

### 3. DENDROCALAMUS Nees, Linnaea 9: 476. 1835.

牡竹属 mu zhu shu

Li Dezhu (李德铎); Chris Stapleton

Arborescent bamboos, large-sized; clumps dense. Rhizomes short necked, pachymorph. Culms unicaespitose, erect, or occasionally scrambling, apex usually pendulous; internodes terete. Branches several to many, none to 3 dominant. Culm sheaths deciduous; ligule conspicuous; auricles often absent or small; blade usually recurved, or erect. Leaf blades usually large; ligule conspicuous; auricles usually absent; venation not tessellate. Inflorescence iterant, fully bracteate, subtended by a narrow single-keeled prophyll, pseudospikelets clustered in soft or spiky globose mass at nodes of leafless flowering branches. Pseudospikelets prophyllate, (1 or)2–8-flowered, with or without rachilla extension and rudiment, sessile, fertile glumes preceded by 1 or more gemmiferous bracts and 0–2 empty glumes. Prophyll narrow, single-keeled. Rachilla internodes usually abbreviated and not disarticulating; florets falling together. Lemma broad, nearly equal to palea, many veined, sometimes long mucronate; palea of lower florets 2-keeled, but rounded or imperfectly keeled in terminal floret if rachilla extension small or absent, apex acute or shortly bifid; lodicules absent or variably 1–3. Stamens 6; filaments usually free, rarely united into a loose tube. Ovary stalked, apex thickened and hairy; style very short, solid; stigmas 1(–3), long, hairy, plumose. Caryopsis terete, apex hairy; pericarp slightly thickened.  $2n = 76^*$ .

Forty species: subtropical and tropical Asia; 27 species (15 endemic) in China, mostly in the southwest.

- 1a. Culms usually apically nodding, basal nodes with branches, 1–3 branches dominant; spikelets light yellow-green, usually in spiny globose mass; florets (1 or)2–4 ..... 1. *D.* subg. *Dendrocalamus*
- 1b. Culms apically pendulous, basal nodes without branches, midculm branches subequal; spikelets yellow-brown, usually in soft globose mass; florets 2–8 ..... 2. *D.* subg. *Sinocalamus*

#### 1. *Dendrocalamus* subg. *Dendrocalamus*

牡竹亚属 mu zhu ya shu

Culms apically nodding, not pendulous (except in *Dendrocalamus hamiltonii* and *D. semiscandens*); wall thick; branching from lower nodes. Branches unequal, 1–3 dominant. Culm sheaths thickly papery. Leaves small; auricles small. Pseudospikelets usually many, clustered on each node of flowering branches into a spicate globose mass. Lemma mucronate or long mucronate.

About 20 species: widely distributed in tropical Asia; 16 species (eight endemic) in China.

*Dendrocalamus parishii* (species no. 16) could not be included in the following key because its culm sheaths are not known.

- 1a. Culm sheath blade erect, triangular, base about as wide as apex of culm sheaths; auricles absent, ligule short; dominant branches 3; pseudospikelets 1–10 per fascicle, not in globose head; lemma shortly mucronate.
  - 2a. Culms 12–25 m, 12–18 cm in diam.; branching from 9th to 14th node up; lemma apically obtuse ..... 6. *D. tibeticus*
  - 2b. Culms 7–15 m, 6–8 cm in diam.; branching from ca. 4th node up; lemma apically deeply cleft ..... 5. *D. bambusoides*
- 1b. Culm sheath blade reflexed or erect, when erect apex of culm sheaths broadly ovate; mouth and base of culm sheath narrow; dominant branches none or 1 (but 3 in *D. brandisii*); pseudospikelets many, clustered, globose; glumes and lemma long mucronate.
  - 3a. Culm sheath blade reflexed, ligule well developed, marginal cilia or bristles 1.5–2 cm; spikelets flat on both sides, apex obtuse; florets separate from each other and each opening when mature; lemmas all 2-keeled; lodicules absent or 2; stigmas 1, rarely 3.
    - 4a. Culm sheath auricles obvious; oral setae 5–10 mm; ligule 2–3 mm, marginal cilia or setae 1.5–2 cm ..... 10. *D. liboensis*
    - 4b. Culm sheath auricles reduced or absent; oral setae to 3 mm; marginal cilia usually to 1 cm.
      - 5a. Culm sheath ligules 4–10 mm; leaf sheaths initially hispid ..... 7. *D. farinosus*
      - 5b. Culm sheath ligules 2–4 mm; leaf sheaths glabrous.
        - 6a. Culm internodes initially sparsely white powdery, wall very thin (1–4 mm); culm sheath ligule ca. 2 mm, with marginal cilia 5–10 mm ..... 8. *D. tsiangii*
        - 6b. Culm internodes initially densely white powdery, wall thick; culm sheath ligule ca. 4 mm, fimbriate or with marginal cilia 1–2 mm ..... 9. *D. pulverulentus*
    - 3b. Culm sheath blade erect or reflexed; ligule short, to 10 mm, marginal cilia or bristles absent or to 1 cm; spikelets rounded, apex acute; florets not separate from each other and remaining closed when mature; lemma of upper floret not 2-keeled; lodicules absent; stigmas 1 (but 2 in *D. brandisii*).
      - 7a. Culm sheath blade erect; ligule 2–3 mm.
        - 8a. Cavity of culm narrow, or absent in basal internodes; pseudospikelets rigid, usually ciliate; glume and lemma both long mucronate ..... 1. *D. strictus*
        - 8b. Cavity of culm broad; pseudospikelets soft, usually glabrous; glume and lemma usually shortly

