

# 1. JUNCUS Linnaeus, Sp. Pl. 1: 325. 1753.

灯心草属 deng xin cao shu

Herbs perennial or annual. Rhizome shortly or long creeping. Stems often tufted. Leaves either all basal or also cauline; leaf sheath open on 1 side, apex often auriculate; leaf blade grasslike, terete, or scalelike. Inflorescences terminal, or pseudolateral when basal involucre bract seemingly a continuation of stem, usually many flowered; ultimate divisions dense heads, lax cymes, or 1-flowered. Bracteoles present or absent. Perianth segments 6, in 2 whorls, papery to hyaline. Stamens 3 or 6, attached to base of perianth segments; filaments filiform; anthers oblong or linear. Ovary 1- or 3-loculed; placentas 3, parietal, sometimes inconspicuously prominent but more frequently protruding and sometimes connate at middle; ovules numerous per locule. Style 1; stigmas twisted. Capsule 3-valved; valves usually bearing placentas at middle. Seeds ovoid or oblong, minute, sometimes appendaged; appendage caudate.

About 240 species: widely distributed in both hemispheres, most abundant in temperate and cold regions, rarely tropical; 76 species (27 endemic) in China.

Several species of *Juncus* reported from China are not treated in this account, either because the present authors have not seen any Chinese specimens, or because the species are not sufficiently well known to be properly placed. They include the following: *Juncus beringensis* Buchenau, *J. brachyspathus* Maximowicz var. *brachyspathus*, *J. dulongjiongensis* Novikov, *J. grubovii* Novikov, *J. jaxarticus* V. I. Kreczetowicz & Gontscharow, *J. orchonicus* Novikov, and *J. soranthus* Schrenk.

- 1a. Inflorescences pseudolateral, basal involucre bract erect, terete, seemingly a continuation of stem; bracteoles 2; leaves reduced to a sheath and closely embracing stem.
  - 2a. Stamens 6.
    - 3a. Stems 40–80 cm × 1.2–4 mm; stamens ca. 1/2 as long as perianth ..... 1. *J. inflexus*
    - 3b. Stems 5–7 cm × ca. 1 mm; stamens ca. 2/3 as long as perianth ..... 2. *J. filiformis*
  - 2b. Stamens 3 (sometimes 6 in *J. effusus*).
    - 4a. Perianth segments unequal, outer ones slightly longer than inner; capsule oblong, 3-loculed ..... 3. *J. effusus*
    - 4b. Perianth segments equal; capsule ovoid, 1-loculed, incompletely 3-septate ..... 4. *J. setchuensis*
- 1b. Inflorescences terminal (if sometimes seemingly pseudolateral, then erect involucre bract leaflike, somewhat flat or adaxially channeled), involucre bract leaflike or absent; bracteoles usually absent; leaves basal and cauline or all basal.
  - 5a. Herbs annual, without a rhizome.
    - 6a. Flower solitary or occasionally paired.
      - 7a. Plants 1.2–2.4 cm tall; leaves basal; perianth segments blackish purple, margin inconspicuously scarious; style 1.9–2.1 mm; stigmas 1.8–3 mm ..... 11. *J. nigroviolaceus*
      - 7b. Plants 4–9 cm tall; leaves basal and cauline; perianth segments whitish, margin hyaline; style ca. 1 mm; stigmas short ..... 12. *J. perparvus*
    - 6b. Flowers few to many.
      - 8a. Capsule trigonous subglobose, ca. 2 mm ..... 16. *J. amuricus*
      - 8b. Capsule trigonous ellipsoid, subellipsoid, or ovoid, 2.9–5 mm.
        - 9a. Flowers secund, subsessile; anthers 0.9–1.1 mm; stigmas ca. 1.5 mm ..... 13. *J. aletaiensis*
        - 9b. Flowers in clusters or lax inflorescences, pedicellate; anthers 0.5–0.8 mm; stigmas 0.5–0.8 mm.
          - 10a. Inflorescences usually lax; inner perianth segments acute at apex, longer than capsule; seeds usually apiculate at base and apex ..... 14. *J. bufonius*
          - 10b. Inflorescences capitate clusters or occasionally lax; inner perianth segments obtuse to rarely acute at apex, shorter than capsule; seeds obtuse at base and apex ..... 15. *J. ranarius*
    - 5b. Herbs perennial, usually with a conspicuous rhizome.
      - 11a. Flowers inserted singly on branches of inflorescences or inflorescences 1- or 2-flowered.
        - 12a. Involucre bract seemingly a continuation of stem; capsule 4–4.5 mm ..... 5. *J. kangpuensis*
        - 12b. Involucre bract not seemingly a continuation of stem; capsule 2–3.6(–4) mm.
          - 13a. Filaments 0.3–0.5 mm; anthers 1.2–1.6 mm.
            - 14a. Involucre bract shorter than inflorescence; perianth segments brownish yellow, apex acuminate ..... 7. *J. libanoticus*
            - 14b. Involucre bract longer than inflorescence; perianth segments yellowish green, apex obtuse ..... 8. *J. heptopotamicus*
          - 13b. Filaments 0.8–1.5 mm; anthers 0.5–1 mm.
            - 15a. Involucre bract longer than inflorescence; perianth segments 1.8–2.6 mm; filaments 0.7–0.9 mm .... 6. *J. gracillimus*
            - 15b. Involucre bract shorter than or equaling inflorescence; perianth segments 3.1–4 mm; filaments 1.2–1.5 mm.
              - 16a. Stamens 6; leaves basal; perianth segments scarious at margin, apex tapered to a sharp point ..... 9. *J. tenuis*
              - 16b. Stamens 3; leaves basal and cauline; perianth segments hyaline at margin, apex acute ..... 10. *J. taonanensis*
      - 11b. Flowers few to many in capitate clusters or indistinct heads (rarely (1 or)2–7 flowers forming cymes in *J. longistamineus* and *J. luzuliformis*).
        - 17a. Leaf blade distinctly but sometimes incompletely septate (septa inconspicuous in *J. dongchuanensis*

- and *J. miyiensis*).
- 18a. Seeds appendaged.
- 19a. Inflorescences with (2-)6-8 heads ..... 20. *J. grisebachii*
- 19b. Inflorescences with 1 or 2(or 3) heads.
- 20a. Stamens shorter than perianth; anthers longer than filaments; leaves basal.
- 21a. Stems borne singly; basal leaf sheaths orange to brownish yellow; leaves filiform, shorter than stem ..... 60. *J. sikkimensis*
- 21b. Stems densely clumped; basal leaf sheaths brown to reddish brown; leaves stout, subequaling stem ..... 61. *J. longiflorus*
- 20b. Stamens longer than perianth; anthers shorter than filaments; leaves basal and cauline.
- 22a. Heads 7-25-flowered; perianth segments 5-8 mm; seeds 0.8-1 mm ..... 18. *J. allioides*
- 22b. Heads 4-6-flowered; perianth segments 4.3-5 mm; seeds ca. 2.7 mm ..... 19. *J. chrysocarpus*
- 18b. Seeds not appendaged.
- 23a. Heads and cymes with flowers both fertile and sterile or all sterile.
- 24a. Outer perianth segments ovate, 2-2.5 mm, 1-veined, inner ones 4-4.5 mm; filaments 3-3.5 mm; style 1.2-1.5 mm; perianth segments of sterile flowers broadly ovate ..... 34. *J. miyiensis*
- 24b. Outer perianth segments lanceolate, 3.9-4.5 mm, 3-veined, inner ones 6-6.4 mm; filaments ca. 6.5 mm; style 2-2.3 mm; perianth segments of sterile flowers narrowly lanceolate ..... 35. *J. dongchuanensis*
- 23b. Heads with all flowers fertile.
- 25a. Leaf blade incompletely septate (completely so in *J. prismatocarpus* subsp. *teretifolius*).
- 26a. Stamens 6; stems laterally broadly winged ..... 31. *J. alatus*
- 26b. Stamens 3; stems narrowly or inconspicuously winged.
- 27a. Perianth segments equal or inner ones somewhat shorter than outer; flower heads globose to hemispheric; capsule narrowly prismatic ..... 32. *J. prismatocarpus*
- 27b. Perianth segments unequal, inner ones longer than outer; flower heads globose and starlike; capsule trigonous oblong ..... 33. *J. diastrophanthus*
- 25b. Leaf blade completely septate.
- 28a. Stamens 6.
- 29a. Stems 2-4 mm in diam.; flower heads globose ..... 21. *J. atratus*
- 29b. Stems usually less than 2 mm in diam.; flower heads usually hemispheric, rarely subglobose.
- 30a. Perianth segments unequal, inner ones slightly longer than outer; anthers ovoid ..... 24. *J. krameri*
- 30b. Perianth segments equal or inner ones slightly shorter than outer; anthers oblong or linear.
- 31a. Perianth segments 2-2.4 mm; anthers shorter than filaments; heads 2-7-flowered; capsule 2.6-3 mm ..... 22. *J. turczaninowii*
- 31b. Perianth segments 2.5-3 mm; anthers usually subequaling filaments; heads 5-10(-15)-flowered; capsule 3-3.5 mm ..... 23. *J. articulatus*
- 28b. Stamens 3.
- 32a. Heads globose, 15-30-flowered; capsule shorter than perianth ..... 25. *J. yanshanuensis*
- 32b. Heads usually hemispheric or obconical, usually less than 10-flowered; capsule longer than perianth.
- 33a. Capsule trigonous oblong, apex cuspidate or tapered into a short beak.
- 34a. Plants 25-40 cm tall; inflorescences usually with more than 25 heads; leaf sheath auricles 0.6-1 mm; capsule apically tapered into a beak ..... 29. *J. wallichianus*
- 34b. Plants 6-11 cm tall; inflorescences with 3-7 heads; leaf sheath auricles 1.4-1.7 mm; capsule apically tapered into a short beak ..... 30. *J. auritus*
- 33b. Capsule trigonous lanceolate or trigonous ellipsoid, apex acute or acuminate (or tapered into a beak in *J. leptospermus*).
- 35a. Heads usually 2-4-flowered; perianth segments narrowly lanceolate; capsule 3-3.5 mm, apex acuminate ..... 26. *J. papillosus*
- 35b. Heads usually 4-9-flowered; perianth segments boatlike or lanceolate; capsule 3.5-4 mm, apex acute or tapered into a beak.
- 36a. Plants 35-70 cm tall; capsule trigonous lanceolate, apex tapered into a beak; seeds spindlelike, 0.5-0.7 mm ..... 27. *J. leptospermus*
- 36b. Plants 14-25 cm tall; capsule trigonous ellipsoid, apex acute; seed obovoid, 0.6-1 mm ..... 28. *J. ohwianus*
- 17b. Leaf blade not septate or septa inconspicuous.
- 37a. Seeds usually not appendaged ..... 17. *J. ochraceus*
- 37b. Seeds usually appendaged.
- 38a. Inflorescence of few to many heads.
- 39a. Stamens longer than perianth.
- 40a. Leaf blade terete or V-shaped in cross section (flat to slightly convolute in *J. lanpinguensis*).

- 41a. Stems 0.5–1 mm in diam.; leaf blade V-shaped in cross section; filaments 4–5 mm ..... 63. *J. concinnus*
- 41b. Stems 1.7–2 mm in diam.; leaf blade flat to slightly convolute or terete in cross section; filaments 5–7.5 mm.
- 42a. Leaf blade flat to slightly convolute in cross section, apex obtuse; leaf sheath auricles absent; flower heads 5–11; anthers 1.2–2 mm; style ca. 2 mm ..... 64. *J. lanpinguensis*
- 42b. Leaf blade terete in cross section, apex acute to acuminate; leaf sheath auricles rounded; flower heads 2; anthers 2.2–2.5 mm; style ca. 0.6 mm ..... 65. *J. meiguensis*
- 40b. Leaf blade flat, grasslike.
- 43a. Anthers 0.7–1.2 mm; capsule blackish brown, 6–7 mm; plants to 60 cm tall ..... 68. *J. spumosus*
- 43b. Anthers 1.5–2.5 mm; capsule yellowish to orange, 3.5–5.4 mm; plants 10–30 cm tall.
- 44a. Flower heads 1.2–2 cm in diam.; perianth segments 4.5–7 mm; anthers linear, 2–2.5 mm ..... 66. *J. clarkei*
- 44b. Flower heads 0.5–1 cm in diam.; perianth segments 2.8–4.5 mm; anthers oblong, 1.5–1.8 mm ..... 67. *J. gracilicaulis*
- 39b. Stamens shorter than or nearly equaling perianth.
- 45a. Leaves all basal.
- 46a. Cataphylls absent; inflorescences terminal; anthers ca. 2 × as long as filaments ..... 62. *J. milashanensis*
- 46b. Cataphylls present; inflorescences seemingly pseudolateral; anthers 2–3 × as long as filaments.
- 47a. Stems borne singly; basal leaf sheaths orange to brownish yellow; leaves filiform, shorter than stem ..... 60. *J. sikkimensis*
- 47b. Stems densely clumped; basal leaf sheaths brown to reddish brown; leaves stout, subequaling stem ..... 61. *J. longiflorus*
- 45b. Leaves basal and cauline.
- 48a. Leaf blade (6–)7–12 mm wide.
- 49a. Heads 15–19 per cyme, each head 0.7–1.2 cm in diam.; style 1–1.5 mm ..... 71. *J. giganteus*
- 49b. Heads 4–10 per cyme, each head 1.2–1.8 cm in diam.; style 2.5–3 mm ..... 72. *J. crassistylus*
- 48b. Leaf blade no more than 6 mm wide.
- 50a. Anthers longer than filaments.
- 51a. Cauline leaves 1–4; stamens shorter than perianth ..... 69. *J. amplifolius*
- 51b. Cauline leaves absent or 1; stamens sometimes subequaling perianth ..... 70. *J. nepalicus*
- 50b. Anthers shorter than filaments.
- 52a. Perianth segments 6.3–11 mm; capsule shorter than perianth ..... 76. *J. sphacelatus*
- 52b. Perianth segments 4–5(–6) mm; capsule longer than perianth.
- 53a. Filaments 2.5–3.5 mm ..... 75. *J. himalensis*
- 53b. Filaments ca. 2 mm.
- 54a. Perianth segments unequal, outer ones longer than inner; capsule 6–7 mm ..... 73. *J. castaneus*
- 54b. Perianth segments equal; capsule 7.5–8 mm ..... 74. *J. tibeticus*
- 38b. Inflorescence usually a solitary head, rarely of (1 or)2–5-flowered cymes.
- 55a. Leaf blade flattened, grasslike; leaf sheath auricles absent.
- 56a. Inflorescences 5–7 mm in diam., 2-flowered; basal leaf 1 ..... 58. *J. unifolius*
- 56b. Inflorescences 7–14 mm in diam., (2 or)3–6-flowered; basal leaves more than 1 ..... 59. *J. minimus*
- 55b. Leaf blade terete or somewhat flattened or linear; leaf sheath auricles usually present.
- 57a. Leaves all basal, rarely sub-basal.
- 58a. Plants 1.5–5 cm tall ..... 42. *J. perpusillus*
- 58b. Plants 5–35 cm tall (rarely ca. 3 cm in *J. brachystigma*).
- 59a. Basal involucre bract distinctly longer than flower head (sometimes equaling head in *J. brachystigma*).
- 60a. Stigmas very short ..... 41. *J. brachystigma*
- 60b. Stigmas 0.5–2.2 mm.
- 61a. Stems 0.5–0.9 mm in diam.; leaf blade flat, 1–8 cm × 0.6–1 mm; flower heads 0.6–1.5 cm in diam. .... 39. *J. leucomelas*
- 61b. Stems 1–1.3 mm in diam.; leaf blade terete, 8–15 cm × 1.2–2 mm; flower heads 1.4–1.9 cm in diam. .... 40. *J. kingii*
- 59b. Basal 1 or 2 involucre bracts shorter than or subequaling or occasionally slightly longer than flower head.
- 62a. Anthers 2.2–3.2 mm; style 2–3 mm.
- 63a. Heads 8–13-flowered; bracts yellowish; anthers 2.2–2.6 mm ..... 38. *J. yunnanensis*
- 63b. Heads (1 or)2(or 3)-flowered; bracts yellowish white; anthers 2.8–3.2 mm ..... 45. *J. longistamineus*
- 62b. Anthers 0.7–2 mm; style not more than 1 mm.
- 64a. Bracts closely encircling flowers; stamens nearly as long as perianth; anthers oblong, 0.7–1 mm ..... 36. *J. triglumis*

- 64b. Bracts spreading outward; stamens longer than perianth; anthers linear, 1.6–2 mm ..... 37. *J. thomsonii*
- 57b. Leaves basal and cauline (rarely only basal in *J. benghalensis*).
- 65a. Cymes 2–7-flowered ..... 46. *J. luzuliformis*
- 65b. Heads 2–20-flowered.
- 66a. Basal 1(or 2) bracts equaling or much longer than flower head.
- 67a. Leaf blade inconspicuously septate; style short ..... 48. *J. membranaceus*
- 67b. Leaf blade not septate; style long.
- 68a. Cauline leaves 2–3 cm; bracts usually 2 ..... 50. *J. bracteatus*
- 68b. Cauline leaves 3–12 cm; bracts 3 to several.
- 69a. Perianth segments 4–6 mm; filaments 5–6 mm; anthers 2.2–3.3 mm ..... 49. *J. benghalensis*
- 69b. Perianth segments 3.1–4 mm; filaments 2.5–4.2 mm; anthers 0.8–1.5 mm.
- 70a. Capsule trigonous obovoid to trigonous oblong, 4.5–5 mm; seeds ca. 2 mm ..... 43. *J. maximowiczii*
- 70b. Capsule ovoid, 3.5–3.7 mm; seeds 0.5–0.7 mm ..... 47. *J. potaninii*
- 66b. Bracts shorter than flower head or basal 1 or 2 bracts slightly longer than head.
- 71a. Stigma 1, capitate or subglobose ..... 51. *J. cephalostigma*
- 71b. Stigmas 3, linear.
- 72a. Style 1.8–4 mm (rarely ca. 0.5 mm in *J. przewalskii*).
- 73a. Cauline leaves usually 2, cataphylls shiny ..... 55. *J. leucanthus*
- 73b. Cauline leaf usually 1, cataphylls dull and often withered.
- 74a. Filaments apically thinner and discolored; seeds ovoid, ca. 0.7 mm; appendages 0.5–0.8 mm ..... 56. *J. tanguticus*
- 74b. Filaments apically neither thinner nor discolored; seeds oblong, ca. 1 mm; appendages 0.9–1 mm ..... 57. *J. przewalskii*
- 72b. Style 0.8–1.7 mm.
- 75a. Perianth segments linear; capsule 5–6 mm ..... 44. *J. triflorus*
- 75b. Perianth segments lanceolate; capsule 2.2–4.5 mm.
- 76a. Cauline leaves usually 2; leaf sheath auricles developed ..... 52. *J. modicus*
- 76b. Cauline leaf 1; leaf sheath auricles absent.
- 77a. Plants 5.5–6.5 cm tall; basal leaves 1 or 2, leaf blade 5–14 cm; cauline leaves not jointed; heads usually 3- or 4-flowered; perianth segments straw-colored or reddish brown, 3–3.7 mm ..... 53. *J. kangdingensis*
- 77b. Plants 14.5–18.5(–25) cm tall; basal leaves absent or leaf blade reduced and bristlelike; cauline leaves jointed near apex; heads usually 5–8-flowered; perianth segments whitish, 3.9–5.8 mm ..... 54. *J. concolor*

**1. *Juncus inflexus* Linnaeus, Sp. Pl. 1: 326. 1753.**

片髓灯心草 pian sui deng xin cao

*Juncus brachytepalus* Trautvetter ex V. I. Kreczetowicz & Gontscharow; *J. glaucus* Ehrhart ex Sibthorp; *J. inflexus* subsp. *austro-occidentalis* K. F. Wu; *J. inflexus* subsp. *brachytepalus* (Trautvetter ex V. I. Kreczetowicz & Gontscharow) Novikov.

