

### 3. Subfam. ORCHIDOIDEAE

兰亚科 lan ya ke

Chen Xinqi (陈心启 Chen Sing-chi), Lang Kaiyong (郎楷永 Lang Kai-yung); Stephan W. Gale, Phillip J. Cribb, Paul Ormerod

Terrestrial or very rarely epiphytic plants with root-stem tubers or fleshy, short to long rhizomes, rarely mycotrophic with leaves reduced to colorless sheaths. Tubers, if present, ovoid, spherical, ellipsoidal, digitate, or cylindrical-fusiform, solitary or in clusters, hairy or glabrous; rhizome, if present, fleshy, elongate. Leaves spirally arranged, 1 to many, basal or arranged along stem, deciduous or rarely persistent for more than a year, often sheathing at base, usually green, rarely spotted or veined with silver, red, or gold, rarely purple spotted or shaded beneath. Inflorescence terminal, erect or arching, 1- to many flowered; peduncle usually terete, glabrous, hairy, or glandular; bracts linear, lanceolate, ovate, or elliptic, usually glabrous and green. Flowers small to large, usually resupinate, flat to tubular, often showy; pedicel often obscure; ovary distinct, glabrous or less frequently hairy or glandular, lacking an abscission layer. Dorsal sepal free or often adnate to petals to form a hood over column; lateral sepals usually free, sometimes connate and oblique at base to form a spurlike mentum. Petals entire or 2-lobed, often adnate to dorsal sepal; lip usually lowermost in flower, usually deflexed, entire, 3- or 5-lobed, or 2-partite, occasionally callose or with 2 basal glands, often saccate at base or with spurlike nectary; nectary fusiform, clavate, or cylindrical, rarely fused to ovary, often lacking nectar. Column basifixed or not; anther 2-locular, longer than or as long as rostellum, locules adnate, divergent, or separated on a  $\pm$  broad connective; pollinia 2 or 4, sectile, attached by short to elongate caudicles to 1 or 2 viscidia; staminodes 2, lateral, usually present, sessile or stalked; stigma entire or 2-lobed, sessile or stalked, concave to convex; rostellum usually 2- or 3-lobed, shorter than or as long as anther, sometimes obscure, when 3-lobed mid-lobe erect or porrect, lying between or in front of anther locules, side lobes short to long, porrect, rarely incurved or upcurved. Capsule 3-ribbed, longitudinally dehiscent. Seeds fusiform to almost cylindrical, with a thin testa.

About 192 genera and ca. 3,630 species in eight tribes and 20 subtribes: well represented in N temperate and tropical areas of both the Old and New Worlds; 46 genera (four endemic, one introduced) and 344 species (153 endemic, one introduced) in China.

This subfamily is particularly well represented in temperate parts of China.

### 5. GOODYERA R. Brown in W. T. Aiton, Hortus Kew., ed. 2, 5: 197. 1813.

斑叶兰属 ban ye lan shu

Chen Xinqi (陈心启 Chen Sing-chi), Lang Kaiyong (郎楷永 Lang Kai-yung); Stephan W. Gale, Phillip J. Cribb, Paul Ormerod

*Epipactis* Séguier (1754), not Zinn (1757, nom. cons.); *Haemaria* Lindley.

Herbs, terrestrial, or rarely epiphytic or lithophytic. Rhizome elongate, creeping, few to many noded, with fibrous roots at nodes. Stem erect or ascending, short or elongate, few to many leaved. Leaves widely spaced along stem, clustered, or rosulate, pale to dark green or blackish, adaxially sometimes with a white or pink midvein or white or pink reticulate venation, lanceolate to ovate-elliptic, usually oblique, slightly fleshy, base contracted into a sheathing petiole-like stalk. Inflorescence terminal, racemose, glabrous or pubescent; peduncle with a few sheathing bracts; rachis laxly or densely 1- to many flowered, secund or cylindrical; floral bracts glabrous or pubescent. Flowers resupinate. Sepals free, subsimilar, outer surface glabrous or pubescent; dorsal sepal concave, connivent with petals and forming a hood over column; lateral sepals connivent with lip, widely spreading or reflexed. Petals membranous, glabrous; lip connate with column at base, cymbiform, composed of a concave-saccate hypochile and a sessile or rarely shortly clawed epichile; hypochile usually papillose inside or rarely glabrous, sometimes with a pair of low keels; epichile transversely elliptic to lanceolate. Column short, dilated toward apex, without appendages; anther erect; pollinia 2, each longitudinally 2-parted, granular-farinaceous, sectile, attached directly to a small, ovate viscidium or attenuate into stalks that attach to an oblong viscidium; rostellum erect, deltoid, remnant shallowly or deeply bifid; stigma lobes connate, positioned below rostellum. Capsule erect, ovoid to ellipsoid.

About 100 species: S Africa, Asia, NE Australia, Europe, Madagascar, North America including Mexico, SW Pacific islands; 29 species (12 endemic) in China.

1a. Leaves rosulate or subrosulate at base of stem.

2a. Leaves uniformly green, without white or pale green venation or markings.

3a. Lip epichile minutely papillose ..... 1. *G. yunnanensis*

3b. Lip epichile glabrous.

4a. Dorsal sepal ca. 2.5 mm ..... 2. *G. brachystegia*

4b. Dorsal sepal 4–7 mm ..... 3. *G. fusca*

2b. Leaves green with white or pale green venation and/or irregular markings on adaxial surface.

5a. Dorsal sepal 7–10 mm ..... 4. *G. schlechtendaliana*

5b. Dorsal sepal 3–4 mm.

6a. Stem less than ca. 1 cm; leaves ovate or ovate-orbicular, 1.3–2.5 cm wide; petiole-like leaf base and tubular sheath very short, ca. 0.5 cm ..... 5. *G. bomiensis*

- 6b. Stem 1–4 cm; leaves ovate to ovate-elliptic or oblong, 0.5–1.5 cm wide; petiole-like leaf base and tubular sheath 1–2 cm.  
 7a. Sepals sparsely pubescent on outer surface; lip hypochile papillose inside ..... 6. *G. repens*  
 7b. Sepals glabrous; lip hypochile glabrous, containing 2 parallel lamellae toward base ..... 7. *G. arisanensis*
- 1b. Leaves spaced along stem or clustered toward apex of stem.  
 8a. Leaves with white or pale green venation and/or irregular markings on adaxial surface.  
 9a. Floral rachis ca. 0.5 cm, 2- or rarely 3-flowered; dorsal sepal 20–25 mm ..... 20. *G. biflora*  
 9b. Floral rachis 3–11 cm, 6- or more flowered; dorsal sepal 3–14 mm.  
 10a. Dorsal sepal 3–6 mm.  
 11a. Apical margin of lip epichile and petals irregularly denticulate ..... 29. *G. yangmeishanensis*  
 11b. Margins of lip and petals entire.  
 12a. Leaves less than 1 cm wide; lip hypochile with 2 lamellae inside ..... 28. *G. wuana*  
 12b. Leaves 1.3–4 cm wide; lip hypochile lacking lamellae.  
 13a. Leaves with a white band along midvein adaxially; lip hypochile glabrous ..... 26. *G. nankoensis*  
 13b. Leaves with fine white reticulate venation adaxially; lip hypochile papillose inside ..... 27. *G. hachijoensis*
- 10b. Dorsal sepal 7–14 mm.  
 14a. Lip epichile with 2 longitudinal lamellae.  
 15a. Peduncle glabrous ..... 23. *G. vittata*  
 15b. Peduncle pubescent.  
 16a. Leaves clustered toward apex of stem; apices of sepals and petals acute .... 24. *G. kwangtungensis*  
 16b. Leaves spaced along stem; apices of sepals and petals acuminate ..... 25. *G. dongchenii*
- 14b. Lip epichile not ornamented.  
 17a. Leaves deep green or occasionally dark purplish green, with a white band along midvein, lacking white reticulate venation or irregular markings; peduncle deep reddish brown ..... 22. *G. velutina*  
 17b. Leaves green with a white or pale green midvein and/or irregular white markings; peduncle pale grayish green.  
 18a. Leaves 4.5–9 × 2–4 cm; dorsal sepal ca. 14 mm ..... 21. *G. daibuzanensis*  
 18b. Leaves 2.5–5 × 0.8–2.2 cm; dorsal sepal 7–10 mm ..... 4. *G. schlechtendaliana*
- 8b. Leaves without white or pale green venation or markings.  
 19a. Plants 25–90 cm tall.  
 20a. Peduncle green; flowers small, opening weakly, white tinged pale green; dorsal sepal 3–3.5 mm ..... 16. *G. procera*  
 20b. Peduncle reddish brown or dark greenish brown; flowers medium-sized, opening widely, yellowish brown; dorsal sepal 6–8.5 mm.  
 21a. Leaves 15–20 cm; petiole-like leaf base and tubular sheath 5–10 cm; floral rachis 10–30 cm, laxly to subdensely flowered ..... 14. *G. fumata*  
 21b. Leaves 9–15 cm; petiole-like leaf base and tubular sheath 2–5.5 cm; floral rachis 4–15 cm, densely flowered ..... 15. *G. rubicunda*
- 19b. Plants 8–28 cm tall.  
 22a. Flowers large, opening widely; lip 12–14 mm.  
 23a. Leaves slightly fleshy; peduncle pale green, 8–13 cm; rachis 1–3-flowered; lip white to pale green, epichile strongly recurved ..... 12. *G. seikoomontana*  
 23b. Leaves thinly textured; peduncle pale red-brown, 5–9 cm; rachis (2 or)3–5-flowered; lip greenish brown tinged white at apex, epichile recurved or spreading forward ..... 13. *G. viridiflora*
- 22b. Flowers small or medium-sized, opening weakly; lip 2.8–10 mm.  
 24a. Plants always epiphytic; peduncle strongly recurved.  
 25a. Stem erect; lip 5–6 mm ..... 8. *G. recurva*  
 25b. Stem pendulous; lip 2.8–3.5 mm ..... 9. *G. pendula*
- 24b. Plants terrestrial (*G. robusta* rarely epiphytic); peduncle not recurved.  
 26a. Lip epichile with 2 longitudinal lamellae or a narrow band of papillae.  
 27a. Dorsal sepal ca. 3.5 mm; lip epichile with a narrow band of papillae from base to midway along its length ..... 17. *G. yamiana*  
 27b. Dorsal sepal 7–11 mm; lip epichile with 2 longitudinal lamellae ..... 10. *G. robusta*
- 26b. Lip epichile not ornamented.  
 28a. Petiole-like leaf base and tubular sheath less than 1 cm; dorsal sepal ca. 3 mm ..... 11. *G. wolongensis*  
 28b. Petiole-like leaf base and tubular sheath more than 1 cm; dorsal sepal 5–13 mm.

- 29a. Stem 9–17 cm; peduncle pubescent, 2.5–5 cm ..... 18. *G. foliosa*  
 29b. Stem 6–10 cm; peduncle glabrous, ca. 1 cm ..... 19. *G. henryi*

**1. *Goodyera yunnanensis*** Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 4: 60. 1919.

川滇斑叶兰 chuan dian ban ye lan

*Epipactis yunnanensis* (Schlechter) Hu; *Goodyera serpens* Schlechter.

Plants terrestrial, 10–23 cm tall. Rhizome slender. Stem erect, 4–7-leaved. Leaves rosulate at base of stem, green, without white markings, elliptic to lanceolate-elliptic, 1.5–3.5 × 0.7–1.5 cm, base cuneate, apex acute; petiole-like base and tubular sheath 0.8–1.8 cm. Peduncle 4.5–9 cm, pubescent, with 2–9 sterile bracts; rachis 3.5–10 cm, densely many flowered, secund; floral bracts linear-lanceolate or linear, to 12 mm, basal ones slightly exceeding flowers, pubescent, apex acuminate. Flowers opening weakly, white or pale green, small; pedicel and ovary cylindrical-fusiform, 4–6 mm, pubescent. Sepals white or pale green, outer surface pubescent, 1-veined; dorsal sepal narrowly ovate, 3–5 × ca. 2 mm, apex subacute; lateral sepals weakly spreading, narrowly ovate, oblique, 3–5 × ca. 2.2 mm, apex subacute. Petals oblong-ligulate, oblique, 3–5 × ca. 1.5 mm, 1-veined, apex slightly obtuse; lip cymbiform, 3–4 mm; hypochile concave-saccate, glabrous, inside with 4 obscure veins; epichile oblong, minutely papillose, apex obtuse. Column ca. 1.5 mm; anther transversely elliptic, ca. 0.8 mm; rostellum remnant shallowly bifid. Fl. Aug–Oct.

- Forests, scrub; 2600–3900 m. NW Sichuan, N and W Yunnan.

**2. *Goodyera brachystegia*** Handel-Mazzetti, Symb. Sin. 7: 1345. 1936.

莲座叶斑叶兰 lian zuo ye ban ye lan

Plants terrestrial, 18–20 cm tall. Rhizome short. Stem erect or ascending, 5- or 6-leaved. Leaves rosulate at base of stem, green, without white markings, broadly elliptic or ovate, 2.4–3.3 × 1.5–2 cm, base rounded, apex acute; petiole-like base and tubular sheath 1–1.5 cm. Peduncle densely pubescent, with 5–7 sterile bracts; rachis 6.5–8 cm, densely many flowered, subsecund; floral bracts lanceolate, ca. as long as ovary, sparsely pubescent, apex acuminate. Flowers opening weakly, white, small; pedicel and ovary cylindrical-fusiform, ca. 5 mm, pubescent. Sepals pubescent on outer surface, 1-veined; dorsal sepal narrowly ovate-oblong, ca. 2.5 × 1.5 mm, concave, apex obtuse; lateral sepals oblong, slightly oblique, ca. 3 × 1.6 mm, apex obtuse. Petals rhombic-oblancheolate, oblique, ca. 2.5 × 1.2 mm, 1-veined, apex obtuse or subacute; lip broadly ovate, ca. 2.5 mm; hypochile concave-saccate, ca. 1.2 × 2.5 mm, glabrous, inside with thickened veins; epichile oblong, ca. 1.3 mm, apex obtuse, slightly reflexed. Column extremely short; anther ovoid-cordate, ca. 1 mm; rostellum ca. 1 mm, remnant deeply bifid. Fl. Jun, fr. Aug.

- Forests; 1300–2000 m. SW Guizhou, C and NE Yunnan.

**3. *Goodyera fusca*** (Lindley) J. D. Hooker, Fl. Brit. India 6: 112. 1890.

脊唇斑叶兰 ji chun ban ye lan

*Hetaeria fusca* Lindley, Gen. Sp. Orchid. Pl. 491. 1840 [“*Aetheria*”]; *Cystorchis fusca* (Lindley) Benth & J. D. Hooker; *Epipactis fusca* (Lindley) A. A. Eaton; *Orchiodes fusca* (Lindley) Kuntze.

Plants terrestrial, 10–22 cm tall. Rhizome short, few noded. Stem erect, 1–3 cm, 5–8-leaved. Leaves rosulate at base of stem, green, without white markings, ovate or ovate-elliptic, 1.5–3.5 × 0.8–2 cm, apex obtuse or acute; petiole-like base and tubular sheath 0.8–1.8 cm. Peduncle pale green, 4.5–9 cm, sparsely pubescent, with 1–3 sterile bracts; rachis 3–9 cm, densely many flowered, secund or not; floral bracts ovate-lanceolate or lanceolate, 6–10 mm, basal ones exceeding flowers, pubescent, apex acuminate. Flowers opening weakly, white flushed with pale green, small; pedicel and ovary cylindrical-fusiform, 6–7 mm, densely pubescent. Sepals pubescent on outer surface, 1-veined; dorsal sepal oblong, 4–7 × 1.5–2 mm, concave, apex obtuse; lateral sepals oblong, oblique, 4–7 × 1.8–2.2 mm, apex subacute. Petals linear-oblong, falcate, 4–7 × 1.5–2 mm, 1-veined, apex obtuse; lip broadly ovate, 3–5 × 2–2.5 mm; hypochile conspicuous and projecting beyond base of lateral sepals, concave-saccate, glabrous, with 2 ridges running parallel to midvein inside; epichile abruptly narrowed, narrowly oblong, apex obtuse, recurved. Column ca. 1.5 mm. Fl. Aug–Sep.  $2n = 32, 32 + 2B$ .

Forests, thickets, alpine meadows; 2600–4500 m. S and SE Xizang, NW Yunnan [Bhutan, NE India, N Myanmar, Nepal].

**4. *Goodyera schlechtendaliana*** H. G. Reichenbach, Linnaea 22: 861. 1849.

斑叶兰 ban ye lan

*Epipactis labiata* (Pampanini) Hu; *E. melinoste* (Schlechter) Hu; *E. schlechtendaliana* (H. G. Reichenbach) A. A. Eaton; *E. secundiflora* (Griffith) Hu; *Georchis schlechtendaliana* (H. G. Reichenbach) H. G. Reichenbach; *Goodyera japonica* Blume; *G. labiata* Pampanini; *G. melinoste* Schlechter; *G. schlechtendaliana* f. *similis* (Blume) Makino; *G. secundiflora* Griffith; *G. similis* Blume; *Orchiodes schlechtendaliana* (H. G. Reichenbach) Kuntze; *Peramium schlechtendalium* (H. G. Reichenbach) Makino.

Plants terrestrial, 6–25 cm tall. Rhizome slender to stout, many noded. Stem erect, 1–6 cm, 4–6-leaved. Leaves subrosulate or spaced along stem, abaxially pale green, adaxially green with irregular white markings, ovate to ovate-lanceolate, 2.5–5 × 0.8–2.2 cm, base subrounded or broadly cuneate, apex acute; petiole-like base and tubular sheath 0.4–1.8 cm. Peduncle pale green, 5–12 cm, pubescent, with 2–4 sterile bracts; rachis 3–10 cm, subdensely 5- to more than 20-flowered, secund; floral bracts lanceolate, 7–12 mm, pubescent, apex acuminate. Flowers opening weakly, white, tinged with pink, medium-sized; pedicel and ovary cylindrical-fusiform, 8–10 mm, pubescent. Sepals pubescent on outer surface, 1-veined; dorsal sepal narrowly elliptic-lanceolate, cymbiform, 7–10 × 3–3.5 mm, apex acute; lateral sepals ovate-lanceolate, 7–9 × 3.5–4 mm, apex acute. Petals rhombic-oblancheolate, 7–10 × 2.5–3 mm, 1-veined, apex

obtuse or subacute; lip ovate, 6–8.5 × 3–4 mm; hypochile concave-saccate, inside papillose; epichile ligulate, 3–3.5 mm, slightly recurved. Column ca. 3 mm; anther ovoid, acuminate; pollinia ca. 3 mm; rostellum 2–3 mm, remnant deeply bifid. Fl. Aug–Oct.  $2n = 30 + 0-2B, 60$ .

Broad-leaved forests along valleys; 500–2800 m. Anhui, N Fujian, S Gansu, Guangdong, Guangxi, Guizhou, Hainan, S Henan, Hubei, Hunan, Jiangsu, Jiangxi, S Shaanxi, Shanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, India, Indonesia (Sumatra), Japan, Korea, Nepal, Thailand, Vietnam].

**5. *Goodyera bomiensis*** K. Y. Lang, Acta Phytotax. Sin. 16(4): 128. 1978.

波密斑叶兰 bo mi ban ye lan

Plants terrestrial, 19–30 cm tall. Rhizome short. Stem erect, less than ca. 1 cm, 3–6-leaved. Leaves rosulate at base of stem, abaxially pale green, adaxially green with white venation and irregular markings, ovate to ovate-orbicular, 1.8–3.2 × 1.3–2.5 cm, base cordate, rounded, or broadly cuneate, apex obtuse or acute; petiole-like base and tubular sheath extremely short, ca. 0.5 cm. Peduncle green, 14–18 cm, pubescent, with 3–5 sterile bracts; rachis 3–10 cm, laxly 8–20-flowered, secund; floral bracts ovate-lanceolate, 5–6 mm, apex acuminate. Flowers opening weakly, white or pale yellowish white, small; pedicel and ovary fusiform, 4–7 mm, pubescent. Sepals white and sometimes tinged pale brown at base, 1-veined; dorsal sepal narrowly ovate, 3–3.5 × 1.5–2 mm, outer surface sparsely pubescent at base, apex obtuse; lateral sepals narrowly elliptic, 3.5–4 × 1.5–2 mm, glabrous, apex obtuse. Petals white, rhombic-oblongate, oblique, 3–3.8 × 1–1.2 mm, 1-veined, apex obtuse; lip ovate-elliptic, 3.5–4 × 2–2.5 mm; hypochile concave-saccate, with a solitary longitudinal ridge toward base and sparsely papillose on midvein inside; epichile ligulate, cymbiform, ca. 1.5 mm, apex obtuse, recurved. Column 1.8–2 mm; rostellum ca. 1.3 mm, remnant deeply bifid. Fl. May–Sep, fr. Jul–Aug.  $2n = 30^*$ .

• Mixed evergreen and broad-leaved forests, damp places in *Abies* forests; 900–3700 m. W Hubei, N Taiwan, E Xizang, Yunnan.

**6. *Goodyera repens*** (Linnaeus) R. Brown in W. T. Aiton, Hortus Kew., ed. 2, 5: 198. 1813.

小斑叶兰 xiao ban ye lan

*Satyrium repens* Linnaeus, Sp. Pl. 2: 945. 1753; *Elastium repens* (Linnaeus) Dulac; *Epipactis chinensis* (Schlechter) Hu; *E. mairei* (Schlechter) Hu (1925), not Schlechter (1919); *E. repens* (Linnaeus) Crantz; *Gonogona repens* (Linnaeus) Link; *Goodyera brevis* Schlechter; *G. chinensis* Schlechter; *G. mairei* Schlechter; *G. marginata* Lindley; *G. nantoensis* Hayata; *G. pubescens* R. Brown var. *repens* (Linnaeus) Alph. Wood; *G. repens* var. *marginata* (Lindley) Tang & F. T. Wang; *Neottia repens* (Linnaeus) Swartz; *Orchiodes marginata* (Lindley) Kuntze; *O. repens* (Linnaeus) Kuntze; *Orchis repens* (Linnaeus) Eyster ex Poiré; *Peramium nantoense* (Hayata) Makino; *P. repens* (Linnaeus) Salisbury; *Serapias repens* (Linnaeus) Villars.

Plants terrestrial, 8–20 cm tall. Rhizome slender, many

noded. Stem ascending, 1–4 cm, 4–6-leaved. Leaves subrosulate at base of stem, abaxially pale green, adaxially deep green with white venation, ovate to ovate-elliptic, 1–3 × 0.5–1.5 cm, base obtuse or broadly cuneate, apex acute; petiole-like base and tubular sheath 1–1.5 cm. Peduncle pale grayish green, 5–12 cm, pubescent, with 2–5 sterile bracts; rachis 1–5.5 cm, subdensely 5–20-flowered, secund; floral bracts lanceolate, 3–5 mm, pubescent, apex acuminate. Flowers opening weakly, white, tinged with green, small; pedicel and ovary cylindrical-fusiform, 3–5 mm, sparsely pubescent. Sepals sparsely pubescent on outer surface, 1-veined; dorsal sepal ovate to ovate-oblong, 3–4 × 1.2–1.5 mm, apex obtuse; lateral sepals ovate to ovate-elliptic, oblique, 3–4 × 1.5–2.5 mm, apex obtuse. Petals spatulate, oblique, 3–4 × 1–1.5 mm, 1-veined, apex obtuse; lip ovate, 3–3.5 × 2–2.5 mm; hypochile concave-saccate, inside papillose; epichile ligulate, ca. 1.5 mm, slightly recurved. Column 1–1.5 mm. Fl. Jul–Aug.  $2n = 30, 32, 40$ .

Forests along valleys; 700–3800 m. Anhui, N Fujian, Gansu, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan [Bhutan, India, Japan, Kashmir, Korea, Myanmar, Nepal, Russia; Europe, North America].

**7. *Goodyera arisanensis*** Hayata, Icon. Pl. Formosan. 6: 91. 1916.

阿里山斑叶兰 a li shan ban ye lan

*Peramium arisanense* (Hayata) Makino.

Plants possibly epiphytic, ca. 25 cm tall. Rhizome stout, densely noded. Stem ascending, ca. 4 cm, 5–7-leaved. Leaves subrosulate at base of stem, ovate or oblong, 1–4 × 0.6–1.5 cm, possibly with white reticulate venation, base cuneate, apex acute; petiole-like base and tubular sheath 1–2 cm. Peduncle ca. 11 cm, sparsely pubescent, with 8 or 9 sterile bracts; rachis ca. 10 cm, densely 12–25-flowered, secund; floral bracts ovate-lanceolate, 3.5–4 mm, glabrous. Flowers small; pedicel and ovary ovoid-fusiform, ca. 3 mm, glabrous or sparsely pubescent. Sepals glabrous, 1-veined; dorsal sepal ovate-lanceolate, 3–3.8 × 1–1.2 mm, apex obtuse; lateral sepals oblong-lanceolate, oblique, 3.5–4 × ca. 1.2 mm, apex obtuse. Petals linear-lanceolate, falcate, ca. 3.5 × 0.7 mm, apex obtuse; lip ovate-lanceolate, 3.5–4 × ca. 1.5 mm, 3-veined; hypochile saccate, projecting beyond base of lateral sepals, glabrous, containing 2 parallel lamellae toward base; epichile linear-ligulate, apex obtuse, slightly recurved. Column ca. 1.5 mm; anther ovoid, ca. 0.8 mm; rostellum remnant deeply bifid. Fl. Aug.

• Forests; ca. 2500 m. N Taiwan.

This species remains poorly circumscribed, and its placement is accordingly problematic. It has been considered synonymous with *Goodyera schlechtendaliana* (see FRPS 17: 133. 1999), though its habit and small flowers indicate that it is more closely affiliated with *G. repens*. Critical re-examination of floral characters, in particular the degree of pubescence on the sepals and the presence of papillae in the lip hypochile, is required to refine its delimitation.

**8. *Goodyera recurva*** Lindley, J. Proc. Linn. Soc., Bot. 1: 183. 1857.

长苞斑叶兰 chang bao ban ye lan

*Epipactis prainii* (J. D. Hooker) A. A. Eaton; *E. recurva* (Lindley) A. A. Eaton; *Goodyera prainii* J. D. Hooker; *G. recurva* var. *prainii* (J. D. Hooker) Pradhan; *Orchiodes recurva* (Lindley) Kuntze.

Plants epiphytic, 12–18 cm tall. Rhizome slender, few noded. Stem erect, 3–4 cm, 6- or 7-leaved. Leaves spaced along stem or clustered, abaxially pale green, adaxially green, without white markings, narrowly ovate-oblong, narrowly ovate, or ovate-elliptic, 3–5.5 × 0.5–1.5 cm, base cuneate or broadly cuneate, apex acute; petiole-like base and tubular sheath 1–2 cm. Peduncle strongly recurved toward apex, 5–9 cm, pubescent, with 3–5 sterile bracts; rachis 5–7 cm, densely many flowered; floral bracts narrowly lanceolate, 7–14 mm, basal ones exceeding flowers, pubescent, apex acuminate. Flowers barely opening, white, small; pedicel and ovary oblong-fusiform, 7–8 mm, sparsely pubescent. Sepals sparsely pubescent on outer surface, 1-veined; dorsal sepal ovate, 5–6 × 3–3.5 mm, apex acute; lateral sepals oblong, oblique, 5–6 × 2.1–2.3 mm, apex acute. Petals linear-oblong, oblique, 5–6 × 1.3–1.5 mm, 1-veined, apex acute; lip broadly ovate, cymbiform, 5–6 × 3–3.2 mm; hypochile concave-saccate, inside glabrous, slightly thickened along 5 veins; epichile linear-ligulate, ca. 3.5 mm, apex recurved. Column ca. 2 mm; anther subovoid, apex acuminate; rostellum remnant deeply bifid. Fl. Sep.

Tree trunks in evergreen broad-leaved forests; 1400–2800 m. N Fujian, Hunan, W Yunnan [Bhutan, N India].

**9. *Goodyera pendula*** Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 32: 623. 1888.

垂叶斑叶兰 chui ye ban ye lan

*Epipactis pendula* (Maximowicz) A. A. Eaton; *Peramium pendulum* (Maximowicz) Makino.

Plants epiphytic or lithophytic, 13–15 cm tall. Rhizome slender, many noded. Stem pendulous, 5–6 cm, many leaved. Leaves spaced along stem, both surfaces green, without white markings, lanceolate to narrowly ovate, 2–3.5 × 0.5–0.7 cm, 3–5-veined, base cuneate, apex acuminate; petiole-like base and tubular sheath to ca. 1 cm. Peduncle strongly recurved midway along length, green, 3–5 cm, sparsely pubescent, with several foliaceous sterile bracts; rachis 4–6 cm, densely many flowered, secund; floral bracts lanceolate, 4–10 mm, membranous, pubescent, apex acuminate. Flowers opening weakly, white tinged red-orange at center of lip, small; pedicel and ovary fusiform, 3–5 mm, pubescent. Sepals similar, narrowly ovate, 3–4 × 1–1.2 mm, pubescent on outer surface, 1-veined, apex subobtuse. Petals narrowly oblanceolate, 3–4 × 0.2–0.4 mm, apex obtuse; lip ovate, cymbiform, 2.8–3.5 mm, shorter than sepals; hypochile saccate, inside glabrous and without ornamentation; epichile ligulate, incurved at apex. Column 1.5–2 mm. Fl. Jun–Jul. 2n = 28, 30.

Forest margins; 1800–1900 m. C Taiwan [Japan].

**10. *Goodyera robusta*** J. D. Hooker, Fl. Brit. India 6: 113. 1890.

滇藏斑叶兰 dian zang ban ye lan

*Epipactis robusta* (J. D. Hooker) A. A. Eaton; *Goodyera*

*bilamellata* Hayata; *Peramium bilamellatum* (Hayata) Makino.

Plants terrestrial or rarely epiphytic, 11–22 cm tall. Rhizome stout, few noded. Stem erect, 3–8 cm, 4–7-leaved. Leaves widely spaced or somewhat clustered toward apex along stem, green, without white markings, ovate to narrowly ovate-elliptic, 3.5–8 × 1.5–3 cm, base obtuse-rounded or broadly cuneate, margin undulate, apex acute; petiole-like base and tubular sheath 1.5–4 cm. Peduncle grayish green, 3–6.5 cm, pubescent, with 3 or 4 sterile bracts; rachis 5–10 cm, subdensely to densely many flowered, secund; floral bracts lanceolate, 8–12 mm, pubescent, apex acuminate. Flowers opening weakly, white or greenish white, sometimes tinged pink, medium-sized; pedicel and ovary cylindrical-fusiform, 6–9 mm, pubescent. Sepals white or pink, midvein green, pubescent on outer surface, 1-veined; dorsal sepal oblong, 7–11 × 2.8–4.5 mm, concave, apex acute; lateral sepals spreading, ovate, oblique, 7–11 × 3–4.5 mm, slightly thickened at base, apex acute. Petals white, rhombic, oblique, 7–10 × 3–4 mm, 1-veined, base attenuate, apex acute; lip white, broadly oblong-ovate, 6–9 × ca. 4 mm; hypochile concave-saccate, ca. 3 mm, inside papillose; epichile ovate-lanceolate, 3–4 mm, with 2 longitudinal lamellae, apex acute, slightly to strongly recurved. Column 2–3 mm; anther narrowly ovoid, ca. 2.5 mm; rostellum ca. 2.5 mm, remnant deeply bifid. Fl. Aug–Dec.

Damp places in forests; 1000–2500 m. SW Guizhou, Taiwan, SE Xizang, S and W Yunnan [NE India].

**11. *Goodyera wolongensis*** K. Y. Lang, Acta Phytotax. Sin. 22: 314. 1984.

卧龙斑叶兰 wo long ban ye lan

Plants terrestrial, 15–18 cm tall. Rhizome slender, few noded. Stem ascending, ca. 3 cm, 3- or 4-leaved. Leaves spaced along stem, green, without white markings, ovate, 1.5–2 × 1–1.5 cm, base rounded, apex acute; petiole-like base and tubular sheath 0.4–0.8 cm. Peduncle green, 7–10 cm, pubescent, with 3 or 4 sterile bracts; rachis 3.5–6 cm, subdensely 12–18-flowered; floral bracts lanceolate, exceeding ovary, pubescent. Flowers opening weakly, white, small; pedicel and ovary green, fusiform, 3–4 mm, pubescent. Sepals pubescent on outer surface, 1-veined; dorsal sepal ovate, ca. 3 × 2 mm, apex obtuse; lateral sepals elliptic, oblique, ca. 3.5 × 1.5 mm, apex acute. Petals ovate-elliptic, ca. 3 × 3 mm, 1-veined; lip subglobose, ca. 3 mm; hypochile concave-saccate, glabrous, with 3 ridges inside; epichile very short, apex obtuse, not recurved. Column 2–2.5 mm; anther ovoid; rostellum remnant shallowly bifid. Fl. Aug.

• Damp places in *Abies* forests; ca. 2700 m. W Sichuan.

**12. *Goodyera seikoomontana*** Yamamoto, J. Soc. Trop. Agric. 4: 187. 1932.

歌绿斑叶兰 ge lu ban ye lan

*Goodyera viridiflora* (Blume) Blume var. *seikoomontana* (Yamamoto) S. S. Ying; *G. youngsayei* S. Y. Hu & Barretto.

Plants terrestrial, 14–25 cm tall. Rhizome stout, several noded. Stem ascending, 3–10 cm, 3–5-leaved. Leaves spaced along stem, slightly fleshy, both surfaces green, without white markings, elliptic or oblong-ovate, 3–7.5 × 1.5–3.5 cm, with 3

distinct veins, base subrounded, apex acute or acuminate; petiole-like base and tubular sheath 1–3.5 cm. Peduncle pale green, 8–13 cm, pubescent, with 2 or 3 sterile bracts; rachis 2–5 cm, laxly 1–3-flowered; floral bracts pale green, lanceolate, 18–25 × 3–5 mm, glabrous, apex acuminate. Flowers opening widely, pale green to green, large; pedicel and ovary pale green, cylindrical-fusiform, 10–15 mm, sparsely pubescent. Sepals whitish to pale green, streaked darker green on veins, sometimes tinged pink at apex, glabrous, 3-veined; dorsal sepal ovate, 15–16 × 5–7 mm, concave, apex acute; lateral sepals widely spreading or reflexed, ovate-elliptic, 14–16 × 5–6.5 mm, apex acute. Petals white to pale green, rhombic, oblique, 15–16 × 5–5.5 mm, 1-veined, base attenuate, apex obtuse; lip white to pale green, streaked darker green on veins, ovate, cymbiform, 12–13 × ca. 7 mm; hypochile concave-saccate, inside densely papillose, with 7 or 9 parallel veins; epichile strongly recurved, triangular-ovate, ca. 4.5 mm, apex acute. Column 3–4 mm; anther lanceolate, ca. 7 mm; pollinia 6–9 mm; viscidium linear, 3–4 mm; rostellum 5–7 mm, remnant deeply bifid. Fl. Feb–Mar.  $2n = 22^*$ .

• Forests, damp places along streams; 700–1300 m. Hong Kong, S Taiwan.

**13. *Goodyera viridiflora*** (Blume) Lindley ex D. Dietrich, Syn. Pl. 5: 165. 1852.

绿花斑叶兰 lǜ huā bān yè lán

*Neottia viridiflora* Blume, Bijdr. 408. 1825; *Epipactis cordata* (Lindley) A. A. Eaton; *E. viridiflora* (Blume) Ames; *Erythrodes viridiflora* (Blume) Schlechter; *Georchis cordata* Lindley; *G. viridiflora* (Blume) F. Mueller; *Goodyera cordata* (Lindley) Benth. ex J. D. Hooker; *G. longirostrata* Hayata; *G. ogatae* Yamamoto; *G. schlechtendaliana* H. G. Reichenbach var. *ogatae* (Yamamoto) M. Hiroe; *G. viridiflora* var. *ogatae* (Yamamoto) T. S. Liu & H. J. Su; *Orchiodes cordata* (Lindley) Kuntze; *O. viridiflora* (Blume) Kuntze; *Peramium longirostratum* (Hayata) Makino; *P. ogatae* (Yamamoto) Makino; *Phy-sururus viridiflorus* (Blume) Lindley.

Plants terrestrial, 13–20 cm tall. Rhizome slender, many noded. Stem ascending, to 6 cm, 2- or 3(-5)-leaved. Leaves widely spaced or clustered toward apex of stem, thinly textured, both surfaces green, without white markings, ovate or ovate-lanceolate, 1.5–6 × 1–3 cm, rounded at base, apex acute; petiole-like base and tubular sheath 1–3 cm. Peduncle pale red-brown, 5–9 cm, pubescent, with 2 sterile bracts; rachis 2–5 cm, laxly (2 or) 3–5-flowered, secund; floral bracts pale reddish brown, ovate-lanceolate, ca. 20 × 6–7 mm, margin ciliate, apex acute. Flowers opening widely, pale green tinged pale reddish brown, large; pedicel and ovary pale reddish brown, cylindrical-fusiform, 14–15 mm, pubescent toward apex. Sepals green tinged reddish brown at apex, glabrous, 1-veined; dorsal sepal elliptic, 12–15 × 5–6 mm, concave, apex acute; lateral sepals widely spreading or reflexed, elliptic, 12–15 × 5–6 mm, apex acute. Petals greenish white tinged brown at apex, rhombic, oblique, 12–15 × 4.5–6.5 mm, 1-veined, base attenuate, apex acute; lip greenish brown tinged white at apex, sometimes streaked darker green on veins, ovate, cymbiform, 12–14 × 8–11 mm, membranous; hypochile concave-saccate, inside densely

papillose; epichile recurved or spreading forward, ligulate, 3–4 mm, apex acute. Column ca. 4 mm; anther lanceolate; pollinia 10–12 mm; viscidium linear; rostellum 7–8 mm, remnant deeply bifid. Fl. Aug–Sep.  $2n = 22$ .

Forests, damp places along streams, in thin leaf litter on rocks; 300–2600 m. Fujian, Guangdong, Hainan, Jiangxi, Taiwan, Yunnan [Bhutan, India, Indonesia, S Japan, Malaysia, Nepal, New Guinea, Philippines, Thailand, Vietnam; Australia].

**14. *Goodyera fumata*** Thwaites, Enum. Pl. Zeyl. 314. 1861.

烟色斑叶兰 yān sè bān yè lán

*Epipactis formosana* (Rolfe) A. A. Eaton; *E. fumata* (Thwaites) A. A. Eaton; *Goodyera caudatilabella* Hayata; *G. cyrtoglossa* Hayata; *G. formosana* Rolfe; *Orchiodes fumata* (Thwaites) Kuntze; *Peramium cyrtoglossum* (Hayata) Makino; *P. formosanum* (Rolfe) Makino.

Plants terrestrial, 40–90 cm tall. Rhizome very long, stout, many noded. Stem erect, 20–50 cm, 5–7-leaved. Leaves widely spaced along stem, abaxially pale green, adaxially green, without white markings, elliptic, strongly oblique, 15–20 × 5–8 cm, base gradually contracted, apex acute; petiole-like base and tubular sheath 5–10 cm. Peduncle dark greenish brown, ca. 30 cm, pubescent, with several sterile bracts; rachis 10–30 cm, laxly to subdensely 25–50-flowered, not secund; floral bracts narrowly lanceolate, 9–12 mm, pubescent, apex acuminate. Flowers fragrant, opening widely, yellowish brown, medium-sized; pedicel and ovary cylindrical-fusiform, 8–12 mm, pubescent. Sepals pubescent on outer surface, 1- or 3-veined; dorsal sepal narrowly ovate-oblong, 6–8 × ca. 2 mm, apex obtuse; lateral sepals spreading, ovate-lanceolate, oblique, 6–8 × ca. 3 mm, apex obtuse. Petals linear-oblong, oblique, 7–9 × 1–1.5 mm, 1-veined, apex obtuse; lip pale brown, tinged white at apex, rhombic-orbicular, 6–7 × 3–4 mm; hypochile embracing column, concave, inside densely papillose; epichile linear-ligulate, ca. 3 mm, apex acute, recurved. Column pale brown, 5–6 mm; anther ovoid, ca. 2 mm, apex subacute; rostellum elongate, remnant shallowly bifid. Fl. Mar.

Forests; 1100–1300 m. Hainan, S Taiwan, SE Xizang, S Yunnan (Jinghong, Lancang, Mengla, Simao) [India (Deccan Plateau, Sikkim), Indonesia (Java), Japan (Ryukyu Islands), Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam].

**15. *Goodyera rubicunda*** (Blume) Lindley, Edwards's Bot. Reg. 25(Misc.): 61. 1839.

红花斑叶兰 hóng huā bān yè lán

*Neottia rubicunda* Blume, Bijdr. 408. 1825; *Epipactis grandis* (Blume) A. A. Eaton; *E. papuana* (Ridley) A. A. Eaton; *E. rubicunda* (Blume) A. A. Eaton; *Georchis rubicunda* (Blume) H. G. Reichenbach; *Goodyera clavata* N. Pearce & P. J. Cribb; *G. confundens* J. J. Smith; *G. grandis* (Blume) Blume; *G. longibracteata* Hayata; *G. longicolumna* Hayata; *G. papuana* Ridley; *G. rubens* Blume; *G. yaeyamae* Ohwi; *N. grandis* (Blume) Kuntze; *Orchiodes grandis* (Blume) Kuntze; *O. rubicunda* (Blume) Kuntze; *Peramium longibracteatum* (Hayata) Makino; *P. longicolumna* (Hayata) Makino; *Rhamphidia rubicunda* (Blume) F. Mueller (1869), not (H. G. Reichenbach) H. G. Reichenbach (1868); *Spiranthes grandis* (Blume) Hasskarl.

Plants terrestrial, 30–60 cm tall. Rhizome stout, several noded. Stem ascending or erect, 10–24 cm, 6–10-leaved. Leaves widely spaced along stem, green, without white markings, oblong, elliptic, or ovate-oblong, 9–15 × 4–6 cm, papery, with 3 distinct veins, base cuneate, apex acuminate; petiole-like base and tubular sheath 2–5.5 cm. Peduncle reddish brown, 10–18 cm, sparsely pubescent, with 3 or 4 sterile bracts; rachis 4–15 cm, densely many flowered; floral bracts reddish brown, lanceolate, 7–15 × 3.5–4.5 mm, pubescent, apex acuminate. Flowers opening widely, pale yellowish brown, medium-sized; pedicel and ovary reddish brown, cylindrical-fusiform, 6–8 mm, pubescent. Sepals reddish brown, pubescent on outer surface, 1-veined; dorsal sepal linear-oblong, 7–8.5 × 2.3–2.5 mm, apex obtuse; lateral sepals spreading, oblong, oblique, 7–8.5 × 2.5–3 mm, apex obtuse. Petals yellowish white, spatulate, 7–8 × 1.8–2 mm, base attenuate, apex obtuse; lip yellowish white, cymbiform, 6–6.5 mm; hypochile saccate, inside papillose; epichile ligulate, ca. 1.5 mm, apex obtuse, strongly recurved. Column 4–4.5 mm, with a clavate callus below stigma; anther lanceolate, ca. 3 mm; rostellum ca. 1.5 mm, remnant deeply bifid. Fl. Jul–Aug.  $2n = 22, 44$ .

Damp places in forests; 300–1500 m. Taiwan, Yunnan [NE India, Indonesia, Japan (Ryukyu Islands), Malaysia, Papua New Guinea, Philippines, Vietnam; NE Australia, Pacific islands].

**16. *Goodyera procera*** (Ker Gawler) Hooker, Exot. Fl. 1: ad t. 39. 1823.

高斑叶兰 gao ban ye lan

*Neottia procera* Ker Gawler, Bot. Reg. 8: ad t. 639. 1822; *Epipactis procera* (Ker Gawler) A. A. Eaton; *Goodyera carnea* A. Richard; *Leucostachys procera* (Ker Gawler) Hoffmann-segg; *Orchiodes procera* (Ker Gawler) Kuntze; *Peramium procerum* (Ker Gawler) Makino.

Plants terrestrial, 25–80 cm tall. Rhizome stout, few noded. Stem erect, 8–35 cm, 5–11-leaved. Leaves spaced along stem or occasionally clustered toward apex, abaxially pale green, adaxially green, without white markings, oblong-elliptic to narrowly ovate-elliptic, 5.5–15 × 1.8–5.5 cm, base attenuate, apex acute or acuminate; petiole-like base and tubular sheath 3–7 cm. Peduncle green, 8–38 cm, glabrous to sparsely pubescent, with 4–10 sterile bracts; rachis 4–18 cm, densely many flowered, usually not secund; floral bracts ovate-lanceolate, 5–7 mm, glabrous, apex acuminate. Flowers fragrant, opening weakly, white tinged pale green, small; pedicel and ovary cylindrical-fusiform, 3–5 mm, glabrous. Sepals glabrous, 1-veined; dorsal sepal ovate or elliptic, 3–3.5 × 1.7–2.5 mm, concave, apex acute; lateral sepals ovate, oblique, 2.5–3.2 × 1.5–2.2 mm, apex acute. Petals white, spatulate, 3–3.5 × 1–1.2 mm, 1-veined, apex obtuse; lip broadly ovate, 2.2–2.5 × 1.5–1.7 mm; hypochile concave-saccate, inside papillose; epichile deltoid, very small, apex obtuse or acute, recurved, with 2 small calli. Column ca. 2 mm; anther ovoid; pollinia ca. 1.3 mm; rostellum remnant shallowly bifid. Fl. Apr–May.  $2n = 38, 42$ .

Forests; 200–1600 m. Anhui, N Fujian, Guangdong, Guangxi, Guizhou, Hainan, S and W Sichuan, Taiwan, SE Xizang, Yunnan, Zhejiang [Bangladesh, Bhutan, Cambodia, India, Indonesia, Japan, Laos, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam].

**17. *Goodyera yamiana*** Fukuyama, Bot. Mag. (Tokyo) 50: 18. 1936.

兰屿斑叶兰 lan yu ban ye lan

Plants terrestrial, 25–28 cm tall. Rhizome slender, several noded. Stem ascending, 6–8 cm, 4- or 5-leaved. Leaves widely spaced along stem, abaxially grayish white, adaxially green, rarely with irregular grayish markings, elliptic to oblong, strongly oblique, 5–8 × 1.5–2.5 cm, base subrounded, apex acuminate; petiole-like base and tubular sheath 1–1.5 cm. Peduncle green, to ca. 12 cm, glabrous to sparsely pubescent, with 3 sterile bracts; rachis 6–8 cm, densely many flowered, not secund; floral bracts ovate-lanceolate, ca. 11 × 4 mm, glabrous, apex acuminate. Flowers opening weakly, whitish green, small; pedicel and ovary green, cylindrical-fusiform, 7–8 mm, glabrous. Sepals whitish green, glabrous, 1-veined; dorsal sepal ovate, ca. 3.5 × 2.5 mm, concave, apex obtuse; lateral sepals ovate, oblique, ca. 4.5 × 2.8 mm, apex obtuse. Petals white, linear-lanceolate, strongly falcate, ca. 3.8 × 1 mm, 1-veined, apex acute; lip ovate, ca. 4.2 mm; hypochile concave-saccate, ca. 0.8 mm, inside densely papillose; epichile white, ovate, ca. 3.3 × 2.7 mm, with a band of papillae from base to midway along its length, apex subacute, not recurved. Column ca. 1.8 mm; anther broadly ovoid; rostellum short, remnant shallowly bifid. Fl. Oct–Nov.

● Forests; 200–400 m. S Taiwan (Lu Dao).

**18. *Goodyera foliosa*** (Lindley) Bentham ex C. B. Clarke, J. Linn. Soc., Bot. 25: 73. 1889.

多叶斑叶兰 duo ye ban ye lan

*Georchis foliosa* Lindley, Gen. Sp. Orchid. Pl. 496. 1840; *Cystorchis nebulorum* Hance; *Epipactis foliosa* (Lindley) A. A. Eaton; *E. nebulorum* (Hance) A. A. Eaton; *Goodyera chilensis* S. S. Ying; *G. commelinoides* Fukuyama; *G. foliosa* var. *alba* S. Y. Hu & Barretto; *G. maximowicziana* Makino f. *commelinoides* (Fukuyama) Hiroe; *G. maximowicziana* var. *commelinoides* (Fukuyama) Masamune; *G. nebulorum* (Hance) Rolfe; *G. pachyglossa* Hayata; *G. sonoharae* Fukuyama; *Orchiodes foliosa* (Lindley) Kuntze; *Peramium pachyglossum* (Hayata) Makino.

Plants terrestrial, 15–25 cm tall. Rhizome slender, few noded. Stem erect or ascending, 9–17 cm, 4–6-leaved. Leaves widely spaced along stem, green, without white markings, ovate to oblong, oblique, 2.5–7.5 × 1.6–3 cm, base truncate or rounded, apex acute; petiole-like base and tubular sheath 1–2 cm. Peduncle green, 2.5–5 cm, pubescent, with 1 or 2 sterile bracts; rachis 3–6 cm, subdensely to densely 3–15-flowered, secund; floral bracts lanceolate, 10–15 × 2–2.5 mm, exceeding flowers, pubescent. Flowers opening weakly, white tinged pink, greenish white, or white, medium-sized; pedicel and ovary cylindrical-fusiform, 8–10 mm, pubescent. Sepals similar, outer surface pubescent, 1-veined; dorsal sepal narrowly ovate, 5–8 × 3.5–4 mm, concave, apex obtuse; lateral sepals ovate, 5–8 × 3.5–4 mm, apex obtuse. Petals rhombic, oblique, 5–8 × 3.5–4 mm, 1-veined, narrowly contracted at base, apex obtuse; lip ovate, 6–8 × 3.5–4.5 mm; hypochile concave-saccate, inside papillose; epichile ligulate, 2–3 mm, apex slightly recurved.

Column ca. 3 mm; anther ovoid, ca. 4 mm; pollinia ca. 3 mm; rostellum ca. 2.5 mm, remnant deeply bifid. Fl. Jul–Sep.  $2n = 28, 56$ .

Forests, damp places along valleys; 300–1500 m. Fujian, Guangdong, Guangxi, Sichuan, Taiwan, SE Xizang, SE and W Yunnan [Bhutan, NE India, Japan, Korea, Myanmar, Nepal, Vietnam].

**19. *Goodyera henryi*** Rolfe, Bull. Misc. Inform. Kew 1896: 201. 1896.

光萼斑叶兰 *guang e ban ye lan*

*Epipactis henryi* (Rolfe) A. A. Eaton; *Goodyera foliosa* (Lindley) Benth. ex J. D. Hooker var. *maximowicziana* (Makino) S. S. Ying; *G. maximowicziana* Makino; *Peramium maximowiczianum* (Makino) Makino.

Plants terrestrial, 8–15 cm tall. Rhizome slender, few noded. Stem ascending, 6–10 cm, 4–6-leaved. Leaves widely spaced or occasionally somewhat clustered toward apex of stem, green, without white markings, ovate to oblong, oblique, 1.5–3 × 0.8–2 cm, base rounded or cuneate, apex acute; petiole-like base and tubular sheath 1–1.5 cm. Peduncle green, ca. 1 cm, glabrous; rachis 1–3.5 cm, densely 3–9-flowered, subsecund; floral bracts lanceolate, 11–18 × 3–4.5 mm, glabrous, apex acuminate. Flowers opening weakly, white, sometimes tinged pale pink, medium-sized; pedicel and ovary green, cylindric-fusiform, 7–12 mm, glabrous. Sepals glabrous, 1-veined; dorsal sepal oblong, 9–13 × 3.5–4.5 mm, concave, apex slightly obtuse or acute; lateral sepals ovate-oblong, oblique, 9–13 × 3.5–5 mm, concave, apex acute. Petals rhombic, 9–12 × 3.5–4 mm, 1-veined, base cuneate, apex acute; lip white, ovate, cymbiform, 8–10 × 4–5 mm; hypochile concave-saccate, inside papillose; epichile ligulate, apex acute, not decurved. Column ca. 3 mm; anther lanceolate, ca. 5 mm; rostellum ca. 4 mm, remnant deeply bifid. Fl. Aug–Oct.  $2n = 28, 56$ .

Damp places in forests; 400–2400 m. S Gansu, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Korea].

**20. *Goodyera biflora*** (Lindley) J. D. Hooker, Fl. Brit. India 6: 114. 1890.

大花斑叶兰 *da hua ban ye lan*

*Georchis biflora* Lindley, Gen. Sp. Orchid. Pl. 496. 1840; *Epipactis biflora* (Lindley) A. A. Eaton; *E. macrantha* (Maximowicz ex Regel) A. A. Eaton; *E. pauciflora* (Schlechter) Hu; *Goodyera biflora* var. *macrantha* (Maximowicz ex Regel) T. Hashimoto; *G. macrantha* Maximowicz ex Regel; *G. pauciflora* Schlechter; *Peramium macranthum* (Maximowicz ex Regel) Makino.

Plants terrestrial, 5–15 cm tall. Rhizome slender, few noded. Stem ascending, 3–12 cm, 4- or 5-leaved. Leaves widely spaced or clustered at apex of stem, abaxially pale green to pale purplish red, adaxially green with white reticulate venation, ovate to elliptic, 2–4 × 1–2.5 cm, base rounded, apex acute; petiole-like base and tubular sheath 1–2.5 cm. Peduncle reddish brown, ca. 1 cm, pubescent, usually enclosed within leaf bases, with 1 or 2 sterile bracts; rachis ca. 0.5 cm, usually 2-flowered, rarely 3-flowered, secund; floral bracts lanceolate, 15–25 × 6–7 mm, pubescent, apex acuminate. Flowers opening weakly, tu-

bular, large; pedicel and ovary cylindric-fusiform, 5–8 mm, pubescent. Sepals reddish pink, similar, pubescent on outer surface, 1-veined; dorsal sepal linear-lanceolate, 20–25 × 3–4 mm, apex acute; lateral sepals linear-lanceolate, 20–25 × 3–4 mm, apex obtuse. Petals creamy white, linear-oblong, slightly oblique, 20–25 × ca. 3 mm, apex acute; lip creamy white, linear-lanceolate, 18–22 × 3–4 mm; hypochile concave-saccate, inside papillose; epichile ligulate, 10–15 mm, apex acute to acuminate, recurved. Column ca. 3 mm; anther narrowly triangular-lanceolate, 10–12 mm; pollinia oblong, 12–16 mm; rostellum 10–12 mm, slender, remnant deeply bifid. Fl. Feb–Jul.  $2n = 28, 29, 30, 31, 32 + 0-4B, 33$ .

Damp places in forests; 500–2200 m. Anhui, N Fujian, S Gansu, Guangdong, Guizhou, S Henan, Hubei, Hunan, Jiangsu, S Shaanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [India, Japan, Korea, Nepal, N Vietnam].

**21. *Goodyera daibuzanensis*** Yamamoto, J. Soc. Trop. Agric. 4: 305. 1932.

大武斑叶兰 *da wu ban ye lan*

Plants terrestrial, 25–45 cm tall. Rhizome slender, many noded. Stem ascending, 8–15 cm, stout, 5–7-leaved. Leaves widely spaced or clustered toward apex of stem, abaxially grayish white, adaxially green with white or pale green midvein and irregular white markings, elliptic to oblong, 4.5–9 × 2–4 cm, base rounded to broadly cuneate, apex acute; petiole-like base and tubular sheath 2–3 cm. Peduncle pale grayish green, 12–20 cm, pubescent, with 2 or 3 sterile bracts; rachis 6–11 cm, subdensely many flowered, secund to cylindric; floral bracts lanceolate, ca. 17 × 5 mm, pubescent, apex acuminate. Flowers barely opening, pale greenish white or white, medium-sized; pedicel and ovary cylindric-fusiform, ca. 10 mm, pubescent. Sepals pubescent on outer surface, 1-veined; dorsal sepal elliptic, ca. 14 × 4.5 mm, concave, apex acute; lateral sepals ovate, oblique, 11–13 × ca. 5 mm, apex acute. Petals rhombic, oblique, ca. 13 × 4.5 mm, 1-veined, apex obtuse; lip ovate, ca. 9 × 4 mm; hypochile concave-saccate, inside papillose; epichile ligulate, cymbiform, 3–4.5 mm, apex acute, not recurved. Column ca. 3 mm; anther narrowly ovoid, ca. 4 mm, apex acuminate; pollinia ca. 1.5 mm; rostellum erect, ca. 5 mm, remnant deeply bifid. Fl. Sep–Oct.

• Shaded places in forests; 700–1600 m. Taiwan.

**22. *Goodyera velutina*** Maximowicz ex Regel, Gartenflora 16: 38. 1867.

绒叶斑叶兰 *rong ye ban ye lan*

*Epipactis velutina* (Maximowicz ex Regel) A. A. Eaton; *Goodyera morrisonicola* Hayata; *G. schlechtendaliana* H. G. Reichenbach var. *velutina* (Maximowicz ex Regel) M. Hiroe; *Orchiodes velutina* (Maximowicz ex Regel) Kuntze; *Peramium morrisonicola* (Hayata) Makino; *P. velutinum* (Maximowicz ex Regel) Makino.

Plants terrestrial, 8–17 cm tall. Rhizome slender, few noded. Stem ascending, 2.5–6 cm, 3–5-leaved. Leaves spaced along stem, abaxially purplish red, adaxially deep green or occasionally dark purplish green, velvetylike, with a white band along midvein, ovate to elliptic, 2–5 × 0.8–2.5 cm, base



rounded, apex acute; petiole-like base and tubular sheath reddish brown at base, 0.8–1.5 cm. Peduncle deep reddish brown, 3–6 cm, pubescent, with 2 or 3 sterile bracts; rachis 2.5–5 cm, laxly 6–15-flowered, secund; floral bracts reddish brown, lanceolate, 10–12 × 3–3.5 mm, apex acuminate. Flowers opening weakly, white tinged pink, medium-sized; pedicel and ovary greenish brown, cylindrical-fusiform, 8–11 mm, pubescent. Sepals pubescent on outer surface; dorsal sepal oblong, 7–12 × 2.2–4 mm, 1-veined, apex obtuse; lateral sepals ovate-elliptic to narrowly elliptic, oblique, 8–12 × 3.5–5 mm, 1–3-veined, apex obtuse. Petals oblong-rhombic, oblique, 7–12 × 3.5–4.5 mm, 1-veined, base attenuate, apex obtuse; lip ovate, 6.5–9 mm; hypochile concave-saccate, inside papillose; epichile ligulate, cymbiform, 2–3.5 mm, apex recurved. Column 2–3 mm; anther ovoid, apex acuminate; pollinia 2.2–3 mm; rostellum ca. 2.5 mm, remnant deeply bifid. Fl. Sep–Oct.  $2n = 28, 30, 56$ .

Damp places in forests; 700–3000 m. N Fujian, Guangdong, Guangxi, Hainan, Hubei, Hunan, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Korea].

**23. *Goodyera vittata*** (Lindley) Benth. ex J. D. Hooker, Fl. Brit. India 6: 113. 1890.

秀丽斑叶兰 xiu li ban ye lan

*Georchis vittata* Lindley, J. Proc. Linn. Soc., Bot. 1: 184. 1857; *Orchiodes vittata* (Lindley) Kuntze.

Plants terrestrial, 10–16 cm tall. Rhizome slender, few noded. Stem erect, 4–6 cm, 5- or 6-leaved. Leaves widely spaced along stem, abaxially reddish purple, adaxially deep green with a white band along midvein, ovate, 1.5–2.5 × 1.2–2 cm, base rounded, apex acute; petiole-like base and tubular sheath 0.8–1 cm. Peduncle purple, 3–5 cm, glabrous, with 1 or 2 sterile bracts; rachis 3–5.5 cm, subdensely 10- or more flowered, secund; floral bracts pink, lanceolate, 9–12 mm, apex acuminate. Flowers opening weakly, pinkish white, medium-sized; pedicel and ovary cylindrical-fusiform, 8–9 mm, glabrous. Sepals white at base, tinged pink toward apex, glabrous, 3-veined; dorsal sepal oblong-lanceolate, ca. 8 × 3 mm, concave, apex obtuse; lateral sepals ovate, oblique, ca. 8 × 4 mm, apex acuminate. Petals white, oblanceolate, slightly falcate, oblique, ca. 8 × 2.5 mm, 3-veined, apex obtuse; lip white, broadly ovate-lanceolate, ca. 8.5 × 5 mm, 7-veined; hypochile concave-saccate, inside papillose; epichile oblong-lanceolate, ca. 4.5 mm, with 2 longitudinal lamellae, apex subacute, slightly recurved. Column ca. 1 mm; anther ovoid-lanceolate, apex acuminate; rostellum ca. 4 mm, remnant deeply bifid. Fl. Jul–Sep.

Shaded and humid places in mixed coniferous and broad-leaved forests; ca. 2100 m. SE Xizang [Bhutan, India (Sikkim), Nepal].

**24. *Goodyera kwangtungensis*** C. L. Tso, Sunyatsenia 1: 134. 1933.

花格斑叶兰 hua ge ban ye lan

*Goodyera rontabunensis* T. Chow.

Plants terrestrial, 18–30 cm tall. Rhizome slender. Stem ascending, 4–8 cm, 3–5-leaved. Leaves clustered toward apex of stem, abaxially pale green, adaxially deep green with white or pale green venation and markings, ovate-elliptic, 4.5–6 × 1.5–3 cm, base cuneate, apex acute; petiole-like base and tubu-

lar sheath 1–2 cm. Peduncle pale grayish green, 7–10 cm, pubescent, with 2 or 3 sterile bracts; rachis 8–10 cm, laxly to subdensely 7–12-flowered, subsecund; floral bracts ovate-lanceolate, ca. 13 × 4 mm, apex acuminate. Flowers barely opening, white, sometimes tinged green, medium-sized; pedicel and ovary cylindrical-fusiform, 12–14 mm, pubescent. Sepals pubescent on outer surface, 1-veined; dorsal sepal oblong-lanceolate, 11–14 × 3–4.3 mm, concave, apex acute; lateral sepals oblong-lanceolate, oblique, 11–14 × 3–4.3 mm, apex acute. Petals white with a green blotch at apex, narrowly rhombic-spatulate, oblique, ca. 11 × 3.5 mm, 1-veined, apex subacute; lip ovate-lanceolate, ca. 10 × 3.8 mm; hypochile concave-saccate, inside papillose; epichile lanceolate, ca. 6 mm, with 2 erose lamellae, carinate abaxially, apex subacute, slightly recurved. Column ca. 4 mm; anther narrowly ovoid, ca. 4 mm; rostellum ca. 3 mm, remnant deeply bifid. Fl. May–Jun.

● Shaded places in forests; 1500–2200 m. Guangdong, Taiwan.

**25. *Goodyera dongchenii*** Lucksom var. ***gongligongensis*** X. H. Jin & S. C. Chen, Novon 18: 72. 2008.

高黎贡斑叶兰 gao li gong ban ye lan

Plants terrestrial, ca. 20 cm tall. Stem ca. 10 cm, 2- or 3-leaved. Leaves spaced along stem, adaxially green with white reticulate venation, ovate, 2.5–3.5 × 1.5–2.3 cm, apex acute; petiole-like base and tubular sheath ca. 0.3 cm. Inflorescence pubescent, ca. 8 cm, 8–10-flowered, secund; peduncle with 3 sterile bracts; floral bracts lanceolate, ca. 15 × 3 mm, pubescent. Flowers not opening widely, white; pedicel and ovary ca. 10 mm, puberulent. Sepals pubescent on outer surface, 3-veined; dorsal sepal narrowly triangular, ca. 10 × 6 mm, apex acuminate; lateral sepals ovate, ca. 10 × 6 mm, apex acuminate. Petals rhombic, ca. 9 × 4 mm, apex acuminate; lip ca. 10 mm; hypochile saccate, inside setose; epichile lanceolate, ca. 7 mm, with 2 fleshy lamellae. Column ca. 2 mm; anther ovoid, ca. 3 mm; rostellum ca. 5 mm, remnant deeply bifid. Fl. Sep.

● Forests; ca. 2400 m. NW Yunnan.

This variety should perhaps be raised to specific rank, as it seems quite distinct from typical *Goodyera dongchenii*, which occurs in NE India (Sikkim).

**26. *Goodyera nankoensis*** Fukuyama, Bot. Mag. (Tokyo) 48: 432. 1934.

南湖斑叶兰 nan hu ban ye lan

Plants terrestrial, ca. 9 cm tall. Rhizome stout, few noded. Stem ascending, 2–3 cm, 4- or 5-leaved. Leaves spaced along stem, abaxially pale green, adaxially green with a white band along midvein, ovate, ca. 2 × 1.3 cm, base rounded, apex obtuse; petiole-like base and tubular sheath ca. 1 cm. Peduncle pale green, ca. 4 cm, sparsely pubescent, with 2 sterile bracts; rachis ca. 3 cm, densely 10–15-flowered, subsecund; floral bracts ovate-lanceolate, 7–10 mm, basal ones slightly exceeding ovary, apex acuminate. Flowers opening weakly, light slightly tinged pink, small; pedicel and ovary cylindrical-fusiform, 7–8 mm, sparsely pubescent. Sepals concave, glabrous, 1-veined; dorsal sepal oblong, ca. 6 × 2.2 mm, apex acute; lateral sepals ovate-lanceolate, oblique, ca. 7 × 3 mm, apex acute. Petals ca. 6 × 2.2 mm, 1-veined, apex obtuse; lip ovate, 5–6 × ca. 2.6 mm;

hypochile concave-saccate, 3–3.5 mm, glabrous; epichile ligulate, cymbiform, 2–2.5 mm, apex acute, slightly recurved. Column ca. 1.5 mm; anther ovoid-cordate, apex acute; pollinia ca. 1.3 mm; rostellum less than 1 mm, remnant deeply bifid. Fl. Jul–Aug.

• Mossy damp places in alpine forests; 2000–3000 m. C and N Taiwan.

**27. *Goodyera hachijoensis*** Yatabe, Bot. Mag. (Tokyo) 5: 1. 1891.

白网脉斑叶兰 bai wang mai ban ye lan

*Epipactis hachijoensis* (Yatabe) A. A. Eaton; *E. matsumurana* (Schlechter) A. A. Eaton; *Goodyera alboreticulata* Hayata; *G. hachijoensis* var. *matsumurana* (Schlechter) Ohwi ex Hatusima & Amano; *G. matsumurana* Schlechter; *Peramium alboreticulatum* (Hayata) Makino; *P. hachijoense* (Yatabe) Makino; *P. matsumuranum* (Schlechter) Makino.

Plants terrestrial, 8–30 cm tall. Rhizome slender, many noded. Stem ascending, 2–10 cm, 3–5-leaved. Leaves widely spaced along stem, abaxially grayish white, adaxially green with fine white reticulate venation, ovate to ovate-oblong, 3–8 × 2–4 cm, base rounded, apex acute; petiole-like base and tubular sheath reddish brown, 1.5–2.5 cm. Peduncle pale reddish brown, 3–10 cm, pubescent, with 4–7 sterile bracts; rachis 3–10 cm, subdensely many flowered, secund; floral bracts green, reddish brown at base, lanceolate to ovate-lanceolate, ca. 8 × 3.5 mm, margin lacerate-fimbriate at base, apex acuminate. Flowers opening weakly, pale green to white, subglobose, small; pedicel and ovary cylindrical-fusiform, 5–5.5 mm, glabrous. Sepals glabrous, 1-veined; dorsal sepal ovate to ovate-oblong, 3–4 × 1.5–3 mm, concave, apex obtuse or acute; lateral sepals ovate to broadly ovate-oblong, oblique, 3–4 × 2–3 mm, apex acute. Petals rhombic, oblique, 3.2–3.5 × 1.4–2 mm, 1-veined, apex obtuse; lip ovate, 3–3.5 × ca. 3.5 mm; hypochile concave-saccate, inside papillose; epichile ligulate, cymbiform, ca. 1 mm, apex obtuse, not recurved. Column yellowish white, ca. 1.5 mm; anther ovoid; rostellum short, remnant shallowly bifid. Fl. May–Jun.  $2n = 28, 40$ .

Damp places in forests; 400–1500 m. C and S Taiwan [Japan].

**28. *Goodyera wuana*** Tang & F. T. Wang, Acta Phytotax. Sin. 1: 69. 1951.

天全斑叶兰 tian quan ban ye lan

Plants terrestrial, ca. 12 cm tall. Stem ascending, 7-leaved. Leaves spaced along stem, abaxially pale green, adaxially green with white venation and irregular markings, ovate, 1.3–1.5 ×

0.6–0.7 cm, base cuneate, apex acute; petiole-like base and tubular sheath to 0.8 cm. Peduncle green, pubescent, with 3 sterile bracts; rachis to 3 cm, 9-flowered, secund; floral bracts lanceolate, ca. 5.5 mm, apex acuminate. Flowers barely opening, white tinged pink, small; pedicel and ovary cylindrical-fusiform, ca. 5.5 mm, sparsely pubescent. Sepals glabrous, 1-veined; dorsal sepal elliptic-oblong, ca. 4.2 × 1.5–1.8 mm, apex obtuse; lateral sepals ovate, oblique, 4–4.5 × 2.3–2.5 mm, apex obtuse. Petals spatulate, oblique, 4–4.2 × ca. 1.2 mm, 1-veined, apex obtuse; lip ovate, 3.8–4 × ca. 4 mm; hypochile concave-saccate, glabrous, with 2 lamellae inside; epichile triangular, apex obtuse, extending forward. Column ca. 2.5 mm including anther. Fl. Aug–Sep.

• Forests. W Sichuan.

**29. *Goodyera yangmeishanensis*** T. P. Lin, Native Orchids Taiwan 2: 173. 1977.

小小斑叶兰 xiao xiao ban ye lan

*Goodyera shixingensis* K. Y. Lang.

Plants terrestrial, 8–11 cm tall. Rhizome slender, few noded. Stem ascending, 3–4 cm, 3–5-leaved. Leaves spaced along stem, abaxially green, adaxially green with white reticulate venation and occasionally with a white band along mid-vein, ovate to oblong-lanceolate, 1.5–5 × 0.9–2 cm, base rounded, apex acute; petiole-like base and tubular sheath 0.5–1 cm. Peduncle red or reddish brown, 2–4 cm, sparsely pubescent, with 2 or 3 sterile bracts; rachis 2–4 cm, subdensely many flowered, subsecund; floral bracts ovate-lanceolate, 6–7.5 × ca. 3.2 mm, basal margin denticulate, apex acuminate. Flowers barely opening, white, small; pedicel and ovary reddish brown, cylindrical-fusiform, 5.5–7 mm, glabrous. Sepals glabrous, 1-veined; dorsal sepal white, tinged reddish brown at apex, elliptic, 3–3.8 × 2.2–2.5 mm, concave, apex obtuse; lateral sepals pale reddish brown, tinged white at apex, ovate, oblique, 4–4.5 × 2–2.8 mm, apex obtuse. Petals white, rhombic-oblong, oblique, ca. 3 × 1 mm, glabrous, 1-veined, apical margin denticulate, apex obtuse; lip ovate, 4–5 × ca. 4 mm, fleshy; hypochile deeply concave-saccate, ca. 3 × 3.5 mm, inside densely papillose; epichile subsquare, ca. 1.5 mm, margin irregularly denticulate, not recurved, apex often involute. Column ca. 1.5 mm; anther deltoid-obovoid; rostellum remnant deeply bifid. Fl. Jul–Sep.

• Damp shaded places in forests; 300–1000 m. Guangdong, N Taiwan.

This species is very similar to *Goodyera pusilla* Blume from Indonesia and Malaysia; the two need to be critically compared.

## 6. HYLOPHILA Lindley, Edwards's Bot. Reg. 19: ad t. 1618. 1833.

袋唇兰属 dai chun lan shu

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

*Dicerostylis* Blume.

Herbs, terrestrial, occasionally lithophytic or rarely epiphytic. Rhizome long, creeping, fleshy; roots borne at rhizome nodes, fibrous. Stem erect or ascending, terete, leafy, glabrous. Leaves ovate-elliptic, with a long petiole-like base dilating into a tubular, amplexicaul sheath. Inflorescence erect, terminal, densely racemose, pubescent; peduncle with a few sheathing bracts; floral bracts ca. as long as ovary, pubescent. Flowers resupinate, not opening widely; ovary twisted, cylindrical-fusiform, pubescent. Outer surfaces

of sepals pubescent; lateral sepals free, oblique, embracing base and sides of lip. Petals connivent with dorsal sepal and forming a hood, glabrous; lip 2-partite; hypochile a dilated, globose sac, sometimes containing 2 erect, digitate calli on each side; epichile narrowly linear to ovate, sulcate to canaliculate. Column stout, sometimes with a short V-shaped appendage below stigma; anther lanceolate, 2-locular; pollinia 2, granular-farinaceous, sectile, with a long caudicle attached to a solitary, elongate viscidium; rostellum erect, remnant deeply bifid; stigma lobes confluent, slightly raised.

About ten species: SE Asia to New Guinea and the Solomon Islands; one species (endemic) in China.

**1. *Hylophila nipponica*** (Fukuyama) S. S. Ying, Coloured Ill. Indig. Orchids Taiwan 1: 469. 1977.

袋唇兰 dai chun lan

*Dicerostylis nipponica* Fukuyama, Bot. Mag. (Tokyo) 50: 19. 1936.

Plants 20–60 cm tall. Stem ascending, 3–6-leaved, black to dark purplish brown. Leaves abaxially pale green, adaxially dark green and glossy, obovate to elliptic, 5–15 × 3–5 cm, base obtuse, apex acuminate or acute; petiole-like base ca. 4 cm. Inflorescence reddish brown, 5–10 cm; floral bracts reddish brown, ovate-lanceolate to lanceolate, ca. 18 × 7.5 mm, slightly longer than pedicel and ovary, abaxially pubescent, apex acuminate. Flowers green, tinged with reddish brown; ovary 10–11

mm including pedicel. Dorsal sepal green, apex tinged with reddish brown, recurved, ovate to ovate-lanceolate, concave, 7–9 × 3.5–4 mm, thickly textured, 3-veined; lateral sepals brownish green, tinged with white at apex, suborbicular-ovate, oblique, 7–9 × 6–9 mm, 4-veined, apex acuminate. Petals pink, tinged with white at apex, narrowly rhombic, oblique, 7–8 × 2.8–3 mm, 1-veined, apex acuminate; lip yellow; hypochile a ventricose-globose sac, 5–6.5 × ca. 4.5 mm, shallowly 2-lobed, with a triangular opening below column; epichile pendulous, pale reddish brown, linear. Column ca. 3 mm, ventrally with a V-shaped appendage; anther reddish yellow, oblong-lanceolate, ca. 5 mm; pollinia joined at tapering ends to a solitary viscidium. Fl. Jul.

• Damp places in rain forests; 100–400 m. S Taiwan.

## 7. **LUDISIA** A. Richard in Bory, Dict. Class. Hist. Nat. 7: 437. 1825.

血叶兰属 xue ye lan shu

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

*Dicrophyla* Rafinesque; *Myoda* Lindley.

Herbs, terrestrial or occasionally lithophytic. Rhizome elongate, creeping, several noded, fleshy; roots borne at rhizome nodes, stout. Stem erect, leafy. Leaves alternate, adaxially usually with silvery or pinkish veins and reticulation, oblong-lanceolate to elliptic; petiole-like base dilating into amplexicaul sheath. Inflorescence pubescent; peduncle with scattered sterile sheathing bracts; terminal raceme few to many flowered; floral bracts ca. as long as ovary, membranous. Flowers widely spreading, resupinate, relatively small; ovary twisted, terete, pubescent. Sepals free, ± similar; dorsal sepal concave, connivent with petals and forming a hood. Petals narrower than sepals; lip obliquely twisted, 3-partite, base connate with column margin; hypochile saccate, shallowly 2-lobed, containing 2 large fleshy calli; mesochile with erect margin, forming a subtubular passage; epichile enlarged into a transversely oblong limb. Column obliquely twisted in opposite direction to lip, apex dilated, abruptly contracted below anther; anther ovoid, large, 2-locular; pollinia 4, granular-farinaceous, sectile, narrowly obovoid, attenuating into slender caudicles that merge and terminate in a small, sticky, oblong viscidium; rostellum triangular, remnant bifid; stigma lobes confluent.

One species: Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Philippines, Thailand, Vietnam.

**1. *Ludisia discolor*** (Ker Gawler) Blume, Coll. Orchid. 113. 1859.

血叶兰 xue ye lan

*Goodyera discolor* Ker Gawler, Bot. Reg. 4: ad t. 271. 1818; *Anoetochilus dawsonianus* H. Low ex H. G. Reichenbach; *Gonogona discolor* (Ker Gawler) Link; *Haemaria dawsoniana* (H. Low ex H. G. Reichenbach) J. D. Hooker; *H. discolor* (Ker Gawler) Lindley; *H. discolor* var. *dawsoniana* (H. Low ex H. G. Reichenbach) B. S. Williams; *H. otletae* Rolfe; *Ludisia dawsoniana* (H. Low ex H. G. Reichenbach) Averyanov; *L. furetii* Blume; *L. odorata* Blume; *L. otletae* (Rolfe) Averyanov; *Neottia discolor* (Ker Gawler) Steudel; *Orchiodes discolor* (Ker Gawler) Kuntze.

Plants 10–25 cm tall. Stem erect, with (2 or)3–5 leaves near base. Leaves abaxially pale red, adaxially blackish green with 5 silvery-red veins, oblong-lanceolate to elliptic, 3–7 × 1.7–3 cm, fleshy, apex acute or mucronate; petiole-like base

1.5–2.2 cm. Inflorescence pubescent, with 2 or 3 sterile bracts; rachis 3–8 cm, laxly few to more than 10-flowered; floral bracts reddish, ovate to ovate-lanceolate, ca. 1.5 cm, membranous, margin minutely ciliate, apex acuminate. Flowers white tinged with red, ca. 7 mm in diam.; ovary 1.5–2 cm including pedicel, pubescent. Dorsal sepal ovate-elliptic, cymbiform, 8–9 × 4.5–5 mm; lateral sepals obliquely ovate to subelliptic, 9–10 × 4.5–5 mm, abaxially with a very short keel toward apex. Petals obliquely ovate, 8–9 × 2–2.2 mm, apex obtuse; lip 9–10 mm; hypochile containing 2 large fleshy calli; mesochile ca. 2 mm; epichile 5–6 mm wide. Column ca. 5 mm. Fl. Feb–Apr.

Damp areas along valleys in evergreen broad-leaved forests; 900–1300 m. Guangdong, Guangxi, Hainan, S and SE Yunnan [Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Thailand, Vietnam].

Though the combination *Ludisia discolor* is frequently attributed to Richard (Dict. Class. Hist. Nat. 7: 437. 1825) in the literature, Blume appears to be the first to have transferred the epithet validly.

## 8. *HERPYSMA* Lindley, Edwards's Bot. Reg. 19: ad t. 1618. 1833.

爬兰属 *pa lan shu*

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

Herbs, terrestrial. Rhizome elongate, creeping, cylindrical, several noded; roots filiform, emerging singly from rhizome nodes. Stem erect or suberect, leafy. Leaves elliptic to ovate-lanceolate, papery; petiole-like leaf base dilating into a tubular, membranous sheath, often imbricate on stem. Inflorescence terminal, shortly racemose, with many small flowers, pubescent; floral bracts large, longer than ovary, pubescent. Flowers resupinate; ovary twisted, cylindrical, pubescent. Sepals similar, abaxially hairy; dorsal sepal and petals forming a hood; lateral sepals free. Petals obliquely rhombic; lip shorter than sepals, adnate to margin of column, pandurate, recurved, long spurred at base; disk with 1 central longitudinal lamella and 2 lamellate calli (1 on either side of central lamella); spur cylindrical, protruding between base of lateral sepals, nearly as long as ovary, apex slightly 2-lobed, internally with a few, irregular, small warts near apex. Column short, lacking appendages; anther 2-locular; pollinia 2, granular-farinaceous, sectile, attached to a narrow, elongate viscidium; rostellum short, erect, 2-lobed; stigma subcircular, below rostellum.

One species: China, NE India, Indonesia, Myanmar, Nepal, Thailand, Vietnam.

### 1. *Herpysma longicaulis* Lindley, Gen. Sp. Orchid. Pl. 506. 1840.

爬兰 *pa lan*

*Erythrodes bracteata* (Blume) Schlechter; *Herpysma bracteata* (Blume) J. J. Smith; *H. sumatrana* Carr; *Physurus bracteatus* Blume.

Plants 18–30 cm tall. Stem stout, 5–8 mm in diam. Leaves several to many, elliptic-oblong to ovate-lanceolate, 5–10 × 2.8–3.5 cm, apex acute or acuminate; petiole-like base attenuate, 2–3 cm. Inflorescence 3–4 cm, many flowered; floral bracts oblong-lanceolate, 1.5–2 cm, longer than ovary, abaxially pu-

bescent, apex acuminate. Flowers white; sepals and petals sometimes orange or pink above middle; ovary 1.2–1.5 cm including pedicel. Dorsal sepal ovate, cymbiform, 8–9 × 4–4.5 mm, apex acute and recurved; lateral sepals spreading, narrowly oblong, concave, 10–11 × 2–2.5 mm, apex obtuse. Petals narrowly rhombic-obovate, 9–10 × 4.5–4.7 mm, thinly textured, apex obtuse; lip reflexed above middle, slightly shorter than sepals, base with 2 crenate, erect lateral lobes, apex obtusely mucronate; spur pendulous, parallel to ovary, 7–10 mm. Fl. Aug–Sep.

Dense forests; ca. 1200 m. W Yunnan [Bhutan, NE India, Indonesia, Myanmar, Nepal, Thailand, Vietnam].

## 9. *ERYTHRODES* Blume, Bijdr. 410. 1825.

钳唇兰属 *qian chun lan shu*

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

*Physurus* Richard ex Lindley, nom. illeg. superfl.

Herbs, terrestrial or rarely epiphytic. Rhizome creeping, cylindrical, fleshy, noded, with several roots at nodes. Stem erect or decumbent, terete, with several to many subrosulate leaves. Leaves green to reddish purple, ovate to elliptic, slightly fleshy, with amplexicaul petiole-like bases. Inflorescence erect, pubescent, terminating in a short, many-flowered raceme. Flowers resupinate, small; ovary pubescent. Sepals abaxially hairy; dorsal sepal and petals adnate and forming a hood; lateral sepals free, spreading. Lip erect, entire or 3-lobed, adnate to column at base, spurred at base; spur tubular, protruding beyond base of lateral sepals, apex obtuse, unlobed or slightly 2-lobed, containing 2 clavate appendages or empty. Column short, apically dilated; anther erect, ovoid, 2-locular; pollinia 2, each ± longitudinally 2-parted, clavate, granular-farinaceous, sectile, attached to an ovate-lanceolate viscidium; rostellum erect, bifid; stigma lobes connate, below base of rostellum. Capsule fusiform.

About 20 species: tropical Asia from India and Sri Lanka to New Guinea and the Pacific islands; two species in China.

- 1a. Mid-lobe of lip broadly ovate to triangular-ovate; spur pendulous, apex shallowly 2-lobed ..... 1. *E. blumei*  
 1b. Mid-lobe of lip suborbicular or transversely elliptic; spur spreading horizontally, apex distinctly 2-lobed and sometimes almost 4-lobed ..... 2. *E. hirsuta*

### 1. *Erythrodes blumei* (Lindley) Schlechter in Schumann & Lauterbach, Nachtr. Fl. Schutzgeb. Südsee, 87. 1905.

钳唇兰 *qian chun lan*

*Physurus blumei* Lindley, Gen. Sp. Orchid. Pl. 504. 1840; *Erythrodes brevicealcar* J. J. Smith; *E. chinensis* (Rolfe) Schlechter; *E. formosana* Schlechter; *E. henryi* Schlechter; *E. triantherae* C. L. Yeh & C. S. Leou; *Microchilus blumei* (Lindley) D. Dietrich; *P. chinensis* Rolfe; *P. henryi* (Schlechter) K. Schumann & Lauterbach.

Plants 18–60 cm tall. Stem erect, green, 2.5–3.5 mm in diam., with 3–6 leaves. Leaves petiolate, abaxially pale green, adaxially dark green, ovate, elliptic, or ovate-lanceolate, sometimes slightly oblique, 4.5–10 × 2–6 cm, abaxially with 3 conspicuous veins, base broadly cuneate or obtuse, apex acute; petiole 2.4–4 cm, basally dilated into amplexicaul sheath. Peduncle 12–40 cm, pubescent, with 3–6 sterile bracts; rachis 5–10 cm, pubescent, subdensely many flowered; floral bracts reddish brown, lanceolate, 10–12 × ca. 4 mm, abaxially pubescent, apex acuminate. Flowers small; sepals pubescent outside, reddish brown or brownish green outside, white with pinkish

markings inside; ovary reddish brown, twisted, terete, pubescent, including pedicel 9–10 mm. Dorsal sepal erect, concave, narrowly elliptic, 4–6 × 1.5–2.5 mm, apex slightly obtuse; lateral sepals spreading, obliquely elliptic or ovate-elliptic, 5.5–6 × ca. 3 mm, apex acute or slightly obtuse. Petals similar in color to sepals, oblanceolate, 4–6 × 1.5–2 mm, midvein transparent, apex obtuse; lip reddish brown adaxially, 4–5.5 mm, 3-lobed at apex; lateral lobes erect, small; mid-lobe reflexed, white, broadly ovate to triangular-ovate, apex subacute; spur pendulous, reddish brown, tubular, 1.5–4 mm, centrally slightly dilated, glabrous, apex shallowly 2-lobed. Column erect, 1.5–4 mm, bearing up to 3 anthers in some Taiwanese populations. Fl. Apr–May.

Evergreen broad-leaved forests; 400–1500 m. Guangdong, Guangxi, Taiwan, SE Yunnan [NE India, Indonesia, Malaysia, N Myanmar, Thailand, Vietnam].

Continuity in the length of the spur and in the outline of the central lobe of the lip make it difficult to distinguish between *Erythrodes chinensis* and *E. blumei*, though Ormerod (Lindleyana 17: 194. 2002) used these characters to differentiate the two. The report of *E. latifolia* Blume from Taiwan (in T. S. Liu & H. J. Su, Fl. Taiwan 5: 990. 1978) is considered a misidentification of *E. blumei*. The recently described *E. triantherae* from Taiwan, which the authors distinguished from *E. blumei* primarily by the presence of up to three anthers on the column (see C. L. Yeh & C. S. Leou, Taiwania 51: 266. 2006), is probably a peloric mutant and is referable to *E. blumei* when the full range in dimensions of other floral parts in the latter is taken into account.

**2. *Erythrodes hirsuta*** (Griffith) Ormerod in Seidenfaden, Contr. Orchid Fl. Thailand 13: 12. 1997.

硬毛钳唇兰 ying mao qian chun lan

*Goodyera hirsuta* Griffith, Not. Pl. Asiat. 3: 393. 1851; *Erythrodes herpysmoides* (King & Pantling) Schlechter; *E. seshagiriana* A. N. Rao; *Physurus hirsutus* (Griffith) Lindley; *P. herpysmoides* King & Pantling.

Plants 15–30 cm tall. Stem erect, green, ca. 2 mm in diam., with 6 or 7 leaves. Leaves petiolate, green, ovate, oblique, 4–6 × 2–3 cm, usually with 3 conspicuous veins abaxially, base obtuse, apex acute; petiole 2–3 cm, basally dilated into amplexicaul sheath. Peduncle 11–20 cm, pubescent, with 2–5 sterile bracts; rachis 1–6 cm, pubescent, densely few to several flowered; floral bracts lanceolate, 6–10 × 1.2–2.5 mm, pubescent, apex acuminate. Flowers small; sepals pubescent and pale reddish brown outside, white tinged pinkish inside; ovary slightly twisted, terete, pubescent, including pedicel 5–10 mm. Dorsal sepal spreading forward, concave, oblong-lanceolate, 6–6.5 × ca. 2 mm, apex subacute; lateral sepals spreading, oblong-lanceolate, 6–6.5 × ca. 2.5 mm, apex acute. Petals similar in color to sepals, spatulate, ca. 6 × 1.5 mm, apex obtuse; lip white, 5.5–6 × ca. 2.4 mm, obscurely 3-lobed at apex; lateral lobes erect, small; mid-lobe reflexed, suborbicular or transversely elliptic, apex rounded and sometimes shortly apiculate; spur spreading horizontally, cylindrical, 3–4.5 mm, dilated below apex, glabrous, apex distinctly 2-lobed and sometimes almost 4-lobed. Column suberect, 3–4 mm. Fl. Jan–Mar.

Evergreen broad-leaved forests; 100–1500 m. Hainan [Bhutan, NE India, Myanmar, Thailand, Vietnam].

## 10. CHEIROSTYLIS Blume, Bijdr. 413. 1825.

叉柱兰属 cha zhu lan shu

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

*Arisanorchis* Hayata; *Gymnochilus* Blume; *Mariarisqueta* Guinea.

