to a bladeless sheath 29b. var. *anpinensis*

29a. *Fimbristylis sieboldii* var. *sieboldii*

锈鳞飘拂草(原变种) xiu lin piao fu cao (yuan bian zhong)

Fimbristylis aginkotensis Hayata; *F. ferruginea* (Linnaeus) Vahl var. *sieboldii* (Miquel ex Franchet & Savatier) Ohwi.

Rhizomes short. Culms 20–65 cm tall, thin, stiff. Leaves with a blade. Fl. and fr. Jun–Aug.

Seashores, salty marshes; near sea level. Anhui, Fujian, Guangdong, Hainan, Jiangsu, Shandong, Taiwan, Xisha Qundao, Zhejiang [Japan, Korea].

29b. *Fimbristylis sieboldii* var. *anpinensis* (Hayata) T. Koyama, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 8: 115. 1961.

安平飘拂草 an ping piao fu cao

Fimbristylis anpinensis Hayata, Icon. Pl. Formosan. 6: 108. 1916; *F. ferruginea* var. *anpinensis* (Hayata) H. Y. Liu; *F. sieboldii* subsp. *anpinensis* (Hayata) T. Koyama.

Rhizomes well developed, horizontally creeping. Culms ca. 60 cm tall, 1–1.5 mm thick, densely tufted or closely arranged in a row along a ± horizontal knotty rhizome. Leaves mostly reduced to a bladeless sheath but apicalmost sheaths with a setaceous short blade.

Sunny wet places at seashores; near sea level. Taiwan [Japan (Bonin Islands, Ryukyu Islands)].

30. *Fimbristylis hookeriana* Boeckeler, Linnaea 37: 22. 1871.

金色飘拂草 jin se piao fu cao

Fimbristylis chalarocephala Ohwi & T. Koyama; *F. fordii* C. B. Clarke.

Annuals or short-lived perennials. Rhizomes absent. Culms tufted, 5–40 cm tall. Leaves slightly shorter than to equaling culm; leaf blade 1–2.5 mm wide, glabrous, midvein abaxially prominent or not, apex acuminate. Involucral bracts 2–5, leaflike, usually longer than inflorescence, ca. 1 mm wide, apex acuminate to acute. Inflorescence a simple or compound anthela. Spikelets digitately clustered or solitary, very narrowly ovoid to linear, 7–17 × ca. 2 mm. Glumes straw-yellow to

greenish yellow, oblong-ovate, 2.5–5 mm, sometimes hairy, abaxially with 3 or more veins, margin hyaline, apex obtuse and mucronate or awned. Stamens usually 2 or 3. Style very long, compressed, basally slightly inflated, apically ciliate; stigmas 2. Nutlet white, very shortly stipitate, obovoid, 1–1.2 mm, biconvex, verruculose with transversely oblong reticulation. Fl. and fr. Aug–Oct.

Among rocks along streams, slopes, grassy areas; ca. 1000 m. Fujian, Guangdong, Hunan, Jiangsu, Jiangxi, Zhejiang [N India, Laos, Philippines, Thailand, Vietnam].

31. *Fimbristylis schoenoides* (Retzius) Vahl, Enum. Pl. 2: 286. 1805.

少穗飘拂草 shao sui piao fu cao

Scirpus schoenoides Retzius, Observ. Bot. 5: 14. 1788; *Fimbristylis kagiensis* Hayata.

Perennials. Rhizomes very short. Culms tufted, 5–40 cm tall, slender, slightly compressed, smooth, striate, with leaves at base. Leaves shorter than culm; leaf blade 0.5–1 mm wide, glabrous, margins often involute and apical part ciliate. Involucral bracts absent or 1 or 2, linear, to 2.5 cm. Inflorescence a reduced anthela, with only 1 or 2 (or 3) spikelets. Spikelets sessile or stipitate, broadly ovoid, ovoid, or oblong-ovoid, 5–12(–16) × 3–4 mm, many flowered. Glumes densely arranged, yellowish white with short brown lines, broadly ovate, membranous, abaxially with many veins but not keeled, apex rounded and not mucronate or sometimes midvein excurrent into a ca. 3 mm mucro. Stamens 3; anthers linear. Style long, compressed, basally inflated, apical half ciliate; stigmas 2. Nutlet yellowish white, globose-obovoid to subglobose, ca. 1.5 mm (including short stipe), biconvex, with hexagonal reticulation. Fl. Aug–Sep, fr. Oct–Nov.

Wet places along streams, ditches, roads, paddy fields; 300–800 m. Fujian, Guangdong, Guangxi, Hainan, Jiangxi, Taiwan, S Yunnan, S Zhejiang [Bangladesh, Bhutan, India, Indonesia, Laos, Malaysia, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa, N Australia].

32. *Fimbristylis subbispicata* Nees & Meyen, Nov. Actorum Acad. Caes. Leop.-Carol. Nat. Cur. 19(Suppl. 1): 75. 1843.

双穗飘拂草 shuang sui piao fu cao

Fimbristylis crassipes Palla (1909), not Boeckeler (1858); *F. gynophora* C. B. Clarke.

Annuals. Culms grayish green, tufted, 7–60 cm tall, slender, flatly 3-angled, smooth, striate, with few leaves at base. Leaves shorter than culm; leaf blade ca. 1 mm wide, flat but sometimes involute, slightly stiff, margin apically ciliate. Involucral bracts absent or only 1, linear, 0.7–10 cm, erect, longer than inflorescence. Inflorescences reduced to 1 (or 2) terminal spikelet. Spikelet ovoid, oblong-ovoid, or narrowly oblong-ovoid, 8–30 × 4–8 mm, terete, many flowered. Glumes spirally imbricate, brown with short rust-colored lines, ovate, broadly ovate, or subelliptic, 5–7 mm, membranous, abaxially with many veins, not keeled, apex obtuse and mucronate. Stamens 3; anthers linear, 2–2.5 mm. Style long, compressed, ciliate, basally

slightly inflated; stigmas 2. Nutlet brown, stipitate, globose-obovoid, 1.5–1.7 mm, flatly biconvex, slightly shiny and with hexagonal reticulation. Fl. Jun–Aug, fr. Sep–Oct. $2n = 10$.

Slopes, valleys, marshes, streamsides, watersides, seashores, salt marshes; near sea level to 1200 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, W Hunan, Jiangsu, Liaoning, Shaanxi, Shandong, Shanxi, Taiwan, Xisha Qundao, Zhejiang [Japan, Korea, Vietnam].

33. *Fimbristylis tristachya* R. Brown, Prodr. 266. 1810.

三穗飘拂草 san sui piao fu cao

Perennials. Rhizomes short. Culms densely tufted, 20–90 cm tall, 1–1.5 mm wide, flatly 3-angled, smooth, striate, with few leaves at base. Leaves shorter than culm; leaf blade 1.5–2 mm wide, stiff, involute, margin apically ciliate. Involucral bract 1, leaflike, much shorter than inflorescence, erect, margin ciliate. Inflorescence a simple anthela, with 3–6 spikelets. Spikelets ovoid to oblong-ovoid, 8–22 × 4–6 mm, terete, many flowered. Glumes spirally imbricate, brown with short rust-colored lines, ovate to broadly ovate, 5–6 × 4–4.5 mm, subleathery, with many veins, abaxial midvein slightly keeled, apex obtuse and mucronate. Stamens 3; anthers linear, 2–2.5 mm. Style ca. 3.5 mm, compressed, ciliate, basally slightly inflated; stigmas 2. Nutlet yellowish brown, stipitate, obovoid, ca. 2 mm, flatly biconvex, slightly shiny and with hexagonal reticulation. Fl. and fr. Jun–Oct.

Slopes, valleys, streamsides, fields, salt marine marshes. Guangdong, Hainan [Bangladesh, India, Indonesia, Malaysia, Papua New Guinea, Philippines, Thailand, Vietnam; NE Australia, Pacific islands].

34. *Fimbristylis polytrichoides* (Retzius) Vahl, Enum. Pl. 2: 248. 1805.

细叶飘拂草 xi ye piao fu cao

Scirpus polytrichoides Retzius, Observ. Bot. 4: 11. 1786.

Annuals or short-lived perennials. Rhizomes very short or absent, with many remnant fibers from old leaves. Culms densely tufted, 5–25 cm tall, slender, cylindrical, smooth, striate, with fewer leaves at base. Leaves shorter than culm; sheath yellowish brown, short, glabrous; leaf blade nearly *Juncus*-like, ca. 1 mm in diam., smooth. Involucral bract (0 or) 1, 5–12 mm, needlelike, basally broadened, margin membranous. Inflorescences with a single terminal spikelet, ellipsoid to oblong, 5–8 × 3–3.5 mm, 10- to many flowered, apex obtuse to rounded. Glumes densely spirally imbricate, pale white and translucent with short brown lines at middle, sometimes apically slightly yellowish brown laterally, oblong, ca. 3 mm, membranous, 1-veined, not keeled, apex rounded and without or with only a very short hard mucro. Stamens 3; anthers linear, short. Style long, slightly compressed, basally inflated, apical half ciliate; stigmas 2. Nutlet grayish black, obovoid, ca. 1 mm, biconvex, sparsely verruculose and with transversely oblong reticulation. Fl. and fr. Mar–Sep. $2n = 10$.

Wet salty places by sea, paddy fields; near sea level. Fujian, Guangdong, Hainan, Taiwan [Bangladesh, India, Indonesia, Malaysia, Myanmar, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa, Australia, Madagascar].

35. *Fimbristylis squarrosa* Vahl, Enum. Pl. 2: 289. 1805.畦畔飘拂草 *qi pan piao fu cao*

Annuals. Culms densely tufted, 6–25 cm tall, slender, compressed, with few leaves at base. Leaves shorter than culm; sheath pale brown, densely pilose; leaf blade less than 1 mm wide, flat, both surfaces pubescent. Involucral bracts 3–7, leaf-like, shorter to slightly longer than inflorescence. Inflorescence a simple, compound, or decompound anthela; rays few to many, to 3 cm. Spikelets solitary, ovoid, narrowly ovoid, or oblong, 3–7 × 1.2–3 mm, many flowered, squarrose or not. Glumes spirally imbricate, yellowish brown, oblong to oblong-ovate, 1.5–2 mm (including awn), membranous, 3-veined forming an abaxial green keel, apex obtuse and awned, awn either long and recurved or short and straight or slightly recurved. Stamen 1; anther oblong, apex apiculate. Style long and compressed, basally inflated with long filiform pendent hairs covering top of nutlet, apically ciliate; stigmas 2. Nutlet yellowish white, shortly stipitate, obovoid, 0.5–1 mm, biconvex, almost smooth or with very indistinct hexagonal reticulation. Fl. Sep.

Watersides, wet places; 100–2200 m. Anhui, Fujian, Guangdong, S Guangxi, NW Guizhou, Hainan, Hebei, Heilongjiang, Henan, Jiangsu, Shandong, Taiwan, SE Xizang, Yunnan, Zhejiang [India, Indonesia, Japan, Korea, Laos, Myanmar, Nepal, Philippines, Thailand, Vietnam; Africa, SW Asia, Australia, S Europe, Pacific islands (New Zealand)].

Fimbristylis squarrosa was treated as a synonym of *F. aestivalis* by D. A. Simpson and T. Koyama (Fl. Thailand 6(4): 333–334. 1998).

- 1a. Glume midvein often excurrent into a recurved 1–1.8 mm awn, ca. 1/2 as long as glume; spikelets squarrose 35a. var. *squarrosa*
 1b. Glume midvein ending in a short and straight or slightly recurved awn, ca. 1/5 as long as glume; spikelets not squarrose 35b. var. *esquarrosa*

35a. *Fimbristylis squarrosa* var. *squarrosa*畦畔飘拂草(原变种) *qi pan piao fu cao (yuan bian zhong)*

Culms 6–20 cm tall. Anthelae simple or compound. Spikelets squarrose, 3–6 × 2–3 mm. Glume midvein often excurrent into a recurved 1–1.8 mm awn, ca. 1/2 as long as glume. Nutlet ca. 1 mm, almost smooth. Fl. Sep. $2n = 20$.

Watersides, wet places; 100–2200 m. Anhui, Fujian, Guangdong, S Guangxi, NW Guizhou, Hebei, Heilongjiang, Henan, Jiangsu, Shandong, Taiwan, SE Xizang, Yunnan, Zhejiang [India, Indonesia, Japan, Korea, Myanmar, Nepal, Philippines; Africa, SW Asia, Australia, S Europe, Pacific islands].

35b. *Fimbristylis squarrosa* var. *esquarrosa* Makino, Bot. Mag. (Tokyo) 17: 47. 1903.短尖飘拂草 *duan jian piao fu cao**Fimbristylis makinoana* Ohwi; *F. velata* R. Brown.

Culms 10–25 cm tall. Anthelae compound or decompound, spreading. Spikelets 3–7 × 1.2–2 mm. Glume midvein ending in a short and straight or slightly recurved awn, ca. 1/5 as long as glume. Nutlet ca. 0.5 mm, almost smooth or with very indistinct hexagonal reticulation. Fl. Sep.

Watersides, wet places. Fujian, Hainan, Hebei, Heilongjiang, Jiangsu, Shandong, Taiwan, Yunnan [Indonesia, Japan, Korea, Laos, Philippines, Thailand, Vietnam; Australia, Pacific islands (New Zealand)].

36. *Fimbristylis bisumbellata* (Forsskål) Bubani, Dodecanthea, 30. 1850.复序飘拂草 *fu xu piao fu cao**Scirpus bisumbellatus* Forsskål, Fl. Aegypt.-Arab. 15. 1775.

Annuals. Culms densely tufted, 4–20 cm tall, slender, flatly 3-angled, smooth, with few leaves at base. Leaves shorter than culm; sheath yellowish green with rust-colored flecks, short, white pilose; leaf blade 0.7–1.5 mm wide, flat, margin apically ciliate, abaxially sometimes sparsely hairy. Involucral bracts 2–5, leaflike, suberect, basal 1 or 2 equaling or longer than inflorescence. Inflorescence a compound or decompound anthela, lax; rays 4–10, to 4 cm, slender. Spikelets solitary, oblong-ovoid, ovoid, or oblong, 2–7 × 1–1.8 mm, 10–20-flowered, apex acute. Glumes spirally imbricate, brown, broadly ovate, 1.2–2 mm, membranous, 3-veined forming an abaxial green keel. Stamens 1 or 2; anthers narrowly oblong-ovoid. Style long and compressed, ciliate, basally inflated; stigmas 2. Nutlet yellowish white, very shortly stipitate, broadly obovoid, ca. 0.8 mm, biconvex, with transversely oblong reticulation. Fl. and fr. Jul–Sep(–Nov). $2n = 10, 16, 20$.

Along rivers, streams, sandy or marshy places, wet places on slopes; 100–1500 m. Anhui, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Yunnan, Zhejiang [Afghanistan, India, Indonesia, Japan, Laos, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Turkmenistan, Vietnam; Africa, SW Asia, Australia, Europe, Indian Ocean islands].

37. *Fimbristylis aestivalis* (Retzius) Vahl, Enum. Pl. 2: 288. 1805.夏飘拂草 *xia piao fu cao**Scirpus aestivalis* Retzius, Observ. Bot. 4: 12. 1786.

Annuals. Rhizomes absent. Culms densely tufted, 3–25 cm tall, slender, flatly 3-angled, smooth, with few leaves at base. Leaves shorter than culm; leaf blade filiform, 0.5–1 mm wide, flat, both surfaces sparsely pubescent, margin slightly involute; sheath brown, short, white pilose. Involucral bracts 3–5, filiform, shorter to longer than inflorescence, sparsely hairy. Inflorescence a compound anthela, lax; rays 3–7, to 3 cm, slender. Spikelets solitary, ovoid, oblong-ovoid, or narrowly ovoid, 2.5–6 × 1–1.5 mm, many flowered. Glumes spirally imbricate, reddish brown, ovate to oblong, ca. 1 mm, membranous, 3-veined forming an abaxial green keel, apex mucronate. Stamen 1; anther narrowly ovoid. Style long and compressed, basally inflated, apically ciliate; stigmas 2, short. Nutlet yellow, subsessile, obovoid, ca. 0.6 mm, biconvex, almost smooth or sometimes with very indistinct hexagonal reticulation. Fl. May–Aug.

Grasslands, marshy places, paddy fields; 400–2200 m. Anhui, S Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Heilongjiang, Hubei, Hunan, Jiangxi, S Shaanxi, Sichuan, Taiwan, S Yunnan, Zhejiang [Bhutan, India, Indonesia, Japan, Laos, Nepal, Papua New Guinea, Philippines, Russia (Far East), Sri Lanka, Thailand, Vietnam; Australia, Pacific islands].

38. *Fimbristylis gracilentia* Hance, J. Bot. 6: 89. 1868.

纤细飘拂草 xian xi piao fu cao

Annuals. Culms tufted, 3–25 cm tall, slender, flatly 3-angled, striate, glabrous, with few leaves at base. Leaves shorter than culm; sheath brown, densely pubescent; leaf blade ca. 1 mm wide, flat, both surfaces sparsely pubescent, margin sometimes slightly involute. Involucral bracts 5 or 6, needlelike, shorter than inflorescence, pubescent. Inflorescence a simple or occasionally compound anthela; rays 5–8, to 5 cm, slender, densely pubescent. Spikelet solitary, oblong, narrowly ovoid, or narrowly linear-ovoid, 4–12 × 1.5–2 mm, with several to 10 or more flowers. Glumes spirally imbricate, pale brown, ovate-lanceolate, ca. 2 mm, membranous, 3-veined forming an abaxial keel, midvein excurrent into a mucro. Stamens 2; anthers dark red, linear-oblong. Style long and compressed, basally inflated, apically ciliate; stigmas 2, short, with papillae. Nutlet brown, shortly stipitate, obovoid, ca. 1 mm, biconvex, almost smooth with indistinct hexagonal reticulation. Fl. Jun–Jul.

Open places. Guangdong [Indonesia (N Sumatra), Thailand, Vietnam].

39. *Fimbristylis simaoensis* Y. Y. Qian, Bull. Bot. Res., Harbin 17: 128. 1997.

思茅飘拂草 si mao piao fu cao

Rhizomes short. Culms tufted, 30–60 cm tall, slender, flatly 3-angled, striate, glabrous, with few leaves at base. Leaves shorter than culm; sheath pale yellow, glabrous; leaf blade 1.5–3 mm wide, flat, adaxially sparsely hairy, margin involute. Involucral bracts 3–6, leaflike, longer than inflorescence, margin ciliate. Inflorescence a compound anthela; rays 2–7, 0.5–7 cm, glabrous. Spikelets solitary, ovoid to narrowly ovoid, 4–10 × 2–4 mm, with 6–20 flowers. Glumes spirally imbricate, brown, elliptic, 2.2–2.4 mm, membranous, 3-veined forming an abaxial keel, midvein excurrent into a mucro. Stamen 1; anther yellow, oblong. Style long and compressed, basally inflated, apically ciliate; stigmas 2. Nutlet dark brown, shortly stipitate, broadly obovoid, 1–1.2 mm, biconvex, with hexagonal reticulation. Fl. Aug–Sep.

- Moist grasslands; ca. 1300 m. S Yunnan (Simao Diqu).

40. *Fimbristylis tetragona* R. Brown, Prodr. 226. 1810.

四棱飘拂草 si leng piao fu cao

Fimbristylis cylindrocarpa Kunth.

Annuals or short-lived perennials. Rhizomes poorly developed. Culms densely tufted, (8–)18–50(–60) cm tall, 4-angled, smooth, with few leaf sheaths at base. Leaves bladeless; sheath margin brown membranous, mouth obliquely truncate. Involucral bracts absent. Inflorescences reduced to a single terminal spikelet, ovoid to ellipsoid, 5–10 × 3–6 mm, many flowered, apex obtuse to rounded. Glumes densely spirally imbricate, pale brownish yellow, oblong, 3.5–5 mm, membranous, many veined, middle 3 veins thicker but abaxially not forming a keel, base sometimes narrower, apex not mucronate. Stamens 3; anthers linear, 1.2–1.5 mm. Style long and compressed, sparsely ciliate, basally gradually broader and nearly as wide as nutlet;

stigmas 2 or 3. Nutlet pale brown, with a ca. 0.7 mm stipe, narrowly oblong, ca. 2.5 mm, biconvex, shiny and with obvious hexagonal reticulation. Fl. and fr. Sep–Oct.

Marshes; below 100–200 m. Fujian, Guangdong, Guangxi, Hainan, Taiwan [India, Indonesia, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Australia].

41. *Fimbristylis pauciflora* R. Brown, Prodr. 225. 1810.

海南飘拂草 hai nan piao fu cao

Fimbristylis hainanensis Tang & F. T. Wang.

Perennials. Rhizomes hardly developed. Culms densely tufted, 5–18 cm tall, slender, short, flatly cylindrical, smooth, glabrous, with few leaf sheaths at base. Leaves bladeless; sheath brown, cylindrical, apically attenuate, margin membranous, mouth obliquely truncate. Involucral bracts absent. Inflorescences reduced to a single terminal spikelet, narrowly oblong to clavate-oblong, 3.5–4.5 × 1–1.5 mm, few flowered, with basalmost glume empty. Glumes pale with rust-colored short lines, oblong to oblong-ovate, 3–3.2 mm, 7–9-veined, midvein abaxially green, apex obtuse and not mucronate. Stamens 3; anthers linear. Style long and compressed, sparsely ciliate, basally slightly broader; stigmas 3, with sparse papillae. Nutlet white, obovoid, ca. 0.8 mm, nearly 3-sided, with sparse verruculose and sub-hexagonal reticulation. Fl. and fr. Aug–Sep.

Wet places by ponds; low elevations. Hainan [India, Indonesia, Japan (Ryukyu Islands), Malaysia, Myanmar, Papua New Guinea, Thailand, Vietnam; Australia, Pacific islands].

42. *Fimbristylis nutans* (Retzius) Vahl, Enum. Pl. 2: 285. 1805.

垂穗飘拂草 chui sui piao fu cao

Scirpus nutans Retzius, Observ. Bot. 4: 12. 1786.

Annuals or short-lived perennials. Rhizomes extremely short or absent. Culms densely tufted, 15–85 cm tall, subcylindrical, stiff, striate, smooth, glabrous, with leaf sheaths at base. Leaves bladeless; leaf sheath brown, basal ones glumelike and apical ones cylindrical, margins membranous, apex obliquely truncate. Involucral bract 1, glumelike, ovate, 2–4.5 mm, apex mucronate. Inflorescences reduced to a single terminal spikelet, ovoid, ellipsoid, or oblong-ovoid, 5–15 × 2–5 mm, slightly nodding, 10- to many flowered. Glumes rather densely spirally imbricate, brown with short rust-colored lines, broadly ovate to subelliptic, 3–5 mm, papery, veins many but abaxially faint, apex rounded and mucronate. Stamens 3; anthers linear. Style long and compressed, basally slightly inflated, apically sparsely ciliate; stigmas 2, short. Nutlet white with a very short brown stipe, obovoid, 1.2–1.5 mm, flatly biconvex to sometimes nearly flat-convex, with transverse wavy reticulation and verruculose margins. Fl. and fr. Jul–Aug.

Wet places. S Fujian, Guangdong, Guangxi, Hainan, S Hunan, Taiwan [India, Indonesia, Japan (Ryukyu Islands), Malaysia, Myanmar, Papua New Guinea, Sri Lanka, Thailand, Vietnam; Australia].

43. *Fimbristylis acuminata* Vahl, Enum. Pl. 2: 285. 1805.

披针穗飘拂草 pi zhen sui piao fu cao

Annuals or short-lived perennials. Rhizomes absent.

Culms sparsely tufted, 6–35 cm tall, thin, slightly compressed, striate, smooth, glabrous. Leaves bladeless; basal sheaths glumelike; apical sheaths cylindric, apex obliquely truncate. Involucral bracts absent. Inflorescences reduced to a single terminal spikelet, ovoid to narrowly ovoid, 5–10 × 2–3 mm, with several to 10 or more flowers. Glumes laxly spirally imbricate, greenish white and sometimes laterally with brown specks, broadly ovate to elliptic, 2.8–4 mm, thickly papery, with several faint veins forming an abaxial green keel, apex obtuse and mucronate. Stamens 2; anthers linear. Style long and compressed, sparsely ciliate, basally inflated; stigmas 2, straight. Nutlet with a short brown stipe, globose-obovoid, ca. 1.5 mm, biconvex, with transverse wavy reticulation. Fl. and fr. Jul–Aug.

Open wet places, sandy soil grasslands, watersides, grasslands by water; low elevations. Fujian, Guangdong, Hainan [India, Indonesia, Japan (Ryukyu Islands), Laos, Malaysia, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Australia].

44. *Fimbristylis nigrobrunnea* Thwaites, Enum. Pl. Zeyl. 434. 1864.

褐鳞飘拂草 he lin piao fu cao

Fimbristylis eragrostis (Nees & Meyen) Hance var. *nigrobrunnea* (Thwaites) S. S. Hooper; *F. pycnostachya* Hance.

Perennials. Rhizomes short. Culms tufted, 10–45 cm tall, slightly scabrid, with radical leaves at base. Leaves 1/4–1/3 as long as culm; sheath leathery, obliquely split at apex, mouth membranous and pale brown; leaf blade linear, 1–2.5 mm wide, apex acute and apiculate or not. Involucral bracts 2–4, leaflike, 2–13 mm, apically attenuate. Inflorescence a simple or rarely compound anthela or sometimes reduced to a single terminal spikelet; rays few, 0.5–3 cm, slender. Spikelets solitary, oblong to ovoid, 6–8 × ca. 2.5 mm, many flowered, sometimes with basal glumes ± distichous. Glumes brown without brown spots, broadly ovate and boat-shaped, 2–3 mm, papery, 1-veined, margin hyaline, apex mucronate. Stamens 3; anthers linear-oblong, 1–1.5 mm. Ovary narrowly oblong; style 3-sided, glabrous, basally inflated; stigmas 3. Nutlet white, obovoid, 1–1.2 mm, flatly 3-sided, verruculose with subhexagonal reticulation. Fl. and fr. Apr–Jul.

Marshes, along rivers, among rocks in valleys; 100–2500 m. Guangdong, Guangxi, Hainan, Yunnan [Cambodia, India, Sri Lanka].

45. *Fimbristylis eragrostis* (Nees & Meyen) Hance, J. Linn. Soc., Bot. 13: 132. 1873.

知风飘拂草 zhi feng piao fu cao

Abildgaardia eragrostis Nees & Meyen in Wight, Contr. Bot. India, 95. 1834.

Perennials. Rhizomes short. Culms tufted, 20–50 cm tall, with fewer radical leaves at base. Leaf sheath leathery, apex obliquely split, mouth margins membranous and pale brown; leaf blade slightly falcate, 10–20 cm × 1–2.5 mm, glabrous, apex acute and apiculate. Involucral bracts 2–4, nearly leaflike, 3–15 mm, apically attenuate; bractlets pale brown, 2–3 mm. Inflorescence a compound anthela; rays 2 to many. Spikelets solitary, oblong, oblong-ovoid, or ovoid, 6–10 × 2–3 mm, many

flowered, with basal 1 or 2 glumes empty. Fertile glumes yellowish brown, broadly ovate to subtriangular, 2.5–3.5 mm, shiny, 1-veined forming an abaxial keel, apex mucronate. Stamens 3. Ovary white, cylindric, striate; style brown, 3-sided, basally inflated; stigmas 3. Nutlet white or slightly brownish, broadly obovoid, 0.7–0.8 mm, 3-sided, verruculose. Fl. and fr. Jun–Sep.

Grasslands; near sea level to 1100 m. Fujian, Guangdong, Guangxi, Hainan, Jiangxi, Nansha Qundao, Taiwan [India, Indonesia, Laos, Malaysia, Papua New Guinea, Sri Lanka, Thailand, Vietnam; Australia].

46. *Fimbristylis disticha* Boeckeler, Linnaea 38: 393. 1874.

红鳞飘拂草 hong lin piao fu cao

Fimbristylis rufoglumosa Tang & F. T. Wang.

Annuals. Culms tufted, 10–30 cm tall. Leaf 1/4–1/3 as long as culm; sheath apex obliquely split, mouth margins membranous and pale brown; leaf blade linear, 1–2.5 mm wide, slightly curved, both surfaces scabrous with appressed short pubescence or glabrescent, apex acute. Involucral bracts 3 or 4, leaflike, to 2.8 cm, basalmost ca. 3 × as long as glumes, apically attenuate. Inflorescence a compound anthela; rays many. Spikelets solitary, ovoid to oblong-ovoid, 3–6 × 1.5–2.5 mm, slightly compressed, with basal 1 or 2 glumes empty. Glumes reddish brown, broadly ovate, ca. 2.5 mm, not shiny, glabrous, 1-veined forming an abaxial keel, apex mucronate. Stamens 3. Style 3-sided, not ciliate, basally inflated; stigmas 3. Nutlet white, obovoid, ca. 0.7 mm, 3-sided, verruculose. Fl. and fr. Aug–Sep.

Grasslands, slopes. Fujian, Guangdong, Guangxi [Cambodia, Indonesia, Laos, Myanmar, Thailand, Vietnam; Indian Ocean islands].

47. *Fimbristylis nanningensis* Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 229. 1961.

南宁飘拂草 nan ning piao fu cao

?Annuals. Culms tufted, 18–55 cm tall, slender, with many radical leaves. Leaves usually shorter than or rarely as long as culm; leaf blade narrowly linear, ca. 1 mm wide, both surfaces scabrous with appressed short pubescence, apically attenuate. Involucral bracts leaflike, much longer than inflorescence, less than 1 mm wide, scabrous with appressed pubescence, apex acuminate. Inflorescence a compound anthela, slightly lax, with many rays and spikelets; rays slender, glabrous. Spikelets solitary, narrowly ovoid, ca. 5 × 1 mm, slightly compressed, with only 2 or 3 flowers. Glumes ovate-lanceolate to lanceolate, ca. 3 mm, membranous, densely gland-dotted, 2- or 3-veined, midvein abaxially forming a slight keel, apex acuminate. Stamens 3. Ovary white, cylindric, slightly 3-sided; style very long, 6–8 × as long as ovary, basally slightly inflated; stigmas 3, often curly. Fl. and fr. Jul.

• Grasslands, slopes. Guangxi.

48. *Fimbristylis cinnamometorum* (Vahl) Kunth, Enum. Pl. 2: 229. 1837.

腺鳞飘拂草 xian lin piao fu cao

Scirpus cinnamometorum Vahl, Enum. Pl. 2: 278. 1805; *Fimbristylis cyperoides* R. Brown.

Perennials or rarely annuals. Rhizomes \pm creeping. Culms moderately tufted to lax, (10–)20–50 cm tall, 0.5–1 mm thick, 3-angled, smooth. Leaves basal, 2-ranked; sheath 1.5–5 cm, apex obliquely truncate and ciliate; ligule a fringe of short white hairs; leaf blade filiform, 4–22 cm \times 0.3–0.6 mm, canalliculate, margin involute, apex subacute. Involucral bracts 2 or 3, leaflike, longest 1–5 cm, shorter than inflorescence. Inflorescence a compound or decompound anthela of 10–90 spikelets, 2–7 \times 2–7 cm, open; primary rays 3–6, 0.8–5 cm. Spikelets solitary, light brown to deep reddish brown, \pm narrowly ovoid, 4–8 \times 1.2–1.5 mm, flattened. Glumes densely gland-dotted, 1–3-veined forming an acute abaxial keel, margin membranous, apex acuminate. Stamens 3; anthers 1.5–2 mm. Stigmas 3. Nutlet narrowly obovoid to obovoid-oblong, 0.8–1 \times 0.3–0.5 mm, 3-sided to nearly subterete, transversely ridged and cancellate with 4 or 5 rows of linear epidermal cells. Fl. Jul, fr. Sep.

Swampy grasslands, wet savannah forests; below 1300 m. Hainan [India, Indonesia, Myanmar, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Australia].

49. *Fimbristylis kwantungensis* C. B. Clarke, J. Linn. Soc., Bot. 36: 238. 1903.

广东飘拂草 *guang dong piao fu cao*

Perennials. Rhizomes very short. Culms tufted, 30–50 cm tall, 0.5–1 mm wide. Leaf blade linear, 1/4–1/2 as long as culm, 2–3 mm wide, often falcately curved, both surfaces hairy, apex acute. Involucral bracts 2–4, leaflike, 5–15 mm wide, hairy, apically attenuate. Inflorescence a compound anthela; rays 3–5, slender, slightly hairy or glabrous. Spikelets solitary, brown, narrowly ovoid, 6–10 \times ca. 3 mm, 8–10-flowered, with basal 2 glumes empty. Glumes brown, ovate-lanceolate to lanceolate, 3.5–4 \times ca. 2 mm, hairy, 1-veined forming an abaxial keel, margin sometimes hyaline, apex with an excurved awn. Stamens 2. Style ca. 3 mm, slender; stigmas 2. Nutlet grayish yellow or white, ellipsoid, ca. 1 \times 0.6 mm, 3-sided, verruculose. Fl. summer.

- Grasslands along rivers. Guangdong (Lianzhou).

50. *Fimbristylis fusca* (Nees) C. B. Clarke in J. D. Hooker, Fl. Brit. India 6: 649. 1893.

暗褐飘拂草 *an he piao fu cao*

Abildgaardia fusca Nees in Wight, Contr. Bot. India, 95. 1834; *Fimbristylis fusca* var. *cantoniensis* C. B. Clarke.

Perennials, rhizomatous. Culms tufted, 20–40 cm tall, with radical leaves. Leaf blade linear, 5–35 cm \times 1–3 mm, both surfaces hairy, apex acute. Involucral bracts 2–4, leaflike, 0.8–1.5 cm, hairy, base much broader, apex attenuate and apiculate. Inflorescence a compound anthela; rays many, hairy. Spikelets solitary, narrowly ovoid to narrowly oblong-ovoid, 6–10 mm, apex attenuate, with basal 2 or 3 glumes empty. Fertile glumes brown to nearly blackish brown, ovate-lanceolate, 4–5 mm, thickly papery, hairy, 1-veined forming an abaxial keel, margin sometimes hyaline, apex apiculate. Stamens 3. Style 4–5 mm, basally inflated; stigmas 3. Nutlet pale brown or white, almost sessile, obovoid, ca. 0.9 mm, 3-sided, verruculose. Fl. and fr. Jun–Sep.

Mountain summits, grassy slopes, grasslands, cultivated fields; 100–2000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Taiwan, Yunnan, Zhejiang [India, Japan, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Thailand, Vietnam; N Australia].

51. *Fimbristylis fimbristylodes* (F. Mueller) Druce, Rep. Bot. Soc. Exch. Club Brit. Isles 4: 623. 1917.

矮飘拂草 *ai piao fu cao*

Abildgaardia fimbristylodes F. Mueller, Fragm. 8: 273. 1874; *Fimbristylis nanofusca* Tang & F. T. Wang.

Annuals. Culms tufted, 5–13 cm tall, with radical leaves. Leaves slightly more than 1/2 as long as culm; leaf blade linear, 1–1.5 mm wide, slightly curved, margin ciliate, apex acute. Involucral bracts 2 or more, leaflike, 0.5–1.8 cm, less than 1 mm wide, hispid, apex acuminate. Inflorescence a simple or rarely subcompound anthela; rays 1–3 cm, hairy. Spikelets solitary, ovoid to broadly ovoid, 4–5 \times ca. 1.5 mm, slightly compressed, with basal 1–3 glumes empty. Glumes brown, ovate, 2.5–3 mm, membranous, not densely gland-dotted, hairy, midvein abaxially forming a slight keel and excurrent into a mucro; empty glumes shorter than fertile ones, with longer awns. Stamens 3. Ovary white, cylindrical, 3-sided; style pale brown, ca. 2 mm, basally inflated; stigmas 3. Nutlet pale yellow to nearly white, very shortly stipitate, obovoid, 3-sided, verruculose, base truncate. Fl. and fr. Aug.

Slopes. Guangdong, Guangxi, Yunnan, Zhejiang [Bhutan, India, Indonesia, Japan (Ryukyu Islands), Korea, Malaysia, Myanmar, Nepal, Papua New Guinea, Thailand, Vietnam; N Australia].

52. *Fimbristylis ovata* (N. L. Burman) J. Kern, Blumea 15: 126. 1967.

独穗飘拂草 *du sui piao fu cao*

Carex ovata N. L. Burman, Fl. Indica, 194. 1768; *Abildgaardia monostachyos* (Linnaeus) Vahl; *A. ovata* (N. L. Burman) Kral; *Cyperus monostachyos* Linnaeus; *Fimbristylis monostachyos* (Linnaeus) Haaskarl; *Iria monostachyos* (Linnaeus) Kuntze.

Perennials. Rhizomes short. Culms tufted, 15–35 cm tall, slender. Leaves 1/2–2/3 as long as culm; leaf blade 0.5–1 mm wide, apex acute. Involucral bracts 1–3, glumelike but basal-most sometimes leaflike, 0.5–1.8 cm, apex with a 2–3 mm awn. Inflorescences reduced to a single terminal spikelet, ovoid, ellipsoid, or oblong-ovoid, 7–13 \times ca. 5 mm, slightly compressed, with basal glumes distichous and apical ones spirally imbricate. Glumes yellowish green, broadly ovate to ovate, 3–6 mm, leathery, shiny, abaxially 3-veined, midvein prominent and excurrent into a mucro. Stamens 3. Style 3-sided, basally inflated; stigmas 3. Nutlet shortly stipitate, obovoid, ca. 2 mm, 3-sided, prominently verruculose. Fl. and fr. Jun–Sep. $2n = 10$.

Grasslands, roadsides, waste fields, open moist hillsides, stream-sides, sunny dry slopes, grassy slopes; 100–1400 m. Fujian, Guangdong, Guangxi, S Guizhou, Hainan, S Hunan, NE Sichuan, Taiwan, Yunnan, Zhejiang [Bhutan, India, Indonesia, Japan, Korea, Laos, Malaysia, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa, SW Asia (Yemen), Central and South America, Pacific islands].

53. *Fimbristylis longistipitata* Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 229. 1961.

长柄果飘拂草 chang bing guo piao fu cao

Perennials, rhizomatous. Culms tufted, 15–30 cm tall, slender. Leaves ca. 1/2 as long as to equaling culm; leaf blade narrowly linear, ca. 0.5 mm wide, apex acuminate. Involucral bracts 2 or 3, glumelike, 0.5–1.8 cm, apex with a longer hairy awn. Inflorescences reduced to a single terminal spikelet, ovoid

to oblong-ovoid, 8–13 × ca. 4 mm. Glumes yellowish green with fine brown spots, broadly ovate to oblong-ovate, ca. 4 mm, shiny, 3-veined forming an abaxial slight keel, midvein prominent, apex mucronate. Stamens 3. Style 3-sided, ciliate, basally inflated; stigmas 3. Nutlet with a ca. 0.8 mm stipe, flatly globose, ca. 1.5 mm, 3-sided, very sparsely verruculose. Fl. and fr. Jun–Oct.

• Stream-sides, open woods, field margins, scrub by seashores; near sea level to 600 m. Guangdong, Hainan.

13. *BULBOSTYLIS* Kunth, Enum. Pl. 2: 205. 1837, nom. cons., not Steven (1817), nor Candolle (1836).

球柱草属 qiu zhu cao shu

Liang Songyun (梁松筠 Liang Song-jun); Gordon C. Tucker

Herbs, annual [or perennial]. Culms tufted, very slender. Leaves with a leaf blade or rarely reduced to a bladeless sheath, mouth with lax white hairs; leaf blade filiform to linear, margin often involute. Involucral bracts leaflike or setaceous. Inflorescence a terminal simple or compound anthela or capitate, sometimes reduced to a single spikelet. Spikelets ovoid to ellipsoid, many flowered. Glumes spirally arranged or rarely distichous, herbaceous or membranous, deciduous, subtending a flower but basal 1 or 2 empty. Flowers bisexual. Perianth bristles absent. Stamens (1 or)2(or 3). Style filiform, base thickened, bulbous, and persistent in fruit; stigmas 3. Nutlet obovoid to obpyriform, 3-sided.

About 100 species: tropical to temperate regions worldwide with high concentration of species in tropical Africa and tropical America; three species in China.

- 1a. Spikelets 2–15, sessile in a capitate inflorescence; glumes brownish to yellowish green, apex with a recurved short awn 3. *B. barbata*
 1b. Spikelet single, in a simple to compound anthela; glumes brownish to brown, apex mucronate.
 2a. Glumes glabrous, apex obtuse; nutlet irregularly puncticulate 1. *B. densa*
 2b. Glumes pubescent, apex acute; nutlet undulate-corrugate 2. *B. puberula*

1. *Bulbostylis densa* (Wallich) Handel-Mazzetti, Vegetationsbilder 20(7): 16. 1930.

丝叶球柱草 si ye qiu zhu cao

Scirpus densus Wallich in Roxburgh, Fl. Ind. 1: 231. 1820; *Bulbostylis capillaris* (Linnaeus) Kunth ex C. B. Clarke var. *trifida* (Kunth) C. B. Clarke; *Isolepis densa* (Wallich) Schultes; *I. tenuissima* D. Don; *I. trifida* Kunth.

Rhizomes absent. Culms tufted, 7–35 cm tall, slender, smooth. Leaf sheath pale, membranous, mouth long pilose; leaf blade filiform, 5–10(–13) × ca. 0.6 mm, papery, abaxially sparsely pilose, margin entire and slightly revolute, apex acuminate. Involucral bracts 2 or 3, setaceous to glumelike, 0.8–1.5 cm, much shorter than inflorescence, apex acuminate. Inflorescence a simple or subcompound anthela, with 4–7 spikelets; rays 3–5, 2–5 cm. Spikelets solitary or clustered, oblong-ovoid to ovoid, 3–6 × ca. 1.5 mm, 5–18-flowered, base rounded, apex acute. Glumes brown, ovate to broadly ovate, 1.5–2 × 1–1.5 mm, membranous, 1–3-veined, base rounded, margin ciliate, apex obtuse to rarely acute; empty glumes yellowish green, apex sometimes mucronate. Stamens 2; anthers oblong-ovoid to ovoid, base cuneate, apex acute. Style filiform; stigmas 3. Nutlet grayish purple at maturity, obovoid, ca. 0.8 × 0.5–0.6 mm, 3-sided, inconspicuously undulate-corrugate and puncticulate, apex contracted with a persistent depressed bulbous style base. Fl. and fr. Apr–Dec. 2n = 64.

Sandy wet places, waste slopes, trail margins, coniferous forests; 100–3200 m. Anhui, Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hebei, S Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Shandong, Sichuan, Taiwan, E Xizang, Yunnan, Zhejiang [Bangladesh, Bhutan, India, Indonesia, Japan, Kashmir, Myanmar, Nepal, Papua New Guinea, Philippines, Russia (Far East), Sri Lanka, Thailand, Vietnam; tropical Africa, Australia, Pacific islands].

2. *Bulbostylis puberula* Kunth, Enum. Pl. 2: 213. 1837.

毛鳞球柱草 mao lin qiu zhu cao

Scirpus puberulus Poiret (1805), not Michaux (1803).

Rhizomes absent. Culms tufted, 10–30 cm tall, slender, smooth. Leaf sheath straw-colored to brownish, thinly membranous, pubescent; leaf blade capillary, 4–6 cm × 0.4–0.8 mm, abaxially pubescent, margin entire and slightly revolute, apex acuminate. Involucral bracts 2 or 3, setaceous, ca. 8 mm, base membranous, margin ciliate. Inflorescence a simple or compound anthela, with 1–3 or more spikelets, often congested to almost capitate, sometimes reduced to a single spikelet. Spikelets ovoid-oblong to ovoid, 3–6 × 1–2 mm, 7–21-flowered, base obtuse to rounded, apex acute. Glumes brownish to dark brown, ovate to broadly ovate, 1.5–2 × 1–1.5 mm, keeled, membranous, abaxially pubescent, margin ciliate, apex with a 1–3-veined yellowish green costa excurrent into a recurved mucro. Stamen 1; anther oblong, apex acute. Style filiform, base depressed globose; stigmas 3. Nutlet white to grayish yellow, obovoid, ca. 0.8 × 0.5–0.6 mm, 3-sided, apex contracted with a

persistent depressed bulbous style base. Fl. and fr. Feb–Jun. $2n = 20$.

Sandy areas. S Fujian, Guangdong, Hainan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Sri Lanka, Thailand, Vietnam; tropical Africa, Indian Ocean islands, Madagascar].

3. *Bulbostylis barbata* (Rottbøll) C. B. Clarke in J. D. Hooker, Fl. Brit. India 6: 651. 1893.

球柱草 qiu zhu cao

Scirpus barbatus Rottbøll, Descr. Icon. Rar. Pl. 27. 1773; *Bulbostylis disticha* Ohwi & T. Koyama; *Isolepis barbata* (Rottbøll) R. Brown.

Rhizomes absent. Culms densely tufted, 0.6–3 cm tall, 0.5–0.8 mm thick, erect, smooth. Leaf sheath brownish, 0.5–2 cm, thinly membranous, glabrous, mouth white hyaline and with scattered long hairs; leaf blade filiform, 4–10 cm × 4–8 mm, abaxially glabrous or sometimes sparsely pilose, margin entire, apex acuminate. Involucral bracts 2 or 3, setaceous, 1–2.5 cm or ± short, very slender, abaxially glabrous or with scat-

tered hairs. Inflorescences terminal, capitate, 5–12 mm thick, with 3–15 sessile spikelets. Spikelets narrowly ovoid, 3–6.5 × 1–1.5 mm, angular, 7–13-flowered, base obtuse to subrounded, apex acute. Glumes brownish to yellowish green turning eventually pale brownish, ovate to nearly broadly ovate, 1.5–2 × 1–1.5 mm, keeled, membranous, apically occasionally pubescent, margin ciliolate, apex with a recurved short awn. Stamens 1 (or 2); anther oblong, apex acute. Style filiform; stigmas 3. Nutlet pale brown to yellowish, obovoid-globose, ca. 0.8 × 0.5–0.6 mm, 3-sided, obscurely tuberculate with transversely rectangular cells, apex rounded to emarginate; persistent style base depressed globose. Fl. and fr. Jun–Nov. $2n = 10$.

Sandy beaches, sometimes beside cultivated fields; 100–2000 m. Anhui, Fujian, Guangdong, Guangxi, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Nei Mongol, Shandong, Taiwan, Zhejiang [Bhutan, Cambodia, India, Indonesia, Japan, Kashmir, Korea, Laos, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; N Africa, Atlantic Ocean islands, Australia, Indian Ocean islands].

This species is naturalized in North and South America.

14. ISOLEPIS R. Brown, Prodr. 221. 1810.

细莞属 xi guan shu

Liang Songyun (梁松筠 Liang Song-jun); A. Muthama Muasya, David A. Simpson

Herbs, annual or rarely perennial. Rhizomes present or absent. Culms tufted, terete. Leaves all basal; sheath green to straw-colored, sometimes nearly reddish; ligule absent; leaf blade often much reduced. Involucral bract leaflike, spreading to erect. Inflorescences capitate, with few to many spikelets or reduced to a single spikelet, rarely an anthela. Spikelets with few to many spirally arranged mostly deciduous glumes. Glumes each subtending a flower but basalmost sometimes empty. Flowers bisexual. Perianth bristles absent. Stamens 1–3. Style linear, persistent, base not or slightly thickened, apex 2- or 3-cleft. Nutlet mostly obovoid, biconvex or 3-sided, papillose or longitudinally ribbed.

About 70 species: worldwide, especially Africa and Australia; one species in China.

1. *Isolepis setacea* (Linnaeus) R. Brown, Prodr. 222. 1810.

细莞 xi guan

Scirpus setaceus Linnaeus, Sp. Pl. 1: 49. 1753; *Schoenoplectus setaceus* (Linnaeus) Palla.

Rhizomes creeping. Culms 3–12 cm tall, ca. 5 mm thick, terete, grooved. Leaves sometimes with only a sheath; leaf blade linear, usually shorter than culm, 0.2–0.5 mm wide, sometimes very short and deltoid or absent. Involucral bract 1 (or 2), ovate-lanceolate, 3–10 (–12) mm, spreading to erect, both surfaces dark red at base, apex long awned or mucronate. Inflorescence a pseudolateral head with 1–3 spikelets. Spikelets ovoid, 2.5–4 mm, many flowered. Glumes ovate to subelliptic, ca. 1.5 mm, both surfaces dark purple to purple, midvein greenish to

straw-colored, apex rounded to obtuse. Perianth bristles absent. Stamens 2; filaments short, thick, with brown minute spots; anthers oblong, 0.3–0.5 mm; connective apex evident beyond anthers. Style short; stigmas (2 or) 3, slender. Nutlet pale brown to orangish brown, broadly obovoid to subspherical, ca. 0.5 mm, plano-convex to compressed 3-sided, each surface prominently longitudinally ribbed, with many fine transverse ridges. Fl. and fr. Jun–Aug. $2n = 28$.

Stream margins, pond margins, moist grassy slopes, floodplains; 1800–4600 m. Gansu, Jiangxi, Ningxia, Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang, Yunnan [Afghanistan, Bhutan, India (Sikkim), Kashmir, Kazakhstan, Kyrgyzstan, Myanmar, Nepal, Pakistan, Russia, Tajikistan, Thailand, Uzbekistan; Africa, SW Asia, Atlantic Ocean islands, Australia, Europe, North America].

15. CYPERUS Linnaeus, Sp. Pl. 1: 44. 1753.

莎草属 suo cao shu

Dai Lunkai (戴伦凯); Gordon C. Tucker, David A. Simpson

Cyperus sect. *Juncellus* Grisebach; *Juncellus* (Grisebach) C. B. Clarke; *Mariscus* Vahl; *Torulinium* Desvaux ex Hamilton.

Herbs, annual or perennial, with rhizomes or stolons. Culms caespitose or solitary, erect, usually 3-angled or acutely triquetrous,

sometimes compressed triquetrous, stout or slender, leafy at basal part or at base. Leaves basal, 3-ranked, rarely without a blade; ligule absent. Involucral bracts leaflike, usually 2–10(–20 or more), at base of inflorescence. Inflorescences terminal, a simple or compound anthela, with several to many rays and usually with raylets (secondary rays); rays and raylets unequal or rarely equal in length or inflorescence capitate. Spikelets few to many in spikes, digitate clusters, or a capitulum at apex of rays, rarely single; rachilla not articulate at base, persistent, usually with narrow wings. Glumes distichous, rarely spirally imbricate; basal 1 or 2 glumes without a flower; remaining glumes each with a bisexual flower. Perianth bristles or scales absent. Stamens (1–)3. Style base not swollen; stigmas (2 or)3, deciduous at maturity. Nutlet 3-sided, smooth, punctulate, tuberculate, or rarely reticulately striate.

About 600 species: temperate, subtropical, and tropical regions worldwide; 62 species (eight endemic, four introduced) in China.

- 1a. Spikelets digitate or fasciculate on a very short rachis, or inflorescences capitate or globose.
- 2a. Inflorescences capitate or anthelate, with very short rays (rarely with 1 or 2 elongated rays).
 - 3a. Spikelets 1–5-flowered, falling from rachis as a single unit while glumes remain attached to winged rachilla; culm base swollen into a bulb shape, enclosed by dark brown or brown leaf sheaths.
 - 4a. Spikelets 1-flowered; glumes inconspicuously veined 58. *C. monospermus*
 - 4b. Spikelets 2–5-flowered; glumes conspicuously veined.
 - 5a. Spikelets narrowly ovoid, 3–5-flowered; glumes broadly ovate, densely brown punctulate, 15–17-veined; nutlet obovoid to ellipsoid 56. *C. dubius*
 - 5b. Spikelets ovoid-ellipsoid, 2- or 3-flowered; glumes ovate, brownish to straw-colored and laxly reddish punctulate at base and apex, 9–13-veined; nutlet oblong 57. *C. hainanensis*
 - 3b. Spikelets 3–8-flowered or more, rachilla remaining attached to rachis as glumes and nutlets fall with maturity; culm base not bulbous.
 - 6a. Spikelets 3- or 4-flowered; nutlet with spongy base of style extending downward along angles of nutlet 19. *C. cephalotes*
 - 6b. Spikelets 8-flowered or more; nutlet without enlarged spongy apex.
 - 7a. Culms usually tall; spikelets several to more than 20, laxly fascicled; glumes conspicuously distichous, ca. 4 mm, apex obtuse and mucicous.
 - 8a. Leaves usually longer than culm; spikelets 5–8 mm, 6–10-flowered; nutlet oblong 17. *C. szechuanensis*
 - 8b. Leaves usually shorter than culm; spikelets 7–25 mm, 8–48-flowered; nutlet obovoid 18. *C. niveus*
 - 7b. Culms dwarf; spikelets numerous, very densely arranged; glumes spirally imbricate or obscurely distichous, ca. 2 mm, apex recurved mucronate.
 - 9a. Spikelets ovoid to narrowly ovoid, 3–4 × ca. 1.5 mm; glumes spirally imbricate 20. *C. michelianus*
 - 9b. Spikelets narrowly oblong-ovoid, oblong, or rarely narrowly ovoid, 3–8 × 1.5–2 mm; glumes distichous but sometimes obscurely so.
 - 10a. Spikelets very numerous, congested into capitulum, 4–5 mm; glumes oblong-lanceolate, apex slightly long mucronate; stigmas 2(or 3); nutlet narrowly oblong to oblong, nearly 3-sided 21. *C. pygmaeus*
 - 10b. Spikelets many, congested with short or slightly elongate rays, 3–8 mm; glumes ovate or broadly ovate, apex shortly mucronate; stigmas 2; nutlet ellipsoid, plano-convex.
 - 11a. Inflorescences capitate, sometimes with 1 ray to 2 cm; glumes broadly ovate, white on both surfaces or rusty brown striate; nutlet oblong 22. *C. nipponicus*
 - 11b. Inflorescence a simple anthela, with 3–6 rays to 6 cm; glumes ovate, pale on both surfaces but medially green; nutlet ellipsoid 23. *C. hilgendorffianus*
 - 2b. Inflorescences anthelate, with elongate rays, sometimes with secondary (compound) and tertiary (decompound) branching.
 - 12a. Nutlet lenticular, with face toward rachilla.
 - 13a. Annuals; spikelets compressed, usually ca. 1.5 mm wide; glumes 1–2 mm; stamens 1 or 2, anthers ellipsoid 61. *C. limosus*
 - 13b. Perennials; spikelets slightly turgid, (2.5–)3–5 mm wide; glumes 2.5–3 mm; stamens 3, anthers linear.
 - 14a. Culms 35–100 cm tall; leaf blade 3–10 mm wide; inflorescence a simple or compound anthela, usually with long rays and 5–17 spikelets arranged into spikes 59. *C. serotinus*
 - 14b. Culms 4–20 cm tall; leaf blade ca. 1 cm wide; inflorescences capitate, usually with 1–8 spikelets 60. *C. pannonicus*
 - 12b. Nutlet 3-sided (sometimes dorsiventrally compressed).
 - 15a. Perennial herbs; glumes ca. 2 mm; nutlet 0.7–1.5 mm.
 - 16a. Spikelets slightly turgid; glumes 7-veined or more.
 - 17a. Culms 1.5–5 cm tall; anthela rays much longer than culm 6. *C. radicans*
 - 17b. Culms 35–70 cm tall; anthela rays much shorter than culm.

- 18a. Culms 3-angled but not winged; involucre bracts 6–12; inflorescence rays 6–16 cm 4. *C. diffusus*
- 18b. Culms 3-angled and winged; involucre bracts 3–5; inflorescence rays 2.5–5.5 cm 5. *C. trialatus*
- 16b. Spikelets compressed; glumes 3–5-veined.
- 19a. Culms and rays with retrorse prickles 7. *C. surinamensis*
- 19b. Culms and rays smooth or with spreading or ascending prickles.
- 20a. Culms compressed triquetrous, with leaves at basal part; leafy involucre bracts 5–12, unequal in length.
- 21a. Culms scabrid on angles; raylets present; stamens 3 per flower; nutlet compressed 3. *C. platystylis*
- 21b. Culms smooth; raylets absent; stamen 1 per flower; nutlet not compressed 24. *C. eragrostis*
- 20b. Culms obtusely 3-angled to subterete, with bladeless sheaths basally; leafy involucre bracts 15–20, nearly equal in length.
- 22a. Involucre bracts flexuose, drooping; apex of glumes acute; nutlet not stipitate 1. *C. involucreatus*
- 22b. Involucre bracts rigid; apex of glumes acuminate; nutlet stipitate 2. *C. alternifolius*
- 15b. Annual or perennial herbs; glumes ca. 1(–1.5) mm; nutlet 0.2–0.3 mm.
- 23a. Leaves very narrow, adaxially canaliculate, margin involute; glumes papery, apex truncate and with a recurved awn; nutlet oblong-obovoid to oblong.
- 24a. Glumes with a (0.5–)0.6–1 mm awn; nutlets 0.5–0.6 mm 15. *C. cuspidatus*
- 24b. Glumes with a 0.2–0.5 mm awn; nutlets 0.7–0.9 mm 16. *C. castaneus*
- 23b. Leaves flat; glumes membranous, apex obtuse and mucronate or muticous; nutlet obovoid or ellipsoid.
- 25a. Perennials or rarely annuals; culms with few leaves or with bladeless sheaths only; stamens (1–)3; nutlet less than 1/2 as long as subtending glume.
- 26a. Leafy involucre bracts usually longer than inflorescence; glumes laxly imbricate, with recurved apex; anther apices not white setose; nutlet 0.2–0.3 mm wide 13. *C. tenuispica*
- 26b. Leafy involucre bracts usually shorter than inflorescence; glumes densely imbricate, apex straight; anther apices white setose; nutlet 0.4–0.5 mm wide 14. *C. haspan*
- 25b. Annuals without stolons (except *C. duclouxii*); culms usually leafy; stamens 1 or 2(or 3); nutlet 1/2 or more as long as subtending glume.
- 27a. Perennials, with stolons; culms scattered; spikelets 3–10, digitately arranged 8. *C. duclouxii*
- 27b. Annuals, with fibrous roots; culms tufted; spikelets many, congested into a capitulum or capitate heads.
- 28a. Spikelets numerous, densely congested into a dense capitulum 12. *C. difformis*
- 28b. Spikelets (?solitary) several to more than 10, congested into a lax capitulum.
- 29a. Glumes lax, orbicular-ovate to suborbicular, spreading when mature, apex mucronate 9. *C. nigrofuscus*
- 29b. Glumes slightly dense, broadly ovate or compressed orbicular, not spreading at maturity, apex muticous.
- 30a. Spikelets ca. 1.5 mm wide; glumes broadly ovate, purplish brown to brown and yellowish green between both lateral veins 10. *C. fuscus*
- 30b. Spikelets ca. 1.8 mm wide; glumes ovate-lanceolate, blackish purple 11. *C. nanellus*
- 1b. Spikelets in spikes terminating rays (rachis (0.5–)1–6 cm, usually visible, sometimes covered by bases of spikelets in pressed specimens).
- 31a. Rachilla not winged or only with very narrow white hyaline margins; style short.
- 32a. Perennials, with long stolons; spikelets slightly turgid; glumes abaxially not keeled or rarely keeled, margin involute, apex obtuse or rounded and usually muticous or rarely mucronate.
- 33a. Culms with long sheaths at basal part, sheaths with short blade or nearly bladeless; rachis of spikes glabrous; spikelets linear; glumes elliptic to oblong 42. *C. malaccensis*
- 33b. Culms with long blades; rachis of spikes hispidulous, rarely glabrous; spikelets narrowly ovoid; glumes ovate or broadly ovate.
- 34a. Rachis of spikes laxly hispidulous, sometimes glabrous; spikelets ca. 3 mm wide; glumes obtuse and muticous at apex 44. *C. procerus*

- 34b. Rachis of spikes slightly densely hispidulous; spikelets 1.5–2.5 mm wide; glumes mucronate or mucicous at apex.
- 35a. Inflorescence a compound anthela; glumes with inconspicuous keel and not spinulose 43. *C. pilosus*
- 35b. Inflorescence a simple anthela; glumes with conspicuous keel and spinulose 45. *C. babakia*
- 32b. Annuals, without rhizomes or stolons, with fibrous roots only; spikelets ± compressed; glumes abaxially keeled, margin not involute, apex mucronate to cuspidate.
- 36a. Dried plants with odor like curry; stamen 1; glumes 7–9-veined, apex cuspidate 53. *C. squarrosus*
- 36b. Dried plants odorless; stamens 3; glumes 3–7-veined, apex obtuse, mucronulate, or cuspidate.
- 37a. Rachis of spikes short; spikelets densely arranged, subcapitate; glumes densely imbricate; nutlet ca. 1/2 as long as subtending glume 50. *C. compressus*
- 37b. Rachis of spikes long; spikelets laxly arranged; glumes laxly imbricate; nutlet nearly as long as subtending glume.
- 38a. Inflorescence a compound anthela; spikelets erect or obliquely spreading.
- 39a. Rachilla not winged; glumes retuse and very shortly mucronate at apex; successive glumes 0.7–0.9 mm apart on same side of rachilla 46. *C. iria*
- 39b. Rachilla wings white hyaline and narrow; glumes orbicular and slightly long mucronate at apex; successive glumes 1–1.5 mm apart on same side of rachilla 47. *C. microiria*
- 38b. Inflorescence a simple anthela; spikelets subspreading.
- 40a. Rachis glabrous; glumes reddish brown, apex slightly excurved mucronate ... 48. *C. amuricus*
- 40b. Rachis white hispidulous on angles; glumes dark blood-red, apex rounded and mucicous 49. *C. orthostachyus*
- 31b. Rachilla winged; style usually long or medium, rarely short.
- 41a. Mature spikelets disarticulating at base of each glume, with each nutlet clasped by rachilla wings; rachilla wings yellowish spongy 62. *C. odoratus*
- 41b. Mature spikelets either falling as a unit or rachilla remaining attached to rachis and glumes falling; rachilla wings hyaline and not spongy.
- 42a. Spikes ± cylindric, with numerous spikelets.
- 43a. Mature spikelets not deciduous with glumes and nutlets falling from rachilla.
- 44a. Spikelets linear, terete or subterete; rachilla broadly winged, wings lanceolate and ± deciduous.
- 45a. Spikes broadly cylindric, 1.5–2 cm wide; spikelets spreading; anther connective minute 25. *C. digitatus*
- 45b. Spikes narrowly cylindric, 0.8–1.2 cm wide; spikelets ascending; anther connective prominent and subulate 26. *C. elatus*
- 44b. Spikelets narrowly oblong-ovoid, compressed; rachilla narrowly winged, wings linear and persistent.
- 46a. Spikes ± pedunculate; spikelets ± distichous, laxly arranged; anthers linear 27. *C. exaltatus*
- 46b. Spikes not pedunculate; spikelets in several rows, densely arranged; anthers oblong.
- 47a. Involutal bracts 8–15; anthela with 12–15 rays; spikes 1.5–11 cm; glumes oblong-obovate, 2.2–2.5 mm, apex straight mucronate; nutlet oblong to obovoid-oblong 28. *C. simaoensis*
- 47b. Involutal bracts 3–5; anthela with 6–10 rays; spikes 1.5–4 cm; glumes broadly ovate, ca. 1.5 mm, apex curved mucronate; nutlet obovoid to ellipsoid 29. *C. imbricatus*
- 43b. Mature spikelets deciduous and falling from rachis with glumes and nutlets attached.
- 48a. Spikelets 1–3(or 4)-flowered; glumes tightly included around nutlet.
- 49a. Spikes cylindric, (1–)2–3.5 × 0.6–1 cm, with parallel sides; anthers (0.6–)0.8–1 mm; nutlet ca. 0.5 mm wide; leaf blade margin smooth 54. *C. cyperoides*
- 49b. Spikes shortly cylindric, oblong, or ovoid, 1.2–1.8 × 0.8–1.2(–1.5) cm, with sides narrowed toward base; anthers 1–1.5 mm; nutlet 0.6–0.9 mm wide; leaf blade margin scabrous 55. *C. cyperinus*
- 48b. Spikelets 4–10-flowered; glumes not tightly included around nutlet.
- 50a. Annuals; glumes with a recurved mucro at apex; stamens 1 53. *C. squarrosus*
- 50b. Perennials; glumes without mucro at apex; stamens 3.
- 51a. Spikelets subulate, 5–18 mm, slightly less than 1 mm wide, arranged into a globose to half-globose spike; culms and anthela rays not papillose; nutlet linear-oblong; leaf sheath purplish red 51. *C. compactus*

- 51b. Spikelets narrowly oblong-ovoid, 4.5–7 × 1.8–2.5 mm, arranged into a cylindrical spike; culms and anthera rays papillose; nutlet broadly ellipsoid to obovoid-ellipsoid; leaf sheath blackish brown 52. *C. javanicus*
- 42b. Spikes broadly ovoid, turbinate, ellipsoid, oblong, orbicular, or rarely cylindrical, with up to 10 spikelets (rarely more in *C. glomeratus* and *C. eleusinoides*).
- 52a. Rhizomes short or surculose, without stolons or tubers; glumes laxly spreading.
- 53a. Culms slender; spikes broadly ovoid; spikelets subquadrangular, obliquely spreading to spreading at maturity; glumes ca. 4 mm 37. *C. tenuiculmis*
- 53b. Culms stout; spikes oblong, cylindrical, ellipsoid, globose, or rarely broadly ovoid; spikelets slightly compressed, suberect or rarely spreading; glumes ca. 2 mm.
- 54a. Spikelets laxly arranged, spreading after anthesis, 0.8–4 cm × ca. 1 mm; glumes dark blood-red 38. *C. distans*
- 54b. Spikelets densely or very densely arranged, suberect, not spreading after anthesis, 0.4–1.1 cm × 1.5–2 mm; glumes reddish brown or yellowish brown.
- 55a. Annuals, without rhizomes but with fibrous roots; glumes mucous at apex 41. *C. glomeratus*
- 55b. Perennials; rhizomes short; glumes mucronate at apex.
- 56a. Anthela raylets radially spreading; spikes 6 cm or more; spikelets 1–1.5 mm wide 39. *C. nutans*
- 56b. Anthela raylets suberect; spikes less than 6 cm; spikelets ca. 2 mm wide 40. *C. eleusinoides*
- 52b. Rhizomes creeping or with stolons and tubers; glumes ± densely imbricate.
- 57a. Culms stout; sheaths bladeless or apicalmost with short blade only; glumes oblong, concave, margin involute; spikelets slightly compressed, rachilla with reddish brown wings 30. *C. pangorei*
- 57b. Culms slightly slender; sheaths with blade; glumes ovate, broadly ovate, or ovate-elliptic, margin not involute.
- 58a. Spikes ovoid; glumes laxly imbricate, spreading at maturity 36. *C. esculentus*
- 58b. Spikes broadly ovoid, obdeltoid, or obovoid; glumes densely imbricate, not spreading at maturity (laxly imbricate and spreading at maturity in *C. mitis* but spikes obovoid).
- 59a. Rachilla narrowly winged; glumes laxly imbricate, spreading at maturity; involucre bracts subulate, shorter than inflorescence 35. *C. mitis*
- 59b. Rachilla broadly winged; glumes densely imbricate, not spreading at maturity; involucre bracts leaflike, usually longer than inflorescence.
- 60a. Leaves and involucre bracts slightly narrow, usually plicate; anthera rays erect or suberect, less than 2 cm.
- 61a. Stolons short; culms laxly tufted; rays of antherae erect; spikelets laxly arranged into spikes, linear, ca. 1 mm wide; anthers ellipsoid; nutlet oblong 31. *C. linearispiculatus*
- 61b. Stolons long; culms scattered; rays of antherae slightly obliquely spreading; spikelets nearly digitately arranged at apex of ray, oblong-lanceolate to lanceolate, 2–3 mm wide, slightly turgid; anthers linear; nutlet obovoid to ellipsoid 32. *C. stoloniferus*
- 60b. Leaves and involucre bracts slightly broad, usually flat; anthera rays obliquely spreading, slender, mostly to 12 cm.
- 62a. Glumes dark blood-red, ovate to oblong-ovate 33. *C. rotundus*
- 62b. Glumes straw-colored to brownish yellow, broadly ovate to elliptic 34. *C. tuberosus*

1. *Cyperus involucreatus* Rottbøll, Descr. Pl. Rar. 22. 1772.

风车草 feng che cao

Cyperus alternifolius Linnaeus subsp. *flabelliformis* Kükenthal; *C. flabelliformis* Rottbøll, nom. illeg. superfl.

Perennials. Roots ± thick, fibrous. Rhizomes short, thick. Culms 30–150 cm tall, slightly stout, obtusely 3-angled, base with bladeless sheaths, apically scabrid. Basal leaf sheaths yellowish brown and cataphylloid; apical leaf sheaths pale green and mostly to 20 cm. Involucre bracts 14–24, leaflike, ca. 2 ×

as long as inflorescence, subequal in length, to 30 cm, 0.5–17 mm wide, margin scabridulous, basally \pm horizontal, apically flexuose and \pm drooping. Inflorescence a decompound anthela; rays numerous, 3–10 cm, each with 4–10 raylets; raylets 1–1.5 cm, each with 3–9 spikelets. Spikelets clustered at apex of raylets, narrowly ovoid or oblong, 3–12 \times 1.5–3 mm, flattened, radially spreading, 8–36-flowered; rachilla straight, wingless. Glumes densely imbricate, ovate, ca. 2 mm, membranous, rusty brown punctate, 3–5-veined, apex acute. Stamens 3; anthers linear, ca. 1 mm, apex setose. Style ca. 1 mm; stigmas 3, ca. 1 mm. Nutlet brown at maturity, not stipitate, broadly ellipsoid, 0.5–0.6 mm, 1/4–1/3 as long as subtending glume, 3-sided, apex not apiculate. Fl. and fr. May–Dec. $2n = 32$.

Cultivated as an ornamental in China, sometimes escaped and naturalized along streams and in wet thickets and disturbed areas; below 400 m. Guangdong, Hunan, Taiwan [native to E Africa and SW Asia (Arabian Peninsula)].

Cyperus involucratus is widely cultivated as an ornamental and sometimes naturalized in tropical and subtropical areas worldwide.

2. *Cyperus alternifolius* Linnaeus, Syst. Nat., ed. 12, 2: 82; Mant. Pl. 28. 1767.

野生风车草 ye sheng feng che cao

Perennials. Roots \pm thick, fibrous. Rhizomes short, thick. Culms 0.5–1.5(–3) m tall, slightly stout, obtusely 3-angled to subterete, base with bladeless sheaths, apically scabrid. Basal leaf sheaths yellowish brown; apical leaf sheaths pale green and mostly to 20 cm. Involucral bracts 11–18, leaflike, ca. 2 \times as long as inflorescence, subequal in length, 1–14 mm wide, \pm horizontal, stiff, margin scabrous. Inflorescence a decompound anthela; rays 8–18, 3–10 cm, each with 1–4 raylets; raylets 1–1.5 cm, each with 3–9 spikelets. Spikelets clustered at apex of raylets, linear to narrowly linear-ovoid, 5–20 \times 1–1.5 mm, flattened, 10–40-flowered; rachilla straight, wingless. Glumes pale green, densely imbricate, ovate, ca. 2 mm, membranous, 3-veined, apex acuminate. Stamens 3; anthers linear, ca. 1 mm, apex setose. Style ca. 1 mm; stigmas 3, ca. 1 mm. Nutlet brown at maturity, stipitate, ellipsoid to ovoid, ca. 0.8 mm, 1/3–1/2 as long as subtending glume, compressed 3-sided, apex apiculate. $2n = 32$.

Naturalized in wetlands along rivers; below 100–300 m. Taiwan [native to Madagascar].

Cyperus alternifolius is naturalized in many tropical areas worldwide.

3. *Cyperus platystylis* R. Brown, Prodr. 214. 1810.

宽柱莎草 kuan zhu suo cao

Perennials. Roots \pm thick. Rhizomes very short. Culms 1(–3 and tufted), 30–90 cm tall, stout, triquetrous, scabrid on apical angles, leaved at basal part. Leaves equaling culm; sheath brownish, basal ones bladeless; leaf blade 5–12 mm wide, \pm stiff, \pm flat plicate, margin scabrous. Involucral bracts 5–12, longer than inflorescence, basal few to 60 cm, spreading to deflexed after anthesis. Inflorescence a compound or decompound anthela; rays many (to 17), 2–8 cm, \pm slender, each with 4–16 raylets; raylets 1–4 cm, each with 3–7 spikelets. Spikelets digitately arranged at apex of raylets, narrowly oblong-ovoid,

5–8 \times ca. 2.5 mm, oblique or spreading, densely 15–35-flowered; rachilla straight, wingless. Glumes broadly ovate, 2–2.5 mm, thickly membranous, inconspicuously 3-veined, keel abaxially greenish, apex acute to obtuse and mucronate. Stamens 3, short. Style long, flattened, margin pilose; stigmas 3, short. Nutlet brownish glaucous, ellipsoid to ovoid-ellipsoid, compressed 3-sided, with concave sides, shiny, angles pale brown and markedly spongy-thickened.

Ponds, lakes; below 500 m. Taiwan, SE Xizang [Bangladesh, India, Indonesia, Malaysia, Myanmar, Nepal, Papua New Guinea, Sri Lanka, Thailand, Vietnam; Australia].

4. *Cyperus diffusus* Vahl, Enum. Pl. 2: 321. 1805.

多脉莎草 duo mai suo cao

Perennials. Rhizomes short, hardened. Culms 25–80 cm tall, slightly thick, triquetrous, smooth, several leaved at basal part. Leaves equaling or shorter than culm; sheath pale green and eventually reddish brown; leaf blade 0.3–2 cm wide, flat, margin scabrous. Involucral bracts 6–12, leaflike, longer than inflorescence, 0.6–1.6(–1.9) cm wide. Inflorescence a decompound anthela; rays many, mostly 12–16 cm, each with 2–8 raylets. Spikelets 1–5, sessile, sometimes more than 3 at apex of raylets or tertiary raylets, oblong to linear-oblong, 3–7(–14) \times 1.5–2 mm, slightly turgid, 6–12(–22)-flowered; rachilla narrowly winged. Glumes reddish brown or rusty brown on both surfaces but middle abaxially green or grayish green, lax, broadly ovate to orbicular-ovate, ca. 2 mm, 7–11-veined, keel prominent, apex rounded and with recurved mucro. Stamens 3; anthers linear, apex with white setae. Style very short; stigmas 3. Nutlet dark brown, ellipsoid, ca. 3/4 as long as subtending glume, 3-sided. Fl. and fr. Jun–Sep.

Forests in valleys, grasslands on mountain slopes, wet places by rivers, along trails, paddy fields; 100–1700 m. Guangdong, Guangxi, Hainan, Taiwan, SE Xizang, S Yunnan [Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam; NE Australia, Indian Ocean islands, Pacific islands].

This was referred to as *Cyperus laxus* Lamarck by D. A. Simpson and T. Koyama (Fl. Thailand 6(4): 366. 1998), but G. C. Tucker (Syst. Bot. Mongr. 43: 44. 1994) noted a distinction between neotropical and paleotropical material, with the latter being recognized as *C. diffusus*, which we accept here.

- 1a. Leaves 0.3–1.2 cm wide; involucral bracts 0.6–1.2 cm wide; spikelets (1 or)2 or 3 digitately arranged at raylets or tertiary raylets, 3–6 mm, 6–12-flowered; glumes reddish brown on both surfaces, middle abaxially green 4a. var. *diffusus*
- 1b. Leaves 0.8–2 cm wide; involucral bracts 1–1.6(–1.9) cm wide; spikelets (1 or)2–5 digitately arranged at raylets or tertiary raylets, 7–14 mm, 10–22-flowered; glumes rusty brown on both surfaces, middle abaxially grayish green 4b. var. *latifolius*

4a. *Cyperus diffusus* var. *diffusus*

多脉莎草(原变种) duo mai suo cao (yuan bian zhong)

Cyperus bancanus Miquel; *C. diffusus* subsp. *bancanus* (Miquel) Kükenthal; *C. diffusus* var. *multispicatus* S. M. Huang.

Leaves 0.3–1.2 cm wide. Involucral bracts 0.6–1.2 cm wide. Spikelets (1 or) 2 or 3 digitately arranged at raylets or tertiary raylets, 3–6 mm, 6–12-flowered. Glumes reddish brown on both surfaces, middle abaxially green. Fl. and fr. Jun–Sep. $2n = 38$.

Forests in valleys, grasslands on mountain slopes, wet places by rivers, along trails, paddy fields; 100–1700 m. Guangdong, Guangxi, Hainan, Taiwan, SE Xizang, S Yunnan [Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam; NE Australia, Indian Ocean islands, Pacific islands].

4b. *Cyperus diffusus* var. *latifolius* L. K. Dai in Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 232. 1961.

宽叶多脉莎草 kuan ye duo mai suo cao

Leaves 0.8–2 cm wide. Involucral bracts 1–1.6(–1.9) cm wide. Spikelets (1 or) 2–5 digitately arranged at raylets or tertiary raylets, 7–14 mm, 10–22-flowered. Glumes rusty brown on both surfaces, middle abaxially grayish green. Fl. and fr. Aug–Sep.

- Wet places, grasslands. Guangdong.

Cyperus diffusus var. *latifolius* appears to be well differentiated from other variants of this widespread paleotropical species.

5. *Cyperus trialatus* (Boeckeler) J. Kern, Reinwardtia 3: 32. 1954.

三翅秆砖子苗 san chi gan zhuan zi miao

Scirpus trialatus Boeckeler, Flora 42: 445. 1859; *Cyperus turgidulus* C. B. Clarke; *Mariscus trialatus* (Boeckeler) Tang & F. T. Wang.

Perennials. Rhizomes short, hardened. Culms 35–70 cm tall, compressed triquetrous, smooth, winged at angles, with several leaves at basal part. Leaves shorter to slightly longer than culm; leaf blade 0.8–1.2 cm wide, flat, smooth. Involucral bracts 3–5, leaflike, basal 2 or 3 longer than inflorescence, subspreading. Inflorescence a compound or sometimes simple anthela; rays 8–10, to 5.5 cm, each with 2–7(–16) raylets; raylets mostly to 1.5 cm. Glomerules of 5–18 spikelets densely arranged at apex of rays and raylets, 5–8 mm in diam. Spikelets ovoid to oblong-ovoid, 3–5.5 × 1.8–2.5 mm, slightly turgid, 6–10-flowered; rachilla wingless. Glumes brown to brownish on both surfaces, densely imbricate, broadly ovate, 2–2.5 mm, membranous, concave, 13–15-veined, keel abaxially green, apex excurved mucronate. Stamens 3; anthers broadly linear, ca. 0.8 mm. Style ca. 0.2 mm; stigmas 3, ca. 1 mm. Nutlet dark brown, sessile, ovoid, ca. 1.8 mm, 3-sided, densely punctate, apex subacute. Fl. and fr. Jun–Jul.

Shaded places under sparse forests or scrub, grasslands by water, field margins; 100–500 m. Guangdong, Hainan [Indonesia, Malaysia, Thailand, Vietnam].

6. *Cyperus radicans* Nees & Meyen ex Kunth, Enum. Pl. 2: 95. 1837.

辐射穗砖子苗 fu she sui zhuan zi miao

Cyperus radicans var. *floribundus* (E. G. Camus) Kükenthal; *C. sinensis* Debeaux; *C. sinensis* var. *floribundus* E. G.

Camus; *Mariscus radicans* (Nees & Meyen ex Kunth) Tang & F. T. Wang; *M. radicans* var. *floribundus* (E. G. Camus) S. M. Huang.

Perennials. Rhizomes very short. Culms tufted, 1.5–5[–8] cm tall, 3-angled, smooth. Leaves longer than culm; sheath purplish brown, very short; leaf blade 2–8 mm wide, stiff, usually folded. Involucral bracts 3–7, leaflike, equaling or shorter than inflorescence. Inflorescence a simple or compound anthela; rays 3–8, mostly 15–18 cm, sometimes with raylets; raylets usually less than 1 cm or mostly 2–3 cm. Capitulum of 8–30 spikelets congested at apex of rays or raylets, globose, 0.8–2.5 cm in diam. Spikelets ovoid, narrowly ovoid, or narrowly oblong-ovoid, 5–12 × 2–5 mm, 4–20-flowered; rachilla wingless. Glumes pale and purplish striate or purplish red on both surfaces, densely imbricate, broadly ovate, 3.5–4 mm, papery, 11–13-veined, keel abaxially green, apex recurved mucronate. Stamens 3; anthers broadly linear. Style long; stigmas 3. Nutlet blackish brown, broadly ellipsoid, ca. 1/2 as long as subtending glume, triquetrous, slightly concave on 3 sides, with dense punctate processes. Fl. and fr. Jul–Oct.

Sands at seashores, wastelands by seashores; near sea level to below 100 m. Fujian, Guangdong, Hainan, Shandong, Taiwan, Zhejiang [Indonesia, Malaysia, Myanmar, Sri Lanka, Thailand, Vietnam].

7. *Cyperus surinamensis* Rottbøll, Descr. Pl. Rar. 20. 1772.

苏里南莎草 su li nan suo cao

Annuals (?or short-lived perennials). Rhizomes absent. Culms tufted, (10–)35–80 cm tall, 3-angled, scaberulose with retrorse prickles. Leaves shorter than culm, flat or V-shaped; leaf blade 5–8(–12) mm wide. Involucral bracts 3–8, horizontal to ascending at ca. 30°, 3–30(–50) cm × 1.5–8(–12) mm, flat or sometimes V-shaped. Inflorescences globose heads, 1–2 cm in diam.; rays 4–12, 1–6(–9) cm, scaberulose with retrorse prickles; raylets often present. Spikelets (6–)15–40(–65), linear to linear-oblong, 4–12 × 1.5–2.5 mm, compressed. Glumes 10–50, pale yellow, light brown, or reddish brown, lanceolate, 1–1.5 mm, medially 3-veined, laterally veinless but distinctly reticulate, basally 2-keeled, apically often scaberulose, apex mucronulate. Stamen 1; anthers ca. 0.5 mm. Nutlets slightly stipitate, brown to reddish brown, narrowly ellipsoid, 0.7–0.9 mm, 3-sided, papillate or obscurely reticulate to rugulose, apex apiculate. Fl. and fr. Mar–Sep.

Pond shores, roadsides; below 200 m. Naturalized in N Taiwan [native to Caribbean and Central, North, and South America].

Cyperus surinamensis is also naturalized in Indonesia (Borneo).

8. *Cyperus duclouxii* E. G. Camus, Notul. Syst. (Paris) 1: 244. 1910.

云南莎草 yun nan suo cao

Perennials. Rhizomes and stolons ± long, soft, scaly. Culms scattered, 15–65 cm tall, 3-angled, smooth, basally few leaved. Leaves usually shorter than culm but sometimes apical leaves longer than culm; sheath reddish brown; leaf blade 0.5–1.5 cm wide, flat. Involucral bracts (2 or) 3–5, leaflike, longer than inflorescence, 0.6–1.6 cm wide, margin scabrous. Inflorescence a compound anthela; rays 4–8, mostly to 3.5 cm, some with ray-

lets. Spikelets 3–6(–10), digitately arranged at apex of rays or raylets, ovoid to narrowly ovoid, 4–6 × 1.5–2 mm, compressed, 6–14-flowered; rachilla wingless. Glumes dark purple on both surfaces but middle yellowish green, densely imbricate, orbicular-ovate to suborbicular, ca. 1.5 mm, membranous, 3-veined, abaxially slightly keeled, margin apically white hyaline, apex rounded and sometimes mucronulate. Stamens 2; anthers oblong, ca. 0.3 mm; connective not prolonged. Style 0.2–0.3 mm; stigmas 3, 0.3–0.5 mm. Nutlet yellowish, oblong to ellipsoid, ca. 2/3 as long as subtending glume, 3-sided, apex mucronate. Fl. and fr. Jun–Nov.

- Wet grasslands on mountain slopes, water margins; (1100–) 1800–2600 m. E Guizhou, Sichuan, Yunnan.

9. *Cyperus nigrofuscus* L. K. Dai in Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 232. 1961.

黑穗莎草 *hei sui suo cao*

Annuals. Roots fibrous. Culms tufted, 2–12 cm tall, slightly soft, compressed triquetrous, winged at angles, smooth, base with leaves. Leaves shorter to longer than culm; sheath brownish, short; leaf blade 2–4 mm wide, flat, midvein abaxially slightly wing-shaped, margin smooth or sometimes spinulose. Involucral bracts 2–4, leaflike, longer than inflorescence. Inflorescence a simple or compound anthela; rays 4–7, mostly to 1.5 cm, sometimes short, each with 7–15 densely arranged spikelets. Spikelets at apex of rays, digitately arranged, linear-oblong to linear, 4–10 × ca. 1.8 mm, 12–30-flowered; rachilla straight, wingless, with successive glumes 0.5–0.7 mm apart. Glumes dark purple to blackish brown on both surfaces but middle yellowish green, lax, orbicular-ovate to suborbicular, ca. 1 mm but extended after anthesis, membranous, prominently longitudinally striate, 3-veined, apex rounded and mucronate. Stamens 2; anthers oblong; connective prominent beyond anthers. Style of medium length; stigmas 3. Nutlet at first yellowish but brownish when mature, ellipsoid to obovoid-ellipsoid, nearly as long as subtending glume, 3-sided, smooth, apex long mucronate. Fl. and fr. Sep–Oct.

- Wet places, shallow water; 1500–3000 m. N Sichuan, Yunnan.

Collections from Yunnan have a compound anthelate inflorescence, have nearly all spikelets solitary, and come from higher elevations than those from Sichuan. Further specimens might show that they merit taxonomic recognition.

10. *Cyperus fuscus* Linnaeus, Sp. Pl. 1: 46. 1753.

褐穗莎草 *he sui suo cao*

Cyperus fuscus f. *palescens* Husnot; *C. fuscus* f. *virescens* (Hoffmann) Vahl; *C. virescens* Hoffmann.

Annuals. Roots fibrous. Culms tufted, 6–30 cm tall, slender, compressed triquetrous, soft, smooth, basally few leaved. Leaves shorter than to sometimes subequaling culm; leaf blade 2–4 mm wide, flat, sometimes folded, margin not scabrous. Involucral bracts 2 or 3, leaflike, longer than inflorescence. Inflorescence a compound or sometimes simple anthela; rays 3–5, most to 3 cm, apex of each ray or raylet with 5 to more than 10 densely arranged spikelets. Spikelets very narrowly ovoid to linear, 3–10 × ca. 1.5 mm, slightly compressed, 8–24-flowered;

rachilla wingless. Glumes purplish brown, brownish, brown, or pale yellowish on both surfaces but middle yellowish green, slightly laxly imbricate, broadly ovate, ca. 1 mm, obscurely 3-veined, apex obtuse. Stamens 2; anthers ellipsoid; connective not prominent beyond anthers. Style short; stigmas 3. Nutlet ellipsoid, ca. 2/3 as long as subtending glume, 3-sided, base barely stipitate to cuneate, apex apiculate. Fl. and fr. Jun–Oct. $2n = 36$.

Swamps, water margins, ditch margins, river margins, shaded places in valleys, along trails, wet places, paddy fields; 100–2000 m. Anhui, Gansu, Hebei, Heilongjiang, Henan, Jiangsu, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Yunnan [Afghanistan, India, Kashmir, Kazakhstan, Kyrgyzstan, Laos, Mongolia, Pakistan, Russia, Tajikistan, Thailand, Turkmenistan, Uzbekistan, Vietnam; N Africa, SW Asia, Atlantic Ocean islands, Europe].

Cyperus fuscus is naturalized in North America.

11. *Cyperus nanellus* Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 232. 1961.

汾河莎草 *fen he suo cao*

Annuals. Roots fibrous. Rhizomes absent. Culms 1–3 cm tall, half-terete, basally usually with 1 or 2 bladeless or bladed sheaths. Leaves shorter than culm; sheath brownish, short, scarious at 1 side; leaf blade ca. 2 mm wide, flat or folded, margin not scabrous. Involucral bracts 2, leaflike, shorter to slightly longer than inflorescence, adaxially ± blackish purple, base ± wide. Inflorescence a simple anthela to almost capitate; rays few, very short, each with a few spikelets densely arranged at apex. Spikelets oblong to linear-oblong, 3–7 × 1.2–1.8 mm, compressed, 8–22-flowered; rachilla wingless, with successive glumes ca. 0.7 mm apart. Glumes blackish purple but adaxially pale yellowish or green at middle, slightly densely imbricate, ovate-lanceolate, ca. 1 mm, membranous, conspicuously longitudinally striate, obscurely 3-veined, margin apically white hyaline and usually involute, apex muticous. Stamens 2; anthers oblong, apex rounded to truncate, muticous, and mucronate. Style short; stigmas 3, longer than style. Nutlet yellowish, ellipsoid, ca. 1 × 0.5 mm, as long as subtending glume, stipitate, apiculate, 3-sided, smooth. Fl. and fr. Oct.

- Sandy stream margins; 800–1500 m. Shanxi.

12. *Cyperus difformis* Linnaeus, Cent. Pl. 2: 6. 1756.

异型莎草 *yi xing suo cao*

Annuals. Roots fibrous. Culms tufted, 2–65 cm tall, slightly thick or flaccid, compressed triquetrous, smooth, few leaved at basal part. Leaves shorter than culm; sheath brown, slightly long; leaf blade 2–6 mm wide, flat or folded. Involucral bracts 2(or 3), leaflike, longer than inflorescence. Inflorescence a simple or rarely compound anthela; rays 3–9, mostly to 3(–5) cm, unequal in length, each with many spikelets at apex densely aggregated into a capitulum. Capitulum of spikelets globose, 0.5–1.5 cm in diam. Spikelets narrowly ovoid to linear, 2–8 × 1–1.2 mm, compressed orbicular, 8–28-flowered; rachilla wingless. Glumes dark reddish purple to dark grayish brown on both surfaces but middle yellowish, less than 1 mm, slightly spreading, obscurely 3-veined, margin white hyaline, apex rounded. Stamens (1 or)2; anthers ellipsoid; connective not

prominent beyond anthers. Style very short; stigmas 3, short. Nutlet yellowish, obovoid-ellipsoid, nearly as long as subtending glume, 3-sided. Fl. and fr. Jul–Oct. $2n = 18, 28, 32, 34, 36$.

Grasslands at mountain slopes, shallow water, water margins, lake margins, wet places in grasslands, along trails, paddy fields; below 100–2000 m. Anhui, Chongqing, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Yunnan, Zhejiang [Afghanistan, Bangladesh, Bhutan, India, Indonesia, Japan, Kashmir, Kazakhstan, Korea, Kyrgyzstan, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Russia, Sri Lanka, Tajikistan, Thailand, Uzbekistan, Vietnam; Africa, SW Asia, Australia, Europe, Indian Ocean islands, Madagascar, Pacific islands].

Cyperus difformis is naturalized in Central, North, and South America.

13. *Cyperus tenuispica* Steudel, Syn. Pl. Glumac. 2: 11. 1854.

窄穗莎草 zhai sui suo cao

Annuals. Roots fibrous. Culms tufted, 3–30 cm tall, flaccid, compressed triquetrous, smooth, base clothed with a few bladeless sheaths, apical sheaths with short blade. Leaves shorter than culm, 2–3 mm wide, flat; sheath reddish brown to purplish brown, 2–6 cm. Involucral bracts usually 2 (or 3), leaf-like, usually basalmost equaling or longer than inflorescence. Inflorescence a compound or sometimes simple anthela; rays 4–10, mostly to 7 cm, unequal in length, each with 2–9 raylets. Spikelets 3–12, digitately arranged at apex of raylets or rays, linear, 3–12 × ca. 1 mm, 10–40-flowered; rachilla wingless. Glumes dark brown on both surfaces but middle abaxially yellowish green, lax, elliptic to suboblong, 0.8–1 mm, membranous, slightly spreading after anthesis, veins inconspicuous, apex obtuse to truncate, slightly excurved, and mucicous. Stamens 1 or 2; anthers not setose at apex. Style long; stigmas 3. Nutlet yellowish, obovoid, ca. 0.3 mm, tuberculate. Fl. and fr. Sep–Nov. $2n = 16$.

Sparse forests, along trails, wet places, paddy fields; below 100–500 m. Anhui, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, SE Xizang, Zhejiang [Bhutan, India, Indonesia, S Japan, Kashmir, Korea, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Tajikistan, Thailand, Uzbekistan, Vietnam; tropical Africa, Australia, Indian Ocean islands].

Cyperus tenuispica is naturalized in Central and South America.

14. *Cyperus haspan* Linnaeus, Sp. Pl. 1: 45. 1753.

畦畔莎草 qi pan suo cao

Cyperus haspan var. *flaccidissimus* Kükenthal; *C. haspan* var. *juncoides* Kükenthal.

Perennials or annuals. Roots fibrous when annual. Rhizomes short to slightly long. Culms tufted or scattered, 10–60 cm tall, slender, compressed triquetrous, smooth. Leaves shorter than culm, sometimes sheathed only and bladeless; sheath pale green, base purplish brown to reddish purple, 2–10 cm; leaf blade 2–3 mm wide. Involucral bracts usually 2, leaflike, shorter to rarely longer than inflorescence. Inflorescence a simple, compound, or decomposed anthela; rays 8–12, mostly 17–

30 cm, unequal in length, each with several raylets; raylets less than 2 cm, usually with 1–6(–14) spikelets at apex. Spikelets digitately arranged or sometimes solitary, linear to narrowly linear-ovoid, 5–12 × 1–1.5 mm, 6–28-flowered; rachilla wingless. Glumes purplish brown, pale brown, or straw-colored but middle pale brownish to pale green, densely imbricate, oblong-ovate to subelliptic, ca. 1.5 mm, membranous, 3-veined, abaxially keeled, apex rounded to subtruncate and mucronate. Stamens 1–3; anthers narrowly oblong, apex white setose. Style of medium length; stigmas 3. Nutlet yellowish, whitish, or reddish brown, broadly obovoid, 0.5–0.6(–0.7) mm, ca. 1/3 as long as subtending glume, 3-sided, tuberculate. Fl. and fr. over a long period, different in each region. $2n = 26$.

Sparse forests, grasslands on mountain slopes, sand by river margins, swamps, ditch margins in valleys, wastelands, wet places, along trails, dry fields, paddy fields; near sea level to 1600 m. Anhui, Fujian, Guangdong, Guangxi, Hainan, S Henan, Hubei, Hunan, S Jiangsu, Jiangxi, Taiwan, SE Xizang, S Yunnan, Zhejiang [Bhutan, Cambodia, India, Indonesia, Japan, Kashmir, Korea, Laos, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Africa, tropical America, SW Asia, Australia, Indian Ocean islands, Madagascar, North America, Pacific islands].

15. *Cyperus cuspidatus* Kunth in Humboldt et al., Nov. Gen. Sp. 1, ed. 4^o: 204. 1816.

长尖莎草 chang jian suo cao

Annuals. Roots fibrous. Culms tufted, 3–15 cm tall, flaccid, 3-angled, smooth, base with few leaves (often withered by flowering time). Leaves shorter than culm; leaf blade 1–2 mm wide, usually folded. Involucral bracts 2 or 3, linear, longer than inflorescence. Inflorescence a simple anthela; rays 2–6, mostly to 2 cm. Spikelets 5 to many, digitately arranged at apex of ray, linear, 4–12 × ca. 1.5 mm, 8–26-flowered; rachilla wingless. Glumes purplish red to brown on both surfaces, ± laxly imbricate, oblong, 1–1.5 mm, 3-veined, apex truncate and with a recurved (0.5–)0.6–1 mm awn. Stamens 3; anthers ellipsoid, ca. 0.1(–0.2) mm. Style (0.2–)0.4–0.6 mm; stigmas 3, 0.3–0.5 mm. Nutlet dark brown, oblong-obovoid to oblong, 0.5–0.6 mm, ca. 1/2 as long as subtending glume, 3-sided, with many tubercles. Fl. and fr. Jun–Sep(–Oct).

Sand at river margins, grasslands at water margins, seashores, along trails, wastelands, mountain slopes, forests, fields; near sea level to 2000 m. Anhui, Fujian, Guangdong, Guangxi, Hainan, Jiangsu, Jiangxi, Shandong, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bangladesh, Bhutan, India, Indonesia, Kashmir, Laos, Malaysia, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam; Africa, Australia, Central, North, and South America, Indian Ocean islands, Madagascar].

16. *Cyperus castaneus* Willdenow, Sp. Pl. 1: 278. 1797.

长板栗莎草 chang ban li suo cao

Annuals. Roots fibrous. Culms tufted, 3–15 cm tall, 3-angled, smooth, base with few leaves but often withered by flowering time. Leaves shorter than culm; leaf blade 0.4–1 mm wide, folded. Involucral bracts 2–5, linear, longer than inflorescence. Inflorescence a simple anthela; rays 1–4, to 3 cm. Spikelets 5–30, digitately or stellately arranged at apex of ray, linear, 5–20 × 1–1.8 mm, 8–26-flowered; rachilla wingless. Glumes purplish red, ± laxly imbricate, oblong to oblong-lanceolate,

1.2–1.7 mm, 3-veined, apex subobtusate to emarginate and with a recurved 0.2–0.5 mm awn. Stamens 2 or 3; anthers ellipsoid, 0.1(–0.2) mm. Nutlets brown, narrowly oblong, 0.7–0.9 mm, 3-sided, surface minutely punctate. Fl. and fr. Jun–Sep. $2n = 40$.

Sand at river margins, roadsides, fields; below 300 m. Guangdong, Guangxi, Guizhou, Hunan [Bhutan, India, Indonesia, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam; S Africa, N Australia].

17. *Cyperus szechuanensis* T. Koyama, Jap. J. Bot. 15: 182. 1956.

四川莎草 *si chuan suo cao*

Perennials. Roots long, fibrous. Rhizomes short. Culms densely tufted, 16–26 cm tall, 3-angled, smooth, base swollen into a bulb shape and with several leaves. Leaves usually longer than culm; sheath dark brown, long; leaf blade 2.5–4 mm wide, flat. Involucral bracts 3, leaflike, longer than inflorescence. Inflorescence a simple anthela, contracted into a capitulum, globose, 1.2–1.6 cm in diam., with many spikelets. Spikelets ovoid to ellipsoid, 5–8 × ca. 3 mm, compressed, 6–10-flowered; rachilla wingless. Glumes yellowish white, adaxially pale rusty brown and shortly striate, densely arranged, ovate, ca. 4 mm, membranous, veins several, prominently keeled, margin white hyaline, apex mucronate. Stamens 3; anthers linear, slightly long; connective dark red, prominent beyond anthers. Style short; stigmas 3, long. Nutlet oblong, 3-sided (not mature).

• Wet places. Sichuan.

18. *Cyperus niveus* Retzcius, Observ. Bot. 5: 12. 1788.

南沙草 *nan suo cao*

Perennials. Rhizomes short, thickened. Culms tufted, 10–70 cm tall, 3-angled, smooth, base slightly swollen into a bulb shape. Leaves shorter than or sometimes as long as culm; leaf blade 2–3 mm wide, usually folded but sometimes flat. Involucral bracts 2 or 3, leaflike, longer than inflorescence. Inflorescences capitate, 2–3 cm in diam., with 6 to more than 20 spikelets. Spikelets narrowly oblong-ovoid to narrowly ovoid, 0.7–2(–2.5) cm × 3–5 mm, compressed, 8–48-flowered; rachilla wingless. Glumes yellowish white to pale straw-colored on both surfaces but adaxially usually pale rusty brown and with short striae, densely imbricate, ovate-lanceolate, 4–4.5 × ca. 2 mm, papery, conspicuously many veined, midvein green, apex subobtusate. Stamens 3; anthers linear; connective not prominent beyond anthers. Style long; stigmas 3, shorter than style. Nutlet broadly obovoid, ca. 1/3 as long as subtending glume, triquetrous. Fl. and fr. Sep–Oct. $2n = 64, 68, 74$.

Sand at stream margins, mountain slopes, wet places; 500–2100 m. Sichuan, SE Xizang, Yunnan [Afghanistan, Bhutan, India, Kashmir, N Myanmar, Nepal, Pakistan, Thailand, Vietnam; tropical Africa, SW Asia].

19. *Cyperus cephalotes* Vahl, Enum. Pl. 2: 311. 1805.

少花穗莎草 *shao hua sui suo cao*

Perennials, stoloniferous. Culms single or laxly tufted, 10–50 cm tall, apically 3-angled to triquetrous, smooth. Leaves shorter than to equaling culm; leaf blade 0.5–4 mm wide, basally folded, apically becoming flat. Involucral bracts 3–5,

leaflike, longer than inflorescence, spreading or longest erect. Inflorescences capitate, conic to globose, 5–10 mm in diam., with 5–30 spikelets. Spikelets ovoid to ± narrowly ovoid, 4–10 × 3–4 mm, slightly compressed, 3- or 4-flowered; rachilla wingless. Glumes yellowish brown tinged with dark brown, densely imbricate, ovate, 3–4 × ca. 2 mm, leathery, 3–5-veined and green, midvein scabrid, margin pale, apex acute and mucronate. Stamens 3; anthers linear, 1–1.5 mm; connective apex not prolonged beyond anthers. Style 3–4 mm, gradually widened to a 3-angled or winged base; stigmas 3, much shorter than style. Nutlet ovoid, ca. 1.5 mm, 1/3–1/2 as long as subtending glume, 3-sided, dorsiventrally flattened, scabrid angled, with spongy base of style extending downward along angles of nutlet, apex acute and beaklike. Fl. and fr. ?summer.

Lakes and rivers, rooted on floating mats of *Pistia*, *Salvinia*, and decayed water plants; near sea level. Fujian (Xiamen) [India, Indonesia, Myanmar, Papua New Guinea, Sri Lanka, Thailand, Vietnam; NE Australia, Indian Ocean islands].

20. *Cyperus michelianus* (Linnaeus) Link, Hort. Berol. 1: 303. 1827.

旋鳞莎草 *xuan lin suo cao*

Scirpus michelianus Linnaeus, Sp. Pl. 1: 52. 1753.

Annuals. Roots many, fibrous. Culms densely tufted, 2–25 cm tall, compressed 3-angled, smooth, few leaved, base not swollen. Leaves shorter to slightly longer than culm; sheath purplish red, short; leaf blade 1–2.5 mm wide, flat or folded. Involucral bracts 3–6, leaflike, much longer than inflorescence, base broad. Inflorescences capitate, pyramidal-ovoid, ovoid, or subglobose, 0.5–1.5 cm in diam., with numerous spikelets. Spikelets densely aggregated at apex of short rays, ovoid to narrowly oblong-ovoid, 3–4 × ca. 1.5 mm, 10–20-flowered or more. Glumes yellowish white but sometimes middle yellowish brown to reddish brown striate, spirally imbricate, oblong-lanceolate, ca. 2 mm, slightly hyaline, 3–5-veined, keel green, apex elongated into a recurved mucro. Stamens (1 or)2; anthers oblong. Style long; stigmas 2(or 3), usually yellow papillate. Nutlet narrowly oblong, ca. 1 mm, 3-sided or plano-convex, margin with white hyaline cells. Fl. and fr. Jun–Sep.

Wet places at water margins or river margins, paddy fields; near sea level to 300 m. Anhui, Fujian, Guangdong, Guangxi, Hebei, Heilongjiang, Henan, E Hubei, Hunan, Jiangsu, Jilin, Liaoning, Shandong, N Xinjiang, SE Xizang, N and NW Yunnan, Zhejiang [India, Japan, Kashmir, Kazakhstan, Korea, Laos, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Russia, Thailand, Vietnam; Africa, SW Asia, Australia, Europe].

21. *Cyperus pygmaeus* Rottbøll, Descr. Icon. Rar. Pl. 20. 1773.

矮莎草 *ai suo cao*

Cyperus michelianus (Linnaeus) Link subsp. *pygmaeus* (Rottbøll) Ascherson & Graebner.

Annuals. Roots fibrous. Culms tufted, 12–18 cm tall, compressed triquetrous, slightly concave on 3 sides, few leaved basally. Leaves shorter than culm; sheath reddish brown, short; leaf blade 2–2.5 mm wide, flat, apical margin and midvein abaxially spinulose. Involucral bracts 4–7, leaflike, longer than inflorescence, ± horizontal to sometimes downward reflexed.

Inflorescences capitate, with numerous spikelets. Spikelets densely aggregated, narrowly oblong-ovoid to suboblong, 4–5 × ca. 1.5 mm, 10–15-flowered. Glumes yellowish white but middle rusty brown and shortly striate, distichous, oblong-lanceolate, ca. 2 mm, 3-veined, midvein green and apically forming a slight keel, apex acute and excurved mucronate. Stamen usually 1; anther short, linear; connective slightly prominent beyond anthers. Style short; stigmas 2(or 3), longer than style. Nutlet oblong, 1–1.2 mm, 2/3–3/4 as long as subtending glume, lenticular with one flat and one convex side, minutely papillose. Fl. and fr. Oct–Nov. $2n = 76$.

Pond margins, water margins, wet places in sand; ca. 100 m. Anhui, Guangdong, Guangxi, Hainan, Henan, Hubei, Taiwan, Zhejiang [Afghanistan, India, Indonesia, Japan, Kashmir, Korea, Laos, Myanmar, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Africa, SW Asia, Australia, S Europe, Indian Ocean islands, Madagascar].

22. *Cyperus nipponicus* Franchet & Savatier, Enum. Pl. Jap. 2: 537. 1878.

白鳞莎草 bai lin suo cao

Annuals. Roots many, slender, fibrous. Culms densely tufted, 5–20 cm tall, flaccid, compressed 3-angled, smooth, few leaved basally. Leaves usually shorter than to sometimes equaling culm; sheath reddish brown to purplish brown, submembranous; leaf blade 1.5–2 mm wide, flat or folded. Involucral bracts 3–5, leaflike, several times as long as inflorescence, basally slightly widened. Inflorescences usually capitate, globose, 1–2 cm in diam., sometimes with a 1–2 cm ray, with many densely arranged spikelets. Spikelets narrowly oblong-ovoid to ovoid-oblong, 3–8 × 1.5–2 mm, compressed, 8–30-flowered; rachilla wings white, hyaline. Glumes white on both surfaces but sometimes sparsely rusty brown shortly striate, slightly spreading, broadly ovate, ca. 2 mm, hyaline, several veined, midvein green, apex mucronate. Stamens 2; anthers linear-oblong. Style elongate; stigmas 2. Nutlet yellowish brown, oblong, ca. 1 mm, plano-convex, sometimes nearly concave-convex. Fl. and fr. Aug–Sep.

Mountain slopes, along trails, sunny places in fields; below 100–1000 m. Anhui, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Shandong, Shanxi, Zhejiang [Japan, Korea, Russia (Far East)].

23. *Cyperus hilgendorffianus* Boeckeler, Bot. Jahrb. Syst. 5: 501. 1884.

山东白鳞莎草 shan dong bai lin suo cao

Cyperus nipponicus Franchet & Savatier f. *hilgendorffianus* (Boeckeler) Kükenthal; *C. shandongense* F. Z. Li.

Annuals. Roots fibrous. Culms tufted, 10–35 cm tall, 3-angled, basally with 1–3 leaves. Leaves shorter to rarely longer than culm; leaf blade 2–4 mm wide. Involucral bracts 5–9, leaflike, several times as long as inflorescence. Inflorescence a simple anthela; rays 3–6, longest 4–6 cm. Spikelets many, densely aggregated at apex of each ray, narrowly ovoid to oblong, 4–6 × ca. 1.5 mm, compressed, 10–20-flowered; rachilla wings white, narrow, hyaline. Glumes pale on both surfaces but middle green, slightly laxly imbricate, ovate, ca. 2 mm, several veined, apex mucronate. Stamens 2; anthers narrowly oblong. Style ca.

1 mm; stigmas 2. Nutlet yellowish brown, ellipsoid, ca. 1 mm, plano-convex or concave-convex.

Wet places at water margins; ca. 100 m. S Heilongjiang, Shandong (Tai'an) [Japan].

24. *Cyperus eragrostis* Lamarck, Tabl. Encycl. 1: 146. 1791.

密穗莎草 mi sui suo cao

Cyperus vegetus Willdenow.

Perennials, rhizomatous. Culms caespitose, (25–)40–60(–90) cm tall, 3-angled to terete, smooth. Leaf blade (10–)25–50 cm × 5–8(–12) mm, flat or V-shaped. Involucral bracts 4–8, horizontal to ascending at 15–30°. Inflorescence an anthela, flat or sometimes V-shaped, 3–30(–50) cm × 1.5–8(–12) mm; rays (0–)3–10, 2.5–5(–12) cm; raylets usually absent. Globose head of (20–)30–50(–70) spikelets at apex of each ray, (1–)2–4 cm in diam. Spikelets oblong, 0.5–2 cm × 2.2–3 mm, compressed. Glumes (12–)20–30(–50), whitish to golden brown, ovate-deltoid, 2–2.3 × 1–1.4 mm, basally 2-keeled, laterally veinless. Stamen 1; anther 1–1.2 mm. Style 1–1.2 mm; stigmas 3, ca. 0.5 mm. Nutlet black to dark brown, with a ca. 0.1 mm stipe, broadly ellipsoid, 1.2–1.4 mm, 3-sided, punctulate, apex apiculate with a 0.2–0.3 mm beak. Fl. and fr. Jul–Aug. $2n = 42$.

Damp grasslands, shores; below 200 m. Naturalized in N Taiwan [native to North and South America and Pacific islands (Easter Island)].

Cyperus eragrostis is naturalized in S Africa, Australia, and Europe.

This species is reported here for the first time from China, based on two collections: Taiwan: Taibei, *Huang Chien-I 1640* (HAST); Yilan, Dongshan Xiang, *Liong Wai-Chao 3809* (HAST).

25. *Cyperus digitatus* Roxburgh, Fl. Ind. 1: 209. 1820.

长小穗莎草 chang xiao sui suo cao

Cyperus digitatus var. *laxiflorus* L. K. Dai; *C. digitatus* var. *pingbienensis* L. K. Dai.

Perennials. Rhizomes woody, very short. Culms tufted, 0.5–1.5 m tall, stout, triquetrous, smooth, basally with leaves. Leaves nearly as long as culm; sheath purplish brown, long; leaf blade 4–15 mm wide, flat or folded, subleathery. Involucral bracts 5–7, leaflike, longer than inflorescence. Inflorescence a compound or decompound anthela; rays 6–10, usually to 18 cm, each with 4–7 raylets; raylets unequal in length. Spikes at apical part of raylets, cylindrical, 3–6 × 0.4–2 cm, without a peduncle, with many laxly arranged spikelets. Spikelets subdistichous, linear to narrowly ovoid, 3–12 × 1–1.5 mm, slightly compressed to compressed, spreading to obliquely spreading, 4–40-flowered; rachilla winged, wings lanceolate and laterally detaching from rachilla with nutlet maturation, with successive glumes 0.9–1.2 mm apart. Glumes straw-colored, reddish brown, or golden-yellow on both surfaces, densely imbricate, ovate to elliptic, 3–5-veined, keel greenish, apex mucronate. Stamens 3; anthers yellow, linear, ca. 0.5 mm; connective not prominent beyond anther apex. Style long; stigmas 3, shorter than style. Nutlet dark gray at maturity, oblong-ellipsoid, 1/2–3/5 as long as subtending glume, 3-sided, punctulate. Fl. Jul–Oct, fr. Aug–Dec. $2n = 84, 104, 108$.

Open areas in forests, ditches, wet places; near sea level to 1800 m. Guangxi, Hainan, Hong Kong, Taiwan, SE Xizang, Yunnan [Bangladesh, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Africa, tropical America and Australia, North America, Pacific islands].

If subspecies are recognized, plants in Asia would belong to *Cyperus digitatus* subsp. *digitatus*. *Cyperus digitatus* subsp. *auricomus* (Sieber ex Sprenger) Kükenthal occurs in Africa.

26. *Cyperus elatus* Linnaeus, Cent. Pl. 2: 5. 1756.

黄翅莎草 huang chi suo cao

Perennials. Rhizomes short, slightly thick, hardened. Culms laxly caespitose, to 3 m tall, stout, smooth, basally subterete, apically 3-angled. Leaves basal, nearly as long as culm; sheath purple; leaf blade 0.8–1.2 cm wide, flat, subleathery, midvein and margin scabrous. Involucral bracts 5–8, leaflike, shorter to longer than inflorescence. Inflorescence a decompound anthela; rays 4–10, to 25 cm, unequal in length, each with 4–7 raylets; raylets usually to 8 cm, apex with 3–5 spikes. Spikes suberect to obliquely spreading, cylindric, 3–6 × 0.8–1.2 cm, with many spikelets. Spikelets obliquely spreading to suberect, linear, 4–7 × ca. 1 mm, subterete to obscurely quadrate, 10–14-flowered; rachilla wings yellow, lanceolate, easily deciduous. Glumes yellowish to golden yellow on both surfaces but middle green, densely imbricate, oblong to elliptic, ca. 1.5 mm, 3–5-veined, apex mucronate. Stamens 3; anthers oblong, ca. 1.5 mm; connective prominent and subulate beyond anther apex, prominent part ca. 1/3 as long as anther, apex setose. Style slender; stigmas 3. Nutlet dark gray at maturity, oblong-ellipsoid, ca. 1/2 as long as subtending glume, densely punctulate. Fl. Jun–Aug.

Pond and stream margins; near sea level to 1500 m. Hainan, Yunnan [Bangladesh, Cambodia, India, Indonesia, Laos, Malaysia, Papua New Guinea, Philippines, Thailand, Vietnam].

27. *Cyperus exaltatus* Retzius, Observ. Bot. 5: 11. 1788.

高秆莎草 gao gan suo cao

Perennials. Roots many, fibrous. Rhizomes short. Culms 1–1.5 m tall, stout, 3-angled, smooth, basally with leaves. Leaves nearly as long as culm; sheath purplish brown, long; leaf blade 6–10 mm wide, margin scabrous. Involucral bracts 3–6, basal ones longer than inflorescence. Inflorescence a compound or decompound anthela; rays 5–10, to 18 cm, unequal in length, each with several raylets. Spikes 1–3 at raylet apex, cylindric or narrowly cylindric, 2–5 cm × 2.5–10 mm, with many spikelets. Spikelets subdistichous, densely or laxly arranged, narrowly oblong-ovoid, 2–6 × 1–1.5 mm, compressed, obliquely spreading, 4–25-flowered; rachilla wings white, linear, narrow, hyaline. Glumes dark grayish brown to yellowish brown, slightly densely imbricate, ovate, 1.5–1.6 mm, slightly shiny, 3–5-veined, keel green, apex obtuse, mucronate, and not excurved. Stamens 3; anthers linear, ca. 1 mm; connective prominent beyond anther apex. Style slender; stigmas 3. Nutlet obovoid to ellipsoid, less than 1/2 as long as subtending glume, 3-sided, smooth. Fl. and fr. Jun–Nov.

Grasslands, pond margins, sandy soil, moist or wet places; near sea level to 1100 m. Anhui, Fujian, Guangdong, S Guizhou, Hainan, E

Hubei, Jiangsu, Jilin, Shandong, Taiwan, Zhejiang [Bangladesh, India, Indonesia, Japan, Kashmir, Korea, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Sri Lanka, Thailand, Vietnam; tropical Africa, Australia, Indian Ocean islands].

- 1a. Spikes narrowly cylindric, 2–4 cm × 2.5–4 mm; spikelets, 2–3 mm, 4–6-flowered 27d. var. *tenuispicatus*
- 1b. Spikes cylindric, 2–5 cm × 7–10 mm; spikelets 4–6 mm, 6–25-flowered.
 - 2a. Spikelets very densely arranged, to 14 mm, 12–25-flowered 27c. var. *megalanthus*
 - 2b. Spikelets ± laxly arranged, 3–6 mm, 6–16-flowered.
 - 3a. Spikelets slightly laxly arranged, 4–6 mm, 6–16-flowered 27a. var. *exaltatus*
 - 3b. Spikelets very laxly arranged, 3–4 mm, 6–8-flowered 27b. var. *hainanensis*

27a. *Cyperus exaltatus* var. *exaltatus*

高秆莎草(原变种) gao gan suo cao (yuan bian zhong)

Spikes cylindric, 2–5 cm × 7–10 mm. Spikelets slightly laxly arranged, 4–6 × 1–1.5 mm, 6–16-flowered. Fl. and fr. Jun–Aug. $2n = 96$.

Moist or wet places; (near sea level to) 500–1100 m. Anhui, Fujian, Guangdong, S Guizhou, Hainan, E Hubei, Jiangsu, Jilin, Shandong, Taiwan, Zhejiang [Bangladesh, India, Indonesia, Japan, Kashmir, Korea, Malaysia, Myanmar, Pakistan, Papua New Guinea, Sri Lanka, Thailand, Vietnam; tropical Africa, Australia, Indian Ocean islands].

Cyperus exaltatus var. *exaltatus* has been introduced to South America. It is similar to the Mexican endemic *Cyperus semiochraceus* Boeckeler.

The culms are used for making mats.

27b. *Cyperus exaltatus* var. *hainanensis* L. K. Dai in Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 230. 1961.

海南高秆莎草 hai nan gao gan suo cao

Spikelets very laxly arranged, 3–4 × ca. 1 mm, 6–8-flowered. Fl. Aug.

- Grasslands, pond margins, sandy soil. Hainan.

27c. *Cyperus exaltatus* var. *megalanthus* Kükenthal, Repert. Spec. Nov. Regni Veg. 27: 107. 1929.

长穗高秆莎草 chang sui gao gan suo cao

Spikelets very densely arranged, to 1.4 cm, 12–25-flowered. Fl. and fr. Sep–Nov.

- Moist places; ca. 100 m. Anhui, Fujian, Jiangsu, Zhejiang.

27d. *Cyperus exaltatus* var. *tenuispicatus* L. K. Dai in Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 230. 1961.

广东高秆莎草 guang dong gao gan suo cao

Inflorescence a decompound anthela. Spikes narrowly

cylindric, 2–4 cm × 2.5–4 mm. Spikelets ± densely arranged, oblong, 2–3 mm, 4–6-flowered. Fl. Sep.

- Guangdong.

28. *Cyperus simaoensis* Y. Y. Qian, Bull. Bot. Res., Harbin 21: 335. 2001.

思茅莎草 *si mao suo cao*

Perennials. Roots many, fibrous. Rhizomes short. Culms tufted, 0.7–1.3 m tall, stout, obtusely 3-angled, smooth, with 3–5 leaves, basally enclosed by leaf sheaths. Leaves shorter than culm; sheath reddish brown but base dark brown, 10–35 cm; leaf blade 0.8–1.2 cm wide, basally folded, apically flat. Involucral bracts 8–15, leaflike, mostly to 1.3 m, usually longer than inflorescence. Inflorescence a compound anthela; rays 12–15, mostly to 25 cm, unequal in length, usually 8–12 each with 2–11 raylets; raylets radially spreading. Spikes cylindric, 1.5–11 × 0.7–1.3 cm, usually not pedunculate but rarely pedunculate. Spikelets numerous, in 3–5 rows, densely arranged, narrowly oblong-ovoid, 4–8 × 1–1.5 mm, obliquely spreading, 4–10-flowered; rachilla wings white, narrow, hyaline, persistent. Glumes brownish yellow on both surfaces, densely imbricate, oblong-obovate, 2.2–2.5 mm, slightly shiny, obscurely 3–5-veined, midvein forming a greenish keel, apex straight and mucronate. Stamens 3; anthers oblong. Style long; stigmas 3. Nutlet narrowly ellipsoid to sometimes subobovoid, 1.2–1.3 mm, 3-sided, smooth. Fl. and fr. Sep.

- River margins; ca. 1200 m. S Yunnan (Simao Diqu).

29. *Cyperus imbricatus* Retzius, Observ. Bot. 5: 12. 1788.

迭穗莎草 *die sui suo cao*

Cyperus densespicatus Hayata; *C. imbricatus* var. *densespicatus* (Hayata) Ohwi; *C. imbricatus* subsp. *elongatus* (Boeckeler) T. Koyama; *C. imbricatus* var. *elongatus* (Boeckeler) Kükenthal; *C. mediorubescens* Hayata; *C. radiatus* Vahl; *C. radiatus* var. *elongatus* Boeckeler.

Perennials. Rhizomes short. Roots many, fibrous. Culms 7–15 cm tall, stout, obtusely 3-angled, smooth, basally clothed by several leaf sheaths. Leaves basal, shorter than culm; sheath reddish brown to dark brown, long; leaf blade 0.5–1.5 cm wide, basally folded, apically flat. Involucral bracts 3–5, leaflike, longer than inflorescence. Inflorescence a compound anthela; rays 6–10, to 16 cm, unequal in length, each with 3–10 raylets; raylets radially spreading. Spikes 3–6 fasciculate at apex of raylet, sessile or subsessile, densely arranged, cylindric, 1.5–4 × 0.6–1.4 cm, with many spikelets. Spikelets in several rows, narrowly ovoid to narrowly oblong-ovoid, 4–12 × 1.5–2 mm, slightly compressed, obliquely spreading, 8–30-flowered; rachilla wings white, narrow, hyaline, persistent; successive glumes 0.4–0.5 mm apart. Glumes brownish yellow to straw-colored, densely imbricate, broadly ovate, 1–1.2 mm (excluding mucro), shiny, 3–5-veined, keel greenish ending in a straight to slightly excurved 0.3–0.5 mm mucro. Stamens 3; anthers oblong, 0.2–0.5 mm; connective prominent beyond anther apex. Style long; stigmas 3. Nutlet obovoid to subellipsoid, ca. 1/2 as long as subtending glume, 3-sided, smooth. Fl. and fr. Sep–Oct.

Shallow water of ponds, shady moist places; 100–1400 m. Guang-

dong, Guangxi, Hainan, Taiwan [Afghanistan, Bangladesh, India, Japan, Laos, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Thailand, Vietnam; tropical Africa and America, SW Asia, Indian Ocean islands, Madagascar].

30. *Cyperus pangorei* Rottbøll, Descr. Pl. Rar. 18. 1772.

红翅莎草 *hong chi suo cao*

Perennials. Rhizomes short, creeping. Culms 50–90 cm tall, stout, obtusely 3-angled, smooth. Leaves basally with a brown long sheath, apically bladeless or with a short blade. Involucral bracts 3–5, leaflike, longer than inflorescence. Inflorescence a decomposed or compound anthela; rays 5–7, to 5 cm, unequal, each with 3–8 raylets. Spikes broadly ovoid, 1–2 × 1–2 cm, with 4–15 spikelets. Spikelets ± laxly arranged, linear, 8–20 × ca. 1.5 mm, slightly compressed, obliquely spreading, 6–30-flowered; rachilla wings reddish brown, linear-oblong. Glumes reddish brown on both surfaces but middle green, lax, oblong, 2–3 mm, papery, 3–5-veined, not keeled, margin slightly revolute at maturity, apex obtuse to rounded. Stamens 3; anthers linear; connective prominent beyond anther, apex sometimes setiferous. Style of medium length; stigmas 3. Nutlet dark brown, obovoid-oblong, ca. 1/2 as long as subtending glume, 3-sided, densely punctulate. Fl. and fr. Nov–Jan. $2n = 208$.

River margins, water margins; near sea level to 400 m. Hainan, Hunan, Sichuan [NE India, Myanmar, Nepal, Pakistan, Sri Lanka].

Cyperus pangorei is cultivated in India for making mats and may possibly be used for the same purpose in China.

31. *Cyperus linearispiculatus* L. K. Dai in Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 230. 1961.

线状穗莎草 *xian zhuang sui suo cao*

Perennials. Roots fibrous. Stolons ± short. Culms laxly tufted, 12–15 cm tall, thin, obtusely 3-angled, base swollen into a tuber, leaved at basal part. Leaves shorter to longer than culm; leaf blade 2–4 mm wide, usually plicate. Involucral bracts 3–5, leaflike, longer than inflorescence, suberect. Inflorescence a simple anthela; rays 4–7, erect. Spikes oblong, 2–4 cm × 3–4 mm, with several to 10 or more spikelets. Spikelets laxly arranged, erect, linear, 5–12 × ca. 1 mm, 8–22-flowered; rachilla wings lanceolate. Glumes pale to brownish yellow but middle brown striate, densely imbricate, ovate, 1.5–2 mm, membranous, 3–5-veined, not keeled, apex obtuse to retuse. Stamens 3; anthers ellipsoid; connective slightly prominent beyond anthers. Style of medium length; stigmas 3, longer than style. Nutlet brown when mature, oblong, ca. 2/5 as long as subtending glume, 3-sided. Fl. and fr. Apr–May.

- Wet places by streams. S Yunnan (Xishuangbanna).

32. *Cyperus stoloniferus* Retzius, Observ. Bot. 4: 10. 1786.

粗根茎莎草 *cu gen jing suo cao*

Perennials. Rhizomes long, ± thick, ± hardened, base of shoot with ellipsoid to ovoid tubers. Culms solitary, 8–22 cm tall, 3-angled, smooth, basal sheaths usually disintegrating into fibers. Leaves usually shorter than culm to rarely longer; leaf blade medium green, 2–4 mm wide, usually folded, rarely flat.

Involucral bracts 2 or 3, ± erect, leaflike, basal 2 longer than inflorescence. Inflorescence a simple anthela; rays 3 or 4, 0.5–3 cm, each with 3–8 congested spikelets. Spikelets narrowly oblong-ovoid to narrowly ovoid, 6–12 × 2–3 mm, slightly thickened, 10–18-flowered; rachilla narrowly winged. Glumes yellow to brownish yellow on both surfaces variegated with brownish blood-red but middle green, densely imbricate, broadly ovate, ca. 3 mm, papery, 5–7-veined, keel obtuse, margin broadly white hyaline, apex acute to subobtuse. Stamens 3; anthers linear, ca. 1.5 mm; connective apex 0.1–0.2 mm. Style of medium length; stigmas 3. Nutlet dark brown when mature, ellipsoid to subobovoid, ca. 2/3 as long as subtending glume, 3-sided. Fl. and fr. Jul.

Swamps, open grasslands, moist places along seashores; near sea level. Fujian, Guangdong, Hainan, Taiwan, Xisha Qundao [Cambodia, India, Indonesia, Japan (Ryukyu Islands), Laos, Malaysia, Myanmar, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; NE Australia, Indian Ocean islands, Madagascar, Pacific islands].

33. *Cyperus rotundus* Linnaeus, Sp. Pl. 1: 45. 1753.

香附子 *xiang fu zi*

Cyperus rotundus var. *quimoyensis* L. K. Dai.

Perennials. Stolons slender, with ellipsoidal tubers. Culms solitary, rarely 2 laxly tufted, 15–90 cm tall, slightly slender, triquetrous, smooth, base swollen into a tuber, leaved at basal part. Leaves equaling or shorter than culm; sheath brown, usually disintegrating into fibers; leaf blade bluish green, 2–5 mm wide, ± flat. Involucral bracts 2 or 3(–5), longer to sometimes shorter than inflorescence. Inflorescence a simple or compound anthela; rays (2 or) 3–10, mostly to 12 cm, unequal in length, spreading. Spikes obdeltoid, with 3–10 slightly laxly arranged spikelets. Spikelets obliquely spreading, linear, 1–3 cm × 1.5–2 mm, 8–28-flowered; rachilla wings white, slightly broad, hyaline. Glumes blood-red to purplish brown on both surfaces but middle green, subdensely imbricate, ovate to oblong-ovate, ca. 3 mm, 5–7-veined (fading some distance before margin), apex acute to obtuse and mucicous. Stamens 3; anthers linear; connective prominent beyond anthers. Style long; stigmas 3, longer than style, exerted from glume. Nutlet obovoid-oblong, 1/3–2/5 as long as subtending glume, 3-sided, punctulate. Fl. and fr. May–Nov. $2n = 80, 84, 96, 100, 104, 108, 110, 112, 116, 124, 132, 138, 160$, ca. 200.

Grasslands, wet or dry areas on mountain slopes, stream margins, along trails, sandbanks, ditch margins, water margins in valleys, paddy field margins; near sea level to 2100 m. Anhui, Chongqing, Dongsha Qundao, Fujian, S Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, S Liaoning, Nansha Qundao, S Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xisha Qundao, SE Xizang, Yunnan, Zhejiang [Afghanistan, Bhutan, India, Indonesia, Japan, Kazakhstan, Korea, Kyrgyzstan, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Tajikistan, Thailand, Uzbekistan, Vietnam; Africa, SW Asia, Australia, Central, North, and South America, Europe, Indian Ocean islands, Madagascar, Pacific islands].

The tubers are used as a Chinese medicine. The species is generally considered to be one of the world's worst weeds.

34. *Cyperus tuberosus* Rottbøll, Descr. Pl. Rar. 18. 1772.

假香附子 *jia xiang fu zi*

Cyperus rotundus Linnaeus subsp. *tuberosus* (Rottbøll) Kükenthal.

Perennials. Rhizomes stoloniferous; stolons long and creeping, terminated by a tuber. Culms solitary, rarely few laxly tufted, 20–55 cm tall, slender, triquetrous, smooth, basally with several leaves. Leaves shorter than culm; sheath reddish brown, eventually disintegrating into fibers; leaf blade medium green, 3–6 mm wide, base flat or slightly folded. Involucral bracts 2 or 3, leaflike, shorter than or equaling inflorescence. Inflorescence a simple or rarely compound anthela; rays 2–6, to 8 cm, unequal in length. Spikes obdeltoid, with 2–11 laxly arranged spikelets. Spikelets linear, 0.8–2 cm × 1.5–2 mm, obliquely spreading, 8–20-flowered; rachilla wings white, broad, hyaline. Glumes brownish yellow to straw-colored on both surfaces but keel green, broadly ovate to elliptic, 3.5–4 mm, membranous, conspicuously 7-veined (nearly reaching margin), margin white hyaline, apex rounded. Stamens 3; anthers linear; connective slightly prominent beyond anthers. Style of medium length; stigmas 3. Nutlet oblong-obovoid, ca. 1/2 as long as subtending glume, 3-sided, punctulate. Fl. and fr. Jun–Jul.

Open grasslands, along trails, sandy shores, gardens; below 1700 m. Sichuan, Taiwan, Yunnan [India, Japan (Ryukyu Islands), Malaysia, Sri Lanka; Africa, SW Asia (Yemen), Indian Ocean islands].

35. *Cyperus mitis* Steudel, Syn. Pl. Glumac. 2: 316. 1855.

疏鳞莎草 *shu lin suo cao*

Cyperus stenostachyus Bentham var. *indicus* C. B. Clarke; *C. subcapitatus* C. B. Clarke; *C. tenuifolius* L. K. Dai (1961), not (Steudel) Dandy (1944).

Perennials. Rhizomes creeping, sometimes with tubers. Culms solitary, 40–50[–80] cm tall, acutely triquetrous, smooth, with 1 or 2 leaves, basalmost part ± swollen. Leaves much shorter than culm; sheath brown, equaling or longer than leaf blade; leaf blade 1–1.5 mm wide. Involucral bracts 2 or 3, subulate, usually shorter than inflorescence, longest erect. Inflorescence a simple anthela, lax; rays 3 or 4, mostly to 8 cm, slender, smooth. Spikes obovoid, with 2–6 spikelets. Spikelets linear to linear-oblong, 1–2.5 cm × ca. 2 mm, 12–26-flowered; rachilla wings white, linear, hyaline. Glumes reddish brown, very lax, eventually extended, oblong-ovate, 2.5–3 mm, papery, 5–7-veined with middle 3 green and conspicuous, not keeled, apex obtuse to rounded and mucicous. Stamens 3; anthers linear, 1–1.3 mm; connective ± long and prominent beyond anthers. Style ± long to medium long; stigmas 3, ± slender. Nutlet straw-colored, narrowly obovoid, ca. 1.2 mm, ca. 2/3 as long as subtending glume, 3-sided, minutely punctate. Fl. and fr. Oct–Nov.

Ditch margins; 700–800 m. Yunnan (Mengla, Zhenxiong) [India, Myanmar, Sri Lanka, Thailand; Indian Ocean islands, Madagascar].

36. *Cyperus esculentus* Linnaeus var. *sativus* Boeckeler, Linnaea 36: 290. 1870.

油莎草 *you suo cao*

Perennials. Root fibrous. Stolons several, apex swollen into a tuber; tubers ellipsoid to globose, 10–18 × 5–8 mm, conspic-

uously nodose, gray tomentose when old. Culms solitary, 10–40 cm tall, triquetrous, smooth, with several leaves at basal part. Leaves ± congested, longer to shorter than culm; sheath reddish brown; leaf blade yellowish green to light green, 3–6 mm wide, margin flat or revolute. Involucral bracts 3–6, basal 2 longer than inflorescence. Inflorescence a simple or compound anthela; rays 5–10, to 12 cm, base sometimes ramose. Spikes ovoid, with 5–14 laxly arranged spikelets. Spikelets distichous, linear to oblong, 1–1.5 cm × 1.6–1.8(–2) mm, subcompressed, divaricate after anthesis, 10–20-flowered; rachilla broadly winged. Glumes yellowish to golden or pale brown, ± laxly imbricate, extended at maturity, ovate to ovate-elliptic, 2.2–2.6 mm, 7-veined, margin apically white hyaline, apex truncate and mucronate. Stamens 3; anthers linear; connective prominent beyond anthers into small ovoid appendage. Style long; stigmas 3, ± long. Nutlet brownish gray, ellipsoid, ca. 1/2 as long as subtending glume, 3-sided, shiny, densely punctulate.

Cultivated in Guangxi, Heilongjiang, Liaoning, Xinjiang, and Yunnan; collected as a naturalized plant in Shandong, Taiwan, and perhaps elsewhere [native to Mediterranean region].

Cyperus esculentus var. *esculentus* occurs in the Mediterranean region and differs by having globose to ovoid tubers, anthela rays to 4 cm, and ellipsoid nutlets. *Cyperus esculentus* var. *sativus* was introduced to China before the 1970s and is now grown as an oil plant. The oil is used as an edible or industrial oil. The tubers could be used as a starch source. This herb grows and reproduces quickly and is good for soil conservation.

37. *Cyperus tenuiculmis* Boeckeler, Linnaea 36: 286. 1870.

四稜穗莎草 si leng sui suo cao

Perennials. Rhizomes short, woody. Culms laxly tufted, 40–75 cm, slender, triquetrous, smooth, basally with several leaves, base slightly swollen. Leaves shorter than culm; sheath brown, ± long; leaf blade 2–6 mm wide, margin revolute. Involucral bracts (2 or)3, leaflike, basalmost longer than inflorescence. Inflorescence a simple or rarely compound anthela; rays 3–7, 1–10 cm. Spikes ovoid, with 3–14 spikelets. Spikelets laxly arranged, narrowly linear-ovoid to linear, 1–2 cm × 1.5–2 mm, subquadrangular, obliquely spreading but subspreading after anthesis, 6–14-flowered; rachilla flexuose, wings blackish brown and caducous. Glumes yellow to yellowish brown on both surfaces, slightly lax, elliptic, ca. 4 mm, membranous, 7–9-veined, keel green, apex obtuse. Stamens 3; anthers linear; connective slightly prominent beyond anthers. Style long; stigmas 3. Nutlet black, ellipsoid to obovoid, 3-sided, concave on 3 sides, ca. 1/2 as long as subtending glume, densely punctulate. Fl. and fr. May–Nov. $2n = 88$.

Mountain slopes, open grasslands, streamsides, wet places under sparse forests, fields; 200–1600 m. Fujian, Guangdong, Guangxi, Hainan, Sichuan, Taiwan, Yunnan, Zhejiang [Bhutan, Cambodia, India, Indonesia, S Japan, Laos, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa and Australia, Pacific islands].

Cyperus tenuiculmis was misidentified as *C. zollingeri* Steudel by Tang and F. T. Wang (Fl. Reipubl. Popularis Sin. 11: 137. 1961).

38. *Cyperus distans* Linnaeus f., Suppl. Pl. 103. 1782.

疏穗莎草 shu sui suo cao

Perennials. Rhizomes short, surculose. Culms 35–110 cm tall, slightly stout, compressed triquetrous, smooth, base slightly swollen. Leaves shorter than or equaling culm; sheath brown, long; leaf blade 4–6 mm wide, flat or slightly folded, margin scabrid. Involucral bracts 4–6, leaflike, basal 2 or 3 longer than inflorescence, remaining ones shorter than inflorescence. Inflorescence a compound or decompound anthela; rays 6–10, to 15 cm, each with 3–5 raylets; raylets to 7 cm, ± thin. Spikes broadly ovoid, with 8–18 spikelets. Spikelets laxly distichous, linear, 0.8–4 cm × less than 1 mm, subterete, oblique to spreading, 6–32-flowered; rachilla thin, flexuose, wings white, hyaline, caducous. Glumes dark blood-red on both surfaces, lax, elliptic, ca. 2 mm, membranous, 3–5-veined, keel green, margin apically white hyaline, apex rounded. Stamens 3; anthers linear; connective prominent beyond anthers. Style short; stigmas 3. Nutlet blackish brown, oblong, ca. 2/3 as long as subtending glume, 3-sided, slightly prominently punctate. Fl. and fr. Jul–Aug.

Forests, swamps, grasslands, slightly dry or wet places on slopes, river margins, along trails; near sea level to 1800 m. Guangdong, Guangxi, Hainan, Taiwan, Xisha Qundao, Yunnan [Bhutan, Cambodia, India, Indonesia, Japan (Ryukyu Islands), Kashmir, Laos, Myanmar, Nepal, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa and Australia, Central, North, and South America, Indian Ocean islands, Madagascar].

39. *Cyperus nutans* Vahl, Enum. Pl. 2: 363. 1805.

垂穗莎草 chui sui suo cao

Perennials. Rhizomes short, hardened. Culms scattered, 75–110 cm tall, stout, compressed 3-angled, smooth, with leaves at basal part. Leaves shorter than culm; leaf blade 6–12 mm wide, flat, margin scabrous. Involucral bracts 4–8, leaflike, basal 3 or 4 usually longer than inflorescence, to 1.2 cm wide, abaxially serrulate apically on 2 lateral veins, margin scabrous. Inflorescence a compound anthela; rays 8–10, to 16 cm, each with 4–10 raylets. Spikes cylindric, 2–5 cm × 4–7 mm, with laxly arranged spikelets. Spikelets linear to narrowly linear-ovoid, 5–11 × ca. 1.5 mm, suberect, 6–10-flowered; rachilla flexuose, wings white and hyaline. Glumes yellowish on both surfaces and rusty brown striate, lax, elliptic, ca. 2 mm, spreading after anthesis, membranous, 7–9-veined, keel reddish brown, apex mucronate. Stamens 3; anthers linear-oblong; connective prominent beyond anthers. Style very short; stigmas 3, slender, exerted. Nutlet dark brown when mature, oblong to obovoid-oblong, ca. 2/3 as long as subtending glume, 3-sided, densely and slightly prominently punctate. Fl. and fr. May–Oct. $2n = 56$.

Sparse forests, grasslands on mountain slopes, water margins in valleys, wet places, river margins, fields; below 100–1600 m. Guangdong, Guangxi, Guizhou, Hainan, Hunan, Sichuan, Taiwan, Yunnan [Bhutan, India, Indonesia, Laos, Malaysia, Nepal, Papua New Guinea, Sri Lanka, Thailand, Vietnam; Africa, Australia].

40. *Cyperus eleusinoides* Kunth, Enum. Pl. 2: 39. 1837.

稊穗莎草 can sui suo cao

Cyperus nutans Vahl subsp. *eleusinoides* (Kunth) T. Koyama; *C. nutans* var. *eleusinoides* (Kunth) Haines.

Perennials. Rhizomes short, surculose. Culms to 1 m tall, stout, 3-angled, smooth, base swollen into a tuber shape, with leaves at basal part. Leaves shorter than culm; sheath long, brown; leaf blade 6–12 mm wide, flat, margin scabrous. Involucral bracts 5 or 6, basal 2 or 3 longer than inflorescence. Inflorescence a compound or decompound anthela; rays 6–12, to 18 cm, each with 3–6 raylets; raylets mostly to 4 cm, unequal in length. Spikes oblong to cylindrical, 1–3 cm × 4–10 mm, with very many spikelets. Spikelets densely arranged in several rows, linear-oblong, 4–8 × ca. 2 mm, 6–12-flowered; rachilla wings white, hyaline, caducous. Glumes pale and brown striate or brown, lax, ovate-elliptic, ca. 2 mm, membranous, 5–7-veined, keel green, apical margin white hyaline, apex mucronate. Stamens 3; anthers linear; connective prominent beyond anthers. Style short; stigmas 3, ± long. Nutlet dark brown, obovoid, 3-sided, ca. 2/3 as long as subtending glume, densely and slightly prominently punctate. Fl. and fr. Aug–Dec. $2n = 64$.

Forests, mountain slopes, sunny water margins, wet places in valleys; 200–2500 m. Fujian, Guangdong, Guangxi, Taiwan, Yunnan [Cambodia, India, Indonesia, Japan (Ryukyu Islands), Kashmir, Laos, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa, SW Asia, tropical Australia].

41. *Cyperus glomeratus* Linnaeus, Cent. Pl. 2: 5. 1756.

头状穗莎草 *tou zhuang sui suo cao*

Annuals. Roots fibrous. Culms scattered, 30–60(–90) cm tall, stout, obtusely 3-angled, smooth, basally with leaves, base slightly swollen. Leaves few, shorter to slightly longer than culm; sheath reddish brown, long; leaf blade 4–8 mm wide, margin smooth. Involucral bracts 3 or 4, leaflike, longer than inflorescence. Inflorescence a compound anthela; rays 3–8, mostly to 12 cm, unequal in length; raylets lacking. Spikes subglobose, ellipsoid, or oblong, 1–3 × 0.6–1.7 cm, not pedunculate, with very many spikelets. Spikelets very densely arranged in several rows, narrowly linear-ovoid to linear, 5–10 × 1.5–2 mm, slightly compressed, 8–16-flowered; rachilla wings white, narrow, hyaline. Glumes reddish brown, lax, suboblong to oblong-lanceolate, ca. 2 mm, slightly spreading, veins very obscure, not keeled, margin involute, apex obtuse. Stamens 3; anthers short, oblong; connective prominent beyond anthers. Style slightly long; stigmas 3, ± short. Nutlet dark gray, narrowly oblong, ca. 1/2 as long as subtending glume, 3-sided, conspicuously reticulately striate. Fl. and fr. Jun–Oct.

Wet grasslands along trails, sandy soil at water margins, river margins, lake banks, paddy fields; 100–1300 m. Anhui, S Gansu, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Zhejiang [Japan, Kashmir, Kazakhstan, Korea, Russia, Tajikistan, Uzbekistan; SW Asia, Europe].

42. *Cyperus malaccensis* Lamarck, Tabl. Encycl. 1: 146. 1791.

茳茳 *jiang du*

Perennials. Rhizomes long, woody, rarely with thin stolons. Culms 0.5–1.5 m tall, 4–6 mm thick, acutely triquetrous, smooth, base brown and with a bladeless sheath, apical 1 or 2 sheaths with a blade. Leaf blade absent or to 3 cm × 4–8 mm, flat. Involucral bracts 3 or 4, leaflike, to 20 cm, longer to

shorter than inflorescence. Inflorescence a simple or compound anthela; rays 6–10, mostly to 9 cm. Spikes broadly ovoid, with 5–10 spikelets; rachis strict, glabrous. Spikelets laxly arranged, linear, 0.8–2.5(–3) cm × ca. 1.5 mm, slightly turgid, spreading, 10–42-flowered; rachilla wings white, narrow, hyaline. Glumes reddish brown but margin yellowish to straw-colored, lax, oblong to elliptic, 2–2.5 mm, papery, inconspicuously 7–9-veined, margin involute at maturity, apex obtuse to rounded. Stamens 3; anthers linear; connective prominent beyond anthers. Style short; stigmas 3, slender. Nutlet blackish brown when mature, narrowly oblong, 1.7–2 mm, almost as long as subtending glume, 3-sided, minutely punctate. Fl. and fr. Jun–Nov.

River margins, ditch margins, water margins, shallow water, ocean beaches, salt marsh margins, forest margins, fields (usually cultivated); near sea level to 700 m. Fujian, Guangdong, Guangxi, Hainan, Jiangsu, Jiangxi, Sichuan, Taiwan, Zhejiang [India, Indonesia, Japan, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; SW Asia, N Australia].

The culms are used for making mats and hats.

- 1a. Apicalmost leaf with an elongated blade; basal involucral bracts longer than inflorescence, spreading; glumes incurved 42a. subsp. *malaccensis*
- 1b. Leaves with short to very short blades, sometimes basalmost sheath bladeless; involucral bracts shorter than inflorescence; glumes not incurved 42b. subsp. *monophyllus*

42a. *Cyperus malaccensis* subsp. *malaccensis*

茳茳(原亚种) *jiang du* (*yuan ya zhong*)

Apicalmost leaf with an elongated blade. Basal involucral bracts longer than inflorescence, spreading. Glumes slightly incurved. Fl. and fr. Jun–Oct.

River margins, ditch margins (usually cultivated); below 100 m. Hainan, Taiwan [India, Indonesia, Japan, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; SW Asia, N Australia].

42b. *Cyperus malaccensis* subsp. *monophyllus* (Vahl) T. Koyama, Fl. Taiwan 5: 266. 1978.

短叶茳茳 *duan ye jiang du*

Cyperus monophyllus Vahl, Enum. Pl. 2: 352. 1805; *C. malaccensis* var. *brevifolius* Boeckeler.

Leaves with short to very short blades, sometimes basalmost sheath bladeless. Involucral bracts shorter than inflorescence. Glumes not incurved. Fl. and fr. Jun–Nov.

Ocean beaches, river margins, shallow water, fields (usually cultivated), forest margins, salt marsh margins; near sea level to 700 m. Fujian, Guangdong, Guangxi, Hainan, Jiangsu, Jiangxi, Sichuan, Taiwan, Zhejiang [Indonesia, Japan, Vietnam].

43. *Cyperus pilosus* Vahl, Enum. Pl. 2: 354. 1805.

毛轴莎草 *mao zhou suo cao*

Cyperus obliquus Nees; *C. pilosus* var. *obliquus* (Nees) C.

B. Clarke; *C. pilosus* var. *pauciflorus* L. K. Dai; *C. pilosus* var. *purpurascens* L. K. Dai.

Perennials. Rhizomes with slender stolons. Culms scattered, 25–85 cm tall, stout, acutely triquetrous, smooth or scabrid on angles of apical part. Leaves shorter than culm; sheath brownish, short; leaf blade 6–8 mm wide, flat, margin serrulate scabrid. Involucral bracts 3–5, basal 2 or 3 longer than inflorescence, margin serrulate scabrid. Inflorescence a compound or decompound anthela; rays 3–10, mostly to 14 cm, unequal in length, each with 3–7 raylets broadly triangular in outline. Spikes ovoid to oblong, 2–3 × 1–2 cm, with 10–20 or more spikelets; rachis densely hispid. Spikelets laxly distichous, narrowly linear-ovoid to linear, 2.5–14 × 1–2.5 mm, slightly turgid, spreading, 4–26-flowered; rachilla wings white, narrow, hyaline. Glumes pale, brown, reddish brown, or dark purple on both surfaces but middle green, slightly lax, broadly ovate, 1.8–2.5 mm, thinly papery, 5–7-veined, keel inconspicuous, margin white hyaline, apex mucronate or mucicous. Stamens 3; anthers linear-oblong, 0.5–0.8 mm; connective prominent beyond anthers. Style ca. 0.6 mm; stigmas 3, ca. 1 mm. Nutlet nearly black when mature, broadly ellipsoid to obovoid, 1/2–3/5 as long as subtending glume, 3-sided, apex mucronate. Fl. and fr. Aug–Nov. $2n = 36, 68$.

Sparse forests, forest margins, grasslands on slopes, marshes, meadows, river margins, wet places, paddy fields, water margins, along trails, parks; near sea level to 2100 m. Anhui, Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Shanxi, Sichuan, Taiwan, SE Xizang, Yunnan, Zhejiang [Bangladesh, Bhutan, India, Indonesia, Japan, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; N Australia, Pacific islands].

Cyperus pilosus is naturalized in North America.

44. *Cyperus procerus* Rottbøll, Descr. Icon. Rar. Pl. 29. 1773.

拟毛轴莎草 ni mao zhou suo cao

Perennials. Rhizomes with long stolons. Culms 45–85 cm tall, stout, compressed triquetrous. Leaves basal, equaling or slightly longer than culm; sheath reddish brown; leaf blade 5–10 mm wide, ± flat. Involucral bracts 3, leaflike, basal 1 or 2 longer than inflorescence. Inflorescence a simple or compound anthela; rays 3–7, mostly to 15 cm, unequal in length, obliquely spreading, smooth. Spikes 1–5, broadly ovoid, with 4–16 spikelets; rachis hispidulous or glabrous. Spikelets laxly arranged, narrowly linear-ovoid to linear-ovoid, 10–25 × ca. 3 mm, slightly turgid, obliquely spreading to spreading, 14–36-flowered; rachilla wings white, narrow, hyaline. Glumes yellowish brown and reddish brown punctate but middle greenish, slightly densely imbricate, broadly ovate, 2.5–3 mm, membranous, 7–9-veined, keeled, margin white hyaline and undulate, apex obtuse. Stamens 3; anthers linear-oblong, 1.2–1.8 mm; connective slightly prominent beyond anthers. Style short; stigmas 3. Nutlet brown, obovoid, 1.3–1.5 mm, ca. 1/2 as long as subtending glume, 3-sided, essentially smooth. Fl. and fr. Jun–Oct. $2n = 18, 64$.

Fields, water margins, wet places, often in sandy soil; below 100 m. Guangdong, Hainan, Taiwan [Bangladesh, Cambodia, India, Indonesia, Laos, Malaysia, Nepal, Philippines, Sri Lanka, Thailand, Vietnam; Africa, N Australia, Madagascar].

45. *Cyperus babakan* Steudel, Syn. Pl. Glumac. 2: 6. 1854.

刺鳞莎草 ci lin suo cao

Cyperus babakensis Steudel ex Miquel; *C. pilosus* Vahl var. *babakensis* (Steudel ex Miquel) C. B. Clarke.

Perennials. Rhizomes stoloniferous. Culms 60–80 cm tall, slightly stout, compressed triquetrous, smooth. Leaves basal, slightly shorter than or subequaling culm; sheath brown and purplish red striate, basalmost bladeless; leaf blade ca. 8 mm wide, with short and transverse septate nodes, midvein and margin scabrous, basally folded, apically flat. Involucral bracts 3 or 4, leaflike, much longer than inflorescence, longest to 25 cm. Inflorescence a simple anthela; rays 3–5, 2.5–12 cm, each with a spike; raylets absent. Spikes ovoid to ellipsoid, ca. 2.5 × 1.8 cm, with several to many spikelets; rachis slightly densely yellowish brown hispidulous. Spikelets slightly densely arranged, spreading, narrowly linear-ovoid to linear-oblong, 0.8–1.2 cm × ca. 2.5 mm, subturgid, 12–30(–40)-flowered; rachilla wings white, narrow, hyaline. Glumes yellowish on both surfaces with purple striae, slightly densely arranged, ovate, 2.5–3 mm, membranous, 7–9-veined, keel green and spinulose especially distally, margin white hyaline, apex obtuse and mucronate. Stamens 3; anthers oblong, 0.7–1 mm; connective prominent beyond anthers. Style short; stigmas 3, ± longer than style. Nutlet black when mature, broadly obovoid to broadly ellipsoid, ca. 1/2 as long as subtending glume, 3-sided, densely punctulate. Fl. and fr. Jun–Oct.

Wet places, paddy fields; below 300 m. Hainan, SE Xizang [NE India, Indonesia, Laos, Malaysia, Papua New Guinea, Philippines, Thailand, Vietnam].

46. *Cyperus iria* Linnaeus, Sp. Pl. 1: 45. 1753.

碎米莎草 sui mi suo cao

Annuals. Roots fibrous. Culms tufted, 8–80 cm tall, slender to slightly stout, compressed triquetrous, base few leaved. Leaves much shorter than culm; sheath reddish brown to brownish purple; leaf blade 2–5 mm wide, slightly folded or flat. Involucral bracts 3–5, leaflike, lowermost 2 or 3 longer than inflorescence. Inflorescence a compound or rarely simple anthela; rays 4–9, mostly to 12 cm, each with 5–10 or more spikes. Spikes ovoid to oblong-ovoid, 1–4 cm, with 5–20 or more spikelets. Spikelets laxly arranged, ascending to slightly spreading, narrowly ovoid, very narrowly ovoid, or oblong, 4–10 × ca. 2 mm, compressed, 6–22-flowered; rachilla almost wingless, with successive glumes 0.7–0.9 mm apart. Glumes yellow to straw-colored, lax, broadly obovate, ca. 1.5 mm, membranous, 3–5-veined, keel middle abaxially green, margin apically white hyaline, apex retuse and mucronulate. Stamens 2(or 3); anthers ellipsoid; connective not prominent beyond anthers. Style very short; stigmas ± short. Nutlet dark brown, obovoid to subellipsoid, 1.2–1.4 mm, nearly as long as subtending glume, 3-sided, densely prominently punctulate. Fl. and fr. Jun–Oct. $2n = 108, 112, 116, 128$.

Forest margins, under shrubs or forests, grasslands by water, mountain slopes, along trails in valleys, river margins, wet places, paddy fields; below 100–2000 m. Anhui, Chongqing, Fujian, S Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Heilongjiang, Henan,

Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, S Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, SE Xizang, Yunnan, Zhejiang [Afghanistan, Bangladesh, Bhutan, India, Indonesia, Japan, Kashmir, Korea, Laos, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Turkmenistan, Uzbekistan, Vietnam; tropical Africa, SW Asia, Australia, Indian Ocean islands, Madagascar, Pacific islands].

Cyperus iria is naturalized in Central, North, and South America.

47. *Cyperus microiria* Steudel, Syn. Pl. Glumac. 2: 23. 1854.

具芒碎米莎草 *ju mang sui mi suo cao*

Cyperus amuricus Maximowicz var. *japonicus* Kükenthall (1936), not Miquel (1866).

Annuals. Roots fibrous. Culms tufted, 20–60 cm tall, slightly slender, acutely triquetrous, smooth, base several leaved. Leaves shorter than or equaling culm; sheath purplish brown; leaf blade ca. 2.5 mm wide, flat. Involucral bracts 3 or 4 (or more), leaflike, longer than inflorescence. Inflorescence a compound or decompound anthela; rays 5–9, mostly to 13 cm, unequal in length. Spikes ovoid, broadly ovoid, or subconic, 2–4 × 1–3 cm, with many spikelets. Spikelets slightly laxly arranged, linear to very narrowly linear-ovoid, 0.6–1.5 cm × ca. 1.5 mm, obliquely spreading to spreading, 8–24-flowered; rachilla wings white, narrow, straight, hyaline; successive glumes on rachilla 1–1.5 mm apart. Glumes straw-colored to pale, lax, broadly obovate, ca. 1.5 mm, membranous, 3–5-veined and green, keel abaxially extended beyond apex into a mucro, apex rounded. Stamens 2 (or 3); anthers oblong, 0.2–0.4 mm. Style very short; stigmas 3, ± short. Nutlet dark brown, oblong-obovoid, 1.2–1.5 mm, nearly as long as subtending glume, 3-sided, densely prominently punctulate. Fl. and fr. Aug–Oct.

Forests, under shrubs, grasslands on mountain slopes, wet places by river margins, ditch margins, water margins, seashores, along trails, paddy fields; near sea level to 3800 m. Anhui, Chongqing, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, S Jilin, Liaoning, NE Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, E Yunnan, Zhejiang [India, Japan, Korea, Thailand, Vietnam].

Cyperus microiria is naturalized in S Australia and North America.

48. *Cyperus amuricus* Maximowicz, Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans 9 [Prim. Fl. Amur.]: 296. 1859.

阿穆尔莎草 *a mu er suo cao*

Annuals. Roots fibrous. Culms tufted, 10–60 cm tall, slender, compressed triquetrous, smooth, base with several leaves. Leaves shorter than culm; leaf blade 2–5 mm wide, flat, scabrid on apical margin and smooth on other parts. Involucral bracts 3–5, leaflike, basal 2 usually longer than inflorescence. Inflorescence a simple anthela; rays 4–10, mostly to 12 cm, each with 1 spike. Spike broadly ovoid to oblong, 1–3 × 0.8–3 cm, with several to many spikelets. Spikelets laxly arranged, linear to narrowly linear-ovoid, 0.5–1.5 cm × 1–2 mm, obliquely spreading but spreading after anthesis, 8–20-flowered; rachilla wings white, narrow, hyaline, persistent; successive glumes on rachilla ca. 0.5 mm apart. Glumes purplish red to brown on both surfaces but middle green, slightly lax, broadly obovate to

suborbicular, 1–1.5 mm, membranous, slightly shiny, 5-veined, midvein forming a keel, apex with an excurved mucro ca. 0.4 mm. Stamens 3; anthers ellipsoid, 0.2–0.4 mm; connective prominent beyond anthers. Style very short; stigmas 3, ± short. Nutlet blackish brown, obovoid to oblong, nearly as long as subtending glume, 3-sided, densely prominently punctulate, apex mucronate. Fl. and fr. Jul–Oct.

Grasslands on mountain slopes, seashores, wet places in ditches, river margins, along trails, fields; below 100–2500 m. Anhui, Chongqing, Fujian, N Guangxi, N Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, S Jilin, Liaoning, SE Shaanxi, Shandong, Shanxi, Taiwan, E Xizang, Yunnan, Zhejiang [Japan, Korea, Russia (Far East)].

Cyperus amuricus is naturalized in North America.

49. *Cyperus orthostachyus* Franchet & Savatier, Enum. Pl. Jap. 2: 539. 1878.

三轮草 *san lun cao*

Annuals. Roots fibrous. Culms slender, 8–65 cm tall, compressed triquetrous, smooth, with few leaves at basal part. Leaves shorter than or equaling culm; sheath brownish, ± long; leaf blade 3–6 mm wide, flat, margin scabrous. Involucral bracts 3 or 4, leaflike, very much longer than inflorescence or basal 1 or 2 longer than inflorescence, margin scabrous. Inflorescence a simple or rarely compound anthela; rays 5–11, mostly to 15(–20) cm, unequal in length, each with 1(–5) spike. Spike ovate-oblong, broadly ovate, or oblong-cylindric, 1–3.5 × 1–3 cm, with 5–32 or many spikelets; rachis white hispidulous on angles. Spikelets slightly laxly or densely arranged, obliquely spreading to suberect, sometimes divergent after anthesis, narrowly ovoid to linear, 0.3–2.5 cm × 1–2 mm, 6–46-flowered; rachilla wings white, narrow, hyaline; successive glumes on rachilla ca. 1 mm apart. Glumes purplish red on both surfaces, slightly lax, broadly ovate to elliptic, 1.4–1.5 mm, membranous, obscurely 5–7-veined, keel abaxially green, margin apically white hyaline, apex rounded to retuse and mucicous. Stamens 3; anthers ellipsoid, short; connective prolonged. Style short; stigmas 3, slightly short. Nutlet brown, obovoid, nearly as long as subtending glume, 3-sided, punctulate, apex mucronate. Fl. and fr. Jul–Oct.

Mountain slopes, river margins, ditch margins, grasslands, along trails, wet places, paddy fields, swamps; 300–1500 m. Anhui, Chongqing, Fujian, NE Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Zhejiang [Japan, Korea, Russia (Far East, E Siberia), Vietnam].

- 1a. Basal 1 or 2 involucral bracts longer than inflorescence; spikes ovoid-oblong to broadly ovoid, with 5–32 spikelets; spikelets slightly laxly arranged, 4–25 × 1.5–2 mm, obliquely spreading but divergent after anthesis, 10–46-flowered 49a. var. *orthostachyus*
- 1b. Involucral bracts very much longer than inflorescence; spikes oblong to oblong-cylindric, with many spikelets; spikelets densely arranged, 3–6 × ca. 1 mm, suberect, 6–12-flowered 49b. var. *longibracteatus*

49a. *Cyperus orthostachyus* var. *orthostachyus*

三轮草(原变种) san lun cao (yuan bian zhong)

Cyperus truncatus Turczaninow var. *orthostachyus* (Franchet & Savatier) C. B. Clarke.

Involucral bracts basal 1 or 2 longer than inflorescence. Spikes ovoid-oblong to broadly ovoid, with 5–32 spikelets. Spikelets slightly laxly arranged, 4–25 × 1.5–2 mm, obliquely spreading but divergent after anthesis, 10–46-flowered. Fl. and fr. Jul–Oct.

Mountain slopes, river margins, ditch margins, grasslands, along trails, wet places, paddy fields; 300–1500 m. Anhui, Chongqing, Fujian, NE Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Zhejiang [Japan, Korea, Russia (Far East, E Siberia), Vietnam].

49b. *Cyperus orthostachyus* var. *longibracteatus* L. K. Dai in Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 231. 1961.

长苞三轮草 chang bao san lun cao

Involucral bracts much longer than inflorescence. Spikes oblong to oblong-cylindrical, with many spikelets. Spikelets densely arranged, 3–6 × ca. 1 mm, suberect, 6–12-flowered. Fl. Aug–Sep.

- Swamps. Heilongjiang, Liaoning.

50. *Cyperus compressus* Linnaeus, Sp. Pl. 1: 46. 1753.

扁穗莎草 bian sui suo cao

Annuals. Roots fibrous. Culms tufted, 5–35 cm tall, ± slender, triquetrous, smooth, base with leaves. Leaves shorter than or sometimes equaling culm; sheath purplish brown; leaf blade 1.5–4 mm wide, flat, sometimes slightly plicate. Involucral bracts 3–5, leaflike, longer than inflorescence. Inflorescence a simple anthela; rays 2–7, 0.8–5 cm, each with 1 spike. Spike broadly ovoid to in outline sublabeliform, with 3–10 spikelets; rachis 2–5 mm. Spikelets densely and nearly digitately arranged, narrowly linear-ovoid, 1–2.5(–4) cm × 3–4 mm, basal ones spreading and apical ones obliquely spreading, 10–20-flowered; rachilla wings white, narrow, hyaline. Glumes pale to straw-colored on both surfaces and sometimes with rusty brown striae but middle green, tightly imbricate, ovate, 3–3.5 mm, thinly leathery, strongly folded, 9–13-veined, keeled, apex acute and with a straight and slightly long mucro. Stamens 3; anthers linear, 0.6–0.7 mm; connective apex reddish, ovate, ca. 0.1 mm. Style 0.9–1.3 mm; stigmas 3, 0.5–0.8 mm. Nutlet dark brown, obovoid, ca. 1/3 as long as subtending glume, 3-sided, slightly concave on 3 sides, punctulate. Fl. and fr. Jul–Dec. $2n =$ ca. 98, 112, 114, 128.

Grasslands, seashores, along trails, lake margins, forests, stony clefts, wet sandy riverbanks, open fields, paddy field margins; near sea level to 900(–1600) m. Anhui, Chongqing, Fujian, S Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Nansha Qundao, Shandong, Shanxi, Sichuan, Taiwan, Xisha Qundao, Xizang, Yunnan, Zhejiang [Afghanistan, Bangladesh, Bhutan, India, Indonesia, Japan, Kashmir, Laos, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Africa, Australia, Central, North, and South America, Indian Ocean islands, Madagascar, Pacific Ocean islands].

51. *Cyperus compactus* Retzius, Observ. Bot. 5: 10. 1788.

密穗砖子苗 mi sui zhuan zi miao

Cyperus compactus var. *macrostachys* (Boeckeler) Kükenthal; *C. dilutus* Vahl; *C. dilutus* var. *macrostachys* Boeckeler; *Mariscus compactus* (Retzius) Druce; *M. compactus* var. *macrostachys* (Boeckeler) F. C. How; *M. microcephalus* J. Presl & C. Presl.

Perennials. Rhizomes short. Culms scattered or sparsely tufted, 50–90 cm tall, stout, terete, with conspicuously transverse veins, basally with leaves, base slightly swollen. Leaves longer to slightly shorter than culm; sheath purplish red, cylindrical, mostly to 10 cm, usually splitting from membranous part; leaf blade 5–9 mm wide, flat, with conspicuously transverse veins, abaxial midvein and margin spinulose. Involucral bracts 3–5, leaflike, much longer than inflorescence, obliquely spreading, abaxially midvein and margin spinulose. Inflorescence a compound anthela, lax to slightly dense; rays 7–9, suberect, mostly to 15 cm, unequal in length, stiff, each with 5–10 raylets; raylets obliquely spreading, usually ± short, mostly to only 2 cm. Spikes with many spikelets congested into nearly a globose to half-globose spike at apex of raylets, 0.8–3.5 cm in diam. Spikelets many, radially spreading, subulate, 0.5–1.8 cm × less than 1 mm, 3–12-flowered; rachilla wings white, hyaline. Glumes blood-red to reddish brown on both surfaces but abaxially green at middle, narrowly oblong, 3–4 mm, slightly shiny, 5–7-veined, apex obtuse to acute. Stamens 3; anthers broadly linear; connective prominent beyond anthers. Style of long to medium length; stigmas 3, slender. Nutlet yellowish brown to brownish, narrowly oblong, 1/2–3/5 as long as subtending glume, 3-sided, densely punctulate, apex mucronate. Fl. and fr. Jun–Dec.

Grasslands, swamps, wet places, shaded places in sparse forests, river margins, along trails, valleys, open field margins, paddy fields, coastal marshes; near sea level to 1000 m. Fujian, Guangdong, Guangxi, S Guizhou, Hainan, Taiwan, SE Xizang, Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Australia, Indian Ocean islands, Madagascar].

52. *Cyperus javanicus* Houttuyn, Nat. Hist. 13: t. 88. 1782.

羽状穗砖子苗 yu zhuang sui zhuan zi miao

Cyperus pennatus Lamarck; *Mariscus albescens* Gaudichaud; *M. javanicus* (Houttuyn) Merrill & F. P. Metcalf; *M. pennatus* (Lamarck) Domin.

Perennials. Rhizomes short, thick, woody. Culms scattered, 30–105 cm tall, stout, obtusely 3-angled, papillose, basally with leaves, base swollen. Leaves longer than culm; sheath blackish brown; leaf blade 5–10 mm wide, leathery, base folded, apically gradually flattened, conspicuously transverse veined, midvein and margin spinulose. Involucral bracts 4–6, obliquely spreading, leaflike, much longer than inflorescence. Inflorescence a compound anthela; rays 6–10, obliquely spreading, mostly to 10 cm, papillose, each with 3–7 raylets. Spikes cylindrical, 1.5–3 × 0.8–1.2 cm, with many spikelets. Spikelets slightly densely arranged, spreading to downward reflexed, narrowly oblong-ovoid, 4.5–7 × 1.8–2.5 mm, slightly turgid, 4–6-flow-

ered; rachilla broadly winged. Glumes brownish to straw-colored and rusty brown striate, slightly densely imbricate, broadly ovate, ca. 3 mm, subleathery, concave, 7–9-veined, not keeled, margin white hyaline, apex acute and not mucronate. Stamens 3; anthers broadly linear. Style long; stigmas 3. Nutlet blackish brown, broadly ellipsoid to obovoid-ellipsoid, ca. 1/2 as long as subtending glume, 3-sided, with dense punctate processes. Fl. and fr. Jul–Sep.

Coastal sandy areas, salt marshes, water margins; near sea level. Guangdong, Hainan, Taiwan, Xisha Qundao [Cambodia, India, Indonesia, Japan (Ryukyu Islands), Malaysia, Myanmar, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; N Australia, Indian Ocean islands, Madagascar, Pacific islands].

53. *Cyperus squarrosus* Linnaeus, Cent. Pl. 2: 6. 1756.

具芒鳞砖子苗 ju mang lin zhuan zi miao

Cyperus aristatus Rottbøll, nom. illeg. superfl.; *Mariscus aristatus* Chermeson (1938), nom. illeg. superfl., not (Benth) Kuntze (1891); *M. squarrosus* (Linnaeus) C. B. Clarke; *Scirpus intricatus* Linnaeus.

Annuals. Roots fibrous. Culms densely tufted, 2–10 cm tall, compressed triquetrous, smooth, leaved at basal part. Leaves longer to slightly shorter than culm; sheath purplish brown; leaf blade ca. 2 mm wide, flat, smooth. Involucral bracts 3–5, leaflike, longer than inflorescence, obliquely spreading. Inflorescence a simple anthela; rays 2–5(–7), to 2.5 cm. Spikes ovoid to oblong-ovoid, 1–1.5 cm × 6–8 mm, with many spikelets. Spikelets densely arranged, linear-oblong to oblong, 4–5 × ca. 1.5 mm (excluding length of arista), slightly compressed, divergent, 8–10-flowered; rachilla wingless, caducous. Glumes reddish brown to brown, lax, ovate-oblong, ca. 2.5 mm (including length of awn), membranous, deciduous at maturity, 7-veined, keel abaxially conspicuous, apex with a 0.5–1(–1.3) mm arista. Stamen 1; anther ellipsoid, 0.2–0.3 mm. Style 0.3–0.5 mm; stigmas 3, 0.4–0.7 mm. Nutlet dark grayish brown, obovoid-oblong, 0.7–0.8(–1.1) mm, 3-sided, with punctate processes, apex truncate and apiculate. Fl. and fr. Sep–Oct. $2n = 98$.

Grasslands in forests, wet places at river margins, mountain slopes, wet sandy areas, along trails and roadsides, field margins; 1200–4000 m. Sichuan, E and S Xizang, Yunnan [Afghanistan, Bangladesh, Bhutan, India, Indonesia, Kashmir, Myanmar, Pakistan, Sri Lanka, Thailand, Vietnam; Africa, SW Asia (Arabian Peninsula), Australia, Central, North, and South America, Europe, Madagascar].

54. *Cyperus cyperoides* (Linnaeus) Kuntze, Revis. Gen. Pl. 3: 333. 1898.

砖子苗 zhuan zi miao

Scirpus cyperoides Linnaeus, Mant. Pl. Alt. 181. 1771; *Cyperus cyperoides* var. *microstachys* Kükenthal; *C. cyperoides* var. *subcompositus* (C. B. Clarke) Kükenthal; *C. subumbellatus* Kükenthal; *C. umbellatus* Benth, nom. illeg. superfl.; *Kyllinga sumatrensis* Retzius; *K. umbellata* Rottbøll, nom. illeg. superfl.; *Mariscus cyperoides* (Linnaeus) Urban (1900), not (Roxburgh) A. Dietrich (1832); *M. philippensis* Steudel; *M. sieberianus* Nees ex C. B. Clarke; *M. sieberianus* var. *evolutior* C. B. Clarke; *M. sieberianus* var. *khasianus* C. B. Clarke; *M. sieberianus* var. *subcompositus* C. B. Clarke; *M. sumatrensis*

(Retzius) J. Raynal; *M. sumatrensis* var. *evolutior* (C. B. Clarke) C. Y. Wu ex Karthikeyan; *M. sumatrensis* var. *khasianus* (C. B. Clarke) C. Y. Wu ex Karthikeyan; *M. sumatrensis* var. *microstachys* (Kükenthal) L. K. Dai; *M. sumatrensis* var. *subcompositus* (C. B. Clarke) Karthikeyan; *M. umbellatus* Vahl, nom. illeg. superfl.; *M. umbellatus* var. *evolutior* (C. B. Clarke) E. G. Camus; *M. umbellatus* var. *microstachys* (Kükenthal) Tang & F. T. Wang; *M. umbellatus* var. *sieberianus* (Nees ex C. B. Clarke) E. G. Camus; *M. umbellatus* var. *subcompositus* (C. B. Clarke) Tang & F. T. Wang.

Perennials. Rhizomes short, hardened. Culms laxly tufted, 10–60 cm tall, acutely triquetrous, smooth, base swollen and with more leaves. Leaves shorter than to equaling culm; sheath brown to reddish brown; leaf blade 3–6(–8) mm wide, folded at basal part but apically gradually flattened, margin not scabrous. Involucral bracts 5–8, obliquely spreading, leaflike, longer than inflorescence. Inflorescence a simple or subcompound anthela; rays several, 6–12 or sometimes more, short or 6–14 cm, unequal in length, each with 1–5 spikes. Spikes cylindric, 1–2.5[–5] cm × 5–10 mm or sometimes narrower, with many dense spikelets. Spikelets narrowly linear-ovoid, 3–7 × ca. 0.7 mm or sometimes shorter, spreading to reflexed, each (1 or) 2- or 3-flowered; rachilla wings white, lanceolate, broad, hyaline. Glumes yellow, yellowish green, or greenish, oblong, ca. 3 mm, veins several with middle 3 green and conspicuous, margin involute, apex obtuse and not mucronate. Stamens 3; anthers broadly linear, 0.8–1 mm; connective prominent beyond anthers. Style short; stigmas 3, slender. Nutlet straw-colored at first but dark brown when mature, narrowly oblong, 1.8–2.2 × ca. 0.5 mm, ca. 2/3 as long as subtending glume, 3-sided, minutely punctate. Fl. and fr. Apr–Dec. $2n = 82, 88, 134, 220, 224$.

Sunny places on mountain slopes, grasslands along trails, ditch margins, river margins, wet places, forests, among herbs, sometimes in dry places; 100–1000(–3200) m. Anhui, Chongqing, Fujian, S Gansu, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Taiwan, Xisha Qundao, Xizang, Yunnan, Zhejiang [Bhutan, India, Indonesia, Japan, Kashmir, Korea, Laos, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa, Atlantic Ocean islands, N Australia, Indian Ocean islands, Madagascar, Pacific islands].

Cyperus cyperoides is naturalized in tropical America.

This widespread species occurs nearly throughout the tropical and warm-temperate regions of the Old World. Numerous varieties have been recognized in China, which may be identical with subspecies and varieties named in Africa (e.g., R. W. Haines & Lye, Sedges & Rushes E. Afr. 204–206. 1983) and S Asia (Karthikeyan, Fl. Ind. Enumerat. Monocot. 64. 1989). Such varieties were based on differences in ray and bract length, number of spikes per ray, and number of fertile glumes per spikelet. Intergradations have been noted by Haines and Lye (q.v.) and characterize some specimens from S China and SE Asia. D. A. Simpson and T. Koyama (Fl. Thailand 6(4): 382. 1998) noted variability in this species (as well as the following species) and recognized no infraspecific taxa. We follow their broad concept for this species and for *C. cyperinus*.

55. *Cyperus cyperinus* (Retzius) J. V. Suringar, Cyperus, 154. 1898.

莎状砖子苗 suo zhuang zhuan zi miao

Kyllinga cyperina Retzius, Observ. Bot. 6: 21. 1791;

Cyperus cyperinus var. *bengalensis* (C. B. Clarke) Kükenthal; *C. cyperoides* (Linnaeus) Kuntze subsp. *cyperinus* (Retzius) Kükenthal; *C. umbellatus* Benth. f. *cyperinus* (Retzius) C. B. Clarke; *Mariscus cyperinus* (Retzius) Vahl; *M. cyperinus* var. *bengalensis* C. B. Clarke; *M. umbellatus* Vahl var. *cyperinus* (Retzius) E. G. Camus.

Perennials. Rhizomes short. Culms scattered, 15–70 cm tall, slightly stout, acutely triquetrous, smooth, base many leaved. Leaves shorter than culm; sheath purplish red; leaf blade 5–7 mm wide, slightly flaccid or stiff, folded at basal part and spreading at apical part, abaxially midvein and margin scabrous. Involucral bracts 6–10, leaflike, longer to slightly shorter than inflorescence, margin scabrous. Inflorescence a simple anthela; rays 6–10, short or to 4.5 cm, unequal in length, with a single spike at apex. Spikes oblong-obovoid, often appearing to taper toward base or rarely cylindrical, 1–1.8[–3] × 0.8–1.2 cm, with many densely arranged spikelets, base cuneate to subtruncate. Spikelets erect to erect-spreading, narrowly linear-ovoid to linear-oblong, 4–6.5 × ca. 1 mm, each (1 or) 2–4-flowered; rachilla wings lanceolate, broad. Glumes crowded, brownish to purplish red on both surfaces, elliptic, ca. 3.5 mm, papery, veins several with middle 3 conspicuous and green, keeled, apex obtuse to acute and not mucronate. Stamens 3; anthers broadly linear, 1–1.5 mm; connective prominent beyond anthers. Style of medium length; stigmas 3. Nutlet dark grayish brown, narrowly oblong, 2–2.5 × 0.6–0.9 mm, ca. 2/3 as long as subtending glume, 3-sided, slightly curved in dorsiventral view, with dense punctate processes. Fl. and fr. Apr–Sep.

Dense forests, wet places on mountain slopes, grasslands, river margins, water margins, valleys; (near sea level to) 300–700(–1800) m. Fujian, Guangdong, Guangxi, Hainan, Hunan, Jiangxi, Sichuan, Taiwan, SE Xizang, Yunnan, Zhejiang [Bangladesh, Bhutan, India, Indonesia, Japan (Ryukyu Islands), Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; SW Asia (Yemen), NE Australia, Indian Ocean islands, Pacific islands].

56. *Cyperus dubius* Rottbøll, Descr. Icon. Rar. Pl. 20. 1773.

鳞茎砖子苗 lin jing zhuan zi miao

Mariscus dregeanus Kunth; *M. dubius* (Rottbøll) Kükenthal.

Perennials. Rhizomes short. Culms densely tufted, 15–30 cm tall, slender, compressed triquetrous, longitudinally sulcate, base swollen into a bulb shape and clothed with many brown rudimentary leaf sheaths. Leaves shorter than to subequaling culm; sheath brownish membranous; leaf blade 2–4 mm wide, flaccid, flat. Involucral bracts 3–5, leaflike, longer than inflorescence, pendent after anthesis. Inflorescences capitate, subglobose, 8–16 × 5–12 mm, with 1–3 spikes. Spikes dense, with many spikelets. Spikelets ovoid to narrowly ovoid, 3–4 × 1.2–2 mm, slightly turgid, 3–5-flowered; rachilla broadly winged. Glumes pale to greenish on both surfaces but middle green, densely arranged, broadly ovate, ca. 2.5 mm, densely brown punctate, 15–17-veined. Stamens (2 or) 3; anthers linear-oblong, ca. 0.5 mm; connective prominent beyond anthers. Style of medium length. Nutlet dark grayish brown, obovoid to ellipsoid, ca. 1.5 × 1 mm, 3-sided, densely punctate. Fl. and fr. Sep–Nov. $2n = 112$.

Sandy areas at seashores; near sea level. Hainan [India, Indonesia, Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa, SW Asia (Yemen), Indian Ocean islands, Madagascar, Pacific islands].

Cyperus dubius is naturalized in SE Australia.

57. *Cyperus hainanensis* (Chun & F. C. How) G. C. Tucker, **comb. nov.**

海南砖子苗 hai nan zhuan zi miao

Basionym: *Mariscus hainanensis* Chun & F. C. How, Acta Phytotax. Sin. 7: 87. 1958.

Perennials. Rhizomes short. Culms tufted, 15–25 cm tall, slender, compressed, base swollen into an oblong bulb shape and clothed with brown fibers from old leaf sheaths. Leaves much longer than culm; sheath brownish and usually purple maculate; leaf blade 3–4 mm wide. Involucral bracts 4 or 5, leaflike, much longer than inflorescence, slightly broad. Inflorescences capitate; rays very short, with 4 or 5 spikes. Spikes subovoid to oblong-ovoid, with many spikelets. Spikelets densely arranged, ovoid-ellipsoid, 3–4 × 1–1.5 mm, 2- or 3-flowered. Glumes brownish to yellowish green, purple punctulate on apical part, and green on abaxial middle, ovate, 2.5–3 mm, 9–13-veined, apex mucronate. Stamens 3; anthers linear-oblong, ca. 0.5 mm; connective not prominent beyond anthers. Nutlet oblong, 1/3–1/2 as long as subtending glume, ca. 1 mm wide, 3-sided, densely punctulate. Fl. and fr. Jul–Oct.

• Sandy areas at seashores; near sea level. Hainan.

58. *Cyperus monospermus* (S. M. Huang) G. C. Tucker, **comb. nov.**

单子砖子苗 dan zi zhuan zi miao

Basionym: *Mariscus monospermus* S. M. Huang, Fl. Hainan. 4: 537. 1977.

Perennials. Rhizomes short. Culms few, tufted, 10–16 cm tall, slender, compressed triquetrous, longitudinally sulcate, glabrous, base swollen into an ovoid to oblong-ovoid bulb shape and clothed with brown to dark brown fibers from old leaf sheaths. Leaves basal, shorter than to equaling culm; sheath brownish; leaf blade 1–2.5 mm wide, flat, margin scabrid. Involucral bracts 3–5, subspreading but pendent after anthesis, leaflike, mostly to 6 cm, base slightly broad. Inflorescences capitate, 6–8 mm in diam., with 2 or 3 spikes. Spikes with many spikelets. Spikelets densely arranged, ovoid-oblong, 2.5–3 mm, 1-flowered. Glumes yellowish to brownish on both surfaces, ovate to narrowly ovate, ca. 3 mm, membranous, usually purple punctate, tightly including nutlet, apex acuminate. Stamens 2; anthers oblong, ca. 1 mm. Style short. Nutlet brown, oblong-obovoid to oblong, ca. 1.8 × 0.7 mm, compressed 3-sided, with dense punctulate processes. Fl. and fr. Jul–Oct.

• Waste grasslands at seashores; near sea level. Hainan.

59. *Cyperus serotinus* Rottbøll, Descr. Icon. Rar. Pl. 31. 1773.

水莎草 shui suo cao

Perennials. Rhizomes with long stolons. Culms 35–100 cm tall, stout, compressed triquetrous, smooth, few leaved at

basal part. Leaves shorter to sometimes longer than culm; leaf blade 3–10 mm wide, smooth, midvein abaxially forming a keel, base folded, apically flat. Involucral bracts 3(or 4), leaf-like, longer than inflorescence, unequal in length, mostly to 8 mm wide. Inflorescence a compound or simple anthela; rays 4–7, obliquely spreading, mostly to 16 cm, each with 1–5 raylets; raylets each with a spike. Spikes with 5–17 spikelets; rachis laxly hispidulous or smooth. Spikelets laxly arranged, subspreading, narrowly ovoid to linear-oblong, 0.8–2.5 cm × ca. 3 mm, 10–34-flowered; rachilla wings white, hyaline. Glumes reddish brown to dark reddish brown on both surfaces, densely imbricate at first but slightly lax after anthesis, broadly ovate, ca. (2–)2.5 mm, papery, 5–7-veined, midvein green, margin yellowish and hyaline, apex obtuse to rounded and sometimes emarginate. Stamens 3; anthers linear. Style short; stigmas 2, long. Nutlet brown, broadly ellipsoid, subglobose, or broadly obovoid, ca. 2 mm, plano-convex, slightly shiny, prominently punctulate, apex apiculate. Fl. and fr. Jul–Nov.

Swamps, river margins, sandy places by water, shallow water, along trails, shady places, fields; below 100–1300(–2500) m. Anhui, Chongqing, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Taiwan, Xinjiang, Yunnan, Zhejiang [Afghanistan, India, Japan, Kashmir, Kazakhstan, Korea, Kyrgyzstan, Pakistan, Russia, Turkmenistan, Uzbekistan, Vietnam; SW Asia, Europe].

- 1a. Spikelets 0.8–2 cm; spike rachis laxly hispidulous; nutlet broadly ellipsoid to obovoid 59a. var. *serotinus*
 1b. Spikelets ca. 2.5 cm; spike rachis smooth; nutlet broadly obovoid to subglobose 59b. var. *inundatus*

59a. *Cyperus serotinus* var. *serotinus*

水莎草(原变种) shui suo cao (yuan bian zhong)

Cyperus serotinus f. *depauperatus* Kükenthal; *Juncellus serotinus* (Rottbøll) C. B. Clarke; *J. serotinus* f. *depauperatus* (Kükenthal) L. K. Dai.

Spike rachis laxly hispidulous. Spikelets 0.8–2 cm. Nutlet broadly ellipsoid to ovoid. Fl. and fr. Jul–Oct.

River margins, sandy places by water, shallow water, along trails, fields; 400–1300(–2500) m. Anhui, Chongqing, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Taiwan, Xinjiang, Yunnan, Zhejiang [Afghanistan, India, Japan, Kashmir, Kazakhstan, Korea, Kyrgyzstan, Pakistan, Russia, Turkmenistan, Uzbekistan, Vietnam; SW Asia, Europe].

Cyperus serotinus var. *serotinus* is naturalized in E North America.

59b. *Cyperus serotinus* Rottbøll var. *inundatus* Kükenthal in Engler, Pflanzenr. 101(IV. 20): 318. 1936.

广东水莎草 guang dong shui suo cao

Cyperus inundatus Roxburgh (1832), not R. Brown (1810); *Juncellus serotinus* var. *inundatus* (Kükenthal) L. K. Dai.

Spike rachis smooth. Spikelets to 2.5 cm. Nutlet broadly obovoid to subglobose. Fl. and fr. Oct–Nov.

Swamps, shady places; below 100 m. Fujian, Guangdong [India].

60. *Cyperus pannonicus* Jacquin, Fl. Austriac. 5: 29. 1778.

花穗水莎草 hua sui shui suo cao

Juncellus pannonicus (Jacquin) C. B. Clarke.

Perennials. Roots many, fibrous. Rhizomes short. Culms densely tufted, 4–20 cm tall, compressed 3-angled, smooth, base with 1 leaf. Leaf sheath slightly long; leaf blade mostly to only 2.5 cm, ca. 1 mm wide. Involucral bracts 3, leaflike, usually 2 longer than inflorescence and 1 shorter; basalmost bract erect, culmlike, elongated, basally ± broad. Inflorescences capitate, with 1–8 spikelets. Spikelets ovoid-oblong to oblong, 0.5–1.5 cm × 2–5 mm, slightly turgid, 10–32-flowered; rachilla subquadrangular, slightly broad. Glumes dark blood-red on both surfaces but middle yellowish green, adaxially reddish brown striate, densely imbricate, orbicular-ovate, ca. 3 mm, subpapery, veins several, apex obtuse and sometimes with a very short mucro. Stamens 3; anthers linear; connective prominent beyond anthers. Style long; stigmas 2. Nutlet brownish yellow, subglobose, ellipsoid, or obovoid, ca. 2 mm, plano-convex, slightly shiny, reticulately striate. Fl. and fr. Aug–Sep.

Swamps, river margins, ditch margins, saline soil; 100–1300 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Nei Mongol, Ningxia, Shaanxi, Shanxi, Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia, Turkmenistan, Uzbekistan; SW Asia, C Europe].

61. *Cyperus limosus* Maximowicz, Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans 9 [Prim. Fl. Amur.]: 294. 1859.

沼生水莎草 zhao sheng shui suo cao

Juncellus limosus (Maximowicz) C. B. Clarke; *Pycereus limosus* (Maximowicz) Schischkin.

Annuals. Roots fibrous. Culms tufted, 10–30 cm tall, compressed triquetrous, smooth, with few leaves. Leaves usually shorter to rarely slightly longer than culm; sheath slightly long; leaf blade 2–3 mm wide, usually folded, sometimes flat. Involucral bracts 3 or 4, leaflike, several times as long as inflorescence. Inflorescence a simple anthela, subcapitate; rays 3–6, very short, each with many spikelets congregated into a small capitulum. Spikelets narrowly oblong to oblong, 3–4 × ca. 1.5 mm, 10–18-flowered; rachilla wingless. Glumes straw-colored to sometimes pale rusty brown on both surfaces, slightly laxly imbricate, oblong, ca. 1 mm, membranous, 3-veined, apex obtuse and mucronate. Stamens 2; anthers ellipsoid, short. Style long; stigmas 2, exerted. Nutlet yellowish, oblong, ± as long as subtending glume, plano-convex. Fl. and fr. Aug–Sep.

Wet sandy places at river or lake margins. Heilongjiang [Russia (Far East), Vietnam].

62. *Cyperus odoratus* Linnaeus, Sp. Pl. 1: 46. 1753.

断节莎 duan jie suo

Cyperus conglobatus Link; *C. ferax* Richard; *C. ferax* var. *conglobatus* (Link) Kükenthal; *Mariscus ferax* (Richard) C. B.

Clarke; *Torulium confertum* Desvaux ex Hamilton; *T. ferax* (Richard) Hamilton [“*feroci*”]; *T. odoratum* (Linnaeus) S. S. Hooper.

Annuals or short-lived perennials. Rhizomes short, with fibrous roots. Culms 30–120 cm tall, stout, 3-angled, ± longitudinally sulcate, smooth, basally with leaves, base swollen into tuber. Leaves shorter than culm; sheath purplish brown, long; leaf blade 4–10 mm wide, flat, slightly stiff. Involucral bracts 6–8, obliquely spreading, usually longer than inflorescence. Inflorescence a compound or decompound anthela; rays 5–12, mostly to 20 cm, slightly stiff, each with several raylets; raylets 0–2 cm. Spikes oblong-cylindric, 2–3 × ca. 1.5 cm, with many spikelets. Spikelets slightly laxly arranged, spreading to downward reflexed, linear-cylindric, 0.8–2.5 cm × ca. 1 mm, 10–25-flowered; rachilla with several to 10 or more articulations,

wings broadly elliptic with a revolute margin, corky, and yellowish in maturity. Glumes yellowish brown, straw-colored, or slightly reddish on both surfaces but middle abaxially green, slightly lax, ovate-elliptic, 2–3.5 mm, concave, shiny, 7–9-veined, abaxially broadly rounded (not keeled), apex obtuse. Stamens 3; anthers broadly linear. Style of medium length; stigmas 3. Nutlet at first red but black when mature, oblong to obovoid-oblong, ca. 2/3 as long as subtending glume, slightly curved, 3-sided, included by wing of rachilla but apical part exserted. Fl. and fr. Aug–Oct(–Mar).

Riverbanks, streambeds, paddy field margins; near sea level to 700 m. Shandong, Taiwan, Zhejiang [Japan, Korea, Malaysia, Myanmar, Papua New Guinea, Philippines, Thailand, Vietnam; tropical Africa, E Australia, Central, North, and South America, Madagascar, Pacific islands].

16. COURTOISINA Soják, Čas. Nár. Muz. Praze, Rada Přír. 148: 193. 1980.

翅鳞莎属 *chi lin suo shu*

Dai Lunkai (戴伦凯); Gordon C. Tucker, David A. Simpson

Courtoisia Nees, Linnaea 9: 286. 1834, not L. Marchand (1830); *Indocourtoisia* Bennet & Raizada, nom. illeg. superfl.; *Pseudomariscus* Rauschert, nom. illeg. superfl.

Herbs, annual or short-lived perennial. Roots fibrous. Culms scattered, with leaves basally. Leaves basal, 3-ranked; ligule absent. Involucral bracts several, leaflike, usually longer than inflorescence. Inflorescence a compound anthela; rays unequal in length, with several ± short raylets. Spikes at apex of ray or raylet, globose, with numerous spikelets. Spikelets densely arranged, each 1- or 2-flowered; rachilla articulate near base, deciduous at articulation when mature. Glumes distichous, persistent on and deciduous with rachilla, basalmost without a flower, remaining ones each with a bisexual flower, keel broadly winged. Flowers without hypogynous bristles or scalelike perianth parts. Style base not swollen, deciduous; stigmas 3. Nutlet 3-sided, one side toward rachilla.

Three species: Africa, Asia, Indian Ocean islands, Madagascar; one species in China.

1. *Courtoisia cyperoides* (Roxburgh) Soják, Čas. Nár. Muz. Praze, Rada Přír. 148: 193. 1980.

翅鳞莎 *chi lin suo*

Kyllinga cyperoides Roxburgh, Fl. Ind. 1: 187. 1820; *Cyperus pseudokyllingioides* Kükenthal; *Mariscus cyperoides* (Roxburgh) A. Dietrich.

Culms 8–38(–80) cm tall, slightly slender, compressed cylindric, sometimes obtusely 3-angled at apical part, smooth. Leaves several, basal, shorter than to equaling culm; sheath short, usually split; leaf blade 2–3 mm wide, flat, apical margin spinulose. Involucral bracts 3–5, leaflike, basal 2 or 3 longer than inflorescence. Inflorescence a compound anthela; rays 3–7, mostly to 4.5 cm, unequal in length, each with (0–)3–6 raylets;

raylets less than 1.5 cm. Spikes globose, 5–9 mm in diam., with 6–15 densely clustered spikelets. Spikelets broadly ellipsoid to ellipsoid, ca. 3 × 1.5–2 mm, strongly compressed, 1- or 2-flowered. Glumes yellowish brown, boat-shaped, 3.5–4 mm, membranous, laterally 1-veined, keel glaucous, broadly winged, and extending into an apical mucro. Stamens 3; anthers oblong. Style short; stigmas 3, slightly longer than style, laxly papilliferous. Nutlet dark reddish brown, narrowly oblong, 3-sided with sharp angles, 2.7–3 mm, densely punctulate, apex acuminate. Fl. and fr. Jun–Sep. $2n = 10$.

Grasslands on mountain slopes, ditch margins, along trails; 1000–1700(–1800) m. SE Xizang, C and S Yunnan [Bhutan, India, Laos, Myanmar, Nepal, Thailand, Vietnam; Africa, Indian Ocean islands, Madagascar].

17. REMIREA Aublet, Hist. Pl. Guiane 1: 44. 1775.

海滨莎属 *hai bin suo shu*

Liang Songyun (梁松筠 Liang Song-jun); Gordon C. Tucker

Herbs, perennial. Rhizomes long, creeping. Culms 1 to few, 3-angled, smooth. Leaves many, aggregated on basal part of culm; ligule absent; leaf blade linear, stiff. Involucral bracts leaflike, spreading. Inflorescences spicate, sessile, with 2 to several clusters of spikelets. Spikelets falling as a unit when mature. Glumes subdistichous; basal 3 glumes veined, without a flower; apicalmost glume thickened, without veins, subtending a bisexual flower. Hypogynous bristles absent. Stamens 3; anthers linear-oblong; connective apex evident beyond anthers. Ovary oblong, 3-sided; stigmas 3. Nutlet long ellipsoid, 3-sided, apex without a beak.

One species: pantropical.

1. *Remirea maritima* Aublet, Hist. Pl. Guiane 1: 45. 1775.

海滨莎 hai bin suo

Mariscus pedunculatus (R. Brown) T. Koyama; *Miegia maritima* (Aublet) Willdenow; *Remirea pedunculata* R. Brown.

