

142. BULBOPHYLLUM Thouars, Hist. Orchid., Tabl. Esp. 3. 1822, nom. cons.

石豆兰属 shi dou lan shu

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Phyllorkis Thouars.

Herbs, epiphytic. Rhizome usually rather long, creeping or hanging, usually bearing a series of pseudobulbs, very rarely without pseudobulbs. Pseudobulbs well spaced to clustered on rhizome, each with a single joint. Leaves 1 or rarely 2 or 3, arising from apex of pseudobulbs or very rarely directly from rhizome; leaf blade usually leathery, varying in size. Scape arising laterally from base of a pseudobulb or from a node of rhizome; inflorescence usually racemose or umbellate, 1- to many flowered; floral bracts often small. Flowers small to large. Sepals subequal in size or lateral sepals much longer than dorsal one; lateral sepals free or \pm connate on lower or upper edges, base adnate to column foot forming a short mentum. Petals free, usually smaller than sepals; lip often hinged to end of column foot, mobile or sometimes immobile, usually fleshy and recurved. Column short, winged, base with a distinct foot; wings often dilated to form teeth or stelidia; anther 2-locular, sometimes 1-locular; pollinia 4, in 2 pairs, waxy, without appendages, sometimes attached to sticky substance.

About 1,900 species: largely in tropical areas of both Old and New Worlds; 103 species (33 endemic) in 18 sections in China.

Bulbophyllum formosanum (Rolfe) K. Nakajima (Biol. Mag. Okinawa 10: 36. 1973; *Cirrhopetalum formosanum* Rolfe, Bull. Misc. Inform. Kew 1914: 372. 1914), described from Taiwan, is a doubtful species. The original description by Rolfe is quite different from that by Seidenfaden (Dansk Bot. Ark. 29(1): 172, fig. 85. 1974), who published the combination *B. formosanum* a year later than Nakajima. An examination of the specimen Seidenfaden cited as type (*Price 1043*, K), which lacks flowers, indicated that its vegetative characteristics are identical with Seidenfaden's figure rather than with Rolfe's description, which seems to refer to another species. Further study is needed.

Key to sections

- 1a. Pseudobulbs 2-leaved.
 - 2a. Lateral sepals 2–5 \times as long as dorsal sepal 17. *B.* sect. *Tripudianthes* (p. 438)
 - 2b. Lateral sepals ca. as long as dorsal sepal or slightly longer 18. *B.* sect. *Pleiophylla* (p. 438)
- 1b. Pseudobulbs, or shoot tip if pseudobulbs inconspicuous, 1-leaved.
 - 3a. All inflorescences 1-flowered.
 - 4a. Petals 5- or more veined.
 - 5a. Dorsal sepal ciliate or denticulate 13. *B.* "Section 13" (63. *B. bicolor*, 69. *B. chinense*; p. 427)
 - 5b. Dorsal sepal glabrous.
 - 6a. Node at base of pedicel at least 1.5 \times width of pedicel above subtending bract 2. *B.* sect. *Sestochilos* (p. 409)
 - 6b. Node at base of pedicel coinciding with bract attachment, or removed from it less than 1 \times width of pedicel 1. *B.* sect. *Leopardina* (p. 406)
 - 4b. Petals 1–3-veined.
 - 7a. New shoots arising well away from basal node of pseudobulb; pseudobulbs distinctly present 5. *B.* sect. *Macrocaulia* (p. 415)
 - 7b. New shoots arising from base of pseudobulb; or pseudobulbs minute, inconspicuous compared to size of plant.
 - 8a. Lateral sepals ca. 2 \times as long as dorsal sepal 13. *B.* "Section 13" (64. *B. omerandrum*; p. 427)
 - 8b. Lateral sepals ca. as long as or slightly longer than dorsal sepal.
 - 9a. Basal node of pedicel well above attachment of floral bract.
 - 10a. Rhizome creeping, roots spreading; petals without appendages 7. *B.* sect. *Monanthaparva* (p. 416)
 - 10b. Rhizome pendulous, roots growing over it toward point of attachment to substrate; petals with appendages 3. *B.* sect. *Epicranthes* (p. 410)
 - 9b. Basal node of pedicel level with attachment of floral bract.
 - 11a. Pseudobulbs distinctly present 6. *B.* sect. *Monanthes* (p. 416)
 - 11b. Pseudobulbs absent or minute, inconspicuous compared to size of plant 16. *B.* sect. *Stachysanthes* (p. 436)
 - 3b. Racemose inflorescences (i.e., with 2 or more flowers) present.
 - 12a. Petals 5- or more veined.
 - 13a. Dorsal sepal ciliate or denticulate 13. *B.* "Section 13" (63. *B. bicolor*, 69. *B. chinense*; p. 427)
 - 13b. Dorsal sepal glabrous.
 - 14a. Lateral sepals twisted inward near base so that upper margins are turned toward one another 12. *B.* sect. *Umbellata* (56. *B. umbellatum*; p. 422)
 - 14b. Lateral sepals not twisted inward near base 1. *B.* sect. *Leopardina* (p. 406)
 - 12b. Petals 1–3-veined.

- 15a. Lip with small auricles well above base.
 - 16a. Raceme elongated, or raceme congested and floral bracts longer than pedicel plus ovary 9. *B.* sect. *Anisopetalon* (p. 418)
 - 16b. Raceme subumbellate, floral bracts shorter than pedicel plus ovary 14. *B.* sect. *Cirrhopetalum* (72. *B. picturatum*; p. 430)
- 15b. Lip without auricles well above base, or with retrorse auricles immediately next to ligament.
 - 17a. Petal margins glabrous.
 - 18a. Pseudobulbs inconspicuous, or very small compared to size of plant.
 - 19a. Inflorescence 2- or 3-flowered 16. *B.* sect. *Stachysanthes* (p. 436)
 - 19b. Inflorescence 5- or more flowered.
 - 20a. Raceme congested, subumbellate 12. *B.* sect. *Umbellata* (p. 422)
 - 20b. Raceme elongated 16. *B.* sect. *Stachysanthes* (92. *B. apodum*; p. 436)
 - 18b. Pseudobulbs distinctly present.
 - 21a. Lateral sepals twisted inward near base so that upper margins are turned toward one another; upper margins fused or free; or lateral sepals ca. 8 mm wide.
 - 22a. Lateral sepals fused along their upper margins; or lateral sepals free, and petals 4–7 mm 12. *B.* sect. *Umbellata* (p. 422)
 - 22b. Lateral sepals free; petals ca. 2 mm 4. *B.* sect. *Corymbosa* (20. *B. ledungense*; p. 411)
 - 21b. Lateral sepals not twisted inward near base, free, \pm spreading; lateral sepals 1–3 mm wide.
 - 23a. Stelidia deltoid to subulate, rounded to acuminate, not twisted inward 4. *B.* sect. *Corymbosa* (p. 411)
 - 23b. Stelidia clavate (?spatulate), twisted inward 12. *B.* sect. *Umbellata* (46. *B. macraei*; p. 422)
 - 17b. Petal margins (irregularly) denticulate, serrate, ciliate, fimbriate, or with glandular appendages.
 - 24a. Raceme congested, flowers all radiating from \pm same point, arranged in an umbel.
 - 25a. Dorsal sepal glabrous with a terminal thread ending in a widened palea, or dorsal sepal ciliate 14. *B.* sect. *Cirrhopetalum* (p. 430)
 - 25b. Dorsal sepal glabrous without a terminal thread ending in a palea, or dorsal sepal papillose, denticulate, erose, or with glandular appendages.
 - 26a. Lateral sepals twisted inward near base so that upper margins are turned toward one another; upper margins fused or free 13. *B.* “Section 13” (p. 427)
 - 26b. Lateral sepals diverging, not twisted inward 8. *B.* “Section 8” (30. *B. levinei*; p. 417)
 - 24b. Raceme elongate.
 - 27a. Dorsal sepal ciliate.
 - 28a. Lip with minute, retrorse auricles at its base, immediately next to ligament 10. *B.* sect. *Hirtula* (p. 419)
 - 28b. Lip without auricles at its base 8. *B.* “Section 8” (32. *B. insuloides*; p. 417)
 - 27b. Dorsal sepal glabrous.
 - 29a. Inflorescence 2- or 3-flowered 13. *B.* “Section 13” (64. *B. omerandrum*; p. 427)
 - 29b. Inflorescence 5- or more flowered.
 - 30a. Raceme lax, flowers spaced, scattered.
 - 31a. Column foot elongate, causing a gap between petals and lateral sepals 11. *B.* sect. *Altisceptrum* (p. 421)
 - 31b. Column foot not elongate, petals and lateral sepals partly overlapping 8. *B.* “Section 8” (31. *B. eublepharum*; p. 417)
 - 30b. Raceme dense, flowers arranged in a \pm regular pattern.
 - 32a. Stelidia without a tooth along lower margin 9. *B.* sect. *Anisopetalon* (33. *B. brevispicatum*; p. 418)
 - 32b. Stelidia with a distinct tooth

along lower margin 15. *B. sect. Brachystachya* (91. *B. repens*; p. 435)

1. *Bulbophyllum* sect. *Leopardina* Bentham & J. D. Hooker, Gen. Pl. 3: 502. 1883 [*“Leopardinae”*].

短萼组 duan ting zu

Rhizome creeping or straggling; roots sprouting mainly below pseudobulbs, spreading; new shoots arising from basal node of pseudobulb. Pseudobulbs distinct, apex with 1 leaf. Leaves persistent, thick. Inflorescences solitary, arising near pseudobulbs, 1-flowered or 2–4-flowered in an elongate or contracted raceme. Pedicel with basal node coinciding with attachment of subtending bract, or no more than 1 × diam. of pedicel above it. Sepals free, ± equal in length or lateral sepals somewhat longer, margins glabrous, 5- or more veined. Petals: margins glabrous to erose, 5- or more veined (3-veined in *Bulbophyllum ambrosia*); lip with or without antrorse auricles along margins well above its base, margins otherwise glabrous to partly or entirely erose or denticulate, adaxially glabrous to variously verrucose or papillose. Column: stigma not protruding at its base, foot distinct; anther: front margin not or slightly projecting, abaxially with a high, conic crest (a small crest in *B. ambrosia*); pollinia 4, with or without stipe, inner more than 1/2 as long as outer.

Seventy-two provisionally accepted species: Himalayas to W Pacific; seven species in China.

- 1a. Proximal margin of stigma distinctly protruding 1. *B. striatum*
- 1b. Proximal margin of stigma not protruding.
 - 2a. Anther abaxially with a low, rounded crest.
 - 3a. Lip margins entire 2. *B. ambrosia*
 - 3b. Lip margins erose-lacerate 3. *B. pectinatum*
 - 2b. Anther abaxially with a high, conic or triangular and dorsiventrally flattened crest.
 - 4a. Pseudobulbs prostrate on rhizome for ca. 2/3 of their length.
 - 5a. Lip adaxially with 2 high, straight ridges with entire crests; anther abaxially with a dorsiventrally flattened crest 4. *B. psittacoglossum*
 - 5b. Lip adaxially with 2 low, wavy ridges with proximally erose crests; anther abaxially with a conic crest 5. *B. yunnanense*
 - 4b. Pseudobulbs obliquely ascending, or prostrate on rhizome at their base only.
 - 6a. Lip 5.5–8.5 × 4–6 mm; stelidia with a distinct, triangular tooth along lower margin 6. *B. griffithii*
 - 6b. Lip 9.5–14 × 6–9 mm; stelidia with an inconspicuous, broadly deltoid wing along lower margin 7. *B. leopardinum*

1. *Bulbophyllum striatum* (Griffith) H. G. Reichenbach, Ann. Bot. Syst. 6: 257. 1861.

细柄石豆兰 xi bing shi dou lan

Dendrobium striatum Griffith, Not. Pl. Asiat. 3: 318. 1851; *Sarcopodium striatum* (Griffith) Lindley.

Roots along entire rhizome. Rhizome 1–4 mm in diam., sections between pseudobulbs 1.5–10 cm, bract fibers hardly persistent. Pseudobulbs distant, globose to ovoid, 0.8–1.7 × 0.7–1.7 cm. Petiole 1.2–5.5 cm; leaf blade ovate to elliptic, 2.3–8 × 1.2–3.8 cm, obtuse. Inflorescence erect to spreading, 2.5–15 cm, 1-flowered or a (subumbellate) raceme, 2–4-flowered; peduncle 1.7–13 cm; bracts 4–6, longest 4.5–9.5 mm; rachis to 1.6 cm; floral bracts ovate, 4–7 × ca. 2 mm, acute. Flowers resupinate, fully opening ± simultaneously, light greenish or yellowish green, veins purple, lip whitish green or yellow with purple lines; pedicel and ovary 10–17 mm. Dorsal sepal recurved, elliptic to ovate, 9–12 × 3.3–4.5 mm, thin, glabrous, base rather narrowly attached, margins entire, apex acute; lateral sepals free, oblique, triangular, 8.5–13.5 × 3.5–5 mm, base rather broadly attached, otherwise as dorsal sepal. Petals recurved, elliptic to ovate-triangular, 4.5–7 × 1.8–2.4 mm, thin, glabrous, base rather narrowly attached, margins entire or slightly erose toward tip, apex acute to acuminate; lip recurved at ca. 1/3 of its length, ovate, 5–8 × 2.2–4 mm (all without artificial spreading), rather thin, glabrous, abaxially with a narrow, retuse median ridge over ca. 2/3 of length of lip, adaxially

slightly concave and with 2 short, rather inconspicuous, parallel, rounded ridges near base, flat or slightly convex toward tip, margins entire and with 2 minute, antrorse, triangular, acute auricles near base, apex emarginate to rounded. Column 2.8–3.5 mm, stigma inside without keels, its basal margin protruding, column foot without tooth; stelidia rounded to ± truncate, ca. 0.7 mm, front margin somewhat erose, acute; anther abaxially glabrous, with a high, conic crest near tip, front margin not drawn out, erose. Fl. Jan–Feb, Oct–Dec.

Rocks in thickets on limestone slopes, epiphytic in forests; 1000–2300 m. SE Yunnan [Bhutan, India, Nepal, Thailand, N Vietnam].

2. *Bulbophyllum ambrosia* (Hance) Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 4: 247. 1919.

芳香石豆兰 fang xiang shi dou lan

Roots below pseudobulbs only. Rhizome 0.8–3 mm in diam., sections between pseudobulbs 3.5–8 cm, bract fibers moderately persistent. Pseudobulbs distant, narrowly ellipsoid or obovoid to cylindrical, somewhat flattened or not, 1.8–5 × 0.5–0.9 cm. Petiole 0.3–0.9 cm; leaf blade elliptic, 3–9 × 0.8–2.1 cm, rounded to obtuse. Inflorescence erect to spreading, 3–11 cm, 1-flowered, rarely a subumbellate raceme, 2-flowered; peduncle 1.7–8 cm; bracts 3 or 4, longest 3–10 mm; rachis to 0.5 cm; floral bracts ovate, 2.5–5 × 1.5–4 mm, acute. Flowers resupinate, moderately to widely, and simultaneously opening. Pedicel and ovary 8–18 mm. Dorsal sepal recurved, (ovate

or) triangular, 9–14 × 6–9 mm, thin, glabrous, base narrowly attached, margin entire, apex acute to acuminate; lateral sepals free, oblique, elliptic to ovate including a winglike, sometimes antrorse widening along lower margin, or triangular, 10–14 × 7–11 mm, base rather broadly attached, otherwise as dorsal sepal. Petals recurved, triangular with lower margin decurrent along column foot, 5–8 × 2.2–4 mm, thin, glabrous, base broadly attached, margins entire, apex acute to acuminate; lip ± reflexed slightly over 1/2 its length, ± elliptic in general outline, 5.5–8 × 5–6 mm (all without artificial spreading), very thick; abaxially with a weak retuse median ridge toward base, surface glabrous; adaxially concave and with a median slit with slightly thickened margins toward base, convex but deeply furrowed toward tip, surface slightly rugose toward tip, apex rounded to apiculate. Column 1.8–3.2 mm, stigma inside without keels, at its base without teeth, column foot without tooth just above ligament; stelia deltoide to triangular, 0.3–0.8 mm, acute with a minute tooth along upper margin, close to tip, or minutely bifurcate; anther abaxially ± glabrous and with a low, rounded crest; front margin not drawn out, slightly erose.

Epiphytic or lithophytic in forests, thickets, and on various bedrock types including limestone; 600–1500 m. Fujian, S Guangdong, W Guangxi, Hainan, Yunnan [Nepal, Vietnam].

- 1a. Pseudobulbs narrowly ellipsoid to cylindrical, slightly flattened 2a. subsp. *ambrosia*
- 1b. Pseudobulbs obovoid, shortly stipitate, not flattened 2b. subsp. *nepalense*

2a. *Bulbophyllum ambrosia* subsp. *ambrosia*

芳香石豆兰(原亚种) fang xiang shi dou lan (yuan ya zhong)

Eria ambrosia Hance, J. Bot. 21: 232. 1883; *Bulbophyllum watsonianum* H. G. Reichenbach.

Rhizome 1.4–3 mm in diam. Pseudobulbs dull, green, often slightly suffused with purple, narrowly ellipsoid to cylindrical, somewhat flattened, 2.5–5 × 0.5–0.9 cm. Petiole 0.4–0.9 cm; leaf blade 3–9 × 1–2.1 cm, obtuse. Inflorescence 1-flowered, rarely a subumbellate raceme, 2-flowered. Flowers whitish with red veins, sometimes suffused with red toward margins, lip white, with a red median band, top part suffused with red or pink. Dorsal sepal 9–13 × 6–8.3 mm; lateral sepals elliptic to ovate including a winglike, sometimes antrorse widening along lower margin, 10–14 × 7–10 mm. Petals 5–8 × 2.2–4 mm. Fl. Jan–May, Nov–Dec.

Epiphytic or lithophytic in primary ever-wet forests, mixed semi-deciduous forests, coniferous forests, thickets, on various bedrock types including limestone; 600–1300 m. Fujian, S Guangdong, W Guangxi, Hainan, S and SE Yunnan [Vietnam].

2b. *Bulbophyllum ambrosia* subsp. *nepalense* J. J. Wood, Kew Bull. 41: 820. 1986 [“*nepalensis*”].

西南石豆兰 xi nan shi dou lan

Rhizome 0.8–1.5 mm in diam. Pseudobulbs glossy, yellowish green, obovoid, not flattened, 1.8–2.5 × 0.7–0.8 cm. Petiole 0.3–0.5 cm; leaf blade 3–5 × 0.8–2 cm, rounded. Inflorescence 1-flowered. Flowers white or yellowish, with red

veins, lip greenish white or yellowish, slightly stained with red toward margins. Dorsal sepal 12–14 × 8–9 mm; lateral sepals triangular, 12–14 × 10–11 mm. Petals 5–5.5 × ca. 3.5 mm. Fl. Nov–Dec.

Epiphytic in forests, associated with *Coelogyne cristata*; 1200–1500 m. Yunnan [Nepal].

3. *Bulbophyllum pectinatum* Finet, Bull. Soc. Bot. France 44: 268. 1897.

长足石豆兰 chang zu shi dou lan

Bulbophyllum pectinatum var. *transarisanense* (Hayata) S. S. Ying; *B. transarisanense* Hayata; *B. transarisanense* f. *alboviride* Fukuyama; *B. viridiflorum* Hayata.

Rhizome 1.8–3 mm in diam., sections between pseudobulbs 0.4–1.2 cm, bract fibers hardly persistent. Pseudobulbs close together, ovoid to almost globose, not or hardly prostrate proximally, 1.1–2.5 × 0.6–1.5 cm. Petiole 0.3–1.5 cm; leaf blade elliptic to ovate, 3–8 × 0.9–2.3 cm, rounded to obtuse. Inflorescence erect to spreading, 6–10 cm, 1-flowered; peduncle 1.2–4.5 cm; bracts ca. 3, longest 6–9 mm; floral bracts tubular for 2/3 or more of their length, 6.5–14 mm, acute. Flowers resupinate, opening wide, pale greenish, often with fine reddish purple spots mainly along veins; lip pale green to white, stained or finely spotted with reddish purple. Pedicel and ovary 32–60 mm. Dorsal sepal recurved with top incurved, ovate, 13–23 × 5–13 mm, rather thin, glabrous, base rather narrowly attached, margin entire, apex obtuse to acute; lateral sepals free, recurved to spreading, elliptic to ovate-triangular, 15–26 × 11–14 mm, (sub-)acute, rather broadly attached, otherwise as dorsal sepal. Petals recurved to spreading, elliptic to ovate-triangular, 10–19 × 5–11 mm, rather thin, glabrous, base rather broadly attached, margins entire, apex obtuse to acute; lip recurved to almost reflexed at ca. 2/3 of its length, ovate-triangular, 10–16 × 7–18 mm (all without artificial spreading), thick but proximally thin toward margins; abaxially with a retuse median ridge up to ca. 2/3 of length of lip, surface glabrous; adaxially deeply concave proximally, with 2 retrorse, dorsiventrally flattened, rounded lobes close together and covering ligament, toward top slightly concave grading to distinctly convex and with 2 well-spaced, high, narrow, papillose ridges with a deeply erose crest, adaxially papillose-verrucose distally and sometimes in between ridges, surface otherwise glabrous, margins erose-lacerate, more deeply so proximally, apex obtuse. Column 2.5–5 mm, stigma inside with 3 keels, at its base without teeth, column foot without a tooth above ligament; stelia deltoide, 1–2 mm, obtuse; anther abaxially ± glabrous and with a rounded crest; front margin drawn out, erose; pollinia with a fleshy stipe firmly attached to their bases. Fl. (Mar–)Apr–Jul(–Sep).

Epiphytic in forests, also found as a lithophyte along ravines; 1000–2700 m. Taiwan, SE to W Yunnan [NE India, Myanmar, N Thailand, Vietnam].

4. *Bulbophyllum psittacoglossum* H. G. Reichenbach, Bot. Zeitung (Berlin) 21: 237. 1863.

滇南石豆兰 dian nan shi dou lan

Phyllorkis psittacoglossa (H. G. Reichenbach) Kuntze;

Sarcopodium psittacoglossum (H. G. Reichenbach) Hooker.

Rhizome 2.8–4 mm in diam., sections between pseudobulbs 1.5–3.8 cm, bract fibers persistent, forming a loose net around pseudobulb. Pseudobulbs distant, ellipsoid to (ob-)ovoid, prostrate on rhizome for ca. 2/3 of their length, 2–3.5 × 1–2 cm. Petiole 1.3–4 cm; leaf blade elliptic to (ob-)ovate, 6–12 × 2.4–4 cm, acute. Inflorescence erect to spreading, 4–9 cm, 1-flowered or a raceme, 2- or 3-flowered; peduncle 0.7–2.5 cm; bracts ca. 2, longest 7–9 mm; rachis 0.3–2 cm; floral bracts elliptic, sometimes tubular at very base only, 4–12 × 2.5–8 mm, acute. Flowers resupinate, moderately opening, (greenish) yellow with dark reddish purple veins, lip yellowish, abaxially mottled with reddish purple, adaxially dark reddish purple. Pedicel and ovary 19–48 mm. Dorsal sepal recurved with top incurved, elliptic to ovate-triangular, 11.5–20 × 4–11.5 mm, rather thick, glabrous, base rather broadly attached, margin entire, apex obtuse to acute; lateral sepals free, recurved, ovate to triangular, 13–20 × 6.5–11 mm, otherwise as dorsal sepal. Petals recurved, elliptic to (ob-)ovate, 11–19 × 3.5–8 mm, rather thick, glabrous, base broadly attached, margins entire, apex obtuse to acute; lip recurved, ovate but constricted ca. halfway, 7–13 × 4–7 mm (all without artificial spreading), thick; abaxially with a retuse median ridge up to 1/2–2/3 of length of lip, surface glabrous; adaxially concave proximally, convex distally, with a median slit over most of length of lip, proximally widening into a shallow cavity bordered by 2 short, distally converging ridges, with 2 more high ridges with straight, entire crests starting at inner surface of auricles and converging gradually, reaching up to ca. 2/3 of length of lip, surface in between finely papillose, surface distally and toward margins almost glabrous to coarsely rugose, margins erose, with a distinct, triangular, obtuse, auricle with a denticulate tip at ca. 1/3 of length of lip, apex obtuse. Column 5–7 mm, stigma inside with 3 keels, at its base without teeth, column foot with a triangular, acute tooth on each side of ligament; stelia triangular to subulate, 1–2 mm, acute, with or without a small antrorse, subacute tooth along upper margin, with a distinct, obliquely antrorse, deltoid, obtuse tooth along lower margin, slightly below middle of column; anther abaxially ± glabrous and with high, dorsiventrally flattened, triangular, obtuse crest; front margin not drawn out, entire; pollinia without a stipe. Fl. May–Jul, Oct–Dec.

Epiphytic in forests; 1100–1700 m. S and SE Yunnan [Myanmar, Thailand, Vietnam].

Chinese records of *Bulbophyllum psittacoglossum* could be based on misidentified plants of *B. pectinatum*.

5. *Bulbophyllum yunnanense* Rolfe, J. Linn. Soc., Bot. 36: 14. 1903.

蒙自石豆兰 meng zi shi dou lan

Bulbophyllum otoglossum Tuyama.

Rhizome 3.5–5 mm in diam., sections between pseudobulbs 1.5–3.5 cm, bract fibers hardly persistent. Pseudobulbs distant, prostrate on rhizome for ca. 2/3 of their length, ovoid, 2–4.5 × 1–1.4 cm. Petiole 0.2–4 cm; leaf blade elliptic(-ovate), 4–12 × 1.9–3.3 cm, acute. Inflorescence erect to spreading, 3.6–

11 cm, 1-flowered or a raceme, 2-flowered; peduncle 0.8–4 cm; bracts ca. 3, longest 7–12 mm; rachis 0.3–1.5 cm; floral bracts usually tubular, 6–12 mm, acute, upper in a raceme sometimes elliptic, ca. 7 mm wide. Flowers resupinate, moderately opening, creamy yellow, densely spotted with red, lip yellow, spotted or suffused with red along sides, column yellow, face red. Pedicel and ovary 13–40 mm. Dorsal sepal recurved with top incurved, ovate, 9.5–12 × 6–9 mm, rather thick, glabrous, base rather broadly attached, margin entire, apex truncate to obtuse, apiculate; lateral sepals free, recurved, 10.5–15.5 × 7–11 mm, rounded to acute, otherwise as dorsal sepal. Petals recurved, elliptic, 7.5–11 × 4–7 mm, rather thin, glabrous, base broadly attached, margins ± entire to finely erose-denticulate, apex obtuse to acute; lip recurved, ovate, 6–10 × 3–5.5 mm (all without artificial spreading), thick; abaxially with a rounded median ridge over most of length of lip, surface glabrous; adaxially slightly concave proximally, convex distally, with a median slit over most of length of lip, proximally deepening and widening into a cavity bordered by 2 short, distally converging ridges, with 2 more ridges with wavy, proximally erose crests starting at lacerate part of margin and running almost parallel or converging slightly up to ca. 2/3 of length of lip, surface in between only slightly verrucose, surface toward margins coarsely and irregularly verrucose, margins deeply denticulate-lacerate at ca. 1/4 of length of lip, otherwise ± entire, apex obtuse. Column 3–4.5 mm, stigma inside with 3 keels, at its base without teeth, column foot without a tooth above ligament; stelia triangular, ca. 1 mm, acute, with or without a small, deltoid, subacute tooth along upper margin, with an inconspicuous, widely deltoid, obtuse wing along lower margin, ca. halfway along column; anther abaxially ± glabrous and with high, narrowly conic, sharp crest; front margin not drawn out, slightly erose; pollinia with a small, thick stipe. Fl. Apr–Jun, Aug.

Epiphytic in (monsoon) forests, also lithophytic; 1400–2900 m. NW and SE Yunnan [Bhutan, Nepal].

6. *Bulbophyllum griffithii* (Lindley) H. G. Reichenbach, Ann. Bot. Syst. 6: 247. 1861.

短齿石豆兰 duan chi shi dou lan

Sarcopodium griffithii Lindley, Fol. Orchid. 2(Sarcopodium): 6. 1853; *Bulbophyllum calodictyon* Schlechter; *B. chitouense* S. S. Ying.

Rhizome 1.2–2 mm in diam., sections between pseudobulbs 0.4–2 cm, bract fibers hardly persistent. Pseudobulbs close together, not or hardly prostrate proximally, ovoid to almost globose, 0.7–3 × 1.3–2 cm. Petiole 0.2–1.5 cm; leaf blade elliptic to ovate, 2.2–12 × 1–2.8 cm, obtuse to acute. Inflorescence erect to spreading, 3.6–6 cm, 1-flowered; peduncle 0.6–2 cm; bracts ca. 2, longest 5–8 mm; floral bracts tubular for 2/3 or more of their length, 4–6.5 mm, acute. Flowers resupinate, moderately opening, yellow or yellowish green with reddish purple dots, lip yellow, heavily stained with reddish purple adaxially, column yellow. Pedicel and ovary 20–26 mm. Dorsal sepal recurved with top incurved, elliptic to ovate, 8–12 × 4.5–9 mm, rather thick, glabrous, base rather broadly attached, margin entire, apex obtuse to acute; lateral sepals free, recurved, (ovate-)triangular, 9–13 × 6–10 mm, (sub-)acute, other-

wise as dorsal sepal. Petals recurved, elliptic to obovate, 6–10 × 3–5 mm, rather thick, glabrous, base broadly attached, margins entire to finely erose-denticulate, apex rounded and apiculate to subacute; lip recurved close to tip, ovate, 5.5–8.5 × 4–6 mm, (all without artificial spreading), thick; abaxially with a rounded median ridge over most of length of lip, surface glabrous; adaxially slightly concave proximally, convex distally, with a median slit over most of length of lip sometimes shortly interrupted proximally, with 2 thin ridges with wavy, erose crests starting on inner surface of auricles and running almost parallel or converging slightly up to ca. 3/4 of length of lip, surface in between partly or almost entirely covered with irregular, wavy transverse ribs, surface toward margins verrucose with verrucae often arranged in oblique, irregular and frequently interrupted crests, margins entire, somewhat irregular distally, with a triangular, obtuse to acute, somewhat erose-lacerate auricle at ca. 1/3 of length of lip, apex rounded to truncate. Column 3.8–5 mm, stigma inside with 3 keels, at its base without teeth, column foot without a tooth above ligament; stelia triangular, 1.2–2 mm, acute, with or without a small subacute tooth along upper margin, with a distinct, spreading, straight, triangular, obtuse to acute tooth along lower margin, ca. halfway along column; anther abaxially ± glabrous and with high, conic, sharp crest; front margin not drawn out, erose; pollinia ?without a stipe. Fl. Feb, Aug, Oct–Nov.