Plants perennial, tufted. Stems terete, 40–80 cm × 1.2–4 mm; pith interrupted. Cataphylls closely embracing stem, reddish brown to brown, shiny or not, sheathlike, 1–13 cm. Inflorescences pseudolateral, many flowered in small, dense panicles; involucrel bract erect, seemingly a continuation of stem, long. Bracteoles 2, broadly ovate to ovate-lanceolate. Perianth yellowish green at center; segments narrowly lanceolate, 2.5–3.5 × ca. 1 mm, subequal or outer ones larger than inner, margin thin, transparent, apex acute. Stamens 6, ca. 1/2 as long as perianth; filaments pale reddish brown; anthers ca. 0.7 mm. Ovary 3-loculed. Style shorter than ovary. Capsule yellowish green to chestnut brown, trigonous, ellipsoid, narrowly ovoid, or ovoid-oblong, 3–3.4 mm, subequaling or slightly longer than outer perianth segments, 3-septate, apex obtuse to acuminate, often mucronate. Seeds brown, obliquely ovoid to oblong, ca. 0.6 mm, reticulate. Fl. Jun–Jul, fr. Jul–Sep.  $2n = 38, 40, 42$ .

Flood plains, wet grasslands, marshes, river banks, ditch margins;

1100–2700 m. Gansu, Guangxi, Guizhou, Henan, Jiangsu, Qinghai, Shanxi, Sichuan, Xizang, Xinjiang, Yunnan [Bhutan, India, Indonesia, Kashmir, Malaysia, Nepal, Pakistan, Russia (E Siberia), Sikkim, Sri Lanka; Africa, Europe, North America].

**2. *Juncus filiformis* Linnaeus, Sp. Pl. 1: 326. 1753.**

丝状灯心草 si zhuang deng xin cao

Plants perennial. Rhizome internodes short. Stems 7–15 cm × ca. 1 mm. Cataphylls usually 2, closely embracing stem, yellow, chestnut brown, or reddish brown, sheathlike, 1.5–5 cm; leaf blade reduced to an awnlike rudiment. Inflorescences pseudolateral, dense or lax, 3–6(–10)-flowered; involucrel bract erect, seemingly a continuation of stem, terete, (0.3–)1–1.5 × as long as stem, apex sharply acute. Flowers pedicellate. Bracteoles 2, broadly ovate, apex obtuse. Perianth segments greenish, straw-colored with age, lanceolate, unequal to subequal; outer segments 2.6–5 × ca. 1 mm; inner segments ca. 2.5 × 1 mm. Stamens 6, ca. 2/3 as long as inner perianth segments; filaments ca. 1.1 mm; anthers oblong, 0.5–0.6 mm. Ovary obliquely ovoid, 3-loculed. Style very short or inconspicuous. Capsule yellowish green to pale brown, trigonous ovoid to trigonous globose, subequaling or longer than perianth, 3-septate, apex obtuse to acuminate, mucronate. Seeds pale chestnut brown, obliquely ovoid, ca. 0.5 mm. Fl. Aug, fr. Sep.  $2n = 84$ .

River valleys, near water; ca. 2500 m. Heilongjiang, Jilin, Liaoning, Xinjiang [Japan; Europe, North America].

**3. *Juncus effusus* Linnaeus, Sp. Pl. 1: 326. 1753.**

灯心草 *deng xin cao*

Plants perennial, densely tufted. Rhizome shortly creeping, thick. Stems terete, 25–90 cm or taller  $\times$  1–3(–4) mm, striate; pith continuous. Cataphylls closely embracing stem, reddish brown to chestnut brown, sheathlike, 2–22 cm. Inflorescences pseudolateral, densely to laxly many flowered; involucrel bract erect, seemingly a continuation of stem, terete, 5–28 cm. Perianth segments usually pale brown, linear-lanceolate, 2–2.7  $\times$  ca. 0.8 mm, unequal with outer ones slightly longer than inner, apex acute. Stamens 3(or 6), ca. 2/3 as long as perianth; anthers 0.5–0.7 mm, slightly shorter than filaments. Ovary 3-loculed. Style very short. Capsule ovoid to oblong, slightly depressed or not, subequaling or slightly longer than perianth, 3-septate, apex obtuse. Seeds ovoid-oblong, 0.5–0.6 mm, reticulate. Fl. Apr–Jul, fr. May–Sep.  $2n = 40, 42$ .

Forest margins, wet grasslands, pools, morasses, lake margins, river banks, fields, rice fields; 200–3400 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shandong, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, India, Indonesia, Japan, Korea, Laos, Malaysia, Nepal, Sikkim, Sri Lanka, Thailand, Vietnam; widespread in temperate and montane-tropical regions].

The pith is used as a wick for oil lamps and candles, and also medicinally as a diuretic and tranquilizer.

**4. *Juncus setchuensis* Buchenau ex Diels, Bot. Jahrb. Syst. 29: 238. 1900.**

野灯心草 *ye deng xin cao*

Plants perennial, densely tufted. Rhizome thick. Stems terete, 25–65 cm  $\times$  0.8–1.7 mm, striate; pith continuous. Cataphylls closely embracing stem, reddish brown to brown, sheathlike, 1–9.5 cm; leaf blade absent. Inflorescences pseudolateral, densely to laxly many flowered; involucrel bract erect, seemingly a continuation of stem, 5–15 cm. Bracteoles 2, triangular-ovate. Perianth segments greenish, ovate-lanceolate, 2–3  $\times$  ca. 0.9 mm, equal, apex acute. Stamens 3; filament longer than anther; anthers 0.8–0.9 mm. Ovary 1-loculed, incompletely 3-septate; placentation parietal, a semilunar valve. Capsule globose to ovoid, often longer than perianth, 3-septate, apex retuse to obtuse. Seeds brown, obliquely ovoid, 0.5–0.7 mm, reticulate. Fl. Apr–Jul, fr. Jun–Sep.

Forests, wet land under forests, shaded and wet places on mountain slopes, near ravines, open hillsides, streamsides, trail sides, roadsides; 300–1800 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shandong, Shanxi, Sichuan, Xizang, Yunnan, Zhejiang [Japan, Korea].

- 1a. Stems distinctly striate; capsule usually ovoid ..... 4a. var. *setchuensis*
- 1b. Stems weakly striate; capsule usually globose ..... 4b. var. *effusoides*

**4a. *Juncus setchuensis* var. *setchuensis***

野灯心草(原变种) *ye deng xin cao (yuan bian zhong)*

*Juncus pauciflorus* R. Brown.

Stems distinctly striate. Capsule usually ovoid, apex obtuse.

Wet land under forests, near ravines, open hillsides, streamsides, trail sides, roadsides; 300–1800 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Shandong, Sichuan, Xizang, Yunnan, Zhejiang [Japan, Korea].

**4b. *Juncus setchuensis* var. *effusoides* Buchenau, Bot. Jahrb. Syst. 36(Beibl. 82): 18. 1905.**

假灯心草 *jia deng xin cao*

Stems often in arclike curves, weakly striate. Involucrel bract often curved. Capsule usually globose, apex retuse.

Forests, shaded and wet places on mountain slopes, near ravines, trail sides; 500–1700 m. Gansu, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Shanxi, Sichuan, Yunnan, Zhejiang [Japan, Korea].

**5. *Juncus kangpuensis* K. F. Wu, Acta Phytotax. Sin. 32: 443. 1994.**

康普灯心草 *kang pu deng xin cao*

Plants perennial. Rhizome short. Stems 7–30 cm, thin, striate. Basal leaves 1 or 2; leaf sheath scarious at margin, auricles distinct; leaf blade linear, 4–9  $\times$  ca. 1 mm, apex obtuse. Inflorescences terminal, 1- or 2-flowered; involucrel bract seemingly a continuation of stem, 0.8–2.4 cm. Flowers shortly pedicellate, often bracteate. Perianth segments chestnut brown, lanceolate, veins 3, apex slightly obtuse to acute; outer segments 3–3.5  $\times$  ca. 1.2 mm; inner segments ca. 4  $\times$  1 mm. Stamens 6; filaments 2.5–3 mm; anthers 1–1.2 mm. Ovary ellipsoid. Style 1.8–2 mm; stigmas ca. 1.6 mm. Capsule dark golden brown, trigonous oblong, 4–4.5 mm, 1-loculed, apex mucronate. Seeds grayish brown, ovoid-oblong, ca. 0.8 mm. Fl. Jun–Jul, fr. Jul–Aug.

- Grasslands on mountain slopes; ca. 3500 m. Yunnan.

**6. *Juncus gracillimus* (Buchenau) V. I. Kreczetowicz & Gontsharov in Komarov, Fl. URSS 3: 627. 1935.**

扁茎灯心草 *bian jing deng xin cao*

*Juncus compressus* Jacquin var. *gracillimus* Buchenau in Engler, Pflanzenr. 25(IV. 36): 112. 1906.

Plants perennial, laxly tufted. Rhizome thick. Stems (8–) 15–80 cm, usually slightly compressed. Cataphylls absent to 3. Basal leaves 1–3; leaf blade linear, 3–15 cm  $\times$  0.5–1 mm. Distal cauline leaves 1 or 2; leaf sheath auricles rounded, ca. 1 mm; leaf blade flat, 10–15(–20) mm. Inflorescences usually lax, many branched; branches unequal, longer ones 4–6 cm; involucrel bract linear, often longer than inflorescence. Bracteoles present, broadly ovate, ca. 1 mm, margin scarious, apex obtuse. Perianth segments lanceolate to oblong-lanceolate, 1.8–2.6  $\times$  0.9–1.1 mm, apex obtuse; outer segments slightly longer and narrower than inner ones, center greenish, margin broadly scarious. Stamens 6; filaments ca. 1 mm; anthers 0.8–1 mm. Ovary oblong. Style very short; stigmas ca. 1.5 mm. Capsule globose to ovoid, ca. 2.5 mm, apex obtuse and mucronate. Seeds obliquely ovoid, ca. 0.4 mm, striate. Fl. May–Jul, fr. Jun–Aug.

River banks, pool margins, marshes, wet grasslands, ridges; 500–1500 m. Gansu, Hebei, Heilongjiang, Henan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Qinghai, Shandong, Shanxi [Japan, Korea,

Mongolia, Pakistan, Russia; Europe].

Chinese records of *Juncus compressus* Jacquin (e.g., in FRPS) are referable to *J. gracillimus*.

**7. *Juncus libanoticus*** Thiébaud, Bull. Soc. Bot. France 95: 20. 1948.

玛纳斯灯心草 ma na si deng xin cao

*Juncus manasiensis* K. F. Wu.

Plants perennial, tufted. Rhizome thick. Stems terete, 8–18 cm × 0.6–1 mm, striate. Cataphylls few. Basal leaves 2–4; leaf sheath auricles obtuse; leaf blade flat, 2.5–7.5 cm, adaxially smooth, abaxially longitudinally striate, apex acute. Inflorescences compound cymes, 2–5-branched; branches unequal; involucre bract shorter than inflorescence. Flowers solitary or in clusters of 2 or 3. Bracteoles 2, broadly ovate, ca. 2 × 1.1 mm, apex obtuse. Perianth segments brownish yellow, oblong-lanceolate, 3–3.3 × 1–1.3 mm, subequal, margin narrowly scarious, apex acuminate. Stamens 6; filaments 0.3–0.5 mm; anthers 1.2–1.6 mm. Ovary oblong, 3-loculed. Style ca. 1 mm; stigmas ca. 1.2 mm. Capsule straw-colored, trigonous ellipsoid, 2–2.8 mm, apex mucronate. Seeds reddish brown, obovoid to oblong, 0.6–0.7 mm, striate. Fl. Jun–Jul, fr. Jul–Aug.

Wet places near villages, reservoir margins. Xinjiang [Afghanistan, Mongolia, S Russia; SW Asia].

**8. *Juncus heptopotamicus*** V. I. Kreczetowicz & Gontscharov in Komarov, Fl. URSS 3: 628. 1935.

七河灯心草 qi he deng xin cao

Plants perennial. Rhizome creeping. Stems terete, 10–30 cm × 0.9–1.2 mm. Basal leaves 2–4; leaf sheath 3–6 cm, occasionally closed or margin narrowly scarious, auricles rounded; leaf blade linear, slightly flattened or margin involute and seemingly narrower and channeled, apex acute. Inflorescences 1.5–3 cm, 2–5-branched; involucre bract often longer than inflorescence. Flowers in clusters of 2–5; pedicel short. Bracteoles 2, chestnut brown to dark brown, 1.5–1.8 mm, margin hyaline, apex subrounded. Perianth segments yellowish green, oblong to elliptic-lanceolate, 2.5–3.5 × 1–1.3 mm, subequal or outer ones somewhat longer than inner, abaxially thickened, margin dark brown, apex obtuse. Stamens 6; filaments ca. 0.5 mm; anthers 1.3–1.6 mm. Ovary oblong. Style ca. 1 mm; stigmas ca. 1.5 mm. Capsule trigonous ellipsoid to trigonous ovoid-oblong, 2.5–3.6 mm, 3-loculed, apex mucronate. Seeds rust- or straw-colored, obovoid, 0.6–0.7 mm, both ends very shortly appendaged. Fl. Jun–Jul, fr. Jul–Aug.

Grasslands, grasslands near rivers, marshes, beside water, fields; 600–3100 m. Qinghai, Xinjiang [Mongolia, Russia].

- 1a. Perianth segments 3.1–3.5 mm; capsule 3.1–3.6 mm ..... 8a. var. *heptopotamicus*  
1b. Perianth segments 2.5–3 mm; capsule 2.5–3 mm ..... 8b. var. *yiningensis*

**8a. *Juncus heptopotamicus* var. *heptopotamicus***

七河灯心草(原变种) qi he deng xin cao (yuan bian zhong)

*Juncus bulbosus* Linnaeus var. *nigricans* Regel; *J. bulbosus*

var. *salsuginosus* (Turczaninow ex E. Meyer) Regel; *J. gerardii* Loisel var. *salsuginosus* (Turczaninow ex E. Meyer) Buchenau; *J. salsuginosus* Turczaninow ex E. Meyer.

Rhizome not elongate. Cauline leaf absent. Perianth segments 3.1–3.5 × 1–1.3 mm. Capsule 3.1–3.6 mm.

Grasslands; 2400–3100 m. Xinjiang [Mongolia, Russia].

Some recent authors separate *Juncus salsuginosus* from *J. heptopotamicus*.

**8b. *Juncus heptopotamicus* var. *yiningensis*** K. F. Wu, Acta Phytotax. Sin. 32: 447. 1994.

伊宁灯心草 yi ning deng xin cao

Rhizome elongate. Cauline leaf sometimes present. Outer perianth segments ca. 3 mm; inner segments 2.5–2.8 mm. Capsule 2.5–3 mm.

• Grasslands near rivers, marshes, beside water, fields; 600–1700 m. Qinghai, Xinjiang.

**9. *Juncus tenuis*** Willdenow, Sp. Pl. 2: 214. 1799.

坚被灯心草 jian bei deng xin cao

*Juncus leptocladus* Hayata; *J. macer* Gray.

