

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 cylindric 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 cylindric, 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, spatheform, 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. vallecuculosa*
- 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, cylindric, 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 lu 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, cylindrical, 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, Uzbekistan; N Africa, SW Asia, Europe, North and South America].

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

贝壳叶荸荠 bei ke ye bi qi

Scirpus retroflexus Poir., 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.

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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. svensonii* 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. $2 \times$ 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 – 4×1 – 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. 1.2×1.5 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 – 15×3 – 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 – 6×2 – 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. 1.5×2 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 – 8×2 – 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 – 1.5×0.6 – 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 ± 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 × 1.5–3 mm, several to many flowered. Basalmost glume empty, amplexicaul for whole spikelet base; fertile glumes pale rust-colored, ± laxly spirally imbricate, oblong to suboblong, ca. 2 × 1 mm, midvein greenish, margin hyaline, apex obtuse to rounded. Perianth bristles 6, rust-colored, ca. 1.5 × as long as nutlet or slightly shorter, densely or laxly retrorsely spinulose. Stigmas 3. Nutlet yellowish to olivaceous, obovoid, 0.8–1.2 × 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 × 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 × 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 ± 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 × ca. 0.5 mm, obtusely 3-sided, smooth; persistent style base deltoid to shortly conic, 1–2 × 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 ± 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 ± laxly to densely tufted, 20–50 cm tall or ± 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 × 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 × 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 × 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 ± short; spikelet ± 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 ± 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 × 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 × 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 × 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 × 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. 1.5×0.5 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. 0.8×0.5 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, $3-5 \times 3-3.5$ 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 \pm pale, broadly elliptic, $1.6-2 \times 1-1.2$ 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, $0.7-1.1 \times$ 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, $2-5.5 \times 1.5-2.5$ 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, $0.3-0.6 \times$ 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 \pm narrowly ovoid, $10-20 \times 4-5$ 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, $1.2-1.5 \times 1-1.2$ 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, \pm tuberculate when dry. Leaf sheaths 2, basally reddish brown to brown and apically green, tubular, 3–10 cm, mouth truncate. Spikelet narrowly oblong-ovoid, $10-18 \times 3-4.5$ mm, many flowered, apex obtuse to subacute. Basal 2 glumes empty; basalmost glume amplexicaul for 1/2 or more of spikelet base; fertile glumes \pm pale at middle and blood-red on sides, slightly tightly imbricate, oblong-lanceolate, $3.5-4.5 \times 1-1.5$ mm, midvein greenish, margin narrowly hyaline, apex subacute. Perianth bristles 4, $1.5-2 \times$ as long as nutlet (including style base), densely and shortly retrorsely spinulose. Stigmas 2. Nutlet yellow to yellowish, obovoid, $1-1.3 \times 0.7-0.8$ 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 submammiiform, 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 cylindric-ovate to cylindric, 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, sublan-ceolate 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. Xinjiang [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 valleculosa* Ohwi var. *setosa* Ohwi, Acta Phytotax. Geobot. 2: 29. 1933.

具刚毛荸荠 ju gang mao bi qi

Eleocharis valleculosa 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 valleculosa var. *valleculosa* 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-obovoid, 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 kamschatica* (C. A. Meyer) Komarov, Fl. Kamtschatka 1: 207. 1927.

大基荸荠 da ji bi qi

Scirpus kamschaticus C. A. Meyer, Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans 1: 198. 1831; *Eleocharis kamschatica* f. *reducta* Ohwi; *E. komarovii* G. Zinslerling; *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. Zinslerling, 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. Zinslerling) 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, 1.4–1.7 × 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 × 3–4 mm, more than 10-flowered. Basalmost glume empty, amplexicaul for more than 1/2 of spikelet base; fertile glumes brown, sublaxly imbricate, ovate to narrowly ovate, ca. 4 × 2 mm, margin ± 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, 5–10 × 3–4 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, ± 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, 1.8–2 × 1.5–1.7 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, 5–7 × 2–3 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).