Herbs, terrestrial or occasionally epiphytic, small. Rhizome decumbent, moniliform to terete, fleshy, with many contracted nodes; roots usually reduced to fine hairs and arranged along ridges on rhizome internodes, rarely fleshy and emerging from rhizome nodes. Stem erect, very short to elongate, glabrous, with 2 to several subrosulate or scattered cauline leaves. Leaves often withered at anthesis, ovate to cordate, with a short petiole-like base dilating into a tubular amplexicaul sheath. Inflorescence erect, terminal, racemose, very short to elongate, 1- to many flowered, glabrous to pubescent. Flowers resupinate, usually small, mostly not secund; ovary shortly pedicellate, twisted, fusiform, glabrous to pubescent. Sepals membranous, outer surface glabrous to pubescent, connate for half to almost entire length and forming a tube, or rarely free. Petals usually connivent with dorsal sepal; lip adnate to column margin at base, sometimes simple and entire though usually 3-partite; hypochile often dilated and saccate, containing fleshy, lobed or seriate (comblike) papillose calli; mesochile subtubular, short to elongate; epichile spreading, 2-lobed or rarely entire, margin lacinate, dentate, wavy, or entire. Column short, ventrally with 2 elongate armlike appendages (stelia) parallel to rostellum; anther erect, ovoid, 2-locular; pollinia 2, each longitudinally 2-partite, granular-farinaceous, clavate, attached to solitary oblong viscidium; rostellum deeply bifid, 2 elongate arms erect, parallel; stigma lobes 2, separate, convex, rather large, placed laterally near apex of column and below rostellum. Capsule ellipsoid.

About 50 species: from tropical Africa through tropical Asia to New Guinea, Australia, and the Pacific islands; 17 species (eight endemic) in China.

Hayata considered species with an entire lip to comprise a distinct genus, *Arisanorchis*, but they conform to *Cheirostylis* in other respects (sepals basally fused and forming a tube, column with two elongate stelia, rostellum deeply bifid) and are most likely peloric forms. A monographic revision of the genus is highly desirable given that overlapping species concepts remain a problem in separating taxa named from different regions. The endemic species of Taiwan and Hong Kong in particular remain poorly known and are in need of re-examination.

- 1a. Leafy stem elongate, (1.5–)3–8 cm; leaves cauline, scattered, sometimes becoming clustered toward apex of stem; inflorescence shorter than, equal to, or sometimes slightly longer than (but always less than 2 × as long as) leafy stem.

- 2a. Leaves elliptic-oblong, 5–7 cm; sepals free, not forming a tube ..... 1. *C. tabiyahanensis*  
 2b. Leaves usually ovate, 0.4–3.2 cm; sepals connate for 1/2–3/5 of length and forming a tube.  
 3a. Leaves up to 0.7 cm; sepals 2.5–3 mm ..... 2. *C. pusilla*  
 3b. Leaves 1–3.2 cm; sepals 3–11 mm.  
 4a. Inflorescence to 1 cm, peduncle often enclosed by leaf bases and not visible beyond stem apex; ovary glabrous; petals 9–10 mm; hypochile calli comblike, composed of several seriate papillose appendages.  
 5a. Apices of sepals acute; epichile without a tooth at apex between 2 lobes, lobes deeply 4- or 5-lacinate, each division 3–4 mm ..... 3. *C. octodactyla*  
 5b. Apices of sepals obtuse; epichile with an acute tooth at apex between 2 lobes, lobes 5- or 6-lacinate, each division 1–2 mm ..... 4. *C. pingbianensis*  
 4b. Inflorescence 2–7 cm, peduncle long, free of leaf bases and visible beyond stem apex; ovary pubescent or villous; petals 4–4.5 mm; hypochile calli bifid.  
 6a. Leaves ovate to lanceolate, 1.5–2.2 cm, petiole-like base and sheath 1.5–1.8 cm; epichile lobes deeply 4- or 5-lacinate ..... 5. *C. tortilacinia*  
 6b. Leaves ovate-orbicular, 2–3 cm, petiole-like base and sheath 0.7–0.9 cm; epichile lobes wavy to shallowly 2- or 3-dentate, teeth broad with acute tips ..... 6. *C. liukuensis*  
 1b. Leafy stem usually no more than 3 cm (rarely to 5 cm); leaves subrosulate or congested at base of stem; inflorescence at least 2 × as long as leafy stem.  
 7a. Lip simple, entire; hypochile lacking papillose calli.  
 8a. Ovary and outer surface of sepals glabrous; lip spatulate, 3–5 mm ..... 7. *C. clibborndyeri*  
 8b. Ovary and outer surface of sepals pubescent; lip narrowly oblong, 6–8 mm ..... 8. *C. takeoi*  
 7b. Lip 3-partite; epichile lobes dentate or lacinate at margin, hypochile containing papillose calli.  
 9a. Sepals and petals 13–15 mm; lip 15–17 mm ..... 9. *C. griffithii*  
 9b. Sepals and petals 3–6.5(–9) mm; lip 5–12 mm.  
 10a. Hypochile shortly spurred ..... 17. *C. calcarata*  
 10b. Hypochile saccate, never spurred.  
 11a. Hypochile divided by a longitudinal septum into 2 parts, each part with (1 or)2 horn-shaped calli ..... 13. *C. malipoensis*  
 11b. Hypochile lacking a longitudinal septum; calli bifid or comblike.  
 12a. Epichile lobes deeply lacinate, divisions narrowly linear; hypochile calli bifid.  
 13a. Rhizome moniliform, olive-green; leaves 0.8–1 cm wide, petiole-like base to 4 mm; lip 8–11.5 mm ..... 10. *C. monteiroi*  
 13b. Rhizome torose, reddish; leaves 1.2–1.7 cm wide, petiole-like base 4–10 mm; lip 5–6 mm ..... 11. *C. cochinchinensis*  
 12b. Epichile lobes irregularly dentate to wavy, teeth coarse, triangular with acute tips or truncate with obtuse tips; hypochile calli comblike, 3–6-toothed.  
 14a. Sepals and petals 5–6.5(–9) mm; lip 9–12 mm.  
 15a. Epichile deeply bilobed, apical margin obviously dentate ..... 12. *C. yunnanensis*  
 15b. Epichile shallowly bilobed, apical margin obscurely denticulate to wavy ..... 14. *C. thailandica*  
 14b. Sepals and petals 3–4 mm; lip 5–7 mm.  
 16a. Epichile lobes wavy to shallowly dentate, teeth truncate with obtuse tips; hypochile calli 2- or 3-lobed ..... 15. *C. jamesleungii*  
 16b. Epichile margin distinctly dentate, teeth triangular with acute tips; hypochile calli 4–6-lobed ..... 16. *C. chinensis*

**1. *Cheirostylis tabiyahanensis*** (Hayata) N. Pearce & P. J. Cribb, *Edinburgh J. Bot.* 56: 278. 1999.

东部叉柱兰 *dong bu cha zhu lan*

*Zeuxine tabiyahanensis* Hayata, *Icon. Pl. Formosan.* 6: 89. 1916; *Cheirostylis nemorosa* Fukuyama; *Macodes tabiyahanensis* (Hayata) S. S. Ying; *Z. nemorosa* (Fukuyama) T. P. Lin.

Plants 10–20 cm tall. Rhizome creeping, terete, short; roots emerging from rhizome nodes, cylindrical, slender, densely pubescent. Stem ascending, 5–8 cm, 5- or 6-leaved. Leaves cauline to clustered at stem apex, elliptic-oblong, 5–7 × ca. 2.5 cm, base cuneate, apex acute; petiole-like base and sheath 1–2 cm.

Inflorescence 6–7 cm, sparsely pubescent, with 2 or 3 sterile bracts; rachis 3–4 cm, subdensely 3–8-flowered; floral bracts lanceolate, 1.5–2 × ca. 0.4 cm, abaxially pubescent, apex acuminate. Flowers slightly nodding; ovary and pedicel 7–9 mm, sparsely pubescent. Sepals free, not spreading, green, tinged with pink, outer surface pubescent, 3-veined; dorsal sepal ovate, 8–10 × ca. 5 mm; lateral sepals oblong, 8–10 × ca. 4 mm. Petals appressed to dorsal sepal, white, obovate-oblong, falcate, 8–10 × ca. 4 mm, 2-veined; lip white, 8–10 mm, 3-partite; hypochile saccate, containing 2 several-toothed, papillose, comblike calli; mesochile thickened, ca. 2 mm, canaliculate with margin first incurved but slightly recurved distally; epichile transversely

dilated, 2-lobed; lobes upturned, subsquare, ca. 4 mm, margin irregularly dentate, teeth shallow with obtuse tips. Column 3–4 mm; stelia elongate, parallel and subequal to rostellum arms; anther triangular-ovoid, ca. 2 mm; pollinia ca. 1.5 mm; rostellum arms 2–2.5 mm. Fl. Mar–May.

- Broad-leaved forests; ca. 1000 m. S Taiwan.

This taxon, the generic placement of which has been questioned by several authors, was transferred most recently to *Cheirostylis* (Pearce & Cribb, Edinburgh J. Bot. 56: 278. 1999) on account of the shape of the lip, despite it having cylindrical roots that emerge from the rhizome nodes and sepals that are not fused into a synsepal to form a tube.

## 2. *Cheirostylis pusilla* Lindley, Gen. Sp. Orchid. Pl. 489. 1840.

细小叉柱兰 xi xiao cha zhu lan

Plants 4–6 cm tall. Rhizome elongate, creeping, moniliform, ca. 0.2 cm in diam. Stem erect, terete, 1.5–3 cm, 3–6-leaved. Leaves scattered along stem, green, ovate, 0.4–0.7 × 0.2–0.4 cm, glabrous, base truncate-rounded, apex acute; petiole-like base and sheath 0.2–0.4 cm. Inflorescence 1–2.5 cm, glabrous to very sparsely pubescent, with 1 or 2 sterile bracts; rachis to 0.4 cm, 1- or 2-flowered; floral bracts ovate, ca. 3 mm, shorter than ovary, apex acuminate. Flowers white, small, suberect; ovary cylindrical-fusiform, 3–4.5 mm including pedicel, glabrous. Sepals 2.5–3 mm, connate for ca. 1/2 of length and forming a tube; free apical lobes ca. 1.2 mm, apex acute. Petals appressed to dorsal sepal, spatulate, slightly oblique, ca. 3 mm, 1-veined, apex obtuse; lip 4–6 mm, 3-partite; hypochile shallowly saccate, containing 2 bifid calli; mesochile ca. 1.5 mm, adaxially with glandular hairs; epichile ca. 2.5 × 3.5–4 mm, 2-lobed; lobes flabellate, ca. 2 mm, apex truncate and with irregular shallow notches. Column ca. 1.5 mm; stelia linear; anther ovoid; rostellum arms ca. 1.5 mm. Fl. Oct.

Shaded forests; ca. 1300 m. S Yunnan (Menghai) [NE India, Malaysia, Thailand].

## 3. *Cheirostylis octodactyla* Ames, Philipp. J. Sci., C, 2: 314. 1907.

羽唇叉柱兰 yu chun cha zhu lan

*Cheirostylis inabae* Hayata; *C. oligantha* Masamune & Fukuyama.

Plants 5–15 cm tall. Rhizome creeping, torose to moniliform, 0.2–0.5 cm in diam., sometimes branching; roots hairlike, in raised bands along rhizome internodes. Stem ascending, pale reddish brown, 4–5 cm, fleshy, 3–6-leaved. Leaves scattered along stem, abaxially pale green, adaxially green, ovate to elliptic, sometimes orbicular-cordate, 1–3.2 × 0.5–1.5 cm, glabrous, base obtuse-rounded or cordate, apex acute; petiole-like base and sheath 0.3–0.8 cm. Inflorescence less than 1 cm, (1 or) 2- or 3-flowered; peduncle often enclosed by leaf bases and not visible beyond stem apex; floral bracts pale green, ovate, 3–4 mm, shorter than ovary, apex acuminate. Flowers white, tubular; ovary green, cylindrical-fusiform, 8–10 mm including pedicel, glabrous. Sepals 8–10 mm, 1-veined, connate for ca. 2/3 of length and forming a tube ca. 4 mm in diam.; free apical lobes triangular, 2–3.5 mm, apex acute. Petals appressed to dorsal sepal, white, narrowly spatulate, oblique, 9–10 × 2.5–3 mm, 1-

veined, apex obtuse; lip 10–11 mm, 3-partite; hypochile shallowly saccate, containing 2 comblike calli, each 7- or 8-toothed; mesochile ca. 7 × 2 mm; epichile with 2 green spots at base, ca. 3 × 8 mm, 2-lobed; lobes 3–5.3 mm, 4- or 5-laciniate, each division 3–4 mm. Column ca. 3 mm; stelia straight, linear, nearly as long as rostellum arms; anther ovoid; rostellum arms ca. 2 mm. Capsule ellipsoid, 1–1.4 cm, borne on elongated peduncle. Fl. Sep.

Damp places in forests, mountain ridges; 1000–2400 m. Taiwan [Philippines, S Vietnam].

## 4. *Cheirostylis pingbianensis* K. Y. Lang, Acta Phytotax. Sin. 34: 635. 1996.

屏边叉柱兰 ping bian cha zhu lan

Plants 5–10 cm tall. Rhizome elongate, creeping, torose. Stem erect, terete, ca. 5 cm, fleshy, 4–8-leaved. Leaves green, cauline, ovate, 1–2.5 × 0.8–1.7 cm, base rounded, apex acute; petiole-like base and sheath 1–1.5 cm. Inflorescence extremely short, to 1 cm, 2- or 3-flowered; peduncle often enclosed by leaf bases and not visible beyond stem apex; floral bracts green, ovate, shorter than ovary, apex acuminate. Flowers glabrous; ovary cylindrical-fusiform, 10–12 mm including pedicel, glabrous. Sepals 10–11 mm, connate for ca. 3/5 of length and forming a tube; free dorsal lobe ca. 3.5 mm and lateral lobes ca. 1.8 mm, apex slightly obtuse. Petals appressed to dorsal sepal, narrowly spatulate, slightly oblique, ca. 9 × 2 mm, base attenuate, apex obtuse; lip 8–13 mm, 3-partite; hypochile slightly saccate, ca. 1.5 mm, containing 2 comblike calli; mesochile ca. 4.5 × 2 mm; epichile ca. 2 × 4 mm, 2-lobed and with an acute tooth between 2 lobes; margin of lobes 5- or 6-laciniate, each linear division 1–2 mm. Column ca. 2.5 mm; stelia linear, ca. 3 mm; anther broadly ovoid, ca. 1.5 mm; rostellum arms to 3.5 mm. Fl. Sep–Oct.

- Shaded humid areas in dense forests; ca. 2100 m. SE Yunnan.

This species is clearly closely related to *Cheirostylis octodactyla*. More material is required on which to base a critical comparison.

## 5. *Cheirostylis tortilacinia* C. S. Leou, Quart. J. Exp. Forest. Natl. Taiwan Univ. 4(4): 72. 1990.

和社叉柱兰 he she cha zhu lan

*Cheirostylis chinensis* Rolfe var. *tortilacinia* (C. S. Leou) S. S. Ying.

Plants 6–7 cm tall. Rhizome ascending, green, tinged with brown, moniliform, 3–10 cm, 10–15-noded. Stem erect, more than 4 cm, fleshy, 2–6-leaved. Leaves cauline, ovate to lanceolate, 1.5–2.2 × 1–2 cm, membranous, glabrous, base rounded to truncate, apex acute; petiole-like base and sheath brownish, 1.5–1.8 cm, glabrous. Inflorescence 2–5 cm, pubescent, with 1–3 sterile bracts; rachis less than 1 cm, 1–6-flowered; floral bracts ovate-lanceolate, shorter than ovary, abaxially hairy, apex acuminate. Flowers small; ovary brownish green, villous. Sepals brownish green, 3–5 mm, basal 1/2 connate and forming a tube, outer surface villous; free lateral lobes longer than dorsal lobe. Petals appressed to dorsal sepal, white, spatulate, oblique, ca. 4.5 mm; lip white, 3-partite; hypochile saccate, containing 2 bifid glands; mesochile short, adaxially with glandular hairs;

epichile often curved or twisted, with 2 green spots at base, deeply 2-lobed; lobes somewhat square in outline, 2–2.5 mm, deeply 4- or 5-laciniate. Column erect, ca. 3 mm; stelia elongate, triangular at apex, ca. 1.5 mm; anther adaxially pink, ca. 2 mm; pollinia ca. 1.5 mm, attached to slender, attenuate viscidium; rostellum arms ca. 1.5 mm. Fl. Jan.

- Bamboo forests; ca. 1000 m. C Taiwan.

**6. *Cheirostylis liukuensis*** Masamune, J. Soc. Trop. Agric. 2: 36. 1930.

琉球叉柱兰 liu qiu cha zhu lan

*Cheirostylis kanashiroi* Ohwi.

Plants 5–9 cm tall. Rhizome creeping, purplish brown, torose to moniliform, sometimes branching; roots hairlike, in tufts on rhizome internodes. Stem erect, brownish, elongate, 4–5 cm, fleshy, 3- or 4-leaved. Leaves scattered along stem, abaxially reddish purple, adaxially dark grayish green, ovate to ovate-orbicular, 2–3 × 1–2 cm, glabrous, base rounded or slightly cordate, apex acute; petiole-like base and sheath 0.7–1 cm. Inflorescence 4–7 cm, pubescent, with 2–4 sterile bracts; rachis 1–1.5 cm, 5–9-flowered; floral bracts ovate, concave, 7–9 mm, often slightly longer than ovary, apex acuminate. Flowers often secund; ovary cylindrical-fusiform, 5–8 mm including pedicel, pubescent. Sepals white, tinged with reddish brown, 4.5–5 mm, connate for ca. 2/3 of length and forming a tube, sparsely pubescent on outer surface; tube 2.1–2.7 mm in diam.; free apical lobes triangular. Petals appressed to dorsal sepal, white, obliquely oblong or oblanceolate, 4–4.5 × 0.7–2 mm, 1-veined, apex obtuse; lip white, 6–7 mm, 3-partite; hypochile shallowly saccate, containing 2 bifid calli; mesochile 2–3 mm, narrow; epichile dilated, with a pair of diffuse green spots at base, 2-lobed; lobes widely diverging, subsquare, 2–2.5 mm, margin wavy to shallowly 2- or 3-dentate, teeth broad with acute tips. Column 2–2.4 mm; stelia elongate, slightly incurved and embracing rostellum arms; anther broadly ovoid, ca. 1.5 mm; pollinia ca. 1.2 mm; rostellum arms ca. 1.2 mm. Fl. Jan–Feb.

Forests, bamboo forests; 200–800 m. Hong Kong, Taiwan [Japan (Ryukyu Islands)].

**7. *Cheirostylis clibborndyeri*** S. Y. Hu & Barretto, Chung Chi J. 13(2): 15. 1976.

叉柱兰 cha zhu lan

*Cheirostylis derchiensis* S. S. Ying; *C. hungyehensis* T. P. Lin.

Plants 13–17 cm tall. Rhizome olive-green to pale yellow, moniliform, 7–12 cm; roots hairlike, in narrow lines along rhizome internodes. Stem ascending, 1–2 cm, 2–5-leaved. Leaves subrosulate, abaxially slightly paler green and tinged with purple, adaxially dark green, ovate, 1–3.5 × 1.5–2.5 cm, abaxially sometimes with variegated venation and minutely hairy, base cordate, apex acute; petiole-like base and sheath pink to red, 1–1.5 cm, glabrous. Inflorescence pink, 10–15 cm, pubescent, with 1–4 sterile bracts; rachis 1.5–2 cm, 5–7-flowered; floral bracts sheathing, ovate-lanceolate, 5–6 × 1–2 mm, apex acute. Flowers not widely spreading; ovary and pedicel 5–10 mm,

glabrous. Sepals greenish brown, 4–4.5 mm, connate for ca. 3/5 of length and forming a tube, glabrous on outer surface; free apical lobes pink, triangular, 1.8–2 mm, apex obtuse. Petals appressed to dorsal sepal, white with single green vein, ovate to ovate-lanceolate, 2–5 × 1–1.5 mm, apex obtuse; lip simple, white, tinged with green, spatulate, 3–5 × 1–2.3 mm, glabrous, base attenuate, margin entire, apex obtuse. Column 2–3 mm; stelia variable, parallel to rostellum or reflexed, usually much shorter than rostellum arms; anther broadly ovoid, ca. 1.5 mm; viscidium 1–1.5 mm; rostellum arms elongate, 1–1.5 mm. Fl. Mar–Apr.

- Damp rocks in forests and along valleys; 300–1500 m. Hong Kong, C and S Taiwan.

**8. *Cheirostylis takeoi*** (Hayata) Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 4: 171. 1919.

全唇叉柱兰 quan chun cha zhu lan

*Arisanorchis takeoi* Hayata, Icon. Pl. Formosan. 4: 110. 1914; *A. tairae* Fukuyama; *Cheirostylis anomala* Ohwi; *C. eglanulosa* Averyanov; *C. tairae* (Fukuyama) Masamune; *C. tatewakii* Masamune; *Goodyera tatewakii* (Masamune) S. S. Ying.

Plants 12–22 cm tall. Rhizome creeping, moniliform, to 1.5 cm in diam.; roots hairlike, in 2–4 rows along rhizome internodes. Stem ascending, 1–2 cm, 2–6-leaved. Leaves often absent or withered at anthesis, subrosulate, pale green, ovate or broadly ovate, 2.5–4 × 2.5–3.5 cm, base rounded or subcordate, apex acute; petiole-like base and sheath 1–1.2 cm. Inflorescence 10–18 cm, sparsely pubescent, with 2 or 3 sheathing sterile bracts; rachis ca. 1 cm, 2–5-flowered; floral bracts ovate to ovate-lanceolate, 4–6 mm, equal in length to ovary, apex acuminate. Flowers barely opening, small; ovary and pedicel green, cylindrical-fusiform, 5–6 mm, sparsely pubescent. Sepals greenish, 5–6 mm, connate for ca. 3/5 of length and forming a tube, sparsely pubescent on outer surface; tube slightly contracted at middle, 3–4 mm in diam.; apical lobes triangular. Petals appressed to dorsal sepal, whitish, oblong, oblique, falcate, 5–6 × ca. 1.5 mm, 1-veined, apex obtuse; lip simple, white, narrowly oblong, 6–8 × 2–2.5 mm, entire, lateral margins incurved, apex obtuse to subacute, recurved. Column 2–3.7 mm; stelia variable, parallel to rostellum or malformed, green, usually much shorter than rostellum arms; anther ovoid, ca. 1.5 mm; pollinia ca. 1.5 mm; viscidium ca. 2 mm; rostellum arms elongate, 1.5–2 mm. Fl. Mar.

Broad-leaved forests; 100–1400 m. Taiwan [Japan (Ryukyu Islands), N Vietnam].

**9. *Cheirostylis griffithii*** Lindley, J. Proc. Linn. Soc., Bot. 1: 188. 1857.

大花叉柱兰 da hua cha zhu lan

*Cheirostylis macrantha* Schlechter.

Plants 15–20 cm tall. Rhizome creeping, terete to torose; roots hairlike, in raised bands along rhizome internodes. Stem erect, short to occasionally elongate, 2–5 cm, fleshy, 3- or 4-leaved. Leaves often withered at anthesis, congested to rarely well spaced, ovate, 1.8–2.5 × 1.2–2 cm, base subrounded, apex



acuminate; petiole-like base and sheath 0.8–1.4 cm. Inflorescence 8–15 cm, sparsely villous, with 2 or 3 sterile bracts; rachis 1–2.5 cm, 1–3-flowered; floral bracts lanceolate, 7–9 mm, shorter than or ca. as long as ovary, apex acuminate. Flowers whitish, rather large; ovary 11–13 mm including pedicel, pubescent. Sepals 13–15 mm, basal 1/2 connate and forming a tube, outer surface sparsely pubescent; free apical lobes acute, spreading. Petals narrowly oblong, oblique, falcate, 13–15 × 2–2.5 mm, apex obtuse; lip 15–17 mm, 3-partite; hypochile slightly saccate, ca. 2 mm, containing 2 comblike calli, each callus 8- or 9-toothed; mesochile 5–7 mm; epichile orbicular, 5–6 × 6–7 mm, base with 2 green spots, 2-lobed; lobes deeply lacinate with 8–10 divisions, each division 1–3.5 mm. Column 2.5–3 mm; stelidia straight, linear, ca. 3 mm, ca. as long as rostellum arms; anther ovoid, ca. 2 mm; rostellum arms spatulate, ca. 3 mm. Fl. Sep.  $2n = 26$ .

Damp places in forests; 2200–2300 m. C Yunnan [India, Myanmar, Nepal, Thailand].

**10. *Cheirostylis monteiroi*** S. Y. Hu & Barretto, *Chung Chi J.* 13(2): 15. 1976.

箭药叉柱兰 jian yao cha zhu lan

Plants 9–13 cm tall. Rhizome olive-green, moniliform, with 4–6 nodes, internodes 5–15 mm, nodes 6–10 mm in diam.; roots hairlike, in narrow rows along rhizome internodes. Stem erect, short, ca. 2.5 cm, 2- or 3-leaved. Leaves congested, green with dark green venation, ovate, 1.2–1.6 × 0.8–1 cm, midvein conspicuous on both surfaces, base subcordate, apex acute or acuminate; petiole-like base and sheath purplish green, 0.3–0.4 cm. Inflorescence 7–9 cm, slender, pubescent, with 3–7 sterile bracts; rachis ca. 1 cm, 2–8-flowered; floral bracts purplish red, cymbiform, ca. 7 mm. Flowers small, glabrous; ovary and pedicel cylindric, 5–6 × 1.5–2 mm, glabrous. Sepals olive-green, tinged with pinkish red, ca. 5 mm, connate for ca. 3/5 of length and forming a tube; tube ca. 3 mm, base slightly swollen; free apical lobes ca. 2 mm. Petals appressed to dorsal sepal, white, oblanceolate, oblique, ca. 5 × 1.5 mm; lip 8–11.5 mm, 3-partite; hypochile saccate, fleshy, margin incurved, containing 2 bifid calli; mesochile short; epichile nearly orbicular in outline, ca. 7 mm, 2-lobed; lobes white, tinged with green at middle, margin deeply 5–8-lacinate, each division ca. 2 mm. Column cylindric, ca. 3 mm; stelidia ca. 1.5 mm, acuminate; anther yellow, broadly ovoid, ca. 1 mm; viscidium linear-lanceolate, ca. 1 mm; rostellum arms ca. 1.5 mm. Fl. Mar–May.

• In shade on damp rocks, along streams in forests; ca. 300 m. Hong Kong.

**11. *Cheirostylis cochinchinensis*** Blume, *Coll. Orchid.* 55. 1858–1859.

雌尾叉柱兰 zhi wei cha zhu lan

*Cheirostylis taichungensis* S. S. Ying.

Plants 7–14 cm tall. Rhizome reddish, torose, 4–10 × 0.2–0.5 cm, internodes 1–1.4 cm; roots hairlike, in rows along rhizome internodes. Stem erect, 1.5–3 cm, 2–4-leaved. Leaves subrosulate, ovate to ovate-oblong, 1.5–3 × 1.2–1.7 cm, papery, glabrous, adaxially with dark green reticulate venation, abaxially paler, base obtuse, apex obtuse or subacute; petiole-like

base and sheath reddish at base, 0.4–1 cm. Inflorescence 5–12 cm, slender, pubescent at base, becoming ± glabrous above, with 2 or 3 sterile bracts; rachis 1–3 cm, 3–10-flowered; floral bracts lanceolate to linear-lanceolate, 2–3 × ca. 1 mm, glabrous, apex acuminate. Flowers small; ovary and pedicel greenish brown, 5–8 mm, glabrous. Sepals pale greenish brown or white, 4–4.5 mm, basal 1/2 connate and forming a tube, slightly pubescent or glabrous; free apical lobes triangular, 2–2.7 mm, apex obtuse. Petals white, obliquely falcate, 4–5 × 1–1.5 mm, 1-veined, apex obtuse; lip white, 5–6 mm, longer than sepals, 3-partite; hypochile saccate, containing 2 bifid calli and often with keel at center; mesochile short; epichile white, with green patch near base, orbicular in outline, 7–9 mm, 2-lobed; lobes suborbicular or flabellate, margin lacinate with 7–9 deep linear divisions, each division 1–1.5 mm. Column erect, 2.4–3 mm; stelidia straight, parallel to rostellum arms and equal in length; anther ovoid, 1.5–2 mm, apex with 1 triangular reddish brown spot; pollinia ca. 1.2 mm; rostellum arms ca. 2 mm. Fl. Feb–May.

Forests; 700–2500 m. S Taiwan [Vietnam].

**12. *Cheirostylis yunnanensis*** Rolfe, *Bull. Misc. Inform. Kew* 1896: 201. 1896.

云南叉柱兰 yun nan cha zhu lan

*Cheirostylis josephii* Schlechter; *C. munnacampensis* A. N. Rao; *C. pabongensis* Lucksom.

Plants 10–18 cm tall. Rhizome moniliform, 1–3.5 × 0.6–1.5 cm; roots in broad, raised bands along rhizome internodes. Stem pale green, usually less than 1 cm, 2- or 3-leaved. Leaves congested, often withered or absent at anthesis, green, ovate, 1.5–3.5 × 0.8–2 cm, membranous, base subrounded, apex acute; petiole-like base and sheath 0.6–1.5 cm. Inflorescence 8–16 cm, sparsely villous, with 3 or 4 sterile bracts; rachis 0.4–2 cm, 2–5(–10)-flowered; floral bracts ovate, concave, 5–6.5 mm, shorter than ovary, abaxially villous, apex acuminate. Flowers often erect; ovary cylindric-fusiform, 7–9 mm including pedicel, sparsely villous. Sepals 5–6.5 mm, basal 1/2 connate and forming a tube, membranous, outer surface sparsely villous, 1-veined; free apical lobes triangular-ovate, 2.5–3 mm, apex subobtuse. Petals appressed to dorsal sepal, white, narrowly oblanceolate-oblong, oblique, 5–6.5 × 1.5–1.8 mm, membranous, 1-veined, entire or sometimes with 2 or 3 obtuse teeth, apex obtuse; lip erect, white, 9–12 mm, 3-partite; hypochile saccate, containing 2 comblike calli, each callus 3- or 4-toothed; mesochile ca. 2 mm, narrow, with 2 lamellae; epichile with green spots at base, flabellate, 5–6 mm, deeply 2-lobed; lobes 4–6 mm wide, margin irregularly 5–7-dentate, teeth triangular with acute tips. Column ca. 2.5 mm; stelidia erect, nearly as long as rostellum arms; anther ovoid, ca. 1 mm; rostellum arms ca. 1.5 mm. Fl. Mar–Apr.

In shade on rocky soils in forests, along streams; 200–1800 m. Guangdong, Guangxi, S Guizhou, Hainan, S Hunan, W Sichuan, S Yunnan [India (Sikkim), Myanmar, Thailand, Vietnam].

**13. *Cheirostylis malipoensis*** X. H. Jin & S. C. Chen, *Acta Phytotax. Sin.* 45: 797. 2007.

麻栗坡叉柱兰 ma li po cha zhu lan

Plants 10–12 cm tall. Rhizome creeping, 8–20 × 2–2.5 mm, fleshy, nodes slightly contracted. Stem erect, 5–30 mm, 1–4-leaved. Leaves green, often reticulated with dark green, ovate-cordate, 1.2–2 × 0.9–1.2 cm, apex acute to subacuminate; petiole-like base and sheath 0.6–0.8 cm. Inflorescence 6–9 cm, pubescent, with 2 or 3 sterile bracts; rachis short, usually less than 1 cm, 2–4-flowered; floral bracts ovate-lanceolate, 7–9 mm, apex acuminate. Flowers white; pedicel and ovary 4–6 mm, sparsely villous. Sepals 4–5 mm, basal 1/2 connate and forming a tube, sparsely villous on outer surface toward base; free apical lobes triangular-ovate, 2–2.5 mm, subobtusate. Petals appressed to dorsal sepal, narrowly lanceolate-oblong, 3.5–4 × ca. 1.5 mm; lip 6–9 mm, 3-partite; hypochile saccate, ca. 2 × 1.5 mm, divided by a longitudinal septum into 2 parts, each part with 2 horn-shaped calli (rarely with just 1 callus on each side); mesochile ca. 1 mm; epichile with 2 green or beige spots at base, deeply bilobed; lobes flabellate, ca. 4 × 4 mm, apical margin 3–5-toothed. Column 1–2 mm; stelidia ca. 1 mm, slightly longer than rostellum arms. Fl. Dec–Feb.

• Forests on limestone mountains, thickets; ca. 1100 m. SE Yunnan.

**14. *Cheirostylis thailandica*** Seidenfaden, Dansk Bot. Ark. 32(2): 74. 1978.

反瓣叉柱兰 fan ban cha zhu lan

Plants 12–25 cm tall. Rhizome creeping, swollen, ca. 1 cm in diam. Stem erect, 1–3 cm, often 3- or 4-leaved. Leaves ± withered at anthesis, broadly lanceolate, 2–6 × 1.5–2 cm, thinly textured; petiole-like base and sheath ca. 1 cm. Inflorescence 11–22 cm, pubescent, with several sterile bracts; rachis short, 3- or 4-flowered; floral bracts lanceolate, small, pubescent; pedicel and ovary ca. 5 mm, pubescent. Sepals green-brown, ca. 8 mm, basal 2/3 connate and forming a tube; free apical lobes triangular. Petals not appressed to dorsal sepal, whitish, suboblong, ca. 9 × 2.5 mm, 1-veined, apex recurved; lip whitish, ca. 12 mm, slightly 3-partite; hypochile saccate, inside containing 2 comb-like calli; mesochile ca. 4 mm, margin involute; epichile with 2 green spots at base, shallowly bilobed; lobes somewhat flabellate, apical margin irregularly denticulate to wavy. Column ca. 4 mm; stelidia ca. 2 mm; rostellum arms ca. 1.5 mm. Fl. Feb.

In shade of open forests; ca. 1200 m. S Yunnan [Thailand].

**15. *Cheirostylis jamesleungii*** S. Y. Hu & Barretto, Chung Chi J. 13(2): 13. 1976.

粉红叉柱兰 fen hong cha zhu lan

Plants ca. 11 cm tall. Rhizome creeping, olive-green, moniliform, 4–5 × 0.3–0.6 cm. Roots minute, in rows along rhizome internodes. Stem erect, ca. 1 cm, with 2 or 3 small leaves. Leaves subrosulate, reddish green with dark green reticulate veins, cordate, 3–8 × 3–8 cm, base truncate, apex acute. Inflorescence ca. 10 cm, slender, with 4 sterile bracts, sparsely villous; rachis less than 1 cm, 2- or 3-flowered; floral bracts pink, cymbiform, shorter than ovary, membranous, 1-veined. Flowers small; ovary and pedicel pink, ca. 5 × 2 mm, sparsely villous. Sepals green, tinged with pink, ca. 4 mm, basal 1/2 connate and forming a tube, outer surface villous at base; free api-

cal lobes triangular, ca. 2 mm. Petals white, lanceolate, oblique, ca. 4 × 1 mm; lip white, ca. 5 mm, 3-partite; hypochile saccate, containing 2 2- or 3-lobed calli; mesochile short, margin incurved; epichile dilated, subrectangular, ca. 3 × 5 mm, 2-lobed; lobes subsquare, margin wavy to shallowly 5- or 6-dentate, teeth broad, truncate with obtuse tips. Column 1.5–2 mm; stelidia acuminate, ca. 0.8 mm; anther ovoid, ca. 1 mm, apex obtuse; viscidium ca. 1 mm; rostellum arms ca. 1 mm. Fl. Mar.

• Damp soils and mossy rocks, in shade by streams; ca. 600 m. Hong Kong.

**16. *Cheirostylis chinensis*** Rolfe, Ann. Bot. (Oxford) 9: 158. 1895.

中华叉柱兰 zhong hua cha zhu lan

*Cheirostylis philippinensis* Ames; *C. taiwanensis* Yamamoto.

Plants 6–20 cm tall. Rhizome creeping, torose to moniliform, to 10 cm; roots in rows along rhizome internodes. Stem ascending, pale green, 1–3 cm, 2–4-leaved. Leaves subrosulate, green, ovate or broadly ovate, 1–3 × 0.7–1.7 cm, membranous, base rounded, apex acute; petiole-like base and sheath 0.3–1 cm. Inflorescence 5–18 cm, pubescent, with 3 or 4 sterile bracts; rachis 1–3 cm, 2–6-flowered; floral bracts oblong-lanceolate, concave, 5–8 mm, nearly as long as ovary, abaxially hairy, apex long acuminate. Flowers small; ovary green, cylindrical-fusiform, 7–8 mm including pedicel, sparsely pubescent. Sepals 3–4 mm, basal 1/2 connate and forming a tube, membranous, outer surface sparsely pubescent, 1-veined; free apical lobes triangular-ovate, ca. 1.8 mm, apex subobtusate. Petals appressed to dorsal sepal, white, narrowly oblanceolate-oblong, oblique, falcate, 3–4 × 1.2–1.5 mm, membranous, 1-veined, apex obtuse; lip erect, white, 5–7 mm, 3-partite; hypochile saccate, containing 2 comb-like calli, each callus (4 or) 5- or 6-toothed; mesochile ca. 1 mm, narrow; epichile with 2 green spots at base, flabellate, ca. 3.5 mm, 2-lobed; lobes ca. 3 mm, margin 4- or 5-dentate, teeth triangular with acute tips. Column ca. 2.5 mm; stelidia erect, nearly as long as rostellum; anther pinkish, ovoid, ca. 1.5 mm; viscidium narrowly oblong, ca. 1 mm; rostellum arms ca. 1.5 mm. Fl. Jan–Mar.

Damp rocky soils in forests, along streams; 200–800 m. Guangxi, Guizhou, Hainan, C and S Taiwan [Myanmar, Philippines, Vietnam].

**17. *Cheirostylis calcarata*** X. H. Jin & S. C. Chen, Acta Phytotax. Sin. 45: 797. 2007.

短距叉柱兰 duan ju cha zhu lan

Plants ca. 15 cm tall. Rhizome almost vertical, ca. 3.5 × 1 cm, fleshy, nodes slightly contracted. Stem short, 4- or 5-leaved. Leaves withered at anthesis, clustered, lanceolate, 1.5–4.5 × 0.7–1.2 cm; petiole-like base and sheath 1–2.5 cm. Inflorescence ca. 14 cm, pubescent, with 2 or 3 sterile bracts; rachis short, 1–5-flowered; floral bracts ovate to lanceolate, 5–10 mm, glabrous. Flowers white; pedicel and ovary ca. 8 mm, glandular hairy. Sepals 6–7 mm, connate for ca. 3/5 of length and forming a ± curved tube; free apical lobes triangular, ca. 2 mm. Petals appressed to dorsal sepal, spatulate, ca. 10 × 1 mm;

lip ca. 1.6 cm, 3-partite; hypochile saccate and shortly spurred, ca. 2 mm, inside with 2 3- or 4-lobed calli; mesochile ca. 6 mm; epichile with 2 green spots at base, deeply bilobed; lobes ca. 10 × 7 mm, 4- or 5-laciniate, each division 1.5–2.5 mm. Column

ca. 2.5 mm; stelia ca. 4 mm, slightly longer than rostellum arm. Fl. Mar.

• Forests on limestone mountains; ca. 1200 m. S Yunnan.

## 11. KUHLSSELTIA J. J. Smith, Icon. Bogor. 4: 1, t. 301. 1910.

旗唇兰属 qi chun lan shu

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

*Vexillabium* F. Maekawa.

Herbs, terrestrial. Rhizome elongate, creeping, noded, fleshy. Stem ascending, glabrous, leafy. Leaves ovate to subcircular, with a short petiole-like base sheathing stem. Inflorescence erect, pubescent; peduncle green, sometimes tinged with purplish red, with scattered sterile bracts; rachis 1- to many flowered; floral bracts lanceolate, ca. as long as pedicel and ovary, membranous, often pubescent and with ciliate margin. Flowers resupinate, small; ovary twisted, glabrous to pubescent. Sepals adaxially glabrous to pubescent; lateral sepals connate along inner margin for up to half their length, forming a tube and enclosing hypochile. Petals membranous, upper margin adnate to dorsal sepal and forming a hood; lip longer than sepals, attached at base to column margin, 3-partite; hypochile a shallowly bilobed sac, sometimes septate, containing 2 oblong appendages; mesochile elongate, margin involute, sub-tubular, with a fleshy flange along exterior margin on each side; epichile dilated, flabellate, obcordate to transversely oblong, entire or bilobed. Column erect, stout, basally dilated; anther on ventral side of column, ovoid, 2-locular; pollinia 2, clavate, each longitudinally parted, granular-farinaceous, sectile, with short caudicle, attached to a solitary viscidium; rostellum at column apex, erect, 2-lobed; stigma lobes connate, at base of rostellum.

About ten species: Indonesia, Malaysia, New Guinea, and the Philippines, north to China, Japan, and Korea; one species in China.

Recent analyses of the Goodyerinae by Ormerod (Lindleyana 17: 189–238. 2002) and Pridgeon et al. (Gen. Orchid. 3: 63–153. 2003) have concluded that *Vexillabium* and *Kuhlshasseltia* are congeneric.

**1. *Kuhlshasseltia yakushimensis*** (Yamamoto) Ormerod, Lindleyana 17: 209. 2002.

旗唇兰 qi chun lan

*Anoectochilus yakushimensis* Yamamoto, Bot. Mag. (Tokyo) 38: 131. 1924; *Cystopus humilis* Fukuyama; *Kuhlshasseltia integra* (Fukuyama) T. C. Hsu & S. W. Chung; *Pristiglottis humilis* (Fukuyama) Fukuyama; *P. integra* Fukuyama; *P. yakushimensis* (Yamamoto) Masamune; *Vexillabium humilum* (Fukuyama) S. S. Ying; *V. integrum* (Fukuyama) S. S. Ying; *V. yakushimense* (Yamamoto) F. Maekawa.

Plants 8–15 cm tall. Rhizome branching, pubescent. Stem ascending, green. Leaves subsulate at base of stem or spaced along stem, green, tinged with reddish purple, ovate, 0.8–5 × 0.6–2.5 cm, fleshy, 3-veined, base rounded, margin sometimes minutely toothed, apex acute; petiole-like base 5–15 mm. Inflorescence often purplish red, 4–8 cm, white pubescent, with 1–3 pinkish red sterile bracts; rachis pinkish, 1.5–4.5 cm, 2–7-flowered, sparsely pubescent; floral bracts purplish red, broadly lan-

ceolate, 5–6 mm, abaxially sparsely pubescent, margin ciliate, apex acuminate. Flowers small; ovary slightly curved, cylindrical-fusiform, 7–8 mm including pedicel, glabrous to pubescent. Sepals green at base, whitish pink toward apex; dorsal sepal shortly connate to lateral sepals at base, erect, oblong-ovate, concave, 3.5–4.5 mm, 1-veined, apex obtuse; lateral sepals oblong, falcate, 5–6 × ca. 2 mm, 1-veined, apex obtuse. Petals ovate, falcate, 4–5 × 1.5–2.5 mm, apex obtuse-apiculate; lip white, ca. 8 mm; hypochile saccate, containing 2 appendages; mesochile with 2 usually dentate flanges; epichile divergently 2-lobed, 3–4 × 4.5–5 mm. Column 2–3 mm; anther cordate, ca. 1.4 mm, apex acuminate; pollinia obovoid, attached to triangular viscidium; rostellum erect, furcately 2-lobed, lobes unequal in size. Fl. Aug–Sep.  $2n = 26$ .

Forests, rocky crevices, along streams; 400–1600 m. Anhui, Hunan, Shaanxi, Sichuan, Taiwan, Zhejiang [Japan, Philippines].

The S Taiwan (Lan Yu) endemic *Pristiglottis integra* has a pubescent ovary but in other character states overlaps with *Kuhlshasseltia yakushimensis*.

## 12. MYRMECHIS (Lindley) Blume, Coll. Orchid. 76. 1859.

全唇兰属 quan chun lan shu

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

*Anoectochilus* sect. *Myrmechis* Lindley, Gen. Sp. Orchid. Pl. 500. 1840; *Tubilabium* J. J. Smith.

Herbs, terrestrial or rarely epiphytic, small. Rhizome elongate, creeping or decumbent, several noded, fleshy; roots hairlike, arranged in irregular clumps or ridges along rhizome internodes. Stem ascending, terete, glabrous, with few to many scattered leaves. Leaves green, ovate or orbicular, small, usually less than 2 cm, slightly fleshy, base shortly petiolate and dilating into tubular amplexicaul sheath. Inflorescence abbreviate or occasionally elongate, glabrous to pubescent, with a few sheathing bracts proximally and 1 to few flowers in a short terminal raceme. Flowers not opening fully, resupinate, small; ovary erect, twisted, glabrous to pubes-

cent. Sepals similar, glabrous to pubescent on outer surface, free or basally connate; dorsal sepal often concave at base; lateral sepals oblique, concave, enclosing base of lip. Petals oblong to elliptic, margin oblique to subequal, connivent with dorsal sepal and forming a hood though apex usually free; lip basally adnate to column margin, 3-partite; hypochile saccate, containing a single, fleshy, entire or divided callus on either side of midvein at base; mesochile elongate, margin involute, subtubular, glabrous or pubescent; epichile transversely dilated or distinctly 2-lobed. Column very short, ventrally with 2 ligulate to longitudinally transverse, low wings; anther ovoid, 2-locular; clinandrium shallow; pollinia 2, 2-partite, granular-farinaceous, sectile, basally attenuate and attached to a solitary, elliptic viscidium; rostellum erect, short, 2-lobed; stigma lobes partly free at apical corners of column, protruding from lateral margin of rostellum.

About 15 species: NE India and the E Himalayas to S Japan, the Philippines, SE Asia, and New Guinea; five species (three endemic) in China.

- 1a. Lip T-shaped, epichile transversely dilated but not divided; petals with equal margins and an obtuse apex (neither oblique nor apiculate at apex).  
 2a. Lip ca. 7 mm; hypochile calli oblong; epichile transversely oblong to obtriangular, 3–3.5 mm wide, entire ..... 1. *M. japonica*  
 2b. Lip ca. 5 mm; hypochile calli subquadrate; epichile transversely obcordate-obovate, 1–1.5 mm wide, occasionally slightly emarginate ..... 2. *M. chinensis*
- 1b. Lip Y-shaped, epichile divergently 2-lobed; petals distinctly oblique and obtuse at apex, or with equal margins and an apiculate apex.  
 3a. Petals broadly urceolate, with equal margins, apex abruptly narrowed into an apiculate, oblong tip ca. 1 mm, ca. 3.5 mm wide ..... 4. *M. urceolata*  
 3b. Petals narrowly ovate or oblanceolate, oblique, apex obtuse, less than 3 mm wide.  
 4a. Lip 10–12 mm; mesochile minutely papillose, margin entire ..... 3. *M. drymoglossifolia*  
 4b. Lip 7–8 mm; mesochile glabrous, margin minutely crenulate ..... 5. *M. pumila*

**1. *Myrmechis japonica*** (H. G. Reichenbach) Rolfe, J. Linn. Soc., Bot. 36: 44. 1903.

日本全唇兰 ri ben quan chun lan

*Rhamphidia japonica* H. G. Reichenbach, Bot. Zeitung (Berlin) 36: 75. 1878.

Plants 8–15 cm tall. Rhizome creeping. Stem somewhat stout, with several leaves. Leaves widely spaced along stem, orbicular to ovate, 5–8 × 5–7 mm, base obtuse-rounded, apex obtuse or acute; petiole-like base and sheath 4–5 mm. Inflorescence 1.5–3 cm, sparsely villous; rachis 1–3-flowered; floral bracts oblong to ovate-lanceolate, shorter than ovary, abaxially sparsely villous, margin ciliate, apex acute or acuminate. Flowers not opening widely, white; ovary and pedicel cylindrical, 8–9 mm, sparsely villous. Sepals white, often tinged with pink on outer surface, ovate-lanceolate, ca. 6 mm, outer surface sparsely villous, 1-veined, connate at base, apex subacute; dorsal sepal cymbiform, ca. 2.3 mm; lateral sepals slightly oblique, ca. 2.3 mm wide. Petals connivent with dorsal sepal and forming a hood though apical 1/3 free and recurved, white, ovate-oblong, not oblique (margins equal), ca. 6 × 2.3 mm, 1-veined, apex obtuse; lip T-shaped, ca. 7 mm, 3-partite; hypochile concave-saccate; calli oblong, entire, apex obtuse; mesochile oblong; epichile dilated, transversely oblong to nearly obtriangular, 3–3.5 mm wide. Fl. Jul–Aug.  $2n = 56$ .

Shaded places and mossy rocks in forests; 800–2600 m. N Fujian, W Sichuan, SE Xizang, NW Yunnan [Japan, Korea].

**2. *Myrmechis chinensis*** Rolfe, J. Linn. Soc., Bot. 36: 44. 1903.

全唇兰 quan chun lan

Plants 5–10 cm tall. Rhizome creeping. Stem slender, with several leaves. Leaves widely spaced along stem, orbicular or ovate, 4–6 × 4–5 mm, base obtuse-rounded, apex obtuse or acute; petiole-like base and sheath 3–5 mm. Inflorescence 1.5–2.5 cm, minutely villous; rachis 1–3-flowered; floral bracts ob-

long-lanceolate, shorter than ovary, abaxially sparsely villous, margin ciliate, apex acute. Flowers not opening widely, white; ovary and pedicel cylindrical, 6–7 mm, sparsely villous. Sepals ovate-lanceolate, 5–6 mm, glabrous, 1-veined, connate at base, apex subacute; dorsal sepal cymbiform, 2–2.2 mm wide; lateral sepals slightly oblique, 2.3–2.5 mm wide. Petals connivent with dorsal sepal and forming a hood though apical 1/3 free and recurved, ovate, not oblique (margins equal), 5–6 × ca. 2.5 mm, 1-veined, apex obtuse; lip white, T-shaped, ca. 5 mm, 3-partite; hypochile concave-saccate; calli subquadrate, entire, apex obtuse; mesochile oblong, minutely papillose; epichile slightly transversely dilated, obcordate-obovate, 1–1.5 mm wide, occasionally slightly emarginate. Fl. Jul.

• Damp places in forests, valleys; 2000–2200 m. N Fujian, W Hubei, NE and W Sichuan.

**3. *Myrmechis drymoglossifolia*** Hayata, Icon. Pl. Formosan. 6: 90. 1916.

阿里山全唇兰 a li shan quan chun lan

*Myrmechis gracilis* (Blume) Blume var. *sasakii* (Yamamoto) S. S. Ying; *M. japonica* (H. G. Reichenbach) Rolfe var. *sasakii* (Yamamoto) S. S. Ying; *M. sasakii* Yamamoto.

Plants 5–7 cm tall. Rhizome slender, branched. Stem white, tinged with red, 2–6 cm, with several leaves. Leaves abaxially grayish green, adaxially green, ovate or orbicular-ovate, 7–15 × 5–10 mm, with 3 main veins, base obtuse, margin slightly undulate, apex acute; petiole-like base and sheath 2–7 mm. Inflorescence to 3 cm, slender, pubescent; rachis 1–3-flowered; floral bracts lanceolate, shorter than ovary, glabrous, margin slightly ciliate. Flowers not fully opening, white; ovary and pedicel cylindrical-fusiform, ca. 10 mm, glabrous. Sepals lanceolate, cymbiform, 6–8 × 2.5–3.5 mm, glabrous, 1-veined, connate at base; dorsal sepal recurved at apex; lateral sepals dilated at base. Petals connivent with dorsal sepal for almost entire length and forming a hood, narrowly ovate, oblique, 6–8

× ca. 2.8 mm, 1-veined, apex obtuse and recurved; lip Y-shaped, 10–12 mm, 3-partite; hypochile concave-saccate; calli suboblong, bidentate; mesochile canaliculate, minutely papillose; epichile distinctly 2-lobed; lobes widely divergent, oblong, 1.5–2 × 1–1.5 mm, apex obtuse. Fl. May–Aug.

- Damp places in forests; 1000–3000 m. Taiwan.

Reports of *Myrmechis gracilis* (in S. S. Ying, Mem. Coll. Agric. Nat. Taiwan Univ. 29(1): 74. 1989) and *M. japonica* (in T. S. Liu & H. J. Su, Fl. Taiwan 5: 1064. 1978) from Taiwan are considered misidentifications of *M. drymoglossifolia*.

**4. *Myrmechis urceolata*** Tang & K. Y. Lang, Acta Phytotax. Sin. 34: 638. 1996.

宽瓣全唇兰 kuan ban quan chun lan

Plants 5–9 cm tall. Rhizome creeping. Stem stout, subfleshy, 5–7-leaved. Leaves widely spaced along stem, abaxially pale green, tinged with reddish purple, adaxially green, ovate, 7–12 × 6–8 mm, base obtuse-rounded, apex acute; petiole-like base and sheath 2–5 mm. Inflorescence ca. 1 cm, pubescent; rachis 1–3-flowered; floral bracts ovate-triangular, 4–5 × 3–4 mm, abaxially pubescent, margin ciliate, apex acute. Flowers not fully opening, white or pink; ovary and pedicel slightly arching, cylindric-fusiform, sparsely pubescent, 6–7 mm. Sepals free, oblong-ovate, outer surface sparsely pubescent, 1-veined; dorsal sepal cymbiform, 5–6 × ca. 3 mm, apex narrowly attenuate, obtuse; lateral sepals 6–7 × 3.5–4 mm, apex narrowly attenuate, obtuse. Petals connivent with dorsal sepal and forming a hood though apiculate apex free, broadly urceolate, not oblique (margins equal), 5–6 × ca. 3.5 mm, 1-veined, apex abruptly narrowed into an apiculate, oblong tip ca. 1 mm; lip Y-shaped, cymbiform, 7–8 mm, 3-partite; hypochile slightly dilated, concave-saccate; calli transversely elliptic, entire, apex obtuse; mesochile short, conduplicate, glabrous; epichile distinctly 2-lobed; lobes divergent, oblong, ca. 2 × 1 mm. Fl. May–Jul.

- Shaded humid places in forests; 500–600 m. N and W Guangdong, C and S Hainan, SE Yunnan.

**5. *Myrmechis pumila*** (J. D. Hooker) Tang & F. T. Wang, Acta Phytotax. Sin. 1: 69. 1951.

矮全唇兰 ai quan chun lan

*Odontochilus pumilus* J. D. Hooker, Fl. Brit. India 6: 99. 1890; *Anoetochilus pumilus* (J. D. Hooker) Seidenfaden & Smitinand; *Cheirostylis franchetiana* King & Pantling; *Cystopus pumilus* (J. D. Hooker) Kuntze; *Myrmechis franchetiana* (King & Pantling) Schlechter; *Zeuxine franchetiana* (King & Pantling) King & Pantling; *Z. pumila* (J. D. Hooker) King & Pantling.

Plants 5–12 cm tall. Rhizome creeping. Stem stout, with several leaves. Leaves ovate to long ovate, 7–14 × 5–8 mm, somewhat fleshy, base obtuse, margin somewhat undulate, apex acute; petiole-like base and sheath 5–8 mm. Inflorescence 2–3 cm, pubescent, proximally with 1 lanceolate sterile bract; rachis 1–4-flowered; floral bracts ovate-lanceolate, 4–5 mm, shorter than ovary, abaxially pubescent, margin ciliate. Flowers barely opening, pale white or grayish white; ovary and pedicel cylindrical, 7–8 mm, slightly pubescent. Sepals ovate, 1-veined, connate at base; dorsal sepal cymbiform, 5–6 mm, apex obtuse and recurved; lateral sepals 6–7 mm, oblique, apex obtuse-acute. Petals connivent with dorsal sepal for almost entire length and forming a hood, oblanceolate, oblique, 5–6 × ca. 2 mm, 1-veined, base slightly contracted, apex obtuse; lip Y-shaped, 7–8 × ca. 3 mm, 3-partite; hypochile dilated, concave-saccate, ca. 3 × 3 mm; calli oblong, truncate, entire to slightly emarginate; mesochile ca. 2 × 1 mm, glabrous, margin involute, minutely crenulate; epichile distinctly 2-lobed; lobes diverging widely, oblong, 2–3 × 1–1.5 mm. Fl. Jul–Aug.

- Damp places in forests; 2800–3800 m. W Yunnan [Bhutan, India, Myanmar, Nepal, Thailand, S Vietnam].

### 13. **HETAERIA** Blume, Bijdr. 409. 1825 [*“Etaeria”*], nom. cons.

翻唇兰属 fan chun lan shu

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

*Cerochilus* Lindley; *Goodyera* sect. *Rhamphidia* Lindley; *Rhamphidia* (Lindley) Lindley.

Herbs, terrestrial. Rhizome ascending, elongate, several noded, fleshy; roots arising from rhizome nodes, elongate, fleshy, pubescent. Stem glabrous, leafy. Leaves subrosulate or scattered along stem, narrowly ovate to elliptic, usually asymmetric, membranous to slightly fleshy, with a petiole-like base dilating into tubular amplexicaul sheath. Inflorescence pubescent, with a few scattered sheathing sterile bracts and several to many flowers in a terminal raceme. Flowers not resupinate; ovary not (or rarely slightly) twisted, glabrous or pubescent. Sepals free, similar, outer surface glabrous or pubescent; lateral sepals embracing base of lip. Petals connivent with dorsal sepal and forming inverted hood, usually narrower than sepals, membranous; lip adnate to margin of column, 2-partite or with a short mesochile and 3-partite; hypochile concave, saccate or cupular, containing 1 to several papillose, warty or lamellate calli on either side of midvein; mesochile (when present) with involute margin; epichile entire and tapering or 2-lobed. Column short, with thin to fleshy winglike appendages at apical margin; anther ovoid, 2-locular; pollinia 4, in 2 pairs, clavate, granular-farinaceous, basally attenuate into short caudicles, attached to solitary ovate viscidium; rostellum erect, relatively long, bifid; stigma lobes separate and placed at apical corners of column. Capsule erect, fusiform.

- About 30 species: tropical Africa and Asia, extending to New Guinea, NE Australia, and the Pacific islands; six species in China.

Records of *Hetaeria cristata* Blume from Taiwan and Hong Kong are based on misidentifications of *Rhomboda tokioi* and *R. abbreviata*, respectively (see p. 68).

- 1a. Lip 3-partite; mesochile short, slender, with involute margin; epichile enlarged, with 2 suborbicular lobes  
ca.  $2.5 \times 2.5$  mm ..... 1. *H. anomala*
- 1b. Lip 2-partite, lacking a mesochile; epichile very small, entire.
- 2a. Epichile narrowly linear or slightly dilated and broadly ovate; petals obliquely (sub)spatulate.
- 3a. Leaves 7.5–13 cm; epichile broadly ovate, ca. 0.5 mm; hypochile calli fleshy, oblong, 2–4-lobed ..... 5. *H. affinis*
- 3b. Leaves 6–7 cm; epichile narrowly linear, ca. 1.8 mm; hypochile calli lamellate, suboblong, toothed ..... 6. *H. obliqua*
- 2b. Epichile abruptly attenuate; petals obliquely obovate or rhombic-obovate.
- 4a. Leaves 8–11 cm; dorsal sepal ca. 3.5 mm; epichile ca. 0.5 mm, lateral margin not involute, apex  
subacute ..... 4. *H. oblongifolia*
- 4b. Leaves 3–9 cm; dorsal sepal 5–7 mm; epichile 1–1.8 mm, lateral margin involute, apex  
acuminate-apiculate.
- 5a. Sepals weakly pubescent on outer surface; hypochile calli papillose, hooked, not divided ..... 2. *H. finlaysoniana*
- 5b. Sepals densely pubescent on outer surface; hypochile calli warty, 2- or 3-lobed ..... 3. *H. youngsayei*

**1. *Hetaeria anomala*** Lindley, J. Proc. Linn. Soc., Bot. 1: 185. 1857 [“*Aetheria*”].

四腺翻唇兰 si xian fan chun lan

*Hetaeria biloba* (Ridley) Seidenfaden & J. J. Wood; *H. grandiflora* Ridley; *H. hainanensis* Tang & F. T. Wang; *H. rotundiloba* J. J. Smith; *Heterozeuxine rotundiloba* (J. J. Smith) C. S. Leou; *Zeuxine biloba* Ridley.

Plants 28–34 cm tall. Stem 3–7-leaved. Leaves scattered along stem, ovate-lanceolate,  $3.5\text{--}7 \times 1.1\text{--}2$  cm, 3-veined, base obtuse, apex acute or acuminate; petiole-like base and sheath 1.5–2 cm. Inflorescence erect, villous, with 1–3 sterile bracts; rachis laxly to subdensely 4–20-flowered, 2–10 cm; floral bracts lanceolate, ca. 7 mm, abaxially villous, margin ciliate. Flowers white; ovary not twisted, often arcuate, subcylindric or ellipsoid, 7–8 mm including pedicel, hispid. Sepals ca. 5 mm, abaxially sparsely hispid, 3-veined; dorsal sepal elliptic, concave, ca. 2 mm wide, apex acute; lateral sepals ovate, somewhat oblique, ca. 2.4 mm wide, apex acute. Petals linear, ca.  $5 \times 0.6$  mm, glabrous, 1-veined, apex obtuse; lip ca. 5 mm, 3-partite; hypochile concave to shallowly saccate, 5-veined, lateral veins each with 1 lamellate, transversely oblong, hooked callus; mesochile short, ca. 1 mm, margin involute; epichile dilated, ca. 6 mm wide, 2-lobed; lobes strongly revolute but divaricate in unfolded state, suborbicular, ca.  $2.5 \times 2.5$  mm, apex slightly emarginate. Column ca. 3 mm; wings reduced; rostellum arms ca. 1.5 mm. Fl. Feb–Mar.

Dense or sparse forests; 800–1000 m. Hainan, C and S Taiwan [NE India, Indonesia, Laos, Malaysia, Myanmar, Philippines, Thailand, Vietnam].

**2. *Hetaeria finlaysoniana*** Seidenfaden, Contr. Orchid Fl. Thailand 13: 10. 1997.

长序翻唇兰 chang xu fan chun lan

*Goodyera elongata* Lindley, Gen. Sp. Orchid. Pl. 494. 1840; *Hetaeria elongata* (Lindley) J. D. Hooker (1890), not (Blume) Miquel (1859); *Rhamphidia elongata* (Lindley) Lindley.

Plants 30–35 cm tall. Stem 4- or 5-leaved. Leaves scattered along stem, oblong to narrowly elliptic, slightly to strongly unequal,  $6\text{--}9 \times 2.5\text{--}4$  cm, base obtuse-rounded, apex acute; petiole-like base and sheath 1.5–3 cm. Inflorescence elongate,

15–22 cm, slender, pubescent; sterile bracts 2 or 3, pink, lanceolate, abaxially weakly pubescent; rachis 8–12 cm, subdensely many flowered; floral bracts pink, lanceolate, 8–9 mm, slightly shorter than ovary, abaxially weakly pubescent, apex acuminate. Flowers half opening, small; ovary subcylindric, not twisted, 10–11 mm including pedicel, densely pubescent. Sepals pink to whitish, outer surface weakly pubescent, 3-veined; dorsal sepal oblong to ovate-oblong, concave,  $5\text{--}6 \times 2.8\text{--}3$  mm, apex obtuse; lateral sepals obliquely oblong to ovate-oblong,  $5\text{--}6 \times 2.8\text{--}3$  mm, apex obtuse. Petals white, obliquely rhombic-obovate,  $5\text{--}6 \times$  ca. 2.5 mm, 2-veined, apex narrowed and apiculate; lip cymbiform, suboblong to oblong-lanceolate,  $4\text{--}4.5 \times 2\text{--}2.3$  mm; hypochile saccate, 5-veined, lateral veins each with 1–3 papillose, hooked calli near base; epichile attenuate, ca. 1.8 mm, lateral margin involute, apex acuminate-apiculate. Column ca. 2 mm; wings subsquare to oblong flaps; rostellum arms ca. 1 mm. Fl. Sep–Oct.

Dense forests. SW Guangxi, Hainan [Sri Lanka, Thailand].

**3. *Hetaeria youngsayei*** Ormerod, Oasis Suppl. 3: 7. 2004.

香港翻唇兰 xiang gang fan chun lan

*Hetaeria shiuyingiana* L. Li & F. W. Xing.

Plants 20–40 cm tall. Stem slender, 2–5-leaved. Leaves cauline or crowded at stem apex, broadly ovate, oblique,  $3\text{--}8 \times 2\text{--}4$  cm, 3-veined, base obliquely obtuse, apex shortly acuminate; petiole-like base and sheath 2–3 cm. Inflorescence 20–22 cm, slender, villous; sterile bracts 3 or 4, pinkish brown, lanceolate, glabrous; rachis subdensely 14–20-flowered, 7–9 cm, glandular pubescent; floral bracts lanceolate, 7–9 mm, shorter than ovary, puberulent, apex acuminate. Flowers half opening; ovary and pedicel held close to rachis, olive-green, subcylindric, not twisted, 8–10 mm, densely glandular pubescent. Sepals pink, tinged olive-green at base, ovate, outer surface densely glandular pubescent, 3-veined, apex acute; dorsal sepal  $5\text{--}7 \times 2\text{--}4$  mm, apex recurved; lateral sepals oblique,  $5\text{--}6 \times$  ca. 2 mm. Petals spreading, white, obliquely obovate,  $4\text{--}6 \times 2.2\text{--}3$  mm, 1-veined, apex obtuse; lip broadly ovate-cymbiform,  $4.5\text{--}5$  mm, fleshy, 2-partite; hypochile yellowish, concave, ca.  $3 \times 2.5$  mm, containing several warty, 2- or 3-lobed calli, 5-veined, distal margin slightly involute; epichile white, 1–1.5 mm, attenuate, margin involute, apex acuminate-apiculate. Column ca. 2 mm, stout; wings broad, oblong flaps; rostellum arms ca. 1 mm. Fl. Mar–Apr.

Forests, ravines; 600–900 m. Hainan, Hong Kong [Thailand].

This taxon has been confused with *Hetaeria nitida* Ridley (J. Linn. Soc., Bot. 32: 404. 1896). See Ormerod (Oasis Suppl. 3: 7. 2004) and Li and Xing (Novon 19: 187–190. 2009) for further discussion.

#### 4. *Hetaeria oblongifolia* Blume, Bijdr. 410. 1825.

矩叶翻唇兰 ju ye fan chun lan

*Epipactis discoidea* (H. G. Reichenbach) A. A. Eaton; *E. erimae* (Schlechter) A. A. Eaton; *Goodyera discoidea* (H. G. Reichenbach) Schlechter; *G. erimae* Schlechter; *Hetaeria discoidea* (H. G. Reichenbach) Schlechter; *H. erimae* (Schlechter) Schlechter; *H. forcipata* H. G. Reichenbach; *H. helferi* J. D. Hooker; *H. micrantha* Blume; *H. pauciseta* J. J. Smith; *H. raymundii* Schlechter; *H. rubicunda* H. G. Reichenbach; *H. samoensis* Rolfe; *H. similis* Schlechter; *H. tenuis* (Lindley) Benthams; *Rhamphidia discoidea* H. G. Reichenbach; *R. rubicunda* (H. G. Reichenbach) H. G. Reichenbach (1868), not (Blume) F. Mueller (1869); *R. tenuis* Lindley.

Plants 30–50 cm tall. Stem fleshy, 4–6-leaved. Leaves cauline, oblong, oblique, 8–11 × 2.5–4.1 cm, 3-veined, base obliquely obtuse or rounded, apex acute; petiole-like base and sheath 2.8–3.3 cm. Inflorescence 24–26 cm, slender, pubescent; sterile bracts 4, pinkish brown, lanceolate, glabrous to sparsely pubescent; rachis subdensely 30–40-flowered, 8–10 cm, pubescent; floral bracts lanceolate, 7–9 mm, subequal in length to ovary, puberulent, margins ciliate below middle, apex acuminate. Flowers half opening; ovary and pedicel held close to rachis, olive-green, subcylindric, not twisted, 4.5–5.5 mm, densely pubescent. Sepals white, tinged light yellowish green at base, broadly ovate, outer surface densely pubescent, apex obtuse; dorsal sepal ca. 3.5 × 2.5 mm; lateral sepals oblique, ca. 4 × 2.2 mm. Petals incurved at apex, white, narrowly rhombic-ovate, falcate, ca. 4 × 1.3 mm, apex subacute; lip cream-colored, broadly ovate-cymbiform, ca. 4 mm, 2-partite, fleshy toward apex; hypochile saccate, ca. 3.5 mm, containing 8–10 papillous calli, distal margin involute; epichile ligulate, attenuate, ca. 0.5 mm, apex subacute. Column ca. 2.2 mm, stout; wings small, ovate; rostellum arms small, linear, ca. 0.5 mm. Fl. Mar–Apr.

Montane forests; ca. 200 m. S Taiwan (Lan Yu) [Indonesia, S Japan, Malaysia, Myanmar, New Guinea, Philippines, Thailand, Vietnam; Australia, SW Pacific islands].

#### 5. *Hetaeria affinis* (Griffith) Seidenfaden & Ormerod, Oasis Suppl. 2: 9. 2001.

滇南翻唇兰 dian nan fan chun lan

*Goodyera affinis* Griffith, Not. Pl. Asiat. 3: 391. 1851; *Cerochilus rubens* Lindley; *Hetaeria rubens* (Lindley) Benthams

ex J. D. Hooker; *Rhamphidia rubens* (Lindley) Lindley.

Plants 25–45 cm tall. Stem somewhat robust, with 6–8 well-spaced leaves. Leaves ovate or elliptic, slightly oblique, 7.5–13 × 3.5–5.5 cm, 5-veined, base obtuse, apex acute; petiole-like base and sheath 2.5–5 cm. Inflorescence 16–28 cm, slender, pubescent; sterile bracts 3–5, lanceolate, abaxially weakly pubescent; rachis densely many flowered, 7–14 cm, densely glandular pubescent; floral bracts lanceolate, 7–8 × ca. 3 mm, nearly as long as ovary, puberulent, apex acuminate. Flowers opening slightly, small; ovary and pedicel subcylindric, not twisted, 8–9 mm, densely glandular pubescent. Sepals green, adaxial apex tinged with pink, outer surface densely glandular pubescent; dorsal sepal broadly ovate, cymbiform, ca. 5 × 3.5 mm, 3-veined, apex obtuse to acute; lateral sepals broadly ovate, concave, slightly oblique, ca. 4.2 × 3.2 mm, 1-veined, apex obtuse. Petals white, obliquely spatulate, ca. 4.5 × 1.6 mm, 1-veined, apex slightly mucronate; lip lageniform-ovate, ca. 3.5 mm, 2-partite; hypochile dilated, concave, ca. 3 × 3.8 mm, 1-veined, containing a solitary, warty, 2–4-lobed callus on either side of midvein, distal margin slightly involute; epichile dilated, broadly ovate, ca. 0.5 × 0.8 mm, apex obtuse. Column ca. 2 mm; wings small, narrow; rostellum arms to 0.8 mm. Fl. Mar–Apr.  $2n = 22, 24, 42$ .

Dense forests; 800–1000 m. S and SE Yunnan [Bhutan, NE India, N Myanmar, Thailand, Vietnam].

#### 6. *Hetaeria obliqua* Blume, Coll. Orchid. 104. 1859.

斜瓣翻唇兰 xie ban fan chun lan

*Dossinia obliqua* (Blume) Miquel.

Plants 30–37 cm tall. Stem 4- or 5-leaved. Leaves scattered along stem, elliptic to oblong-ovate, oblique, 6–7 × 2.5–3.5 cm, base obtuse-rounded, apex acute; petiole-like base and sheath 2–2.5 cm. Inflorescence 18–23 cm, pubescent, with 4 or 5 sterile bracts; rachis 8–11 cm, with many densely arranged flowers; floral bracts lanceolate, 6–7 mm, shorter than ovary, abaxially puberulent, apex acuminate. Flowers small; ovary subcylindric, not twisted, 8–9 mm including pedicel, pubescent. Sepals 3-veined, outer surface pubescent; dorsal sepal ovate, concave, ca. 5.8 × 3 mm, apex obtuse; lateral sepals ovate-oblong, ca. 5.5 × 2.1 mm, apex obtuse. Petals white, obliquely subspatulate, ca. 5 × 1.6 mm, glabrous, 1-veined, apex obtuse; lip white, suboblong, cymbiform, ca. 4.5 × 2 mm; hypochile concave, 3-veined, lateral veins each with 1 or 2 suboblong, lamellate, toothed calli toward base; epichile a narrow, sublinear blade, ca. 1.8 mm, lateral margin involute. Column 2.5–3 mm; wings shallow, broad; rostellum arms linear, ca. 1.2 mm. Fl. Mar.

Dense forests. Hainan [Indonesia, Malaysia, Thailand].

## 14. RHOMBODA Lindley, J. Proc. Linn. Soc., Bot. 1: 181. 1857.

菱兰属 ling lan shu

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

Herbs, terrestrial or rarely epiphytic. Rhizome creeping, several noded, fleshy; roots fibrous, villous, arising from rhizome nodes. Stem erect, glabrous, with a few tubular sheaths at base, leafy. Leaves usually crowded at stem apex, green-red, midvein often

white, lanceolate, ovate, or elliptic, oblique, apex acute, with a petiole-like base dilating into tubular amplexicaul sheath. Inflorescence erect, terminal, racemose, pubescent; peduncle with a few scattered sheathing bracts; rachis laxly to subdensely few to many flowered; floral bracts sparsely pubescent. Flowers not opening widely, obliquely resupinate or not resupinate; ovary and pedicel not twisted, glabrous to sparsely pubescent. Sepals free, similar, ovate-elliptic, outer surface glabrous to sparsely pubescent. Petals connivent with dorsal sepal and forming a hood, often broadly dilated, membranous; lip adnate to ventral margin of column, 2-partite or with a short mesochile and 3-partite; hypochile saccate, with a low, longitudinal carina along midvein forming a large, raised bicarinate callus toward apex of hypochile, and with 1 fleshy, undivided callus on either side near base; exterior of hypochile with fleshy flanges; mesochile (when present) short, margin involute; epichile linear, quadrate or transversely dilated, simple or 2-lobed. Column short, abruptly dilated apically, with 2 large, parallel wings; anther ovoid, 2-locular; pollinia 2, clavate, attached to a solitary, small, ovate viscidium; rostellum deltoid, short, broad, remnant shortly bifid; stigma lobes 2, separate, placed laterally at column apex, convex. Capsule erect.

About 25 species: from the Himalayas and NE India, across S and SE China to S Japan, and throughout SE Asia to New Guinea and the SW Pacific islands; four species (one endemic) in China.

The genus *Rhomboda* was recently reinstated by Ormerod (Orchadian 11: 323–339. 1995), having been neglected (with its constituent taxa being variously referred to *Hetaeria*, *Zeuxine*, or *Odontochilus*) for over a century. Species belonging to *Rhomboda* can be distinguished by the medial bicarinate callus within the hypochile of the lip (in addition to the two large, often stalked, basal calli) in combination with the flanges on the exterior surfaces of the hypochile and the presence of two large wings on the column. Most of the Chinese species remain poorly known.

- 1a. Lip oblong-ovate or broadly ovate, 3–3.5 mm; mesochile lacking or to 0.5 mm and often indistinct; epichile small, broadly elliptic, subquadrate, or obtriangular, 0.4–0.8 mm wide, narrower than hypochile.  
 2a. Epichile broadly elliptic to subquadrate, tapering, apex obtuse ..... 1. *R. tokioi*  
 2b. Epichile obtriangular, apex truncate with acute corners and sometimes a small apiculate extension at center ..... 2. *R. abbreviata*  
 1b. Lip T-shaped, 6–7 mm, distinctly 3-partite; mesochile 1–1.8 mm; epichile transversely dilated, ca. 6 mm wide, wider than hypochile.  
 3a. Hypochile 3–3.5 × 3.2–4 mm; epichile lobes obovate, apex irregularly denticulate ..... 3. *R. moulmeinensis*  
 3b. Hypochile ca. 5 × 4.6 mm; epichile lobes subquadrate, apex rounded ..... 4. *R. fanjingensis*

**1. *Rhomboda tokioi*** (Fukuyama) Ormerod, Austral. Orchid. Rev. 63(4): 11. 1998.

白肋菱兰 bai lei ling lan

*Hetaeria tokioi* Fukuyama, Bot. Mag. (Tokyo) 48: 434. 1934; *Goodyera pogonorrhyncha* Handel-Mazzetti; *H. cristata* Blume var. *minor* Rendle; *H. cristata* var. *tokioi* (Fukuyama) S. S. Ying; *Rhomboda pogonorrhyncha* (Handel-Mazzetti) Ormerod.

Plants 15–28 cm tall. Stem dark reddish brown, 5–9 cm, 4–6-leaved. Leaves abaxially pale green, adaxially sometimes with a white stripe along midvein, ovate to ovate-lanceolate, 3–9 × 1.5–4 cm; petiole-like base and tubular sheath 1–3 cm. Peduncle 5–15 cm, with 1–4 sterile bracts; rachis 3–6 cm, laxly 3–15-flowered; floral bracts brownish red, ovate-lanceolate, 5–8 × 2.5–3 mm, lower ones exceeding ovary, margin ciliate, apex acuminate. Flowers half opening, not resupinate, small; ovary and pedicel 7–10 mm, glabrous to sparsely pubescent. Sepals reddish brown, glabrous to sparsely pubescent, 1-veined; dorsal sepal broadly ovate, 2.8–3 × 1.5–2 mm, apex acute; lateral sepals ovate, oblique, 3.2–4 × 2–2.3 mm, apex acute. Petals white, ovate, oblique, sides extremely unequal, 2.8–3 × ca. 2 mm, glabrous, 1-veined, apex acute; lip white, oblong-ovate, cymbiform, 3–3.5 mm, 2-partite; hypochile concave-saccate, 2–2.5 × 1.8–2 mm, containing 2 large hornlike calli near base; carina low, forming a fleshy bicarinate callus toward apex of hypochile; epichile broadly elliptic to subquadrate, tapering, ca. 1 × 0.4–0.8 mm, margin involute, apex obtuse; disk irregularly papillose. Column ca. 1.5 mm. Fl. Sep–Oct.  $2n = 42$ .

Forests; below 1500 m. Guangdong, C and N Taiwan [Japan, Vietnam].

Plants of this species from Taiwan were misidentified in Fl. Taiwan (5: 1033. 1978; ed. 2, 5: 926. 2000) and FRPS (17: 183–185. 1999) as *Hetaeria cristata* Blume (*Rhomboda cristata* (Blume) Ormerod). True *Rhomboda cristata* is known only from Indonesia (Java).

**2. *Rhomboda abbreviata*** (Lindley) Ormerod, Orchadian 11: 329. 1995.

小片菱兰 xiao pian ling lan

*Hetaeria abbreviata* Lindley, Gen. Sp. Orchid. Pl. 481. 1840; *Anoetochilus abbreviatus* (Lindley) Seidenfaden; *Hetaeria abbreviata* (Lindley) J. J. Smith; *Odontochilus abbreviatus* (Lindley) Tang & F. T. Wang; *Zeuxine abbreviata* (Lindley) J. D. Hooker.

Plants 15–30 cm tall. Stem dark green, 4–5 cm, 3–5-leaved. Leaves abaxially pale green, sometimes tinged with red, adaxially dark green, ovate-lanceolate, 4–8 × 2–3 cm, apex acute to acuminate; petiole-like base and tubular sheath 1–2 cm. Peduncle 8–10 cm, with 2 or 3 sterile bracts; rachis 3–7 cm, laxly 8–12-flowered; floral bracts pinkish red, ovate, 7–10 × ca. 2.5 mm, shorter than to equal to ovary, margin ciliate, apex acuminate. Flowers half opening, obliquely resupinate, small; ovary and pedicel 9–11 mm, glabrous. Sepals greenish white, glabrous to sparsely pubescent, 1-veined; dorsal sepal broadly ovate, 2.5–3.5 × 1.5–2 mm, apex acute; lateral sepals spreading, ovate, slightly oblique, ca. 4 × 2.2 mm, apex acute. Petals white, ovate-lanceolate, oblique, sides unequal, 2.5–3.5 × 1.2–1.4 mm, glabrous, 1-veined, apex abruptly narrowed into a



short apiculus; lip white, broadly ovate, cymbiform, 3–3.5 mm, obscurely 3-partite; hypochile concave-saccate, ca. 2.5 × 2–2.2 mm, containing 2 oblong-ellipsoid calli near base; carina low, forming a 2-laminate callus toward apex of hypochile; mesochile short and often indistinct, ca. 0.5 mm, margin involute; epichile obtriangular, ca. 1.2 × 0.8 mm, margin involute, apex truncate with acute corners and sometimes a small apiculate extension at center. Column ca. 2 mm. Fl. Aug–Sep.

Forests, valleys; 600–1200 m. Guangdong, Guangxi, Guizhou, Hainan [NE India, Myanmar, Nepal, Thailand].

Plants of this species from Hong Kong were misidentified in Gen. Orchidaceae Hong Kong (49. 1977) and FRPS (17: 183–185. 1999) as *Hetaeria cristata* Blume (*Rhomboda cristata* (Blume) Ormerod). See also the comment under *R. tokioi* above.

**3. *Rhomboda moulemeinensis*** (E. C. Parish & H. G. Reichenbach) Ormerod, *Orchadian* 11: 325. 1995.

艳丽菱兰 yan li ling lan

*Hetaeria moulemeinensis* E. C. Parish & H. G. Reichenbach, *Trans. Linn. Soc. London* 30: 142. 1874; *Anoectochilus moulemeinensis* (E. C. Parish & H. G. Reichenbach) Seidenfaden; *A. multiflorus* Rolfe ex Downie; *Odontochilus moulemeinensis* (E. C. Parish & H. G. Reichenbach) Tang & F. T. Wang; *O. multiflorus* (Rolfe ex Downie) Tang & F. T. Wang; *Zeuxine moulemeinensis* (E. C. Parish & H. G. Reichenbach) J. D. Hooker.

Plants 16–35 cm tall. Stem dark reddish brown, 4–11 cm, 5–7-leaved. Leaves abaxially grayish green, adaxially green with a broad white stripe along midvein, ovate-elliptic to ovate-lanceolate, 3–11 × 1.5–3.5 cm, apex acute or acuminate; petiole-like base and tubular sheath 1.5–4 cm. Peduncle 10–22 cm, with 1–3 pale red sterile bracts, sometimes densely villous; rachis 2–6 cm, laxly 5–16-flowered; floral bracts pale red, ovate to ovate-lanceolate, 5–10 × ca. 2.5 mm, shorter than to equal to ovary, margin ciliate, apex acuminate. Flowers spreading, obliquely resupinate, medium-sized; ovary and pedicel 8–11 mm, purplish green, glabrous to sparsely pubescent. Sepals pale red, glabrous, 1-veined; dorsal sepal erect, broadly ovate, cymbiform, 5.5–7 × 2.5–3.2 mm, apex acute to acuminate; lateral sepals spreading, broadly ovate, slightly oblique, 5.8–7.5 × 3–4

mm, apex acuminate. Petals white suffused with pink, broadly subovate, sides extremely unequal, 5.5–7 × 3.5–4 mm, apex apiculate; lip white, T-shaped, 6–7 mm, 3-partite; hypochile saccate, 3–3.5 × 3.2–4 mm, apex truncate or emarginate, containing 2 subglobose calli near base; basal calli shortly stalked, crenulate at apex; carina undulate, forming a fleshy bicarinate callus midway along hypochile; mesochile linear, 1–1.8 mm, slender; epichile transversely dilated, ca. 6 mm wide, 2-lobed; lobes diverging ± at right angles to lip axis, obovate, 2–3 × 1.2–1.8 mm, apex irregularly denticulate; disk irregularly papillose. Column 2.5–3.5 mm. Fl. Aug–Oct.

Damp forests, valleys; 400–2200 m. Guangxi, Guizhou, Sichuan, SE Xizang, Yunnan [Myanmar, Thailand].

**4. *Rhomboda fanjingensis*** Ormerod, *Orchadian* 11: 327. 1995.

贵州菱兰 gui zhou ling lan

Plants ca. 28 cm tall. Stem dark reddish brown, ca. 6.5 cm, 5-leaved. Leaves adaxially green with a narrow white stripe along midvein, ovate-elliptic, 6–8 × 3–4 cm, apex acute; petiole-like base and tubular sheath 2–3 cm. Peduncle ca. 10 cm, with 3 or 4 sterile bracts; rachis ca. 10 cm, laxly 17-flowered; floral bracts pale red, ovate-lanceolate, ca. 9 × 4 mm, shorter than to equal to ovary, margin ciliate, apex acuminate. Flowers half opening, obliquely resupinate, medium-sized; ovary and pedicel ca. 9 mm, glabrous. Sepals pink-red, glabrous, 1-veined; dorsal sepal narrowly ovate-elliptic, ca. 7 × 3.3 mm, apex acuminate; lateral sepals reflexed, ovate-elliptic, oblique, ca. 7 × 2.5–3 mm, apex acute. Petals white suffused with pink, narrowly ovate-oblong, sides extremely unequal, ca. 7 × 2–3 mm, shortly clawed at base, apex acuminate; lip white, irregularly T-shaped, ca. 7 mm, 3-partite; hypochile saccate, ca. 5 × 4.6 mm, apex truncate or emarginate, containing 2 transversely elliptic calli near base; apical lobes rounded, projecting forward beyond base of mesochile; basal calli minutely denticulate; carina low, abruptly arising toward apex of hypochile and forming a laminate, bicarinate callus; mesochile linear, ca. 1 mm, slender; epichile transversely dilated, ca. 6 mm wide, 2-lobed, apiculate; lobes diverging ± at right angles to lip axis, subquadrate, ca. 2.3 × 1.8–2 mm, apex rounded. Column 4–5.5 mm. Fl. Oct–Nov.

• Forests; ca. 500 m. NE Guizhou.

## 15. CHAMAEGASTRODIA Makino & F. Maekawa, *Bot. Mag. (Tokyo)* 49: 596. 1935.

叠鞘兰属 die qiao lan shu

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

Herbs, small, holomycotrophic. Rhizome coralloid, fleshy, sometimes branching. Stem ascending or erect, yellow to pale brownish red, tinged purplish red, glabrous, leafless, with overlapping sheathing scales. Inflorescence erect, terminal, racemose, glabrous, several to many flowered; floral bracts membranous, glabrous. Flowers erect, not resupinate, small; ovary fusiform, not twisted, glabrous. Sepals free, ± similar, glabrous; dorsal sepal ovate, usually connivent with petals; lateral sepals enclosing base of lip. Petals oblong to ligulate-lanceolate, nearly as long as dorsal sepal, much narrower than sepals, membranous; lip usually 3-partite and T-shaped, or rarely entire, ovate with unlobed apex; hypochile concave-saccate, containing 2 fleshy calli toward base (1 on either side of midvein); mesochile subtubular, sometimes with narrow lamellate flanges along external lateral margins; epichile bilobed. Column stout, ventrally with 2 triangular-falcate appendages (wings) toward apex; anther ovoid, 2-locular, sessile or rarely attached to column via a slender filament; pollinia 2, each longitudinally parted, granular-farinaceous, sectile, attenuate into slender stalk and attached to a solitary viscidium; rostellum long or short, remnant entire to shortly bifid; stigma lobes confluent to narrowly separated, small to relatively large, raised, placed toward apex of column beneath lower margin of rostellum.

About three species: China, India, Japan, Myanmar, Thailand, Vietnam; three species (one endemic) in China.

Despite the leafless, mycotrophic habit, the shape of the lip and the structure of the column indicate that *Chamaegastrodia* is closely related to *Odontochilus*. Indeed, taxa previously included here (see Seidenfaden, Nordic J. Bot. 14: 293–301. 1994) that were first described in the now defunct genus *Evrardia* have been transferred recently to *Odontochilus* (see Pridgeon et al., Gen. Orchid. 3: 74. 2003). The shape and placement of the column wings in the remaining three species of *Chamaegastrodia* are thought to distinguish them from the rest of *Odontochilus*, though more detailed study, including molecular data, may reveal this distinction to be artificial.

- 1a. Lip narrowly ovate to ovate-oblong, 3–3.5 mm, apex acute to acuminate ..... 1. *C. vaginata*  
 1b. Lip T-shaped, 5–7 mm, with a dilated, 2-lobed epichile.  
 2a. Lip mesochile with external flanges; anther lacking basal lobes, attached to column via a short filament ..... 2. *C. shikokiana*  
 2b. Lip mesochile lacking external flanges; anther with 2 narrowly triangular-lanceolate lobes at base, sessile ..... 3. *C. inverta*

**1. *Chamaegastrodia vaginata*** (J. D. Hooker) Seidenfaden, Nordic J. Bot. 14: 294. 1994.

戟唇叠鞘兰 ji chun die qiao lan

*Aphyllorchis vaginata* J. D. Hooker, Fl. Brit. India 6: 117. 1890; *Chamaegastrodia exigua* (Rolfe) F. Maekawa ex Ormerod; *Evrardianthe exigua* (Rolfe) Rauschert; *Hetaeria exigua* (Rolfe) Schlechter; *Spiranthes exigua* Rolfe.

Plants 4–6 cm tall. Rhizome stout, fleshy. Stem erect, deep red, somewhat slender, with several dark red sheathing scales. Inflorescence 4-flowered; rachis 2–3 cm; floral bracts dark red, oblong-lanceolate, ca. 8 mm, slightly exceeding to subequal in length to ovary, apex subacute. Flowers deep red; ovary and pedicel brownish red, cylindrical-fusiform, 6–8 mm. Dorsal sepal connivent with petals, ovate, concave, ca. 3 × 1.6 mm, 1-veined, apex subobtusate; lateral sepals ovate, oblique, ca. 3.2 × 1.6 mm, 1-veined, apex subobtusate. Petals narrowly oblong to oblong-lanceolate, ca. 3 × 0.8–1 mm, 1-veined, apex obtuse-acute; lip narrowly ovate to ovate-oblong, 3–3.5 × ca. 1.2 mm, base concave and with 2 sessile, elliptic calli, apex unlobed, acute to acuminate. Column stout, with 2 narrowly lanceolate wings toward apex; anther broadly ovoid, sessile; pollinia 2, attached to a narrowly oblong viscidium; rostellum subulate, curved slightly backward, remnant shortly bifid. Fl. Aug.