- mucronate.
- 9a. Culms nodding, internodes partially covered with gray scurfy stripes initially; pseudospikelets globose, 1–2 cm in diam. .... 11. *D. hamiltonii*
- 9b. Culms pendulous, but because of developed main branch (sometimes as robust as culm) upper part of culm climbing; internode completely covered with gray cilia, cilia not in stripes; pseudospikelets globose, 1.9–3.2 cm in diam. .... 12. *D. semiscandens*
- 7b. Culm sheath blade reflexed (but erect in *D. brandisii*); ligule (2–)3–10 mm.
- 10a. Culm sheath auricles and oral setae inconspicuous.
- 11a. Internodes white powdery, without hairs; pseudospikelets usually glabrous; leaves thin ..... 2. *D. membranaceus*
- 11b. Internodes white hairy; pseudospikelets usually ciliate.
- 12a. Internodes with stripes of gray cilia, dominant branches developed or not, other branches on same node slender and surrounding culm; culm sheath ligule ca. 10 mm; culm 20–40 m, 12.5–20 cm in diam. .... 13. *D. brandisii*
- 12b. Internodes with uniformly distributed, gray cilia, cilia not in stripes; dominant branches 3, other branches on same node not enclosing culm; culm sheath ligule 4–5 mm; culms 7–10 m, to 8 cm in diam. .... 4. *D. birmanicus*
- 10b. Culm sheath auricles obvious, oral setae well developed, 5–8 mm.
- 13a. Leaves 1–2 cm wide, secondary veins 5- or 6-paired ..... 3. *D. barbatus*
- 13b. Leaves (1.5–)3–7 cm wide, secondary veins 7–13-paired.
- 14a. Internodes white powdery, glabrous; leaf blade 15–30 × 3.8–7 cm, secondary veins 10–12-paired; culm sheath auricles obvious ..... 14. *D. sikkimensis*
- 14b. Internodes very thinly white powdery, brown setose; leaf blade 20–35 × 3–5 cm, secondary veins 7–11-paired; culm sheath auricles inconspicuous ..... 15. *D. asper*

**1. *Dendrocalamus strictus*** (Roxburgh) Nees, *Linnaea* 9: 476. 1834.

牡竹 mu zhu

*Bambos stricta* Roxburgh, *Pl. Coromandel*. 1: 58. 1798;  
*Bambusa stricta* (Roxburgh) Roxburgh.

Culms 7–17 m, (3–)6–10 cm in diam.; internodes 30–45 cm, white powdery; wall thick, culm often solid. Branches several, main mid-culm ones 3. Culm sheaths deciduous, orange-brown, ca. 3/4 as long as internodes, thickly papery, margins ciliate, apex rounded; auricles absent; ligule 1–3 mm, serrulate; blade erect, narrowly triangular. Leaf sheaths initially sparsely hairy, becoming glabrous; ligule short, serrulate; blade usually narrowly lanceolate, 5–30 × 1–3 cm. Pseudospikelet clusters 2.5–5 cm in diam. Spikelets 8–15 mm, usually densely pubescent; fertile florets 2–4. Glumes 2 or more, 6–8 mm, long mucronate; lemma 9–10 mm, apex long mucronate; palea 8–9 mm. Anthers yellow, ca. 5 mm, connective apically produced. Ovary turbinate; style ca. 6.5 mm; stigmas 1. Caryopsis 6–8 mm.

Cultivated. Guangdong, Taiwan [India].

**2. *Dendrocalamus membranaceus*** Munro, *Trans. Linn. Soc. London* 26: 149. 1868.

黄竹 huang zhu

*Bambusa membranacea* (Munro) Stapleton & N. H. Xia.

Culms 8–15 m, 7–10 cm in diam.; internodes 34–42 cm, initially thinly white powdery, becoming glossy; wall thick to thin. Branches from culm base, 3 to several, subequal, main mid-culm ones 3, central not dominant. Culm sheaths deciduous, initially orange-green, elliptical to oblong, usually longer

than internodes, papery, margins ciliate; auricles small; oral setae short; ligule 8–10 mm, serrulate; blade reflexed, linear-lanceolate, 30–40 × 2–3 cm. Leaf sheaths initially sparsely hairy, becoming glabrous; ligule short, serrulate; blade lanceolate, 12.5–25 × 1.2–2 cm. Pseudospikelet clusters dense, 2.5–5 cm in diam., prophylls broad, 2-keeled. Spikelets 8–15 mm, glabrous; fertile florets 2–5. Glumes 2 or more, 8–9 mm, long mucronate; lemma 9–10 mm, apex long mucronate; palea 7–8 mm. Anthers yellow or purple, 4–5 mm, apex apiculate. Ovary turbinate; style 5–6 mm; stigma purple. Caryopsis 6–8 mm.

River valleys to hilly forested areas; 500–1000 m. S Yunnan [Laos, Myanmar, N Thailand, N Vietnam].

This species has also been placed in *Bambusa* because of its vegetative characters and 2-keeled inflorescence prophyll, but it has a more capitate inflorescence than other *Bambusa* species.

It is the most important and most extensive wild species of bamboo in subtropical China, found in pure bamboo forest or mixed with broad-leaved trees.

**3. *Dendrocalamus barbatus*** Hsueh & D. Z. Li, *J. Bamboo Res.* 7(4): 4. 1988.

小叶龙竹 xiao ye long zhu

Culms 15–18 m, 10–15 cm in diam., tip slightly drooping; internodes 26–32 cm; wall thick. Branches several, main mid-culm ones 3. Culm sheaths deciduous, orange-brown, ca. 3/4 as long as internodes, leathery, margins ciliate, apex rounded; auricles 5–15 mm; oral setae present or absent; ligule 5–8 mm, serrulate; blade reflexed, glabrous or densely bearded at base. Leaf sheaths sparsely hairy; auricles inconspicuous, sparsely hairy; ligule ca. 1 mm; blade narrowly lanceolate, 10–15 × 1–2 cm. Pseudospikelet clusters 1–2.2 cm in diam. Spikelets 6–8.5 mm, nearly glabrous; fertile florets usually 2. Glumes 2 or 3;

lemma 6–7 mm, apex shortly mucronate; palea 5–6 mm. Anthers yellow, becoming purple when dry, ca. 6 mm. Pistil 6–7.5 mm; ovary, style, and stigma all hairy; stigmas solitary. Fruit unknown.

