

22. ARUNDINARIA Michaux, Fl. Bor.-Amer. 1: 73. 1803.

青篱竹属 qing li zhu shu

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Small to arborescent bamboos, spreading or loosely clumped. Rhizomes leptomorph. Culms diffuse to pluricaespitose, suberect to drooping, 1–7(–13) m tall, 0.5–4(–6) cm thick; internodes terete to flattened on one side above branches. Branch buds tall, with or without promontory, within 2-keeled prophyll, always open at front. Branches (1 or)2–5(–7), subequal. Lateral branch axes always subtended by sheaths, without replication of lateral branches. Culm sheaths deciduous to persistent, blade usually recurved or reflexed, lanceolate, articulate. Leaf sheaths persistent; blade oblong-lanceolate or narrowly lanceolate, small to medium-sized, without marginal necrosis in winter, arrangement random, transverse veins distinct. Inflorescence an open panicle or raceme, flowering branches usually subtended by tiny bracts. Spikelets several to many flowered, slender; rachilla internodes extended, disarticulating. Glumes 1 or 2, mucronate; lemma similar to glumes; palea 2-keeled, apex obtuse; lodicules 3. Stamens 3; filaments free, slender; anthers yellow. Style usually very short; stigmas 2 or 3, plumose. Caryopsis dry, oblong. New shoots May–Jun.

About eight species: SW China, E Himalayas, Vietnam, SE United States; five species (four endemic) in China.

In FRPS (9(1), 1996), *Arundinaria* was considered a unispecific, North American genus with no Asian representatives at all. A much broader treatment of the genus has also been advocated by several authors. In this treatment the morphologically closest Asian species under *Arundinaria*, those from *Bashania* and *Sarocalamus*, are included. *Arundinaria* subg. *Arundinaria* differs in its persistent culm sheaths and larger florets and is restricted to the SE United States.

- 1a. Culms 3–8(–13) m tall; internodes grooved above branches; rough, finely striate, waxy; leaf blade 10–32 cm wide, thick, dark, glossy; inflorescence branches pulvinate, becoming reflexed; pedicels pubescent (*A.* subg. *Bashania*).
- 2a. Culms 2–4(–6.5) cm in diam.; culm sheath scars brown setose, later glabrous; leaf sheath ligule ciliate 1. *A. fargesii*
- 2b. Culms 0.3–0.7(–1) cm in diam.; culm sheath scars prominent and densely setose; leaf sheath ligule glabrous 2. *A. qingchengshanensis*
- 1b. Culms 1–3 m tall; internodes terete, smooth; leaf blade (2.2–)3–10 cm wide, thin, light, matte; inflorescence branches not pulvinate, remaining erect; pedicels glabrous (*A.* subg. *Sarocalamus*).
- 3a. Leaf sheath auricles prominent, narrow, erect; leaf blade abaxially sparsely long pilose 3. *A. racemosa*
- 3b. Leaf sheath auricles minute or absent; leaf blade glabrous.
- 4a. Culm sheath completely glabrous; culms 0.3–0.6 cm in diam. 4. *A. faberi*
- 4b. Culm sheath sparsely setulose; culms 0.6–1.2 cm in diam. 5. *A. spanostachya*

1. *Arundinaria* subg. *Bashania* (P. C. Keng & T. P. Yi) D. Z. Li, Novon 15: 600. 2005.

巴山木竹亚属 ba shan mu zhu ya shu

Bashania P. C. Keng & T. P. Yi, J. Nanjing Univ., Nat. Sci. Ed. 1982(3): 722. 1982.

Subarborescent subtropical to temperate bamboos. Culms 3–8(–13) m tall; internodes grooved above branches, rough, finely striate, waxy; nodes slightly swollen, supra-nodal ridge prominent, wavy. Branch buds on promontory; prophyll keels thickened, prominent, densely pubescent and ciliate. Branches initially 3–6, erect to spreading, terete, basal internodes compressed, lateral branching close to culm. Leaves few, branchlets ramifying extensively. Leaf blade lanceolate, to 32 cm, thick, dark glossy. Inflorescence terminal or lateral. Branches erect to spreading, pubescent, branching subtended by very small remnants of sheaths or rings of hairs, pulvinate. Spikelets several, on promontory; prophyll represented by lower glume; glumes 2, lower glume close to lower lemma, without subtended buds; palea keels glabrous, appressed to rachilla.

• Two species: China.

Molecular evidence would suggest that *Arundinaria* subg. *Bashania* is possibly closer to *Indocalamus* than to *A.* subg. *Arundinaria*.

1. *Arundinaria fargesii* E. G. Camus, Notul. Syst. (Paris) 2: 244. 1912.

