

4. Subfam. VANILLOIDEAE

香荚兰亚科 xiang jia lan ya ke

Chen Xinqi (陈心启 Chen Sing-chi); Phillip J. Cribb, Stephan W. Gale

Small to large terrestrial autotrophic or holomycotrophic, monopodial or sympodial herbs or scrambling or climbing vines. Roots elongate, fleshy; rhizome short to elongate. Stems erect or scrambling, unbranched or branched, very short to long, leafy. Leaves 1 to many, sometimes reduced to scales, alternate, fleshy or leathery, conduplicate, spreading or suberect, ovate, elliptic, lanceolate, ligulate, or oblong, green, glabrous. Inflorescences terminal or lateral, 1- to many flowered, racemose or paniculate, rarely 1-flowered; rachis sometimes pubescent; bracts conduplicate. Flowers often showy; pedicel short; ovary 1-locular or 3-locular, glabrous or pubescent; abscission layer between pedicel and ovary, sometimes with a distinct calyculus present. Sepals free, subsimilar, glabrous or externally pubescent. Petals free, glabrous; lip free or with side margins fused to column, 3-lobed or entire, usually with a callus of hairs, papillae, or backward-facing scales, lacking a nectary. Column elongate, slender, porrect, hooded at tip; anther 1, terminal, mobile; pollinia obscure; pollen loose, shed in monads or rarely tetrads; stigma 3-lobed, concave, viscid. Capsule erect to pendulous, 3-ribbed, cylindrical to almost ellipsoidal, glabrous to pubescent. Seeds spherical with a hard testa.

Twenty-four genera and ca. 185 species: widespread in the tropical regions of Africa, America, and Asia, with a few species reaching temperate areas; six genera and 19 species (five endemic) in China.

Of the six genera in China, four are vines (*Cyrtosia*, *Erythrorchis*, *Galeola*, and *Vanilla*) and the other two are terrestrial herbs (*Lecanorchis* and *Pogonia*).

51. VANILLA Plumier ex P. Miller, Gard. Dict. Abr., ed. 4. 1754.

香荚兰属 xiang jia lan shu

Chen Xinqi (陈心启 Chen Sing-chi); Phillip J. Cribb

Vines, climbing, herbaceous, to several meters long. Stem with an aerial root and a leaf at each node. Leaves large, fleshy, shortly petiolate [sometimes reduced to scales outside Flora area]. Racemes axillary, several to many flowered. Flowers resupinate, often large, often with an abscission layer between ovary and perianth. Sepals and petals similar, free, spreading. Lip often joined to sides of column with its basal margin, sometimes almost to top of column and \pm trumpet-shaped, free part often dilated, spurless, sometimes 3-lobed, disk often with hairy appendages adaxially. Column long, slender, slightly curved near top; anther inserted pointing downward; pollinia 2 or 4, granular-farinaceous or loosely granular, without caudicle or viscidium; rostellum often broad, below anther. Fruit cylindrical, fleshy, often indehiscent. Seeds with stout testa, often black, wingless.

About 70 species: throughout the tropics; four species (two endemic) in China; one additional species (endemic) is incompletely known.

- 1a. Inflorescence very short, usually 2-flowered 2. *V. somae*
- 1b. Inflorescence 3–20 cm, many flowered.
 - 2a. Sepals and petals 14–20 \times 4–6 mm, white tinged with greenish 4. *V. annamica*
 - 2b. Sepals and petals 38–48 \times 10–28 mm, yellowish green, sometimes with purple-red lip.
 - 3a. Sepals and petals 10–13 mm wide; lip not purple-red 1. *V. siamensis*
 - 3b. Sepals and petals 16–28 mm wide; lip purple-red 3. *V. shenzhenica*

1. *Vanilla siamensis* Rolfe ex Downie, Bull. Misc. Inform. Kew 1925: 410. 1925.

大香荚兰 da xiang jia lan

Stem to several meters long, with long internodes, with a root and a leaf at each node. Leaves loosely arranged, fleshy; blade elliptic, 14–25 \times 6–8(–13) cm, glabrous, base slightly contracted, apex acuminate; petiole robust, 1.5–2.5 cm, broad. Raceme axillary, 7–14 cm, many flowered; floral bracts broadly ovate, 7–8 mm, fleshy; pedicel and ovary ca. 2 cm. Flowers opening ephemerally; sepals and petals yellowish green. Sepals oblong or narrowly ovate, 3.8–4.5 \times ca. 1.2 cm, apex rounded and slightly involute. Petals obovate-oblong, ca. 4 \times 1–1.3 cm, thinly textured; lip rhombic-obovate, ca. 4 cm, basal half adnate to both sides of column, \pm trumpet-shaped, indistinctly 3-lobed; lateral lobes embracing column; mid-lobe undulate at margin,

with fimbriate papillae near apex; disk with a cup-shaped, shortly hairy appendage centrally. Column 2–2.6 cm, villous on central surface. Fl. Aug. $2n = 32$.

Forests; 800–1200 m. S Yunnan [Thailand].

2. *Vanilla somae* Hayata, Icon. Pl. Formosan. 6: 88. 1916 [“*somai*”].

台湾香荚兰 tai wan xiang jia lan

Vanilla griffithii H. G. Reichenbach var. *formosana* Ito; *V. griffithii* var. *ronoensis* (Hayata) S. S. Ying; *V. ronoensis* Hayata.