Understory epiphyte in forests; 1000–1700 m. C Taiwan, C and SE Yunnan [Bhutan, India (Sikkim), Nepal, Vietnam].

7. *Bulbophyllum leopardinum* (Wallich) Lindley, Gen. Sp. Orchid. Pl. 48. 1830.

短葶石豆兰 duan ting shi dou lan

Dendrobium leopardinum Wallich, Tent. Fl. Nepal. 39. 1826; *Bulbophyllum colomaculosum* Z. H. Tsi & S. C. Chen; *Sarcopodium leopardinum* (Wallich) Lindley.

Rhizome 2.5–8 mm in diam., sections between pseudobulbs 1.2–4 cm, bract fibers moderately persistent, sometimes forming a loose net around pseudobulb. Pseudobulbs close together or distant, often somewhat prostrate proximally, ovoid, 2–5.5 × 1–2.5 cm. Petiole 2–8 cm; leaf blade elliptic to obovate, 3.5–18 × 2–6.5 cm, obtuse to acute. Inflorescence erect to spreading, 5–10 cm, 1-flowered or a raceme, 2-flowered; peduncle 0.6–2.5 cm; bracts ca. 2, longest 6–10 mm; rachis 0.2–0.7 cm; floral bracts tubular, 7–14 mm, acute. Flowers resupinate, moderately opening, (creamy) yellow to (pale) green, often partly spotted or suffused with red or purple, sometimes with a yellow halo around numerous red or purple spots, lip yellow, adaxially strongly suffused with red. Pedicel and ovary 28–50 mm. Dorsal sepal recurved with top incurved, elliptic to ovate-triangular, 14–20 × 6.5–13.5 mm, rather thick, glabrous, base rather broadly attached, margin entire, apex truncate and apiculate to acute; lateral sepals free, recurved, ovate to triangular, 15–23 × 10–15 mm, obtuse and apiculate to acute, otherwise as dorsal sepal. Petals recurved, elliptic to ovate, 10–14 × 5–9 mm, rather thick, glabrous, base rather narrowly attached, margins entire, sometimes slightly erose proximally along lower margin, apex acute to acuminate; lip recurved, ovate, 9.5–14 × 6–9 mm (all without artificial spreading), thick; abaxially with a truncate median ridge up to 2/3 of length of lip, surface glabrous; adaxially slightly concave proximally, convex distally, with a median slit over most of length of lip, proximally deepening and widening into a cavity bordered by 2 short, distally converging ridges, with 2 more ridges with straight, proximally erose-verrucose crests starting at lacerate part of margin and running almost parallel or converging slightly over most of length of lip, surface in between glabrous, surface toward margins almost glabrous to finely rugose-verruculose, margins denticulate-lacerate at ca. 1/4 of length of lip, otherwise ± entire, apex obtuse. Column 4–6.5 mm, stigma inside without keels, at its base without teeth, column foot without a tooth above ligament; stelia triangular, 1–2 mm, acute, with or without a small, deltoid, obtuse tooth along upper margin, with an inconspicuous, widely deltoid, obtuse wing along lower margin, ca. halfway along column; anther abaxially ± glabrous and with conic, sharp crest; front margin not drawn out, ± entire; pollinia without a stipe. Fl. Apr–Aug, Oct.

Epiphytic in forests, also lithophytic; 1300–3300 m. S Xizang, S Yunnan [Bhutan, India, Laos, Nepal, N Vietnam].

2. *Bulbophyllum* sect. *Sestochilos* Benth & J. D. Hooker, Gen. Pl. 3: 502. 1883.

大花组 da hua zu

Rhizome creeping; roots sprouting along rhizome, spreading; new shoots arising from basal node of pseudobulb. Pseudobulbs distinct, apex with 1 leaf. Leaves persistent, thick. Inflorescences solitary, arising near pseudobulbs, 1-flowered. Pedicel with basal node distinctly more than 1 × diam. of pedicel above subtending bract. Sepals free, ± equally long, margins glabrous, 5- or more veined. Petals: margins glabrous, 5- or more veined; lip with or without lateral lobes along margins well above its base, margins otherwise glabrous to partly or entirely erose or denticulate, adaxially glabrous. Column: stigma not protruding at its base, foot distinct; anther: front margin not or slightly projecting, abaxially with a low, or a high, conic crest; pollinia 4, inner more than 1/2 as long as outer, all without appendages.

Seventeen provisionally accepted species: Himalayas to the Philippines and Sulawesi; two species in China.

- 1a. Lip with rounded lateral lobes near middle 8. *B. pteroglossum*
- 1b. Lip without lateral lobes, lanceolate in outline 9. *B. affine*

8. *Bulbophyllum pteroglossum* Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 4: 71. 1919.

曲萼石豆兰 qu e shi dou lan

Bulbophyllum devangiriense N. P. Balakrishnan; *B. monanthum* (Kuntze) J. J. Smith (1912), not *B. monanthos* Ridley (1896); *B. tiagii* A. S. Chauhan; *B. uniflorum* Griffith (1851), not Hasskarl (1844); *Phyllorkis monantha* Kuntze; *Sarcopodium uniflorum* Lindley.

Rhizome stout, ca. 5 mm in diam., rooting at nodes. Pseudobulbs 6–8 cm apart from each other, cylindrical, 3–4 cm, ca. 5 mm in diam., with a terminal leaf. Leaf subsessile; blade oblong, 18–24.5 × 3.4–5.5 cm, fleshy or thickly leathery, apex obtuse. Scape flattened, arising from nodes of rhizome, pendulous, 5–8 cm, terminating in a solitary flower; floral bracts ovate, much shorter than pedicel and ovary, apex acute. Flowers thickened, erect, pale yellow spotted with red, except purple-red mid-lobe of lip. Dorsal sepal elliptic, concave, 12–15 × ca. 7 mm, apex obtuse; lateral sepals obliquely ovate-triangular, ca. 7 × 6 mm, contracted and twisted above middle, base adnate to column foot forming a broad mentum, apex obtuse. Petals oblong-lanceolate, ca. 8 × 3 mm, margin entire, apex subacute; lip erect, 2–2.5 mm, basal half subsquare, cordate at base, connected to end of column foot by a mobile joint, near middle 3-lobed; lateral lobes erect, their apices ca. 6 mm apart; mid-lobe deltoid, apex obtuse-rounded. Column stout; foot upcurved, ca. 1 cm, with free part ca. 2 mm; stelia inconspicuous; anther cap nearly subspherical. Fl. Nov.

Tree trunks in forests; ca. 1400 m. S Yunnan [Bhutan, NE India, Myanmar].

9. *Bulbophyllum affine* Lindley, Gen. Sp. Orchid. Pl. 48. 1830.

赤唇石豆兰 chi chun shi dou lan

Bulbophyllum kusukusense Hayata; *Phyllorkis affinis* (Lindley) Kuntze; *Sarcopodium affine* (Lindley) Lindley & Paxton.

Rhizome stout, 4–5 mm in diam., covered with scalelike sheaths, rooting at nodes. Pseudobulbs erect, 4–8 cm apart from each other, subcylindric, 3–4 cm, 5–8 mm in diam., with a terminal leaf. Petiole 1–2 cm; leaf blade oblong, 6–26 × 1–4 cm, leathery or fleshy, base contracted into petiole, apex obtuse and slightly emarginate. Scape from node of rhizome and base of pseudobulb, 4–8 cm; inflorescence 1-flowered, base with 3–5 sheaths. Pedicel and ovary 3.5–7.5 cm. Flower thickly textured; sepals and petals pale yellow with purplish stripes; lip purple. Dorsal sepal lanceolate, 17–20 × 4–5 mm, apex acute; lateral sepals falcate-lanceolate, similar in size to dorsal sepal, base adnate to column foot forming a broad mentum, apex acute. Petals lanceolate, 11–15 × 3–4 mm, margin entire, apex acute; lip lanceolate, 8–10 mm, fleshy, adaxially glabrous, grooved at base, hinged to end of column foot by a mobile joint, apex acuminate, slightly recurved. Column ca. 5 mm, stout; stelia inconspicuous; foot ca. 5 mm, without free part; anther cap ca. 3 mm, adaxially finely papillate. Fl. May–Jul. *2n* = 36.

Tree trunks or rocks in forests or along valleys; 100–600 m. S Guangdong, S Guangxi, Hainan, S Taiwan, S Yunnan [Bhutan, NE India, Japan (Ryukyu Islands), Laos, Nepal, Thailand, Vietnam].

3. *Bulbophyllum* sect. *Epicranthes* (Blume) J. D. Hooker, Fl. Brit. India 5: 753. 1890 [*“Epicrianthes”*].

飘带组 piao dai zu

Epicranthes Blume, Bijdr. 306. 1825.

Rhizome spreading to pendulous; roots sprouting along rhizome, growing backward over or alongside rhizome until they reach substrate; new shoots arising from basal node of pseudobulb. Pseudobulbs distinct, apex with 1 leaf. Leaves persistent, thick. Inflorescences arising near pseudobulbs, clustered on a lateral sympodium, 1-flowered. Pedicel with basal node distinctly more than 1 × diam. of pedicel above attachment of subtending bract. Sepals free, ± equally long, margins glabrous, 3-veined. Petals: margins with long appendages of a texture different than petal itself, 3–5-veined; lip: margins without auricles or lateral lobes, otherwise hirsute and conspicuously vesicular on both sides. Column: stigma not protruding at its base, foot distinct; anther: front margin projecting into a retuse beak, abaxially with rounded crest; pollinia 2 or 4, with inner more than 1/2 as long as outer, all usually without appendages.

Thirty-eight provisionally accepted species: Myanmar to W Pacific; one species in China.

10. *Bulbophyllum haniffii* Carr, Gard. Bull. Straits Settle. 7: 20. 1932.

飘带石豆兰 piao dai shi dou lan

Rhizome pendulous, slender, sometimes branched, only basal nodes with many roots. Pseudobulbs close, ovoid, 5–6 mm, 3–4 mm in diam., with a terminal leaf. Leaf sessile; blade

elliptic, 2.2–2.4 × ca. 0.9 cm, fleshy, apex acute. Scape from base of pseudobulb, terminating in a solitary flower; peduncle 2–3 mm, slender, base with 2 cupular sheaths. Pedicel and ovary ca. 3 mm. Sepals free, subequal in size, lanceolate, ca. 5.5 × 2 mm, margin entire, apex acuminate; lateral sepals ca. 1/3 width of base adnate to column foot forming a mentum. Petals lobed almost deeply to base, with a broad sinus, each lobe with

2–4 appendages; appendages grayish black, densely finely papillate, linear-oblong, ca. 3.5 × 0.3 mm, base with a filiform stalk ca. 1.5 mm, apex obtuse; lip lanceolate, ca. 3.5 mm, fleshy, adaxial base grooved and densely papillate-hairy, apex acute. Column ca. 2 mm, ca. 1 mm in diam.; foot ca. 1 mm,

with free part ca. 0.6 mm; stelidia very short, dentate; anther cap with 1 crestlike ridge on apical margin. Fl. Jul.

Tree trunks in evergreen broad-leaved forests; ca. 1700 m. S Yunnan [Laos, Malaysia, Myanmar, Thailand].

4. *Bulbophyllum* sect. *Corymbosa* (Blume) Averyanov, Oprel. Orkhid. Vietnam, 261. 1994 [*“Corymbosia”*].

短序组 duan xu zu

Diphyes sect. *Corymbosae* Blume, Bijdr. 315. 1825 [*“Corymbosia”*].

Rhizome creeping or straggling with roots sprouting mainly below pseudobulbs, or rhizome spreading to pendulous, with roots growing backward over or alongside rhizome until they reach substrate; new shoots arising from basal node of pseudobulb. Pseudobulbs distinct, apex with 1 leaf. Leaves persistent, thick. Inflorescences solitary, arising along length of rhizome or near pseudobulbs, with 3 to many flowers in a contracted to subumbellate raceme (an elongate raceme in *Bulbophyllum reptans* and *B. polyrrhizum*). Pedicel with base ± coinciding with attachment of subtending bract. Sepals free, margins glabrous, 1–3-veined; lateral sepals ca. as long as dorsal sepal or somewhat longer, not twisted inward near base (twisted inward in *B. ledungense*). Petals: margins glabrous, 1–3-veined; lip: margins without auricles or lateral lobes, otherwise ± glabrous, adaxially usually glabrous (with glandular hairs in *B. odoratissimum*). Column: stigma not protruding at its base, foot distinct; anther: front margin not projecting or projecting into a rounded beak, abaxially with or without a rounded crest; pollinia 4, inner more than 1/2 as long as outer, all without appendages.

Seventy-six provisionally accepted species: Himalayas to the Philippines and Sulawesi; 14 species (six endemic) in China.

Bulbophyllum reptans and *B. polyrrhizum* may not belong here. The first has spiral vessels in its flower parts similar to Continental African species such as *B. pumilum* (Swartz) Lindley.

- 1a. Raceme elongate, more than 2 cm.
 - 2a. Leaves deciduous before anthesis 11. *B. polyrrhizum*
 - 2b. Leaves not deciduous at anthesis 12. *B. reptans*
- 1b. Raceme umbellate or subumbellate, sometimes condensed-racemose.
 - 3a. Pseudobulbs close, less than 1 cm apart from each other on rhizome.
 - 4a. Rhizome patent to pendulous, with roots growing backward alongside it to base.
 - 5a. Lateral sepals 2.3–7 mm; petal margins irregularly denticulate 13. *B. corallinum*
 - 5b. Lateral sepals 21–23 mm; petal margins entire 14. *B. dulongjiangense*
 - 4b. Rhizome creeping or straggling, with roots spreading.
 - 6a. Lateral sepals obviously longer than dorsal sepal.
 - 7a. Stelidia deltoid or broadly triangular 15. *B. sutepense*
 - 7b. Stelidia narrowly triangular-subulate, slender 16. *B. rubrolabellum*
 - 6b. Sepals subequal in length.
 - 8a. Floral bracts shorter than pedicel plus ovary; petals elliptic 16. *B. rubrolabellum*
 - 8b. Floral bracts longer than pedicel plus ovary; petals ovate-lanceolate 17. *B. tengchongense*
 - 3b. Pseudobulbs spaced more than 1 cm apart from each other on rhizome.
 - 9a. Scape nearly as long as or slightly longer than pseudobulb.
 - 10a. Rhizome stout, 3–4 mm in diam.; pseudobulbs 2–5 cm; dorsal sepal 7–10 mm 18. *B. cauliflorum*
 - 10b. Rhizome slender, 1–2 mm in diam.; pseudobulbs 0.8–1.5 cm; dorsal sepal 4–6 mm.
 - 11a. Roots only from base of pseudobulbs; scape arising only from base of pseudobulb 19. *B. stenobulbon*
 - 11b. Roots from all nodes of rhizome and base of pseudobulb; scape arising from base of pseudobulb or nodes between 2 pseudobulbs 20. *B. ledungense*
 - 9b. Scape more than 2 × as long as pseudobulb.
 - 12a. Lip adaxially and along margin with glandular hairs 21. *B. odoratissimum*
 - 12b. Lip glabrous.
 - 13a. Stelidia rounded; petals obtuse 22. *B. wuzhishanense*
 - 13b. Stelidia acute; petals acute to acuminate.
 - 14a. Lateral sepals adnate to column foot for 1/5–2/5 of their width; petals narrowly lanceolate, 4–5 mm, apex long acuminate; column foot ca. 0.5 mm, with almost invisible free part 23. *B. kwangtungense*
 - 14b. Lateral sepals adnate to column foot over almost their entire width; petals ovate-lanceolate, 3–3.5 mm, apex acute; column foot ca. 2 mm, with its free part 0.8–1 mm 24. *B. shweliense*

11. *Bulbophyllum polyrrhizum* Lindley, Gen. Sp. Orchid. Pl. 53. 1830.

锥茎石豆兰 *zhui jing shi dou lan*

Rhizome creeping, ca. 1.5 mm in diam., rooting from base of pseudobulbs. Pseudobulbs 5–10 mm apart on rhizome, ovoid, 7–10 mm, 5–7 mm in diam., apex narrowed and somewhat necklike, with a terminal leaf. Leaf blade narrowly oblong, shorter than scape. Flowers and leaves not appearing at same time. Scapes from base of leafless pseudobulbs, 8–12 cm, slender; raceme 3–6 cm, sparsely with many small flowers; peduncle ca. 1 mm in diam., with 2 or 3 bractlike sheaths; floral bracts ovate, small, ca. 1.5 mm, apex acute. Pedicel and ovary ca. 3 mm. Flowers yellowish green, widely opening. Dorsal sepal subovate, concave, ca. 4 × 2 mm, apex subacute; lateral sepals ovate-lanceolate, ca. 4.5 × 2 mm, apex acute. Petals ovate-triangular, 2.3–2.5 × 1.2–1.3 mm, apex acute; lip reflexed, sub-oblong, ca. 3 × 0.8 mm, adaxially densely minutely papillate, grooved at adaxial base, attached to end of column foot, immobile, apex obtuse-acute. Column ca. 1.2 mm; foot ca. 1 mm; stelidia obliquely triangular-subulate. Fl. Mar. $2n = 38$.

Tree trunks in evergreen broad-leaved forests; 900–1400 m. S Yunnan [NE India, Myanmar, Nepal, N Thailand].

12. *Bulbophyllum reptans* (Lindley) Lindley, Gen. Sp. Orchid. Pl. 51. 1830.

伏生石豆兰 *fu sheng shi dou lan*

Tribrachia reptans Lindley, Coll. Bot. ad t. 41. 1826; *Phyl-lorkis reptans* (Lindley) Kuntze.

Rhizome creeping, 2–3.5 mm in diam., branched, covered with tubular sheaths 7–10 mm. Pseudobulbs 5–9 cm apart on rhizome, ovoid or ovoid-conic, 1–2 cm, 5–10 mm in diam., with a terminal leaf. Petiole 1–2 cm; leaf blade narrowly oblong, 7–8(–15) × 0.7–1(–1.4) cm, leathery, base contracted into petiole, apex obtuse and slightly emarginate. Scape from base of pseudobulb, erect, 12–14 cm, slender; raceme 4–6 cm, usually 3–6-flowered; peduncle with 3 or 4 tubular sheaths; floral bracts ovate-lanceolate, 3–6 mm. Pedicel and ovary 3–5 mm. Flowers pale yellow with purplish red stripes. Sepals lanceolate, 7–10 × 2–2.2 mm, thickly textured, abaxially carinate, apex subacute; lateral sepals slightly longer than dorsal sepal, lower edges of basal half connate to each other, base adnate to column foot. Petals ovate-elliptic or obovate, 3–4 × 1.5–2 mm, thinly textured, entire, obtuse-rounded; lip recurved, slightly longer than petals, somewhat fleshy, entire, obtuse. Column ca. 0.8 mm; foot ca. 2 mm, with free part ca. 1 mm; stelidia filiform or subulate, ca. 0.8 mm. Fl. Jan–Oct. $2n = 38 + 0-2B, 42$.

Tree trunks or rocks in evergreen broad-leaved forests; 1000–2800 m. Guangxi, SW Guizhou, Hainan, S and SE Xizang, W to SE Yunnan [Bhutan, NE India, Myanmar, Nepal, Vietnam].

13. *Bulbophyllum corallinum* Tixier & Guillaumin, Bull. Mus. Natl. Hist. Nat., sér. 2, 35: 204. 1963.

环唇石豆兰 *huan chun shi dou lan*

Rhizome patent to pendulous, with roots creeping alongside it toward base. Pseudobulbs close or ± spaced, ± curved,

subcylindric or ovoid, ca. 1 cm, with a terminal leaf. Leaf sessile; blade narrowly oblong or ligulate, 25–43 × 4–7 mm, apex acute. Scape from base of pseudobulb or node of rhizome, very short; peduncle less than 5 mm; raceme dense with several small flowers, and scalelike sheaths at base; floral bracts membranous, longer than pedicel and ovary, ca. 4 mm, apex acute. Flowers brownish red. Sepals free, thickly textured; dorsal sepal ovate-lanceolate, 2.2–6 × ca. 1 mm, apex acuminate; lateral sepals obliquely ovate-triangular or falcate-lanceolate, 2.3–7 × ca. 1 mm, base adnate to column foot forming a mentum, margins strongly incurved above middle, apex long acuminate. Petals oblong, 1.2–1.8 × 0.5–0.8 mm, membranous, margins irregularly denticulate, apex acute; lip hooked-recurved, ca. 1.3 × 0.3 mm, fleshy, base connected to end of column foot by a mobile joint, margins densely white villous, apex obtuse; disk with 2 keels. Column ca. 0.6 mm; foot ca. 1 mm, with free part ca. 0.3 mm; stelidia fusiform, ca. 0.8 mm; anther cap glabrous, centrally with 1 ridge. Fl. Mar–Sep.

Tree trunks in open forests; 1100–1600 m. S and SE Yunnan [Myanmar, N Thailand, Vietnam].

14. *Bulbophyllum dulongjiangense* X. H. Jin, Novon 16: 497. 2006.

独龙江石豆兰 *du long jiang shi dou lan*

Rhizome patent to pendulous, with roots creeping alongside it toward base. Pseudobulbs close, cylindric, 1.5–2 × 0.5–0.8 cm, with a terminal leaf. Leaves subsessile; blade lanceolate, ca. 35 × 9–10 mm, apex acute. Scape from base of pseudobulb or node of rhizome, very short; peduncle ca. 5 mm; raceme dense with 10–15 small flowers, and 2 or 3 scalelike sheaths at base; floral bracts membranous, longer than pedicel and ovary, 7–8 mm, apex acute. Flowers pale yellow. Sepals free; dorsal sepal linear, 12–14 × ca. 1 mm, apex caudate; lateral sepals obliquely linear, 21–23 × ca. 2 mm, base adnate to column foot forming a mentum, apex caudate. Petals oblong, 1.9–2.1 × 1.3–1.5 mm, membranous, margins entire, apex acuminate; lip hooked-recurved, 2–2.2 × 0.9–1 mm, fleshy, base connected to end of column foot by a mobile joint, margins ciliate, apex obtuse; disk with 2 keels. Column ca. 2.5 mm; foot ca. 2 mm; stelidia narrowly triangular, ca. 2 mm. Fl. Oct–Nov.

• Branches and tree trunks in forests. NW Yunnan (Dulong Jiang).

15. *Bulbophyllum sutepense* (Rolfe ex Downie) Seidenfaden & Smitinand, Orchids Thailand 3: 366. 1961.

聚株石豆兰 *ju zhu shi dou lan*

Cirrhopetalum sutepense Rolfe ex Downie, Bull. Misc. Inform. Kew 1925: 376. 1925.

Rhizome creeping, roots spreading. Pseudobulbs contiguous, pyriform or subglobose, 6–12 mm, 5–10 mm in diam., with a terminal leaf, wrinkled when dried. Leaf subsessile; blade oblong or oblong-ligulate, 1.5–4.5 × 0.6–0.9 cm, leathery, base cuneate, apical margins denticulate, apex acute or subobtus. Scapes 1 or 2, from base of pseudobulb, slightly longer than pseudobulb, glabrous; raceme with shortened rachis, umbel-like, often 4- or 5-flowered; peduncle less than 5 mm, enclosed in 3 or 4 membranous sheaths; floral bracts ovate-

lanceolate, ca. 4 mm, apex shortly acute. Flowers pale yellow, with free sepals. Dorsal sepal ovate-lanceolate, concave, 2.2–3 × ca. 1.8 mm, entire, shortly acute, apical margins slightly incurved; lateral sepals obliquely lanceolate, 5–6 × 1.5–1.8 mm, entire, margins in apical half incurved and tubular, apex long acuminate. Petals narrowly oblong, ca. 1.5 × 0.7 mm, entire, acute; lip recurved, nearly ovate-triangular, very small, shorter than petals, 3-lobed; lateral lobes erect, deltoid; mid-lobe narrowly oblong, apex subacute; disk densely papillate adaxially. Column ca. 1.1 mm, stout; stelia deltoid to broadly triangular, ca. 0.1 mm; foot upcurved, ca. 1.4 mm, with free part ca. 0.8 mm; anther cap subglobose, slightly mucronate. Fl. May.

Tree trunks in mixed forests; 1200–1600 m. S Yunnan [Laos, N Thailand].

16. *Bulbophyllum rubrolabellum* T. P. Lin, *Taiwania* 20: 163. 1975.

红心石豆兰 hong xin shi dou lan

Bulbophyllum fenghuangshanianum S. S. Ying; *B. odoratissimum* (Smith) Lindley var. *rubrolabellum* (T. P. Lin) S. S. Ying.

Rhizome creeping, roots spreading. Pseudobulbs close, green, ovoid, 8–9 mm, 6–7 mm in diam., with a terminal leaf. Leaf sessile; blade oblong, 2.5–3.5 × 0.8–1 cm, leathery, apex acute. Scape from base of pseudobulb, 1–1.5 cm, with 2 or 3 sheaths; raceme shortened, umbel-like, densely 6–8-flowered; floral bracts ca. 2 mm, apex acute. Pedicel and ovary ca. 2.5 mm. Flowers not resupinate, whitish yellow. Sepals free, subequal, ovate, 3.5–4 × 1.6–2 mm, apex acuminate. Petals elliptic, ca. 1.5 × 0.6 mm, apex acute; lip recurved, red, ligulate, ca. 2.8 mm, hinged to end of column foot by a joint, adaxially minutely papillate. Column whitish yellow, short, ca. 1 mm; stelia narrowly triangular-subulate, ca. 0.6 mm, slender; foot ca. 2 mm. Capsule ellipsoid, ca. 1 cm. Fl. Sep–Oct. $2n = 38^*$, 58^* .

• Tree trunks in forests; 700–1500(–1800) m. Taiwan.

17. *Bulbophyllum tengchongense* Z. H. Tsi, *Bull. Bot. Res., Harbin* 9(2): 29. 1989.

云北石豆兰 yun bei shi dou lan

Rhizome creeping, roots spreading. Pseudobulbs close, subovoid, 5–11 mm, 4–6 mm in diam., with a terminal leaf. Leaf sessile; blade oblong, 1.4–3 × 0.4–1.1 cm, subleathery, apical margins scabrous, apex acute. Scapes 2 or 3, from base of pseudobulb, ca. 1.3 cm, with 2 or 3 tubular sheaths 2–3 mm; raceme shortened, umbel-like, often 4- or 5-flowered; floral bracts ovate-lanceolate, 3–4 mm, apex acute. Pedicel and ovary 2.5–3 mm. Flowers not resupinate, yellowish, with red lip and apical part of sepals. Sepals free, 3.3–4 × 1.6–2 mm, 3-veined, apex acuminate; dorsal sepal ovate; lateral sepals ovate-lanceolate, margins ± incurved. Petals ovate-lanceolate, 1.5–2 × ca. 0.7 mm, 1-veined, apex acute; lip attached to end of column foot, immobile, slightly recurved, ligulate, ca. 2.8 mm, fleshy, adaxially minutely papillate, grooved at base. Column ca. 1.3 mm, foot ca. 2 mm, with free part ca. 1 mm; stelia conspicuous, subulate, ca. 0.8 mm; anther cap subglobose, apex mucronate. Capsule ovoid, ca. 6 mm, ca. 3 mm in diam. Fl. Jul.

• Tree trunks in forests; ca. 2000 m. SW Yunnan.

18. *Bulbophyllum cauliflorum* J. D. Hooker, *Fl. Brit. India* 5: 758. 1890.

茎花石豆兰 jing hua shi dou lan

Rhizome creeping or straggling, stout, 3–4 mm in diam., branched, covered with scalelike sheaths, roots spreading. Pseudobulbs 4–12 cm apart from each other, cylindrical or narrowly ovoid, 2–5 cm, 7–10 mm in diam., with a terminal leaf. Petiole 5–15 mm; leaf blade oblong, 5–10 × 1.4–2.7 cm, leathery, apex obtuse and slightly emarginate. Scape from node of rhizome or base of pseudobulb, erect, nearly as long as pseudobulb; raceme shortened, umbel-like, often 3–5-flowered; peduncle ca. 1 mm in diam., with several tubular sheaths; floral bracts ovate-lanceolate, ca. 4 mm, apex acute. Pedicel and ovary ca. 4 mm. Flowers small, yellowish green. Sepals free, subequal, narrowly lanceolate, 7–10 × ca. 1.5 mm, apex acuminate-caudate. Petals lanceolate, 5–7 × ca. 1.2 mm, entire, acuminate; lip attached to end of column foot by a mobile joint, lanceolate, 3–4 mm, grooved at adaxial base, apex acuminate. Column ca. 0.6 mm, foot ca. 2 mm, with free part ca. 0.5 mm; stelia fusiform, ca. 1 mm; anther cap subglobose, apex mucronate. Capsule ovoid, ca. 1 cm, ca. 4 mm in diam. Fl. Jun–Jul, fr. Nov. $2n = 42$.

Tree trunks or rocks in broad-leaved forests; 800–1800 m. SE Xizang [NE India].

19. *Bulbophyllum stenobulbon* E. C. Parish & H. G. Reichenbach, *Trans. Linn. Soc. London* 30: 153. 1874.

短足石豆兰 duan zu shi dou lan

Bulbophyllum clarkeanum King & Pantling; *B. youngsayeanum* S. Y. Hu & Barretto; *Phyllorkis stenobulbon* (E. C. Parish & H. G. Reichenbach) Kuntze.

Rhizome creeping or straggling, 1–1.5 mm in diam., branched, rooting from base of pseudobulbs, roots spreading. Pseudobulbs 1.5–3 cm apart from each other, ovoid-cylindrical, usually 1–1.5 cm, 3–6 mm in diam., with a terminal leaf. Petiole 2–3 mm; leaf blade oblong, 1.5–3.3 × ca. 1 cm, leathery, apex obtuse-rounded and slightly emarginate. Scapes 1 or 2, from base of pseudobulb, filiform, 2–3.5 cm, slightly longer than pseudobulb; raceme shortened, umbel-like, often 2–4-flowered; peduncle with 3 or 4 tubular sheaths; floral bracts ovate-lanceolate, 2–3 mm, apex acute. Pedicel and ovary 2.5–3.5 mm. Flowers yellowish, tinged with orange-yellow on lip and apical half of sepals and petals. Sepals free, thickly textured; dorsal sepal narrowly lanceolate, 4.5–5 × 1.3–1.5 mm, apical margins ± incurved, apex long acuminate; lateral sepals similar to but slightly longer than dorsal sepal, base adnate to column foot forming a mentum. Petals ovate, 2–2.4 × 0.8–1 mm, thinly textured, entire, subobtuse; lip spreading horizontally, ligulate or ovate-lanceolate, ca. 2 × 0.5–0.7 mm, fleshy, grooved at base, abaxially densely finely papillate, adaxially often with 3 longitudinal ridges, lateral ridges often thickened and raised, apex rounded or subtruncate, slightly recurved. Column ca. 1.1 mm, stout; stelia subulate, ca. 0.5 mm; foot slightly upcurved, 1–1.3 mm, with free part ca. 0.3 mm; anther cap subglobose, apex mucronate. Fl. May–Jun. $2n = 38$.