巴山木竹 ba shan mu zhu

Arundinaria dumetosa Rendle; *A. fargesii* var. *grandifolia* E. G. Camus; *Bashania fargesii* (E. G. Camus) P. C. Keng & T. P. Yi; *Indocalamus dumetosus* (Rendle) P. C. Keng; *I. fargesii* (E. G. Camus) Nakai; *I. scariosus* McClure.

Culms pluricaespitose, predominantly tillering in fertile soil, more separated in poor soil. Culms basally erect, apically

slightly pendulous, 5–8(–13) m, 2–4(–6.5) cm in diam.; internodes deep green and glaucous initially, light yellow when old, 30–50(–75) cm; wall 4–8 mm thick; pith membranous; nodes weakly prominent, ridged; intranode 6–12 mm; sheath scars brown setose, later glabrous. Culm sheaths initially green and setose, with persistent papillae and imprints of setae; ligule 2–4 mm, dentate; auricles absent; oral setae present; blade lanceolate, tomentose at base, margins ciliate, undulate. Leaves (1–)4–6; sheath setose, pilose, margins ciliate; ligule (1.5–)2–4 mm, slightly hairy, dentate, initially ciliate; blade lanceolate,

10–20(–30) × 2.5–3 cm, abaxially pubescent, adaxially glabrous, secondary veins 5–8(–11)-paired; petiole short, densely pubescent. Inflorescence paniculate, 5–11(–15) × 2–4 cm; spikelets purple-black, cylindrical, 2–3 × ca. 0.4 cm; rachilla internodes compressed, 2–3.5 mm; florets 4–7. Glumes ovate-lanceolate; lemma oblong or lanceolate, pubescent; palea 2-cleft; lodicules sparsely ciliolate at margin. Anthers 4–5 mm. Ovary ovoid; stigmas 2 or 3, ca. 2.5 mm plumose. Caryopsis slightly curved, ca. 1 cm, beaked, suture slender. Fl. late Mar–Apr or May, fr. late May.

• Mountain forests, pure bamboo forests; (1100–)1700–2000(–2500) m. Gansu, Hubei, Shaanxi, Sichuan.

The culms are often used for papermaking; also for weaving.

2. *Arundinaria qingchengshanensis* (P. C. Keng & T. P. Yi) D. Z. Li, *Novon* 15: 600. 2005.

饱竹子 *bao zhu zi*

Bashania qingchengshanensis P. C. Keng & T. P. Yi, *J. Nanjing Univ., Nat. Sci. Ed.* 1982(3): 728. 1982.

Culms 2–4 m, 0.3–0.7(–1) cm in diam.; internodes deep green, 40–45(–56) cm, glabrous, distally waxy-powdery, solid or subsolid; nodes weakly prominent, glabrous; intranode 3–5 mm; sheath scar prominent, densely setose. Culm sheaths dark green or purple-green, setose, margins distally ciliolate; ligule purple, truncate or arcuate, less than 1 mm; auricles absent; oral setae 3–5, 3–4 mm; blade persistent, dark green, triangular-lanceolate, basally setose, striate, margins serrulate. Leaves 1–3 per ultimate branch; sheath green, sometimes purple, glabrous; auricles deciduous, green, elliptic, margin ciliate; ligule light green, truncate, ca. 1 mm, glabrous; petiole 3–4 mm, glabrous; blade lanceolate, 22–32 × 2.4–3.8 cm, glabrous, secondary veins 6–8-paired, base cuneate, margin serrulate, apex acuminate. Inflorescence paniculate, 6–10 cm. Spikelets 5–15; pedicel 2–12 mm, densely setose; rachilla internodes 3–5 mm, densely setose; florets 6–14. Glumes setose, long mucronate; lemma ovate, setose, margins ciliolate, long mucronate; palea 2-cleft, 2-keeled, with 2 or 3 veins between keels, 2 veins beside keels, margin ciliolate; lodicules purple-red, rhombic-ovate, membranous, transparent, margins densely ciliolate. Anthers purple, glabrous. Ovary ellipsoid, glabrous; style 1; stigmas 2, white, plumose. Caryopsis slightly curved, brown, ellipsoid, 7–8 × 2–2.5 mm, glabrous, apex acute, suture elongated. New shoots Apr, fl. Apr, fr. May.

• Hardwood forests; 800–1200 m. Sichuan (Guanxian, Qonglai).

Bashania aristata Y. Ren et al. (*Novon* 13: 473. 2003) and *B. baoxingensis* T. P. Yi (*J. Bamboo Res.* 19(1): 9. 2000) are possibly synonyms of this species.

The culms are used for pen and brush holders, abacus frames, and chopsticks. This species is also cultivated as an ornamental.