Along valleys and in damp places in evergreen broad-leaved forests; 1000–1600 m. Hubei, Sichuan [NE India].

The shape of the lip suggests that this entity is probably a semi-peloric form. Seidenfaden (Nordic J. Bot. 14: 293–301. 1994) provides commentary that suggests that its closest relative is *Chamaegastrodia asraoa* (J. Joseph & Abbareddy) Seidenfaden & A. N. Rao, an Indian species now regarded as a member of *Odontochilus*; if so, the validity of *Chamaegastrodia* as an independent genus is questionable.

**2. *Chamaegastrodia shikokiana*** Makino & F. Maekawa, Bot. Mag. (Tokyo) 49: 596. 1935.

叠鞘兰 die qiao lan

*Hetaeria shikokiana* (Makino & F. Maekawa) Tuyama.

Plants 5–18 cm tall. Rhizome 1.2–1.4 cm, stout, 2.5–3.5 mm in diam. Stem erect, yellow to pale brownish red, with a few membranous sheathing scales. Inflorescence few to more than 10-flowered; rachis 3–5 cm; floral bracts yellow to pale brownish red, narrowly ovate-elliptic, 5–8 mm, shorter than ovary, membranous, apex acute. Flowers yellowish brown; ovary and pedicel yellow to pale brownish red, cylindrical-fusiform, 8–10 mm. Sepals 1-veined; dorsal sepal connivent with

petals, ovate, concave, ca. 3 × 1.6 mm, apex obtuse; lateral sepals ovate, oblique, 3–3.5 × 1.8–2 mm, apex obtuse. Petals linear, ca. 3 × 0.6 mm, 1-veined, apex obtuse; lip T-shaped, ca. 4.5 mm, 3-partite; hypochile slightly dilated, concave-saccate, ca. 0.8 mm, containing 2 sessile, subglobose calli at base; mesochile ca. 2 mm, with external flanges; flanges narrow, margin irregularly incised-crenulate; epichile transversely dilated, sub-oblong, ca. 2 × 5 mm, 2-lobed; lobes suboblong, diverging at right angles to axis of lip, ca. 1.5 × 2 mm, margin entire or slightly crenulate, apex truncate or occasionally slightly apiculate. Column short, with 2 triangular, falcate wings toward apex; anther ovoid, attached to column via a short linear filament; rostellum very small. Fl. Jul–Aug.

Damp places in evergreen broad-leaved forests; 2500–2800 m. SW Sichuan, E Xizang [NE India, Japan].

“*Gastrodia shikokiana*” (Makino, Bot. Mag. (Tokyo) 6: 48. 1892) is a nomen nudum and was therefore not validly published.

**3. *Chamaegastrodia inverta*** (W. W. Smith) Seidenfaden, Nordic J. Bot. 14: 297. 1994.

川滇叠鞘兰 chuan dian die qiao lan

*Zeuxine inverta* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 13: 222. 1921; *Evrardianthe inverta* (W. W. Smith) Rauschert; *Hetaeria inverta* (W. W. Smith) Schlechter.

Plants 5–15 cm tall. Rhizome stout, fleshy. Stem erect, pale brownish yellow, with a few brownish yellow sheathing scales. Inflorescence few to more than 10-flowered; rachis 2.5–5.5 cm; floral bracts ovate-lanceolate, 7–9 mm, slightly shorter than ovary, glabrous, apex acute. Flowers orange-yellow; ovary and pedicel brownish yellow, fusiform, 8–10 mm. Dorsal sepal connivent with petals, narrowly oblong, concave, ca. 4 × 1.2 mm, 1-veined, apex obtuse; lateral sepals ovate, oblique, falcate, ca. 4.5 × 1.8 mm, 1-veined, apex subacute. Petals linear to linear-lanceolate, falcate, ca. 4 × 0.5 mm, 1-veined, apex acute; lip T-shaped, 5–6 mm, 3-partite; hypochile slightly dilated, concave-saccate, ca. 1.5 mm, containing 2 domed calli near base; mesochile 2.5–3 mm, lacking external flanges; epichile transversely dilated, suboblong, 1.2–1.6 × ca. 4 mm, 2-lobed; lobes subquadrate, diverging at right angles to axis of lip, ca. 1.5 × 1.5 mm, margin minutely erose, apex truncate. Column short, with 2 triangular-falcate wings; anther ovoid, with 2 narrowly triangular-lanceolate lamellate lobes at base; rostellum erect, remnant bifid. Fl. Jul–Aug.

• Damp places in forests, along valleys; 1200–2600 m. SW Sichuan, C and W Yunnan.

## 16. ZEUXINE Lindley, Orchid. Scelet. 9. 1826 [“*Zeuxina*”], nom. cons.

线柱兰属 xian zhu lan shu

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

*Haplochilus* Endlicher; *Heterozeuxine* T. Hashimoto; *Monochilus* Wallich ex Lindley; *Psychechilos* Breda; *Strateuma* Rafinesque; *Tripleura* Lindley.

Herbs, terrestrial or rarely lithophytic. Rhizome usually elongate, creeping, fleshy, several noded; roots emerging from rhizome nodes, cylindric, stout. Stem erect or ascending, terete, leafy, glabrous. Leaves cauline or subrosulate, withered or pendulous at anthesis in some species, adaxially green to blackish, sometimes with a white stripe along midvein, linear-lanceolate, obliquely ovate-lanceolate, or elliptic, with or without a petiole-like base sheathing stem, sometimes slightly fleshy. Inflorescence glabrous or pubescent, with a few crowded to scattered sheathing bracts and a few to many flowers in a short to elongate terminal raceme; floral bracts usually equal in length to pedicel and ovary. Flowers resupinate or occasionally erect, small, not opening widely; ovary twisted, glabrous or pubescent. Sepals free, similar, outer surface glabrous to pubescent; dorsal sepal concave, forming a hood with petals; lateral sepals enclosing base of lip. Petals connivent with dorsal sepal, nearly as long as dorsal sepal though usually narrower; lip usually adnate to column margin at base, 2- or 3-partite or rarely entire; hypochile concave-saccate to cymbiform, containing 1 to a few scalelike, subulate or lamellate calli on each side at base; mesochile (when present) short, margin often involute and forming a tube, externally glabrous or pubescent and sometimes with a lamellate flange on each side; epichile dilated, entire to 2-lobed. Column short, dilated, with or without a pair of lateral wings; anther ovoid, 2-locular; pollinia 2, each longitudinally parted, granular-farinaceous, sectile, attached either directly to viscidium or via a short tegula; viscidium ligulate-lanceolate to ovate; rostellum conspicuous, erect, bifid; stigma lobes separate, convex, lateral or at apical corners of column. Capsule erect.

About 80 species: tropical and S Africa, through tropical and subtropical Asia, to New Guinea, NE Australia, and the SW Pacific islands; 14 species (two endemic) in China; two additional species (both endemic) are incompletely known.

This is a taxonomically complex group and further analysis of collections from throughout Asia is necessary before nomenclatural stability can be achieved.

- 1a. Leaves linear to linear-lanceolate, not stalked, base directly sheathing stem.
  - 2a. Plants 4–24 cm tall; ovary and sepals glabrous ..... 1. *Z. strateumatica*
  - 2b. Plants 20–35 cm tall; ovary and sepals pubescent ..... 2. *Z. membranacea*
- 1b. Leaves ovate-lanceolate to elliptic, base contracted into a petiole-like stalk sheathing stem.
  - 3a. Lip entire, rhombic, not adnate to column, base contracted and lacking calli ..... 3. *Z. integrilabella*
  - 3b. Lip 2- or 3-partite, base adnate to column, hypochile concave and containing 2 or more subulate, lamellate, or 2- or 3-digitate calli near base.
    - 4a. Epichile of lip transversely dilated but as broad as or narrower than hypochile, entire to shallowly 2-lobed.
      - 5a. Ovary sparsely hairy; sepals hairy abaxially ..... 5. *Z. philippinensis*
      - 5b. Ovary glabrous; sepals glabrous.
        - 6a. Leaves with a white line along midvein; inflorescence subdensely flowered; lip with a much-reduced mesochile; mesochile margin membranous, glabrous ..... 4. *Z. goodyeroides*
        - 6b. Leaves lacking a white line along midvein; inflorescence laxly flowered; lip lacking a mesochile, apical margin of hypochile fleshy, papillose ..... 6. *Z. agyokuana*
    - 4b. Epichile of lip dilated, broader than hypochile, distinctly 2-lobed.
      - 7a. Plants robust, 30–50 cm tall; leaves 5–12 × 3–7 cm; lateral sepals 8–9 mm ..... 7. *Z. odorata*
      - 7b. Plants slender to somewhat stout, to 35 cm tall; leaves 2–6 × 1–3 cm; lateral sepals 3–7.5 mm.
        - 8a. Midvein of leaves marked with silvery blotches or a white line (also on lateral veins in *Z. gengmanensis*); leaves not usually withering at anthesis.
          - 9a. Stem stout, ca. 5 mm in diam.; lateral veins of leaves marked with white lines; flowers pink; hypochile containing 2 short, rounded calli ..... 8. *Z. gengmanensis*
          - 9b. Stem slender, 1–2 mm in diam.; lateral veins of leaves without white lines; flowers white or pale yellow; hypochile containing 2 2- or 3-digitate to narrowly lamellate calli ..... 9. *Z. nervosa*
      - 8b. Leaves uniformly green or occasionally tinged with red, withering and pendulous at anthesis.
        - 10a. Lip T-shaped; epichile lobes diverging at right angles to axis of lip.
          - 11a. Lip white ..... 10. *Z. parvifolia*
          - 11b. Lip saffron ..... 11. *Z. flava*
        - 10b. Lip Y-shaped; epichile lobes diverging at acute angles to axis of lip; epichile not mucronate at apex.
          - 12a. Lip 7–9 mm; hypochile containing 2 lamellate calli, each often with a linear extension; epichile lobes 3–5.5 mm; column wings lacking ..... 12. *Z. grandis*
          - 12b. Lip to 6 mm; hypochile containing 2 subulate, hooked calli; epichile lobes 2–3 mm; column with triangular or transversely oblong wings.

- 13a. Lip straight, or epichile rotated gently downward; epichile lobes obovate-flabellate, 2–2.5 × 2–2.2 mm ..... 13. *Z. affinis*  
 13b. Epichile reflexed sharply downward from apex of mesochile; epichile lobes oblong to irregularly rhombic, 2.5–3 × 1.2–1.8 mm ..... 14. *Z. reflexa*

**1. *Zeuxine strateumatica*** (Linnaeus) Schlechter, Bot. Jahrb. Syst. 45: 394. 1911.

线柱兰 xian zhu lan

*Orchis strateumatica* Linnaeus, Sp. Pl. 2: 943. 1753; *Adenostylis emarginata* Blume; *A. integerrima* Blume; *A. strateumatica* (Linnaeus) Ames; *A. sulcata* (Roxburgh) Hayata; *Neottia strateumatica* (Linnaeus) R. Brown; *Pterygodium sulcatum* Roxburgh; *Spiranthes strateumatica* (Linnaeus) Lindley; *Tripleura pallida* Lindley; *Zeuxine bonii* Gagnepain; *Z. bracteata* Wight; *Z. brevifolia* Wight; *Z. emarginata* (Blume) Lindley; *Z. integerrima* (Blume) Lindley; *Z. procumbens* Blume; *Z. robusta* Wight; *Z. rupicola* Fukuyama; *Z. stenochila* Schlechter; *Z. strateumatica* f. *rupicola* (Fukuyama) T. Hashimoto; *Z. strateumatica* var. *rupicola* (Fukuyama) S. S. Ying; *Z. sulcata* (Roxburgh) Lindley; *Z. tripleura* Lindley; *Z. wariana* Schlechter.

Plants 4–24 cm tall, slender. Rhizome short. Stem erect or ascending, pale brown, with several to many leaves. Leaves cauline, usually clustered and overlapping, pale brown, linear to linear-lanceolate, sometimes bractlike, 2–8 × 0.2–0.6 cm, base directly sheathing stem, not stalked, apex acuminate. Inflorescence 2–7 cm, glabrous, with a few to more than 20 densely arranged flowers; floral bracts reddish brown, ovate-lanceolate, 8–12 mm, longer than flower, glabrous, apex long acuminate. Flowers resupinate, white or yellowish white, small; ovary and pedicel elliptic-cylindric, 5–6 mm, glabrous. Sepals glabrous; dorsal sepal narrowly ovate-oblong, concave, 4–6 × 2–3 mm, 1-veined, apex obtuse; lateral sepals obliquely oblong, 4–5.5 × 1.5–2.5 mm, 1-veined, apex acute or obtuse. Petals subovate to obovate, oblique, 4–5.5 × 1.5–1.8 mm, glabrous, 1-veined, apex obtuse; lip pale yellow to yellow, cymbiform, 4–5 mm, 3-partite; hypochile concave-saccate, containing 2 subtriangular, lamellate calli; mesochile ca. 1 mm, exterior surfaces minutely papillate toward apex, margin denticulate, involute; epichile transversely elliptic-oblong, 1.4–1.8 × 2–2.5 mm, minutely papillate, apex with a small mucro to slightly emarginate. Column ca. 1.5 mm; wings longitudinally oblong; rostellum arms ca. 0.6 mm. Capsule pale brown, elliptic, ca. 6 mm. Fl. Mar–Jul.  $2n = 20, 22, 40, 42, 50, 100$ .

Damp grasslands, meadows, valleys, along streams; below 1000 m. Fujian, Guangdong, Guangxi, Hainan, Hubei, Sichuan, Taiwan, Yunnan [Afghanistan, Bhutan, Cambodia, India, Japan, Kashmir, Laos, Malaysia, Myanmar, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; SW Asia, Pacific islands].

This is a weed in Saudi Arabia and the United States (Florida, Hawaii).

**2. *Zeuxine membranacea*** Lindley, Gen. Sp. Orchid. Pl. 486. 1840.

膜质线柱兰 mo zhi xian zhu lan

*Zeuxine debrajiana* Sud. Chowdhury; *Z. evrardii* Gagnepain; *Z. godefroyi* H. G. Reichenbach.

Plants 20–35 cm tall, slender. Rhizome short. Stem erect or ascending, pale brown, with several to many leaves. Leaves cauline, usually spaced along stem, pale brown, linear, 4–6 × 0.2–0.6 cm, base directly sheathing stem, not stalked, apex acuminate. Inflorescence 4–11 cm, often puberulent above, with many densely arranged flowers; floral bracts lanceolate, 5–10 mm, lower ones exceeding flower, abaxially pubescent, apex acuminate. Flowers resupinate, white, small; ovary and pedicel elliptic-fusiform, 5–7 mm, pubescent. Sepals puberulent on outer surface; dorsal sepal oblong-lanceolate, concave, ca. 6 × 3 mm, 1-veined, apex acute; lateral sepals oblong, ca. 5.5 × 2.5 mm, apex acute. Petals oblong-ovate, 4–5 × ca. 2.2 mm, glabrous, 1-veined, apex acute; lip white, cymbiform, 4–5 mm, 3-partite; hypochile concave-saccate, containing 2 calli; mesochile short; epichile transversely oblong, ca. 1.2 × 2.5 mm, apex with a small mucro. Column ca. 2 mm. Capsule pale brown, elliptic, ca. 7 mm. Fl. Nov–Jan.

Damp grasslands, meadows, valleys, along streams. Hong Kong [Bhutan, Cambodia, NE India, Myanmar, Thailand, Vietnam].

**3. *Zeuxine integrilabella*** C. S. Leou, Quart. J. Exp. Forest. Natl. Taiwan Univ. 8(4): 2. 1994.

全唇线柱兰 quan chun xian zhu lan

*Hetaeria integrilabella* (C. S. Leou) S. S. Ying.

Plants ca. 27 cm tall, slender. Rhizome usually short. Stem erect or ascending, pale reddish brown, 8–18 × 0.3–0.5 cm, 4- or 5-leaved. Leaves subrosulate, abaxially pale red, adaxially green with a silver-white stripe along midvein, oblong to ovate-elliptic, 2–7 × 1.5–3.5 cm, base obtuse or rounded, apex acute; petiole-like base pale purple, 0.5–1.7 cm including tubular sheath. Inflorescence to 15 cm, with 2 or 3 sterile bracts, tomentose, pale purple; rachis 8–14-flowered; floral bracts ovate, shorter than ovary, margin usually ciliate toward apex. Flowers resupinate; ovary and pedicel subcylindric, 7–8 mm, glabrous. Sepals pale brown, unequal in size, concave, glabrous; dorsal sepal elliptic, ca. 5.5 mm; lateral sepals oblong, ca. 5 mm. Petals white, falcate, 1-veined; lip rhombic, ca. 6 × 4 mm, entire, base contracted, not connate with column, lacking calli. Column 2.5–2.8 mm; wings low, triangular; anther ca. 2.2 mm; pollinia ca. 1.3 mm; rostellum arms ca. 1.2 mm. Fl. Apr.

- Broad-leaved forests; 1000–1800 m. C Taiwan.

The shape of the lip indicates that this taxon is a peloric mutant, with the presence of a silver-white stripe on the leaves and the low column wings suggesting an alliance to *Zeuxine goodyeroides*. More material is required on which to base a critical comparison.

**4. *Zeuxine goodyeroides*** Lindley, Gen. Sp. Orchid. Pl. 486. 1840.

白肋线柱兰 bai lei xian zhu lan

*Monochilus galeatus* Lindley; *M. goodyeroides* (Lindley) Lindley.

Plants 17–30 cm tall, slender to somewhat stout. Rhizome elongate. Stem erect, 4–6-leaved. Leaves cauline, adaxially green, with a white line along midvein, ovate to oblong-ovate, 3–5.5 × 1.8–2.5 cm, base obtuse, apex acute; petiole-like base 1–2 cm including tubular sheath. Inflorescence 9–18 cm, with 1 or 2 widely spaced sterile bracts, puberulent; rachis 2.5–5 cm, with several to more than 10 subdensely arranged flowers; floral bracts pink, ovate, nearly as long as ovary, abaxially glabrous, apex acuminate. Flowers resupinate, white or pink, small; ovary and pedicel fusiform, 9–10 mm, glabrous. Sepals glabrous, 1-veined; dorsal sepal ovate, concave, ca. 5 × 2.5 mm, apex acute; lateral sepals spreading, narrowly oblong-lanceolate, ca. 4.5 × 1–1.4 mm. Petals white, falcate, ca. 4.5 × 1.5 mm, 1-veined, apex subacute; lip white, cymbiform, ca. 4.5 mm, obscurely 3-partite; hypochile dilated, saccate, ca. 2.5 × 2 mm, containing 2 subulate, hooked calli; mesochile short, ca. 0.5 mm, glabrous, margin involute; epichile transversely dilated but narrower than hypochile, suborbicular or subreniform, ca. 1 × 1.8 mm, membranous, entire to shallowly 2-lobed at apex. Column 2–2.4 mm; wings low, transversely oblong; rostellum arms ca. 0.8 mm. Fl. Sep–Oct.

Forests, valleys, crevices on limestone; 1200–2500 m. W Guangxi, SE Yunnan [Bhutan, NE India, Myanmar, Nepal, Vietnam].

**5. *Zeuxine philippinensis*** (Ames) Ames, *Schedul. Orchid. Corrig.* xxxvii. 1938.

菲律宾线柱兰 *fei lü bin xian zhu lan*

*Adenostylis philippinensis* Ames, *Schedul. Orchid.* 6: 9. 1923.

Plants slender, ca. 10 cm tall. Rhizome elongate. Stem ascending, pale red-brown, 2–4-leaved. Leaves adaxially green, midrib white with dark green reticulation, triangular-lanceolate, 3.2–6 × 1.4–2.3 cm, 5-veined, apex acuminate; petiole ca. 1.5 cm. Inflorescence ca. 17 cm, hairy, with 5 sterile bracts; rachis ca. 8 cm, 13-flowered; floral bracts hairy. Flowers half opening, resupinate; ovary sparsely hairy. Sepals hairy abaxially; dorsal sepal concave, light brown, ovate, ca. 5 mm; lateral sepals dark green, ovate-lanceolate, ca. 4 mm. Petals white, falcate, ca. 4.5 mm; lip white, ca. 4 mm, obscurely 3-partite; hypochile ventricose-saccate, ca. 1.7 mm wide, inside containing 2 digitate calli; mesochile short; epichile dilated, reflexed, transverse-oblong or subreniform, ca. 1.7 mm wide, nearly entire at apex. Column ca. 2.2 mm. Fl. Feb–Mar.

Forests; ca. 200 m. S Taiwan [Philippines].

**6. *Zeuxine agyokuana*** Fukuyama, *Bot. Mag. (Tokyo)* 48: 433. 1934.

绿叶线柱兰 *lü ye xian zhu lan*

*Hetaeria agyokuana* (Fukuyama) Nackejima; *H. cristata* Blume var. *agyokuana* (Fukuyama) S. S. Ying.

Plants 10–25 cm tall, slender. Rhizome short. Stem ascending, purplish green, 4- or 5-leaved. Leaves usually clustered at stem apex, abaxially pale green, adaxially deep green, ovate-elliptic, 3–4.5 × 1.5–2 cm, margin undulate, apex acute; petiole-like base 0.8–1.2 cm including tubular sheath. Inflorescence 5–15 cm, with 2 or 3 sterile bracts, reddish brown,

puberulent; rachis 2–6 cm, laxly 3–10-flowered; floral bracts ovate-lanceolate, 6–8 mm, apex acuminate. Flowers resupinate, small; ovary and pedicel reddish, fusiform, 8–10 mm, glabrous. Sepals reddish brown, glabrous; dorsal sepal ovate, concave, 4–5 × 2.8–3 mm, apex acute to obtuse; lateral sepals widely spreading, lanceolate to narrowly ovate, 4–5 × 1.5–1.6 mm, apex acute. Petals white, narrowly obovate, 4–5 × ca. 2.5 mm, apex acute; lip ovate-cymbiform, shorter than sepals, 3–4 × 1.7–2 mm, 2-partite; hypochile concave-saccate, containing 2 subulate, occasionally divided, hooked calli, apical margin of hypochile slightly involute, thickened and distinctly fleshy, outer surface papillose; epichile much reduced, narrower than hypochile, reniform to ovate, 1–1.5 × ca. 1 mm, apex obtuse. Column ca. 3 mm; wings much reduced and indistinct; anther ca. 1.7 mm; rostellum arms narrowly linear, 1.5–2 mm. Fl. Sep.  $2n = 20$ .

Shaded humid places in broad-leaved forests; ca. 900 m. N Taiwan [Japan].

**7. *Zeuxine odorata*** Fukuyama, *Bot. Mag. (Tokyo)* 50: 20. 1936.

香线柱兰 *xiang xian zhu lan*

*Heterozeuxine odorata* (Fukuyama) T. Hashimoto.

Plants robust, 30–50 cm tall. Rhizome elongate, ca. 5 mm in diam. Stem ascending, stout, 4–6-leaved. Leaves cauline, widely spaced or sometimes clustered, not withering at anthesis, obliquely elliptic to ovate-elliptic, 5–12 × 3–7 cm, base rounded, apex acute; petiole-like base 1.5–3.5 cm including tubular sheath. Inflorescence 20–35 cm, with 3 or 4 sterile bracts, puberulent; rachis 5–8 cm, subdensely 10–15-flowered; floral bracts ovate-lanceolate, ca. 15 × 8 mm, pubescent on abaxial surface and margin, apex acuminate. Flowers fragrant, resupinate, half opening, relatively large; ovary and pedicel subcylindric, 8–10 mm, sparsely pubescent. Sepals whitish green, glabrous to puberulent; dorsal sepal ovate, concave, 6–8 × 4–5.5 mm, apex obtuse; lateral sepals obliquely ovate, 8–9 × 4–4.5 mm, apex obtuse to acute. Petals white, obliquely ovate, 7–8 × 3–4.5 mm, apex mucronate; lip white, Y-shaped, 9–9.5 mm, 3-partite; hypochile slightly dilated, saccate, ca. 4 × 3 mm, containing 2 to several lamellate calli; mesochile flat, ca. 1.5 × 1.5 mm, with 2 longitudinal keels; epichile dilated, ca. 3 × 7 mm, 2-lobed; lobes diverging at an acute angle, subsquare to suborbicular, ca. 2.8 × 2.8 mm, margin undulate, yellowish at base. Column 4–4.5 mm; wings quadrate; anther cordate, ca. 2.5 mm; rostellum arms ca. 2 mm. Fl. Apr.  $2n = 20$ .

Shaded humid places in forests; ca. 300 m. S Taiwan [Japan (Ryukyu Islands)].

**8. *Zeuxine gengmanensis*** (K. Y. Lang) Ormerod, *Lindleyana* 17: 238. 2002.

耿马齿唇兰 *geng ma chi chun lan*

*Anoectochilus gengmanensis* K. Y. Lang, *Acta Phytotax. Sin.* 34: 554. 1996.

Plants 18–22 cm tall, somewhat stout. Rhizome elongate. Stem ascending, stout, ca. 5 mm in diam., 5- or 6-leaved. Leaves cauline, not withering at anthesis, abaxially green, adax-

ially dark green, with white line along midvein and lateral veins, ovate to elliptic, 3–5.5 × 2–3 cm, base obliquely cuneate to obtuse, apex acute; petiole-like base 1.5–3 cm including tubular sheath. Inflorescence 8–12 cm, with 2 or 3 sterile bracts, pilose; rachis 5–6 cm, subdensely several to many flowered; floral bracts lanceolate to ovate-lanceolate, slightly shorter than ovary, abaxially puberulent, apex acuminate. Flowers resupinate, pink, small; ovary and pedicel cylindrical-fusiform, 10–12 mm, pubescent. Sepals pubescent; dorsal sepal ovate, concave, ca. 4 × 3 mm, 1-veined; lateral sepals widely spreading, ovate-elliptic, ca. 5.5 × 4 mm, 1-veined. Petals obliquely obovate, ca. 4.5 × 2.2 mm, 1-veined, apex obtuse; lip Y-shaped, ca. 6 mm, 3-partite; hypochile concave-saccate, containing 2 short, rounded calli; mesochile narrow, ca. 0.8 mm; epichile dilated, 2-lobed; lobes diverging at acute angle, quadrate, 2.5–3 × ca. 2 mm. Column ca. 2.8 mm; wings transversely oblong; anther triangular-ovoid, ca. 1.8 mm; rostellum arms ca. 0.5 mm. Fl. May.

- Shaded rocky slopes in forests; ca. 2500 m. SW Yunnan.

**9. *Zeuxine nervosa*** (Wallich ex Lindley) Trimen, J. Ceylon Branch Roy. Asiat. Soc. 9: 90. 1885.

芳香线柱兰 fang xiang xian zhu lan

*Monochilus nervosus* Wallich ex Lindley, Gen. Sp. Orchid. Pl. 487. 1840; *Adenostylis formosana* (Rolfe) Hayata; *A. zamboangensis* Ames; *Haplochilus nervosus* (Wallich ex Lindley) D. Dietrich; *Heterozeuxine nervosa* (Wallich ex Lindley) T. Hashimoto; *Zeuxine cognata* Ohwi & T. Koyama; *Z. fluvida* Fukuyama; *Z. formosana* Rolfe; *Z. hengchuanense* S. S. Ying; *Z. somae* Tuyama; *Z. vittata* Rolfe ex Downie; *Z. zamboangensis* (Ames) Ames.

Plants 20–35 cm tall, slender. Rhizome elongate. Stem erect, 1–2 mm in diam., 3–6-leaved. Leaves clustered at stem apex, not usually withering at anthesis, adaxially green, usually with silvery blotches or a white line along midvein, ovate to ovate-elliptic, 4–6 × 1.5–2.5 cm, apex acute; petiole-like base 1–1.5 cm including tubular sheath. Inflorescence 18–28 cm, with 2 or 3 widely spaced sterile bracts, sparsely villous; rachis 3–10 cm, with a few to more than 10 subdensely arranged flowers; floral bracts reddish brown, ovate-lanceolate, cymbiform, 6–10 × 3–4.5 mm, abaxially puberulent to glabrous, margin ciliate, apex acuminate. Flowers fragrant, resupinate, weakly spreading, small; ovary and pedicel fusiform, 8–9 mm, glabrous to puberulent. Sepals reddish brown to yellowish green, glabrous; dorsal sepal ovate, concave, 5–5.5 × 4.5–5 mm, apex acute or subacuminate; lateral sepals oblong-ovate, 6–6.5 × ca. 3.5 mm, apex acute to obtuse. Petals white, ovate, oblique, ca. 5.5 × 3.2 mm, glabrous, apex obtuse; lip white or pale yellow, Y-shaped, to 7 mm, 3-partite; hypochile concave-saccate, ca. 2.5 × 2.5 mm, containing 2 2- or 3-digitate to narrowly lamellate calli; mesochile relatively long and narrow, ca. 1.5 mm, margin incurved; epichile dilated, ca. 4 mm wide, 2-lobed; lobes diverging at an acute angle, suborbicular, ca. 2 × 2 mm. Column ca. 2.2 mm; wings prominent, broadly triangular; rostellum arms ca. 1.2 mm. Fl. Feb–Mar.  $2n = 20$ .

Damp places in forests; 200–1200 m. S Taiwan, S and SW Yunnan [Bangladesh, Bhutan, Cambodia, NE India, Japan (Ryukyu Islands), Laos, Nepal, Philippines, Sri Lanka, Thailand, Vietnam].

**10. *Zeuxine parvifolia*** (Ridley) Seidenfaden, Dansk Bot. Ark. 32(2): 82. 1978.

白花线柱兰 bai hua xian zhu lan

*Hetaeria parvifolia* Ridley, J. Straits Branch Roy. Asiat. Soc. 39: 87. 1903; *Adenostylis benguetensis* Ames; *Zeuxine benguetensis* (Ames) Ames; *Z. boninensis* Tuyama; *Z. gracilis* (Breda) Blume var. *sakagutii* (Tuyama) Hashimoto; *Z. gracilis* var. *tenuifolia* (Tuyama) T. Hashimoto; *Z. leucochila* Schlechter; *Z. sakagutii* Tuyama; *Z. shuishiehensis* S. S. Ying; *Z. tenuifolia* Tuyama; *Z. tonkinensis* Gagnepain.

Plants 15–22 cm tall, slender. Rhizome elongate. Stem erect, pale purplish brown, 3–6-leaved. Leaves cauline, widely spaced, withered or pendulous at anthesis, pale green, ovate to elliptic, 2–4(–6) × 1.2–2 cm, apex obtuse to acute; petiole-like base 1–1.5 cm including tubular sheath, margin sometimes ciliate. Inflorescence 10–20 cm, with 2 or 3 sterile bracts, pubescent; rachis 2–7.5 cm, with 3 to more than 10 laxly to subdensely arranged flowers; floral bracts pale red, ovate-lanceolate, 4–7 mm, shorter than ovary, pubescent abaxially and on margin, apex long acuminate. Flowers resupinate, small; ovary and pedicel fusiform, 6–9 mm, puberulent. Sepals dark green to purple-brown, sparsely puberulent; dorsal sepal ovate-lanceolate to ovate, 3.8–4.5 × 2–2.8 mm, 1-veined, apex acute; lateral sepals weakly to widely spreading, oblong-ovate, slightly oblique, 3.8–4.5 × 1.5–2 mm, 1-veined, apex acute to obtuse. Petals white, suboblanceolate-oblong, oblique, 4–4.5 × 1.2–1.3 mm, 1-veined, base attenuate, apex subobtuse; lip white or pale yellow, T-shaped, 3.5–5 mm, 3-partite; hypochile saccate, containing 2 subulate, hooked calli; mesochile ca. 1 mm, margin involute toward apex; epichile transversely oblong, ca. 1 × 3–4 mm, composed of 2 lobes diverging at right angles to axis of lip, often with a small mucro at apex between lobes; lobes suboblong, 1.5–2 × 0.8–1.2 mm, apical margin entire or sometimes irregularly denticulate. Column ca. 2 mm; wings much reduced and indistinct; anther ovoid-lanceolate, ca. 1.5 mm; rostellum arms linear, ca. 0.8 mm. Fl. Feb–Aug.  $2n = 20$ .

Damp places, rocky soils in forests, mountain slopes; 200–1700 m. Hainan, Hong Kong, Taiwan, S and SW Yunnan [Cambodia, Japan, Laos, Malaysia, Myanmar, Philippines, Thailand, Vietnam].

This is a widespread and variable species in need of critical review. Reassessment of type material for certain synonyms placed here may reveal that they represent distinct species. The Japanese names are tentatively considered conspecific, following Garay and Sweet (Orchids S. Ryukyu Islands, 83–85. 1974).

**11. *Zeuxine flava*** (Wallich ex Lindley) Trimen, J. Ceylon Branch Roy. Asiat. Soc. 9: 90. 1885.

黄花线柱兰 huang hua xian zhu lan

*Monochilus flavus* Wallich ex Lindley, Gen. Sp. Orchid. Pl. 487. 1840; *Haplochilus flavus* (Wallich ex Lindley) D. Dietrich; *Zeuxine aurantiaca* Schlechter.

Plants 20–30 cm tall, slender. Stem erect, 3- or 4-leaved. Leaves spaced, often withered and pendulous at anthesis, broadly lanceolate to narrowly ovate, 5–6 × 1.5–2 cm, apex

acuminate; petiole-like base including tubular sheath 1–1.2 cm. Inflorescence to 13 cm, with several sterile bracts, pubescent; rachis 4–5 cm, 8–15-flowered; floral bracts lanceolate, ca. 5 mm, hairy abaxially, apex caudate. Flowers resupinate, not fully opening, saffron, small; pedicel and ovary glabrescent, ca. 1.2 cm. Dorsal sepal subovate, concave, ca.  $3.5 \times 2$  mm; lateral sepals oblique, ca.  $3 \times 1.2$  mm. Petals oblong, ca.  $2.5 \times 1$  mm; lip T-shaped, ca. 3 mm, 3-partite; hypochile saccate, inside with 2 hooked calli; mesochile ca. 1 mm, with involute margin; epichile transversely oblong, ca.  $1 \times 4.5$  mm, with 2 lobes diverging at nearly right angles to axis of lip. Column ca. 2 mm. Fl. May.

Open forests in limestone areas; ca. 1400 m. SE Yunnan [Bhutan, N India, Malaysia, Myanmar, Nepal, Thailand, Vietnam].

**12. *Zeuxine grandis*** Seidenfaden, Dansk Bot. Ark. 32(2): 90. 1978.

大花线柱兰 da hua xian zhu lan

Plants 12–25 cm tall, slender. Rhizome elongate. Stem erect, 3–6-leaved. Leaves cauline, withered and pendulous at anthesis, green, often tinged with red, lanceolate, narrowly elliptic, or ovate,  $2-5 \times 1-2$  cm, apex acute; petiole-like base 1.5–2.5 cm including tubular sheath. Inflorescence 6–20 cm, with 2 or 3 sterile bracts, pubescent; sterile bracts small, abaxially pubescent; rachis 2–10 cm, laxly to subdensely 4–23-flowered; floral bracts lanceolate, ca. 10 mm, slightly shorter than ovary, abaxially pubescent, apex long acuminate. Flowers resupinate, relatively large; ovary and pedicel narrowly elliptic, 7–10 mm, pubescent. Sepals greenish, ovate,  $5-7.5 \times$  ca. 3 mm, pubescent; dorsal sepal tinged white toward apex, 1-veined, apex obtuse; lateral sepals slightly longer than dorsal sepal, 1-veined, margin white, apex obtuse to acute. Petals white, oblong, slightly oblique,  $5-7.5 \times 2-3$  mm, glabrous, 2-veined, apex obtuse-subtruncate; lip white, sometimes with a yellow patch on disk, Y-shaped, 7–9 mm, 3-partite; hypochile concave-saccate, ca.  $2 \times 1.5$  mm, containing 2 lamellate calli, each often with a linear extension; mesochile ca. 2 mm, narrow, margin erect; epichile dilated, distinctly 2-lobed; lobes not diverging widely, orbicular to obovate,  $3-5.5 \times 3-4$  mm, apical margin undulate. Column ca. 3 mm; wings lacking; rostellum arms ca. 1 mm. Fl. Feb–Apr.

Forests; ca. 600 m. Hainan, Hunan [Thailand, Vietnam].

**13. *Zeuxine affinis*** (Lindley) Bentham ex J. D. Hooker, Fl. Brit. India 6: 108. 1890.

宽叶线柱兰 kuan ye xian zhu lan

*Monochilus affinis* Lindley, Gen. Sp. Orchid. Pl. 487. 1840; *Adenostylis arisanensis* (Hayata) Hayata; *Zeuxine arisanensis* Hayata; *Z. sutepensis* Rolfe ex Downie; *Z. taiwaniana* S. S. Ying; *Z. uraiensis* S. S. Ying.

Plants 11–30 cm tall, slender. Rhizome elongate. Stem erect, deep reddish brown to greenish brown, 4–6-leaved. Leaves subrosulate, withered and pendulous at anthesis, often reddish, ovate, ovate-lanceolate, or elliptic,  $2.5-4 \times 1.2-2.5$  cm, apex acute or obtuse; petiole-like base ca. 1 cm including

tubular sheath. Inflorescence 5–20 cm, with 1 or 2 puberulent sterile bracts, pubescent, pale brown; rachis 3–9 cm, subdensely several to many flowered; floral bracts ovate-lanceolate, 7–8 mm, pubescent on margin and lower half of abaxial surface, apex long acuminate. Flowers resupinate or occasionally erect, small; ovary and pedicel fusiform, 5–6 mm, glabrous to puberulent. Sepals not spreading, dark brownish green at base, white toward apex, pubescent; dorsal sepal broadly ovate,  $4-5 \times$  ca. 2.5 mm, concave, 1-veined, apex obtuse or acute; lateral sepals ovate-oblong, slightly oblique,  $3.5-4.5 \times$  ca. 2.5 mm, 1-veined, apex obtuse. Petals white, elliptic to obovate, oblique, ca. as long as dorsal sepal, 1.5–2 mm wide, 1-veined, apex obtuse; lip white or pale yellow, Y-shaped, 4.5–6 mm, 3-partite; hypochile concave-saccate, containing 2 subulate, hooked calli; mesochile short, to 1 mm, tapering toward apex, margin involute; epichile dilated, 2-lobed; lobes not diverging widely, obovate-flabellate, widening toward apex,  $2-2.5 \times 2-2.2$  mm. Column 1.5–2 mm; wings triangular; anther ovoid-lanceolate, to 2 mm; rostellum arms oblong, ca. 0.6 mm. Fl. Feb–Apr.  $2n = 20$ .

Shaded places in forests, forest margins, valleys; 800–1700 m. Guangdong, Hainan, Hunan, Taiwan, Yunnan [Bangladesh, Bhutan, India, Laos, Malaysia, Myanmar, Thailand, Vietnam].

Hong Kong plants previously treated as *Zeuxine gracilis* (Breda) Blume (e.g., by S. Y. Hu, Gen. Orchidaceae Hong Kong, 50. 1977) are probably referable here.

**14. *Zeuxine reflexa*** King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 291. 1898.

折唇线柱兰 zhe chun xian zhu lan

Plants 15–30 cm tall, slender. Rhizome elongate. Stem erect, greenish brown, 4–6-leaved. Leaves cauline, widely spaced, withered at anthesis, bright green, ovate-lanceolate,  $3-4 \times 1.5-2$  cm, base obtuse, apex acute; petiole-like base 1–2.5 cm including tubular sheath. Inflorescence 10–20 cm, with 1 or 2 pubescent sterile bracts, villous; rachis 5–8 cm, subdensely several to densely many flowered; floral bracts reddish brown, ovate-lanceolate, 6–8 mm, pubescent, margin ciliate, apex acuminate. Flowers resupinate, small; ovary and pedicel subcylindric-elliptic, 8–10 mm, pubescent. Sepals not widely spreading, dark greenish brown, puberulent; dorsal sepal ovate,  $3-4.5 \times$  ca. 2 mm; lateral sepals ovate, slightly oblique,  $3-4.3 \times$  ca. 1.8 mm. Petals white, suboblong to subovate, ca. as long as to slightly longer than dorsal sepal, apex acute to obtuse; lip Y-shaped,  $3.8-5.2$  mm, 3-partite, white at base, mesochile and epichile sometimes yellow; hypochile saccate, containing 2 subulate, hooked calli; mesochile flat, variable in length, to 1.5 mm; epichile dilated, reflexed downward, 2-lobed; lobes diverging at an acute angle, oblong to irregularly rhombic,  $2.5-3 \times 1.2-1.8$  mm. Column 2–2.5 mm; wings low, transversely oblong; anther triangular-lanceolate, ca. 1.5 mm; rostellum arms oblong, ca. 0.8 mm. Fl. Apr.

Open places in forests; ca. 700 m. Hong Kong, Taiwan [Bhutan, NE India, Thailand].

A collection from Hong Kong at Kew (*Barretto s.n.*) is tentatively referred here.

## Incompletely known species

**Zeuxine nijimae** Tatewaki & Masamune, Bot. Mag. (Tokyo) 46: 772. 1932 [“*nijimai*”].

眉原线柱兰 *mei yuan xian zhu lan*

Plants ca. 20 cm tall, slender. Rhizome ascending. Stem 2-leaved. Leaves ovate-lanceolate, slightly oblique, ca.  $2.5 \times 1.5$  cm, membranous, base rounded, apex acute; petiole-like base ca. 0.7 cm including tubular sheath. Rachis ca. 2 cm, 2- or 3-flowered; floral bracts ovate-lanceolate, ca. as long as ovary, apex acuminate. Flowers small. Dorsal sepal ovate, concave, ca. 6 mm, apex acuminate; lateral sepals obliquely ovate, ca.  $5 \times 2$  mm, 1- or 3-veined, apex obtuse. Petals ovate-deltoid, ca.  $5 \times 2.5$  mm, apex acute; lip Y-shaped, ca. 4 mm; epichile 2-lobed; lobes obliquely orbicular, ca.  $2 \times 1.5$  mm. Column ca. 2 mm. Fl. Apr.

• C Taiwan.

The type material has not been seen by us. This taxon is possibly conspecific with *Zeuxine affinis*.

**Zeuxine kantokeiensis** Tatewaki & Masamune, Bot. Mag. (Tokyo) 46: 772. 1932.

关刀溪线柱兰 *guan dao xi xian zhu lan*

Plants ca. 30 cm tall, slender. Leaves withered at anthesis. Inflorescence 9–21 cm, pubescent, with a few sterile bracts; sterile bracts ovate-deltoid, ca.  $10 \times 3$  mm, apex acuminate; rachis 3–9 cm; floral bracts ovate, ca.  $4 \times 2$  mm, apex acute-acuminate. Flowers subaxially arranged, small; ovary ovoid, ca. 3 mm including pedicel. Dorsal sepal ovate, concave, ca. 3 mm, outer surface pubescent, 1-veined, apex acute to obtuse; lateral sepals obliquely ovate, ca.  $2 \times 1$  mm, 3-veined, apex acute to obtuse. Petals oblong, ca.  $2 \times 1$  mm, glabrous, apex obtuse; lip T-shaped; epichile 2-lobed; lobes ca.  $1.3 \times 1$  mm, apex obtuse. Column ca. 1 mm; rostellum arms linear, ca. 1 mm. Fl. Apr.

• C Taiwan.

The type material has not been seen by us. This taxon is possibly conspecific with *Zeuxine parvifolia*.

## 17. VRYDAGZYNEA Blume, Coll. Orchid. 71; Fl. Javae Nov. Ser. 1: 59. 1858–1859.

二尾兰属 *er wei lan shu*

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

Herbs, terrestrial or rarely epiphytic. Rhizome elongate or short, ascending, cylindrical, fleshy, with nodes bearing several slender roots. Stem erect or ascending, leafy. Leaves ovate, slightly fleshy, with a short petiole-like base sheathing stem. Inflorescence erect, terminal, racemose, densely several to many flowered. Flowers resupinate, not fully opening, medium-sized or small; ovary twisted, cylindrical-fusiform, pubescent. Sepals subequal; dorsal sepal and petals forming a hood; lateral sepals free, spreading. Lip short, triangular-ovate, obscurely 3-lobed, spurred at base; spur conic to fusiform, large, projecting between base of lateral sepals, containing 2 stalked glands near base. Column very short, stout; anther erect, on dorsal side of column, 2-locular; pollinia 2, granular-farinaceous, narrowly obovoid, attenuate at base, attached to a large ovate-oblong viscidium; rostellum short, erect, remnant shortly bifid; stigma 2-lobed; lobes separate, raised, protruding beyond sides of rostellum.

About 35 species: India to the Pacific islands; one species in China.

### 1. *Vrydagzynea nuda* Blume, Coll. Orchid. 71. 1858–1859.

二尾兰 *er wei lan*

*Vrydagzynea albida* Blume var. *formosana* (Hayata) T. Hashimoto; *V. formosana* Hayata.

Plants terrestrial, 5–18 cm tall. Leaves 5–7, deep green, ovate to ovate-elliptic,  $2-3.5 \times 0.7-2.5$  cm, base broadly truncate or subrounded, apex acute; petiole-like base 1–1.5 cm. Rachis 2–5 cm, 3–10-flowered, pubescent; floral bracts triangular to ovate-lanceolate,  $8-9 \times 3.5-4$  mm, abaxially pubescent, apex acuminate. Flowers white or greenish white; ovary and pedicel 6–8 mm. Sepals white or pale green, abaxially pubes-

cent at base, fleshy at apex; dorsal sepal narrowly ovate-oblong, cymbiform,  $5-6 \times 1.5-2.5$  mm, apex obtuse; lateral sepals ovate-lanceolate, oblique,  $5-6 \times 2-3$  mm, apex obtuse. Petals white, linear to narrowly ovate,  $4.5-5 \times 0.8-2.3$  mm, apex obtuse; lip white, erect, oblong-elliptic or obovate, concave,  $3-4 \times 2.5-3.5$  mm, apex rounded-bifid; spur pendulous, parallel to ovary, conic-cylindrical,  $4-5 \times 1.5-2.5$  mm, apex obtuse and shallowly 2-lobed. Column erect, 3-lobed, ca. 2 mm; rostellum flat, apex forming a viscidium. Fl. Mar–May.

Damp forests and humid places along valleys; 300–700 m. Hainan, Hong Kong, C and N Taiwan [Indonesia (Java), Malay Archipelago (Borneo)].

## 18. ANOECTOCHILUS Blume, Bijdr. 411. 1825 [“*Anecochilus*”], nom. cons.

金线兰属 *jin xian lan shu*

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

*Chrysobaphus* Wallich.

Herbs, terrestrial. Rhizome creeping, terete, several noded, fleshy; roots narrowly filiform to fibrous, villous, arising singly from rhizome nodes. Stem erect or ascending, with 1 to a few loose tubular sheaths at base, and a few clustered subrosulate leaves, glabrous. Leaves green to purplish black with white, pinkish, or golden reticulate venation on adaxial surface, ovate or elliptic, velvety and often slightly fleshy, with a long petiole-like base dilating into tubular amplexicaul sheath. Inflorescence erect, terminal, race-



mose, pubescent; peduncle with a few scattered sheathing bracts; rachis laxly 2–10-flowered. Flowers resupinate or not; ovary slender, twisted or not. Sepals free, similar, often widely spreading, outer surface usually pubescent; dorsal sepal forming a hood with petals. Petals obliquely ligulate-oblong, membranous; lip basally adnate to base of column, distinctly 3-partite, with an exerted conic to cylindrical spur at base; hypochile subtubular, lateral margin erect; mesochile short to elongate, canaliculate, both external lateral margins with an entire, pectinate or filamentous flange; epichile entire to deeply 2-lobed, lobes divergent, rarely divided; spur containing a pair of irregular calli or septa. Column short, dorsally dilated, ventrally with 2 intramarginal, lamellate or fleshy appendages (wings); anther erect, ovoid, 2-locular; pollinia 2, clavate, sectile, granular-farinaceous, each attenuate into a narrow stalk attached to a solitary ovate viscidium; rostellum usually erect, remnant shortly bifid; stigma lobes 2, separate, convex, placed laterally toward apex of column. Capsule narrowly ellipsoid.

About 30 species: India and the E Himalayas, through S and SE Asia to Australia and the SW Pacific islands; 11 species (seven endemic) in China.

The taxonomic distinction between *Anoectochilus* and its close ally *Odontochilus* has been problematic, and members of the latter (and other closely related genera) have frequently been lumped with those of the former. *Anoectochilus* is circumscribed here in line with Pridgeon et al. (Gen. Orchid. 3: 69–72. 2003), which regards the ornate venation of the leaves, the conic spur that is exerted beyond the bases of the lateral sepals, and the widely separated stigma lobes that are placed laterally toward the apex of the column as definitive generic characters. Members of *Odontochilus*, in contrast, lack colored reticulate venation on their leaves, possess only a short saccate hypochile that is enclosed within the bases of the lateral sepals, and have confluent or narrowly separated stigma lobes that are positioned directly beneath the rostellum. Further work is clearly required to better resolve generic and specific affinities; the endemic species of China, in particular, remain poorly known.

A photograph labeled "*Anoectochilus roxburghii*" by X. H. Jin, X. D. Zhao, and X. C. Shi (Native Orchids Gaoligongshan Mts. China, 79. 2009) appears to represent *A. calcareus* Averyanov (Bot. Zhurn. (Moscow & Leningrad) 81(10): 75. 1996). This would be a new record for China, but it was discovered too late to be given a full entry in the present treatment.

- 1a. Lip T-shaped, epichile lobes diverging at right angles to axis of lip ..... 1. *A. pingbianensis*  
 1b. Lip Y-shaped, epichile lobes diverging at an acute angle to one another.  
 2a. Mesochile of lip with entire or occasionally shallowly notched flanges.  
 3a. Lip 13–22 mm, yellow; spur 2–3.2 mm, apex obtuse ..... 2. *A. burmannicus*  
 3b. Lip ca. 10 mm, white; spur 4–6 mm, apex deeply bilobed ..... 3. *A. koshunensis*  
 2b. Mesochile of lip with pectinate or filamentous flanges.  
 4a. Flowers resupinate; ovary twisted.  
 5a. Mesochile flange composed of 4–8 teeth, each tooth ca. 1 mm ..... 4. *A. xingrenensis*  
 5b. Mesochile flange 3–9-laciniate, each filament 2–8 mm.  
 6a. Ovary and pedicel ca. 8 mm; flange filaments of lip mesochile 2–3.5 mm ..... 5. *A. baotingensis*  
 6b. Ovary and pedicel 10–14 mm; flange filaments of lip mesochile 4–8 mm.  
 7a. Lip pale yellowish white; mesochile flanges 4- or 5-laciniate; spur 2–4 mm ..... 6. *A. formosanus*  
 7b. Lip white; mesochile flanges 7–9-laciniate; spur ca. 8 mm ..... 7. *A. hainanensis*  
 4b. Flowers usually erect, not resupinate; ovary not twisted.  
 8a. Lip pinkish white, mesochile flanges 6–8-laciniate, each filament 2.5–6 mm ..... 8. *A. roxburghii*  
 8b. Lip white, mesochile flanges fimbriate, composed of 2–5 teeth, each tooth 1.5–3 mm.  
 9a. Epichile lobes 8–9 × 6–7 mm ..... 9. *A. chapaensis*  
 9b. Epichile lobes 5–6 × 2–5 mm.  
 10a. Leaves 0.7–2.6 × 0.6–2.1 cm; epichile lobes flabellate, ca. 5 mm wide ..... 10. *A. zhejiangensis*  
 10b. Leaves 3.5–4 × 3–3.2 cm; epichile lobes oblong to oblanceolate, ca. 2 mm wide ..... 11. *A. emeiensis*

**1. *Anoectochilus pingbianensis*** K. Y. Lang, Acta Phytotax. Sin. 34: 556. 1996.

屏边金线兰 ping bian jin xian lan

Plants 15–18 cm tall. Stem erect or ascending, 3–4 mm in diam., 4- or 5-leaved. Leaves abaxially pale green or pale red, adaxially dark green with gold venation, ovate, slightly oblique, 3–4.5 × 2–3 cm, apex acute; petiole-like base and tubular sheath 1.5–2 cm. Peduncle ca. 9 cm, with 2 or 3 pale red sheathing sterile bracts; rachis ca. 4 cm, few to 8-flowered; floral bracts ovate-lanceolate, 10–13 mm, ca. as long as ovary, outer surface pubescent, apex acuminate. Flowers resupinate; ovary and pedicel twisted, cylindrical-fusiform, 10–12 mm, densely pubescent. Sepals pink, outer surface pubescent, 1-veined; dorsal sepal ovate, cymbiform, ca. 6 × 4 mm, apex acute; lateral sepals spreading, oblong, slightly oblique, ca. 8 × 3.5 mm, apex acute. Petals white, ovate, slightly oblique, ca. 6

× 2 mm, 1-veined, apex acute; lip white, T-shaped, ca. 9 mm; hypochile ca. 2 mm; mesochile ca. 2.8 mm; flanges laciniate, composed of 5 or 6 narrow filaments; epichile transversely dilated, broader than long, 2-lobed; lobes diverging at right angles to axis of lip, narrowly oblong, entire, ca. 5.5 × 1.2 mm, apex obtuse; spur conic, ca. 3 mm, mouth ca. 2 mm in diam., apex obtuse, containing 2 narrowly elliptic, fleshy, stalked calli near entrance. Column ovoid, ca. 2.8 mm, with 2 lamellate wings; stigma lobes suborbicular. Fl. Oct.

• Shaded humid places in forests; ca. 1500 m. SE Yunnan.

**2. *Anoectochilus burmannicus*** Rolfe, Bull. Misc. Inform. Kew 1922: 24. 1922.

滇南金线兰 dian nan jin xian lan

Plants 16–30 cm tall. Roots fibrous, to 9 cm. Stem erect, 3–6-leaved. Leaves abaxially pinkish red, adaxially blackish

green with limited bronze venation, broadly ovate to ovate-elliptic, slightly oblique, 3–8 × 1.8–5 cm, apex acute; petiole-like base and tubular sheath 1.5–2.8 cm. Peduncle 9–14 cm, with 2 or 3 pale red sterile sheathing bracts; rachis 3.5–6 cm, 3–12-flowered; floral bracts ovate-lanceolate, often sheathing ovary at base, 9–14 mm, shorter than ovary, outer surface sparsely pubescent, apex acuminate. Flowers erect, not resupinate; ovary and pedicel narrowly fusiform, not twisted, 11–15 mm, pubescent. Sepals pink, outer surface pubescent, 1-veined; dorsal sepal broadly ovate, cymbiform, 4.5–6 × 4–5 mm, apex subobtusate; lateral sepals spreading, oblong-elliptic, oblique, 6–7.5 × 3–5 mm, apex subacute. Petals yellowish white, broadly ovate-elliptic, strongly oblique, falcate, 5–6 × 3–4 mm, 1-veined, apex obtuse; lip yellow, Y-shaped, 13–22 mm; hypochile 2–3 mm; mesochile reflexed at right angle from apex of hypochile, 5–9 mm; flanges narrow, margin entire, terminating in small, slightly revolute auricles at apex of mesochile; epichile longitudinally dilated, 2-lobed; lobes diverging at an acute angle to one another, oblong, oblanceolate, or spatulate, 6–9 × 2–3 mm, entire, apex obtuse; spur conic, 2–3.2 mm, mouth 1.5–2.2 mm in diam., apex obtuse, containing 2 subelliptic, sessile calli near entrance. Column broadly ovoid, ca. 3 mm, with 2 lamellate wings; stigma lobes elliptic. Fl. Sep–Dec.

Damp places in evergreen broad-leaved forests, valleys; 1000–2200 m. S Yunnan [Laos, Malaysia (Peninsular), Myanmar, Thailand].

**3. *Anoectochilus koshunensis*** Hayata, Icon. Pl. Formosan. 4: 104. 1914.

恒春银线兰 heng chun yin xian lan

*Odontochilus koshunensis* (Hayata) S. S. Ying.

Plants ca. 20 cm tall. Stem ascending, 2–4-leaved. Leaves abaxially reddish purple, adaxially blackish green with white venation, ovate to orbicular-ovate, 3–4 × 2–3 cm, apex acute; petiole-like base and tubular sheath ca. 1 cm. Peduncle 7–10 cm, with 2 or 3 sheathing sterile bracts, reddish brown; rachis ca. 4.5 cm, 5- or 6-flowered; floral bracts pinkish, ovate to ovate-lanceolate, ca. 7 mm, shorter than ovary, outer surface pubescent. Flowers suberect, not resupinate, white; ovary and pedicel cylindrical-fusiform, not twisted, ca. 12 mm, pubescent. Sepals reddish brown, pubescent on outer surface, 1-veined; dorsal sepal orbicular-ovate, cymbiform, 5–5.5 × 3–4 mm, apex acute to cuspidate; lateral sepals spreading, narrowly elliptic, oblique, 7–8 × 3.5–4 mm, apex acute. Petals white, ovate-elliptic, strongly oblique, falcate, 5.5–6 × 1.5–2 mm, 1-veined, apex cuspidate and incurved; lip white, Y-shaped, ca. 10 mm; hypochile 1–2 mm; mesochile reflexed at right angle from apex of hypochile, 3–4 mm; flanges oblong to linear-lanceolate, 4–5 × ca. 2 mm, entire or sometimes shallowly notched at apex; epichile longitudinally dilated, 2-lobed; lobes diverging at an acute angle to one another, oblong, 7–9 × 3.5–3.7 mm, apex obtuse to slightly mucronate; spur tubular-conic, 4–6 mm, mouth ca. 2 mm in diam., apex deeply bilobed, containing 2 irregular, stalked calli. Column ovoid, 3–3.5 mm, with 2 lamellate wings; stigma lobes orbicular. Fl. Jul–Oct.

• Broad-leaved evergreen forests; 700–2000 m. Taiwan.

**4. *Anoectochilus xingrenensis*** Z. H. Tsi & X. H. Jin, Acta Phytotax. Sin. 40: 84. 2002.

兴仁金线兰 xing ren jin xian lan

Plants 15–20 cm tall. Stem ascending, 2–3 mm in diam., 2–5-leaved. Leaves adaxially dark green with golden venation, ovate to orbicular-ovate, 2–5 × 2–3 cm, apex apiculate; petiole-like base and tubular sheath 1.5–2 cm. Peduncle ca. 12 cm, with 2 or 3 sterile sheathing bracts; rachis 3–5 cm, 3–5-flowered; floral bracts pink, ovate-lanceolate, 10–12 mm, subequal in length to ovary. Flowers resupinate; ovary and pedicel twisted, 10–13 mm, pubescent. Sepals pinkish red, outer surface pubescent; dorsal sepal ovate, concave, 5–7 × 3–5 mm, apex acute; lateral sepals suboblong, slightly oblique, 7–9 × 3.5–5 mm, apex acute. Petals white, ovate, oblique, 6–8 × 2–3 mm, 1-veined, apex cuspidate; lip white, Y-shaped, 13–18 mm; hypochile ca. 3 mm; mesochile ca. 3 mm; flanges pectinate, composed of 4–8 short teeth, each tooth ca. 1 mm; epichile longitudinally dilated, 2-lobed; lobes diverging at an acute angle to one another, flabellate, 6–7 × 2.5–3.5 mm, apical margin slightly incised; spur narrowly conic, 3–4 mm, mouth ca. 2 mm in diam., containing 2 irregular calli. Column ca. 1 mm. Fl. Aug.

• Forests; ca. 1200 m. SW Guizhou (Xingren).

**5. *Anoectochilus baotingensis*** (K. Y. Lang) Ormerod, Taiwaniana 48: 87. 2003.

保亭金线兰 bao ting jin xian lan

*Anoectochilus roxburghii* (Wallich) Lindley var. *baotingensis* K. Y. Lang, Acta Phytotax. Sin. 34: 557. 1996.

Plants 15–17 cm tall. Stem erect, 2- or 3-leaved. Leaves purplish red, suborbicular, ca. 3 × 2.5 mm, apex acute; petiole-like base and tubular sheath ca. 0.6 cm. Peduncle ca. 8 cm, with 3 sheathing sterile bracts; rachis ca. 1 cm, 3-flowered; floral bracts ovate-lanceolate, 9–12 mm, ca. as long as to exceeding ovary, apex acute. Flowers resupinate, white; ovary and pedicel twisted, cylindrical-fusiform, ca. 8 mm, pubescent. Sepals 1-veined, outer surface pubescent; dorsal sepal ovate, cymbiform, ca. 6.5 × 2.5 mm, apex acuminate; lateral sepals spreading, oblong-elliptic, ca. 7.5 × 3 mm, apex acute. Petals oblong-cuneate, strongly oblique, ca. 6.5 × 2.5 mm, 1-veined, apex ligulate-acute; lip white, Y-shaped, ca. 17.5 mm; hypochile rectangular, ca. 5 mm, with lateral lobes ca. 1.5 mm wide; mesochile ca. 3 mm; flanges 3-laciniate, each filament 2–3.5 mm; epichile longitudinally dilated, 2-lobed; lobes diverging at an acute angle to one another, ligulate, ca. 8 × 2.5 mm, entire, apex obtuse; spur conic, 3–3.5 mm, apex obtuse, containing 2 large, circular, carunculate calli. Column ovoid, 5–6 mm, with 2 oblong-elliptic wings; stigma lobes deltoid. Fl. Apr.

• Soil-covered rocks in forests; 300–400 m. Hainan.

**6. *Anoectochilus formosanus*** Hayata, Icon. Pl. Formosan. 4: 101. 1914.

台湾银线兰 tai wan yin xian lan

Plants 11–20 cm tall. Stem ascending, 2–4-leaved. Leaves abaxially reddish purple, adaxially dark green with white venation, ovate to orbicular, 2–5 × 1–3.5 cm, apex acute; petiole-like base and tubular sheath 0.8–1.6 cm. Peduncle 10–15 cm, with 2 or 3 sheathing sterile bracts, reddish brown; rachis 1.5–5 cm, 3–5-flowered; floral bracts ovate-lanceolate, 8–10

mm, shorter than ovary, outer surface hairy, apex acuminate. Flowers resupinate, pale yellowish white; ovary and pedicel twisted, fusiform, 10–14 mm, pubescent. Sepals reddish brown, pubescent on outer surface; dorsal sepal suborbicular, cymbiform, 6–7 × 5–6 mm, apex acute; lateral sepals narrowly elliptic, oblique, 8–10 × 5–6 mm, apex acute. Petals white, ovate, strongly oblique, falcate, ca. 8 × 2.6 mm, apex cuspidate; lip pale yellowish white, Y-shaped, 12–16 mm; hypochile ca. 2 mm; mesochile 5–6 mm; flanges 4- or 5-laciniate, each filament 4–6 mm; epichile longitudinally dilated, 2-lobed; lobes diverging at an acute angle to one another, linear-oblong to rhombic-oblong, 6–7.5 × 1.5–3 mm, apex obtuse; spur conic, 2–4 mm, mouth ca. 3 mm in diam., apex shallowly bilobed, containing 2 carunculate calli. Column ovoid, ca. 2 mm. Fl. Oct–Nov.  $2n = 24, 40$ .

Broad-leaved evergreen forests, bamboo forests; 500–1500 m. Taiwan [Japan (Ryukyu Islands)].

**7. *Anoectochilus hainanensis*** H. Z. Tian, F. W. Xing & L. Li, *Ann. Bot. Fenn.* 45: 220. 2008.

海南开唇兰 *hai nan kai chun lan*

Plants ca. 12 cm tall. Stem ascending, 3- or 4-leaved. Leaves abaxially lilac, adaxially velvety blackish green with dense golden reticulate venation, ovate, oblique, 3–3.5 × 1.8–2.2 cm, apex acute; petiole-like base and tubular sheath 1.2–1.5 cm. Peduncle 3–3.5 cm, with 2 or 3 sterile bracts, pubescent; rachis 3–4 cm, 4–6-flowered; floral bracts ovate-lanceolate, 6–9 mm, shorter than ovary, outer surface hairy, apex acuminate. Flowers resupinate, slightly fragrant, white; ovary and pedicel twisted, fusiform, ca. 14 mm, pubescent. Sepals green tinged reddish brown at apex and pubescent on outer surface; dorsal sepal ovate-elliptic, 9–10 × ca. 6 mm, apex acuminate; lateral sepals elliptic, oblique, 11–12 × 4.5–5 mm, apex subacute. Petals olive-green with white margins, elliptic-falcate, oblique, 8–8.5 × ca. 3.6 mm, apex acuminate; lip white, Y-shaped, ca. 16 mm; hypochile ca. 2.5 mm; mesochile ca. 4.5 mm; flanges 7–9-laciniate, each filament 4–8 mm; epichile longitudinally dilated, 2-lobed; lobes diverging at an acute angle to one another, ligulate-elliptic, ca. 9 × 3.5 mm, apex truncate; spur cylindrical-conic, ca. 8 mm, mouth ca. 3.5 mm in diam., apex distinctly bilobed, containing 2 trapeziform calli. Column stout, ca. 4 mm, with 2 semicircular wings. Fl. Jan (in cultivation).

• Damp shady places in montane forests. Hainan.

**8. *Anoectochilus roxburghii*** (Wallich) Lindley, *Ill. Bot. Himal. Mts.* 368. 1839.

金线兰 *jin xian lan*

*Chrysobaphus roxburghii* Wallich, *Tent. Fl. Nepal.* 37. 1826; *Anoectochilus yungianus* S. Y. Hu; *Zeuxine roxburghii* (Wallich) M. Hiroe.

Plants 8–20 cm tall. Stem erect, 2–5-leaved. Leaves abaxially pale purplish red, adaxially dark green to blackish purple with pinkish golden reticulate venation, ovate to ovate-orbicular, 1.3–4.5 × 0.8–3.6 cm, apex acute; petiole-like base and tubular sheath 0.6–1.8 cm. Peduncle 7–15 cm, with 2 or 3 pinkish sterile bracts; rachis 1–5 cm, 2–10-flowered; floral bracts

pinkish, ovate-lanceolate to lanceolate, 6–9 mm, shorter than ovary, apex acuminate. Flowers usually erect, not resupinate; ovary and pedicel narrowly cylindrical, not twisted, 10–15 mm, pubescent. Sepals pinkish, outer surface pubescent, 1-veined; dorsal sepal ovate, cymbiform, ca. 6 × 2.5–3 mm, apex acuminate; lateral sepals spreading, oblong to oblong-elliptic, 7–8 × 2.5–3 mm, apex subacute. Petals pinkish white, ovate-elliptic, strongly oblique, 7–8 × 2–2.5 mm, 1-veined, apex acuminate; lip pinkish white, Y-shaped, 10–16 mm; hypochile 2–4 mm; mesochile reflexed at right angle from apex of hypochile, 4–5 mm; flanges 6–8-laciniate, each filament 2.5–6 mm; epichile longitudinally dilated, 2-lobed; lobes diverging at an acute angle to one another, obovate-oblong to spatulate, entire, 5.5–8 × 1.5–2.2 mm, apex obtuse; spur conic, 3–4.5 mm, apex shallowly bilobed, mouth ca. 1.5 mm in diam., containing 2 irregular, fleshy calli near entrance. Column ovoid, ca. 2.5 mm, with 2 broad, lamellate wings; stigma lobes elliptic. Fl. Aug–Dec.  $2n = 15 + 2-3B, 30$ .

Evergreen broad-leaved forests, damp valleys; 100–1600 m. Fujian, Guangdong, Guangxi, Hainan, Hunan, Jiangxi, Sichuan, SE Xizang, Yunnan, Zhejiang [Bangladesh, Bhutan, India, Japan, Laos, Nepal, Thailand, Vietnam].

**9. *Anoectochilus chapaensis*** Gagnepain, *Bull. Mus. Natl. Hist. Nat.*, sér. 2, 3: 679. 1931.

滇越金线兰 *dian yue jin xian lan*

Plants 12–18 cm tall. Stem ascending or erect, 2.5–3 mm in diam., 4- or 5-leaved. Leaves abaxially pale green, adaxially blackish green with golden-red venation, ovate, oblique, 2–5 × 1.5–3.5 cm, apex acute; petiole-like base and tubular sheath 0.8–1.6 cm. Peduncle 8–11 cm, with 2 or 3 pale red sheathing sterile bracts; rachis 2–5 cm, 2–7-flowered; floral bracts pale red, ovate-lanceolate, 6–10 mm, shorter than ovary, outer surface pubescent, apex acuminate. Flowers erect, not resupinate, white; ovary and pedicel narrowly cylindrical, not twisted, 10–13 mm, pubescent. Sepals pubescent on outer surface, 1-veined; dorsal sepal ovate, cymbiform, ca. 6 × 3.5 mm, apex acuminate; lateral sepals ovate-oblong, ca. 6 × 3 mm, apex obtuse. Petals ovate, strongly oblique, falcate, ca. 6 × 3 mm, 1-veined, apex caudate and incurved; lip white, Y-shaped, 10–12 mm; hypochile short; mesochile 5–6 × ca. 3 mm; flanges oblong, pectinate, divided into 3 or 4 narrow teeth; epichile longitudinally dilated, 2-lobed; lobes diverging widely, obovate, 8–9 × 6–7 mm, margin crenulate, apex truncate; spur conic, 4–5 mm, apex obtuse, containing 2 calli. Column short, with 2 broad lamellate wings. Fl. Jul–Aug.

Shaded humid places in dense forests; 1300–1400 m. SE Yunnan [N Vietnam].

**10. *Anoectochilus zhejiangensis*** Z. Wei & Y. B. Chang, *Bull. Bot. Res.*, Harbin 9(2): 39. 1989.

浙江金线兰 *zhe jiang jin xian lan*

Plants 8–16 cm tall. Stem ascending, pale reddish brown, 2–6-leaved. Leaves abaxially pale purplish red, adaxially dark greenish purple with golden-red venation, broadly ovate to ovate-orbicular, 0.7–2.6 × 0.6–2.1 cm, margin slightly undulate, apex acute; petiole-like base and tubular sheath ca. 0.8 cm.

Peduncle 5–10 cm, with 2 sterile bracts; rachis 1–4 cm, 1–4 flowered; floral bracts ovate-lanceolate, ca. 6.5 mm, subequal in length to ovary, outer surface pubescent, apex acuminate. Flowers erect, not resupinate; ovary and pedicel pale reddish brown, narrowly fusiform, not twisted, ca. 7 mm, white pubescent. Sepals pinkish red, outer surface pubescent; dorsal sepal ovate, cymbiform, ca. 5 × 3.5 mm, apex acute; lateral sepals spreading, oblong-obovate, slightly oblique, ca. 7 × 3 mm, apex obtuse. Petals white, oblanceolate, strongly oblique, ca. 6 × 2 mm, apex acute; lip white, Y-shaped, ca. 10 mm; hypochile ca. 2.5 mm; mesochile ca. 3 mm; flanges pectinate, composed of 2–5 narrow teeth, each tooth ca. 2 mm; epichile longitudinally dilated, 2-lobed; lobes diverging at an acute angle to one another, flabellate, slightly oblique, ca. 6 × 5 mm, entire, apex truncate; spur conic, slightly curved, ca. 5 mm, apex shallowly bilobed, containing 2 irregular, stalked calli near entrance. Column short. Fl. Jul–Sep.

• Damp places in dense forests, valleys; 700–1200 m. C and N Fujian, N Guangxi, SW Zhejiang.

**11. *Anoectochilus emeiensis*** K. Y. Lang, Acta Phytotax. Sin. 20: 183. 1982.

峨眉金线兰 e mei jin xian lan

Plants 19–21 cm tall. Stem ascending, ca. 2 mm in diam.,

3-leaved. Leaves abaxially purplish red, adaxially blackish green with golden-red venation, ovate, 3.5–4 × 3–3.2 cm, apex acute; petiole-like base and tubular sheath 1–2 cm. Peduncle pale purplish red, ca. 12 cm, with 2–4 pale purplish red sterile bracts; rachis 2–2.5 cm, 3- or 4-flowered; floral bracts pale purplish red, lanceolate, ca. 6 mm, shorter than ovary, outer surface pubescent, apex acuminate. Flowers erect, not resupinate, white, foetid; ovary and pedicel cylindrical-fusiform, not twisted, ca. 13 mm, pubescent. Sepals purplish red, outer surface sparsely pubescent, 1-veined; dorsal sepal ovate-elliptic, cymbiform, ca. 7 × 2 mm, apex acute; lateral sepals spreading, narrowly oblong-obovate, oblique, 7–8 × ca. 3.2 mm, apex acute to shortly mucronate. Petals pinkish white, ovate, strongly oblique, falcate, ca. 7 × 3 mm, 1-veined, apex acute; lip white, Y-shaped, ca. 13 mm; hypochile ca. 3 mm; mesochile reflexed sharply downward from apex of hypochile, ca. 4 mm; flanges subsquare, 3–3.5 × 3–3.5 mm, margin fimbriate, divided into 5 teeth, each tooth ca. 1.5 mm; epichile longitudinally dilated, 2-lobed; lobes diverging at an acute angle to one another, oblong to oblanceolate, ca. 5 × 2 mm, entire, apex obtuse; spur conic, ca. 6 mm, apex shallowly bilobed, containing 2 subcuneate calli. Column ca. 5.5 mm, stout, with 2 broad, oblong wings; stigma lobes elliptic. Fl. Aug–Sep.

• Forests along streams; ca. 900 m. SC Sichuan.

## 19. ODONTOCHILUS Blume, Fl. Javae Nov. Ser. 1: 66. 1858–1859.

齿唇兰属 chi chun lan shu

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

*Cystopus* Blume (1858), not Lévillé (1847); *Evardia* Gagnepain (1932), not Adanson (1763); *Evardiana* Averyanov, nom. illeg. superfl.; *Evardianthe* Rauschert; *Pristiglottis* Cretzoiu & J. J. Smith.

Herbs, terrestrial, autotrophic or rarely holomycotrophic. Rhizome creeping, cylindrical, several noded, fleshy; roots narrowly filiform to fibrous, arising singly from rhizome nodes or rarely absent. Stem erect or ascending, with 1 to a few loose tubular sheaths at base, and a few scattered or subrosulate leaves, or leafless (when holomycotrophic), glabrous. Leaves green or purple, occasionally with 1–3 white stripes, suborbicular, ovate-lanceolate, or elliptic, oblique, with a short to long petiole-like base dilating into tubular amplexicaul sheath. Inflorescence erect, terminal, racemose, glabrous or pubescent; peduncle with a few scattered sheathing bracts; rachis laxly to subdensely few to many flowered; floral bracts membranous, glabrous or pubescent. Flowers resupinate or erect and not resupinate; ovary twisted or not, slender, glabrous or pubescent. Sepals glabrous or pubescent; dorsal sepal free or connate for half its length with lateral sepals; lateral sepals similar to dorsal sepal, completely enclosing base of lip. Petals usually appressed to dorsal sepal, linear-ligulate to ovate, membranous; lip 3-partite, spurless; hypochile subglobose, aseptate and saccate or with a central septum and bisaccate, containing a pair of fleshy calli; mesochile usually elongate, tubular, external margin with an entire or fimbriate-pectinate flange, rarely with 2 flanges on either side, or rarely not flanged at all. Column dilated, twisted or not, ventrally with 2 intramarginal, lamellate appendages (wings); anther erect, ovoid, 2-locular; pollinia 2, obovoid-obpyriform or clavate, usually attenuate into slender stalks that attach to a solitary small viscidium; rostellum deltoid, remnant shortly to deeply bifid; stigma lobes separate to confluent, placed directly beneath rostellum. Capsule ellipsoid.

About 40 species: N India and the Himalayas, through SE Asia, as far north as Japan, east to the SW Pacific islands; 11 species (two endemic) in China.

The circumscription of *Odontochilus* has been contentious, with the structural similarity of its flowers to those of *Anoectochilus* often resulting in its inclusion in the latter. It is defined here (following Pridgeon et al., Gen. Orchid. 3: 126–129. 2003) by the combination of a saccate but spurless lip that is enclosed at its base by the lateral sepals and the placement of the confluent or occasionally separate stigma lobes directly beneath the rostellum.

1a. Plants holomycotrophic, achlorophyllous and lacking leaves, purplish red or brown.

2a. Flowers resupinate; petals and lip white ..... 3. *O. saprophyticus*

2b. Flowers not resupinate; petals and lip purplish red, yellow, or fawn-colored.

3a. Dorsal sepal ca. 7 × 4 mm; lip T-shaped, ca. 16 mm, with 2 hornlike, divergent, V-shaped lacunae

at apex; lobes of epichile oblong, ca. 5 × 2.5 mm ..... 1. *O. poilanei*

- 3b. Dorsal sepal 3.8–4.1 × 1.8–2 mm; lip Y-shaped, 11.2–12.2 mm, without lacunae at apex; lobes of epichile subquadrate, 3.2–4 × 2.8–3.2 mm ..... 2. *O. guangdongensis*
- 1b. Plants autotrophic, leafy, green, dark green, greenish brown, or dark greenish purple.
- 4a. Sepals uniformly green or yellowish green, sometimes tinged red toward apex; hypochile of lip bisaccate, divided by a central longitudinal septum.
- 5a. Lip mesochile lacking flanges ..... 4. *O. crispus*
- 5b. Lip mesochile with a fimbriate-pectinate flange along each external margin.
- 6a. Floral bracts ca. 5 mm, much shorter than ovary; ovary and pedicel pubescent ..... 5. *O. elwesii*
- 6b. Floral bracts 8–15 mm, subequal in length to or exceeding ovary; ovary and pedicel glabrous.
- 7a. Adaxial surface of leaves uniformly dark green; flowers white or yellowish white; lateral sepals 9–10 mm ..... 6. *O. brevistylis*
- 7b. Adaxial surface of leaves dark green with whitish stripes along midvein and 2 lateral veins; flowers yellow; lateral sepals 6–7.5 mm ..... 7. *O. lanceolatus*
- 4b. Sepals white, pale green, or purplish with either dark brownish green patches or purplish red longitudinal stripes; hypochile of lip globose-saccate (though hypochile of *O. clarkei* occasionally shallowly 2-lobed), aseptate.
- 8a. Plants 7.5–8.5 cm tall; leaf petiole-like base and tubular sheath 0.3–0.5 cm; lip 12–13 mm ..... 8. *O. nanlingensis*
- 8b. Plants 10–30 cm tall; leaf petiole-like base and tubular sheath 1.5–3.5 cm; lip 17–26 mm.
- 9a. Lip epichile lobes ca. 5.5 mm ..... 9. *O. tortus*
- 9b. Lip epichile lobes ca. 10 mm.
- 10a. Flowers erect, not resupinate; ovary and pedicel not twisted; lip uniformly white; mesochile 9.5–16 mm, not dilated at base ..... 10. *O. inabae*
- 10b. Flowers resupinate; ovary and pedicel twisted; mesochile ca. 5 mm, dilated at base, reddish; epichile lobes yellow ..... 11. *O. clarkei*

**1. *Odontochilus poilanei*** (Gagnepain) Ormerod, Lindleyana 17: 225. 2002.

齿爪齿唇兰 *chi zhao chi chun lan*

*Evrardia poilanei* Gagnepain, Bull. Mus. Natl. Hist. Nat., sér. 2, 4: 596. 1932; *Chamaegastrodia poilanei* (Gagnepain) Seidenfaden & A. N. Rao; *Evrardiana poilanei* (Gagnepain) Averyanov; *Evrardianthe poilanei* (Gagnepain) Rauschert; *Hetaeria poilanei* (Gagnepain) Tang & F. T. Wang.

Plants holomycotrophic, 12–18 cm tall. Rhizome yellowish white, short, stout. Stem erect, purplish red, stout, leafless, with many sheathing scales; scales overlapping, purplish red, membranous, pubescent on outer surface and margin. Rachis 3–7 cm, subdensely several to more than 10-flowered, pubescent; floral bracts purplish red, ovate, ca. 10 mm, ca. as long as ovary, outer surface pubescent, apex acuminate. Flowers fragrant, erect, not resupinate; ovary and pedicel purplish red, cylindric-fusiform, not twisted, 10–12 mm, pubescent. Sepals purplish red, pubescent on outer surface; dorsal sepal connivent with petals, ovate, cymbiform, ca. 7 × 4 mm, 1-veined, apex subacute; lateral sepals slightly spreading, ovate, oblique, ca. 7 × 3.3 mm, apex acute. Petals purplish red, linear-lanceolate, oblique, falcate, ca. 7 × 1.5 mm, 1-veined, apex acute; lip deep yellow, T-shaped, ca. 16 mm; hypochile slightly dilated, concave-saccate, ca. 2 mm, aseptate, containing 2 sessile, domed calli at base; mesochile 6–8 mm; flanges narrow, irregularly erose-crenulate; epichile transversely dilated, ca. 3 × 12 mm wide, 2-lobed, with 2 hornlike, divergent, V-shaped lacunae at apex; lobes diverging at right angles to axis of lip, oblong, ca. 5 × 2.5 mm, minutely papillate on both surfaces, margin incised-erose, apex truncate. Column short, with 2 subsquare, lamellate wings; anther ovoid, ca. 2.5 mm, apex acuminate; rostellum erect, furcately 2-lobed. Fl. Aug.

Damp places in broad-leaved evergreen forests, valleys; 1000–1800 m. SE Xizang, SE Yunnan [Japan, Myanmar, Thailand, S Vietnam].

**2. *Odontochilus guangdongensis*** S. C. Chen, S. W. Gale & P. J. Cribb, **nom. nov.**

广东齿唇兰 *guang dong chi chun lan*

Replaced synonym: *Chamaegastrodia nanlingensis* H. Z. Tian & F. W. Xing, Novon 18: 261. 2008, not *Odontochilus nanlingensis* (L. P. Siu & K. Y. Lang) Ormerod, Taiwania 48: 91. 2003 [see p. 83].

Plants holomycotrophic, 20–26 cm tall. Rhizome hazel in color, translucent, fleshy, slender, up to 25 cm; roots coralloid. Stem erect, light brown, slender to stout, leafless, with many sheathing scales; scales overlapping, brick-red, membranous, puberulent along margin. Rachis up to 6 cm, subdensely 4–9-flowered, puberulent; floral bracts maroon, ovate-lanceolate, ca. 8 × 3.2 mm, ca. as long as ovary, outer surface puberulent, apex acuminate. Flowers not resupinate; ovary and pedicel fusiform, not twisted, ca. 8 mm, finely puberulent. Sepals fawn-colored, puberulent on outer surface and densely so at apex; dorsal sepal connivent with petals, ovate, cymbiform, 3.8–4.1 × 1.8–2 mm, 1-veined, apex acute; lateral sepals slightly spreading, narrowly ovate-falcate, oblique, 7–7.2 × 3.2–3.5 mm, 2-veined, apex acute. Petals fawn-colored, linear-lanceolate, oblique, falcate, 4.5–4.8 × 1–1.3 mm, 1-veined, apex acute; lip yellow, Y-shaped, 11.2–12.2 mm; hypochile slightly dilated, concave-saccate, 2–2.2 mm, containing 2 sessile, subglobose calli at base; mesochile ca. 5.5 mm; flanges narrow, irregularly erose-crenulate; epichile transversely dilated, 3.2–4 × ca. 7 mm, 2-lobed; lobes diverging at acute angle to one another, subquadrate, 3.2–4 × 2.8–3.2 mm, margin slightly erose, apex truncate. Column short, with 2 oblong, lamellate wings; anther lanceolate, ca. 2 mm, apex acuminate; rostellum erect, furcately 2-lobed. Capsule brick-red, ellipsoid, ca. 11 × 5 mm. Fl. Aug.

• Humus-rich soils in evergreen broad-leaved forests; 1300–1600 m. Guangdong, Hunan.

**3. *Odontochilus saprophyticus*** (Averyanov) Ormerod, *Taiwania* 48: 141. 2003.

腐生齿唇兰 fu sheng chi chun lan

*Pristiglottis saprophytica* Averyanov, Updated Checkl. Orchids Vietnam, 90. 2003.

Plants holomycotrophic, achlorophyllous, 15–18 cm tall. Rhizome 2–4.5 cm, 0.5–2 cm in diam. Stem erect, pinkish brown, leafless, with 6 or 7 sheathing scales; scales overlapping, membranous, pubescent on outer surface. Rachis ca. 7.5 cm, subdensely 12- or 13-flowered, pubescent; floral bracts elliptic-ovate, concave, 8–10 × 4–5 mm, outer surface pubescent, apex acuminate. Flowers resupinate; ovary and pedicel 10–11 mm, pubescent. Sepals olive pinkish brown, pubescent on outer surface; dorsal sepal connivent with petals and forming a hood, ovate, cymbiform, 4–5 × ca. 3 mm, 1-veined, apex obtuse; lateral sepals reflexed, oblong, oblique, 8–9 × 2–3 mm, 1-veined, apex subacute. Petals white, narrowly oblong, 4–5 × 1.5–2 mm, 1-veined, apex acute; lip white, T-shaped, 11–12 × 4–5 mm; hypochile concave-saccate, ca. 2 mm, aseptate, containing 2 sessile, ligulate calli at base; mesochile 4–5 mm; flanges irregularly erose-papillate; epichile 2-lobed; lobes diverging at right angles to axis of lip, subquadrate-obovate, 4–5 × 3–4 mm. Column ca. 1.5 mm, with 2 semicircular to cordate wings; anther narrowly ovoid, ca. 2 mm; rostellum erect, furcately 2-lobed. Fl. May–Jun.

Leaf litter in tropical montane forests; 900–1100 m. Hainan [Vietnam].

**4. *Odontochilus crispus*** (Lindley) J. D. Hooker, *Fl. Brit. India* 6: 99. 1890.

小齿唇兰 xiao chi chun lan

*Anoetochilus crispus* Lindley, *J. Proc. Linn. Soc., Bot.* 1: 180. 1857; *Cystopus crispus* (Lindley) Kuntze.

Plants autotrophic, 6–20 cm tall. Stem ascending, 3–5-leaved. Leaves abaxially pale green, adaxially dark green, ovate, 1.2–1.5 × 0.9–1.2 cm, apex acute; petiole-like base and tubular sheath 0.5–1 cm. Peduncle 1.5–7 cm, with 1 or 2 sterile bracts, pubescent, purplish red; rachis 1–5 cm, subdensely (1–)3–8-flowered, pubescent; floral bracts purplish, lanceolate, 7–9 mm, nearly as long as ovary, outer surface pubescent, apex acuminate. Flowers resupinate, greenish white; ovary and pedicel twisted, cylindrical, 8–10 mm, glabrous. Sepals green, pubescent on outer surface, 1-veined; dorsal sepal forming a hood with petals, narrowly ovate, cymbiform, ca. 6 × 2.3 mm, apex acuminate; lateral sepals narrowly elliptic, oblique, ca. 6.5 × 2.7 mm, apex subacute. Petals green, triangular, falcate, ca. 6 × 2 mm, glabrous, 1-veined, apex acuminate; lip white, Y-shaped, ca. 13 mm; hypochile slightly dilated, shallowly bisaccate, ca. 2 mm, containing a central longitudinal septum and 1 stalked, fleshy callus on either side; mesochile ca. 4 mm, margin incurved and entire to shallowly crenulate, lacking flanges; epichile longitudinally dilated, long, 2-lobed; lobes diverging at an acute angle to one another, oblong to obovate, ca. 7 × 3 mm,

margin crenulate or serrulate, apex truncate-obtuse. Column stout, not twisted, with 2 lamellate wings; rostellum short, erect, bifid; stigma lobes separate. Fl. Sep–Oct.

Damp places in forests, valleys; 1600–1800 m. SE Xizang, NW Yunnan [Bhutan, NE India, Nepal].

**5. *Odontochilus elwesii*** C. B. Clarke ex J. D. Hooker, *Fl. Brit. India* 6: 100. 1890.

西南齿唇兰 xi nan chi chun lan

*Anoetochilus elwesii* (C. B. Clarke ex J. D. Hooker) King & Pantling; *A. purpureus* (C. S. Leou) S. S. Ying; *Cystopus elwesii* (C. B. Clarke ex J. D. Hooker) Kuntze; *Odontochilus purpureus* C. S. Leou.

Plants autotrophic, 15–25 cm tall. Stem ascending or erect, somewhat robust, ca. 3 mm in diam., 6- or 7-leaved. Leaves abaxially pale red or pale green, adaxially deep green to dark greenish purple and sometimes with 3 reddish veins, ovate to ovate-lanceolate, 1.5–5 × 1–3 cm, apex acute; petiole-like base and tubular sheath 0.5–2 cm. Peduncle 8–11 cm, with 1–3 sheathing sterile bracts, pubescent; rachis 1–6 cm, laxly 2–4-flowered, pubescent; floral bracts ovate, ca. 5 mm, much shorter than ovary, outer surface pubescent, apex mucronate. Flowers resupinate; ovary and pedicel twisted, cylindrical-fusiform, ca. 13 mm, pubescent. Sepals green or white, tinged purplish red toward apex, outer surface pubescent, 1-veined; dorsal sepal forming a hood with petals, with 2 broad purplish red stripes, ovate, cymbiform, ca. 7 × 4 mm, apex acuminate; lateral sepals ovate, oblique, ca. 10 × 6 mm, saccate at base. Petals white, ovate, strongly oblique, falcate, ca. 7 × 4 mm, 1-veined, apex acuminate; lip white, Y-shaped, ca. 15 mm; hypochile slightly dilated, shallowly bisaccate, ca. 3.5 mm, containing a central longitudinal septum and 1 fleshy, subsquare callus on either side; mesochile dark purple, 5–7 mm, with a fimbriate flange along either margin; flanges composed of 4 or 5 filaments; epichile transversely dilated, ca. 12 × 14 mm, 2-lobed; lobes diverging widely, suboblong, ca. 10 × 5 mm, margin slightly undulate, apex truncate. Column ca. 4 mm, stout, with 2 suboblong, lamellate wings; anther narrowly ovoid, ca. 4 mm; pollinia clavate, ca. 3 mm, attached to a narrowly lanceolate viscidium ca. 1.5 mm; rostellum erect, small, remnant furcately bifid; stigma lobes separate, suborbicular, large. Fl. Jul–Aug.