Stem climbing, to 3 m, with internodes 7–10 cm. Leaves alternate; blade narrowly ovate or elliptic-lanceolate, 10–20 \times 4–8 cm, thickly fleshy, slightly reticulate veined, base obtuse and with a very short petiole, apex acuminate. Inflorescence axillary, very short, usually 2-flowered; floral bracts subtriangu-

lar, 1–1.5 cm; pedicel and ovary 4–5 cm. Flowers 5–6 cm in diam., whitish or tinged with greenish; lip adaxially red-striped, abaxially tinged with pink. Sepals similar, spreading, elliptic-oblongate or oblanceolate, 3.5–4 × 0.8–1 cm, apex recurved. Petals similar to sepals; lip 3.5–4 cm, basally connate for ca. 3/5 length to both sides of column forming a trumpet-shaped tube, margin undulate, apex dilated and slightly 3-lobed; lateral lobes rather large, incurved; mid-lobe subtriangular or orbicular, adaxially with 2 or 3 rows of papillae near apex; disk with a white brushlike appendage centrally. Column 2.5–3 cm, apex with 2 small wings; anther ca. 3 mm, fleshy. Fruit subcylindric, 7–10 cm, with 3 inconspicuous longitudinal ridges. Fl. and fr. Apr–Aug. $2n = 32^*$.

- Forests; below 1200 m. Taiwan.

3. *Vanilla shenzhenica* Z. J. Liu & S. C. Chen, Acta Phytotax. Sin. 45: 301. 2007.

深圳香荚兰 shen zhen xiang jia lan

Stem scandent, 1–1.5 cm, with internodes 5–10 cm. Leaf blade elliptic, 10–20 × 5.5–9.5 cm, base shortly petiolate. Inflorescence 3–5 cm, usually 4-flowered; floral bracts oblong, 1.8–2.1 cm, leathery. Flowers not fully opening, yellowish green, with purple-red lip and white appendage. Sepals and petals oblong-lanceolate to elliptic, 4.4–4.8 × 1.6–2.8 cm; lip broadly obovate when spreading, 4.4–4.6 cm, basally connate for ca. 3/4 length to both sides of column forming a trumpet-shaped tube, apical margin undulate, adaxially tufted with a

retorse white fimbriate appendage composed of many thin pieces, with 3–5 rows of small horn-shaped appendages above middle, and with 2 lamellae extending from base up to fimbriate appendage. Column 3.8–4.2 cm. Fl. Feb–Mar.

- Forests or cliffs along valleys; below 300 m. S Guangdong.

One of us (Cribb) suggests that *Vanilla shenzhenica* needs to be further compared with *V. somae*, which is very close morphologically.

4. *Vanilla annamica* Gagnepain, Bull. Mus. Natl. Hist. Nat., sér. 2, 3: 686. 1931.

南方香荚兰 nan fang xiang jia lan

Stem climbing, 6–20 m, ca. 1 cm in diam., swollen noded, with internodes 6–10 cm. Leaf blade elliptic, 18–23 × 5–10 cm; petiole 1–1.5 cm, base amplexicaul. Inflorescence 10–20 cm; floral bracts broadly elliptic or elliptic, concave, 7–12 mm, thickened, obtuse at apex. Flowers white, tinged with greenish. Sepals and petals lanceolate, 14–20 × 4–6 mm; lip 2–2.5 × ca. 1.5 cm, basally connate for ca. 3/4 length to both sides of column forming a tube, apex inconspicuously 3-lobed; lateral lobes broad, margins incised; mid-lobe with dense, fimbriate hairs near apex; disk with scaly appendages. Column ca. 2 cm. Fl. Apr–May.

Cliffs, forests; 1200–1300 m. Fujian, SW Guizhou, Hong Kong, SE Yunnan [Thailand, Vietnam].

Of the Chinese specimens referred to this species, only the one from Hong Kong has flowered, confirming its identity. The other specimens are sterile but are very similar in habit to *Vanilla annamica*.

Incompletely known species

Vanilla taiwaniana S. S. Ying, Quart. J. Chin. Forest. 20: 55. 1987.

宝岛香荚兰 bao dao xiang jia lan

Stem scandent, elongate, with long internodes, with a leaf at each node. Leaves alternate; blade narrowly ovate-elliptic or elliptic-lanceolate, 10–15 × 5–7 cm, apex acute or acuminate; petiole 1–1.5 cm, ± amplexicaul. Inflorescence terminal, racemose, 15–30 cm, many flowered; floral bracts reddish or brownish, ovate, 5–6 mm; pedicel and ovary 1–1.8 cm, glabrous. Flowers reddish or brownish, glabrous. Sepals oblanceo-

late, 25–30 × 6–8 mm, base contracted, apex obtuse. Petals linear, 25–28 × 3–4 mm, apex obtuse; lip narrowly elliptic or elliptic, adaxially villous at center, 3-lobed, margin indistinctly serrate; disk with 2 thickened ridges. Column 2–2.5 cm. Fl. unknown.

- Thickets; 800–1600 m. C Taiwan.

No specimen of this species has been seen. According to the original description and the color photograph provided by the author (Coloured Ill. Indig. Orchids Taiwan 2: photo: 109. 1990), this taxon seems to be a member of *Galeola* rather than *Vanilla*.