Rhizomes slender, long creeping, branching, rigid. Culms 6–15 cm tall, 1–2 mm thick, 3-angled, smooth, basally clothed with brown sheaths and their fibrous remnants and buried in sand. Leaves 3–15, covering base and lower culm, usually slightly longer than culm; sheath pale brown; leaf blade lanceolate, 4.5–6.5 mm wide, leathery, abaxial surface prominently keeled. Involucral bracts leaflike, longer than inflorescence. Inflorescences terminal, capitate, usually with 2–7 clusters, oblong-ellipsoid to ovoid-oblong, 1–2 × 0.7–1 cm, with many spikelets. Spikelets dense, fusiform-ellipsoid, ca. 5 mm; bract-

lets glumelike, ovate-lanceolate, ca. 3 mm, with brown lines, 1-veined, apex acute. Basal 3 glumes without a flower; basalmost glume broadly ovate, ca. 2 mm, 2-veined and with brown lines, apex rounded; second glume ovate, ca. 4 mm, 7-veined, apex rounded; third glume slightly longer than second one; fourth glume fleshy, ca. 3 mm, veinless, with brown minute spots, margin involute, apex slender. Stamens 3; anthers ca. 2 mm. Ovary oblong, 3-sided; style short; stigmas 3, slender, ± as long as style. Nutlet blackish brown, sessile, cylindrical-ellipsoid, 2–2.5 mm, compressed 3-sided. Fl. and fr. Sep–Dec.

Moist sandy beaches; near sea level. Guangdong, Hainan, Taiwan [India, Indonesia, Japan (Ryukyu Islands), Malaysia, Myanmar, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa and America, N Australia, Indian Ocean islands, Madagascar, SE North America, Pacific islands].

18. PYCREUS P. Beauvois, Fl. Oware 2: 48. 1816.

扁莎属 bian suo shu

Dai Lunkai (戴伦凯); Gordon C. Tucker, David A. Simpson

Herbs, annual or perennial. Rhizomes present or absent. Culms usually tufted, 3-angled or compressed 3-angled, rarely triquetrous. Leaves basal, 3-ranked; ligule absent; leaf blade usually present. Involucral bracts (1 or)2–5(–8), leaflike, rarely very thin. Inflorescences terminal, a simple or rarely compound anthela; rays several, long or very short, or inflorescence capitate. Spikelets few to many, arranged into a short spike or capitulum at apex of rays, or fascicled; rachilla not articulate at base, persistent, wingless or narrowly winged. Glumes distichous, gradually deciduous from base to apex of rachilla at maturity, basal 1 or 2 usually without a flower but remaining ones each with a bisexual flower. Flowers without hypogynous bristles or scalelike perianth parts. Stamens 1–3; connective apex prominent or not prominent beyond anthers. Style base not swollen; stigmas 2, deciduous at maturity. Nutlet biconvex, slightly compressed or slightly turgid, one margin facing rachilla, punctulate and reticulately striate or transversely undulately striate.

More than 70 species: Africa, America, Asia, Europe, oceanic islands; 11 species (three endemic) in China.

- 1a. Cells on nutlet surface transversely oblong with an elevated margin resulting in nutlet surface transversely undulately striate or scabrously rugose.
- 2a. Culms 10–35 cm tall; spikelets narrowly oblong-ovoid to narrowly linear-ovoid, 0.8–2 cm × 3–3.5 mm, 16–30-flowered; glumes brown to dark brown 9. *P. diaphanus*
- 2b. Culms 3–15 cm tall; spikelets ovoid, oblong-ovoid, or narrowly ovoid, 5–15 cm × 2.5–4 mm, 8–16-flowered; glumes straw-colored, yellowish brown, or purplish red.
- 3a. Culms slender; leaves 0.3–1.5 mm wide; anthela rays very short; spikelets 1 to several per ray, nearly fascicled; glumes purplish red to reddish brown on both surfaces 10. *P. setiformis*
- 3b. Culms slightly thick; leaves 1–3 mm wide; anthela rays mostly to 2.5 cm; spikelets 3–8 per ray, congested; glumes straw-colored to yellowish brown 11. *P. pseudolatespicatus*
- 1b. Cells on nutlet surface hexagonally reticulately striate or punctulate.
- 4a. Glumes broadly sulcate on both surfaces 8. *P. sanguinolentus*
- 4b. Glumes not broadly sulcate on both surfaces.
- 5a. Glume apices truncate to emarginate and excurved mucronate to awned 7. *P. pumilus*
- 5b. Glume apices obtuse or acute and not excurved mucronate.
- 6a. Spikelets narrowly linear-ovate, narrowly ovoid, narrowly oblong-ovoid, or oblong-ovoid; glumes densely imbricate, ca. 3 mm or more; stamens 3.
- 7a. Spikelets ca. 2.5(–3) mm wide; glumes blackish brown 1. *P. delavayi*
- 7b. Spikelets 3–5 mm wide; glumes straw-colored or yellowish brown 2. *P. unioides*
- 6b. Spikelets linear, linear-oblong, narrowly linear-ovoid, or narrowly ovoid; glumes slightly laxly imbricate or rarely densely imbricate, 1.5–2 mm; stamens 1 or 2.
- 8a. Nutlet oblong, both surfaces concave sulcate; stamen 1 6. *P. sulcinus*
- 8b. Nutlet obovoid-oblong or obovoid, both surfaces not concave sulcate; stamens (1 or)2.
- 9a. Anthelae with very short rays; spikelets narrowly ovoid to narrowly linear-ovoid; glumes subelliptic, abaxially not conspicuously keeled 5. *P. lijiangensis*
- 9b. Anthelae simple, lax, usually with slightly long or rarely very short rays; spikelets linear-oblong or linear; glumes oblong-ovate or subovate, abaxially keeled.

- 10a. Spikelets radiately arranged; rachilla 4-angled, with trabeculae in both lateral sulculi; glumes brown to dark brown, laxly imbricate, apex obtuse; anthers oblong 3. *P. flavidus*
 10b. Spikelets suberect; rachilla flexuose, narrowly winged; glumes straw-colored to rarely pale brown, densely imbricate, apex sometimes mucronate; anthers linear 4. *P. polystachyos*

1. *Pycreus delavayi* C. B. Clarke, J. Linn. Soc., Bot. 36: 203. 1903.

黑鳞扁莎 hei lin bian suo

Cyperus delavayi (C. B. Clarke) Kükenthal.

Perennials. Roots fibrous. Rhizomes short. Culms tufted, 40–60 cm tall, slender, acutely triquetrous, with a few leaves basally. Leaves shorter than culm; leaf blade 1–2 mm wide, usually folded. Involucral bracts 2, subulate, longer than inflorescence. Inflorescence a simple anthela; rays 2 or 3, mostly to only 2 cm, sometimes very short and inflorescence almost capitate, each with 2–10 spikelets. Spikelets laxly arranged, narrowly linear-ovoid to narrowly ovoid, 0.6–1.6 cm × 2.5–3 mm, obliquely spreading, 6–16-flowered; rachilla 4-angled, wingless, with successive glumes ca. 1.2 mm apart. Glumes blackish brown on both surfaces, slightly laxly imbricate, ovate, 2.7–3 mm, subleathery, veins 3 and straw-colored, apex acute. Stamens 3; anthers linear, 1–1.2 mm. Style slightly short; stigmas 2, slender. Nutlet black, oblong-obovoid, ca. 1.2 mm, ca. 1/2 as long as subtending glume, biconvex, densely prominently punctulate, apex mucronate. Fl. and fr. Jun.

• Swamps, boggy seepages, shallow water; 2000–3000 m. Yunnan.

2. *Pycreus unioloides* (R. Brown) Urban, Symb. Antill. 2: 164. 1900.

禾状扁莎 he zhuang bian suo

Cyperus unioloides R. Brown, Prodr. 216. 1810; *Pycreus chekiangensis* Tang & F. T. Wang.

Perennials. Rhizomes short. Culms tufted, 40–90 cm tall, slender, stiff, 3-angled, smooth, with a few leaves basally. Leaves shorter than culm; sheath reddish brown, to 8 cm; leaf blade 3–4 mm wide, folded or flat, somewhat rigid. Involucral bracts 2–4, leaflike, basal 1 or 2 longer than inflorescence. Inflorescence a simple anthela; rays 2–6, mostly to 6 cm, sometimes short, each with 3–12 spikelets arranged into a spike. Spikelets narrowly oblong-ovoid, narrowly ovoid, or oblong-ovoid, 0.6–1.8 cm × 3–5 mm, compressed, spreading to downward reflexed at basal part at maturity, (6–)10–22-flowered; rachilla flexuose, wingless. Glumes straw-colored, yellowish brown, or sometimes slightly reddish brown on both surfaces, slightly densely to slightly laxly imbricate, ovate, 4–5 mm, subleathery, veins 3 and green, apex acute. Stamens 3; anthers linear; connective prominent beyond anthers. Style long; stigmas 2, slightly shorter than style. Nutlet yellowish when young but black when mature, broadly obovoid to globose-obovoid, 1/4–1/3 as long as subtending glume, compressed biconvex, densely prominently punctulate. Fl. and fr. Jun–Oct.

Wet places, river margins in valleys; 200–2200 m. Guangdong, Taiwan, Yunnan, Zhejiang [Bhutan, Cambodia, India, Indonesia, Japan, Myanmar, Nepal, Papua New Guinea, Philippines, Thailand, Vietnam; Africa, E Australia, Central, North, and South America, Madagascar].

Pycreus chekiangensis appears to be based on immature plants of *P. unioloides*. Although the glumes are lighter, this variation can be found in *P. unioloides* in various parts of its pantropical range.

3. *Pycreus flavidus* (Retzius) T. Koyama, J. Jap. Bot. 51: 316. 1976.

球穗扁莎 qiu sui bian suo

Perennials. Roots fibrous. Rhizomes short. Culms tufted, 2–50 cm tall, obtusely 3-angled, smooth, with a few leaves basally. Leaves shorter or longer than culm; sheath reddish brown at basal part, long; leaf blade 1–2 mm wide, folded or flat. Involucral bracts 2–4, longer than inflorescence, slender. Inflorescence a simple anthela; rays 1–6, mostly to 6 cm, unequal in length, sometimes very short, each with many to rarely few spikelets. Spikelets congested at apex of rays, linear-oblong to linear, 0.3–1.8 cm × 1–3 mm, strongly compressed, radially spreading and forming a globose spike, 6–34(–66)-flowered; rachilla straight, 4-angled, with trabeculae in both lateral sulculi. Glumes yellowish brown, reddish brown, dark purplish red, dark grayish brown, or purplish brown on both surfaces, lax or dense, oblong-ovate, 1.5–2 mm, 3-veined, keel abaxially green, margin narrowly white hyaline, apex obtuse. Stamens 2; anthers oblong, ca. 0.5 mm. Style of medium length; stigmas 2, slender. Nutlet brown to dark grayish brown, obovoid, 0.8–1.2 mm, ca. 1/3 as long as subtending glume, slightly compressed, biconvex, prominently punctulate, apex mucronate. Fl. and fr. Jun–Nov.

Swamps, shallow water, river margins, shady wet places, meadows, water margins, ditch margins, paddy field margins; below 100–3400 m. Anhui, Chongqing, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, SE Xizang, Yunnan, Zhejiang [Afghanistan, Bangladesh, Bhutan, Cambodia, India, Indonesia, Japan, Kashmir, Kazakhstan, Korea, Laos, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Russia, Sri Lanka, Tajikistan, Thailand, Turkmenistan, Uzbekistan, Vietnam; Africa, SW Asia, Australia, S Europe, Indian Ocean islands, Madagascar].

- 1a. Culms 2–3 cm tall; inflorescence a simple anthela, with only 1 ray and 3–9 spikelets 3d. var. *minimus*
 1b. Culms 7–50 cm tall; inflorescence a simple anthela, with 2–6 rays each with many or rarely few spikelets.
 2a. Leaves usually longer than culm; spikelets 3–8 × 1–1.5 mm, 6–14-flowered 3c. var. *strictus*
 2b. Leaves shorter than culm; spikelets 6–18 × 1.5–3 mm or narrower, 12–34(–66)-flowered.
 3a. Spikelets 1.5–3 mm wide; glumes yellowish brown, reddish brown, or dark purplish red, lax 3a. var. *flavidus*

- 3b. Spikelets less than 1.5 mm wide; glumes dark grayish brown to purplish brown, dense 3b. var. *nilagiricus*

3a. *Pycereus flavidus* var. *flavidus*

球穗扁莎(原变种) qiu sui bian suo (yuan bian zhong)

Cyperus flavidus Retzius, Observ. Bot. 5: 13. 1788; *C. globosus* Allioni (1789), not Forsskål (1775); *Pycereus globosus* Reichenbach.

Culms tufted, 7–50 cm tall. Leaves shorter than culm. Inflorescence a simple anthela; rays 2–6, each with many to rarely few spikelets. Spikelets 0.6–1.8 cm × 1.5–3 mm, 12–34(–66)-flowered. Glumes yellowish brown, reddish brown, or dark purplish red, lax. Fl. and fr. Jun–Nov.

Wet places at river margins, ditch margins, herbaceous along trails, field margins; below 100–3400 m. Anhui, Chongqing, Fujian, S Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, SE Xizang, Yunnan, Zhejiang [Bangladesh, Bhutan, Cambodia, India, Indonesia, Japan, Kashmir, Kazakhstan, Korea, Laos, Malaysia, Nepal, Pakistan, Papua New Guinea, Philippines, Russia, Sri Lanka, Tajikistan, Thailand, Turkmenistan, Uzbekistan, Vietnam; SW Africa, SW Asia, Australia, S Europe, Indian Ocean islands, Madagascar].

3b. *Pycereus flavidus* var. *nilagiricus* (Hochstetter ex Steudel) C. Y. Wu ex Karthikeyan, Fl. Ind. Enumerat. Monocot. 65. 1989.

小球穗扁莎 xiao qiu sui bian suo

Cyperus nilagiricus Hochstetter ex Steudel, Syn. Pl. Glumac. 2: 2. 1854; *C. globosus* var. *nilagiricus* (Hochstetter ex Steudel) C. B. Clarke; *Pycereus globosus* var. *nilagiricus* (Hochstetter ex Steudel) C. B. Clarke.

Culms ± tall. Leaves shorter than culm. Inflorescence a simple anthela. Spikelets less than 1.5 mm wide. Glumes dark grayish brown to purplish brown, densely arranged. Fl. and fr. Jul–Sep.

Swamps, shallow water, river margins, shady wet places; 100–3000 m. Fujian, Gansu, Guangdong, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jilin, Liaoning, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Yunnan, Zhejiang [India, Japan, Kazakhstan, Korea, Malaysia, Myanmar, Philippines, Russia, Sri Lanka, Uzbekistan, Vietnam; E Africa, Madagascar].

3c. *Pycereus flavidus* var. *strictus* C. Y. Wu ex Karthikeyan, Fl. Ind. Enumerat. Monocot. 65. 1989.

直球穗扁莎 zhi qiu sui bian suo

Cyperus strictus Roxburgh, Fl. Ind. 1: 203. 1820, not Lamarck (1791); *C. globosus* var. *strictus* C. B. Clarke; *Pycereus globosus* var. *strictus* C. B. Clarke.

Culms ± tall, slightly stiff. Leaves usually longer than culm. Spikelets 3–8 × 1–1.5 mm, 6–14-flowered. Glumes brown to brownish yellow but sometimes more pale. Fl. and fr. Jun–Aug.

Meadows, swamps, river margins, water margins, shallow water, ditch margins, shady wet places, paddy field margins; 200–1400 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Jiangsu, Jiangxi, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Afghanistan, Bhutan, India, Japan, Kashmir, Nepal; SW Asia (Iran), Australia, Indian Ocean islands, Madagascar].

3d. *Pycereus flavidus* var. *minimus* (Kükenthal) L. K. Dai, comb. nov.

矮球穗扁莎 ai qiu sui bian suo

Basionym: *Cyperus globosus* f. *minimus* Kükenthal, Acta Horti Gothob. 5: 108. 1930; *Pycereus globosus* var. *minimus* (Kükenthal) Tang & F. T. Wang.

Culms 2–3 cm tall. Leaves longer than culm. Inflorescences with 1 ray and 3–9 spikelets. Spikelets arranged into a spike. Glumes dark purplish brown. Fl. and fr. Sep–Oct.

- Shady wet places; ca. 800 m. Shanxi.

4. *Pycereus polystachyos* (Rottbøll) P. Beauvois, Fl. Oware 2: 48. 1816.

多枝扁莎 duo zhi bian suo

Cyperus polystachyos Rottbøll, Descr. Pl. Rar. 21. 1772; *Pycereus polystachyos* var. *brevispiculatus* How ex Y. F. Deng.

Annuals or short-lived perennials. Roots fibrous. Rhizomes short. Culms densely tufted, 8–60 cm tall, compressed 3-angled, stiff, smooth. Leaves shorter than culm; sheath brown at basal part, long; leaf blade 2–4 mm wide, flat, sometimes folded, slightly rigid. Involucral bracts 4–6, leaflike, longer than inflorescence. Inflorescence a simple or almost capitate anthela; rays 5–8, mostly to 3.5 cm but sometimes short, each with many spikelets. Spikelets linear to linear-oblong, (0.5–)0.7–1.8 cm × 1.5–2 mm, congested into a globose spike, 6–30-flowered or more; rachilla flexuose, narrowly winged. Glumes on both surfaces straw-colored, reddish brown, dark grayish brown, or blackish dark grayish brown, densely imbricate, ovate-oblong, ca. 2 mm, membranous, 3-veined, keel abaxially green, apex sometimes mucronate. Stamens (1 or)2; anthers linear; connective prominent beyond anthers. Style long; stigmas 2, slender. Nutlet suboblong to ovoid-oblong, ca. 1/2 as long as subtending glume, biconvex, punctulate, apex mucronate. Fl. and fr. May–Oct.

Wet places, sandy areas at seashores, water margins, shady areas in wet sand, paddy field margins; near sea level to 300 m. Fujian, Guangdong, E Guangxi, Hainan, Jiangsu, S Liaoning, Taiwan, Xisha Qundao, Zhejiang [Cambodia, India, Indonesia, Japan, Korea, Laos, Malaysia, Myanmar, Pakistan, Philippines, Russia (Far East), Sri Lanka, Thailand, Vietnam; Africa, SW Asia, Australia, Central, North, and South America, S Europe, Indian Ocean islands, Madagascar, Pacific islands].

Plants with anthela rays short or nearly absent occur sporadically throughout the range of this pantropical and warm-temperate species. Such plants have been collected in S China (Guangdong) and given the name *Pycereus polystachyos* var. *brevispiculatus*. When the species is revised on a worldwide basis, it may be appropriate to provide a formal designation for these plants with a capitulum-like inflorescence.

5. *Pycreus lijiangensis* L. K. Dai in Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 233. 1961.

丽江扁莎 li jiang bian suo

Perennials. Roots few, fibrous. Rhizomes very short. Culms scattered, (5–)15–40 cm tall, slightly slender, stiff, obtusely 3-angled or sometimes nearly half-cylindric, smooth, with a few leaves basally. Leaves shorter than culm; sheath grayish brown, ± short; leaf blade 1–2 mm wide, usually folded, apical margin scabrous. Involucral bracts 3, leaflike, longer than inflorescence. Inflorescence a simple anthela; rays very short, rarely to 1.5 cm, with 7 to many spikelets clustered into a globose capitulum. Spikelets narrowly to very narrowly ovoid, 4.5–11 × 1.5–2.2 mm, 10–26-flowered; rachilla 4-angled, with trabeculae in both lateral sulculi. Glumes dark purplish red on both surfaces, slightly laxly imbricate, elliptic to ovate-elliptic, 1.8–2 mm, membranous, veins 3 and greenish yellow, keel inconspicuous, apex obtuse and mucous. Stamens 2; filaments ca. 1.2 mm; anthers linear, ca. 0.5 mm; connective barely prolonged beyond anthers. Style short; stigmas 2, slender. Nutlet dark grayish brown, oblong to obovoid-oblong, ca. 0.9 mm, 2/5–1/2 as long as subtending glume, compressed biconvex, densely punctulate. Fl. and fr. Jun.

• Wet places at river and pond margins; 2000–3000 m. SW Sichuan, NW Yunnan.

6. *Pycreus sulcinus* (C. B. Clarke) C. B. Clarke in J. D. Hooker, Fl. Brit. India 6: 593. 1893.

槽果扁莎 cao guo bian suo

Cyperus sulcinus C. B. Clarke, J. Linn. Soc., Bot. 21: 56. 1884; *Pycreus substellatus* E. G. Camus.

Annuals. Roots fibrous. Culms tufted, 5–40 cm tall, slender, 3-angled, smooth, with a few leaves basally. Leaves shorter than culm; sheath purplish brown; leaf blade 0.5–2 mm wide, usually folded, apical margin scabrous. Involucral bracts 3–5, spreading, leaflike, usually basal 1 or 2 longer than inflorescence. Inflorescence a simple anthela; rays 3–8, mostly to 7 cm, slender, each with 3–15 spikelets arranged into a spike. Spikelets spreading, linear, 0.5–1.5[–3.5] cm × 1–1.5 mm, compressed, 8–20-flowered; rachilla flexuose, narrowly winged. Glumes straw-colored to brownish yellow on both surfaces, lax, ovate to oblong-ovate, ca. 1.8 mm, medially veins 3 and green, laterally membranous and veinless, margin narrowly white hyaline, apex obtuse and mucronate. Stamen 1; anther oblong, ca. 0.3 mm. Style of medium length; stigmas 2. Nutlet blackish brown, oblong, 1.2–1.3 mm, ca. 2/3 as long as subtending glume, slightly compressed, both surfaces concave sulcate and punctulate. Fl. and fr. Jun–Aug.

Under sparse forests in valleys, along trails on mountain slopes; 100–500 m. Guangdong, Guangxi, Hainan, Taiwan, SE Xizang, Yunnan [Bangladesh, Bhutan, Cambodia, India, Indonesia, Malaysia, Myanmar, Papua New Guinea, Philippines, Thailand, Vietnam; N Australia, Pacific islands].

7. *Pycreus pumilus* (Linnaeus) Nees, Linnaea 9: 283. 1834.

矮扁莎 ai bian suo

Cyperus pumilus Linnaeus, Cent. Pl. 2: 6. 1756; *C. nitens* Retzius.

Annuals. Roots fibrous. Culms tufted, 2–20[–35] cm tall, slightly slender, compressed 3-angled, smooth, with a few leaves basally. Leaves shorter to longer than culm; leaf blade 1–2 mm wide, folded or flat. Involucral bracts 3–5, leaflike, longer than inflorescence. Inflorescence a simple anthela; rays 3–6, mostly to 2 cm, sometimes very short into a capitulum, each with 10–20 or more spikelets congested into a subglobose spike. Spikelets oblong to linear-oblong, 3–15 × 1.5–2 mm, compressed, 8–30(–40)-flowered; rachilla straight, wingless. Glumes pale to yellowish white, densely imbricate, ovate to ovate-elliptic, 1.2–1.5 mm, 3–5-veined, keel abaxially green, laterally membranous and veinless, apex truncate-emarginate and with a 0.3–0.5 mm mucro. Stamens 1 or 2; anthers oblong, ca. 0.2 mm. Style ca. 0.5 mm; stigmas 2, ca. 0.3 mm. Nutlet grayish brown, obovoid to oblong, ca. 0.6 mm, 1/3–2/5 as long as subtending glume, biconvex, densely prominently punctulate, apex obtuse. Fl. and fr. Aug–Nov.

Water margins, wet places in fields; below 100–500 m. Fujian, Guangdong, SE Guangxi, Hainan, Hunan, Jiangxi, S Taiwan [Bangladesh, Bhutan, India, Indonesia, Kashmir, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Africa, N Australia, Indian Ocean islands, Madagascar].

Pycreus pumilus is naturalized in North and South America.

8. *Pycreus sanguinolentus* (Vahl) Nees ex C. B. Clarke in J. D. Hooker, Fl. Brit. India 6: 590. 1893.

红鳞扁莎 hong lin bian suo

Cyperus sanguinolentus Vahl, Enum. Pl. 2: 351. 1805, nom. cons.; *C. eragrostis* Lamarck var. *cyrtostachys* Miquel; *C. eragrostis* var. *humilis* Miquel; *C. eragrostis* f. *melanocephalus* (Miquel) J. V. Suringar; *C. flavescens* Linnaeus f. *rubromarginatus* Schrenk; *C. korshinskii* Meinshausen; *C. melanocephalus* Miquel; *C. sanguinolentus* f. *humilis* (Miquel) Kükenthal; *C. sanguinolentus* f. *melanocephalus* (Miquel) Kükenthal; *C. sanguinolentus* f. *rubromarginatus* (Schrenk) Kükenthal; *Pycreus korshinskii* (Meinshausen) V. I. Kreczetowicz; *P. sanguinolentus* var. *cyrtostachys* (Miquel) L. K. Dai; *P. sanguinolentus* f. *humilis* (Miquel) L. K. Dai; *P. sanguinolentus* f. *melanocephalus* (Miquel) L. K. Dai; *P. sanguinolentus* f. *rubromarginatus* (Schrenk) L. K. Dai.

Annuals. Roots fibrous. Culms densely tufted, 5–50 cm tall, compressed 3-angled, smooth, with several leaves basally. Leaves several, usually shorter than culm to rarely longer; sheath usually reddish brown, short; leaf blade 2–4 mm wide or less, flat, apical margin denticulate. Involucral bracts 2–5, leaflike, longer than inflorescence, subspreading. Inflorescence a simple anthela; rays 3–5, mostly to 4.5 cm to sometimes very short and inflorescence a capitulum, each with 4–12 or more spikelets congregated into a short spike or nearly a capitulum. Spikelets radially spreading, narrowly ovoid to narrowly oblong-ovoid, 0.5–1.8 cm × 2.5–3 mm, 6–24-flowered; rachilla straight, 4-angled, wingless. Glumes straw-colored, brownish yellow, or blackish brown on both surfaces but middle yellowish green, slightly laxly imbricate, ovate, ca. 2 mm, membranous, medially 3–5-veined, often distinctly furrowed on both sides of keel, margin dark blood-red to dark brownish red, apex obtuse. Stamens (2 or)3; anthers linear, 0.7–1 mm. Style long;

stigmas 2, exerted, slender. Nutlet black at maturity, globose-obovoid to broadly ellipsoid, 1–1.3 mm, 1/2–3/5 as long as subtending glume, biconvex, slightly turgid, minutely punctate. Fl. and fr. Jul–Dec. $2n = 48, 50$.

Sparse forest margins, grasslands on mountain slopes, meadows, swamps, lake margins, sunny places at river margins or shallow water, valleys, wet places along trails, field margins, old fields; below 100–3400 m. Anhui, Chongqing, Fujian, S Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, S and SE Xizang, Yunnan, Zhejiang [Bhutan, India, Indonesia, Japan, Kashmir, Kazakhstan, Korea, Kyrgyzstan, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Russia, Sri Lanka, Tajikistan, Thailand, Turkmenistan, Uzbekistan, Vietnam; Africa, SW Asia, Australia, Pacific islands].

Pycurus sanguinolentus is naturalized in North America.

9. *Pycurus diaphanus* (Schrader ex Schultes) S. S. Hooper & T. Koyama, J. Jap. Bot. 51: 316. 1976.

宽穗扁莎 kuan sui bian suo

Cyperus diaphanus Schrader ex Schultes, Mant. 2: 477. 1824; *C. latespicatus* Boeckeler; *C. latespicatus* var. *diaphanus* (Schrader ex Schultes) Kükenthal; *Pycurus latespicatus* (Boeckeler) C. B. Clarke.

Annuals. Roots fibrous. Culms densely tufted, 10–35 cm tall, slightly slender, obtusely 3-angled, smooth, with a few leaves basally. Leaves shorter than culm; leaf blade 1.5–2.5 mm wide, apical margin denticulate. Involucral bracts 2 or 3 (or 4), leaflike, longer than inflorescence. Inflorescence a simple anthela; rays 2–4, mostly to 7 cm but sometimes short, each with 3–6 spikelets arranged into a spike. Spikelets radiate spreading, narrowly oblong-ovoid to narrowly linear-ovoid, 0.8–2 cm × 3–3.5 mm, compressed, 16–36-flowered; rachilla slightly flexuose, wingless. Glumes dark grayish brown to brown on both surfaces, densely imbricate, broadly ovate, ca. 3 mm, membranous, shiny, 3-veined, keel abaxially green, margin with broad whitish undulate border, apex obtuse. Stamens 2; anthers oblong, 0.8–1 mm. Style long; stigmas 2, shorter than style. Nutlet grayish black, broadly obovoid, 1–1.3 mm, ca. 1/3 as long as subtending glume, biconvex, turgid, transversely undulately striate. Fl. and fr. Sep–Oct.

Water margins, wet places; 600–1800 m. Guizhou, Hainan, Jiangxi, Xizang, Yunnan [Bangladesh, Bhutan, Cambodia, India, Indonesia, Japan, Kashmir, Korea, Nepal, Philippines, Russia (Far East), Thailand, Vietnam].

19. KYLLINGA Rottbøll, Descr. Icon. Rar. Pl. 12. 1773, nom. cons., not *Killinga* Adanson (1763).

水蜈蚣属 shui wu gong shu

Dai Lunkai (戴伦凯); Gordon C. Tucker, David A. Simpson

Herbs, perennial or rarely annual, with rhizomes or only fibrous roots. Culms tufted or scattered, usually slightly slender, rarely slightly stout. Leaves basal, 3-ranked; ligule absent; leaf blade elongated or reduced. Involucral bracts spreading, leaflike. Inflorescences terminal, capitate, with 1–3 spikes. Spikes sessile, capitate, with densely numerous spikelets. Spikelets short, compressed, each usually with 1 or 2(–5) bisexual flowers; rachilla articulate near base, deciduous at articulation when mature. Glumes distichous, persistent on rachilla and deciduous with it, basal 2 without a flower, apicalmost rarely with a male flower, remaining ones

10. *Pycurus setiformis* (Korshinsky) Nakai, Bot. Mag. (Tokyo) 26: 201. 1912.

东北扁莎 dong bei bian suo

Cyperus setiformis Korshinsky, Trudy Imp. S.-Peterburgsk. Bot. Sada 12: 405. 1892.

Annuals. Roots fibrous. Culms tufted, 5–30 cm tall, slender, 3-angled, smooth, with a few leaves basally. Leaves shorter than culm; sheath slightly reddish brown; leaf blade 0.3–1.5 mm wide, flat. Involucral bracts 1–3, usually longer than inflorescence, spreading, sometimes basalmost bract erect. Inflorescence a simple anthela; rays very short, each with 1 to several spikelets. Spikelets obliquely spreading, oblong to narrowly oblong-ovoid, 0.5–1.5 cm × 3–4 mm, compressed, 8–16-flowered; rachilla flexuose, narrowly winged. Glumes purplish red to reddish brown on both surfaces, slightly densely imbricate, ovate, ca. 2.5 mm, 3-veined, keel green, margin white hyaline, apex obtuse. Stamens 2; anthers linear; connective apex prominent beyond anthers. Style long; stigmas 2, slightly short. Nutlet black, broadly obovoid, ca. 1.5 mm, biconvex, inconspicuously transversely undulately striate to nearly reticulately striate, apex mucronate. Fl. and fr. Jul–Sep.

Meadows, wet sandy areas. Heilongjiang, Jilin, Liaoning, Nei Mongol [Japan, Korea, Russia (Far East)].

11. *Pycurus pseudolatespicatus* L. K. Dai in Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 233. 1961.

似宽穗扁莎 si kuan sui bian suo

Annuals. Culms 3–15 cm tall, 3-angled, smooth, base with leaves. Leaves shorter to longer than culm; sheath reddish brown, short, usually split; leaf blade 1–3 mm wide, flat, margin laxly denticulate. Involucral bracts 3 or 4, spreading, leaflike, longer than inflorescence. Inflorescence a simple anthela; rays 3–5, mostly to 2.5 cm, each with 3–8 spikelets arranged into a short spike. Spikelets congregated near apex of ray, oblong-ovoid to subovoid, 6–10 × ca. 2.5 mm, radially spreading, 8–14-flowered; rachilla substrict, wingless. Glumes straw-colored to yellowish brown, slightly laxly imbricate, ovate, ca. 3 mm, concave, slightly thick, 3-veined, apex obtuse and mucous. Stamens 2; anthers broadly linear; connective slightly prominent beyond anthers. Style long; stigmas 2. Nutlet brownish, obovoid, ca. 1/3 as long as subtending glume, slightly turgid, conspicuously and transversely undulately striate. Fl. and fr. Aug–Sep.

• Paddy field margins; 1500–2100 m. Guizhou, Sichuan.

each with a bisexual flower. Flowers without perianth bristles or scalelike perianth parts. Style base not swollen, deciduous; stigmas 2. Nutlet compressed biconvex, one angle toward rachilla.

About 75 species: tropics and warm temperate regions worldwide; seven species (one introduced) in China.

1a. Glumes abaxially keeled.

2a. Perennials, with rhizomes; glumes with membranous spiny denticulate wings 6. *K. nemoralis*

2b. Annuals, with fibrous roots; glumes with papery broadly dentate wings shaped like a cockscomb 7. *K. squamulata*

1b. Glumes not abaxially keeled.

3a. Rhizomes short; culms tufted; spikes (1–)3; glume abaxial keel without spinules.

4a. Middle spike broadly ovoid, 5–6 mm; lateral spikes globose, 3–4 mm; spikelets oblong, 1-flowered; glumes greenish yellow and reddish brown maculate 1. *K. bulbosa*

4b. Middle spike oblong-cylindric to oblong, 6–14 mm; lateral spikes oblong, ca. 6 mm; spikelets ovoid-ellipsoid to ovoid, 1- or 2-flowered; glumes greenish yellow to yellowish white and not reddish brown maculate 2. *K. cylindrica*

3b. Rhizomes long and creeping; culms scattered, single at each node of rhizome; spike 1(–)3; glume abaxial keel spinulose.

5a. Rhizomes thin; culms 5–30 cm tall, slender, compressed 3-angled; leaves bladeless on basal 2 sheaths, with a 5–15(or more) cm blade on apical 2 or 3 leaf sheaths; nutlet brown at maturity, obovoid 5. *K. brevifolia*

5b. Rhizomes thick; culms 30–120 cm tall, stout, very compressed 3-angled or nearly compressed; leaves bladeless or with a shorter than 15 cm blade on apical 1 or 2 sheaths; nutlet black at maturity, oblong to obovoid-oblong.

6a. Involucral bracts 3; leaf sheaths purplish 3. *K. melanosperma*

6b. Involucral bracts 5–8; leaf sheaths brown 4. *K. polyphylla*

1. *Kyllinga bulbosa* P. Beauvois, Fl. Oware 1: 11. 1804.

三头水蜈蚣 san tou shui wu gong

Kyllinga nana Nees.

Perennials. Rhizomes short. Culms tufted, 5–30 cm tall, compressed 3-angled, smooth, base swollen, bulbous, and clothed with persistent brown leaf sheath remains splitting into fibers. Leaves shorter than culm; leaf blade 2–3 mm wide, flaccid, folded or flat, apical margin sparsely denticulate. Involucral bracts 2 or 3, leaflike, longer than inflorescence, ± horizontal, downward reflexed after anthesis. Spikes usually 3, with numerous spikelets congested into a capitate shape; middle spike broadly ovoid, 5–6 mm; lateral spikes globose, 3–4 mm. Spikelets radially arranged, oblong, 2–2.5 mm, 1-flowered. Glumes greenish yellow and reddish brown maculate, ovate to ovate-ellipsoid, 2–2.5 mm, concave, keel abaxially green, veins 2 or 3 on each side of keel, apex mucronate. Stamens 1–3. Style short; stigmas 2, longer than style. Nutlet yellowish brown, oblong, 2/3–3/4 as long as subtending glume, compressed plano-convex, with punctate processes. Fl. and fr. Jul–Oct. $2n = 14$.

Wet places at field margins. Guangdong, Hainan [Bangladesh, India, Malaysia (Peninsular), Myanmar, Pakistan, Sri Lanka, Thailand, Vietnam; tropical Africa].

Kyllinga bulbosa is naturalized in E Australia and Malaysia.

The name *Kyllinga triceps* Rottbøll (Descr. Icon. Rar. Pl. 14. 1773) has been misapplied to this species (e.g., in FRPS 11: 185. 1961). That name was nomenclaturally superfluous when published and is therefore illegitimate because, in the protologue, Rottbøll cited the older name *Scirpus glomeratus* Linnaeus (Sp. Pl. 1: 52. 1753) as a synonym.

2. *Kyllinga cylindrica* Nees in Wight, Contr. Bot. India, 91. 1834.

圆筒穗水蜈蚣 yuan tong sui shui wu gong

Cyperus sesquiflorus (Torrey) Mattfeld & Kükenthal var.

cylindricus (Nees) Kükenthal; *Kyllinga odorata* Vahl subsp. *cylindrica* (Nees) T. Koyama; *K. sesquiflora* Torrey subsp. *cylindrica* (Nees) T. Koyama.

Perennials. Rhizomes short. Culms tufted, 8–32 cm tall, slightly slender, 3-angled, smooth, base few leaved. Leaves shorter than culm; sheath short; leaf blade 2.5–4 mm wide, flat, margin denticulate. Involucral bracts 3(or 4), ± horizontal, sometimes reflexed. Spikes (1–)3, congestate, with numerous densely arranged spikelets; middle spike oblong-cylindric to oblong, 6–14 × 4–6 mm; lateral spikes oblong, ca. 6 mm. Spikelets ovoid-ellipsoid to ovoid, ca. 2.2 mm, slightly turgid, 1- or 2-flowered. Glumes greenish yellow to yellowish white, broadly ovate, ca. 2 mm, concave, veins several, keel not spinulose, apex mucronate. Stamens 2; anthers broadly linear. Style of medium length; stigmas 2. Nutlet at first yellow but dark brown when mature, ellipsoid to obovoid-ellipsoid, compressed biconvex, with punctate processes. Fl. and fr. May–Jul.

Wet places along trails, river margins, ditch margins; near sea level to 2000 m. Fujian, Guangdong, NE Guizhou, SE Jiangxi, Taiwan, S Yunnan [Bhutan, India, Indonesia, Japan (Ryukyu Islands), Nepal, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa, Madagascar].

3. *Kyllinga melanosperma* Nees in Wight, Contr. Bot. India, 91. 1834.

黑籽水蜈蚣 hei zi shui wu gong

Cyperus melanospermus (Nees) J. V. Suringar.

Perennials. Rhizomes thick, long creeping, internodes short, clothed with brown scales, with 1 culm at each node. Culms distant, 30–120 cm tall, very compressed 3-angled to nearly compressed, smooth, base bulbous, clothed with long leaf sheaths. Leaf sheath brown, cylindric, margin scarious, mouth obliquely truncate, apex mucronate, apical 1 or 2 with a blade; leaf blade ca. 5 cm × 3–5 mm or shorter, flat, apical mar-

gin denticulate. Involucral bracts 3, leaflike, spreading to downward reflexed. Spike 1, ovoid, oblong-ovoid, or subglobose, 6–12 × 6–8 mm, with numerous densely arranged spikelets. Spikelets narrowly ellipsoid-ovoid, ca. 3 mm, 1- or 2-flowered. Glumes straw-colored with rusty brown striae, ovate-lanceolate, ca. 3 mm, 5–7-veined, keel ± spinulose, apex mucronate. Stamens 3; anthers shortly linear; connective prominent beyond anthers. Style long; stigmas 2, shorter than style. Nutlet yellowish white at first but black when mature, oblong to obovoid-oblong, ca. 1/2 as long as subtending glume, plano-convex, with dense punctate processes, apex mucronate. Fl. and fr. Apr–Sep.

Wet places along trails, water margins, sandy areas; below 100–1000 m. Guangdong, S Guangxi, Hainan, Yunnan [India, Indonesia, Malaysia, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Africa, NE Australia, Madagascar].

4. *Kyllinga polyphylla* Kunth, Enum. Pl. 2: 134. 1837.

水蜈蚣 shui wu gong

Cyperus aromaticus (Ridley) Mattfeld & Kükenthal; *Kyllinga aromatica* Ridley; *K. erecta* Schumacher var. *polyphylla* (Kunth) Hooper.

Perennials. Rhizomes thick, horizontally long creeping, internodes short, clothed with brown to purple or blackish scales, with 1 culm at each node. Culms scattered, 25–90 cm tall, 3-angled, smooth, base bulbous, clothed with long leaf sheaths. Leaf sheath purplish, cylindrical, margin scariosus, mouth obliquely truncate, apex subacute, apical 1 or 2 with a blade; leaf blade 3–5(–15) cm × 2–6 mm or shorter, flat, apical margin denticulate. Involucral bracts 5–8, leaflike, longest to 15 cm, ± horizontal to slightly reflexed. Spikes 1–3, hemispheric to subglobose, 6–12 × 6–8 mm; lateral spikes much smaller, with numerous densely arranged spikelets. Spikelets narrowly ellipsoid-ovoid, ca. 3 mm, 1- or 2-flowered. Glumes straw-colored with rusty brown striae, ovate-lanceolate, 3–4 mm, 5–7-veined, midvein ± spinulose, apex mucronate. Stamens 3; anthers shortly linear; connective prominent beyond anthers. Style long; stigmas 2, shorter than style. Nutlet yellowish white at first but black when mature, oblong to obovoid-oblong, ca. 1/2 as long as subtending glume, plano-convex, densely punctulate, apex apiculate. Fl. and fr. Jul–Oct.

Naturalized in moist or brackish sandy areas; below 300 m. Hong Kong, Taiwan [native to tropical Africa, Indian Ocean islands, and Madagascar].

Kyllinga polyphylla is also naturalized in tropical America, Asia, Australia, and Pacific islands.

5. *Kyllinga brevifolia* Rottbøll, Descr. Icon. Rar. Pl. 13. 1773.

短叶水蜈蚣 duan ye shui wu gong

Perennials. Rhizomes slender, long creeping, clothed with brown, membranous scales, internodes 1–2.5 cm, with 1 culm at each node. Culms serially arranged, sometimes also laxly tufted, 2–30 cm tall, compressed 3-angled, smooth, base not swollen, with 4 or 5 leaf sheaths. Leaves shorter to slightly longer than culm; sheaths brown, mouth obliquely truncate, apex acuminate, basal 2 bladeless, apical 2 or 3 with a blade; leaf blade 5–15 cm × 2–4 mm, flaccid, flat, midvein and apical

margin spinulose. Involucral bracts 3, leaflike, longest erect to oblique or horizontal. Spike 1(–3), globose to ovoid-globose, 5–11 × 4–10 mm, with numerous densely arranged spikelets. Spikelets narrowly oblong-ovoid to narrowly ovoid, ca. 3 × 1 mm, compressed, 1- or 2-flowered. Glumes white and rusty brown maculate or rarely straw-colored, ovate, 2.8–3 mm, keel spinulose or not, veins 2 or 3 on each side of keel, apex with a strict or recurved mucro or not mucronate. Stamens 1–3; anthers linear, ca. 0.7 mm. Style long; stigmas 2, less than 1/2 as long as style. Nutlet obovoid-oblong, 1–1.5 mm, biconvex, densely punctate. Fl. and fr. May–Oct.

Under shrubs or forests, grasslands, swamps, meadows, mountain slopes, valleys, wet places along trails, ditch margins, shallow water, river margins, wet places at seashores, paddy field margins; near sea level to 2800 m. Anhui, Chongqing, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xisha Qundao, S and SE Xizang, Yunnan, Zhejiang [Afghanistan, Bangladesh, Bhutan, India, Indonesia, Japan, Korea, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Russia (Far East), Sri Lanka, Thailand, Vietnam; tropical Africa, Atlantic Ocean islands, Australia, Central, North, and South America, Indian Ocean islands, Madagascar, Pacific islands].

Kyllinga brevifolia var. *yunnanensis* E. G. Camus (Notul. Syst. (Paris) 1: 239. 1910) could not be treated here because no material was seen by the present authors.

- 1a. Culms 2–6 cm tall; spike 4–6 mm wide, with several to 20 or more spikelets; spikelets 1- or 2-flowered 5c. var. *stellulata*
- 1b. Culms 5–30 cm tall; spike 4.5–10 mm wide, with numerous spikelets; spikelets 1-flowered.
 - 2a. Keel of glumes spinulose, apex recurved mucronate; longest involucral bract erect to oblique 5a. var. *brevifolia*
 - 2b. Keel of glumes not spinulose, apex without a mucro or sometimes with a strict mucro; longest involucral bract oblique to horizontal 5b. var. *leirolepis*

5a. *Kyllinga brevifolia* var. *brevifolia*

短叶水蜈蚣(原变种) duan ye shui wu gong (yuan bian zhong)

Cyperus brevifolius (Rottbøll) Endlicher ex Hasskarl.

Culms 5–30 cm tall. Longest involucral bract erect to oblique. Spike 5–11 × 4.5–10 mm, with numerous spikelets. Spikelets 1-flowered. Glumes with a spinulose keel, apex recurved mucronate. Fl. and fr. May–Oct. $2n = 18$.

Under shrubs or forests, grasslands, swamps, meadows, mountain slopes, valleys, wet places along trails, ditch margins, shallow water, river margins, paddy field margins; 100–2800 m. Anhui, Chongqing, Fujian, S Gansu, Guangdong, Guangxi, Guizhou, Hainan, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Sichuan, Taiwan, Xisha Qundao, S and SE Xizang, Yunnan, Zhejiang [Afghanistan, Bangladesh, Bhutan, India, Indonesia, Japan, Korea, Laos, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa, Atlantic Ocean islands, Australia, Central, North, and South America, Indian Ocean islands, Madagascar, Pacific islands].

5b. *Kyllinga brevifolia* var. *leiolepis* (Franchet & Savatier) H. Hara, J. Jap. Bot. 14: 339. 1938.

无刺鳞水蜈蚣 wu ci lin shui wu gong

Kyllinga monocephala Rottbøll var. *leiolepis* Franchet & Savatier, Enum. Pl. Jap. 2: 108. 1877; *Cyperus brevifolius* var. *gracillimus* (Miquel) Kükenthal; *K. brevifolia* var. *leiocarpa* Kitagawa; *K. gracillima* Miquel; *K. monocephala* var. *leiocarpa* Kitagawa.

Longest involucre bract oblique to horizontal. Spikelets slightly broad and turgid. Glumes not spinulose on keel, apex without a mucro or sometimes with a strict mucro. Fl. and fr. May–Oct.

Along trails, grassland slopes, river margins, shallow water, wet places at seashores, paddy field margins; near sea level to 1200 m. Anhui, Fujian, Gansu, Hebei, Henan, Hubei, Jiangsu, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, NW Yunnan, Zhejiang [Japan, Korea, Nepal, Russia (Far East)].

Naturalized in E North America, this variety has a more northerly distribution than the others and has been treated as a species, *Kyllinga gracillima*, in some floras (e.g., Fl. N. Amer. 23: 193–194. 2002).

5c. *Kyllinga brevifolia* var. *stellulata* (J. V. Suringar) Ohwi, Bot. Mag. (Tokyo) 56: 199. 1942.

小星穗水蜈蚣 xiao xing sui shui wu gong

Cyperus brevifolius var. *stellulatus* J. V. Suringar, Cyperus, 48. 1898; *Kyllinga intermedia* R. Brown.

Culms 2–6 cm tall. Spike globose, 4–6 mm wide, with several to 20 or more spikelets. Spikelets laxly arranged, radially spreading, usually 1- or 2-flowered. Glumes not spinulose on keel. Fl. and fr. Jun–Jul.

Valleys; 1900–2700 m. NW Yunnan [S India, Indonesia, Papua New Guinea, Philippines].

Kyllinga brevifolia f. *pumila* (J. V. Suringar) Tang & F. T. Wang (Fl. Reipubl. Popularis Sin. 11: 188. 1961; *Cyperus brevifolius* f. *pumila* J. V. Suringar, Geslacht Cyperus Mal. Archipel. 48. 1898) is similar to *K. brevifolia* var. *stellulata*, but the two taxa have not been provisionally combined here because the type of f. *pumila* has not been seen.

6. *Kyllinga nemoralis* (J. R. Forster & G. Forster) Dandy ex Hutchinson & Dalziel, Fl. W. Trop. Afr. 2: 487. 1936.

单穗水蜈蚣 dan sui shui wu gong

Thryocephalon nemorale J. R. Forster & G. Forster, Char. Gen. Pl. 65. 1775.

Perennials. Rhizomes long creeping. Culms distant or laxly tufted, 10–40 cm tall, slender, compressed triquetrous, base not swollen. Leaves usually shorter than culm; sheath brown or purplish brown maculate, short, basalmost bladeless; leaf blade

2.5–4.5 mm wide, flat, flaccid, margin laxly dentate. Involucre bracts 3 or 4, leaflike, much longer than inflorescence. Spike 1(–3), ovoid to globose, 5–9 × 5–7 mm, with numerous spikelets. Spikelets subobovoid to narrowly ovoid-oblong, 2.5–3.5 × ca. 1.5 mm, compressed, 1-flowered. Glumes pale to straw-colored and rusty brown maculate, boat-shaped, 2.5–3.5 mm, keel wings narrow at basal part and ± broad from middle to apex, veins 3 or 4 on each side of keel, margin spinulose, apex slightly recurved mucronate. Stamens 3. Style long; stigmas 2. Nutlet brown, oblong to obovoid-oblong, ca. 1/2 as long as subtending glume, compressed plano-convex, densely punctulate, apex shortly mucronate. Fl. and fr. May–Aug. $2n = 18$.

Under shrubs or forests, meadows, swamps in valleys, mountain slopes, wet places along trails, field margins, river margins, ditch margins; 100–1400 m. Guangdong, Guangxi, Hainan, Hunan, Taiwan, Yunnan [Bhutan, Cambodia, India, Indonesia, Japan, Kashmir, Laos, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa, NE Australia, Indian Ocean islands, Madagascar, Pacific islands].

Kyllinga nemoralis is naturalized in tropical America.

7. *Kyllinga squamulata* Vahl, Enum. Pl. 2: 381. 1805.

冠鳞水蜈蚣 guan lin shui wu gong

Cyperus metzii (Hochstetter ex Steudel) Mattfeld & Kükenthal; *Kyllinga metzii* Hochstetter ex Steudel; *K. squamulosa* Kunth.

Annuals. Roots fibrous. Culms densely tufted, 2–20 cm tall, slender, compressed triquetrous, smooth, base not swollen. Leaves equaling or slightly shorter than culm; sheath brownish purple, basal 1 or 2 bladeless; leaf blade 2–3 mm wide, flaccid. Involucre bracts 3 or 4, leaflike, much longer than inflorescence, spreading to downward reflexed, base usually broadening. Spike 1(–3), subglobose, 6–9 mm in diam., with many spikelets. Spikelets densely congested, broadly ovoid, 2.5–3 × 1.5–2 mm, compressed, 1-flowered. Glumes pale to straw-colored and sometimes rusty brown maculate, boat-shaped, 2.5–3 mm, keel green, winged, with 6–10 slightly broad teeth shaped like a cockscomb on apical ca. 2/3 of margin, and 1–3 spinelike trichomes at apex of teeth, apex with a strict mucro. Stamens 1 or 2; anthers oblong. Style of medium length; stigmas 2. Nutlet at first yellow but dark brown when mature, ellipsoid, ca. 2/3 as long as subtending glume, compressed, with dense punctate processes. Fl. and fr. Aug–Oct. $2n = 14$.

Wet grasslands, forests in valleys; 2300–3000 m. SW Sichuan, Yunnan [Bhutan, India, Nepal, Pakistan, Vietnam; tropical Africa, NE Australia, Madagascar].

Kyllinga squamulata is naturalized in SE North America and the Caribbean.

20. LIPOCARPHA R. Brown in Tuckey, Narr. Exped. Zaire, 459. 1818, nom. cons.

湖瓜草属 hu gua cao shu

Dai Lunkai (戴伦凯); Gordon C. Tucker

Herbs, annual or perennial. Leaves basal; leaf blade flat. Involucre bracts leaflike. Spikes 2–7, fascicled into a capitulum or rarely single, with many bractlets and spikelets; bractlets spirally arranged, each with a spikelet. Spikelet with 2 glumes (sometimes

absent) and a bisexual flower; rachilla very short, articulate at base, deciduous at article when mature; glumes alternate, membranous, several veined; basal glume without a flower; apical glume with a bisexual flower. Perianth bristles absent. Stamens 2. Stigmas 2. Nutlet 3-sided, biconvex, or plano-convex, included by subtending glume.

About 35 species: warm temperate and subtropical regions; four species in China.

- 1a. Leaf blade 2–4 mm wide; spikes (3 or)4–7-fascicled at culm apex; bractlet apex subtruncate, acuminate; nutlet biconvex 1. *L. chinensis*
 1b. Leaf blade 1–2 mm wide; spikes 2- or 3(or 4)-fascicled at culm apex; bractlet apex abruptly contracted and forming a recurved mucro; nutlet 3-sided to plano-convex.
 2a. Bractlets blackish purple but mucro green; spikes 4–7 mm; nutlet blackish purple, narrowly ovoid 4. *L. tenera*
 2b. Bractlets greenish with reddish brown striae; spikes 2–5 mm; nutlet straw-colored, narrowly oblong.
 3a. Culms 5–40 cm; nutlet 0.9–1 mm, subtended by 2 glumes 2. *L. microcephala*
 3b. Culms 5–30 cm; nutlet 0.5–0.6 mm, subtended only by a squarrose bract 3. *L. squarrosa*

1. *Lipocarpa chinensis* (Osbeck) J. Kern, Blumea, Suppl. 4: 167. 1958.

华湖瓜草 hua hu gua cao

Scirpus chinensis Osbeck, Dagb. Ostind. Resa, 220. 1757; *Hypaelyptum argenteum* Vahl, nom. illeg. superfl.; *Lipocarpa argentea* R. Brown, nom. illeg. superfl.; *L. bawangensis* R. H. Miao; *L. senegalensis* (Lamarck) T. Durand & H. Durand; *S. senegalensis* Lamarck.

Perennials. Culms tufted, 10–60 cm tall, 1–1.5 mm thick, flat or compressed triquetrous, longitudinally sulcate, very laxly puberulent. Leaves basal; sheath tubular, 1.8–2.5 cm, glabrous, basal ones without a blade, apical ones with a blade; leaf blade linear, ca. 1/2 as long as culm, 2–4 mm wide, papery, margin revolute, apex acuminate. Involucral bracts 2 or 3, leaflike, 2–7 cm, not sheathing. Spikes (3 or)4–7-fascicled, ovoid to broadly ovoid, 5–10 × ca. 5.5 mm, with numerous bractlets and spikelets; bractlets pale and purple striate, oblanceolate, ca. 2 mm, keeled, submembranous, apex subtruncate to acuminate. Spikelets with 2 glumes and 1 bisexual flower; basal glume elliptic, ca. 1.5 mm, membranous, 5-veined, margin involute, apex obtuse; apical glume ovate-lanceolate, ca. 1.5 mm, with a bisexual flower, apex acute. Stamens 2; anthers narrowly oblong. Style of medium length; stigmas 3, nearly as long as style, puberulent. Nutlet brown when mature, oblong-obovoid, ca. 1 mm, biconvex, with punctate processes on surface, apex rounded and shortly apiculate. Fl. and fr. May–Oct. $2n = 26$.

Wet places at roadsides, ditch margins, river margins, mountain slopes, field margins; 100–2100 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Shandong, Taiwan, SE Xizang, Yunnan, Zhejiang [Bhutan, Cambodia, India, Indonesia, Japan (Ryukyu Islands), Kashmir, Korea, Laos, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Africa, N Australia, Indian Ocean islands, Madagascar].

2. *Lipocarpa microcephala* (R. Brown) Kunth, Enum. Pl. 2: 268. 1837.

湖瓜草 hu gua cao

Hypaelyptum microcephalum R. Brown, Prodr. 220. 1810.

Annuals, without a rhizome. Culms 5–40 cm tall, ca. 0.7 mm thick, flat, longitudinally sulcate, puberulent. Leaves basal; sheath tubular, 1.5–2.5 cm, membranous, glabrous, basal ones

without a blade, apical ones with a blade; leaf blade linear, 1/4–1/2 as long as culm, 0.7–1.5 mm wide, papery, both surfaces glabrous, midvein obsolete, margin involute. Involucral bracts 2 or 3, leaflike, slightly broad at base, not sheathing. Spikes 2- or 3(or 4)-fascicled, ovoid, 3–5 × ca. 3 mm, with numerous bractlets and spikelets; bractlets oblanceolate to spatulate, ca. 2 mm, membranous, apex abruptly contracted and formed into recurved mucro. Spikelets with 2 glumes and 1 bisexual flower; basal glume white, elliptic, ca. 1 mm, hyaline, 5-veined, apex obtuse; apical glume oblong, ca. 1 mm, membranous, several veined, with a bisexual flower, apex acute. Stamens 2; anthers linear-oblong, ca. 0.3 mm. Style slender, exerted from subtending glume; stigmas 3, pubescent. Nutlet straw-colored, narrowly oblong, 0.9–1 mm, slightly curved, 3-sided, densely punctulate, shiny, apex mucronate. Fl. and fr. Jun–Oct. $2n = 46$.

Water margins, wet places, swamps; 400–2100 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Shandong, Sichuan, Taiwan, S Yunnan, Zhejiang [Cambodia, India, Indonesia, Japan, Korea, Laos, Malaysia, Myanmar, Papua New Guinea, Philippines, Thailand, Vietnam; Australia, Pacific islands].

3. *Lipocarpa squarrosa* (Linnaeus) Goetghebeur, Wagenin-gen Agr. Univ. Pap. 89(1): 71. 1989.

毛毯细莞 mao tan xi guan

Scirpus squarrosus Linnaeus, Mant. Pl. Alt. 181. 1771; *Isolepis squarrosa* (Linnaeus) Roemer & Schultes; *Schoenoplectus squarrosus* (Linnaeus) S. Yun Liang; *Scirpus neochinensis* Tang & F. T. Wang.

Annuals, without a rhizome. Culms 5–30 cm tall, ca. 0.7 mm thick, subterete, smooth. Leaves basal; sheath tubular, 1.5–2.5 cm, membranous, glabrous, basal ones without a blade, apical ones with a blade; leaf blade linear, 1–7 cm × 0.6–1 mm, papery, both surfaces glabrous, midvein obsolete, margin involute. Involucral bract 1, leaflike, dilated at base. Spikes 1 or 2, ovoid, 3–5 × ca. 3 mm; bractlets oblanceolate to spatulate, ca. 2 mm, membranous, apex abruptly contracted and formed into recurved mucro (i.e., squarrose). Spikelets without glumes, with 1 bisexual flower. Stamens 1 or 2; anthers ellipsoid, 0.2–0.3 mm. Style slender, exerted from subtending bract; stigmas 3. Nutlet pale yellowish brown, narrowly obovoid, 0.5–0.6 mm, 3-sided, densely punctulate, shiny, apex mucronate.

Wastelands, shady sandy areas. Guangdong (Guangzhou), Hainan (Dongfang), Zhejiang [Cambodia, India, Indonesia (Java), Kashmir, Malaysia (Peninsular), Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam].

4. *Lipocarpha tenera* Boeckeler, Beitr. Cyper. 1: 21. 1888.

细秆湖瓜草 xi gan hu gua cao

Lipocarpha atropurpurea Boeckeler.

Annuals, without a rhizome. Culms tufted, 10–18 cm tall, ca. 1 mm thick, compressed, longitudinally sulcate, glabrous. Leaves basal, ca. 1/3 as long as culm; sheath tubular, 1–1.5 cm; leaf blade ca. 1 mm wide, obsolete midveined, glabrous, margin involute. Involucral bracts 2 or 3, leaflike, slender, not

sheathing. Spikes 2- or 3-fascicled at culm apex, rarely single, ovoid, 4–7 × ca. 2.6 mm, with many bractlets and spikelets; bractlets blackish purple, oblanceolate, keeled, glabrous, apex green, caudate-acuminate, and slightly recurved. Spikelets with 2 glumes and a bisexual flower; glumes oblong, ca. 1 mm, membranous, with several slightly thick veins, margin hyaline, apex acute to obtuse. Stamens 2; anthers oblong, as long as filament. Style short, as long as stigma; stigmas 3. Nutlet blackish purple when mature, narrowly ovoid, ca. 1 mm, plano-convex to nearly 3-sided, densely blackish punctulate, apex rounded and mucronate. Fl. and fr. Oct–Dec.

Wet places at water margins; 1800–1900 m. Guangxi, Hainan, Yunnan [Vietnam; Africa].

21. BLYSMUS Panzer ex Schultes, Mant. 2: 41. 1824, nom. cons.

扁穗草属 bian sui cao shu

Liang Songyun (梁松筠 Liang Song-jun); Gordon C. Tucker

Blismopsis Oteng-Yeboah; *Nomochloa* P. Beauvois ex T. Lestiboudois.

Herbs, perennial. Rhizomes creeping. Culms nodose or not, 3-angled or terete, smooth or scabrous. Leaves basal or cauline, ligulate. Basalmost involucral bract leaflike, suberect; bractlets glumelike. Inflorescences spicate with few to many pseudodistichous spikelets, rarely with a lateral branch. Spikelets dark brown, with few bisexual flowers. Glumes imbricate, subdistichous. Perianth bristles 3–6, rarely absent, usually retrorsely scabrous. Stamens 3; connective apex evident beyond anthers. Style deciduous, base not thickened; stigmas 2. Nutlet stipitate, oblong, plano-convex, smooth, apex beaked.

About four species: temperate regions in N Africa, Asia, Europe, and North America; three species in China.

- 1a. Culms subterete; nutlet 3.5–4 mm; perianth bristles shorter than nutlet or usually absent 1. *B. rufus*
 1b. Culms 3-angled; nutlet ca. 2 mm; perianth bristles 1–3 × as long as nutlet.
 2a. Perianth bristles erect or slightly flexuose, ± as long as nutlet; anthers ca. 2 mm 2. *B. compressus*
 2b. Perianth bristles contorted, slender, 2–3 × as long as nutlet; anthers 2–2.5 mm 3. *B. sinocompressus*

1. *Blismus rufus* (Hudson) Link, Hort. Berol. 1: 278. 1827.

内蒙古扁穗草 nei meng gu bian sui cao

Schoenus rufus Hudson, Fl. Angl., ed. 2, 1: 15. 1778; *Blismopsis rufa* (Hudson) Oteng-Yeboah; *Blismus exilis* (Printz) Ivan; *B. rufus* subsp. *exilis* Printz; *Scirpus rufus* (Hudson) Schrader.

Rhizomes slender. Culms 3–20 cm tall, subterete, clothed at base with brown bladeless leaf sheaths. Cauline leaves as long as or shorter than culm; leaf blade brown, narrowly linear, thickly crescentic in cross section, apex ± obtuse. Involucral bract dark reddish brown, leaflike or glumelike, many veined, apex acute. Inflorescences consisting of 4–7 spikelets arranged in a distichous spike, 0.7–1.7 cm. Spikelets oblong-ovoid, 5–6 mm, 2- or 3-flowered, apex ± obtuse. Glumes elliptic-ovate, ca. 5 mm, 2- or 3-veined, apex obtuse. Perianth bristles usually absent. Stamens 3; anthers 3–4 mm; connective apex ca. 2 mm. Stigmas 2. Nutlet yellowish, shortly stipitate, oblong-ovoid, ca. 3.5 × 1.5 mm, plano-convex, base subrounded. Fl. and fr. Jun–Sep. $2n = 40$.

Wet saline meadows, wet sandy places; 500–5200 m. Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Xinjiang [Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Uzbekistan; Europe, North America].

2. *Blismus compressus* (Linnaeus) Panzer ex Link, Hort. Berol. 1: 278. 1827.

扁穗草 bian sui cao

Schoenus compressus Linnaeus, Sp. Pl. 1: 43. 1753; *Blismopsis compressus* (Linnaeus) Oteng-Yeboah; *Nomochloa compressa* (Linnaeus) Beetle; *Scirpus compressus* (Linnaeus) Persoon.

Rhizomes 1–1.5 cm × 1.5–2 mm. Culms 9–30 cm tall, 3-angled, clothed at base with black bladeless leaf sheaths. Cauline leaves usually shorter than culm; sheath brown to rust-colored, mouth obliquely truncate, apex acuminate; ligule very short; leaf blade linear, flat, 1–3.5 mm wide, membranous. Involucral bract leaflike, slightly shorter or longer than inflorescence. Inflorescences consisting of 3–12 spikelets arranged in a simple distichous spike, oblong to obovoid, 1–2.2 × 0.4–0.9 cm. Spikelets ovoid to narrowly ovoid, 5–7 mm, 5–8-flowered. Glumes subdistichous, oblong-ovate, ca. 5 mm, membranous, 7-veined, apex obtuse. Perianth bristles 6, as long as nutlet, slightly flexuose at base, retrorsely scabrous. Stamens 3; anthers oblong, ca. 2 mm. Stigmas 2, as long as nutlet. Nutlet brown, obovoid, ca. 2 mm, plano-convex. Fl. and fr. Jul–Sep. $2n = 44, 79$.

Swampy meadows, valleys, wet places; 500–5000 m. Qinghai,

Shanxi (Lüliang Shan), Xinjiang, Xizang [Afghanistan, Bhutan, N India, Kashmir, Kazakhstan, Kyrgyzstan, Nepal, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; N Africa, SW Asia, Europe].

3. *Blysmus sinocompressus* Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 224. 1961.

华扁穗草 hua bian sui cao

Rhizomes yellow, 2–7 cm × 2.5–3.5 mm, shiny, with black scales. Culms scattered, 5–60 cm tall, 0.7–4 mm thick, compressed 3-angled, clothed at base with brown to purplish brown leaf sheaths. Cauline leaves shorter than culm; ligule pale, very short; leaf blade flat, 0.5–4 mm wide, membranous, involute, margin scabrous, apex acuminate. Involucral bract leaflike, usually surpassing inflorescence; bractlets glumelike, membranous. Inflorescences consisting of 3–10 or more spikelets, densely arranged in a distichous or subdistichous spike; basal 1 or several spikelets usually remote, 1.5–3 × 0.6–1.1 cm. Spikelets narrowly ovoid, ovoid, or long ellipsoid, 5–7 mm, 2–9-flowered. Glumes rust-colored brown, subdistichous, long ovate, 3.5–4.5 mm, 3–5-veined, keel green, apex acute. Perianth bristles 3–6, flexuose or contorted, 2–3 × as long as nutlet, retrorsely scabrous. Stamens 3; anthers narrowly oblong, 2–2.5 mm; connective apex ca. 0.3 mm. Stigmas 2, ± as long as style. Nutlet dark brown, broadly obovoid, ca. 2 mm, plano-convex. Fl. and fr. Jun–Sep.

Wet places, stream and river margins, riverbeds, grasslands, valleys, swampy meadows, slopes; 500–4800 m. Gansu, Hebei, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, NW Yunnan [Mongolia].

1a. Culms 0.7–1 mm thick; leaf blade 0.5–0.8 mm wide 3c. var. *tenuifolius*

1b. Culms 1–4 mm thick; leaf blade 1.5–4 mm wide.
2a. Culms 5–20 cm tall, 1–1.2 mm thick; leaf blade 1.5–2.5 mm wide 3a. var. *sinocompressus*
2b. Culms 26–60 cm tall, 3–4 mm thick; leaf blade 3–4 mm wide 3b. var. *nodosus*

3a. *Blysmus sinocompressus* var. *sinocompressus*

华扁穗草(原变种) hua bian sui cao (yuan bian zhong)

Culms 5–20 cm tall, 1–1.2 mm thick. Leaf blade 1.5–2.5 mm wide. Fl. and fr. Jun–Sep.

Stream margins, riverbeds, grasslands; 500–4800 m. Gansu, Hebei, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Sichuan, Xinjiang, Xizang, NW Yunnan [Mongolia].

3b. *Blysmus sinocompressus* var. *nodosus* Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 224. 1961.

节秆扁穗草 jie gan bian sui cao

Culms 26–60 cm tall, 3–4 mm thick. Leaf blade 3–4 mm wide. Fl. and fr. Jul–Sep.

• Wet places, stream margins, river margins, swampy meadows; ca. 2700 m. Hebei, Nei Mongol, Shaanxi, Shanxi.

3c. *Blysmus sinocompressus* var. *tenuifolius* Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 224. 1961.

细叶扁穗草 xi ye bian sui cao

Culms slender, 0.7–1 mm thick. Leaf blade finely linear, 0.5–0.8 mm wide. Fl. and fr. Aug.

• Slopes; ca. 2200 m. S Gansu (Minxian), Shanxi, W Sichuan.

22. ACTINOSCHOENUS Bentham, Hooker's Icon. Pl. 14: 33. 1881.

星穗莎属 xing sui suo shu

Zhang Shuren (张树仁), Liang Songyun (梁松筠 Liang Song-jun); Tetsuo Koyama, David A. Simpson

Perennials, shortly rhizomatous or stoloniferous. Culms scapose, tufted. Leaves ligulate; leaf blade very short or absent. Involucral bracts small. Inflorescences capitate with 2 to many spikelets. Spikelets with 4–7 distichous deciduous glumes of increasing length, 1(or 2)-flowered. Flowers bisexual, subtended by penultimate large glume enclosed by wings of next glume; rachilla internodes short, ± elongated between flowers. Perianth bristles absent. Stamens 3. Style deeply 3-cleft, deciduous, basally distinctly thickened. Nutlet obovoid, 3-sided, ± 3-ribbed, smooth to slightly tuberculate.

Four species: Africa, S and SE Asia, Australia, Indian Ocean islands, Madagascar, Pacific islands (New Caledonia); two species in China.

1a. Spikelets 3–7(–12), ovoid to narrowly ovoid; glumes reddish brown, thickly papery, apical half hairy; leaves with a blade 1. *A. yunnanensis*
1b. Spikelets 1 or 2(–6), narrowly ovoid; glumes brown, membranous, glabrous; leaves reduced to a bladeless sheath 2. *A. thourarii*

1. *Actinoschoenus yunnanensis* (C. B. Clarke) Y. C. Tang, Abstr. Pap. 30th Anniv. Bot. Soc. China, 130. 1963.

云南星穗莎 yun nan xing sui suo

Fimbristylis yunnanensis C. B. Clarke, J. Linn. Soc., Bot. 36: 247. 1903.

Rhizomes creeping. Culms 12–50 cm tall, slender. Leaves

1/3–1/2 as long as culm; leaf blade 1–1.5 mm wide, sparsely hairy, apex acute. Involucral bracts 2 or 3, leaflike to nearly setaceous, 0.5–2.7 cm, longer than inflorescence, hairy. Inflorescences capitate, 0.8–1.2 cm in diam., with 3–7(–12) spikelets. Spikelets ovoid to narrowly ovoid, 5–7 mm, with 7 or 8 glumes distichous basally and with 4 or 5 basal ones empty. Glumes reddish brown, ovate-lanceolate and boat-shaped, thickly papery, apically hairy. Stamens 3. Style 3-sided, not cili-

ate, basally inflated; stigmas 3. Nutlet white, obovoid, 1/3–1/2 as long as subtending glume, obtusely 3-sided, reticulation not prominent. Fl. and fr. Jun.

Mountain slopes; 1200–1300 m. Yunnan [N India, Thailand, Vietnam].

D. A. Simpson and T. Koyama (Fl. Thailand 6(4): 342. 1998) treated this as *Fimbristylis yunnanensis* but noted that its placement was uncertain.

2. *Actinoschoenus thouarsii* (Kunth) Benth., Hooker's Icon. Pl. 14: 33. 1881.

星穗莎 xing sui suo

Arthrostylis thouarsii Kunth, Enum. Pl. 2: 284. 1837; *A. chinensis* Benth.; *Actinoschoenus chinensis* (Benth.) Benth.; *Fimbristylis chinensis* (Benth.) Tang & F. T. Wang.

Culms tufted, 15–40 cm tall, slender, 3-angled, with 2

sheaths at base. Leaves bladeless; sheath brown, with prominent ribs, margin membranous and darker, apically attenuate to a caudate apex but basal ones not caudate, mouth obliquely truncate. Involucral bracts subulate, usually shorter than inflorescence, base continuing into culm. Spikelets 1 or 2(–6), narrowly ovoid, 6–8 × 0.5–2 mm, with fewer flowers, with 5–7 glumes distichous basally and 3 basal ones empty, few-flowered and apicalmost glume with a sterile flower. Glumes brown, semicircular to broadly ovate basally on spikelet and oblong-ovate apically on spikelet, 0.2–2 mm, membranous, glabrous, 3-veined, apex mucronate. Stamens 3; stigmas 3. Nutlet cream-colored to light brownish, obovoid, 1–1.2 mm, 3-sided, smooth to verruculose and indistinctly reticulate. Fl. Sep–Oct, fr. Apr–May.

On rocks in woods; 200–300 m. Guangdong, Hainan [Cambodia, India, Indonesia, Malaysia (Peninsular), Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa, Australia, Indian Ocean islands, Madagascar].

23. *RHYNCHOSPORA* Vahl, Enum. Pl. 2: 229. 1805 [*“Rynchospora”*], nom. cons.

刺子莞属 ci zi guan shu

Liang Songyun (梁松筠 Liang Song-jun); David A. Simpson

Herbs, perennial or more rarely annual. Culms tufted, erect, 3-angled or terete. Leaves basal or cauline; sheath closed, with or without a ligule; leaf blade linear, flat or canaliculate. Involucral bracts leaflike, sheathing. Inflorescences paniculate, usually consisting of terminal and lateral anthelae, sometimes spicate or capitate. Spikelets sessile or pedunculate, narrowly ovoid, ovoid, or ellipsoid, slightly bilaterally compressed or terete. Glumes few to many, spirally imbricate or rarely distichous, 1-veined; basal 3 or 4 glumes shorter than apical ones and empty. Flowers bisexual or basal flower bisexual and apical one male or sterile. Perianth bristles 0–6(–13), antrorsely or retrorsely scabrous, rarely smooth. Stamens 2 or 3. Style slender; stigmas 2. Nutlet usually obovoid to ovoid, biconvex, with various ornamentations or more rarely smooth; persistent style base thickened, mostly conic or rarely lunate, spongy, base truncate or ± lobed.

About 350 species: cosmopolitan but particularly in tropics and subtropics of the New World; nine species in China.

1a. Inflorescences with 1 to several globose heads.

2a. Inflorescence with 2–7 spicate heads 7. *R. malasica*

2b. Inflorescence with 1 terminal head.

3a. Nutlet obovoid; perianth bristles 1/3–1/2 as long as nutlet 8. *R. rubra*

3b. Nutlet linear-oblong; perianth bristles longer than nutlet and persistent style base 9. *R. submarginata*

1b. Inflorescences paniculate, consisting of terminal and lateral open panicles.

4a. Perianth bristles absent; persistent style base saddle-shaped, much depressed and much broader than high; nutlet 1.3–1.5 mm, coarsely transversely wrinkled; leaf blade setaceous 6. *R. gracillima*

4b. Perianth bristles present; persistent style base compressed conic to almost subulate; nutlet 2–4 mm; leaf blade flat or canaliculate, not setaceous.

5a. Leaf blade 9–17 mm wide; nutlet 3–4 mm, deeply channeled; style hardly divided 1. *R. corymbosa*

5b. Leaf blade 0.5–4 mm wide; nutlet ca. 2 mm, not channeled; style 2-cleft.

6a. Perianth bristles 9–13, retrorsely scabrous 2. *R. alba*

6b. Perianth bristles less than 6, antrorsely or retrorsely scabrous.

7a. Leaf blade 0.5–1 mm wide; perianth bristles retrorsely scabrous 3. *R. faberi*

7b. Leaf blade 1.5–3 mm wide; perianth bristles antrorsely scabrous.

8a. Spikelets 3–4.5 mm; perianth bristles shorter than nutlet and persistent style base 4. *R. rugosa*

8b. Spikelets 7–9 mm; perianth bristles longer than nutlet and persistent style base 5. *R. chinensis*

1. *Rhynchospora corymbosa* (Linnaeus) Britton, Trans. New York Acad. Sci. 11: 84. 1892.

伞房刺子莞 san fang ci zi guan

Scirpus corymbosus Linnaeus, Cent. Pl. 2: 7. 1756; *Rhynchospora aurea* Vahl.

Perennials. Rhizomes short. Culms erect, 60–140 cm tall, stout, 3-angled, with several nodes, smooth or scaberulose on angles. Leaves basal and cauline; sheath semirounded, 2–6 cm, membranous, ligulate at mouth; leaf blade broadly linear, 30–60 × 0.9–1.7 cm, flat, herbaceous to thinly leathery, margin and abaxial midvein scabrous, apex long acuminate. Involucral

bracts 3–5, leaflike, shorter than inflorescence, base sheathing. Inflorescence a large compound panicle consisting of 2–5 distant corymbiform anthelae, 20–50 cm; anthelae compound, to 15 cm in diam., ± dense, diffuse, many branched; bractlets setaceous. Spikelets many, in clusters of 2–5, erect or obliquely patent, narrowly ovoid to fusiform, 7–10 mm; basal flower bisexual; apical 1 or 2 flowers male. Glumes 7 or 8, ovate to ovate-lanceolate, basal 4 and apicalmost empty. Perianth bristles 6, as long as nutlet, antrorsely scabrous. Stamens 3; filaments shorter than nutlet and style base; anthers linear; connective subulate. Style ca. 1.7 cm, base dilated; stigmas 2. Nutlet brown, oblong-obovoid to obovoid, 3–4 mm, compressed, finely transversely wrinkled in middle part, coarsely undulate rugose toward margin; persistent style base long conic, ca. 5.5 mm, ± as broad as nutlet, compressed, conspicuously grooved on both sides, smooth or asperous. Fl. and fr. Mar–Dec. $2n = 18$.

Moist stream margins along valleys; 100–900 m. Guangdong, Guangxi, Hainan, Hunan, Taiwan, Yunnan [Bangladesh, India, Indonesia, Malaysia, Myanmar, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Africa, Australia, Central and South America, Indian Ocean islands, Madagascar, Pacific islands].

2. *Rhynchospora alba* (Linnaeus) Vahl, Enum. Pl. 2: 236. 1805.

白鳞刺子莞 bai lin ci zi guan

Schoenus albus Linnaeus, Sp. Pl. 1: 44. 1753.

Perennials. Rhizomes short, slender. Culms tufted, erect, 15–42(–50) cm tall, 0.5–0.8 mm thick, apically slightly scabrous. Leaves shorter than culm; sheath straw-colored brown, basal ones with a blade or bladeless; leaf blade filiform, 0.7–2 mm wide, papery, margin involute. Involucral bracts leaflike, basal ones with a sheath, apical ones sheathless. Inflorescences paniculate, consisting of terminal and lateral subcapitate anthelae. Spikelets fascicled in a group of 2–7, sessile or shortly pedunculate, narrowly ovoid, 5–6 mm, 2-flowered. Glumes 5 or 6, at first white turning pale brown, ovate to ovate-lanceolate, membranous, keeled, apex mucronate. Perianth bristles 9–13, longer than nutlet, retrorsely scabrous, base sparsely hispid. Stamens 2; filaments as long as nutlet and style base; anthers linear. Style filiform, base dilated; stigmas 2, almost as long as style. Nutlet yellowish green to greenish brown, obovoid to oblong-obovoid, 1.5–2.5 mm, biconvex, ± smooth to obscurely wrinkled; persistent style base conic-subulate, 1/2–2/3 as long as nutlet. Fl. and fr. Aug. $2n = 26$.

Swamps, wet places; ca. 900 m. Jilin, Taiwan [Japan, Kazakhstan, Korea, Russia; SW Asia, Caribbean (Puerto Rico), Europe, North America].

3. *Rhynchospora faberi* C. B. Clarke, J. Linn. Soc., Bot. 36: 259. 1903.

细叶刺子莞 xi ye ci zi guan

Perennials. Rhizomes very short, with dense and slender fibrous roots. Culms tufted, erect, 20–40(–60) cm tall, 0.5–1 mm thick, 3-angled, basally clothed with pale yellowish bladeless sheaths, apically sometimes slightly scabrous. Leaves basal and a few cauline, shorter than culm; leaf blade filiform, 0.5–1 mm wide, 3-angled, sometimes slightly scabrous, apex finely

acuminate. Involucral bracts leaflike or setaceous, sheathing. Inflorescences paniculate, consisting of a terminal and 3 or 4 lateral corymbiform anthelae; anthelae small, very distant, with 2–5 spikelets. Spikelets erect, dark brown, narrowly ovoid, ca. 3.5 mm, base subtruncate, apex acuminate. Glumes 5 or 6, ovate to elliptic-ovate, 1- or 2-flowered; basal 3 or 4 glumes narrowly ovate, empty. Perianth bristles 6, slightly longer than nutlet, retrorsely scabrous. Stamen 1; filament as long as nutlet and style base. Style slender; stigmas 2. Nutlet brown to pale reddish brown, broadly obovoid to obovoid-globose, 1.5–2 mm, biconvex, finely transversely wrinkled with longitudinally oblong epidermal cells; persistent style base narrowly conic, 1/3–2/3 as long as nutlet. Fl. and fr. Aug–Oct.

Swamps, stream margins; ca. 400 m. Fujian, Guangdong, Guangxi, Hunan, Jiangsu, Jiangxi, Shandong, Zhejiang [Japan, Korea, Russia (Far East)].

4. *Rhynchospora rugosa* (Vahl) Gale subsp. ***brownii*** (Roemer & Schultes) T. Koyama in H. Hara, Stearn & L. H. J. Williams, Enum. Fl. Pl. Nepal 1: 118. 1978.

白喙刺子莞 bai hui ci zi guan

Rhynchospora brownii Roemer & Schultes, Syst. Veg. 2: 86. 1817; *R. glauca* Vahl var. *condensata* Kükenthal; *R. rugosa* var. *condensata* (Kükenthal) T. Koyama.

Perennials. Rhizomes very short. Culms tufted, erect, 30–55(–90) cm tall, slender, 3-angled, smooth but apically usually scabrous. Leaves basal and a few cauline and distant, shorter than culm; sheath brown, closed, 2.6–6 cm, glabrous, with very short ligule at mouth; leaf blade narrowly linear, 1.5–3 mm wide, flat or canaliculate, margin and abaxial midvein scabrous, apex long acuminate. Involucral bracts leaflike, basal ones sheathing, apicalmost sheathless. Inflorescences paniculate, narrow, consisting of 3 or 4 dense to ± lax corymbiform anthelae; lateral peduncles solitary or 2 together, compressed, often long exserted from sheaths; rays very unequal, erect; raylets setaceous. Spikelets dark brown, ellipsoid to subovoid, 3–4.5 mm, 3- or 4-flowered, base ± obtuse, apex acute. Glumes 7 or 8, elliptic-ovate, ovate, or broadly ovate; basal 3 or 4 glumes empty. Perianth bristles 6, slightly shorter than nutlet, unequal, antrorsely scabrous. Stamens (1–)3; filaments longer than nutlet and style base. Ovary obovoid; style filiform; stigmas 2, as long as style. Nutlet pale rust-colored, broadly ellipsoid-obovoid, ca. 1.7 mm, biconvex, finely transversely wrinkled with longitudinal epidermal cell; persistent style base broadly conic, shorter than nutlet. Fl. and fr. Jun–Oct. $2n = 36$.

Swamps, moist river margins; 1000–2400 m. Fujian, Guangdong, Guangxi, Guizhou, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [India, Indonesia, Japan, Malaysia, Nepal, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Africa, Australia, Europe, Indian Ocean islands, Madagascar, Pacific islands].

Rhynchospora rugosa subsp. *rugosa* occurs in tropical America and South America.

5. *Rhynchospora chinensis* Nees & Meyen ex Nees, Nov. Actorum Acad. Caes. Leop.-Carol. Nat. Cur. 19(Suppl. 1): 108. 1843.

华刺子莞 hua ci zi guan

Rhynchospora glauca Vahl var. *chinensis* (Nees & Meyen ex Nees) C. B. Clarke; *R. japonica* Makino; *R. longisetigera* Hayata.

Perennials. Rhizomes very short. Culms tufted, erect, 25–60(–125) cm tall, slender, 3-angled, rigid, basally clothed with 1 or 2 bladeless sheaths, apically scabrous. Leaves basal and cauline, shorter than inflorescence; sheath 5–9 cm; ligule rust-colored brown, short, membranous; leaf blade narrowly linear, 1.5–2.5 mm wide, margin scabrous, apex acuminate. Involucral bracts leaflike, longer than inflorescence, basal ones sheathing, apicalmost one shortly sheathing or sheathless. Inflorescences paniculate, consisting of 3–5 corymbiform anthelae, mostly binate, suberect; peduncle exserted, subclaxly bearing 2–9 clusters of spikelets. Spikelets brown, narrowly ovoid, 7–8 mm, 2–5-flowered, base ± obtuse, apex acute. Glumes 5–8, brown to yellowish brown, elliptic-ovate to lanceolate-elliptic; basal 2 or 3 glumes empty; apical glumes broadly ovate to lanceolate-elliptic, membranous, 1-costate, apex mucronate to acuminate. Perianth bristles 6, antrorsely scabrous. Stamens 3; filaments slightly longer than nutlet and style base; anthers linear. Ovary obovoid; style filiform, base dilated; stigmas 2, shorter than style. Nutlet dark reddish brown, broadly ellipsoid-obovoid, 2–3.7 mm, biconvex, finely transversely wrinkled with longitudinally oblong epidermal cell; persistent style base narrowly conic, slightly shorter than or equaling nutlet. Fl. and fr. May–Oct.

Swamps, moist places, wet grasslands; 100–1400 m. Anhui, Fujian, Guangdong, Guangxi, Hainan, Hubei, Jiangsu, Jiangxi, Shandong [Japan, Myanmar, Sri Lanka, Thailand, Vietnam; Indian Ocean islands, Madagascar].

6. *Rhynchospora gracillima* Thwaites, Enum. Pl. Zeyl. 435. 1864.

柔弱刺子莞 rou ruo ci zi guan

Rhynchospora kamphoeveneri Boeckeler.

Annuals or short-lived perennials. Culms densely tufted, 20–60 cm tall, filiform, 3-angled, smooth. Leaves shorter than culm; leaf blade setaceous, 0.5–1 mm wide, canaliculate, apex scabrous. Involucral bracts setaceous, sheathing. Inflorescences laxly paniculate, consisting of 1–3 corymbiform anthelae to 4 cm; terminal anthela longer than lateral ones, simple or subcompound; lateral anthelae simple, with peduncles exserted from sheaths; rays capillary, 2–4 cm, often upcurved, smooth, subtended by setaceous bractlets. Spikelets solitary, narrowly ovoid, 3- or 4-flowered, apex acute; peduncle long. Glumes 7 or 8, pale rust-colored with purplish lines, spirally imbricate, broadly ovate, membranous, mucous. Perianth bristles absent. Stamens 2; anthers 1.5–2.3 mm. Style ca. 2.3 mm, base much depressed, saddle-shaped, 2-lobed, and almost as broad as nutlet, apex 2-cleft to middle. Nutlet grayish white, shortly stipitate, broadly obovoid, 1.3–1.5 × 1.3–1.5 mm, biconvex, deeply transversely wavy ridged, with longitudinally linear epidermal cells, apex truncate. Fl. and fr. Sep–Oct.

Moist places, grassy slopes, forests; 900–1000 m. Fujian, Hong Kong [India, Indonesia, Papua New Guinea, Sri Lanka, Thailand; tropical Africa, NE Australia, Indian Ocean islands, Madagascar].

No specimens of *Rhynchospora gracillima* from China have been

seen by the present authors. The plants from China would be *R. gracillima* subsp. *gracillima*; another subspecies occurs in tropical Africa and Madagascar.

7. *Rhynchospora malasica* C. B. Clarke in J. D. Hooker, Fl. Brit. India 6: 670. 1893.

日本刺子莞 ri ben ci zi guan

Rhynchospora nipponica Makino.

Perennials. Rhizomes short, creeping. Culms erect, simple, 60–100 cm tall, rigid, with several nodes, smooth, basally obtusely 3-angled and clothed with dusky brown bladeless sheaths, apically acutely 3-angled. Leaves longer than culm; sheath elongated, tightly surrounding culm; ligule rust-colored brown, short, membranous; leaf blade broadly linear, 5–9 mm wide, flattish, apex long acuminate to acute. Involucral bracts spreading, 7–20 cm, much longer than inflorescence, sheathless. Inflorescences spicate, 3–20 cm, with 2–7 heads, basally interrupted, apically subcontiguous; heads sessile, globose, 1–1.5 cm in diam. Spikelets narrowly ovoid, 6–7 mm, weakly laterally compressed, 1-flowered, base contracted, apex acuminate. Glumes 5 or 6; basal 3 or 4 grayish brown, ovate, much smaller than others, membranous, 1-veined, apex acute; apical 2 glumes lanceolate-ovate. Perianth bristles 6, filiform, 3.5–4.5 mm, ca. 2 × as long as nutlet, flexuose, smooth. Stamens 3; anthers ca. 2 mm. Style slender; stigmas 2. Nutlet dark brown, obovoid to broadly obovoid, 2–2.3 mm, biconvex, indistinctly transversely wrinkled, shiny, base attenuate; persistent style base narrowly conic-subulate, 4–5 mm, glabrous. Fl. and fr. Sep–Oct.

Swamps, rarely in shallow water. Guangdong, Taiwan [Indonesia, Japan, Korea, Malaysia].

8. *Rhynchospora rubra* (Loureiro) Makino, Bot. Mag. (Tokyo) 17: 180. 1903.

刺子莞 ci zi guan

Schoenus ruber Loureiro, Fl. Cochinch. 1: 41. 1790; *Morisia wallichii* Nees; *Rhynchospora wallichii* (Nees) Kunth.

Annuals or short-lived perennials. Rhizome short. Culms tufted, 30–65 cm tall, 0.8–2 mm thick, terete, smooth. Leaves shorter than culm; sheath brownish straw-colored, 1–7 cm; leaf blade narrowly linear, 1.5–3.5 mm wide, papery, slightly scabrous, apex acuminate. Involucral bracts 4–10, stiffly spreading, leaflike, 1–5(–8.5) cm, longer than inflorescence, unequal, densely ciliate at dilated base, sheathless. Inflorescence a single terminal head, brown to orangish brown, globose, 1–1.8 cm in diam., with many spikelets. Spikelets narrowly ovoid, 6–8 mm, shiny, 2–4-flowered. Glumes 7 or 8, brown, ovate-lanceolate to elliptic-ovate, thinly papery, keeled, vein 1, apex obtuse to acute; basal glumes each with a female flower; apical 1 or 2 glumes each with a male flower. Perianth bristles 4–6, unequal, 1/3–1/2 as long as nutlet, antrorsely scabrous. Stamens 2 or 3; filaments shorter to longer than subtending glume; anthers linear; connective evident. Style filiform; stigmas 2 or sometimes undivided, very short. Nutlet brown when mature, obovoid, 1.5–1.8 mm, biconvex, edges subacute with apical half hispid-serrulate, sides sparsely hispid-scabrous mainly on apical half, obscurely spotted with minute isodia-

metric epidermal cells; persistent style base conic, 1/5–1/4 as long as nutlet, base abruptly widened. Fl. and fr. May–Nov.

Road margins, grassy slopes, wet places; 100–1400 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Taiwan, S Yunnan, Zhejiang [India, Indonesia, Japan, Korea, Laos, Malaysia, Nepal, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Africa, Australia, Indian Ocean islands, Madagascar, Pacific islands].

Plants from China would be *Rhynchospora rubra* subsp. *rubra*; other subspecies occur in Africa and Madagascar.

9. *Rhynchospora submarginata* Kükenthal, Bot. Jahrb. Syst. 74: 498. 1949.

类缘刺子莞 lei yuan ci zi guan

Rhynchospora marginata C. B. Clarke (1908), not (Liebmann) Steudel (1855).

Annuals. Roots fibrous. Culms tufted, erect, 10–60 cm

tall, slender, 3-angled, smooth. Leaves basal and 1 or 2 cauline in lower 1/3 of culm, 1/4–3/4 as long as culm; leaf blade linear, 2–2.5 mm wide, glabrous or pubescent, margin slightly involute, apex acuminate. Involucral bracts 3–6, leaflike, to 15 cm, base dilated and densely ciliate, apically slightly involute, sheathless, apex acuminate. Inflorescence a single terminal head, 1.2–2 cm in diam. Spikelets narrowly ovoid, 5–6 mm, shiny, 2-flowered. Glumes 6 or 7, rust-colored, ovate-lanceolate to elliptic-lanceolate; basal 3 or 4 empty, ± smaller; middle glumes ca. 4 mm, each with 1 female flower; apical 2 or 3 glumes each with a male flower. Perianth bristles 6, longer than nutlet and style base, antrorsely scabrous. Stamens 2 or 3; anthers linear, ca. 2 mm; connective slightly evident, reddish, pubescent. Nutlet blackish, linear-oblong, ca. 3.5 mm, sub-biconvex, whitish setulose to almost glabrous; persistent style base pale brown, ca. 1/2 as long as nutlet. Fl. and fr. Jun–Oct.

Sandy grasslands, paddy fields. Hainan [India, Indonesia, Malaysia, Papua New Guinea, Thailand, Vietnam; N Australia].

24. *SCHOENUS* Linnaeus, Sp. Pl. 1: 42. 1753.

赤箭莎属 chi jian suo shu

Liang Songyun (梁松筠 Liang Song-jun); Jeremy J. Bruhl, Karen L. Wilson

Herbs, perennial or rarely annual. Rhizomes short. Culms terete. Leaves basal or cauline; sheath reddish brown; leaf blade flat, 3-angled, or semiterete. Involucral bracts leaflike, sheathing. Inflorescences paniculate, racemose, or rarely headlike. Spikelets usually narrowly ovoid or oblong-ovoid, usually 1–4-flowered, basal 1 or 2 flowers usually bisexual, apical 1 or 2 flowers male. Glumes dark colored with whitish margin, distichous, usually papery, deciduous, 1-veined, keeled, basal 2 or 3 empty. Perianth bristles 6 or absent. Stamens 3. Style slender; stigmas 3. Nutlet ellipsoid or obovoid, usually terete, 3-sided, or rarely biconvex, smooth or with reticulate ornamentation.

More than 120 species: mostly in Australia, a few in E and SE Asia, Pacific islands (New Caledonia, New Zealand), Europe, and America; four species (one endemic) in China.

- 1a. Inflorescences lax; spikelets ca. 2 cm; peduncle 10–15 cm 1. *S. calostachyus*
 1b. Inflorescences dense; spikelets less than 1 cm; peduncle much shorter or inflorescences sessile.
 2a. Culms densely tufted; perianth bristles absent 4. *S. nudifructus*
 2b. Culms laxly tufted; perianth bristles 1–6.
 3a. Culms 60–100 cm tall; leaf blade 1–5 mm wide; spikelets 7–14 × ca. 2.5 mm 2. *S. falcatus*
 3b. Culms 20–40 cm tall; leaf blade ca. 0.5 mm wide; spikelets 4–6 × ca. 1 mm 3. *S. apogon*

1. *Schoenus calostachyus* (R. Brown) Poiret, Encycl., Suppl. 2: 251. 1811.

长穗赤箭莎 chang sui chi jian suo

Chaetospora calostachya R. Brown, Prodr. 233. 1810.

Perennials. Rhizomes short. Culms tufted, erect, (30–)70–90 cm tall, obtusely 3-angled to subterete, sulcate, smooth. Leaves basal and cauline; sheath blackish purple; leaf blade linear, 30–75 cm × 1–2 mm, rigid, 3-veined on abaxial surface, margin scaberulose, apex acute. Involucral bracts leaflike; sheaths black purplish red to reddish black, 1.5–2.5 cm, terete; mouth pale, oblique, membranous. Inflorescences racemose, to 50 cm, very lax, with 2 or 3 very distant fascicles of branches; peduncle 10–15 cm, glabrous; branches solitary or 2(or 3) together, erect, ca. 12.5 cm, unequal, compressed, scaberulose on angles, each bearing 1(–3) spikelets. Spikelets chestnut-brown, oblong to narrowly ovoid, 3–5-flowered, apex acute to acuminate. Glumes distichous, narrowly lanceolate, basal 5 and apical

1 or 2 empty; fertile glumes to 1.5 cm; sterile glumes ca. 0.4 cm, leathery, densely ciliate especially toward apex, keel green. Perianth bristles 4–7, white, ca. 1/2 as long as nutlet, antrorsely scabrous on apical part, easily caducous. Stamens 3; anthers linear, caducous. Style slender, apical half ciliate; stigmas 3, papillate. Nutlet grayish brown, obovoid, 3-sided, reticulately wrinkled, glabrous, base attenuate, apex obscurely beaked. Fl. and fr. Jul–Sep.

Slopes, hilltops; ca. 600 m. Guangdong, S Guangxi, Hainan (Wenchang) [Indonesia, Japan (Ryukyu Islands), Malaysia, Papua New Guinea, Thailand, Vietnam; Australia, Pacific islands].

2. *Schoenus falcatus* R. Brown, Prodr. 232. 1810.

赤箭莎 chi jian suo

Schoenus sinensis Handel-Mazzetti.

Perennials. Rhizomes short. Culms tufted, 60–100 cm tall, 2–5 mm thick, subterete, smooth. Leaves basal and cauline.

Basal leaves with sheath dark purple to dark reddish purple, 3–4 cm; leaf blade linear, 1–5 mm wide, margin scabrous. Cauline leaves 1–3, remote, rather short; sheath reddish brown, mouth oblique. Involucral bracts leaflike; sheaths brown to reddish brown; basalmost bract with a blade subequalling inflorescence. Inflorescence a narrow lax panicle; branches 2–4-nate, occasionally single. Spikelets brown, narrowly ovoid, 7–14 × ca. 2.5 mm, erect, slightly flattened, shortly pedunculate, 3–8-flowered. Glumes brown with a pale margin, distichous, ovate-lanceolate to ovate, 5–7 mm, papery, glabrous except for scabrous keel, keel yellowish green, apex acute; basal 2 or 3 glumes sterile and smaller. Perianth bristles (0 or) 1–3, ferruginous, antrorsely scabrous. Stamens 3; filaments slender; anthers linear, ca. 3 mm, caducous; connective apex appendage white, to 0.5 mm. Style 3–4 mm; stigmas 3, much shorter than style. Nutlet rusty brown, obovoid, 1–1.5 mm, 3-sided, reticulate, apex hirsute with white appressed hairs. Fl. and fr. May–Jul.

Swamps, wet places; ca. 400 m. Guangdong, Guangxi, Guizhou, Taiwan [Indonesia, Japan (Ryukyu Islands), Malaysia, Papua New Guinea, Thailand, Vietnam; N Australia, Pacific islands].

3. *Schoenus apogon* Roemer & Schultes, Syst. Veg. 2: 77. 1817.

矮赤箭莎 ai chi jian suo

Annuals or short-lived perennials, slender. Roots fibrous. Culms tufted, 20–40 cm tall, 0.5–1 mm thick, mostly 2-nodose, smooth. Leaves basal and cauline. Cauline leaves 2, shorter than culm; sheath reddish purple, 1–2 cm; leaf blade capillary, ca. 0.5 mm wide. Involucral bracts surpassing inflorescence; sheath reddish purple, 0.5–1 cm. Inflorescences consisting of 2–5 distant corymbiform partial panicles, each bearing several sessile and shortly pedunculate spikelets; partial panicles 0.8–1.5 cm and as broad. Spikelets reddish brown, narrowly ovoid, 4–6 mm, flattened, 1- or 2(or 3)-flowered. Glumes sanguineous

with pale margin, lanceolate to ovate-lanceolate, 3–4 mm, papery, apex obtuse; basal 2 or 3 glumes empty, rather short. Perianth bristles 6, ca. 2 mm, antrorsely scabrous. Stamens 3. Style ca. 1.5 mm, base glabrous; stigmas 3, as long as style. Nutlet whitish, globose-obovoid, ca. 1 mm, obtusely 3-sided, sides convex, shiny, and minutely reticulate. Fl. and fr. May.

Moist coastal grasslands; near sea level. W Taiwan (Taizhong) [Japan, Vietnam; Australia].

This is a very rare species in Taiwan with only one collection at the TAI herbarium, collected in May 1906 and obtained from the MAK herbarium.

4. *Schoenus nudifructus* C. Chen in Tang & F. T. Wang, Fl. Reipubl. Popularis Sin. 11: 230. 1961.

无刚毛赤箭莎 wu gang mao chi jian suo

?Perennials, tightly clumped. Roots slender fibrous. Culms tufted, erect, 55–100 cm tall, 0.8–1.1 mm thick, terete, smooth. Leaves basal, rarely also cauline. Basal leaf sheaths 1.5–2.5 cm, reddish black at base; leaf blade linear, 1–2 mm wide, papery, veins 7 and abaxially prominent. Cauline leaf sheaths brown, cylindric, 1.7–3 cm, glabrous, ligule absent. Involucral bracts leaflike; sheath brown; blade gradually shorter apically. Inflorescences paniculate, lax, branches 6 or 7 or more. Spikelets erect, narrowly ovoid, 7–9 mm, compressed, usually 2 or 3 or more clustered, ± pedunculate, 3- or 4-flowered. Glumes brownish red, lanceolate to ovate, keel abaxially yellowish green, margin pale, apex mucronate in basal glume and obtuse in apical glumes; basal 2 or 3 glumes empty, apical ones with 3 or 4 bisexual flowers. Perianth bristles absent. Stamens 3; anthers linear, deciduous. Style slender; stigmas 3, pubescent. Nutlet brownish, broadly ovoid to ovoid-oblong, 1–1.3 mm, 3-sided, reticulate, apex sparsely pubescent or glabrous. Fl. and fr. Jul.

• 1800–1900 m. C Yunnan (Kunming).

25. *GAHNIA* J. R. Forster & G. Forster, Char. Gen. Pl. 26. 1775.

黑莎草属 hei suo cao shu

Liang Songyun (梁松筠 Liang Song-jun); Jeremy J. Bruhl, Karen L. Wilson

Herbs, perennial, forming slender to massive tussocks. Roots stout. Rhizomes woody. Culms erect, usually tall and robust, terete, several noded. Leaves linear, deeply many channeled, narrowly crescent-shaped, twisted lengthwise through 180°, involute on drying; ligule present, usually truncate, papery. Inflorescences plumose-paniculate, usually decompound, consisting of several fascicles per node. Spikelets brown or black, numerous, solitary or 2–4 together. Flowers 1 or 2, apical one bisexual, usually with a second more basal one male. Glumes black or dark brown, spirally arranged, papery; basal 3–8 glumes empty, lanceolate, keeled, abaxial surface and margin scabrous, apex acute; apical 2 or 3 glumes smaller than remaining ones, thin at anthesis but becoming thick in fruit, apex obtuse; apicalmost glume bearing a bisexual flower. Perianth bristles absent. Stamens (2 or) 3[or 6]; filaments elongating markedly after anthesis, persistent on nutlet and entangled in glumes thereby suspending fruit. Stigmas 3[or 4]. Nutlet ovoid, ellipsoid, obovoid-fusiform, or globose, terete or 3-sided; endocarp blackish, thick, bony.

About 30 species: S and SE Asia; three species in China.

- 1a. Inflorescences spikelike, dense; spikelets 7–10 mm 1. *G. tristis*
 1b. Inflorescences paniculate, lax; spikelets 4–5 mm.
 2a. Spikelets usually 1-flowered; filaments strongly elongate after anthesis, tips enrolled by apex of glumes 2. *G. javanica*
 2b. Spikelets usually 2-flowered; filaments scarcely elongate after anthesis, sticky tips in bisexual flower
 cohering with tips of basal male flower 3. *G. baniensis*

1. *Gahnia tristis* Nees in Hooker & Arnott, Bot. Beechey Voy. 228. 1837.

黑莎草 *hei suo cao*

Roots stout, rigid. Rhizomes short, woody. Culms 0.5–1.5 m tall, robust, hollow, noded. Leaves basal and cauline; sheath brown to reddish brown, 10–20 cm; leaf blade 0.4–1.8 m × 0.7–1.2 cm, papery to leathery, margin scabrous, apex acuminate. Inflorescence a contracted panicle, spikelike, 14–40 × 2–3 cm, bearing 7–20 fascicles of partial panicles; partial panicles ovoid to ellipsoid, 2–5 cm; peduncles short, rigid, enclosed by inflorescence bract sheath. Spikelets numerous, densely congested, fusiform, 8–10 mm, 1-flowered. Glumes 8–10, initially yellowish brown but maturing to dark brown; basal 4–6 glumes ovate-lanceolate, papery, rigid, 1-veined, apex acuminate; apical 2 or 3 glumes broadly ovate, much shorter, margin apically ciliolate, apex emarginate to rounded; apicalmost glume bearing a bisexual flower. Perianth bristles absent. Stamens 3. Stigmas 3. Nutlet pale brown when young but maturing black, obovoid-oblong, 4–4.5 × 1.7–2 mm, 3-sided, smooth, shiny. Fl. and fr. Mar–Dec.

Dry grassy slopes, thickets, forests; 100–3000 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangsu, Jiangxi, Taiwan, Zhejiang [India, Indonesia, Japan (Ryukyu Islands), Malaysia, Thailand, Vietnam].

2. *Gahnia javanica* Zollinger & Moritzi in Moritzi, Syst. Verz. 98. 1846.

爪哇黑莎草 *zhua wa hei suo cao*

Gahnia castanea Ridley; *G. javanica* f. *sinensis* Benl.

Culms 75–120 cm tall, robust, terete, solid, nodose. Leaf sheath 10–15 cm; leaf blade usually longer than inflorescence, ca. 8 mm wide, papery to subleathery, gradually narrow apically, margin scabrous. Inflorescence a panicle, spreading and lax, consisting of a terminal and several lateral partial panicles; lateral panicles usually 2, shortly exerted from sheath; peduncles 6–10 cm. Spikelets narrowly ellipsoid, 5.5–6 mm, 1-flow-

ered. Glumes 7 or 8; basal 3 or 4 glumes ovate-lanceolate; apical 2 glumes chestnut-brown to black, broadly oblong, shorter, 2.8–4 mm, apex ± distinctly awned and distally ciliolate; apicalmost glume with a bisexual flower. Perianth bristles absent. Stamens 3; filaments strongly elongate after anthesis; filament tips enrolled by apex of glumes. Stigmas 3. Nutlet yellowish brown with a black apex, narrowly elliptic, ca. 3.8 mm, 3-sided, smooth, shiny. Fl. and fr. Apr–Oct.

Mossy forests, thickets in dry alpine grasslands. Yunnan [Indonesia, Malaysia, Papua New Guinea, Philippines, Vietnam; Pacific islands].

3. *Gahnia baniensis* Benl, Repert. Spec. Nov. Regni Veg. 44: 197. 1938.

散穗黑莎草 *san sui hei suo cao*

Gahnia javanica Zollinger & Moritzi var. *penangensis* C. B. Clarke; *G. penangensis* (C. B. Clarke) Kükenthal.

Culms ca. 90 cm tall, robust, terete, rigid, noded. Leaf sheath blackish brown, 8–15 cm; leaf blade equaling or slightly longer than inflorescence, 8–12 mm wide, papery to leathery, margin scabrous, apex acuminate. Involucral bracts usually shorter than inflorescence. Inflorescences black, 40–70 × 6–15 cm, spreading and lax, consisting of a terminal and several lateral panicles. Spikelets blackish, in clusters of 2 or 3 or solitary, oblong, 4–5 mm, 2-flowered. Glumes 7 or 8, blackish brown, rigid; basal 5 or 6 glumes ovate to ovate-elliptic, 2–3 mm, keeled, empty, apex mucronate; apical 2 glumes broader, bearing a bisexual flower and next a functionally male flower, margin ciliolate, apex obtuse. Perianth bristles absent. Stamens (2 or)3; filaments scarcely elongate after anthesis, sticky tips of filaments of bisexual flower cohering with tips of basal male flower. Stigmas 3. Nutlet reddish brown, ellipsoid, ca. 3 mm, 3-sided, smooth, shiny. Fl. and fr. Aug–Sep.

Moist hills and slopes; 800–1500 m. Fujian, Guangdong, Guangxi, Hainan [Indonesia, Japan, Malaysia (Peninsular), Vietnam; Australia].

26. CLADIUM P. Browne, Civ. Nat. Hist. Jamaica, 114. 1756.

克拉莎属 *ke la suo shu*

Liang Songyun (梁松筠 Liang Song-jun); Jeremy J. Bruhl, Karen L. Wilson

Herbs, perennial. Rhizomes short, creeping. Culms terete. Leaves cauline; leaf blade V-shaped in cross section, margin scabrous. Involucral bracts leaflike, sheathing. Inflorescence an elongated compound anthela. Spikelets ovoid. Glumes ± spirally arranged, basal 4–6 empty, apical 2 fertile, apicalmost flower bearing a nutlet. Perianth bristles absent. Stamens 2. Stigmas 3; style base not distinct, thickened, persistent. Nutlet ovoid, subterete.

About four species: tropical and warm temperate regions of Asia, Australia, Europe, North and South America, and Pacific islands; one species in China.

1. *Cladium jamaicense* Crantz subsp. ***chinense*** (Nees) T. Koyama in H. Hara, Stearn & L. H. J. Williams, Enum. Fl. Pl. Nepal 1: 105. 1978.

克拉莎 *ke la suo*

Cladium chinense Nees in Hooker & Arnott, Bot. Beechey Voy. 228. 1837; *C. mariscus* (Linnaeus) Pohl subsp. *chinense* (Nees) Govaerts.

Herbs, clump-forming. Rhizomes short, creeping. Culms solitary, 1–2.5 m tall, terete at base, many noded. Leaves cauline; ligule absent; leaf blade broadly linear, 60–80 cm × 8–10 mm, V-shaped in cross section, thickly leathery, gradually tapering apically to a 3-angled caudate apex, margin and abaxial midvein strongly antrorsely scabrous. Involucral bracts leaflike, decreasing in length distally, margin and abaxial midvein strongly antrorsely scabrous. Inflorescences with 5–8 terminal

and lateral antherae; peduncles compressed; bractlets glumelike, narrowly ovate to lanceolate, papery, veins brown, apex caudate to acuminate. Spikelets in 4–12 rusty brown globose heads, ovoid to broadly so, ca. 3 × 4–7 mm. Glumes 6–8, ovate to broadly ovate, apex obtuse to acute; basal 4 glumes empty, apical 2 fertile. Distal flower bisexual, basal flower functionally male. Anthers ca. 2 mm. Style slender; stigmas 3, as long as

style, pubescent. Nutlet brown, oblong-ovoid, ca. 2.5 mm, base rounded, apex obscurely beaked. Fl. and fr. May.

Wet places, swamps; ca. 2200 m. Guangdong, Guangxi, Hainan, Taiwan, E Xizang, Yunnan [India, Japan, Korea, Nepal, Vietnam; Pacific islands].

Cladium jamaicense subsp. *jamaicense* occurs in tropical America.

27. MACHAERINA Vahl, Enum. Pl. 2: 238. 1805.

剑叶莎属 *jian ye suo shu*

Liang Songyun (梁松筠 Liang Song-jun); Jeremy J. Bruhl, Karen L. Wilson

Baumea Gaudichaud.

Herbs, perennial, often with long scaly rhizomes. Culms tufted, erect, flattened, angular, or terete, usually smooth, rarely rough. Leaves distichous; basal sheaths brown to purplish; ligule absent; leaf blade unifacial, compressed or terete, sometimes reduced to a sheath. Involucral bracts sheathing and with a short blade. Inflorescences paniculate, consisting of few to several partial panicles, main axis often sinuous. Spikelets often clustered, rarely solitary, ovoid to narrowly ovoid, compressed. Glumes distichous, basal 1 or 2 flowers bisexual, apical flower(s) male. Perianth bristles absent. Stamens 3. Style base distinctly thickened, conic or pyramidal, persistent; stigmas 3. Nutlet stipitate or sessile, ovoid, oblong, or oblong-ellipsoid, ± terete or 3-sided, smooth or rugulose, apex beaked.

About 50 species: mostly tropical and temperate regions, especially Australia; three species (two endemic) in China.

- 1a. Culms terete 3. *M. rubiginosa*
 1b. Culms flattened.
 2a. Leaf blade ca. 1.5 m, margin smooth; spikelets ca. 5 mm 1. *M. myriantha*
 2b. Leaf blade ca. 0.5 m, margin scabrous; spikelets 10–12 mm 2. *M. ensigera*

1. *Machaerina myriantha* (Chun & F. C. How) Y. C. Tang, Fl. Hainan. 4: 537. 1977.

多花剑叶莎 *duo hua jian ye suo*

Cladium myrianthum Chun & F. C. How, Acta Phytotax. Sin. 7: 83. 1958.

Rhizomes short, stout. Culms to 2 m tall, 6–8 mm thick, flattened, several nodose. Leaves basal; leaf blade ensiform, ca. 1.5 m × 1.8–2.2 cm, smooth, margin entire, apically gradually narrowed. Inflorescences paniculate, consisting of a terminal and several lateral branches, 20–60 cm. Spikelets 2–4 clustered, oblong-ovoid, 4–5 mm, 2–4-flowered; basal 1 or 2 spikelets bearing nutlet. Glumes 5 or 6, brown, ovate to oblong, basal-most ca. 4 mm, pubescent, margins hyaline and ciliate, apex obtuse. Perianth bristles 4–6, brown, shorter than style. Stamens 3; anthers oblong, 3.5–4 mm; connective apex apiculate. Style ca. 4 mm, persistent, with white hairs, base thickened; stigmas 3. Nutlet brown, obovoid, ca. 1 mm, acutely 3-sided, glabrous, apex beaked. Fl. and fr. Aug–Sep.

• Riversides, forests, ditch sides; 900–2800 m. Hainan.

2. *Machaerina ensigera* (Hance) T. Koyama, Bot. Mag. (Tokyo) 69: 63. 1956.

剑叶莎 *jian ye suo*

Cladium ensigerum Hance, J. Bot. 23: 80. 1885.

Rhizomes horizontal, 4.5–6.8 mm thick. Culms flattened. Leaves basal; leaf blade ensiform, 3.8–50 × 0.7–2.5 cm, rigid, many veined, margin purple, finely scabrous, and denticulate. Inflorescences paniculate, narrow, usually 3-branched. Spikelets purple, ca. 11.3 × 3.5 mm, 2- or 3-flowered. Glumes ovate-lan-

ceolate, apex acuminate. Nutlet subdrupaceous, ellipsoid, 3-furrowed; persistent style base thickened. Fl. and fr. Apr–Aug.

• Swamps, lake margins. Hong Kong.

No specimen has been seen by the present authors.

3. *Machaerina rubiginosa* (Solander ex G. Forster) T. Koyama, Bot. Mag. (Tokyo) 69: 65. 1956.

圆叶剑叶莎 *yuan ye jian ye suo*

Schoenus rubiginosus Solander ex G. Forster, Fl. Ins. Austr. 89. 1786; *Fuirena rubiginosa* (Solander ex G. Forster) Sprengel.

Rhizomes long, horizontal, scaly. Culms tufted, (0.3–)1–1.8 m tall, 2–6 mm thick, compressed biconvex to subterete, smooth. Basal leaves shorter than to equaling culm; leaf blade erect, (2–)4–7 mm wide, biconvex with obtuse edges to subterete, smooth; pith spongy. Cauline leaves long sheathing with short blades. Inflorescences paniculate, erect, narrow, dense or interrupted, (10–)20–50 cm, 3–7-noded. Spikelets in oblong to globose clusters, 4–7 × 2–2.5 mm, narrowly ovoid maturing to ovoid, 2- or 3-flowered, bearing 1 or 2 nutlets. Glumes 5, ovate to lanceolate, 4.5–6.5 mm, margins long ciliate, apex acuminate. Perianth bristles absent. Stamens 3; anthers 1.5–2 mm; connective apex prominently apiculate. Nutlet orange to reddish brown, sessile, ellipsoid to oblong-ellipsoid, 3–5 × 1.5–2 mm, 3-sided, smooth, shiny; persistent style base depressed to shortly pyramidal, densely hairy. Fl. and fr. Apr–Aug.

Swamps, lake margins, *Sphagnum* bogs; below 1800 m. Hong Kong, Yunnan (Tengchong) [Bangladesh, India, Indonesia, Japan (Ryukyu Islands), Malaysia, Papua New Guinea, Philippines, Sri Lanka, Vietnam; Australia, Pacific islands (New Zealand)].

28. LEPIDOSPERMA Labillardière, Nov. Holl. Pl. 1: 14. 1805.鳞籽莎属 *lin zi suo shu*

Liang Songyun (梁松筠 Liang Song-jun); Jeremy J. Bruhl, Karen L. Wilson

Herbs, perennial. Rhizomes short, woody. Culms tufted, erect, terete or flattened. Leaves basal, distichous, usually equitant; leaf blade terete or flattened, similar to culm, sheathing. Inflorescences paniculate. Spikelets narrowly ovoid-oblong. Flowers usually (1 or)2 or 3(-5), proximal one usually functionally male, distal one bisexual. Glumes 3-8, seemingly spirally arranged, mostly distally scaberulose, basal ones empty. Perianth scales [3 or]6, shorter than nutlet, fleshy. Stamens 3; connective apex apiculate. Style slender, base persistent. Nutlet oblong or oblong-ellipsoid, ± terete, usually smooth and shiny.

About 100 or more species: mostly Australia including many undescribed species, SE Asia, Pacific islands (New Zealand); one species in China.

1. *Lepidosperma chinense* Nees & Meyen ex Kunth, Enum. Pl. 2: 320. 1837.

鳞籽莎 *lin zi suo*

Rhizomes creeping. Culms tufted, erect, 45-90 cm tall, terete to obscurely angular, stiff. Leaves basal; sheath purplish black to blood-red, 3-8 cm, margins membranous; ligule present; leaf blade shorter than culm, 2-3 mm thick, terete, stiff, smooth, glabrous. Involucral bracts spathe-like, sheathing, glabrous. Inflorescences paniculate, 3-10 cm. Spikelets densely

clustered, fusiform-oblong, 6-8 mm, 1- or 2-flowered. Glumes lanceolate, 4-6.5 mm, scabrous, apex obtuse and mucronate; basal 2 glumes empty, apical 2 with bisexual flowers. Perianth scales 6, whitish, very short, connate at base. Stamens 3; connective apex apiculate. Stigmas 3. Nutlet brownish yellow, ovoid to ellipsoid, 2.5-4 mm, terete, smooth, shiny. Fl. and fr. Jul-Dec.

Hillsides, wet places, riversides, sparse forests along valleys; 800-1500 m. Fujian, Guangdong, E Guangxi, Hainan, S Hunan, S Zhejiang [Indonesia, Malaysia, Papua New Guinea, Vietnam].

29. TRICOSTULARIA Nees ex Lehmann, Nov. Stirp. Pug. 8: 50. 1844.三肋果莎属 *san lei guo suo shu*

Liang Songyun (梁松筠 Liang Song-jun); Jeremy J. Bruhl, Karen L. Wilson

Herbs, perennial. Rhizomes short. Culms tufted, erect, terete or 3-angled. Leaves basal, rarely 1 or 2 cauline, often reduced to sheaths; ligule absent. Inflorescences paniculate, usually much branched. Spikelets solitary or clustered, compressed, narrowly ovoid-oblong, 1- or 2(or 3)-flowered, basalmost flower usually male, apical flower(s) bisexual. Glumes 4-6, pale brown, distichous, membranous, glabrous, 1-veined, keeled, basal 2-4 empty. Perianth scales (3-6), whitish, lanceolate to linear, short, flat, hyaline. Stamens 3; connective apex apiculate. Stigmas 3. Nutlet brown, sessile, obovoid or pyriform, small, 3-sided, with 3 pale ribs, hispid at apex.

Six species: all in Australia, one extending to Asia; one species in China.

1. *Tricostularia undulata* (Thwaites) J. Kern, Acta Bot. Neerl. 8: 267. 1959.

三肋果莎 *san lei guo suo**Cladium undulatum* Thwaites, Enum. Pl. Zeyl. 353. 1864.

Herbs, tussock-forming. Roots thick. Culms 30-90 cm tall, 1-2 mm thick, rigid, obtusely 3-angled, sulcate-striate, smooth. Leaves basal, shorter than to as long as culm; leaf blade 1-3 mm wide, rigid, margin involute and scabrous. Inflorescences paniculate, branched, diffuse to dense, consisting of 4 or 5 fascicles; branches 2 or 3 together, unequal, ± exserted from

sheath, compressed, rigid, flexuose, scabrous. Spikelets almost sessile, in clusters of 2-8, 1-flowered. Glumes 4, oblong-lanceolate, apex acute; basal 2 glumes ca. 2 mm, apical ones 4-5 mm. Perianth scales 6, lanceolate to linear-lanceolate, densely covered with white antrorse short hairs. Stamens 3; anthers ca. 2 mm; connective apex 3-sided, oblong. Nutlet chestnut-brown to blackish, obtusely 3-sided, slightly reticulate-rugulose, with 3 whitish ribs, apex hispidulous.

Watersides near seacoast; near sea level. Hainan (Wenchang) [India, Indonesia, Malaysia, Papua New Guinea, Sri Lanka, Thailand, Vietnam; N Australia].

30. SCLERIA P. J. Bergius, Kongl. Vetensk. Acad. Handl. 26: 142. 1765.珍珠茅属 *zhen zhu mao shu*

Zhang Shuren (张树仁); Gordon C. Tucker, David A. Simpson

Herbs, perennial or annual, rhizomatous or not; stolons sometimes present. Culms erect, 3-angled or rarely terete. Leaves cauline or both basal and cauline; sheaths at middle part of culm, winged or not, apex sometimes with contraligule opposite blade; leaf blade linear, scabrid, sheathing, usually prominently 3-veined. Involucral bracts leaflike and sheathing, setaceous, or glumelike; bractlets usually setaceous, rarely glumelike. Inflorescences terminal, paniculate, usually stout and elongated, sometimes reduced into a discontinuous spike. Unisexual spikelets usually dominant on inflorescence, rarely bisexual ones dominant; basal 2-4 glumes

of spikelets empty. Male spikelets with several flowers. Female spikelets with a single flower. Bisexual spikelets with a basal female flower and several male flowers. Flowers unisexual. Male flowers: stamens 1–3; anthers linear or linear-oblong; connective apex often protruding and subulate. Female flowers: style base not inflated; stigmas 3. Nutlet brick red, white, or yellowish purple, spherical or ovoid, often obtusely 3-sided, smooth or variously sculptured, mostly shiny, glabrous or hairy (hairs simple or stellate), usually borne on a gynophore apically dilated into a \pm 3-lobed disk.

About 200 species: pantropical and extending into temperate regions in S Africa, E Asia, and North and South America; 24 species (three endemic) in China.

Note: nutlets and underground parts are essential for accurate identification.

- 1a. Bisexual spikelets dominant on inflorescences; disk subtending nutlet either stipelike or indistinct.
 - 2a. Annuals, without a rhizome; inflorescences spicate; glumes ovate; nutlet surface transversely rugose 1. *S. pergracilis*
 - 2b. Perennials, with a woody creeping rhizome; inflorescences paniculate; glumes lanceolate or ovate-lanceolate; nutlet surface smooth, subsmooth, or slightly rugose.
 - 3a. Spikelets 4–10 mm, pilose; disk stalklike.
 - 4a. Nutlet 1.5–1.8 mm, covered with tufts of stellate hairs; contraligule absent 2. *S. neesii*
 - 4b. Nutlet 2.5–2.7 mm, glabrous; contraligule narrow 3. *S. tonkinensis*
 - 3b. Spikelets 3–4.5 mm, glabrous; disk appressed to nutlet.
 - 5a. Culms 30–60 cm tall, 1.4–2 mm thick; leaf blade 1.5–2 mm wide; lateral branches of inflorescence often spicate, single; nutlet ca. 2.5 mm 4. *S. lithosperma*
 - 5b. Culms 60–200 cm tall, 3–7 mm thick; leaf blade 15–20 mm wide; lateral branches of inflorescence cymose, often binate; nutlet ca. 3.5 mm 5. *S. corymbosa*
- 1b. Bisexual spikelets few or absent on inflorescences; disk subtending nutlet lobed or cup-shaped (but not well developed in *S. novae-hollandiae*).
 - 6a. Small annuals (or short-lived perennials); rhizomes absent or not well developed.
 - 7a. Involucral bracts linear-lanceolate; nutlet ca. 1.5 mm in diam.; disk lobes obtuse 7. *S. rugosa*
 - 7b. Involucral bracts setaceous; nutlet ca. 2 mm in diam.; disk lobes acute or acuminate.
 - 8a. Leaf sheath glabrous; disk ca. 1/2 height of nutlet, lobes brown, membranous, apex acuminate; nutlet surface smooth.
 - 9a. Nutlet \pm spherical, apex with purple tip 8. *S. biflora*
 - 9b. Nutlet trisulcate, apex with yellowish white tip 9. *S. laxa*
 - 8b. Leaf sheath villous; disk 1/4–1/3 height of nutlet, lobes yellowish white, thick, apex acute; nutlet surface pitted with regular longitudinally elongate pattern.
 - 10a. Nutlet 2–2.5 mm, subovoid-spherical; perianth lobes rounded at apex 6. *S. novae-hollandiae*
 - 10b. Nutlet 2.8–3 mm, spheroid to obovoid-spherical; perianth lobes acute at apex 10. *S. parvula*
 - 6b. Perennials; rhizomes well developed and prominent.
 - 11a. Culms terete or slightly 3-angled; leaf sheath not winged.
 - 12a. Nutlet surface smooth, only apically slightly hispid; disk not cup-shaped, scarcely 1/5 height of nutlet, appressed to base of nutlet, lobes triangular, margins reflexed; leaves alternate, well spaced, not whorled 23. *S. harlandii*
 - 12b. Nutlet surface hexagonally reticulate, pilose; disk cup-shaped, 1/2–4/5 height of nutlet and enclosing it, lobe apex dentate, margins not reflexed; leaves \pm 3-whorled 24. *S. sumatrensis*
 - 11b. Culms 3-angled or triquetrous; leaf sheath winged at middle part of culm (not obviously in *S. hookeriana*).
 - 13a. Nutlet smooth.
 - 14a. Inflorescences subspicate, branches short or without secondary branches; spikelets with 3–5 awns; nutlet 4–4.5 mm; disk obscurely 3-lobed 19. *S. psilorrhiza*
 - 14b. Inflorescences paniculate; spikelets without or with fewer fine awns; nutlet 3–3.5 mm; disk obviously 3-lobed.
 - 15a. Bractlets glumelike, shorter than spikelet; leaf blade thickly leathery, contraligule scarcely developed; stamen 1; nutlet ca. 2.5 mm in diam.; disk lobes triangular 20. *S. poiformis*
 - 15b. Bractlets setaceous, longer than spikelet; leaf blade papery, contraligule conspicuous and triangular; stamens 3; nutlet ca. 2 mm in diam.; disk lobes subrounded at apex.
 - 16a. Inflorescences with 4 or 5 lateral branches; disk lobes semicircular 21. *S. radula*
 - 16b. Inflorescences with 1–3 lateral branches; disk lobes ovate 22. *S. oblata*

- 18a. Contraligule oblong to oblong-lanceolate, 4–12 mm, glabrous 12. *S. ciliaris*
 18b. Contraligule depressed rounded, semicircular or nearly semicircular, at most 4 mm, ciliate or glabrescent.
 19a. Disk slightly 3-lobed or barely lobed; lobes flatly semicircular, apex rounded.
 20a. Nutlet with white reticulation 13. *S. terrestris*
 20b. Nutlet with purplish brown reticulation 14. *S. dulungensis*
 19b. Disk deeply 3-lobed; lobes lanceolate-triangular or ovate-triangular, apex acute to subtruncate.
 21a. Nutlet ca. 2 mm in diam., rugose 15. *S. levis*
 21b. Nutlet 2.5–2.8 mm in diam., reticulate-pitted or scrobiculate.
 22a. Leaves alternate, not whorled; disk yellowish white 16. *S. jiangchengensis*
 22b. Leaves in whorls of 2–5; disk brownish purple.
 23a. Nutlet whitish when mature, 2.2–2.7 mm wide, scrobiculate to smooth 17. *S. scrobiculata*
 23b. Nutlet at first whitish but brownish purple when mature, 1.7–2 mm wide, cancellate 18. *S. purpurascens*

1. *Scleria pergracilis* (Nees) Kunth, Enum. Pl. 2: 354. 1837.

纤秆珍珠茅 xian gan zhen zhu mao

Hypoporum pergracile Nees, Edinburgh New Philos. J. 17: 267. 1834.

Annuals. Rhizomes absent. Culms tufted, erect, 11–30 cm tall, ca. 0.5 mm wide, 3-angled, sulcate, glabrous. Leaves basal and cauline, sheathing; contraligule rounded to obtuse; leaf blade capillary, ca. 1 mm wide. Involucral bracts setaceous, basal one to 0.6 cm and shorter than spikelet cluster; bractlets glumelike. Inflorescences spicate, 2.5–8.5 cm, formed by clusters of 2 or 3 spikelets each separated by 2–17 mm. Spikelets mostly bisexual, ovoid, 3–4 mm, rarely basal one unisexual with a single male flower. Glumes ovate, keeled, both sides of midvein membranous with reddish brown lines, apex mucronate; basal 2 glumes empty; middle glume with a female flower; apical 1 or 2 glumes with a male flower. Male flowers: stamens 3; connective apex protruding, forming a thin tip. Female flowers: stigmas 3. Disk obscure. Nutlet white, subspherical, ca. 1 mm in diam., slightly 3-sided, transversely rugose, base with a brown stalk, apex tipped. Fl. and fr. Aug–Oct. $2n = 10$.

Alpine grasslands, valley pastures; 1200–4000 m. Guangdong, Guangxi, Jiangsu, E Xizang, Yunnan [Bangladesh, Cambodia, India, Indonesia, Kashmir, Korea, Laos, Myanmar, Nepal, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa, NE Australia].

2. *Scleria neesii* Kunth, Enum. Pl. 2: 358. 1837.

柄果珍珠茅 bing guo zhen zhu mao

Perennials. Rhizomes short, thick, woody, oblique, not creeping. Culms 16–70 cm tall, slender, triquetrous, glabrous or pilose. Leaves basal and cauline. Basal leaves only with closed sheath, without leaf blade; sheath pale brown, 3-angled, edges villous, surfaces pubescent, not winged, apex with 3 triangular teeth. Culine leaves with a sheath like that of basal leaves; contraligule absent; leaf blade linear, 1.5–3 mm wide but apically narrowing, both surfaces villous, margins scabrous, apex obtuse. Involucral bracts leaflike, basalmost to 5 cm, sheathing; bractlets setaceous, both surfaces densely pilose. Inflorescences subcapitate, laxly globose, 1–3 cm, with 5–20 spikelets. Spikelets narrowly ovoid, 4–8 mm, villous especially distally, unisexual,

with 14–16 glumes. Glumes yellowish brown, awned, basal 1 or 2 empty, 1 above empty ones with a female flower, others with male flowers. Male flowers: stamens 3. Female flower: style slender; stigmas 3, longer than style, slightly puberulent. Disk brown, stalklike, not lobed. Nutlet white or light brown, subspherical, 1.5–2 mm, obscurely if at all 3-sided, tuberculate, shiny, with tufts of stellate hairs, apex rounded and with a fine tip. Fl. and fr. Apr–Jul.

Moist sandy open or shaded habitats; low elevations. Hainan [India, Laos, Malaysia (Peninsular), Sri Lanka, Thailand, Vietnam; Indian Ocean islands].

3. *Scleria tonkinensis* C. B. Clarke, Bull. Misc. Inform. Kew, Addit. Ser. 8: 57. 1908.

越南珍珠茅 yue nan zhen zhu mao

Scleria kwangtungensis Chun & F. C. How; *S. levis* Retz. var. *scaberrima* Benth.

Perennials. Rhizomes short, thick, woody, creeping, densely covered with scales; scale brown, tubular, with several parallel veins. Culms 16–70 cm tall, thinner, sharply 3-angled, villous at apical part. Leaves basal and cauline. Basal leaves only with closed sheath, without leaf blade; sheath pale brown, 3-angled, edges villous, surfaces pubescent, not winged, apex with 3 triangular teeth. Culine leaves with a sheath like that of basal leaves; contraligule dark reddish brown, narrowly triangular, membranous; leaf blade linear, 0.5–1.5 cm wide but apically attenuate, both surfaces villous, margins scabrous, apex obtuse. Involucral bracts leaflike, basalmost to 5 cm, sheathing; bractlets setaceous, both surfaces villous. Inflorescences paniculate, 2.5–6 cm. Spikelets narrowly ovoid, 8–10 mm, villous, both bisexual and unisexual spikelets numerous, with 14–16 glumes. Glumes pale brown to yellowish green, basal 1 or 2 empty, 1 above empty ones with a female flower, others with male flowers. Male flowers: stamens 3. Female flower: style slender; stigmas 3, longer than style, slightly puberulent. Disk brown, stalklike, not lobed. Nutlet white, broadly obovate to subspherical, 3–3.5 mm, obscurely 3-sided, obscurely rugose to subsmooth, shiny, apex rounded with a fine tip. Fl. and fr. Apr–Jul.

Moist grasslands, thickets; below 100 m. Guangdong, Guangxi, Hainan [Cambodia, Thailand, Vietnam].

Scleria tonkinensis was misidentified as *S. radula* by Tang and F. T. Wang (Fl. Reipubl. Popularis Sin. 11: 206. 1961).

4. *Scleria lithosperma* (Linnaeus) Swartz, Prodr. 18. 1788.

石果珍珠茅 shi guo zhen zhu mao

Perennials. Rhizomes short, thick, woody, creeping. Culms tufted, 30–50 cm tall, 1.4–2 mm wide, 3-angled, glabrous. Leaves basal and cauline. Basal leaves sheathlike, bladeless. Cauline leaves with sheath 3-angled, closed, pilose; contraligule depressed rounded or depressed deltoid, ciliate; leaf blade narrowly linear, 1.5–2 mm wide, margins finely serrate, apex attenuate into a caudate tip. Involucral bracts leaflike, basal one to 10 cm, sheathing. Inflorescences paniculate, well-developed ones more than 30 cm, with 1–3 lateral branches or without branch at basal part; basal part often reduced to spikelike, 3.5–7 cm. Spikelets 1–3 in a cluster, 3–4.5 mm, with 4 or 5 glumes, with 1 or 2 male flowers and 1 female flower below male ones. Glumes ovate-lanceolate, keeled, both sides of midvein membranous with short brown lines, apex mucronate. Disk not well developed. Nutlet white, broadly obovoid to subellipsoid, ca. 2.5 mm, 3-sided or not, smooth or transversely rugose or irregularly ± reticulate with wavy ridges, shiny, base narrow and triangular. Fl. and fr. Jun–Oct.

Thickets in forests, woods; 100–1000 m. Guangdong, Hainan, Taiwan, SE Yunnan [India, Indonesia, Malaysia, Myanmar, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa, America, and Australia, Indian Ocean islands, North and South America, Pacific islands].

- 1a. Nutlet smooth 4a. subsp. *lithosperma*
 1b. Nutlet transversely rugose or
 irregularly somewhat reticulate
 with wavy ridges 4b. subsp. *linearis*

4a. *Scleria lithosperma* subsp. *lithosperma*

石果珍珠茅(原亚种) shi guo zhen zhu mao (yuan ya zhong)

Scirpus lithospermus Linnaeus, Sp. Pl. 1: 51. 1753.

Nutlet smooth.

Thickets in forests; 100–1000 m. Guangdong, Hainan, Taiwan, SE Yunnan [India, Indonesia, Malaysia, Myanmar, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa, America, and Australia, Indian Ocean islands, North and South America, Pacific islands].

4b. *Scleria lithosperma* subsp. *linearis* (Bentham) T. Koyama in Dessanayake & Fosberg, Revis. Handb. Fl. Ceylon 5: 353. 1985.

线叶珍珠茅 xian ye zhen zhu mao

Scleria lithosperma var. *linearis* Bentham, Fl. Austral. 7: 430. 1878; *S. lithosperma* var. *roxburghii* C. B. Clarke; *S. roxburghii* (C. B. Clarke) Domin.

Nutlet transversely rugose or irregularly somewhat reticulate with wavy ridges.

Woods. Hainan [India, Indonesia, Malaysia, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; N Australia, Pacific islands (Fiji)].

5. *Scleria corymbosa* Roxburgh, Fl. Ind., ed. 1832, 3: 574. 1832.

伞房珍珠茅 san fang zhen zhu mao

Scleria ridleyi C. B. Clarke.

Perennials. Rhizomes thick, subwoody, covered with brown scales. Culms 0.6–2 m tall, 3–7 mm wide, sharply 3-angled. Leaves on apical part of culms nearly whorled; sheath laxly embracing culm; contraligule semicircular, margin ca. 1 mm wide and membranous; leaf blade linear, 50–80 × 1.4–2 cm, midvein and margins apically scabrid, apex acute. Involucral bracts leaflike, basalmost to 47 cm, sheathing, glabrous; bractlets setaceous, 1–1.5 cm, base dilated, margin ciliate. Inflorescences compound paniculate, ca. 40 cm; lateral inflorescence branches 5–7, cymose, often binate, ovoid, ca. 4 cm; inflorescence axes robust, 3-angled, slightly hairy. Spikelets 3–4 mm, 1–3 in a cluster, mostly bisexual, fewer male. Glumes broadly ovate to ovate-lanceolate, leathery, keel green, laterally brown with rust-colored short lines, apex mucronate. Male flowers: stamens 3; anthers linear, ca. 2 mm; connective apex protruding beyond anthers. Disk reduced, appressed to nutlet. Nutlet white or grayish white, obovoid to ellipsoid, ca. 3.5 × 2.5 mm, slightly 3-sided, smooth, glabrous, base attenuate, apex apiculate. Fl. and fr. summer and autumn.

Water margins, valleys, woods; elevation probably below 100 m. Guangdong, Hainan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Papua New Guinea, Philippines, Sri Lanka, Thailand].

6. *Scleria novae-hollandiae* Boeckeler, Flora 58: 120. 1875.

角架珍珠茅 jiao jia zhen zhu mao

Scleria fujianensis G. P. Li; *S. nankingensis* Tang & F. T. Wang.

Annuals. Rhizomes short, subwoody. Culms 30–60 cm tall, slender, 3-angled, glabrous. Leaves cauline; sheath 3-angled, not winged, glabrous; contraligule semicircular; leaf blade narrowly linear, 2.5–3.5(–5.5) mm wide, papery, slightly shiny, glabrous, margin scabrous, apex acute. Involucral bracts leaflike, sheathing; bractlets small, narrow, sheathless. Inflorescences paniculate; branches single or binate, (0.5–)1–2 cm, distant. Spikelets mostly unisexual, narrowly ovoid, ca. 5 mm, lax, with ca. 9 flowers, with 11 or 12 glumes. Bisexual spikelets with 1 or 2 empty basal glumes, middle glumes with a female flower, apicalmost glume empty or with a reduced flower. Glumes pale brown, ovate to ovate-lanceolate but apical ones lanceolate, membranous, keel abaxially green, apex acute. Perianth lobes rounded at apex. Male flowers: stamens 2 or 3. Female flowers: style slender; stigmas 2, almost as long as style. Disk not well developed. Nutlet white, subovoid-spherical, 2–2.5 mm (excluding stalk), obscurely reticulate, glabrous, base truncate, apex subrounded and without a tip. Fl. and fr. Jul–Oct.

Slopes, swamps; near sea level. Fujian (Zhao'an), Guangdong, Jiangsu (Lianyungang, Nanjing) [Indonesia, Papua New Guinea, Philippines, Vietnam; Australia, Pacific islands (Micronesia)].

7. *Scleria rugosa* R. Brown, Prodr. 240. 1810.

垂序珍珠茅 chui xu zhen zhu mao

Scleria fenestrata Franchet & Savatier var. *pubigera* (Makino) Ohwi; *S. onoei* Franchet & Savatier; *S. onoei* var. *pubigera* (Makino) Ohwi; *S. pubigera* Makino.

Annuals. Roots fibrous. Rhizomes absent. Culms tufted, erect, 10–25 cm tall, 3-angled, glabrous or villous. Leaves cauline; sheath barely winged, pubescent to villous; contraligule semicircular, margin ciliate; leaf blade linear, 2–4 mm wide but apically attenuate, papery, both surfaces hairy, margins scabrous, apex obtuse. Involucral bracts leaflike, to 14 cm, sheathing, opening of sheath with dense brown pubescence; bractlets small, sheathless. Inflorescences paniculate, with 3–5 branches; branches 0.7–1.5 cm, distant, with few spikelets; branch peduncles 0.4–4 cm, usually winged. Spikelets 1 or 2 in a cluster, narrowly ovoid, 2–4 mm, mostly unisexual; female spikelets with 3–5 glumes and 1 female flower. Female flowers: ovary obovoid, smooth, glabrous. Disk 1/4–1/3 height of nutlet, 3-lobed; lobes semicircular, margin reflexed, apex rounded. Nutlet white or grayish white, spherical to subspherical, ca. 1.5 mm in diam., smooth, shiny, apex subrounded and slightly tipped.

Wet grassy places; 600–700 m. SW Fujian, Guangdong, Hainan, Jiangsu, Taiwan, S Yunnan [India, Indonesia, Japan, S Korea, Malaysia, Myanmar, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; N Australia, Indian Ocean islands, Pacific islands].

8. *Scleria biflora* Roxburgh, Fl. Ind., ed. 1832, 3: 573. 1832.

二花珍珠茅 er hua zhen zhu mao

Scleria biflora var. *ferruginea* J. Kern; *S. ferruginea* Ohwi (1938), not Peter (1937).

Annuals. Roots fibrous. Rhizomes absent. Culms nearly tufted, 30–40 cm tall, slender, 3-angled, glabrous. Leaves cauline; sheath tubular, 3-angled, barely winged, glabrous, apex of basal ones with triangular teeth; contraligule semicircular, pubescent; leaf blade linear, 2.5–5.5 mm wide but apically attenuate, papery, smooth, glabrous, margins scabrous, apex slightly obtuse. Involucral bracts leaflike, basal one to 15 cm, sheathing, opening of sheath with brown pubescence; bractlets setaceous, sheathless, much longer than spikelet. Inflorescences paniculate, with 2 or 3 branches; branches 1.5–2.5 cm, with many spikelets; lateral branches distant. Spikelets 1 or 2 in a cluster, narrowly ovoid, 3.5–4 mm, mostly unisexual; female spikelets with 4 or 5 glumes and 1 female flower; male spikelets with 7–9 or more glumes. Glumes ovate to lanceolate, apically attenuate, keel green to same color as glume, apex acute and apiculate. Male flowers: stamens 2 or 3. Female flowers: ovary obovoid, finely reticulate, densely pubescent. Disk ca. 1/2 height of nutlet, 3-lobed; lobes ovoid-triangular, slightly shiny. Nutlet white or yellowish, subspherical, ca. 2 mm in diam., reticulate, apex with a purple tip. Fl. and fr. Aug–Sep.

Grasslands, wastelands, field margins; 600–1800 m. Fujian, Guangdong, Guangxi, Hainan, N Jiangsu, Taiwan, Yunnan [India, Indonesia, Japan (Ryukyu Islands), Kashmir, Malaysia (Peninsular), Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam].

Scleria biflora was misidentified as *S. tessellata* C. B. Clarke by Tang and F. T. Wang (Fl. Reipubl. Popularis Sin. 11: 208. 1961).

9. *Scleria laxa* R. Brown, Prodr. 240. 1810.

疏松珍珠茅 shu song zhen zhu mao

Scleria trisulcata G. P. Li.

Annuals. Roots fibrous. Rhizomes short or not well developed, thick. Culms tufted, 20–40 cm tall, slender, 3-angled, smooth, glabrous, apically often nodding. Leaves cauline; sheaths at culm base glabrous, barely winged, bladeless or with a short blade; sheaths at middle and apical part of culm narrowly winged, villous and more densely so near contraligules; contraligule semicircular, apex obtuse; leaf blade linear, 3.5–5.5 mm wide but apically attenuate, papery, both surfaces hairy or only on 2 lateral veins of abaxial surface, margins scabrous, apex slightly obtuse to acute. Involucral bracts leaflike, sheathing, opening of sheath with dense brown pubescence; bractlets setaceous, as long as or slightly longer than spikelet. Inflorescences paniculate, with 2–4 branches; branches 1.2–3 cm, distant, with few spikelets. Spikelets narrowly ovoid, 4–5 mm, mostly unisexual; female spikelets with 4 or 5 glumes and 1 female flower; male spikelets with 7–9 or more glumes. Glumes deeply straw-colored to brownish purplish, ovate to lanceolate, keeled, apex acute and apiculate. Male flowers: stamens 2 or 3. Female flowers: ovary subspherical, glabrous. Disk yellowish white, 1/4–1/3 height of nutlet, slightly 3-lobed; lobes ovoid-triangular to subglobose, margin reflexed, apex truncate. Nutlet subspherical to obovoid-spherical, 2.8–3 × 1.8–2 mm, trisulcate, pitted with irregular longitudinally elongate lacunae (i.e., trabeculate), glabrous, apex with a yellowish white tip. Fl. and fr. Aug–Oct.

Grassy swamps; near sea level. Fujian (Zhao'an), Guangdong, Hainan [Papua New Guinea, Philippines; N Australia].

10. *Scleria parvula* Steudel, Syn. Pl. Glumac. 2: 174. 1855.

小型珍珠茅 xiao xing zhen zhu mao

Scleria fenestrata Franchet & Savatier; *S. tessellata* C. B. Clarke (1903), not Willdenow (1805).

Annuals. Roots fibrous. Rhizomes short or not well developed, thick. Culms tufted, 40–60 cm tall, slender, 3-angled, smooth, glabrous. Leaves cauline; sheaths at culm base glabrous, barely winged, bladeless or with a short blade; sheaths at middle and apical part of culm narrowly winged, villous and more densely so near contraligules; contraligule semicircular, apex obtuse; leaf blade linear, 3.5–5.5 mm wide but apically attenuate, papery, both surfaces hairy or only on 2 lateral veins of abaxial surface, margins scabrous, apex slightly obtuse to acute. Involucral bracts leaflike, basalmost to 20 cm, sheathing, opening of sheath with dense brown pubescence; bractlets setaceous, as long as or slightly longer than spikelet. Inflorescences paniculate, with 2–4 branches; branches 1.2–3 cm, distant, with few spikelets. Spikelets narrowly ovoid, 4–5 mm, mostly unisexual; female spikelets with 4 or 5 glumes and 1 female flower; male spikelets with 7–9 or more glumes. Glumes deeply straw-colored to brownish purplish, ovate to lanceolate, keeled, apex acute and apiculate. Perianth lobes acute at apex. Male flowers: stamens 2 or 3. Female flowers: ovary subspherical, glabrous. Disk yellowish white, 1/4–1/3 height of nutlet,

slightly 3-lobed; lobes ovoid-triangular to subglobose, margin reflexed, apex acute. Nutlet subspherical to obovoid-spherical, 2.8–3 × 1.8–2 mm, pitted with regular longitudinally elongate lacunae, glabrous, apex with a yellowish white tip. Fl. and fr. Jul–Oct.

Slopes, valleys, wastelands, paddy fields; 700–2700 m. Fujian, Guangdong, Guizhou, Hunan, NE Jiangsu, Jiangxi, Shandong, Sichuan, SE Xizang, Yunnan, Zhejiang [Bhutan, Cambodia, India, Japan, Korea, Laos, Nepal, Papua New Guinea, Philippines, Sri Lanka, N Thailand, Vietnam; tropical Africa].

Scleria parvula was misidentified as *S. biflora* by Tang and F. T. Wang (Fl. Reipubl. Popularis Sin. 11: 208. 1961).

11. *Scleria hookeriana* Boeckeler, *Linnaea* 38: 498. 1874.

黑鳞珍珠茅 hei lin zhen zhu mao

Perennials, stoloniferous. Rhizomes short, woody, densely covered with purplish red oblong-ovate scales. Culms erect, 60–100 cm tall, 2–4 mm wide, 3-angled, slightly scabrous, sometimes pubescent. Leaf sheath 1–10 cm, sometimes pubescent; sheaths basal on culm purplish red to pale brown, obtusely 3-angled, with 3 triangular teeth of various sizes at opening; sheaths at middle part of culm green, sharply 3-angled, rarely narrowly winged; contraligule semicircular, with purple barbs; leaf blade linear, 4–35 cm × 4–8 mm, papery, slightly scabrous, glabrous or slightly pubescent. Involutral bracts leaflike, basalmost to 30 cm, sheathing; bractlets setaceous, base auriculate with barbate auricles. Inflorescences paniculate, 4–7 × 2–4 cm. Spikelets (1 or) 2–4 in a close cluster, ca. 3 mm, mostly unisexual, rarely bisexual. Male spikelets oblong-ovoid; glumes ovate-lanceolate to oblong-lanceolate. Female spikelets usually at basal part of inflorescence branch, narrowly ovoid, with few glumes; glumes broadly ovate, triangular, or ovate-lanceolate. Male flowers: stamens 3. Female flowers: ovary villous; stigmas 3. Disk yellowish, ± 3-lobed; lobes semicircular, margin reflexed, apex rounded. Nutlet white, ovoid, ca. 2 mm in diam., reticulate, slightly rust-colored hispid, apex obtusely 3-sided. Fl. and fr. May–Jul.

Sunny slopes, valleys, scrub, roadsides, grasslands; 1400–2200 m. Chongqing, Fujian, Guangdong, Guangxi, Guizhou, W Hubei, Hunan, Jiangxi, Sichuan, Yunnan, S Zhejiang [India, Vietnam].

12. *Scleria ciliaris* Nees in Wight, *Contr. Bot. India*, 117. 1834.

华珍珠茅 hua zhen zhu mao

Scleria chinensis Kunth.

Perennials. Rhizomes woody, covered with purple to purplish brown scales. Culms tufted, 70–120 cm tall, ca. 5 mm wide, 3-angled, slightly scabrous, glabrous. Leaf sheath 1–10 cm, papery, glabrous; sheaths at culm base brown to purplish brown, not winged, with 3 narrowly ovoid teeth of various sizes at opening; sheaths at middle part of culm green, wing 1–3 mm wide; contraligule brown to reddish brown, lanceolate to oblong-lanceolate, 4–12 mm (fragile tip sometimes broken off), glabrous, margin sometimes apically purple; leaf blade linear, 15–35 cm × 6–9 mm, papery, slightly scabrous, glabrous. Invol-

ucral bracts leaflike, basalmost to 20 cm, sheathing; bractlets setaceous, base auriculate and hispid. Inflorescences paniculate, with 1–3 slightly distant lateral branches; branches 6–10 × 2–6 cm, slightly condensed. Spikelets brown to purple, (1 or) 2–4 in a cluster, ca. 4 mm, mostly unisexual. Male spikelets oblong-ovoid; glumes 3–4 mm, membranous, margin sometimes ciliate; basal glumes keeled, apex aristate to apiculate. Female spikelets usually growing at base of branch, narrowly ovoid; glumes broadly ovate to ovate-lanceolate, keeled, apex aristate to apiculate. Male flowers: stamens 3. Female flowers: ovary pubescent; stigmas 3. Disk yellow, 1.6–2 mm in diam., with dense rust-colored lines, 3-lobed; lobes nearly semicircular, margin reflexed, apex rounded. Nutlet white, subspherical, ca. 2.5 mm in diam., slightly 3-sided, slightly reticulately pitted, slightly stellate pubescent. Fl. and fr. Dec–Apr.

Valleys, forests, grasslands; (below 100–)300–900 m. Guangdong, Hainan [Cambodia, Indonesia, Laos, Malaysia, Myanmar, Papua New Guinea, Philippines, Thailand, Vietnam; tropical Australia, Pacific islands].

13. *Scleria terrestris* (Linnaeus) Fassett, *Rhodora* 26: 159. 1924.

高秆珍珠茅 gao gan zhen zhu mao

Zizania terrestris Linnaeus, *Sp. Pl.* 2: 991. 1753; *Scleria doederleiniana* Boeckeler; *S. elata* Thwaites; *S. elata* var. *latior* C. B. Clarke.

Perennials, stoloniferous. Rhizomes woody, with dark purple scales. Culms sparse, 0.6–3 m tall, 4–7 mm wide, 3-angled, often scabrous, glabrous. Leaf sheaths 1–8 cm, papery; basal 2 or 3 sheaths on culm purplish red, not winged; sheaths at middle part of culm with wings 1–3 mm wide; contraligule semicircular, short, usually barbate, barbs purple; leaf blade linear, 30–40 cm × 6–10 mm, papery, slightly scabrous, glabrous. Involutral bracts leaflike, basalmost to 40 cm, sheathing; bractlets setaceous, basally auriculate, auricles slightly hispid. Inflorescences paniculate, with 1–3 distant branches; branches 3–8 × 1.5–6 cm. Spikelet 1(or) 2 in a cluster, entirely unisexual, oblong-ovoid to narrowly ovoid, apex truncate to acuminate. Glumes of male spikelets 2–3 mm, thickly membranous, basal ones keeled and with rust-colored short lines, apical ones pale colored and scarious. Female spikelets usually growing at base of branch; glumes broadly ovate to ovate-lanceolate, 2–4 mm wide, sometimes with rust-colored short lines, keeled, apex apiculate. Male spikelets 3-flowered. Male flowers: anthers linear. Female flowers: stigmas 3. Disk yellow, ca. 1.8 mm in diam., slightly 3-lobed to barely lobed; lobes semicircular, flat, margin reflexed. Nutlet white or pale brown, spherical to ovoid, ca. 2.5 mm in diam., sometimes ± 3-sided, reticulate, slightly hispid, apex tipped. Fl. and fr. May–Oct.

Slopes, dry or moist places, valleys, stream margins, under shrubs, open woods, beside farms or roads; near sea level to 2000 m. Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hainan, S Hunan, Jiangsu, Jiangxi, SE Sichuan, Taiwan, SE Xizang, Yunnan, Zhejiang [Bhutan, Cambodia, India, Indonesia, S Japan, Kashmir, Laos, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; N Australia].

14. *Scleria dulungensis* P. C. Li, Acta Bot. Yunnan. 12: 12. 1990.

独龙珍珠茅 du long zhen zhu mao

Rhizomes not seen. Culms to 100 cm tall, 5–8 mm wide, 3-angled, scabrous on ridges. Leaf sheath pale green, 3-angled, glabrous, not winged; contraligule oblong, barbate; leaf blade 15–20 cm, glabrous, veins and margin scabrous. Involucral bracts leaflike, sheaths pale green; bractlets glumelike, long awned. Inflorescences paniculate, to 50 cm, with 9–11 lateral branches; branches 10–15 × 10–12 cm, spreading and distant, with many spikelets. Spikelets single, unisexual, blackish purple; basal spikelets female, apex obovate; apical spikelets male, oblong, apex truncate; female glumes ovate-oblong, 3–3.5 mm, midrib green, apex acuminate. Disk ca. 3 mm in diam., 3-lobed; lobes golden yellow with purple lines, semicircular, margins reflexed. Nutlet white, spherical, ca. 3 mm, puberulent, reticulation purplish brown, apex tipped. Fl. and fr. Aug.

• Grasslands bordering evergreen broad-leaved forests on slopes; 1300–1400 m. Yunnan (Gongshan).

15. *Scleria levis* Retzius, Observ. Bot. 4: 13. 1786.

毛果珍珠茅 mao guo zhen zhu mao

Scleria hebecarpa Nees; *S. hebecarpa* var. *pubescens* (Steudel) C. B. Clarke; *S. levis* var. *pubescens* (Steudel) C. Z. Zheng; *S. pubescens* Steudel.

Perennials, stoloniferous. Rhizomes woody, covered with purple scales. Culms laxly tufted or scattered, 70–90 cm tall, 3–5 mm wide, 3-angled, scabrous, pubescent. Leaf sheath 1–8 cm, papery; sheath of leaves at culm base brown, not winged; sheaths on apical half of culm green, wing 1–3 mm wide; contraligule nearly semicircular, short, barbate; leaf blade linear, ca. 30 cm × 7–10 mm. Involucral bracts leaflike, basalmost to 13 cm; bractlets setaceous, auriculate at base, auricles barbate. Inflorescences paniculate, with 1 or 2 lateral branches; branches 3–8 × 1.5–3 cm. Spikelets 1 or 2 in a cluster, brown, unisexual, sessile, ca. 3 mm. Male spikelets narrowly ovoid to oblong-ovoid; glumes 1.5–3 mm, keeled, thickly membranous. Female spikelets usually at basal part of branch, narrowly ovoid; glumes oblong-ovate, broadly ovate, or ovate-lanceolate, keeled, with rust-colored short lines. Male flowers: stamens 3; anthers linear, ca. 1.3 mm. Female flowers: stigmas 3. Disk pale yellow, slightly narrower than nutlet, deeply 3-lobed; lobes lanceolate-triangular, margin reflexed. Nutlet white, spherical to ovoid, ca. 2 mm in diam., bluntly 3-sided, ± smooth to rugulose, apex tipped. Fl. and fr. Jun–Sep.

Dry places, grasslands on slopes, thickets in forests, scrub; near sea level to 1500 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, SE Xizang, Yunnan, Zhejiang [Bangladesh, Cambodia, India, Indonesia, Japan, Laos, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; NE Australia, Pacific islands].

16. *Scleria jiangchengensis* Y. Y. Qian, Bull. Bot. Res., Harbin 19: 241. 1999.

江城珍珠茅 jiang cheng zhen zhu mao

Perennials, stoloniferous. Rhizomes woody, covered with

brown scales. Culms laxly tufted to scattered, 70–110 cm tall, 3–4 mm wide, 3-angled, slightly puberulent. Sheath brown to greenish brown at middle part of culm, 1–6 cm, papery, puberulent, wings 1–3 mm wide; contraligules nearly semicircular, puberulent, barbate; leaf blade linear, to 35 cm × 3–8 mm, both surfaces pubescent. Involucral bracts leaflike, sheathing; bractlets setaceous, puberulent, base auriculate. Inflorescences paniculate, with 2–4 lateral branches; branches 2–7 × 1.5–5 cm, slightly distant. Spikelets 1 or 2 in a cluster, greenish purple to dark purple, 3.5–4.5 mm, unisexual. Male spikelets narrowly ovoid; basal glumes 1.5–3.3 mm, thickly membranous; apical glumes thinner and paler. Female spikelets usually at basal part of branch, narrowly ovoid; glumes 5; basal 2 glumes ovate, not keeled; apical 3 glumes ovate to ovate-lanceolate, keeled, apex awned. Male flowers: stamens 3. Female flowers: stigmas 3. Disk yellowish white, slightly narrower than nutlet, deeply 3-lobed, margins partly reflexed. Nutlet white, spherical, 2.5–2.8 mm in diam., 3-sided, reticulate, puberulent, apex tipped. Fl. and fr. Jul–Sep.

• Forests; 1000–1100 m. Yunnan (Jiangcheng).

No specimen of this species has been seen by the present authors. The description was adapted from the original protologue of the species.

17. *Scleria scrobiculata* Nees & Meyen in Wight, Contr. Bot. India, 117. 1834.

轮叶珍珠茅 lun ye zhen zhu mao

Perennials. Rhizomes hardened. Culms 1–2.5 m, 4–10 mm thick, triquetrous, scabrous on apical angles. Leaves ± in whorls of 2–5 at mid-culm (otherwise scattered); sheaths 4–6 cm, papery, glabrous, winged or not; contraligule depressed rounded, margin ciliate; leaf blade linear, ca. 40 × 1–1.3 cm, thickly papery, slightly scabrous, apically attenuate. Involucral bracts leaflike, basalmost to 15 cm, sheathing; bractlets setaceous. Inflorescences paniculate, with several branches; lateral branches spreading, often 2 or 3 in a cluster, 6–7 × ca. 10 cm, axes angled. Spikelets 2 or 3 in a cluster, brown, 3–4 mm, unisexual. Male spikelets oblong-ovoid, pedicellate, apex truncate; glumes rust-colored to brown, 3–4 mm, membranous, basal ones keeled and with a cuspidate apex. Female spikelets narrowly ovoid, apex acuminate; glumes broadly ovate to ovate, keeled. Male flowers: stamens 3; anthers linear, ca. 1 mm; connective apex protruding, ca. 1/4 as long as anther. Female flowers: stigmas 3. Disk brown to purple, 3-lobed; lobes smooth, narrow, apex acute. Nutlet whitish, globose, 2.5–3 × 2.2–2.7 mm, slightly 3-sided, with hexagonal reticulation, scrobiculate (marked with many shallow depressions, grooves, or pits), glabrous but sparsely pubescent on ridges, apex cuspidate. Fl. and fr. Apr–Aug.

Evergreen broad-leaved forests; below 100–300 m. Guangdong (Lianzhou), Taiwan (Taidong) [Indonesia, Malaysia, Papua New Guinea, Philippines, Thailand, Vietnam; N Australia, Indian Ocean islands, Pacific islands].

18. *Scleria purpurascens* Steudel, Syn. Pl. Glumac. 2: 169. 1855.

紫花珍珠茅 zi hua zhen zhu mao

Perennials. Rhizomes hardened. Culms 1–2 m tall, 3–7

mm thick, triquetrous, scabrous or smooth on apical angles, glabrous or pubescent. Leaves \pm in whorls of 2–5 at mid-culm (otherwise scattered); sheath 3–6 cm, papery, glabrous, wingless; contraligule depressed rounded, margin hirsute-ciliate; leaf blade linear, 30–60 \times 0.3–1.5 cm, thickly papery, slightly scabrous, apically long acuminate. Involucral bracts leaflike, basalmost to 15 cm, sheathing; bractlets setaceous. Inflorescences paniculate, 20–50 cm, with 1–4 branches; lateral branches often 2 or 3 clustered, spreading, 4–10 \times ca. 10 cm, axes angled. Spikelets 2 or 3 in a cluster, brown, 3–4 mm, unisexual (rarely bisexual). Male spikelets oblong-ovoid, pedicellate, apex truncate; glumes rust-colored to brown, 3–4 mm, membranous, basal ones keeled and with a cuspidate apex. Female spikelets obovoid, apex acuminate; glumes broadly ovate to ovate, keeled. Male flowers: stamens 3; anthers linear, ca. 1 mm; connective apex protruding, ca. 1/4 as long as anther. Female flowers: stigmas 3. Disk brown to purple, 3-lobed; lobes smooth, narrow, apex acute. Nutlet white but purplish brown when mature, ovoid, ellipsoid, or obovoid, 2–2.5 \times 1.7–2 mm, slightly 3-sided, with hexagonal reticulation, conspicuously cancellate, sparsely pubescent on ridges and apex, apex cuspidate. Fl. and fr. summer.

Slopes, valleys, open woods; below 1000 m. Guangdong, Hainan [India, Indonesia, Malaysia, Myanmar, Philippines, Thailand, Vietnam; Indian Ocean islands].

19. *Scleria psilorrhiza* C. B. Clarke in J. D. Hooker, Fl. Brit. India 6: 691. 1894.

细根茎珍珠茅 xi gen jing zhen zhu mao

Perennials. Stolons ca. 3 mm in diam., covered with brown [or purplish] scales. Culms 60–100[–150] cm tall, 2–4 mm wide, sharply 3-angled, smooth to scabrous, glabrous. Leaf sheath 1–15 cm; several sheaths brown at base of culm, membranous to papery, not winged; other sheaths yellowish green, papery, wing 2–5 mm wide; ligule yellowish brown, glabrous or pilose; contraligule ovate-deltoid; leaf blade linear, ca. 30 \times 0.5–1.5 cm, papery, glabrous. Involucral bracts leaflike, basalmost to 23 cm, sheathing; bractlets setaceous, base dilated. Inflorescences paniculate, with 1 distant lateral branch; branch spicate. Spikelets usually 2 or 3 in a cluster, rust-colored brown, sessile, ca. 3.5 mm, unisexual [or bisexual]. Male spikelets ellipsoid to oblong; glumes 2–3 mm, thickly membranous. Female spikelets usually at base of branch, ellipsoid to narrowly ovoid; glumes broadly ovate-lanceolate to broadly ovate, keeled, apex aristate. Male flowers: stamens 3; anthers linear, ca. 1.5 mm. Female flowers: stigmas 3. Disk pale brown, bluntly triangular, ca. 2.5 mm in diam., shallowly 3-lobed; lobes nearly semicircular, short, margin reflexed. Nutlet white or pale brown, ovoid, ca. 3 mm in diam., smooth, shiny, glabrous. Fl. and fr. Jul.

Sunny slopes; ca. 200 m. Yunnan [Cambodia, India, Indonesia, Papua New Guinea, Philippines, Thailand; N Australia].

20. *Scleria poiformis* Retzius, Observ. Bot. 4: 13. 1786.

稻形珍珠茅 dao xing zhen zhu mao

Scleria oryzoides J. Presl & C. Presl.

Perennials. Culms to 1 m tall, robust, 3-angled, scabrous,

glabrous. Leaf sheath 7–25 cm, to 2 mm thick, leathery to \pm fleshy, glabrous, sometimes 3-winged, basal ones purplish red; contraligule not prominent; leaf blade linear, ca. 1 m \times 1–2.5 cm, glabrous, margins sometimes scabrous, apex acute. Involucral bracts setaceous, basalmost to 1.5 cm; bractlets glumelike, shorter than spikelets. Inflorescences compound paniculate, ca. 15 \times 7–8 cm, with many branches; branch axes long, angled, scabrous, with many spikelets. Spikelets 1 or 2 in a cluster, dark brown, unisexual. Male spikelets many, more than female ones, oblong-ovoid, ca. 4 mm, apex truncate; glumes 2–3 mm, membranous, with rust-colored lines. Female spikelets usually at base of branch, narrowly ovoid, slightly longer than male ones, apex acuminate; glumes triangular-ovate, ovate-lanceolate, or broadly ovate, slightly longer than male glumes. Male flowers: stamen 1; anther linear, ca. 1.7 mm; connective apex protruding, 1/5–1/4 as long as anthers. Female flowers: stigmas 3. Disk brown, triangular-cordate, ca. 1.5 mm in diam., 3-lobed; lobes triangular, short, margin reflexed, apex acute. Nutlet white or gray, ovoid, ca. 3 \times 2.5 mm, bluntly triangular, smooth, shiny, glabrous. Fl. and fr. Apr.

Water margins. Hainan [Cambodia, India, Indonesia, Laos, Malaysia, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa and Australia, Madagascar].

21. *Scleria radula* Hance, Ann. Sci. Nat., Bot., sér. 4, 18: 232. 1862.

光果珍珠茅 guang guo zhen zhu mao

Scleria laeviformis Tang & F. T. Wang.

Perennials. Culms ca. 1 m tall, ca. 1 cm wide, 3-angled. Leaf sheath laxly embracing culm, to 15 cm, sometimes pubescent, winged on middle part of culm, wing 1–4 mm wide; contraligule purple, triangular; leaf blade linear, 15–50 \times 1.5–2.5 cm, papery, slightly scabrous, glabrous. Involucral bracts leaflike, basalmost to 25 cm, sheathing; bractlets setaceous, pubescent. Inflorescences paniculate; lateral branches 4 or 5, 6–5 \times 5–10 cm, compact, with many spikelets, ca. 2/3 of spikelets male. Male spikelets brown, oblong-ovoid; glumes membranous. Female spikelets usually basal, narrowly ovoid to ovoid; glumes brown, thickly membranous, hispid, apex apiculate. Male flowers: stamens 3. Female flowers: stigmas 3. Disk yellow, ca. 1.5 mm in diam., 3-lobed; lobes semicircular, margins thick and reflexed. Nutlet white, ovoid, ca. 2.5 \times 2 mm, bluntly 3-sided, smooth, glabrous, apex tipped. Fl. and fr. Apr–Aug.

• Valleys, streamsides, dense forests, wet places among hills; 100–800 m. Guangdong, Guangxi, Hainan, Taiwan, Yunnan.

22. *Scleria oblata* S. T. Blake, Blumea 11: 219. 1961.

扁果珍珠茅 bian guo zhen zhu mao

Perennials. Rhizomes woody, covered with purple to purplish brown scales. Culms tufted, 60–120 cm tall, 2–3 mm wide, triquetrous, smooth, glabrous. Leaves cauline; sheath 2–7 cm, papery, glabrous; sheath at culm base brown to purplish brown, not winged, with 3 ovoid-lanceolate teeth of various sizes at opening; sheath at middle part of culm green, wing 1–3 mm wide; contraligule brown to reddish brown, shortly deltate, 1–3 mm, glabrous or ciliate; leaf blade linear, 15–60 cm \times 6–9

mm, papery, slightly scabrous, glabrous. Involucral bracts leaf-like, basalmost to 25 cm, sheathing; bractlets setaceous, base auriculate and hispid. Inflorescences paniculate, 10–20 cm, with 1–3 slightly distant lateral branches; branches 6–10 × 2–6 cm, slightly condensed. Spikelets 2 or 3 in a cluster, brown to purple, ca. 4 mm, unisexual. Male spikelets oblong-ovoid to narrowly ovoid-oblong; glumes 3–4 mm, membranous, margin sometimes ciliate; basal glumes keeled, apex aristate to apiculate. Female spikelets usually at base of branch, ovoid; glumes ovate-orbicular, keeled, apex acuminate. Male flowers: stamens 3. Female flowers: ovary pubescent; stigmas 3. Disk yellow, 1.6–2 mm in diam., deeply 3-lobed; lobes ovate, margin reflexed, apex obtuse to rounded. Nutlet white, ± spherical, ca. 2.5 mm in diam., smooth, glabrous.

Open wet grasslands; below 700 m. Guangdong [Bangladesh, India, Indonesia, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam; Indian Ocean islands].

23. *Scleria harlandii* Hance, Ann. Sci. Nat., Bot., sér. 5, 5: 248. 1866.

圆秆珍珠茅 *yuan gan zhen zhu mao*

Scleria purpurascens Benth (1861), not Steudel (1855).

Perennials. Culms to more than 1 m tall, ca. 6 mm wide, subcylindric to sometimes slightly 3-angled, shiny, glabrous. Leaf sheath yellow with purple lines, tightly embracing culm, 4–6 cm, thinly leathery, not winged, sometimes pilose, apical ones often overlapped; contraligule purple, semicircular, margin ciliate, cilia ca. 1 mm; leaf blade linear, ca. 30 × 0.6–0.8 cm, thinly leathery, slightly scabrous, glabrous, apex attenuate. Involucral bracts leaflike, basalmost to 35 cm, sheathing; bractlets setaceous, subequaling spikelets, hairy, base auriculate. Inflorescences compound paniculate, to 40 cm, with 8 or 9 branches; branches ca. 5 cm, triangular, axes often pubescent. Spikelets 1 or 2 in a cluster, light rust-colored to purple, 3–4 mm, mostly unisexual. Male spikelets oblong-ovoid to narrowly ovoid, apex truncate to acute; glumes 1.4–3 mm, membranous, with rust-colored lines. Female spikelets usually at base of branch, narrowly ovoid, apex acuminate; glumes broadly ovate to ovate-lanceolate, ± keeled, margin apically ciliate, apex cuspidate.

Male flowers: stamens 3; anthers linear, ca. 1 mm; connective apex ca. 0.3 mm. Female flowers: stigmas 3. Disk yellow with light rust-colored lines, ca. 2 mm in diam., 3-lobed; lobes triangular, margins reflexed, apex acute to acuminate or 2- or 3-lobed. Nutlet white, subspherical, ca. 2.5 mm in diam., bluntly 3-sided, smooth, shiny, only apical part sparsely hairy, apex tipped. Fl. and fr. Mar–Sep.

Slopes, valleys, woodlands; below 400 m. Fujian, Guangdong, Guangxi, Hainan, SE Yunnan [Vietnam].

24. *Scleria sumatrensis* Retzius, Observ. Bot. 5: 19. 1788.

印尼珍珠茅 *yin ni zhen zhu mao*

Perennials. Culms 2–4 m tall, 6–7 mm wide, 3-angled, glabrous. Leaves ± in whorls of 3; sheaths ca. 4 cm, papery, glabrous, basal ones winged; contraligule nearly semicircular, very short, margin ciliate; leaf blade linear, ca. 40 × 1–1.3 cm, thickly papery, slightly scabrous, apically attenuate. Involucral bracts leaflike, basalmost to 25 cm, sheathing; bractlets setaceous, laterally hairy, base dilated. Inflorescences compound paniculate, with several branches; lateral branches often 2 or 3 in a cluster, 6–7 × ca. 10 cm, spreading, axes angled. Spikelets 1 or 2 in a cluster, brown, ca. 5 mm, unisexual, basal glumes distichous. Male spikelets oblong-ovoid, apex truncate; glumes rust-colored to brown, 2–3.5 mm, membranous, basal ones keeled and with a cuspidate apex. Female spikelets narrowly ovoid, apex acuminate; glumes broadly ovate-lanceolate, ovate, or oblong-ovate, keeled. Male flowers: stamens 3; anthers linear, ca. 1.2 mm; connective apex protruding, ca. 1/4 as long as anther. Female flowers: stigmas 3. Disk brown, purple, yellowish, or bright shiny red, cup-shaped, 1/2–4/5 height of nutlet and enclosing it, 3-lobed; lobes smooth, shiny, apex dentate. Nutlet flattened globose, ca. 1.5 × 2–2.5 mm, with hexagonal reticulation, sparsely pubescent, apex cuspidate. Fl. and fr. Apr.

Stream margins; 200–300 m or less. Hainan, Taiwan (Pingdong) [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam; N Australia, Indian Ocean islands, Pacific islands].

31. *DIPLACRUM* R. Brown, Prodr. 240. 1810.

裂颖茅属 *lie ying mao shu*

Zhang Shuren (张树仁); Gordon C. Tucker, Jeremy J. Bruhl

Herbs, annual or occasionally perennial, tenuous, with thin fibers. Leaves cauline, sheathing, without a ligule, regularly spaced along stem; leaf blade linear, short. Inflorescence a capitate cyme, condensed, exerted from leaf sheath. Spikelets unisexual. Male spikelets basal on inflorescence; glumes usually 3, usually thin and narrow, each with 1 or 2 male flowers. Female spikelets apical on inflorescence; glumes 2, opposite, equal in size, veined, each with 1 female flower, apex 3-lobed or not. Male flowers: anthers 1–3. Female flowers: stigmas 3. Disk present. Nutlet small, globose, with vertical ribs or reticulate, sometimes apically hairy, tightly enclosed in 2 subtending glumes and shed with them.

About six species: tropics into warm temperate regions of both hemispheres; two species in China.

- 1a. Glume subtending female flower prominently several veined, apex 3-lobed; nutlets globose, with 3 longitudinal ribs and rectangular reticulation 1. *D. caricinum*
 1b. Glume subtending female flower with only a prominent midvein, apex not lobed; nutlets depressed globose, with 3 longitudinal ribs and square reticulation between ribs 2. *D. reticulatum*

1. *Diplacrum caricinum* R. Brown, Prodr. 241. 1810.

裂颖茅 lie ying mao

Scleria caricina (R. Brown) Benth.

Annuals. Culms 10–40 cm, slightly erect or sprawling, 3-angled, glabrous. Veins of leaf blades and bracts purple, fine. Leaf sheath with narrow wings but apically broader; ligule absent; leaf blade linear, 1–4 cm × 1.5–3 mm, apex acute to acuminate. Involucral bracts and bractlets leaflike or glumelike; leaflike bracts green, 3–10 mm, papery. Inflorescence a capitate cyme, 1 or 2 at each node. Male spikelets with 3 glumes and 1 or 2 flowers; glumes scarious. Female spikelets oblong to ovoid, with 2 opposite glumes and 1 flower; glumes greenish yellow, suboblong, ca. 1.8 mm, membranous, prominently several veined, 3-lobed, middle lobe larger, longer, and apically mucronate. Male flowers: anthers 1 or 2. Female flowers: stigmas 3, pubescent. Disk adnate to base of nutlet, obscurely 3-sided. Nutlet included in 2 glumes, globose, 0.8–1 mm in diam., with 3 longitudinal ribs and rectangular reticulation, apex hispid. Fl. and fr. Sep–Oct.

Water margins, shaded slopes, field margins; below 100–800 m. Fujian, Guangdong, S Guangxi, Hainan, S Jiangsu, Taiwan, S Zhejiang [Bangladesh, Cambodia, India, Indonesia, Japan, Laos, Malaysia, Myanmar,

Philippines, Sri Lanka, Thailand, Vietnam; N Australia, Indian Ocean islands, Pacific islands].

2. *Diplacrum reticulatum* Holttum, Gard. Bull. Singapore 11: 295. 1947.

网果裂颖茅 wang guo lie ying mao

Scleria reticulata (Holttum) J. Kern.

Annuals. Culms 10–40 cm, slightly erect or sprawling, 3-angled, glabrous. Veins of leaf blades and bracts purple, fine. Leaf sheath with narrow wings but apically broader; ligule absent; leaf blade linear, 1–4 cm × 1.5–3 mm, apex acute to acuminate. Involucral bracts and bractlets leaflike or glumelike; leaflike bracts green, 3–10 mm, papery. Inflorescence a capitate cyme, 1 or 2 at each node. Male spikelets with 3 glumes and 1 or 2 flowers; glumes scarious. Female spikelets turbinate, 1.2–1.5 × ca. 1.2 mm; glumes greenish yellow and often with pale red spots, ovate to oblong, ca. 1.2 mm, membranous, midvein prominent, lateral veins faint, apex entire (not 3-lobed) and mucronate. Disk adnate to base of nutlet, obscurely 3-sided. Nutlet depressed globose, ca. 1 mm in diam., with 3 longitudinal ribs and square reticulation between ribs, apex hispid. Fl. and fr. autumn and winter.

Wet grasslands. Hainan [Bangladesh, Malaysia (Peninsular), Myanmar, Thailand].

32. KOBRESIA Willdenow, Sp. Pl. 4: 205. 1805.

嵩草属 song cao shu

Zhang Shuren (张树仁); Henry J. Noltie

Herbs, perennial. Rhizomes usually very short, sometimes obliquely and shortly creeping, rarely stoloniferous and spreading. Stems usually tufted, rarely scattered. Leaves basal or sub-basal; basal leaf sheaths persistent and usually prominent; blade with midrib not distinct abaxially (margin involute, sometimes filiform), or with midrib distinct abaxially (flat, sometimes folded). Inflorescence terminal, paniculate to spicate, sometimes unisexual; lowest involucral bract leafy or glumelike, sheathless; branches of inflorescence sessile. Spikelets subtended by glumes, unisexual or bisexual; bisexual spikelets with 1 female flower at base and 1 to several male flowers at distal parts enclosed by prophylls; unisexual spikelets with a solitary female flower within prophylls. Sterile rachilla in female spikelet usually present. Flowers unisexual. Female flowers reduced to naked pistils; ovary 2- or 3-carpellate; style elongated; stigmas 2 or 3. Male flowers subtended by male glumes; stamens 1–3; filaments free, longer than glumes, slender; male glumes usually distinct in shape from glumes of female spikelets. Nutlets trigonous or flattened, usually included in prophylls, beaked or not, stipitate or not.

About 54 species: mainly in temperate regions of the N Hemisphere; 44 species (16 endemic, one unconfirmed) in China.

- 1a. Prophylls leathery in texture, utriculiform, inflated, much larger than nutlet at maturity.
 - 2a. Leaves flat with midrib conspicuous abaxially; culms over 6 cm; prophylls over 5 mm; plants of meadows and slopes up to 4600 m 16. *K. inflata*
 - 2b. Leaves filiform, U-shaped in cross section, midrib not conspicuous abaxially; culms under 4 mm; prophylls to 5 mm; dwarf mat-forming plants of stony plateaus over 4800 m 17. *K. yadongensis*
- 1b. Prophylls thinly textured, open or utriculiform, if utriculiform then closely enveloping nutlet at maturity.
 - 3a. Nutlets mostly with 2 stigmas, compressed (biconvex) with 2 sharp edges.
 - 4a. Spikes linear, more than 5 × as long as broad; sometimes some nutlets with 3 stigmas 28. *K. myosuroides*
 - 4b. Spikes short, ca. 3 × as long as broad; nutlets all with 2 stigmas.
 - 5a. Glumes pale brown to brown, margin hyaline or not; nutlets obovoid, very shortly stipitate; lower spikelets with 1 female and 2–5 male flowers (E China) 43. *K. pusilla*
 - 5b. Glumes dark brown, occasionally brown, margin narrowly hyaline or not; nutlets oblong, distinctly stipitate; lower spikelets with 1 female and 1–3 male flowers (W China) 44. *K. karakoromensis*
 - 3b. Nutlets all or mostly with 3 stigmas (in *K. capillifolia*, *K. filifolia*, and *K. myosuroides* sometimes with 2), trigonous, although one of angles sometimes extremely weak (so nutlet appearing compressed).
 - 6a. Rhizomes elongate, stoloniferous.

- 7a. Stigmas 3; nutlets not stipitate; prophylls usually over 7 mm; plants robust 1. *K. gammiei*
- 7b. Stigmas 2; nutlets long stipitate at maturity (stipes to 1 mm); prophylls to 6.5 mm; plants slender.
- 8a. Leaf blade flat, midrib distinct abaxially; prophylls to 3.6 mm; spikelets usually unisexual; glumes fawn brown 14. *K. macrantha*
- 8b. Leaf blade filiform, U-shaped, midrib not distinct abaxially; prophylls over 4 mm; lower spikelets of lateral spikes usually bisexual; glumes dark reddish brown 15. *K. hohxilensis*
- 6b. Rhizomes extremely short, so plants densely tufted.
- 9a. Inflorescence paniculate.
- 10a. Prophylls utriculiform (open only near apex); most spikelets unisexual (some near base of inflorescence branches sometimes bisexual).
- 11a. Prophylls to 3.5 mm; glumes of female spikelets to 3 mm 6. *K. fragilis*
- 11b. Prophylls over 3.5 mm; glumes of female spikelets over 4 mm.
- 12a. Leaves usually over 5 mm wide; prophylls over 8 mm, rachilla much shorter than nutlet; inflorescence branches linear, elongate 3. *K. curticeps*
- 12b. Leaves never over 5 mm wide; prophylls under 7 mm (if more than inflorescence dense, clublike and lowest involucre bract glumelike), rachilla subequaling or exceeding nutlet.
- 13a. Nutlet elliptic, ca. 2 × as long as wide (Yunnan only) 5. *K. loliacea*
- 13b. Nutlet narrowly elliptic to linear, ca. 3 × as long as wide (more widespread).
- 14a. Surface of prophyll glabrous; branches ± equal in length throughout inflorescence, curving outward 2. *K. laxa*
- 14b. Surface of prophyll minutely hispid near apex; lower inflorescence branches longer than upper, appressed or obliquely ascending.
- 15a. Rachilla shorter than nutlet; margins of glumes hyaline; culms slender 4. *K. sikkimensis*
- 15b. Rachilla almost or exceeding prophyll; margins of glumes not hyaline; culms stout 7. *K. uncinoides*
- 10b. Prophylls open almost to base; spikelets bisexual or unisexual.
- 16a. Spikelets bisexual.
- 17a. Leaves filiform; some nutlets with 2 stigmas 11. *K. filifolia*
- 17b. Leaves flat; all nutlets with 3 stigmas.
- 18a. Culms very stout, acutely triquetrous; inflorescence very dense, club-shaped 12. *K. kansuensis*
- 18b. Culms slender, not obviously triquetrous; inflorescence branches slightly spreading 13. *K. royleana*
- 16b. Spikelets unisexual.
- 19a. Rhizome stout, oblique, very shortly creeping, bearing short, bladeless sheaths 8. *K. kuekenthaliana*
- 19b. Rhizome not developed, culms densely tufted, not bearing bladeless sheaths.
- 20a. Leaves filiform 9. *K. condensata*
- 20b. Leaves flat, midrib distinct abaxially.
- 21a. Prophylls over 5 mm, keels hispid 10. *K. tunicata*
- 21b. Prophylls to 4 mm, keels not hispid 13. *K. royleana*
- 9b. Inflorescence spicate.
- 22a. Prophylls over 6 mm 21. *K. robusta*
- 22b. Prophylls under 6 mm.
- 23a. Lower spikelets bisexual, with at least 1 male flower enclosed within prophyll.
- 24a. Leaves flat, midrib distinct abaxially.
- 25a. Prophylls with basal female and 2–7 male flowers 18. *K. humilis*
- 25b. Prophylls with basal female and 1 or 2 male flowers.
- 26a. Prophylls utriculiform, open only above middle; glumes not or minutely aristate; leaves short, stiff 19. *K. duthiei*
- 26b. Prophylls open almost to base; glumes long aristate; leaves longer, flaccid 20. *K. filicina*
- 24b. Leaves filiform, midrib not distinct abaxially.
- 27a. Prophylls open in upper half (SW Xizang) 22. *K. burangensis*
- 27b. Prophylls open almost to base.
- 28a. Plants and spikes robust, basal sheaths conspicuous, papery, commonly orange-brown, shiny; male flowers up to 7 per prophyll.

- 29a. Glumes aristate, with conspicuous greenish midrib; inflorescence elongate; nutlets 3–4.5 mm 23. *K. cuneata*
- 29b. Glumes usually not aristate, midrib not conspicuous; inflorescence shorter and broader; nutlets 1.7–3.5 mm 24. *K. schoenoides*
- 28b. Plants and spikes more slender, basal sheaths often dark brown; male flowers 1–5 per prophyll.
- 30a. Culm stout (to 1.5 mm in diam.), erect, exceeding leaves; spike very short in relation to culm 27. *K. tibetica*
- 30b. Culm more slender (to 1.3 mm in diam.), not or slightly exceeding leaves; spike more elongate.
- 31a. Sheaths usually dark chocolate brown, sometimes shiny; glumes wide, blunt, with broad hyaline margin 26. *K. capillifolia*
- 31b. Sheaths paler, dull; glumes narrower, more acute, not or narrowly hyaline margined.
- 32a. Spike club-shaped; glumes orange-brown; male flowers usually 3–5 per spikelet; nutlets all with 3 stigmas 25. *K. setschwanensis*
- 32b. Spike linear; glumes dark brown; male flowers usually 1 per spikelet; some nutlets sometimes with 2 stigmas 28. *K. myosuroides*
- 23b. All spikelets unisexual, prophylls enclosing a nutlet and sterile rachilla, male and female spikelets sometimes in separate inflorescences or on separate plants.
- 33a. Spikes clearly bisexual (androgynous), with female spikelets below and male spikelets at apex.
- 34a. Prophylls utriculiform, open only in upper half; glumes orange-brown 29. *K. nepalensis*
- 34b. Prophylls open to base; glumes dark brown 30. *K. cercostachys*
- 33b. Spikes unisexual (occasionally with a few reduced male spikelets at apex).
- 35a. Leaves flat.
- 36a. Prophylls narrowly elliptic or oblong, not embracing nutlets, keels obscure 32. *K. fissiglumis*
- 36b. Prophylls linear or linear-oblong, embracing nutlets, keels obvious and scabrid.
- 37a. Prophylls 2–3.5 mm, utriculiform when young; female inflorescence linear, 1.7–6.5 cm 31. *K. esenbeckii*
- 37b. Prophylls 5–5.5 mm, open to base even when young; female inflorescence oblong, 1.5–2 cm 33. *K. falcata*
- 35b. Leaves filiform.
- 38a. Prophylls utriculiform, open only in upper half.
- 39a. Midvein of glume conspicuous, ca. 1/3 width of glume, green 34. *K. vidua*
- 39b. Midvein of glume less than 1/3 width of glume, not conspicuously green.
- 40a. Plants slender; glumes reddish brown to brown; prophylls elliptic (Sichuan) 35. *K. yangii*
- 40b. Plants rigid; glumes pale brown; prophylls narrowly oblong or lanceolate (more widespread, especially Xizang).
- 41a. Plants robust (culms 1–2 mm in diam.); inflorescences large, female ones 15–40 × 2–3 mm, male ones 17–30 × 4–5 mm; prophylls 3.5–5 mm 36. *K. littledalei*
- 41b. Plants slender (culms less than 1 mm in diam.); inflorescences small, female ones 10–20 × 2–3 mm, male ones 6–13 × 2–5 mm; prophylls 2.5–3 mm 37. *K. prainii*
- 38b. Prophylls open almost to base.
- 42a. Spikes club-shaped (ca. 2 × as long as wide).
- 43a. Dwarf, turf-forming plants; culms commonly under 5 cm; prophylls ca. 2.5 mm (widespread) 38. *K. pygmaea*
- 43b. Erect, tufted plants; culms usually over 7 cm; prophylls over 3 mm (Gansu, Qinghai) 39. *K. squamiformis*
- 42b. Spikes linear (more than 5 × as long as wide).
- 44a. Plants slender, culms ca. 0.5 mm in diam.; spikes slender, linear 40. *K. vaginosa*

- 44b. Plants stout, culms ca. 1 mm or more in diam.; spikes oblong.
- 45a. Basal sheaths fibrillose, dull; female glumes $5-6 \times 1.5-2$ mm, apex acute to obtuse, not hyaline; prophylls $5-6$ mm 41. *K. graminifolia*
- 45b. Basal sheaths not fibrillose, slightly shiny; female glumes $6.2-8 \times 2.5-4$ mm, apex broad, very blunt, hyaline; prophylls $7-9$ mm 42. *K. woodii*

1. *Kobresia gammiei* C. B. Clarke, Bull. Misc. Inform. Kew, Addit. Ser. 8: 68. 1908.

根茎嵩草 gen jing song cao

Kobresia williamsii T. Koyama.

Rhizomes elongated, stoloniferous. Basal sheaths few, pale reddish brown, dull, retaining dried leaf blades. Culms loosely tufted, trigonous to subterete, 7–58 cm tall, slender, 1–1.5 mm in diam. Leaves basal or sub-basal, shorter than culms; blade flat, 1.5–4.5(–5) mm wide, midrib distinct abaxially. Inflorescence loosely or densely paniculate, reddish brown with green, club-shaped, $2.6-8 \times 0.5-1.2$ cm; lowest involucral bract leafy or glumelike with long arista, shorter than or exceeding inflorescence. Lowest spikelets of inflorescence branches bisexual with 1 basal female flower and 1 distal male flower, middle ones unisexual with only 1 female flower, apical ones male; glumes reddish brown, with green midvein, elliptic to oblong, $(3.5-5.5-8.5 \times 3.2-4)$ mm, midvein broad, margin broadly hyaline, apex subacute to rounded-truncate. Prophylls pale green, partly brown, utriculiform, lanceolate, $(5.6-7-10.3 \times 1-2)$ mm, membranous, 2-keeled, keels smooth, apex attenuate into a beak. Nutlets yellowish green, obovoid, trigonous, $3.3-4 \times 1.5-2$ mm, not beaked. Rachilla in unisexual spikelets, shorter than or subequaling nutlet, flat, prominent, sometimes with a sterile male glume at apex. Stigmas 3, base of style disklike. Fl. and fr. May–Aug.

Grassy slopes, damp slopes in *Abies* forests, streamsides, cliffs; 3700–4400 m. Xizang [Bhutan, India (Sikkim), Nepal].

2. *Kobresia laxa* Nees in Wight, Contr. Bot. India, 119. 1834 [*“Cobresia”*].

疏穗嵩草 shu sui song cao

Elyna laxa (Nees) Kunth; *Hemicarex laxa* (Nees) Benth.; *Kobresia pseudolaxa* C. B. Clarke; *Schoenoxiphium laxum* (Nees) K. V. Ivanova.

Rhizomes shortly elongated. Basal sheaths few, pale to dark brown, dull, retaining dried leaf blades or not. Culms loosely tufted, obscurely trigonous, $(4-13-35)$ cm tall, slender, ca. 1 mm in diam. Leaves sub-basal, shorter than culms; blade flat, 1.4–4 mm wide, midrib distinct abaxially. Inflorescence a loose or sometimes slightly compact panicle, reddish brown, linear or oblong, $3.5-8 \times 1-1.5$ cm; inflorescence branches all similar in length, curving outward, lower branches again branched; lowest involucral bract leaflike, sometimes surpassing inflorescence. Inflorescence branches usually androgynous in upper part of inflorescence, those in lower part usually female, sometimes whole inflorescence composed of primarily

male or primarily female spikelets; spikelets unisexual; glumes reddish brown, with green midvein, narrowly ovate or oblong, $3.5-5 \times 1-1.4$ mm, midvein narrow, margin broadly hyaline, apex aristate, acute, or rounded. Prophylls pale green, utriculiform, linear or linear-lanceolate, sometimes slightly curved, $(3.5-4.5-6.6 \times 0.5-0.8)$ mm, membranous, 2-keeled, keels slightly scabrid, margins fused to apex or free in upper half. Nutlets pale yellow or brown, narrowly oblong or elliptic-oblong, trigonous, $2.5-3 \times 0.4-0.6$ mm, slightly beaked. Rachilla in female spikelets longer than nutlet, exerted from or included in prophyll, green, flat, margins scabrid. Stigmas 3. Fl. and fr. May–Jul.

Moist meadows, on wet rocks; 2200–3700 m. Xizang [Afghanistan, India (Himachal Pradesh, Sikkim), Kashmir, Nepal, Pakistan, Tajikistan].

3. *Kobresia curticeps* (C. B. Clarke) Kükenthal in Engler, Pflanzenr. 38(IV. 20): 47. 1909.

短梗嵩草 duan geng song cao

Carex curticeps C. B. Clarke in J. D. Hooker, Fl. Brit. India 6: 729. 1894.

Rhizomes short. Basal sheaths stout, pale brown, dull, retaining dried leaf blades, sometimes decaying to fibers. Culms tufted, erect, rigid, trigonous, 22–95 cm tall, 1.1–2.2 mm in diam. Leaves borne on lower half and subequaling culm; blade flat, $(3.7-5-7.5)$ mm wide, midrib distinct abaxially. Inflorescence densely paniculate, brown, narrow, $6.5-9.5 \times 0.8-2.3$ cm; lowest involucral bract erect, leaflike, sometimes exceeding inflorescence; branches usually androgynous in upper part of inflorescence, those in lower part usually female, sometimes whole inflorescence composed of primarily female spikelets; spikelets unisexual. Lower inflorescence branches linear, stiffly appressed (lowest to 6 cm), androgynous or female, sometimes again branched, bearing spikelets to base. Female glumes cream or brown, with green midvein, narrowly ovate or oblong, encircling branch, $5.5-10 \times 2-3$ mm, midvein broad, 3–5-ribbed, apex aristate. Prophylls utriculiform, linear-lanceolate, $(6-8-11.3 \times 1-1.6)$ mm, 2-keeled, keels minutely scabrid, herbaceous and strongly ca. 4-veined between keels, usually minutely hispid near margins above, margins fused from base to just below apex. Nutlets cream or pale brown, very narrowly ellipsoid, trigonous, $5.5-6.5 \times 1.3-1.7$ mm, shortly stipitate. Rachilla in female spikelets less than 1/2 length of nutlet. Stigmas 3. Fl. and fr. Jun–Oct.