Damp places in evergreen broad-leaved forests, bamboo forests, valleys; 300–1500 m. Guangxi, Guizhou, Sichuan, C Taiwan, Yunnan [Bhutan, NE India, N Myanmar, Thailand, N Vietnam].

**6. *Odontochilus brevistylis*** J. D. Hooker, *Fl. Brit. India* 6: 100. 1890.

短柱齿唇兰 duan zhu chi chun lan

*Anoetochilus brevistylis* (J. D. Hooker) Ridley; *A. candidus* (T. P. Lin & C. C. Hsu) K. Y. Lang; *A. inabae* Hayata var. *candidus* (T. P. Lin & C. C. Hsu) S. S. Ying; *A. tonkinensis* Gagnepain; *Cystopus brevistylis* (J. D. Hooker) Kuntze; *Odontochilus candidus* T. P. Lin & C. C. Hsu; *O. inabae* (Hayata) Hayata var. *candidus* (T. P. Lin & C. C. Hsu) S. S. Ying.

Plants autotrophic, 12–18 cm tall. Stem ascending, dark

purple-brown, 3–4 mm in diam., 4- or 5-leaved. Leaves abaxially pale green, adaxially dark green, ovate-lanceolate to oblong, oblique, 2.5–5 × 1–2 cm, apex acute; petiole-like base and tubular sheath 1–1.5 cm. Peduncle 6–8 cm, pubescent, with 1 or 2 sterile bracts; rachis 4–7 cm, subdensely 5–9-flowered, pubescent; floral bracts lanceolate, 10–15 mm, subequal in length to or exceeding ovary, outer surface pubescent, apex acuminate. Flowers resupinate, white or yellowish white; ovary and pedicel twisted, cylindrical-fusiform, 9–10 mm, glabrous. Sepals yellowish green, outer surface pubescent, 1-veined; dorsal sepal forming a hood with petals, ovate, cymbiform, 6–6.5 × 4–4.5 mm, apex acute; lateral sepals ovate-elliptic, oblique, 9–10 × 3.5–3.7 mm, apex subobtuse. Petals white, ovate, strongly oblique, falcate, 6–6.5 × ca. 3 mm, glabrous, 1-veined, apex long apiculate; lip white or yellowish white, Y-shaped, 16–18 mm; hypochile slightly dilated, bisaccate, ca. 2 mm, containing a central longitudinal septum and 1 fleshy, hooked callus on either side; mesochile 6–8 mm, with a pectinate flange along each margin; flanges composed of 4 or 5 filaments to ca. 3 mm and 3 or 4 shorter obtuse teeth; epichile longitudinally dilated, ca. 6 × 8 mm, 2-lobed; lobes diverging at an acute angle to one another, obovate-flabellate, ca. 5.5 × 3.5 mm, margin slightly crenulate, apex obtuse. Column twisted, ca. 3 mm, stout, with 2 lamellate wings; anther ovoid, short, apex obtuse; pollinia attached to 1 small, narrowly elliptic viscidium; rostellum broad, bifid; stigma lobes separate. Fl. Aug.  $2n = 40, 42$ .

Damp places in evergreen broad-leaved forests; 1700–1900 m. SE Xizang, Yunnan [Malaysia (Peninsular), Thailand, Vietnam].

**7. *Odontochilus lanceolatus*** (Lindley) Blume, Coll. Orchid. 80. 1859.

齿唇兰 *chi chun lan*

*Anoetochilus lanceolatus* Lindley, Gen. Sp. Orchid. Pl. 499. 1840; *A. bisaccatus* Hayata; *A. flavus* Benth & J. D. Hooker; *A. luteus* Lindley; *Cystopus flavus* (Benth & J. D. Hooker) Kuntze; *C. lanceolatus* (Lindley) Kuntze; *Odontochilus bisaccatus* (Hayata) Hayata ex T. P. Lin; *O. yunnanensis* Rolfe; *Pristiglottis bisaccata* (Hayata) K. Nakajima.

Plants 15–30 cm tall. Stem ascending, green-brown, 4- or 5-leaved. Leaves abaxially pale green, adaxially dark green with whitish stripes along midvein and 2 lateral veins, ovate, ovate-lanceolate, or elliptic, 1.5–8 × 1–5 cm, apex acute; petiole-like base and tubular sheath 0.9–2 cm. Peduncle 4–6 cm, pubescent, with 1 or 2 sheathing sterile bracts; rachis 4–6 cm, subdensely 3–10-flowered, pubescent; floral bracts lanceolate to ovate-lanceolate, 8–10 mm, subequal in length to ovary, abaxially glabrous, ciliate along basal margin, apex acuminate. Flowers resupinate, yellow; ovary and pedicel twisted, fusiform, 9–10 mm, glabrous. Sepals yellowish green, glabrous, 1-veined; dorsal sepal forming a hood with petals, ovate to ovate-oblong, cymbiform, 4–6 × 3–4 mm; lateral sepals spreading, ovate-elliptic, oblique, 6–7.5 × 4–5 mm, apex acute to slightly obtuse. Petals whitish green, ovate, strongly oblique, 4–6 × 2.5–4 mm, 1-veined; lip golden yellow, Y-shaped, 12–18 mm; hypochile slightly dilated, bisaccate, ca. 3 mm, containing a central longitudinal septum and 1 subulate, usually curved callus on either side; mesochile 4–6 mm, with a pectinate flange along

either margin; flanges composed of 4–7(–9) obtuse teeth to ca. 2.5 mm; epichile transversely dilated, 2-lobed; lobes diverging widely, cuneate-oblong to obovate, 5–6 × 4–4.5 mm, margin entire or slightly crenulate, apex truncate. Column very short, squat, with 2 deltoid wings toward apex; rostellum twisted, broad, remnant bifid; stigma lobes separate, large. Fl. Jun–Sep.  $2n = 60, 120$ .

Damp places in evergreen broad-leaved forests, valleys; 800–2200 m. Guangdong, Guangxi, C Taiwan, Yunnan [Bhutan, NE India, Myanmar, Nepal, Thailand, Vietnam].

**8. *Odontochilus nanlingensis*** (L. P. Siu & K. Y. Lang) Ormerod, Taiwania 48: 91. 2003.

南岭齿唇兰 *nan ling chi chun lan*

*Anoetochilus nanlingensis* L. P. Siu & K. Y. Lang, Acta Phytotax. Sin. 40: 164. 2002.

Plants autotrophic, 7.5–8.5 cm tall. Stem ascending, green-brown, 1–1.5 mm in diam., 3–5-leaved. Leaves abaxially purple, adaxially deep green, ovate, 0.6–0.8 × 0.4–0.6 cm, apex acute; petiole-like base and tubular sheath 0.3–0.5 cm, base sheathing. Peduncle 3–4 cm, with 2 sheathing sterile bracts, villous; rachis 1.5–3 cm, subdensely (1 or)2- or 3(or 4)-flowered; floral bracts purplish, narrowly ovate, 5–7 × 2.5–3 mm, glabrous with sparsely ciliate margin, apex long acuminate. Flowers resupinate; ovary and pedicel fusiform, 7–8 mm. Sepals white with a reddish purple longitudinal stripe on either side of midvein, 1-veined; dorsal sepal forming a hood with petals, narrowly ovate, 5–6 × 2–2.5 mm, glabrous, apex obtuse; lateral sepals oblong-lanceolate, oblique, 8–9 × 2.8–3 mm, saccate at base. Petals white with a reddish purple longitudinal band along midvein, linear-lanceolate, oblique, 5–6 × ca. 1 mm, margin ciliate, apex acute; lip white, Y-shaped, 12–13 mm, membranous; hypochile concave, globose-saccate, 2–2.5 × 1.5–2 mm, aseptate, containing 2 narrowly oblong calli; mesochile 4.5–5 mm, with a fimbriate flange along each margin, with 3 or 4 reddish purple blotches on either side of midvein; flanges composed of 5–8 narrow, well-spaced filaments, each filament 1–2 mm; epichile dilated, 2-lobed, with a solitary reddish purple blotch in sinus; lobes diverging at an acute angle to one another, obovate, 4–5 × 3.5–4 mm, margin slightly undulate, apex truncate-obtuse. Column ca. 1.5 mm, stout; anther purple-red, narrowly lanceolate, ca. 3.5 mm; rostellum pink, apex forked; stigma lobes separate, subrotund. Fl. Jun–Jul.

• Forests; 600–1600 m. Guangdong, Taiwan.

**9. *Odontochilus tortus*** King & Pantling, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 65: 125. 1896.

一柱齿唇兰 *yi zhu chi chun lan*

*Anoetochilus densiflorus* Mansfeld; *A. repens* (Downie) Seidenfaden & Smitinand; *A. tortus* (King & Pantling) King & Pantling; *Odontochilus densiflorus* (Mansfeld) Tang & F. T. Wang ex Merrill & Metcalf; *O. repens* Downie; *Pristiglottis torta* (King & Pantling) Averyanov.

Plants autotrophic, 18–25 cm tall. Stem ascending, stout, ca. 5 mm in diam., 5- or 6-leaved. Leaves abaxially pale green, adaxially deep green, elliptic to ovate-lanceolate, slightly

oblique, 2.5–8 × 2–4.5 cm, apex acute; petiole-like base and tubular sheath 2–2.5 cm. Peduncle relatively short, stout, pubescent, with 1 or 2 sterile bracts; rachis subdensely many flowered; floral bracts ovate-lanceolate, slightly longer than ovary, outer surface pubescent, apex acuminate. Flowers resupinate; ovary and pedicel twisted, cylindrical, ca. 13 mm, sparsely pubescent. Sepals purplish green with brownish purple stripes on either side of midvein, sparsely pubescent on outer surface, 1-veined; dorsal sepal forming a hood with petals, ovate, concave, ca. 8 × 4 mm, apex acute; lateral sepals spreading, oblong, oblique, ca. 9 × 3 mm, apex acute. Petals greenish white with brownish purple stripes on either side of midvein, ovate, oblique, falcate, ca. 8 × 4 mm, glabrous, 1-veined, apex apiculate; lip white, Y-shaped, ca. 17 mm; hypochile slightly dilated, globose-saccate, ca. 3 mm, aseptate, containing 2 oblong, shallowly 3-lobed calli; mesochile ca. 7 mm, with a pectinate flange along each margin; flanges composed of 4 or 5 filaments and 4 or 5 shorter obtuse teeth; epichile transversely dilated, ca. 6 × 11 mm, 2-lobed; lobes diverging widely, obovate, ca. 5.5 × 4 mm, margin crenulate, apex obtuse. Column ca. 2.5 mm, with 2 triangular-linear wings; anther narrowly ovoid, ca. 6 mm, apex acuminate; rostellum obovate, very large, ca. 3 × 2 mm, remnant deeply bifid; stigma lobes confluent, large. Fl. Jul–Sep.

Dense forests, along valleys; 400–1300 m. N and W Guangxi, Hainan, SE Xizang, S and SW Yunnan [Bhutan, Myanmar, Thailand, N Vietnam].

**10. *Odontochilus inabae*** (Hayata) T. P. Lin, *Native Orchids Taiwan* 1: 216. 1975 [*“inabai”*].

台湾齿唇兰 tai wan chi chun lan

*Anoetochilus inabae* Hayata, *Icon. Pl. Formosan.* 4: 102. 1914 [*“inabai”*].

Plants autotrophic, 10–20 cm tall. Stem ascending, 4- or 5-leaved. Leaves green, ovate-oblong to ovate, slightly oblique, 4–6 × 2.5–3.5 cm, apex acute; petiole-like base and tubular sheath 1.5–3.5 cm. Peduncle green, tinged reddish brown, 5–8 cm, pubescent; rachis 2–6 cm, laxly 3–10-flowered; floral bracts pale brown, ovate-lanceolate to lanceolate, 8–12 mm, slightly shorter than ovary, outer surface pubescent. Flowers erect, not resupinate; ovary and pedicel reddish brown or green, cylindrical-fusiform, not twisted, 10–15 mm, pubescent. Sepals pale green with large dark brownish green patches, outer surface pubescent; dorsal sepal forming a hood with petals, ovate, 5–6 × 3.5–4 mm, apex acuminate or shortly cuspidate; lateral sepals oblong, slightly oblique, 11–12 × 4.5–5 mm, apex acute. Petals pale green with large dark brownish green patches, ovate-lanceolate, strongly oblique, 6.5–7 × 2.2–3 mm, apex acuminate-caudate; lip white, Y-shaped, 17–26 mm; hypochile

globose-saccate, ca. 3 mm, aseptate, containing 2 digitate calli; mesochile 9.5–16 × 2–3 mm, with a fimbriate flange along each margin; flanges composed of 5 or 6 filaments and a shallowly crenulate lamella, each filament 4–8 mm; epichile longitudinally dilated, 2-lobed; lobes diverging widely, flabellate, ca. 10 × 5.5 mm, apex obtuse to slightly crenulate. Column slightly twisted, ca. 3.5 mm, with 2 low, lamellate wings; anther ovoid; rostellum erect, furcately bifid; stigma lobes narrowly separated. Fl. May–Aug.  $2n = 28$ .

Moist forests; 500–1700 m. Taiwan [Japan (Ryukyu Islands), N Vietnam].

**11. *Odontochilus clarkei*** J. D. Hooker, *Fl. Brit. India* 6: 100. 1890.

红萼齿唇兰 hong e chi chun lan

*Anoetochilus clarkei* (J. D. Hooker) Seidenfaden & Smitinand; *Cystopus clarkei* (J. D. Hooker) Kuntze.

Plants autotrophic, to 30 cm tall. Stem ascending or erect, ca. 5 mm in diam., 5- or 6-leaved. Leaves abaxially pale green, adaxially dark green, ovate, ovate-elliptic, or elliptic, oblique, 4–6 × 2–3 cm, apex acute; petiole-like base and tubular sheath 2–2.5 cm. Peduncle 3–5 cm, with 1 or 2 sheathing sterile bracts, pubescent; rachis 4–7 cm, subdensely many flowered; floral bracts purplish red, lanceolate, to 13 mm, slightly exceeding ovary, outer surface pubescent, apex acuminate. Flowers resupinate; ovary and pedicel twisted, cylindrical, 8–10 mm, pubescent. Sepals purplish red with a deep purplish red stripe on either side of midvein, outer surface glabrous to sparsely pubescent, 1-veined; dorsal sepal forming a hood with petals, ovate, ca. 5 × 3.2 mm, apex acuminate-caudate; lateral sepals broadly ovate-elliptic, oblique, ca. 9 × 5.5 mm, apex subobtuse. Petals yellow, tinged red and with a deep purplish red stripe on either side of midvein, ovate, strongly oblique, falcate, ca. 6 × 2.5 mm, 1-veined, apex long acuminate; lip Y-shaped, 18–20 mm; hypochile slightly dilated, globose-saccate, ca. 3 mm, aseptate but sometimes shallowly 2-lobed, containing 2 fleshy, somewhat acerose, hooked calli near center; mesochile ca. 5 mm, expanded at base into an orbicular to obcordate plate, reddish, with a pectinate flange along each margin; flanges composed of 2 or 3 obtuse teeth; epichile yellow, longitudinally dilated, 2-lobed, apiculate in sinus between lobes; lobes diverging widely, obovate-cuneate, ca. 10 × 5 mm, apex truncate. Column ca. 2 mm, stout, with 2 elliptic wings; anther ovoid-lanceolate; pollinia attached to a small, elliptic viscidium; rostellum erect, remnant bifid; stigma lobes separate. Fl. Sep.

Shaded places in evergreen broad-leaved forests; ca. 1100 m. SE Xizang [India (Sikkim), Myanmar].

## 20. *SPIRANTHES* Richard, *De Orchid. Eur.* 20, 28, 36. 1817, nom. cons.

绶草属 shou cao shu

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

*Aristotelea* Loureiro (1790), not *Aristotela* Adanson (1763), nor *Aristotelia* L'Héritier (1785–1786, nom. cons.); *Gyrostachys* Persoon ex Blume; *Ibidium* Salisbury ex Small; *Monustes* Rafinesque; *Orchiastrum* Séguier.

Herbs, terrestrial, acaulescent. Roots fasciculate, fusiform, fleshy, glabrous. Leaves basal, forming a rosette, linear, elliptic,



or broadly ovate, rarely subcylindric, base sheathing. Inflorescence terminal, racemose with many small flowers arranged spirally around rachis. Flowers resupinate, horizontal or nodding, not opening widely, small; ovary twisted, fusiform. Sepals free, narrowly elliptic to lanceolate, subsimilar; dorsal sepal erect, often connivent with petals and forming a hood; lateral sepals dilated or sometimes saccate at base. Petals erect, oblanceolate, recurved; lip entire or obscurely 3-lobed, shortly clawed, apex recurved, undulate, lateral margins embracing column; disk usually papillose, with 2 fleshy glands at base. Column clavate, ventrally pubescent; anther erect, 2-locular, on dorsal surface of column; pollinia 2, each 2-partite, granular-farinaceous, with or without short caudicle and attached to narrow viscidium; rostellum erect, 2-lobed at apex after removal of viscidium; stigma suborbicular to elliptic. Capsule ellipsoid.

About 50 species: mainly in North America, with a few species in Africa, Asia, Australia, Central and South America, and Europe; three species (two endemic) in China.

- 1a. Flowers purplish red or pink; floral bracts, ovary, and sepals glabrous ..... 1. *S. sinensis*
- 1b. Flowers white; floral bracts, ovary, and sepals glandular pubescent.
  - 2a. Dorsal sepal ca. 4 mm, apex obtuse ..... 2. *S. hongkongensis*
  - 2b. Dorsal sepal ca. 6 mm, apex acute ..... 3. *S. sunii*

**1. *Spiranthes sinensis*** (Persoon) Ames, *Orchidaceae* 2: 53. 1908.

绶草 shou cao

*Neottia sinensis* Persoon, *Syn. Pl.* 2: 511. 1807; *Gyrostachys australis* (R. Brown) Blume; *G. stylites* (Lindley) Kuntze; *Monustes australis* (R. Brown) Rafinesque; *N. amoena* M. Bieberstein; *N. australis* R. Brown; *N. australis* var. *chinensis* Ker Gawler; *Spiranthes amoena* (M. Bieberstein) Sprengel; *S. australis* (R. Brown) Lindley; *S. australis* var. *suishaensis* Hayata; *S. sinensis* var. *amoena* (M. Bieberstein) H. Hara; *S. sinensis* var. *australis* (R. Brown) H. Hara & S. Kitamura; *S. stylites* Lindley; *S. suishaensis* (Hayata) Schlechter.

Plants 13–30 cm tall. Roots 2–3 mm in diam. Leaves 2–5, erect and spreading, broadly linear to broadly linear-lanceolate, rarely narrowly oblong, 3–10 × 0.5–1 cm, apex acute or acuminate, with an indistinct petiole-like base. Inflorescence erect, 10–25 cm, glabrous; rachis 4–10 cm, with many spirally arranged flowers; floral bracts ovate-lanceolate, glabrous, apex long acuminate. Flowers purplish red or pink; ovary pale green, 4–5 mm including pedicel, glabrous. Dorsal sepal forming a hood with petals, narrowly oblong, cymbiform, ca. 4 × 1.5 mm, glabrous, apex subacute; lateral sepals lanceolate, slightly oblique, ca. 5 × 2 mm, glabrous, base slightly gibbous, apex subacute. Petals rhombic-oblong, oblique, ca. as long as dorsal sepal, thinly textured, apex obtuse; lip broadly oblong, 4–5.5 × ca. 2.5 mm, shortly clawed, concave base containing 2 clavate glands, lateral margins erect, apical margin with strongly wrinkled teeth, apex obtuse and recurved; disk papillate. Column erect, ca. 2 mm; anther ovoid; pollinia ca. 1 mm; rostellum narrowly triangular-lanceolate; stigma discoid, weakly 3-lobed, slightly raised. Fl. Jul–Aug.  $2n = 24, 30, 32$ .

Open and moist areas in forests, thickets, wet grasslands, meadows, marshes; 200–3400 m. Almost throughout China [Afghanistan, Bhutan, India, Japan, Kashmir, Korea, Malaysia, Mongolia, Myanmar, Nepal, Philippines, Russia (Siberia), Thailand, Vietnam; Australia].

**2. *Spiranthes hongkongensis*** S. Y. Hu & Barretto, *Chung Chi J.* 13(2): 2. 1976.

香港绶草 xiang gang shou cao

Plants 11–44 cm tall. Roots 1.5–3.5 mm in diam. Leaves 2–6, erect and spreading, linear to oblanceolate, 4–12 × 0.5–0.9

cm, apex acute. Inflorescence erect, 10–42 cm, becoming densely glandular pubescent distally; rachis 3.5–13 cm, with many spirally arranged flowers; floral bracts lanceolate, sparsely glandular pubescent, apex acuminate. Flowers creamy white; ovary green, ca. 4 mm, glandular pubescent. Dorsal sepal forming a hood with petals, oblong, cymbiform, ca. 4 × 1.5 mm, outer surface glandular pubescent, apex obtuse; lateral sepals oblong-lanceolate, slightly oblique, ca. 4 × 1.5 mm, outer surface glandular pubescent, apex obtuse. Petals sometimes tinged pale pink, oblong, slightly oblique, ca. as long as dorsal sepal, thinly textured, apex obtuse; lip broadly oblong, 4–5 × ca. 2.5 mm, basal portion thickened and with 2 transparent, spherical glands, lateral margins erect and crisped, apex truncate-obtuse and recurved; disk papillate. Column erect, ca. 1 mm; anther ovoid; pollinia ca. 1 mm; rostellum triangular-lanceolate; stigma slightly raised, shield-shaped, distinctly 3-lobed. Fl. Mar–Apr.  $2n = 60^*$ .

• Open moist to dry hillsides, grasslands, meadows; 800–900 m. Hong Kong.

Since it was first described, this species has largely been ignored by subsequent authors who have referred it to synonymy of *Spiranthes sinensis*. However, Hu and Barretto (*Chung Chi J.* 13(2): 4–6. 1976) identified the often densely glandular pubescent rachis, glandular pubescent floral bracts and sepals, and the broad, distinctly 3-lobed stigma as clear morphological characters that distinguish it from *S. sinensis*. More recently, Sun (*Amer. J. Bot.* 83: 252–260. 1996) demonstrated that *S. hongkongensis* is an allopolyploid probably derived from natural hybridization between *S. sinensis* and *S. spiralis* (Linnaeus) Chevallier. Though *S. hongkongensis* has only been confirmed from Hong Kong to date, it is likely to be more widespread, particularly where the two parental species are sympatric; re-examination of herbarium material may result in the revoking of its endemic status, and synonymy may have to be re-assigned.

**3. *Spiranthes sunii*** Boufford & Wen H. Zhang, *Harvard Pap. Bot.* 13: 261. 2008.

宋氏绶草 song shi shou cao

Plants 8–20 cm tall. Roots up to ca. 5 mm in diam. Leaves 5–7, spreading, elliptic to narrowly lanceolate, 2–6.5 × 0.5–1.2 cm, apex acute, basally contracted into a distinct petiole-like stalk. Inflorescence erect, 8.5–21 cm, basally sparsely glandular pubescent, distally densely so; rachis 2.5–6 cm, with several to many spirally arranged flowers; floral bracts obovate, elliptic, or rhombic, sparsely glandular pubescent, apex acuminate.

Flowers white; ovary green, 4–6 mm, glandular pubescent. Dorsal sepal forming a hood with petals, oblong, ca. 6 × 2 mm, outer surface glandular pubescent, apex acute; lateral sepals narrowly oblong, slightly oblique, 5–6 × ca. 0.8 mm, outer surface glandular pubescent, apex acute. Petals oblanceolate, slightly oblique, 5–6 × ca. 0.8 mm, apex obtuse; lip oblong, 5–6 × ca. 2 mm, basal portion with 2 clavate glands, lateral margins erect and shallowly erose, apex truncate and recurved; disk

glabrous. Column erect, ca. 1.5 mm; anther ovoid; pollinia ca. 1.5 mm; rostellum triangular. Fl. May.

• Open moist soil along streams, grasslands and mixed deciduous forests; 800–900 m. Gansu.

This taxon is clearly very similar to *Spiranthes hongkongensis*. Further comparative studies, including observations of chromosome numbers, are required.

## 21. PELEXIA Poiteau ex Lindley, Bot. Reg. 12: ad t. 985. 1826, nom. cons.

肥根兰属 fei gen lan shu

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

*Adnula* Rafinesque; *Collea* Lindley.

Herbs, terrestrial, lithophytic, or rarely epiphytic. Rhizome absent, inconspicuous, or long; roots numerous, fleshy. Leaves usually forming a basal rosette, rarely cauline, several to many, lanceolate to ovate, petiole-like at base; petiole-like base slender or stout, channeled. Inflorescence erect, terminal, racemose, proximally glabrous, pubescent above; peduncle covered by several sheathing bracts. Flowers sometimes produced before leaves, resupinate, erect or horizontal, medium-sized, tubular; ovary fusiform, pubescent. Sepals pubescent adaxially; dorsal sepal concave, connivent with petals and forming a hood; lateral sepals connate at base, adnate to column foot and forming a short spur, or rarely free and not forming a spur. Petals elliptic to oblanceolate, often oblique at base; lip entire and obovate to spatulate, or sometimes 2-partite with an expanded epichile, fleshy, margin adherent to column for most of its length. Column elongate, stout, ventrally often puberulent or pubescent, base with long column foot; anther sessile, 2-locular; pollinia 2, longitudinally cleft, oblong-ovoid to narrowly ovoid, granular-farinaceous, tapering into caudicles attached to a solitary ovate viscidium; rostellum flexible, narrowly oblong or ligulate; stigma 2-lobed; lobes confluent or separate.

About 75 species: Central and South America; one species (introduced) in China.

**1. *Pelexia obliqua*** (J. J. Smith) Garay, Bot. Mus. Leaflet. 28: 345. 1982.

肥根兰 fei gen lan

*Spiranthes obliqua* J. J. Smith, Bull. Dépt. Agric. Indes Néerl. 43: 74. 1910; *Manniella hongkongensis* S. Y. Hu & Barretto.

Plants terrestrial, 12–15 cm tall. Rhizome short; roots 1–7 × 0.5–1 cm, fleshy, pilose. Leaves forming a basal rosette, appearing after flowering, 7 or 8, oblong to elliptic, 3.5–6.5 × 1.5–3.5 cm, margin occasionally undulate, apex acute; petiole-like base short. Inflorescence glandular hairy; rachis ca. 4 cm,

5–18-flowered; floral bracts linear-lanceolate, 7–11 mm, puberulent. Flowers ca. 3 mm in diam. Sepals pale grayish green, glandular hairy; dorsal sepal suboblong, concave at base, ca. 4 × 1.5 mm, 3-veined; lateral sepals basally connate and forming a pouch, united with base of column. Petals pale grayish green, ca. as long as dorsal sepal, ca. 1 mm wide; lip subsessile, cream-yellow, 2-partite, fleshy; hypochile subquadrate, concave, papillate, base with 2 fleshy appendages near margin; epichile recurved, transversely ovate. Column short; stigma 2-lobed. Fl. Sep.

Valleys. Hong Kong [introduced in Indonesia (Java) and the SW Pacific islands; native to Central America].

## 22. CORYBAS Salisbury, Parad. Lond. ad t. 83. 1807.

铠兰属 kai lan shu

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

*Calcearia* Blume; *Corysanthes* R. Brown; *Nematoceras* J. D. Hooker.

Herbs, terrestrial or rarely epiphytic, small. Tuber solitary, globose to ovoid; subterranean stem and roots slender, fleshy, pubescent. Stem slender, erect, sometimes short and remaining subterranean, usually angled or winged, with a membranous tubular cataphyll at base. Leaf solitary (rarely 2), cordate or broadly ovate, entire or rarely 3- or 5-lobed, sessile or with a short petiole-like base, often appressed to ground, with 1–3 main veins, venation usually white or red. Floral bracts 1 or 2. Flower terminal, solitary, nearly sessile, resupinate, held ± erect at leaf base; ovary usually 6-ridged. Dorsal sepal hoodlike and curved over lip, basal margin incurved and forming a tube that embraces base of lip; lateral sepals and petals linear, narrow, free or connate at base; lip deeply channeled at base and forming a decurved tube with dorsal sepal, upper limb enlarged, spreading or reflexed, adaxially usually minutely papillose or hairy, with 2 spurs or auricles (rarely neither) at base. Column short; anther terminal, erect, 2-locular; pollinia 4 or 2 with cleft, granular-farinaceous, without caudicles, directly attached to sticky viscidium; rostellum dorsal; stigma entire, concave. Capsule strongly 6-ridged, borne on elongate pedicel.

About 100 species: mainly in New Guinea, Australia, and the Pacific islands, extending through SE Asia to the Himalayas; five species (four endemic) in China.

- 1a. Petals 12–30 mm.  
 2a. Dorsal sepal apex long apiculate; lateral sepals free ..... 4. *C. sinii*  
 2b. Dorsal sepal apex rounded; lateral sepals connate at base ..... 5. *C. himalaicus*  
 1b. Petals 8.5–10 mm.  
 3a. Lip without callus at base; floral bracts conspicuously longer than ovary ..... 1. *C. taiwanensis*  
 3b. Lip with a large callus at base; floral bracts slightly longer to shorter than ovary.  
 4a. Lip with a suborbicular lamella; floral bracts slightly longer than pedicel and ovary ..... 2. *C. taliensis*  
 4b. Lip without a lamella; floral bracts nearly equal to or slightly shorter than pedicel and ovary ..... 3. *C. fanjingshanensis*

**1. *Corybas taiwanensis*** T. P. Lin & S. Y. Leu, *Taiwania* 20: 162. 1975.

台湾铠兰 tai wan kai lan

*Calcearia taiwanensis* (T. P. Lin & S. Y. Leu) M. A. Clements & D. L. Jones.

Plants small, 3–5 cm tall. Tuber subglobose or ovoid, 3–4 × ca. 3 mm; subterranean stem erect, pilose. Stem erect, glabrous, with 1 short cataphyll at basal node. Leaf solitary, near apex of stem, sessile, cordate, ca. 1.5 × 1.6 cm, with reticulate venation, apex acute. Floral bract lanceolate, ca. 5 mm. Flower solitary, pale purplish red, subsessile; ovary ca. 3 mm. Dorsal sepal incurved, linear, entire, ca. 13 × 2 mm, apex obtuse; lateral sepals narrowly linear, ca. 13 mm, connate at base for up to 3 mm. Petals narrowly linear, ca. 10 mm; lip orbicular-elliptic when expanded, ca. 17 × 10 mm, base tubular, apical margin fimbriate; disk with several dark red stripes but lacking calli and lamellae; spurs 2, hornlike, ca. 3 mm. Column broadly elliptic, ca. 3.5 mm; pollinia 4, in 2 pairs, ca. 1.2 mm; viscidium elliptic, large; stigma protruding, cupular. Fl. Aug.

- Mossy cliffs, rocky outcrops in forests; ca. 1400 m. N Taiwan.

**2. *Corybas taliensis*** Tang & F. T. Wang, *Acta Phytotax. Sin.* 1: 185. 1951.

大理铠兰 da li kai lan

*Calcearia taliensis* (Tang & F. T. Wang) M. A. Clements & D. L. Jones.

Plants small, 5–6.5 cm tall. Tuber subglobose, ca. 5 mm in diam.; subterranean stem erect, pilose. Stem erect, slender, with 1 short cataphyll at basal node. Leaf solitary, near apex of stem, sessile, cordate to broadly ovate, 8.5–14 × 8–10.5 mm, adaxially with pale reticulate venation, base amplexicaul, apex shortly acuminate. Floral bract linear-lanceolate, slightly longer than ovary. Flower solitary, purplish. Dorsal sepal erect, spatulate, hoodlike, ca. 14 × 7 mm, 5–7-veined, apex rounded, apiculate; lateral sepals similar to petals, narrowly linear or subulate, ca. 8.5 × 1.5 mm, 1-veined; lip subobovoid when expanded, ca. 10 × 8 mm, base tubular and erect, apex recurved; disk with 1 suborbicular, slightly fleshy lamella and 1 large callus at base; spurs 2, hornlike, ca. 3.5 mm. Column ca. 2.5 mm. Fl. Sep.

- Forests; 2100–2500 m. W Sichuan, W Yunnan.

**3. *Corybas fanjingshanensis*** Y. X. Xiong, *Acta Phytotax. Sin.* 45: 809. 2007.

梵净山铠兰 fan jing shan kai lan

Plants small, 3.5–6 cm tall. Tuber subglobose, 4–6 mm in diam.; subterranean stem erect. Stem erect, with 1 short cata-

phyll at basal node. Leaf solitary, near apex of stem, cordate or broadly ovate, 9–14 × 7–9.5 cm, adaxially with white reticulate venation, base amplexicaul, apex shortly acuminate. Floral bract lanceolate, nearly equal to or slightly shorter than pedicel and ovary. Flower solitary, rosy or pink, longitudinally striped with purple. Dorsal sepal erect, spatulate, hoodlike, 10–12 × 5–8 mm, 7–9-veined, apex rounded; lateral sepals narrowly linear or subulate, 5–5.5 × 0.5–0.8 mm, 1-veined. Petals similar to lateral sepals, 6–7 × 0.5–1 mm; lip subobovate when expanded, 11–15 × 6–10 mm, base tubular, apical half recurved; disk with a callus at base; spurs 2, ca. 3 mm. Column ca. 2 mm. Fl. Jun–Jul.

- Mossy places; 2100–2400 m. NE Guizhou.

**4. *Corybas sinii*** Tang & F. T. Wang, *Acta Phytotax. Sin.* 1: 186. 1951.

铠兰 kai lan

*Calcearia sinii* (Tang & F. T. Wang) M. A. Clements & D. L. Jones.

Plants small, to 4 cm tall. Tuber ovoid to ellipsoid, 3.5–6 × 3.5–4 mm; subterranean stem erect, with long curved soft hairs. Stem puberulent, with 1 short cataphyll at basal node. Leaf solitary, near apex of stem, sessile, broadly ovate, 9–18 × 8–16.5 mm, with reticulate venation, base cordate, amplexicaul, margin shallowly undulate, apex long acuminate. Floral bract subulate, ca. 1.5 × as long as ovary. Flower solitary, deep purple; ovary ca. 3 mm. Dorsal sepal oblanceolate, ca. 18.5 × 5 mm, 9-veined, apex rounded and long apiculate; lateral sepals free, subulate, ca. 14 × 1 mm. Petals similar to lateral sepals, to 25–30 mm, 1-veined; lip subobovoid when expanded, ca. 13 × 11 mm, 13-veined, basally tubular and erect, apical part recurved, margin erose, apex rounded; disk lacking a lamella but with 1 large callus at base; spurs 2, hornlike, ca. 5 mm. Column ca. 3.8 mm. Fl. Jun–Nov.

- Forests; 1500–2300 m. C and N Guangxi, C Taiwan.

**5. *Corybas himalaicus*** (King & Pantling) Schlechter, *Repert. Spec. Nov. Regni Veg.* 19: 19. 1923.

杉林溪铠兰 shan lin xi kai lan

*Corysanthes himalaica* King & Pantling, *J. Asiatic Soc. Bengal, Pt. 2, Nat. Hist.* 65: 128. 1896; *Corybas purpureus* J. Joseph & Yoganarasimhan; *C. shanlinshiensis* W. M. Lin, T. C. Hsu & T. P. Lin.

Plants small, 3–6 cm tall. Tuber globose to ellipsoid, ca. 4 mm, minutely pilose; subterranean stem erect, 0.5–3 cm, pilose. Stem erect, to 5 cm, glabrous, with a tubular cataphyll at basal node. Leaf solitary, near apex of stem, cordate, 0.8–2.2 × 0.7–2.3 cm, adaxially with palmate venation, base amplexicaul,

apex cuspidate. Floral bract linear-lanceolate, 6–12 × ca. 2 mm. Flower solitary, white and purplish red; pedicel and ovary 4–5 mm. Dorsal sepal spatulate, 12–17 × 4–8 mm, apex rounded; lateral sepals filiform, 11–14 mm, connate at base for ca. 1/5 of length. Petals similar to lateral sepals, 12–20 mm; lip orbicular and 8–14 mm wide when expanded, slightly shorter than petals,

base tubular, apical part recurved; disk papillose, marked with parallel violet-red lines, with a conspicuous callus at base; spurs 2, whitish, straight or slightly arcuate, 3–7 mm. Column ca. 2.5 mm. Fl. Jul–Aug.

Mossy rocky places in forests; 1700–1900 m. C Taiwan [Bhutan, NE India].

### 23. STIGMATODACTYLUS Maximowicz ex Makino, Ill. Fl. Japan 1(7): 81, t. 43. 1891.

指柱兰属 zhi zhu lan shu

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

*Pantlingia* Prain.

Herbs, terrestrial, small. Tubers solitary, globose, small; subterranean stem above tuber erect, elongate, becoming fleshy and rhizomatous apically, producing lateral droppers that form new tubers at their tips. Stem slender, glabrous, unbranched, with membranous cataphylls at each node. Leaf solitary, cauline, green. Inflorescence terminal, racemose, 1- to few flowered; floral bracts foliaceous, smaller than leaf. Flowers resupinate, suberect, shortly pedicellate. Sepals free, narrow, similar but lateral sepals slightly oblique and shorter than dorsal sepal. Petals similar to lateral sepals; lip broad, base with fleshy, deeply lobed callus. Column erect, incurved toward apex, sometimes keeled ventrally and with narrow wings at margin, lacking column foot; anther terminal, 2-locular; stigma concave, with prominent digital appendage at posterior margin; pollinia 4, in 2 pairs, granular-farinaceous, lacking caudicle and viscidium.

About ten species: Indonesia, New Guinea, and the Solomon Islands, with a few species reaching China, the Himalayas, N India, and Japan; one species in China.

1. *Stigmatodactylus sikokianus* Maximowicz ex Makino, Ill. Fl. Japan 1(7): 70, t. 43. 1891.

指柱兰 zhi zhu lan

Plants to 10 cm tall. Tuber ca. 3 mm in diam.; rhizomatous portion of subterranean stem cylindric, 6–10 × 1–2 mm, puberulent, with 1 or 2 small apical scales. Stem 4–10 cm, slender, angled, with 1 short cataphyll near base. Leaf midway along stem, triangular-ovate, 3–5 × 2–4 mm, 3-veined, apex acuminate. Inflorescence 1–3-flowered; floral bracts pale green, slightly smaller than leaf. Flowers pale green with pale reddish

purple lip; pedicel and ovary 5–9 mm. Dorsal sepal linear, ca. 4 × 0.5 mm, basal margin long ciliate; lateral sepals narrowly linear, ca. 2.5 mm. Petals ca. 3.5 mm, narrower than dorsal sepal; lip broadly ovate, ca. 3.5 mm, margin denticulate; basal callus ca. 1.5 mm, fleshy, divided at middle into apical and basal lobes, apical lobe slightly shorter than basal lobe, both shallowly 2-lobed at apex. Column ca. 3.5 mm, with a digital appendage below stigma. Fl. Aug–Sep.

In shade and along gullies in dense forests; ca. 1800 m. N Fujian, S Hunan, Taiwan [Japan].

### 24. CRYPTOSTYLIS R. Brown, Prodr. 317. 1810.

隐柱兰属 yin zhu lan shu

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

*Chlorosa* Blume; *Zosterostylis* Blume.

Herbs, terrestrial. Rhizome horizontal or ascending, short, densely noded, producing aerial shoots from apical nodes; roots fasciculate, long, fleshy. Leaves basal, elliptic to ovate-lanceolate, base long attenuate into erect petiole-like stalks, with or without loosely sheathing cataphylls at base. Inflorescence erect or ascending, terminal, racemose, several flowered, with sheathing cataphylls at base and scattered sterile bracts along peduncle; floral bracts sheathing. Flowers not resupinate; pedicel and ovary erect, arcuate. Sepals and petals subsimilar, free, spreading, very narrow, margin often involute. Petals often slightly shorter and smaller than sepals; lip attached to base of column, entire, tapering toward apex, basally expanded and embracing column, spurless; disk usually with longitudinal ridges or elongate calli. Column short, with lateral wings; anther terminal, erect, 4-locular; pollinia 4, in 2 pairs, clavate, granular-farinaceous, attached to solitary viscidium; stigma entire, convex, fleshy; rostellum erect, broad and stout.

About 20 species: mainly in tropical Asia, from India and Sri Lanka to the Philippines, Australia, and the Pacific islands; two species in China.

- 1a. Leaves, petioles, inflorescence, and floral bracts uniformly green, lacking dark green or purplish brown blotches; lip ovate-lanceolate to ovate-oblong, lateral veins running closely parallel to midvein ..... 1. *C. arachnites*  
 1b. Leaves, petioles, inflorescence, and floral bracts with dark green or purplish brown blotches; lip rhombic-ovate or obovate, outermost lateral veins widely spaced and running midway between midvein and lateral margins .... 2. *C. taiwaniana*

**1. *Cryptostylis arachnites*** (Blume) Blume, Coll. Orchid. 133. 1859.

隐柱兰 *yin zhu lan*

*Zosterostylis arachnites* Blume, Bijdr. 419. 1825; *Chlorosa latifolia* Blume; *Cryptostylis alismatifolia* F. Mueller; *C. erythroglossa* Hayata; *C. fulva* Schlechter; *C. fulva* var. *subregularis* Schlechter; *C. papuana* Schlechter; *C. stenochila* Schlechter; *C. vitiensis* Schlechter; *C. walkerae* (Wight) Blume; *C. zeylanica* (Lindley) Blume; *Zosterostylis walkerae* Wight; *Z. zeylanica* Lindley.

Plants 15–50 cm tall. Rhizome creeping; roots 4–6 cm, 5–7 mm in diam. Leaves 2 or 3, abaxially pale green, adaxially green, elliptic-ovate to elliptic, 8.5–11 × 4.5–5 cm, glabrous, base broadly cuneate or obtuse, apex acuminate; petiole-like base green, 6.5–11.5 cm. Inflorescence green, 15–47 cm, slender, glabrous, with several to many sterile bracts; rachis 8–10 cm, 10–20-flowered; floral bracts green, lanceolate, 10–15 × 2–3 mm, apex acuminate; ovary cylindric, 8–14 mm including pedicel, glabrous. Sepals yellowish green, linear-lanceolate, 15–19 × 1.5–2 mm, 3-veined, margin involute, apex acuminate. Petals yellowish green, linear, 9–10 × ca. 1 mm, 1-veined, margin involute, apex acuminate; lip abaxially yellowish green, adaxially orange-red, tinged yellow near apex and with bright red spots, elliptic-lanceolate to ovate-oblong, 15–21 × 5–7 mm, 5-veined, lateral veins running closely parallel to midvein, base rounded and shallowly saccate, apex acuminate; disk with minute hairs. Column 2–2.5 mm; wings smooth; anther ellipsoid; pollinia 1.5–1.7 mm. Fl. May–Jun.  $2n = 42$ .

Broad-leaved evergreen forests, bamboo forests; 200–1500 m. S Guangdong, SW Guangxi, Taiwan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam].

**2. *Cryptostylis taiwaniana*** Masamune, Trans. Nat. Hist. Soc. Formosa 23: 208. 1933.

台湾隐柱兰 *tai wan yin zhu lan*

*Cryptostylis arachnites* (Blume) Blume var. *taiwaniana* (Masamune) S. S. Ying.

Plants 15–25 cm tall. Rhizome creeping or ascending. Leaves 1–3, pale green abaxially, green with dark green blotches adaxially, ovate to ovate-oblong, 5–15 × 3–6 cm, base obtuse or rounded, apex acute; petiole-like base with dark green or purplish brown spots, 7–12 cm. Inflorescence green with dark green or purplish brown spots, to 25 cm, glabrous, with 2–5 sterile bracts; rachis 5–15 cm, 5–15-flowered; floral bracts green with purplish brown spots, ovate-lanceolate, ca. 15 × 5 mm, 5-veined, apex acute or acuminate; ovary cylindric, 8–10 mm including pedicel, glabrous. Sepals green, lanceolate, 8–15 × 2–3 mm, 3-veined, margin involute, apex acute. Petals similar to sepals, green, 7–12 × ca. 2 mm, 1-veined, margin involute, apex acute; lip adaxially orange-purple, with scattered dark crimson spots, rhombic-oblong to obovate, 15–20 × 8–12 mm, 5-veined, lateral veins widely spaced, outermost pair running midway between midvein and lateral margins, base rounded and shallowly saccate, lateral margins slightly revolute, apex acute; disk with minute hairs. Column 2.3–2.5 mm; wings rugose; anther ellipsoid; pollinia 1–1.5 mm. Fl. Apr–Aug.

Broad-leaved forests; 100–500 m. S Taiwan [Philippines].

Sufficient material of *Cryptostylis taiwaniana* on which to base a critical comparison with the widespread and variable *C. arachnites* is presently unavailable. In particular, the stability of the primary character used to distinguish the two—namely, the presence/absence of purple-green blotches on the vegetative parts—remains uncertain. As well, other character states are similar or overlap.

“*Cryptostylis philippinensis*” (Schlechter, Bot. Jahrb. Syst. 58: 54. 1922) is a nomen nudum and was therefore not validly published, and neither was the intended new combination “*Cryptostylis arachnites* var. *philippinensis*” (S. S. Ying, Coloured Ill. Indig. Orchids Taiwan 1(2): 118. 1977).

## 25. MICROTIS R. Brown, Prodr. 320. 1810.

葱叶兰属 *cong ye lan shu*

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

Herbs, terrestrial, small. Tubers subglobose, to 1 cm in diam., fleshy; roots wiry, filamentous. Stem erect, slender, with membranous cataphylls at nodes. Leaf basal, solitary, cylindric, slender, hollow, glabrous, basally amplexicaul, sessile. Inflorescence terminal, racemose, with several to many flowers, emerging through opening in leaf; floral bracts small, sheathing. Flowers resupinate, small; ovary ribbed, glabrous; pedicel extremely short. Dorsal sepal free, erect, similar to but larger than lateral sepals, cucullate over column; lateral sepals free, spreading. Petals free, smaller than sepals; lip adnate to base of column, usually with basal callus adaxially, entire or sometimes apically emarginate, spurless. Column very short, fleshy, with 2 wings apically or laterally; anther erect, 2-locular; stigma entire, quadrate; pollinia 4, in 2 pairs, granular-farinaceous, with short caudicle and viscidium. Capsule erect.

About 14 species: mainly in Australia and New Zealand, with one species extending to tropical and subtropical Asia; one species in China.

**1. *Microtis unifolia*** (G. Forster) H. G. Reichenbach, Beitr. Syst. Pflanzenk. 62. 1871.

葱叶兰 *cong ye lan*

*Ophrys unifolia* G. Forster, Fl. Ins. Austr. 59. 1786; *Microtis formosana* Schlechter; *M. parviflora* R. Brown.

Plants 15–30 cm tall. Tuber small, 4–7 × 3–6 mm. Leaf erect or suberect, 16–33 × 0.2–0.3 cm, adaxially channeled. Inflorescence usually more than 10-flowered, emergent through opening in lower half of leaf; rachis 2.5–5 cm; floral bracts narrowly ovate-lanceolate, 1–2 mm. Flowers green or pale green; ovary and pedicel 2–3.5 mm. Dorsal sepal concave and forming

a hood, broadly elliptic, ca.  $2 \times 1.5$  mm, apex obtuse; lateral sepals suboblong or narrowly elliptic, ca.  $1.5 \times 0.8$  mm. Petals narrowly oblong, ca.  $1.2 \times 0.5$  mm, apex obtuse; lip narrowly elliptic-ligulate,  $1.5\text{--}2 \times$  ca. 1.2 mm, slightly fleshy, with notched callus at base. Column extremely short. Capsule ellip-

tic, ca.  $4 \times 2\text{--}2.5$  mm. Fl. and fr. May–Sep.  $2n = 44, 88$ .

Grassy slopes, moist sunny meadows; 100–800 m (to 2000 m in Taiwan). Anhui, Fujian, Guangdong, Guangxi, Hunan, Jiangxi, SE Sichuan, Taiwan, Zhejiang [Indonesia, Japan, Philippines; Australia, Pacific islands (New Zealand)].

## 26. ORCHIS Linnaeus, Sp. Pl. 2: 939. 1753.

红门兰属 hong men lan shu

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

Herbs, terrestrial, small to medium-sized. Tubers ovoid or ellipsoid; roots filiform, emerging from subterranean stem at apex of tubers. Stem usually erect, terete, with tubular sheaths near base, glabrous. Leaves 2–5, basal or cauline, alternate, rarely subopposite, base contracted into clasping sheaths, spotted or not. Inflorescence terminal, cylindric, few to many flowered; floral bracts lanceolate to ovate, membranous. Flowers resupinate, secund or not, small to medium-sized; ovary twisted, pedicellate. Sepals free, glabrous; dorsal sepal erect, often concave; lateral sepals spreading, erect or connivent with dorsal sepal and petals to form a hood. Petals free, usually porrect; lip simple or 3- or 4-lobed, spurred at base or rarely spurless; disk with or without basal calli. Column stout; anther erect, base firmly adnate to apex of column, with 2 parallel or divergent locules; pollinia 2, granular-farinaceous, sectile, each attached to a viscidium by a slender caudicle; each viscidium enclosed in a sticky globe, both globes enclosed in a common bursicle formed by folding of rostellar arms; stigma lobes confluent, concave, beneath rostellum; rostellum slightly protruding, with 2 arms; auricles 2, on each side of column. Capsule erect.

About 20 species: mainly in Europe, temperate C and W Asia, and N Africa; one species in China.

### 1. *Orchis militaris* Linnaeus, Sp. Pl. 2: 941. 1753.

四裂红门兰 si lie hong men lan

Plants 20–45 cm tall. Tubers ovoid, 1–1.5 cm, fleshy, entire. Stem with 2 tubular sheaths at base, 3–5-leaved. Leaves abaxially pale green, adaxially green, not spotted, oblong-elliptic to elliptic,  $8\text{--}18 \times 2.5\text{--}5$  cm, apex obtuse. Inflorescence  $4\text{--}10 \times 0.3\text{--}0.5$  cm, densely 5–15-flowered; floral bracts green sometimes tinged purplish red, ovate, 2–3 mm, much shorter than ovary, apex acuminate. Flowers scented, medium-sized; ovary green, tinged with violet, oblong, slightly arching, 1–1.5 cm including pedicel, glabrous. Sepals pinkish white, veined rose-purple on inner surfaces; dorsal sepal erect, ovate-lanceolate, concave,  $9\text{--}13 \times 3\text{--}4$  mm, 3-veined, apex acuminate; lateral sepals erect, obliquely ovate-lanceolate,  $9\text{--}13 \times 3.5\text{--}4.5$

mm, 3-veined, apex acuminate. Petals erect, connivent with dorsal sepal and forming a hood, pale purple to pink, linear, slightly shorter and narrower than dorsal sepal, 1-veined, apex acuminate; lip whitish in center with fine purplish red papillate spots, 1–1.4 cm, spurred at base, 4-lobed, lobes purplish red; basal lobes often erect, linear-falcate, ca.  $8 \times 1$  mm, apex obtuse; mid-lobe much larger than basal lobes, linear-oblong to obovate, ca. 2 mm wide, apex divergently 2-lobed, with an apiculus between 2 lobules; lobules oblong-obovate, to 4 mm; spur pendulous, curving slightly forward, white or pink, cylindrical, 5–6 mm, much shorter than ovary, apex obtuse. Column obtuse; anther purplish; rostellum 3-lobed. Fl. May–Jun, fr. Jul–Aug.  $2n = 42$ .

Limestone grasslands; ca. 600 m. N Xinjiang (Habahe) [Afghanistan, Mongolia, Russia; SW Asia, Europe].

## 27. GALEARIS Rafinesque, Herb. Raf. 71. 1833.

盔花兰属 kui hua lan shu

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

*Aceratorchis* Schlechter; *Aorchis* Vermeulen; *Galeorchis* Rydberg.

Herbs, terrestrial, small to medium-sized. Rhizome creeping, usually short; roots fibrous to fleshy. Stem erect, terete, with tubular sheaths near base. Leaves basal or cauline, 1 or 2, alternate, rarely subopposite, base contracted into clasping sheath. Inflorescence erect, terminal, racemose, laxly 1- to several flowered, glabrous; floral bracts conspicuous, lanceolate to ovate, leaflike. Flowers resupinate, secund or not, showy, small to medium-sized; ovary twisted, pedicellate, glabrous. Sepals free, glabrous; dorsal sepal erect, often concave; lateral sepals and petals usually connivent with dorsal sepal and forming a hood; lip simple or obscurely 3-lobed, spurred at base or rarely spurless. Column stout; anther erect, base firmly adnate to apex of column, with 2 parallel or divergent locules; pollinia 2, granular-farinaceous, sectile, each attached to a viscidium by a slender caudicle; each viscidium enclosed in a sticky globe, both globes enclosed in a common bursicle formed by folding of rostellar arms; stigma lobes confluent, concave, beneath rostellum; rostellum slightly protruding, with 2 arms; auricles 2, winglike, on each side of column. Capsule erect.

About ten species: mainly in the N temperate zone, extending to alpine areas of subtropical Asia and North America; five species (two endemic) in China.

*Galearis huanglongensis* Q. W. Meng & Y. B. Luo (Bot. J. Linn. Soc. 158: 690. 2008), recently described from Sichuan (Songpan, 3000–3100 m), could not be treated here because no specimens were seen by the present authors.

- 1a. Lip similar to but shorter than petals, base not contracted or clawed, spurless ..... 1. *G. tschiliensis*
- 1b. Lip distinct from and longer than petals, base contracted or shortly clawed, spurred.
  - 2a. Spur straight, stout, ca. 2 mm, much shorter than ovary ..... 2. *G. spathulata*
  - 2b. Spur curved forward, slender, 6–10 mm, almost as long as to slightly longer than ovary.
    - 3a. Lip deeply 3-lobed near apex ..... 5. *G. roborowskyi*
    - 3b. Lip simple, undivided.
      - 4a. Plants 1-leaved; leaf broadly elliptic, broadly ovate, or suborbicular, base abruptly contracted; rachis 1- or 2-flowered; lip 4–6 mm wide ..... 3. *G. cyclochila*
      - 4b. Plants 2-leaved; leaf elliptic to oblong-lanceolate, base gradually attenuate; rachis 5- to more than 10-flowered; lip 8–9 mm wide ..... 4. *G. wardii*

**1. Galearis tschiliensis** (Schlechter) S. C. Chen, P. J. Cribb & S. W. Gale, **comb. nov.**

河北盔花兰 he bei kui hua lan

Basionym: *Aceratorchis tschiliensis* Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 12: 329. 1922; *A. albiflora* Schlechter; *Galeorchis albiflora* (Schlechter) Grubov; *Orchis aceratorchis* Soó; *O. tschiliensis* (Schlechter) Soó.

Plants 6–15 cm tall. Rhizome fleshy. Stem with 2 tubular sheaths at base, 1-leaved. Leaf basal, green, oblong-spatulate to spatulate, 3–5 × 1.2–2.6 cm, base gradually attenuate into conduplicate sheath, apex obtuse. Inflorescence 3–6 cm, slender; rachis 0.5–2.5 cm, with 1–6 secund flowers; floral bracts lanceolate, apex acuminate, basal one often longer than flower. Flowers spreading, pink, small to medium-sized; ovary cylindrical-fusiform, 1–13 mm including pedicel. Sepals rose-purple, oblong, subequal in size, 5–8 × 2.5–4 mm, 3-veined, apex obtuse; dorsal sepal erect, concave; lateral sepals spreading. Petals erect, forming a hood with dorsal sepal, purplish red, pale purple, or white, oblong-lanceolate, oblique, 4–7 × 2–3.5 mm, 1-veined, apex acute; lip similar to petals, spreading, simple, ovate-lanceolate to ovate-oblong, 4–6.8 × 3–3.8 mm, slightly shorter but broader than petals, base slightly concave, spurless, margin entire to slightly undulate, apex obtuse or subacute. Fl. Jun–Aug, fr. Jul–Sep.

• Forests, meadows; 1600–4100 m. Gansu, Hebei, S Qinghai, Shaanxi, Shanxi, NW Sichuan, Xizang, Yunnan.

**2. Galearis spathulata** (Lindley) P. F. Hunt, Kew Bull. 26: 172. 1971.

二叶盔花兰 er ye kui hua lan

*Gymnadenia spathulata* Lindley, Gen. Sp. Orchid. Pl. 280. 1835; *Aorchis spathulata* (Lindley) Vermeulen; *A. spathulata* var. *foliosa* (Finet) Soó; *A. spathulata* var. *wilsonii* (Schlechter) Soó; *Galearis diantha* (Schlechter) P. F. Hunt; *Galeorchis diantha* (Schlechter) Soó; *G. reichenbachii* Nevski; *G. spathulata* (Lindley) Soó; *G. spathulata* var. *wilsonii* (Schlechter) Soó; *Habenaria spathulata* (Lindley) Benth; *Orchis diantha* Schlechter; *O. spathulata* (Lindley) H. G. Reichenbach ex Benth (1881), not Linnaeus (1781); *O. spathulata* var. *foliosa* Finet; *O. spathulata* var. *wilsonii* Schlechter; *Ponerorchis diantha* (Schlechter) Soó.

Plants 8–15 cm tall. Rhizome slender. Stem with 1 or 2 tubular, somewhat membranous sheaths at base, (1 or)2(or)3-leaved. Leaves subopposite, narrowly spatulate-oblong-lanceolate,

narrowly spatulate, or elliptic, 2.3–9 × 0.5–3 cm, base gradually attenuate into a long conduplicate sheath, apex obtuse-rounded to acute. Inflorescence 4–10 cm, slender to slightly fleshy; rachis to 2 cm, with 1–5 often secund flowers; floral bracts spreading, suboblong to narrowly elliptic-lanceolate, apex obtuse or acute, basal one often equal to or longer than flower. Flowers spreading, purple, medium-sized to relatively large; ovary fusiform, 7–9 mm including pedicel. Sepals rose-purple, suboblong, 7–10 × 2.5–4 mm, subequal in length, apex obtuse; dorsal sepal erect, concave, 3(or)5-veined; lateral sepals spreading, slightly oblique, 3-veined. Petals erect, forming a hood with dorsal sepal, purplish pink, ovate-oblong to broadly oblong, 6.5–8 × 2.5–3.5 mm, 3-veined, apex obtuse; lip simple, oblong, elliptic, ovate, or subsquare, 8–11 × 4–6.5 mm, longer than petals, base narrowed into a short claw, spurred, margin entire to slightly undulate, apex obtuse-rounded or subtruncate; disk purplish pink, spotted with dark purple, papillose; spur straight, cylindrical, short, ca. 2 mm, much shorter than ovary, stout. Fl. Jul–Aug, fr. Jul–Sep.

Open forests, scrub, alpine meadows, roadsides; 2300–4300 m. SE Gansu, NE Qinghai, Shaanxi, W Sichuan, E and S Xizang, NW Yunnan [Bhutan, India, Nepal].

**3. Galearis cyclochila** (Franchet & Savatier) Soó, Ann. Univ. Sci. Budapest. Rolando Eötvös, Sect. Biol. 11: 72. 1969.

卵唇盔花兰 luan chun kui hua lan

*Habenaria cyclochila* Franchet & Savatier, Enum. Pl. Jap. 2: 516. 1879; *Galeorchis cyclochilus* (Franchet & Savatier) Nevski; *Orchis cyclochila* (Franchet & Savatier) Maximowicz.

Plants 9–19 cm tall. Rhizome fleshy. Stem slender, with 1 or 2 tubular, membranous sheaths at base, 1-leaved. Leaf green, broadly elliptic, broadly ovate, or suborbicular, 5–9 × 2.5–5 cm, thickly textured, base abruptly contracted into a conduplicate sheath, apex obtuse or obtuse-rounded. Inflorescence 5–12 cm, slender, ca. 1 mm in diam.; rachis branching at apex of scape, (1 or)2-flowered; floral bracts subopposite, oblong-lanceolate to narrowly ovate, 1–2.5 cm, apex obtuse to subacute. Flowers spreading, pink, relatively large; ovary cylindrical, 9–13 mm including pedicel, slender. Dorsal sepal erect, pink, broadly lanceolate to oblong-ovate, concave, 6–9 × 3–4 mm, 3-veined, apex acuminate; lateral sepals spreading, pink, ovate-lanceolate, oblique, 7–10 × 2.5–3 mm, 3-veined, apex acuminate. Petals erect, forming a hood with dorsal sepal, pale pink to white, narrowly oblong to linear-lanceolate, 6–9 × 1.2–2 mm, 1-veined, apex subobtuse; lip spreading, simple, ovate-orbicular, 7–10 × 4–6 mm, longer than petals, basally contracted into a

claw, spurred, margin irregularly wavy-dentate, apex obtuse-rounded; disk pale pink, spotted with purple, papillose; spur pendulous, slightly curved forward, linear-cylindric, slender, 6–9 mm, almost as long as ovary, attenuate toward end, apex subacute. Fl. May–Jun, fr. Jul–Aug.  $2n = 42$ .

Forests, scrub; 1000–2900 m. Heilongjiang, Jilin, NE Qinghai [Japan, Korea, Russia].

**4. *Galearis wardii*** (W. W. Smith) P. F. Hunt, Kew Bull. 26: 172. 1971.

斑唇盔花兰 ban chun kui hua lan

*Orchis wardii* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 13: 215. 1921.

Plants 12–25 cm tall. Rhizome stout, fleshy. Stem stout, with 2 or 3 tubular sheaths at base, 2-leaved. Leaves green, elliptic to oblong-lanceolate, 7–15 × 2.5–4.5 cm, thickly textured, base gradually attenuate into a conduplicate sheath, apex obtuse-rounded or mucronate. Inflorescence 3.5–8 cm, stout, 2–3 mm in diam.; rachis to 3 cm, 5- to more than 10-flowered; floral bracts lanceolate, basal ones to 3.5 cm, much longer than flowers, apex acuminate. Flowers spreading, whitish pink to purple, spotted with dark purple, relatively large; ovary cylindrical, 10–12 mm including pedicel. Sepals pinkish purple, inner surfaces spotted with purple, subequal in length, 8–9 × 3–3.5 mm, 3-veined; dorsal sepal erect, narrowly ovate-lanceolate, apex obtuse; lateral sepals spreading horizontally or reflexed, falcate to narrowly ovate-lanceolate, apex slightly obtuse. Petals erect, forming a hood with dorsal sepal, pinkish purple spotted with deep purple, ovate-lanceolate, ca. 7 × 2.5 mm, 3-veined; lip simple, spreading, pinkish purple spotted with deep purple to purplish black, broadly ovate to suborbicular, 8–9 × 8–9 mm, longer than petals, base contracted, spurred, margin strongly erose and wrinkled, apex obtuse-rounded; spur pendulous, cylindrical, slightly curved forward, 7–10 mm, almost as long as ovary, slender, apex obtuse. Fl. Jun–Jul, fr. Jul–Aug.

• Forests, alpine meadows; 2400–4500 m. W Sichuan, E Xizang, NW Yunnan.

**5. *Galearis roborowskyi*** (Maximowicz) S. C. Chen, P. J. Cribb & S. W. Gale, **comb. nov.**

北方盔花兰 bei fang kui hua lan

Basionym: *Orchis roborowskyi* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 31: 104. 1887; *Aorchis roborowskyi* (Maximowicz) Seidenfaden; *Chusua roborowskyi* (Maximowicz) P. F. Hunt; *Galearis paxiana* (Schlechter) P. F. Hunt; *G. stracheyi* (J. D. Hooker) P. F. Hunt; *G. szechenyiana* (H. G. Reichenbach ex Kanitz) P. F. Hunt; *Galeorchis paxiana* (Schlechter) Soó; *G. roborowskyi* (Maximowicz) Nevski; *G. stracheyi* (J. D. Hooker) Soó; *G. szechenyiana* (H. G. Reichenbach ex Kanitz) Soó; *Orchis paxiana* Schlechter; *O. stracheyi* J. D. Hooker; *O. szechenyiana* H. G. Reichenbach ex Kanitz.

Plants 5–15 cm tall. Rhizome fleshy. Stem with 2 or 3 tubular sheaths at base, 1(or 2)-leaved. Leaves basal, ovate, ovate-orbicular, or narrowly oblong, 3–9 × 1–2.5 cm, base attenuate into a clasping sheath, apex obtuse to subacute. Inflorescence 5–10 cm, somewhat slender; rachis 2–3.5 cm, with 1–5 often secund flowers; floral bracts ovate-lanceolate to lanceolate, apex acuminate, basal one often longer than flower. Flowers spreading, pinkish white or purple, medium-sized; ovary fusiform, 8–10 mm including pedicel. Sepals purplish red, nearly equal in size, 6–7 × ca. 4 mm; dorsal sepal erect, ovate to ovate-oblong, concave, 3-veined, apex obtuse; lateral sepals erect to slightly spreading, ovate-oblong, oblique, 3-veined, apex obtuse. Petals erect, forming a hood with dorsal sepal, purplish red, ovate, 5–6 × ca. 2.5 mm, slightly smaller than sepals, 3-veined, apex obtuse to acute; lip spreading horizontally, purple, deeply 3-lobed near apex, broadly ovate, ca. 7 × 8–9 mm, longer than petals, base contracted, spurred; lateral lobes triangular to obtusely triangular, margin undulate, apex acuminate to obtuse; mid-lobe oblong to triangular, apex obtuse; spur pendulous, curved forward, cylindrical, 6–9 mm, almost as long as to slightly longer than ovary, slender, apex obtuse. Fl. Jun–Jul, fr. Jul–Sep.

Forests, scrub, alpine meadows; 1700–4500 m. Gansu, Hebei, Henan, Qinghai, W Sichuan, Xinjiang, S Xizang [Bhutan, India, Nepal].

## 28. *PONERORCHIS* H. G. Reichenbach, *Linnaea* 25: 227. 1852.

小红门兰属 xiao hong men lan shu

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

*Chusua* Nevski.

Herbs, terrestrial, small to medium-sized, slender. Tubers subglobose, ovoid, or ellipsoid, not divided, fleshy. Stem usually erect, terete, glabrous, with 1–3 tubular sheaths near base and 1–5 leaves above. Leaves basal or cauline, alternate or rarely subopposite, basally contracted into clasping sheath, glabrous to sparsely pubescent. Inflorescence terminal, glabrous or pubescent; rachis laxly or densely 1- to many flowered; floral bracts lanceolate to ovate. Flowers resupinate, secund or not, small to medium-sized; ovary twisted, often slightly arcuate, glabrous or pubescent. Sepals free; dorsal sepal erect, often concave; lateral sepals spreading. Petals often connivent with dorsal sepal and forming a hood; lip entire or 3- or 4-lobed, spurred at base or rarely spurless; spur usually as long as ovary. Column stout; anther erect, base firmly adnate to apex of column, with 2 parallel locules; pollinia 2, granular-farinaceous, sectile, each attached to a viscidium by a slender caudicle; each viscidium enclosed in a sticky globe, both globes enclosed in a common bursicle formed by folding of rostellar arms; stigma concave, beneath rostellum; rostellum protruding, with 2 arms; auricles 2, usually prominent, one on each side of column. Capsule erect.

About 20 species: from the Himalayas through C and E China to Korea and Japan; 13 species (ten endemic) in China; one additional species (endemic) is incompletely known.



From observations of many fresh flowers of this genus in the field, we infer that the bursicle formed by the rostellar arms is solitary but later becomes separate.

- 1a. Plants always 1-leaved; leaf basal, cordate, ovate, or elliptic; leaf adaxially often marked with purple spots, abaxially purplish red.
  - 2a. Leaf adaxially with off-white lines along principal veins; rachis 1–3-flowered; spur short, saccate, ca. 1 mm ..... 1. *P. brevicealcarata*
  - 2b. Leaf lacking lines along veins; rachis 2- to more than 20-flowered; spur pendulous, cylindric, 4–12 mm.
    - 3a. Inflorescence and ovary pubescent; flowers often secund; lip obtriangular-flabellate, 5–6 × 5–6 mm; spur pendulous, slightly bent forward, 4–6 mm ..... 2. *P. monophylla*
    - 3b. Inflorescence and ovary glabrous; flowers not usually secund; lip broadly oblong-ovate, 10–11 × 8–9 mm; spur horizontal, straight or slightly curved upward, occasionally slightly curved downward, 8–12 mm ..... 3. *P. limprichtii*
- 1b. Plants usually 2–5-leaved; if 1-leaved (some plants of *P. tominagae*, *P. omeishanica*, and *P. chusua*) then leaf cauline, linear, lanceolate, oblong, or elliptic; leaves green, lacking purple spots.
  - 4a. Flowers whitish, creamy white, yellow, or yellowish green.
    - 5a. Leaves basal, subopposite; rachis 1-flowered; petals broadly ovate, 8.5–15 mm; spur 12–25 mm ..... 4. *P. chrysea*
    - 5b. Leaves cauline, alternate, widely spaced, or rarely clustered near base of stem; rachis (1 or)2–8-flowered; petals ovate or narrowly ovate-lanceolate, 4.5–6.5 mm; spur 4–7 mm.
      - 6a. Stem (1–)2–6 cm; rachis (1 or)2–4-flowered; floral bracts to 12 mm, shorter than to slightly exceeding ovary; lip 8–12 mm; spur 4–5.5 mm ..... 6. *P. tominagae*
      - 6b. Stem 8–12 cm; rachis 4–8-flowered; floral bracts to 20 mm, basal ones conspicuously exceeding flowers; lip 5–6 mm; spur ca. 7 mm ..... 8. *P. omeishanica*
  - 4b. Flowers pink, rose, purplish rose, purplish red, purple, or violet, rarely white.
    - 7a. Plants 3.5–6 cm tall; stem 1.5–2 cm; leaves basal, subopposite; lip not lobed ..... 5. *P. crenulata*
    - 7b. Plants (5–)8–45 cm tall; stem (2.5–)5–23 cm; leaves cauline, alternate, widely spaced; lip 3- or 4-lobed.
      - 8a. Petals glabrous.
        - 9a. Lip broadly oblong to obovate, lobed above middle; mid-lobe oblong, square, or ovate, 1.8–3.5(–5) × 2–3.5(–6) mm, usually longer than broad ..... 7. *P. chusua*
        - 9b. Lip obtriangular to suborbicular, lobed toward apex; mid-lobe transversely oblong to ovate, 4–8 × 4–8 mm, usually broader than long ..... 10. *P. kiraishiensis*
      - 8b. Petals papillose and/or with ciliate margins.
        - 10a. Floral bracts foliaceous, 20–40 mm, conspicuously exceeding flowers ..... 9. *P. pugeensis*
        - 10b. Floral bracts to 15 mm, shorter than to slightly exceeding ovary.
          - 11a. Stem and inflorescence green; rachis 2–6-flowered; ovary and pedicel 20–22 mm, densely minutely pubescent; sepals and petals densely minutely papillose on both surfaces ..... 11. *P. sichuanica*
          - 11b. Stem and inflorescence green with purple striations, purple, or purplish with dark striations; rachis 5–20-flowered; ovary and pedicel 6–15 mm, glabrous; sepals glabrous; petals glabrous apart from ciliate margins.
            - 12a. Lip oblong to obovate, 3-lobed below middle, 6–10 × 6–8 mm; lateral lobes ovate to suboblong; mid-lobe oblong to obovate-oblong, longer than broad; spur 8–12 mm ..... 12. *P. takasagomontana*
            - 12b. Lip ovate-orbicular, 3-lobed near middle, 9–15 × 8–12 mm; lateral lobes transversely oblong to subsquare; mid-lobe suborbicular, usually broader than long; spur 12–20 mm ..... 13. *P. taiwanensis*

**1. Ponerorchis brevicealcarata** (Finet) Soó, Acta Bot. Acad. Sci. Hung. 12: 353. 1966.

短距小红门兰 duan ju xiao hong men lan

*Hemipilia brevicealcarata* Finet, Bull. Soc. Bot. France 44: 420. 1898; *Chusua brevicealcarata* (Finet) P. F. Hunt; *Gymnadenia brevicealcarata* (Finet) Finet; *Orchis brevicealcarata* (Finet) Schlechter.

Plants 5–18 cm tall. Tubers elliptic or ovoid, 5–20 mm. Stem to 2.5 cm, with 1 or 2 tubular, membranous sheaths at base, 1-leaved. Leaf basal, abaxially often purplish red, adaxially deep green with off-white lines along 5–7 principal veins and dark purple spots between them, cordate to broadly ovate,

1–3 × 0.7–2 cm, adaxially sparsely minutely papillose, base subcordate, apex acute. Inflorescence erect or slightly curved, 4–14 cm, slender, glabrous; rachis 1–3.5 cm, laxly 1–3-flowered; floral bracts broadly ovate, 4–5 × 2.5–3 mm, much shorter than ovary, apex acuminate. Flowers often secund, deep purplish red, small to medium-sized; ovary cylindric, 10–12 mm including pedicel, slender, glabrous. Dorsal sepal erect, concave, oblong, 5–6 × 2–3 mm, 1-veined, apex obtuse; lateral sepals ovate-oblong, oblique, 6–8 × 3–4 mm, 1-veined, often with pinnate veinlets, apex obtuse. Petals erect, forming a hood with dorsal sepal, obliquely ovate, 5–6 × 3–4 mm, glabrous, 1-veined, apex obtuse; lip spreading, with dark purple spots at base, cuneate-obovate, 3-lobed above middle, 10–11 × 10–11 mm, spurred, margin entire to slightly crenulate; lateral lobes

elliptic to suborbicular, 1.8–4 × 3–4 mm, usually broader than mid-lobe, apex obtuse, truncate; mid-lobe subsquare, 2–3.8 × 2.2–3.8 mm, apex obtuse-rounded, occasionally emarginate; spur saccate, short, ca. 1 mm, apex obtuse. Fl. Jun–Jul.

• Open forests, grassy slopes; 1500–3400 m. SW Sichuan, NW Yunnan.

**2. *Ponerorchis monophylla*** (Collett & Hemsley) Soó, Acta Bot. Acad. Sci. Hung. 12: 353. 1966.

毛轴小红门兰 mao zhou xiao hong men lan

*Habenaria monophylla* Collett & Hemsley, J. Linn. Soc., Bot. 28: 134. 1890; *Chusua monophylla* (Collett & Hemsley) P. F. Hunt; *Orchis geniculata* Finet; *O. monophylla* (Collett & Hemsley) Rolfe; *Peristylus monophyllus* (Collett & Hemsley) Kraenzlin; *Sirindhornia monophylla* (Collett & Hemsley) H. A. Pedersen & Suksathan.

Plants 12–25 cm tall. Tubers oblong, 10–35 mm. Stem 1–3 cm, slender, with 2 tubular, membranous sheaths at base, 1-leaved. Leaf basal, abaxially purplish red, adaxially deep green with dark purple spots, cordate, ovate, or elliptic, 3–6 × 2.5–3.5 cm, sparsely pubescent on principal veins on both surfaces, apex acute. Inflorescence erect or slightly curved, 9–19 cm, with 2 or 3 lanceolate sterile bracts, pubescent; rachis 4–10 cm, laxly several to subdensely more than 20-flowered; floral bracts ovate-lanceolate or ovate, 5–9 mm, usually shorter than ovary, margin ciliate, apex acuminate. Flowers often secund, pinkish white or purplish rose, small to medium-sized; ovary cylindrical, 6–10 mm including pedicel, slender, pubescent. Dorsal sepal erect, oblong, concave, 3.5–5 × 2–2.5 mm, 3-veined, apex sub-obtuse; lateral sepals obliquely ovate-elliptic, 4–5 × 2–3 mm, 3-veined, apex obtuse. Petals erect, forming a hood with dorsal sepal, marked with chestnut-colored spots, suboblong, 3.5–5 × 1.5–2.5 mm, glabrous, 2-veined, apex obtuse; lip spreading, obtriangular-flabellate, 5–6 × 5–6 mm, 3-lobed above middle, spurred, disk papillose, base narrowed and cuneate; lateral lobes obliquely subsquare, 1.2–2 × 1–2 mm, apical margin minutely crenulate, apex truncate; mid-lobe subsquare, 1–1.5 × 1–1.8 mm, apex obtuse-rounded, sometimes emarginate; spur pendulous, slightly bent forward, cylindrical, 4–6 mm, much shorter than to almost as long as ovary, apex obtuse. Fl. Jun–Aug.

Forests; ca. 1200 m. C and SE Yunnan [Myanmar].

**3. *Ponerorchis limprichtii*** (Schlechter) Soó, Acta Bot. Acad. Sci. Hung. 12: 353. 1966.

华西小红门兰 hua xi xiao hong men lan

*Orchis limprichtii* Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 12: 330. 1922; *Chusua hui* (Tang & F. T. Wang) P. F. Hunt; *C. limprichtii* (Schlechter) P. F. Hunt; *O. hui* Tang & F. T. Wang; *Ponerorchis hui* (Tang & F. T. Wang) Soó.

Plants 4.5–23 cm tall. Tubers oblong or ovoid, 12–30 mm. Stem 1–3 cm, with 1 or 2 (or 3) tubular, membranous sheaths at base, 1-leaved. Leaf basal, abaxially purplish green, adaxially deep green and often marked with purple spots, cordate, ovate, or elliptic, 2.8–6.5 × 1.2–4.5 cm, glabrous, apex acuminate or acute. Inflorescence erect or slightly curved, 2–17 cm, glabrous; rachis to 7 cm, laxly 2–14-flowered; floral bracts lanceolate or ovate-lanceolate, 5–15 mm, shorter than ovary, apex acuminate.

Flowers not usually secund, lilac to rose-purple, medium-sized; ovary cylindrical, 10–12 mm including pedicel, slender, glabrous. Dorsal sepal erect, suboblong, concave, 6–8 × 3–3.5 mm, 1-veined, apex subacute; lateral sepals spreading, obliquely ovate, 7–9 × 3.5–4 mm, 1-veined, apex acute. Petals erect, forming a hood with dorsal sepal, ovate-cymbiform, oblique, 5–7 × ca. 3 mm, glabrous, 1-veined, apex slightly obtuse; lip spreading, broadly oblong-ovate, slightly concave, 10–11 × 8–9 mm, disk papillose, spurred, 3-lobed at middle, margin slightly undulate, tinged white at base, dotted with deep lilac; lateral lobes transversely suboblong, 2–3 × 3–5.5 mm, apex obtuse-rounded; mid-lobe subsquare, 4–5 × 3–4 mm, longer than lateral lobes, apex obtuse-rounded, sometimes slightly emarginate or shortly apiculate; spur horizontal, straight or slightly curved upward, occasionally slightly curved downward, cylindrical, 8–12 mm, slightly swollen toward apex, apex obtuse. Fl. May–Jun.

• Forests, alpine grasslands; 1400–4000 m. SE Gansu, Henan, Shaanxi, NW Sichuan, Yunnan.

**4. *Ponerorchis chrysea*** (W. W. Smith) Soó, Acta Bot. Acad. Sci. Hung. 12: 353. 1966.

黄花小红门兰 huang hua xiao hong men lan

*Habenaria chrysea* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 13: 204. 1921; *Chusua chrysea* (W. W. Smith) P. F. Hunt; *Orchis chrysea* (W. W. Smith) Schlechter.

Plants 4–10 cm tall. Tubers subglobose, 5–10 mm in diam. Stem 1–3 cm, with 1 or 2 tubular sheaths at base, 2-leaved. Leaves basal, subopposite, green, lacking purple spots, oblong to narrowly elliptic, 2–6.5 × 0.6–1.5 cm, glabrous, apex acuminate or subobtusely. Inflorescence erect, 1–3 cm, 1-flowered, glabrous; floral bract foliaceous, sheathing, oblanceolate, 18–45 mm, base contracted, apex acute to acuminate. Flower fragrant, creamy white or yellow, medium-sized; pedicel 10–15 mm; ovary fusiform, ca. 10 mm, glabrous. Dorsal sepal erect, oblong-lanceolate, concave, 9–15 × 3.5–4.5 mm, 1-veined, apex acuminate; lateral sepals falcate-lanceolate, oblique, 9–16 × ca. 3 mm, 1-veined, apex acuminate. Petals erect, forming a loose hood with dorsal sepal, broadly ovate, oblique, 8.5–15 × 4.5–7 mm, glabrous, 3-veined, apex obtuse; lip spreading, broadly ovate-triangular, slightly concave, simple to obscurely 3-lobed, ca. 12 × 8–12 mm, slightly fleshy, thickened along midvein, spurred, margin slightly crenulate; spur pendulous, cylindrical, 12–25 mm, slightly narrowed toward acuminate apex. Fl. Aug–Sep.

Mossy rocks in forests, grassy slopes; 3400–4200 m. S and SW Xizang, NW Yunnan [Bhutan].

**5. *Ponerorchis crenulata*** Soó, Acta Bot. Acad. Sci. Hung. 12: 353. 1966.

齿缘小红门兰 chi yuan xiao hong men lan

*Orchis crenulata* Schlechter, Repert. Spec. Nov. Regni Veg. 19: 373. 1924, not Gilibert (1792); *Chusua crenulata* (Soó) P. F. Hunt; *Ponerorchis schlechteri* Perner & Y. B. Luo, nom. illeg. superfl.

Plants 3.5–6 cm tall. Tubers ellipsoid, 5–10 mm. Stem 1.5–2 cm, with 1 or 2 membranous, tubular sheaths at base, 2-leaved. Leaves basal, subopposite, green, lacking purple spots, linear-oblong, 1.3–3 × 0.2–0.6 cm, glabrous, apex acute. Inflo-

rescence erect, 1–2 cm, 1-flowered, glabrous; floral bract linear-lanceolate to linear, 7–12 mm, exceeding ovary, apex acute. Flower purplish rose, medium-sized; pedicel 8–10 mm; ovary fusiform, 6–8 mm, slender, glabrous. Dorsal sepal erect, concave, lanceolate-oblong, 6–8 × 3–3.5 mm, 3- or 5-veined, apex obtuse; lateral sepals spreading or reflexed, ovate-lanceolate, oblique, 8–9 × 4–5 mm, 3- or 5-veined, base attenuate, apex obtuse. Petals erect, obliquely ovate, 6–7 × 3–3.5 mm, glabrous, 3-veined, apex subobtusate; lip spreading, broadly ovate to suborbicular, 6–7 × 7–8 mm, base contracted and subcordate, spurred, not lobed, margin irregularly erose-crenulate, apex rounded to slightly emarginate and apiculate at center; spur pendulous, parallel to ovary, cylindrical-conic, slightly curved, 8–9 mm, ca. as long as to slightly exceeding ovary, slightly dilated at mouth, apex obtuse. Fl. Jun.

• Forests on slopes, moist limestone rubble; 3400–3700 m. NW Yunnan.

**6. *Ponerorchis tominagae*** (Hayata) H. J. Su & J. J. Chen, Fl. Taiwan, ed. 2, 5: 1029. 2000 [“*tominagai*”].

白花小红门兰 bai hua xiao hong men lan

*Gymnadenia tominagae* Hayata, Icon. Pl. Formosan. 6: 93. 1916; *Amitostigma tominagae* (Hayata) Schlechter; *Chusua kunihikoana* (Masamune & Fukuyama) P. F. Hunt; *Orchis kiraishiensis* Hayata f. *leucantha* Masamune; *O. kiraishiensis* var. *leucantha* (Masamune) Masamune; *O. kuanshanensis* S. S. Ying; *O. kunihikoana* Masamune & Fukuyama; *O. taolii* S. S. Ying; *O. tominagae* (Hayata) Soó; *Ponerorchis kiraishiensis* (Hayata) Ohwi var. *leucantha* (Masamune) A. T. Hsieh; *P. kuanshanensis* (S. S. Ying) S. S. Ying; *P. kunihikoana* (Masamune & Fukuyama) Soó; *P. taolii* (S. S. Ying) T. P. Lin.

Plants 3.5–18 cm tall. Tubers ovoid to subglobose, 5–10 × 4–9 mm. Stem green, (1–)2–6 cm, with 1 or 2 tubular sheaths at base, 1–3-leaved. Leaves cauline, alternate and widely spaced, or rarely clustered near base of stem, green, lacking purple spots, lanceolate to linear-oblong, 2–7 × 0.5–0.8 cm, glabrous, apex acute. Inflorescence erect, green, 2–10 cm, glabrous; rachis 1–2 cm, (1 or)2–4-flowered; floral bracts lanceolate to ovate-lanceolate, 5–12 × 2–3 mm, shorter than to slightly exceeding ovary, apex acuminate. Flowers secund, whitish or with purple or red dots on lip, medium-sized; ovary cylindrical-fusiform, 8–10 mm including pedicel, glabrous. Dorsal sepal erect, oblong to elliptic, 5.5–7 × 2–3 mm, 3-veined, apex obtuse or subacute; lateral sepals ovate-oblong, oblique, 7–9 × 3–4 mm, 3-veined, apex obtuse or acute. Petals erect, forming a hood with dorsal sepal, ovate, oblique, 5–6.5 × ca. 3 mm, glabrous, 3-veined, apex obtuse; lip obtriangular to obovate, 8–12 × 7–11 mm, 3- or 4-lobed above middle, margin subentire to irregularly serrate, spurred, disk pubescent on midvein, tinged greenish at base, sometimes spotted with rose; lateral lobes subtriangular to ovate, ca. 3 × 3 mm, apex obtuse or subacute; mid-lobe ovate-quadrangular, 3–5 × 4–5 mm, margin slightly undulate, apex truncate, shallowly to deeply emarginate and forming 2 lobules, often apiculate between lobules; spur pendulous, straight, cylindrical to conic-cylindrical, 4–5.5 mm, much shorter than ovary, apex obtuse. Fl. Jul–Aug.

• Mossy rocks in alpine forests, alpine grasslands, scree slopes; 2700–3800 m. Taiwan.

**7. *Ponerorchis chusua*** (D. Don) Soó, Acta Bot. Acad. Sci. Hung. 12: 352. 1966.

广布小红门兰 guang bu xiao hong men lan

*Orchis chusua* D. Don, Prodr. Fl. Nepal. 23. 1825; *Amitostigma beesianum* (W. W. Smith) Tang & F. T. Wang; *Chusua donii* Nevski; *C. nana* (King & Pantling) Pradhan; *C. pauciflora* (Lindley) P. F. Hunt; *C. pulchella* (Handel-Mazzetti) P. F. Hunt; *C. roborowskyi* (Maximowicz) P. F. Hunt var. *delavayi* (Schlechter) P. F. Hunt; *C. roborowskyi* var. *giraldiana* (Kraenzlin) P. F. Hunt; *C. roborowskyi* var. *nana* (King & Pantling) P. F. Hunt; *C. roborowskyi* var. *tenii* (Schlechter) P. F. Hunt; *C. roborowskyi* var. *unifoliata* (Schlechter) P. F. Hunt; *C. secunda* Nevski; *Gymnadenia chusua* (D. Don) Lindley; *G. chusua* var. *nana* (King & Pantling) Finet; *G. pauciflora* Lindley; *Habenaria chusua* (D. Don) Benthams; *Orchis beesiana* W. W. Smith; *O. chusua* var. *delavayi* (Schlechter) Soó; *O. chusua* var. *nana* King & Pantling; *O. chusua* var. *pulchella* (Handel-Mazzetti) Tang & F. T. Wang; *O. chusua* var. *tenii* (Schlechter) Soó; *O. delavayi* Schlechter; *O. giraldiana* Kraenzlin; *O. mairei* H. Lévillé; *O. nana* (King & Pantling) Schlechter; *O. parvicoloroides* Handel-Mazzetti; *O. pulchella* Handel-Mazzetti; *O. secunda* (Nevski) Voroschilov; *O. tenii* Schlechter; *O. unifoliata* Schlechter; *Ponerorchis beesiana* (W. W. Smith) Soó; *P. chusua* var. *delavayi* (Schlechter) Soó; *P. chusua* var. *giraldiana* (Kraenzlin) Soó; *P. chusua* subsp. *nana* (King & Pantling) Soó; *P. chusua* var. *tenii* (Schlechter) Soó; *P. chusua* var. *unifoliata* (Schlechter) Soó; *P. nana* (King & Pantling) Soó; *P. pauciflora* (Lindley) Ohwi; *P. pulchella* (Handel-Mazzetti) Soó.