52. CYRTOSIA Blume, Bijdr. 396. 1825.

肉果兰属 rou guo lan shu

Chen Xinqi (陈心启 Chen Sing-chi); Phillip J. Cribb

Herbs, mycotrophic. Rhizome stout, with fleshy or sometimes tuberlike roots. Stems erect, often several arising from 1 rhizome, simple or branched, yellowish brown to reddish brown, fleshy, with scales at nodes. Raceme or panicle terminal or lateral, several or many flowered; rachis shortly hairy or mealy-hairy; floral bracts persistent. Flowers not fully opening, medium-sized. Sepals and petals connivent; sepals often ± hairy abaxially. Petals glabrous; lip erect, unlobed, spurless, base connate to column, ± embracing column. Column slightly curved, stout, upper part enlarged, without a foot; anther terminal, incumbent, 2-locular; pollinia 2, granular-farinaceous, without caudicle or viscidium. Fruit fleshy, indehiscent. Seeds with stout testa, wingless or with a narrow surrounding wing.

Five species: tropical Asia to E Asia; three species in China.

- 1a. Plants rather large, 30–170 cm tall; lateral racemes 3–7(–10) cm; tuberlike roots absent 3. *C. septentrionalis*
 1b. Plants relatively small, 8–22 cm tall; lateral racemes very short or absent; tuberlike roots conspicuous, 5–12 mm in diam.

- 2a. Inflorescence terminal; lip glabrous 1. *C. javanica*
 2b. Inflorescence terminal and lateral, latter at least represented by a short raceme; lip with white hairs near
 adaxial apex 2. *C. nana*

1. *Cyrtosia javanica* Blume, Bijdr. 396. 1825.

肉果兰 rou guo lan

Galeola javanica (Blume) Bentham & J. D. Hooker.

Plants small, ca. 10 cm tall. Tuberlike roots tufted, cylindrical or clavate, 5–8 cm, stout, 8–12 mm in diam., thick, fleshy. Stems 1–3 arising from 1 rhizome, erect, 6–8 cm tall, with imbricate scales at nodes; scales alternate, yellowish brown, turning dark brown with age, elliptic-ovate, cymbiform or with subspherical base, glabrous. Inflorescence racemose, 5–8-flowered; floral bracts subtriangular, small; pedicel and ovary 1–1.5 cm, mealy-pubescent. Flowers not fully opening, yellowish brown, fleshy. Sepals mealy-pubescent abaxially; dorsal sepal oblong, ca. 16 × 8 mm, slightly concave; lateral sepals broadly ovate, ca. 16 × 9 mm. Petals oblong, ca. 15 × 7 mm, thinly textured; lip adnate to base of column, yellowish at base, whitish near apex, suborbicular, with thickened disk and spongy limb. Column clavate, ca. 8 mm, winged at apex; wing erose-dentate at apex. Fruit sausage-shaped, ca. 5 cm, indehiscent. Fl. May–Jun.

Bamboo forests. C Taiwan [India, Indonesia, Malaysia, Philippines, Sri Lanka, Thailand, Vietnam].

2. *Cyrtosia nana* (Rolfe ex Downie) Garay, Bot. Mus. Leaflet 30: 233. 1986.

矮小肉果兰 ai xiao rou guo lan

Galeola nana Rolfe ex Downie, Bull. Misc. Inform. Kew 1925: 409. 1925.

Plants small, ± fleshy. Rhizome short, stout. Tuberlike roots pale yellowish white, cylindrical, 2.5–9 cm, 5–8 mm in diam., fleshy. Stem erect, yellowish white, slightly tinged with red, 10–22 cm tall, glabrous or apical half with sparse rust-colored, mealy, short hairs, nodes with lanceolate scales; internodes usually 1–3 cm. Inflorescence terminal and lateral, sometimes lateral inflorescence very short or inconspicuous; terminal raceme 6–11-flowered; rachis rusty mealy-puberulent; floral

bracts ovate-lanceolate, 2–4 mm, abaxially rusty puberulent; pedicel and ovary 8–10 mm, also with rust-colored hairs. Flowers pale yellow, lip with orange-red longitudinal stripes. Sepals elliptic, 1–1.2 × ca. 0.6 cm, abaxially rusty mealy-puberulent, apex acute. Petals similar to sepals, slightly narrower, glabrous; lip ± embracing column, broadly ovate, ca. 1 × 1.2 cm, margin somewhat undulate, disk with a thick longitudinal ridge centrally, adaxially white pilose near apex. Column ca. 6 mm, apex slightly dilated, without conspicuous wing. Fl. Apr–Jun. $2n = 28$.

Forests or shaded places along valleys; 500–1400 m. S Guangxi, SW Guizhou [Thailand, N Vietnam].

3. *Cyrtosia septentrionalis* (H. G. Reichenbach) Garay, Bot. Mus. Leaflet 30: 223. 1986.

血红肉果兰 xue hong rou guo lan

Galeola septentrionalis H. G. Reichenbach, Xenia Orchid. 2: 78. 1865.

Plants rather large. Rhizome nearly creeping, stout, 1–2 cm in diam., with sparse ovate scales. Stem erect, red-brown, 30–170 cm, apical half shortly rusty tomentose. Inflorescence terminal and lateral; lateral raceme 3–7(–10) cm, 4–9-flowered, base with a few ovate-lanceolate sterile bracts 1.5–2.5 cm; floral bracts ovate, 2–3 mm, abaxially with rusty hairs; pedicel and ovary 1.5–2 cm, shortly rusty tomentose. Flowers yellow, ± tinged with red-brown. Sepals elliptic-ovate, ca. 2 cm, abaxially shortly rusty tomentose. Petals similar to sepals, slightly narrower, glabrous; lip nearly broadly ovate, shorter than sepals, adaxially hairy-papillose or occasionally crested-lamellate along main veins, margin irregularly dentate or erose. Column ca. 7 mm. Fruit blood-red, suboblong, 7–13 × 1.5–2.5 cm, fleshy. Seeds with surrounding wing; wing less than 1 mm wide. Fl. May–Jul, fr. Sep. $2n = 28$.