Open stony or sandy slopes in damp conifer (including *Abies*) forests [in Bhutan]; 2700–4100 m. S Xizang (Yadong) [Bhutan, India (Sikkim, West Bengal), Nepal].

4. *Kobresia sikkimensis* Kükenthal in Engler, Pflanzenr. 38(IV. 20): 47. 1909.

锡金嵩草 xi jin song cao

Carex prainii Kükenthal, Bull. Herb. Boissier, sér. 2, 4: 51. 1903, not C. B. Clarke (1904), nor *Kobresia prainii* Kükenthal (1904).

Rhizomes short. Basal sheaths cream, dull, slender, retaining dried leaf blades. Culms tufted, rigid, erect, trigonous, 16–38 cm tall, ca. 1 mm in diam. Leaves borne on lower half, 1/2 as long as to equaling culm; blade flat, 2.4–3 mm wide, midrib conspicuous abaxially. Inflorescence densely paniculate, brown, narrowly pyramidal, 4–7 × 1–2 cm; lowest involucrel bract erect, leaflike, exceeding inflorescence; branches androgynous; spikelets unisexual. Lower inflorescence branches narrowly oblong, not stiffly appressed (lowest to 4 cm), androgynous, not bearing spikelets in lower 1/3. Female glumes brown, with green midvein, narrowly ovate or oblong, ca. 5.5 × 2 mm, midvein narrow, 3-ribbed, margin hyaline, apex aristate. Prophylls utriculiform, linear-lanceolate, 4.1–5.8 × 1–1.7 mm, 2-keeled, keels minutely scabrid, herbaceous and weakly ca. 4-veined between keels, usually minutely hispid above, margins fused from base to just below apex. Nutlets cream or pale brown, very narrowly ellipsoid, trigonous, 3–3.3 × 0.8–1.5 mm, shortly stipitate. Rachilla in female spikelets more than 1/2 length of nutlet. Stigmas 3. Fl. and fr. Jul–Aug.

?S Xizang [Bhutan, India (Sikkim), Nepal].

Although not yet recorded in China, this species is almost certain to occur in S Xizang, as it occurs very close to the border in NW Bhutan and also in India (Sikkim) and NE Nepal (where it occurs at forest margins and on scree in *Juniperus* forests at elevations of 3000–4200 m).

5. *Kobresia loliacea* F. T. Wang & Tang ex P. C. Li, Acta Bot. Yunnan. 12: 13. 1990.

黑麦嵩草 hei mai song cao

Rhizomes short. Basal sheaths few, pale brown, dull, retaining dried leaf blades. Culms tufted, 15–45 cm tall, slender, 1–1.5 mm in diam. Leaves basal or sub-basal, shorter than culms; blade flat, 1.5–2 mm wide, midrib distinct abaxially. Inflorescence loosely paniculate, yellowish green, linear, 2.5–6 × 0.4–0.5 cm; lowest involucrel bract leafy, longer than inflorescence. Spikelets bisexual with 1 basal female flower and 1–4 distal male flowers, sometimes unisexual with only 1 female flower; glumes yellowish green, oblong, 4.5–5.5 × 2–2.5 mm, apex mucronate. Prophylls yellowish green, utriculiform, oblong or elliptic, 5–6.6 × ca. 2 mm, papery, 2-keeled, keels smooth, many veined between keels, apex attenuate into beak. Nutlets pale to dark brown, obovoid-oblong, obscurely trigonous, 2.8–3.8 × 1–2 mm, not beaked. Rachilla in unisexual spikelets prominent, flat, ca. 2/3 as long as nutlet, with a sterile male glume at apex. Stigmas 3. Fl. and fr. Jul–Sep.

• Slopes, roadsides, grasslands; 3200–3400 m. Sichuan, Xizang, Yunnan.

6. *Kobresia fragilis* C. B. Clarke, J. Linn. Soc., Bot. 36: 267. 1903.

囊状嵩草 nang zhuang song cao

Carex curvata Boott, Ill. Gen. Carex 1: 2. 1858, not Knaf (1847); *Kobresia bonatiana* Kükenthal; *K. clarkeana* (Kükenthal) Kükenthal; *K. curticeps* (C. B. Clarke) Kükenthal var. *gyirongensis* Y. C. Yang; *K. curvata* C. B. Clarke; *K. hispida* Kükenthal; *K. yuennanensis* Handel-Mazzetti; *Schoenoxiphium clarkeanum* Kükenthal; *S. fragile* (C. B. Clarke) C. B. Clarke.

Rhizomes short. Basal sheaths few, pale brown, dull, not retaining dried leaf blades. Culms tufted, erect, trigonous or subterete, (1.5–)6–45 cm tall, slender, 0.5–1.1 mm in diam. Leaves basal or sub-basal, shorter than or equaling culms, sometimes curved; blade V-shaped in transverse section, inrolled, 1–2 mm wide, midrib not distinct abaxially. Inflorescence a loose or sometimes slightly compact panicle, yellowish brown, or green and partly brown, linear or narrowly cylindrical, sometimes curved, 1–8 × 0.2–0.7 cm; branches mainly androgynous, subequal in length, appressed or slightly spreading; lower inflorescence branches compound or simple, linear-oblong to ovate; lowest involucrel bract leaflike, usually surpassing inflorescence. Spikelets usually unisexual (occasionally bisexual); glumes pale yellow to brown, sometimes marked with brown spots and lines, ovate or oblong, 2–3.5 × 1–1.7 mm, midvein green, broad, margin hyaline, apex aristate, acute, or rounded. Prophylls pale yellow or pale green, sometimes with reddish brown spots and lines, utriculiform, oblong, narrowly elliptic, or narrowly ovate to lanceolate, 2.4–3.5 × 0.8–1.5 mm, membranous, 2-keeled, keels slightly scabrid or smooth, margins fused to apex. Nutlets pale yellow or brown, narrowly oblong or elliptic-obovoid, trigonous, 1.5–2.5 × 0.5–1 mm, shortly beaked. Rachilla in female spikelets longer than nutlet, included in prophyll, green, flat, margins scabrid. Stigmas 3. Fl. and fr. Jun–Sep.

Open grassy slopes, grasslands under *Quercus* woods, riversides; 2600–4300 m. Qinghai, Sichuan, Xizang, Yunnan [Bhutan, India (Sikkim), Nepal].

This species represents a complex on which further work is required. There are two distinct forms differing in micromorphology of nutlet surface, but these cannot be correlated with the forms that differ (often dramatically) in gross morphology (e.g., in habit—erect vs. weak) or the forms that are predominantly male.

7. *Kobresia uncinoides* (Boott) C. B. Clarke in J. D. Hooker, Fl. Brit. India 6: 698. 1894 [“*uncinoides*”].

钩状嵩草 gou zhuang song cao

Carex uncinoides Boott, Ill. Gen. Carex 1: 8. 1858.

Rhizomes very stout, shortly oblique. Basal sheaths few, pale brown or cream, dull, retaining dried leaf blades, decaying to fibers. Culms tufted, rigid and erect, obtusely trigonous or subterete, (1.5–)6–50 cm tall, 1–2.5 mm in diam. Leaves basal or sub-basal, shorter than culms; blade flat, 2–4 mm wide, midrib distinct abaxially. Inflorescence densely paniculate (very rarely spicate), yellowish brown and partly green, narrowly club-shaped, (1–)2.5–7 × 0.8–1.7 cm; lowest involucrel bract glumelike, apex aristate, arista short or long (occasionally subequaling inflorescence); branches oblong or lanceolate, appressed, androgynous or female, lower branches sometimes

distant; spikelets unisexual with only 1 female flower; female glumes yellowish brown, with green midvein, oblong or ovate, 5–8 (excluding awn) \times 2.4–3.6 mm, membranous, midvein extending into arista, margin not hyaline, apex aristate. Prophylls yellowish brown, utriculiform, narrowly lanceolate, 5.5–8.5(–10.5) \times 1.4–1.5 mm, herbaceous, upper part often hairy, 2-keeled and many veined, keels scabrid, margins fused from base to just below apex. Nutlets chestnut-brown, narrowly oblong, trigonous, 3.1–4.5 \times 0.8–1.4 mm, not beaked (but style base sometimes persistent), shortly stipitate. Rachilla in female spikelets longer than nutlet, slightly exserted from prophyll, green, flat, margins ciliate. Stigma 3. Fl. and fr. Jun–Oct.

Alpine meadows, streamsides, lakesides, grassy slopes, forest margins, among shrubs; 2900–4900 m. Sichuan, Xizang, Yunnan [Bhutan, India (Sikkim), Myanmar, Nepal].

8. *Kobresia kuekenthaliana* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 57: 290. 1920.

宁远嵩草 ning yuan song cao

Schoenoxiphium kuekenthalianum (Handel-Mazzetti) K. V. Ivanova.

Rhizomes shortly and obliquely elongate, bearing pale brown scales (bladeless sheaths). Basal sheaths persistent, brown, not retaining dried leaves. Culms densely tufted, erect, obtusely trigonous, 25–40 cm, slender, ca. 1 mm in diam. Leaves basal, longer than culms; sheaths with reddish brown, membranous margins; blade flat or folded, 1.5–2.5 mm wide, midrib distinct abaxially. Inflorescence densely paniculate, pale brown, linear-lanceolate, 2.6–4 \times 0.6–0.8 cm; branches \pm equal in length, slightly spreading; lowest involucre bract glumelike, apex aristate. Inflorescence branches androgynous, with 1 (perhaps sometimes more) basal female spikelet, and ca. 6 upper and terminal male flowers. Glumes pale brown or brown, with yellowish brown midvein, ovate or ovate-oblong, 4.5–5.5 \times 1.5–2 mm, membranous, midvein narrow, margin hyaline, apex acute or mucronate. Prophylls yellowish brown, oblong or oblong-elliptic, 4.3–5 \times 1–1.5 mm, membranous, 2-keeled, keels smooth, margins free from apex almost to base, apex rounded or slightly 2-toothed. Immature nutlets yellowish, oblong-obovoid, ca. 3 \times 1 mm. Rachilla sometimes present in female spikelets, very short. Stigmas 3. Fl. and fr. Apr.

- Sandy ground; ca. 2700 m. S Sichuan (Xichang).

This taxon is known only from the immature type specimen; further collections are required to assess its status, in particular its relationship with *Kobresia royleana* subsp. *minshanica*.

9. *Kobresia condensata* (Kükenthal) S. R. Zhang & Noltie, *comb. et stat. nov.*

密穗嵩草 mi sui song cao

Basionym: *Kobresia capillifolia* (Decaisne) C. B. Clarke var. *condensata* Kükenthal, Notes Roy. Bot. Gard. Edinburgh 7: 134. 1912.

Rhizomes short. Basal sheaths prominent and persistent, outer ones dark brown, inner ones orange-brown, margins and apices fibrillose, retaining dried leaf blades. Culms densely tufted, erect, stiff, obtusely trigonous, 14–44 cm, slender, 1–1.8

mm in diam. Leaves basal, shorter than culms; blade stiffly erect, filiform, V-shaped in cross section, 0.5–1 mm wide. Inflorescence a dense panicle, brown, oblong-lanceolate, to 2–4 \times 0.6–1 cm; branches short, obliquely appressed; lowest involucre bract glumelike, apex shortly aristate. Lateral branches androgynous with 1 or 2 basal female spikelets and up to 10 male flowers, or unisexual with up to 6 female spikelets. Glumes brown, with conspicuous green midvein, ovate-oblong, 5.5–6 \times 2.7–3 mm, papery, midvein broad, margin hyaline, apex acute or mucronate. Prophylls yellowish brown, oblong, 4–4.5 \times 1.5–1.8 mm, membranous, strongly 2-keeled, keels minutely scabrid, margins free nearly to base, apex hyaline, truncate. Nutlets cream, oblong, compressed trigonous, 3–3.5 \times 1.1–1.7 mm, not or very shortly beaked, very shortly stipitate. Stigmas 3. Fl. and fr. Jun–Jul.

- Streambeds, river terraces and wet meadows with shrubs, open areas in mixed conifer forests; 3200–4000 m. SW Sichuan (Daocheng, Xiangcheng), NW Yunnan (Lijiang).

10. *Kobresia tunicata* Handel-Mazzetti, Symb. Sin. 7: 1254. 1936.

玉龙嵩草 yu long song cao

Rhizomes short. Basal sheaths prominent and persistent, brown, not shiny, not retaining dried leaf blades. Culms densely tufted, erect and rigid, trigonous, 20–25 cm tall, ca. 1.5 mm in diam. Leaves basal, longer than culms; blade flat or folded, 1.5–3 mm wide, midrib distinct abaxially. Inflorescence loosely paniculate, brown, lanceolate, ca. 5 cm \times 7 mm; lowest involucre bract glumelike, blunt; inflorescence branches linear, androgynous; spikelets unisexual, terminal spikelets male (up to 3), lower ones (up to 9) female. Female glumes brown, with green midvein, ovate-lanceolate or oblong-ovate, 5–5.5 \times 1.5–2 mm, midvein narrow, margin hyaline, apex subacute or obtuse. Prophylls pale brown, linear-lanceolate, 5.2–6 \times ca. 1 mm, papery, apex hyaline, 2-keeled, keels scabrid, margins free to base, overlapping. Immature nutlets narrowly elliptic, obscurely trigonous, ca. 4 mm (including stipe) \times 0.8 mm, stipitate, crowned with stout beaklike style base, beak ca. 1 mm. Stigmas 3. Sterile rachilla of female spikelets flat, ca. 2 mm, sometimes with vestigial glume at apex. Fl. and fr. May–Sep.

- Alpine grasslands, marshes at edges of pools; 3300–4300 m. Sichuan, Yunnan.

Both Kükenthal and Ivanova (in schedis, 1939, 1941) referred the type specimen of *Kobresia tunicata* (Handel-Mazzetti 3525, WU) to *K. kansuensis*, of which it may only be a less-robust form with unisexual spikelets. It is also possible that it is a form of *K. graminifolia* with a branched inflorescence, but further collections are required.

11. *Kobresia filifolia* (Turczaninow) C. B. Clarke, J. Linn. Soc., Bot. 20: 381. 1883.

丝叶嵩草 si ye song cao

Elyna filifolia Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 28(1): 353. 1855; *Kobresia capillifolia* (Decaisne) C. B. Clarke var. *filifolia* (Turczaninow) Kükenthal; *K. filifolia* var. *macrophylla* Y. C. Yang; *K. gracilis* Meinshausen; *K. macrophylla* (Y. C. Yang) P. C. Li; *K. pratensis* Freyn.

Rhizomes short. Basal sheaths prominent and persistent, orange-brown, not retaining dried leaf blades, sometimes decaying to fibers. Culms densely tufted, obtusely trigonous, 15–50 cm, slender, 0.6–1 mm in diam. Leaves basal, shorter than or subequaling culms; blade filiform, weak, margin involute, 0.5–1.5 mm wide. Inflorescence a dense spike-like panicle (occasionally reduced to a spike), reddish brown or pale brown, cylindrical, 1–3 × 0.3–0.7 cm, branches short, appressed; lowest involucre bract glumelike, apex aristate. Lower inflorescence branches with terminal spikelets male, lower spikelets bisexual. Bisexual spikelets 2–7-flowered, basal one female, other 1–6 male. Glumes reddish brown or brown, with yellowish brown midvein, ovate or ovate-oblong, (3–)4–4.5(–6.2) (excluding arista) × 1.5–2.8 mm, membranous, margin broadly hyaline, apex acute or aristate. Prophylls brown or yellowish brown, ovate-oblong or oblong-elliptic, 3–4 × 1–1.8 mm, membranous, 1- or 2-keeled, keels slightly scabrid, margins free to base, apex rounded or slightly 2-toothed. Nutlets dark brown, obovoid or oblong-obovoid, trigonous or biconvex, 2.1–3.5 (excluding beak) × 1–1.2 mm, very shortly stipitate, shortly beaked, beak slightly conic. Stigmas usually 3, occasionally both 3 and 2 on same inflorescence. Fl. and fr. May–Oct. $2n = ca. 60$.

Wet grassy slopes, boggy meadows; 1700–2900 m. Gansu, Hebei, Nei Mongol, Qinghai, Shanxi [Mongolia, Russia].

Forms with simple (spicate) inflorescences are similar to *Kobresia myosuroides* subsp. *bistaminata* and to *K. capillifolia* (both of which share the bistigmatic tendency). Such forms differ from both taxa in having weaker leaves; and they differ from the latter in having dull, orange-brown, shorter basal sheaths and usually more than 2 male flowers per spikelet.

12. *Kobresia kansuensis* Kükenthal, Acta Horti Gothob. 5: 38. 1930.

甘肃嵩草 gan su song cao

Kobresia pseuduncinoides Noltie.

Rhizomes short, thick, woody. Basal sheaths prominent, dark brown, shiny, leathery, not retaining dried leaf blades. Culms densely tufted, erect, sharply triquetrous, (14–)20–70 cm tall, stout, 2.2–4(–6) mm in diam. Leaves basal, shorter than or ± equaling culms; blade flat, sometimes folded at base, 4–9 mm wide, midrib distinct abaxially. Inflorescence densely paniculate (occasionally spicate), brown or dark brown, partly green, narrowly oblong to lanceolate, (2–)3–6.5 × 0.7–1.8 cm, with numerous short, appressed branches; inflorescence branches simple; lowest involucre bract glumelike, broad green midvein elongated into filiform arista not exceeding inflorescence. Terminal spikelets of inflorescence branches male, lower ones bisexual with 1 basal female flower and 2–4(–6) distal male flowers, sometimes with some unisexual female ones above (or throughout). Glumes brown, with yellowish green or green midvein, oblong, oblong-elliptic, or oblong-ovate, 5–10 × 2–3.5 mm, midvein narrow, margin narrowly hyaline near apex, apex acute to strongly aristate. Prophylls yellow or yellowish green in lower part, brown in upper part, narrowly oblong, 4.5–7.4 × 1–1.3 mm, papery, 2-keeled, keels minutely scabrid, sometimes 2–4-veined between keels, margins open to base. Nutlets brown or grayish brown, narrowly obovoid or narrowly oblong, trigo-

nous, 2.8–4(–5) × 0.8–1 mm, very shortly stipitate, shortly beaked, beak to 0.6 mm. Stigmas 3. Fl. and fr. May–Oct.

Shaded and wet places, open marshes, among shrubs, alpine meadows, grassy slopes, streamsides; 3000–4700 m. Gansu, Qinghai, Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, Nepal].

Specimens from Bhutan, Nepal, and SE Xizang (described as *Kobresia pseuduncinoides*) tend to be extremely robust, with large prophylls and strongly aristate glumes, but variation in these characters is found to be continuous. Forms with simple spikes can be distinguished from robust forms of *K. cuneata* by their flat leaves.

13. *Kobresia royleana* (Nees) Boeckeler, Linnaea 39: 8. 1875.

喜马拉雅嵩草 xi ma la ya song cao

Rhizomes short, thick, woody. Basal sheaths prominent, brown or reddish brown, dull, not fibrillose, retaining dried leaf blades. Culms densely tufted, rigid, acutely trigonous, or subterete in lower part, (2–)6–75 cm tall, 1–2.5 mm in diam. Leaves basal, shorter than culms; blade flat, 2–4 mm wide, midrib distinct abaxially. Inflorescence a dense or slightly loose panicle, brown, 1–3.5 × 0.6–1.2 cm; inflorescence branches simple, obliquely ascending, decreasing in length toward apex; lowest involucre bract glumelike, apex aristate. Terminal spikelets of inflorescence branches male, lower ones bisexual or unisexual. Bisexual spikelets with 1 basal female flower and 2 or 3(–6) distal male flowers. Glumes brown, with green midvein, ovate-oblong, 2.6–5.1 × 1.7–3.5 mm, margin hyaline or not, apex acute or aristate. Prophylls pale brown, oblong or oblong-lanceolate, 2.7–5 mm, membranous, 2-keeled, keels scabrid, margins open to base. Nutlets narrowly oblong, trigonous, 1.7–4 mm, beak to 1 mm, very shortly stipitate. Sterile rachilla sometimes present in female spikelets, to 1/3 as long as nutlet. Stigmas 3. Fl. and fr. May–Sep.

Moist habitats, among scrub; 700–5200 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan [Afghanistan, India (Himachal Pradesh, Uttarakhand), Kashmir, Kyrgyzstan, Nepal, Pakistan, Tajikistan].

- 1a. Spikelets bisexual; culms rigid, acutely trigonous, or subterete in lower part, 5–35 cm tall, 1.5–2.5 mm in diam.; leaf blade 2–4 mm wide 13a. subsp. *royleana*
- 1b. Spikelets unisexual; culms trigonous, or subterete in lower part, 30–75 cm tall, slender, 1–1.5(–1.8) mm in diam.; leaf blade 1.5–2(–2.5) mm wide ... 13b. subsp. *minshanica*

13a. *Kobresia royleana* subsp. *royleana*

喜马拉雅嵩草(原亚种) xi ma la ya song cao (yuan ya zhong)

Trilepis royleana Nees, Edinburgh New Philos. J. 17: 267. 1834; *Elyna kokanica* Regel; *E. stenocarpa* Karelin & Kirilov; *Kobresia paniculata* Meinshausen; *K. royleana* var. *kokanica* (Regel) Kükenthal; *K. royleana* var. *paniculata* (Meinshausen) Kükenthal; *K. stenocarpa* (Karelin & Kirilov) Steudel; *K. stenocarpa* var. *royleana* (Nees) C. B. Clarke; *K. stenocarpa* var. *simplex* Y. C. Yang.

Culms rigid, acutely trigonous, or subterete in lower part, 5–35 cm tall, 1.5–2.5 mm in diam. Leaves basal, blade flat, 2–4 mm wide. Inflorescence a dense panicle, lower branches some-

times slightly distant, 1–3.5 × 0.6–1.2 cm. Terminal spikelets of inflorescence branches male, lateral ones bisexual or unisexual. Lower spikelets of branches usually bisexual with 1 basal female flower and 2 or 3(–6) distal male flowers. Glumes ovate-oblong, 2.6–4.5 × 3.2–3.5 mm. Prophylls 3–5 mm. Nutlets 2.4–4 mm, beak to 1 mm.

Moist habitats; 700–5200 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan [Afghanistan, India (Himachal Pradesh, Uttarakhand), Kashmir, Kyrgyzstan, Nepal, Pakistan, Tajikistan].

Records of *Kobresia caricina* Willdenow (FRPS 12: 22–23. 2000) and *K. persica* Kükenthal & Bornmüller (loc. cit.: 35–36) are based on misidentifications of *K. royleana* subsp. *royleana*.

13b. *Kobresia royleana* subsp. *minshanica* (F. T. Wang & Tang ex Y. C. Yang) S. R. Zhang, *Novon* 9: 453. 1999.

岷山嵩草 *min shan song cao*

Kobresia minshanica F. T. Wang & Tang ex Y. C. Yang, *Acta Biol. Plateau Sin.* 2: 1. 1984; *K. menyuanica* Y. C. Yang.

Culms trigonous, or subterete in lower part, 30–75 cm tall, slender, 1–1.5(–1.8) mm in diam. Leaf blade flat, 1.5–2(–2.5) mm wide. Inflorescence narrowly paniculate, compact or slightly loose in lower part, 1.2–3.5 × 0.7–0.9 cm. Lower spikelets of inflorescence branches usually unisexual with 1 female flower only (occasionally bisexual with 1 basal female flower and 2–5 distal male flowers). Glumes ovate-oblong, 3.3–5.1 × 1.7–2.1 mm. Prophylls 2.7–4.4 mm. Nutlets 1.7–3 mm, beak ca. 0.4 mm. Sterile rachilla in female spikelets much shorter than nutlet.

• Moist places, hillsides, among scrub; 2900–3800 m. Gansu, Qinghai, Sichuan, Yunnan.

14. *Kobresia macrantha* Boeckeler, *Beitr. Cyper.* 1: 39. 1888.

大花嵩草 *da hua song cao*

Blysmocarex macrantha (Boeckeler) K. V. Ivanova; *B. macrantha* subsp. *nudicarpa* (Y. C. Yang) D. S. Deng; *B. nudicarpa* Y. C. Yang; *Kobresia macrantha* var. *nudicarpa* (Y. C. Yang) P. C. Li; *K. nudicarpa* (Y. C. Yang) S. R. Zhang.

Rhizomes elongate, slender, stoloniferous. Basal sheaths pale brown, retaining dried leaf blades. Culms scattered, erect, trigonous, 3–17 cm tall, 1–1.5 mm in diam. Leaves basal, shorter than culms; blade flat, 1–3 mm wide, midrib distinct abaxially. Inflorescence paniculate, cylindrical to ovoid, 1–2 × 0.6–1 cm; inflorescence branches androgynous or unisexual (whole inflorescence sometimes ± unisexual), lowest branch sometimes slightly distant; lowest involucre bract leaflike or glumelike, apex long aristate. Spikelets usually unisexual; glumes chestnut-brown with green midvein, ovate to ovate-lanceolate, 4–6.3 × 2–2.3 mm, margin broadly hyaline, apex acute or obtuse. Prophylls yellowish brown, ovate-lanceolate, 3–3.6 × 1.2–2 mm, thinly membranous, 2-keeled, keels smooth, margins free or connate at base. Nutlets elliptic-ovoid or subcircular, flattened, 1.4–2 × 0.8–1 mm, not beaked, conspicuously stipitate, stipe 0.6–1 mm. Sterile rachilla of female spikelets terete, minute, subequaling stipe of nutlet. Stigmas 2, very long. Fl. and fr. Jun–Aug.

Open ground, sandy soils, meadows in river valleys; 2500–4800 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang [Nepal].

15. *Kobresia hohxilensis* R. F. Huang, *Biol. & Human Physiol.* Hoh Xil Region, 101. 1996.

匍茎嵩草 *pu jing song cao*

Blysmocarex macrantha (Boeckeler) K. V. Ivanova subsp. *stolonifera* (Y. C. Tang ex P. C. Li) D. S. Deng; *Kobresia stolonifera* Y. C. Tang ex P. C. Li.

Rhizomes elongate, slender, stoloniferous. Basal sheaths yellowish brown or brown, 2–5 cm, retaining dried leaf blades or not. Culms scattered, erect or curved, subterete, slender, 3–20 cm tall, 0.6–1 mm in diam. Leaves basal, shorter than culms; blade filiform, margin involute, 0.4–0.8 mm wide. Inflorescence narrowly paniculate, sometimes spicate, reddish brown, cylindrical to narrowly ovoid, 1.5–2 × ca. 0.8 cm; lower inflorescence branches androgynous, or with mixed female and male spikelets, upper part of inflorescence spicate consisting of bisexual and terminal male spikelets; lowest involucre bract glumelike, apex long aristate. Spikelets unisexual and bisexual; glumes reddish brown, with yellowish brown midvein, narrowly ovate, 5.6–6.5 × 2–3 mm, margin hyaline, apex rounded or acute. Prophylls yellow to yellowish brown, narrowly ovate, 4.3–6.5 × 1.6–2.7 mm, papery to leathery, margins free or connate at base and overlapping. Nutlets broadly oblong, flattened, 2–3 × 1.5–1.8 mm, not beaked, stipe 0.6–1 mm. Sterile rachilla of female spikelets terete, minute. Stigmas 2, very long, slender. Fl. and fr. Jun–Sep.

• Sandy or rocky and sandy ground, open grassy plains; 3100–4900 m. Gansu, Qinghai, Xizang.

16. *Kobresia inflata* P. C. Li in S. Y. Jin & Y. L. Chen, *Cat. Type Spec. Herb. China (Suppl.)*, 73. 1999.

膨囊嵩草 *peng nang song cao*

Rhizomes obliquely and shortly elongate. Basal sheaths yellowish brown, dull, retaining dried leaf blades. Culms tufted, obscurely trigonous, 4–12 cm tall, usually slender, 0.6(–1.4) mm in diam. Leaves basal, shorter than culms, curved; blade flat, 2–3 mm wide, midrib distinct abaxially. Inflorescence spicate or sometimes paniculate, 2–2.5 × 0.7–2 cm, predominantly unisexual; branches if present short, appressed; lowest involucre bract glumelike, apex aristate to varying degrees. Spikelets unisexual (sometimes bisexual), shortly stipitate; glumes brown to yellowish brown, ovate, 4–7.2 × 3–3.5 mm. Prophylls brown or yellowish green marked with brown, utriculiform, inflated (not tightly appressed to nutlet at maturity), ovoid, beaked, 5.5–8 × 2.3–3 mm, thickly papery or leathery, 2-keeled, keels smooth, apex weakly notched. Nutlets obovoid, triquetrous, 2.5–4 × 1.8–2.5 mm, not beaked, style base disklike. Sterile rachilla of female spikelets flat, subequaling or exceeding nutlet, sometimes with 1 or 2 male flowers distally. Stigmas 3. Fl. and fr. Jul–Sep.

Alpine meadows, grasslands on slopes, dry banks by streams, scree; 3600–4600 m. Xizang, Yunnan [Bhutan].

This species is similar to *Kobresia nitens* C. B. Clarke of the W Himalayas, which differs in having bisexual spikelets.

17. *Kobresia yadongensis* Y. C. Yang in C. Y. Wu, Fl. Xizang. 5: 387. 1987.

亚东嵩草 ya dong song cao

Plants forming dense, round patches; rhizomes very short. Basal sheaths prominent and persistent, brown, dull, not retaining dried leaf blades. Culms erect, subterete, dwarf, ca. 0.5–(4) cm tall, scarcely emerging from sheaths. Leaves basal, usually longer than culms (to 1.5 cm); blade stiffly erect, filiform, ca. 0.8 mm wide, margin involute. Inflorescence spicate, unisexual; all spikelets 1-flowered. Male spikes not seen. Female spike pale brown, subspherical, ca. 1 cm, spikelets ca. 5; lowest involucral bract glumelike with long green arista. Female glumes ovate, ca. 5 (excluding arista) \times 3.5 mm, brown laterally, with yellowish green midrib, midrib broad, 3-veined, margin broadly hyaline, apex acute or aristate. Prophylls flushed brown, utriculiform, triangular-ovoid, inflated (not tightly appressed to nutlet at maturity), 4–5 \times 2.5–4 mm, thickly papery or leathery, keels obscure, minutely hispid, margins fused to above middle, apex acute, notched. Nutlets triangular-ovoid, 3-lobed, 2.5–3 \times ca. 2.3 mm, attenuate to apex. Stigmas 3. Sterile rachillas flat, minute, ca. 1/3 as long as nutlet. Fl. and fr. Sep.

• Alpine meadows, gravelly river terraces; 4800–5100 m. S Xizang (upper Targo Tsangpo basin, Yadong).

18. *Kobresia humilis* (C. A. Meyer ex Trautvetter) Sergievskaja in Komarov, Fl. URSS 3: 111. 1935.

矮生嵩草 ai sheng song cao

Elyna humilis C. A. Meyer ex Trautvetter, Trudy Imp. S.-Peterburgsk. Bot. Sada 1: 21. 1871; *Kobresia royleana* (Nees) Boeckeler var. *humilis* (C. A. Meyer ex Trautvetter) Kükenthal.

Rhizomes short. Basal sheaths prominent, pale brown to brown, dull, retaining dried leaf blades. Culms densely tufted, erect, obtusely trigonous, 2–15 cm tall, 0.8–1.5 mm in diam. Leaves basal, shorter than culms, sometimes recurved; blade flat, midrib distinct abaxially, folded at base, 1–2.2 mm wide. Inflorescence spicate, brown, densely cylindric, 0.8–1.7 \times 0.4–0.6 cm, with up to 10 spikelets; lowest involucral bract glumelike, aristate. Terminal spikelets of inflorescence male, lower ones bisexual with 1 basal female flower and 2–7 distal male flowers. Glumes brown, with a yellowish green or green midvein, oblong, ovate-elliptic, or ovate, 3–5 \times 1.5–2.5 mm, margin broadly hyaline, apex obtuse or rounded, sometimes aristate. Prophylls pale brown, oblong or elliptic, 3–5 \times 1.5–2 mm, membranous, glabrous, 2-keeled, keels scabrid, margins open to base. Nutlets brown or grayish brown, narrowly obovoid or elliptic, trigonous, 2.5–3 \times 1–1.5 mm, very shortly stipitate, shortly beaked. Stigmas usually 3. Fl. and fr. Jun–Sep.

Sunny slopes, alpine meadows; 2500–4400 m. ?Ningxia, ?Qinghai, Xinjiang, Xizang [Afghanistan, India (Sikkim), Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Tajikistan, Uzbekistan; SW Asia].

This species sometimes has two stigmas, and may then resemble *Kobresia pusilla*.

19. *Kobresia duthiei* C. B. Clarke in J. D. Hooker, Fl. Brit. India 6: 697. 1894.

线形嵩草 xian xing song cao

Rhizomes short. Basal sheaths persistent, brown, reddish brown, or yellowish brown, dull, not fibrillose, retaining dead leaf blades or not. Culms densely tufted, stiffly erect, subterete, (0.5–)4–20(–40) cm tall, 0.6–1.2 mm in diam. Leaves basal, shorter than culms; blade flat, 1.4–2.3 mm wide, midrib distinct abaxially. Inflorescence spicate, greenish or pale brown, linear or linear-oblong, 1–5 \times 0.2–0.4 cm, dense; all spikelets bisexual, occasionally male flowers reduced; lowest involucral bract glumelike, apex acute or aristate. Spikelets usually 2-flowered, basal one female, distal one male. Glumes pale brown laterally, with green midvein, ovate, 2–4.5 \times 1.5–2.6 mm, midvein broad, 3-ribbed, margin hyaline, apex acute or obtuse, sometimes with very short scabrid arista; male glume 2.3–3.6 mm, stamen 1. Prophylls pale green or yellowish brown with ferruginous spots and lines, oblong or linear-oblong, (2.2–)3–5 \times 0.7–1 mm, membranous, 2-keeled, keels scabrid, margins united to above middle, apex obtuse or 2-toothed. Nutlets pale brown, narrowly oblong, trigonous, 1.9–2.8 (excluding beak) \times 0.6–0.9 mm, beak 0.5–1.5 mm, exerted from prophyll when mature, shortly stipitate. Stigmas 3. Fl. and fr. May–Sep.

Bare mossy peat, wet and open marshes, exposed and dry rocky ridges, grassy slopes; 3600–4600 m. Sichuan, Xizang, Yunnan [Bhutan, India (Sikkim, Uttarakhand), Nepal].

20. *Kobresia filicina* (C. B. Clarke) C. B. Clarke in J. D. Hooker, Fl. Brit. India 6: 696. 1894.

蕨状嵩草 jue zhuang song cao

Hemicarex filicina C. B. Clarke, J. Linn. Soc., Bot. 20: 384. 1883; *Kobresia filicina* var. *subfilicinoides* P. C. Li.

Rhizomes short. Basal sheaths persistent, brown, reddish brown, or yellowish brown, dull, not fibrillose, retaining a few dried leaf blades. Culms tufted, flaccid or slightly stiff, obtusely trigonous, 8–35 cm tall, slender, 0.4–0.8 mm in diam. Leaves basal, slightly shorter than to exceeding culms; blade flat or partly folded, 0.6–2(–3) mm wide, usually flaccid, midrib distinct abaxially. Inflorescence spicate, yellowish green or partly brown, linear or linear-oblong, 1–4(–5) \times 0.1–0.3 cm, dense above, basal spikelets usually slightly distant; a few terminal spikelets male, lower ones bisexual; lowest involucral bract glumelike, apex aristate, arista to 8 mm. Bisexual spikelets usually 2-flowered, basal one female, distal one male, male flower with 1 or 2(or 3) stamens. Glumes yellowish brown laterally, with green midvein, ovate-oblong, 2–3 (excluding arista) \times 0.5–1 mm, midvein broad, 3-ribbed, margin hyaline, apex aristate or acute, arista to 2 mm. Prophylls yellowish green or yellowish brown with ferruginous spots and lines, oblong or linear-oblong, 2–2.6 \times 0.5–0.7 mm, membranous, 2-keeled (sometimes obscurely), keels scabrid, margins open to middle part or below, apex rounded. Nutlets narrowly oblong, trigonous, 1.9–2.4 (excluding beak) \times ca. 0.6 mm, beak ca. 0.5 mm, exerted from prophylls when mature, shortly stipitate, stipe ca. 0.2 mm. Stigmas 3, short. Fl. and fr. Jul–Oct.

Forest understories, dry riverbeds, on rocks; 2000–4000 m. Sichuan, Xizang, Yunnan [Bhutan, India (Himachal Pradesh, Sikkim, Uttarakhand), Nepal].

A specimen with wide leaves and long spikes from Yunnan was described as *Kobresia filicina* var. *subfilicinaoides*, but similar forms have been seen from Nepal and are not worth taxonomic recognition.

21. *Kobresia robusta* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 29: 218. 1883.

粗壮嵩草 cu zhuang song cao

Kobresia robusta var. *sargentiana* (Hemsley) Kükenthal; *K. sargentiana* Hemsley.

Rhizomes short or obliquely elongated and rarely stoloniferous, thick, woody. Basal sheaths prominent and persistent, yellow to yellowish brown, slightly shiny, to 5 cm, not retaining dried leaf blades. Culms tufted, erect or curved, rigid, obtusely trigonous or subterete, 5–60 cm tall, stout, 1.2–3 mm in diam. Leaves basal, longer or shorter than culms; blade rigid, erect or curved, filiform, 0.7–1.7(–2) mm wide, margin involute. Inflorescence densely spicate, with ca. 10 spikelets, lower spikelets sometimes distant, very pale orange-brown, cylindrical, 2–5 × 0.4–0.8 cm; terminal spikelets male, lower spikelets bisexual; lowest involucre bract glumelike, apex rounded. Bisexual spikelets with 1 basal female flower and 1–3 distal male flowers. Glumes yellowish brown laterally, with pale yellow to yellow midvein, broadly ovate, (7.2–)7.8–10 × 5.5–6.5 mm, midvein broad, 3–9-veined, margin very broadly hyaline, apex obtuse. Prophylls yellowish brown, utricle-like, broadly elliptic or ovate-elliptic, abruptly narrowed above, 6.5–10 × 2.5–3.5 mm, membranous, obscurely 2-keeled, keels smooth, margins free in upper 1/3 or almost to base. Nutlets grayish brown, oblong or broadly elliptic, trigonous, concave, 4–5 × 2–2.4 mm, very shortly beaked, stipitate, stipe ca. 1 mm. Stigmas 3. Fl. and fr. May–Sep.

• Sandy soils, herb-rich meadows; 2900–5200 m. Gansu, Qinghai, Xinjiang, Xizang [?Mongolia].

22. *Kobresia burangensis* Y. C. Yang, Fl. Xizang. 5: 374. 1987.

普兰嵩草 pu lan song cao

Rhizomes short. Basal sheaths prominent, yellowish brown to pale brown, shiny, not retaining dried leaf blades. Culms densely tufted, rigid and erect, subterete, 8–12 cm tall, 1–1.2 mm in diam. Leaves basal, erect, longer than or ± equaling culms; blade filiform, 0.5–0.8 mm wide, margin involute. Inflorescence densely spicate, yellowish brown, narrowly elliptic to lanceolate, 1.8–2(–2.5) × 0.2–0.3 cm; terminal spikelets male, lower ones bisexual; lowest involucre bract glumelike, apex obtuse or rounded. Bisexual spikelets with 1 basal female flower and 2 or 3 distal male flowers. Glumes yellowish brown, with pale green or yellowish green midvein, ovate-oblong or oblong, 5–7 × 2.5–3 mm, obtuse and rounded, midvein broad, margin broadly hyaline. Prophylls lower part pale yellow, upper part brown, obovate-oblong, 3.5–4 × ca. 1.2 mm, membranous, apex truncate and hyaline, 2-keeled, keels slightly scabrid, margins united from base to halfway. Immature nutlets elliptic, obscurely trigonous. Stigmas 3. Fl. Jul.

• Grassy slopes; ca. 5000 m. SW Xizang (Burang).

This species is known only from the immature type specimen.

23. *Kobresia cuneata* Kükenthal, Acta Horti Gothob. 5: 39. 1930.

截形嵩草 jie xing song cao

Kobresia lepidochlamys F. T. Wang & Tang ex P. C. Li.

Rhizomes short, thick, woody. Basal sheaths prominent, brown or dark brown, margins fibrillose, retaining dried leaf blades. Culms densely tufted, erect and stout, obtusely trigonous, (10–)15–45 cm tall, 1.5–2.5 mm in diam. Leaves basal, shorter than or ± equaling culms; blade filiform, 1–3(–5) mm wide, V- or U-shaped in cross section, midrib not distinct abaxially. Inflorescence a dense spike, sometimes interrupted at base, brown or dark brown, oblong to narrowly oblong, 2–6 × 0.5–1.2 cm; lowest involucre bract glumelike, apex aristate. Spikelets (except a few terminal ones that may be male only) bisexual with a basal female flower and (1–)3–7 distal male flowers; glumes brown or chestnut-brown, with yellowish green or green midvein, oblong, oblong-elliptic, or oblong-ovate, 5–6 × 2–3 mm, margin hyaline or not, apex obtuse or rounded and aristate; arista sinuate, 1–5 mm, margin hispid. Prophylls yellow or whitish yellow in lower part, brown above, oblong, 5–8 × 1.8–3 mm, papery, 2-keeled, keels smooth or very minutely scabrid, with up to 8 veins between keels, margins open to base, apex truncate. Nutlets yellow or yellowish brown, oblong, trigonous, 3–4.5 × 2–3 mm, very shortly stipitate, not or shortly beaked. Stigmas 3. Fl. and fr. May–Sep.

• Alpine meadows among shrubs, alpine swampy meadows, wet grassy slopes, grassy areas under woods; 3000–4800 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan.

This is like a robust form of *Kobresia schoenoides*, from which it is distinguished by its fibrillose sheaths; longer spikes; midribs of glumes broader, green, developed into an arista; and nutlets larger, narrower. In the description of *K. lepidochlamys*, the male flowers were misinterpreted as perianth scales. A specimen from Yunnan (*Rock 9600*) is intermediate between *K. cuneata* and *K. kansuensis*: it has the spicate inflorescence and fibrillose leaf sheaths of the former, but the very robust habit and flat leaves (midribs distinct abaxially) of the latter.

24. *Kobresia schoenoides* (C. A. Meyer) Steudel, Syn. Pl. Glumac. 2: 246. 1855.

赤箭嵩草 chi jian song cao

Elyna schoenoides C. A. Meyer in Ledebour, Fl. Altaic. 4: 235. 1833; *Kobresia deasyi* C. B. Clarke; *K. glaucifolia* F. T. Wang & Tang ex P. C. Li; *K. lacustris* P. C. Li; *K. maquensis* Y. C. Yang; *K. pamiroalaica* K. V. Ivanova; *K. septatonodosa* T. Koyama.

Rhizomes short. Basal sheaths prominent, commonly yellowish- to reddish brown (occasionally dark brown), shiny, leathery, not retaining dried leaf blades. Culms densely tufted, erect, subterete or upper part trigonous, 3–60(–70) cm tall, stout, 1–2.5 mm in diam. Leaves basal, erect or sometimes curved, longer or shorter than culms; blade filiform, 1–2 mm wide, midrib not distinct abaxially, margin involute. Inflorescence densely spicate, dark to yellowish brown, oblong to clavate, occasionally ovate or narrowly ovate, 1–4 × 0.2–1 cm. Spikelets (except a few terminal ones that may be male only) bisexual; lowest involucre bract glumelike, apex aristate or not.

Bisexual spikelets with 1 basal female flower and (1–)4–7 distal male flowers; glumes brown, with yellowish green midvein, oblong to narrowly ovate or sometimes broadly ovate, 3–6 × 1.2–3.6 mm, midvein broad, margin broadly to narrowly hyaline, apex obtuse or mucronate. Prophylls yellowish brown to brown, oblong, narrowly elliptic, or lanceolate, (3–)3.5–7.3 × (0.9–)1.4–2.5 mm, papery to membranous, 2-keeled (sometimes obscurely so), keels smooth, sometimes many veined between keels, margins free to base. Nutlets pale yellow to grayish brown, obovoid or oblong-obovoid, trigonous, 1.7–3.5 × 1–2.1 mm, 1/2–2/3 as long as prophyll, shortly stipitate, shortly beaked, beak 0.5–0.7 mm. Stigmas 3. Fl. and fr. May–Sep.

Boggy places among shrubs, sedge moors, streamsides, shaded places; 2500–5800 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan [Afghanistan, Bhutan, India (Himachal Pradesh, Sikkim), Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Tajikistan, Uzbekistan; SW Asia (Iran)].

25. *Kobresia setschwanensis* Handel-Mazzetti, Symb. Sin. 7: 1254. 1936.

四川嵩草 *si chuan song cao*

Kobresia handel-mazzettii K. V. Ivanova; *K. longearistita* P. C. Li; *K. pinetorum* F. T. Wang & Tang ex P. C. Li.

Rhizomes short. Basal sheaths prominent and persistent, pale brown, dull or slightly shiny, not fibrillose, not retaining dried leaf blades. Culms densely tufted, stiffly erect, obtusely trigonous, 5–20(–40) cm, slender, 0.7–1.3 mm in diam. Leaves basal, shorter than culms; blade folded or margin involute, stiff, 1–2 mm wide, midrib not distinct abaxially. Inflorescence usually a dense spike (occasionally with 1 or 2 branches at base), greenish brown, cylindrical, 1–3.5 × 0.3–0.6 cm; lowest involucre bract glumelike, apex long or shortly aristate; terminal few spikelets male, lower ones bisexual with 1 female and 2–5 male flowers. Glumes brown, with yellowish green to green midvein, oblong-ovate to oblong-lanceolate, 3–4.5 × 1.5–2.5 mm, papery, midvein broad, margin usually narrowly hyaline, apex usually subacute, sometimes shortly aristate. Prophylls yellowish brown, oblong, 2–4.5 × 1–1.6 mm, membranous, 2-keeled, keels smooth or slightly scabrid, sometimes veined between keels, margins free nearly to base, apex rounded or acute. Nutlets yellowish, narrowly obovoid, compressed trigonous, 2.1–3 × 1–1.3 mm, not beaked, subsessile. Stigmas 3. Fl. and fr. May–Sep.

• Grassy slopes, alpine meadows, swampy meadows and marshes by lakes, dry limestone slopes, forest (including *Pinus*) understories, *Quercus* scrub; 2300–4300 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan.

This is a slender version of *Kobresia schoenoides* with narrower spikes—linking that species with *K. capillifolia* and *K. tibetica*, together forming a complex that requires further work.

Plants with slender culms, filiform leaves, and small spikes from *Pinus* forests (i.e., dry habitats) in NW Yunnan were described as *Kobresia pinetorum*; but specimens with equally small spikes have been seen from wet habitats, and forms from *Pinus* forests with robust culms and larger spikes are also known: all of these seem best referred to a variable *K. setschwanensis*.

26. *Kobresia capillifolia* (Decaisne) C. B. Clarke, J. Linn. Soc., Bot. 20: 378. 1883.

线叶嵩草 *xian ye song cao*

Elyna capillifolia Decaisne in Jacquemont, Voy. Inde 4(Bot.): 173. 1844; *Kobresia brunnescens* Boeckeler; *K. capilliformis* N. A. Ivanova; *K. elata* Boeckeler; *K. kashgarica* Dickoré; *K. macrolepis* Meinshausen; *K. ovczinnikovii* T. V. Egorova; *K. yushuensis* Y. C. Yang.

Rhizomes short. Basal sheaths prominent and persistent, brown to dark brown, often shiny, apices and margins sometimes fibrillose, not retaining dried leaf blades. Culms densely tufted, erect, slightly stiff, obtusely trigonous, (5–)10–45 cm tall, slender, 0.6–1 mm in diam. Leaves basal, shorter than to equaling culms; blade stiffly erect, filiform (tubular in section), margin involute, 0.7–1 mm wide. Inflorescence a dense spike, lowest spikelets sometimes slightly distant, brown, narrowly cylindrical, 2–4.5 × 0.2–0.4 cm; lowest involucre bract glumelike, apex aristate or not; terminal few spikelets male, lower ones bisexual. Bisexual spikelets with 1 basal female floret and (1 or)2–4 distal male florets. Glumes pale brown to dark brown, with yellowish green to green midvein, usually broadly oblong-lanceolate to ovate, 4–6 × 2.5–2.8 mm, papery, midvein narrow or wide, margin broadly hyaline, apex usually rounded. Prophylls brown, oblong, lanceolate, or elliptic, 2.5–5.3 × 0.8–1.8 mm, membranous, 1- or 2-keeled, keels smooth or slightly scabrid, margins free nearly to base, apex rounded or truncate. Nutlets brown to dark brown, elliptic to obovoid, trigonous, (2–)2.5–3.5 × 0.8–1.6 mm, shortly beaked, subsessile. Stigmas (2 or)3. Fl. and fr. May–Sep.

Dry and open grassy and rocky slopes, slopes in *Juniperus* scrub, disturbed slopes in *Picea* forests, grassy areas within *Abies* forests; 2000–4800 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang [Afghanistan, Bhutan, India (Himachal Pradesh, Sikkim), Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Tajikistan].

Kobresia kashgarica, described from high elevations in Xinjiang, appears to be an extremely reduced form of *K. capillifolia* but is also similar to *K. myosuroides* subsp. *bistaminata*. Reduced forms of many species can be found; they appear to represent phenotypic responses to extreme habitats and (while often difficult to identify) do not merit specific treatment.

27. *Kobresia tibetica* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 29: 219. 1883.

西藏嵩草 *xi zang song cao*

Kobresia capillifolia (Decaisne) C. B. Clarke var. *tibetica* (Maximowicz) Kükenthal.

Rhizomes short. Basal sheaths prominent, brown to dark brown, dull, not retaining dried leaf blades. Culms densely tufted, rigid and erect, subterete or upper part trigonous, 10–40 cm tall, 1–1.5 mm in diam. Leaves basal, erect, shorter than culms; blade filiform (tubular in section), 0.5–1 mm wide. Inflorescence spicate, brown or dark brown, broadly and densely cylindrical, 1–2.5 × 0.3–0.4 cm; terminal spikelets male, lower ones bisexual; lowest involucre bract glumelike, apex aristate or not. Bisexual spikelets with a basal female flower and 2–4 distal male flowers. Glumes brown or dark brown, with pale

midvein, oblong to ovate-oblong, 3.5–4.5 × 1.5–2.5 mm, obtuse, midvein narrow, margin narrowly hyaline or not. Prophylls pale colored to yellowish brown or occasionally brown, oblong-ovate, 2.1–3 × 1–1.4 mm, hyaline to very thinly membranous, usually without keels and veins, rarely obscurely keeled, margins free to base. Nutlets brown or dark brown, oblong or narrowly ovoid-oblong, flattened-trigonus, slightly shorter than prophylls, 1.5–2.5(–3) × 1–1.4 mm, very shortly stipitate, shortly beaked. Stigmas 3. Fl. and fr. May–Aug.

• Alpine swampy meadows, weedy plains, marshes, riversides; 2500–4600 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang.

This species is distinguished from *Kobresia capillifolia* with difficulty: the culm is wider, and longer in relation to the leaves, and the spike is shorter in proportion to breadth, and much shorter in proportion to the length of the culm (resembling an *Eleocharis*).

28. *Kobresia myosuroides* (Villars) Fiori in Fiori et al., Fl. Italia 1: 125. 1896.

嵩草 song cao

Rhizomes short. Basal sheaths prominent and persistent, reddish brown to dark brown, dull or slightly shiny, margins and apices sometimes fibrillose, not retaining dried leaf blades. Culms densely tufted, erect, slightly stiff, obtusely trigonus or subterete, 3–30(–40) cm tall, 0.5–1 mm in diam. Leaves basal, shorter than or ca. as long as culms; blades stiffly erect, filiform (tubular in cross section), 0.25–0.7 mm wide. Inflorescence a dense spike, reddish brown to brown, narrowly cylindrical, 1–3 × 0.2–0.3 cm, lowest spikelets sometimes slightly distant; lowest involucre bract glumelike, apex aristate or not; a few terminal spikelets male, others bisexual (lower ones occasionally female only). Bisexual spikelets with basal female flower and 1(or 2) male flowers. Glumes yellowish- or reddish brown to dark brown, with pale midvein, ovate or oblong-ovate, 2–4 × 1.2–2.7 mm, submembranous, midvein very narrow, margin broadly to not or narrowly hyaline, apex acute or rounded. Prophylls pale below, brown above, oblong or oblong-ovate, 2.2–3.5 × 1–1.4 mm, membranous, 2-keeled, keels slightly scabrid, margins free to lower 1/3 or nearly to base, upper margin hyaline, apex rounded or acute. Nutlets brown to dark brown, slightly shiny, oblong-obovoid, trigonus or flattened-trigonus, 1.8–3 (including beak) × 0.8–1 mm, shortly beaked, subsessile. Stigmas 2 or 3 (sometimes both on same plant). Fl. and fr. May–Sep. $2n = 56$.

Moist or dry open places in calcareous soils, alpine meadows, on rocks, dry ridges, grassy slopes, among shrubs; 1500–4500 m. Gansu, Hebei, Jilin, Nei Mongol, Ningxia, Qinghai, Shanxi, Sichuan, Xinjiang, Xizang [Japan, Kazakhstan, Korea, Mongolia, Russia; Europe, North America].

- 1a. Stigmas 3; glumes 2.5–4 mm, usually pale brown; nutlets ca. 2.5 mm 28a. subsp. *myosuroides*
 1b. Stigmas usually 2, but sometimes 3, or a mixture of both on same plant; glumes 2–3 mm, dark brown; nutlets 1.8–2.3 mm 28b. subsp. *bistaminata*

28a. *Kobresia myosuroides* subsp. *myosuroides*

嵩草(原亚种) song cao (yuan ya zhong)

Carex myosuroides Villars, Prosp. Hist. Pl. Dauphiné, 17. 1779; *C. affinis* R. Brown; *C. bellardii* Allioni; *Elyna myosuroides* (Villars) Fritsch ex Janchen; *E. spicata* Schrader; *Kobresia bellardii* (Allioni) Degland ex Loiseleur-Deslongchamps; *K. filiformis* Dewey; *K. scirpina* Willdenow.

Basal sheaths reddish brown. Inflorescences 1–3 × 0.2–0.3 cm. Glumes yellowish brown or reddish brown to brown, 2.5–4 × 1.2–2 mm. Prophylls oblong, 2.5–3.5 × 1–1.3 mm. Nutlets 2.5–3 (including beak) × 0.8–1 mm. Stigmas 3. Fl. and fr. May–Sep. $2n = 56$.

Moist or dry open places in calcareous soils, alpine meadows, on rocks, dry ridges, grassy slopes, among shrubs; 1500–3500 m. Gansu, Hebei, Jilin, Nei Mongol, Shanxi, Xinjiang [Japan, Kazakhstan, Korea, Mongolia, Russia; Europe, North America].

28b. *Kobresia myosuroides* subsp. *bistaminata* (W. Z. Di & M. J. Zhong) S. R. Zhang, Novon 9: 453. 1999.

二蕊嵩草 er rui song cao

Kobresia bistaminata W. Z. Di & M. J. Zhong, Acta Bot. Boreal.-Occid. Sin. 6: 275. 1986.

Basal sheaths brown to dark brown. Inflorescence 1–2.5 × ca. 0.2 cm. Glumes pale brown to dark brown, 2–3 mm. Prophylls oblong or oblong-ovate, 2.2–2.8 mm. Nutlets 1.8–2.3 mm (including beak). Stigmas usually 2 (sometimes 3, or both 2 and 3 on same plant). Fl. and fr. Jun–Sep.

• Alpine meadows, grassy slopes, among shrubs; 2100–4500 m. Gansu, Nei Mongol, Ningxia, Qinghai, Sichuan, Xinjiang, Xizang.

The frequent bistigmatic tendency found in Chinese plants has not been noted elsewhere in the range of the widespread circumboreal *Kobresia myosuroides*. A similar tendency (though to a lesser degree) is also found in Chinese *K. capillifolia*. Further work may confirm that specific rank for the bistigmatic “Greater Tibetan” taxon is more appropriate.

29. *Kobresia nepalensis* (Nees) Kükenthal in Engler, Pflanzener. 38(IV. 20): 40. 1909.

尼泊尔嵩草 ni bo er song cao

Uncinia nepalensis Nees in Wight, Contr. Bot. India, 129. 1834; *Carex linearis* Boott (1858), not Clairville (1811); *C. linearis* var. *elachista* C. B. Clarke; *Kobresia nepalensis* var. *elachista* (C. B. Clarke) Kükenthal.

Rhizomes short. Basal sheaths prominent and persistent, pale brown or brown, dull, fibrillose, not retaining dried leaf blades. Culms densely tufted, erect and rigid, occasionally filiform, obtusely trigonus, (2–)10–44 cm tall, 0.7–1.5 mm in diam. Leaves basal, ± equaling culms; blade filiform, margin involute, 0.3–1.1 mm wide. Inflorescence spicate, androgynous, linear, 1.5–8 × 0.2–0.5 cm, dense above, looser below; lowest involucre bract glumelike, apex long aristate. Spikelets all unisexual, 1-flowered. Male glumes yellowish brown laterally, with green midvein, narrowly oblong, ca. 7.5 × 1.5 mm, sides papery, margin not hyaline, apex obtuse. Female glumes brown laterally, with green midvein, ovate to lanceolate, 3.3–5 × 2–2.4 mm, midvein broad, margin hyaline or not, apex mucronate, acute, or obtuse. Prophylls lower part pale green, apex brown,

utriculiform, linear-oblong, 4–7.5 × 0.8–1.7 mm, membranous, 2-keeled, keels scabrid, margins open only near apex. Nutlets narrowly oblong or oblanceolate, trigonous, stipitate and beaked, 3.5–6.5 (including beak and stipe) × 0.7–1 mm, beak 1.5–2.2 mm, stipe ca. 0.5 mm. Stigmas 3. Sterile rachilla of female spikelets green, linear, 1/4–2/3 as long as nutlet, margin ciliate. Fl. and fr. Jun–Oct.

Scree slopes, dry grassy slopes, on rocks, alpine shrubby meadows, damp rocky cliffs; 3600–4600 m. Sichuan, Xizang, Yunnan [Bhutan, India (Sikkim, Uttarakhand), Kashmir, Nepal, Pakistan].

30. *Kobresia cercostachys* (Franchet) C. B. Clarke, J. Linn. Soc., Bot. 36: 267. 1903.

尾穗嵩草 wei sui song cao

Carex cercostachys Franchet, Bull. Soc. Philom. Paris, sér. 8, 7: 27. 1895; *Kobresia nepalensis* (Nees) Kükenthal var. *stiebritziana* (Handel-Mazzetti) R. C. Srivastava; *K. stiebritziana* Handel-Mazzetti.

Rhizomes short. Basal sheaths prominent and persistent, brown or pale brown, dull, margins strongly fibrillose, not retaining dried leaf blades. Culms densely tufted, erect or sometimes curved, rigid, obtusely trigonous, 5–35 cm tall, 0.7–1.5 mm in diam. Leaves basal, shorter than or equaling culms; blade filiform, folded or involute, 1–2 mm wide, midrib not distinct abaxially. Inflorescence densely spicate, androgynous, brown, linear, 1.7–7 × 0.3–0.7 cm; lowest involucre bract glumelike, apex obtuse, acute, or shortly aristate; upper spikelets male, lower spikelets female (rarely androgynous in lowest part of inflorescence). Male glumes brown, oblong-lanceolate, 4–6 mm, membranous, margin hyaline near apex. Female glumes brown to dark brown, with pale brown or pale green midvein, oblong-lanceolate or lanceolate, 4–6.5(–7.5) × 1.5–2.3 mm, midvein narrow or broad, margin hyaline, apex acute or obtuse, occasionally aristate. Prophylls: lower part pale green, apex brown, narrowly oblong or lanceolate, 4.5–7 × 0.8–1 mm, papery, 2-keeled, keels scabrid, margins free to base, overlapping, apex truncate or notched, hyaline. Nutlets narrowly oblong or oblanceolate, trigonous, shortly stipitate and beaked, 2.7–4 (excluding beak) × 0.6–1.2 mm, beak 0.5–1 mm. Stigmas 3. Sterile rachilla of female spikelets to 1/2 as long as nutlet, sometimes with vestigial glume(s) at apex. Fl. and fr. Jul–Oct.

Scree slopes, grassy slopes among shrubs, on rocks, alpine meadows; 3600–5000 m. Sichuan, Xizang, Yunnan [Bhutan, India (Sikkim), Nepal].

31. *Kobresia esenbeckii* (Kunth) Noltie, Edinburgh J. Bot. 50: 43. 1993.

三脉嵩草 san mai song cao

Carex esenbeckii Kunth, Enum. Pl. 2: 522. 1837, based on *C. trinervis* Nees in Wight, Contr. Bot. India, 120. 1834, not Degland (1807); *C. mutans* Boott ex C. B. Clarke; *Hemicarex hookeri* (Boeckeler) Benth; *H. trinervis* (Boeckeler) Benth & J. D. Hooker ex C. B. Clarke; *Kobresia angusta* C. B. Clarke; *K. foliosa* C. B. Clarke; *K. hookeri* Boeckeler; *K. hookeri* var. *dioica* C. B. Clarke; *K. seticulmis* Boeckeler; *K. trinervis* Boeckeler.

Rhizomes short. Basal sheaths prominent and persistent, brown or dark brown, shiny, sometimes decaying to fibers, not retaining dried leaf blades. Culms densely tufted, erect, trigonous (sometimes obtusely), 3–32 cm tall, slender, 0.5–1 mm in diam. Leaves basal, ± equaling culms; blade flat, 1.5–5 mm wide, midrib distinct abaxially. Inflorescence spicate, unisexual or androgynous, male and female spikes sometimes borne on same plant; all spikelets 1-flowered (occasionally a few at base bisexual with a single male flower). Male spikes compact, 3.5–5 × ca. 0.4 cm; male glumes yellowish brown, narrowly oblong, 7–8.5 × 1.5–2 mm, 1-veined, margin broadly hyaline, apex obtuse. Female and androgynous spikes linear, 1.7–6.5 × 0.15–0.4 cm, spikelets usually loosely arranged; lowest involucre bract glumelike, apex aristate. Female glumes brown laterally, with green midvein, oblong or ovate, 2.2–4 × 1–2 mm, midvein narrow, margin narrowly hyaline, apex mucronate, acute, or obtuse. Prophylls utriculiform when young, splitting to base when mature, pale brown, linear-oblong, 2–3.7 × 0.4–0.7 mm, membranous, 2-keeled, keels ciliate, apex truncate and rounded. Nutlets narrowly oblong or elliptic, curved or not, very shortly stipitate and beaked, 2.5–3.7 (excluding beak) × 0.7–1 mm, stipe ca. 0.5 mm, beak 0.8–2 mm. Stigmas 3, twisted, white in field, thick. Sterile rachilla of female spikelets linear, minute, to 1/4 as long as nutlet. Fl. and fr. May–Oct.

Wet rocks, crevices of cliffs, grassy slopes, lakeshores, on trees; 2800–4300(–4900) m. Sichuan, Xizang, Yunnan [Bhutan, India (Himachal Pradesh, Sikkim, Uttarakhand), Myanmar, Nepal].

32. *Kobresia fissiglumis* C. B. Clarke in J. D. Hooker, Fl. Brit. India 6: 696. 1894.

柄果嵩草 bing guo song cao

Kobresia esenbeckii (Kunth) Noltie var. *fissiglumis* (C. B. Clarke) Noltie.

Rhizomes short. Basal sheaths prominent and persistent, brown, dull, not retaining dried leaf blades. Culms densely tufted, erect, triquetrous or obtusely trigonous, 3–14 cm tall, slender, ca. 0.5 mm in diam. Leaves basal, shorter than to exceeding culms; blade flat, 1.5–2 mm wide, midrib distinct abaxially. Inflorescences spicate, unisexual, dense above, looser below, male and female inflorescences borne on same plant; all spikelets unisexual, 1-flowered; lowest involucre bract of female spikes glumelike, apex obtuse. Male spikes linear, ca. 1.5 × 0.3 cm; male glumes reddish brown, oblong, 6–7 × ca. 2 mm, 1-veined, margin hyaline, apex obtuse. Female spikes linear, 2.2–4 × 0.2–0.3 cm; female glumes brown or reddish brown laterally, with green midvein, oblong or narrowly ovate, 3.5–5 × 1–1.5 mm, midvein narrow, margin of upper parts hyaline, apex rounded or obtuse. Prophylls pale brown or brown, oblong or elliptic-oblong, 2–3 × 0.5–0.9 mm, membranous, not keeled, margins open to base even in juvenile stage, apex rounded. Nutlets narrowly oblong, trigonous, stipitate and beaked, 2–3.5 (excluding beak) × 0.5–0.9 mm in diam., stipe 0.6–0.7 mm, beak 1–1.5 mm. Stigmas 3, curved, slender. Sterile rachilla of female spikelets linear, minute. Fl. and fr. Jun–Aug.

Grassy slopes, on rocks and cliff ledges; 3200–4300 m. Xizang, Yunnan [Bhutan, India (Himachal Pradesh, Sikkim), Nepal].

33. *Kobresia falcata* F. T. Wang & Tang ex P. C. Li, Acta Bot. Yunnan. 12: 18. 1990.

镰叶嵩草 lian ye song cao

Rhizomes short. Basal sheaths prominent and persistent, dark brown, dull, not retaining dried leaf blades. Culms densely tufted, erect, trigonous, 12–15 cm tall, slender, ca. 1 mm in diam. Leaves basal, slightly shorter than or \pm equaling culms; blade flat, slightly curved and falcate, 2–3.7 mm wide. Inflorescence moderately densely spicate, androgynous, oblong, 1.5–2 \times 0.3–0.4 cm; all spikelets 1-flowered, terminal 3 or 4 male, others female; lowest involucral bract glumelike, apex aristate, arista to 9 mm. Male glumes brown, lanceolate, 5–6 mm, membranous. Female glumes brown laterally, with yellowish brown midvein, narrowly oblong, 6–6.5 (excluding arista) \times ca. 2 mm, papery, margin of upper parts very narrowly hyaline, apex rounded and aristate, arista 1–1.5 mm. Prophylls yellow in lower part, upper parts and margin brown, linear-oblong, 5–5.5 \times 0.5–0.7 mm, membranous, 2-keeled, keels scabrid, margins open to base even in juvenile stage, apex rounded. Nutlets narrowly oblong, trigonous, 4.8–5.2 mm (including beak), beak ca. 2 mm, included in prophylls when mature. Stigmas 3. Sterile rachilla of female spikelets linear, minute, ca. 1/5 as long as nutlet. Fl. and fr. Jul–Aug.

- In rock crevices; 2800–4000 m. Gansu, Sichuan.

34. *Kobresia vidua* (Boott ex C. B. Clarke) Kükenthal in Engler, Pflanzenr. 38(IV. 20): 40. 1909.

短轴嵩草 duan zhou song cao

Carex vidua Boott ex C. B. Clarke in J. D. Hooker, Fl. Brit. India 6: 713. 1894; *Kobresia harrismithii* Kükenthal; *K. prattii* C. B. Clarke.

Rhizomes short. Basal sheaths prominent and persistent, brown to dark brown, slightly shiny, not fibrillose, not retaining dried leaf blades. Culms densely tufted, stiffly erect, subterete, (1.5–)3–20 cm tall, slender, 0.8–1(–2) mm in diam. Leaves basal, shorter to longer than culms; blade erect, filiform, 0.5–1.1 mm wide, margin involute. Inflorescence spicate, unisexual; all spikelets 1-flowered. Male spikes pale brown, narrowly ellipsoid, (0.7–)1–2.5 \times 0.2–0.5 cm; male glumes pale brown laterally, with yellow midvein, linear-oblong, 4.5–7 \times 1–3 mm, apex obtuse. Female spikes compact or slightly lax, brown and partly green, linear or cylindrical, 1.3–3.5 \times 0.2–0.4 cm; lowest involucral bract glumelike; female glumes brown or chestnut-brown laterally, with green midvein, oblong-ovate, 1.9–5 \times 1.3–2.4 mm, papery, midvein very broad (ca. 1/3 width of glume), margin narrowly hyaline, apex rounded or mucronate. Prophylls: lower parts pale green, upper parts brown or chestnut-brown, utriculiform, elliptic or oblong, 2.2–4 \times 0.6–1.7 mm, papery, 2-keeled, keels ciliate or smooth, margins fused to apex. Nutlets pale brown, oblong or elliptic, trigonous, 1.6–3.5 \times 0.9–1.3 mm, very shortly stipitate, shortly beaked, beak 0.4–1 mm. Stigmas 3. Sterile rachilla of female spikelets less than 1/2 as long as nutlet. Fl. and fr. May–Sep.

Grassy slopes, alpine meadows, on rocks, among shrubs; 3000–5100 m. Gansu, Qinghai, ?Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, India (Sikkim), Nepal].

35. *Kobresia yangii* S. R. Zhang, Acta Phytotax. Sin. 33: 160. 1995.

纤细嵩草 xian xi song cao

Kobresia gracilis Y. C. Yang, Acta Biol. Plateau Sin. 2: 10. 1984, not Meinshausen (1901).

Rhizomes very short. Basal sheaths prominent and persistent, brown, dull, fibrillose, not retaining dried leaf blades. Culms densely tufted, erect, subtriquetrous, 8–23 cm tall, slender, less than 0.5 mm in diam. Leaves basal, shorter than to subequaling culms; blade filiform, thinner than culms, margin involute. Inflorescence spicate, unisexual; all spikelets 1-flowered. Male spikes pale brown, linear, occasionally with 1 or 2 female spikelets at base; male glumes pale brown, oblong, ca. 4 mm, membranous, apex acute or rounded. Female spike compact, brown or pale brown, linear or cylindrical, (0.5–)1–2 \times 0.1–0.2 cm; lowest involucral bract glumelike, apex rounded; female glumes brown or chestnut-brown laterally, with green midvein, oblong-ovate, 3–3.5 mm, membranous, midvein broad, margin narrowly hyaline, apex rounded. Prophylls yellowish green, with brown apex, utriculiform, narrowly elliptic, 2–3 \times 0.7–1 mm, membranous, 2-keeled, keels smooth, margins fused to apex. Nutlets pale brown, oblong, trigonous or compressed trigonous, very shortly stipitate, shortly beaked, 1.5–2.5 mm, beak ca. 0.8 mm. Stigmas 3. Sterile rachilla of female spikelets narrowly lanceolate, ca. 1/2 as long as nutlet. Fl. and fr. Aug.

- Grassy slopes, grasslands among *Quercus*; 3600–4400 m. Sichuan.

36. *Kobresia littledalei* C. B. Clarke, Bull. Misc. Inform. Kew, Addit. Ser. 8: 67. 1908.

康藏嵩草 kang zang song cao

Kobresia tibetica Maximowicz subsp. *littledalei* (C. B. Clarke) P. C. Li.

Rhizomes short. Basal sheaths prominent and persistent, very pale brown, dull, not fibrillose, not retaining dried leaf blades. Culms densely tufted, erect, rigid, subterete, 10–25 cm tall, 1–2 mm in diam. Leaves basal, shorter than or \pm equaling culms; blade stiffly erect, filiform, ca. 1 mm wide, margin involute. Inflorescence spicate, usually unisexual; all spikelets 1-flowered. Male spikes linear or linear-oblong, 1.7–3 \times 0.4–0.5 cm, occasionally with a few female spikelets at base; male glumes yellowish brown to brown, with pale green midvein, lanceolate, margin broadly hyaline, apex obtuse. Female spikes slightly lax, pale brown, linear, 1.5–4 \times 0.2–0.3 cm; lowest involucral bract glumelike, apex aristate or not; female glumes brown or yellowish brown laterally, with pale green midvein, ovate to lanceolate, 4–6 \times 1.5–2 mm, margin narrowly hyaline, apex acute. Prophylls pale brown or brown, utriculiform, oblong or lanceolate, 3.5–5 \times 1.2–1.3 mm, membranous, 2-keeled, keels ciliate, margins fused to middle part or to apex, apex rounded. Nutlets oblong, trigonous, 2–2.7 \times ca. 1 mm, not stipitate, not beaked. Stigmas 3. Sterile rachilla of female spikelets linear, flat, ca. 1/2 as long as nutlet or slightly longer. Fl. and fr. May–Sep.

- Grassy slopes, alpine meadows, alpine shrubby meadows, rocky and sandy grassy slopes; 4300–5300 m. ?Qinghai, Sichuan, Xizang.

37. *Kobresia prainii* Kükenthal, Bull. Herb. Boissier, sér. 2, 4: 50. 1903.

不丹嵩草 bu dan song cao

Kobresia prainii var. *elliptica* Y. C. Yang; *K. utriculata* C. B. Clarke.

Rhizomes short. Basal sheaths prominent and persistent, pale brown, dull, not retaining dried leaf blades. Culms densely tufted, erect, rigid, subterete, 3–10(–25) cm tall, slender, 0.5–1 mm in diam. Leaves basal, shorter to longer than culms; blade erect or recurved, filiform, less than 0.5 mm wide, margin involute. Inflorescence spicate, unisexual; all spikelets 1-flowered. Male spikes cream to pale brown, narrowly elliptic, often curved, 6–13 × 2–5 mm; male glumes whitish or pale brown, linear-lanceolate, 5.5–7.5 × 0.8–1 mm, membranous, apex obtuse. Female spike slightly lax, pale brown, linear-elliptic or narrowly oblong, 1–2 × 0.2–0.3 cm; lowest involucre bract glumelike, blunt; female glumes brown or yellowish brown laterally, with paler midvein, ovate to lanceolate, 3.5–6 × 1–1.5 mm, midvein narrow, margin narrowly hyaline, apex acute or obtuse. Prophylls lower parts yellowish green, upper parts brown, utriculiform, oblong, 2.5–3 × 0.8–1 mm, membranous, 2-keeled, keels ciliate, margins fused to apex, apex rounded. Nutlets brown, oblong or elliptic, trigonous, 1.8–2.4 × 0.7–1 mm, not stipitate, not beaked. Stigmas 3. Sterile rachilla of female spikelets linear, less than 1/2 as long as to subequaling nutlet. Fl. and fr. May–Sep.

Grassy slopes, alpine meadows, rocky and grassy slopes; 3300–5600 m. Xizang [Bhutan, India (Sikkim), Nepal].

38. *Kobresia pygmaea* (C. B. Clarke) C. B. Clarke in J. D. Hooker, Fl. Brit. India 6: 696. 1894.

高山嵩草 gao shan song cao

Hemicarex pygmaea C. B. Clarke, J. Linn. Soc., Bot. 20: 383. 1883; *Kobresia microstachya* K. V. Ivanova; *K. pygmaea* var. *filiculmis* Kükenthal.

Plants usually extremely densely tufted, forming turf or cushions. Basal sheaths persistent, brown or pale brown, dull, not retaining dried leaf blades. Culms stiffly erect, obtusely trigonous, very short, (0.4–)1–10 cm tall, ca. 0.5 mm in diam. Leaves basal, ca. as long as culms; blades erect, filiform, 0.3–0.5 mm wide, margin involute. Inflorescence a dense ovoid spike, brown, 0.3–10 × 0.1–0.3 cm, androgynous; lowest involucre bract glumelike, apex sometimes shortly aristate; all spikelets unisexual, terminal spikelets male, lower ones female (occasionally with a sterile glume within prophyll). Male glumes brown, oblong-lanceolate, ca. 4 × 1.8 mm, membranous. Female glumes brown, with yellowish green to green midvein, ovate or oblong-ovate, 2–3.5 × 2–2.5 mm, papery, midvein broad, margin narrowly hyaline, apex acute or obtuse. Prophylls brown, oblong or elliptic, 2–2.5 × 1–1.2 mm, membranous, 1- or 2-keeled, keels smooth or slightly scabrid, margins free to base, sometimes overlapping, apex truncate. Nutlets brown to dark brown, shiny, obovoid, trigonous, 1.5–2 × ca. 1 mm, very shortly beaked and stipitate. Stigmas 3. Fl. and fr. May–Sep.

Dry and open grassy places, wet alpine meadows, turf in wet habitats, rocky slopes, on sand and gravel beside rivers; 3100–5600 m. Gansu, Hebei, Nei Mongol, Qinghai, Shanxi, Sichuan, ?Xinjiang, Xizang, Yunnan [Bhutan, India (Himachal Pradesh, Sikkim, Uttarakhand), Kashmir, Myanmar, Nepal, Pakistan].

39. *Kobresia squamiformis* Y. C. Yang, Acta Biol. Plateau Sin. 2: 9. 1984 [*“squamaeformis”*].

夏河嵩草 xia he song cao

Kobresia setschwanensis Handel-Mazzetti subsp. *squamiformis* (Y. C. Yang) S. R. Zhang.

Rhizomes short, plants densely tufted. Basal sheaths persistent, brown, dull, not retaining dried leaf blades. Culms stiffly erect, obtusely trigonous, very short, 9–16 cm tall, ca. 0.8 mm in diam. Leaves basal, ca. as long as culms; blade erect, filiform, ca. 0.5 mm wide, margin involute. Inflorescence a dense spike, brown, cylindric, 1–1.5 × 0.3–0.5 cm, androgynous; lowest involucre bract glumelike, apex shortly aristate; spikelets usually all unisexual, terminal few male, lower ones female (occasionally with a single reduced male flower within prophyll). Male glumes brown, with yellowish green midvein, lanceolate, ca. 3.5 × 1.5 mm, apex rounded. Female glumes brown, with yellowish green midvein, ovate or oblong-ovate, 3–3.5 × 1.8–2.5 mm, papery, midvein broad, margin very narrowly hyaline, apex rounded. Prophylls brown, oblong, 3–3.8 × 1.2–1.5 mm, membranous, 2-keeled, keels smooth, margins free to base. Nutlets brown to dark brown, shiny, oblong-elliptic, trigonous, 2.3–2.5 × 1.3–1.6 mm, not beaked, not stipitate. Stigmas 3. Sterile rachilla of female spikelets much shorter than to subequaling nutlet, sometimes bearing a vestigial male glume. Fl. and fr. Jul–Oct.

• Grassy slopes; 2900–3600 m. Gansu (Xiahe), E Qinghai (Zèkog).

This appears to form a link between *Kobresia pygmaea* and *K. setschwanensis*; it seems more logical to recognize it as a distinct species than as a slender subspecies of the latter, when it could equally well be made a robust subspecies of the former.

40. *Kobresia vaginosa* C. B. Clarke in J. D. Hooker, Fl. Brit. India 6: 695. 1894.

发秆嵩草 fa gan song cao

Kobresia cercostachys (Franchet) C. B. Clarke var. *capillacea* P. C. Li; *K. nepalensis* (Nees) Kükenthal subsp. *vaginosa* (C. B. Clarke) T. Koyama; *K. nepalensis* var. *vaginosa* (C. B. Clarke) R. C. Srivastava.

Rhizomes short, or shortly and obliquely elongated, plants forming a turf. Basal sheaths prominent and persistent, reddish brown or pale brown, dull, fibrillose, not retaining dried leaf blades. Culms densely tufted, erect or curved, subterete, 3.5–10 cm tall, slender, ca. 0.5 mm in diam. Leaves basal, equaling or exceeding culms; blade filiform, flaccid, ca. 0.5 mm wide, margin involute. Inflorescence spicate, linear, rather lax, usually unisexual, occasionally gynaeandrous or androgynous, plants with male and female inflorescences on same individual, or sometimes dioecious; spikelets unisexual. Male spikes 1.5–3 × ca. 0.2 cm; male glumes oblong-lanceolate, 6–8 × 1.2–2 mm,

midvein green, margin and apex hyaline. Female spikes 2–3.5 × ca. 0.2 cm; lowest involucre bract glumelike, apex acute or shortly aristate; female glumes brown, with pale brown or pale green midvein, lanceolate, 5–6.2 × 1.7–2 mm, midvein narrow, margin broadly hyaline, apex subacute or obtuse. Prophylls lower part yellow, upper part and margin brown, linear, 4.7–5.7 × ca. 0.7 mm, 2-keeled, keels scabrid, margins free to base, apex truncate, hyaline. Nutlets narrowly oblong or oblanceolate, trigonous, shortly stipitate and beaked, 3.5–4 (excluding beak) × 0.6–1.2 mm, beak 0.5–1 mm. Stigmas 3. Sterile rachilla of female spikelets to 1/2 as long as nutlet. Fl. and fr. Jul–Sep.

Dry slopes, on rocks in alpine meadows; 4000–4800 m. Xizang, Yunnan [India (Sikkim), ?Nepal].

41. *Kobresia graminifolia* C. B. Clarke, J. Linn. Soc., Bot. 36: 268. 1903.

禾叶嵩草 he ye song cao

Rhizomes short. Basal sheaths prominent and persistent, pale brown or yellowish brown, dull or slightly shiny, margins and apices fibrillose, not or retaining a few dried leaf blades. Culms densely tufted, erect and rigid, obscurely trigonous, (7–)20–45 cm tall, 1–1.5 mm in diam. Leaves basal, shorter to longer than culms; blade semicircular or V-shaped in transverse section, 0.5–1.5 mm wide, midrib not usually distinct abaxially. Inflorescence ± densely spicate, usually unisexual (sometimes androgynous or gynaeandrous), male and female spikes borne on same plant. Male inflorescence narrowly cylindrical or narrowly ellipsoid, 1.5–3(–5) × 0.3–0.6 cm; male glumes narrowly oblong, 6–8(–10) × 1–2 mm, margin narrowly hyaline, apex rounded. Female inflorescence brown, narrowly cylindrical, 2.5–7.5 × 0.3–0.6 cm, lower spikelets distant; lowest involucre bract glumelike, apex acute or shortly aristate; female glumes brown, with paler midvein, oblong-ovate or narrowly triangular-ovate, 5–6 × 1.5–2 mm, midvein narrow, margin very narrowly hyaline, apex acute or obtuse. Prophylls lower part pale green, apex brown, narrowly oblong-elliptic, 4–6 × 0.8–1.8 mm, papery, 2-keeled, keels scabrid, margins free to base or fused in lower 1/4, not overlapping, apex truncate or notched. Nutlets narrowly elliptic or oblanceolate, trigonous, very shortly stipitate and shortly beaked, 3.5–5.5 (including stipe and beak) × 0.8–1.5 mm. Stigmas 3. Sterile rachilla of female spikelets 1.2–2 mm, less than 1/2 length of nutlet. Fl. and fr. Jun–Sep.

Grassy slopes, among shrubs, on mossy rocks, alpine meadows; 3100–4700 m. Gansu, Qinghai, Shaanxi, Sichuan, Xizang, Yunnan [Nepal].

This is possibly a form of *Kobresia cercostachys*, which it resembles (especially in its fibrillose leaf sheaths and somewhat intermediate leaf morphology) but differs from it in its (usually) contrasting female and male spikes.

42. *Kobresia woodii* Noltie, Edinburgh J. Bot. 50: 48. 1993.

阔鳞嵩草 kuo lin song cao

Rhizomes short. Basal sheaths prominent and persistent, inner ones straw-colored, outer ones chocolate brown with darker margins, slightly shiny, not fibrillose, retaining dried leaf blades. Culms densely tufted, erect and rigid, subterete, 24–28

cm tall, ca. 1 mm in diam. Leaves basal, slightly longer than culms; blade filiform, semicircular or V-shaped in transverse section, ca. 1.5 mm wide, midrib not distinct abaxially. Inflorescence spicate, narrowly cylindrical, unisexual, male and female spikes borne on same plant. Male inflorescence ca. 4 × 0.3 cm; male glumes oblong-oblanceolate, ca. 8 × 2.5 mm, margin narrowly hyaline, apex rounded. Female inflorescence dense, lower spikelets sometimes distant, brown, ca. 6 × 0.6 cm; lowest involucre bract glumelike, apex aristate, arista ca. 5 mm; female glumes brown laterally, with green midvein, oblong-ovate, 6.2–8 × 2.5–3.9 mm, midvein broad, margin very narrowly hyaline or not hyaline, apex obtuse. Prophylls lower part pale brown, apex brown, linear-oblong, 7–10 × 1–1.5 mm, papery, 2-keeled, keels minutely scabrid, margins free to base, overlapping. Nutlets linear, obscurely trigonous, body ca. 2.5 × 0.7 mm, with stipe ca. 1 mm, beaked with stout style base (ca. 1.5 mm). Stigmas 3. Fl. and fr. May–Sep.

Grasslands, alpine meadows; 3300–4800 m. S Xizang (Yadong) [Bhutan].

43. *Kobresia pusilla* N. A. Ivanova, Bot. Zhurn. S.S.S.R. 24: 496. 1939.

高原嵩草 gao yuan song cao

Kobresia coninix F. T. Wang & Tang; *K. daqingshanica* X. Y. Mao; *K. helanshanica* W. Z. Di & M. J. Zhong.

Rhizomes short. Basal sheaths pale brown to brown, dull, retaining dried leaf blades. Culms densely tufted, erect, obtusely trigonous, 2–15 cm tall, 0.7–1 mm in diam. (relatively stout for length). Leaves basal, shorter than or ± equaling culms, sometimes recurved; blade flat, folded at base (V-shaped in cross section), 1–1.5(–2) mm wide, midrib distinct abaxially or not. Inflorescence densely spicate (occasionally branched in lower part), brown, narrowly elliptic or narrowly ovate-oblong, 0.5–1.2 × 0.3–0.4 cm; lowest involucre bract glumelike, apex shortly aristate. Terminal spikelets of inflorescence male, lower ones bisexual with 1 basal female flower and (1 or)2–5 distal male flowers. Glumes brown or pale brown, with yellowish green or green midvein, oblong, ovate, or lanceolate, 3.2–5 × 1.5–2.5 mm, margin hyaline or not, apex obtuse or acute. Prophylls pale brown, oblong, ovate-oblong, or elliptic, 2.9–4 × 1–2 mm, membranous, abaxially sometimes hairy, 2-keeled, keels scabrid, margins open to base, apex truncate or 2-toothed. Nutlets brown and shiny, elliptic or oblong-ovate, flattened, body 1.6–2.5 × 0.8–1.5 mm, shortly stipitate, very shortly beaked. Stigmas 2. Fl. and fr. May–Oct.

• Exposed dry slopes, alpine meadows, shaded places, marshes; 3100–5300 m. Gansu, Hebei, Nei Mongol, Qinghai, Sichuan, Xizang.

This species is similar to *Kobresia humilis*, differing largely in its bistigmatic nutlets.

44. *Kobresia karakorumensis* Dickoré, Stapfia 39: 77. 1995.

喀拉昆仑嵩草 ka la kun lun song cao

Rhizomes short. Basal sheaths pale brown to brown, dull, retaining dried leaf blades. Culms densely tufted, dwarf, erect and rigid, subterete in lower part, trigonous above, (2–)3–15(–20) cm tall, 0.5–0.7 mm in diam. Leaves basal, usually

shorter than culms; blade V-shaped in section, recurved, 1–2.5 mm wide, midrib not distinct abaxially. Inflorescence spicate (rarely compound), brown or dark brown, densely and broadly cylindrical, 0.5–1.2 × 0.2–0.4 cm; lowest involucre bract glume-like. Terminal spikelets of inflorescence male, lower ones bisexual with 1 basal female flower and (1 or)2(or 3) distal male flowers. Glumes brown or dark brown, with pale midvein, ovate, 2.5–3 × ca. 2 mm, midvein narrow, margin very narrowly or not hyaline, apex obtuse. Prophylls pale brown at upper part, narrowly elliptic, ca. 3.3 × 0.9 mm, membranous, glabrous,

hyaline at base, obscurely 2-keeled, margins connate in lower 1/4(–1/2). Nutlets brown or pale brown, oblong-elliptic, flattened, body ca. 1.5 × 0.9 mm, stipe ca. 0.5 mm, very shortly beaked. Stigmas 2. Fl. and fr. Jul–Sep.

High alpine turf; (3100–)3800–5000 m. Xinjiang, Xizang [Afghanistan, India (Himachal Pradesh), Kashmir, ?Nepal, Pakistan, Tajikistan].

This is, perhaps, a western form of *Kobresia pusilla*, but it is also close to *K. myosuroides* subsp. *bistaminata*.

33. CAREX Linnaeus, Sp. Pl. 2: 972. 1753.

藁草属 tai cao shu

Dai Lunkai (戴伦凯), Liang Songyun (梁松筠 Liang Song-jun), Zhang Shuren (张树仁), Tang Yancheng (汤彦承 Tang Yen-cheng); Tetsuo Koyama, Gordon C. Tucker

Herbs, perennial; rhizome usually stoloniferous. Culms tufted or sparse, lateral or central, erect, trigonous, bladeless sheathed at base. Leaves basal or basal and cauline, flat, rarely involute or revolute on margins, linear or lorate, rarely lanceolate, sheathed at base. Involucral bracts leaflike, rarely scale-shaped or setaceous, sheathed or not. Flowers unisexual, 1 male flower or 1 female flower in a unisexual spikelet, female spikelet included by prophyll, prophyll wholly connate at margins into utricle, sometimes reduced spikelet axis present in utricle, with scalelike bractlet at base. Spikes 1 to numerous, usually numerous spikes arranged in spicate, racemose, or paniculate inflorescence, composed of many unisexual or bisexual spikes, bisexual spike androgynous or gynaeandrous, usually plants monoecious, rarely dioecious, pedunculate or sessile, with or without sheathlike or utriculiform cladoprophyll at base; male flower with (2 or)3 stamens, filaments distinct; female flower with 1 pistil, style slightly slender, persistent or deciduous, base usually not thickened; stigmas 2 or 3. Utricles trigonous, plano-convex or biconvex, with slightly long or short beak. Nutlets rather tightly or loosely enveloped in utricle, trigonous or plano-convex.

About 2,000 species: cosmopolitan; 527 species (260 endemic) in three subgenera and 69 sections (two endemic) in China.

- 1a. Spikes numerous, all bisexual, sessile, usually densely arranged in spicate inflorescence, cladoprophyll not present; stigmas usually 2, rarely 3 3. *C. subg. Vigna*
- 1b. Spikes few to numerous, unisexual or bisexual, pedunculate, rarely shortly pedunculate to subsessile, rarely single and terminal, usually loosely arranged in racemose or paniculate inflorescence, rarely in spicate inflorescence, cladoprophyll present; stigmas usually 3, rarely 2.
- 2a. Spikes bisexual and androgynous, very rarely unisexual, usually arranged in complex inflorescence, cladoprophyll utriculiform at spike base, with a female flower 1. *C. subg. Vigneastr*
- 2b. Spikes unisexual, or unisexual and bisexual, rarely all bisexual, spikes 1 to several borne in an involucre bract sheath, rarely arranged in complex inflorescence, cladoprophyll sheathlike, without female flower 2. *C. subg. Carex*

1. *Carex* subg. *Vigneastr* (Tuckerman) Kükenthal, Bot. Jahrb. Syst. 27: 516. 1899.

复序藁草亚属 fu xu tai cao ya shu

Zhang Shuren (张树仁); Tetsuo Koyama, Gordon C. Tucker

Carex sect. *Vigneastr* Tuckerman, Enum. Meth. Caric. 10. 1843; *C. subg. Indocarex* Baillon ex Kükenthal, nom. illeg. superfl.

Inflorescence simple or compound. Spikes few to numerous, usually bisexual and androgynous, rarely unisexual; cladoprophyll utriculiform, with or without a developed female flower.

About 100 species: tropical and subtropical Asia; 36 species (16 endemic) in ten sections (one endemic) in China.

Key to sections

- 1a. Each cladoprophyll with a developed female flower inside; inflorescence spicate; spikes numerous and densely arranged 1. *C. sect. Japonicae*
- 1b. Cladoprophylls without flowers or some with flowers; inflorescence paniculate or racemose, if inflorescence spicate then spikes fewer.
- 2a. Cladoprophyll below terminal spike with a developed female flower inside, others without flower; rachilla present at base of nutlet; inflorescence racemose.
- 3a. Terminal spike androgynous; utricle with smooth straight beak; nutlets with flat faces 2. *C. sect. Mundae*
- 3b. Terminal spike male; utricle with scabrous geniculate beak; nutlets with concave faces 3. *C. sect. Hangzhouenses*

- 2b. Cladophylls without flowers; rachilla absent; inflorescence paniculate or spicate.
- 4a. Inflorescence spicate; spikes fewer, densely arranged in capitate spicate inflorescence 10. *C. sect. Scabrellae*
- 4b. Inflorescence paniculate.
- 5a. Spikes unisexual, male ones at upper parts of inflorescence branches, female ones at lower parts 9. *C. sect. Hypolytroides*
- 5b. Spikes bisexual, androgynous.
- 6a. Culm lateral; cauline leaves reduced and spathe-like; involucre bracts spathe-like.
- 7a. Radical leaves fasciated, leaf blades elliptic to linear-elliptic 7. *C. sect. Hemiscaposae*
- 7b. Several radical leaves forming a high shoot, leaf blades linear 8. *C. sect. Surculosae*
- 6b. Culm central; cauline leaves well developed and leafy; involucre bracts leafy.
- 8a. Leaf blades and involucre bracts elliptic to linear-elliptic, with prominent transverse veins; inflorescence branches with fewer spikes 6. *C. sect. Euprepes*
- 8b. Leaf blades and involucre bracts linear, without transverse veins; inflorescence branches bearing numerous spikes, very rarely bearing few spikes.
- 9a. Spikes cylindrical, larger, 2–8 cm, with numerous spikelets 4. *C. sect. Polystachyae*
- 9b. Spikes oblong, smaller, less than 2 cm, with fewer spikelets 5. *C. sect. Indicae*

1. *Carex* sect. *Japonicae* Kükenthal in Engler, Pflanzenr. 38(IV. 20): 252. 1909, not Franchet (1898).

日本藁草组 ri ben tai cao zu

Zhang Shuren (张树仁); Tetsuo Koyama

Plants small. Involucre bracts leafy, without sheaths. Inflorescence spicate, single, with many densely arranged spikes. Spikes arising from utriculiform cladophylls; cladophyll with 1 developed female flower inside.

One species: China, Japan, Philippines, Vietnam.

1. *Carex satsumensis* Franchet & Savatier, Enum. Pl. Jap. 2: 558. 1878 [“*satsumensis*”].

砂地藁草 sha di tai cao

Carex nikoensis Franchet & Savatier; *C. satsumensis* var. *longiculma* Hayata; *C. satsumensis* var. *nakaii* Hayata.

Rhizome elongate and creeping. Culms loosely tufted, triangular, 7–20 × ca. 0.15 cm, glabrous, striate. Leaves shorter or longer than culms, flat, 1.5–7 mm wide, slightly stiff, glabrous; basal leaf sheaths blackish brown, fibriform. Involucre bracts linear, shorter than inflorescence, without sheaths. Inflorescence spicate, terminal, oblong-cylindrical, 3–8 × 1–1.7 cm. Spikes numerous, androgynous, dense and patent, oblong, arising from cladophylls with a developed female flower inside, several

basal ones sometimes branched; male part of spikelet tiny, 2–3 mm, with 4 or 5 flowers; female part with numerous and dense flowers; male glumes pale yellow or pale brown, lanceolate, 2.5–3 mm, membranous, apex acuminate; female glumes pale yellow or pale brown laterally, ovate, 2–2.5 mm, membranous, with 1 midrib, margins hyaline, apex acute. Utricles pale yellow-brown at maturity, patent, slightly longer than glumes, oblong-lanceolate, bluntly trigonous, 2.5–3 mm, membranous, with 2 raised lateral veins and several fine veins abaxially, nerveless and paler adaxially, base contracted abruptly into a short stipe, apex attenuate into a long beak, orifice obliquely truncate. Nutlet pale yellow at maturity, oblong, bluntly trigonous, ca. 1.5 mm, base attenuate, apex not apiculate; style base slightly thickened; stigmas 3.

Sandy places. Taiwan [Japan, Philippines, Vietnam].

2. *Carex* sect. *Mundae* Kükenthal in Engler, Pflanzenr. 38(IV. 20): 254. 1909.

秀丽藁草组 xiu li tai cao zu

Zhang Shuren (张树仁); Tetsuo Koyama

Inflorescence racemose. Spikes 3–8, bisexual, androgynous, long pedunculate, single or binate, terminal one usually 1- or 2-branched at base, branched spike arising from utriculiform cladophyll with a female flower inside, others arising from involucre bract sheaths. Rachilla often present at nutlet base.

Four species: Himalayas and adjacent China; two species (one endemic) in China.

- 1a. Rhizome creeping; spikes 3–7, lowest one single, middle ones binate, upper ones binate or ternate; utricle elliptic, glabrous; leaf blade 2.5–3.5 mm wide; basal persistent sheaths pale brown 2. *C. munda*
- 1b. Rhizome not creeping; spikes 5 or 6, all single; utricle obovate-lanceolate, pubescent; leaf blade 1–2 mm wide; basal persistent sheaths dark brown 3. *C. yulungshanensis*

2. *Carex munda* Boott, Ill. Gen. Carex 1: 7. 1858.

Carex munda var. *mundiformis* T. Koyama.

秀丽藁草 xiu li tai cao

Rhizome creeping. Culms 20–40 cm, less than 1 mm thick,

trigonus, tenuous, soft, smooth. Leaves slightly longer than culms, flat, 2.5–3.5 mm wide, glabrous; basal persistent leaf sheaths pale brown. Involucral bracts leafy, longer than spikes, with long sheaths. Spikes 3–7, bisexual, androgynous, distant, linear-cylindric, 1.5–2 cm, lowest one single and often arising from base of culm, middle ones binate, upper ones binate or ternate, terminal one with 1 or 2 branches, male part longer than female part, branched spikes arising from cladophylls with a developed female flower inside; male part of lateral spikes shorter than female part, lateral spikes borne from sheaths; male glumes yellowish brown, ovate-lanceolate, 3–3.5 mm, membranous, with 1 midrib, apex acuminate; female glumes yellowish brown laterally, green at middle, ovate or oblong, 2.5–3 mm, 3-veined, margins hyaline, apex obtuse or emarginate, apiculate. Utricles yellowish green, upright, longer than glumes, elliptic, bluntly trigonus, 3–4 mm, membranous, with 2 lateral veins and several fine veins abaxially, base contracted into a short stipe, apex abruptly contracted into a short excurved beak, orifice truncate. Nutlet pale brown at maturity, ovate, trigonus, ca. 2 mm, base shortly stipitate, apex apiculate; style base slightly thickened; stigmas 3. Rachilla if present 0.2–0.3 mm, flat.

Abies forests, alpine shrubs and meadows; 3500–3900 m. SE Xizang [Bhutan, NE India, Nepal].

3. *Carex yulungshanensis* P. C. Li, Acta Bot. Yunnan. 12: 138. 1990.

3. *Carex* sect. **Hangzhouenses** C. Z. Zheng, X. F. Jin & B. Y. Ding, Novon 15: 157. 2005.

杭州藁草组 hang zhou tai cao zu

Zhang Shuren (张树仁); Gordon C. Tucker

Inflorescence subracemose. Terminal spike pedunculate, male, unbranched; lateral secondary inflorescences 1–3, each with 6–10 closely branched androgynous spikes; each branched spike produced from a sacculate cladophyll with a female flower inside. Rachilla present at nutlet base.

• One species: China.

4. *Carex hangzhouensis* C. Z. Zheng, X. F. Jin & B. Y. Ding, Novon 15: 157. 2005.

杭州藁草 hang zhou tai cao

Rhizome short. Culms densely tufted, 30–60 cm, trigonus, glabrous. Leaves longer than culms, flat or with involute margins, 2.5–4 mm wide, glabrous; basal leaf sheaths smooth. Involucral bracts linear, shorter than inflorescence, with sheaths 1.5–2.5 cm. Inflorescence subracemose, terminal, oblong-cylindric, 3–8 × 1–1.7 cm, terminating in a male spike 4–4.5 cm; lowermost peduncle to 8 cm; lateral secondary inflorescences each with a terminal male clavate spike 1.5–2 cm. Spikes patent, oblong; lateral androgynous spikes each with a solitary female flower and apically with 4–6 male flowers; male glumes pale yellow or pale brown, oblong, ca. 8 mm, membranous,

玉龙藁草 yu long tai cao

Plants perennial. Culms densely tufted, up to 50 cm, trigonus, tenuous, glabrous. Leaves shorter than culms, flat or margins involute, 1–2 mm wide, basal persistent leaf sheaths dark brown. Involucral bracts leafy, shorter than inflorescence, long sheathed. Spikes 5 or 6, bisexual, androgynous, single, distant, linear-cylindric, 30–40 × 3–4 mm, terminal one with 1(or 2) branches, male part much longer than female part, branched spikes arising from cladophylls with a developed female flower inside; male part of lateral spikes much shorter and with only few flowers, female part with dense numerous flowers; peduncles of spikes tenuous, lowest one up to 20 cm, upper ones shorter; male glumes purplish brown, oblong-lanceolate, 4–4.5 mm, membranous, apex acuminate; female glumes purplish brown laterally, green at middle, oblong, 3.5–4 mm, papery, 3-veined, scabrid on veins, margins narrowly hyaline, apex rounded, apiculate. Utricles yellowish green, obovate-lanceolate, compressed trigonus, 3.5–4 mm, papery, pubescent, with 2 raised lateral veins and no fine veins abaxially, base attenuate into a short stipe, apex contracted into a short excurved beak, orifice truncate. Nutlet obovate-oblong, 2.2–2.5 mm, sessile, apex not apiculate; style base slightly thickened; stigmas 3. Rachilla ca. 0.3 mm, flat.

• Alpine meadows and scree; 3900–4300 m. NW Yunnan (Lijiang).

apex obtuse; female glumes green, broadly ovate, ca. 8.5 mm, subleathery, with 1 midrib prolonged into awn ca. 3 mm, apex acute. Utricles pale yellow-brown when mature, patent, ± equaling glumes, obovoid, obtusely trigonus, 6.5–7 mm, membranous, smooth, with 2 raised lateral veins and several fine veins abaxially, nerveless and paler adaxially, base cuneate, apex contracted into a geniculate beak ca. 2 mm, orifice 2-toothed. Nutlet castaneous, ellipsoid to obovoid, trigonus with concave faces, 3.5–4 mm, base subsessile, apex retuse; style base thickened, persistent; stigmas 3; vestigial rachilla ca. 2 mm. Fl. and fr. Apr–May.

• On rocks in forests; below 100 m. Zhejiang (Hangzhou).

This is a peculiar species in *Carex*. Its affinity is uncertain and needs further study.

4. *Carex* sect. **Polystachyae** Tuckerman, Enum. Meth. Caric. 10. 1843.

多穗藁草组 duo sui tai cao zu

Zhang Shuren (张树仁); Tetsuo Koyama

Panicle compound or simple. Spikes numerous, bisexual, androgynous, arising from flowerless utriculiform cladophylls, cylindric, 2–8 cm.

Four species: tropical and subtropical continental Asia; four species in China.

- 1a. Utricles inflated, red to purplish red 5. *C. baccans*
 1b. Utricles not inflated, pale green to brown.
 2a. Utricles ovate-globose, flatly trigonous, 3–3.5 mm, shortly beaked, margins of upper part hairy; female glumes hairy abaxially; persistent sheaths pale brown 8. *C. composita*
 2b. Utricles obovate-lanceolate, obtusely trigonous, 3.5–4 mm, with beak of medium length, margins of upper part scabrid; female glumes glabrous abaxially; persistent sheaths dark brown.
 3a. Inflorescence branches few spiked; spikes often single; female glumes pale green, margins membranous and brown 6. *C. myosurus*
 3b. Inflorescence branches many spiked; spikes binate; female glumes brown, margins hyaline 7. *C. eminens*

5. *Carex baccans* Nees in Wight, Contr. Bot. India, 122. 1834.

浆果薹草 *jiang guo tai cao*

Rhizome woody. Culms densely tufted, erect and robust, 80–150 × 0.5–0.6 cm, trigonous, glabrous, leafy below middle. Leaves longer than culms, flat, 8–12 mm wide, glabrous abaxially, scabrid adaxially; basal persistent leaf sheaths red-brown, reticulate. Involucral bracts leafy, longer than inflorescence, long sheathed. Panicle compound, 10–35 cm, 3–8-branched; inflorescence branches single, oblong, 5–6 × 3–4 cm; peduncles of inflorescence branches rigid, basal one 12–14 cm, upper ones gradually shorter, usually enclosed in sheaths; inflorescence axes bluntly triquetrous, subglabrous; bractlets glumelike, lanceolate, 3.5–4 mm, leathery, only basal one with short sheath, others sheathless, awned. Spikes numerous, bisexual and androgynous, arising from utriculiform cladophylls, cylindrical, 3–6 cm; male part of spike tenuous, few flowered, 1/3–1/2 length of female part; female part with dense and numerous flowers; male glumes chestnut, broadly ovate, 2–2.5 mm, membranous, apex awned; female glumes purplish brown or chestnut, broadly ovate, 2–2.5 mm, papery, with 1 green midrib, margins hyaline, apex awned. Utricles red to purplish red at maturity, shining, obovate-globose or subglobose, inflated, 3.5–4.5 mm, subleathery, with many vertical veins, upper margins hairy, base shortly stipitate, apex shortly beaked, orifice minutely 2-toothed. Nutlet brown at maturity, elliptic, trigonous, 3–3.5 mm, base shortly stipitate, apex apiculate; style base not thickened; stigmas 3.

Margins of woods, riversides; 200–2700 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Sichuan, Taiwan, Yunnan [Cambodia, India, Laos, Malaysia, Nepal, Thailand, Vietnam].

6. *Carex myosurus* Nees in Wight, Contr. Bot. India, 122. 1834.

鼠尾薹草 *shu wei tai cao*

Carex myosurus subsp. *spiculata* Boott.

Rhizome woody. Culms tufted, robust, 80–120 × ca. 0.3 cm, trigonous, scabrid, leafy below middle. Leaves longer than culms, flat, 5–7 mm wide, glabrous abaxially, scabrid adaxially; basal persistent leaf sheaths dark brown, fibriform. Involucral bracts leafy, longer than inflorescence, long sheathed. Panicle compound, 20–30 cm, 3–6-branched; inflorescence branches racemose, single, 5–8 cm, 2–4-spiked; peduncles of inflorescence branches tenuous, 3–11 cm; inflorescence axes triquetrous, scabrid; bractlets glumelike. Spikes single, bisexual and androgynous, cylindrical, 20–60 × 3.5–4.5 mm; male part of

spike 1/4–1/2 length of or very rarely equaling female part; female part with dense and numerous flowers; male glumes pale green, oblong-lanceolate, 3.5–4 mm, membranous; female glumes green or pale green at middle and pale brown laterally, oblong, 2.5–3 mm, papery, with 1 scabrid midrib, upper margin hyaline, apex acuminate, shortly awned. Utricles pale green, longer than glumes, obovate-lanceolate, trigonous, 4–4.5 mm, papery, with several fine veins, glabrous or lateral keels hairy, base attenuate, sessile, apex shortly beaked, beak 1/5–1/4 length of utricule, orifice minutely 2-toothed. Nutlet dark brown at maturity, closely enclosed in utricule, elliptic, trigonous, base shortly stipitate, apex nearly not apiculate; style base slightly thickened; stigmas 3.

Evergreen forests and forest margins; 1200–2000 m. SE Xizang, NW Yunnan [India, Myanmar, Nepal, Vietnam].

7. *Carex eminens* Nees in Wight, Contr. Bot. India, 122. 1834.

显异薹草 *xian yi tai cao*

Carex composita Boott var. *eminens* (Nees) Boeckeler; *C. floribunda* Boeckeler; *C. peiana* F. T. Wang & Tang.

Rhizome woody. Culms tufted, tall and robust, 80–120 × 0.3–0.4 cm, trigonous, smooth. Leaves basal and cauline, longer than culms, flat, 5–8 mm wide, glabrous abaxially, scabrid adaxially; basal persistent leaf sheaths dark brown, fibriform. Involucral bracts leafy, longer than inflorescence, long sheathed. Panicle compound, 3–8-branched; inflorescence branches simply paniculate, single or binate, broadly ovate, 5–8 × 2–3 cm, many spiked; peduncles of inflorescence branches rigid, 4–15 × 0.1–0.2 cm, scabrid; inflorescence axes triquetrous, densely hairy on edges; bractlets glumelike. Spikes single or 2 or 3 clustered, bisexual and androgynous, cylindrical, 2–6 cm; male part of spike ca. 1/2 length of or equaling female part; female part with dense and numerous flowers; male glumes brown, oblong-lanceolate, 3–4 mm, membranous; female glumes brown or purplish brown, oblong or oblong-lanceolate, 2.5–3 mm, papery, with 1 scabrid or smooth midrib, margins hyaline, apex acute, shortly awned. Utricles yellowish green with brown spots, obovate-lanceolate, bluntly trigonous, 3–4 mm, membranous, lateral keels hairy, with few fine veins, base attenuate, apex contracted into short excurved beak, beak ca. 1/4 length of utricule, orifice minutely 2-toothed. Nutlet dark brown at maturity, closely enclosed in utricule, elliptic, trigonous, ca. 2 mm, base shortly stipitate, apex nearly not apiculate; style base slightly thickened; stigmas 3.

Slopes, roadsides, grasslands, margins of evergreen forests; 300–2000 m. Hunan, Sichuan, Xizang [Bhutan, India (Sikkim), Kashmir, Nepal].

8. *Carex composita* Boott, Ill. Gen. Carex 1: 3. 1858.复序薹草 *fu xu tai cao*

Rhizome woody. Culms tufted, 40–60 × 0.15–0.2 cm, trigonous, smooth. Leaves basal and cauline, flat, 2–3 mm wide, glabrous abaxially, prominently scabrid adaxially; basal persistent leaf sheaths pale brown, fibriform. Involucral bracts leafy, longer than inflorescence, long sheathed. Panicle simple, 20–30 cm, 2–4-branched; inflorescence branches racemose, single, 5–8 cm, 3–8-spiked; peduncles of inflorescence branches tenuous, 5–8 cm, usually not exerted from sheaths; inflorescence axes loosely hairy on edges; bractlets glumelike. Spikes bisexual and androgynous, cylindric, 2–6 cm; male part of spike usually ca. 1/2 length of or rarely equaling female part; female part with many dense flowers; male glumes brown or brown laterally and

pale green at middle, lanceolate, 3–3.5 mm, membranous, margins narrowly hyaline, apex apiculate; female glumes yellowish green at middle and reddish brown or purplish brown laterally, oblong-lanceolate, 2.5–3 mm, membranous, loosely pubescent, 3-veined, margins narrowly hyaline, apex acuminate, shortly awned. Utricles pale green, obovate or ovate-globose, flatly trigonous, slightly inflated, 3–3.5 mm, papery, with several fine veins, upper part with brown spots and loosely pubescent, base subsessile, apex shortly beaked, orifice minutely 2-toothed. Nutlet brown at maturity, loosely enclosed in utricle, ovate to triangular-ovate, trigonous, ca. 1.5 mm, base shortly stipitate, apex with contorted apiculus; style base slightly thickened; stigmas 3.

Forests, grasslands; 1300–2500 m. Guizhou, Yunnan [Bhutan, India].

5. *Carex* sect. *Indicae* Tuckerman, Enum. Meth. Caric. 10. 1843.印度薹草组 *yin du tai cao zu*

Zhang Shuren (张树仁); Tetsuo Koyama, Gordon C. Tucker

Panicle compound. Spikes numerous, bisexual, androgynous, arising from flowerless utriculiform cladophylls, oblong, less than 2 cm. Utricles not inflated or slightly inflated, several veined.

About 20 species: tropical and subtropical Asia; 13 species (four endemic) in China.

- 1a. Female glume awnless (sometimes awned or mucronate); utricle less than 3 mm, brown to reddish brown or pale brown with dense reddish brown spots and lines; style base not thickened or slightly thickened.
- 2a. Female glume awned or mucronate; upper part of utricle hairy.
 - 3a. Inflorescence branches linear; beak of utricle straight, strongly 2-toothed 14. *C. burttii*
 - 3b. Inflorescence branches oblong-lanceolate to ovate-triangular; beak of utricle straight, minutely 2-toothed or obliquely truncate.
 - 4a. Inflorescence branches ovate-triangular, single; utricle pale brown with dense brown spots and lines, beak slightly shorter than 1/2 length of utricle; style base slightly thickened 20. *C. continua*
 - 4b. Inflorescence branches oblong-lanceolate, usually binate; utricle reddish brown, beak ca. 1/2 length of utricle; style base not thickened 21. *C. rafflesiana*
- 2b. Female glume awnless, glabrous abaxially; utricle glabrous.
 - 5a. Inflorescence branches compact; female glumes and utricles pale brown, pale yellowish green, or pale green, sometimes with scattered brown spots and lines 19. *C. subfilioides*
 - 5b. Inflorescence branches patent and lax; female glumes and utricles brown to reddish brown or pale brown with dense reddish brown spots and lines.
 - 6a. Utricle elliptic or narrowly elliptic, with many fine veins, beak ca. 1/2 length of utricle; inflorescence branches triangular-ovate 17. *C. filicina*
 - 6b. Utricle ovate-oblong, with several raised veins, beak slightly shorter than 1/2 length of utricle; inflorescence branches elliptic 18. *C. doisutepensis*
- 1b. Female glume aristate; utricle 3.5–10 mm, pale brown to pale green; style base usually thickened.
 - 7a. Male part of spike oblong, 6–7 × 2–3 mm; utricle 5.5–10 mm, beak thin and long, nearly 2 × as long as utricle body; inflorescence branches loosely few spiked; leaf blade 2–2.5 mm 9. *C. commixta*
 - 7b. Male part of spike oblong-cylindric or cylindric, 5–8 × ca. 1 mm; utricle 3.5–5 mm, beak shorter than or as long as utricle body; inflorescence branches many spiked (only *C. tenuipaniculata* with few spikes); leaf blade 5–12 mm.
 - 8a. Female glume with excurved or twisting awn, awn 1–2 × as long as glume.
 - 9a. Inflorescence branches compact; male part longer than or as long as female part of spike; utricle ovate or elliptic, trigonous, slightly inflated, green, pale brown when dried; female glume yellowish brown, 1/3–1/2 length of utricle 10. *C. indica*
 - 9b. Inflorescence branches lax and outspread; male part 1/5–1/3 length of female part of spike; utricle rhomboid-ovate, trigonous, not inflated, pale green; female glume yellowish white, ca. 1/4 length of utricle 11. *C. indiciformis*
 - 8b. Female glume with straight awn, awn shorter than glume.
 - 10a. Female glume yellowish white, with dense brown spots and lines; inflorescence axes densely hairy; orifice of utricle beak 2-toothed.

- 11a. Inflorescence branches many spiked; peduncles of inflorescence branches and inflorescence axes rigid; utricle elliptic 12. *C. cruciata*
- 11b. Inflorescence branches 3–8-spiked; peduncles of inflorescence branches and inflorescence axes flaccid; utricle narrowly elliptic or oblanceolate 13. *C. tenuipaniculata*
- 10b. Female glume brown or pale yellowish green; inflorescence axes slightly hairy or glabrous; orifice of utricle beak obliquely truncate.
- 12a. Female glume brown, falling off with utricle at maturity, apex emarginate; inflorescence branches lax; utricle narrowly elliptic, ca. 5 mm; ligule of cladophyll ca. 2 × as long as body 15. *C. deciduisquama*
- 12b. Female glume pale yellowish green, stramineous when dried, persistent, apex rounded or obtuse; inflorescence branches compact; utricle oblong or ovate-oblong, ca. 3.5 mm; ligule of cladophyll nearly as long as body 16. *C. stramentitia*

9. *Carex commixta* Steudel, Syn. Pl. Glumac. 2: 207. 1855.

细长喙藁草 xi chang hui tai cao

Carex chuniana F. T. Wang & Tang; *C. hainanensis* Merrill ex Chun & F. C. How; *C. humbertii* F. T. Wang & Tang (1949), not Chermeson (1926); *C. hypolytrifolia* T. Koyama; *C. spatiosa* Boott.

Rhizome thick. Culms tufted, erect and robust, 30–100 × 0.3–0.5 cm, trigonous, smooth. Leaves basal and cauline, linear, 2–2.5 cm wide, glabrous or slightly scabrid; persistent sheaths brown, fibriform. Involucral bracts leafy, longer than inflorescence, long sheathed. Panicle simple or compound, 25–30 cm, 1–5-branched; inflorescence branches single, ovate-triangular, 4–10 × 2–6 cm, sometimes binate; peduncles of inflorescence branches rigid, upper part hairy, trigonous, lowest one 10–20 cm, upper ones gradually shorter; inflorescence axes trigonous, hairy on edges; bractlets glumelike, 1–1.5 mm, hairy abaxially, with awns 2–5 mm. Spikes numerous, bisexual, androgynous, arising from abaxially hairy cladophylls, 7–18 mm; male part of spike suboblong, 6–7 × 2–3 mm, usually longer than or sometimes as long as female part; female part elliptic, many flowered; male glumes pale yellow or pale brown, narrowly lanceolate, 6–7 mm, membranous, hairy abaxially, apex shortly awned; female glumes pale yellowish white, pale greenish white, or pale brown, lanceolate, 4.5–5.5 mm, membranous, hairy abaxially, midrib extending into scabrid awn, apex acuminate or emarginate. Utricles pale brown or pale green, shorter than glumes, subrhomboid, bluntly trigonous, 5.5–10 mm, hairy, many veined, base stipitate, apex elongate into beak, beak to 2/3 length of utricle, orifice obliquely truncate. Nutlets brown at maturity, elliptic, trigonous, 3–3.5 mm; style base slightly thickened; stigmas 3.

Forests, forest margins; 600–1300 m. Hainan [Indonesia, Malaysia, Myanmar, Thailand, Vietnam].

10. *Carex indica* Linnaeus, Mant. Pl. Alt. 574. 1771.

印度藁草 yin du tai cao

Rhizome thick, tufted, woody. Culms 40–100 × 0.2–0.25 cm, trigonous, smooth. Leaves basal and cauline, longer than culms, flat, 6–8 mm wide, scabrid; persistent sheaths dark brown, fibriform. Involucral bracts leafy, longer than inflorescence, long sheathed. Panicle compound, 20–30 cm, 5- or 6-branched; inflorescence branches single, ovate-oblong, 4–5 × 2.3–2.5 cm; peduncles of inflorescence branches tenuous, tri-

gonous, lowest one 7–8 cm, upper ones gradually shorter, hairy on edges; inflorescence axes trigonous, hairy; bractlets glumelike, ca. 1.5 mm, emarginate, with awns 4–6 mm. Spikes numerous, bisexual, androgynous, arising from cladophylls, 6–10 mm; male part of spike longer than or as long as female part; female part 2–8-flowered; male glumes pale yellow at middle, pale brown laterally, lanceolate, 5–7 mm, membranous, with 1 midrib, with awns 2–3 mm; female glumes pale yellowish brown or yellowish white at middle, pale brown laterally, ovate or oblong, 2–2.5 mm, papery, 3-veined, margins broadly hyaline, apex acute or emarginate, with awns ca. 3 mm. Utricles pale brown, patent, ovate or elliptic, trigonous, slightly inflated, ca. 3.5 mm, papery, many veined, loosely pubescent, sessile, apex elongate into beak of medium length, beak slightly shorter than utricle body, hairy laterally, orifice obliquely truncate. Nutlets brown at maturity, oblong, trigonous, ca. 2 mm; style base prominently thickened; stigmas 3.

Slopes; 800–900 m. Guangxi, Guizhou [Bangladesh, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Australia, Pacific islands].

11. *Carex indiciformis* F. T. Wang & Tang ex P. C. Li, Acta Phytotax. Sin. 37: 156. 1999 [*"indicaeformis"*].

印度型藁草 yin du xing tai cao

Rhizome thick, woody. Culms tufted, 60–100 × 0.2–0.4 cm, trigonous, smooth. Leaves basal and cauline, longer than culms, flat, 8–15 mm wide, glabrous; persistent sheaths pale brown, fibriform. Involucral bracts leafy, longer than inflorescence branches, long sheathed. Panicle compound, 4–6-branched; inflorescence branches single, patent, loose, triangular-ovate, 5–8 × 4–5 cm; peduncles of inflorescence branches tenuous, trigonous, lowest one 12–14 cm, upper ones gradually shorter, smooth or upper part hairy; inflorescence axes trigonous, hairy on edges; bractlets glumelike, ca. 1 mm, membranous, glabrous, with awns 3–5 mm. Spikes numerous, bisexual, androgynous, arising from cladophylls, loose and patent, terminal one 10–20 mm, lateral ones 5–16 mm; male part of spike oblong, 1/5–1/3 length of female part; female part of terminal one 6–9-flowered, female part of lateral ones 4–7-flowered; male glumes pale green, lanceolate, 2.5–3 mm, membranous, apex acuminate, with awns 1–1.5 mm; female glumes pale yellowish white, ovate or oblong, 1–1.5 mm, membranous, apex rounded or emarginate. Utricles pale green, obliquely patent, much longer than glumes, ovate or rhomboid-ovate, trigonous, 4–4.2 mm, papery, many veined, apex attenuate into beak of

medium length, orifice obliquely truncate. Nutlets brown at maturity, ovate or rhomboid-ovate, trigonous, ca. 2 mm; style base thickened and conic; stigmas 3.

• Forests, shady slopes; 400–1000 m. Guangxi, Guizhou, Hainan, Yunnan.

12. *Carex cruciata* Wahlenberg, Kongl. Vetensk. Acad. Nya Handl. 24: 149. 1803.

十字藁草 shi zi tai cao

Carex bengalensis Roxburgh; *C. cruciata* subsp. *rubrobrunnea* (Ohwi) T. Koyama; *C. cruciata* var. *rubrobrunnea* Ohwi; *C. hakkuensis* Hayata; *C. valida* Nees.

Rhizome thick, woody, with stolons. Culms tufted, 40–90 × 0.3–0.5 cm, trigonous, smooth. Leaves basal and cauline, longer than culms, flat, 4–13 mm wide, scabrid abaxially, glabrous adaxially; persistent sheaths dark brown, fibriform. Involucral bracts leafy, longer than inflorescence branches, long sheathed. Panicle compound; inflorescence branches usually single, rarely binate, ovate-triangular, 4–15 × 3–6 cm; peduncles of inflorescence branches rigid, bluntly trigonous, lowest one 10–18 cm, upper ones gradually shorter, smooth; inflorescence axes trigonous, hairy; bractlets glumelike, ca. 1.5 mm, hairy abaxially. Spikes numerous, bisexual, androgynous, arising from several veined, abaxially hairy cladophylls, patent horizontally, 5–12 mm; male part of spike nearly as long as female part; male glumes pale brownish white with dense brown spots and short lines, lanceolate, ca. 2.5 mm, membranous, apex acuminate, mucronate; female glumes ovate, ca. 2 mm, membranous, 3-veined, apex obtuse, shortly awned. Utricles pale brownish white with brown spots and short lines, longer than glumes, elliptic, trigonous, inflated, 3–3.2 mm, smooth or upper part loosely hairy, with several raised veins, subsessile, apex attenuate into beak of medium length, beak ca. 1/3 length of utricule, hairy or glabrous laterally, orifice obliquely truncate. Nutlets dark brown at maturity, ovate-elliptic, trigonous, ca. 1.5 mm; style base thickened; stigmas 3.

Forest margins, grasslands, roadsides; 300–2500 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, India, Indonesia, Japan, Nepal, Thailand, Vietnam; Madagascar].

13. *Carex tenuipaniculata* P. C. Li, Acta Phytotax. Sin. 37: 158. 1999.

细序藁草 xi xu tai cao

Rhizome short. Culms tufted, 30–40 × ca. 0.2 cm, slender, trigonous, subglabrous. Leaves cauline, longer than culms, flat, 4–5 mm wide, hairy along midvein abaxially and later glabrescent, scabrid adaxially; persistent sheaths brown. Involucral bracts leafy, longer than inflorescence branches, long sheathed. Panicle compound, ca. 20 cm, with 3 or 4 distant inflorescence branches; inflorescence branches usually single, oblong, 10–25 × 4–6 mm, loosely 3–8-spiked; peduncles of inflorescence branches tenuous, trigonous, hairy on edges, lowest one to 18 cm, upper ones gradually shorter; inflorescence axes filiform, soft and drooping, acutely trigonous, densely hairy; bractlets glumelike, ovate, ca. 0.8 mm, membranous, apex with awns 3.5–5 mm. Spikes bisexual, androgynous, arising from cladophylls, patent, 4–5 mm; male part of spike as long as female

part; female part 2–5-flowered; male glumes pale brown with dense brown spots and short lines, lanceolate, 2.5–3 mm, membranous, with 1 midvein, apex acuminate, shortly awned; female glumes pale brown with dense brown spots and short lines, ovate, 2.5–3 mm, membranous, with 1 midvein, apex mucronate. Utricles pale brown with dense brown spots and short lines, narrowly elliptic or lanceolate, trigonous, slightly inflated, 3–3.5 mm, papery, upper part loosely hairy, with 2 to several raised veins, subsessile, apex contracted into beak of medium length, beak slightly shorter than utricule body, orifice minutely 2-toothed. Nutlets yellowish brown at maturity, narrowly elliptic, trigonous, ca. 2 mm, base shortly stipitate, apex not mucronate; style base slightly thickened; stigmas 3.

• Forests; ca. 2100 m. C Yunnan (Kunming).

14. *Carex burtii* Noltie, Edinburgh J. Bot. 50: 186. 1993.

伯特藁草 bo te tai cao

Carex vesiculosa Boott f. *pallida* Kükenthal; *C. vesiculosa* var. *pallida* (Kükenthal) R. C. Srivastava.

Rhizome thick, woody, without stolons. Culms tufted, 40–80 × 0.3–0.5 cm, trigonous, smooth. Leaves basal and cauline, slightly exceeding culms, flat, 2–3.5 mm wide, hispid when young; persistent sheaths reddish purple, margins fibrillose. Involucral bracts leafy, slightly longer than inflorescence branches, long sheathed. Panicle compound, 18–36 cm; inflorescence branches linear, 4–15 × 3–6 cm, 2–4 per node; peduncles of inflorescence branches stiff, bluntly trigonous; inflorescence axes trigonous, hairy; bractlets with conspicuous long filiform points; cladophylls utriculiform, without a flower, several veined and hairy abaxially. Spikes few, bisexual, androgynous, arising from cladophylls, suberect, 5–12 mm; male part of spike nearly as long as female part; male glumes pale brownish white, with dense brown spots and short lines, lanceolate to oblong-elliptic, 2.4–3.5 mm, membranous, obtuse, mucronate; anthers ca. 2 mm; female glumes ovate, 1.5–2.5 mm, membranous, glabrous, obtusely emarginate, mucronate. Utricles whitish green, with chestnut-brown spots, suberect at maturity, slightly longer than body of glumes, narrowly elliptic, trigonous, inflated, 2.4–2.9 mm, distal part sparsely hairy, sessile, apex attenuate into a beak ca. 1/3 length of utricule, hispid, orifice distinctly 2-toothed. Nutlets not seen; stigmas 3. Fl. Apr–May, fr. Aug–Oct.

Wet cliffs, on rocks, among bamboo; ca. 2300 m. SE Xizang (Cona: Nyam Jang Chu) [Bhutan, India (Sikkim)].

15. *Carex deciduisquama* F. T. Wang & Tang ex P. C. Li, Acta Phytotax. Sin. 37: 160. 1999.

落鳞藁草 luo lin tai cao

Rhizome short. Culms tufted, up to 1 m high, ca. 3 mm thick, trigonous, smooth. Leaves basal and cauline, flat, 5–7 mm wide, scabrid abaxially, glabrous adaxially; persistent sheaths dark brown, fibriform. Involucral bracts leafy, ± as long as or slightly shorter than inflorescence branches, long sheathed. Panicle compound, ca. 20 cm; inflorescence branches single, oblong, 4–7 × 2.5–3 cm; peduncles of inflorescence branches tenuous, trigonous, subsmooth, lowest one 12–14 cm; inflorescence axes trigonous, loosely hairy; bractlets glumelike, oblong, 2.5–3.5 mm, apex emarginate, with awns ca. 2 mm.

Spikes numerous, bisexual, androgynous, arising from cladophylls, distant, slightly patent, cylindric, 1–2 cm, terminal one to 3 cm; male part of spike as long as female part, with over 10 flowers; female part with 2–10 slightly distant flowers; male glumes not deciduous at maturity, pale brown, oblong, 3.5–4.5 mm, with 1 midvein, apex emarginate with mucro; female glumes deciduous at maturity, pale brown, oblong, 3–4 mm, papery, 3-veined at middle, apex emarginate, with awns up to 2 mm. Utricles pale yellowish brown, narrowly elliptic, trigonous, slightly inflated, ca. 5 mm, papery, many veined, sessile, apex attenuate into long beak, orifice obliquely truncate. Nutlets brown at maturity, narrowly elliptic, trigonous, ca. 2.5 mm, sessile, apex mucronate; style base thickened and conic; stigmas 3.

- Woods; 2300–2500 m. NW Yunnan (Gongshan).

16. *Carex stramentitia* Boott ex Boeckeler, *Linnaea* 40: 351. 1876.

草黄薹草 *cao huang tai cao*

Rhizome long, obliquely elongate, woody. Culms tufted, 30–75 cm, bluntly trigonous, smooth. Leaves basal and cauline, nearly as long as culms, flat, 1–2 mm wide; persistent sheaths dark brown, fibriform. Involucral bracts leafy, longer than inflorescence branches, long sheathed. Panicle compound, 20–30 cm, 3–5-branched; inflorescence branches single, triangular-ovate, 5–7.5 × 4–5 cm; peduncles of inflorescence branches rigid, trigonous, scabrid on edges; inflorescence axes sharply trigonous, hairy; bractlets glumelike, with long awns. Spikes numerous, bisexual, androgynous, arising from cladophylls, dense, obliquely patent, oblong, 10–12 mm; male part of spike longer than female part, with over 10 flowers; female part with over 10 flowers; male glumes pale yellow, oblong-lanceolate, 3–4 mm, papery, apex obtuse and mucronate; female glumes stramineous when dried, slightly shining, ovate-oblong, 2.5–3 mm, papery, 3-veined, margins hyaline, apex obtuse or rounded with short awns. Utricles brownish green, longer than glumes, oblong or ovate-oblong, trigonous, slightly inflated, ca. 3.5 mm, many veined, subsessile, apex contracted into long beak, orifice obliquely truncate. Nutlets broadly ovate, trigonous, 2.5–3 mm; style base thickened; stigmas 3.

Grasslands by woods; 100–1000 m. Guangxi, Guizhou, Yunnan [Bhutan, India, Indonesia (Java), Myanmar, Nepal, Thailand, Vietnam].

17. *Carex filicina* Nees in Wight, *Contr. Bot. India*, 123. 1834, nom. cons.

蕨状薹草 *jue zhuang tai cao*

Carex caricina (D. Don) Ghildyal & U. C. Bhattacharyya; *C. filicina* var. *meiogyne* (Nees) Strachey; *C. filicina* subsp. *pseudofilicina* (Hayata) T. Koyama; *C. filicina* var. *subdensa* F. T. Wang & Tang; *C. meiogyne* Nees; *C. pseudofilicina* Hayata; *Cyperus caricinus* D. Don.

Rhizome thick, woody. Culms densely tufted, 40–90 × 0.2–0.25 cm, sharply trigonous, glabrous. Leaves longer or rarely shorter than culms, flat, 5–14 mm wide, scabrid abaxially or glabrous on both surfaces; persistent sheaths purplish red or purplish brown, fibriform. Involucral bracts leafy, longer than inflorescence branches, long sheathed. Panicle compound, 20–50 cm, 4–8-branched; inflorescence branches single, rarely bi-

nate, triangular-ovate, 4–15 × 3–7 cm; peduncles of inflorescence branches tenuous, trigonous, lowest one 10–20 cm, upper ones gradually shorter, loosely hairy on edges; inflorescence axes sharply trigonous, hairy; bractlets glumelike, 2–3 mm, apex long awned. Spikes numerous, bisexual, androgynous, arising from cladophylls, patent or slightly patent, oblong or oblong-cylindric, 5–15 mm, terminal one 8–20 mm; male part of spike shorter than female part, 3–7-flowered; female part 2–16-flowered; male glumes brown or reddish brown, lanceolate, 2–3 mm, membranous, apex acuminate; female glumes brown, reddish brown, or pale brown with reddish brown spots and short lines, ovate or lanceolate, 1.5–2 mm, membranous, glabrous, with 1 midrib, apex acuminate or acute. Utricles with lower part yellowish white and upper part brown or reddish brown, or wholly pale brown with reddish brown spots and short lines, elliptic or narrowly elliptic, trigonous, ca. 3 mm, membranous, glabrous, with 2 lateral veins and several fine veins abaxially, subsessile, apex contracted into long excurved beak, beak ca. 1/2 length of utricle, orifice obliquely truncate. Nutlets yellowish brown at maturity, elliptic, trigonous, ca. 1.5 mm; style base not thickened; stigmas 3.

Forests, grasslands; 1200–2800 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [India, Indonesia, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam].

18. *Carex doisutepensis* T. Koyama, *Naturaliste Canad.* 82: 196. 1955.

景洪薹草 *jing hong tai cao*

Rhizome thick, creeping. Culms up to 150 cm, trigonous, glabrous. Leaves basal and cauline, linear, 3–4 mm wide, flat or folded; persistent sheaths brown, fibriform. Involucral bracts leafy, longer than inflorescence branches, sheath to 4 cm. Panicle compound, up to 60 cm, 4–7-branched; inflorescence branches single, oblong-elliptic; peduncles of inflorescence branches long, smooth; inflorescence axes sharply trigonous, densely hairy. Spikes numerous, bisexual, androgynous, arising from cladophylls, patent or horizontally patent, ovate-elliptic, 4–8 × 3.5–5 mm; male part of spike shortly linear, slightly shorter than or as long as female part, fewer flowered; female part 3–6-flowered; male glumes brownish ferruginous, lanceolate, ca. 2.5 mm; female glumes brown with dark brown spots, ovate-triangular, 1.8–2.3 mm, membranous, with 1 midrib, apex acute with excurved mucro. Utricles ovate-oblong, trigonous, inflated, 2.5–3.5 mm, patent, membranous, with many raised veins, base attenuate, apex contracted abruptly into long beak, orifice deeply 2-toothed. Nutlets blackish brown at maturity, broadly elliptic, trigonous, 1.4–1.5 mm; style base not thickened; stigmas 3.

S Yunnan (Xishuangbanna) [N Thailand].

19. *Carex subfilicinoides* Kükenthal, *Acta Horti Gothob.* 5: 42. 1930.

近蕨薹草 *jin jue tai cao*

Rhizome with thick fibers. Culms tufted, 50–90 × 0.25–0.3 cm, trigonous, glabrous. Leaves basal and cauline, longer than culms, flat, 7–12 mm wide, glabrous or scabrid along veins abaxially, prominently scabrid adaxially; persistent sheaths pur-

plish red, fibriform. Involucral bracts leafy, longer than inflorescence branches, long sheathed. Panicle compound, 20–50 cm, 4–9-branched; inflorescence branches distant, binate, rarely single, lanceolate, 3.5–9 × 1.5–3 cm; peduncles of inflorescence branches tenuous, 10–20 cm, obtusely trigonous, upper part pubescent; inflorescence axes sharply trigonous, loosely hairy; bractlets glumelike, ca. 1 mm, loosely hairy, awned. Spikes numerous, bisexual, androgynous, arising from cladophylls, ovate or oblong, 5–10 mm; male part of spike thinner and shorter than female part, 4–6-flowered; female part 5–12-flowered; male glumes yellowish green, lanceolate, ca. 3 mm, membranous, with 1 midrib, apex acuminate; female glumes pale green at middle, white or pale brown laterally, ovate, 1.7–1.8 mm, membranous, glabrous, with 1 midrib, apex obtuse. Utricles pale brown or pale yellowish green, sometimes with brown spots and short lines, elliptic, 3–3.5 mm, patent, membranous, without veins abaxially, with 2–4 raised veins adaxially, glabrous or upper part scabrid, sessile, apex attenuate into excurved beak of medium length, orifice obliquely truncate. Nutlets elliptic, trigonous, ca. 1.5 mm, sessile, apex not mucronate; style base slightly thickened; stigmas 3.

• Evergreen forests, shady slopes, roadsides; 1200–2900 m. Hubei, Sichuan, Yunnan.

20. *Carex continua* C. B. Clarke in J. D. Hooker, Fl. Brit. India 6: 717. 1894.

连续藁草 lian xu tai cao

Carex rafflesiana Boott var. *continua* (C. B. Clarke) Kükenthal.

Rhizome with thick fibers. Culms tufted, 60–90 × ca. 0.3 cm, trigonous, glabrous. Leaves basal and cauline, longer than culms, flat, 6–8 mm wide, scabrid along margins and abaxially, glabrous adaxially; persistent sheaths dark brown, fibriform. Involucral bracts leafy, longer than inflorescence, long sheathed. Panicle compound, ca. 30 cm, 5–9-branched; inflorescence branches single, sometimes binate, ovate-triangular, 3–8 × 1.5–3 cm; peduncles of inflorescence branches tenuous, lowest one to 14 cm, upper ones gradually shorter, trigonous, glabrous; inflorescence axes sharply trigonous, densely hairy on edges; bractlets glumelike, ca. 1.5 mm, loosely hairy abaxially, with long scabrid awns. Spikes numerous, bisexual, androgynous, arising from cladophylls, patent, oblong-cylindric, 4–10 mm; male part of spike shorter than female part, oblong, densely 4–10-flowered; female part 3–9-flowered, slightly dense; male

glumes pale brownish white with dense brown spots and short lines, lanceolate, 1.7–2.5 mm, membranous, with 1 midrib, upper margins hairy, apex acuminate, mucronate; female glumes pale brownish white with dense brown spots and short lines, ovate, 1.8–2.5 mm, membranous, glabrescent later, with 1 midrib, apex acute, awned or mucronate. Utricles pale brownish green with brown spots and short lines, elliptic, trigonous, 2.7–3 mm, membranous, upper part scabrid, with several raised veins adaxially, sessile, apex attenuate into excurved long beak, orifice obliquely truncate. Nutlets elliptic, trigonous, ca. 1.7 mm, sessile, apex not mucronate; style base slightly thickened; stigmas 3.

Among shrubs on slopes; ca. 1100 m. S Yunnan [India, Indonesia, Laos, Malaysia, Myanmar, Philippines, Thailand, Vietnam].

21. *Carex rafflesiana* Boott, Trans. Linn. Soc. London 20: 132. 1846.

红头藁草 hong tou tai cao

Carex bengalensis Roxburgh var. *scaberrima* Boeckeler; *C. cruciata* Wahlenberg var. *rafflesiana* (Boott) Nooteboom; *C. rafflesiana* subsp. *scaberrima* (Boeckeler) T. Koyama; *C. rafflesiana* var. *scaberrima* (Boeckeler) Kükenthal; *C. scaberrima* (Boeckeler) C. B. Clarke.

Rhizome short, subwoody. Culms tufted or single, 80–200 × 0.3–0.5 cm, trigonous, smooth, base covered by 1 or 2 reddish brown sheaths. Leaves shorter than culms, flat, 10–13 mm wide; sheaths long, reddish brown; persistent sheaths fibriform. Involucral bracts leafy, long sheathed, lowest one as long as or longer than inflorescence, upper ones gradually shorter. Panicle compound, ca. 20 cm, 8–11-branched; inflorescence branches usually binate, oblong-lanceolate, 5–15 cm, slightly dense, lower part branched. Spikes numerous, bisexual, androgynous, arising from cladophylls, ovate-oblong, 3–6 mm; male part of spike nearly as long as female part; female glumes white with reddish brown spots, ovate or ovate-lanceolate, 1.5–2 mm, scabrid, midrib extending into mucro, apex obtuse or acute. Utricles reddish brown, oblong or elliptic-oblong, trigonous, 2.7–3.5 mm, herbaceous, with several veins, upper part hairy, apex attenuate into beak, beak excurved, nearly as long as utricle body, orifice minutely 2-toothed. Nutlets elliptic, trigonous, ca. 1.5 mm; style base not thickened; stigmas 3.

Forest margins, grasslands on slopes; 500–600 m. Taiwan [Indonesia, Malaysia, Philippines, Thailand; Australia].

6. *Carex* sect. *Euprepes* Nelves & Airy Shaw, Hooker's Icon. Pl. 35: t. 3433. 1943.

菰叶藁草组 gu ye tai cao zu

Zhang Shuren (张树仁); Tetsuo Koyama

Culms aphyllopodic, surrounded at base with only bladeless sheaths. Blade-bearing leaves borne on upper part of culms; leaf blade lanceolate to narrowly elliptic, narrowed toward both ends, transversely septate. Involucral bracts much longer than inflorescence. Inflorescence spicate or spikelike. Spikes androgynous. Utricles densely pubescent.

Two or three species: S China and Indochina; one species (endemic) in China.

22. *Carex zizaniifolia* Raymond, Mém. Jard. Bot. Montréal 53: 36. 1959 [*“zizaniaefolia”*].

菰叶藁草 gu ye tai cao

Rhizome short. Culms tufted, 60–70 × ca. 0.2 cm, obtusely trigonous, lower part only bearing sheaths, from middle up bearing leaves. Leaves loosely arranged, longer than culms; leaf blade narrowly elliptic or lanceolate, 15–25 × 2–2.5 cm, scabrid

along veins, with prominent transverse veins, margins loosely hairy, base cuneate, apex acuminate; sheaths 1.4–2 cm, glabrous, sheath mouth loosely pubescent and then glabrescent. Involucral bracts similar to leaves, much longer than inflorescence branches. Panicle compound, 5–6 × 1–1.5 cm, 14–16-branched; inflorescence branches single, spicate or spikelike, 8–12 mm, arising from axil of involucral bract; peduncles of inflorescence branches tenuous, glabrous; inflorescence axes sharply trigonous, hairy on edges; bractlets glumelike, ca. 2

mm, awned. Cladoprophylls utriculiform, ca. 1 mm, apex ligulate, ligule as long as cladoprophyll, hairy along veins; spikes bisexual, androgynous, 5–6 mm; male part of spike slightly longer than female part; female part fewer flowered; female glumes ovate, ca. 2 mm, hairy, margins erose, midrib extending into scabrid awn. Utricles ovate-elliptic, ca. 3 mm, densely hairy, apex attenuate into beak, orifice minutely 2-toothed. Nutlets immature.

• SE Yunnan (Pingbian).

7. *Carex* sect. **Hemiscaposae** C. B. Clarke, J. Linn. Soc., Bot. 37: 4. 1904.

花葶藁草组 hua ting tai cao zu

Zhang Shuren (张树仁); Tetsuo Koyama, Gordon C. Tucker

Culms lateral. Leaves basal and 1 or 2 on upper part of culm. Radical leaves with sheath elongate, pipelike; leaf blade lanceolate or narrowly elliptic, narrowed toward both ends; culm leaves much reduced, sheathlike. Inflorescence paniculate; partial panicles subtended by a sheathlike bract bearing a short blade much surpassed by the subtended partial panicle. Spikes androgynous.

Ten to 12 species: S China, India, Laos, Vietnam; nine species (six endemic) in China.

- 1a. Inflorescence branches with 1 or 2 (or 3) spikes; leaf blade replicate; utricle with many raised veins.
 2a. Inflorescence branches single, rarely binate; spike linear-cylindric; basal leaf single 30. *C. kucyniakii*
 2b. Inflorescence branches binate or ternate; spike oblong; basal leaves 2 or 3 tufted 31. *C. peliosanthifolia*
 1b. Inflorescence branches with 10 or more to numerous spikes; leaf blade flat; utricle only with 2 lateral veins abaxially.
 3a. Panicle simple, usually with only 1 terminal branch, rarely with 1 or 2 lateral branches; culms soft.
 4a. Leaf blade linear, margins flat; male part of spike cylindric, 3–5 × ca. 1 mm; culms hairy and later glabrescent 28. *C. ypsilandrifolia*
 4b. Leaf blade narrowly elliptic, margins replicate; male part of spike circular or oblong, 2.5–4 × ca. 3 mm; culms hairy 29. *C. lingii*
 3b. Panicle compound, with several branches; culms rigid.
 5a. Inflorescence branches paniculate; male part of spike linear-lanceolate or linear.
 6a. Male glume 1–1.5 mm; nutlet ovoid, style base conic 24. *C. damiaoshanensis*
 6b. Male glume 3–3.5 mm; nutlet elliptic, style base not conic 23. *C. scaposa*
 5b. Inflorescence branches subcorymbose; male part of spike circular, oblong, or oblong-cylindric.
 7a. Leaf blade linear or linear-oblancoate; utricle ovate, beak only ca. 1/4 length of utricle 27. *C. liouana*
 7b. Leaf blade narrowly elliptic, narrowly elliptic-lanceolate, or narrowly elliptic-oblancoate, rarely narrowly elliptic-linear; utricle elliptic, beak slightly shorter than 1/2 length of utricle.
 8a. Leaf blade margins densely ciliate; petiole loosely or densely hairy; nutlet elliptic 25. *C. densifimbriata*
 8b. Leaf blade margins smooth; petiole glabrous; nutlet ovate 26. *C. adrieni*

23. *Carex scaposa* C. B. Clarke, Bot. Mag. 113: t. 6940. 1887.

花葶藁草 hua ting tai cao

Rhizome woody. Culms lateral, 20–80 × 0.1–0.3 cm, trigonous, base with leafless pale brown sheaths. Leaves basal and cauline; basal leaves tufted, longer or shorter than culms, elliptic to elliptic-linear, 10–35 × 2–5 cm, glabrous on both surfaces or scabrid or densely hairy abaxially, sometimes with transverse veins, base attenuate, apex acuminate; petiole up to 30 cm, glabrous, sometimes leaf base extending downward forming narrow wings; cauline leaves brown, spathe-like, papery, glabrous. Involucral bracts spathe-like, with blades, usually shorter than inflorescence branches. Panicle compound, 3- to several branched; inflorescence branches paniculate, single or binate, triangular-ovate, 2–3.5 × 1.5–3 cm; peduncles of inflorescence branches rigid, trigonous, 4–8 cm, densely pubescent; inflorescence axes sharply trigonous, densely pubescent; bractlets brownish white with deep brown spots, glumelike, lanceolate,

4–5 mm. Spikes 10–20, bisexual, androgynous, arising from flowerless utriculiform cladoprophylls, patent, oblong-cylindric, 5–14 mm; male part of spike linear-lanceolate, usually shorter than female part, fewer flowered; female part 2–7-flowered; male glumes pale brown, ovate-lanceolate, 3–3.5 mm, membranous; female glumes brown laterally, yellowish green with brown spots and 3 veins at middle, ovate, 2–2.5 mm, membranous, margins ciliate when young, apex acuminate. Utricles pale yellowish green with dense brown spots, elliptic, trigonous, 3–4 mm, papery, with 2 lateral veins abaxially, glabrous, subsessile, apex contracted gradually into beak of medium length, beak slightly shorter than 1/2 length of utricle, orifice emarginate. Nutlets brown at maturity, elliptic, trigonous, 1.5–2.2 mm; style base not or slightly thickened; stigmas 3.

Forests, watersides, shady slopes, cliffs, valleys; 200–1500 m. Fujian, Guangdong, Guangxi, Guizhou, Hunan, Jiangxi, Sichuan, Yunnan, Zhejiang [Vietnam].

- 1a. Male part of spike 10–13 mm, much longer than female part 23b. var. *dolicostachya*
 1b. Male part of spike less than 7 mm, usually shorter than female part.
 2a. Leaves glabrous on both surfaces or scabrid abaxially; style base not thickened 23a. var. *scaposa*
 2b. Leaves densely hairy abaxially; style base slightly thickened 23c. var. *hirsuta*

23a. *Carex scaposa* var. *scaposa*

花葶藶草(原变种) hua ting tai cao (yuan bian zhong)

Carex pandanophylla E. G. Camus (1910), not C. B. Clarke (1894); *C. scaposa* var. *marantacea* Raymond.

Leaves glabrous on both surfaces or scabrid abaxially. Style base not thickened.

Forests, watersides, shady slopes, cliffs; 400–1500 m. Fujian, Guangdong, Guangxi, Guizhou, Hunan, Jiangxi, Sichuan, Yunnan, Zhejiang [Vietnam].

23b. *Carex scaposa* var. *dolicostachya* F. T. Wang & Tang, Contr. Inst. Bot. Natl. Acad. Peiping 6(2): 58. 1949.

长雄藶草 chang xiong tai cao

Male part of spike 10–13 mm, much longer than female part.

- Forests; ca. 800 m. Guangdong, Guangxi.

23c. *Carex scaposa* var. *hirsuta* P. C. Li, Acta Phytotax. Sin. 37: 162. 1999.

糙叶花葶藶草 cao ye hua ting tai cao

Leaves densely hairy abaxially. Style base slightly inflated.

- Woods, valleys, watersides; 200–700 m. Guangdong, Hunan, Sichuan.

24. *Carex damiaoshanensis* X. F. Jin & C. Z. Zheng, J. Syst. Evol. 46: 226. 2008.

大苗山藶草 da miao shan tai cao

Rhizome woody. Culms lateral, 25–40 × 0.1–0.3 cm, trigonous, base with leafless pale brown sheaths. Leaves basal and cauline; basal leaves tufted, longer or shorter than culms, elliptic to elliptic-linear, 10–35 × 2–5 cm, glabrous on both surfaces, without transverse veins, base attenuate, apex acuminate; petiole 6–10 cm, glabrous, sometimes leaf base extending downward forming narrow wings; cauline leaves reddish brown, spathe-like, papery, glabrous. Involucral bracts spathe-like, with blades, usually shorter than inflorescence branches. Panicle compound, 4–6-branched; inflorescence branches paniculate, single, triangular-ovate, 0.8–1.2 × 1–2 cm; peduncles of inflorescence branches rigid, trigonous, 4–8 cm, glabrous; inflorescence axes sharply trigonous, glabrous; bractlets brownish white with deep brown spots, glumelike, lanceolate, 4–5 mm. Spikes 3 or 4, bisexual, androgynous, arising from flowerless utriculiform cladophylls, patent, oblong-cylindric, 8–12 mm; male part of spike linear, 4–7 mm; female part 1–3-flowered; male glumes pale brown, ovate-deltate, 1–1.5 mm, membra-

nous, densely spotted; female glumes brown laterally, yellowish green with brown spots and 1 vein medially, broadly ovate, 1.5–2 mm, membranous, glabrous, apex obtuse. Utricles fulvous, densely spotted, ovoid, trigonous, 4–5 mm, membranous, glabrous, many veined, subsessile, apex contracted gradually into an emarginate beak ca. 2 mm. Nutlets ashy brown, ovoid, trigonous, 2–2.5 mm; style base conic; stigmas 3. Fl. and fr. May–Sep.

- Rocky valleys, forest margins; 400–1700 m. N Guangxi (Rongshui).

25. *Carex densifimbriata* Tang & F. T. Wang, Acta Phytotax. Sin. 24: 240. 1986.

流苏藶草 liu su tai cao

Rhizome woody. Culms lateral, 30–80 × 0.12–0.25 cm, trigonous, densely hairy, rarely glabrous, base with pale brown sheaths. Leaves basal and cauline; basal leaves tufted, usually shorter or rarely longer than culms, elliptic to narrowly lanceolate, 25–40 × 2.8–4.5 cm, glabrous on both surfaces or scabrid or densely hairy abaxially, base attenuate, margins densely ciliate, apex acuminate; petiole 2–20 cm, hairy; cauline leaves spathe-like, lower part green and upper part pale brown, margins ciliate. Involucral bracts spathe-like. Panicle compound, 2- to several branched; inflorescence branches subcorymbose, single or binate, triangular-ovate, 1.5–2.5 × 2–3 cm; peduncles of inflorescence branches tenuous, 4–8 cm, densely hairy; inflorescence axes densely hairy; bractlets glumelike, oblong, 4–5 mm, membranous, densely hairy abaxially, apex obtuse. Spikes 4–12, bisexual, androgynous, patent, ovate to oblong, 5–10 mm; male part of spike oblong, longer than or equaling female part; female part 4–10-flowered; male glumes oblong-lanceolate, 3–4.5 mm, apex acuminate; female glumes pale green at middle, brownish white laterally with dense brown spots and short lines, ovate-oblong, 2.8–3 mm, papery, apex obtuse. Utricles pale yellowish white, sometimes with dense brown spots and short lines, slightly longer than glumes, obliquely patent, elliptic, trigonous, 3–3.5 mm, with 2 lateral veins abaxially, subsessile, apex contracted into beak of medium length, beak slightly shorter than 1/2 length of utricle, orifice obliquely truncate. Nutlets brown at maturity, elliptic, trigonous, ca. 2 mm; style base thickened; stigmas 3.

- Woods, shady slopes, valleys. Guangxi, Guizhou, Hunan.

- 1a. Leaves glabrous on both surfaces or scabrid abaxially 25a. var. *densifimbriata*
 1b. Leaves densely hairy abaxially 25b. var. *hirsuta*

25a. *Carex densifimbriata* var. *densifimbriata*

流苏藶草(原变种) liu su tai cao (yuan bian zhong)

Leaves glabrous on both surfaces or scabrid abaxially.

- Woods, shady slopes, valleys; 300–1400 m. Guangxi, Guizhou, Hunan.

25b. *Carex densifimbriata* var. *hirsuta* P. C. Li, Acta Phytotax. Sin. 37: 162. 1999 [*“densifimbriata”*].

粗毛流苏藶草 cu mao liu su tai cao

Leaves densely hairy abaxially.

- Grassy places in valleys. Guizhou, Hunan.

26. *Carex adrienii* E. G. Camus in Lecomte, Fl. Indo-Chine 7: 186. 1912.

广东藁草 *guang dong tai cao*

Carex chienii F. T. Wang & Tang; *C. kwangtungensis* F. T. Wang & Tang; *C. scaposa* C. B. Clarke var. *baviensis* Franchet.

Rhizome subwoody. Culms tufted, lateral, 30–50 × 0.1–0.2 cm, trigonous, densely hairy, base with pale brown leafless sheaths. Leaves basal and cauline; basal leaves tufted, shorter than culms, narrowly elliptic to elliptic-linear, 25–35 × 2–3 cm, scabrid abaxially, glabrous adaxially, margins entire, apex acuminate; petiole 5–15 cm, glabrous; cauline leaves spathe-like, lower part green, upper part pale brown, with dense brown spots and lines, margins ciliate and glabrescent later. Involucral bracts spathe-like. Panicle compound, 2–6-branched; inflorescence branches subcorymbose, single or binate, slightly distant, triangular-ovate, 1.5–2 × 2–2.5 cm; peduncles of inflorescence branches tenuous, 2–4 cm, densely hairy; inflorescence axes densely hairy; bractlets glumelike, 3–3.5 mm, densely hairy. Spikes 20 or less, bisexual, androgynous, patent, oblong-cylindrical, 7–10 × 2–2.5 mm; male part of spike longer than female part, oblong, with more than 10 flowers; female part ± densely 3–10-flowered; male glumes brown, oblong, ca. 3 mm, membranous, apex obtuse; female glumes brownish white with dense brown spots and short lines, ovate-oblong, 2.5–3 mm, membranous, 1-veined, apex obtuse. Utricles pale brownish white with dense brown spots and short lines, elliptic, obliquely or horizontally patent, trigonous, ca. 3 mm, with 2 lateral veins abaxially, base obtuse, apex contracted into beak of medium length, beak slightly shorter than 1/2 length of utricule, orifice obliquely truncate. Nutlets brown at maturity, ovate, trigonous, ca. 1.5 mm; style base thickened; stigmas 3.

Evergreen forests, watersides, shady places; 500–1200 m. Fujian, Guangdong, Guangxi, Hunan, Sichuan, Yunnan [Laos, Vietnam].

27. *Carex liouana* F. T. Wang & Tang, Contr. Inst. Bot. Natl. Acad. Peiping 6(2): 62. 1949.

刘氏藁草 *liu shi tai cao*

Rhizome woody. Culms tufted, lateral, 30–60 × 0.2–0.3 cm, trigonous, loosely pubescent when young, base with brown sheaths. Leaves basal and cauline; basal leaves tufted, longer or shorter than culms, linear or linear-oblong, sometimes narrowly elliptic, 20–40 × 1.4–4 cm, glabrous on both surfaces or scabrid abaxially, margins entire or ciliate, apex acuminate; petiole 4–20 cm, glabrous; cauline leaves yellowish brown with dense brown spots, spathe-like. Involucral bracts spathe-like. Panicle compound, 3–5-branched; inflorescence branches subcorymbose, single or binate, triangular-ovate, 2–3.5 × 2–3 cm; peduncles of inflorescence branches tenuous, 4–6 cm, densely hairy or glabrous; inflorescence axes trigonous; bractlets pale yellow with dense brown spots, glumelike, lanceolate, 3–4 mm, densely hairy or glabrous. Spikes more than 10, bisexual, androgynous, 5–8 mm; male part of spike shorter than or equaling female part, circular or oblong; female part 3–10-flowered; male glumes pale yellowish brown or brown, lanceolate, 2–2.5 mm, membranous; female glumes pale yellowish brown or brown with dark brown spots and short lines, ovate or lanceolate, 2–

2.5 mm, 1-veined, apex obtuse. Utricles pale brown with dense dark brown spots and short lines, ovate, rarely elliptic, trigonous, 2.5–3 mm, papery, glabrous, with 2 lateral veins abaxially, subsessile, apex contracted into beak of medium length, beak ca. 1/4 length of utricule, orifice obliquely truncate. Nutlets brown at maturity, ovate, trigonous, 1.5–2 mm; style base thickened; stigmas 3.

• Forests; 300–1100 m. Fujian, Guangdong, Guangxi, Hunan, Jiangxi.

28. *Carex ypsilandrifolia* F. T. Wang & Tang, Contr. Inst. Bot. Natl. Acad. Peiping 6(2): 58. 1949 [*“ypsilanraefolia”*].

丫蕊藁草 *ya rui tai cao*

Rhizome woody. Culms tufted, lateral, flaccid, 15–20 × ca. 0.1 cm, trigonous, loosely hairy and glabrescent later, base with pale brown sheaths. Leaves basal and cauline; basal leaves tufted, linear or linear-elliptic, 15–25 × 1.5–3 cm, glabrous, apex acuminate; petiole 1–10 cm, base covered with brown sheaths, upper part with narrow wings formed by leaf blade base; cauline leaves often absent, if present then brown, spathe-like, membranous, glabrous or loosely pubescent. Involucral bracts spathe-like. Panicle simple, triangular-ovate, 1.5–3 × 2–3 cm; peduncles of inflorescence branches tenuous, 1–3 cm, loosely pubescent; bractlets pale yellow with dense brown spots and short lines, glumelike, lanceolate, 3–7 mm, membranous. Spikes 1–10, bisexual, androgynous, arising from flowerless utriculiform cladophylls, oblong-cylindrical, 7–10 mm; male part of spike nearly same length as female part, oblong-cylindrical; female part 3–8-flowered; male glumes pale brownish white with dense brown spots and short lines, lanceolate, 3–4 mm, with 1 midrib, apex acuminate; female glumes pale brownish white with dense brown spots and short lines, lanceolate, 2–3 mm, membranous, glabrous, 1-veined, apex obtuse. Utricles pale brownish white with dense brown spots and short lines, rhomboid-ovate or elliptic, trigonous, patent, 3.5–4 mm, membranous, with 2 lateral veins abaxially, subsessile, apex contracted into long beak, beak slightly shorter than 1/2 length of utricule, orifice obliquely truncate. Nutlets brown at maturity, subovate, trigonous, 1.5–2 mm; style base thickened; stigmas 3.

• Woods, shady slopes; 700–1700 m. Fujian, Guangdong, Hunan, Jiangxi.

29. *Carex lingii* F. T. Wang & Tang, Contr. Inst. Bot. Natl. Acad. Peiping 6(2): 61. 1949.

林氏藁草 *lin shi tai cao*

Carex sinocrispa Raymond.

Rhizome woody. Culms tufted, lateral, flaccid, 15–40 × ca. 0.1 cm, trigonous, loosely hairy and then glabrescent, base with pale to deep brown sheaths. Leaves basal and cauline; basal leaves tufted, narrowly elliptic to linear-elliptic, 12–30 × 2–2.5 cm, glabrous or scabrid along abaxial veins, base attenuate, margins densely replicate, apex acuminate; petiole 5–20 cm, subglabrous; cauline leaves pale greenish white, sometimes with brown spots and short lines, spathe-like, loosely pubescent. Involucral bracts spathe-like. Panicle simple, triangular-ovate, 1.5–

3 × 2–3 cm, ca. 10-spiked; peduncles of inflorescence branches tenuous, densely hairy; bractlets glumelike, 2.5–3 mm, glabrous. Spikes bisexual, androgynous, arising from flowerless utriculiform cladophylls, oblong, patent horizontally, 4–10 mm; male part of spike suborbicular to oblong; female part 3–10-flowered, nearly as long as male part; male glumes pale brownish white with dense brown spots and short lines, oblong-lanceolate, 2.2–2.5 mm, membranous, with 1 midrib, apex obtuse; female glumes similar to male ones. Utricles brownish white with dense brown spots and short lines, ovate-elliptic, trigonous, obliquely or horizontally patent, ca. 3.5 mm, membranous, with 2 lateral veins abaxially, subsessile, apex contracted into long beak, orifice obliquely truncate. Nutlets brown at maturity, ovate, trigonous, 1.5–1.8 mm; style base thickened; stigmas 3.

- Woods, shady places. Fujian, Zhejiang.

30. *Carex kucyniakii* Raymond, *Naturaliste Canad.* 82: 155. 1955.

棕叶薹草 *zong ye tai cao*

Rhizome thick, woody, with stolons. Culms loosely tufted, lateral, slender, 22–35 × 0.2–0.25 cm, trigonous, lower part smooth, upper part loosely pubescent, base with brown sheaths. Leaves basal and cauline; basal leaf single, elliptic or elliptic-lanceolate, 22–42 × 4–10 cm, scabrid abaxially, glabrous adaxially, 7–14-veined, replicate, entire, base attenuate, apex caudate; petiole 7–10 cm, folded, glabrous; cauline leaves green, spathe-like, loosely pubescent, margins brown, membranous. Involucral bracts spathe-like. Panicle compound, several branched; inflorescence branches racemose, single or binate, often 1 or 2 (or 3)-spiked; peduncles of inflorescence branches tenuous, lowest one up to 8 cm, upper ones gradually shorter, scabrid; bractlets glumelike, ovate-lanceolate, 3–4 mm, loosely hairy. Spikes bisexual, androgynous, arising from flowerless utriculiform cladophylls, linear-cylindric, 25–40 × 3–4 mm; male part of spike nearly as long as female part, oblong; female part loosely many flowered; male glumes dark brown, oblong, 4.5–5 mm, membranous, 3-veined, apex obtuse; female glumes pale brown

with dark brown spots and short lines, oblong, 4.5–5 mm, membranous, loosely hairy abaxially, 3-veined, apex acuminate. Utricles pale brown with dark brown spots and short lines, elliptic, trigonous, ca. 4 mm, membranous, with 2 lateral veins abaxially, subsessile, apex contracted into beak of medium length, orifice obliquely truncate. Nutlets brown at maturity, obovate-oblong, trigonous, ca. 2.5 mm; style base not thickened; stigmas 3.

Wet grasslands in valleys; ca. 1300 m. SE Yunnan [Vietnam].

31. *Carex peliosanthifolia* F. T. Wang & Tang ex P. C. Li, *Acta Phytotax. Sin.* 37: 162. 1999.

扇叶薹草 *shan ye tai cao*

Rhizome stoloniferous, woody. Culms lateral, 40–45 × ca. 0.2 cm, trigonous, loosely pubescent, base with brown sheaths. Leaves basal and cauline; basal leaves 2 or 3 tufted on rhizome node, narrowly elliptic, 20–35 × 3.8–7 cm, glabrous or scabrid on abaxial veins, replicate, base attenuate, apex acuminate; petiole 14–24 cm, folded, glabrous; cauline leaves pale greenish white with dense brown spots and short lines, spathe-like, pubescent. Involucral bracts spathe-like. Panicle compound, 10- or more branched; inflorescence branches racemose, binate or ternate, 1–3-spiked; peduncles of inflorescence branches tenuous, 2–10 cm, densely pubescent; bractlets glumelike, ovate-oblong, ca. 3.5 mm, densely pubescent abaxially. Spikes bisexual, androgynous, arising from flowerless utriculiform cladophylls, oblong, 5–10 mm; male part of spike slightly shorter than female part, with 10 or more flowers; female part 4–10-flowered; male glumes pale yellow laterally with dense spots and short lines, pale green at middle, ovate-lanceolate, ca. 3 mm, membranous, 3-veined, apex acuminate; female glumes similar to male glumes, but loosely pubescent abaxially. Utricles pale yellowish white with brown spots and short lines, obliquely to horizontally patent, elliptic, trigonous, 3–3.2 mm, membranous, glabrous, with many raised veins, base subrounded, apex attenuate into an excurved long beak, orifice obliquely truncate. Nutlets brown at maturity, elliptic, trigonous, 1.9–2 mm; style excurved, base not thickened; stigmas 3.

- Streamsides. Guangxi.

8. *Carex* sect. *Surculosae* Raymond, *Mém. Jard. Bot. Montréal* 53: 21. 1959.

藥枝薹草組 *nie zhi tai cao zu*

Zhang Shuren (张树仁); Tetsuo Koyama

Culms lateral. Leaves radical or cauline, several radical leaves often forming a high shoot, leaf blades linear, less than 1 cm wide; cauline leaves and involucral bracts spathe-like. Inflorescence branches only with 3–10 spikes.

Four species: E and SE Asia; three species (two endemic) in China.

- 1a. Leaves densely hairy abaxially; utricles 2.5–3 mm, ovate-rhomboid, upper part with brownish red papillae 32. *C. kwangsiensis*
- 1b. Leaves glabrous; utricles 3.5–4 mm, elliptic or oblong, without papillae.
- 2a. Utricles loosely hairy, beak ca. 1/3 length of utricule, orifice prominently 2-toothed; radical leaves shorter than culms; female glumes mucronate 33. *C. oligostachya*
- 2b. Utricles glabrous, beak ca. 1/2 length of utricule, orifice not prominently 2-toothed; radical leaves longer than culms; female glumes not mucronate 34. *C. tsiangii*

32. *Carex kwangsiensis* F. T. Wang & Tang ex P. C. Li, *Acta Phytotax. Sin.* 37: 164. 1999.

广西藁草 *guang xi tai cao*

Rhizome woody, with stolons. Culms lateral, 30–50 × ca. 0.15 cm, trigonous, loosely pubescent when young and glabrescent later, with brown sheaths at base. Leaves radical and cauline; radical leaves longer than culms, several ones forming a high shoot, leaf blades linear, flat, 5–7 mm wide, with dense white hairs abaxially, base covered with persistent brown sheaths; cauline leaves brown, spathe-like, loosely hairy along veins. Involucral bracts spathe-like. Panicle compound; inflorescence branches subcorymbose, single or terminal ones binate, 2–3 × 2–2.5 cm, 3–10-spiked; peduncles of inflorescence branches tenuous, 5–10 cm, loosely pubescent; inflorescence axes sharply trigonous, densely hairy; bractlets glumelike, lanceolate, lowest one 5–10 mm, upper ones gradually shorter, terminal one awnlike, pale brown, loosely pubescent. Spikes bisexual, androgynous, obliquely or horizontally patent, 7–18 mm; male part of spike cylindrical, longer than or equaling female part; female part 2–13-flowered; peduncles of spikes arising from flowerless utriculiform cladoprophylls, tenuous, lowest one 2–2.5 mm, upper ones gradually shorter, loosely pubescent; male glumes brown laterally, pale green at middle, lanceolate, 3.5–4 mm, loosely pubescent and glabrescent later, with 1 midrib, margins ciliate, membranous, apex obtuse; female glumes brown laterally, pale green at middle, oblong-lanceolate, 2.2–2.5 mm, membranous, loosely pubescent, with 1 midrib, apex obtuse. Utricles ovate-rhomboid, inflated trigonous, 2.5–3 mm, upper part with brownish red papillae, with many raised veins, hairy, sessile, apex contracted into an excurved long beak of ca. 1/2 length of utricule, orifice obliquely truncate. Nutlets brown at maturity, ovate-rhomboid, trigonous, ca. 1.8 mm; style base thickened; stigmas 3.

• Among shrubs in shady valleys. Guangxi.

33. *Carex oligostachya* Nees, Hooker's *J. Bot. Kew Gard. Misc.* 6: 29. 1854.

少穗藁草 *shao sui tai cao*

Carex rhizomatosa Steudel.

Rhizome stoloniferous, woody. Culms lateral, 20–80 × 0.1–0.2 cm, trigonous, glabrous, base with brown sheaths. Leaves radical and cauline; radical leaves shorter than culms, several ones forming a high shoot, leaf blades linear, flat, 2–5 mm wide, base covered with brown sheaths; cauline leaves brown, spathe-like. Involucral bracts spathe-like, with linear blades, shorter than inflorescence branches. Panicle compound, with 6–12 distant branches; inflorescence branches subcorymbose, single or binate, 3–5-spiked; peduncles of inflorescence

branches tenuous, erect, slightly scabrid; inflorescence axes loosely hairy on edges; bractlets glumelike, ca. 3 mm. Spikes bisexual, androgynous, patent, 4–10 mm; male part of spike nearly as long as or longer than female part; male glumes brown, lanceolate, 3–3.5 mm, glabrous; female glumes pale brown with dense purplish red spots and short lines, ovate to lanceolate, 2–3 mm, upper part loosely pubescent, margins hyaline, apex obtuse, mucronate. Utricles brownish green to purplish brown, patent, oblong, slightly inflated, trigonous, 2.5–4 mm, with several raised veins, hairy, apex contracted into excurved beak of medium length, beak ca. 1/3 length of utricule, orifice prominently 2-toothed. Nutlets elliptic, trigonous, 2–2.3 mm; style base not thickened; stigmas 3.

Grasslands on slopes; 900–1200 m. Guangxi, Guizhou [India, Indonesia, Malaysia, Myanmar, Papua New Guinea, Philippines, Vietnam].

34. *Carex tsiangii* F. T. Wang & Tang, *Contr. Inst. Bot. Natl. Acad. Peiping* 6(2): 59. 1949.

三念藁草 *san nian tai cao*

Carex surculosa Raymond.

Rhizome woody, with stolons. Culms tufted, lateral, 40–60 × ca. 0.1 cm, trigonous, glabrous, base with brown sheaths. Leaves radical and cauline; radical leaves longer than culms, several ones forming a high shoot, leaf blades linear, flat, 5–7 mm wide, glabrous, margins entire or scabrid, base covered with brown sheaths; cauline leaves brown, spathe-like, loosely pubescent and glabrescent later. Involucral bracts spathe-like, with linear blades, shorter than inflorescence branches. Panicle compound, 6–10 cm, 3–6-branched; inflorescence branches subcorymbose, single or binate, 3–10-spiked, broadly ovate, ca. 2 × 2–3 cm; peduncles of inflorescence branches tenuous, 3–5.5 cm, slightly scabrid; inflorescence axes sharply trigonous, densely hairy and glabrescent later; bractlets pale brown laterally, pale green at middle, glumelike, lanceolate, 2.5–3 mm, loosely pubescent. Spikes bisexual, androgynous, obliquely or horizontally patent, 10–15 mm; male part of spike cylindrical, longer than female part; female part 3–9-flowered; male glumes pale green with brown spots and short lines, lanceolate, 3–3.5 mm, with 1 midrib, apex acuminate; female glumes pale brown with brown spots and short lines, ovate-lanceolate, 2.5–3 mm, membranous, loosely pubescent and glabrescent later, with 1 midrib, margins ciliate, apex acute. Utricles brown, elliptic or broadly elliptic, obtusely trigonous, 3.5–4 mm, papery, glabrous, with several fine veins, apex contracted into long beak, beak nearly as long as utricule, orifice minutely 2-toothed. Nutlets elliptic or broadly elliptic, trigonous, 1.5–2 mm; style base thickened; stigmas 3.

• Among shrubs on slopes. Guangdong.

9. *Carex* sect. **Hypolytroides** Nelmes, *Kew Bull.* 6: 121. 1951.

宝兴藁草组 *bao xing tai cao zu*

Zhang Shuren (张树仁); Tetsuo Koyama

Culms bearing leaves from base to inflorescence. Leaves papillose abaxially. Panicle compound; inflorescence branches corymbose. Spike unisexual; male spikes at upper part of inflorescence branches, female spikes at lower part.

Two species: SE Asia; one species (endemic) in China.

35. *Carex moupinensis* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 10: 102. 1887.

宝兴藁草 bao xing tai cao

Homalostachys sinensis Boeckeler.

Rhizome stoloniferous, woody. Culms 20–50 × 0.3–0.4 cm, stiff, trigonous, base with persistent brown sheaths. Leaves longer or shorter than culms, flat, 3–5 mm wide, pubescent and glabrescent later, papillose abaxially, scabrid adaxially, long sheathed, sheath mouth villous. Involucral bracts same as leaves, shorter than inflorescence, much longer than inflorescence branches. Panicle compound, 10–20 cm, 4–10-branched; inflorescence branches corymbose, simple, 5–12-spiked, 2–3 × 1.5–2 cm; peduncles of inflorescence branches tenuous, 6–8 cm, trigonous, loosely pubescent; inflorescence axes sharply trigonous, loosely pubescent; bractlets brown, glumelike, lanceolate, 3–4 mm, loosely pubescent. Spikes unisexual, male ones at

upper part of inflorescence branches, female at lower part, arising from flowerless utriculiform cladophylls; male spikes oblong, 6–10 mm, many flowered, sometimes with few female flowers at base; female spikes oblong, 7–10 mm, densely many flowered, sometimes with few male flowers at top; male glumes brown, lanceolate, 2.5–3.5 mm, membranous, with 1 midrib, apex acuminate; female glumes brownish white with dense brown spots, lanceolate, 2.5–3.5 mm, with 1 midrib, margins narrowly hyaline, apex acuminate. Utricles brownish white with brown spots, obliquely patent, shorter than glumes, obovate, sometimes obliquely obovate, slightly inflated, trigonous, ca. 2 mm, papery, glabrous, 2-veined abaxially, apex contracted abruptly into short beak, orifice obliquely truncate. Nutlets yellowish white at maturity, obovate, trigonous, ca. 1.2 mm; style base thickened; stigmas 3.

• Shady slopes, roadsides. Guizhou, Hubei, Sichuan, Yunnan.

10. *Carex* sect. *Scabrellae* Kükenthal in Engler, Pflanzenr. 38(IV. 20): 286. 1909.

粗糙藁草组 cu cao tai cao zu

Zhang Shuren (张树仁); Tetsuo Koyama

Involucral bracts leafy, with or without sheaths. Inflorescence spicate, 1–5-branched; inflorescence branches subsessile. Spikes fewer, androgynous, dense, few flowered.

About seven species: tropical Asia and tropical America; one species in China.

36. *Carex tricephala* Boeckeler, Flora 58: 263. 1875.

三头藁草 san tou tai cao

Rhizome oblique. Culms tufted, 18–40 × ca. 0.1 cm, slender, trigonous, scabrid at upper part. Leaves longer or shorter than culms, flat, 4–8 mm wide, margins and veins scabrid; persistent sheaths brown, fibriform. Involucral bracts leafy, without sheaths, lowest one longer than inflorescence, others very short, setaceous. Panicle spicate, 1–4-branched; inflorescence branches subsessile, fewer spiked, sometimes with sterile spike at lower part. Spikes bisexual, androgynous, dense, ovate-globose, 5–8 × 4–7 mm, subsessile; male part of spike not prominent, usually not exerted from female part, 3–5-flowered;

female part densely fewer flowered; male glumes yellowish white, lanceolate, 4.5–5 mm, membranous, upper part hairy, with 1 midrib, apex acuminate; female glumes yellowish white, lanceolate, 3–3.5 mm, densely hairy, with 1 midrib and several fine veins, apex acuminate, with short awns. Utricles yellowish white, slightly inflated, trigonous, 4.5–5 mm, membranous, densely hairy, with 2 lateral keels and several fine veins, subsessile, margins very narrowly winged, apex contracted into long beak, orifice minutely 2-toothed. Nutlets pale yellow at maturity, ovate, trigonous, ca. 3 mm; style base thickened and pyriform; stigmas 3.

Forests; 700–1100 m. S Yunnan (Xishuangbanna) [Cambodia, Indonesia, Laos, Myanmar, Thailand, Vietnam].

2. *Carex* subg. *Carex*

藁草亚属 tai cao ya shu

Dai Lunkai (戴伦凯), Liang Songyun (梁松筠 Liang Song-jun), Tang Yancheng (汤彦承 Tang Yen-cheng), Zhang Shuren (张树仁); Tetsuo Koyama, Gordon C. Tucker

Herbs, perennial. Rhizome stoloniferous or without stolons. Spikes few to numerous, unisexual or unisexual and bisexual, rarely all bisexual, bisexual spike usually androgynous (male flowers at upper part), sometimes gynaeandrous (female flowers at upper part), rarely single and terminal, usually arranged in spicate, racemose, or paniculate inflorescence; cladophyll sheathlike, without flower. Utricles trigonous, plano-convex, or biconvex. Nutlets trigonous, plano-convex, or biconvex; style slightly slender, base thickened or not thickened; stigmas usually 3, rarely 2.

About 1,450 species: ± worldwide; 443 species (235 endemic) in 42 sections in China.

1a. Spike single, terminal.

2a. Nutlets biconvex or plano-convex, stigmas 2.

3a. Spikes bisexual, androgynous; utricles not spongy at base 51. *C. sect. Capituligerae*

3b. Spikes unisexual; utricles spongy at base 52. *C. sect. Physoglochin*

- 2b. Nutlets trigonous, stigmas 3.
- 4a. Female glumes early deciduous; utricles downward reflexed in maturity, lateral veins not more conspicuous than veins on abaxial surface; regressive branch rachilla conspicuous, usually longer than nutlets 46. *C. sect. Leucoglochis*
- 4b. Female glumes deciduous at same time as utricles or later than utricles; utricles not distinctly downward reflexed in maturity, lateral veins more conspicuous than veins on abaxial surface; without regressive branch rachilla, or if with regressive branch rachilla then rachilla shorter than nutlets.
- 5a. Spikes shortly cylindric to capitate.
- 6a. Nutlets with regressive branch rachilla at base 47. *C. sect. Rupestres*
- 6b. Nutlets without regressive branch rachilla at base 48. *C. sect. Rarae*
- 5b. Spikes linear or linear-cylindric, rarely only female spikes so.
- 7a. Utricles shortly beaked (beak not over 1 mm), veins obscure on abaxial surface 49. *C. sect. Grallatoriae*
- 7b. Utricles long beaked (beak over 1 mm), veins conspicuous on abaxial surface 50. *C. sect. Rhizopodae*
- 1b. Spikes 2 to numerous, usually 1 to several spikes borne in an involucre bract sheath, rarely arranged in compound inflorescence.
- 8a. Utricles plano-convex or biconvex; stigmas 2.
- 9a. Involucral bracts sheathed; female spikes sparsely flowered, rarely slightly densely flowered 45. *C. sect. Graciles*
- 9b. Involucral bracts without sheaths; female spikes densely many flowered.
- 10a. Spikes pedunculate, ± pendent.
- 11a. Spikes 2–6 borne in every involucre bract sheath on inflorescence 44. *C. sect. Tuminenses*
- 11b. Spikes solitary in every involucre bract sheath on inflorescence 43. *C. sect. Praelongae*
- 10b. Spikes nearly sessile or only lowermost or basal spike rather long pedunculate.
- 12a. Utricles distinctly beaked, beak 0.5–1.5 mm, 2-toothed at orifice 42. *C. sect. Forficulae*
- 12b. Utricles beakless or shortly beaked, truncate or emarginate at orifice 41. *C. sect. Phacocystis*
- 8b. Utricles trigonous; stigmas 3.
- 13a. Utricles nearly beakless or with short beak, truncate, emarginate, or very shortly 2-toothed at orifice.
- 14a. Female spikes densely flowered; involucre bracts usually without sheath or only very shortly sheathed.
- 15a. Female spikes remote, pedunculate.
- 16a. Male spikes 2–6 (only 1 male spike in *C. inanis*); utricles hispidulous or scabrous 15. *C. sect. Hirtae*
- 16b. Male spike solitary, terminal; utricles glabrous 16. *C. sect. Anomalae*
- 15b. Female spikes contiguous or rather congested, rarely lower 1 or 2 remote, without peduncle or very shortly pedunculate, rarely lowermost one rather long pedunculate.
- 17a. Involucral bracts leaflike or lower ones leaflike, rarely setaceous; terminal spike gynaeandrous, rarely male 11. *C. sect. Racemosae*
- 17b. Involucral bracts scale-shaped or lower ones linear, upper ones scale-shaped; terminal spike male.
- 18a. Female glumes red-brown or dark brown; utricles glabrous, usually shiny, obliquely truncate at orifice of beak; style base thickened 14. *C. sect. Lamprochlaenae*
- 18b. Female glumes brown or brownish; utricle hirtellous or papillate, emarginate or very shortly 2-toothed at orifice of beak.
- 19a. Utricles papillate; style base thickened 12. *C. sect. Glauciformes*
- 19b. Utricles hirtellous; style base not thickened 13. *C. sect. Acrocystis*
- 14b. Female spikes sparsely flowered; involucre bracts usually sheathed.
- 20a. Utricles glabrous or scabrid.
- 21a. Leaf blades usually revolute at margins; involucre bracts sheathlike, without blades; male spike few flowered; style base thickened and globose 22. *C. sect. Albae*
- 21b. Leaf blades flat; involucre bracts leaflike or spathe-like, with short blades; male spike many flowered; style base not thickened.
- 22a. Culms lateral; leaf blades rather broad, 6–30 mm wide (very few species with 3–6 mm wide blades); spikes bisexual, androgynous; female glumes pale or reddish brown 25. *C. sect. Siderostictae*
- 22b. Culms central; leaf blades rather narrow, 2–5 mm wide; spikes unisexual; female glumes ferruginous-brown or yellow-brown.
- 23a. Involucral bracts shortly sheathed; female spikes densely flowered, slenderly pedunculate, usually pendulous; style exerted from utricle 23. *C. sect. Limosae*

- 23b. Involucral bracts long sheathed; female spikes sparsely flowered, slightly thickly pedunculate, erect; style included in utricle (only stigmas exerted) 24. *C. sect. Paniceae*
- 20b. Utricles pubescent or hispidulous, rarely glabrous.
- 24a. Involucral bracts spathe-like, without blade, rarely leaflike; nutlets not thickened at apex into annulate shape; style base slightly thickened or not thickened, rarely thickened and conic.
- 25a. Involucral bracts leaflike, rarely sheathlike; spikes bisexual, androgynous; utricles subleathery or papery; style base thickened and conic 20. *C. sect. Radicales*
- 25b. Involucral bracts spathe-like, rarely sheathlike; spikes unisexual, terminal spike male, lateral spikes female; utricles membranous; style base thickened or not thickened 21. *C. sect. Clandestinae*
- 24b. Involucral bracts with short blades; nutlets thickened at apex into annulate shape; style base thickened into different shapes.
- 26a. Nutlets with persistent and bent style base at apex 17. *C. sect. Cryptostachyae*
- 26b. Nutlets without persistent style base at apex, or if nutlets with persistent style base then style base straight or thickened into cucullate shape.
- 27a. Nutlets with \pm cylindrical style base, concave at apex, persistent style base not thickened into cucullate shape 18. *C. sect. Lageniformes*
- 27b. Nutlets \pm thickened into disk shape, not concave at apex, persistent style base thickened into cucullate shape 19. *C. sect. Mitratae*
- 13b. Utricles with a long beak or medium-sized beak (beak rather short in *C. sect. Paludosae*), long or shortly 2-toothed at orifice, rarely subtruncate or very shortly toothed.
- 28a. Leaf blades with transverse septate nodes between longitudinal veins.
- 29a. Utricles \pm hispidulous or pubescent, rarely glabrous or ciliate on margins of beak.
- 30a. Female glumes ovate or broadly ovate, apex acute, mucronate; utricles obtusely trigonous, ca. 4 mm, rarely 5 mm, shortly beaked, shortly 2-toothed at orifice 39. *C. sect. Occlusae*
- 30b. Female glumes lanceolate, narrowly ovate, or oblong-ovate (broadly ovate in *C. latisquamea*), apex acuminate, aristate or mucronate; utricles slightly inflated trigonous or inflated trigonous, 5–10 mm, rarely ca. 4 mm, medium to long beaked, \pm long to long 2-toothed at orifice 40. *C. sect. Carex*
- 29b. Utricles glabrous.
- 31a. Female glumes long aristate; utricles eventually horizontally patent or downward reflexed, obtusely trigonous, long beaked, deeply splitting into 2 long teeth at orifice 36. *C. sect. Pseudocypereae*
- 31b. Female glumes mucicous or mucronate, rarely aristate; utricles eventually obliquely patent, rarely horizontally patent or downward reflexed, inflated trigonous or slightly so, medium to long beaked or very shortly beaked.
- 32a. Female glumes oblong-lanceolate or narrowly ovate, without mucro or awn; utricles inflated trigonous, membranous or subleathery, medium to long beaked 37. *C. sect. Physocarpae*
- 32b. Female glumes ovate or broadly ovate, mucronate, rarely aristate; utricles slightly inflated trigonous, leathery or suberose, very shortly beaked 38. *C. sect. Paludosae*
- 28b. Leaf blades without transverse septate nodes between longitudinal veins.
- 33a. Female glumes dark purple-red or brown; utricles compressed trigonous, rarely trigonous.
- 34a. Spikes numerous, bisexual, androgynous, usually several spikes borne in an involucral bract sheath 26. *C. sect. Decorae*
- 34b. Spikes 2–7, unisexual, solitary in an involucral bract sheath, terminal spikes male, rarely gynaeandrous, lateral spikes female 27. *C. sect. Aulocystis*
- 33b. Female glumes pale, rarely dark brown; utricles trigonous or inflated trigonous (subplano-convex in *C. sect. Secalinae*).
- 35a. Culms lateral, rarely central; nutlets usually constricted or with constriction on angles, rarely not constricted or without constriction; style base thickened or inflated, rarely not thickened.

- 36a. Female spikes densely many flowered; nutlets usually constricted or with constriction on angles, rarely not constricted 34. *C. sect. Rhomboidales*
- 36b. Female spikes sparsely several flowered; nutlets not constricted on angles 35. *C. sect. Careyanae*
- 35b. Culms central; nutlets not constricted or without constrictions on angles; style base not thickened.
- 37a. Male spikes 1–3, borne at apex of culm; utricles leathery, subplano-convex 33. *C. sect. Secalinae*
- 37b. Terminal spike male, rarely androgynous or gynaeandrous; utricles membranous or papery, rarely subleathery.
- 38a. Female spikes densely many flowered; involucre bracts usually without sheaths or with very short sheath; utricles eventually divaricate, horizontally patent, or downward reflexed, rarely obliquely patent, distinctly several veined.
- 39a. Female glumes long aristate, rarely mucronate (*C. ischnostachya* and *C. subtumida* without mucro or awn); utricles eventually horizontally patent or slightly downward reflexed, rarely slightly divaricate, brown-green or dark brown or black-brown at maturity 31. *C. sect. Confertiflorae*
- 39b. Female glumes mucronate or mucicous, rarely aristate; utricles eventually obliquely patent, rarely horizontally patent, yellowish green or stramineous, rarely brownish yellow 32. *C. sect. Molliculae*
- 38b. Female spikes usually sparsely flowered (densely flowered in *C. sect. Hymenochlaenae*); involucre bracts sheathed; utricles erect or slightly obliquely patent, greenish or greenish yellow, obscurely veined.
- 40a. Female spikes oblong or shortly cylindrical; utricles less than 3 mm 28. *C. sect. Chlorostachyae*
- 40b. Female spikes cylindrical, narrowly cylindrical, or linear-cylindrical; utricles 4–7 mm, rarely 3–3.5 mm.
- 41a. Female spikes cylindrical, rather densely flowered; utricles elliptic or obovate-elliptic, shortly 2-toothed at orifice 29. *C. sect. Hymenochlaenae*
- 41b. Female spikes narrowly cylindrical or linear-cylindrical, sparsely or very loosely flowered; utricles oblong-lanceolate, lanceolate, or narrowly oblong, obliquely truncate or very shortly 2-toothed at orifice 30. *C. sect. Debiles*

11. Carex sect. Racemosae G. Don in Loudon, Hort. Brit. 376. 1830.

褐穗薹草组 he sui tai cao zu

Liang Songyun (梁松筠 Liang Song-jun); Tetsuo Koyama

Involucre bracts leaflike or setaceous. Spikes erect, rarely pendent; terminal spike gynaeandrous, rarely male; lateral spikes female, sometimes with a few apical male flowers. Female glumes dark purple-brown. Utricles yellow-green or pale brown, usually tinged with dark purple-brown, elliptic, ovate, or obovate, membranous or leathery, glabrous, minutely papillose or punctate, apex shortly beaked, orifice entire, emarginate, or 2-toothed. Style base thickened; stigmas 3, rarely 2.

About 60 species: Asia, Europe, North America; 28 species (ten endemic) in China.

- 1a. Female glumes 9–10 mm 37. *C. praeclara*
- 1b. Female glumes less than 8 mm.
- 2a. Utricles densely papillose, gray-green.
- 3a. Female glumes acuminate or with short awn at apex, longer than utricles 38. *C. tarunensis*
- 3b. Female glumes obtuse at apex, equaling or slightly shorter than utricles.
- 4a. Female spikes 5–12 mm, sessile 39. *C. meyeriana*
- 4b. Female spikes 10–25 mm, shortly stipitate 40. *C. hongyuanensis*
- 2b. Utricles smooth or minutely punctate, yellowish green, stramineous, pale brown, or dark purple-red.
- 5a. Upper 3 or 4 spikes male, rarely with a few female flowers at base 41. *C. polymascula*

- 5b. Terminal spikes male or gynaeandrous or all spikes gynaeandrous.
- 6a. All spikes gynaeandrous 42. *C. aristulifera*
- 6b. Spikes gynaeandrous or with terminal spike male.
- 7a. Terminal spike male (rarely bisexual in *C. melanantha*).
- 8a. Female glumes broadly white hyaline on margins 45. *C. moorcroftii*
- 8b. Female glumes narrowly white hyaline on margins or not.
- 9a. Utricles 2-toothed at orifice 46. *C. minxianensis*
- 9b. Utricles emarginate at orifice.
- 10a. Spikes distant; leaves soft 43. *C. augustinowiczii*
- 10b. Spikes approximate at culm apex, only lowest spike distant; leaves slightly stiff 44. *C. melanantha*
- 7b. Terminal spike gynaeandrous.
- 11a. Utricles scabrous above on margins 47. *C. obscura*
- 11b. Utricles smooth on margins.
- 12a. Female glumes with a scabrous long awn at apex 48. *C. gmelinii*
- 12b. Female glumes without scabrous long awn at apex.
- 13a. Utricles veined.
- 14a. Utricles elliptic or elliptic-lanceolate.
- 15a. Spikes distant; female glumes pale or light ferruginous; orifice of utricles yellow-green, 2-toothed 59. *C. peiktusani*
- 15b. Spikes approximate; female glumes dark purple; orifice of utricles purple-red, emarginate 60. *C. schneideri*
- 14b. Utricles obovate-elliptic, obovate, or oblanceolate.
- 16a. Utricles inflated.
- 17a. Utricles 2–2.2 mm; female glumes broadly ovate, ca. 1.2 mm 61. *C. lehmannii*
- 17b. Utricles (2.5–)3–3.3 mm; female glumes oblong, 2–2.5 mm 62. *C. montis-wutaii*
- 16b. Utricles not inflated.
- 18a. Utricles oblanceolate or narrowly elliptic, beak 2-toothed at orifice 63. *C. serreana*
- 18b. Utricles obovate or elliptic-obovate, beak short and subtruncate at orifice 64. *C. caucasica*
- 13b. Utricles nerveless (except for 2 costas on edges).
- 19a. Spikes contiguous forming a capitate or spicate inflorescence.
- 20a. Utricles membranous, vesicular, nerveless 51. *C. melanocephala*
- 20b. Utricles leathery, granulose or glabrous, 3–5-veined.
- 21a. Rhizome long; utricles ovate, glabrous, 4–5 mm; sandy plants 49. *C. sabulosa*
- 21b. Rhizome short, culms loosely tufted; utricles obovate, minutely granulose, 2.5–3 mm 50. *C. melananthiformis*
- 19b. Spikes loosely disposed in racemose inflorescence.
- 22a. Female glumes 2–3 mm; female spikes 4–15 mm.
- 23a. Utricles inflated, horizontally patent at maturity 57. *C. hancockiana*
- 23b. Utricles compressed or slightly inflated, not horizontally patent at maturity.
- 24a. Culms 30–60 cm tall; female glumes white hyaline on margins 55. *C. angarae*
- 24b. Culms 15–25 cm tall; female glumes not white hyaline on margins 56. *C. duthiei*
- 22b. Female glumes 4–6 mm; female spikes (20–)25–35 mm.
- 25a. Utricles stramineous, sometimes upper yellow-brown or purple punctate, compressed 52. *C. kansuensis*
- 25b. Utricles dark brown to purple-brown.
- 26a. Female glumes 6–6.5 mm; nutlets ca. 2.5 mm 53. *C. bijiangensis*
- 26b. Female glumes 3.5–4 mm; nutlets 1.5–1.7 mm.
- 27a. Utricles elliptic or ovate, shallowly 2-toothed at orifice 58. *C. atrata*
- 27b. Utricles narrowly oblong, obliquely truncate at orifice 54. *C. obliquitruncata*

37. *Carex praeclara* Nelves, Hooker's Icon. Pl. 35: t. 3403. 1940.