Tree trunks or rocks in forests; 1200–2100 m. S and W Guangdong, SW Guizhou, SE Yunnan [Bhutan, India (Sikkim), Laos, Myanmar, Thailand, Vietnam].

20. *Bulbophyllum ledungense* Tang & F. T. Wang, *Acta Phytotax. Sin.* 12: 45. 1974.

乐东石豆兰 *le dong shi dou lan*

Rhizome creeping, 1–2 mm in diam., branched, rooting at nodes and from base of pseudobulbs, roots spreading. Pseudobulbs 1–4 cm apart on rhizome, cylindrical or ellipsoid, 8–13 mm, 3–5 mm in diam., with a terminal leaf. Petiole short, 1–2 mm; leaf blade oblong, 1.5–3 × 0.3–0.8 cm, leathery, base contracted into petiole, apex obtuse-rounded and slightly emarginate. Scapes 1 or 2, from base of pseudobulb or nodes of rhizome, erect, 10–20 mm, slender; raceme shortened, umbel-like, 2–5-flowered; floral bracts oblong, small, ca. 2.5 mm, apex acuminate. Pedicel and ovary ca. 2.5 mm. Sepals free, lanceolate, 4–6 × ca. 1.2 mm, thickly textured, apical margins slightly incurved, apex acuminate; lateral sepals slightly longer than dorsal sepal, base adnate to column foot. Petals oblong, ca. 2 × 0.8 mm, entire, shortly acute; lip narrowly oblong, ca. 1.2 × 0.4 mm, fleshy, grooved at base, abaxially ± finely papillate, adaxially with a ridge on either side near margins, apex obtuse-rounded. Column ca. 0.8 mm, stout; stelia subulate, ca. 0.4 mm; foot ca. 0.8 mm, with free part ca. 0.3 mm; anther cap mucronate at apex. Fl. Jun–Oct.

- Rocks in forests. S Hainan.

21. *Bulbophyllum odoratissimum* (Smith) Lindley, *Gen. Sp. Orchid. Pl.* 55. 1830.

密花石豆兰 *mi hua shi dou lan*

Stelis odoratissima Smith in Rees, *Cycl.* 34: Stelis no. 12. 1814; *Bulbophyllum congestum* Rolfe; *B. hyacinthodorum* W. W. Smith; *B. trichocephalum* (Schlechter) Tang & F. T. Wang; *B. trichocephalum* var. *wallongense* Agrawala, Sabapathy & H. J. Chowdhery; *Cirrhopetalum trichocephalum* Schlechter.

Rhizome creeping or straggling, 2–4 mm in diam., branched, covered with membranous tubular sheaths, rooting from base of pseudobulbs, roots spreading. Pseudobulbs 4–8 cm apart from each other, subcylindrical, 2.5–5 cm, 3–6(–9) mm in diam., with a terminal leaf. Leaf sessile; blade oblong, 4–13.5 × 0.8–2.6 cm, leathery, apex obtuse and slightly emarginate. Scapes 1 or 2, yellowish green, from base of pseudobulb, erect, to 14 cm; raceme often nodding, shortened, umbel-like, densely more than 10-flowered; peduncle 1–3 mm in diam., with 3 or 4 tubular sheaths 8–10 mm; floral bracts whitish, ovate-lanceolate, 7–10 mm, membranous, apex acuminate. Pedicel and ovary shorter than floral bracts. Flowers slightly fragrant; sepals and petals white, later turning into orange in apical half; lip tangerine. Sepals free, thickly textured; dorsal sepal ovate or ovate-lanceolate, 3–7 × ca. 1.5 mm; lateral sepals lanceolate, 4–14 × ca. 2 mm, margins incurved from middle to apex and tubular or subulate in shape, apex obtuse or subacute. Petals subovate or elliptic, 1–2 × 1–1.5 mm, thinly textured, apex subobtuse; lip slightly recurved, ligulate, fleshy, margins with white glandular hairs, adaxially with 2 densely minutely glandular-hairy ridges, base with a short claw attached to end of

column foot, apex obtuse. Column ca. 1 mm, stout; stelia ca. 0.2 mm; foot ca. 1 mm, with free part ca. 0.5 mm; anther cap nearly subglobose or cordate, finely papillate. Fl. Apr–Aug. *2n* = 38.

Tree trunks in mixed forests, rocks along valleys; 200–2400 m. Fujian, Guangdong, Guangxi, S Sichuan, SE Xizang, W to SE Yunnan [Bhutan, NE India, Laos, Myanmar, Nepal, Thailand, Vietnam].

22. *Bulbophyllum wuzhishanense* X. H. Jin, *Brittonia* 57: 255. 2005.

五指山石豆兰 *wu zhi shan shi dou lan*

Rhizome creeping, rooting from nodes of rhizome and base of pseudobulbs, roots spreading. Pseudobulbs 1–4 cm apart from each other, ovoid, ca. 0.5 cm, ca. 3 mm in diam., with a terminal leaf. Petiole 2–4 mm; leaf blade oblong, 1.5–3 × 0.8–1 cm, leathery, apex retuse. Scape from base of pseudobulb or node of rhizome, erect, 3.5–4 cm, slender; inflorescence 1-flowered or a shortened, umbel-like raceme, 2- or 3-flowered; peduncle ca. 0.5 mm in diam., with 3–5 bracts; floral bracts lanceolate, ca. 2 mm. Pedicel and ovary 10–15 mm. Flowers white. Sepals free, ovate-triangular, ca. 6 × 3 mm, apex acuminate; lateral sepals ca. 7 × 3 mm, adnate to column foot for more than 1/2 their width; mentum inconspicuous. Petals ovate, ca. 4 × 1.5 mm, entire, obtuse; lip ovate, ca. 4 × 1.5 mm, fleshy, grooved in basal half, adaxially with 2 ridges, apex obtuse. Column 1–1.5 mm; stelia very short, rounded; foot 1.5–2 mm. Pollinia 2. Fl. Oct.

- Tree trunks in moist tropical forests; ca. 1800 m. Hainan.

The almost vestigial, rounded stelia are unusual in the section.

23. *Bulbophyllum kwangtungense* Schlechter, *Repert. Spec. Nov. Regni Veg.* 19: 381. 1924.

广东石豆兰 *guang dong shi dou lan*

Rhizome creeping or straggling, ca. 2 mm in diam., rooting from nodes of rhizome and base of pseudobulbs, roots spreading. Pseudobulbs 2–7 cm apart from each other, cylindrical, 1–2.5 cm, 2–5 mm in diam., with a terminal leaf. Petiole 1–2 mm; leaf blade oblong, usually 2.5–4.7 × 0.5–1.4 cm, leathery, apex obtuse-rounded and slightly emarginate. Scape from base of pseudobulb or node of rhizome, erect, to 9.5 cm, slender; raceme shortened, umbel-like, 2–4(–7)-flowered; peduncle ca. 0.5 mm in diam., sparsely with 3–5 narrowly tubular sheaths 6–10 mm; floral bracts narrowly lanceolate, ca. 2 mm. Pedicel and ovary ca. 2 mm. Flowers pale yellow. Sepals free, narrowly lanceolate, 8–10 × 1–1.3 mm, apical ca. 3/5 length of margins incurved, apex long acuminate; lateral sepals often slightly longer than dorsal sepal, 1/5–2/5 width of their base adnate to column foot; mentum inconspicuous. Petals narrowly ovate-lanceolate, 4–5 × ca. 0.4 mm, entire, long acuminate; lip narrowly lanceolate, ca. 1.5 × 0.4 mm, fleshy, grooved in basal half, adaxially with 2 or 3 ridges fused halfway to form a thickened ridge, apex obtuse. Column ca. 0.5 mm; stelia ca. 0.2 mm; foot ca. 0.5 mm, with free part ca. 0.1 mm; anther cap densely minutely papillate. Fl. May–Aug.

- Rocks in forests; 800–1200 m. N Fujian, Guangdong, C and N Guangxi, Guizhou, Hubei, SW Hunan, Jiangxi, S Yunnan, Zhejiang.

24. *Bulbophyllum shweliense* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 13: 191. 1921.

伞花石豆兰 san hua shi dou lan

Bulbophyllum craibianum Kerr.

Rhizome creeping or straggling, slender, ca. 1 mm in diam., branched, rooting from base of pseudobulbs, roots spreading. Pseudobulbs 2–5 cm apart from each other, subcylindric or narrowly ellipsoid-cylindric, 10–15 mm, 4–5 mm in diam., with a terminal leaf. Petiole 1–2 mm; leaf blade oblong, 2–3 × 0.5–1 cm, leathery, base contracted into petiole, apex obtuse-rounded and slightly emarginate. Scapes 1 or 2, from base of pseudobulb, erect, 3–4.5 cm, slender; raceme shortened, umbel-like, 4–10-flowered; peduncle ca. 0.5 mm in diam., with 3

or 4 narrowly tubular sheaths 4–6 mm; floral bracts lanceolate, 2–3 mm. Pedicel and ovary ca. 2 mm. Flowers slightly fragrant, orange. Sepals free, similar to each other, lanceolate, 7.5–8 × ca. 2 mm, apex long acuminate; dorsal sepal with slightly incurved apical margins; lateral sepals with distal margins incurved and tubular, base entirely adnate to column foot forming a subglobose mentum. Petals ovate-lanceolate, 3–3.5 × 1.4–2 mm, entire, shortly acute; lip recurved near apex, ovate-lanceolate in outline, ca. 2 mm, fleshy, glabrous, grooved at base, apex acute. Column ca. 1 mm; stelia subulate, ca. 0.5 mm; foot upcurved, ca. 2 mm, with free part 0.8–1 mm; anther cap obtusely triangular. Fl. Jun.

Tree trunks in forests; 1300–2100 m. N Guangdong, S and W Yunnan [N Thailand, N Vietnam].

5. *Bulbophyllum* sect. *Macrocaulia* (Blume) Averyanov, Oprel. Orkhid. Vetnama, 279. 1994.

巨球组 ju qiu zu

Diphyes sect. *Macrocaules* Blume, Bijdr. 318. 1825 [“*Macrocaulia*”].

Rhizome creeping; roots sprouting along rhizome, spreading; new shoots arising well above basal node of pseudobulb. Pseudobulbs distinct, apex with 1 leaf. Leaves persistent or deciduous, thin to thick. Inflorescences arising near pseudobulbs, solitary or a few in succession, 1-flowered. Pedicel with basal node distinctly more than 1 × diam. of pedicel above attachment of subtending bract. Sepals free, ± equally long or lateral sepals somewhat longer, margins glabrous, 3-veined. Petals: margins glabrous, 1-veined; lip glabrous adaxially, margins without auricles or lateral lobes, glabrous. Column: stigma not protruding at its base, foot distinct; anther: front margin not or slightly projecting, abaxially with a rounded crest; pollinia 4, inner 1/2 as long as outer or shorter, all without appendages.

Sixty-three provisionally accepted species: Nepal to the Philippines and Sulawesi; three species (one endemic) in China.

- 1a. Lip elliptic to ovate; lip margins rounded in proximal half 25. *B. ovalifolium*
- 1b. Lip with a triangular basal part and a distally swollen top part.
 - 2a. Lip 1.5–2 mm, top part coarsely verrucose 26. *B. catenarium*
 - 2b. Lip ca. 4 mm, top part glabrous 27. *B. menghaiense*

25. *Bulbophyllum ovalifolium* (Blume) Lindley, Gen. Sp. Orchid. Pl. 49. 1830.

卵叶石豆兰 luan ye shi dou lan

Diphyes ovalifolia Blume, Bijdr. 318. 1825; *Bulbophyllum ovatilabellum* Seidenfaden.

Plants small. Rhizome creeping. Pseudobulbs contiguous, nearly flattened globose or ellipsoid, 4–10 × 5–8 mm, with a terminal leaf. Leaf subsessile or shortly petiolate; blade elliptic, 10–30 × 4.5–10 mm, leathery, base contracted, apex obtuse. Scapes from base of pseudobulb, erect, 32–60 mm, terminating in a solitary flower; peduncle filiform, 10–30 mm; floral bracts cupular, ca. 2 mm, apex acute. Pedicel and ovary 15–23 mm. Flowers cream-colored or yellow to red, usually with darker veins; lip yellow, orange, or red. Dorsal sepal elliptic, 3.8–6.8 × 1.5–3 mm, apex acute-apiculate, margins glabrous to finely erose to ciliolate distally; lateral sepals elliptic, 4.5–12 × 2–8 mm, ± glabrous, margins entire, apex acute to acuminate. Petals (ob-)ovate-oblong, 1–1.8 × 0.7–1 mm, obtuse, margins entire; lip elliptic to ovate, 1.8–3.5 × 1.2–2.5 mm, fleshy, proximally concave because of upturned margins, margins then folding downward, rounded, adaxial surface distally papillose to verrucose toward margins. Column 1–1.8 mm; stelia narrowly triangular to subulate, 0.5–1 mm, lower margin with a deltoid, ob-

tuse tooth; foot ca. 1.5 mm, with free part ca. 1 mm; anther cap subglobose, papillose. Fl. May.

Tree trunks in forests; ca. 2400 m. Yunnan [Indonesia, Malaysia, Thailand].

This species was first recorded from China, without illustration, by X. H. Jin, H. Li, and D. Z. Li (Acta Phytotax. Sin. 45: 803–804. 2007), as *Bulbophyllum ovatilabellum*.

26. *Bulbophyllum catenarium* Ridley, Trans. Linn. Soc. London, Bot. 4: 235. 1894.

链状石豆兰 lian zhuang shi dou lan

Plants small. Rhizome creeping. Pseudobulbs contiguous, flattened globose to flattened cylindrical, 1–7 × 1–3 mm, with a terminal leaf. Leaf subsessile; blade elliptic, 4–12 × 3–6 mm, leathery, base contracted, apex obtuse. Scapes from base of pseudobulb, erect, 25–55 mm, terminating in a solitary flower; peduncle filiform, 25–32 mm; floral bracts cupular, 1.5–2.2 mm, apex acute. Pedicel and ovary 10–22 mm. Flowers bright yellow, with or without orange veins, or entirely orange; lip dark red to purple. Dorsal sepal elliptic, 3–6.4 × 2–2.5 mm, margins erose to ciliolate distally, apex acuminate; lateral sepals elliptic, 5–9 × 3.5–5.5 mm, margins entire to slightly erose, apex acuminate. Petals ovate, 1–1.3 × 0.4–0.7 mm, obtuse, mar-

gins entire to finely erose; lip with a triangular basal part and a swollen, subglobose top part, 1.5–2 × 0.8–1.6 mm, fleshy, proximally concave because of upturned margins, margins then folding sharply downward and distinctly angular, adaxial surface coarsely verrucose distally. Column 1–2.5 mm; stelia narrowly triangular to subulate, 0.5–1 mm, lower margin with inconspicuous, rounded wings; foot ca. 1 mm, with free part very short; anther cap subglobose, papillose. Fl. Apr–May.

Trees in forests; 2200–2300 m. Yunnan [Malay Archipelago (Borneo), Malaysia (Peninsular), Vietnam].

This species was first recorded from China, including color photographs, by Y. M. Shui and W. H. Chen (Seed Pl. Karst Region China 1: 216. 2006).

27. *Bulbophyllum menghaiense* Z. H. Tsi, Bull. Bot. Res., Harbin 1(1–2): 109. 1981.

勐海石豆兰 meng hai shi dou lan

Plants small. Rhizome creeping. Pseudobulbs contiguous,

nearly flattened globose, broader than long, 3–4 mm in diam., with a terminal leaf. Leaf subsessile; blade ovate-lanceolate or oblong-ligulate, 4–10 × 2–3 mm, leathery, base contracted, apex acute. Scapes 1 or 2, from base of pseudobulb, erect, 7–10 mm, terminating in a solitary flower; peduncle filiform, 5–7 mm; floral bracts cupular, ca. 1 mm, apex acute. Pedicel and ovary ca. 4 mm. Flowers yellowish with reddish brown veins; lip orange-red. Dorsal sepal ovate, 5.5–7 × ca. 1.8 mm, apex acute-acuminate; lateral sepals ovate-triangular, 6–7 × ca. 2 mm, apex acute. Petals obovate-oblong, ca. 2.2 × 1 mm, entire, obtuse; lip with a triangular basal part and a linear top part, ending in a somewhat swollen tip, ca. 4 × 1.3 mm, fleshy, proximally concave because of upturned margins, margins then folding downward and angular, adaxial surface glabrous. Column ca. 1 mm; stelia narrowly fusiform, ca. 1.1 mm, lower margin rounded, without a tooth; foot ca. 1.5 mm, upcurved, with free part ca. 0.7 mm; anther cap subglobose, glabrous. Fl. Jul.

• Tree trunks in forests; ca. 1500 m. S Yunnan.

6. *Bulbophyllum* sect. *Monanthes* (Blume) Averyanov, Oprel. Orkhid. Vetnama, 279. 1994.

单花组 dan hua zu

Diphyes sect. *Monanthes* Blume, Bijdr. 311. 1825.

Rhizome creeping; roots sprouting mainly below pseudobulbs, spreading; new shoots arising from basal node of pseudobulb. Pseudobulbs distinct, apex with 1 leaf. Leaves persistent, thin to thick. Inflorescences solitary, or clustered on a lateral sympodium, arising near pseudobulbs, 1-flowered. Pedicel with basal node ± coinciding with attachment of subtending bract. Sepals free [lateral sepals often fused along lower margin in extralimital species], ± equally long, margins glabrous, 3-veined. Petals: margins ± glabrous, 1-veined; lip: margins without retrorse auricles on each side of ligament [these often present in extralimital species], with lateral lobes higher up along margins, margins otherwise ± glabrous, adaxially glabrous. Column: stigma not protruding at its base, foot distinct; anther: front margin not or slightly projecting, abaxially with a rounded crest; pollinia 4, inner ca. 1/2 as long as outer, all without appendages.

One hundred and twenty-two provisionally accepted species: Himalayas to W Pacific; one species in China.

28. *Bulbophyllum depressum* King & Pantling, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66: 585. 1897.

戟唇石豆兰 ji chun shi dou lan

Bulbophyllum hastatum Tang & F. T. Wang.

Rhizome creeping, slender, ca. 1 mm in diam., branched, with 2 or 3 roots at base of pseudobulbs. Pseudobulbs 8–14 mm apart on rhizome, prostrate on rhizome, apical half ascending, obliquely ovoid, small, 4–8 mm, 2.5–4 mm in diam., with a terminal leaf. Petiole 1–2 mm; leaf blade ovate or ovate-lanceolate, 6–15(–23) × 4–8(–10) mm, papery, apex apiculate. Scape from base of pseudobulb or node of rhizome, erect, filiform, ca. 6 mm, 0.3–0.4 mm in diam., terminating in a solitary flower, with 1 membranous sheath at base; floral bracts cupular, shorter than pedicel and ovary, membranous. Pedicel and ovary ca. 1

mm. Flowers very small, erect, purple, with greenish base and apex. Dorsal sepal lanceolate, ca. 3 × 0.7 mm, apex acute-acuminate; lateral sepals falcate-lanceolate, slightly longer than dorsal sepal, ca. 0.7 mm, base adnate to column foot forming a mentum, apex acuminate. Petals elliptic, ca. 2 × 0.5 mm, apex acute; lip subovate in outline, ca. 1.5 mm, glabrous, 3-lobed; lateral lobes erect, suborbicular, their apices ca. 1 mm apart when spreading out, membranous; mid-lobe ligulate, fleshy-thickened, ca. 0.7 mm, apex obtuse; disk with 1 callus running to mid-lobe. Column ca. 1 mm; foot ca. 1.5 mm, without free part; stelia inconspicuous; anther cap subglobose, glabrous. Fl. Jun–Nov.

Tree trunks in dense forests or rocks along valleys; 400–600 m. SW Guangdong, Hainan, SE Yunnan [India, Thailand].

7. *Bulbophyllum* sect. *Monanthaparva* Ridley, J. Linn. Soc., Bot. 32: 269. 1896.

柱唇组 zhu chun zu

Rhizome creeping; roots sprouting mainly below pseudobulbs, spreading; new shoots arising from basal node of pseudobulb. Pseudobulbs distinct, apex with 1 leaf. Leaves persistent, thin to thick. Inflorescences arising near pseudobulbs, solitary or a few together on a lateral sympodium, 1-flowered. Pedicel with basal node more than 1 × diam. of pedicel above attachment of subtending bract. Sepals free, ± equally long, margins glabrous, 3-veined. Petals: margins ± glabrous, 1-veined; lip: margins without auricles or lateral lobes, margins glandular-papillose, adaxially glandular papillose. Column: stigma not protruding at its base, foot absent or

very short; anther: front margin projecting into a triangular beak, abaxially with a slight, rounded crest; pollinia 4, inner more than 1/2 as long as outer, all without appendages.

Twenty-nine provisionally accepted species: Indochina to W Pacific; one species (endemic) in China.

29. *Bulbophyllum menglunense* Z. H. Tsi & Y. Z. Ma, Acta Bot. Yunnan. 7: 83. 1985.

勐仑石豆兰 meng lun shi dou lan

Plants small. Rhizome creeping, slender, ca. 1 mm in diam., bearing roots from base of pseudobulbs. Pseudobulbs ca. 1 cm apart on rhizome, ovoid, 5–7 mm, 3–4 mm in diam., base ± prostrate on rhizome, with a terminal leaf. Petiole ca. 1 mm, ± twisted; leaf blade ovate, 8–13 × 5–6 mm, leathery, apex mucronate. Scape from base of pseudobulb or node of rhizome, erect, filiform, 5–7 mm, ca. 0.4 mm in diam., terminating in a solitary flower, with 1 sheath at base; floral bracts cupular, ca. 1 mm,

membranous. Pedicel and ovary ca. 2 mm. Flowers very small, purplish red. Sepals free; dorsal sepal ovate, ca. 2.1 × 0.8 mm, apical margins slightly incurved, apex acuminate; lateral sepals obliquely ovate-lanceolate, ca. 2.2 × 1.1 mm, margins ± incurved above middle, apex acute. Petals elliptic, ca. 1 × 0.7 mm, apex acute; lip slightly recurved, subcylindric, ca. 1.5 × 0.3 mm, fleshy, base connate to end of column foot, immobile, margins in basal half with glandular hairs. Column ca. 1 mm; foot ca. 0.8 mm, without distinct free part; stelia inconspicuous; anther cap subglobose. Fl. Mar.

• Tree trunks in open forests in limestone areas; ca. 800 m. S Yunnan.

8. *Bulbophyllum* “Section 8”

穗花组 sui hua zu

Rhizome creeping; roots sprouting mainly below pseudobulbs, spreading; new shoots arising from basal node of pseudobulb. Pseudobulbs distinct, apex with 1 leaf. Leaves persistent, thick. Inflorescence solitary, arising near pseudobulbs, an elongate to ± sub-umbellate raceme. Pedicel with basal node ± coinciding with attachment of subtending bract. Dorsal sepal with margin glabrous, papillose, erose, or ciliate; lateral sepals free, ca. as long as or longer than dorsal sepal, with margins glabrous or slightly denticulate, 3–5-veined. Petals: margins denticulate to ciliate, 1–3-veined; lip: margins without auricles or lateral lobes, margins otherwise ± glabrous, adaxially ± glabrous. Column: stigma protruding at its base or not, foot distinct; anther: front margin projecting or not, abaxially with or without a low, rounded crest; pollinia 4, inner 1/2 as long as outer or longer, all without appendages.

Six provisionally accepted species: India to Indochina; three species (one endemic) in China.

- 1a. Inflorescence umbellate 30. *B. levinei*
- 1b. Inflorescence racemose.
 - 2a. Lip 3.5–4 mm 31. *B. eublepharum*
 - 2b. Lip 2–2.8 mm 32. *B. insulsoides*

30. *Bulbophyllum levinei* Schlechter, Repert. Spec. Nov. Regni Veg. 19: 381. 1924.

齿瓣石豆兰 chi ban shi dou lan

Bulbophyllum insulsum (Gagnepain) Seidenfaden; *Cirrhopetalum insulsum* Gagnepain.

Rhizome creeping, slender. Pseudobulbs close, subcylindric or bottle-shaped, 5–10 mm, 2–4 mm in diam., with a terminal leaf. Petiole 4–10 mm; leaf blade narrowly oblong or obovate-lanceolate, 3–4(–9) × 0.5–0.7(–1.4) cm, thinly leathery, base contracted into petiole, margin slightly undulate, apex subacute. Scape from base of pseudobulb, erect, 3–5 cm, longer than leaves, slender, glabrous; raceme shortened, umbel-like, often 2–6-flowered; peduncle ca. 0.5 mm in diam., sparsely with 2 or 3 tubular sheaths; floral bracts erect, narrowly lanceolate, 2–3.5 mm, apex acuminate. Pedicel and ovary longer than floral bracts. Flowers thinly textured, white tinged with purple. Dorsal sepal ovate-lanceolate, concave, 4–5 × 1.5–2 mm, abruptly contracted and thickened above middle, margin denticulate, apex acute; lateral sepals obliquely ovate-lanceolate, 5–5.5 × 1.5–2 mm, thickened above middle, base adnate to column foot forming a mentum, margins entire, apex cuspidate. Petals connivent to sepals, ovate-lanceolate, ca. 3.5 × 1.5 mm, margins denticulate, apex long acuminate; lip recurved, lanceo-

late in outline, 2–2.5 mm, nearly fleshy, basal half grooved, base attached to end of column foot, immobile, margin entire, apex subacute. Column ca. 1.2 mm; stelia filiform, ca. 0.5 mm; foot curved, ca. 1.5 mm, with free part ca. 0.5 mm; anther cap subglobose, apex narrowed and beaked, with a densely finely papillate ridge centrally. Fl. May–Aug.

Tree trunks in forests, rocks along valleys; ca. 800 m. Fujian, S Guangdong, Guangxi, SE Hunan, SW Jiangxi, W to SE Yunnan, Zhejiang [Vietnam].

31. *Bulbophyllum eublepharum* H. G. Reichenbach, Ann. Bot. Syst. 6: 252. 1861.

墨脱石豆兰 mo tuo shi dou lan

Bulbophyllum yuanyangense Z. H. Tsi.

Pseudobulbs close, cylindric, 4–6.5 cm, 7–10 mm in diam., with a terminal leaf. Petiole 1–2 cm; leaf blade oblong, 13–21.5 × 3.5–4 cm, thickly leathery, base contracted into a petiole, apex acute. Scape from base of pseudobulb, erect, to 55 cm; raceme 9–10 cm, sparsely many flowered; peduncle 2–4 mm in diam., base with 2 or 3 tubular sheaths to 2.5 cm; floral bracts narrowly lanceolate, 5–8 mm, apex long acuminate. Pedicel and ovary 5–8 mm. Flowers green. Sepals free, ovate-lanceolate, ca. 15 × 6 mm, apex acuminate; dorsal sepal slightly shorter than

lateral sepals. Petals broadly elliptic, 3–4 × 2.5–3.5 mm, margins ciliate, apex obtuse; lip oblong-lanceolate, thickly fleshy, grooved at adaxial base, margin glandular-ciliate, apex obtuse and retuse. Column stout, base dilated, with wings enlarged at base; foot short; stielidia subulate. Fl. unknown. 2n = 38.

Tree trunks in forests; 2000–2100 m. SE Xizang, NW and SE Yunnan [Bhutan, NE India].

32. *Bulbophyllum insulsoides* Seidenfaden, Dansk Bot. Ark. 29(1): 89. 1974.

穗花卷瓣兰 sui hua juan ban lan

Bulbophyllum racemosum Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 317. 1911, not Rolfe (1893); *Cirrhopetalum racemosum* Hayata.

Pseudobulbs close, ovoid-conic, 2.5–3 cm, 8–15 mm in diam., with 1 leaf at apex. Leaf shortly petiolate; blade narrowly oblong, 10–17 × 1.3–3 cm, leathery, base contracted into petiole, apex subacute. Scape from base of pseudobulb, ca. 12 cm, slender; raceme elongate, sparsely 10-flowered; peduncle with 2–4 sheathlike bracts; floral bracts lanceolate, 6–9 mm. Pedicel and ovary shorter than floral bracts. Flowers yellowish green with pale red spots. Dorsal sepal ovate-lanceolate, 6–8 × ca. 2.5 mm, densely ciliate, apex acuminate and recurved; lateral sepals obliquely ovate-lanceolate, 7–11 × 2–3 mm, base adnate to column foot, apex long caudate. Petals ovate, 2–4 × 1.5–2 mm, densely ciliate; lip ligulate, ca. 2.5 × 1.5 mm, adaxially with 3 ridges (central 1 yellow, lateral 2 yellowish white), attached to end of column foot, immobile. Column white, ca. 2 mm, with a foot ca. 2 mm; stielidia slender. Fl. Jul–Sep.

• Tree trunks in forests; 1000–2000 m. C and S Taiwan.

9. *Bulbophyllum* sect. *Anisopetalon* (Hooker) Lindley, Veg. Kingd. 181. 1846.

异瓣组 yi ban zu

Anisopetalon Hooker, Exot. Fl. 2: ad t. 149. 1825.

Rhizome creeping or straggling; roots sprouting mainly below pseudobulbs, spreading; new shoots arising from basal node of pseudobulb. Pseudobulbs distinct, apex with 1 leaf. Leaves persistent, thick. Inflorescence solitary, arising near pseudobulbs, an elongate or somewhat contracted raceme. Pedicel with basal node coinciding with attachment of subtending bract. Sepals: margins glabrous, 3-veined; lateral sepals ± fused along their lower margins. Petals: margins glabrous to erose, 1–3-veined; lip: margins without retrorse auricles on each side of ligament, with antrorse, often denticulate auricles higher up along margins (absent in *Bulbophyllum brevispicatum*), margins otherwise ± glabrous to denticulate, adaxially ± glabrous. Column: stigma not protruding at its base, foot distinct; anther: front margin not or slightly projecting, abaxially with or without a low, rounded crest; pollinia 4, inner 1/2 as long as outer or longer, all without appendages.

About 38 provisionally accepted species (several taxa are of uncertain status): India to Vietnam and Peninsular Malaysia; five species (one endemic) in China.