Forests; 1000–1300 m. SW Anhui, W Henan, Hunan, Zhejiang [Japan (Ryukyu Islands)].

53. GALEOLA Loureiro, Fl. Cochinch. 2: 520. 1790.

山珊瑚属 shan shan hu shu

Chen Xinqi (陈心启 Chen Sing-chi); Phillip J. Cribb

Herbs, mycotrophic, erect, or scrambling vines, often with rather stout, tuberous rhizomes. Stem yellowish brown or reddish brown, often stout, slightly fleshy, with scales at nodes. Raceme or panicle terminal and lateral, with many slightly fleshy flowers; rachis pubescent; floral bracts persistent. Flowers usually yellow or tinged with reddish brown, medium-sized. Sepals free, abaxially often hairy. Petals slightly smaller than sepals, glabrous; lip unlobed, usually concave, cup-shaped or saccate, ± embracing column, conspicuously larger than sepals, spurless, with longitudinal ridge or callus adaxially. Column often short and stout, dilated at apex, curved, without column foot, subterminal; pollinia 2, cleft, granular-farinateous, without caudicle or viscidium; stigma large, deeply concave; rostellum short, wide, above stigma. Fruit a dry capsule, rather long, dehiscent. Seeds with stout testa, with broad surrounding wing.

About ten species: mainly in tropical Asia, extending to S China, Japan, New Guinea, and Madagascar; four species (one endemic) in China.

- 1a. Plants climbing vines; stem with 1 aerial root at each node 4. *G. nudifolia*
 1b. Plants erect, not climbing; lacking aerial roots at nodes.

- 2a. Floral bracts glabrous abaxially; lip with scattered lamellate appendages 2. *G. faberi*
 2b. Floral bracts conspicuously hairy abaxially; lip without lamellate appendages.
 3a. Lip not contracted at base, never saccate; floral bracts 5–6(–10) mm 1. *G. lindleyana*
 3b. Lip narrowed near saccate base; floral bracts (1–)1.2–1.5 cm 3. *G. falconeri*

1. *Galeola lindleyana* (J. D. Hooker & Thomson) H. G. Reichenbach, *Xenia Orchid*. 2: 78. 1865.

毛萼山珊瑚 mao e shan shan hu

Cyrtosia lindleyana J. D. Hooker & Thomson in J. D. Hooker, Ill. Himal. Pl. t. 22. 1855; *Erythrorchis lindleyana* (J. D. Hooker & Thomson) H. G. Reichenbach; *Galeola kwangsiensis* Handel-Mazzetti; *G. lindleyana* var. *unicolor* Handel-Mazzetti; *G. matsudae* Hayata.

Herbs, tall. Rhizome stout, 2–3 cm in diam., with sparse ovate scales at nodes. Stem erect, reddish brown, 1–3 m tall, base ± ligneous, ± hairy or glabrous with age, nodes with broadly ovate scales. Panicle composed of terminal and lateral racemes; lateral raceme 2–5(–10) cm, several to 10-flowered, usually very shortly pedunculate; sterile bracts at base of raceme ovate-lanceolate, 1.5–2.5 cm, nearly glabrous; floral bracts ovate, 5–6 mm, abaxially rusty pubescent; pedicel and ovary often ± curved, 1.5–2 cm, densely rusty pubescent. Flowers yellow, ca. 3.5 cm in diam. Sepals elliptic to ovate-elliptic, 1.6–2 × 0.9–1.1 cm, abaxially densely shortly rusty tomentose and carinate; lateral sepals often slightly longer than dorsal sepal. Petals broadly ovate to suborbicular, slightly shorter than dorsal sepal, 1.2–1.4 cm wide, glabrous; lip concave, cup-shaped, nearly subglobose, ca. 1.3 cm in diam., adaxially papillate-hairy, near base with 1 smooth callus, unlobed, margin shortly fimbriate. Column clavate, ca. 7 mm; anther cap papillate-spinescent. Fruit pale brown, suboblong, 8–12(–20) × 1.7–2.4 cm; fruiting pedicel 1–1.5 cm. Seeds with broad wing, wings 1–1.3 mm wide. Fl. May–Aug, fr. Sep–Oct.

Sparse forests, sparse thickets, humus-rich and moist rocky places along valleys; 700–3000 m. Anhui, W Guangdong, N Guangxi, Guizhou, Henan, Hunan, S Shaanxi, Sichuan, Taiwan, SE Xizang, W to SE Yunnan [Bhutan, India, Indonesia, Nepal].

2. *Galeola faberi* Rolfe, Bull. Misc. Inform. Kew 1896: 200. 1896.

山珊瑚 shan shan hu

Galeola shweliensis W. W. Smith.

Herbs, 1–2 m tall. Rhizome nearly creeping, stout, to 2 cm in diam., nodes with sparse broadly ovate scales. Stem erect, reddish brown, base ± ligneous, upper part sparsely shortly rusty tomentose. Panicle composed of terminal and lateral racemes; lateral raceme 5–10 cm, usually 4–7-flowered; peduncle often 2–4 cm; sterile bracts at base of raceme lanceolate, 1–2 cm, glabrous; floral bracts lanceolate or ovate-lanceolate, 1–4 mm, abaxially glabrous; pedicel and ovary often 1–2 cm, ± rusty pubescent. Flowers yellow, ca. 3.5 cm in diam. Sepals narrowly elliptic or suboblong, 2.8–3 × 0.6–0.8 cm, abaxially slightly and very shortly rusty tomentose, apex obtuse. Petals similar to sepals, glabrous; lip obovate, ca. 2 × 1.2 cm, adaxially with many thick longitudinal veins, basal part concave, unlobed, margin incurved and irregularly incised and ± undulate; veins irregularly lamellate or crenate, mostly on distal

part. Column 8–10 mm. Fl. May–Jul.