- Mostly in cultivation; 300–1100 m. S Yunnan.

- 1a. Culm sheath auricles with oral setae;  
blade with basal beard ..... 3a. var. *barbatus*  
1b. Culm sheath auricles without oral setae;  
blade glabrous ..... 3b. var. *internodiradicatus*

**3a. *Dendrocalamus barbatus* var. *barbatus***

小叶龙竹(原变种) xiao ye long zhu (yuan bian zhong)

Culm sheath auricles with oral setae; blade with basal beard.

- Mostly in cultivation; 300–1100 m. S Yunnan.

**3b. *Dendrocalamus barbatus* var. *internodiradicatus*** Hsueh & D. Z. Li, J. Bamboo Res. 7(4): 6. 1988 [*“internodiradicatus”*].

毛脚龙竹 mao jiao long zhu

Culm sheath auricles without oral setae; blade glabrous.

- Cultivated. S Yunnan (Menglun Tropical Botanical Garden).

**4. *Dendrocalamus birmanicus*** A. Camus, Bull. Mus. Natl. Hist. Nat., sér. 2, 4: 1044. 1932.

缅甸龙竹 mian dian long zhu

Culms 7–10 m, to 8 cm in diam.; internodes 20–28 cm. Branches several, main mid-culm ones 3. Culm sheaths deciduous, shorter than internodes, leathery or thickly papery; auricles small; ligule 3–4 mm, serrulate; blade reflexed, 6–10 cm, adaxially setose. Leaf sheaths thinly white powdery, glabrous; ligule ca. 1 mm; serrulate; blade 16–20 × 1.5–2.5 cm. Pseudospikelet clusters 1–1.8 cm in diam. Spikelets 7–8 mm; fertile florets 2 or 3. Glumes 2, 4–4.5 mm, margins ciliate; lemma 5.5–7 mm, apex long mucronate; palea 5.5–7 mm. Anthers 3–4 mm. Style glabrous; stigma 1, about as long as style. Fruit unknown.

Yunnan [Myanmar].

**5. *Dendrocalamus bambusoides*** Hsueh & D. Z. Li, J. Bamboo Res. 6(2): 16. 1987.

椅子竹 yi zi zhu

*Sellulocalamus bambusoides* (Hsueh & D. Z. Li) W. T. Lin.

Culms 7–15 m, 6–8 cm in diam.; internodes 26–34 cm; wall 1.4–2.8 cm thick. Branches several, main mid-culm ones 3. Culm sheaths deciduous, thickly papery to leathery, abaxially yellow hispid or glabrous, apex slightly arched; auricles absent; ligule ca. 2 mm; blade erect. Leaf sheaths glabrous, margins ciliate; ligule ca. 1 mm; blade narrowly lanceolate, (5–)14–17 × 0.8–1.6 cm. Pseudospikelets subtended by 1–5 bracts, 8–16 mm; fertile florets 3 or 4. Glumes 1 or 2, 5–7 mm, margins ciliate; lemma 7–13 mm, apex mucronate; palea 6–14 mm. An-

thers yellow, 4–6 mm. Pistil 1.3–1.7 cm; stigma 1. Fruit unknown.

- S Yunnan.

**6. *Dendrocalamus tibeticus*** Hsueh & T. P. Yi, J. Bamboo Res. 2(1): 31. 1983.

西藏牡竹 xi zang mu zhu

*Sellulocalamus tibeticus* (Hsueh & T. P. Yi) W. T. Lin.

Culms 12–25 m, 12–18 cm in diam.; internodes (30–)40–45(–60) cm; wall thick, 6–12 mm. Branching usually from ca. 9th node up, usually with central branch slightly dominant. Culm sheaths initially orange-brown, leathery, abaxially usually with dark brown setae, adaxially glabrous; auricles absent; ligule 2–4 mm; blade erect or slightly reflexed. Leaf sheaths 6–11 mm, glabrous; ligule truncate, 1–1.5 mm; blade broadly lanceolate, 10–32 × 2.2–4.5 cm. Pseudospikelets 2–10 per cluster, 1–1.2 cm, with 3 or 4 florets, basal one sterile; fertile florets 2–3. Glumes 1, ca. 7 × 5 mm, margins ciliate, mucronate; lemma 6–18 mm, margins ciliate, apex obtuse or acute; palea 5–7 mm. Anthers yellow, 5–6 mm. Ovary ovoid; style 5–8 mm; stigmas 1, 2–3 mm. Fruit unknown.

- Broad-leaved forests; 1200–1700 m. Xizang, NW Yunnan.

**7. *Dendrocalamus farinosus*** (Keng & P. C. Keng) L. C. Chia & H. L. Fung, Acta Phytotax. Sin. 18: 215. 1980.

大叶慈 da ye ci

*Sinocalamus farinosus* Keng & P. C. Keng, J. Wash. Acad. Sci. 36(3): 79. 1946; *Dendrocalamus ovatus* N. H. Xia & L. C. Chia; *Lingnania farinosa* (Keng & P. C. Keng) P. C. Keng; *Neosinocalamus farinosus* (Keng & P. C. Keng) P. C. Keng & T. H. Wen.

Culms 7–12 m, 4–8 cm in diam.; internodes 20–45 cm; wall 4–10 mm thick. Branches from ca. 10th node up; dominant branches distinct, 1–2.5 m, 4–12 mm in diam. Culm sheaths initially orange-brown, becoming brown, oblong-triangular, about as long as internodes, thickly papery or leathery, margins ciliate, apex truncate or concave; auricles absent; ligule ca. 1.3 cm, with setae; blade reflexed, narrowly lanceolate. Leaf sheaths initially hispid; ligule 1–1.5 mm; blade lanceolate, 9–33 × 1.5–6 cm. Pseudospikelets 7–20 per node, 8–14 mm; florets 3–5. Glumes 2 or more, 6–8 mm, long mucronate; lemma 7–10 mm, apex mucronate; palea ca. 7 mm. Anthers yellow, 3–5 mm, connectives aristate. Ovary ovoid, style ca. 1 mm; stigmas 1–3, 2–3 mm. Caryopsis yellow, glabrous, apex beaked.

