

3. CALAMUS Linnaeus, Sp. Pl. 1: 325. 1753.

省藤属 sheng teng shu

Cornera Furtado; *Palmijuncus* Kuntze; *Rotang* Adanson; *Rotanga* Boehmer; *Schizospatha* Furtado; *Zalacella* Beccari.

Stems clustered or less often solitary, mostly slender and climbing, occasionally non-climbing and then either short and subterranean or free standing. Leaves 10–60, pinnate, spiny; sheaths closed in climbing stems, open in non-climbers, variously hairy and spiny, hairs of young sheaths soon wearing off; sheath spines scattered or densely arranged (rarely absent), or arranged in rows, occasionally hairy on margins, variously shaped and colored, sometimes arranged in overlapping, interlocking rings and forming chambers; sheath apices usually extended above point of insertion of petiole into an inconspicuous or prominent ocrea; knees present in climbing stems; flagella present in climbers, whiplike and armed with small, grapnel-like spines; cirri present in few species (and then flagella absent, and vice versa); pinnae variously arranged and shaped, occasionally whitish or gray on abaxial surfaces. Plants dioecious. Inflorescences usually elongate, branched to 3 orders, male inflorescences more branched than female ones; branches and rachillae covered with overlapping bracts with clawed spines on outer surfaces in climbers; male flowers borne along opposite sides of rachillae; female flowers borne in pairs with a sterile male flower, along opposite sides of rachillae. Fruits mostly small, variously shaped and colored, usually 1-seeded, sometimes pedicellate, always covered with overlapping scales, these sometimes with a groove down middle; endosperm homogeneous or ruminant; germination adjacent; eophylls bifid or pinnate.

About 385 species: from W Africa, India, and Sri Lanka through S and SE Asia to Australia and the Pacific islands; 28 species (15 endemic) in China.

Calamus palustris Griffith (Calcutta J. Nat. Hist. 5: 60. 1845) has been reported from China, but no reliable fertile material has been seen (Henderson, Palms S. Asia, 80. 2009). *Calamus latifolius* Roxburgh (Hort. Bengal. 73. 1814) has been recorded from China as well (e.g., in Govaerts et al. 2010. World Checklist of Areaceae. The Board of Trustees of the Royal Botanic Gardens, Kew. Published on the Internet; <http://www.kew.org/wcsp/> accessed 6 May 2010); however, the species group to which it belongs is complex and not well understood, so the record is thought to be best excluded.

- 1a. Stems non-climbing, free standing or short and subterranean; knees, flagella, and cirri usually absent; inflorescence bracts without clawed spines.
 - 2a. Pinnae whitish abaxially.
 - 3a. Pinnae 11–15 per side of rachis, lanceolate to broadly lanceolate, irregularly arranged in distant clusters 1. *C. oxycarpus*
 - 3b. Pinnae 30–45 per side of rachis, linear, regularly arranged but with gaps 2. *C. macrorrhynchus*
 - 2b. Pinnae green abaxially.
 - 4a. Petioles and rachis with whorls of yellow spines 3. *C. erectus*
 - 4b. Petioles and rachis without whorls of yellow spines.
 - 5a. Pinnae regularly arranged and spreading in same plane 4. *C. dianbaiensis*
 - 5b. Pinnae irregularly arranged in remote clusters and spreading in different planes 5. *C. thysanolepis*
- 1b. Stems climbing; knees, flagella, and/or cirri usually present; inflorescence bracts with clawed spines.
 - 6a. Flagella absent; cirri present.
 - 7a. Pinnae 3–10 per side of rachis.
 - 8a. Pinnae to 5 per side of rachis, regularly arranged; fruits globose to ellipsoid, to 1 × 0.8 cm, not stalked, scales not grooved 6. *C. compsostachys*
 - 8b. Pinnae to 10 per side of rachis, clustered in alternate pairs; fruits ovoid to ellipsoid, to 1.8 × 1.2 cm, stalked, with grooved scales 7. *C. austroguangxiensis*
 - 7b. Pinnae 14–40 per side of rachis.
 - 9a. Stems solitary 8. *C. siphonospathus*
 - 9b. Stems clustered.
 - 10a. Pinnae 18 or 19 per side of rachis; Taiwan 9. *C. formosanus*
 - 10b. Pinnae 14–40 per side of rachis; Hainan, Yunnan.
 - 11a. Pinnae 36–40 per side of rachis; Yunnan 10. *C. nambariensis*
 - 11b. Pinnae 14–22 per side of rachis; Hainan.
 - 12a. Pinnae clustered in alternate groups of 2 or 3 11. *C. egregius*
 - 12b. Pinnae regularly arranged 12. *C. simplicifolius*
 - 6b. Flagella present; cirri absent.
 - 13a. Pinnae 3–16 per side of rachis, usually irregularly arranged, apical ones inserted close together in a fan shape, apical pair free or joined at their bases.
 - 14a. Pinnae whitish abaxially 13. *C. albidus*
 - 14b. Pinnae green abaxially.
 - 15a. Stems to 5 cm in diam.; petioles very short or absent; ocreas densely bristly; pinnae