Plants perennial, tufted. Stems 10–40 cm × 0.6–1.2 mm, rigid to weak. Leaves basal; leaf sheath auricles obtuse, 2–4 mm, margin scarious to broadly so; leaf blade flat, 4–23 cm × 0.5–1.8 mm, margin often involute. Inflorescences terminal panicles, 3–7 cm, usually lax, 6–40-flowered, rarely flowers in a few clusters; involucre bracts 2, leaflike, 4–18 cm. Bracteoles 2. Perianth segments greenish, lanceolate, 3.5–4 × ca. 1 mm, subequal or outer ones somewhat longer than inner, margin white scarious, apex long tapered to a sharp point. Stamens 6; filaments ca. 1.2 mm; anthers ca. 0.8 mm. Style shorter than ovary; stigmas ca. 1.6 mm. Capsule trigonous ovoid, shorter than to rarely equaling perianth, apex truncate and shortly mucronate to obtuse. Seeds reddish brown, 0.4–0.5 mm, appendaged; appendage white, short. Fl. Jun–Jul, fr. Aug–Sep. 2n = 30, 32, 84.

Riversides, streamsides, wet grasslands; ca. 400 m. Heilongjiang, Henan, Jiangxi, Shandong, Taiwan, Zhejiang [India, Japan, Korea; Europe, North America].

**10. *Juncus taonanensis*** Satake & Kitagawa, Bot. Mag. (Tokyo) 48: 610. 1934.

洮南灯心草 tao nan deng xin cao

Plants perennial. Rhizome horizontal. Stems terete, 5–20 cm. Basal leaves 3 or 4, cauline leaves 1 or 2; leaf sheath auricles rounded; leaf blade flat, 0.6–2 cm × ca. 1 mm, apex needle-like. Inflorescences terminal, 3–26-flowered; involucre bract 2–7 cm, subequaling inflorescence. Flowers solitary. Bracteoles 2, ovate, 18–2.5 × 1–1.5 mm, apex obtuse. Perianth segments lanceolate-oblong, 3.1–4 × 1–1.2 mm, subequal or outer ones slightly longer than inner, margin broadly hyaline, apex acute. Stamens 3; filaments 1.2–1.5 mm; anthers 0.5–0.9 mm. Ovary oblong, 3-loculed. Style very short; stigmas brown, 0.5–1 mm. Capsule brownish, shiny, oblong-ovoid, ca. 3 mm. Seeds dark reddish, ellipsoid. Fl. Jun–Aug, fr. Jul–Oct.

• Riversides, pond margins, grassy marshlands, wet places; ca. 1100 m. Hebei, Heilongjiang, Jiangsu, Jilin, Liaoning, Nei Mongol,

Shandong.

**11. *Juncus nigroviolaceus*** K. F. Wu, Acta Phytotax. Sin. 32: 448. 1994.

黑紫灯心草 *hei zi deng xin cao*

Plants annual. Stems terete, distinctly channeled, 1.2–2.4 cm × ca. 0.5 mm. Cataphylls early withered. Basal leaf 1; leaf sheath auricles absent; leaf blade linear, ca. 1.5 cm. Inflorescences terminal, 1-flowered; bracts 2, lanceolate; basal bract leaflike and usually conspicuously longer than flower; other one membranous and shorter than flower. Perianth segments blackish purple, lanceolate, 3–4 mm, subequal, thickly papery, margin inconspicuously scarious, apex somewhat obtuse to acuminate. Stamens 6, ca. 1/2 as long as perianth; filaments ca. 0.6 mm; anthers ca. 1.5 mm. Ovary broadly ovoid. Style 1.9–2.1 mm; stigmas 1.8–3 mm. Fruit not seen. Fl. Jul.

• Glacial moraines by lakes; ca. 4300 m. Xizang.

**12. *Juncus perparvus*** K. F. Wu, Acta Phytotax. Sin. 32: 448. 1994.

单花灯心草 *dan hua deng xin cao*

Plants annual, 4–9 cm tall. Stems thin. Cataphylls few. Basal and cauline leaves 1–4. Basal leaf blade linear, short. Cauline leaves often 2; proximal leaf with sheath auricles well developed; leaf blade linear, 4–5.5 cm, apex acuminate; distal leaf 1–2 cm including sheath with auricles inconspicuous. Inflorescences terminal, 1(or 2)-flowered. Bracteoles 2, ovate, 2–2.5 mm. Perianth segments whitish, ovate-lanceolate to lanceolate, 2.5–3 × 1–1.2 mm, unequal with outer ones slightly shorter than inner, margin hyaline. Stamens 6, subequaling inner perianth segments; filaments 2.1–2.4 mm; anthers 0.8–0.9 mm. Ovary ca. 2 mm. Style ca. 1 mm; stigmas short, branches inconspicuous. Capsule brown, trigonous oblong, ca. 3 mm, 1-loculed, apex mucronate. Seeds 0.5–0.6 mm; appendages 0.4–0.5 mm. Fl. Jul, fr. Aug.

• Valley forests, mountain grasslands, rocks; 1800–4100 m. Jilin, Qinghai, Yunnan.

**13. *Juncus aletaiensis*** K. F. Wu, Acta Phytotax. Sin. 32: 450. 1994.

阿勒泰灯心草 *a le tai deng xin cao*

Plants annual, ca. 16 cm tall including inflorescences. Stems striate. Basal leaf 1, cauline leaves sometimes present and similar to basal one; leaf sheath auricles absent; leaf blade linear, 3–4 cm, margin narrowly scarious, apex acute. Inflorescences 2/3–4/5 × plant height; branches few, ascending, somewhat arcuate, usually weak; involucre bract 3–5 cm, shorter than inflorescence. Flowers usually many, secund, sessile. Bracteoles 2, broadly ovate, 1.6–2 mm. Perianth segments yellowish green, lanceolate, unequal; outer segments ca. 5.5 × 1.5 mm, apex acute; inner segments ca. 4.8 × 1.1 mm, apex subobtuse. Stamens 6; filaments 1.2–1.4 mm; anthers 0.9–1.2 mm. Ovary 3-loculed. Style ca. 0.8 mm; stigmas ca. 1.5 mm. Capsule purplish red at maturity, trigonous ellipsoid, 3.8–4 mm, apex shortly mucronate. Seeds (immature) chestnut brown, ellipsoid. Fl. Jun–Jul, fr. Jul–Aug.

• Sandy soil near small streams; ca. 600 m. Xinjiang.

This species is close to *Juncus bufonius* or possibly *J. erythropodus* V. I. Kreczetowicz. Further study is needed to determine the relationships.

**14. *Juncus bufonius*** Linnaeus, Sp. Pl. 1: 328. 1753.

小灯心草 *xiao deng xin cao*

Plants annual, 4–20(–30) cm tall. Stems usually many, erect or ascending, usually weak, base often reddish brown. Leaves basal and cauline; leaf sheath often swollen basally, margin hyaline; leaf blade flat, 1–13 cm × ca. 1 mm, margin often slightly convolute. Inflorescences usually lax, 1/4–4/5 × plant height; branches few, ascending, somewhat arcuate, usually weak, few flowered. Flowers subterminal, remote, appressed to subappressed; involucre bract leaflike. Bracteoles 2 or 3, 1.3–2.5 × 1.2–2.2 mm. Perianth segments lanceolate; outer segments 4.25–5.5 × 1–1.8 mm, center green, margin broadly white membranous, apex sharply pointed; inner segments 4–5 mm, often mostly membranous, apex acute. Stamens 6, 1/3–1/2 as long as perianth; filaments 0.8–1.2 mm; anthers 0.5–0.8 mm. Style absent; stigmas ca. 0.5 mm. Capsule ovoid to subellipsoid, 3–4(–5) mm, 3-loculed, apex slightly obtuse. Seeds ellipsoid, 0.4–0.6 mm, striate, base and apex usually apiculate. Fl. May–Jul, fr. Jun–Sep.  $2n = 100, 110$ .

Wet grasslands, swamps, lakesides, river banks, streamsides; 100–3500 m. Anhui, Fujian, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [Afghanistan, Bhutan, India, Japan, Kazakstan, Korea, Mongolia, Nepal, Pakistan, Philippines, Russia, Sikkim, Sri Lanka, Thailand, Vietnam; SW Asia, Europe, North and South America].

**15. *Juncus ranarius*** Songeon & E. P. Perrier in Billot, Annot. Fl. France Allemagne, 192. 1860.

簇花灯心草 *cu hua deng xin cao*

Plants annual, 4–12 cm tall. Stems usually many, erect or ascending, often weak. Leaves basal and cauline; leaf blade flat and margin convolute to subterete, 1.5–5 cm × 0.5–1 mm; leaves below inflorescence 1–4. Inflorescences of capitate clusters or occasionally lax; involucre bract leaflike. Bracteoles 2, broadly ovate, 1.5–2 × ca. 1.5 mm. Perianth segments whitish, lanceolate; outer segments 3–5 × 1–1.4 mm, center green and thick, margin membranous, apex acute; inner segments 2.8–3.3 × 0.3–1.2 mm, mostly scarious, apex obtuse to rarely acute. Stamens 6; filaments 0.8–1.3 mm; anthers 0.3–0.7 mm. Style absent; stigmas ca. 0.5 mm. Capsule trigonous ellipsoid, 2.9–4 mm, slightly longer than inner perianth segments, apex obtuse. Seeds broadly ellipsoid to ovoid, 0.4–0.5 mm, base and apex obtuse. Fl. May–Jun, fr. Jul–Sep.  $2n = 34$ .

Streamsides, near ditches and hot springs; 2300–4300 m. Gansu, Jiangsu, Nei Mongol, Qinghai, Yunnan, Xinjiang [Mongolia; Europe].

The Chinese material placed here may in fact be the C Asian species *Juncus turkestanicus* V. I. Kreczetowicz & Gontscharov (*J. bufonius* Linnaeus subsp. *turkestanicus* V. I. Kreczetowicz & Gontscharov) Novikov).

**16. *Juncus amuricus*** (Maximowicz) V. I. Kreczetowicz & Gontscharov subsp. *wui* Novikov, Byull. Moskovsk. Obshch.

Isp. Prir., Otd. Biol. 103(4): 66. 1998.

圓果灯心草 yuán guo deng xin cao

*Juncus subglobosus* K. F. Wu, Acta Phytotax. Sin. 32: 451. 1994, not Moss ex Adamson (1935).

Plants annual, ca. 13 cm tall including inflorescence. Stems 2.5–3.5 cm, thin. Basal leaves linear, sometimes sheath-like. Cauline leaves with sheath auricles absent or inconspicuous; leaf blade ca. 3.5 × 0.8 mm, margin involute. Inflorescences 2/3–3/4 × plant height; branches few, ascending, usually weak; involucre bract 2.5–4.5 cm, often shorter than inflorescence. Flowers many, basally 2-bracteolate. Perianth segments lanceolate; outer segments 2.4–2.9 × ca. 1 mm, center green and thick, margin hyaline, apex acute; inner segments 2–2.2 × ca. 1 mm, margin broadly hyaline, apex acuminate. Stamens 6, ca. 1/2 as long as perianth; filaments ca. 0.8 mm; anthers 0.5–0.6 mm. Capsule trigonous subglobose, subequaling inner perianth segments, ca. 1.9 mm in diam., apex obtuse and very shortly mucronate. Seeds ovoid, ca. 0.3 mm, striate, base and apex acute. Fl. Jul, fr. Aug.

- Wet places; ca. 500 m. Xinjiang.

*Juncus amuricus* subsp. *amuricus* occurs in the Far East region of Russia.

**17. *Juncus ochraceus*** Buchenau, Abh. Naturwiss. Vereine Bremen 3(2): 292. 1872.

羽序灯心草 yu xu deng xin cao

*Juncus tratangensis* Satake.

Plants perennial, tufted, 15–33 cm tall. Rhizome short. Stems terete, ca. 1 mm in diam., striate. Basal leaves few, cauline leaves 2 or 3; leaf sheath auricles obtuse, membranous, free part ca. 0.3 mm; leaf blade linear (4–)7–17 cm, apex acute. Inflorescences cymose, much branched, plumelike, to 12 cm; involucre bract leaflike, 2.7–3.5 cm. Perianth segments lanceolate, center greenish, margin hyaline, apex acute or acuminate; outer segments 3–3.5 × ca. 1.2 mm; inner segments 3–3.2 × ca. 1.2 mm. Stamens 6; filaments 1–1.5 mm; anthers 1.3–2.2 mm. Style 1.7–2.6 mm; stigmas 1.7–3.2 mm. Capsule trigonous oblong, ca. 2.4 mm; beak ca. 1.8 mm. Seeds (immature) apparently not appendaged at both ends. Fl. Sep–Oct, fr. Oct–Nov.

Valley forests, slopes, bare soil or earthy banks near rivers; 2500–4000 m. Sichuan, Xizang, Yunnan [Bhutan, India, Nepal, Sikkim].

This species is readily distinguished from others by its plumelike, vegetatively reproductive partial inflorescences and by the long style and stigmas of the fertile flowers. *Juncus tratangensis* was described for the fertile form that grows intermingled with the sterile form. *Juncus fimbriatylodes* Noltie (Edinburgh J. Bot. 55: 39. 1998), recently described from Yunnan, resembles *J. ochraceus* in its plumelike partial inflorescences but differs in having a single stem leaf and smaller sterile partial inflorescences, with fewer, smaller, acute bracts.

**18. *Juncus allioides*** Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 10: 99. 1887.

葱状灯心草 cong zhuang deng xin cao

Plants perennial, sparsely tufted. Rhizome short and knobby or creeping. Stems terete, 9–55 cm × 0.8–2 mm, striate. Cataphylls few. Basal and cauline leaves 2 or 3. Cauline leaves

with sheath auricles well developed, obtuse, 0.5–3 mm; leaf blade terete, 1–10(–21) cm × 1–1.5 mm, perfectly and distinctly septate. Inflorescences terminal; head 1, wrapped in basal bract while in bud, 10–25 mm in diam., 7–25-flowered; bracts 3–5, lanceolate, basal one or two 1.5–2.3 cm × 2–3(–5) mm, others ca. 1.2 cm × 3–4 mm. Flowers pedicellate, bracteolate. Perianth segments spreading and reflexed, whitish yellow, lanceolate, 5–8 × 1.2–2 mm, subequal, membranous, veins usually 3. Stamens 6; filaments reddish at base in fruit, purple-black distally, 4–7 mm; anthers 2–4 mm. Style ca. 2 mm; stigmas 0.7–1 mm. Capsule dark brown when mature, narrowly trigonous ellipsoid, 5–7 mm, 1-loculed, apex mucronate. Seeds 0.8–1 mm, oblong; appendages 2, white, 1–1.2 mm. Fl. Jun–Aug, fr. Jul–Sep.

Paths and wet places in forests, *Salix* thickets, slopes, grasslands; 1700–4700 m. Gansu, Guizhou, Henan, Hubei, Ningxia, Qinghai, Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, Sikkim].

**19. *Juncus chrysocarpus*** Buchenau, Bot. Jahrb. Syst. 6: 201. 1885.

丝节灯心草 si jie deng xin cao

Plants perennial, 14–25(–30) cm tall. Stems ca. 1 mm in diam., striate. Basal leaves 2 or 3, cauline leaves usually 2; leaf sheath auricles developed; leaf blade linear, 3–8 cm, perfectly septate, apex acute. Inflorescences terminal; heads 1 or 2, hemispheric, 11–15 mm in diam., 4–6-flowered; bracts 3–5, basal one slightly longer than proximal head, others lanceolate to ovate-lanceolate. Perianth segments yellowish white, narrowly lanceolate, 4.3–5 mm, unequal with inner ones slightly longer than outer, apex acute. Stamens 6; filaments 4–4.3 mm; anthers 2–2.2 mm. Ovary ovoid. Style 2–2.5 mm; stigmas 0.7–1 mm. Capsule golden yellow, shiny, longer than perianth, 1-loculed with incomplete septa, apex tapered into a short beak. Seeds sawdustlike, ca. 2.7 mm, white caudate. Fl. Aug–Sep, fr. Oct.

Slopes, trail sides; ca. 3900 m. Xizang [Bhutan, Nepal, Sikkim].

**20. *Juncus grisebachii*** Buchenau, Abh. Naturwiss. Vereine Bremen 3(2): 295. 1873.

节叶灯心草 jie ye deng xin cao

*Juncus phaeocarpus* A. M. Lu & Z. Y. Zhang.

Plants perennial, 25–60 cm tall. Rhizome creeping. Stems terete, 1.5–4 mm in diam., striate. Basal leaves 1–3, cauline leaves 1(or 2); leaf sheath auricles well developed, obtuse, free part ca. 3 mm; leaf blade 7–40 cm, laterally compressed, septate, apex acute. Inflorescences sparingly branched; involucre bract leaflike, 2–20 cm, septate; heads (2–)6–8, hemispheric, 1.2–1.7 cm in diam., 6–10(–12)-flowered; bracts 3–5, broadly ovate to lanceolate, apex acute. Pedicels 1.5–3 mm or sometimes flowers subsessile. Perianth segments straw-colored, lanceolate to linear-lanceolate; outer segments 4.1–7.5 × 1–2 mm; inner segments 4.1–6.7 × ca. 1 mm, apex acuminate. Stamens 6; filaments chestnut brown, 3–4.5 mm; anthers 1–3 mm. Ovary 3-septate. Style ca. 3 mm. Capsule chestnut brown, shiny, broadly trigonous ovoid, apex beaked; beak ca. 2 mm. Seeds sawdustlike, ca. 1 mm, both ends appendaged; appendages 0.8–

1 mm. Fl. Aug, fr. Sep.

Valley forest margins, grassy slopes, wet places near ravines and in mountainous regions; 2700–3700 m. Xizang [Bhutan, India, Nepal, Sikkim].