- Guangxi, Guizhou, Sichuan, Yunnan.

**8. *Dendrocalamus tsiangii*** (McClure) L. C. Chia & H. L. Fung, Acta Phytotax. Sin. 18: 216. 1980.

黔竹 qian zhu

*Lingnania tsiangii* McClure, Sunyatsenia 6(1): 41. 1941; *Dendrocalamus ronganensis* Q. H. Dai & D. Y. Huang; *D. textilis* N. H. Xia, L. C. Chia & C. Y. Xia.

Culms 6–8 m, 3–4 cm in diam.; internodes 20–30(–40)

cm; wall 1–4 mm thick. Branches usually from 7th–11th node up, several, dominant branches longer and thicker. Culm sheaths deciduous, thickly papery, abaxially appressed setose; auricles absent; ligule ca. 2 mm, margin setaceous; blade reflexed. Leaf sheaths glabrous; ligule 1–2 mm, serrulate or crinkled; blade oblong-lanceolate, 6–16 × 1–2 cm. Inflorescence unknown.

- Guangxi, Guizhou, Sichuan.

An ornamental cultivar, *Dendrocalamus tsiangii* 'Viridistriatus' (花黔竹 hua qian zhu) is distinguished by its yellow culms with green stripes.

**9. *Dendrocalamus pulverulentus*** L. C. Chia & But, Kew Bull. 43: 115. 1988.

粉麻竹 fen ma zhu

Culms to 8 m, 4–6 cm in diam.; internodes 25–30 cm; wall thick. Branches usually from ca. 10th node upward, several, dominant branches longer and thicker. Culm sheaths deciduous, abaxially appressed brown setose; auricles small or absent; ligule ca. 4 mm, margin hairy, apex arched; blade reflexed, lanceolate. Leaf sheaths glabrous; ligule ca. 1 mm, serrulate; blade lanceolate to oblong-lanceolate, 13–20 × 2.5–3.3 cm. Inflorescence unknown.

- Cultivated. Guangdong.

**10. *Dendrocalamus liboensis*** Hsueh & D. Z. Li, J. Bamboo Res. 8(1): 37. 1989.

荔波吊竹 li bo diao zhu

*Dendrocalamus exilis* N. H. Xia & L. C. Chia; *D. guiyangensis* N. H. Xia & L. C. Chia.

Culms (8–)12–15 m, (4–)6–9 cm in diam.; internodes (26–)32–36 cm, initially densely white powdery; wall 8–13 mm thick. Branches usually from 6th or 7th node up, central branch dominant, 3–5 m. Culm sheaths deciduous, leathery, abaxially appressed black-brown setose; auricles undulate; oral setae 5–10 mm; ligule 2–4 mm, margin fringed or with setae ca. 1 cm; blade reflexed, lanceolate, 9–12 cm. Leaf sheaths glabrous; ligule ca. 1 mm; blade 8–40 × 1.5–8.5 cm. Inflorescence unknown.

- Guizhou.

**11. *Dendrocalamus hamiltonii*** Nees & Arnott ex Munro, Trans. Linn. Soc. London 26: 151. 1868.

版纳甜龙竹 ban na tian long zhu

*Sinocalamus hamiltonii* (Nees & Arnott ex Munro) T. Q. Nguyen.

Culms 12–18 m, 9–13 cm in diam., often very pendulous; internodes 30–50 cm, persistently densely white to brown scurfy; wall 1.2–2 cm thick. Branches several, dominant central branch very well developed, especially on older pendulous culms where branches can approach size of culm. Culm sheaths deciduous, initially with patches or stripes of dark brown hairs, margins ciliate, apex slightly arched; auricles absent but with a delicate, naked, triangular protuberance to 1 cm on each side;

ligule 1–3 mm, apex somewhat undulate and dentate; blade erect, 3–7 cm, narrow. Leaf sheaths yellow setose; ligule 1.5–2 mm; blade variable, largest ca. 38 × 7 cm. Pseudospikelets 10–25 per node, clusters 1–4 cm in diam. Spikelets dark purple, 8–10 × 3–5 mm, glabrous; fertile florets 2–4. Glumes 1 or 2; lemma 5–7 × 6–7 mm, apex long mucronate; palea about as long as lemma, apex bifid. Anthers yellow or red-purple, apex apiculate. Style ca. 4.5 mm; stigmas 1–3, red-purple. Caryopsis brown, ± spherical.

Yunnan [Bhutan, India, Laos, Myanmar, Nepal].

**12. *Dendrocalamus semiscandens*** Hsueh & D. Z. Li, J. Bamboo Res. 8(1): 28. 1989.

野龙竹 ye long zhu

Culms (7–)10–18 m, (6–)10–15 cm in diam.; internodes 29–35(–60) cm. Branches several, central dominant. Culm sheaths deciduous, leathery, abaxially brown hairy, apex rounded; auricles absent; ligule ca. 1 mm; blade erect. Leaf sheaths white hairy; ligule 3–5 mm; blade 25–35 × 3–4.5 cm. Pseudospikelets 30–40 per node; clusters (1–)1.9–3.2 cm in diam. Spikelets obovate-triangular, 10–13 × 4–7.5 mm; florets 4 or 5. Glumes 1–3; lemma 8.5–9.5 × 5–6 mm, apex long mucronate; palea 7.5–8 mm. Filaments ca. 7 mm; anthers yellow, ca. 3.7 mm, apiculate. Style purple, ca. 6 mm; stigma 1. Caryopsis golden, with a beak ca. 1.5 mm, basally glabrous, distally including beak white pubescent.

- 500–1000 m. Yunnan.

This bamboo is not yet well distinguished from the widely distributed and variable *Dendrocalamus hamiltonii*.

**13. *Dendrocalamus brandisii*** (Munro) Kurz, Prelim. Rep. Forest Pegu, 94. 1875.

勃氏甜龙竹 bo shi tian long zhu

*Bambusa brandisii* Munro, Trans. Linn. Soc. London 26: 109. 1868; *Sinocalamus brandisii* (Munro) P. C. Keng.