- 1a. Lip without basal auricles on both sides 33. *B. brevispicatum*
- 1b. Lip with 2 basal auricles on both sides.
 - 2a. Raceme ca. 8 cm, sparsely flowered 34. *B. rufinum*
 - 2b. Raceme 2–7 cm, densely flowered.
 - 3a. Flowers yellowish white; floral bracts much longer than flowers; petals acute at apex 35. *B. bittnerianum*
 - 3b. Flowers yellowish green or yellowish brown, with purplish red spots or stripes; floral bracts nearly as long as or slightly longer than flowers; petals cuspidate or shortly caudate at apex.
 - 4a. Basal auricles of lip subsquare, apex truncate and slightly retuse; column with deltoid teeth 36. *B. crassipes*
 - 4b. Basal auricles of lip falcate, apex apiculate and unequally 2- or 3-toothed; column with subulate teeth 37. *B. orientale*

33. *Bulbophyllum brevispicatum* Z. H. Tsi & S. C. Chen, Acta Phytotax. Sin. 32: 555. 1994.

短序石豆兰 duan xu shi dou lan

Pseudobulbs ca. 2 cm apart from each other, subcylindric, 3–3.5 cm, 5–7 mm in diam., with a terminal leaf. Leaf subsessile; blade oblong, ca. 17 × 2.8 cm, apex acute. Scape from base of pseudobulb, arching, ca. 2 cm; raceme densely 6- or 7-flowered; peduncle with 3 scalelike sheaths ca. 6 mm; floral bracts lanceolate, ca. 6 mm, apex acuminate. Pedicel and ovary 4–5 mm. Flowers purplish red. Dorsal sepal ovate-elliptic, concave, ca. 5 × 3 mm, abaxially densely papillate, apex acute; lateral sepals ovate, nearly as large as dorsal sepal, abaxially densely papillate, their lower edges connate to each other, with

free apex. Petals ovate, ca. 3 × 2 mm, margins irregularly denticulate, apex rounded; lip attached to end of column foot by a mobile joint, recurved, ligulate, ca. 3 mm, fleshy, glabrous, base with 1 central groove, with 2 cornute auricles on both basal sides, apex obtuse-rounded. Column ca. 2 mm; stielidia subulate, ca. 1.5 mm, foot with free part ca. 1.5 mm; anther cap tower-shaped, densely papillate. Fl. Jan.

• Tree trunks at forest margins along valleys; 1300–1400 m. S Yunnan.

34. *Bulbophyllum rufinum* H. G. Reichenbach, Xenia Orchid. 3: 44. 1881.

窄苞石豆兰 zhai bao shi dou lan

Rhizome stout, 5–6 mm in diam., with scalelike sheaths,

rooting from base of pseudobulbs. Pseudobulbs ca. 8 cm apart on rhizome, pale yellow when dried, ovoid-conic, 2.5–4 cm, 1.5–2 cm in diam., with a terminal leaf. Petiole ca. 1 cm; leaf blade oblong, 11–20.5 × ca. 3 cm, fleshy or thickly leathery, base contracted into petiole, apex obtuse and slightly emarginate. Scape from base of pseudobulb, slightly arching, ca. 10 cm, often slender; raceme ca. 8 cm, sparsely many flowered; peduncle with several sheaths at base; floral bracts narrowly oblong-lanceolate, 7–20 mm, apex obtuse. Flowers yellow, thinly textured. Dorsal sepal ovate-lanceolate, ca. 6 × 2 mm, apex acuminate; lateral sepals ovate-lanceolate, ca. 9 × 2.2 mm, their lower edges connate to each other, upper edges incurved, apex acute. Petals obliquely ovate-lanceolate, ca. 2 × 0.9 mm, apex caudate; lip ligulate, ca. 3 × 1 mm, margins finely papillate, grooved at adaxial base, with 2 auricles on both basal sides, apex obtuse; auricles falcate, ca. 0.5 mm, apex acute. Column ca. 1.8 mm; stelidia subulate, ca. 1 mm; foot ca. 1.5 mm, with free part ca. 0.5 mm. Fl. Nov. $2n = 38$.

Tree trunks in dense forests; 800–900 m. S Yunnan [Cambodia, Laos, Myanmar, Thailand, Vietnam].

35. *Bulbophyllum bittnerianum* Schlechter, *Orchis* 4: 108. 1910.

团花石豆兰 *tuan hua shi dou lan*

Rhizome stout, 4–5 mm in diam., rooting from nodes of rhizome. Pseudobulbs 3–5 cm apart from each other, ovoid, ca. 2.5 cm, 1.3–2.3 cm in diam., 4-ribbed, with a terminal leaf. Petiole 1–1.5 cm; leaf blade oblong, 15–17.5 × 2–3.5 cm, slightly fleshy, base contracted into petiole, apex subobtuse. Scape from base of pseudobulb, suberect or arching; raceme 3–4 cm, densely many flowered; peduncle stout, with 3 or 4 large sheaths; floral bracts yellowish white, oblong, large, ca. 20 × 7–8 mm, papery, margins with purple spots. Pedicel and ovary yellowish white, ca. 3 mm; flowers enclosed in floral bracts, fleshy; sepals and petals yellowish white spotted with purple; lip yellowish with purple apex. Dorsal sepal oblong, concave, ca. 6.5 × 3.5 mm, entire, obtuse; lateral sepals obliquely ovate, ca. 8 × 4.5 mm, base adnate to column foot, their lower edges connate to each other, apex acute. Petals narrowly ovate, ca. 3 × 1.8 mm, entire, acute; lip ligulate, ca. 3.5 × 1 mm, narrowed toward obtuse apex, adaxial base grooved, with 2 auricles on both basal sides, both surfaces densely papillate. Column ca. 3 mm; foot ca. 2 mm; stelidia deltoid, ca. 1 mm; anther cap yellow, apex beaked. Fl. Jul.

Tree trunks in evergreen broad-leaved forests; ca. 1700 m. S Yunnan [N Thailand].

36. *Bulbophyllum crassipes* J. D. Hooker, *Fl. Brit. India* 5: 760. 1890.

短耳石豆兰 *duan er shi dou lan*

Rhizome stout, 3–4 mm in diam., rooting from base of

pseudobulbs. Pseudobulbs 2–30 cm apart from each other, ovoid or conic, 3–4 cm, 1.5–2.5 cm in diam., usually 4- or 5-veined, with a terminal leaf. Petiole 1–2 cm; leaf blade oblong, 12–17 × 2–3.5 cm, fleshy or thickly leathery, apex obtuse and slightly emarginate. Scape from base of pseudobulb, arching, 4–17 cm; raceme 2–7 cm, densely many flowered; peduncle stout, base with 3 or 4 sheaths; floral bracts pale brown, ovate-lanceolate, 5–7 mm, apex acute. Pedicel and ovary 4–5 mm. Flowers yellowish brown. Dorsal sepal oblong, concave, ca. 6 × 3 mm, apex obtuse-rounded; lateral sepals ovate-lanceolate, much longer than dorsal sepal, base ca. 3.5 mm wide, their lower edges connate and upper edges incurved near apex to form an ovoid sac, apex acute. Petals obliquely triangular, 2.5–3 × ca. 2 mm, decurrent to column foot, margins often irregularly denticulate, apex shortly caudate; lip ligulate, longer than petals, fleshy, margin finely papillate, grooved at adaxial base, with 2 auricles on both basal sides; auricles subsquare, ca. 1 mm, apex truncate and slightly retuse. Column ca. 2 mm; stelidia deltoid, ca. 1 mm, apex acute; foot ca. 2 mm, with free part ca. 1 mm; anther cap glabrous. Fl. Apr. $2n = 38$.

Tree trunks in evergreen broad-leaved forests; 1100–1200 m. S Yunnan [Bhutan, NE India, Malaysia (Penang), Myanmar, Thailand].

37. *Bulbophyllum orientale* Seidenfaden, *Dansk Bot. Ark.* 33(3): 138. 1979.

麦穗石豆兰 *mai sui shi dou lan*

Rhizome stout, 4–5 mm in diam., rooting from base of pseudobulbs. Pseudobulbs 4–6 cm apart on rhizome, ovoid, usually 2–3 cm, base ca. 1.5 cm in diam., with a terminal leaf. Petiole 0.5–1 cm; leaf blade oblong, 8–30 × 1.5–3.4 cm, leathery or fleshy, base contracted into petiole, apex slightly retuse. Scape from base of pseudobulb, arching, 5–13 cm; raceme 3–6 cm, densely many flowered; peduncle with 4 or 5 large sheaths ca. 2 cm; floral bracts ovate-lanceolate, 5–6 mm, apex acute. Pedicel and ovary ca. 5 mm. Flowers yellowish green, with brown venation on sepals and petals and black spots on lip. Dorsal sepal ovate, ca. 6 × 3 mm, entire, acute; lateral sepals obliquely ovate-lanceolate, ca. 7.5 × 4.2 mm, abaxially slightly papillate, base adnate to column foot, their lower edges connate forming an ovoid sac, apex acute. Petals slightly obliquely triangular, ca. 2.5 × 1.8 mm, slightly decurrent to column foot, apex cuspidate; lip ca. 6 mm, fleshy, centrally grooved in basal half, apex obtuse, recurved, margin papillate, with 2 auricles on both basal sides; auricles falcate, ca. 1.3 × 0.4 mm, apex apiculate and irregularly toothed. Column yellow, subcylindric, ca. 2 mm; foot ca. 3 mm, with free part ca. 1.5 mm; stelidia subulate, ca. 1 mm; anther cap glabrous. Fl. Jun–Sep. $2n = 38$.

Tree trunks in evergreen broad-leaved forests; 1000–2000 m. S and SW Yunnan [Thailand, Vietnam].

10. *Bulbophyllum* sect. *Hirtula* Ridley, *Mat. Fl. Malay. Penins.* 1: 68. 1908.

硬毛组 *ying mao zu*

Rhizome creeping; roots sprouting mainly below pseudobulbs, spreading; new shoots arising from basal node of pseudobulb. Pseudobulbs distinct, apex with 1 leaf. Leaves persistent, thick. Inflorescence solitary, arising near pseudobulbs, an elongate raceme. Pedicel with basal node ± coinciding with attachment of subtending bract or well above it. Sepals free, ± equally long, margins

ciliate, adaxially glabrous to hirsute, 3-veined. Petals: margins ciliate, 1-veined; lip: margins with a retrorse auricle immediately next to ligament, without lateral lobes, margins ciliate, adaxially glabrous, finely papillose, verrucose, finely pubescent or velutinous. Column: stigma protruding at its base or not, foot distinct; anther: front margin not projecting, abaxially with a rounded crest; pollinia 4, inner 1/2 as long as outer or longer, all without appendages.

Forty accepted species: India to the Philippines and Sulawesi; four species in China.

See the revision by Vermeulen (Gard. Bull. Singapore 54: 26. 2002).

The New Guinean *Bulbophyllum phreatiopsis* J. J. Vermeulen is better excluded.

- 1a. Sepals adaxially glabrous 38. *B. secundum*
- 1b. Sepals adaxially partly or entirely pubescent or pilose.
 - 2a. Lip distally pouch-shaped, deeply concave adaxially 39. *B. scaphiforme*
 - 2b. Lip distally convex, flat, or only slightly concave.
 - 3a. Lip 2.8–4.2 × 1–1.6 mm, abaxially convex toward tip 40. *B. nigripetalum*
 - 3b. Lip 5–7 × 2–3.3 mm, abaxially ± flat to slightly concave toward tip 41. *B. nigrescens*

38. *Bulbophyllum secundum* J. D. Hooker, Fl. Brit. India 5: 764. 1890.

少花石豆兰 shao hua shi dou lan

Bulbophyllum subparviflorum Z. H. Tsi & S. C. Chen;
Phyllorkis secunda (J. D. Hooker) O. Kuntze.

Rhizome 0.8–2 mm in diam., sections between pseudobulbs 0.5–1.8 cm. Pseudobulbs close, depressed conic to lenticular, 0.4–1 × 0.6–1.5 cm. Petiole 0.7–1.5 cm; leaf blade elliptic, 3.2–10 × 0.4–1 cm, obtuse to acute. Inflorescence an elongate, rather lax raceme, erect, 7.5–22 cm, 8–23-flowered; peduncle 5–13.2 cm; bracts ca. 4, longest 2–4.5 mm; rachis not thickened, 2.2–11 cm, glabrous; floral bracts triangular, 1–1.8 × 0.8–1.2 mm, acute to acuminate. Flowers distichous or scattered, resupinate, secund, not fully opening, several simultaneously, pale green, often suffused with dull reddish brown or purple toward tip, or almost entirely of that color except for base, lip reddish purple, or brownish green, proximally dark brown along margins. Pedicel and ovary 1.8–6 mm. Dorsal sepal ± porrect, ovate to triangular, 2–3.2 × 0.9–1.3 mm, rather thin, surface glabrous, base rather narrowly attached, margin ciliolate, apex obtuse to acute; lateral sepals recurved, triangular, 2.2–3.8 × 1.3–2.2 mm, upper margin glabrous to sparsely ciliolate, (sub-)acute, otherwise as dorsal sepal. Petals porrect, obovate to spatulate, 1.5–2.5 × 0.6–1 mm, thin, glabrous or slightly papillose toward tip, base broadly attached, margins ciliate, apex rounded to obtuse; lip recurved in proximal half, ovate, 1.8–3 × 0.9–1.2 mm, thick; abaxially with an inconspicuous, retuse ridge toward base, surface glabrous; adaxially slightly concave near base and with a deeply cleft, triangular basal callus, with 2 very weak, rounded ridges diverging proximally and fused to a single slightly convex body in distal half of lip, surface finely papillose to shortly pubescent proximally and glabrous distally, margins ciliate except near tip, apex rounded. Column 1.1–1.3 mm; stelia triangular, 0.3–0.5 mm, acute. Fl. Jan–Feb, May–Jul, Sep.

Epiphytic in montane temperate or tropical evergreen (shrub) forests, also reported from depleted evergreen forests; 1200–2500 m. Yunnan [India, Myanmar, Nepal, Thailand, Vietnam].

39. *Bulbophyllum scaphiforme* J. J. Vermeulen, Gard. Bull. Singapore 54: 84. 2002.

囊唇石豆兰 nang chun shi dou lan

Rhizome: sections between pseudobulbs 1.5–2.5 cm. Pseudobulbs close, depressed conic, 1.5–2.5 × 1.5–3 cm. Petiole 1–1.5 cm; leaf blade ?elliptic, 7–9.2 × ca. 1.8 cm, ?subacute. Inflorescence an elongate, rather lax raceme, erect to spreading, 28–54 cm, 23–33-flowered; peduncle 14–25 cm; rachis not thickened, 14–22 cm, glabrous; floral bracts triangular, 3–4 × ca. 2 mm, acute. Flowers spreading to reflexed, secund, not fully opening, many simultaneously, blackish purple, yellowish toward base, or yellowish with blackish purple veins, margins, and scattered spots, lip blackish purple with green or yellowish ridges adaxially. Pedicel and ovary 5.5–9 mm. Dorsal sepal porrect to recurved, ovate, 4.5–7.5 × 2–4.2 mm, rather thin, abaxially glabrous, adaxially pubescent, base rather broadly attached, margin ciliate, apex acute; lateral sepals recurved, elliptic to ovate, 6–8 × 2.5–4.2 mm, acute to acuminate, otherwise as dorsal sepal. Petals ± porrect, spatulate, 2–2.5 × 0.8–1.5 mm, surface pubescent distally, base broadly attached; rather thick with a thick top, margins ciliate distally, apex acute to acuminate; lip recurved in proximal half, pouch-shaped distally, obovate in outline, 4.8–5.5 × 1.8–3.2 mm, rather thin; abaxially with a wide, rounded ridge near base, surface otherwise convex, pubescent, or only so in front of basal ridge and toward margins; adaxially somewhat concave and with a median slit reaching up to ca. 1/3 of lip near base, with 2 distinct, obtuse ridges diverging proximally, running ± parallel over ca. 3/4 of lip, and ending in some irregularly shaped calli, surface with irregular, radiating furrows distally but otherwise glabrous, margins ciliate, apex rounded. Column 1–1.6 mm; stelia triangular, 0.4–0.7 mm, acute. Fl. Mar–May, Jul.

Epiphytic; 1100–1400 m. Yunnan [Thailand, Vietnam].

40. *Bulbophyllum nigripetalum* Rolfe, Bull. Misc. Inform. Kew 1891: 197. 1891.

黑瓣石豆兰 hei ban shi dou lan

Rhizome 1.5–3 mm in diam., sections between pseudobulbs 0.6–2.5 cm. Pseudobulbs close, ovoid or broadly conic, 0.9–1.7 × 0.9–1.8 cm. Petiole 0.8–2 cm; leaf blade elliptic, 5.2–17 × 0.6–1.5 cm, obtuse. Inflorescence an elongate, rather lax raceme, erect to spreading, 15–49 cm, 13–32-flowered; peduncle 8–25 cm; bracts ca. 5, longest 4–9 mm; rachis not thickened, 5.5–25 cm, glabrous; floral bracts triangular, 1.8–4.5 × 1–2 mm, acuminate. Flowers spreading to reflexed, secund, not fully opening, many simultaneously, cream-colored or yellow,

near base often with blackish purple veins, sometimes blackish purple distally, or blackish purple all over, lip blackish purple, often yellowish at base. Pedicel and ovary 3.8–6.5 mm. Dorsal sepal porrect to recurved, ovate to triangular, 3.1–6 × 1.3–2.2 mm, rather thin, abaxially glabrous, adaxially pubescent, base rather narrowly attached, margin ciliate, apex obtuse to acute; lateral sepals recurved, 3–6 × 2.2–3 mm, otherwise as dorsal sepal. Petals ± porrect, elliptic to obovate or spatulate, 1.6–2.2 × 0.5–1 mm, rather thin with a thick tip, surface pubescent distally, base broadly attached, margins ciliate distally, apex obtuse to acuminate; lip recurved in proximal half, obovate to elliptic, 2.8–4.2 × 1–1.6 mm, thick and fleshy; abaxially with a wide, rounded ridge near base, surface elsewhere convex, partly or entirely velutinous; adaxially somewhat concave near base, with 3 ridges: 2 distinct, obtuse ridges diverging proximally, continuing over 1/3–3/4 of lip, and a thin, low, sometimes inconspicuous median ridge continuing over ca. 1/2 of lip, surface glabrous, finely velutinous toward margins, margins ciliate, apex rounded to obtuse. Column 1–1.3 mm; stelia triangular, 0.3–0.6 mm, acute. Fl. Mar–May.

Epiphytic or lithophytic in forests; 1000–1300 m. Yunnan [Thailand].

41. *Bulbophyllum nigrescens* Rolfe, Bull. Misc. Inform. Kew 1910: 158. 1910.

钩梗石豆兰 *gou geng shi dou lan*

Bulbophyllum anguste-ellipticum Seidenfaden.

Rhizome 2–3.5 mm in diam., sections between pseudobulbs 0.6–2.5 cm. Pseudobulbs close, ovoid or broadly conic, 0.8–1.7 × 1–2 cm. Petiole 0.8–2 cm; leaf blade elliptic to ovate,

6–13 × 0.9–1.7 cm, obtuse. Inflorescence an elongate, rather lax raceme, erect to spreading, 23–44 cm, 13–27-flowered; peduncle 8–22 cm; bracts ca. 5, longest 6.5–9 mm; rachis not thickened, 9–20 cm, glabrous; floral bracts triangular, 1.8–4.5 × 1–2 mm, acuminate. Flowers spreading to reflexed, secund, not fully opening, many simultaneously, yellowish, stained with blackish purple and with blackish purple veins, sometimes entirely blackish purple adaxially and pale reddish brown abaxially, petals and lip almost entirely blackish purple, petals proximally sometimes yellow with a blackish purple vein. Pedicel and ovary 5–11 mm. Dorsal sepal porrect to recurved, ovate to triangular, 5.5–9.5 × 1.8–3.2 mm, rather thin, adaxially pubescent, abaxially glabrous, base rather narrowly attached, margin ciliate, apex obtuse to acute; lateral sepals recurved, 6.5–10.5 × 2.7–4.2 mm, otherwise as dorsal sepal. Petals ± porrect, elliptic to obovate or spatulate, 1.5–2.5 × 0.8–1.5 mm, rather thin with a thick top, surface pubescent distally, base broadly attached, margins ciliate distally, apex obtuse to acuminate; lip recurved in proximal half, obovate to elliptic, 5–7 × 2–3.3 mm, rather thin; abaxially with a wide, rounded ridge near base, surface elsewhere concave to flat, glabrous or partly pubescent; adaxially somewhat concave near base and with a median slit or furrow reaching up to 1/3–2/3 of lip, with 2 distinct, obtuse ridges diverging proximally, continuing over 1/3–3/4 of lip, and often ending in a patch of irregularly shaped verrucae, surface glabrous, margin ciliate, apex rounded to obtuse. Column 1.4–1.8 mm; stelia triangular, 0.5–0.8 mm, acute. Fl. Jan–May, Jul.

Epiphytic or lithophytic in deciduous or evergreen forests; 700–1800 m. S Yunnan [Thailand, Vietnam].

Chinese records of *Bulbophyllum nigrescens* could be based on misidentified plants.

11. *Bulbophyllum* sect. *Altisceptrum* J. J. Smith, Bull. Jard. Bot. Buitenzorg, sér. 2, 13: 34. 1914.

狭瓣组 *xia ban zu*

Rhizome creeping; roots sprouting mainly below pseudobulbs, spreading; new shoots arising from basal node of pseudobulb. Pseudobulbs distinct, apex with 1 leaf. Leaves persistent, thick. Inflorescence solitary, arising near pseudobulbs, an elongate raceme. Pedicel with basal node well above attachment of subtending bract. Sepals free, margins glabrous, adaxially glabrous, 3-veined. Petals: margins erose, 1-veined; lip: margins without auricles or lateral lobes, margins glabrous, adaxially glabrous. Column: stigma not protruding at its base, foot distinctly elongated so as to leave a gap between lower margin of petal and upper of lateral sepal; anther: front margin not projecting, abaxially with a rounded crest; pollinia 4, inner more than 1/2 as long as outer, all without appendages.

Ten accepted species: Himalayas to the Philippines, Sulawesi, and New Guinea; one species in China.

See the revision by Vermeulen (Gard. Bull. Singapore 54: 26. 2002).

42. *Bulbophyllum gymnopus* J. D. Hooker, Fl. Brit. India 5: 764. 1890.

线瓣石豆兰 *xian ban shi dou lan*

Drymoda gymnopus (J. D. Hooker) Garay, Hamer & Siegerist, *Phyllorkis gymnopus* (J. D. Hooker) O. Kuntze.

Rhizome 2.5–4.5 mm in diam., sections between pseudobulbs 3–22 cm; bracts densely spotted with purplish brown when young, soon withering, including veins. Pseudobulbs distant, ovoid, 1.2–4 × 0.8–1.5 cm. Petiole 1–3.5 cm; leaf blade elliptic, 4.8–17 × 1–3.2 cm, obtuse. Inflorescence a lax raceme, erect to spreading, 7–23 cm, 7–28-flowered; peduncle 1.8–7 cm; bracts 4–6, longest 5–17 mm; rachis 5–17 cm; floral bracts ovate

to triangular, 1.8–3.5 × 1–1.8 mm, acute. Flowers resupinate; white, pale greenish white, or yellowish, lip yellow or orange, column white to orange. Pedicel and ovary 8–10 mm. Dorsal sepal ovate to triangular, 4.5–7 × 1.4–2.2 mm, thin, surface glabrous or slightly papillose toward tip abaxially, base narrowly attached, margins entire, apex emarginate, rounded to acute; lateral sepals falcate, 5–8 × 1.4–2.5 mm, obtuse, otherwise as dorsal sepal. Petals recurved, falcate, linear with a wide base, 3–5.5 × 0.4–0.7 mm, thin, base broadly attached, margins erose toward tip, apex obtuse to acuminate; lip recurved slightly below middle, ligulate, 2–4 × 0.8–1.3 mm, thick, surface glabrous, abaxially with a distinct, deeply emarginate ridge up to ca. 1/3 of length of lip, adaxially concave near base, often with

2 inconspicuous, obtuse ridges ca. halfway up lip, space in between 2 ridges somewhat channeled, margin of lip entire, glabrous or finely papillose locally, apex obtuse. Column 2–3 mm, foot elongated so that a gap exists between petals and lateral se-

pals; stelidia triangular, 0.4–1 mm, acute. Fl. Jan–Mar, Oct–Dec.

Epiphytic or lithophytic in montane and evergreen forests; 600–2000 m. S Yunnan [Bhutan, India, Thailand].

12. *Bulbophyllum* sect. *Umbellata* Bentham & J. D. Hooker, Gen. Pl. 3: 503. 1883 [“*Umbellatae*”].

伞形组 san xing zu

Rhizome creeping or straggling; roots sprouting mainly below pseudobulbs, spreading; new shoots arising from basal node of pseudobulb. Pseudobulbs distinct, apex with 1 leaf. Leaves persistent, thick. Inflorescence solitary, arising near pseudobulbs, a ± subumbellate raceme. Pedicel with basal node ± coinciding with attachment of subtending bract. Sepals: margins glabrous, 3–7-veined; lateral sepals usually longer than dorsal sepal, twisted inward near base, upper margins approaching or meeting and connate (free and not twisted in *Bulbophyllum violaceolabellum*). Petals: margins glabrous, 1–5-veined; lip: margins without auricles or lateral lobes, margins otherwise ± glabrous (ciliolate in *B. unciniferum*), adaxially ± glabrous. Column: stigma not protruding at its base, foot distinct; anther: front margin projecting or not, abaxially with or without a low, rounded crest; pollinia 4, inner 1/2 as long as outer or longer, all without appendages.

Thirty-eight provisionally accepted species: India to New Guinea; 19 species (five endemic) in China.

- 1a. Dorsal sepal slightly shorter than lateral sepals 43. *B. violaceolabellum*
- 1b. Dorsal sepal 1.5–6 × shorter than lateral sepals.
 - 2a. Lateral sepals 2.5–6 cm.
 - 3a. Leaf 2.5–6.5 × 1–1.5 cm; flowers white 44. *B. caudatum*
 - 3b. Leaf 8–25 × 2.2–6 cm; flowers purple, deep yellow, or yellowish white striped with reddish brown or tinged with purplish red.
 - 4a. Stelidia distally widened, tip obtuse, erose or bidenticulate.
 - 5a. Petals truncate to emarginate and mucronate; lateral sepals ca. 60 mm 45. *B. delitescens*
 - 5b. Petals rounded and mucronate; lateral sepals 25–37 mm 46. *B. macraei*
 - 4b. Stelidia distally tapering, acute.
 - 6a. Median sepal shortly mucronate; petals truncate and mucronate, 5–7-veined 47. *B. funingense*
 - 6b. Median sepal caudate with a thread ca. 3 mm; petals tapering, caudate, 3-veined 48. *B. tianguii*
 - 2b. Lateral sepals less than 2.5 cm.
 - 7a. Scape nearly as long as or sometimes slightly longer than pseudobulb.
 - 8a. Rhizomes suberect or ascending; lateral sepals forming a conic tube 49. *B. unciniferum*
 - 8b. Rhizomes creeping; lateral sepals forming a slipper-shaped synsepal 50. *B. spathulatum*
 - 7b. Scape 3–7 × as long as pseudobulb.
 - 9a. Lip densely hirsute on margin and abaxial surface 62. *B. gongshanense* (*B.* “Section 13”)
 - 9b. Lip margin and abaxial surface glabrous.
 - 10a. Lip narrowed, drawn-out and somewhat thinly cylindric in apical half.
 - 11a. Lip hooked-revolute at apex; anther cap entire apically 51. *B. japonicum*
 - 11b. Lip not hooked-revolute at apex; anther cap with comblike teeth apically 52. *B. fordii*
 - 10b. Lip not thinly cylindric in apical half.
 - 12a. Lateral sepals free.
 - 13a. Petals acute 53. *B. elatum*
 - 13b. Petals rounded to obtuse.
 - 14a. Column without wings along lower margins 54. *B. rolfei*
 - 14b. Column with deltoid to triangular, rounded to acute wings along lower margins, near base.
 - 15a. Column with acute wings along lower margins 55. *B. guttulatum*
 - 15b. Column with rounded wings along lower margins 56. *B. umbellatum*
 - 12b. Lateral sepals adhering or connate along their upper and/or lower edges.
 - 16a. Pseudobulbs globose; leaves elliptic-oblong, ca. 1 cm 57. *B. sphaericum*
 - 16b. Pseudobulbs ovoid-conic to narrowly ovoid; leaves oblong or ovate-lanceolate, 1.6–8 cm.
 - 17a. Lateral sepals papillose abaxially.
 - 18a. Lateral sepals ca. 7 mm; scape ca. 2 cm 58. *B. bomiense*
 - 18b. Lateral sepals 14–27 mm; scape 3–7 cm 59. *B. farreri*
 - 17b. Lateral sepals glabrous.
 - 19a. Lateral sepals 11–21 mm; flowers yellow, ± with purple-red veins or becoming reddish 60. *B. retusiusculum*

19b. Lateral sepals 5–10 mm; flowers deep or dark red, usually
± with deep-colored spots or veins 61. *B. tigrinum*

43. *Bulbophyllum violaceolabellum* Seidenfaden, Nordic J. Bot. 1: 210. 1981.

等萼卷瓣兰 deng e juan ban lan

Rhizome stout, creeping, 4–6 mm in diam., rooting. Pseudobulbs 4–9 cm apart on rhizome, ovoid, 1.5–3.4 cm, 1–1.3 cm in diam., with a terminal leaf. Petiole conduplicate, 1.5–2 cm; leaf blade oblong to obovate-oblong, 10–20 × 2.2–4.3 cm, slightly fleshy or leathery, apex obtuse. Scape from base of pseudobulb, erect, 19–26 cm; raceme shortened, umbel-like, often 3–5-flowered; peduncle 2–3 mm in diam., with 3 or 4 tubular sheaths 8–13 mm; floral bracts lanceolate, ca. 5 mm, apex acuminate. Pedicel and ovary ca. 2.2 mm. Flowers widely opening, with yellow and purplish spotted sepals and petals and purple lip. Dorsal sepal broadly ovate, 6–8 × ca. 6.2 mm, margin slightly undulate, apex obtuse; lateral sepals ovate-triangular, 8–9 × ca. 8 mm, base adnate to column foot, apex mucronate. Petals ovate-lanceolate, 4–5 × ca. 3 mm, entire, aristate; lip strongly recurved, ligulate, ca. 5 × 3 mm, fleshy, base attached to end of column foot by a mobile joint, apex truncate. Column yellow, ca. 2 mm, base ca. 3 mm in diam., with wings decurrent to foot; foot purple, ca. 5.5 mm, with free part ca. 2.5 mm; stielidia subulate, ca. 2.5 mm. Fl. Apr.

Trees or rocks in open forests in limestone areas; ca. 700 m. S Yunnan [Laos].