沙生藁草 sha sheng tai cao

Rhizome creeping, thick. Culms 20–30 cm tall, trigonous, slightly rigid, clothed at base with purple-brown sheaths. Leaves shorter than culm, blades linear, 3–5 mm wide, flat, apex acuminate. Involucral bracts sheathless, lowest one with setaceous blade, remaining ones glumelike. Spikes 3–8, densely disposed in a head, androgynous except 1 or 2 bearing female flowers at base, oblong, 1.3–2.5 cm, sessile. Female glumes dark purple, narrowly elliptic or oblong-lanceolate, 9–10 × 3.5–4 mm, 1-veined, margins broadly white hyaline, apex acuminate. Utricles pale brown, shorter than glume, elliptic or oblong-elliptic, compressed trigonous, (3–)4.5–5 mm, upper densely papillose, without conspicuous veins, contracted at both ends, beak short, orifice 2-toothed. Nutlets light brown, obovate-oblong or elliptic, trigonous, ca. 2.5 mm; stigmas 3. Fl. and fr. Sep.

Grassy slopes, sandy soil; 4800–5400 m. Xizang, Yunnan [India (Sikkim)].

38. *Carex tarunensis* Franchet, Bull. Soc. Philom. Paris, sér. 8, 7: 87. 1895.

长麟藁草 chang lin tai cao

Rhizome long creeping. Culms erect, 20–60 cm tall, acutely trigonous, scabrous below inflorescence, clothed at base with purple bladeless sheaths often disintegrating into reticulate fibers. Leaves nearly equaling culm, blades linear, 2–3 mm wide, flat, margins revolute. Lowest involucral bract setaceous or leafy, upper ones glumelike. Spikes 3 or 4, approximate; terminal spike with female flowers in middle and male flowers at apex and base; lateral spikes female, ovate-oblong, 1–1.5 cm, sessile. Female glumes purple-brown, green at middle, narrowly ovate-lanceolate, 4–4.5 mm (including awn), margins white hyaline, 1-veined costa forming short awn at apex, apex acuminate. Utricles light gray-green, shorter than glume, elliptic, compressed trigonous, 2.5–3.5 mm, subleathery, densely papillose, many veined, base contracted into a short stipe, apex abruptly narrowed into a very short beak, orifice 2-toothed. Nutlets loosely enveloped, subobovate, trigonous, ca. 1.8 mm; stigmas 3. Fl. and fr. Mar.

Meadows, wet places in forests; 1400–1500 m. S Jilin (Changbai Shan) [Japan].

39. *Carex meyeriana* Kunth, Enum. Pl. 2: 438. 1837.

乌拉草 wu la cao

Rhizome short, densely caespitose. Culms tufted, 20–50 cm tall, 1–1.5 mm wide, slender, obscurely trigonous, rigid, smooth, clothed at base with chestnut-brown lustrous bladeless sheaths disintegrating into fibers. Leaves shorter than or subequaling culm, blades setaceous, flexuose, rather stiff, folded, margins scabrous. Involucral bracts sheathless, lowest one setaceous, upper ones glumelike. Spikes 2 or 3, approximate; terminal spike male, cylindrical, 1.5–2 cm; lateral spikes female, globose or ovate, 5–12 × ca. 0.5 mm, densely flowered. Female glumes dark purple or red-brown, ovate-oblong, 2.8–3.5 mm,

faintly 3-veined, margins narrowly white hyaline, apex obtuse. Utricles bluish green to gray, equaling or nearly longer than glume, ovate or elliptic, compressed trigonous, 2.5–3 mm, finely 5- or 6-veined, densely papillose, base shortly stipitate, apex abruptly contracted into a cylindrical entire beak. Nutlets brown, tightly enveloped, obovate-elliptic, compressed trigonous, 1.5–2 mm, base shortly stipitate, apex rounded; style base not thickened; stigmas 3. Fl. and fr. Jun–Jul.

Marshes. Heilongjiang, Jilin, Liaoning, Nei Mongol, Sichuan [Japan, Korea, Mongolia, Russia (Far East, Siberia)].

40. *Carex hongyuanensis* Y. C. Tang & S. Yun Liang, Fl. Reipubl. Popularis Sin. 12: 520. 2000.

红原藁草 hong yuan tai cao

Rhizome short, woody. Culms to 50 cm tall, trigonous, smooth, scabrous above, clothed at base with dark brown sheaths. Leaves shorter than culm, blades linear, 3–4 mm wide, flat, margins scabrous. Involucral bracts leafy, shorter than inflorescence, sheathless. Spikes 4, approximate; terminal spike male, long cylindrical, 23–25 × 2–4 mm, with peduncle ca. 4 mm; lateral spikes female, cylindrical, 1–2.5 × 0.5–0.6 cm, densely flowered, peduncles 1–2.7 cm. Female glumes dark brown, yellowish, or pale yellow, oblong, ca. 3.5 × 1.5 mm, 1-veined, apex obtuse. Utricles yellow-green, longer than glume, elliptic, compressed trigonous, ca. 4 × 2 mm, glabrous, 7–9-veined, constricted at both ends, beak short, orifice entire. Stigmas 3.

• Ditch sides; ca. 3600 m. N Sichuan (Hongyuan).

41. *Carex polymascula* P. C. Li, Acta Bot. Yunnan. 12: 140. 1990.

多雄藁草 duo xiong tai cao

Rhizome stoloniferous. Culms 60–70 cm tall, subrigid, scabrous above, clothed at base with brown sheaths. Leaves shorter than culm, blades linear, 3–4 mm wide, flat, slightly soft. Lower involucral bracts subleafy, sheathless, upper ones glumelike. Spikes 5–7, contiguous, lowest spike much spaced, cylindrical, 25–36 × 6–7 mm, densely flowered, upper 3 or 4 male (rarely with a few female flowers at base), remaining spikes female, usually with a few male flowers at apex; peduncles slender, with dense papillae, upper ones rather short. Female glumes dark purple or brown, oblong-lanceolate, 4–4.5 mm, margins white hyaline, 1-veined green costa ending in a mucro at apex. Utricles pale brown, shorter than glume, subrounded or broadly ovate, compressed trigonous, 2.3–2.5 mm, purple punctate, glabrous, nerveless, apex abruptly contracted into a very short beak, orifice hyaline and emarginate. Nutlets loosely enveloped, elliptic, base abruptly contracted into short stipe; style base not thickened; stigmas 3. Fl. and fr. Jul–Aug.

• *Abies* forests, alpine meadows in thickets; 3700–4200 m. W Sichuan.

42. *Carex aristulifera* P. C. Li, Acta Bot. Yunnan. 12: 141. 1990.

具芒藁草 ju mang tai cao

Rhizome short. Culms tufted, 15–30 cm tall, slender, pendent apically, trigonous, clothed at base with dark brown

bladeless sheaths. Leaves shorter than culm, blades linear, 1.5–2 mm wide, flat, papillose abaxially. Spikes 2 or 3, gynaeandrous, with male part ca. 1/3 length of spike, approximate, or lowest spike distant, oblong, 10–20 × ca. 5 mm, densely flowered, slenderly pedunculate, pendent. Female glumes dark purple, oblong, 2.8–3.2 mm, densely minutely papillose, 3-veined green costa often forming a scabrous long awn at apex. Utricles yellow-green, slightly longer than glume, elliptic, compressed trigonous, 3.2–3.5 mm, membranous, densely finely granulose toward apex, apex abruptly contracted into a short beak, beak entire at purple orifice. Nutlets loosely enveloped, obovate-oblong, trigonous, base shortly stipitate; style base not thickened; stigmas 3. Fl. and fr. Jul.

• Rocky places in thickets of alpine grasslands; 3200–3500 m. NW Yunnan (Gongshan).

43. *Carex augustinowiczii* Meinshausen ex Korshinsky, Trudy Imp. S.-Peterburgsk. Bot. Sada 12: 411. 1892.

短鳞薹草 duan lin tai cao

Carex augustinowiczii subsp. *soyaensis* (Kükenthal) T. V. Egorova; *C. eleusinoides* Turczaninow var. *flaccidior* F. Schmidt; *C. flaccidior* (F. Schmidt) Miyabe & Kudô; *C. soyaensis* Kükenthal.

Rhizome shortly stoloniferous. Culms tufted, 30–50 cm tall, trigonous, slender, slightly scabrous, clothed at base with purple-brown bladeless sheaths disintegrating into fibers. Leaves green, slightly shorter than or equaling culm, blades 2–3 mm wide, soft. Lowest involucre bract leafy, sheathing, remaining ones setaceous. Spikes 3–5, ± distant; terminal spike male, cylindrical, 1–1.7 cm; lateral spikes female, rarely few with male flowers at base, cylindrical, 1.5–3.5 cm; lowest spike with short peduncle, others sessile. Female glumes dark sanguineous or purple-red, pale green at middle, oblong, 2–2.8 mm, apex acuminate or obtuse. Utricles pale gray-green or yellow-green, longer than glume, ovate-lanceolate or oblong-lanceolate, obtusely trigonous, ca. 3 mm, finely many veined, base cuneate, apex gradually narrowed into a beak, orifice emarginate. Nutlets elliptic, trigonous, ca. 2 mm; style slender, base not thickened; stigmas 3.

Forests, riversides, sandy wet places. Hebei, Heilongjiang, Jilin, Liaoning [Japan, Russia (Far East)].

44. *Carex melanantha* C. A. Meyer in Ledebour, Fl. Altaic. 4: 216. 1833.

黑花薹草 hei hua tai cao

Rhizome creeping, thick. Culms 8–30 cm tall, trigonous, firm, clothed at base with brownish remnants of bladeless and blade-bearing sheaths. Leaves shorter than or subequaling culm, blades linear, 3–6 mm wide, subleathery. Lowest involucre bract setaceous, sheathless, upper involucre bracts glumelike. Spikes 3–6, aggregated in a capitate inflorescence; terminal spike usually male or gynaeandrous (rarely mixed), ovate, 1–2.5 cm, sessile; lateral spikes female, ovate or oblong, 1–2 cm, sessile or lowest one with rather short peduncle. Female glumes ferruginous-brown, green at middle, oblong-ovate, 4–5 mm, margins narrowly white hyaline, apex acute. Utricles dark purple on upper part, shorter than glume, oblong or obovate, tri-

gonous, 3–3.5 mm, leathery, without conspicuous veins except for 2 costas on edges, abruptly contracted at both ends, base shortly stipitate, beak short, emarginate at orifice. Nutlets pale yellow-brown, obovate or obovate-oblong, ca. 2 mm; style base not thickened; stigmas 3. Fl. and fr. Jun–Aug.

Alpine meadows and shady slopes; 2500–4500 m. Xinjiang [Afghanistan, Mongolia, Nepal, Russia (Siberia); C Asia].

45. *Carex moorcroftii* Falconer ex Boott, Trans. Linn. Soc. London 20: 140. 1846.

青藏薹草 qing zang tai cao

Carex melanantha C. A. Meyer var. *moorcroftii* (Falconer ex Boott) Kükenthal.

Rhizome creeping, thick. Culms 7–20 cm tall, trigonous, firm, clothed at base with brown sheaths disintegrating into fibers. Leaves shorter than culm, blades linear, 2–4 mm wide, flat, leathery, margins scabrous. Involucre bracts setaceous, shorter than inflorescence, sheathless. Spikes 4 or 5, approximate, lowest spike ± distant, densely many flowered; terminal spike male, oblong or cylindrical, 1–1.8 cm; lateral spikes female, ovate or oblong, 0.7–1.8 cm, sessile or lowest with rather short peduncle. Female glumes purple, ovate-lanceolate, 5–6 mm, margins broadly white hyaline, apex acuminate. Utricles yellow-green, purple above, equaling or slightly shorter than glume, elliptic-obovate, trigonous, leathery, faintly veined, apex abruptly contracted into a short beak, orifice 2-toothed. Nutlets obovate, trigonous, 2–2.3 mm; stigmas 3. Fl. and fr. Jul–Sep.

Alpine meadows in thickets, grasslands, lakesides, plateaus; 3400–5700 m. Qinghai, W Sichuan, Xizang [NE India].

46. *Carex minxianensis* S. Yun Liang, Fl. Reipubl. Popularis Sin. 12: 520. 2000.

陇南薹草 long nan tai cao

Rhizome stoloniferous. Culms 25–40 cm tall, trigonous, smooth, slightly scabrous above, clothed at base with brown sheaths disintegrating into fibers. Leaves shorter than culm, blades linear, 2–3 mm wide, flat, apex acuminate. Lowest involucre bract setaceous, base auriculate surrounding culm, sheathless, upper ones glumelike. Spikes 4–6; terminal spike male, cylindrical, 1.2–3 cm; lateral spikes female, oblong or cylindrical, 1–2.5 cm, densely many flowered, upper ones approximate, sessile, lowest distant, with peduncle. Female glumes dark purple, ovate-lanceolate, 4.5–5 mm, 1-veined, margins sometimes narrowly white hyaline, apex acuminate, mucronate. Utricles yellow-green, dark purple above, shorter than glume, ovate, trigonous, 3.5–4 mm, base gradually attenuate, apex abruptly contracted into a short beak, orifice 2-toothed. Nutlets tightly enclosed, obovate, trigonous, ca. 2 mm; stigmas 3. Fl. and fr. Jun–Jul.

• Wet places along valleys; ca. 3000 m. S Gansu (Minxian).

47. *Carex obscura* Nees var. *brachycarpa* C. B. Clarke in J. D. Hooker, Fl. Brit. India 6: 731. 1894.

刺囊薹草 ci nang tai cao

Rhizome short, rarely obliquely ascending. Culms tufted,

15–80 cm tall, acutely trigonous, smooth below, scabrous above, clothed at base with purple sheaths. Leaves shorter than culm, blades linear, 2–5 mm wide, flat, margins scabrous, apex long acuminate. Basal 1 or 2 involucre bracts longer than inflorescence, sheathless. Spikes 3–6; terminal spike gynaeandrous, oblong, 1–1.5 cm; lateral spikes female, oblong, 8–12 mm, with short peduncles or subsessile. Female glumes dark purple, ovate or broadly ovate, 1.8–2 mm, apex slightly acute or obtuse. Utricles pale green, longer than glume, obovate-elliptic or broadly elliptic, trigonous, 2–2.5 mm, apex abruptly contracted into a very short beak, orifice emarginate. Nutlets castaneous, obovate or obovate-elliptic, 1.5–2 mm; style short; stigmas 3. Fl. and fr. Jun–Aug.

Shady and wet places in alpine coniferous forests, shallow water, meadows; 2700–4100 m. W Sichuan, SE Xizang, NW Yunnan [Bhutan, NE India, Kashmir, Nepal].

Carex obscura var. *obscura* occurs in the W Himalayas, Nepal, and Pakistan.

48. *Carex gmelinii* Hooker & Arnott, Bot. Beechey Voy. 118. 1832.

长芒藁草 chang mang tai cao

Rhizome obliquely ascending, stoloniferous. Culms densely tufted, 20–60 cm tall, scabrous above, clothed at base with dark purple bladeless sheaths disintegrating into reticulate fibers. Leaves shorter than culm, blades linear or broadly linear, 3–7 mm wide, slightly firm. Involucral bracts leafy, nearly sheathless. Spikes 3–8, terminal 3 approximate, sessile, lower ones distant and with a peduncle, lowest peduncle 2–3 cm, ± pendent or erect; terminal spike gynaeandrous, rarely male, oblong, 2–3 cm; lateral spikes female, oblong, 1.5–3 cm. Female glumes dark purple-red or black-purple, ovate, margins narrowly white hyaline, 1–3-veined costa forming a scabrous long awn at apex. Utricles yellowish green, becoming pale brown, longer than glume, ovate or subobovate, trigonous, 4–5 mm, membranous, densely finely granular, 6–8-veined, base stipitate, apex abruptly contracted into a short ferruginous scarcely emarginate or entire beak. Nutlets loosely enveloped, obovate, trigonous, slightly compressed; style base not thickened; stigmas 3.

Grasslands, seashores. Jilin [Japan, Korea, Russia (Far East, E Siberia); North America].

49. *Carex sabulosa* Turczaninow ex Kunth, Enum. Pl. 2: 432. 1837.

沙地藁草 sha di tai cao

Rhizome creeping, with stolons. Culms 15–40 cm tall, smooth, clothed at base with reddish brown bladeless and blade-bearing sheaths. Leaves shorter than culm, blades linear, 2–3.5 mm wide, stiff, weakly involute. Lower involucre bracts shorter than inflorescence. Spikes 2–5, upper spikes approximate, lower 1 or 2 distant; terminal spike gynaeandrous, sometimes male, clavate, 2–2.5 × 0.8–1 cm; remaining spikes female, ovate to ovate-oblong, 1.5–2 × 0.8–1 cm; peduncles 1–2 cm. Female glumes ferruginous with a pale midrib, ovate, margins white hyaline, apex acute. Utricles yellow-green, broader than but as long as or shorter than glume, ovate, trigonous, 4–

5(–6) mm, smooth, 3–5-veined, base broadly cuneate, stipitate, apex abruptly contracted into a smooth, deeply 2-lobed beak. Fr. Jun–Jul.

Sands on hillsides. Xinjiang [Mongolia, Russia (E Siberia); C Asia].

No specimens have been seen by the present authors.

50. *Carex melananthiformis* Litvinov, Trudy Bot. Muz. Imp. Akad. Nauk 7: 90. 1910 [*“melananthaeformis”*].

尤尔都斯藁草 you er du si tai cao

Rhizome short, with stolons. Culms 10–30 cm tall, erect to slightly curved, scabrous above, clothed at base with brownish red bladeless sheaths disintegrating into fibers. Leaves slightly shorter than or subequaling culm, blades linear, 2.5–3 mm wide, apex long acuminate. Spikes 3–6, disposed in an interrupted spicate inflorescence; terminal spike gynaeandrous, obovate to oblong, clavate, 1–2.5 × 0.6–0.8 cm; remaining spikes female, ovate to oblong, 0.8–1.5 × 0.6–0.8 cm; lowest peduncle ca. 0.8 cm. Female glumes dark ferruginous, lighter on midrib, ovate, margins white hyaline, apex obtuse or acute. Utricles yellowish, ferruginous above, shorter than glume, obovate, 2.5–3 mm, minutely granulose, faintly 3- or 4-veined on both surfaces, base cuneate, apex abruptly contracted into a very short, smooth, emarginate beak. Fl. and fr. Jun–Aug.

Meadows, riversides, sands, swampy grasslands, lakesides; 100–2100 m. Xinjiang [N Mongolia, Russia (E and W Siberia); C Asia].

No specimens have been seen by the present authors.

51. *Carex melanocephala* Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 28(1): 334. 1855.

黑鳞藁草 hei lin tai cao

Rhizome short. Culms 10–20 cm tall, trigonous, firm, erect, scabrous above, clothed at base with pale brown bladeless sheaths. Leaves shorter than culm, ca. 1/2 length of culm, blades 2–4 mm wide, flat, apex acuminate. Lowest involucre bract setaceous, sheathless. Spikes 3 or 4, disposed in a capitate inflorescence; terminal spike gynaeandrous, oblong, 8–10 mm; lateral spikes female, globose or ovate to oblong, 5–10 cm. Female glumes blackish brown, ovate, 1-veined, margins narrowly white hyaline, apex subacute. Utricles ferruginous-brown, longer than glume, oblong-obovate or oblong-elliptic, trigonous, ca. 3 mm, membranous, nerveless, base cuneate, apex gradually tapering into a beak, orifice 2-toothed and white hyaline. Nutlets loosely enveloped, subovate, trigonous, ca. 1.5 mm; stigmas 3. Fl. and fr. Jul–Aug.

Wet places; 1800–2400 m. Xinjiang [N Mongolia, Russia (Far East, Siberia); C Asia].

52. *Carex kansuensis* Nelves, Bull. Misc. Inform. Kew 1939: 201. 1939.

甘肃藁草 gan su tai cao

Rhizome short. Culms 45–100 cm tall, acutely trigonous, firm, clothed at base with purple bladeless sheaths. Leaves shorter than culm, blades broadly linear, 5–7 mm wide, flat, margins scabrous. Involucral bracts sheathless, lowest bracts shortly bladed, shorter than inflorescence, scabrous on margins,

upper ones setaceous. Spikes 4–6, approximate; terminal spike gynaeandrous; lateral spikes female with a few male flowers at base, densely many flowered, oblong-cylindric, 1.5–3.5 cm; lowest peduncle (ca. 2 mm) slender, pendulous. Female glumes dark purple, elliptic-lanceolate, 4–4.5 mm, margins narrowly white hyaline, apex acuminate. Utricles stramineous, subequaling glume, compressed, sometimes upper yellow-brown or purple punctate, nerveless, apex abruptly contracted into a short beak, orifice 2-toothed. Nutlets loosely enveloped, oblong or obovate-oblong, trigonous, ca. 2 mm; stigmas 3. Fl. and fr. Jul–Sep.

• Alpine meadows in thickets, lakesides, wet grasslands; 3400–4600 m. Gansu, Qinghai, Shaanxi, W Sichuan, E Xizang, NW Yunnan.

53. *Carex bijiangensis* S. Yun Liang & S. R. Zhang, *Novon* 16: 364. 2006.

碧江薹草 *bi jiang tai cao*

Rhizome short. Culms tufted, 50–60 cm tall, 2.5–3.5 mm wide, trigonous, clothed at base with dark purple sheaths sometimes disintegrating into fibers. Leaves shorter than culm, blades linear, 4–7 mm wide, flat. Lowest 1 or 2 involucre bracts leaflike, overtopping inflorescence, sheathless, upper ones setaceous, shorter than inflorescence, sheathless. Spikes 4–6, approximate, lowest 1 or 2 distant; terminal spike gynaeandrous, cylindric, 2–3 × 0.8–0.9 cm; lowest peduncle 8–12 mm, upper spikes with short peduncle or sessile. Female glumes dark brown, ovate-lanceolate, 6–6.5 (awn 1–1.5 mm) × ca. 2 mm, membranous, 1-veined, costa forming a scabrous long awn at apex. Utricles yellowish green to dark purple, shorter than glume, narrowly elliptic, 4–5 mm, membranous, subleathery, nerveless, apex gradually narrowed into a short beak, orifice truncate or emarginate. Nutlets enveloped, narrowly obovate, trigonous, ca. 2.5 mm; stigmas 3. Fl. and fr. Jul–Sep.

• Alpine meadows; ca. 4000 m. SE Xizang (Zayü), NW Yunnan (Bijiang, Dêqên, Zhongdian).

54. *Carex obliquitruncata* Y. C. Tang & S. Yun Liang, *Novon* 16: 364. 2006.

斜口薹草 *xie kou tai cao*

Rhizome short. Culms tufted, 25–50 cm tall, 1–2.5 mm wide, trigonous, scabrous above, clothed at base with purple or dark purple bladeless sheaths disintegrating into fibers. Leaves shorter than culm, blades 2–3.5 mm wide, flat, apex acuminate. Lowest involucre bract leafy, overtopping inflorescence, sheathless, remaining bracts setaceous. Spikes 3 or 4, contiguous or lowest distant; terminal spike gynaeandrous, 1.5–2.5 × ca. 0.8 cm; lateral spikes female, or occasionally with a few male flowers at base, purplish brown, oblong or cylindric, 1.5–2.5 × ca. 0.8 cm; lowest peduncle 2–5 mm, upper spikes sessile. Female glumes dark purple-brown, long lanceolate, 3.5–4 mm, 1-veined. Utricles dark purple-brown, longer than glume, narrowly oblong or long elliptic, 3.2–4.5 mm, membranous, without conspicuous veins except for 2 costas on edges, base contracted into a short stipe, apex gradually narrowed into a beak, orifice obliquely truncate. Nutlets castaneous, enveloped, ovate, trigonous, rather small, ca. 1.5 mm, sessile; stigmas 3. Fl. and fr. Sep.

• Grassy slopes; 3000–4000 m. NW Yunnan (Bijiang, Gongshan).

55. *Carex angarae* Steudel, *Syn. Pl. Glumac.* 2: 190. 1855.

圆穗薹草 *yuan sui tai cao*

Rhizome shortly creeping. Culms 30–60 cm tall, trigonous, slender, ± scabrous above, rarely smooth, clothed at base with purple bladeless sheaths. Leaves shorter than culm, blades 2–3 mm wide, flat, slightly revolute, apex acuminate. Involucre bracts leaflike, longer than inflorescence, sheathless. Spikes 3–5, upper 3 approximate; terminal spike gynaeandrous, oblong, 6–8 mm; lateral spikes female, ovate or oblong-ovate, 4–5 mm; lowest spike with peduncle, upper sessile. Female glumes ferruginous-brown, oblong-ovate, ca. 2 mm, 3-veined, margins narrowly white hyaline, apex acute. Utricles yellowish green, becoming yellowish brown, longer than glume, oblong-obovate or oblong-elliptic, ± inflated trigonous, 2.2–3 mm, thinly membranous, slender veined, base stipitate, apex abruptly contracted into a slightly curving beak, orifice emarginate, 2-toothed. Nutlets loosely enveloped, elliptic-obovate or elliptic, trigonous, ca. 2 mm, apex with a short beak; style slightly curving, base not thickened; stigmas 3. Fl. and fr. Jun–Aug.

Wet places in forests, grasslands at forest margins; 600–700 m. Heilongjiang, Jilin, Nei Mongol [N Mongolia, Russia (Far East, Siberia)].

56. *Carex duthiei* C. B. Clarke in J. D. Hooker, *Fl. Brit. India* 6: 731. 1894.

雷波薹草 *lei bo tai cao*

Carex alpina Swartz var. *gracilentata* (Boott ex Strachey) C. B. Clarke; *C. gracilentata* Boott ex Strachey; *C. infuscata* Nees var. *gracilentata* (Boott ex Strachey) P. C. Li.

Culms 15–25 cm tall, loosely tufted, scabrous below inflorescence. Leaves equaling to shortly overtopping culm, blades 3–5 mm wide, gradually tapering to acute apex; basal sheaths brownish and red-purple tinged, scarcely disintegrating into fibers. Spikes 3 or 4, approximate, oblong-elliptic, 10–15 × 4–5 mm; terminal spike gynaeandrous with short basal male part no more than 3 mm; lateral spikes female or with several male flowers at base. Female glumes dark purple-brown, ovate to ovate-oblong, ca. 2 × 1–1.5 mm, midrib stramineous, nearly as long as utricles, apex acute. Utricles oblong-obovate to obovate, rather conspicuously veined, base attenuate, apex contracted into a purple-tinged beak ca. 0.5 mm, orifice subtruncate. Nutlets rather tightly enveloped, obovate, trigonous, ca. 1.25 mm; stigmas 3. Fl. and fr. Jun.

Subalpine meadows or forest margins; 2700–3600 m. SW and W Sichuan, NW Yunnan [Bhutan, India].

57. *Carex hancockiana* Maximowicz, *Bull. Soc. Imp. Naturalistes Moscou* 54(1): 66. 1879.

点叶薹草 *dian ye tai cao*

Rhizome shortly creeping, woody. Culms tufted, 30–80 cm tall, slender, trigonous, slightly scabrous, clothed at base with purple bladeless sheaths disintegrating into reticulate fibers. Leaves shorter or longer than culm, blades linear, 2–5 mm wide,

flat, densely minutely papillose abaxially, margins scabrous. Involucral bracts leaflike, longer than inflorescence, sheathless. Spikes 3–5; terminal spike gynaeandrous, cylindric, 1–2 cm, densely many flowered, with slender, often pendulous peduncle; lateral spikes female, oblong, 1–1.5 cm, with slender peduncles 1.5–3 cm. Female glumes purple-brown, pale green at middle, ovate-lanceolate, ca. 2 mm, 3-veined, margins broadly white hyaline, apex acuminate. Utricles yellowish green, longer than glume, elliptic or oblanceolate, inflated, horizontally patent at maturity, 2.5–3 mm, finely 5- or 6-veined, base gradually attenuate, apex abruptly contracted into a short beak, orifice 2-toothed. Nutlets obovate, trigonous, ca. 1.5 mm; stigmas 3. Fl. and fr. Jun–Jul.

Forest grasslands, wet places, alpine meadows; 400–2700 m. Gansu, Hebei, Jilin, Nei Mongol, Qinghai, Shaanxi, Shanxi, Xinjiang [Korea, Mongolia, Russia (Siberia)].

58. *Carex atrata* Linnaeus, Sp. Pl. 2: 976. 1753.

黑穗薹草 *hei sui tai cao*

Rhizome usually short. Culms densely tufted, 15–65 cm tall, trigonous, scabrous above, slightly inclined at apex, clothed at base with purple-red bladeless sheaths disintegrating into slightly reticulate fibers. Leaves shorter than culm, blades linear, 3–5 mm wide. Lower 1 or 2 involucral bracts leaflike, sheathless, upper ones setaceous or glumelike. Spikes 3–5, contiguous; terminal spike gynaeandrous, obovate or oblong; lateral spikes female, oblong, 10–15 × 5–6 mm, lower 2 with long peduncles, pendulous. Female glumes brown, dark brown, or purple-brown, ovate to narrowly ovate, 1-veined pale brownish costa forming a mucro at apex, apex acute to acuminate. Utricles brownish especially on upper part, nearly equaling or slightly shorter or longer than glume, elliptic or ovate, planoconvex, 3–3.5 mm, minutely papillose, without conspicuous veins except for 2 costas on edges, apex abruptly contracted into a conic short beak, orifice shallowly 2-toothed. Nutlets loosely enveloped, obovate, trigonous, 1.5–1.7 mm; style base not thickened; stigmas 3.

Alpine frozen soil, thickets, alpine meadows. Jilin, Qinghai, Sichuan, Taiwan, Xinjiang, SE Xizang, NW Yunnan [Bhutan, India, Japan, Korea, Mongolia, Nepal, Russia; C Asia, Europe].

- 1a. Rhizome long, creeping 58d. subsp. *longistolonifera*
 1b. Rhizome short.
 2a. Utricles 4–4.5 mm 58c. subsp. *aterrima*
 2b. Utricles 3–3.8(–4) mm.
 3a. Female glumes ovate, apex acute; utricles sessile, apex abruptly contracted into a conic short beak 58a. subsp. *atrata*
 3b. Female glumes lanceolate, apex long acuminate; utricles shortly stipitate, apex abruptly contracted into a very short beak or beakless, orifice emarginate 58b. subsp. *pullata*

58a. *Carex atrata* subsp. *atrata*

黑穗薹草(原亚种) *hei sui tai cao (yuan ya zhong)*

Carex apodostachya Ohwi; *C. atrata* subsp. *apodostachya* (Ohwi) T. Koyama; *C. atrata* var. *japonalpina* T. Koyama; *C. japonalpina* (T. Koyama) T. Koyama; *C. paishanensis* Nakai.

Female glumes ovate, apex acute. Utricles sessile, apex abruptly contracted into a conic short beak.

Alpine frozen soil, thickets. Jilin, Taiwan [Bhutan, India, Japan, Korea, Russia; Europe].

58b. *Carex atrata* subsp. *pullata* (Boott) Kükenthal in Engler, Pflanzenr. 38(IV. 20): 400. 1909.

尖鳞薹草 *jian lin tai cao*

Carex atrata var. *pullata* Boott, Ill. Gen. Carex 3: 114. 1862; *C. atrata* var. *sinensis* Kükenthal.

Female glumes lanceolate, apex long acuminate. Utricles shortly stipitate, apex abruptly contracted into a very short beak or beakless, orifice emarginate.

Alpine meadows; 3000–4800 m. W Sichuan, Taiwan, SE Xizang, NW Yunnan [India (Sikkim), Nepal].

58c. *Carex atrata* subsp. *aterrima* (Hoppe) S. Yun Liang, Fl. Reipubl. Popularis Sin. 12: 114. 2000.

大桥薹草 *da qiao tai cao*

Carex aterrima Hoppe, Denkschr. Königl.-Baier. Bot. Ges. Regensburg 1: 3. 1815.

Utricles 4–4.5 mm.

Xinjiang [Mongolia, Russia (Siberia); C Asia].

58d. *Carex atrata* subsp. *longistolonifera* (Kükenthal) S. Yun Liang, Fl. Reipubl. Popularis Sin. 12: 114. 2000.

长匍匐茎薹草 *chang pu fu jing tai cao*

Carex atrata var. *longistolonifera* Kükenthal in Engler, Pflanzenr. 38(IV. 20): 400. 1909.

Rhizome long, creeping.

• Sichuan.

59. *Carex peiktusani* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 18: 445. 1901.

白头山薹草 *bai tou shan tai cao*

Carex hancockiana Maximowicz var. *peiktusani* (Komarov) Kükenthal.

Rhizome short. Culms 30–60 cm tall, trigonous, clothed at base with purple sheaths slightly disintegrating into fibers. Leaves longer than culm, blades gray-green, linear, 2–4.5 mm wide, flat, margins scabrous, apex acuminate. Involucral bracts leaflike, longer than inflorescence, sheathless. Spikes 3 or 4; terminal spikes gynaeandrous, 2–2.5 cm, cylindric, with peduncle 0.7–1 cm; lateral spikes female, 1.8–2.5 mm, oblong or long cylindric, lowest spike 2–3 cm, slightly pendulous. Female glumes pale ferruginous or greenish whitish, lanceolate or ovate-lanceolate, 3–4 mm, 3-veined. Utricles yellowish green, obliquely patent, equaling or slightly longer than glume, elliptic, trigonous, 3.5–4 mm, 5- or 6-veined, apex gradually nar-

rowed into a short beak, orifice 2-toothed. Nutlets obovate or obovate-elliptic, trigonous, ca. 2 mm, base shortly stipitate; stigmas 3. Fl. and fr. Jun–Aug.

Forests, riversides; 1000–1700 m. Hebei, Heilongjiang, Liaoning, Shandong, Shanxi [Korea, Russia (Far East)].

60. *Carex schneideri* Nelves, Bull. Misc. Inform. Kew 1939: 201. 1939.

川滇薹草 *chuan dian tai cao*

Rhizome short. Culms tufted, 60–90 cm tall, acutely trigonous, scabrous above, clothed at base with purple-brown sheaths often disintegrating into fibers. Leaves shorter than culm, blades linear, 2–4 mm wide, flat, margins scabrous, apex acuminate. Involucral bracts leaflike, lowest one longer than inflorescence. Spikes 4 or 5, approximate; terminal spike gynaeandrous, oblong-cylindric, 1.5–2 cm; lateral spikes female, oblong-cylindric, 2–2.5 cm; peduncle slender, lowest one 2–4 cm, rarely up to 15 cm, becoming shorter upward. Female glumes dark purple, lanceolate, 3.5–4.5 mm, 1-veined, apex acuminate. Utricles yellowish green, shorter or longer than glume, elliptic-lanceolate, trigonous, slightly inflated, 3.5–4 mm, veined, apex gradually narrowed to a short beak, orifice purple, emarginate. Nutlets loosely enveloped, oblong, trigonous, ca. 2 mm; stigmas 3. Fl. and fr. Jul–Aug.

• Thickets, grasslands, rocky slopes; 2900–4100 m. Sichuan, Xizang, Yunnan.

61. *Carex lehmannii* Drejer, Symb. Caric. 13. 1844.

膨囊薹草 *peng nang tai cao*

Rhizome stoloniferous. Culms 15–70 cm tall, slender, trigonous, clothed at base with purple-brown sheaths. Leaves nearly equaling culm, blades linear, 2–5 mm wide, flat, soft. Involucral bracts leaflike, longer than inflorescence. Spikes 3–5; terminal spike gynaeandrous, oblong, 5–8 mm; lateral spikes female, ovate or oblong, 5–9 mm; upper spikes with short peduncles or sessile, lowest with peduncle 1–4 cm. Female glumes dark purple or dark brown, broadly ovate, ca. 1.2 mm, 1-veined, apex obtuse or subacute. Utricles yellowish green, longer than glume, obovate or obovate-elliptic, trigonous, 2–2.2 mm, inflated, veined, apex abruptly contracted into a short beak, orifice emarginate or truncate. Nutlets obovate, trigonous, 1.2–1.7 mm; style short; stigmas 3. Fl. and fr. Jul–Aug.

Mountain slopes, grasslands, forests, riversides; 2800–4100 m. Gansu, Henan, Hubei, Qinghai, Shaanxi, Shanxi, W Sichuan, SE Xizang, NW Yunnan [Bhutan, India, Japan, Korea, Nepal].

62. *Carex montis-wutaii* T. Koyama, Jap. J. Bot. 15: 172. 1956.

五台山薹草 *wu tai shan tai cao*

Rhizome stoloniferous. Culms 55–88 cm tall, erect, trigonous, scabrous above, clothed at base with chestnut-colored or brown, sometimes brown-red, bladeless or shortly bladed sheaths slightly disintegrating into fibers. Leaves longer or shorter than culm, blades linear, 3–5 mm wide, plicate, rather soft, margins scabrous, inrolled. Lower 2 involucral bracts leaflike, longer than inflorescence, remaining bracts setaceous, sheathless. Spikes 3 or 4, approximate; terminal spike gynae-

candrous, oblong-obovate, 10–15 mm, male part shorter than female part; lateral spikes female, oblong, 9–12 × 4–6 mm, densely many flowered, scabrous above, with slender peduncles, pendulous. Female glumes brown-red or brown-purple, oblong or ovate-oblong, 2–2.5 × ca. 0.6 mm, 1-veined, margins white hyaline, apex acuminate. Utricles longer than glume, obovate or elliptic, inflated, (2.5–)3–3.3 × 1.5–1.8 mm, membranous, glabrous, densely finely granular, 3–7-veined, base cuneate, beak 0.3–0.4 mm, smooth, curved, orifice white hyaline, 2-toothed. Nutlets brown, loosely enveloped, obovate, trigonous, 1.5–1.8 × ca. 1 mm, base gradually attenuate, apex rounded or truncate; style slightly elongate; stigmas 3.

• Shanxi (Wutai Shan).

63. *Carex serreana* Handel-Mazzetti, Oesterr. Bot. Z. 85: 225. 1936.

紫喙薹草 *zi hui tai cao*

Carex wenchenii F. T. Wang & Tang.

Rhizome short. Culms tufted, 25–60 cm tall, trigonous, slender, smooth, clothed at base with purple-brown sheaths. Leaves shorter than culm, blades 2–3 mm wide, soft. Involucral bracts setaceous, sheathless. Spikes 2 or 3, approximate; terminal spike gynaeandrous, ovate or oblong, 5–10 mm; peduncles slender, lowest one 5–12 mm. Female glumes dark purple-red, ovate or ovate-lanceolate, 2–2.2 mm, 3-veined, margins narrowly white hyaline, apex acute or obtuse. Utricles yellowish green or pale brown, longer than glume, oblanceolate or narrowly elliptic, trigonous, 3–3.5 × ca. 1 mm, not inflated, veined, apex abruptly contracted into a short beak, orifice dark purple, 2-toothed. Nutlets oblong, trigonous, ca. 2 mm; style long, base not thickened; stigmas 3. Fl. and fr. Jul–Aug.

• Forests, wet places. Gansu, Hebei, Qinghai, Shanxi.

64. *Carex caucasica* Steven, Mém. Soc. Imp. Naturalistes Moscou 4: 68. 1813.

高加索薹草 *gao jia suo tai cao*

Rhizome short. Culms densely or subloosely tufted, 25–70 cm tall, trigonous, scabrous above, clothed at base with dark purple, lustrous bladeless sheaths disintegrating into fibers. Leaves as long as or shorter than culm, blades 3–8 mm wide. Lowest involucral bracts leaflike, slightly longer than inflorescence, remaining bracts setaceous, sheathless. Spikes 4–7; terminal spikes gynaeandrous, obovate or oblong, 15–25 × 5–6 mm; remaining spikes female, ovate or oblong to clavate, 1.5–3 × 0.6–0.8 cm, densely many flowered, with peduncle 4–5 cm, lowest 1 or 2 pendent on elongate peduncle. Female glumes dark purple-brown to purple-black, lanceolate, oblong-ovate, or lanceolate-elliptic, 3.2–3.8 mm, membranous, margins white hyaline, 3-veined yellowish costa forming a mucro at apex, apex acute to cuspidate. Utricles yellowish greenish, upper part ± stained with purple or ferruginous-yellow at length, obovate, obovate-elliptic, or compressed trigonous, 3–4 mm, faintly 3–5-veined at base or 7–9-veined abaxially, apex abruptly contracted into an erect short beak, orifice subtruncate or 2-toothed-emarginate. Nutlets loosely contained, obovate or elliptic, trigonous, 1.9–2.5 mm; stigmas 3. Fl. and fr. Jun–Jul.

Alpine meadows and grasslands. Taiwan, Xinjiang [C Asia, SW Asia (Caucasus), Europe].

No specimens have been seen by the present authors.

- 1a. Leaf blades 4–8 mm wide; utricles 3.5–4 mm, faintly 3–5-veined at base; nutlets obovate, ca. 2.5 mm 64a. subsp. *caucasica*
 1b. Leaf blades 3–5 mm wide; utricles 3–3.5 mm, 5–9-veined abaxially; nutlets elliptic, 1.9–2.1 mm 64b. subsp. *jisaburo-ohwiana*

64a. *Carex caucasica* subsp. *caucasica*

高加索薹草(原亚种) gao jia suo tai cao (yuan ya zhong)

Carex atrata Linnaeus subsp. *caucasica* (Steven) Kükenthal.

Leaf blades 4–8 mm wide. Utricles 3.5–4 mm, faintly 3–5-veined at base. Nutlets obovate, ca. 2.5 mm.

Meadows in valleys. Xinjiang [C Asia, SW Asia (Caucasus), Europe].

64b. *Carex caucasica* subsp. *jisaburo-ohwiana* (T. Koyama) T. Koyama, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot., 8: 197. 1962.

大井扁果薹草 da jing bian guo tai cao

Carex jisaburo-ohwiana T. Koyama, Jap. J. Bot. 15: 176. 1956.

Leaf blades 3–5 mm wide. Utricles 3–3.5 mm, 5–9-veined abaxially. Nutlets elliptic, 1.9–2.1 mm.

• Alpine grasslands. Taiwan.

12. *Carex* sect. *Glauciformes* Ohwi, Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 11: 413. 1936 [“*glauciformes*”].

米柱薹草组 mi zhu tai cao zu

Dai Lunkai (戴伦凯); Tetsuo Koyama

Rhizome stoloniferous. Involucral bracts not sheathed. Spikes few, remote; terminal spike male; lateral spikes female, densely many flowered, sessile or shortly pedunculate. Female glumes purple-brown, ovate. Utricles yellow-brown, obliquely patent, ovate or broadly ovate, inflated trigonous, subleathery, papillose, distinctly veined, apex abruptly narrowed into a very short beak, orifice emarginate. Style base thickened; stigmas 3.

One species: NE China, Korea, E Russia.

65. *Carex glauciformis* Meinshausen, Trudy Imp. S.-Peterburgsk. Bot. Sada 18: 389. 1901 [“*glauciformis*”].

米柱薹草 mi zhu tai cao

Rhizome stoloniferous, stolons slender. Culms loosely tufted, 30–70 cm tall, acutely triquetrous, smooth on lower part, scabrous on angles of upper part, purple-brown and bladeless sheathed at base, sheaths disintegrating into reticulate fibers. Leaves slightly shorter than culm, blades 2–3 mm wide, flat or conduplicate at lower part, slightly revolute when dry, slightly stiff, red-brown and rather long sheathed. Involucral bracts leaflike, linear, slightly shorter than inflorescence, not sheathed. Spikes 3 or 4, rather remote; uppermost 1 or 2 spikes male, narrowly oblong or lanceolate, (1–)2–3 cm, subsessile; female spikes 2 or 3, oblong or ovoid, 0.8–2 cm, densely many flow-

ered, lowermost one very shortly pedunculate, others sessile. Female glumes dark red-brown laterally, brownish at middle, ovate or oblong-ovate, ca. 3 mm, membranous, 1-veined, apex acute or acuminate, sometimes mucronate. Utricles greenish brown, obliquely patent, equaling or slightly longer than glume, elliptic or subovate, slightly inflated trigonous, 2.5–3 mm, subleathery, glabrous, papillose, distinctly several veined, base abruptly contracted into a short stipe, apex abruptly narrowed into a short beak, orifice emarginate, slightly purple-brown. Nutlets stramineous, subloosely enveloped, broadly obovate, trigonous, ca. 2 mm, base broadly truncate, apex mucronate; style base thickened; stigmas 3. Fl. and fr. May–Jun.

Wet places on mountain slopes, riversides, gully sides. Heilongjiang, Jilin, Liaoning, Nei Mongol [Korea, Russia (Far East, E Siberia)].

13. *Carex* sect. *Acrocystis* Dumortier, Fl. Belg. 147. 1827.

玉簪薹草组 yu zan tai cao zu

Dai Lunkai (戴伦凯); Tetsuo Koyama

Culms usually rather short. Leaf blades narrow, lower leaf sheaths red-brown. Involucral bracts shorter than inflorescence, blades scalelike or lowermost one linear or setaceous. Spikes 3–5, rather contiguous; terminal spike male; lateral spikes female, sessile or subsessile. Female glumes red-brown. Utricles obliquely patent, obovate or ovate, inflated trigonous, membranous, usually hirtellous, apex shortly beaked, orifice emarginate or slightly 2-toothed. Nutlets tightly enveloped, trigonous; style base not thickened; stigmas 3.

About 35 species: circumboreal in Asia, Europe, and North America; five species in China.

- 1a. Utricles distinctly veined.
 2a. Leaf blades glabrous; female glumes ovate, ca. 2 mm, costa not projecting beyond apex forming a mucro; utricles obovate, 2.5–3 mm 66. *C. globularis*
 2b. Leaf blades hispid; female glumes oblong, ca. 4 mm, costa usually projecting beyond apex forming a mucro; utricles oblong-obovate, 4–4.5 mm 67. *C. ulobasis*

1b. Utricles obscurely veined or nerveless.

3a. Involucral bracts scalelike; female glumes mucronate at apex 70. *C. vanheurckii*

3b. Lower involucral bract blades leaflike, sometimes rather narrow, upper ones scalelike; female glumes not mucronate at apex.

4a. Female glumes broadly ovate, 2.2–2.5 mm; utricles obovate, 2.5–2.8 mm, yellowish green 68. *C. chinganensis*

4b. Female glumes ovate, ca. 3 mm; utricles oblong-obovate, 3–3.5 mm, yellowish brown 69. *C. amgunensis*

66. *Carex globularis* Linnaeus, Sp. Pl. 2: 976. 1753.

玉簪臺草 yu zan tai cao

Rhizome obliquely ascending, stoloniferous; stolons slender, clothed with red-brown leaf sheaths. Culms loosely tufted, 20–60 cm tall, slender, triquetrous, slightly scabrous on upper part, red-brown and bladeless sheathed at base; sheaths at membranous part usually disintegrating into reticulate fibers. Leaves equaling or slightly shorter than culm, blades 1–2 mm wide, rather soft, glabrous, margins revolute, upper margin scabrous; sheaths rather long, hispidulous adaxially. Lower involucral bracts leaflike, linear, shorter than inflorescence, nearly not sheathed, upper involucral bracts scalelike, not sheathed. Spikes 3 or 4, male spike and uppermost female spike approximate, remaining spikes remote; terminal spike male, linear, 1–2 cm, sessile; lateral spikes female, oblong, ovate, or subglobose, 0.5–1.2 cm, few flowered; lowermost spike very shortly pedunculate, upper ones sessile. Female glumes yellow-brown at middle, ovate, ca. 2 mm, membranous, 3-veined, sometimes 2 lateral veins indistinct, margins yellowish white, apex obtuse, mucous. Utricles green-brown, obliquely patent, longer than glume, broadly obovate or broadly elliptic, trigonous, 2.5–3 mm, membranous, densely hispidulous, many veined, base broadly cuneate, apex abruptly contracted into a short beak, orifice emarginate. Nutlets dark brown, tightly enveloped, obovate or broadly obovate, trigonous, 1.8–2 mm, apex mucronate; style base not thickened; stigmas 3. Fl. and fr. Jun–Aug.

Grasslands on mountain slopes, wet places in forests, swamps. Heilongjiang, Jilin, Nei Mongol [Japan, Korea, Russia; Europe].

The stems and leaves of this species are good pasture for sheep, cows, and horses.

67. *Carex ulobasis* V. I. Kreczetowicz in Komarov, Fl. URSS 3: 608. 1935.

卷叶臺草 juan ye tai cao

Carex montana Linnaeus var. *manshuriensis* Komarov.

Rhizome short, ligneous. Culms densely tufted, 15–25 cm tall, slightly compressed triquetrous, smooth on lower part, slightly scabrous on upper part, red-brown and bladeless sheathed at base, sheaths eventually disintegrating into fibers. Leaves equaling or shorter than culm, blades 1–2.5 mm wide, ± stiff, flat, loosely pubescent on adaxial surface, scabrous on margins, long and red-brown sheathed; sheaths usually split at membranous side, eventually blade at base usually volute. Involucral bracts scalelike, ovate, hyaline on margins, basal part closing around stem, aristate at base. Spikes 2 or 3, rather congested at top of culm; terminal spike male, lanceolate or clavate, 0.8–1.5 cm, sessile; lateral spikes female, ovate, 0.8–1.2 cm, densely 10- or more flowered, sessile. Female glumes ferruginous, oblong, ca. 4 mm, membranous, 1-veined,

costa pale brown, apex emarginate, mucronate or shortly awned. Utricles yellowish green, ferruginous on upper part and beak, obliquely patent, equaling or slightly shorter than glume, oblong-obovate, compressed trigonous, 4–4.5 mm, loosely white villous, distinctly many veined, base gradually narrowed to a short stipe, apex gradually narrowed to a short beak, orifice obliquely truncate or emarginate. Nutlets brown, rather tightly enveloped, ovate or oblong-ovate, trigonous, ca. 2.5 mm, base shortly stipitate; style base not thickened; stigmas 3. Fl. and fr. May–Jul.

Lax forests and among shrubs on sunny mountain slopes, meadows. Heilongjiang, Nei Mongol [Korea, Russia (Far East, E Siberia)].

68. *Carex chinganensis* Litvinov, Sched. Herb. Fl. Ross. 6: 135. 1908.

兴安臺草 xing an tai cao

Rhizome slender, creeping or obliquely ascending, clothed with red-brown and bladeless sheaths. Culms tufted, 20–40 cm tall, slender, compressed triquetrous, smooth on lower part, scabrous on angles of upper part, red-brown sheathed at base. Leaves shorter than culm, blades 1–1.5 mm wide, flat, scabrous on upper surface and margins, sheathed; sheaths usually split at one side. Lowermost involucral bract leaflike, linear, upper ones scalelike, aristate, not sheathed. Spikes 2 or 3, congregated at top of culm, lowermost one slightly remote; terminal spike male, clavate or linear, 0.8–1.2 cm, sessile; lateral spikes female, globose or broadly ovate, ca. 5 mm, few flowered, sessile. Female glumes brownish, broadly ovate, 2.2–2.5 mm, 1-veined, margins hyaline, apex acuminate. Utricles yellowish green, slightly pale brown at base and near apex, obliquely patent, slightly longer than or equaling glume, obovate, obtusely trigonous, 2.5–2.8 mm, herbaceous, densely hispidulous, not veined or indistinctly few veined at base, base cuneate, margins hyaline, apex abruptly contracted into a rather short beak, orifice obliquely truncate or emarginate. Nutlets yellowish, tightly enveloped, subelliptic or elliptic-obovate, obtusely trigonous, ca. 2 mm, apex mucronate; style base not thickened; stigmas 3. Fl. and fr. Jun–Jul.

Forests on mountain slopes. Heilongjiang, Jilin, Nei Mongol [Russia (Far East)].

69. *Carex amgunensis* F. Schmidt, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 12(2) [Reis. Amur-Land., Bot.]: 69. 1868.

球穗臺草 qiu sui tai cao

Carex amgunensis var. *chloroleuca* (Meinshausen) Kükenthal; *C. chloroleuca* Meinshausen.

Rhizome slender, creeping or obliquely ascending, with slender stolons. Culms densely tufted, 15–35 cm tall, slender, triquetrous, smooth, scabrous on angles of upper part, with few brown and bladeless sheaths at base, sheaths eventually disintegrating into fibers. Leaves shorter than or nearly equaling

culm, blades 1–2 mm wide, flat, slightly soft, scabrous on upper surface and margins, slightly long sheathed, eventually split at membranous side. Lowermost involucre bract green, leaflike, rather thin, longer than spike, upper ones scalelike, brownish, not sheathed. Spikes 2 or 3, rarely 4, congregated at top of culm; terminal spike male, lanceolate, 5–10 mm, sessile; lateral spikes female, subglobose or broadly ovoid, 5–6 mm, 6–10-flowered, sessile. Female glumes yellowish brown, ovate, ca. 3 mm, 1-veined, margins hyaline, apex acute. Utricles yellow-brownish, obliquely patent, slightly longer than glume, oblong-obovate, plano-convex-trigonal, 3–3.5 mm, herbaceous, densely hispidulous on upper part, indistinctly veined, base cuneate, margins hyaline, apex abruptly contracted into a short beak, orifice obliquely truncate or emarginate. Nutlets stramineous, tightly enveloped, elliptic, trigonal, ca. 2.5 mm, base shortly stipitate; style base not thickened; stigmas 3. Fl. and fr. May–Jun.

Shady places on mountain slopes, swamps; ca. 2000 m. Hebei, Heilongjiang [Mongolia, Russia; E Europe (Ukraine)].

70. *Carex vanheurckii* Müller *Argovensis* in Van Heurck, *Observ. Bot.* 1: 30. 1870.

鳞苞薹草 *lin bao tai cao*

Rhizome slender, clothed with dark brown, bladeless sheaths, stoloniferous. Culms tufted, 10–30 cm tall, slender, obtusely trigonal, scabrid on upper part, brown sheathed at base, sheaths disintegrating into fibers. Leaves slightly shorter than culm, blades 1–2 mm wide, flat, scabrous on upper surface and margins, sometimes slightly revolute on margins when dry, long sheathed. Involucre bracts scalelike, rarely lowermost one subulate, green, long aristate. Spikes 2 or 3, congregated at top of culm, sometimes lowermost one slightly remote; terminal spike male, linear or fusiform, 0.7–1.5 cm, nearly sessile; lateral spikes female, globose or ovate, 4–7 mm, few flowered, sessile. Female glumes brown laterally, ovate, ca. 2.5 mm, with a pale midrib, hyaline on upper margin, apex acuminate, mucronate. Utricle yellowish green, slightly brown on upper part, obliquely patent, nearly equaling glume, elliptic or obovate, plano-convex-trigonal, 2.5–3 mm, laxly hispidulous, not veined, base cuneate, apex abruptly contracted into a short beak, hispidulous on margins of beak, orifice emarginate. Nutlets tightly enveloped in utricule, broadly obovate, trigonal, ca. 1.7 mm; style base not thickened; stigmas 3. Fl. and fr. May–Jun.

Forests or grasslands on mountain slopes; ca. 1200 m. Heilongjiang, Jilin, Liaoning, Nei Mongol [Japan, N Korea, Mongolia, Russia (Far East, E Siberia)].

14. *Carex* sect. *Lamprochlaenae* Drejer, *Symb. Caric.* 10. 1844.

黄囊薹草组 *huang nang tai cao zu*

Dai Lunkai (戴伦凯); Tetsuo Koyama

Rhizome creeping. Culms tufted, slightly slender, clothed with red-brown, bladeless sheaths. Leaves usually rather narrow. Involucre bracts scalelike or lowermost one leaflike, linear, rarely setiform, nearly not sheathed or very shortly sheathed. Spikes 2–5; terminal spike male, rare species with 2 male spikes, linear-lanceolate, lanceolate, or clavate; lateral spikes female, ovate, broadly ovate, or subglobose, subdensely flowered, sessile or rarely shortly pedunculate. Female glumes red-brown or yellow-brown, margins broadly hyaline. Utricles obliquely patent or eventually divaricate, obovate or elliptic-obovate, obtusely or inflated trigonal, glabrous, rarely hispid, shiny, shortly beaked, orifice obliquely truncate, emarginate, or shortly 2-toothed. Nutlets tightly enveloped; style base slightly thickened; stigmas 3.

Twelve species: circumboreal in Asia, Europe, and North America, also in N Africa; seven species (five endemic) in China.

1a. Culms 2–8 cm tall; utricles 2–3 mm.

2a. Spikes 2 or 3, female spikes congregated at top of culm; involucre bracts scalelike, aristate at apex, not sheathed; utricles shorter than glume, 2–2.2 mm 71. *C. pseudosupina*

2b. Spikes 3 or 4, female spikes congregated at base of culm, lower than leaves; involucre bracts setaceous, shortly sheathed; utricles equaling or longer than glume, 2.5–3 mm 72. *C. tangulashanensis*

1b. Culms 10–35 cm tall (*C. aridula* only 5–20 cm tall); utricles 3–4 mm.

3a. Lowermost involucre bract leaflike, upper involucre bracts scalelike or setiform, shortly sheathed; female spikes (0.5–)0.8–1.5 cm, shortly pedunculate or lowermost female spike rather long sheathed.

4a. Spikes 3–5, lowermost spike slightly remote, upper spikes congregated at top of culm, terminal spikes 1 or 2 male, female spikes 2–4, 1–1.5 cm, densely flowered, shortly pedunculate; utricles smooth, glabrous 76. *C. turkestanica*

4b. Spikes 2 or 3, congregated at top of culm, terminal spike male, female spikes 1 or 2, (0.5–)0.8–1.2 cm, rather loosely flowered, lowermost spike long pedunculate, others shortly pedunculate; utricles hispid 77. *C. asperifructus*

3b. Involucre bracts scalelike, lowermost one long awned, not sheathed; female spikes 0.5–0.8(–1) cm, sessile.

5a. Female spikes congregated at top of culm; utricles dark brown at maturity 73. *C. ivanoviae*

5b. Lowermost female spikes rather remote; utricles yellow or yellowish green at maturity.

6a. Utricles elliptic or obovate, inflated trigonal, 3–4 mm, yellow 74. *C. korshinskii*

6b. Utricles globose-obovate, obtusely trigonal, ca. 3 mm, yellowish green 75. *C. aridula*

71. *Carex pseudosupina* Y. C. Tang ex L. K. Dai, Acta Phytotax. Sin. 37: 177. 1999.

高山藁草 gao shan tai cao

Rhizome with slender stolons, clothed with brown bladeless leaf sheaths. Culms tufted, 5–8 cm tall, triquetrous, smooth on lower part and scabrous on angles of top, clothed with few yellow-brown or red-brown, bladeless sheaths at base, sheaths partly splitting into fibers. Leaves slightly longer than or shorter than culm, blades 0.5–1 mm wide, rather thin, flat or slightly revolute on margins, sheathed; sheaths membranous at one side, usually split. Involucral bracts yellowish brown, scalelike, lanceolate, awned at apex, not sheathed. Spikes 2 or 3, congregate at top of culm; terminal spike male, lanceolate, 7–8 mm, sessile; lateral spikes female, broadly ovate or subglobose, 5–6 mm, densely several flowered, sessile. Female glumes dark red-brown, elliptic or elliptic-ovate, ca. 3 mm, 1-costate, upper margins hyaline, apex acute or obtuse. Utricles greenish yellow, sometimes slightly brown, suberect or slightly obliquely patent, shorter than glume, broadly obovate or obovate, obtusely trigonous, 2–2.2 mm, leathery, shiny, glabrous, not veined, base cuneate, margins membranous, apex abruptly contracted into a very short beak, orifice truncate. Nutlets dark brown, tightly enveloped, broadly obovate, trigonous, ca. 1.5 mm; style persistent, base thickened; stigmas 3. Fl. and fr. Jul–Aug.

• Mountain slopes; ca. 3700 m. Sichuan (Kangding).

72. *Carex tangulashanensis* Y. C. Yang, Acta Phytotax. Sin. 18: 362. 1980.

唐古拉藁草 tang gu la tai cao

Rhizome slender. Culms loosely tufted, 2–4 cm tall, compressed triquetrous, smooth, few dark brown and bladeless sheathed at base. Leaves slightly shorter than culm, blades 2–3 mm wide, flat, ± stiff, scabrid on veins and upper margins. Involucral bracts setaceous or mucro-shaped, membranous sheathed, usually clothed by leaf sheath. Spikes 3 or 4; terminal spike male, lanceolate or lanceolate-ovate, 6–12 mm, densely 10- or more flowered; lateral spikes female, congregate at base of culm, hidden in leaf tuft, ovate or ovoid, 4–7 mm, densely 5–10-flowered, with short peduncle. Female glumes yellow-brown laterally, yellow-green at middle, ovate, 2.5–3 mm, membranous, 1-costate, margins hyaline, apex acute, mucronate. Utricles yellow-brown, slightly obliquely patent, equaling or slightly longer than glume, elliptic, obtusely trigonous, 2.5–3 mm, thinly leathery, base broadly cuneate, margins hyaline, apex abruptly contracted into a short beak, orifice emarginate. Nutlets yellowish, elliptic, obtusely trigonous, ca. 1.5 mm; style slightly thick and short; stigmas 3. Fl. and fr. Jun–Aug.

• Wet places; 4000–4800 m. Qinghai (Yushu), Xizang.

73. *Carex ivanoviae* T. V. Egorova, Novosti Sist. Vyssh. Rast. 1966 [3]: 34. 1966.

无穗柄藁草 wu sui bing tai cao

Rhizome rather long, creeping or obliquely ascending. Culms densely tufted, 10–15 cm tall, nearly half-terete, smooth, several brown and old leaves and sheaths usually disintegrating into fibers. Leaves shorter than culm, not up to 1 mm wide, usu-

ally involute into needle-shape, smooth, brown and membranous sheathed. Involucral bracts scale-shaped, lanceolate, long aristate at apex, longer than or slightly shorter than spike, not sheathed. Spikes 2–4, congregate at top of culm; terminal spike male, narrowly lanceolate, 8–15 mm, sessile; lateral spikes female, ovate, 5–8(–10) mm, densely several flowered, subsessile. Female glumes dark brown, ovate, 3.5–4 mm, membranous, with 1-veined yellowish costa, hyaline on upper margin, apex acute, mucronate. Utricles dark brown, suberect or slightly obliquely patent, shorter than or equaling glume, ovate, obtusely trigonous, 3.5–4 mm, thinly leathery, shiny, indistinctly veined, base cuneate, shortly stipitate, apex abruptly contracted into a short beak, orifice very shortly 2-toothed. Nutlets brownish yellow, subelliptic, trigonous, ca. 2 mm, sessile, apex mucronate; style short, base slightly thickened; stigmas 3. Fl. and fr. Jun–Aug.

• Grasslands on mountain slopes, riversides, lakesides; 4000–5300 m. Qinghai, Xizang.

74. *Carex korshinskii* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 20: 394. 1901.

黄囊藁草 huang nang tai cao

Carex supina Wahlenberg var. *costata* Meinshausen; *C. supina* subsp. *korshinskii* (Komarov) Malyshev; *C. supina* var. *korshinskii* (Komarov) Kükenthal.

Rhizome slender, creeping or obliquely ascending. Culms densely tufted, 15–35 cm tall, slender, compressed triquetrous, smooth on lower part and scabrid on upper part, with few yellowish brown or red-brown bladeless sheaths and rudimentary sheaths at base, rudimentary sheaths usually disintegrating into fibers. Leaves shorter or longer than or equaling culm, blades 1–2 mm wide, slightly stiff, scabrous on upper surface and margins, sheathed. Involucral bracts scale-shaped, lowermost sometimes long awned at apex. Spikes 2 or 3(or 4), uppermost female spike and male spike approximate, lowermost female spike rather remote; terminal spike male, clavate or lanceolate, 1–2.5 cm, sessile; lateral spikes female, ovate or subglobose, 5–10 mm, densely several to 10-flowered, sessile. Female glumes brown, ovate, ca. 3 mm, with 1 midrib, margins white hyaline, apex acute. Utricles yellow, first obliquely patent, later slightly divergent, elliptic or obovate, inflated trigonous, 3–4 mm, leathery, shiny, smooth, obscurely veined, base obtuse, apex abruptly contracted into a very short beak, orifice obliquely truncate or emarginate. Nutlets gray-brown, tightly enveloped in utricle, elliptic, trigonous, 2–2.5 mm, apex mucronate; style base slightly thickened; stigmas 3. Fl. and fr. Jul–Sep.

Grasslands, mountain slopes, sand dunes; 700–1300 m. Gansu, Heilongjiang, Liaoning, Nei Mongol, Shaanxi, Xinjiang [Korea, Mongolia, Russia (Far East, E Siberia)].

75. *Carex aridula* V. I. Kreczetowicz, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 9: 191. 1946.

干生藁草 gan sheng tai cao

Rhizome long stoloniferous. Culms tufted, 5–20 cm tall, slender, compressed triquetrous, smooth on lower part and

scabrous on angles of upper part, few red-brown and bladeless sheathed and rudimentary sheathed at base, rudimentary sheaths usually disintegrating into fibers. Leaves shorter or slightly longer than culm, blades 1–1.5 mm wide, scabrous on upper surface and margins, sometimes slightly involute on margins. Involucral bracts scalelike, lowermost long awned at apex, enclosing culm at base. Spikes 2 or 3, uppermost female spike and male spike approximate, lowermost female spike rather remote; terminal spike male, clavate, 1–1.5 cm, subsessile; lateral spikes female, globose or oblong, 5–8 mm, densely several to 10-flowered, sessile. Female glumes red-brown, ovate or broadly ovate, ca. 3 mm, membranous, with 1 midrib, margins white hyaline, apex acute. Utricles yellowish green, slightly brownish at maturity, first obliquely patent, later nearly horizontally divaricate, globose-obovate, obtusely trigonous, ca. 3 mm, smooth, shiny, nerveless, base broadly cuneate, margins white hyaline, apex abruptly contracted into a very short beak, orifice obliquely truncate. Nutlets dark brown, obovate or broadly obovate, trigonous, ca. 2 mm, base cuneate, apex mucronate; style base thickened; stigmas 3. Fl. and fr. Jun–Sep.

• Alpine meadows, mountain slopes, ditch sides; 2000–3900 m. Gansu, Nei Mongol, Qinghai, Sichuan, Xizang.

76. *Carex turkestanica* Regel, *Trudy Imp. S.-Peterburgsk. Bot. Sada* 7: 570. 1880.

新疆臺草 *xin jiang tai cao*

Carex nitida Host var. *aspera* (Boeckeler) Kükenthal; *C. obesa* Allioni var. *aspera* Boeckeler.

Rhizome long, creeping or obliquely ascending. Culms tufted, 10–30 cm tall, triquetrous, smooth, clothed with few red-brown and bladeless sheaths and rudimentary sheaths at base, rudimentary sheaths usually disintegrating into reticulate fibers. Leaves shorter than culm, blades 1–3 mm wide, ± stiff, flat or revolute on margins, scabrous on upper surfaces and margins, rather shortly sheathed. Lowest involucral bract leaflike, shortly sheathed, upper ones scalelike, long awned at apex. Spikes 3–5, upper spikes congregated at top of culm, lowest spike rather remote; terminal spikes 1 or 2 male, lanceolate or lanceolate-clavate, 1–2.5 cm, subsessile; lateral spikes female, oblong or ovate, 1–1.5 cm, densely several to 12-flowered, shortly pedun-

culate. Female glumes red-brown, oblong-ovate, ca. 4 mm, membranous, 1-veined, margins yellowish hyaline, apex acuminate. Utricles yellow-green, dark brown at maturity, yellow at base, obliquely patent, later nearly horizontally divaricate, almost equaling glume, subelliptic or elliptic-obovate, obtusely trigonous, 3.8–4 mm, leathery, smooth, indistinctly veined, base broadly cuneate, apex abruptly contracted into a medium-sized to long beak, orifice emarginate. Nutlets gray, elliptic or sub-obovate, trigonous, ca. 3 mm; style base thickened; stigmas 3. Fl. and fr. Jul–Sep.

Mountain slopes, valleys, forests; 1000–2600 m. Gansu, Xinjiang [Afghanistan, Russia (W Siberia), Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Uzbekistan].

77. *Carex asperifructus* Kükenthal, *Acta Horti Gothob.* 5: 111. 1930.

粗糙囊臺草 *cu cao nang tai cao*

Rhizome rather long, obliquely ascending, slender stoloniferous. Culms loosely tufted, 10–20 cm tall, slender, acutely triquetrous, smooth, red-brown and bladeless sheathed at base, rudimentary sheaths usually disintegrating into fibers. Leaves shorter than or nearly equaling culm, blades 1–2 mm wide, flat, scabrous on upper surface and margins; sheaths yellowish, distinctly many veined, veins sometimes pallid or reddish. Involucral bracts shortly sheathed, lowest involucral bract leaflike, upper ones setiform. Spikes 2 or 3, rather approximate, congregated at top of culm; terminal spike male, clavate-linear or oblong, 0.8–1.2 cm, subsessile; lateral spikes female, ovate or subelliptic, 5–12 mm, loosely few to several flowered, lowest spike with slender peduncle, upper with very short peduncle or subsessile. Female glumes yellowish brown or brown, ovate, ca. 3 mm, membranous, with broad midrib, apex acute. Utricles stramineous in upper part and brownish on basal surface, obliquely patent, equaling or slightly longer than glume, obovate, obtusely trigonous, 3–3.5 mm, leathery, hispidulous, rather dense on upper part, with 2 distinct lateral veins abaxially, base cuneate, apex abruptly contracted into a short beak, orifice truncate and membranous. Nutlets yellow, elliptic or obovate-elliptic, trigonous, 2.5–2.8 mm, apex mucronate; style base slightly thickened; stigmas 3. Fl. and fr. Jun–Sep.

• Forests on mountain slopes; 2100–3700 m. Qinghai, Shanxi.

15. *Carex* sect. *Hirtae* Tuckerman ex Kükenthal in Engler, *Pflanzenr.* 38(IV. 20): 742. 1909.

糙果臺草組 *cao guo tai cao zu*

Dai Lunkai (戴伦凯); Tetsuo Koyama

Rhizome sometimes stoloniferous. Involucral bracts leaflike or lowest leaflike and upper setiform. Spikes unisexual and bisexual, upper spikes rather congregated, sessile, lowest spike rather remote, ± pedunculate; male spikes usually 2–6; female spikes 2–7, densely many flowered, sometimes with male flowers at upper part. Female glumes mucronate or aristate at apex. Utricles membranous, white hispidulous, with short beak, orifice emarginate. Style base not thickened; stigmas 3.

About 30 species: circumboreal in Asia, Europe, and North America, also in S Asia; three species (one endemic) in China.

Some authors (e.g., Reznicek & Catling, *Fl. N. Amer.* 23: 491. 2002) include *Carex* sect. *Hirtae* in *C.* sect. *Paludosae*.

1a. Rhizome short and thick; male spike 1, terminal, lateral spike female or sometimes with few male flowers at top; utricles broadly obovate or obovate, 2–2.5 mm, shortly 2-toothed at beak orifice 78. *C. inanis*

- 1b. Rhizome with slender stolons; male spikes 1–4, inserted at top, remaining spikes bisexual and unisexual, androgynous and male or androgynous and female; utricles 2.5–3 mm, truncate and slightly emarginate at apex.
- 2a. Spikes slightly laxly many flowered, male spikes 1–4, inserted at top, remaining spikes androgynous (female in var. *schlagintweitiana*); female glumes ovate, ca. 3 mm, mucronate at apex; utricles obovate, laxly hispidulous; nutlets obovate, ca. 1 mm 79. *C. setigera*
- 2b. Spikes rather densely many flowered, male spikes 2 or 3, sometimes with few female flowers at base, remaining spikes female, rarely androgynous; female glumes lanceolate, 6–8 mm, aristate at apex, arista 2–4 mm; utricles elliptic or broadly elliptic, densely white hispidulous; nutlets orbicular-ovate or orbicular, ca. 2 mm 80. *C. lancisquamata*

78. *Carex inanis* Kunth, Enum. Pl. 2: 522. 1837.

毛囊薹草 mao nang tai cao

Rhizome short and thick, ligneous. Culms densely tufted, 10–50 cm tall, slender, obtusely trigonous, smooth, clothed with few red-brown and bladeless sheaths, rudimentary sheaths usually disintegrating into reticulate fibers. Leaves shorter or slightly longer than culm, blades 1–2 mm wide, scabrous and revolute on margins, sheathed. Involucral bracts leaflike, slender, longer than inflorescence, lower involucral bracts shortly sheathed, upper very shortly sheathed or almost not sheathed. Spikes 4–7, lowest spike inserted near base of culm or rather remote, remaining spikes congregated at top of culm; terminal spike male, narrowly cylindrical or narrowly lanceolate, 1.5–4 cm, subsessile; lateral spikes female, sometimes with few male flowers at apex or branching bearing secondary spikes at base, female spikes oblong or oblong-cylindrical, 0.8–2.5 cm, densely many flowered, lower spikes shortly pedunculate, upper subsessile. Female glumes yellowish brown, oblong or subovate, 2–3 mm, membranous, costate, apex acuminate. Utricles stramineous, sometimes brownish at base, obliquely patent, shorter than glume, broadly ovate or ovate, trigonous, 2–2.5 mm, membranous, densely white hispidulous, indistinctly veined, base abruptly contracted into a very short stipe, apex abruptly contracted into a short beak, orifice 2-toothed. Nutlets brown, tightly enveloped in utricle, obovate, broadly obovate, or subelliptic, trigonous, ca. 1.5 mm, base shortly stipitate, apex with torsional mucro; style base not thickened; stigmas 3. Fl. and fr. Jul–Aug.

Dense forests, riversides, mountain slopes; 2300–3500 m. Xizang, Yunnan [Bhutan, NE India, Kashmir, Nepal].

79. *Carex setigera* D. Don, Trans. Linn. Soc. London 14: 330. 1824.

长茎薹草 chang jing tai cao

Rhizome with slender, ligneous stolons. Culms hardly tufted, 8–35 cm tall, slender, obtusely trigonous, smooth, red-brown and bladeless sheathed at base, rudimentary sheaths usually disintegrating into reticulate fibers. Leaves longer or shorter than culm, blades 1–3 mm wide, flat, scabrous on margins, sheathed. Involucral bracts leaflike, linear, lower involucral bracts longer than inflorescence, sheathed, uppermost shorter than inflorescence, not sheathed. Spikes 3–6, congregated at top of culm, approximate; male spikes 1–4, inserted at top of culm, cylindrical or oblong-lanceolate, 5–25 mm, nearly sessile; remaining spikes bisexual or female, oblong-cylindrical, narrowly oblong, or oblong, 0.8–3 cm, slightly laxly many flowered, lower spikes pedunculate, upper spikes sessile or sub-

sessile. Female glumes purple-brown, ovate, ca. 3 mm, membranous, costate, costa yellowish, apex acuminate. Utricles yellowish green, purple-brown flecked, obliquely patent, shorter than glume, obovate, trigonous, 2.5–3 mm, membranous, laxly hispidulous, indistinctly veined, base gradually attenuate into a short stipe, apex attenuate into a short beak, orifice obliquely truncate and emarginate. Nutlets dark brown, tightly enveloped, obovate, trigonous, ca. 1 mm, base very shortly stipitate, apex mucronate; style base not thickened; stigmas 3. Fl. and fr. May–Jun.

Wet places at riversides, forests on mountain slopes, grasslands; 2300–4100 m. Xizang, Yunnan [Bhutan, India, Kashmir, Nepal, Pakistan].

- 1a. Culms 25–35 cm tall; leaves longer or slightly shorter than culm; male spikes 2–4, congregated at top of culm, cylindrical, 5–25 mm, remaining spikes bisexual, androgynous, oblong-cylindrical or narrowly oblong, 2–3 cm; utricles 2.5–3 mm 79a. var. *setigera*
- 1b. Culms 8–15 cm tall; leaves shorter than culm; male spike 1, terminal, oblong-lanceolate, 6–8 mm, remaining spikes female, oblong, 0.8–1 cm; utricles ca. 2 mm 79b. var. *schlagintweitiana*

79a. *Carex setigera* var. *setigera*

长茎薹草(原变种) chang jing tai cao (yuan bian zhong)

Carex aristata D. Don ex Tilloch & Taylor (1823), not Honckeny (1792), nor R. Brown (1823).

Culms 25–35 cm tall. Leaves longer or slightly shorter than culm. Male spikes 2–4, congregated at top of culm, cylindrical, 0.5–2.5 cm; remaining spikes bisexual, androgynous, oblong-cylindrical or narrowly oblong, 2–3 cm. Utricles 2.5–3 mm.

Wet places at riversides, forests on mountain slopes, grasslands; 2700–4100 m. Xizang, Yunnan [Bhutan, India, Nepal].

79b. *Carex setigera* var. *schlagintweitiana* (Boeckeler) Kükenthal in Engler, Pflanzenr. 38(IV. 20): 419. 1909.

小长茎薹草 xiao chang jing tai cao

Carex schlagintweitiana Boeckeler, Beitr. Cyper. 1: 48. 1888; *C. tsangensis* Franchet.

Culms 8–15 cm tall. Leaves shorter than culm. Male spike 1, terminal, oblong-lanceolate, 6–8 mm; remaining spikes female, oblong, 8–10 mm. Utricles ca. 2 mm.

Forests on mountain slopes, wet places in grasslands; 2300–3000 m. Xizang, Yunnan [India, Kashmir, Pakistan].

80. *Carex lancisquamata* L. K. Dai, Acta Phytotax. Sin. 37: 181. 1999.

披针鳞薹草 pi zhen lin tai cao

Rhizome stoloniferous, stolons slightly thick and long, clothed with purple-brown sheaths. Culms tufted, 40–45 cm tall, rather slender, obtusely trigonous, scabrid on angles, few purple-brown and bladeless sheathed at base, rudimentary sheaths usually disintegrating into reticulate fibers. Leaves slightly shorter or slightly longer than culm, blades 2–4 mm wide, canaliculate on midrib of upper surface, revolute on margins, scabrous on upper surface and margins, rather long sheathed, sheaths 5–6 cm and purple-brown at lower part of culm. Involucral bracts leaflike, lower 1 or 2 longer than inflorescence, shortly sheathed, upper ones linear, shorter than inflo-

rescence, not sheathed. Spikes 6 or 7, rather congregated at top of culm, sometimes lowest one rather remote; uppermost spikes 2 or 3 male, sometimes with few female flowers at base, lanceolate or cylindric, 1.5–3 cm, subsessile; remaining spikes female or androgynous, cylindric, 4–5 cm, densely many flowered, lower spikes with slender peduncles, upper ones with short peduncles. Female glumes purple-brown or yellow-brown laterally, lanceolate, 6–8 mm, membranous, 1-costate, apex acuminate, long aristate, arista 2–4 mm. Utricles olivaceous and slightly red-brown at base and beak, obliquely patent, shorter than glume, elliptic or broadly elliptic, obtusely trigonous or plano-convex, ca. 3 mm, herbaceous, densely white hispidulous, indistinctly veined, base abruptly contracted into a short stipe, apex abruptly narrowed into a ± long beak, orifice subtruncate or emarginate. Nutlets brown, tightly enveloped in utricle, orbicular-ovate or suborbicular, trigonous, ca. 2 mm; style base deflexed, not thickened; stigmas 3. Fl. and fr. May–Jun.

• Riversides; ca. 2600 m. W Yunnan (Dali).

16. *Carex* sect. *Anomalae* J. Carey in A. Gray, Manual, 557. 1848.

异囊薹草组 yi nang tai cao zu

Dai Lunkai (戴伦凯); Tetsuo Koyama

Rhizome sometimes stoloniferous. Involucral bracts leaflike or lowest one leaflike, shortly sheathed, upper ones setaceous, not sheathed. Spikes usually unisexual; terminal spike male; lateral spikes female, rarely bisexual, androgynous, female spikes rather remote, densely many flowered, pedunculate. Female glumes usually mucronate at apex, rarely without mucro. Utricles membranous, glabrous, some species purple-red papillate, glandular punctate, or punctate, shortly beaked, orifice subtruncate or emarginate. Style base not thickened; stigmas 3.

About 20 species: E Asia, Australia, North America; four species (one endemic) in China.

1a. Utricles neither papillate nor glandular punctate.

2a. Utricles without conspicuous veins except costas, purple punctate; female glumes muticous; terminal

spike male 81. *C. jaluensis*

2b. Utricles several veined between costas; female glumes long awned; terminal spike gynaeandrous 82. *C. hemineuros*

1b. Utricles purple-red papillate or glandular punctate.

3a. Female glumes oblong-ovate or ovate, 3-veined; utricles broadly obovate or broadly elliptic, 2.2–2.5

mm, purple-red papillate; nutlets broadly obovate or broadly elliptic, yellowish brown, shortly stipitate 83. *C. maculata*

3b. Female glumes narrowly oblong, 1-costate; utricles obovate, ca. 2 mm, purple-red glandular punctate;

nutlets obovate, yellowish white, sessile 84. *C. angustitricula*

81. *Carex jaluensis* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 20: 369. 1901.

鸭绿薹草 ya lü tai cao

Carex dineuros C. B. Clarke.

Rhizome short, liginous, rather stout stoloniferous. Culms densely tufted, 30–85 cm tall, rather stout, obtusely trigonous, scabrid on upper angles, yellowish brown and with bladeless or shortly bladed sheaths at base. Leaves slightly shorter than culm, blades 3–6 mm wide, flat, sometimes slightly revolute on margins, slightly stiff, with 2 distinct lateral veins, scabrous on veins and margins; long sheaths of lower leaves up to 10 cm. Lower involucral bracts leaflike, longer than inflorescence, shortly sheathed, upper 2 or 3 setaceous, shorter than inflorescence, usually not sheathed. Spikes 5–7, lower 1 or 2 slightly remote, upper ones rather approximate; terminal spike male,

rarely 2 male spikes, occasionally with few female flowers at apex, oblong-cylindric or cylindric, 1.5–5 cm, subsessile; remaining spikes female, narrowly cylindric, 1.5–6 cm, densely many flowered, lower spikes with slender peduncles and slightly pendent, upper spikes shortly pedunculate or subsessile. Female glumes yellowish brown laterally, green between veins, ovate or narrowly ovate, ca. 2.5 mm, 3-veined, apex subacute and mucronate. Utricles greenish or yellowish green, obliquely patent, nearly equaling glume, elliptic or obovate-oblong, indistinctly trigonous, ca. 2.5 mm, membranous, glabrous, purple punctate, obscurely veined, base cuneate, shortly stipitate, apex abruptly contracted into a very short beak, orifice subtruncate or emarginate. Nutlets tightly enveloped, obovate, trigonous, ca. 1.5 mm, apex mucronate; style base not thickened; stigmas 3. Fl. and fr. May–Jul.

Riversides in valleys, wet places at ditch sides or in forests; 400–1500 m. Hebei, Jilin, Liaoning [Korea, Russia (Far East)].

82. *Carex hemineuros* T. Koyama, Bot. Mag. (Tokyo) 86: 276. 1973.

藏南薹草 zang nan tai cao

Rhizome short, covered with brown scales not disintegrated into fibers. Culms 55–80 cm tall, smooth, sometimes 1-leaved at middle. Leaves 4–6, blades linear, slightly shorter than culm, 5–7 mm wide, herbaceous; sheaths long, uppermost up to 30 cm, brownish abaxially, bearing ca. 0.5 mm ferruginous ligule at mouth. Lower 2 involucre bracts bladed and overtopping inflorescence, shortly sheathing. Spikes 4–6, ± contiguous; terminal spike gynaeceandrous, 2–5 cm, male part brownish or reddish brown, 2–3.5 cm × ca. 3 mm, female part up to 1/2 as long as spike, 6–8 mm wide; lateral spikes female, at times upper 1 or 2 bearing short male part, olive-brownish, 2.5–4 cm × 5–8 mm, densely many flowered, long pedunculate. Female glumes brownish, ovate, 2–3 × 1.2–1.5 mm, membranous, 3-veined costa excurrent beyond apex into an erect awn ca. 1.5 mm. Utricles glaucous green, longer than body of glume but surpassed by awn, obovate to broadly obovate, 2.8–3 × 1.5–2 mm, herbaceous, glabrous, strongly 2-costate and bearing 4 or 5 veins reaching halfway up utricule, base cuneate-attenuate, apex rounded-contracted into a very short beak, orifice scarcely 2-toothed. Nutlets loosely enveloped, obovate, 1.5–2 × 1–1.5 mm; style ca. 1.8 mm; stigmas 3, ca. 1.5 mm.

Deciduous and coniferous forests; 2700–3100 m. S Xizang [Nepal].

83. *Carex maculata* Boott, Trans. Linn. Soc. London 20: 128. 1846.

斑点果薹草 ban dian guo tai cao

Rhizome slender, ligneous. Culms tufted, 30–55 cm tall, slightly thin, triquetrous, smooth, few yellowish brown and bladeless sheathed at base. Leaves shorter than culm, blades 3–6 mm wide, flat, smooth, sheathed. Involucre bracts leaflike, longer than inflorescences, sheathed, sheath rather long in lowermost part and short in upper part. Spikes 3 or 4, lowermost spike remote, others congregated at top of culm; terminal spike male, linear-cylindric, (1.5–)2–6 cm, nearly sessile; lateral spikes female, oblong-cylindric to cylindric, (1–)2–4 cm, densely many flowered, lower spikes rather long pedunculate, upper shortly pedunculate. Female glumes yellowish brown, with short ferruginous striae, oblong-ovate or ovate, ca. 2 mm,

membranous, 3-veined and green on veins, apex acute or obtuse, sometimes mucronate. Utricles yellow-brown, becoming dark purple, obliquely patent, longer than glume, broadly obovate or nearly broadly elliptic, trigonous, 2.2–2.5 mm, membranous, densely purple papillate, 3–5-veined, base gradually attenuate and cuneate, apex abruptly contracted into a very short beak, orifice subtruncate or emarginate. Nutlets yellowish brown, tightly enveloped in utricule, broadly obovate or broadly elliptic, trigonous, ca. 1.5 mm, base abruptly contracted into a short stipe, apex with inflected mucro; style base not thickened; stigmas 3.

Wet places at ditch sides in valleys, forests, grasslands at the foot of mountains; 400–1300 m. Fujian, Guangdong, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Zhejiang [India, Indonesia, Sri Lanka].

84. *Carex angustitricula* F. T. Wang & Tang ex L. K. Dai, Acta Phytotax. Sin. 37: 182. 1999.

狭果囊薹草 xia guo nang tai cao

Rhizome short, ligneous, without stolons. Culm tufted, 30–35 cm, rather thin, obtusely trigonous, smooth, brown and bladeless sheathed at base. Leaves shorter or slightly longer than culm, blades 3–6 mm wide, flat, scabrous on apex margin and veins, slightly long sheathed. Involucre bracts leaflike, longer than inflorescence, rather shortly sheathed. Spikes 3 or 4, lowermost one remote, others approximate at top of culm; terminal spike male, narrowly cylindric, 2.5–5 cm, subsessile; lateral spikes female, narrowly cylindric, 1.5–3.5 cm, densely many flowered, lowermost spike slightly long pedunculate, upper ones shortly pedunculate or subsessile. Female glumes yellowish, with short red-brown striae, narrowly oblong, ca. 1.8 mm, membranous, 1-costate, costa green, apex obtuse, muticous. Utricles yellowish brown, obliquely patent, later nearly horizontally patent, slightly longer than glume, obovate, trigonous, ca. 2 mm, membranous, densely purple-red glandular punctate, distinctly 5-veined, base cuneate or broadly cuneate, shortly stipitate, apex attenuate into a short beak, orifice subtruncate or emarginate. Nutlets yellowish white, tightly enveloped in utricles, obovate, trigonous, ca. 1.2 mm, apex with inflected mucro; style base not thickened; stigmas 3. Fl. and fr. Apr–May.

• Wet places on mountain slopes; ca. 1600 m. Sichuan (Emei Shan, Mabian).

17. *Carex* sect. *Cryptostachyae* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 3, 10: 106. 1898 [“*Cryptostachydeae*”].

隐穗薹草组 yin sui tai cao zu

Tang Yancheng (汤彦承 Tang Yen-cheng), Zhang Shuren (张树仁); Tetsuo Koyama

Rhizome elongate. Flowering culms usually solitary, rarely 2, arising from axils of leaves, scapelike. Involucre bracts bristle-like, sheathed. Spikes nearly all (at least terminal one) androgynous. Utricles oblong-rhombic to obovate-fusiform, with concave-convex surface. Nutlets trigonous, rhombic, angles constricted at middle, faces excavated in both upper and lower parts; style base persistent, bent.

One species: Australia, China, Indonesia, Malaysia, Philippines, Thailand, Vietnam.

85. *Carex cryptostachys* Brongniart in Duperrey, Voy. Monde, Phanérog. 152. 1832.

隐穗薹草 yin sui tai cao

Rhizome long, woody, covered with dark brown fibrous remnants of basal sheaths. Flowering culms arising from axils of leaves, 12–30 cm tall, compressed trigonous, scapelike, flaccid. Leaves longer than culm, blades 6–15 mm wide, flat,

smooth, leathery, margins scabrid. Involucral bracts bristlelike, sheathed, sheath 5–15 mm. Spikes 6–10, nearly all (at least terminal one) androgynous, oblong or cylindric, 8–25 mm, loosely flowered; male part short, 3–5 mm; peduncle 7–25 mm, slender. Female glumes pale brown to yellow-green, ovate-oblong, ca. 2.2 mm, costa green, apex acute or mucronate. Utricles yellow-green, longer than glume, oblong-rhombic to obovate-fusiform, obscurely trigonous, 4–5 mm, membranous, densely puberulent above and ciliate on margins, many veined, base cuneate, with a

stipe ca. 1 mm, apex attenuate into a short beak, orifice minutely 2-toothed. Nutlets trigonous, rhombic, 2.5–3 mm, faces excavated in both upper and lower parts, angles constricted at middle; style base persistent, bent; stigmas 3. Fl. winter, fr. next spring.

Wet places in dense forests; 100–1200 m. Fujian, Guangdong, Guangxi, Hainan, Taiwan [Indonesia, Malaysia, Philippines, Thailand, Vietnam; Australia].

18. Carex sect. Lageniformes (Ohwi) Nelmès, Reinwardtia 1: 366. 1951.

匏囊臺草組 pao nang tai cao zu

Tang Yancheng (汤彦承 Tang Yen-cheng), Zhang Shuren (张树仁); Tetsuo Koyama, Gordon C. Tucker

Carex subsect. *Lageniformes* Ohwi, Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 11: 340. 1936.

Rhizome short or oblique. Flowering culm central or arising from basal leaf axils, slender or soft, scapelike. Leaves longer than culm. Involucral bracts short, bladed or leafy, sheathed. Spikes 3–6 or more; terminal spike male; lateral spikes female. Female glumes oblong-ovate or obovate. Utricles fusiform or rhombic-fusiform. Nutlet rhombic or fusiform, with faces excavated both at upper and lower parts; style base cylindric, slightly thickened, persistent, apex truncate or shallowly concave.

About 12 species: E and SE Asia; eight species (four endemic) in China.

- 1a. Lower involucral bracts surpassing inflorescence.
 2a. Utricles 3.5–5 mm; leaves 4–7 mm wide; culms 10–20 cm tall 92. *C. breviscapa*
 2b. Utricles 5–6.5 mm; leaves 2–3 mm wide; culms 5–10 cm tall 87. *C. rhynchachaenium*
 1b. All involucral bracts much shorter than inflorescence.
 3a. Utricles 3–6 mm 86. *C. truncatigluma*
 3b. Utricles 2–4 mm.
 4a. Inflorescence short, much surpassed by leaves 93. *C. tenuispicula*
 4b. Inflorescence tall, equaling to longer than leaves.
 5a. Nutlets constricted at middle on angles.
 6a. Culms, leaves, and bracts glabrous; leaves 2–4 mm wide 90. *C. ascotreta*
 6b. Culms, leaves, and bracts pilose; leaves 4–12 mm wide 91. *C. densipilosa*
 5b. Nutlets not constricted on angles.
 7a. Male spikes linear, ca. 1 mm wide 88. *C. ligata*
 7b. Male spikes linear-cylindric, ca. 3 mm wide 89. *C. taihuensis*

86. Carex truncatigluma C. B. Clarke, J. Linn. Soc., Bot. 36: 315. 1904.

截鳞臺草 jie lin tai cao

Carex gracilispica Hayata.

Rhizome obliquely ascending, covered with dark brown fibrous remains of old leaf sheath. Flowering culms arising from axils of leaves, 10–30 cm tall, trigonous, slender, slightly scabrid. Leaves equaling to longer than culm, blade 3–10 mm wide, flat, scabrid on both surfaces, herbaceous. Involucral bracts shortly bladed, sheathed, sheath 6–9 mm. Spikes 4–6; terminal spike male, narrowly cylindric, 1–1.5 cm, ca. 1 mm thick, sessile or with peduncle 0.5–2 cm; lateral spikes female, cylindric, 20–50 × 2.5–3 mm, loosely flowered, uppermost female spike surpassing male spike, with peduncle enclosed in involucral bract sheath, lower female spikes spaced, with exserted peduncles, lowest peduncle 2–4(–6) cm. Female glumes dark yellow, broadly obovate, margins broadly hyaline, green costa projecting into a mucro 0.1–0.3 mm, apex truncate to rounded, often emarginate. Utricles olive-green, longer than glume, fusiform, obscurely trigonous, 3–6 × ca. 1 mm, mem-

branous, minutely pubescent, many veined, base cuneate, stipitate, apex attenuate into a beak, orifice 2-toothed. Nutlet pale brown, tightly enveloped, fusiform, trigonous, 2.5–3 mm, with faces excavated both at upper and lower parts, base stipitate, stipe 0.2–0.3 mm, apex with a distinct, stout, cylindric neck, neck ca. 0.5 mm, truncate or shallowly concave at top; style base slightly thickened, persistent; stigmas 3. Fl. and fr. Mar–May.

Forests, grasslands on mountain slopes, streamsides; 500–1200 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Malaysia, Philippines, Vietnam].

87. Carex rhynchachaenium C. B. Clarke, Publ. Bur. Sci. Gov. Lab. 35: 5. 1905.

喙果臺草 hui guo tai cao

Carex hatuimana Ohwi; *C. truncatigluma* C. B. Clarke subsp. *rhynchachaenium* (C. B. Clarke) Y. C. Tang & S. Yun Liang.

Plants densely tufted in small clumps. Rhizome short, clothed with hard, dark brown fibers. Culms very low, hidden

by leaves, 5–10 cm tall. Leaves narrowly linear, very elongate, 15–28 cm, 2–3 mm wide, gradually tapering to long acute apex. Lower 2 or 3 involucral bracts leaflike, much surpassing inflorescence, up to 20 cm, shortly sheathing. Spikes 3–6, subfastigiate except lowest, erect; terminal spike male, linear, 1–2 cm, shorter than next female spike; lateral spikes female, shortly cylindrical, 1–2 cm, subaxially and contiguously few flowered, peduncle enclosed in sheath. Female glumes stramineous, oblong-elliptic, hard membranous, slenderly many veined besides obsoletely 3-veined costa, ciliolate, apex truncate-rounded, occasionally mucronate. Utricles upright, lageniform with weak constriction at middle, 2 × as long as glume, 5–6.5 mm, thickly membranous, wholly pubescent, slenderly many veined, base stipitate, apex gradually narrowed to erect short beak, orifice shallowly 2-toothed. Nutlets tightly enclosed, ovate-rhomboid, ca. 4 mm, trigonous, base cuneate, apex with neck ca. 1 × 0.7 mm, and truncate at top; style short, base thickened; stigmas 3, short.

Taiwan [Philippines, Vietnam].

This species, which can be discerned at once by the short, slender culms concealed by the leaf tussocks, clearly differs from *Carex truncatigluma* by the larger (5.5–6.5 mm vs. 3–3.7 mm) utricles of thicker texture and the mucous (vs. cuspidate) subtending glumes.

88. *Carex ligata* Boott ex Bentham, Fl. Hongk. 402. 1861.

香港薹草 xiang gang tai cao

Carex hongkongensis Franchet; *C. ligata* var. *nexa* (Boott ex Bentham) Kükenthal; *C. nexa* Boott ex Bentham.

Rhizome short. Flowering culms arising from axils of leaves, 25–50 cm tall, slender, obtusely trigonous, smooth. Basal sheaths split into dark brown fibers. Leaves longer than culm, blade glaucous green, 4–6 mm wide, flat, stiff, scabrid abaxially and along margins. Involucral bracts shortly bladed; sheath purple, 1–2 cm. Spikes 3 or 4, spaced; terminal spike male, linear, 3–5 cm, ca. 1 mm thick, with peduncle 3.5–5.5 cm; lateral spikes female, cylindrical, 10–20 × 3–4 mm, rather densely or subdistichously flowered, with slender peduncle 1.5–3.5 cm. Female glumes yellowish green, obovate-oblong, ca. 2.7 mm, green costa 1–3-veined, midvein distinct, margins hyaline, apex somewhat rounded. Utricles longer than glume, rhombic-fusiform, trigonous, 3–3.5 mm, membranous, minutely pubescent above, many veined, base shortly stipitate, apex gradually attenuate into a beak ca. 1 mm, orifice 2-toothed. Nutlet tightly enveloped, fusiform, trigonous, ca. 2.7 mm, faces excavated in both upper and lower parts, base shortly stipitate, stipe ca. 0.3 mm, apex with a white, short, cylindrical neck, neck 0.2–0.3 mm, shallowly concave at top; style base thickened; stigmas 3. Fl. and fr. Feb–Mar.

• Shady places in forests. Anhui, Fujian, Guangdong.

89. *Carex taihuensis* S. W. Su & S. M. Xu, Bull. Bot. Res., Harbin 9(1): 51. 1989.

太湖薹草 tai hu tai cao

Rhizome short. Culm 40–65 cm tall, slender, trigonous, smooth. Basal sheaths scalelike, brown-purple, slightly shining, slightly split into fibers. Involucral bracts bristlelike, sheathed,

lower sheaths longer, upper sheaths shorter. Spikes 3 or 4, spaced; terminal spike male, yellowish brown, linear-cylindrical, 3–4.5 cm, ca. 3 mm thick, pedunculate; lateral spikes female, linear-cylindrical, 2–3 cm, ca. 3 mm thick, loosely flowered, peduncles not exerted. Female glumes pale yellow to yellowish brown, oblong-ovate, ca. 2.5 mm, costa excurrent into a mucro, apex ± acute. Utricles pale green, longer than glume, narrowly fusiform, ca. 4 mm, membranous, sparsely puberulent, many veined, base attenuate into a stipe, apex contracted into a short or medium-sized beak, beak slightly recurved, shallowly emarginate at orifice. Nutlet tightly enveloped, oblong-obovate, trigonous, ca. 3 mm, base shortly stipitate, apex contracted into a short neck; style base slightly thickened; stigmas 3.

• Waysides on mountain slopes. Anhui.

90. *Carex ascotreta* C. B. Clarke ex Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 3, 9: 182. 1897.

宜昌薹草 yi chang tai cao

Carex davidii Franchet var. *ascotreta* (C. B. Clarke ex Franchet) Kükenthal; *C. formosensis* H. Léveillé & Vaniot; *C. ichangensis* C. B. Clarke; *C. ligata* Boott ex Bentham subsp. *formosensis* (H. Léveillé & Vaniot) T. Koyama; *C. ligata* var. *formosensis* (H. Léveillé & Vaniot) Kükenthal.

Rhizome stout, covered with fibrous, brown remnants of old scales. Culms 10–60 cm tall, obscurely trigonous, smooth, basal leaf sheaths dark brown, split into fibers. Leaves shorter than culm, blades 2–4 mm wide, flat, margins scabrid. Involucral bracts leafy, blade shorter than inflorescence, sheathed, sheath 5–18 mm. Spikes 4–6; peduncles erect, nearly enclosed in involucral bract sheath; terminal spike male, linear, 1–4 × ca. 0.2 cm, with peduncle 2–14 mm; lateral spikes female, oblong to cylindrical, 12–40 × 2–4 mm, upper ones contiguous, lowermost spaced. Female glumes pale yellow-green, elliptic, 2.5–3 mm (excluding awn), green costa 3-veined, excurrent into a scabrid awn 2–4 mm, apex emarginate or acute. Utricles green, slightly longer than or nearly equaling glume, fusiform, 3.5–4 mm, membranous, puberulent, many veined, base attenuate into a short stipe 0.5–0.6 mm, apex attenuate into a slightly recurved beak, orifice obliquely truncate. Nutlet yellow-brown, tightly enveloped, fusiform, ca. 2.5 mm, with angles contracted at middle and faces excavated in both upper and lower parts, base with stipe ca. 1 mm, apex with short cylindrical neck, neck shallowly concave at top, pale yellow, 0.4–0.5 mm; style base slightly thickened; stigmas 3. Fl. and fr. Apr–May.

Forests on low hills, wet places, waysides; 100–1100 m. Guizhou, Hubei, Hunan, Shaanxi, Sichuan, Taiwan [Japan, Korea].

91. *Carex densipilosa* C. Z. Zheng & X. F. Jin, Acta Phytotax. Sin. 42: 544. 2004.

金华薹草 jin hua tai cao

Rhizome oblique, covered with fibrous, brown remnants of old scales. Culms 15–35 cm tall, obscurely trigonous, smooth, basal leaf sheaths dark brown, split into fibers. Leaves shorter than culm, blades 4–12 mm wide, flat, densely pilose throughout, margins scabrid. Involucral bracts leafy, pilose,

blade much shorter than inflorescence, sheath 3–7 mm. Spikes 4–6; peduncles erect to flexuose, well exerted from involucre bract sheath; terminal spike male, ca. 10-flowered, cylindric, 1–2 × 0.2–0.25 cm, with peduncle 2–14 mm; lateral spikes female, oblong to cylindric, 12–40 × 2–4 mm, upper 2 contiguous, lower ones widely spaced. Female glumes pale yellow-green, broadly obovate, 2–2.5 mm, green costa 3-veined, apex truncate to rounded, awnless. Utricles greenish brown, ca. 1.5 × as long as glume, fusiform, ca. 3.5 mm, membranous, puberulent, several veined, base attenuate into a short stipe 0.3–0.4 mm, apex attenuate into a straight beak, orifice weakly 2-toothed. Nutlet yellow-brown, tightly enveloped, trigonous, fusiform, ca. 2.5 mm, with angles constricted at middle and faces excavated in both upper and lower parts, base with stipe ca. 1 mm, apex with short cylindric neck 0.4–0.5 mm; style base slightly thickened; stigmas 3. Fl. and fr. Apr–Jun.

- Hillsides. Zhejiang (Jinhua).

92. *Carex breviscapa* C. B. Clarke in J. D. Hooker, Fl. Brit. India 6: 736. 1894.

短葶藶草 duan ting tai cao

Carex laxisquamata Tang & F. T. Wang; *C. lutchuensis* Ohwi; *C. obtusobracteata* Hayata.

Rhizome short. Culms 10–20 cm tall, trigonous. Basal sheaths dark brown, split into fibers. Leaves longer than culm, blades 4–7 mm wide, flat, smooth, leathery. Involucral bracts leafy, much longer than inflorescence, sheathed. Inflorescence 3–5-noded; spikes many, 3–5 at each node; terminal spike male, linear, 17–45 × 1–1.5 mm, shortly pedunculate; lateral spikes female or mostly with male part at apex, narrowly cylindric, 3–4.5 cm, ca. 3 mm thick, subloosely flowered, sessile or shortly pedunculate. Female glumes ovate-oblong, 2.5–3 mm, ciliate, apex rounded. Utricles green, longer than glume, rhombic-fusiform, trigonous, 3.5–5 mm, membranous, many veined, gla-

brous or puberulent above, base cuneate, stipitate, apex gradually attenuate into a conic beak, beak ca. 1 mm, 2-toothed at orifice. Nutlet brown to dark brown, tightly enveloped, rhombic, trigonous, 2.5–3 mm, faces excavated in both upper and lower parts, base cuneate, shortly stipitate, apex with distinct short neck ca. 0.3 mm, neck shallowly concave at top, neck and angles yellowish white; style base slightly thickened; stigmas 3. Fl. winter, fr. next spring.

Forests; 400–1000 m. Fujian, Hainan, Taiwan [Indonesia, Japan, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam; Australia].

93. *Carex tenuispicula* Tang ex S. Yun Liang, Acta Phytotax. Sin. 34: 92. 1996.

纤穗藶草 xian sui tai cao

Rhizome short. Flowering culms arising from axils of leaves. Basal sheaths dark brown, split into fibers. Leaf blades 12–40 cm × 2–3 mm, flat, margins scabrid, apex acuminate. Lowest involucre leafy, longer than inflorescence, uppermost scalelike. Spikes 5 or 6; terminal spike male, linear, 3–4 cm, ca. 0.5 mm thick, with peduncle 3–4(–17) mm; lateral spikes female, 4 or 5, narrowly cylindric, 10–40 × 1.5–2 mm, subloosely flowered, with slender peduncle 4–10 cm. Female glumes pale brown, broadly ovate, 1.2–1.5 mm, membranous, 1–3-veined, costa green, margins ciliate, hyaline, apex rounded. Utricles pale brown, longer than glume, rhombic-fusiform, trigonous, 2–3 mm, ca. 1 mm wide, membranous, puberulent, many veined, apex gradually attenuate into a beak, orifice emarginate. Nutlet brown, tightly enveloped, rhombic or fusiform, trigonous, 1.5–2 mm, with faces excavated in both upper and lower parts, base shortly stipitate, apex bearing a short cylindric neck, neck pale yellow, 0.1–0.2 mm, truncate at top; style base not thickened; stigmas 3. Fl. and fr. winter.

- Shady places in mixed forests of valleys; ca. 400 m. Fujian, Guangdong.

19. *Carex* sect. *Mitratae* Kükenthal in Engler, Pflanzenr. 38(IV. 20): 458. 1909.

灰帽藶草组 hui mao tai cao zu

Tang Yancheng (汤彦承 Tang Yen-cheng), Zhang Shuren (张树仁); Tetsuo Koyama, Gordon C. Tucker

Spikes usually unisexual; terminal spike male; lateral spikes often female, rarely androgynous, female spike long cylindric, cylindric, or linear. Utricles herbaceous, glabrous or puberulent, shortly beaked or nearly beakless, orifice truncate or 2-toothed. Nutlet tightly enveloped, trigonous, sometimes with contracted angles and excavated faces, apex often discoid-annulate; stigmas 3.

About 60 species: C, E, and SE Asia, Australia, Europe, Pacific islands (New Zealand); 27 species (16 endemic) in China.

- 1a. Nutlet contracted on angles or excavated at faces.
 - 2a. Nutlet contracted on angles.
 - 3a. Nutlet excavated at faces 103. *C. chungii*
 - 3b. Nutlet not excavated at faces.
 - 4a. Leaves not trabeculate; utricles 2–2.5 mm 94. *C. foraminata*
 - 4b. Leaves trabeculate; utricles 3.5–5 mm.
 - 5a. Peduncles of female spikes mostly included; nutlets ca. 2 mm 97. *C. tungfangensis*
 - 5b. Peduncles of female spikes mostly exerted; nutlets ca. 4 mm 95. *C. tianmushanica*
 - 2b. Nutlet not contracted on angles.
 - 6a. Utricle distinctly convex adaxially, beak recurved; nutlet only slightly excavated at lower part of face 98. *C. foraminatiformis*
 - 6b. Utricle indistinctly convex adaxially, beak erect; nutlet excavated at both upper and lower part of face.

- 7a. Leaf sheaths and blades puberulent 102. *C. duvaliana*
 7b. Leaf sheaths and blades glabrous.
 8a. Utricles ovate-fusiform, 2.5–4 mm 100. *C. dolichostachya*
 8b. Utricles elliptic-rhombic, oblong-ellipsoid, or rhombic-oblong, 2.5–3 mm.
 9a. Male spike 25–45 mm; nutlet 2.5–3 mm 96. *C. qingliangensis*
 9b. Male spike 10–30 mm; nutlet 1.5–2 mm.
 10a. Female spike linear-cylindric, 2–2.5 mm wide, loosely flowered 101. *C. rugata*
 10b. Female spike cylindric or oblong-cylindric, 3–4 mm wide, densely flowered 99. *C. sociata*
- 1b. Nutlet neither contracted on angles nor excavated at faces.
 11a. Utricles lanceolate-ovate, 3.5–4.5 mm.
 12a. Spikes usually 2; terminal male spike ovate-clavate; lateral spike androgynous 107. *C. shanghangensis*
 12b. Spikes 2–4; terminal male spike linear-oblong; lateral spikes female 108. *C. orthostemon*
- 11b. Utricles ellipsoid, ovoid, or ovate-fusiform, 2–3(–4) mm.
 13a. Lower involucral bracts hardly or shortly sheathing (3–7 mm).
 14a. Male spike shortly pedunculate, base not surpassing next female spike.
 15a. Male spike pale brown; female spikes linear to linear-cylindric, 2–3 mm wide 106. *C. mitrata*
 15b. Male spike pale green; female spikes ellipsoid to ovoid, more than 3 mm wide 109. *C. breviculmis*
- 14b. Male spike long pedunculate, base surpassing next female spike.
 16a. Utricles rhombic-elliptic to broadly ovate or obovate.
 17a. Utricles puberulent, stipe very short and not conspicuous 110. *C. hypochlora*
 17b. Utricles only sparsely puberulent, stipe conspicuous though short 113. *C. subbracteata*
- 16b. Utricles ovate-elliptic or ovate-oblong.
 18a. Rhizome slender, long creeping; costa of female glumes not excurrent beyond apex 119. *C. nervata*
 18b. Rhizome short; plants densely tufted; costa of female glumes excurrent into a mucro 120. *C. kiangsuensis*
- 13b. Lower involucral bracts long sheathing (1–3 cm).
 19a. Male glumes usually connate at margin forming a cuplike structure; most spikes fastigiate to subfastigiate; male spike linear.
 20a. Leaves slightly verruculose on upper surface; male glumes with margins connate 105. *C. pseudotristachya*
 20b. Leaves not verruculose on upper surface; male glumes with margins connate or free 104. *C. tristachya*
- 19b. Male glumes scalelike, not connate at margin; spikes racemose; male spike ovate-cylindric.
 21a. Female spike ovate, ovate-oblong, or cylindric, 4–5 mm thick, with denser utricles.
 22a. Utricle nearly beakless, orifice entire 111. *C. davidii*
 22b. Utricle shortly beaked, orifice minutely or acutely 2-toothed.
 23a. Female glumes pale; utricles sparsely puberulent 112. *C. breviaristata*
 23b. Female glumes pale or stramineous and pale brown on upper margins; utricles glabrous 114. *C. qiyunensis*
- 21b. Female spike linear to linear-cylindric, rarely oblong-ovate, 2–3 mm thick, with rather lax utricles.
 24a. Leaf blade hairlike, up to 2 mm wide 115. *C. capilliformis*
 24b. Leaf blade 2–4 mm wide.
 25a. Beak of utricles ± recurved, orifice toothless 116. *C. polyschoenoides*
 25b. Beak erect, orifice 2-toothed.
 26a. Utricle densely puberulent; female glumes with mucro; nutlet gray-black, ovate, shortly stipitate 117. *C. pisiformis*
 26b. Utricle glabrous; female glumes without mucro; nutlet ashy brown, ellipsoid, not stipitate 118. *C. hezhouensis*

94. *Carex foraminata* C. B. Clarke, J. Linn. Soc., Bot. 36: 285. 1903.

穿孔臺草 chuan kong tai cao

Rhizome stout, covered with fibrous remains of old scales. Culms 40–70 cm tall, rather stout, trigonous, smooth, sur-rounded at base by dark brown bladeless sheaths, sheaths usually disintegrating into fibers. Leaves longer than or equaling

culm, blades 4–7 mm wide, flat, leathery, smooth, margins scabrid. Lower involucral bracts shortly leaflike, upper one bristlelike, shorter than subtending spike, sheath 2–5 cm. Spikes 4–6; terminal spike male, cylindric, 50–80 × 3–5 mm, with peduncle 4–6 cm; lateral spikes female, spaced, cylindric, 50–80 × 3–5 mm, densely flowered, ± nodding at apex, peduncle 2–4 cm, slightly exerted but upper ones enclosed in involucral bract sheath. Female glumes pale brown on both upper sides,

oblong, 3–3.5 mm, costa pale green, with a distinct midrib, apex acute. Utricles shorter than glume, obovate, 2–2.5 mm (including stipe), prominently many veined, puberulent, base stipitate, apex shortly beaked, beak slightly recurved, emarginate at orifice. Nutlet stramineous, tightly enveloped, shortly oblong, 1.5–2 mm, with angles contracted at middle, base with short and bent stipe, apex abruptly contracted into a short cylindrical beak; style base slightly thickened, most parts not persistent; stigmas 3. Fl. and fr. Apr–May.

• Forest margins on mountain slopes, shady places near rocks in valleys, ditch sides; 300–800 m. Anhui, Fujian, Guizhou, Jiangxi, Zhejiang.

95. *Carex tianmushanica* C. Z. Zheng & X. F. Jin, Acta Phytotax. Sin. 42: 541. 2004.

天目山薹草 *tian mu shan tai cao*

Rhizome short. Culms tufted, 30–50 cm tall, slender, compressed triquetrous, smooth, covered at base by dark brown bladeless sheaths. Leaves longer than or shorter than culm, blades 4–7 mm wide, flat, trabeculate, margins scabrid. Lower involucre bracts leaflike, short, upper one bristlelike, shorter than subtending spike, sheath 1–2 cm. Spikes 4; terminal spike male, linear-cylindric, 30–60 × 3–5.5 mm, with peduncle 3–6 cm; lateral spikes female, widely spaced, linear-cylindric, 25–50 × 3–5 mm, laxly flowered, peduncle 1.5–5 cm, all including upper ones slightly exerted from involucre bract sheaths. Female glumes pale brown, oblong, 3–3.5 mm, costa pale green, with a distinct midrib, apex acuminate. Utricles longer than or equaling glume, ellipsoid, 4–5 mm, sparsely pubescent to subglabrous, prominently many veined, base rounded, apex with a straight beak ca. 1.5 mm, orifice slightly emarginate. Nutlet ashy brown, tightly enveloped, ellipsoid, ca. 4 mm, with angles constricted at middle, base with a short straight stipe, apex abruptly contracted into a short cylindrical beak; style base annulate, slightly thickened; stigmas 3. Fl. and fr. Apr–Jun.

• Forests on mountain slopes; 1000–1500 m. Zhejiang.

96. *Carex qingliangensis* D. M. Weng, H. W. Zhang & S. F. Xu, Nordic J. Bot. 27: 7. 2009.

清凉峰薹草 *qing liang feng tai cao*

Rhizome short, indurate. Culms tufted, 40–55 cm tall, slender, trigonous, smooth, covered at base by dark brown bladeless sheaths. Leaves shorter or longer than culm, blades 4–7 mm wide, flat, trabeculate, scabrid along distal margins. Involucre bracts setaceous, shorter than subtending spikes, sheath 0.5–2 cm. Spikes 4 or 5; terminal spike male, cylindric, 25–45 mm, with peduncle 1–2.5 cm; lateral spikes female, rather widely spaced, linear-cylindric, 25–40 mm, densely flowered, peduncle 1–2.5 cm, barely exerted from bract sheath. Female glumes pale green, elliptic-ovate, 3.5–4 mm, costa yellow-green, with a distinct midrib, apex acuminate with a short scabrous awn. Utricles green, slightly longer than glume, oblong-ellipsoid, trigonous, 4–5 mm, sparsely pubescent distally, prominently many veined, base attenuate, not stipitate, apex with a straight beak ca. 1.5 mm, orifice distinctly emarginate. Nutlet ashy brown, tightly enveloped, oblong-ovoid, 2.5–3 mm,

faces concave in proximal half, angles not constricted at middle, base with a short straight stipe, apex gradually contracted into a short cylindrical beak; style base slightly thickened; stigmas 3. Fl. and fr. Apr–May.

• Forests and roadsides on mountain slopes; 500–1300 m. NW Zhejiang (Lin'an).

97. *Carex tungfangensis* L. K. Dai & S. M. Huang, Fl. Hainan. 4: 343, 536. 1977.

东方薹草 *dong fang tai cao*

Rhizome rather short. Culms up to 80 cm tall, compressed trigonous, slender, straight. Basal sheath bladeless, brown, shiny. Leaves longer than culm, blades 6–7 mm wide, with distinct midvein and transverse veinlets, margins scabrid. Involucre bracts sheathed, lower 2 or 3 leaflike, upper 1 or 2 bristlelike. Spikes 4 or 5; terminal spike male, linear-cylindric, 4–10 × ca. 0.4 cm, shortly pedunculate; lateral spikes female, linear-cylindric, 3–3.5 cm, ca. 4 mm thick; peduncles 1.5–5 cm, mostly enclosed in involucre bract sheaths. Female glumes pale yellow, oblong, ca. 3 mm, membranous, with distinct costa excurrent into a mucro, apex acute. Utricles greenish yellow, ovate or ovate-lanceolate, ca. 3.5 mm, herbaceous, minutely hirsute or subglabrous, with a few slender veins, base attenuate, apex gradually attenuate into a short beak ca. 1 mm, orifice obliquely truncate and minutely 2-toothed. Nutlet brown-yellow, tightly enveloped, elliptic-ovate, obtusely trigonous, ca. 2 mm, with angles contracted at middle and faces excavated both in upper and lower parts, base abruptly narrowed to a short stipe, apex abruptly contracted into an annulate disk; style base thickened; stigmas 3.

• Mountain slopes; 900–1400 m. Hainan.

98. *Carex foraminatiformis* Y. C. Tang & S. Yun Liang, Fl. Reipubl. Popularis Sin. 12: 521. 2000.

拟穿孔薹草 *ni chuan kong tai cao*

Rhizome stout, clothed with fibrous remains of old scales. Flowering culms both central and arising from axils of leaves, 30–40 cm tall, compressed, smooth, surrounded at base by pale brown bladeless sheaths or their fibrous remains. Leaves shorter or longer than culm, blades 6–12 mm wide, soft, flat, smooth, margins scabrid. Involucre bracts shorter than spike, sheathed, sheaths 1–3.5 mm, lower involucre bracts shortly leaflike, upper ones bristlelike. Spikes 4 or 5; terminal spike male, cylindric, 30–60 × 1.5–2 mm; lateral spikes female, remotely spaced, cylindric, 2–3.5 cm, ca. 4 mm thick, densely flowered; peduncles 1–4.5 cm, lower ones slightly exerted, upper ones enclosed in involucre bract sheaths. Female glumes oblong, 2–2.5 mm, membranous laterally, costa with 3 distinct veins and pale yellow-green, apex mucronate. Utricles nearly equaling glume, ovate, ca. 2.5 mm, sparsely puberulent, with many prominent veins, base nearly estipitate, apex shortly beaked, beak ca. 0.5 mm, recurved, emarginate at orifice. Nutlet brown at maturity, tightly enveloped, ovate, 1.5–2 mm, with faces slightly excavated in lower part, base nearly estipitate, apex abruptly contracted into a very short beak; style base thickened, miter-shaped, persistent; stigmas 3. Fl. and fr. Mar–Apr.

• Ditch sides, grassy areas in woods; 600–800 m. Guizhou, Sichuan.

99. *Carex sociata* Boott, Mem. Amer. Acad. Arts, n.s., 6: 420. 1858.

伴生藁草 ban sheng tai cao

Carex atromucula Hayata; *C. daibuensis* Hayata; *C. ligata* Boott ex Benth. var. *strictior* (Kükenthal) Kükenthal; *C. nexa* Boott ex Benth. var. *strictior* Kükenthal; *C. transalpina* Hayata; *C. uraiensis* Hayata.

Rhizome short. Culms tufted, 20–50 cm tall, slender, smooth. Basal sheaths bladeless, dark brown, disintegrated into fibers. Leaf blades 3–6 mm wide, flat, rather stiff to herbaceous, with rather short sheaths. Lower 2–4 involucral bracts leaflike, nearly equaling inflorescence, lowest one with rather long sheath. Spikes 4–8, spaced or upper 2 or 3 contiguous; terminal spike male, green, linear-cylindric, 1.5–3 cm; lateral spikes female, rarely androgynous or very rarely with a few male flowers at base, single or binate at each node, green, cylindric or oblong-cylindric, 15–40 × 3–4 mm, densely flowered; peduncles slightly exerted or enclosed in involucral bract sheaths. Female glumes oblong, ca. 3 mm (including awn), membranous, 1–3-veined green costa excurrent into a short awn 0.7–1 mm. Utricles elliptic-fusiform, trigonous, ca. 2.5 mm, puberulent, many veined, abruptly contracted at both ends, apex shortly beaked, orifice shallowly 2-toothed. Nutlet tightly enveloped, ca. 1.5 mm, trigonous, abruptly contracted at both ends, apex discoid-annulate; style base thickened; stigmas 3.

Grasslands, forests. Taiwan [Japan].

No specimens have been seen by the present authors. The description is largely taken from Fl. Taiwan (5: 338–340. 1978).

100. *Carex dolichostachya* Hayata, Icon. Pl. Formosan. 10: 61. 1921.

长穗藁草 chang sui tai cao

Rhizome stout, covered with fibrous remains of scales. Culms several to a clump, 30–60 cm tall, slender, smooth. Basal sheaths bladeless, purple-brown to dark brown, usually split into fibers. Leaves shorter or longer than culm, blades 3–10 mm wide, flat, leathery, stiff, scabrous along margins and on abaxial midvein. Involucral bracts sheathed, sheath 1–3.5 cm, lower involucral bracts leaflike, upper ones bristlelike, shorter than to nearly equaling subtending spike. Spikes 4 or 5; terminal spike male, linear-cylindric, 35–50 × 1.5–2 mm; lateral spikes female, linear-cylindric to cylindric, 20–40 × 1.5–3 mm, loosely flowered; peduncles slender, erect, 1.5–7 cm. Female glumes obovate-oblong, 2.5–3.5 mm, membranous, 1–3-veined green costa excurrent into a mucro, apex rounded. Utricle longer than glume, ovate-fusiform, 2.5–4 mm, puberulent or more densely pubescent, prominently many veined, base attenuate into a short stipe, apex attenuate into a short beak, orifice 2-toothed. Nutlet tightly enveloped, ovate, trigonous, 2–2.5 mm, apex discoid-annulate; style base thickened, persistent; stigmas 3.

Forests, ditch sides on mountain slopes; 800–1600 m. Anhui, Shaanxi, Sichuan, Taiwan, Zhejiang [Japan, Philippines].

1a. Utricle 3.5–4 mm, puberulent;
leaf blade 5–10 mm wide 100a. subsp. *dolichostachya*

1b. Utricle 2.5–3.5 mm, more densely
pubescent; leaf blade 3–5 mm
wide 100b. subsp. *trichosperma*

100a. *Carex dolichostachya* subsp. *dolichostachya*

长穗藁草(原亚种) chang sui tai cao (yuan ya zhong)

Carex matsudae (Hayata) Hayata ex Makino & Nemoto; *C. qimenensis* S. W. Su & S. M. Xu; *C. rankanensis* Hayata; *Diplocarex matsudae* Hayata.

Leaf blade 5–10 mm wide. Utricle 3.5–4 mm, puberulent.

Forests, ditch sides on mountain slopes; 800–1600 m. Anhui, Shaanxi, Sichuan, Taiwan, Zhejiang [Japan, Philippines].

100b. *Carex dolichostachya* subsp. *trichosperma* (Ohwi) T. Koyama, Fl. Taiwan 5: 341. 1978.

阿里山宿柱藁 a li shan su zhu tai

Carex trichosperma Ohwi, Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 6: 241. 1931.

Leaf blade 3–5 mm wide. Utricle 2.5–3.5 mm, more densely pubescent.

• Forests. Taiwan.

101. *Carex rugata* Ohwi, Acta Phytotax. Geobot. 1: 76. 1932.

横纹藁草 heng wen tai cao

Rhizome short, with creeping stolons. Culms arising from axils of leaves, 20–50 cm tall, slender, obtusely trigonous, smooth, clothed at base with fibrous remains of old basal leaf sheaths. Leaves slightly shorter than or nearly equaling culm, blades 2–4(–5) mm wide, flat, glabrous, margins scabrid. Involucral bracts with blades, longer than subtending spike, sheathed, sheath 0.5–2.5 cm. Spikes 4 or 5, upper spikes contiguous, lower ones spaced; terminal spike male, linear-cylindric, 10–20 × 1.5–2 mm, sessile or shortly pedunculate, surpassing next female spikelet; lateral spikes female, linear-cylindric, 15–28 × 2–2.5 mm, densely flowered, with peduncle enclosed in involucral bract sheath or shortly exerted. Female glumes yellow-white, oblong, 2.5–3 mm, with 1-veined green costa, apex cuneate, mucronate. Utricle pale green, longer than glume, rhombic-oblong, obtusely trigonous, ca. 3 mm, thinly membranous, glabrous, many veined, apex gradually attenuate into a conic beak, beak ca. 0.5 mm, minutely 2-toothed at orifice. Nutlet tightly enveloped, oblong, ca. 2 mm, with faces excavated both in upper and lower parts, not contracted at angles, base shortly stipitate, apex discoid-annulate; style base slightly thickened; stigmas 3. Fl. and fr. May.

Forest margins on mountain slopes, waysides. Anhui, Fujian [Japan].

102. *Carex duvaliana* Franchet & Savatier, Enum. Pl. Jap. 2: 568. 1878.

三阳藁草 san yang tai cao

Carex sachalinensis F. Schmidt var. *duvaliana* (Franchet & Savatier) T. Koyama; *C. tenuissima* Boott var. *duvaliana* (Franchet & Savatier) Kükenthal.

Rhizome short, with creeping stolons. Culms tufted, 20–35 cm tall, slender, obtusely trigonous, puberulent. Leaves slightly shorter than culm, blades pale green, 1.5–3 mm wide, flat, puberulent; basal sheaths pale yellow to pale brown, densely puberulent. Lower involucre bracts with blades, longer than subtending spike, long sheathed, sheath 1–4.5 mm, upper involucre bracts bristlelike, shortly sheathed, puberulent. Spike 3–5, spaced, sometimes upper ones slightly contiguous; terminal spike male, cylindrical, 15–22 × 2–3 mm, with peduncle 1.5–2 cm; lateral spikes female, cylindrical, 10–20 × 2–3 mm, loosely flowered, with peduncle enclosed in involucre bract sheath or shortly exerted. Female glumes yellowish white, obovate, ca. 3 mm, green costa 1–3-veined, rather prominent and excurrent into a short awn. Utricles pale green, longer than glume, ovate-fusiform, trigonous, 3.5–4 mm, membranous, many veined, sparsely puberulent, base attenuate into a stipe 0.5–1 mm, apex contracted into a medium-sized beak ca. 1 mm, orifice 2-toothed. Nutlet tightly enveloped, ovate, trigonous, 1.5–2 mm, base shortly stipitate, stipe slightly bent, apex discoid-annulate; style short, base conically thickened; stigmas 3. Fl. and fr. May.

Waysides on mountain slopes, forest margins; 600–1700 m. Anhui [Japan].

103. *Carex chungii* Z. P. Wang, J. Nanjing Univ., Nat. Sci. Ed. 1962(2): 45. 1962.

仲氏藁草 *zhong shi tai cao*

Rhizome short. Culms tufted, 25–50 cm tall, slender, trigonous, slightly scabrid. Basal sheaths bladeless or with short blades, usually split into fibers. Leaves longer or shorter than culm, blades 1.5–2(–3) mm wide, flat. Basal involucre bract leafy, rarely shortly leaflike, longer than subtending spike, sheathed, sheath 1–2.2(–3) cm. Spikes (3 or) 4 or 5; terminal spike male, linear-cylindrical, 15–60 × 2–3 mm, with exerted peduncle 0.8–5 cm; lateral spikes female, cylindrical, 1–3.5 cm, 2–3 mm thick, rather densely or loosely flowered, lower ones pedunculate, upper ones subsessile. Female glumes pale, obovate or oblong, 2–2.5 mm (excluding awn), green costa 3-veined, excurrent into an awn 1–2.5 mm. Utricles green, longer than glume, rhombic-elliptic, 3–3.5 mm, membranous, sparsely puberulent, many veined, irregularly excavated, base attenuate, shortly stipitate, apex contracted into a short conic beak, orifice 2-toothed. Nutlet tightly enveloped, ovate, trigonous, ca. 2 mm, with angles contracted at middle, with faces excavated both in upper and lower parts, base shortly stipitate, apex discoid-annulate; style short, base conically thickened; stigmas 3. Fl. and fr. Apr–May.

• Forests on mountain slopes, waysides, bogs. Anhui, Fujian, Henan, Hunan, Jiangsu, Shaanxi, Sichuan, Zhejiang.

- 1a. Male spike 1.5–2.5 cm, with peduncle 0.8–1.2 cm, female spike 10–20 × 2–3 mm, rather densely flowered 103a. var. *chungii*
 1b. Male spike 5–6 cm, with peduncle 3.5–5 cm, female spike (15–)30–35 × ca. 2 mm, rather loosely flowered 103b. var. *rigida*

103a. *Carex chungii* var. *chungii*

仲氏藁草(原变种) *zhong shi tai cao* (*yuan bian zhong*)

Carex anhuiensis S. W. Su & S. M. Xu; *C. truncatirostris* S. W. Su & S. M. Xu; *C. truncatirostris* f. *erostriis* S. W. Su & S. M. Xu; *C. xuanchengensis* S. W. Su & S. M. Xu.

Male spike 1.5–2.5 cm, with peduncle 0.8–1.2 cm; female spike 10–20 × 2–3 mm, rather densely flowered.

• Forests on mountain slopes, waysides. Anhui, Henan, Hunan, Jiangsu, Shaanxi, Sichuan, Zhejiang.

103b. *Carex chungii* var. *rigida* Y. C. Tang & S. Yun Liang, Fl. Reipubl. Popularis Sin. 12: 522. 2000.

坚硬藁草 *jian ying tai cao*

Male spike 5–6 cm, with peduncle 3.5–5 cm; female spike (15–)30–35 × ca. 2 mm, loosely flowered.

• Bogs. Fujian, Hunan.

104. *Carex tristachya* Thunberg in Murray, Syst. Veg., ed. 14, 845. 1784.

三穗藁草 *san sui tai cao*

Rhizome short. Culms tufted, 20–45 cm tall, slender, obtusely trigonous, smooth. Basal sheath dark brown, split into fibers. Leaves shorter than or nearly equaling culm, blades 2–4(–5) mm wide, flat, margins scabrid. Involucre bracts leaflike, longer than subtending spikes, sheathed, sheath 6–12 mm. Spikes 4–6, upper ones contiguous and fastigiate, sometimes lowest one distant; terminal spike male, linear-cylindrical, 10–40 × 1–1.5 mm, subsessile, male glumes free or connate from base to above middle, filament of stamen threadlike or flat, free or connate; lateral spikes cylindrical, 10–30(–35) × 2–3 mm, densely flowered; upper peduncles short and enclosed in involucre bract sheath, lowest one exerted. 2.5–3.5(–5.5) cm, erect, slender. Female glumes pale yellow laterally, elliptic or oblong, ca. 2 mm, costa green, apex obtuse, truncate, or acute, mucronate. Utricles green, longer than glume, erect, ovate-fusiform, trigonous, 3–3.2 mm, membranous, puberulent, many veined, base attenuate and stipitate, apex attenuate into a beak, orifice minutely 2-toothed. Nutlet pale brown, tightly enveloped, ovate, 2–2.5 mm, apex discoid-annulate; style base conically thickened; stigmas 3. Fl. and fr. Mar–May.

Waysides and grasslands on mountain slopes, wet places in forests and field margins, forests; 300–1100 m. Anhui, Fujian, Guangdong, Guangxi, Hainan, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Zhejiang [Japan, Korea].

- 1a. Male glumes free, filament of stamen threadlike, free 104a. var. *tristachya*
 1b. Male glumes connate from base to above middle, filament of stamen flat and connate 104b. var. *pocilliformis*

104a. *Carex tristachya* var. *tristachya*

三穗藁草(原变种) *san sui tai cao* (*yuan bian zhong*)

Male glumes free; filaments of stamens threadlike, free.

Waysides on mountain slopes, wet places in forests. Anhui, Hainan, Hunan, Jiangsu, Zhejiang [Japan, Korea].

104b. *Carex tristachya* var. *pocilliformis* (Boott) Kükenthal in Engler, Pflanz. 38(IV. 20): 473. 1909.

合鳞藁草 he lin tai cao

Carex pocilliformis Boott, Ill. Gen. Carex 4: 175. 1867; *C. tristachya* subsp. *pocilliformis* (Boott) T. Koyama.

Male glumes connate from base to above middle; filaments of stamens flat and connate.

Grasslands on mountain slopes, forests, wet places in field margins; 300–1100 m. Anhui, Fujian, Guangdong, Guangxi, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Zhejiang [Japan, Korea].

105. *Carex pseudotristachya* X. F. Jin & C. Z. Zheng, Acta Phytotax. Sin. 42: 543. 2004.

拟三穗藁草 ni san sui tai cao

Rhizome short. Culms tufted, 15–20 cm tall, slender, triquetrous, smooth. Basal sheaths dark brown, disintegrating into persistent fibers. Leaves equaling to exceeding culm, blades 3–5 mm wide, flat, slightly verruculose on upper surface, scabrid along involute margins. Involucral bracts leaflike, shorter or longer than subtending spikes, sheath 5–10 mm. Spikes 2–4, upper ones separated; terminal spike male, linear, 10–25 × ca. 1 mm, subsessile, male glumes with connate margins from base to middle, filament of stamen flat, free (not connate); lateral spikes cylindrical, 10–25 × ca. 3 mm, sparsely flowered; upper peduncles short and enclosed in involucral bract sheath, lowest one exserted, 0.5–1 cm, erect, slender. Female glumes pale brown, broadly ovate, ca. 1.5 mm, apex acute. Utricles yellowish green, longer than glume, erect, ovate-fusiform, trigonous, 4.5–5 mm, membranous, puberulent, many veined, base attenuate and stipitate, apex gradually attenuate into a beak, orifice minutely 2-toothed. Nutlet yellowish, tightly enveloped, ovate, ca. 3 mm, apex discoid-annulate; style base conically thickened; stigmas 3. Fl. and fr. Apr–May.

- Forests, roadsides; ca. 1200 m. S Zhejiang (Baishanzu).

106. *Carex mitrata* Franchet, Bull. Soc. Philom. Paris, sér. 8, 7: 88. 1895.

灰帽藁草 hui mao tai cao

Rhizome short. Culms 10–30 cm tall, slender, obtusely trigonous, smooth. Basal sheaths brown. Leaves longer than culm, blades 1.5–2(–3) mm wide, flat, scabrid. Basal involucral bract bristlelike, shorter than inflorescence, shortly sheathed, sheath 3–4 mm. Spikes 3 or 4, upper ones contiguous, lowest one slightly spaced; terminal spike male, oblong-linear or linear, sessile or shortly pedunculate; lateral spikes female, cylindrical, 5–15 × 2–3 mm, slightly densely flowered, upper ones subsessile, lowest one with peduncle enclosed in involucral bract sheath or shortly exserted. Female glumes pale brown, obovate-oblong, ca. 2 mm, green costa 1-veined, apex acute, usually mucronate or shortly awned. Utricles pale yellow-green, longer than or nearly equaling glume, ovate-fusiform, obtusely trigonous, 2–2.5 mm, membranous, sparsely puberulent or subglabrous, many veined, base attenuate and shortly stipitate, apex contracted into a conic beak, orifice truncate or emarginate. Nutlet tightly enveloped, ovate, 1.5–2 mm, base shortly sti-

tate, apex discoid-annulate; style base conically thickened; stigmas 3.

Sandy slopes, bamboo forests, grasslands on mountain slopes. Anhui, Hubei, Jiangsu, Sichuan, Taiwan, Zhejiang [Japan, Korea].

- 1a. Male spike 1–1.7 cm, linear; female glume usually mucronate 106a. var. *mitrata*
- 1b. Male spike shorter, oblong-linear; female glume shortly awned 106b. var. *aristata*

106a. *Carex mitrata* var. *mitrata*

灰帽藁草(原变种) hui mao tai cao (yuan bian zhong)

Male spike 1–1.7 cm, ca. 1 mm thick, linear. Female glume usually mucronate at apex. Fl. and fr. Apr–May.

Sandy slopes, bamboo forests. Anhui, Jiangsu, Zhejiang [Japan, Korea].

106b. *Carex mitrata* var. *aristata* Ohwi, Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 5: 269. 1930.

具芒灰帽藁草 ju mang hui mao tai cao

Carex mitrata subsp. *aristata* (Ohwi) T. Koyama.

Male spike oblong-linear, shorter than that of typical variety. Female glumes shortly awned at apex. Fl. and fr. Apr–May.

Grasslands on mountain slopes; ca. 1600 m. Anhui, Hubei, Jiangsu, Sichuan, Taiwan, Zhejiang [Japan].

107. *Carex shanghaiensis* S. Yun Liang, Acta Phytotax. Sin. 34: 94. 1996.

上杭藁草 shang hang tai cao

Rhizome short. Culms 15–40 cm tall, slender, trigonous. Basal sheath dark brown, split into fibers. Leaves longer than culm, blades 1–2 mm wide, leathery, margins scabrid, revolute, apex acuminate. Involucral bract bristlelike, longer than inflorescence, 2.5–3 cm, shortly sheathed ca. 1.5 mm. Spikes 2; terminal spike male, pale yellow, ovate-clavate, 7–10 mm, with peduncle 5–12 mm; lateral spike androgynous, oblong-ovate or suborbicular, 7–12 × 5–8 mm, densely flowered, subsessile. Female glumes pale yellow, oblong, ca. 2 × 1 mm, midvein distinct, apex obtuse. Utricle stramineous, longer than glume, ovate-lanceolate, 3.5–3.8 mm, membranous, densely puberulent, many veined, base attenuate, apex attenuate into a beak, orifice 2-toothed. Nutlet chestnut-colored, loosely enveloped, oblong, trigonous, apex discoid-annulate; style base thickened; stigmas 3. Fl. and fr. Aug.

- Forests; ca. 600 m. Fujian.

108. *Carex orthostemon* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30: 389. 1911.

直蕊藁草 zhi rui tai cao

Carex breviculmis R. Brown var. *cupulifera* (Hayata) Y. C. Tang & S. Yun Liang; *C. orthostemon* var. *cupulifera* Hayata.

Plants densely tufted with short erect rhizome. Culms slender, 6–30 cm tall, ± recurved. Leaves shorter than to briefly overtopping culms, blades 2–5 mm wide; sheaths short, brownish, eventually disintegrating into brown fibers. Involu-

cral bracts shortly sheathing (3–6 mm), lower 1 or 2 bladed and surpassing spikes. Spikes 2–4, subfastigiate or lowest spaced; terminal spike male, pale brownish, linear-oblong, several flowered; lateral spikes female, ovoid to oblong, 5–20 mm, laxly several flowered, subsessile or lower ones with short enclosed peduncle. Female glumes tinged with light brown, ovate, ca. 2 mm, costa ending in a short mucro at acute apex. Utricles much longer than glume, lanceolate-oblong, suberect, 3.5–4.5 mm, sparsely pubescent, slenderly many veined, base gradually narrowed to a shortly stipe, apex gradually attenuate into a short beak, orifice shallowly 2-lobed. Nutlets tightly enveloped, lanceolate-oblong, 2.5–3 mm, base shortly stipitate, apex annulate; style base dilated; stigmas 3.

- Grassy openings of mountain forests. Taiwan.

This is a good species that can be readily separated from the widespread *Carex breviculmis* not only by its slender lanceolate-oblong (vs. obovate) utricles but by its subleathery (vs. herbaceous) leaves.

109. *Carex breviculmis* R. Brown, Prodr. 242. 1810.

青绿藁草 qing lü tai cao

Rhizome short or elongate and stoloniferous. Culms tufted, 8–40 cm tall, trigonous, scabrid above. Basal sheaths pale brown, split into fibers. Leaves shorter than culm, blades 2–3(–5) mm wide, flat, stiff, margins scabrid. Lowest involucre bract leafy, longer than inflorescence, shortly sheathed, sheath 1.5–2 mm, remaining bracts bristlelike, nearly sheathless. Spikes 2–5, upper ones contiguous, lower ones spaced; terminal spike male, oblong, 10–15 × 2–3 mm, subsessile, close to next female spike; lateral spikes female, oblong or oblong-ovate, subcylindric, 6–15(–20) × 3–4 mm, densely flowered, sessile or lowest one with peduncle 2–3 mm. Female glumes pale, oblong or obovate-oblong, 2–2.5 (excluding awn) × 1.2–2 mm, membranous, green costa 3-veined and excurrent into an awn 2–3.5 mm, apex truncate or rounded. Utricles pale green, nearly equaling glume, obovate, obtusely trigonous, membranous, densely puberulent above, several veined, base attenuate and shortly stipitate, apex abruptly contracted into a conic beak, orifice emarginate. Nutlet chestnut-colored, tightly enveloped, ovate, ca. 1.8 mm, apex discoid-annulate; style base conically thickened; stigmas 3.

Grasslands on mountain slopes, waysides, ditch sides in valleys; 400–2300 m. Anhui, Fujian, Gansu, Guangdong, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [India, Japan, Korea, Myanmar, Russia (Far East)].

- 1a. Rhizome short; culm slender 109a. var. *breviculmis*
 1b. Rhizome stoloniferous; culm
 much stouter 109b. var. *fibrillosa*

109a. *Carex breviculmis* var. *breviculmis*

青绿藁草(原变种) qing lü tai cao (yuan bian zhong)

Carex breviculmis f. *filiculmis* (Franchet & Savatier) Kükenthal; *C. breviculmis* f. *longearistata* Kükenthal; *C. breviculmis* subsp. *royleana* (Nees) Kükenthal; *C. filiculmis* Franchet & Savatier; *C. leucochlora* Bunge; *C. leucochlora* var. *filiculmis* (Franchet & Savatier) Kitagawa; *C. leucochlora*

f. *longearistata* (Kükenthal) Kitagawa; *C. leucochlora* var. *longearistata* (Kükenthal) Kitagawa; *C. leucochlora* var. *morrisonicola* (Hayata) Katsuyama; *C. leucochlora* var. *petrogena* Kitagawa; *C. morrisonicola* Hayata; *C. royleana* Nees.

Rhizome short. Culm slender. Utricle 2–2.5 × 1.2–2 mm. Fl. and fr. Mar–Jun.

Grasslands on mountain slopes, waysides, ditch sides in valleys; 400–2300 m. Anhui, Fujian, Gansu, Guangdong, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [India, Japan, Korea, Myanmar, Russia (Far East)].

109b. *Carex breviculmis* var. *fibrillosa* (Franchet & Savatier) Kükenthal ex Matsumura & Hayata, Enum. Pl. Formosa, 493. 1906.

纤维青藁 xian wei qing jian

Carex fibrillosa Franchet & Savatier, Enum. Pl. Jap. 2: 564. 1878; *C. breviculmis* f. *fibrillosa* (Franchet & Savatier) Kükenthal; *C. breviculmis* subsp. *fibrillosa* (Franchet & Savatier) T. Koyama; *C. leucochlora* f. *fibrillosa* (Franchet & Savatier) K. T. Fu; *C. pallens* Z. P. Wang.

Rhizome stoloniferous. Culm much stouter than that of typical variety. Utricles with more prominent veins.

Sandy places along waysides. Anhui, Gansu, Shaanxi, Taiwan [Japan, Korea].

110. *Carex hypochlora* Freyn, Oesterr. Bot. Z. 53: 26. 1903.

绿囊藁草 lü nang tai cao

Rhizome short. Culms tufted, 20–45 cm tall, slender, obtusely trigonous. Basal sheaths dark brown, split into fibers. Leaves longer than culm, blades 1–2.5 mm wide, flat, margins scabrid. Lowest involucre bract leafy, longer than subtending spike, shortly sheathed, sheath 1–1.5 mm. Spikes 2 or 3; terminal spike male, clavate, 8–15 × 3–4 mm, with peduncle 5–9 mm; lateral spikes female, orbicular to ovate or oblong, 4–7 × 3–4 mm, densely flowered, with short peduncle 2–4 mm. Female glume pale brown, broadly elliptic or obovate-oblong, ca. 2.5 × 1.2 mm, membranous, green costa 1-veined, excurrent into a scabrid mucro. Utricle pale yellowish green, longer than glume, rhombic-elliptic or broadly ovate, obtusely trigonous, ca. 2.5 mm, puberulent, distinctly veined abaxially, faintly veined adaxially, base abruptly contracted into a very short stipe, apex abruptly contracted into a conic beak, orifice 2-toothed. Nutlet pale brown, tightly enveloped, ovate, trigonous, ca. 1.5 mm, apex discoid-annulate; stigmas 3. Fl. and fr. May–Jun.

Meadows on mountain slopes, *Pinus* forests; 400–500 m. Heilongjiang, Jilin, Liaoning [Korea, Russia (Far East)].

111. *Carex davidii* Franchet, Pl. David. 1: 319. 1884.

无喙囊藁草 wu hui nang tai cao

Carex kengiana Z. P. Wang.

Rhizome obliquely ascending. Culms tufted, 20–65 cm tall, slender, obtusely trigonous. Basal sheaths dark brown, split

into fibers. Leaves longer than culm, blades 2–5 mm wide, flat, margins scabrid. Involucral bracts shortly leafy, shorter than subtending spike, long sheathed, lowest sheath 1.5–3 mm. Spikes 3–5, spaced; terminal spike male, clavate-cylindric, 12–40 × 3–5 mm, with peduncle 2.5–5.5 cm; lateral spikes female, cylindric, 12–40 × 3–6 mm, densely flowered; peduncle erect, lowest one exerted, upper ones enclosed in involucral bract sheath. Female glumes pale yellowish white, oblong, 2.5–3 mm, green costa 3-veined, excurrent into a scabrid awn 2.5–3 mm, apex truncate or emarginate. Utricles green, obovate-elliptic or elliptic, trigonous, ca. 3 mm, membranous, puberulent, many veined, base abruptly contracted into a very short stipe ca. 0.5 mm, apex abruptly contracted and nearly beakless, orifice truncate. Nutlet tightly enveloped, obovate, trigonous, ca. 2 mm, with faces excavated in lower part, apex abruptly contracted into an annulus; style base slightly thickened; stigmas 3. Fl. and fr. Apr–Jun.

• Grasslands on mountain slopes, forest margins; 400–1200 m. Anhui, Gansu, Hubei, Shaanxi, Sichuan, Zhejiang.

112. *Carex breviaristata* K. T. Fu, Fl. Tsinling. 1(1): 444. 1976.

短芒藁草 duan mang tai cao

Rhizome obliquely ascending. Culms tufted, 15–35 cm tall, slender, compressed trigonous, smooth. Basal sheaths dark brown, split into fibers. Leaves longer or shorter than culm, blades 3–5 mm wide, flat, margins scabrid. Involucral bracts shortly leafy, shorter than inflorescence, long sheathed, sheath 1.2–2 mm. Spikes 3 or 4, spaced; terminal spike male, clavate-cylindric, 15–30 × 2–3 mm, with peduncle (0.5–)1.5–5 cm; lateral spikes female, cylindric, 17–30 × 3–4 mm, densely flowered; peduncle enclosed in involucral bract sheath but lowest one exerted. Female glumes pale, obovate-oblong, ca. 2.5 mm (excluding awn), green costa 3-veined, excurrent into a scabrid awn 1.5–2 mm, apex obtuse or rounded. Utricles pale green, longer than or equaling glume, sometimes slightly recurved, elliptic or obovate, ca. 3 mm, membranous, sparsely puberulent, many veined, base attenuate into a short stipe, apex attenuate into a short beak; beak conic, recurved, 2-toothed at orifice. Nutlet pale brown, tightly enveloped, obovate, trigonous, ca. 1.8 mm, base shortly stipitate, apex contracted into a short neck, neck apex discoid-annulate; style base conically thickened; stigmas 3. Fl. and fr. Apr–Jul.

• Grasslands on mountain slopes, wet and shady places in forests; 400–1800 m. Anhui, Gansu, Hunan, Shaanxi, Zhejiang.

113. *Carex subbracteata* (Kükenthal) Ohwi, Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 6: 252. 1931.

小苞叶藁草 xiao bao ye tai cao

Carex pisiformis Boott var. *subbracteata* Kükenthal in Engler, Pflanzenr. 38(IV. 20): 477. 1909.

Rhizome with slender stolons. Culms tufted, 15–30 cm tall, slender, compressed trigonous, smooth. Basal sheaths pale brown or brown, split into fibers. Leaves shorter than culm, blades 1.5–2.5 mm wide, flat, scabrid adaxially and along margins. Involucral bracts bristlelike, shorter than subtending spike, sheathed, sheaths 5–7 mm. Spikes 2 or 3, spaced; terminal spike

male, sometimes close to next female spike, narrowly cylindric or clavate, 12–18 × 2–3 mm, with peduncle 0.4–2.5 cm; lateral spikes female, cylindric or oblong, 6–12 × ca. 3 mm, rather densely flowered, with peduncle enclosed in involucral bract sheath or slightly exerted. Female glumes rusty colored, obovate or ovate, margins white membranous, green costa with distinct midrib excurrent into a scabrid mucro, apex acute. Utricles pale green, longer than or nearly equaling glume, obovate or broadly obovate, obtusely trigonous, 2–2.7 mm, sparsely puberulent, faintly few veined, base attenuate into a short stipe, apex abruptly contracted into a conic beak, beak slightly recurved, emarginate abaxially and truncate adaxially at orifice. Nutlet tightly enveloped, broadly obovate, obtusely trigonous, 1.2–1.5 mm, base shortly stipitate, apex discoid-annulate; stigmas 3. Fl. and fr. Jul.

Wet places in forests. Heilongjiang, Nei Mongol [Japan, Korea, Russia (Far East, E Siberia)].

114. *Carex qiynensis* S. W. Su & S. M. Xu, Bull. Bot. Res., Harbin 9(1): 50. 1989.

齐云藁草 qi yun tai cao

Rhizome short. Culms tufted, 30–40 cm tall, slender, trigonous, smooth. Basal sheaths pale yellow to pale brown, slightly split into fibers. Leaves slightly longer than culm, blades 2–3 mm wide, flat, stiff, margins scabrid. Involucral bracts shortly leafy or bristlelike, long sheathed, sheaths 1.2–2.2 cm. Spikes 2 or 3, spaced; terminal spike male, narrowly cylindric, 22–65 × 2–3 mm, with peduncle 2–7.5 cm; lateral spikes female, cylindric, 13–30 × 4–6 mm, rather densely flowered, with a few male flowers at apex, with peduncle enclosed in involucral bract sheath or slightly exerted. Female glumes pale or stramineous and pale brown on upper margins, oblong-lanceolate, ca. 3 mm (excluding awn), costa 1-veined, excurrent into a scabrid awn, apex acuminate. Utricles pale brown, shorter than glume, ovate-oblong, trigonous, ca. 3 mm, membranous, glabrous, distinctly many veined, base attenuate into a short stipe, apex attenuate into a beak, orifice obliquely truncate. Nutlet tightly enveloped, ovate, trigonous, ca. 2 mm, with faces slightly excavated in lower part, base shortly stipitate, apex distinctly discoid-annulate; style base conically thickened; stigmas 3. Fl. and fr. Apr.

• Waysides on mountain slopes. Anhui.

115. *Carex capilliformis* Franchet, Bull. Soc. Philom. Paris, sér. 8, 7: 89. 1895.

丝叶藁草 si ye tai cao

Carex capilliformis var. *major* Kükenthal; *C. pisiformis* Boott var. *major* (Kükenthal) T. Koyama.

Rhizome slender. Culms tufted, (6–)10–50 cm tall, hair-like, trigonous, soft, smooth or slightly scabrid. Basal sheaths purple-brown, split into reticulate fibers. Leaves longer or shorter than culm, blades hairlike, 0.5–3 mm wide, involute at margins, scabrid. Involucral bracts ± spathe-like, shorter than subtending spike, sheathed. Spikes 2 or 3, spaced; terminal spike male, pale brown, linear, ca. 10 × 1 mm, with peduncle 2.8–3.3 cm; lateral spikes female, narrowly cylindric, 7–14 ×

ca. 2 mm, with a few rather loose flowers, with hairlike peduncle 1.5–2.5 cm. Female glumes yellow-brown, oblong or oblong-ovate, ca. 3 mm (including mucro), costa scabrid, excurrent into a mucro, apex obtuse or truncate. Utricles dark green, equaling glume, elliptic or oblanceolate-elliptic, obtusely trigonous, ca. 3 mm, densely and shortly hirsute, indistinctly veined, base shortly stipitate, apex abruptly contracted into a beak, orifice truncate. Nutlet gray-black at maturity, tightly enveloped, obovate-oblong, obtusely trigonous, ca. 2 mm, base shortly stipitate, apex discoid-annulate; style base thickened; stigmas 3. Fl. and fr. Jul–Sep.

- Forests on mountain slopes; 2000–3600 m. Shaanxi, Sichuan.

116. *Carex polyschoenoides* K. T. Fu, Fl. Tsinling, 1(1): 444. 1976.

类白穗藁草 lei bai sui tai cao

Carex polyschoenoides var. *fractiflexa* Y. C. Yang.

Rhizome rather long. Culms tufted, 20–35 cm tall, slender, soft, compressed trigonous, smooth. Basal sheaths chestnut-brown, split into fibers. Leaves shorter than culm, blades 2–3 mm wide, flat, slightly scabrid, margins scabrid. Involucral bracts bristlelike, shorter than subtending spike, sheathed, sheath 1–2.2 cm. Spikes 3–5, spaced; terminal spike male, narrowly cylindrical, 25–40 × 2–3 mm, with peduncle 2.5–4 cm; lateral spikes female, linear, 13–27 × 1.5–2 mm, loosely flowered, peduncles enclosed in involucral bract sheath. Female glumes pale yellow-brown, ovate, 2–2.5 mm (excluding mucro), distinct midvein excurrent into a mucro, apex truncate or acute. Utricles pale green, slightly longer than or equaling glume, elliptic, trigonous, ca. 3 mm, shortly hirsute, many veined, base attenuate, apex attenuate into a slightly recurved beak, orifice truncate. Nutlet pale brown, tightly enveloped, obovate-elliptic, trigonous, ca. 2.5 mm, base stipitate, apex discoid-annulate; stigmas 3. Fl. and fr. Apr–May.

- Streamsides in valleys, waysides, rock crevices; 900–1900 m. Anhui, S Gansu (Xiaolong Shan), Shaanxi.

117. *Carex pisiformis* Boott in A. Gray, Narr. Exped. China Japan, 324. 1857.

豌豆形藁草 wan dou xing tai cao

Carex albomas C. B. Clarke; *C. alterniflora* Franchet; *C. bauhwaensis* Z. P. Wang; *C. conicoides* Honda; *C. duvaliana* Franchet & Savatier var. *alterniflora* (Franchet) Kükenthal ex Matsumura; *C. fernaldiana* H. Léveillé & Vaniot; *C. pisiformis* var. *alterniflora* (Franchet) T. Koyama; *C. pisiformis* var. *feraldiana* (H. Léveillé & Vaniot) T. Koyama; *C. pisiformis* var. *koreana* (Nakai) T. Koyama; *C. pisiformis* f. *polyschoena* (H. Léveillé & Vaniot) Kükenthal; *C. pisiformis* var. *sachalinensis* (F. Schmidt) Kükenthal ex Matsumura; *C. polyschoena* H. Léveillé & Vaniot; *C. sachalinensis* F. Schmidt; *C. sachalinensis* subsp. *alterniflora* (Franchet) T. Koyama; *C. sachalinensis* var. *alterniflora* (Franchet) Ohwi; *C. sachalinensis* var. *conicoides* (Honda) Ohwi; *C. sachalinensis* subsp. *feraldiana* (H. Léveillé & Vaniot) T. Koyama; *C. sachalinensis* var. *feraldiana* (H. Léveillé & Vaniot) T. Koyama; *C. umbrosa* Host var. *koreana* Nakai.

Rhizome short or stoloniferous. Culms tufted, 15–50 cm tall, slender, compressed trigonous, smooth or slightly scabrid. Basal sheaths pale yellow-brown to rusty brown. Leaves shorter or longer than culm, blades 2–3(–4) mm wide, flat, margins scabrid. Involucral bracts sheathed, sheath 5–18 mm, lower ones leafy, upper ones bristlelike, shorter than or equaling inflorescence. Spikes 2–4, spaced; terminal spike male, narrowly cylindrical, 15–20 mm; lateral spikes female, sometimes with male flowers at apex, oblong-cylindric or narrowly cylindrical, 10–30 × 2–3 mm, loosely flowered, peduncles enclosed in involucral bract sheath or slightly exerted. Female glumes pale or pale brown, obovate, green costa 1–3-veined, excurrent into a mucro, apex truncate. Utricles pale yellow-green, longer than or nearly equaling glume, ovate-elliptic, obtusely trigonous, ca. 3 mm, densely puberulent, slightly many veined, base attenuate into a short stipe, apex attenuate into a conic beak, orifice 2-toothed. Nutlet gray-black at maturity, tightly enveloped, ovate, trigonous, ca. 1.5 mm, base shortly stipitate, apex discoid-annulate; stigmas 3. Fl. and fr. May–Jun.

Forests on mountain slopes, waysides; 400–1400 m. Anhui, Hebei, Liaoning, Shandong [Japan].

118. *Carex hezhouensis* Hong Wang & S. N. Wang, Guihaia 25: 105. 2005.

贺州藁草 he zhou tai cao

Rhizome short. Culms tufted, 20–55 cm tall, slender, compressed trigonous with rounded angles, smooth, covered at base by dark brown bladeless sheaths. Leaves shorter or longer than culm, blades 2.5–4 mm wide, flat, trabeculate, margins scabrid. Lower involucral bracts leaflike, short, upper one bristlelike, shorter than subtending spike, sheath 1–2 cm. Spikes 4 or 5; terminal spike male, linear, 30–60 mm, with peduncle 1–2.5 cm; lateral spikes female, widely spaced, linear-cylindric, 10–35 × 3–5 mm, laxly flowered, ± erect, peduncle 0.6–5 cm, all except upper ones slightly exerted from bract sheath. Male glumes narrowly oblanceolate, ca. 6 mm, apex obtuse. Female glumes pale brown, ovate-oblong, 7.5–8 mm, costa 1-veined, apex subacute. Utricles longer than glume, oblong-ellipsoid, 3–4 mm, glabrous, prominently many veined, base narrowly cuneate, not stipitate, apex with straight beak 0.8–1 mm, orifice 2-toothed. Nutlet ashy brown, tightly enveloped, ellipsoid, trigonous, 1.5–2 mm, with angles not constricted at middle, base cuneate to substipitate, apex contracted into a short pilose beak; style base slightly thickened; stigmas 3. Fl. and fr. Apr.

- Mountain forests; ca. 500 m. E Guangxi (Hezhou).

119. *Carex nervata* Franchet & Savatier, Enum. Pl. Jap. 2: 566. 1878.

截嘴藁草 jie zui tai cao

Carex caryophyllea Latourrette subsp. *nervata* (Franchet & Savatier) Kükenthal.

Rhizome slender, creeping. Culms 10–27 cm tall, slender, compressed trigonous, smooth or slightly scabrid. Basal sheaths brown, split into fibers. Leaves shorter than culm, blades 1.5–2.5 mm wide, flat, soft, margins scabrid. Involucral bracts bristlelike, lowest equaling or longer than subtending spike, sheathed, sheath 4–8 mm. Spikes 2–4, upper ones ± contiguous;

terminal spike male, narrowly lanceolate or oblanceolate, (5–)8–18 × 1.5–2 mm, with peduncle 8–15 mm; lateral spikes female, oblong or shortly cylindric, 8–15 × 2–3 mm, slightly loosely flowered, with peduncles 6–20 mm. Female glumes pale rusty colored, obovate to ovate, ca. 2.5 mm, green costa 1–3-veined, margins white membranous, apex acute or obtuse. Utricles pale yellow-green, slightly longer than glume, ovate-elliptic, obtusely trigonous, 2.5–3 mm, sparsely puberulent at upper part, distinctly and slenderly many veined, base narrowly cuneate, apex attenuate into a conic beak, orifice emarginate abaxially and truncate adaxially. Nutlet tightly enveloped, elliptic, trigonous, ca. 1.8 mm, base shortly stipitate, apex discoid-annulate; stigmas 3. Fl. and fr. Jun–Jul.

Grasslands on mountain slopes, broad-leaved forests, thickets. Heilongjiang, Jilin, Nei Mongol [Japan, Korea, Russia (Far East)].

120. *Carex kiangsuensis* Kükenthal, Repert. Spec. Nov. Regni Veg. 27: 109. 1929.

江苏薹草 *jiang su tai cao*

Carex conica Boott ex Perry var. *densa* Kükenthal.

Rhizome short. Culms tufted, 20–45 cm tall, slender, compressed trigonous, smooth, slightly scabrid above. Basal sheaths bladeless, dark brown, split into fibers. Leaves shorter than culm, blades 2–3 mm wide, flat, ± stiff, margins scabrid. Involucral bracts bristlelike, shorter than inflorescence, sheathed, sheath (3–)5–8 mm. Spikes 3 or 4, spaced; terminal spike male, oblong-elliptic or clavate, 12–25 × 3–5 mm, with peduncle 1–2 cm; lateral spikes female, oblong or narrowly cylindric, 8–15 × 2–3 mm, subdensely flowered, with peduncles enclosed in involucral bract sheath. Female glumes pale brown, diluted colored on margins, broadly ovate or obovate, 2.5–3 × ca. 1.8 mm, costa with distinct midvein excurrent into a mucro at apex, apex emarginate or ± acute. Utricles pale green, slightly shorter than glume, ovate-oblong, trigonous, 3–3.5 mm, glabrous, slenderly many veined, base attenuate into a short stipe, apex attenuate into a conic beak, orifice truncate. Nutlet tightly enveloped, oblong-ovate, trigonous, ca. 2.5 mm, base shortly stipitate, apex discoid-annulate; style base thickened; stigmas 3. Fl. and fr. Apr–May.

• Forest margins on mountain slopes, waysides. Anhui, Jiangsu.

20. *Carex* sect. *Radicales* (Kükenthal) Nelmes, Reinwardtia 1: 389. 1951.

根穗薹草组 *gen sui tai cao zu*

Dai Lunkai (戴伦凯); Tetsuo Koyama

Carex subsect. *Radicales* Kükenthal in Engler, Pflanzenz. 38(IV. 20): 480. 1909.

Involucral bracts leaflike, longer than inflorescence, long sheathed. Spikes androgynous, 1 to several, usually remote, lowest spike borne from middle part or base of culm, rarely contiguous. Utricles papery or subleathery, pubescent, hispidulous, or glabrous, usually ciliate on margins, many veined, apex abruptly contracted into a short beak. Style base usually thickened, rarely not thickened; stigmas 3.

About 20 species: E, S, and SE Asia; 13 species (ten endemic) in China.

- 1a. Culms 35–55 cm tall; leaf blades 8–20 mm wide; spikes 2–6, cylindric, 4–6 cm, 3–5 mm thick; peduncles short, enclosed in involucral bract sheath; utricles glabrous; style base not thickened 121. *C. courtallensis*
- 1b. Culms not exceeding 30 cm tall; leaf blades 2–5 mm wide or filiform; spikes 1–5, ovate to cylindric, 3–40 mm, 2–6 mm thick; peduncles slender, exerted from involucral bract sheath; utricles pubescent, hispidulous, or glabrous; style base thickened.
 - 2a. Culms short, shorter than leaves; involucral bract leaf setaceous or scalelike; utricles 2–2.5 mm; style densely brown granular-punctate.
 - 3a. Culms obtusely trigonous, filiform, not exceeding 0.5 mm thick; involucral bract leaf setaceous; spikes ovate or ovate-oblong, 2–5 mm; style flat 122. *C. tsoi*
 - 3b. Culms flat, ca. 1 mm thick; involucral bract leaf scalelike; spikes cylindric, 5–10 mm; style cylindric 123. *C. planiscapa*
 - 2b. Culms long, longer than or equaling leaves; involucral bract leaflike; utricles 3.5–6.5 mm; style smooth or hairy, sometimes style and nutlets granular-punctate.
 - 4a. Leaves subleathery, stiff; culms robust, stiff.
 - 5a. Spikes ovate, 2.5–3 cm, 8–10 mm thick; utricles 6–6.5 mm 133. *C. pterocaulos*
 - 5b. Spikes cylindric, 2.5–4.5 cm, 5–6 mm thick; utricles not surpassing 5.5 mm.
 - 6a. Leaf blades flat, 3–4 mm wide; utricles ovate; nutlets smooth 131. *C. caudispicata*
 - 6b. Leaf blades linear, ca. 1 mm wide; utricles elliptic or oblong; nutlets granular-punctate on surface 132. *C. anningensis*
 - 4b. Leaves herbaceous, soft; culms thin.
 - 7a. Spikes 4–6, lowermost one remote, others approximate, peduncles rather short, enclosed in involucral bract sheath, except lowermost one 124. *C. cylindrostachys*
 - 7b. Spikes 1–3, remote, borne at middle part or base of culm, except terminal spike, long pedunculate and exerted, male flower part usually shorter than or nearly equaling female flower part.

- 8a. Culms and leaves hispidulous; culms, female glumes, and utricles granular-punctate on surface; style thickened, globose 125. *C. chlorocephala*
- 8b. Culms and leaves glabrous; culms, female glumes, and utricles not granular-punctate on surface; style base thickened.
- 9a. Spikes ovate; lower female glumes with a rather long or short awn at apex.
- 10a. Utricles hispidulous; style pubescent; spikes 5–8 mm 126. *C. chuana*
- 10b. Utricles glabrous; style smooth; spikes 8–20 mm 127. *C. delavayi*
- 9b. Spikes oblong to cylindric; female glumes without an awn at apex.
- 11a. Leaves linear, blades 1–1.5 mm wide; utricles obovate-oblong, 4–4.2 mm; nutlet and style granular-punctate on surface 130. *C. tsaiiana*
- 11b. Leaves flat, blades 2–10 mm wide; utricles oblong or obovate; nutlet and style smooth.
- 12a. Utricles oblong, 4–5 mm, green, thinly few veined, pubescent, eventually glabrescent; style base slightly thickened; leaf blades 4–10 mm wide 128. *C. speciosa*
- 12b. Utricles obovate, ca. 4 mm, yellowish brown, thickly several veined, glabrous; style base thickened, conic; leaf blades 2–4 mm wide 129. *C. funhuangshanica*

121. *Carex courtallensis* Nees ex Boott, Ill. Gen. *Carex* 1: 52. 1858.

隐穗柄薹草 yin sui bing tai cao

Carex speciosa Kunth var. *courtallensis* (Nees ex Boott) Kükenthal.

Rhizome elongate. Culms loosely tufted, 35–55 cm tall, 1.5–2 mm thick, triquetrous, stiff, smooth. Leaves shorter than culm, blades flat, 0.8–2 cm wide, smooth, soft, with few dark brown persistent leaf sheaths. Involucral bracts leaflike, longer than inflorescence, flat, 8–12 mm wide, long sheathed. Spikes 2–6, androgynous, remote, lowest one borne at middle part or base of culm, cylindric, 4–6 cm, 3–5 mm thick, densely many flowered; male part of spike slightly shorter than female part, slightly thin. Female glumes green, ovate or ovate-oblong, 3.5–4 mm, papery, 1-costate and few thinly veined, ciliate on margins of upper part, apex rounded or obtuse. Utricles green, elliptic, slightly inflated trigonous, 4.8–5 mm, papery, glabrous, many veined, base attenuate, spongiform, margins narrowly winged and ciliate, apex abruptly contracted into a short beak, orifice 2-toothed. Nutlets brown at maturity, obovate-oblong, trigonous, 2.5–3 mm, base shortly stipitate, apex rounded and beakless; style base not thickened; stigmas 3. Fl. and fr. May–Aug.

Evergreen broad-leaved forests; 1300–2800 m. Yunnan [India, Laos, Nepal, Vietnam].

122. *Carex tsoi* Merrill & Chun, *Sunyatsenia* 2: 207. 1935.

线茎薹草 xian jing tai cao

Rhizome long, ligneous. Culms densely tufted, usually 1 or 2 borne in a leaf axil, 3–15 cm tall, subfiliform, rather soft, compressed triquetrous, smooth. Leaves equaling or longer than culm, flat, 1–5.5 mm wide, soft, glabrous, with dark brown persistent leaf sheaths. Involucral bracts sheathlike, blade setiform. Spikes 1–5, androgynous, remote, ovate or ovate-oblong, 2–5 mm, ca. 3.5 mm thick, densely many flowered; male part of spike shorter than or nearly equaling female part, slightly thin. Female glumes white or pale green, ovate, 1.2–1.5 mm, papery, 1-costate and laterally few veined, margins narrowly membranous, apex rounded or obtuse. Utricles pale green, longer than glume, ovate-elliptic, compressed trigonous, 2–2.5 mm,

papery, loosely pubescent and ciliate, distinctly 2-veined laterally and thinly few veined, base cuneate, nearly estipitate, apex attenuate into an indistinct short beak, orifice obliquely truncate. Nutlets dark brown at maturity, ovate-oblong, trigonous, sides slightly concave, 1–1.5 mm, base cuneate, nearly estipitate, apex with a slightly recurved beak; style rather inflated, slightly compressed, densely brown granular-punctate; stigmas 3. Fl. and fr. May–Sep.

• On wet rocks in forests, wet grasslands at riversides; 500–800 m. Hainan (Ding'an).

123. *Carex planiscapa* Chun & F. C. How, *Acta Phytotax. Sin.* 7: 82. 1958.

扁茎薹草 bian jing tai cao

Rhizome short. Culms densely tufted, 1 or 2 borne in a leaf axil, 8–18 cm tall, ca. 1 mm thick, compressed, soft and smooth. Leaves 2 × as long as culm or more, flat, 3.5–7 mm wide, soft, glabrous, scabrous on margins, with brown persistent sheaths. Involucral bracts sheathlike, blade scalelike. Spikes usually 1 or 2, androgynous, remote, cylindric, 5–10 mm, 2–3 mm thick; male part of spike 2 × as long as female part or more (rarely both parts equal), densely many flowered; female part few flowered; lateral spike usually borne from upper part of culm, peduncle short and compressed. Female glumes yellowish, broadly ovate or oblong, 1.5–2 mm, papery, green 1-costate and thinly few veined, margins narrowly membranous, apex obtuse. Utricles pale green, ovate-elliptic, compressed trigonous, 2–3 mm, papery, loosely pubescent on upper part, later glabrescent, 2-veined laterally and thinly few veined, base subrounded, margins ciliate, apex attenuate into an indistinct beak, orifice obliquely truncate. Nutlets dark brown at maturity, elliptic, trigonous, sides slightly concave, ca. 2 mm, base cuneate, nearly estipitate, apex attenuate, with a second and short beak; style cylindric, brown granular-punctate, base slightly thickened; stigmas 3. Fl. and fr. Sep–Dec.

• On rocky mountain slopes in forests or grasslands at riversides; 1600–2800 m. Hainan (Wuzhi Shan).

124. *Carex cylindrostachys* Franchet, *Bull. Soc. Philom. Paris*, sér. 8, 7: 32. 1895.

柱茎薹草 zhu sui tai cao

Rhizome long, ligneous, creeping or obliquely ascending. Culms dark brown, loosely tufted, 12–20 cm tall, 1.5–2 mm thick, stiff, triquetrous, scabrous on angles, persistent sheathed at base. Leaves longer than culm, flat, blades 2–3 mm wide, stiff, slightly scabrous. Involucral bracts leaflike, longer than inflorescence, ca. 2 mm wide, long sheathed. Spikes 4–6, androgynous, cylindric, 2–3 cm, ca. 2.5 mm thick, lowermost one remote and with an erect and long peduncle, remaining spikes approximate, with very short peduncle and usually enclosed; male part of spike longer than female part, densely many flowered; female part densely few flowered. Female glumes pale green laterally, green at middle, oblong, 4–4.5 mm, papery, 3-veined, thinly several veined, margins white hyaline, apex acute. Utricles greenish, longer than glume, obovate-oblong or oblong, trigonous, 4.5–5 mm, papery, densely pubescent, 2-veined laterally and thinly several veined, base contracted into a ± long stipe, margins very narrowly winged, ciliate, apex contracted into a short beak, orifice 2-toothed. Nutlets obovate or obovate-oblong, trigonous, 2–3 mm, base abruptly contracted into a short stipe, apex shortly beaked or nearly beakless; style with a thickened and conic base; stigmas 3. Fl. and fr. Jun–Sep.

• *Pinus* forests on high mountains, wet grasslands; 1900–3400 m. SW and W Sichuan, NW Yunnan.

125. *Carex chlorocephala* F. T. Wang & Tang ex P. C. Li, *Acta Bot. Yunnan.* 12: 143. 1990.

绿头藁草 lǜ tóu tai cǎo

Rhizome short. Culms densely tufted, 6–30 cm tall, ca. 1 mm thick, triquetrous, densely hispidulous and granular-punctate, brown and persistent sheathed at base. Leaves equaling culm, blades 1.5–3 mm wide, flat, soft, densely hispidulous on both surfaces, margins slightly revolute. Involucral bracts leaflike, shorter than inflorescence, densely hispidulous, sheathed. Spikes 2 or 3, androgynous, oblong, 1–1.5 cm, 3–3.5 mm thick, terminal 2 usually borne in an involucral bract sheath, lateral 1 borne at base of culm, with a filiform and long peduncle; male part of spike shorter than or equaling female part, both slightly densely few flowered; sometimes lateral spike with only 2 or 3 male flowers. Female glumes yellowish green laterally, green at middle, oblong, 3.4–3.6 mm, granular-punctate, 3-veined, margins white hyaline, apex attenuate and mucronate. Utricles greenish, slightly longer than glume, obovate-oblong, obtusely trigonous, ca. 4 mm, thickly papery, granular-punctate and densely hispidulous, 2-veined laterally and thinly several veined, base attenuate into a stipe, margins ciliate, apex abruptly contracted into a short beak, orifice emarginate. Nutlets brown at maturity, obovate-oblong, trigonous, ca. 2 mm, base attenuate, nearly estipitate, apex abruptly contracted into a short beak; style short, base ovoid; stigmas 3. Fl. and fr. Jul–Aug.

• *Pinus* forests, among shrubs on dry mountain slopes; 2200–3000 m. W Yunnan (Dali, Jingdong, Lijiang).

126. *Carex chuana* F. T. Wang & Tang ex P. C. Li, *Acta Phytotax. Sin.* 37: 167. 1999 [*“chuiana”*].

桂龄藁草 guì líng tai cǎo

Rhizome short. Culms brown, densely tufted, 10–20 cm tall, ca. 1 mm thick, slender, triquetrous, scabrous on angles,

persistent sheathed at base. Involucral bracts leaflike, linear, blades ca. 1 mm wide, longer than subtending spike, sheathed. Spike single, rarely 2, androgynous, terminal spike ovoid, 5–8 mm, 4–6 mm wide, sometimes a lateral spike borne at base of culm, usually long pedunculate; male part of spike shorter than female part, densely few flowered; female part 3- or 4-flowered. Female glumes greenish, broadly ovate, 1.8–3 mm, membranous, several veined, apex acute and long awned. Utricle green, obliquely patent, longer than glume, obovate-elliptic, slightly inflated trigonous, ca. 5 mm, densely hispidulous, distinctly 2-veined laterally and thinly several veined, base cuneate, apex abruptly contracted into a short beak, orifice shortly 2-toothed. Nutlets yellowish green at maturity, ovate, trigonous, 2.2–2.8 mm, base contracted into a slightly long stipe, apex not mucronate; style with a thickened, conic base, loosely pubescent; stigmas 3. Reduced rachilla sometimes present and setaceous. Fl. and fr. Jun–Aug.

• Thickets or meadows on high mountains, *Pinus* forests or evergreen broad-leaved forests; 900–3000 m. S Sichuan (Yanbian), NW Yunnan.

127. *Carex delavayi* Franchet, *Bull. Soc. Philom. Paris, sér.* 8, 7: 29. 1895.

年佳藁草 nián jiā tai cǎo

Rhizome ligneous, long and obliquely ascending. Culms loosely tufted, 10–30 cm tall, acutely triquetrous, slightly stiff, densely papillose, scabrous on angles, dark brown and persistent sheathed at base. Leaves longer than culm, blades 3–5 mm wide, flat, scabrous on upper surface. Involucral bracts leaflike, linear, shorter than inflorescence, shortly sheathed. Spike single, terminal, or 2 or 3, lateral spikes borne at middle or lower part of culm, terminal spike broadly ovate or ovate-orbicular, 8–20 mm, 6–10 mm thick, lateral spikes rather small; peduncle filiform, rather long; male part of spike oblong-cylindric, densely several to many flowered; female part rather short, loosely 3–10-flowered. Female glumes stramineous laterally, green at middle, ovate or broadly ovate, ca. 4 mm, papery, 3-veined and thinly few veined, margins white hyaline, apex slightly recurved and long awned. Utricles brownish green, patent, slightly longer than glume, elliptic, ca. 5 mm, subleathery, glabrous, 2-veined laterally and thinly several veined, base attenuate, nearly estipitate, margins winged and ciliate, apex contracted into a short beak, orifice slightly patent 2-toothed. Nutlets yellowish brown at maturity, broadly ovate, trigonous, slightly concave on sides, ca. 3.5 mm, base shortly stipitate or nearly estipitate, apex beakless; style base slightly thickened, conic; stigmas 3. Fl. and fr. Jul–Aug.

• Meadow thickets on high mountains, mixed forests, grasslands on gully sides; 1800–3700 m. SW Sichuan, NW Yunnan (Eryuan).

128. *Carex speciosa* Kunth, *Enum. Pl.* 2: 504. 1837.

翠丽藁草 cuì lì tai cǎo

Rhizome long, ligneous. Culms densely tufted, 15–30 cm tall, 1–1.5 mm thick, slender, compressed triquetrous, winged or not, soft, slightly scabrous. Leaves shorter or longer than culm, flat, blades 4–10(–16) mm wide, soft, smooth, with dark brown persistent sheaths. Involucral bracts leaflike, longer than

inflorescence, blades 2.5–5 mm wide, long sheathed. Spike single, terminal, or 2 or 3(–7), lateral spikes borne at middle or base of culm, androgynous, cylindrical, 1–4 cm, 3–5 mm thick, long pedunculate at middle and rather shortly pedunculate at base; male part of spike usually shorter than female part, rather thin, densely few to many flowered; female part densely many flowered. Female glumes greenish, broadly ovate to oblong, 2–4.4 mm, papery, distinctly 1–3-veined at middle, thinly several veined on both sides, margins membranous, apex acute or acuminate. Utricles green, longer than glume, oblong, trigonous, 4–5 mm, papery, loosely pubescent on upper part, later glabrescent, 2-veined laterally and thinly few veined, base contracted into a short stipe, margins narrowly winged or not winged, loosely ciliate, apex attenuate into a short beak, orifice small 2-toothed. Nutlets oblong, 2.5–3 mm, base contracted into a short stipe, apex beakless; style base slightly thickened or not thickened; stigmas 3. Fl. and fr. Jun–Sep.

Quercus, coniferous, and evergreen broad-leaved forests, thickets or grasslands on riversides; 1000–3400 m. SW Sichuan, Yunnan [Bhutan, Cambodia, India, Indonesia, Laos, Nepal, Thailand, Vietnam].

- 1a. Leaves 0.4–1 cm wide; female
glumes 2–3 mm 128a. subsp. *speciosa*
1b. Leaves 1–1.6 cm wide; female
glumes 3–4.4 mm 128b. subsp. *dilatata*

128a. *Carex speciosa* subsp. *speciosa*

翠丽藁草(原亚种) cui li tai cao (yuan ya zhong)

Carex longispica Boeckeler; *C. speciosa* var. *abscondita* Kükenthal; *C. speciosa* var. *angustifolia* Boott; *C. speciosa* var. *minor* Boeckeler.

Culms not winged. Leaves equaling or longer than culm, 0.4–1 cm wide. Spikes 1–3. Female glumes 2–3 mm.

Quercus, coniferous, and evergreen broad-leaved forests, thickets or grasslands on riversides; 1000–3400 m. SW Sichuan, Yunnan [Cambodia, India, Indonesia, Laos, Nepal, Thailand, Vietnam].

128b. *Carex speciosa* subsp. *dilatata* Noltie, Edinburgh J. Bot. 50: 197. 1993.

翅茎翠丽藁草 chi jing cui li tai cao

Culms winged. Leaves shorter than culm, 1–1.6 cm wide. Spikes 2–7. Female glumes 3–4.4 mm.

Dense evergreen broad-leaved forests; 2500–2900 m. W Yunnan (Gengma, Lincang) [Bhutan, NE India, Nepal].

129. *Carex funhuangshanica* F. T. Wang & Tang ex P. C. Li, Acta Phytotax. Sin. 37: 168. 1999.

凤凰山藁草 feng huang shan tai cao

Rhizome short. Culms densely tufted, 23–26 cm tall, ca. 0.5 mm thick, triquetrous, smooth. Leaves longer than culm, flat, blades 2–4 mm wide, stiff, scabrous on margins, with brown persistent sheaths. Involucral bracts leaflike, longer than inflorescence, long sheathed. Spikes 2, androgynous, oblong, 1–1.4 cm, 3–4 mm thick; male part of spike ca. 1/4 length of female part, densely few flowered; female part densely 10- or more flowered. Female glumes yellowish laterally, ovate or

broadly ovate, 2.5–3 mm, subleathery, green 1-costate and thinly few veined, margins white hyaline, apex acute. Utricles yellowish brown, ovate or obovate, trigonous, 4–4.5 mm, subleathery, glabrous, laterally veined and thickly several veined, base cuneate, nearly estipitate, margins rather narrowly winged, ciliate, apex contracted into a short beak, orifice 2-lobed. Nutlets yellow, brownish at maturity, ovate or obovate, trigonous, 3–3.5 mm, base contracted into a short stipe, apex beakless; style thickened, base conic; stigmas 3. Fl. and fr. Jun–Jul.

• Lax forests on mountain slopes; ca. 200 m. Guangxi (Wuming; Fenghuang Shan).

130. *Carex tsaiiana* F. T. Wang & Tang ex P. C. Li, Acta Phytotax. Sin. 37: 169. 1999.

希陶藁草 xi tao tai cao

Rhizome short. Culms densely tufted, 13–16 cm tall, less than 1 mm thick, filiform, triquetrous. Leaves shorter than or equaling culm, linear, revolute on margins, blades 1–1.5 mm wide, soft, sheaths dark brown, persistent. Involucral bracts leaflike, shorter than inflorescence, long sheathed. Spike single, terminal, androgynous, cylindrical, 1–1.5 cm, 2–3 mm thick; male part of spike slightly shorter than female part, few flowered; female part loosely 8–12-flowered. Female glumes pale green laterally, ovate or ovate-oblong, 2.8–3.2 mm, subleathery, green 1-costate, margins brownish and narrowly membranous, apex acute. Utricle greenish, longer than glume, obovate-oblong, 4–4.2 mm, subleathery, 2-veined laterally and thinly several veined, winged at lower part, base stipitate, margins ciliate, apex abruptly contracted into a short beak, orifice shortly 2-toothed. Nutlets brown at maturity, obovate-oblong, trigonous, 2.3–2.5 mm, granular-punctate, base contracted to a short stipe, apex beakless; style base thickened, conic; stigmas 3. Fl. and fr. Jun–Jul.

• Forest margins, rock crevices in sparse forests; 1100–1600 m. SE Yunnan (Pingbian).

131. *Carex caudispicata* F. T. Wang & Tang ex P. C. Li, Acta Phytotax. Sin. 37: 170. 1999.

尾穗藁草 wei sui tai cao

Rhizome elongating. Culms loosely tufted, 10–30 cm tall, 1–1.5 mm thick, triquetrous, stiff, smooth. Leaves longer than or slightly shorter than culm, blades 3–5 mm wide, flat, stiff, scabrous on both surfaces, dark brown and persistent sheathed. Involucral bracts linear, nearly equaling inflorescence, sheathed. Spikes 1 or 2(or 3), androgynous, oblong, 2–3 cm, ca. 5 mm thick; male part of spike slightly shorter than or equaling female part, both parts densely many flowered; lateral spike borne at middle of culm, with erect long peduncle. Female glumes pale green laterally, green at middle, ovate to broadly ovate, 4–4.5 mm, subleathery, 1-veined, margins white and narrowly membranous, apex acute. Utricles green, ovate, compressed trigonous, 5–5.5 mm, subleathery, loosely pubescent, then glabrescent, 2-veined laterally and thinly several veined, base cuneate, nearly estipitate, apex contracted into a short beak, orifice shortly 2-toothed. Nutlets dark brown at maturity, obovate, compressed trigonous, 3–3.5 mm, base abruptly contracted to a short stipe, apex beakless; style base thickened, trigonous-conic, loosely pubescent; stigmas 3. Fl. and fr. Jul–Oct.

• Dry grasslands on mountain slopes, *Pinus* forests, rock crevices on ditch sides, on rocks in mixed forests; 1200–2800 m. C and SE Yunnan (Kunming, Yanshan).

132. *Carex anningensis* F. T. Wang & Tang ex P. C. Li, *Acta Phytotax. Sin.* 37: 171. 1999.

安宁藁草 an ning tai cao

Rhizome rather long. Culms loosely tufted, 25–30 cm tall, ca. 1.5 mm thick, slender, triquetrous, smooth. Leaves slightly longer than culm, linear, revolute on margins, blades ca. 1 mm wide, stiff, scabrous on upper surface; sheaths dark brown and persistent. Involucral bracts leaflike, longer than inflorescence, sheathed. Spikes 2 or 3, androgynous, lowermost one borne below middle of culm, linear, long pedunculate, remaining spikes remote, rather shortly pedunculate, cylindrical, 2.5–4 cm, 4–5 mm thick; male part of spike to 1/2 length of female part, both parts densely many flowered. Female glumes pale greenish laterally, green at middle, ovate-lanceolate or elliptic-lanceolate, 3–3.5 mm, subleathery, 1-veined, margins narrowly white hyaline, apex acuminate. Utricles greenish, longer than glume, elliptic or oblong, slightly inflated trigonous, 3.8–4.2 mm, subleathery, loosely pubescent, 2-veined laterally and thinly several veined, base attenuate into a short stipe, margins narrowly winged, ciliate, apex contracted into a short beak, orifice shortly 2-toothed. Nutlets dark brown at maturity, ovate or elliptic, trigonous, 2.8–3 mm, granular-punctate; style base thickened, conic, loosely pubescent; stigmas 3. Fl. and fr. Oct–Nov.

• C Yunnan (Anning).

133. *Carex pterocaulos* Nelmes, Hooker's Icon. Pl. 35: t. 3467. 1947.

翅茎藁草 chi jing tai cao

Rhizome slightly short. Culms tufted, 40–45 cm tall, 1.2–1.5 mm thick, stiff, triquetrous, scabrous on upper part of angles. Leaves longer than culm, flat, blades 10–11 mm wide, stiff, slightly scabrous on veins of lower surface and margins, glabrous, few sheaths brownish, persistent at base. Involucral bracts leaflike, longer than inflorescence, shortly sheathed. Spikes single, terminal, sometimes 1 or 2 lateral spikes borne on middle or lower part of culm, remote, not well developed; terminal spike ovate, 2.5–3 cm, 8–10 mm thick; male part of spike slightly shorter than or equaling female part, oblong, densely many flowered; female part densely many flowered. Female glumes pale greenish laterally, green at middle, ovate or broadly ovate, 4.5–5.5 mm, membranous, 3-veined, thinly several veined on both sides, apex acute or acuminate. Utricles greenish, longer than glume, obovate-oblong, trigonous, 6–6.5 mm, thickly papery, several veined, pubescent on veins, base attenuate into a short stipe, margins densely hispidulous, apex abruptly contracted into a short beak, orifice shortly 2-toothed. Nutlets brown at maturity, obovate-elliptic, trigonous, 4–4.5 mm, base abruptly contracted into a short stipe, apex beakless; style base thickened, conic; stigmas 3. Fl. and fr. Oct–Nov.

Forests in ravines; ca. 1200 m. SE Yunnan (Yanshan) [Myanmar].

21. *Carex* sect. *Clandestinae* G. Don in Loudon, Hort. Brit. 376. 1830.

指状藁草组 zhi zhuang tai cao zu

Dai Lunkai (戴伦凯); Tetsuo Koyama, Gordon C. Tucker

Carex sect. *Digitatae* (Fries) H. Christ; *C.* [unranked] *Digitatae* Fries.

Involucral bracts spathaceous, long sheathed, blade indistinct, often setaceous. Spikes 2–6; terminal spike male; lateral spikes female. Female glumes brownish or dark purple-brown, rarely greenish or yellow-green. Utricles obovate to obovate-oblong, densely pubescent, rarely glabrous, with a short beak or beakless. Stigmas 3.

Thirty-five species: temperate to tropical regions of Asia, Europe, and North America; 29 species (21 endemic) in China.

- 1a. Culms 2–6 cm tall, concealed in lower part of leaves; leaves pubescent.
- 2a. Leaves thin, hair-shaped; rhizome slender, creeping or obliquely ascending; culms loosely tufted; female spike loosely 1–3-flowered; female glumes lanceolate, ferruginous or pale ferruginous 134. *C. callitrichos*
- 2b. Leaves flat, 1–1.5 mm wide; rhizome short; culms densely tufted; female spike loosely 2–5(–7)-flowered; female glumes brown or purple-brown.
- 3a. Female glumes ovate, ca. 4 mm, apex acute 135. *C. humilis*
- 3b. Female glumes oblong or obovate-lanceolate, ca. 3 mm, apex rounded, shortly awned, or aristate.
- 4a. Culms roundly trigonous; male spike 4–6 mm; nutlets ovate, long stipitate 136. *C. minuticulmis*
- 4b. Culms subterete; male spike 7–7.5 mm; nutlets narrowly elliptic, shortly stipitate 137. *C. pseudohumilis*
- 1b. Culms 10–40 cm tall, rarely up to 60 cm tall, exserted; leaves glabrous.
- 5a. Culms lateral; female spike 2–10- or more flowered.
- 6a. Male spike lower than adjacent female spike, female spike 2–4-flowered, rachis tortuous 138. *C. quadriflora*
- 6b. Male spike taller than adjacent female spike, female spike 4–10- or more flowered, rachis strict.
- 7a. Female spike 4–6-flowered; female glumes purplish brown; utricles with ± long and conic beak at apex; leaf blades 6–7 mm wide, sheaths dark brown and persistent 139. *C. lancifolia*
- 7b. Female spike 10- or more flowered; female glumes brown; utricles with short beak at apex; leaf blades 2–4 mm wide, sheaths purple-red or dark red and persistent 140. *C. erythrobasis*

- 5b. Culms centric; female spike 10- or more to many flowered, rarely 2–4-flowered.
- 8a. Female glumes yellowish or greenish.
- 9a. Female glumes yellowish; nutlets long beaked at apex and exerted from orifice; male spike taller than or equaling adjacent female spike; leaf blades 0.5–1.5 mm wide, soft 141. *C. yuexiensis*
- 9b. Female glumes greenish; nutlets shortly beaked at apex, not exerted from orifice; male spike distinctly taller than adjacent female spike; leaf blades 2–4 mm wide, stiff.
- 10a. Female spikes long pedunculate and exerted from involucre bract sheath; utricles nearly equaling glume, 2-veined laterally and thinly several veined; leaves shorter than culm, persistent sheaths dark brown 142. *C. tapinzensis*
- 10b. Female spikes shortly pedunculate, not or slightly exerted from involucre bract sheath; utricles shorter than glume, 2-veined laterally, not thinly veined; leaves nearly equaling culm, persistent sheaths yellow-brown or brown 143. *C. qingyangensis*
- 8b. Female glumes brownish, brown, or purple-brown.
- 11a. Rhizome long and creeping; culms loosely tufted.
- 12a. Utricles broadly obovate, with several convex veins, \pm estipitate; spikes approximate, female spikes oblong, densely flowered or loosely few flowered at lower part; female glumes brown; leaf blades linear, not up to 0.5 mm wide 144. *C. pachyneura*
- 12b. Utricles obovate-oblong, 2-veined laterally and not thinly veined, shortly stipitate; spikes remote, female spikes linear, loosely flowered; female glumes purple-brown; leaf blades flat, 1–2.5 mm wide 145. *C. capilliculmis*
- 11b. Rhizome short, obliquely ascending; culms densely tufted.
- 13a. Leaves stiff; male spike 4–8 cm.
- 14a. Female spikes cylindrical, 3.5–5 cm, 5–7 mm thick, peduncle slightly stiff, usually not exerted from involucre bract sheath; male glumes narrowly lanceolate, 8–10 mm, apex acuminate; female glumes narrowly oblong, 4–4.5 mm 149. *C. shuchengensis*
- 14b. Female spikes linear-cylindrical, 2–4 cm, 3–4 mm thick, peduncle slender, long exerted from involucre bract sheath; male glumes oblong, 6–8 mm, apex rounded, acute, or truncate; female glumes oblong, 3–3.5 mm.
- 15a. Male glumes 8–8.5 mm, apex truncate; female glumes green at middle, brown or brown-red laterally, rounded at apex 148. *C. macrosandra*
- 15b. Male glumes 6–7 mm, apex rounded or acute; female glumes brownish.
- 16a. Leaves slightly shorter than culm, abaxial surface pale cinereous, densely papillose; female glumes rounded at apex; culms 40–100 cm tall 146. *C. sichouensis*
- 16b. Leaves longer than culm, slightly scabrous abaxially; female glumes acuminate at apex; culms 30–50 cm tall 147. *C. meihshienica*
- 13b. Leaves soft; male spike not exceeding 3 cm.
- 17a. Female spikes with rather short peduncle, usually not exerted or slightly exerted from involucre bract sheath, lowermost one slightly remote, but not basal.
- 18a. Female spikes 2–4-flowered; utricles broadly ovoid or obovate-elliptic, 2-veined laterally and thinly several veined, apex abruptly contracted into a short or medium-sized beak.
- 19a. Rhizome elongate and creeping; spikes usually 2, male spike 1.2–1.3 cm, taller than adjacent female spike; utricles broadly ovoid, ca. 3.5 mm, apex abruptly contracted into a medium-sized beak 161. *C. scolopendriformis*
- 19b. Rhizome short; spikes usually 3 or 4, male spike ca. 0.5 cm, shorter than adjacent female spike; utricles obovate-elliptic or elliptic, 5–6 mm, apex abruptly contracted into a short beak 162. *C. infossa*
- 18b. Female spikes densely many flowered; utricles obovate or obovate-oblong, 2-veined laterally, with or without thin veins, apex shortly beaked.
- 20a. Leaves involute on margins, linear, shorter than culm; spikes approximate except lowermost one remote 158. *C. crebra*
- 20b. Leaves flat, longer than or equaling culm; spikes remote.
- 21a. Involucre bract blades shortly leaflike, involucre bract sheaths green, narrowly membranous and white at sheath mouth; spike densely many flowered; rachis strict; leaves shorter than or equaling culm 159. *C. pediformis*

- 21b. Lower 1 or 2 involucre bract blades setaceous, remaining blades mucro-shaped, green abaxially, elsewhere brown, membranous and white at sheath mouth and margins; spike loosely or somewhat densely 5–10- or more flowered; rachis tortuous; leaves longer than culm after flowering 160. *C. lanceolata*
- 17b. Female spike long stipitate, peduncle filiform, pendulous, long exerted from involucre bract sheath, lowermost one far from upper spike or subbasal.
- 22a. Female glumes only ca. 2 mm, brownish; utricles narrowly elliptic, 2–2.5 mm; male spike sometimes with 1–3 female flowers at base, female spike sometimes with a few male flowers at apex or 1–3-branched at base; persistent leaf sheaths brownish 150. *C. shaanxiensis*
- 22b. Female glumes longer than 3 mm, usually purple-brown or dark purple-brown, sometimes brown, dark brown, or brownish; utricles oblong or obovate-oblong, 3–5 mm; male spike without female flowers, female spike without male flowers; persistent leaf sheaths dark brown.
- 23a. Female glumes 3–3.5 mm, without white hyaline margins; utricles 3–3.2 mm 151. *C. laeta*
- 23b. Female glumes 3–5 mm, with broad white hyaline margins; utricles 3–5 mm.
- 24a. Utricles ca. 3 mm, nearly beakless at apex; style thickened, ovoid, all exerted from utricle; female glumes purple-brown, ca. 3 mm 152. *C. globistylosa*
- 24b. Utricles longer than 4 mm, shortly beaked at apex; style not thickened or only slightly thickened at base, not exerted from utricle; female glumes 3.8–5 mm.
- 25a. Utricles hispidulous on veins and upper margins; female spike densely flowered but loosely flowered at lower part; female glumes truncate or emarginate at apex 153. *C. huolushanensis*
- 25b. Utricles densely pubescent or puberulent; female spike densely flowered; female glumes rounded or emarginate at apex.
- 26a. Female glumes dark brown, scabrous abaxially and on veins; leaves much shorter than culm; involucre bract blades setaceous 154. *C. chiuwana*
- 26b. Female glumes brownish or dark purple-brown, smooth abaxially; leaves shorter than or nearly equaling culm; involucre bract blades shortly leaflike.
- 27a. Female glumes dark purple-brown, mucronate at apex; utricles only 2-veined laterally 157. *C. obovatosquamata*
- 27b. Female glumes brownish, shortly awned or mucicous at apex; utricles 2-veined laterally and thinly several veined.
- 28a. Culms trigonous, scabrous; female glumes 4.3–4.7 mm 155. *C. cardiolepis*
- 28b. Culms subterete, smooth; female glumes 2–3 mm 156. *C. dayuonensis*

134. *Carex callitrichos* V. I. Kreczetowicz in Komarov, Fl. URSS 3: 613. 1935.