Culms 10–15 m, 10–12 cm in diam.; internodes 34–43 cm; wall ca. 3 cm thick. Branches several, dominant branches well developed. Culm sheaths deciduous, orange-brown to bright yellow, leathery; auricles small; ligule ca. 1 mm, margin deeply dentate; blade reflexed or nearly erect. Leaf sheaths white hairy; ligule 1.5–2 mm; blade variable, 23–30 × 2.5–5 cm. Pseudospikelets 5–25 per node, clusters 1.3–1.8 cm in diam. Spikelets ovate-orbicular, 7–9 × 4–5 mm; florets 2–4. Glumes 1 or 2, apex acute; lemma 5–6 mm; palea 2-keeled, keels ciliate, 3-veined between keels, acute or mucronate. Filaments short; anthers green-yellow, ca. 3 mm, apiculate. Ovary ovoid; style ca. 3 mm; stigmas 1 or 2. Caryopsis ovoid, 1.5–5 mm, distally hairy, apex beaked.

Cultivated around villages. Yunnan [native to Laos, Myanmar, Thailand, and Vietnam; cultivated in India].

**14. *Dendrocalamus sikkimensis*** Gamble ex Oliver, Hooker's Icon. Pl. 18: t. 1888. 1770.

锡金龙竹 xi jin long zhu

Culms 10–18 m, 10–13 cm in diam.; internodes becoming

orange, 46–56 cm; wall 1–2.5 cm thick. Branches several, sometimes 1 branch dominant. Culm sheaths deciduous, leathery, very densely dark brown velvety; auricles reflexed, broad, 0.5–2 × 0.2–0.5 cm; oral setae orange, curved, long; ligule ca. 5 mm, serrulate; blade strongly deflexed, 10–18 cm. Leaf sheaths appressed white hairy; auricles and oral setae prominent; ligule ca. 1 mm; blade variable, 15–30 × 3.8–7 cm. Pseudospikelet clusters ca. 4 cm in diam. Spikelets lanceolate, 1.2–1.8 cm; florets 2 or 3. Glumes 3 or 4, ovate; lemma ovate, margins ciliate, apex acute or mucronate; palea keels ciliate, many veined. Anthers apiculate at apex. Ovary spherical. Caryopsis obovoid, apex beaked.

100–600 m. S Yunnan [Bhutan, India (Sikkim)].

**15. *Dendrocalamus asper*** (Schultes & J. H. Schultes) Backer ex K. Heyne, *Nutt. Pl. Ned.-Ind.*, ed. 2, 1: 301. 1927.

马来甜龙竹 ma lai tian long zhu

*Bambusa aspera* Schultes & J. H. Schultes, *Syst. Veg.* 7: 1352. 1830; *Dendrocalamus flagellifer* Munro; *Gigantochloa aspera* (Schultes & J. H. Schultes) Kurz; *Sinocalamus flagellifer* (Munro) T. Q. Nguyen.

Culms 15–20 m, 6–10(–12) cm in diam.; internodes 30–50 cm. Branches from ca. 9th node up, central branch dominant. Culm sheaths deciduous, initially light green, leathery, apex rounded; ligule 7–10 mm, margin with brown setae; auricles linear, ca. 20 × 7 mm, margin undulate; oral setae present; blade reflexed, lanceolate. Leaf sheaths initially sparsely hairy, becoming glabrous; ligule truncate, ca. 2 mm, entire or serrulate; blade variable, lanceolate or oblong-lanceolate, (10–)20–30(–35) × (1.5–)3–5 cm. Spikelets 6–9 mm; florets 4 or 5, apical one sterile. Glumes 1 or 2, ovate-lanceolate; lemma broadly ovate, margins ciliate; palea about as long as lemma, keels and margins ciliate, 1–3-veined between and 2-veined on either side of keels. Anthers 3–5 mm, apex apiculate. Ovary hairy; style hairy; stigmas 1. Fruit unknown.

Hong Kong, Taiwan, Yunnan [Indonesia, Laos, Malaysia, Myanmar, Philippines, Thailand].

**16. *Dendrocalamus parishii*** Munro, *Trans. Linn. Soc. London* 26: 149. 1868.

巴氏龙竹 ba shi long zhu

*Dendrocalamus hookeri* Munro var. *parishii* (Munro) Blatter; *Sinocalamus parishii* (Munro) W. T. Lin.

Culms to 10 m, to 10 cm in diam. Culm sheaths unknown. Leaf sheaths glabrous; ligule ca. 2 mm; blade ca. 17 × 3 cm, glabrous. Pseudospikelets 20–35 per node, clusters 2.5–3.2 cm in diam. Spikelets ovoid, ca. 13 × 5 mm; florets 2 or 3. Glumes 1 or 2, apex mucronate; lemma 10–12 × 7.5–8.5 mm, margins ciliate, apex long mucronate; palea 5–9 mm, 2-keeled, keels sparsely ciliate, apex obtuse. Anthers 3–5 mm, apex apiculate. Pistil 0.8–1 cm; stigmas 1 or 2. Fruit unknown.

Yunnan [India, Pakistan].

The identification of this bamboo appears somewhat speculative.

**2. *Dendrocalamus* subg. *Sinocalamus*** (McClure) Hsueh & D. Z. Li, *J. Bamboo Res.* 7(4): 9. 1988.

麻竹亚属 ma zhu ya shu

*Sinocalamus* McClure, *Lingnan Univ. Sci. Bull.* 9: 66. 1940.

Culms apically pendulous, basally without branches, dominant branches none or 1. Culm sheaths thickly leathery. Leaves usually large. Pseudospikelets 1 to several on nodes of flowering branches, yellow-brown; florets 2–8. Lemma not mucronate; lodicules absent to 1. Stigmas 1.

About 25 species: mainly distributed in SE Asia; 11 species (seven endemic) in China.