Plants (5–)8–45 cm tall. Tubers oblong or globose, 10–20 × ca. 10 mm. Stem (2.5–)5–23 cm, with 1–3 tubular sheaths at base, (1 or)2–5-leaved. Leaves cauline, alternate, widely spaced, green, lacking purple spots, linear, oblong-lanceolate, or elliptic, 3–15 × 0.2–3 cm, becoming smaller and bractlike above, glabrous, apex acute or acuminate. Inflorescence erect or slightly curved, 2–20 cm, glabrous; rachis 1.5–9 cm, (1 or)2–20-flowered; floral bracts lanceolate to ovate-lanceolate, 7–22 mm, lower ones foliaceous and exceeding flower, apex acuminate. Flowers often secund, pink, purplish red, or purple, medium-sized; ovary fusiform, 7–15 mm including pedicel, glabrous. Dorsal sepal erect, oblong or ovate-oblong, concave, 5–7(–8) × 2.5–4(–5) mm, 3-veined, apex subobtusate or acute; lateral sepals reflexed, ovate-lanceolate, oblique, 6–8(–9) × 3–5 mm, 3-veined, apex subobtusate to acuminate. Petals erect, forming a hood with dorsal sepal, narrowly ovate, broadly ovate, or narrowly ovate-oblong, oblique, 5–6(–7) × 3–4 mm, glabrous, 3-veined, apex obtuse; lip broadly oblong to obovate, 7–12(–15) × 7–13(–17) mm, spurred, 3- or 4-lobed above middle, margin crenulate, disk tinged white at base, marked with deep purple blotches; lobes variable; lateral lobes broadly oblong to subtriangular, falcate, 2–3(–5) × 2.5–5(–7) mm, apex obtuse or acute; mid-lobe oblong, square, or ovate, 1.8–3.5(–5) × 2–3.5(–6) mm, usually longer than broad, apex truncate to obtuse-rounded, subentire to distinctly notched and forming 2 lobules, often apiculate between 2 lobules; spur slightly pendulous or horizontal, sometimes distinctly curved upward toward apex, cylindrical to cylindrical-conic, often slightly attenuate, 7–15(–19) mm, usually slightly longer than ovary. Fl. Jun–Aug.

Forests, *Rhododendron* scrub, alpine grasslands, limestone outcrops, scree; 500–4500 m. E Gansu, Heilongjiang, Henan, SE and W Hubei, Jilin, Nei Mongol, Ningxia, E Qinghai, S Shaanxi, Sichuan, S and SE Xizang, NE and NW Yunnan [Bhutan, N India, Japan, Korea, N Myanmar, Nepal, Russia (Far East, Siberia)].

**8. *Ponerorchis omeishanica*** (Tang, F. T. Wang & K. Y. Lang) S. C. Chen, P. J. Cribb & S. W. Gale, **comb. nov.**

峨眉小红门兰 e mei xiao hong men lan

Basionym: *Orchis omeishanica* Tang, F. T. Wang & K. Y. Lang, Acta Phytotax. Sin. 18: 416. 1980.

Plants 14–22 cm tall. Tubers ovoid, 8–12 mm. Stem 8–12 cm, with 1 or 2 tubular sheaths at base, 1- or 2-leaved above middle. Leaves cauline, alternate, widely spaced, green, lacking purple spots, narrowly oblong, oblong, or elliptic, 4.5–5 × 1.2–2.8 cm, glabrous, apex acute or shortly acuminate. Inflorescence erect, ca. 6.5 cm, with 1 foliaceous, ovate sterile bract, glabrous; rachis 2.5–3 cm, subdensely 4–8-flowered; floral bracts ovate-lanceolate, to 20 mm, basal ones conspicuously exceeding flowers, apex acuminate. Flowers pale yellowish green, small to medium-sized; ovary and pedicel fusiform, 10–14 mm, glabrous. Sepals similar, ovate-lanceolate, 6–7 × 2–2.8 mm, 3-veined, apex shortly aristate; dorsal sepal erect; lateral sepals spreading, oblique. Petals spreading, not forming a hood with dorsal sepal, narrowly ovate-lanceolate, 4.5–5 × ca. 1.8 mm, slightly shorter than sepals, margin ciliate; lip spreading, suborbicular, 5–6 × 6–7 mm, disk papillose, margin ciliate, base contracted, spurred, 3-lobed toward apex; lateral lobes triangular or rectangular, ca. 2 mm, apex obtuse, truncate; mid-lobe triangular or oblong, ca. 2 mm, apex shortly apiculate; spur pendulous, cylindrical, shorter than ovary, ca. 7 mm, apex obtuse. Fl. Jul–Aug.

• Rocky places along streams, grasslands at forest margins; ca. 2800 m. SC Sichuan (Emei Shan).

**9. *Ponerorchis pugeensis*** (K. Y. Lang) S. C. Chen, P. J. Cribb & S. W. Gale, **comb. nov.**

普格小红门兰 pu ge xiao hong men lan

Basionym: *Orchis pugeensis* K. Y. Lang, Acta Phytotax. Sin. 25: 403. 1987.

Plants ca. 30 cm tall. Tuber oblong, ca. 20 × 0.8 mm. Stem ca. 10 cm, with 2 tubular sheaths at base, 2-leaved. Leaves cauline, alternate, widely spaced, green, lacking purple spots, oblong to oblong-lanceolate, 7.5–10.5 × 2–2.7 cm, glabrous, apex acute or acuminate. Inflorescence erect or slightly curved, ca. 15 cm, glabrous; rachis ca. 7 cm, subdensely 13-flowered; floral bracts foliaceous, ovate-lanceolate, 20–40 mm, conspicuously exceeding flowers, apex acuminate. Flowers purple, medium-sized; ovary cylindrical-fusiform, 12–13 mm including pedicel, glabrous. Dorsal sepal erect, elliptic, ca. 5.5 × 2.5 mm, 3-veined, apex obtuse; lateral sepals spreading, obliquely ovate, ca. 7 × 3.5 mm, 3- or 4-veined, apex obtuse. Petals spreading, obliquely ovate, ca. 5 × 2.5 mm, inner surfaces finely papillose, 3-veined, margin ciliate, apex obtuse; lip reflexed, ovate, ca. 8 × 6 mm, thickened along midvein, disk finely papillose, margin ciliate, spurred, 3-lobed at middle; lateral lobes obliquely rhom-

bic, falcate, ca. 2 × 2 mm, apex obtuse; mid-lobe oblong, 3.5–4 × 2–3 mm, apex acute; spur pendulous, cylindrical, ca. 10 mm, shorter than ovary, apex obtuse. Fl. Jul–Aug.

• Alpine grasslands, slopes; ca. 2800 m. SW Sichuan (Puge).

**10. *Ponerorchis kiraishiensis*** (Hayata) Ohwi, Acta Phytotax. Geobot. 5: 146. 1936.

奇莱小红门兰 qi lai xiao hong men lan

*Orchis kiraishiensis* Hayata, Icon. Pl. Formosan. 9: 116. 1920; *Chusua kiraishiensis* (Hayata) P. F. Hunt; *O. nanhutanensis* S. S. Ying.

Plants 10–18 cm tall. Tubers subglobose or ovoid, 5–10 mm. Stem pale green, 4–12 cm, with 1 or 2 tubular, membranous sheaths at base, 2- or 3-leaved. Leaves cauline, alternate, clustered to widely spaced, green, lacking purple spots, linear to linear-lanceolate, 4–5 × 0.7–0.8 cm, glabrous, apex acute or acuminate. Inflorescence erect, pale green, 4–10 cm, glabrous; rachis 1–3 cm, 1–3-flowered; floral bracts green or purple, lanceolate, 7–20 mm, lower one usually exceeding ovary, apex acuminate. Flowers purple or rose, medium-sized; ovary fusiform, 10–15 mm including pedicel, glabrous. Dorsal sepal erect, oblong, concave, 6–9 × 3–4 mm, apex acute; lateral sepals ovate-oblong, oblique, 8–11 × 3.5–5 mm, apex acute. Petals forming a loose hood with dorsal sepal, very rarely pure white, ovate-oblong, slightly oblique, 6–8 × 3–3.5 mm, glabrous, margin entire to irregularly serrate, apex obtuse; lip obtriangular to suborbicular, 12–15 × 15–16 mm, spurred, 3- or 4-lobed toward apex, disk white or pale yellow at base, spotted with purple; lateral lobes ovate or triangular, 2–4 × 2–3 mm, apex obtuse, truncate; mid-lobe transversely oblong to ovate, 4–8 × 4–8 mm, usually broader than long, apex truncate, emarginate to distinctly notched and forming 2 lobules, often apiculate between lobules; spur pendulous, cylindrical-conic, 7–13 × 2–3 mm, apex obtuse. Fl. Jul–Aug.

• Alpine grasslands, scree slopes; 3000–3900 m. Taiwan.

This species is clearly closely related to *Ponerorchis chusua* and in need of critical review.

**11. *Ponerorchis sichuanica*** (K. Y. Lang) S. C. Chen, P. J. Cribb & S. W. Gale, **comb. nov.**

四川小红门兰 si chuan xiao hong men lan

Basionym: *Orchis sichuanica* K. Y. Lang, Acta Phytotax. Sin. 25: 401. 1987.

Plants 19–32 cm tall. Tubers oblong or ellipsoid, 10–20 × 5–10 mm. Stem green, 7.5–9 cm, stout, with 2 tubular sheaths at base, 2- or 3-leaved. Leaves cauline, alternate, widely spaced, green, narrowly oblong, oblong, or ovate, lowest one 3.5–7 × 1–4 cm, becoming smaller above, glabrous, apex acute or acuminate. Inflorescence erect, green, 12–17 cm, glabrous; rachis 4.5–11 cm, 2–6-flowered; floral bracts ovate-lanceolate, to 15 mm, shorter than ovary, apex acuminate. Flowers violet, medium-sized; ovary cylindrical, 20–22 mm including pedicel, densely minutely pubescent. Sepals minutely papillose on both surfaces, margin sometimes finely ciliate; dorsal sepal erect, elliptic, 8–10 × 3–4 mm, 3-veined, apex obtuse; lateral sepals

reflexed, obliquely ovate, 9–11 × ca. 5 mm, 3- or 4-veined, apex obtuse to acute. Petals erect, forming a hood with dorsal sepal, obliquely ovate, shorter than dorsal sepal, both surfaces densely minutely papillose, 3-veined, margin conspicuously ciliate, apex acute; lip reflexed, broadly obovate, 12–15 × 10–12 mm, both surfaces densely minutely papillose, spurred, margin ciliate, 3-lobed near middle; lobes variable; lateral lobes recurved, broadly ovate to transversely elliptic, 2.5–3 × 4.5–7 mm, apex obtuse-rounded or obtuse; mid-lobe oblong, square, ovate, or obovate, 3.5–6 × 2–3.8 mm, apex acute, truncate, or emarginate and sometimes apiculate at center; spur pendulous, cylindrical, stout, 18–22 × 2–3 mm, nearly as long as to slightly exceeding ovary, apex obtuse. Fl. May–Jul.

• Alpine grasslands, slopes; 2400–2500 m. W Sichuan (Baoping, Ebian).

**12. *Ponerorchis takasagomontana*** (Masamune) Ohwi, Acta Phytotax. Geobot. 5: 146. 1936 [*“takasago-montana”*].

高山小红门兰 gao shan xiao hong men lan

*Orchis takasagomontana* Masamune, Trop. Hort. 3: 45. 1933 [*“takasago-montana”*]; *Chusua takasagomontana* (Masamune) P. F. Hunt; *O. chingshuishania* S. S. Ying.

Plants 14–33 cm tall. Tubers globose or ovoid, 10–20 mm. Stem purplish, often with dark striations, 8–17 cm, with 1 or 2 tubular sheaths at base, 2–5-leaved. Leaves cauline, alternate, widely spaced, green, lacking purple spots, linear-lanceolate or oblong-lanceolate, 3–9 × 0.5–1.4 cm, becoming smaller and bractlike above, glabrous, apex acute or acuminate. Inflorescence erect, purplish, often with dark striations, 4–13 cm, glabrous; rachis 2–10 cm, 5–17-flowered; floral bracts green or purple, lanceolate, 10–15 mm, shorter than to slightly exceeding ovary, apex acuminate. Flowers pale purple or rose, rarely white, medium-sized; pedicel and ovary fusiform, 6–15 mm. Dorsal sepal ovate or elliptic, concave, 4–5 × 2–3 mm, apex acute or obtuse; lateral sepals ovate-falcate, oblique, 5–6 × 2–4 mm, apex obtuse. Petals forming a loose hood with dorsal sepal, ovate or elliptic, oblique, 4–5 × 2–3 mm, margin ciliate, apex obtuse; lip tinged pale yellow toward base and spotted with purple, oblong to obovate, 6–10 × 6–8 mm, spurred, 3-lobed below middle; lateral lobes ovate to suboblong, 2–4 × 2–3 mm, apex obtuse; mid-lobe oblong to obovate-oblong, 4–6 ×

3.5–4.5 mm, longer than narrow, ridged at base, apex truncate, entire to shallowly emarginate; spur pendulous, cylindrical, 8–12 × 2.5–3 mm, usually shorter than ovary. Fl. Apr.

• Cliffs, crevices in limestone rocks; 1500–2000 m. C and E Taiwan.

**13. *Ponerorchis taiwanensis*** (Fukuyama) Ohwi, Acta Phytotax. Geobot. 5: 146. 1936.

台湾小红门兰 tai wan xiao hong men lan

*Orchis taiwanensis* Fukuyama, Bot. Mag. (Tokyo) 49: 290. 1935; *Chusua taiwanensis* (Fukuyama) P. F. Hunt; *Orchis taitungensis* S. S. Ying; *O. taitungensis* var. *alboflorens* S. S. Ying; *Ponerorchis taitungensis* (S. S. Ying) S. S. Ying; *P. taitungensis* var. *alboflorens* (S. S. Ying) S. S. Ying.

Plants 9–25(–40) cm tall. Tubers ellipsoid or subglobose, 5–30 × 5–20 mm. Stem green with purple striations or purple, ca. 12.5 cm, with 1 or 2 tubular sheaths at base, 2–5-leaved. Leaves cauline, alternate, widely spaced, green, lacking purple spots, linear to linear-lanceolate, 4–9(–15) × 0.4–2 cm, becoming smaller and bractlike above, glabrous, apex acuminate. Inflorescence erect, green with purple striations or purple, 5–12 cm, glabrous; rachis 3–10 cm, 5–20-flowered; floral bracts erect, green or purple, lanceolate, 10–15 mm, almost as long as ovary, apex acuminate. Flowers secund, pale purple or rose, rarely white, medium-sized; ovary purple or green spotted with purple, cylindrical, 10–15 mm including pedicel, glabrous. Dorsal sepal erect, elliptic, concave, 5–7 × 2.5–4 mm, apex obtuse; lateral sepals ovate to oblong, oblique, 6–7 × 3–3.5 mm, apex obtuse. Petals erect, forming a loose hood with dorsal sepal, obliquely elliptic, 5–6 × 2.5–4 mm, margin ciliate, apex obtuse; lip ovate-orbicular, 9–15 × 8–12 mm, spurred, 3-lobed near middle, margin subentire to irregularly serrate, disk tinged white or pale yellow at base, with red or purple dots or patches; lateral lobes transversely oblong to subsquare, oblique, ca. 1.8 × 2 mm, apex obtuse, truncate; mid-lobe suborbicular, 4–5.5 × 4–6 mm, usually broader than long, margin irregularly undulate-serrate, apex obtuse or slightly emarginate; spur pendulous, cylindrical, 12–20 mm, ca. as long as to slightly exceeding ovary, inside pubescent, apex obtuse. Fl. Jul–Aug.

• Cliffs, crevices of rocks, alpine grasslands; 1500–3400 m. C and S Taiwan (Hualian, Nantou, Taidong).

#### Incompletely known species

***Ponerorchis exilis*** (Ames & Schlechter) S. C. Chen, P. J. Cribb & S. W. Gale, **comb. nov.**

细茎小红门兰 xi jing xiao hong men lan

Basionym: *Orchis exilis* Ames & Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 4: 40. 1919.

Plants 20–35 cm tall. Tubers oblong. Stem ca. 10 cm, 2- or 3-leaved. Leaves cauline, alternate, widely spaced, linear to linear-ligulate, 5–10 × 0.5–0.8 cm, glabrous, apex acute. Inflorescence to 10 cm, with 1 or 2 foliaceous sterile bracts; rachis laxly 5–12-flowered; floral bracts suberect, lanceolate, nearly as long as ovary, apex acuminate. Flowers purplish red, small to medium-sized; ovary cylindrical, ca. 8 mm including pedicel,

glabrous. Dorsal sepal erect, elliptic, ca. 4 mm, apex obtuse; lateral sepals reflexed, oblique, elliptic-oblong, ca. 5 mm, apex obtuse. Petals erect, forming a hood with dorsal sepal, oblong-ovate, oblique, slightly shorter than dorsal sepal, margin ciliate, apex obtuse; lip 3-lobed above middle, ca. 6.5 × 6 mm, disk minutely papillose, base broadly cuneate; lateral lobes obliquely rhombic, apex obtuse; mid-lobe spreading, ovate-triangular, larger than lateral lobes, margin subentire, apex obtuse; spur pointing backward, cylindrical, ca. 8 × 1.5 mm, ca. as long as ovary. Fl. unknown.

• C and NE Yunnan (Dongchuan, Kunming).

Although we accept this species, it is known only from the protologue; the type has not been seen by us.

## 29. HEMIPILIA Lindley, Gen. Sp. Orchid. Pl. 296. 1835.

舌喙兰属 she hui lan shu

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

Herbs, terrestrial, small to medium-sized. Tuber subspherical to ellipsoid, fleshy. Stem erect, abbreviate, with 1 short sheathing cataphyll at base and 1 solitary leaf (rarely 2 leaves). Leaf basal, usually appressed to substrate, green, often with purple markings, cordate to ovate-cordate, directly sheathing stem at base, fleshy, glabrous. Inflorescence elongate, with 2–4 scattered sterile bracts and a few to several flowers in a lax to subdense terminal raceme, glabrous; floral bracts lanceolate, usually shorter than ovary. Flowers resupinate, purple, purplish red, pink, or nearly white, medium-sized; pedicel and ovary often slightly arcuate, narrowly cylindrical-fusiform, glabrous. Sepals free; dorsal sepal often erect; lateral sepals spreading, oblique. Petals usually connivent with dorsal sepal and forming a hood over column, slightly smaller than sepals; lip spreading, spurred at base, 3-lobed or entire, adaxially finely papillate, with 2 prominent ridges below mouth of spur; spur cylindrical to conic, rather long, often papillate inside. Column stout; anther hoodlike, with 2 divergent locules and a broad connective; rostellum conspicuous, to 2 mm, protruding between anther cells, lateral lobes fleshy, apically infolded; pollinia 2, granular-farinaceous, sectile, attached to viscidia via long caudicles; viscidia cymbiform, enclosed by folded apices of rostellum lateral lobes; stigma lobes confluent, slightly concave, posterior to rostellum; auricles 2, one on either side of anther base. Capsule narrowly ellipsoid.

About ten species: from Nepal, through Bhutan and S China, to Myanmar and Thailand; seven species (five endemic) in China; one additional species (endemic) is incompletely known.

- 1a. Lip 3-lobed, though lateral lobes sometimes reduced.
- 2a. Mid-lobe of lip rectangular to ovate-orbicular, margins usually diverging, apex not divided ..... 1. *H. cordifolia*
- 2b. Mid-lobe of lip subsquare to rectangular, margins often tapering slightly toward apex, apex divided into 2 rounded lobules ..... 2. *H. henryi*
- 1b. Lip simple.
- 3a. Spur ca. 10 mm or more.
- 4a. Lip 8–10 mm, basally contracted into short claw, blade flabellate to orbicular; spur conic-cylindric, attenuate, 13–18 mm ..... 3. *H. flabellata*
- 4b. Lip ca. 13 mm, not clawed, blade suboblong; spur cylindric, uniformly thick (not attenuate), 10–12 mm ..... 4. *H. crassicalcarata*
- 3b. Spur to 8 mm.
- 5a. Lip ovate to orbicular, broadest below middle ..... 5. *H. limprichtii*
- 5b. Lip obovate to oblong, broadest above middle.
- 6a. Lip 12–13 mm wide ..... 6. *H. kwangsiensis*
- 6b. Lip 6–8 mm wide ..... 7. *H. calophylla*

### 1. *Hemipilia cordifolia* Lindley, Gen. Sp. Orchid. Pl. 296. 1835.

心叶舌喙兰 xin ye she hui lan

*Hemipilia bulleyi* Rolfe; *H. cordifolia* var. *yunnanensis* Finet; *H. cruciata* Finet; *H. formosana* Hayata; *H. yunnanensis* (Finet) Schlechter.

Plants 13–27 cm tall. Tubers ovoid to subspherical, 1.5–4.5 cm. Stem with 1 tubular cataphyll at base, 1-leaved. Leaf abaxially purplish, adaxially dark green with purple spots, suborbicular to cordate, 2.5–8 × 2–6.5 cm, fleshy, base cordate, apex acute or obtuse. Inflorescence 11–25 cm, with 2 or 3 lanceolate sterile bracts; rachis 5–10 cm, laxly to subdensely 3- to more than 10-flowered; floral bracts lanceolate, apex acuminate. Flowers purplish red to pink; pedicel and ovary erect, often arcuate toward apex, 7–15 mm. Dorsal sepal oblong to ovate-lanceolate, 4–6 × 2–3.2 mm, 5-veined, apex obtuse; lateral sepals spreading to reflexed, oblong-ovate, falcate, 6–7 × 3.5–4 mm, 5-veined, apex acuminate. Petals connivent with dorsal sepal and forming a hood, ovate, slightly oblique, 3.2–4.5 × 2–3 mm, 3-veined, apex subacute; lip variable in outline, 7–9 × ca. 5 mm, 3-lobed though lateral lobes sometimes reduced, adaxially finely papillate, apical margin usually fimbri-

ate; lateral lobes short, rectangular, triangular, or suborbicular, margin entire to minutely incised; mid-lobe rectangular to ovate-orbicular, margins usually diverging, entire to slightly serrate, apex not divided; spur straight and horizontal or slightly upcurved toward apex, to strongly downcurved, cylindrical to attenuate, 10–15 mm, apex obtuse. Column ca. 2.5 mm; rostellum ca. 1 mm. Capsule ca. 2.5 cm. Fl. Jun–Sep.  $2n = 42$ .

Forests, rocky slopes; 1500–3500 m. SW Sichuan, Taiwan, S Xizang, NW Yunnan [Bhutan, India, Myanmar, Nepal].

### 2. *Hemipilia henryi* Rolfe, Bull. Misc. Inform. Kew 1896: 203. 1896.

裂唇舌喙兰 lie chun she hui lan

*Hemipilia amesiana* Schlechter; *H. cordifolia* Lindley var. *cuneata* Finet; *H. cuneata* (Finet) Schlechter.

Plants 20–32 cm tall. Tubers ellipsoid, ca. 2 cm. Stem with 1 tubular cataphyll at base, 1- or rarely 2-leaved. Leaf abaxially pale green, adaxially green with purple spots, ovate, 4–11 × 3–8 cm, base cordate or rounded, apex acute or cuspidate. Inflorescence 17–30 cm, with 2–4 sterile bracts; rachis 6–11 cm, laxly to subdensely 3–9-flowered; floral bracts lanceolate, to ca. 12 mm, apex acuminate or long acuminate. Flowers purplish

red; pedicel and ovary erect, slightly arcuate, 16–24 mm. Dorsal sepal ovate-elliptic, 6–7 × ca. 3 mm, 3-veined, apex obtuse; lateral sepals broadly ovate, oblique, ca. 8.5 × 5 mm, adaxially finely papillate, 3- or 5-veined, apex obtuse. Petals obliquely rhombic-ovate, ca. 6 × 3.5–4 mm, adaxially inconspicuously papillate, 3-veined, apex obtuse; lip broadly obovate-cuneate, 3-lobed, ca. 12 × 10 mm, adaxially finely papillate; lateral lobes broadly triangular to suboblong, margin sometimes irregularly serrulate, apex obtuse to acute; mid-lobe subsquare to rectangular, margin often tapering slightly toward apex, truncate, apex divided into 2 rounded lobules; spur straight and horizontal or slightly curved downward, narrowly conic, gradually attenuate, 14–18 mm, slightly shorter than ovary, apex sometimes hooked. Column ca. 3 mm; rostellum ovate, ca. 2 mm, apex acute. Fl. Jul–Aug.

• Rocky outcrops; 800–1100 m. W Hubei, NE, SE, and SW Sichuan.

**3. *Hemipilia flabellata*** Bureau & Franchet, J. Bot. (Morot) 5: 152. 1891.

扇唇舌喙兰 shan chun she hui lan

*Hemipilia cordifolia* Lindley var. *subflabellata* Finet; *H. flabellata* var. *grandiflora* Finet; *H. flabellata* var. *leptoceras* Soó; *H. quinquangularis* Tang & F. T. Wang; *H. sikangensis* Tang & F. T. Wang.

Plants 15–28 cm tall. Tubers narrowly ellipsoid, 1.5–4.5 cm. Stem with 1 tubular cataphyll at base, 1-leaved. Leaf abaxially purple, adaxially green with purple spots, cordate to broadly ovate, 2–10 × 2–9 cm, base cordate to rounded, apex acute to cuspidate. Inflorescence 12–24 cm, with 3 or 4 lanceolate sterile bracts; rachis 4–8 cm, laxly to subdensely 3–15-flowered; floral bracts lanceolate, largest to 11 mm. Flowers variable in color, from purplish red to nearly pure white; pedicel and ovary erect, sometimes arcuate toward apex, 12–18 mm. Dorsal sepal oblong to narrowly ovate, concave, 6–9 × 2.5–4 mm, 3- or 5-veined, apex obtuse or acute; lateral sepals obliquely ovate to oblong, falcate, 7–10 × 3.5–5 mm, 3-veined, apex obtuse. Petals broadly ovate, slightly oblique, 5–7 × 3–5 mm, 3-veined, apex subacute; lip simple, 8–10 mm, basally contracted into short claw; claw oblong or cuneate, ca. 2 mm; blade widely dilated, flabellate to orbicular, 6–8 × 6.5–8.5 mm, margin irregularly crenulate, apex truncate or obtuse, sometimes emarginate; spur usually straight and horizontal or sometimes slightly curved downward, conic-cylindric, attenuate, 13–18 mm, apex obtuse or shallowly 2-lobed. Column ca. 3 mm; rostellum ligulate, ca. 1 mm, apex rounded. Capsule ca. 3 mm. Fl. Jun–Aug.

• Forests, crevices on limestone cliffs; 1600–3200 m. NW Guizhou, SW Sichuan, C and NW Yunnan.

**4. *Hemipilia crassicalcarata*** S. S. Chien, Contr. Biol. Lab. Sci. Soc. China, Bot. Ser. 6: 80. 1931.

粗距舌喙兰 cu ju she hui lan

*Hemipilia silvestrii* Pampanini.

Plants 15–35 cm tall. Tubers ellipsoid, 1–2 cm. Stem with 1 tubular cataphyll at base, 1- or rarely 2-leaved. Leaf ovate to

ovate-cordate, 5–12 × 4–5.8 cm, base cordate or subcuneate, apex acute. Inflorescence 13–30 cm, with 4 ovate to lanceolate sterile bracts to 2.5 cm; rachis ca. 6 cm, subdensely (2–)7–15-flowered; floral bracts lanceolate, to ca. 11 mm. Flowers purplish red; pedicel and ovary 12–18 mm. Dorsal sepal erect, ovate, cymbiform, 6–6.5 × ca. 3 mm, 3-veined, apex obtuse; lateral sepals obliquely ovate, ca. 7 × 4 mm, 3-veined, apex obtuse. Petals similar to lateral sepals but slightly smaller, oblong-ovate, oblique, ca. 7 × 3.5 mm, 3-veined, margin sometimes irregularly denticulate, apex obtuse to subtruncate; lip simple, suboblong, ca. 13 × 9–10 mm, adaxially finely papillate, base broadly cuneate, margin irregularly crenate, apex truncate, often apiculate or occasionally emarginate; spur straight and horizontal or sometimes slightly curved downward, white, cylindric, uniformly thick (not attenuate), 10–12 mm, apex obtuse and slightly dilated. Column to 4 mm; rostellum oblong-elliptic, ca. 1.5 mm, apex rounded. Fl. Jul.

• Cypress forests, grassy slopes; 1000–1200 m. S Shaanxi, SE Shanxi, N and W Sichuan.

**5. *Hemipilia limprichtii*** Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 12: 331. 1922.

短距舌喙兰 duan ju she hui lan

*Hemipilia cordifolia* Lindley var. *bifoliata* Finet.

Plants 10–30 cm tall. Tubers narrowly oblong-ellipsoid, 1–1.5 cm. Stem with 1 tubular cataphyll at base, 1- or rarely 2-leaved. Leaf ovate, 3–6 × 2.2–5.5 cm, base cordate, apex subacute. Inflorescence to 28 cm, with 4–9 ovate-lanceolate sterile bracts; rachis to 10 cm, laxly 3- to usually more than 10-flowered; floral bracts ovate-lanceolate, to ca. 9 mm. Flowers purplish red; pedicel and ovary 10–12 mm. Dorsal sepal ovate, cymbiform, 4.5–5.5 × ca. 2.5 mm, apex obtuse; lateral sepals spreading to reflexed, oblong-ovate, oblique, 5–6.5 × ca. 3 mm, apex obtuse or emarginate. Petals erect, triangular-ovate, oblique, subequal in length to lateral sepals, apex subacute; lip ovate to orbicular, 8–10 × 9–11 mm, adaxially papillate-puberulent, basally broadly cuneate, simple, margin irregularly crenulate, apex emarginate; spur often slightly upcurved, conic, 6–7 mm, attenuate toward apex. Column ca. 3 mm; rostellum ovate, ca. 2 mm. Fl. Jul–Aug.

• Limestone meadows, grasslands; 1000–1600 m. C Guizhou, C and NW Yunnan.

**6. *Hemipilia kwangsiensis*** Tang & F. T. Wang ex K. Y. Lang, Guihaia 18: 7. 1998.

广西舌喙兰 guang xi she hui lan

Plants 13–20 cm tall. Tubers ellipsoid, 1.5–2 cm. Stem 1-leaved. Leaf orbicular to suborbicular, 5.5–6 × 5–6 cm, base cordate, apex acute. Inflorescence 11–18 cm, with 3 lanceolate sterile bracts; rachis 5–7 cm, laxly 5–7-flowered; floral bracts ovate or ovate-lanceolate, 7–14 mm, apex long acuminate. Flowers pale red; pedicel and ovary suberect, 14–18 mm. Dorsal sepal ovate-elliptic, 5–7 × ca. 3 mm, 3-veined, apex subacute; lateral sepals ovate-elliptic, slightly oblique, 6–7 × 3–3.5 mm, 3-veined, apex subacute. Petals ovate-triangular, oblique, 5–6 × 2.5–3 mm, 1-veined, margin minutely ciliate, apex acute;

lip obovate, 11–12 × 12–13 mm, adaxially finely papillate, base slightly contracted, simple, apex emarginate; spur cylindrical-conic, ca. 6 × 3 mm, attenuate, apex subacute, usually down-curved. Column ca. 2 mm; rostellum ligulate, ca. 2 mm. Fl. Aug.

• Forests on limestone substrates; 400–1000 m. S Guangxi, SE Yunnan.

**7. *Hemipilia calophylla*** E. C. Parish & H. G. Reichenbach, J. Bot. 12: 197. 1874.

美叶舌喙兰 mei ye she hui lan

*Galearis subrotunda* (King & Pantling) P. F. Hunt; *Hemipilia amethystina* Rolfe ex J. D. Hooker; *Orchis subrotunda* King & Pantling.

Plants 5.5–11 cm tall. Tubers ovoid, ca. 2 cm. Stem with 1 tubular cataphyll at base, 1- or 2-leaved. Leaves abaxially dark greenish purple, adaxially dark green netted with purplish brown, suborbicular to ovate, 1.5–3 × 1–2.5 cm, base cordate to rounded, apex acute. Inflorescence 5–9.5 cm, with 2 or 3 nar-

rowly ovate sterile bracts; rachis 1–3.5 cm, laxly 1–4-flowered; floral bracts ovate, ca. 6 mm, apex acuminate. Flowers white and purple; pedicel and ovary erect, sometimes slightly arcuate, 12–20 mm. Dorsal sepal ovate, 5–6.5 × 2–3 mm, 3-veined, apex acute; lateral sepals ovate-elliptic, oblique, 6–7 × 2.5–3 mm, 1-veined, apex acute. Petals ovate, slightly oblique, 4.5–5 × ca. 2 mm, 1-veined, apex acute; lip oblong to obovate, 9–11 × 6–8 mm, truncate, simple, margin undulate and slightly crenulate toward apex, apex obtuse or occasionally emarginate; spur conic to urceolate, 6–8 mm, slightly downcurved toward apex. Column ca. 2 mm; rostellum ligulate, ca. 1.5 mm. Fl. Oct.

About 1500 m. Yunnan [Myanmar, Thailand, N Vietnam].

A single, somewhat dwarf collection at K (*Henry 13815*) is referable to this taxon, though material from neighboring countries in SE Asia indicates that overall dimensions, as well as those for the leaf and flower parts, can sometimes be greater. When these larger plants are taken into consideration, lip dimensions in *Hemipilia calophylla* become continuous with those of *H. kwangsiensis*, making the distinction given in the key somewhat artificial. More material from China is required to assess the stability of floral characters within either taxon.

#### Incompletely known species

***Hemipilia forrestii*** Rolfe, Notes Roy. Bot. Gard. Edinburgh 8: 27. 1913.

长距舌喙兰 chang ju she hui lan

*Hemipilia forrestii* var. *macrantha* Handel-Mazzetti.

Plants ca. 20 cm tall. Tubers ellipsoid, 3–4(–5) cm. Stem 1-leaved. Leaf ovate-oblong, ca. 4.5 × 2.5 cm, base subcordate, apex acute. Inflorescence ca. 17 cm; rachis ca. 6 cm, several flowered; floral bracts lanceolate or ovate-lanceolate, 10–12 mm, apex acuminate. Flowers rose-purple; pedicel and ovary ca. 20 mm. Dorsal sepal erect, cymbiform, ovate-oblong, ca. 6

mm, apex obtuse; lateral sepals ovate, oblique, concave, ca. 12 mm, apex subobtuse, recurved. Petals ovate-oblong, ca. 5 mm, apex obtuse; lip sessile, quadrate-obovate, ca. 13 × 10 mm, margin irregularly crenate, apex truncate; spur attenuate, ca. 30 mm, slightly incurved, apex subacute. Column ca. 5 mm; rostellum ovate-oblong, ca. 3 mm. Fl. Sep.

• Crevices on rocky slopes; 1200–3000 m. SW Sichuan, SE Xizang, NW Yunnan.

This species is clearly a close ally of *Hemipilia flabellata*, though with larger flower parts and a longer spur. No specimens have been seen by us to confirm its identity.

### 30. BRACHYCORYTHIS Lindley, Gen. Sp. Orchid. Pl. 363. 1838.

苞叶兰属 bao ye lan shu

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

*Diplacorchis* Schlechter; *Gyaladenia* Schlechter; *Phyllophax* Schlechter; *Schwartzkopffia* Kraenzlin.

Herbs, terrestrial or epiphytic, leafy (or rarely holomycotrophic). Tubers ellipsoid to subglobose, fleshy, neck with several slender roots. Stem erect, leafy (or covered with scales in holomycotrophic species). Leaves alternate, often densely arranged and imbricate, sheathing at base. Inflorescence terminal, racemose, often many flowered; floral bracts foliaceous, often as long as or exceeding flowers. Flowers resupinate, purple to white, often with fine dark spots or markings. Sepals free; dorsal sepal erect, ± concave; lateral sepals spreading or reflexed, often larger than dorsal sepal. Petals usually adnate at their base to side of column, ascending or erect; lip protruding, 2-partite, lateral margins reflexed, often longer than sepals and petals; hypochile concave with basal sac or spur; epichile 2- or 3-lobed. Column erect, short, with 2 prominent auricles (on either side of anther base); anther ovoid, usually obtuse at base, with 2 parallel locules; pollinia 2, oblong, granular-farinnaceous, sectile, attached via short caudicles to a large, naked viscidium; rostellum 3-lobed; stigma lobes confluent.

About 33 species: mainly in S and tropical Africa and Madagascar, with a few species extending to tropical and subtropical Asia; three species (one endemic) in China.

- 1a. Plants (21–)24–54 cm tall; leaves 6–15 cm; lip entire at apex ..... 1. *B. henryi*  
 1b. Plants 8–25 cm tall; leaves 1.2–4.5 cm; lip emarginate at apex.  
     2a. Dorsal sepal ca. 7.5 mm, 3-veined; spur 3–4(–6) mm, not curved, not divided at apex ..... 2. *B. galeandra*  
     2b. Dorsal sepal 12–13 mm, 5-veined; spur 10–12 mm, curved, shallowly 2-lobed at apex ..... 3. *B. menglianensis*



**1. *Brachycorythis henryi*** (Schlechter) Summerhayes, Kew Bull. 10: 235. 1955.

长叶苞叶兰 chang ye bao ye lan

*Phyllomphax henryi* Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 4: 45. 1919; *Platanthera dielsiana* Soó.

Plants (21–)24–54 cm tall. Tubers oblong, 1.5–2 cm. Stem with several overlapping tubular sheaths at base, densely 4- or 5-leaved above. Leaves oblong-elliptic or sometimes elliptic, 6–15 × 2–4 cm, apex subacute. Inflorescence with 4–10 or more well-spaced flowers; floral bracts ca. as large as leaves or slightly smaller, much longer than flowers. Flowers white or pale purple, rather large; ovary slightly arching toward apex, twisted, cylindrical, ca. 1.5 cm including pedicel. Dorsal sepal narrowly ovate-lanceolate, ca. 13 × 5 mm, 5-veined, apex obtuse; lateral sepals similar to dorsal sepal, slightly oblique, ca. 13 × 5 mm, 5-veined. Petals oblique, ovate-lanceolate, ca. 12.5 × 6 mm, 3- or 4-veined, apex obtuse; lip much larger than sepals and petals, suborbicular, 1.5–2.5 × 1.5–2 cm, base spurred, apex entire; spur subcylindric-conic, 6.5–15 mm, apex shallowly 2-lobed and then abruptly contracted, often hooked. Fl. Aug–Sep.

Forests, open grassy slopes; 500–1800(–2300) m. S Guizhou, S and SW Yunnan [Myanmar, Thailand, Vietnam].

**2. *Brachycorythis galeandra*** (H. G. Reichenbach) Summerhayes, Kew Bull. 10: 241. 1955.

短距苞叶兰 duan ju bao ye lan

*Platanthera galeandra* H. G. Reichenbach, Linnaea 25: 226. 1852; *Brachycorythis truncatolabellata* (Hayata) S. S. Ying; *Gymnadenia galeandra* (H. G. Reichenbach) H. G. Reichenbach; *Habenaria galeandra* (H. G. Reichenbach) Ben-  
tham; *H. galeandra* var. *annamica* Gagnepain; *Phyllomphax championii* (Lindley) Schlechter; *P. galeandra* (H. G. Reichenbach) Schlechter; *P. truncatolabellata* (Hayata) Schlechter; *Platanthera championii* Lindley; *P. truncatolabellata* Hayata.

Plants 8–24(–30) cm tall. Tubers oblong, 1.5–2 cm. Stem

with 2 or 3 tubular sheaths at base, densely 4–6-leaved above. Leaves elliptic or ovate, sometimes oblong-elliptic, 2–4.5 × 0.7–2 cm, apex acute. Inflorescence with 3–10 well-spaced flowers; floral bracts ca. as large as leaves or slightly smaller, much longer than flowers. Flowers pink, pale purple, or bluish purple, small; ovary slightly arching toward apex, twisted, cylindrical, to 1.5 cm including pedicel. Dorsal sepal erect, linear-lanceolate, ca. 7.5 × 1.5 mm, 3-veined, apex acute; lateral sepals broadly lanceolate, ca. 8 × 3.5 mm, slightly oblique, 3-veined, apex obtuse. Petals obliquely ovate, ca. 6.5 × 2.2 mm, 3-veined, apex slightly obtuse; lip orbicular-obovate, 0.7–1.2 × 0.6–1 cm, base shortly spurred, apex often emarginate; spur conic, 3–4(–6) mm, apex undivided. Fl. May–Jul.  $2n = 42$ .

Scrubby slopes, grasslands, hilltops, in damp areas along gullies; 1200–2100 m. Guangdong, Guangxi, Guizhou, W Hunan, Sichuan, Taiwan, NW Yunnan [NE India, Myanmar, Thailand, Vietnam].

**3. *Brachycorythis menglianensis*** Y. Y. Qian, Acta Phytotax. Sin. 39: 278. 2001.

孟连苞叶兰 meng lian bao ye lan

Plants 14–25 cm tall. Tubers oblong, 2–3 cm. Stem with 2–4 sheaths at base, 4–7-leaved above, densely pubescent. Leaves ovate, 1.2–4.5 × 1–2.8 cm, pubescent along margin and abaxial veins at base, apex acute or obtuse. Inflorescence with 4–7 well-spaced flowers; floral bracts ca. as large as leaves or slightly smaller, slightly pubescent abaxially and on margin. Flowers white, marked with purple-red, rather large; ovary slightly arching toward apex, twisted, cylindrical, slightly pubescent along ridges, ca. 2 cm including pedicel. Dorsal sepal narrowly ovate or oblong, 12–13 × 4–4.5 mm, 5-veined, apex obtuse; lateral sepals ovate, 14–16 × 5–6 mm, 5-veined, apex obtuse. Petals lanceolate, 12–14 × 2.4–2.6 mm, 3-veined, apex obtuse; lip suborbicular, 18–20 × 20–23 mm, densely papillate adaxially, spurred, apex emarginate and somewhat 2-lobed; spur white, conic, 10–12 mm, curved, shallowly 2-lobed at apex. Fl. Jul.

• Grasslands; ca. 1600 m. SW Yunnan.

### 31. **PLATANThERA** Richard, De Orchid. Eur. 20, 26, 35. 1817, nom. cons.

舌唇兰属 she chun lan shu

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

*Blephariglottis* Rafinesque; *Gymnadeniopsis* Rydberg; *Limnorchis* Rydberg; *Lysiella* Rydberg; *Perularia* Lindley; *Piperia* Rydberg; *Tulotis* Rafinesque.

Herbs, terrestrial, small to medium-sized. Rootstock composed of a slender, creeping stolon, or of a fusiform or ovoid tuber, fleshy, sometimes fascicled, usually with several filiform roots at neck. Stem erect or ascending, with 1 to several leaves. Leaves basal or cauline, alternate or rarely subopposite, elliptic, ovate-elliptic, or linear-lanceolate, sheathing at base. Inflorescence terminal, glabrous; peduncle cylindrical, with 1 or more often foliaceous bracts; rachis few to many flowered, lax or dense; floral bracts usually lanceolate, herbaceous. Flowers often sweetly scented, resupinate, white, green, yellow-green, rose-pink, or orange, variable in size; pedicel and ovary twisted, arcuate toward apex, cylindrical to fusiform, glabrous. Dorsal sepal usually connivent with petals and forming a hood, concave, short, margin ciliate or glabrous; lateral sepals spreading or reflexed, longer than dorsal sepal, margin ciliate or glabrous. Petals usually narrower than sepals; lip spreading or pendulous, sometimes strongly deflexed, entire and ligulate, sometimes with small lateral lobes at base, or divided and fimbriate to varying degrees, usually slightly fleshy, sometimes with a central thickening, sometimes with a callus on disk, spurred at base; spur usually very long and filiform or narrowly cylindrical, rarely short and conic. Column short, stout, with a pair of staminodes at base of anther; anther erect, broad, with 2 parallel or divergent locules, connective conspicuous; pollinia 2, sectile, clavate, granular-farinoaceous, each with conspicuous caudicle and naked vis-

cidium; rostellum triangular, with 2 divergent arms at base; stigma lobes confluent, concave, lying below rostellum and fused with its lower part, or on a convex surface surrounded by rostellum, or sometimes of 2 separate, raised lobes placed in front of mouth of spur. Capsule erect.

About 200 species: throughout Europe and N Africa, north temperate Asia, the Malay Archipelago, and New Guinea, and Central and North America; 42 species (19 endemic) in China.

Placement of some of the small-flowered and shortly spurred species here as opposed to in *Peristylus* is questionable, though critical re-evaluation currently is hampered by the very limited material (particularly of the endemic Chinese species) available for study.

- 1a. Spur shorter than or subequal in length to lip.
- 2a. Leaves 4 or 5; floral bracts pubescent; lip with a basal callus ..... 34. *P. clavigera*
- 2b. Leaves 1–3; floral bracts glabrous; lip ecallose.
- 3a. Plants less than 5 cm tall; lip 15–20 mm; spur 7–9 mm ..... 42. *P. peichatieniana*
- 3b. Plants more than 5 cm tall; lip 1.5–6 mm; spur 1–4 mm.
- 4a. Flowers white, sometimes flushed with pink.
- 5a. Leaves 1 or 2, oblong to elliptic, 1–3 cm wide; dorsal sepal ovate to suborbicular, 2.5–3 mm ..... 35. *P. brevicealcarata*
- 5b. Leaf solitary, linear to ligulate, 0.4–1 cm wide; dorsal sepal oblong, 5–6.5 mm ..... 36. *P. roseotincta*
- 4b. Flowers green, pale green, or yellowish green.
- 6a. Leaf solitary; spur ca. 1 mm ..... 37. *P. minutiflora*
- 6b. Leaves 2; spur 2–3 mm.
- 7a. Leaves linear, at least 5 × as long as broad; disk of lip densely papillose ..... 41. *P. kwangsiensis*
- 7b. Leaves ovate, ovate-oblong, oblong, or elliptic, less than 4 × as long as broad; lip glabrous.
- 8a. Leaves 5–7 × 2–3 cm; lip more than 4 mm ..... 40. *P. taiwanensis*
- 8b. Leaves 3–3.5 × 1–1.6 cm; lip to ca. 3.6 mm.
- 9a. Lip ca. 3.6 mm; spur clavate, ca. 2.2 mm; leaves oblong, ca. 3 × 1 cm ..... 38. *P. handel-mazzettii*
- 9b. Lip ca. 2.5 mm; spur cylindrical to ovoid, ca. 2 mm; leaves elliptic, ca. 3.5 × 1.6 cm ..... 39. *P. herminoides*
- 1b. Spur conspicuously longer than lip.
- 10a. Leaves always 2, basal and subopposite.
- 11a. Spur 20–25 mm, slender, not dilated; connective narrow, apex ca. 0.5 mm wide; anther locules parallel ..... 13. *P. bifolia*
- 11b. Spur 25–36 mm, stout, dilated toward apex; connective rather broad, apex ca. 1.5 mm wide; anther locules divergent ..... 14. *P. chlorantha*
- 10b. Leaf solitary and basal, or leaves 2–6, cauline, alternate and usually widely spaced, never basal and subopposite.
- 12a. Lip with a pair of small lateral lobes at base.
- 13a. Lip with a conic callus on disk in front of mouth of spur ..... 28. *P. finetiana*
- 13b. Lip ecallose.
- 14a. Spur 50–64 mm ..... 24. *P. arcuata*
- 14b. Spur 4–14 mm.
- 15a. Spur 4–5 mm, shorter than ovary ..... 23. *P. ussuriensis*
- 15b. Spur 10–14 mm, equal in length to or exceeding ovary.
- 16a. Leaves linear to linear-lanceolate, 1–2.5 cm wide; lip 6–8 mm ..... 15. *P. devolii*
- 16b. Leaves obovate to elliptic, 3–7 cm wide; lip 4–5 mm ..... 19. *P. souliei*
- 12b. Lip simple, lacking lateral lobes.
- 17a. Lip with an oblong or conic callus on disk in front of mouth of spur.
- 18a. Leaves (2 or)3–6; inflorescence laxly flowered; margin of dorsal sepal ciliate ..... 29. *P. latilabris*
- 18b. Leaves 1–4; inflorescence subdensely to densely flowered; dorsal sepal glabrous ..... 20. *P. sachalinensis*
- 17b. Lip ecallose.
- 19a. Leaves usually 4–6 (though *P. japonica* occasionally 3-leaved).
- 20a. Leaves 3–7.5 cm wide; spur 25–60 mm ..... 30. *P. japonica*
- 20b. Leaves 0.8–3 cm wide; spur 10–20 mm.
- 21a. Plants less than 25 cm tall; inflorescence laxly 5–9-flowered ..... 33. *P. sikkimensis*
- 21b. Plants more than 30 cm tall; inflorescence subdensely to densely many flowered.
- 22a. Plants 30–35 cm tall; peduncle robust; flowers green to yellowish green; lip linear, ca. 1 mm wide ..... 31. *P. oreophila*
- 22b. Plants 35–85 cm tall; peduncle slender; flowers white; lip ligulate to ligulate-lanceolate, 2.5–3 mm wide ..... 32. *P. hologlottis*
- 19b. Leaves 1–3.
- 23a. Sepal margins ciliate.
- 24a. Lip ca. 11 mm; petals ca. 8 mm ..... 18. *P. curvata*
- 24b. Lip to 8 mm; petals to 6 mm.

- 25a. Leaf usually solitary, or rarely 2; inflorescence 3–10-flowered.  
 26a. Leaf linear to linear-oblong, 0.7–1.4 cm wide; viscidia suborbicular ..... 8. *P. leptocaulon*  
 26b. Leaf elliptic or oblong-elliptic, 0.7–3.5 cm wide; viscidia narrowly oblong.  
 27a. Petals 2–2.2 mm wide; anther locules divergent; staminodes rectangular ..... 6. *P. chiloglossa*  
 27b. Petals 1–1.5 mm wide; anther locules parallel; staminodes suborbicular ..... 7. *P. exelliana*  
 25b. Leaves usually 2 (though *P. stenantha* occasionally 1-leaved); inflorescence 7- to many flowered.  
 28a. Lip 2–2.5 mm wide; stigma lobes confluent ..... 12. *P. stenantha*  
 28b. Lip 1.5–1.6 mm wide; stigma lobes separate.  
 29a. Spur 17–18 mm; lip strongly deflexed; sepals only ciliate along apical margin ..... 16. *P. deflexilabella*  
 29b. Spur 10–12 mm; lip straight; sepals ciliate along whole margin ..... 17. *P. longiglandula*  
 23b. Sepals glabrous.  
 30a. Leaves 3.  
 31a. Dorsal sepal and petals not connivent, not forming a hood; leaves 13–19 cm ..... 27. *P. likiangensis*  
 31b. Dorsal sepal and petals connivent, forming a hood; leaves 8–13 cm.  
 32a. Lip ca. 14 mm ..... 25. *P. sinica*  
 32b. Lip ca. 6 mm ..... 26. *P. bakeriana*  
 30b. Leaves 1 or 2 (though *P. minor* sometimes 3-leaved).  
 33a. Dorsal sepal and petals not connivent, not forming a hood.  
 34a. Leaf always solitary, basal, broadly elliptic to ovate-elliptic, 2–6 cm wide; sterile bracts small, not foliaceous ..... 1. *P. stenoglossa*  
 34b. Leaves 1 or 2, basal or cauline, narrowly elliptic, oblong, or linear-lanceolate, 1.5–3 cm wide; sterile bracts large, foliaceous ..... 9. *P. mandarinorum*  
 33b. Dorsal sepal and petals connivent, forming a hood.  
 35a. Plants less than 18 cm tall; leaf narrow, to 0.8 cm wide ..... 5. *P. stenophylla*  
 35b. Plants 20–80 cm tall; leaf 0.8–5 cm wide.  
 36a. Spur 6–8 mm, slightly shorter than to ca. as long as ovary; viscidia large, lanceolate ..... 11. *P. longicalcarata*  
 36b. Spur more than 10 mm, usually exceeding ovary; viscidia small, suborbicular.  
 37a. Leaf 0.8–2.2 cm wide.  
 38a. Inflorescence 3–8-flowered; dorsal sepal 4.5–6 × 3–4.5 mm; lip 6–8 mm ..... 3. *P. damingshanica*  
 38b. Inflorescence many flowered; dorsal sepal 2.5–3 × 2–2.5 mm; lip 5–6 mm ..... 4. *P. tipuloides*  
 37b. Leaf 2–5 cm wide.  
 39a. Peduncle usually robust; rachis many flowered.  
 40a. Dorsal sepal 3.5–4 mm wide; spur pendent ..... 21. *P. minor*  
 40b. Dorsal sepal ca. 7 mm wide; spur spreading horizontally ..... 22. *P. densa*  
 39b. Peduncle slender; rachis 4–14-flowered.  
 41a. Spur pendulous, incurved, ca. 11 mm ..... 2. *P. lancilabris*  
 41b. Spur usually spreading horizontally, parallel to ovary, occasionally slightly pendulous and incurved, 17–23 mm ..... 10. *P. yangmeiensis*

**1. *Platanthera stenoglossa*** Hayata, Icon. Pl. Formosan. 4: 123. 1914.

狭瓣舌唇兰 xia ban she chun lan

*Platanthera chingshuishania* S. S. Ying; *P. iriomotensis* Masamune; *P. stenosepala* Schlechter.

Plants 12–40 cm tall. Rootstock tuberous, fusiform, 2–5 × 0.4–0.7 cm. Stem erect or ascending, with a tubular sheath at base, 1-leaved. Leaf basal, broadly elliptic to ovate-elliptic, 3–15 × 2–6 cm, base clasping, apex acute or obtuse. Peduncle ridged, with 1–3 scattered, small, scalelike (non-foliaceous), lanceolate bracts; rachis 5–15 cm, laxly 5–10-flowered; floral bracts lanceolate to ovate-lanceolate, 6–13 mm, shorter than ovary. Flowers pale yellowish green to green; pedicel and ovary arcuate, fusiform, 8–16 mm. Dorsal sepal not connivent with sepals, ovate, concave, 4–5 × 2–4 mm, glabrous, 1-veined, apex acute; lateral sepals strongly reflexed, linear, 6–7 × 0.8–1.5 mm, glabrous, 1-veined, apex obtuse. Petals erect, spreading,

deltoid to ovate-lanceolate, oblique, 4.5–6 × 3–4 mm, 2-veined, apex acute; lip linear-lanceolate, 7–8 × 2–2.5 mm, fleshy, entire, apex obtuse; spur spreading horizontally to slightly pendulous, cylindrical, 12–18 mm, slender, apex obtuse. Column 2.5–3 mm; staminodes conspicuous, ellipsoid; anther locules nearly parallel; connective broad, concave; pollinia ovoid, with slender caudicles and orbicular viscidia; rostellum slightly arched, concave; stigma lobes confluent, transversely oblong. Capsule erect, fusiform. Fl. Mar–May.

Broad-leaved forests, forest margins, moist rocks; 300–1600 m. C and N Taiwan [Japan (Ryukyu Islands)].

**2. *Platanthera lancilabris*** Schlechter, Repert. Spec. Nov. Regni Veg. 17: 25. 1921.

披针唇舌唇兰 pi zhen chun she chun lan

Plants 30–35 cm tall. Rootstock tuberous, narrowly oblong. Stem erect or ascending, with tubular sheaths at base, 1-leaved. Leaf oblong, 7–8 × 2.7–3 cm, base contracted and

clasping, apex obtuse. Peduncle with 2 foliaceous, lanceolate bracts; rachis to 9 cm, subdensely 8–14-flowered; floral bracts lanceolate, basal ones exceeding flowers, apex acuminate. Flowers green; pedicel and ovary cylindrical, ca. 7 mm. Dorsal sepal erect, lanceolate, concave, ca. 4.5 mm, glabrous, 1-veined, apex obtuse; lateral sepals reflexed, ligulate-lanceolate, oblique, ca. 5 mm, glabrous, 1-veined, apex obtuse. Petals ovate-lanceolate, oblique, 1-veined, apex subacute; lip ca.  $5 \times 1.5$  mm, entire, basal margin adnate to petals, free part lanceolate, apex obtuse; spur pendulous, slightly incurved, cylindrical, ca. 11 mm, apex subobtusate; anther locules slightly divergent; rostellum short, broadly triangular.

- Forests on slopes. NE Yunnan.

**3. *Platanthera damingshanica*** K. Y. Lang & H. S. Guo, Fl. Zhejiang 7: 552. 1993.

大明山舌唇兰 da ming shan she chun lan

Plants 32–47 cm tall. Rootstock creeping, cylindrical, stoloniferous. Stem slender, with tubular sheaths at base, 1-leaved. Leaf basal, narrowly oblanceolate to oblong,  $7\text{--}15 \times 1\text{--}2.2$  cm, base contracted and clasping, apex obtuse. Peduncle slender, with 1–3 scattered bracts; rachis 6–11 cm, laxly 3–8-flowered; floral bracts lanceolate, 6–13 mm. Flowers yellowish green; pedicel and ovary cylindrical, 6–12 mm. Dorsal sepal erect, forming a hood with petals, broadly ovate, cymbiform,  $4.5\text{--}6 \times 3\text{--}4.5$  mm, glabrous, 3-veined, apex acute; lateral sepals reflexed, narrowly oblong to linear, oblique, ca.  $7 \times 2$  mm, glabrous, 3-veined, apex obtuse. Petals erect, ovate, oblique,  $4\text{--}5.5 \times 2\text{--}3.5$  mm, 2-veined, apex acute; lip linear-ligulate,  $6\text{--}8 \times$  ca. 1 mm, entire, apex obtuse; spur pendulous, cylindrical, 12–14 mm. Column ca. 4 mm; anther locules nearly parallel; pollinia obovoid, with long caudicles and suborbicular viscidia; rostellum rather large; stigma lobes confluent, concave, lying directly below rostellum. Fl. May.

- Dense forests on slopes, shaded and humid places along valleys. Fujian, Guangdong, Guangxi, Hunan, Zhejiang.

**4. *Platanthera tipuloides*** (Linnaeus f.) Lindley, Gen. Sp. Orchid. Pl. 285. 1835.

筒距舌唇兰 tong ju she chun lan

*Orchis tipuloides* Linnaeus f., Suppl. Pl. 401. 1782; *Perularia whangshanensis* S. S. Chien; *Tipularia tipuloides* (Linnaeus f.) Druce; *Tulotis whangshanensis* (S. S. Chien) H. Hara.

Plants 20–40 cm tall. Rootstock tuberous, narrowly fusiform to cylindrical, elongate,  $3.5\text{--}5 \times 0.3\text{--}0.6$  cm. Stem slender, with a tubular sheath at base, 1-leaved. Leaf oblong-elliptic,  $5\text{--}11 \times 0.8\text{--}2$  cm, base clasping, apex obtuse. Peduncle slender, with 2 or 3 foliaceous, ovate-lanceolate bracts; rachis 6–12 cm, sparsely many flowered; floral bracts narrowly lanceolate, 12–15 mm, basal ones exceeding ovary. Flowers yellowish green; pedicel and ovary cylindrical, 9–12 mm, slender. Dorsal sepal erect, forming a hood with petals, broadly ovate, cymbiform,  $2.5\text{--}3 \times 2\text{--}2.5$  mm, glabrous, 3-veined, apex obtuse; lateral sepals reflexed, narrowly elliptic,  $3\text{--}3.5 \times 1.2\text{--}1.3$  mm, glabrous, 3-veined, apex obtuse. Petals erect, ovate to narrowly ovate,

oblique,  $2.5\text{--}3 \times 1\text{--}1.5$  mm, slightly fleshy, 1-veined, apex obtuse; lip spreading horizontally to pendulous, broadly linear,  $5\text{--}6 \times 1.2\text{--}1.5$  mm, entire, apex obtuse; spur slightly pendulous, sometimes incurved, cylindrical, 12–17 mm, slender, apex obtuse. Column ca. 1.5 mm; anther locules nearly parallel; connective slightly concave; pollinia obovoid, with short caudicles and suborbicular viscidia; rostellum rather small; stigma lobes confluent, concave, lying directly below rostellum. Fl. May–Jul.  $2n = 42$ .

Dense forests on slopes, forest margins along valleys; 700–1700 m. Anhui, Fujian, Hong Kong, Hunan, Jiangxi, Zhejiang [Japan, Korea, Russia (Kamchatka, Sakhalin)].

**5. *Platanthera stenophylla*** Tang & F. T. Wang, Acta Phytotax. Sin. 1: 59. 1951.

独龙江舌唇兰 du long jiang she chun lan

Plants 15–17.5 cm tall. Rootstock creeping, cylindrical. Stem erect or ascending, rather slender, with 1 tubular sheath at base, 1-leaved. Leaf cauline, narrowly oblong,  $4\text{--}4.5 \times 0.7\text{--}0.8$  cm, base attenuate and clasping, apex obtuse. Peduncle slender; rachis 3.5–4 cm, laxly 3–5-flowered; floral bracts lanceolate, slightly exceeding ovary, apex acuminate. Flowers green; pedicel and ovary cylindrical-fusiform, ca. 8 mm. Dorsal sepal ovate-lanceolate, ca.  $6 \times 1.8$  mm, glabrous, 3-veined, apex obtuse; lateral sepals lanceolate, oblique,  $3.5\text{--}6 \times$  ca. 1.3 mm, glabrous, 1-veined, apex obtuse. Petals ovate-lanceolate, oblique, ca.  $5 \times 1.8$  mm, slightly fleshy, 1-veined, apex obtuse; lip lanceolate-ligulate, ca.  $5 \times 1.4$  mm, entire, apex obtuse; spur pendulous to spreading horizontally, cylindrical, ca.  $9.5 \times 1$  mm, exceeding ovary, tapering slightly toward apex, apex obtuse. Column ca. 1.5 mm. Fl. Aug–Sep.

- *Betula* forests, grasslands on slopes; 2500–3800 m. SE Xizang (Bomi), NW Yunnan (Gongshan).

**6. *Platanthera chiloglossa*** (Tang & F. T. Wang) K. Y. Lang, Vasc. Pl. Hengduan Mts. 2: 2523. 1994.

察瓦龙舌唇兰 cha wa long she chun lan

*Habenaria chiloglossa* Tang & F. T. Wang, Acta Phytotax. Sin. 1: 63. 1951.

Plants 10–31 cm tall. Rootstock creeping, cylindrical, stoloniferous. Stem erect or ascending, slightly stout, with 1 or 2 tubular sheaths at base, 1-leaved. Leaf cauline, oblong-elliptic,  $2.5\text{--}10 \times 0.7\text{--}3.5$  cm, base clasping, apex acute. Peduncle sometimes with 1 small, foliaceous bract; rachis 2–10 cm, 3–10-flowered; floral bracts lanceolate, apex acuminate, basal ones exceeding flowers. Flowers pale yellowish green; pedicel and ovary fusiform, ca. 9 mm. Dorsal sepal erect and connivent with petals, narrowly elliptic, concave,  $5.5\text{--}6 \times$  ca. 2 mm, 3-veined, margin ciliate, apex obtuse; lateral sepals reflexed, obliquely lanceolate,  $5.5\text{--}6 \times$  ca. 2 mm, 1-veined, margin ciliate, apex subacuminate. Petals triangular, oblique, ca.  $5 \times 2\text{--}2.2$  mm, 1-veined, apex obtuse; lip slightly recurved, ligulate, ca.  $6.5 \times 1.5$  mm, entire, apex obtuse; spur pendulous, cylindrical, slightly incurved, ca. 16 mm, exceeding ovary, somewhat dilated toward apex, apex obtuse. Column short; staminodes rectangular, small; anther locules slightly divergent; pollinia ellip-

soid, with long caudicles and narrowly oblong viscidia; rostellum erect, short; stigma lobes separate, raised, elliptic, large, extending on either side of mouth of spur. Fl. Aug.

• Forests, grasslands on slopes and along gullies; 2500–3300 m. W Sichuan, Xizang (Zayü), NW Yunnan.

**7. *Platanthera exelliana*** Soó, Ann. Hist.-Nat. Mus. Natl. Hung. 26: 359. 1929.

高原舌唇兰 gao yuan she chun lan

*Platanthera elachyantha* Tang & F. T. Wang.

Plants 15–25 cm tall. Rootstock tuberous, fusiform, ca. 1.5 cm. Stem erect or ascending, with a tubular sheath at base, 1- or rarely 2-leaved. Leaf basal, elliptic to oblong-elliptic, 2.5–10 × 0.7–3.5 cm, base sheathing, apex obtuse or acute. Peduncle slender, with 1 or 2 small, foliaceous bracts; rachis 2–10 cm, laxly 3–10-flowered; floral bracts lanceolate, 8–22 mm, apex acuminate. Flowers pale yellowish green; pedicel and ovary slightly arcuate, cylindrical-fusiform, 6–7 mm. Dorsal sepal erect, forming a hood with petals, narrowly oblong, 3.5–4.5 × 1.2–1.8 mm, 1- or 3-veined, margin ciliate, apex obtuse; lateral sepals reflexed, narrowly oblong, oblique, 4–5 × 1.5–1.8 mm, 1- or 3-veined, margin ciliate, apex slightly obtuse. Petals erect, narrowly triangular-lanceolate, oblique, 3.5–5 × 1–1.5 mm, fleshy, apex obtuse; lip slightly recurved, ligulate to ligulate-lanceolate, 3.8–5 × ca. 1.3 mm, thickened, entire, apex obtuse; spur pendulous, slightly incurved, cylindrical, 8–10 mm, ca. as long as or exceeding ovary, somewhat dilated toward apex, apex obtuse. Column short; staminodes suborbicular, small; anther locules parallel; connective very narrow; pollinia obovoid, with short caudicles and narrowly oblong viscidia; rostellum rather small; stigma lobes separate, raised, elliptic, extending on either side of mouth of spur. Capsule ovoid. Fl. Aug–Sep.

Alpine and subalpine meadows, scrub; 3300–4500 m. W Sichuan, SE Xizang, NW Yunnan (Dêqên, Gongshan, Zhongdian) [Bhutan, India (Sikkim), Nepal].

**8. *Platanthera leptocaulon*** (J. D. Hooker) Soó, Ann. Hist.-Nat. Mus. Natl. Hung. 26: 360. 1929.

条叶舌唇兰 tiao ye she chun lan

*Habenaria leptocaulon* J. D. Hooker, Fl. Brit. India 6: 154. 1890; *Platanthera silaensis* Handel-Mazzetti.

Plants 19–25 cm tall. Rootstock creeping, cylindrical, stoloniferous. Stem erect, with 1 or 2 sheaths at base, 1- or rarely 2-leaved. Leaf cauline, linear to linear-oblong, 3.5–8.5 × 0.7–1.4 cm, base clasping, apex acute to subobtuse. Peduncle slender, with 1–3 foliaceous, linear-lanceolate bracts; rachis 4.5–9 cm, laxly 3–6-flowered; floral bracts erect, lanceolate to ovate-lanceolate, 10–12 mm, apex acuminate. Flowers yellowish green; pedicel and ovary cylindrical-fusiform, ca. 10 mm. Dorsal sepal erect and forming a hood with petals, sublanceolate, ca. 6 × 2–2.2 mm, 3-veined, margin ciliate, apex obtuse; lateral sepals reflexed, lanceolate, slightly oblique, ca. 6 × 2–2.1 mm, 3-veined, margin ciliate, apex obtuse. Petals triangular-lanceolate, oblique, ca. 6 × 2 mm, fleshy, 1-veined, apex acute; lip ligulate-lanceolate, 5.5–8 × 1–1.3 mm, thickened, entire, apex obtuse; spur pendulous, cylindrical, 12–20 mm, usually much longer than

ovary, slender. Column erect, short; staminodes subelliptic, small; anther locules nearly parallel; pollinia ellipsoid, with short caudicles and suborbicular viscidia; rostellum erect, short; stigma lobes separate, raised, elliptic-oblong, extending on either side of mouth of spur. Fl. Aug–Oct.

Forests, grasslands on slopes; 3000–4000 m. SW Sichuan, S Xizang, NW Yunnan [Bhutan, NE India, Nepal].

**9. *Platanthera mandarinorum*** H. G. Reichenbach, Linnaea 25: 226. 1852.

尾瓣舌唇兰 wei ban she chun lan

Plants 10–50 cm tall. Rootstock tuberous, ovoid to fusiform, 3–8 × 0.4–0.8 cm. Stem erect, with 2 or 3 tubular sheaths at base, 1- or 2-leaved. Leaves basal or cauline, alternate, narrowly elliptic, oblong, or linear-lanceolate, 3–12 × 0.8–3 cm, base clasping, apex acute or obtuse. Peduncle slender to somewhat robust, distinctly ridged, with several foliaceous, lanceolate bracts; rachis 3–22 cm, laxly to subdensely 3–20-flowered; floral bracts lanceolate to ovate-lanceolate, 8–20 mm, equal to or exceeding ovary. Flowers pale greenish yellow to green; pedicel and ovary arcuate, narrowly fusiform, 10–14 mm. Dorsal sepal not connivent with petals, broadly ovate to cordate or deltoid, concave, 4–7 × 3–5.5 mm, glabrous, 3-veined, apex obtuse or bluntly rounded; lateral sepals spreading or reflexed, oblong-lanceolate to broadly lanceolate or linear-lanceolate, oblique, 5–9 × 1.3–3.5 mm, glabrous, 3-veined, apex acute to acuminate. Petals spreading, ovate-lanceolate or ovate-linear, oblique, 6–9 × 3–4 mm, 3-veined, apex acute or obtuse; lip pendulous, linear-lanceolate to ligulate, 7–10 × 1–2.5 mm, entire, apex obtuse; spur pendulous, spreading horizontally, or curving upward, cylindrical, 8–30 mm, obtuse to acute. Column 3–4 mm; staminodes ellipsoid, conspicuous; anther locules divergent or parallel, connective 2–3 mm wide, apex emarginate; pollinia ellipsoid, with long caudicles and suborbicular viscidia; rostellum broadly triangular; stigma lobes confluent, transversely oblong, concave, lying directly below rostellum.

Forests, forest margins, alpine or moist grasslands; 300–3200 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shandong, Sichuan, Taiwan, NE Yunnan, Zhejiang [Japan, Korea].

- 1a. Lateral sepals linear-lanceolate, 1.3–2 mm wide, dorsal sepal deltoid ..... 9b. subsp. *formosana*
- 1b. Lateral sepals oblong-lanceolate to broadly lanceolate, (1.5–)2–3.5 mm wide, dorsal sepal broadly ovate to cordate.
  - 2a. Spur usually spreading horizontally or upcurved, (15–)20–30 mm; anther locules divergent .... 9a. subsp. *mandarinorum*
  - 2b. Spur pendulous, 8–15 mm; anther locules parallel ..... 9c. subsp. *pachyglossa*

**9a. *Platanthera mandarinorum*** subsp. *mandarinorum*

尾瓣舌唇兰(原亚种) wei ban she chun lan (yuan ya zhong)

*Habenaria mandarinorum* (H. G. Reichenbach) Herklots; *Platanthera cornu-bovis* Nevski; *P. delavayi* Schlechter; *P. mandarinorum* var. *cornu-bovis* (Nevski) Kitagawa; *P. man-*

*darinorum* var. *delavayi* (Schlechter) Soó; *P. mandarinorum* var. *neglecta* (Schlechter) F. Maekawa; *P. mandarinorum* var. *ophryodes* Finet; *P. mandarinorum* subsp. *winkleriana* (Schlechter) Soó; *P. minax* Schlechter; *P. neglecta* Schlechter; *P. winkleriana* Schlechter.

Leaves elliptic to oblong, rarely linear-lanceolate, 4.5–10 × 0.8–2.5 cm. Dorsal sepal broadly ovate to cordate, 4–4.5 × 3–4 mm; lateral sepals oblong-lanceolate to broadly lanceolate, 5–7 × (1.5–)2–3 mm; spur 15–30 mm. Anther locules divergent. Fl. Apr–Jun.

Forests, grasslands; 300–2100 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shandong, Sichuan, NE Yunnan [Japan, Korea].

**9b. *Platanthera mandarinorum* subsp. *formosana*** T. P. Lin & K. Inoue, J. Phytogeogr. Taxon. 28: 12. 1980.

宝岛舌唇兰 bao dao she chun lan

*Platanthera mandarinorum* var. *formosana* (T. P. Lin & K. Inoue) S. S. Ying.

Leaves ovate, oblong, or lanceolate, 3–6 × 1.2–3 cm. Dorsal sepal deltoid, 5–7 × 4–4.5 mm; lateral sepals linear-lanceolate, oblique, 7–9 × 1.3–2 mm; spur 12–18 mm. Anther locules slightly divergent. Fl. May–Jul.

• Moist grasslands, forest margins; 1200–1600 m. Taiwan (Taibei, Taidong).

**9c. *Platanthera mandarinorum* subsp. *pachyglossa*** (Hayata) T. P. Lin & K. Inoue, J. Phytogeogr. Taxon. 28: 10. 1980.

厚唇舌唇兰 hou chun she chun lan

*Platanthera pachyglossa* Hayata, Icon. Pl. Formosan. 4: 123. 1914; *Habenaria pachyglossa* (Hayata) Masamune.

Leaves oblong to lanceolate, 5–12 × 2–3 cm. Dorsal sepal broadly ovate, 5–6 × 4.5–5.5 mm; lateral sepals oblong-lanceolate, oblique, 7–9 × 3–3.5 mm; spur 8–15 mm. Anther locules parallel. Fl. Jun–Aug.

• Alpine grasslands; 2000–3200 m. C and N Taiwan.

**10. *Platanthera yangmeiensis*** T. P. Lin, J. Phytogeogr. Taxon. 28: 7. 1980.

阴生舌唇兰 yin sheng she chun lan

*Platanthera lalashaniana* S. S. Ying.

Plants 22–40 cm tall. Rootstock tuberous, fusiform, 2–5 × 0.3–0.5 cm. Stem erect, with a tubular sheath at base, 1- or 2-leaved. Leaves basal or cauline, alternate, elliptic-oblong, 10–15 × 3–5 cm, base clasping, apex obtuse or acute. Peduncle slender, with several scattered, foliaceous, lanceolate bracts; rachis 2–7 cm, laxly 4–8-flowered; floral bracts lanceolate, 8–30 mm. Flowers pale yellowish white to light whitish green; pedicel and ovary arcuate, cylindrical, 12–15 mm, slender, glabrous. Dorsal sepal forming a hood with petals, suborbicular, concave, ca. 4.5 × 3.5 mm, glabrous, 3-veined, apex obtuse; lateral sepals reflexed, linear-falcate, ca. 6.5 × 1.8 mm, glabrous, 2-veined, apex acuminate. Petals deltoid, oblique, ca. 5.5 × 1.8 mm, 2-veined, apex acuminate; lip broadly linear, ca. 7 ×

1.6 mm, entire, apex obtuse; spur usually spreading horizontally and parallel to ovary, occasionally slightly pendulous and incurved, cylindrical, 17–23 mm, slender, gradually tapering toward apex. Column ca. 3 mm; staminodes conspicuous; anther locules nearly parallel; pollinia obovoid, with slender caudicles and suborbicular viscidia; rostellum slightly arched, concave; stigma lobes confluent, flat to slightly concave. Fl. Jun–Aug.

• Shaded humid places in forests; 1000–1700 m. Taiwan.

**11. *Platanthera longicalcarata*** Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 350. 1911.

长距舌唇兰 chang ju she chun lan

*Habenaria longicalcarata* (Hayata) S. S. Ying; *Plantaginorchis longicalcarata* (Hayata) Szlachetko & Kras-Lapinska; *Tulotis longicalcarata* (Hayata) T. S. Liu & H. J. Su.

Plants 20–45 cm tall. Rootstock elongate, creeping, tapering, 3–8 × 0.3–0.6 cm, stoloniferous. Stem erect, with 1 or 2 tubular sheaths at base, 1- or 2-leaved. Leaves cauline, alternate, widely spaced, oblong-oblong, 8–12 × 3–3.5 cm, base cuneate, apex subacute. Peduncle slender, ridged, with 2 foliaceous, lanceolate bracts; rachis 8–18 cm, 5–20-flowered; floral bracts lanceolate, 6–16 mm. Flowers greenish; pedicel and ovary fusiform, 6–9 mm. Dorsal sepal forming a hood with petals, ovate-triangular, 3–3.5 × 2.8–3.3 mm, glabrous, 1-veined, apex obtuse; lateral sepals reflexed, ovate-lanceolate, oblique, 4.5–5.5 × 2–3 mm, glabrous, 1-veined, apex obtuse. Petals lanceolate, oblique, 4–4.5 × 1.8–2 mm; lip ovate-triangular, 4.5–5 × 1.8–2.5 mm, entire, apex obtuse; spur pendulous, incurved, 6–8 mm, apex obtuse. Column 1.5–2 mm, with 2 small projections linking to lip at base; staminodes conspicuous; anther locules slightly divergent; connective narrow; pollinia ellipsoid, with slender caudicles and large, oblong viscidia; rostellum curved; stigma lobes confluent, flat, anterior margin protruding beyond anther locules. Fl. Jul–Sep.

• *Tsuga chinensis* and *Picea morrisonicola* forests on slopes; 2400–3000 m. Taiwan.

**12. *Platanthera stenantha*** (J. D. Hooker) Soó, Ann. Hist.-Nat. Mus. Natl. Hung. 26: 363. 1929.

条瓣舌唇兰 tiao ban she chun lan

*Habenaria stenantha* J. D. Hooker, Fl. Brit. India 6: 153. 1890; *Hemihabenaria stenantha* (J. D. Hooker) Finet.

Plants 25–32 cm tall. Rootstock elongate, cylindrical, stoloniferous. Stem erect, with 1 or 2 tubular sheaths at base, 1- or 2-leaved. Leaves cauline, alternate, widely spaced, elliptic or broadly elliptic, 4–15 × 2–5.5 cm, base contracted and clasping, apex acute. Peduncle slender, with 2–4 foliaceous bracts; rachis 6–15 cm, 7–17-flowered; floral bracts linear-lanceolate, 10–20 mm, basal ones exceeding flowers, apex acuminate. Flowers yellowish green; pedicel and ovary cylindrical, 8–12 mm. Dorsal sepal erect, forming a hood with petals, ovate, cymbiform, 4–5 × 2–2.6 mm, 3-veined, margin ciliate, apex obtuse; lateral sepals reflexed, oblong, oblique, 5–6 × 1.5–1.7 mm, 3-veined, margin ciliate, apex obtuse. Petals yellow, erect, linear, oblique, 4–5 × ca. 1 mm, slightly fleshy, 1-veined, apex obtuse; lip yellow, narrowly ovate to ligulate-lanceolate, 5–6 × 2–2.5 mm, en-

tire, apex obtuse; spur pendulous, slightly incurved, cylindrical, 12–18 mm, exceeding ovary, slender, slightly dilated toward apex. Column short; staminodes small; anther locules slightly divergent; pollinia obovoid, with long caudicles and lanceolate viscidia; rostellum rather large; stigma lobes confluent, raised, elliptic, placed above mouth of spur. Fl. Aug–Sep.

Evergreen broad-leaved forests, coniferous (*Abies* and *Tsuga*) forests; 1500–3100 m. S and SE Xizang (Mêdog, Yadong), Yunnan (Bijiang, Gongshan) [Bhutan, India (Sikkim), N Myanmar, Nepal].

**13. *Platanthera bifolia*** (Linnaeus) Richard, *De Orchid.* Eur. 35. 1817.

细距舌唇兰 xi ju she chun lan

*Orchis bifolia* Linnaeus, Sp. Pl. 2: 939. 1753; *Habenaria bifolia* (Linnaeus) R. Brown; *Platanthera metabifolia* F. Maekawa.

Plants 28–42 cm tall. Rootstock tuberous, ovoid-fusiform, tapering at base, 2.5–3 × 0.8–1.4 cm. Stem erect, with 1 or 2 tubular sheaths at base, 2-leaved. Leaves basal, subopposite, spatulate-elliptic, oblong, or elliptic, 9–12 × 1.8–3.5 cm, gradually contracted at base, apex obtuse. Peduncle slender to robust, with 2–4 scattered, lanceolate bracts; rachis 9–19 cm, laxly to subdensely 7–17-flowered; floral bracts lanceolate, 15–20 mm, basal ones exceeding ovary. Flowers fragrant, white, greenish white, or green; pedicel and ovary arcuate, cylindrical, 14–15 mm. Dorsal sepal erect and forming a hood with petals, ovate to broadly ovate, cymbiform, 5.5–6 × 4–4.5 mm, glabrous, apex obtuse; lateral sepals spreading, ovate-lanceolate, oblique, 6–7 × 3.5–4 mm, glabrous, apex subacute. Petals linear-lanceolate, oblique, 5.5–6 × ca. 1 mm, apex acute; lip spreading, ligulate, 9–10 × 1–1.5 mm, thickened, entire, apex obtuse; spur pendulous, cylindrical, slender, 20–25 × 1.5–1.8 mm, apex subacute. Column stout; staminodes conspicuous; anther locules slightly divergent; pollinia ellipsoid, with long caudicles and suborbicular viscidia; rostellum belt-shaped; stigma lobes confluent, concave, lying directly below rostellum. Fl. Jul–Aug, fr. Aug–Sep.  $2n = 42$ .

Forests on slopes, damp meadows; 200–2800 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Qinghai, Shandong, Shanxi, Sichuan [Japan, Korea, Mongolia, Russia; N Africa, W Asia, Europe].

The Chinese plants do not differ significantly from the widespread Eurasian *Platanthera bifolia*. Its sister and equally widespread species, *P. chlorantha*, is also found in China. The distinctness of *P. metabifolia*, originally described from Japan, is questionable once the full range of variation in *P. bifolia* is considered.

The extensive extra-Chinese synonymy is not cited here.

**14. *Platanthera chlorantha*** (Custer) Reichenbach in Mössler, *Handb. Gewächsk.*, ed. 2, 2: 1565. 1829.

二叶舌唇兰 er ye she chun lan

*Orchis chlorantha* Custer, *Neue Alp.* 2: 400. 1827; *Gymnadenia chlorantha* (Custer) Ambrosi; *Habenaria chlorantha* (Custer) Babington; *H. subulifera* W. W. Smith; *Platanthera sigmoidea* Maekawa; *P. subulifera* (W. W. Smith) Schlechter.

Plants 30–54 cm tall. Rootstock tuberous, ovoid-fusiform, 2–4 × 0.8–1.5 cm. Stem erect, with a tubular sheath at base, 2-

leaved. Leaves basal, subopposite, spatulate-elliptic or oblanceolate-elliptic, 10–20 × 3–8 cm, gradually contracted and sheathing at base, apex obtuse or acute. Peduncle slender to robust, with 1–4 scattered, lanceolate bracts; rachis 7–23 cm, laxly to subdensely 9–32-flowered; floral bracts lanceolate, 10–22 mm, basal ones exceeding ovary, apex acuminate. Flowers fragrant, greenish white or white; pedicel and ovary arcuate, cylindrical, 12–18 mm. Dorsal sepal erect, forming a hood with petals, ovate to orbicular-cordate, cymbiform, 5–7 × 5–6 mm, glabrous, 5-veined, apex obtuse; lateral sepals spreading, ovate, oblique, 7.5–8 × 4–4.5 mm, glabrous, 3–5-veined, apex acute. Petals narrowly ovate-lanceolate, oblique, 5–6 × 2.5–3 mm, 1–3-veined, apex acute; lip spreading to pendulous, ligulate, gradually tapering toward apex, 8–13 × ca. 2 mm, entire, apex obtuse; spur pendulous to spreading horizontally or sometimes arching upward, clavate-cylindrical, 16–36 mm, exceeding ovary, conspicuously thickened toward apex, apex obtuse. Column stout; staminodes conspicuous; anther locules divergent; pollinia ellipsoid, with slender caudicles and orbicular viscidia; rostellum broad, tapelike; stigma lobes confluent, concave, lying directly below rostellum. Fl. Jun–Aug, fr. Jul–Sep.  $2n = 42$ .

Forests on slopes, grasslands; 400–3300 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xizang, Yunnan [Japan, Korea, Russia; W Asia, Europe].

**15. *Platanthera devolii*** (T. P. Lin & T. W. Hu) T. P. Lin & K. Inoue, *J. Phytogeogr. Taxon.* 28: 5. 1980.

长叶舌唇兰 chang ye she chun lan

*Tulotis devolii* T. P. Lin & T. W. Hu, *Quart. J. Chin. Forest.* 9: 53. 1976; *Platanthera longicalcarata* Hayata var. *devolii* (T. P. Lin & T. W. Hu) S. S. Ying.

Plants 20–35 cm tall. Rootstock creeping, slender, stoloniferous. Stem erect, with 2 tubular sheaths at base, 2-leaved. Leaves cauline, alternate, widely spaced, linear to linear-lanceolate, 8–18 × 1–2.5 cm, base clasping, apex acute. Peduncle slender, with 2 or 3 small, lanceolate bracts; rachis 10–25 cm, 8–16-flowered; floral bracts lanceolate, 10–14 mm, apex acuminate. Flowers yellowish green; pedicel and ovary fusiform-cylindrical, 8–15 mm. Dorsal sepal erect, forming a hood with petals, broadly ovate, concave, 2.5–3 × 2.5–3 mm, glabrous, 3-veined, apex obtuse; lateral sepals spreading or reflexed, oblique, ovate to narrowly elliptic, 4–5 × 2–3 mm, glabrous, 3-veined, apex obtuse. Petals ovate-lanceolate, oblique, ca. 3 × 1.5–2 mm, 1-veined, apex obtuse; lip pendulous and strongly deflexed, ligulate-lanceolate, 6–8 × ca. 2 mm, with small lateral lobes at base, apex obtuse; basal lobes square or obtusely triangular, to 2 mm, apex acute; spur pendulous, cylindrical, 10–14 mm, exceeding ovary, slender, apex acute. Fl. Jun–Sep.

• Shaded places and wet mossy rocks in forests, forest margins, roadsides; 1900–2400 m. C and N Taiwan.

**16. *Platanthera deflexilabella*** K. Y. Lang, *Acta Phytotax. Sin.* 20: 186. 1982.

反唇舌唇兰 fan chun she chun lan

Plants 30–47 cm tall. Rootstock creeping, cylindrical, stoloniferous. Stem erect or ascending, with 2 tubular sheaths at base, 2-leaved. Leaves cauline, widely spaced, elliptic, narrowly elliptic, or narrowly oblong, 9–15 × 1.5–5 cm, base contracted and clasping, apex subobtuse or subacute. Peduncle slender, with 1 or 2 foliaceous, lanceolate bracts; rachis cylindrical, 6.5–12 cm, laxly many flowered; floral bracts narrowly lanceolate, margin ciliate, apex long acuminate. Flowers fragrant, yellowish green; pedicel and ovary cylindrical-fusiform, 5–6 mm. Dorsal sepal erect, connivent with petals, ovate-oblong, ca. 4 × 1.8 mm, 3-veined, apical margin ciliate, apex obtuse; lateral sepals spreading, linear-lanceolate, oblique, ca. 4.5 × 1.2 mm, 3-veined, apical margin ciliate, apex obtuse. Petals triangular-ovate, oblique, ca. 5 × 2 mm, 1- or rarely 2-veined, apex obtuse; lip strongly deflexed, ligulate-linear, ca. 6 × 1.5 mm, entire, apex obtuse; spur pendulous, cylindrical, 17–18 mm, exceeding ovary, slender, tapering slightly toward apex, apex obtuse. Column ca. 1.5 mm, stout; staminodes small; anther locules nearly parallel; pollinia obovoid, with short caudicles and elliptic viscidia; rostellum erect, short; stigma lobes separate, raised, clavate, protruding. Fl. Jul–Aug.

• Forests on slopes, roadsides; 2500–2600 m. SC Sichuan (Emei Shan).

**17. *Platanthera longiglandula*** K. Y. Lang, Acta Phytotax. Sin. 20: 188. 1982.

长粘盘舌唇兰 chang zhan pan she chun lan

Plants 28–33 cm tall. Rootstock creeping, cylindrical, stoloniferous. Stem erect or ascending, with 2 tubular sheaths at base, 2-leaved. Leaves cauline, widely spaced, narrowly oblong, narrowly lanceolate, or spatulate, 12–17 × 1.5–3 cm, base attenuate and clasping, apex obtuse or acute. Peduncle slender, with 2 or 3 foliaceous bracts; rachis cylindrical, 8–10 cm, subdensely many flowered; floral bracts lanceolate, margin ciliate, apex acuminate, basal ones exceeding flowers. Flowers fragrant, yellowish green; pedicel and ovary slightly arcuate, fusiform, 6–7 mm, glabrous. Dorsal sepal erect and connivent with petals, ovate, cymbiform, ca. 4 × 2.2 mm, 1-veined, margin ciliate, apex obtuse; lateral sepals spreading, ovate, slightly oblique, ca. 4 × 2 mm, 1-veined, margin ciliate, apex obtuse. Petals ovate, oblique, ca. 3.5 × 2 mm, 1-veined, apex slightly obtuse; lip straight, ligulate-ovate, ca. 3.5 × 1.6 mm, entire, apex obtuse; spur pendulous, cylindrical, 10–12 mm, exceeding ovary, slender, apex obtuse. Column ca. 1.5 mm, stout; staminodes small; anther locules nearly parallel; pollinia obovoid, with short caudicles and narrowly lanceolate viscidia; rostellum erect, short; stigma lobes separate, raised, clavate, protruding, apex obtuse. Fl. Jul.

• Bamboo forests on slopes; ca. 2800 m. SC Sichuan (Emei Shan).

**18. *Platanthera curvata*** K. Y. Lang, Fl. Xizang. 5: 697. 1987.

弓背舌唇兰 gong bei she chun lan

*Habenaria platantheroides* Tang & F. T. Wang, Bull. Fan Mem. Inst. Biol. Bot. 7: 133. 1936, not Schlechter (1918); *Platanthera platantheroides* K. Y. Lang.