羊须草 yang xu cao

Rhizome elongate, creeping or obliquely ascending. Culms loosely tufted, 2–6 cm tall, hair-shaped, obtusely trigonous, smooth; sheaths red-brown, persistent at base. Leaves 5–6 × as long as culm, blades 0.2–0.8(–1) mm wide, hair-shaped, soft, glabrous, rarely loosely pubescent. Involucre bracts spathe-like, 7–10 mm, smooth, acute at apex, membranous on margins of sheath mouth, without distinct involucre bract blade. Spikes 2–

4, remote; terminal spike male, cylindrical, 5–8 mm, 1–1.5 mm thick, few flowered; lateral spikes 1–3, female, linear, 5–7 mm, loosely 1–3-flowered; peduncle short, usually not exerted from involucre bract sheath; rachis tortuous. Female glumes ferruginous or pale ferruginous laterally, green at middle, lanceolate, 3–4 mm, 1-veined, margins broadly white hyaline, apex acuminate or acute, mucronate. Utricles greenish, shorter than glume, obovate, obtusely trigonous, 2.5–3 mm, pubescent, distinctly 2-veined laterally and obscurely thinly several veined, base abruptly contracted to a bent and short stipe, apex rounded and very shortly beaked, orifice emarginate or truncate, usually

brownish. Nutlets brown at maturity, oblong-obovate, trigonous, 2.3–2.5 mm, base contracted into a short stipe, apex rounded and shortly beaked; style base slightly thickened; stigmas 3. Fl. and fr. Apr–Jul.

Pinus forests, mixed forests, mountain slopes; 800–1000 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol [Japan, Korea, Russia (Far East, E Siberia)].

The stems and leaves may be used for making paper and rope.

- 1a. Male spike few flowered, male
glumes acute at apex, female
spike 1–3-flowered 134a. var. *callitrichos*
1b. Male spike 3- or 4-flowered, male
glumes acuminate at apex, female
spike 1- or 2-flowered 134b. var. *nana*

134a. *Carex callitrichos* var. *callitrichos*

羊须草(原变种) yang xu cao (yuan bian zhong)

Carex humilis Leysser f. *callitrichos* (V. I. Kreczetowicz) T. Koyama; *C. humilis* var. *callitrichos* (V. I. Kreczetowicz) Ohwi.

Male spike few flowered; male glumes acute at apex; female spike 1–3-flowered.

Pinus forests; 800–1000 m. Heilongjiang [Japan, Korea, Russia (Far East)].

134b. *Carex callitrichos* var. *nana* (H. Léveillé & Vaniot) Ohwi, Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 11: 399. 1936.

矮丛薹草 ai cong tai cao

Carex lanceolata Boott var. *nana* H. Léveillé & Vaniot, Bull. Acad. Int. Géogr. Bot. 10: 269. 1901; *C. nanella* Ohwi.

Male spike 3- or 4-flowered; male glumes acuminate at apex; female spike 1- or 2-flowered. Fl. and fr. Apr–Jul.

Mountain slopes, mixed or *Pinus* forests; below 1000 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol [Japan, Korea, Russia (Far East, E Siberia)].

135. *Carex humilis* Leysser, Fl. Halens. 175. 1761.

低矮薹草 di ai tai cao

Rhizome short. Culms densely tufted, 2–5 cm tall, subcylindric, smooth, brown and persistent sheathed at base. Leaves 3–5 × as long as culm, flat, blades 1–2 mm wide, soft or slightly stiff, loosely pubescent. Involucral bracts reddish brown, spathe-like, with broad white hyaline margins at sheath mouth, involucral bract blades setaceous. Spikes 2–5, remote; terminal spike male, linear-cylindric, 1–1.4 cm, ca. 2 mm thick, many flowered; lateral spikes 1 or 2, female, ovate or oblong, 5–7 mm, loosely 2–7-flowered; peduncles short, enclosed in sheath or lowermost one slightly exerted; rachis tortuous. Female glumes red-brown laterally, green at middle, ovate, ca. 4 mm, 1-veined, margins broadly white hyaline, base enclosing rachis, apex acute. Utricles greenish, slightly shorter than glume, obovate-oblong, trigonous, 3–3.2 mm, membranous, loosely ferruginous punctate, densely pubescent, 2-veined laterally, not distinctly thinly veined, base abruptly contracted into a short

stipe, apex subrounded and shortly beaked, beak purple-red, truncate at orifice. Nutlets dark brown at maturity, elliptic or obovate-oblong, trigonous, 2.5–3 mm, base attenuate into a short stipe, apex with bent short beak; style base slightly thickened; stigmas 3. Fl. and fr. May–Jun.

Pinus or *Xylosma* forests, sunny places on mountain slopes, mountains near the sea; 100–1000 m. Anhui, Hebei, Liaoning, Shanxi [Japan, Russia; Europe].

This species is cultivated in grasslands and used as feed for domestic animals.

- 1a. Leaves soft, 1–1.5 mm wide; spikes
2 or 3, female spikes 2–4-flowered 135a. var. *humilis*
1b. Leaves slightly stiff, ca. 2 mm wide;
spikes 4 or 5, female spikes
4–7-flowered 135b. var. *scirrobasis*

135a. *Carex humilis* var. *humilis*

低矮薹草(原变种) di ai tai cao (yuan bian zhong)

Carex callitrichos V. I. Kreczetowicz var. *austroringanica* Y. L. Chang & Y. L. Yang.

Leaves soft, 1–1.5 mm wide. Spikes 2 or 3; female spikes 2–4-flowered.

Pinus or *Xylosma* forests, sunny places on mountain slopes; 100–1000 m. Anhui, Liaoning [Japan, Russia; Europe].

135b. *Carex humilis* var. *scirrobasis* (Kitagawa) Y. L. Chang & Y. L. Yang, Fl. Pl. Herb. Chin. Bor.-Orient. 11: 121. 1976.

维田薹草 chu tian tai cao

Carex scirrobasis Kitagawa, Rep. Inst. Sci. Res. Manchoukuo 2: 285. 1938.

Leaves slightly stiff, ca. 2 mm wide. Spikes 4 or 5; female spikes 4–7-flowered. Fl. and fr. May–Jun.

• Mountains near the sea, *Pinus* forests on mountain slopes; 100–1000 m. Hebei, Liaoning, Shanxi.

136. *Carex minutilmis* S. W. Su & S. M. Xu, Bull. Bot. Res., Harbin 8(3): 79. 1988.

矮秆薹草 ai gan tai cao

Rhizome short, oblique. Culms densely tufted, 1–4(–5) cm tall, roundly trigonous, hair-shaped, smooth, base with dark purple persistent sheaths. Leaves much longer than culm (up to 15 cm), flat, blades 3–4 mm wide, soft or slightly stiff, smooth. Involucral bracts reddish brown, leaflike, sheath 3–6 mm. Spikes 3 or 4, approximate; terminal spike male, linear-cylindric, 0.4–0.6 cm, ca. 2 mm thick, many flowered; lateral spikes 1 or 2, female, ovate or oblong, 5–7 mm, loosely 2–5-flowered; peduncles short, enclosed in sheath or lowermost one slightly exerted; rachis straight. Female glumes red-brown laterally, green at middle, obovate-lanceolate, ca. 2 mm, 3-veined, margins broadly white hyaline, base enclosing rachis, apex aristate. Utricles greenish, decidedly longer than glume, broadly ovate, obtusely trigonous, 3–3.5 mm, leathery, purple punctate, hirsute to glabrescent, 2-veined laterally, otherwise nerveless, base abruptly contracted into a stipe 1–1.3 mm, apex subrounded,

beak distinct, erect, ± emarginate at orifice. Nutlets dark brown at maturity, ovate, trigonous, 2.5–3 mm, densely punctate, base attenuate into an elongated stipe, apex obtuse to truncate; style base distinctly thickened; stigmas 3. Fl. and fr. Apr–May.

- Roadsides on slopes. SW Anhui (Taihu).

No specimens have been seen by the present authors.

137. *Carex pseudohumilis* F. T. Wang & Y. L. Chang ex P. C. Li, Acta Phytotax. Sin. 37: 172. 1999.

似矮薹草 si ai tai cao

Rhizome short. Culms tufted, 3–5 cm tall, slender, hair-shaped, triquetrous, smooth, brown and persistent sheathed at base. Leaves longer than or equaling culm, flat, blades 1.2–2 mm wide, slightly stiff, glabrous, scabrous on upper surface and margins, triquetrous and revolute at apex. Involucral bracts brown, spathe-like, involucral bract blades awn-shaped and slightly scabrous. Spikes 2 or 3, basal one radicleous, remaining spikes approximate; terminal spike male, obovate-oblong, 7–7.5 mm, 3–5-flowered; lateral spikes 1 or 2, female, oblong, 7–8 mm, ca. 3 mm thick, loosely 4–6-flowered; peduncles slender, hair-shaped, basal one 2.5–2.7 cm, upper rather short, ca. 10 mm, enclosed in involucral bract sheath; rachis tortuous. Female glumes brown laterally, green at middle, oblong, papery, 1-veined, margins white hyaline, apex subrounded, scabrous shortly awned. Utricles yellowish brown, narrowly elliptic, trigonous, ca. 3 mm, densely pubescent, 2-veined laterally, not distinctly thinly veined, base attenuate into a stipe, apex attenuate into a short beak, orifice shortly 2-toothed. Nutlets yellowish brown at maturity, narrowly elliptic, trigonous, 2.2–2.5 mm, base shortly stipitate, apex beakless; style base slightly thickened; stigmas 3. Fl. and fr. Jul–Aug.

- Grasslands in valleys; ca. 3000 m. NW Yunnan (Lijiang).

138. *Carex quadriflora* (Kükenthal) Ohwi, Acta Phytotax. Geobot. 1: 74. 1932.

四花薹草 si hua tai cao

Carex digitata Linnaeus subsp. *quadriflora* Kükenthal in Engler, Pflanzenr. 38(IV. 20): 497. 1909; *C. digitata* var. *pallida* Meinshausen.

Rhizome short, obliquely ascending. Culms densely tufted, lateral, 15–30 cm tall, not exceeding 1 mm thick, triquetrous, scabrous at upper part, purple-red sheathed at base. Leaves shorter than culm, nearly equaling culm after fruiting, blades 2–4 mm wide, soft, flat, smooth, purple-red and persistent sheathed. Involucral bracts red-brown, spathe-like, membranous on margins, truncate at apex, involucral bract blade awn-shaped. Spikes 2 or 3, remote; terminal spike male, shorter than adjacent female spike, linear, 4.5–10 mm, 1–2 mm thick; lateral spikes 1 or 2, female, linear, 1–1.5 cm, 2–2.5 mm thick, loosely 2–4(–6)-flowered; peduncles filiform, 1–3 cm, soft; rachis tortuous. Female glumes ferruginous laterally, green at middle, obovate-oblong, ca. 3 mm, 1-veined, margins broadly white hyaline, apex rounded, mucronate. Utricles yellowish green, longer than glumes, obovate, obtusely trigonous, subplano-convex, 4–5 mm, loosely pubescent, 2-veined laterally, not distinctly thinly veined, base abruptly contracted into a short stipe,

apex rounded and shortly beaked, beak ferruginous, truncate at orifice. Nutlets pale ferruginous at maturity, obovate, trigonous, 3.5–4 mm, base contracted into a short stipe, apex abruptly contracted into a short beak; style short, base not thickened; stigmas 3. Fl. and fr. May–Jun.

Xylosma or *Pinus* forests; 800–1400 m. Hebei, Heilongjiang, Liaoning [Korea, Russia (Far East)].

139. *Carex lancifolia* C. B. Clarke, J. Linn. Soc., Bot. 36: 293. 1903.

披针薹草 pi zhen tai cao

Carex glandulifolia Kükenthal.

Rhizome short. Culms densely tufted, lateral, 10–15 cm tall, slender, soft, slightly compressed, smooth, clothed with purple-red long sheaths and short blades at lower part. Leaves longer than or equaling culm, flat, blades 6–7 mm wide, smooth, some sheaths bladeless; persistent sheaths dark brown, usually disintegrating into fibers. Involucral bracts sheathlike, without distinct involucral bract blade, only lowermost one with awn-shaped blade. Spikes 4 or 5, remote, basal one radicleous; terminal spike male, usually not taller or slightly taller than adjacent female spike, linear, ca. 1 cm, 1.5–2 mm thick; lateral spikes 3 or 4, female, linear-cylindric, 1–1.5 cm, loosely 4–6-flowered; peduncles erect, usually exerted from involucral bract sheath; rachis strict. Female glumes purplish brown laterally, green at middle, obovate-oblong, ca. 3.5 mm, membranous, 1-veined, without white hyaline margins, apex emarginate, mucronate. Utricles green, longer than glume, oblong, trigonous, ca. 5 mm, membranous, pubescent, distinctly 2-veined laterally, not thinly veined, base attenuate into a long stipe, apex contracted into a medium-sized to long and conic beak, orifice 2-lobed. Nutlets brown at maturity, oblong, trigonous, ca. 3 mm, base contracted into a long stipe, apex attenuate, beakless; style base slightly thickened; stigmas 3. Fl. and fr. Mar–May.

- Lax forests on mountain slopes; 1500–2700 m. W Hubei, S Shaanxi (Qin Ling).

140. *Carex erythrobasis* H. Léveillé & Vaniot, Repert. Spec. Nov. Regni Veg. 5: 240. 1908.

红鞘薹草 hong qiao tai cao

Carex hallaisanensis H. Léveillé & Vaniot; *C. pedunculata* Muhlenberg ex Willdenow var. *erythrobasis* (H. Léveillé & Vaniot) T. Koyama.

Rhizome short. Culms densely tufted, lateral, 12–25 cm tall, slender, compressed triquetrous, slightly scabrous, with purple-red or dark purple and bladeless sheaths at base. Involucral bracts spathe-like, involucral bract sheaths green and slightly purple-red or dark purple, lower involucral bracts with short blade, upper blades setaceous. Spikes 3 or 4, lowermost one remote, borne from base of culm, remaining spikes approximate; terminal spike male, usually taller than adjacent female spike, cylindric, 7–10 mm; lateral spikes female, oblong, 2–3 mm, loosely 10- or more flowered; peduncles slightly stiff, lowermost one rather long, others short, slightly exerted from involucral bract sheath. Female glume pale brown laterally,

green at middle, oblong, 2.5–3 mm, 3-veined, membranous, apex rounded or truncate, with awn 0.8–1 mm. Utricles yellowish, slightly longer than glume, elliptic, trigonous, ca. 4 mm, papery, loosely pubescent, 2-veined laterally, base attenuate into a long stipe, apex contracted into a short beak, orifice emarginate. Nutlets yellowish, elliptic, trigonous, ca. 3 mm, base stipitate, apex contracted into a short beak; style base not thickened; stigmas 3. Fl. and fr. Jun–Jul.

Broad-leaved or *Pinus koraiensis* forests; 200–800 m. S Jilin (Changbai Shan) [Korea, Russia (Far East)].

141. *Carex yuexiensis* S. W. Su & S. M. Xu, Bull. Bot. Res., Harbin 8(3): 78. 1988.

岳西藁草 yue xi tai cao

Rhizome short. Culms densely tufted, 20–35 cm tall, triquetrous, slightly scabrous. Leaves nearly equaling culm, linear, blades 0.5–1.5 mm wide, soft, smooth, yellow-brown and persistent sheathed at base. Involucral bracts spathe-like, yellowish abaxially, white and hyaline adaxially, with setaceous involucral bract blade. Spikes 3 or 4, lowermost one remote, others approximate; terminal spike male, oblong, ca. 1 cm, not exceeding or slightly exceeding adjacent female spike; lateral spikes 2 or 3, female, uppermost one approximate to male spike, oblong, 1–1.5 cm, 3.5–4 mm thick, loosely several flowered; peduncles slightly scabrous, only lowermost one exerted from sheath, others enclosed in sheath. Female glumes yellowish brown laterally, green at middle, oblong, ca. 5 mm, 1-veined, margins white membranous, apex rounded, mucronate. Utricles yellowish green, shorter than glume, obovate-oblong, ca. 3.2 mm, papery, densely pubescent, 2-veined laterally and thinly several veined, base attenuate into a short stipe, apex contracted into a short beak, orifice obliquely truncate. Nutlets obovate-oblong, ca. 2.5 mm, base attenuate, nearly estipitate, apex abruptly contracted into a long beak exerted from utricle; style base slightly thickened; stigmas 3. Fl. and fr. Apr–May.

• Mountain slopes, roadsides. SW Anhui (Taihu, Yuexi).

142. *Carex tapinzensis* Franchet, Bull. Soc. Philom. Paris, sér. 8, 7: 44. 1895.

大坪子藁草 da ping zi tai cao

Carex lamprosandra Franchet; *C. tapinzensis* var. *lamprosandra* (Franchet) Kükenthal.

Rhizome long, ligneous, obliquely ascending. Culms densely tufted, 15–70 cm tall, ca. 1 mm thick, slender and stiff, triquetrous, scabrous on angles. Leaves shorter than culm, flat, blades 2–4 mm wide, stiff, slightly scabrous, dark brown sheathed at base, sheaths eventually disintegrating into fibers. Involucral bracts spathe-like, involucral bract sheath green, white and membranous at sheath mouth, lowermost involucral bract blade leaflike, rather long, but shorter than inflorescence, other setaceous. Spikes 3–5; terminal spike male, usually taller than adjacent female spike, cylindrical, 2–3 cm, densely many flowered; lateral spikes 2–4, female, uppermost one approximate to male spike, others remote, cylindrical, 2–4 cm, rather densely many flowered, sometimes with few male flowers at apex; peduncles slender, slightly stiff, long exerted from invo-

lucral bract sheath, upper ones gradually shortened. Female glumes greenish or yellowish green laterally, dark green at middle, oblong or obovate-oblong, 4–4.5 mm, papery, 3-veined, scabrous on costa and short awn, margins broadly white hyaline, apex acuminate, acute, subrounded, or truncate. Utricles greenish, nearly equaling glume, oblong or obovate-oblong, obtusely trigonous, 4–4.5 mm, papery, densely pubescent, 2-veined laterally and thinly several veined, base attenuate into a long stipe, apex abruptly contracted into a recurved and short beak, orifice obliquely truncate. Nutlets brown at maturity, obovate-oblong, trigonous, 2.5–3 mm, base attenuate into a short stipe, apex with a recurved and short beak; style short, base thickened; stigmas 3. Fl. and fr. May–Aug.

• *Picea* or *Pinus* forests, subalpine thickets; 1800–3800 m. SW and W Sichuan, E Xizang, NW Yunnan.

143. *Carex qingyangensis* S. W. Su & S. M. Xu, Bull. Bot. Res., Harbin 8(3): 77. 1988.

青阳藁草 qing yang tai cao

Rhizome ligneous, obliquely ascending. Culms 25–40 cm tall, obtusely trigonous, smooth. Leaves equaling culm, flat, blades 3–4 mm wide, stiff, scabrous on margins, yellow-brown or purple-brown and persistent sheathed at base, sheaths eventually disintegrating into fibers. Involucral bracts spathe-like, green abaxially, yellow-brown adaxially, white hyaline on margins, with setaceous involucral bract blade. Spikes 4 or 5, remote; terminal spike male, long pedunculate, taller than adjacent female spike, cylindrical, 4–5 cm, densely many flowered; lateral spikes 3 or 4, female, cylindrical, 2–3 cm, ca. 3 mm thick, densely many flowered, peduncles not or slightly exerted from involucral bract sheath. Female glumes greenish, ovate-lanceolate, 2.2–2.5 mm, papery, 1–3-veined, margins white hyaline, apex acuminate. Utricles stramineous, slightly shorter than glume, elliptic, obtusely trigonous, 2–2.5 mm, densely pubescent, 2-veined laterally, not thinly veined, base contracted into a short stipe, apex abruptly contracted into a recurved and short beak, orifice obliquely truncate. Nutlets elliptic, trigonous, ca. 2 mm, base estipitate, apex with a recurved and short beak; style base slightly thickened; stigmas 3. Fl. and fr. Apr–May.

• Forest margins on mountain slopes. Anhui (Qingyang: Jiu Hua Shan).

144. *Carex pachyneura* Kitagawa, Rep. Inst. Sci. Res. Manchoukuo 4: 78. 1940.

肋脉藁草 lei mai tai cao

Rhizome slender, creeping. Culms loosely tufted, 10–25 cm tall, less than 1 mm thick. Leaves shorter than culm, elongate after flowering, involute on margins, filiform, blades 0.3–0.5 mm wide, slightly stiff, brown and persistent sheathed at base, sheaths eventually disintegrating into fibers. Involucral bracts green, spathe-like, lowermost involucral bract blade shortly leaflike, upper ones setaceous. Spikes 2 or 3; terminal spike male, taller than adjacent female spike, clavate or cylindrical, 9–18 mm, densely many flowered; lateral spikes 1 or 2, female, lowermost one remote, sometimes borne at base of culm, upper one approximate to male spike, oblong, 7–15 mm, densely several flowered, sometimes loosely few flowered at

lower part; peduncles slender, exerted from involucre bract sheath. Female glumes brown laterally, green at middle, ovate, 2.5–3.5 mm, membranous, 3-veined, narrowly white hyaline on upper margin, apex acute, mucronate. Utricles brown, slightly longer than glume, obovate, inflated trigonous, 2.5–2.8 mm, papery, smooth on lower part, loosely pubescent near apex, with several convex veins, base broadly truncate, estipitate, apex abruptly contracted into a short beak, orifice shortly 2-toothed. Nutlets yellow at maturity, obovate, trigonous, 1.7–2.2 mm, base sessile, apex abruptly contracted into a short beak; style base slightly thickened; stigmas 3. Fl. and fr. Jul–Aug.

- Mountain slopes of grassland regions; ca. 1500 m. Jilin, Nei Mongol.

145. *Carex capilliculmis* S. R. Zhang, *Novon* 15: 498. 2005.

丝秆藁草 si gan tai cao

Carex filamentosa K. T. Fu, *Fl. Tsinling*. 1(1): 445. 1976, not Petrie (1916).

Rhizome long and thick, obliquely ascending. Culms loosely tufted, 15–20 cm tall, slender, filiform, obtusely trigonous, scabrous on angles. Leaves shorter than culm, elongate after flowering, flat, blades 1–2.5 mm wide, soft, sheaths dark brown, persistent. Involucral bracts spathe-like, involucre bract sheaths long, with short blade. Spikes 2 or 3, lowermost one remote or nearly borne at base of culm, others approximate; terminal spike male, linear, 7–10 mm, 1.5–2 mm thick, few flowered; lateral spikes 1 or 2, female, oblong or narrowly oblong, 7–10 mm, 2–3 mm thick, loosely few flowered; peduncles slender, filiform, long exerted from involucre bract sheath; rachis straight or tortuous. Female glumes purple-brown laterally, green at middle, ovate-oblong, 3–3.8 mm, papery, 1-veined, scabrous on vein, margins white hyaline, apex acute, mucronate. Utricles pale greenish, slightly longer than glume, obovate-oblong, obtusely trigonous, 3.5–4 mm, papery, densely pubescent, 2-veined laterally, not thinly veined, base contracted into an incurved long stipe, apex abruptly contracted into an indistinctly recurved, short beak, orifice emarginate. Nutlets brown at maturity, obovate-oblong, trigonous, ca. 3 mm, base attenuate, stipitate, apex rounded with a recurved short beak; style base slightly thickened; stigmas 3. Fl. and fr. May–Aug.

- *Picea* and *Abies* forests, thickets, alpine meadows; 1100–4300 m. S Gansu, E Qinghai, Shaanxi (Taibai Shan), SW and W Sichuan, NW Yunnan.

146. *Carex sichouensis* P. C. Li, *Acta Phytotax. Sin.* 37: 173. 1999.

西畴藁草 xi chou tai cao

Rhizome ligneous, obliquely ascending. Culms densely tufted, 40–100 cm tall, 1.5–2 mm thick, triquetrous. Leaves slightly shorter than culm, flat, 4–5 mm wide, stiff, scabrous on upper part and margins, abaxial surface cinereous, densely papillate. Involucral bracts green or brown, spathe-like, involucre bract blades setaceous. Spikes 4 or 5, rather remote; terminal spike male, cylindrical, 4–5 cm, ca. 3 mm thick, peduncle ca. 4 cm, taller than adjacent female spike; lateral spikes female, line-

ar-cylindrical, 2–2.5 cm, ca. 3 mm thick, densely many flowered, peduncles slender, ± long exerted from involucre bract sheath. Female glumes brown punctate on upper part, yellow-green on lower part, oblong, ca. 3 mm, membranous, 1-veined, apex rounded, mucronate. Utricles oblong, obtusely trigonous, ca. 3 mm, papery, densely hispidulous, several veined, base attenuate into a short stipe, apex contracted into a recurved short beak, orifice emarginate. Nutlets oblong, trigonous, ca. 2 mm, base shortly stipitate, apex rounded; style recurved, base inflated; stigmas 3. Fl. and fr. Mar–Apr.

- Rock crevices on mountain slopes, forests; 700–1700 m. SE Yunnan (Funing, Xichou).

147. *Carex meihshienica* K. T. Fu, *Fl. Tsinling*. 1(1): 445. 1976.

眉县藁草 mei xian tai cao

Rhizome ligneous, creeping. Culms erect, stiff, 30–50 cm tall, obtusely trigonous, smooth, dark brown and persistent sheathed at base. Leaves longer than culm, flat, blades 3–4 mm wide, ± rigid, margins involute. Involucral bracts green at lower part and nearly pale at upper part, spathe-like, brownish on margins, with short involucre bract blade. Spikes 3–5, remote; terminal spike male, clavate-cylindrical, 5–6.5 cm; lateral spikes 2–4, female, linear-cylindrical, 3–4 cm, ca. 4 mm thick, densely many flowered; peduncles slender, basal one 7–8 cm, upward gradually shorter, rather long exerted from involucre bract sheath. Female glumes brownish laterally, green at middle, ovate-oblong, 3–3.5 mm, membranous, 3-veined, margins white hyaline, apex acuminate, mucronate. Utricles brownish, slightly shorter than glume, obovate-oblong, 2.5–3 mm, membranous, laxly pubescent, 2-veined laterally and thinly several veined, base attenuate, nearly estipitate, apex abruptly contracted into a short beak, orifice 2-toothed. Nutlets brownish at maturity, elliptic, trigonous, 1.5–1.8 mm, base nearly estipitate, apex shortly beaked; style base slightly thickened; stigmas 3. Fl. and fr. Apr–Jun.

- Streamsides in valleys; 1000–1400 m. Shaanxi.

148. *Carex macrosandra* (Franchet) V. I. Kreczetowicz, *Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R.* 9: 189. 1946.

大雄藁草 da xiong tai cao

Carex lanceolata Boott var. *macrosandra* Franchet, *Nouv. Arch. Mus. Hist. Nat.*, sér. 3, 9: 169. 1897; *C. pediformis* C. A. Meyer var. *macrosandra* (Franchet) C. B. Clarke.

Rhizome ligneous. Culms densely tufted, 30–80 cm tall, triquetrous, 1–1.5 mm thick. Leaves slightly shorter than or equaling culm, flat, blades 3–5 mm wide, rigid, stiff, scabridulous on both surfaces, slightly revolute on margins, base attenuate into a stipe; stipe stiff, rigid, glabrous; sheaths brown, persistent, eventually disintegrating into fibers. Involucral bracts brown-red, spathe-like, obliquely truncate at mouth of involucre bract sheath, without involucre bract leaf. Spikes 4–7, rather remote; terminal spike male, cylindrical, 4–8 cm, 3–4 mm thick, densely many flowered, peduncle 4–5 cm, taller than adjacent female spike; lateral spikes female, linear-cylindrical, 2.5–3.5 cm, ca. 3 mm thick, densely many flowered, peduncles slender,

rather long exerted from involucre bract sheath. Male glumes 8–8.5 mm, apex truncate; female glumes brown or brown-red laterally, green at middle, oblong, 3.5–3.8 mm, hispidulous on upper part, 1-veined, scabrous on vein, margins broadly white hyaline, apex rounded, mucronate. Utricles green, obovate-oblong, obtusely trigonous, 2.5–3.1 mm, thickly papery, densely hispidulous, not distinctly veined laterally, thinly several veined, base attenuate into a curved stipe, apex contracted into a curved short beak, orifice truncate. Nutlets brown at maturity, obovate-oblong or obovate, trigonous, 1.8–2 mm; style erect or bent, base thickened; stigmas 3. Fl. and fr. Mar–May.

• Sunny mountain slopes; 700–1000 m. Hubei (Yichang), Sichuan.

149. *Carex shuchengensis* S. W. Su & Q. Zhang, Acta Phytotax. Sin. 27: 465. 1989.

舒城藁草 shu cheng tai cao

Rhizome ligneous, obliquely ascending. Culms 30–45 cm tall, 2–2.5 mm thick, obtusely trigonous, smooth. Leaves longer than culm, flat, blades 6–10 mm wide, stiff, rigid, margins scabrous; basal sheaths dark brown, persistent, usually disintegrating into fibers. Involucral bracts red-brown, spathe-like, margins white hyaline, apex acute, without distinct involucre bract leaf. Spikes 5 or 6, remote; terminal spike male, clavate, 7–8 cm, 5–7 mm thick, densely many flowered, peduncle rather long, taller than adjacent female spike; lateral spikes 4 or 5, female, cylindrical, 3.5–5 cm, ca. 5 mm thick, densely many flowered, laxly several flowered at base, peduncles usually not exerted or slightly exerted from involucre bract sheath at lower part. Female glumes red-brown laterally, green at middle, narrowly oblong, 4–4.5 mm, papery, 3-veined, margins broadly white hyaline, apex acute. Utricles yellowish green, shorter than glume, elliptic, obtusely trigonous, ca. 3 mm, laxly pubescent, 2-veined laterally and thinly several veined, base attenuate into a short stipe, apex abruptly contracted into a short beak, orifice obliquely truncate. Nutlets obovate-oblong, trigonous, ca. 2 mm, base gradually narrowed, shortly stipitate, apex rounded and tortuously beaked; style base slightly thickened; stigmas 3.

• Shady places at forest margins on mountain slopes. Anhui (Shucheng).

150. *Carex shaanxiensis* F. T. Wang & Tang ex P. C. Li, Acta Phytotax. Sin. 37: 174. 1999.

陕西藁草 shan xi tai cao

Rhizome short. Culms densely tufted, 30–35 cm tall, rather slender, ca. 1.5 mm thick, soft, smooth. Leaves shorter than culm, flat, blades 1–2 mm wide, soft, brownish and persistent sheathed at base. Involucral bracts spathe-like, greenish sheathed, with involucre bract leaf at apex. Spikes 3 or 4, lowermost one remote or nearly basal, others approximate; terminal spike male, cylindrical, 1.4–1.6 cm, ca. 2 mm thick, densely many flowered, sometimes with 1–3 female flowers at base; lateral spikes female, linear-cylindrical, 1.7–3 cm, ca. 2 mm thick, sometimes 1–3-branched at base with branches arising from flowered utriculiform cladophylls, sometimes with a few male flowers at apex; peduncles filiform, very long exerted from involucre bract sheath. Female glumes brownish laterally,

green at middle, oblong, ca. 2 mm, papery, 3-veined, margins narrowly white hyaline, apex truncate or emarginate, mucronate. Utricles greenish, equaling or slightly longer than glume, narrowly elliptic, obtusely trigonous, 2–2.5 mm, papery, densely pubescent, 2-veined laterally, not thinly veined, base gradually narrowed to a short stipe, apex attenuate into a short beak, orifice emarginate. Nutlets brown at maturity, narrowly elliptic, 1.8–2 mm, trigonous; style base not thickened; stigmas 3. Fl. and fr. Jul–Sep.

• Grasslands on mountain slopes, wet places in valleys; 2800–3200 m. S Gansu, Shaanxi (Taibai Shan).

151. *Carex laeta* Boott, Ill. Gen. Carex 1: 69. 1858.

明亮藁草 ming liang tai cao

Carex pisanensis T. Koyama.

Rhizome obliquely ascending, ligneous, several branched. Culms densely tufted, 10–30 cm tall, ca. 1 mm thick, slender, obtusely trigonous, smooth. Leaves shorter than culm, flat, blades 1–1.5 mm wide, soft, dark brown and persistent sheathed at base; basal sheaths eventually disintegrating into fibers. Involucral bracts spathe-like, involucre bract sheaths long, green, white hyaline on margins, lowermost one with short involucre bract leaf, upper ones setaceous. Spikes 3 or 4; terminal spike male, oblong, 8–10 mm, taller than adjacent female spike, densely few flowered; lateral spikes 2 or 3, female, lowermost one sometimes basal, uppermost one near male spike, others remote, cylindrical, 1–2.5 cm, ca. 3 mm thick, densely many flowered. Female glumes brown or purple-brown, oblong, 3–3.5 mm, papery, green 1-veined, apex obtuse, mucronate. Utricles yellow-brown or greenish, equaling glume, obovate, trigonous, 3–3.2 mm, densely pubescent, 2-veined laterally, not distinctly thinly veined, base contracted into a short stipe, apex abruptly contracted into a short beak, orifice obliquely truncate. Nutlets brown at maturity, obovate, trigonous, ca. 2.2 mm, base subsessile, apex shortly beaked; style base not thickened; stigmas 3. Fl. and fr. Jun–Sep.

Meadow thickets on high mountains, forest margins or grasslands at riversides; 2000–4300 m. SW and W Sichuan, E Xizang, NW Yunnan [Bhutan, NE India, Nepal].

152. *Carex globistylota* P. C. Li, Acta Bot. Yunnan. 12: 144. 1990.

球柱藁草 qiu zhu tai cao

Rhizome stout, ligneous. Culms densely tufted, 40–60 cm tall, ca. 1 mm thick, slender, obtusely trigonous. Leaves shorter than culm, flat or plicate, blades 1–2 mm wide, adaxial surface scabrous, dark brown and persistent sheathed at base. Involucral bracts green, spathe-like, with linear bract leaf at apex. Spikes 3; terminal spike male, cylindrical, 2–3 cm, densely many flowered, peduncles slender, soft, 6–6.5 cm; lateral spikes 2, female, remote, lower one nearly basal, cylindrical, 1.8–3 cm, ca. 2 mm thick, densely many flowered, peduncles slender, filiform, soft, lower one up to 20 cm, upper one ca. 10 cm. Female glumes purple-brown laterally, green at middle, oblong, ca. 3 mm, 3-veined, margins broadly white hyaline, apex truncate or emarginate, mucronate. Utricles greenish, equaling glume, obovate-oblong, obtusely trigonous, ca. 3 mm, papery, densely

hispidulous, 2-veined laterally and thinly several veined, base gradually narrowed to a short stipe, margins ciliate, apex rounded, indistinctly beaked, orifice emarginate. Nutlets brownish at maturity, obovate-oblong, trigonous, ca. 2 mm, base shortly stipitate, apex nearly beakless; style short, thickened, ovoid, exserted from orifice of utricule; stigmas 3.

• Rocky mountain slopes; 4300–4400 m. SW Sichuan (Xiangcheng).

153. *Carex huolushanensis* P. C. Li, Acta Bot. Yunnan. 12: 145. 1990.

火炉山薹草 huo lu shan tai cao

Rhizome stout, stoloniferous. Culms densely tufted, 15–40 cm tall, ca. 1.5 mm thick, slender, obtusely trigonous. Leaves shorter than culm, flat, blades 1–3 mm wide, soft, margins scabrous, base dark brown and persistent sheathed. Involucral bracts spathe-like, sheaths brownish, with linear involucral bract leaf at apex. Spikes 3 or 4; terminal spike male, cylindrical, 2–2.5 cm, ca. 3 mm thick, densely many flowered, peduncle slender, 3.5–4 cm, taller than adjacent female spike; lateral spikes 2 or 3, female, remote, cylindrical, 1–4 cm, 2–3 mm thick, many flowered, loosely several flowered at lower part, densely many flowered at upper part, peduncles slender, soft, rather long exserted from involucral bract sheath. Female glumes dark purple-brown laterally, green at middle, oblong, 4–5 mm, papery, scabrous abaxially, 3-veined, margins broadly white hyaline, apex truncate or emarginate, mucronate. Utricles greenish, shorter than glume, oblong or obovate-oblong, obtusely trigonous, ca. 4 mm, 2-veined laterally and not thinly veined, hispidulous on veins and margins, base gradually narrowed to a stipe, apex contracted into a short beak, orifice emarginate. Nutlets brownish at maturity, obovate-oblong, trigonous, 2.5–3 mm, base nearly estipitate, apex rounded; style base slightly thickened; stigmas 3. Fl. and fr. Jun–Jul.

• Thickets on high mountains; 3900–4000 m. SW Sichuan (Yanyuan).

154. *Carex chiwuana* F. T. Wang & Tang ex P. C. Li, Acta Bot. Yunnan. 12: 143. 1990.

启无薹草 qi wu tai cao

Rhizome short. Culms densely tufted, 18–30 cm tall, ca. 1.5 mm thick, slender, obtusely trigonous, stiff. Leaves shorter than culm, flat, blades 3–5 mm wide, slightly stiff, dark brown and persistent sheathed at base. Involucral bracts spathe-like, sheaths greenish, involucral bract mouth white and membranous, with linear bract leaf at apex. Spikes 3 or 4; terminal spike male, oblong, 1.2–1.3 cm, ca. 3 mm thick, densely many flowered, peduncle 4.5–7 cm, taller or not taller than adjacent female spike; lateral spikes 2 or 3, female, remote, cylindrical, 2–3 cm, ca. 4 mm thick, densely many flowered, peduncles slender, very long exserted from involucral bract sheath. Female glumes dark brown laterally, green at middle, oblong or obovate-oblong, 3.8–4.2 mm, 1–3-veined, scabrous abaxially and on veins, broadly white hyaline on upper margin, apex rounded or emarginate, mucronate. Utricles yellowish green, slightly longer than glume, obovate-oblong, obtusely trigonous, 4–4.2 mm, papery, densely hispidulous, 2-veined laterally, not thinly

veined, base gradually narrowed to a long stipe, apex abruptly contracted into a short beak, orifice obliquely truncate, membranous. Nutlets obovate-oblong, 2.1–2.5 mm, base nearly estipitate, apex rounded; style thickened into conic shape at base, erect or recurved; stigmas 3. Fl. and fr. Jun–Jul.

• *Rhododendron* thickets, *Pinus* and *Larix* forests; 2800–4500 m. NW Yunnan (Lijiang, Zhongdian).

155. *Carex cardiolepis* Nees in Wight, Contr. Bot. India, 127. 1834.

藏东薹草 zang dong tai cao

Rhizome obliquely ascending, ligneous, stout. Culms densely tufted, 20–40 cm tall, ca. 1 mm thick, slightly scabrous. Leaves slightly shorter than or nearly equaling culm, elongating after flowering, flat or plicate, blades 1–2 mm with soft, dark brown persistent sheaths at base. Involucral bracts spathe-like, sheaths green, membranous on margin, shortly leafy at apex. Spikes 3 or 4, remote, rarely lowermost one basal; terminal spike male, clavate-cylindrical, 1.5–2 cm, 2–2.5 mm thick, densely many flowered; lateral spikes 2 or 3, female, cylindrical, 1–2 cm, ca. 3 mm thick, laxly many flowered; peduncles filiform, very long exserted from involucral bract sheath. Female glumes brownish laterally, green at middle, obovate-oblong or oblong, 4.3–4.7 mm, papery, 3-veined, margins white hyaline, apex rounded or emarginate, with scabrous awn. Utricles greenish, shorter than or equaling glume, obovate-oblong, inflated trigonous, 4–4.5 mm, papery, densely pubescent, 2-veined laterally and thinly several veined, base gradually narrowed into a short stipe, apex abruptly contracted into a recurved and short beak, orifice entire. Nutlets obovate-oblong, 2.5–2.8 mm, trigonous, base shortly stipitate, apex with recurved and short beak; style base slightly thickened; stigmas 3. Fl. and fr. May–Sep.

Meadow thickets on high mountains, forests; 3000–4300 m. S Qinghai, SW and W Sichuan, E and S Xizang, NW Yunnan [Afghanistan, India, Kashmir, Nepal].

156. *Carex dayuogensis* Z. P. Wang, Acta Bot. Yunnan. 11: 166. 1989.

大庸薹草 da yong tai cao

Rhizome ± horizontal, indurate, slender. Culms densely tufted, 20–30 cm tall, ca. 1 mm thick, subterete, smooth. Leaves longer than or equaling culm, flat or plicate, blades 1–2 mm wide, rough margined; sheaths brown, persistent as fibrous remnants. Involucral bracts spathe-like, sheaths green, reddish brown basally, membranous on margin, with short leaflike blade. Spikes 4 or 5, remote; terminal spike male, clavate, 3.5–4.5 cm, 2.5–3 mm thick, subluxly many flowered; peduncles slender, scabrous or smooth, well exserted from involucral bract sheath. Male glumes ligulate, ca. 6 mm, apex obtuse to acuminate; female glumes pale brown laterally, green at middle, oblong, 2–3 mm, papery, obscurely 3-veined, margins white hyaline, apex rounded or emarginate, mucicous. Utricles greenish, ± equaling glume, obovate, trigonous, 2.5–3 mm, membranous, densely puberulent, 2-veined laterally and thinly several veined, base cuneate, apex abruptly contracted into a short straight beak, orifice weakly 2-toothed. Nutlets obovate-oblong, 2.5–2.8 mm,

trigonus, base shortly stipitate, apex with minute beak; style base conical; stigmas 3, ± as long as utricle.

- Forests in valleys; ca. 300 m. NW Hunan (Zhangjiajie).

157. *Carex obovatosquamata* F. T. Wang & Y. L. Chang ex P. C. Li, *Acta Phytotax. Sin.* 37: 175. 1999.

倒卵鳞藁草 *dao luan lin tai cao*

Rhizome short. Culms densely tufted, 20–40 cm tall, ca. 1 mm thick, slender, triquetrous, smooth. Leaves slightly shorter than or equaling culm, flat, soft, smooth, blades 1.3–2.2 mm wide, plicate at upper part, linear, dark brown and persistent sheathed at base. Involucral bracts spathe-like, sheaths long, involucral bract leafy at apex, linear, longer than peduncle. Spikes 3 or 4, remote, lowermost one basal; terminal spike male, cylindrical, 1.5–2.5 cm, ca. 3 mm thick, densely many flowered; lateral spikes 2–4, female, cylindrical, 2–3 cm, ca. 3.5 mm thick, densely many flowered; peduncles slender, filiform, soft, very long exerted from involucral bract sheath. Female glumes dark purple-brown, green at middle, obovate-oblong or oblong, 3.5–4.8 mm, papery, 3-veined, narrowly white hyaline margined at upper part, apex subrounded, mucronate. Utricles green, slightly longer than glume, obovate-oblong, obtusely trigonus, 4.2–5 mm, papery, densely white pubescent, indistinctly 2-veined laterally, not thinly veined, base gradually narrowed to a short stipe, apex abruptly contracted into a short beak, orifice obliquely split, 2-toothed. Nutlets brown at maturity, obovate-oblong, trigonus, 2.5–3.5 mm, base shortly stipitate, apex nearly beakless; style erect or slightly bent, base inflated; stigmas 3. Fl. and fr. Jul–Sep.

- Thickets or meadows on high mountains, grasslands at *Abies* forest margins; 3400–4300 m. E Xizang, NW Yunnan (Dêqên).

158. *Carex crebra* V. I. Kreczetowicz, *Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R.* 9: 190. 1946.

密生藁草 *mi sheng tai cao*

Rhizome short. Culms densely tufted, 10–30 cm tall, not up to 1.5 mm thick, compressed triquetrous, smooth. Leaves rather shorter than culm, scabrous and involute on margins, linear, slightly stiff, blades 0.8–1 mm wide, dark brown and persistent sheathed at base, sheaths eventually disintegrating into fibers. Involucral bracts spathe-like, sheaths green abaxially and purple-red adaxially, white hyaline on margins, lowermost one with setaceous involucral bract leaf, upper ones without leaf. Spikes 2–4, lowermost spike remote, others approximate; terminal spike male, taller than adjacent female spike, cylindrical, 8–10 mm, densely many flowered; lateral spikes 1–3, female, subcylindrical, 7–20 mm, densely 4–10- or more flowered; peduncles short, usually not exerted or slightly exerted from involucral bract sheath. Female glumes purple-brown laterally, green at middle, oblong, 4.5–5 mm, papery, 3-veined, margins broadly white hyaline, apex acute, shortly awned. Utricle slightly shorter than glume, obovate-oblong, obtusely trigonus, 3.5–4 mm, papery, densely pubescent, 2-veined laterally and thinly several veined, base gradually narrowed to a short stipe, apex contracted into a recurved and short beak or nearly beakless, orifice truncate. Nutlets brown at maturity, obovate-elliptic, obtusely trigonus, 3–3.2 mm, slightly concave on 3 faces,

base shortly stipitate or nearly estipitate, apex with recurved and short beak; style rather short, base not thickened; stigmas 3. Fl. and fr. Apr–Aug.

- Sunny meadow thickets on high mountains; 1700–3900 m. Gansu, S Qinghai, SW and W Sichuan, E and S Xizang, NW Yunnan.

159. *Carex pediformis* C. A. Meyer, *Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans* 1: 219. 1831.

柄状藁草 *bing zhuang tai cao*

Rhizome short or elongate and obliquely ascending. Culms densely or loosely tufted, 25–40 cm, slender, ca. 1.5 mm thick, triquetrous, slightly scabrous, subrigid. Leaves shorter than or equaling culm, flat, blades 2–3 mm wide, slightly stiff, brown or dark brown and persistent sheathed at base, sheaths usually disintegrating into fibers. Involucral bracts spathe-like, sheaths brown on lower part, green abaxially, white hyaline on margins, involucral bract leaf short or setaceous. Spikes 3 or 4, lowermost one slightly remote, others approximate or all spikes rather remote; terminal spike male, surpassing adjacent female spike, clavate-cylindrical, 8–20 mm, ca. 3 mm thick, densely several or many flowered; lateral spikes 2 or 3, female, oblong or oblong-cylindrical, 1–2 cm, 3–3.5 mm thick, loosely or densely many flowered; peduncles usually not exerted or slightly exerted from involucral bract sheath; rachis erect. Female glumes brown or brown-red laterally, green at middle, obovate, ovate-oblong, or oblong, 4–4.5 mm, papery, 1–3-veined, margins broadly white hyaline, apex obtuse or acute, mucronate or aristate. Utricles greenish, slightly shorter than glume, obovate or obovate-oblong, obtusely trigonus, 3.5–4.5 mm, densely white pubescent, nerveless or indistinctly shortly veined abaxially, 2-veined laterally and thinly several veined or shortly veined adaxially, rarely nerveless or convexly several veined on both surfaces, base gradually narrowed to a long stipe, apex rounded, abruptly contracted into a recurved and short beak, orifice emarginate. Nutlets yellow-brown at maturity, obovate, trigonus, 2.5–3 mm, base shortly stipitate, apex with very short and recurved beak; style base thickened; stigmas 3. Fl. and fr. May–Sep.

Grasslands, mountain slopes, lax forests; 500–2000 m. Gansu, Hebei, Heilongjiang, Jilin, Nei Mongol, Shaanxi, Shanxi, Xinjiang [Korea, Mongolia, Russia (Far East, Siberia)].

- 1a. Utricles usually nerveless or indistinctly shortly veined abaxially, 2-veined laterally and thinly several veined or shortly veined adaxially, rarely nerveless on both surfaces 159a. var. *pediformis*
- 1b. Utricles usually convexly several veined on both surfaces 159b. var. *pedunculata*

159a. *Carex pediformis* var. *pediformis*

柄状藁草(原变种) *bing zhuang tai cao* (yuan bian zhong)

Carex aneurocarpa V. I. Kreczetowicz; *C. ayouensis* X. Y. Mao & Y. C. Yang; *C. hankaensis* Kitagawa; *C. kirilowii* Turczaninow; *C. macroua* Meinshausen; *C. pediformis* var. *floribunda* Korshinsky; *C. pediformis* var. *macroua* (Meinshausen) Kükenthal; *C. rhizina* Blytt ex Lindblom; *C. rhizodes* Blytt ex Boott var. *abbreviata* Meinshausen; *C. supermascula* V. I. Kreczetowicz; *C. sutchanensis* Komarov.

Utricles usually nerveless or indistinctly shortly veined abaxially, 2-veined laterally and thinly several veined or shortly veined adaxially, rarely nerveless on both surfaces.

Grasslands, mountain slopes, lax forests; 500–2000 m. Gansu, Hebei, Heilongjiang, Jilin, Nei Mongol, Shaanxi, Shanxi, Xinjiang [Mongolia, Russia (Far East, Siberia)].

The plants are used for making mats and are good for use as forage.

We have examined a large number of specimens in China and find that, although the spikes, glumes, and utricles of this species have many variable characters, these characters form a continuum and are very difficult to correlate with separate species. Therefore, we agree with Y. L. Chang and Y. L. Yang (Fl. Pl. Herb. Chin. Bor.-Orient. 11: 116. 1976) in combining *Carex hankaensis*, *C. macroura*, and *C. supermascula* with *C. pediformis*.

159b. *Carex pediformis* var. *pedunculata* Maximowicz, Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans 9 [Prim. Fl. Amur.]: 310. 1859.

柞藁草 zuo tai cao

Utricles usually convexly several veined on both surfaces. Fl. and fr. May–Jun.

Forests; 500–600 m. Heilongjiang, Jilin, Nei Mongol [Korea, Russia (Far East)].

160. *Carex lanceolata* Boott in A. Gray, Narr. Exped. China Japan, 326. 1857.

大披针藁草 da pi zhen tai cao

Rhizome stout, obliquely ascending. Culms densely tufted, 10–35 cm tall, ca. 1.5 mm thick, slender, compressed triquetrous, scabrous on upper part. Leaves shorter than culm when young, eventually elongating, equaling or longer than culm, blades 1–2.5 mm wide, flat, soft, margins slightly scabrous, base purple-brown and persistent sheathed, sheaths eventually disintegrating into fibers. Involucral bracts spathe-like, sheath green and brownish lined, brownish abaxially, white and membranous at sheath mouth and adaxially, lower 1 or 2 involucral bract blades setaceous, remaining blades mucro-shaped. Spikes 3–6, remote; terminal spike male, linear-cylindric, 5–15 mm, 1.5–2 mm thick, shorter than or equaling adjacent female spike; lateral spikes 2–5, female, oblong or oblong-cylindric, 1–1.7 cm, 2.5–3 mm thick, loosely or subdensely 5–10-flowered, or loosely 2- or 3-flowered; peduncles usually not exerted from involucral bract sheath, lowermost one slightly exerted; rachis slightly or distinctly flexuose. Female glumes purple-brown laterally, green at middle, lanceolate, obovate-lanceolate, obovate, or obovate-oblong, 5–6 mm, papery, 3-veined, margins broadly white hyaline, apex acute, mucronate. Utricles greenish, shorter than glume, obovate-oblong, obtusely trigonous, ca. 3 mm, papery, densely pubescent, 2-veined laterally and convexly several veined, base abruptly contracted into a long stipe, apex rounded, shortly beaked, orifice truncate. Nutlets obovate-elliptic, trigonous, 2.5–2.8 mm, base shortly stipitate, apex with recurved and short beak; style base slightly thickened; stigmas 3. Fl. and fr. Apr–Jul.

Forests, grasslands at forest margins, dry grasslands on sunny slopes, mountain slopes, thickets, watersides, field margins, on rocks; 100–2300 m. Anhui, Gansu, Guizhou, Hebei, Heilongjiang, Henan,

Hubei, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang [Japan, Korea, Mongolia, Russia (Far East, E Siberia)].

- 1a. Culms shorter than 10–35 cm tall; female spikes only loosely 2- or 3-flowered; rachis distinctly flexuose 160c. var. *laxa*
- 1b. Culms 10–35 cm tall; female spikes loosely or slightly densely 5–10-flowered; rachis slightly flexuose.
 - 2a. Female glumes lanceolate or obovate-lanceolate; utricles 2-veined laterally and convexly several veined 160a. var. *lanceolata*
 - 2b. Female glumes obovate or obovate-oblong; utricles only 2-veined laterally 160b. var. *subpediformis*

160a. *Carex lanceolata* var. *lanceolata*

大披针藁草(原变种) da pi zhen tai cao (yuan bian zhong)

Carex lanceolata var. *alashanica* T. V. Egorova; *C. longisquamata* Meinshausen ex Komarov.

Culms 10–35 cm tall. Female spikes loosely or slightly densely 5–10-flowered. Female glumes lanceolate or obovate-lanceolate. Utricles 2-veined laterally and convexly several veined.

Forests, grasslands at forest margins, dry grasslands on sunny slopes; 100–2300 m. Anhui, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang [Japan, Korea, Mongolia, Russia (Far East, E Siberia)].

The culms and leaves are used for making paper, and the young plants are used as animal feed.

160b. *Carex lanceolata* var. *subpediformis* Kükenthal in Engler, Pflanzenr. 38(IV. 20): 493. 1909.

亚柄藁草 ya bing tai cao

Carex prevernalis Kitagawa; *C. pseudolanceolata* V. I. Kreczetowicz; *C. subpediformis* (Kükenthal) Suto & Suzuki.

Female glumes obovate or obovate-oblong. Utricles only 2-veined laterally, not distinctly thinly veined. Fl. and fr. Apr–Jul.

Mountain slopes, thickets, watersides, field margins; 300–2200 m. Gansu, Hebei, Hubei, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shanxi, W Sichuan [Japan, Russia (Far East)].

160c. *Carex lanceolata* var. *laxa* Ohwi, Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 11: 402. 1936.

少花大披针藁草 shao hua da pi zhen tai cao

Carex karafutoana Ohwi.

Culms shorter than 10–35 cm tall. Female spikes only loosely 2- or 3-flowered; rachis distinctly flexuose. Fl. and fr. May–Jun.

On rocks of mountain slopes near forests. Jilin, Nei Mongol [Japan, Russia (Far East, E Siberia)].

161. *Carex scolopendrififormis* F. T. Wang & Tang ex P. C. Li, Acta Bot. Yunnan. 12: 142. 1990.

蜈蚣藁草 wu gong tai cao

Rhizome elongate, creeping. Culms 15–30 cm tall, 0.5–0.8 mm thick, slender and soft. Leaves shorter than or equaling culm, filiform, soft, dark brown and persistent sheathed at base. Involucral bracts sheathlike, brown, with setaceous blade. Spikes 2; terminal spike male, linear, 1.2–1.3 cm, ca. 1 mm thick, densely many flowered; peduncle thin, 2.5–3 cm, surpassing lower female spike; lateral spike 1, female, oblong, 5–6 mm, laxly 2- or 3-flowered; peduncle rather slender, slightly exerted from involucral bract sheath. Female glumes brown, subovate, 2.4–2.6 mm, papery, 1-veined, margins broadly white hyaline, apex attenuate and mucronate. Utricles green-brown, longer than glume, broadly ovoid, inflated trigonous, 3.5–3.6 mm, densely hispidulous, 2-veined laterally and longitudinally several veined, base abruptly contracted into a short stipe, apex contracted into a moderately long beak, orifice membranous, 2-toothed. Nutlets brown at maturity, broadly obovoid, trigonous, ca. 1.8 mm; style base thickened; stigmas 3. Fl. and fr. May–Jun.

• Wet grasslands on mountain slopes, thickets, *Pinus* forests; 1000–3500 m. NW Hunan (Zhangjiajie: Tianmen Shan), SW Sichuan, NW Yunnan (Lijiang, Zhongdian).

162. *Carex infossa* Z. P. Wang, J. Nanjing Univ., Nat. Sci. Ed. 1962(2): 52. 1962.

隐匿藁草 yin ni tai cao

Rhizome short. Culms up to 30 cm tall, slender, triquetrous, shortly bracteate or bractless sheathed at base, sheaths dark purple, sometimes disintegrating into fibers. Leaves shorter than culm, blades 2.5–3 mm wide, soft, both surfaces or abaxial side scabrous. Involucral bract leaflike, longer than spike, shortly sheathed. Spikes 3 or 4; terminal spike male, lower than or surpassing adjacent female spike, narrowly obovate or sub-linear, ca. 5 mm, shortly pedunculate, lower spikes remote; lateral spikes female, oblong, 0.8–2 cm, laxly 3- or 4-flowered,

rarely 5- or 6-flowered, slightly long pedunculate. Female glumes pale, greenish at middle, oblong or oblong-ovate, ca. 3.5 mm, membranous, 3-veined, apex mucronate or shortly awned. Utricles gray-green, nearly erect, longer than glume, elliptic or obovate-elliptic, trigonous, 5–6 mm, brown punctate, pubescent, 2-veined laterally and indistinctly thinly several veined, base abruptly contracted into a short stipe and apex into a short or long beak, orifice 2-toothed. Nutlets broadly elliptic, trigonous, ca. 3.5 mm, base with tortuous stipe, apex concave; style short, base slightly thickened; stigmas 3. Fl. and fr. Apr–Jun.

• Mountain slopes, forests, gully sides. Anhui, Jiangsu.

- 1a. Terminal male spike rather short, lower than adjacent female spike, lowermost female spike not basal; utricles shortly beaked at apex 162a. var. *infossa*
 1b. Terminal male spike rather long, surpassing adjacent female spike, lowermost female spike nearly basal; utricles rather long beaked at apex 162b. var. *extensa*

162a. *Carex infossa* var. *infossa*

隐匿藁草(原变种) yin ni tai cao (yuan bian zhong)

Terminal male spike rather short, lower than adjacent female spike, lowermost female spike not basal. Utricles shortly beaked at apex.

• Mountain slopes, forests, gully sides. Anhui (Langya Shan), Jiangsu.

162b. *Carex infossa* var. *extensa* S. W. Su, J. Anhui Univ., Nat. Sci. Ed. 20(3): 108. 1996.

显穗藁草 xian sui tai cao

Terminal male spike rather long, surpassing adjacent female spike, lowermost female spike nearly basal. Utricles rather long beaked at apex.

• S Anhui (Qimen).

22. *Carex* sect. *Albae* (Ascherson & Graebner) Kükenthal in Engler, Pflanzenr. 38(IV. 20): 499. 1909.

白鳞藁草组 bai lin tai cao zu

Dai Lunkai (戴伦凯); Tetsuo Koyama

Carex [unranked] *Albae* Ascherson & Graebner, Syn. Mitteleur. Fl. 2(2): 156. 1903.

Rhizome stoloniferous. Culms obtusely trigonous. Leaves narrow, involute on margins. Involucral bracts sheathlike, bladeless. Spikes unisexual; terminal spike male; lateral spikes female, loosely few flowered, with slender peduncle. Female glumes very broadly hyaline on margins. Utricles swollen trigonous, glabrous, shiny, shortly beaked, beak obliquely truncate at orifice. Nutlets tightly enveloped in utricle; style base thickened and globose; stigmas 3.

Four species: Asia, Europe, North America; two species in China.

- 1a. Leaves ca. 1/2 height of culms; terminal spike usually lower than adjacent female spike, female spikes 2–6-flowered; female glumes shorter than utricle; utricles 3.5–4 mm, yellow-green, shiny 163. *C. alba*
 1b. Leaves equaling culms; terminal spike surpassing adjacent female spike, female spikes 2–4-flowered; female glumes equaling utricle; utricles ca. 3 mm, dark brown, not shiny 164. *C. ussuriensis*

163. *Carex alba* Scopoli, Fl. Carniol., ed. 2, 2: 216. 1772.

白鳞藁草 bai lin tai cao

Rhizome stoloniferous. Culms tufted, 15–30 cm tall, rather slender, obtusely trigonous, smooth; sheaths leafless at base. Leaves rather shorter than culm, blades flat, ca. 1 mm wide,

eventually involute on margins, soft, brown sheathed at base. Involucral bracts brown-green, sheathlike, ca. 1 cm, hyaline on margins, without involucral bract leaf. Spikes usually 3, rarely 2 or 4, slightly approximate; terminal spike male, usually not surpassing adjacent female spike, linear, 1–1.5 cm; lateral spikes usually 2, rarely 1 or 3, female, oblong or subovate, 5–10 mm, loosely 2–6-flowered, peduncles slender. Female glumes stramineous or yellow-brownish, broadly ovate, ca. 3 mm, membranous, not hyaline margined, green 1-veined, apex acute. Utricles yellow-green, brownish yellow at maturity, obliquely patent, slightly longer than glume, broadly obovate or elliptic-obovate, obtusely trigonous, 3.5–4 mm, leathery, glabrous, shiny, several slightly concave veined, base obtusely rounded, margins hyaline, apex contracted into a short beak, orifice obliquely truncate. Nutlets dark brown, tightly enveloped in utricle, obovate-elliptic, trigonous, ca. 2.5 mm, brownish yellow and slightly convex on angles, tuberculate on surface; style base thickened and globose; stigmas 3. Fl. and fr. Jun–Jul.

On rocks of mountain slopes, sandy areas, swamps. Xinjiang [Russia; WC Europe].

164. *Carex ussuriensis* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 18: 443. 1901.

乌苏里藁草 wu su li tai cao

23. *Carex* sect. *Limosae* Meinshausen, Trudy Imp. S.-Peterburgsk. Bot. Sada 18: 283, 349. 1901.

湿生藁草组 shi sheng tai cao zu

Dai Lunkai (戴伦凯); Tetsuo Koyama

Rhizome stoloniferous. Involucral bracts ± spathe-like, usually short involucral bract leafy, sheaths long or short. Spikes few, unisexual, rather remote; terminal spike male; lateral spikes female, subdensely few to many flowered; peduncles slender, usually pendent. Female glumes long or shortly mucronate or awned. Utricles leathery, glabrous, papillate or granular punctate, nearly beakless or very shortly beaked, orifice truncate or emarginate. Nutlets rather tightly enveloped in utricle; style exerted from utricle, base not thickened; stigmas 3.

Four species: polar and alpine regions of Asia, Europe, and North and South America; two species in China.

- 1a. Lowermost involucral bract shortly sheathed, sheath less than 5 mm; female glumes slightly longer than utricle; utricles ovate or elliptic 165. *C. limosa*
 1b. Lowermost involucral bract long sheathed, sheath up to 2 cm, female glumes shorter than utricle; utricles oblong-elliptic 166. *C. laxa*

165. *Carex limosa* Linnaeus, Sp. Pl. 2: 977. 1753.

湿生藁草 shi sheng tai cao

Rhizome long stoloniferous. Culms 20–45 cm, triquetrous, rather slender, scabrid at upper part, red-brown sheathed at base, sheaths sometimes disintegrating into fibers. Leaves shorter than culm, blades 1.5–2.5 mm wide, slightly plicate, grooved at middle, scabrous on margins, sheathed. Involucral bracts leaflike, with short involucral bract leaf, involucral bract sheaths short. Spikes 2 or 3, remote; terminal spikes male, erect, linear, 2–2.5 cm, pedunculate; lateral spikes female, sometimes with few male flowers at apex, oblong or ovate, 1–2 cm, subdensely many flowered, peduncles slender, often pendent. Female glumes yellowish brown, ovate or lanceolate-ovate, 4–6 mm, green at middle, 1–3-veined, apex hard mucronate. Utricles suberect, slightly shorter than glume, ovate or elliptic,

Carex alba Scopoli subsp. *ussuriensis* (Komarov) Kükenthal.

Rhizome stoloniferous, stolons slender. Culms loosely tufted, 20–40 cm tall, obtusely trigonous, smooth, bladeless sheathed at base. Leaves nearly equaling height of culm, blades ca. 0.5 mm wide, slightly revolute on margins, slightly soft, yellow-brown sheathed. Involucral bracts sheathlike, up to 2 cm, broadly membranous on margin of sheathing mouth, without involucral bract leaf. Spikes 2 or 3, slightly remote; terminal spike male, usually surpassing adjacent female spike, lanceolate-linear, 1–2 cm; lateral spikes female, oblong, 0.5–1 cm, very loosely 2–4-flowered; rachis flexuose; peduncles slender, up to 3 cm. Female glumes yellowish, ovate or subelliptic, ca. 3 mm, membranous, 1-veined, basal part enclosing rachis, margins broadly hyaline, apex hard mucronate. Utricles yellow-green, dark brown at maturity, suberect, nearly equaling glume, obovate, indistinctly trigonous, ca. 3 mm, subleathery, not shiny, glabrous, several slightly concave veined, base broadly truncate or subrounded, apex abruptly narrowed to a short beak, orifice truncate. Nutlets rather tightly enveloped in utricle, obovate, trigonous, ca. 2 mm; style base thickened; stigmas 3, slender. Fl. and fr. Jun–Jul.

Needle-leaved forests, shady and wet places. Heilongjiang, Jilin, Nei Mongol, Shaanxi [Japan, Korea, Russia (Far East)].

compressed trigonous, 3.5–4 mm, leathery, glabrous, densely punctate, several veined, base rounded, shortly stipitate, apex abruptly narrowed into a very short beak, orifice truncate or emarginate. Nutlets slightly loosely enveloped in utricles, elliptic, compressed trigonous, ca. 2 mm; style exerted from utricle, persistent, base not thickened; stigmas 3. Fl. and fr. May–Jul.

Swamps, grasslands at watersides. Heilongjiang, Liaoning [Japan, Korea, Mongolia, Russia (Far East, Siberia); Europe, North America].

166. *Carex laxa* Wahlenberg, Kongl. Vetensk. Acad. Nya Handl. 24: 156. 1803.

稀花藁草 xi hua tai cao

Rhizome slender stoloniferous. Culms 25–35 cm tall, slender, sometimes slightly pendent at apex, obtusely trigonous, smooth, brownish and bladeless sheathed at base. Leaves

shorter than culm, blades 1–2 mm wide, flat, sometimes longitudinally grooved, slightly soft, scabrid on margins, sheathed. Involucral bracts leaflike, with long sheath and short blade. Spikes usually 3, rather remote; terminal spike male, linear-lanceolate; lateral spikes female, oblong, 1–2 cm, subdensely few flowered, peduncles slender, pendent. Female glumes yellowish brown, ovate or oblong-ovate, ca. 3 mm, membranous, green 1-veined, apex obtuse, mucronate. Utricles greenish, suberect, slightly longer than glume, oblong-elliptic, indistinctly trigo-

nous, ca. 3.5 mm, leathery, glabrous, densely papillose, few veined, base gradually narrowed and cuneate, shortly stipitate, apex abruptly contracted into a short beak, beak ferruginous-brown, truncate at orifice. Nutlets rather tightly enveloped in utricule, obovate, trigonous; style exerted from utricule, base not thickened; stigmas 3. Fl. and fr. Jun–Aug.

Swamps, wet places on lakesides or riversides. Heilongjiang, Liaoning, Nei Mongol [Japan, Russia; Europe].

24. Carex sect. Paniceae G. Don in Loudon, Hort. Brit. 376. 1830.

少花薹草组 shao hua tai cao zu

Dai Lunkai (戴伦凯); Tetsuo Koyama

Rhizome stoloniferous. Culms usually slightly slender. Leaves much shorter than culm, rather narrow. Involucral bracts rather long sheathed. Spikes 3–6, unisexual; terminal spike male; lateral spikes female, rather remote, loosely flowered, pedunculate. Female glume usually mucronate. Utricles membranous or subleathery, inflated trigonous, glabrous, densely punctulate, shortly beaked; style base not thickened or slightly thickened; stigmas 3.

Fourteen species: Asia, Europe, North and South America; one species in China.

167. Carex vaginata Tausch, Flora 4: 557. 1821.

少花薹草 shao hua tai cao

Rhizome slender stoloniferous. Culms 20–50 cm tall, slender, obtusely trigonous, smooth, leafy at lower part. Leaves much shorter than culm, blades 3–5 mm wide or wider, flat, slightly soft; sheaths brown, sometimes purplish red. Involucral bracts with long sheath and rather short blade. Spikes 2–4, usually 3, rather remote; terminal spike male, subclavate, 1–1.5 cm; lateral spikes female, oblong-cylindric or oblong, 1–2.5 cm, loosely several flowered; peduncles long and erect. Female glumes ferruginous-brown, broadly ovate, ca. 3 mm, membranous, green 3-veined, margins hyaline, apex obtuse or acute. Utricles yellow-green, obliquely patent, longer than glume, ovate, inflated trigonous, 4–6 mm, subleathery, glabrous, indistinctly veined, base broadly cuneate, apex abruptly narrowed into a short or medium-sized beak, orifice emarginate or 2-toothed. Nutlets rather loosely enveloped in utricule, obovate, trigonous, ca. 2.5 mm, base shortly stipitate; style base slightly thickened; stigmas 3. Fl. and fr. May–Jul.

Forests, thickets, grasslands, grassland margins. Heilongjiang, Jilin, Liaoning, Nei Mongol [Japan, Korea, Mongolia, Russia; Europe].

- 1a. Leaf blades 3–5 mm wide; utricles
ca. 4 mm 167a. var. *vaginata*

- 1b. Leaf blades much wider; utricles
5–6 mm 167b. var. *petersii*

167a. Carex vaginata var. *vaginata*

少花薹草(原变种) shao hua tai cao (yuan bian zhong)

Carex panicea Linnaeus var. *sparsiflora* Wahlenberg; *C. sparsiflora* (Wahlenberg) Steudel.

Leaf blades 3–5 mm wide. Utricles ca. 4 mm.

Wet places in forests or at grassland margins. Heilongjiang, Liaoning [Japan, Korea, Russia; Europe].

167b. Carex vaginata var. *petersii* (C. A. Meyer ex F. Schmidt) Akiyama, J. Jap. Bot. 11: 499. 1935.

大少花薹草 da shao hua tai cao

Carex petersii C. A. Meyer ex F. Schmidt, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 12(2) [Reis. Amur-Land., Bot.]: 194. 1868; *C. falcata* Turczaninow; *C. sparsiflora* var. *falcata* (Turczaninow) Kükenthal; *C. sparsiflora* var. *petersii* (C. A. Meyer ex F. Schmidt) Kükenthal.

Leaf blades much wider. Utricles 5–6 mm.

Forests, thickets, grasslands. Heilongjiang, Jilin, Liaoning, Nei Mongol [Mongolia, Russia].

25. Carex sect. Siderostictae Franchet ex Ohwi, Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 11: 428. 1936.

宽叶薹草组 kuan ye tai cao zu

Tang Yancheng (汤彦承 Tang Yen-cheng), Zhang Shuren (张树仁); Tetsuo Koyama, Gordon C. Tucker

Rhizome elongate, rarely shortened. Leaf blades linear or oblanceolate, midvein prominent abaxially, 2 lateral veins prominent adaxially. Involucral bract sheaths ± inflated above and spathe-like, blade often shorter to slightly longer than sheath. Spikes androgynous, linear to linear-cylindric. Utricles trigonous, often prominently many veined, nearly beakless to shortly beaked, orifice subtruncate. Stigmas 3.

Twelve species: E and SE Asia; eight species (six endemic) in China.

- 1a. Lowermost involucral bract blades nearly equaling to longer than sheaths.
2a. Spikes less than 2 cm; utricles with beak erect.

- 3a. Spikes subcapitate, 5–7 mm 172. *C. subcapitata*
 3b. Spikes linear-cylindric, 10–20 mm 171. *C. grandiligulata*
 2b. Spikes 2–5 cm; utricles with beak recurved.
 4a. Leaves linear, 5–7 mm wide; utricles broadly ovoid, glabrous 173. *C. wuyishanensis*
 4b. Leaves oblanceolate, 10–30 mm wide; utricles oblong-elliptic, sparsely hairy 169. *C. oblanceolata*
 1b. Lowermost involucre bract nearly bladeless or blades much shorter than sheaths.
 5a. Leaves oblong-oblanceolate, 1–3 cm wide.
 6a. Plants stoloniferous; utricles nearly beakless 168. *C. siderosticta*
 6b. Plants tufted without stolons; utricle beaked 170. *C. esquiroliana*
 5b. Leaves linear, less than 1 cm wide.
 7a. Spike linear-cylindric, male part 1/4–1/2 length of spike; utricles ca. 3 mm, convex adaxially, beak bent downward, 1/8–1/4 length of utricle; female glume slightly shorter than utricle, apex acute 174. *C. glossostigma*
 7b. Spike linear, male part 1/2–3/4 length of spike; utricles ca. 4.5 mm, not convex adaxially, beak erect, ca. 1/3 length of utricle; female glume ca. 1/2 length of utricle, apex subtruncate 175. *C. longshengensis*

168. *Carex siderosticta* Hance, J. Linn. Soc., Bot. 13: 89. 1873.

宽叶薹草 kuan ye tai cao

Rhizome elongate. Flowering culms and vegetative culms spaced; flowering culms clothed by bladeless sheaths at base, pale brown, without leaves. Leaf blades of vegetative culms oblong-lanceolate, 10–20 × 1–2.5 cm, sometimes with white stripes, midvein and 2 lateral veins rather distinct, sometimes ciliate, glabrous adaxially, sparsely pilose on veins abaxially or on both surfaces. Flowering culms up to 30 cm tall; involucre bract sheaths inflated above and spathe-like, 2–2.5 cm, with blade 5–10 mm. Spikes 3–6(–10), single or binate at each node, androgynous, or terminal spike usually male, linear-cylindric, 1.5–3 cm, loosely flowered; peduncles 2–6 cm, usually exserted. Female glumes elliptic-oblong to lanceolate-oblong, 4–5 mm, hyaline-membranous laterally, sparsely rusty punctate, green costa 3-veined, apex obtuse. Utricles obovate or elliptic, trigonous, 3–4 mm, glabrous or pilose, slenderly and prominently many veined, base attenuate into a very short stipe, apex contracted into a short beak or beakless, orifice truncate. Nutlet tightly enveloped, elliptic, trigonous, ca. 2 mm; style persistent, base not thickened, slightly exserted from utricle; stigmas 3. Fl. and fr. Apr–May.

Needle-leaved and broad-leaved mixed forests and forest margins or broad-leaved forests, rather dry grasslands; 1000–2000 m. Anhui, Hebei, Heilongjiang, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Zhejiang [Japan, Korea, Russia (Far East)].

- 1a. Utricle glabrous; leaf blade margin glabrous 168a. var. *siderosticta*
 1b. Utricle pilose; leaf blade margin ciliate 168b. var. *pilosa*

168a. *Carex siderosticta* var. *siderosticta*

宽叶薹草(原变种) kuan ye tai cao (yuan bian zhong)

Carex siderosticta var. *variegata* Akiyama.

Leaf blade glabrous at margins, glabrous adaxially and sparsely pilose on veins abaxially. All spikes androgynous. Utricle glabrous.

Needle-leaved and broad-leaved mixed forests and forest margins or broad-leaved forests; 1000–2000 m. Anhui, Hebei, Heilongjiang, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Zhejiang [Japan, Korea, Russia (Far East)].

168b. *Carex siderosticta* var. *pilosa* H. Léveillé ex T. Koyama, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 8: 233. 1962.

毛缘宽叶薹草 mao yuan kuan ye tai cao

Carex ciliatomarginata Nakai, Repert. Spec. Nov. Regni Veg. 13: 244. 1914 [“*ciliato-marginata*”].

Leaf blades ciliate and sparsely pilose on both surfaces. Terminal spike usually male. Utricle pilose. Fl. and fr. Apr–May.

Rather dry grasslands, forest margins. Anhui, Jiangsu, Liaoning, Zhejiang [Japan, Korea].

169. *Carex oblanceolata* T. Koyama, Willdenowia 5: 489. 1969.

矩圆薹草 ju yuan tai cao

Rhizomes thick, with stolons. Culms lateral, longer than leaves, 40–50 cm. Leaves basal, clustered, 1–3 cm wide, with many prominently raised veins, glabrous on both surfaces, middle part of culm bearing 1 leaf, cauline leaf oblanceolate, 60–80 × 6–8 mm, long sheathed. Involucre bracts shortly leafy, 1.5–5 cm, shorter than spikes, long sheathed. Spikes 4 or 5, distant, androgynous, linear, 30–50 × 2–3 mm; male part ca. 1/5 length of spike, much shorter than female part, densely flowered; female part loosely flowered; peduncles slender, 1–4 cm, often exserted from involucre bract sheaths. Male glumes oblong, ca. 1 mm, with 1 midvein, apex subtruncate or retuse; female glumes brown or castaneous, subsquare or broadly oblong, ca. 1.5 × 1 mm, papery, glabrous, conspicuously many veined, margins ciliate, apex truncate. Utricles pale green, oblong-elliptic, ca. 3 × 1 mm, with 8–10 raised veins, sparsely hairy, base gradually attenuate into a short stipe, apex narrowed into a beak ca. 0.5 mm, orifice 2-toothed. Nutlets elliptic, ca. 2 × 0.5 mm; style base not thickened; stigmas 3.

• Guangdong.

170. *Carex esquiroliana* H. Léveillé, Repert. Spec. Nov. Regni Veg. 12: 506. 1913.

贵州薹草 gui zhou tai cao

Plants tufted, 8–28 cm, without stolons. Culms lateral, shorter to longer than leaves, slender. Leaves basal, clustered,

10–25 × 0.5–2.5 cm, blades oblanceolate to linear-oblanceolate, herbaceous to thickly papery, glabrous, many veined, midvein protruding abaxially and sunken adaxially, base narrowed into petiole, margins entire or slightly rugose, apex long acuminate or caudate. Involucral bracts purplish, sheathlike, with a bristle-like blade, shorter than sheath. Terminal spike male, linear, 1–4 × ca. 0.1 cm, male flowers compact, glumes purplish brown, oblong, ca. 3 × 1 mm, membranous; lateral spikes 2–4, female or with a few male flowers at top, 0.8–4 × 0.1–0.3 cm. Female glumes brown, broadly ovate, ca. 2 × 1.1 mm, membranous, midrib yellowish green or paler, apex acute or rounded. Utricles dark brown, narrowly elliptic, ca. 3.5 × 1 mm, upper margins ciliate, base with a greenish stipe 0.3–0.5 mm, apex long beaked, orifice with 2 small teeth. Nutlets brown, elliptic-oblong, ca. 2 × 1 mm, smooth. Fl. and fr. May–Jul.

On rocks; 300–500 m. Guangxi, Guizhou [Vietnam].

171. *Carex grandiligulata* Kükenthal, Bot. Jahrb. Syst. 36(Beibl. 82): 9. 1905.

大舌藁草 da she tai cao

Rhizome slender and elongate. Flowering culms and vegetative culms spaced; sub-basal sheaths of flowering culms with blades; blades of vegetative culms narrowly linear, 20–40 cm × 2.5–4 mm, herbaceous, midvein and sometimes 2 lateral veins prominent, glabrous. Flowering culms 20–30 cm tall, with spikes at nodes above middle; involucral bract sheaths not distinctly inflated above, involucral bract blades equaling or slightly longer than sheath, ligule up to 2 mm, lowest sheath densely puberulent. Spikes androgynous, single or binate at node, linear-cylindric, 1–2 cm; male part of spike usually equaling female part, with denser male flowers and 2 or 3 female flowers; peduncles 1–5 cm, shortly exerted. Female glumes tinged with pale brown, ovate-oblong, ca. 4 mm, hyaline-membranous laterally, rusty punctate, costa green, apex obtuse. Utricles elliptic, 4–5 mm, faintly veined, rusty punctate, apex attenuate into a short beak, orifice subtruncate. Nutlet tightly enveloped, elliptic, trigonous, ca. 2.5 mm; style base not thickened; stigmas 3. Fl. and fr. Apr–May.

• Lax forests, rocky places; 1600–1800 m. Hebei, Shaanxi, Sichuan.

172. *Carex subcapitata* X. F. Jin, C. Z. Zheng & B. Y. Ding, Acta Phytotax. Sin. 41: 566. 2003.

近头状藁草 jin tou zhuang tai cao

Rhizome slender, woody. Culms loosely tufted, compressed trigonous, 20–30 cm tall; sub-basal sheaths of flowering culms with blades; blades of vegetative culms narrowly linear, 40–50 cm × 3–5 mm, herbaceous, glabrous, acuminate. Inflorescence with spikes at nodes above middle; lowermost bract with sheath nearly equaling blade, upper branches with shorter bracts and sheaths. Spikes androgynous, single or binate at node, subcapitate, 5–7 mm, male part ± equaling female part, with denser male flowers and 4–7 female flowers; peduncles 6–8 cm, well exerted. Male glumes reddish brown, ca. 1.5 mm, 1-veined; female glumes ovate-oblong, ca. 2.5 mm, laterally reddish punctate, 3-veined, apex rounded. Utricles brown, broadly elliptic, ca. 4 mm, many veined, apex attenuate

into an erect beak 1.5–2 mm, orifice 2-toothed. Nutlet tightly enveloped, ovoid, trigonous, faces concave, ca. 2 mm; style base slightly thickened; stigmas 3. Fl. and fr. Apr–May.

• Forests. Zhejiang.

173. *Carex wuyishanensis* S. Yun Liang, Acta Phytotax. Sin. 34: 94. 1996.

武夷山藁草 wu yi shan tai cao

Rhizome rather stout, sometimes elongate. Sub-basal sheaths of flowering culms with blades; blades of vegetative culms herbaceous, linear, shorter than culm, 5–7 mm wide, glabrous, midvein and 2 lateral veins slightly prominent, ligule up to 1 mm. Flowering culms 50–65 cm tall, with spikes at nodes above middle; involucral bract sheaths hardly inflated above, glabrous, blades nearly equaling to slightly longer than sheath. Spikes androgynous, single to ternate at each node, linear-cylindric, 2–5 cm; male part of spike nearly equaling female part, densely flowered; female part loosely 3–7-flowered; peduncles 3–10 cm, slender, exerted, slightly nodding. Female glumes pale brown, oblong-ovate, 3–4 mm, rusty punctate, costa with 3 green veins, apex obtuse. Utricles broadly ovoid, ca. 3 mm, convex adaxially, prominently many veined, base shortly stipitate, apex contracted into a short recurved beak ca. 0.5 mm, orifice emarginate abaxially. Nutlet tightly enveloped, elliptic, trigonous, ca. 2 mm; style base not thickened; stigmas 3. Rachilla small, ca. 1.5 mm. Fl. and fr. Apr.

• Grasslands; ca. 1000 m. Fujian.

174. *Carex glossostigma* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 59: 140. 1922.

长梗藁草 chang geng tai cao

Carex dayunshanensis L. K. Ling & Y. Z. Huang; *C. exerta* K. L. Chu; *C. ferruspiculata* K. L. Chu; *C. mandarinorum* Raymond.

Rhizome rather stout and elongate. Flowering and vegetative culms spaced; sub-basal sheaths of flowering culms bladeless; blades of vegetative culms leathery to papery, broadly linear, 20–40 × 1–2.5 cm, glabrous or pilose on veins of both surfaces or abaxially, midvein and 2 lateral veins prominent. Flowering culms 30–40 cm tall, with spikes at nodes of upper 2/3 of culm; involucral bract sheaths inflated above and spathe-like, glabrous or shortly pilose, blades much shorter to ca. 1/2 length of sheath, ligule indistinct. Spikes androgynous, single to 5-nate at each node, linear-cylindric, 2–3 cm, pedunculate; peduncle 2–15 cm, slender, often exerted; male part 1/4–1/2 length of spike, mostly distinctly shorter than female part, rather densely flowered; female part with 8–15 flowers, utricles sparse at maturity. Female glumes pale brown, ovate-elliptic, ca. 2.5 mm, rusty punctate, midvein distinct, many lateral veins indistinct, apex obtuse. Utricles slightly longer than glume, ovate-elliptic, trigonous, ca. 3 mm, prominently many veined, apex abruptly contracted into a short beak, beak bent downward, 1/8–1/4 length of utricle, subtruncate at orifice. Nutlet tightly enveloped, elliptic, trigonous, ca. 2.5 mm; style base not thickened; stigmas 3. Fl. and fr. May–Jul.

• Wet and shady places in forests; 800–1500 m. Anhui, Fujian, Guangdong, Guangxi, Hunan, Jiangxi, Zhejiang.

175. *Carex longshengensis* Y. C. Tang & S. Yun Liang, Fl. Reipubl. Popularis Sin. 12: 522. 2000.

龙胜藁草 long sheng tai cao

Rhizome stout, sometimes elongate. Sub-basal sheaths of flowering culms bladeless; blades of vegetative culms herbaceous to papery, broadly linear, 40–50 × 1.5–3.5 cm, glabrous, midvein and 2 lateral veins distinctly prominent. Flowering culms 30–50 cm tall, with spikes at nodes above middle; involucre bract sheaths slightly inflated above and spathe-like, 2.5–5 cm (except uppermost one very short), glabrous, nearly bladeless or blades up to 1 cm, not ligulate. Spikes androgynous, single or binate at each node, linear, 2.5–4.5 cm, pedunculate;

peduncle 1–8 cm, slender, often exerted; male part nearly 1/2–3/4 length of spike, distinctly longer than female part, rather densely flowered; female part with 2–5 flowers, utricles sparse at maturity. Female glumes brown, subsquare to horizontally oblong, ca. 2.5 mm, rusty punctate, with 3 distinct veins at middle, faintly veined at both lateral sides, apex subtruncate. Utricles brown, oblong-elliptic, trigonous, 4.5–5.5 mm, rusty punctate, prominently many veined, apex abruptly contracted into an erect beak ca. 1.5 mm, orifice subtruncate. Nutlet tightly enveloped, elliptic, ca. 2.5 mm; style base not thickened, sparsely puberulent, persistent; stigmas 3. Fl. and fr. May–Jun.

• Dense forests. Guangxi.

26. *Carex* sect. *Decorae* (Kükenthal) Ohwi, Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 11: 338. 1936.

美穗藁草组 mei sui tai cao zu

Liang Songyun (梁松筠 Liang Song-jun); Tetsuo Koyama, Gordon C. Tucker

Carex subsect. *Decorae* Kükenthal in Engler, Pflanzenr. 38(IV. 20): 541. 1909.

Rhizome short or long creeping. Culms slightly stout. Leaves basal or cauline. Involucre bracts leaflike, rarely setaceous, sheathing. Inflorescence a panicle, each partial panicle with 2–7 spikes; terminal 1 or 2 male; remaining spikes androgynous, with unequal peduncles. Female glumes pale brown, purple-red, or blood-red. Utricles suberect or obliquely patent, elliptic or ovate-lanceolate, compressed trigonous, glabrous or hispid, beak long, orifice pale hyaline. Nutlets oblong or elliptic-obovate, trigonous; stigmas 3.

About 26 species: E, S, and SE Asia; 11 species (eight endemic) in China.

- 1a. Leaves cauline 176. *C. insignis*
 1b. Leaves basal, rarely cauline.
 2a. Spikes sessile or subsessile, several spikes aggregated in capitate inflorescences 184. *C. subperakensis*
 2b. Spikes pedunculate, not forming capitate inflorescences.
 3a. Leaf blades 7–12 mm wide.
 4a. Style base curved 182. *C. zhenkangensis*
 4b. Style base erect.
 5a. Utricles glabrous, faintly veined; style base glabrous 183. *C. baiposhanensis*
 5b. Utricles hispidulous, conspicuously veined.
 6a. Style base hispidulous 185. *C. perakensis*
 6b. Style base glabrous 186. *C. morii*
 3b. Leaf blades 2–5 mm wide.
 7a. Utricles ca. 2.3 mm; culms compressed cylindric 177. *C. pomiensis*
 7b. Utricles 3–7 mm; culms trigonous.
 8a. Female glumes ± equaling utricle, apex obtuse, mucicous; utricles hispidulous, curved, stipitate 178. *C. jizhuangensis*
 8b. Female glumes much shorter than utricle, 1-veined costa excurrent into an awn at apex; utricles glabrous or sparsely pubescent, contracted at base.
 9a. Utricles lanceolate, 6–7 mm, sparsely pubescent 181. *C. urelytra*
 9b. Utricles elliptic, 3–4 mm, glabrous.
 10a. Spikes 3–4 cm; utricles yellowish green 179. *C. dielsiana*
 10b. Spikes 1–2 cm; utricles chestnut-brown 180. *C. anomoea*

176. *Carex insignis* Boott, Ill. Gen. Carex 1: 5. 1858.

秆叶藁草 gan ye tai cao

Rhizome long stoloniferous. Culms 90–100 cm tall, trigonous, smooth, clothed at base with purple bladeless sheaths. Leaves cauline, shorter than culm, blades linear, 4–5 mm wide, flat, scabrous adaxially, with purple-reddish long sheaths. Involucre bracts leaflike, with purple-reddish long sheaths, 3.5–4.5 mm. Spikes numerous, 3–5 each arising from involucre

bract axil, long linear, androgynous or terminal male, 1.5–5 cm. Female glumes pale brown, ovate, 2–2.5 mm, margins hyaline, 3-veined costa excurrent into a scabrous awn, apex emarginate and ciliate. Utricles olive-green, longer than glume, elliptic, trigonous, 3–3.5 mm, membranous, purple punctulate, hispidulous above or later glabrous, base truncate, apex abruptly contracted into a scabrous long beak, orifice hyaline, emarginate or subentire. Nutlets dark chestnut, tightly enveloped, rhomboid-trigonous, ca. 2 mm; style base slightly thickened; stigmas 3. Fl. and fr. Aug–Oct.

Forests, ditch sides; 1500–1800 m. Xizang, SE Yunnan [Bhutan, India, Nepal, Vietnam].

177. *Carex pomiensis* Y. C. Yang, Fl. Xizang, 5: 408. 1987.

波密薹草 bo mi tai cao

Rhizome short. Culms 40–50 cm tall, densely tufted, compressed cylindrical, smooth, clothed at base with castaneous sheaths. Leaves basal, shorter than culm, blade linear, 2–3 mm wide, flat, margins scabrous. Lower involucre bracts leaflike. Spikes linear, 1–4 cm, 4–7 each arising from involucre bract axil, usually female, only one spike gynaeandrous; peduncles unequal. Female glumes pale castaneous, elliptic, ca. 2 mm, 1-veined, narrowly white hyaline margined. Utricles slightly longer than glume, ca. 2.3 mm, base shortly stipitate, apex abruptly contracted into a long beak, 0.8–1 mm. Nutlets tightly enveloped, elliptic, trigonous; style short; stigmas 3. Fl. and fr. Jul–Aug.

• Ditch sides in forests, moist places; 2100–2800 m. SE Xizang (Médog).

178. *Carex jizhuangensis* S. Yun Liang, Fl. Reipubl. Popularis Sin. 12: 522. 2000.

季莊薹草 ji zhuang tai cao

Rhizome long creeping. Culms 40–60 cm tall, trigonous, smooth, clothed at base with purple-reddish sheaths disintegrating into fibers. Leaves slightly shorter than culm, blades linear, 2–3 mm wide, leathery, stiff. Lower involucre bracts leaflike, shorter than inflorescence, sheathing, 3–4 mm, purple-reddish, upper blades setaceous. Spikes numerous, arising single or binate from involucre bract axil; upper 1–3 male, 1–3 cm; remaining spikes androgynous, male part longer than or equaling female part, with slender smooth peduncles. Female glumes purple-reddish, oblong, ca. 3 mm, green 3-veined at middle, upper margins white hyaline, apex obtuse. Utricles olive-green, equaling or longer than glume, long cylindrical, trigonous, 3–3.5 mm, densely hispidulous, many veined, base shortly stipitate, apex gradually tapering into a short beak, orifice entire. Nutlets tightly enveloped, oblong, trigonous, 3–5 mm, base curved stipitate, apex abruptly contracted into a short beak; stigmas 3. Fl. and fr. Aug–Oct.

• Guandong.

179. *Carex dielsiana* Kükenthal, Notes Roy. Bot. Gard. Edinburgh 8: 10. 1913.

丽江薹草 li jiang tai cao

Rhizome short, woody. Culms densely tufted, 25–60 cm tall, trigonous, smooth. Leaves basal, almost equaling or longer than culm, blades linear, ca. 2 mm wide, flat, scabrous above, rigid, with brown-green sheaths, lowest sheath bladeless. Lowest involucre bract leaflike, longer than inflorescence. Spikes 4–7, androgynous, linear-cylindrical, 3–4 cm, upper ones usually binate, lower ones single, rarely branched at base, with long peduncles. Female glumes reddish, ovate-oblong, 1-veined costa excurrent into a mucro. Utricles yellowish green, longer than glume, elliptic, obtusely trigonous, 3–4 mm, glabrous, many veined, base contracted, apex gradually narrowed into a

beak of medium length, orifice truncate, hyaline. Nutlets loosely enveloped, trigonous, ca. 1.5 mm; style base thickened; stigmas 3. Fl. and fr. May–Jul.

• Grassy slopes, moist places along streams, forest margins; 1900–3800 m. SW Sichuan, NW Yunnan.

The following variety could not be treated here because no material was seen by the present authors: *Carex dielsiana* var. *pallidior* Handel-Mazzetti (Symb. Sin. 7: 1267. 1936), described from Sichuan.

180. *Carex anomoea* Handel-Mazzetti, Symb. Sin. 7: 1267. 1936.

中甸薹草 zhong dian tai cao

Carex inaequalis Boott ex C. B. Clarke, Fl. Brit. India 6: 726. 1894, not J. F. Gmelin (1791).

Rhizome short, woody. Culms densely tufted, 22–55 cm, roundly trigonous, smooth. Leaves cauline, almost equaling or longer than culm, blades linear, ca. 2 mm wide, flat, scabrous above, rigid, with brown-green sheaths, lowest sheath bladeless. Lowest involucre bract leaflike, longer than inflorescence. Spikes 4–7, androgynous or female, linear, 1–2 cm, 2–4 per node, with peduncles up to 6 cm (androgynous spikes usually on longer peduncles). Female glumes reddish brown, ovate-oblong, margins hyaline, 1-veined costa excurrent into a mucro ca. 0.6 mm. Utricles chestnut-brown, shiny, longer than glume, narrowly elliptic, obtusely trigonous, 3–3.5 mm, glabrous (except for few hairs on margins of beak), weakly veined, base gradually contracted, apex gradually narrowed into a beak of medium length, orifice 2-toothed, hyaline. Nutlets loosely enveloped, trigonous, ca. 1.5 mm; style base thickened; stigmas 3. Fl. and fr. Jul–Aug.

Calcareous rocks in coniferous forests; ca. 2700 m. NW Yunnan (Zhongdian) [Bhutan, India (Sikkim), Nepal].

181. *Carex urelytra* Ohwi, J. Jap. Bot. 7: 204. 1934.

扁果薹草 bian guo tai cao

Rhizome short. Culms tufted, rigid, 20–60 cm tall, trigonous, subsmooth, occasionally 1-leaved at middle, clothed at base with purple or dark brown sheaths disintegrating into parallel fibers. Leaves shorter than culm, blades linear, 3–5 mm wide, flattish or with ± revolute margins, with purple-brown veins. Lower involucre bracts equaling or shorter than subtending spike, long sheathing, upper involucre bracts shortly sheathing, blades setaceous. Spikes 7–10 at 5–7 nodes, middle ones 2- or 3-nate, rarely 4-nate, upper ones ± contiguous, lower one spaced, all androgynous, with male part 1/3–2/5 length of spike, cylindrical to oblong-cylindrical, 2–5 cm, male part 1–2 mm wide, female part 3–4 mm wide, densely many flowered, peduncles exerted. Female glumes yellow-brown, ovate to lanceolate-ovate, 3–4 mm (excluding awn), membranous, margins pale hyaline, 1-veined costa excurrent into a scabrous awn 1–3 mm, apex acute. Utricles erect, yellowish green with brown flecks or turning brown, longer than glume, lanceolate, flattened trigonous, 6–7 mm, thinly membranous, sparsely puberulent, faintly veined, base contracted, upper margins serrulate, apex gradually tapering into a beak, orifice deeply 2-lobed. Nutlets elliptic, trigonous, ca. 2.5 mm, base stipitate; stigmas 3, persistent.

- Forest floors on high mountains. Taiwan.

No specimens have been seen by the present authors.

182. *Carex zhenkangensis* F. T. Wang & Tang ex S. Yun Liang, Fl. Reipubl. Popularis Sin. 12: 523. 2000.

镇康藁草 zhen kang tai cao

Rhizome stoloniferous. Culms 65–70 cm tall, trigonous, smooth, clothed at base with dark brown sheaths. Leaves subequaling culm, blades broadly linear, 7–10 mm wide, herbaceous, slightly stiff, flat, apex acuminate. Involucral bracts leaflike, shorter than inflorescence, long sheathing, 3–3.5 mm. Inflorescence subpaniculate, spikes numerous; terminal spike male, 1–1.5 cm; remaining spikes androgynous, male part longer than female part, cylindrical, 1.5–4.5 cm, loosely flowered, with slender unequal peduncles. Female glumes yellow-brown, oblong-lanceolate, 5.8–6.5 mm, margins white hyaline, apex acuminate. Utricles longer than glume, obliquely patent, ovate-lanceolate, 7–7.5 mm (including beak), glabrous, nerveless except for 2 costas on edges, base shortly stipitate, stipe ca. 1 mm, apex abruptly contracted into a long beak ca. 3.5 mm, orifice obliquely truncate, 2-toothed. Nutlets oblong, ca. 2 mm, base shortly stipitate; style ca. 2.5 mm, base curved, glabrous; stigmas 3. Fl. and fr. Jun–Jul.

- Grassy slopes, subalpine thickets; 3000–3600 m. Guangxi, Yunnan.

183. *Carex baiposhanensis* P. C. Li, Acta Bot. Yunnan. 12: 145. 1990.

百坡山藁草 bai po shan tai cao

Rhizome woody, stoloniferous. Culms tufted, 40–50 cm tall, slender, clothed at base with reddish brown sheaths. Leaves subequaling culm, blades linear, 5–7 mm wide, flat, scabrous above. Involucral bracts leaflike, longer than inflorescence, long sheathing. Spikes numerous, 2–5 at each node on 5 or 6 nodes, all spaced, upper 3–6 spikes male, lower spikes usually female, occasionally becoming androgynous, linear-cylindrical, 2–3.5 cm, loosely flowered, with slender peduncles. Female glumes sanguineous-red, oblong, 4–4.5 mm, margins broadly hyaline, yellowish green 3-veined costa forming a short awn at apex, apex subrounded or emarginate. Utricles green, almost longer than glume, ovate-rhomboid, trigonous, 5–7 mm, membranous, glabrous, finely veined, base shortly stipitate, apex gradually narrowed into a scabrous long beak, orifice shortly 2-toothed. Nutlets brown, elliptic, 2.8–3 mm; style base thickened; stigmas 3. Fl. and fr. Jul.

- Forests; ca. 900 m. Sichuan.

184. *Carex subperakensis* L. K. Ling & Y. Z. Huang, Fl. Fujian. 6: 689. 1995.

类霹雳藁草 lei pi li tai cao

Rhizome short, stout, woody. Culms 50–70 cm tall, trigonous, thick, clothed at base with brown sheaths disintegrating into fibers. Leaves longer than culm, blades purple-brown, linear, 7–11 mm wide, many veined, scabrous abaxially, base usually plicate. Lower involucral bracts leaflike, longer than inflorescence, long sheathing, upper involucral bracts with short

blades or setaceous or glumelike, shorter than inflorescence, nearly sheathless. Spikes numerous, 3–7 disposed in a head, androgynous, ovate-cylindrical, male part 1/4–1/3 length of spike, almost without peduncles. Female glumes broadly ovate, ca. 2.5 mm, margins white hyaline, green 3-veined costa excurrent into a short mucro, apex acute. Utricles pale greenish, longer than glume, ovate-elliptic, flattened, trigonous, ca. 3 mm, membranous, densely white hispidulous, apex gradually narrowed to a beak, orifice sharply 2-toothed. Nutlets pale brown, elliptic, ca. 2 mm, compressed trigonous with faces slightly concave; style base thickened, scabrous; stigmas 3. Fl. and fr. Jun–Jul.

- Forests; ca. 900 m. Fujian (Yong'an).

185. *Carex perakensis* C. B. Clarke in J. D. Hooker, Fl. Brit. India 6: 720. 1894.

霹雳藁草 pi li tai cao

Carex dunzii Hayata; *C. prainii* C. B. Clarke (1904), not Kükenthal (1903); *C. setulifolia* Nelmes; *C. tatewakiana* Ohwi; *C. tonkinensis* Franchet.

Rhizome stout, woody. Culms central, 30–120 cm tall, ca. 2 mm thick near base, trigonous, with several nodes, clothed at base with shortly bladed or bladeless dark purple-red sheaths disintegrating into fibers. Leaves basal or cauline, some overtopping culm, blades broadly linear, 4–12 mm wide, stiff, flattish, leathery; cauline leaves rather long, sheathing, dark brown, membranous, pale greenish and black-brown veined abaxially. Lower involucral bracts leaflike, longer than inflorescence, long sheathing, upper involucral bracts glumelike. Inflorescence an interrupted panicle, 30–40 cm, with 3–6 partial panicles, partial panicles 2–5 cm, lower ones single or binate, upper ones binate or occasionally ternate, each bearing 3–7 sessile spikes, lower ones with long peduncles; spikes bisexual, androgynous, lanceolate or oblong-lanceolate, 1.5–3 cm, male part 1/3–1/2 length of spike. Female glumes pale or slightly brown, broadly ovate to oblong, 2.2–4.5 mm, membranous, 1-veined costa excurrent into a short awn 1–1.5 mm, apex acute to subobtuse. Utricles longer than glume, obovate-elliptic or ovate-fusiform, trigonous, 4.5–6 mm, herbaceous, hispidulous above, many veined, gradually tapering at both ends, beak conic, 1–2 mm, hispidulous or glabrescent, obliquely truncate at hardly 2-toothed orifice. Nutlets dark brown, tightly enveloped, obovate-elliptic, trigonous, 2.5–3 mm, faces concave; style erect, sparsely hispidulous, base slightly thickened; stigmas 3. Fl. and fr. Jul–Oct.

Shady and moist places in forests; 700–1800 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Sichuan, Taiwan, Yunnan [Indonesia, Malaysia, Thailand, Vietnam].

186. *Carex morii* Hayata, Icon. Pl. Formosan. 6: 135. 1916.

森氏藁草 sen shi tai cao

Rhizome short. Culms 70–120 cm tall, acutely trigonous, several nodose, smooth, clothed at base with brown or chestnut-brown sheaths ± disintegrating into fibers. Leaves basal and a few upper spaced on culm, usually shorter than culm, blades broadly linear, 4–9 mm wide, flattish, leathery. Involucral bracts leaflike, lower 2 overtopping inflorescence, remaining bracts

much shorter, lower involucre bract sheaths 3–5 cm. Inflorescence paniculate, interrupted, with 3–6 partial panicles, partial panicles binate or ternate, 3–9 cm, some further branched, bearing 3–14 spikes; peduncles exserted; spikes androgynous, oblong or ovate-oblong, 1–2 cm, male part shorter than female part, subdensely flowered, sessile or shortly pedunculate. Female glumes light brown, ovate to ovate-elliptic, 2.8–3 mm, thinly membranous, margins broadly whitish, faintly many veined, green 3-veined costa projecting beyond apex forming a

short mucro, apex acute. Utricles pale brownish, longer than glume, suberect, fusiform, lanceolate-elliptic, compressed trigonous, 4.5–6.5 mm, herbaceous, hispidulous on upper 1/2–2/3, finely many veined, attenuate at both ends, beak ca. 1 mm, orifice 2-toothed. Nutlets tightly enveloped, rhomboid-elliptic, trigonous, 3.5–4 mm; style base thickened; stigmas 3.

- Tropical forests; 500–1000 m. Taiwan.

No specimens have been seen by the present authors.

27. Carex sect. Aulocystis Dumortier, Fl. Belg. 147. 1827.

冻原藁草组 *dong yuan tai cao zu*

Liang Songyun (梁松筠 Liang Song-jun); Tetsuo Koyama

Carex sect. *Frigidae* Fries ex Kükenthal.

Rhizome short or stoloniferous. Culms trigonous, smooth, rarely scabrous above. Involucre bracts leaflike or setaceous, usually sheathing or sheathless. Spikes 2–7(–10); terminal spike male (sometimes gynaeandrous); lateral spikes female, upper ones contiguous, lower ones spaced, with slender long peduncles, usually pendent. Female glumes dark purple-red or brown, awned. Utricles yellow-green or brown, elliptic or narrowly trigonous, usually flattened, membranous, hispidulous or glabrous, margins scabrous, apex gradually attenuate into a long beak, orifice hyaline, obliquely truncate or 2-toothed. Style base thickened or not; stigmas 3, rarely 2.

About 60 species: Asia, Europe, North America; 38 species (24 endemic) in two subsections in China.

- 1a. Utricles glabrous; terminal spike gynaeandrous or male 1. *C.* subsect. *Fuliginosae*
 1b. Utricles hispidulous, at least margins scabrous; terminal spikes male 2. *C.* subsect. *Ferrugineae*

1. Carex subsect. **Fuliginosae** Tuckerman ex Kükenthal in Engler, Pflanzenr. 38(IV. 20): 550. 1909.

黑色藁草亚组 *hei se tai cao ya zu*

Involucre bracts shortly bladed, sheathing or sheathless. Spikes 3–7(–13); terminal spike male or gynaeandrous or all spikes gynaeandrous; lateral spikes female, subclavate-oblong, cylindrical, or ovate, densely flowered, all with long peduncles, usually pendent, rarely sessile. Female glumes dark brown. Utricles glabrous; stigmas 3.

About 20 species: Asia, Europe; 14 species (seven endemic) in China.

- 1a. Terminal or all spikes gynaeandrous.
 2a. All spikes gynaeandrous; female glumes much longer than utricle 192. *C. atrofuscoidea*
 2b. Terminal 1 or 2 spikes gynaeandrous; female glumes shorter than or equaling utricle.
 3a. Plants without creeping rhizomes 193. *C. viridimarginata*
 3b. Plants with creeping rhizomes.
 4a. Upper 1 or 2 spikes gynaeandrous, remaining ones female; utricles dark purple-red, apex abruptly contracted into a short beak 194. *C. nivalis*
 4b. Terminal spike gynaeandrous or merely male, remaining ones female; utricles yellow-green, apex abruptly contracted into a long beak 195. *C. psychrophila*
 1b. Terminal spike male.
 5a. Involucre bracts sheathless 196. *C. neodigyna*
 5b. Involucre bracts sheathing.
 6a. Rhizomes neither creeping nor stoloniferous.
 7a. Leaf blades 3–4 mm wide; utricles narrowly lanceolate, scabrous on upper margins 197. *C. cruenta*
 7b. Leaf blades 1–2.5 mm wide; utricles oblong.
 8a. Spikes 7–13 198. *C. gonggaensis*
 8b. Spikes 4–6.
 9a. Terminal spike male; female glumes elliptic, obtuse at apex 199. *C. nakaoana*
 9b. Terminal 2 or 3 spikes male; female glumes broadly ovate, acuminate at apex 200. *C. kwangtoushanica*
 6b. Rhizomes creeping, emitting stolons.
 10a. Leaf blades ca. 1 mm wide, involute toward apex.
 11a. Lateral female spikes sessile; utricles abruptly contracted into a long beak 187. *C. mucronatiformis*
 11b. Lateral female spikes with peduncles, slender, slightly pendent; utricles abruptly contracted into a short beak or beakless 188. *C. montis-everestii*

- 10b. Leaf blades 2–3 mm wide, flat, acuminate at apex.
 12a. Utricles broadly elliptic, with rather broad light green to yellowish green margins 189. *C. coriophora*
 12b. Utricles without light green to yellowish green margins.
 13a. Female glumes ovate-lanceolate or oblong-lanceolate, 4–5 mm, apex acute 190. *C. atrofusca*
 13b. Female glumes elliptic, 3–3.5 mm, apex obtuse 191. *C. qinghaiensis*

187. *Carex mucronatiformis* Tang & F. T. Wang ex S. Yun Liang, Fl. Reipubl. Popularis Sin. 12: 523. 2000.

类短尖藁草 lei duan jian tai cao

Rhizome long creeping. Culms 10–20 cm tall, slender, smooth, clothed at base with pale brown sheaths eventually disintegrating into reticulate fibers. Leaves shorter than culms, blades green, linear, ca. 1 mm wide, papery, involute, slightly firm, apex acuminate. Lower involucral bracts setaceous, upper glumelike. Spikes 2 or 3, approximate; terminal spike male, clavate, 1–1.5 cm, with a short peduncle; lateral spikes female or with several male flowers at apex, ovate, 6–10 mm, sessile. Female glumes brown, oblong-lanceolate, ca. 4 mm, margins pale hyaline, green 1-veined costa forming a mucro at apex. Utricles yellow-green below, red-brown above, ovate-trigonous, 4–4.5 mm, glabrous, faintly veined, base contracted and shortly stipitate, apex abruptly contracted into a long beak, orifice white hyaline, obliquely truncate, 2-toothed. Nutlets chestnut-colored, tightly enveloped, ovate-trigonous, ca. 2 mm; style base not thickened; stigmas 3.

- Alpine meadows, sands; 2000–3900 m. Gansu, Qinghai.

188. *Carex montis-everestii* Kükenthal, Bull. Misc. Inform. Kew 1934: 261. 1934.

窄叶藁草 zhai ye tai cao

Rhizome woody, stoloniferous. Culms tufted, (2–)5–15 cm tall, slender, obtusely trigonous, smooth, clothed at base with purple-red sheaths. Leaves linear, shorter than culm, blades pale green, ca. 1 mm wide, involute, margins minutely dentate, apex curved. Lower involucral bracts setaceous, upper glumelike. Spikes usually 2, rarely 3 or 4, approximate; terminal spike male, occasionally with 1 or 2 female flowers at base, oblong, ca. 10 × 3 mm; lateral spikes female, oblong or ovate, 10–15 × 6–10 mm, densely many flowered; peduncles slender, smooth. Female glumes dark purple-red, ovate-lanceolate, 5–6.5 mm, lustrous, margins broadly white hyaline, green 1-veined costa forming a mucro at apex. Utricles pale green below, dark purple-red above, subequaling glume, elliptic or ovate, compressed, ca. 5 × 2.5 mm, faintly veined, glabrous though slightly scabrous on upper margins, base subrounded, apex abruptly contracted into a short beak or beakless, orifice 2-toothed. Nutlets loosely enveloped, elliptic, ca. 1.2 mm, base with short stipe ca. 0.5 mm; style ca. 3 mm; stigmas 3. Fl. and fr. Jun–Aug.

Slopes, flood lands, thickets, meadows, grasslands; 4000–5500 m. Xizang [India (Sikkim), Nepal].

189. *Carex coriophora* Fischer & C. A. Meyer ex Kunth, Enum. Pl. 2: 463. 1837.

扁囊藁草 bian nang tai cao

Rhizome shortly stoloniferous. Culms 50–70 cm tall, trigonous, smooth, clothed at base with pale brown sheaths dis-

integrating into fibers. Leaves linear, ca. 1/3 length of culm, blades pale green, 3–5 mm wide, flat, firm, upper margins scabrous, apex acuminate. Involucral bracts leaflike, shorter than inflorescence, sheathing. Spikes 3–5; upper 1 or 2 spikes male, oblong, 10–15 × 3–4 mm; remaining spikes female, elliptic or oblong, 10–17 × 5–10 mm, densely many flowered, with slender, smooth peduncles 2–4 cm. Female glumes pale ferruginous below, purple-brownish above, ovate, ovate-oblong, or ovate-lanceolate, 4–4.2 × ca. 2 mm, with a green midrib, margins narrowly white hyaline, apex acute or acuminate. Utricles yellowish brown, longer than glume, broadly elliptic, much compressed trigonous, 4.8–5.2 × ca. 3 mm, glabrous, faintly veined, base and apex subrounded, margins pale green, sometimes upper margins minutely dentate, apex abruptly contracted into a short, narrowly cylindrical beak, orifice pale hyaline, 2-toothed. Nutlets yellowish, very loosely enveloped, ca. 1.5 mm, base with a stipe ca. 1 mm; style slender, erect, base not thickened; stigmas 3. Fl. and fr. Jun–Aug.

Wet grasslands on riverbanks, boggy meadows, slopes, marshes; 700–3500 m. Gansu, Hebei, Heilongjiang, Nei Mongol, Qinghai, Shanxi [Mongolia, Russia (Siberia)].

- 1a. Female glumes ovate or ovate-oblong, apex acute 189a. subsp. *coriophora*
 1b. Female glumes ovate-lanceolate, apex acuminate 189b. subsp. *langtaodianensis*

189a. *Carex coriophora* subsp. *coriophora*

扁囊藁草(原亚种) bian nang tai cao (yuan ya zhong)

Carex atrofusca Schkuhr var. *coriophora* (Fischer & C. A. Meyer ex Kunth) Kükenthal.

Female glumes ovate or ovate-oblong, apex acute.

Wet grasslands on riverbanks, boggy meadows, slopes; 700–3500 m. Gansu, Heilongjiang, Nei Mongol, Qinghai, Shanxi [Mongolia, Russia (Siberia)].

189b. *Carex coriophora* subsp. *langtaodianensis* S. Yun Liang, Fl. Reipubl. Popularis Sin. 12: 524. 2000.

浪淘殿藁草 lang tao dian tai cao

Female glumes ovate-lanceolate, apex acuminate.

- Marshes; ca. 3000 m. S Gansu (Minxian).

190. *Carex atrofusca* Schkuhr subsp. *minor* (Boott) T. Koyama, Fl. E. Himalaya 3: 122. 1975.

黑褐穗藁草 hei he sui tai cao

Carex ustulata Wahlenberg var. *minor* Boott, Ill. Gen. Carex 1: 71. 1858; *C. atrofusca* var. *angustifruetus* Kükenthal; *C. atrofusca* var. *minor* (Boott) Kükenthal; *C. oxyleuca* V. I. Kreczetowicz.

Rhizome long creeping. Culms 10–70 cm tall, trigonous, smooth, clothed at base with brown sheaths. Leaves shorter than culm, 1/7–1/5 length of culm, blades pale green, (2–)3–5 mm wide, flat, slightly stiff, apex acuminate. Lowest involucre bract leafy, green, shorter than spike, sheathing, upper glume-like, dark purple-red. Spikes 2–5; upper 1 or 2 spikes male, oblong or ovate, 7–15 × ca. 6 mm, densely many flowered; peduncles pendent, slender, 0.5–2.5 cm. Female glumes dark purple-red, ovate-lanceolate or oblong-lanceolate, 4–5 mm, with a light midrib, margins narrowly white hyaline, apex long acuminate. Utricles dark purple above, longer than glume, oblong or elliptic, compressed, 4.5–5.5 × 2.5–2.8 mm, glabrous, nerveless, base subrounded, apex abruptly contracted into a short beak, orifice white hyaline, 2-toothed. Nutlets loosely enveloped, oblong, compressed trigonous, 1.5–1.8 mm, base with a stipe 0.5–1 mm; style base not thickened; stigmas 3. Fl. and fr. Jul–Aug.

Alpine and subalpine meadows in thickets; 2000–5200 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang, NW Yunnan [Afghanistan, Bhutan, India, Kashmir, Nepal; C Asia].

Carex atrofusca subsp. *atrofusca* occurs in subarctic to temperate regions of Asia, Europe, and North America.

191. *Carex qinghaiensis* Y. C. Yang, Acta Phytotax. Sin. 18: 364. 1980.

青海藁草 qing hai tai cao

Rhizome long creeping. Culms 30–40 cm tall, trigonous, slightly scabrous, clothed at base with dark chestnut-colored sheaths. Leaves ca. 1/2 length of culm, blades linear, 2–4 mm wide, flat, slightly stiff, margins scabrous. Involucre bracts reduced to shortly bladed, shorter than inflorescence, sheathing. Spikes 3 or 4, oblong; upper 1 or 2 spikes male, 1–1.5 cm, with short peduncles or subsessile; lower 2 spikes female, with slender long peduncles, pendent. Female glumes dark purple, elliptic, 3–3.5 mm, apex obtuse. Utricles dark purple-red, longer than glume, elliptic, compressed, ca. 4 mm, membranous, glabrous, base contracted, apex abruptly contracted into a short beak. Nutlets loosely enveloped, oblong, ca. 1 mm wide, base with a stipe ca. 0.5 mm; style base not thickened; stigmas 3. Fl. and fr. Jul.

• Thickets; 3000–3400 m. E Qinghai (Tongren).

192. *Carex atrofuscoidea* K. T. Fu, Fl. Tsinling. 1(1): 446. 1976.

类黑褐穗藁草 lei hei he sui tai cao

Rhizome short, oblique. Culms 20–30 cm tall, trigonous, smooth, clothed at base with brown sheaths. Leaves ca. 1/2 length of culm, blades pale greenish, linear, 2–4 mm wide, flat, margins scabrous, apex acuminate. Lower involucre bracts reduced to shortly bladed or setaceous, longer or shorter than inflorescence, sheathing ca. 4 mm, purple, upper bracts glume-like. Spikes 2 or 3, entirely gynaeandrous, ovate or elliptic, 1–1.5 × 0.8–1.2 cm, with slender pendent peduncles. Female glumes dark purple-red, lanceolate, 5.5–6 × ca. 1.2 mm, 1-veined, upper margins narrowly white hyaline, apex long acuminate. Utricles stramineous at base, dark purple-brown above, shorter than glume, ovate-lanceolate, compressed trigonous, ca.

4 mm, membranous, glabrous, nerveless, base cuneate, apex gradually narrowed to a short beak, orifice smooth, white hyaline, emarginate. Nutlets pale brown, loosely enveloped, elliptic, obtusely trigonous, ca. 1.5 mm, base with a stipe ca. 0.5 mm; style enclosed in utricle, erect, base scabrous; stigmas 3. Fl. and fr. Jul–Aug.

• Alpine meadows, alpine meadows in thickets; 1000–4700 m. Qinghai, Shaanxi, W Sichuan, Xizang.

193. *Carex viridimarginata* Kükenthal, Acta Horti Gothob. 5: 113. 1930.

绿边藁草 lü bian tai cao

Culms 15–20 cm tall, slender, trigonous, smooth, clothed at base with purple-red sheaths slightly disintegrating into fibers. Leaves nearly equaling culm, blades linear, ca. 2 mm wide. Lowest involucre bracts leaflike, sheathless, shorter than inflorescence, upper ones glume-like. Spikes 3 or 4, slightly approximate; terminal spikes gynaeandrous, obovate-lanceolate, 1.3–1.5 cm; lateral spikes female, oblong, 8–12 mm, ca. 3 mm wide, densely many flowered; lowest spike with short peduncle, remaining ones sessile. Female glumes dark brown, ovate, ca. 3 mm, margins white hyaline, green 3-veined costa projecting beyond apex forming a short mucro. Utricles stramineous, subequaling or slightly longer than glume, elliptic, trigonous, 3–3.5 mm, membranous, glabrous, finely veined, base cuneate, margins green, apex abruptly contracted into a conic beak, beak slightly scabrous on margins, orifice brown, 2-toothed. Nutlets loosely enveloped, elliptic, trigonous, ca. 2 mm; stigmas 3. Fl. and fr. Jul.

• Alpine grasslands; ca. 2500 m. Shanxi.

194. *Carex nivalis* Boott, Proc. Linn. Soc. London 1: 256. 1845.

喜马拉雅藁草 xi ma la ya tai cao

Rhizome stoloniferous. Culms 20–40 cm tall, trigonous, clothed at base with brown-purple sheaths. Leaves shorter than culm, blades broadly linear, 6–7 mm wide, flat, apex acuminate. Lower involucre bracts leaflike, gradually attenuate above to a long cusp, shortly sheathing, upper ones glume-like. Spikes 3–5, subfastigiate, dark purple-red, clavate-cylindric, 2–3.5 cm; upper 1 or 2 gynaeandrous or male, sessile; remaining spikes female, with slender peduncles, lowest one sometimes remote. Female glumes dark purple-red, lanceolate or oblong, 4–5 mm, green 1-veined costa forming a mucro or not at apex. Utricles dark purple-red, pale at base, longer than glume, elliptic or ovate, compressed trigonous, 5–6 mm, papery, glabrous, nerveless, base rounded, with a very short stipe, upper margins slightly scabrous, apex abruptly contracted into a short beak, orifice hyaline, obliquely truncate, 2-toothed. Nutlets loosely enveloped, oblong or elliptic, ca. 2.5 mm, base long stipitate; style enclosed in utricle, base not thickened; stigmas 3. Fl. and fr. Jun–Jul.

Grasslands in *Picea* forests, alpine grasslands in thickets; 3000–5200 m. W Sichuan, W Xizang, NW Yunnan [Afghanistan, India (Sikkim), Kashmir, Kyrgyzstan, Nepal, Pakistan, Uzbekistan].

195. *Carex psychrophila* Nees in Wight, Contr. Bot. India, 127. 1834.

黄绿藁草 huang lü tai cao

Rhizome stoloniferous. Culms 30–60 cm tall, slender, acutely trigonous, scabrous above, pendent, clothed at base with purple-red bladeless sheaths disintegrating into reticulate fibers. Leaves subequaling culm, blades linear, 2–3 mm wide, flat, margins scabrous. Lower involucre bracts leaflike, sheathless. Spikes 3–5, oblong-cylindric, 10–20 × ca. 6 mm, densely many flowered, upper ones approximate, sessile, lowest one remote, with long peduncle; terminal spike gynaeandrous or merely male, clavate; lateral spikes female. Female glumes dark purple-red, lanceolate-ovate, 1-veined costa excurrent into a long awn. Utricles stramineous-green, longer than glume, elliptic, trigonous, 3.5–4 mm, suberect, membranous, glabrous, densely punctate, many veined, base gradually narrowed, apex abruptly contracted into a slender, curved, slightly scabrous long beak, orifice purple-red, 2-toothed. Nutlets ovate, base shortly stipitate; style base tortuous, not thickened; stigmas 3.

Slopes; 3000–3700 m. Sichuan [India (Sikkim), Kashmir, Nepal, Pakistan].

No specimens have been seen by the present authors.

196. *Carex neodigyna* P. C. Li, Acta Bot. Yunnan. 12: 146. 1990.

双柱藁草 shuang zhu tai cao

Rhizome short, stoloniferous. Culms tufted, 8–13 cm tall, rigid, clothed at base with brown bladeless sheaths. Leaves shorter than culm, blades linear, 3–4 mm wide, flat, stiff. Involucre bracts reduced to shortly bladed, sheathless. Spikes 4 or 5, lowest one subradical; upper 1–3 spikes male; remaining spikes female, ovate, 1–1.5 × 0.6–0.7 cm, densely many flowered, with short peduncles. Female glumes brown, oblong, 4–6 mm, glabrous, margins white hyaline, green 1-veined costa excurrent into a mucro at apex. Utricles pale below, brown above, equaling glume, oblong, slightly compressed, papery, glabrous, faintly veined, base contracted and shortly stipitate, margins hispid, apex gradually attenuate into an obliquely truncate long beak, 2-toothed. Nutlets suborbicular, ca. 2 mm; style puberulent, base not thickened; stigmas 2. Fl. and fr. Jul–Sep.

• Alpine thickets and meadows; 3900–4100 m. Sichuan.

197. *Carex cruenta* Nees in Wight, Contr. Bot. India, 128. 1834.

狭囊藁草 xia nang tai cao

Rhizome creeping. Culms 20–75 cm tall, erect, acutely trigonous, slender, slightly pendent, clothed at base with brown sheaths. Leaves shorter than culm, blades linear, 3–4 mm wide, flat. Lower involucre bracts leaflike, shorter than inflorescence, long sheathing, upper ones glumelike. Spikes 4–7; upper 1–3 male or mixed with female flowers, sometimes gynaeandrous; remaining spikes female, oblong, 1.5–3 cm, densely many flowered, pendent, with slender peduncles 2–7 cm. Female glumes dark sanguineous, ovate or lanceolate, ca. 4 mm, midrib stramineous, apex acuminate. Utricles longer than glume, narrowly lanceolate, upper margins scabrous. Nutlets narrowly

elliptic, base long stipitate; style base not thickened; stigmas 3. Fl. and fr. Jun–Jul.

Picea forests, alpine meadows in thickets, grasslands; 3000–5600 m. W Sichuan, S Xizang (Yadong) [India (Sikkim), Kashmir, Nepal, Pakistan].

198. *Carex gonggaensis* P. C. Li, Acta Bot. Yunnan. 12: 147. 1990.

贡嘎藁草 gong ga tai cao

Rhizome short. Culms tufted, 25–35 cm tall, slender, obtusely trigonous, rigid, smooth, clothed at base with brown sheaths. Leaves shorter than culm, blades linear, 1–2 mm wide, flat, soft. Lower involucre bracts leaflike, shorter than inflorescence, sheathing, upper ones glumelike. Spikes 7–13, upper ones fastigiate, with short peduncles, lower spikes slightly spaced, with long peduncles, sometimes lowest one subradical and distant, 20–30 × 1.5–2 mm; terminal spike male; lateral spikes female, erect, densely many flowered at base, subloosely flowered above. Female glumes ovate-oblong, 1.8–2.5 mm, green 1-veined costa scabrous and excurrent into a mucro at apex. Utricles stramineous-green, narrowly oblong, compressed trigonous, 4–4.8 mm, glabrous, several veined, gradually narrowed at both ends, orifice white hyaline, obliquely truncate, 2-toothed. Nutlets narrowly oblong, base long stipitate; style base not thickened; stigmas 3. Fl. and fr. Jun–Jul.

• Grassy slopes, moist places on riversides; 2000–3400 m. W Sichuan (Gongga Shan).

199. *Carex nakaoana* T. Koyama, Acta Phytotax. Geobot. 15: 112. 1954.

钝鳞藁草 dun lin tai cao

Rhizome short. Culms densely tufted, 25–35 cm tall, smooth, clothed at base with brown sheaths disintegrating into reticulate fibers. Leaves shorter than culm, blades linear, ca. 2.5 mm wide, flat, apex acute. Lower involucre bracts leaflike, shorter than or subequaling inflorescence, long sheathing. Spikes 4 or 5; terminal spike male, oblong, 1.2–1.5 cm; lateral spikes female, oblong, 1.5–2 cm, loosely flowered, lower ones pedunculate. Female glumes dark castaneous with purple, elliptic, ca. 2.5 mm, glabrous or hispid on midrib adaxially. Utricles longer than glume, narrowly elliptic or lanceolate, compressed trigonous, 2.5–3 mm, base very shortly stipitate, margins ciliate, apex gradually narrowed into a beak. Nutlets loosely enveloped, elliptic; style base not thickened; stigmas 3. Fl. and fr. Aug.

Gravelly slopes, thickets; 4000–5000 m. Xizang [India (Sikkim), Nepal].

200. *Carex kwangtoushanica* K. T. Fu, Fl. Tsinling. 1(1): 447. 1976.

光头山藁草 guang tou shan tai cao

Rhizome short. Culms tufted, 10–20 cm tall, slender, compressed trigonous, smooth, clothed at base with purple-red, bladeless sheaths disintegrating into fibers. Leaves shorter than culm, blades 1–1.5 mm wide, flat, margins scabrous. Involucre bracts leaflike, shorter than inflorescence, sheathing. Spikes 4

or 5; upper 2 or 3 male, approximate, linear-cylindric, 8–12 mm, sessile; remaining 2 or 3 spikes female, distant, narrowly cylindric, 8–12 mm, 5–7-flowered, with slender slightly scabrous peduncles. Female glumes ferruginous, broadly ovate, margins narrowly white hyaline, apex subacuminate. Utricles suberect, castaneous, lustrous, elliptic, trigonous, ca. 4 mm,

longer than glume, glabrous, nerveless, base contracted, apex gradually attenuate into a scabrous long beak, orifice 2-toothed. Nutlets pale, tightly enveloped, elliptic, obtusely trigonous, ca. 2.2 mm; style base not thickened; stigmas 3. Fl. and fr. May–Jul.

- Rock crevices on mountaintops; ca. 2700 m. Shaanxi (Huxian).

2. Carex subsect. **Ferrugineae** Tuckerman ex Kükenthal in Engler, Pflanzenr. 38(IV. 20): 559. 1909.

锈色藁草亚组 xiu se tai cao ya zu

Culms slender. Involucral bracts leaflike, sheathing. Spikes 3–9(–12); upper 1–3 male; remaining spikes female, ovate or cylindric, lower ones with long peduncles, usually pendent. Female glumes brown or purple-red. Utricles hispidulous, finely veined or nerveless, margins scabrous; stigmas 2 or 3.

About 38 species: Asia, Europe, North America; 24 species (17 endemic) in China.

1a. Stigmas 2, rarely 3.

2a. Female glumes red-brown, margins narrowly white hyaline; utricles red-brown above, pale stramineous below 201. *C. przewalskii*

2b. Female glumes pale brown, margins broadly white hyaline; utricles stramineous-green 202. *C. yajiangensis*

1b. Stigmas 3.

3a. Utricles ca. 2 mm 203. *C. limprichtiana*

3b. Utricles 3.5–7 mm.

4a. Rhizome stoloniferous.

5a. Female spikes densely many flowered.

6a. Female glumes obovate, ciliate on upper margins; terminal spike with long peduncle, remote from next lateral spike 204. *C. chrysolepis*

6b. Female glumes ovate-oblong, not ciliate on upper margins; terminal spike with short peduncle, near next lateral spike 205. *C. drepanorhyncha*

5b. Female spikes loosely flowered.

7a. All spikes androgynous, narrowly cylindric 206. *C. karlongensis*

7b. Terminal spike male, lateral spikes female, narrowly oblong.

8a. Utricles glabrous; female spikes oblong, 10–20 × 5–8 mm 207. *C. tatsiensis*

8b. Utricles densely hispid; female spikes narrowly cylindric, 25–45 × ca. 5 mm 208. *C. brachyathera*

4b. Rhizome without stolons.

9a. Utricles trigonous.

10a. Leaves longer than culm, with purple-red sheaths at base 209. *C. purpureovaginata*

10b. Leaves shorter than culm, with dark brown sheaths at base.

11a. Peduncles 15–21 cm; utricles obovate-oblong, 4.2–4.5 mm 210. *C. ridongensis*

11b. Peduncles 2.5–5.5(–13) cm; utricles narrowly elliptic, ca. 4 mm 211. *C. setosa*

9b. Utricles compressed trigonous.

12a. Utricles with green or pale green margins.

13a. Plants slender, 10–25 cm tall; leaf blades ca. 1 mm wide 212. *C. hirtelloides*

13b. Plants slightly stiff, 25–70 cm tall; leaf blades 1.5–3 mm wide 213. *C. haematostoma*

12b. Utricles without green or pale green margins.

14a. Female glumes with ciliate upper margins.

15a. Utricles with curved beak 214. *C. fulvorubescens*

15b. Utricles with short beak 215. *C. makinoensis*

14b. Female glumes not ciliate on upper margins.

16a. Utricles with short beak or beakless.

17a. Utricles hispid above.

18a. Upper 2–4 spikes male; style scabrous 220. *C. heshuonensis*

18b. Upper 7–11 spikes male; style glabrous 221. *C. graminculmis*

17b. Utricles wholly hispid.

19a. Terminal spike gynaeceandrous or male, upper 1 or 2 lateral

spikes subsessile, near terminal spike 223. *C. siroumensis*

19b. Terminal spike male or with few female flowers at base, lateral

spikes pedunculate, spaced 224. *C. cranaocarpa*

16b. Utricles with long beak.

20a. Style scabrous or pubescent.

- 21a. Basal sheaths disintegrating into reticulate fibers; utricles oblong-elliptic with erect long beak; style scabrous 222. *C. plectobasis*
 21b. Basal sheaths disintegrating into parallel fibers; utricles lanceolate-trigonous with curved very long beak; style pubescent 217. *C. scabrirostris*
 20b. Style glabrous.
 22a. Female spikes sessile, erect; leaf blades plicate, ca. 1 mm wide 218. *C. kunlunensis*
 22b. Female spikes with peduncles 3–6 cm, pendent; leaf blades flat, 3–6 mm wide.
 23a. Spikes 5–8; female spikes narrowly linear 219. *C. regeliana*
 23b. Spikes 3–5; female spikes ovate to oblong-obovate 216. *C. stenocarpa*

201. *Carex przewalskii* T. V. Egorova in Grubov, Rast. Tsentral. Azii 3: 80. 1967.

红棕薹草 hong zong tai cao

Carex haematostoma Nees var. *digyna* Kükenthal; *C. przewalskii* var. *ramosa* Y. C. Yang.

Rhizome short, creeping. Culms tufted, 15–45 cm tall, erect, trigonous, clothed at base with brown sheaths eventually disintegrating into fibers. Leaves shorter than or equaling culm, blades linear, 2–3 mm wide, flat, apex long acuminate. Lowest involucre bract shortly bladed, shorter than inflorescence, sheathing, 4–10 mm. Spikes 3–7, approximate; upper 1–5 spikes male, cylindrical, 7–20 mm; remaining spikes female, sometimes with male flowers at apex, oblong or ovate-elliptic, 10–20 mm, densely many flowered, with short peduncles. Female glumes red-brown, oblong-ovate or oblong-lanceolate, 3.5–5 mm, margins narrowly white hyaline, apex acute. Utricles red-brown above, stramineous-yellow below, longer than glume, elliptic-ovate or ovate-lanceolate, compressed trigonous, 4–6 mm, membranous, apex gradually attenuate into a beak, orifice white hyaline, emarginate. Nutlets loosely enveloped, elliptic or broadly ovate, compressed trigonous, ca. 2 mm, base with a stipe ca. 1 mm; style pubescent; stigmas 2, rarely 3. Fl. and fr. Jun–Sep.

• Alpine meadows, subalpine thickets, grasslands; 2000–4500 m. Gansu, Qinghai, Sichuan, Yunnan.

202. *Carex yajiangensis* Tang & F. T. Wang ex S. Yun Liang, Fl. Reipubl. Popularis Sin. 12: 524. 2000.

雅江薹草 ya jiang tai cao

Rhizome short, woody. Culms 40–50 cm tall, smooth, clothed at base with yellow-brown sheaths. Leaves shorter than culm, blades gray-green, linear, 1–2 mm wide, flat, slightly soft, apex acuminate. Involucre bracts leaflike, shorter than inflorescence, sheathing. Spikes 4–7; upper 2 or 3 spikes male, 10–12 mm; remaining spikes female, sometimes few spikes with male flowers at apex, cylindrical, 1–2 cm, many flowered, with peduncles 5–20 mm. Female glumes yellow-brown, ovate, 3–3.2 mm, hispid, 1-veined, margins broadly white hyaline, apex acute. Utricles stramineous-green, longer than glume, ovate, trigonous, 3.5–4.4 mm, membranous, hispid, faintly veined, base shortly stipitate, apex gradually attenuate into a beak, orifice 2-toothed. Nutlets yellow-brown, oblong, ca. 2.5 mm, base with a stipe ca. 0.5 mm; style ca. 1.5 mm, pubescent, base not thickened; stigmas 2.

• Sichuan.

203. *Carex limprichtiana* Kükenthal, Repert. Spec. Nov. Regni Veg. Beih. 12: 311. 1922.

小果囊薹草 xiao guo nang tai cao

Rhizome with slender, rigid stolons. Culms 8–14 cm tall, slender, trigonous, slightly scabrous, clothed at base with sheaths disintegrating into reticulate fibers. Leaves shorter than culm, blades pale green, linear, ca. 1 mm wide, margins revolute. Involucre bracts reduced to shortly bladed, lowest one equaling inflorescence, shortly sheathing. Spikes 3, approximate, sessile; terminal spike gynaeandrous, subclavate, ca. 8 mm; lateral spikes female, oblong or ovate, densely many flowered but loosely flowered at base. Female glumes brown, ovate, margins narrowly white hyaline, 1-veined costa excurrent into a mucro at apex, apex acute. Utricles stramineous-ferruginous, longer than glume, ovate-elliptic, obtusely trigonous, obliquely patent, ca. 2 mm, membranous, faintly veined, base contracted, apex abruptly contracted into a smooth long beak, orifice 2-toothed; stigmas 3.

• About 3500 m. Sichuan.

204. *Carex chrysolepis* Franchet & Savatier, Enum. Pl. Jap. 2: 571. 1878.

黄花薹草 huang hua tai cao

Carex chrysolepis var. *odontostoma* (Kükenthal) Ohwi; *C. gokwanensis* Hayata; *C. odontostoma* Kükenthal.

Rhizome short, stolons elongate. Culms subloosely tufted, 10–35 cm tall, slender, erect or ± curved, subsmooth, clothed at base with yellow-brown to dark brown sheaths disintegrating into fibers. Leaves longer than culm, blades linear, 1.5–3 mm wide, flattish or slightly curved. Lower involucre bracts with sheaths 1–1.5 cm, lowest with a setaceous blade, upper glume-like. Spikes 2–5, upper ones close together, lower 2 or 3 somewhat distant, erect, with long peduncles; terminal spike male, linear-clavate, 10–30 × ca. 5 mm; lateral spikes female, linear-cylindrical, 1–3 × 0.5–0.8 cm, subloosely to subdensely many flowered, mostly with short peduncles enclosed in involucre bract sheaths. Female glumes reddish or purplish brown, ovate-lanceolate or obovate, somewhat shiny, upper margins ciliate, green 1-veined costa ending in a mucro, apex acute. Utricles stained with reddish brown above, longer than glume, erect to erect-patent, ovate-lanceolate, compressed trigonous, 4–7 mm, faintly veined, wholly pubescent, margins subdensely hispidulous, beak rather long, deeply lobed at orifice. Nutlets tightly enveloped, elliptic-oblong; style beaklike, base thickened; stigmas 3.

Rather dry grasslands in forests. Taiwan [Japan].

205. *Carex drepanorhyncha* Franchet, *Nouv. Arch. Mus. Hist. Nat.*, sér. 2, 10: 183. 1887–1888.

镰喙藁草 *lian hui tai cao*

Rhizome woody, rigid, stoloniferous. Culms tufted, 20–45 cm tall, slender, obtusely trigonous, smooth, clothed at base with dark brown sheaths eventually disintegrating into reticulate fibers. Leaves longer than culm, blades pale green, linear, 3–5 mm wide, flat, slightly rigid, margins scabrous. Involucral bracts reduced to shortly bladed, sheathing 8–15 mm, lowest one setaceous. Spikes 4 or 5; terminal spike male, larger, clavate, 3–5 × 0.3–0.5 cm, with short peduncle; lateral spikes female, distant, narrowly cylindrical, 2–5 × 0.4–0.5 cm, densely many flowered, subloosely flowered at base. Female glumes red-brown, obovate-oblong, ca. 3.5 mm, margins narrowly white hyaline, 1-veined costa ending in a mucro, apex truncate or emarginate. Utricles yellow-green and ferruginous, longer than glume, ovate or narrowly elliptic, trigonous, 4.2–4.5 mm, membranous, densely hispid, base gradually attenuate into stipe ca. 1 mm, apex abruptly contracted into beak 1.2–1.8 mm, orifice obliquely truncate, 2-toothed. Nutlets pale brown, tightly enveloped, ovate, trigonous, 1.5–2 mm; style base slightly thickened; stigmas 3.

• Forests, alpine thickets, meadows, roadsides; 2000–4200 m. W Sichuan, NW Yunnan.

206. *Carex karlongensis* Kükenthal, *Acta Horti Gothob.* 5: 47. 1930.

卡郎藁草 *ka lang tai cao*

Rhizome long creeping. Culms 20–25 cm tall, slender, compressed trigonous, smooth, basal sheaths pale brown. Leaves longer than culm, blades linear, 1.5–2 mm wide, flat, scabrous abaxially, smooth adaxially, margins scabrous, apex acuminate. Involucral bracts leaflike, shorter than inflorescence, sheathing 0.5–3 mm. Spikes 3, slightly spaced, androgynous, narrowly cylindrical, 2.5–3 cm; male part of spike linear, densely many flowered, equaling or slightly longer than female part; female part loosely many flowered, with slender peduncles 1–3 cm, lowest peduncle 3.5–10.5 cm, scabrous. Female glumes pale brown, ovate or ovate-oblong, 2.8–3 mm, margins broadly white hyaline, green 1-veined costa forming a mucro at apex, apex acute. Utricles yellow-green or olivaceous-green, equaling glume, obovate, trigonous, 3–3.5 mm, pubescent, especially on upper part, nerveless except for 2 costas on edges, base cuneate, apex abruptly contracted into a beak ca. 1 mm, orifice white hyaline, obliquely truncate, 2-toothed. Nutlets brown, tightly enveloped, obovate, trigonous, ca. 2 mm, base with a short stipe ca. 0.5 mm; style erect, base not thickened; stigmas 3. Fl. and fr. Jun–Aug.

• Flood lands, alpine meadows; 3000–4000 m. W Sichuan.

207. *Carex tatsiensis* (Franchet) Kükenthal in Engler, *Pflanzenr.* 38(IV. 20): 563. 1909.

打箭藁草 *da jian tai cao*

Carex ferruginea Scopoli var. *tatsiensis* Franchet, *Nouv. Arch. Mus. Hist. Nat.*, sér. 3, 10: 55. 1898.

Rhizome with long stolons. Culms 15–30 cm tall, slender, acutely trigonous, smooth, basal sheaths purple-brown. Leaves shorter than culm, blades pale green, linear, 1–2 mm wide, flat, rarely plicate, soft, margins scabrous, apex acuminate. Involucral bracts leaflike, shorter than inflorescence, sheathing 0.7–1.5 cm, purple-brown above. Spikes 3–5; terminal spike male, linear, 1–2 cm; remaining spikes female, distant, rarely with several male flowers at apex, oblong, 1–2 × 0.5–0.8 cm, loosely flowered, with slender scabrous peduncles. Female glumes brown or castaneous, ovate-lanceolate or oblong, 3.5–4 mm, margins broadly white hyaline, 1-veined costa forming a mucro, apex acute. Utricles ferruginous, slightly longer than glume, obliquely patent at maturity, ovate-elliptic, obtusely trigonous, 5–5.5 mm, membranous, slightly lustrous, glabrous, nerveless except for 2 costas on edges, base cuneate, apex abruptly contracted into a scabrous beak 2–3 mm, orifice obliquely truncate, 2-toothed. Nutlets pale brown, tightly enveloped, ovate-elliptic, trigonous, 2.8–3.2 mm, base with a stipe ca. 1 mm; style erect, base not thickened; stigmas 3. Fl. and fr. Jul.

• Alpine meadows, shady and moist grasslands on forested slopes; 3000–4000 m. Gansu, Qinghai, W Sichuan.

208. *Carex brachyathera* Ohwi, *Jap. J. Bot.* 7: 190. 1934.

垂穗藁草 *chui sui tai cao*

Rhizome woody, rather thick, usually stoloniferous. Culms loosely tufted, 30–60 cm tall, slender, trigonous, scabrous above, clothed at base with brown or dark brown sheaths ± disintegrating into fibers. Leaves shorter than culm, blades linear, 1.5–2.5 mm wide, slightly stiff, flattish or flattish plicate. Lowest involucral bract leaflike, shorter than spike, sheathing 3–5 cm, upper ones setaceous. Spikes 3–5, upper spikes contiguous to closely contiguous, suberect, lowest one very remote and pendent on long exserted, filiform peduncle; terminal spike male or rarely with a few female flowers at base, clavate to linear-clavate, 2–3 cm; lateral spikes female, narrowly cylindrical, 2.5–4.5 × ca. 0.5 cm, subclavate many flowered, peduncles exserted, filiform. Female glumes deep chestnut-brown with pale upper margin, oblong, thinly herbaceous, greenish 1-veined costa forming a straight scabrous awn ca. 1 mm, apex truncate or shallowly emarginate. Utricles slightly longer than glume, erect, ovate-fusiform, trigonous, 4.5–5 mm, membranous, densely hispid except at very base, nearly nerveless except for 2 costas on edges, gradually attenuate at both ends, base shortly stipitate, apex rather long beaked, orifice obliquely truncate, 2-toothed. Nutlets tightly enveloped, ovate-elliptic, compressed trigonous, 2–2.5 mm, base shortly stipitate; style base thickened; stigmas 3. Fl. and fr. Jul.

• Sandy grasslands at high elevations. Taiwan.

209. *Carex purpureovagina* F. T. Wang & Y. L. Chang ex S. Yun Liang, *Fl. Reipubl. Popularis Sin.* 12: 525. 2000.

紫红鞘藁草 *zi hong qiao tai cao*

Rhizome oblique, woody. Culms tufted, 25–28 cm tall, obtusely trigonous, smooth, basal sheaths purple-red, disintegrating into fibers. Leaves longer than culm, blades greenish, linear, ca. 2.5 mm wide, margins scabrous, apex long acuminate. Involucral bracts reduced to shortly bladed, shorter than inflores-

cence, sheathing 1.5–2 cm. Spikes 3, distant; terminal spike male, linear, 48–50 × 1.5–2.5 mm, densely many flowered; lateral spikes female, cylindrical, 2.8–3.2 × 0.3–0.4 cm, slightly densely many flowered, with peduncles 3–9 cm. Female glumes brown, ovate or broadly oblong, 3.3–3.5 mm, margins white hyaline, green 1-veined costa forming a mucro, apex acute. Utricles stramineous, longer than glume, oblong-lanceolate, trigonous, 3.5–4 mm, hirsute, veins slightly conspicuous, contracted at both ends, base shortly stipitate, apical beak 1–1.3 mm, hispidulous on margins, orifice obliquely truncate, shallowly 2-lobed. Nutlets tightly enveloped, elliptic, trigonous, 2–2.2 mm; style erect, base conspicuously thickened; stigmas 3. Fl. and fr. Apr–May.

• Shady valleys, rocky places in sparse forests; 1000–1700 m. Guangxi.

210. *Carex ridongensis* P. C. Li, Acta Bot. Yunnan. 12: 148. 1990.

日东藁草 *ri dong tai cao*

Rhizome woody, oblique. Culms tufted, 70–80 cm tall, slender, basal sheaths dark brown, bladeless. Leaves shorter than culm, blades linear, 2–3 mm wide, flat, scabrous. Involucral bracts reduced to shortly bladed, long sheathing. Spikes 4, distant, cylindrical, 3.5–4 × 0.3–0.4 cm; terminal spike male; lateral spikes female, slightly densely many flowered, with peduncles 15–21 cm, pendent. Female glumes brown, oblong, 3.2–3.5 mm, green 3-veined costa excurrent into a mucro. Utricles longer than glume, obovate-oblong, trigonous, 4.2–4.5 mm, hirsute, nerveless except for 2 costas on edges, base gradually attenuate into a short stipe, apex abruptly contracted into a brown long beak, orifice white hyaline, 2-toothed. Nutlets obovate-oblong, ca. 2 mm; style base slightly thickened; stigmas 3. Fl. and fr. Sep.

• Alpine meadows in thickets; 3000–4000 m. Xizang.

211. *Carex setosa* Boott, Ill. Gen. Carex 3: 108. 1862.

刺毛藁草 *ci mao tai cao*

Rhizome elongate or rarely short, oblique. Culms 15–45 cm tall, slender, obtusely trigonous, smooth, clothed at base with brown sheaths disintegrating into fibers. Leaves shorter than culm, blades greenish, linear, 2–4 mm wide, slightly stiff, margins scabrous. Involucral bracts setaceous, sheathing for 1–2 cm, or spathaceous. Spikes 3–7; terminal spike male, cylindrical, 3–4 × ca. 0.4 cm, slightly laxly flowered; peduncles slender, 2.5–5.5(–13) cm, scabrous above. Female glumes ferruginous, oblong, 3–3.5 mm, scabrous adaxially, margins very narrowly white hyaline, green 1-veined costa excurrent into a short mucro, apex subrounded or emarginate. Utricles stramineous-green or ferruginous above, equaling glume, narrowly elliptic, trigonous, ca. 4 mm, hirsute, ferruginous punctate or not, base gradually attenuate into a short stipe, apex abruptly contracted into a beak, orifice obliquely truncate, 2-toothed. Nutlets stramineous, tightly enveloped, oblong or obovate, trigonous, 2.5–3 mm, base shortly stipitate; style erect, base slightly thickened or not; stigmas 3. Fl. and fr. Jun–Jul.

Subalpine meadows in thickets, grassy areas on mountaintops, sandy areas at streamsides of hills; 1400–3700 m. Gansu, Guangxi, Guizhou, Hunan, Qinghai, Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, India (Sikkim), Kashmir, Nepal].

- 1a. Utricles ferruginous punctate 211b. var. *punctata*
 1b. Utricles not ferruginous punctate.
 2a. Involucral bracts setaceous 211a. var. *setosa*
 2b. Involucral bracts spathaceous
 211c. var. *mianxianica*

211a. *Carex setosa* var. *setosa*

刺毛藁草(原变种) *ci mao tai cao* (yuan bian zhong)

Carex pachyrrhiza Franchet.

Involucral bracts setaceous. Utricles not ferruginous punctate.

Subalpine meadows in thickets; 1400–3700 m. Gansu, Guizhou, Hunan, Qinghai, Sichuan, Xizang, Yunnan [Kashmir, Nepal].

211b. *Carex setosa* var. *punctata* S. Yun Liang, Fl. Reipubl. Popularis Sin. 12: 525. 2000.

锈点刺毛藁草 *xiu dian ci mao tai cao*

Utricles ferruginous punctate.

• Grassy areas on mountaintops. Guangxi, Sichuan.

211c. *Carex setosa* var. *mianxianica* S. Yun Liang, Fl. Reipubl. Popularis Sin. 12: 525. 2000.

沔县刺毛藁草 *mian xian ci mao tai cao*

Rhizome short. Involucral bracts spathaceous. Utricles not ferruginous punctate.

• Sandy areas at streamsides of hills. SW Shaanxi (Mianxian).

212. *Carex hirtelloides* (Kükenthal) F. T. Wang & Tang ex P. C. Li, Vasc. Pl. Hengduan Mount. 2: 2379. 1994.

流石藁草 *liu shi tai cao*

Carex haematostoma Nees var. *hirtelloides* Kükenthal, Repert. Spec. Nov. Regni Veg. Beih. 12: 311. 1922.

Rhizome short, woody. Culms 10–25 cm tall, slender, smooth, often pendent, clothed at base with brown sheaths disintegrating into fibers. Leaves shorter than culm, blades finely linear, ca. 1 mm wide, slightly weakly curved. Involucral bracts leaflike, shorter than inflorescence, sheathing. Spikes 3–6; terminal spike male, 8–12 × 0.2–0.3 cm, oblong, upper spikes with short peduncles, lowest spike with a long peduncle, remote. Female glumes dark purple-red, 1/2–2/3 length of utricle, ovate, 2.6–3 mm, margins very narrowly white hyaline, green 3-veined costa forming a mucro, apex acute. Utricles gray-green, longer than glume, narrowly oblong-lanceolate, compressed trigonous, 4.2–4.5 mm, membranous, hirsute, faintly veined, base shortly stipitate, apex gradually attenuate into a beak, orifice 2-toothed. Nutlets brown, oblong, ca. 2.2 mm, base with short stipe ca. 0.5 mm; style slightly scabrous, base hirsute; stigmas 3. Fl. and fr. Jul–Sep.

• Slopes; 3000–4900 m. W Sichuan, NW Yunnan.

213. *Carex haematostoma* Nees in Wight, Contr. Bot. India, 125. 1834.

红嘴藁草 hong zui tai cao

Rhizome woody. Culms tufted, 25–70 cm tall, smooth, clothed at base with pale brown sheaths disintegrating into fibers. Leaves shorter than culm, blades gray-green, linear, 1.5–3 mm wide, flattish, slightly revolute, margins scabrous, apex acuminate. Involucral bracts leaflike, shorter than inflorescence, shortly sheathing. Spikes 4–8; upper 2–4 male, approximate, subclavate-cylindric, 1.4–1.8 cm; remaining spikes female, cylindric, 1–3 cm, lower 1 or 2 distant, sometimes lowest one branched, densely many flowered; peduncles 2–8 cm, scabrous. Female glumes dark brown or dark purple-red, oblong, 2.5–3.5 mm, margins very narrowly white hyaline, green 1-veined costa scabrous and excurrent into a mucro. Utricles dark brown above, pale below, longer than glume, oblong-elliptic, compressed trigonous, 4–5 mm, membranous, densely hirsute, faintly veined, margins green or pale, apex gradually attenuate into a short beak, orifice 2-toothed. Nutlets pale brown, loosely enveloped, oblong-trigonous, subcompressed, ca. 1.8 mm, base with a stipe ca. 0.7 mm; style erect, scabrous; stigmas 3. Fl. and fr. Jul–Aug.

Alpine meadows in thickets, forest margins; 2000–3700 m. Qinghai, SW Sichuan, Xizang, NW Yunnan [Bhutan, NE India, Nepal].

214. *Carex fulvorubescens* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30: 283. 1911.

茶色藁草 cha se tai cao

Rhizome short. Culms 10–35 cm tall, erect, trigonous, scabrous, clothed at base with purple-brown sheaths eventually disintegrating into parallel fibers. Leaves longer than culm, blades linear, 1.5–5 mm wide, flattish plicate, ± stiff. Lower involucral bracts setaceous, sheathing, upper involucral bracts glumelike, sheathless. Spikes 4–9, subfastigiate; terminal spike male, rarely gynaeandrous, linear or linear-cylindric, 1–12 cm; lateral spikes female or androgynous, linear, 1–10 cm, subdensely many flowered. Female glumes dark brown or golden brown, lanceolate-ovate, 2–5 mm, membranous, upper margins ciliate, apex acute. Utricles longer than glume, erect, linear-oblong or lanceolate, compressed trigonous, 4–8 mm, membranous, sparsely pubescent, ciliate on margins, finely many veined, base gradually attenuate into a short stipe, apex gradually narrowed to a long curved beak, orifice deeply 2-toothed. Nutlets ovate-oblong, ca. 1.5 mm, base with a long, filiform stipe 2–3 mm; style slender, base not markedly thickened; stigmas 3.

- Sandy or rocky slopes in montane regions. Taiwan.

- 1a. Leaves rather narrow, 1.5–3 mm wide; male spike 2–4 cm, female spikes 1–3 cm; female glumes dark brown 214a. subsp. *fulvorubescens*
- 1b. Leaves rather broad, 3–5 mm wide; male spike up to 12 cm, female spikes up to 10 cm; female glumes golden brown 214b. subsp. *longistipes*

214a. *Carex fulvorubescens* subsp. *fulvorubescens*

茶色藁草(原亚种) cha se tai cao (yuan ya zhong)

Leaves rather narrow, 1.5–3 mm wide. Male spike 2–4 cm; female spikes 1–3 cm. Female glumes dark brown.

- Sandy or rocky slopes in montane regions. Taiwan.

No specimens have been seen by the present authors.

214b. *Carex fulvorubescens* subsp. *longistipes* (Hayata) T. Koyama, Fl. Taiwan 5: 361. 1978.

长梗扁果藁草 chang geng bian guo tai cao

Carex longistipes Hayata, Icon. Pl. Formosan. 10: 66. 1921; *C. tagawana* T. Koyama.

Leaves rather broad, 3–5 mm wide. Male spike up to 12 cm; female spikes up to 10 cm. Female glumes golden brown.

- Poorly vegetated rocky or sandy slopes in montane regions. Taiwan.

215. *Carex makinoensis* Franchet, Bull. Soc. Philom. Paris, sér. 8, 7: 47. 1895.

牧野藁草 mu ye tai cao

Carex shimadae Hayata; *C. shimadae* var. *longibracteata* Hayata; *C. warburgiana* Kükenthal.

Rhizome short. Culms densely tufted, 20–80 cm tall, slender, trigonous, rigid, subsmooth but scabrous below inflorescence, clothed at base with dark brown or purple-brown sheaths eventually disintegrating into parallel fibers. Leaves longer than culm, blades linear, 2–5 mm wide, ± stiff, plicate. Lowest involucral bract with a leaflike blade, remaining bracts nearly bladeless or with a short setaceous blade. Spikes 3–7, upper spikes approximate, lower 2 or 3 distant; terminal spike male, purple-brown, linear-cylindric, 4–10 × ca. 0.25 cm; lateral spikes female or androgynous, cylindric or linear-cylindric, 3–7 × 0.4–0.6 cm, subloosely many flowered, erect, with rather short mostly enclosed peduncle. Female glumes dark brown to chestnut-brown, sometimes light brown, ovate or ovate-oblong, membranous, upper margins ciliate, pale 3-veined costa forming a mucro at apex, apex acute. Utricles longer than glume, lanceolate, compressed trigonous, suberect, 4–6 mm, membranous, sparsely hirsute on upper half, finely many veined, apical beak short, orifice sharply 2-lobed. Nutlets tightly enveloped, elliptic or oblong, trigonous, 2.5–3 mm, contracted at both ends, base stipitate; style base not thickened; stigmas 3.

Grasslands on low mountains or near the seacoast. Taiwan [Japan].

216. *Carex stenocarpa* Turczaninow ex V. I. Kreczetowicz in Komarov, Fl. URSS 3: 607. 1935.

细果藁草 xi guo tai cao

Rhizome short. Culms tufted, 20–55 cm tall, smooth, clothed at base with light brown sheaths. Leaves 1/3–1/2 length of culm, blades light green, linear, 2–5 mm wide, flat, margins scabrous, apex acuminate. Involucral bracts leaflike, shorter

than subtending spike, sheathing. Spikes 3–5; upper 1 or 2 male, approximate, oblong, 1–1.2 × 0.3–0.5 cm; remaining spikes female, ovate to oblong-ovate, 1.2–1.4 × 0.5–0.7 cm, slightly remote, lowest one remote, with slender, scabrous peduncles 3–4 cm. Female glumes castaneous to ferruginous-brown, broadly ovate or oblong, 3.5–4.5 mm, 1-veined, margins rather broadly white hyaline, apex obtuse. Utricles greenish yellow below, brown above, longer than glume, oblong-ovate, compressed trigonous, 3–6 mm, hirsute abaxially and on margins, nerveless, base contracted, apex gradually attenuate into a conic beak, beak scabrous margined, obliquely truncate, orifice hyaline, 2-toothed. Nutlets brown, tightly enveloped, oblong-trigonous, 2.5–3 mm, base contracted into a short stipe; style erect; stigmas 3. Fl. and fr. Jul–Aug.

Alpine meadows; 900–4200 m. Gansu, Xinjiang [Russia].

217. *Carex scabrostris* Kükenthal, Bot. Jahrb. Syst. 36(Beibl. 82): 9. 1905.

糙喙薹草 cao hui tai cao

Rhizome elongate. Culms 25–70 cm tall, slender, obtusely trigonous, smooth, clothed at base with dark brown sheaths disintegrating into fibers. Leaves shorter than culm, blades linear, 1–3 mm wide, flat, margins slightly scabrous. Involucral bracts leaflike, shorter than inflorescence, long sheathing 1–3 mm. Spikes 3–5; upper 1 or 2(or 3) male, slightly distant, cylindrical, 1–2 × 0.4–0.6 cm; lateral spikes 2 or 3, female, oblong-ovate, ca. 1 cm, loosely flowered. Female glumes dark brown, ovate or ovate-lanceolate, 3.5–4 mm, margins white hyaline, 1-veined costa forming a mucro, apex acuminate. Utricles stramineous below, dark above, 2 × as long as glume, suberect, lanceolate, subcompressed trigonous, 6–7 mm, membranous, faintly many veined, base contracted into a stipe, margins hirsutulous, apex abruptly contracted into a long beak, orifice obliquely truncate, white hyaline, 2-toothed. Nutlets light brown, obovate-oblong, compressed trigonous, 2–2.5 mm; style slender, long, sparsely pubescent; stigmas 3. Fl. and fr. Jul–Aug.

• Alpine meadows or moist places, *Picea* forests; 3000–4600 m. Gansu, Qinghai, Shaanxi, Sichuan, Xizang.

218. *Carex kunlunensis* N. R. Cui in S. Y. Jin & Y. L. Chen, Cat. Type Spec. Herb. China (Suppl. II), 77. 2007 [*“kumlunanssis”*].

昆仑薹草 kun lun tai cao

Rhizome horizontal. Culms (3–)7–16 cm tall, slender, erect, smooth, clothed at base with brown sheaths. Leaves equaling or slightly longer or shorter than culm, blades linear, plicate, filiform, ca. 1 mm wide, glabrous. Lower involucral bracts leaflike, shorter than inflorescence, sheathing, brown. Spikes (2 or)3(or 4), slightly distant; terminal spike male, 1–1.5 × ca. 0.3 cm; remaining spikes female, oblong, 0.8–1.5 × ca. 0.3 cm, sessile. Female glumes dark purple-brown, ovate, 4–5 mm, 1-veined, margins hyaline. Utricles purple above, green below, lanceolate, trigonous, 3.5–4 mm, nerveless, margins slightly scabrous, apex long beaked, orifice 2-toothed; stigmas 3. Fl. and fr. Jun–Aug.

• Alpine meadows; 4000–4300 m. SE Xinjiang (Ruoqiang).

This name was originally published by N. R. Cui (Fl. Xinjiang. 6: 435, 604. 1996, *“kumlunanssis”*), where the type was indicated as having been collected in Ruoqiang Xian and deposited in three herbaria in Xinjiang (XJA, XJBI, XJNU). However, because no collector's name, number, or date was cited, the requirements of *Vienna Code* Art. 37 were not satisfied and consequently the name was not validly published there. The name was validated by S. Y. Jin and Y. L. Chen by full and direct reference to N. R. Cui's validating Latin description and indication of the holotype at XJNU.

219. *Carex regeliana* Kükenthal ex Litvinov, Trudy Bot. Muz. Imp. Akad. Nauk 7: 94. 1910.

瘦果薹草 shou guo tai cao

Rhizome stout, ascending. Culms densely tufted, 40–70 cm tall, obtusely trigonous, slender, smooth, glabrous, clothed at base with pale brown sheaths disintegrating into parallel fibers. Leaves crowded in basal rosettes, 1/4–1/3 length of culm, blades linear, 3–5 mm wide, rigid, flat to subcanaliculate. Lower involucral bracts leaflike, longer than spike but shorter than inflorescence. Spikes 5–8, slightly distant; terminal 1 or 2 male, erect, narrowly lanceolate to lanceolate-clavate, 1.5–2.5 cm; remaining spikes female, linear, 1–2 cm, rather sparsely flowered, especially below, solitary, pendent, with slender, scabrous peduncles 3–4 cm. Female glumes slightly ferruginous, ovate, finely 1-veined, margins broadly white hyaline, apex subobtuse. Utricles purplish brown to blackish brown, oblong-ovate, faintly trigonous, subplano-convex, ca. 4 mm, lustrous, nerveless, base shortly stipitate, apex gradually tapering into an elongate beak, beak obliquely truncate, white hyaline margined. Fl. and fr. May–Sep.

• Alpine meadows and marshes; 1400–4300 m. Xinjiang.

220. *Carex heshuonensis* S. Yun Liang, Fl. Reipubl. Popularis Sin. 12: 525. 2000.

和硕薹草 he shuo tai cao

Rhizome woody. Culms 30–60 cm tall, obtusely trigonous, smooth, clothed at base with brown sheaths disintegrating into parallel fibers. Leaves shorter than culm, blades light green, linear, 1–2 mm wide, flattish, margins scabrous, apex long acuminate. Involucral bracts reduced to shortly bladed, sheathing. Spikes 3–7; upper 2–4 male, approximate, clavate, 0.7–1.5 cm; remaining spikes female, rarely with male flowers at apex, 1–1.5 cm, slightly remote, with short peduncles. Female glumes ferruginous, broadly ovate or ovate-oblong, 4–4.5 mm, margins white hyaline, green 3-veined costa forming a mucro, apex acute. Utricles stramineous, longer than glume, elliptic-oblong or obovate-oblong, compressed trigonous, 5.5–7 mm, membranous, hirsute, ferruginous punctate and scabrous margined above, 6- or 7-veined abaxially, nerveless adaxially, base contracted, apex abruptly contracted into a very short beak, orifice obliquely truncate, 2-toothed. Nutlets yellow-brown, elliptic-trigonous, ca. 2.5 mm, base with a stipe ca. 0.7 mm; style scabrous; stigmas 3. Fl. and fr. Aug.

• Forested slopes; 2000–2800 m. Xinjiang (Hoshud).

221. *Carex graminiculmis* T. Koyama, Jap. J. Bot. 15: 170. 1956.

禾秆藁草 he gan tai cao

Rhizome short, woody, with 1 or 2 rather long stolons, brown. Culms 60–70 cm tall, erect, rigid, slender, obtusely trigonous, smooth, clothed at base with brown-yellow sheaths disintegrating into parallel fibers. Leaves ca. 1/2 length of culm, blades linear, 1.5–5 mm wide, flattish, revolute, margins scabrous, apex long acuminate. Basal involucre bracts leaflike, slightly shorter than or equaling inflorescence, shortly sheathing, 1.5–2.5 cm, remaining bracts setaceous, very shortly sheathing. Spikes 9–21, approximate, subfastigiate, disposed in a panicle, rarely spicate; upper 7–11 spikes male, castaneous-red, sessile or sometimes lower 1 or 2 slightly shortly pedunculate; terminal spike oblong-elliptic, 15–20 × 3–9 mm, densely many flowered; remaining spikes female, oblong, obovate, or obovate-oblong, 8–25 × 3–8 mm, declined, densely many flowered, sometimes loosely flowered at base. Female glumes red-brown or castaneous, ovate or broadly rhomboid-elliptic, 4–4.5 × 2–2.3 mm, lustrous, densely hirsute on upper part and along margins, margins broadly white hyaline, costa green, 3-veined, veins scabrous, apex acute. Utricles brown-purple or castaneous, longer than glume, obovate-elliptic, compressed, (4.2–)5–6 × 2–3 mm, thinly membranous, densely hirsute, 5–7-veined, base subabruptly contracted into a very short stipe, apex abruptly contracted into a very short beak, orifice broadly white hyaline, obliquely truncate, entire. Nutlets light yellow, loosely enveloped, oblong, trigonous, ca. 2.5 × 1 mm, slightly convex on faces, base cuneate, attenuate into a stipe ca. 0.8 mm, apex abruptly contracted into a mucro; style up to ca. 3 mm, slightly curved; stigmas (2 or)3.

• Shanxi (Wutai Shan).

222. *Carex plectobasis* V. I. Kreczetowicz, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 9: 192. 1946.

硬毛藁草 ying mao tai cao

Carex hirtella Drejer, Symb. Caric. 21. 1844, not (Swartz) J. F. Gmelin (1791).

Rhizome woody, oblique. Culms tufted, 20–65 cm tall, slender, obtusely trigonous, clothed at base with red-brown to dark brown sheaths eventually disintegrating into parallel fibers. Leaves shorter than culm, involute, slightly rigid, gray-green, margins scabrous, apex acuminate. Involucral bracts setaceous, shorter than inflorescence, shortly sheathing. Spikes 4–6; upper 3 or 4 male, approximate, linear-cylindric, 0.8–2 cm, sessile; remaining spikes female, remote, oblong-cylindric, 1–3 cm, with slender, slightly scabrous peduncles. Female glumes castaneous, pale at middle, broadly ovate or ovate-oblong, 4–4.5 mm, margins broadly white hyaline. Utricles yellow-green, brown above, longer than glume, suberect, oblong-elliptic, compressed trigonous, 5–7 mm, membranous, many veined, base gradually narrowed to a stipe, margins hispidulous, apex abruptly contracted into a conic long beak, orifice white hyaline. Nutlets stramineous, oblong-obovate, trigonous, ca. 2.5 mm, base with stipe ca. 0.7 mm; style erect, scabrous; stigmas 3. Fl. and fr. Jul.

Sands, rocky sunny slopes; 3000–4300 m. W Sichuan, Xizang, Yunnan [Afghanistan, Kashmir, Nepal].

223. *Carex siroumensis* Koidzumi, Bot. Mag. (Tokyo) 32: 54. 1918.

冻原藁草 dong yuan tai cao

Rhizome short, woody, oblique. Culms densely tufted, 10–22 cm tall, slender, compressed trigonous, slightly scabrous, clothed at base with light brown sheaths eventually disintegrating into parallel fibers. Leaves equaling or shorter than culm, blades linear, 1–2 mm wide, flattish, sometimes involute, margins scabrous, apex acuminate. Lower involucre bracts leaflike, shorter than inflorescence, sheathing 1–2 mm, upper involucre bracts glumelike. Spikes 3–7; terminal spike gynaeandrous, rarely male, clavate, 1.4–1.8 cm; remaining spikes female, cylindric, 1–2 cm, upper 1 or 2 approximate, sessile or subsessile, lowest spike slightly distant, with long peduncle. Female glumes purple-brown, elliptic-ovate, 2.5–3.5 mm, margins white hyaline, yellow-green 1-veined costa excurrent into a mucro, apex acute. Utricles yellow-green or purple-brown at apex, longer than glume, oblong-lanceolate, compressed trigonous, 4–5.5 mm, membranous, hirsute, faintly veined, base cuneate, margins scabrous, apex gradually attenuate into a beak, orifice 2-toothed. Nutlets light brown, loosely enveloped, oblong, compressed trigonous, 2–2.5 mm, base with stipe ca. 1 mm; style erect, base not thickened; stigmas 3. Fl. and fr. Jul–Aug.

Alpine grasslands, rock crevices, cliffs; 2000–2400 m. Jilin [Japan, Korea].

224. *Carex cranaocarpa* Nelmes, Bull. Misc. Inform. Kew 1939: 184. 1939.

鹤果藁草 he guo tai cao

Rhizome oblique, woody. Culms tufted, 50–80 cm tall, obtusely trigonous, smooth, scabrous above, clothed at base with brown sheaths eventually disintegrating into parallel fibers. Leaves shorter than culm, blades linear, 2–3 mm wide, flat, margins scabrous, apex long acuminate. Involucral bracts reduced to shortly bladed, shorter than inflorescence, sheathing 1–2 cm. Spikes 4–9; upper 3–5(–7) male, approximate, cylindric, 1–2 cm, sessile; remaining spikes female, rarely with male flowers at apex, cylindric or oblong, 2–3.2 × ca. 0.4 cm, densely many flowered, with slender, scabrous peduncles 1.5–5 cm. Female glumes castaneous, elliptic-lanceolate or broadly ovate, 5–5.5 mm, scabrous on 2 lateral veins of costa, margins broadly white hyaline. Utricles stramineous below, purple-brown above, longer and broader than glume, elliptic-lanceolate, compressed trigonous, 7–8 mm, papery, densely papillose, conspicuously veined abaxially, faintly veined adaxially, base contracted, apex gradually narrowed into a beak, orifice obliquely truncate, white hyaline. Nutlets brown, loosely enveloped, oblong, trigonous, ca. 2.5 mm, base with short stipe 0.5–0.8 mm; style long and erect, hispidulous, base not thickened; stigmas 3. Fl. and fr. Jul–Sep.

• Rock crevices, sunny slopes, roadsides; 1500–3000 m. Hebei, Nei Mongol, Shaanxi.

28. Carex sect. Chlorostachyae Meinshausen, Trudy Imp. S.-Peterburgsk. Bot. Sada 18: 283, 360. 1901.

绿穗藁草组 lǜ sui tai cao zu

Dai Lunkai (戴伦凯); Tetsuo Koyama

Rhizomes short, rarely stoloniferous. Culms slender. Leaves narrow. Involucral bract leaf-shaped, sheathed. Spikes few, 1 per involucral bract sheath; terminal spike male or bisexual, sometimes with few female flowers at base or apex; lateral spikes female, rarely bisexual, usually pendulous, loosely or subdensely few to 10-flowered or over 10-flowered; peduncles slender (upper slightly short). Female glumes obtuse to rounded at apex, rarely aristate or mucronate, early deciduous. Utricles obtusely trigonous or swollen trigonous, membranous, obscurely veined, rarely 2-veined laterally, beak short, rarely slightly long, scabrous on both margins, truncate or emarginate at orifice. Stigmas 3.

About ten species: N Africa, Asia, Europe, North America; seven species (one endemic) in China.

- 1a. Rhizome stoloniferous; spikes androgynous, loosely few flowered, sometimes lateral spikes female; female glumes slightly longer or shorter than utricle, aristate at apex 225. *C. handelii*
- 1b. Rhizome without stolons; terminal spike male, sometimes with few female flowers at apex or base, lateral spikes female; female glumes shorter than utricle.
- 2a. Utricles greenish or yellowish green at maturity, not nitid; terminal spike male, sometimes with female flowers at apex or base.
- 3a. Leaves sulcate on upper face; terminal spike androgynous, lateral spike loosely 3–7-flowered 226. *C. sedakowii*
- 3b. Leaves flat, not sulcate; terminal spike male or sometimes with few flowers at apex, lateral spike rather densely many flowered.
- 4a. Utricles obovate or suborbicular, 1.5–2 mm, with very short beak or nearly beakless; terminal spike gynaeandrous or male 227. *C. karoii*
- 4b. Utricles oblong-lanceolate, 3–4.5 mm, stipitate, with rather long beak; terminal spike male 228. *C. tenuiformis*
- 2b. Utricles wholly or partly yellow-brown at maturity, nitid; terminal spike male (sometimes with few female flowers in *C. capillaris*).
- 5a. Utricles ovate or narrowly ovate, 3.5–4 mm, gradually attenuate to a slightly long beak at apex 229. *C. capillaris*
- 5b. Utricles ovate or obovate-fusiform, ca. 3 mm, abruptly contracted to a rather short or very short beak at apex.
- 6a. Terminal male spike oblong-lanceolate, not surpassing uppermost female spike; utricles obtusely trigonous, rather swollen, brown at maturity, abruptly contracted to a very short beak at apex 230. *C. chlorostachys*
- 6b. Terminal male spike oblanceolate or clavate, surpassing uppermost female spike; utricles obtusely trigonous, not swollen, yellowish brown, abruptly contracted to a short beak at apex 231. *C. ledebouriana*

225. Carex handelii Kükenthal in Handel-Mazzetti, Symb. Sin. 7: 1268. 1936.

双脉囊藁草 shuang mai nang tai cao

Carex karlongensis Kükenthal subsp. *handelii* (Kükenthal) P. C. Li.

Rhizome slightly long, stoloniferous. Culms densely tufted, 15–25 cm tall, slender, trigonous, smooth, clothed with a few bladeless or shortly bladed sheaths at base. Leaves shorter than or nearly equaling culm, blades 1–2 mm wide, rather soft, flat, rather smooth proximally, scabrous distally and at margins, longest sheath ca. 3 cm. Involucral bracts shorter or longer than spike, lower blades leaflike, upper involucral bracts with setaceous blade, sheathed. Spikes 1–3, usually 2, single in an involucral bract sheath, distance between spikes 4–5 cm, androgynous, with male part longer than female part, many male flowers in upper part and loosely with few female flowers in lower part, cylindrical, 1.5–3 cm; peduncles slender. Female glumes brownish yellow, narrowly oblong or oblong-lanceolate, ca. 5 mm, membranous, green 1-veined, apex acuminate, mucronate, sometimes aristate in basal glumes. Utricles greenish, suberect, shorter than glume, obovate, obtusely trigonous, ca. 3

mm, herbaceous, 2-veined laterally, whitish hispidulous on veins and margins, base broadly cuneate, apex abruptly contracted into a rather long beak, orifice 2-toothed. Nutlets dark brown, tightly enveloped, obovate, obtusely trigonous, ca. 2 mm, base broadly cuneate, apex mucronate; style persistent, base thickened; stigmas 3, rather short, ca. 1 mm.

• Mixed forests in ravines, forests and grassy areas on mountain slopes; 2500–3100 m. Sichuan, Yunnan.

226. Carex sedakowii C. A. Meyer ex Meinshausen, Trudy Imp. S.-Peterburgsk. Bot. Sada 18: 360. 1901.

沟叶藁草 gou ye tai cao

Rhizome short. Culms densely tufted, 8–40 cm tall, slender, obtusely triquetrous, smooth. Leaves basal, 1/3–1/2 height of culms, blades ca. 1 mm wide, involute and hair-shaped, sulcate on upper faces of blades, scabrous on margins, sheathed; sheaths ca. 1 cm, usually dehiscent at membranous part, proximally red-brown, distally stramineous. Lowest involucral bract leaflike, slender, surpassing spike, blades of upper involucral bracts setaceous or reduced to bladeless sheaths, shorter than spike, sheaths 0.8–2 cm. Spikes 2–4, remote, single in an involucral bract sheath; terminal spike androgynous, 0.7–1 cm,

with few male flowers at upper part, with 3 or 4 female flowers at lower part; lateral spikes female, narrowly oblong or ovate, 5–8 mm, loosely 3–5-flowered; peduncles slender. Female glumes brownish yellow to red-brown, ovate, ca. 2 mm, membranous, 1-veined, early deciduous, apex obtuse, mucous. Utricles ferruginous-brown at maturity, suberect, slightly longer than glume, obovate, obtusely trigonous, ca. 2.5 mm, membranous, glabrous, ± nitid, obscurely veined, base attenuate into a short stipe, apex abruptly contracted into a rather long beak, orifice white hyaline, obliquely truncate. Nutlets brown, stramineous on angles, rather tightly enveloped, elliptic, trigonous, ca. 2 mm; style persistent, base thickened; stigmas 3. Fl. and fr. Jun–Aug.

Grassy mountain slopes, morass in forests, streamsides; 600–3200 m. Heilongjiang, Jilin, Liaoning, Nei Mongol [Japan, Korea, Mongolia, Russia (Far East, Siberia)].

227. *Carex karoii* Freyn, Oesterr. Bot. Z. 40: 303. 1890.

小粒薹草 *xiao li tai cao*

Carex capillaris Linnaeus var. *parvirostris* Kükenthal; *C. karoii* var. *parvirostris* (Kükenthal) Á. Löve et al.; *C. licentii* Nelmes; *C. selengensis* K. V. Ivanova; *C. takenakae* Nakai.

Rhizome short. Culms densely tufted, 10–40 cm tall, rather slender, lower part smooth, upper part scabrous, clothed at base with sheaths disintegrating into fibers. Leaves nearly basal, shorter than culm, blades 1–2 mm wide, slightly stiff, base plicate and gradually flattened distally, margins scabrous; sheaths 1–2 cm. Lowest involucre bracts leaflike, surpassing subtending spike, upper involucre bracts with setaceous blade, uppermost usually sheathlike. Spikes 3 or 4(–6), single in an involucre bract sheath, lower remote and upper contiguous; terminal spike gynaeandrous, female part shorter than male part, or sometimes male, surpassing uppermost female spike, oblong-obovate or clavate, 4–10 mm; lateral spikes female, oblong or shortly cylindrical, 4–15 mm, densely many flowered; peduncles slender, lower ones rather long and upper short. Female glumes yellowish, broadly ovate or suborbicular, ca. 1.5 mm, membranous, 1-veined, apex obtuse, mucous. Utricles yellowish green, obliquely patent, slightly longer than glume, broadly obovate or suborbicular, inflated trigonous, 1.5–2 mm, membranous, inconspicuously veined, base broadly cuneate, apex abruptly contracted into a very short beak or nearly beakless, slightly scabrous on margins, orifice obliquely truncate. Nutlets loosely enveloped, broadly elliptic or obovate-elliptic, trigonous, ca. 1.2 mm, apex mucronate; style base not thickened; stigmas 3. Fl. and fr. Jun–Aug.

Wet places in thickets, riversides, swamps. Hebei, Liaoning, Nei Mongol, Shanxi [Mongolia, Russia].

228. *Carex tenuiformis* H. Léveillé & Vaniot, Bull. Acad. Int. Géogr. Bot. 11: 104. 1902.

细形薹草 *xi xing tai cao*

Carex koreana Komarov.

Rhizome short. Culms densely tufted, 20–40 cm tall, rather slender, obtusely trigonous, smooth, slightly scabrous at upper part, closed at base with brownish or red-brown sheaths,

old sheaths usually disintegrated into fibers. Leaves slightly shorter than culm, blades 2–2.5 mm wide, flat, rather soft, scabrous on margins, rather long sheathed. Involucre bracts leaflike, usually shorter than subtending spike, sheathed, rather long. Spikes 3, rather remote; terminal spike male, lanceolate or broadly linear, 1.2–1.7 cm, conspicuously longer than adjacent female spike; lateral spikes female, broadly linear or oblong-linear, 1.5–2 cm, loosely 10- to more flowered; peduncle slender, up to 6 cm, slightly scabrous, slightly pendent or erect. Female glumes ferruginous, elliptic or obovate-oblong, 2.5–3 mm, membranous, green 1-veined, margins broadly hyaline at upper part, apex obtuse or acute. Utricles yellowish green, suberect, longer than glume, oblong-lanceolate, compressed trigonous, 3.5–4.5 mm, membranous, nerveless or 2-veined laterally, gradually tapering to a short stipe at base and a long beak at apex, beak scabrous on margins, obliquely truncate at orifice, slightly ferruginous. Nutlets rather loosely enveloped, obovate, trigonous, ca. 2 mm, apex mucronate; style base slightly thickened; stigmas 3. Fl. and fr. Jun–Jul.

Forests, grasslands on forest margins or in thickets, sometimes on mountain slopes. Heilongjiang, Nei Mongol [Japan, Korea, Russia (Far East, E Siberia)].

229. *Carex capillaris* Linnaeus, Sp. Pl. 2: 977. 1753.

细秆薹草 *xi gan tai cao*

Rhizome short, without stolons. Culms densely tufted, 15–40 cm tall, rather slender, obtusely trigonous, smooth, with brown sheaths at base, old sheaths usually disintegrated into fibers. Leaves much shorter than culm, 1/3–1/2 height of culm, blades 1.5–2 mm wide, flat, rather soft, scabrous on margins, shortly sheathed. Involucre bracts leaflike, linear, shorter than subtending spike, with rather long sheath. Spikes 3 or 4, rather remote, slightly pendulous; terminal spike male, sometimes with 2 or 3 female flowers at base or apex, narrowly lanceolate, 0.5–1 cm, not surpassing uppermost female spike; lateral spikes female, narrowly oblong, 0.8–1.5 cm, loosely 6–10-flowered; peduncles slender, longest up to 5 cm, smooth or slightly scabrous. Female glumes early deciduous, yellow-brown or brown, obovate, ca. 2.5 mm, membranous, green 3-veined, with veins and midrib convex, margins broadly white hyaline, apex obtuse or acute and mucronate. Utricles dark yellow-green or brown-green, suberect, longer than glume, ovate-oblong or narrowly ovate, obtusely trigonous, 3.5–4 mm, membranous, nerveless, base gradually attenuate into a short stipe, apex gradually narrowed into a ± long beak, beak slightly scabrous on margins, white hyaline and obliquely truncate or emarginate at orifice. Nutlets yellowish, tightly enveloped, obovate, trigonous, ca. 1.5 mm; style base slightly thickened; stigmas 3. Fl. and fr. Jun–Jul.

Alpine grasslands and meadows, mountain slopes, streamsides, watersides. Gansu, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shanxi [Japan, Korea, Russia; Europe, North America].

230. *Carex chlorostachys* Steven, Mém. Soc. Imp. Naturalistes Moscou 4: 68. 1813.

绿穗薹草 *lü sui tai cao*

Rhizome short. Culms densely tufted, 10–30(–50) cm tall,

slender, subrigid, obtusely trigonous, smooth, bearing many leaves at lower part. Leaves shorter than culm, blades 2–2.5 mm wide, flat, rather soft, smooth, slightly scabrous distally, sheaths short. Lower involucre bracts leaflike, upper involucre bracts setaceous, 5–15 mm, sheathed. Spikes 3–6, single in an involucre bract sheath, lower remote, longest space up to 6 cm, upper approximate; terminal spike male, oblong-lanceolate, 6–10 mm; lateral spikes female, cylindrical or oblong, 8–18 mm, loosely (6–)8–10(–12)-flowered; peduncles slender, usually pendulous. Female glumes brownish yellow or stramineous, obovate or subelliptic, ca. 2 mm, membranous, 1-veined, early deciduous, apex rounded, mucous. Utricles yellow-green or brown at maturity, obliquely patent, longer than glume, ovate-fusiform, obovate-fusiform, or subelliptic, obtusely trigonous, 2–3 mm, membranous, shiny, nerveless, base abruptly constricted into a short stipe, apex abruptly narrowed to a very short beak not up to 0.5 mm, orifice obliquely truncate, white hyaline on margins. Nutlets brown, subloosely enveloped, broadly obovate, trigonous, ca. 1.5 mm, base estipitate; style base slightly thickened; stigmas 3. Fl. and fr. Jun–Aug.

Thickets on mountain slopes, grasslands, riversides, lakeshores, wet places in ravines; 1100–3200 m. Gansu, Hebei, Nei Mongol, Qinghai, Shanxi, Sichuan, Xinjiang, Xizang [Japan, Korea, Russia (European part, Siberia)].

- 1a. Spikes remote, longest space up to 6 cm, upper spikes approximate; utricles ovate-fusiform or obovate-fusiform, ca. 3 mm, beak short 230a. var. *chlorostachys*
 1b. Spikes approximate; utricles subelliptic, 2–2.5 mm, nearly beakless 230b. var. *conferta*

230a. *Carex chlorostachys* var. *chlorostachys*

绿穗薹草(原变种) lǜ sui tai cao (yuan bian zhong)

Carex capillaris Linnaeus var. *chlorostachys* (Steven) Grossheim; *C. capillaris* var. *pohuanshanensis* Yabe.

Lower spikes remote, longest space up to 6 cm, upper spikes approximate. Utricles ovate-fusiform or obovate-fusiform, ca. 3 mm, beak short.

Thickets on mountain slopes, grasslands, riversides, lakeshores; 1100–3200 m. Gansu, Hebei, Nei Mongol, Qinghai, Shanxi, Sichuan, Xinjiang, Xizang [Japan, Korea, Russia (European part, Siberia)].

230b. *Carex chlorostachys* var. *conferta* Tang & F. T. Wang ex L. K. Dai, var. nov.

29. *Carex* sect. *Hymenochlaenae* (Drejer) L. H. Bailey in Coulter, Man. Bot. Rocky Mt. 379. 1885.

膜囊薹草组 mo nang tai cao zu

Dai Lunkai (戴伦凯); Tetsuo Koyama, Gordon C. Tucker

Carex [unranked] *Hymenochlaenae* Drejer, Symb. Caric. 10. 1844.

Involucre bracts leaflike, with long sheaths. Spikes usually bisexual, rarely unisexual, cylindrical or oblong, densely or subdensely many flowered, rarely loosely flowered, single in an involucre bract sheath, rarely ramose and arranged in a panicle. Female glume lanceolate-ovate or ovate, rarely oblong. Utricles elliptic or obovate-elliptic, rarely narrowly ovate, obtusely trigonous or slightly inflated trigonous, inconspicuously veined, rarely distinct, with rather long or slightly long beak, orifice 2-toothed or emarginate. Nutlets subloosely enveloped; style base not thickened; stigmas 3.

Between 50 and 60 species: Africa, Asia, Central and North America, Europe; 15 species (13 endemic) in China.

无喙绿穗薹草 wu hui lǜ sui tai cao

Type: China. Qinghai: Datong, 28 Jul 1936, K. M. Liou 6326 (holotype, PE).

Validating Latin diagnosis: that of “*Carex chlorostachys* var. *conferta*” (L. K. Dai in L. K. Dai & S. Yun Liang, Fl. Reipubl. Popularis Sin. 12: 526. 2000).

Spikes approximate. Utricles subelliptic, 2–2.5 mm, nearly beakless. Fl. and fr. Jul–Aug.

• Grasslands or wet places in ravines; ca. 2000 m. NE Qinghai (Datong).

This name was not validly published by L. K. Dai in 2000 because the herbarium in which the type is conserved was not specified (*Vienna Code*, Art. 37.7). For the same reason, it was not validated by S. Y. Jin and Y. L. Chen (Cat. Type Spec. Herb. China (Suppl. II), 75. 2007).

231. *Carex ledebouriana* C. A. Meyer & Treviranus, Bull. Soc. Imp. Naturalistes Moscou 36(1): 540. 1863.

棒穗薹草 bang sui tai cao

Carex capillaris Linnaeus var. *ledebouriana* (C. A. Meyer & Treviranus) F. Schmidt.

Rhizome short. Culms densely tufted, 10–15 cm tall, slender, obtusely trigonous, smooth, sheaths usually disintegrated into fibers. Leaves basal, ca. 1/2 height of culm or rather longer, blades 1–2 mm wide, flat, midrib and 2 lateral veins conspicuous, upper margins scabrous, sheaths rather short, usually dehiscent at lateral plane. Lower 2 or 3 involucre bracts leaflike, longer than subtending spike, rather long sheathed, upper sheath-shaped, nearly bladeless. Spikes 4–6, rather approximate; terminal spike male, oblanceolate or clavate, 6–10 mm, with short peduncle; lateral spikes female, ovate or oblong, 5–12 mm, loosely few to several flowered, with slender peduncle, erect or slightly pendulous. Female glumes yellowish brown, ovate, ca. 1.5 mm, membranous, 1-veined, margins white hyaline, apex obtuse. Utricles greenish yellow and yellowish brown at maturity, obliquely patent, longer than glume, ovate or oblong, obtusely trigonous, 2.5–3 mm, membranous, nerveless, base acute or obtuse, apex abruptly contracted into a short beak, orifice truncate and white hyaline on margins. Nutlets dark brown, tightly enveloped, obovate, trigonous, ca. 1.5 mm, base acute, apex mucronate; style short; stigmas 3. Fl. and fr. Jun–Aug.

Marsh meadows, wet places on mountain slopes; ca. 2400 m. Xizang [N Mongolia, Russia].

- 1a. Spikes bisexual, androgynous, or terminal spike male, lateral spikes bisexual.
- 2a. Terminal spike male, lateral spikes bisexual; utricles 5–7 mm, distinctly veined.
- 3a. Leaf blades 2–3 mm wide; terminal spike male or sometimes with few female flowers; female glumes ovate-oblong, 3.5–4 mm, apex mucronate; utricles 5–6 mm, stramineous, red-fuscous punctate; nutlets broadly elliptic, fuscous 236. *C. spachiana*
- 3b. Leaf blades 3–5 mm wide; terminal 1 or 2 spikes male; female glumes ovate, ca. 2.5 mm (except length of arista), apex long aristate; utricles 6–7 mm, stramineous, shiny; nutlets oblong, pale yellow 237. *C. nitiditriculata*
- 2b. Spikes bisexual, androgynous; utricles 3–4 mm, inconspicuously veined.
- 4a. Spikes arranged in loose or dense panicles.
- 5a. Spikes numerous, female part subequal to or longer than male part, male parts oblong or ovoid; glumes patent; utricles estipitate; nutlets dark brown 232. *C. neopolycephala*
- 5b. Spikes 10 or more, female part much longer than male part, male parts linear; glumes not patent; utricles shortly stipitate; nutlets brownish yellow 233. *C. shuangbaiensis*
- 4b. Spike single in an involucre bract sheath, not arranged in a panicle.
- 6a. Culms slender, 25–45 cm tall; leaves shortly sheathed, blades 1.5–2 mm wide; spikes 2 or 3, 1–3 cm; utricles ca. 3 mm 234. *C. aristatisquamata*
- 6b. Culms robust, 50–60 cm; leaves long sheathed, clothing lower part of culm up to 15 cm tall, blades 4–5 mm wide; spikes 7–10, 2–5 cm, sometimes ramose at base, female spikes sometimes with several male flowers; utricles ca. 4 mm 235. *C. wenshanensis*
- 1b. Spikes unisexual, terminal spike male, with few female flowers at base or apex in rare species, lateral spikes female.
- 7a. Male spike sometimes with few female flowers at base or apex; utricles emarginate at orifice.
- 8a. Female spikes oblong-cylindric, 3–4 mm wide; utricles ca. 3.5 mm 238. *C. yunnanensis*
- 8b. Female spikes oblong, 7–8 mm wide; utricles 4.5–5 mm 239. *C. magnotriculata*
- 7b. Male spike without female flowers; utricles rather long 2-toothed at orifice.
- 9a. Utricles obtusely trigonous, not inflated, 4–6 mm.
- 10a. Utricles obovate or broadly elliptic, thinly leathery, 5–6 mm 246. *C. zekogensis*
- 10b. Utricles narrowly ovate or narrowly oblong, papery or membranous, 4–4.5 mm.
- 11a. Male spikes 3–6, borne at apex of culm; female spike with several to 10 or more utricles; utricles glabrous 244. *C. tangii*
- 11b. Male spike 1, terminal; female spikes with many utricles; utricles hispid 245. *C. sutchuensis*
- 9b. Utricles inflated trigonous, 5–7 mm.
- 12a. Female spikes usually 2 or 3 in an involucre bract sheath; female glumes pale, ca. 3 mm, earlier deciduous than utricles; utricles horizontally patent at maturity 240. *C. juxianshanensis*
- 12b. Female spikes usually single in an involucre bract sheath; female glumes yellowish brown, 3.5–4 mm, not early deciduous; utricles obliquely patent at maturity.
- 13a. Terminal spike gynaeceandrous, rarely male; utricles red-brown punctate; nutlets elliptic 243. *C. metallica*
- 13b. Uppermost 1–3 spikes male; utricles not red-brown punctate; nutlets obovate.
- 14a. Male spike 1; lower involucre bracts with short sheath 242. *C. minquiniensis*
- 14b. Male spikes 2 or 3; lower involucre bracts sheathless 241. *C. arnellii*

232. *Carex neopolycephala* Tang & F. T. Wang ex L. K. Dai, Acta Phytotax. Sin. 32: 175. 1994.