**21. *Juncus atratus*** Krocke, Fl. Siles. 1: 562. 1787.

黑头灯心草 *hei tou deng xin cao*

Plants perennial. Rhizome creeping, 40–70(–120) cm. Stems terete, 2–3.5 mm in diam., hollow. Basal leaves few, cauline leaves 3 or 4(or 5); leaf sheath auricles well developed; leaf blade terete, 8–23 cm × 1–2.5(–3) mm, ribbed, perfectly septate, apex acute. Inflorescences terminal, 3–5-branched; involucre bract leaflike, 7–10 cm, apex acute; heads 35–70, globose, ca. 6 mm in diam., 6–16-flowered; bracts broadly lanceolate, 1.5–2.2 mm, 1-veined. Perianth segments chestnut brown, lanceolate; inner segments 2.5–3 × ca. 0.8 mm, slightly longer than outer ones, veins 1–3, apex acute. Stamens 6, 1.5–2 mm; anthers 0.7–1 mm, equaling or slightly longer than filaments. Stigmas ca. 2 mm. Capsule trigonous ovoid, 2.2–2.6 mm, 1-loculed, apex abruptly contracted to a short beak. Seeds ovoid, 0.3–0.5 mm, reticulate. Fl. Jul–Aug, fr. Aug–Sep.

Wet places by lakes; ca. 600 m. Xinjiang [Russia; Europe].

**22. *Juncus turczaninowii*** (Buchenau) V. I. Kreczetowicz in Komarov, Fl. URSS 3: 539. 1935.

尖被灯心草 *jian bei deng xin cao*

Plants perennial, densely tufted, 25–45 cm tall. Stems terete, 1–1.5 mm in diam. Basal leaves 1 or 2, cauline leaves 2; leaf sheath 3–7 cm, auricles narrow; leaf blade terete or somewhat laterally compressed, 5–15 cm × 1–2 mm, perfectly and distinctly septate, apex acute. Inflorescences with involucre bract leaflike, often shorter than inflorescence; heads usually many, hemispheric, 2–5 mm in diam., (2 or) 3–6(or 7)-flowered. Perianth segments ovate-lanceolate to lanceolate or oblong-lanceolate, 2–2.4 mm, subequal or outer segments slightly longer than inner, margin scarios, apex obtuse or acute. Stamens 6; filaments 1–1.1 mm; anthers 0.8–0.9 mm. Capsule black-brown to brown, shiny, trigonous oblong to trigonous ellipsoid, 2.6–3 mm, apex mucronate. Seeds subovoid to ellipsoid, ca. 0.5 mm, reticulate. Fl. Jun–Jul, fr. Jul–Sep.

Wet grasslands by rivers, swamps, wet places; 700–1400 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol [Mongolia, Russia].

- 1a. Perianth segments ovate-lanceolate to lanceolate, apex acute ..... 22a. var. *turczaninowii*  
1b. Perianth segments oblong-lanceolate, apex obtuse ..... 22b. var. *jeholensis*

**22a. *Juncus turczaninowii* var. *turczaninowii***

坚被灯心草(原变种) *jian bei deng xin cao (yuan bian zhong)*

*Juncus lampocarpus* Ehrhart ex Hoffmann var. *turczaninowii* Buchenau, Bot. Jahrb. Syst. 12: 378. 1890.

Perianth segments ovate-lanceolate to lanceolate, apex acute.

Wet grasslands by rivers, swamps; 700–1400 m. Hebei, Heilong-

jiang, Jilin, Liaoning, Nei Mongol [Mongolia, Russia].

**22b. *Juncus turczaninowii* var. *jeholensis*** (Satake) K. F. Wu & Ma, Acta Sci. Nat. Univ. Intramongol. 15: 114. 1984.

热河灯心草 *re he deng xin cao*

*Juncus jeholensis* Satake in Nakai et al., Rep. Exped. Manchoukuo Sect. 4, 4: 106. 1936.

Perianth segments oblong-lanceolate, usually unequal with outer ones slightly longer than inner, apex obtuse, especially so on inner segments.

- Swamps, wet places; ca. 700 m. Nei Mongol.

**23. *Juncus articulatus*** Linnaeus, Sp. Pl. 1: 327. 1753.

小花灯心草 *xiao hua deng xin cao*

*Juncus lampocarpus* Ehrhart ex Hoffmann; *J. lampocarpus* var. *senescens* Buchenau.

Plants perennial, tufted or rhizome creeping, (10–)15–40 (–60) cm tall. Stems terete, 0.8–1.5 mm in diam. Cataphylls absent to 2. Cauline leaves 2–6; leaf sheath auricles well developed, acute, free part ca. 2 mm, membranous; leaf blade terete or somewhat laterally compressed, 2.5–7.5(–10) cm × 0.8–1.4 mm, perfectly septate. Inflorescences usually broad; branches rigid, spreading; involucre bract erect to ascending, 0.7–3 cm; heads 5–30, hemispheric to toplike, 5–10(–15)-flowered. Perianth segments reddish brown with greenish midvein, lanceolate, 2.5–3 mm, subequal, apex acute. Stamens 6, 1/2–3/4 as long as perianth; filaments 0.7–0.9 mm; anthers oblong, 0.5–1 mm. Capsule dark brown, shiny, trigonous ovoid, 3–3.5 mm, apex sharply acute and tapered to a conspicuous tip. Seeds ovoid, 0.5–0.7 mm, reticulate. Fl. Jun–Jul, fr. Aug–Sep.  $2n = 80$ .

Wet meadows, sand, along rivers, edges of water along ditches; 1200–3700 m. Gansu, Hebei, Henan, Hubei, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Afghanistan, Bhutan, India, Kashmir, Mongolia, Nepal, Pakistan, Russia (E Siberia), Vietnam; Africa, Europe, North America].

**24. *Juncus krameri*** Franchet & Savatier, Enum. Pl. Jap. 2: 99. 1876.

短喙灯心草 *duan hui deng xin cao*

Plants perennial, 4–35 cm tall. Rhizome short. Stems tufted. Basal and cauline leaves several; leaf sheath auricles obtuse; leaf blade 2–9 cm, ± septate, apex acute. Inflorescences 2–11 cm; heads 3–26, 3–4 mm in diam., 2–4(–6)-flowered. Bracteoles ca. 1.2 × 1 mm. Perianth segments green to straw-colored with age, lanceolate, ca. 2.5 × 1 mm, equal or inner ones somewhat longer than outer, margin scarios, apex acuminate. Stamens 6; filaments ca. 1 mm; anthers 0.5–0.6 mm. Capsule trigonous ellipsoid, ca. 3.1 mm, apex mucronate. Seeds obovoid, ca. 0.5 mm, reticulate. Fl. Jul–Aug, fr. Aug–Sep.

Swampy meadows, along rivers, sandy slopes, trail sides on slopes; 100–1300 m. Jilin, Liaoning, Shandong [Japan, Korea].

**25. *Juncus yanshanuensis*** Novikov, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 103(4): 67. 1998.

球头灯心草 *qiu tou deng xin cao*

*Juncus sphaerocephalus* K. F. Wu, Acta Phytotax. Sin. 32:

453. 1994, not Salzmann ex Pouzolz (1826).

Plants perennial, tufted, 35–50 cm tall. Stems terete, 1–2 mm in diam. Cataphylls 1 or 2. Basal leaves 1 or 2, cauline leaves 1 or 2; leaf sheath auricles rounded; leaf blade 5–18 cm × 0.6–1.5 mm, shorter than stem, perfectly septate. Inflorescences terminal, much branched and compound; involucre bract leaflike, 2.5–5.2 cm; heads many, globose, 7–10 mm in diam., 15–30-flowered. Perianth segments lanceolate, 3–3.5 × less than 1 mm, equal, veins 3, center papery, margin hyaline, apex acute. Stamens 3; anthers ca. 0.5 mm, 1/3–1/2 as long as filaments. Capsule chestnut brown, shiny, trigonous ovoid, 2.5–3 mm, 1-loculed, apex mucronate. Seeds ellipsoid, ca. 0.4 mm, reticulate. Fl. Aug–Sep, fr. Sep–Oct.

- Wet places; ca. 1200 m. Yunnan.

**26. *Juncus papillosus*** Franchet & Savatier, Enum. Pl. Jap. 2: 98. 1876.

乳头灯心草 ru tou deng xin cao

*Juncus nikkoensis* Satake.

Plants perennial, 15–50 cm tall, usually papillose. Rhizome short. Stems terete, 1–2 mm in diam. Basal leaves 2 or 3, cauline leaves 2; leaf sheath auricles narrow; leaf blade terete, 3–10 cm × 1–2 mm, hollow, distinctly septate. Inflorescences terminal, compoundly branched; primary branches erect; involucre bract leaflike, often shorter than inflorescence; heads many, usually obconical, 2–4-flowered. Perianth segments narrowly lanceolate, ca. 2 mm, unequal with inner ones somewhat longer than outer, apex acute. Stamens 3; filaments 1.4–1.6 mm; anthers 0.5–0.8 mm. Capsule trigonous lanceolate, 3–3.5 mm, apex acuminate. Seeds obovoid to narrowly ellipsoid, ca. 0.5 mm, reticulate. Fl. Jul–Aug, fr. Jun–Sep.

Swampy meadows; 800–2000 m. Hebei, Heilongjiang, Henan, Jiangsu, Jilin, Liaoning, Nei Mongol, Shandong [Japan, Korea].

**27. *Juncus leptospermus*** Buchenau, Bot. Jahrb. Syst. 6: 203. 1885.

细子灯心草 xi zi deng xin cao

*Juncus mairei* H. Léveillé.

Plants perennial, 35–70 cm tall, tufted. Rhizome thick. Stems terete or somewhat compressed. Basal and cauline leaves 2–5; leaf sheath auricles well developed, acute, 1–2 mm, membranous; leaf blade erect, terete, unitubular, to 25 cm (on proximal leaves), sturdy, distinctly and perfectly septate, apex acute. Inflorescences terminal, branched; involucre bract leaflike, shorter than inflorescence; heads 6–12, hemispheric to obconical, 4–8-flowered. Perianth segments chestnut brown to yellowish green, center thickened, margin narrowly hyaline, apex acute; outer segments boatlike, 2.3–2.5 × ca. 0.8 mm; inner segments 2.5–3 × 0.6–1 mm. Stamens 3, shorter than outer perianth segments; filaments 1.5–1.6 mm; anthers 0.6–0.7 mm. Style 0.2–0.4 mm. Capsule reddish brown, trigonous lanceolate, 3.8–4 mm, apex beaked; beak 0.2–0.3 mm. Seeds pale brown, spindlelike, 0.5–0.7 mm, reticulate. Fl. Jun–Aug, fr. Apr–Nov.

Swampy ground at pond margins; 100–3600 m. Guangdong,

Guangxi, Guizhou, Heilongjiang, Shaanxi, Yunnan [Bhutan, India].

**28. *Juncus ohwianus*** M. T. Kao in H. L. Li et al., Fl. Taiwan 5: 150. 1978.

台湾灯心草 tai wan deng xin cao

Plants perennial, 14–25 cm tall. Rhizome short, creeping. Stems terete, ca. 2 mm in diam. Basal and cauline leaves 2 or 3; leaf sheath auricles well developed; leaf blade terete, 2–27 cm, on cauline leaves tubular and distinctly septate. Inflorescences terminal, shorter than cauline leaves; involucre bract leaflike; heads many, hemispheric, many flowered. Bracteoles ovate, ca. 2 × 1 mm, apex mucronate. Perianth segments lanceolate, 2.5–3 mm, margin scarious, apex acute to mucronate. Stamens 3, ca. 1.5 mm; anthers ovoid, shorter than filaments. Capsule trigonous ellipsoid, 3.5–4 mm, apex acute. Seeds obovoid, 0.6–1 mm.

- Taiwan.

The above description is based on the protologue because no material has been examined by the present authors. This species is similar to the North American *Juncus canadensis* J. Gay, but the seeds lack appendages at the ends.

**29. *Juncus wallichianus*** J. Gay ex Laharpe, Mém. Soc. Hist. Nat. Paris 3: 139. 1827.

针灯心草 zhen deng xin cao

*Juncus prismatocarpus* R. Brown var. *leschenaultii* (J. Gay ex Laharpe) Buchenau subvar. *unitubulosus* Buchenau; *J. pseudokrameri* Satake.

Plants perennial, densely tufted, 25–40 cm tall. Stems terete, 1–2 mm in diam. Basal leaves 1 or 2, cauline leaves 2; leaf sheath auricles obtuse, 0.6–1 mm; leaf blade terete, 3–15 cm × 1–2 mm, hollow, distinctly septate. Inflorescences terminal; involucre bract leaflike, usually shorter than inflorescence; heads usually more than 25, hemispheric, 2–5 mm in diam., (2–)4–6 (–10)-flowered. Perianth segments chestnut brown, lanceolate, 2–2.8 × ca. 0.8 mm, often unequal with inner ones larger than outer, margin scarious, apex mucronate to acuminate. Stamens 3; filaments ca. 1 mm; anthers ca. 0.7 mm. Capsule dark chestnut brown, shiny, trigonous oblong, 2.8–3.5 mm, apex cuspidate. Seeds reddish brown, ca. 0.5 mm. Fl. Jul–Aug, fr. Aug–Sep.

Riversides, swamps, meadows, moist roadsides; 800–2900 m. Fujian, Gansu, Guangdong, Hainan, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shandong, Taiwan, Yunnan, Zhejiang [Bhutan, India, Japan, Korea, Nepal, Russia (Siberia), Sikkim, Sri Lanka].

The stems and leaves are used for paper making and knitting.

**30. *Juncus auritus*** K. F. Wu, Acta Phytotax. Sin. 32: 453. 1994.

长耳灯心草 chang er deng xin cao

Plants perennial, 6–11 cm tall. Rhizome short. Stems terete, 0.8–1 mm in diam. Basal leaves 1–3, cauline leaves 2; leaf sheath auricles well developed, acuminate to slightly obtuse, 1.4–1.7 mm; leaf blade 1–5 cm × 0.5–0.7 mm, perfectly septate, striate. Inflorescences terminal, sparingly branched; involucre bract leaflike, shorter than inflorescence; heads 3–7, 4–7 mm in diam., 3–5(–7)-flowered; bracts 2.5–3 × 0.9–1.3 mm, apex

acute. Perianth segments lanceolate, ca.  $3 \times 1$  mm, subequal, veins 3, margin scarious, apex acute. Stamens 3; anthers ca. 0.9 mm, ca.  $3/5$  as long as filaments. Ovary trigonous oblong, 1-loculed. Stigmas usually curved, ca. 1.2 mm. Capsule chestnut brown, 3–3.5 mm including persistent style, apex tapered into a short beak. Seeds ca. 0.6 mm, longitudinally striate. Fl. May–Jun, fr. Jul–Aug.

- Trail sides on slopes; ca. 2500 m. Yunnan.

**31. *Juncus alatus*** Franchet & Savatier, Enum. Pl. Jap. 2: 98. 1879.

翅茎灯心草 *chi jing deng xin cao*

Plants perennial, tufted, 11–50 cm tall. Rhizome short. Stems flat, 2–4 mm wide, laterally broadly winged. Basal leaves 2–4, cauline leaves 1 or 2; leaf sheath auricles small, rounded, membranous; leaf blade flat, 5–16 cm  $\times$  3–4 mm, usually incompletely septate. Inflorescences terminal, 3–12 cm, sparingly branched; heads (4–)7–27, 3–7-flowered; bracts 2 or 3, broadly ovate, 2–2.5  $\times$  ca. 1.5 mm, membranous, apex acute. Perianth segments greenish to chestnut brown, lanceolate, 3–3.5  $\times$  1–1.3 mm, margin scarious, apex acuminate. Stamens 6; anthers 0.5–0.8 mm, ca.  $1/2$  as long as filaments. Ovary ellipsoid, 1-loculed. Capsule chestnut brown, 3.5–5 mm. Seeds ellipsoid, 0.4–0.5 mm, longitudinally striate. Fl. Apr–Jul, fr. May–Oct.

Forests on mountain slopes, fields, swampy meadows, riversides, moist to wet streamsides, ditches; 100–2300 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang [Japan, Korea].

**32. *Juncus prismatocarpus*** R. Brown, Prodr. 259. 1810.

筍石菖 *ji shi chang*

Plants perennial, tufted, (8–)10–65 cm tall. Stems erect or ascending, terete or compressed, 0.7–3 mm in diam. Basal leaves few, cauline leaves 2–4; leaf sheath auricles obtuse, short; leaf blade linear, terete to compressed, 10–25 cm  $\times$  (1–)2–4 mm, distinctly and perfectly to incompletely septate, apex obtuse, acute, or acuminate. Inflorescences terminal, sparingly or much branched; involucre bract leaflike, shorter than inflorescence; heads 5–10(–30), globose to hemispheric, 7–10 mm in diam., (3–)8–15(–20)-flowered; bracts 2–2.5 mm, broadly ovate to ovate-lanceolate, thinly membranous. Perianth segments narrowly lanceolate to linear-lanceolate, 3.5–4 mm, subequal, veins longitudinal, apex acute. Stamens 3, inserted opposite outer perianth segments; filaments 1.2–1.4 mm; anthers 0.9–1 mm. Stigmas very long, often recurved or sinuous. Capsule narrowly prismatic, 3.8–4.5 mm; angles prominent, acute; placentas not or only slightly intruded, hence fruit 1-loculed. Seeds wax yellow, oblong, 0.6–0.8 mm, regularly longitudinally ribbed; transverse veins faint, remote. Fl. (Jan–)Mar–Jun, fr. May–Nov.

Forests and trail sides on mountain slopes, wet grasslands in sparse forests, thickets, fields, marshy places, swampy river banks, streamsides, sink holes; near sea level to 3000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shandong, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, Cambodia, India, Indonesia, Japan, Korea, Laos, Malaysia, Nepal, Pakistan, Papua New Guinea, Sikkim, Sri Lanka, Thailand, Vietnam;

Australia, Pacific Islands (New Zealand)].

This is a widespread and polymorphic species.