• Humus-rich and humid places in open forests or bamboo forests; 1800–2300 m. C Guizhou, SW Sichuan, NW to SE Yunnan.

3. *Galeola falconeri* J. D. Hooker, Fl. Brit. India 6: 88. 1890.

直立山珊瑚 zhi li shan shan hu

Plants 1–3 m tall. Rhizome 3–5 cm in diam., branched, nodes with many triangular scales. Stem erect, brownish, lower part almost glabrous, upper part sparsely and shortly rusty hairy. Panicle composed of terminal and lateral racemes; raceme (5–)10–20 cm; peduncle and rachis ± shortly tomentose; floral bracts ovate to narrowly elliptic, 1–2 cm, often vertical to rachis, abaxially shortly rusty tomentose; pedicel and ovary 2–2.8 cm, densely rusty tomentose. Flowers bright yellow. Sepals elliptic-oblong, 2.2–3 × 1–1.5 cm, abaxially shortly rusty tomentose. Petals slightly narrower than sepals, glabrous; lip broadly ovate or orbicular, ca. 2 × 1.6–1.8 cm, adaxially densely papillate-hairy especially near margin, unlobed, concave, basal part ± embracing column, near base narrowed and forming a small sac, margin fimbriate and undulate-toothed. Column 7–8 mm. Capsule more than 10 cm. Fl. Jun–Jul. $2n = 30$.

Open places in forests, bamboo forests, sunny slopes; 800–2300 m. Anhui, S Hunan, Taiwan [Bhutan, India, Thailand].

The plants of Anhui, Hunan, and Taiwan are similar to each other but show some differences from the Himalayan plants, in which the lip is slightly 3-lobed and petals denticulate along margins. We follow H. J. Su in treating this entity as *Galeola falconeri* here, but further investigation is needed.

4. *Galeola nudifolia* Loureiro, Fl. Cochinch. 2: 521. 1790.

蔓生山珊瑚 man sheng shan shan hu

Cranichis nudifolia (Loureiro) Persoon; *Erythrorchis kuhlii* H. G. Reichenbach; *Galeola hydra* H. G. Reichenbach; *G. kuhlii* (H. G. Reichenbach) H. G. Reichenbach.

Plants climbing. Rhizome nearly creeping, ca. 1 cm in diam., with many sparse, broadly ovate, fleshy scales. Stem 1–3 m, branched, lower part almost glabrous, upper part slightly pubescent, often with 1 aerial root at each node. Inflorescence large, branched, composed of many racemes and panicles; lateral racemes or panicles 5–16 cm; rachis ± rusty pubescent, bearing flowers in succession near apex; basal sterile bracts ovate, 1–2 cm, glabrous, amplexicaul; floral bracts ovate, 2.5–4 mm, abaxially hairy; pedicel and ovary 1–1.2 cm, with short hairs. Flowers yellow, ± with orange-red veins adaxially. Sepals subelliptic, 1.2–1.4 × 0.6–0.8 cm, lateral sepals obviously wider than dorsal sepal, abaxially ± hairy when young. Petals similar to dorsal sepal, glabrous; lip suborbicular, strongly concave, slightly shorter than sepals, shortly hairy adaxially, near base with 1 callus. Column strongly curved, ca. 5 mm. Fl. Apr–Jun.

Forests or shaded slopes along valleys; 400–500 m. S Hainan [Bhutan, India, Indonesia, Malaysia, Myanmar, Philippines, Thailand, Vietnam].

54. ERYTHROCHIS Blume, Rumphia 1: 200. 1837.倒吊兰属 *dao diao lan shu*Chen Xinqi (陈心启 *Chen Sing-chi*); Stephan W. Gale, Phillip J. Cribb

Vines, climbing or scrambling, mycotrophic. Stem climbing, reddish brown or yellowish brown, cylindrical, flexuous, much branched, glabrous, with a root and a scale at each node. Raceme or panicle terminal or lateral, densely many flowered; rachis and flower glabrous; floral bracts persistent. Flowers not fully opening, thin. Sepals and petals often connivent; lip nearly unlobed, broad, central part with 1 stout and thick longitudinal ridge, both sides with many transversely parallel ridges composed of small papillae. Column slightly curved, with a short foot, tapering into central longitudinal ridge of lip; anther subterminal; pollinia 2, granular-farinaceous, without caudicle or viscidium; stigma concave, large; rostellum small. Fruit a capsule, oblong-cylindric, dry, dehiscent. Seeds with stout testa and broad surrounding wing.

Three species: mainly in SE Asia, extending north to S Japan (Ryukyu Islands) and southeast to New Guinea and the Pacific islands; one species in China.

1. Erythrorchis altissima (Blume) Blume, Rumphia 1: 200. 1837.倒吊兰 *dao diao lan*

Cyrtosia altissima Blume, Bijdr. 396. 1825; *Erythrorchis ochobiensis* (Hayata) Garay; *Galeola altissima* (Blume) H. G. Reichenbach; *G. ochobiensis* Hayata; *Haematorchis altissima* (Blume) Blume.