- broadly lanceolate 14. *C. acanthospathus*
- 15b. Stems to 2 cm in diam.; petioles usually present and well developed; ocreas not or rarely densely bristly; pinnae linear to lanceolate, not broadly lanceolate.
- 16a. Pinnae regularly arranged but with wide gaps between groups, shiny green, curled over at tips.
- 17a. Fruits to 2 × 1 cm 15. *C. gracilis*
- 17b. Fruits to 2.7 × 2 cm 16. *C. hainanensis*
- 16b. Pinnae regularly arranged or clustered, dull green, not curled over at tips.
- 18a. Leaf sheath spines subulate, not longer at sheath apices (rarely spines absent) 17. *C. tetradactylus*
- 18b. Leaf sheath spines needlelike, longer at sheath apices 18. *C. tetradactylodes*
- 13b. Pinnae 27–70 per side of rachis, apical ones not inserted close together in a fan shape, apical pair not joined at their bases.
- 19a. Leaf sheath spines arranged in rows.
- 20a. Leaf sheaths with needlelike spines to 2.5 cm, not longer at sheath apices 19. *C. beccarii*
- 20b. Leaf sheaths with flattened spines to 4(–10 at sheath apices) cm 20. *C. rhabdocladus*
- 19b. Leaf sheath spines not in rows.
- 21a. Pinnae strongly clustered, spreading in different planes.
- 22a. Fruits black 21. *C. melanochrous*
- 22b. Fruits brown, whitish, or yellowish.
- 23a. Ocreas short; knees present; fruits to 1 cm in diam. 22. *C. viminalis*
- 23b. Ocreas to 35 cm, soon tattered; knees absent; fruits to 2.5 cm in diam. 23. *C. wuliangshanensis*
- 21b. Pinnae not strongly clustered, spreading in same plane.
- 24a. Leaf sheath spines upward pointing; ocreas conspicuous, tattering and soon falling; inflorescence bracts not sheathing, split open and flat, brown 24. *C. guruba*
- 24b. Leaf sheath spines not upward pointing; ocreas short, inconspicuous; inflorescence bracts not split open and flat, not brown.
- 25a. Leaf sheath spines densely arranged, to 5.5(–10 at sheath apices) cm, interspersed with shorter spines 25. *C. flagellum*
- 25b. Leaf sheath spines scattered, to 2.5 cm (not longer or to 7 cm at sheath apices), usually not interspersed with shorter spines.
- 26a. Ocreas densely bristly; leaf sheath spines not longer at sheath apices; inflorescence bracts not tattering 26. *C. walkeri*
- 26b. Ocreas not densely bristly; leaf sheath spines sometimes longer at sheath apices; inflorescence bracts tattering.
- 27a. Leaf sheaths with spines to 2 cm (sometimes to 7 cm at sheath apices) 27. *C. henryanus*
- 27b. Leaf sheaths with spines to 1.5 cm (sometimes to 3 cm at sheath apices) 28. *C. multispicatus*

1. Calamus oxycarpus Beccari, Ann. Roy. Bot. Gard. (Calcutta) 11(1) (Suppl.): 138. 1913.

尖果省藤 jian guo sheng teng

Stems clustered, not climbing, to 3 m tall, to 2 cm in diam. Leaf sheaths not seen; ocreas not seen; knees absent; flagella absent; rachis to 50 cm with to 15 lanceolate to broadly lanceolate pinnae per side, these irregularly arranged in distant clusters, apical few pinnae in a fan shape, apical pair free; middle pinnae 41–42 cm, 3–4 cm wide at mid-point, margins minutely bristly, densely white waxy abaxially and with many minute bristles; cirri absent. Inflorescences not seen in their entirety, not flagellate; inflorescence bracts splitting and tattering longitudinally and disintegrating. Fruits brownish, pear-shaped with a pronounced rostrum, to 3 × 1.7 cm, scales with densely brown tomentose margins.

• Ravines in dense semievergreen forests; 800–1100 m. Guangxi, Guizhou.

2. Calamus macrorrhynchus Burret, Notizbl. Bot. Gart. Berlin-Dahlem 13: 590. 1937.

大喙省藤 da hui sheng teng

Stems clustered, non-climbing, to 3 m, to 4 cm in diam. Leaf sheaths with brown hairs, densely covered with short rows of yellowish, flattened spines to 2.5 cm; ocreas to 15 cm, spiny as sheath, fibrous, disintegrating; knees absent; flagella absent; rachis to 1 m with 30–45 linear pinnae per side, these regularly arranged but sometimes with gaps; middle pinnae 20–28 cm, 1–1.7 cm wide at mid-point, margins not or scarcely bristly, densely white waxy abaxially and with many minute bristles; cirri absent. Inflorescences to 1 m, erect, not flagellate; inflorescence bracts splitting and tattering longitudinally and eventually disintegrating. Fruits brownish, pear-shaped, with a pronounced rostrum, to 2.7 × 1.5 cm, scales with densely brown tomentose margins.

• Lowland rain forests or bamboo forests in hilly places usually

near streams; 400–1400 m. Guangdong, Guangxi.

3. Calamus erectus Roxburgh, Fl. Ind., ed. 1832, 3: 744. 1832.

直立省藤 zhi li sheng teng

Calamus collinus Griffith; *C. erectus* var. *birmanicus* Beccari; *C. erectus* var. *collinus* (Griffith) Beccari; *C. erectus* var. *macrocarpus* (Griffith) Beccari; *C. erectus* var. *schizospathus* (Griffith) Beccari; *C. macrocarpus* Griffith; *C. schizospathus* Griffith; *Palmijuncus collinus* (Griffith) Kuntze; *P. erectus*

(Roxburgh) Kuntze; *P. macrocarpus* (Griffith) Kuntze; *P. schizospathus* (Griffith) Kuntze.