Plants 24–32 cm tall. Rootstock creeping, cylindrical, sto-

loniferous. Stem erect or ascending, with 1 or 2 tubular sheaths at base, usually 2-leaved. Leaves elliptic to obovate, 5–8 × 2–3.5 cm, base clasping, apex acute or acuminate. Peduncle slender, sometimes with 1 or 2 foliaceous bracts; rachis 5.5–12 cm, 4–10- or more flowered; floral bracts lanceolate, apex acuminate or acute. Flowers yellowish green; pedicel and ovary strongly arcuate, cylindrical-fusiform, ca. 12 mm. Dorsal sepal erect and connivent with petals, broadly ovate, cymbiform, ca. 7 × 5 mm, 3-veined, margin ciliate, apex obtuse; lateral sepals reflexed, lanceolate, oblique, ca. 9 × 3 mm, 3-veined, margin ciliate, apex obtuse. Petals erect, narrowly lanceolate, falcate, ca. 8 × 2 mm, 1- or rarely 3-veined, apex acute; lip ligulate-lanceolate, ca. 11 × 2.3 mm, 3-veined, entire, apex obtuse; spur spreading horizontally, cylindrical-clavate, ca. 18 mm, much longer than ovary, slightly thickened toward apex, apex obtuse. Column erect, short; staminodes square, small; anther locules slightly divergent; pollinia ellipsoid, with slender caudicles and large, orbicular viscidia; rostellum erect, short; stigma lobes separate, clavate, large, protruding obliquely on either side of mouth of spur. Fl. Jul–Aug.

• Forests, scrub, grasslands on slopes; 1900–3600 m. SW and W Sichuan, SE Xizang (Médog), SW Yunnan (Menglian).

**19. *Platanthera souliei*** Kraenzlin, Repert. Spec. Nov. Regni Veg. 5: 199. 1908.

蜻蜓舌唇兰 qing ting she chun lan

*Habenaria pugionifera* W. W. Smith; *Orchis fuscescens* Linnaeus; *Perularia fuscescens* (Linnaeus) Lindley; *P. souliei* (Kraenzlin) Schlechter; *Platanthera fuscescens* (Linnaeus) Kraenzlin; *P. pugionifera* (W. W. Smith) Schlechter; *Tulotis asiatica* H. Hara; *T. fuscescens* (Linnaeus) Rafinesque; *T. souliei* (Kraenzlin) H. Hara.

Plants 20–60 cm tall. Rootstock slender, stoloniferous. Stem erect, stout, with 1 or 2 tubular sheaths at base, 2(or 3)-leaved. Leaves cauline, obovate to elliptic, 6–15 × 3–7 cm, base clasping, apex obtuse. Peduncle with several lanceolate bracts; rachis elongate, many flowered; floral bracts narrowly lanceolate, exceeding ovary. Flowers yellowish green; pedicel and ovary cylindrical-fusiform, ca. 10 mm. Dorsal sepal erect, forming a hood with petals, ovate, concave, ca. 4 × 3 mm, glabrous, 3-veined, apex acute or obtuse; lateral sepals spreading, elliptic, oblique, slightly longer and narrower than dorsal sepal, glabrous, 3-veined, margin slightly reflexed, apex obtuse. Petals elliptic-lanceolate, oblique, 5.5–6.5 × 1.5–1.8 mm, slightly fleshy, 1-veined, apex obtuse; lip pendulous, ligulate-lanceolate, 4–5 × ca. 1.5 mm, with small lateral lobes at base, apex obtuse; basal lobes triangular-falcate, ca. 1 mm, apex acute; spur pendulous, slightly arcuate, cylindrical, ca. 10 mm, ca. equal in length to ovary, slender, slightly dilated toward apex. Fl. Jun–Aug, fr. Sep–Oct. 2n = 42.

Forests along gullies; 400–4300 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, E Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, NW Yunnan [Japan, Korea, Russia (Siberia)].

**20. *Platanthera sachalinensis*** F. Schmidt, Reis. Amur-Land., Bot. 181. 1868.

高山舌唇兰 gao shan she chun lan



*Habenaria transnokoensis* (Ohwi & Fukuyama) S. S. Ying; *Platanthera longibracteata* Hayata; *P. transnokoensis* Ohwi & Fukuyama; *Tulotis transnokoensis* (Ohwi & Fukuyama) S. S. Ying; *T. ussuriensis* (Regel) H. Hara var. *transnokoensis* (Ohwi & Fukuyama) T. S. Liu & H. J. Su.

Plants 25–60 cm tall. Rootstock tuberous, clavate-fusiform, 1.5–6 × 0.4–0.9 cm. Stem erect, stout, with several tubular sheaths, 1–3-leaved. Leaves cauline, alternate, widely spaced, ovate-oblong to lanceolate, 8–15 × 2.5–5 cm, base clasping, apex obtuse. Peduncle with several scattered, foliaceous, lanceolate bracts; rachis 10–30 cm, subdensely to densely 10–40-flowered; floral bracts lanceolate, 8–27 mm, exceeding ovary. Flowers whitish green to nearly white; pedicel and ovary arcuate, cylindrical-fusiform, 6–18 mm. Dorsal sepal forming a hood with petals, narrowly ovate, concave, 3–3.5 × ca. 2 mm, glabrous, 3-veined, apex obtuse; lateral sepals reflexed or spreading, ovate-lanceolate, falcate, 4–4.5 × ca. 2 mm, glabrous, 3-veined, apex obtuse. Petals oblong, oblique, 3–3.5 × 1.5–2 mm, 2-veined, apex obtuse; lip strongly deflexed, broadly linear, 5–7 × 1–1.2 mm, entire, apex obtuse; disk with an oblong callus in front of mouth of spur; spur spreading horizontally, slightly arcuate, cylindrical, 10–20 mm, slender, apex obtuse. Column 2–2.5 mm; staminodes ellipsoid, small, inconspicuous; anther locules parallel; connective narrow; pollinia ellipsoid, with long caudicles and small, narrowly triangular viscidia; rostellum concave, V-shaped; stigma lobes confluent, concave, anterior margin slightly protruding. Fl. Jul–Sep.  $2n = 42$ .

Alpine grasslands, sparse forests; 2000–3000 m. C and N Taiwan [Japan, Russia (Sakhalin)].

**21. *Platanthera minor*** (Miquel) H. G. Reichenbach, Bot. Zeitung (Berlin) 36: 75. 1878.

小舌唇兰 xiao she chun lan

*Habenaria japonica* (Thunberg) A. Gray var. *minor* Miquel, Ann. Mus. Bot. Lugduno-Batavi 2: 207. 1865; *H. henryi* Rolfe; *H. multibracteata* W. W. Smith; *Platanthera henryi* (Rolfe) Kraenzlin; *P. interrupta* Maximowicz; *P. multibracteata* (W. W. Smith) Schlechter; *P. sigeyosii* Masamune.

Plants 20–60 cm tall. Rootstock tuberous, fusiform, elongate, 1.5–6 × 0.4–1.5 cm. Stem erect, stout, with 1 or 2 tubular sheaths at base, 1- or 2(or 3)-leaved. Leaves cauline, alternate, usually widely spaced, elliptic, ovate-elliptic, or oblong-lanceolate, 6–15 × 2–5 cm, base clasping, apex acute or obtuse-rounded. Peduncle robust, ridged, with 2–5 foliaceous, lanceolate bracts; rachis 10–18 cm, laxly many flowered; floral bracts ovate-lanceolate, 8–20 mm, basal ones exceeding flowers, apex acuminate. Flowers yellowish green; pedicel and ovary slightly arcuate, cylindrical-fusiform, 10–15 mm. Dorsal sepal erect, forming a hood with petals, broadly ovate, concave, 4–5 × 3.5–4 mm, glabrous, 3-veined, apex obtuse or acute; lateral sepals reflexed, elliptic, oblique, 5–6(–7) × 2.5–3 mm, glabrous, 3-veined, apex obtuse. Petals ovate, oblique, 4–5 × 2–2.5 mm, 2-veined, apex obtuse; lip spreading horizontally to slightly pendulous, ligulate, 5–8 × 1.5–2.5 mm, entire, apex obtuse; spur pendulous, cylindrical, 11–18 mm, apex obtuse or acute. Column 3–4 mm; staminodes conspicuous; anther locules slightly

divergent; connective broad, apex concave; pollinia obovoid, with slender caudicles and suborbicular viscidia; rostellum broad, short; stigma lobes confluent, concave, large, lying directly below rostellum. Fl. May–Jul.  $2n = 42$ .

Forests on slopes, alpine meadows; 200–3000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Korea].

**22. *Platanthera densa*** Freyn, Oesterr. Bot. Z. 46: 96. 1896.

多叶舌唇兰 duo ye she chun lan

*Platanthera chloranthella* Nakai; *P. chlorantha* var. *orientalis* Schlechter; *P. densa* subsp. *orientalis* (Schlechter) Efimov.

Plants ca. 30 cm tall. Rootstock narrowly fusiform, shortly 2-lobed, ca. 4 × 1.3 cm. Stem erect, with 2 tubular sheaths at base, 2-leaved. Leaves cauline, elliptic, 6–7 × 2–3 cm, contracted and clasping at base, apex obtuse. Peduncle with 1 lanceolate bract; rachis ca. 6 cm, subdensely 15-flowered; floral bracts ovate-lanceolate, ca. 15 × 5 mm, slightly exceeding ovary. Flowers green; pedicel and ovary ca. 8 mm. Dorsal sepal erect, forming a hood with petals, cordate-ovate, ca. 5 × 7 mm, apex obtuse; lateral sepals elliptic, oblique, shorter and narrower than dorsal sepal. Petals lanceolate, ca. 3 mm, apex abruptly cuspidate; lip spreading forward, ligulate, ca. 10 × 2.5 mm, entire, apex obtuse; spur spreading horizontally, ca. 20 mm, much longer than ovary. Fl. Jun.

Alpine meadows. China (without precise locality) [Korea, Russia (Far East)].

Material of this species has not been seen. It is possibly conspecific with *Platanthera minor*.

**23. *Platanthera ussuriensis*** (Regel) Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 31: 107. 1887.

东亚舌唇兰 dong ya she chun lan

*Platanthera tipuloides* Lindley var. *ussuriensis* Regel, Tent. Fl. Ussur. 157. 1861; *Habenaria shensiana* Kraenzlin; *H. ussuriensis* (Regel) Miyabe; *Perularia shensiana* (Kraenzlin) Schlechter; *P. ussuriensis* (Regel) Schlechter; *Platanthera herbiola* Lindley var. *japonica* Finet; *P. shensiana* (Kraenzlin) Tang & F. T. Wang; *Tulotis shensiana* (Kraenzlin) H. Hara; *T. ussuriensis* (Regel) H. Hara.

Plants 20–55 cm tall. Rootstock creeping, 2–4 cm, slender, stoloniferous. Stem erect, slender, with 1 or 2 tubular sheaths at base, 2- or 3-leaved. Leaves cauline, widely spaced, spatulate to narrowly oblong, 6–14 × 1.2–2.5(–3) cm, base clasping, apex obtuse or acute. Peduncle slender, with 1 to several small, lanceolate bracts; rachis 6–10 cm, laxly 10–20-flowered; floral bracts narrowly lanceolate, 8–11 mm, apex acuminate. Flowers pale yellowish green; pedicel and ovary cylindrical, 8–9 mm. Dorsal sepal erect, forming a hood with petals, broadly ovate, concave, 2.5–3 × 2–2.5 mm, glabrous, 3-veined, apex obtuse; lateral sepals spreading or reflexed, narrowly elliptic, slightly oblique, ca. 3 × 1 mm, glabrous, 3-veined, apex obtuse. Petals narrowly oblong-lanceolate, 2.5–3 × ca. 1 mm, slightly fleshy, 1-veined, apex obtuse or subtruncate; lip pendulous, slightly deflexed, narrowly ligulate-lanceolate, ca. 4 × 1 mm, with small lateral lobes at base, apex obtuse; basal lobes suborbicular, apex rounded; mid-lobe ligulate-lanceolate or ligulate, apex obtuse;

spur pendulous, slightly incurved, cylindric, 4–5 mm, shorter than ovary, slender, apex acute. Fl. Jul–Aug, fr. Sep–Oct.  $2n = 42$ .

Forests, forest margins, shaded places along gullies; 400–2800 m. Anhui, N Fujian, NE Guangxi (Ziyuan), Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Shaanxi, Sichuan, Zhejiang [Japan, Korea, Russia (Far East)].

**24. *Platanthera arcuata*** Lindley, Gen. Sp. Orchid. Pl. 289. 1835.

弧形舌唇兰 hu xing she chun lan

*Habenaria arcuata* (Lindley) J. D. Hooker.

Stem erect, robust, 2- or more leaved. Leaves cauline, oblong or oblong-lanceolate, 6.5–10.2 cm, base clasping, apex acute. Rachis laxly many flowered; floral bracts foliaceous, linear-lanceolate, 15–38 mm, lower ones exceeding flowers, apex acuminate. Flowers large; pedicel and ovary arcuate, ca. 35 mm. Dorsal sepal cymbiform, ca. 8 mm; lateral sepals deflexed, oblong, slightly larger than dorsal sepal, 3-veined, apex obtuse. Petals linear, 1-veined; lip linear-ligulate, entire, with small lateral lobes at base, margin reflexed; disk puberulous; basal lobes rounded; spur cylindric, slender, 50–64 mm, exceeding ovary, incurved, apex acute. Column stout; anther locules divergent; pollinia obovoid, with stout, short caudicles and large, ovate viscidia; rostellum broadly triangular.

Grasslands. Xizang [Bhutan, NE India, Nepal].

The present authors saw no Chinese specimens of this species. It was reported from Xizang by Press et al. (Annot. Checkl. Fl. Pl. Nepal, 223. 2000).

**25. *Platanthera sinica*** Tang & F. T. Wang, Acta Phytotax. Sin. 1: 59. 1951.

滇西舌唇兰 dian xi she chun lan

Plants 35–50 cm tall. Rootstock creeping, cylindric, to 4 cm, stoloniferous. Stem erect, stout, with 2 or 3 tubular sheaths at base, usually 3-leaved. Leaves cauline, oblong or elliptic, 8–11 × 3–4.5 cm, base contracted and clasping, apex obtuse or acute. Peduncle slender, with several scattered, lanceolate bracts; rachis 10–12 cm, laxly 8–12-flowered; floral bracts lanceolate, basal ones exceeding flowers, apex acuminate. Flowers fragrant, yellowish green, petals and lip white and sometimes tinged yellow; pedicel and ovary cylindric, 14–15 mm. Dorsal sepal erect, forming a hood with petals, elliptic, cymbiform, 6–6.5 × 3–3.5 mm, glabrous, 3-veined, apex obtuse; lateral sepals reflexed, ovate, oblique, 6.5–7 × 3.5–4.5 mm, glabrous, 3-veined, apex obtuse. Petals erect, linear, oblique, 5.5–6 × 1.4–1.5 mm, 1-veined, apex truncate and slightly emarginate; lip linear-subulate, ca. 14 × 1–1.8 mm, base slightly dilated, entire, apex emarginate; spur pendulous, cylindric, 16–18 × ca. 1.5 mm, slightly thickened toward apex, apex obtuse. Column short; staminodes conspicuous; anther locules parallel; connective rather broad, apex slightly concave; pollinia obovoid, with short caudicles and linear-ellipsoid viscidia; rostellum erect, short; stigma lobes confluent, concave, elliptic, lying directly below rostellum. Fl. Jun–Jul.

• Forests, grassy slopes; 2500–3500 m. NW Yunnan (Gongshan to Zhongdian).

**26. *Platanthera bakeriana*** (King & Pantling) Kraenzlin, Orchid. Gen. Sp. 1: 632. 1899.

滇藏舌唇兰 dian zang she chun lan

*Habenaria bakeriana* King & Pantling, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 65: 132. 1896.

Plants 30–58 cm tall. Rootstock tuberous, cylindric-fusiform, tapering, 2–7 × 0.5–1 cm. Stem erect, stout, with 2 or 3 tubular sheaths at base, usually 3-leaved. Leaves cauline, alternate, clustered to widely spaced, broadly elliptic, 8–13 × 1.5–5.5 cm, base contracted and clasping, apex acute. Peduncle slender to robust, with 2–4 foliaceous bracts; rachis 4–25 cm, subdensely many flowered; floral bracts linear-lanceolate, 10–25 mm, basal ones exceeding flowers, apex acuminate. Flowers faintly fragrant, yellowish green or green; pedicel and ovary cylindric-fusiform, 8–14 mm. Dorsal sepal erect, forming a hood with petals, oblong-ovate, cymbiform, 4–5.5 × 1.5–2.2 mm, glabrous, 3-veined, apex obtuse; lateral sepals reflexed, oblong-lanceolate, 4–5.5 × ca. 2 mm, glabrous, 3-veined, apex obtuse. Petals erect, obliquely ovate, 4.5–5 × 1.5–2.2 mm, apex obtuse; lip spreading to slightly pendulous, linear to ligulate, ca. 6 × 1.5 mm, entire, apex obtuse; spur pendulous, incurved, cylindric, 8–16 mm, much longer than ovary, slender, apex acuminate. Column short, staminodes small; anther locules slightly divergent; pollinia obovoid, with long caudicles and linear viscidia; rostellum rather large; stigma lobes confluent, raised, transversely elliptic, deeply 2-lobed, somewhat saddle-shaped, placed above mouth of spur. Fl. Jun–Aug.

Forests, scrub; 2200–4000 m. Sichuan (Miyi), SE Xizang (Médog), N Yunnan (Baoshan, Luquan) [Bhutan, India, Nepal].

**27. *Platanthera likiangensis*** Tang & F. T. Wang, Acta Phytotax. Sin. 1: 58. 1951.

丽江舌唇兰 li jiang she chun lan

Plants 28–30 cm tall. Rootstock tuberous, narrowly ellipsoid, 1.5–1.7 × 0.4–0.5 cm. Stem erect, stout, with 2 or 3 tubular sheaths at base, 3-leaved. Leaves cauline, spatulate, 13–19 × 2.8–5.3 cm, base attenuate and sheathing, apex acute. Peduncle with 1 or 2 lanceolate bracts; rachis 5–8 cm, laxly 9–12-flowered; floral bracts lanceolate, 12–13 mm, exceeding ovary, apex acuminate. Flowers yellowish green; pedicel and ovary cylindric-fusiform, 12–13 mm. Dorsal sepal erect, not connivent with petals, cymbiform, cordate-ovate, ca. 5 × 5 mm, glabrous, 7-veined, apex obtuse; lateral sepals spreading, ovate-lanceolate, oblique, ca. 7.5 × 3.5 mm, glabrous, 3(–5)-veined. Petals erect, linear-lanceolate, oblique, ca. 6 × 1.5 mm, slightly fleshy, apex obtuse; lip pendulous, linear, ca. 10 × 1 mm, entire, apex obtuse; spur pendulous, cylindric-clavate, 20–21 × ca. 1 mm, slightly dilated toward apex, apex obtuse. Fl. Jul.

• Forests on slopes; 2800–3000 m. NW Yunnan (Lijiang, Weixi).

**28. *Platanthera finetiana*** Schlechter, Repert. Spec. Nov. Regni Veg. 9: 23. 1910.

对耳舌唇兰 dui er she chun lan

*Habenaria stenantha* J. D. Hooker var. *auriculata* (Finet) S. Y. Hu; *Hemihabenaria stenantha* (J. D. Hooker) Finet var. *auriculata* Finet.

Plants 30–60 cm tall. Rootstock creeping, cylindrical, stoloniferous. Stem erect, stout, with tubular sheaths at base, 3- or 4-leaved. Leaves cauline, widely spaced, oblong, elliptic, or elliptic-lanceolate, 10–16 × 2.3–5 cm, base clasping, apex obtuse or acute. Peduncle with several lanceolate bracts; rachis 10–18 cm, subdensely to densely 8–26-flowered; floral bracts lanceolate, basal ones exceeding flowers, apex acuminate. Flowers pale yellowish green to whitish green; pedicel and ovary slightly arcuate, cylindrical, 12–13 mm. Dorsal sepal erect, forming a hood with petals, ovate-elliptic, cymbiform, 4.5–5.5 × 3–3.5 mm, glabrous, 3-veined, apex obtuse; lateral sepals reflexed, broadly ovate, oblique, 4.5–5.5 × 3.2–3.6 mm, glabrous, 3-veined, apex obtuse. Petals linear, oblique, 4–5 × ca. 1.5 mm, 1-veined, apex truncate-obtuse; lip pendulous, linear-ligulate, 9–10.5 × ca. 1.5 mm, with small lateral lobes at base, margin reflexed, apex obtuse; disk with a conic callus in front of mouth of spur; basal lobes square, apex truncate; spur pendulous, cylindrical, exceeding ovary, tapering gradually toward apex, apex acute and slightly hooked. Column short; staminodes conspicuous; anther locules parallel; connective somewhat broad, apex subtretuse; pollinia obovoid, with long, slender caudicles and linear-elliptic viscidia; rostellum erect, broadly triangular, short; stigma lobes confluent, concave, elliptic, lying directly below rostellum. Fl. Jul–Aug.

• Forests on slopes or along valleys; 1200–3500 m. SE Gansu, W Hubei, Sichuan.

**29. *Platanthera latilabris*** Lindley, Gen. Sp. Orchid. Pl. 289. 1835.

白鹤参 bai he shen

*Habenaria bonatiana* Schlechter; *H. latilabris* (Lindley) J. D. Hooker; *Habenella latilabris* (Lindley) Szlachetko & Kras-Lapinska; *Pecteilis latilabris* (Lindley) Mitra; *Platanthera acuminata* Lindley; *Platantheroides latilabris* (Lindley) Szlachetko.

Plants 18–55 cm tall. Rootstock tuberous, ellipsoid or ovoid, 1–2.5 cm. Stem stout, with 2 or 3 tubular sheaths at base, (2 or)3–6-leaved. Leaves cauline, widely spaced, ovate to oblong, 5–13 × 2–5 cm, base clasping, apex acuminate. Peduncle elongate, with 1–4 foliaceous bracts; rachis cylindrical, 7–30 cm, laxly several to 40-flowered; floral bracts lanceolate or ovate-lanceolate, apex acuminate. Flowers yellowish green; ovary and pedicel cylindrical-fusiform, 10–16 mm. Dorsal sepal erect and connivent with petals, broadly ovate to orbicular, cymbiform, 5–7 × 3–4.5 mm, 3-veined, pubescent, margin ciliate, apex obtuse-rounded; lateral sepals reflexed or spreading, ovate, slightly oblique, 5.5–8 × ca. 3.5 mm, 3-veined, pubescent, margin ciliate, apex obtuse. Petals oblong, slightly oblique, 4–7 × (2.5–)4–5 mm, fleshy, 1- or rarely 2-veined, apex obtuse to subacute; lip linear-lanceolate to oblong, 5.5–13 × ca. 1 mm, entire, apex obtuse; disk with a conic callus in front of mouth of spur; spur spreading horizontally to slightly pendulous, cylindrical, 8–18 mm, usually longer than ovary, slender, apex obtuse to slightly acuminate. Column erect, short; staminodes subsquare, small; anther locules nearly parallel; pollinia obovoid, with very short caudicles and small, orbicular viscidia; rostellum erect, short; stigma lobes separate, raised, oblong to nar-

rowly oblong, parallel, spreading on either side of base of lip. Capsule fusiform, shortly beaked. Fl. Jul–Aug.

Forests, scrub, grasslands; 1600–3500 m. SW Sichuan, S and SE Xizang, NE and NW Yunnan [Bhutan, NE India, Kashmir, Nepal].

**30. *Platanthera japonica*** (Thunberg) Lindley, Gen. Sp. Orchid. Pl. 290. 1835.

舌唇兰 she chun lan

*Orchis japonica* Thunberg in Murray, Syst. Veg., ed. 14, 811. 1784; *Habenaria japonica* (Thunberg) A. Gray; *H. omeiensis* Rolfe; *Platanthera manubriata* Kraenzlin; *P. omeiensis* (Rolfe) Schlechter; *P. setchuenica* Kraenzlin; *P. stenantha* (J. D. Hooker) Soó subsp. *omeiensis* (Rolfe) Soó.

Plants 35–80 cm tall. Rootstock tuberous, cylindrical to narrowly ovoid. Stem erect, stout, with several tubular sheaths at base, (3 or)4–6-leaved. Leaves cauline, alternate, widely spaced, elliptic to narrowly elliptic, 10–18 × 3–7.5 cm, base sheathing, apex obtuse or acute. Peduncle robust, with 3 or 4 foliaceous, lanceolate bracts; rachis 10–18 cm, 10–28-flowered; floral bracts narrowly lanceolate, 20–45 mm, basal ones exceeding flowers, apex acuminate. Flowers white; pedicel and ovary straight to slightly arcuate, cylindrical, 18–25 mm. Dorsal sepal erect, forming a hood with petals, ovate, cymbiform, 7–8 × 5–6 mm, glabrous, 3-veined, apex obtuse or acute; lateral sepals reflexed, ovate, oblique, 8–9 × 4–5 mm, glabrous, 3-veined, apex acute. Petals linear, 6–7 × ca. 1.5 mm, 1-veined, apex obtuse; lip pendulous or spreading, linear, 13–15(–20) mm, entire, apex obtuse; spur pendulous, cylindrical to filiform, 25–60 mm, much longer than ovary, slender, apex acute. Column 1–2 mm; staminodes conspicuous; anther locules almost parallel; connective rather broad, apex subtretuse; pollinia obovoid, with slender caudicles and linear-ellipsoid viscidia; rostellum erect, broadly triangular, short; stigma lobes confluent, concave, lying directly below rostellum. Fl. Mar–Jul, fr. May–Sep.  $2n = 42$ .

Forests, grasslands on slopes; 600–2600 m. Anhui, Chongqing, Gansu, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Shaanxi, Sichuan, Yunnan, Zhejiang [Japan, Korea].

**31. *Platanthera oreophila*** Schlechter, Repert. Spec. Nov. Regni Veg. 20: 381. 1924.

齿瓣舌唇兰 chi ban she chun lan

*Habenaria oreophila* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 13: 208. 1921, not Greenman (1903).

Plants 30–35 cm tall. Rootstock tuberous, cylindrical. Stem erect, stout, with 1 or 2 tubular sheaths at base, 4-leaved. Leaves cauline, elliptic to lanceolate, 8–9 × 2.5–3 cm, base clasping, apex subacute. Peduncle with 3–5 bracts; rachis 7–10 cm, densely many flowered; floral bracts lanceolate, 10–20 mm, basal ones exceeding flower, apex acuminate. Flowers green to yellowish green; pedicel and ovary cylindrical-fusiform, 11–13 mm. Dorsal sepal erect, forming a hood with petals, ovate, cymbiform, 6–7 × 4–4.5 mm, slightly fleshy, glabrous, 3-veined, apex obtuse; lateral sepals reflexed, narrowly ovate, oblique, 7.5–8 × 3–3.8 mm, slightly fleshy, glabrous, 3-veined, apex subacute. Petals triangular-ovate, oblique, 6–7 × 3–3.2

mm, 1-veined, margin ciliate, apex slightly acute; lip pendulous, linear, 7–10 × ca. 1 mm, entire, apex subobtuse; spur pendulous, cylindric-clavate, 13–20 mm, exceeding ovary, apex obtuse. Column stout; staminodes small; anther locules parallel; connective broad, apex subtruncate; pollinia obovoid, with long caudicles and small, suborbicular viscidium; rostellum deltoid, short; stigma lobes confluent, concave, lying directly below rostellum. Fl. Jun–Jul.

• Forests, scrub, grasslands; 1900–3800 m. SW Sichuan (Muli), NW and W Yunnan (Tengchong, Zhongdian).

**32. *Platanthera hologlottis*** Maximowicz, Mém. Acad. Imp. Sci. St. Pétersbourg Divers Savans 9 [Prim. Fl. Amur.] 268. 1859.

密花舌唇兰 mi hua she chun lan

*Habenaria glossophora* W. W. Smith; *Limnorchis hologlottis* (Maximowicz) Nevski; *Platanthera glossophora* (W. W. Smith) Schlechter; *P. hologlottis* var. *glossophora* (W. W. Smith) K. Inoue.

Plants 35–85 cm tall. Rootstock elongate, creeping, cylindric, narrow, stoloniferous. Stem erect, with 1 or 2 tubular sheaths at base, 4–6-leaved. Leaves cauline, alternate, widely spaced, linear-lanceolate to broadly linear, 7–20 × 0.8–2 cm, base clasping, apex acuminate or acute. Peduncle slender, with several scattered lanceolate bracts; rachis 5–20 cm, subdensely to densely many flowered; floral bracts lanceolate or linear-lanceolate, 10–15 × 2–3 mm, subequal in length to ovary, apex acuminate. Flowers fragrant, white; pedicel and ovary slightly arcuate, cylindric-fusiform, 10–13 mm. Dorsal sepal erect, forming a hood with petals, ovate or elliptic, cymbiform, 4–5 × 3–3.5 mm, glabrous, 5–7-veined, apex obtuse; lateral sepals reflexed, elliptic-ovate, oblique, 5–6(–7) × 1.5–2.5(–3) mm, glabrous, 5–7-veined, apex obtuse. Petals ovate, oblique, 4–5 × 1.5–2 mm, 5-veined, apex obtuse; lip pendulous, ligulate to ligulate-lanceolate, 6–7 × 2.5–3 mm, entire, apex obtuse-rounded; spur pendulous, slightly arcuate, cylindric, 10–20 mm, exceeding ovary, slender, with a conspicuous projection near mouth. Column short; staminodes conspicuous, suborbicular; anther locules parallel; connective broad, apex subtruncate; pollinia obovoid, with long caudicles and lanceolate viscidia; rostellum erect, short; stigma lobes confluent, large, concave, lying directly below rostellum. Fl. Jun–Jul, fr. Aug.  $2n = 42$ .

Forests on slopes, damp grasslands along valleys; 300–3200 m. Anhui, Fujian, Guangdong, Hebei, Heilongjiang, Henan, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shandong, W Sichuan, W Yunnan, Zhejiang [Japan, Korea, Russia (Far East)].

**33. *Platanthera sikkimensis*** (J. D. Hooker) Kraenzlin, Orchid. Gen. Sp. 1: 621. 1898.

长瓣舌唇兰 chang ban she chun lan

*Habenaria sikkimensis* J. D. Hooker, Fl. Brit. India 6: 155. 1890.

Plants 17–21 cm tall. Rootstock tuberous, cylindric to ovoid, 0.5–1.5 × 0.3–0.5 cm. Stem erect, with tubular sheaths at base, 5- or 6-leaved. Leaves cauline, oblong-lanceolate, 4–5 × 1–1.5 cm, base clasping, apex acute. Peduncle slender, with several foliaceous, lanceolate bracts; rachis 4–7 cm, laxly 5–9-

flowered; floral bracts ovate-lanceolate, 10–25 mm, lower ones exceeding ovary, apex acute. Flowers yellowish green with deep yellow-green petals and a brownish red lip; pedicel and ovary slightly arcuate, cylindric-fusiform, 9–13 mm. Dorsal sepal erect, narrowly triangular-ovate, 5–7 × 2.5–4 mm, 1-veined, apex subacute; lateral sepals reflexed, linear-lanceolate, 6.5–8 × 1.2–1.8 mm, glabrous, 1-veined, apex acute. Petals spreading, lanceolate, falcate, 6.5–7 × 2.2–2.5 mm, glabrous, 1-veined, apex obtuse; lip pendulous, lanceolate, ca. 9 × 1.2 mm, 1-veined, entire, apex acuminate; spur curving upward, cylindric, 11–15 mm, exceeding ovary. Column short; staminodes narrowly oblong; anther locules divergent; connective emarginate at apex; pollinia ellipsoid, with long caudicles and small, ovoid viscidia; rostellum large; stigma lobes confluent, large, concave, lying directly below rostellum. Fl. Jul–Aug.

Evergreen broad-leaved forests; ca. 2300 m. NW Yunnan (Gongshan) [India (Sikkim), Nepal].

**34. *Platanthera clavigera*** Lindley, Gen. Sp. Orchid. Pl. 289. 1835.

藏南舌唇兰 zang nan she chun lan

*Habenaria clavigera* (Lindley) Dandy; *H. densa* Wallich ex Lindley; *Habenella clavigera* (Lindley) Szlachetko & Kras-Lapinska; *H. densa* (Wallich ex Lindley) Szlachetko & Kras-Lapinska; *Platanthera densa* (Wallich ex Lindley) Soó (1929), not Freyn (1896); *Platantheroides clavigera* (Lindley) Szlachetko; *P. densa* (Wallich ex Lindley) Szlachetko.

Plants 18–62 cm tall. Rootstock tuberous, ovoid, 1–2 cm. Stem stout, with 2 or 3 tubular sheaths at base, 4- or 5-leaved. Leaves cauline, widely spaced, narrowly ovate to oblong, 3.5–10 × 1.5–3 cm, base clasping, apex acuminate. Peduncle with 1 foliaceous bract; rachis cylindric, 8–30 cm, densely many flowered; floral bracts lanceolate, pubescent, apex acuminate. Flowers yellowish green; pedicel and ovary cylindric-fusiform, 8–12 mm. Dorsal sepal erect and connivent with petals, elliptic-oblong, cymbiform, 3–5 × 2–2.6 mm, pubescent, 3-veined, margin ciliate, apex obtuse; lateral sepals spreading or reflexed, elliptic-oblong to elliptic-lanceolate, oblique, 4–5.5 × 1.8–2.5 mm, pubescent, 3-veined, margin ciliate, apex obtuse. Petals oblong-ovate, oblique, 3.5–5 × 1.8–2.2 mm, fleshy, 3-veined, apex acute; lip linear, 5–5.5 × ca. 1 mm, entire, apex obtuse; disk with a conic callus in front of mouth of spur; spur pendulous, clavate, 5–6 mm, much shorter than ovary. Column erect, short; staminodes small, elliptic; anther locules nearly parallel; pollinia subglobose, with very short caudicles and large, orbicular viscidia; rostellum erect, small; stigma lobes separate, raised, shortly clavate to narrowly oblong, spreading on either side of base of lip. Capsule ovoid, ridged. Fl. Aug–Sep.

Forests, scrub, grasslands along valleys, flooded wastelands; 2300–3400 m. S Xizang [Bhutan, India, Kashmir, Nepal].

**35. *Platanthera brevicealcarata*** Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 350. 1911.

短距舌唇兰 duan ju she chun lan

*Habenaria brevicealcarata* (Hayata) Masamune (1968), not Fukuyama (1932).

Plants 7–20 cm tall. Rootstock elongate, creeping, 2–6 cm, 2–5 mm in diam., stoloniferous. Stem erect or ascending, with 1 or 2 tubular sheaths at base, 1- or 2-leaved. Leaves basal, widely spaced, oblong to elliptic, 2–6 × 1–3 cm, base cuneate, apex acute. Peduncle slender, with 1–4 foliaceous, lanceolate bracts; rachis 3–5 cm, 3–8-flowered; floral bracts lanceolate, 7–11 mm, ca. as long as or slightly exceeding ovary. Flowers white; pedicel and ovary cylindrical-fusiform, 7–10 mm. Dorsal sepal forming a hood with petals, ovate to suborbicular, concave, 2.5–3 × 2–2.3 mm, glabrous, 1-veined, apex obtuse; lateral sepals spreading, obovate-elliptic, slightly oblique, 4–5 × 2–3 mm, glabrous, 1-veined, apex obtuse. Petals ovate, oblique, 2.5–3 × 1.8–2 mm, 1- or 2-veined, apex subobtuse; lip deflexed, oblong, 4–5.5 × 2–2.5 mm, entire, apex obtuse; spur pendulous, slightly incurved, cylindrical, ca. 3 mm, apex rounded. Column short, ca. 1.5 mm; staminodes conspicuous; anther locules nearly parallel; pollinia ellipsoid, with slender caudicles and globose viscidia; rostellum protruding; stigma lobes confluent, slightly raised, anterior margin protruding beyond anther locules. Fl. May–Jul.

Coniferous and mixed broad-leaved forests, grasslands; 1600–3700 m. Taiwan [S Japan].

**36. *Platanthera roseotincta*** (W. W. Smith) Tang & F. T. Wang, Bull. Fan Mem. Inst. Biol. Bot. 10: 30. 1940.

棒距舌唇兰 bang ju she chun lan

*Habenaria roseotincta* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 13: 210. 1921; *Chondradenia doyonensis* (Handel-Mazzetti) Vermeulen; *Galearis doyonensis* (Handel-Mazzetti) P. F. Hunt; *Galeorchis doyonensis* (Handel-Mazzetti) Soó; *Orchis doyonensis* Handel-Mazzetti; *Platanthera altigena* Schlechter.

Plants 8–15 cm tall. Rootstock creeping, cylindrical, stoloniferous. Stem erect or ascending, with 1 or 2 tubular sheaths at base, 1-leaved. Leaf cauline, linear or ligulate, 3–4 × 0.4–1 cm, base clasping, apex obtuse to acute. Peduncle slender, sometimes with 1 foliaceous bract; rachis 2–5 cm, 3–10- or more flowered; floral bracts lanceolate to ovate-lanceolate, 6–25 mm, basal ones exceeding ovary, apex acuminate. Flowers white, sometimes flushed with pink; pedicel and ovary fusiform, 4–7 mm. Dorsal sepal erect, connivent with petals, oblong, 5–6.5 × 2–2.2 mm, glabrous, 1-veined, apex acute; lateral sepals spreading, oblong, 5–6.5 × 1.8–2 mm, glabrous, 1-veined, apex acute. Petals ovate to ovate-lanceolate, 4.5–5.5 × 1.5–1.8 mm, 1-veined, apex acute; lip ligulate-lanceolate, 5–6 × ca. 2 mm, thickened, entire, apex acute; spur pendulous, clavate-fusiform, 3–4 mm, shorter than ovary, neck narrowed, apex obtuse-rounded. Column short; staminodes small; anther locules nearly parallel; pollinia obovoid, with short caudicles and elliptical viscidia; rostellum small; stigma lobes separate, raised, globose, extending on either side of mouth of spur. Fl. Sep.

Alpine grasslands; 3400–3800 m. Xizang (Mêdog, Zayü), Yunnan (Dêqên, Fugong, Gongshan) [N Myanmar].

**37. *Platanthera minutiflora*** Schlechter, Acta Horti Gothob. 1: 138. 1924.

小花舌唇兰 xiao hua she chun lan

*Lysiella nevskii* Averyanov.

Plants 10–30 cm tall. Rootstock creeping, cylindrical, stoloniferous. Stem erect, with 1 or 2 tubular sheaths at base, 1-leaved. Leaf basal, spatulate or elliptic-spatulate, 5–10 × 1–2.5 cm, base contracted and clasping, apex obtuse or acute. Peduncle slender, ridged, with 1 or 2 foliaceous, lanceolate bracts; rachis 3–8 cm, subdensely 4–12-flowered; floral bracts lanceolate, 8–14 mm, nearly as long as flowers, apex acuminate. Flowers yellowish green; pedicel and ovary cylindrical, ca. 10 mm. Dorsal sepal erect, forming a hood with petals, broadly ovate or nearly orbicular, cymbiform, 2–3 × ca. 2.5 mm, glabrous, 1(–3)-veined, apex obtuse; lateral sepals spreading, ovate, falcate, 2.5–3.5 × 1.2–1.8 mm, glabrous, 1-veined, apex obtuse. Petals ovate to ovate-lanceolate, oblique, 2–3 × 1–1.3 mm, 1-veined, apex obtuse; lip pendulous, slightly recurved, ligulate to ligulate-lanceolate, 2.5–3 × ca. 1 mm, entire, apex obtuse; spur pendulous, conic, very short, ca. 1 mm, apex usually slightly hooked. Column stout; staminodes subelliptic, small; anther locules slightly divergent; connective rather broad, apex subretuse; pollinia obovoid, with short caudicles and suborbicular viscidia; rostellum broadly triangular, short; stigma lobes confluent, concave, lying directly below rostellum. Fl. Jun–Jul.

Forests on slopes; 2700–4100 m. Gansu, Shaanxi, NW and W Sichuan, Xinjiang, SE Xizang, NW Yunnan [Kazakhstan, Kyrgyzstan].

**38. *Platanthera handel-mazzettii*** K. Inoue, J. Jap. Bot. 61: 195. 1986.

贡山舌唇兰 gong shan she chun lan

Plants ca. 16 cm. Rootstock tuberous, narrowly ellipsoid, ca. 2 cm. Stem erect, 1- or 2-leaved. Leaves basal, oblong, ca. 3 × 1 cm, apex acute. Peduncle slender, with 1 small bract; rachis ca. 6 cm, 8- or 9-flowered; floral bracts lanceolate, ca. 8 mm. Flowers green; pedicel and ovary cylindrical, ca. 5 mm. Dorsal sepal forming a hood with petals, narrowly ovate, ca. 2.6 × 1.7 mm, glabrous, 1-veined, apex obtuse; lateral sepals slightly reflexed, narrowly ovate, oblique, ca. 2.6 × 1.3 mm, glabrous, 1-veined, apex obtuse. Petals deltoid, oblique, ca. 2.8 × 1.6 mm, 2-veined, apex obtuse; lip slightly deflexed, narrowly triangular, ca. 3.6 × 1.6 mm, entire, apex obtuse; spur clavate, ca. 2.2 mm. Column ca. 1.3 × 0.5 mm; anther locules nearly parallel; connective narrow; pollinia ca. 1 mm, with short caudicles and oblong-lanceolate viscidia; rostellum well developed, protruding; stigma lobes confluent, triangular, flat. Fl. Aug.

• Bamboo forests on slopes; 3600–3800 m. NW Yunnan (Gongshan).

**39. *Platanthera herminoides*** Tang & F. T. Wang, Acta Phytotax. Sin. 1: 58. 1951.

高黎贡舌唇兰 gao li gong she chun lan

Plants ca. 12 cm tall. Stem erect, with 2 tubular sheaths at base, 2-leaved. Leaves basal, elliptic, ca. 3.5 × 1.6 cm, base attenuate and clasping, apex obtuse. Rachis ca. 3 cm, densely 7-flowered; floral bracts lanceolate, ca. 4 mm, exceeding ovary. Flowers green; pedicel and ovary cylindrical-fusiform, ca. 4 mm. Dorsal sepal orbicular, ca. 2.5 × 3 mm, glabrous, 3-veined, apex rounded; lateral sepals oblong, oblique, ca. 3 × 1.5 mm,

glabrous, 3-veined, apex obtuse. Petals rhombic-ovate, ca.  $2 \times 1.5$  mm, 1-veined, apex obtuse; lip ligulate, ca.  $2.5 \times 1$  mm, dilated at base, entire; spur cylindrical to ovoid, ca.  $2 \times 1$  mm, slightly hooked toward apex, apex obtuse. Column ca. 1 mm. Fl. Jul–Aug.

• NW Yunnan (Gaoligong Shan).

**40. *Platanthera taiwanensis*** (S. S. Ying) S. C. Chen, S. W. Gale & P. J. Cribb, **comb. nov.**

台湾舌唇兰 tai wan she chun lan

Basionym: *Tulotis taiwanensis* S. S. Ying, Quart. J. Chin. Forest. 8: 144. 1975.

Plants 15–20 cm tall. Rootstock tuberous, ovoid,  $3\text{--}5 \times$  ca. 0.4 cm. Stem erect, slender, with basal sheaths, 2-leaved. Leaves basal, ovate to ovate-oblong,  $5\text{--}7 \times 2\text{--}3$  cm, membranous, base contracted and sheathing, apex acute. Rachis many flowered; floral bracts lanceolate to ovate-lanceolate,  $6\text{--}9 \times 2\text{--}3$  mm, apex acute. Flowers pale green to yellowish green; pedicel and ovary cylindrical, 4–6 mm. Dorsal sepal ovate,  $2\text{--}2.5 \times$  ca. 1.5 mm, glabrous, apex obtuse; lateral sepals ovate,  $1.5\text{--}2 \times$  ca. 1.5 mm, apex obtuse or acute. Petals narrowly ovate,  $2\text{--}3 \times$  ca. 1 mm, glabrous, apex acuminate; lip ligulate,  $4\text{--}6 \times 2\text{--}3$  mm, entire, apex obtuse-rounded; spur  $2\text{--}2.5 \times$  ca. 1 mm.

• Alpine grasslands; 3200–3600 m. C and S Taiwan.

**41. *Platanthera kwangsiensis*** K. Y. Lang, Guihaia 18: 5. 1998.

广西舌唇兰 guang xi she chun lan

Plants 23–28 cm tall. Stem erect or ascending, with tubular sheaths at base, 2-leaved. Leaves cauline, alternate, linear,  $10\text{--}12 \times 1.8\text{--}2$  cm, base contracted and clasping, apex obtuse or acute. Peduncle slender, with 1 or more lanceolate bracts; rachis 4.5–10.5 cm, densely many flowered; floral bracts lanceolate, ca. 15 mm, basal ones exceeding flowers. Flowers yellowish

green; pedicel and ovary fusiform, 7–8 mm. Dorsal sepal erect, forming a hood with petals, ovate-oblong, cymbiform,  $5\text{--}6 \times$  ca. 2 mm, glabrous, 3-veined, apex obtuse; lateral sepals spreading, ovate-oblong, oblique,  $5\text{--}6 \times$  ca. 2 mm, glabrous, 3-veined, apex subobtuse. Petals erect, narrowly ovate, ca.  $5.5 \times 2.2$  mm, 3-veined, apex obtuse; lip deflexed, linear, ca. 5 mm, fleshy, disk densely papillose, entire, apex obtuse; spur clavate, ca.  $3 \times 1.3$  mm, shorter than ovary, apex obtuse. Column stout, ca. 1 mm; staminodes small; anther locules nearly parallel; pollinia obovoid, with short caudicles and elliptic viscidia; rostellum broad; stigma lobes confluent, concave, lying directly below rostellum. Fl. Jul–Aug.

• Alpine grasslands; ca. 2100 m. N Guangxi (Xingan).

**42. *Platanthera peichatieniana*** S. S. Ying, Coloured Ill. Fl. Taiwan 2: 691. 1987 [*“peichatieniana”* and *“peichiatieniana”*].

北插天山舌唇兰 bei cha tian shan she chun lan

Plants 2–4 cm tall. Stem with tubular sheaths at base, 2- or 3-leaved. Leaves ovate-lanceolate to oblong-lanceolate,  $3.5\text{--}4.5 \times 1.5\text{--}2$  cm, base obtuse and clasping, apex acute to acuminate. Peduncle short, slender, with a foliaceous, lanceolate bract; rachis 1.5–2 cm, 2–4-flowered; floral bracts lanceolate to linear-lanceolate,  $4\text{--}8 \times 2\text{--}2.5$  mm, apex acuminate. Flowers pale green to greenish yellow, small; pedicel and ovary fusiform, 4–8 mm. Dorsal sepal erect, forming a hood with petals, ovate to triangular-ovate, strongly concave,  $2.5\text{--}3 \times$  ca. 1.5 mm, glabrous, 3-veined, apex acute; lateral sepals lanceolate,  $5\text{--}6.5 \times 2\text{--}3$  mm, glabrous, apex obtuse. Petals narrowly ovate-lanceolate, slightly oblique, ca.  $5.5 \times 2$  mm, apex acute; lip spreading forward, entire, ligulate, elongate,  $15\text{--}20 \times 2.5\text{--}3.5$  mm, apex obtuse; spur cylindrical, slender,  $7\text{--}9 \times$  ca. 0.5 mm, tapering toward apex, apex obtuse. Column  $2\text{--}2.5 \times$  ca. 1.5 mm.

• *Quercus* forests, *Fagus* forests; 1400–1700 m. N Taiwan (Beicha Shan).

## 32. *DACTYLORHIZA* Necker ex Nevski, Fl. URSS 4: 697, 713. 1935, nom. cons.

掌裂兰属 zhang lie lan shu

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

*Coeloglossum* Hartman; *Dactylorchis* (Klinge) Vermeulen; *Orchis* subg. *Dactylorchis* Klinge; *Satyrium* Linnaeus (1753), not Swartz (1800, nom. cons.).

Herbs, terrestrial, small to large, slender to robust. Tubers palmately lobed, fleshy, neck with several slender roots. Stem usually erect, terete, with tubular sheaths near base and several leaves above, glabrous. Leaves cauline, alternate, green, with purple spots or not spotted, glabrous, base attenuate into clasping sheath. Inflorescence erect, terminal, racemose; rachis densely several to many flowered; floral bracts lanceolate to ovate, foliaceous, often exceeding flowers. Flowers resupinate, secund or not, rose-purple, violet, yellow, greenish yellow, or rarely white, small to medium-sized; ovary twisted, cylindrical-fusiform, glabrous. Sepals free, glabrous; dorsal sepal erect, often concave; lateral sepals spreading or reflexed, rarely connivent. Petals often connivent with dorsal sepal and forming a hood; lip simple, entire or 3- or 4-lobed, spurred at base; spur cylindrical, conic, or saccate, much shorter than to subequal in length to ovary. Column stout; anther erect, base firmly adnate to apex of column, with 2 parallel or divergent locules; pollinia 2, granular-farinaceous, sectile, each attached to a viscidium by a slender caudicle; each viscidium enclosed in a sticky globe, both globes enclosed in a common bursicle formed by folding of rostellar arms; rostellum slightly protruding, with 2 arms; stigma lobes confluent, concave, beneath rostellum; auricles 2, usually prominent, on each side of column. Capsule erect.

About 50 species: mainly in Europe and Russia, extending east to Korea, Japan, and North America, and south to alpine areas of subtropical Asia and N Africa; six species in China.

Owing to the occurrence of both hybridization and polyploidy, specific relationships within *Dactylorhiza* are complex. Accordingly, the taxonomy of the genus is problematic, and nomenclature largely remains open to debate.

Several recent molecular studies have shown *Dactylorhiza* to be monophyletic only when re-circumscribed to include the monospecific genus *Coeloglossum* (Pridgeon et al., *Lindleyana* 12: 89–109. 1997; Bateman et al., *Lindleyana* 12: 113–141. 1997; Pillon et al., *Biol. Conserv.* 129: 4–13. 2006).

From observations of many fresh flowers of this genus in the field, we infer that the bursicle formed by the rostellar arms is solitary but later becomes separate.

*Dactylorhiza salina* (Turczaninow ex Lindley) Soó (Nom. Nov. Gen. *Dactylorhiza*, 4. 1962; *Orchis salina* Turczaninow ex Lindley, Gen. Sp. Orchid. Pl. 259. 1835) has been recorded from China (World Checklist of Monocotyledons, <http://www.kew.org/wcsp/monocots/>). However, no material has been seen by the present authors.

- 1a. Flowers greenish yellow to greenish brown; spur saccate-ovoid, 2–4 mm ..... 6. *D. viridis*
- 1b. Flowers magenta, lilac, purplish rose, pink, or white; spur cylindric or conic, 4.5–15 mm.
  - 2a. Apex of sepals and petals acuminate; spur spreading backward to upcurved ..... 5. *D. aristata*
  - 2b. Apex of sepals and petals obtuse or subacute; spur pendulous.
    - 3a. Leaves uniformly green, lacking purple spots or markings.
      - 4a. Lip ovate to orbicular, broadest below middle ..... 1. *D. hatagirea*
      - 4b. Lip obovate or obcordate, broadest above middle ..... 2. *D. umbrosa*
    - 3b. Leaves green with large purple spots or speckles.
      - 5a. Leaves with small purple spots; lip 5–6 mm, unlobed to obscurely 3-lobed; spur 4.5–6 mm ..... 3. *D. incarnata*
      - 5b. Leaves with large purple blotches; lip 7–9 mm, deeply 3-lobed; spur 6–8 mm ..... 4. *D. fuchsii*

**1. *Dactylorhiza hatagirea*** (D. Don) Soó, Nom. Nov. Gen. *Dactylorhiza*, 4. 1962.

掌裂兰 zhang lie lan

*Orchis hatagirea* D. Don, Prodr. Fl. Nepal. 23. 1825.

Plants slender to robust, 10–40 cm tall. Tubers palmately 3–5-lobed. Stem erect, stout, hollow in robust plants, with 2 or 3 tubular sheaths at base, 3–6-leaved. Leaves erect or spreading, clustered and subopposite near base of stem, widely spaced and alternate above, green, not spotted, oblong to linear-lanceolate, (5–)8–15 × 0.8–3 cm, apex obtuse or acuminate. Rachis 2–15 cm, subdensely several to densely many flowered; floral bracts lanceolate, basal ones to 4 cm, becoming smaller above, exceeding ovary, apex acuminate. Flowers not secund, lilac to purplish rose, medium-sized; ovary and pedicel 8–14 mm. Sepals and petals lilac or purplish rose; dorsal sepal erect, ovate-oblong, concave, 5.5–7(–9) × 3–4 mm, 3-veined, apex obtuse; lateral sepals ovate-lanceolate to ovate-oblong, oblique, 6–8(–9.5) × 4–5 mm, 3–5-veined, apex obtuse. Petals erect, forming a hood with dorsal sepal, ovate-lanceolate, slightly oblique, 5.5–7 × 3–5 mm, 2- or 3-veined, apex obtuse; lip ovate to suborbicular, 6–9 × 6–10 mm, usually slightly broader than long, base spurred, margin entire to shallowly 3-lobed toward apex, margin slightly crenulate, apex or mid-lobe obtuse, disk minutely papillose, purplish red to rose, sometimes whitish toward base with a spoon-shaped patch of dark purple spots or lines; spur pendulous, ± straight to slightly curved forward, cylindric to conic, to 12 mm, equaling to slightly shorter than ovary, apex obtuse. Fl. Jun–Aug.  $2n = 40, 80$ .

Shrubby slopes, grasslands along ravines; 600–4100 m. Gansu, Heilongjiang, Jilin, Nei Mongol, Ningxia, Qinghai, W Sichuan, Xinjiang, E Xizang [Bhutan, Kashmir, Mongolia, Nepal, Pakistan].

This entity has been widely known as *Dactylorhiza latifolia* (Linnaeus) Soó, a name that can no longer be used because its basionym, *Orchis latifolia* Linnaeus, has been rejected outright (see *Vienna Code*, p. 477). In Europe, the name *D. latifolia* has been applied in the sense of what is now generally known as *D. incarnata*. We regard *D. hatagirea* as an Asian species that is taxonomically distinct from *D. incarnata*.

**2. *Dactylorhiza umbrosa*** (Karelin & Kirilov) Nevski, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 4: 332. 1937.

阴生掌裂兰 yin sheng zhang lie lan

*Orchis umbrosa* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 504. 1842; *Dactylorchis umbrosa* (Karelin & Kirilov) Wendelbo; *Dactylorhiza chuhensis* Renz & Taubenheim; *D. incarnata* (Linnaeus) Soó subsp. *turkestanica* (Klinge) H. Sundermann; *D. knorringiana* (Kraenzlin) Ikonnikov; *D. kotschyi* (H. G. Reichenbach) P. F. Hunt & Summerhayes; *D. merovenensis* (Grossheim) Averyanov; *D. persica* (Schlechter) Soó; *D. renzii* Averyanov; *D. sanasunitensis* (H. Fleischmann) Soó; *D. umbrosa* var. *chuhensis* (Renz & Taubenheim) Kreutz; *D. umbrosa* var. *knorringiana* (Kraenzlin) Soó; *D. umbrosa* var. *longibracteata* Renz; *D. umbrosa* var. *ochroleuca* (Bornmüller) Renz; *O. hatagirea* D. Don var. *afghanica* Soó; *O. incarnata* Linnaeus var. *knorringiana* Kraenzlin; *O. incarnata* var. *kotschyi* H. G. Reichenbach; *O. incarnata* f. *ochroleuca* Bornmüller; *O. knorringiana* (Kraenzlin) Czerniak; *O. kotschyi* (H. G. Reichenbach) Schlechter; *O. merovenensis* Grossheim; *O. orientalis* (H. G. Reichenbach) Klinge subsp. *turkestanica* Klinge; *O. persica* Schlechter; *O. sanasunitensis* H. Fleischmann; *O. turkestanica* (Klinge) Klinge ex B. Fedtschenko.

Plants usually robust, 15–45 cm tall. Tubers palmately 3–5-lobed. Stem erect, stout, hollow, with 2 or 3 tubular sheaths at base, 4–8-leaved. Leaves usually congested at base of stem or sometimes widely spaced, green, not spotted, lanceolate to linear-lanceolate, 7–13 × 1–5 cm, apex acuminate. Rachis 3–15 cm, densely many flowered; floral bracts green, sometimes tinged with purplish red, narrowly lanceolate, basal ones exceeding ovary, apex acuminate. Flowers purplish rose, medium-sized; ovary and pedicel 12–15 mm. Sepals and petals purplish rose to pale purple; dorsal sepal erect, oblong, concave, 7–10 × 2.5–3 mm, 3-veined, apex obtuse; lateral sepals reflexed, ovate-lanceolate, oblique, 8–9 × 3–3.5 mm, 3-veined, apex subobtuse. Petals erect, forming a hood with dorsal sepal, narrowly oblong,

oblique, 7–9 × 1.5–2 mm, 2-veined, apex subobtuse; lip obovate to obcordate, (7–)8–10 × (7–)8–11 mm, base spurred, margin entire to shallowly 3-lobed, apex or mid-lobe obtuse-rounded, disk densely minutely papillose, purplish rose to pale purple with a spoon-shaped patch composed of dark purple lines and dots; spur pendulous, slightly curved forward, cylindrical, 12–15 mm, almost as long as ovary, apex obtuse. Fl. May–Jul.

Swampy meadows, riverbanks, damp grasslands in valleys, mountain slopes; 600–4000 m. N Xinjiang [Afghanistan, Kazakhstan, Pakistan, Russia (SW Siberia), Turkmenistan, Uzbekistan; SW Asia].

**3. *Dactylorhiza incarnata*** (Linnaeus) Soó subsp. ***cruenta*** (O. F. Müller) P. D. Sell, *Watsonia* 6: 317. 1967.

紫点掌裂兰 *zi dian zhang lie lan*

*Orchis cruenta* O. F. Müller, Fl. Dan. t. 876. 1782; *Dactylorhiza cruenta* (O. F. Müller) Soó; *O. latifolia* Linnaeus var. *cruenta* (O. F. Müller) Lindley.

Plants slender to robust, 11–30 cm tall. Tubers palmately 3- or 4-lobed. Stem erect, cylindrical, stout, hollow, with 2 or 3 tubular sheaths at base, 3–5-leaved. Leaves widely spaced, green, with fine purple spots on both surfaces, broadly lanceolate, lanceolate, or oblong-lanceolate, 6–11 × 1.5–2.5 cm, apex obtuse-acute. Rachis 3–10 cm, densely many flowered; floral bracts often tinged with pale purple and marked with purplish speckles, lanceolate, basal ones exceeding ovary, apex acuminate. Flowers not secund, purplish rose, medium-sized; ovary and pedicel 9–10 mm. Sepals purplish rose, oblong-ovate, 3-veined, apex obtuse, outer surface marked with a few dark speckles; dorsal sepal erect, concave, 5–6 × 2–2.5 mm; lateral sepals spreading to reflexed, oblique, 5.5–7 × 2–2.5 mm. Petals erect, forming a hood with dorsal sepal, purplish rose, obliquely lanceolate to oblong-ovate, 5–5.5 × ca. 2 mm, 3-veined, apex obtuse; lip broadly rhombic-ovate, 5–6 × 4.5–6 mm, base spurred, margin entire to obscurely 3-lobed near apex, margin slightly crenate, apex obtuse or sometimes apiculate, disk minutely papillose, purplish rose, marked with dark purplish dots and lines; spur pendulous, straight or slightly curved forward, conic to cylindrical-conic, 4.5–6 mm, shorter than ovary, 1.5–2 mm in diam. at base, attenuate toward apex, apex obtuse. Fl. Jun–Jul.

Humid grasslands, along streams, slopes; 1400–2800 m. NW Xinjiang (Fuhai to Zhaosu) [Russia; Europe].

**4. *Dactylorhiza fuchsii*** (Druce) Soó, Nom. Nov. Gen. *Dactylorhiza*, 8. 1962.

紫斑掌裂兰 *zi ban zhang lie lan*

*Orchis fuchsii* Druce, Rep. Bot. Exch. Club Brit. Isles 4: 105. 1915; *Dactylorhiza fuchsii* (Druce) Vermeulen; *D. maculata* (Linnaeus) Soó subsp. *fuchsii* (Druce) Hylander.

Plants often slender, 18–45 cm tall. Tubers palmately 3- or 4-lobed. Stem erect, stout, nearly solid, with 2 or 3 tubular sheaths at base, 5- or 6-leaved. Leaves usually widely spaced, green, with large purple blotches adaxially, narrowly obovate, oblong-obovate, or oblong-lanceolate, 4–12 × 1.5–2.5(–4) cm, apex subobtuse or acuminate. Rachis 3–6(–10) cm, densely

many flowered; floral bracts linear-lanceolate, shorter than flowers, apex acuminate. Flowers pale to deep pink, medium-sized; ovary and pedicel 9–10 mm. Sepals pale to deep pink, lanceolate to broadly lanceolate, apex slightly obtuse; dorsal sepal erect, 6–9 × ca. 2 mm, 3-veined; lateral sepals with dark spots on veins, oblique, 7–8 × ca. 2.5 mm, 3-veined. Petals erect, forming a hood with dorsal sepal, pink, sublanceolate, 6–9 × ca. 2 mm, 3-veined, apex subacute; lip pink with deep purple spots that sometimes form thick stripes along adaxial veins, orbicular-rhombic, 7–8(–9) × 8–10 mm, deeply 3-lobed at or above middle; mid-lobe oblong-ovate to ovate-triangular, 3–4 × 1.5–2.5 mm, apex obtuse or acute; lateral lobes rhombic to broadly triangular, broader than mid-lobe, margin crenate or obtusely toothed; spur pendulous, straight, cylindrical, 6–8 mm, slightly shorter than ovary, 1–1.5 mm in diam., apex obtuse. Fl. Jun–Jul. *2n* = 40.

Forests, grasslands, valleys; 900–2300 m. N Xinjiang (Altay, Fuyun, Habahe) [N Mongolia, Russia; Europe].

**5. *Dactylorhiza aristata*** (Fischer ex Lindley) Soó, Nom. Nov. Gen. *Dactylorhiza*, 5. 1962.

芒尖掌裂兰 *mang jian zhang lie lan*

*Orchis aristata* Fischer ex Lindley, Gen. Sp. Orchid. Pl. 262. 1835; *Dactylorhiza aristata* f. *alba* P. M. Brown; *D. aristata* var. *kodiakensis* Luer & G. M. Luer; *D. aristata* f. *perbracteata* (Lepage) Catling; *D. aristata* f. *rosea* P. M. Brown; *O. aristata* var. *immaculata* Makino; *O. aristata* var. *maculata* Makino; *O. aristata* var. *perbracteata* Lepage; *O. beeringiana* (Chamisso) Kudô; *O. latifolia* Linnaeus var. *beeringiana* Chamisso.

Plants robust, 10–35 cm tall. Tuber palmately 3- or 4-lobed. Stem erect, stout, with 2 or 3 tubular sheaths at base, 3–6-leaved. Leaves usually congested at base of stem, uniformly green or occasionally with small purple spots or speckles adaxially, ovate-elliptic to oblong-elliptic, 5–15 × 0.8–4 cm, apex obtuse to acute. Rachis 3–13 cm, densely many flowered; floral bracts lanceolate, basal ones exceeding flowers, apex acuminate. Flowers white, pink, or magenta, medium-sized; ovary and pedicel 4–8 mm. Sepals white, pink, or magenta, ovate to ovate-lanceolate, apex long acuminate; dorsal sepal erect, 9–12 × 3–5 mm; lateral sepals erect or spreading forward, concave, oblique, 8–11 × 3–5 mm. Petals erect, forming a hood with dorsal sepal, white, pink, or magenta, narrowly ovate-lanceolate, 6–8 × 2–3.5 mm, apex acuminate; lip white, pink, or magenta with deep purple spots usually forming 2 distinct arcs, suborbicular to obcordate, 8–12 × 8–12 mm, 3-lobed near apex; mid-lobe narrowly deltoid, 2.2–3.5 × 1–1.8 mm, apex acuminate; lateral lobes ovate, much broader than mid-lobe, apex rounded-obtuse; spur spreading backward to upcurved, cylindrical, 6–9 mm, subequal in length to or slightly exceeding ovary, ca. 1.8 mm in diam., apex obtuse. Fl. Jun–Aug.

Grasslands. Hebei, Henan, Shandong, Shanxi [Japan, Korea, Russia (Far East); North America (Alaska)].

The present authors have seen no Chinese specimens of this species. The Chinese distribution is based on H. P. Wood (*Orchid Digest* 73: 52–55. 2009).



**6. *Dactylorhiza viridis*** (Linnaeus) R. M. Bateman, Pridgeon & M. W. Chase, *Lindleyana* 12: 129. 1997.

凹舌掌裂兰 ao she zhang lie lan

*Satyrium viride* Linnaeus, Sp. Pl. 2: 944. 1753; *Coeloglossum bracteatum* (Muhlenberg ex Willdenow) Parlatores; *C. nankotaizanense* (Masamune) S. S. Ying; *C. taiwanianum* S. S. Ying; *C. viride* (Linnaeus) Hartman; *C. viride* var. *bracteatum* (Muhlenberg ex Willdenow) A. Gray; *Gymnadenia viridis* (Linnaeus) Richard; *Habenaria viridis* (Linnaeus) R. Brown; *H. viridis* var. *bracteata* (Muhlenberg ex Willdenow) A. Gray; *Herminium nankotaizanense* Masamune; *Orchis bracteata* Muhlenberg ex Willdenow; *Peristylus bracteatus* Lindley; *P. viridis* (Linnaeus) Lindley; *Platanthera nankotaizanensis* (Masamune) Masamune; *P. viridis* (Linnaeus) Lindley.

Plants slender to robust, 14–45 cm tall. Tuber palmately 2- or 3-lobed. Stem erect, with 2 or 3 tubular sheaths at base, 3–5-leaved. Leaves usually widely spaced and alternate, green, not spotted, narrowly obovate-oblong or elliptic to elliptic-lanceolate, 5–12 × 1.5–5 cm, apex obtuse or acute, uppermost leaf

often smaller and bractlike. Rachis 3–15 cm, ± laxly to densely many flowered; floral bracts linear to narrowly lanceolate, 2–3 cm, lower ones exceeding flowers. Flowers greenish yellow to greenish brown, small; ovary and pedicel ca. 10 mm. Dorsal sepal erect, concave, ovate-elliptic, 4.2–8 × 2.5–3.5 mm, 3-veined, apex obtuse; lateral sepals oblique, ovate-elliptic, slightly longer than dorsal sepal, 4 or 5-veined, apex obtuse. Petals straight, forming a hood with dorsal sepal, linear-lanceolate, 5–6 × 1–1.2 mm, 1-veined; lip deflexed, oblong-lanceolate, 5–9 × 3–4 mm, fleshy, disk with a short, central, longitudinal keel, 3-toothed toward apex; lateral teeth 1.5–2 mm; mid-tooth smaller, less than 1 mm; spur saccate-ovoid, 2–4 mm. Fl. Jun–Aug.  $2n = 40, 41, 42$ .

Forests, thickets, alpine grasslands; 1200–4300 m. Gansu, Hebei, Heilongjiang, Henan, Hubei, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Taiwan, Xinjiang, NE Xizang, NW Yunnan [Bhutan, Japan, Kashmir, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Nepal, Russia, Turkmenistan; SW Asia, Europe, North America].

The extensive extra-Chinese synonymy is not cited here.

### 33. SMITHORCHIS Tang & F. T. Wang, *Bull. Fan Mem. Inst. Biol. Bot.* 7: 139. 1936.

反唇兰属 fan chun lan shu

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

Herbs, terrestrial, small. Rhizome creeping, slender, fleshy, neck with several slender roots. Stem erect, glabrous, 2–4-leaved. Leaves cauline, narrowly lanceolate. Inflorescence a terminal raceme, up to 10-flowered. Flowers not resupinate, small; ovary twisted, fusiform. Sepals free, similar, subequal in size. Petals smaller than sepals; lip slipper-shaped, entire, base saccate-spurred. Column short, with 2 lateral appendages; anther sessile, hooded, erect, with 2 nearly parallel and contiguous locules; rostellum and stigma combined into a solitary orbicular structure at posterior margin of anther; pollinia 2, granular-farinaceous, sectile, attached via very short caudicles to orbicular viscidia.

• One species: China.

This monospecific genus is distinguished from its closest allies *Herminium* and *Diphylax* by its long creeping rhizome, non-resupinate flowers, and undifferentiated rostellum.

**1. *Smithorchis calceoliformis*** (W. W. Smith) Tang & F. T. Wang, *Bull. Fan Mem. Inst. Biol. Bot.* 7: 140. 1936.

反唇兰 fan chun lan

*Herminium calceoliforme* W. W. Smith, *Notes Roy. Bot. Gard. Edinburgh* 13: 211. 1921.

Plants 5–10 cm tall. Stem with 2 or 3 tubular sheaths at base. Leaves spreading, narrowly lanceolate, ca. 20 × 4 mm, base contracted into an amplexicaul sheath, apex acute or acu-

minate. Inflorescence 7-flowered; rachis ca. 1.5 cm; floral bracts lanceolate, slightly longer than ovary, margin denticulate. Flowers fragrant, deep yellow; ovary and pedicel ca. 3 mm. Sepals similar, membranous, 1-veined; dorsal sepal obovate, ca. 1 × 0.7 mm, apex obtuse; lateral sepals spreading, oblong-ovate, oblique, ca. 1.5 × 1 mm, apex subacute. Petals spreading, rhombic-ovate, smaller than sepals, slightly fleshy, 1-veined, apex obtuse; lip ca. 1.5 mm, fleshy, much thicker than sepals, saccate-spurred at base; rostellum and stigma undifferentiated.

• Open alpine grasslands; 3200–4000 m. NW Yunnan.

### 34. DIPHYLAX J. D. Hooker, *Hooker's Icon. Pl.* 19: ad t. 1865. 1889.

尖药兰属 jian yao lan shu

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

Herbs, terrestrial, small. Tubers ovoid to cylindrical, fleshy. Stem erect, terete, short, glabrous, with 1 to several basal sheaths and 1–3 subradical leaves. Leaves lanceolate to elliptic, adaxially often with yellow or white reticulate veins, basally contracted into a petiole-like amplexicaul sheath. Inflorescence with 1 to several foliaceous sterile bracts, and with several to more than 20 second flowers in a terminal raceme; floral bracts ovate to lanceolate. Flowers resupinate, small to medium-sized; ovary twisted, shortly pedicellate. Sepals and petals similar; sepals not widely spreading, narrowly ovate to lanceolate, subequal in size. Petals linear-

oblong to lanceolate; lip usually decurved, linear-lanceolate or linear-ligulate, nearly as long as sepals, base concave, spurred, margin entire, lateral margins involute, apex acuminate; spur pendulous, urn-shaped, ellipsoid, or conic, shorter than ovary, contracted at neck. Column very short with 2 elongate lateral appendages; anther erect, 2-locular, locules contiguous, parallel; connective distinct; rostellum small to elongate; pollinia 2, clavate, granular-farinaceous, sectile, each attached by short caudicle to naked viscidia; stigma entire, large, raised. Capsule ovoid.

Three species: SW China to the Himalayas; three species (two endemic) in China.

- 1a. Leaf oblong to oblong-lanceolate; sepals to 5 mm; lip ca. 4.5 mm; spur urn-shaped; staminodes linear, elongate, extending as far as or beyond apex of anther locules ..... 1. *D. urceolata*  
 1b. Leaves spatulate, ovate, or elliptic; sepals ca. 7 mm or more; lip ca. 8 mm; spur ellipsoid or ellipsoid-cylindric; staminodes oblong, ovate, or obovate, relatively short, terminating below apex of anther locules.  
 2a. Leaves usually 2 or 3, spatulate or lorate-spatulate, 7–13 cm; floral bracts lanceolate, longer than ovary; connective oblong at apex, clearly protruding from anther apex; lateral appendages oblong ..... 2. *D. contigua*  
 2b. Leaf usually solitary, elliptic to ovate, 3–6 cm; floral bracts shorter than ovary; connective slightly convex at apex of anther; lateral appendages ovate to obovate ..... 3. *D. uniformis*

**1. *Diphylax urceolata*** (C. B. Clarke) J. D. Hooker, Hooker's Icon. Pl. 19: ad t. 1865. 1889.

尖药兰 jian yao lan

*Habenaria urceolata* C. B. Clarke, J. Linn. Soc., Bot. 25: 73. 1889.

Plants 8–10 cm tall. Stem often slightly curved, slender, with 1 or 2 tubular sheaths at base and 1 large leaf above. Leaf oblong to oblong-lanceolate, 3–3.5 × 1–1.2 cm, adaxially with white venation, apex acute. Inflorescence with several to 12 secund flowers; foliaceous sterile bracts 1 or 2, lanceolate, 0.8–1 × 0.1–0.4 cm, apex acute; rachis 2.5–3 cm; floral bracts ovate or lanceolate, ca. as long as ovary. Flowers white, greenish white, or pink, small; ovary fusiform, 4–5 mm including pedicel. Sepals lanceolate, ca. 5 × 1.5 mm, 1-veined, apex acute. Petals connivent with dorsal sepal and forming a hood, linear-oblong, ca. 4.5 × 1.5 mm, 1-veined, apex obtuse; lip decurved, linear-lanceolate, ca. 4.5 mm, lateral margins above middle to apex involute and forming a tube, concave at base, apex acuminate; spur urn-shaped, 2.5–3 mm, shorter than ovary. Column 1–2 mm; apex of connective lanceolate, protruding from anther; rostellum very small; lateral appendages linear, extending as far as or beyond apex of anther locules. Fl. Aug–Oct.

Forests; 1900–3800 m. W Sichuan, NW Yunnan [Bhutan, NE India, N Myanmar, Nepal].

**2. *Diphylax contigua*** (Tang & F. T. Wang) Tang, F. T. Wang & K. Y. Lang, Vasc. Pl. Hengduan Mts. 2: 2526. 1994.

长苞尖药兰 chang bao jian yao lan

*Platanthera contigua* Tang & F. T. Wang, Bull. Fan Mem. Inst. Biol. Bot. 10: 28. 1940.

Plants 20–24 cm tall. Stem sometimes slightly curved, ca. 2 mm in diam., with up to 5 tubular sheaths at base and (1 or) 2 or 3 leaves above. Leaves spatulate to lorate-spatulate, 7–13 × 1.2–2.2 cm, apex acute. Inflorescence with more than 10 often secund flowers; foliaceous sterile bracts 2 or 3, lanceolate, 1.5–5 × 0.4–0.7 cm, apex acuminate; rachis to 5.5 cm; floral bracts lanceolate, longer than ovary, apex acuminate. Flowers greenish white, medium-sized; ovary fusiform, 8–10 mm including pedicel, glabrous. Sepals lanceolate, 1-veined, apex acuminate; dor-

sal sepal ca. 8 × 2.5 mm; lateral sepals slightly oblique, ca. 8.5 × 2.8 mm. Petals ± connivent with dorsal sepal and forming a hood, obliquely lanceolate, ca. 7.5 × 2 mm, 1-veined, apex subacute; lip slightly decurved, linear-oblong, ca. 8 × 2 mm, fleshy, lateral margins above middle to apex involute and forming a tube, slightly dilated at base, apex subacute; disk pubescent on central veins; spur ellipsoid, ca. 5 × 2.5 mm, inner surface densely pubescent, apex obtuse. Column ca. 3 mm; anther ca. 2 mm; apex of connective oblong, protruding from anther; rostellum very small; lateral appendages oblong, short, terminating below apex of anther locules. Fl. Sep.

• Bamboo forests; ca. 3200 m. NW Yunnan.

**3. *Diphylax uniformis*** (Tang & F. T. Wang) Tang, F. T. Wang & K. Y. Lang, Bot. Res. Acad. Sin. 4: 11. 1989.

西南尖药兰 xi nan jian yao lan

*Platanthera uniformis* Tang & F. T. Wang, Bull. Fan Mem. Inst. Biol. Bot. 10: 31. 1940; *P. opsimantha* Tang & F. T. Wang.

Plants 10–18.5 cm tall. Stem with 1 or 2 tubular sheaths at base and 1(or 2) leaves above. Leaf elliptic to ovate, 3–6 × 1.5–3 cm, apex acute. Inflorescence with several to more than 20 secund flowers; foliaceous sterile bracts 4, lanceolate, 0.7–1.5 × 0.3–0.6 cm, apex acute; rachis 3–7 cm; floral bracts lanceolate, shorter than ovary, apex acuminate. Flowers white, medium-sized; ovary fusiform, ca. 7 mm including pedicel, glabrous. Dorsal sepal linear-lanceolate, ca. 8 × 2 mm, 1-veined, base concave, apex obtuse; lateral sepals linear-lanceolate, slightly falcate, ca. 7 × 1.5 mm, 1-veined, apex obtuse. Petals firmly adnate to sepals, nearly as long as lateral sepals, 1-veined, apex obtuse; lip slightly decurved, linear-oblong, ca. 8 × 1.5 mm, slightly dilated at base, lateral margins above middle to apex involute and forming a tube, apex obtuse; spur ellipsoid-cylindric, ca. 4.5 × 2.5 mm, apex obtuse. Column ca. 2 mm; anther ca. 1 mm; apex of connective slightly convex at anther apex; rostellum very small; lateral appendages ovate to obovate, terminating at or slightly below apex of anther locules. Fl. Aug–Sep.

• Rocky slopes, mossy outcrops in dense forests; 1800–3200 m. Guizhou (Fanjing Shan), Sichuan (Min Jiang), NW Yunnan.

**35. HERMINIUM** Linnaeus, Opera Var. 251. 1758.角盘兰属 *jiao pan lan shu*

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

*Aopla* Lindley; *Monorchis* Séguier.

Herbs, terrestrial, slender. Tubers globose to oblong-ellipsoid, undivided, fleshy, neck with several slender roots. Stem erect, with tubular sheaths at base, 1- to several leaved, glabrous. Leaves basal, green, elliptic to lanceolate, base contracted into amplexicaul sheath. Inflorescence erect, terminal, racemose, glabrous; peduncle often with 1 or more foliaceous sterile bracts; rachis laxly to densely many flowered; floral bracts lanceolate. Flowers erect, horizontal, or nodding, small, often spidery, resupinate or rarely not, usually yellowish green; ovary and pedicel straight, arcuate or sometimes distinctly hooked toward apex, twisted or rarely not, cylindric-fusiform, glabrous. Sepals subequal; dorsal sepal free or loosely connivent with petals and forming a hood; lateral sepals spreading. Petals smaller and narrower than sepals, usually thickened and fleshy; lip adnate to base of column, base shallowly concave or shortly spurred, margin entire, 3- or rarely 5-lobed. Column very short; anther adnate to apex of column, 2-locular, locules parallel; pollinia 2, oblong to ellipsoid, granular-farinaceous, sectile, each attached to a viscidium via a short caudicle; viscidia often involute and hornlike, naked; rostellum small, 3-lobed; stigma lobes 2, raised, clavate; auricles 2, usually prominent, placed laterally at base of anther. Capsule usually erect, oblong.

About 25 species: Europe, parts of SW and C Asia, extending to E and SE Asia and the Himalayas; 18 species (ten endemic) in China.

*Herminium kamengense* A. N. Rao (J. Econ. Taxon. Bot. 25: 287. 2001) was described from the region of the border of NE India and SE Xizang.

- 1a. Lip entire.
- 2a. Plants 1-leaved.
- 3a. Floral bracts exceeding flowers; petals forming a hood to weakly spreading, linear-oblong, ca. 2.8 × 0.5 mm; lip spurless ..... 13. *H. angustilabre*
- 3b. Floral bracts much shorter than to slightly exceeding ovary; petals erect, ovate, ca. 1.8 × 1–1.5 mm; lip shortly spurred; spur cylindric-obovoid, ca. 1.5 × 0.75 mm ..... 16. *H. singulum*
- 2b. Plants 2-leaved.
- 4a. Flowers not secund; lip spurless, base dilated and shallowly concave.
- 5a. Peduncle with several triangular-lanceolate sterile bracts, lower one often foliaceous; flowers white ..... 14. *H. tangianum*
- 5b. Peduncle ebracteate; flowers green to yellowish green ..... 15. *H. josephii*
- 4b. Flowers usually secund; lip shortly spurred; spur conic, 0.7–0.8 mm.
- 6a. Leaves uniformly green; lip ovate-lanceolate, ca. 2 × 1 mm ..... 17. *H. carnosilabre*
- 6b. Leaves green with white reticulate markings; lip orbicular-ovate, ca. 1.5 × 1.2 mm ..... 18. *H. orbiculare*
- 1b. Lip 3- or 5-lobed (though sometimes only obscurely so).
- 7a. Plants 1-leaved.
- 8a. Flowers not resupinate; ovary not twisted ..... 1. *H. glossophyllum*
- 8b. Flowers resupinate; ovary twisted.
- 9a. Peduncle ebracteate or with 1 sterile bract; ovary distinctly hooked toward apex; dorsal sepal 3.5–5 mm; lip furcately 3-lobed below middle, 6–7 mm ..... 2. *H. ophioglossoides*
- 9b. Peduncle with 2–7 sterile bracts; ovary straight; dorsal sepal 1.5–2 mm; lip apex 3-toothed to shallowly 3-lobed, 1.8–2.5 mm.
- 10a. Rachis sublaxly several to subdensely many flowered; lip 0.8–1 mm wide; lateral lobes triangular-falcate ..... 3. *H. coiloglossum*
- 10b. Rachis densely many flowered; lip ca. 1.8 mm wide; lateral lobes triangular ..... 4. *H. yunnanense*
- 7b. Plants 2–4-leaved (though *H. chloranthum* rarely 1-leaved).
- 11a. Peduncle narrowly winged; lip 5-lobed ..... 5. *H. quinquelobum*
- 11b. Peduncle cylindric; lip 3-lobed (though sometimes only obscurely so).
- 12a. Lip obscurely to shallowly 3-lobed; lateral lobes of lip ovate-triangular to triangular.
- 13a. Dorsal sepal ca. 3.2 mm; petals rhombic to narrowly elliptic, ca. 4 × 1.8 mm; lip ca. 3.2 × 2.8 mm ..... 6. *H. chloranthum*
- 13b. Dorsal sepal 0.8–1.5 mm; petals ovate or ovate-lanceolate, 1.2–2 × 0.8–1.2 mm; lip 1.8–2.2 × 0.8–1.2 mm.
- 14a. Leaves basal, clustered, 3–10 cm; peduncle ebracteate or sometimes with 1 sterile bract; flowers yellowish green; lip shortly saccate-spurred ..... 7. *H. macrophyllum*
- 14b. Leaves cauline, widely spaced, alternate, 10–12 cm; peduncle with 1–4 sterile bracts; flowers white; lip spurless ..... 8. *H. ecalcaratum*

- 12b. Lip furcately 3-lobed; lateral lobes of lip linear, linear-triangular, or linear-falcate.  
 15a. Petals rhombic; mid-lobe of lip 1.5–3.2 mm, longer than lateral lobes ..... 9. *H. monorchis*  
 15b. Petals ovate-lanceolate or linear; mid-lobe of lip 0.5–1.5 mm, shorter than lateral lobes.  
 16a. Petals ovate-lanceolate, abruptly narrowed above middle, apex cuspidate;  
 lip shortly spurred ..... 10. *H. alaschanicum*  
 16b. Petals linear, apex obtuse to subacute; lip spurless.  
 17a. Lip 4–10 mm; lateral lobes 2–7 mm ..... 11. *H. lanceum*  
 17b. Lip 3.2–4.5 mm; lateral lobes 1–2 mm ..... 12. *H. souliei*

**1. *Herminium glossophyllum*** Tang & F. T. Wang, Bull. Fan Mem. Inst. Biol. Bot. 7: 127. 1936.

雅致角盘兰 ya zhi jiao pan lan

*Herminium ophioglossoides* Schlechter var. *minus* Handel-Mazzetti.

Plants 8–12 cm tall. Tubers oblong-ellipsoid, 10–15 × 5–8 mm. Stem with 1 or 2 tubular sheaths at base, 1-leaved. Leaf basal, arising from within basal sheaths, oblong-elliptic or oblong-ovate, 2.5–5 × 0.7–1.6 cm, apex subacute. Inflorescence 7–10 cm; peduncle cylindrical, ebracteate; rachis 2–4 cm, laxly to subdensely many flowered; floral bracts lanceolate to ovate-lanceolate, ca. 3 mm, shorter than ovary, apex acuminate. Flowers not resupinate, nodding, yellowish green; ovary distinctly hooked toward apex, not twisted, 3.5–5 mm including pedicel. Dorsal sepal erect, oblong-ovate, 2.5–3.5 × 1–1.6 mm, 1-veined, apex obtuse; lateral sepals spreading, oblong-elliptic, oblique, 3–4 × 1.2–1.8 mm, 1-veined, apex acute. Petals spreading, narrowly ovate-lanceolate, oblique-falcate, 3.5–5 × 0.8–1 mm, somewhat fleshy, 1-veined, apex acute; lip spreading, oblong-ovate, 3-lobed above middle, 3–3.5 × 2–2.2 mm, base dilated and concave, somewhat fleshy; lateral lobes linear, ca. 0.8 mm; mid-lobe narrowly triangular-lanceolate, 1–1.2 mm, slightly broader than lateral lobes, apex acute. Column ca. 1 mm; pollinia globose; viscidia involute, hornlike. Fl. Jun–Aug.

- Grassy slopes; 3100–3600 m. SW Sichuan, NW Yunnan.

**2. *Herminium ophioglossoides*** Schlechter, Notes Roy. Bot. Gard. Edinburgh 5: 96. 1912.

长瓣角盘兰 chang ban jiao pan lan

*Monorchis ophioglossoides* (Schlechter) O. Schwarz.

Plants 6–26 cm tall. Tubers ellipsoid or ovoid, 10–20 × 5–12 mm. Stem with 2 or 3 tubular sheaths at base, 1-leaved. Leaf basal, arising from within basal sheaths, elliptic-ligulate, 2–9 × 0.5–2.5 cm, apex acute or obtuse. Inflorescence 5–20 cm; peduncle cylindrical, ebracteate or with 1 occasionally foliaceous sterile bract 0.5–3 cm; rachis 1–12.5 cm, laxly to subdensely many flowered; floral bracts lanceolate, 2.5–5 mm, much shorter than to almost as long as ovary, apex acuminate. Flowers nodding, yellowish green; ovary distinctly hooked toward apex, 4–7 mm including pedicel. Dorsal sepal erect, suberect, oblong-lanceolate, 3.5–5 × ca. 2 mm, 1-veined, apex obtuse; lateral sepals oblong-lanceolate, 3.5–5 × ca. 2 mm, 1-veined, apex obtuse. Petals narrowly ovate, 5–7 × 0.6–1.4 mm, somewhat fleshy, 2-veined, apex obtuse; lip decurved or spreading, oblong-ovate, 6–7 × 1.5–2.4 mm, base concave, furcately 3-lobed below middle; lateral lobes linear, 3–4 mm; mid-lobe

linear, 4–5 mm, slightly broader than lateral lobes, apex acute. Column ca. 1 mm; pollinia globose; viscidia involute, hornlike. Fl. Jun–Jul.

- Grassy slopes; 2100–3500 m. SW and W Sichuan, C and NW Yunnan.

**3. *Herminium coiloglossum*** Schlechter, Repert. Spec. Nov. Regni Veg. 3: 15. 1906.

条叶角盘兰 tiao ye jiao pan lan

*Monorchis coiloglossa* (Schlechter) O. Schwarz.

Plants 8–30 cm tall. Tubers ovoid to ovoid-oblong, 5–20 × 3–10 mm. Stem with 2 tubular sheaths at base, 1-leaved. Leaf basal, arising from within basal sheaths, linear to linear-oblong, 4–12 × 0.4–0.8 cm, apex acute. Inflorescence 7–27 cm; peduncle cylindrical, with 2–7 lanceolate sterile bracts 0.2–0.8 cm; rachis 2–11 cm, ± laxly several to subdensely many flowered; floral bracts ovate, 1.5–3 mm, much shorter than ovary, apex acute to acuminate. Flowers erect, yellowish green; ovary straight, 3–5 mm including pedicel. Dorsal sepal erect, ovate, concave, ca. 1.5 × 1–1.2 mm, 1-veined, apex obtuse; lateral sepals spreading, oblong-ovate, slightly oblique, 1.8–2 × 1–1.2 mm, 1-veined, apex obtuse. Petals forming a loose hood with dorsal sepal to spreading, oblong, slightly oblique, concave, ca. 1.2 × 0.8 mm, 1-veined, apex obtuse; lip horizontal to slightly pendulous, oblong, 1.8–2.4 × 0.8–1 mm, concave, contracted at middle, somewhat fleshy, base shallowly concave, apex shallowly 3-lobed; lateral lobes triangular-falcate, to ca. 0.3 mm, apex subacute; mid-lobe triangular, ca. 0.3 mm, slightly wider than lateral lobes, apex acute. Column ca. 1 mm; pollinia globose; viscidia ovoid. Fl. Aug–Sep.

- Forests, grassy slopes; 1600–2800 m. C, S, and W Yunnan.