- 1a. Leaf blade compressed, incompletely septate ..... 32a. subsp. *prismatocarpus*
- 1b. Leaf blade terete, sometimes slightly compressed when dry, distinctly and perfectly septate ..... 32b. subsp. *teretifolius*

**32a. *Juncus prismatocarpus*** subsp. *prismatocarpus*

筍石菖(原亚种) *ji shi chang* (*yuan ya zhong*)

*Juncus leschenaultii* J. Gay ex Laharpe; *J. prismatocarpus* var. *leschenaultii* (J. Gay ex Laharpe) Buchenau.

Leaf blade compressed, incompletely septate.

Wet grasslands in sparse forests, trail sides on mountain slopes, fields, marshy places, swampy river banks, streamsides, sink holes; near sea level to 1300 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shandong, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, Cambodia, India, Indonesia, Japan, Korea, Laos, Malaysia, Nepal, Pakistan, Papua New Guinea, Sikkim, Sri Lanka, Thailand, Vietnam; Australia, Pacific Islands (New Zealand)].

**32b. *Juncus prismatocarpus*** subsp. *teretifolius* K. F. Wu, Acta Phytotax. Sin. 32: 455. 1994.

圆柱叶灯心草 *yuan zhu ye deng xin cao*

Plants large, robust. Leaf blade terete, sometimes slightly compressed when dry, distinctly and perfectly septate.

- Forests on slopes, thickets, streamsides in valleys; 800–3000 m. Guangdong, Jiangsu, Xizang, Yunnan, Zhejiang.

This subspecies is very close to *Juncus wallichianus*, and further study is needed to determine its relationship.

**33. *Juncus diastrophanthus*** Buchenau, Bot. Jahrb. Syst. 12: 309. 1890.

星花灯心草 *xing hua deng xin cao*

Plants perennial, tufted, (5–)15–25(–35) cm tall. Rhizome short. Stems slightly compressed, 1–2.5 mm wide, very narrowly winged on both sides. Basal leaves few, cauline leaves 1–3; leaf sheath auricles somewhat obtuse, free portion ca. 0.5 mm; leaf blade linear, compressed, 3–10 cm  $\times$  1–4 mm, incompletely septate, apex acuminate. Inflorescences terminal, usually 2- or 3-branched, 7–8 cm; involucre bract leaflike, 1.7–4 cm; heads (3–)6–24, globose, starlike, 6–10 mm in diam., 5–14-flowered. Perianth segments narrowly lanceolate, 3–4  $\times$  0.7–1 mm, unequal with inner ones longer than outer, margin scarious, apex with setaceous tip. Stamens 3,  $1/2$ – $2/3$  as long as perianth; filaments ca. 1 mm; anthers oblong, ca. 0.8 mm. Ovary 1-loculed. Capsule yellowish green to chestnut brown, shiny, trigonous oblong, 4–5 mm, apex acute. Seeds obovate-ellipsoid, 0.5–0.7 mm, striate, both ends mucronate. Fl. Apr–Jun, fr. Apr–Oct.

Moist places in sparse forests, streamsides, fields; 600–1300 m. Anhui, Gansu, Guangdong, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shandong, Shanxi, Sichuan, Zhejiang [India, Japan, Korea].

**34. *Juncus miyiensis*** K. F. Wu, Acta Phytotax. Sin. 32: 456.

1994.

米易灯心草 mi yi deng xin cao

Plants perennial, 15–25 cm tall. Stems terete, 1–1.5 mm in diam., striate. Basal leaf absent or 1, cauline leaf 1; leaf sheath auricles present; leaf blade linear, flat, 7–12(–17) cm × 2–3 mm, inconspicuously septate, apex with a callus. Inflorescences terminal; involucre bract leaflike, lanceolate; heads 2–4(or 5), with both fertile and sterile flowers, or sometimes heads small with only sterile flowers; bracts reddish brown, broadly ovate, shorter than flowers. Perianth of fertile flowers with outer segments ovate, 2–2.5 mm, vein 1, apex somewhat obtuse; inner segments yellowish white, lanceolate, 4–4.5 mm, apex acuminate. Stamens 6; filaments 3–3.5 mm; anthers 1.5–2 mm. Ovary ovoid. Style 1.2–1.5 mm; stigmas ca. 0.7 mm. Mature fruit not seen. Fl. Jul.

- Meadows; ca. 3200 m. Sichuan.

No mature fruits have been seen, and this species may be a sterile hybrid.

The rhizomes are used medicinally.

**35. *Juncus dongchuanensis*** K. F. Wu, Acta Phytotax. Sin. 32: 457. 1994.

东川灯心草 dong chuan deng xin cao

Plants perennial, 17–35 cm tall. Rhizomes clustered, densely branched, short. Stems terete, 1–1.4 mm in diam., striate. Cataphylls few. Basal and cauline leaves 1–3; leaf sheath auricles obtuse, sometimes inconspicuous; leaf blade terete to slightly compressed, 7–18 cm × 2–3 mm, inconspicuously septate, apex with a callus. Inflorescences terminal; involucre bract subulate, 1.1–1.8 cm; heads 2–7, subglobose, 6–13 mm in diam., with sterile flowers except for 1–3 fertile ones at base; bracts yellowish white, broadly ovate to ovate-lanceolate, 2–5.5 × 1–1.5 mm. Pedicels short. Perianth of fertile flowers yellowish white, scarious; outer segments lanceolate, 3.9–4.5 × 1–1.2 mm, veins 3, apex somewhat obtuse; inner segments oblong-lanceolate, 6–6.4 × 1.2–1.4 mm. Stamens 6; filaments ca. 6.5 mm; anthers ca. 2 mm. Style 2–2.3 mm; stigmas ca. 1 mm. Capsule (immature) orange, trigonous oblong, 3–3.5 mm, shorter than inner perianth segments, 3-septate, apex beaked; beak ca. 1 mm. Seeds sterile. Fl. Jul, fr. Aug–Oct.

- *Abies* forests, trail sides on mountain slopes, grassy meadows, marshy areas; 2500–3500 m. C and W Yunnan.

This species is probably a sterile hybrid involving *Juncus concinnus*.

**36. *Juncus triglumis*** Linnaeus, Sp. Pl. 1: 328. 1753.

贴苞灯心草 tie bao deng xin cao

Plants usually tufted, 7–20(–30) cm tall. Rhizome short. Stems terete, 0.7–1 mm in diam. Leaves all basal; leaf sheath auricles often purplish red, obtuse; leaf blade linear, 2–6 cm × ca. 0.7 mm. Inflorescences terminal; head solitary; flowers (2 or)3–5 in a horizontal row; bracts 3 or 4, erect-spreading, broadly ovate, 4–6 × 2.8–3.5 mm. Perianth segments yellowish white, lanceolate, 3–4 × 1.3–1.6 mm, unequal with outer ones slightly longer than inner, apex acuminate. Stamens 6; filaments ca. 3 mm; anthers oblong, 0.7–1 mm. Style ca. 0.8

mm; stigmas slightly longer than style. Capsule trigonous ellipsoid, ca. 4 mm, 3-septate, apex obtuse and mucronate. Seeds oblong, ca. 0.9 mm; appendages 2, whitish, subequal. Fl. Jun–Jul, fr. Jul–Aug.  $2n = 50$ .

Wet places mainly on mountain slopes; 600–4500 m. Hebei, Qinghai, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Bhutan, India, Japan, Kashmir, Korea, Mongolia, Russia, Sikkim; Europe].

**37. *Juncus thomsonii*** Buchenau, Bot. Zeitung (Berlin) 25: 148. 1867.

展苞灯心草 zhan bao deng xin cao

*Juncus thomsonii* var. *fulvus* K. F. Wu.

Plants perennial, tufted in tussocks, (5–)10–20(–30) cm tall. Rhizome short. Stems terete, 0.6–1 mm in diam. Leaves all sub-basal, usually 2; leaf sheath reddish brown, margin scarious, auricles acute, membranous, free portion ca. 0.5 mm; leaf blade linear, 1–10 cm, apex with a callus. Inflorescences terminal; head solitary, 5–10 mm in diam., 2–8-flowered; bracts 3 or 4, spreading, ovate-lanceolate, 3–8 × 1–3 mm, shorter than head, apex obtuse. Perianth segments yellowish white, straw-colored, or chestnut brown, oblong-lanceolate, 4.5–5 × 1.2–1.6 mm, equal or inner ones slightly shorter than outer, apex obtuse. Stamens 6; filaments 4.3–6 mm; anthers linear, 1.6–2 mm. Style short; stigmas 1.1–2.2 mm. Capsule reddish brown to dark brown when mature, trigonous ellipsoid, 4–5 mm, 3-septate, apex beaked; beak 0.5–1.5 mm. Seeds oblong, 0.7–1 mm; appendages 2, whitish, 0.8–1 mm. Fl. Jul–Aug, fr. Aug–Sep.

Wet places in forests, swamps, pond margins, alpine meadows; 2800–5000 m. Gansu, Qinghai, Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, Nepal, Pakistan, Sikkim; C Asia].

**38. *Juncus yunnanensis*** A. Camus in Lecomte, Notul. Syst. (Paris) 1: 275. 1910.

云南灯心草 yun nan deng xin cao

Plants perennial, 13–25 cm tall. Rhizome short. Stems terete, 0.9–1.3 mm in diam., striate. Leaves all basal; leaf sheath auricles usually obtuse, free portion 0.5–1 mm; leaf blade linear, channeled, 5–16 cm, apex with a callus. Inflorescences terminal; head solitary, hemispheric, 8–13-flowered; bracts 5–7, broadly ovate to broadly lanceolate, 5–15 × 2.5–4 mm, basal one 0.9–1.5 cm, equal or slightly longer than head, apex acuminate, others shorter than head. Perianth segments yellowish white, lanceolate, 5.7–7.5 × 1.4–1.6 mm, subequal or inner ones slightly longer than outer, apex acuminate. Filaments 4.2–4.5 mm; anthers 2.2–2.6 mm. Style 2.2–2.5 mm; stigmas 1.4–1.6 mm. Capsule (immature) trigonous ovoid, 1-loculed. Fl. Apr–Jul.

- Boggy and/or stony pastures, mountainous regions; 2200–3000 m. Yunnan.

**39. *Juncus leucomelas*** Royle ex D. Don, Trans. Linn. Soc. London 18: 319. 1840.

长苞灯心草 chang bao deng xin cao

Plants perennial, tufted, 5–16(–25) cm tall. Rhizome creeping. Stems subterete, 0.5–0.9 mm in diam., striate. Cataphylls few. Basal leaves 1 or 2; leaf sheath auricles absent

or obtuse, membranous, free portion ca. 0.5 mm; leaf blade flat, unitubular, channeled, 1–8 cm × 0.6–1 mm, margin convolute to subterete. Inflorescences terminal; head solitary, 6–15 mm in diam., 6–13-flowered; bracts 3–5, pale brown, broadly ovate to lanceolate, 1–2.5 cm; basal 1 (or 2) bracts leaflike, 1.5–2.3 mm to 2 × head length. Perianth segments lanceolate, 5.2–6.5 × ca. 1.2 mm, subequal, membranous, center chestnut brown to reddish brown, margin yellowish, apex obtuse. Stamens 6; filaments 4–5 mm; anthers 2.2–2.5 mm, slightly smaller in basal flowers. Style 1.8–2.5 mm; stigmas 0.9–2.1 mm. Capsule ovoid-oblong, usually shorter than perianth, 3-septate, apex mucronate. Seeds sawdustlike; appendages 2. Fl. Jul–Aug, fr. Aug–Sep.

Meadows on slopes; 3000–4500 m. Gansu, Sichuan, Xizang, Yunnan [Bhutan, India, Kashmir, Nepal, Pakistan, Sikkim].

**40. *Juncus kingii*** Rendle, J. Bot. 44: 45. 1906.

金灯心草 jin deng xin cao

*Juncus longibracteatus* A. M. Lu & Z. Y. Zhang.

Plants perennial, stoloniferous, 15–35 cm tall. Rhizome deeply buried. Stems 1–1.3 mm in diam. Cataphylls 1 or 2. Basal leaf 1; leaf sheath auricles rounded, membranous, straw-like, free portion ca. 0.8 mm; leaf blade terete, 8–15 cm × 1.2–2 mm, apex tapered to a point. Inflorescences terminal; head solitary, subglobose, 1.4–1.9 cm in diam., 8–22-flowered; bracts several, broadly ovate to ovate-lanceolate, vein 1, apex acute; basal bract leaflike, 1.5–4(–7) cm, longer than head; other bracts equaling or slightly longer than head. Perianth segments straw-colored, lanceolate, 4.8–6 × 1.2–1.5 mm, subequal or inner ones slightly longer than outer, membranous. Stamens 6; filaments 6–7 mm; anthers 2–2.5 mm. Style 2–2.5 mm; stigmas 1–2.2 mm. Capsule chestnut brown at maturity, trigonous ellipsoid, 3.2–4 mm, 3-septate, apex beaked; beak 1.2–2 mm. Seeds spindlelike, 0.5–0.8 mm; appendages 2, ca. 0.1 mm. Fl. Jul–Aug, fr. Aug–Sep.

Thickets, meadows, limestone screes, trail sides on slopes; 3600–5000 m. Qinghai, Sichuan, Xizang, Yunnan [Bhutan, Nepal, Sikkim].

**41. *Juncus brachystigma*** Samuelsson in Handel-Mazzetti, Symb. Sin. 7: 1236. 1936.

短柱灯心草 duan zhu deng xin cao

Plants perennial, (3–)5–10(–18) cm tall. Rhizome very short. Stems terete. Cataphylls reddish brown, not shiny. Basal leaves with sheath auricles very short, free portion ca. 0.1 mm; leaf blade slightly flat, sometimes subterete, 3–11 cm × 0.2–1.2 mm. Inflorescences terminal; head solitary, hemispheric, 0.5–1.7 cm in diam., (3–)7–15(–20)-flowered; bracts several, whitish to chestnut brown, ovate to ovate-lanceolate; basal bract obliquely spreading, usually leaflike, 0.4–1(–3) cm, equaling head or sometimes with an aristate point to 3 cm; other bracts shorter than head. Perianth segments straw-colored, ovate-lanceolate, 4–5.5 × 1–1.3 mm, subequal, veins 3, apex obtuse. Stamens 6; filaments whitish to dark brown, ca. 5 mm; anthers 1.2–1.4 mm. Style 1.3–1.8 mm; stigmas subglobose or headlike, very short. Capsule brown, trigonous oblong, 2.5–3.5 mm, 1-loculed, apex obtuse, beaked; beak 1.8–2 mm. Seeds

dark brown, subtrigonus ovoid, 0.6–0.7 mm; appendages 2, 0.2–0.8 mm. Fl. Jun–Jul, fr. Aug.

Mountainous regions, moist stony meadows; 3100–4600 m. Xizang, Yunnan [Bhutan, Nepal, Sikkim].

**42. *Juncus perpusillus*** Samuelsson in Handel-Mazzetti, Symb. Sin. 7: 1237. 1936.

短茎灯心草 duan jing deng xin cao

Plants perennial, 1.5–5 cm tall. Stems thin. Leaves basal; leaf sheath whitish to dark brownish, 5–8 mm, auricles well developed, obtuse; leaf blade linear, 0.6–2.5 cm × ca. 0.3 mm, apex obtuse. Inflorescences terminal; head solitary, hemispheric, (1 or)2-flowered; bracts 2 or 3, chestnut brown, membranous; basal bracts ovate-lanceolate, 4.5–5.5 × ca. 2 mm, apex elongate; other bracts ovate, shorter, apex obtuse. Perianth segments chestnut brown, oblong-lanceolate, 3.5–4 × ca. 1 mm, subequal, apex obtuse. Stamens 6; filaments dark brown, 5.5–6.5 mm; anthers 1.5–2 mm. Ovary ovoid. Style ca. 1.2 mm; stigmas ca. 0.5 mm. Capsule (immature) dark brown, trigonous ovoid, ca. 3 mm, 1-loculed, apex obtuse and mucronate.

Mountainous and calcareous regions; 4400–4600 m. Sichuan, Xizang [Sikkim].

**43. *Juncus maximowiczii*** Buchenau, Bot. Jahrb. Syst. 12: 394. 1890.

长白灯心草 chang bai deng xin cao

Plants perennial, densely tufted, 6–15 cm tall. Rhizome short. Stems thin. Cataphylls 1 or 2. Basal and cauline leaves many; leaf sheath 1–1.3 cm, auricles conspicuous; leaf blade hairlike, 8–9 cm. Inflorescences terminal; head solitary, usually 2- or 3-flowered; bracts ovate, 2–3 × ca. 1.2 mm, membranous; basal bract longer than flowers. Perianth segments yellowish, lanceolate, 3.1–3.8 × 1–1.4 mm, subequal, margin scarious, apex obtuse. Stamens 6; filaments 3.5–4.2 mm; anthers 1.1–1.5 mm. Style ca. 0.7 mm; stigmas ca. 0.8 mm. Capsule brownish, trigonous obovoid to trigonous oblong, 4.5–5 mm, apex mucronate. Seeds ca. 2 mm, both ends appendaged; appendages caudate. Fl. Jun–Jul, fr. Aug.

Wet meadows in mountains; ca. 2400 m. Jilin [Japan, Korea].

**44. *Juncus triflorus*** Ohwi, J. Jap. Bot. 13: 334. 1937.

三花灯心草 san hua deng xin cao

*Juncus takasagomontanus* Satake.