2. *Arundinaria* subg. *Sarocalamus* (Stapleton) D. Z. Li, *Novon* 15: 600. 2005.

冷箭竹亚属 *leng jian zhu ya shu*

Sarocalamus Stapleton, *Novon* 14: 346. 2004.

Small subalpine bamboos. Culms 1–3 m tall; internodes terete, smooth; nodes not swollen; supra-nodal ridge well developed. Branch buds on promontory; prophyll keels delicate, slightly ciliate. Branches initially 1–3, very erect, appressed, grooved, basal internodes progressively longer, often all long, lateral branching often distant from culm; complement proliferating to become broomlike. Leaf blade pale, linear-lanceolate, thin, matte, less than 12 cm. Inflorescence initially terminal or lateral to leafy branches, later in leafless branch complements; branches very erect, appressed, glabrous, branching subtended by long hairs, not pulvinate; glumes 1 or 2, both small, lower glume usually very small, usually distant from lower lemma, with vestigial remnants of subtended buds; palea keels ciliate.

About three species: Bhutan, China, NE India, Nepal; three species (two endemic) in China.

Molecular evidence would suggest that *Arundinaria* subg. *Sarocalamus* is possibly phylogenetically more closely related to *Phyllostachys*, even though it is morphologically closest to *A.* subg. *Arundinaria* from North America and *A.* subg. *Bashania*.

3. *Arundinaria racemosa* Munro, *Trans. Linn. Soc. London* 26: 17. 1868.

总花冷箭竹 *zong hua leng jian zhu*

Fargesia racemosa (Munro) T. P. Yi; *Sarocalamus race-*

mosus (Munro) Stapleton; *Yushania racemosa* (Munro) R. B. Majumdar.

Culms nodding, to 2 m; internodes smooth, without wax, glabrous; nodes slightly raised. Culm sheaths glabrous; auricles

small; oral setae spreading; blade erect. Leaf sheath nearly glabrous, without tessellation; auricles erect, prominent, narrow; oral setae persistent, erect, stout, nearly glabrous; ligule short; blade to 10 cm, abaxially sparsely long pilose, adaxially glabrous, tessellation distinct, margins similarly thickened. Spikelets with up to 10 florets; rachilla sections scabrous, with pubescent edges, distally pubescent; fertile lemma scabrous, margins pubescent; palea scabrous, keels ciliate. Anthers shortly bifid.

Undergrowth of coniferous forests, yak pastures; 2900–3500 m. Xizang [Bhutan, NE India, Nepal].

The identity of this species was clarified by Gamble (Bull. Misc. Inform. Kew 1912: 198. 1912).

The culms are used for brooms, and the foliage is an important winter fodder for yaks and wild animals.

4. *Arundinaria faberi* Rendle, J. Linn. Soc., Bot. 36: 435. 1904.

冷箭竹 *leng jian zhu*

Arundinaria fangiana A. Camus; *Bashania faberi* (Rendle) T. P. Yi; *B. fangiana* (A. Camus) P. C. Keng & T. H. Wen; *Gelidocalamus fangianus* (A. Camus) P. C. Keng & T. H. Wen; *Sinarundinaria faberi* (Rendle) P. C. Keng; *S. fangiana* (A. Camus) Keng & P. C. Keng.

Culms (0.5–)1–2.5(–3) m, 3–6 mm in diam.; internodes green, yellow-green when old, often purple spotted, 15–20 cm, initially slightly glaucous, glabrous; wall 1.5–3 mm thick, pith initially lamellate, later powdery; sheath scars flattened or slightly prominent; intranode 2–3 mm. Culm sheaths shorter than internodes, glabrous, margins ciliate; auricles minute or absent; oral setae initially scarce, readily deciduous, purple; ligule truncate, ca. 0.5 mm; blade green or purple-red at apex, glabrous, margins revolute. Leaves 2–4 per ultimate branch; sheath glabrous, ribbed, margins initially ciliate; auricles minute or absent; oral setae scarce, initially purple, later gray-white, 5–7 mm, undulate; ligule truncate, ca. 0.5 mm; pseudopetiole 1–2 mm, glabrous; blade lanceolate, 3–9 × (0.4–)0.8–1.1(–1.4) cm, glabrous, secondary veins 3- or 4(or 5)-paired, base rounded, margin serrulate, scabrous, apex acuminate. Inflorescence racemose to paniculate, 4–6(–13) cm; spikelets 3–12; pedicel 8–22 mm; florets (4 or)5–7, purple-red; rachilla internodes 3–5 mm. Glumes 2; lemma ovate-lanceolate, long mucronate; palea ciliolate, bifid, 1-veined between keels; lodicules ovate, anterior 2 larger. Anthers purple-red. Ovary ellipsoid, glabrous; style 1; stigmas 3. Caryopsis slightly curved, purple-brown or brown, oblong, 6–7 × 1.5–2 mm, style base persistent, beaked, suture shallow, pericarp thin and easy to separate. Fl. May–Aug, fr. Jul–Oct.