新多穗藨草 xin duo sui tai cao

Rhizome very short, ligneous. Culms densely tufted, 25–50 cm tall, obtusely trigonous, smooth, clothed with bladeless sheaths at base. Leaves many, nearly basal, shorter or slightly longer than culm, blades 3–8 mm wide, stiff, smooth on both surfaces, scabrous on upper margins, margins revolute; sheaths 3.5–8 cm, eventually splitting. Involucre bracts leaflike, surpassing subtending spikes, sheathed. Spikes numerous, usually 5–9 borne in an involucre bract sheath, sometimes ramose and disposed in a panicle, androgynous, female part and male part subequal or female part slightly longer, oblong or oblong-cylindric, sometimes narrowly ovate, 10–25 × ca. 5 mm, densely many flowered; lower peduncles slender, upper rather short. Female glumes pale yellow, ovate-lanceolate, ca. 4 mm, mem-

branous, 1–3-veined, margins white hyaline, apex attenuate, mucronate or muticous. Utricles yellowish green, nearly horizontally patent or obliquely patent at maturity, shorter than or equaling glume, elliptic or ovate-elliptic, trigonous, ca. 3.5 mm, membranous, glabrous, 5-veined, 2 lateral veins distinct and others inconspicuous, base subrounded, estipitate, apex attenuate into a ± long beak, orifice shortly 2-toothed. Nutlets dark brown, tightly enveloped, broadly ovate, trigonous, ca. 1.2 mm, base estipitate; stigmas 3. Fl. and fr. Apr–May.

- Among rocks, ravines; 1300–2700 m. C Yunnan (Kunming).

- 1a. Spikes numerous, 5–9 borne in an involucre bract sheath, sometimes ramose and disposed in a panicle; utricles with ± long beak, nearly horizontally patent at maturity 232a. var. *neopolycephala*

- 1b. Spikes 10 or more, 1 to few borne in an involucre bract sheath, racemosely disposed; utricles with rather long beak, obliquely patent at maturity 232b. var. *simplex*

232a. *Carex neopolycephala* var. *neopolycephala*

新多穗藁草(原变种) xin duo sui tai cao (yuan bian zhong)

Spikes numerous, 5–9 borne in an involucre bract sheath, sometimes ramose and disposed in a panicle. Utricles with ± long beak, nearly horizontally patent at maturity. Fl. and fr. Apr–May.

- Among rocks; ca. 2700 m. C Yunnan (Kunming).

232b. *Carex neopolycephala* var. *simplex* Tang & F. T. Wang ex L. K. Dai, Acta Phytotax. Sin. 32: 175. 1994.

简序藁草 jian xu tai cao

Spikes 10 or more, 1 to few borne in an involucre bract sheath, racemosely disposed. Utricles with rather long beak, obliquely patent at maturity. Fl. and fr. May.

- Ravines; 1300–2700 m. C Yunnan (Kunming).

233. *Carex shuangbaiensis* L. K. Dai, Acta Phytotax. Sin. 37: 187. 1999.

双柏藁草 shuang bai tai cao

Rhizome short. Culms ca. 75 cm tall, obtusely trigonous, smooth. Leaves cauline and basal, shorter than or subequaling culm, blades 3–6 mm wide, smooth on both surfaces, base plicate and flattened distally, upper margins scabrous; sheaths long, brownish, adaxially membranous, usually split. Involucre bracts leaflike, upper blade linear; lowest sheath ca. 3 cm, upper rather short. Spikes 10 or more, 3 or 4 spikes racemosely disposed and 3–5 racemes composed in a narrowly conic panicle, androgynous, female part longer than male part, cylindrical, male part linear, (1–)2.5–4 cm; peduncles very short or nearly absent. Female glumes brownish yellow, ovate, 2–2.5 mm, membranous, green 1-veined, apex acute, mucronate. Utricles stramineous, longer than glume, obliquely patent, obovate-elliptic or obovate-oblong, trigonous, ca. 3.5 mm, membranous, 3-veined abaxially, base stipitate, apex abruptly attenuate into a short beak, beak slightly recurved, shortly 2-toothed at orifice. Nutlets brownish yellow, tightly enveloped, elliptic, trigonous, ca. 2 mm, base estipitate, apex mucronate; stigmas 3. Fl. and fr. Sep–Oct.

- Forests; ca. 2000 m. C Yunnan (Shuangbai).

234. *Carex aristisquamata* Tang & F. T. Wang ex L. K. Dai, Acta Phytotax. Sin. 32: 179. 1994.

芒鳞藁草 mang lin tai cao

Rhizome short, ligneous. Culms tufted, 25–45 cm tall, rather slender, compressed triquetrous, smooth, with few bladeless sheaths. Leaves shorter than culm, blades ca. 1.5 mm wide, flat, margins scabrous. Lower involucre bracts leaflike, shorter than inflorescence, sheaths 7–9 mm, upper blades setaceous. Spikes 2 or 3, androgynous, male part shorter than female part, ovate-lanceolate or narrowly cylindrical, 1–3 cm × 4–5 mm, with slender peduncle. Female glumes brownish yellow or stramineous,

ovate or oblong-ovate, 3–4.5 mm, membranous, 1-veined, upper margins white hyaline, apex mucronate or shortly aristate. Utricles yellow-green, longer than glume or slightly shorter than glume at lower part of spike, elliptic or elliptic-obovate, trigonous, 3–3.5 mm, inconspicuously veined, base cuneate, apex attenuate into a medium-sized to long beak, orifice shallowly 2-toothed. Nutlets yellow-brown, rather loosely enveloped, elliptic-obovate, trigonous, ca. 1.5 mm; stigmas 3.

- Grasslands, rock beaches; 3500–3800 m. NC Sichuan (Maowen).

235. *Carex wenshanensis* L. K. Dai, Acta Phytotax. Sin. 37: 179. 1999.

文山藁草 wen shan tai cao

Rhizome short, with slender stolons. Culms hardly tufted, rather robust, 50–60 cm tall, obtusely trigonous, smooth, clothed below with dark brown and long sheaths. Leaves longer than or equaling culm, blades 4–5 mm wide, flat, smooth on both surfaces, margins scabrous; lower sheaths 12–15 cm. Involucre bracts leaflike, upper sublinear, lower sheathed, upper with short sheaths or nearly sheathless. Spikes 7–10 or more, lower sometimes ramified, androgynous or lower spikes female, female part much longer than male part, cylindrical or oblong-cylindrical, 2–5 cm × ca. 8 mm, lower 2 spikes pedunculate, others sessile. Female glumes stramineous at middle, red-brown on sides, ovate, 2.5–3 mm, membranous, 1–3-veined, apex acute and aristate, arista scabrous on both margins. Utricles yellow-green, nearly horizontally patent, longer than glume (excluding length of arista), obovate, trigonous, ca. 4 mm, membranous, ferruginous punctate, glabrous, inconspicuously veined, base cuneate, apex abruptly contracted into a long beak, beak ca. 2 mm, shortly 2-toothed at orifice. Nutlets brown, brownish yellow on angles, tightly enveloped, broadly obovate or ovate, trigonous, ca. 2 mm, base stipitate; style base bent, persistent; stigmas 3. Fl. and fr. Apr–May.

- Evergreen broad-leaved forests on mountain ridges; ca. 2400 m. SE Yunnan (Wenshan).

236. *Carex spachiana* Boott, Ill. Gen. Carex 1: 43. 1858.

澳门藁草 ao men tai cao

Rhizome ligneous. Culms tufted, 30–60 cm tall, slightly slender, smooth. Leaves longer than culm, blade 2–3 mm wide, flat, ± stiff, with brown sheath. Lower involucre bracts leaflike, longer than inflorescence, sheathed, upper blades of involucre bracts setaceous, very shortly sheathed. Spikes 4–9; terminal spike male or sometimes only with male flowers at base or apex, with remaining flowers female; lateral spikes usually androgynous, rarely with few male flowers at base, oblong or oblong-cylindrical, 1.5–2.5 cm, densely many flowered; peduncles slender. Female glumes pale yellowish, ovate-oblong, 3.5–4 mm, membranous, 1-veined, apex acute or obtuse. Utricles stramineous, longer than glume, suberect, narrowly elliptic, plano-convex, 5–6 mm, red-fuscosus punctate, inconspicuously 5-veined, base cuneate, apex abruptly attenuate into a long beak, scabrous on upper and beak margins, orifice shortly 2-toothed. Nutlets fuscous, loosely enveloped, broadly elliptic, trigonous, ca. 2 mm, base shortly stipitate; style long; stigmas 3.

• Guangdong.

237. *Carex nitidiutriculata* L. K. Dai, Acta Phytotax. Sin. 37: 186. 1999.

亮果薹草 liang guo tai cao

Rhizome rather slender, ligneous. Culms tufted, 25–70 cm tall, triquetrous, smooth, clothed with red-brown bladeless or shortly bladed sheaths at base. Leaves basal, shorter or longer than culm, blades 3–5 mm wide, with 2 distinct lateral veins, smooth, scabrous on upper margins; sheaths red-brown, splitting at membranous part. Involucral bracts leaflike, usually longer than subtending spike, sheathed, with liguliform or semi-orbicular ligule at mouth of sheath. Spikes 5–8; terminal 1 or 2 spikes male, oblong or narrowly cylindrical, 1–3 cm; remaining spikes androgynous, female part longer than male part, cylindrical or lanceolate, (1.5–)3–6 cm, densely many flowered; peduncles slender, lowest peduncle 5–11 cm, upper ones rather short. Female glumes cinereous-green at middle, brownish on sides, ovate, ca. 2.5 mm (excluding length of arista), membranous, 3-veined, apex mucronate or aristate. Utricles yellowish green, brownish near base, much longer than glume, obliquely patent, elliptic or obovate-elliptic, obtusely trigonous or plano-convex, 6–7 mm, shiny, 7-veined abaxially, base cuneate, shortly stipitate, apex abruptly contracted into a long beak, spinulose on margins of beak. Nutlets pale yellow, rather tightly enveloped, obovate-elliptic, trigonous, ca. 2 mm, base shortly stipitate, apex mucronate; stigmas 3. Fl. and fr. Apr–May.

• Forests on mountain slopes, wet places in fields, ravines; 2000–2300 m. C and E Yunnan (Fumin, Kunming, Shizong).

238. *Carex yunnanensis* Franchet, Bull. Soc. Philom. Paris, sér. 8, 7: 31. 1895.

云南薹草 yun nan tai cao

Rhizome short, without stolons. Culms densely tufted, 20–50(–85) cm tall, slender, compressed triquetrous, smooth, with few bladeless sheaths at base. Leaves basal, shorter than culm, blades 2–3 mm wide, plicate near base and gradually flattened distally. Lower involucral bracts leaflike, upper blades of involucral bracts setaceous, sheaths up to 2 cm. Spikes 3 or 4; terminal spike male or sometimes with female flowers at apex or base; lateral spikes female, single in an involucral bract sheath, oblong-cylindric or oblong, (8–)15–20(–30) mm, densely many flowered; peduncles slender. Female glumes brown-yellow, ovate-lanceolate, 2.8–3 mm, green 3-veined, apex acute, muticous. Utricles pale green, longer than glume, suberect, elliptic, obtusely trigonous, ca. 3.5 mm, papery, inconspicuously veined, base abruptly contracted into a short stipe, apex gradually narrowed to a medium-sized to long beak, orifice shortly 2-toothed, red-brown on margins. Nutlets yellowish, oblong-obovate or obovate, trigonous, ca. 1.5 mm, base stipitate; style rather long; stigmas 3. Fl. and fr. May–Jun.

• Mountain slopes, roadsides, streamsides; 1500–3000 m. Sichuan, Yunnan.

239. *Carex magnoutriculata* Tang & F. T. Wang ex L. K. Dai, Acta Phytotax. Sin. 32: 179. 1994.

大果囊薹草 da guo nang tai cao

Rhizome short, ligneous. Culms densely tufted, 30–85 cm tall, compressed triquetrous, rather slender, smooth with few shortly bladed sheaths at base. Leaves shorter than or equaling culm, blades 3–3.5 mm wide, ± stiff, flat, margins scabrous; sheaths rather long, truncate at mouth. Involucral bracts leaflike, sublinear, surpassing subtending spike, scabrous on margins. Spikes 3 or 4, rather remote; terminal spike male, sometimes with female flowers at base or apex, 1.5–3.5 cm; lateral spikes 2 or 3, female, oblong, 1.5–2.5 cm, densely many flowered; peduncles slender. Female glumes brown-yellow, ovate, ca. 2 mm, membranous, green 1-veined, upper margins white hyaline, apex acute, muticous. Utricles yellow-green, longer than glume, obovate-elliptic, trigonous 4.5–5 mm, inconspicuously veined, base cuneate, apex gradually narrowed to a long beak, orifice shortly 2-toothed. Nutlets brown, elliptic, trigonous, ca. 1.5 mm, base shortly stipitate; stigmas 3, slender. Fl. and fr. May–Jun.

• Open places on mountain slopes, roadsides, streamsides; 1400–2600 m. Sichuan, Yunnan.

240. *Carex jiuxianshanensis* L. K. Dai & Y. Z. Huang, Fl. Fujian. 6: 690. 1995.

九仙山薹草 jiu xian shan tai cao

Rhizome rather thick, ligneous, clothed with sheaths, sheaths usually disintegrating into fibers. Culms tufted, 30–70 cm tall, obtusely trigonous, smooth. Leaves basal, equaling or shorter than culm, blades (3–)5–7 mm wide, flat, scabrous on both surfaces and margins, sheathed. Lower involucral bracts leaflike, sheaths up to 3 cm, upper blades of involucral bracts setaceous, shortly sheathed, sheaths only 2–3 mm. Spikes 8–10 or more, usually 1–3 in an involucral bract sheath, lower spikes remote, upper spikes ± contiguous; terminal spike male, linear; lateral spikes female, cylindrical, 3–6 cm, loosely many flowered. Female glumes deciduous earlier than utricles, pale, lanceolate-ovate, ca. 3 mm, membranous, 1-veined, hispid on vein, apex mucronate or aristate. Utricles yellowish green, longer than glume, horizontally patent at maturity, elliptic-ovate, plano-convex, ca. 6 mm, papery, shiny, 5-veined abaxially, base broadly cuneate, apex gradually narrowed to a long beak, orifice thinly membranous, shortly 2-toothed. Nutlets loosely enveloped, elliptic, trigonous, ca. 2 mm, base stipitate; stigmas 3. Fl. and fr. May–Jun.

• Wet places in forests, streamsides, grasslands. Fujian (Dehua, Shanghang), Zhejiang.

241. *Carex arnellii* Christ, Kongl. Svenska Vetensk. Acad. Handl., n.s., 22(10) [Scheutz, Pl. Vasc. Jenis.]: 177. 1888 [“*arnellii*”].

麻根薹草 ma gen tai cao

Rhizome robust, ligneous, clothed with old sheaths, usually splitting into fibers. Culms densely tufted, 25–90 cm tall, triquetrous, slightly slender, smooth at lower part, upward slightly scabrous. Leaves basal, nearly equaling culm, blades 3–4 mm wide, flat, smooth on both surfaces, margins scabrous; sheaths long. Lower involucral bracts leaflike, upper blades

setaceous, shorter than subtending spike; sheaths short, not up to 1 cm. Spikes 5–7; upper 2 or 3 spikes male, narrowly oblong, subsessile; lower 3 or 4 spikes female, remote, cylindrical, 2–3.5 cm, loosely many flowered, peduncles slender, ± pendulous. Female glumes stramineous or brownish yellow, lanceolate-ovate, 3.5–5 mm (including arista), membranous, green 1–3-veined, scabrous on upper part of costa and margins of arista, apex acuminate and aristate, arista short or slightly long. Utricles green-yellow, obliquely patent, equaling or slightly longer than glume, elliptic or obovate-elliptic, inflated trigonous, 4–4.5 mm, papery, glabrous, shiny, nerveless, base broadly cuneate, apex abruptly contracted into a medium-sized to long beak, orifice 2-toothed. Nutlets loosely enveloped, obovate or broadly obovate, trigonous, ca. 2.5 mm, sessile, apex mucronate; stigmas 3. Fl. and fr. May–Jun.

Mountain slopes, forests, meadows, wet places by watersides; 200–1700 m. Hebei, Heilongjiang, Jilin, Nei Mongol [Japan, Korea, Mongolia, Russia].

242. *Carex minquensis* Z. P. Wang, Acta Bot. Yunnan. 11: 169. 1989.

闽清藁草 min qing tai cao

Rhizome short, indurate. Culms tufted, 50–90 cm tall, triquetrous, smooth, nodding, clothed at base with sheaths splitting into fibers. Leaves basal, shorter than culm, blades 4–6 mm wide, flat, scabrous above, smooth below. Lower involucre bracts leaflike, sheathed. Spikes 7 or 8; terminal spike male, narrowly linear; lateral spikes female, 2.5–4.5 cm, subdensely many flowered; peduncles slender, lowermost 4–5 cm, gradually shorter upward. Female glumes pale yellow to whitish, ovate to elliptic, 4–5 mm, membranous, 1-veined, apex obtuse (rarely acute) to emarginate (sometimes mucronate). Utricles pale stramineous, longer than glume, spreading, strongly inflated, ovate, plano-convex, 4–5 mm, papery, shiny, many veined, base cuneate, apex gradually narrowed to a long beak, orifice shallowly 2-toothed. Nutlets castaneous, very loosely enveloped, rhomboid-ellipsoid, trigonous, ca. 2 mm, base shortly stipitate; style slender; stigmas 3, short.

• E Fujian (Minqing).

243. *Carex metallica* H. Léveillé, Repert. Spec. Nov. Regni Veg. 5: 239. 1908.

锈果藁草 xiu guo tai cao

Carex pachinensis Hayata.

Rhizome short, without stolons. Culms densely tufted, 15–50 cm tall, triquetrous, smooth, clothed at base with sheaths splitting into fibers. Leaves slightly longer or sometimes slightly shorter than culm, blades 3–5 mm wide, flat, margins scabrous; sheaths usually splitting at membranous part. Lower involucre bracts leaflike, sheathed, upper blades setaceous, sheathless. Spikes 5–8; terminal spike gynaeandrous, rarely male, clavate-cylindrical; lateral spikes female or sometimes with a few male flowers at base, usually 1 or 2 spikes exerted from an involucre bract sheath, cylindrical, 2.5–4.5 cm, densely many flowered; peduncles slender, gradually shorter upward. Female glumes yellowish white, ovate-lanceolate, ca. 4.8 mm, membranous, 1-veined, apex mucronate. Utricles stramineous, longer than glume, suberect, elliptic, plano-convex, ca. 7 mm, mem-

branous, red-brown punctate, slightly shiny, inconspicuously 5-veined, base abruptly contracted into a short stipe, apex gradually narrowed to a long beak, scabrous on margins of upper part and beak, orifice shallowly 2-toothed. Nutlets stramineous, very loosely enveloped, elliptic, trigonous, ca. 2 mm, base shortly stipitate; style slender; stigmas 3. Fr. Apr–May.

Fujian, Taiwan [Japan, Korea].

244. *Carex tangii* Kükenthal, Bull. Fan Mem. Inst. Biol. 3: 144. 1932.

河北藁草 he bei tai cao

Rhizome slender, creeping. Culms densely tufted, slender, 30–40 cm tall, compressed triquetrous, upper part scabrous, lower part smooth, with 4 or 5 bladeless sheaths at base; sheaths red-brown, usually splitting into reticulate fibers at lateral side. Leaves usually shorter than culm, rarely equaling culm, blades 2–3 mm wide, flat, verrucose on upper surface, margins scabrous. Lower involucre bracts leaflike, sheathed, involucre bracts at base of male spikes scalelike. Spikes 4–8; upper 3–6 male, contiguous at top of culm, subsessile; remaining spikes female, oblong or oblong-cylindrical, 1.5–2.5 cm × 3–5 mm, loosely many flowered; peduncles slender. Female glumes stramineous, ovate-lanceolate or lanceolate, ca. 5 mm, 1-veined, margins white hyaline, apex acuminate. Utricles pale green, shorter than or equaling glume, narrowly ovate, ca. 4.5 mm, papery, obscurely 2-veined laterally on abaxial surface, base broadly cuneate, apex gradually narrowed to a long beak, orifice shortly 2-toothed. Nutlets loosely enveloped, obovate; style rather long; stigmas 3. Fl. and fr. May–Jun.

• Wet places at forest margins, grasslands, ravines; 1600–1700 m. Hebei (Wuling Shan).

245. *Carex sutchuensis* Franchet, Bull. Soc. Philom. Paris, sér. 8, 7: 45. 1895.

四川藁草 si chuan tai cao

Rhizome ligneous. Culms tufted, 20–30 cm tall, slender, obtusely trigonous, smooth. Leaves shorter than culm, blades ca. 2 mm wide, flat, slightly revolute at apex, scabrous on upper surface, sheathed, lower sheaths dark brown. Spikes several; terminal spike male, linear-clavate, ca. 2 cm, with peduncles; lateral spikes female, remote, cylindrical, 1.5–2 cm × 4–5 mm, subdensely many flowered, with peduncles. Female glume yellow-brown, ovate or suboblong, ca. 3 mm, membranous, green 1-veined, apex obtuse, mucronate. Utricles yellow-green, suberect, longer than glume, narrowly elliptic or narrowly ovate, trigonous, ca. 4 mm, membranous, laxly hirsute, inconspicuously veined, base cuneate, shortly stipitate, apex abruptly contracted into a rather long beak, orifice 2-toothed. Nutlets tightly enveloped, elliptic, trigonous, ca. 2 mm, apex mucronate; stigmas 3.

• Sichuan (Emei Shan).

246. *Carex zekogensis* Y. C. Yang, Acta Phytotax. Sin. 18: 362. 1980.

泽库藁草 ze ku tai cao

Rhizome slender. Culms 15–20 cm tall, slightly slender, 0.3–0.8 mm thick, obtusely trigonous, glabrous. Leaves basal, shorter than or equaling culm, blades 1–2 mm wide, flat,

smooth on both surfaces. Involucral bracts leaflike, shorter than inflorescence, rather long sheathed. Spikes 4 or 5; upper 2 or 3 spikes male, contiguous, band-shaped, uppermost one 1.5–2 cm, others rather short; female spikes 1 or 2, remote, narrowly oblong, 2–3 cm, loosely 4–10-flowered; peduncles slender, usually pendulous; rachis flexuose. Female glumes brownish, ovate or ovate-lanceolate, 4–5 mm, 1-veined, margins narrowly white hyaline, apex acuminate. Utricles purplish brown, obliquely pa-

tent, longer than glume, obovate or broadly elliptic, obtusely trigonous, 5–6 mm, leathery, glabrous, shiny, distinctly 2-veined laterally, base broadly cuneate, apex abruptly contracted into a long beak, beak 2–2.5 mm, orifice deeply 2-lobed. Nutlets yellow-green, obovate or broadly elliptic, obtusely trigonous, ca. 3 mm; style base not thickened; stigmas 3. Fl. and fr. Jul–Aug.

• Mountain slopes; ca. 3200 m. E and S Qinghai.

30. *Carex* sect. *Debiles* (J. Carey) Ohwi, Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 11: 444. 1936.

瘦果薹草组 shou guo tai cao zu

Dai Lunkai (戴伦凯); Tetsuo Koyama

Carex [unranked] *Debiles* J. Carey in A. Gray, Manual, 558. 1848.

Spikes unisexual, rarely bisexual, female spikes linear-cylindric, cylindric, rarely oblong, loosely or very loosely flowered, usually solitary in an involucral bract sheath, 2 or 3 spikes exerted from an involucral bract sheath or disposed in racemose or paniculate inflorescences. Female glumes lanceolate-ovate, oblong-ovate, ovate, or oblong. Utricles elliptic, oblong-lanceolate, lanceolate, or narrowly oblong, rarely obovate, obtusely trigonous, inconspicuously veined, rarely 2-veined laterally (utricle conspicuously veined in *Carex baohuashanica*), base usually stipitate, apex with long beak, orifice obliquely truncate, sometimes emarginate or shortly 2-toothed. Nutlets tightly enveloped; style base not thickened; stigmas 3.

Ten species: E Asia; eight species (five endemic) in China.

- 1a. Spikes bisexual or unisexual and bisexual.
 - 2a. Spikes bisexual, androgynous, 10–20 or more disposed in a narrow and rather long panicle; utricles laxly hispidulous 247. *C. hirtiutriculata*
 - 2b. Spikes unisexual and bisexual, terminal spike and terminal spike of partial panicles usually bisexual, androgynous or gynaeandrous, remaining spikes female, sometimes with few male flowers.
 - 3a. Spikes 2 or 3, usually solitary in an involucral bract sheath, terminal spike androgynous, lateral spikes female or sometimes with few male flowers; utricles hispidulous on upper part 248. *C. wutuensis*
 - 3b. Spikes numerous, disposed in a panicle, terminal spike of partial panicles bisexual, gynaeandrous, remaining spikes female; utricles glabrous 249. *C. fastigiata*
- 1b. Spikes unisexual, terminal spike male, lateral spikes female, usually solitary in an involucral bract sheath, rarely 2 or 3 spikes borne in an involucral bract sheath, 1 spike male, 1 or 2 spikes female, rarely with few male flowers at apex.
 - 4a. Spikes usually 3 borne in an involucral bract sheath, 1 spike male and 2 spikes female, rarely with few male flowers at apex of female spikes, spikes only solitary in lowermost 1 or 2 involucral bract sheaths, 2 male spikes in uppermost, male spikes linear, 3–5.5 cm; female and male glumes purple-brown 250. *C. purpureosquamata*
 - 4b. Spikes solitary in an involucral bract sheath, terminal spike male, clavate or narrowly lanceolate, not up to 3 cm (only *C. finitima* with male spike linear, ca. 5 cm), lateral spikes female; female and male glumes brownish yellow or brown-yellow.
 - 5a. Male spike linear, to 5.5 cm, female spikes linear-cylindric, to 12 cm; female glumes ovate, ca. 1/2 length of utricule 251. *C. finitima*
 - 5b. Male spike clavate or narrowly lanceolate, not up to 3 cm, female spikes cylindric or oblong, 2–6 cm; female glumes oblong, narrowly oblong, ovate-lanceolate, or ovate, ca. 2/3 length of utricule or more.
 - 6a. Female spikes oblong, 2–3.5 cm, loosely 4–6-flowered; female glumes ovate; utricles obovate; nutlets obovate 252. *C. baohuashanica*
 - 6b. Female spikes cylindric, 3–6 cm, loosely many flowered; female glumes oblong, narrowly oblong, or ovate-lanceolate; utricles narrowly oblong or lanceolate; nutlets narrowly oblong or oblong.
 - 7a. Female glumes ovate-lanceolate; utricles lanceolate, 6–7 mm, glabrous; style longer than utricule 253. *C. bostrychostigma*
 - 7b. Female glumes oblong or narrowly oblong; utricles narrowly oblong, ca. 4.5 mm, loosely hispidulous on 2 lateral veins and margins of beak; style shorter than utricule 254. *C. deqinensis*

247. *Carex hirtiutriculata* L. K. Dai, Acta Phytotax. Sin. 32: 181. 1994.

糙毛薹草 cao mao tai cao

Rhizome slightly elongate, ligneous, with long stolons. Culms 45–60 cm tall, rather slender, obtusely trigonous, smooth, eventually disintegrating into fibers at base. Leaves slightly longer than culm, blades ca. 5 mm wide, relatively stiff, with 2

conspicuous lateral veins, base plicate and flattened distally, upper surface and margins scabrous; sheaths up to 10 cm, sometimes eventually splitting. Involucral bracts leaflike, longer than inflorescence, long sheathed. Panicle rather narrow and loose, longest up to 40 cm, with 10–20 or more spikes, lowermost 1 or 2 partial panicles remote, with slender peduncle, upper peduncles rather short; spikes androgynous, male part longer than female part, only with few female flowers, narrowly cylindrical, 1.5–2.5 cm, with medium-sized peduncle. Female glumes brown-yellow, ovate, ca. 3.5 mm, membranous, green 1-veined, apex acute, mucicous. Utricles greenish, longer than glume, suberect, oblong-lanceolate, trigonous, ca. 5 mm, ferruginous punctate, loosely hispidulous, abaxially distinctly 2-veined laterally, base abruptly contracted into a stipe, apex gradually narrowed to a medium-sized beak, orifice obliquely truncate, brownish on margins. Nutlets brownish yellow, tightly enveloped, oblong, trigonous, ca. 3 mm, base very shortly stipitate, apex mucronate; style base not thickened; stigmas 3. Fl. and fr. Apr–May.

• Forests on mountain slopes; ca. 2300 m. Yunnan (Jingdong: Wuliang Shan).

248. *Carex wutuensis* K. T. Fu, Fl. Tsinling. 1(1): 448. 1976.

武都薹草 wu du tai cao

Rhizome short. Culms 30–40 cm tall, rather slender, triquetrous, smooth, clothed with red-brown bladeless sheaths at base. Leaves shorter than culm, blades 1.5–2 mm wide, flat, smooth on both surfaces, margins scabrous. Involucral bracts leaflike, rather short at upper part, shorter than spike, sheathed. Spikes 2 or 3, remote; terminal spike androgynous, 3.5–4.5 cm, male part longer than female part, loosely with a few female flowers at base; peduncles slender, pendent. Female glumes brownish, oblong-ovate or ovate, ca. 4.5 mm, membranous, 1-veined, margins white hyaline, apex mucronate or aristate. Utricles brownish yellow, suberect, longer than glume, elliptic, trigonous, 5–6 mm, hispidulous on upper part, distinctly 2-veined laterally, base attenuate, apex abruptly contracted into a long beak, orifice obliquely truncate or emarginate, white hyaline on margins. Nutlets brown, tightly enveloped, oblong, trigonous, ca. 2.5 mm; style base not thickened; stigmas 3. Fl. and fr. May–Jun.

• Roadsides on mountain slopes; ca. 2400 m. Gansu (Wudu).

249. *Carex fastigiata* Franchet, Bull. Soc. Philom. Paris, sér. 8, 7: 34. 1895.

簇穗薹草 cu sui tai cao

Rhizome short, ligneous. Culms tufted or loosely tufted, 20–50 cm tall, rather thick, obtusely trigonous, smooth, bearing a few leaves near base. Leaves shorter than culm, blades 5–9 mm wide, plicate near base and flattened distally, scabrous on both surfaces and margins, sheaths \pm long, membranous at one side. Involucral bracts leaflike, upper ones linear, shorter than inflorescence, scabrous, shortly sheathed, lowermost sheath up to 6 cm. Inflorescence a compound panicle with several partial panicles, each partial panicles usually with a few spikes; all spikes of terminal partial panicle and terminal spikes of lateral partial panicles gynaeandrous, sessile; remaining spikes fe-

male, \pm stipitate, usually slightly pendulous; spikes narrowly cylindrical, 3–4 cm, loosely many flowered. Female glumes brownish yellow, ovate-lanceolate, ca. 4 mm, membranous, midrib keeled, margins white hyaline, apex acuminate. Utricles greenish, suberect, longer than glume, elliptic-lanceolate, trigonous, ca. 5 mm, papery, glabrous, slightly shiny, distinctly 2-veined laterally, other veins inconspicuous, base cuneate, apex gradually narrowed to a long beak, beak ca. 2 mm, scabrous on both margins, orifice obliquely truncate, white hyaline on margins. Nutlets brownish, tightly enveloped, oblong, trigonous, ca. 2 mm, sessile; stigmas 3.

Mountain slopes, ravines, grasslands; 2500–3600 m. Sichuan, Yunnan [Bhutan, Nepal].

250. *Carex purpureosquamata* L. K. Dai, Acta Phytotax. Sin. 37: 183. 1999.

紫鳞薹草 zi lin tai cao

Rhizome short, stoloniferous. Culms tufted, 60–65 cm tall, slightly thick, compressed triquetrous, smooth, clothed with 2 or 3 bladeless sheaths at base. Leaves shorter than culm, blades 4–7 mm wide, flat, with 2 conspicuous lateral veins on upper surface, smooth, scabrous on margins and near apex, sheathed; lowermost sheath up to 8 cm. Involucral bracts leaflike, longer than subtending spike, scabrous near apex and on margins, sheathed. Spikes 11–15; uppermost 2 spikes male; usually 3 spikes borne in an involucral bract sheath (1 spike male and 2 spikes female or bearing a few male flowers at apex); only 1 female spike borne in lowermost involucral bract sheaths; male spikes linear, 3–5.5 cm, slenderly pedunculate; female spikes narrowly cylindrical or oblong, 1.2–6 cm, subloosely 10–20-flowered, lowermost peduncle up to 12 cm, upper ones rather short. Female glumes dark brown, yellowish at margin of apex, oblong, ca. 5 mm, membranous, 1-veined, apex obtuse or rounded, mucicous. Utricles gray-green, brownish at lower part, suberect, longer than glume, oblanceolate, obtusely trigonous, 7–8 mm, distinctly 2-veined laterally, base attenuate, shortly stipitate, apex gradually narrowed to a long beak, beak 3–3.5 mm, truncate or emarginate at orifice. Nutlets brown, tightly enveloped, elliptic, trigonous, ca. 2 mm, apex mucronate; stigmas 3, slender. Fl. and fr. Jun–Jul.

• Roadsides in ravines; ca. 3200 m. W Yunnan (Bijiang).

251. *Carex finitima* Boott, Ill. Gen. Carex 1: 44. 1858.

亮绿薹草 liang lü tai cao

Rhizome short, ligneous. Culms tufted, 25–80 cm tall, slightly thick, obtusely trigonous, smooth, bearing rather many leaves at base. Leaves shorter than or equaling culm, blades 4–8 mm wide, flat, scabrous on veins of upper surface and margins of top; lower sheaths up to 6 cm, reddish brown. Involucral bracts leaflike, longer than or slightly shorter than inflorescence, sheathed, sheathing mouth concave. Spikes 4–7, lowermost spaced up to 10 cm, uppermost 2 \pm contiguous; terminal spike male, linear, 1–5.5 cm; remaining spikes female, linear-cylindrical, 2–12 cm, loosely many flowered; peduncles slender, slightly pendulous. Female glumes brownish yellow, ovate, ca. 3.5 mm, membranous, 1-veined, margins white hyaline, upper margin praemorse, apex acute, mucronate or mucicous. Utricles

brownish green, suberect, longer than glume, elliptic-lanceolate, trigonous, 5–7 mm, membranous, glabrous, shiny, 2 lateral veins elevated, base attenuate, shortly stipitate, apex gradually narrowed to a long beak, beak ca. 2.5 mm. Nutlets tightly enveloped, narrowly elliptic, trigonous, ca. 2.5 mm; stigmas 3. Fl. and fr. Jun–Jul.

Forests, streamsides, roadsides, grasslands at watersides; 2000–3000 m. S Gansu, Sichuan, Taiwan, Yunnan [Bhutan, India, Indonesia (Sumatra), Nepal, New Guinea].

- 1a. Culms 40–80 cm tall; leaves slightly shorter than or equaling culm; male spike 2–5.5 cm, female spikes 5–10 cm; utricles 6–7 mm 251a. var. *finitima*
 1b. Culms 25–35 cm tall; leaves much shorter than culm; male spike 1–2.5 cm, female spikes 2–4(–5) cm; utricles ca. 5 mm 251b. var. *attenuata*

251a. *Carex finitima* var. *finitima*

亮绿藁草(原变种) liang lü tai cao (yuan bian zhong)

Carex fusiformis Nees subsp. *finitima* (Boott) Noltie; *C. fusiformis* var. *majishanica* Y. C. Yang; *C. remotiflora* Hayata.

Culms 40–80 cm tall. Leaves slightly shorter than or equaling culm. Male spike 2–5.5 cm; female spikes 5–10 cm. Utricles 6–7 mm.

Forests, streamsides, roadsides; 2100–2600 m. S Gansu (Xiaolong Shan), Sichuan, Taiwan, Yunnan [NE India (Darjeeling, Sikkim), Indonesia (Sumatra), New Guinea].

251b. *Carex finitima* var. *attenuata* C. B. Clarke in J. D. Hooker, Fl. Brit. India 6: 736. 1894.

短叶亮绿藁草 duan ye liang lü tai cao

Culms 25–35 cm tall. Leaves much shorter than culm. Male spike 1–2.5 cm; female spikes 2–4(–5) cm. Utricles ca. 5 mm.

Grasslands at watersides, roadsides; 2000–3000 m. Yunnan [Bhutan, India, Nepal].

252. *Carex baohuashanica* Tang & F. T. Wang ex L. K. Dai, Acta Phytotax. Sin. 32: 182. 1994.

宝华山藁草 bao hua shan tai cao

Rhizome short, ligneous. Culms 50–60 cm tall, rather slender, compressed triquetrous, smooth, clothed with reddish brown bladeless sheaths. Leaves shorter than culm, blades 3–4 mm wide, flat, scabrous on upper margins, sheathed, lower sheaths up to 6 cm, usually splitting. Lower involucre bracts leaflike, upper ones subulate, usually shorter than subtending spike; sheaths 1–3 cm. Spikes 3 or 4, solitary in an involucre bract sheath, remote; terminal spike male, cylindrical, ca. 3 cm; lateral spikes female, shortly cylindrical or cylindrical, very loosely 4–6-flowered; peduncles slender, lowermost up to 6.5 cm, upper 1–2 cm. Female glumes white hyaline or sometimes yellowish, gray-green at middle, ovate, ca. 5 mm, membranous, 1-veined, apex acuminate. Utricles brown, suberect, longer than glume, obovate, trigonous, ca. 7 mm, papery, glabrous, several veined, base attenuate into a short stipe, apex contracted into a

long beak, orifice obliquely truncate. Nutlets yellow, tightly enveloped, obovate, trigonous, ca. 3 mm; style base persistent, not thickened; stigmas 3. Fl. and fr. Mar–Apr.

- Ravines. Jiangsu (Baohua Shan).

253. *Carex bostrychostigma* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 31: 118. 1886.

卷柱头藁草 juan zhu tou tai cao

Rhizome elongate, ligneous, clothed with sheaths eventually disintegrating into dark brown fibers. Culms densely tufted, 20–50 cm tall, slightly slender, obtusely trigonous, smooth. Leaves shorter than or nearly equaling culm, blades 3–4 mm wide, flat, scabrous on 2 lateral veins of adaxial surface and costa of abaxial surface, sheathed. Lowermost 1 or 2 involucre bracts leaflike, upper ones setaceous, slightly scabrous, sheathed. Spikes 5–8, solitary in an involucre bract sheath; terminal spike male, linear-cylindrical, 2–4 cm, peduncle slender; lateral spikes female, space up to 6 cm, rather short near top, narrowly cylindrical, 2–4 cm, loosely many flowered; peduncles rather short and thin, enclosed in involucre bract sheath. Female glumes brownish yellow, ovate-lanceolate, 4.5–5 mm, membranous, 3-veined, 2 lateral veins inconspicuous, costa scabrous, margins broadly white hyaline, apex acute. Utricles yellowish green, suberect, longer than glume, narrowly lanceolate, trigonous, ca. 7 mm, membranous, base attenuate, apex gradually narrowed to a long beak, orifice obliquely truncate, white hyaline on margins, sometimes shortly 2-toothed. Nutlets yellow-brown, tightly enveloped, narrowly oblong, trigonous, ca. 3.5 mm, base shortly stipitate; style much longer than utricle; stigmas 3. Fl. and fr. May–Jul.

Meadow moors, watersides, wet places at roadsides; 200–1000 m. Jilin, Liaoning, Shaanxi, Zhejiang [Japan, Korea, Russia (Far East)].

254. *Carex deqinensis* L. K. Dai, Acta Phytotax. Sin. 32: 182. 1994.

德钦藁草 de qin tai cao

Rhizome slightly elongate, ligneous. Culms 65–80 cm, slender, obtusely trigonous, smooth, clothed with sheaths at base eventually disintegrating and fiberlike. Leaves 1/4–1/2 height of culms, blades 2–3 mm wide, subrigid, scabrous on both surfaces and margins; sheaths long, brownish yellow, outer sheaths usually later splitting. Lower involucre bracts leaflike, long sheathed, upper involucre bract blades awn-shaped, shortly sheathed. Spikes 4 or 5, uppermost 1 or 2 spikes remote, space up to 20 cm; terminal spike male, clavate, 2–2.5 cm; peduncles slender, most up to 10 cm. Female glumes brown, oblong or narrowly oblong, 3–4 mm, membranous, 1-veined, apex acute, mucronate or aristate. Utricles green-brown, suberect, longer than glume, narrowly oblong, plano-convex, ca. 4.5 mm, membranous, distinctly 2-veined laterally, hispidulous on veins, base attenuate, shortly stipitate, apex gradually narrowed to a long beak, beak scabrous on margins, orifice 2-toothed. Nutlets tightly enveloped, oblong, trigonous, ca. 2 mm, base estipitate; style persistent, base not thickened; stigmas 3. Fl. and fr. Jun–Jul.

- Forests; 2900–3300 m. NW Yunnan (Dêqên).

31. Carex sect. Confertiflorae Franchet ex Ohwi, Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 11: 474. 1936.

密花薹草组 mi hua tai cao zu

Dai Lunkai (戴伦凯); Tetsuo Koyama, Gordon C. Tucker

Involucral bracts sheathed or not sheathed. Spikes unisexual; terminal spikes male; lateral spikes female (*Carex olivacea* with a few male flowers at apex), long cylindric, densely many flowered. Female glumes ovate-lanceolate, apex aristate (*C. ischnostachya* and *C. subtumida* with female glumes ovate, not mucronate or aristate). Utricles dark brown or brown-green, ovate or elliptic, inflated trigonous, nearly horizontally patent or \pm reflexed low in some species, many veined, beak \pm long or slightly short, rather long in few species, orifice 2-toothed. Nutlets rather loosely enveloped; stigmas 3.

About 20 species: E and SE Asia, Australia, Pacific islands; 16 species (seven endemic) in China.

Carex cercidascus C. B. Clarke (J. Linn. Soc., Bot. 36: 279. 1903) could not be treated here because no material was seen by the present authors.

- 1a. Male spike linear, shorter than 3 cm; female glumes ovate or broadly ovate, shorter than 1/2 length of utricule, mucous at apex.
- 2a. Female glumes broadly ovate; utricles suberect or slightly obliquely patent, ovate-oblong, ca. 4 mm; male flower with 3 stamens 255. *C. ischnostachya*
- 2b. Female glumes ovate; utricles nearly horizontally patent, elliptic or obovate, ca. 3 mm; male flower with 1 stamen 256. *C. subtumida*
- 1b. Male spike cylindric, narrowly cylindric, or clavate, usually longer than 3 cm (rather short in *C. brownii* and *C. transversa*); female glumes narrowly ovate, oblong, or lanceolate, longer than 2/3 length of utricule or much more, mucronate or aristate at apex.
- 3a. Utricles hispidulous.
- 4a. Leaf blades 6–8 mm wide; spikes contiguous at top of culm; female glumes attenuate at apex, long aristate; utricles ca. 3 mm, equaling glume, dark brown, beak usually recurved 257. *C. nemostachys*
- 4b. Leaf blades 3–6 mm wide; spikes remote; female glumes mucronate at apex; utricles 2–2.8 mm, longer than glume, brown-green, beak straight 258. *C. sclerocarpa*
- 3b. Utricles smooth, glabrous.
- 5a. Culms lateral; female glumes dark purple-red.
- 6a. Female glumes awned, ca. 5 mm; nutlets ellipsoid 259. *C. retrofracta*
- 6b. Female glumes emarginate, 2–2.5 mm; nutlets obovoid 260. *C. obliquicarpa*
- 5b. Culms central; female glumes usually pale, greenish or brownish.
- 7a. Female spikes cylindric-oblong, 1–2 cm; utricles distinctly many veined.
- 8a. Utricles broadly obovate, ca. 3 mm, apex abruptly contracted into a short beak 261. *C. brownii*
- 8b. Utricles oblong-ovate, 4–6 mm, apex gradually narrowed to a long beak.
- 9a. Utricles distinctly stipitate, 2-toothed at orifice 262. *C. benkei*
- 9b. Utricles broadly cuneate at base, obliquely truncate or minutely 2-toothed at orifice 263. *C. transversa*
- 7b. Female spikes long cylindric, longer than 3 cm, longest up to 10 cm; utricles few veined.
- 10a. Male spike linear or linear-cylindric; female glumes ovate, awned at apex, length of awn 1–2.5 \times as long as utricule; utricles suberect or slightly obliquely patent at maturity, brown-green, beak straight.
- 11a. Male spike 6–14 cm; female spikes 6–14 cm; utricles ovate, ca. 3 mm, with medium-sized beak 264. *C. oedorrhapha*
- 11b. Male spike 2.5–3 cm; female spikes 2.5–5.5 cm; utricles broadly ovate, ca. 4 mm, with rather long beak 265. *C. sinoaristata*
- 10b. Male spike rather thick, long cylindric; female glumes lanceolate or oblong-lanceolate, mucronate or aristate at apex, awn shorter than 1/2 length of glume (*C. olivacea* with female glumes sometimes with long awn, slightly longer than 1/2 length of glume); utricles obliquely patent to \pm horizontally patent, sometimes reflexed downward, dark brown or nearly black-brown, rarely yellow-brown, beak \pm recurved.
- 12a. Female spikes rather remote, loosely flowered; utricles horizontally patent or slightly reflexed downward, nearly black-brown, beak distinctly recurved 266. *C. recurvisaccus*
- 12b. Female spikes contiguous at top of culm, densely many flowered; utricles obliquely patent or nearly horizontally patent, not reflexed downward, yellow-brown or dark brown, beak slightly recurved.
- 13a. Leaf blades 8–18 mm wide; female spikes usually with few male flowers at upper part; utricles inflated trigonous, ca. 4 mm; nutlets subloosely enveloped 267. *C. olivacea*
- 13b. Leaf blades 4–8(–12) mm wide; female spike without male flowers; utricles not inflated trigonous or slightly inflated trigonous, ca. 3 mm; nutlets rather tightly enveloped.

- 14a. Leaf blades 8–12 mm wide; female glumes dark brown, rather long aristate; utricles dark brown at maturity, irregularly rugose or ± verrucose 268. *C. confertiflora*
- 14b. Leaf blades 4–8 mm wide; female glumes purple-red on margins, mucronate or aristate; utricles brown-yellow at maturity.
- 15a. Utricles with transverse rugae at maturity, beak purple-red at upper part; nutlets stramineous 269. *C. dispalata*
- 15b. Utricles smooth at maturity, beak red-brown at upper part; nutlets dark brown 270. *C. pseudodispalata*

255. *Carex ischnostachya* Steudel, Syn. Pl. Glumac. 2: 222. 1855.

狭穗薹草 xia sui tai cao

Rhizome thick and short, ligneous. Culms tufted, 30–60 cm tall, rather slender, triquetrous, smooth, leafy at base, purple-brown bladeless sheathed at lowermost part. Leaves slightly shorter than or nearly equaling culm, blades 4–6 mm wide, flat, rather soft, distinctly 2-veined laterally; sheaths rather long. Involucral bracts leaflike, longer than uppermost spike, rather long sheathed. Spikes 4 or 5, upper 3 or 4 contiguous at apex of culm, lowermost 1 or 2 rather remote; terminal spike male, linear, 1.5–3 cm, with short peduncle; lateral spikes 3–5, female, narrowly cylindrical, 2–6 cm, rather loosely and biseriately many flowered, upper spikes sessile, lower 1 or 2 with peduncles. Female glumes yellowish white, ovate, 1.5–1.8 mm, membranous, 1-veined, apex acute, mucous. Utricles brown-green, suberect, much longer than glume, ovate-elliptic, obtusely trigonous, 4–5 mm, membranous, glabrous, 5–7-veined, base rounded, apex gradually narrowed to a medium-sized beak, orifice emarginate to shortly 2-toothed. Nutlets brownish yellow, rather tightly enveloped, elliptic, trigonous, ca. 2 mm, base shortly stipitate, apex mucronate; style base not thickened; stigmas 3. Fl. and fr. Apr–May.

Roadsides, mountain slopes, watersides. Fujian, Guizhou, Hunan, Jiangsu, Jiangxi, Sichuan, Zhejiang [Japan, Korea].

256. *Carex subtumida* (Kükenthal) Ohwi, Acta Phytotax. Geobot. 1: 75. 1932.

肿胀果薹草 zhong zhang guo tai cao

Carex ischnostachya Steudel var. *subtumida* Kükenthal, Repert. Spec. Nov. Regni Veg. 27: 109. 1929.

Rhizome short or elongate. Culms 45–75 cm tall, slightly thick, triquetrous, smooth, few purple-brown and bladeless sheathed at base. Leaves slightly shorter than culm, blades 6–7 mm wide, flat, subrigid, with 2 conspicuous lateral veins on upper surface, scabrous on veins of both surfaces and margins; sheaths long, lowermost ones purple-brown and usually splitting later. Involucral bracts leaflike, much surpassing subtending spike, lower ones slightly long sheathing, upper ones shortly sheathing, uppermost nearly not sheathing. Spikes 4–6, lowest 1 or 2 remote, upper 3 or 4 contiguous at apex of culm; terminal spike male, linear, 2.5–3 cm, sessile; lateral spikes female, long cylindrical, 3.5–7 cm, densely many flowered, lowest 1 or 2 with long peduncle, upper ones sessile. Female glumes yellowish or brownish yellow, ovate, ca. 1 mm, membranous, 1-veined, apex acuminate. Utricles brown-green, horizontally patent later, much longer than glume, elliptic-obo-

vate, obtusely trigonous, 3.2–3.5 mm, membranous, many veined, base rounded, apex abruptly contracted into a rather short beak, orifice shortly 2-toothed. Nutlets stramineous, elliptic, trigonous, ca. 1.5 mm, sessile, apex mucronate; style not thickened; stigmas 3. Fl. and fr. Apr–May.

• Ravine sides, watersides, roadsides on mountain slopes; 800–1000 m. Anhui, Jiangsu, Jiangxi.

257. *Carex nemostachys* Steudel, Flora 29: 23. 1846.

条穗薹草 tiao sui tai cao

Rhizome thick and short, ligneous, stoloniferous. Culms 40–90 cm tall, thick, triquetrous, scabrous on upper part, sheaths at base eventually disintegrating into yellow-brown fibers. Leaves longer than culm, blades 6–8 mm wide, rather stiff, plicate near base and flattened distally, distinctly 2-veined laterally, scabrous on veins and margins. Involucral bracts longer or shorter than culm, lower ones leaflike, upper one setaceous, not sheathed. Spikes 5–8, contiguous at top of culm; terminal spike male, linear, 5–10 cm, sessile; lateral spikes female, cylindrical, 4–12 cm, densely many flowered, sessile or with short peduncle at lower part. Female glumes pale, narrowly lanceolate, 3–4 mm, membranous, green 1–3-veined, apex aristate, scabrous on margins of awn. Utricles brown, patent, slightly shorter than glume (including length of awn), ovate or broadly ovate, obtusely trigonous, ca. 3 mm, membranous, hispidulous, few veined, base cuneate, apex abruptly contracted into a slender, recurved beak, orifice obliquely truncate, sometimes minutely 2-toothed. Nutlets brownish yellow, loosely enveloped, broadly obovate or subelliptic, trigonous, ca. 1.8 mm; stigmas 3. Fl. and fr. Sep–Dec.

Streamsides, moors, shady and wet places in forests; 300–1600 m. Anhui, Fujian, Guangdong, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Yunnan, Zhejiang [Bangladesh, Cambodia, India, Japan, Myanmar, Thailand, Vietnam].

258. *Carex sclerocarpa* Franchet, Bull. Soc. Philom. Paris, sér. 8, 7: 91. 1895.

硬果薹草 ying guo tai cao

Rhizome obliquely ascending. Culms tufted, 30–60 cm tall, medium thick, triquetrous, smooth, clothed with bladeless brown-red sheaths at base. Leaves shorter than culm, blades 3–6 mm wide, flat, distinctly 2-veined laterally, lower sheaths usually brown-red. Involucral bracts leaflike, shorter than culm, long sheathed. Spikes 6 or 7; terminal spike male, linear, ca. 4 cm; lateral spikes female, narrowly cylindrical, 2.5–7 cm, densely many flowered, uppermost 2 contiguous at top of culm, sessile, lower ones slightly remote, with very short peduncle. Female glumes pale, lanceolate, ca. 2 mm, membranous, greenish

1-veined, apex acuminate, with a short awn. Utricles brown-green, obliquely patent, longer than glume, elliptic, obtusely trigonous, 2–2.8 mm, membranous, inconspicuously 5-veined, hispidulous on veins, base cuneate, apex abruptly contracted into a ± long beak, orifice obliquely truncate or later emarginate. Nutlets yellowish, rather tightly enveloped, subelliptic, trigonous, ca. 1 mm, verrucose; style base thickened; stigmas 3, rather short. Fl. and fr. May–Jun.

- Forests; 900–1700 m. Anhui, Hunan, Sichuan.

259. *Carex retrofracta* Kükenthal, Repert. Spec. Nov. Regni Veg. 27: 110. 1929.

反折果薹草 fan zhe guo tai cao

Rhizome robust and elongate, ligneous. Culms loosely tufted, 60–100 cm tall, rather thick, compressed triquetrous, smooth, with purple-brown bladeless sheaths at base. Leaves shorter than culm, blades 1–1.8 cm wide, flat, with distinct midrib and 2 lateral veins on both surfaces, upper surface smooth, lower surface loosely hispidulous; sheaths rather long. Involucral bracts leaflike, longer than subtending spike, sheaths rather long, but upper ones very short. Spikes 4 or 5, lower 2 remote, upper ones contiguous; terminal spike male, cylindrical, 3–6 cm, shortly pedunculate; lateral spikes female, cylindrical, 4–10 cm, loosely many flowered, lower 2 rather long pedunculate, upper ones shortly pedunculate or subsessile. Female glumes brown, dark green at middle, ovate, ca. 5 mm (including length of awn), 3-veined, apex with long awn, awn scabrous on margins. Utricles dark brown-green, obliquely patent, horizontally patent or reflexed later, ovate or obovate, slightly inflated trigonous, 4–5 mm, membranous, inconspicuously 3–5-veined, slightly shiny, base obtusely rounded, apex abruptly contracted into a long beak, orifice obliquely truncate. Nutlets yellowish, rather tightly enveloped, elliptic, trigonous, ca. 2 mm, apex mucronate; style base slightly thickened; stigmas 3. Fl. and fr. Mar–Apr.

- Wet places in forests. N Zhejiang (Hangzhou).

260. *Carex obliquicarpa* X. F. Jin, C. Z. Zheng & B. Y. Ding, Ann. Bot. Fenn. 42: 223. 2005.

斜果薹草 xie guo tai cao

Rhizome short, indurate. Culms loosely tufted, 50–65 cm, trigonous, smooth, with reddish brown bladeless sheaths at base. Leaves equal to culm, blades 0.9–1.9 cm wide, flat, with distinct veins on both surfaces, surfaces and margin smooth; sheaths 3–6 cm. Involucral bracts leaflike, ± equal to inflorescence, sheaths of lowermost equaling its blade. Spikes 4 or 5, lowest remote, upper contiguous; terminal spike male, linear-cylindrical, 3–4 cm, shortly pedunculate; lateral spikes female, cylindrical, 3–5 cm, many flowered. Male glumes narrowly elliptic, 4–4.5 mm, apex obtuse; female glumes reddish brown, dark green medially, narrowly obovate, 2–2.5 mm, smooth, 2-veined, apex truncate, awnless. Utricles dark brown-green, obliquely patent, obovate, obtusely trigonous, 3.5–4 mm, slightly shiny, membranous, inconspicuously 3–5-veined, base obtusely cuneate, apex abruptly contracted into a long beak, orifice emarginate. Nutlets chestnut-brown, rather tightly enveloped, obovoid, trigonous, ca. 2 mm, apex emarginate; style base slightly thickened; stigmas 3. Fl. and fr. May.

- Wet places in forests; 800–900 m. E Guangxi (Hezhou).

261. *Carex brownii* Tuckerman, Enum. Meth. Caric. 21. 1843.

亚澳薹草 ya ao tai cao

Carex nipposinica Ohwi.

Rhizome short. Culms tufted, 30–60 cm tall, medium thick, triquetrous, smooth, clothed with bladeless brown sheaths at base, few sheaths disintegrating into fibers. Leaves shorter than culm, blades 3–4 mm wide, flat, rather stiff, sheathed. Involucral bracts longer than culm, leaflike, lowest sheath long, upper ones rather short. Spikes 3 or 4, rather remote; terminal spike male, linear, 1–2 cm, shortly pedunculate; lateral spikes female, oblong or oblong-cylindrical, 1–3 cm, densely many flowered, lowest long pedunculate, upper ones rather shortly pedunculate. Female glumes pale, lanceolate-ovate, ca. 2.8 mm, membranous, 1–3-veined, apex acuminate, with an awn. Utricles brown-green, obliquely patent, horizontally patent at maturity, slightly longer than glume, broadly obovate, inflated trigonous, ca. 3 mm, membranous, glabrous, many veined, base broadly cuneate, estipitate, apex abruptly contracted into a short beak, orifice 2-toothed. Nutlets pale brown, yellowish on angles, slightly loosely enveloped, nearly broadly elliptic or broadly obovate, trigonous, ca. 2 mm; stigmas 3, short. Fl. and fr. Apr–May.

Ditch sides, forests, wet places in low-lying lands; 400–1700 m. Anhui, Gansu, Henan, Jiangsu, Jiangxi, Shanxi, Sichuan, Taiwan, Zhejiang [Indonesia, Japan, Korea; Australia, Pacific islands (New Zealand)].

262. *Carex benkei* Tak. Shimizu, Acta Phytotax. Geobot. 60: 41. 2009.

东亚薹草 dong ya tai cao

Rhizome short. Culms tufted, 30–60 cm tall, triquetrous, smooth, clothed with bladeless light brown sheaths at base, few sheaths disintegrating into fibers. Leaves shorter than culm, blades 3–4 mm wide, flat, rather stiff. Involucral bracts longer than culm, leaflike, lowest sheath long, upper ones rather short. Spikes 3 or 4, rather remote; terminal spike male, linear, 1–2 cm, shortly pedunculate; lateral spikes female, oblong or oblong-cylindrical, 1–3 cm, densely many flowered, lowest long pedunculate, upper ones rather shortly pedunculate. Female glumes pale, lanceolate-ovate, 4–5 mm, membranous, 1–3 veined, apex with an awn. Utricles brown-green, obliquely patent, perpendicularly patent at maturity, slightly longer than glume, broadly obovate, inflated trigonous, ca. 4.5 mm, membranous, glabrous, many veined, base distinctly stipitate, apex abruptly contracted into a long beak, orifice 2-toothed. Nutlets brown, slightly loosely enveloped, broadly elliptic or broadly obovate, trigonous, ca. 2 mm; stigmas 3, short. Fl. and fr. Apr–May.

Anhui [Japan].

263. *Carex transversa* Boott in A. Gray, Narr. Exped. China Japan, 324. 1857.

横果薹草 heng guo tai cao

Carex brownii Tuckerman var. *transversa* (Boott) Kükenthal.

Rhizome short. Culms tufted, 30–60 cm tall, acutely triquetrous, clothed with purple-brown bladeless sheaths at base. Leaves shorter than or slightly longer than culms, blades 3–5 mm wide, flat, rather soft; sheaths rather long. Involucral bracts longer than subtending spike, leaflike, sheathing portion ca. 1/2 length of subtending peduncle. Spikes 3–5, upper 2 or 3 slightly contiguous, lower ones rather remote; terminal spike male, narrowly cylindrical, 1–1.5 cm, with peduncle; lateral spikes female, broadly cylindrical or suboblong, 2–3 cm, densely many flowered, with rather long peduncle. Female glumes pale and hyaline laterally, ovate, 4–5 mm, membranous, green 1–3-veined, apex acuminate, with a long awn. Utricles brown-green, obliquely patent, longer than or as long as glume (including length of awn), ovate or elliptic-ovate, slightly inflated trigonous, 5–6.5 mm, membranous, glabrous, conspicuously several veined, base broadly cuneate, apex gradually attenuate into a long beak, orifice obliquely truncate or minutely 2-toothed. Nutlets yellowish, subloosely enveloped, broadly obovate, trigonous, ca. 3 mm, base stipitate, apex mucronate; stigmas 3. Fl. and fr. Apr–May.

Forests, grasslands, wet places; 500–800 m. Anhui, Fujian, Guangdong, Hunan, Jiangsu, Jiangxi, Zhejiang [Japan, Korea].

264. *Carex oedorrhapha* Nelves, Bull. Misc. Inform. Kew 1939: 659. 1939.

肿喙藁草 zhong hui tai cao

Carex tumida Boott (1858), not Beilschmid (1850).

Rhizome short, ligneous. Culms loosely tufted, rather thick, triquetrous, smooth, with several yellowish brown bladeless sheaths at base. Leaves longer than culm, blades 3–6 mm wide, flat, plicate proximally, with 2 distinct lateral veins, scabrous on both surfaces and margins, long sheathed; sheaths up to 15 cm. Involucral bracts leaflike, longer than subtending spike, lower sheaths rather long and upper sheaths rather short. Spikes 5 or 6, upper 3 or 4 approximate, lower 2 slightly remote; terminal spike male, linear-cylindrical, 6–14 cm, with short peduncle or subsessile; lateral spikes female, cylindrical, (3–)5–14 cm, densely many flowered, upper 2 with very short peduncle, lower ones with slightly long peduncle. Male glumes pale yellow, narrowly lanceolate, (5–)7–9 mm, membranous, 1-veined, apex acuminate, with a long awn, awn ca. 1/2 length of glume and hispidulous along margins; female glumes pale yellow, ovate, ca. 2.8 mm, membranous, 1-veined, apex attenuate, with a long awn, awn as long as or longer than 1/2 length of glumes and hispidulous along margins. Utricles brownish green, obliquely patent, slightly longer than glume, elliptic or obovate, obtusely trigonous, 2.8–3 mm, membranous, 3–5-veined abaxially, base cuneate, shortly stipitate, apex contracted into a medium-sized to long beak, orifice subtruncate or emarginate. Nutlets yellow or brownish yellow, rather tightly enveloped, elliptic, trigonous, ca. 1.5 mm, base shortly stipitate, apex mucronate; stigmas 3. Fl. and fr. Mar–May.

Mountain slopes, open forests, canals, shady and wet areas; 700–2000 m. Guangdong, Yunnan [Bhutan, India (Sikkim), Indonesia, Thailand, Vietnam].

265. *Carex sinoaristata* Tang & F. T. Wang ex L. K. Dai, Acta Phytotax. Sin. 32: 184. 1994 [“*sino-aristata*”].

华芒鳞藁草 hua mang lin tai cao

Rhizome short, ligneous. Culms 35–75 cm tall, slightly thick, triquetrous, smooth, scabrous on upper part. Leaves usually longer than culm, blades 3–6 mm wide, flat, distinctly 2-veined laterally, scabrous on both surfaces and margins; sheaths long, usually dehiscent. Involucral bracts leaflike, much longer than subtending spike, sheathed. Spikes 4, uppermost 2 contiguous at top of culm, lower ones rather remote; terminal spike male, narrowly cylindrical, 2.5–3 cm, with very short peduncle; lateral spikes female, cylindrical, 2.5–5.5 cm, densely many flowered, uppermost 1 with very short peduncle, remaining spikes with rather long peduncles, enclosed in involucral bract sheaths and shortly exerted. Female glumes pale yellow, ovate-lanceolate, ca. 2 mm (excluding length of awn), membranous, 1–3-veined, apex with long awn, awn up to 6 mm and scabrous on margins. Utricles dark brown, obliquely patent, broadly ovate, trigonous, ca. 4 mm, membranous, glabrous, few veined abaxially, base abruptly contracted, apex attenuate into a medium-sized to long beak, orifice shortly 2-toothed. Nutlets yellowish, rather tightly enveloped, obovate or suborbicular, trigonous, ca. 2 mm; stigmas 3. Fl. and fr. May–Jun.

• Shady and wet areas. Chongqing (Nanchuan: Jinfo Shan).

266. *Carex recurvisaccus* T. Koyama, Jap. J. Bot. 15: 166. 1956.

垂果藁草 chui guo tai cao

Rhizome short, ligneous, with numerous and rather thick roots. Culms loosely tufted, 55–75 cm tall, rather robust, acutely triquetrous, smooth on lower part and scabrid on upper angles, with many leaves at base. Leaves longer than culm, blade 0.7–1.5 cm wide, flat, with 2 distinct lateral veins, smooth on both surfaces and lower margins, scabrid on upper margins, sheathed, basal sheaths usually dehiscent. Involucral bract leaflike, much longer than subtending spike, not sheathed. Spikes usually 6; uppermost 1 or 2 spikes male, narrowly cylindrical, 5–12 cm, shortly pedunculate or nearly sessile; remaining spikes female, rather remote, cylindrical, 8–11 cm, densely many flowered, lowermost 1 or 2 spikes shortly pedunculate, upper spikes nearly sessile. Female glumes red-brown on sides, yellowish green between 2 lateral veins, lanceolate or narrowly ovate, 3–4 mm (including length of awn), membranous, 3-veined, apex attenuate, with a long awn, awn 1/3–1/2 length of glume, slightly scabrous on margins. Utricles black-brown, obliquely patent, horizontally patent or pendent at maturity, slightly longer than or as long as glume, ovate-oblong, inflated trigonous, 4–5 mm, membranous, 5-veined abaxially, base abruptly contracted into a short stipe, apex attenuate into a medium-sized to long beak, beak recurved, truncate or emarginate at orifice. Nutlets loosely enveloped, obovate, trigonous, ca. 2 mm, base cuneate, apex mucronate; stigmas 3. Fl. and fr. Feb–Mar.

• Mountain slopes, ditches, shady and wet areas, lax forests; ca. 1300 m. Guangdong, Yunnan.

267. *Carex olivacea* Boott, Proc. Linn. Soc. London 1: 286. 1845.

榄绿果藁草 lan lu guo tai cao

Rhizome rather thick and short, ligneous, with elongate

and rather thick stolons. Culms loosely tufted, 45–95 cm tall, acutely triquetrous, slightly scabrous on angles, densely with many leaves at base. Leaves longer than culm, blades 8–18 mm wide, flat, with 2 distinct lateral veins, smooth on both surfaces, scabrous on margins, sheathed, basal sheaths usually dehiscent. Involucral bracts leaflike, longer than subtending spike, very shortly sheathed or nearly not sheathed. Spikes 5–7, usually congregate at top of culm; uppermost 1 or 2 spikes male, cylindrical or narrowly cylindrical, 3–7 cm, shortly pedunculate or nearly sessile; remaining spikes female, sometimes with few male flowers at apex, cylindrical, 5–10 cm, lowermost spike sometimes with rather long peduncle, upper spikes with much shorter peduncle or nearly sessile. Female glumes at base of spike subovate, ca. 8.5 mm (including ca. 5 mm awn), apex with long awn, upper glumes oblong-lanceolate, 4–5 mm, apex attenuate or truncate, with a short awn or mucro, ferruginous, membranous, 1–3-veined. Utricles dark brown-green, nearly equaling glume, shorter than glume at base of spike, nearly horizontally patent at maturity, ovate, broadly ovate, or subobovate, inflated trigonous, ca. 4 mm, membranous, glabrous, several veined, transversely rugose and several tuberculate between veins, base broadly cuneate, apex abruptly contracted into a medium-sized to long or rather short beak, beak recurved, emarginate or shortly 2-toothed at orifice. Nutlets yellowish brown, rather loosely enveloped, elliptic or subobovate, trigonous, ca. 2 mm, densely tuberculate on surface, base very shortly stipitate, apex with recurved mucro; stigmas 3.

Marshes, wet areas; 1200–3000 m. Sichuan, Yunnan [Bhutan, NE India].

268. *Carex confertiflora* Boott, Mem. Amer. Acad. Arts, n.s., 6: 418. 1858.

密花薹草 mi hua tai cao

Carex olivacea Boott var. *angustior* Kükenthal.

Rhizome short, stoloniferous. Culms 60–95 cm tall, acutely triquetrous, winged on 3 angles, medium thick, clothed with bladeless or shortly bladed sheaths at base, and with 1 or 2 leaves on upper part. Leaves slightly shorter than culm, uppermost leaf usually longer than culm, blades 8–12 mm wide, flat, with 2 distinct lateral veins, smooth on both surfaces, scabrous on margins, sheathed, lower sheaths usually dehiscent. Involucral bracts leaflike, longer than subtending spike, upper involucral bracts narrow, nearly not sheathed. Spikes 4–6, ± contiguous at upper part of culm; terminal spike male, cylindrical or narrowly cylindrical, 4–8 cm, shortly pedunculate; lateral spikes female, cylindrical, (2–)3.5–8 cm, densely many flowered, lower 1 or 2 spikes shortly pedunculate, upper spikes nearly sessile. Female glumes ferruginous, narrowly oblong or narrowly oblong-ovate, 3–3.5 mm, membranous, green 1-veined, apex attenuate, awned. Utricles ferruginous, slightly shorter than glume, horizontally patent at maturity, ovate or subobovate, trigonous, ca. 3 mm, membranous, glabrous, several veined abaxially, base broadly cuneate, apex attenuate into a short beak, beak straight or slightly recurved, obliquely truncate or sometimes shortly 2-toothed at orifice. Nutlets brown at maturity, rather loosely enveloped, subobovate, trigonous, ca. 2 mm, base

estipitate, apex with torsional mucro; stigmas 3. Fl. and fr. May–Jul.

Wet areas in forests, watersides or grasslands among shrubs; 1800–2700 m. Guizhou, Hubei, Yunnan [Japan].

269. *Carex dispalata* Boott ex A. Gray, Narr. Exped. China Japan, 325. 1857.

皱果薹草 zhou guo tai cao

Carex dispalata var. *costata* Kükenthal; *C. pollens* C. B. Clarke; *C. pollens* var. *angustior* C. B. Clarke.

Rhizome thick, ligneous, with elongate and thick stolons. Culms 40–80 cm tall, acutely triquetrous, medium thick, slightly scabrous on upper angles, red-brown and bladeless sheathed, sheaths eventually disintegrating into reticulate fibers on one side. Leaves nearly equaling culm, blades 4–8 mm wide, flat, with 2 distinct lateral veins, smooth on both surfaces, scabrous on upper margins, lower leaves long sheathed, upper leaves nearly not sheathed. Involucral bracts leaflike, lower involucral bracts longer than subtending spike, upper ones shorter than spike, not sheathed. Spikes 4–6, approximate, usually ± contiguous at upper part of culm; terminal spike male, cylindrical, 4–6 cm, pedunculate; lateral spikes female, cylindrical, 3–9 cm, densely many flowered, sometimes with several male flowers at apex, subsessile or shortly pedunculate at lowest spike. Female glumes red-brown on sides, yellowish green at middle, ovate-lanceolate or lanceolate, ca. 3 mm, membranous, 3-veined, apex acuminate, mucicous or mucronate. Utricles brownish green, slightly longer than glume, obliquely patent or nearly horizontally patent at maturity, ovate, slightly inflated trigonous, 3–4 mm, thickly papery, glabrous, transversely rugose, indistinctly few veined, base rounded, stipitate, apex abruptly contracted into a medium-sized to long beak, beak slightly recurved, purple-red at top, obliquely truncate or emarginate at orifice. Nutlets stramineous, slightly loosely enveloped, obovate or elliptic-obovate, trigonous, ca. 2 mm, apex mucronate; stigmas 3. Fl. and fr. May–Jul.

Ditches, marshes, wet areas; 500–2900 m. Anhui, Hebei, Jiangsu, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanxi, Zhejiang [Japan, Korea].

270. *Carex pseudodispalata* K. T. Fu, Fl. Tsinling, 1(1): 448. 1976.

似皱果薹草 si zhou guo tai cao

Rhizome with stolons. Culms 40–60 cm tall, slightly thick, acutely triquetrous, scabrous on upper angles, basal sheaths usually disintegrated into fibers. Leaves nearly equaling culm, blades 4–8 mm wide, flat, rather stiff, scabrous on margins, sheathed. Involucral bracts leaflike, lower involucral bracts nearly equaling subtending spike, upper involucral bract shorter than subtending spike. Spikes 4–6, lowermost spike remote, upper spikes rather approximate; terminal spike male, cylindrical, 4–7 cm, pedunculate; lateral spikes female, cylindrical, 2–7.5 cm, densely many flowered, lower spikes long pedunculate, upper spikes subsessile. Female glumes red-brown, ovate-lanceolate, ca. 3 mm, membranous, green 1-veined, apex acuminate, mu-

cronate or aristate, scabrous on awn. Utricles greenish yellow, longer than glume, obliquely patent, elliptic, trigonous, ca. 3 mm, papery, glabrous, 5–7-veined, base attenuate, apex abruptly contracted into a medium-sized to long beak, beak slightly recurved, upper part red-brown, obliquely truncate and later

shortly 2-toothed at orifice. Nutlets dark brown, slightly loosely enveloped, broadly obovate or subelliptic, trigonous, ca. 1.7 mm; style base not thickened; stigmas 3. Fl. and fr. Apr–Jul.

- In low water; ca. 700 m. S Shaanxi (Qin Ling).

32. Carex sect. Molliculae Ohwi, Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 11: 450. 1936.

柔果藁草组 rou guo tai cao zu

Dai Lunkai (戴伦凯); Tetsuo Koyama, Gordon C. Tucker

Rhizome stoloniferous. Involucral bracts not sheathed or shortly sheathed. Spikes usually unisexual, terminal spike male, lateral spikes female (*Carex harrismithii* and *C. agglomerata* with unisexual spikes and bisexual spikes), cylindric, rarely oblong, densely many flowered. Female glumes ovate or lanceolate-oblong, apex acuminate, mucronate, aristate, or muticous. Utricles yellowish green or stramineous, erect or obliquely patent, ovate, elliptic, or oblong, slightly inflated or inflated trigonous, many veined, beak medium sized to long or rather long, orifice shortly 2-toothed, rarely obliquely truncate or emarginate. Nutlets rather loosely enveloped; stigmas 3.

About 20 species: E and SE Asia; 18 species (nine endemic) in China.

- 1a. Spikes unisexual and bisexual, uppermost 1 or 2 spikes androgynous or gynaeandrous, remaining spikes female, or uppermost 1 or 2 spikes male and remaining female or bisexual.
- 2a. Uppermost 1 or 2 spikes bisexual, androgynous or gynaeandrous, remaining spikes female, spikes oblong, not over 2 cm, approximate, usually congregate at top of culm; female glumes stramineous or yellowish green.
 - 3a. Spikes 2, rarely 3, androgynous, with few male flowers at top of spike; female glumes lanceolate, ca. 2 mm; utricles ca. 3 mm; nutlets stipitate 271. *C. harrismithii*
 - 3b. Spikes 3 or 4, rarely 2, terminal spike gynaeandrous, lateral spikes female; female glumes ovate, ca. 3 mm; utricles 3.5–4 mm; nutlets sessile 272. *C. agglomerata*
- 2b. Uppermost 1 or 2 spikes male, remaining spikes female or bisexual, bisexual spikes androgynous or gynaeandrous, spikes cylindric, 2.5–10 cm, remote, not congregate at top of culm; female glumes purple or brown-red.
 - 4a. Rhizome stoloniferous; leaves glabrous; female spikes densely many flowered, usually with few male flowers at base; female glumes muticous or mucronate; utricles with a short beak 273. *C. alliiformis*
 - 4b. Rhizome without stolons; leaves pubescent abaxially; female spikes laxly flowered, usually with few male flowers at top; female glumes long aristate or awned; utricles with a long beak.
 - 5a. Leaves 7–12 mm wide; male spike 7–10 cm; utricles spreading 274. *C. purpureotincta*
 - 5b. Leaves up to 17 mm wide; male spike 4–6 cm; utricles reflexed 275. *C. xiangxiensis*
- 1b. Spikes usually unisexual, uppermost 1 or 2 spikes male (*C. planiculmis* sometimes bearing male spikes with several female flowers at top), remaining spikes female, sometimes with few male flowers at top (e.g., *C. doniana*).
 - 6a. Utricles wholly scabrid pubescent 282. *C. scabrisacca*
 - 6b. Utricles glabrous, not scabrid.
 - 7a. Spikes approximate, usually congregate at top of culm, male spikes clavate, 1.5–2 cm, female spikes oblong, not over 2.5 cm (only *C. huashanica* with male spikes 2–5 cm, female spikes 3–6 cm), subsessile or shortly pedunculate.
 - 8a. Female spikes cylindric, 3–6 cm; female glumes with long awn at apex, scabrous on margins at awn; utricles ca. 5 mm, obliquely truncate or emarginate at orifice 276. *C. huashanica*
 - 8b. Female spikes oblong, not over 2.5 cm; female glumes muticous or mucronate; utricles 3–4 mm, 2-toothed at orifice (except in *C. submollicula*).
 - 9a. Leaf blades 2–4 mm wide; utricles ca. 5 mm, distinctly veined 280. *C. submollicula*
 - 9b. Leaf blades 4–10 mm wide; utricles 3–4 mm, obscurely veined.
 - 10a. Female spikes 1.5–2.5 cm; utricles oblong-ovate, slightly inflated trigonous, membranous, usually rugulose, apex abruptly contracted into a medium-sized to long beak 279. *C. mollicula*
 - 10b. Female spikes 0.8–1.7 cm; utricles elliptic, inflated trigonous, thickly papery, smooth, apex abruptly contracted into a short beak.
 - 11a. Female glumes ovate or narrowly ovate; nutlets obovate 277. *C. aphanolepis*
 - 11b. Female glumes oblong; nutlets subrhomboid 278. *C. radicina*
 - 7b. Spikes remote, not congregate at top of culm, male spike and female spikes cylindric (*C. japonica* with spikes oblong), 2.5–7 cm, lower spikes long pedunculate, upper spikes shortly pedunculate.

- 12a. Leaf blades 5–12 mm wide; female spikes (1.5–)2–7 cm; utricles attenuate to a short beak at apex, nearly obliquely truncate or obscurely 2-toothed at orifice.
- 13a. Culms compressed triquetrous, one angle obscure; male spike not over 3.5 cm, with female flowers at top, female spikes 1.5–4.5 cm, without male flowers at top; female glumes ovate, mucicous or sometimes mucronate at apex; utricles ovate, with a recurved beak, style deciduous, stigmas short 288. *C. planiculmis*
- 13b. Culms triquetrous; male spike 3–7.5 cm, female spikes 2–7 cm, sometimes with several male flowers; female glumes ovate-lanceolate, mucronate at apex; utricles oblong-ovate, with a straight beak; style usually persistent, stigmas rather long.
- 14a. Spikes 2–6, male spike linear-cylindric, 3–7.5 cm, female spikes cylindric, 3–7 cm; female glumes pale yellow; utricles 3.5–4 mm, greenish yellow; basal leaf sheaths brownish 286. *C. doniana*
- 14b. Spikes 3 or 4, male spike narrowly cylindric, ca. 3 cm, female spikes cylindric, 2–3.5 cm; female glumes yellow-brown; utricles 4–4.5 mm, olivaceous; basal leaf sheaths purple-brown 287. *C. phaenocarpa*
- 12b. Leaf blades 2–5 mm wide; female spikes 1–3(–4) cm; utricles attenuate to medium-sized or long beak at apex, distinctly 2-toothed at orifice.
- 15a. Female spikes oblong or oblong-cylindric, 1–2.5 cm; utricles 4–5 mm, stramineous, slightly nitid, obscurely veined 281. *C. japonica*
- 15b. Female spikes cylindric, to 3 cm or more; utricles ca. 3.5 mm, yellowish green, not nitid, distinctly veined.
- 16a. Culms 30–60 cm tall; male spike clavate, 2–3 cm; female glumes narrowly ovate, mucicous at apex; utricles ovate, slightly inflated 285. *C. alopecuroides*
- 16b. Culms not over 30 cm tall; male spike linear, 1–5 cm; female glumes oblong-ovate, mucronate at apex; utricles elliptic or oblong, not inflated.
- 17a. Utricles elliptic, 3–3.5 mm, with a medium-sized to long beak, beak ca. 1/3 length of utricule 283. *C. subtransversa*
- 17b. Utricles oblong, 4–5 mm, with a long beak, beak ca. 1/2 length of utricule 284. *C. liui*

271. *Carex harrismithii* Kükenthal, Acta Horti Gothob. 5: 40. 1930.

哈氏薹草 ha shi tai cao

Rhizome short, without stolons. Culms loosely tufted, 15–20 cm tall, slender, compressed triquetrous, smooth, clothed with yellowish brown and bladeless sheaths at base, sheaths usually disintegrating into fibers. Leaves shorter than culm, blades 1–2 mm wide, flat, smooth, long sheathed. Lowest involucre bracts leaflike, linear, longer than subtending spike, not sheathed or shortly sheathed (2–3 mm), upper involucre bracts setaceous, not sheathed. Spikes 2, congested at top of culm, androgynous, ovate or oblong, 5–10 mm, densely many flowered, with few male flowers at top of spike, shortly pedunculate or sessile. Male glumes yellow-brown, narrowly lanceolate, ca. 3 mm, membranous, green 1-veined, apex acuminate; female glumes yellowish, narrowly ovate, 1.5–2 mm, membranous, green 1-veined, apex acuminate, mucronate or aristate. Utricles stramineous, obliquely patent, longer than glume, obovate-elliptic or narrowly elliptic, trigonous, ca. 3 mm, membranous, smooth, nerveless, base acute, apex abruptly contracted into a medium-sized to long beak, orifice truncate or emarginate, membranous, hyaline. Nutlets rather tightly enveloped, elliptic, trigonous, ca. 1.5 mm, base shortly stipitate, apex mucronate; style rather short, base slightly thickened; stigmas 3. Fl. and fr. May–Jun.

• Mountain slopes; ca. 2500 m. W Sichuan.

272. *Carex agglomerata* C. B. Clarke, J. Linn. Soc., Bot. 36: 269. 1903.

团穗薹草 tuan sui tai cao

Carex agglomerata var. *rhizomata* Y. C. Yang.

Rhizome rather long, ligneous, stoloniferous. Culms 20–60 cm tall, slightly slender, acutely triquetrous, scabrous on angles, purple-brown and bladeless sheathed, sheaths eventually disintegrating into reticulate fibers. Leaves shorter than or equaling culm, blades 2–6 mm wide, scabrous and sometimes slightly revolute on margins, reddish brown sheathed. Lowest involucre bract leaflike, longer than subtending spike, upper involucre bracts awn-shaped, shorter than subtending spike, not sheathed. Spikes 3 or 4, congested at top of culm; terminal spike gynaeandrous, clavate-oblong, ca. 1.5 cm, rarely male, narrowly oblong, sessile; lateral spikes 2 or 3, female, oblong, 1–1.5 cm, densely many flowered, sessile. Male glumes brownish yellow, lanceolate-ovate, ca. 4 mm, membranous, 1-veined, apex acuminate, aristate; female glumes brownish yellow, ovate, ca. 3 mm, membranous, 1-veined, scabrid on veins, apex acuminate, shortly aristate. Utricles yellowish green, obliquely patent, nearly horizontally patent at maturity, longer than glume, ovate or narrowly ovate, slightly inflated trigonous, 3.5–4 mm, membranous, glabrous, distinctly 2-veined laterally, other veins obscure, base obtusely rounded, apex attenuate into a slightly long beak, orifice 2-toothed. Nutlets yellowish, rather loosely enveloped, obovate, trigonous, ca. 2 mm; style base not thickened; stigmas 3. Fl. and fr. Apr–Jul.

• Forests on mountain slopes, wet places in valleys; 1200–3200 m. Gansu, Qinghai, Shaanxi, Sichuan.

273. *Carex alliiformis* C. B. Clarke, J. Linn. Soc., Bot. 36: 270. 1903.

葱状薹草 cong zhuang tai cao

Rhizome short, with long stolons, stolons clothed with red-brown and bladeless sheaths. Culms loosely tufted, 25–45 cm tall, obtusely trigonous, rather thick, clothed with few bladeless sheaths. Leaves longer than culm, blades 7–14 mm wide, flat, distinctly 2-veined laterally, purple-red sheathed. Involucral bracts leaflike, lower involucral bracts longer than subtending spike, slightly long sheathed, upper involucral bracts rather narrow and shorter than subtending spike, shortly sheathed. Spikes 5–8, lower spikes remote, upper spikes approximate; terminal 1 or 2 spikes male, sublinear, 2.5–4 cm, pedunculate; remaining spikes female, sometimes with few male flowers at base, cylindrical, 2.5–5.5 cm, densely many flowered, lower spikes rather long pedunculate, upper spikes shortly pedunculate. Male glumes brownish red, lanceolate, ca. 6 mm, 1-veined, apex acute; female glumes brownish red, lanceolate-ovate or lanceolate, 3–4 mm, membranous, 1-veined, apex acuminate or acute, mucronate. Utricles green or yellowish green, obliquely patent, longer than glume, obovate-oblong, inflated trigonous, ca. 4 mm, herbaceous, glabrous, several veined, base cuneate, apex abruptly contracted into a rather short beak, orifice 2-toothed. Nutlets gray-green, brownish yellow on angles, rather loosely enveloped, elliptic, trigonous, ca. 2 mm; style base not thickened; stigmas 3. Fl. and fr. May–Jul.

Forests, forest margins, open areas on mountain slopes. Guizhou, Hubei, Hunan, Sichuan, Taiwan [Japan, Vietnam].

274. *Carex purpureotincta* Ohwi, Acta Phytotax. Geobot. 2: 159. 1933.

太鲁阁薹草 tai lu ge tai cao

Rhizome short, without stolons. Culms 60–90 cm tall, rather thick, triquetrous, smooth, clothed with red-brown and bladeless sheaths. Leaves shorter or slightly longer than culm, blades 7–12 mm wide, flat, slightly stiff, puberulent on lower surface, sheathed. Involucral bracts leaflike, longer than subtending spike, lower involucral bracts shortly sheathed, upper involucral bracts nearly not sheathed. Spikes 4, rather congregate at top of culm or lowermost spike slightly remote; terminal spike male, sublinear, 7–10 cm, shortly pedunculate; remaining spikes female, cylindrical, 6–10 cm, slightly loosely many flowered, sometimes with few male flowers, lowest spike pedunculate, upper spikes nearly sessile. Female glumes pale, slightly purple-red laterally, ovate, ca. 3.5 mm (including ca. 2.3 mm awn), membranous, 3-veined, apex obtuse, long aristate, scabrous on margins of awn. Utricles brownish green, obliquely patent, slightly longer than glume, elliptic, subinflated trigonous, ca. 4 mm, membranous, glabrous, purple-red punctulate, many veined, base cuneate, apex abruptly attenuate into a long beak, beak scabrous on margins, truncate at orifice. Nutlets loosely enveloped, ovate, trigonous, ca. 2 mm; style base slightly thickened; stigmas 3.

Dense forests. Taiwan [Japan].

275. *Carex xiangxiensis* Z. P. Wang, Acta Bot. Yunnan. 11: 168. 1989.

湘西薹草 xiang xi tai cao

Rhizome short, indurate, thickened. Culms 40–90 cm tall, rather thick, triquetrous, smooth but scabrous on angles, clothed with dark purple and bladeless sheaths. Leaves shorter than or equaling culm, blades up to 17 mm wide, with several prominent veins, flat, slightly stiff, puberulent on veins above and generally on lower surface, sheathed. Involucral bracts leaflike, longer than subtending spike, shortly sheathed. Spikes 4 or 5, ± remote; terminal spike male, sublinear, 4–6 cm, shortly pedunculate; remaining spikes female, cylindrical, 4–9 cm, densely flowered, lowest spike pedunculate, upper spikes nearly sessile. Female glumes pale, slightly purple-red laterally, ovate to oblong, ca. 5 mm (including ca. 2.3 mm awn), membranous, 3-veined, apex obtuse, mucronate to aristate. Utricles olivaceous, reflexed, longer than glume, obovate to elliptic, subinflated, trigonous, 3.5–4 mm, membranous, glabrous, many veined, base sessile, apex abruptly attenuate into a long beak, beak scabrous on margins, 2-toothed at orifice. Nutlets yellowish brown, loosely enveloped, rhomboid-elliptic, trigonous, ca. 2.3 mm; style base slightly thickened; stigmas 3, ± equaling beak.

• Forests in valleys; ca. 300 m. NW Hunan (Zhangjiajie).

276. *Carex huashanica* Tang & F. T. Wang ex L. K. Dai, Acta Phytotax. Sin. 32: 186. 1994.

华山薹草 hua shan tai cao

Rhizome rather thick and short, long stoloniferous. Culms densely tufted, 35–55 cm tall, acutely triquetrous, slightly thick, scabrous on angles, bladeless sheathed at base. Leaves longer than culm, blades 4–6 mm wide, flat, distinctly 2-veined laterally, lower part smooth, scabrous near top, long sheathed. Involucral bracts leaflike, much longer than subtending spike, not sheathed. Spikes 3 or 4, rather congregate at top of culm; terminal spike male, narrowly cylindrical, 2–5 cm, shortly pedunculate; lateral spikes female, cylindrical, 3–6 cm, densely many flowered, shortly pedunculate. Male glumes stramineous, lanceolate, ca. 4 mm, membranous, 1-costate, apex aristate or mucronate, ciliate on margins of awn; female glumes stramineous, ovate, ca. 2 mm, membranous, 1-costate, apex aristate or mucronate, awn ciliate at margins. Utricles stramineous, suberect, elliptic, slightly inflated trigonous, ca. 5 mm, papery, several veined abaxially, base broadly cuneate, apex attenuate into a long beak, orifice emarginate or shortly 2-toothed. Nutlets dark brown, yellow-brown on angles, rather loosely enveloped, obovate, trigonous, ca. 2 mm, apex mucronate; style ± long; stigmas 3. Fl. and fr. Apr–May.

• Roadsides in valleys; ca. 1800 m. Shaanxi (Hua Shan, Weinan).

277. *Carex aphanolepis* Franchet & Savatier, Enum. Pl. Jap. 2: 580. 1878.

匿鳞薹草 ni lin tai cao

Carex japonica Thunberg var. *aphanolepis* (Franchet & Savatier) Kükenthal; *C. japonica* var. *humilis* Franchet.

Rhizome slender and long stoloniferous. Culms 15–30 cm tall, slightly slender, triquetrous, scabridulous, brownish sheathed at base. Leaves longer than or nearly equaling culm, blades 3–8 mm wide, flat, soft, scabrous on margins, ± long

sheathed, basal sheath \pm disintegrated into fibers. Involucral bracts leaflike, longer than inflorescence, not sheathed. Spikes 3 or 4, upper spikes approximate, lower spikes rather remote; terminal spike male, linear, 1–3 cm, shortly pedunculate or nearly sessile; lateral spikes female, globose-oblong or oblong, 0.8–1.7 cm, ca. 5 mm wide, densely many flowered, upper spikes sessile, lower spikes shortly pedunculate. Male glumes brown, lanceolate-oblong, ca. 4 mm, membranous, 1-veined, apex acuminate; female glumes green at middle, pale laterally, ovate or narrowly ovate, 2.5–3 mm, membranous, 3-veined, apex acuminate, mucronate. Utricles yellowish, obliquely patent, longer than glume, elliptic, inflated trigonous, ca. 4 mm, thickly papery, slightly shiny, obscurely veined, base broadly cuneate or obtusely rounded, apex abruptly contracted into a short beak, orifice shortly 2-toothed. Nutlets brown, rather loosely enveloped, elliptic or obovate-elliptic, trigonous, ca. 2 mm, apex mucicous; style base slightly thickened; stigmas 3, rather short.

Forests, wet places at forest margins. Anhui, Jiangsu [Japan, Korea].

278. *Carex radicina* Z. P. Wang, J. Nanjing Univ., Nat. Sci. Ed. 1962(2): 53. 1962.

细根茎藨草 xi gen jing tai cao

Rhizome short, with slender stolons. Culms 30–50 cm tall, acutely triquetrous, scabrous on angles. Leaves longer than culm, blades 6–8 mm wide, slightly stiff, distinctly 2-veined laterally on upper surface, sheathed. Involucral bracts leaflike, longer than subtending spike, not sheathed. Spikes 3 or 4, rather congested at top of culm, lowest spike slightly remote; terminal spike male, linear, 2–3 cm, sometimes with few female flowers at apex, shortly pedunculate; lateral spikes female, oblong or shortly cylindrical, 1.5–2.5 cm, densely many flowered, nearly sessile. Male glumes pale, elliptic, ca. 3.8 mm, membranous, 1-veined, apex acuminate, mucronate; female glumes pale, green at middle, oblong or ovate-oblong, ca. 3 mm, membranous, 1-veined, apex acuminate, mucicous or mucronate. Utricles stramineous, obliquely patent, nearly equaling glume, broadly obovate, obtusely trigonous, ca. 3 mm, glabrous, shiny, obscurely few veined, base obtusely rounded, apex abruptly contracted into a short beak, orifice shortly 2-toothed. Nutlets slightly loosely enveloped, subrhomboid, trigonous, ca. 1.5 mm; style base slightly thickened; stigmas 3, slender, persistent at fruiting stage.

- Forests on mountain slopes. Jiangsu (Baohua Shan).

279. *Carex mollicula* Boott, Ill. Gen. Carex 4: 192. 1867.

柔果藨草 rou guo tai cao

Rhizome stoloniferous. Culms densely tufted, 15–30 cm tall, acutely triquetrous or sometimes narrowly winged on angles, scabrous on upper angles, with few bladeless sheaths at base. Leaves longer than culm, blades 4–8 mm wide, flat, rather soft, distinctly 2-veined laterally on upper surface, sheathed, sheaths brown at base of culm. Involucral bracts longer than subtending spike, upper involucral bracts sublinear, lower involucral bracts leaflike, nearly not sheathed. Spikes 3–5, usually congested at top of culm, distances short; terminal spike male, linear or subclavate, 1–2 cm, shortly pedunculate; lateral

spikes female, oblong-cylindric, 1.5–2.5 cm, densely many flowered, very shortly pedunculate or nearly sessile. Male glumes pale, narrowly oblong, ca. 4 mm, green 1-veined, apex mucronate; female glumes brownish yellow, oblong-ovate or subovate, ca. 3 mm, membranous, 1-veined, apex acuminate, sometimes mucronate. Utricles yellow-green or stramineous, obliquely patent, eventually nearly horizontally patent, much longer than glume, oblong-ovate or lanceolate-ovate, inflated trigonous, ca. 4 mm, membranous, glabrous, obscurely veined, usually rugose, base obtusely rounded, apex attenuate into a medium-sized or rather long beak, orifice shortly 2-toothed. Nutlets rather loosely enveloped, elliptic, trigonous, ca. 2 mm, base acute or slightly obtuse, apex mucronate; style base not thickened; stigmas 3. Fl. and fr. May–Jun.

Forests, thickets, wet areas, riversides, ditch sides. Taiwan, Zhejiang [Japan, Korea].

280. *Carex submollicula* Tang & F. T. Wang ex L. K. Dai, Acta Phytotax. Sin. 32: 186. 1994.

似柔果藨草 si rou guo tai cao

Rhizome short, long stoloniferous. Culms densely tufted, 15–20 cm tall, acutely triquetrous, scabrous on angles, bladeless sheathed at base. Leaves slightly longer than culm, blades 2–4 mm wide, distinctly 2-veined laterally, scabrous on lateral veins and margins, slightly involute on margins at dry stage, membranous part of sheaths usually splitting. Involucral bracts leaflike, longer than subtending spike, not sheathed. Spikes 3 or 4, usually congested at top of culm, distance short; terminal spike male, clavate, 1.5–2 cm, very shortly pedunculate; lateral spikes female, elliptic, oblong, or narrowly oblong, 1.2–2.5 cm, densely many flowered, lower spikes shortly pedunculate, upper spikes nearly sessile. Male glumes stramineous, lanceolate, ca. 4 mm, membranous, 1-veined, apex acute; female glumes stramineous, ovate, 2.5–3 mm, sometimes ferruginous punctulate, 1-veined, apex acute, mucronate. Utricles brown-yellow, obliquely patent, horizontally patent at maturity, longer than glume, ovoid, inflated trigonous, ca. 5 mm, membranous, glabrous, distinctly several veined, base rounded, estipitate, apex abruptly contracted into a short recurved beak, orifice obliquely truncate, sometimes emarginate. Nutlets loosely enveloped, obovate, trigonous, slightly concave on 3 sides, ca. 1.5 mm, base acute, apex mucronate; style \pm long; stigmas 3.

- Mountain slopes, marshes. Fujian, Guangdong, Jiangxi, Zhejiang.

281. *Carex japonica* Thunberg in Murray, Syst. Veg., ed. 14, 845. 1784.

日本藨草 ri ben tai cao

Rhizome short, with slender stolons. Culms laxly tufted, 20–40 cm tall, rather slender, compressed triquetrous, scabrous on upper angles, clothed with few brownish and bladeless sheaths at base, sheaths usually split into reticulate fibers. Upper leaves longer than culm, basal leaves usually shorter than culm, blades 3–4 mm wide, slightly stiff, flat, distinctly 2-veined laterally, scabrous on margins, sheathed. Involucral bracts leaflike, lower involucral bracts longer than subtending

spike, upper 1 or 2 involucral bracts shorter than subtending spike, not sheathed. Spikes 3 or 4, rather remote; terminal spike male, linear, 2–4 cm, pedunculate; lateral spikes female, oblong-cylindric or oblong, 1–2.5 cm, densely many flowered, lower ones shortly pedunculate, upper ones sessile or nearly sessile. Male glumes pale, lanceolate, ca. 5 mm, membranous, 3-veined, greenish between veins, apex acuminate; female glumes pale or brownish, narrowly ovate, 2.5–3 mm, membranous, 3-veined, greenish between veins, apex acuminate. Utricles yellowish green or stramineous, obliquely patent, elliptic-ovate or ovate, slightly inflated trigonous, 4–4.5 mm, papery, glabrous, slightly shiny, obscurely veined, base broadly cuneate, apex abruptly contracted into a medium-sized to long beak, orifice hyaline-membranous on margins, shortly 2-toothed. Nutlets brownish, slightly loosely enveloped, elliptic or obovate-elliptic, trigonous, ca. 2 mm; style base slightly thickened; stigmas 3. Fl. and fr. May–Aug.

Shady and wet areas in forests, forest margins, ditch sides in valleys; 1200–2000 m. Hebei, Henan, Hubei, Jiangsu, Liaoning, Nei Mongol, Shaanxi, Shanxi, Sichuan, Yunnan [Japan, Korea].

282. *Carex scabrisacca* Ohwi & T. S. Liu, J. Jap. Bot. 12: 655. 1936.

糙囊薹草 cao nang tai cao

Rhizome with long slender stolons. Culms 30–40 cm tall, sharply triquetrous, 1-leaved at middle. Leaves soft; basal sheaths slightly disintegrating into brownish fibers. Lowest involucral bract leaflike, surpassing culm, not sheathing. Spikes 3 or 4, congested; terminal spike male, stramineous, 2–3 cm, shortly pedunculate; lateral spikes female, suberect, cylindric, 2–3 cm × 5–6 mm, subsessile. Female glumes pale, lanceolate-ovate, costa green, 3-veined, apex acuminate. Utricles opaque, longer than glume, ovate, slightly inflated, 3–5 mm, wholly scabrid with short hairs, with slender veins, apex suddenly contracted into a short beak, orifice minutely 2-toothed. Nutlets rhombic-ovoid, ca. 1.5 mm; stigmas 3.

• Jiangxi (Lushan).

Carex scabrisacca is known only from the type gathering. Owing to its scabrid pubescent utricles it is a clear-cut species in *C. sect. Molliculae* because all other species in this section have glabrous utricles.

283. *Carex subtransversa* C. B. Clarke, Philipp. J. Sci., C, 2: 108. 1907.

似横果薹草 si heng guo tai cao

Carex alopecuroides D. Don ex Tilloch & Taylor subsp. *subtransversa* (C. B. Clarke) T. Koyama; *C. hayatana* Honda; *C. japonica* Thunberg subsp. *subtransversa* (C. B. Clarke) T. Koyama; *C. kawakamii* Hayata; *C. pseudojaponica* Hayata (1911), not C. B. Clarke (1908).

Rhizome short, with slender stolons. Culms densely tufted, 15–30 cm tall, slightly slender, triquetrous, scabrous on upper angles, clothed with few brownish and bladeless sheaths at base. Leaves usually shorter than culm, blades 2–4 mm wide, flat, slightly stiff, distinctly 2-veined laterally, rather long sheathed. Lower involucral bracts leaflike, longer than sub-

tending spike, upper involucral bracts linear, rather short, usually not sheathing. Spikes 3–5, lower 1 or 2 rather remote, upper 2 or 3 rather congested; terminal spike male, linear, 1–5 cm, shortly pedunculate; lateral spikes female, shortly cylindric or suboblong, 1–3 cm, densely many flowered, sometimes with few male flowers, lower ones shortly pedunculate, upper ones nearly sessile. Male glumes brownish, lanceolate, 2–2.5 mm, thickly papery, 1-veined, apex acute, mucronate; female glumes brownish, oblong-ovate, 2–2.5 mm, papery, 1-veined, apex acute, mucronate. Utricles green or yellowish green, suberect, elliptic, trigonous, 3–3.5 mm, membranous, glabrous, many veined, base broadly cuneate or subrounded, apex abruptly attenuate into a slightly long beak, orifice shortly 2-toothed. Nutlets loosely enclosed, broadly ovate, trigonous, 1–1.5 mm; style base not thickened; stigmas 3. Fl. and fr. Jun–Oct.

Wet forest floors, grassy areas in forests; 1300–2500 m. Taiwan, Zhejiang [Japan, Philippines].

284. *Carex liui* T. Koyama & T. I. Chuang, Quart. J. Taiwan Mus. 13: 224. 1960.

台中薹草 tai zhong tai cao

Rhizome with slender stolons. Culms laxly tufted, 10–15 cm tall, slightly triquetrous, smooth, clothed with few bladeless sheaths at base. Leaves nearly basal, shorter than culm, blades 2–3 mm wide, soft, long sheathed; sheaths at base yellowish brown, usually ± split into brown fibers. Involucral bracts leaflike, longer than subtending spike, not sheathed. Spikes 3–5, contiguous at upper part of culm; terminal spike male, linear-cylindric, 2–4 cm, shortly pedunculate; lateral spikes female, cylindric or oblong-cylindric, 2–4 cm, densely many flowered, lower spikes with long peduncles, peduncles up to 5 cm in length, upper ones rather short. Female glumes pale brown, oblong-ovate, 3.5–4 mm, membranous, 3-veined, apex acute or obtuse and mucronate. Utricles yellowish green, obliquely patent, longer than glume, oblong or subovate, trigonous, 4–5 mm, membranous, glabrous, many veined, base broadly cuneate, apex gradually narrowed to a long beak, orifice subtruncate or emarginate. Nutlets dark brown, loosely enclosed, elliptic, trigonous, ca. 1.8 mm, apex mucronate; style base not thickened; stigmas 3.

• Forests on mountain slopes; ca. 2900 m. Taiwan, Zhejiang.

285. *Carex alopecuroides* D. Don ex Tilloch & Taylor, Philos. Mag. J. 62: 455. 1823.

禾状薹草 he zhuang tai cao

Carex japonica Thunberg var. *alopecuroides* (D. Don ex Tilloch & Taylor) C. B. Clarke.

Rhizome short, with slender stolons. Culms tufted, 30–60 cm tall, triquetrous, scabrous on upper angles, clothed with few pale brown and bladeless sheaths. Leaves nearly equaling or slightly longer than culm, blades 2–4 mm wide, flat, slightly stiff, 3-veined on upper surface, distinctly 1-veined on lower surface, scabrous on veins and upper margins, margins usually revolute when dry, long sheathed, membranous part of sheaths usually split. Involucral bracts leaflike, lower involucral bracts

longer than subtending spike, upper 1 or 2 involucre bracts equaling or shorter than subtending spike, not sheathed. Spikes 3–5, usually contiguous at top of culm; terminal spike male, sometimes with female flowers at top, subclavate, 2–3 cm, very shortly pedunculate or nearly sessile; lateral spikes female, cylindrical, 2–3 cm, densely many flowered, lowest 1 or 2 shortly pedunculate, upper ones nearly sessile. Female glumes pale stramineous, oblong-ovate or lanceolate-ovate, 2–3 mm, membranous, 1-veined, apex attenuate or sometimes subobtusate and mucronate or mucicous, mucro hispidulous laterally. Utricles green, stramineous at maturity, obliquely patent, ± horizontally patent at maturity, lower ones equaling or slightly shorter than glume, upper ones shorter than glume, ovate, obtusely trigonous, slightly inflated, ca. 3 mm, membranous, glabrous, 5-veined abaxially, base obtuse, apex attenuate into a medium-sized to long beak, orifice emarginate and shortly 2-toothed. Nutlets brown, slightly tightly enveloped, broadly ovate or subelliptic, trigonous, ca. 1.5 mm, base estipitate, apex mucronate; style base not thickened; stigmas 3. Fl. and fr. Apr–Jul.

Wet places at ditch sides or in forests on mountain slopes; 400–2700 m. Hubei, Hunan, Sichuan, Taiwan, Yunnan, Zhejiang [Bhutan, India, Indonesia (Sumatra), Japan, Nepal, New Guinea, Philippines].

286. *Carex doniana* Sprengel, Syst. Veg. 3: 825. 1826.

签草 qian cao

Carex chlorostachys D. Don ex Tillich & Taylor, Philos. Mag. J. 62: 455. 1823, not Steven (1813); *C. alopecuroides* D. Don ex Tillich & Taylor var. *chlorostachya* C. B. Clarke; *C. japonica* Thunberg subsp. *chlorostachya* (C. B. Clarke) T. Koyama; *C. japonica* var. *chlorostachya* (C. B. Clarke) Kükenthal; *C. sasakii* Hayata.

Rhizome short, with slender stolons. Culms 30–60 cm tall, rather thick, compressed triquetrous, scabrous on angles, with brownish yellow sheaths at base, sheaths sometimes disintegrating into fibers. Leaves slightly longer than or nearly equaling culm, blades 5–12 mm wide, flat, rather soft, distinctly 2-veined laterally on upper surface, scabrous on upper margins, sheathed. Involucre bracts leaflike, upper ones linear, longer than subtending spike, not sheathed. Spikes 2–6, lowest 1 or 2 spikes remote, upper ones rather congested at top of culm; terminal spike male, linear-cylindrical, 3–7.5 cm, pedunculate; lateral spikes female, sometimes with several male flowers at apex, cylindrical, 3–7 cm, densely many flowered, lower ones shortly pedunculate, upper ones nearly sessile. Female glumes pale yellow or partly pale brown, ovate-lanceolate, ca. 2.5 mm, membranous, green 1-veined, apex mucronate. Utricles greenish yellow, eventually horizontally patent, longer than glume, oblong-ovate, slightly inflated trigonous, 3.5–4 mm, membranous, obscurely several veined, base broadly cuneate or subrounded, apex attenuate into a straight and short beak, orifice shortly 2-toothed. Nutlets dark yellow, loosely enveloped, obovate, trigonous, ca. 1.8 mm, apex mucronate; style base not thickened; stigmas 3, slender, persistent. Fl. and fr. Apr–Oct.

Streamsides, ditch sides, forests, among shrubs, wet places in grasslands; 500–3000 m. Fujian, Guangdong, Guangxi, Hubei, Jiangsu, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Korea, Nepal, Philippines].

287. *Carex phaenocarpa* Franchet, Bull. Soc. Philom. Paris, sér. 8, 7: 90. 1895.

硕果藁草 shuo guo tai cao

Carex japonica Thunberg var. *phaenocarpa* (Franchet) Kükenthal.

Rhizome short, long stoloniferous. Culms 35–50 cm tall, ca. 1.5 mm thick, compressed trigonous. Leaves shorter than culm, upper blades rather long, lower blades short, 5–8 mm wide, flat, sheathed, lower sheaths purple-brown. Involucre bracts leaflike, longer than spike, very shortly sheathed or sheathless. Spikes 3 or 4, slightly approximate; terminal spike male, narrowly cylindrical, ca. 3 cm × 4 mm, pedunculate; lateral spikes 2 or 3, female, cylindrical, 2–3.5 cm × ca. 8 mm, densely many flowered, subsessile or lowermost with very short peduncle. Male glumes yellow-brown, ovate-lanceolate, green veined, apex acute; female glumes yellow-brown, ovate-lanceolate, ca. 2.5 mm, green carinate-costate, apex acute and aristulate. Utricles olivaceous, horizontally patent at maturity, ovate, slightly inflated trigonous, 4–4.5 mm, shiny, papery, 5-veined, base broadly cuneate, apex gradually attenuate into a medium-sized to long beak, orifice shortly 2-toothed. Nutlets loosely enveloped, obovate, trigonous, ca. 2 mm; stigmas 3, rather short. Fl. and fr. Apr–Jun.

• Forests, forest margins. Yunnan.

288. *Carex planiculmis* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 18: 448. 1901.

扁秆藁草 bian gan tai cao

Rhizome thick and slightly elongate, with slender stolons. Culms tufted, 30–45 cm tall, rather thick, compressed triquetrous, winged on 2 angles and 1 angle obscure, scabrous on angles, few bladeless sheathed at base. Leaves slightly shorter than culm, blades 5–10 mm wide, flat, rather soft, scabrous on veins and margins, ± long sheathed; sheaths brownish yellow, eventually split on membranous part. Lower involucre bracts leaflike, longer than subtending spike, upper involucre bracts awn-shaped, usually shorter than subtending spike, scabrous on veins and margins, not sheathed. Spikes 4–6, lowest one rather remote, others contiguous at top of culm; terminal spike male, sometimes with some female flowers at apex, narrowly cylindrical, 2.5–3.5 cm, shortly pedunculate; lateral spikes female, cylindrical, 1.5–4.5 cm, densely many flowered and slightly loosely flowered at base, lowest one rather long pedunculate, upper spikes shortly pedunculate. Female glumes brownish yellow or yellowish, ovate or oblong-ovate, ca. 2.5 mm, membranous, 1-veined, apex acuminate, mucronate. Utricles yellowish green, obliquely patent, more divergent at maturity, longer than glume, ovate or narrowly ovate, obscurely trigonous, 3.5–4 mm, membranous, shiny, glabrous, 5-veined abaxially, base subrounded, apex attenuate into a medium-sized to long and recurved beak, orifice emarginate. Nutlets brown, slightly loosely enveloped, obovate or subelliptic, trigonous, ca. 2 mm; style base slightly thickened; stigmas 3. Fl. and fr. Apr–Aug.

Streamsides, ditch sides, wet places in forests; 1100–1900 m. Hebei, Heilongjiang, Jilin, Liaoning, Shaanxi [Japan, Korea, Russia (Far East)].

33. Carex sect. Secalinae (O. Lang) O. Lang ex Kükenthal in Engler, Pflanzenr. 38(IV. 20): 679. 1909.

离穗藁草组 li sui tai cao zu

Dai Lunkai (戴伦凯); Tetsuo Koyama

Carex [unranked] *Secalinae* O. Lang, Linnaea 24: 611. 1851.

Rhizome rather thick. Culms tufted, robust, triquetrous, leafy below middle part of culm, leaves rather stiff. Involucral bracts leaflike, longer than inflorescence, upper involucral bracts rather short, long sheathed. Spikes unisexual, upper 1–3 male, remaining spikes female, densely many flowered, with rather short peduncle. Female glumes scabrous on costa. Utricles plano-convex-trigonous, 5–10 mm, leathery, glabrous or scabrous, distinctly many veined, apex attenuate into a long beak, orifice slightly long 2-toothed. Style base not thickened; stigmas 3.

Three species: N Africa, Asia, Europe; one species in China.

289. Carex eremopyroides V. I. Kreczetowicz in Komarov, Fl. URSS 3: 617. 1935.

离穗藁草 li sui tai cao

Rhizome short. Culms tufted, 5–25 cm tall, triquetrous, smooth, clothed at base with reddish brown sheaths. Leaves longer than culm, blades 2–3 mm wide, flat, scabrous on margins, slightly long sheathed, lower sheaths usually red-brown. Involucral bracts leaflike, longer than subtending spike, lower sheaths rather long, upper sheaths rather short. Spikes 4 or 5, ± contiguous, lowermost one rather spaced; upper 1 or 2 spikes male, clavate, 0.8–1.2 cm, shortly pedunculate, suppressing contiguous female spike; remaining spikes female, oblong, 1–1.8 cm, densely many flowered, upper spikes shortly pedunculate, lower ones slightly long pedunculate, peduncles usually

enclosed in involucral bracts sheaths. Female glumes pale or slightly brownish yellow, ovate or broadly ovate, ca. 3 mm, 3-veined, green between veins, scabrid on veins, margins hyaline, apex acute. Utricles yellowish green, slightly brownish at maturity, slightly obliquely patent, longer than glume, ovate-lanceolate or oblong-ovate, plano-convex-trigonous, 5–8 mm, subleathery, glabrous, 2–4-veined abaxially, base subrounded, margins serrulate winged, apex attenuate into a slightly broad and ± long beak, orifice membranous and deeply splitting into 2 teeth. Nutlets dark brown, slightly loosely enveloped, oblong, compressed trigonous, 3–4 mm, granular-punctate, base shortly stipitate; style tortuous, persistent, base slightly thickened; stigmas 3. Fl. and fr. May–Jul.

Moors, wet places on lakesides and riversides. Heilongjiang, Jilin, Nei Mongol [Mongolia, Russia].

34. Carex sect. Rhomboidales Kükenthal in Engler, Pflanzenr. 38(IV. 20): 622. 1909.

菱形果藁草组 ling xing guo tai cao zu

Liang Songyun (梁松筠 Liang Song-jun); Tetsuo Koyama, Gordon C. Tucker

Culms central or lateral, rarely very short. Involucral bracts shortly bladed and sheathing or leaflike and sheathless. Terminal spike male, cylindrical, clavate, or linear; lateral spikes androgynous, usually with a long or short male part at apex, rarely all female. Female glumes ovate, oblong, or ovate-lanceolate, rarely linear-lanceolate, apex mucronate, rounded or acuminate, rarely emarginate. Utricles rhomboid, elliptic, or ovate, subleathery or membranous, glabrous, rarely hirsute, many veined, base gradually attenuate, apex abruptly contracted into a long beak, orifice 2-toothed. Nutlets obovate or ovate, trigonous, with angles constricted at middle, beak erect or curved, annulate or not at orifice; style base thickened or not thickened; stigmas 3.

About 50 species: E and SE Asia; 43 species (34 endemic) in China.

1a. Culms very short.

- 2a. Female glumes ovate, rounded at apex 331. *C. radicyflora*
 2b. Female glumes linear-lanceolate, acuminate at apex, scabrous on margins 332. *C. zunyiensis*

1b. Culms long.

3a. Nutlets trigonous with angles not constricted at middle.

4a. Utricles hirsute.

- 5a. Female spikes usually bearing male flowers at base; utricles rhomboid or obovate 290. *C. chinensis*
 5b. Female spikes without male flowers at base; utricles ovate or lanceolate-ovate.

- 6a. Utricles lanceolate-ovate, 4.5–5 mm 291. *C. dipledon*
 6b. Utricles ovate, 3–4 mm 292. *C. blinii*

4b. Utricles glabrous.

- 7a. Nutlets with transparent grains on surfaces 304. *C. oxyphylla*
 7b. Nutlets without transparent grains on surfaces.

- 8a. Style slender, base curved 293. *C. qingdaoensis*
 8b. Style base slightly thickened, not curved.

9a. Involucral bracts leaflike, all involucral bracts or lowest one longer than inflorescence.

- 10a. Spikes 4 or 5, terminal spike linear, sessile 294. *C. manciformis*

- 10b. Spikes 2–4, terminal spike linear-cylindric, linear-oblong, or linear, pedunculate.
- 11a. Spikes 3 or 4, terminal spike male, linear-cylindric, lateral spikes androgynous, male part 1/3–1/2 length of female part 297. *C. austrosinensis*
- 11b. Spikes 2–4, terminal spike male, linear or linear-oblong, lateral spikes female, oblong 298. *C. macrandrolepis*
- 9b. Involucral bracts shortly bladed, shorter than inflorescence.
- 12a. Utricles hirsute.
- 13a. Utricles narrowly rhomboid, 5–6 mm 299. *C. tatsutakensis*
- 13b. Utricles oblong, 7–8 mm 300. *C. longerostrata*
- 12b. Utricles glabrous.
- 14a. Leaves 6–10 mm wide.
- 15a. Leaves subequaling culm, 6–8 mm wide; nutlets with beak erect, base erect stipitate 301. *C. xiphium*
- 15b. Leaves surpassing culm, 7–10 mm wide; nutlets with beak curved, base curved stipitate 303. *C. yangshuoensis*
- 14b. Leaves 1.5–3.5 mm wide.
- 16a. Spikes 2, terminal spike clavate, ca. 1 cm, lateral spikes female, ovate, ca. 1 cm, 4- or 5-flowered 302. *C. pseudolongostrata*
- 16b. Spikes 3 or 4, terminal spike cylindric, 3–6 cm, lateral spikes mostly female, ± with male flowers at apex, cylindric, 1.5–4.5 cm, slightly densely flowered.
- 17a. Leaves 3–5 mm wide; utricle beak 2-toothed; nutlets ovoid, ca. 5 mm 295. *C. simulans*
- 17b. Leaves 7–12 mm wide; utricle beak barely 2-toothed; nutlets broadly obovoid, 3.5–4.5 mm 296. *C. austrozhejiangensis*
- 3b. Nutlets trigonous with angles constricted at middle.
- 18a. Culms lateral.
- 19a. Nutlets with curved beak.
- 20a. Nutlets with longer beak, ca. 1 mm; female spikes oblong, 1.7–3 cm.
- 21a. Leaf blades, involucral bracts, and sheaths scabrous; involucral bracts leaflike, longer than spike; female glumes pale brown, green 3-veined scabrous costa excurrent into a long awn at obtuse apex 305. *C. shangchengensis*
- 21b. Leaf blades, involucral bracts, and sheaths glabrous; involucral bracts shortly bladed, shorter than spike; female glumes yellow-white, green 3-veined glabrous costa excurrent into a mucro at emarginate apex 306. *C. manca*
- 20b. Nutlets with shorter beak; female spikes cylindric, 3–7 cm.
- 22a. Female spikes rather thick, ca. 15 mm wide; utricles subglobose 307. *C. nanchuanensis*
- 22b. Female spikes rather slender, 7–11 mm wide; utricles ovate.
- 23a. Lateral spikes androgynous, usually male part equaling female part, densely flowered 310. *C. tibetica*
- 23b. Lateral spikes mostly female with male flowers at apex, male part shorter than female part.
- 24a. Female spikes sparsely flowered, horizontally patent at maturity 308. *C. heudesii*
- 24b. Female spikes densely flowered, obliquely patent at maturity 309. *C. taipaihanica*
- 19b. Nutlets with erect beak.
- 25a. Female spikes only 1; female glumes ovate, costa projecting beyond apex forming a long awn 311. *C. funingensis*
- 25b. Female spikes 3–5; female glumes ovate or ovate-oblong, obtuse or rounded at apex, green 3-veined costa projecting beyond apex forming a mucro or cusp but rarely an awn.
- 26a. Female spikes cylindric; nutlets with cylindric beak annulate at orifice.
- 27a. Female spikes spaced, sparsely flowered; female glumes with a mucro at apex; utricles puberulent 314. *C. longqishanensis*
- 27b. Female spikes approximate, densely flowered; female glumes awned or cuspidate at apex; utricles glabrous.
- 28a. Female glumes awned at apex; terminal spike male, linear-cylindric, 4.5–8 cm 312. *C. harlandii*
- 28b. Female glumes cuspidate at apex; terminal spike male, linear 1.5–3 cm 313. *C. hoozanensis*

- 26b. Female spikes ovate or oblong; beak of nutlets not thickened or slightly thickened but not annulate at orifice.
- 29a. Utricles puberulent 306. *C. manca*
- 29b. Utricles glabrous.
- 30a. Culms 25–40 cm tall; leaf blades 4–6 mm wide 315. *C. hastata*
- 30b. Culms 7–13 cm tall; leaf blades 10–15 mm wide 316. *C. kaoi*
- 18b. Culms central.
- 31a. Culms, leaves, involucre bracts, female glumes, and utricles all puberulent.
- 32a. Beak of nutlets erect; female spikes 3, bearing a short male part at apex; leaf blades 6–10 mm wide 317. *C. pseudolaticeps*
- 32b. Beak of nutlets curved; female spikes 1 or 2; leaf blades 3–5 mm wide 318. *C. laticeps*
- 31b. Culms, leaves, involucre bracts, and female glumes all glabrous.
- 33a. Female glumes linear-lanceolate or ovate-lanceolate, usually acuminate at apex, rarely awned.
- 34a. Female glumes brown.
- 35a. Female glumes linear-lanceolate; lateral spikes usually female, occasionally becoming androgynous, male part shorter than female part; style base not thickened 329. *C. brevicuspis*
- 35b. Female glumes ovate-lanceolate; lateral spikes usually female, occasionally becoming androgynous, male part longer than or equaling female part; style base thickened 330. *C. kuchunensis*
- 34b. Female glumes pale green or pale yellow.
- 36a. Beak of nutlets curved; female glumes slightly longer than or equaling utricles 326. *C. cheniana*
- 36b. Beak of nutlets erect; female glumes shorter than utricles.
- 37a. Culms up to ca. 65 cm tall; leaf blades 8–10 mm wide; lateral spikes cylindric, ca. 6.5 × 1 cm 327. *C. saxicola*
- 37b. Culms 2–10 cm tall; leaf blades 1.5–2.5 mm wide; lateral spikes oblong-cylindric, ca. 1.2 × 0.6 cm 328. *C. lianchengensis*
- 33b. Female glumes ovate, oblong-ovate, or oblong, obtuse, rounded, or truncate at apex, green 1- or 3-veined costa projecting beyond apex forming a mucro or long awn.
- 38a. Beak of nutlets short and curved, annulate at orifice, style base thickened; leaf blades abruptly contracted into a cusp at apex 319. *C. liqingii*
- 38b. Beak of nutlets long and erect, rarely short, annulate or not at orifice, style base hardly thickened; leaf blades not contracted into a cusp at apex.
- 39a. Nutlets shallowly constricted on angles at middle, beak short; leaf blades papery 320. *C. rhynchophora*
- 39b. Nutlets deeply constricted on angles at middle, beak ca. 1 mm or more; leaf blades leathery.
- 40a. Female glumes ovate, acute or mucronate at apex, red-brown; nutlets constricted on angles and concave surfaced 321. *C. calcicola*
- 40b. Female glumes oblong, obtuse or emarginate at apex, green 3-veined costa excurrent into an awn, brown; nutlets constricted only on angles at middle.
- 41a. Spikes 2, lateral spike wholly female 325. *C. putuoensis*
- 41b. Spikes 3 or 4, lateral spikes female or androgynous with male part up to 1/2 length of spike.
- 42a. Nutlets rhomboid 322. *C. tenebrosa*
- 42b. Nutlets obovoid or ovoid-ellipsoid.
- 43a. Nutlets ovoid-ellipsoid; female glumes with awn ca. 3.5 mm 323. *C. chaofangii*
- 43b. Nutlets broadly obovoid; female glumes with awn ca. 5 mm 324. *C. wahuensis*

290. *Carex chinensis* Retzius, Observ. Bot. 3: 42. 1783.

中华薹草 zhong hua tai cao

Rhizome short, obliquely ascending, woody. Culms tufted, 20–55 cm tall, slender, obtusely trigonous, clothed at base with

brown sheaths disintegrating into fibers. Leaves longer than culm, blades light green, linear, 3–9 mm wide, leathery, margins scabrous. Involucre bracts shortly bladed, long sheathing. Spikes 4 or 5, distant; terminal spike usually male, rarely gynaecandrous, narrowly cylindric, 2.5–4.2 cm, peduncle 2.5–3.5

cm; lateral spikes female, usually with several male flowers at apex or base, subdensely flowered, peduncles erect, slender. Female glumes pale, oblong-lanceolate, rarely obovate-oblong, ca. 3 mm, green 3-veined costa excurrent into a scabrous long awn, apex truncate or sometimes emarginate or acuminate. Utricles yellow-green, longer than glume, obliquely patent, rhomboid or obovate, subinflated trigonous, 3–4 mm, membranous, sparsely puberulent, many veined, base gradually narrowed into a stipe, apex abruptly contracted into a beak of medium length, orifice 2-toothed. Nutlets tightly enveloped, rhomboid, trigonous, faces concave, apex abruptly contracted into a short beak, beak annulate at orifice; style base thickened; stigmas 3. Fl. and fr. Apr–Jun.

• Shady places in valleys, rocky streamsides and grasslands; 200–1700 m. Fujian, Guangdong, Guizhou, Hunan, Jiangxi, Shaanxi, Sichuan, Yunnan, Zhejiang.

- 1a. Terminal spike male; female glumes
oblong-lanceolate 290a. var. *chinensis*
1b. Terminal spike gynaeandrous;
female glumes obovate-oblong 290b. var. *longkiensis*

290a. *Carex chinensis* var. *chinensis*

中华藁草(原变种) *zhong hua tai cao* (yuan bian zhong)

Terminal spike male. Female glumes oblong-lanceolate.

• Shady places in valleys, rocky streamsides and grasslands; 200–1700 m. Fujian, Guangdong, Guizhou, Hunan, Jiangxi, Shaanxi, Sichuan, Yunnan, Zhejiang.

290b. *Carex chinensis* var. *longkiensis* (Franchet) Kükenthal in Engler, Pflanzenr. 38(IV. 20): 625. 1909.

龙奇藁草 *long qi tai cao*

Carex longkiensis Franchet, Bull. Soc. Philom. Paris, sér. 8, 7: 86. 1895.

Terminal spike gynaeandrous. Female glumes obovate-oblong.

• NE Yunnan.

291. *Carex dipledon* Nelves, Bull. Misc. Inform. Kew 1939: 184. 1939.

秦岭藁草 *qin ling tai cao*

Rhizome very short. Culms 19–22 cm tall, obtusely trigonous, slightly thick, smooth, clothed at base with brown sheaths disintegrating into fibers. Leaves longer than culm, blades linear, 3–5 mm wide, slightly curved or plicate, apex acuminate. Involucral bracts shortly bladed, shorter than subtending spike, long sheathing. Spikes 4 or 5, approximate, lowest one often distant; terminal spike male, brown, narrowly cylindrical, 2.5–3 cm; lateral spikes female, erect, cylindrical, 2.5–5 cm, densely many flowered, sessile or with short peduncles. Female glumes pale green, oblong-lanceolate, green 3-veined costa excurrent into a mucro. Utricles green-brown, longer and broader than glume, obliquely patent, lanceolate-ovate, subtrigonous, 4.5–5 mm, membranous, sparsely hispid, many veined, base cuneate, apex gradually tapering into a conic long beak, orifice 2-toothed. Nutlets tightly enveloped, elliptic, trigonous, faces con-

cave at base, apex abruptly contracted into a short beak, beak annulate at orifice; style base thickened; stigmas 3. Fr. Apr.

• On rocks along valleys and slopes. Gansu, Shaanxi.

292. *Carex blinii* H. Léveillé & Vaniot, Bull. Soc. Bot. France 53: 316. 1906.

白里藁草 *bai li tai cao*

Rhizome short. Culms lateral, tufted, 3–13 cm tall, trigonous, scabrous above, with dark brown sheaths 1–2 cm, sheaths disintegrating into fibers. Leaves basal, much surpassing culm, blades linear, 2–7 mm wide, flattish plicate, apex long acuminate. Lowest involucral bract leaflike, 1.5–2.5 cm surpassing inflorescence. Spikes 2–4, crowded; terminal spike male, linear-clavate, 3–5 mm; lateral spikes female, broadly elliptic or subglobose, 5–7 mm, slightly densely flowered, ± sessile. Female glumes dark brown or whitish, deltoid, deltoid-lanceolate, broadly ovate, or deltoid-ovate, 1.5–2.7 mm, margins hyaline, green 3-veined costa excurrent into a short mucro, apex acute or acuminate. Utricles longer than glume, patent, ovate-rhomboid, trigonous, 3–4 × 1.6–1.8 mm, glaucous, glabrous to puberulent, 10–14-veined, base shortly stipitate, apex gradually narrowed to a conic beak ca. 0.6 mm, orifice deeply 2-toothed with up to ca. 0.5 mm long teeth. Nutlets tightly enveloped, broadly ovate, trigonous, faces concave, 2.3–2.4 × ca. 1.6 mm; style base thickened; stigmas 3.

Streamsides in evergreen forests, woods; 300–700 m. Guangxi, Guizhou, Shanghai [Thailand, Vietnam].

- 1a. Leaf blades 2–5 mm wide; female
glumes deltoid or deltoid-lanceolate,
1.5–2.7 mm 292a. subsp. *blinii*
1b. Leaf blades 3–7 mm wide; female
glumes broadly ovate or
deltoid-ovate, ca. 2 mm 292b. subsp. *shanghaiensis*

292a. *Carex blinii* subsp. *blinii*

白里藁草(原亚种) *bai li tai cao* (yuan ya zhong)

Leaf blades 2–5 mm wide. Female glumes deltoid or deltoid-lanceolate, 1.5–2.7 mm.

Streamsides in evergreen forests; 300–700 m. Guangxi, Guizhou [Thailand, Vietnam].

292b. *Carex blinii* subsp. *shanghaiensis* (S. X. Qian & Y. Q. Liu) S. Yun Liang & T. Koyama, **comb. et stat. nov.**

上海藁草 *shang hai tai cao*

Basionym: *Carex shanghaiensis* S. X. Qian & Y. Q. Liu, Acta Phytotax. Sin. 37: 103. 1999.

Leaf blades 3–7 mm wide. Female glumes broadly ovate or deltoid-ovate, ca. 2 mm.

• Woods. Shanghai.

293. *Carex qingdaoensis* F. Z. Li & S. J. Fan, Bull. Bot. Res., Harbin 13: 71. 1993.

青岛藁草 *qing dao tai cao*

Rhizome thick, obliquely ascending. Culms 30–40 cm tall,

slender, trigonous, clothed at base with dark brown sheaths disintegrating into parallel fibers. Leaves longer than culm, blades linear, 3–5 mm wide, leathery. Involucral bracts shortly bladed, shorter than subtending spike, sheathing 2.5–4 cm. Spikes 2 or 3; terminal spike male, cylindrical, ca. 40 × 7 mm; lateral spikes female, with few male flowers at apex, distant, cylindrical, 4–5 × ca. 0.8 cm, densely flowered; peduncles 3–5 cm. Female glumes brown, elliptic-lanceolate, 8–10 mm, 3-veined costa excurrent into a scabrous awn ca. 5 mm, apex truncate or emarginate. Utricles obovate-elliptic, trigonous, 5–6 mm, glabrous, faces concave at base, apex abruptly contracted into a scabrous beak ca. 3 mm, orifice deeply 2-lobed. Nutlets obovate, trigonous, 2–2.5 mm, faces concave at base; style slender, base curved; stigmas 3.

- Shandong (Qingdao).

294. *Carex maniciformis* C. B. Clarke ex Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 3, 10: 62. 1898 [*“mancaeformis”*].

鄂西薹草 *e xi tai cao*

Rhizome woody, slightly oblique, roots thick and rigid. Culms 30–40 cm tall, slender, trigonous, slightly scabrous, clothed at base with dark brown sheaths disintegrating into fibers. Leaves longer than culm, blades glaucous green, broadly linear, 5–9 mm wide, flat, leathery. Involucral bracts leaflike, much longer than subtending spike, sheathing. Spikes 4 or 5; terminal spike male, linear, 2–3 cm, sessile; lateral spikes female, cylindrical, 2–3.5 cm, slightly loosely flowered, uppermost one contiguous to male spike, subsessile, remaining spikes slightly distant, shortly pedunculate. Female glumes pale green, ovate, 5–6 mm, green 3-veined costa excurrent into a mucro. Utricles yellow-green, longer than or subequaling glume, rhomboid, inflated trigonous, 5.5–6 mm, leathery, slightly pubescent when young, later glabrous, slightly shiny, many veined, base attenuate, apex abruptly contracted into a cylindrical, smooth, long beak, orifice 2-toothed. Nutlets tightly enveloped, ovate, trigonous, curved, faces concave at base, base shortly stipitate, apex abruptly contracted into a cylindrical curved beak, beak annulate at orifice; style slightly thickened; stigmas 3. Fl. and fr. Mar–Apr.

- Sparse forests; ca. 1600 m. Guizhou, Hubei, Sichuan.

295. *Carex simulans* C. B. Clarke, J. Linn. Soc., Bot. 36: 310. 1904.

相仿薹草 *xiang fang tai cao*

Rhizome thick, woody, rigid. Culms lateral, 30–70 cm tall, slender, obtusely trigonous, smooth, scabrous above, clothed at base with dark brown sheaths disintegrating into fibers. Leaves shorter than culm, blades pale green, linear, 3–5 mm wide, flat, revolute, upper margins scabrous, apex acuminate. Involucral bracts shortly bladed, long sheathing. Spikes 3 or 4, distant; terminal spike male, cylindrical, 3–6 cm; lateral spikes mostly female, sometimes bearing few to many male flowers at apex, cylindrical, 1.5–4.5 cm, slightly or rather densely flowered; peduncles erect. Female glumes brown or white, ovate-lanceolate or oblong-lanceolate, 5–5.5 mm, green 3-veined costa excurrent into a scabrous awn at emarginate apex. Utricles green, slightly longer than glume, obliquely patent, ovate (excluding beak), 6–

8 mm (including beak), subleathery, glabrous, many veined, base contracted, apex abruptly contracted into a scabrous long beak, orifice 2-toothed. Nutlets loosely enveloped, ovate, trigonous, ca. 5 mm (including beak), not constricted on angles at middle, base shortly stipitate, apical beak erect, ca. 1 mm; style base thickened; stigmas 3. Fl. and fr. Mar–May.

- Roadsides, slopes, forests, streamsides. Hubei, Sichuan, Zhejiang.

- 1a. Female glumes brown, shortly awned at apex; female spikes slightly densely flowered 295a. var. *simulans*
- 1b. Female glumes white, long awned at apex; female spikes rather densely flowered 295b. var. *densiflora*

295a. *Carex simulans* var. *simulans*

相仿薹草(原变种) *xiang fang tai cao* (yuan bian zhong)

Female spikes slightly densely flowered. Female glumes brown, shortly awned. Fl. and fr. Mar–May.

- Roadsides, slopes, forests, streamsides. Hubei, Sichuan, Zhejiang.

295b. *Carex simulans* var. *densiflora* Tang & F. T. Wang ex S. Yun Liang, Acta Phytotax. Sin. 36: 537. 1998.

密花相仿薹草 *mi hua xiang fang tai cao*

Female spikes rather densely flowered. Female glumes white, long awned.

- Forests; ca. 2100 m. Sichuan.

296. *Carex austrozhejiangensis* C. Z. Zheng & X. F. Jin, Acta Phytotax. Sin. 42: 546. 2004.

浙南薹草 *zhe nan tai cao*

Rhizome thick, woody, rigid. Culms lateral, 15–40 cm tall, slender, obtusely trigonous, smooth, clothed at base with dark brown sheaths. Leaves longer than culm, blades pale green, linear, 7–12 mm wide, flat, apex acuminate-caudate. Involucral bracts shortly bladed, sheath 6–12 mm. Spikes 3 or 4, distant; terminal spike male, cylindrical, 1.5–2 cm; lateral spikes female, cylindrical, 2–3.5 cm, densely flowered; peduncles erect. Female glumes reddish brown, broadly ovate, 3–3.5 mm (excluding awn), green 3-veined costa excurrent into a scabrous awn ca. 1 mm at subacute apex. Utricles green, longer than glume, slightly patent, ovoid-ellipsoid, 6.5–7 mm (including beak), glabrous, many veined, base contracted, apex gradually contracted into a beak 1.5–2 mm, orifice barely 2-toothed. Nutlets loosely enveloped, broadly obovoid, trigonous, ca. 5 mm (including beak), not constricted on angles at middle, base shortly stipitate, apical beak erect, ca. 1 mm; style base thickened; stigmas 3. Fl. and fr. May–Jul.

- Roadsides, slopes, forests, streamsides; ca. 600 m. Zhejiang (Longquan, Qingtian, Suichang).

297. *Carex austrosinensis* Tang & F. T. Wang ex S. Yun Liang, Acta Phytotax. Sin. 33: 488. 1995.

华南薹草 *hua nan tai cao*

Rhizome woody. Culms 25–45 cm tall, slender, trigonous, smooth, clothed at base with brown sheaths often disintegrating into fibers. Leaves surpassing culm, blades dark green, linear, 1.5–3 mm wide, margins scabrous, revolute, apex acuminate. Involucral bracts leaflike, long sheathing, lowest involucral bract longer than culm. Spikes 3 or 4, distant; terminal spike male, yellow-brown, linear-cylindric, 3–4 × 0.2–0.25 cm, with slender long peduncle; lateral spikes androgynous, male part 1/3–1/2 length of female part, cylindric, loosely flowered. Female glumes yellow-brown, ovate, green 3-veined costa excurrent into a scabrous awn, apex truncate or sometimes emarginate. Utricles brown, longer than glume, obliquely patent, lanceolate, 5–6 mm, papery, glabrous, slender, many veined, base cuneate, apex gradually narrowed to a smooth or slightly scabrous long beak, orifice 2-toothed. Nutlets brown, tightly enveloped, obovate, trigonous, 2.5–3 mm, faces concave, base curved stipitate, apex abruptly contracted into a curved beak ca. 1 mm, beak annulate at orifice; style base thickened; stigmas 3. Fr. Jun.

- Rocky slopes; ca. 1100 m. Guangdong.

298. *Carex macrandrolepis* H. Léveillé & Vaniot, Repert. Spec. Nov. Regni Veg. 5: 241. 1908 [*“macrandrolepsis”*].

和平菱果薹草 he ping ling guo tai cao

Carex sharyotensis Hayata.

Rhizome slender, horizontal, with slender stolons. Culms slender, 13–14 cm tall, 0.3–0.7 mm thick, trigonous, smooth, clothed at base with dark brown sheaths eventually disintegrating into fibers. Leaves equaling or slightly longer than culm, blades green, linear, 2–3 mm wide, flattish plicate, scabrous adaxially, apex acuminate. Involucral bracts leaflike, sheathing. Spikes 3 or 4, distant; terminal spike male, pale brownish, linear or linear-oblong, 10–30 × 1.5–2.5 mm, much surpassing uppermost female spike; lateral spikes female, oblong, 10–15 × ca. 4 mm, subloosely 5–10-flowered; peduncles erect, upper 1 or 2 short and enclosed, lower 1 or 2 exserted. Female glumes pale, usually brownish margined, obovate-elliptic or obovate, 3.8–4 mm, membranous, green 3-veined costa excurrent into a straight short awn, apex rounded or shallowly emarginate. Utricles pale greenish, longer than glume, erect, patent, rhomboid, trigonous, 5–6 mm, thin leathery, slightly shiny, sparsely hirsute to glabrescent, obscurely few veined or nearly nerveless except for 2 costas on edges, cuneate at both ends, apical beak conic, obliquely truncate at sharply 2-toothed orifice. Nutlets tightly enveloped, obovate, ca. 2.5 mm, trigonous with angles shallowly constricted at middle, base cuneate, shortly stipitate, apex obtuse; style base slightly thickened; stigmas 3.

Grasslands at low elevations. Taiwan [WC Japan, S Korea].

299. *Carex tatsutakensis* Hayata, Icon. Pl. Formosan. 6: 133. 1916.

锐果薹草 rui guo tai cao

Carex taihokuensis Hayata.

Rhizome short. Culms lateral, slender, 10–30 cm tall, trigonous, erect, smooth, clothed at base with 2–4 purplish or dark

brown, bladeless or shortly bladed sheaths disintegrating into parallel fibers. Leaves surpassing culm, blades broadly or narrowly linear, 2.5–8 mm wide, flattish, soft or subrigid. Spikes 2–4, all or occasionally except lowest one subfastigate; terminal spike male, pale brownish, linear, 5–10 mm, surpassed by next female spike, few or several flowered; lateral spikes female or rarely with a few male flowers at apex, suberect, oblong, 7–12 × ca. 5 mm, subloosely 3–7-flowered, sessile or subsessile. Female glumes pale, lanceolate to lanceolate-oblong, 3–4 mm, membranous, glaucous green 3-veined costa projecting beyond apex forming a short erect awn or cusp, apex subacute. Utricles light green, longer than glume, erect-patent, rhomboid or rhomboid-ovate, trigonous, 6–7 mm, papery, glabrous to sparsely hirsute, faintly several veined, base cuneate, shortly stipitate, apex truncate and narrowed to a slender beak ca. 2 mm, beak scabrous on edges, 2-toothed at orifice. Nutlets tightly enveloped, ovate or oblong-ovate, ca. 3 mm, trigonous with shallowly concave sides; style base slightly thickened; stigmas 3.

- Wet grasslands on mountain slopes. Taiwan.

300. *Carex longerostrata* C. A. Meyer, Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans 1: 220. 1831.

长嘴薹草 chang zui tai cao

Rhizome short or long creeping, obliquely ascending, woody. Culms tufted, slender, 15–50 cm tall, compressed trigonous, slightly scabrous above, clothed at base with light green sheaths when young, finally becoming dark brown, disintegrating into fibers. Involucral bracts shortly bladed, shorter than inflorescence, sheathing. Spikes usually 2, rarely 3; terminal spike male, brownish, clavate, 1–2.5 cm, densely flowered; lateral spikes female, ovate or oblong, 1–1.7 cm, 6–10-flowered; peduncles scarcely exserted from sheath. Female glumes light ferruginous, narrowly elliptic or lanceolate, ca. 6.5 mm, green 3-veined costa excurrent into a scabrous long awn at truncate or obtuse apex, or apex awnless. Utricles green or pale brown, slightly longer than glume, obliquely patent, obovate, obtusely trigonous, 7–8 mm (including beak), membranous, sparsely hirsute or glabrous, many veined, base contracted, apex abruptly contracted into a scabrous long beak, orifice deeply 2-lobed with long teeth. Nutlets tightly enveloped, obovate, obtusely trigonous, ca. 3 mm, faces concave at base, base shortly stipitate; style persistent, base slightly thickened, curved or erect; stigmas 3. Fl. and fr. Apr–Jun.

Grassy slopes, mountain thickets, watersides, forests, grasslands, on cliffs; 400–2500 m. Hebei, Heilongjiang, Jilin, Liaoning, Shaanxi, Shanxi, Zhejiang [Japan, Korea, Russia (Far East, Kamchatka)].

- 1a. Rhizome short, oblique; utricles sparsely hirsute; style base curved 300a. var. *longerostrata*
- 1b. Rhizome long creeping.
 - 2a. Utricles glabrous; style erect 300c. var. *hoi*
 - 2b. Utricles sparsely hirsute or pubescent; style curved.
 - 3a. Female glumes aristate 300b. var. *pallida*
 - 3b. Female glumes acuminate 300d. var. *exaristata*

300a. *Carex longerostrata* var. *longerostrata*

长嘴藁草(原变种) chang zui tai cao (yuan bian zhong)

Carex longerostrata var. *tsinlingensis* K. T. Fu.

Rhizome short, oblique. Female glumes aristate. Utricles sparsely hirsute. Style base curved.

Grassy slopes, mountain thickets, watersides, forests; 1200–2500 m. Hebei, Heilongjiang, Jilin, Liaoning, Shaanxi, Shanxi [Japan, Korea, Russia (Far East, Kamchatka)].

300b. *Carex longerostrata* var. *pallida* (Kitagawa) Ohwi, Acta Phytotax. Geobot. 4: 43. 1935.

细穗藁草 xi sui tai cao

Carex tenuistachya Nakai var. *pallida* Kitagawa, Bot. Mag. (Tokyo) 48: 25. 1934; *C. tenuistachya* f. *pallida* (Kitagawa) Kitagawa.

Rhizome long creeping. Female glumes aristate. Utricles sparsely hirsute. Style base curved.

Forests, grasslands. Jilin, Liaoning [Japan, Korea].

300c. *Carex longerostrata* var. *hoi* Chü ex S. Yun Liang, Acta Phytotax. Sin. 36: 537. 1998.

城弯藁草 cheng wan tai cao

Rhizome long creeping. Female glumes aristate. Utricles glabrous. Style base erect. Fl. and fr. Apr.

• Zhejiang.

300d. *Carex longerostrata* var. *exaristata* X. F. Jin & C. Z. Zheng, Acta Phytotax. Sin. 42: 548. 2004.

无芒长嘴藁草 wu mang chang zui tai cao

Rhizome long creeping. Female glumes acuminate, not aristate. Utricles very sparsely pubescent. Style base curved. Fl. and fr. Apr.

• On cliffs; ca. 400 m. Zhejiang (Yueqing).

301. *Carex xiphium* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 18: 446. 1901.

稗藁草 bai tai cao

Rhizome long creeping, woody. Culms lateral, 30–45 cm tall, compressed trigonous, slightly scabrous above, clothed at base with brown sheaths slightly disintegrating into fibers. Leaves subequaling culm, blades pale green, broadly linear, 6–8 mm wide, flat, margins scabrous. Involucral bracts shortly bladed, long sheathing. Spikes 2 or 3, distant; terminal spike male, clavate-oblong, 1.5–2 cm; lateral spikes female, oblong, 1–2 cm, loosely flowered; peduncles enclosed. Female glumes pale ferruginous, oblong-ovate, green scabrous 3-veined costa excurrent into an awn. Utricles yellow-green, longer than glume, obliquely patent, obovate-elliptic (excluding beak), obtusely trigonous, 6–7 mm (including beak), membranous, glabrous, faintly veined, base contracted into a stipe, apex abruptly contracted into a compressed cylindrical, scabrous, long beak, orifice deeply 2-lobed with long teeth. Nutlets tightly enveloped, obovate, obtusely trigonous angles not constricted, faces concave

at base, base with short stipe ca. 0.5 mm; style base slightly thickened; stigmas 3. Fl. and fr. Jun.

Forests. Jilin [Korea, Russia (Far East)].

302. *Carex pseudolongerostrata* Y. L. Chang & Y. L. Yang, Fl. Pl. Herb. Chin. Bor.-Orient. 11: 206. 1976 [“*pseudo-longerostrata*”].

假长嘴藁草 jia chang zui tai cao

Rhizome obliquely ascending, woody. Culms densely tufted, 15–30 cm tall, slender, compressed trigonous, scabrous above, clothed at base with brown sheaths disintegrating into fibers. Leaves shorter than culm, ca. 1/2 as long as culm, 1.5–3.5 mm wide, flat, margins scabrous, apex acuminate. Involucral bracts shortly bladed, shortly sheathing. Spikes usually 2, rarely 3; terminal spike male, clavate, cylindrical, ca. 1 cm; lateral spikes female, ovate, ca. 1 cm, 4- or 5-flowered, with short peduncles. Female glumes brown, ovate, green 3-veined costa forming a scabrous awn at apex. Utricles yellow-green, longer than glume, obliquely patent, ovate (excluding beak), ca. 6 mm (including beak), glabrous, finely faintly many veined, base contracted, apex abruptly contracted into a cylindrical scabrous long beak, orifice deeply 2-lobed with long teeth. Nutlets dark castaneous, tightly enveloped, obovate, ca. 1 mm, trigonous with angles not constricted at middle; style erect, base slightly thickened; stigmas 3. Fl. and fr. Jul–Aug.

Alpine frozen soil, grasslands, meadows in sparse forests; 1800–2300 m. Gansu, Jilin [Korea].

303. *Carex yangshuoensis* Tang & F. T. Wang ex S. Yun Liang, Acta Phytotax. Sin. 33: 488. 1995.

阳朔藁草 yang shuo tai cao

Rhizome woody, rigid. Culms 20–40 cm tall, glabrous, clothed at base with dark brown sheaths disintegrating into fibers. Leaves surpassing culm, blades linear, 7–10 mm wide, apex acuminate. Involucral bracts shortly bladed, long sheathing. Spikes 3 or 4, distant; terminal spike male, cylindrical, 3–4.5 × 0.3–0.4 cm, long pedunculate; lateral spikes androgynous, male part ca. 1/3 length of female part, cylindrical, 2.5–4.3 cm, densely flowered; peduncles smooth. Female glumes red-brown, ovate-lanceolate, margins pale hyaline, green 3-veined costa excurrent into a mucro. Utricles dark green, longer than glume, obliquely patent, elliptic, 5–6 mm, membranous, slender, glabrous, many veined, base truncate, apex abruptly contracted into a scabrous long beak, orifice 2-toothed. Nutlets pale brown, loosely enveloped, rhomboid, trigonous, 2.5–3 mm, not constricted on angles, faces concave at base, base curved stipitate, apex abruptly contracted into a curved beak ca. 1 mm; style base slightly thickened; stigmas 3.

• E Guangxi (Yangshuo).

304. *Carex oxyphylla* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 3, 10: 57. 1898.

尖叶藁草 jian ye tai cao

Carex jackiana Boott f. *oxyphylla* (Franchet) Kükenthal.

Rhizome stoloniferous. Culms 20–40 cm tall, smooth.

Leaves surpassing culm, blades linear, 2–4 mm wide, flat, margins scabrous, apex long acuminate. Involucral bracts leaflike, lower involucral bracts sheathing, upper involucral bracts shortly sheathing or not. Spikes 3–5, lowest spike distant, upper spikes approximate; terminal spike male, cylindrical, subacute, ca. 2 cm, shortly pedunculate; lateral spikes female, often bearing several male flowers, oblong or cylindrical, shortly pedunculate. Female glumes pale white, ovate-lanceolate or ovate, green 1-veined costa excurrent into an awn. Utricles green-brown, equaling glume, ovate-trigonous, ca. 3 mm, apex abruptly contracted into a short beak, orifice 2-toothed. Nutlets obovate or broadly ovate, ca. 1.2 mm, trigonous, faces concave with grains transparent on surfaces, apex rounded; style base not thickened; stigmas 3. Fl. and fr. May–Jun.

• Evergreen forests, forest margins; 1300–3000 m. SW Sichuan, NW Yunnan.

305. *Carex shangchengensis* S. Yun Liang, Acta Phytotax. Sin. 24: 242. 1986.

商城藁草 shang cheng tai cao

Rhizome short, woody. Culms lateral, 20–45 cm tall, compressed trigonous, clothed at base with dark brown sheaths eventually disintegrating into fibers. Leaves shorter than culm, blades green, linear, 4–7 mm wide, usually scabrous adaxially and on margins. Involucral bracts leaflike, scabrous, sheathing. Spikes 2; terminal spike male, clavate, ca. 3 mm; lateral spike androgynous, oblong, ca. 2.5 cm, densely flowered. Female glumes yellow-brown, oblong, 4.5–5 mm (excluding awn), green 3-veined scabrous costa excurrent into a long awn. Utricles pale brown, longer than glume, broadly ovate, ca. 6.5 mm, obliquely patent, densely hispid, many veined, apex abruptly contracted into a beak ca. 2.5 mm, orifice 2-toothed. Nutlets castaneous, tightly enveloped, ovate, ca. 3 mm, trigonous with angles constricted at middle, faces concave at base, base shortly stipitate, apex abruptly contracted into a curved beak; style base not thickened; stigmas 3. Fl. and fr. Apr.

• Slopes; ca. 600 m. Henan.

306. *Carex manca* Boott ex Benth, Fl. Hongk. 402. 1861.

弯柄藁草 wan bing tai cao

Rhizome thick and short, woody. Culms lateral, 30–70 cm tall, trigonous, slender, smooth, clothed at base with bladeless sheaths. Leaves longer than culm, rarely shorter, blades broadly linear, 2–10 mm wide, flat, leathery, base plicate, upper margins scabrous, apex acuminate. Involucral bracts shortly bladed, long sheathing. Spikes 2 or 3, distant; terminal spike male, linear-cylindrical, (1–)4–5 cm, with peduncles ca. 5 cm; lateral spikes female, oblong-cylindrical, 2–3 cm, slightly densely flowered, with short peduncles. Female glumes stramineous, oblong-lanceolate or ovate-lanceolate, green 3-veined costa excurrent into a mucro. Utricles yellow-green, longer than glume, obliquely patent, rhomboid-elliptic, trigonous, 6–8 mm, sub-leathery, sparsely pubescent, slender, many veined, base shortly stipitate, apex abruptly contracted into a smooth long beak, orifice 2-toothed. Nutlets yellow-brown, tightly enveloped, ovate, ca. 2.5 mm, trigonous with angles constricted at middle, faces

concave at base, base curved stipitate, apex abruptly contracted into a cylindrical curved beak; style base thickened; stigmas 3.

• Anhui, Guangdong, Hubei, Taiwan.

1a. Leaf blades shorter than culm 306d. subsp. *wichuræ*

1b. Leaf blades longer than culm.

2a. Leaf blades 2–3 mm wide; nutlets trigonous, sometimes with 1 angle constricted at middle 306b. subsp. *jiuhuaensis*

2b. Leaf blades 3–8 mm wide.

3a. Nutlets with apical beak curved 306a. subsp. *manca*

3b. Nutlets with apical beak short and erect 306c. subsp. *takasagoana*

306a. *Carex manca* subsp. *manca*

弯柄藁草(原亚种) wan bing tai cao (yuan ya zhong)

Leaves longer than culm, blades 6–8 mm wide. Nutlets with apical beak curved.

• Guangdong, Hubei (Badong).

306b. *Carex manca* subsp. *jiuhuaensis* (S. W. Su) S. Yun Liang, Acta Phytotax. Sin. 36: 537. 1998.

九华藁草 jiu hua tai cao

Carex jiuhuaensis S. W. Su, Bull. Bot. Res., Harbin 10(4): 5. 1990.

Leaves longer than culm, blades 2–3 mm wide. Nutlets trigonous, sometimes with 1 angle constricted at middle.

• Roadsides, slopes. Anhui.

306c. *Carex manca* subsp. *takasagoana* (Akiyama) T. Koyama, Fl. Taiwan 5: 328. 1978.

梦佳藁草 meng jia tai cao

Carex takasagoana Akiyama, Carices Far East. Reg. Asia, 214. 1955.

Leaves longer than culm, blades 3–5 mm wide. Utricles 7–8 mm. Nutlets with apical beak short and erect.

• Forests at high elevations. Taiwan.

306d. *Carex manca* subsp. *wichuræ* (Boeckeler) S. Yun Liang, Acta Phytotax. Sin. 36: 537. 1998 [“*wichurai*”].

短叶藁草 duan ye tai cao

Carex wichuræ Boeckeler, Bot. Jahrb. Syst. 5: 519. 1884 [“*wichurai*”]; *C. manca* var. *wichuræ* (Boeckeler) Kükenthal.

Leaves shorter than culm. Male spike 1–1.5 cm; female spikes ca. 2 cm, uppermost female spike approximate to male.

• Forested slopes, wet places, streamsides. Macao.

307. *Carex nanchuanensis* Chü ex S. Yun Liang, Acta Phytotax. Sin. 36: 532. 1998.

南川藁草 nan chuan tai cao

Rhizome obliquely ascending, thick, woody, rigid. Culms

lateral, 20–35 cm tall, compressed trigonous, smooth, clothed at base with dark brown sheaths disintegrating into fibers. Leaves surpassing culm, blades green, linear, 1.2–1.8 mm wide, flat, upper margins scabrous. Involucral bracts shortly bladed, scabrous on margins, long sheathing. Spikes 4 or 5; terminal spike male, clavate-cylindric, 2.2–3 cm; lateral spikes 3 or 4, female, occasionally with few male flowers at apex, cylindric, 4–5.5 × ca. 1.5 cm, densely flowered; peduncles erect. Female glumes lanceolate, dark green 3-veined costa excurrent into a mucro. Utricles yellow-green, slightly longer than glume, obliquely patent, subglobose (excluding beak), 6–7 mm (including beak), membranous, sparsely pubescent, with very prominent veins, base shortly stipitate, apex abruptly contracted into a cylindrical long beak, orifice 2-toothed. Nutlets dark purple-black, tightly enveloped, subglobose, ca. 2 mm, trigonous with angles constricted at middle, faces concave at base, apex with a very short beak; style base thickened; stigmas 3. Fl. Jun.

- Grassy rocky places; 2000–2100 m. Chongqing.

308. *Carex heudesii* H. Léveillé & Vaniot, Bull. Acad. Int. Géogr. Bot. 12: 12. 1903.

长安藁草 chang an tai cao

Rhizome obliquely ascending, thick. Culms lateral, 30–45 cm tall, slender, obtusely trigonous, smooth, clothed at base with pale brown or dark brown bladeless sheaths. Leaves longer than culm, blades light green, broadly linear, 7–18 mm wide, leathery, flat, revolute, upper margins scabrous, apex acuminate. Involucral bracts shortly bladed, shorter than subtending spike, scabrous margined, long sheathing. Spikes 3 or 4; terminal spike male, linear-cylindric, 1.5–4 cm, loosely many flowered, long pedunculate; lateral spikes 2 or 3, mostly female, sometimes bearing a few male flowers at apex, cylindric, 3–6 mm, loosely flowered, with erect peduncles 4.5–5 mm. Female glumes yellow-white, ovate-lanceolate, 4–5 mm, green 3-veined costa ending in an awn at acuminate apex. Utricles pale brown or brown-olivaceous, longer than glume, horizontally patent at maturity, ovate-orbicular, inflated trigonous, 4.5–6 mm, papery, slightly scabrous, many veined, apex abruptly contracted into a cylindrical long beak, orifice deeply 2-lobed. Nutlets dark black, loosely enveloped, obovate, ca. 2 mm, trigonous with angles constricted at middle, faces concave at base, base curved stipitate; style base thickened, oblique, persistent; stigmas 3. Fl. and fr. May–Jul.

- Rock crevices, moist places in forests; 1100–2000 m. Gansu, Hubei, Shaanxi, Sichuan.

309. *Carex taipaishanica* K. T. Fu, Fl. Tsinling. 1(1): 449. 1976.

太白山藁草 tai bai shan tai cao

Rhizome thick, woody, rigid. Culms 15–40 cm tall, somewhat slender, trigonous, smooth, clothed at base with dark brown fibrous sheaths. Leaves flat, revolute, green, leathery, apex acuminate. Involucral bracts shortly bladed, long sheathing. Spikes 3 or 4; terminal spike male, red-brown, linear-clavate, 1.5–2.5 cm; lateral spikes 2 or 3, female, sometimes with several male flowers at apex, cylindric, 2.5–4 cm, densely flowered; peduncles erect. Female glumes light green-yellow,

ovate-lanceolate, green 3-veined costa forming a mucro at obtuse apex. Utricles pale brown, equaling or longer than glume, obliquely patent, elliptic, 6–6.5 mm (including beak), membranous, sparsely pubescent, many veined, base gradually narrowed, apex abruptly contracted into a cylindrical long beak, orifice 2-toothed. Nutlets yellow when young, dark brown at maturity, loosely enveloped, elliptic-ovate, ca. 2.5 mm, trigonous with angles constricted at middle, faces concave, base shortly stipitate, apex abruptly contracted into a short beak, slightly curved; style persistent, base thickened; stigmas 3. Fr. Apr–May.

- Forested slopes, thickets along valleys; ca. 1200 m. Gansu, Shaanxi, Sichuan.

310. *Carex thibetica* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 10: 103. 1887–1888.

藏藁草 zang tai cao

Rhizome thick, woody, rigid. Culms lateral, 35–50 cm tall, obtusely trigonous, smooth, clothed at base with brown bladeless sheaths. Leaves surpassing culm, blades pale green, broadly linear, 5–17 mm wide, leathery, upper margins scabrous, apex acuminate. Involucral bracts shortly bladed, shorter than subtending spike, long sheathing. Spikes 4–6; terminal spike male, narrowly cylindric, 3–6 cm, pedunculate; lateral spikes androgynous, male part usually equaling female part, cylindric, 4–7 cm, densely flowered, with slender, scabrous peduncles. Female glumes light yellow-brown, ovate-lanceolate, green 3-veined costa excurrent into a mucro. Utricles yellow-brown, longer than glume, obovate, subinflated trigonous, 5–6 mm (including beak), membranous, glabrous or sparsely hispid, many veined, base gradually narrowed, apex abruptly contracted into a cylindrical long beak, beak slightly curved, deeply 2-lobed at orifice. Nutlets castaneous, tightly enveloped, obovate, ca. 2 mm (excluding beak), trigonous with angles constricted at middle, base curved stipitate, apical beak slender, slightly curved; style persistent, base hardly thickened; stigmas 3. Fl. and fr. Apr–May.

- Forests, shady and moist places or rock crevices along valleys, cliffs along streamsides; 800–2200 m. Chongqing, Guangxi, Guizhou, Henan, Hubei, Hunan, Shaanxi, Sichuan, Yunnan, Zhejiang.

- 1a. Leaf blades ca. 5 mm wide only; lateral spikes 2–3 cm 310c. var. *minor*
- 1b. Leaf blades 6–17 mm wide; lateral spikes 4–7 cm.
 - 2a. Lateral spikes many flowered 310a. var. *thibetica*
 - 2b. Lateral spikes 6- or 7-flowered 310b. var. *pauciflora*

310a. *Carex thibetica* var. *thibetica*

藏藁草(原变种) zang tai cao (yuan bian zhong)

Carex dichroa Franchet (1895), not Freyn (1890); *C. tchenkeouensis* E. G. Camus.

Leaf blades 6–17 mm wide. Lateral spikes many flowered.

- Forests, shady and moist places or rock crevices along valleys; 800–2000 m. Chongqing, Guangxi, Guizhou, Henan, Hubei, Hunan, Shaanxi, Sichuan, Yunnan, Zhejiang.

310b. *Carex thibetica* var. *pauciflora* Tang & F. T. Wang ex S. Yun Liang, Fl. Reipubl. Popularis Sin. 12: 526. 2000.

少花藏薹草 shao hua zang tai cao

Leaf blades 6–12 mm wide. Lateral spikes 6- or 7-flowered.

- Cliffs along streamsides; ca. 2200 m. Yunnan (Yongshan).

310c. *Carex thibetica* var. *minor* Kükenthal, Bot. Jahrb. Syst. 36(Beibl. 82): 10. 1905.

小藏薹草 xiao zang tai cao

Leaf blades ca. 5 mm wide only. Lateral spikes 2–3 cm.

- Shaanxi.

311. *Carex funingensis* Tang & F. T. Wang ex S. Yun Liang, Acta Phytotax. Sin. 36: 534. 1998.

富宁薹草 fu ning tai cao

Rhizome short, woody. Culms lateral, up to 40 cm tall, compressed trigonous, smooth, clothed at base with dark brown sheaths disintegrating into fibers. Leaves surpassing culm, blades broadly linear, 7–9 mm wide, base plicate and flattened distally, adaxial surface and upper margins scabrous, apex acuminate. Involucral bracts leaflike, almost sheathless. Spike 1, female, cylindric, ca. 5.5 × 1 mm, pedunculate. Female glumes yellow-white, lanceolate, 6–8 mm, green 3-veined costa excurrent into a long awn. Utricles green, longer than glume, obliquely patent, ovate (excluding beak), 7–7.5 mm (including beak), membranous, sparsely pubescent, conspicuously many veined, apex abruptly contracted into a long beak, orifice 2-toothed. Nutlets pale castaneous, tightly enveloped, trigonous ovate, ca. 4 mm, constricted on angles at middle, faces concave at base, base very shortly stipitate, apex abruptly contracted into a cylindric beak ca. 1.5 mm, orifice inflated; style persistent, base not thickened; stigmas 3. Fr. Apr.

- Dense forests; ca. 1100 m. SE Yunnan.

No male spike was described. This is unusual because in *Carex* sect. *Rhomboidales* no unispicate species should exist. This species requires further study.

312. *Carex harlandii* Boott, Ill. Gen. Carex 2: 87. 1860 [*“harlandii”*].

长囊薹草 chang nang tai cao

Carex anomocarya Nelmes; *C. chlorocystis* Boeckeler; *C. harlandii* var. *liuguensis* S. Yun Liang & D. Y. Liu; *C. harlandii* var. *xiuningensis* S. W. Su.

Rhizome thick and short, woody. Culms lateral, 30–90 cm tall, trigonous, stiff, smooth. Sterile leaves longer than culm, blades broadly linear, 1–2.2 cm wide, flat, leathery, base plicate, upper margins scabrous, apex acuminate. Involucral bracts leaflike, longer than inflorescence, sheathing. Spikes 3 or 4, distant; terminal spike male, linear-cylindric, 4.5–8 cm, pedunculate; lateral spikes mostly female, with several male flowers at apex, uppermost spike contiguous with male spike, remaining spikes distant, cylindric, 4.5–9 × 0.9–1.3 cm, densely flowered, with short peduncles. Female glumes pale green, ovate-oblong or ob-

long, 3–3.5 mm, green 3-veined costa excurrent into a scabrous awn. Utricles yellow-green or green, much longer than glume, obliquely patent, elliptic-rhomboid, 9–10 mm (including beak), papery, glabrous, many veined, base gradually narrowed, apex abruptly contracted into a long beak, orifice 2-toothed. Nutlets yellow-brown, tightly enveloped, rhomboid-elliptic, trigonous, ca. 7 mm, constricted on angles at middle, faces concave at base, base curved stipitate, apex abruptly contracted into a slender and erect beak, orifice annulate; style base broadly conic; stigmas 3. Fl. and fr. Apr–Jul.

Forests, thickets, moist places and on rocks along streamsides, grasslands, slopes. Anhui, Fujian, Guangdong, Guangxi, Hainan, Hubei, Jiangxi, Zhejiang [Indonesia, Myanmar, Thailand, N Vietnam].

313. *Carex hoozanensis* Hayata, Icon. Pl. Formosan. 10: 67. 1921.

凤凰薹草 feng huang tai cao

Rhizome thick, obliquely ascending. Culms densely tufted, slender, 5–20 cm tall, 1.2–1.5 mm thick, smooth, suberect, clothed for most length with bladed sheaths. Leaves several times longer than culm, blades broadly linear, 5–15 mm wide, flat, leathery, 3-costate, with rather conspicuous, transverse, light yellowish brown veinlets, shortly sheathing. Involucral bracts leaflike, surpassing inflorescence, shortly sheathing. Spikes 2 or 3, subfastigate, erect; terminal spike male, linear, 1.5–3 cm; lateral spikes female, oblong, 1.5–3 × 0.7–0.8 cm, subaxly many flowered, subsessile or shortly pedunculate. Female glumes pale, ovate-elliptic to ovate-oblong, ca. 3 mm, membranous, broad, green 3-veined costa forming a cusp at subacute apex. Utricles olive-green, longer than glume, patent, ovate-fusiform, 7–8 mm, herbaceous, glabrous, finely many veined, rather gradually narrowed at both ends, apical beak narrowly conic, orifice 2-lobed. Nutlets tightly enveloped, obovate, 4–5 mm, trigonous with angles usually minutely constricted at middle, base annulate; style gradually enlarged toward base forming a persistent beaklike appendage on nutlet; stigmas 3, short.

Forests. Taiwan [Vietnam].

314. *Carex longqishanensis* S. Yun Liang, Pl. Lonqi Mount. 603. 1994.

陇栖山薹草 long qi shan tai cao

Rhizome short, woody. Culms lateral, 55–65 cm tall, trigonous, glabrous, clothed at base with bladeless sheaths. Leaves longer or shorter than culm, blades broadly linear, 7–8 mm wide, flat, leathery, apex acuminate. Involucral bracts shortly bladed, shorter than inflorescence, long sheathing. Spikes 3, distant; terminal spike male (occasionally with 1 to few female flowers at base), linear, 4–5 cm, with peduncles 5.5–6.5 cm, scabrous; lateral spikes female (or bearing a short male part at apex), cylindric, 2.7–4 cm, loosely flowered. Female glumes pale, oblong, 4.5–5 mm, green 3-veined costa forming a short mucro at apex. Utricles yellow-green, longer than glume, 9–10 mm, pubescent, many veined, base cuneate, apex gradually narrowed to a long beak, orifice 2-toothed. Nutlets tightly enveloped, oblong, ca. 3 mm, obtusely trigonous, constricted on angles at middle, base stipitate, apex abruptly contracted into a

cylindric beak, beak expanding into a discoid-annulate orifice; style base thickened; stigmas 3. Fr. May–Jun.

- Streamsides along valleys; ca. 900 m. Fujian (Longxi Shan).

315. *Carex hastata* Kükenthal, Repert. Spec. Nov. Regni Veg. 27: 110. 1929.

戟叶薹草 *ji ye tai cao*

Rhizome short, woody. Culms lateral, 25–40 cm tall, slender, trigonous, scabrous above, clothed at base with dark brown sheaths disintegrating into fibers. Leaves surpassing culm, blades gray-green, linear, 4–6 mm wide, flat, rigid, margins scabrous, apex acuminate. Involucral bracts shortly bladed, scabrous on margins, sheathing. Spikes 2 or 3, approximate; terminal spike male, linear, ca. 1 cm, shortly pedunculate; lateral spikes female, oblong-ovate, ca. 12 × 5–7 mm, few to 7-flowered, shortly pedunculate, uppermost female spike and terminal male spike nearly paired. Female glumes yellow-white, ovate, green 3-veined costa excurrent into a scabrous short awn, apex acute. Utricles yellow-green, longer than glume, obliquely patent, rhomboid, ca. 7.5 mm, membranous, glabrous, finely many veined, base cuneate, apex abruptly contracted into a scabrous long beak, orifice 2-toothed. Nutlets yellow-brown, tightly enveloped, elliptic, trigonous, up to 5 mm, base with erect stipe ca. 1 mm, apex abruptly contracted into a beak ca. 1 mm, orifice slightly enlarged; style base thickened; stigmas 3. Fr. Apr–May.

- Bamboo forests. Hunan, Zhejiang.

316. *Carex kaoi* Tang & F. T. Wang ex S. Yun Liang, Acta Phytotax. Sin. 36: 530. 1998.

高氏薹草 *gao shi tai cao*

Rhizome short, woody. Culms lateral, 7–13 cm tall, compressed trigonous, curved, smooth, clothed at base with 3 or 4 bladeless sheaths. Leaves 3–4 × as long as culm, blades broadly linear, 1–1.5 cm wide, flat, base plicate, margins scabrous, apex acuminate. Involucral bracts shortly bladed, sheathing. Spikes 3 or 4, approximate, pedunculate; terminal spike male, clavate, 5–7 mm; lateral spikes female, ovate, ca. 10 × 7 mm, loosely 5–7-flowered. Female glumes yellow-white, broadly ovate-lanceolate, green 3-veined costa excurrent into an awn. Utricles yellow-green, longer than glume, obliquely patent, rhomboid, 7–8 mm, papery, glabrous, many veined, contracted at both ends, apical beak ca. 2.5 mm, orifice deeply 2-lobed with sharp teeth. Nutlets black, tightly enveloped, rhomboid-elliptic, ca. 5 mm, trigonous with angles constricted at middle, faces concave at base, apex abruptly contracted into a long beak ca. 1 mm, orifice slightly enlarged; style base thickened; stigmas 3. Fr. May.

- Forest margins. N Guangdong (Ruyuan).

317. *Carex pseudolaticeps* Tang & F. T. Wang ex S. Yun Liang, Acta Phytotax. Sin. 36: 536. 1998 [*"pseudo-laticeps"*].

弥勒山薹草 *mi le shan tai cao*

Rhizome short, woody. Culms up to 33 cm tall, trigonous, pubescent, clothed at base with dark brown sheaths disintegrating into fibers. Leaves surpassing culm, blades broadly linear, 6–10 mm wide, flat, pubescent on both faces, base pli-

cate, apex acuminate. Involucral bracts shortly bladed, pubescent, long sheathing. Spikes 4, approximate; terminal spike male, narrowly cylindric, ca. 3.5 cm, with long pubescent peduncles; lateral spikes 3, androgynous, bearing a short male part at apex, cylindric, 3.5–4.2 cm, subdensely flowered, with pubescent peduncles. Female glumes yellow-white, lanceolate, ca. 5 mm, pubescent, green 3-veined costa excurrent into a mucro. Utricles yellow-brown, slightly longer than glume, obliquely patent, ovate-elliptic, ca. 8 mm, papery, densely pubescent, many veined, base cuneate, apex abruptly contracted into a long beak ca. 3 mm, orifice 2-toothed. Nutlets black, tightly enveloped, rhomboid-obovate, ca. 4 mm, trigonous with angles constricted at middle, faces concave at base, base with short curved stipe, apex abruptly contracted into a long erect beak ca. 1.5 mm, beak expanding into an annulate orifice; style base thickened; stigmas 3. Fl. and fr. Apr–May.

- Rock crevices. Hong Kong.

318. *Carex laticeps* C. B. Clarke ex Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 3, 9: 178. 1897.

弯喙薹草 *wan hui tai cao*

Carex cavaleriei H. Léveillé & Vaniot; *C. hancei* C. B. Clarke.

Rhizome short, woody, rigid, stoloniferous. Culms 30–40 cm tall, slender, trigonous, sparsely pubescent, clothed at base with brown sheaths disintegrating into fibers. Leaves shorter than culm, blades gray-green, linear, 3–5 mm wide, flat, revolute, pubescent, apex acuminate. Involucral bracts shortly bladed, pubescent, long sheathing. Spikes 2 or 3, distant, peduncles pubescent; terminal spike male, clavate, 1.5–2.5 cm, with peduncles 4–9 mm; lateral spikes 1 or 2, female, oblong or oblong-cylindric, 2–2.5 × 1–1.4 cm, densely flowered. Female glumes yellow-white, ovate-lanceolate, 5–6 mm, green 1-veined costa excurrent into an awn. Utricles brown-green, longer than glume, ovate, trigonous, 7–8 mm (including beak), pubescent, many veined, apex abruptly contracted into a cylindric beak ca. 3 mm, orifice deeply 2-lobed with long acute teeth. Nutlets black at maturity, tightly enveloped, ovate, 3–4 mm, trigonous with angles constricted at middle, faces concave at base, base with short curved stipe, apex with short curved beak; style base thickened; stigmas 3. Fl. and fr. Mar–Apr.

Forested slopes, roadsides, streamsides. Anhui, Fujian, Hubei, Hunan, Jiangsu, Jiangxi, Zhejiang [Japan, Korea].

319. *Carex liqingii* Tang & F. T. Wang ex S. Yun Liang, Acta Phytotax. Sin. 33: 489. 1995.

立卿薹草 *li qing tai cao*

Rhizome very short. Culms ca. 26 cm tall, trigonous, smooth. Leaves longer than culm, blades broadly linear, 1–1.3 cm wide, flat, revolute, glabrous, upper margins scabrous, apex cuspidate. Involucral bracts shortly bladed, sheathing. Spikes 4, approximate; terminal spike male, clavate, cylindric, 2–4.5 cm; lateral spikes 3, female, cylindric, 2–2.5 × 0.5–0.7 cm, densely flowered; peduncles short. Female glumes red-brown, ovate, ca. 3 mm, margins narrowly pale hyaline, green 3-veined costa excurrent into a mucro. Utricles brown, longer than glume, obliquely patent, ovate-elliptic, ca. 5 mm (including beak), sub-

leathery, glabrous, many veined, base shortly stipitate, apex gradually attenuate into a beak ca. 2 mm, orifice 2-lobed with sharp teeth. Nutlets yellow-brown, tightly enveloped, ovate, ca. 2 mm, trigonous with angles constricted at middle, faces concave at base, base shortly stipitate, apex abruptly contracted into a curved short beak, orifice annulate; style base thickened; stigmas 3.

- Guangxi (Liucheng).

320. *Carex rhynchophora* Franchet, Bull. Soc. Philom. Paris, sér. 8, 7: 90. 1895.

长颈薹草 *chang jing tai cao*

Rhizome obliquely ascending, woody. Culms 30–60 cm tall, slender, rigid, trigonous, scabrous above, clothed at base with dark brown sheaths disintegrating into fibers. Leaves longer than culm, blades linear, 2–5 mm wide, rigid, revolute, upper margins scabrous, apex acuminate. Involucral bracts shortly bladed, sheathing. Spikes 3–5; terminal spike male, cylindrical, ca. 2.2 cm, with long peduncles; lateral spikes androgynous, with male part 1/3–1/2 length of female part, cylindrical, 2.5–4 cm, subdensely flowered, with short peduncles. Female glumes ferruginous, oblong-elliptic, green 3-veined costa excurrent into a scabrous awn. Utricles green, slightly longer than glume, obliquely patent, lanceolate-ovate, 6–7 mm (including beak), subleathery, glabrous, many veined, apex gradually tapering into a long (2.5–3 mm) beak, orifice deeply 2-lobed with long teeth. Nutlets tightly enveloped, ovate-elliptic, 3.5–4 mm (including beak), trigonous with angles constricted at middle, base with a short curved stipe, apex abruptly contracted into an erect beak 0.5–0.8 mm, beak expanding into an annulate orifice; style base hardly thickened; stigmas 3. Fl. and fr. Mar–May.

- Slopes, on rocks along valleys; 600–1800 m. Chongqing, Guizhou, Jiangsu, Zhejiang.

321. *Carex calcicola* Tang & F. T. Wang, Acta Phytotax. Sin. 24: 244. 1986.

灰岩生薹草 *hui yan sheng tai cao*

Rhizome oblique, woody, rigid. Culms 50–60 cm tall, trigonous, stiff, scabrous above, clothed at base with dark brown sheaths disintegrating into fibers. Leaves surpassing culm, blades broadly linear, 0.8–1.1 cm wide, leathery, flat, revolute, upper margins scabrous, apex acuminate. Involucral bracts leaflike, shorter than inflorescence, sheathing. Spikes numerous; terminal spike male or androgynous (male part equaling female part or 1/3–1/2 length of spike), cylindrical, 3–11 × 7–11 mm, densely flowered, shortly pedunculate. Female glumes red-brown, ovate, much narrowed, margins white hyaline, green 3-veined costa excurrent into a mucro. Utricles longer than glume, obliquely patent, ovate-lanceolate, 6–6.5 mm (including beak), leathery, glabrous, faintly many veined, base cuneate, apex abruptly contracted into a cylindrical long beak ca. 4 mm, beak scabrous on margins, orifice deeply 2-lobed with divergent teeth. Nutlets yellow-brown, tightly enveloped, elliptic, 3–3.5 mm (including beak), trigonous with angles constricted at middle, faces concave both at apex and base, base with short curved

stipe, apex abruptly contracted into a beak 1–1.5 mm; style base hardly thickened; stigmas 3. Fr. Feb.

- On rocks; 800–900 m. Guangxi, S Guizhou (Libo, Pingtang).

322. *Carex tenebrosa* Boott, Ill. Gen. Carex 2: 88. 1860.

芒尖鳞薹草 *mang jian lin tai cao*

Rhizome short, woody, rigid. Culms 60–150 cm tall, trigonous, smooth, rigid. Leaves surpassing culm, blades brown-green, broadly linear, 5–8 mm wide, flat, leathery, base plicate, revolute margins scabrous, apex acuminate. Involucral bracts setaceous, scabrous, sheathing. Spikes 3 or 4; terminal spike male, narrowly cylindrical, 5–6 cm, with long peduncle; lateral spikes 2 or 3, androgynous, male part slightly shorter than female part, cylindrical, 3–7 cm, densely flowered, lowest peduncle rather long, smooth, erect, upper ones rather short. Female glumes brown, oblong, 1-veined costa projecting beyond emarginate apex forming a scabrous substraight long awn. Utricles brown-olivaceous, longer than glume, rhomboid, 9–9.5 mm, subleathery, many veined, base cuneate, margins sparsely hispid, apex gradually attenuate into a subcylindrical, scabrous long beak, orifice deeply 2-lobed with long teeth. Nutlets tightly enveloped, rhomboid, ca. 5 mm (including beak), trigonous with angles deeply constricted in middle, faces concave below, apex abruptly contracted into a cylindrical beak ca. 2 mm, orifice slightly inflated; style base ± thickened; stigmas 3, rather long. Fr. Mar.

- Forests, swampy grasslands. Hong Kong.

323. *Carex chaofangii* C. Z. Zheng & X. F. Jin, Acta Phytotax. Sin. 42: 548. 2004.

朝芳薹草 *chao fang tai cao*

Rhizome short, woody, rigid. Culms 25–35 cm tall, triquetrous, smooth, rigid. Leaves surpassing culm, blades brown-green, broadly linear, 6–10 mm wide, flat, leathery, margins scabrous. Involucral bracts leaflike, shorter than spikes, smooth, sheathing. Spikes 3; terminal spike male, cylindrical, 2–3 cm, with peduncle 2.5–3 cm; lateral spikes 2, female, cylindrical, 3–3.5 × ca. 1 cm, densely flowered, lower peduncle 3.5–5 cm, smooth, erect, upper ones shorter. Female glumes green, glaucous, ovate-elliptic, ca. 3 mm (excluding awn), 1-veined costa projecting beyond subacute apex forming a scabrous awn ca. 3.5 mm. Utricles green, glaucous, longer than glume, ellipsoid to obovoid-ellipsoid, ca. 7 mm, subleathery, glabrous, inconspicuously many veined, base cuneate, apex gradually attenuate into a subcylindrical, smooth beak ca. 2 mm, orifice deeply 2-toothed. Nutlets tightly enveloped, broadly ovoid-ellipsoid, ca. 6 mm (including beak), trigonous with angles deeply constricted in middle, faces concave below, apex abruptly contracted into a cylindrical beak ca. 1 mm, apex slightly swollen; style base ± thickened; stigmas 3. Fl. and fr. Apr–Jun.

- Forests, valleys, on rocks; 700–1400 m. Zhejiang (Baishanzu, Longquan, Qingyuan).

324. *Carex wahuensis* C. A. Meyer subsp. **robusta** (Franchet & Savatier) T. Koyama, Fl. Taiwan 5: 326. 1978.

健壮薹草 *jian zhuang tai cao*

Carex bongardii Boott var. *robusta* Franchet & Savatier, Enum. Pl. Jap. 2: 561. 1878; *C. bongardii* Boott; *C. boottiana* Hooker & Arnott; *C. reflexistyla* Hayata; *C. wahuensis* var. *robusta* (Franchet & Savatier) Franchet & Savatier.

Densely tufted with thick rhizomes; rhizome oblique, clothed with dusty brown fibers. Culms 1 or few to a clump, erect or obliquely ascending, 20–100 cm tall, 1–2 mm thick, trigonous, rigid, scabrous on upper angles. Leaves surpassing culm, blades broadly linear, 3–12 mm wide, flattish, leathery, stiff, sheaths rather short, pale with brown or purple-brown veins, eventually disintegrating into dusty brown parallel fibers. Lower involucre bracts long sheathing, blades leaflike, much surpassing subtending spike but shorter than inflorescence, upper involucre bracts shortly sheathing with short setaceous blade. Spikes 3–6, upper 2 or 3 approximate, remaining spikes distant, or all distant; terminal spike male, narrowly clavate or subcylindric, 3–7 × 3–6 mm; lateral spikes usually female, occasionally becoming androgynous with male part up to 1/2 length of spike, 2–6 × 0.6–0.8 mm, densely many flowered, with erect peduncles. Female glumes pale or slightly rusty brown, ovate or lanceolate-ovate, 4–5 mm, membranous, margins white hyaline, light green 3-veined costa excurrent into a ± straight awn to ca. 5 mm, apex obtuse or shallowly emarginate. Utricles equaling glume, patent, ovate-globose, swollen trigonous, 5–6 mm, herbaceous, glabrous, many veined, contracted at both ends, apical beak erect, spinulose margined, orifice deeply 2-lobed, with sharp curved teeth 1–2 mm. Nutlets rather tightly enveloped, broadly obovoid, trigonous with angles shallowly constricted at middle, crowned with a beak subannulate at base; style base enlarged; stigmas 3, elongate, ± persistent.

Seacoasts, in stable sands and among rocks. Hong Kong, Taiwan [Japan (including Bonin Islands and Ryukyu Islands), Korea].

Carex wahuensis subsp. *wahuensis* occurs in the Pacific islands (Hawaiian Islands).

325. *Carex putuoensis* S. Yun Liang, Acta Phytotax. Sin. 33: 486. 1995.

普陀藁草 pu tuo tai cao

Rhizome woody. Culms ca. 25 cm tall, trigonous, clothed at base with dark brown bladeless sheaths. Leaves shorter than glume, blades brown-green, linear, 2–4 mm wide, revolute, leathery. Involucre bracts shortly bladed, sheathing. Spikes 2; terminal spike male, clavate, ca. 4.5 cm, peduncles ca. 7.5 cm; lateral spike female, cylindric, ca. 3.5 cm, densely flowered, shortly pedunculate. Female glumes brown, oblong, ca. 3.5 mm, upper margins white hyaline, 3-veined costa excurrent into a scabrous long awn at slightly emarginate apex. Utricles brown, longer than glume, obovate, trigonous, ca. 5 mm, papery, many veined, base cuneate, apex gradually narrowed into a sparsely serrulate beak, orifice deeply 2-lobed with long teeth. Nutlets dark brown, tightly enveloped, obovate, ca. 2 mm, trigonous with angles constricted at middle, faces concave at base, apex abruptly contracted into a curved beak; stigmas 3.

• E Zhejiang (Putuo).

326. *Carex cheniana* Tang & F. T. Wang ex S. Yun Liang, Acta Phytotax. Sin. 36: 532. 1998.

陈氏藁草 chen shi tai cao

Rhizome short. Culms 40–57 cm tall, trigonous, smooth. Leaves surpassing culm, blades green, broadly linear, 5–9 mm wide, flat, revolute, upper margins scabrous, apex acuminate. Involucre bracts shortly bladed, sheathing. Spikes 4 or 5; terminal spike male, clavate-cylindric, 1–2.7 cm; lateral spikes 3 or 4, female except for several male flowers at apex, cylindric, 3.5–6 × 0.5–0.8 cm, densely flowered. Female glumes pale, elliptic-lanceolate, 6–6.5 mm, lustrous, glabrous, green 3-veined costa excurrent into a long awn. Utricles yellow-brown, shorter than glume, obliquely patent, rhomboid-elliptic (excluding beak), 7–7.5 mm (including beak), leathery, pubescent, many veined, base cuneate, apex abruptly contracted into a compressed long beak ca. 4 mm, orifice deeply 2-lobed with long teeth. Nutlets tightly enveloped, ovate-elliptic, ca. 3 mm, trigonous with angles constricted at middle, faces concave both at apex and at base, base curved stipitate, apex abruptly contracted into a very short curved beak; style base slightly thickened; stigmas 3. Fl. and fr. Apr–May.

• Forested slopes. Fujian, Hunan, Jiangxi, Zhejiang.

327. *Carex saxicola* Tang & F. T. Wang, Fl. Hainan. 4: 535. 1977.

岩生藁草 yan sheng tai cao

Rhizome short, woody. Culms up to ca. 65 cm tall, rigid, trigonous, scabrous above. Leaves surpassing culm, blades broadly linear, 8–10 mm wide, upper margins scabrous, apex acuminate. Involucre bracts surpassing inflorescence, sheathing. Spikes 4, approximate; terminal spike male, linear-cylindric, 5.5–7 cm, with long peduncle; remaining 3 spikes mostly female, occasionally becoming androgynous with male part ca. 1/6 length of female part, cylindric, 6–7.5 × ca. 1 cm, densely flowered, peduncles exerted. Female glumes pale yellow, elliptic-lanceolate or lanceolate, 5.5–6 mm, membranous, hispid, green 3-veined costa excurrent into a short awn ca. 2 mm. Utricles shorter than glume, obliquely patent, ovate-lanceolate, 7.5–8 mm, sparsely hispid, many veined, base cuneate, apex gradually narrowed into a scabrous long beak 2–3 mm, orifice 2-lobed with short teeth. Nutlets tightly enveloped, broadly elliptic-rhomboid, ca. 4 mm, trigonous with angles constricted at middle, faces concave at base, apex abruptly contracted into a narrowly cylindric curved beak ca. 1 mm, beak expanding into a discoid-annulate orifice; style persistent, base thickened; stigmas 3. Fr. Dec.

• Dense forests, shady and moist places, rock crevices along valleys; 900–1100 m. Guangxi, Hainan (Dongfeng), Hunan.

328. *Carex lianchengensis* S. Yun Liang & Y. Z. Huang, Fl. Fujian. 6: 690. 1995.

连城藁草 lian cheng tai cao

Rhizome short, woody. Culms central, 2–10 cm tall, acutely trigonous, clothed at base with black-brown sheaths disintegrating into fibers. Leaves longer than or subequaling culm, blades linear, 1.5–2.5 mm wide, revolute. Involucre bracts shortly bladed, shorter than inflorescence, shortly sheathing. Spikes 2 or 3; terminal spike male, gray-brown, narrowly cylin-

dric, ca. 10 × 2 mm, with short peduncle; lateral spikes female, oblong-cylindric, ca. 1.2 × 0.6 cm, lowest peduncle ca. 7 mm, upper ones rather short. Female glumes pale, ovate-lanceolate, 4–4.5 mm, green 3-veined costa excurrent into an awn. Utricles brown-green, longer than glume, ovate-elliptic, slightly inflated trigonous, 7–7.5 mm, thickly papery, glabrous, many veined, base cuneate, apex gradually narrowed into a long beak, orifice deeply 2-lobed with sharp teeth. Nutlets castaneous-brown, tightly enclosed, elliptic, ca. 5 mm, base shortly stipitate, apex abruptly contracted into a cylindrical erect beak, beak expanding into an annulate orifice; style base thickened, conic; stigmas 3. Fl. and fr. Mar–Apr.

- Forests; ca. 700 m. W Fujian (Liancheng).

329. *Carex brevicuspis* C. B. Clarke, J. Linn. Soc., Bot. 36: 277. 1903.

短尖薹草 duan jian tai cao

Rhizome short, stout. Culms 20–55 cm tall, trigonous, rigid, smooth, clothed at base with dark brown sheaths disintegrating into parallel fibers. Leaves surpassing culm, blades broadly linear, 5–10 mm wide, flattish, apex acuminate. Involucral bracts leaflike but much shorter than inflorescence, sheathing. Spikes 4 or 5, distant; terminal spike male, linear, 2.5–4 cm, with peduncle ca. 4 cm; lateral spikes mostly female, sometimes with several male flowers at apex, narrowly cylindrical, 3.7–7 × 0.9–1 cm, densely flowered, lowest peduncle 5–7.5 cm, smooth. Female glumes pale or yellow-brown, linear-lanceolate, green 3-veined costa ending at apex. Utricles brownish green, longer than or nearly equaling glume, obliquely patent, ovate or obovate (excluding beak), 6–7 mm (including beak), herbaceous, pubescent above, many veined, contracted at both ends, apex abruptly contracted into a linear beak ca. 3 mm, orifice 2-lobed with sharp teeth. Nutlets black-purple, tightly enveloped, ovate, ca. 2 mm, trigonous with angles constricted at middle, faces concave at base, base curved stipitate, apex abruptly contracted into a cylindrical beak ca. 1 mm, beak slightly annulate at orifice, rarely beak absent; style base enlarged; stigmas 3. Fr. Apr–May.

- Forested slopes, streamsides; 500–700 m. Anhui, Fujian, Hubei, Hunan, Jiangxi, Shaanxi, Taiwan, Zhejiang.

1a. Culms long; nutlets with beak 329a. var. *brevicuspis*
1b. Culms short; nutlets without beak 329b. var. *basiflora*

329a. *Carex brevicuspis* var. *brevicuspis*

短尖薹草(原变种) duan jian tai cao (yuan bian zhong)

Culms long. Nutlets with beak.

- Forested slopes, streamsides; 500–700 m. Anhui, Fujian, Hunan, Jiangxi, Taiwan, Zhejiang.

329b. *Carex brevicuspis* var. *basiflora* (C. B. Clarke) Kükenthal in Engler, Pflanzenr. 38(IV. 20): 630. 1909.

基花薹草 ji hua tai cao

Carex basiflora C. B. Clarke, J. Linn. Soc., Bot. 36: 274. 1903.

Culms short. Nutlets without beak.

- Hubei, Shaanxi.

330. *Carex kuchunensis* Tang & F. T. Wang ex S. Yun Liang, Acta Phytotax. Sin. 36: 536. 1998.

古城薹草 gu cheng tai cao

Rhizome short, woody. Culms 50–76 cm tall, smooth. Leaves surpassing culm, blades broadly linear, 6–8 mm wide, flat, leathery, margins scabrous. Involucral bracts shortly bladed, long sheathing. Spikes 4 or 5; terminal spike male, linear-cylindric, 5–7.5 cm, with long peduncle; lateral spikes 3 or 4, androgynous, cylindric, male part linear, longer than or equaling female part, 5–7.5 cm, with long or short peduncles. Female glumes pale brown, ovate-lanceolate, green 3-veined costa ending in a cusp. Utricles slightly longer than or nearly equaling glume, slightly obliquely patent, subhorizontal at maturity, ovate (excluding beak), 6–7 mm (including beak), leathery, glabrous, many veined, base rounded, apex abruptly contracted into a slightly compressed long beak ca. 4 mm, beak sparsely serrulate, 2-toothed at orifice. Nutlets purple-black at maturity, tightly enveloped, ovate, ca. 2.5 mm, trigonous with angles constricted at middle, faces concave at base, base with curved short stipe, apex abruptly contracted into a curved beak; style base inflated conic; stigmas 3.