Plants perennial, tufted, 5–20 cm tall. Stems terete or angled, slender. Basal and cauline leaves 3 or 4; leaf blade filiform, ± compressed, basal ones slightly shorter to longer than stem. Inflorescences terminal; head solitary, 2- or 3-flowered; bracts ovate; basal bract ca. 4 × 3 mm. Flowers sessile. Perianth segments greenish, linear, 4.5–6 mm, unequal with inner ones longer than outer, apex obtuse. Stamens 6; filaments 5–6 mm; anthers ca. 1.7 mm. Style very short; stigmas ca. 1.3 mm. Capsule yellowish to light brown, obovoid-ellipsoid, 5–6 mm, 1-loculed. Seeds ca. 0.5 mm, both ends appendaged; appendages white, caudate.

• Wet places in mountains. C Taiwan.

This species is closely related to *Juncus maximowiczii* and *J. modicus*. The type of *J. triflorus* has not been seen by the present authors.

**45. *Juncus longistamineus*** A. Camus in Lecomte, Notul. Syst. (Paris) 1: 277. 1910.

长蕊灯心草 chang rui deng xin cao

Plants perennial, tufted, 9–18 cm tall. Rhizome black-brown. Stems 0.3–0.6 mm in diam. Cataphylls 1–3. Basal leaves 1 or 2; leaf sheath auricles obtuse; leaf blade linear, 5–13 cm × 0.3–0.9 mm, apex acute. Inflorescences (1 or 2)(or 3)-flowered; basal bract straw-colored, lanceolate, 5–9 mm, veins 3; other bracts yellowish white, broadly ovate, 1.5–3 mm, veins 1–3, apex acute. Flowers milk white. Perianth segments lanceolate; outer segments 4.5–5.5 × 1–1.5 mm, veins 3; inner segments 6–6.5 mm. Stamens 6, 7–8 mm; filaments 4–5 mm; anthers 2.8–3.2 mm. Style 2–3 mm; stigmas 1–1.5 mm. Capsule chestnut brown, ovoid, 4.5–5 mm, 1-loculed. Seeds rust-colored, broadly ellipsoid, crooked, ca. 1.5 mm, both ends appendaged; appendages caudate, short. Fl. Jul, fr. Aug.

• Meadows on slopes; ca. 3600 m. Yunnan.

**46. *Juncus luzuliformis*** Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 10: 99. 1887–1888.

分枝灯心草 fen zhi deng xin cao

*Juncus luzuliformis* var. *modestus* (Buchenau) Buchenau; *J. modestus* Buchenau.

Plants perennial, densely tufted, 7–30 cm tall. Stems erect or obliquely ascending, ca. 0.3 mm in diam. Cataphylls few. Basal leaves 2(–4), sub-basal leaf 1; leaf sheath auricles sharply pointed; leaf blade linear, proximal ones 10–12 cm, distal ones 1–2.5 cm. Bract subtending inflorescence leaflike, 0.5–0.7 cm. Inflorescences cymose, 2–7-flowered; bracts 2 at base of pedicels. Bracteoles 2 subtending each flower, chestnut brown, broadly ovate, ca. 3.5 mm, apex sharply pointed. Perianth segments greenish white to straw-colored, lanceolate, apex acute; outer segments 4.3–5.5 mm; inner segments 5–7 mm. Stamens 6; filaments ca. 3.2 mm; anthers 1.5–2 mm. Style 2.5–3 mm; stigmas 0.8–1 mm. Capsule chestnut brown at maturity, trigonous ovoid, ca. 5 mm, 1-loculed, apex usually narrowed into a beak. Seeds oblong, ca. 0.8 mm; appendages 2, white, ca. 0.5 mm. Fl. Jul–Aug, fr. Aug–Sep.

Wet places in forests, shady moist rocks; 2200–2600 m. Gansu, Guizhou, Hubei, Shanxi, Sichuan [Japan, Korea].

**47. *Juncus potaninii*** Buchenau, Bot. Jahrb. Syst. 12: 394. 1890.

单枝灯心草 dan zhi deng xin cao

*Juncus luzuliformis* Franchet var. *potaninii* (Buchenau) Buchenau.

Plants perennial, tufted, 6–15 cm tall. Stems erect or obliquely ascending, ca. 0.3 mm in diam. Cataphylls 1–3; basal and cauline leaves 2(–4); leaf sheath auricles obtuse, 0.1–0.3 mm, membranous; leaf blade filiform, proximal one 5–11 cm × 0.3–0.5 mm, distal one 2–3 cm. Inflorescences terminal; head solitary, rarely paired, (1 or 2)-flowered; bracts 2 or 3, broadly ovate, ca. 3 mm, apex acute. Perianth segments whitish to yel-

lowish but outer ones brownish with age, lanceolate, 3.8–4 mm, unequal with inner ones slightly longer than outer, apex sub-acute. Stamens 6, subequaling or slightly longer than perianth; filaments 2.5–3 mm; anthers 0.8–1 mm. Style 0.8–1 mm; stigmas capitate, ca. 0.5 mm. Capsule dark brown at maturity, ovoid-oblong, 3.5–3.7 mm, 1-loculed, apex beaked; beak ca. 0.3 mm. Seeds ovoid, 0.5–0.7 mm; appendages 0.2–0.3 mm, unequal. Fl. Jun–Sep, fr. Jul–Sep.

• Moist places on forested slopes, alpine meadows, streamsides, rock crevices, roadsides; 2300–4200 m. Gansu, Guizhou, Henan, Hubei, Ningxia, Qinghai, Shaanxi, Sichuan, Xizang, Yunnan.

**48. *Juncus membranaceus*** Royle ex D. Don, Trans. Linn. Soc. London 18: 320. 1840.

膜耳灯心草 mo er deng xin cao

Plants perennial, 17–45 cm tall. Rhizome creeping. Stems terete, 0.8–1.5 mm in diam. Basal leaves 1 or 2, cauline leaf 1; leaf sheath auricles well developed or not, acute, ca. 1 mm; leaf blade terete, 7–14 cm, inconspicuously septate, apex acute. Inflorescences terminal; head solitary, 4–5 mm in diam., 5–20-flowered; bracts several; basal bract 6–14 mm, equaling or longer than head; others bracts yellowish, broadly ovate, shorter than head. Perianth segments yellowish white, lanceolate, ca. 6 mm, subequal or inner ones slightly longer than outer, apex obtuse or on outer segments subacute. Stamens 6; filaments slightly longer than perianth; anthers ca. 2 mm. Capsule chestnut brown, shiny, trigonous ovoid, longer than perianth, apex mucronate. Seeds oblong, ca. 1 mm; appendages 2, white, caudate, ca. 1 mm. Fl. Jun–Jul, fr. Jul–Aug.

Meadows on mountain slopes, by ravines, trail sides; 3000–4000 m. Xizang, Yunnan [Afghanistan, Kashmir, Nepal, Pakistan].

**49. *Juncus benghalensis*** Kunth, Enum. Pl. 3: 360. 1841.

孟加拉灯心草 meng jia la deng xin cao

*Juncus sphenostemon* Buchenau.

Plants perennial, tufted, 6.5–25 cm tall. Rhizome filiform, short. Stems thin. Cataphylls absent to 2. Basal leaves 2 or 3, cauline leaf absent or 1; leaf sheath greenish to reddish, auricles well developed, purplish red, obtuse, 0.7–1.2 mm; leaf blade linear, 3–12 cm, apex acute. Inflorescences terminal; head solitary, 1–1.8 cm in diam., (2–)4–8(–11)-flowered; bracts 3–5, often purplish red, broadly ovate to ovate-lanceolate, apex acute; basal bract erect, leaflike, longer than head, 1–4 cm; other bracts subequaling head. Perianth segments straw-colored, lanceolate, 4–6 × 1.5–2 mm, membranous, apex obtuse. Stamens 6; filaments 5–6 mm; anthers 2.2–3.3 mm. Style 1.5–2 mm; stigmas 0.8–1 mm. Capsule chestnut brown at maturity, ovoid, 2.6–3 mm, 1-loculed, base narrowed, apex beaked; beak 0.8–1.5 mm; style persistent. Seeds spindlelike, ca. 1 mm, appendaged; appendages 2, white. Fl. Jul–Aug, fr. Aug–Sep.

Rocky mountain slopes, wet meadows; 2200–4200 m. Xizang, Yunnan [Bhutan, Kashmir, Nepal, Sikkim].

**50. *Juncus bracteatus*** Buchenau, Bot. Jahrb. Syst. 6: 220. 1885.

显苞灯心草 xian bao deng xin cao

Plants perennial, 14–20 cm tall. Rhizome short. Stems 0.2–0.5 mm in diam. Cataphylls few. Basal and cauline leaves 2 or 3; leaf sheath reddish brown at base and margin, 1.5–2 cm, auricles obtuse, black-brown at margin; leaf blade linear, 2–3 cm, apex acute. Inflorescences terminal; head solitary, hemispheric, 1.1–1.3 cm in diam., usually 4- or 5-flowered; bracts usually 2, chestnut brown to dark brown; basal bract broadly ovate, ladlelike, much longer than head, apex tapered and elongate. Perianth segments whitish to yellowish, lanceolate, 5–6 mm, subequal, apex obtuse. Stamens 6, longer than perianth; filaments subequaling perianth; anthers shorter than filaments. Style long; stigmas short. Capsule chestnut brown, trigonous ovoid, 1-loculed, apex beaked. Seeds (immature) ovoid. Fl. Jul–Aug, fr. Aug–Sep.

Moist meadows in high mountains, wet places in ravines; 3100–4000 m. Gansu, Xizang, Yunnan [Sikkim].

Some authors treat *Juncus bracteatus* as a synonym of *J. benghalensis*.

**51. *Juncus cephalostigma*** Samuelsson in Handel-Mazzetti, Symb. Sin. 7: 1233. 1936.

头柱灯心草 tou zhu deng xin cao

Plants perennial, 5–15(–18) cm tall. Rhizome short, thick. Stems terete, 0.3–0.5 mm in diam. Cataphylls 1–3, reddish to brownish, shiny, septate, apex aristate. Basal leaf blade flat, or tubelike when margin involute, 3–13 cm, apex acute. Cauline leaves ca. 0.8 cm; leaf sheath reddish brown, margin apically scarious, auricles present, inconspicuous, or absent; leaf blade linear. Inflorescences terminal; head solitary, hemispheric, 0.9–1.5 cm in diam., (2–)4–6(–9)-flowered; bracts 3–5, chestnut brown, ovate to ovate-lanceolate, 5–7 mm. Perianth segments yellowish, lanceolate, 3.5–7 × 1–1.5 mm, subequal, apex obtuse. Stamens 6; filaments usually 5–7 mm; anthers usually 2–2.6 mm. Style 2–3.5 mm; stigma 1, capitate to subglobose, 0.4–0.6 mm in diam. Capsule dark brown to chestnut brown, trigonous ovoid, 2–3.3 mm, 1-loculed, apex obtuse, beaked; beak 1.2–1.5 mm. Seeds sawdustlike, 1–1.5 mm, usually appendaged. Fl. Jun–Jul, fr. Jul–Aug.

Wet places mainly in high mountains, steep mountain slopes; 2100–4200 m. Sichuan, Xizang, Yunnan [Bhutan, India, Myanmar, Nepal, Sikkim].

- 1a. Leaf sheath auricles present or inconspicuous ..... 51a. var. *cephalostigma*  
1b. Leaf sheath auricles absent ..... 51b. *dingjieensis*

**51a. *Juncus cephalostigma* var. *cephalostigma***

头柱灯心草(原变种) tou zhu deng xin cao (yuan bian zhong)

Leaf sheath auricles present or inconspicuous. Filaments 5–7 mm; anthers 2–2.6 mm.

Wet places mainly in high mountains; 2100–4200 m. Sichuan, Xizang, Yunnan [Bhutan, India, Myanmar, Nepal, Sikkim].

**51b. *Juncus cephalostigma* var. *dingjieensis*** K. F. Wu, Acta Phytotax. Sin. 32: 460. 1994.

定结灯心草 ding jie deng xin cao

Leaf sheath auricles absent. Filaments and anthers short. Fl. Jun.

- Steep mountain slopes; ca. 3600 m. Xizang.

**52. *Juncus modicus*** N. E. Brown, J. Linn. Soc., Bot. 36: 165. 1903.

多花灯心草 duo hua deng xin cao

Plants perennial, densely tufted, 4–15 cm tall. Stems 0.3–0.5 mm in diam. Cataphylls 1–3. Basal leaves 2 or 3, 3.5–10 cm; cauline leaves 1 or 2, 0.2–2 cm; leaf sheath auricles obtuse, ca. 0.5 × 0.5 mm, membranous; leaf blade linear, 1–5 cm. Inflorescences terminal; head solitary, 6–9 mm in diam., 4–8-flowered; basal bracts 0.5–0.7 mm, slightly shorter than or subequaling inflorescence. Perianth segments milk white to yellowish, narrowly lanceolate, 3–4 × 0.7–1 mm, subequal, apex obtuse to acuminate. Stamens 6; filaments 3.2–4 mm; anthers 1.2–2.2 mm. Style 0.8–1.5 mm; stigmas 0.8–1.2 mm. Capsule chestnut brown at maturity, trigonous ovoid, 3.5–4.5 mm, 1-loculed, apex beaked; beak 0.8–1 mm. Seeds oblong, 0.5–0.7 mm; appendages 2, white, ca. 0.2 mm. Fl. Jun–Aug, fr. Sep.

• Wet places in forests, mountain valleys, rock crevices; 1700–2900 m. Gansu, Guizhou, Henan, Hubei, Shaanxi, Sichuan, Xizang.

**53. *Juncus kangdingensis*** K. F. Wu, Acta Phytotax. Sin. 32: 460. 1994.

康定灯心草 kang ding deng xin cao

Plants perennial, 5.5–6.5 cm tall. Rhizome short. Stems terete, 0.3–0.4 mm in diam., striate. Basal leaves 1 or 2, cauline leaf 1; leaf sheath auricles absent; leaf blade linear or flat, 5–14 cm including sheaths, margin usually involute, apex obtuse. Inflorescences 3 or 4(or 5)-flowered; bracts 3 or 4, broadly ovate, shell-shaped, 3.2–4 mm, center swollen, apex obtuse-rounded. Perianth segments straw-colored to reddish brown, lanceolate, 3–3.7 × 1–1.6 mm, equal, veins 1–3, apex obtuse. Stamens 6; filaments black-purple, somewhat thick; anthers 1.1–1.6 mm. Style ca. 1.4 mm; stigmas 0.3–0.5 mm. Capsule (immature) purplish black, shiny, subglobose to broadly ovoid, 2.2–3 mm. Seeds (immature) ellipsoid, ca. 0.3 mm, both ends appendaged; appendages short. Fl. Jul, fr. Aug.

• Wet grasslands, mountain slopes, trail sides; ca. 3400 m. Sichuan.

**54. *Juncus concolor*** Samuelsson in Handel-Mazzetti, Symb. Sin. 7: 1232. 1936.

同色灯心草 tong se deng xin cao

Plants perennial, 15–20(–25) cm tall. Rhizome thick. Stems creeping, terete, 0.3–0.7 mm in diam. Cataphylls few. Cauline leaf 1; leaf sheath auricles absent; leaf blade terete, slightly compressed, shorter than stems, 1–1.5 mm in diam., jointed near apex, part above node soon withered. Inflorescences terminal; head solitary, hemispheric, 5–8-flowered; bracts 5 or 6; basal bract subequaling head; other bracts lanceolate, shorter than head, membranous, veins 1–3. Pedicels 1.5–1.8 mm. Bracteole 1 subtending each flower. Perianth segments whitish, lanceolate; outer segments 3.9–5.8 mm; inner segments 3.8–5.2 mm. Stamens 6; filaments brown, 3.8–5 mm; anthers

1.2–1.5(–2) mm. Ovary ovoid, ca. 2.6 mm. Style 1.2–1.7 mm; stigmas 0.5–0.7 mm. Capsule (immature) trigonous, 1-loculed. Fl. Jun–Jul.

- Mainly in mountains; 2600–3800 m. W Yunnan (Yangbi Xian).

**55. *Juncus leucanthus*** Royle ex D. Don, Trans. Linn. Soc. London 18: 318. 1840.

甘川灯心草 gan chuan deng xin cao

Plants perennial, 7–18(–25) cm tall. Rhizome creeping, thick. Stems arising singly, terete, ca. 1 mm in diam. Cataphylls several, brown, shiny, apex sometimes sharply pointed. Basal cauline leaves 2(or 3), terete, 5.5–15 cm × 0.6–1 mm; distal cauline leaves usually 2, terete, 1–3 cm; leaf sheath auricles well developed, obtuse, free part ca. 1.5 × 1 mm; leaf blade brownish. Inflorescences terminal; head solitary, 0.4–1.8 cm in diam., (2–)4–10-flowered; bracts 3–5, lanceolate, shorter than or subequaling flowers; basal bract sometimes slightly longer than flowers, 3.3–6 × ca. 3 mm, apex acuminate. Perianth segments dark purple, yellowish, or whitish, lanceolate, 4.5–5 × ca. 1.2 mm, subequal, veins 3, apex obtuse to acute. Stamens 6; filaments black-brown at maturity, 3–5 mm; anthers 1.8–3 mm. Ovary 1-loculed, imperfectly 3-septate. Style 1.8–2 mm; stigmas 0.8–1 mm. Capsule dark chestnut brown, trigonous ovoid, ca. 3 mm, apex beaked; beak ca. 0.8 mm. Seeds obliquely ovoid, ca. 0.7 mm, both ends appendaged; appendages white, 0.1–0.2 mm. Fl. Jun–Jul, fr. Jul–Aug.

*Abies* forests, grasslands in high mountains, wet places; 3000–4200 m. Gansu, Qinghai, Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, India, Nepal, Sikkim].