• Subalpine coniferous forests, especially *Abies*; 2300–3500 m. Guizhou (Fangjing Shan), SW Sichuan, Yunnan (Dongchuan, Wumeng Shan).

The culms are used for arrows, penholders, and roofing of temporary shelters. This species is also an important food resource for the giant panda.

5. *Arundinaria spanostachya* (T. P. Yi) D. Z. Li, Novon 15:

600. 2005.

峨热竹 *e re zhu*

Bashania spanostachya T. P. Yi, Acta Bot. Yunnan. 11: 35. 1989; *Sarocalamus spanostachyus* (T. P. Yi) Stapleton.

Culms (0.5–)1–3.5 m, 0.6–1.2 cm in diam.; internodes initially green, yellow when old, purple spotted, cylindrical, 13–18(–24) cm, initially slightly glaucous, glabrous; wall 3–4 mm thick, pith initially lamellate, later coarsely powdery; nodes flat; intranode 1.5–3 mm; sheath scar slightly prominent, glabrous. Culm sheaths persistent, yellow, glabrous or adnately setose; auricles absent; oral setae rarely present, 4–6 mm; ligule purple, arcuate, ca. 1 mm, glabrous; blade initially gray-green or purplish, smooth or sometimes rugose, glabrous, margin entire. Leaves 2–4 per ultimate branch; sheath green-purple, glabrous, margins smooth; auricles absent; oral setae 1 or 2, 2–5 mm; ligule purple, truncate, ca. 0.5 mm, glabrous; pseudopetiole purple, 0.8–1.5 mm, glabrous; blade linear-lanceolate, (2.2–)3.3–6.7 × 0.4–0.8 cm, glabrous, secondary veins 2- or 3-paired, base broadly cuneate, one margin serrulate, other margin remotely serrulate or nearly entire, apex acuminate. Inflorescence racemose; rachilla internodes 3.5–5 mm, setose; pedicel 2–6(–11) mm, slender; florets 4–6, purple. Glumes 2, glabrous; lemma ovate-lanceolate, glabrous or setose, long mucronate; palea 2-cleft; lodicules rhombic-lanceolate, margins ciliolate. Anthers purple. Ovary light yellow, ellipsoid, glabrous; style 1; stigmas 3. Fruit unknown. New shoots and fl. May.

• Dominating undergrowth of *Abies georgei* and *Rhododendron* forests; 3200–3900 m. SW Sichuan.

The culms are often used as brooms. The plant also provides

winter forage for cattle and is important for water and soil conservation in fragile alpine regions.

Taxa incertae sedis

Arundinaria acerba W. T. Lin (J. S. China Agric. Univ. 13(2): 84. 1992) was described from Guangdong.

Arundinaria conghuaensis W. T. Lin (J. Bamboo Res. 19(4): 2. 2000) was described from Guangdong (Conghua). In the protologue it was compared with *A. projecta* (a synonym of *Acidosasa nanunica* in this account).

Arundinaria multinervis W. T. Lin & Z. M. Wu (J. S. China Agric. Univ. 11(3): 48. 1990; *Indocalamus multinervis* (W. T. Lin & Z. M. Wu) W. T. Lin, J. Bamboo Res. 19(4): 17. 2000) was described from sterile material from Guangdong (Shixing).

Arundinaria parvifolia Hackel ex Keng (J. Wash. Acad. Sci. 26: 396. 1936; *Fargesia hackelii* Ohnberger; *Indocalamus parvifolius*

(Hackel ex Keng) P. C. Keng) was described from Yunnan. It may be a species of *Fargesia*, but there is no information on the rhizome.

Arundinaria rectirama W. T. Lin (J. S. China Agric. Univ. 13(2): 85. 1992) was described from Guangdong. The original description is incomplete, and the taxon could belong to any one of several genera of the *Arundinariinae*.

Arundinaria rigidula E. G. Camus (Not. Syst. 2: 243. 1912; *Indocalamus rigidulus* (E. G. Camus) Nakai; *Yushania rigidula* (E. G. Camus) Ohnberger) was described from Sichuan. It may be a species of *Fargesia* or *Yushania*, but there is no information on the rhizome.

Bashania abietina T. P. Yi & L. Yang (J. Bamboo Res. 17(4): 1. 1998) was described from Sichuan. It possibly belongs in *Indocalamus* rather than *Arundinaria* subg. *Bashania*.

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