Stems clustered, non-climbing, free standing or sometimes leaning, to 6 m, to 5 cm in diam. Leaf sheaths dark green with dark brown hairs, with short rows of brown, flattened spines to 3.5 cm; ocreas present, with rows of short spines, split into 2, soon falling; knees absent; flagella absent; petioles and rachis with whorls of yellow spines; rachis to 3 m with up to 40 lanceolate pinnae per side, these regularly arranged; middle pinnae 60–80 cm, 3.5–5 cm wide at mid-point, adaxial and abaxial veins and margins bristly; cirri absent. Inflorescences to 2 m, not flagellate; inflorescence bracts tubular, tattering at apices. Fruits greenish- or reddish brown, ellipsoid, 3–5 × 2–2.5 cm, scales grooved.

Lowland or montane rain forests or drier forests usually on steep slopes; below 1400 m. Yunnan [Bangladesh, Bhutan, India, Laos, Myanmar, Nepal, Thailand].

This species provides a short, thick, non-flexible cane used in construction and furniture-making.

4. Calamus dianbaiensis C. F. Wei, Guihaia 6: 24. 1986.

电白省藤 dian bai sheng teng

Calamus guangxiensis C. F. Wei; *C. yuangchunensis* C. F. Wei.

Stems clustered, non-climbing, free standing or creeping, to 4 m, to 7 cm in diam. Leaf sheaths yellowish brown with brown hairs, with short, oblique rows of yellowish, flattened spines to 3 cm; ocreas present, to 20 cm, fibrous; knees absent; flagella absent; rachis to 3 m with up to 30 linear-lanceolate pinnae per side, these regularly arranged; middle pinnae 50–60 cm, 2.5–4 cm wide at mid-point, adaxial veins and margins bristly; cirri absent. Inflorescences to 1 m, not flagellate; inflorescence bracts split open and tattering at apices. Fruits brownish, globose to ellipsoid, to 2 × 1.5 cm, scales grooved.

• Lowland rain forests. Guangdong, Guangxi.

5. Calamus thysanolepis Hance, J. Bot. 12: 265. 1874.

毛鳞省藤 mao lin sheng teng

Calamus hoplites Dunn; *C. scutellaris* Beccari; *C. thysanolepis* var. *polylepis* C. F. Wei; *Palmijuncus thysanolepis* (Hance) Kuntze.

Stems clustered, non-climbing, short and subterranean or free standing, to 5 m, to 5 cm in diam. Leaf sheaths greenish brown with brown hairs, with densely arranged, black, needle-like spines to 2 cm; ocreas to 40 cm, spiny, fibrous and soon disintegrating; knees absent; flagella absent; rachis to 1.5 m with 28–49 lanceolate pinnae per side, these strongly clustered and spreading in different planes; middle pinnae 30–37 cm, 1.5–2 cm wide at mid-point, adaxial veins and margins bristly; cirri absent. Inflorescences to 1 m, erect, not flagellate; inflorescence bracts split open and tattering. Fruits reddish brown, ovoid or ellipsoid, to 1.5 × 1 cm.

Lowland rain forests; below 800 m. Fujian, Guangdong, Guangxi, Hunan, Jiangxi, Zhejiang [Vietnam].

The fruits are eaten.

6. *Calamus compositachys* Burret, Notizbl. Bot. Gart. Berlin-Dahlem 13: 598. 1937.

短轴省藤 duan zhou sheng teng

Stems clustered, climbing, to 10 m, to 1 cm in diam. Leaf sheaths greenish brown, with scattered, dark brown, needlelike spines to 0.5 cm; ocreas present; knees present; flagella absent; rachis to 0.7 m with 5–10 broadly lanceolate pinnae per side, these remotely clustered, apical pair free at base; middle pinnae to 25 cm, 3–3.5 cm wide at mid-point, adaxial veins and margins bristly; cirri to 0.5 m. Inflorescences to 0.6 m, not flagellate; inflorescence bracts tubular. Fruits yellowish, globose to ellipsoid, to 0.8 cm in diam.

- Lowland rain forests. Guangdong, Guangxi.

7. *Calamus austroguangxiensis* S. J. Pei & San Y. Chen, Acta Phytotax. Sin. 27: 144. 1989.

桂南省藤 gui nan sheng teng

Calamus distichus Ridley var. *shangxiensis* S. J. Pei & San Y. Chen.

Stems clustered, climbing, to 10 m, to 1.5 cm in diam. Leaf sheaths green with brown hairs, with scattered, yellowish, flattened spines to 1.5 cm; ocreas present, short, spiny; knees present; flagella absent; rachis to 0.9 m with up to 10 broadly lanceolate pinnae per side, these clustered, alternately paired, apical pair not joined at their bases; middle pinnae 12–16.5 cm, 3–3.5 cm wide at mid-point, veins not bristly, margins minutely bristly; cirri to 1 m. Inflorescences to 1 m, not flagellate; inflorescence bracts tubular. Fruits yellowish brown, ovoid to ellipsoid, to 1.8 × 1.2 cm, stalked, scales grooved.

- Lowland rain forests. Guangdong, Guangxi.

The stems are used to make furniture.

8. *Calamus siphonopathus* Martius, Hist. Nat. Palm. 3: 342. 1853.

管苞省藤 guan bao sheng teng

Calamus siphonopathus var. *sublaevis* Beccari.