1a. Culm 15–25(–30) m, 10–20(–30) cm in diam.; spikelets acute, with 5–8 florets, florets inseparable and each floret usually closed when mature (open in *D. fugongensis*).

2a. Culm sheath blade reflexed or nearly erect; apex of palea bifid.

3a. Basal culm internodes normal; culm sheath blade reflexed; spikelet 1–1.5 cm; 2-veined between 2 keels of palea ..... 17. *D. giganteus*

- 3b. Basal culm internodes congested; culm sheath blade nearly erect; spikelet 3–3.5 cm; 5-veined between 2 keels of palea ..... 18. *D. sinicus*
- 2b. Culm sheath blade erect; apex of palea obtuse.
- 4a. Culm initially white ciliate; bracts basal to inflorescence obviously shorter than pseudospikelets ..... 19. *D. calostachyus*
- 4b. Culm initially white powdery, not ciliate; bracts basal to inflorescence nearly as long as pseudospikelets ..... 20. *D. fugongensis*
- 1b. Culm 15–20 m (to 25 m in *D. yunnanicus* and *D. latiflorus*), 10–18 cm in diam.; spikelets obtuse or acute, truncate, with 2–8 florets, florets slightly separable from each other and each floret usually open when mature (closed in *D. pachystachys*).
- 5a. Culm sheath setaceous, or setaceous and tomentose; spikelets 0.5–1.2 × 0.4–0.8 cm, with 4 or 5 florets.
- 6a. Culm internodes glabrous, white powdery initially; abaxial surface of culm sheath with appressed brown setae ..... 25. *D. minor*
- 6b. Culm internodes with setae or tomentose, without powder.
- 7a. Culm sheath with dense black-brown setae and white to light brown tomentum scattered and not clustered into spots; spikelets obovate-triangular, 10–12 × 5–8 mm ..... 26. *D. peculiaris*
- 7b. Culm sheath with black-brown tomentum and spots of white tomentum; spikelet oblong-ovate, ca. 5 × 4.5 mm ..... 27. *D. tomentosus*
- 5b. Culm sheaths glabrous or with readily deciduous setae, becoming glabrous; spikelet 1–1.6(–2.8) × 0.5–1.3 cm, with 5–8 florets.
- 8a. Culms white ciliate or glabrous.
- 9a. Ligule 3–4 mm; spikelet 1.7–2.8 × 0.5–1 cm, apex acute; florets inseparable from each other and each floret closed when mature, floret white ciliate ..... 21. *D. pachystachys*
- 9b. Ligule 1–2 mm; spikelet 1.2–1.5 × 0.7–1.3 cm, apex obtuse; florets partially separable from each other, each open when mature, only upper floret yellow-brown ciliate ..... 22. *D. latiflorus*
- 8b. Culms with appressed setae, or tomentose, or with sparse white powder.
- 10a. Apex of culm sheath truncate or projected at center, 6–11 cm wide; ligule 1–4 mm; internodes of flowering branches white-brown or yellow-brown tomentose ..... 23. *D. jianshuiensis*
- 10b. Apex of culm sheath depressed, 3–7 cm wide; ligule 5–8 mm; internodes of flowering branches yellow-brown ciliate ..... 24. *D. yunnanicus*

**17. *Dendrocalamus giganteus*** Munro, Trans. Linn. Soc. London 26: 150. 1868.

龙竹 long zhu

*Sinocalamus giganteus* (Munro) A. Camus, Rev. Int. Bot. Appl. Agric. Trop. 29: 551. 1949.

Culms 20–30 m, 20–30 cm in diam.; internodes 30–45 cm; wall 1–3 cm thick. Branches several. Culm sheaths deciduous, initially purple, thickly leathery, brown hairy; margins broadly rounded; auricles reflexed, wavy; oral setae absent; ligule 6–12 mm, serrulate; blade reflexed, ovate-lanceolate, 13–38 cm. Leaf sheaths glabrous; ligule 1–3 mm, serrulate; blade usually oblong-lanceolate, to 45 × 10 cm. Inflorescence branches pendulous, long. Pseudospikelets 4–12(–25) cm. Spikelets 10–15 × 3–4 mm; florets 5–8, apical one sterile. Glumes 2, 3–4 mm; lemma broadly ovate, margins ciliate, apex mucronate; palea about as long as lemma, 2-keeled, keels ciliate, 2-veined between and 1-veined on either side of keels. Anthers ca. 6.5 mm, apex apiculate. Pistil ca. 1 cm, shortly hairy. Ovary ovoid; style long; stigma 1, purple. Caryopsis oblong, apex obtuse, plumose.

Yunnan; cultivated in Taiwan [Myanmar; cultivated in Malaysia and Thailand].

**18. *Dendrocalamus sinicus*** L. C. Chia & J. L. Sun, Bamboo Res. 1(1): 10. 1982.

歪脚龙竹 wai jiao long zhu

Culms 20–30 m, 20–30 cm in diam.; internodes 17–22 cm.

Culm sheaths deciduous or persistent, initially yellow-green, thickly leathery; auricles absent; ligule ca. 6 mm; blade erect. Leaf sheaths initially slightly hairy, becoming glabrous; ligule 1.5–2 mm; blade 20–40 × 4–6.5 cm. Pseudospikelets 1 or more. Spikelets 30–35 × 6.5–7.5 mm; florets 5 or 6. Glumes 1.2–1.5 cm, abaxially slightly hairy, apex mucronate; lemma 17–25 mm; palea 5-veined between keels, apex bifid. Filaments 1.5–3 cm; anthers 8–12 mm. Style long; stigma 1. Fruit unknown.

• 600–1000 m. Yunnan.

**19. *Dendrocalamus calostachyus*** (Kurz) Kurz, Prelim. Rep. Forest Pegu, 94. 1875.

美穗龙竹 mei sui long zhu

*Bambusa calostachya* Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42: 247. 1873; *Sinocalamus calostachyus* (Kurz) P. C. Keng.