Plants climbing, to several meters long. Stem cylindrical, slender, with many branches, curved or twisted, reddish brown or greenish brown, nodes \pm dilated, with scales. Inflorescence large, much branched, branch 5–15 cm or longer, sometimes lateral racemes branched again; rachis rather slender, glabrous; floral bracts persistent, subtriangular, 2–3 mm, glabrous; pedicel and ovary ca. 8 mm, glabrous. Flowers whitish yellow or

pale yellow, slightly spotted with brown, not opening widely. Sepals suboblong, 1.2–1.5 \times 0.3–0.5 cm, glabrous. Petals oblong, slightly shorter and narrower than sepals; lip slightly tinged with brown, subobovate, concave, ca. 1 cm, apex slightly 3-lobed, centrally with 1 longitudinal ridge ca. 5 mm extending from base to middle; longitudinal ridge slightly divergent at apex and then with a woolly callus near its apex, both sides of ridge with many transversely papillary stripes vertical to ridge. Column 6–7 mm. Capsule reddish, narrowly cylindrical, 13–22 cm \times 5–10 mm, surface smooth. Seeds with surrounding wing less than 1 mm wide, wing cleft on one side. Fl. Apr–May, fr. Aug.

Bamboo forests, evergreen broad-leaved forests; below 500 m. S Hainan, Taiwan [Cambodia, NE India, Indonesia, Japan (Ryukyu Islands), Laos, Malaysia, Myanmar, Philippines, Thailand, Vietnam].

55. LECANORCHIS Blume, Mus. Bot. 2: 188. 1856.孟兰属 *yu lan shu*Chen Xinqi (陈心启 *Chen Sing-chi*); Phillip J. Cribb, Stephan W. Gale

Herbs, mycotrophic. Rhizomes creeping or ascending, cylindrical, slender, slightly rigid or subfleshy, branched or simple. Stem suberect, slender, branched or simple, with sparse scalelike sheaths. Raceme terminal, usually several to 10-flowered; floral bracts small, membranous. Flowers usually resupinate, small or medium-sized, with 1 small toothed cup (calyculus) between ovary and perianth, with abscission layer above calyculus near perianth base. Sepals and petals free, similar; lip base clawed, usually by canalicate claw connate to column foot forming a tube, rarely free, spurless, upper part 3-lobed or unlobed; disk often hairy or papillose. Column rather slender, slightly dilated toward apex, slightly clavate; anther subterminal, 2-locular; pollinia 2, granular-farinaceous, without caudicle or conspicuous viscidium; rostellum short. Fruit a cylindrical capsule.

About ten species: SE Asia to the Pacific islands, north to S China and Japan; four species (one endemic) in China.

Hsu and Chung (Taiwania 54: 83. 2009) recently added three species of *Lecanorchis* to the flora of China based on new discoveries in Taiwan. However, detailed accounts have yet to be published. Two of the three species, *L. suginoana* (Tuyama) Serizawa (Bunrui 5(1): 38. 2005) and *L. virella* T. Hashimoto (Ann. Tsukuba Bot. Gard. 8: 1. 1989), are also known to occur only in Japan, from where they were originally described. The third, *L. triloba* J. J. Smith (Bull. Dep. Agric. Indes Neerl. 19: 26. 1908; *L. javanica* Blume), is more widespread throughout parts of mainland SE Asia, the Malay Archipelago, New Guinea, and S Japan. The present authors have not seen Chinese material for any of these species. In the absence of refutable material, the three taxa are omitted from the following account.

- 1a. Lip simple, ca. 1.5 mm wide 4. *L. nigricans*
 1b. Lip \pm 3-lobed, more than 3 mm wide.
 2a. Raceme 13–21-flowered; sepals 9–10 mm 1. *L. multiflora*
 2b. Raceme 3–9-flowered; sepals 11–25 mm.
 3a. Sepals 11–14 mm; mid-lobe of lip sparsely hairy adaxially 2. *L. japonica*
 3b. Sepals 18–25 mm; mid-lobe of lip densely hairy adaxially 3. *L. thalassica*

1. *Lecanorchis multiflora* J. J. Smith, Bull. Jard. Bot. Buitenzorg, sér. 2, 26: 8. 1918.

多花盃兰 duo hua yu lan

Plants 20–30 cm tall, with fleshy rhizomes underground. Rhizomes 3–4 mm in diam., branched, with nodes, nodes with amplexicaul sheaths; sheaths membranous, margin toothed. Stem suberect, slender, noded, nodes with sheaths; sheaths ovate to broadly ovate, 4–6 mm, membranous, base amplexicaul. Raceme terminal, 8–10 cm, 13–21-flowered; floral bracts ovate, 2–3 mm, membranous. Flowers 9–10 mm; lip 3-lobed; mid-lobe hairy adaxially; disk with 2 calli. Capsule (immature) 1.7–2 cm.

Forests in limestone areas; 600–700 m. S Yunnan [Indonesia, Malaysia, Thailand].

2. *Lecanorchis japonica* Blume, Mus. Bot. 2: 188. 1856.

盃兰 yu lan

Lecanorchis cerina Fukuyama; *L. cerina* f. *albida* (T. P. Lin) S. S. Ying; *L. cerina* var. *albida* T. P. Lin; *L. ohwii* Masamune.