44. *Bulbophyllum caudatum* Lindley, Gen. Sp. Orchid. Pl. 56. 1830.

尾萼卷瓣兰 wei e juan ban lan

Cirrhopetalum caudatum (Lindley) King & Pantling.

Rhizome slender, 1–2 mm in diam., branched, rooting from their nodes. Pseudobulbs 2–8 cm apart from each other, ovoid, 1–2.5 cm, 6–10 mm in diam., with a terminal leaf. Petiole short, 2–3 mm; leaf blade ovate-lanceolate or sometimes oblong, 2.5–6.5 × 1–1.5 cm, leathery, apex acute or obtuse. Scape from base of pseudobulb, erect, usually 1–3 cm; umbel flabellate, many flowered; floral bracts lanceolate, nearly as long as pedicel and ovary. Flowers white. Dorsal sepal ovate-oblong, ca. 5 × 2.5 mm, apex acuminate; lateral sepals free, parallel to each other or slightly divergent, lanceolate, 25–35 mm, apex long caudate. Petals obovate-oblong, short, apex obtuse; lip oblong, ca. as long as petals, clawed at base, basal margins erect, distal margins decurved. Column stout, with nearly suborbicular wings; stielidia slender; anther cap papillate. Fl. unknown. $2n = 38$.

Tree trunks in evergreen broad-leaved forests; 800–1000 m. SE Xizang [India (Sikkim), Nepal].

45. *Bulbophyllum delitescens* Hance, J. Bot. 14: 44. 1876.

直唇卷瓣兰 zhi chun juan ban lan

Cirrhopetalum delitescens (Hance) Rolfe.

Rhizome creeping, stout, ca. 4 mm in diam., often branched, rooting. Pseudobulbs 3–11 cm apart on rhizome, ovoid or subcylindric, 1.7–3.5 cm, 5–10 mm in diam., with a

terminal leaf. Petiole 2–3 cm; leaf blade oblong, elliptic, or obovate-oblong, 16–25 × 3.5–6 cm, leathery, apex obtuse or shortly acute. Scape from base of pseudobulb, erect, 10–22 cm; umbel often 2–4-flowered; peduncle ca. 1.5 mm in diam., sparsely with 3 tubular sheaths ca. 1 cm; floral bracts lanceolate, 4–6 mm, apex aristate. Pedicel and ovary ca. 1 mm. Flowers purple. Dorsal sepal ovate, cymbiform, ca. 10 × 3 mm, apex truncate and emarginate, in sinus with an awn ca. 7 mm; lateral sepals narrowly lanceolate, ca. 60 × 2 mm, base adnate to column foot, twisted near base and connate along their upper and lower edges forming a tube, apex long acuminate. Petals falcate-lanceolate, 5–7 × 1.5–2 mm, apex truncate to emarginate, in sinus with 1 short thread centrally; lip recurved, ligulate, ca. 5 mm, fleshy, base grooved, attached to end of column foot, immobile, apex obtuse. Column ca. 3 mm, with wings dilated at its base; foot ca. 5 mm, with free part ca. 3 mm; stielidia ca. 3 mm, apex sharply bidentate. Fl. Apr–Nov.

Rocks along streamsides or valleys, tree trunks in forests; 1000–2000 m. S Fujian, E and S Guangdong, Hainan, SE Xizang, NE, S, and W Yunnan [NE India, Vietnam].

46. *Bulbophyllum macraei* (Lindley) H. G. Reichenbach, Ann. Bot. Syst. 6: 263. 1861.

乌来卷瓣兰 wu lai juan ban lan

Cirrhopetalum macraei Lindley, Gen. Sp. Orchid. Pl. 59. 1830; *Bulbophyllum macraei* var. *autumnale* (Fukuyama) S. S. Ying; *B. uraiense* Hayata; *C. autumnale* Fukuyama.

Rhizome creeping, ca. 2 mm in diam. Pseudobulbs close or 1–2 cm apart from each other, ovoid, 1–2.8 cm, 1–1.8 cm in diam., with a terminal leaf. Petiole 1–1.5 cm; leaf blade subelliptic, 8–18 × 2.5–6 cm, thickly leathery, base contracted into petiole, apex obtuse. Scape yellowish green, 10–20 cm, slender; umbel 3–5-flowered; peduncle ca. 1 mm in diam., with 2 or 3 sheaths; floral bracts lanceolate, ca. 5 mm, apex acute. Pedicel and ovary yellowish green or purplish red, ca. 9 mm. Flowers yellowish white, sometimes ± tinged with purplish red on sepals and petals. Dorsal sepal ovate-lanceolate, 15–18 × 3–5 mm, apex acuminate; lateral sepals narrowly lanceolate, 2.5–3.7 cm, twisted near base, their lower edges connate to each other, apex acuminate. Petals falcate, 5–6.5 × 2–2.7 mm, apex rounded and with apical thread; lip recurved, ligulate, 4–6.5 mm, attached to end of column foot, immobile. Column yellowish green, 2–3 mm; foot ca. 4 mm; stielidia ± twisted and thinly clavate, ca. 2 mm; anther cap subglobose, with comblike teeth at apex. Fl. Jul–Oct. $2n = 38$.

Tree trunks in forests; 500–1000 m. Taiwan [India, Japan (Ryukyu Islands), Sri Lanka, N Vietnam].

47. *Bulbophyllum funingense* Z. H. Tsi & S. C. Chen, Bull. Bot. Res., Harbin 1(1–2): 112. 1981.

富宁卷瓣兰 fu ning juan ban lan

Rhizome creeping, ca. 5 mm in diam., rooting from base of pseudobulbs. Pseudobulbs ca. 6 cm apart from each other,

ovoid, 2–3 cm, ca. 1.3 cm in diam., ribbed, with a terminal leaf. Petiole conduplicate, 1–2 cm; leaf blade narrowly oblong, 11–16 × 2.2–2.5 cm, thickly leathery, apex obtuse and slightly emarginate. Scape from base of pseudobulb, erect, 8–11 cm; umbel 2-flowered; peduncle ca. 2 mm in diam., with 2 tubular sheaths 1.5–2 cm; floral bracts narrowly ovate, 1–1.5 cm. Pedicel and ovary ca. 3 cm. Flowers large, deep yellow with reddish brown veins. Dorsal sepal ovate, ca. 18 × 8 mm, apex shortly mucronate; lateral sepals oblong, ca. 43 × 8 mm, slightly connate to each other on their basal edges and adnate to column foot, twisted near base. Petals subovate-triangular, ca. 10 × 6 mm, entire, truncate and mucronate, 5–8-veined; lip ovate-lanceolate and abruptly contracted above middle, ca. 1.3 cm, attached to end of column foot by a mobile joint, basal margin incurved and ciliate, adaxially with 1 keel centrally, surface densely finely papillate, apex subacute. Column ca. 3 mm, with triangular, rounded wings near base; stelidia triangular, ca. 2 mm, acute; anther cap subglobose, densely finely papillate. Fl. Apr.

Rocks along valleys; ca. 1000 m. SE Yunnan [N Vietnam].

48. *Bulbophyllum tianguii* K. Y. Lang & D. Luo, J. Wuhan Bot. Res. 25: 558. 2007.

天贵卷瓣兰 tian gui juan ban lan

Rhizome creeping, ca. 3 mm in diam., rooting from base of pseudobulbs. Pseudobulbs 1–2.5 cm apart from each other, ovoid-conic or narrowly ovoid, 1.5–2.5 cm, 0.7–1.2 cm in diam., ribbed, with a terminal leaf. Petiole conduplicate, 5–10 mm; leaf blade elliptic-oblong, (4–)7–15 × (1–)1.5–2 cm, leathery, apex obtuse and slightly emarginate. Scape from base of pseudobulb, erect, yellowish with reddish purple dots, ca. 6 cm, ca. 1 mm in diam.; umbel 2- or 3-flowered; peduncle ca. 2 mm in diam., below middle with 2 or 3 tubular sheaths; floral bracts narrowly oblong, boat-shaped, ca. 1.1 cm. Pedicel and ovary tenuous, ca. 2.5 cm, densely covered with reddish purple fine dots. Flowers yellowish with purplish brown veins. Dorsal sepal broadly ovate, concave, 13–14 × 8–9 mm, apex acuminate with a thread ca. 3 mm, 7-veined, margin entire; lateral sepals narrowly lanceolate, ca. 30 × 4–4.5 mm, margin entire, connate to each other along their upper edges except near base, adnate to column foot, twisted near base. Petals elliptic-ovate, 6.5–7 × ca. 3.5 mm, tapering and acuminate with a thread ca. 1.5 mm, 3-veined; lip greenish brown, ovate-lanceolate, ca. 6.5 mm, ca. 3.5 mm wide at base, attached to end of column foot by a mobile joint, margins ciliate, above middle abruptly narrowed and curved downward, adaxially with 2 fleshy, ciliate keels, apex subacute. Column ca. 2.5 mm, with obtusely triangular, rounded wings near base, foot ca. 5 mm; stelidia subtriangular, together with thin apex ca. 2 mm, ca. 1 mm wide at base; anther cap subglobose, fimbriate in front, adaxially small papillate. Fl. Mar.

• Rocks in forests; 900–1000 m. NW Guangxi (Leye).

49. *Bulbophyllum unciniferum* Seidenfaden, Bot. Tidsskr. 68: 58. 1973.

直立卷瓣兰 zhi li juan ban lan

Rhizome usually ± ascending, ca. 3 mm in diam. Pseudo-

bulbs 2–4 cm apart on rhizome, cylindric or oblong, 2–3.5 cm, usually 6–9 mm in diam., with a terminal leaf. Leaf blade narrowly oblong, 7–8 × 1–1.9 cm, apex obtuse. Scape from base of pseudobulb, 3–3.5 cm; raceme shortened, umbel-like, 2–4-flowered; peduncle ca. 1.5 mm in diam., with several tubular sheaths at base; floral bracts lanceolate, ca. 7 mm, apex acuminate. Pedicel and ovary white, ca. 1.5 cm. Dorsal sepal pale yellow, with purplish spots; lateral sepals vermilion; lip purplish red. Dorsal sepal subelliptic, concave, ca. 10 × 6 mm, apex obtuse or slightly emarginate; lateral sepals lanceolate, 1.6–2 cm, their upper and lower edges connate forming a narrow conic tube, outer surface densely papillate. Petals broadly ovate, ca. 4 × 2.5 mm, near apex fleshy thickened and with densely papillate hairs, apex slightly recurved; lip recurved, base attached to end of column foot by a slender band, mobile, ciliate below middle, apex slightly emarginate. Column stout, with triangular wings; foot with free part ca. 1 mm; stelidia deltoid, ca. 1 mm, apex aristate and slightly hooked; anther cap subglobose. Fl. Mar.

Tree trunks in forests; 1100–1500 m. S Yunnan [N Thailand].

50. *Bulbophyllum spathulatum* (Rolfé ex E. W. Cooper) Seidenfaden, Bot. Tidsskr. 65: 347. 1970.

匙萼卷瓣兰 chi e juan ban lan

Cirrhopetalum spathulatum Rolfé ex E. W. Cooper, Orchid Rev. 37: 106. 1929.

Rhizome creeping, stout, ca. 4 mm in diam., rooting from base of pseudobulbs. Pseudobulbs 10–11 cm apart from each other, narrowly ovoid, 3–4 cm, ca. 1 cm in diam., with a terminal leaf. Petiole ca. 1 cm, ± conduplicate; leaf blade oblong, 10–18 × 2–2.4 cm, fleshy, apex obtuse. Scape from base of pseudobulb, 3–4 cm; umbel more than 20-flowered; peduncle with 4 or 5 sheaths ca. 1 cm; floral bracts oblong-ovate, ca. 1 cm, apex subacute. Pedicel and ovary 1.5–2 cm. Flowers purplish red. Dorsal sepal subobovate, ca. 8 × 4 mm, apex subtruncate and slightly mucronate; lateral sepals ca. 18 mm, twisted near base, their upper and lower edges connate to varying degrees forming a slipper-shaped synsepal; synsepal ca. 11 mm wide, outer surface finely papillate, apex rounded. Petals narrowly oblong-lanceolate, ca. 5 × 1.3 mm, entire, obtuse; lip recurved at a right angle, lanceolate, glabrous, ± conduplicate in basal half, apex obtuse. Column ca. 2 mm; foot ca. 3 mm, with free part ca. 1 mm; stelidia deltoid, ca. 1 mm; anther cap ± subspherical. Fl. Oct.

Tree trunks in broad-leaved forests; 800–900 m. S Yunnan [India (Sikkim), Laos, Myanmar, Thailand, Vietnam].

51. *Bulbophyllum japonicum* (Makino) Makino, Bot. Mag. (Tokyo) 24: 31. 1910.

瘤唇卷瓣兰 liu chun juan ban lan

Cirrhopetalum japonicum Makino, Ill. Fl. Japan 1(7): t. 42. 1891; *Bulbophyllum inabae* Hayata; *C. inabae* (Hayata) Hayata.

Rhizome ca. 1.2 mm in diam., slender. Pseudobulbs 7–18 mm apart from each other, ovoid, 5–10 mm, 3–5 mm in diam., with a terminal leaf. Leaf sessile; blade oblong or obliquely oblong, usually 3–4.5 × 0.5–0.8 cm, leathery, apical margins

finely papillate, apex acute. Scape from base of pseudobulb, 2–3 cm; umbel often 2–4-flowered; peduncle ca. 0.8 mm in diam., with 3 tubular sheaths; floral bracts lanceolate, ca. 2 mm. Pedicel and ovary ca. 4 mm. Flowers purplish red. Dorsal sepal ovate-elliptic, ca. 3×1.5 mm, apex acute; lateral sepals lanceolate, $5\text{--}6 \times$ ca. 2 mm, twisted near base, their upper and lower edges connivent to each other, apical margins incurved, apex acuminate. Petals subspatulate, ca. 2×1.5 mm, entire, obtuse-rounded; lip recurved, ligulate, ca. 2 mm, fleshy, narrowed and thinly cylindrical in distal half, apex dilated and hooked-revolute. Column ca. 1.5 mm; foot ca. 1 mm, with free part ca. 0.5 mm; stielidia subulate, ca. 0.7 mm; anther cap subglobose. Fl. Jun. *2n* = 40.

Tree trunks in broad-leaved forests, humid rocks along valleys; 600–1500 m. N Fujian, Guangdong, E and NE Guangxi, SW Hunan, Taiwan [Japan].

52. *Bulbophyllum fordii* (Rolfe) J. J. Smith, Bull. Jard. Bot. Buitenzorg, sér. 2, 8: 24. 1912.

狭唇卷瓣兰 xia chun juan ban lan

Cirrhopetalum fordii Rolfe, Bull. Misc. Inform. Kew 1896: 193. 1896.

Rhizome stout. Pseudobulbs 2–9 cm apart from each other, narrowly ovoid, 2–3.5 cm, with a terminal leaf. Petiole ca. 2 cm; leaf blade narrowly oblong, ca. 8×3 cm, leathery, base contracted into petiole, apex obtuse and slightly emarginate. Scape from base of pseudobulb, erect, 5–10 cm; umbel many flowered; peduncle ca. 1.2 mm in diam., sparsely with 3 tubular sheaths; floral bracts lanceolate, 3–5 mm, apex acute. Pedicel and ovary 4–7 mm. Flowers pale yellow, tinged with purple. Dorsal sepal ovate-oblong, cymbiform, ca. 7×4 mm, apex obtuse; lateral sepals narrowly oblong, ca. 1 cm, base adnate to column foot, twisted near base, with their upper edges connate in apical half. Petals narrowly oblong, ca. 3.5×1.5 mm, entire, acute; lip slightly recurved, narrowly lanceolate-cylindrical, ca. 4 mm, fleshy, grooved at adaxial base, margin decurved, entire, apex subacute. Column ca. 2 mm, with suborbicular, enlarged wings at middle; foot ca. 3.5 mm, with free part upcurved; stielidia subulate, ca. 1 mm; anther cap with comblike teeth at apex. Fl. Aug.

• N Guangdong, SW Yunnan.

53. *Bulbophyllum elatum* (J. D. Hooker) J. J. Smith, Bull. Jard. Bot. Buitenzorg, sér. 2, 8: 23. 1912.

高茎卷瓣兰 gao jing juan ban lan

Cirrhopetalum elatum J. D. Hooker, Fl. Brit. India 5: 775. 1890.

Pseudobulbs contiguous, cylindrical, ca. 4 cm, ca. 6 mm in diam., with a terminal leaf. Petiole ca. 2 cm; leaf blade oblong, ca. 16×2.2 cm, leathery, apex obtuse and slightly emarginate. Scape from base of pseudobulb, erect, 15–18 cm; umbel many flowered; peduncle ca. 2 mm in diam., with 3 or 4 sheaths; floral bracts lanceolate, shorter than pedicel and ovary. Flowers dark yellow. Dorsal sepal ovate, ca. 13×7 mm, apex acute; lateral sepals narrowly lanceolate, ca. $3 \times$ as long as dorsal sepal, abaxially finely papillate, base twisted, their upper edges con-

nate to each other, apex acuminate. Petals obliquely ovate-triangular, ca. 4 mm, entire, acute; lip recurved, ovate-lanceolate, fleshy, grooved at base, apex acute. Column stout, with deltoid, rounded wings along lower margins; foot with free part ca. 5 mm; stielidia slender, slightly hooked. Fl. unknown.

Tree trunks in evergreen broad-leaved forests, rocks along valleys; 2200–2500 m. S Xizang, NW Yunnan [Bhutan, India, Nepal, Vietnam].

54. *Bulbophyllum rolfei* (Kuntze) Seidenfaden, Dansk Bot. Ark. 33(3): 149. 1979.

若氏卷瓣兰 ruo shi juan ban lan

Phyllorkis rolfei Kuntze, Revis. Gen. Pl. 2: 676. 1891, based on *Cirrhopetalum parvulum* J. D. Hooker, Fl. Brit. India 5: 778. 1890; *Bulbophyllum dyerianum* (King & Pantling) Seidenfaden; *B. parvulum* (J. D. Hooker) J. J. Smith (1912), not Lindley (1830); *C. dyerianum* King & Pantling.

Rhizome creeping, 0.8–1 mm in diam. Pseudobulbs 0.1–2.4 cm apart from each other, ovoid, 0.7–1.5 cm, 3–9 mm in diam., ribbed, with a terminal leaf. Petiole 1–2 cm; leaf blade elliptic-oblong, $2\text{--}3.5 \times 0.8\text{--}1.2$ cm, leathery, base contracted into petiole 3–5 mm, apex (sub-)acute. Scape from base of pseudobulb, erect, 4–5.5 cm, slender; umbel 2–4-flowered; peduncle ca. 1 mm in diam., with a few tubular sheaths; floral bracts narrowly lanceolate, 6–8 mm, apex acuminate. Pedicel and ovary 4–7 mm. Flowers yellow to red-purple, spotted deep purple; lip deep red-purple. Dorsal sepal elliptic-ovate, concave, $5\text{--}6 \times 1.5\text{--}2$ mm, apex acute; lateral sepals free, obliquely ovate-triangular, $10\text{--}16 \times 2\text{--}3$ mm, \pm narrowed and somewhat twisted near base so that upper edges face one another, apex acute. Petals elliptic-ovate, ca. 4×1.2 mm, obtuse, margin entire; lip recurved, ovate in outline, $3\text{--}4 \times 0.5\text{--}0.8$ mm, adaxially finely papillose toward top, base dilated and attached to end of column foot, apex rounded. Column 1–1.5 mm, without wings along lower margins; foot ca. 2.5 mm, with free part ca. 2 mm, upcurved; stielidia filiform, ca. 1 mm; anther cap subglobose. Fl. Aug.

2400–2500 m. W Yunnan (Fugong) [Bhutan, India, Nepal].

This species was first recorded from China by X. H. Jin, H. Li, and D. Z. Li (Acta Phytotax. Sin. 45: 803. 2007), whose description deviates from *Bulbophyllum rolfei* in having lateral sepals fused along the upper margins and petals erose. Their record could refer to a different species.

55. *Bulbophyllum guttatum* (J. D. Hooker) N. P. Balakrishnan, J. Bombay Nat. Hist. Soc. 67(1): 66. 1970.

钻齿卷瓣兰 zuan chi juan ban lan

Cirrhopetalum guttatum J. D. Hooker, Fl. Brit. India 5: 776. 1890.

Rhizome creeping, ca. 3 mm in diam. Pseudobulbs ca. 1 cm apart from each other, ovoid-conic or narrowly ovoid, 2–2.5 cm, 7–10 mm in diam., ribbed, with a terminal leaf. Petiole 1–2 cm; leaf blade elliptic-oblong, $7\text{--}14 \times$ ca. 3 cm, leathery, base contracted into petiole, apex obtuse-rounded. Scape from base of pseudobulb, erect, 10–15 cm, slender; umbel often 2- or 3-flowered; peduncle ca. 1 mm in diam., sparsely with 2 or 3 tubular sheaths; floral bracts ovate-lanceolate, ca. 5 mm, apex acuminate. Pedicel and ovary ca. 2.5 mm. Flowers yellow,

spotted with red. Dorsal sepal broadly ovate, concave, 8–10 × 6–7 mm, apex subtruncate and mucronulate; lateral sepals obliquely ovate-lanceolate, 10–11 × ca. 6 mm, ± narrowed and twisted near base, their lower margin connate to each other toward base, apex obtuse. Petals broadly ovate-triangular, ca. 4.5 × 4 mm, base ca. 1/3 width adnate to column foot, margin entire, apex mucronate; lip recurved, subovate in outline, ca. 5 × 3.4 mm, adaxially with 3 longitudinal keels, base dilated and attached to end of column foot, immobile, apex emarginate. Column ca. 3 mm, with triangular, acute wings along lower margins; foot ca. 5 mm, with free part ca. 2 mm, upcurved; stelia filiform, ca. 2.8 mm; anther cap subglobose, glabrous. Fl. Aug.

Tree trunks in broad-leaved forests; 800–1800 m. SE Xizang [Bhutan, NE India, Nepal, Vietnam].

56. *Bulbophyllum umbellatum* Lindley, Gen. Sp. Orchid. Pl. 56. 1830.

伞花卷瓣兰 san hua juan ban lan

Bulbophyllum saruwatarii Hayata; *B. tibeticum* Rolfe; *Cirrhopetalum saruwatarii* (Hayata) Hayata; *Phyllorkis umbellata* (Lindley) Kuntze.

Rhizome creeping and rooting, 3–4 mm in diam. Pseudobulbs often 1–2 cm apart on rhizome, ovoid or ovoid-conic, 1.3–3.5 cm, 1–2 cm in diam., with a terminal leaf. Petiole 1–2 cm; leaf blade oblong, 8–19 × 1.3–2.8 cm, leathery, apex obtuse and emarginate. Scape from base of pseudobulb, erect, 8–12 cm; umbel often 2–4-flowered; peduncle 1.5–2 mm in diam., with 2 tubular sheaths ca. 1 cm; floral bracts lanceolate, ca. 9 mm, concave. Pedicel and ovary ca. 2 cm. Flowers dark greenish yellow or dark brown with purplish apex except whitish lip. Dorsal sepal ovate, concave, ca. 9 × 5 mm, apex acute; lateral sepals falcate-lanceolate, ca. 15 × 5 mm, base adnate to column foot, twisted near base, their lower edges of basal part connate, apex obtuse. Petals ovate, ca. 7 × 5 mm, entire, obtuse-rounded; lip recurved, ligulate, ca. 5 mm, fleshy, base subcordate, apex obtuse. Column ca. 2 mm, stout, with deltoid, rounded wings along lower margins; foot ca. 5 mm, with free part ca. 1.5 mm; stelia deltoid, ca. 1 mm; anther cap subglobose. Fl. Apr–Jun. $2n = 38$.

Tree trunks in forests; 1000–2200 m. SW Guizhou, SW Sichuan, Taiwan, SE Xizang, S and W Yunnan [Bhutan, NE India, Myanmar, Nepal, Thailand, Vietnam].

57. *Bulbophyllum sphaericum* Z. H. Tsi & H. Li, Bull. Bot. Res., Harbin 1(1–2): 117. 1981.

球茎卷瓣兰 qiu jing juan ban lan

Rhytionanthos sphaericus (Z. H. Tsi & H. Li) Garay, Hamer & Siegerist.

Rhizome creeping, ca. 1.5 mm in diam., branched, rooting from base of pseudobulbs. Pseudobulbs ca. 1 cm apart from each other, globose, 7–8 mm in diam., with 1 leaf at apex. Leaf sessile; blade abaxially purplish red, adaxially pale green, elliptic-oblong, ca. 10 × 6–8 mm, thickly leathery, margin slightly recurved, apex retuse. Scape from base of pseudobulb, erect, much longer than leaf; umbel 4- or 5-flowered; floral bracts ca.

1.5 mm. Pedicel and ovary ca. 3 mm. Flowers purplish red. Dorsal sepal ovate-lanceolate, ca. 5 × 2 mm, abaxially papillate below middle, apex emarginate; lateral sepals narrowly lanceolate, ca. 2.5 × 3 mm, abaxially densely papillate in basal half, base twisted, their upper and lower edges connate to each other, margins incurved, apex cuspidate. Petals elliptic, ca. 3 × 2 mm, entire, obtuse-rounded; lip recurved, lanceolate, ca. 3.5 mm, fleshy, base grooved, attached to end of column foot by a mobile joint. Column ca. 2 mm; stelia subsquare, ca. 0.5 mm; foot upcurved, with free part ca. 1 mm. Fl. Sep–Dec.

• Tree trunks in evergreen broad-leaved forests. Sichuan, SW Yunnan.

58. *Bulbophyllum bomiense* Z. H. Tsi, Acta Phytotax. Sin. 16(4): 128. 1978 [*“bomiensis”*].

波密卷瓣兰 bo mi juan ban lan

Rhizome creeping, ca. 1 mm in diam., sheathing when young. Pseudobulbs 1–2 cm apart from each other, ovoid-conic, 7–10 mm, ca. 5 mm in diam., with a terminal leaf. Leaf subsessile; blade oblong, 1.7–3.5 × 0.5–0.7 cm, leathery, margin slightly undulate, apex obtuse and slightly emarginate. Scape from base of pseudobulb, erect, ca. 2 cm, slender; umbel 2–4-flowered; peduncle with 3 tubular sheaths ca. 7 mm; floral bracts ovate-lanceolate, ca. 3 mm. Pedicel and ovary ca. 4 mm. Flowers deep red or purplish, spotted with deep purple on petals, thickly textured. Dorsal sepal oblong, concave, ca. 7 × 2.5 mm, distal margins densely finely papillate, abaxially sparsely papillate; lateral sepals nearly falcate-lanceolate, ca. 7 mm, abaxially densely papillate especially in apical half, base adnate to column foot, apical margins incurved, twisted near base, their upper and lower edges connate to each other, apex obtuse. Petals subelliptic, ca. 4 × 2.5 mm, margins densely finely papillate, apex rounded; lip slightly recurved, subligulate, ca. 3 mm, fleshy, base grooved, attached to end of column foot by a mobile joint, laterally with 2 longitudinal lamellae close to both margins. Column ca. 1.2 mm, winged; foot ca. 1.5 mm, with free part ca. 0.8 mm; stelia sharply dentate, ca. 0.5 mm; anther cap densely finely papillate, apex with 1 small globose projection. Fl. Jul.

• Rocks in evergreen broad-leaved forests; 2000–2100 m. SE Xizang, NW Yunnan.

59. *Bulbophyllum farreri* (W. W. Smith) Seidenfaden, Dansk Bot. Ark. 29(1): 212. 1974.

麻栗坡卷瓣兰 ma li po juan ban lan

Cirrhopetalum farreri W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 13: 196. 1921; *Bulbophyllum malipoense* Z. J. Liu, S. C. Chen & S. P. Lei.

Rhizome creeping, rooting below pseudobulbs. Pseudobulbs clustered, ovoid-globose, 9–12 mm, 6–8 mm in diam., with 1 leaf at apex. Leaf subsessile; blade 20–70 × 6–22 mm, thickly leathery, apex obtuse and emarginate. Scapes at base of pseudobulbs, spreading, ca. as long as leaves; umbel 5–9-flowered; floral bracts lanceolate, 5–6 mm. Pedicel and ovary 5.5–6.5 mm. Dorsal sepal and petals yellowish with 3 dark purple veins, lateral sepals yellowish with purplish spots and veins. Dorsal sepal ovate, 3.8–5 × 1.6–3 mm, margin entire, apex ob-

tuse; lateral sepals twisted so that upper margins meet, fused along upper margins, lanceolate, 14–27 mm, abaxially densely papillose-hirsute, apex acute-acuminate. Petals obliquely elliptic, 2.5–4.5 × 1.5–2.2 mm, margins entire, apex obtuse; lip recurved, ovate-lanceolate, 1.8–2.8 × 1–1.5 mm, fleshy, adaxially channeled near base, apex obtuse. Column ca. 1 mm, foot ca. 2 mm. Fl. Apr–May.

Rocks and trees in broad-leaved forests; ca. 1000 m. Yunnan [Myanmar, Vietnam].

The type of *Bulbophyllum malipoense* is smaller in all parts than that of *B. farreri*, but otherwise the two are not different.

60. *Bulbophyllum retusiusculum* H. G. Reichenbach, Gard. Chron. 1869: 1182. 1869.

藓叶卷瓣兰 xian ye juan ban lan

Bulbophyllum flavisepalum Hayata; *B. oreogenes* (W. W. Smith) Seidenfaden; *B. retusiusculum* var. *oreogenes* (W. W. Smith) Z. H. Tsi; *Cirrhopetalum flavisepalum* (Hayata) Hayata; *C. oreogenes* W. W. Smith; *C. retusiusculum* (H. G. Reichenbach) Hemsley; *Phyllorkis retusiuscula* (H. G. Reichenbach) Kuntze.

Rhizome creeping, ca. 2 mm in diam., rooting from base of pseudobulbs. Pseudobulbs often 1–3 cm apart from each other, rarely close, ovoid-conic or narrowly ovoid, 5–25 mm, 4–13 mm in diam., with a terminal leaf. Petiole short; leaf blade oblong or ovate-lanceolate, 1.6–8 × 0.4–1.8 cm, leathery, base contracted into petiole, apex obtuse and slightly emarginate. Scape from base of pseudobulb, suberect, to 14 cm, slender; umbel many flowered; peduncle ca. 1 mm in diam., sparsely with 3 tubular sheaths; floral bracts narrowly lanceolate, cymbiform, 3–6 mm, apex acuminate. Pedicel and ovary 5–10 mm, slender. Flowers yellow with reddish veins or becoming reddish. Dorsal sepal oblong-ovate or suboblong, 3–3.5 × 1.5–2 mm, abaxially sometimes sparsely papillate in basal half, mar-

gin entire or scabrid, apex subtruncate and emarginate; lateral sepals narrowly lanceolate or linear, 11–21 × 1.5–3 mm, abaxially sometimes sparsely papillate, twisted near base, their upper and lower edges connate to each other forming an ellipsoid or horn-shaped synsepal. Petals nearly oblong or ovate, 2.5–3 × ca. 1.8 mm, base ca. 2/5 width adnate to column foot, margins entire or scabrid, apex obtuse-rounded; lip recurved, ligulate, ca. 3 mm, fleshy, base grooved, attached to end of column foot by a mobile joint, apex obtuse. Column 1.5–2 mm, with wings slightly dilated at base; foot ca. 2.5 mm, with free part ca. 1 mm, upcurved; stelidia subtriangular, ca. 0.8 mm; anther cap slightly finely papillate. Fl. Sep–Dec. $2n = 38$.