Culms tall. Culm sheaths leathery, apex truncate; ligule 1–2 mm, rounded or serrulate; auricles absent; blade erect. Leaf sheaths glabrous, margins long ciliate, apex truncate; ligule 1–2 mm, rounded or serrulate; blade variable, broadly lanceolate, 23–30 × 2.5–6.5 cm, apex acute. Pseudospikelets 1–5. Spikelets 1–1.5 cm; florets 4–6. Glumes 2 or 3, broadly ovate, margins ciliate, apex mucronate; lemma 9–11 × 6–9 mm; palea 6–7 mm, 3–5-veined between and 1-veined on either side of keels, apex acuminate. Filaments slender; anthers yellow, ca. 5.5 mm; Pistil ca. 1.1 cm; ovary ovoid or orbicular; style 1; stigma 1. Fruit unknown.

Yunnan [Myanmar; cultivated in India].

**20. *Dendrocalamus fugongensis*** Hsueh & D. Z. Li, J. Bamboo Res. 7(4): 9. 1988.

福贡龙竹 fu gong long zhu

Culms to 20 m, 10–15 cm in diam.; internodes 35–46 cm; wall ca. 2 cm thick. Branches several, central branch dominant. Culm sheaths deciduous, yellow-green when dry, leathery; auricles absent; ligule ca. 3 mm, serrulate; blade erect. Leaf sheaths glabrous, margin ciliate; ligule 1.5–2 mm; auricles small; blade 18–25 × 3–4.2 cm. Pseudospikelets 6–14 per node, clusters 1–1.5 cm in diam. Spikelets 10–13 × 3–4 mm; florets 4. Glumes 1 or more, 8–10 × 6–8 mm, long mucronate; lemma 1–1.2 cm, long mucronate; palea 7–9 mm. Anthers yellow or purple. Style 6–7 mm; stigma 1. Fruit unknown.

• NW Yunnan.

**21. *Dendrocalamus pachystachys*** Hsueh & D. Z. Li, J. Bamboo Res. 8(1): 25. 1989.

粗穗龙竹 cu sui long zhu

Culms 10–12 m, to 10 cm in diam.; internodes 39–47 cm; wall to 2 cm thick. Branches several, dominant branch well developed. Culm sheaths deciduous, initially yellow-green, leathery or thickly leathery, glabrous; auricles absent; ligule ca. 3 mm, serrulate; blade erect, 6–12 cm. Leaf sheaths brown hairy; ligule 3–5 mm, serrulate; blade to 40 × 12 cm. Pseudospikelets 1 or more per node. Spikelets 17–24 × 5–10 mm; florets 5–8. Glumes 2 or 3, apex mucronate; lemma 7.5–12.5 mm, leathery, apex mucronate; palea about as long as lemma or slightly longer, 4- or 5-veined between keels, apex bifid. Filaments 7–11 mm; anthers yellow, 6–7 mm. Pistil 1.2–1.7 cm; stigma 1. Fruit unknown.

• Yunnan.

**22. *Dendrocalamus latiflorus*** Munro, Trans. Linn. Soc. London 26: 152. 1868.

麻竹 ma zhu

*Bambusa latiflora* (Munro) Kurz; *Dendrocalamus latiflorus* var. *lagenarius* W. C. Lin; *Sinocalamus latiflorus* (Munro) McClure; *S. latiflorus* var. *magnus* T. H. Wen.

Culms 20–25 m, 15–30 cm in diam.; internodes 45–60 cm; wall 1–3 cm thick. Branches several, central branch dominant. Culm sheaths deciduous, thickly leathery; auricles small; ligule 1–3 mm, serrulate; blade reflexed, ovate to lanceolate. Leaf sheaths initially slightly hairy, becoming glabrous; ligule 1–2 mm, serrulate; blade oblong-lanceolate, 15–35(–50) × 2.5–7 cm. Pseudospikelets 1–7 or more per node. Spikelets 12–15 × 7–13 mm; florets 6–8. Glumes 2 or more, ca. 5 mm, margins ciliate; lemma 12–13 × 7–16 mm; palea 7–11 × 3–4 mm. Anthers yellow, 5–6 mm, apex mucronate. Ovary broadly ovoid; style white hairy; stigma 1. Caryopsis 8–12 mm.

Fujian, Guangdong, Guangxi, Guizhou, Hainan, Sichuan, Taiwan, Yunnan; cultivated in SW Jiangsu and S Zhejiang [Myanmar, Vietnam].

Two cultivars occur in Taiwan: *Dendrocalamus latiflorus* ‘Subconvex’ (葫芦麻竹 hu lu ma zhu), distinguished by its much smaller culms, 5–10 m, 4–12 cm in diam., with internodes 10–30 cm, basally

congested and pear-shaped; and *D. latiflorus* ‘Mei-nung’ (美浓麻竹 mei nong ma zhu), with culms and branches yellow-green with green stripes and culm sheaths yellow-green to brown-green with several narrow, yellow stripes.

**23. *Dendrocalamus jianshuiensis*** Hsueh & D. Z. Li, J. Bamboo Res. 7(4): 14. 1988.

建水龙竹 jian shui long zhu

Culms 17–18 m, 10–12 cm in diam.; internodes 25–37 cm; wall 1.2–2 cm thick; branching from 8th–9th node up, central branch dominant. Culm sheaths deciduous, about as long as internodes, thickly leathery, apex truncate; auricles small, 0.5–2 cm; ligule 1–4 mm, serrulate; blade reflexed, 10–20 × 3.5–7.5 cm. Leaf sheaths glabrous; ligule ca. 2 mm; blade 20–38 × 3.5–8.5 cm. Pseudospikelets 1 or more per node. Spikelets 10–18 × 5–10 mm, apex obtuse; florets 6 or 7. Glumes 1–3, 5–8 mm, abaxially slightly hairy, apex mucronate; lemma and glumes 7–12 × 5–10 mm; palea 6–9 mm. Filaments 1–1.4 cm; anthers yellow, 4–6 mm, apex mucronate. Pistil 1–1.5 cm, white hairy; stigma 1. Fruit unknown.