**4. *Herminium yunnanense*** Rolfe, Notes Roy. Bot. Gard. Edinburgh 8: 24. 1913.

云南角盘兰 yun nan jiao pan lan

*Monorchis yunnanensis* (Rolfe) O. Schwarz.

Plants 15–26 cm tall. Tubers ovoid to ovoid-oblong, 5–15 × 5–10 mm. Stem with 2 tubular sheaths at base, 1-leaved. Leaf basal, linear to linear-oblong, 4.5–13 × 0.4–1 cm, apex acute. Inflorescence 12–22 cm; peduncle cylindrical, with a few ovate-lanceolate sterile bracts; rachis 4–6.5 cm, densely many flowered; floral bracts ovate, 3–4 mm, shorter than ovary, apex acuminate. Flowers erect, yellowish green; ovary straight, ca. 5 mm including pedicel. Dorsal sepal suberect, ovate, concave, ca. 2 × 1.2 mm, 1-veined, apex obtuse; lateral sepals spreading, subovate, ca. 2.5 × 1.2–1.5 mm, 1-veined, apex obtuse. Petals forming a loose hood with dorsal sepal, ovate, ca. 1.5 × 1.2

mm, 1-veined, apex subacute; lip horizontal to slightly pendulous, oblong, 2.2–2.5 × ca. 1.8 mm, somewhat fleshy, base concave, apex 3-toothed to shallowly 3-lobed; lateral lobes triangular, small, apex acute; mid-lobe triangular, broader than lateral lobes, apex acute. Column ca. 1 mm; pollinia globose; viscidia ovoid; rostellum clavate-oblong, 2-lobed. Fl. Aug–Sep.

- Grassy slopes; 2200–3300 m. C and W Yunnan.

This species seems very close to Schlechter's *Herminium coiloglossum*. More material on which to base a critical comparison is needed.

**5. *Herminium quinquelobum*** King & Pantling, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 65: 130. 1896.

秀丽角盘兰 xiu li jiao pan lan

*Monorchis quinqueloba* (King & Pantling) O. Schwarz.

Plants 25–29 cm tall. Tubers oblong to subglobose, 15–20 × 5–15 mm. Stem with 2 tubular sheaths at base, 2-leaved. Leaves basal, subopposite, arising from within basal sheaths, linear-lanceolate to linear-oblong, 13–18 × 1.5–2 cm, apex acute or acuminate. Inflorescence 13–20 cm; peduncle narrowly winged, with 1 linear-lanceolate sterile bract to 7 cm; rachis ca. 13 cm, subdensely many flowered; floral bracts lanceolate, 3–8 mm, exceeding ovary, apex acuminate. Flowers erect or horizontal, green; ovary straight, 2–4 mm including pedicel. Dorsal sepal erect, oblong to oblong-elliptic, 1.8–2 × 0.5–0.8 mm, 1-veined, apex obtuse; lateral sepals spreading, oblong, 1.8–2 × 0.8–1 mm, 1-veined, apex subacute. Petals spreading, linear, 1.6–1.8 × ca. 0.3 mm, 1-veined, apex acute or acuminate; lip pendulous, oblong, 5-lobed, ca. 2.2 × 0.6 mm, usually slightly longer than sepals, base shallowly concave; basal lobes triangular, small; lateral lobes triangular, small, apex obtuse; mid-lobe triangular-lanceolate, ca. 0.6 mm, apex acuminate. Column ca. 0.5 mm; anther ca. 0.3 mm; pollinia obovoid; viscidia small, disklike; auricles oblong. Fl. Aug–Sep.  $2n = 38$ .

Evergreen broad-leaved forests; ca. 2200 m. NW Yunnan [Bhutan, India, Nepal].

**6. *Herminium chloranthum*** Tang & F. T. Wang, Bull. Fan Mem. Inst. Biol. Bot. 10: 34. 1940.

矮角盘兰 ai jiao pan lan

Plants 4–15 cm tall. Tubers ellipsoid to subglobose, 7–20 × 4–12 mm. Stem with 2 or 3 tubular sheaths at base, usually (1 or)2(or 3)-leaved. Leaves basal, subopposite, arising from within basal sheaths, oblong, elliptic, or spatulate, 3–7 × 0.4–2 cm, apex obtuse or acute. Inflorescence 3.5–13 cm; peduncle cylindrical, ebracteate; rachis 1–6 cm, laxly few to subdensely many flowered; floral bracts ovate, smaller than ovary, apex obtuse. Flowers nodding, pale green; ovary distinctly hooked toward apex, 3–5 mm including pedicel. Dorsal sepal erect, broadly ovate, concave, ca. 3.2 × 2.5 mm, 3-veined, apex obtuse; lateral sepals spreading, elliptic, oblique, ca. 3 × 1.2 mm, 1- or 2-veined, apex obtuse. Petals spreading, narrowly rhombic to narrowly elliptic, ca. 4 × 1.8 mm, somewhat fleshy, 2-veined, apex obtuse; lip spreading, pandurate, ca. 3.2 × 2.8 mm, somewhat fleshy, base attenuate and shallowly concave, shallowly 3-lobed above middle; lateral lobes triangular, small, apex obtuse; mid-

lobe triangular, slightly longer than lateral lobes. Column short; pollinia globose; viscidia involute, hornlike. Fl. Jul–Aug.

- Alpine grasslands; 2500–4100 m. W Sichuan, S and SE Xizang, NW Yunnan.

**7. *Herminium macrophyllum*** (D. Don) Dandy, J. Bot. 70: 328. 1932.

耳片角盘兰 er pian jiao pan lan

*Neottia macrophylla* D. Don, Prodr. Fl. Nepal. 27. 1825; *Herminium congestum* Lindley; *Spiranthes macrophylla* (D. Don) Sprengel.

Plants 6–22 cm tall. Tubers ovoid or ellipsoid, 6–15 × 5–10 mm. Stem with 2 or 3 tubular sheaths at base, 2- or 3-leaved. Leaves basal, clustered, arising from within basal sheaths, narrowly oblong-elliptic to oblanceolate, 3–10 × 0.6–2 cm, apex subacute to obtuse. Inflorescence 5–19 cm; peduncle cylindrical, ebracteate or sometimes with 1 foliaceous sterile bract; rachis 1.5–8 cm, subdensely several to many flowered; floral bracts ovate-lanceolate, 1–3 mm, much shorter than ovary, apex acute to acuminate. Flowers horizontal or nodding, yellowish green; ovary distinctly hooked toward apex, 3–6 mm including pedicel. Dorsal sepal erect, ovate, 0.8–1.5 × 0.8–1 mm, 1-veined, apex obtuse; lateral sepals spreading, oblong-lanceolate, 1.5–2 × 0.5–1 mm, 1-veined, apex acute to acuminate. Petals spreading, ovate-lanceolate, oblique, 1.2–2 × 0.8–1.2 mm, somewhat fleshy, 1-veined, apex acuminate; lip slightly decurved, ovate-lanceolate, 1.8–2.2 × 0.8–1 mm, fleshy, shortly saccate-spurred, base dilated and concave, gradually attenuate, obscurely 3-lobed; disk slightly warty; lateral lobes obscure, ovate-triangular, margin crenulate, apex obtuse; mid-lobe ovate-triangular, ca. 0.5 mm, apex acute or obtuse; spur globose, ca. 0.5 mm. Column ca. 1 mm; pollinia subglobose; viscidia involute, hornlike. Fl. Jun–Aug.  $2n = 40$ .

Alpine *Quercus-Abies* mixed forests, open places in forests, scrub, grassy slopes; 2400–4100 m. S Xizang [Bhutan, India, Kashmir, Nepal, Pakistan].

**8. *Herminium ecalcaratum*** (Finet) Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 4: 101. 1919.

无距角盘兰 wu ju jiao pan lan

*Peristylus ecalcaratus* Finet, Rev. Gén. Bot. 13: 520. 1901; *Monorchis ecalcarata* (Finet) O. Schwarz.

Plants 10–20 cm tall. Tubers oblong-ovoid, 10–15 × ca. 5 mm. Stem with 2 tubular sheaths at base, 2-leaved. Leaves cauline, widely spaced, alternate, oblong, 10–12 × 0.8–1 cm, apex obtuse. Inflorescence 7–14 cm; peduncle cylindrical, with 1–4 ovate-lanceolate sterile bracts 0.2–0.4 cm; rachis 3–8 cm, densely many flowered; floral bracts ovate-lanceolate to lanceolate, ca. 2 mm, shorter than ovary, apex acuminate or acute. Flowers erect or horizontal, white; ovary straight to slightly arcuate, 3–4 mm including pedicel. Dorsal sepal erect, ovate, concave, ca. 1.5 × 1.2 mm, 1-veined, apex obtuse; lateral sepals spreading, ovate, slightly oblique, ca. 1.6 × 1 mm, 1-veined, apex obtuse to subacute. Petals forming a hood to spreading, ovate, slightly oblique, ca. 1.5 × 0.8 mm, 1-veined, apex obtuse; lip obovate, 1.8–2.2 × ca. 1.2 mm, base shallowly concave, apex

shallowly 3-lobed; lateral lobes incurved to erect, subtriangular, small, apex obtuse; mid-lobe spreading, broadly ovate, slightly longer and wider than lateral lobes. Column ca. 0.8 mm; anther ca. 0.6 mm; pollinia globose; viscidia elliptic. Fl. Sep.

- Alpine grasslands; 2500–3200 m. W Sichuan, NW Yunnan.

**9. *Herminium monorchis*** (Linnaeus) R. Brown in W. T. Aiton, Hortus Kew., ed. 2, 5: 191. 1813.

角盘兰 jiao pan lan

*Ophrys monorchis* Linnaeus, Sp. Pl. 2: 947. 1753; *Arachnites monorchis* (Linnaeus) Hoffmann; *Epipactis monorchis* (Linnaeus) F. W. Schmidt; *Herminium alaschanicum* Maximowicz var. *tanguticum* Maximowicz; *H. tanguticum* (Maximowicz) Rolfe; *Monorchis herminium* O. Schwarz; *Orchis monorchis* (Linnaeus) Allioni; *Satyrium monorchis* (Linnaeus) Persoon.

Plants 5.5–35 cm tall. Tubers globose to ellipsoid, 6–10 × 5–10 mm. Stem with 1 or 2 tubular sheaths at base, 2-leaved. Leaves basal and subopposite to cauline, widely spaced and alternate, elliptic to elliptic-lanceolate, 1.5–10 × 0.5–2.5 cm, apex acute. Inflorescence 3.5–24 cm; peduncle cylindrical, with 1 or 2 ovate-lanceolate sterile bracts 0.5–5.5 cm, lower one occasionally foliaceous; rachis 1–11 cm, densely or occasionally ± laxly many flowered; floral bracts linear-lanceolate, 2–3 mm, shorter than ovary, apex acuminate-cuspidate. Flowers fragrant, nodding, yellowish green; ovary distinctly hooked toward apex, 3–5 mm including pedicel. Dorsal sepal suberect, oblong-ovate, ca. 2.2 × 1.2 mm, 1-veined, apex obtuse; lateral sepals weakly spreading, oblong-ovate, ca. 2 × 1 mm, 1-veined, apex subacute. Petals forming a hood, rhombic, ca. 2.5 × 1 mm, somewhat fleshy, 1-veined, sometimes obscurely 3-lobed near middle, apex acute; lip spreading to decurved, oblong-obovate, 2.2–5 × 1.2–1.5 mm, slightly fleshy, base attenuate and shallowly concave, furcately 3-lobed near middle; lateral lobes linear-triangular, 0.8–1.5 mm, apex acute; mid-lobe linear-triangular, 1.5–3.2 mm, longer and broader than lateral lobes, apex acute. Column to 1 mm; pollinia subglobose; viscidia large, involute, hornlike. Fl. Jul–Aug.  $2n = 38, 40, 42$ .

Broad-leaved forests, coniferous forests, thickets, grasslands, grassy swamps, flood lands; 600–4500 m. Anhui, Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xizang, N and NW Yunnan [India (Sikkim), Japan, Kashmir, Korea, Mongolia, Nepal, Pakistan, Russia; C and W Asia, Europe].

**10. *Herminium alaschanicum*** Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 31: 105. 1887.

裂瓣角盘兰 lie ban jiao pan lan

*Herminium altigenum* Schlechter; *Monorchis alaschanica* (Maximowicz) O. Schwarz; *Peristylus alaschanicus* (Maximowicz) N. Pearce & P. J. Cribb.

Plants 13–30 cm tall. Tubers oblong, 1–1.5 × ca. 0.8 cm. Stem with 2 or 3 tubular sheaths at base, 2–4-leaved. Leaves clustered toward base of stem, narrowly elliptic-lanceolate, 4–15 × 0.4–1 cm, apex acute or acuminate. Inflorescence 14–27

cm; peduncle cylindrical, with 3–5 lanceolate sterile bracts 5–15 mm; rachis 4–8 cm, subdensely many flowered; floral bracts ovate-lanceolate, 5–9 mm, exceeding ovary, apex cuspidate. Flowers nodding, green; ovary distinctly hooked toward apex, 5–6 mm including pedicel. Dorsal sepal ovate, 3–4 × 2–3 mm, 3-veined, apex obtuse; lateral sepals weakly spreading, ovate-lanceolate to lanceolate, 3–4 × 1.5–2 mm, 1-veined, apex subacute. Petals connivent with dorsal sepal and forming a hood, ovate-lanceolate, 3.2–4.5 × ca. 1.5 mm, abruptly narrowed above middle, fleshy, 3-veined, apex cuspidate; lip decurved, suboblong, 4–5.5 × ca. 1.5 mm, slightly fleshy, base concave, shortly saccate-spurred, furcately 3-lobed near middle; lateral lobes linear, 1.5–2.5 mm; mid-lobe narrowly linear-triangular, 1–1.5 mm, slightly broader than lateral lobes, apex acute; spur pendulous, slightly incurved, oblong, 0.8–1 mm, apex obtuse. Column ca. 1 mm; pollinia obovoid; viscidia involute, hornlike. Fl. Jun–Sep.

Alpine *Quercus* forests or scrubby grasslands along valleys; 1800–4500 m. Gansu, Hebei, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, W Sichuan, Xizang, NW Yunnan [Mongolia].

**11. *Herminium lanceum*** (Thunberg ex Swartz) Vujik, Blumea 11: 228. 1961.

叉唇角盘兰 cha chun jiao pan lan

*Ophrys lancea* Thunberg ex Swartz, Kongl. Vetensk. Acad. Nya Handl. 21: 223. 1800; *Aceras angustifolium* Lindley; *A. angustifolium* var. *longicrura* (C. Wright ex A. Gray) Miquel; *A. lanceum* (Thunberg ex Swartz) Steudel; *A. longicrura* C. Wright ex A. Gray; *Herminium altigenum* Schlechter; *H. angustifolium* (Lindley) Ridley; *H. angustifolium* var. *brevilabre* Tang & F. T. Wang; *H. angustifolium* var. *longicrura* (C. Wright ex A. Gray) Makino; *H. angustifolium* var. *nematolobum* Handel-Mazzetti; *H. lanceum* var. *longicrura* (C. Wright ex A. Gray) H. Hara; *H. longicrura* (C. Wright ex A. Gray) Tang & F. T. Wang (1951), not Bentham & Hooker (1883); *H. minutiflorum* Schlechter; *H. stenostachyum* Tang & F. T. Wang; *Monorchis angustifolia* (Lindley) O. Schwarz; *M. minutiflora* (Schlechter) O. Schwarz; *Platanthera angustifolia* (Lindley) H. G. Reichenbach; *Satyrium lanceum* (Thunberg ex Swartz) Persoon; *Spiranthes lancea* (Thunberg ex Swartz) R. C. Bakhuizen & Steenis.

Plants 14–83 cm tall. Tubers subglobose to ellipsoid, 10–15 × 5–12 mm. Stem with 2 tubular sheaths at base, 2–4-leaved. Leaves cauline, often widely spaced, alternate, linear to linear-lanceolate, 6–20 × 0.5–1.4 cm, apex acute or acuminate. Inflorescence 12–43 cm; peduncle cylindrical, with 1 to a few linear-lanceolate sterile bracts 1–6 cm; rachis 6–31 cm, laxly to subdensely many flowered; floral bracts lanceolate, 2–8 mm, shorter than or occasionally exceeding ovary, apex acuminate. Flowers erect or horizontal, pale yellowish green to green; ovary straight to slightly arcuate, 5–7 mm including pedicel. Dorsal sepal suberect, ovate to oblong, concave, 2–4 × 1–1.5 mm, 1-veined, apex obtuse; lateral sepals spreading, oblong to ovate-oblong, oblique, 2.2–4 × 1–2 mm, 1-veined, apex subobtuse or acute. Petals forming a hood, linear, 2–4 × 0.2–1 mm, 1-veined, apex obtuse to subacute; lip often pendulous, oblong,

4–10 × 1–2 mm, base dilated and concave, furcately 3-lobed near middle; disk ridged; lateral lobes linear, 2–7 mm; mid-lobe oblong to triangular, to ca. 1 mm, apex acute to obtuse. Column ca. 0.8 mm; pollinia globose; viscidia orbicular. Fl. Jun–Aug.  $2n = 38, 40, 42, 76$ .

Mixed forests, coniferous forests, bamboo forests, thickets, grasslands; 700–3600 m. Anhui, N Fujian, SE Gansu, Guangdong, Guangxi, Guizhou, S Henan, Hubei, Hunan, Jiangxi, S Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [India, Indonesia, Japan, Kashmir, Korea, Malaysia, Myanmar, Nepal, Philippines, Thailand, Vietnam].

**12. *Herminium souliei*** (Finet) Rolfe, J. Linn. Soc., Bot. 36: 51. 1903.

宽萼角盘兰 kuan e jiao pan lan

*Herminium angustifolium* (Lindley) Ridley var. *souliei* Finet, Rev. Gén. Bot. 13: 518. 1901; *H. limprichtii* Schlechter; *H. souliei* var. *lichiangense* W. W. Smith; *Monorchis limprichtii* (Schlechter) O. Schwarz; *M. souliei* (Finet) O. Schwarz.

Plants 12–40 cm tall. Tubers oblong-ellipsoid, 10–20 × 6–10 mm. Stem with 2 or 3 tubular sheaths at base, 2–4-leaved. Leaves basal and subopposite or cauline, widely spaced and alternate, narrowly oblong, 4.5–20 × 0.5–2 cm, apex acute. Inflorescence 8–25 cm; peduncle cylindrical, with 1 or 2 lanceolate sterile bracts 0.5–2.4 cm; rachis 4–12 cm, subdensely many flowered; floral bracts ovate-lanceolate, 2–5 mm, shorter than ovary, apex acuminate. Flowers erect or horizontal, pale green; ovary straight to slightly arcuate, 4–5 mm including pedicel. Dorsal sepal erect, ovate, concave, 2.5–3 × ca. 2 mm, 3-veined, apex obtuse; lateral sepals spreading, ovate, oblique, ca. 3.5 × 2.5 mm, 1-veined, apex obtuse. Petals erect, linear, 2.5–3 × ca. 0.6 mm, 1-veined, apex obtuse; lip pendulous, narrowly oblong, 3.2–4.5 × 0.8–1.2 mm, slightly contracted at middle, base slightly dilated and shallowly concave, furcately 3-lobed toward apex; lateral lobes linear-falcate, incurved, 1–2 mm; mid-lobe oblong-lanceolate to obtusely triangular, ca. 0.5 mm, apex obtuse. Column ca. 1 mm; pollinia ovoid; viscidia ovoid. Fl. Jul–Aug.

• Broad-leaved forests, coniferous forests, grassy slopes; 1400–4200 m. W Sichuan, SE Xizang, NE and W Yunnan.

This species is clearly closely allied to *Herminium lanceum*, though the typically longer lateral lobes of the lip in the latter give its flowers a more spidery appearance.

**13. *Herminium angustilabre*** King & Pantling, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 65: 131. 1896.

狭唇角盘兰 xia chun jiao pan lan

*Monorchis angustilabris* (King & Pantling) O. Schwarz.

Plants 7–18 cm tall. Tubers oblong-ellipsoid, 6–15 × 3–7 mm. Stem with 1 or 2 tubular sheaths at base, 1-leaved. Leaf basal or cauline, usually distant from basal sheath, oblong-elliptic, 1.8–2.5 × 0.4–1 cm, apex obtuse. Inflorescence 4–14 cm; peduncle somewhat angled, with 1–5 linear to oblong-lanceolate sterile bracts 0.5–1.5 cm; rachis 3–5 cm, laxly 8–12-flowered; floral bracts lanceolate, 4–6 mm, exceeding flowers, apex acuminate. Flowers horizontal to slightly nodding, green to yellowish green; ovary arcuate, ca. 3.5 mm including pedicel. Dorsal sepal suberect, broadly ovate, concave, 2–2.6 × 1.2–2

mm, 1-veined, apex acute; lateral sepals reflexed, narrowly oblong, slightly oblique, 2.8–3 × ca. 0.7 mm, 1-veined, apex acute. Petals forming a hood to weakly spreading, linear-oblong, slightly oblique, ca. 2.8 × 0.5 mm, 1-veined, apex acute; lip pendulous, linear-oblong, 3–3.5 × ca. 0.7 mm, base slightly dilated and shallowly concave, margin entire, apex acute and reflexed. Column ca. 0.5 mm; pollinia globose; viscidia elliptic; auricles oblong, narrow. Fl. Jul.

Scrub, grassy slopes; ca. 3500 m. NW Yunnan [India (Sikkim)].

**14. *Herminium tangianum*** (S. Y. Hu) K. Y. Lang, Acta Phytotax. Sin. 25: 458. 1987.

宽叶角盘兰 kuan ye jiao pan lan

*Peristylus tangianus* S. Y. Hu, Quart. J. Taiwan Mus. 27: 461. 1974, based on *P. ecalcaratus* Tang & F. T. Wang, Acta Phytotax. Sin. 1: 64. 1951, not Finet (1901), based on *Herminium latifolium* Gagnepain, Bull. Mus. Natl. Hist. Nat., sér. 2, 3: 325. 1931, not (A. Richard) Lindley (1832).

Plants 20–30 cm tall. Tubers subglobose to oblong-ellipsoid, 10–20 mm. Stem with 2 or 3 tubular sheaths at base, 2-leaved. Leaves basal, orbicular or elliptic, 2.5–5 × 2–2.5 cm, apex subacuminate. Peduncle cylindrical, with several triangular-lanceolate sterile bracts, lower one often foliaceous; rachis 4–10 cm, many flowered; floral bracts lanceolate, 6–7 mm, slightly shorter than ovary, apex acuminate. Flowers white; ovary ca. 8 mm including pedicel. Dorsal sepal ovate, ca. 2.5 × 1.6 mm, 1-veined, apex obtuse; lateral sepals oblanceolate, ca. 2.6 × 1 mm, 1-veined, apex obtuse. Petals ovate, oblique, 1.2–2.4 × ca. 1.2 mm, 1-veined, apex obtuse; lip decurved, ovate-pandurate, ca. 2.5 × 1.4 mm, somewhat fleshy, base dilated and shallowly concave, contracted near middle, margin entire, apex dilated and obtuse. Column short; viscidia elliptic, ca. 0.8 mm. Fl. unknown.

• Moist grasslands. C Yunnan.

**15. *Herminium josephii*** H. G. Reichenbach, Flora 55: 276. 1872 [“*josephi*”].

宽卵角盘兰 kuan luan jiao pan lan

*Herminium forrestii* Schlechter; *Monorchis forrestii* (Schlechter) O. Schwarz; *M. josephii* (H. G. Reichenbach) O. Schwarz.

Plants 11–27 cm tall. Tubers ovoid or ellipsoid, 10–20 × 7–10 mm. Stem with 2 or 3 tubular sheaths at base, 2-leaved. Leaves basal, subopposite, linear-oblong to oblong-elliptic, 3.5–10 × 0.5–1.5 cm, apex acute. Inflorescence 9–24 cm; peduncle cylindrical, ebracteate; rachis 3.5–8.5 cm, subdensely several to many flowered; floral bracts ovate-lanceolate to lanceolate, ca. 3 mm, shorter than ovary, apex acute. Flowers fragrant, erect or horizontal, green to yellowish green; ovary straight, 7–8 mm including pedicel. Dorsal sepal suberect, broadly ovate, ca. 3 × 2 mm, 1-veined, apex obtuse; lateral sepals weakly spreading, ovate-lanceolate, slightly oblique, 3–4.5 × ca. 1.5 mm, 1-veined, apex obtuse. Petals ovate-lanceolate, oblique, 3–3.5 × ca. 1.2 mm, somewhat fleshy, 1-veined, apex subobtuse; lip pendulous, broadly ovate, 4–5 × 3–3.5 mm, somewhat fleshy, base shallowly concave, entire; disk with 2 short ridges below mid-

dle. Column ca. 1.5 mm; pollinia obovoid; viscidia involute, hornlike. Fl. Jul–Aug.  $2n = 38$ .

*Abies* forests, forest margins, scrub, alpine meadows; 1900–4000 m. W Sichuan, S and SE Xizang, NE and NW Yunnan [Bhutan, India (Sikkim), Nepal].

**16. *Herminium singulum*** Tang & F. T. Wang, Bull. Fan Mem. Inst. Biol. Bot. 10: 35. 1940.

披针唇角盘兰 pi zhen chun jiao pan lan

Plants 8–30 cm tall. Tubers subglobose, ca. 10 mm. Stem with 1 or 2 tubular sheaths at base, 1-leaved. Leaf basal, elliptic, 2–4 × 1–2.5 cm, apex obtuse or acute. Inflorescence 6.5–27 cm; peduncle cylindric, with 2 lanceolate sterile bracts 1–1.5 cm; rachis 2.5–10 cm, subclaxly 4- to many flowered; floral bracts lanceolate, much shorter than to slightly exceeding ovary, apex acuminate. Flowers erect, held close to rachis, color not recorded; ovary straight, 4–7 mm including pedicel. Dorsal sepal erect, ovate, ca. 1.5 × 1 mm, 1-veined, concave at base, apex acute or obtuse; lateral sepals reflexed, oblong-ovate, oblique, ca. 1.5 × 0.8 mm, 1-veined, apex obtuse. Petals erect, ovate, oblique, ca. 1.8 × 1–1.5 mm, somewhat fleshy, 1-veined, apex obtuse or acute; lip lanceolate, ca. 2.5 × 1 mm, base dilated, gradually attenuate from middle toward apex, somewhat fleshy, shortly spurred, margin entire, apex obtuse or acute; spur cylindric-obovoid, ca. 1.5 × 0.75 mm, slightly dilated toward apex, apex obtuse. Column short; anther relatively small. Fl. Aug–Sep.

• Forests; 2600–2800 m. SW Sichuan, NW Yunnan.

**17. *Herminium carnosilabre*** Tang & F. T. Wang, Bull. Fan Mem. Inst. Biol. Bot. 10: 32. 1940.

厚唇角盘兰 hou chun jiao pan lan

Plants 10–22 cm tall. Tubers ovoid, ca. 10 mm. Stem with 1 or 2 tubular sheaths at base, 2-leaved. Leaves basal, subopposite to somewhat spaced and alternate, elliptic to oblong-lanceolate, 1.5–3 × 0.5–1.5 cm, apex obtuse. Peduncle cylindric,

with 2 or 3 lanceolate sterile bracts; rachis 1.5–3.5 cm, subdensely many flowered; floral bracts ovate, shorter than ovary, apex acute. Flowers usually secund, erect, pale green; ovary ca. 3.2 mm including pedicel. Dorsal sepal erect, oblong, concave, ca. 1.6 × 0.8 mm, 1-veined, apex obtuse; lateral sepals oblong-ovate, oblique, ca. 1.5 × 0.8 mm, 1-veined, apex obtuse. Petals erect-ascending, oblong, falcate, ca. 1.2 × 0.5 mm, 1-veined, apex obtuse; lip ovate-lanceolate, ca. 2 × 1 mm, somewhat fleshy, base dilated, shortly spurred, margin entire, apex obtuse; spur conic, ca. 0.8 mm. Column short. Fl. Aug–Sep.

• Bamboo forests; 3200–3600 m. NW Yunnan.

**18. *Herminium orbiculare*** J. D. Hooker, Fl. Brit. India 6: 130. 1890.

西藏角盘兰 xi zang jiao pan lan

*Monorchis orbicularis* (J. D. Hooker) O. Schwarz.

Plants 6–15 cm tall. Tubers subglobose to ovoid, 4–8 × 4–6 mm. Stem with 1 tubular sheath at base, 2-leaved. Leaves basal and subopposite, or cauline, somewhat spaced and alternate, oblanceolate to elliptic-oblong, 1.2–3 × 0.3–1.5 cm, adaxially with white reticulate markings, apex obtuse or acute. Inflorescence 4–14 cm; peduncle cylindric, with 1 to several lanceolate sterile bracts 2–6 mm; rachis 1–4 cm, laxly few to subdensely many flowered; floral bracts ovate-lanceolate, 1–2.5 mm, shorter than ovary, apex acute. Flowers usually secund, erect or horizontal, green; ovary straight to slightly arcuate, 2–4 mm. Dorsal sepal suberect, broadly ovate, ca. 0.8 × 0.5 mm, 1-veined, apex obtuse; lateral sepals weakly spreading, broadly orbicular-ovate, ca. 1.2 × 0.8 mm, 1-veined, apex obtuse. Petals forming a hood to weakly spreading, oblong-ovate, ca. 0.8 × 0.5 mm, 1-veined, apex obtuse; lip slightly decurved, orbicular-ovate, ca. 1.5 × 1.2 mm, fleshy, shortly spurred, entire, apex obtuse; disk slightly warty; spur conic, ca. 0.7 mm. Column ca. 0.4 mm; pollinia clavate; viscidia orbicular. Fl. Jul–Sep.

Valleys; ca. 3700 m. Xizang [Bhutan, India (Sikkim)].

### 36. AMITOSTIGMA Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 4: 91. 1919.

无柱兰属 wu zhu lan shu

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

*Mitostigma* Blume, Mus. Bot. 2: 189. 1856, not Decaisne (1844).

Herbs, terrestrial, slender. Tubers subglobose to ovoid, undivided, fleshy, neck with several slender roots. Stem erect, 1- or occasionally 2-leaved, glabrous or occasionally pubescent. Leaves basal or cauline, usually green and unspotted, rarely with purple-brown blotches, oblong, lanceolate, elliptic, or ovate, base contracted into amplexicaul sheath. Inflorescence a terminal raceme, glabrous; peduncle elongate, with 1 or more sterile bracts; rachis 1- to several flowered. Flowers often secund, resupinate, white, pink, mauve, or purple, rarely yellow; ovary usually straight, twisted, shortly pedicellate, cylindric-fusiform, glabrous. Sepals free, oblong to ovate, 1-veined. Petals free, often connivent with dorsal sepal and forming a hood, usually wider than sepals; lip spreading, spurred at base, 3-lobed; disk often papillose; mid-lobe often divided, forming 2 lobules; spur cylindric to narrowly conic, short to elongate. Column very short; anther usually erect, oblong-ellipsoid to obovoid, 2-locular, locules parallel or slightly divergent; pollinia 2, oblong, sectile, granular-farinaceous; caudicles straplike; viscidia naked, oblong-ovate; rostellum rather small, 3-lobed, base with ± ascending arms on both sides, margin adnate to column; stigma ventral, 3-lobed, lobes confluent, relatively large, flat to somewhat raised; auricles 2, large, stout, placed laterally at base of anther. Capsule suberect.

About 30 species: E Asia and adjacent areas; 22 species (21 endemic) in China.

The generic affinity of several of the entities presently referred to *Amitostigma* remains questionable and in need of re-examination; many of the endemic Chinese taxa are poorly known.



- 1a. Plants 2-leaved (*A. alpestre* rarely 1-leaved).
  - 2a. Leaves cauline, widely spaced.
    - 3a. Lip obovate, 3-lobed near middle, 4.5–5.5 mm wide, longer than broad; lateral lobes ovate-oblong, ca. 0.5 mm wide; spur 4–4.5 mm ..... 17. *A. alpestre*
    - 3b. Lip orbicular to transversely elliptic, 3-lobed toward apex, ca. 8.5 mm wide, broader than long; lateral lobes quadrate, ca. 2.5 mm wide; spur 5–7 mm ..... 18. *A. yuanum*
  - 2b. Leaves basal, subopposite.
    - 4a. Rachis 1-flowered ..... 19. *A. papilionaceum*
    - 4b. Rachis 3- to more than 10-flowered.
      - 5a. Leaves usually appressed to substratum; petals ca. 5 × 3 mm; lip ca. 9 mm ..... 22. *A. physoceras*
      - 5b. Leaves erect or porrect; petals 3–3.5 × 1.5–2 mm; lip 4.5–6 mm.
        - 6a. Lip 3-lobed below middle; lateral lobes linear ..... 20. *A. bifoliatum*
        - 6b. Lip 3-lobed above middle; lateral lobes ovate ..... 21. *A. wenshanense*
- 1b. Plants 1-leaved.
  - 7a. Leaf appressed to substratum, adaxially with purplish brown blotches ..... 1. *A. hemipilioides*
  - 7b. Leaf erect or porrect, uniformly green.
  - 8a. Rachis 1- or rarely 2-flowered.
    - 9a. Spur 8–17 mm, ca. as long as to exceeding ovary.
      - 10a. Lip 3-lobed toward apex, 11–15 × 13–19 mm; lateral lobes broadly oblong-ovate, ca. 5 mm wide ..... 6. *A. pinguicula*
      - 10b. Lip 3-lobed below middle, 8–10 × 6–10 mm; lateral lobes linear-oblong or ovate-triangular, 1–3 mm wide.
        - 11a. Dorsal sepal 4–5 mm; spur 11–12 mm ..... 7. *A. dolichocentrum*
        - 11b. Dorsal sepal ca. 7 mm; spur 8–9 mm ..... 8. *A. tibeticum*
    - 9b. Spur 2–4 mm, usually much shorter than ovary.
      - 12a. Stem densely pubescent around leaf base; floral bract much shorter than ovary; lip 5–6 mm ..... 2. *A. amplexifolium*
      - 12b. Stem glabrous; floral bract nearly as long as to exceeding ovary; lip 7–15 mm.
        - 13a. Flower yellow ..... 3. *A. simplex*
        - 13b. Flower pale purple, pink, or white.
          - 14a. Leaf 0.1–0.4 cm wide; petals broadly ovate, 4.5–5.5 mm wide ..... 4. *A. farreri*
          - 14b. Leaf 0.6–1 cm wide; petals ovate, 1.6–2 mm wide ..... 5. *A. monanthum*
    - 8b. Rachis usually 3- or more flowered (*A. faberi* rarely 1- or 2-flowered).
      - 15a. Mid-lobe of lip 4–7 mm wide, nearly as broad as to broader than long.
        - 16a. Ovary and pedicel 15–25 mm; dorsal sepal ca. 7 mm; lip ca. 13 mm ..... 16. *A. gonggashanicum*
        - 16b. Ovary and pedicel 6–10 mm; dorsal sepal 2.5–3.5 mm; lip 5–7.5 mm.
          - 17a. Peduncle ebracteate; spur 2–3 mm ..... 14. *A. basifoliatum*
          - 17b. Peduncle with 1 sterile bract; spur 5–6 mm ..... 15. *A. faberi*
      - 15b. Mid-lobe of lip 0.5–3.5 mm wide, much longer than broad.
        - 18a. Mid-lobe of lip ca. 3.5 mm wide, deeply divided above middle to form 2 distinct lobules ..... 9. *A. parceflorum*
        - 18b. Mid-lobe of lip 0.5–2 mm wide, apex truncate, obtuse-rounded, occasionally emarginate or shallowly notched.
          - 19a. Lateral lobes of lip oblong-obovate, 1.6–2 mm wide; spur 3.5–6 mm ..... 10. *A. tetralobum*
          - 19b. Lateral lobes of lip lanceolate, linear-oblong, ovate-oblong, or triangular, 0.3–0.8 mm wide; spur 1–2.5(–3.5) mm.
            - 20a. Peduncle ebracteate; flowers white; mid-lobe of lip ca. 1.6 mm ..... 11. *A. capitatum*
            - 20b. Peduncle with 1 or 2 sterile bracts; flowers pink, rose-pink, purplish red, or purple; mid-lobe of lip 2–4 mm.
              - 21a. Plants 7–25 cm tall; leaf usually basal; lip 3-lobed above middle ..... 12. *A. gracile*
              - 21b. Plants 24–36 cm tall; leaf cauline; lip 3-lobed below middle ..... 13. *A. trifurcatum*

**1. *Amitostigma hemipilioides*** (Finet) Tang & F. T. Wang, Bull. Fan Mem. Inst. Biol. Bot. 7: 5. 1936.

卵叶无柱兰 *luan ye wu zhu lan*

*Gymnadenia hemipilioides* Finet, Rev. Gén. Bot. 13: 515. 1901; *Amitostigma microhemipilia* Schlechter; *Chusua hemi-*

*pilioides* (Finet) P. F. Hunt; *Hemipilia silvatica* Kraenzlin; *Orchis microhemipilia* (Schlechter) Soó; *Ponerorchis hemipilioides* (Finet) Soó.

Plants 8–12 cm tall. Tubers oblong, 8–12 × 5–10 mm. Stem with 2 tubular sheaths at base, 1-leaved. Leaf basal, ap-

pressed to substratum, adaxially with purplish brown blotches, ovate-orbicular to oblong, 1.5–2.2 × 0.8–2.5 cm, apex acute. Peduncle with 1 or 2 lanceolate sterile bracts; rachis to 5.5 cm, subdensely (2 or) 3–12-flowered; floral bracts ovate, much shorter than ovary, apex acute. Flowers pinkish white, with pinkish purple spots on lip; ovary and pedicel ca. 7 mm. Dorsal sepal oblong-ovate, concave, 3–3.5 × 1.5–1.8 mm, 1-veined, apex obtuse; lateral sepals oblong-ovate, slightly oblique, ca. 3.5 × 1.7 mm, apex subobtuse. Petals connivent with dorsal sepal and forming a hood, oblong, slightly oblique, 2.7–3 × 1.2–1.5 mm, 1-veined, margin irregularly serrulate, apex obtuse; lip obovate, 5–7 × 4–4.5 mm, base cuneate, margin 3-lobed above middle, margin irregularly serrulate; disk finely papillate; lateral lobes oblong-quadrangle, oblique, ca. 1 × 1 mm, 3- or 4-veined, apex subacute; mid-lobe quadrate, ca. 2 × 2 mm, apex obtuse; spur horizontal and curving downward to pendulous, cylindrical, 3–4 mm, apex obtuse; viscidia subovoid; stigma lobes oblong. Fl. Jun–Jul.

• Rocky soils, moist places in forests, crevices; 2400–2500 m. C Guizhou, NW Yunnan.

**2. *Amitostigma amplexifolium*** Tang & F. T. Wang, Bull. Fan Mem. Inst. Biol. Bot. 7: 3. 1936.

抱茎叶无柱兰 *bao jing ye wu zhu lan*

Plants 6–10 cm tall. Tubers globose, ca. 5 mm in diam. Stem with 1 tubular sheath at base, 1-leaved, densely pubescent around leaf base. Leaf subbasal to cauline, porrect, elliptic to oblong-elliptic, 1–2 × 0.5–1 cm, apex acute. Rachis 1- or 2-flowered; floral bracts oblong-elliptic, much shorter than ovary, apex obtuse or acute. Flower white, with purplish red spots; ovary and pedicel 8–10 mm. Dorsal sepal elliptic, ca. 3.5 × 2–2.3 mm, apex obtuse; lateral sepals elliptic, slightly oblique, ca. 4 × 2.5 mm, apex obtuse. Petals elliptic, slightly oblique, ca. 3 × 2 mm, apex truncate-obtuse; lip obovate, 5–6 × 4–5 mm, base cuneate, 3-lobed below middle; lateral lobes falcate-oblong, apex obtuse; mid-lobe cuneate-oblong, margin erose, shallowly notched near apex to form 2 small lobules, sinus with a small tooth; spur pendulous, cylindrical, curved, ca. 2 mm, much shorter than ovary; viscidia ovate-triangular; stigma lobes oblong. Fl. Jul.

• Forests. W Sichuan.

**3. *Amitostigma simplex*** Tang & F. T. Wang, Bull. Fan Mem. Inst. Biol. Bot. 10: 25. 1940.

黄花无柱兰 *huang hua wu zhu lan*

Plants 5–14 cm tall. Tubers ovoid to subglobose, 4–5 mm in diam. Stem with 1 or 2 tubular sheaths at base, 1-leaved. Leaf basal, porrect, linear to oblong-elliptic, 1.5–4 × 0.3–0.6 cm, apex acute or obtuse. Peduncle ebracteate; rachis 1-flowered; floral bracts lanceolate, 6–10 mm, nearly as long as ovary, apex acute or acuminate. Flower erect, yellow, sometimes spotted with brown, rather large; ovary and pedicel 8–9 mm. Dorsal sepal narrowly oblong, concave, 3.8–6 × 1.3–3 mm, 1-veined, apex obtuse; lateral sepals spreading, narrowly oblong-elliptic, falcate, 4.2–8 × 1.5–4 mm, 1-veined, apex obtuse. Petals connivent with dorsal sepal and forming a hood, ovate, oblique,

3.7–5.5 × 1.8–3.5 mm, 1-veined, apex obtuse; lip broadly obovate, 7–15 × 6–13 mm, deeply 3-lobed near middle; lateral lobes oblong-ovate, falcate, 3–7 × 3–6 mm, apex rounded; mid-lobe obcordate to flabellate, 3–5 × 4–8 mm, margin undulate, apex emarginate to shallowly notched to form 2 small lobules; spur pendulous, cylindrical, 3–4 mm, much shorter than ovary, apex obtuse. Fl. Jul–Aug.

• Grassy slopes; 2300–4400 m. W Sichuan, NW Yunnan.

**4. *Amitostigma farreri*** Schlechter, Repert. Spec. Nov. Regni Veg. 20: 378. 1924.

长苞无柱兰 *chang bao wu zhu lan*

*Orchis farreri* (Schlechter) Soó.

Plants 3.5–9 cm tall. Tubers globose, ca. 5 mm in diam. Stem with 2 tubular sheaths at base, 1-leaved. Leaf subbasal, porrect, linear to narrowly oblong, 1.5–5 × 0.1–0.4 cm, apex acute. Rachis 1-flowered; floral bracts narrowly lanceolate, exceeding ovary, apex acute. Flower pink; ovary and pedicel 4–5 mm. Dorsal sepal erect, ovate-oblong, concave, 5–7.5 × 4–5 mm, 3-veined, apex obtuse; lateral sepals ovate-oblong, slightly oblique, 5.5–8 × 4–5 mm, apex subobtuse. Petals connivent with dorsal sepal and forming a hood, broadly ovate, oblique, 5–7 × 4.5–5.5 mm, 3-veined, margin slightly undulate, apex obtuse; lip obovate, 7–12 × 5–8 mm, base broadly cuneate, 3-lobed below middle; lateral lobes triangular, 2–3 × ca. 1 mm, margin crenulate, apex acute; mid-lobe obcordate-obovate, 5–9 × 5–9 mm, margin crenulate, apex notched to form 2 distinct lobules, sinus with a small acute tooth; spur pendulous, straight, conic-cylindrical, 3–4 mm, slightly shorter than ovary, apex obtuse; viscidia ellipsoid; stigma lobes oblong. Fl. Aug.

• Grassy slopes; 3600–4200 m. SE Xizang, NW Yunnan.

**5. *Amitostigma monanthum*** (Finet) Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 4: 94. 1919.

一花无柱兰 *yi hua wu zhu lan*

*Peristylus monanthus* Finet, Rev. Gén. Bot. 13: 523. 1901; *Amitostigma forrestii* Schlechter; *A. monanthum* var. *forrestii* (Schlechter) Tang & F. T. Wang; *A. nivale* Schlechter; *Orchis forrestii* (Schlechter) Soó; *O. monantha* (Finet) Soó; *O. nivalis* (Schlechter) Soó.

Plants 6–10 cm tall. Tubers ovoid to subglobose, ca. 5 mm in diam. Stem with 1 or 2 tubular sheaths at base, 1-leaved, occasionally pubescent. Leaf basal, erect to porrect, lanceolate, narrowly oblong, or oblanceolate-spatulate, 2–3 × 0.6–1 cm, apex acute or obtuse. Peduncle ebracteate; rachis 1-flowered; floral bract linear-lanceolate, 6–12 mm, usually exceeding ovary, apex acute. Flower pale purple, pink, or pure white, with purple spots on lip, rather large; ovary and pedicel 6–11 mm. Dorsal sepal erect, narrowly ovate, concave, 4–4.5 × 1.6–1.8 mm, 1-veined, apex obtuse; lateral sepals spreading to reflexed, narrowly oblong-elliptic, 4.5–5 × ca. 1.6 mm, apex subobtuse. Petals loosely connivent with dorsal sepal and forming a hood, ovate, slightly oblique, 3.8–4.4 × 1.6–2 mm, 1-veined, apex obtuse; lip ovate-orbicular, 8–10 × 8–10 mm, base shortly clawed, deeply 3-lobed below middle; disk finely papillate; lateral lobes suboblong-obovate, 4–5 × 1.8–3 mm, margin often

slightly undulate, apex obtuse; mid-lobe broadly obovate, 6–7.5 × ca. 7 mm, much wider than lateral lobes, margin usually entire or sometimes slightly undulate, apex slightly emarginate to deeply notched to form 2 distinct lobules; spur pendulous, straight, cylindrical, 2.5–4 mm, much shorter than ovary, apex obtuse; viscidia ovate; stigma lobes subsquare. Fl. Jul–Aug.

• Grassy slopes, alpine meadows, rocky soils and gravel along streams; 2800–4100 m. S Gansu, S Shaanxi, NW and W Sichuan, SE Xizang, NW Yunnan.

**6. *Amitostigma pinguicula*** (H. G. Reichenbach & S. Moore) Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 4: 94. 1919.

大花无柱兰 da hua wu zhu lan

*Gymadenia pinguicula* H. G. Reichenbach & S. Moore, J. Bot. 16: 135. 1878; *Diplomeris chinensis* Rolfe; *Habenaria pinguicula* (H. G. Reichenbach & S. Moore) Bentham ex Rolfe; *Orchis pinguicula* (H. G. Reichenbach & S. Moore) Soó.

Plants 7–16 cm tall. Tubers ovoid, 10–15 mm in diam. Stem with 1 or 2 tubular sheaths at base, 1-leaved. Leaf subbasal, porrect, linear-oblong, narrowly elliptic, oblong-ovate, or ligulate-oblong, 1.5–8 × 0.6–1.2 cm, apex subacute. Peduncle with 1 or 2 lanceolate sterile bracts; rachis 1- or rarely 2-flowered; floral bract linear-lanceolate, 5–6 mm, much shorter than ovary, apex acuminate. Flower rose-red to purplish red, rather large; ovary 9–17 mm including pedicel, very slender. Dorsal sepal erect, ovate, concave, 5–7 × 3–4 mm, 1-veined, apex acute; lateral sepals spreading to reflexed, ovate-lanceolate, slightly oblique, 6–8 × 3–4 mm, 2- or 3-veined, apex acute. Petals loosely connivent with dorsal sepal and forming a hood, broadly ovate, slightly oblique, 3.5–4.5 × ca. 3 mm, 3-veined, apex obtuse; lip flabellate, 11–15 × 13–19 mm, base cuneate, 3-lobed toward apex; lateral lobes broadly oblong-ovate, ca. 4 × 5 mm, apex truncate; mid-lobe broadly obovate, ca. 4 × 7.5 mm, apex truncate to slightly emarginate; spur horizontal to pendulous, straight to slightly curved, narrowly conic, 15–17 mm, usually exceeding ovary, gradually attenuate, apex acute; viscidia subovate; stigma lobes narrowly oblong. Fl. Apr–May.

• Rocky soils in forests, moist grasslands, valleys; 200–400 m. NE Zhejiang.

*Diplomeris chinensis* is tentatively referred to the synonymy of this species.

**7. *Amitostigma dolichocentrum*** Tang, F. T. Wang & K. Y. Lang, Acta Phytotax. Sin. 20: 84. 1982.

长距无柱兰 chang ju wu zhu lan

Plants 6–8 cm tall. Tubers ovoid, ca. 5.5 mm. Stem with 2 tubular sheaths at base, 1-leaved, pubescent. Leaf subbasal, porrect, elliptic or ovate, 0.7–2 × 0.3–0.8 cm, apex acute. Peduncle with 1 foliaceous, ovate sterile bract; rachis 1-flowered; floral bract ovate-lanceolate, ca. 5 mm, much shorter than ovary, apex acuminate. Flower erect, color not recorded, rather large; ovary and pedicel 10–12 mm. Dorsal sepal erect, oblong-elliptic, 4–5 × 2.5–3 mm, 3-veined, apex obtuse; lateral sepals reflexed, oblong-obovate, oblique, 5–6 × 2–3 mm, 3-veined,

apex obtuse. Petals loosely connivent with dorsal sepal and forming a hood, oblong-ovate, 4–5 × 2.5–3 mm, 3-veined, apex obtuse; lip orbicular-obovate, deeply 3-lobed near base, 8–10 × 8–10 mm; lateral lobes linear-oblong, slightly oblique, 5–6 × 1–1.3 mm, 1- or 2-veined, apex obtuse; mid-lobe spatulate, ca. 7 × 3–5 mm, 3–5-veined, margin slightly crenulate, apex obtuse-rounded; spur pendulous, cylindrical, slightly incurved, 11–12 mm, ca. as long as to slightly exceeding ovary, neck wide, attenuate toward apex, apex obtuse. Fl. Jul.

• W Sichuan.

**8. *Amitostigma tibeticum*** Schlechter, Repert. Spec. Nov. Regni Veg. 20: 379. 1924.

西藏无柱兰 xi zang wu zhu lan

*Orchis tibetica* (Schlechter) Soó.

Plants 6–8 cm tall. Tubers ellipsoid to globose, ca. 5 mm in diam. Stem purple, with 1 or 2 tubular sheaths at base, 1-leaved. Leaf subbasal, erect, purple, ligulate, lanceolate, or oblanceolate, 2.5–3 × 0.5–0.6 cm, apex subacute or subobtuse. Peduncle ebracteate; rachis 1-flowered; floral bract oblong-lanceolate, 8–14 mm, exceeding ovary, apex subacute. Flower suberect, pinkish purple to mauve, rather large; ovary and pedicel 7–10 mm. Dorsal sepal erect, narrowly ovate-oblong, slightly concave, ca. 7 × 2–3 mm, 3-veined, apex obtuse; lateral sepals spreading to reflexed, sometimes twisted, narrowly ovate-oblong, slightly oblique, ca. 7 × 3.5 mm, 3-veined, apex obtuse. Petals loosely connivent with dorsal sepal and forming a hood, narrowly ovate, slightly oblique, ca. 6 × 3 mm, 2-veined; lip obovate to orbiculate, 8–9 × ca. 6 mm, base broadly cuneate, 3-lobed below middle; lateral lobes ovate-triangular, oblique, 1.5–3.5 × 1–3 mm, margin irregularly serrate, apex acute or obtuse; mid-lobe orbiculate, 4.5–6 × 4–5 mm, margin irregularly serrate, apex slightly emarginate; spur pendulous, cylindrical, slightly incurved, 8–9 mm, ca. as long as to slightly exceeding ovary, slightly attenuate, apex obtuse; viscidia ovoid; stigma lobes oblong. Fl. Aug.

• Alpine meadows; 3600–4400 m. SE Xizang, NW Yunnan.

**9. *Amitostigma parceflorum*** (Finet) Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 4: 94. 1919.

少花无柱兰 shao hua wu zhu lan

*Peristylus tetralobus* Finet f. *parceflorus* Finet, Rev. Gén. Bot. 13: 525. 1901; *Orchis parceflora* (Finet) Handel-Mazzetti; *O. tetraloba* (Finet) Schlechter var. *parceflora* (Finet) Soó.

Plants 10–15 cm tall. Tubers subglobose, ca. 8 × 6 mm. Stem with 2 tubular sheaths at base, 1-leaved. Leaf cauline, porrect, linear to elliptic-lanceolate, ca. 3.5 × 0.4 cm, apex acute. Peduncle ebracteate; rachis 2–4 cm, laxly 3–5-flowered; floral bracts lanceolate, ca. 3 mm, much shorter than ovary, apex acute. Flowers rose-red; ovary and pedicel 7–9 mm. Dorsal sepal erect, ovate-oblong, slightly concave, 2–3 × ca. 1.3 mm, 1-veined, apex obtuse; lateral sepals spreading, oblong, slightly oblique, 2.2–3.5 × ca. 1.4 mm, 1-veined, apex obtuse. Petals erect or loosely connivent with dorsal sepal and forming a hood, ovate, oblique, 2–3 × ca. 1.7 mm, 1-veined, apex acute;

lip oblong-obovate, 6–8 × ca. 4 mm, 3-lobed below middle; lateral lobes narrowly oblong, slightly falcate, 3–4 × ca. 1 mm, broadening slightly toward apex, apex truncate-obtuse; mid-lobe oblanceolate, ca. 5 × 3.5 mm, widening gradually from narrow base, deeply divided above middle to form 2 distinct lobules, sinus usually with a small tooth; spur pendulous, straight to slightly incurved, cylindrical, 4–6 mm, shorter than ovary, attenuate toward apex, apex acute; viscidia suborbicular; stigma lobes oblong. Fl. Jul.

- Forests; ca. 2000 m. Chongqing, NE Sichuan.

**10. *Amitostigma tetralobum*** (Finet) Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 4: 95. 1919.

滇蜀无柱兰 dian shu wu zhu lan

*Peristylus tetralobus* Finet, Rev. Gén. Bot. 13: 524. 1901; *Amitostigma yunnanense* Schlechter; *Orchis tetraloba* (Finet) Schlechter; *O. tetraloba* var. *yunnanensis* (Schlechter) Soó.

Plants 7–26 cm tall. Tubers subglobose to oblong, 10–15 × 5–10 mm. Stem with 2 tubular sheaths at base, 1-leaved. Leaf cauline, porrect, linear-lanceolate, 2–8 × 0.3–0.8 cm, apex acute. Peduncle ebracteate or with 1 occasionally foliaceous sterile bract; rachis 1–3.5 cm, laxly to subdensely 3- to more than 10-flowered; floral bracts lanceolate, 3–6 mm, usually shorter than ovary, apex acute. Flowers secund, pink to pale purple; ovary and pedicel 6–9 mm. Dorsal sepal erect, oblong-ovate, concave, 2.5–3.3 × ca. 2 mm, 1-veined, apex obtuse; lateral sepals spreading to reflexed, ovate, slightly oblique, 3–4 × ca. 1.8 mm, 1-veined, apex obtuse. Petals loosely connivent with dorsal sepal and forming a hood, broadly ovate, slightly oblique, 2.8–3.5 × ca. 2 mm, 1-veined, apex obtuse; lip rhombic-obovate, 4.5–6(–8) × 3.5–4 mm, 3-lobed near middle; disk finely papillate; lateral lobes oblong-obovate, 2–3.5 × 1.6–2 mm, apex obtuse-truncate; mid-lobe oblong-obovate, 2.5–4 × ca. 2 mm, base attenuate, apex usually obtuse-truncate, or occasionally emarginate to shallowly notched to form 2 small lobules; spur ± pendulous, slightly incurved, cylindrical, 3.5–6 mm, slightly dilated toward apex, apex obtuse; viscidia narrowly elliptic; stigma lobes clavate. Fl. Jun–Aug.

- Rocky soils in forests, grassy slopes; 1500–2700 m. SW Sichuan, SW and W Yunnan.

**11. *Amitostigma capitatum*** Tang & F. T. Wang, Bull. Fan Mem. Inst. Biol. Bot. 7: 4. 1936.

头序无柱兰 tou xu wu zhu lan

Plants 8–14 cm tall. Tubers ellipsoid, 6–8 mm. Stem with 1 or 2 tubular sheaths at base, 1-leaved. Leaf cauline, porrect, narrowly elliptic to narrowly oblong, 3.5–5 × 0.5–1.5 cm, apex acute. Peduncle ebracteate; rachis 0.8–1 cm, densely several to more than 10-flowered; floral bracts lanceolate, 3–5 mm, nearly as long as ovary, apex acuminate. Flowers white; ovary and pedicel 4–6 mm. Dorsal sepal ovate-elliptic, concave, 2–2.2 × 1.5–1.7 mm, inner surface finely papillate, 1-veined, apex obtuse; lateral sepals ovate-elliptic, oblique, 2.5–3 × 2–2.2 mm, inner surfaces finely papillate, 1-veined, apex obtuse. Petals broadly ovate, oblique, 1.5–1.8 × 1.8–2 mm, inner surfaces finely papillate, 2-veined, apex obtuse; lip obovate, ca. 5 × 3.3

mm, concave at base, 3-lobed near middle; lateral lobes ovate-oblong, slightly oblique, ca. 1.5 × 0.5 mm, apex obtuse; mid-lobe oblong, ca. 1.6 × 0.5 mm, apex truncate and shallowly notched, sinus with a small, acute tooth; spur pendulous, globose, ca. 1 mm, apex rounded; viscidia oblong; stigma lobes clavate. Fl. Jul.

- Rocky soils and damp places in forests; 2600–3600 m. W Hubei, E and W Sichuan.

**12. *Amitostigma gracile*** (Blume) Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 4: 93. 1919.

无柱兰 wu zhu lan

*Mitostigma gracile* Blume, Mus. Bot. 2: 190. 1856; *Amitostigma chinense* (Rolfe) Schlechter; *A. formosensis* (S. S. Ying) S. S. Ying; *A. yunkianum* Fukuyama; *Cynosorchis chinensis* Rolfe; *C. gracilis* (Blume) Kraenzlin; *Gymnadenia gracilis* (Blume) Miquel; *G. tryphiiformis* H. G. Reichenbach; *Orchis formosensis* S. S. Ying; *O. gracilis* (Blume) Soó; *O. gracilis* var. *chinensis* (Rolfe) Soó; *O. sooi* S. S. Ying; *O. yunkiana* (Fukuyama) S. S. Ying; *Ponerorchis formosensis* (S. S. Ying) S. S. Ying.

Plants 7–25 cm tall. Tubers ovoid to oblong-ellipsoid, 8–15 × 5–10 cm. Stem with 1 or 2 tubular sheaths at base, 1-leaved. Leaf usually basal, porrect, oblong to ovate-lanceolate, 3–12 × 0.8–3 cm, apex obtuse or acute. Peduncle with 1 sterile bract; rachis 0.5–4 cm, subdensely 5- to more than 15-flowered; floral bracts ovate-lanceolate, 2–3 mm, much shorter than ovary. Flowers often secund, pink, purplish red, or purple; ovary and pedicel 4–8 mm, usually straight. Dorsal sepal ovate, concave, 2–3 × 1.2–2 mm, 1-veined, apex obtuse; lateral sepals erect to spreading, ovate to obovate, slightly oblique, 2–3 × 1.2–1.8 mm, 1-veined, apex obtuse. Petals connivent with dorsal sepal and forming a hood, elliptic to ovate, oblique, 2–3 × ca. 2 mm, 1-veined, apex acute to obtuse; lip obovate, 3.5–5(–7) × 2.5–3.2 mm, 5–7(–9)-veined, base cuneate, 3-lobed above middle; lateral lobes linear-oblong to triangular, often falcate, 1–2 × 0.5–0.8 mm, apex obtuse-truncate or acute; mid-lobe obovate, 2–2.8 × 1.2–1.8 mm, larger than lateral lobes, apex truncate or obtuse-rounded, sometimes emarginate; spur pendulous, straight to very slightly incurved, cylindrical, 1–2.5(–3.5) mm, much shorter than ovary, apex obtuse; viscidia elliptic; stigma lobes subclavate. Fl. Jun–Jul, fr. Sep–Oct.  $2n = 42$ .

Damp rocky soils in forests, crevices, valleys; 200–3000 m. Anhui, N Fujian, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Liaoning, Shaanxi, Shandong, Sichuan, Taiwan, Zhejiang [Japan, Korea].

**13. *Amitostigma trifurcatum*** Tang, F. T. Wang & K. Y. Lang, Acta Phytotax. Sin. 20: 80. 1982.

三叉无柱兰 san cha wu zhu lan

Plants 24–36 cm tall. Tubers globose, 7–10 mm in diam. Stem with 2 tubular sheaths at base, 1-leaved. Leaf cauline, porrect, narrowly oblong-lanceolate, 5.5–7.5 × 0.5–0.7 cm, apex acute. Peduncle with 2 occasionally foliaceous sterile bracts; rachis 2–6 cm, subdensely 6–9-flowered; floral bracts lanceolate, 4–5 mm, shorter than ovary, apex acuminate. Flowers

second, rose-pink with darker spots on lip; ovary and pedicel 6–7 mm. Dorsal sepal erect, narrowly elliptic-lanceolate, 3–4 × 1–1.5 mm, 1-veined, apex subacute; lateral sepals spreading to reflexed, narrowly elliptic-lanceolate, slightly oblique, 3.2–4.2 × 1–1.5 mm, apex subacute. Petals forming a hood to erect, narrowly ovate-lanceolate, slightly oblique, 3–3.8 × ca. 1.5 mm, 1-veined, apex subacute; lip narrowly elliptic, 5–7.5 × 2.4–3 mm, with 5 stout, raised veins, 3-lobed below middle; lateral lobes lanceolate to narrowly triangular, 1–1.5 × ca. 0.3 mm, apex obtuse or acute; mid-lobe oblong-ligulate, 3.5–4 × 1–1.5 mm, apex obtuse; spur pendulous, subconic to broadly cylindrical, 1–1.5 mm, apex obtuse; viscidia narrowly ovate, large; stigma lobes subclavate. Fl. Sep.

- Marshes, wet grasslands; ca. 2900 m. NW Yunnan.

**14. *Amitostigma basifoliatum*** (Finet) Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 4: 92. 1919.

四裂无柱兰 *si lie wu zhu lan*

*Peristylus tetralobus* Finet f. *basifoliatum* Finet, Rev. Gén. Bot. 13: 525. 1901; *Orchis basifoliata* (Finet) Schlechter.

Plants 10–23 cm tall. Tubers subglobose, 5–10 mm. Stem with 2 tubular sheaths at base, 1-leaved. Leaf basal or cauline, porrect, narrowly oblong-lanceolate, 3.5–7 × 0.5–1.4 cm, apex acute. Peduncle ebracteate; rachis 0.5–3 cm, ± laxly 4- to densely more than 10-flowered; floral bracts ovate-lanceolate, 3–6 mm, shorter than ovary, apex acute to acuminate. Flowers second, white often tinged pinkish red, with purple spots on lip; ovary and pedicel 6–10 mm. Dorsal sepal erect, ovate-oblong, concave, 3–3.5 × ca. 1.7 mm, 1-veined, apex obtuse; lateral sepals spreading to reflexed, oblong, oblique, 4–4.5 × ca. 2 mm, 1-veined, apex obtuse. Petals connivent with dorsal sepal and forming a hood, rhombic-ovate, 4–4.5 × ca. 2.5 mm, 1-veined, apex acute; lip broadly obovate, 5–7 × 7–9 mm, 3-lobed below middle; lateral lobes oblong, slightly falcate, 3–5 × 2–3 mm, apex irregularly obtuse-toothed; mid-lobe obovate-flabellate, 4–5 × 4–6 mm, base cuneate, apex truncate, irregularly crenulate to shallowly notched to form 2 small lobules, sinus often with a short obtuse tooth; spur pendulous, straight to slightly incurved, cylindrical, 2–3 mm, apex obtuse; viscidia ovoid; stigma lobes clavate-oblong. Fl. Jun–Jul.

- Damp places in forests, grassy slopes; 2600–3800 m. SW Sichuan, NE and NW Yunnan.

**15. *Amitostigma faberi*** (Rolfe) Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 4: 93. 1919.

峨眉无柱兰 *e mei wu zhu lan*

*Habenaria faberi* Rolfe, Bull. Misc. Inform. Kew 1896: 201. 1896; *Gymnadenia faberi* (Rolfe) Rolfe; *Orchis faberi* (Rolfe) Soó.

Plants 3.5–15(–21) cm tall. Tubers ovoid, 5–10 mm. Stem with 1 or 2 tubular sheaths at base, 1-leaved. Leaf cauline, porrect, linear-lanceolate to narrowly oblong-elliptic, 3–6 × 0.5–1.3 cm, apex acute or obtuse. Peduncle with 1 sterile bract; rachis 1.5–8 cm, several to more than 10-flowered (rarely 1- or 2-flowered); floral bracts ovate-lanceolate, ca. 3 mm, much shorter than ovary, apex acuminate. Flowers often second,

pinkish purple; ovary and pedicel 8–10 mm. Dorsal sepal broadly oblong-elliptic, concave, 2.5–3.5 × 2–3 mm, 1-veined, apex obtuse; lateral sepals spreading, broadly ovate, slightly oblique, 3–4 × 2–3 mm, 1-veined. Petals connivent with dorsal sepal and forming a hood, broadly ovate-orbicular, slightly oblique, 2–3 × 2.5–3 mm, 1-veined, margin somewhat undulate, apex obtuse; lip broadly ovate-orbicular, 6–7.5 × 6.2–7.5 mm, base cuneate, 3-lobed below middle; disk densely papillate; lateral lobes overlapping mid-lobe, oblong, slightly falcate, 2.5–3.8 × ca. 1.5 mm, apical margin crenate, apex obtuse; mid-lobe obovate, 3–4.2 × 6–7 mm, base cuneate and shortly clawed, apical margin irregularly crenate, deeply notched toward apex to form 2 distinct lobules, sinus with an obtuse tooth; spur pendulous, slightly incurved, cylindrical-clavate, 5–6 mm, slightly dilated toward apex, apex obtuse; viscidia ovate-lanceolate; stigma lobes clavate. Fl. Jul.

- Forests, scrub, valleys, crevices, alpine grasslands, grassy slopes; (600–)2300–4300 m. NE Guizhou, Sichuan, NW Yunnan.

**16. *Amitostigma gonggashanicum*** K. Y. Lang, Acta Phytotax. Sin. 22: 312. 1984.

贡嘎无柱兰 *gong sha wu zhu lan*

Plants 16–30 cm tall. Tubers ovoid to globose, 10–15 × ca. 10 mm. Stem with 2 tubular sheaths at base, 1-leaved. Leaf cauline, erect, narrowly oblong-elliptic, 5.5–8 × 0.6–1.6 cm, apex acute. Peduncle ebracteate; rachis 2.5–5 cm, subdensely 3–14-flowered; floral bracts lanceolate or ovate-lanceolate, shorter than ovary, apex acute. Flowers purplish red, 1–2 cm in diam., lip white; ovary and pedicel 15–20(–25) mm. Dorsal sepal erect, oblong-ovate, ca. 7 × 3.5 mm, 3-veined, apex obtuse; lateral sepals spreading, oblong-ovate, slightly oblique, ca. 7.2 × 3.5 mm, 3-veined, apex obtuse. Petals connivent with dorsal sepal and forming a hood, ovate, ca. 6 × 4 mm, 3(–5)-veined, apex obtuse; lip broadly ovate, ca. 13 × 13 mm, with a dense cluster of hairs near base, deeply 3-lobed near base; lateral lobes obovate, ca. 4 × 4 mm, margin undulate, apex obtuse; mid-lobe broadly obovate, ca. 7 × 6 mm, margin undulate, deeply notched toward apex to form 2 distinct lobules, sinus with a small obtuse tooth; spur pendulous, cylindrical-conic, ca. 4 mm, apex obtuse; viscidia ovate; stigma lobes elliptic. Fl. Jun–Jul.

- Forests; 2400–3800 m. SW Sichuan.

**17. *Amitostigma alpestre*** Fukuyama, Bot. Mag. (Tokyo) 49: 664. 1935.

台湾无柱兰 *tai wan wu zhu lan*

*Orchis alpestre* (Fukuyama) S. S. Ying.

Plants 5–20 cm tall. Tubers ovoid to subglobose, 5–7 × 3–4 mm. Stem with 2 tubular sheaths at base, (1 or)2-leaved. Leaves cauline, erect to porrect, usually widely spaced, oblanceolate to linear, 3.5–7.5 × 0.5–1 cm, apex acute. Peduncle ebracteate; rachis less than 1 cm, 2–4-flowered; floral bracts green or purple, lanceolate, 5–7 mm, slightly shorter than ovary, apex acuminate. Flowers often second, pale pink to white with darker pink spots on lip; ovary and pedicel 5–8 mm. Dorsal sepal erect, ovate-oblong, concave, 4–5 × 2–2.5 mm, 1-veined,

apex obtuse; lateral sepals spreading, narrowly elliptic or ovate-oblong, slightly oblique, 5–6.5 × 2–3 mm, 3-veined, apex acute. Petals connivent with dorsal sepal and forming a hood, ovate-lanceolate, slightly oblique, 4–5 × 1.4–1.6 mm, 1–3-veined, apex obtuse; lip obovate, 5–6.5 × 4.5–5.5 mm, 3-lobed near middle; disk finely papillate; lateral lobes ovate-oblong, falcate, 2.8–3.5 × ca. 0.5 mm, apex acute or obtuse; mid-lobe obovate-quadrangle, 4–4.5 × ca. 4.5 mm, apex truncate and shallowly notched to form 2 lobules, sinus with a small tooth; spur pendulous, slightly incurved, cylindrical, 4–4.5 mm, shorter than ovary, slightly attenuate toward apex, apex obtuse; viscidia ovate. Fl. Jul.

• Alpine grasslands, rocky patches; 2500–3800 m. C and N Taiwan.

**18. *Amitostigma yuanum*** Tang & F. T. Wang, Bull. Fan Mem. Inst. Biol. Bot. 10: 26. 1940.

齿片无柱兰 *chi pian wu zhu lan*

Plants 7.5–15 cm tall. Tubers globose, 3–5 mm in diam. Stem with 1 or 2 tubular sheaths at base, 2-leaved. Leaves cauline, erect to prostrate, widely spaced, narrowly ovate, oblong-lanceolate, or oblanceolate, 0.6–3.5 × 0.3–0.6 mm, apex acute. Peduncle ebracteate; rachis 1- or 2-flowered; floral bracts narrowly ovate to oblong-lanceolate, 7–8 mm, ca. as long as ovary, apex acute or acuminate. Flowers pink or white, 1–1.5 cm in diam.; ovary and pedicel 7–8 mm. Dorsal sepal erect, concave, oblong, ca. 4 × 1.5–2 mm, 1-veined, apex obtuse; lateral sepals reflexed, ovate-oblong, slightly oblique, ca. 5 × 2.5 mm, 1-veined, apex acute. Petals loosely connivent with dorsal sepal and forming a hood, ovate, ca. 3 × 2 mm, 3-veined, margin crenulate, apex acute; lip orbicular to transversely elliptic, ca. 7 × 8.5 mm, 3-lobed toward apex; disk finely papillate; lateral lobes quadrate, oblique, ca. 2 × 2.5 mm, slightly widened toward apex, 3-veined, apical margin crenulate, apex truncate; mid-lobe subquadrate, smaller than lateral lobes, ca. 1.3 × 2 mm, 3-veined, apex truncate and shallowly notched, sinus with a small acute tooth; spur pendulous, straight to slightly incurved, cylindrical, 5–7 mm, slightly shorter than ovary, slightly attenuate toward apex, apex obtuse; viscidia ellipsoid; stigma lobes oblong. Fl. Jul–Aug.

• On moss in *Rhododendron* thickets, alpine grasslands; 3000–3700 m. SE Xizang, NW Yunnan.

**19. *Amitostigma papilionaceum*** Tang, F. T. Wang & K. Y. Lang, Acta Phytotax. Sin. 20: 83. 1982.

蝶花无柱兰 *die hua wu zhu lan*

Plants 2–3.5 cm tall. Tubers oblong, 6–10 × ca. 4 mm. Stem with tubular sheaths at base, 2-leaved. Leaves basal, subopposite, prostrate, ovate-orbicular, elliptic, or lanceolate, 0.3–0.7 × 0.1–0.6 cm, slightly fleshy, apex acute. Peduncle ebracteate; rachis 1-flowered; floral bract ovate-lanceolate, ca. 3 mm, much shorter than ovary, apex acute. Flower horizontal to erect, pale purple, with dark purple spots at base of lip, rather large; ovary and pedicel ca. 7 mm. Dorsal sepal erect, ovate-lanceolate, concave, 4–5 × 1.3–1.5 mm, 1-veined, apex subobtusely; lateral sepals spreading, oblong-lanceolate, slightly oblique, 4–5 ×

1.3–1.5 mm, 1-veined, apex subobtusely. Petals connivent with dorsal sepal and forming a hood, ovate, slightly oblique, 4.5–5.5 × 2–2.5 mm, 1- or 2-veined, apex subobtusely; lip broadly elliptic-obovate, 7–9 × 5–8 mm, deeply 3-lobed below middle; lateral lobes linear-oblong, 3–4.5 × 1–2 mm, 1-veined, apex obtuse; mid-lobe spatulate to obovate, 5–5.5 × 4–5 mm, 3-veined, margin denticulate, apex rounded; spur pendulous, globose, 1.5–2 mm, apex rounded. Fl. Jul.

• Rocky soils, cliffs; ca. 2500 m. NW Sichuan.

**20. *Amitostigma bifoliatum*** Tang & F. T. Wang, Bull. Fan Mem. Inst. Biol. Bot. 7: 127. 1936.

棒距无柱兰 *bang ju wu zhu lan*

Plants 6.5–17 cm tall. Tubers ovoid to ellipsoid, ca. 10 × 5–6 mm. Stem with 2 tubular sheaths at base, 2-leaved. Leaves basal, subopposite, erect to prostrate, broadly ovate to ovate-lanceolate, 1.5–3 × 0.4–0.8 cm, apex acute to acuminate. Peduncle ebracteate; rachis 2–5 cm, subdensely several to more than 10-flowered; floral bracts lanceolate, shorter than ovary, apex acuminate. Flowers mostly secund, pale purple; ovary and pedicel ca. 8 mm. Dorsal sepal elliptic-ovate, concave, ca. 4 × 2 mm, 1-veined, apex acute; lateral sepals reflexed, ovate-lanceolate, slightly oblique, ca. 4 × 2 mm, 1-veined, apex acute. Petals connivent with dorsal sepal and forming a hood, ovate, oblique, ca. 3.5 × 1.5 mm, 1-veined, apex acute; lip rhombic, ca. 6 × 5–7 mm, 3-lobed below middle; disk finely papillate; lateral lobes linear; mid-lobe cuneate-oblong, ca. 3 mm, apex slightly dilated and irregularly serrulate; spur pendulous, slightly incurved, cylindrical-clavate, ca. 3 mm, neck contracted, apex obtuse; viscidia elliptic; stigma lobes clavate. Fl. Aug–Sep.

• Damp places, shrubby slopes, grasslands; 700–1200 m. S Gansu, N Sichuan.

**21. *Amitostigma wenshanense*** W. H. Chen, Y. M. Shui & K. Y. Lang, Acta Bot. Yunnan. 25: 521. 2003.

文山无柱兰 *wen shan wu zhu lan*

Plants ca. 20 cm tall. Tubers oblong, ca. 40 × 15 mm. Stem with 1 or 2 tubular sheaths at base, 2-leaved. Leaves basal, subopposite, erect to prostrate, oblong-oblanceolate, 6–6.5 × 1–1.6 cm, apex acute. Peduncle ebracteate; rachis 1.5–2.5 cm, subdensely 6–9-flowered; floral bracts ovate-lanceolate, 1.5–2.5 mm, shorter than ovary, apex acute. Flowers not secund; ovary and pedicel ca. 8 mm. Dorsal sepal oblong-lanceolate, ca. 3 × 2 mm, 1-veined, apex obtuse; lateral sepals reflexed, obovate, oblique, ca. 4 × 2.5 mm, 1-veined, apex acute. Petals connivent with dorsal sepal and forming a hood, ovate, oblique, ca. 3 × 2 mm, 1-veined, apex acute; lip ovate, 4.5–5 × ca. 1.5 mm, 3-lobed above middle; disk with 2 short longitudinal lamellae; lateral lobes ovate; mid-lobe lanceolate, ca. 1.8 mm, apex obtuse; spur pendulous, slightly incurved, subglobose, ca. 1.3 mm, apex rounded. Fl. Aug.

• Damp places in forests; ca. 3000 m. Yunnan.

**22. *Amitostigma physoceras*** Schlechter, Acta Horti Gothob. 1: 133. 1924.

球距无柱兰 *qiu ju wu zhu lan*

*Orchis physoceras* (Schlechter) Soó.

Plants 6–11 cm tall. Tubers subglobose, ca. 10 mm in diam. Stem 2-leaved. Leaves basal, subopposite, usually appressed to substratum, ovate to ovate-lanceolate, 1–2 × 0.7–1.4 cm, apex acute to subacuminate. Peduncle ebracteate; rachis to 6 cm, subdensely 3–10-flowered; floral bracts lanceolate, much shorter than ovary, apex acuminate. Flowers secund, pinkish purple; ovary and pedicel 5–9 mm. Dorsal sepal erect, lanceolate to ovate-lanceolate, concave, ca. 5 × 2 mm, 1-veined, apex acuminate; lateral sepals reflexed, lanceolate to ovate-lanceolate, slightly oblique, concave, ca. 5 × 2 mm, 1-veined, apex

acuminate. Petals ovate-lanceolate, ca. 5 × 3 mm, 1-veined, apex acute; lip ovate, ca. 9 × 7–8 mm, base broadly cuneate, deeply 3-lobed; disk finely papillate; lateral lobes slightly diverging, obovate-subrhombic, oblique, ca. 3 mm, apical margin subcrenulate, apex obtuse; mid-lobe suborbicular-obovate, ca. 5 × 4 mm, margin irregularly denticulate, apex obtuse; spur pendulous, with a short, contracted neck and then dilated and globose, ca. 3 mm, much shorter than ovary; viscidia elliptic; stigma lobes clavate. Fl. Jul–Aug.

• Forests, damp places along cliffs, valleys; 2000–2700 m. NW and W Sichuan.

**37. NEOTTIANTHE** (Reichenbach) Schlechter, *Repert. Spec. Nov. Regni Veg.* 16: 290. 1919.

兜被兰属 *dou bei lan shu*

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

*Himantoglossum* subg. *Neottianthe* Reichenbach, *Icon. Bot. Pl. Crit.* 6: 26. 1828; *Symphiosepalum* Handel-Mazzetti.

Herbs, terrestrial, slender. Tubers subglobose to ovoid, unlobed, fleshy, neck with several slender roots. Stem erect or ascending, with tubular sheaths at base, (1 or)2-leaved, glabrous. Leaves basal, subopposite, (though cauline, alternate, and widely spaced in *Neottianthe secundiflora*), base contracted into amplexicaul sheath. Inflorescence a terminal raceme, glabrous; peduncle elongate, with 1 to a few scattered sterile bracts; rachis usually several to many flowered, rarely with a solitary flower. Flowers often secund, resupinate, pink, purple, or rarely pale yellow; ovary slightly twisted, cylindrical-fusiform, glabrous. Sepals connivent and forming a hood, narrowly oblong to lanceolate, subequal in size. Petals appressed to dorsal sepal, linear to oblong; lip spreading, spurred at base, 3-lobed; disk densely finely papillate; lobes linear to oblong; mid-lobe longer and wider than lateral lobes; spur straight or curved forward. Column erect, short; anther erect, oblong or ellipsoid, apex obtuse, 2-locular, locules parallel; pollinia 2, oblong, granular-farinaceous, sectile; caudicles short; viscidia small, ovate, orbicular, or elliptic, naked; rostellum small, 3-lobed, raised, deltoid; stigma lobes confluent, raised, lying below rostellum; auricles 2, on either side of anther, small, inconspicuous, suborbicular. Capsule erect.

About seven species: E Europe, through Russia and China to Japan, extending to alpine areas of subtropical Asia; seven species (five endemic) in China.

- 1a. Flowers pale yellow to yellowish green; spur ca. 2.5 mm ..... 6. *N. luteola*
- 1b. Flowers pink, purplish red, or purple; spur 2.8–20 mm.
  - 2a. Rachis 1- or rarely 2-flowered; lip 12–13 × 12–13 mm; spur 15–20 mm ..... 7. *N. camptoceras*
  - 2b. Rachis 2–22-flowered; lip 4–10 × 1–7 mm; spur 2.8–7 mm.
    - 3a. Plants 1-leaved.
      - 4a. Leaf blade ovate or broadly ovate, 1.2–1.6 × 1–1.2 cm; spur ca. 3 × 1.5 mm ..... 4. *N. ovata*
      - 4b. Leaf blade oblong, 4–6 × 1.2–1.8 cm; spur 5–6 × 1.8–2 mm ..... 5. *N. oblonga*
    - 3b. Plants usually 2-leaved.
      - 5a. Leaves cauline, alternate, widely spaced ..... 3. *N. secundiflora*
      - 5b. Leaves basal, subopposite.
        - 6a. Plants 8–9 cm tall; dorsal sepal 9–10 × 3–3.5 mm; lateral sepals 10–11 × 3.5–4 mm ..... 2. *N. compacta*
        - 6b. Plants (4–)8–24 cm tall; dorsal sepal 4–7 × 1.5–2.7 mm; lateral sepals 5–8 × 1.5–2.8 mm ..... 1. *N. cucullata*

**1. Neottianthe cucullata** (Linnaeus) Schlechter, *Repert. Spec. Nov. Regni Veg.* 16: 292. 1919.

二叶兜被兰 *er ye dou bei lan*

Plants (4–)8–24 cm tall. Tubers subglobose to ovoid, 8–15 mm. Stem erect or ascending, with 1 or 2 tubular sheaths at base, (1 or)2-leaved. Leaves basal, subopposite, dark green, adaxially often with purple spots, ovate, elliptic, oblanceolate-spatulate, or narrowly oblong, 2.2–9 × (0.5–)1–3 cm, apex acute to obtuse. Peduncle ebracteate or with 1–4 sterile bracts; rachis 1.5–8 cm, laxly to subdensely 4–22-flowered; floral bracts lanceolate, 5–12 mm, lower ones exceeding ovary, apex acuminate. Flowers often secund, rose-pink to deep purple;

ovary and pedicel slightly arcuate, 5–7 mm. Sepals connivent and forming a hood; hood 5–8 × 3–5 mm; dorsal sepal oblong-lanceolate to lanceolate, (4–)5–7 × 1.5–2.7 mm, 1-veined, apex acute; lateral sepals lanceolate, oblique, 5–8 × 1.5–2.8 mm, 1-veined, apex acute to acuminate. Petals appressed to dorsal sepal, linear-lanceolate, 4–7 × 0.5–1.2 mm, 1-veined, apex acute to acuminate; lip spreading, narrowly oblong, 5–10 × 1.8–3 mm, base cuneate, 3-lobed near middle; lateral lobes linear-lanceolate, 2–6 × 0.3–0.5 mm, 1-veined, apex acute; mid-lobe linear-lanceolate, 4–8 × 1–2 mm, 3-veined, apex obtuse; spur pendulous, straight to strongly curved forward, cylindrical-conic, 4–6 mm, ca. 1 mm in diam. at base, apex obtuse. Fl. Jul–Oct.

Forests, thickets, grassy slopes, alpine grasslands; 400–4500 m.

Anhui, N Fujian, Gansu, NE Guizhou, Hebei, Heilongjiang, Henan, W Hubei, Jiangxi, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang, NW Yunnan, Zhejiang [Bhutan, N India, Japan, Korea, Mongolia, Nepal, Russia; E Europe].

- 1a. Leaves (0.5–)1–3 cm wide; peduncle with 1–4 sterile bracts; petals 4–5 mm; spur usually strongly curved forward and U-shaped ..... 1a. var. *cucullata*  
 1b. Leaves 0.5–1(–2.2) cm wide; peduncle ebracteate or rarely with 1 sterile bract; petals (4–)5–7 mm; spur straight to slightly curved forward ..... 1b. var. *calvicola*

**1a. Neottianthe cucullata** var. *cucullata*

二叶兜被兰(原变种) er ye dou bei lan (yuan bian zhong)

*Orchis cucullata* Linnaeus, Sp. Pl. 2: 939. 1753; *Gymnadenia cucullata* (Linnaeus) Richard; *G. cucullata* var. *maculata* Nakai & Kitagawa; *G. monophylla* Ames & Schlechter; *G. pseudodiphylax* Kraenzlin; *G. scabrilinguis* Kraenzlin; *Habenaria cucullata* (Linnaeus) Höfft; *Himantoglossum cucullatum* (Linnaeus) H. G. Reichenbach; *Neottianthe angustifolia* K. Y. Lang; *N. cucullata* f. *maculata* (Nakai & Kitagawa) Nakai & Kitagawa; *N. maculata* (Nakai & Kitagawa) Nakai & Kitagawa; *N. monophylla* (Ames & Schlechter) Schlechter; *N. pseudodiphylax* (Kraenzlin) Schlechter; *N. pseudodiphylax* var. *monophylla* (Ames & Schlechter) Soó.

Leaves ovate, elliptic, or sometimes narrowly oblong, (0.5–)1–3 cm wide, base cuneate, apex acute to obtuse. Peduncle with 1–4 small sterile bracts, lowest one sometimes herbaceous; rachis laxly to subdensely 4–22-flowered. Sepals and petals connivent and forming a hood; hood 3–5 mm wide. Dorsal sepal 4–6 × 1.5–2 mm; lateral sepals 1.5–2.5 mm wide. Petals 4–5 × ca. 0.5 mm; spur pendulous, usually strongly curved forward and U-shaped. Fl. Aug–Sep.

Open places in forests, thickets, grassy slopes; 400–4100 m. Anhui, N Fujian, Gansu, Hebei, Heilongjiang, Henan, W Hubei, Jiangxi, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shanxi, W Sichuan, Xizang, NW Yunnan, Zhejiang [Bhutan, N India, Japan, Korea, Mongolia, Nepal, Russia; E Europe].

**1b. Neottianthe cucullata** var. *calvicola* (W. W. Smith) Soó, Ann. Hist.-Nat. Mus. Natl. Hung. 26: 353. 1929.

密花兜被兰 mi hua dou bei lan

*Gymnadenia calvicola* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 8: 188. 1914; *Neottianthe calvicola* (W. W. Smith) Schlechter; *N. gymnadenioides* (Handel-Mazzetti) K. Y. Lang & S. C. Chen; *Symphiosepalum gymnadenioides* Handel-Mazzetti.

Leaves oblanceolate-spatulate to narrowly oblong, 0.5–1(–2.2) cm wide, base gradually tapering, apex usually acute. Peduncle ebracteate or rarely with 1 sterile bract; rachis subdensely 6–20-flowered. Sepals and petals connivent and forming a hood; hood 4.5–5 mm wide. Dorsal sepal 4–7 × (1.5–)2–2.7 mm; lateral sepals (1.5–)2.5–2.8 mm wide. Petals (4–)5–7 × 0.5–1.2 mm; spur pendulous, straight to slightly curved forward. Fl. Jul–Oct.

Forests, thickets, alpine grasslands; 2100–4500 m. SE Gansu, NE Guizhou, S Qinghai, S and W Sichuan, E and S Xizang, NW Yunnan [Bhutan, India (Sikkim), Nepal].

**2. Neottianthe compacta** Schlechter, Acta Horti Gothob. 1: 136. 1924.

川西兜被兰 chuan xi dou bei lan

Plants 8–9 cm tall. Tubers ellipsoid, 10–20 mm. Stem erect, with 1 or 2 tubular sheaths at base, 2-leaved. Leaves basal, subopposite, narrowly oblong to oblong-lanceolate, 5–6 × 1–1.5 cm, apex obtuse. Rachis 3–3.5 cm, densely 6–8-flowered; floral bracts herbaceous, narrowly lanceolate, slightly longer than ovary, apex acuminate. Flowers pink; ovary and pedicel 6–7 mm. Sepals connivent and forming a hood; hood 10–11 × ca. 10 mm; dorsal sepal narrowly oblong-lanceolate, concave, 9–10 × 3–3.5 mm, 3-veined, apex subacute; lateral sepals lanceolate-falcate, oblique, 10–11 × 3.5–4 mm, 2-veined, apex acuminate. Petals appressed to dorsal sepal, linear-falcate, 8–9 × 1.4–1.5 mm, inner surfaces papillate, 1-veined, apex obtuse; lip reflexed, obovate, 9–10 × ca. 7 mm, base cuneate, 3-lobed below middle; lateral lobes obliquely ligulate, ca. 3 mm, apex obtuse; mid-lobe narrowly ligulate, ca. 6 mm, apex obtuse; spur pendulous, slightly curved forward, cylindrical-conic, 6–7 mm, stout, ca. 2.5 mm in diam. at base, apex obtuse. Fl. Aug.

• Alpine meadows; 4000–4100 m. W Sichuan.

**3. Neottianthe secundiflora** Schlechter, Repert. Spec. Nov. Regni Veg. 16: 291. 1919.

侧花兜被兰 ce hua dou bei lan

*Habenaria secundiflora* J. D. Hooker, Fl. Brit. India 6: 165. 1890, not Barbosa Rodrigues (1881); *Gymnadenia secundiflora* Kraenzlin; *Neottianthe mairei* Schlechter; *Peristylus secundiflorus* Kraenzlin.