- Shady forests, on rocks by streamsides along valleys; ca. 900 m. Guangxi.

331. *Carex radiflora* Dunn, J. Linn. Soc., Bot. 38: 371. 1908.

根花薹草 gen hua tai cao

Rhizome short, woody, rigid. Culms very short. Leaves 35–70 cm, blades broadly linear, 1.4–2 cm wide, flat, base clothed with purple-brown sheaths disintegrating into fibers, upper margins slightly scabrous, apex acuminate. Involucral bracts sheathlike. Spikes 3–6, all basal and approximate; terminal spike male, linear-cylindric, 1.8–2 cm; remaining spikes female, oblong-cylindric, 1.8–3 cm, densely flowered, pedunculate. Female glumes light green-brown, ovate, ca. 3 mm, margins broadly white hyaline, 3-veined costa forming a short mucro at obtuse apex. Utricles brown, more than 2 × as long as glume, obliquely patent, ovate-lanceolate, inflated trigonous, 6–6.5 mm, leathery, puberulent, many veined, contracted at both ends, base shortly stipitate, apical beak serrulate, orifice shallowly 2-lobed with short teeth. Nutlets dark purple-brown, tightly enveloped, elliptic, ca. 3.5 mm, trigonous with angles constricted at middle, base shortly stipitate, apex abruptly contracted into a beak ca. 1 mm, beak expanding into an annulate orifice; style base thickened; stigmas 3. Fr. Apr–May.

- Rock crevices along streamsides, shady places in forests; 600–1200 m. Fujian, Guangdong, Guangxi, Hunan, Yunnan.

332. *Carex zunyiensis* Tang & F. T. Wang, Acta Phytotax. Sin. 24: 241. 1986.

遵义薹草 zun yi tai cao

Rhizome short, woody. Culms very short. Leaves 25–70 cm, blades dark green, broadly linear, 1–1.5 cm wide, flat, base clothed with dark brown sheaths disintegrating into fibers, up-

per margins slightly scabrous, apex acute or acuminate. Involucral bracts shortly bladed, sheathless. Spikes 4–7, subbasal, approximate; terminal spike male, linear-cylindric, 3.5–5 cm; remaining spikes female, oblong-cylindric, 3–5 cm, densely flowered, pedunculate. Female glumes green-yellow, lanceolate, ca. 4 mm, margins scabrous, 3-veined costa excurrent into a scabrous mucro at sharp apex. Utricles olivaceous-green, longer than glume, obliquely patent, elliptic, 4–5 mm, membra-

nous, sparsely hispid, many veined, contracted at both ends, apical beak subcylindric, 2-toothed at orifice. Nutlets yellow when young, tightly enveloped, ovate-elliptic, trigonous with angles constricted above, apical beak short, curved, expanding into an annulate orifice; stigmas 3. Fl. and fr. Mar–Apr.

• Streamsides along valleys, on rocks in forests; 200–1400 m. Anhui, Guangdong, Guangxi, Guizhou, Sichuan.

35. Carex sect. Careyanae Tuckerman ex Kükenthal in Engler, Pflanzenr. 38(IV. 20): 679. 1909.

疏花薹草组 shu hua tai cao zu

Liang Songyun (梁松筠 Liang Song-jun); Tetsuo Koyama, Gordon C. Tucker

Culms central or lateral. Spikes 2–5; terminal spike male, rarely androgynous; lateral spikes female, usually few, loosely or slightly loosely flowered. Utricles membranous, rarely subleathery, many veined, glabrous or pilose.

About 15 species: Asia, Europe, North America; 11 species (seven endemic) in China.

- 1a. Culms lateral.
- 2a. Utricles glabrous, 5.5–6.5 mm 342. *C. arisanensis*
- 2b. Utricles sparsely pubescent, 4–4.5 mm 343. *C. changmuensis*
- 1b. Culms central.
- 3a. Terminal spike androgynous 341. *C. yunlingensis*
- 3b. Terminal spike male.
- 4a. Leaf margins and veins sparsely pilose.
- 5a. Female glumes obtuse at apex, not mucronate; utricles densely papillose 337. *C. hypoblephara*
- 5b. Female glumes slightly obtuse at apex, mucronate; utricles glabrous or sparsely pilose (but not papillose) 338. *C. pilosa*
- 4b. Leaves glabrous.
- 6a. Utricles glabrous.
- 7a. Involucral bracts leaflike 339. *C. filipes*
- 7b. Involucral bracts shortly bladed 340. *C. baimaensis*
- 6b. Utricles hirsute.
- 8a. Utricles obovate or obovate-lageniform, 5–6 mm.
- 9a. Utricles obovate, inflated trigonous, 5–6 mm, yellow-green, hirsute, many veined 334. *C. giraldiana*
- 9b. Utricles obovate-lageniform, compressed trigonous, ca. 5 mm, yellowish or grayish green, scattered setulose adaxially, nerveless, scabrous margined above 333. *C. alajica*
- 8b. Utricles oblong, 7–9 mm.
- 10a. Leaves shorter than culm; nutlets oblong, sessile 335. *C. wushanensis*
- 10b. Leaves longer than culm; nutlets elliptic, canaliculate adaxially, 2 lateral faces slightly concave 336. *C. canaliculata*

333. Carex alajica Litvinov, Trudy Bot. Muz. Imp. Akad. Nauk 7: 99. 1910.

葱岭薹草 cong ling tai cao

Rhizome short, ascending, stoloniferous. Culms tufted, 15–25 cm tall, trigonous, scabrous above, slightly curving, clothed at base with brown sheaths eventually disintegrating into parallel fibers. Leaves ca. 1/2 length of culm, blades linear, 1.5–2.5 mm wide, erect, apex long acuminate. Involucral bracts leaflike, 2 × as long as spike, sheathing 5–8 mm. Spikes 2 or 3; terminal spike male, lanceolate to lanceolate-clavate, 1–1.5 cm, sessile; remaining spikes female, obovate, 1–1.5 cm, loosely slightly patent, with short peduncles 5–8 mm. Female glumes reddish ferruginous, ovate, margins white hyaline, apex long acuminate. Utricles yellowish or grayish green, much longer than glume, obovate-lageniform, compressed trigonous, ca. 5 mm, thinly leathery, scattered setulose adaxially, nerveless, up-

per margins scabrous, apex abruptly tapering into a flattened long beak, beak scabrous on margins, deeply 2-lobed at orifice. Fr. Jun.

Meadows in valleys; 2000–3500 m. Xinjiang [C Asia].

334. Carex giraldiana Kükenthal, Bot. Jahrb. Syst. 36(Beibl. 82): 10. 1905.

涝峪薹草 lao yu tai cao

Rhizome creeping, woody. Culms 16–30 cm tall, compressed trigonous, smooth, clothed at base with pale brown sheaths disintegrating into fibers. Leaves shorter than or equaling culm, blades light green, linear, 2–5 mm wide, slightly rigid, margins scabrous, revolute. Involucral bracts shortly bladed, sheathing. Spikes 3–5, distant; terminal spikes male, clavate-cylindric, ca. 1 cm; lateral spikes female, often with male flowers at apex, ovate, 3–5-flowered, 6–8 mm; pedun-

cles scabrous, upper 2 enclosed, lower 2 exerted. Female glumes yellowish white, oblong, green 3-veined costa excurrent into a scabrous mucro at subtruncate apex. Utricles yellow-green, subequalling glume, obliquely patent, obovate, inflated trigonous, 5–6 mm, hirsute, many veined, apex abruptly contracted into a cylindrical beak, orifice 2-toothed. Nutlets tightly enveloped, obovate, trigonous with angles constricted at middle, faces concave at base, base shortly stipitate, apical beak expanding into a discoid-annulate orifice; style base enlarged; stigmas 3. Fl. and fr. Mar–May.

- Roadsides along valleys; ca. 1200 m. Hebei, Shaanxi.

335. *Carex wushanensis* S. Yun Liang, Acta Phytotax. Sin. 33: 484. 1995.

武山薹草 wu shan tai cao

Rhizome long, obliquely ascending, woody. Culms 28–40 cm tall, slender, clothed at base with brown sheaths disintegrating into fibers. Leaves shorter than culm, blades linear, 1.5–3 mm wide, flat. Involucral bracts shortly bladed, long sheathing. Spikes 2 or 3, distant; terminal spike male, cylindrical, 2–3 cm, peduncles 6–10 cm; lateral spikes female, sometimes with several male flowers at apex, oblong, 1.5–1.8 cm, 2–4-flowered, peduncles 1.5–2.5 cm. Female glumes pale, oblong, green 3-veined costa excurrent into a mucro. Utricles brown-green, longer than glume, obliquely patent, oblong, trigonous, ca. 9 mm, membranous, pubescent, many veined, base cuneate, apex abruptly contracted into a long beak, orifice 2-toothed. Nutlets tightly enveloped, oblong, ca. 4 mm, sessile, apical beak ca. 1.3 mm; style base thickened; stigmas 3. Fr. Jun.

- Slopes; ca. 1600 m. Gansu (Wushan, Zhangxian).

336. *Carex canaliculata* P. C. Li in S. Y. Jin & Y. L. Chen, Cat. Type Spec. Herb. China (Suppl.), 67. 1999.

沟囊薹草 gou nang tai cao

Rhizome creeping, woody. Culms 18–30 cm tall, very slender, smooth, clothed with purple-red sheaths at base. Leaves surpassing culm, blades linear, 4–6 mm wide, flat, margins scabrous. Involucral bracts shortly bladed, long sheathing. Spikes 3, distant; terminal spike male, cylindrical, 1.5–2 cm, peduncles 0.5–2 cm; remaining spikes female, ovate, 7–12 mm, densely several flowered, peduncles enclosed. Female glumes yellow-white, oblong, 5–5.5 cm, green 3-veined costa excurrent into a mucro at rounded apex. Utricles green, longer than glume, oblong, trigonous, 7–7.5 mm, subleathery, upper pubescent, veined at base, base long stipitate, apex abruptly contracted into a long beak, orifice 2-toothed. Nutlets tightly enveloped, elliptic, ca. 4 mm, canaliculate adaxially, 2 lateral faces slightly concave, base long stipitate; style base thickened; stigmas 3. Fl. and fr. May.

- Forested slopes; ca. 2500 m. W Sichuan, Yunnan.

337. *Carex hypoblephara* Ohwi & T. S. Liu, J. Jap. Bot. 12: 654. 1936.

睫背薹草 jie bei tai cao

Rhizome short, indurate. Culms tufted, up to 50 cm tall, triquetrous, striate, clothed at base with bladeless sheaths.

Leaves shorter than culm, blades broadly linear, ca. 10 mm wide, flat, dark green, 2-veined, sparsely pilose beneath. Involucral bracts leaflike, scarcely setaceous toward apex, base sheathing. Spikes up to 15, in groups of 1–3, lower ones distant; terminal spike male; lateral spikes female, shortly cylindrical, 2–3 cm × 4–5 mm, loosely 8–12-flowered; peduncles usually smooth, unequal. Female glumes ferruginous or reddish brown, elliptic, green 3-veined costa not excurrent, apex obtuse. Utricles olive-green, spreading, ± as long as glume, ovate or subelliptic, swollen trigonous, ca. 2.5 mm, membranous, densely papillose, many veined, base cuneate, beak short, slightly ex-curved, 2-toothed. Nutlets tightly enveloped, obovate, trigonous, ca. 2 mm; style base somewhat thickened; stigmas 3, papillate.

- Jiangxi (Lushan).

338. *Carex pilosa* Scopoli, Fl. Carniol., ed. 2, 2: 226. 1772.

毛缘薹草 mao yuan tai cao

Rhizome long stoloniferous, slender. Culms 30–60 cm tall, compressed trigonous, usually loosely pilose, clothed at base with purple-red bladeless sheaths, sparsely pilose. Leaves shorter than culm, blades broadly linear, 5–8 mm wide, sparsely pilose on veins and margins. Involucral bracts leaflike, usually pilose, shorter than inflorescence, sheathing 2–5 cm. Spikes 3 or 4, distant; terminal spike male, oblong or linear-clavate, 2–3 cm, with long peduncle much overtopping next spike; lateral spikes female, narrowly cylindrical, 2–4 cm, loosely 8–12-flowered; peduncles usually smooth, lowest one up to 12 cm. Female glumes purple or ferruginous, ovate or elliptic, green 3-veined costa excurrent into a mucro, apex slightly obtuse. Utricles light green, becoming yellow, longer than glume, ovate or subelliptic, swollen trigonous, 4–5 mm, membranous, glabrous or sparsely pilose, many veined, base contracted into a short stipe, apex abruptly contracted into a long conic beak, beak curved, obliquely truncate, emarginate, orifice purple-red, 2-toothed. Nutlets tightly enveloped, obovate, obtusely trigonous, ca. 2.5 mm; style base not thickened; stigmas 3. Fl. and fr. Apr–May. $2n = 44$.

Forests. Heilongjiang, Liaoning [Japan, Korea; Europe].

- 1a. Utricles and peduncles glabrous 338a. var. *pilosa*
- 1b. Utricles and peduncles sparsely pilose 338b. var. *auriculata*

338a. *Carex pilosa* var. *pilosa*

毛缘薹草(原变种) mao yuan tai cao (yuan bian zhong)

Utricles and peduncles glabrous.

Forests. Heilongjiang, Liaoning [Japan, Korea; Europe].

338b. *Carex pilosa* Scopoli var. *auriculata* (Franchet) Kükenthal in Engler, Pflanzenr. 38(IV. 20): 637. 1909.

刺毛缘薹草 ci mao yuan tai cao

Carex auriculata Franchet, Bull. Soc. Philom. Paris, sér. 7, 10: 106. 1886.

Utricles and peduncles sparsely pilose.

Forests. Heilongjiang, Liaoning [Japan, Korea; Europe].

339. *Carex filipes* Franchet & Savatier, Enum. Pl. Jap. 2: 576. 1878.

丝柄薹草 *si bing tai cao*

Rhizome short or slightly long. Culms 30–55 cm tall, compressed trigonous, smooth, clothed with purple-red bladeless sheaths at base. Leaves shorter than culm, blades linear, 2–8 mm wide, flat, soft, apex acuminate. Involucral bracts leaflike, shorter than inflorescence, long sheathing. Spikes 3 or 4, distant; terminal spike male, oblong-lanceolate or cylindrical, 2–3 cm, with long peduncle; lateral spikes female, loosely usually 3–6-flowered, peduncle 3–6 mm, very slender, pendent. Female glumes yellow-brown or yellow-white, ovate or ovate-lanceolate, 5–6 mm, green 3-veined costa ending at acute apex. Utricles yellow-green, longer than glume, ovate or elliptic, trigonous, 5–7 mm, glabrous, faintly many veined, base cuneate, shortly stipitate, apex abruptly contracted into a slender long beak, orifice 2-toothed. Nutlets stramineous, broadly obovate or ovate, trigonous, 2.5–3 mm; style base not thickened; stigmas 3. Fl. and fr. Mar–May.

Forests, wet places on roadsides, grasslands; 1300–2200 m. Anhui, Fujian, Guizhou, Hebei, Heilongjiang, Hubei, Jiangsu, Liaoning, Zhejiang [Japan, Korea, Russia (Far East)].

- 1a. Utricles ca. 5 mm; leaves 2–3 mm wide; plants loosely tufted 339a. var. *filipes*
 1b. Utricles 6–7 mm; leaves 5–8 mm wide; plants densely tufted 339b. var. *oligostachys*

339a. *Carex filipes* var. *filipes*

丝柄薹草(原变种) *si bing tai cao (yuan bian zhong)*

Carex egena H. Léveillé & Vaniot; *C. filipes* var. *sparsimux* (C. B. Clarke ex Franchet) Kükenthal; *C. sparsimux* C. B. Clarke ex Franchet.

Plants loosely tufted. Leaves 2–3 mm wide. Utricles ca. 5 mm.

Forests, wet places on roadsides, grasslands; 1500–2200 m. Anhui, Fujian, Guizhou, Hubei, Jiangsu, Zhejiang [Japan, Korea].

339b. *Carex filipes* var. *oligostachys* (Meinshausen ex Maximowicz) Kükenthal in Engler, Pflanzenr. 38(IV. 20): 641. 1909.

少囊薹草 *shao nang tai cao*

Carex oligostachys Meinshausen ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 31: 117. 1886; *C. filipes* subsp. *oligostachys* (Meinshausen ex Maximowicz) T. Koyama; *C. filipes* var. *rouyana* (Franchet) Kükenthal; *C. rouyana* Franchet.

Plants densely tufted. Leaves 5–8 mm wide. Utricles 6–7 mm.

Forests; 1300–1400 m. Hebei, Heilongjiang, Liaoning [Korea, Russia (Far East)].

340. *Carex baimaensis* S. W. Su, Bull. Bot. Res., Harbin 10(4): 6. 1990.

白马薹草 *bai ma tai cao*

Rhizome stoloniferous. Culms 20–40 cm tall, clothed at

base with pale yellow sheaths, some sheaths disintegrating into fibers. Leaves longer than or equaling culm, blades linear, 3–5 mm wide, flat. Involucral bracts shortly bladed, scabrous on margins, long sheathing. Spikes 3 or 4, distant; terminal spike male, linear-cylindrical, 3–5 × ca. 0.2 cm; lateral spikes female, long elliptic, 1.2–2 cm, 7- or 8-flowered; peduncles enclosed in involucral bract sheaths, lowest one sometimes subbasal. Female glumes stramineous or yellowish brown, obovate, ca. 5 mm, margins hyaline, green 3-veined costa excurrent into a mucro at obtuse or emarginate apex. Utricles slightly longer than glume, obliquely patent, ovate, ca. 9 mm, sparsely pilose, especially on margins, later becoming glabrous, many veined, base stipitate, apex abruptly contracted into a cylindrical long beak ca. 2 mm, orifice 2-toothed. Nutlets black-brown, obovate-trigonous, ca. 3 mm, base with curved stipe, apex abruptly contracted into a curved beak; style base thickened; stigmas 3. Fl. and fr. May.

- Forest margins, slopes; ca. 1000 m. Anhui.

341. *Carex yunlingensis* P. C. Li, Acta Bot. Yunnan. 12: 149. 1990.

云岭薹草 *yun ling tai cao*

Rhizome short. Culms tufted, 30–40 cm tall, slender, smooth, clothed with deep brown sheaths at base. Leaves subequaling culm, blades linear, 4–5 mm wide, flat. Involucral bracts leaflike, longer than inflorescence, sheathing. Spikes 3–5, distant, oblong, 2–2.5 × 0.6–0.7 cm, loosely flowered; terminal spike androgynous; lateral spikes female (often with male part at apex); peduncles enclosed in involucral bract sheaths. Female glumes pale, oblong-lanceolate, 4.5–5 mm, green 3-veined costa excurrent into a long awn. Utricles brownish olivaceous, rhomboid-oblong, inflated trigonous, 8–9 mm, veined, glabrous, base shortly stipitate, apex abruptly contracted into a scabrous long beak, orifice 2-toothed. Nutlets pale, obovate or oblong, ca. 3.2 mm, faces concave at base, base shortly stipitate, apex abruptly contracted into a short beak; style base slightly thickened; stigmas 3. Fr. Jul.

- Forests, ditch sides along valleys; ca. 3400 m. Yunnan.

342. *Carex arisanensis* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30: 378. 1911.

阿里山薹草 *a li shan tai cao*

Rhizome short. Culms sublateral, 15–40 cm tall, slender, compressed trigonous, smooth, clothed with pale brown (sometimes purple-red) bladeless sheaths at base. Leaves shorter or longer than culm, blades linear, 4–8 mm wide, flat, apex acuminate. Involucral bracts shortly bladed, sheathing 2–4 cm. Spikes 3 or 4; terminal spike male, lanceolate-oblong, 4–8 mm, very close to next female spike; remaining spikes female, oblong, 6–10 mm, 2- or 3-flowered; peduncles slender, erect, long exerted beyond involucral bract blade. Female glumes pale, occasionally tinged with brown, ovate-oblong, 3.5–4.5 mm, green obscurely 3-veined costa ending at mucicous apex. Utricles brown-green, ca. 2 × as long as glume, fusiform, trigonous, 5.5–6.5 mm, herbaceous, glabrous, faintly many veined, base cuneate, apex gradually narrowed to a long upright beak, orifice

hyaline, 2-toothed. Nutlets pale brown, tightly enveloped in lower part of utricle, obovate or elliptic, trigonous, ca. 3 mm; style base not thickened; stigmas 3. Fl. and fr. Apr–Jun.

Forests; below 500–1100 m. Fujian, Guangxi, Hunan, Taiwan, Zhejiang [Japan].

- 1a. Leaves 4–8 mm wide; involucrel bracts sheathing 2–4 cm 342a. subsp. *arisanensis*
 1b. Leaves 12–18 mm wide; involucrel bracts not sheathing 342b. subsp. *ruianensis*

342a. *Carex arisanensis* subsp. *arisanensis*

阿里山藁草(原亚种) a li shan tai cao (yuan ya zhong)

Carex filipes Franchet & Savatier subsp. *arisanensis* (Hayata) T. Koyama.

Leaves 4–8 mm wide. Involucrel bracts sheathing 2–4 cm. Spikes 3 or 4, lowest with long peduncle.

Forests; 900–1100 m. Guangxi, Hunan, Taiwan [Japan].

342b. *Carex arisanensis* subsp. *ruianensis* Hong Wang, C. Song & X. F. Jin, Ann. Bot. Fenn. 45: 156. 2008.

瑞安藁草 rui an tai cao

Leaves 12–18 mm wide. Involucrel bracts not sheathing. Spikes 3, lowest sessile.

- Moist soil in forests; below 500 m. Zhejiang (Rui'an).

343. *Carex changmuensis* Tang & F. T. Wang ex Y. C. Yang, Fl. Xizang, 5: 410. 1987.

樟木藁草 zhang mu tai cao

Rhizome short, with many slender, long roots. Culms lateral, densely tufted, 30–40 cm tall, compressed trigonous, less than ca. 1 mm wide, clothed at base with 3 or 4 castaneous bladeless sheaths slightly disintegrating into fibers. Leaves gray-green, conspicuously longer than culm, 3–4 mm wide, flat, stiff, scabrous adaxially. Lower involucrel bracts shorter or longer than inflorescence, sheathless, upper ones glumelike. Spikes 2 or 3; terminal spike male, yellow-brown, clavate, 1–1.5 cm, subsessile; lateral spikes female, gray-green, ovate, ca. 8 mm, several flowered, dense, sessile or only lowest one with short peduncle. Female glumes pale or light brown, ovate or oblong-ovate, 3–4 mm, green 3-veined costa excurrent into a mucro, apex acute. Utricles green-brown at base, ovate-lanceolate or elliptic, obtusely trigonous, 4–4.5 mm, sparsely pubescent, faintly veined adaxially, apex abruptly contracted into a medium-sized beak, orifice 2-toothed. Nutlets obovate or broadly oblong, obtusely trigonous, with 1 face concave at base; style easily deciduous; stigmas 3.

- Evergreen broad-leaved forests; ca. 1900 m. S Xizang (Nyalam).

36. *Carex* sect. *Pseudocypereae* Tuckerman ex Kükenthal in Engler, Pflanzenr. 38(IV. 20): 693. 1909 [*“Pseudo-cypereae”*].

似莎藁草组 si suo tai cao zu

Dai Lunkai (戴伦凯); Tetsuo Koyama

Leaf blades distinctly 2-veined laterally, with transverse septate nodes. Involucrel bracts leaflike, longer than spike, usually not sheathed. Spikes unisexual, 3–9; uppermost 1–3 male, narrowly cylindrical; remaining spikes female, single in an involucrel bract sheath, oblong or cylindrical, densely many flowered, pedunculate, upper peduncles rather short. Female glumes awned. Utricles yellow-green at maturity, eventually horizontally divaricate or deflexed, narrowly lanceolate or elliptic, obtusely trigonous, not inflated, subleathery or leathery, distinctly several veined, base shortly stipitate, apex rather long beaked, orifice long 2-toothed, teeth subulate or awn-shaped, sometimes recurved. Nutlets rather loosely enveloped in utricle; style slender, usually tortuous, base not thickened; stigmas 3.

Fourteen species: Asia, Australia, Europe, New Guinea, North America, Pacific islands (New Zealand), S South America, West Indies; two species in China.

- 1a. Female spikes oblong or elliptic, 2–3 cm, 1.5–2 cm wide, subsessile; female glumes rather shortly awned, awn nearly as long as glume; utricles narrowly lanceolate, 6–8 mm, with long beak, 2-toothed at orifice, teeth ca. 2 mm, recurved toward both sides 344. *C. capricornis*
 1b. Female spikes cylindrical, 1.5–5 cm, less than 1 cm wide, rather long pedunculate; female glumes long awned, awn ca. 2.5 × as long as glume; utricles elliptic, 4–5 mm, with medium-sized to long beak, slightly long 2-toothed at orifice, teeth ca. 1 mm, rather straight 345. *C. pseudocyperus*

344. *Carex capricornis* Meinshausen ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 31: 119. 1886.

弓喙藁草 gong hui tai cao

Rhizome short. Culms tufted, 30–70 cm tall, stout, triquetrous, scabrous on upper part, few purple-brown and bladeless sheathed at base, rudimentary sheaths sometimes disintegrating into fibers. Leaves longer than or slightly shorter than culm, blades 3–8 mm wide, flat, slightly stiff, with 2 distinct lateral veins and with short and transverse septate nodes,

sheathed. Involucrel bracts leaflike, longer than spike, usually not sheathed. Spikes 3–5, congregated at top of culm, sometimes lowermost one slightly remote; terminal spike male, usually not surpassing or slightly longer than contiguous female spike, clavate or linear-cylindrical, 2–3 cm, subsessile; lateral spikes female, oblong-ovate or shortly cylindrical, 2–3 × 1.5–2 cm, densely many flowered, very shortly pedunculate or subsessile. Female glumes brownish laterally, oblong, 4–5 mm, thickly membranous, greenish 3-veined in middle abaxially, apex acuminate and aristate, awn nearly as long as glume, scab-

rous on margins. Utricles yellowish green, obliquely patent or divaricate, longer than glume, narrowly lanceolate, compressed trigonous, 6–8 mm, thickly membranous, smooth, glabrous, several veined, base abruptly contracted into a short stipe, apex gradually narrowed to a long beak, orifice long 2-toothed, teeth ca. 2 mm, recurved toward both sides. Nutlets dark brown, loosely enveloped, elliptic, trigonous, 1–1.5 mm; style slender, tortuous, base not thickened; stigmas 3, rather short. Fl. and fr. May–Aug.

Riversides, lakesides, swamps or wet places. Heilongjiang, Jiangsu, Jilin, Liaoning [Japan, Korea, Russia (Far East)].

345. *Carex pseudocyperus* Linnaeus, Sp. Pl. 2: 978. 1753.

似莎草 *si suo tai cao*

Rhizome short, without stolons. Culms tufted, 30–70 cm tall, rather stout, trigonous, scabrous on angles of upper part. Leaves longer than culm, blades 5–8 mm wide, flat, slightly stiff, long sheathed, sheaths brownish at base. Involucral bracts of lower part leaflike, longer than spike, lowermost one shortly

sheathed, uppermost one awn-shaped, not sheathed. Spikes 3–5, congregated at top of culm, lowermost one slightly remote; terminal spike male, narrowly cylindrical, 2–3 cm, pedunculate; lateral spikes female, cylindrical or shortly cylindrical 1.5–5 cm, densely many flowered, pedunculate. Female glumes pale, oblong-ovate, ca. 5 mm (including awn), membranous, greenish 3-veined, apex acute and aristate, awn 3–3.5 mm, hispidulous on margins. Utricles yellowish green, obliquely patent, later horizontally divaricate or deflexed, 2–3 × as long as glume (excluding awn), elliptic, trigonous, 4–5 mm, subleathery, glabrous, distinctly several veined, base abruptly contracted into a short stipe, apex gradually narrowed to a medium-sized to long beak, beak straight, deeply split into 2 teeth at orifice, teeth ca. 1 mm, straight, ± rigid, not recurved toward sides. Nutlets yellowish, slightly loosely enveloped, broadly obovate, trigonous, ca. 1.2 mm; style slender, tortuous, base not thickened; stigmas 3, rather short. Fl. and fr. Sep–Nov.

Ditch sides, watersides; ca. 1300 m. Gansu [Japan, Russia; Europe, North America].

37. *Carex* sect. *Physocarpae* Drejer ex L. H. Bailey in J. M. Coulter, Man. Bot. Rocky Mt. 382. 1885.

胀囊草组 *zhang nang tai cao zu*

Dai Lunkai (戴伦凯); Tetsuo Koyama, Gordon C. Tucker

Culms usually rather tall and slightly stout. Leaf blades with transverse septate nodes. Involucral bracts leaflike, longer than inflorescence, usually not sheathed, rarely shortly sheathed. Spikes unisexual, several, few species with male flowers at top of female spike or with female flowers at top of male spike; 1–4 spikes at top of culm male, narrowly cylindrical; remaining spikes female, single in involucral bract axil, oblong or cylindrical, densely many flowered, usually shortly pedunculate. Female glumes oblong-lanceolate or narrowly ovate, muticous. Utricles obliquely patent, later rarely horizontally divaricate or deflexed, broadly ovate or ovate, inflated trigonous, membranous or subleathery, glabrous, distinctly veined, apex abruptly contracted into a short to long beak, orifice shortly 2-toothed or indistinctly toothed. Nutlets loosely enveloped in utricle, broadly obovate, trigonous; style slender, usually tortuous; stigmas 3.

About 20 species: E and SE Asia, Europe, North America; ten species in China.

- 1a. Utricles ovate or broadly so, 6–12 mm.
 - 2a. Female spikes cylindrical, 3–7.5 cm; utricles 6–8 mm.
 - 3a. Leaf blades 8–15 mm wide; male spikes usually 3–7, sometimes with few female flowers at base, with few male flowers at top of female spike; female glumes oblong-lanceolate; utricles horizontally divaricate in maturity, ovoid, apex abruptly contracted into a slightly long beak 346. *C. rhynchophysa*
 - 3b. Leaf blades 2–5 mm wide; male spikes 2 or 3, spikes unisexual; female glumes narrowly lanceolate; utricles obliquely patent in maturity, oblong-ovate, apex attenuate into a rather short beak 347. *C. vesicaria*
 - 2b. Female spikes oblong or ovoid, 1.5–3 cm; utricles 9–12 mm.
 - 4a. Male spike 1; female spikes ovoid, 1.5–2 × ca. 1.5 cm, distance approximate, usually congregated at top of culm; utricles broadly ovate; nutlets broadly rhomboid, style base slightly thickened 348. *C. dickinsii*
 - 4b. Male spikes 1 or 2; female spikes oblong, 2–3 × 1–1.2 cm, distance remote; utricles oblong-ovate; nutlets obovate, style thickened at lower half 349. *C. idzuroei*
- 1b. Utricles oblong-ovate or ovate, 4–5.5 mm.
 - 5a. Male spike 1, terminal; utricles with recurved and slightly long stipe 350. *C. mollissima*
 - 5b. Male spikes 2 to several, inserted at top of culm; utricles estipitate.
 - 6a. Utricles oblong-ovate, apex attenuate into a beak, emarginate at orifice, not 2-toothed.
 - 7a. Culms 60–90 cm tall; female glumes oblong-lanceolate, slightly shorter than or nearly equaling utricle; utricles 5–5.5 mm 351. *C. pamirensis*
 - 7b. Culms 15–50 cm tall; female glumes ovate, ca. 1/2 length of utricle or slightly longer than utricle; utricles 4–4.5 mm 352. *C. dichroa*

- 6b. Utricles ovate or broadly ovate, apex abruptly narrowed into a beak, slightly long or rather shortly 2-toothed at orifice.
 8a. Female glumes oblong-lanceolate, slightly shorter than or nearly equaling utricle; utricles ca. 4 mm 353. *C. rostrata*
 8b. Female glumes ovate or narrowly lanceolate, shorter than utricle; utricles ca. 5 mm.
 9a. Female glumes narrowly lanceolate, brown-purple 354. *C. obscuriceps*
 9b. Female glumes ovate, brown-yellow 355. *C. vesicata*

346. *Carex rhynchophysa* C. A. Meyer in Fischer & Avé-Lallemant, Index Sem. Hort. Petrop. 9 (suppl.): 9. 1844.

大穗薹草 da sui tai cao

Carex bullata Schkuhr subsp. *laevirostris* (Blytt ex Fries) Fries; *C. bullata* var. *laevirostris* Blytt ex Fries; *C. laevirostris* (Blytt ex Fries) Andersson.

Rhizome rather thick, stoloniferous. Culms 60–100 cm tall, stout, triquetrous, smooth on lower part, scabrid on upper part, clothed with brown or reddish brown sheaths at base. Leaves longer than culm, blades 8–15 mm wide, flat, slightly stiff, with short and transverse septate nodes, sheathed. Involucral bracts leaflike, longer than culm, lowermost involucral bract shortly sheathed, upper involucral bracts not sheathed. Spikes 7–11; terminal 3–7 spikes male, rather approximate, narrowly cylindrical, 1.5–4.5 cm, sometimes with few female flowers at base, subsessile; remaining spikes female, cylindrical, 3–7.5 × 1–1.5 cm, densely many flowered, sometimes with a few male flowers at apex, shortly pedunculate. Female glume brownish or yellowish brown, oblong-lanceolate, ca. 4.2 mm, membranous, costate, upper margins white hyaline, apex acute, mucous. Utricles yellow-green, horizontally patent in maturity, longer than glume, ovoid or broadly ovate, inflated trigonous, 6.5–7 mm, membranous, slightly nitid, glabrous, several veined, base subrounded, shortly stipitate, apex abruptly narrowed to a slightly long beak, orifice 2-toothed. Nutlets loosely enveloped in utricle, obovate, trigonous, ca. 2 mm, base shortly stipitate; style slender, flexuose, base not thickened; stigmas 3, rather shorter than style. Fl. and fr. Jun–Jul.

Wet places in swamps, at riversides, or at lakesides. Heilongjiang, Jilin, Xinjiang [Japan, Korea, Mongolia, Russia; Europe].

347. *Carex vesicaria* Linnaeus, Sp. Pl. 2: 979. 1753.

胀囊薹草 zhang nang tai cao

Rhizome stoloniferous, stolons branched. Culms 30–100 cm tall, ± stiff, triquetrous, scabrous on upper part, with red-brown and bladeless sheaths at base, rudimentary sheaths usually disintegrating into reticulate fibers. Leaves slightly shorter than culm, blades 2–5 mm wide, flat, ± stiff, with transverse septate nodes between veins, sheathed. Involucral bracts leaflike, lowermost shortly sheathed, upper not sheathed. Spikes 4–6, remote; terminal 2 or 3 spikes male, approximate, linear-cylindrical, 2–3.5 mm, subsessile; remaining spikes female, oblong or oblong-cylindrical, 3–7 × 1–1.5 cm, densely many flowered, shortly pedunculate. Female glumes pale ferruginous or ferruginous, narrowly ovate or ovate-lanceolate, ca. 3.2 mm, membranous, 3-veined, yellow-green between veins, margins white hyaline, apex acuminate and mucous. Utricles yellowish green, obliquely patent, longer than glume, ovate or conic-ovate, inflated trigonous, 6–8 mm, subleathery, slightly nitid,

glabrous, several veined, base rounded, shortly stipitate, apex attenuate into a short beak, orifice 2-toothed. Nutlets rather loosely enveloped, obovate, trigonous, 1.7–2 mm, base stipitate; style slender, usually flexuose, base not thickened; stigmas 3, rather short. Fl. and fr. May–Jul.

Wet places at riversides, at lakesides, in swamps, or in meadows. Heilongjiang, Jilin, Liaoning, Nei Mongol [Japan, Korea, Mongolia, Russia; Europe, North America].

This plant is used as forage and for making paper.

348. *Carex dickinsii* Franchet & Savatier, Enum. Pl. Jap. 2: 581. 1878.

朝鲜薹草 chao xian tai cao

Carex coreana L. H. Bailey.

Rhizome with slender stolons. Culms 20–70 cm tall, slightly stout, obtusely trigonous, smooth on lower part and scabrid on top, yellow-brown sheathed at base. Leaves longer than or equaling culm, blades 4–8 mm wide, flat, ± stiff, with transverse septate nodes between veins, sheathed. Involucral bracts leaflike, surpassing inflorescence, usually without sheaths or sometimes lowermost one shortly sheathed. Spikes usually 3, rarely 2 or 4; terminal spike male, clavate, 1.5–2 cm, shortly pedunculate; lateral spikes female, rather approximate, subglobose or oblong-ovate, 1.5–2 × ca. 1.5 cm, densely many flowered, nearly sessile or shortly pedunculate. Female glumes yellowish laterally, ovate-lanceolate, ca. 5.5 mm, membranous, 3-veined, yellowish brown between veins, apex acuminate, sometimes mucronulate. Utricles stramineous or yellowish brown, obliquely patent, later horizontally patent or reflexed, much longer than glume, broadly ovate or ovate, inflated trigonous, ca. 10 mm, thinly leathery, nitid, glabrous, distinctly 5-veined abaxially, base subrounded, rather shortly stipitate, apex gradually narrowed to a stiff beak, orifice sharply 2-toothed. Nutlets fuscous, rather pale on angles, very loosely enveloped, broadly rhomboid, trigonous, ca. 3 mm, base shortly stipitate; style flexuose, persistent, base slightly thickened; stigmas 3. Fl. and fr. Jul–Sep.

Forests, ditch sides in valleys or swamps; ca. 1100 m. Fujian [Japan, Korea].

349. *Carex idzuroei* Franchet & Savatier, Enum. Pl. Jap. 2: 583. 1878.

马菅 ma jian

Carex pseudovesicaria H. Lévillé & Vaniot.

Rhizome with slender and branched stolons. Culms laxly tufted, 30–60 cm tall, triquetrous, smooth, clothed with long sheaths at base. Leaves usually shorter than culm at lower part and longer than culm at upper part, blades 4–9 mm wide, flat, 2

lateral veins distinct, with shortly transverse septate nodes between veins, purple-brown long sheathed at base. Involucral bracts leaflike, longer than spike, usually not sheathed. Spikes 4 or 5; terminal 1 or 2 spikes male, linear-cylindric, 2–4 cm, pedunculate; remaining spikes female, oblong, 2–3 × 1–1.2 cm, subdensely many flowered, sessile at upper spikes, shortly pedunculate at lowermost spike. Female glumes dark yellow, lanceolate-ovate, 5–6 mm, membranous, green 3-veined, apex acuminate, mucronate. Utricles yellow-brown, obliquely patent, much longer than glume, oblong-ovate, inflated trigonous, 9–12 mm, thinly leathery, glabrous, several veined, base rounded, shortly stipitate, apex gradually narrowed to a long beak, orifice slightly long 2-toothed. Nutlets yellowish brown, rather loosely enveloped, obovate, trigonous, ca. 4 mm, base shortly stipitate; style thickened at lower part, persistent, slightly stiff; stigmas 3, rather short. Fl. and fr. Apr–May.

Riversides, lakesides, wet places. Fujian, Jiangsu, Zhejiang [Japan].

350. *Carex mollissima* Christ, Kongl. Svenska Vetensk. Acad. Handl., n.s., 22(10) [Scheutz, Pl. Vasc. Jenis.]: 181. 1888.

柄藁草 bing tai cao

Carex divaricata Kükenthal; *C. yingkiliensis* A. I. Baranov & Skvortsov.

Rhizome short, with long and branched stolons. Culms 30–40 cm tall, slightly slender, compressed triquetrous, scabrid on upper part, yellowish brown and bladeless sheathed at base, sheaths sometimes disintegrating into fibers. Leaves longer than culm, blades 2–4 mm wide, flat, soft, scabrid on margins and veins, long sheathed. Involucral bracts leaflike, longer than spike, nearly not sheathed, lowermost sometimes shortly sheathed. Spikes 3 or 4, lowermost spike remote, upper spikes approximate; terminal 1 or 2 spikes male, linear or clavate, 1–1.8 cm, shortly pedunculate; remaining spikes female, oblong-cylindric or cylindric, 1–3.5 × 0.7–0.8 cm, densely many flowered, upper spikes shortly pedunculate, lowermost spike pedunculate, peduncle up to 5 cm. Female glumes pale ferruginous or pale, ovate-oblong, ca. 3 mm, membranous, 3-veined, margins white hyaline, apex obtuse. Utricles yellowish green, horizontally patent or reflexed, longer than glume, ovate, inflated trigonous, 4–5 mm, papery, glabrous, slightly nitid, several veined, base subrounded, with short and bent stipe, apex abruptly contracted into a long beak 1–1.5 mm, orifice slightly slitting into 2 teeth or emarginate. Nutlets rather loosely enveloped, elliptic or obovate, trigonous, ca. 1.5 mm, base shortly stipitate; style slender, base bent, not thickened; stigmas 3, rather short. Fl. and fr. Jul–Aug.

Swamps in high mountain regions. Heilongjiang, Nei Mongol (Da Hinggan Ling) [Korea, Russia].

351. *Carex pamirensis* C. B. Clarke, Bot. Zhurn. (St. Petersburg) 1: 191. 1907.

帕米尔藁草 pa mi er tai cao

Rhizome with rather thick stolons. Culms 60–90 cm tall, triquetrous, stout, stiff, smooth on lower part, scabrous on upper

part, with red-brown and bladeless sheaths at base. Leaves nearly equaling culm, blades 3–10 mm wide, flat, usually plicate at base, with transverse septate nodes between veins, scabrous on veins and margins. Involucral bracts leaflike, longer than spike, not sheathed or lower involucral bract shortly sheathed. Spikes 4 or 5; terminal 1–3 male, approximate, clavate or narrowly cylindric, 2–4 cm, subsessile; remaining spikes female, rather remote, oblong or shortly cylindric, 2.5–3 × 0.6–1.5 cm, densely many flowered, shortly pedunculate. Female glumes red-brown, lanceolate or narrowly lanceolate, 4.2–5 mm, membranous, costate, apex subacute. Utricles stramineous or dark chestnut-brown, obliquely patent, slightly longer than or nearly equaling glume, oblong-ovate, inflated trigonous, 5–5.5 mm, glabrous, shiny, thinly 5-veined, base rounded, very shortly stipitate, apex gradually narrowed to a short beak, orifice emarginate. Nutlets broadly ovate, trigonous, ca. 2 mm, base shortly stipitate; style slender, base bent; stigmas 3, rather short. Fl. and fr. Jul–Aug.

Alpine wetlands, damp alpine grasslands; 2400–3700 m. Gansu, N Sichuan, Xinjiang [Afghanistan, India (Sikkim), Kazakhstan, Russia].

- 1a. Leaf blades 5–10 mm wide; female spikes 1.2–1.5 cm wide 351a. subsp. *pamirensis*
 1b. Leaf blades 3–4 mm wide; female spikes 0.6–0.8 cm wide 351b. subsp. *angustispicata*

351a. *Carex pamirensis* subsp. *pamirensis*

帕米尔藁草(原亚种) pa mi er tai cao (yuan ya zhong)

Carex vesicaria Linnaeus var. *pamirica* O. Fedtschenko, Trudy Imp. S.-Peterburgsk. Bot. Sada 21: 432. 1903; *C. dichroa* Freyn subsp. *pamirensis* (C. B. Clarke) T. V. Egorova; *C. obscuriceps* Kükenthal var. *pamirica* (O. Fedtschenko) Kükenthal; *C. pamirica* (O. Fedtschenko) B. Fedtschenko, nom. superfl.

Leaf blades 5–10 mm wide. Female spikes 1.2–1.5 cm wide. Utricles stramineous, usually with brownish streaks. Fl. and fr. Jul–Aug.

Alpine wetlands; 2400–3700 m. Gansu, N Sichuan, Xinjiang [Afghanistan, India (Sikkim), Kazakhstan, Russia].

351b. *Carex pamirensis* subsp. *angustispicata* (Y. C. Yang) G. C. Tucker, **stat. nov.**

狭穗帕米尔藁草 xia sui pa mi er tai cao

Basionym: *Carex pamirensis* var. *angustispicata* Y. C. Yang, Acta Biol. Plateau Sin. 3: 89. 1984.

Leaf blades 3–4 mm wide. Female spikes 0.6–0.8 cm wide. Utricles dark chestnut-brown. Fl. and fr. Jul.

- Damp alpine grasslands; ca. 3400 m. Gansu (Maqu).

352. *Carex dichroa* Freyn, Oesterr. Bot. Z. 40: 304. 1890.

小穗藁草 xiao sui tai cao

Rhizome with slender stolons. Culms 15–50 cm, triquetrous, rather thin, scabrous on upper part, clothed with yellowish brown and bladeless sheaths at base. Leaves equaling or slightly longer than culm, blades 2–4 mm wide, flat, sheathed. Involucral bracts leaflike, longer than spike, nearly not sheathed. Spikes 2–5; terminal 1–3 spikes male, approximate,

linear or clavate, 1–3 cm, subsessile; remaining spikes female, remote, oblong, 1.5–2.5 × 0.7–0.8 cm, densely many flowered, pedunculate, lowermost peduncle 2–3 cm. Female glumes brown, ovate, 2.5–3 mm, membranous, costate, white hyaline on margin of apex, apex subacute. Utricles stramineous, slightly brown on upper part, obliquely patent, longer than glume, oblong-ovate, inflated trigonous, 4–4.5 mm, glabrous, slightly shiny, few veined, base rounded, apex gradually narrowed to a medium-sized beak, orifice emarginate. Nutlets rather loosely enveloped; style slender; stigmas 3, rather short. Fl. and fr. Jun–Aug.

Swamps, wet places at lakesides and riversides. Nei Mongol [Mongolia, Russia].

353. *Carex rostrata* Stokes in Withering, Bot. Arr. Brit. Pl., ed. 2, 2: 1059. 1787.

灰株薹草 *hui zhu tai cao*

Carex ampullacea Goodenough.

Rhizome with long and slightly stout stolons. Culms loosely tufted, 40–100 cm tall, rather stout, obtusely trigonous, smooth, bladeless sheathed at base, rudimentary sheaths usually disintegrating into fibers. Leaves longer than culm, blades gray-green, 2–5 mm wide, flat, ± stiff, with transverse septate nodes between veins, scabrid on margins. Involucral bracts leaflike, lower involucral bracts longer than spike, shortly sheathed or not sheathed, upper involucral bracts not sheathed. Spikes 3–6; terminal 2–4 spikes, rarely only 1 spike, male, approximate, linear-cylindric, 1–3.5 cm, sessile or subsessile; remaining spikes female, lower spikes remote, cylindric, 3–6 × 0.7–0.8 cm, densely many flowered, subsessile or lower spikes shortly pedunculate. Female glumes ferruginous or pale ferruginous, oblong-lanceolate, 3.5–4 mm, membranous, green costate, margins white hyaline, apex acute or obtuse. Utricles yellowish green, slightly longer than or equaling glume, obliquely patent, eventually slightly divergent, ovate or broadly ovate, inflated trigonous, ca. 4 mm, membranous, glabrous, shiny, 4–6-veined abaxially, base subrounded, shortly stipitate, apex abruptly contracted into a medium-sized beak, orifice shortly 2-toothed. Nutlets brown, very loosely enveloped, broadly obovate, trigonous, ca. 1.5 mm, base shortly stipitate; style slender, flexuose, base not thickened; stigmas 3, rather short. Fl. and fr. Jun–Jul.

Swamps or meadows in high mountain regions; ca. 2400 m. Heilongjiang, Jilin, Nei Mongol [Korea, Mongolia, Russia; Europe, North America].

354. *Carex obscuriceps* Kükenthal in Engler, Pflanzenr. 38(IV. 20): 723. 1909.

38. *Carex* sect. *Paludosae* G. Don in Loudon, Hort. Brit. 377. 1830.

沼生薹草组 *zhao sheng tai cao zu*

Dai Lunkai (戴伦凯); Tetsuo Koyama

Rhizomes stoloniferous. Leaves with short and transverse septate nodes between veins. Involucral bracts not sheathed or lower involucral bracts shortly sheathed. Spikes unisexual, usually 1–4 spikes male, remaining spikes female, single in an involucral bract sheath; female spikes cylindric or oblong, densely many flowered, shortly pedunculate, upper spikes rather shortly pedunculate or nearly sessile. Female glumes ovate or broadly ovate, usually 3-veined, apex mucronate or aristate. Utricles obliquely patent, ovoid, rarely oblong or lanceolate, slightly inflated trigonous, leathery or corky, glabrous, several veined, rarely veins indistinct, apex atten-

褐紫鳞薹草 *he zi lin tai cao*

Rhizome stoloniferous. Culms laxly tufted, 20–45 cm tall, obtusely trigonous, stiff, smooth, with bladeless sheaths at base. Leaves shorter or longer than culm, blades 3–5 mm wide, plicate proximally and flattened distally, sheathed. Involucral bracts leaflike, longer than spike, not sheathed or lowermost involucral bract shortly sheathed. Spikes 4 or 5; terminal 2 or 3 spikes male, narrowly cylindric, 1.5–4 cm, subsessile; remaining spikes female, remote, oblong-cylindric or broadly cylindric, 2–5 × 1–1.2 cm, densely many flowered, shortly pedunculate. Female glumes brown, lanceolate, ca. 4 mm, membranous, green costate, apex acuminate, mucicous or mucronate. Utricles stramineous or sometimes slightly brown, obliquely patent, eventually divergent, longer than glume, ovate, inflated trigonous, ca. 5 mm, membranous, glabrous, shiny, 5-veined abaxially, base rounded, apex abruptly contracted into a medium-sized beak, orifice rather long 2-toothed, teeth slightly recurved. Nutlets usually immature; stigmas 3.

Swamps or wet places; ca. 3500 m. SW Sichuan, NW Yunnan [Bhutan, India (Sikkim)].

355. *Carex vesicata* Meinshausen, Trudy Imp. S.-Peterburgsk. Bot. Sada 18: 367. 1901.

褐黄鳞薹草 *he huang lin tai cao*

Carex vesicaria Linnaeus var. *tenuistachya* Kükenthal.

Rhizome stoloniferous. Culms 30–70 cm tall, triquetrous, scabrous on upper part, clothed with red-brown sheaths at base. Leaves shorter than culm, blades 3–4 mm wide, slightly stiff, sheathed. Involucral bracts leaflike, longer than spike, usually not sheathed or lowermost involucral bract shortly sheathed. Spikes 4–6; terminal 2 or 3 spikes male, linear, 2–4 cm, nearly sessile; remaining spikes female, remote, oblong or ovate, 2–4 × ca. 1 cm, densely many flowered at upper part and laxly flowered at base, shortly pedunculate. Female glumes ferruginous, ovate-lanceolate, ca. 3.5 mm, 1–3-veined, margins white hyaline, apex acuminate, mucicous. Utricles yellowish green, sometimes brownish, obliquely patent, longer than glumes, ovate, inflated trigonous, ca. 5 mm, papery, glabrous, 3–5-veined abaxially, base rounded, apex abruptly contracted into a medium-sized beak, orifice shortly 2-toothed, teeth slightly recurved. Nutlets very loosely enveloped, subovate, trigonous, ca. 1.5 mm; style slender, flexuose at lower part, base not thickened; stigmas 3, rather short. Fl. and fr. Jun–Aug.

Wet places at riversides and ditch sides; ca. 600 m. Jilin, Liaoning, Nei Mongol [N Japan, Mongolia, Russia (Far East, E Siberia)].

uate into a short beak, orifice shortly 2-toothed. Nutlets rather loosely enveloped; style strict, base sometimes recurved, not or rarely thickened; stigmas 3.

About 35 species: Africa, temperate Asia, North and South America; 12 species (three endemic) in China.

- 1a. Female spikes oblong, not surpassing 2.5 cm; utricles subcorky, thick, with slightly concave or indistinct veins.
- 2a. Female glumes orbicular-ovate, apex mucronate; utricles ovoid, 3–4 mm, indistinctly veined; nutlets broadly obovate or broadly elliptic 363. *C. heterostachya*
- 2b. Female glumes broadly ovate or ovate, apex muticous (only *C. melanostachya* and *C. subpumila* with aristate or mucronate apex); utricles oblong or ovate, 5–8.5 mm, distinctly or slightly concave veined; nutlets oblong or obovate.
- 3a. Female glumes broadly ovate, 5.5–6 mm; utricles 6–8.5 mm, with distinct veins, not concave.
- 4a. Utricles oblong-elliptic, 6–8.5 mm; nutlets oblong, 4–5.5 mm 364. *C. scabrifolia*
- 4b. Utricles ovate, 6–6.5 mm; nutlets obovate, ca. 3 mm 365. *C. pumila*
- 3b. Female glumes ovate, 3.5–4.5 mm; utricles ca. 5 mm, with slightly concave veins.
- 5a. Female glumes mucronate at apex; utricles narrowly elliptic or oblong; nutlets narrowly elliptic, ca. 4 mm 366. *C. subpumila*
- 5b. Female glumes aristate at apex; utricles ovate; nutlets obovate, ca. 2 mm 367. *C. melanostachya*
- 1b. Female spikes cylindric; utricles subleathery or leathery, with convex veins.
- 6a. Male spikes 3–6, sometimes lower male spike with few female flowers at base 356. *C. riparia*
- 6b. Male spikes 1 or 2, rarely 3, without female flowers at base.
- 7a. Female glumes lanceolate, apex mucronate; utricles oblong or oblong-lanceolate, 6–7 mm.
- 8a. Utricles oblong, stramineous, usually dark red flecked, veins indistinct 357. *C. argyi*
- 8b. Utricles lanceolate or oblong-lanceolate, olivaceous or brownish green, veins distinct 358. *C. kirganica*
- 7b. Female glumes ovate or broadly ovate, apex muticous or mucronate; utricles oblong-ovate, ovate, or broadly ovate, 4–5(–5.5) mm.
- 9a. Female glumes broadly ovate, apex obtuse, mucronate; utricles elliptic or ovate-elliptic, 5–6 mm, brownish green, emarginate at orifice 359. *C. rugulosa*
- 9b. Female glumes ovate, apex acuminate or acute, muticous or mucronate; utricles broadly ovate or ovate, ca. 4 mm, stramineous, brown or brown-red flecked, 2-toothed at orifice.
- 10a. Female glumes acute at apex, mucronate; utricles ovate, obtusely trigonous, teeth divergent at orifice 360. *C. gotoi*
- 10b. Female glumes acuminate at apex, muticous; utricles broadly ovate, inflated trigonous, teeth strict at orifice.
- 11a. Utricles orange or stramineous, usually brown flecked, with distinct veins 361. *C. songorica*
- 11b. Utricles stramineous, without brown flecks, veins indistinct 362. *C. tangiana*

356. *Carex riparia* Curtis, Fl. Londin. 4: t. 60. 1783.

泽生藁草 ze sheng tai cao

Rhizome stout. Culms 60–150 cm tall, triquetrous, scabrous on upper part, clothed with brown or reddish brown sheaths at base. Leaves equaling or longer than culm, blades 10–15 mm wide, flat, ± stiff, with distinct and transverse septate nodes between veins, rather long sheathed. Involucral bracts leafy, lowermost involucral bract longer than inflorescence, nearly not sheathed or lower involucral bracts shortly sheathed. Spikes 5–10, lower spikes remote and upper spikes approximate; terminal 3–6 spikes male, oblong-cylindric or cylindric, 2–6 cm, subsessile; remaining spikes female, cylindric, 3–6 × ca. 1 cm, densely many flowered, sometimes with male flowers at top, upper spikes subsessile, lower spikes slightly long pedunculate. Female glumes brown, lanceolate, ca. 6 mm, 3-veined, apical margins hispidulous, apex acuminate, mucronate. Utricles fuscous-green, obliquely patent, nearly equaling glume, elliptic-ovate, obtusely trigonous, 5–6 mm, leathery or slightly corky, glabrous, several veined, base cuneate, apex gradually narrowed to a slightly broad and short beak, orifice slightly divergent and shortly 2-toothed. Nutlets rather loosely enveloped, obovate, trigonous, slightly concave on 3 sides;

style stiff, persistent, base not thickened; stigmas 3. Fl. and fr. May–Jun.

Damp places at riversides, at lakesides, or in swamps. Xinjiang [Russia (W Siberia); SW Asia (Iran)].

357. *Carex argyi* H. Léveillé & Vaniot, Bull. Soc. Agric. Sarthe 60: 78. 1905.

阿齐藁草 a qi tai cao

Rhizome with rather thick stolons. Culms 30–60 cm tall, stiff, triquetrous, smooth, clothed with dark red or red-brown bladeless sheaths at base, remnant sheaths usually disintegrating into reticulate fibers. Leaves shorter than culm, blades 3–4 mm wide, flat, stiff, with distinct transverse septate nodes between veins, sheathed. Involucral bracts leafy, lower ones longer than inflorescence, upper ones nearly not sheathed, lowermost involucral bract shortly sheathed. Spikes 5–7; terminal 2–4 spikes male, distance between spikes short, linear-cylindric, 2–5 cm, nearly sessile; remaining spikes female, remote, cylindric, 2.5–5 × 0.8–1 cm, densely many flowered, upper ones shortly pedunculate, lower one long pedunculate. Female glumes pale, lanceolate, ca. 5 mm, membranous, 3-veined, apex acuminate, shortly aristate. Utricles stramineous, usually dark red

flecked, obliquely patent, longer than glume, oblong-ovate, inflated trigonous, 5–6.5 mm, leathery, glabrous, several veined, base rounded, apex gradually narrowed to a slightly broad and medium-sized beak, orifice 2-toothed. Nutlets slightly loosely enveloped, obovate or ovate, trigonous, ca. 3 mm, base stipitate; style slightly thick, stiff; stigmas 3. Fl. and fr. Apr–Jun.

- Damp places at riversides or ditch sides. Anhui, Hubei, Jiangsu.

358. *Carex kirganica* Komarov, Repert. Spec. Nov. Regni Veg. 13: 164. 1914.

显脉薹草 xian mai tai cao

Carex graciliculis Ohwi; *C. kirganica* var. *mukdensis* (Kitagawa) Kitagawa; *C. mukdensis* Kitagawa; *C. rugulosa* Kükenthal var. *graciliculis* (Ohwi) Kitagawa.

Rhizome stoloniferous. Culms laxly tufted, 40–70 cm tall, triquetrous, smooth, clothed with red-brown and bladeless sheaths at base. Involucral bracts leafy, slightly shorter than inflorescence, sheathed, upper ones shortly sheathed or nearly not sheathed, lowermost one shortly sheathed, usually 5–10 mm. Spikes 4–7; terminal 2 or 3 spikes male, approximate, cylindrical, 3–4 cm, nearly sessile; remaining spikes female, remote, cylindrical, 2–5.5 × ca. 1 cm, densely many flowered, shortly pedunculate. Female glumes ferruginous, green at middle, lanceolate, ca. 5 mm, membranous, 1–3-veined, apex acuminate, aristate. Utricles olivaceous or brownish green, obliquely patent, longer than glume, lanceolate or oblong-lanceolate, obtusely trigonous, 6–7 mm, corky, glabrous, several veined, base subrounded, apex gradually narrowed to a slightly broad and short beak, orifice shortly 2-toothed. Nutlets slightly tightly enveloped in utricle, elliptic, trigonous, 2–3 mm, base stipitate, apex mucronate; style base not thickened; stigmas 3. Fl. and fr. Jun–Jul.

Swamps, meadows. Heilongjiang, Nei Mongol [Korea, Russia (Far East, E Siberia)].

359. *Carex rugulosa* Kükenthal, Bull. Herb. Boissier, sér. 2, 4: 58. 1903.

粗脉薹草 cu mai tai cao

Carex riparia Curtis var. *rugulosa* (Kükenthal) Kükenthal; *C. smirnovii* V. I. Kreczetowicz.

Rhizome with rather thick stolons. Culms 50–80 cm tall, obtusely trigonous, smooth on lower part, scabrid on upper part, clothed with red-brown and bladeless sheaths at base, remnant sheaths usually disintegrating into reticulate fibers. Leaves nearly equaling culm, blades 3–5 mm wide, flat, stiff, sheathed. Involucral bracts leafy, lowermost involucral bract equaling or slightly longer than inflorescence, upper involucral bracts rather short, shortly sheathed. Spikes 4–6; terminal 2 or 3 spikes male, distance between spikes short, narrowly lanceolate, 1–3.5 cm, nearly sessile; remaining spikes female, remote, cylindrical or oblong-cylindrical, 2–4 × ca. 1 cm, densely many flowered, laxly flowered at base, with ca. 1 cm peduncle. Female glumes pale ferruginous laterally, ovate, 3.5–4 mm, membranous, 3-veined, apex acute. Utricles brown-green or brown-yellow,

obliquely patent, longer than glume, elliptic or ovate-elliptic, obtusely trigonous, 5–6 mm, corky, glabrous, several veined abaxially, base rounded, apex abruptly contracted into a slightly broad and short beak, orifice half-rounded concave and shortly 2-toothed. Nutlets slightly tightly enveloped, elliptic or ovate-elliptic, trigonous, ca. 3 mm, base shortly stipitate; style slightly long, flexuose, persistent, base not thickened; stigmas 3. Fl. and fr. Jun–Jul.

Riversides, grasslands at lakesides, strands. Hebei, Heilongjiang, Jilin, Nei Mongol [N Japan, Russia (Far East)].

360. *Carex gotoi* Ohwi, Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 5: 248. 1930.

叉齿薹草 cha chi tai cao

Carex sukaczovii V. I. Kreczetowicz.

Rhizome with long stolons. Culms laxly tufted, 20–70 cm tall, triquetrous, smooth or ± smooth, clothed with red-brown and bladeless sheaths at base, rudimentary sheaths usually disintegrating into reticulate fibers. Leaves shorter than culm, blades 2–3 mm wide, flat or plicate, ± stiff, scabrous on margins, rather long sheathed. Involucral bracts leafy, lowermost involucral bract nearly equaling inflorescence, shortly sheathed, upper ones rather short, nearly not sheathed. Spikes 3–5, usually 4; terminal 1–3 spikes male, slightly approximate, cylindrical or lanceolate, uppermost one 2.5–3 cm, lower 1 or 2 usually rather short, nearly sessile; remaining spikes female, remote, cylindrical or suboblong, 1.5–3.5 × 0.5–0.6 cm, densely many flowered, shortly pedunculate. Female glumes fuscous, ovate or narrowly ovate, ca. 3.5 mm, membranous, 3-veined, pale fuscous on margins and between veins, apex acuminate, mucronate or aristate, scabrous on margins of mucro or awn. Utricles dark red-brown, sometimes stramineous, obliquely patent, longer than glume, ovate, obtusely trigonous, ca. 4 mm, leathery, glabrous, several veined, base cuneate, apex abruptly contracted into a slightly broad and short beak, orifice 2-toothed, teeth rather long and divergent. Nutlets rather loosely enveloped, broadly obovate or obovate, trigonous, 1.5–2 mm, base shortly stipitate, apex mucronate; style base not thickened, slightly recurved; stigmas 3. Fl. and fr. May–Jun.

Damp places at riversides, meadows; 1000–1300 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shaanxi [N Korea, Mongolia, Russia (Far East, E Siberia)].

361. *Carex songorica* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 525. 1842.

准噶尔薹草 zhun ga er tai cao

Rhizome with long and rather thick stolons. Culms 30–50 cm tall, triquetrous, scabrous on upper part, clothed with red-brown and bladeless sheaths at base, remnant sheaths usually disintegrating into reticulate fibers. Leaves shorter than culm, blades 3–5 mm wide, flat or slightly plicate, with distinctly transverse septate nodes between veins, sheathed. Involucral bracts leafy, longer than inflorescence, lowermost involucral bract shortly sheathed, upper involucral bracts not sheathed. Spikes 3 or 4; terminal 1 or 2 spikes male, approximate, narrowly clavate, 1.5–2 cm, nearly sessile; remaining spikes fe-

male, remote, cylindric, 2–4 × 0.5–0.6 cm, densely many flowered and laxly flowered at base, shortly pedunculate, lowermost peduncle ca. 1 cm. Female glumes brown laterally, brownish at middle, ovate, ca. 3 mm, 3-veined, apex acuminate. Utricles orange or ferruginous, usually brown flecked, obliquely patent, longer than glume, ovoid or broadly ovoid, biconvex, 3–4 mm, leathery, shiny, thinly several veined abaxially, base rounded, apex abruptly contracted into a slightly broad and short beak, orifice shortly 2-toothed. Nutlets elliptic or ovate-elliptic, trigonous, ca. 2 mm, base shortly stipitate, apex mucronate; style base flexuose, not thickened; stigmas 3. Fl. and fr. Apr–Jun.

Salt grasslands; below 100–3000 m. Xinjiang [Afghanistan, India, NW Mongolia, Russia; SW Asia (Iran)].

362. *Carex tangiana* Ohwi, J. Jap. Bot. 12: 656. 1936.

唐进藁草 tang jin tai cao

Rhizome with rather thick, stiff stolons. Culms 30–40 cm tall, triquetrous, smooth, scabrid on upper part, clothed with red-brown and bladeless sheaths at base. Leaves slightly longer than or equaling culm, blades 2–3 mm wide, flat, stiff, scabrous on margins, rather long sheathed. Involucral bracts leafy, lowermost involucral bract longer than inflorescence, upper involucral bracts shorter than inflorescence, nearly not sheathed. Spikes 3 or 4; terminal 1 or 2 spikes male, approximate, narrowly cylindric or lanceolate, 1.2–2.5 cm, sessile; remaining spikes female, remote, cylindric, 2.5–3.5 × 0.5–0.6 cm, densely many flowered, lowermost one shortly pedunculate, upper ones nearly sessile. Female glumes brown-yellow, ovate, ca. 3 mm, membranous, 3-veined, brownish yellow between veins, apex acuminate, shortly aristate, scabrous on margins of awn. Utricles stramineous, obliquely patent, slightly longer than glume, elliptic or broadly ovate, subplano-convex, slightly inflated, 3.5–4 mm, leathery, glabrous, slightly shiny, indistinctly veined, base subrounded or broadly cuneate, apex abruptly narrowed to a short beak, orifice shortly 2-toothed, teeth straight. Nutlets rather loosely enveloped, subobovate, trigonous, ca. 2 mm, base stipitate; style rather long, base not thickened, slightly recurved; stigmas 3, rather short. Fl. and fr. May–Jul.

• Damp places in valleys, ditch sides, roadsides; 500–1000 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Shaanxi, Shanxi.

Based on its original description, *Carex purpureovaginalis* Q. S. Wang (J. Wuhan Bot. Res. 5: 343. 1987, “*purplevaginalis*”) is very difficult to distinguish from *C. tangiana*. We have not seen the type specimen and so cannot make a provisional determination here.

363. *Carex heterostachya* Bunge, Enum. Pl. China Bor. 69. 1833.

异穗藁草 yi sui tai cao

Rhizome with long stolons. Culms 20–40 cm tall, triquetrous, smooth on lower part, scabrid on upper part, clothed with red-brown and bladeless sheaths at base, rudimentary sheaths usually disintegrating into fibers. Leaves shorter than culm, blades 2–3 mm wide, flat, ± stiff, scabrous on margins, slightly long sheathed. Involucral bracts awn-shaped, usually shorter than spike, sometimes lowermost slightly longer than spike, not sheathed or lowermost one shortly sheathed. Spikes 3

or 4, congregate on top of culm; terminal 1 or 2 spikes male, oblong or clavate, 1–3 cm, sessile; remaining spikes female, ovate or oblong, 0.8–1.8 cm, densely many flowered, nearly sessile, sometimes lowermost one very shortly pedunculate. Female glumes brown laterally, yellowish brown at middle, orbicular-ovate or ovate, ca. 3.5 mm, membranous, 3-veined, green costate, margins white hyaline, sometimes upper margin erose, apex acute, mucronate. Utricles brown, obliquely patent, slightly longer than glume, broadly ovate or ovoid, obtusely trigonous, 3–4 mm, leathery, glabrous, slightly shiny, indistinctly veined, base subrounded, apex abruptly narrowed to a slightly broad and short beak, orifice shortly 2-toothed. Nutlets rather tightly enveloped in utricle, broadly obovate or broadly elliptic, trigonous, ca. 2.8 mm, base shortly stipitate, apex mucronate; style base not thickened; stigmas 3. Fl. and fr. Apr–Jun.

Dry mountains, grasslands, roadsides; 300–1000 m. Hebei, Heilongjiang, Henan, Jilin, Liaoning, Shaanxi, Shandong, Shanxi [N Korea].

364. *Carex scabrifolia* Steudel, Syn. Pl. Glumac. 2: 237. 1855.

糙叶藁草 cao ye tai cao

Carex pierotii Miquel.

Rhizome stoloniferous. Culms 2 or 3 tufted at nodes of stolon, 30–60 cm tall, rather thin, trigonous, smooth, scabrid on upper part, clothed with red-brown and bladeless sheaths at base, rudimentary sheaths ± disintegrating into reticulate fibers. Leaves shorter than or upper ones slightly longer than culm, blades 2–3 mm wide, stiff, longitudinally furrowed on middle of upper surface, scabrous and slightly involute on margins, rather long sheathed. Lower involucral bracts leafy, longer than inflorescence, not sheathed, upper involucral bracts scalelike. Spikes 3–5; terminal 2 or 3 spikes male, approximate, narrowly cylindric, 1–3.5 cm, shortly pedunculate or nearly sessile; remaining spikes female, slightly remote, oblong or subovate, 1.5–2 × ca. 1 cm, densely 10–15-flowered, shortly pedunculate or upper ones nearly sessile. Female glumes brown, pale at middle, broadly ovate, 5–6 mm, membranous, 3-veined, apex acuminate, mucronate. Utricles brown, obliquely patent, longer than glume, oblong-elliptic, inflated trigonous, 6–8.5 mm, sub-corky, glabrous, slightly concave, several veined, base obtuse, apex abruptly narrowed to a slightly broad and short beak, orifice half-moon-shaped concave and shortly 2-toothed. Nutlets brown, tightly enveloped, oblong or narrowly oblong, obtusely trigonous, 4–5.5 mm; style base slightly thickened; stigmas 3. Fl. and fr. Apr–Jul.

Beaches or wet places in maritime regions or fields. Fujian, Hebei, Jiangsu, Liaoning, Shandong, Taiwan, Zhejiang [Japan, N Korea, Russia (Far East)].

This species is used for making rope.

365. *Carex pumila* Thunberg in Murray, Syst. Veg., ed. 14, 846. 1784.

矮生藁草 ai sheng tai cao

Rhizome with slender stolons. Culms laxly tufted, 10–30 cm tall, triquetrous, nearly all clothed with sheaths, lower part clothed with several reddish brown and bladeless sheaths, one side of sheath usually disintegrating into reticulate fibers.

Leaves longer than or equaling culm, blades 3–4 mm wide, flat or sometimes plicate, stiff, scabrous on veins and margins, sheathed. Involucral bracts leafy, longer than culm, shortly sheathed. Spikes 3–6, slightly approximate; terminal 2 or 3 spikes male, clavate or narrowly cylindrical, 1.5–3.5 cm, shortly pedunculate; remaining spikes female, oblong or oblong-cylindrical, 1.5–2.5 × ca. 0.8 cm, slightly laxly many flowered, usually shortly pedunculate. Female glumes brownish, sometimes ferruginous and shortly striate, green at middle, broadly ovate, ca. 5.5 mm, membranous, 3-veined, margins white hyaline, apex acuminate, mucronate or aristate. Utricles yellowish or yellowish brown, obliquely patent, ovate, inflated trigonous, 6–6.5 mm, corky, glabrous, distinctly several veined, base broadly cuneate, rather thick and shortly stipitate, apex gradually narrowed to a rather broad and short beak, orifice sanguineous and 2-toothed. Nutlets rather tightly enveloped, broadly obovate or subelliptic, trigonous, ca. 3 mm, base shortly stipitate; style ± long, base slightly thickened, usually persistent; stigmas 3. Fl. and fr. Apr–Jun.

Seaside sands. Fujian, Hebei, Jiangsu, Liaoning, Shandong, Taiwan, Zhejiang [Japan, N Korea, Russia (Far East)].

366. *Carex subpumila* Tang & F. T. Wang ex L. K. Dai, Acta Phytotax. Sin. 37: 182. 1999.

似矮生藁草 si ai sheng tai cao

Rhizome rather long, with slightly dense roots. Culms 10–30 cm, trigonous, almost all clothed with leaf sheaths, clothed with brown and bladeless sheaths at base. Leaves longer than culm, blades 1.5–2 mm wide, slightly involute on margins, with transverse septate nodes between veins, slightly long sheathed. Involucral bracts leafy, lower involucral bracts longer than inflorescence, upper involucral bracts rather short and thin, shortly sheathed. Spikes 2 or 3, contiguous; terminal spike male, clavate or narrowly cylindrical, 2–3.5 cm, shortly pedunculate; lateral spikes female, oblong, 0.8–1.5 × ca. 1 cm, laxly several flowered, shortly pedunculate. Female glumes pale laterally, green at middle, ovate or narrowly ovate, 3.5–4 mm, membranous, 3-veined, apex acuminate, mucronate. Utricles stramineous, obliquely patent, later nearly horizontally patent, longer than

glume, narrowly elliptic or oblong, inflated trigonous, 4–5 mm, thickly leathery, glabrous, with 7 slightly concave veins, veins gradually indistinct toward apex, base abruptly contracted and broadly cuneate, apex abruptly narrowed to a slightly broad and short beak, orifice half-moon-shaped concave and sharply 2-toothed. Nutlets tightly enveloped in utricle, narrowly elliptic, trigonous, ca. 3 mm; style base not thickened, late deciduous; stigmas 3. Fl. and fr. Apr–Jun.

• Sandbanks at seashores. Fujian, Hebei.

367. *Carex melanostachya* M. Bieberstein ex Willdenow, Sp. Pl. 4: 299. 1805.

凹脉藁草 ao mai tai cao

Rhizome with ligneous and slender stolons. Culms 20–50 cm tall, triquetrous, rather slender, smooth on lower part and scabrid near top, clothed with red-brown and bladeless sheaths at base, one side of sheaths disintegrating into reticulate fibers. Leaves slightly longer than or equaling culm, blades 2–3 mm wide, stiff, longitudinally furrowed on costa, involute on margins, mid-sheathed. Involucral bracts leafy, lower involucral bracts longer than inflorescence, shortly sheathed, upper involucral bracts rather short, nearly not sheathed. Spikes 3–6; terminal 1–3 male, slightly contiguous, clavate, 1–2.5 cm, nearly sessile; remaining spikes female, remote, ovate or oblong, 1–3 × ca. 1 cm, slightly densely many flowered, pedunculate, peduncle less than 1 cm. Female glumes fuscous laterally, pale at middle, ovate or narrowly ovate, 4.5–5 mm, membranous, costate, apex acuminate, aristate. Utricles brown-green, obliquely patent, longer than glume (excluding awn), ovoid, slightly inflated trigonous, ca. 5 mm, leathery, glabrous, with several rather concave veins, base broadly cuneate, apex abruptly contracted into a slightly broad and short beak, orifice shortly 2-toothed, teeth straight, smooth. Nutlets broadly obovate or subelliptic, trigonous, ca. 2 mm, base stipitate, apex slightly long mucronate; style base not thickened; stigmas 3. Fl. and fr. Apr–Jun.

Solonchalk or solonetz soil in grasslands, damp places in valleys; ca. 1300 m. Xinjiang [Russia; C Asia, C Europe].

39. *Carex* sect. *Occlusae* C. B. Clarke, Bull. Misc. Inform. Kew, Addit. Ser. 8: 147. 1908.

硬毛果藁草组 ying mao guo tai cao zu

Dai Lunkai (戴伦凯); Tetsuo Koyama

Leaves with transverse septate nodes between longitudinal veins. Involucral bracts leafy, rather long sheathed. Spikes 3–8; male spike single, terminal, linear-cylindrical; lateral spikes female, single in an involucral bract axil, oblong or oblong-cylindrical, densely many flowered, thinly pedunculate. Female glumes ovate or broadly ovate, usually red-brown punctate, apex acute and mucronate. Utricles obliquely patent, ovate or obovate, trigonous, not inflated, densely hispidulous, rarely laxly hirtellous or glabrous, distinctly 2-veined laterally or indistinctly veined abaxially, apex abruptly contracted to a medium-sized or short beak, orifice shortly 2-toothed. Nutlets tightly enveloped; style base not thickened or slightly thickened; stigmas 3.

Eight species: E, S, and SE Asia; seven species (three endemic) in China.

1a. Spikes approximate, usually congregated at top of culm, subcapitately disposed.

2a. Culms 12–15 cm tall; leaf blades 2–5 mm wide; female spikes 0.7–1.5 cm; utricles ca. 2.5 mm, ciliate only on margins of beak 368. *C. pseudophyllocephala*

2b. Culms 20–60 cm tall; leaf blades 8–15 mm wide; female spikes 2–3 cm; utricles 2.8–3.5 mm, densely hispidulous 369. *C. phyllocephala*

- 1b. Spikes remote, not congregated at top of culm, racemosely disposed.
- 3a. Female spikes with lax utricles; utricles subrhombic, distinctly trigonous, ca. 5 mm, dark gray-green, several veined abaxially, glabrous, sometimes ciliate on margins, dark brown glandular punctate; female glumes connate at base, funnelform 370. *C. poculisquama*
- 3b. Female spikes with dense utricles; utricles ovoid or obovoid, indistinctly trigonous, 3–4 mm (ca. 4.8 mm in *C. ligulata*), brownish green, with 2 lateral veins abaxially, densely hispidulous, rarely ciliate on margins or veins; female glumes not connate at base, not funnelform.
- 4a. Culms rather slender; leaf blades less than 5 mm wide; female spikes 3–4 mm wide; utricles subdistichous, laxly disposed, ca. 3 mm, densely hispidulous 371. *C. hebecarpa*
- 4b. Culms stouter than above; leaf blades (5–)7–15 mm wide; female spikes 5–6 mm wide; utricles multiseriate, densely or rather densely disposed, 3–5 mm, densely hispidulous or only on veins and upper margins.
- 5a. Utricles 3–3.5 mm, hispidulous only on veins and upper margins 372. *C. pseudoligulata*
- 5b. Utricles 3–5 mm, densely hispidulous.
- 6a. Leaf sheaths not overlapping, sheaths rather loosely enveloping culm; female glumes ca. 3 mm; utricles obovate, 4–5 mm 373. *C. ligulata*
- 6b. Leaf sheaths overlapping, sheaths rather tightly enveloping culm; female glumes ca. 1.8 mm; utricles broadly ovate, ca. 3 mm 374. *C. maubertiana*

368. *Carex pseudophyllocephala* L. K. Dai, Acta Phytotax. Sin. 32: 187. 1994 [*"pseudo-phyllocephala"*].

假头序藁草 jia tou xu tai cao

Rhizome short, without stolons. Culms tufted, 12–15 cm tall, slender, triquetrous, clothed with brown and shortly bladed sheaths at base. Upper leaves longer than culm, lower leaves shorter than culm, blades 2–5 mm wide, flat, scabrous on veins and margins, slightly shortly sheathed, upper and lower sheaths ± overlapping. Involucral bracts leaflike, congregated at top of culm, longer than inflorescence, scabrous on veins of adaxial surface and margins, smooth on abaxial surface, rather shortly sheathed. Spikes 4 or 5, congregated at top of culm; terminal spike male, linear, 1–1.5 cm, shortly pedunculate; lateral spikes female, narrowly oblong, 0.7–1.5 cm, several to 15-flowered, shortly pedunculate. Female glumes brown-yellow, orbicular-ovate, ca. 2 mm, membranous, 1-veined, apex acute, sometimes mucronate. Utricles yellow-green, yellow-brown in maturity, obliquely patent, longer than glume, lanceolate or broadly lanceolate, trigonous, ca. 2.5 mm, membranous, glabrous or sometimes laxly ciliate on margins near beak, abaxially distinctly 2-veined laterally, base cuneate, apex gradually narrowed to a rather short beak, orifice shortly 2-toothed. Nutlets brown-yellow, tightly enveloped, lanceolate, ca. 2 mm; style rather short, base not thickened; stigmas 3. Fl. and fr. Jun–Jul.

• Thickets on mountain slopes, damp places at forest margins. Hunan.

369. *Carex phyllocephala* T. Koyama, Acta Phytotax. Geobot. 16: 40. 1955.

密苞叶藁草 mi bao ye tai cao

Rhizome short and slightly thick, ligneous, without stolons. Culms 20–60 cm tall, rather stout, obtusely trigonous, clothed with reddish brown and bladeless sheaths at lower part. Leaves contiguously disposed, longer than culm, blades 8–15 mm wide, ± stiff, revolute on margins with distinctly transverse septate nodes between veins on abaxial surface, slightly long sheathed; sheaths ± overlapping, distinctly ligulate, reddish. Involucral bracts leaflike, congregated at top of culm, longer

than inflorescence, rather shortly sheathed. Spikes 6–10, congregated at top of culm; terminal spike male, linear-cylindrical, 1–2.5 cm, shortly pedunculate; lateral spikes female, sometimes with few male flowers at apex, narrowly cylindrical, 2–3 cm, densely many flowered, pedunculate. Female glumes green at middle, pale laterally, very shortly ferruginous striate, broadly obovate, ca. 1.8 mm, membranous, 3-veined, apex acute, mucronate. Utricles grass-green, very shortly ferruginous striate, obliquely patent, longer than glume, broadly obovate, trigonous, 2.8–3.5 mm, membranous, densely white hispidulous, distinctly 2-veined laterally, base cuneate, apex abruptly contracted into a rather short beak, orifice shortly 2-toothed. Nutlets obovate, trigonous, ca. 2 mm, sessile; style base slightly thickened; stigmas 3. Fl. and fr. Jun–Sep.

Damp places in forests, roadsides, valleys; 500–1000 m. Fujian [Japan].

370. *Carex poculisquama* Kükenthal, Repert. Spec. Nov. Regni Veg. 27: 111. 1929.

杯鳞藁草 bei lin tai cao

Rhizome short. Culms densely tufted, 30–50 cm tall, triquetrous, rather slender, stiff, scabrous on upper part, clothed with bladeless or shortly bladed sheaths at lower part. Upper leaves longer than culm and lower leaves shorter than culm, blades 3–4 mm wide, furrowed on midrib of adaxial surface, revolute on margins, scabrous on margins and abaxial surface, rather long sheathed. Involucral bracts leafy, nearly equaling or longer than inflorescence, rather shortly sheathed. Spikes 3 or 4, upper spikes approximate, lower spikes slightly remote; terminal spike male, linear, 1–2 cm, shortly pedunculate; lateral spikes female, narrowly cylindrical, 1–3 cm, laxly 10- or more flowered, rather slenderly pedunculate. Female glumes yellowish and ferruginous punctate, broadly ovate, ca. 4 mm, membranous, 1-costate, base connate and clasping rachilla, apex acute, shortly aristate. Utricles gray-green, obliquely patent, longer than glume, rhombic-elliptic, trigonous, ca. 5 mm, papery, glabrous, thinly several veined, base gradually narrowed and stipitate, margins hispidulous, apex gradually narrowed to a slightly broad and short beak, orifice 2-toothed.

Nutlets tightly enveloped, elliptic, trigonous, ca. 3 mm, sessile, apex with slightly long acumen; style short, base slightly thickened; stigmas 3. Fl. and fr. May–Jun.

• Damp places at ditch sides and lakesides. Anhui, S Jiangsu, Zhejiang.

371. *Carex hebecarpa* C. A. Meyer, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 1: 223. 1831.

疏果薹草 shu guo tai cao

Rhizome stoloniferous. Culms 30–50 cm tall, triquetrous, slender, scabrous on upper part, clothed with reddish brown and bladeless sheaths. Upper leaves longer than culm, blades 2–5 mm wide, flat, scabrous on veins of adaxial surface, rather long sheathed; sheaths often overlapping, laxly pubescent on surface. Involucral bracts leafy, longer than inflorescence, rather long sheathed, pubescent on outside. Spikes 5 or 6, upper spikes approximate, lower spikes rather remote; terminal spike male, linear, ca. 2 cm, shortly pedunculate; lateral spikes female, narrowly cylindrical, 1.5–4 cm, laxly many flowered, lower spikes long pedunculate, upper spikes rather shortly pedunculate; peduncles scabrous. Female glumes pale, shortly ferruginous striate, broadly ovate, 1.8–2 mm, membranous, 3-veined, apex acute, mucronate. Utricles red-brown, obliquely patent, subdistichous, easily deciduous in maturity, longer than glume, obovate-elliptic, obtusely trigonous, ca. 3 mm, submembranous, densely white hispidulous, distinctly 2-veined laterally, base cuneate, apex abruptly contracted into a medium-sized beak, orifice shortly 2-toothed. Nutlets tightly enveloped in utricle, elliptic, trigonous, ca. 2 mm; style short, early deciduous; stigmas 3. Fl. and fr. May–Oct.

Damp places in valleys of mountain regions, in forests, or at roadsides. Fujian, Guangdong, Hunan, Taiwan [Bhutan, India, Nepal].

372. *Carex pseudoligulata* L. K. Dai, Acta Phytotax. Sin. 32: 187. 1994.

似舌叶薹草 shi she ye tai cao

Rhizome ligneous. Culms tufted, 35–65 cm tall, triquetrous, clothed with red-brown and bladeless sheaths. Upper leaves longer than culms, blades 5–9 mm wide, flat, scabrous on both surfaces and margins, sheathed, sheaths 2–7 cm, lower ones rather long, upper ones short. Involucral bracts leaflike, longer than inflorescence, sheathed. Spikes 5 or 6, upper spikes slightly approximate, lower spikes slightly remote; terminal spike male, linear, 2–2.5 cm, shortly pedunculate; lateral spikes female, oblong or narrowly cylindrical, 1.5–4 cm, laxly 10–30-flowered, rather long pedunculate, greater part of peduncles clothed in involucral bract sheaths. Female glumes stramineous laterally, shortly ferruginous striate, ovate or broadly ovate, ca. 2.5 mm, membranous, green 1-costate, apex acute. Utricles yellowish green, ferruginous punctate, suberect, longer than glume, obovate, trigonous, 3–3.5 mm, membranous, distinctly 2-veined laterally, hispidulous on lateral veins and upper margins, base gradually narrowed, shortly stipitate, apex abruptly contracted into a slightly long beak, orifice shortly 2-toothed. Nutlets yellow-brown, tightly enveloped in utricle, elliptic or obovate-elliptic, trigonous, ca. 2 mm, sessile, smooth; style short; stigmas 3. Fl. and fr. May–Jun.

• Forest margins or thickets at ditch sides or on mountain slopes; 400–800 m. Hunan.

373. *Carex ligulata* Nees in Wight, Contr. Bot. India, 127. 1834.

舌叶薹草 she ye tai cao

Carex hebecarpa C. A. Meyer var. *ligulata* (Nees) Kükenthal.

Rhizome stout and short, ligneous, without stolons, with rather many rootlets. Culms laxly tufted, 35–70 cm tall, triquetrous, rather stout, scabrous on upper angles, clothed with red-brown and bladeless sheaths. Upper leaves longer than culm, lower leaves shorter than culm, blades 6–12 mm wide, sometimes up to 15 mm wide, flat, sometimes involute on margins, slightly soft, with distinctly transverse septate nodes between veins on abaxial surface; sheaths ferruginous, ligulate, up to 6 cm. Involucral bracts leaflike, longer than inflorescence, lower involucral bracts slightly long sheathed, upper involucral bracts shortly sheathed or not sheathed. Spikes 6–8, remote in lower part, approximate in upper part; terminal spike male, linear-cylindric, 1–2 cm, shortly pedunculate or subsessile; lateral spikes female, cylindrical or oblong-cylindric, 2.5–4 cm, 5–6 mm thick, densely many flowered, pedunculate, upper peduncles rather short. Female glumes brownish yellow, shortly ferruginous striate, ovate or broadly ovate, ca. 3 mm, membranous, glabrous, green 1-costate, apex acute, usually mucronate. Utricles green-brown, shortly ferruginous striate, suberect, longer than glume, obovate, obtusely trigonous, 4–5 mm, densely white hispidulous, 2-veined laterally, base cuneate, apex abruptly narrowed to a slightly short beak, orifice shortly 2-toothed. Nutlets brown, tightly enveloped, elliptic, trigonous, 2.5–3 mm, smooth; style short, base slightly thickened; stigmas 3. Fl. and fr. May–Jul.

Forests on mountain slopes, grasslands, ditch sides in valleys, damp places at riversides; 600–2000 m. Fujian, Guizhou, Henan, Hubei, Hunan, Jiangsu, Shaanxi, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [NE and S India, Japan, Nepal, Sri Lanka].

Carex ligulata var. *glabriutriculata* Q. S. Wang (J. Wuhan Bot. Res. 5: 344. 1987) differs from *C. ligulata* and *C. pseudoligulata* in having utricles glabrous. Because the original description of *C. ligulata* var. *glabriutriculata* is very simple and we have not seen the type specimen, we cannot compare them in detail and take time to make any determination.

374. *Carex maubertiana* Boott, Ill. Gen. Carex 1: 45. 1858.

套鞘薹草 tao qiao tai cao

Carex hebecarpa C. A. Meyer var. *maubertiana* (Boott) Franchet.

Rhizome thick and short, ligneous, without stolons. Culms tufted, 60–80 cm tall, slightly slender, stiff, obtusely trigonous, with brown and bladeless sheaths at base. Leaves rather dense, upper leaves longer than culm, lower ones rather short, blades 5–6 mm wide, revolute on margins, with transverse septate nodes between veins on abaxial surface; sheaths rather long, overlapping, purple-red and ligulate at sheath mouth. Involucral bracts leaflike, longer than inflorescence, sheathed. Spikes 6–9,

upper spikes approximate, lower spikes rather remote; terminal spike male, narrowly cylindrical, 2–3 cm, shortly pedunculate; lateral spikes female, cylindrical, 2–3 cm, densely many flowered, shortly pedunculate. Female glumes pale yellow, shortly ferruginous striate, broadly ovate, ca. 1.8 mm, membranous, green 1-veined, apex acute. Utricles yellowish green, shortly ferruginous striate, suberect, longer than glume, broadly obovate, obtusely trigonous, ca. 3 mm, membranous, densely white hispidulous, distinctly 2-veined laterally, base abruptly nar-

rowed to a short stipe, apex abruptly narrowed to a rather short beak, orifice shortly 2-toothed. Nutlets tightly enveloped in utricule, broadly elliptic, trigonous, ca. 2 mm, base abruptly narrowed to a short stipe, apex acute; style short, base slightly thickened; stigmas 3. Fl. and fr. Jun–Sep.

Forests on mountain slopes, wet places at roadsides; 400–1000 m. Fujian, Hubei, Sichuan, Yunnan, Zhejiang [NE and S India, Nepal, Vietnam].

40. *Carex* sect. *Carex*

藁草组 tai cao zu

Dai Lunkai (戴伦凯); Tetsuo Koyama

Leaves with transverse septate nodes between veins. Involucral bracts leafy, sheathed, rarely shortly sheathed or not sheathed. Spikes 3–8; male spikes 1–4, rarely up to 7, borne at top of culm; remaining spikes female, single in an involucral bract axil, cylindrical, densely many flowered, pedunculate. Female glumes lanceolate, narrowly ovate, or oblong-ovate, usually 3-veined, apex acuminate, mucronate or aristate. Utricles obliquely patent, ovate or oblong-ovate, slightly inflated or inflated trigonous, laxly or densely pubescent or hispidulous, rarely glabrous, distinctly several veined, apex gradually narrowed to a medium-sized beak, orifice rather long 2-toothed. Nutlets rather loosely or tightly enveloped in utricule, apex slightly long mucronate; style base not thickened; stigmas 3 (*Carex humida* with stigmas 2).

About 30 species: Asia, Europe, North America; 13 species (four endemic) in China.

- 1a. Involucral bracts usually not sheathed or lowermost very shortly sheathed; utricles 3–4 mm, densely hispidulous (*C. glabrescens* with utricles up to 6 mm, laxly pilose), with 2 short to medium-sized teeth; nutlets tightly enveloped in utricule.
- 2a. Male spike single, terminal, distanced from uppermost female spike by up to 15 cm, upper female spikes subsessile, lower ones very shortly pedunculate; female glumes ovate, mucronate 375. *C. filipedunculata*
- 2b. Male spikes 2 or 3, sometimes 4, borne at top of culm, rather shortly pedunculate, female spikes usually pedunculate, rarely upper ones subsessile; female glumes ovate-lanceolate, narrowly ovate, or lanceolate, aristate or mucronate.
- 3a. Leaf blades 1–2 mm wide, slightly involute on margins; female glumes lanceolate or oblong-ovate, acuminate at apex, longer than or equaling utricule; utricles with short beak, veins indistinct 376. *C. lasiocarpa*
- 3b. Leaf blades 3–5 mm wide, flat; female glumes ovate-lanceolate or narrowly ovate, mucronate or aristate at apex, usually shorter than (excluding awn) utricule; utricles with medium-sized beak, several veins distinct.
- 4a. Female glumes narrowly ovate; utricles broadly ovate or ovate, 5–6 mm, laxly hispidulous 377. *C. glabrescens*
- 4b. Female glumes ovate-lanceolate; utricles oblong-ovate, 3–4 mm, densely hispidulous.
- 5a. Culms stout; leaves stiff; female spikes densely many flowered; utricles with short beak, long 2-toothed at orifice 378. *C. fedia*
- 5b. Culms slender; leaves soft; female spikes graduate flowered from laxly at base to densely many flowered above; utricles with rather long beak, shortly 2-toothed at orifice 379. *C. miyabei*
- 1b. Involucral bracts usually sheathed; utricles 5–10 mm, laxly pubescent or glabrous (*C. wui* with utricles densely hirsute), long 2-toothed; nutlets rather loosely enveloped in utricule.
- 6a. Male spike single and terminal, distant uppermost female spike near; lowermost involucral bract shortly sheathed, sheath not exceeding 1 cm.
- 7a. Female glumes ovate-lanceolate, long aristate at apex, dark purple-red laterally, laxly hirsute; utricles broadly ovate, red-brown, densely hirsute, with 2 medium-sized teeth at orifice 380. *C. wui*
- 7b. Female glumes broadly ovate, mucronate at apex, stramineous laterally, glabrous or ciliate only at apex; utricles oblong-ovate, yellow-green, glabrous, with 2 short teeth at orifice 381. *C. latisquamea*
- 6b. Male spikes 2–5, distant uppermost female spike far; lowermost involucral bract rather long sheathed, sheath usually exceeding 1 cm.
- 8a. Utricles laxly hispidulous or ciliate on beak margins.
- 9a. Leaves 4–6 mm wide, glabrous; lower involucral bracts longer than inflorescence, upper involucral bracts shorter than inflorescence; spikes 5–7, female spikes 3–5 cm; utricles 5–7 mm, ciliate on beak margins 386. *C. drymophila*
- 9b. Leaves 2–3 mm wide, laxly hispidulous on both surfaces; involucral bracts shorter than inflorescence; spikes usually 4, female spikes 2–2.8 cm; utricles 4–5.6 mm, hispidulous 387. *C. hirticaulis*

- 8b. Utricles glabrous.
- 10a. Utricles oblong-lanceolate, 8–10 mm, leathery, obliquely truncate at orifice, teeth unequal 382. *C. raddei*
- 10b. Utricles ovate or oblong-ovate, 5–8 mm, subleathery or herbaceous, not obliquely truncate at orifice, teeth of equal length.
- 11a. Stigmas 2; nutlets biconvex 385. *C. humida*
- 11b. Stigmas 3; nutlets trigonous.
- 12a. Leaves glabrous at abaxial surface; utricles ovate, 6–7 mm, thinly leathery, stramineous, teeth rather short and strict, not divergent 383. *C. orthostachys*
- 12b. Leaves pubescent at abaxial surface; utricles broadly ovate, 7–8(–10) mm, herbaceous, greenish, teeth rather long, divergent 384. *C. eriophylla*

375. *Carex filipedunculata* S. W. Su, J. Anhui Univ., Nat. Sci. Ed. 20(3): 105. 1996.

丝梗藁草 si geng tai cao

Rhizome with slightly thick stolons. Culms 45–60 cm tall, slightly thick, acutely triquetrous, scabrous on upper part, dark red-brown and bladeless sheathed at base, sheaths later usually splitting into reticulate fibers. Leaves longer than or equaling culm, blades 3–7 mm wide, flat, scabrous on adaxial surface and margins, with indistinctly transverse septate nodes between veins, long sheathed. Involucral bracts leafy, nearly equaling culm, not sheathed, sometimes lowermost involucral bract shortly sheathed. Spikes 4 or 5; terminal spike male, rarely male spikes 2, 3–4.5 cm, 2–3 mm thick; lateral spikes female, remote, distance between uppermost female spike and male spike 3.5–15 cm, female spikes 1.5–4.5 cm, 4–5 mm thick, densely many flowered, upper spike sessile, lowermost spike shortly pedunculate. Female glumes brownish laterally, greenish at middle, slightly red-brown on upper part, ovate or ovate-lanceolate, 4–6 mm (including awn), membranous, 1–3-veined, margins white hyaline, apex acuminate, aristate or mucronate, scabrous on margins of awn or mucro. Utricles gray-brown, obliquely patent, equaling or slightly shorter than glume, oblong-ovate, slightly inflated trigonous, ca. 4 mm, membranous, hispid, 5-veined, base abruptly contracted, subrounded, shortly stipitate, apex gradually narrowed to a long and slightly broad beak, beak scabrous on margins, 2-toothed and red-brown at orifice. Nutlets tightly enveloped, obovate, trigonous, 1.5–1.8 mm, apex curved mucronate; style base slightly thickened; stigmas 3, slightly long. Fl. and fr. Apr–May.

- Anhui (Xiuning).

376. *Carex lasiocarpa* Ehrhart, Hannover. Mag. 9: 132. 1784.

毛藁草 mao tai cao

Carex koidzumii Honda var. *fuscata* (Ohwi) Ohwi; *C. lasiocarpa* var. *fuscata* Ohwi.

Rhizome stoloniferous. Culms laxly tufted, 50–100 cm tall, obtusely trigonous, stiff, slightly scabrous on upper part, with red-brown and bladeless sheaths at base, sheaths later splitting into reticulate fibers. Leaves shorter than or nearly equaling culm, blades 1–2 mm wide, involute on margins, slightly plicate, stiff, with transverse septate nodes between veins, rather long sheathed. Involucral bracts leafy, linear, nearly equaling or slightly longer than inflorescence, lower involucral bracts up to 5 mm sheathed, upper involucral bracts nearly not sheathed. Spikes 3–5; terminal 1–3 spikes male, approximate, linear-cylindric, 2–3 cm, sessile; remaining

spikes female, remote, ovate or oblong-cylindric, 1.5–3 cm, 5–6 mm thick, densely many flowered, shortly pedunculate, upper ones sessile. Female glumes brown or red-brown laterally, green at middle, oblong-ovate or lanceolate, 4.5–5 mm, membranous, 3-veined, apex acuminate, mucronate. Utricles yellow-green, obliquely patent, slightly shorter than or nearly equaling glume, ovate or oblong-ovate, slightly inflated trigonous, 4–5 mm, leathery, densely brownish gray tomentose, indistinctly veined, base obtusely rounded, apex gradually narrowed to a slightly broad and short beak, orifice slightly recurved 2-toothed. Nutlets rather tightly enveloped, obovate, trigonous, ca. 2 mm, base shortly stipitate; style short, usually curved, base not thickened; stigmas 3. Fl. and fr. Jun–Jul.

Swamps or meadow moors. Heilongjiang, Nei Mongol [Korea, Mongolia, Russia; Europe, North America].

The stems and leaves are used for making paper and rope.

377. *Carex glabrescens* (Kükenthal) Ohwi, Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 6: 245. 1931.

辽东藁草 liao dong tai cao

Carex wallichiana Sprengel f. *glabrescens* Kükenthal in Engler, Pflanzenr. 38(IV. 20): 749. 1909; *C. drymophila* Turczaninow ex Steudel var. *glabrescens* (Kükenthal) Kitagawa; *C. drymophila* var. *pilifera* Kükenthal; *C. fedia* Nees ex Wight var. *pilifera* (Kükenthal) T. Koyama.

Rhizome short, with long and rather thick stolons. Culms 30–50 cm tall, triquetrous, stout, slightly scabrous on upper part, with red-brown and bladeless sheaths at base, sheaths later usually splitting into reticulate fibers at lateral side. Leaves longer than culm, blades 3–4 mm wide, flat, stiff, scabrous on adaxial surface and margins, smooth on abaxial surface, sheathed, with transverse septate nodes between veins. Involucral bracts leafy, lower involucral bracts shortly sheathed, upper ones nearly not sheathed, setaceous at base of male spikes. Spikes 5 or 6; terminal 2 or 3(or 4) spikes male, approximate, linear, 2–4 cm, sessile; remaining spikes female, rather remote, cylindric, 4–5 cm, densely many flowered, rather lax at base, upper spikes sessile, lower ones shortly pedunculate. Female glumes red-brown laterally, green at middle, narrowly ovate, ca. 5 mm, 3-veined, margins white hyaline, apex acuminate, mucronate or aristate, scabrous on margins of awn or mucro. Utricles stramineous, obliquely patent, longer than glumes, broadly ovate or ovate, slightly inflated trigonous, 5–6 mm, thickly membranous, laxly hispidulous, distinctly several veined, base subrounded, shortly stipitate, apex abruptly narrowed to a medium-sized beak, ciliate on beak margins, orifice

slightly long 2-toothed. Nutlets loosely enveloped, elliptic, trigonous, ca. 2.5 mm; style usually curved, base not thickened; stigmas 3.

Wet places at forest margins on mountain slopes. Liaoning [Japan, Korea].

378. *Carex fedia* Nees in Wight, Contr. Bot. India, 129. 1834.

南亚藁草 nan ya tai cao

Rhizome short, stoloniferous. Culms tufted, 30–75 cm tall, triquetrous, rather thick, smooth on lower part, scabrous on upper part, ferruginous and bladeless sheathed at base, sheaths later usually splitting into reticulate fibers. Leaves longer than culm, blades 3–4 mm wide, flat, stiff, sheathed. Involucral bracts leafy, longer than inflorescence, lowermost involucral bract shortly sheathed, upper ones nearly not sheathed. Spikes 5–7; terminal 2–4 spikes male, approximate, linear-cylindric, 2–3 cm, subsessile; remaining spikes female, rather remote, lowermost distance up to 12 cm, densely many flowered, lowermost spike rather long pedunculate, upper ones shortly pedunculate, peduncles glabrous. Female glumes red-brown laterally, yellow-green at middle, lanceolate, 3–3.5 mm, membranous, 3-veined, apex acuminate, aristate, awn up to 3 mm at base of spike, scabrous on margins. Utricles brown, obliquely patent, horizontally patent in maturity, longer than or equaling glume, shorter than glume at base of spike (including awn), oblong-ovate, trigonous, 4–5 mm, leathery, densely pubescent, 5-veined abaxially, base abruptly contracted into a short stipe, apex gradually narrowed to a slightly thick and short beak, orifice long 2-toothed. Nutlets stramineous, tightly enveloped, obovate or subelliptic, trigonous, ca. 2 mm, apex mucronate; style of medium length, base not thickened; stigmas 3.

Mountain slopes; [400–]3000–3400 m. Yunnan [Afghanistan, India, Myanmar, Nepal, Pakistan, N Thailand, Vietnam].

379. *Carex miyabei* Franchet var. ***maopengensis*** S. W. Su, J. Anhui Univ., Nat. Sci. Ed. 20(3): 107. 1996.

毛果藁草 mao guo tai cao

Rhizome long stoloniferous, rather thick. Culms 30–60 cm tall, triquetrous, scabrous on upper part, with reddish brown and bladeless sheaths at base, sheaths later splitting into reticulate fibers adaxially. Leaves longer than culm, blades 3–5 mm wide, flat, rather stiff, scabrous on margins and adaxial surface. Lower involucral bracts leaflike, longer than inflorescence, not sheathed, sometimes lowermost one shortly sheathed. Spikes 5 or 6; terminal 2–4 spikes male, approximate, linear, 1.5–3 cm, ca. 2 mm thick, usually with 1–3 female flowers; remaining spikes female, distance 4–6 cm between 2 spikes, cylindric, 2–6 cm, 4–5 mm thick, densely many flowered, lax at base of spike, upper spikes shortly pedunculate, lower ones long pedunculate, slightly scabrous. Female glumes dark red-brown laterally, brownish at middle, lanceolate, 3.5–5 mm, membranous, 3-veined, margins white hyaline, apex mucronate or aristate. Utricles obliquely patent, broadly obovate, trigonous, 3–4 mm, membranous, white pubescent, pubescence rather dense on upper part, indistinctly veined, base cuneate, apex abruptly contracted into a rather long beak, orifice 2-toothed. Nutlets tightly

enveloped, broadly obovate, trigonous, ca. 2 mm, apex curved mucronate; style base slightly thickened; stigmas 3, ± long.

• Wet places at roadsides. Anhui.

Carex miyabei var. *miyabei* occurs in Japan and Korea. It has male spikes usually without 1–3 female flowers; upper female spikes nearly sessile; female glumes oblong-ovate, without mucro or mucinous at apex; and utricles hispidulous.

380. *Carex wui* Chü ex L. K. Dai, Acta Phytotax. Sin. 37: 179. 1999.

沙坪藁草 sha ping tai cao

Rhizome slender stoloniferous. Culms 50–100 cm tall, rather thick, triquetrous, densely hispidulous, dark red-brown and bladeless sheathed at base. Leaves longer than culm, 4–8 mm wide, flat, densely hirsute, rather long sheathed. Involucral bracts leaflike, longer than inflorescence, shortly sheathed, densely hirsute. Spikes 4 or 5, approximate; terminal spike male, linear-cylindric, 5–7 cm, nearly sessile; remaining spikes female, cylindric, 2.5–5 cm, densely many flowered, shortly pedunculate. Female glumes red-brown laterally, green at middle, ovate-lanceolate, 4–6 mm, membranous, laxly hirsute, 3-veined, apex acuminate, aristate. Utricles dark red-brown, obliquely patent, elliptic or broadly ovate, slightly inflated trigonous, 6–7 mm, thinly leathery, hirsute, distinctly several veined, base rounded, apex gradually narrowed to a medium-sized beak, orifice 2-toothed, teeth slightly long and strict. Nutlets elliptic or obovate, ca. 3 mm, apex mucronate; style base not thickened; stigmas 3. Fl. and fr. May–Jul.

• Wet places on mountain slopes, ditch sides, watersides; 1900–2900 m. Guizhou, Sichuan.

381. *Carex latisquamea* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 18: 447. 1901.

宽鳞藁草 kuan lin tai cao

Carex villosa Boott var. *latisquamea* (Komarov) Kükenthal.

Rhizome short, shortly stoloniferous. Culms laxly tufted, 30–75 cm tall, triquetrous, laxly pubescent, with brown, pubescent, and bladeless sheaths at base. Leaves equaling culm, blades 3–6 mm, flat, with transverse septate nodes between veins, laxly pubescent, lower ones long sheathed. Involucral bracts leafy, lowermost one nearly equaling inflorescence, upper ones shorter than inflorescence, shortly sheathed. Spikes 3 or 4, slightly remote; terminal spike male, narrowly lanceolate or linear, 1–2 cm, shortly pedunculate; lateral spikes female, oblong or oblong-ovate, 1–2.5 cm, slightly densely more than 10-flowered, lower spikes shortly pedunculate, upper one subsessile. Female glumes yellowish brown laterally, green at middle, broadly ovate, ca. 3 mm, membranous, 3-veined, apex acuminate, mucronate. Utricles green-brown, obliquely patent, longer than glume, ovate, obtusely trigonous, 5–6 mm, subleathery, raised several veined, base broadly cuneate, shortly stipitate, apex gradually narrowed to a short beak, orifice long and recurved 2-toothed. Nutlets slightly tightly enveloped, obovate, trigonous, 2.5–3 mm, apex recurved mucronate; style base not thickened; stigmas 3. Fl. and fr. Apr–May.

Wet places in lax forests or in meadows. Heilongjiang, Jilin, Liaoning [Japan, Korea, Russia (Far East)].

382. *Carex raddei* Kükenthal, Bot. Centralbl. 77: 97. 1899.

锥囊薹草 zhui nang tai cao

Carex aristata R. Brown subsp. *raddei* (Kükenthal) Kükenthal.

Rhizome long and thick. Culms laxly tufted, 35–100 cm tall, acutely triquetrous, rather stout, stiff, smooth, clothed with red-brown and bladeless sheaths at base, sheaths later usually splitting into reticulate fibers. Leaves shorter than culm, blades 3–4 mm wide, flat, slightly involute and scabrous on margins, with transverse septate nodes between veins, rather long sheathed, lower sheaths laxly pubescent, upper ones glabrous or very laxly pubescent. Lower involucral bracts leafy, slightly shorter than or equaling inflorescence, slightly long sheathed, upper involucral bracts setaceous, very shortly sheathed. Spikes 4–6, upper ones approximate, lower ones rather remote; terminal 2 or 3 spikes male, narrowly lanceolate, 2–4 cm, subsessile; remaining spikes female, oblong-cylindric, 3–5 cm, slightly laxly many flowered, shortly pedunculate. Female glumes pale ferruginous laterally, ovate-lanceolate or lanceolate, 6–8 mm (including awn), membranous, pale 3-veined, apex acuminate, aristate. Utricles greenish, stramineous at maturity, obliquely patent, longer than glume, oblong-lanceolate, slightly inflated trigonous, 8–10 mm, leathery, glabrous, distinctly several veined, base rounded, shortly stipitate, apex gradually narrowed to a short beak, orifice rather long 2-toothed, teeth ca. 1 mm. Nutlets loosely enveloped, broadly ovate, trigonous, ca. 3 mm, base shortly stipitate, apex mucronate; style sometimes curved, base not thickened; stigmas 3. Fl. and fr. Jun–Jul.

On sands of riversides, wet places on mountain slopes, fields, watersides, swampy meadows. Hebei, Heilongjiang, Jiangsu, Jilin, Liaoning, Nei Mongol [Korea, Russia (Far East)].

383. *Carex orthostachys* C. A. Meyer in Ledebour, Fl. Altaic. 4: 231. 1833.

直穗薹草 zhi sui tai cao

Carex aristata R. Brown subsp. *orthostachys* (C. A. Meyer) Kükenthal.

Rhizome long stoloniferous. Culms laxly tufted, 40–70 cm tall, acutely triquetrous, rather thick, smooth or slightly scabrous on upper part, clothed with red-brown and bladeless sheaths at base, sheaths later splitting into fibers or reticulate fibers. Leaves shorter than culm, blades 3–5 mm wide, flat, revolute on margins, glabrous, with transverse septate nodes between veins on abaxial surface, sheathed, lower sheaths rather long. Involucral bracts leafy, slightly longer than or equaling inflorescence, shortly sheathed, setaceous at base of male spikes, usually shorter than spike. Spikes 5–7, upper ones approximate, lowermost one remote; terminal 2 or 3 spikes male, narrowly lanceolate or narrowly cylindric, 2–4 cm, subsessile; remaining spikes female, oblong-cylindric or cylindric, 3–6 cm, pedunculate, lower peduncles rather long, upper ones short. Female glumes pale ferruginous, brownish at middle, oblong-ovate or lanceolate, ca. 5 mm, membranous, 3-veined, apex acuminate,

aristate, scabrous on margins of awn. Utricles stramineous, obliquely patent, longer than glume, ovate, inflated trigonous, 6–7 mm, thinly leathery, glabrous, distinctly several veined, base subrounded, shortly stipitate, apex gradually narrowed to a medium-sized to long beak, orifice rather long and strict 2-toothed. Nutlets loosely enveloped in utricle, elliptic-obovate, trigonous, ca. 2.5 mm, base shortly stipitate, apex mucronate; style base not thickened; stigmas 3. Fl. and fr. May–Jul.

Swamps, riversides, wet places. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Xinjiang [Mongolia, Russia].

384. *Carex eriophylla* (Kükenthal) Komarov, Mal. Oprod. Rast. Dal'nevost. Kraja, 135. 1925.

毛叶薹草 mao ye tai cao

Carex aristata R. Brown var. *eriophylla* Kükenthal in Engler, Pflanzenr. 38(IV. 20): 755. 1909.

Rhizome stoloniferous. Culms densely tufted, 70–100 cm tall, obtusely trigonous, smooth, clothed with red-brown and bladeless sheaths at base. Leaves shorter than culm, blades 5–8 mm wide, flat, slightly revolute on margins, glabrous on adaxial surface, pubescent on abaxial surface and sheath, lower leaves rather long sheathed. Involucral bracts leafy, lowermost involucral bract longer than inflorescence, medium to long sheathed, sheath pubescent, upper involucral bracts rather short. Spikes 6–8, remote; terminal 3 or 4 spikes male, narrowly cylindric, 3–5 cm, usually sessile; remaining spikes female, oblong-cylindric or cylindric, 2.5–5 cm, rarely rather long, laxly many flowered, very lax at base, lowermost peduncle ca. 2 cm, upper peduncles rather short. Female glumes brownish, yellow-brown at middle, oblong-ovate or lanceolate, 5–8 mm, up to 11 mm (including awn) at base of spike, membranous, 3-veined, sometimes scabrous on midrib, apex acuminate, aristate, scabrous on awn margins. Utricles green, obliquely patent, longer than glume, rarely shorter than glume at base of spike, broadly ovate, inflated trigonous, 7–8(–10) mm, herbaceous, glabrous or only ciliate on margins, distinctly several veined, base subrounded, shortly stipitate, apex gradually narrowed to a long beak, orifice rather long 2-toothed, teeth divergent. Nutlets loosely enveloped in utricle, obovate, trigonous, ca. 2.2 mm, base shortly stipitate, apex mucronate; style base not thickened; stigmas 3. Fl. and fr. Jun–Jul.

Wet places at riversides, lakesides, swamps. Heilongjiang, Jilin [Korea, Russia (Far East)].

385. *Carex humida* Y. L. Chang & Y. L. Yang, Fl. Pl. Herb. Chin. Bor.-Orient. 11: 204. 1976.

湿薹草 shi tai cao

Rhizome long stoloniferous. Culms densely tufted, 50–70 cm tall, obtusely trigonous, smooth on lower part and slightly scabrous on upper part, clothed with red-brown and bladeless sheaths at base, sheaths later usually splitting into reticulate fibers. Leaves shorter than culm, blades 4–6 mm wide, flat, slightly revolute on margins, with transverse septate nodes between veins, glabrous or laxly pubescent, rather long sheathed, sometimes upper sheaths laxly pubescent. Involucral bracts leafy, lowermost one longer than or equaling inflorescence,

upper involucre bracts shorter than inflorescence, shortly sheathed, uppermost nearly not sheathed. Spikes 3–7, upper spikes approximate, lower ones rather remote; terminal 2–4 spikes male, narrowly lanceolate, 2–3 cm, subsessile; remaining spikes female, oblong-cylindric or cylindric, 3–5 cm, densely many flowered, rather lax at base, lower spikes shortly pedunculate, upper ones subsessile. Female glumes pale ferruginous, oblong-ovate or ovate-lanceolate, 6–7.5 mm (including awn), membranous, 3-veined, apex acuminate, long aristate. Utricles greenish or yellow-green, obliquely patent, slightly longer than glume, ovate, plano-convex, 6–8 mm, thinly leathery, glabrous, several veined, base subrounded, shortly stipitate, apex gradually narrowed into a medium-sized to long beak, orifice rather long 2-toothed. Nutlets loosely enveloped in utricle, obovate, convex on both sides, ca. 2.5 mm, base stipitate; style base not thickened; stigmas 2. Fl. and fr. Jun–Jul.

• Wet places at watersides in swamps or ravines. Heilongjiang, Jilin, Nei Mongol.

386. *Carex drymophila* Turczaninow ex Steudel, Syn. Pl. Glumac. 2: 238. 1855.

野笠藁草 ye li tai cao

Rhizome long stoloniferous. Culms 60–70(–100) cm tall, obtusely trigonous, rather stout, smooth or scabrous on upper part, clothed with red-brown and bladeless sheaths at base, sheaths split into reticulate fibers on margins. Leaves shorter than culm, blades 4–6(–10) mm wide, flat, glabrous, only pubescent on membranous part of sheaths, or laxly pubescent on abaxial surface, scabrous on margins, rather long sheathed. Involucral bracts leafy, lower 1 or 2 involucral bracts longer than inflorescence, slightly long sheathed, upper involucral bracts usually shorter than inflorescence, shortly sheathed; male spikes with setaceous or scalelike involucral bract at base. Spikes 5–7, lower spikes remote, upper spikes approximate; terminal 2 or 3 spikes male, fasciated or narrowly lanceolate, 2–4 cm, subsessile; remaining spikes female, oblong-cylindric or cylindric, 3–5 cm, slightly laxly many flowered, rather lax at base, lowermost peduncle 6–7 cm, erect or slightly pendulous, upper peduncles rather short. Female glumes pale ferruginous laterally, greenish at middle, narrowly ovate or lanceolate, 4–4.5 mm, membranous, 3-veined, margins white hyaline, apex acuminate or slightly acute, shortly aristate. Utricles olivaceous, obliquely patent, longer than glumes, ovate-orbicular, inflated trigonous, 5–7 mm, herbaceous, distinctly several veined, base subrounded, very shortly stipitate, apex gradually narrowed to a slightly broad and ± long beak, beak brownish hispid on margins, strict and rather long 2-toothed at orifice. Nutlets loosely enveloped, obovate, trigonous, ca. 3 mm, base shortly stipitate, apex mucronate; style base not thickened; stigmas 3. Fl. and fr. Jun–Aug.

Wet grasslands in forest regions, wet places at lakesides or riversides, in swamps or meadows. Heilongjiang, Jilin, Nei Mongol [Japan, Korea, Mongolia, Russia (Far East, E Siberia)].

1a. Culms 60–70 cm tall; leaf blades 4–6 mm wide, glabrous or only pubescent on membranous part of sheaths; utricle hispid on margins of beak 386a. var. *drymophila*

1b. Culms up to 100 cm tall; leaf blades 5–8(–10) mm wide, usually laxly pubescent on abaxial surface; utricle hispid on upper part and margins of beak 386b. var. *abbreviata*

386a. *Carex drymophila* var. *drymophila*

野笠藁草(原变种) ye li tai cao (yuan bian zhong)

Carex orthostachys C. A. Meyer var. *drymophila* (Turczaninow ex Steudel) Maximowicz.

Culms 60–70 cm tall. Leaf blades 4–6 mm wide, glabrous or only pubescent on membranous part of sheaths. Utricles hispid on margins of beak. Fl. and fr. Jun–Aug.

Wet grasslands in forest regions. Heilongjiang, Jilin, Nei Mongol [Korea, Mongolia, Russia (Far East, E Siberia)].

The culms and leaves are used as animal feed.

386b. *Carex drymophila* var. *abbreviata* (Kükenthal) Ohwi, Acta Phytotax. Geobot. 12: 107. 1943.

毛果野笠藁草 mao guo ye li tai cao

Carex amurensis Kükenthal var. *abbreviata* Kükenthal, Bot. Centralbl. 77: 94. 1899; *C. akanensis* Franchet; *C. drymophila* var. *akanensis* (Franchet) Kükenthal.

Culms up to 100 cm tall, stout. Leaf blades 5–8(–10) mm wide, usually laxly pubescent on abaxial surface. Utricles hispid on upper part and margins of beak. Fl. and fr. Jun–Jul.

Wet places at lakesides or riversides, in swamps or meadows. Heilongjiang, Jilin, Nei Mongol [Japan, Korea, Russia (Far East)].

387. *Carex hirticaulis* P. C. Li, Acta Bot. Yunnan. 12: 149. 1990.

密毛藁草 mi mao tai cao

Rhizome short. Culms tufted, 35–45 cm tall, slender, triquetrous, hispid, clothed with brownish and bladeless sheaths at base. Leaves shorter than culm, blades 2–3 mm wide, flat, hispid on both surfaces, long sheathed, sheaths hispid. Involucral bracts leaflike, shorter than inflorescence, hispid, lowermost involucral bract long sheathed, upper ones nearly not sheathed. Spikes usually 4; terminal 2 spikes male, approximate, cylindric, 2–4 cm; remaining spikes female, slightly remote, oblong-cylindric, 2–2.8 cm, densely many flowered, uppermost one subsessile, lower spikes shortly pedunculate, usually clothed in involucral bract sheaths. Female glumes brownish, ovate, ca. 4 mm, membranous, glabrous, midrib green, margins hyaline, apex acute, shortly aristate. Utricles yellowish green, suberect, longer than glume, elliptic, obtusely trigonous, 4–5.6 mm, membranous, hispid, several veined, base cuneate, very shortly stipitate, apex gradually narrowed to a rather long beak, orifice deeply split into 2 teeth, teeth slightly recurved. Nutlets immature; style base not thickened; stigmas 3. Fl. and fr. Jun–Jul.

• Grasslands on high mountains; ca. 3200 m. NW Yunnan (Zhongdian).

41. *Carex* sect. **Phacocystis** Dumortier, Fl. Belg. 146. 1827.急尖藁草组 *ji jian tai cao zu*Liang Songyun (梁松筠 *Liang Song-jun*); Tetsuo Koyama, Gordon C. Tucker

Rhizome short or stoloniferous. Culms trigonous, stiff or slender. Involucral bracts setaceous or leaflike, sheathless or shortly sheathing. Inflorescence racemose, with 2–8 spikes; upper 1 or 2 spikes male, or terminal spike gynaeandrous; remaining spikes female (with few male flowers at apex), oblong or cylindrical, densely many flowered, sessile or with short peduncles. Female glumes dark purple or brown, apex obtuse to acuminate. Utricles suborbicular, broadly obovate, or elliptic, plano-convex or biconvex, densely minutely papillose, apex abruptly contracted into a short beak, orifice truncate or subentire, rarely 2-toothed. Nutlets obovate or oblong; style base not thickened; stigmas 2.

Between 70 and 90 species: Asia, Australia, Europe, North America, Pacific islands (New Zealand), austral South America; 27 species (12 endemic) in three subsections China.

- 1a. Terminal spike gynaeandrous 1. *C.* subsect. *Gynaecandrae*
 1b. Terminal spike male.
 2a. Female glumes 1-veined 2. *C.* subsect. *Rigidae*
 2b. Female glumes 3-veined 3. *C.* subsect. *Caespitosae*

1. *Carex* subsect. **Gynaecandrae** T. V. Egorova, Novosti Sist. Vyssh. Rast. 24: 44. 1987.雌雄序藁草亚组 *ci xiong xu tai cao ya zu*

Leaves amphistomatic. Terminal spike gynaeandrous; lateral spikes female. Female glumes obtuse. Utricles plano-convex, faintly veined. Stigmas 2.

One species: E Asia, NW North America.

388. *Carex eleusinoides* Turczaninow ex Kunth, Enum. Pl. 2: 407. 1837.

蟋蟀藁草 *xi shuai tai cao*

Rhizome short. Culms tufted, 30–40 cm tall, slender, compressed trigonous, slightly scabrous above, clothed at base with purple-red or brown bladeless sheaths eventually disintegrating into parallel fibers. Leaves shorter than or subequaling culm, blades gray-green, linear, 2.5–4 mm wide, flat, papillose, margins scabrous. Lower 1 or 2 involucral bracts leaflike, surpassing inflorescence, sheathless, upper glumelike. Spikes 3–5, approximate, cylindrical, 10–25 × ca. 0.5 mm, densely many flowered; terminal spike gynaeandrous or with male flowers at apex or base, female in middle; lateral spikes female, upper 2 or

3 sessile or subsessile, lower 1 or 2 with peduncles up to ca. 1.5 mm. Female glumes dark purple-black, oblong-elliptic, ca. 2.5 × 1.2–2 mm, with a light midrib, margins narrowly white hyaline, apex obtuse. Utricles light brown or light green, sometimes red or purple spotted above, longer than glume, suberect, elliptic or obovate-elliptic, plano-convex, (2–)2.5–3 mm, membranous, indistinctly veined, base shortly stipitate, apex abruptly contracted into a short cylindrical reddish brown beak, orifice entire or slightly emarginate. Nutlets tightly enveloped, broadly obovate, 1.5–1.7 × ca. 1.3 mm, base very shortly stipitate; style base not thickened; stigmas 2. $2n = 84$.

Alpine frozen soil, wet places; 1700–2500 m. Jilin [Japan, Korea, Mongolia, Russia (Far East, E Siberia); North America (Alaska, NW Canada)].

2. *Carex* subsect. **Rigidae** Fries ex Kükenthal in Engler, Pflanzenr. 38(IV. 20): 299. 1909.坚挺藁草亚组 *jian ting tai cao ya zu*

Rhizome short, stoloniferous. Culms rigid. Terminal spike male; lateral spikes female, oblong-ovate or oblong-cylindrical, approximate, with short peduncles at base, upper subsessile. Female glumes light black, 1-veined, apex obtuse or acute, without awn. Utricles suborbicular, obovate-orbicular, or oblong, membranous, faintly veined. Stigmas 2.

About 20 species: Asia, North America; 15 species (eight endemic) in China.

- 1a. Lower involucral bracts leaflike.
 2a. Upper 1–3 spikes male.
 3a. Utricles 4–5 mm, slightly longer than subtending glume; basal sheaths rather long, yellow-brown 402. *C. middendorffii*
 3b. Utricles ca. 3 mm, ca. 1/2 as long as subtending glume; basal sheaths rather short, red-brown or red-purple 403. *C. cryptocarpa*
 2b. Terminal spike male.
 4a. Utricles shorter than glume.
 5a. Female glumes oblong or ovate-lanceolate, 3.5–4 mm; utricles oblong, ca. 3 × 1.2 mm 397. *C. zhonghaiensis*
 5b. Female glumes ovate-oblong or elliptic, ca. 2.5 mm; utricles elliptic, 2–2.5 mm 398. *C. minxianica*
 4b. Utricles longer than glume.

- 6a. Utricles broadly obovate or suborbicular; female glumes 1.5–1.7 mm 399. *C. platysperma*
 6b. Utricles broadly ovate, broadly elliptic, or ovate; female glumes 2–3 mm.
 7a. Utricles broadly ovate or broadly elliptic, 2.5–3 mm; female glumes ca. 2.5 mm, rounded
 at apex 400. *C. muliensis*
 7b. Utricles ovate, 2.2–2.5 mm; female glumes ca. 2 mm, truncate at mucronate apex 401. *C. kiotensis*
- 1b. Lower involucre bracts setaceous.
 8a. Utricles suborbicular, ovate-orbicular, or obovate-orbicular.
 9a. Female spikes ovate to oblong, sessile or lower with peduncles 1.5–3 mm.
 10a. Rhizome with stolons; utricles suborbicular or subglobose, beak very short, orifice entire or
 emarginate with small teeth 389. *C. orbicularis*
 10b. Rhizome without stolons; utricles broadly ovate or suborbicular, beak short, orifice irregular
 truncate 390. *C. satakeana*
 9b. Female spikes cylindrical, lower with peduncles 5–20 mm.
 11a. Female glumes narrowly oblong, purple-brown, margins narrowly white hyaline 391. *C. arcatica*
 11b. Female glumes ovate, blackish purple-red, margins broadly white hyaline 392. *C. borealihinganica*
- 8b. Utricles ovate or elliptic.
 12a. Culms 5.5–8 cm tall; basal leaves gray-green 393. *C. taldycola*
 12b. Culms 20–60 cm tall; basal leaves green.
 13a. Basal sheaths purple or blackish purple 394. *C. altaica*
 13b. Basal sheaths castaneous-brown.
 14a. Utricles ca. 2.5 mm; nutlets obovate, sessile 395. *C. ensifolia*
 14b. Utricles 4–4.5 mm; nutlets oblong, stipitate 396. *C. shandanica*

389. *Carex orbicularis* Boott, Proc. Linn. Soc. London 1: 254. 1845.

圆囊薹草 yuan nang tai cao

Rhizome stoloniferous. Culms tufted, 10–25 cm tall, slender, trigonous, scabrous, clothed at base with castaneous sheaths disintegrating into fibers. Leaves shorter than culm, blades linear, 1.5–3 mm wide, flat, margins rather stiffly scabrous. Basal involucre bracts setaceous, shorter than inflorescence, sheathless, upper ones glumelike. Spikes 2 or 3 (or 4); terminal spike male, cylindrical, 1.2–2 cm, with peduncle 3–9 mm; lateral spikes female, ovate or oblong, 0.5–1.5 cm, densely many flowered, lowest with peduncle 2–3 mm, upper sessile. Female glumes blackish brown or red-brown, oblong or oblong-lanceolate, 1.8–2.5 × 1–1.2 mm, with light midrib, margins white hyaline, apex slightly obtuse. Utricles light brown below, blackish brown above, longer than glume and 1/3–1/2 as broad, broadly ovate or subglobose, plano-convex, 2–3 × 2.3–2.5 mm, densely minutely papillose, nerveless, apex rounded, with a short cylindrical beak, orifice emarginate with small teeth. Nutlets ovate, ca. 2 mm; style base not thickened; stigmas 2. Fl. and fr. Jul–Aug.

Meadows, wet places; 2000–5000 m. Gansu, Qinghai, Xinjiang, Xizang [Afghanistan, NW India, Kashmir, Nepal, Pakistan, Russia].

390. *Carex satakeana* T. Koyama, Acta Phytotax. Geobot. 15: 113. 1954.

藏北薹草 zang bei tai cao

Rhizome short, subwoody. Culms 5–30 cm tall, erect, slender, rigid, acutely trigonous, smooth, ± curving above, clothed at base with brown sheaths disintegrating into parallel fibers. Leaves shorter than culm, blades linear, 2–3 mm wide, flat or plicate, margins scabrous, apex acuminate. Lowest involucre bracts setaceous, sheathless, upper glumelike, dark brown. Spikes 2–5, erect, approximate; terminal spike (rarely 2) male, narrowly oblong or oblanceolate, 20–25 × ca. 3.5 mm; lateral spikes female, sometimes bearing several male flowers

at apex, narrowly oblong or shortly cylindrical, 15–25 × 4–5 mm, densely many flowered, lowest spike with peduncle, upper sessile. Female glumes dark brown or castaneous, ovate-oblong, ca. 2.5 mm, with yellowish green midrib, apex obtuse. Utricles dark brown above, pale below, broader and slightly longer than glume, broadly ovate or suborbicular, plano-convex, 2.5–2.8 × ca. 1.5 mm, glabrous, ± nerveless, base shortly stipitate, apex rounded, with erect beak, orifice irregular truncate. Nutlets red-brown, tightly enveloped, obovate-orbicular, ca. 1.5 mm; style base not thickened; stigmas 2. Fr. Jun.

• Xizang (Xigazê).

391. *Carex arcatica* Meinshausen, Trudy Imp. S.-Peterburgsk. Bot. Sada 18: 336. 1901.

北疆薹草 bei jiang tai cao

Rhizome creeping. Culms 20–50 cm tall, slender, trigonous, scabrous, clothed at base with reddish brown to castaneous sheaths usually disintegrating into fibers. Leaves shorter than culm, blades linear, 2–3 mm wide, flat, margins scabrous. Lowest involucre bract setaceous, shorter than inflorescence, sheathless, upper ones glumelike. Spikes 2–4, distant; terminal spike male, cylindrical, 2–3.5 cm, with peduncle 1.5–2 cm; lateral spikes female, cylindrical or oblong, (10–)17–30 × 4–6 mm, densely many flowered, lower peduncles 10–18 mm. Female glumes dark brown, narrowly oblong, ca. 2.5 × 0.7–0.9 mm, with light midrib, margins narrowly white hyaline, apex obtuse or acute. Utricles brownish green to ferruginous-green, slightly longer than glume and 2–3 × as broad, broadly ovate or obovate, plano-convex, ca. 2.5 × 1.8 mm, densely minutely papillose, faintly veined, base shortly stipitate, apex with cylindrical short beak, orifice weakly emarginate. Nutlets brown, obovate, ca. 2 mm; style base not thickened; stigmas 2. Fl. and fr. Apr–Jul.

Marshes, riversides, moist places; 100–3300 m. Gansu, Ningxia, Qinghai, Xinjiang [Russia].

392. *Carex borealihinganica* Y. L. Chang & Y. L. Yang, Fl. Pl. Herb. Chin. Bor.-Orient. 11: 206. 1976.

北兴安藁草 bei xing an tai cao

Rhizome short, obliquely ascending with curving stolons. Culms 40–50 cm tall, trigonous, smooth, rigid, clothed at base with bladed sheaths but sterile culm with purple-red bladeless sheaths. Leaves shorter than culm, blades gray-green, linear, 2–4 mm wide, margins revolute. Involucral bracts glumelike, lowest one setaceous, sheathless. Spikes 3–5; terminal spike male, clavate, 1–1.5 cm; remaining spikes female, oblong, 5–15 mm, lower spikes with peduncles 5–10 mm, upper sessile. Female glumes blackish purple-red, ovate, 2–2.2 × 1.8–2 mm, 1-veined, margins broadly white hyaline, apex rounded. Utricles purple-red punctate above, equaling glume, broadly obovate or suborbicular, plano-convex, 2–2.2 × 1.8–2 mm, membranous, densely minutely papillose, nerveless, base shortly stipitate, apex rounded, with very short beak, orifice emarginate. Nutlets gray-brown, tightly enveloped, broadly obovate, 1.5–1.8 × ca. 1.5 mm; style base not thickened; stigmas 2.

• Slopes. Heilongjiang.

393. *Carex taldycola* Meinshausen, Trudy Imp. S.-Peterburgsk. Bot. Sada 18: 339. 1901.

南疆藁草 nan jiang tai cao

Carex orbicularis Boott var. *taldycola* (Meinshausen) Kükenthal.

Rhizome obliquely ascending, woody. Culms 5.5–8 cm tall, ca. 2 mm thick, trigonous, scabrous above, clothed at base with castaneous sheaths disintegrating into fibers. Leaves shorter than culm, blades gray-green, linear, 2–4 mm wide, flat, margins scabrous, revolute. Involucral bracts setaceous, shorter than spike, sheathless. Spikes 2–4, approximate; terminal spike male, oblong or clavate, 5–12 mm, with peduncle ca. 1.5 mm; lateral spikes female, oblong to ovate, 5–9 × 4–5 mm, densely many flowered, subsessile. Female glumes ferruginous, ovate, ca. 2.2 × 1.5 mm, with faint midrib, upper margins white hyaline, apex obtuse. Utricles purple-brown above, light brown below, slightly longer than glume, ovate, plano-convex, 2–2.4 × ca. 1.8 mm, densely minutely papillose, faintly veined, apex with purple-brown short beak, orifice entire. Stigmas 2. Fl. and fr. Jun–Jul.

• Slopes, grasslands; 2000–2600 m. Xinjiang.

394. *Carex altaica* (Gorodkov) V. I. Kreczetowicz in Komarov, Fl. URSS 3: 227. 1935.

阿尔泰藁草 a er tai tai cao

Carex rigida Schrank subsp. *altaica* Gorodkov, Zhurn. Russk. Bot. Obshch. 15: 183. 1930; *C. bigelowii* Torrey ex Schweinitz subsp. *altaica* (Gorodkov) Malyshev; *C. orbicularis* Boott subsp. *altaica* (Gorodkov) T. V. Egorova.

Rhizome short, stout. Culms 15–30 cm tall, 1–1.5 mm thick, scabrous above, clothed at base with purple or black-purple sheaths disintegrating into parallel fibers. Leaves shorter than culm, blades linear, 3–4 mm wide, flat, margins scabrous, apex acuminate. Lower involucral bracts setaceous, shorter than inflorescence, sheathless, upper ones glumelike. Spikes 3 or 4,

approximate; terminal spike male, clavate, 1–1.5 cm; lateral spikes female, ovate or oblong, 5–15 × 5–6 mm, densely many flowered, lowest with peduncle 2–5 mm, others subsessile. Female glumes black-purple, elliptic, 2.5–2.8 × ca. 1.1 mm, with faint midrib, apex acuminate. Utricles black-purple above, light brown below, longer than glume, elliptic to ovate, plano-convex, ca. 3 × 2.2 mm, densely minutely papillose, faintly veined, apex with short beak, orifice entire, without small teeth. Stigmas 2. Fl. and fr. Jun–Aug.

Alpine grasslands, boggy valleys; 2000–2600 m. Xinjiang [Russia (Siberia)].

395. *Carex ensifolia* Turczaninow ex Ledebour, Fl. Ross. 4: 309. 1852.

箭叶藁草 jian ye tai cao

Rhizome stoloniferous. Culms 15–60 cm tall, slender, trigonous, scabrous, clothed at base with castaneous-brown sheaths disintegrating into fibers. Leaves shorter than culm, blades linear, 2–3 mm wide, flat, margins scabrous. Involucral bracts setaceous, shorter than inflorescence. Spikes 3 or 4; terminal spike male, oblong-cylindric to cylindric, 1–2 cm, with peduncle 3–6 mm; lateral spikes female, oblong or oblong-cylindric to cylindric, 8–20 × 4–5 mm, densely many flowered, lowest with peduncle 3–7 mm, others subsessile. Female glumes blackish purple, oblong, ca. 2.5 mm, with light midrib, margins narrowly white hyaline, apex obtuse. Utricles light brown below, blackish above, equaling glume, elliptic or ovate-elliptic, plano-convex, ca. 2.5 mm, densely minutely papillose, nerveless, apex abruptly contracted into a short beak, orifice truncate. Nutlets yellowish, tightly enveloped, broadly obovate, ca. 1.5 mm; style base not thickened; stigmas 2. Fl. and fr. Jul–Aug.

Slopes, grasslands, moist places; 2000–3500 m. Gansu, Ningxia, Qinghai, Xinjiang, Xizang [Mongolia, Russia].

396. *Carex shandanica* Y. C. Yang, Acta Biol. Plateau Sin. 3: 86. 1984.

山丹藁草 shan dan tai cao

Rhizome short. Culms tufted, 25–40 cm tall, acutely trigonous, scabrous, clothed at base with blackish castaneous sheaths disintegrating into fibers. Leaves shorter than culms, blades linear, 2–3 mm wide, flat, margins scabrous. Involucral bracts setaceous, shorter than spike, sheathless. Spikes 4 or 5; terminal spike male, blackish brown, oblong, 1.5–1.8 cm, densely many flowered; lateral spikes female, oblong, 1–2 cm; lowest peduncle ca. 1 cm, upper spikes sessile. Female glumes blackish brown, oblong, ca. 3 × 1 mm, with light brown midrib, apex obtuse and rounded. Utricles light brown, longer than glume, plano-convex, 4–4.5 mm, base stipitate, apex abruptly contracted into a short beak, orifice truncate, entire. Nutlets loosely enveloped, oblong, base stipitate; stigmas 2. Fl. and fr. Aug–Sep.

• Riversides along valleys; ca. 3100 m. Gansu (Shandan).

397. *Carex zhonghaiensis* S. Yun Liang, Fl. Reipubl. Popularis Sin. 12: 526. 2000.

中海藁草 zhong hai tai cao

Rhizome short. Culms 40–70 cm tall, 1.5–2 mm thick, trigonous, scabrous above, clothed at base with light brown blade-

less sheaths. Leaves shorter than culm, blades linear, 2–3 mm wide, flat, margins scabrous. Basal involucre bracts leaflike, shorter than inflorescence, sheathless, remaining bracts setaceous. Spikes 3–5; terminal spike male, occasionally some becoming androgynous bearing several male flowers at apex, cylindrical, 20–40 × 4–5 mm, densely many flowered, subsessile. Female glumes blackish purple, oblong or ovate-lanceolate, 3.5–4 × 0.8–1 mm, with light midrib, apex acuminate. Utricles blackish purple, lower part light brown, shorter than glume, oblong, ca. 3 × 1.2 mm, base very shortly stipitate, apex gradually narrowed to a short beak ca. 0.3 mm, orifice entire. Nutlets yellow-brown, slightly loosely enveloped, obovate, ca. 1.5 × 1 mm; style base not thickened; stigmas 2. Fl. and fr. Jul–Aug.

- In water; ca. 2400 m. N Xinjiang (Qinghe: Zhonghaizi).

398. *Carex minxianica* Y. C. Yang, Acta Biol. Plateau Sin. 3: 86. 1984.

岷县藁草 min xian tai cao

Rhizome short, stoloniferous, slender, woody. Culms tufted, 40–60 cm tall, ca. 1 mm thick, trigonous, glabrous, scabrous above, clothed at base with dark purple sheaths disintegrating into fibers. Leaves shorter than culm, blades linear, ca. 2 mm wide, flat, margins scabrous. Involucral bracts leaflike, shorter than inflorescence, sheathless. Spikes 3–5; terminal spike male, linear or narrowly cylindrical, 20–23 × 2–4 mm, pallid; remaining spikes female, only upper one androgynous, linear-cylindrical, 20–25 × 2.5–3 mm, sessile, lower spikes with peduncles. Female glumes blackish brown, ovate-oblong or elliptic, ca. 2.5 mm, with light midrib, apex obtuse or acute. Utricles shorter than or equaling glume, elliptic, plano-convex, 2–2.5 mm, faintly veined, apex gradually attenuate into a beak, orifice entire or shortly 2-toothed. Nutlets ovate, ca. 2 mm, base shortly stipitate; stigmas 2. Fl. and fr. Jul–Aug.

- S Gansu (Minxian).

399. *Carex platysperma* Y. L. Chang & Y. L. Yang, Fl. Pl. Herb. Chin. Bor.-Orient. 11: 206. 1976.

双辽藁草 shuang liao tai cao

Rhizome short, stoloniferous. Culms 40–50 cm tall, slender, smooth, clothed at base with brown, bladeless, lustrous sheaths. Leaf blades 2–2.5 mm wide, flat, margins scabrous. Involucral bracts leaflike, equaling or slightly longer than inflorescence, sheathless. Spikes 3 or 4; terminal spike male, linear, 1–2.5 cm; remaining spikes female, slightly overlapping, cylindrical, 1–2 cm, densely many flowered, subsessile. Female glumes brownish purple-red, light green abaxially, oblong-ovate, 1.5–1.7 mm, 1-veined, apex obtuse, sometimes with mucro. Utricles longer than glume, broadly obovate or suborbicular, rarely ovate or elliptic, plano-convex, 2–2.5 mm, thinly membranous, 3–5-veined, base very shortly stipitate, apex abruptly contracted into a short beak, orifice emarginate or 2-toothed, rarely apex beakless. Nutlets tightly enveloped, obovate, ± biconvex; style base not thickened; stigmas 2.

- Grasslands, marshes, moist places. Heilongjiang, Jilin.

1a. Utricles broadly obovate or suborbicular, plano-convex, with a short beak at apex 399a. var. *platysperma*

1b. Utricles ovate or elliptic, beakless at apex 399b. var. *sungareensis*

399a. *Carex platysperma* var. *platysperma*

双辽藁草(原变种) shuang liao tai cao (yuan bian zhong)

Utricles broadly obovate or suborbicular, plano-convex, apex with a short beak.

- Moist places in grasslands. Jilin.

399b. *Carex platysperma* var. *sungareensis* Y. L. Chang & Y. L. Yang, Fl. Pl. Herb. Chin. Bor.-Orient. 11: 206. 1976.

松花江藁草 song hua jiang tai cao

Utricles ovate or elliptic, apex beakless.

- Marshes, moist places. Heilongjiang.

400. *Carex muliensis* Handel-Mazzetti, Symb. Sin. 7: 1262. 1936.

木里藁草 mu li tai cao

Rhizome short. Culms 15–65 cm tall, trigonous, scabrous above, clothed at base with brown bladeless sheaths. Leaves shorter than culm, blades linear, 1.5–3 mm wide, flat, margins scabrous, often revolute. Basal involucre bracts leaflike, shorter than or equaling inflorescence, sheathless, upper ones setaceous or glumelike. Spikes 3–5, approximate; terminal spike male, narrowly cylindrical, 12–30 × 3–5 mm, with peduncle 3–10 mm; lateral spikes female, occasionally some becoming androgynous bearing several male flowers at apex, cylindrical or oblong, 10–40 × 5–6 mm, densely many flowered, with peduncles 1–3 cm, slender. Female glumes blackish purple, oblong or narrowly ovate, ca. 2.5 × 0.8–1.3 mm, with light midrib, margins narrowly white hyaline, apex rounded, sometimes acute. Utricles light brown, upper blackish purple, longer than glume, broadly ovate or broadly elliptic, 2.5–3 × ca. 1.7 mm, densely minutely papillose, veined at base, apex abruptly contracted into a short beak, orifice entire. Nutlets castaneous, slightly tightly enveloped, obovate, ca. 2 mm, apex with short beak; style base not thickened; stigmas 2. Fl. and fr. Jul–Aug.

- Alpine meadows, boggy meadows; 3000–4600 m. W Sichuan.

401. *Carex kiotensis* Franchet & Savatier, Enum. Pl. Jap. 2: 556. 1878.

褐柄藁草 he bing tai cao

Carex phaeopoda Ohwi.

Rhizome short, without stolons. Culms densely tufted, 30–60 cm tall, erect, trigonous, scabrous above. Leaves many, 6–13 mm wide, basal sheaths rusty brown or somewhat purplish brown. Involucral bracts leaflike, much surpassing inflorescence, sheathless at base. Spikes 5–7, subfastigate, sessile or pedunculate; terminal spike male, or with a few female flowers, linear, 4–8 cm; lateral spikes female, cylindrical, rarely with a few male flowers, 5–9 × 0.4–0.5 cm, densely many flowered. Female glumes pale and flecked with dark purple-brown, ovate or elliptic, ca. 2 mm, greenish 1-veined costa excurrent into a mucro at truncate apex. Utricles light brownish green, suberect,

ovate, biconvex, 2.2–2.5 mm, nerveless, base shortly stipitate, apical beak rather short, truncate. Nutlets loosely enveloped, broadly obovoid, biconvex, ca. 1.5 mm, contracted at both ends; stigmas 2.

Grassy places at middle elevations. Taiwan [Japan].

No specimens from China have been seen by the present authors.

402. *Carex middendorffii* F. Schmidt, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 12(2) [Reis. Amur-Land., Bot.]: 70. 1868.

高鞘薹草 gao qiao tai cao

Rhizome with stout stolons. Culms 30–60 cm tall, slightly scabrous or smooth above, clothed at base with yellowish brown bladeless long sheaths disintegrating into reticulate fibers. Leaves shorter than culm, blades linear, 2–4 mm wide, slightly rigid. Involucral bracts leaflike, ± equaling inflorescence, sheathless. Spikes 3–5; upper 1 or 2(or 3) spikes male, oblong, up to ca. 2.5 cm; remaining spikes androgynous, distant, ovate or oblong-ovate, 1–2.5 cm, densely many flowered. Female glumes ferruginous, brown, or dark brown, light at middle, oblong-ovate, margins narrowly pale hyaline, apex slightly obtuse. Utricles grayish green, becoming light ferruginous, longer than glume, ovate or rhomboid-ovate, plano-convex, 4–5 mm, 3–5-veined, base estipitate, apex gradually attenuate into a smooth or slightly scabrous short beak, orifice truncate. Nutlets broadly obovate; style stout; stigmas 2.

Moss marshes. Heilongjiang [Japan, Russia (Far East)].

403. *Carex cryptocarpa* C. A. Meyer, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 1: 226. 1831.

隱果薹草 yin guo tai cao

Carex lyngbyei Hornemann subsp. *cryptocarpa* (C. A. Meyer) Hultén; *C. lyngbyei* subsp. *prionocarpa* (Franchet) Kitagawa; *C. prionocarpa* Franchet.

Rhizome with stout stolons. Culms 30–120 cm tall, stout, slightly smooth, clothed at base with reddish purple, lustrous, bladeless sheaths. Leaves shorter than culm, blades broadly linear, 5–10 mm wide, flat, margins slightly involute. Involucral bracts leaflike, lower 2 or 3 surpassing inflorescence. Spikes 5–7, remote; upper 2 or 3 spikes male, fusiform or clavate, 6–7 cm; remaining spikes female, usually with male flowers at apex, cylindrical, 2–8 × 0.8–1.2 cm, many flowered, with peduncles up to ca. 10 cm, smooth, pendent. Female glumes dark brown-purple, lanceolate or oblong-lanceolate, pale 1-veined costa excurrent into a mucro. Utricles gray-green, becoming light brown, ca. 1/2 as long as glume, ovate, biconvex, ca. 3 mm, slender, 6–8-veined, base shortly stipitate, apex gradually attenuate into a beak, orifice truncate. Nutlets brown, tightly enveloped, elliptic; style base not thickened; stigmas 2.

Marshes, meadows, riversides [Japan, Russia (Far East); North America (Alaska)].

No specimens from China have been seen by the present authors. Standley et al. (Fl. N. Amer. 23: 383–384. 2002) suggested that Asian populations are a different species from North American *Carex lyngbyei* and are appropriately given species status.

3. *Carex* subsect. **Caespitosae** Fries ex Kükenthal in Engler, Pflanzenr. 38(IV. 20): 324. 1909.

丛薹草亚组 cong tai cao ya zu

Rhizome short or stoloniferous. Culms slender, acutely trigonous, clothed at base with bladeless sheaths. Leaves flat or plicate, margins revolute. Involucral bracts leaflike or setaceous. Spikes upper 1–3 male; remaining spikes female, cylindrical or oblong, densely many flowered, sessile or lower ones with short peduncles, erect. Female glumes brown or blackish, 3-veined, apex obtuse or acute. Utricles ovate or elliptic, plano-convex or biconvex, membranous, veined or nerveless except for 2 marginal veins.

About 16 species: Asia, North America; 11 species (four endemic) in China.

- 1a. Utricles scabrous on upper margins 404. *C. forrestii*
 1b. Utricles smooth on margins.
 2a. Lower involucral bracts setaceous.
 3a. Utricles obovate or suborbicular 412. *C. schmidtii*
 3b. Utricles ovate or elliptic.
 4a. Female spikes oblong or cylindrical, to 25 mm, with short peduncles; utricles with short beak 413. *C. caespitosa*
 4b. Female spikes broadly ovate, ca. 7 mm, sessile; utricles ± beakless 414. *C. maquensis*
 2b. Lower involucral bracts leaflike.
 5a. Utricles veined.
 6a. Rhizome without stolons; female glumes narrowly elliptic, 1.5–2 mm 405. *C. appendiculata*
 6b. Rhizome with long stolons; female glumes oblong, 2.5–2.8 mm 406. *C. thunbergii*
 5b. Utricles nerveless or faintly few veined.
 7a. Utricles shorter than glume 407. *C. aperta*
 7b. Utricles longer than glume.
 8a. Rhizome without stolons; spikes disposed in fastigate inflorescence; utricles oblong-fusiform 408. *C. prolongata*
 8b. Rhizome stoloniferous; spikes disposed in racemose inflorescence.
 9a. Utricles ovate, with obscure beak, orifice entire 409. *C. cinerascens*
 9b. Utricles elliptic or obovate, with very short beak, orifice emarginate or entire.

- 10a. Female spikes narrowly oblong, 15–40 × 2–3 mm 410. *C. micrantha*
 10b. Female spikes cylindrical, 12–20 × 6–7 mm 411. *C. caespititia*

404. *Carex forrestii* Kükenthal, Notes Roy. Bot. Gard. Edinburgh 8: 9. 1913.

刺喙藁草 *ci hui tai cao*

Rhizome with long stolons, slender, woody. Culms 10–25 cm tall, slender, acutely trigonous, clothed at base with sheaths disintegrating into fibers. Leaves subequaling culm, blades linear, 1.5–3 mm wide, flat, margins revolute. Involucral bracts sheathless, lowest involucral bract leaflike, longer or shorter than inflorescence. Spikes 3–5; terminal spike male, linear-cylindrical, 2.5–4.5 cm; lateral spikes female, occasionally some becoming androgynous and bearing several male flowers at apex, oblong or ovate, 1.5–2.8 cm, lowest one with slender peduncle 7–20 mm, others subsessile. Female glumes dark brown, oblong or oblong-lanceolate, ca. 2 mm, green 3-veined at middle, margins narrowly white hyaline, apex obtuse. Utricles gray-green above, brownish below, minutely ferruginous papillose, longer and broader than glume, broadly ovate, plano-convex, ca. 2.5 mm, base rounded, shortly stipitate, apex abruptly contracted into a hispidulous short beak, orifice entire. Nutlets loosely enveloped, oblong; stigmas 2. Fl. and fr. May–Jul.

• Marshy meadows, field margins; 2000–3200 m. S Xizang, NW Yunnan.

405. *Carex appendiculata* (Trautvetter) Kükenthal, Bull. Herb. Boissier, sér. 2, 4: 54. 1903.

灰脉藁草 *hui mai tai cao*

Rhizome short, tussock-forming. Culms tufted, 30–75 cm tall, acutely trigonous, slender, scabrous, clothed at base with reddish brown, slightly lustrous, bladeless sheaths disintegrating into fibers. Leaves subequaling culm, blades linear, ca. 2 mm wide, flat, margins scabrous. Lowest involucral bract leaflike, equaling or longer than inflorescence, sheathless. Spikes 3–5; upper 1 or 2 spikes male, narrowly cylindrical, 0.8–2.5 cm, terminal spike with peduncle; remaining spikes female, occasionally some becoming androgynous and bearing several male flowers at apex, oblong to narrowly cylindrical, 10–30 × 3–4 mm, densely many flowered, with short peduncles or subsessile. Female glumes purple-black, narrowly elliptic, 1.5–2 mm, green 1–3-veined at middle, scabrous on veins, margins narrowly white hyaline, apex obtuse. Utricles light green, longer than and much broader than glume, elliptic, rarely obovate or suborbicular, plano-convex, (1.8–)2.2–3 mm, densely minutely papillose, veined, apex abruptly contracted into a short beak, orifice emarginate. Nutlets tightly enveloped, broadly obovate or obovate, plano-convex, ca. 1.5 mm; style base not thickened; stigmas 2. Fl. and fr. Jun–Jul.

Moist places, marshes; ca. 600 m. Heilongjiang, Jilin, Nei Mongol [Korea, Russia (Far East, E Siberia)].

- 1a. Utricles elliptic, 2.2–3 mm; female glumes 1.6–2 mm 405a. var. *appendiculata*
 1b. Utricles obovate or suborbicular, 1.8–2.3 mm; female glumes ca. 1.5 mm 405b. var. *sacculiformis*

405a. *Carex appendiculata* var. *appendiculata*

灰脉藁草(原变种) *hui mai tai cao* (yuan bian zhong)

Carex acuta Linnaeus var. *appendiculata* Trautvetter in Trautvetter & C. A. Meyer, Fl. Ochot. Phaenog. 100. 1856.

Female glumes 1.6–2 mm. Utricles elliptic, 2.2–3 mm.

Moist places, marshes; ca. 600 m. Heilongjiang, Jilin, Nei Mongol [Korea, Russia (Far East, E Siberia)].

405b. *Carex appendiculata* var. *sacculiformis* Y. L. Chang & Y. L. Yang, Fl. Pl. Herb. Chin. Bor.-Orient. 11: 206. 1976.

小囊灰脉藁草 *xiao nang hui mai tai cao*

Female glumes ca. 1.5 mm. Utricles obovate or suborbicular, 1.8–2.3 mm.

• Marshes, moist places. Jilin, Nei Mongol.

406. *Carex thunbergii* Steudel, Flora 29: 23. 1846.

陌上菅 *mo shang jian*

Carex gaudichaudiana Kunth var. *thunbergii* (Steudel) Kükenthal.

Rhizome with long stolons. Culms 40–100 cm tall, trigonous, smooth, slightly scabrous above, clothed at base with light brown sheaths slightly disintegrating into parallel or reticulate fibers. Leaves shorter or slightly longer than culm, subflat, blades linear, ca. 3 mm wide, margins slightly scabrous. Involucral bracts leaflike, longer than or equaling inflorescence, sheathless. Spikes 3–5, distant; upper 1 or 2 spikes male, linear, ca. 3.5 cm; remaining spikes female, cylindrical, 25–40 × 3–4 mm, densely many flowered, lower ones shortly pedunculate. Female glumes ferruginous or light brown, oblong, 2.5–2.8 mm, green 3-veined at middle, margins white hyaline, apex obtuse. Utricles green-yellow, longer than glume, elliptic or long elliptic, plano-convex, membranous, densely minutely papillose, 4- or 5-veined, base shortly stipitate, apex abruptly contracted into a very short beak, orifice emarginate or entire. Nutlets loosely enveloped, obovate, plano-convex, apex rounded; style base not thickened; stigmas 2.

Lakesides, wet grasslands. Heilongjiang, Liaoning [Japan].

407. *Carex aperta* Boott in Hooker, Fl. Bor.-Amer. 2: 218. 1839.

亚美藁草 *ya mei tai cao*

Rhizome short, stoloniferous. Culms tufted, 60–70 cm tall, trigonous, rigid, smooth, scabrous above, clothed at base with reddish bladeless sheaths. Leaves shorter than culm, blades linear, ca. 3 mm wide, subflat, margins revolute. Involucral bracts leaflike, subequaling inflorescence, sheathless. Spikes 2 or 3; upper 1 or 2 spikes male, linear, 1–2.5 cm; remaining spikes female, cylindrical, ca. 2 mm, densely many flowered, lower ones shortly pedunculate. Female glumes ferruginous-brown, lanceolate, 3-veined at middle, margins narrowly white hyaline. Utricles ferruginous-brown, shorter than glume, broadly

elliptic or ovate-elliptic, inflated, 2.5–2.8 × ca. 1.8 mm, densely minutely papillose, nerveless except for 2 marginal veins, base rounded, apex abruptly contracted into a short smooth beak, orifice emarginate. Nutlets loosely enveloped; style base not thickened; stigmas 2.

Meadows. Heilongjiang [Russia (Far East); North America].

408. *Carex prolongata* Kükenthal in Handel-Mazzetti, Symb. Sin. 7: 1262. 1936.

延长藁草 *yan chang tai cao*

Rhizome short. Culms ca. 30 cm tall, slender, compressed, scabrous. Leaves shorter than culm, blades linear, 2–4 mm wide, flat, apex acuminate. Involucral bracts leaflike, shorter than inflorescence, sheathless. Spikes 5, disposed in fastigiate inflorescence; terminal spike male, narrowly cylindrical, ca. 1.5 cm; lateral spikes usually female, but with several male flowers at apex, cylindrical, 2–3 cm, erect, lower 2 slightly distant, densely many flowered, with short peduncles, upper 2 sessile. Female glumes dark brown or dark purple-blackish, oblong-ovate, with green midrib, margins narrowly white hyaline, apex rounded. Utricles longer than glume, oblong-fusiform, compressed, ca. 3.5 mm, densely minutely papillose, few and faintly veined, base attenuate, apex contracted into a short brown beak, orifice truncate. Stigmas 2. Fl. and fr. Jul.

• Moist grasslands; ca. 3600 m. NW Yunnan.

409. *Carex cinerascens* Kükenthal, Bull. Herb. Boissier, sér. 2, 2: 1017. 1902.

灰化藁草 *hui hua tai cao*

Rhizome short, long stoloniferous. Culms 25–60 cm tall, tufted, acutely trigonous, smooth, scabrous in lower part of inflorescence, clothed at base with yellow-brown or brown bladeless sheaths disintegrating into reticulate fibers. Leaves shorter than or equaling culm, flat, 2–4 mm wide. Lowest involucral bract leaflike, longer than or equaling inflorescence, sheathless, remaining ones setaceous. Spikes 3–5; upper 1 or 2 spikes male, narrowly cylindrical, 2–5 cm; remaining spikes female, occasionally some becoming androgynous and bearing several male flowers at apex, narrowly cylindrical, 15–30 × 2–4 mm, densely many flowered, lower spikes with peduncles, upper sessile. Female glumes dark brown or purplish, oblong-lanceolate, ca. 2.5 mm, margins narrowly white hyaline, yellow-green 3-veined costa excurrent into a mucro, apex acute, rarely obtuse. Utricles gray, light green, or yellow-green, longer than glume, ovate, ca. 3 mm, membranous, ferruginous punctate, obscurely veined, base contracted into a short stipe, apex gradually attenuate into an obscure beak, orifice entire. Nutlets slightly tightly enveloped, obovate-oblong, ca. 1.5 mm; style base slightly thickened; stigmas 2. Fl. and fr. Apr–May.

Lakesides, marshes, wet places. Anhui, Heilongjiang, Hubei, Hunan, Jiangsu, Jilin, Liaoning, Nei Mongol, Shaanxi [Japan].

410. *Carex micrantha* Kükenthal, Bull. Herb. Boissier, sér. 2, 2: 1018. 1902.

滑茎藁草 *hua jing tai cao*

Rhizome short, long stoloniferous. Culms 40–50 cm tall,

slender, acutely trigonous, smooth, clothed at base with brown or purple-red bladeless sheaths. Leaves equaling culm, blades linear, 2–3 mm wide, flat or plicate, upper margins scabrous. Involucral bracts leaflike, lower ones surpassing inflorescence, sheathless. Spikes 3–5; terminal spike male, linear, 15–25 mm, with peduncle 8–35 mm, slender; lateral spikes female, narrowly cylindrical, 15–40 × 2–3 mm, densely many flowered, lowest with peduncle, others sessile. Female glumes brown, ovate or lanceolate, ca. 1.8 mm, midrib green, 3-veined, margins white hyaline, apex obtuse or truncate. Utricles light yellow-green, longer than glume, elliptic or obovate-elliptic, planoconvex, 2–2.5 mm, membranous, densely minutely papillose, nerveless except for 2 costas on edges, sessile, apex abruptly contracted into a very short beak, orifice emarginate. Nutlets tightly enveloped, ovate, ca. 1.6 mm; style base not thickened; stigmas 2. Fl. and fr. May–Jun.

Wet places, marshes; 400–500 m. Heilongjiang [Korea].

411. *Carex caespititia* Nees in Wight, Contr. Bot. India, 127. 1834.

丛生藁草 *cong sheng tai cao*

Rhizome long. Culms 15–20 cm tall, acutely trigonous, slender, scabrous above. Leaves shorter than culm, blades linear, 3–4 mm wide, flat, margins scabrous. Involucral bracts leaflike, shorter than inflorescence, sheathless. Spikes 3 or 4, approximate; terminal spike male, light brown, cylindrical, 20–22 × ca. 4 mm, with peduncle 5–10 mm; lateral spikes female, oblong or cylindrical, 12–20 × 6–7 mm, with peduncles 4–5 mm, upper sessile. Female glumes dark purple-red, oblong or lanceolate, ca. 2 mm, green 3-veined costa excurrent into a mucro. Utricles longer than glume, broadly oblong or obovate, planoconvex, 2.5–3 mm, veined, base shortly stipitate, apex abruptly contracted into a very short beak, orifice emarginate or entire. Nutlets loosely enveloped, broadly elliptic, planoconvex, ca. 1.5 mm; style base not thickened; stigmas 2. Fl. and fr. Jun.

Watersides; 2000–3200 m. SW Sichuan, Xizang, NW Yunnan [Nepal].

412. *Carex schmidtii* Meinshausen, Beitr. Kenntn. Russ. Reiches 26: 224. 1871.

瘤囊藁草 *liu nang tai cao*

Rhizome short. Culms densely tufted, 30–80 cm tall, slender, trigonous, scabrous, clothed at base with castaneous-brown bladeless sheaths slightly disintegrating into reticulate fibers. Leaves shorter than culm, blades 2–3 mm wide, flat, margins revolute. Lowest involucral bract leaflike, subequaling inflorescence, sheathless. Spikes 3–5; upper 1–3 spikes male, approximate, linear or narrowly cylindrical, 1–3 cm; remaining spikes female, cylindrical, 12–30 × 4–6 mm, lower spikes with short peduncles, upper sessile. Female glumes castaneous-brown, lanceolate, ca. 3 mm, margins narrowly white hyaline, 3-veined costa excurrent into a mucro, apex acute. Utricles brown-green or castaneous-brown, slightly shorter than or equaling glume and 2 × as broad as glume, broadly obovate or suborbicular, inflated, 2–3 mm, densely minutely papillose, nerveless except for 2 marginal veins, base shortly stipitate, upper margins

slightly scabrous, rarely smooth, apex abruptly contracted into a short beak, orifice entire. Nutlets brown, tightly enveloped, obovate-orbicular, biconvex, ca. 1.8 mm wide; style base not thickened; stigmas 2. Fl. and fr. Jun–Jul.

Marshes, streamsides, forest margins. Heilongjiang, Jilin, Nei Mongol [Japan, Korea, Mongolia, Russia (Far East, E Siberia)].

413. *Carex caespitosa* Linnaeus, Sp. Pl. 2: 978. 1753.

丛藁草 *cong tai cao*

Carex minuta Franchet; *C. rubra* H. Léveillé & Vaniot.

Rhizome short. Culms densely tufted, 40–90 cm tall, slender, trigonous, clothed at base with purple-brown or red-brown bladeless sheaths disintegrating into reticulate fibers. Leaves shorter than culm, blades linear, 2–3.5 mm wide, flat, margins slightly revolute. Involucral bracts setaceous, ± equaling spike, sheathless. Spikes 3 or 4, approximate; terminal spike male, linear or oblong, 20–30 mm; remaining spikes female, occasionally some becoming androgynous and bearing several male flowers at apex, oblong or cylindrical, 5–25 × 3–5 mm, with short peduncles. Female glumes purple-brown or ferruginous-brown, narrowly ovate, ca. 2 mm, green and 1-veined medially, margins white hyaline, apex obtuse. Utricles gray-green or light green-brown, ovate to elliptic, ± biconvex or plano-convex,

2–2.5(–3) × ca. 1.2 mm, densely minutely papillose, nerveless or faintly 1–3-veined, base gradually attenuate to cuneate, shortly stipitate, apex contracted into a short beak. Style base not thickened; stigmas 2. Fl. and fr. Jun–Jul.

• Marshes, wet places. Heilongjiang, Jilin.

414. *Carex maquensis* Y. C. Yang, Acta Biol. Plateau Sin. 3: 85. 1984.

玛曲藁草 *ma qu tai cao*

Rhizome short. Culms tufted, 20–35 cm tall, ca. 1 mm thick, slender, acutely trigonous, slightly scabrous, clothed at base with blackish brown sheaths. Leaves shorter than culm, blades linear, ca. 1.2 mm wide, flat, margins scabrous, apex acuminate. Basal involucral bract setaceous, brown, sheathless. Spikes 2 or 3; terminal spike male, red-brown, oblong, 1–1.2 cm; lateral spikes female, blackish brown, broadly ovate, ca. 7 mm, sessile. Female glumes blackish brown, broadly ovate, 3-veined medially, apex acute. Utricles light brown, subequaling glume, broadly elliptic, ca. 3 mm, glabrous, base shortly stipitate, apex ± beakless, truncate and entire. Nutlets enveloped, broadly obovate or obovate, biconvex, ca. 1.5 mm, base shortly stipitate; style base not thickened; stigmas 2. Fr. Jul.

• Alpine marshes; ca. 3500 m. Gansu.

42. *Carex* sect. *Forficulae* (Franchet ex Kükenthal) Raymond, Mém. Jard. Bot. Montréal 53: 57. 1959 [*“Forficulae”*].

溪水藁草组 *xi shui tai cao zu*

Liang Songyun (梁松筠 Liang Song-jun); Tetsuo Koyama, Gordon C. Tucker

Carex subsect. *Forficulae* Franchet ex Kükenthal in Engler, Pflanzenr. 38(IV. 20): 334. 1909 [*“Forficulae”*].

Rhizome often stoloniferous. Culms trigonous, clothed at base with bladeless sheaths ± disintegrating into reticulate fibers. Leaves flat, margins revolute. Involucral bracts leaflike, sheathless. Spikes 3–6; upper 1 or 2 spikes male; remaining spikes female, cylindrical, densely many flowered, upper ones approximate, sessile, lowest spike distant from next, with erect short peduncle. Female glumes brown or pale, with mucro or not. Utricles membranous, plano-convex or biconvex, nerveless or obscurely veined, with beak.

About seven species: E and SE Asia; seven species (one endemic) in China.

- 1a. Stigmas persistent, ca. 2 × as long as utricle.
 2a. Utricles oblong or oblong-lanceolate, abruptly contracted above to a smooth long beak 415. *C. rubrobrunnea*
 2b. Utricles ovate or obovate, abruptly contracted above to an often scabrous medium-sized beak 416. *C. sadoensis*
 1b. Stigmas deciduous.
 3a. Utricles shorter than or equaling glume 421. *C. luctuosa*
 3b. Utricles longer than glume.
 4a. Utricles scabrous on upper margins 417. *C. forficula*
 4b. Utricles smooth on upper margins.
 5a. Utricles nerveless except for 2 costas on edges, usually with purple-black flecks 420. *C. otaruensis*
 5b. Utricles veined, uniformly yellowish to brown.
 6a. Utricles 2-toothed at orifice; female glumes purple-red, green at middle, apex acuminate 418. *C. heterolepis*
 6b. Utricles entire or emarginate at orifice; female glumes dark purple-black, green
 3-veined costa excurrent into a scabrous awn at emarginate apex 419. *C. teres*

415. *Carex rubrobrunnea* C. B. Clarke in J. D. Hooker, Fl. Brit. India 6: 710. 1894 [*“rubro-brunnea”*].

点囊藁草 *dian nang tai cao*

Rhizome short. Culms tufted, 20–60 cm tall, acutely trigonous, slightly stiff, smooth, slightly scabrous, clothed at base with brown sheaths disintegrating into fibers. Leaves longer

than culm, blades linear, 3–4 mm wide, flat, leathery, margins scabrous. Lower involucral bracts leaflike, longer than inflorescence, rarely shorter, upper ones setaceous, sheathless. Spikes 4–6, approximate, disposed in fastigate inflorescence; terminal spike male or gynaeandrous, linear-cylindrical, 40–55 × 2–4 mm, densely many flowered, with peduncle or sessile; lateral spikes female (occasionally some of these becoming

androgynous and bearing several male flowers apically), cylindrical, 35–70 × 3–4 mm, densely many flowered, lowest with peduncle 1–1.5 cm, others gradually becoming sessile to sessile. Female glumes castaneous, lanceolate, margins narrowly white hyaline, yellow-green 3-veined costa excurrent into a mucro, apex acuminate. Utricles brown to olivaceous, slightly shorter than glume, oblong or oblong-lanceolate, planoconvex, 2.5–4 mm, lustrous, densely minutely papillose, nerveless except for 2 marginal costas, apex abruptly contracted into a long beak, orifice 2-toothed. Nutlets tightly enveloped, broadly obovoid, ca. 1.5 mm; stigmas 2, 0.5–2 × as long as utricule. Fl. and fr. (May–)Jun.

Grassland slopes, wet places in forests, rock crevices along valleys or streamsides, moist places; 1000–3900 m. Anhui, Gansu, Guangdong, Guangxi, Hubei, Jiangxi, Shaanxi, Sichuan, Xizang, Yunnan, Zhejiang [Bhutan, India, Myanmar, N Vietnam].

- 1a. Involucral bracts shorter than inflorescence 415c. var. *brevibracteata*
 1b. Involucral bracts longer than inflorescence.
 2a. Utricles ca. 2.5 mm; stigmas ca. 1/2 length of utricule 415a. var. *rubrobrunnea*
 2b. Utricles 3–4 mm; stigmas ca. 2 × as long as utricule 415b. var. *taliensis*

415a. *Carex rubrobrunnea* var. *rubrobrunnea*

点囊薹草(原变种) dian nang tai cao (yuan bian zhong)

Involucral bracts longer than inflorescence. Utricles ca. 2.5 mm. Stigmas ca. 1/2 length of utricule.

Grassland slopes, wet places in forests; 2000–3900 m. Guangdong, Xizang, Yunnan [India].

415b. *Carex rubrobrunnea* var. *taliensis* (Franchet) Kükenthal in Engler, Pflanzenz. 38(IV. 20): 344. 1909.

大理薹草 da li tai cao

Carex taliensis Franchet, Bull. Soc. Philom. Paris, sér. 8, 7: 34. 1895; *C. stachydesma* Franchet.

Involucral bracts longer than inflorescence. Utricles 3–4 mm. Stigmas ca. 2 × as long as utricule.

• Rock crevices along valleys in forests; 1000–2800 m. Anhui, Gansu, Guangdong, Guangxi, Hubei, Jiangxi, Shaanxi, Sichuan, Xizang, Yunnan, Zhejiang.

415c. *Carex rubrobrunnea* var. *brevibracteata* T. Koyama, Bull. Natl. Sci. Mus., Tokyo, n.s., 3: 25. 1956.

短苞薹草 duan bao tai cao

Involucral bracts shorter than inflorescence. Female glumes ± equaling utricule. Fl. and fr. May–Jun.

• Rock crevices along streamsides, moist places; ca. 1500 m. Jiangxi, Sichuan.

416. *Carex sadoensis* Franchet, Bull. Soc. Philom. Paris, sér. 8, 7: 41. 1895.

美丽薹草 mei li tai cao

Rhizome short, stoloniferous. Culms tufted, 30–60 cm tall, acutely trigonous, smooth or scabrous, clothed at base with yellow-brown, lustrous, bladeless sheaths slightly disintegrating into fibers. Leaves ± equaling or slightly shorter than culm, blades gray-green, linear, 2–4 mm wide, flat, slightly soft, densely minutely papillose, margins involute. Involucral bracts leaflike, equaling inflorescence, sheathless. Spikes 4 or 5; terminal spike male, linear-cylindrical, 20–40 × 3–4 mm, with peduncle; lateral spikes female, cylindrical, 20–70 × 3–5 mm, densely many flowered, with short peduncles or sessile. Female glumes red-brown, narrowly ovate-lanceolate, ca. 3 mm, lustrous, green 3-veined costa excurrent into a mucro at truncate or emarginate apex. Utricles light green or stramineous, usually with minute flecks, shorter but broader than glume, oblong-ovate or obovate, biconvex, ca. 3 mm, membranous, nerveless except for 2 marginal costas, base contracted into a short stipe, apex abruptly contracted into an often scabrous-margined beak, orifice 2-toothed. Nutlets tightly enveloped, oblong-ovate or obovate, biconvex, 1.5–1.8 mm; style very short, ca. 0.2 mm, base not thickened; stigmas 2, long and slender, persistent.

Streamsides along valleys. Anhui [Japan, Russia (Far East)].

417. *Carex forficula* Franchet & Savatier, Enum. Pl. Jap. 2: 557. 1878.

溪水薹草 xi shui tai cao

Rhizome short. Culms densely tufted, 40–90 cm tall, trigonous, scabrous, clothed at base with yellow-brown, slightly lustrous, bladeless sheaths disintegrating into reticulate fibers. Leaves equaling or slightly longer than culm, blades green, linear, 2.5–4 mm wide, flat, margins revolute. Involucral bracts leaflike, shorter than inflorescence, sheathless. Spikes 3–5; terminal spike male, linear, 3–4 cm, with peduncle; lateral spikes female, narrowly cylindrical, 1.5–5 cm, densely many flowered, sometimes slightly laxly flowered at base, lower spikes with short peduncles, others sessile. Female glumes dark ferruginous or purple-brown, lanceolate or oblong, ca. 3 mm, green 3-veined costa forming a scabrous mucro. Utricles yellow-green, longer than glume, obovate or ovate, compressed biconvex, 3–4 mm, hardly veined, sometimes finely few veined, base truncate, upper margins scabrous, apical beak deeply 2-lobed at orifice. Nutlets tightly enveloped, ovoid or broadly obovoid, subbiconvex, 2–2.5 mm, base broadly truncate; style base not thickened; stigmas 2. Fl. and fr. Jul–Aug.

Forests, streamsides, moist places; 700–900 m. Anhui, Hebei, Jilin, Liaoning, Shaanxi [Japan, Korea, Russia (Far East)].

418. *Carex heterolepis* Bunge, Enum. Pl. China Bor. 69. 1833.

异鳞薹草 yi lin tai cao

Rhizome short, long stoloniferous. Culms 40–70 cm tall, trigonous, scabrous above, clothed at base with yellow-brown sheaths disintegrating into reticulate fibers. Leaves subequaling culm, blades linear, 3–6 mm wide, flat, margins scabrous. Involucral bracts leaflike, lowest one surpassing inflorescence, sheathless. Spikes 3–6; terminal spike male, cylindrical, 20–40 × ca. 4 mm, with peduncle 0.8–2 cm; lateral spikes female, cylindrical, erect, 10–45 × ca. 6 mm, often sessile, only lowest one with short peduncle. Female glumes light brown, narrowly

lanceolate or narrowly oblong, 2–3 mm, green 1–3-veined costa excurrent into a mucro. Utricles light brown, slightly longer than glume, obovate or elliptic, compressed biconvex, 2.5–3 mm, densely minutely papillose, base truncate, apex abruptly contracted into a beak ca. 0.5 mm, orifice 2-toothed. Nutlets dark brown, tightly enveloped, broadly obovoid or obovoid, 2–2.2 mm; style base not thickened; stigmas 2. Fl. and fr. Apr–Jul.

Marshes, watersides; 500–1900 m. Hebei, Heilongjiang, Hubei, Jiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi [Japan, Korea].

419. *Carex teres* Boott, Ill. Gen. *Carex* 1: 62. 1858.

糙芒藁草 *cao mang tai cao*

Rhizome creeping. Culms 40–90 cm tall, acutely trigonous, smooth, scabrous above, clothed at base with dark purple-red or brown bladeless sheaths. Leaves shorter or slightly longer than culm, blades linear, 4–6 mm wide, flat, margins revolute, scabrous, apex acuminate. Involucral bracts leaflike, equaling or slightly longer than inflorescence, sheathless. Spikes 4–7, subfasciculate, narrowly cylindrical, 5–6 cm; upper 1–4 spikes male, sometimes androgynous; remaining spikes usually female, sometimes upper spikes male, lower female, lowest spike with peduncle up to ca. 1 cm. Female glumes dark purple-black, ovate or oblong-lanceolate, ca. 3 mm, green 3-veined costa excurrent into a scabrous awn at entire or emarginate apex. Utricles yellow-brown, ± equaling glume, elliptic, ca. 3 mm, glabrous, veined, apex abruptly contracted into a conic short beak, orifice entire or emarginate. Nutlets laxly enveloped, ovoid, ca. 2 mm; stigmas 2. Fl. and fr. Jun.

Moist places in forests; ca. 3100 m. Xizang [Bhutan, India, Nepal].

420. *Carex otaruensis* Franchet, Bull. Soc. Philom. Paris, sér. 8, 7: 34. 1895.

鹞落藁草 *yao luo tai cao*

Rhizome elongate, stoloniferous. Culms tufted, 30–60 cm tall, acutely trigonous, scabrous, clothed at base with reddish brown, lustrous, bladeless sheaths disintegrating into reticulate fibers. Leaves equaling culm, blades gray-green below, linear, 3–5 mm wide, flat, rigid, margins revolute. Lowest involucral bract leaflike, equaling or sometimes longer than inflorescence,

upper ones setaceous, sheathless. Spikes 4 or 5; terminal spike male, linear, 30–80 × ca. 2.5 mm, with short peduncle; lateral spikes usually female, rarely with several male flowers at apex, linear-cylindric, 30–80 × ca. 3 mm, densely many flowered, upper spikes approximate, with short peduncles, lower ones slightly distant, with scabrous, slender, erect peduncles. Female glumes pale, ovate-lanceolate, 2–2.5 mm, 1–3-veined costa forming a slightly scabrous mucro at apex. Utricles light green, often purple-brown, longer than glume, ovate or elliptic, biconvex, 2.5–3 mm, membranous, minutely papillose, nerveless except for 2 marginal costas, base truncate, shortly stipitate, apex contracted into a slightly scabrous columnar short beak, orifice pale, emarginate. Nutlets tightly enveloped, narrowly obovoid, 1.5–2 mm; style base slightly thickened; stigmas 2. Fl. and fr. Jul.

Wet places on roadsides, slopes. Anhui [Japan].

421. *Carex luctuosa* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 3, 9: 130. 1897.

城口藁草 *cheng kou tai cao*

Carex luctuosa f. *brevisquama* K. T. Fu; *C. luctuosa* f. *mucronata* K. T. Fu.

Rhizome short. Culms 30–100 cm tall, acutely trigonous, erect, rather stiff, scabrous, clothed at base with dark brown sheaths disintegrating into reticulate fibers. Leaves shorter than culm, blades linear, 3–5 mm wide, margins scabrous. Lower involucral bracts leaflike, surpassing inflorescence, sheathless, upper setaceous, shorter than inflorescence, sheathless. Spikes 4–6; terminal spike male or gynaeandrous, narrowly cylindrical, 3–3.5 cm; lateral spikes female, cylindrical, 20–30 × 4–5 mm, densely many flowered, upper spikes approximate, sessile, lowest spike remote, with short peduncle. Female glumes dark reddish, oblong, 2.5–2.8 mm, pale yellow 3-veined costa forming a mucro at apex or apex obtuse. Utricles light brown-green, slightly shorter than or equaling glume, obovate, slightly biconvex, 2.3–2.8 mm, nerveless except for 2 marginal costas, apex abruptly contracted into a smooth short beak, orifice 2-toothed. Nutlets obovoid, slightly biconvex, ca. 1.6 mm; stigmas 2. Fl. and fr. Jul.

• Watersides, wet places, slopes, roadsides, grasslands; 1000–2600 m. Gansu, Shaanxi, Sichuan.

43. *Carex* sect. *Praelongae* (Kükenthal) Nelm., Reinwardtia 1: 421. 1951.

帚状藁草组 *zhou zhuang tai cao zu*

Liang Songyun (梁松筠 Liang Song-jun); Tetsuo Koyama, Gordon C. Tucker

Carex subsect. *Praelongae* Kükenthal in Engler, Pflanzenr. 38(IV. 20): 345. 1909.

Rhizome short or stoloniferous. Culms acutely trigonous, clothed at base with bladeless sheaths ± disintegrating into reticulate fibers. Leaves flat, margins revolute. Involucral bracts leaflike, sheathless. Terminal spike male or gynaeandrous; lateral spikes female, long cylindrical, ± pedunculate, often pendent. Female glumes ferruginous, glandular or not, green 3-veined costa excurrent into a mucro or awn at apex. Utricles plano-convex, biconvex, or inflated at maturity, usually densely minutely papillose or with purple-red flecks, apex with short beak or not, orifice entire or 2-toothed. Style erect or curved; stigmas 2.

About 29 species: mainly in E Asia, also in tropical and S Africa, SE Asia, W Himalayas, Madagascar, and Sri Lanka; 17 species (ten endemic) in China.

- 1a. Utricles densely minutely papillose.
- 2a. Female glumes with scabrous awn at truncate or emarginate apex.
- 3a. Terminal spike gynaeandrous, female part ca. 5 mm wide, male part ca. 3 mm wide, lateral female spikes rather thick, 5–6 mm wide 437. *C. dimorpholepis*
- 3b. Terminal spike male, narrowly cylindrical, 1.5–2 mm wide, lateral female spikes rather slender, 3–4 mm wide 438. *C. phacota*
- 2b. Female glumes with mucro at acuminate or subrounded apex.
- 4a. Female spikes 25–30 × 8–9 mm 434. *C. maximowiczii*
- 4b. Female spikes 40–50 × 3–6 mm.
- 5a. Female glumes oblong, subrounded at apex 435. *C. subcernua*
- 5b. Female glumes oblong-lanceolate or lanceolate, acuminate at apex 436. *C. pruinosa*
- 1b. Utricles with purple-red flecks or faintly minutely papillose.
- 6a. Utricles not inflated at maturity.
- 7a. Terminal spike male, lateral spikes female; utricles elliptic 422. *C. melinacra*
- 7b. Upper 1–5 spikes gynaeandrous, remaining spikes female; utricles ovate or obovate.
- 8a. Female glumes obovate, 2-lobed at apex; style erect; spikes narrowly cylindrical, 5–10 cm 423. *C. praelonga*
- 8b. Female glumes lanceolate, acuminate at apex; style base curved; spikes cylindrical, 1.5–3 cm 424. *C. goligongshanensis*
- 6b. Utricles inflated at maturity.
- 9a. Female glumes dark brown.
- 10a. Plants 150–160 cm tall; spikes up to ca. 17 cm, branched at base 431. *C. lancangensis*
- 10b. Plants 65–100 cm tall.
- 11a. Spikes 5.5–12 cm, terminal spikes male; utricles without purple-red flecks 432. *C. jinshonensis*
- 11b. Spikes 1.5–5 cm, terminal spike gynaeandrous; utricles with purple-red flecks 433. *C. longpanlaensis*
- 9b. Female glumes light brown or light red.
- 12a. Female glumes much longer than utricle 425. *C. cremostachys*
- 12b. Female glumes short than or equaling utricle.
- 13a. Utricles hardly beaked.
- 14a. Leaves 8–12 mm wide; female spikes long cylindrical, 50–90 × 5–6 mm 426. *C. fargesii*
- 14b. Leaves 4–5 mm wide; female spikes cylindrical, 25–40 × 3.5–4 mm 427. *C. makuensis*
- 13b. Utricles with short and erect beak.
- 15a. Spikes 3 or 4, terminal spike male 428. *C. aequalta*
- 15b. Spikes 5–8, upper 2 or 3 male.
- 16a. Female glumes broadly ovate, 1.8–2 mm; female spikes 70–85 × ca. 3 mm 429. *C. wawuensis*
- 16b. Female glumes lanceolate, 2.5–3 mm; female spikes 60–130 × 4–6 mm 430. *C. longispiculata*

422. *Carex melinacra* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 3, 9: 135. 1897.

扭喙藁草 niu hui tai cao

Rhizome indurate. Culms 50–95 cm tall, ca. 2 mm thick, acutely trigonous, smooth, scabrous above, clothed at base with dark purple-red bladeless sheaths disintegrating into fibers. Leaves subequaling or shorter than culm, blades linear, 3–5 mm wide, flat, apex acuminate. Involucral bracts leaflike, shorter than inflorescence, sheathless. Spikes 4 or 5, long cylindrical, 5.5–11 × 0.3–0.6 cm; terminal spike male, with peduncle 2–5 mm; lateral spikes female, uppermost one approximate to male spike, lowest spike with peduncle 1.5–3.5(–11) cm. Female glumes blackish purple, ovate-lanceolate or oblong-lanceolate, ca. 3 mm, green 1-veined costa excurrent into a mucro, apex rounded. Utricles green, shorter or slightly longer than or equaling glume, elliptic, 2.5–3 mm, smooth or slightly scabrous, purple-red flecked or minutely papillose, apex abruptly contracted into a smooth or scabrous short beak, orifice with 2 divergent teeth; style base not thickened; stigmas 2. Fl. and fr. May.

• Moist grasslands along valleys, streamsides; 2000–3500 m. SW Sichuan, W Yunnan.

- 1a. Lowest peduncle 1.5–3.5 cm; utricles shorter than or equaling female glumes 422a. var. *melinacra*
- 1b. Lowest peduncle 5–11 cm; utricles longer than female glumes 422b. var. *changningensis*

422a. *Carex melinacra* var. *melinacra*

扭喙藁草(原变种) niu hui tai cao (yuan bian zhong)

Carex forficula Franchet & Savatier var. *melinacra* (Franchet) Kükenthal.

Lowest peduncle 1.5–3.5 cm. Utricles shorter than or equaling female glumes. Fl. and fr. May.

• Moist grasslands along valleys; 2000–3500 m. SW Sichuan, NW Yunnan.

422b. *Carex melinacra* var. *changningensis* S. Yun Liang, Acta Phytotax. Sin. 37: 193. 1999.

昌宁藁草 chang ning tai cao

Lowest peduncle distant, slender, 5–11 cm. Utricles longer than female glumes. Fl. and fr. May.

• Streamsides; 2000–3000 m. W Yunnan (Changning).

423. *Carex praelonga* C. B. Clarke in J. D. Hooker, Fl. Brit. India 6: 707. 1894.

帚状藁草 zhou zhuang tai cao

Rhizome stoloniferous. Culms 60–90 cm tall, acutely trigonous, smooth, clothed at base with brown, lustrous sheaths. Leaves shorter than culm, blades broadly linear, 6–8 mm wide, flat, stiff. Involucral bracts leaflike, surpassing inflorescence, sheathless. Spikes 4–9, narrowly cylindrical, 5–10 cm, densely many flowered, upper spikes approximate, lower 1 or 2 slightly distant, with peduncles, pendent; upper 1–4 spikes gynaeandrous (rarely male at apex); remaining spikes female. Female glumes dark sanguineous, subobovate, green 3-veined costa excurrent into a scabrous awn at truncate or 2-lobed apex. Utricles yellow-green, subequaling glume, suberect, broadly ovate or subovate, plano-convex, ca. 3 mm, membranous, minutely papillose, nerveless except for 2 costas on edges, base shortly stipitate, apex abruptly contracted into a slender pale beak, orifice emarginate, often scabrous. Nutlets ovate; style erect, base not thickened; stigmas 2, rather short.

Tsuga forests, thickets; 2000–3200 m. NW Yunnan [India].

424. *Carex gologongshanensis* P. C. Li, Acta Bot. Yunnan. 12: 140. 1990.

高黎贡山藁草 gao li gong shan tai cao

Rhizome short. Culms tufted, 40–60 cm tall, slender, acutely trigonous, clothed at base with brown bladeless sheaths. Leaves short or longer than culm, blades linear, 3–5 mm wide, flat. Lowest involucral bract leaflike, surpassing inflorescence, sheathless, remaining bracts setaceous. Spikes 4 or 5, gynaeandrous, oblong or oblong-cylindric, 15–30 × 5–6 mm, densely many flowered, upper 3 or 4 approximate, lowest one distant, with long and slender peduncle, pendent. Female glumes dark purple, lanceolate, 2.8–3 mm, green 3-veined costa excurrent into a scabrous long awn. Utricles yellow-green, longer than glume, long ovate, 3–3.5 mm, membranous, biconvex, subpapillose, nerveless except for 2 costas on edges, base subrounded, shortly stipitate, emarginate, apex abruptly contracted into a short beak, orifice entire. Nutlet obovate or subglobose, 1.8–1.9 mm; style curved, base not thickened; stigmas 2. Fl. and fr. Jul.

• Thicket slopes; 3000–3600 m. NW Yunnan (Gaoligong Shan).

425. *Carex cremostachys* Franchet, Bull. Soc. Philom. Paris, sér. 8, 7: 34. 1895.

燕子藁草 yan zi tai cao

Carex prescottiana Boott var. *cremostachys* (Franchet) Kükenthal.

Rhizome short. Culms up to ca. 90 cm tall, acutely trigonous, smooth, clothed at base with dark purple-red bladeless sheaths disintegrating into reticulate fibers. Leaves subequaling culm, blades linear, 4–6 mm wide, upper shortly sheathing. Involucral bracts leaflike, very long, surpassing inflorescence, sheathless. Spikes 7–12, cylindrical, 6–10 cm, densely many flowered, upper 1 or 2 spikes gynaeandrous, remaining spikes female, lower spikes with long peduncles, others sessile.

Female glumes pale red or pale brown, lanceolate, ca. 4 × 1 mm, ferruginous glandular, green 3-veined costa excurrent into a long awn. Utricles yellow-green, much shorter than glume, ovate, 2.5–3 mm, papery, ferruginous glandular, apex abruptly contracted into a short beak, orifice shortly 2-toothed. Nutlets castaneous, slightly loosely enveloped, ovate, biconvex, ca. 1.8 mm; style base not thickened; stigmas 2.

• Forests in valleys, shady and moist places; 3000–3300 m. W Sichuan, NW Yunnan.

426. *Carex fargesii* Franchet, Bull. Soc. Philom. Paris, sér. 8, 7: 34. 1895.

川东藁草 chuan dong tai cao

Carex immanis C. B. Clarke; *C. prescottiana* Boott var. *fargesii* (Franchet) Kükenthal.

Rhizome indurate. Culms 45–95 cm tall, 3–5 mm thick, acutely trigonous, scabrous, clothed at base with dark reddish bladeless sheaths disintegrating into reticulate fibers. Leaves basal or cauline, longer or shorter than culm, blades broadly linear, 0.8–1.2 cm wide, flat, margins scabrous, revolute, apex acuminate. Lowest involucral bract leaflike, surpassing inflorescence, sheathless, remaining bracts setaceous. Spikes 5–8; terminal spike male, sometimes with a few female flowers at apex or in middle, linear, 65–80 × ca. 2 mm, with peduncle 2–3 mm; lateral spikes female, long cylindrical, 50–90 × 5–6 mm, lowest peduncle 2–5 mm. Female glumes light reddish or light yellow pale, obovate, 1.8–2.7 mm, green 1-veined costa excurrent into a mucro at truncate or emarginate apex. Utricles light reddish, slightly longer than glume, ovate or lanceolate-oblong, 2.8–3 mm, membranous, faintly ferruginous glandular, conspicuously veined, beakless, emarginate at orifice. Nutlets castaneous, slightly loosely enveloped, ovate or obovate, plano-convex, ca. 2 mm; style base not thickened; stigmas 2. Fl. and fr. May–Jul.

• Shady places, streamsides; 900–2300 m. Guizhou, Hubei, Hunan, Sichuan.

427. *Carex makuensis* P. C. Li, Acta Bot. Yunnan. 12: 139. 1990.

马库藁草 ma ku tai cao

Rhizome indurate. Culms 30–40 cm tall, slender, acutely trigonous, stiff. Leaves subequaling culm, clothed at base with brown-red bladeless sheaths. Involucral bracts leaflike, much longer than inflorescence, sheathless. Spikes 5, upper approximate, lowest one distant; terminal spike gynaeandrous, linear-cylindric, 4–4.6 cm; lateral spikes female, cylindrical, 25–40 × 3.5–4 mm, densely many flowered. Female glumes brown, oblong, 1.7–2.2 mm, green 3-veined costa excurrent into an awn, apex subrounded or emarginate. Utricles light brown, dark purple-brown flecked, longer than glume, narrowly oblong, biconvex, later inflated, 2.7–3.5 mm, papery, veined, base rounded, shortly stipitate, apex abruptly contracted into a very short beak, orifice entire. Nutlets elliptic or obovate-elliptic, 1.7–2.3 mm; style base not thickened; stigmas 2. Fl. and fr. Aug.