Plants ca. 33 cm tall. Rhizome 5–6 mm in diam., fleshy. Stem tinged with white, black when fruiting, slender, with 4 sheaths below middle; sheaths tubular, 5–7 mm, membranous, amplexicaul. Raceme terminal, 4–5 cm, 3–7-flowered; floral bracts ovate to ovate-lanceolate, 2.5–3 mm; pedicel and ovary 1.4–2 cm, slender; calyculus 0.8–1 mm tall, ca. 1 mm wide, 6-toothed. Sepals oblanceolate, 11–14 × 2–2.5 mm, apex obtuse. Petals similar to sepals; lip base clawed, canaliculate claw connate to column along margin forming a tube; tube 3.5–4 mm; distal free part nearly obovate or obovate-lanceolate, 8–9 mm, 3-lobed; lateral lobes subovate; mid-lobe broadly elliptic or orbicular, ca. 3 × 4 mm, adaxially densely barbate-villous, margin crisped and erose; disk barbate-villous. Column 7–10 mm, apex slightly dilated. Capsule erect, cylindric, 2–4 cm. Fl. May–Jul.

Forests; 800–1000 m. N Fujian, SW Hunan, Taiwan [Japan].

3. *Lecanorchis thalassica* T. P. Lin, Native Orchids Taiwan 3: 153. 1987 [*“thalassicus”*].

灰绿盃兰 hui lü yu lan

Lecanorchis japonica Blume var. *thalassica* (T. P. Lin) S. S. Ying.

Plants to 50 cm tall. Rhizome ascending. Stem erect, reddish brown, with black dots, unbranched, with several sheaths; sheaths dark brown, 3–4 mm. Raceme terminal, 3–4 cm, 4–10-flowered; floral bracts persistent, ovate, ca. 2 mm; pedicel and ovary 2.5–3.3 cm; calyculus very small, ca. 1 mm tall, margin toothed. Flowers not widely open, margin grayish green and yellowish. Dorsal sepal oblanceolate, ca. 20 × 5 mm, apex obtuse; lateral sepals falcate-oblanceolate, ca. 20 × 3 mm. Petals obovate-lanceolate to spatulate, ca. 20 × 6 mm, apex obtuse or rounded; lip obovate, ca. 1.6 cm, cuneate toward base, distal part 3-lobed, basal half connate to column forming a tube; tube ca. 8 mm, contracted near middle, swollen part ca. 3 mm wide; lateral lobes erect, abaxially purple, suborbicular, adaxially shortly villous; mid-lobe entire, suborbicular, ca. 5.5 mm, abaxially with several purple bands, adaxially densely yellow villous, apex emarginate; disk with yellow hairs extending to mid-lobe. Column ca. 9 mm, apex dilated. Fl. May.

• Broad-leaved forests; 1400–2000 m. C Taiwan.

4. *Lecanorchis nigricans* Honda, Bot. Mag. (Tokyo) 45: 470. 1931.

全唇盃兰 quan chun yu lan

Lecanorchis oligotricha Fukuyama; *L. purpurea* Masamune; *L. taiwaniana* S. S. Ying.

Plants 12–40 cm tall. Rhizome ascending, ligneous, with short scales at nodes. Stem erect, blackish, slender, often branched, remotely with several sheaths. Raceme terminal, 3–5 cm, 5–8-flowered; floral bracts ovate-triangular, 2–4 mm; pedicel and ovary purplish brown, 1–2 cm, slender; calyculus ca. 0.8 mm tall, denticulate. Flowers almost opening widely; sepals and petals brownish to nearly whitish, sometimes tinged with purple, concave. Sepals narrowly oblanceolate, 10–16 × 2–3 mm, apex acute; lateral sepals somewhat oblique, falcate-lanceolate, 12–14 × ca. 2.5 mm. Petals oblanceolate-linear, similar to sepals in size; lip whitish, tinged with purple, narrowly oblanceolate to obovate-spatulate, nearly as long as sepals, adaxially ± papillose-hairy, unlobed. Column white, 6–10 mm, slender. Fl. Aug–Oct.

Damp places in forests; 600–1000 m. Fujian, N Taiwan [Japan (Ryukyu Islands)].

56. POGONIA Jussieu, Gen. Pl. 65. 1789.

朱兰属 zhu lan shu

Chen Xinqi (陈心启 Chen Sing-chi); Stephan W. Gale, Phillip J. Cribb

Herbs, terrestrial. Rhizome ascending, cylindric, slender; roots fascicled, elongate, fibrous, slightly fleshy. Stem erect, slender, 1-leaved. Leaf elliptic to oblong-lanceolate, herbaceous to slightly fleshy, sheathing at base. Inflorescence terminal, slender, usually with a solitary flower, rarely 2- or 3-flowered; floral bract persistent, foliaceous. Flower resupinate, showy. Sepals free, similar, spreading. Petals free, usually deflexed over column, slightly wider and shorter than sepals; lip oblong-obovate, entire to shallowly 3-lobed above middle, not spurred, margin fimbriate; disk densely papillose. Column slender, dilated at apex; clinandrium erose at margin; anther terminal, incumbent; pollinia 2, granular-farinaceous, without caudicles or viscidia; stigma surface large; rostellum short, broad, protruding above stigma. Capsule erect.

Four species: three species in E Asia and one in North America; three species (one endemic) in China.

- 1a. Leaf elliptic, 1–3(–4.5) cm; floral bract positioned up to 2.5 cm above leaf, 5–17 mm; flower suberect 3. *P. yunnanensis*
 1b. Leaf oblong or oblong-lanceolate, 3–6 cm; floral bract positioned 3–8 cm above leaf, 15–30 mm;
 flower spreading.
 2a. Flowers pale pinkish purple to purple; sepals 15–22 mm 1. *P. japonica*
 2b. Flowers white; sepals 12–13(–15) mm 2. *P. minor*

1. *Pogonia japonica* H. G. Reichenbach, *Linnaea* 25: 228. 1852.