Tree trunks or rocks in forests; 500–2800 m. S Gansu, Guizhou, Hainan, Hubei, S Hunan, Sichuan, Taiwan, S and SE Xizang, W to SE Yunnan [Bhutan, NE India, Laos, Malaysia, Myanmar, Nepal, Thailand, Vietnam].

61. *Bulbophyllum tigrinum* Hance, J. Bot. 21: 232. 1883.

虎斑卷瓣兰 hu ban juan ban lan

Bulbophyllum retusiusculum H. G. Reichenbach var. *tigrinum* (Hance) Z. H. Tsi; *Cirrhopetalum tigrinum* (Hance) Rolfe.

Rhizome stout. Pseudobulbs 1–3 cm apart from each other, ovoid, usually 10–20 mm, 6–7 mm in diam., with a terminal leaf. Leaf shortly petiolate; blade oblong, varying in size, usually 22–25 × 4–5 mm, leathery. Scape from base of pseudobulb, erect, filiform, 10–14 cm, much longer than leaf; umbel 5–8-flowered; floral bracts small, 3–5 mm. Pedicel and ovary 3–7 mm, slender. Flowers small, dark red with purple-red veins. Dorsal sepal ovate, 3–3.5 × 1.5–2 mm, apex obtuse; lateral sepals lanceolate or linear, 5–7 × ca. 2 mm, abaxially glabrous, their upper and lower edges connate to each other forming a horn-shaped tube; lip recurved, ligulate, fleshy, attached to end of column foot by a mobile joint. Column 1–1.5 mm; foot ca. 2 mm, with free part ca. 0.8 mm. Fl. Sep.

• S Guangdong.

13. *Bulbophyllum* “Section 13”

中华组 zhong hua zu

Rhizome creeping or straggling; roots sprouting mainly below pseudobulbs, spreading; new shoots arising from basal node of pseudobulb. Pseudobulbs distinct, apex with 1 leaf. Leaves persistent, thick. Inflorescences arising near pseudobulbs, solitary, 1-flowered or a ± subumbellate raceme. Pedicel with basal node ± coinciding with attachment of subtending bract. Sepals 3–7-veined; dorsal sepal with margins glabrous to erose or denticulate (with glandular appendages in *Bulbophyllum chondriophorum*, ciliolate in *B. bicolor*), lateral sepals twisted inward near base, with upper margins approaching or meeting and connate, with margins glabrous. Petals: margins glabrous, erose to denticulate (with glandular appendages in *B. chondriophorum*), 1–3-veined; lip: margins without auricles or lateral lobes, margins otherwise ± glabrous (ciliate in *B. gongshanense*), adaxially ± glabrous (hirsute in *B. gongshanense*). Column: stigma not protruding at its base, foot distinct; anther: front margin projecting or not, abaxially with or without a low, rounded crest; pollinia 4, inner ca. 1/2 as long as outer or longer, all without appendages.

Twenty-six provisionally accepted species: India to Indochina, Java to the Philippines; ten species (five endemic) in China.

- 1a. Lip densely hirsute on margin and abaxial surface 62. *B. gongshanense*
- 1b. Lip glabrous.
 - 2a. Either dorsal sepal or petals entire.
 - 3a. Margin of dorsal sepal red ciliate; petals entire along margin, 5-veined 63. *B. bicolor*
 - 3b. Margin of dorsal sepal glabrous; petals erose to denticulate along margin, 3-veined.
 - 4a. Front margin of anther cap ciliate; lateral sepals free 64. *B. omerandrum*
 - 4b. Front margin of anther cap entire to denticulate; lateral sepals fused along upper margin.

- 5a. Pseudobulbs distant, 1–10 cm apart; petiole 2–7 cm 65. *B. forrestii*
 5b. Pseudobulbs contiguous, less than 1 cm apart from each other; petiole less than 1.3 cm 66. *B. taeniophyllum*
 2b. Both dorsal sepal and petals toothed, ciliate, fimbriate, or with glandular, wartlike appendages on margins.
 6a. Margins of dorsal sepal and petals with glandular-papillate or clavate-glandular, wartlike appendages 67. *B. chondriophorum*
 6b. Margins of dorsal sepal and petals erose to denticulate.
 7a. Scape nearly as long as pseudobulb 68. *B. emarginatum*
 7b. Scape much longer than pseudobulb.
 8a. Petals 5-veined, 7–8 mm 69. *B. chinense*
 8b. Petals 3-veined, ca. 3 mm.
 9a. Lateral sepals connate along upper and lower margins 70. *B. helenae*
 9b. Lateral sepals connate along upper margins only 71. *B. andersonii*

62. *Bulbophyllum gongshanense* Z. H. Tsi, Bull. Bot. Res., Harbin 1(1–2): 111. 1981.

贡山卷瓣兰 *gong shan juan ban lan*

Cirrhopetalum gongshanense (Z. H. Tsi) Garay, Hamer & Siegerist.

Rhizome creeping, ca. 2 mm in diam. Pseudobulbs 5–10 mm apart on rhizome, narrowly ovoid or bottle-shaped, 6–17 mm, ca. 5 mm in diam., with a terminal leaf. Leaf subsessile; blade oblong, 3.7–4.7 × 0.9–1.1 cm, leathery, apex obtuse. Scape from base of pseudobulbs, suberect, 5.5–9.5 cm; umbel often 4- or 5-flowered; peduncle ca. 0.7 mm in diam., sparsely with 3 tubular sheaths ca. 5 mm; floral bracts narrowly lanceolate, 3–4 mm, apex acuminate. Pedicel and ovary ca. 7 mm. Flowers red. Dorsal sepal suboblong, ca. 4.2 × 2 mm, distal margins finely papillate, apex subtruncate and emarginate; lateral sepals oblong, ca. 14 × 3.5 mm, twisted near base, their upper edges connate to each other forming an elliptic synsepal except their apices. Petals subelliptic, ca. 4 × 2 mm, base clawed and ca. 1/3 of its width adnate to column foot, margin entire, apex obtuse-rounded; lip recurved, ligulate, ca. 3 mm, fleshy, ± conuplicate in basal half, base attached to end of column foot by a mobile joint, margins and abaxial surface densely hirsute. Column ca. 1 mm, with wings dilated toward base; foot ca. 3 mm, with free part ca. 2 mm, upcurved; stelia subulate, ca. 0.8 mm; anther cap subglobose, apex slightly thickened. Fl. Oct.

- Tree trunks in forests; ca. 2000 m. NW Yunnan.

63. *Bulbophyllum bicolor* Lindley, Gen. Sp. Orchid. Pl. 49. 1830.

二色卷瓣兰 *er se juan ban lan*

Cirrhopetalum bicolor (Lindley) Rolfe; *Phyllorkis bicolor* (Lindley) Kuntze.

Rhizome stout, 3–4 mm in diam. Pseudobulbs 3–4 cm apart from each other, ovoid, 1.5–2 cm, 8–13 mm in diam., with a terminal leaf. Petiole ca. 1.5 cm; leaf blade oblong, 10.4–14 × 1.8–2.3 cm, leathery, base contracted into petiole, apex obtuse and retuse. Scape from base of pseudobulb, ca. 5 cm; umbel 1–3-flowered; peduncle with 1 or 2 sheaths; floral bracts lanceolate, ca. 6 mm. Pedicel and ovary ca. 1.5 cm. Sepals and petals pale yellow, with purple spots at adaxial base and purplish red at apex; lip olive-green or turning to tangerine. Dorsal sepal oblong, ca. 15 × 10 mm, margin red ciliate, apex acuminate; lat-

eral sepals obliquely ovate-lanceolate, ca. 20 × 7.5 mm, twisted near base, with their lower edges connate at basal part to each other, apex obtuse. Petals oblong, ca. 10 × 6 mm, entire, mucronate; lip recurved, ovate, attached to end of column foot by a mobile joint, apex obtuse. Column short, with 2 narrowly dentate stelia on both upper sides and triangular, enlarged wings at middle. Fl. May.

- Rocks and cliffs along streams; 100–500 m. Hong Kong.

64. *Bulbophyllum omerandrum* Hayata, Icon. Pl. Formosan. 4: 50. 1914.

毛药卷瓣兰 *mao yao juan ban lan*

Cirrhopetalum omerandrum (Hayata) Hayata.

Rhizome creeping, ca. 2 mm in diam., rooting from base of pseudobulbs. Pseudobulbs 1.5–4 cm apart on rhizome, ovoid-globose, 1–2 cm, 5–8 mm in diam., with a terminal leaf. Leaf subsessile; blade oblong, 1.5–8.5 × 0.8–1.4 cm, thickly leathery, base cuneate, apex obtuse and retuse. Scape from base of pseudobulb, erect, usually 5–6 cm; umbel or condensed raceme 1–3-flowered; peduncle slender, ca. 1 mm in diam., sparsely with 2 or 3 tubular sheaths; floral bracts ovate, cymbiform, 7–8 mm. Pedicel and ovary 1.5–2 cm. Flowers yellow. Dorsal sepal ovate, 10–14 × 7–8 mm, apex obtuse and slightly hairy; lateral sepals usually free, lanceolate, 20–33 × 4–5 mm, base adnate to column foot, margin entire, twisted near base and divergent, apex obtuse. Petals ovate-triangular, 5–7 × 4–5 mm, apical margins fimbriate-ciliate, apex purplish brown, obtuse and apiculate; lip recurved, ligulate, ca. 7 mm, fleshy, base attached to end of column foot by a mobile joint, apex obtuse, ± ciliate, sparsely finely papillate on both apical sides. Column ca. 4 mm, with crescent-shaped wings at middle; foot curved, ca. 5 mm, with free part ca. 2 mm; stelia deltoid, ca. 1 mm; anther cap shortly fimbriate margined. Fl. Mar–Apr.

- Tree trunks in forests, rocks along valleys; 1000–2000 m. N Fujian, N Guangdong, Guangxi, W Hubei, N Hunan, C and S Taiwan, Zhejiang.

65. *Bulbophyllum forrestii* Seidenfaden, Dansk Bot. Ark. 29(1): 120. 1974 [*“forrestii”*].

尖角卷瓣兰 *jian jiao juan ban lan*

Cirrhopetalum aemulum W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 13: 195. 1921, not *Bulbophyllum aemulum* Schlechter (1905); *Rhytionanthos aemulus* (W. W. Smith) Garay, Hamer & Siegerist.

Rhizome creeping, ca. 4 mm in diam. Pseudobulbs 1–2 cm apart on rhizome, ovoid, 2–3 cm, 1–2 cm in diam., with a terminal leaf. Petiole 2–3 cm; leaf blade oblong, 15–25 × 1.3–2.8 cm, thickly leathery, base contracted into petiole, apex obtuse and slightly emarginate. Scape from base of pseudobulb, yellowish green, densely spotted with purple, erect, to 15 cm, slender; raceme shortened, umbel-like, 10-flowered; peduncle sparsely with 3 or 4 membranous sheaths; floral bracts narrowly lanceolate, ca. 1 cm. Pedicel and ovary yellow, 1–1.8 cm. Flowers yellow, with purplish red spots on lip. Dorsal sepal ovate, concave, 7–10 × ca. 4 mm, apex subobtuse; lateral sepals lanceolate, 1.5–2.5 cm, outer surface minutely papillate, base adnate to column foot and twisted above it, their upper and lower edges connate to each other forming a lanceolate tube, apex acuminate. Petals ovate-triangular, 2–3 × 1.5–2 mm, margins irregularly denticulate, apex acute; lip recurved, lanceolate, ca. 5 mm, strongly narrowed above middle, base attached to end of column foot by a mobile joint, margin decurved and ± minutely papillate, apex obtuse. Column short; column foot curved, with free part ca. 2 mm; stelidia shortly subulate, ca. 0.5 mm; anther cap with irregularly incised margin. Fl. May–Jun.

Tree trunks in forests; 1800–2000 m. S and W Yunnan [Myanmar, Thailand].

66. *Bulbophyllum taeniophyllum* E. C. Parish & H. G. Reichenbach, *J. Bot.* 12: 198. 1874.

带叶卷瓣兰 dai ye juan ban lan

Cirrhopetalum taeniophyllum (E. C. Parish & H. G. Reichenbach) J. D. Hooker; *Phyllorkis taeniophylla* (E. C. Parish & H. G. Reichenbach) Kuntze.

Rhizome stout. Pseudobulbs contiguous, subcylindric, 3.5–3.8 cm, 7–9 mm in diam., with a terminal leaf. Leaf subsessile; blade narrowly oblong, 16.5–19 × 1.5–2 cm, leathery, apex obtuse. Scape from base of pseudobulb, erect, cylindric, 13–14 cm; umbel several flowered; peduncle ca. 1.5 mm in diam., with 2 or 3 tubular sheaths ca. 5 mm; floral bracts ovate-lanceolate, ca. 4 mm, shorter than pedicel and ovary; ovary ± covered with papillate hairs. Flowers whitish to greenish, densely with small purple spots, sometimes with yellowish brown lip. Dorsal sepal ovate, concave, ca. 7.5 × 5 mm, margin ± dentate toward apex, apex acute; lateral sepals narrowly lanceolate, ca. 20 × 4 mm, base adnate to column foot and twisted (180°), with their upper edges connate and lower edges incurved, apex acuminate. Petals narrowly ovate, ca. 4.2 × 2.2 mm, margins toothed, apex subacute; lip recurved, lanceolate, ca. 5 × 1 mm, fleshy, adaxially with 2 keels and a channel between them, base attached to end of column foot, immobile, apex subacute. Column ca. 1.5 mm, with triangular, enlarged wings at middle; foot ca. 2 mm, with free part ca. 1 mm; stelidia shortly subulate; anther cap glabrous, apex slightly 3-lobed. Fl. Jun.

Tree trunks in dense forests; ca. 800 m. S Yunnan [Indonesia, Laos, Malaysia, Myanmar, Thailand, Vietnam].

67. *Bulbophyllum chondriophorum* (Gagnepain) Seidenfaden, *Dansk Bot. Ark.* 29(1): 53. 1974.

城口卷瓣兰 cheng kou juan ban lan

Cirrhopetalum chondriophorum Gagnepain, *Bull. Soc. Bot. France* 78: 4. 1931; *Bulbophyllum quadrangulum* Z. H. Tsi.

Rhizome creeping, ca. 1.2 mm in diam., covered with membranous cupular sheaths, rooting from base of pseudobulbs. Pseudobulbs ca. 1 cm apart from each other, ovoid, 6–8 mm, ca. 4 mm in diam., with a terminal leaf. Leaf subsessile; blade oblong or obovate-oblong, 1.5–3.5 × 0.5–0.8 cm, leathery, apex obtuse and retuse. Scape from base of pseudobulb, erect, 2–3 cm; raceme shortened, umbel-like, often 2–4-flowered; peduncle ca. 0.8 mm in diam., with 2 spathe-like sheaths ca. 2.5 mm; floral bracts lanceolate, ca. 3 mm, apex acute. Pedicel and ovary 5–7 mm. Flowers yellow. Dorsal sepal ovate-oblong, concave, 4–5.5 × 2–3 mm, margins except base with densely glandular-papillate appendages, apex subobtuse; lateral sepals obliquely ovate, 7–25 × 2–2.2 mm, base adnate to column foot, their lower edges connate, apex acute. Petals ovate-oblong, 3–4 × 1.2–2 mm, margins densely with glandular-papillate appendages, apex subobtuse; lip recurved, ligulate, ca. 2.5 mm, fleshy, grooved at base, basal margins decurved, apex obtuse. Column 1.5–1.8 mm; foot 2–3 mm, with free part ca. 1 mm; stelidia deltoid, 0.3–0.8 mm, apex acute and narrowly dentate; anther cap rounded at apex. Fl. Jun.

• Tree trunks in open forests; 700–1200 m. Chongqing, N Fujian, S Shaanxi, NE Sichuan, Zhejiang.

68. *Bulbophyllum emarginatum* (Finet) J. J. Smith, *Bull. Jard. Bot. Buitenzorg, sér. 2*, 8: 24. 1912.

匍茎卷瓣兰 pu jing juan ban lan

Cirrhopetalum emarginatum Finet, *Bull. Soc. Bot. France* 44: 269. 1897; *Bulbophyllum yoksunense* J. J. Smith.

Rhizome creeping, ca. 3 mm in diam., rigid, branched, with internodes 2–5 cm, rooting mainly from base of pseudobulbs. Pseudobulbs 9–18 cm apart from each other, narrowly ovoid or subcylindric, 2–4 cm, 5–10 mm in diam., narrowed toward apex, with a terminal leaf. Petiole ca. 5 mm; leaf blade oblong or ligulate, 4–10 × 1.5–3.5 cm, thickly leathery, apex obtuse and retuse. Scape from base of pseudobulb, 2–4 cm; raceme shortened, umbel-like, 2–4-flowered; floral bracts lanceolate, ca. 8 mm, apex acute. Pedicel and ovary ca. 1.5 cm. Flowers purplish red. Dorsal sepal ovate-oblong, ca. 10 × 8 mm, apex truncate and emarginate, ciliate; lateral sepals falcate-lanceolate, 2–4.2 cm, abaxially papillate, base adnate to column foot, twisted near base, their upper and lower edges connate to each other forming a conic-cylindric synsepal, apex caudate. Petals suborbicular, ca. 9 × 9 mm, ciliate; lip ovate, ca. 8 × 4 mm, base attached to end of column foot by a mobile joint, with 2 lamellae extending from base to near apex, apex obtuse-rounded. Column ca. 3 mm; foot ca. 5 mm, with free part ca. 2 mm; stelidia ca. 0.2 mm; anther cap irregularly denticulate margined, centrally carinate-ridged. Fl. Oct.

Tree trunks in forests; 800–2200 m. SE Xizang, SE to NW Yunnan [Bhutan, NE India, Myanmar, Nepal, Vietnam].

69. *Bulbophyllum chinense* (Lindley) H. G. Reichenbach, *Ann. Bot. Syst.* 6: 260. 1861.

中华卷瓣兰 zhong hua juan ban lan

Cirrhopetalum chinense Lindley, Edwards's Bot. Reg. 28(Misc.): 37. 1842; *Phyllorkis chinensis* (Lindley) Kuntze.

Pseudobulbs spaced, oblong-ovoid, 1.5–2 cm, 1–1.2 cm in diam., with a solitary leaf at apex. Leaf subsessile; blade lanceolate, 6.5–8.5 × 1.6–1.8 cm. Scape ca. 12 cm; peduncle with 2 sheaths; umbel 9- or 10-flowered; floral bracts lanceolate, ca. 5 mm. Pedicel and ovary 1.5–2 cm. Dorsal sepal and petals purplish; lateral sepals yellowish green. Dorsal sepal oblong, 10–15 × 5–8 mm, margin denticulate, apex aristate; lateral sepals ovate-lanceolate, 24–32 × 6–7 mm, twisted near base, with their lower edges shortly connate at base. Petals suboblong, 7–8 × 3.5–4.5 mm, adaxially shortly hairy toward apex, margins serrulate-ciliate, apex obtuse, mucronate; lip recurved, ligulate, fleshy, glabrous, base attached to end of column foot by a mobile joint, apex obtuse. Column dilated and subrounded at base, 1.5–1.8 mm; column foot ca. 6 mm, with free part ca. 2 mm; stelidia narrowly subulate, ca. 3 mm. Fl. Jul.

- Habitat and locality unknown. "China."

This species is known only from the type at K.

70. *Bulbophyllum helenae* (Kuntze) J. J. Smith, Bull. Jard. Bot. Buitenzorg, sér. 2, 8: 24. 1912.

角萼卷瓣兰 jiao e juan ban lan

Phyllorkis helenae Kuntze, Revis. Gen. Pl. 2: 676. 1891.

Rhizome stout, 6–7 mm in diam. Pseudobulbs 3–6 cm apart from each other, narrowly ovoid, 3–6 cm, 1.1–1.5 cm in diam., with a terminal leaf. Petiole 5–6 cm, conduplicate; leaf blade oblong, 27–30 × 2.8–4 cm, leathery, apex obtuse. Scapes 1 or 2, from base of pseudobulbs, erect, 14–18 cm; umbel 6–10-flowered; peduncle with 3 or 4 sheaths 12–15 mm; floral bracts lanceolate, ca. 6 mm, apex acuminate. Pedicel and ovary ca. 11 mm. Flowers yellowish green with red spots. Dorsal sepal ovate, concave, ca. 6 × 3.2 mm, margin irregularly toothed or slightly erose, apex obtuse; lateral sepals lanceolate, ca. 32 × 3 mm, 5-veined, base finely papillate abaxially, twisted near base, their upper and lower edges connate to each other forming a horn-shaped synsepal. Petals ovate-triangular, ca. 3 × 3 mm, base ca. 1/3 width adnate to column foot, margins fimbriate, apex aristate; lip subovate-lanceolate, ca. 3 × 0.7 mm, fleshy, grooved at

base, apex acuminate. Column ca. 2 mm, stout, with slightly enlarged wings; foot ca. 3 mm, with free part ca. 2 mm; stelidia ca. 0.5 mm; anther cap ± finely papillate. Fl. Aug.

Tree trunks in forests; 600–2300 m. S and SW Yunnan [Bhutan, NE India, Myanmar, Nepal].

71. *Bulbophyllum andersonii* (J. D. Hooker) J. J. Smith, Bull. Jard. Bot. Buitenzorg, sér. 2, 8: 22. 1912.

梳帽卷瓣兰 shu mao juan ban lan

Cirrhopetalum andersonii J. D. Hooker, Fl. Brit. India 5: 777. 1890; *Bulbophyllum henryi* (Rolfe) J. J. Smith; *C. henryi* Rolfe; *Phyllorkis andersonii* (J. D. Hooker) Kuntze.

Rhizome creeping, 3–5 mm in diam. Pseudobulbs 3–11 cm apart on rhizome, ovoid-conic or narrowly ovoid, 2–5 cm, 6–15 mm in diam., with a terminal leaf. Petiole 1–2.5 cm; leaf blade oblong, 7–21 × 1.6–4.3 cm, leathery, apex obtuse and retuse. Scape from base of pseudobulb, erect, yellowish green with purplish red stripes, ca. 17 cm; umbel several flowered; peduncle slender, 1–2 mm in diam., with several tubular sheaths; floral bracts pale yellow, spotted with purple, lanceolate, ca. 5 mm, apex acute. Pedicel and ovary ca. 1 cm, slender. Sepals and petals whitish, densely spotted with purplish red; lip purple. Dorsal sepal ovate-oblong, concave, ca. 5 × 3 mm, with 5 veins spotted with purplish red, adaxially slightly scabrous or finely papillate, apical margins toothed, apex with a long awn ca. 3 mm; lateral sepals oblong, 15–20 mm, base adnate to column foot, twisted near base, connate along upper margin, apex obtuse. Petals oblong or falcate-oblong, ca. 3 × 1 mm, with 3 thickened veins spotted with purplish red, both surfaces densely minute-papillate, margins purplish red and with comblike or irregular teeth, apex with an awn ca. 0.8 mm; lip recurved, ovate-triangular, fleshy, centrally with 1 white longitudinal band, base grooved, attached to end of column foot by a mobile joint, apex obtuse. Column yellowish green, 1–2 mm, with wings at middle; foot white, spotted with purplish red, upcurved, ca. 3 mm, with free part ca. 1.5 mm; stelidia deltoid, ca. 1 mm, apex acute; anther cap yellow, apical margins ciliate. Fl. Feb–Nov. *2n* = 38.

Tree trunks or rocks in forests; 400–2000 m. Guangxi, SW Guizhou, SW Sichuan, SE to NW Yunnan [NE India, Myanmar, Vietnam].

14. *Bulbophyllum* sect. *Cirrhopetalum* (Lindley) H. G. Reichenbach, Ann. Bot. Syst. 6: 259. 1861.

单叶卷瓣兰组 dan ye juan ban lan zu

Cirrhopetalum Lindley, Gen. Sp. Orchid. Pl. 45, 58. 1830, nom. cons.

Rhizome creeping or straggling; roots sprouting mainly below pseudobulbs, spreading; new shoots arising from basal node of pseudobulb. Pseudobulbs distinct, apex with 1 leaf. Leaves persistent, thick. Inflorescence solitary, arising near pseudobulbs, 1-flowered or a ± subumbellate raceme. Pedicel with basal node ± coinciding with attachment of subtending bract. Sepals 3–5-veined; dorsal sepal with margins ciliate, fimbriate, or with paleaceous appendages (with a single apical thread in *Bulbophyllum amplifolium*); lateral sepals twisted inward near base, with upper margins approaching or meeting and connate, margins glabrous to ciliate. Petals: margins fimbriate or with paleaceous appendages, 1–3-veined; lip: margins with or without auricles above base, margins usually ± glabrous, adaxially ± glabrous. Column: stigma not protruding at its base, foot distinct; anther: front margin projecting or not, abaxially with or without a low, rounded crest; pollinia 4, inner ca. 1/2 as long as outer or longer, all without appendages.

Fifty-seven provisionally accepted species: India to W Pacific, also Africa and Madagascar; 17 species (ten endemic) in China.

1a. Dorsal sepal entire, with a terminal thread only.

- 2a. Lip with small auricles well above base; stelidia straight or slightly curved downward, triangular 72. *B. picturatum*
 2b. Lip without auricles; stelidia strongly curved downward, hook-shaped and fusiform 73. *B. amplifolium*
 1b. Dorsal sepal ciliate to fimbriate, or with other appendages along margins.
 3a. Lateral sepals 15–19 cm 74. *B. rothschildianum*
 3b. Lateral sepals less than 6 cm.
 4a. Scape ca. as long as pseudobulb.
 5a. Lateral sepals 5–7 mm, ca. 2 × as long as dorsal sepal or shorter 75. *B. brevipedunculatum*
 5b. Lateral sepals ca. 10 mm, ca. 2.5 × as long as dorsal sepal or longer 76. *B. henanense*
 4b. Scape much longer than pseudobulb.
 6a. Lateral sepals 0.7–1.4 cm.
 7a. Adaxial surface of lip glabrous; lateral sepals 0.7–1.1 cm 77. *B. albociliatum*
 7b. Adaxial surface of lip partly papillose; lateral sepals 1.2–1.4 cm 78. *B. kuanwuense*
 6b. Lateral sepals 1.5–3.5 cm or longer.
 8a. Lateral sepals long caudate at apex 79. *B. pecten-veneris*
 8b. Lateral sepals obtuse to acute at apex.
 9a. Stelidia of column narrowly lanceolate, ca. 5 mm 80. *B. longibrachiatum*
 9b. Stelidia of column toothlike, filiform, or subulate, less than 1.5 mm.
 10a. Lateral sepals free, with or without upper and lower margin inrolled; or lateral sepals partly connate and with upper and lower margin inrolled.
 11a. Lateral sepals without inrolled margins, free 81. *B. taiwanense*
 11b. Lateral sepals with inrolled margins, free or partly connate.
 12a. Lateral sepals ca. 3.4 cm; lip with 2 keels adaxially 82. *B. setaceum*
 12b. Lateral sepals 1.2–1.5 cm; lip without keels adaxially 83. *B. melanoglossum*
 10b. Lateral sepals connate along upper margin, without inrolled margins (lateral sepals may be folded over midvein).
 13a. Floral bracts 7–8 mm; column ca. 6 mm 84. *B. pingtungense*
 13b. Floral bracts 3–5 mm; column 1–3 mm.
 14a. Lip with 2 longitudinal grooves and between them a keel adaxially 85. *B. tseanum*
 14b. Lip without grooves and keel as above.
 15a. Stelidia suborbicular 86. *B. lepidum*
 15b. Stelidia subulate.
 16a. Dorsal sepal acuminate 87. *B. hirundinis*
 16b. Dorsal sepal rounded to obtuse 88. *B. fimbriperianthium*

72. *Bulbophyllum picturatum* (Loddiges) H. G. Reichenbach, Ann. Bot. Syst. 6: 262. 1861.

彩色卷瓣兰 cai se juan ban lan

Cirrhopetalum picturatum Loddiges, Edwards's Bot. Reg. 26(Misc.): 49. 1840.

Rhizome creeping, 6–10 mm in diam., densely covered with membranous sheaths. Pseudobulbs 2–6 cm apart from each other, ovoid-cylindric, 3–9 cm, 1.5–3 cm in diam., with a terminal leaf. Petiole 4–5 cm; leaf blade elliptic or elliptic-oblong, 15–25 × 3–6 cm, leathery, base subrounded, apex obtuse. Scapes 1 or 2, from base of pseudobulbs, erect, 15–18 cm; umbel 5–13-flowered; peduncle with 3–5 tubular sheaths; floral bracts lanceolate or oblong-lanceolate, 7–8 mm. Pedicel and ovary 1.6–1.8 cm. Flowers large, yellowish, median sepal and petals spotted with purple distally, lateral sepals finely spotted with purple proximally; lip yellowish spotted with purple. Dorsal sepal elliptic, concave, 6–6.5 × 5.5–6 mm, apex rounded to emarginate, with a (clavate-tipped) thread 5–7 mm; lateral sepals ovate-triangular, 23–35 × 5–6 mm, base adnate to column foot and twisted above it, their upper edges connate to each other except in basal part. Petals elliptic to ovate, ca. 4 × 2.5 mm, tip caudate with a thread 1–1.5 mm, margins finely erose to deeply lacerate distally; lip recurved, with rounded, patent auricles well above base, ovate-oblong, 3.5–5 × 1.5–3 mm,

fleshy, adaxially with 2 rounded ridges, base hardly concave, apex obtuse. Column ca. 3 mm; foot ca. 3 mm, with free part ca. 1.5 mm; stelidia porrect or slightly curved downward, triangular, acute, with a small tooth along upper margin, ca. 1.5 mm; anther cap toothed at apex. Fl. Mar.

Tree trunks in limestone forests; ca. 1100 m. SW Yunnan (Menglian) [India, Myanmar, Thailand, Vietnam].