Stems solitary, climbing, to 30 m, 2.5–5 cm in diam. Leaf sheaths yellowish brown, sparsely covered with needlelike, yellowish spines to 1 cm; ocreas membranous; knees obscure; flagella absent; rachis to 2 m with 25–50 linear pinnae per side, these regularly arranged and closely spaced; middle pinnae to 32 cm, to 2 cm wide at mid-point, adaxial veins and margins bristly; cirri to 1 m. Inflorescence to 0.6 m, not flagellate; inflorescence bracts open and swollen near apex. Fruits yellowish brown, ellipsoid, to 0.6 × 0.4 cm.

Scrub forests at low elevations. Taiwan (Lan Yu) [Indonesia, Philippines].

9. *Calamus formosanus* Beccari, Rec. Bot. Surv. India 2: 211. 1902.

台湾省藤 tai wan sheng teng

Calamus orientalis C. E. Chang; *C. quinquesetinerivus* Burret.

Stems clustered, climbing, to 20 m, 3–5 cm in diam. Leaf sheaths yellowish brown, densely covered with flattened, yellowish, upward-pointing spines to 2 cm; ocreas short or absent; knees prominent, swollen, spiny; flagella absent; petioles short or absent; rachis to 2 m with 18 or 19 broadly lanceolate pinnae per side, these irregularly arranged (regularly arranged on young plants), distantly spaced; middle pinnae 30–45 cm, 3–5 cm wide at mid-point, adaxial veins and margins bristly; cirri to 1.5 m. Inflorescences to 1.2 m, flagellate; inflorescence bracts tightly sheathing. Fruits yellowish brown, pedicellate, ellipsoid, to 2 × 1 cm.

- Lowland rain forests; below 1000 m. Taiwan.

10. *Calamus nambariensis* Beccari, Ann. Roy. Bot. Gard. (Calcutta) 11(1): 433. 1908.

南巴省藤 nan ba sheng teng

Calamus banlingensis Cheng Y. Yang, Zheng H. Yang & J. Lu; *C. doriaei* Beccari; *C. giganteus* Beccari var. *robustus* S. J. Pei & San Y. Chen; *C. inermis* T. Anderson; *C. inermis* var. *menghaiensis* San Y. Chen, S. J. Pei & K. L. Wang; *C. khasianus* Beccari; *C. multinervis* Beccari var. *menglaensis* San Y. Chen, S. J. Pei & K. L. Wang; *C. nambariensis* var. *alpinus* S. J. Pei & San Y. Chen; *C. nambariensis* var. *furfuraceus* S. J. Pei & San Y. Chen; *C. nambariensis* var. *mengloungensis* S. J. Pei & San Y. Chen; *C. nambariensis* var. *xishuangbannaensis* S. J. Pei & San Y. Chen; *C. nambariensis* var. *yingjiangensis* S. J. Pei & San Y. Chen; *C. obovoideus* S. J. Pei & San Y. Chen; *C. palustris* Griffith var. *longistachys* S. J. Pei & San Y. Chen; *C. platyacanthoides* Merrill; *C. platyacanthus* Warburg; *C. platyacanthus* var. *longicarpus* San Y. Chen & K. L. Wang; *C. platyacanthus* var. *mediostachys* S. J. Pei & San Y. Chen; *C. polydesmus* Beccari; *C. wailong* S. J. Pei & San Y. Chen; *Palmijuncus inermis* (T. Anderson) Kuntze.

Stems clustered, climbing, to 30 m, to 6 cm in diam. Leaf sheaths green with light brown hairs, with scattered to densely arranged, yellowish brown, triangular, flattened, downward-pointing spines to 3.5(–9) cm, often interspersed among shorter spines, or sometimes spines absent; ocreas present; knees prominent; flagella absent; rachis to 4 m with 36–40 lanceolate pinnae per side, these clustered or regularly arranged; middle pinnae 40–55 cm, 2.5–7 cm wide at mid-point, margins bristly; cirri to 2.5 m. Inflorescences to 2 m, not flagellate; inflorescence bracts tubular. Fruits whitish to yellowish brown, globose to ovoid or ellipsoid, to 2.4(–3.4) × 2.5 cm, stalked, scales grooved.

Lowland or montane rain forests; below 2000 m. Yunnan [Bangladesh, Bhutan, India, Laos, Myanmar, Nepal, Thailand, Vietnam].

This species provides a high-quality cane used in furniture-making and binding. It has been introduced into other areas for trial plantings.

Calamus nambariensis is very variable and difficult taxonomically, and it represents a species complex. It is morphologically similar to *C. palustris*, which does not occur in China, and the two can be distinguished reliably only by the female inflorescences and fruits. *Calamus nambariensis* has been treated in local floras as consisting of several distinct species. The characters used to separate these species are based mostly on leaf sheath spines or their absence, leaflet arrangement, and fruit size. Here, only one species is recognized, although many local

forms are likely to be encountered, and the complex is greatly in need of a modern revision. There are also nomenclatural problems. The widely accepted name used here, *C. nambariensis*, is not the oldest name, which is *C. inermis* T. Anderson (J. Linn. Soc., Bot. 11: 11. 1869). However, Evans et al. (Kew Bull. 57: 53–54. 2002) are followed here, and this name is used pending a revision of the whole complex. The FRPS record (13(1): 98. 1991) of *C. palustris* var. *cochinchinensis* Beccari is probably based on a misidentification of material belonging to this complex.

11. *Calamus egregius* Burret, Notizbl. Bot. Gart. Berlin-Dahlem 13: 599. 1937.