• Sandy soil of riversides; ca. 1400 m. Yunnan.

428. *Carex aequalta* Kükenthal in Engler, Pflanzenr. 38(IV. 20): 354. 1909.

等高薹草 deng gao tai cao

Rhizome short. Culms tufted, 30–60 cm tall, trigonous, smooth, clothed at base with dark brown bladeless sheaths disintegrating into reticulate fibers. Leaves subequaling culm, blades linear, 3–4 mm wide, flat, stiff. Involucral bracts leaflike, surpassing inflorescence, sheathless. Spikes 3 or 4; terminal spike male, linear, 2–3 cm, subsessile; lateral spikes female, cylindrical, 3–5 cm, slightly loosely flowered, with erect short peduncles. Female glumes ferruginous, oblong-ovate, 3-veined costa excurrent into a mucro at obtuse apex. Utricles ferruginous, densely flecked, equaling glume but rather broad, patent, orbicular-ovate, much inflated, 2.5–3 mm, membranous, many veined, apex abruptly contracted into a very short beak, orifice entire. Nutlets loosely enveloped, orbicular or obovate, ca. 2 mm; style base not thickened; stigmas 2.

Watersides. Anhui, Jianguo [Japan].

429. *Carex wawuensis* Chü ex S. Yun Liang, Acta Phytotax. Sin. 37: 192. 1999.

瓦屋薹草 wa wu tai cao

Rhizome short. Culms up to ca. 50 cm tall, ca. 2 mm thick, acutely trigonous, smooth, clothed with purple-red sheaths at base. Leaves shorter than culm, blades linear, 5–6 mm wide, flat, margins scabrous. Upper involucral bracts setaceous, lower leaflike, sheathless. Spikes 8; upper 3 spikes male, occasionally with a few female flowers at base, linear, 20–60 × 1.5–2 mm, sessile or with very short peduncles; remaining spikes female, linear-cylindrical, 70–85 × ca. 3 mm, slightly densely flowered, lowest spike sometimes branched, with peduncle ca. 1 cm. Female glumes yellowish brown, broadly ovate, 1.8–2 mm, green 3-veined costa excurrent into a mucro. Utricles brown, ferruginous flecked, longer than glume, ovate, 2.2–2.5 mm, veined, apex abruptly contracted into a short beak, orifice entire. Nutlets stramineous, tightly enveloped, broadly ovoid, plano-convex, ca. 1.5 mm, base shortly stipitate, apex abruptly contracted into a short beak; style base not thickened; stigmas 2. Fl. and fr. Jun–Jul.

• C Sichuan (Hongya: Wawu Shan).

430. *Carex longispiculata* Y. C. Yang, Acta Biol. Plateau Sin. 3: 91. 1984.

长密花穗薹草 chang mi hua sui tai cao

Rhizome short. Culms tufted, 48–100 cm tall, acutely trigonous, smooth, clothed at base with dark brown bladeless sheaths. Leaves shorter than culm, blades linear, 3–5 mm wide, flat, margins scabrous, apex long acuminate; side of sheaths ferruginous, membranous. Lower involucral bracts leaflike, surpassing inflorescence, sheathless. Spikes 5–7; upper 2 or 3 spikes male, ferruginous, linear, 50–100 × ca. 2 mm, with short peduncles; remaining spikes female, long cylindrical, 60–130 × 4–6 mm, densely many flowered, with slender peduncles 1–3 cm, pendent. Female glumes light brown, lanceolate, 2.5–3 mm, green 3-veined costa excurrent into a mucro. Utricles green, equaling glume, ovate or ovate-lanceolate, inflated, 2.5–3 mm,

horizontally patent at maturity, membranous, base cuneate, apex gradually attenuate into an erect or curved, conic short beak, orifice shortly 2-toothed or entire. Nutlets castaneous, loosely enveloped, ovoid to broadly ovoid, biconvex, ca. 1.5 × 1.2 mm; style base not thickened; stigmas 2. Fl. and fr. May–Jul.

• Moist places, shady slopes, thickets along valleys; 1000–2800 m. Gansu, W Sichuan.

431. *Carex lancangensis* S. Yun Liang, Acta Phytotax. Sin. 37: 189. 1999.

澜沧薹草 lan cang tai cao

Rhizome indurate. Culms 150–160 cm tall, stout, 3–4 mm thick, acutely trigonous, smooth, slightly scabrous above, clothed at base with dark purple-red bladeless sheaths disintegrating into fibers. Leaves surpassing culm, blades broadly linear, 5–7 mm wide, flat, scabrous adaxially, revolute, stiff. Involucral bracts leaflike, lowest one surpassing inflorescence, sheathless, upper involucral bracts setaceous. Spikes 8 or 9, linear-cylindrical, 10–17 cm, lower 1 or 2 spikes branched, with peduncles 1–5 cm. Female glumes dark brown, oblong-lanceolate, 2.5–2.8 × ca. 1 mm, green 3-veined costa excurrent into a scabrous awn. Utricles yellow-brown, sparsely purple-red flecked, slightly longer than glume, ovate, ca. 3 mm, apex abruptly contracted into a beak, orifice 2-toothed. Nutlets dark brown, slightly loosely enveloped, ovoid to obovoid, plano-convex, 1.8–2 mm; style base not thickened; stigmas 2. Fl. and fr. Apr–May.

• Pond margins; ca. 2000 m. SW Yunnan.

432. *Carex jinfoshanensis* Tang & F. T. Wang ex S. Yun Liang, Acta Phytotax. Sin. 37: 191. 1999.

金佛山薹草 jin fo shan tai cao

Rhizome short, indurate. Culms 80–100 cm tall, 1.5–2 mm thick, acutely trigonous, smooth, clothed at base with purple-red sheaths disintegrating into reticulate fibers. Leaves shorter than culm, blades pale green, linear, 3.5–5 mm wide, flat, margins scabrous. Involucral bracts leaflike, surpassing inflorescence, sheathless. Spikes 5 or 6; upper 1 or 2 spikes male, linear, with peduncles; remaining spikes female, long cylindrical, 55–120 × 4–5 mm, lowest one with peduncle 1–3 cm. Female glumes dark brown, oblong-ovate, 2.5–3 mm, green 3-veined costa excurrent into a scabrous short awn. Utricles slightly longer than or equaling glume, ovate, 2.6–3 × ca. 1.5 mm, veined, apex abruptly contracted into a short beak, orifice emarginate. Nutlets loosely enveloped, obovoid, ca. 1.8 × 1.5 mm; style base not thickened; stigmas 2.

• Shady ditch sides; ca. 1200 m. Chongqing.

433. *Carex longpanlaensis* S. Yun Liang, Acta Phytotax. Sin. 37: 191. 1999.

龙盘拉薹草 long pan la tai cao

Rhizome short. Culms 65–90 cm tall, 2–3 mm thick, acutely trigonous, smooth, scabrous above, clothed at base with purple-brown bladeless sheaths. Leaves shorter than culm, blades broadly linear, 5–8 mm wide, upper margins scabrous,

apex acuminate. Lower 2 involucre bracts leaflike, surpassing inflorescence, sheathless, remaining bracts setaceous. Spikes 7–9; terminal spike gynaeandrous, 3.5–5 cm, with peduncle 7–10 mm; lateral spikes female, occasionally with male flowers at base, 18–50 × 4–6 mm, with peduncles 2–3 mm, slender, pendent. Female glumes dark brown, oblong, 1.5–2 mm, green 3-veined costa excurrent into a scabrous short awn. Utricles stramineous with purple-red flecks, longer than glume, ovate, 2.8–3 mm, apex contracted into a short beak, orifice entire or emarginate. Nutlets brown, rather loosely enveloped, oblong, biconvex, 1.3–1.5 mm; style base not thickened; stigmas 2. Fl. and fr. Jul–Oct.

- Forests; ca. 3000 m. Yunnan.

434. *Carex maximowiczii* Miquel, Ann. Mus. Bot. Lugduno-Batavi 2: 180. 1866.

乳突薹草 ru tu tai cao

Carex pruinosa Boott subsp. *maximowiczii* (Miquel) Kükenthal.

Rhizome short, rarely creeping. Culms tufted, 30–75 cm tall, acutely trigonous, slightly rigid, clothed at base with brown or red-brown bladeless sheaths usually disintegrating into fibers. Leaves shorter than or subequaling culm, blades linear, 3–4 mm wide, flat, margins revolute. Lowest involucre bract leaflike, surpassing inflorescence, upper ones setaceous or glumelike. Spikes 2 or 3; terminal spike male, narrowly cylindrical, with peduncle 2–4 cm; lateral spikes female, oblong-cylindrical or oblong, 2.5–3 × 0.8–0.9 cm, lowest one with slender peduncle 1.5–2 cm, pendent, upper peduncles much shorter, erect or pendent. Female glumes red-brown, oblong-lanceolate, 4–4.5 mm, green 3-veined costa forming a short awn at acuminate apex. Utricles red-brown, shorter than or equaling glume, broadly obovoid to broadly ovoid, biconvex, 4–4.2 × 3–3.5 mm, densely papillose and red-brown glandular, nearly nerveless except for 2 costas on edges, base broadly cuneate, shortly stipitate, apex abruptly contracted into a short beak, orifice entire. Nutlets brown, loosely enveloped, compressed orbicular, 2–2.2 mm; style long, base not thickened; stigmas 2. Fl. and fr. Jun–Jul.

Sunny slopes, moist places at watersides; 300–800 m. Liaoning, Shandong [Japan, Korea].

435. *Carex subcernua* Ohwi, Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 5: 278. 1930.

武义薹草 wu yi tai cao

Rhizome short. Culms tufted, 40–65 cm tall, acutely trigonous, smooth, scabrous above, clothed at base with dark brown bladeless sheaths, some sheaths disintegrating into reticulate fibers. Leaves longer than culm, blades linear, 3–5 mm wide, flat. Involucre bracts leaflike, lowest one surpassing inflorescence. Spikes 4; terminal spike male, narrowly cylindrical, ca. 50 × 2 mm; lateral spikes female, rarely with male flowers at base or apex, cylindrical, 45–50 × 4–5 mm. Female glumes ferruginous, oblong, ca. 2.8 mm, green 3-veined costa forming a short awn at subrounded apex. Utricles slightly longer or broader than glume, elliptic, ca. 3 × 2 mm, densely papillose,

conspicuously veined, base broadly cuneate, apex abruptly contracted into a short beak, orifice entire. Nutlets brown, slightly loosely enveloped, obovate, ca. 2 × 1.5 mm; stigmas 2. Fl. and fr. Apr.

Pond margins, slopes. Zhejiang [Japan].

436. *Carex pruinosa* Boott, Proc. Linn. Soc. London 1: 255. 1845.

粉被薹草 fen bei tai cao

Rhizome short. Culms tufted, 30–80 cm tall, slightly stiff, smooth, with red-brown sheaths at base. Leaves subequaling or shorter than culm, blades linear, 3–5 mm wide, flat, margins revolute. Involucre bracts leaflike, surpassing inflorescence. Spikes 3–5; terminal spike male, occasionally with several female flowers at apex, narrowly cylindrical, 20–30 mm, with slender peduncle; lateral spikes female, sometimes with male flowers at apex, cylindrical, 20–40 × 5–6 mm, with slender peduncles 1.5–3 cm, pendent. Female glumes densely ferruginous flecked, oblong-lanceolate or lanceolate, 2.8–3 mm, membranous, green 3-veined costa excurrent into a mucro. Utricles equaling or slightly longer than glume, oblong-ovate, ca. 2.5 × 2 mm, densely papillose and red-brown glandular, veined, base broadly cuneate, apex abruptly contracted into a short beak, orifice emarginate. Nutlets yellowish brown, slightly loosely enveloped, broadly ovate, biconvex, ca. 2 × 1.5 mm; stigmas 2. Fl. and fr. Mar–Jun.

Moist streambanks and grasslands in valleys; 100–2500 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hunan, Jiangsu, Jiangxi, Shandong, Sichuan, Yunnan, Zhejiang [Bhutan, India, Indonesia, N Thailand].

437. *Carex dimorpholepis* Steudel, Syn. Pl. Glumac. 2: 214. 1855.

二形鳞薹草 er xing lin tai cao

Carex cernua Boott.

Rhizome short. Culms tufted, 35–80 cm tall, acutely trigonous, scabrous above, clothed at base with red-brown to blackish brown bladeless sheaths. Leaves shorter than or equaling culm, blades linear, 4–7 mm wide, flat, margins slightly revolute. Lower 2 involucre bracts leaflike, surpassing inflorescence, upper ones setaceous. Spikes 5 or 6, approximate; terminal spike gynaeandrous, 40–60 mm; lateral spikes female, upper 3 with male flowers at base, cylindrical, 45–55 × 5–6 mm, with slender peduncles 1.5–6 cm, pendent. Female glumes pale, sparsely ferruginous flecked, obovate-oblong, 4–4.5 mm, membranous, green 3-veined costa excurrent into a scabrous awn ca. 2.2 mm at emarginate or truncate apex. Utricles red-brown, ferruginous flecked, longer than glume, elliptic or elliptic-lanceolate, ca. 3 mm, slightly compressed, densely papillose, base cuneate, apex abruptly contracted into a short beak, orifice entire; stigmas 2. Fl. and fr. Apr–Jun.

Moist soil of ditch sides and roadsides; 200–1300 m. Anhui, Gansu, Guangdong, Henan, Hubei, Jiangsu, Jiangxi, Liaoning, Shaanxi, Shandong, Sichuan, Zhejiang [India, Japan, Korea, Myanmar, Nepal, Sri Lanka, N Thailand, Vietnam].

438. *Carex phacota* Sprengel, Syst. Veg. 3: 826. 1826.镜子藁草 *jing zi tai cao**Carex shichiseitensis* Hayata.

Rhizome short. Culms tufted, 20–75 cm tall, acutely trigonous, clothed at base with yellowish brown or dark yellow-brown sheaths disintegrating into reticulate fibers. Leaves subequaling culm, blades linear, 3–5 mm wide, flat, margins revolute. Lower involucre bracts leaflike, conspicuously surpassing inflorescence, sheathless, upper ones setaceous. Spikes 3–5, approximate; terminal spike male, rarely with a few female flowers at apex, narrowly cylindrical, 45–65 × 1.5–2 mm, with peduncle; lateral spikes female, rarely a few male flowers at apex, long cylindrical, 2.5–6.5 × 3–4 mm, densely many flow-

ered, with slender, slightly scabrous peduncles, lowest one 2–3 cm, pendent. Female glumes pale, ferruginous flecked, oblong, ca. 2 mm (excluding awn), green 3-veined costa excurrent into a scabrous awn at truncate or emarginate apex. Utricles dark brown, longer than glume, broadly ovate or elliptic, biconvex, 2.5–3 × ca. 1.8 mm, densely papillose, nerveless except for 2 costas on edges, broadly convex, apex abruptly contracted into a short beak, orifice entire or emarginate. Nutlets brown, slightly loosely enveloped, suborbicular or broadly ovate, ca. 1.5 mm, densely papillose; style long, base not thickened; stigmas 2. Fl. and fr. Mar–May.

Moist soil of grasslands, ditches, streambanks, roadsides. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangsu, Jiangxi, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [India, Indonesia, Japan, Malaysia, Myanmar, Nepal, Sri Lanka, N Thailand, Vietnam].

44. *Carex* sect. *Tuminenses* Y. L. Chang, Fl. Pl. Herb. Chin. Bor.-Orient. 11: 207. 1976 [*“Tuminensis”*].图们藁草组 *tu men tai cao zu*Liang Songyun (梁松筠 *Liang Song-jun*); Tetsuo Koyama

Rhizome creeping. Culms stout, trigonous, scabrous above, clothed at base with purple-red bladeless sheaths disintegrating into reticulate fibers. Leaves flat, blades broadly linear, up to ca. 10 mm wide. Involucre bracts leaflike, surpassing inflorescence, sheathless. Spikes numerous; upper 1–6 spikes male; remaining spikes female, rather often with male flowers at apex, cylindrical, densely many flowered, with long peduncles, pendent. Female glumes lanceolate, green 1-veined costa excurrent into a mucro. Utricles plano-convex or biconvex, membranous, veined, apex shortly beaked, orifice entire. Nutlets obovate or oblong; stigmas 2.

Eight species: E Asia, Pacific islands (New Zealand), South America; one species in China.

439. *Carex tuminensis* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 18: 444. 1901.图们藁草 *tu men tai cao*

Rhizome creeping. Culms tufted, stout, trigonous, 60–100 cm tall. Leaves shorter than culm, blades widely linear, 6–10 mm wide, flat, margins slightly revolute. Involucre bracts leaflike, lower 3 surpassing inflorescence. Spikes numerous, usually 10–30, 2–4 from axil of involucre bract; upper 3–6 spikes male, sometimes some becoming androgynous and bearing several female flowers at base, cylindrical or clavate, 1.5–5.5 cm,

with slender, scabrous peduncles 1–12 cm, pendent. Female glumes pale brown or ferruginous, elliptic-lanceolate or lanceolate, 3–3.8 mm, green 3-veined costa excurrent into a mucro. Utricles brown-green with brown-purple flecks, shorter than glume, elliptic or ovate, biconvex, 2.5–3 mm, 4–6-veined, base stipitate, apex abruptly contracted into a short beak, orifice entire. Nutlets dark castaneous, tightly enveloped, oblong, ca. 2 mm; style base not thickened, curved; stigmas 2. Fl. and fr. Jun–Sep.

Margins of wet places; 1000–1800 m. Heilongjiang, Jilin [Korea, Russia (Far East)].

45. *Carex* sect. *Graciles* Kükenthal in Engler, Bot. Jahrb. Syst. 27: 516. 1899.细柄藁草组 *xi bing tai cao zu*

Dai Lunkai (戴伦凯); Tetsuo Koyama

Plants perennial, with short rhizome, rarely with long, slender rhizome, without stolons. Involucre bracts sheathed. Spikes few to numerous, single or several fasciculate in an involucre bract sheath or arranged in a raceme or panicle, usually bisexual, rarely unisexual or bisexual and unisexual, bisexual spikes androgynous, laxly or densely many flowered, rarely few flowered; peduncle slender. Utricles lenticular or plano-convex, several veined, base stipitate, beak orifice shortly 2-toothed. Nutlets compressed lenticular or plano-convex; style base slightly thickened; stigmas 2, rather long.

About 30 species: E, S, and SE Asia, Australia, Pacific islands; 21 species (13 endemic) in China.

1a. Utricles 4–7.5 mm (only ca. 3 mm in *C. lushanensis*), yellow-green or stramineous in maturity, glabrous or only scabrous on beak margins.

2a. Spikes oblong or oblong-cylindrical, 12–15(–18) mm; utricles densely disposed, orbicular or broadly elliptic (except beak), 3–4 mm; nutlets orbicular or broadly obovate.

3a. Female glumes lanceolate-ovate; utricles broadly elliptic (except beak), ca. 3 mm; nutlets punctulate 456. *C. lushanensis*

3b. Female glumes ovate or narrowly ovate; utricles orbicular (except beak), ca. 4 mm; nutlets not punctulate 457. *C. orbicularinucis*

- 2b. Spikes cylindric, 2–6.5 cm; utricles laxly disposed, elliptic, oblong, or lanceolate-oblong (except beak), 5–7.5 mm; nutlets elliptic or oblong.
- 4a. Spikes (4–)5–6.5 cm; utricles very laxly disposed, oblong-lanceolate, 6–7.5 mm; nutlets oblong, ca. 3 mm, yellowish in maturity 458. *C. sinodissitiflora*
- 4b. Spikes (1.5–)2–3(–4) cm; utricles slightly laxly disposed, elliptic, 5–6 mm; nutlets elliptic, 2–2.5 mm, brown in maturity.
- 5a. Leaf blades 2–4 mm wide; spikes single in an involucre bract sheath, sometimes branched at lower spikes; utricles ca. 6 mm; nutlets compressed plano-convex 459. *C. longipes*
- 5b. Leaf blades 5–8 mm wide; spikes 1–3 borne in an involucre bract sheath, usually branched; utricles ca. 5 mm; nutlets biconvex 460. *C. ereica*
- 1b. Utricles usually not exceeding 4 mm in length, sometimes up to 4.5 mm in few species, yellow-brown or reddish brown in maturity, hispidulous on both surfaces or only on margins, glabrous in few species.
- 6a. Utricles (except beak) oblong or narrowly oblong, 4–4.5 mm; stigmas longer than or equaling utricule; female glumes slightly longer than or equaling utricule.
- 7a. Female glumes narrowly ovate or lanceolate, awned or mucronate at apex, longer than utricule 440. *C. teinogyna*
- 7b. Female glumes oblong-ovate or narrowly oblong, mucous and without mucro at apex, nearly equaling or slightly shorter than utricule.
- 8a. Leaves ca. 1/3 length of culm; spikes laxly with female flowers; female glumes nearly equaling or slightly longer than utricule; stigmas persistent 441. *C. bilateralis*
- 8b. Leaves longer than or equaling culm; spikes densely with female flowers; female glumes equaling or slightly shorter than utricule; stigmas late deciduous 442. *C. hattoriana*
- 6b. Utricles (except beak) broadly ovate, elliptic, or suborbicular, not exceeding 4 mm; stigmas usually shorter than utricule, rarely slightly longer than utricule; female glumes shorter than utricule.
- 9a. Terminal spike male, lateral spikes bisexual and androgynous or unisexual and female.
- 10a. Lateral spikes bisexual, androgynous.
- 11a. Culms stout, 60–100 cm tall, clothed with dark brown bladeless sheaths on lowermost 30–50 cm; utricles dense 451. *C. stipitimus*
- 11b. Culms rather thin, 50–60(–70) cm tall, clothed with brown bladeless sheaths on lowermost ca. 10 cm; utricles lax 452. *C. autumnalis*
- 10b. Lateral spikes unisexual, female or 3–8 spikes fascicled in an involucre bract sheath, one of them male and others female.
- 12a. Culms rather stout; leaf blades 4–12 mm wide; 3–8 spikes fascicled in an involucre bract sheath, one of them male, occasionally with few female flowers at apex, remaining spikes female, peduncles hispidulous 453. *C. omeiensis*
- 12b. Culms rather thin; leaf blades 1–1.5 mm wide; spikes single, rarely 2-nate in an involucre bract sheath, terminal spike male, remaining spikes female, peduncles glabrous.
- 13a. Utricles hispidulous on both surfaces 454. *C. chui*
- 13b. Utricles glabrous 455. *C. pergracilis*
- 9b. Spikes numerous, bisexual, androgynous.
- 14a. Spikes arranged in a panicle or raceme; utricles 2–3(–4) mm, usually glabrous.
- 15a. Culms stout, 80–140 cm tall; spikes linear-cylindric and arranged in a panicle; female glumes ovate or narrowly ovate, apex acute 443. *C. henryi*
- 15b. Culms somewhat slender, 40–70 cm tall; spikes narrowly oblong or lanceolate, single or 3–6-nate in an involucre bract sheath, spikes or only lower spikes usually branched, arranged in a raceme; female glumes broadly ovate, apex obtuse or rounded.
- 16a. Utricles ca. 2.5 mm, oval in outline, apex abruptly contracted into a beak; female glumes ca. 1 mm, apex ending below beak 445. *C. gentilis*
- 16b. Utricles 3–4.5 mm, ovate-elliptic or broadly ovate, apex rather gradually narrowed to beak; female glumes 2–3.5 mm, apex reaching beak.
- 17a. Utricles ca. 3 mm, ovate-elliptic; spikes 1–2 cm 444. *C. mosoynensis*
- 17b. Utricles 3.5–4 mm, broadly ovate; spikes 1.5–3 cm 446. *C. nachiana*
- 14b. Spikes single or several fasciculate in an involucre bract sheath, not branched and not arranged in a panicle or raceme; utricles exceeding 3 mm, hispidulous on both surfaces, on veins and margins, or only on margins.
- 18a. Spikes more than 5 to many, usually 1–4 in an involucre bract sheath, 15–30 mm; utricles white hispidulous on both surfaces or on veins and margins.
- 19a. Spikes usually 1 or 2 in an involucre bract sheath, densely flowered; utricles broadly elliptic or orbicular (except beak), beak short, ca. 1/4 length of utricule, white hispidulous on both surfaces 447. *C. brunnea*

- 19b. Spikes usually 3 or 4 in an involucre bract sheath, laxly flowered; utricles elliptic (except beak), beak medium sized, ca. 1/3 length of utricle, hispidulous on veins and margins 448. *C. gongshanensis*
- 18b. Spikes 3–5, single in an involucre bract sheath, 8–15 mm; utricles only hispidulous on margins.
- 20a. Culms 10–35 cm tall, with slender stolons; utricles 3–3.5 mm, only hispidulous on margins of beak 449. *C. sendaica*
- 20b. Culms 35–100 cm tall, without stolons; utricles 4–4.5 mm, hispidulous on margins 450. *C. bodinieri*

440. *Carex teinogyna* Boott, Ill. Gen. *Carex* 1: 60. 1858.

长柱头藁草 chang zhu tou tai cao

Carex scabriculumis (Kükenthal) Ohwi; *C. teinogyna* var. *scabriculumis* Kükenthal.

Rhizome short. Culms densely tufted, 25–60(–90) cm tall, slender, triquetrous, slightly scabrous, clothed with few bladeless sheaths. Leaves shorter than or equaling culms, blades 2.5–3 mm wide, conduplicate at base, canaliculate on midrib surface, flattened at upper part, scabrous on veins and margins, basal sheaths usually disintegrating into fibers. Involucral bracts shorter than or equaling inflorescence, lower ones leaflike, upper ones setaceous, scabrous on margins, sheathed; sheaths 5–30 mm. Spikes numerous, 1–3 in an involucre bract sheath, androgynous, linear, 1–5 cm, male part shorter than female part, lower spikes sometimes branched, laxly flowered, slender or rather shortly pedunculate. Female glumes brown-yellow or brownish yellow, oblong-ovate, 4–5 mm, membranous, green 3-veined, apex acute, aristate or mucronate, sometimes mucicous, hispidulous on margins of awn. Utricles dark brown, shorter than glume, oblong or narrowly elliptic, plano-convex, ca. 4.5 mm, membranous, hispidulous, several veined, base abruptly contracted into a short stipe, apex gradually narrowed to a rather long beak, orifice minutely 2-toothed. Nutlets yellowish, tightly enveloped, elliptic, compressed biconvex, ca. 2 mm, sessile; style base rather thickened; stigmas 2, slender, persistent.

Lax forests in valleys, riversides, wet places at ditch sides or on rocks, sands; 500–2000 m. Anhui, Guangdong, Guangxi, Hunan, Jiangxi, Yunnan, Zhejiang [India, Japan, Korea, Myanmar, Vietnam].

441. *Carex bilateralis* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30: 380. 1911.

台湾藁草 tai wan tai cao

Carex asperinervis T. Koyama; *C. kotoensis* Hayata; *C. subteinogyna* Ohwi.

Rhizome short, without stolons. Culms densely tufted, 40–60 cm tall, triquetrous, scabrous on upper part of angles, clothed with dark brown sheaths at base, rudimentary sheaths usually disintegrating into fibers. Leaves basal, much shorter than culm, blades 2–3 mm wide, flat, ± stiff, scabrous on upper surface, rather shortly sheathed. Involucral bracts shorter than spike, lower ones shortly leaflike, upper ones setaceous, sheathed, lower sheaths slightly long. Spikes 5–8, 1–3 in an involucre bract sheath, upper spikes contiguous, lower spikes rather spaced, androgynous, narrowly lanceolate, 10–15 mm, male part shorter than female part, female part somewhat laxly flowered; peduncles mostly long and slender, upper peduncles rather short.

Female glumes yellow-brown, narrowly oblong, costate, margins white hyaline, apex acute or obtuse, mucicous. Utricles brown, suberect, equaling or slightly shorter than glume, elliptic, compressed trigonous, ca. 4 mm, membranous, thinly several veined, base abruptly contracted into a short stipe, margins hispidulous, apex gradually narrowed to a medium-sized beak, orifice 2-toothed. Nutlets tightly enveloped, elliptic, compressed biconvex, ca. 2 mm; style slightly short, base thickened; stigmas 2, rather long, persistent.

- Forests, wet places on mountain slopes; 1800–2000 m. Taiwan.

442. *Carex hattoriana* Nakai ex Tuyama, Bot. Mag. (Tokyo) 49: 508. 1935.

长叶藁草 chang ye tai cao

Rhizome short. Culms tufted, 60–100 cm tall, triquetrous, scabrous on upper part of angles. Leaves basal, longer than culm, blades 3–5 mm wide, conduplicate proximally and distally gradually flattened, sheathed at base; sheaths dark brown, usually split. Involucral bracts sheathing, blades of lowest involucre bract leaflike, surpassing its subtending spike, upper blades setaceous, uppermost involucre bract sheathlike and shorter than spike. Spikes more than 10, 1–3 in an involucre bract sheath, sometimes branched on lower spikes, remote and upward rather congregate, androgynous, male part longer than female part, narrowly lanceolate, 1.5–3 cm, rather densely with female flowers; lower spikes with slender peduncles, upper spikes with rather short peduncles. Female glumes ferruginous-brown, oblong-ovate, ca. 4 mm, membranous, thinly several veined, apex acuminate. Utricles reddish brown, suberect, equaling or slightly longer than glume, elliptic, compressed trigonous, 4–4.5 mm, membranous, thinly several veined abaxially, base abruptly contracted into a short stipe, apex gradually narrowed to a slightly long beak, orifice 2-toothed. Nutlets tightly enveloped, elliptic, lenticular; style base slightly thickened; stigmas 2, ± long.

- Forests or forest margins at ± low elevations. Taiwan [Japan].

443. *Carex henryi* (C. B. Clarke) L. K. Dai, Fl. Reipubl. Popularis Sin. 12: 439. 2000.

亨氏藁草 heng shi tai cao

Carex longicruris Nees var. *henryi* C. B. Clarke, J. Linn. Soc., Bot. 36: 295. 1903.

Rhizome short, ligneous, without stolons. Culms densely tufted, 80–140 cm tall, slightly stout, obtusely trigonous, smooth. Leaves basal and cauline, shorter than culm, blades 3–4 mm wide, conduplicate at base and distally gradually flattened, scabrous on both surfaces and margins, long sheathed; sheaths near base black-brown. Involucral bracts sheathed,

lower involucre bract blades leafy, upper blades setaceous; sheaths 0.5–6 cm. Spikes numerous, loosely arranged in a panicle, androgynous, male part shorter than female part, linear-cylindric, 10–25 mm, with few male flowers at apex, loosely with female flowers at lower part, slender and rather long pedunculate. Female glumes brown-yellow, ovate, ca. 2 mm, membranous, green costate, apex acute, muticous. Utricles yellow-green, suberect, longer than glume, elliptic, plano-convex, ca. 3 mm, 5–7-veined abaxially, base abruptly contracted into a short stipe, apex gradually narrowed to a medium-sized beak, beak laxly ciliate on margins, ca. 1/3 length of utricle, orifice shortly 2-toothed, usually purple-brown on margins. Nutlets tightly enveloped, elliptic, compressed biconvex, ca. 1.7 mm; style equaling or longer than utricle, base slightly thickened; stigmas 2. Fl. and fr. Aug–Oct.

• Ditch sides, riversides, paddy field margins, roadsides on mountain slopes, wet places in forests; 500–3000 m. Anhui, Guizhou, Hubei, Shaanxi, Sichuan, Yunnan, Zhejiang.

444. *Carex mosoyensis* Franchet, Bull. Soc. Philom. Paris, sér. 8, 7: 31. 1895.

滇西薹草 dian xi tai cao

Rhizome elongate, creeping. Culms loosely tufted, 30–40 cm tall, slender, triquetrous, smooth. Leaves shorter than or subequaling culm, blades ca. 2 mm wide, slightly revolute on lower margins, upward gradually flattened, scabrous on both surfaces and margins; sheaths less than 5 cm, black-brown, membranous part usually splitting to base. Involucral bracts sheathed, lower involucre bract blades linear, upper blades setaceous, sheaths 5–20 mm. Spikes few, remote, distance between 2 spikes up to 8 cm, single in an involucre bract sheath, androgynous, narrowly lanceolate, 1–2 cm, laxly few flowered. Female glumes yellowish brown, broadly ovate, ca. 2 mm, membranous, 1–3-veined, apex obtuse or rounded. Utricles yellow-brown, suberect, longer than glume, elliptic-ovate or ovate, compressed plano-convex, ca. 3 mm, membranous, glabrous, thinly 7-veined abaxially, base abruptly contracted into a short stipe, apex abruptly narrowed to a short beak ca. 1 mm, orifice shortly 2-toothed. Nutlets yellowish, tightly enveloped, elliptic, compressed plano-convex, ca. 1.5 mm; style base slightly thickened; stigmas 2, short. Fl. and fr. Aug–Sep.

• Forests, wet places; ca. 1600 m. Sichuan, Yunnan.

445. *Carex gentilis* Franchet, Bull. Soc. Philom. Paris, sér. 8, 7: 84. 1895.

亲族薹草 qin zu tai cao

Rhizome short. Culms densely tufted, 25–70 cm tall, slender, trigonous, smooth. Leaves shorter than culm, blades (1.5–)2–3(–4.5) mm wide, flat, scabrous on both surfaces and margins, sheathed; sheaths usually split. Involucral bracts sheathed, lower 1 or 2 leaflike, upper blade setaceous, slightly scabrous; sheaths 5–20 mm, membranous part brown, slightly split. Spikes numerous, 3–6 in an involucre bract sheath, lower spikes usually branched, androgynous, male part shorter than female part, male part of terminal spike longer, narrowly oblong, 8–12 mm, female part loosely few flowered. Female glumes brown, broadly ovate or oblong-lanceolate, 1–2 mm,

membranous, 1-costate, margins white hyaline and ± erose, apex acute or obtuse, muticous. Utricles reddish brown, suberect, longer than glume, elliptic, plano-convex, 2.5–3(–4) mm, membranous, glabrous, thinly 5–7-veined, base cuneate, shortly stipitate, apex abruptly narrowed to a medium-sized beak, orifice shortly 2-toothed. Nutlets yellowish, tightly enveloped, elliptic, plano-convex, ca. 1.5 mm; style base slightly thickened; stigmas 2, short. Fl. and fr. Aug–Oct.

• Forests, ditch sides, riversides, mountain slopes, rock crevices, grasslands; 1300–2200 m. Chongqing, Guizhou, Jiangxi, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan.

1a. Female glumes broadly ovate, ca. 1 mm.

2a. Leaf blades 2–3 mm wide; utricles ca. 2.5 mm 445a. var. *gentilis*

2b. Leaf blades ca. 4.5 mm wide; utricles ca. 3 mm 445b. var. *intermedia*

1b. Female glumes oblong-lanceolate, 1.5–2 mm.

3a. Leaf blades ca. 1.5 mm wide; female glumes ca. 1.5 mm; utricles 3–4 mm, beak ca. 1/3 length of utricle 445c. var. *macrocarpa*

3b. Leaf blades 2–3 mm wide; female glumes ca. 2 mm; utricles ca. 3 mm, beak less than 1/3 length of utricle 445d. var. *nakaharai*

445a. *Carex gentilis* var. *gentilis*

亲族薹草(原变种) qin zu tai cao (yuan bian zhong)

Leaf blades 2–3 mm wide. Female glumes broadly ovate, ca. 1 mm. Utricles ca. 2.5 mm. Fl. and fr. Aug–Oct.

• Forests, ditch sides, riversides; ca. 1500 m. Jiangxi, Sichuan, Yunnan (Qingfeng Shan).

445b. *Carex gentilis* var. *intermedia* Tang & F. T. Wang ex Y. C. Yang, Fl. Xizang. 5: 408. 1987.

宽叶亲族薹草 kuan ye qin zu tai cao

Leaf blades ca. 4.5 mm wide. Female glumes broadly ovate, ca. 1 mm. Utricles ca. 3 mm, beak ca. 1/3 length of utricle. Fl. and fr. Aug–Oct.

• Mountain slopes, ditch sides, rock crevices; 1300–2000 m. Chongqing (Chengkou), Guizhou, Shaanxi, Xizang (Bomi), Yunnan.

445c. *Carex gentilis* var. *macrocarpa* Tang & F. T. Wang ex L. K. Dai, Acta Phytotax. Sin. 37: 188. 1999.

大果亲族薹草 da guo qin zu tai cao

Leaf blades ca. 1.5 mm wide. Female glumes oblong-lanceolate, ca. 1.5 mm. Utricles 3–4 mm, beak ca. 1/3 length of utricle. Fl. and fr. Aug–Sep.

• Mountain slopes, ditch sides, rock crevices, grasslands; 1300–1800 m. Chongqing (Chengkou).

445d. *Carex gentilis* var. *nakaharai* (Hayata) T. Koyama, Jap. J. Bot. 15: 179. 1956 [*“nakaharai”*].

短喙亲族薹草 duan hui qin zu tai cao

Carex nakaharae Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30: 387. 1911 [“*nakaharai*”]; *C. gentilis* subsp. *nakaharae* (Hayata) T. Koyama.

Leaf blades 2–3 mm wide. Female glumes oblong-lanceolate, ca. 2 mm. Utricles ca. 3 mm, beak short, less than 1/3 length of utricule. Fl. and fr. Aug–Oct.

- Mountain slopes; ca. 2200 m. Taiwan.

446. *Carex nachiana* Ohwi, Acta Phytotax. Geobot. 2: 103. 1933.

日南臺草 *ri nan tai cao*

Rhizome short, without stolons. Culms slightly loosely tufted, ca. 70 cm tall, stiff, triquetrous, scabrid on upper part or smooth, 1- or 2-leaved. Leaves ± stiff, blades 2.5–4 mm wide, flat, sheaths at base dusky brown, usually not split. Involucral bracts long sheathed, lower involucral bract blades leaflike. Spikes numerous, 1–3 borne in an involucral bract sheath, androgynous, cylindric, 1.5–3 cm, loosely many flowered; peduncle slightly exerted or included in involucral bract sheath. Female glumes brownish, ovate-oblong, ca. 3.5 mm, thinly 1-costate, apex acute but mucicous. Utricles brown, suberect, subequaling or slightly longer than glume, broadly ovate or elliptic, compressed biconvex, 3.5–4 mm, membranous, glabrous except scabrous on margins, several veined, base abruptly contracted into a short stipe, apex gradually narrowed to a medium-sized beak, orifice 2-toothed. Nutlets tightly enveloped, orbicular-ovate, compressed biconvex, ca. 2 mm; style strict and short, base thickened; stigmas 2, ± long.

Forests on mountain slopes. Jiangsu, Taiwan, Zhejiang [Japan].

447. *Carex brunnea* Thunberg in Murray, Syst. Veg., ed. 14, 844. 1784.

褐果臺草 *he guo tai cao*

Carex brunnea var. *nakiri* Ohwi; *C. sendaica* Franchet var. *nakiri* (Ohwi) Koyama.

Rhizome short, without stolons. Culms densely tufted, slender, 40–70 cm tall, triquetrous, smooth, many leaved at base. Leaves longer or shorter than culm, blades 2–3 mm wide, conduplicate proximally, distally gradually flattened, scabrous on both surfaces and margins, sheathed; sheaths short, usually less than 5 cm, splitting at membranous part. Involucral bracts sheathed, lower involucral bracts blades leaflike, upper blades setaceous; sheaths 7–20 mm, brownish green. Spikes few to more than 10, usually 1 or 2 in an involucral bract sheath, not branched, distance between 2 spikes up to more than 10 cm, spikes androgynous, male part much shorter than female part, cylindric, 1.5–3 cm, densely many flowered, pedunculate; peduncles short at upper part, long at lower part. Female glumes yellowish brown, shortly brown striate, ovate, ca. 2.5 mm, membranous, 3-veined, apex acute or obtuse, mucicous. Utricles brown, suberect, longer than glume, elliptic or suborbicular, compressed plano-convex, 3–3.5 mm, membranous, thinly 9-veined abaxially, white hispidulous on both surfaces, base abruptly contracted into a short stipe, apex abruptly narrowed to a short beak, beak less than 1 mm, 2-toothed at orifice. Nutlets yellow-brown, tightly enveloped, suborbicular, compressed bi-

convex, base estipitate; style base slightly thickened; stigmas 2. Fl. and fr. Jun–Oct.

Mountain slopes, forests or among shrubs in valleys, riversides, shady places at roadsides, sunny places at watersides; 200–1800 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [India, Japan, Korea, Nepal, Philippines, Vietnam; Australia].

448. *Carex gongshanensis* Tang & F. T. Wang ex Y. C. Yang, Fl. Xizang. 5: 404. 1987.

貢山臺草 *gong shan tai cao*

Rhizome short and thick, ligneous. Culms tufted, 70–80 cm tall, slender, obtusely trigonous, smooth. Leaves basal and cauline, basal leaves much shorter than culm, cauline leaves rather long, blades 2–3 mm wide, flat, scabrous on veins and margins; sheaths up to 4 cm. Involucral bracts sheathed, lower involucral bract blades leaflike, upper blades setaceous, uppermost bract nearly bladeless; sheaths 0.5–1 cm. Spikes numerous, usually 3 or 4 in an involucral bract sheath, androgynous, male part shorter than female part, with few male flowers at upper part, loosely more than 10-flowered at lower part, linear, 12–25 mm, thinly pedunculate. Female glumes brown, ovate, ca. 2.8 mm, membranous, 1-costate, apex acute, mucicous or sometimes mucronate. Utricles brown, suberect, longer than glume, elliptic or narrowly elliptic, plano-convex, 3–3.5 mm, membranous, thinly several veined, loosely white hispidulous on veins and margins, base gradually narrowed to a short stipe, apex attenuate into a slightly long beak ca. 1.5 mm, orifice 2-toothed. Nutlets yellowish, tightly enveloped, elliptic, compressed biconvex, ca. 1.5 mm; style shorter than utricule, base slightly thickened; stigmas 2. Fl. and fr. Aug–Sep.

- Mountain slopes, forests; ca. 2500 m. Xizang (Bomi), Yunnan (Gongshan).

449. *Carex sendaica* Franchet, Bull. Soc. Philom. Paris, sér. 8, 7: 42. 1895.

仙台臺草 *xian tai tai cao*

Rhizome slender, stoloniferous. Culms densely tufted, 10–35 cm tall or more, slender, triquetrous, smooth, scabrid near apex. Leaves basal, shorter than or equaling culm, blades 2–3 mm wide, flat or sometimes slightly conduplicate, scabrous on margins, sheathed; sheaths 2–3 cm, usually splitting. Involucral bracts sheathed, lower blades linear, upper blades setaceous; sheaths 5–10 mm, lateral part of sheath membranous, brown. Spikes 3 or 4(–8), single in an involucral bract sheath, space up to 5.5 cm, uppermost 2 ± contiguous, androgynous, terminal spike with male part longer than female part, lateral spikes with female part longer than male part, oblong, 8–15 mm, female part slightly densely few to more than 10-flowered; peduncles thin. Female glumes reddish brown, ovate, 2–2.5 mm, membranous, 3-veined, apex acute, mucicous. Utricles reddish brown, suberect, longer than glume, broadly elliptic or broadly ovate, plano-convex, ca. 3 mm, membranous, thinly several veined abaxially, base abruptly contracted into a short stipe, apex abruptly narrowed to a short beak, beak less than 1 mm, hispidulous on margins, orifice shortly 2-toothed. Nutlets yellowish, tightly enveloped, suborbicular, compressed plano-con-

vex, ca. 2 mm, base estipitate; style base slightly thickened; stigmas 2, exerted part longer than utricule. Fl. and fr. Aug–Oct.

Thickets, grasslands, wet places on mountain slopes, ditch sides in valleys, rock crevices, field banks; 100–1900 m. Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Zhejiang [Japan].

- 1a. Culms 10–35 cm tall; spikes 3 or 4, oblong-cylindric 449a. var. *sendaica*
 1b. Culms more than 35 cm tall; spikes up to 8, shortly cylindrical 449b. var. *pseudosendaica*

449a. *Carex sendaica* var. *sendaica*

仙台臺草(原变种) xian tai tai cao (yuan bian zhong)

Carex brunnea Thunberg var. *sendaica* (Franchet) Kükenthal; *C. lenta* D. Don var. *sendaica* (Franchet) T. Koyama; *C. longistolon* C. B. Clarke ex Franchet.

Culms 10–35 cm tall. Spikes 3 or 4, oblong-cylindric. Fl. and fr. Aug–Oct.

Thickets, grasslands, wet places on mountain slopes, ditch sides in valleys, rock crevices; 100–1900 m. Guizhou, Hubei, Jiangsu, Jiangxi, Shaanxi, Sichuan, Zhejiang [Japan (Sendai)].

449b. *Carex sendaica* var. *pseudosendaica* T. Koyama, J. Jap. Bot. 29: 46. 1954.

多穗仙台臺草 duo sui xian tai tai cao

Culms more than 35 cm tall. Spikes up to 8, shortly cylindrical. Fl. and fr. Aug–Sep.

Field banks, thickets; 1000–1700 m. Guizhou, Henan, Hunan, Jiangsu, Sichuan [Japan].

450. *Carex bodinieri* Franchet, Bull. Soc. Philom. Paris, sér. 8, 7: 85. 1895.

滨海臺草 bin hai tai cao

Rhizome short, ligneous, without stolons. Culms tufted or loosely tufted, slightly slender, 35–100 cm tall, triquetrous, smooth, clothed at base with sheaths, sheaths ± disintegrating into fibers. Leaves usually basal, rarely cauline, shorter than culm, blades 2–4 mm wide, flat, ± stiff, scabrous on both surfaces and margins; sheaths short, usually splitting to base. Involucral bracts sheathed, lower blades leafy, upper blades linear; sheaths 0.5–4.5 cm, upper part brownish green. Spikes numerous, 1–3 in an involucral bract sheath, usually 2 or 3 racemes composed of several spikes in lower involucral bract sheaths, distance of lower part up to 18 cm, upper part slightly contiguous, spikes androgynous, male part much shorter than female part, rarely terminal spike male, narrowly cylindrical or sublancoolate, (1–)1.5–3.5 cm, pedunculate. Female glumes brown, sometimes brownish and brown striate at middle, broadly ovate, ca. 3 mm, membranous, green 3-veined, apex acute, muticous. Utricle red-brown, suberect, slightly longer than glume, broadly elliptic, compressed plano-convex, ca. 4 mm, membranous, thinly 9-veined abaxially, base abruptly contracted into a short stipe, upper margins loosely ciliate, apex abruptly contracted into a medium-sized beak, orifice 2-toothed. Nutlets yellowish, tightly enveloped, elliptic, compressed plano-convex, ca. 2 mm; style base slightly thickened; stigmas 2, shorter than utricule. Fl. and fr. Mar–Oct.

Grasslands on mountain slopes, forests or shady places in valleys. Anhui, Fujian, Guangdong, Hunan, Jiangsu, Zhejiang [Japan].

451. *Carex stipitinux* C. B. Clarke ex Franchet, Bull. Soc. Philom. Paris, sér. 8, 7: 31. 1895.

柄果臺草 bing guo tai cao

Carex brunnea Thunberg var. *stipitinux* (C. B. Clarke ex Franchet) Kükenthal.

Rhizome short, ligneous, without stolons. Culms tufted, slightly slender, 60–100 cm tall, triquetrous, smooth, clothed with dark brown and bladeless sheaths at base, most up to 15 cm. Leaves shorter than or nearly equaling culm, blades 4–5 mm wide, ± stiff, scabrous on midrib of abaxial surface and margins, long sheathed; sheaths most up to 11 cm, membranous part of sheaths eventually disintegrating into reticulate fibers. Involucral bracts sheathed, lowest involucral bract blade leaf-like, upper blades needle-shaped or setaceous, shorter than inflorescence, scabrous near apex. Spike numerous, 1–3 in an involucral bract sheath, usually 2 or 3 racemes composed of several spikes borne in lower involucral bract sheaths, terminal spike male, remaining spikes androgynous, male part much shorter than female part, densely many flowered, linear-cylindric, 10–28 mm, thinly pedunculate. Female glumes yellowish brown, broadly ovate, ca. 2.5 mm, membranous, green 1-costate, white hyaline on apex, apex obtuse or acute, muticous. Utricles green-yellow, suberect, longer than glume, elliptic, plano-convex, ca. 3 mm, white hispidulous on upper part, thinly 9–11-veined, base abruptly contracted into a short stipe, apex abruptly contracted into a short beak less than 1 mm, orifice slightly splitting into 2 teeth. Nutlets brown, tightly enveloped, elliptic, compressed biconvex, ca. 2 mm, base estipitate; style base slightly thickened; stigmas 2. Fl. and fr. Jun–Sep.

• Lax or dense forests or thickets on mountain slopes or valleys, shady places at roadsides; 200–1500 m. Anhui, Gansu, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Zhejiang.

452. *Carex autumnalis* Ohwi, Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 5: 251. 1930.

秋生臺草 qiu sheng tai cao

Rhizome short. Culms tufted, slender, 50–60(–70) cm tall, triquetrous, smooth. Leaves basal, many, shorter than culm, blades 2–3 mm wide, ± stiff, conduplicate proximally, distally flattened, scabrous on margins, with sheaths 4–5 cm, membranous part usually splitting, few dark brown and bladeless sheathed at base. Involucral bracts sheathed, lower involucral bract blades linear or setaceous, upper bracts bladeless. Spike 3–6 or more; terminal spike male, linear, 2–3 cm; remaining spikes androgynous, male part very short, sometimes only with 1 or 2 male flowers, rarely without male flower, loosely with female flowers, cylindrical, 1–2.5 cm, thinly pedunculate. Female glumes yellowish brown, ovate, ca. 2.5 mm, membranous, 1-costate, apex obtuse or acute, sometimes mucronate. Utricles chestnut-brown, obliquely patent, longer than glume, broadly elliptic, plano-convex, ca. 3.5 mm, membranous, thinly several veined, sparsely hispidulous on veins, base cuneate, shortly stipitate, apex gradually narrowed into a medium-sized beak, orifice emarginate. Nutlets elliptic, compressed plano-convex,

ca. 1.8 mm; style short, base thickened; stigmas 2, medium sized. Fl. and fr. Sep–Oct.

Shady places in ravines. Fujian, Zhejiang [Japan].

453. *Carex omeiensis* Tang, Bull. Fan Mem. Inst. Biol. 3: 361. 1932.

峨眉藁草 e mei tai cao

Carex omeiensis var. *multifasciata* Q. S. Wang.

Rhizome rather long, ligneous, horizontal. Culms laxly tufted, 40–65 cm tall, triquetrous, smooth, scabrid nearly apex, clothed at base with dark brown and bladeless sheaths. Leaves slightly short, equaling or slightly longer than culm, blades 0.4–1.2 cm wide, flat, ± stiff, smooth on adaxial surface, scabrous on abaxial surface and margins; sheaths 5–10 cm, dark brown, membranous part of sheaths usually splitting to base. Involucral bracts sheathed, lower involucral bract blades leaflike or setaceous, usually shorter than spike, upper bracts bladeless, sheaths 5–7 mm, brownish, white hyaline on margins of mouth. Spikes numerous, 3–8 spikes fascicled in an involucral bract sheath; terminal spike male; remaining spikes female, densely arranged in a raceme near apex, cylindrical, 10–20 mm, sparsely few to more than 10-flowered, thinly pedunculate. Female glumes brownish yellow, ovate, ca. 2 mm, membranous, 1-costate. Utricles reddish brown, suberect, longer than glume, elliptic, plano-convex, 2.5–3 mm, membranous, glabrous, 7–9-veined abaxially, base abruptly contracted into a short stipe, apex gradually narrowed into a short beak less than 1 mm, orifice emarginate. Nutlets yellowish brown, tightly enveloped, ovate-orbicular, plano-convex, ca. 1.5 mm, base estipitate; style persistent, base slightly thickened; stigmas 2. Fl. and fr. May–Aug.

• Watersides in valleys, roadsides on mountain slopes, wet places in forests; ca. 1800 m. Hubei, NW Hunan, Shaanxi, Sichuan (Emei Shan).

454. *Carex chui* Nelmes, Kew Bull. 3: 108. 1948 [*“chuii”*].

曲氏藁草 qu shi tai cao

Rhizome short. Culms tufted, 5–20 cm tall, slender, trigonous, smooth. Leaves basal, shorter than culm, blades 1–1.5 mm wide, flat, smooth on both surfaces, scabrous on margins, sheathed; sheaths up to 2 cm, obliquely truncate at mouth, membranous on margins; outer sheaths usually splitting to base. Involucral bracts sheathed, lower involucral bract blades linear, longer than spike, upper blades setaceous, shorter than spike; sheaths 5–10 mm, brownish, membranous on margin of mouth. Spikes 3–5, rarely 1 or 2, slightly contiguous, most distance ca. 4 cm; terminal spike male, linear, 5–14 mm; remaining spikes female, narrowly oblong or narrowly cylindrical, 8–13 mm, sparsely few flowered. Female glumes yellowish brown, broadly ovate, ca. 2.5 mm, membranous, conspicuously 1–3-veined, apex obtuse or acute, usually muticous. Utricles castaneous, obliquely patent, slightly longer than or equaling glume, broadly elliptic or suborbicular, compressed plano-convex, ca. 2.5 mm, membranous, densely white hispidulous, thinly 7-veined abaxially, base abruptly narrowed into a short stipe, apex abruptly narrowed into a short beak only ca. 0.5 mm, orifice emarginate. Nutlets yellowish, tightly enveloped,

broadly elliptic or broadly obovate, compressed biconvex, ca. 1.5 mm, base estipitate; style base slightly thickened; stigmas 2, shorter than utricle. Fl. and fr. Jun–Jul.

• Streamsides; ca. 2500 m. Sichuan (Baoping).

455. *Carex pergracilis* Nelmes, Kew Bull. 3: 107. 1948.

纤细藁草 xian xi tai cao

Rhizome short. Culms densely tufted, 10–25 cm tall, slender, triquetrous, smooth. Leaves usually basal, much shorter than culm, blades 1–2 mm wide, smooth on both surfaces, only scabrid on upper margins, sheathed; sheaths less than 2 cm, brown, eventually membranous part usually disintegrating into fibers. Involucral bracts sheathed, lower blades linear, upper blades setaceous; sheaths 5–8 mm, brownish, membranous at margin of mouth. Spikes few, remote, spaced up to 5 cm, usually singular in an involucral bract sheath; terminal spike male, linear, 7–8 mm; lateral spikes female, oblong, ca. 5 mm, sparsely few flowered. Female glumes yellowish brown and with brown striae, ovate, ca. 2 mm, membranous, 1-costate, apex acute and muticous. Utricles dark brown, suberect, longer than glume, elliptic, compressed plano-convex, ca. 2.8 mm, membranous, thinly 7-veined abaxially, base cuneate, shortly stipitate, apex gradually narrowed into a medium-sized to long beak, orifice shortly 2-toothed. Nutlets brown, tightly enveloped, obovate-elliptic, compressed biconvex, ca. 1.8 mm; style medium sized in length, base slightly thickened; stigmas 2, rather short. Fl. and fr. Jun–Aug.

• Forest margins, roadsides of mountain slopes, wet places in rock crevices; 1800–2500 m. Sichuan (Tianquan), Yunnan.

456. *Carex lushanensis* Kükenthal, Acta Horti Gothob. 5: 47. 1930.

芦山藁草 lu shan tai cao

Rhizome short, ligneous, obliquely ascending. Culms ca. 30 cm tall, trigonous, smooth, clothed with dark brown and remnant sheaths at base. Leaves shorter than culm, blades ca. 3 mm wide, flat. Involucral bracts long sheathed, lower blades leaflike, upper blades setaceous, shorter than spike. Spikes 4 or 5, singular in an involucral bract sheath, lower spikes remote, upper spikes ± contiguous, androgynous, male part short, oblong-cylindrical, 12–15 mm, densely many flowered; lower spikes long pedunculate, upper spikes shortly pedunculate. Female glumes pallid, lanceolate-ovate, greenish 3-veined, apex acuminate. Utricles greenish, suberect, longer than glume, broadly elliptic, plano-convex, ca. 3 mm, membranous, glabrous, several veined, base abruptly contracted, apex abruptly narrowed into a long beak, beak sparsely hispidulous on margins or subsmooth, 2-toothed at orifice. Nutlets tightly enveloped, subobovate, punctate; style base slightly thickened; stigmas 2, short.

• About 1700 m. C and S Sichuan (Lushan, Xichang).

No specimens have been seen by the present authors. The description is written according to the photograph of the isotype and the original description.

457. *Carex orbicularinucis* L. K. Dai, Acta Phytotax. Sin. 37: 183. 1999.

圆坚果藁草 yuan jian guo tai cao

Rhizome slightly elongate. Culms loosely tufted, 35–55 cm tall, medium thick, obtusely trigonous, smooth, several brown and bladeless sheathed at base, sheaths eventually disintegrating into fibers. Leaves sheathed, lower blades shorter than culm, upper blades nearly equaling culm, blades 3–4 mm wide, flat, ± stiff, scabrous on veins and margins; sheaths 3–4 cm. Involucral bracts sheathed or upper 2 or 3 nearly not sheathed, longer than spikes. Spikes 3–5, androgynous, with few male flowers at upper part, densely with many female flowers at lower part, oblong or broadly ovate, 0.8–1.5 cm; lowermost spike with a ca. 7 cm peduncle, upper 2 or 3 spikes almost sessile. Female glumes pallid or pale cinnamon-colored, ovate or narrowly ovate, ca. 3 mm, membranous, green 3-veined, apex acuminate, mucronate or aristate. Utricles yellowish green or stramineous, longer than glume, suberect, suborbicular, plano-convex, ca. 4 mm, membranous, glabrous, 9–13-veined abaxially, base broadly cuneate, apex abruptly contracted into a medium-sized to long beak, orifice shortly 2-toothed. Nutlets stramineous, tightly enveloped, broadly obovate or suborbicular, plano-convex, ca. 2 mm, base broadly cuneate; style persistent, base thickened; stigmas 2. Fl. and fr. Jun–Sep.

• Thickets on mountain slopes or in ravines, dry places in grasslands, rarely at watersides, in ditches; 1700–1900 m. S Sichuan, C Yunnan (Kunming).

458. *Carex sinodissitiflora* Tang & F. T. Wang ex L. K. Dai, Acta Phytotax. Sin. 32: 177. 1994 [“*sino-dissitiflora*”].

华疏花藁草 hua shu hua tai cao

Rhizome short, ligneous. Culms densely tufted, 20–55 cm tall, rather slender, triquetrous, smooth, clothed with few bladeless sheaths eventually disintegrating into fibers. Leaves shorter than culm, blades 3–6 mm wide, rather soft, smooth on both surfaces, denticulate on veins and margins; sheaths 3–4 cm, brownish. Involucral bracts leaflike, much longer than spike, sheaths 2–2.5 cm. Spikes 4 or 5, androgynous, male part shorter than female part, narrowly cylindrical, (4–)5–6 cm, sparsely more than 10-flowered; lower spikes remote, peduncle slender, up to 5 cm, slightly pendent; upper spikes rather contiguous, shortly pedunculate or nearly sessile. Female glumes green at middle, pale stramineous laterally, oblong-lanceolate or ovate-lanceolate, 3.5–4 mm, 1-costate, apex acuminate, aristate or mucronate. Utricles yellowish green, longer than glume, suberect, oblong-lanceolate, plano-convex, 6–7.5 mm, membranous, glabrous, several veined abaxially, base gradually narrowed into a slightly long stipe, apex gradually narrowed into a long beak, beak smooth on margins, rather long 2-toothed at orifice. Nutlets yellowish, tightly enveloped, oblong, compressed plano-convex, ca. 3 mm, base shortly stipitate, apex mucronate; style medium sized to long, base slightly thickened; stigmas 2. Fl. and fr. Apr–Jun.

• Wet places on mountain slopes; ca. 1900 m. C Yunnan (Kunming).

459. *Carex longipes* D. Don ex Tillich & Taylor, Philos. Mag. J. 62: 455. 1823.

长穗柄藁草 chang sui bing tai cao

Rhizome slightly elongate, ligneous, clothed with dark

brown sheaths eventually disintegrating into fibers. Culms tufted or loosely tufted, 10–70 cm tall, rather thin, triquetrous, smooth on lower part, scabrous on upper part. Leaves basal, much shorter than culm, blades 2–4 mm wide, flat, scabrous on both surfaces and margins; sheaths less than 2 cm, usually splitting. Involucral bracts sheathed, lower involucral bracts leaflike, upper ones setaceous, uppermost 1 or 2 nearly bladeless; sheaths 0.5–4.5 cm. Spikes 3–5, single in an involucral bract sheath, remote, spaced up to 18 cm, upper spikes rather contiguous, usually not branched, androgynous, cylindrical, 2–4 cm, with few male flowers on upper part, sparsely with more than 10 female flowers on lower part; lower spikes long pedunculate, upper spikes shortly pedunculate. Female glumes yellowish green, ovate-lanceolate, 3.5–5 mm, membranous, several veined, midrib slightly thick, apex acuminate, aristate, scabrous on awn. Utricles greenish, obliquely patent, longer than glume, elliptic or broadly elliptic, plano-convex, 5–6 mm, membranous, glabrous, 5–9-veined abaxially, base cuneate, apex gradually narrowed into a slightly long beak, beak ca. 2.5 mm, scabrid on margins, 2-toothed at orifice. Nutlets stramineous, tightly enveloped, broadly elliptic, compressed plano-convex, ca. 2.5 mm, base shortly stipitate; style base slightly thickened; stigmas 2. Fl. and fr. Jun–Aug.

Grasslands or dry places on mountain slopes, riversides; 1200–2600 m. Hubei, Sichuan, Yunnan [Bhutan, India, Indonesia, Kashmir, Nepal].

- 1a. Culms 40–70 cm tall; lower spikes with slender peduncle, upper spikes with short peduncle 459a. var. *longipes*
 1b. Culms 10–28 cm tall; spikes without peduncle or with very short peduncle 459b. var. *sessilis*

459a. *Carex longipes* var. *longipes*

长穗柄藁草(原变种) chang sui bing tai cao (yuan bian zhong)

Culms 40–70 cm tall. Lower spikes with slender peduncle, upper spikes with short peduncle. Fl. and fr. Jun–Aug.

Grasslands on mountain slopes, riversides; 1200–1300 m. Hubei, Sichuan, Yunnan [India, Indonesia, Nepal].

459b. *Carex longipes* var. *sessilis* Tang & F. T. Wang ex L. K. Dai, Acta Phytotax. Sin. 32: 179. 1994.

短穗柄藁草 duan sui bing tai cao

Culms 10–28 cm tall. Spikes without peduncle or with very short peduncle.

• Dry places on mountain slopes; ca. 2600 m. Yunnan (Jingdong: Wuliang Shan).

460. *Carex ereica* Tang & F. T. Wang ex L. K. Dai, Acta Phytotax. Sin. 32: 177. 1994.

二峨藁草 er e tai cao

Rhizome thick and short, ligneous. Culms densely tufted, up to 85 cm tall, rather thin, trigonous, smooth, clothed with sheaths eventually disintegrating into fibers. Leaves basal, shorter than culm, blades 5–8 mm wide, smooth on both surfaces, scabrous on upper margins; sheaths brown, usually splitting. Involucral bracts sheathed, lower involucral bracts leaf-

like, upper involucre bracts sublinear, longer than spike. Spikes 6 or 7, remote at lower part and \pm contiguous at upper part, androgynous, male part shorter than female part, narrowly cylindrical, (2-)3-5 cm, sparsely many flowered; peduncle clothed in involucre bract sheath. Female glumes stramineous, lanceolate, 3-4 mm, membranous, 1-costate, apex acuminate, sometimes mucronate. Utricles stramineous, longer than glume, suberect, oblong-lanceolate, plano-convex, ca. 5 mm, membranous, gla-

brous, several veined, base gradually narrowed into a short stipe, apex gradually narrowed into a long beak, beak smooth on margins, rather long 2-toothed at orifice. Nutlets dark brown, tightly enveloped, elliptic, biconvex, ca. 2.5 mm, base shortly stipitate, apex mucronate; style base slightly thickened; stigmas 2. Fl. and fr. Jun-Jul.

- Roadsides. Sichuan (Er'e Shan).

46. Carex sect. Leucoglochin Dumortier, Fl. Belg. 146. 1827.

尖苞藁草组 jian bao tai cao zu

Tang Yancheng (汤彦承 Tang Yen-cheng), Zhang Shuren (张树仁); Tetsuo Koyama

Carex sect. *Orthocerates* W. D. J. Koch; *Leucoglochin* (Dumortier) Heuffel.

Inflorescence 1-spiked, terminal, androgynous, elliptic, densely few flowered, bractless. Female glumes caducous. Utricles suberect first, reflexed at maturity, papery, faintly many veined, spongy at base, with rachilla adaxially. Stigmas 3.

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

- 1a. Two lowermost female glumes with a mucro to short awn; utricles 6-8 mm; rachilla not exerted 461. *C. parva*
1b. All female glumes obtuse at apex; utricles 3.5-4.5 mm; rachilla distinctly exerted 462. *C. microglochin*

461. Carex parva Nees in Wight, Contr. Bot. India, 120. 1834.

小藁草 xiao tai cao

Carex unifoliata Kükenthal & Handel-Mazzetti; *Kobresia lolonum* Handel-Mazzetti.

Rhizome rather stout, usually elongate. Culms loosely tufted, 10-35 cm tall, rather soft, often flattened, smooth, with brown bladeless basal sheaths, old sheath not splitting into fibers. Basal leaf 1, cauline leaves shorter than culm, blades flat or involute, 1-1.2 mm wide, smooth. Inflorescence 1-spiked, terminal, androgynous (very rarely completely male); male part many flowered, longer than female part; female part 2-4(-6)-flowered. Female glumes dark brown to brown, caducous, oblong-lanceolate, 5-6.5 mm, 3-veined costa of 2 lowest glumes excurrent into a mucro or a short awn up to 7 mm in length, apex acute to slightly obtuse. Utricles suberect first, reflexed at maturity, lanceolate-rhombic, nearly half globose in transverse section, 6-8 mm (including ca. 1.5 mm spongy base), papery, many veined, apex gradually attenuate into a rather long beak, orifice adaxially obliquely truncate. Nutlet shortly cylindrical, trigonous, 3.5-4.5 mm, with stipe ca. 1.5 mm and embraced in spongy base of utricle; rachilla soft, flat, slightly longer than nutlet, not exerted; stigmas 3. Fr. May-Aug.

Forest margins, mountain slopes, bogs, wet places along riverbanks; 2300-4400 m. Gansu, Qinghai, Shaanxi, Xizang, Yunnan [Bhutan, India (Sikkim), Nepal; C Asia].

462. Carex microglochin Wahlenberg, Kongl. Vetensk. Acad. Nya Handl. 24: 140. 1803.

尖苞藁草 jian bao tai cao

Uncinia microglochin (Wahlenberg) Sprengel.

Rhizome slender, elongate. Culms densely or loosely tufted, 5-20 cm tall, subterete, smooth. Leaves shorter than culm, blades involute, needlelike, hard, smooth. Inflorescence 1-spiked, terminal, androgynous, oblong, ca. 1 cm; male part very short, 5-7-flowered; female part longer than male part, 4-12-flowered. Female glumes dark brown to brown, caducous, elliptic-oblong, ca. 3 mm, 3-veined, margins hyaline, apex obtuse. Utricles pale brown, suberect first, reflexed at maturity, eventually with short bent stipe, longer than glume, lanceolate-acicular, subglobose in transverse section, 3.5-4.5 mm, smooth, papery, somewhat many veined, base spongy, apex gradually attenuate into a beak, orifice hyaline and subtruncate. Nutlet oblong, ca. 2 mm, with very short stipe embraced in spongy base of utricle; rachilla hard, pointed at apex, exerted part up to 2 mm; stigmas 3, exerted. Fl. and fr. May-Aug.

Lake margins, wet grassy places along riverbanks, alpine meadows; 3400-5100 m. Qinghai, Sichuan, Xinjiang, Xizang [Bhutan, India (Sikkim), Kashmir, Mongolia, Nepal, Russia; N Europe, N North America].

47. Carex sect. Rupestres (Tuckerman) Mackenzie, N. Amer. Fl. 18: 219. 1935.

石藁草组 shi tai cao zu

Tang Yancheng (汤彦承 Tang Yen-cheng), Zhang Shuren (张树仁); Tetsuo Koyama

Carex [unranked] *Rupestres* Tuckerman, Enum. Meth. Caric. 8. 1843.

Inflorescence 1-spiked, terminal, androgynous, densely or sparsely flowered. Utricles broadly ovate to broadly elliptic, faintly veined, apex abruptly contracted into a short beak. Nutlet often with reduced rachilla at base; stigmas 3.

Twelve species: NW Africa, Asia, Europe, North America; two species in China.

- 1a. Utricles submembranous; female glumes obtuse at apex 463. *C. argunensis*
 1b. Utricles leathery; female glumes acute at apex 464. *C. obtusata*

463. *Carex argunensis* Turczaninow ex Ledebour, Fl. Ross. 4: 267. 1852.

额尔古纳藁草 e er gu na tai cao

Rhizome elongate, woody, covered with dark brown fibrous remains of old scales and leaf sheaths. Culms 10–25 cm tall, erect or slightly curved, slightly rough, with pale to dark brown fibrous remains of leaf sheaths at base. Leaves nearly equaling culm, blades 2–3 mm wide, flat, slightly rough. Inflorescence 1-spiked, terminal, androgynous, pale brown, 1.5–2 cm; male part clavate, ca. 4 mm wide, densely flowered; female part densely 6–15-flowered. Female glumes pale brown on margins, white membranous at middle, elliptic-orbicular, ca. 3 mm, with slightly distinct midvein, apex obtusely rounded. Utricles ellipsoid to broadly ellipsoid, ca. 3 mm, submembranous, faintly veined, base shortly stipitate, apex subrounded, shortly beaked, orifice slightly emarginate. Nutlet tightly enveloped, elliptic, trigonous, crowned with short, cylindrical, persistent style base; rachilla slender, not 1/2 as long as nutlet; stigmas 3. Fr. Jun.

Sandy places of steppes, dunes in *Pinus* forests; ca. 500 m. Heilongjiang [Mongolia, Russia (Far East, E Siberia)].

464. *Carex obtusata* Liljeblad, Kongl. Vetensk. Acad. Nya Handl. 14: 69. 1793.

北藁草 bei tai cao

Rhizome elongate, creeping. Culms loosely tufted, with purple-red sheaths at base, 10–20 cm tall, trigonous, often scabrid above. Leaves shorter than culm, blades flat or involute, 1–1.5 mm wide. Inflorescence 1-spiked, terminal, androgynous; male part linear-cylindric, 5–8 mm; female part 3–8-flowered, subspherical at maturity. Female glumes pale brown, broadly ovate, ca. 3 mm, 3-veined, margins broadly membranous, apex acute. Utricles chestnut-colored to dark brown, broadly ovate, convex abaxially, with 2 shallow grooves at slightly flat adaxial side, ca. 3 mm, leathery, faintly veined, apex abruptly contracted into a short beak, orifice membranous, obliquely truncate. Nutlet loosely enveloped, elliptic, trigonous, ca. 2 mm, with a linear rachilla or rarely a not fully developed utricule at base; rachilla as long as nutlet; stigmas 3. Fr. Aug.

Forests, forest margins; ca. 2500 m (in Xinjiang). Heilongjiang, Jilin, Xinjiang [Kazakhstan, Mongolia, Russia; SW Asia (Caucasus), C and N Europe, North America].

48. *Carex* sect. *Rarac* C. B. Clarke in J. D. Hooker, Fl. Brit. India 6: 711. 1894.

单穗藁草组 dan sui tai cao zu

Tang Yancheng (汤彦承 Tang Yen-cheng), Zhang Shuren (张树仁); Tetsuo Koyama

Inflorescence 1-spiked, terminal, androgynous, rather densely flowered, spherical to oblong, rarely slightly cylindric, bractless at base. Utricles broadly ovate, oblong-lanceolate, or elliptic to ovate-oblong, membranous, estipitate, rarely shortly stipitate, nearly beakless to shortly beaked (rarely up to 1 mm), orifice toothless or minutely 2-toothed. Stigmas 3.

Seventeen species: Asia, Australia, Pacific islands (New Zealand); nine species (four endemic) in China.

- 1a. Male part of spike developed, longer than to equaling female part, sometimes a little shorter than female part at flowering, but overtopping next lower utricule at maturity.
 2a. Female glumes mucronate at apex; utricles ovate-elliptic, ca. 3 mm, tapering above to a beak ca. 1 mm 465. *C. litorhyncha*
 2b. Female glumes obtuse at apex; utricles broadly ovate, elliptic-ovate, or lanceolate-ovate, 1.5–3 mm, tapering above to a beak less than 1 mm.
 3a. Utricles broadly ovate to elliptic-ovate, 1.5–2.5 mm 466. *C. rara*
 3b. Utricles lanceolate-ovate, 2.5–3 mm 467. *C. capillacea*
 1b. Male part of spike less developed, much shorter than female part, not overtopping next lower utricule at maturity.
 4a. Stipe of utricule ca. 0.8 mm 468. *C. stipitiutriculata*
 4b. Utricle estipitate (only *C. uda* with very short stipe).
 5a. Utricles oblong-lanceolate, 3.5–4 mm.
 6a. Leaf blades 2–3 mm wide; utricles horizontally patent or reflexed at maturity 469. *C. uda*
 6b. Leaf blades ca. 0.3 mm wide, hairlike; utricles suberect at maturity 470. *C. austro-occidentalis*
 5b. Utricles broadly ovate or elliptic to ovate-oblong, 2–3 mm.
 7a. Utricles nearly beakless 471. *C. dahurica*
 7b. Utricles shortly beaked.
 8a. Leaf blades flat, 1–1.5 mm wide; utricles 2.5–3 mm 472. *C. onoei*
 8b. Leaf blades hairlike, 0.5–0.8 mm wide; utricles ca. 2 mm 473. *C. kirinensis*

465. *Carex litorhyncha* Franchet, Bull. Soc. Philom. Paris, sér. 8, 7: 84. 1895.

坚喙藁草 jian hui tai cao

Rhizome short. Culms tufted, 15–40 cm tall, slender, smooth, with leaves at base. Leaves shorter than culm, blades convolute, threadlike, rather hard, slightly smooth. Inflorescence 1-spiked, terminal, androgynous; male part linear, dis-

tinct; female part as long as male part, slightly loosely many flowered. Female glumes ovate-lanceolate, apex mucronate. Utricles olive-green, longer than glume, obliquely patent at maturity, ovate-elliptic, trigonous, ca. 3 mm, membranous, glabrous, base contracted, apex tapering to a beak ca. 1 mm, orifice 2-toothed. Nutlet brown-red, small, ovate, trigonous; stigmas 3.

- Yunnan.

466. *Carex rara* Boott, Proc. Linn. Soc. London 1: 284. 1845.

松叶藁草 song ye tai cao

Carex biwensis Franchet; *C. pseudobiwensis* Kitagawa; *C. rara* var. *biwensis* (Franchet) Kükenthal ex Matsumura.

Rhizome short. Culms densely tufted, 20–30 cm tall, smooth to slightly scabrous above. Leaves shorter to slightly longer than culm, blades 0.5–1 mm wide, flat or involute, smooth or slightly scabrous on upper margins; basal sheaths split into gray-brown fibers. Inflorescence 1-spiked, terminal, androgynous; male part distinct, linear, 4–12 mm, 5–17-flowered; female part oblong to shortly cylindric, 4–10 mm, densely 6–18-flowered. Female glumes brown but diluted on upper margins, oblong-ovate, 1.5–2 mm, 3-veined, apex rounded-obtuse. Utricles horizontally patent at maturity, equaling to slightly longer than glume, broadly ovate to elliptic-ovate, slightly swollen, trigonous, 1.5–2.5 mm, faintly veined or distinctly veined near base, sometimes with rusty spots, base rounded-obtuse, apex gradually attenuate into a short beak, orifice subtruncate. Nutlet tightly enveloped, elliptic to ovate, trigonous, 1–2 mm; style base not thickened, persistent; stigmas 3. Fl. and fr. Apr–May.

Forests, forest margins, banks of mountain streams, shady and wet grassy places; 1000–3300 m. Anhui, Guangdong, Heilongjiang, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Sichuan, Xizang, Yunnan, Zhejiang [Bhutan, NE India, Japan, Korea, Nepal].

467. *Carex capillacea* Boott, Ill. Gen. Carex 1: 44. 1858.

发秆藁草 fa gan tai cao

Carex capillacea var. *linzensis* Y. C. Yang; *C. capillacea* var. *yunnanensis* Franchet; *C. rara* Boott var. *capillacea* (Boott) Kükenthal; *C. rara* f. *yunnanensis* (Franchet) Kükenthal.

Rhizome short. Culms tufted, 15–40 cm tall, slightly scabrous above. Leaves shorter than culm, blades threadlike, 0.5–1 mm wide, flat or involute, smooth; basal sheaths split into brown fibers. Inflorescence 1-spiked, terminal, androgynous; male part distinct, linear, 4–7 mm, 3–7-flowered; female part ovate-orbicular, 3–6 mm, densely 4–10-flowered. Female glumes brown laterally and diluted at middle, elliptic-ovate, ca. 2 mm, 1–3-veined, apex rounded-obtuse. Utricles horizontally patent at maturity, slightly longer than glume, lanceolate-ovate, swollen, trigonous, 2.5–3 mm, with distinct marginal veins and faint veins at middle, sometimes with rusty spots, base rounded-obtuse, apex gradually attenuate into a short beak, orifice slightly emarginate or minutely 2-toothed. Nutlet loosely enveloped, elliptic, trigonous, ca. 1.8 mm; style base not thickened, persistent; stigmas 3. Fl. and fr. Apr–May.

Wet grasslands on mountain slopes, streambanks. Anhui, Fujian,

Jiangxi, Taiwan, Yunnan, Zhejiang [Indonesia, Japan, Myanmar, Philippines, Thailand].

468. *Carex stipitiutriculata* P. C. Li, Acta Bot. Yunnan. 12: 137. 1990.

柄囊藁草 bing nang tai cao

Rhizome short. Culms tufted, 5–8 cm tall, slender, smooth, leafy in lower 1/3. Cauline leaves shorter than culm; blades needlelike, ca. 0.5 mm wide, smooth; sheaths pale brown. Inflorescence 1-spiked, terminal, androgynous, oblong, 5–8 mm; male part 2-flowered, short, indistinct; female part 3- or 4-flowered. Female glumes dark brown laterally, green at middle, oblong-lanceolate, 3.5–4.2 mm, 3-veined, apex attenuate. Utricles green, slightly tinged with pale brown, erect, lanceolate-oblong, 4.5–5 mm (including stipe ca. 0.8 mm), membranous, not distinctly veined, apex gradually attenuate into a beak ca. 1.5 mm, orifice obliquely truncate, indistinctly toothed. Nutlet oblong, trigonous, ca. 2 mm; style base slightly thickened; stigmas 3.

- Alpine meadows; ca. 3600 m. Yunnan.

469. *Carex uda* Maximowicz, Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans 9 [Prim. Fl. Amur.]: 303. 1859.

大针藁草 da zhen tai cao

Rhizome short. Culms tufted, soft, smooth, leafy at lower 1/3. Cauline leaves shorter than culm; blades 2–3 mm wide, flat, smooth. Inflorescence 1-spiked, terminal, androgynous, elliptic-ovate, 6–12 mm; male part very short, 3–5-flowered; female part longer than male part, 7–15(–23)-flowered. Female glumes pale brown, oblong-lanceolate to elliptic-lanceolate, ca. 3 mm, faintly 3-veined, apex acute to slightly obtuse. Utricles horizontally patent or reflexed at maturity, oblong-lanceolate, trigonous, 3.5–4 mm, membranous, with many distinct slender veins on both sides, base rounded, with very short stipe, apex gradually attenuate into a beak, orifice subtruncate. Nutlet loosely enclosed, oblong, trigonous, ca. 2 mm; style base not thickened; stigmas 3. Fl. and fr. Jun–Jul.

Damp places in broad-leaved and *Pinus koraiensis* mixed forests. Heilongjiang, Jilin [Japan, Korea, Russia (Far East)].

470. *Carex austro-occidentalis* F. T. Wang & Tang ex Y. C. Tang, Fl. Reipubl. Popularis Sin. 12: 527. 2000.

西南藁草 xi nan tai cao

Rhizome slender, elongate, covered with pale brown split scales. Culms loosely tufted, 10–25 cm tall, slender, soft, slightly scabrid on angles, leafy in lower 1/4. Cauline leaves shorter than culm; blades hairlike, ca. 0.3 mm wide, flat, smooth, soft; basal sheath pale brown. Inflorescence 1-spiked, terminal, ovate, 6–8 mm; male part very short, 1–3-flowered; female part 4–6-flowered, longer than male part. Female glumes red-brown to dark brown laterally, green at middle, elliptic-ovate, ca. 2.5 mm, 1-veined, apex acute. Utricles erect at maturity, oblong-lanceolate, trigonous, ca. 3.5 mm, membranous with rather distinct slender veins on both sides, base rounded, apex gradually attenuate into a beak, orifice minutely 2-toothed. Nutlet loosely enveloped, elliptic, trigonous, ca. 2 mm; style base not thickened, persistent; stigmas 3. Fl. and fr. May–Jul.

- Forests, wet grasslands along waysides; ca. 2400 m. Sichuan.

471. *Carex dahurica* Kükenthal, Repert. Spec. Nov. Regni Veg. 8: 326. 1910.

针藁草 zhen tai cao

Rhizome short. Culms tufted, 10–20 cm tall, smooth, leafy in lower 1/4. Leaves shorter than culm, blades narrow, 0.5–1 mm wide, involute; basal sheaths pale brown. Inflorescence 1-spiked, terminal, androgynous, ovate to orbicular-ovate, 4–7 × 4–5 mm; male part not distinct, 3–5-flowered; most of spike female, 5–10-flowered. Female glumes pale brown laterally, broadly ovate, membranous, pale on 3-veined costa. Utricles patent at maturity, slightly longer than or equaling glume, broadly ovate, slightly swollen, trigonous, ca. 2 mm, not distinctly veined on both sides, base subcordate adaxially, apex nearly beakless, orifice truncate. Nutlet loosely enveloped, elliptic or obovate, trigonous, ca. 1.5 mm; style base not thickened, persistent; stigmas 3.

Carex meyeriana bogs in forest regions. Jilin [Russia (Far East, E Siberia)].

472. *Carex onoei* Franchet & Savatier, Enum. Pl. Jap. 2: 551. 1878.

针叶藁草 zhen ye tai cao

Carex capituliformis Meinshausen ex Maximowicz; *C. hakonensis* Franchet & Savatier var. *capituliformis* (Meinshausen ex Maximowicz) Ohwi; *C. hakonensis* var. *onoei* (Franchet & Savatier) Ohwi; *C. onoei* subsp. *capituliformis* (Meinshausen ex Maximowicz) T. V. Egorova; *C. onoei* var. *macrogyne* Tang.

Rhizome short. Culms tufted, 20–40 cm tall, soft, slightly scabrid on angles, surrounded by pale brown basal leaf sheaths at base. Leaves shorter than culm, blades 1–1.5 mm wide, flat,

soft. Inflorescence 1-spiked, terminal, androgynous, broadly ovate to spherical, 5–7 mm; male part not distinct, 2- or 3-flowered; most of spike female, usually 5- or 6-flowered. Female glumes pale brown laterally, broadly ovate, ca. 2 mm, membranous, pale on 3-veined costa. Utricles horizontally patent at maturity, ovate-oblong, obscurely trigonous, 2.5–3 mm, membranous, with distinct lateral veins especially abaxially, base subrounded, apex abruptly contracted into a short beak, orifice minutely 2-toothed. Nutlet tightly enclosed, obovate-oblong to elliptic, trigonous, ca. 2 mm; style base not thickened, persistent; stigmas 3.

Forests, wet grasslands, streambanks; 500–1600 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Shaanxi, Zhejiang [Japan, Korea, Russia (Far East)].

473. *Carex kirinensis* F. T. Wang & Y. L. Chang, Fl. Pl. Herb. Chin. Bor.-Orient. 11: 207. 1976.

吉林藁草 ji lin tai cao

Rhizome short. Culms tufted, ca. 20 cm tall, smooth, surrounded at base by pale brown to brown leaf sheaths. Leaves shorter than culm, blades 0.5–0.8 mm wide, hairlike, soft. Inflorescence 1-spiked, terminal, androgynous, subspherical, ca. 5 mm; male part very indistinct, 2- or 3-flowered; most of spike female, 5–10-flowered. Female glumes pale brown laterally, ovate-oblong to oblong, ca. 2 mm, 1–3-veined. Utricles horizontally patent at maturity, slightly longer than glume, elliptic, obscurely trigonous, ca. 2 mm, abaxially distinctly veined, adaxially faintly veined, apex abruptly constricted into a short beak, orifice minutely 2-toothed. Nutlet tightly enclosed, oblong, trigonous, ca. 1.5 mm; style base not thickened; stigmas 3.

• Broad-leaved and needle-leaved mixed forests. Heilongjiang, Jilin.

49. *Carex* sect. *Grallatoriae* Kükenthal in Engler, Pflanzenr. 38(IV. 20): 88. 1909.

短喙藁草组 duan hui tai cao zu

Tang Yancheng (汤彦承 Tang Yen-cheng), Zhang Shuren (张树仁); Tetsuo Koyama

Inflorescence 1-spiked, terminal, androgynous [or plants dioecious], female part sparsely flowered. Female glumes red-brown, clasping rachilla at base. Utricle obovate-oblong to obovate-elliptic, sparsely hirsute on upper half, nerveless except for 2 costas, base gradually tapering into a short stipe, apex abruptly contracted into a short recurved beak. Nutlet without reduced rachilla; stigmas 3.

One species: China (Taiwan), Japan.

474. *Carex grallatoria* Maximowicz var. *heteroclita* (Franchet) Kükenthal ex Matsumura, Index Pl. Jap. 2(1): 113. 1905.

异型菱果藁 yi xing ling guo tai

Carex heteroclita Franchet, Bull. Soc. Philom. Paris, sér. 8, 7: 28. 1895; *C. grallatoria* subsp. *heteroclita* (Franchet) T. Koyama.

Rhizome slender, ca. 1 mm thick, covered with red-brown scales. Culms tufted, 5–20 cm tall, filiform, scabrid above. Leaves many, radical, elongate after anthesis, longer than culms, blades 2–3 mm wide, flattish, soft; sheaths sanguineous-purple or dusky-brown, split into reticulate fibers. Inflorescence 1-spiked, terminal, androgynous; male part linear to linear-oblong,

1–1.5 mm thick, several flowered; female part 1–2 cm, loosely bearing 3–8 flowers. Female glumes pale laterally, stained with sanguineous brown on upper half or 1/3, oblong to obovate-oblong, ca. 3.5 mm, membranous, greenish costa 1- or obscurely 3-veined, base clasping rachilla, apex obtuse to subtruncate. Utricles pale greenish to pale yellowish, slightly longer than glumes, erect-patent to patent, obovate-oblong to obovate-elliptic, trigonous, 3.5–4 mm, thinly herbaceous to membranous, sparsely hirsute on upper half, nerveless except 2 costas, base gradually tapering into short stipe, apex abruptly contracted into short, recurved, conic beak, orifice not toothed. Nutlet tightly enveloped, obovate-oblong, trigonous, 2–2.5 mm; stigmas 3.

Grasslands, forest margins. Taiwan [Japan].

No specimens have been seen by the present authors. The description is based mainly on Fl. Taiwan (ed. 2, 5: 215. 2000).

Carex grallatoria var. *grallatoria*, with plants dioecious, is endemic to Japan.

50. Carex sect. Rhizopodae Ohwi, Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 11: 443. 1936.

根足藁草组 gen zu tai cao zu

Tang Yancheng (汤彦承 Tang Yen-cheng), Zhang Shuren (张树仁); Tetsuo Koyama, Gordon C. Tucker

Inflorescence 1-spiked, terminal, androgynous, long cylindric, sparsely or rather densely flowered, bractless. Utricles green, herbaceous, trigonous, glabrous, many veined, apex attenuate or abruptly contracted into a rather long beak, orifice subentire or acutely 2-toothed.

Three species: China, Japan; three species (two endemic) in China.

- 1a. Utricles abruptly contracted above to a subcylindric beak 2–3 mm, acutely 2-toothed at orifice 475. *C. rhizopoda*
 1b. Utricles attenuate above to a beak 1–1.5 mm, emarginate at orifice.
 2a. Utricles compressed trigonous, obovoid, apex abruptly constricted into a beak; nutlet stipitate, broadly obovoid, trigonous or quadrangular, lateral surface excavated 477. *C. yunyiana*
 2b. Utricles trigonous, lanceolate, apex gradually constricted into a beak; nutlet estipitate, ellipsoid, trigonous, lateral surface not excavated 476. *C. densicaespitosa*

475. Carex rhizopoda Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 31: 114. 1886.

根足藁草 gen zu tai cao

Rhizome thick, elongate, covered with fibrous, brown remains of leaf sheath. Culms 30–60 cm tall, soft, trigonous, scabrid on angles. Leaves herbaceous, soft, shorter than culm, blades 2–4 mm wide, flat, margins scabrid. Inflorescence 1-spiked, terminal, androgynous, erect, linear-cylindric, 40–70 × 2–3 mm, bractless; male part very short, 3–5-flowered; female part loosely flowered, sometimes lowermost 2 flowers 1–2 cm apart from each other. Female glumes pale brown laterally, ovate-lanceolate to oblong-lanceolate, 4–5 mm, green costa 3-veined, apex acute to mucronate, or lower glumes shortly awned. Utricles longer than glume, erect, lanceolate, trigonous, ca. 6 mm (including beak), herbaceous, glabrous, abaxially distinctly slenderly many veined, apex abruptly contracted into a subcylindric beak 2–3 mm, orifice distinctly shortly 2-toothed, teeth acute. Nutlet obovate, ca. 2.5 mm, crowned with slightly recurved beak; stigmas 3.

Wet places along waysides. Anhui [Japan].

476. Carex densicaespitosa L. K. Dai, Acta Phytotax. Sin. 32: 173. 1994.

密丛藁草 mi cong tai cao

Rhizome short. Culms densely tufted, 20–55 cm tall, slender, compressed trigonous, smooth, clothed at base with bladeless sheaths. Basal leaves shorter than culm, scabrid on both surfaces. Inflorescence 1-spiked, terminal, androgynous, long cylindric, 2.5–3 cm; male part shorter than female part, 5–7-

flowered; female part loosely 8–12-flowered. Female glumes pale yellow, ovate or lanceolate, ca. 4 mm, costa green, apex mucronate to shortly awned. Utricles obliquely patent, longer than glume, lanceolate, trigonous, ca. 6 mm, herbaceous, glabrous, abaxially distinctly slenderly many veined, apex gradually attenuate into a short beak ca. 1 mm, orifice slightly emarginate. Nutlet ellipsoid, trigonous, ca. 2.5 mm; stigmas 3. Fr. Jun.

• Forests; ca. 1500 m. Guangxi.

477. Carex yunyiana X. F. Jin & C. Z. Zheng, Nordic. J. Bot. 27: 344. 2009.

云亿藁草 yun yi tai cao

Rhizome short, woody. Culms densely tufted, 20–40 cm tall, slender, trigonous, scabrous, clothed at base with bladeless sheaths. Basal leaves shorter to slightly longer than culm, scabrid on margin. Inflorescence 1-spiked, terminal, androgynous, narrowly cylindric, 2–2.5 cm; male part shorter than female part, 6–11-flowered; female part loosely 9–14-flowered. Female glumes pale green, obovate, 4–4.5 mm, costa green, apex acuminate. Utricles pale green, erect to obliquely patent, slightly longer than glume, obovoid, compressed trigonous, 5–6 mm, herbaceous, glabrous, abaxially distinctly many veined, apex abruptly constricted into a short beak ca. 1.5 mm, orifice slightly bidentate. Nutlet broadly obovoid, trigonous or quadrangular, ca. 2.5 mm, lateral surface excavated, base stipitate; stigmas 3. Fl. and fr. Apr–May.

• *Cryptomeria* forests; ca. 1000 m. E Zhejiang (Tiantai).

51. Carex sect. Capituligeræ Kükenthal, Bot. Jahrb. Syst. 27: 495. 1899.

头穗藁草组 tou sui tai cao zu

Tang Yancheng (汤彦承 Tang Yen-cheng), Zhang Shuren (张树仁); Tetsuo Koyama

Inflorescence 1-spiked, terminal, androgynous, ovate to elliptic, densely flowered, male part rather short. Utricles ovate to elliptic, faintly veined on both surfaces, apex gradually attenuate into a short beak. Nutlet lenticular, without or with a very short rachilla at base; stigmas 2.

About three species: Asia, Europe, North America, austral South America; one species (endemic) in China.

478. *Carex motuoensis* Y. C. Yang, Fl. Xizang. 5: 443. 1987.

墨脱藁草 mo tuo tai cao

Rhizome short. Culms densely tufted, 5–20 cm tall, slender, smooth, compressed trigonous, 2-leaved in lower 1/3. Basal sheaths with blades, pale brown, not split into fibers; blades slightly shorter to slightly longer than culm, linear, flat, ca. 1 mm wide, smooth, margins scabrid. Inflorescence 1-spiked, terminal, androgynous, pale brown, ovate-elliptic, 1–1.3 × ca. 0.5

cm; male part short, 3–6-flowered; female part longer than male part, densely many flowered, bractless at base. Female glumes pale brown, oblong, ca. 3.5 mm, 1-veined. Utricles ovate-elliptic, ca. 4 mm (including stipe ca. 1 mm), membranous, not distinctly veined on both surfaces, apex gradually attenuate into a short beak, orifice subtruncate. Nutlet elliptic-orbicular, ca. 1.5 mm, lenticular, without or with a very short rachilla at base; stigmas 2.

• About 4000 m. Xizang.

52. *Carex* sect. *Physoglochin* Dumortier, Fl. Belg. 145. 1827.

异株藁草组 yi zhu tai cao zu

Tang Yancheng (汤彦承 Tang Yen-cheng), Zhang Shuren (张树仁); Tetsuo Koyama

Inflorescence 1-spiked, terminal, often unisexual and plants dioecious, rarely male spike with female flowers at base. Utricles ovate to lanceolate, subleathery, base spongy, apex shortly beaked. Nutlet lenticular; stigmas 2.

Between four and six species: circumboreal in Asia, Europe, and North America; one species in China.

479. *Carex gynocrates* Wormskjöld ex Drejer, Naturhist. Tidsskr. 3: 434. 1841.

异株藁草 yi zhu tai cao

Carex cobresiiiformis A. I. Baranov & Skvortsov; *C. dioica* Linnaeus subsp. *gynocrates* (Wormskjöld ex Drejer) Hultén; *C. dioica* var. *gynocrates* (Wormskjöld ex Drejer) Ostenfeld.

Rhizome slender, creeping. Culms loosely tufted, 20–30 cm tall, smooth, leafy on lower 1/4. Basal leaf sheaths rusty

brown, eventually pale brown, split into fibers. Blades shorter than culm, ca. 0.5 mm wide, smooth. Plants dioecious, male plant not seen; inflorescence 1-spiked, terminal; female spike brown, narrowly cylindrical, 1.5–1.8 × ca. 0.2 cm. Female glumes rusty brown, broadly ovate, apex acute. Utricles nearly equaling to slightly longer than glume (ripe specimens not seen), 2–2.5 mm, slenderly veined on both surfaces, apex gradually attenuate into a short beak, orifice minutely 2-toothed; stigmas 2.

Bogs in forests; ca. 900 m. Jilin [Japan, Russia (Far East, E Siberia); North America].

3. *Carex* subg. *Vignea* (P. Beauvois ex T. Lestiboudois) Petermann, Deutschl. Fl. 602. 1849.

二柱藁草亚属 er zhu tai cao ya shu

Liang Songyun (梁松筠 Liang Song-jun); Tetsuo Koyama, Gordon C. Tucker

Vignea P. Beauvois ex T. Lestiboudois, Essai Cyp. 22. 1819.

Rhizome short or creeping. Flowers unisexual; plants monoecious, rarely dioecious. Spikes usually numerous, bisexual, androgynous or gynaeandrous, rarely spikes entirely male or female, ovate, oblong, or orbicular, sessile, arranged in spicate, paniculate, or capitate inflorescence, rarely paniculiform or spicate-paniculate, not prophyllate at base. Utricles plano-convex or biconvex, globose or elliptic, rarely inflated. Nutlets plano-convex or biconvex; stigmas 2, rarely 3.

About 350 species: ± worldwide, mostly temperate; 48 species (nine endemic) in 17 sections (one endemic) in China.

1a. Spikes gynaeandrous.

2a. Stigmas 3 63. *C.* sect. *Gibbae*

2b. Stigmas 2.

3a. Involucral bracts leaflike, conspicuously longer than inflorescence.

4a. Spikes distantly alternate on an elongate rachis, forming loosely spicate inflorescence 64. *C.* sect. *Remotae*

4b. Spikes forming a densely capitate inflorescence 65. *C.* sect. *Cyperoideae*

3b. Involucral bracts glumelike or setaceous.

5a. Utricles usually minutely papillose or minutely tuberculate, beakless or with short beak

subentire or emarginate at orifice 69. *C.* sect. *Glareosae*

5b. Utricles neither minutely papillose nor minutely tuberculate, with long beak 2-toothed at orifice.

6a. Utricles patent at maturity, not winged on margins 68. *C.* sect. *Stellulatae*

6b. Utricles erect at maturity, winged on margins.

7a. Lower involucral bracts setaceous (rarely leaflike, not more than 5 cm, not more than

2 × as long as inflorescence) 66. *C.* sect. *Ovales*

- 7b. Lower involucral bracts leaflike, exceeding inflorescence 67. *C. sect. Planatae*
- 1b. Spikes androgynous (rarely entirely male or female), plants rarely dioecious.
- 8a. Stigmas 3; plants monoecious, rarely dioecious; female glumes 10–15 mm; spikes unisexual (very rarely androgynous), numerous, densely crowded into a larger inflorescence 62. *C. sect. Macrocephalae*
- 8b. Stigmas 2; plants monoecious; female glumes less than 5 mm.
- 9a. Utricles strongly inflated bulliform to globose or elliptic at maturity, 10–15 mm 60. *C. sect. Physodeae*
- 9b. Utricles not inflated at maturity, less than 6 mm.
- 10a. Rhizome long creeping.
- 11a. Utricles winged on margins or narrowly winged on distal margins, beak scabrous, more than 0.25 mm, usually 2-toothed at apex (suture abaxial); leaf sheath opposite blade herbaceous and membranous only near orifice 58. *C. sect. Holarrhenae*
- 11b. Utricles not winged on margins, beak less than 0.25 mm, margins smooth or serrulate.
- 12a. Utricles plano-convex, margins acutely angled, beak serrulate 59. *C. sect. Foetidae*
- 12b. Utricles biconvex, margins rounded, beak smooth 61. *C. sect. Dispermae*
- 10b. Rhizome short; culms tufted.
- 13a. Utricles spongy at base.
- 14a. Leaf sheaths red-brown or yellow punctate, not rugulose 56. *C. sect. Heleoglochin*
- 14b. Leaf sheaths transversely rugulose, not punctate 57. *C. sect. Vulpinae*
- 13b. Utricles not spongy at base.
- 15a. Utricles nerveless 53. *C. sect. Echinochloomorphae*
- 15b. Utricles veined.
- 16a. Culms with nodes, thickened to bulbous at base 54. *C. sect. Thomsonianae*
- 16b. Culms without nodes, not thickened at base 55. *C. sect. Phleoidae*

53. *Carex* sect. *Echinochloomorphae* Y. L. Chang ex S. Yun Liang, Acta Phytotax. Sin. 28: 153. 1990 [*“Echinochloomorphae”*].

类稗藁草组 lei bai tai cao zu

Rhizome short, indurate. Culms tall. Spikes numerous, androgynous. Inflorescence branched, paniculate. Female glumes ovate. Utricles ovate or broadly ovate, nerveless, base not spongy. Style base thickened; stigmas 2.

- One species: China.

480. *Carex echinochloiformis* Y. L. Chang ex Y. C. Yang, Fl. Xizang. 5: 436. 1987 [*“echinochloaeformis”*].

类稗藁草 lei bai tai cao

Rhizome short, indurate. Culms tufted, 35–90 cm tall, sharply trigonous, scabrous above, with bladeless sheaths at base. Leaves usually longer than culm, blades linear, 4–5 mm wide, margins slightly scabrous, apex long acuminate. Involucral bracts glumelike. Spikes numerous, androgynous, ovate or oblong-ovate, 4–5 mm, inflorescence branched, paniculate, 8–

13 cm. Female glumes broadly ovate, margins white hyaline, green 3-veined costa excurrent into a mucro. Utricles light green, nearly equaling glume, ovate or ovate-elliptic, plano-convex, 2.2–3.5 mm, membranous, nerveless, base not spongy, margins winglike and thickened, apex gradually narrowed into a beak, scabrous on margins, orifice deeply 2-lobed. Nutlets loosely enveloped, ovate or broadly elliptic, plano-convex, 1.3–2 mm, base abruptly contracted into a short stipe; style base slightly thickened; stigmas 2. Fl. and fr. May–Jun.

- Forests; ca. 2500 m. Xizang, NW Yunnan.

54. *Carex* sect. *Thomsonianae* Y. L. Chang ex S. Yun Liang, Acta Phytotax. Sin. 28: 154. 1990.

高节藁草组 gao jie tai cao zu

Rhizome indurate, oblique. Culms tall, stiff, with nodes, thickened to bulbous at base, clothed with black-brown sheaths disintegrating into fibers. Spikes numerous, bisexual, androgynous, inflorescence spicate, cylindric. Female glumes ovate. Utricles ovate or suborbicular. Style base not thickened; stigmas 2.

- One species: Bhutan, S China, NE India, N Myanmar, Nepal, N Thailand, N Vietnam.

481. *Carex thomsonii* Boott, Ill. Gen. Carex 1: 1. 1858.

高节藁草 gao jie tai cao

Rhizome short, indurate. Culms loosely tufted, 15–30 cm tall, obtusely trigonous, smooth, stiff, with nodes, thickened to bulbous at base, clothed with dark brown sheaths disintegrating into fibers. Leaves longer than culm, blades narrowly linear,

2.5–3 mm wide, flattish plicate, rather stiff, slightly scabrous on margins, long sheathing. Lowest involucral bract leaflike, much surpassing inflorescence. Inflorescence long cylindric, 5–9.5 cm; spikes numerous, androgynous, ovate, 5–7 × 3–4 mm. Female glumes pale ferruginous, with brownish spots, ovate, 2.5–2.8 mm, margins white hyaline, green 3-veined costa forming a short mucro at acute apex. Utricles pale brown with

dark spots, equaling or slightly longer than glume, ovate or ovate-elliptic, plano-convex, 2–2.5 × 1.8–2.5 mm, subleathery, narrowly winged, serrulate above, finely many veined abaxially, apex gradually narrowed into a beak ca. 0.3 mm, serrulate on upper margins, orifice 2-toothed. Nutlets brown, tightly enveloped, oblong-ovate, plano-convex, ca. 1.2 mm; stigmas 2. Fl. and fr. Apr–Aug.

Sandy and wet places along rivers, grassland slopes; 200–1700 m.

Guangxi, Guizhou, Sichuan, Yunnan [Bhutan, NE India, N Myanmar, Nepal, N Thailand, N Vietnam].

A variant of this species (from Guizhou and Sichuan), with utricles broader and nerveless or weakly veined, was recognized in FRPS (12: 473, 2000) under the name "*Carex thompsonii* Franchet." However, Franchet's name was not validly published and was apparently only an orthographic variant of Boott's name. From the few specimens available, "*C. thompsonii*" cannot be reliably distinguished from *C. thomsonii*.

55. *Carex* sect. **Phleoideae** Meinshausen, Trudy Imp. S.-Peterburgsk. Bot. Sada 18: 281, 322. 1901.

多花薹草组 duo hua tai cao zu

Rhizome short. Culms tufted. Involucral bracts leaflike, setaceous, or glumelike. Spicate inflorescence long cylindric, lower spikes sometimes shortly branched; spikes numerous, androgynous. Female glumes ovate or ovate-oblong. Utricles winged or wingless and thickened on margins, membranous, veined, orifice 2-toothed. Stigmas 2.

Ten species: E, S, and SE Asia; six species in China.

- 1a. Utricles winged on margins.
 2a. Spikes disposed in a pyramidal-cylindric, dense inflorescence, 2.5–8 cm; utricles on margins from middle to apex with broad serrulate wings, densely brown punctulate above 482. *C. neurocarpa*
 2b. Spikes disposed in a long cylindric or ovate-elliptic inflorescence dense at apex, 1.5–3.5 cm; utricles on margins from middle to apex with narrow serrulate wings, not or sparsely brown punctulate 483. *C. fluviatilis*
 1b. Utricles thickened on margins or narrowly winged on upper part of margins.
 3a. Utricles with several large tubercles abaxially 484. *C. paxii*
 3b. Utricles without large tubercles abaxially.
 4a. Involucral bracts glumelike 487. *C. laevissima*
 4b. Lowest involucral bracts leaflike or setaceous.
 5a. Utricles densely ferruginous punctulate 486. *C. leiorhyncha*
 5b. Utricles not ferruginous punctulate 485. *C. nubigena*

482. *Carex neurocarpa* Maximowicz, Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans 9 [Prim. Fl. Amur.]: 306. 1859.

翼果薹草 yi guo tai cao

Rhizome short, indurate. Plant wholly ferruginous punctulate. Culms tufted, flattened, smooth, clothed with pinkish ferruginous bladeless sheaths at base. Leaves shorter or longer than culm, blades linear, 2–3 mm wide, flat, margins ± involute, scabrous, apex acuminate; membranous side of leaf sheath ferruginous. Lower involucral bracts leaflike, much surpassing inflorescence, sheathless, upper involucral bracts setaceous. Spicate inflorescence dense, pyramidal-cylindric, 2.5–8 × 1–1.8 mm; spikes numerous, androgynous, ovate, 5–8 mm. Female glumes ferruginous-yellow, ferruginous spotted, ovate to oblong-elliptic, 2–4 × ca. 1.5 mm, apex acute, shortly awned. Utricles ferruginous spotted, longer than glume, suberect, ovate or broadly ovate, plano-convex, 2.5–4 mm, membranous, many veined on both faces, densely ferruginous punctulate above, margins from middle to apex with broad serrulate wings, apex gradually contracted into a beak, orifice 2-toothed. Nutlets pale brown, loosely enveloped, ovate or elliptic, plano-convex, ca. 1 mm, smooth, lustrous; stigmas 2. Fl. and fr. Jun–Aug. $2n = 108$.

Wet places along ponds and riversides, grasslands; (below 100–)100–1700 m. Anhui, Gansu, Hebei, Heilongjiang, Henan, Jiangsu, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi [Japan, Korea, Russia (Far East)].

483. *Carex fluviatilis* Boott, Ill. Gen. Carex 4: 172. 1867.

溪生薹草 xi sheng tai cao

Carex yungningensis Handel-Mazzetti & Kükenthal.

Rhizome short, indurate. Culms tufted, 10–70 cm tall, trigonous, erect, stiff, clothed with brown-reddish sheaths at base. Lower involucral bracts leaflike, much surpassing inflorescence. Spicate inflorescence long cylindric or ovate-elliptic, 1.5–3.5 × 0.8–1.3 cm, dense at apex, lower 1 or 2 usually distant; spikes numerous, androgynous, ovate, 5–7 mm. Female glumes pale, light green at middle, ovate-lanceolate, 2.5–3 × 1.2–1.5 mm, membranous, apex acuminate, awned. Utricles pale green, longer than glume, ovate-lanceolate or oblong-elliptic, plano-convex, 3–3.5 × ca. 1.5 mm, membranous, glabrous, many veined on both faces, margins from middle to apex with narrow serrulate wings, apex gradually narrowed into a medium-sized beak, orifice 2-toothed. Nutlets pale brown, loosely enveloped, ovate or suborbicular, plano-convex, 1.3–1.5 mm, lustrous; stigmas 2. Fl. and fr. Jun–Sep.

Wet places in forests and streamsides along valleys; 1300–3200 m. Guizhou, Sichuan, Xizang, Yunnan [India, Myanmar].

484. *Carex paxii* Kükenthal in Engler, Pflanzenr. 38(IV. 20): 765. 1909.

紫疣薹草 zi you tai cao

Rhizome short, oblique, indurate. Culms tufted, 12–55 cm

tall, trigonous, scabrous above, clothed at base with dark brown sheaths disintegrating into fibers. Leaves shorter or longer than culms, blades linear, 1.5–2.5 mm wide, flat, margins scabrous, apex long acuminate. Lower involucre bracts setaceous, upper glumelike. Spicate inflorescence long cylindrical, 3–6.5 × 5–10 mm; spikes numerous, androgynous, ovate, 5–7 mm. Female glumes yellowish brown, ovate, 2.2–3 × 1.5–2 mm, membranous, green 3-veined at middle. Utricles yellowish brown, slightly longer than glume, ovate-conic, plano-convex, 2.5–3.2 mm, subleathery, many veined on both faces, with several purple-red tubercles abaxially, base subrounded, spongy, shortly stipitate, margins from middle to apex with narrow denticulate wings, apex gradually narrowed into a beak, orifice 2-toothed. Nutlets loosely enveloped, ovate or subelliptic, biconvex, 1–1.2 × ca. 1 mm wide, lustrous, base shortly stipitate; stigmas 2. Fl. and fr. Jun–Sep.

Wet places on slopes or grasslands. Jiangsu, Jiangxi [Japan, Korea].

485. *Carex nubigena* D. Don ex Tilloch & Taylor, *Philos. Mag.* J. 62: 455. 1823.

云雾薹草 yun wu tai cao

Rhizome short, indurate. Culms tufted, 10–70 cm tall, trigonous, scabrous above, clothed with brown bladeless sheaths at base. Leaves shorter than culm, blades linear, 1–2 mm wide, flat or plicate, apex acuminate; membranous side of leaf sheaths not transversely wrinkled, with purple-red spots. Lower involucre bracts 1 or 2 leaflike, green, much surpassing inflorescence, upper involucre bracts setaceous. Spicate inflorescence long cylindrical, 2.5–5.0 × 0.7–1 cm, dense at apex, lower ones distant; spikes numerous, androgynous, ovate 5–9 × 4–6 mm, sometimes spikes branched at base. Female glumes pale green, ovate, 2.5–2.8 mm, membranous, green 1-veined, apex acute, awned. Utricles pale green, rarely tinged with red-brown, longer than glume, ovate-lanceolate or oblong-elliptic, plano-convex, 2.5–3.5 × ca. 1 mm, membranous, many veined on both faces, glabrous, base shortly stipitate, margins thickened, without wings, apex gradually narrowed into a long beak, orifice 2-toothed. Nutlets pale brown, tightly enveloped, broadly elliptic or suborbicular, plano-convex, ca. 1.2 mm, base shortly stipitate; stigmas 2. Fl. and fr. Jun–Aug.

Streamsides, forest margins and roadsides on slopes, grassy slopes, wet places; (1100–)1300–3700 m. Chongqing, Gansu, Guizhou, Hubei, Ningxia, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan [?Afghanistan, Bhutan, India, Indonesia (Java), Japan, Malaysia, Nepal, ?Pakistan, Philippines, Russia (Kuril Islands), Sri Lanka, Vietnam].

- 1a. Spikes 3–5, densely congested without space 485c. subsp. *pseudoarenicola*
- 1b. Spikes many (more than 10), dispersed, lower one slightly spaced.
 - 2a. Utricles lanceolate-ovate, ca. 3 × 1 mm, light green; spike ca. 5 mm wide 485a. subsp. *nubigena*
 - 2b. Utricles broadly lanceolate, tinged with red-brown 485b. subsp. *albata*

485a. *Carex nubigena* subsp. *nubigena*

云雾薹草(原亚种) yun wu tai cao (yuan ya zhong)

Carex nubigena f. *viridans* Kükenthal; *C. pleistogyna* V. I. Kreczetowicz.

Spikes many, ca. 5 mm wide. Utricles light green, lanceolate-ovate, ca. 3 × 1 mm.

Streamsides, forest margins and roadsides on slopes; (1100–)1500–3700 m. Gansu, Guizhou, Ningxia, Shaanxi, Xizang, Yunnan [?Afghanistan, India, Indonesia (Java), Nepal, ?Pakistan, Sri Lanka, Vietnam].

485b. *Carex nubigena* subsp. *albata* (Boott ex Franchet & Savatier) T. Koyama, *Bot. Mag.* (Tokyo) 72: 306. 1959.

褐红脉薹草 he hong mai tai cao

Carex albata Boott ex Franchet & Savatier, *Enum. Pl. Jap.* 2: 553. 1878; *C. nubigena* var. *albata* (Boott ex Franchet & Savatier) Kükenthal ex Matsumura.

Spikes many. Utricles broadly lanceolate, tinged with red-brown. Fl. and fr. Jun–Jul. $2n = 112$.

Grassy slopes; ca. 1900 m. Chongqing (Chengkou, Wuxi), Hubei (Badong, Shennongjia) [Japan, Russia (Kuril Islands)].

485c. *Carex nubigena* subsp. *pseudoarenicola* (Hayata) T. Koyama, *Fl. Taiwan* 5: 367. 1978.

聚生穗序薹 ju sheng sui xu tai

Carex pseudoarenicola Hayata, *Icon. Pl. Formosan.* 6: 118. 1916; *C. fallax* Steudel var. *pseudoarenicola* (Hayata) Ohwi.

Spikes 3–5, densely congested without space.

Wet places at high elevations. Taiwan [Malaysia, Philippines].

486. *Carex leiorrhyncha* C. A. Meyer, *Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans* 1: 217. 1831.

尖嘴薹草 jian zui tai cao

Rhizome short, indurate. Plants wholly ferruginous punctulate. Culms tufted, 20–80 cm tall, trigonous, scabrous above, clothed with ferruginous-brown sheaths at base. Leaves shorter than culm, loosely subtending culm, blades linear, 3–5 mm wide, flat, apex long acuminate; membranous side of leaf sheath transversely wrinkled, truncate at apex. Lower 1 or 2 involucre bracts leaflike, upper ones setaceous. Spicate inflorescence cylindrical, 5–8 cm; spikes numerous, dense, androgynous, ovate, 5–12 × 4–6 mm. Female glumes pale ferruginous, ovate, 2.2–3 mm, ferruginous punctulate, apex subacute, awned. Utricles pale yellow or pale green, longer than glume, lanceolate-ovate or oblong-ovate, plano-convex, 3.5–4 × ca. 1 mm, membranous, ferruginous punctulate, many veined on both faces, base rounded, not spongy, shortly stipitate, margins wingless, apex gradually narrowed into a smooth long beak, orifice 2-toothed. Nutlets loosely enveloped, elliptic or ovate-elliptic, plano-convex, 1–1.2 mm; style long, base not thickened. Fl. and fr. Jun–Jul. $2n = 76–80$.

Grassy roadsides and trailsides in mountains; 400–1000 m. Hebei, Heilongjiang, Shanxi [Korea, Russia (Far East, E Siberia)].

487. *Carex laevissima* Nakai, *Repert. Spec. Nov. Regni Veg.* 13: 245. 1914.

假尖嘴薹草 jia jian zui tai cao

Rhizome short, indurate. Culms tufted, 25–50 cm tall, slightly scabrous, clothed with pale brown bladeless sheaths at base. Leaves shorter than culm, blades linear, ca. 2 mm wide, flat, margins scabrous, apex long acuminate; membranous side of leaf sheath transversely wrinkled. Involucral bracts glume-like, ovate or oblong, awned at apex. Spicate inflorescence cylindrical, 3–4.5 × 1–1.3 cm, densely flowered above, sparsely below. Female glumes brownish ferruginous, ovate or ovate-oblong, ca. 3 mm, green 3-veined at middle, margins pale hyaline, apex acuminate. Utricles light green-yellow, longer than

glume, narrowly ovate or lanceolate-ovate, plano-convex, 3–3.5 × ca. 1 mm, membranous, not ferruginous punctulate, many veined on both faces, base subrounded, margins not winged, thickened, apex gradually narrowed into a long beak, sharp margins usually subsmooth, sometimes slightly scabrous, orifice 2-toothed. Nutlets brown, loosely enveloped, elliptic, plano-convex, 1–1.2 mm, lustrous, base shortly stipitate; style brown, slender, base not thickened; stigmas 2. Fl. and fr. Jun–Jul.

Meadows, forest margins; 500–1800 m. Heilongjiang, Jilin, Liaoning, Nei Mongol [Russia (Far East)].

56. Carex sect. Heleglochis Dumortier, Fl. Belg. 146. 1827.

圆锥藁草组 yuan zhui tai cao zu

Rhizome elongate, shortly creeping. Culms loosely tufted; sheaths red-brown or yellow punctate. Inflorescence ± branched; spikes androgynous, lower spikes forming a spicate-paniculate inflorescence. Utricles leathery, unequally biconvex.

About 15 species: N and W Africa, Asia, Australia, Europe, North America, Pacific islands; one species in China.

488. Carex diandra Schrank, Cent. Bot. Anmerk. 49 ["57"]. 1781.

圆锥藁草 yuan zhui tai cao

Rhizome shortly creeping, indurate. Culms loosely tufted, 30–45[–90] cm tall, compressed trigonous, scabrous above, clothed with brown or dark brown bladeless sheaths at base. Leaves shorter than culm, blades linear, 2–3 mm wide, flat, margins scabrous, apex acuminate. Involucral bracts setaceous, shorter than inflorescence. Inflorescence spicate-paniculate, 2–3.5 cm; sometimes lowest spike ± branched; spikes androgynous, broadly ovate, 5–7 mm. Female glumes ferruginous-brown, broadly ovate, ca. 3 × 2 mm, 3-veined, margins pale

hyaline, apex acuminate. Utricles ferruginous-brown, greenish above, subequaling glume, broadly ovate, plano-convex, ca. 3 × 2 mm, leathery, with 4 or 5 short veins at base abaxially, nerveless adaxially, base broadly subcordate, spongy, shortly stipitate, distal margins denticulate, apex gradually contracted into a serrulate-margined and narrowly winged beak ca. 1 mm. Nutlets tightly enveloped, obovate, plano-convex, ca. 1.4 × 1.2 mm, base broadly cuneate, shortly stipitate; style base slightly thickened; stigmas 2. Fl. and fr. Jul. $2n = 48, 50, 54, 60$.

Alpine lakes, marshes, boggy meadows. Nei Mongol [Russia (Far East, Siberia)]; C and SW Asia, C and N Europe, North America, Pacific islands (New Zealand)].

57. Carex sect. Vulpinae (Heuffel) Christ, Bull. Soc. Roy. Bot. Belgique 24(2): 18. 1885.

海绵基藁草组 hai mian ji tai cao zu

Vignea [unranked] *Vulpinae* Heuffel, Flora 27: 529. 1844.

Rhizome short or absent. Culms tufted; sheaths transversely rugulose. Involucral bracts glumelike, lower ones sometimes setaceous or narrow, leaflike. Spikes numerous, androgynous (lower ones sometimes female), many flowered, several aggregated on abbreviated branches, forming large, usually dense spicate-paniculate inflorescence. Utricles plano-convex, leathery or membranous, ± strongly patent at maturity, veined, base spongy, beak orifice 2-toothed.

About 15 species: mainly in North America, some species in E, N, and S Africa, temperate zone of Asia, S Australia, and Europe; four species (one endemic) in China.

- 1a. Female glumes without awn at apex 492. *C. earistata*
 1b. Female glumes with scabrous awn at apex.
 2a. Utricles lanceolate (i.e., broadest at base), membranous, beak slightly 2-toothed, deeply cuneate cleft abaxially 489. *C. stipata*
 2b. Utricles ovate, ovate-lanceolate, or oblong-lanceolate (i.e., broadest at lower 1/4 or 1/3).
 3a. Culms narrowly winged; female glumes with brown, slightly scabrous, 1–1.5 mm long awn; utricles leathery, with very small tubercles, at maturity reddish or ferruginous-brown, with thickened veins, beak deeply cleft abaxially, slightly cuneate-cleft adaxially 490. *C. vulpina*
 3b. Culms wingless; female glumes with green strongly scabrous shorter awn; utricles membranous, shining, without tubercles, at maturity greenish yellow or slightly brownish, thinly veined, beak equally cleft abaxially and adaxially 491. *C. otrubae*

489. Carex stipata Muhlenberg ex Willdenow, Sp. Pl. 4: 233. 1805.

海绵基藁草 hai mian ji tai cao

Rhizome short. Culms tufted, 40–70 cm tall, compressed trigonous, scabrous above, leafy in middle or lower, clothed at base with black-brown bladeless sheaths disintegrating into fibers. Leaves shorter or longer than culm, blades pale green, 6–

7 mm wide, flat, soft, margins serrulate, apex acuminate; membranous side of leaf sheath usually transversely wrinkled. Lower involucral bracts setaceous, upper ones glumelike. Inflorescence cylindrical, sometimes slightly branching, 3.5–5 × 1–1.5 cm; spikes androgynous, slightly stellate patent, simple above, branched below. Female glumes pale green, ovate, 3–4 × ca. 1.8 mm, green 1-veined costa excurrent into an awn 0.5–1.2 mm. Utricles pale ferruginous, longer than glume, cuneate-lanceolate, plano-convex, 4–5 mm, membranous, lustrous, many veined abaxially, base spongy, shortly stipitate, upper margins narrowly serrate winged, apex gradually narrowed into a serrate-margined long beak, beak cleft abaxially, 2-toothed at orifice. Nutlets tightly enveloped, broadly ovate, plano-convex or slightly biconvex, 1.5–1.7 mm, base shortly stipitate; style base slightly thickened; stigmas 2. Fl. and fr. Jul. $2n = 48, 52$.

Mixed forests, swampy meadows; 700–1700 m. Hubei, Jilin [Japan, Korea, Russia (Far East); North America].

490. *Carex vulpina* Linnaeus, Sp. Pl. 2: 973. 1753.

狐狸薹草 hu li tai cao

Rhizome short, indurate. Culms tufted, 40–70 cm tall, slightly stiff, compressed trigonous, scabrous narrowly winged above, clothed at base with pale brown sheaths disintegrating into fibers. Leaves longer than culm, blades pale green, linear, 5–7 mm wide, flat, margins scabrous, apex acuminate; membranous side of leaf sheaths ferruginous punctulate. Involucral bracts setaceous. Inflorescence cylindrical, 3–4.5 × 1.5–2 cm; spikes numerous, androgynous, ovate, 7–10 mm. Female glumes pale green, ovate, 2.5–3.5 mm, ferruginous punctulate, green 1-veined costa excurrent into a slightly scabrous awn. Utricles ferruginous-brown, longer than glume, ovate-lanceolate, plano-convex, 3.5–4 mm, leathery, distinctly veined abaxially, nerveless or veined only at base adaxially, base subrounded, spongy, shortly stipitate, upper margins narrowly winged, spinulose-serrate, apex gradually attenuate into a long beak, beak deeply cleft abaxially, cuneate-cleft adaxially, 2-toothed at orifice. Nutlets brown, oblong, biconvex, ca. 2 mm, lustrous; style base thickened; stigmas 2. Fl. and fr. Aug. $2n = 68$.

Wet grassy riverbanks; ca. 1200 m. Xinjiang [Russia (Siberia); C Asia, SW Asia (Caucasus), Europe].

58. *Carex* sect. *Holarrhenae* (Döll) Pax in Engler & Prantl, Nat. Pflanzenfam. 2(2): 124. 1888.

二柱薹草组 er zhu tai cao zu

Carex [unranked] *Holarrhenae* Döll, Fl. Baden, 245. 1857.

Plants usually with long creeping rhizome. Leaves: side of sheath opposite blade herbaceous and membranous only near orifice. Involucral bracts usually glumelike. Inflorescence dense, spicate; spikes androgynous (or unisexual). Utricles plano-convex, papery or membranous, veined, in upper half with very narrow denticulate winglike margins, beak scarcely 2-toothed. Nutlets loosely enveloped, shorter than utricle bodies.

About 11 species: temperate zone of Asia, Europe, North America; 11 species (five endemic) in China.

- 1a. Utricles leathery, with winglike thickened margins, scabrous above, veins numerous on both faces, conspicuously raised 503. *C. curaica*
 1b. Utricles membranous, with winged margins (at least above), veins not conspicuously raised.
 2a. Utricles winged on margins above.

491. *Carex otrubae* Podpera, Spisy Přír. Fak. Masarykovy Univ. 12: 15. 1922.

捷克薹草 jie ke tai cao

Rhizome short. Culms 40–70 cm tall, compressed trigonous, scabrous above. Leaves cauline, shorter than culm, blades pale green, linear, 3–7 mm wide, flat, margins serrate, apex acuminate, clothed with orange sheaths at base. Involucral bracts glumelike, lowest setaceous or leaflike, shorter than or equaling inflorescence. Inflorescence cylindrical, ca. 5 cm, interrupted below. Female glumes pale orange-brown, ovate, ca. 3 mm, 1-veined costa excurrent into an awn. Utricles pale green or orange-brown or dark gray, longer than glume, ovate or ovate-lanceolate, ca. 5 mm, lustrous, smooth, without conspicuous veins on both faces, apex gradually attenuate into a serrate beak, orifice 2-toothed, orange-brown. Nutlets elliptic, ca. 2.5 × 2 mm, base shortly stipitate; style base slightly thickened; stigmas 2. Fl. and fr. Jul. $2n = 58, 62, 64$.

Ravines, forest margins, moist places; ca. 1800 m. Xinjiang [Russia (W Siberia); C Asia, Europe].

492. *Carex earistata* F. T. Wang & Y. L. Chang ex S. Yun Liang, Acta Phytotax. Sin. 28: 153. 1990.

无芒薹草 wu mang tai cao

Rhizome absent. Culms 20–55 cm tall, trigonous, smooth, clothed with dark brown bladeless sheaths. Leaves shorter than culm, blades green, linear, 3–5 mm wide, flat, margins scabrous, apex acuminate; leaf sheath at mouth membranous. Involucral bracts glumelike, lowest setaceous. Spicate inflorescence cylindrical, 2.5–4.5 × 1–1.5 cm; upper spikes dense, lower ones interrupted; spikes 8–14, androgynous, ovate, 5–8 mm. Female glumes ferruginous, ovate, 2–2.5 mm, membranous, 1-veined, margins sometimes pale hyaline, apex without awn. Utricles ferruginous-brown, longer than glume, ovate-lanceolate, plano-convex, 3–3.5 mm, many veined abaxially, 3- or 4-veined adaxially, scabrous in distal half, base rounded, spongy, margins thickened, apex gradually attenuate into a long beak, beak deeply cleft abaxially, subentire adaxially. Nutlets oblong, plano-convex, ca. 1.5 × 1 mm, base contracted into a short stipe; style base thickened; stigmas 2.

- Streambanks; ca. 2000 m. Gansu.

- 3a. Utricles ovate or oblong-ovate, sparsely pilose on both faces, rather densely so above, and usually verruculose 493. *C. pallida*
- 3b. Utricles obovate-oblong, distally verruculose and sparsely hirsute on both faces 494. *C. maorshanica*
- 2b. Utricles narrowly winged on margins.
- 4a. Utricles pubescent and verruculose, ovate-lanceolate or lanceolate.
- 5a. Leaf blades 2.5–3.5 mm wide; utricles 3.5–4.5 mm, pubescent on both faces, sometimes sparsely long puberulent at base 495. *C. dailingensis*
- 5b. Leaf blades 1.5–2 mm wide; utricles 5.5–6.5 mm, verruculose and sparsely hirsute on both faces above 496. *C. laricetorum*
- 4b. Utricles glabrous, not verruculose, ovate or elliptic-ovate.
- 6a. Utricles ovate to broadly ovate, spongy 497. *C. lithophila*
- 6b. Utricles elliptic-ovate or ovate-lanceolate, not spongy.
- 7a. Spikes usually unisexual; plants dioecious (rarely monoecious); utricles usually sparsely ferruginous dotted 498. *C. unisexualis*
- 7b. Spikes usually androgynous, rarely unisexual; plants monoecious; utricles not ferruginous dotted.
- 8a. Utricles 2-toothed at orifice.
- 9a. Utricles gradually attenuate into a long beak; creeping rhizome subterete; plants of forests or sandy beaches 499. *C. yamatsutana*
- 9b. Utricles abruptly constricted into a short beak; creeping rhizome trigonous; plants of swamps 500. *C. pseudocuraica*
- 8b. Utricles obliquely truncate at orifice, deeply cleft to middle or 2-toothed abaxially.
- 10a. Female glumes oblong, ca. 4 mm, apex acuminate 501. *C. jiaodongensis*
- 10b. Female glumes broadly ovate or suborbicular, 2–2.2 mm, apex obtuse 502. *C. paracuraica*

493. *Carex pallida* C. A. Meyer, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 1: 215. 1831.

疣囊薹草 you nang tai cao

Rhizome long creeping, stout, indurate, clothed at base with brown glumelike sheaths disintegrating into fibers. Culms 6–100 cm tall, stout or slender, acutely trigonous, scabrous, with bladeless sheaths at base. Leaves shorter than culm, blades linear, 1–5 mm wide, flat, apex acuminate. Involucral bracts glumelike. Spicate inflorescence cylindric, usually interrupted, 1.8–7.5 × 0.7–1.3 cm; spikes ovate or oblong, 5–12 × 4–6 mm, upper and lower spikes usually androgynous, middle ones male, lower spikes entirely female. Female glumes pale yellow-brown, ovate, 2.2–3 × 1–1.5 mm, green 1-veined, margins broadly white hyaline. Utricles pale yellow-green, longer than glume, broadly ovate or oblong, plano-convex, 3.5–4 × 1.5–2 mm, membranous, sparsely pilose on both faces, rather densely so above, and usually verruculose, abaxially conspicuously 8–10-veined, adaxially 3–5-veined toward base, base rounded, shortly stipitate, margins broadly serrulate winged, apex gradually narrowed into a beak, beak compressed, deeply 2-toothed at orifice. Nutlets tightly enveloped, ovate or elliptic, plano-convex, 1.5–2 mm, base brown, cuneate or rounded, shortly stipitate; stigmas 2. Fl. and fr. Jun–Aug.

Forested slopes, meadows, forests, grasslands on forest margins. Heilongjiang, Jilin, Liaoning, Nei Mongol [Japan, Korea, Russia (Far East, E Siberia)].

- 1a. Culms rather stout; leaf blades 3–5 mm wide; inflorescence 3–7.5 cm 493a. var. *pallida*
- 1b. Culms slender; leaf blades 1–2 mm wide; inflorescence 1.8–2.5 cm 493b. var. *angustifolia*

493a. *Carex pallida* var. *pallida*

疣囊薹草(原变种) you nang tai cao (yuan bian zhong)

Carex accrescens Ohwi.

Culms rather stout. Leaf blades 3–5 mm wide. Inflorescence 3–7.5 cm. Fl. and fr. Jul–Aug.

Forested slopes, meadows. Heilongjiang, Jilin, Liaoning, Nei Mongol [Japan, Russia (Far East, E Siberia)].

493b. *Carex pallida* var. *angustifolia* Y. L. Chang, Fl. Pl. Herb. Chin. Bor.-Orient. 11: 207. 1976.

狭叶疣囊薹草 xia ye you nang tai cao

Culms slender. Leaf blades 1–2 mm wide. Inflorescence 1.8–2.5 cm. Fl. and fr. Jun–Jul.

- Forests, grasslands on forest margins. Nei Mongol.

494. *Carex maorshanica* Y. L. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 4(4): 40. 1979.

帽儿山薹草 mao er shan tai cao

Plants gray-green. Rhizome very long. Culms 30–50 cm tall, acutely trigonous, scabrous, clothed with dark purple bladeless sheaths at base. Leaves equaling or longer than culm, blades linear, 2.5–5 mm wide, flat, scabrous. Involucral bracts glumelike. Spicate inflorescence cylindric, 3.5–4.5 cm; spikes 8–14, ovate or oblong, 5–10 mm, male spike in middle, upper and lower spikes androgynous or spikes entirely androgynous (rarely lowest female). Female glumes pale brown, oblong-ovate, greenish costa 1-veined. Utricles pale yellowish brown-green, longer than glume, obovate-oblong, plano-convex, 5–5.5 mm, distally verruculose and sparsely hirsute on both faces, abaxially 7–9-veined, adaxially faintly veined or nerveless, base cuneate, shortly stipitate, upper margins narrowly serrate winged, apex gradually attenuate into a long beak, orifice 2-toothed. Stigmas 2. Fr. Jun.

- Meadows in forests. Heilongjiang.

495. *Carex dailingensis* Y. L. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 4(4): 42. 1979.

带岭薹草 dai ling tai cao

Plant gray-green. Rhizome long and creeping. Culms 35–58 cm tall, acutely trigonous, scabrous, clothed at base with brown bladeless sheaths. Leaves longer than or equaling culm, blades linear, 2.5–3.5 mm wide, flat. Involucral bracts glume-like. Spicate inflorescence rather small, 1–1.8 cm; spikes 5–9, ovate-lanceolate, 3–4 mm, upper and lower spikes female, male in middle, rarely mixed spikes, oblong-ovate, 4–5(–6) mm. Female glumes yellowish brown, oblong-ovate, margins pale hyaline, apex acute. Utricles brown, longer than glume, ovate-lanceolate or lanceolate, plano-convex, 3.5–4.5 mm, subleathery, pubescent on both faces, sometimes sparsely puberulent at base, faintly 3–6-veined abaxially, nearly nerveless adaxially, base cuneate, shortly stipitate, margins narrowly serrate winged, apex gradually attenuate into a long beak, orifice 2-toothed. Style base curved; stigmas 2. Fr. Jul–Aug.

• Slopes; ca. 1100 m. Heilongjiang.

496. *Carex laricetorum* Y. L. Chou, Bull. Herb. N. E. Forest. Acad., Harbin 1: 19. 1959.

落叶松薹草 luo ye song tai cao

Rhizome slender. Culms 20–60 cm tall, slender, trigonous, scabrous above, clothed at base with pale brown bladeless sheaths. Leaves shorter than culm, blades linear, 1.5–2 mm wide, flat, scabrous. Involucral bracts glumelike. Spicate inflorescence oblong or oblong-ovate, 1.8–2.7 cm; spikes 6–10, androgynous or mixed gynaeandrous, rarely female, ovate or oblong-ovate, 5–7 mm. Female glumes oblong-ovate, margins pale hyaline, apex acute. Utricles pale ferruginous-yellow, slightly greenish above, longer than glume, ovate-lanceolate, plano-convex, (5–)5.5–6.5 mm, subleathery, sparsely verruculose and hirsute above adaxially, 5–10-veined abaxially, 3–5-veined adaxially, base subrounded, sessile, upper margins narrowly serrate winged, apex gradually attenuate into a conic long beak, orifice 2-toothed. Stigmas 2.

• Sparse forests; ca. 1300 m. S Jilin (Changbai Shan).

497. *Carex lithophila* Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 28: 328. 1855.

二柱薹草 er zhu tai cao

Rhizome long creeping, subcylindric. Culms 10–60 cm tall, acutely trigonous, scabrous above, clothed with bladeless sheaths at base. Leaves shorter than culm, blades linear, 2–4 mm wide, flat, margins scabrous, apex acuminate. Involucral bracts glumelike. Spicate inflorescence cylindrical or subconic, 2–5.5 × 0.7–1.5 cm, usually interrupted below; spikes 10–20, terminal and lower spikes female, middle and upper ones male or androgynous (or entirely female), ovate, 5–9 × 2–3 mm; female spikes broadly ovate, 7–10 × 5–7 mm. Female glumes pale ferruginous-brown, ovate-lanceolate or oblong-ovate, ca. 3.5 mm, margins white hyaline, apex acute. Utricles stramineous, longer than glume, broadly ovate, plano-convex, 3.5–4 × 1.8–2 mm, thinly membranous, spongy, slender, several veined on both faces, base rounded, upper margins serrulate winged,

apex abruptly contracted into a beak, orifice 2-toothed. Nutlets yellow-brown, loosely enveloped, elliptic or oblong, plano-convex, 1.5–1.8 mm, base shortly stipitate; style base slightly thickened; stigmas 2. Fl. and fr. May–Jun.

Swamps, riverbanks, meadows; 100–700(–1700) m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Xinjiang [Japan, Korea, Mongolia, Russia (Far East, E Siberia)].

498. *Carex unisexualis* C. B. Clarke, J. Linn. Soc., Bot. 36: 316. 1904.

单性薹草 dan xing tai cao

Carex fluviatilis Boott var. *unisexualis* (C. B. Clarke) Kükenthal.

Rhizome long creeping, slender, clothed with brown sheaths disintegrating into fibers. Culms (10–)15–50 cm tall, compressed trigonous, with pale brown sheaths at base. Leaves shorter than culm, blades linear, 1–2.5 mm wide, flat or plicate, apex acuminate. Involucral bracts setaceous or glumelike. Plants dioecious (rarely monoecious); female spicate inflorescence cylindrical, 2.5–8 × 0.7–1 cm; male inflorescence rather narrow, 5–6 mm wide; spikes 15–30, unisexual, rarely androgynous; female spikes oblong-ovate, 5–8 × ca. 4 mm wide; male spikes oblong, ca. 6 × 2–3 mm. Female glumes pale green, ovate, 2–3 mm, sparsely ferruginous punctulate, margins white hyaline, green 1-veined costa excurrent into an awn at acute apex. Utricles greenish or pale, ferruginous dotted, longer than glume, ovate, plano-convex, 2–3 × 1–1.5 mm, membranous, many veined on both faces, base subrounded, spongy, shortly stipitate, upper margins serrulate winged, apex gradually narrowed into a scabrous beak, orifice 2-toothed. Nutlets dark brown, loosely enveloped, ovate or elliptic, plano-convex, ca. 1.2 mm, lustrous, base shortly stipitate, apex rounded; stigmas 2. Fl. and fr. Apr–Jun.

Lakesides, ponds, swamps, grasslands. Anhui, Hubei, Hunan, Jiangsu, Jiangxi, Yunnan, Zhejiang [Japan].

499. *Carex yamatsutana* Ohwi, Acta Phytotax. Geobot. 1: 72. 1932.

山林薹草 shan lin tai cao

Carex diplasiocarpa V. I. Kreczetowicz.

Rhizome long creeping, subterete, clothed with brown scales. Culms ca. 20 cm tall, slender, trigonous, slightly scabrous above, clothed with brown or pale brown sheaths at base. Leaves ± equaling culm, blades linear, 2–3 mm wide, flat, margins slightly scabrous, apex acuminate. Involucral bracts glumelike. Spicate inflorescence oblong, 1–2 cm, sometimes interrupted below; spikes androgynous or gynaeandrous, sometimes lower ones female, ovate. Female glumes pale or slightly ferruginous, green at middle, lanceolate, ca. 2.3 mm, margins white hyaline, apex acute. Utricles yellowish green, longer than glume, ovate, plano-convex, 3–4 mm, membranous, many veined abaxially, faintly 3–5-veined adaxially, base subrounded, shortly stipitate, upper margins narrowly serrulate winged, apex gradually attenuate into a long beak, orifice membranous, obliquely truncate, 2-toothed. Nutlets somewhat tightly enveloped, oblong, ca. 1.3 mm; stigmas 2. Fl. and fr. Jun–Jul.

Forests. Heilongjiang, Jilin, Liaoning, Nei Mongol [Russia (Far East, E Siberia)].

500. *Carex pseudocuraica* F. Schmidt, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 12(2) [Reis. Amur-Land., Bot.]: 67. 1868.

漂筏藁草 piao fa tai cao

Carex chordorrhiza Ehrhart ex Linnaeus f. var. *pseudocuraica* (F. Schmidt) Trautvetter.

Rhizome rather thick, short, with long, trigonous, horizontal, rather thickened stolons. Culms 15–40 cm tall, compressed trigonous, scabrous above, clothed with gray-brown bladed sheaths. Leaves shorter than culm, blades greenish, linear, 1.5–3 mm wide, flat. Involucral bracts glumelike. Inflorescence slightly loose, oblong-cylindric, 1.5–3 cm; spikes 5–10, usually androgynous, rarely unisexual, rarely entirely female, elliptic-ovate, 4–10 mm. Female glumes ferruginous-yellow, glumelike, ovate or elliptic-ovate, 2.5–4 × ca. 1.5 mm, margins white hyaline, apex acute. Utricles pale brown or stramineous, equaling or longer than glume, ovate or elliptic, plano-convex, 2.5–4 mm, membranous, spongy, 6- or 7-veined or more abaxially, rather rarely faintly veined adaxially, base rounded or cuneate, shortly stipitate, upper margins narrowly winged, apex abruptly contracted into a short compressed beak, orifice pale hyaline, obliquely truncate, slightly 2-toothed adaxially. Nutlets slightly loosely enveloped, ovate or elliptic, plano-convex, 1.2–1.7 mm, base shortly stipitate; style base slightly thickened; stigmas 2. Fr. Jun.

Swamps, lakesides. Heilongjiang, Jilin, Nei Mongol [Japan, Korea, Russia (Far East, E Siberia)].

This species is sometimes placed in its own section, *Carex* sect. *Chordorrhizae* (Heuffel) Meinshausen.

501. *Carex jiaodongensis* Y. M. Zhang & X. D. Chen, Acta Phytotax. Sin. 31: 381. 1993.

胶东藁草 jiao dong tai cao

Rhizome creeping, elongate, 50–100 cm, dark brown, clothed with sheaths disintegrating into fibers. Culms 15–20 cm tall, trigonous, scabrous above, clothed with brown bladeless sheaths at base. Leaves shorter than culm, blades linear, 2–3 mm wide, margins scabrous, apex acuminate. Involucral bracts glumelike. Spicate inflorescence oblong or cylindric, ca. 2 cm; spikes 6–10, androgynous, sometimes female spikes at base and male spikes at middle, ovate, ca. 5 mm. Female glumes chestnut-brown, oblong, ca. 4 mm, margins pale hyaline, apex acuminate. Utricles pale green, ferruginous above, equaling or slightly shorter than glume, plano-convex, 3.5–4 mm, many veined on both faces, base contracted, upper margins serrulate

winged, apex gradually narrowed into a ferruginous, obliquely truncate, long beak 2-toothed abaxially. Nutlets oblong, ca. 1.8 mm; style base slightly thickened; stigmas 2. Fl. and fr. May.

• Sandy coastal beaches. E Shandong (Muping).

502. *Carex paracuraica* F. T. Wang & Y. L. Chang ex S. Yun Liang, Fl. Reipubl. Popularis Sin. 12: 527. 2000.

陇县藁草 long xian tai cao

Rhizome long creeping, stout. Culms 10–20 cm tall, trigonous, scabrous, clothed with pale brown bladeless sheaths at base. Leaves subequaling or shorter than culm, blades linear, 3–5 mm wide, flat, rarely plicate, margins scabrous, apex acuminate. Involucral bracts glumelike. Spicate inflorescence cylindric, 3–4.5 cm; spikes 6–20, androgynous, ovate or oblong-ovate, 5–7 × 3–5 mm. Female glumes pale ferruginous, broadly ovate or suborbicular, 2–2.2 × 1.5–1.8 mm, membranous, 1-veined, margins white hyaline, apex obtuse. Utricles pale ferruginous-yellow, longer than glume, ovate-lanceolate, plano-convex, 3–3.5 mm, many veined abaxially, 2–4-veined adaxially, base subrounded, shortly stipitate, margins narrowly serrulate winged, apex gradually attenuate into a long beak, beak ferruginous, deeply cleft to middle abaxially, membranous, 2-toothed at orifice. Nutlets rather loosely enveloped, elliptic, plano-convex, ca. 1.5 mm, base substipitate, apex subrounded; stigmas 2. Fl. and fr. May–Jun.

• Ravines; ca. 1900 m. Shaanxi (Longxian).

503. *Carex curaica* Kunth, Enum. Pl. 2: 375. 1837.

库地藁草 ku di tai cao

Rhizome stout, long creeping, indurate. Culms 20–38 cm tall, trigonous, scabrous above, clothed with brown bladeless sheaths at base. Leaves shorter than culm, blades linear, 3–3.5 mm wide, flat, stiff, margins scabrous. Involucral bracts glumelike. Spicate inflorescence oblong or ovate, 1.5–2 cm, dense; spikes numerous, androgynous, ovate, 5–7 × ca. 4 mm. Female glumes ferruginous, ovate, ca. 2.5 × 1.5 mm, 1-veined, margins pale hyaline, apex acute. Utricles stramineous, longer than glume, ovate or ovate-lanceolate, plano-convex, 2.8–3.5 × ca. 1.2 mm, leathery, glabrous, scabrous above, many veined on both faces, veins conspicuously raised, base subrounded, shortly stipitate, margins winglike, thickened, apex abruptly contracted into a ferruginous, scabrous beak, orifice white hyaline, deeply cleft abaxially, shallowly cleft adaxially, 2-toothed. Nutlets brown, tightly enveloped, elliptic or ovate, plano-convex or compressed trigonous; style slightly thickened; stigmas 2. Fl. and fr. Jul–Aug.

Shallow water of rivers, swamps, forest margins; 1900–2500 m. Xinjiang [N Mongolia, Russia (Siberia)].

59. *Carex* sect. *Foetidae* (Tuckerman ex L. H. Bailey) Kükenthal in Engler, Pflanzenr. 38(IV. 20): 114. 1909.

烈味藁草组 lie wei tai cao zu

Carex [unranked] *Foetidae* Tuckerman ex L. H. Bailey in Coulter, Man. Bot. Rocky Mt. 390. 1885.

Plants colonial or loosely caespitose, rhizomatous. Involucral bracts glumelike. Spikes androgynous, ovate, congested in densely capitate or spicate inflorescence, inflorescence ovate or oblong. Female glumes ovate or lanceolate, apex acute. Utricles erect to patent, ovate or lanceolate, biconvex or plano-convex, subleathery or membranous, ± conspicuously veined, beak obliquely truncate at orifice. Nutlets loosely enveloped; stigmas 2.

About ten or 11 species: Asia, Europe, North and South America; six species (one endemic) in China.

- 1a. Utricles leathery 504. *C. duriuscula*
 1b. Utricles papery or membranous.
 2a. Utricles veined.
 3a. Leaf blades setaceous-involute, 1–1.5 mm wide 505. *C. reptabunda*
 3b. Leaf blades rather broad, flat, 4–6 mm wide 506. *C. pycnostachya*
 2b. Utricles nerveless or faintly veined or ± veined at base.
 4a. Plants taller 10–30 cm tall; leaf blades flat or plicate 507. *C. enervis*
 4b. Plants shorter, (2–)3–7 cm tall; leaf blades linear-involute.
 5a. Female glumes ovate or elliptic, castaneous-brown; culms 3–10 cm tall 508. *C. pseudofortida*
 5b. Female glumes lanceolate, pale brown; culms to 2 cm tall 509. *C. sagaensis*

504. *Carex duriuscula* C. A. Meyer, Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans 1: 214. 1831.

寸草 cun cao

Plants with slender, long creeping rhizomes and bunches of shoots forming loose tufts. Culms 5–20 cm tall, slender, smooth, clothed at base with gray-brown sheaths disintegrating into fibers. Leaves shorter than culm, blades linear, 1–1.5 mm wide, involute, stiff, margins slightly scabrous. Involucral bracts glumelike. Inflorescence ovate or globose, 5–15 × ca. 5 mm; spikes 3–6, androgynous, ovate, dense, 4–6 mm. Female glumes ferruginous-brown, broadly ovate or elliptic, 3–3.2 mm, white hyaline on margins and apex, apex acute or obtuse. Utricles ferruginous or yellow-brown, shorter to slightly longer than glume, ovate, ovate-elliptic, or broadly ovate, plano-convex, 3–4.5 × ca. 2 mm, leathery, slightly lustrous at maturity, many veined on both faces, base subrounded, spongy, thickly stipitate, apex abruptly contracted into a short scabrous beak, orifice white hyaline, obliquely truncate, shallowly cleft abaxially. Nutlets slightly loosely enveloped, suborbicular or broadly elliptic, 1.5–2 × 1.5–1.7 mm; style base thickened; stigmas 2. Fl. and fr. Apr–Jun.

Grasslands, slopes, wet places or rocky and sandy areas on riverbanks, roadsides, semidry regions, meadows; (below 100–)200–700 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Xinjiang, Xizang [Afghanistan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, New Guinea, Pakistan, Russia (Far East, Siberia), Tajikistan, Turkmenistan, Uzbekistan; SW Asia, North America].

- 1a. Leaf blades linear-involute 504a. subsp. *duriuscula*
 1b. Leaf blades flat.
 2a. Female glumes usually longer than or equaling utricles, broadly white hyaline on margins and at apex, apex subobtusate; inflorescence white 504b. subsp. *rigescens*
 2b. Female glumes usually shorter than utricles, rarely as long, brown-castaneous, with narrower hyaline margins, apex acute; inflorescence brownish 504c. subsp. *stenophylloides*

504a. *Carex duriuscula* subsp. *duriuscula*

寸草(原亚种) cun cao (yuan ya zhong)

Carex duriuscula var. *tenuispica* X. Y. Yuan; *C. stenophylla* Wahlenberg var. *duriuscula* (C. A. Meyer) Trautvetter.

Leaf blades linear-involute. Female glumes ferruginous-brown, white hyaline on margins.

Grasslands, slopes, wet places on riverbanks, roadsides; 200–700 m. Gansu, Heilongjiang, Jilin, Liaoning, Nei Mongol [Kazakhstan, Korea, E Mongolia, New Guinea, Russia (Far East, Siberia); North America].

504b. *Carex duriuscula* subsp. *rigescens* (Franchet) S. Yun Liang and Y. C. Tang, Acta Phytotax. Sin. 28: 155. 1990.

白颖藁草 bai ying tai cao

Carex stenophylla var. *rigescens* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 7: 128. 1884; *C. rigescens* (Franchet) V. I. Kreczetowicz; *C. stenophylla* subsp. *rigescens* (Franchet) S. Yun Liang.

Leaf blades flat. Inflorescence white. Female glumes usually longer than or equaling utricles, broadly white hyaline on margins and at apex, apex subobtusate.

Slopes, semidry regions, meadows. Gansu, Hebei, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi [Russia (Far East)].

504c. *Carex duriuscula* subsp. *stenophylloides* (V. I. Kreczetowicz) S. Yun Liang & Y. C. Tang, Acta Phytotax. Sin. 28: 155. 1990.

细叶藁草 xi ye tai cao

Carex stenophylloides V. I. Kreczetowicz in B. Fedtschenko et al., Fl. Turkmen. 1: 230. 1932; *C. duriusculiformis* V. I. Kreczetowicz; *C. longepedicellata* Boeckeler; *C. stenophylla* var. *longepedicellata* (Boeckeler) Kükenthal; *C. stenophylla* subsp. *stenophylloides* (V. I. Kreczetowicz) T. V. Egorova.

Leaf blades flat. Inflorescence brownish. Female glumes brown-castaneous, usually shorter than utricles, rarely as long, with narrower hyaline margins, apex acute.

Meadows, rocky and sandy areas on riverbanks. Gansu, Nei Mongol, Shaanxi, Xinjiang, Xizang [Afghanistan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

505. *Carex reptabunda* (Trautvetter) V. I. Kreczetowicz, Izv. Bot. Sada Akad. Nauk S.S.S.R. 30: 134. 1932.

走茎藁草 zou jing tai cao

Carex stenophylla Wahlenberg var. *reptabunda* Trautvetter, Trudy Imp. S.-Peterburgsk. Bot. Sada 1(2): 194. 1871; *C. decurticaulis* Ohwi; *C. heilongjiangensis* Y. L. Chou.

Rhizome long creeping. Culms 10–60 cm tall, slender, subflexuose, smooth or slightly scabrous above. Leaves shorter than culm, blades linear, 1–1.5 mm wide, involute on margins, rarely plicate, scabrous above. Involucral bracts glumelike. Spicate inflorescence ovate or oblong, somewhat lax, 8–12 × 4–10 mm; spikes 2–5, androgynous, ovate. Female glumes ferruginous, broadly ovate or oblong-ovate, 3–3.5 × ca. 1.5 mm, 1-veined, margins broadly white hyaline, apex acute. Utricles pale, ferruginous above, subequaling or longer than glume, ovate or oblong-ovate, plano-convex, 3–4.5 mm, membranous, finely many veined or nerveless on both faces, base subrounded, shortly stipitate, apex gradually attenuate into a short smooth beak, orifice white hyaline, 2-toothed. Nutlets loosely enveloped, ovate, plano-convex or slightly biconvex, 1.5–2 mm; style short; stigmas 2. Fl. and fr. May–Jul.

Wet grasslands. Heilongjiang, Jilin, Liaoning, Nei Mongol, Shaanxi [Mongolia, Russia (E Siberia)].

506. *Carex pycnostachya* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 522. 1842.

密穗藁草 mi sui tai cao

Carex curaica Kunth subsp. *pycnostachya* (Karelin & Kirilov) T. V. Egorova; *C. curaica* var. *pycnostachya* (Karelin & Kirilov) Kükenthal.

Rhizome long creeping. Culms 10–50 cm tall, obtusely trigonous, stout. Leaves flat, blades linear, 4–6 mm wide, subfalcate, apex acuminate. Involucral bracts leaflike at base. Spicate inflorescence ovate, dense; spikes androgynous (sometimes male ones in middle), oblong, 6–12(–15) mm. Female glumes pale brown, 1-veined, apex acuminate. Utricles brown or olivaceous, longer than glume, ovate to ovate-elliptic, plano-convex, 3.2–4 mm, 5–8-veined, with veins evanescent, margins scarcely scabrous winged, apex gradually contracted into a beak. Stigmas 2. Fl. and fr. Jun–Jul.

Grassy slopes, alpine meadows; ca. 1800 m. Xinjiang [NW Mongolia, Russia (W Siberia); C Asia].

507. *Carex enervis* C. A. Meyer in Ledebour, Fl. Altaic. 4: 209. 1833.

无脉藁草 wu mai tai cao

Carex enervis subsp. *chuanxibeiensis* S. Yun Liang & Y. C. Tang; *C. stenophylla* Wahlenberg var. *enervis* (C. A. Meyer) Kükenthal.

Rhizome thick, long creeping. Culms 10–30 cm tall, trigonous, slightly curved, scabrous above, clothed with pale brown sheaths at base. Leaves shorter than culm, blades gray-green, linear, 2–3 mm wide, flat or plicate, margins scabrous, apex acuminate. Involucral bracts setaceous or glumelike. Spic-

ate inflorescence ovate or oblong, 1–2 × 0.7–1.4 cm; spikes numerous, androgynous. Female glumes pale brown to ferruginous, oblong or broadly ovate, 3–3.5 × 1.8–2 mm, margins narrowly white hyaline, 1-veined costa forming a mucro, apex acute or acuminate. Utricles stramineous to ferruginous, ± equaling glume, oblong-ovate or elliptic, plano-convex, ca. 3 × 1.2 mm, papery, usually nerveless or several veined at base abaxially, nerveless adaxially, base subrounded or cuneate, margins thickened, apex gradually tapering into a scabrous-margined beak, orifice pale hyaline, 2-toothed. Nutlets pale gray, tightly enveloped, elliptic-obovate, 1.2–1.5 × ca. 1 mm, lustrous; stigmas 2. Fl. and fr. Jun–Aug.

Wet places, roadsides, meadows, swamps; 2500–4500 m. Gansu, Heilongjiang, Jilin, Nei Mongol, Qinghai, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Mongolia, Russia (Siberia)].

508. *Carex pseudofetida* Kükenthal, Bot. Tidsskr. 28: 225–226. 1907.

无味藁草 wu wei tai cao

?*Carex roborowskii* V. I. Kreczetowicz; *C. vulpinaris* Nees var. *pseudofetida* (Kükenthal) Y. C. Yang.

Rhizome slender, long creeping. Culms 3–10 cm tall, acutely trigonous, smooth, clothed with brown sheaths at base. Leaves shorter than or subequaling culm, blades linear, 1–2 mm wide, flat, or involute on margins, stiff, apex acute. Involucral bracts glumelike. Inflorescence capitate, globose or ovate-oblong, 6–12 × 6–8 mm; spikes 3–5, androgynous, oblong, 5–6 mm, sessile. Female glumes castaneous-brown, ovate or elliptic, 3–4 mm, membranous, 1-veined, apex acute. Utricles subequaling glume, lanceolate, plano-convex, 3.5–4.5 mm, base subrounded, stipitate, faintly veined, apex gradually tapering into a slightly scabrous beak, orifice 2-toothed. Stigmas 2. Fl. and fr. Apr–Jul. $2n = 62$.

Slopes, moist places, meadows; 3700–5200 m. Qinghai, Xizang [Afghanistan, Bhutan, India, Kashmir, Mongolia, Nepal, Russia (W Siberia); C Asia, SW Asia (Iran)].

509. *Carex sagaensis* Y. C. Yang, Fl. Xizang. 5: 439. 1987.

萨嘎藁草 sa ga tai cao

Rhizome short. Culms densely tufted, ca. 2 cm tall, trigonous, smooth. Leaves longer or shorter than culm, blades needlelike, less than ca. 1 mm wide. Involucral bracts glumelike, broadly obovate, sheathless, awned at apex. Inflorescence capitate, broadly elliptic or ovate, 6–8 mm; spikes 2 or 3, androgynous, elliptic, 5–6 mm. Female glumes pale brown, lanceolate, ca. 4.5 mm, membranous, 1-veined. Utricles subequaling glume, lanceolate, membranous, base cuneate, apex gradually attenuate into a slightly scabrous beak, orifice 2-toothed. Nutlets broadly oblong, compressed trigonous, ca. 2 mm, base shortly stipitate; stigmas 2. Fl. and fr. Aug.

• Meadows; ca. 5000 m. Xizang (Saga).

60. *Carex* sect. *Physodeae* Christ ex Kükenthal in Engler, Pflanzenr. 38(IV. 20): 118. 1909.

囊果藁草组 nang guo tai cao zu

Rhizome slender, long creeping. Involucral bracts glumelike. Spikes androgynous, congested in capitate inflorescence, oblong-

ovate. Utricles thinly membranous, finally becoming strongly inflated bulliform, ca. 1 cm, veined, base rounded, apex with very short, obliquely truncate beak. Nutlets loosely enveloped; stigmas 2.

Three species: Europe (between lower Volga and lower Ural rivers) and arid and subarid areas of Asia; one species in China.

510. *Carex physodes* M. Bieberstein, Mém. Soc. Imp. Naturalistes Moscou 2: 104. 1809.

囊果薹草 nang guo tai cao

Rhizome slender, long creeping. Culms 20–25 cm tall, erect, obtusely trigonous, slender, smooth, clothed with pale brown sheaths at base. Leaves shorter than culm, blades gray-green, linear, 1–2 mm wide, plicate or involute, slightly curved, margins scabrous. Involucral bracts glumelike, setaceous at base. Inflorescence capitate, dense, oblong-ovate or subglobose, 2–3 × 1.2–2 cm; spikes 3–6, androgynous. Female glumes brown, broadly ovate-lanceolate, 3–4 × ca. 2 mm, 1-veined,

margins broadly white hyaline, apex acute. Utricles yellowish ferruginous, much longer and broader than glume, ovate when young, strongly inflated bulliform to globose or elliptic at maturity, 1–1.5 × 0.5–1 cm, membranous, yellowish orange or reddish brownish veined, base rounded, slightly shortly stipitate, apex abruptly contracted into a short beak, orifice white hyaline, 2-toothed. Nutlets yellowish, very loosely enveloped, elliptic or suborbicular, flat, ca. 3 × 2 mm, sometimes with rudimentary rachis at base; style base thickened; stigmas 2. Fl. and fr. Apr–May.

Sandy deserts; ca. 600 m. Xinjiang [Afghanistan, Russia; Europe].

61. *Carex* sect. *Dispermae* Ohwi, Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 11: 237. 1936.

二籽薹草组 er zi tai cao zu

Rhizome slender, creeping. Culms slender. Involucral bracts glumelike, setaceous at base. Spikes androgynous, few flowered, globose, distant. Female glumes pale. Utricles elliptic, biconvex, leathery, lustrous, veined, base spongy, apex abruptly contracted into a short beak. Nutlets tightly enveloped; style base not thickened; stigmas 2.

One species: NE Asia (NE China, E Russia), N Europe (Scandinavia), North America.

511. *Carex disperma* Dewey, Amer. J. Sci. Arts 8: 266. 1824.

二籽薹草 er zi tai cao

Rhizome slender, creeping, branching. Culms 30–50 cm tall, acutely trigonous, weak, scabrous above. Leaves shorter than culm, blades bright green, linear, 1–1.5 mm wide, flat, soft. Involucral bracts setaceous at base, glumelike above. Spikes 2–5, androgynous, distant, globose, with 1 or 2 male flowers above and 2 or 3 female flowers below. Female glumes pale, ovate, 2–2.5 mm, 3-veined costa forming a short mucro.

Utricles brown, slightly longer than glume, elliptic, biconvex, 2.5–3 × 1.3–1.5 mm, leathery, lustrous, many veined on both faces, base subrounded, spongy, shortly stipitate, apex abruptly contracted into a smooth beak up to 0.25 mm, orifice emarginate. Nutlets reddish brown, tightly enveloped, elliptic, biconvex, 1.5–1.8 mm, lustrous; style base not thickened; stigmas 2. Fl. and fr. Jun–Jul. $2n = 70$.

Swamps, wet places in forests. Heilongjiang, Jilin, Nei Mongol [Russia (Far East, Siberia); N Europe (Scandinavia), North America].

62. *Carex* sect. *Macrocephalae* Kükenthal in Engler, Pflanzenr. 38(IV. 20): 186. 1909.

筛草组 shai cao zu

Rhizome long creeping, indurate. Plants monoecious or dioecious. Involucral bracts glumelike or narrowly leaflike, sometimes surpassing inflorescence. Inflorescence oblong-ovate; spikes numerous, male or female, rarely androgynous, ovate. Female glumes larger, ferruginous. Utricles lanceolate-ovate, plano-convex, 10–15 mm, thickly leathery, many veined, serrulate winged, apex with long beak, orifice deeply 2-toothed. Stigmas 3, rarely 2.

Two species: E Asia, North America; one species in China.

512. *Carex kobomugi* Ohwi, Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 5: 281. 1930.

筛草 shai cao

Carex macrocephala Willdenow ex Sprengel var. *kobomugi* (Ohwi) Miyabe & Kudô; *C. macrocephala* var. *longibracteata* Oliver.

Rhizome long creeping, clothed with dark brown fibrous remnants of old glumes. Culms 10–20 cm tall, 3–4 mm thick, erect, rigid, obtusely trigonous, subsmooth, clothed at base with dark brown sheaths disintegrating into parallel fibers. Leaves

longer than culm, blades yellow-green, broadly linear, 3–8 mm wide, flat, ± curved, leathery, serrulate margined. Lowest involucral bracts narrowly leaflike. Plants dioecious, rarely monoecious; male inflorescence oblong, 4–5 × 1.2–1.3 cm; female inflorescence ovate to oblong, 4–6 × ca. 3 cm; spikes numerous, ovate, 10–15 mm. Female glumes yellow-green, ovate to narrowly ovate, 12–16 × 4–5 mm, leathery, many veined, margins broadly hyaline, broad costa excurrent into a long scabrous awn, apex acute, usually toothed. Utricles yellow-greenish, slightly shorter than or ± equaling glume, lanceolate or ovate-lanceolate, plano-convex, 10–15 × ca. 4 mm, leathery, lustrous, finely many veined on both faces, narrowly winged margins irregu-

larly serrulate-scabrous on upper part, apex gradually tapering into a long weakly incurved beak, orifice 2-toothed. Nutlets olivaceous, loosely enveloped, oblong-obovate or oblong, compressed trigonous, base slightly cuneate, apex rounded; style sparsely pilose below, base slightly thickened; stigmas 2. Fl. and fr. Jun–Sep. $2n = 84$.

Seashores, riversides, sandy lakeshores. Anhui, Hebei, Heilong-

jiang, Jiangsu, Liaoning, Qinghai, Shandong, Taiwan, Zhejiang [Japan, Korea, Russia (Far East)].

Carex macrocephala Willdenow ex Sprengel has been attributed to China (see Fl. N. Amer. 23: 309. 2002); its range includes coastal areas of NW North America and NE Asia (Japan, Russia). However, we have found no specimens from China, and the reports probably can be traced to an older usage of *C. macrocephala*, which included *C. kobomugi*.

63. Carex sect. Gibbae Kükenthal in Engler, Pflanzenr. 38(IV. 20): 238. 1909.

穹隆臺草组 qiong long tai cao zu

Rhizome short. Involucral bracts leaflike, long. Spikes gynaeandrous, densely flowered. Female glumes orbicular-ovate, awned. Utricles erect, broadly ovate, compressed trigonous, subleathery, nerveless, margins winged, apex with short beak. Style base thickened; stigmas 3.

One species: China, Japan, Korea.

513. Carex gibba Wahlenberg, Kongl. Vetensk. Acad. Nya Handl. 24: 148. 1803.

穹隆臺草 qiong long tai cao

Rhizome short. Culms tufted, 20–60 cm tall, erect, obtusely trigonous, smooth, clothed at base with brown sheaths disintegrating into fibers. Leaves longer than or equaling culm, blades linear, 3–4 mm wide, flat, rather soft. Involucral bracts leaflike, longer than inflorescence. Spicate inflorescence rather dense above, interrupted below, sometimes branched in lowest spike, 3–8 cm; spikes gynaeandrous, ovate or oblong, 5–12 × 3–5 mm, densely flowered. Female glumes whitish, subcordate,

green 3-veined costa excurrent into an awn 0.7–1 mm, apex subcuneate. Utricles greenish, longer than glume, suborbicular or broadly ovate, plano-convex, 3.2–3.5 × ca. 2 mm, membranous, smooth, nerveless, base contracted, cuneate, margins winged, scabrous above, apex abruptly contracted into a short beak, orifice 2-toothed. Nutlets greenish, tightly enveloped, broadly ovoid, biconvex, ca. 2.2 × 1.5 mm, apex with a discoid appendage; stigmas 3. Fl. and fr. Apr–Aug.

Wet places along valleys, grassland slopes or forests; 200–1300 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Shaanxi, Shanxi, Sichuan, Zhejiang [Japan, Korea].

64. Carex sect. Remotae C. B. Clarke, J. Linn. Soc., Bot. 37: 3. 1904.

薺臺草组 sou tai cao zu

Involucral bracts leaflike, rather long, surpassing inflorescence. Spikes gynaeandrous, distantly alternate on an elongate rachis, forming loosely spicate inflorescence. Utricles plano-convex, thinly membranous, rather narrowly winged above, not spongy.

Five species: N Africa, Asia, Europe; three species (one endemic) in China.

- 1a. Utricles ovate to broadly ovate, nerveless or faintly 1- or 2-veined abaxially 514. *C. ovatispiculata*
 1b. Utricles lanceolate-ovate, veined.
 2a. Spikes ovate-globose, 4–6 mm 515. *C. remotiuscula*
 2b. Spikes oblong, 5–15 mm 516. *C. rochebrunii*

514. Carex ovatispiculata F. T. Wang & Y. L. Chang ex S. Yun Liang, Acta Phytotax. Sin. 28: 155. 1990.

卵穗臺草 luan sui tai cao

Rhizome short. Culms 25–50 cm tall, smooth, clothed at base with brown sheaths usually disintegrating into fibers. Leaves shorter than or subequaling culm, blades linear, 1–2.5 mm wide, flat, soft, margins slightly scabrous, apex acuminate; membranous side of leaf sheaths emarginate. Lower involucral bracts leaflike, surpassing inflorescence, upper ones setaceous or glumelike. Spikes 5–11, gynaeandrous, ovate, 3–6 × 3–4 mm, upper spikes approximate, lower ones remote. Female glumes pale, ovate, 2–2.2 mm wide, green 1-veined costa forming a micro, apex acuminate or acute. Utricles yellowish green, longer than glume, ovate or broadly ovate, ca. 2.5 × 1 mm, membranous, usually nerveless or rarely faintly 1- or 2-veined, base cuneate, upper margins narrowly serrulate winged and gray-green, apex abruptly contracted into a short beak,

orifice 2-toothed. Nutlets tightly enveloped, elliptic-obovate, plano-convex, ca. 1.5 mm; style base thickened; stigmas 2. Fl. and fr. Jun–Aug.

• Streambanks, wet places; 1700–3500 m. Hunan, Shaanxi, Sichuan, Xizang, Yunnan.

515. Carex remotiuscula Wahlenberg, Kongl. Vetensk. Acad. Nya Handl. 24: 147. 1803.

丝引臺草 si yin tai cao

Carex remota Linnaeus var. *remotiformis* (Komarov) Kükenthal; *C. remotiformis* Komarov; *C. rochebrunii* Franchet & Savatier var. *remotiformis* (Komarov) Akiyama.

Rhizome short. Culms tufted, 30–50 cm tall, slender, usually weak, slightly scabrous. Leaves shorter than culm, blades pale green, linear, 1–2 mm wide, flat, soft. Lower involucral bracts leaflike, surpassing inflorescence, upper involucral bracts setaceous or glumelike. Spikes 4–10, gynaeandrous, ovate, 4–

6 × 4–5 mm, upper 3–5 spikes congested, remaining spikes remote. Female glumes light ferruginous, narrowly ovate, ca. 2.5 mm, green 1-veined, margins broadly white hyaline. Utricles green, yellow-green at maturity, longer than glume, lanceolate or ovate-lanceolate, ca. 3 mm, membranous, distinctly many veined on both faces, upper margins finely serrulate winged, apex gradually narrowed into a beak, beak rather deeply cleft abaxially, 2-toothed at orifice. Nutlets tightly enveloped, elliptic-ovate, plano-convex, ca. 1.5 mm, base shortly stipitate, apex subrounded; style base thickened; stigmas 2. Fl. and fr. Jun–Jul.

Wet grasslands on slopes, meadows; 900–3700 m. Anhui, Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Shaanxi, Shanxi, Sichuan, Yunnan [Japan, Korea, Russia (Far East)].

516. *Carex rochebrunii* Franchet & Savatier, Enum. Pl. Jap. 2: 555. 1878 [*“rochebruni”*].

书带藁草 *shu dai tai cao*

Rhizome short, stout, indurate. Culms tufted, 25–50 cm tall, slender, trigonous, smooth, clothed at base with brown or pale brown bladeless sheaths disintegrating into fibers. Leaves shorter or longer than culm, blades linear, 2–3 mm wide, flat, soft; membranous side of leaf sheaths at mouth projected forming a tonguelike appendage or not. Lower involucre bracts leaflike, surpassing inflorescence. Spikes 5–10, gynaeandrous, oblong, 5–15 × 3–4 mm, upper spikes approximate, lower ones remote. Female glumes pale, oblong, 2.5–3 mm, green 3-veined costa excurrent into a scabrous short awn, apex acute. Utricles green or green-yellow, longer than glume, lanceolate or ovate-lanceolate, 3–4 mm, conspicuously veined on both faces, many veined abaxially and hardly veined adaxially, or nerveless, base cuneate, shortly stipitate, upper half of margins narrowly scabrous winged, apex gradually attenuate into a long beak, orifice 2-toothed. Nutlets tightly enveloped, plano-convex, 1.5–2 mm, base contracted and shortly stipitate, apex subrounded; style base thickened; stigmas 2. Fl. and fr. May–Aug.

Forests, wet grasslands, swamps, grasslands and thickets at high elevations. Anhui, Gansu, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Shaanxi, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Bhutan, India, Indonesia, Japan, Nepal, Sri Lanka].

- 1a. Utricles nerveless; membranous side of leaf sheaths at mouth projected forming a tonguelike appendage 516b. subsp. *reptans*
 1b. Utricles conspicuously veined; membranous side of leaf sheaths at

mouth not projected forming a tonguelike appendage.

- 2a. Utricles veined on both faces 516a. subsp. *rochebrunii*
 2b. Utricles several veined abaxially, hardly veined adaxially 516c. subsp. *remotispicula*

516a. *Carex rochebrunii* subsp. *rochebrunii*

书带藁草(原亚种) *shu dai tai cao* (yuan ya zhong)

Carex remota Linnaeus subsp. *rochebrunii* (Franchet & Savatier) Kükenthal; *C. remota* var. *rochebrunii* (Franchet & Savatier) C. B. Clarke.

Leaves: membranous side of leaf sheaths at mouth not projected forming a tonguelike appendage. Utricles veined on both faces.

Forests, wet grasslands. Anhui, Henan, Jiangsu, Zhejiang [Bhutan, India, Indonesia, Japan, Nepal, Sri Lanka].

516b. *Carex rochebrunii* subsp. *reptans* (Franchet) S. Yun Liang & Y. C. Tang, Acta Phytotax. Sin. 28: 158. 1990.

匍匐藁草 *pu fu tai cao*

Carex remota var. *reptans* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 3, 8: 235. 1896; *C. remota* var. *enervulosa* Kükenthal.

Leaves: membranous side of leaf sheaths at mouth projected forming a tonguelike appendage. Utricles nerveless. Fl. and fr. Jun–Aug.

• Wet grasslands, swamps; 1600–3700 m. Gansu, Hubei, Shaanxi, Sichuan, Yunnan.

516c. *Carex rochebrunii* subsp. *remotispicula* (Hayata) T. Koyama, Fl. Taiwan 5: 369. 1978.

高山穗序藁草 *gao shan sui xu tai cao*

Carex remotispicula Hayata, Icon. Pl. Formosan. 10: 57. 1921; *C. remota* var. *remotispicula* (Hayata) Ohwi.

Leaves: membranous side of leaf sheaths at mouth not projected forming a tonguelike appendage. Utricles several veined abaxially, hardly veined adaxially. Fl. and fr. Jun–Jul.

• Grasslands and thickets at high elevations. Gansu, Guangxi, Guizhou, Hubei, Hunan, Shaanxi, Shanxi, Sichuan, Taiwan.

65. *Carex* sect. *Cyperoideae* G. Don in Loudon, Hort. Brit. 376. 1830.

莎藁草组 *suo tai cao zu*

Schelhammeria Moench (1802), not *Schelhammeria* Heister ex Fabricius (1759), nor *Schelhammera* R. Brown (1810, nom. cons.).

Involucre bracts leaflike, several times surpassing inflorescence. Spikes gynaeandrous, many flowered, disposed in close capitate inflorescence. Utricles flattened-plano-convex, narrowly lanceolate, membranous, with a narrow scabrous wing extending nearly to base, with a very long and narrow, deeply 2-lobed beak.

Two species: Asia, Europe, North America; one species in China.

517. *Carex bohémica* Schreber, Besch. Gräs. 2(2): 52. 1772.

莎藁草 *suo tai cao*

Carex cyperoides Linnaeus; *Schelhammeria capitata* Moench, nom. illeg. superfl.

Rhizome short. Culms tufted, 25–40 cm tall, compressed

trigonus, smooth. Leaves shorter than culm, blades pale green, linear, 2–4 mm wide, flat, soft. Involucral bracts leaflike, much longer than inflorescence. Inflorescence capitate, orbicular or ovate, 1.5–2 × 1.5–2 cm; spikes 4–15, gynaeandrous, ovate-oblong, 1–1.5 cm. Female glumes pale brown, narrowly lanceolate, 5–7 mm, 1-veined, apex acuminate. Utricles pale green or ferruginous-yellow, much longer than glume, narrowly lanceolate, plano-convex, 7–10 mm, membranous, many veined on

both faces, base long stipitate, upper margins narrowly scabrous winged, apex gradually narrowed into a flat, deeply 2-lobed, long beak. Nutlets tightly enveloped, oblong, plano-convex, ca. 1.3 × 0.8 mm, base shortly stipitate, ca. 2 mm; style base slightly thickened; stigmas 2. Fl. and fr. Jul. $2n = 60$.

Wet sandy soils, swamps; 400–700 m. Heilongjiang, Jilin, Nei Mongol [Japan, N Korea, Russia (Siberia); Europe].

66. Carex sect. Ouales Kunth, Enum. Pl. 2: 394. 1837.

卵果薹草组 luan guo tai cao zu

Rhizome short. Involucral bracts glumelike, lowest ones sometimes narrowly leaflike. Spikes 4–16(–20), gynaeandrous, disposed in densely spicate or capitate inflorescence. Female glumes ovate or oblong-ovate. Utricles ovate or ovate-lanceolate, plano-convex, 3–4 × 1–1.5 mm, membranous, veined or nerveless, margins with a narrow or broad wing, beak ± elongate, shortly 2-toothed, deeply bifid abaxially. Nutlets brown, obovoid-oblong or oblong, flatly biconvex, smooth, shortly beaked and stipitate; stigmas 2.

About 80 species: N Africa, temperate zone of Asia, Europe, North and South America; two species in China.

- 1a. Inflorescence 2.5–6 cm; spikes pale green, 10–16, lower ones distant 518. *C. maackii*
 1b. Inflorescence 2–2.5 cm; spikes brown, 4–7, contiguous 519. *C. leporina*

518. Carex maackii Maximowicz, Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans 9 [Prim. Fl. Amur.]: 308. 1859.

Wet grassy places along streams. Anhui, Heilongjiang, Henan, Jiangsu, Jilin, Liaoning, Zhejiang [Japan, Korea, Russia (Far East)].

卵果薹草 luan guo tai cao

Rhizome short, indurate. Culms tufted, 20–70 cm tall, erect, acutely trigonous, scabrous above, clothed with brown bladeless sheaths at base. Leaves shorter than or subequalling culm, blades linear, 2–4 mm wide, flat, soft, margins serrulate. Involucral bracts setaceous at base, other bracts glumelike. Spicate inflorescence cylindrical, 2.5–6 cm; spikes 10–16(–20), gynaeandrous, pale green, ovate, 5–10 × 4–6 mm, densely flowered, upper spikes contiguous, lower ones distant. Female glumes pale brown, ovate, 2.2–2.8 mm, green 1-veined, apex acute. Utricles longer than glume, ovate or ovate-lanceolate, plano-convex, curved, 3.4–3.7 mm, membranous, spongy, 5–7-veined abaxially, 4- or 5-veined adaxially, base rounded, margins very narrowly scabrous winged, apex gradually narrowed into a ± long beak, orifice 2-toothed. Nutlets pale brown, loosely enveloped, oblong or oblong-ovate, slightly biconvex, ca. 1.5 mm, base cuneate, shortly stipitate; style base not thickened; stigmas 2. Fl. and fr. May–Jun. $2n = 68$.

519. Carex leporina Linnaeus, Sp. Pl. 2: 973. 1753.

卵形薹草 luan xing tai cao

Rhizome not seen. Culms slender, 50–80 cm tall, 0.8–1 mm thick, trigonous, smooth below, scabrous above, leaflike near base. Leaves 3 or 4, flat, ca. 1.5 mm wide, much shorter than culm, margins scabrous. Involucral bracts glumelike, lowest long awned. Inflorescence 2–2.5 × 0.8–1.3 cm; spikes 4–7, gynaeandrous, brown, ovate to oblong, 5–10 × 3–6 mm, contiguous, sessile. Female glumes yellowish [or reddish] brown, ovate, ca. 3 × 1.5 mm, 1-veined, with pale yellow midrib and broadly hyaline margins, apex acute. Utricles light brown, ovate, plano-convex, 3.5–4 × 1–1.5 mm, smooth, 4–6-veined abaxially, rather broadly winged from shoulder to top, margins scabrous near top, spongy-thickened below, beak ca. 1 mm, deeply bifid abaxially. Nutlets brown, obovoid-oblong, compressed biconvex, ca. 2 × 1 mm, smooth, slightly shiny, shortly beaked and stipitate; stigmas 2. Fr. Aug. $2n = 66, 74$.

Lakesides; ca. 1400 m. Xinjiang (Burqin) [Russia; N Europe].

67. Carex sect. Planatae Akiyama, Carices Far East. Reg. Asia, 67. 1955.

高秆薹草组 gao gan tai cao zu

Rhizome short. Lower involucral bracts leaflike, longer than inflorescence. Inflorescence with upper spikes approximate, middle and lower ones remote; spikes gynaeandrous (sometimes terminal spike all female), ovate, densely flowered. Utricles ovate or elliptic, spongy. Nutlets loosely enveloped.

Four species: E and SE Asia; two species in China.

- 1a. Utricles smaller, ca. 2.5 mm; nutlet elliptic 520. *C. alta*
 1b. Utricles larger, 3–3.5 mm; nutlet oblong to oblong-ovate 521. *C. craspedotricha*

520. Carex alta Boott, Proc. Linn. Soc. London 1: 254. 1845.

subsp. *alta* (Boott) Kükenthal.

高秆薹草 gao gan tai cao

Carex alta var. *latialata* Kükenthal; *C. remota* Linnaeus

Rhizome short, indurate. Culms densely tufted, 40–80 cm tall, obtusely trigonous, scabrous, clothed at base with several

pale brown bladeless sheaths sometimes slightly disintegrating into fibers. Leaves shorter than culm, blades linear, 2–3 mm wide, flat, margins slightly scabrous. Lower involucral bracts leaflike, surpassing inflorescence, upper setaceous or glume-like. Spikes 9–22, gynaeandrous, ovate to oblong-ovate, 5–12 × ca. 3 mm, upper spikes approximate, lower ones remote. Female glumes pale green, ovate or narrowly ovate to lanceolate, ca. 2.5 × 1–1.5 mm, membranous, 1-veined at middle. Utricles pale green, slightly longer than glume, elliptic or elliptic-ovate, plano-convex, ca. 2.5 mm, membranous, spongy, many veined on both faces, base subrounded, upper margins slightly serrulate winged, apex abruptly contracted into a short beak, orifice 2-toothed. Nutlets rather loosely enveloped, elliptic, base subcuneate; style base slightly thickened; stigmas 2. Fl. and fr. May–Jul.

Grassland slopes, wet places in dense forests; 1500–2500 m. Guangxi, Guizhou, Sichuan, Xizang, Yunnan [India, Indonesia, N Vietnam].

521. *Carex craspedotricha* Nelmes, Bull. Misc. Inform. Kew 1939: 657. 1939.

缘毛薹草 yuan mao tai cao

68. *Carex* sect. *Stellulatae* (Kunth) Christ, Bull. Soc. Roy. Bot. Belgique 24(2): 18. 1885.

星穗薹草组 xing sui tai cao zu

Carex [unranked] *Stellulatae* Kunth, Enum. Pl. 2: 399. 1837.

Rhizome short. Culms caespitose. Involucral bracts usually glumelike. Spikes numerous, gynaeandrous, stellate at maturity. Utricles ovate or ovate-lanceolate, plano-convex, membranous to subleathery, base spongy. Nutlets tightly enveloped, ovate; stigmas 2.

About 20 species: mostly in North America, also in Asia, Australia, Europe, New Guinea, and Pacific islands (Hawaiian Islands, New Zealand); two species in China.

1a. Utricles small, 3–3.5 mm, nerveless on both faces (rarely 1- or 2-veined abaxially); nutlets narrowly ovate 522. *C. basilata*
1b. Utricles longer, 4.5–5 mm, conspicuously veined abaxially, few veined adaxially; nutlets ovate-elliptic 523. *C. omiana*

522. *Carex basilata* Ohwi, Acta Phytotax. Geobot. 11: 258. 1942.

小星穗薹草 xiao xing sui tai cao

Carex muricata Linnaeus var. *basilata* (Ohwi) Y. L. Chou.

Rhizome short, oblique. Culms densely tufted, 20–40 cm tall, slender, trigonous, scabrous above, clothed at base with pale brown bladeless sheaths. Leaves shorter than culm, blades linear, 1–2 mm wide, flat. Basal involucral bracts setaceous, remaining bracts glumelike. Spicate inflorescence with upper spikes approximate, lower ones remote; terminal spike clavate, female flower part thick above, male flower part narrower below, remaining spikes mostly female; spikes 3–5, gynaeandrous, sometimes all female, ovate or oblong-ovate, stellate patent, 4–6 mm. Female glumes ferruginous or pale green, broadly ovate or subdeltooid, 1.5–2 mm wide, margins white hyaline, green 1–3-veined costa forming a mucro, apex acute. Utricles yellow-brown or pale green, longer than glume, ovate-trigonous, plano-convex, 3–3.5 mm, nerveless on both faces, rarely 1- or 2-veined abaxially, base broadly rounded, spongy, apex gradually tapering into a long beak, orifice 2-toothed,

Carex squamata V. I. Kreczetowicz.

Rhizome short, indurate. Culms tufted, 30–55 cm tall, smooth, soft, clothed at base with pale brown or brown bladeless sheaths usually disintegrating into fibers. Leaves shorter than culm, blades linear, 2–3 mm wide, flat, soft, margins scabrous, apex long acuminate. Lower involucral bracts leaflike, conspicuously surpassing inflorescence, gradually tapering becoming setaceous to glumelike. Spicate inflorescence 10–15 cm, upper spikes approximate, lower ones remote; spikes 8–13, gynaeandrous, sometimes terminal spike all female, broadly ovate or ovate-orbicular, 5–10 × 3–8 mm. Female glumes pale green, narrowly ovate to elliptic, 1.8–2.5 mm, 1-veined at middle. Utricles longer than glume, elliptic or ovate, compressed, 3–3.5 × 1.2–1.5 mm, spongy, distinctly several veined on both faces, upper margins narrowly serrulate winged, apex abruptly contracted into a beak, orifice 2-toothed. Nutlets loosely enveloped, oblong to oblong-ovate, base contracted to shortly stipitate, apex subrounded; style base thickened; stigmas 2. Fl. and fr. Apr.

Wet places, moist grasslands; ca. 300 m. Fujian, Guangdong, Henan, Hunan, Jiangxi, Zhejiang [N Thailand].

abaxially deeply cleft. Nutlets narrowly ovate; style base not thickened; stigmas 2. Fr. Jul.

Alpine meadows, wet places along streamsides; ca. 1700 m. Jilin [Japan, Korea, Russia (Far East); North America].

In FRPS (12: 514. 2000), the name *Carex angustior* Mackenzie was misapplied to this species. True *C. angustior* is restricted to North America.

523. *Carex omiana* Franchet & Savatier, Enum. Pl. Jap. 2: 554. 1878.

星穗薹草 xing sui tai cao

Carex stellulata Goodenough var. *omiana* (Franchet & Savatier) Kükenthal.

Rhizome short. Culms tufted, 20–50 cm tall, obtusely trigonous, scabrous above, clothed at base with pale brown sheaths. Leaves shorter than culm, blades linear, 2–2.5 mm wide, flat, rarely plicate, slightly stiff. Involucral bracts glume-like. Spicate inflorescence ca. 2 cm; spikes 3 or 4, gynaeandrous, globose, terminal spike with a slightly longer male portion than in those of lateral ones. Female glumes ferruginous,

ovate or broadly ovate, 3.5–4 × ca. 1.8 mm, green 1-veined at middle, margins white hyaline, apex acute. Utricles greenish brown or yellow-ferruginous, longer than glume, ovate-lanceolate, strongly patent to somewhat deflexed, 4.5–5 mm, submembranous, many veined abaxially, few veined adaxially, base rounded, spongy, margins slightly thickened, apex abruptly con-

tracted into a smooth or scabrous long beak, orifice 2-toothed. Nutlets somewhat tightly enveloped, ovate-elliptic, biconvex, base shortly stipitate, apex rounded; style base slightly thickened; stigmas 2. Fl. and fr. Apr.

Wet places. Liaoning [Japan].

69. Carex sect. Glareosae G. Don in Loudon, Hort. Brit. 376. 1830.

白山藁草组 bai shan tai cao zu

Rhizome short or rarely creeping. Culms loosely to densely caespitose. Involucral bracts glumelike. Spikes numerous, gynaeandrous or lateral spikes sometimes female, ovate or subglobose, densely flowered; inflorescence interrupted or capitate. Utricles ovate, plano-convex, thinly leathery or membranous, papillose or minutely tuberculate, many veined, usually with a short beak, orifice entire or scarcely emarginate, sometimes deeply cleft adaxially.

About 23 species: temperate zone of Asia, Australia, Europe, New Guinea, North and South America, Pacific islands (New Zealand); four species in China.

- 1a. Female glumes brown; utricles deeply cleft adaxially at orifice 524. *C. lachenalii*
 1b. Female glumes pale or pale yellow; utricles emarginate at orifice.
 2a. Utricles with a slightly cuneate-emarginate scabrous short beak 525. *C. canescens*
 2b. Utricles beakless.
 3a. Utricles with prominent veins, shortly stipitate; spikes distant 526. *C. loliacea*
 3b. Utricles with obscure veins, estipitate; spikes congested in ovoid or suborbicular head 527. *C. tenuiflora*

524. Carex lachenalii Schkuhr, Besch. Riedgräs. 51. 1801, nom. cons.

二裂藁草 er lie tai cao

Carex tripartita Allioni.

Rhizome oblique. Culms loosely tufted, 8–20 cm tall, obtusely trigonous, smooth, slightly scabrous above, clothed at base with pale brown sheaths. Leaves shorter than culm, blades linear, 1–2 mm wide, flat or slightly involute. Involucral bracts glumelike. Spikes usually 3, upper 2 gynaeandrous, lower spikes female or gynaeandrous, terminal spike clavate, 0.8–1.2 cm, remaining spikes rather small, elliptic, rarely ovate, 4–8 mm. Female glumes brown, elliptic or ovate, with green midrib. Utricles yellow-brown below, dark brown above, longer than glume, ovate or obovate, plano-convex, ca. 3 × 1 mm, obscurely finely veined, base broadly cuneate, stipitate, apex gradually tapering into a smooth blackish beak, beak deeply cleft abaxially at orifice. Nutlets rather tightly enveloped, ovate-elliptic or elliptic; style base not thickened; stigmas 2. $2n = 64$.

Alpine frozen soil. S Jilin (Changbai Shan) [Japan, Korea, Russia (Far East, C Siberia); Europe].

525. Carex canescens Linnaeus, Sp. Pl. 2: 974. 1753.

白山藁草 bai shan tai cao

Carex curta Goodenough.

Rhizome short. Culms tufted, 25–50 cm tall, erect, trigonous, scabrous above, clothed at base with brown bladeless sheaths. Leaves shorter than culm, blades 2–3 mm wide, flat, margins scabrous. Involucral bracts glumelike, proximal ones sometimes setaceous. Spikes 4–7, gynaeandrous, ovate-oblong, 6–10 × 3–4 mm; upper spikes congested, lower ones remote. Female glumes pale, ovate, ca. 2 mm, membranous, 1-veined, apex acute. Utricles green-brown, slightly longer than

glume, ovate or elliptic, plano-convex, 2–2.2 × ca. 1.2 mm, membranous, glabrous, minutely tuberculate, brown-purple 5–12-veined on both faces, base subrounded, spongy, shortly stipitate, apex abruptly contracted into a slightly scabrous short beak, orifice emarginate. Nutlets tightly enveloped, elliptic or ovate, plano-convex, ca. 1.5 mm, base shortly stipitate; style base not thickened; stigmas 2. Fl. and fr. Jun–Aug. $2n = 56$.

Swamps, wet places along streamsides; 900–1100 m. Heilongjiang, Jilin, Nei Mongol, Xinjiang [temperate Asia, Europe, North and South America].

526. Carex loliacea Linnaeus, Sp. Pl. 2: 974. 1753.

间穗藁草 jian sui tai cao

Rhizome slender and creeping. Culms loosely tufted, 15–25 cm tall, slender, trigonous above, clothed at base with pale brown bladeless sheaths. Leaves shorter than culm, blades linear, 1–2 mm wide, flat, margins scabrous. Involucral bracts glumelike. Inflorescence with upper 2 spikes approximate, lowermost 2 distant by at least 1 cm; spikes 3 or 4, gynaeandrous, ovate, 3–5 × 2–5 mm, few flowered. Female glumes pale, broadly ovate or ovate, ca. 2 mm, membranous, with green midrib. Utricles pale green-brown, longer than glume, oblong or ovate, plano-convex, 2.5–3 mm, subleathery, many veined on both faces, base rounded, spongy, shortly stipitate, apex nearly beakless, orifice entire or emarginate. Nutlets tightly enveloped, broadly elliptic, ca. 1.5 × 1.2 mm, subrounded at both ends; style base not thickened; stigmas 2. Fr. May. $2n = 54$.

Forests. Heilongjiang [Japan, Kazakhstan, Korea, N Mongolia, Russia (Far East, Siberia); EC and N Europe, North America].

527. Carex tenuiflora Wahlenberg, Kongl. Vetensk. Acad. Nya Handl. 24: 147. 1803.

细花藁草 xi hua tai cao

Rhizome short, with short stolons. Culms loosely tufted, 20–50 cm tall, slender, trigonous, slightly stiff, smooth or sub-smooth. Leaves shorter than culm, blades linear, 1–1.5 mm wide, flat or involute, slightly scabrous. Involucral bracts glume-like. Spikes 2–4, gynaeandrous, globose, 3–4 mm, few flowered, disposed in a capitate or spicate inflorescence. Female glumes pale yellow, ovate, 2–2.5 mm, with pale brown midrib, margins hyaline. Utricles yellowish green, subequaling glume,

ovate or elliptic, plano-convex, 2–2.5 × ca. 1.1 mm, subleathery, minutely white tuberculate, brown-purple 5–9-veined on both faces, base rounded, nearly estipitate, apex beakless, orifice emarginate. Nutlets tightly enveloped, elliptic or broadly elliptic, biconvex, ca. 1.2 mm, base rounded to cuneate; style base not thickened; stigmas 2. Fl. and fr. Jul. $2n = 58$.

Swamps; ca. 900 m. Jilin, Nei Mongol [Japan, Korea, N Mongolia, Russia (Far East, Siberia); Europe, North America].

Taxa incertae sedis

Carex aristata R. Brown var. **lancessquama** Handel-Mazzetti, Symb. Sin. 7: 1270. 1936.

No specimens were seen by the present authors. The type is from NW Yunnan.

Carex esquirolii H. Léveillé & Vaniot, Bull. Soc. Bot. France 53: 315. 1906.

No specimens were seen by the present authors. The plant, a

member of *Carex* subg. *Vignea*, cannot be confidently associated with any known species based on the description. The type is from Guizhou.

Carex polycephala Boott var. **simplex** Kükenthal in Handel-Mazzetti, Symb. Sin. 7: 1268. 1936.

No specimens were seen by the present authors. The type is from Yunnan.