**56. *Juncus tanguticus*** Samuelsson in Handel-Mazzetti, Symb. Sin. 7: 1233. 1936.

陕甘灯心草 shan gan deng xin cao

Plants perennial, 8–25 cm tall. Rhizome brown. Stems terete, 0.6–0.9 mm in diam. Cataphylls few, gray-yellow to chestnut brown. Basal and cauline leaves 1–3; leaf sheath auricles well developed; leaf blade linear, 0.6–3 cm × 0.6–1 mm, apex obtuse to expanded into a callus. Inflorescences terminal; head solitary, hemispheric to obconical, 0.8–1.2 cm in diam., 4–8-flowered; bracts 4 or 5, chestnut brown, ovate-lanceolate, 5.5–7 × 1.2–2.5 mm, equaling or slightly longer than head, veins 3–5, center thickened, apex acuminate. Perianth segments whitish to chestnut brown, lanceolate, ca. 5 × 1–1.5 mm, subequal; outer segments boat-shaped; inner segments flat, apex acuminate. Filaments blackish chestnut brown, ca. 6 mm, apex tapered to a whitish thread; anthers 2–2.5(–3) mm. Ovary ovoid. Style 2–3 mm; stigmas short. Capsule brown, trigonous ovoid, 3.2–4.5 mm, 1-loculed, apex mucronate. Seeds ovoid, ca. 0.7 mm; appendages 2, 0.5–0.8 mm. Fl. Jul–Aug, fr. Aug–Sep.

- Mountains; 3400–4000 m. Gansu, Shaanxi, Sichuan.

**57. *Juncus przewalskii*** Buchenau, Bot. Jahrb. Syst. 12: 401. 1890.

长柱灯心草 chang zhu deng xin cao

Plants perennial, tufted, 6–25 cm tall. Rhizome short. Stems terete, thin, striate. Cataphylls dark brown to chestnut

brown, often withered. Basal leaf 1; leaf sheath auricles chestnut brown, obtuse, ca. 0.5 × 0.5 mm; leaf blade terete, 5–9 cm × 0.5–1 mm. Cauline leaf usually 1, borne distally on stem; leaf sheath auricles absent; leaf blade linear, 0.7–2 cm. Inflorescences terminal; head solitary, 0.7–2.2 cm in diam., 4–10-flowered; bracts 3–5, ovate to obovate-oblancheolate; basal bract 9–12 × ca. 4 mm, slightly longer than head, apex acuminate. Perianth segments chestnut brown or whitish, lanceolate, 5–8.5 × 1–2.5 mm, subequal, center thickened, margin membranous, apex obtuse. Stamens 6, equaling or slightly longer than perianth; filaments purplish brown at maturity, 4.5–6 mm; anthers 2.2–2.6 mm. Style 0.5–4 mm; stigmas 0.5–2 mm. Capsule reddish brown, trigonous oblong, 3–3.3 mm, 3-septate, apex beaked; beak ca. 1.5 mm. Seeds oblong, 0.9–1 mm; appendages ca. 1 mm, unequal. Fl. Jul–Aug, fr. Aug–Oct.

- Wet grasslands in high mountains, limestone cliffs, moist ledges, roadsides on slopes; 2000–4500 m. Gansu, Qinghai, Shaanxi, Sichuan, Xizang, Yunnan.

- 1a. Heads 4–8-flowered; perianth segments chestnut brown, 1–2 mm wide; style 2.5–4 mm ..... 57a. var. *przewalskii*
- 1b. Heads usually ca. 10-flowered; perianth segments whitish, 2–2.5 mm wide; style 0.5–2 mm ..... 57b. var. *discolor*

**57a. *Juncus przewalskii* var. *przewalskii***

长柱灯心草(原变种) chang zhu deng xin cao (yuan bian zhong)

Heads 4–8-flowered. Perianth segments chestnut brown, 1–2 mm wide. Style 2.5–4 mm. Fl. Jul–Aug, fr. Aug–Sep.

- Wet grasslands in high mountains, limestone cliffs, moist ledges; 2000–4000 m. Gansu, Qinghai, Shaanxi, Sichuan, Yunnan.

**57b. *Juncus przewalskii* var. *discolor*** Samuelsson in Handel-Mazzetti, Symb. Sin. 7: 1234. 1936.

苍白灯心草 cang bai deng xin cao

Heads usually ca. 10-flowered. Perianth segments whitish, 2–2.5 mm wide. Style 0.5–2 mm. Fl. Jul–Aug, fr. Sep–Oct.

- Roadsides on slopes; 2900–4500 m. Xizang, Yunnan.

**58. *Juncus unifolius*** A. M. Lu & Z. Y. Zhang, Acta Phytotax. Sin. 17(3): 125. 1979.

单叶灯心草 dan ye deng xin cao

Plants perennial, tufted, 4–5 cm tall. Rhizome short. Stems ca. 0.5 mm in diam., striate. Cataphylls chestnut brown. Leaf 1; leaf sheath auricles absent; leaf blade linear-lanceolate, 1–3 cm × ca. 2 mm, apex obtuse. Inflorescences terminal; head solitary, 5–7 mm in diam., 2-flowered; bracts 1 or 2, chestnut brown; basal bract leaflike, lanceolate, 0.7–1.2 cm, longer than head. Perianth segments lanceolate, 3–4 mm, unequal with inner ones longer than outer, margin blackish chestnut brown, apex obtuse, membranous. Stamens 6, subequaling perianth; filaments 3–4 mm; anthers sulfur yellow, ca. 1 mm. Capsule blackish chestnut brown, trigonous ovoid, distinctly longer than perianth, imperfectly 3-septate, apex mucronate. Seeds whitish, sawdustlike,

1–1.2 mm. Fl. Jul–Aug, fr. Aug–Sep.

- Trail sides on limestone slopes; 4000–4300 m. Xizang, Yunnan.

**59. *Juncus minimus*** Buchenau, Bot. Zeitung (Berlin) 25: 145. 1867.

矮灯心草 ai deng xin cao

Plants perennial, tufted, 3–7 cm tall. Rhizome short. Stems terete, striate. Cataphylls 1 or 2, pale brown. Leaves basal, occasionally 1 cauline; leaf sheath open or sometimes closed, auricles absent; leaf blade broadly linear to narrowly lanceolate, flat, 1.5–6 cm × 1–3 mm, apex obtuse. Inflorescences terminal; head solitary, 0.7–1.4 cm in diam., (2 or) 3–6-flowered; basal bract leaflike, 0.5–2 cm, often longer than head. Perianth segments brownish yellow to chestnut yellow, chestnut in fruit, lanceolate, 4–4.5 × 1.1–1.6 mm, equal or inner ones slightly longer than outer, apex acute. Stamens 6; filaments 2.5–3.5 mm; anthers 0.5–0.7 mm. Style 0.5–1.5 mm; stigmas 1.5–2 mm. Capsule chestnut brown, trigonous oblong to ellipsoid, 5–6 mm, imperfectly 3-septate, apex mucronate. Seeds oblong, 0.5 mm; appendages white, 1.1–1.5 mm including tails. Fl. Jun–Jul, fr. Jul–Aug.

Moist sand on river banks, wet gravel; 4000–4700 m. Sichuan, Xizang, Yunnan [Bhutan, Nepal, Sikkim].

**60. *Juncus sikkimensis*** J. D. Hooker, Fl. Brit. Ind. 6: 399. 1894.

锡金灯心草 xi jin deng xin cao

*Juncus pseudocastaneus* (Lingelsheim) Samuelsson; *J. sikkimensis* var. *pseudocastaneus* Lingelsheim.

Plants perennial, 10–25 cm tall. Rhizome creeping, densely branched, tufted. Stems borne singly, terete, slightly compressed, striate. Cataphylls shortly aristate. Basal leaf 1, sometimes with remnants of old leaves; leaf sheath auricles obtuse, free part ca. 0.3 × 0.7 mm; leaf blade subterete to slightly compressed, 7–14 cm × 1–3 mm, sometimes septate, apex obtuse to subacute. Inflorescences seemingly pseudolateral; involucre bract leaflike, ovate-lanceolate, 1.5–3.5 cm, base black-brown; heads usually 2 (or) 3, 2–5(–7)-flowered. Perianth segments blackish brown to chestnut brown, lanceolate; outer segments 4.5–8 × 1.8–3 mm, apex acuminate; inner segments slightly shorter than outer ones, margin broadly scarious, apex obtuse. Stamens 6; filaments 0.5–1.5 mm; anthers oblong, 2.2–4 mm. Style 2.5–3 mm; stigmas linear, 3–5.5 mm. Capsule chestnut brown at maturity, shiny, trigonous ovoid to trigonous ellipsoid, 4–5.9 mm, 3-septate, apex beaked; beak ca. 1 mm. Seeds oblong, 0.5–1 mm, both ends appendaged; appendages white, 0.8–1 mm. Fl. Jun–Oct, fr. Jul–Oct.

Forests, *Rhododendron* forests, wet grasslands on slopes, swamps, bogs, wet places by streams; 4000–4600 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan [Bhutan, India, Nepal, Sikkim].

**61. *Juncus longiflorus*** (A. Camus) Noltie, Edinburgh J. Bot. 51: 134. 1994.

德钦灯心草 de qin deng xin cao

*Juncus sikkimensis* J. D. Hooker var. *longiflorus* A. Camus in Lecomte, Notul. Syst. (Paris) 1: 283. 1910; *J. sikkimensis* var.

*helvolus* K. F. Wu.

Plants perennial, 10–25 cm tall. Rhizome creeping, densely branched, tufted. Stems densely clumped, terete, slightly compressed, striate. Cataphylls shortly aristate. Basal leaf 1, sometimes with remnants of old leaves; leaf sheath auricles obtuse, free part ca. 0.3 × 0.7 mm; leaf blade subterete to slightly compressed, 7–14 cm × 1–3 mm, sometimes septate, apex obtuse to subacute. Inflorescences seemingly pseudolateral; involucre bract leaflike, ovate-lanceolate, 1.5–3.5 cm, base black-brown; head usually solitary, 2–5(–7)-flowered. Perianth segments blackish brown to chestnut brown, lanceolate; outer segments 4.5–8 × 1.8–3 mm apex acuminate; inner segments slightly shorter than outer ones, margin broadly scarious, apex obtuse. Stamens 6; filaments 0.5–1.5 mm; anthers oblong, 2.2–4 mm. Style 2.5–3 mm; stigmas linear, 3–5.5 mm. Capsule chestnut brown at maturity, shiny, trigonous ovoid to trigonous ellipsoid, 4–5.9 mm, 3-septate, apex beaked; beak ca. 1 mm. Seeds oblong, 0.5–1 mm, both ends appendaged; appendages white, 0.8–1 mm. Fl. Jun–Oct, fr. Jul–Oct.

Wet grasslands; 3600–4000 m. ?Xizang, NW Yunnan [Bhutan].

**62. *Juncus milashanensis*** A. M. Lu & Z. Y. Zhang, Acta Phytotax. Sin. 17(3): 127. 1979.

米拉山灯心草 mi la shan deng xin cao

Plants perennial, 5–15(–25) cm tall. Rhizome erect or creeping, ca. 2 mm in diam. Stems straw-colored, shiny, 1–2 mm in diam., rigid. Cataphylls absent. Basal leaves with sheath auricles inconspicuous; leaf blade lanceolate or involute marginally and subterete, 2–5(–15) cm, abaxially multigrooved, apex acuminate. Cauline leaf often present, borne ca. 2/3 from base of stem; leaf sheath somewhat inflated; leaf blade depauperate, 8–15 mm, apex obtuse. Inflorescences terminal; heads 1 or 2, 2–5-flowered; basal bract leaflike, 1–2 cm, longer than inflorescence; other bracts shorter than inflorescence. Perianth segments blackish brown, lanceolate, 4–6 mm, subequal. Stamens 6; filaments ca. 1 mm; anthers 1.5–2 mm. Style ca. 1.5 mm; stigmas red, 3–4 mm. Capsule chestnut brown, ovoid, ca. 3.2 mm, apex beaked; beak ca. 1 mm. Seeds 2.5–3 mm including 2 appendages; appendages white, caudate. Fl. Aug, fr. Sep.

- Mainly in high mountains; 4600–5300 m. Sichuan, Xizang.

**63. *Juncus concinnus*** D. Don, Prodr. Fl. Nepal. 44. 1825.

雅灯心草 ya deng xin cao

*Juncus elegans* Royle ex D. Don; *J. elegans* Samuelsson (1936) not Royle ex D. Don (1840).

Plants perennial, tufted, 16–45 cm tall. Rhizome chestnut brown. Stems terete, 0.5–1 mm in diam., striate. Cataphylls 1 or 2, chestnut brown. Basal leaves 1 or 2, cauline leaves 1–3; leaf sheath auricles 0.5–1 mm, membranous; leaf blade linear, pluritubular, adaxially channeled, V-shaped in cross section, not septate, 2–16 cm × 0.3–2 mm, apex obtuse. Inflorescences terminal; involucre bract leaflike, lanceolate, 1.5–6 cm; heads 2–5(–7), hemispheric, 8–10 mm in diam., (3–)5–7(–14)-flowered. Perianth segments yellowish white, lanceolate to oblong; outer segments 3–3.5 mm, apex acute; inner segments 3.5–4 mm,

apex obtuse. Stamens 6, distinctly longer than perianth; filaments chestnut brown, linear, 4–5 mm; anthers 1–1.5 mm. Style 1.2–1.8 mm; stigmas 0.7–1.1 mm. Capsule trigonous ovoid to ellipsoid, 2–3 mm, 3-septate, apex beaked; beak 0.5–1 mm; style persistent. Seeds chestnut brown, ovoid to oblong, 0.6–0.7 mm, both ends appendaged; appendages 0.1–0.2 mm. Fl. Jul–Aug, fr. Aug–Sep.

Forests on mountain slopes, wet grasslands, moist soil in ravines; 1500–3900 m. Sichuan, Xizang, Yunnan [Bhutan, India, Kashmir, Nepal, Sikkim].

**64. *Juncus lanpinguensis*** Novikov, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 103(4): 67. 1998.

密花灯心草 mi hua deng xin cao

*Juncus glomeratus* K. F. Wu, Acta Phytotax. Sin. 32: 462. 1994, not Thunberg (1784).

Plants perennial, tufted, 20–50 cm tall. Rhizome chestnut brown, 1–2.5 in diam. Stems terete, straight, 1–2.5 mm in diam., striate. Cataphylls 1 or 2, brownish, 1–5 cm, apex mucronate. Basal leaves 2, cauline leaves 1 or 2; leaf sheath auricles absent; leaf blade linear-lanceolate, flat to slightly convolute, 7–22 cm × 2–5 mm, apex obtuse. Inflorescences with involucre bract linear-lanceolate 1.5–7 cm; heads 5–11, mostly crowded, 1–1.3 cm in diam., 6–15-flowered; bracts ovate-lanceolate, 3–4 mm, apex acute. Perianth segments yellowish white, lanceolate, 3.5–5 × 1–1.2 mm, subequal or outer ones somewhat shorter than inner, apex acuminate. Stamens 6, much longer than perianth at maturity; filaments 5–7.5 mm; anthers 1.2–2 mm. Style ca. 2 mm; stigmas 1.2–2 mm. Capsule (immature) yellowish, shiny, 1-loculed. Seeds (immature) appendaged at both ends. Fl. Jun–Aug, fr. Aug–Sep.

• Wet grasslands on slopes, ravine margins; 2800–3600 m. Yunnan.

**65. *Juncus meiguensis*** K. F. Wu, Acta Phytotax. Sin. 32: 463. 1994.

美姑灯心草 mei gu deng xin cao

Plants perennial, 35–40 cm tall. Rhizome short. Stems terete, 1.7–2 mm in diam., striate. Basal leaves 2, cauline leaves 2; leaf sheath 2.5–4 cm, auricles rounded; leaf blade terete, 1.5–10 cm, apex acute to acuminate. Inflorescences with involucre bract leaflike, shorter than inflorescence; heads 2, hemispheric, ca. 1.2 cm in diam., 10–15-flowered; bracts 3–5, straw-colored, ovate-lanceolate, 5–7 mm, veins 1–3 at middle, apex acuminate. Pedicels 1.6–2 mm. Bracteole usually 1 subtending each flower. Perianth segments straw-colored, lanceolate, apex acuminate; outer segments boatlike, 4.2–4.8 mm; inner segments 5.2–5.8 × ca. 1 mm. Stamens 6; filaments brown, 6.2–7.2 mm; anthers 2.2–2.5 mm. Ovary 1-loculed. Style brown, ca. 0.6 mm; stigmas ca. 1.4 mm. Capsule (immature) trigonous ovoid, ca. 5 mm, apex usually narrowed into a ca. 1.3 mm beak. Seeds (immature) appendaged at both ends. Fl. Jul–Aug, fr. Aug–Sep.

• Sunny areas in mountains. Sichuan.

**66. *Juncus clarkei*** Buchenau, Bot. Jahrb. Syst. 6: 210. 1885.

印度灯心草 yin du deng xin cao

Plants perennial, 22–30 cm tall. Rhizome short. Stems terete, 1–2 mm in diam. Basal leaves 2, cauline leaves 2; leaf sheath 3–7 cm, auricles absent; leaf blade linear to linear-lanceolate, flat, 8–25 cm × 3–6(–7) mm, margin not membranous, or narrowly membranous and serrulate or tasseled, apex acuminate. Inflorescences with involucre bracts usually 2 or 3, leaf-like, longer than inflorescence, basal one 2.5–15 cm; heads 1–6, 1.2–2 cm in diam., 4–12-flowered. Perianth segments yellowish white, lanceolate, 4.5–7 × ca. 1.2 mm, subequal, membranous, apex acute. Stamens 6; filaments 4–5 mm; anthers 2–2.5 mm. Style 1.5–4 mm; stigmas 0.3–1.5 mm. Capsule orange at maturity, shiny, ovoid to ellipsoid, 4.5–5.4 mm, 1-loculed, apex mucronate. Seeds ellipsoid, ca. 1 mm; appendages 2, white, caudate, 1.5–2 mm. Fl. Jul–Aug, fr. Aug–Sep.