朱兰 zhu lan

Pogonia kungii Tang & F. T. Wang; *P. ophioglossoides* (Linnaeus) Ker Gawler var. *japonica* (H. G. Reichenbach) Finet; *P. parvula* Schlechter; *P. similis* Blume.

Plants 10–20(–25) cm tall. Rhizome 10–20 × ca. 2 mm, with several, slender, elongate, slightly fleshy roots. Leaf oblong to oblong-lanceolate, 3.5–6(–9) × 0.7–1.7 cm, slightly fleshy, base contracted and amplexicaul, apex acute or obtuse. Floral bract positioned 4–8 cm above leaf, narrowly oblong, linear-lanceolate, or lanceolate, 15–25(–40) × 3–7 mm. Flower solitary, terminal, erect, not opening widely, pale pinkish purple to purple; pedicel and ovary 10–18 mm. Sepals narrowly oblong-oblancheolate, 15–22 × 2.5–3.5 mm, apex obtuse or acuminate. Petals similar to sepals, 14–22 × 3.5–5 mm, apex acuminate; lip narrowly oblong, 14–20 × 3–4 mm, slightly contracted toward base, obscurely 3-lobed above middle; lateral lobes triangular, ca. 0.8 mm, apical margin irregularly incised or fimbriate; mid-lobe ligulate to obovate, 6–13 × 3–4 mm, with 2 or 3 fimbriate-hairy crests, margin fimbriate-incised; disk with 2 or 3 longitudinal lamellae or ridges extending from base of lip and becoming continuous with hairy crests on mid-lobe. Column erect, 7–10 mm, slender. Capsule oblong, 20–25 × 5–6 mm. Fl. May–Jul, fr. Jul–Oct. $2n = 18, 20$.

Grasslands on hilltops, forests along valleys, wet places in thickets, open wet places; 1100–2300 m. Anhui, N Fujian, N Guangxi, Guizhou, Heilongjiang, Hubei, Hunan, Jiangxi, Jilin, Nei Mongol, Shandong, Sichuan, NE Yunnan, Zhejiang [Japan, Korea].

2. *Pogonia minor* (Makino) Makino, *Bot. Mag. (Tokyo)* 23: 137. 1909.

小朱兰 xiao zhu lan

Pogonia japonica H. G. Reichenbach var. *minor* Makino, *Bot. Mag. (Tokyo)* 12: 103. 1898.

Plants 13–16 cm tall. Rhizome 2–7 × ca. 2 mm, with several, elongate, slender roots. Stem with a sheath below leaf; sheath 7–12 mm. Leaf oblong-lanceolate, 3–7 × 0.4–1.2 cm,

slightly fleshy, base amplexicaul, apex acute or obtuse. Floral bract positioned 3–6 cm above leaf, narrowly lanceolate, 20–30 × 3–4 mm. Flower solitary, terminal, erect, not opening widely, white; pedicel and ovary 10–20 mm. Sepals narrowly oblancheolate, 12–13(–15) × 2–3 mm, apex acute. Petals similar to sepals, narrowly ovate-elliptic, 12–13(–15) × 2.5–4 mm, apex acute; lip oblanceolate, ca. 11 × 2 mm, 3-lobed above middle; lateral lobes triangular, ca. 1 mm, apex acute; mid-lobe oblong, ca. 5 × 2 mm, with 3 crests of fleshy hairs, margin irregularly denticulate; disk with 3 longitudinal ridges extending from base of lip to base of mid-lobe and becoming continuous with hairy crests on mid-lobe. Column erect, nearly straight, white, ca. 7 mm. Capsule oblong-cylindric, ca. 20 mm. Fl. May–Jun. $2n = 18$.

Grasslands; 2200–2400 m. S Taiwan [Japan].

3. *Pogonia yunnanensis* Finet, *Bull. Soc. Bot. France* 44: 419. 1898.

云南朱兰 yun nan zhu lan

Plants (2–)5–9(–12) cm tall. Rhizome ca. 5 × 1 mm, with several slender roots. Leaf elliptic, 1–3(–4.5) × (0.4–)0.7–1.5(–2) cm, slightly fleshy, base contracted and amplexicaul, apex acute. Floral bract positioned up to 2.5 cm above leaf, narrowly elliptic, narrowly ovate, or narrowly ovate-lanceolate, 5–17(–20) mm. Flower solitary, terminal, suberect, not opening widely, rose-pink with a red-purple lip; pedicel and ovary 5–8(–15) mm. Sepals narrowly oblong, 14–17 × ca. 3 mm, apex acute. Petals narrowly obovate-oblong, 12–16 × 3.5–4 mm, apex obtuse; lip narrowly oblong, 13–15 × ca. 3 mm, usually slightly shorter than sepals, slightly contracted toward base, 3-lobed above middle; lateral lobes narrowly triangular-ovate, 1–2 mm, apex acute; mid-lobe linear-oblong, 5–6 × ca. 2.5 mm, densely papillose-hairy, margin irregularly denticulate; disk with 2 longitudinal ridges extending from base of lip to base of mid-lobe and becoming papillose-hairy toward apex. Column suberect, slightly curved, 6–8 mm. Capsule erect, obovate-elliptic, 10–12 × 3–6 mm. Fl. Jun–Jul, fr. Oct.

• Alpine grasslands, *Abies* forests; 2300–3300 m. SW and W Sichuan, SE Xizang, NW Yunnan.