短叶省藤 duan ye sheng teng

Stems clustered, climbing, to 50 m, 3–5 cm in diam. Leaf sheaths yellowish green with brown hairs, with scattered, brownish, flattened spines to 2 cm; ocreas to 10 cm, disintegrating; knees conspicuous; flagella absent; rachis to 1.5 m with to 20 lanceolate pinnae per side, these clustered in alternate groups of 2 or 3; middle pinnae 10–17 cm, 2–3 cm wide at mid-point, margins bristly; cirri to 1 m. Inflorescences to 1 m, not flagellate; inflorescence bracts tubular. Fruits brown, ovoid, to 2 × 1.6 cm, stalked, scales grooved.

- Lowland rain forests; below 1000 m. Hainan.

This species provides a high-quality cane for binding and weaving. The palm hearts are eaten.

12. *Calamus simplicifolius* C. F. Wei, Guihaia 6: 36. 1986.

单叶省藤 dan ye sheng teng

Stems clustered, climbing, to 50 m, 3–6 cm in diam. Leaf sheaths green with brown hairs, with densely arranged, yellowish, flattened, triangular, downward-pointing spines to 4 cm; ocreas absent; knees present; flagella absent; rachis to 2 m with 14–22 broadly lanceolate pinnae per side, these regularly arranged, tending to be irregular on younger leaves; middle pinnae 36–40 cm, 2–5 cm wide at mid-point, margins bristly; cirri to 1.5 m. Inflorescences to 1 m, not flagellate; inflorescence bracts tubular. Fruits yellowish, globose, to 3 × 2.3 cm.

- Lowland rain forests. Hainan.

This species provides a high-quality cane used in furniture-making and binding. It has been introduced into other areas of China for trial plantings.

13. *Calamus albidus* L. X. Guo & A. J. Henderson, Brittonia 59: 346. 2007.

狭叶省藤 xia ye sheng teng

Calamus oxycarpus Beccari var. *angustifolius* San Y. Chen & K. L. Wang, Acta Bot. Yunnan. 24: 201. 2002.

Stems clustered, climbing, to 6 m, to 3 cm in diam. Leaf sheaths with brown hairs, densely covered with gray or black, flattened spines to 2 cm; ocreas to 10 cm, spiny as sheath, fibrous, disintegrating; knees absent; flagella present; petioles 20–58 cm; rachis to 50 cm with 15 or 16 linear to lanceolate pinnae per side, these irregularly arranged in distant clusters of 2 or 3 pinnae, apical few pinnae in a fan shape, apical pair free; middle pinnae 17–27 cm, 1.5–2 cm wide at mid-point, margins

minutely bristly, densely white waxy abaxially and with many minute spines; cirri absent. Inflorescences 1–2 m, flagellate; inflorescence bracts tubular. Fruits brownish, pear-shaped to ovoid, to 2.5 × 1.5 cm, scales with densely brown tomentose margins.

- Broad-leaved forests; 1000–1900 m. Yunnan.

A new epithet had to be given to this taxon when it was raised to species rank because of the existence of the earlier name *Calamus angustifolius* Griffith.

14. *Calamus acanthospathus* Griffith, Calcutta J. Nat. Hist. 5: 39. 1845.

云南省藤 yun nan sheng teng

Calamus feanus Beccari; *C. feanus* var. *medogensis* S. J. Pei & San Y. Chen; *C. montanus* T. Anderson; *C. yunnanensis* Govaerts; *C. yunnanensis* var. *densiflorus* S. J. Pei & San Y. Chen; *C. yunnanensis* var. *intermedius* S. J. Pei & San Y. Chen; *Palmijuncus acanthospathus* (Griffith) Kuntze; *P. montanus* (T. Anderson) Kuntze.

Stems solitary or weakly clustered, climbing, to 30 m, 1.5–5 cm in diam. Leaf sheaths green with brown hairs, with sparsely to densely arranged, sometimes in short rows, brown, flattened spines to 1 cm, these with sinuous margins, densely hairy initially; ocreas present, densely bristly; knees present; flagella present, to 5.6 m; petioles very short or absent; rachis to 1.4 m with 8–15 broadly lanceolate pinnae per side, these regularly arranged, sometimes somewhat irregularly, especially near base of leaf; middle pinnae 18–30 cm, 3.5–7 cm wide at mid-point, adaxial veins and margins bristly; cirri absent. Inflorescences to 3 m, flagellate; inflorescence bracts tubular; rachillae short and strongly recurved. Fruits yellowish brown, ovoid to ellipsoid, to 2.5 × 1.5 cm, scales grooved.

Lowland or montane rain forests; 800–2400 m. Xizang, Yunnan [Bhutan, India, Laos, Myanmar, Nepal, Thailand, Vietnam].

This species provides a cane used in basketry and furniture-making.

15. *Calamus gracilis* Roxburgh, Fl. Ind., ed. 1832, 3: 781. 1832.

细茎省藤 xi jing sheng teng

Palmijuncus gracilis (Roxburgh) Kuntze.

Stems clustered, climbing, to 30 m, to 2 cm in diam. Leaf sheaths green with mottled, dark brown and whitish hairs, without spines or with scattered, black-tipped, conic-based spines to 0.5 cm; ocreas small; knees present; flagella present; petioles very short; rachis to 0.7 m with 8–15 linear or lanceolate pinnae per side, these regularly arranged but with wide gaps between groups, shiny green, curled over at tips, apical ones inserted close together in a fan shape, apical pair not joined at their bases; middle pinnae 25–35 cm, 1.5–2.5 cm wide at mid-point, adaxial and abaxial veins and margins bristly; cirri absent. Inflorescences to 0.7 m, flagellate; inflorescence bracts tubular. Fruits yellowish or orange, ovoid to ellipsoid, to 2 × 1 cm, stalked, scales grooved.