This species was first recorded from China by X. H. Jin and S. C. Chen (Acta Bot. Yunnan. 29: 169. 2007).

73. *Bulbophyllum amplifolium* (Rolfe) N. P. Balakrishnan & Sud. Chowdhury, Bull. Bot. Surv. India 9: 89. 1967.

大叶卷瓣兰 da ye juan ban lan

Cirrhopetalum amplifolium Rolfe, Notes Roy. Bot. Gard. Edinburgh 8: 21. 1913.

Rhizome creeping, 6–10 mm in diam., densely covered with membranous sheaths. Pseudobulbs ca. 10 cm apart from each other, ovoid-cylindric, 5–8 cm, ca. 1.5 cm in diam., with a terminal leaf. Petiole 4–7 cm; leaf blade elliptic or elliptic-oblong, (8–)10–21 × ca. 8.5 cm, leathery, base subrounded, apex obtuse. Scapes 1 or 2, from base of pseudobulbs, erect, 15–30 cm; umbel 4–8-flowered; peduncle 3–4 mm in diam., sparsely with 3–5 tubular sheaths; floral bracts lanceolate or

oblong-lanceolate, 8–13 mm. Pedicel and ovary 1.5–2 cm. Flowers large, yellowish brownish. Dorsal sepal suborbicular, concave, ca. 1 × 1 cm, densely finely papillate, apical margins slightly denticulate, apex with a clavate-tipped awn ca. 8 mm; lateral sepals lanceolate, 4.5–5.5 cm, base adnate to column foot and twisted above it, their upper and lower edges connate to each other except apices. Petals ovate-triangular, ca. 4 × 3 mm, margins comblike, apex with a long clavate-tipped awn; lip recurved, without auricles, ovate-oblong, ca. 6 mm, fleshy, base subcordate, apex obtuse. Column ca. 3 mm; foot ca. 4 mm, with free part ca. 3 mm; stielidia strongly curved downward, hook-shaped and fusiform, ca. 5 mm; anther cap toothed at apex. Fl. Oct–Nov.

Rocks at broad-leaved forest margins; 1700–2000 m. S Guizhou, SE Xizang, W Yunnan [Bhutan, NE India, Myanmar].

74. *Bulbophyllum rothschildianum* (O'Brien) J. J. Smith, Bull. Jard. Bot. Buitenzorg, sér. 2, 8: 27. 1912.

美花卷瓣兰 mei hua juan ban lan

Cirrhopetalum rothschildianum O'Brien, Gard. Chron., ser. 3, 18: 608. 1895.

Rhizome stout, 5–7 mm in diam., densely with short tubular sheaths. Pseudobulbs well spaced, ovoid, ca. 3 cm in diam., with 1 leaf at apex. Petiole ca. 1 cm; leaf blade subelliptic, usually 9–10 × 2–2.5 cm, thickly leathery, apex obtuse and retuse. Scape from base of pseudobulb, erect, 20–24 cm, stout; umbel 4–6-flowered; peduncle ca. 4 mm in diam., sparsely with 3 tubular sheaths, ca. 1 cm; floral bracts lanceolate, ca. 1 cm, apex acuminate. Pedicel and ovary ca. 2 cm. Flowers large, purplish red. Dorsal sepal ovate, cymbiform, ca. 15 × 7 mm, abaxially sparsely papillate, margins fimbriate, apex caudate; fringes narrowly oblong, to 7 mm, easily falling away; lateral sepals lanceolate, 15–19 cm, abaxially densely papillate below middle, twisted near base, their upper edges connate forming a synsepal ca. 2 cm wide, apex long caudate. Petals ovate-triangular, ca. 10 × 4 mm, abruptly contracted above middle and caudate, margins fimbriate; lip ligulate-elliptic, ca. 1 cm, fleshy, ± conduplicate in basal half, base attached to end of column foot by a mobile joint, margins and adaxial surface densely fimbriate-hairy, apex obtuse. Column ca. 5 mm, with triangular, enlarged wings at middle; foot ca. 7 mm, with free part ca. 3 mm; stielidia suboblong, ca. 2 mm. Fl. unknown.

Tree trunks in dense forests; 1500–1600 m. S Yunnan [NE India].

75. *Bulbophyllum brevipedunculatum* T. C. Hsu & S. W. Chung, Taiwania 53: 23. 2008.

短萼卷瓣兰 duan ting juan ban lan

Rhizome long creeping, 0.6–0.8 mm in diam. Pseudobulbs 1–2 cm apart on rhizome, often ascending, narrowly ovoid, 0.7–1 cm, 3–5 mm in diam., with a terminal leaf. Leaf ± sessile; blade oblong to linear-oblong, 1–7 × 0.7–0.8 cm, apex obtuse to retuse. Scape from base of pseudobulb, 0.5–0.7 cm; umbel 2- or 3-flowered, rarely 1-flowered; peduncle stout, with 3 scalelike sheaths. Pedicel and ovary 2–3 mm. Flowers reddish, lateral sepals sometimes tinged yellow. Dorsal sepal concave, elliptic, ca. 3.5 × 2 mm, margins shortly white ciliate, apex rounded; lat-

eral sepals rhombic, 5–7 × 2–3 mm, upper margins incurved, free or loosely adhering near apex over a short distance, glabrous, apex obtuse-mucronate. Petals elliptic, ca. 2 × 1.2 mm, margin white ciliate, apex rounded; lip recurved, ovate-triangular, ca. 2 mm, adaxially slightly and finely papillose. Column subterete, with a distinct foot, conspicuously winged; stielidia triangular, slender; anther cap subglobose. Fl. Feb–Apr.

• Epiphytic on tree trunks in broad-leaved evergreen forests; 1800–2100 m. Taiwan.

Further research is needed to compare this to *Bulbophyllum inconspicuum* Maximowicz from Japan.

76. *Bulbophyllum henanense* J. L. Lu, Bull. Bot. Res., Harbin 12: 331. 1992.

河南卷瓣兰 he nan juan ban lan

Rhizome creeping, slender. Pseudobulbs 4–10 mm apart on rhizome, ovoid, ca. 5 mm, 2–4 mm in diam., ribbed, with a terminal leaf. Leaf shortly petiolate; blade ovate-oblong, 8–12 × 5–8 mm, leathery, apex obtuse or retuse. Scape from base of pseudobulb, ascending, ca. 4 mm; umbel 2-flowered. Flowers small, with yellow sepals and purplish red lip. Dorsal sepal ovate, concave, ca. 3.5 × 2.5 mm, abaxial base and margin villos, apex obtuse; lateral sepals narrowly oblong, ca. 10 × 1.5 mm, base adnate to column foot, twisted near base, their lower edges connate except apices, apex obtuse. Petals obovate-oblong, ca. 2 × 1 mm, margins long ciliate, apex obtuse; lip triangular-lanceolate, ca. 3.5 × 1.5 mm, fleshy, ± conduplicate toward base, base attached to end of column foot, immobile, apex acuminate. Column ca. 1.2 mm, stout, with triangular, enlarged wings at middle; foot ca. 2 mm; stielidia narrow; anther cap nearly subspherical. Fl. May–Jun.

• Tree trunks in forests; 800–1100 m. Henan.

77. *Bulbophyllum albociliatum* (T. S. Liu & H. J. Su) K. Nakajima, Biol. Mag. Okinawa 10: 36. 1973.

白毛卷瓣兰 bai mao juan ban lan

Cirrhopetalum albociliatum T. S. Liu & H. J. Su, Quart. J. Taiwan Mus. 24: 173. 1971; *Bulbophyllum albociliatum* var. *weiminianum* T. P. Lin & Kuo Huang; *B. taichungianum* S. S. Ying.

Rhizome creeping, slender, ca. 1 mm in diam. Pseudobulbs ca. 2 cm apart on rhizome, ± ascending, narrowly ovoid, 1–1.3 cm, 5–7 mm in diam., with a terminal leaf. Leaf sessile; blade oblanceolate or obovate, 2.5–4 × 0.8–1 cm, apex obtuse or sometimes retuse. Scape from base of pseudobulb, 5–6 cm; umbel 5- or 6-flowered; peduncle slender, with 2 scalelike sheaths; floral bracts narrowly triangular, ca. 3 mm. Pedicel and ovary ca. 5 mm. Flowers reddening, with reddish yellow lateral sepals. Dorsal sepal concave, elliptic, ca. 3 × 2 mm, base subtruncate, margin long white ciliate, apex rounded; lateral sepals lanceolate, 7–11 × ca. 2 mm, twisted near base, with their upper edges ± connate, apex acute. Petals elliptic, ca. 2 × 1.2 mm, base truncate, margins long white ciliate, apex rounded; lip recurved, hornlike, 1.5–2 mm. Column yellow, subterete, ca. 1.5 mm, with a distinct foot, conspicuously winged; stielidia slender; anther cap subglobose. Fl. Apr–May.

- Tree trunks in forests; 1300–1800 m. C and S Taiwan.

78. *Bulbophyllum kuanwuense* S. W. Chung & T. C. Hsu, *Taiwania* 51: 139. 2006 [*“kuanwuensis”*].

台南卷瓣兰 tai nan juan ban lan

Rhizome long creeping, ca. 2 mm in diam. Pseudobulbs 1–2 cm apart on rhizome, globose to ovoid, 0.7–1 cm, 6–9 mm in diam., with a terminal leaf. Leaf ± sessile; blade elliptic to obovate, 1.8–4 × 1–1.5 cm, apex rounded to slightly retuse. Scape from base of pseudobulb, 2–3 cm; umbel 3–7-flowered; peduncle stout, with 2 scalelike sheaths. Pedicel and ovary 4–5 mm. Flowers with dorsal sepal reddish orange, tinged white near base and with red-brown veins, lateral sepals reddish to orange, petals reddish, lip orange. Dorsal sepal concave, ovate, 6–7 × 3–3.5 mm, margins white ciliate, apex acute; lateral sepals linear-oblong, 12–14 × 2–3 mm, slightly twisted near base, with their upper and lower edges often loosely adhering, margins ciliolate, apex obtuse. Petals ovate, ca. 3.5 × 1.5–2 mm, margins long white ciliate, apex acute; lip recurved, ovate-triangular, 2–2.5 mm, adaxially deeply grooved and papillose near apex and base. Column subterete, with a distinct foot, conspicuously winged; stelidia slender; anther cap subglobose. Fl. Apr.

- *Chamaecyparis* forests on mountain ridges; ca. 2000 m. S Taiwan.

This species is close to *Bulbophyllum albociliatum*.

79. *Bulbophyllum pecten-veneris* (Gagnepain) Seidenfaden, *Dansk Bot. Ark.* 29(1): 37. 1974 [*“pectenveneris”*].

斑唇卷瓣兰 ban chun juan ban lan

Cirrhopetalum pecten-veneris Gagnepain, *Bull. Soc. Bot. France* 78: 6. 1931; *Bulbophyllum flaviflorum* (T. S. Liu & H. J. Su) Seidenfaden; *C. flaviflorum* T. S. Liu & H. J. Su; *C. minutum* Rolfe.

Rhizome creeping, 1–2 mm in diam., rooting from base of pseudobulbs. Pseudobulbs 5–10 mm apart on rhizome, ovoid, 5–12 mm, 5–10 mm in diam., with a terminal leaf. Leaf subsessile; blade elliptic, oblong-lanceolate, or ovate, 1–6 × 0.7–1.8 cm, thickly leathery, apex obtuse or sometimes retuse. Scape from base of pseudobulb, erect, ca. 10 cm; umbel 3–9-flowered; peduncle slender, sparsely with 2 or 3 tubular sheaths; floral bracts lanceolate, small, 3–4 mm. Pedicel and ovary 7–10 mm, slender. Flowers yellowish green or yellow slightly tinged with brown. Dorsal sepal ovate, concave, ca. 5 × 2.5 mm, margin fimbriate-ciliate, apex long caudate; lateral sepals narrowly lanceolate, 35–50 × ca. 2.5 mm, twisted near base, their upper and lower edges connate to each other forming a long-cuspidate tube, with their apices separate, apex long cuspidate. Petals obliquely ovate, 2.5–3 × ca. 1.5 mm, base ca. 2/5 width adnate to column foot, margins fimbriate-ciliate especially in apical half, apex acute; lip recurved, ligulate, ca. 2.5 mm, fleshy, nearly glabrous, subacute. Column ca. 2 mm; stelidia subulate, ca. 1 mm; foot upcurved, ca. 1.5 mm, with free part ca. 0.5 mm; anther cap papillate margined. Fl. Apr–Sep.

- Tree trunks or rocks in forests; below 1600 m. S Anhui, N Fujian, Guangxi, Hainan, Hong Kong, W Hubei, C and S Taiwan [Laos, Vietnam].

80. *Bulbophyllum longibrachiatum* Z. H. Tsi, *Bull. Bot. Res., Harbin* 1(1–2): 115. 1981.

长臂卷瓣兰 chang bi juan ban lan

Bulbophyllum purpureifolium Averyanov; *Cirrhopetalum longibrachiatum* (Z. H. Tsi) Garay, Hamer & Siegerist.

Rhizome stout, ca. 6 mm in diam., often branched, rooting from base of pseudobulbs. Pseudobulbs well spaced, erect, narrowly ovoid, 4–4.3 cm, ca. 1 cm in diam., with a terminal leaf. Petiole 2–3 cm; leaf blade elliptic, large, 12.5–15.5 × 3.5–5 cm, thickly leathery, base contracted into petiole, apex obtuse. Scape from base of pseudobulb, erect, 15–28 cm; umbel 3- or 4-flowered; peduncle 2–3.5 mm in diam., sparsely with 3 or 4 sheaths ca. 1 cm; floral bracts lanceolate, ca. 9 mm, apex acuminate. Pedicel and ovary ca. 2 cm. Flowers pale green, tinged with purple. Dorsal sepal ovate, concave, ca. 15 × 9 mm, margin fimbriate in apical half, apex acuminate; lateral sepals narrowly lanceolate, ca. 35 × 6 mm, twisted near base, their upper and lower edges connate to each other forming a tube, with their apices separate, apex acuminate. Petals falcate-lanceolate, ca. 10 × 4 mm, margins densely fimbriate, apex with a long awn ca. 0.8 mm; lip strongly reflexed, lanceolate, ca. 1 cm, base ± conduplicate, base attached to end of column foot by a mobile joint, slightly ciliate, apex acute. Column ca. 5 mm, with triangular, enlarged wings above; foot ca. 10 mm, with free part upcurved, ca. 5 mm; stelidia horizontally spreading, narrowly lanceolate, ca. 5 mm, base slightly twisted; anther cap comblike on apical margin. Fl. Nov.

- Tree trunks in forests; 1300–1600 m. SE Yunnan [N Vietnam].

81. *Bulbophyllum taiwanense* (Fukuyama) K. Nakajima, *Biol. Mag. Okinawa* 10: 36. 1973.

台湾卷瓣兰 tai wan juan ban lan

Cirrhopetalum taiwanense Fukuyama, *Bot. Mag. (Tokyo)* 49: 761. 1935.

Rhizome creeping, 1–2 mm in diam., rigid, rooting from base of pseudobulbs. Pseudobulbs 5–15 mm apart on rhizome, usually ovoid, 6–12 mm, 4–8 mm in diam., ± longitudinally striped, with a terminal leaf. Leaf shortly petiolate; blade narrowly oblong, 3–5 × 1–2 cm, fleshy, apex obtuse and retuse. Scape from base of pseudobulb, 6–10 cm; raceme shortened, umbel-like, 6–10 mm, densely 5–8-flowered; peduncle yellowish green, slender, longitudinally striped, sparsely with several brown sheaths ca. 5 mm; floral bracts lanceolate, ca. 3 mm, apex acuminate. Pedicel and ovary ca. 1 cm. Flowers not widely opening, yellowish red. Dorsal sepal ovate-lanceolate, concave, 6–8 × ca. 3 mm, apex acuminate, ciliate; lateral sepals free, divergent, obliquely lanceolate, 13–15 × ca. 2 mm, margins incurved in apical half, apex obtuse, sometimes ciliate. Petals ovate, ca. 5 × 2 mm, membranous, apex acute, ciliate; lip slightly reflexed, hornlike, ca. 3 mm, fleshy, adaxially with 1 longitudinal groove, base dilated and attached to end of column foot, apex obtuse. Column subcylindric, ca. 1.5 mm; foot curved, ca. 1.5 mm; stelidia linear. Fl. Apr–May.

- Tree trunks in forests; below 1000 m. S Taiwan.

82. *Bulbophyllum setaceum* T. P. Lin, Native Orchids Taiwan 1: 55. 1975.

鹤冠卷瓣兰 guan guan juan ban lan

Bulbophyllum ciliisepalum T. C. Hsu & S. W. Chung; *B. taitungianum* Ying.

Rhizome short. Pseudobulbs close or ca. 1 cm apart from each other, ovoid to narrowly cylindrical, 1–1.3 cm, 5–10 mm in diam., with a terminal leaf. Leaf blade elliptic to oblong-elliptic, 3–6 × 1.2–2 cm, thickly leathery, apex obtuse and retuse. Scape green, erect, 14–16 cm; umbel 12–16-flowered; floral bracts ovate-lanceolate, ca. 5 mm. Pedicel and ovary ca. 11 mm. Flowers yellow, tinged with brown, with tangerine lip. Dorsal sepal ovate, concave, ca. 5.5 × 3 mm, brown veined, white ciliate, apex shortly cuspidate; lateral sepals lanceolate or linear, ca. 3.4 × 2 mm, brown tipped, slightly red at base, basal margins usually sparsely ciliate, their upper and lower edges connate in basal half and separate but inrolled margined in apical half forming a fork-shaped synsepal. Petals obliquely elliptic, ca. 3 × 2 mm, with 5 reddish brown veins, acute, long ciliate; lip recurved, ligulate, ca. 2.5 mm, with 2 keels adaxially, grooved at base, apex obtuse. Column ca. 1.5 mm; stelidia broadly subulate; anther cap lacerate margined. Fl. Mar–May.

- Tree trunks in forests; 1500–2400 m. C Taiwan.

83. *Bulbophyllum melanoglossum* Hayata, Icon. Pl. Formosan. 4: 49. 1919.

紫纹卷瓣兰 zi wen juan ban lan

Bulbophyllum linchianum S. S. Ying; *B. melanoglossum* var. *rubropunctatum* (S. S. Ying) S. S. Ying; *B. rubropunctatum* S. S. Ying; *Cirrhopetalum melanoglossum* (Hayata) Hayata; *C. striatum* T. S. Liu & H. J. Su.

Rhizome creeping, 1–2 mm in diam. Pseudobulbs 1–6 cm apart on rhizome, ovoid, usually 1–1.5 cm, 5–7 mm in diam., with a terminal leaf. Leaf subsessile; blade obovate-lanceolate or oblong, 4–8 × 0.8–1.5 cm, leathery, apex obtuse and retuse or apiculate. Scape from base of pseudobulb, yellowish green, with purplish red spots, 7–12 cm; umbel several to 10-flowered; peduncle slender, ca. 0.6 mm in diam., sparsely with 2 or 3 sheaths; floral bracts narrowly lanceolate, ca. 3 mm. Pedicel and ovary 6–12 mm. Sepals and petals pale yellow, usually densely with purplish red stripes or spots; lip reddish adaxially, yellow abaxially. Dorsal sepal ovate, 4.5–5 × 2.5–3 mm, 3-veined, margin fimbriate-ciliate, apex acute; lateral sepals narrowly lanceolate, 12–20 × ca. 3 mm, 5-veined, twisted near base, their upper and lower edges ± connate forming a somewhat tubular synsepal, base broad and adnate to column foot, margin entire, apex acute. Petals ovate-elliptic, 3–3.5 × 1.5–1.8 mm, apex acute and with a black blotch, ciliate; lip recurved, ligulate, ca. 2.5 mm, fleshy, base attached to end of column foot, immobile. Column suberect, yellow, ca. 1.5 mm; foot ca. 1.5 mm, with many purplish red spots; stelidia subulate, ca. 1 mm; anther cap yellow, finely papillate. Fl. May–Jul.

- Tree trunks in forests, on rocks along valleys; 400–1800 m. C and S Fujian, Hainan, Taiwan.

84. *Bulbophyllum pingtungense* S. S. Ying & C. Chen, Coloured Ill. Fl. Taiwan 1: 499. 1985 [*“pingtungensis”*].

屏东卷瓣兰 ping dong juan ban lan

Rhizome 2–3 mm in diam. Pseudobulbs 5–10 cm apart on rhizome, ovoid or narrowly ovoid, 1–4 cm, 0.8–2 cm in diam., 3–5 ribbed, with a terminal leaf. Leaf subsessile; blade elliptic to narrowly oblong, 3–15 × 1–2.5 cm, leathery, base contracted, apex obtuse and retuse. Scape erect, 5–15 cm, stout; umbels 2–4-flowered; peduncle with 2 sheaths; floral bracts lanceolate, 7–8 mm, apex acute. Flowers erect, orange-yellow to pale red, marked with red or deep purplish red stripes and spots. Dorsal sepal ovate, concave, 1.5–2.4 × 1.1–1.5 cm, adaxially hairy, ciliate, apex cuspidate; lateral sepals obliquely lanceolate, 2.5–4 × 0.7–1 cm, base adnate to column foot, apex acute. Petals narrowly triangular, 1–1.2 cm, base broad and adnate to column foot, ciliate, apex acute; lip recurved, ligulate, ca. 1 cm, fleshy, hairy on both basal sides. Column ca. 0.6 cm, with triangular, enlarged wings at base; foot ca. 1.2 cm; stelidia conspicuous. Fl. Jan–Apr.

- Tree trunks in broad-leaved forests; 100–400 m. S Taiwan.

Chinese records of *Bulbophyllum wightii* H. G. Reichenbach (e.g., in FRPS 19: 240. 1999) are referable to *B. pingtungense*.

85. *Bulbophyllum tseanum* (S. Y. Hu & Barretto) Z. H. Tsi, Fl. Reipubl. Popularis Sin. 19: 239. 1999.

香港卷瓣兰 xiang gang juan ban lan

Cirrhopetalum tseanum S. Y. Hu & Barretto, Chung Chi J. 13(2): 30. 1976.

Rhizome creeping, ca. 3 mm in diam., with straw-yellow sheaths. Pseudobulbs ovoid, 1–1.5 cm, 6–8 mm in diam., with a terminal leaf. Petiole 3–7 mm; leaf blade oblong, 4–7 × 1.7–2.5 cm, thickly leathery, apex rounded and retuse. Scape from base of pseudobulb, 8–12 cm; umbel 4- or 5-flowered; peduncle pale purplish red, slender, ca. 1 mm in diam., with 2 sheaths; floral bracts subulate, ca. 3 mm, apex acuminate or apiculate. Pedicel and ovary ca. 4 mm, deep red. Flowers yellow, with dark red margins on dorsal sepal and petals, densely spotted with dark purple-red on lateral sepals and tinged with orange on lip. Dorsal sepal subovate, concave, ca. 5 × 4 mm, margins with dark red fimbriate cilia, apex long caudate; lateral sepals obliquely lanceolate, twisted near base, their upper edges connate to each other forming an elliptic synsepal 1.8–2 × 0.7–0.8 cm. Petals obliquely ovate, ca. 4 × 2.5 mm, margins fimbriate-ciliate, apex long caudate; lip recurved, ligulate, fleshy, base attached to end of column foot by a mobile joint, adaxially with 2 grooves and 1 longitudinal keel between them. Column ca. 3 mm, with triangular, enlarged wings at base; foot distinct; stelidia very short; anther cap glabrous. Fl. Apr. 2n = 38*.

- Rocks. Hong Kong.

86. *Bulbophyllum lepidum* (Blume) J. J. Smith, Orch. Java, 471. 1905.

南方卷瓣兰 nan fang juan ban lan

Ephippium lepidum Blume, Bijdr. 310. 1825; *Bulbophyllum obtusiangulum* Z. H. Tsi.

Rhizome creeping, ca. 3 mm in diam., rooting from base of pseudobulbs. Pseudobulbs 2–3 cm apart on rhizome, ovoid, 1.5–1.8 cm, ca. 1.3 cm in diam., with a terminal leaf. Petiole ca. 1.5 cm; leaf blade obovate-lanceolate or suboblong, 7–11 × 1.7–2.4 cm, leathery, apex obtuse and retuse. Scape from base of pseudobulb, to 17 cm; umbel 10-flowered; peduncle ca. 1.5 mm in diam., with 2 or 3 sheaths; floral bracts narrowly lanceolate, ca. 3.5 mm, apex acuminate. Pedicel and ovary ca. 6 mm. Flowers yellow. Dorsal sepal broadly ovate, cymbiform, ca. 3.5 × 3 mm, margin fimbriate-ciliate, apex acute; lateral sepals suboblong, ca. 15 × 3 mm, base adnate to column foot, twisted near base, their upper edges connate except apices, apex obtuse. Petals obliquely ovate, ca. 3 × 2 mm, margins fimbriate-ciliate, apex cuspidate; lip recurved, ligulate, ca. 2.5 mm, base attached to end of column foot by a mobile joint, apex acute. Column ca. 2 mm, with suborbicular, enlarged wings at middle; foot ca. 3.5 mm, with free part ca. 1.5 mm. Fl. Apr–May.

Tree trunks in dense forests; ca. 900 m. S Hainan [Cambodia, Indonesia, Laos, Malaysia, Thailand, Vietnam].

87. *Bulbophyllum hirundinis* (Gagnepain) Seidenfaden, Dansk Bot. Ark. 29(1): 76. 1974.

莲花卷瓣兰 lian hua juan ban lan

Cirrhopetalum hirundinis Gagnepain, Bull. Soc. Bot. France 78: 5. 1931; *Bulbophyllum electrinum* Seidenfaden; *B. hirundinis* var. *electrinum* (Seidenfaden) S. S. Ying; *C. aurantiacum* W. W. Smith; *C. melinanthum* Schlechter; *C. remotifolium* Fukuyama.

Rhizome creeping, 1–2 mm in diam., branched. Pseudobulbs close or 5–20 mm apart from each other, ovoid, 7–15 mm, 5–10 mm in diam., with a terminal leaf. Leaf subsessile; blade narrowly elliptic, oblong, or ovate-ligulate, 1.3–5 × 0.6–2 cm, thickly leathery or fleshy, apex obtuse or acute, sometimes retuse. Scape from base of pseudobulb, erect, 3.5–13 cm; peduncle slender, base with a few sheaths; umbel 3–5-flowered; floral bracts lanceolate, ca. 3 mm, apex acuminate. Pedicel and ovary 6–7 mm. Flowers yellow, tinged with purplish red. Dorsal sepal ovate, concave, ca. 5 × 3 mm, margin fimbriate-ciliate,

apex acute to subcaudate; lateral sepals linear, (16–)20–30 × 2–3 mm, twisted near base, their lower edges ± connate to each other forming an elliptic synsepal, free and divergent toward apex, entire or shortly ciliate. Petals obliquely ovate-triangular, 3–4 × 1.5–2.5 mm, margins usually fimbriate-ciliate, sometimes densely finely papillate on both surfaces, 3-veined, apex acute; lip slightly recurved, ligulate, ca. 2.5 mm, fleshy, glabrous, obtuse. Column ca. 1.5 mm; foot ca. 1.5 mm, with free part ca. 0.5 mm; stelidia subulate, ca. 0.8 mm; anther cap with many dentate projections. Fl. unknown.

Tree trunks in forests; 500–3000 m. S Anhui, Guangxi, Hainan, Taiwan, S Yunnan [Vietnam].

88. *Bulbophyllum fimbriperianthium* W. M. Lin, Kuo Huang & T. P. Lin, Taiwania 51: 162. 2006.

钝萼卷瓣兰 dun e juan ban lan

Rhizome long creeping, 1.8–3 mm in diam. Pseudobulbs 0.5–1.5 cm apart on rhizome, often ± ascending, ovoid-conic, 1–1.6 cm, 6–10 mm in diam., with a terminal leaf. Leaf shortly petiolate; blade oblong to oblong-oblong, 4–8.5 × 1.2–2 cm, apex slightly retuse. Scape from base of pseudobulb, 6–8 cm; umbel 4–8-flowered; peduncle slender, with 2 scalelike sheaths; floral bracts narrowly triangular, 3–4 mm. Pedicel and ovary 5–8 mm. Flowers with dorsal sepal and petals white with red veins, tip red, lateral sepals apple-green toward base, yellow elsewhere, lip whitish yellow tinged with orange red toward base. Dorsal sepal oblong, 6–9 × 4–6 mm, margin white ciliate, apex rounded to obtuse; lateral sepals lanceolate, 23–33 × 4–5 mm, twisted near base, with their upper edges loosely touching, margins sparsely ciliolate, apex obtuse. Petals obliquely elliptic, 4–5 × 2.5–3 mm, margins long white ciliate, apex rounded to obtuse; lip recurved, ovate, 2.5–3 mm, adaxially shallowly grooved, deeper so abaxially. Column subterete, ca. 2 mm, with a distinct foot, conspicuously winged; stelidia slender; anther cap subglobose. Fl. Sep–Oct.

• Trunks and branches of conifers; 1300–1400 m. S Taiwan.

This species mainly differs from *Bulbophyllum hirundinis* in having a rounded to obtuse dorsal sepal.

15. *Bulbophyllum* sect. *Brachystachya* Bentham & J. D. Hooker, Gen. Pl. 3: 504. 1883 [*“Brachystachyae”*].

微球组 wei qiu zu

Rhizome creeping or straggling; roots sprouting mainly below pseudobulbs, spreading; new shoots arising from basal node of pseudobulb. Pseudobulbs inconspicuous compared to size of plant, apex with 1 leaf. Leaves persistent, thick. Inflorescence solitary, mostly arising near pseudobulbs, an elongate or contracted raceme. Pedicel with basal node ± coinciding with attachment of subtending bract. Sepals: margins glabrous, 3-veined; lateral sepals ca. as long as dorsal sepal or somewhat longer, approaching or partly fused along their lower margins. Petals: margins glabrous to erose or denticulate, 1-veined; lip: margins without auricles or lateral lobes, margins ± glabrous to papillose, adaxially glabrous to papillose. Column: stigma not or only slightly protruding at its base, foot very short, often inconspicuous; anther: front margin not or slightly projecting, abaxially with or without a low, rounded crest; pollinia 4, inner slightly less than 1/2 as long as outer or longer, all without appendages.

Sixty-five provisionally accepted species: India to W Pacific; three species in China.

- 1a. Raceme with a large spathe-like basal bract ca. 25 mm 89. *B. cylindraceum*
 1b. Raceme with a small basal bract ca. 8 mm, or with several small bracts lower down on peduncle.
 2a. Petals acute; raceme cylindrical-ellipsoid 90. *B. khasyanum*
 2b. Petals truncate to rounded; raceme globose to ovoid 91. *B. repens*

89. *Bulbophyllum cylindraceum* Lindley, Gen. Sp. Orchid. Pl. 53. 1830.