Open forest margins, moist meadows, grasslands on high mountains, rocky areas by ravines; 2100–4700 m. Sichuan, Xizang, Yunnan [Bhutan, India, Sikkim].

- 1a. Leaf blade margin not membranous; heads (1–)3–6 per inflorescence; style 1.5–2 mm ..... 66a. var. *clarkei*
- 1b. Leaf blade margin narrowly membranous, serrulate or tasseled; heads 1–3 per inflorescence; style 2.5–4 mm ..... 66b. var. *marginatus*

**66a. *Juncus clarkei* var. *clarkei***

印度灯心草(原变种) yin du deng xin cao (yuan bian zhong)

Leaf blade margin not membranous. Heads (1–)3–6 per inflorescence. Style 1.5–2 mm. Fl. Jul–Aug, fr. Aug–Sep.

Open forest margins, moist meadows; 2100–2300 m. Xizang, Yunnan [Bhutan, India, Sikkim].

**66b. *Juncus clarkei* var. *marginatus*** A. Camus in Lecomte, Notul. Syst. (Paris) 1: 278. 1910.

膜边灯心草 mo bian deng xin cao

Leaf blade margin narrowly membranous, serrulate or tasseled. Heads 1–3 per inflorescence. Style 2.5–4 mm. Fl. Aug, fr. Sep.

• Grasslands on high mountains, rocky areas by ravines; 3000–4700 m. Sichuan, Yunnan.

**67. *Juncus gracilicaulis*** A. Camus in Lecomte, Notul. Syst. (Paris) 1: 279. 1910.

细茎灯心草 xi jing deng xin cao

*Juncus concinnus* D. Don var. *gracilicaulis* (A. Camus) R. C. Srivastava.

Plants perennial, 10–30 cm tall. Rhizome short. Stems 0.6–1 mm in diam. Cataphylls few, chestnut brown. Basal leaves 1 or 2, cauline leaf 1; leaf sheath auricles well developed; leaf blade linear-lanceolate, flat, 5–30 cm × 1–4 mm, veins numerous, apex acuminate. Inflorescences with involucre bract leaflike, 3–15 cm, longer than inflorescence; heads 3 or 4, subglobose to hemispheric, 5–10 mm in diam., 3–7-flowered. Perianth segments lanceolate, apex acute; outer segments 2.8–3.5 mm; inner segments 3–4.5 mm. Stamens 6; filaments 6–7 mm; anthers 1.5–1.8 mm. Style 1.5–2 mm; stigmas 1–1.5 mm. Capsule yellowish, somewhat shiny, inconspicuously trigonous ellip-

soid, 3.5–5 mm, 1-loculed. Seeds brown, ovoid, 0.7–0.9 mm, both ends appendaged; appendages caudate, 0.2–0.5 mm. Fl. Jun–Jul, fr. Aug–Sep.

Rocks in forests, streamsides, mountain summits, cut-over areas; 2700–3600 m. Sichuan, Yunnan [Bhutan, Sikkim].

**68. *Juncus spumosos*** Noltie, *Edinburgh J. Bot.* 51: 139. 1994.

碧罗灯心草 *bi luo deng xin cao*

*Juncus biluoshanensis* K. F. Wu.

Plants perennial, tufted, ca. 60 cm tall. Rhizome robust. Stems terete, straight, ca. 2 mm in diam. (ca. 3 mm at base), striate. Cataphylls few. Basal leaves 2 or 3, cauline leaves 3 or 4; leaf sheath 4–7 cm, auricles absent; leaf blade linear-lanceolate, flat, 10–14 cm × 3–6 mm, thickly papery, margin very narrowly membranous and serrulate. Inflorescences with involucre bract leaflike, ca. 9.5 cm; heads 6–7, 1–1.5 cm in diam., 6–14-flowered; bracts yellowish white, lanceolate, shorter than flowers. Perianth segments yellowish white, linear-lanceolate, apex acute to obtuse; outer segments 2.8–3.2 × 0.6–0.8 mm, abaxially thickened at center; inner segments 3.2–3.5 × 0.5–0.8 mm, veins 1–3, inconspicuous. Stamens 6; filaments 3–4 mm; anthers 0.7–1.2 mm. Ovary ovoid. Style ca. 2 mm; stigmas ca. 0.9 mm. Capsule blackish brown, shiny, trigonous ovoid, (5–) 6–7 mm, 1-loculed, narrowly 3-septate, apex long beaked. Seeds ovoid, ca. 0.5 mm, both ends appendaged; appendages white, to 2.3 mm, subequal. Fl. Jul–Aug, fr. Aug–Sep.

• Roadsides on mountain slopes; ca. 3900 m. Yunnan.

**69. *Juncus amplifolius*** A. Camus in Lecomte, *Notul. Syst. (Paris)* 1: 281. 1910.

走茎灯心草 *zou jing deng xin cao*

Plants perennial, 20–40(–50) cm tall. Rhizome creeping, knobby, stout. Stems terete to slightly flattened, 1–2 mm in diam. Cataphylls several, pinkish. Basal leaves 1–3, cauline leaves 1–4; leaf sheath auricles absent; leaf blade flat, 5–14 cm × 2–6 mm, apex obtuse to acute. Inflorescences with involucre bract erect, leaflike, 1–6 cm, shorter or slightly longer than inflorescence; heads 2–5, 8–15 mm in diam., 3–9-flowered; basal bract leaflike, lanceolate, ca. 1.5 × 0.1–0.2 cm. Perianth segments reddish brown to purplish brown, lanceolate, 4.5–6 × ca. 1.2 mm, unequal with outer ones slightly shorter than inner, keeled, margin scarious, apex acute to acuminate. Stamens 6; filaments flat and wider at base, 1.5–2 mm; anthers 2–3 mm. Style 2–2.5 mm; stigmas dark brown, linear, 3–5 mm. Capsule brown, ellipsoid, 5–6 mm, 3-septate, apex beaked; beak 2.5–3 × 2.5–3 mm. Seeds reddish brown, ovoid, ca. 0.8 mm, both ends appendaged; appendages white, 1–1.5 mm. Fl. May–Jul, fr. Jun–Aug.

Rock crevices in forests, scrub on turfy soils, wet grasslands in high mountains, stony pastures, river banks, moist cliffs, steep and dripping roadside banks; 1700–4900 m. Gansu, Qinghai, Shanxi, Sichuan, Xizang, Yunnan [Bhutan, Myanmar, E Nepal, Sikkim].

**70. *Juncus nepalicus*** Miyamoto & H. Ohba, *J. Jap. Bot.* 68: 28. 1993.

矮茎灯心草 *ai jing deng xin cao*

*Juncus amplifolius* A. Camus var. *pumilus* A. Camus.

Plants perennial, 5–10(–25) cm tall. Rhizome creeping, knobby, stout. Stems terete to slightly flattened, 1–2 mm in diam. Cataphylls several, pinkish. Basal leaves 1–3, cauline leaf absent or 1; leaf sheath auricles absent; leaf blade flat, 5–14 cm × 2–6 mm, apex obtuse to acute. Inflorescences with involucre bract erect, leaflike, 1–6 cm, shorter or slightly longer than inflorescence; heads 1 or 2, 8–15 mm in diam., 3–9-flowered; basal bract leaflike, lanceolate, ca. 1.5 × 0.1–0.2 cm. Perianth segments reddish brown to purplish brown, lanceolate, 3.3–4 × ca. 1.2 mm, unequal with outer ones slightly shorter than inner, keeled, margin scarious, apex acute to acuminate. Stamens 6; filaments flat and wider at base, 1.5–2 mm; anthers ca. 1.3 mm. Style 2–2.5 mm; stigmas dark brown, linear, 2–2.5 mm. Capsule brown, ellipsoid, 5–6 mm, 3-septate, apex beaked; beak 2.5–3 × 2.5–3 mm. Seeds reddish brown, ovoid, ca. 0.8 mm, both ends appendaged; appendages white, 1–1.5 mm. Fl. Jun–Jul, fr. Aug.

Wet meadows on mountain slopes; ca. 3500 m. Xizang, Yunnan [Bhutan, Nepal, Sikkim].

**71. *Juncus giganteus*** Samuelsson, *Acta Horti Gothob.* 3: 70. 1927.

巨灯心草 *ju deng xin cao*

Plants perennial, 50(–90) cm tall. Rhizome brownish yellow, ca. 1.5 mm in diam. Stems terete, 2.5–3 mm in diam. Basal leaves 3, cauline leaf 1; leaf sheath to leaf blade transition not distinct, auricles absent; leaf blade linear-lanceolate, flat, 20–50(–70) cm × (6–)7–9 mm, with many minute spots abaxially and at margin, veins 16–22, apex acuminate. Inflorescences strict, usually branched; branches 3, erect or ascending; involucre bract leaflike, flat, to 26 cm × ca. 6 mm; heads 15–19, 5–12-flowered; bracts several subtending each head, lanceolate, 3-veined. Bracteole 1 subtending each flower, lanceolate, shorter than flower. Perianth segments yellowish green to sometimes pale purplish, lanceolate, veins 3, apex acute; outer segments 5–7 mm; inner segments 4.5–6.5 mm. Stamens 6; filaments 1.5–2 mm; anthers 1.4–1.6 mm. Ovary ovoid. Style 1–1.5 mm; stigmas blackish brown, linear, 1.5–2.5 mm. Capsule dark brown, ovoid to oblong, subequaling perianth, apex tapered into a mucro. Seeds ca. 3.5 mm, sawdustlike. Fl. Jun–Jul, fr. Jul–Aug.

• Trail sides on mountain slopes, ravine margins; ca. 3200 m. Sichuan.

**72. *Juncus crassistylus*** A. Camus in Lecomte, *Notul. Syst. (Paris)* 1: 278. 1910.

粗状灯心草 *cu zhuang deng xin cao*

Plants perennial, 35–60(–70) cm tall. Rhizome horizontal, 2–3 mm in diam., robust. Stems terete, channeled, 3–5 mm in diam. from base to middle, usually hollow. Cataphylls few, maroon. Basal leaves 1 or 2, cauline leaves 1 or 2; leaf sheath auricles inconspicuous; leaf blade lanceolate or linear-lanceolate, 14–30 cm × 8–12 mm, shorter on basal leaves than on distal cauline ones, thickly papery to thinly leathery, margin undulate or serrulate, apex acute. Inflorescences arched to slightly pendulous, 4–7 cm; involucre bract linear-lanceolate, 9–14 cm

× 2–5 mm, apex acuminate to apiculate; heads 4–10, subglobose, 1.2–1.8 cm in diam., 6–20-flowered. Perianth segments yellowish white, lanceolate, 6–7 × 1.5–2 mm, subequal, vein 1, apex obtuse or acute. Stamens 6; filaments 1.2–2 mm; anthers 1.5–2 mm. Style 2.5–3 mm; stigmas 0.8–1 mm. Capsule chestnut brown, shiny, trigonous ovoid, 4–5 mm, 3-septate, apex beaked; beak ca. 0.5 mm. Seeds ellipsoid, 0.7–0.8 mm, both ends appendaged; appendages 0.5–0.8 mm, striate, apex acute. Fl. Jun–Aug, fr. Aug–Oct.

• Thickets, grassy slopes, mountain summits; 3000–4000 m. Yunnan.

**73. *Juncus castaneus* Smith, Fl. Brit. 1: 383. 1800.**

栗花灯心草 li hua deng xin cao

Plants perennial, 15–40 cm tall. Rhizome of long, subterranean runners. Stem usually solitary, terete, 2–3.5 mm in diam. Cataphylls few. Basal leaves 2–4, cauline leaf absent or 1; leaf sheath auricles absent; leaf blade flat, 6–25 cm × 3–6 mm, margin usually involute. Inflorescences with involucre bracts 1 or 2, leaflike, usually longer than inflorescence; heads 2–8, hemispheric, 7–9 mm in diam. at anthesis, 4–10-flowered; bracts 2 or 3, lanceolate, usually shorter than flowers. Pedicels ca. 2 mm. Perianth segments dark brown to chestnut brown, narrowly ovate to lanceolate, 4–5 mm, unequal with outer ones slightly longer than inner, apex acuminate. Stamens 6; filaments ca. 2 mm; anthers ca. 1 mm. Style 1–1.5 mm; stigmas 2–3 mm. Capsule trigonous ellipsoid, 6–7 mm, 3-septate, base lighter colored, apex reddish brown, tapered to an acute tip. Seeds ca. 1 mm, both ends appendaged; appendages white, ca. 1 mm. Fl. Jul–Aug, fr. Aug–Sep.  $2n = 40, 60$ .

Wet meadows or swamps in mountainous areas; 2100–3100 m. Gansu, Hebei, Jilin, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Yunnan [Russia (Siberia); Europe, North America].

**74. *Juncus tibeticus* T. V. Egorova, Trudy Bot. Inst. Akad. Nauk SSSR, Ser. 1, Fl. Sist. Vyssh. Rast. 3: 96. 1967.**

西藏灯心草 xi zang deng xin cao

Plants perennial, 25–60 cm tall. Rhizome creeping. Basal leaves 2–4; leaf blade somewhat flat, 2–20 cm, basal one represented only by leaf sheath. Distal cauline leaves 1 or 2; leaf blade channeled, 15–21 cm. Inflorescences branched; involucre bract leaflike, 9–10 cm, longer than inflorescence; heads 3–10, 1.5–2.5 cm in diam., 5–12-flowered. Perianth segments pale chestnut brown, lanceolate, 4.5–5 mm, equal, apex acute. Filaments ca. 2 mm; anthers 0.7–1.2 mm. Capsule long conical, 7.5–8 mm, 3-angled, faces convex, apex beaked; beak ca. 0.5 mm. Seeds ca. 1 mm, appendaged; appendages 1.2–1.5 mm.

• Forested mountain ridges, wet slopes, alpine meadows; 2700–4200 m. Gansu, Xizang.

Neither the type nor other material of *Juncus tibeticus* has been seen by the present authors. The above description is based on the prologue.

**75. *Juncus himalensis* Klotzsch in Klotzsch & Garcke, Bot. Ergebn. Reise Waldemar, 60. 1862.**

喜马拉雅灯心草 xi ma deng xin cao

*Juncus exploratorum* E. Walker; *J. himalensis* var. *schlagintweitii* (Buchenau) Buchenau; *J. schlagintweitii* Buchenau.

Plants perennial, 30–70 cm tall, stoloniferous; rhizomes short. Stems terete, 1–2.5 mm in diam., striate. Cataphylls 1 or 2, brownish. Basal leaves 3 or 4, cauline leaves 1 or 2; leaf sheath reddish brown at base, auricles obtuse, membranous, free part ca. 1 × 2 mm; leaf blade terete, adaxially channeled, 14–30 cm × 2–5 mm, margin sometimes involute and finely serrate, apex acuminate. Inflorescences terminal, usually 3–5-branched, 5–11 cm; involucre bracts 1 or 2, linear-lanceolate, 4–10(–20) cm; heads 3–7 or more, 6–10 mm in diam., 3–8-flowered. Pedicels 1.3–2 mm. Perianth segments brown to pale brown, narrowly lanceolate, 5–6 × 1.5–1.8 mm, subequal or inner ones shorter than outer, apex acute. Stamens 6; filaments 2.5–3.5 mm; anthers 1–1.5 mm. Style ca. 1 mm, stigmas 1.9–2.5 mm. Capsule chestnut brown, trigonous oblong, 6.5–7.5 mm, imperfectly 3-septate, apex beaked; beak 0.7–1.5 mm. Seeds 0.5–1 mm, both ends appendaged; appendages white, 1.2–1.5 mm. Fl. Jun–Jul, fr. Jul.

Meadows on slopes, gravelly stream banks, wet places in river valleys, among rocks in moist soil; 2400–4300 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan [Bhutan, India, Kashmir, Nepal, Pakistan, Sikkim, Tajikistan].

**76. *Juncus sphacelatus* Decaisne in Jacquemont, Voy. Inde 172. 1844.**

枯灯心草 ku deng xin cao

Plants perennial, 17–55 cm tall. Rhizome 1.5–3 mm in diam. Stems terete, 2–3.5 mm in diam. Cataphylls few. Basal leaves 5 or 6; leaf sheath auricles obtuse, membranous, free part ca. 3 mm; leaf blade linear-lanceolate, semiterete, 4–14 cm × 3–5 mm, apex obtuse. Inflorescences terminal, usually 2- or 3-branched; involucre bract linear-lanceolate, 5–15 cm, equaling inflorescence; heads 2–5(–8), subglobose to hemispheric, 1.2–2 cm in diam. in fruit, 5–7-flowered. Pedicels 2–3(–5) mm. Perianth segments chestnut brown to blackish brown, lanceolate, veins 1–3, apex acute; outer segments 6.5–11 mm; inner segments 6.3–9.7 mm. Stamens 6; filaments chestnut brown at base, 2–4 mm, apex whitish hyaline; anthers 2–2.5 mm. Style 1.5–2 mm; stigmas 2–3 mm. Capsule chestnut brown, shiny, trigonous oblong, 6–8 mm, 3-septate, apex obtuse, beaked; beak ca. 1 mm. Seeds ellipsoid, 0.7–0.9 mm, both ends appendaged; appendages white, 1.2–1.5 mm. Fl. Jul–Aug, fr. Aug–Sep.

Wet places at ravine margins and riversides, moist streamsides, grasslands on mountain slopes; 3300–4800 m. Qinghai, Sichuan, Xizang, Yunnan [Afghanistan, Bhutan, India, Kashmir, Nepal, Sikkim].