• Yunnan.

**24. *Dendrocalamus yunnanicus*** Hsueh & D. Z. Li, J. Bamboo Res. 7(4): 17. 1988.

云南龙竹 yun nan long zhu

Culms 18–25 m, 11–18 cm in diam.; internodes 42–52 cm; wall 1–2 cm thick. Branches several. Culm sheaths deciduous, leathery to thickly so, depressed, apex narrow; auricles small; ligule 5–8 mm, serrulate; blade reflexed, 9–18 × 3–9 cm, adaxially brown hairy. Leaf sheaths white hairy; ligule 1.5–2 mm; blade 25–35 × 4.5–6.5 cm, abaxially glabrous. Pseudospikelets 1 or more per node. Spikelets 1–1.6 cm, apex acute; florets 5–7. Glumes 2 or more, 2–4 mm, abaxially slightly hairy, apex acute; lemma 5–9 mm, long mucronate; palea 4–8 mm, 4- or 5-veined between keels, apex depressed. Anthers yellow, 3–4 mm, apex mucronate. Style ca. 4 mm; stigma 1. Fruit unknown.

Yunnan [Vietnam].

**25. *Dendrocalamus minor*** (McClure) L. C. Chia & H. L. Fung, Acta Phytotax. Sin. 18: 215. 1980.

吊丝竹 diao si zhu

Culms 5–12 m, (3–)6–8 cm in diam.; internodes green or yellow with green stripes, 30–45 cm; wall 5–5.6 mm thick. Branches several. Culm sheaths deciduous, initially grass-green, leathery, initially appressed brownish hispid, becoming glabrous; auricles small; ligule 3–8 mm, fimbriate; blade reflexed, ovate-lanceolate or lanceolate, abaxially glabrous. Leaf sheaths initially slightly hairy, becoming glabrous; ligule ca. 1 mm, serrulate; blade oblong-lanceolate, 10–25 × 1.5–3 cm, base rounded, apex acute. Pseudospikelets 5–10 per node. Spikelets ca. 1.2 cm; florets 4 or 5. Glumes usually 2(or 3), ca. 6 mm, margins ciliate; lemma 9–11 mm, glabrous, margins ciliate, apex acute, mucronate; palea 6–8 mm, 2-keeled, 3-veined between keels, apex acuminate or bifid. Anthers yellow, 5–6 mm, apex mucronate. Ovary ovoid; style slender; stigma 1. Caryopsis ca. 5 mm.

- Low hills. Guangdong, Guangxi, Guizhou.

- 1a. Culms 6–12 m, to 8 cm in diam., internodes green; glumes 2, palea apically acuminate ..... 25a. var. *minor*
- 1b. Culms 5–8 m, 4–6 cm in diam.; internodes slightly yellow with 5–8 deep green stripes; glumes 3, palea apically bifid ..... 25b. var. *amoenus*

**25a. *Dendrocalamus minor* var. *minor***

吊丝竹(原变种) diao si zhu (yuan bian zhong)

*Sinocalamus minor* McClure, Sunyatsenia 6(1): 47. 1941;  
*Dendrocalamus sapidus* Q. H. Dai & D. Y. Huang.

Culms 6–12 m, to 8 cm in diam., internodes green. Glumes 2; palea acuminate at apex.

- Guangdong, Guangxi, Guizhou.

**25b. *Dendrocalamus minor* var. *amoenus*** (Q. H. Dai & C. F. Huang) Hsueh & D. Z. Li, J. Bamboo Res. 8(1): 39. 1989.

花吊丝竹 hua diao si zhu

*Sinocalamus minor* McClure var. *amoenus* Q. H. Dai & C. F. Huang, Acta Phytotax. Sin. 19: 261. 1981.

Culms 5–8 m, 4–6 cm in diam.; internodes slightly yellow, with 5–8 deep green stripes. Glumes 3; palea bifid at apex.

- Low hills. Guangxi.

**26. *Dendrocalamus peculiaris*** Hsueh & D. Z. Li, J. Bamboo Res. 8(1): 32. 1989.

金平龙竹 jin ping long zhu

Culms 13–18 m, 10–15 cm in diam.; internodes 36–43 cm; wall 3–3.5 cm thick. Culm sheaths deciduous, orange-brown, leathery; auricles absent; ligule 6–10 mm, serrulate; blade reflexed. Leaf sheaths initially slightly hairy, becoming glabrous, margins ciliate; ligule ca. 1 mm; blade 25–40 × 3–5.5 (–10) cm. Pseudospikelets 2–15 per node. Spikelets 1–1.2 cm; florets 4 or 5. Glumes 2; lemma 7–11 mm, margins undulate, apex mucronate; palea 6–8 mm, 2-keeled, 2-veined between keels, apex acute. Anthers yellow, 3–3.5 mm, apex mucronate. Pistil ca. 1 cm; stigma 1. Fruit unknown.

- Yunnan.

**27. *Dendrocalamus tomentosus*** Hsueh & D. Z. Li, J. Bamboo Res. 8(1): 34. 1989.

毛龙竹 mao long zhu

Culms to 20 m, 9–12 cm in diam.; internodes 29–42(–55) cm; wall ca. 2 cm thick. Branches several, dominant branches well developed, 5–6 m. Culm sheaths deciduous, leathery; auricles absent; ligule 5–7 mm; blade reflexed, abaxially setaceous. Leaf sheaths initially thinly white powdery, becoming black; ligule ca. 1 mm; blade 25–34 × 2.5–4.2 cm. Pseudospikelets 6–8 per node, clusters 7–11 mm in diam. Spikelets ca. 5.5 mm; florets 4 or 5. Glumes 1 or 2; lemma 4–5 mm, slightly hairy; palea ca. 4 mm, apex obtuse or depressed. Anthers yellow, 2.5–3 mm, apex mucronate. Pistil ca. 6 mm; stigma 1. Fruit unknown.

- Broad-leaved forests; 800–900 m. Yunnan.



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