大苞石豆兰 da bao shi dou lan

Phyllorkis cylindracea (Lindley) Kuntze.

Rhizome creeping, stout, 5–6 mm in diam. Pseudobulbs spaced, 5–7 mm apart from each other, very small, 3–5 mm, 3–4 mm in diam., rigid, with a terminal leaf. Petiole 4–7 cm; leaf blade erect, elliptic-oblong or obovate-lanceolate, 15–25 × 2–4 cm, fleshy or leathery, apex obtuse and apiculate. Scape from base of pseudobulb, erect, 15–25 cm; raceme pendulous, to 6.5 cm, densely many flowered, with an involucre at base; involucre spathe-like, large, ca. 25 × 7 mm; peduncle with 2 or 3 tubular sheaths 2–2.5 cm; floral bracts ovate, small, ca. 4 mm. Pedicel and ovary ca. 3 mm. Flowers pale purple, thickly textured, not widely opening. Dorsal sepal ovate-triangular, ca. 5 × 2.2 mm, abaxially ± scaly, apex acute; lateral sepals obliquely ovate, ca. 5 × 3 mm, abaxially ± scaly, their lower edges connate to each other except apices, apex obtuse. Petals oblong-lanceolate, 2–4.4 × ca. 1.5 mm, thinly textured, entire, acute or obtuse; lip recurved, ligulate, ca. 3.5 × 2 mm, fleshy, grooved at base, adaxially with 3 keels, densely papillate, apex obtuse. Column ca. 0.6 mm, stout; foot very short, without conspicuous free part; stelia narrowly fusiform, ca. 1 mm; anther cap truncate and slightly apiculate at apex. Fl. Nov. $2n = 38, 40, 42$.

Tree trunks or rocks in forests; 1400–2400 m. W to SE Yunnan [Bhutan, NE India, Nepal].

90. *Bulbophyllum khasyanum* Griffith, Not. Pl. Asiat. 3: 284. 1851.

卷苞石豆兰 juan bao shi dou lan

Bulbophyllum cylindraceum Lindley var. *khasyanum* (Griffith) J. D. Hooker.

Rhizome creeping, stout, 4–5 mm in diam. Pseudobulbs 4–6 mm apart from each other, ovoid-subglobose, very small, 3–5 mm, 3–4 mm in diam., with a terminal leaf. Petiole 3–4 cm; leaf blade elliptic-oblong or suboblong, 12–20 × 3–4 cm, apex obtuse. Scape from base of pseudobulb, 15–25 cm; ra-

ceme nodding, 5.5–6 cm, densely many flowered, with several involucre at base; involucre scale-shaped, ca. 8 × 2 mm, apex aristate; floral bracts lanceolate, ca. 7 mm, much longer than pedicel and ovary, apex curled-aristate. Flowers dark purple, lip even darker. Dorsal sepal ovate, ca. 5 × 2 mm; lateral sepals obliquely ovate, ca. 5 × 3 mm, abaxially slightly scaly, their lower edges connate to each other. Petals lanceolate, ca. 4 × 1.5 mm, apex long acuminate; lip ligulate, fleshy, grooved at base, adaxially with 3 keels and densely papillate. Column short, with a short but distinct foot. Fl. Nov.

About 2000 m. C Yunnan [Bhutan, NE India, Malaysia, Thailand, Vietnam].

91. *Bulbophyllum repens* Griffith, Not. Pl. Asiat. 3: 293. 1851.

球花石豆兰 qiu hua shi dou lan

Bulbophyllum poilanei Gagnepain.

Pseudobulbs close, subovoid, very small, ca. 5 mm, ca. 7 mm in diam., with a terminal leaf. Leaf blade obovate-lanceolate, 11–12 × 0.7–1.7 cm, nearly fleshy, narrowed toward base, base with a few tubular sheaths, apex obtuse. Scape from base of pseudobulb, short; raceme shortened, globose, 4–5 mm, densely many flowered; floral bracts ovate-triangular, very small, ca. 1 mm, apex acute. Pedicel and ovary ca. 2 mm. Flowers purple. Dorsal sepal ovate, ca. 3.5 × 2 mm, 3-veined, entire, obtuse; lateral sepals subequal in size to dorsal sepal, obliquely ovate, 3-veined, their lower edges connate to each other, apex obtuse. Petals truncate to rounded, ca. 2.2 × 1.2 mm, 1-veined, margins glabrous to erose, apex obtuse; lip reflexed, ligulate, fleshy, with a basal groove, adaxially ± papillate, base attached to end of column foot by a mobile joint, apex obtuse. Column stout; stelia subfalcate; anther cap ± mucronate at apex. Fl. Mar.

Tree trunks in dense forests; 500–600 m. Hainan [India, Vietnam].

“*Bulbophyllum cylindricoides* W. H. Chen & Y. M. Shui” (Seed Pl. Karst Region China 1: 217. 2006) belongs here but was not validly published because no Latin description or diagnosis was provided and no type was indicated (*Vienna Code*, Art. 36.1 and 37.1).

16. *Bulbophyllum* sect. *Stachysanthes* (Blume) Averyanov, Oprel. Orkhid. Vetnama, 276. 1994.

少花微球组 shao hua wei qiu zu

Diphyes sect. *Stachysanthes* Blume, Bijdr. 312. 1825.

Rhizome creeping or straggling; roots sprouting mainly below pseudobulbs, spreading; new shoots arising from basal node of pseudobulb. Pseudobulbs inconspicuous compared to size of plant, apex with 1 leaf. Leaves persistent, thick. Inflorescence solitary, mostly arising near pseudobulbs, 1-flowered, or an elongate or contracted 2- or 3-flowered raceme. Pedicel with basal node ± coinciding with attachment of subtending bract. Sepals free, ± equally long, margins glabrous, 3-veined. Petals: margins glabrous, to erose or denticulate, 1-veined; lip: margins without auricles or lateral lobes, margins ± glabrous to papillose, adaxially glabrous. Column: stigma protruding at its base or not, foot very distinct or short; anther: front margin projecting or not, abaxially with or without a low, rounded crest; pollinia 2 or 4, inner ca. 1/2 as long as outer or smaller, all usually without appendages.

Seventy-two provisionally accepted species: India to W Pacific; five species (three endemic) in China.

- 1a. Inflorescence with 5 or more flowers 92. *B. apodum*
- 1b. Inflorescence with 1–3 flowers.
 - 2a. Rhizome very short, nearly invisible; leaves 3–5, in clusters 93. *B. pauciflorum*
 - 2b. Rhizome elongate; leaf solitary, well spaced.
 - 3a. Lip adaxially with 2 calli 94. *B. hainanense*

3b. Lip adaxially without calli

- 4a. Sepals 6–16 mm 95. *B. drymoglossum*
 4b. Sepals 2.5–4 mm 96. *B. tokioi*

92. *Bulbophyllum apodum* J. D. Hooker, Fl. Brit. India 5: 766. 1890.

柄叶石豆兰 *bing ye shi dou lan*

Bulbophyllum ebulbum King & Pantling; *B. spathaceum* Rolfe.

Rhizome creeping, 4–5 mm in diam., rooting at nodes of rhizome. Pseudobulb minute. Leaves arising from nodes of rhizome, 2–11 cm apart from each other. Petiole 4–8 cm; leaf blade oblong, 8–24 × 3–3.2 cm, fleshy, apex obtuse and retuse. Scape arising from base of pseudobulb, ascending, to 22 cm, with 2 or 3 sheaths at base; raceme 8–10 cm, densely with many small flowers; floral bracts narrowly lanceolate, ca. 3.5 mm. Pedicel and ovary 2.5–4 mm. Flowers pale yellow, thickly textured. Dorsal sepal oblong, 4.5–5 × 1.7–2 mm, 3-veined, entire, acute to acuminate; lateral sepals falcate-lanceolate, 5.2–6 × 2–2.6 mm, 3-veined, apex acute to acuminate. Petals elliptic, 2.5–3 × 1–1.1 mm, 1-veined, entire, obtuse; lip recurved, lanceolate, 3.3–4 × ca. 2 mm, 3-veined, slightly conduplicate toward base, apex obtuse. Column 1–1.5 mm; foot ca. 2 mm, slightly curved, adaxial base with a callus; stelidia erect, subtriangular, very short; anther cap finely papillate. Fl. Aug–Sep. $2n = 38$.

Tree trunks in broad-leaved forests; ca. 1000 m. SE Yunnan [India, Indonesia, Laos, Malaysia, Myanmar, ?New Guinea, Philippines, Thailand, Vietnam; ?Pacific islands].

93. *Bulbophyllum pauciflorum* Ames, Philipp. J. Sci., C, 7: 132. 1912.

白花石豆兰 *bai hua shi dou lan*

Bulbophyllum riy anum Fukuyama.

Rhizome very short, nearly invisible, covered with several membranous scalelike sheaths; roots fascicular, slender. Pseudobulb absent. Leaves often 3–5 in clusters, nearly secund on rhizome, subsessile; blade elliptic or oblong, 20–35 × 5–8 mm, apex obtuse and retuse. Scapes several, erect, 15–25 mm, slender; raceme often 2-flowered; peduncle slender, base with 2 minute sheaths; floral bracts ovate-lanceolate, 2–3 mm. Pedicel and ovary ca. 5 mm. Flowers erect, pale yellow or whitish, with yellow lip, not fully opening. Dorsal sepal oblong, concave, 4–5.5 × 1.5–2 mm, 3-veined, apex acute; lateral sepals obliquely triangular, 5–6 × ca. 3 mm, base adnate to column foot forming a short mentum, apex acute. Petals oblong-spatulate, very small, 2–3 × 0.6–0.7 mm, 1-veined, entire, obtuse; lip erect, slightly reflexed, narrowly elliptic, ca. 2.5 mm, thinly textured, both surfaces glabrous, 3-veined, base attached to end of column foot, margin entire, apex acute. Column very short, with a foot ca. 2.6 mm; stelidia triangular-acute. Capsule fusiform, ca. 1.1 cm, ca. 3.5 mm in diam. Fl. May–Oct.

• Tree trunks in dense forests; 300–1400 m. E Hainan, E and N Taiwan.

94. *Bulbophyllum hainanense* Z. H. Tsi, Bull. Bot. Res., Harbin 1(1–2): 118. 1981.

海南石豆兰 *hai nan shi dou lan*

Rhizome slender, ca. 0.8 mm in diam., rigid, bearing 1 leaf and 2 or 3 slender roots at nodes. Pseudobulb absent. Leaves 1–1.5 cm apart from each other, subsessile; blade elliptic, 8–15 × 6–8 mm, fleshy, apex obtuse. Scapes several, usually arising from leaf-bearing nodes, erect, 2–3.5 cm, slender; umbel 2-flowered; peduncle ca. 0.4 mm in diam., with 3 or 4 tubular sheaths ca. 2.5 mm; floral bracts ovate-lanceolate, ca. 1.5 mm, apex acute. Pedicel and ovary ca. 3 mm. Flowers slightly nodding, pure yellow, thickly textured. Sepals free; dorsal sepal ovate-lanceolate, 5–7 × ca. 2.5 mm, apex acute; lateral sepals obliquely ovate-triangular, 4.5–6.5 × ca. 3.2 mm, base adnate to column foot, apex acute. Petals oblong, ca. 3 × 1.2 mm, entire, obtuse; lip broadly ovate in outline, ca. 3.2 mm, base attached to end of column foot by a mobile joint, apex obtuse; disk with a pair of calli adaxially. Column ca. 2 mm; foot upcurved, ca. 2.5 mm, with free part ca. 1 mm; anther cap glabrous. Fl. Nov.

• Tree trunks in mixed forests; ca. 500 m. E Hainan.

95. *Bulbophyllum drymoglossum* Maximowicz ex Okubo, Bot. Mag. (Tokyo) 1: 14. 1884.

圆叶石豆兰 *yuan ye shi dou lan*

Bulbophyllum aureolabellum T. P. Lin; *B. gracillimum* Hayata (1912), not Rolfe (1907); *B. somae* Hayata.

Rhizome creeping, slender, 0.5–1 mm in diam., noded, with internodes 1–2 cm, each node bearing 1 leaf and 1–3 roots. Pseudobulb absent. Leaf subsessile; blade subelliptic or orbicular, 5–30 × 5–10 mm, fleshy-thickened, apex obtuse. Scape arising from base of petiole, erect, 7–40 mm; peduncle slender, ca. 0.3 mm in diam., with 2 or 3 sheaths, terminating in a solitary flower; floral bracts ovate, 1.3–3 mm, membranous, apex acute. Pedicel and ovary 2–5 mm. Flowers pale yellow, with purplish brown stripes on sepals and petals and usually heavily tinged with purplish brown on lip. Sepals free, similar, ovate-lanceolate, 6–16 × 2–4 mm, apex long acuminate; lateral sepals slightly larger. Petals oblong, subelliptic, or linear, 1.5–4 × 1–2 mm, entire, obtuse; lip recurved, ovate-elliptic, 1.5–5 × 0.3–3 mm, 3-veined, base attached to end of column foot by an immobile joint, basal margins ± undulate, apex obtuse. Column 1–2 mm, stout; foot purplish brown, 1.3–4 mm, with free part 0.8–1.8 mm; stelidia deltoid, inconspicuous; anther cap glabrous. Fl. May. $2n = 40$.

Tree trunks in forests; 300–2400 m. N Guangdong, E Guangxi, Taiwan, SE and SW Yunnan [Japan, Korea].

96. *Bulbophyllum tokioi* Fukuyama, Bot. Mag. (Tokyo) 49: 439. 1935.

小叶石豆兰 *xiao ye shi dou lan*

Bulbophyllum tokioi f. *alboviride* Fukuyama.

Rhizome creeping, ca. 0.5 mm in diam., with tubular sheaths. Pseudobulb absent. Leaves small, well spaced, sessile; leaf blade elliptic or elliptic-orbicular, 5–6 × 3–4.5 mm, fleshy, with a few very small membranous sheaths at base, apex

rounded and mucronate. Scapes 1 or 2, axillary, erect, ca. 10 mm; raceme 2-flowered; peduncle slender; floral bracts elliptic, shorter than pedicel and ovary. Pedicel and ovary ca. 1 mm. Flowers yellowish white, tinged with purple on lip. Sepals membranous, glabrous, 3-veined; dorsal sepal oblong, ca. 2.5 × 1 mm, apex obtuse; lateral sepals obliquely ovate-triangular, 2.6–4 × 1.5–2 mm, apex acute. Petals oblong, 1.3–2.4 × 0.6–1

mm, 1-veined, entire, acute; lip ovate-triangular, 1.5–2.4 × ca. 1 mm, 3-veined, base attached to end of column foot by an immobile joint, margin entire, apex obtuse-rounded. Column 0.7–1 mm, base with a foot 1–2 mm; stelidia deltoid, very small. Fl. Apr.

• Tree trunks in dense forests; 600–800 m. C and N Taiwan.

17. Bulbophyllum sect. **Tripudianthes** Seidenfaden, Dansk Bot. Ark. 33(3): 188. 1979.

双叶卷瓣兰组 *shuang ye juan ban lan zu*

Tripudianthes (Seidenfaden) Szlachetko & Kras.

Rhizome creeping, roots sprouting mainly below pseudobulbs, spreading; new shoots arising from basal node of pseudobulb. Pseudobulbs distinct, apex with 2 leaves. Leaves deciduous, thin. Inflorescences solitary, mostly arising near pseudobulbs, an elongate or somewhat contracted 2- to several-flowered raceme. Pedicel with basal node ± coinciding with attachment of subtending bract. Dorsal sepal with margins ± glabrous to erose or fimbriate, 3-veined; lateral sepals fused along their lower margins, 2–5 × as long as dorsal sepal, margins glabrous, 3–7-veined. Petals: margins fimbriate, 1-veined; lip: margins without auricles or distinct lateral lobes, margins glabrous to papillose or ciliate, adaxially partly papillose and hirsute. Column: stigma protruding at its base or not, foot short; anther: front margin projecting or not, abaxially with or without a low, rounded crest; pollinia 4, inner less than 1/2 as long as outer or longer, all without appendages.

Eleven provisionally accepted species: India to Indochina, Thailand, Java; two species in China.

- 1a. Margins of dorsal sepal irregularly fimbriate 97. *B. wallichii*
- 1b. Margins of dorsal sepal glabrous 98. *B. khaoyaiense*

97. Bulbophyllum wallichii (Lindley) H. G. Reichenbach, Ann. Bot. Syst. 6: 259. 1861.

双叶卷瓣兰 *shuang ye juan ban lan*

Cirrhopetalum wallichii Lindley, Gen. Sp. Orchid. Pl. 59. 1830; *Bulbophyllum refractoides* Seidenfaden; *Phyllorkis wallichii* (Lindley) Kuntze; *Tripudianthes wallichii* (Lindley) Szlachetko & Kras.

Pseudobulbs close, ovoid, ca. 1 cm in diam., with 2 leaves at apex. Leaf deciduous at anthesis, subsessile; blade narrowly oblong, usually ca. 5 × 1 cm, apex acute. Scape from base of leafless pseudobulb, erect, 10–15 cm, sparsely with 2 tubular sheaths; raceme usually nodding, ca. 4 cm, few to many flowered; floral bracts yellowish green, ovate-lanceolate, ca. 4 mm, apex acuminate. Sepals and petals yellowish brown, with dense purple spots, usually turning tangerine; lip purplish black adaxially and pale tangerine abaxially. Dorsal sepal lanceolate, ca. 5 × 1.7 mm, 1-veined, margins irregularly fimbriate, apex long acuminate and hooked; lateral sepals narrowly oblong, 3.7–4.0 × 2–2.5 mm, base adnate to column foot, twisted near base, sparsely ciliate, their lower edges connate to each other, apex acute and ± curved. Petals obliquely ovate-triangular, ca. 3 × 1.5 mm, margins irregularly fimbriate-ciliate, 1-veined, apex acuminate and ± hooked; lip reflexed, subligulate, ca. 3.5 mm, fleshy, margins and abaxial surface ± hairy, base attached to end of column foot by a mobile joint, apex obtuse. Column white, ca. 1.5 mm, base with a distinct foot; stelidia narrowly cylindrical, ca. 1.5 mm; anther cap purple, subglobose, finely papillate. Fl. Mar–Apr. 2*n* = 38.

Tree trunks in forests; 1400–1500 m. S and W Yunnan [Bhutan, NE and NW India, Myanmar, Nepal, Thailand, Vietnam].

98. Bulbophyllum khaoyaiense Seidenfaden, Bot. Tidsskr. 65: 342. 1970.

白花卷瓣兰 *bai hua juan ban lan*

Bulbophyllum tripudians E. C. Parish & H. G. Reichenbach var. *pumilum* Seidenfaden & Smitinand.

Pseudobulbs close, subovoid, 1.3–2 cm, 7–8 mm in diam., with 2 leaves at apex. Leaves deciduous at anthesis. Scape from base of pseudobulb, erect, 14–15.5 cm; raceme nodding, 5–6 cm, usually with more than 10 secund flowers; peduncle stout, ca. 2 mm in diam., with 2 or 3 membranous sheaths; floral bracts lanceolate, ca. 3 mm, apex acuminate. Pedicel and ovary ca. 2 mm. Flowers thinly textured, white, with purplish red lip. Dorsal sepal narrowly ovate-triangular, ca. 8 × 2 mm, adaxially sparsely with short hairs, margin entire, apex long acuminate; lateral sepals lanceolate, ca. 20 × 2.5 mm, abaxial base densely papillate, base adnate to column foot, twisted near base, with their lower edges connate to each other, margin entire, apex acuminate. Petals narrowly triangular, ca. 4 × 1.2 mm, margins sparsely fimbriate-ciliate, apex long acuminate; lip ca. 2 × 1 mm, fleshy, fleshy-thickened in apical half, with papillate hairs adaxially, base attached to end of column foot by a mobile joint. Column ca. 1.5 mm, base with a foot ca. 1 mm; stelidia subulate, ca. 1 mm, ± hooked; anther cap subglobose, apex densely papillate. Fl. Mar.

Tree trunks in forests; ca. 1400 m. S Yunnan [Thailand].

18. Bulbophyllum sect. **Pleiophylla** J. J. Smith, Bull. Jard. Bot. Buitenzorg, sér. 2, 13: 34. 1914 [“*Pleiophyllus*”].

双叶石豆兰组 *shuang ye shi dou lan zu*

Rhizome creeping, roots sprouting mainly below pseudobulbs, spreading; new shoots arising from basal node of pseudobulb. Pseudobulbs distinct, apex with 2 leaves. Leaves deciduous, thin. Inflorescence solitary, mostly arising near pseudobulbs, an elongate

or somewhat contracted several- to many-flowered raceme. Pedicel with basal node ± coinciding with attachment of subtending bract. Sepals: margins glabrous to ciliate, surface glabrous to hirsute, 3-veined; lateral sepals free (fused along their lower margins in *Bulbophyllum cariniflorum* and *B. triste*), ca. as long as dorsal sepal or slightly longer. Petals: margins glabrous, 1-veined; lip: margins without auricles or distinct lateral lobes, margins glabrous to papillose, adaxially glabrous to papillose. Column: stigma protruding at its base or not, foot short; anther: front margin projecting or not, abaxially with or without a low, rounded crest; pollinia 2 or 4, with inner ca. 1/2 as long as outer or shorter, all without appendages.

Nineteen provisionally accepted species: India to Indochina, Thailand, Sumatra; five species in China.

- 1a. Flowers and leaves appearing at same time.
 2a. Lateral sepals distinctly keeled; leaves 12–15 × 2.7–4 cm, apex acute; scape shorter than leaves 99. *B. cariniflorum*
 2b. Lateral sepals not keeled; leaves 3–7 × 1–2.1 cm, apex rounded and emarginate; scape much longer than leaves 100. *B. shanicum*
 1b. Flowers and leaves not appearing at same time.
 3a. Lateral sepals connate along lower margins; pseudobulbs subglobose, broader than long 101. *B. triste*
 3b. Lateral sepals free; pseudobulbs ovoid or ovoid-conic, longer than broad.
 4a. Sepals abaxially hirsute; rachis pubescent 102. *B. hirtum*
 4b. Sepals abaxially glabrous; rachis glabrous 103. *B. suavisimum*

99. *Bulbophyllum cariniflorum* H. G. Reichenbach, Ann. Bot. Syst. 6: 253. 1861.

尖叶石豆兰 *jian ye shi dou lan*

Bulbophyllum densiflorum Rolfe.

Rhizome stout, ca. 3 mm in diam., rooting from base of pseudobulbs. Pseudobulbs close, ovoid, 1–1.5 in diam., with 2 leaves at apex. Leaves deciduous at anthesis; petiole 5–10 mm; leaf blade oblong, 12–15 × 2.7–4 cm, leathery, base contracted into petiole, apex acute. Scape from base of pseudobulb, ca. 8 cm; panicle nodding, 2–3 cm, densely many flowered; peduncle ca. 1.2 mm in diam., with 3 or 4 sheaths; floral bracts narrowly lanceolate, 3–4 mm, apex acuminate. Pedicel and ovary 2–3 mm. Flowers yellow, not widely opening, thickly textured. Sepals similar, ovate-oblong, ca. 6 × 3 mm, apex obtuse; dorsal sepal concave; lateral sepals with lower edges connate to each other, base ca. 1/2 width adnate to column foot, apex hooded. Petals lanceolate, ca. 3.5 × 1.5 mm, entire, acute; lip recurved, ± conduplicate, ligulate, ca. 3 × 1.3 mm, fleshy, entire, obtuse. Column ca. 2 mm; foot ca. 2 mm, with free part ca. 1 mm; stelidia deltoid, ca. 1 mm; anther cap finely papillate margined. Fl. Jul. $2n = 38$.

Rocks in mixed forests; 2100–2200 m. S Xizang [Bhutan, NE India, Nepal, Thailand].

100. *Bulbophyllum shanicum* King & Pantling, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66: 587. 1897.

二叶石豆兰 *er ye shi dou lan*

Rhizome creeping, ca. 3 mm in diam., densely with tubular sheaths, rooting from base of pseudobulbs. Pseudobulbs 1–2 cm apart from each other, ovoid, 7–14 mm in diam., with 2 leaves at apex. Leaves deciduous at anthesis, subsessile; leaf blade obovate-lanceolate, 3–7 × 1–2.1 cm, leathery, apex rounded and emarginate. Scape from base of leafless pseudobulb, erect, 11–17 cm; raceme 6–10 cm, densely with many secund flowers, peduncle ca. 1.5 mm in diam., glabrous, with 5 tubular sheaths; floral bracts lanceolate, small, ca. 3 mm, apex acuminate. Pedicel and ovary 4–5 mm. Flowers pale yellow. Sepals free, ovate-lanceolate, 3-veined, apex obtuse; dorsal sepal ca. 4.5 × 1.6 mm; lateral sepals ca. 5.5 × 3 mm, base ca. 1/2 width adnate to column foot. Petals ovate-lanceolate, ca. 4 ×

1.3 mm, entire, acute or mucronate; lip reflexed, ± conduplicate, ca. 3 mm, fleshy, adaxially with 1 longitudinal keel, apex obtuse, ciliate. Column ca. 1.8 mm; foot ca. 1.5 mm, with free part ca. 0.3 mm; stelidia deltoid, ca. 0.8 mm; anther cap densely finely papillate, centrally with 1 globose projection. Fl. Oct.

Rocks in forests; 1800–1900 m. SW Yunnan [Myanmar].

101. *Bulbophyllum triste* H. G. Reichenbach, Ann. Bot. Syst. 6: 253. 1861.

球茎石豆兰 *qiu jing shi dou lan*

Phyllorkis tristis (H. G. Reichenbach) Kuntze.

Rhizome stout, 2–3 mm in diam. Pseudobulbs ca. 5 mm apart on rhizome, subglobose, broader than long, 13–20 mm in diam., apex with 2 leaves. Leaf deciduous at anthesis, subsessile; blade pale green, ± lanceolate, ca. 10 × 2 cm, apex acute. Scape arising from base of leafless pseudobulb, 2–4 cm; raceme sometimes nodding, 1–1.5 cm, densely many flowered; peduncle ca. 1 mm in diam., with 2 or 3 sheaths 5–6 mm; floral bracts 2–3 mm, apex acute. Pedicel and ovary ca. 2 mm. Flowers pale purplish red, marked with purple spots. Dorsal sepal ovate, concave, ca. 4 × 2.2 mm, glabrous, entire, acute; lateral sepals adnate to column foot, ovate, ca. 5 × 2.2 mm, glabrous, their lower edges connate to each other, entire, acute. Petals triangular, ca. 2.2 × 1.2 mm, base ca. 1/2 width adnate to column foot, margin entire, apex acute; lip ligulate, ca. 3.2 mm, ± fleshy, base grooved, attached to end of column foot by an immobile joint, margin decurved. Column ca. 2 mm; foot ca. 1.5 mm, with free part ca. 1 mm; stelidia narrowly lanceolate, ca. 0.6 mm; anther cap slightly and minutely papillate. Fl. Jan–Feb. $2n = 38$.

Tree trunks in forests; 800–1800 m. S Yunnan [India, Myanmar, Nepal, Thailand].

102. *Bulbophyllum hirtum* (Smith) Lindley, Gen. Sp. Orchid. Pl. 51. 1830.

落叶石豆兰 *luo ye shi dou lan*

Stelis hirta Smith in Rees, Cycl. 34: Stelis no. 11. 1816; *Phyllorkis hirta* (Smith) Kuntze; *Tribrachia hirta* (Smith) Lindley.

Rhizome creeping and rooting, 3–4 mm in diam. Pseudobulbs 5–10 mm apart from each other, ovoid-conic, 1.5–3 cm, ca. 1 cm in diam., with 2 leaves at apex. Leaves deciduous at anthesis; petiole ca. 5 mm; blade elliptic or oblong, ca. 12 × 2.5–3 cm, leathery, apex obtuse. Scape arising from base of leafless pseudobulb, to 15 cm; raceme pendulous, ca. 5 cm, with pubescent rachis, densely with many small flowers; peduncle ca. 3 mm in diam., with 2 or 3 tubular sheaths; floral bracts ovate, ca. 0.7 mm, apex acute, ciliate. Pedicel and ovary pubescent, ca. 1 mm. Flowers greenish white. Sepals free; dorsal sepal lanceolate, ca. 4.5 × 2 mm, abaxially densely pubescent, apex acute and slightly curved; lateral sepals slightly larger than dorsal sepal, obliquely ovate-lanceolate, abaxially densely pubescent, base adnate to column foot, apex acute. Petals oblanceolate, ca. 2 × 1.5 mm, membranous, margins fimbriate-ciliate; lip recurved, ± conduplicate, narrowly oblong, fleshy, ciliate, base attached to end of column foot by an immobile joint, apex retuse. Column ca. 1.5 mm; stelidia subulate, nearly as high as anther, ca. 0.5 mm; foot ca. 2.7 mm, with free part ca. 0.7 mm; anther cap papillate. Fl. Jul.

Tree trunks in evergreen broad-leaved forests; ca. 1800 m. S Yunnan [NE India, Myanmar, Nepal, Thailand, Vietnam].

103. *Bulbophyllum suavissimum* Rolfe, Gard. Chron., ser. 3, 5: 297. 1889.

直萼石豆兰 zhi ting shi dou lan

Rhizome creeping, ca. 1.5 mm in diam. Pseudobulbs ca. 1 cm apart on rhizome, ovoid, ca. 8 mm, ca. 5 mm in diam., with 2 leaves at apex. Leaves deciduous at anthesis, not seen. Scape from base of leafless pseudobulb, erect, ca. 8 cm; peduncle slender, with 2 or 3 sheaths ca. 4 mm; raceme sparsely with several secund flowers; rachis glabrous; floral bracts ovate, 1.5–2 mm, apex acute. Pedicel and ovary ca. 4 mm. Flowers thinly textured, pale yellow. Dorsal sepal ovate, ca. 4 × 2.2 mm, entire, acute; lateral sepals ovate-lanceolate, ca. 6 × 2 mm, base adnate to column foot, margin entire, apex acute. Petals ovate-lanceolate, ca. 2.8 × 1.2 mm, base ca. 1/2 width adnate to column foot, apical margin ± denticulate, apex obtuse; lip recurved, narrowly oblong, ca. 3.5 × 0.7 mm, fleshy, centrally channeled at base, adaxially densely finely papillate, apex obtuse. Column ca. 1.5 mm; foot ca. 1.5 mm, with free part ca. 0.5 mm; stelidia dentate, apex subulate; anther cap subglobose, finely papillate. Fl. Mar.

Tree trunks in evergreen broad-leaved forests; ca. 900 m. S Yunnan [Myanmar, N Thailand].