Lowland or montane rain forests; 800–1500 m. Yunnan [Bangla-

desh, India, Laos, Myanmar, Vietnam].

16. *Calamus hainanensis* C. C. Chang & L. G. Xu ex R. H. Miao, Acta Sci. Nat. Univ. Sunyatseni 1981(3): 116. 1981.

海南省藤 hai nan sheng teng

Stems clustered, climbing, to 15 m, to 1 cm in diam. Leaf sheaths green with brown and whitish hairs, without spines or with scattered, conic-based spines to 0.5 cm; ocreas small; knees inconspicuous or absent; flagella present; petioles very short; rachis to 0.4 m with 12–14 linear pinnae per side, these regularly arranged but with wide gaps between groups, shiny green, curled over at tips, apical ones inserted close together in a fan shape, apical pair not joined at their bases; middle pinnae 9–15 cm, 0.7–1 cm wide at mid-point, adaxial veins and margins bristly; cirri absent. Inflorescences to 0.7 m, flagellate; inflorescence bracts tubular. Fruits yellowish or orange, ellipsoid, to 2.7 × 2 cm, stalked, scales grooved.

- Lowland rain forests; below 1000 m. Hainan.

The validity of this name has been challenged on the basis that no type was designated; however, the protologue listed only a single collection, which thus must be the type collection, and was published before 1990 when the ICBN required the explicit designation of a holotype. Thus, the name is valid.

17. *Calamus tetradactylus* Hance, J. Bot. 13: 289. 1875.

白藤 bai teng

Calamus bonianus Beccari; *C. cambojensis* Beccari; *C. tetradactylus* var. *bonianus* (Beccari) Conrard; *Palmijuncus tetradactylus* (Hance) Kuntze.

Stems clustered, climbing, to 6 m, to 1.8 cm in diam. Leaf sheaths green, without hairs, with scattered, yellowish brown, triangular spines to 1.5 cm, or spines absent; ocreas prominent, not spiny; knees present; flagella to 1 m; petiole short or absent; rachis to 0.5 m with to 10 clustered, lanceolate pinnae per side, apical few close together in a fan shape, apical pair joined at their bases, margins often with a thin, brown line of hairs; middle pinnae 11–28 cm, 2–6.5 cm wide at mid-point, margins bristly; cirri absent. Inflorescences to 1.8 m, usually flagellate; inflorescence bracts tubular, briefly split at apex. Fruits yellowish, globose, to 0.9 cm in diam., stalked.

Lowland rain forests or scrub forests, or sometimes around villages; below 1000 m. Fujian, Guangdong, Guangxi, Hainan [Cambodia, Laos, Thailand, Vietnam].

18. *Calamus tetradactyloides* Burret, Notizbl. Bot. Gart. Berlin-Dahlem 13: 596. 1937.

多刺鸡藤 duo ci ji teng

Calamus pulchellus Burret.

Stems clustered, climbing, to 5 m, to 1 cm in diam. Leaf sheaths greenish brown with brown hairs, with densely arranged, brown, needlelike spines to 1(–2 at sheath apex) cm; ocreas short and densely bristly; knees present; flagella to 1 m; rachis to 0.5 m with 4 or 5(–12) linear-lanceolate to broadly lanceolate pinnae per side; middle pinnae 16–30 cm, 1.5–4 cm

wide at mid-point, not bristly; cirri absent. Inflorescences to 0.7 m, flagellate; inflorescence bracts tubular. Fruits whitish, subglobose, to 1.5 × 1 cm.

- Lowland rain forests. Hainan.

19. *Calamus beccarii* A. J. Henderson, Taiwania 50: 222. 2005.

土藤 tu teng

Stems clustered, climbing, to 50 m, to 4 cm in diam. Leaf sheaths brown, covered with black, needlelike, horizontally spreading spines to 2.5 cm, these arranged in short rows, interspersed with shorter spines to 0.5 cm; ocreas present, densely spiny; knees obscure; flagella present, to 2.5 m; rachis to 0.8 m with 30–62 linear pinnae per side, these regularly arranged and closely spaced; middle pinnae to 40 cm, to 1.5 cm wide at mid-point, adaxial and abaxial veins minutely bristly; cirri absent. Inflorescences to 3 m, flagellate; inflorescence bracts tubular. Fruits yellowish brown, globose-ellipsoid, to 2 (including a short beak) × 1.2 cm, scales fringed.

- Lowland rain forests. Taiwan.

20. *Calamus rhabdocladus* Burret, Notizbl. Bot. Gart. Berlin-Dahlem 10: 884. 1930.

杖藤 zhang teng

Calamus pseudoscutellaris Conrard; *C. pseudoscutellaris* var. *cylindrocarpus* Conrard; *C. rhabdocladus* var. *globulosus* S. J. Pei & San Y. Chen.

Stems clustered, climbing (sometimes only shortly climbing or erect), to 40 m, 4–6 cm in diam. Leaf sheaths green with reddish brown hairs, with densely arranged, oblique rows of glossy, black or brown, flattened spines to 4(–10 at sheath apices) cm; ocreas present; knees inconspicuous or absent; flagella to 5 m; rachis to 1.5 m with to 60 linear pinnae per side, these regularly arranged (young plants regularly arranged but with gaps); middle pinnae 30–50 cm, 1.8–2 cm wide at mid-point, adaxial and abaxial veins and margins prominently bristly; cirri absent. Inflorescences to 8 m, flagellate; inflorescence bracts tubular. Fruits reddish or yellowish, globose, ellipsoid, or ovoid, to 1.4 × 0.8 cm.

Lowland or montane rain forests; below 1600 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Yunnan [Laos, Vietnam].

This species provides a cane of medium quality for furniture-making, and the palm hearts and fruits are eaten.

21. *Calamus melanochrous* Burret, Notizbl. Bot. Gart. Berlin-Dahlem 11: 208. 1931.

瑶山省藤 yao shan sheng teng

Stems not known. Leaf sheaths not known; rachis with to 36 linear pinnae per side, these clustered and spreading in different planes; cirri absent. Inflorescence bracts tattering at base. Fruits black, ovoid, to 2.4 × 1.8 cm.

- Lowland rain forests. Guangxi.

22. *Calamus viminalis* Willdenow, Sp. Pl. 2: 203. 1799.

柳条省藤 liu tiao sheng teng

Calamus extensus Martius; *C. fasciculatus* Roxburgh; *C. litoralis* Blume; *C. pseudorotang* Martius ex Kunth; *C. viminalis* subvar. *andamanicus* Beccari; *C. viminalis* subvar. *bengalensis* Beccari; *C. viminalis* subvar. *cochinchinensis* Beccari; *C. viminalis* var. *fasciculatus* (Roxburgh) Beccari; *C. viminalis* subvar. *pinangianus* Beccari; *Palmijuncus fasciculatus* (Roxburgh) Kuntze; *P. litoralis* (Blume) Kuntze; *P. pseudorotang* (Martius ex Kunth) Kuntze; *P. viminalis* (Willdenow) Kuntze; *Rotang viminalis* (Willdenow) Baillon.

Stems clustered, climbing or often forming thickets, to 35 m, to 4 cm in diam. Leaf sheaths green with dense covering of grayish or brownish hairs, with scattered, greenish or brownish, triangular, flattened spines to 4.5 cm; ocreas present; knees present; flagella to 5 m; rachis to 1.3 m with 32–55 lanceolate pinnae per side, these gray-green, distinctly clustered and spreading in different planes, apical ones usually smaller than others; middle pinnae 15–35 cm, 1–1.5 cm wide at mid-point, adaxial and abaxial main vein prominently bristly; cirri absent. Inflorescences to 3 m, flagellate; inflorescence bracts tubular. Fruits whitish or yellowish, globose, to 1 cm in diam., sometimes borne in pairs.

Lowland rain forests or deciduous forests, persisting in cleared areas and often present near villages, sometimes planted; below 600 m. Yunnan [Bangladesh, Cambodia, India, Indonesia (Bali, Java, Sumatra), Laos, Malaysia (Peninsular), Myanmar, Thailand, Vietnam].

This species provides a widely used cane for basketry and furniture-making, and the palm heart and fruits are eaten.

23. *Calamus wuliangshanensis* San Y. Chen, K. L. Wang & S. J. Pei, Acta Bot. Yunnan. 24: 199. 2002.

无量山省藤 wu liang shan sheng teng

Calamus wuliangshanensis var. *sphaerocarpus* San Y. Chen & K. L. Wang.

Stems clustered, climbing, to 15 m, to 3.5 cm in diam. Leaf sheaths gray or brown, with gray hairs, with scattered or densely arranged, yellowish brown, flattened spines to 2.5 cm; ocreas present, to 35 cm, soon tattering; knees absent; flagella present; rachis to 2.8 m with 45–70 linear-lanceolate pinnae per side, these in distant clusters and spreading in different planes; middle pinnae to 55 cm, to 1.5 cm wide at mid-point, spiny along margins; cirri absent. Inflorescences to 5 m, flagellate; inflorescence bracts tubular. Fruits brownish, ellipsoid to globose, to 2.7 × 2.5 cm, scale margins densely brown tomentose.

- Montane rain forests; 2000–2400 m. Yunnan.

24. *Calamus guruba* Buchanan-Hamilton ex Martius, Hist. Nat. Palm. 3: 211 [ed. 2]. 1845.

褐鞘省藤 he qiao sheng teng

Calamus guruba var. *ellipsoideus* San Y. Chen & K. L. Wang; *C. mastersianus* Griffith; *C. multirameus* Ridley; *C. nitidus* Martius; *Daemonorops guruba* (Buchanan-Hamilton ex Martius) Martius; *D. guruba* var. *hamiltoniana* Martius; *D. guruba* var. *mastersiana* (Griffith) Martius; *Palmijuncus guruba*

(Buchanan-Hamilton ex Martius) Kuntze; *P. nitidus* (Martius) Kuntze.

Stems clustered, climbing or forming thickets, to 20 m, to 3 cm in diam. Leaf sheaths dull green with rusty brown or light brown hairs, with scattered to densely arranged, dark brown, flattened, upward-pointing spines to 3.5 cm (sometimes to 10 cm at sheath apices); ocreas conspicuous, tattering and soon falling; knees present; flagella to 3 m; rachis to 1.3 m with 30–65 linear-lanceolate pinnae per side, these regularly arranged, apical ones smaller than others; middle pinnae 25–45 cm, 1.7–2.2 cm wide at mid-point, adaxial and abaxial veins bristly; cirri absent. Inflorescences to 3 m, flagellate; inflorescence bracts not sheathing, split open and flat, brown. Fruits yellowish or brown, globose, to 0.8 cm in diam.

Lowland or montane rain forests, scrub forests, dry forests, disturbed areas, especially roadsides; below 1200 m. Yunnan [Bangladesh, Bhutan, Cambodia, India, Laos, Malaysia (Peninsular), Myanmar, Thailand].

25. *Calamus flagellum* Griffith ex Martius, Hist. Nat. Palm. 3: 333. 1853.

长鞭藤 chang bian teng

Calamus flagellum var. *furvifuraceus* S. J. Pei & San Y. Chen; *C. flagellum* var. *karinensis* Beccari; *C. karinensis* (Beccari) S. J. Pei & San Y. Chen; *C. polygamus* Roxburgh; *Palmijuncus flagellum* (Griffith ex Martius) Kuntze; *P. polygamus* (Roxburgh) Kuntze.

Stems clustered, climbing, to 30 m, 4.5–5 cm in diam. Leaf sheaths greenish yellow with dark brown hairs, with densely arranged, black, brownish, or yellowish, flattened spines to 5.5(–10 at sheath apices) cm, interspersed with shorter spines; ocreas fibrous, soon falling; knees inconspicuous; flagella to 7 m; rachis to 3 m with 27–35 linear-lanceolate pinnae per side, these regularly or sometimes irregularly arranged; middle pinnae 60–70 cm, 3.5–4.5 cm wide at mid-point, adaxial and abaxial veins and margins bristly; cirri absent. Inflorescences to 7 m, flagellate; inflorescence bracts tubular, tattering at apices. Fruits yellowish or brownish, ovoid, 2.7–3 × 1.8–2.2 cm, scales grooved.

Lowland or montane rain forests; below 1500 m. Guangxi, Xizang, Yunnan [Bangladesh, Bhutan, India, Laos, Myanmar, Nepal, Thailand, Vietnam].

The hearts are eaten.

26. *Calamus walkeri* Hance, J. Bot. 12: 266. 1874.

多果省藤 duo guo sheng teng

Calamus faberi Beccari; *C. faberi* var. *brevispicatus* (C. F. Wei) S. J. Pei & San Y. Chen; *C. tonkinensis* Beccari; *C. tonkinensis* var. *brevispicatus* C. F. Wei; *Palmijuncus walkeri* (Hance) Kuntze.

Stems clustered, climbing, to 15 m, to 3 cm in diam. Leaf sheaths green with gray-brown hairs, with scattered, yellowish, black-tipped, flattened spines to 2.5 cm; ocreas densely bristly; knees present; flagella to 5 m; rachis to 1.5 m with to 40 linear-lanceolate pinnae per side, these regularly arranged; middle pin-

nae 30–50 cm, 1.5–2 cm wide at mid-point, adaxial veins and margins bristly; cirri absent. Inflorescences to 5.5 m, flagellate; inflorescence bracts tubular. Fruits yellowish, ovoid, to 1.2 × 1 cm.

Lowland rain forests. Guangdong, Hainan [Vietnam].

The fruits are eaten.

27. *Calamus henryanus* Beccari, Rec. Bot. Surv. India 2: 199. 1902.

滇南省藤 dian nan sheng teng

Calamus balansanus Beccari; *C. balansanus* var. *castaneolepis* (C. F. Wei) S. J. Pei & San Y. Chen; *C. henryanus* var. *castaneolepis* C. F. Wei.

Stems clustered, climbing, to 20 m, to 1.8 cm in diam. Leaf sheaths with mottled, reddish brown hairs, with scattered, yellowish, flattened, triangular spines to 2 cm (sometimes a few spines to 7 cm at sheath apices); ocreas very short, sometimes spiny; knees present; flagella to 4 m; rachis to 1.3 m with 30–45 linear pinnae per side, these regularly arranged, or often regularly arranged but with gaps; middle pinnae 15–40 cm, 1.3–2 cm wide at mid-point, adaxial veins and margins bristly; cirri

absent. Inflorescences to 4.5 m, flagellate; inflorescence bracts tattering at apices. Fruits yellowish brown, globose to ellipsoid, 1–1.5 × 0.7–1 cm.

Lowland or montane rain forests or scrub forests; below 1700 m. Guangxi, S Sichuan, Yunnan [Laos, Myanmar, Thailand, Vietnam].

This species provides a cane used in furniture-making.

Records of *Calamus rugosus* Beccari from China (e.g., Chen et al., Acta Bot. Yunnan. 24: 203. 2002) are based on a misidentification of this species.

28. *Calamus multispicatus* Burret, Notizbl. Bot. Gart. Berlin-Dahlem 13: 592. 1937.

裂苞省藤 lie bao sheng teng

Stems clustered, climbing, to 5 m, 1–1.5 cm in diam. Leaf sheaths with brown hairs, with scattered, brown, flattened spines to 1.5 cm (sometimes to 3 cm at sheath apices); ocreas short; knees present; flagella to 2 m; rachis to 1.3 m with 33–45 linear pinnae per side, these regularly arranged; middle pinnae 20–25 cm, 1–1.5 cm wide at mid-point, adaxial veins and margins bristly; cirri absent. Inflorescences to 2 m, flagellate; inflorescence bracts tattering. Fruits yellowish brown, globose, to 1 cm in diam.

• Lowland rain forests; below 600 m. Hainan.

This species provides a cane used in furniture-making.