Plants 10–35 cm tall. Tubers subglobose to ellipsoid, 8–15 mm. Stem erect, with 1 or 2 tubular sheaths at base, 2-leaved. Leaves cauline, alternate, widely spaced, linear to narrowly oblong, 5–14 × 0.4–1 cm, apex acuminate to subacute. Peduncle with 1–4 sterile bracts, lowest one usually large and herbaceous; rachis 7–9 cm, laxly 8- to densely more than 30-flowered; floral bracts linear-lanceolate, to 25 mm, basal ones exceeding flowers, apex acuminate. Flowers mostly secund, pale to dark purple; ovary and pedicel 6–7 mm. Sepals connivent and forming a hood; hood 5–7 × 3–5 mm; dorsal sepal erect, lanceolate, concave, 5–6 × 1.5–1.8 mm, 1-veined, apex acute; lateral sepals lanceolate-falcate, oblique, 6–7 × 1.8–2.8 mm, 1-veined, apex acute. Petals appressed to dorsal sepal, linear to oblong-lanceolate, 5–5.5 × 0.7–1.2(–1.5) mm, 1-veined, apex acute; lip spreading, slightly reflexed, narrowly oblong, 4.5–6.5 × 2–3 mm, base attenuate, 3-lobed toward apex; lateral lobes oblong-ovate to lanceolate, 0.8–1.8 × 0.5–1 mm, apex obtuse or acute; mid-lobe narrowly oblong-ovate, 1.5–2.2 × 0.8–1.5 mm, apex obtuse or acute; spur pendulous, straight to slightly curved forward, conic, stout, 2.8–4 × 1.5–1.8 mm, apex obtuse. Fl. Aug–Oct.

Forests, grassy slopes; 2700–3800 m. W Sichuan, E and S Xizang, NW Yunnan [Bhutan, India, Myanmar, Nepal].



**4. *Neottianthe ovata*** K. Y. Lang, Acta Phytotax. Sin. 35: 542. 1997.

卵叶兜被兰 luan ye dou bei lan

Plants 6–10 cm tall. Tubers subglobose, ca. 10 mm. Stem erect, with 1 or 2 tubular sheaths at base, 1-leaved. Leaf basal, ovate or broadly ovate, 1.2–1.6 × 1–1.2 cm, base rounded or broadly cuneate, apex acute. Peduncle with 1 small sterile bract; rachis 2–4 cm, subdensely 4–8-flowered; floral bracts lanceolate, 4–6 mm, apex acuminate, basal one ca. as long as ovary. Flowers secund, pale purple or pink; ovary and pedicel slightly arcuate, 4–6 mm. Sepals connivent and forming a hood; hood ca. 6 × 4 mm; dorsal sepal oblong, concave, ca. 6 × 1.6 mm, 1–3-veined, apex obtuse; lateral sepals oblong, ca. 6 × 1.6 mm, 2-veined, apex obtuse. Petals appressed to dorsal sepal, linear, ca. 5.5 × 0.7 mm, 1-veined, apex subobtuse; lip spreading, oblong-ovate, ca. 6 × 3 mm, base cuneate, 3-lobed near middle; lateral lobes linear-lanceolate, ca. 2.5 × 0.4 mm, 1-veined, apex acuminate; mid-lobe oblong, ca. 3.5 × 1 mm, 3-veined, apex subobtuse or rarely notched; spur pendulous, slightly curved forward, conic, ca. 3 mm, stout, ca. 1.5 mm in diam. at base, slightly attenuate, apex obtuse. Fl. Sep.

• Alpine *Pinus* forests, shrubby slopes; 2400–3300 m. W Sichuan.

In the protologue, the specimen *Qinghai-Xizang Exped. 13979* (PE) was indicated as “holotype” and *P. C. Li 207* (PE) was indicated as a “type.” The latter is interpreted as a paratype.

**5. *Neottianthe oblonga*** K. Y. Lang, Acta Phytotax. Sin. 35: 544. 1997.

长圆叶兜被兰 chang yuan ye dou bei lan

Plants 9.5–14 cm tall. Tubers ovoid, ca. 10 mm. Stem erect, with 1 or 2 tubular sheaths at base, 1-leaved. Leaf basal, oblong, 4–6 × 1.2–1.8 cm, apex subobtuse or subacute. Peduncle ebracteate; rachis 4–5 cm, subdensely 5–9-flowered; floral bracts lanceolate, 6–8 mm, shorter than ovary, apex acuminate. Flowers secund, pale purple; ovary and pedicel slightly arcuate, 8–10 mm. Sepals connivent and forming a hood; hood 7–8 × ca. 5 mm; dorsal sepal linear-lanceolate, 6–7.5 × 1.4–1.6 mm, 1-veined, apex acuminate; lateral sepals lanceolate, oblique, 7–8.5 × 2–2.2 mm, 1-veined, apex acuminate. Petals appressed to dorsal sepal, linear, 5–6.5 × 0.8–1 mm, 1-veined, apex acuminate; lip spreading, narrowly oblong-ovate, 8–9 × ca. 4 mm, 3-lobed near middle; lateral lobes linear-lanceolate, 3–3.5 × 0.5–0.7 mm, 1-veined, apex obtuse; mid-lobe lanceolate, 4–4.5 × 1.3–1.5 mm, 3-veined, apex obtuse; spur pendulous, ± straight to slightly curved forward, conic, 5–6 mm, stout, 1.8–2 mm in diam. at base, slightly attenuate, apex obtuse. Fl. Aug.

• *Quercus* forests; ca. 3100 m. NW Yunnan.

**6. *Neottianthe luteola*** K. Y. Lang & S. C. Chen, Acta Phytotax. Sin. 35: 545. 1997.

淡黄花兜被兰 dan huang hua dou bei lan

Plants 13–17 cm tall. Tubers subglobose, 10–15 mm. Stem erect or ascending, with 1 or 2 tubular sheaths at base, 1-leaved. Leaf subbasal, erect-spreading, linear to linear-lanceolate, 9–10 × 0.4–0.6 cm, apex acuminate. Peduncle with 1 small sterile bract above middle; rachis 4–6 cm, densely 9–13-flowered; floral bracts lanceolate, apex acuminate, basal ones exceeding flowers. Flowers not secund, pale yellow to yellowish green, small; ovary and pedicel 5–6 mm. Sepals connivent and forming a hood; hood ca. 4.5 × 4 mm; dorsal sepal erect, oblong, concave, ca. 4.5 × 1.5 mm, 1-veined, apex obtuse; lateral sepals oblong, oblique, ca. 4.5 × 1.5 mm, 1-veined, apex obtuse. Petals appressed to dorsal sepal, oblong, slightly oblique, ca. 4 × 1.4 mm, 1-veined, apex obtuse; lip spreading, obovate, ca. 4 × 2.8 mm, base cuneate, 3-lobed near middle; lateral lobes oblong, ca. 1.5 × 0.7 mm, apical margin irregularly 2- or 3-denticulate, apex obliquely truncate; mid-lobe oblong, ca. 2 × 1 mm, apex notched and forming 2 small teeth; spur pendulous, straight, cylindrical-conic, ca. 2.5 mm, stout, ca. 1.2 mm in diam. at base, apex obtuse. Fl. Sep–Oct.

• Humid grassy slopes; ca. 3000 m. NW Yunnan.

**7. *Neottianthe camptoceras*** (Rolfe) Schlechter, Repert. Spec. Nov. Regni Veg. 16: 292. 1919.

大花兜被兰 da hua dou bei lan

*Habenaria camptoceras* Rolfe, J. Linn. Soc., Bot. 29: 319. 1892; *Amitostigma potaninii* K. V. Ivanova; *A. potaninii* f. *macranthum* K. V. Ivanova; *Galearis constricta* (L. O. Williams) P. F. Hunt; *Galeorchis constricta* (L. O. Williams) Soó; *Gymnadenia camptoceras* (Rolfe) Schlechter; *Orchis constricta* L. O. Williams.

Plants 4.5–10 cm tall. Tubers subglobose, ca. 10 mm. Stem erect, 2-leaved. Leaves basal, subopposite, elliptic to ovate-lanceolate, 2.5–3 × 0.5–1 cm, apex acute. Rachis 1- or rarely 2-flowered; floral bract lanceolate, slightly shorter than ovary, apex acuminate. Flower deep purple, large; ovary and pedicel 12–13 mm. Sepals connivent and forming hood; hood ca. 9 × 8 mm; dorsal sepal narrowly oblong-ovate, concave, ca. 8 × 2.2 mm, 3-veined, apex obtuse; lateral sepals lanceolate-falcate, oblique, ca. 9 × 4 mm, 3-veined, apex obtuse. Petals appressed to dorsal sepal, linear-lanceolate, ca. 7.5 × 1.2 mm, 1- or 2-veined, apex obtuse; lip spreading, broadly oblong-ovate, 12–13 × 12–13 mm, 3-lobed near base; disk with a few white spots; lateral lobes oblong-ligulate, ca. 5 × 2 mm, apex obtuse; mid-lobe ovate-rhombic, ca. 10 × 8 mm, apex rounded-obtuse; spur pendulous, curved forward or hooked near apex, cylindrical, dilated toward apex, 15–20 mm, conspicuously longer than ovary, apex obtuse. Fl. May–Jun.

• Forests, grassy slopes; 2700–3100 m. SW and W Sichuan.

### 38. GYMNADENIA R. Brown in W. T. Aiton, Hortus Kew., ed. 2, 5: 191. 1813.

手参属 shou shen shu

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

*Nigritella* Richard.

Herbs, terrestrial, medium-sized, slender to robust. Tubers palmately lobed, fleshy, neck with several slender, slightly fleshy

roots. Stem erect, terete, fleshy, glabrous, leafy. Leaves cauline, alternate, linear-ligulate to elliptic, basally conduplicate and sheathing stem. Inflorescence capitate to elongate, with a few lanceolate sterile bracts proximally and many flowers in a dense terminal raceme; floral bracts shorter than, equal to, or slightly longer than ovary. Flowers resupinate, small to medium-sized; ovary usually twisted, narrowly cylindrical or fusiform, glabrous. Sepals free, spreading; dorsal sepal concave; lateral sepals reflexed. Petals connivent with dorsal sepal and forming a hood, straight, slightly shorter than sepals; lip broadly rhombic to obovate, concave at base, spurred, conspicuously 3-lobed to entire; spur often slightly arcuate, cylindrical, longer or shorter than ovary, apex obtuse or bilobed. Column short; anther oblong or ovoid, 2-locular; pollinia 2, clavate, granular-farinaceous, sectile, each with a slender caudicle attached to a separate viscidium; viscidia naked, narrowly oblong to elliptic; rostellum small to elongate, inconspicuously 3-lobed; staminodes 2, small, subglobose, placed laterally at base of anther; stigma distinctly 2-lobed, rather large, placed at base of column. Capsule erect.

About 16 species: throughout Europe and parts of C and E Asia, the Himalayas, and Japan; five species (three endemic) in China.

- 1a. Spur 7–14 mm, ca. as long as or exceeding ovary.  
 2a. Leaves linear-lanceolate, narrowly oblong, or lorate, 0.8–2(–2.5) cm wide; mid-lobe of lip usually smaller than lateral lobes ..... 1. *G. conopsea*  
 2b. Leaves elliptic to elliptic-oblong, 2.5–4.5 cm wide; mid-lobe of lip equal to or slightly larger than lateral lobes ..... 2. *G. orchidis*  
 1b. Spur 2–5 mm, much shorter than ovary.  
 3a. Plants 50–70 cm tall; flowers yellowish green; spur shallowly 2-lobed at apex ..... 5. *G. bicornis*  
 3b. Plants 7–50 cm tall; flowers white or pink; spur undivided, apex obtuse.  
 4a. Flowers pink, rarely tinged with white; lip broadly obovate, 3-lobed at apex ..... 3. *G. crassinervis*  
 4b. Flowers white; lip rhombic-ovate, obscurely 3-lobed at apex ..... 4. *G. emeiensis*

**1. *Gymnadenia conopsea*** (Linnaeus) R. Brown in W. T. Aiton, Hortus Kew., ed. 2, 5: 191. 1813.

手参 shou shen

*Orchis conopsea* Linnaeus, Sp. Pl. 2: 942. 1753; *Gymnadenia conopsea* var. *latifolia* Schlechter; *G. conopsea* var. *ussuriensis* Regel; *G. sibirica* Turczaninow ex Lindley; *Habenaria conopsea* (Linnaeus) Benth.

Plants slender to robust, 20–60 cm tall. Tubers ovoid, 1–3.5 cm, with many short, slender lobes. Stem stout, with 2 or 3 tubular sheaths at base and 3–5 cauline leaves. Leaves widely spaced or clustered, linear-lanceolate, narrowly oblong, or lorate, 5.5–20 × 0.8–2(–2.5) cm, apex acuminate to subobtuse. Inflorescence 11–26 cm, slender; peduncle with 1 to a few scattered, lanceolate bracts 1.5–6 cm; rachis 4–12 cm, densely many flowered; floral bracts lanceolate, often longer than ovary and flower, apex long acuminate-caudate. Flowers fragrant, pink, rarely pinkish white; ovary 5–8 mm including pedicel. Dorsal sepal broadly elliptic to broadly ovate-elliptic, 3.5–5 × 3–4 mm, 3-veined, slightly concave, apex acute; lateral sepals reflexed, obliquely ovate, 4–5.5 × 3–4 mm, 3-veined, margin revolute, apex acute. Petals obliquely ovate-triangular, 3.5–5 × 3–4 mm, 3-veined, apex acute; lip spreading, broadly cuneate-obovate, 4–5 × 4–5 mm, 3-lobed at apex; lateral lobes elliptic to broadly ovate, 1.8–3 mm wide, apex obtuse or occasionally truncate; mid-lobe triangular, 1–2 mm wide, usually smaller than lateral lobes, apex obtuse to acute; spur pendulous, curved forward, 10–14 mm, exceeding ovary, slender. Column 1–1.5 mm; viscidia linear-oblong. Fl. Jul–Aug.  $2n = 30, 40, 42, 80, 100, 120$ .

Forests, grasslands, waterlogged meadows; 200–4700 m. SE Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanxi, N and W Sichuan, SE Xizang, NW Yunnan [Japan, Korea, Russia; Europe].

The extensive extra-Chinese synonymy is not cited here.

**2. *Gymnadenia orchidis*** Lindley, Gen. Sp. Orchid. Pl. 278. 1835.

西南手参 xi nan shou shen

*Gymnadenia conopsea* (Linnaeus) R. Brown var. *yunnanensis* Schlechter; *G. cylindrostachya* Lindley; *G. delavayi* Schlechter; *G. himalayica* Schlechter; *G. microgymnadenia* (Kraenzlin) Schlechter; *G. souliei* Schlechter; *G. violacea* Schlechter; *Habenaria microgymnadenia* Kraenzlin; *H. orchidis* (Lindley) J. D. Hooker; *H. stoliczkae* Kraenzlin; *Orchis cylindrostachya* (Lindley) Kraenzlin; *Peristylus orchidis* (Lindley) Kraenzlin.

Plants robust, 15–50 cm tall. Tubers ovoid-ellipsoid, 1–3 cm, with many, slender, elongate lobes. Stem stout, with 2 or 3 tubular sheaths at base and 3–6 cauline leaves. Leaves widely spaced or clustered, elliptic to elliptic-oblong, 4–16 × 2.5–4.5 cm, apex obtuse to acute. Inflorescence 8–23 cm, stout; peduncle with 1–3 scattered, lanceolate bracts 2–5 cm; rachis 3–12 cm, densely many flowered; floral bracts lanceolate, apex acuminate, basal ones longer than flowers. Flowers fragrant, purplish red or pink, very rarely tinged with white; ovary 7–8 mm including pedicel. Dorsal sepal erect, ovate, 3–5 × 2–3.5 mm, 3-veined, apex obtuse; lateral sepals reflexed, ovate, oblique, 4–5 × 2.5–4 mm, 3-veined, margin revolute, apex obtuse. Petals straight, broadly ovate-triangular, oblique, 3–5 × 2.5–3.5 mm, 3-veined, apex obtuse; lip spreading, broadly obovate, 3.5–5.5 × 3–4.5 mm, 3-lobed at apex; lateral lobes ovate, 1–2 mm wide, apex obtuse; mid-lobe triangular, 1–2.2 mm wide, equal to or slightly larger than lateral lobes, apex obtuse to subacute; spur pendulous, slightly curved forward, 7–12 mm, equal to or exceeding ovary, slender. Column ca. 2 mm; viscidia lanceolate. Fl. May–Aug.

Forests, thickets, alpine grasslands; 2800–4100 m. SE Gansu, W Hubei, S Qinghai, S Shaanxi, W Sichuan, E and S Xizang, NW Yunnan [Bhutan, NE India, Kashmir, Nepal, Pakistan].

**3. *Gymnadenia crassinervis*** Finet, Rev. Gén. Bot. 13: 514. 1901.

短距手参 duan ju shou shen

Plants stout or slender, 7–20(–40) cm tall. Tubers ellipsoid, 1–2 cm, with a few slender lobes. Stem stout, with 2 or 3 tubular sheaths at base and 3–5 cauline leaves. Leaves clustered, rarely widely spaced, elliptic-oblong, 3.5–7(–11) × 0.8–2 cm, apex acute. Inflorescence 4–10(–26) cm, stout; peduncle with 1 or 2 lanceolate bracts 2–4(–5) cm; rachis 2–4(–7.5) cm, densely or laxly many flowered; floral bracts lanceolate to ovate-lanceolate, much longer than ovary, apex acuminate. Flowers pink, rarely tinged with white; ovary 5–7 mm including pedicel. Dorsal sepal erect, ovate-oblong to ovate-lanceolate, cymbiform, 2.8–3.5 × 1.2–2 mm, 3-veined, apex acute to obtuse; lateral sepals spreading, ovate-lanceolate, oblique, 3.5–4.5 × 1.5–2.2 mm, 3-veined, apex acute. Petals straight, broadly ovate, 3–4 × 1.8–2.5 mm, 2-veined, apex acute; lip spreading forward, broadly obovate, 3–3.5 × 2–2.8 mm, 3-lobed at apex; lateral lobes obovate-orbicular, 0.5–1 mm wide, apex obtuse-rounded or truncate; mid-lobe triangular, 0.8–1.5 mm wide, longer than lateral lobes, apex obtuse; spur pendulous, usually curved forward, 2–4 mm, much shorter than ovary, slightly dilated toward apex, apex obtuse. Column 0.8–1 mm; viscidia lanceolate. Fl. Jun–Jul, fr. Aug–Sep.

• *Rhododendron* thickets, crevices on rocky slopes; 2000–3800 m. W Sichuan, E and S Xizang, NW Yunnan.

- 1a. Plants short, stout, 7–20 cm tall; leaves clustered; inflorescence 4–10 cm; rachis 2–4 cm, densely many flowered ..... 3a. var. *crassinervis*  
 1b. Plants slender, ca. 40 cm tall; leaves widely spaced; inflorescence ca. 26 cm; rachis ca. 7.5 cm, laxly many flowered ..... 3b. var. *elatior*

**3a. *Gymnadenia crassinervis* var. *crassinervis***

短距手参(原变种) duan ju shou shen (yuan bian zhong)

*Herminium chiwui* Tang & F. T. Wang.

Plants 7–20 cm tall, stout. Leaves clustered, 3.5–7 cm. Inflorescence short, 4–10 cm; rachis 2–4 cm, densely many flowered.

• *Rhododendron* thickets, crevices on rocky slopes; 2000–3800 m. W Sichuan, E and S Xizang, NW Yunnan.

**3b. *Gymnadenia crassinervis* var. *elatior*** Tang & F. T. Wang, Bull. Fan Mem. Inst. Biol. Bot. 7: 131. 1936.

高大手参 gao da shou shen

Plants ca. 40 cm tall, slender. Leaves widely spaced, to 11 cm. Inflorescence elongate, ca. 26 cm; rachis ca. 7.5 cm, laxly 20-flowered.

• “Western China.”

Only the type material for this taxon has been examined. Floral features agree with the typical variety, but the habit is quite different.

**4. *Gymnadenia emeiensis*** K. Y. Lang, Acta Phytotax. Sin. 20: 182. 1982.

峨眉手参 e mei shou shen

Plants robust, 30–50 cm tall. Tubers ellipsoid, 1–3.5 cm, with 4 or 5 elongate lobes. Stem stout, with 3 or 4 tubular sheaths at base and 5 or 6 cauline leaves. Leaves widely spaced, narrowly elliptic to oblong-lanceolate, 9–11 × 2–3 cm, apex subobtuse or acuminate. Inflorescence ca. 14 cm, stout; peduncle with 2 lanceolate bracts 2–4 cm; rachis 6–7 cm, densely many flowered; floral bracts ovate-lanceolate, apex long acuminate, basal ones longer than flowers. Flowers white; ovary 8–9 mm including pedicel. Dorsal sepal erect, ovate, slightly concave, ca. 3 × 2 mm, 3-veined, apex obtuse; lateral sepals spreading, elliptic, oblique, ca. 4 × 2 mm, 3-veined, apex obtuse. Petals straight, broadly rhombic-ovate, oblique, ca. 3 × 2.5 mm, 2-veined, apex obtuse; lip spreading, rhombic-ovate, ca. 3 × 2–2.5 mm, obscurely 3-lobed at apex, apex slightly reflexed; lateral lobes shallow, rounded; mid-lobe ca. 1.5 mm wide, apex obtuse; spur pendulous, curved slightly forward, cylindrical, tapering slightly toward apex, 4–5 mm, much shorter than ovary, apex obtuse. Column ca. 1.5 mm; viscidia lanceolate. Fl. May–Jun.

• Thickets, alpine grasslands; ca. 3100 m. SW Sichuan.

**5. *Gymnadenia bicornis*** Tang & K. Y. Lang, Acta Phytotax. Sin. 16(4): 126. 1978.

角距手参 jiao ju shou shen

Plants somewhat robust, 50–70 cm tall. Tubers ellipsoid, 3–5 cm, with a few slender, elongate lobes. Stem stout, with 2 or 3 tubular sheaths at base and 6–8 cauline leaves. Leaves widely spaced, elliptic, narrowly elliptic, or lanceolate, 9–13 × 2–4 cm, apex acuminate. Inflorescence elongate, ca. 25 cm; peduncle with 2 lanceolate bracts to 5 cm; rachis 8–11.5 cm, densely many flowered; floral bracts ovate-lanceolate to lanceolate, apex acuminate, basal ones longer than flowers. Flowers pale yellowish green, relatively small; ovary 6–7 mm including pedicel. Dorsal sepal erect, broadly ovate, slightly concave, ca. 2.5 × 2 mm, 3-veined, apex obtuse; lateral sepals recurved, broadly ovate, ca. 3 × 2.3 mm, 3-veined, apex obtuse. Petals rhombic-ovate, oblique, ca. 3 × 2.3 mm, 3-veined, apex obtuse; lip rhombic-ovate, ca. 3 × 2.5 mm, almost entire; lateral lobes much reduced; mid-lobe ovate-orbicular, ca. 2 mm wide, apex obtuse; spur pendulous, slightly curved forward, 3–3.5 mm, much shorter than ovary, slender, shallowly 2-lobed at apex. Column ca. 0.8 mm. Fl. Jul–Aug.

• Shrubby slopes; 3200–3600 m. E and SE Xizang.

**39. TSAIORCHIS** Tang & F. T. Wang, Bull. Fan Mem. Inst. Biol. Bot. 7: 131. 1936.

长喙兰属 chang hui lan shu

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

Herbs, terrestrial, slender. Tubers spreading horizontally, slender, fleshy. Stem erect, terete, glabrous, with (1 or)2 or 3 basal

leaves. Leaves ovate-oblong to oblong-elliptic, base attenuate into short petiole-like sheath. Inflorescence terminal, racemose, with a few secund flowers; floral bracts nearly as long as ovary. Flowers resupinate, small; ovary twisted, cylindric-fusiform, glabrous; sepals and petals free, spreading, subequal in size; lip spreading, 3-lobed near middle, base adnate to column, spurred; spur shorter than ovary; anther erect, sessile, oblong, apex aristate, 2-locular; locules parallel, not protruding at base; pollinia 2, granular-farinaceous, sectile; caudicles very short, attached to a common viscidium; viscidium narrowly oblong-elliptic, enclosed in a chamber formed by lip and column; rostellum flattened, elongate, canaliculate, beaklike, slightly exceeding anther, 1-toothed on either side at middle, basal half entirely united with column; stigma lobes 2, separate, linear; lateral appendages 2, elongate, positioned on either side of anther base, exceeding anther.

- One species: China.

A genus distinguished by its long, bidentate rostellum and 2-lobed stigma, its placement remains a matter of contention. The nature of the column has been thought to affiliate the genus with *Gymnadenia* and *Neottianthe* (Bull. Fan Mem. Inst. Biol. Bot. 7: 133. 1936); however, *Tsaiorchis* has also been considered congeneric with *Diphylax* (Pridgeon et al., Gen. Orchid. 2: 284–286. 2001).

**1. *Tsaiorchis neottianthoides*** Tang & F. T. Wang, Bull. Fan Mem. Inst. Biol. Bot. 7: 133. 1936.

长喙兰 chang hui lan

Plants 6–10 cm tall. Leaves 3–7 × 1–3.5 cm, 7-veined, apex acute. Rachis 1.5–2 cm, with 5–7 secund flowers; floral bracts ovate, apex acuminate. Flowers pale purple to pink; ovary ca. 5.5 mm including pedicel. Dorsal sepal oblong-elliptic, ca. 4.5 mm, 1-veined, apex acute; lateral sepals narrowly oblong, oblique, ca. 4 mm, 1-veined, apex acute. Petals

obliquely elliptic, ca. 3.8 mm, 1-veined, apex obtuse; lip oblong-ovate, ca. 6 × 3 mm, 3-lobed; disk densely papillose; lateral lobes subelliptic, falcate, ca. 1.5 mm; mid-lobe subobovate, slightly longer than lateral lobes, apex emarginate; spur narrowly obovoid to subcylindric, ca. 2.8 × 1.5 mm, apex obtuse. Column ca. 2 mm; rostellum laterally compressed, elongate, canaliculate, bifid at apex. Fl. Aug–Sep.

- Dense forests, valleys; ca. 1500 m. C and E Guangxi, SE Yunnan.

#### 40. *PECTEILIS* Rafinesque, Fl. Tellur. 2: 37. 1837.

白蝶兰属 bai die lan shu

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

Herbs, terrestrial, medium-sized to large. Tubers solitary or paired, oblong, ellipsoid, or subglobose, undivided, fleshy, neck with several slender roots. Stem erect, often stout, leafy. Leaves cauline and alternate or in a basal rosette, ovate-elliptic or ovate, slightly fleshy, amplexicaul at base. Inflorescence terminal, with 1 to several flowers; floral bracts large, foliaceous. Flowers resupinate, often large, showy, usually white; pedicel and ovary twisted, usually slightly arcuate, narrowly fusiform. Sepals free, similar, broad; dorsal sepal erect; lateral sepals oblique. Petals linear-lanceolate, oblanceolate, or oblong, often narrower and smaller than sepals; lip decurved, irregularly ovate to flabellate, spurred, deeply 3-lobed; lateral lobes spreading, margin fimbriate-lacerate, denticulate, or rarely entire; mid-lobe straight, linear or broadly triangular; spur pendulous, straight to strongly curved, cylindric, often very long, much longer than ovary. Column erect, short; anther erect, 2-locular; locules widely spaced in a very broad connective; pollinia 2, granular-farinaceous, sectile; caudicles slender; viscidia small, each hidden in a tubular fold at end of rostellum arms; lateral appendages 2, elliptic, small, at base of anther; rostellum 3-lobed, lateral arms long, tapering, mid-lobe blunt; stigma lobes adnate to base of lip, connate, convex, sessile.

About five species: E and SE Asia, Himalayas; three species in China.

- 1a. Leaves linear to narrowly lanceolate, to 0.8 cm wide; sepals 7–10 mm; outer margin of petals dentate to shallowly fimbriate ..... 3. *P. radiata*  
 1b. Leaves ovate, ligulate-oblong, oblong, or lanceolate, 2–6 cm wide; sepals 15–40 mm; petals entire.  
 2a. Leaves 3–6 cm wide, intergrading into foliaceous sheaths above; sepals 25–40 mm; dorsal sepal broadly ovate to orbicular, much longer than petals; lip ecallose ..... 1. *P. susannae*  
 2b. Leaves 2–3.5 cm wide, usually distinct from bractlike sheaths above; sepals 15–20 mm; dorsal sepal oblong-ovate, subequal in length to petals; lip with a small callus near base ..... 2. *P. henryi*

**1. *Pecteilis susannae*** (Linnaeus) Rafinesque, Fl. Tellur. 2: 38. 1837 [“*susanna*”].

龙头兰 long tou lan

*Orchis susannae* Linnaeus, Sp. Pl. 2: 939. 1753; *Habenaria susannae* (Linnaeus) R. Brown; *Hemihabenaria susannae* (Linnaeus) Finet; *Platanthera robusta* Lindley; *P. susannae* (Linnaeus) Lindley.

Plants robust, 45–120 cm tall. Tubers ovoid-cylindric, 3–6 × 1–2.5 cm. Stem stout, with several tubular sheaths at base and several to many leaves intergrading into amplexicaul sterile bracts above. Leaves ovate, oblong, or lanceolate, 6–10(–12) × 3–6 cm, apex acute. Sterile bracts often foliaceous, ovate-elliptic to lanceolate, 4–7 × 1–3.5 cm, apex acuminate. Rachis 6–15 cm, laxly 2–5-flowered; floral bracts foliaceous, lanceolate, 3–5 cm, shorter than, equal to, or slightly exceeding ovary, apex

acute to acuminate. Flowers fragrant, white, large; pedicel and ovary 40–60 mm, shallowly winged, glabrous. Dorsal sepal erect, broadly ovate to orbicular, 25–30 × 20–28 mm, apex obtuse-rounded; lateral sepals spreading, broadly ovate, slightly oblique, 25–40 × 12–22 mm, usually slightly longer than dorsal sepal, apex obtuse. Petals linear-lanceolate, 7–12 × ca. 2.5 mm; lip irregularly ovate, 25–40 × 25–44 mm; lateral lobes broad, subflabellate, 16–22 × 18–24 mm, lateral margins entire, apical margin lacerate-fimbriate; mid-lobe linear-oblong, 18–30 × 4–6 mm, slightly fleshy, entire; spur straight to gradually curved forward, 6–13 cm × 3–5 mm, apex acute. Fl. Jul–Sep.  $2n = 36, 42, 44$ .

Forests, grassy slopes, damp places in valleys; 500–2500 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Jiangxi, SW Sichuan, Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Thailand, S Vietnam].

**2. *Pecteilis henryi*** Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 4: 45. 1919.

滇南白蝶兰 dian nan bai die lan

*Habenaria bassacensis* Gagnepain; *H. lacei* (Rolfe ex Downie) Gagnepain; *Pecteilis bassacensis* (Gagnepain) Tang & F. T. Wang; *P. lacei* (Rolfe ex Downie) Tang & F. T. Wang; *P. susanna* (Linnaeus) Rafinesque subsp. *henryi* (Schlechter) Soó; *Platanthera lacei* Rolfe ex Downie.

Plants slender to robust, 50–70 cm tall. Tubers oblong, ca. 3.5 × 1.5 cm. Stem stout, with 1 to several tubular sheaths at base, with 4–6 or more leaves and several amplexicaul sterile bracts above. Leaves ligulate-oblong to lanceolate, 7.5–10(–12) × 2–3.5 cm, apex acute. Sterile bracts usually tightly sheathing stem, narrowly elliptic to lanceolate, 6–10 × 1–1.5 cm, apex acute. Rachis 5–8 cm, laxly 4–7-flowered; floral bracts foliaceous, narrowly oblong-lanceolate, 3–4 cm, exceeding ovary, apex acute. Flowers white, large; pedicel and ovary 25–45 mm, shallowly winged, glabrous. Dorsal sepal oblong-ovate, 15–20 × 8–15 mm, apex obtuse; lateral sepals spreading, oblong-ovate, slightly oblique, 15–20 × 6–14 mm, apex obtuse. Petals erect to spreading, oblanceolate to linear, slightly oblique, 12–18 × 1–2.5 mm, apex subacute; lip broadly flabellate, 20–25 × 15–25 mm; disk with 1 small, convex callus near base; lateral

lobes broadly cuneate-ligulate to nearly rhombic, 15–20 × ca. 14 mm, apical margin and outer lateral margins deeply lacerate-fimbriate, inner lateral margins entire; mid-lobe linear-ligulate, 15–22 × ca. 3 mm, slightly fleshy, entire, apex slightly obtuse; spur pendulous, often distinctly curved forward, slender, 8–11.5 cm × 1–1.5 mm, attenuate toward apex. Fl. Jul.

Forests, grasslands, gullies; 1000–1900 m. S Yunnan [Cambodia, Laos, Myanmar, Thailand, Vietnam].

**3. *Pecteilis radiata*** (Thunberg) Rafinesque, Fl. Tellur. 2: 38. 1837.

狭叶白蝶兰 xia ye bai die lan

*Orchis radiata* Thunberg, Trans. Linn. Soc. 2: 326. 1794; *Habenaria radiata* (Thunberg) Sprengel; *Hemihabenaria radiata* (Thunberg) Finet; *Plantaginorchis radiata* (Thunberg) Szlachetko; *Platanthera radiata* (Thunberg) Lindley.

Plants slender, 18–37 cm tall. Tubers ellipsoid to subglobose, 0.8–2 × 0.5–1 cm. Stem slender, with 1 or 2 tubular sheaths at base, 3–5 spaced cauline leaves, and 1–3 sterile bracts above. Leaves linear to narrowly lanceolate, 4–10 × 0.3–0.8 cm, apex acuminate. Sterile bracts linear, 1.5–4 × 0.2–0.5 cm, apex acuminate. Rachis to 3.5 cm, 1- or 2-flowered; floral bracts ovate-lanceolate, 7–12 mm, shorter than ovary, apex acuminate. Flowers white, large; pedicel and ovary 10–15 mm, slightly ridged, glabrous. Dorsal sepal suberect, pale green, narrowly ovate, 7–10 × 2–3 mm, 5–7-veined, apex acute; lateral sepals spreading, pale green, narrowly ovate, slightly oblique, 8–10 × 2–4 mm, 5–7-veined, apex acute. Petals erect and loosely connivent with dorsal sepal, white, ovate, oblique, 10–12 × 3.5–6 mm, outer margin toothed to shallowly fimbriate, apex subacute; lip irregularly flabellate, 13–18 × 16–25 mm; lateral lobes obliquely flabellate, 8–12 × 6–10 mm, outer margins deeply fimbriate-laciniate; mid-lobe linear, 5–10 × 1–2 mm, slightly fleshy, entire, apex subobtusely; spur pendulous, straight to slightly curved forward, 25–40 × ca. 1.5 mm, slender, slightly dilated toward apex, apex obtuse. Fl. Jul–Aug.  $2n = 32, 48$ .

Glades in forests; ca. 1500 m. W Henan [Japan].

#### 41. PERISTYLUS Blume, Bijdr. 404. 1825, nom. cons.

阔蕊兰属 kuo rui lan shu

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

*Glossaspis* Sprengel; *Glossula* Lindley.

Herbs, terrestrial, slender to robust, medium-sized. Tubers subglobose to ellipsoid-oblong, undivided, fleshy, neck with several slender roots. Stem erect, with 2 or 3 tubular sheaths at base, 1- to many leaved, glabrous. Leaves basal, clustered midway along stem or widely spaced, elliptic, ovate, oblanceolate, or linear, base contracted into amplexicaul sheath. Inflorescence erect, terminal, racemose, glabrous; peduncle often with 1 to several sterile bracts; rachis laxly to densely many flowered. Flowers spirally arranged, resupinate, small, sometimes spidery, green, yellowish green, or white; ovary and pedicel usually erect and held close to rachis, twisted, cylindric-fusiform, slender, usually glabrous. Sepals free; dorsal sepal erect; lateral sepals usually spreading, rarely reflexed. Petals often connivent with dorsal sepal and forming a hood, slightly fleshy; lip connate with column at base, distally 3-lobed or rarely entire, larger than sepals and petals, slightly fleshy, spurred at base, ecallose or with a fleshy callus above mouth of spur; spur short and scrotiform, or sometimes elongate and cylindric, usually much shorter than ovary. Column erect, very short, stout; anther

with 2 parallel or slightly divergent locules; pollinia 2, granular-farinaceous, sectile, each attached to a viscidium via a short caudicle; viscidia often small, naked, elliptic, ovate, or suborbicular; rostellum small, with short, inconspicuous arms; stigma lobes 2, basally connate but diverging widely, convex, globose or subclavate, often adnate to base of lip; auricles 2, prominent, placed laterally at base of anther.

About 70 species: E, S, and SE Asia to New Guinea, NE Australia, and the SW Pacific islands; 19 species (five endemic) in China.

- 1a. Lip entire.
- 2a. Leaves linear, 0.2–0.3 cm wide; spur 5.5–6(–8) mm, ca. as long as ovary ..... 17. *P. Forrestii*
- 2b. Leaves oblong, oblong-elliptic, elliptic-lanceolate, or lanceolate, 0.7–2 cm wide; spur 0.7–1.2 mm, much shorter than ovary.
- 3a. Plants 2–5-leaved; floral bracts ca. 8 mm, exceeding flower ..... 18. *P. forceps*
- 3b. Plants 1-leaved; floral bracts 4–5 mm, almost as long as to slightly exceeding ovary ..... 19. *P. nematocaulon*
- 1b. Lip 3-lobed.
- 4a. Lateral lobes of lip filiform or linear, ca. 2 × as long as mid-lobe or much longer, spreading at right angles from axis of lip.
- 5a. Lip lacking a transverse ridge, not clearly demarcated into a hypochile and epichile, deeply 3-lobed near base.
- 6a. Lateral sepals spreading; lip with a large, subglobose callus near base; spur saccate-ovoid, neck contracted, ca. 2 mm ..... 4. *P. formosanus*
- 6b. Lateral sepals reflexed; lip ecallose; spur cylindrical-clavate, ca. 3.5 mm ..... 5. *P. jinchuanicus*
- 5b. Lip divided near base by a transverse ridge into a short, concave hypochile and a longer, deflexed, deeply 3-lobed epichile.
- 7a. Lateral lobes of lip linear, 4–7 mm, 2–3 × as long as mid-lobe ..... 3. *P. densus*
- 7b. Lateral lobes of lip filiform, 8–18 mm, 4–6 × as long as mid-lobe.
- 8a. Spur fusiform, 3–5 mm ..... 2. *P. calcaratus*
- 8b. Spur globose-saccate, 1–2.5 mm ..... 1. *P. tentaculatus*
- 4b. Lateral lobes of lip oblong, triangular, ovate-triangular, or triangular-lanceolate, shorter than to subequal in length to mid-lobe, spreading at an acute angle to axis of lip.
- 9a. Lip with a large, subglobose callus near base.
- 10a. Ovary 7–10 mm; dorsal sepal 2.8–3.5 mm; lip 3.5–4.2 mm; spur ovoid, apex acute ..... 14. *P. lacertifer*
- 10b. Ovary 4–5 mm; dorsal sepal 2–2.5 mm; lip 2–3 mm; spur globose or saccate, apex obtuse.
- 11a. Flowers white or pale whitish green; callus on lip glabrous ..... 15. *P. coeloceras*
- 11b. Flowers green; callus on lip papillose ..... 16. *P. neotineoides*
- 9b. Lip ecallose.
- 12a. Plants 1-leaved ..... 6. *P. fallax*
- 12b. Plants 2–6-leaved.
- 13a. Leaves linear, to 0.6 cm wide.
- 14a. Petals ca. 3.5 mm; lip 3–4.5 mm; spur cylindrical, curved forward, 4–6 mm, almost as long as ovary ..... 7. *P. bulleyi*
- 14b. Petals 2–2.5 mm; lip 2–2.5 mm; spur scrotiform, 1–1.5 mm, much shorter than ovary ..... 8. *P. mannii*
- 13b. Leaves elliptic-lanceolate, elliptic, oblong-elliptic, ovate-lanceolate, or ovate, 0.8–6.5 cm wide.
- 15a. Petals and lip pure white; dorsal sepal 7–9 mm; lip 9–11 mm ..... 9. *P. constrictus*
- 15b. Petals and lip green, yellowish green, or creamy white; dorsal sepal 2–5.5 mm; lip 2.5–6 mm.
- 16a. Plants usually robust; lip shallowly 3-lobed toward apex, 3.5–4 mm wide, disk with a dark, triangular nectary toward base ..... 10. *P. goodyeroides*
- 16b. Plants slender to somewhat robust; lip 3-lobed near middle, 1–2 mm wide, disk lacking a nectary.
- 17a. Petals and lip creamy white; lip base concave-saccate, papillose in front of spur mouth ..... 11. *P. affinis*
- 17b. Petals and lip green to yellowish green; lip base shallowly concave, glabrous.
- 18a. Leaves narrowly elliptic-lanceolate, 0.8–2 cm wide; floral bracts 5–8 mm, almost as long as ovary; lip ca. 3 mm; spur ca. 1 mm ..... 12. *P. elisabethae*
- 18b. Leaves elliptic-lanceolate to ovate, 2–3.5 cm wide; floral bracts 8–12 mm, exceeding ovary (and sometimes flowers); lip 4–5.5 mm; spur 1.8–2.5 mm ..... 13. *P. parishii*

**1. *Peristylus tentaculatus*** (Lindley) J. J. Smith, Fl. Buitenzorg 6: 35. 1905.

触须阔蕊兰 *chu xu kuo rui lan*

*Glossula tentaculata* Lindley, Bot. Reg. 10: ad t. 862. 1825; *Glossaspis antennifera* H. G. Reichenbach; *G. tentaculata* (Lindley) Sprengel; *Habenaria garrettii* Rolfe ex Downie; *H. tentaculata* (Lindley) H. G. Reichenbach; *Peristylus garrettii* (Rolfe ex Downie) J. J. Wood & Ormerod.

Plants slender to somewhat robust, 16–45(–60) cm tall. Tubers subglobose to ovoid, 1–2.2 × 0.5–1 cm. Stem with 2 or 3 tubular sheaths at base, 2–5-leaved. Leaves basal to somewhat spaced along stem, ovate-oblong to lanceolate, 4–9(–12) × 0.8–1.5(–3) cm, base attenuate, apex acute. Inflorescence 10–34(–48) cm; peduncle cylindrical, slender to stout; sterile bracts several, lanceolate, 5–12 mm; rachis 4.5–17 cm, subdensely many flowered; floral bracts ovate to ovate-lanceolate, 5–8 mm, shorter than to almost as long as ovary, apex acuminate. Flowers erect, green or yellowish green; ovary 6–10 mm including pedicel. Dorsal sepal erect, oblong-ovate, concave, ca. 2.8 × 1–1.5 mm, 1-veined, apex obtuse; lateral sepals spreading, oblong-ovate, slightly oblique, ca. 3 × 1.2 mm, slightly narrower than dorsal sepal, 1-veined, apex obtuse. Petals connivent with dorsal sepal and forming a hood, ovate-oblong, slightly oblique, ca. 3 × 1.5 mm, 1-veined, apex obtuse; lip oblong, 2.8–3.5 × ca. 0.8 mm, divided near base by a transverse ridge into a short, concave hypochile and a longer, deflexed, deeply 3-lobed epichile, ecallose; lateral lobes spreading at right angles to axis of lip, filiform, 10–18 mm; mid-lobe narrowly oblong-ligulate, ca. 2 mm, apex obtuse; spur pendulous, globose-saccate, 1–2.5 mm, apex usually shallowly 2-lobed, neck contracted. Column ca. 1 mm; viscidia ovate; rostellum with short arms. Fl. Nov–Apr.

Damp places on slopes, beside streams, wastelands; 100–300 m. S Fujian, S Guangdong, E Guangxi, Hainan, SE and W Yunnan [Cambodia, Thailand, Vietnam].

**2. *Peristylus calcaratus*** (Rolfe) S. Y. Hu, Quart. J. Taiwan Mus. 26: 398. 1973.

长须阔蕊兰 *chang xu kuo rui lan*

*Glossula calcarata* Rolfe, Bull. Misc. Inform. Kew 1913: 145. 1913; *Habenaria calcarata* (Rolfe) Schlechter; *H. lilungshania* S. S. Ying; *Platanthera pricei* Hayata.

Plants slender, 17–48 cm tall. Tubers subglobose to oblong-ellipsoid, 0.8–2 × 0.5–1.5 cm. Stem with 2–4 tubular sheaths at base, 3–5-leaved. Leaves clustered near base to somewhat spaced along stem, elliptic-lanceolate, 2.5–12 × 0.6–3.5 cm, base attenuate, apex acute to obtuse. Inflorescence 13–38 cm; peduncle cylindrical, slender; sterile bracts few, lanceolate, to 2 cm; rachis 6–23 cm, laxly to subdensely many flowered; floral bracts ovate-lanceolate, 6–11 mm, shorter than to slightly exceeding ovary, apex acuminate. Flowers erect, pale yellowish green; ovary 7–9 mm including pedicel. Dorsal sepal erect, oblong-ovate, concave, 2–3 × ca. 1.5 mm, 1-veined, apex obtuse; lateral sepals spreading, oblong, 3–3.5 × ca. 1.2 mm, slightly narrower than dorsal sepal, apex obtuse. Petals con-

nivent with dorsal sepal and forming a hood, ovate-oblong, oblique, 3–3.5 × 1.5–2 mm, 1- or 2-veined, apex obtuse; lip narrowly oblong, 3–3.5 × ca. 0.5 mm, divided near base by a transverse ridge into a short, concave hypochile and a longer, deflexed, deeply 3-lobed epichile, ecallose; lateral lobes spreading at right angles to axis of lip, horizontal or ascending, filiform, 8–15 mm; mid-lobe narrowly oblong-lanceolate, 2–3 mm, apex obtuse; spur pendulous, fusiform, 3–5 mm, apex obtuse or sometimes shallowly 2-lobed. Column ca. 1 mm; viscidia ellipsoid. Fl. Jul–Oct.

Forests, grassy slopes; 200–1300 m. Guangdong, Guangxi, Hunan, Jiangsu, Jiangxi, Taiwan, W Yunnan, Zhejiang [Vietnam].

**3. *Peristylus densus*** (Lindley) Santapau & Kapadia, J. Bombay Nat. Hist. Soc. 57: 128. 1960.

狭穗阔蕊兰 *xia sui kuo rui lan*

*Coeloglossum densum* Lindley, Gen. Sp. Orchid. Pl. 302. 1832; *C. flagelliferum* (Makino) Maximowicz ex Makino; *Glossula passerina* Gagnepain; *Habenaria atramentaria* Kraenzlin; *H. burchneroides* Schlechter; *H. dankiaensis* Gagnepain; *H. evrardii* Gagnepain; *H. flagellifera* Makino; *H. neglecta* King & Pantling; *H. passerina* (Gagnepain) Tang & F. T. Wang; *H. stenostachya* (Lindley ex Bentham) Bentham; *H. stenostachya* subsp. *burchneroides* (Schlechter) Soó; *Peristylus flagellifer* (Makino) Ohwi; *P. neglectus* (King & Pantling) Kraenzlin; *P. stenostachyus* (Lindley ex Bentham) Kraenzlin; *P. xanthochlorus* Blatter & McCann; *Platanthera stenostachya* Lindley ex Bentham.

Plants slender to somewhat robust, 15–50(–65) cm tall. Tubers subglobose to oblong-ovoid, 0.8–2 × 0.6–1.5 cm. Stem with 2 or 3 tubular sheaths at base, 4–6-leaved. Leaves widely spaced along stem, ovate, oblong, or oblong-lanceolate, 2.5–10 × 0.6–2.5 cm, apex acute or acuminate. Inflorescence 11–38(–47) cm; peduncle cylindrical to slightly ridged, slender to stout; sterile bracts several, ovate-lanceolate, to 3.5 cm; rachis 4–24 cm, laxly to subdensely many flowered; floral bracts ovate-lanceolate, 5–15 mm, basal ones often exceeding ovary, apex acuminate. Flowers erect to horizontal, yellowish green or pale green to whitish; ovary 6–10 mm including pedicel. Dorsal sepal forming a hood to erect, narrowly oblong-ovate, concave, 3–4 × 0.8–1.2 mm, 1-veined, apex obtuse; lateral sepals spreading, oblong-lanceolate, oblique, 3–4 × 0.8–1 mm, 1-veined, apex obtuse. Petals connivent with dorsal sepal and forming a hood, narrowly ovate-oblong, ca. 3 × 0.8–1 mm, 1-veined, apex obtuse; lip narrowly oblong-ovate, ca. 4.5 × 0.8 mm, divided near base by a transverse ridge into a short, concave hypochile and a longer, deflexed, deeply 3-lobed epichile, ecallose; lateral lobes spreading at right angles to axis of lip, linear, 4–7 mm; mid-lobe oblong-lanceolate, ca. 2.5 mm, apex obtuse; spur pendulous, cylindrical-clavate, 3–4 mm, apex sometimes shallowly 2-lobed. Column ca. 1.5 mm; viscidia ellipsoid; rostellum with short arms. Fl. May–Oct.  $2n = 25 \pm 2, 42 + 0-2B, 44, 46, 48, 50$ .

Forests, moist grasslands; 300–2100 m. N Fujian, Guangdong, Guangxi, Guizhou, Jiangxi, Yunnan, Zhejiang [Bangladesh, Cambodia, India, Japan, Korea, Myanmar, Thailand, Vietnam].

**4. *Peristylus formosanus*** (Schlechter) T. P. Lin, Native Orchids Taiwan 2: 274. 1977.

台湾阔蕊兰 tai wan kuo rui lan

*Habenaria formosana* Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 4: 127. 1919, based on *H. tentaculata* (Lindley) H. G. Reichenbach var. *acutifolia* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 354. 1911; *H. brevicealcarata* Fukuyama (1932), not (Hayata) Masamune (1968); *Peristylus flagellifer* (Makino) Ohwi var. *acutifolius* (Hayata) Hatusima; *P. lacertifer* (Lindley) J. J. Smith var. *formosanus* (Schlechter) S. S. Ying, nom. superfl.

Plants slender, 15–45 cm tall. Tubers subglobose, 1–2 × 0.8–1.5 cm. Stem with 2 or 3 tubular sheaths at base, 3- or 4-leaved. Leaves forming a basal rosette to somewhat spaced along stem, elliptic to ovate-lanceolate, 5–10 × 2–3 cm, apex obtuse or acute. Inflorescence 13–36 cm; peduncle cylindrical, slender; sterile bracts 2 or 3, lanceolate, to 1.5 cm; rachis 6–20 cm, densely many flowered; floral bracts ovate-lanceolate, 8–12 mm, basal ones exceeding flowers, apex acuminate. Flowers erect to horizontal, whitish green; ovary 8–10 mm including pedicel. Dorsal sepal erect, ovate, concave, 3.5–4 × 2.2–2.5 mm, apex obtuse-rounded; lateral sepals spreading, oblong-elliptic, 3.8–4.8 × ca. 1.8 mm, apex subobtuse to acute. Petals connivent with dorsal sepal and forming a hood, ovate-rhombic, 3.8–4.8 × ca. 2.5 mm, apex acute; lip narrowly ovate, ca. 4 × 1.8 mm, deeply 3-lobed near base; disk with a large, subglobose callus near base; lateral lobes diverging widely from axis of lip, filiform, 5–12 mm; mid-lobe ligulate, 1.7–3 mm, apex obtuse; spur saccate-ovoid, neck contracted, ca. 2 mm, apex subacute. Column ca. 1.5 mm; viscidia oblong; rostellum with short arms. Fl. Aug–Dec.

Open places, grasslands; below 300 m. Taiwan [Japan (Ryukyu Islands)].

“*Caeloglossum formosanum*” [sic] (Makino & Hayata, J. Coll. Sci. Imp. Univ. Tokyo 22: 420. 1906) belongs here but is a nomen nudum and was therefore not validly published.

The identity and placement of this species within the genus remains contentious. Garay and Sweet (Orchids S. Ryukyu Islands, 37. 1974) considered it conspecific with *Habenaria lacertifera*, a position followed by Seidenfaden (Dansk Bot. Ark. 31(3): 58. 1977, as *Peristylus lacertifer*). More recently, however, Su (Fl. Taiwan 5: 994. 2000) maintained the two taxa as distinct on account of differences in lip shape and flower color. A re-assessment of type material and of fresh material is clearly required.

**5. *Peristylus jinchuanicus*** K. Y. Lang, Acta Phytotax. Sin. 25: 447. 1987.

金川阔蕊兰 jin chuan kuo rui lan

Plants slender, 17–50 cm tall. Tubers oblong, 2–4 × 1–2 cm. Stem with 2 tubular sheaths at base, 4- or 5-leaved. Leaves widely spaced along stem, oblong-lanceolate, 5–10 × 0.8–2 cm, apex acute or acuminate. Inflorescence 11–33 cm; peduncle cylindrical, slender; sterile bracts 4–8, lanceolate, to 2.4 cm; rachis 5–21 cm, subdensely many flowered; floral bracts lanceolate, to 9 mm, basal ones sometimes exceeding flowers, apex acuminate. Flowers erect, yellowish green; ovary ca. 7 mm including pedicel. Dorsal sepal erect, ovate, concave, ca. 4 × 2.5

mm, 3-veined, apex obtuse; lateral sepals reflexed, oblong, oblique, ca. 4 × 2 mm, 3-veined, apex obtuse. Petals connivent with dorsal sepal and forming a hood, ovate-lanceolate, slightly oblique, 4.5–5 × ca. 1.5 mm, 1-veined, apex acute; lip narrowly oblong, ca. 6 × 1 mm, deeply 3-lobed near base, ecallose; lateral lobes spreading almost at right angles to axis of lip, linear, 5–6 mm; mid-lobe narrowly oblong, ca. 3 mm, apex obtuse; spur pendulous, cylindrical-clavate, ca. 3.5 mm, apex obtuse or sometimes shallowly 2-lobed. Column ca. 1 mm; viscidia ellipsoid; rostellum with short arms. Fl. Jul–Sep.

• *Picea* forests, thickets, grasslands; 1700–3900 m. W Sichuan, NW Yunnan.

**6. *Peristylus fallax*** Lindley, Gen. Sp. Orchid. Pl. 298. 1835.

盘腺阔蕊兰 pan xian kuo rui lan

*Habenaria fallax* (Lindley) King & Pantling; *Herminium fallax* (Lindley) J. D. Hooker; *Monorchis fallax* (Lindley) O. Schwarz; *Peristylus fallax* var. *dwarikae* Deva & H. B. Naitani; *Platanthera fallax* (Lindley) Schlechter.

Plants slender to somewhat robust, 14–30 cm tall. Tubers subglobose to oblong-ellipsoid, 1–1.5 × ca. 0.8 cm. Stem with 2 or 3 tubular sheaths at base, 1-leaved. Leaf basal or cauline, narrowly oblong-elliptic to oblanceolate, 6–13 × 0.8–2 cm, apex acute. Inflorescence 11–22 cm; peduncle cylindrical to slightly ridged, slender to stout, ebracteate or with 1 lanceolate sterile bract to 20 mm; rachis 5–14 cm, subaxially to densely many flowered; floral bracts lanceolate, 6–15 mm, basal ones exceeding flowers, apex acuminate. Flowers horizontal, yellowish green; ovary 6–7 mm including pedicel. Dorsal sepal suberect, oblong-ovate, concave, 3–4 × 1.5–1.8 mm, 1-veined, apex obtuse; lateral sepals spreading, ovate-lanceolate, oblique, slightly concave, 3.5–4.2 × ca. 1.4 mm, 1-veined, apex subacute. Petals ascending, ovate-lanceolate, 3.2–4 × ca. 1.2 mm, 1-veined, apex acute; lip spreading, ovate, 3.2–5.5 × 1–1.3 mm, ecallose, 3-lobed near middle; lateral lobes diverging at an acute angle from axis of lip, oblong, 0.8–1.5 mm, apex obtuse; mid-lobe oblong, 1–2 mm, broader than lateral lobes; spur pendulous, scrotiform to oblong-clavate, 0.8–1.5 mm, apex obtuse or sometimes shallowly 2-lobed. Column ca. 1 mm; viscidia disklike; rostellum broad, with short arms. Fl. Jul–Sep.  $2n = 30$ , 34, 42.

Forests, forest margins, alpine grasslands; 3000–3300 m. SW Sichuan, S Xizang, NW Yunnan [Bhutan, India, Nepal].

**7. *Peristylus bulleyi*** (Rolfe) K. Y. Lang, Acta Phytotax. Sin. 25: 448. 1987.

条叶阔蕊兰 tiao ye kuo rui lan

*Habenaria bulleyi* Rolfe, Notes Roy. Bot. Gard. Edinburgh 8: 25. 1913; *H. beesiana* W. W. Smith; *Herminium bulleyi* (Rolfe) Tang & F. T. Wang; *Peristylus gracillimus* (J. D. Hooker) Kraenzlin f. *lankongensis* Finet; *Platanthera praeus-tipetala* Kraenzlin.

Plants slender, 15–35 cm tall. Tubers oblong, 1–2 × ca. 0.5 cm. Stem with 2 tubular sheaths at base, 2–4-leaved. Leaves somewhat spaced to clustered midway along stem, linear, 4–10 × 0.2–0.6 cm, apex acute or acuminate. Inflorescence 13–30



cm; peduncle cylindrical to slightly ridged, slender; sterile bracts 1–3, linear-lanceolate, 5–7 mm; rachis 5–15 cm, subclaxly several to subdensely many flowered; floral bracts ovate-lanceolate, 4–6 mm, shorter than ovary, apex acuminate. Flowers erect, yellowish green; ovary 5–8 mm including pedicel. Dorsal sepal erect, ovate-oblong, concave, 2–3.5 × 0.8–1.2 mm, 1-veined, apex obtuse; lateral sepals spreading to reflexed, oblong, slightly oblique, 3–4 × 0.8–1.2 mm, 1-veined, apex obtuse. Petals erect-spreading to reflexed, narrowly ovate-lanceolate, ca. 3.5 × 1(–1.5) mm, slightly fleshy above middle, 3-veined, apex acute; lip narrowly oblong, 3–4.5 × ca. 0.4 mm, ecallose, 3-lobed near middle; lateral lobes diverging at an acute angle from axis of lip, narrowly oblong, 0.8–2.5 mm; mid-lobe linear-oblong, 2–3 mm, slightly longer and wider than lateral lobes, apex obtuse; spur pendulous, curved forward, cylindrical, 4–6 mm, almost as long as ovary, apex obtuse. Column ca. 0.8 mm; viscidia ellipsoid. Fl. Jul–Aug.

• *Pinus* forests, grassy slopes; 2500–3300 m. SW and W Sichuan, N and NW Yunnan.

**8. *Peristylus manni*** (H. G. Reichenbach) Mukerjee, Notes Roy. Bot. Gard. Edinburgh 21: 153. 1953.

纤茎阔蕊兰 xian jing kuo rui lan

*Coeloglossum manni* H. G. Reichenbach, Linnaea 41: 54. 1877; *Habenaria duclouxii* Rolfe; *H. gracillima* J. D. Hooker; *H. spiranthiformis* Ames & Schlechter; *Herminium manni* (H. G. Reichenbach) Tang & F. T. Wang; *H. spiranthiforme* (Ames & Schlechter) Tang & F. T. Wang; *H. yuanum* Tang & F. T. Wang; *Peristylus gracillimus* (J. D. Hooker) Kraenzlin; *Platanthera manni* (H. G. Reichenbach) Schlechter.

Plants slender, 15–40 cm tall. Tubers subglobose to oblong-elliptic, 1–1.5 × 0.4–1 cm. Stem with 2 tubular sheaths at base, 2–4-leaved. Leaves clustered at base of stem, linear, 3.5–15 × 0.2–0.4 cm, apex acuminate. Inflorescence 14–37 cm; peduncle cylindrical, slender; sterile bracts 1–5, lanceolate, to 20 mm; rachis 4–20 cm, subclaxly few to many flowered; floral bracts ovate-lanceolate, 2–4 mm, shorter than ovary, apex acuminate. Flowers horizontal, green to pale yellowish green; ovary 3–5 mm including pedicel. Dorsal sepal oblong-ovate, concave, ca. 2.5 × 0.8 mm, 1-veined, apex obtuse; lateral sepals weakly spreading, ligulate to narrowly oblong, ca. 2.5 × 0.8 mm, 1-veined, apex obtuse. Petals loosely connivent with dorsal sepal and forming a hood, narrowly ovate-lanceolate, 2–2.5 × ca. 0.8 mm, slightly fleshy above middle, 2-veined, apex obtuse; lip spreading, narrowly ovate, 2–2.5 × ca. 0.8 mm, ecallose, 3-lobed near middle; lateral lobes diverging at an acute angle from axis of lip, narrowly oblong, 0.8–1.2 mm; mid-lobe oblong, slightly attenuate, 1–1.5 mm, slightly broader than lateral lobes, 3-veined; spur pendulous, scrotiform, 1–1.5 mm, apex obtuse. Column ca. 0.5 mm; viscidia ellipsoid. Fl. Sep–Oct.

Open forests, thickets, grassy slopes; 1700–2900 m. S Sichuan, C and W Yunnan [India].

**9. *Peristylus constrictus*** (Lindley) Lindley, Gen. Sp. Orchid. Pl. 300. 1835.

大花阔蕊兰 da hua kuo rui lan

*Herminium constrictum* Lindley, Edwards's Bot. Reg. 18:

ad t. 1499. 1832; *Habenaria constricta* (Lindley) J. D. Hooker; *Platanthera constricta* (Lindley) Wallich.

Plants robust, (30–)45–77 cm tall. Tubers oblong, 3–4 × 0.8–1.5 cm. Stem with 4–6 tubular sheaths at base, 4–6-leaved. Leaves basal and clustered to somewhat spaced along stem, broadly elliptic, 5–13 × 3.5–6.5 cm, apex acute. Inflorescence 21–42 cm; peduncle cylindrical, stout; sterile bracts several, lanceolate, to 30 mm; rachis 5–18 cm, densely many flowered; floral bracts ovate-lanceolate, 9–15 mm, exceeding ovary, apex acuminate. Flowers horizontal; sepals pale brown; petals and lip pure white; ovary 8–10 mm including pedicel. Dorsal sepal forming a hood, concave, 7–9 × 2–3 mm, 1-veined, apex obtuse; lateral sepals spreading, narrowly oblong-lanceolate, oblique, 7–9 × ca. 2.5 mm, 1-veined, margin incurved, apex acute to mucronate. Petals ovate-lanceolate, oblique, 9–11 × 3.5–4 mm, 3- or 4-veined, apex obtuse; lip spreading, oblong-obovate, 9–11 × 4–5 mm, ecallose, base shallowly concave, 3-lobed near middle; lateral lobes diverging at an acute angle from axis of lip, triangular to shortly oblong, slightly falcate, 2.8–5.8 mm, apex acute; mid-lobe 3–5.5 mm, slightly broader than lateral lobes, apex obtuse; spur pendulous, globose, 2–3 mm, apex rounded, neck contracted. Column ca. 1.8 mm; viscidia ovoid; rostellum deltoid, with short arms. Fl. Jun–Aug. 2n = 38, 42.

Scrubby slopes; 1500–2800 m. SW and W Yunnan [Bhutan, Cambodia, India, Myanmar, Nepal, Thailand, Vietnam].

**10. *Peristylus goodyeroides*** (D. Don) Lindley, Gen. Sp. Orchid. Pl. 299. 1835.

阔蕊兰 kuo rui lan

*Habenaria goodyeroides* D. Don, Prodr. Fl. Nepal. 25. 1825; *H. goodyeroides* var. *formosana* Hayata; *H. hayatana* Schlechter; *H. pandurilabia* Schlechter; *H. tenii* Schlechter; *Herminium goodyeroides* (D. Don) Lindley; *Peristylus sphaerocentron* Tang & F. T. Wang.

Plants usually robust, (17–)28–60(–90) cm tall. Tubers oblong, 1.5–4 × 0.5–2 cm. Stem with 2–4 tubular sheaths at base, 4–6-leaved. Leaves usually clustered midway along stem, ovate to oblong-elliptic, 3.5–17 × 2.5–6.5 cm, apex obtuse or acute. Inflorescence (10–)22–44(–60) cm; peduncle cylindrical, stout; sterile bracts 1 to many, occasionally foliaceous, lanceolate, 8–35 mm; rachis 4–21 cm, subclaxly to densely many flowered; floral bracts lanceolate, 6–15 mm, ca. as long as to slightly exceeding ovary, apex acuminate. Flowers erect to horizontal; sepals olive to brownish green; petals and lip pale yellowish green to creamy white; ovary 6–11 mm including pedicel. Dorsal sepal erect, ovate-lanceolate to broadly ovate, concave, 4–5.5 × 2.5–3.5 mm, 1-veined, apex obtuse; lateral sepals spreading, oblong, oblique, 4–6 × 2–2.8 mm, 1-veined, apex acute to obtuse. Petals spreading, broadly ovate, oblique, 4–5.5 × 3–4(–5) mm, 2- or 3-veined, base concave, apex obtuse; lip spreading, oblong-obovate, 4–6 × 3.5–4 mm, shallowly 3-lobed toward apex; disk ecallose but with a dark, triangular nectary toward base; lateral lobes ovate-triangular, 0.8–1.8 mm, apex obtuse; mid-lobe ovate, 1–1.8 mm, slightly broader than lateral lobes, apex obtuse; spur pendulous, globose-scrotiform, ca. 2 mm, apex rounded, neck contracted. Col-

umn ca. 1.5 mm; viscidia ellipsoid; rostellum with short arms. Fl. Jun–Aug.  $2n = 23 + 2f, 42, 46, 47$ .

Broad-leaved forests, scrub, grassy slopes; 500–2300 m. Guangdong, Guangxi, Guizhou, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Bhutan, Cambodia, N India, Indonesia, Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Thailand, Vietnam].

**11. *Peristylus affinis*** (D. Don) Seidenfaden, Dansk Bot. Ark. 31(3): 48. 1977.

小花阔蕊兰 xiao hua kuo rui lan

*Habenaria affinis* D. Don, Prodr. Fl. Nepal. 25. 1825; *Gymnadenia affinis* (D. Don) H. G. Reichenbach; *H. cavaleriei* Schlechter; *H. goodyeroides* D. Don var. *affinis* (D. Don) King & Pantling; *H. sampsonii* (Hance) Hance; *Peristylus goodyeroides* (D. Don) Lindley var. *affinis* (D. Don) Cooke; *P. sampsonii* Hance; *Phyllomphax affinis* (D. Don) Schlechter.

Plants slender, 21–54 cm tall. Tubers oblong-ellipsoid, 1–2 × 0.4–1 cm. Stem with 2–4 tubular sheaths at base, 3–5-leaved. Leaves clustered to somewhat spaced along stem, elliptic to ovate-lanceolate, 2.5–9 × 1–3.5 cm, apex acute. Inflorescence 14–25 cm; peduncle cylindric, slender; sterile bracts 1 or 2, lanceolate, ca. 15 mm; rachis 8–15 cm, subdensely several to many flowered; floral bracts ovate-lanceolate, 8–10 mm, ca. as long as to slightly exceeding ovary, apex acuminate. Flowers erect; sepals olive to brownish green, petals and lip creamy white; ovary 8–10 mm including pedicel. Dorsal sepal erect, oblong, slightly concave, ca. 3 × 1.5–1.8 mm, 1-veined, apex obtuse; lateral sepals spreading, oblong, ca. 3 × 1.2 mm, 1-veined, apex obtuse. Petals forming a loose hood with dorsal sepal, ovate, oblique, ca. 2.5 × 2 mm, 1-veined, apex obtuse; lip spreading, oblong-obovate, 2.5–3 × ca. 1.8 mm, ecallose, papillose near mouth of spur, base concave-saccate, 3-lobed near middle; lateral lobes diverging at an acute angle from axis of lip, oblong, to ca. 1 mm, apex obtuse; mid-lobe oblong, ca. 1.2 mm, broader than lateral lobes, apex obtuse; spur pendulous, saccate, 0.8–1.2 mm, apex rounded. Column ca. 0.8 mm; viscidia subellipsoid; rostellum small, with short arms on both sides. Fl. Jun–Sep.  $2n = 28, 42, 44, 46 + 0–3B$ .

Evergreen broad-leaved forests, open scrub along valleys, roadsides, grassy slopes; 400–3000 m. Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan, Yunnan [NE India, Laos, Myanmar, Nepal, Thailand].

**12. *Peristylus elisabethae*** (Duthie) R. K. Gupta, Fl. Nainital. 351. 1968.

西藏阔蕊兰 xi zang kuo rui lan

*Habenaria elisabethae* Duthie, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 71: 44. 1902; *Herminium elisabethae* (Duthie) Tang & F. T. Wang.

Plants slender, 9–36 cm tall. Tubers oblong-ellipsoid, 1.5–2 × 0.5–1.2 cm. Stem with 1 or 2 tubular sheaths at base, 2- or 3-leaved. Leaves basal to somewhat spaced along stem, narrowly elliptic-lanceolate, 4.5–12 × 0.8–2 cm, apex acute or acuminate. Inflorescence 8–32 cm; peduncle cylindric, slender; sterile bracts 1 or 2, occasionally foliaceous, lanceolate, to 40 mm; rachis 3.5–22 cm, subdensely many flowered; floral bracts

lanceolate, 5–8 mm, almost as long as ovary, apex acuminate. Flowers horizontal, green to yellowish green; ovary 6–9 mm including pedicel. Dorsal sepal broadly ovate, concave, ca. 2 × 1.8 mm, 1-veined, apex obtuse; lateral sepals weakly spreading, ovate, oblique, ca. 2.2 × 1.5 mm, 1-veined, apex acute. Petals loosely connivent with dorsal sepal and forming a hood, ovate-lanceolate, oblique, 1.5–1.8 × ca. 1.2 mm, 1-veined, apex obtuse; lip slightly deflexed, oblong, ca. 3 × 1 mm, ecallose, base shallowly concave, 3-lobed near middle; lateral lobes triangular to shortly oblong, ca. 1.2 mm, diverging at an acute angle from axis of lip, apex obtuse; mid-lobe oblong, 1.2–1.5 mm, slightly broader than lateral lobes, apex obtuse; spur pendulous, oblong-clavate, ca. 1 mm, apex obtuse or shallowly 2-lobed. Column ca. 1 mm; viscidia ellipsoid. Fl. Jul–Sep.  $2n = 42$ .

Coniferous and broad-leaved mixed forests, glades in forests, flooded meadows, grasslands; 3100–4100 m. C and S Xizang [Bhutan, India, Nepal].

**13. *Peristylus parishii*** H. G. Reichenbach, Trans. Linn. Soc. London 30: 139. 1874.

滇桂阔蕊兰 dian gui kuo rui lan

*Habenaria parishii* (H. G. Reichenbach) J. D. Hooker.

Plants slender to somewhat robust, 26–57 cm tall. Tubers ovoid-oblong, 1–2.5 × 0.8–1.5 cm. Stem with 3–5 tubular sheaths at base, 4- or 5-leaved. Leaves clustered near middle of stem, elliptic-lanceolate to ovate, 4–9 × 2–3.5 cm, apex acute. Inflorescence 17–41 cm; peduncle cylindric to slightly ridged, slender to stout, ebracteate or with 1 lanceolate sterile bract ca. 10 mm; rachis 7–25 cm, densely many flowered; floral bracts ovate-lanceolate, 8–12 mm, exceeding ovary (and sometimes flowers), apex acuminate. Flowers horizontal, green; ovary 6–9 mm including pedicel. Dorsal sepal erect, ovate, concave, 3.2–4.5 × 1.8–2 mm, 1-veined, apex obtuse; lateral sepals spreading, oblong, oblique, 3.5–5 × ca. 1.5 mm, 1-veined, apex obtuse. Petals spreading, ovate, oblique, 3.5–4.8 × 1.8–2.2 mm, 1- or 2-veined, apex obtuse; lip spreading to deflexed, ovate, 4–5.5 × ca. 2 mm, ecallose, base shallowly concave, 3-lobed near middle; lateral lobes oblong-triangular, ca. 0.8 mm, apex obtuse; mid-lobe oblong, ca. 1.5 mm, slightly broader than lateral lobes, apex obtuse; spur pendulous, fusiform, 1.8–2.5 mm, apex acute, neck contracted. Column ca. 1 mm; viscidia oblong; rostellum with short arms. Fl. Jun–Aug.

Broad-leaved forests, thickets; 700–1800 m. N Guangxi, S and SE Yunnan [India, Myanmar, Nepal, Thailand, Vietnam].

**14. *Peristylus lacertifer*** (Lindley) J. J. Smith, Bull. Jard. Bot. Buitenzorg, sér. 3, 9: 23. 1927.

撕唇阔蕊兰 si chun kuo rui lan

Plants slender, 16–45 cm tall. Tubers subglobose to oblong, 0.6–1.5 × 0.5–1 cm. Stem with 2 or 3 tubular sheaths at base, 2- or 3-leaved. Leaves subopposite or clustered at base of stem, oblong-lanceolate to ovate-lanceolate, 2.5–12 × 1–3.5 cm, apex acute. Inflorescence 14–40 cm; peduncle cylindric, slender; sterile bracts 3 or more, occasionally foliaceous, lanceolate, to 30 mm; rachis 5–16 cm, subdensely many flowered; floral bracts lanceolate, 6–12 mm, ca. as long as to slightly exceeding

ovary, apex acuminate. Flowers erect, green to pale yellowish green or white; ovary 7–10 mm including pedicel, glabrous. Dorsal sepal erect, ovate-oblong, concave, 2.8–3.5 × ca. 1.8 mm, 1-veined, apex acute; lateral sepals erect to obliquely spreading, 2.8–3.5 × ca. 1.4 mm, 1-veined, apex acute. Petals connivent with dorsal sepal and forming a hood, ovate, 2.8–3.5 × ca. 1.5 mm, 1-veined, apex obtuse; lip usually deflexed, oblong-obovate, 3.5–4.2 × 1.8–2 mm, base concave, 3-lobed toward apex; disk with a large, subglobose callus near base; lateral lobes triangular-lanceolate, 1–1.6 mm, apex acute; mid-lobe ovate-ligulate, 0.8–1.4 mm, broader than lateral lobes, apex obtuse; spur pendulous, somewhat incurved, ovoid, ca. 1 mm, apex acute. Column 1–1.2 mm; viscidia elliptic, small. Fl. Jul–Oct.  $2n = 44, 88$ .

Forests, thickets, grassy slopes; 100–1300 m. S Fujian, S and SW Guangdong, C and SE Guangxi, S Hainan, SW Sichuan, C Taiwan, S Yunnan [India, Indonesia, Japan (Ryukyu Islands), Malaysia, Myanmar, Philippines, Thailand, Vietnam].

- 1a. Flowers green to pale yellowish green ..... 14a. var. *lacertifer*  
 1b. Flowers white ..... 14b. var. *taipoensis*

#### 14a. *Peristylus lacertifer* var. *lacertifer*

撕唇阔蕊兰(原变种) *si chun kuo rui lan* (yuan bian zhong)

*Coeloglossum lacertiferum* Lindley, Gen. Sp. Orchid. Pl. 302. 1835; *Choeradoplectron spiranthes* Schauer; *Coeloglossum acuminatum* Lindley; *Habenaria lacertifera* (Lindley) Benth.; *H. maingayi* King & Pantling; *H. meyenii* Merrill; *Peristylus chloranthus* Lindley ex Benth.; *P. spiranthes* (Schauer) S. Y. Hu.

Flowers green to pale yellowish green. Lateral lobes of lip shorter than to subequal in length to mid-lobe.

Forests, thickets, grassy slopes; 600–1300 m. S Fujian, S and SW Guangdong, C and SE Guangxi, S Hainan, SW Sichuan, C Taiwan, S Yunnan [India, Indonesia, Japan (Ryukyu Islands), Malaysia, Myanmar, Philippines, Thailand, Vietnam].

#### 14b. *Peristylus lacertifer* var. *taipoensis* (S. Y. Hu & Barretto) S. C. Chen, S. W. Gale & P. J. Cribb, **comb. nov.**

短裂阔蕊兰 *duan lie kuo rui lan*

Basionym: *Peristylus spiranthes* (Schauer) S. Y. Hu var. *taipoensis* S. Y. Hu & Barretto, Chung Chi J. 13(2): 2. 1976; *P. taipoensis* (S. Y. Hu & Barretto) T. C. Hsu & S. W. Chung.

Flowers white. Lateral lobes of lip always shorter than mid-lobe.

- Forests, grasslands; 100–800 m. Hong Kong, C Taiwan.

#### 15. *Peristylus coeloceras* Finet, Rev. Gén. Bot. 13: 519. 1901.

凸孔阔蕊兰 *tu kong kuo rui lan*

*Herminium coeloceras* (Finet) Schlechter; *H. tenianum* Kraenzlin; *H. unicorne* Kraenzlin; *Monorchis coeloceras* O. Schwarz; *M. teniana* (Kraenzlin) O. Schwarz.

Plants slender, 6–35 cm tall. Tubers oblong-ovoid, 1–2 × 0.5–1 cm. Stem with 1 or 2 tubular sheaths at base, 1–3-leaved.

Leaves clustered at base of stem, narrowly elliptic-lanceolate to oblong-elliptic, 2–10 × 0.8–2 cm, apex obtuse or acute. Inflorescence 5–27 cm; peduncle cylindrical, slender; sterile bracts 1–3, occasionally foliaceous, ovate-lanceolate, 4–32 mm; rachis 2–10 cm, subdensely to densely many flowered; floral bracts lanceolate, 4–6 mm, slightly longer than ovary, apex acuminate. Flowers horizontal, white or pale whitish green; ovary 4–5 mm including pedicel. Dorsal sepal broadly erect, ovate, concave, 2–2.2 × ca. 1.8 mm, 1-veined, apex obtuse; lateral sepals spreading, cuneate-ovate, ca. 2.3 × 1.5 mm, 1-veined, apex obtuse. Petals ovate, oblique, 2–2.2 × ca. 1.4 mm, slightly fleshy above middle, 3-veined, apex obtuse; lip spreading, cuneate, ca. 3 × 2 mm, 3-lobed toward apex; disk with a large, glabrous, subglobose callus near base; lateral lobes oblong-ovate, ca. 0.5 mm, apex obtuse; mid-lobe oblong-ovate, ca. 0.8 mm, apex obtuse; spur pendulous, globose-saccate, very small, ca. 1 mm, apex obtuse. Column ca. 0.8 mm; viscidia elliptic; rostellum with short arms. Fl. Jun–Aug.

Coniferous and broad-leaved mixed forests, thickets, alpine grasslands; 2000–3900 m. W Sichuan, E and SE Xizang, NE and NW Yunnan [N Myanmar].

#### 16. *Peristylus neotineoides* (Ames & Schlechter) K. Y. Lang, Acta Phytotax. Sin. 25: 453. 1987.

川西阔蕊兰 *chuan xi kuo rui lan*

*Herminium neotineoides* Ames & Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 4: 42. 1919; *Monorchis neotineoides* (Ames & Schlechter) O. Schwarz.

Plants slender, 20–38 cm tall. Tubers oblong-ovoid, 1.5–2 × 1–1.5 cm. Stem with 2 or 3 tubular sheaths at base, 2-leaved. Leaves basal, oblong to oblong-lanceolate, 4–14 × 0.8–3 cm, apex acute to acuminate. Peduncle cylindrical, with 1 sterile bract; rachis 8–16 cm, densely many flowered; floral bracts lanceolate, basal ones ca. as long as flowers, apex acuminate. Flowers green; ovary ca. 5 mm including pedicel. Dorsal sepal erect, elliptic, 2–2.5 × ca. 1.5 mm, 1-veined, apex obtuse; lateral sepals spreading, elliptic, 2–2.5 × ca. 1.1 mm, 1-veined, apex obtuse. Petals connivent with dorsal sepal and forming a hood, ovate-lanceolate, oblique, 2–2.5 × ca. 1 mm, 1–3-veined, basal half concave, apex obtuse; lip ovate, 2–3 × 2–2.5 mm, base concave, 3-lobed toward apex; disk with a large, papillose, subglobose callus near base; lateral lobes lanceolate, falcate, apex obtuse; mid-lobe ovate-lanceolate, slightly longer and broader than lateral lobes, apex obtuse; spur saccate, very small; viscidia ovate. Fl. Jul.

- Grassy slopes; 3100–4000 m. W Sichuan.

#### 17. *Peristylus forrestii* (Schlechter) K. Y. Lang, Acta Phytotax. Sin. 25: 454. 1987.

条唇阔蕊兰 *tiao chun kuo rui lan*

*Habenaria forrestii* Schlechter, Notes Roy. Bot. Gard. Edinburgh 5: 101. 1912; *Herminium suave* Tang & F. T. Wang.

Plants slender, 20–25 cm tall. Tubers oblong, 1.5–2 × 0.5–1 cm. Stem with 2 or 3 tubular sheaths at base, 2- or 3-leaved. Leaves basal, linear, 2–6 × 0.2–0.3 cm, ± conduplicate, apex acute. Inflorescence 16–22 cm; peduncle cylindrical, slender;

sterile bracts 1–3, lanceolate, 4–5 mm; rachis 6–15 cm, laxly many flowered; floral bracts ovate-lanceolate, ca. 3 mm, much shorter than ovary, apex acuminate. Flowers horizontal to nodding, green; ovary 5–8 mm including pedicel. Dorsal sepal erect, broadly ovate, ca.  $2.5 \times 2$  mm, 1-veined, apex obtuse; lateral sepals reflexed, oblong-ligulate, falcate, ca.  $2.5 \times 1.2$  mm, 1-veined, apex obtuse. Petals ovate-lanceolate to ovate, oblique, ca.  $3 \times 1$  mm, 1-veined, apex obtuse; lip deflexed, ligulate, ca. 3 mm, with an oblong groove near base, ecallose, entire, apex obtuse; spur pendulous, curving forward, cylindrical, 5.5–6(–8) mm, ca. as long as ovary, slightly dilated toward apex; pollinia ovoid; caudicles short; viscidia slightly curled, ovate. Fl. Aug–Sep.

• Forests, grassy slopes; 1700–3900 m. SW Sichuan, NE and NW Yunnan.

**18. *Peristylus forceps*** Finet, Rev. Gén. Bot. 13: 521. 1901.

一掌参 *yi zhang shen*

*Habenaria forceps* (Finet) Schlechter; *H. herminoides* Ames & Schlechter; *Herminium forceps* (Finet) Schlechter; *H. liguliforme* Tang & F. T. Wang; *H. tsoongii* Tang & F. T. Wang.

Plants slender, 15–45 cm tall. Tubers ovoid-oblong, ca. 1 cm. Stem with 2 or 3 tubular sheaths at base, 2–5-leaved. Leaves widely spaced along stem, elliptic-lanceolate to lanceolate, 4–10  $\times$  0.8–2 cm, apex acute or acuminate, intergrading into sterile bracts above. Inflorescence 10–30 cm; peduncle cylindrical, slender; sterile bracts several, often foliaceous, lanceolate, to 35 mm; rachis 8–18 cm, densely many flowered; floral bracts ovate-lanceolate, ca. 8 mm, exceeding flower, apex acuminate. Flowers horizontal, green; ovary ca. 5 mm including pedicel, glabrous to slightly pubescent. Dorsal sepal erect, ovate, 2–3  $\times$  ca. 2 mm, 3-veined, apex obtuse; lateral sepals spreading, oblong, slightly oblique, 2–3  $\times$  ca. 1.5 mm, 1- or 3-veined, apex obtuse. Petals ovate-lanceolate, slightly oblique, 2–3  $\times$  ca. 1.5 mm, fleshy above middle, 1-veined, apex obtuse; lip deflexed,

ligulate-lanceolate, entire, 2.5–3.5  $\times$  1.5–1.8 mm, sometimes abruptly narrowed above middle, abaxially carinate, ecallose, margin incurved, apex obtuse; spur pendulous, obovoid, 0.7–1 mm, much shorter than ovary, apex obtuse. Column ca. 0.8 mm; viscidia disklike; rostellum with short arms. Fl. Jun–Aug.

• *Abies* forests, *Quercus* forests along valleys, grassy slopes; 1200–4000 m. S Gansu, Guizhou, W Hubei, Sichuan, SE Xizang, Yunnan.

**19. *Peristylus nematocaulon*** (J. D. Hooker) Banerji & P. Pradhan, Orchids Nepal Himalaya 106. 1984.

小巧阔蕊兰 *xiao qiao kuo rui lan*

*Habenaria nematocaulon* J. D. Hooker, Fl. Brit. India 6: 154. 1890; *H. juncea* King & Pantling; *Platanthera juncea* (King & Pantling) Kraenzlin; *P. nematocaulon* (J. D. Hooker) Kraenzlin.

Plants slender, 7.5–25 cm tall. Tubers oblong-cylindrical, 1.5–2  $\times$  0.5–0.7 cm. Stem with 1 or 2 tubular sheaths at base, 1-leaved. Leaf subbasal, oblong to oblong-elliptic, 1.2–8  $\times$  0.7–2 cm, apex subacute. Inflorescence 7–20 cm; peduncle cylindrical, slender, ebracteate or with 1 or 2 linear-lanceolate sterile bracts 7–13 mm; rachis 1.2–10 cm, laxly few to several flowered; floral bracts lanceolate, 4–5 mm, almost as long as to slightly exceeding ovary, apex subacute. Flowers horizontal, pale green; ovary 3–5 mm including pedicel. Dorsal sepal erect, ovate-lanceolate, 1.5–2  $\times$  0.8–1 mm, 1-veined, apex acute; lateral sepals weakly spreading, ovate-lanceolate, slightly oblique, 1.5–2  $\times$  ca. 0.8 mm, apex acute. Petals narrowly oblong, 1.5–2  $\times$  0.8–1 mm, 1-veined, apex subobtusely; lip horizontal, oblong-lanceolate, 1.5–2.2  $\times$  ca. 0.7 mm, ecallose, entire, apex subacute; spur pendulous, slightly curving forward, cylindrical-clavate, ca. 1.2 mm, much shorter than ovary, apex obtuse. Column ca. 0.6 mm; caudicles very short; viscidia elliptic. Fl. Jul–Aug.

Alpine scrub, meadows; 3500–3800 m. SE Xizang [Bhutan, NE India, Nepal].

## 42. HABENARIA Willdenow, Sp. Pl. 4: 5, 44. 1805.

玉凤花属 *yu feng hua shu*

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

*Fimbrorchis* Szlachetko; *Habenaria* sect. *Kryptostoma* Summerhayes; *Habenorkis* Thouars; *Kryptostoma* (Summerhayes) Geerinck; *Medusorchis* Szlachetko; *Ochrorchis* Szlachetko; *Senghasiella* Szlachetko; *Smithanthe* Szlachetko & Margońska.

Herbs, terrestrial. Tubers subglobose, ellipsoid, or oblong, fleshy, unlobed, neck with several slender roots. Stem erect, base often with tubular sheaths, above sheaths with leaves and sometimes several bractlike leaves above. Leaves 1 to several, loosely arranged or tufted, base contracted into amplexicaul sheaths. Inflorescence racemose, terminal, few to many flowered. Flowers resupinate. Sepals free; dorsal sepal connivent with petals forming a hood; lateral sepals spreading and reflexed. Petals simple or bilobed; lip often 3-lobed, base often spurred, sometimes saccate or spurless. Column short, both sides often with auricles (staminodes); anther erect, with distinct connective and 2 divergent locules, base of each often protruding and grooved; pollinia 2, granular-farinaceous, sectile, usually each by a long caudicle attached to a viscidium; viscidium naked, relatively small; stigmas 2, separate, convex or elongate,  $\pm$  clavate, at base of column; rostellum usually stout and large, with arms parallel to basal grooves of anther,  $\pm$  embracing caudicles.

About 600 species: worldwide, mainly in tropical and subtropical areas; 54 species (19 endemic) in China.

The recent fragmentation of *Habenaria* by Szlachetko and his co-workers (Szlachetko & Olszewski, Fl. Cameroun 34: 231. 1998; Olszewski & Szlachetko, Ann. Bot. Fenn. 37: 299. 2000; Szlachetko, Orchidee (Hamburg) 55: 489. 2004; Szlachetko, Richardiana 4: 55. 2004; Szlachetko &

Margońska, *Orchidee* (Hamburg) 55: 174. 2004) has not been widely taken up. Although Szlachetko et al. retain many species in *Habenaria*, they also recognize the genera *Fimbrorchis*, *Kryptostoma*, *Medusorchis*, *Ochrorchis*, *Senghasiella*, and *Smithanthe* as represented in China and have placed some Chinese *Habenaria* species in these genera. *Habenaria* is almost certainly polyphyletic and some reorganization of it is undoubtedly necessary. We await the results of molecular studies that are currently underway before adopting a different generic classification from that proposed here.

- 1a. Leaves basal, appressed to substrate, often 2, rarely 1 or more than 2, often cordate, orbicular, or ovate.
- 2a. Petals simple.
- 3a. Flowers white; sepals ciliate or not.
- 4a. Leaves 3 or 4(–6), in a rosette; lip with a conic appendage at base; spur longer than pedicel and ovary ..... 1. *H. delavayi*
- 4b. Leaves 2, subopposite; lip lacking an appendage; spur shorter than pedicel and ovary ..... 2. *H. siamensis*
- 3b. Flowers green or greenish white; sepals not ciliate.
- 5a. Spur 8–13 mm, ca. as long as or longer than ovary; leaves 2–3 × as long as wide ..... 5. *H. humidicola*
- 5b. Spur indistinct or 1–7 mm, shorter than ovary; leaves slightly longer than wide.
- 6a. Stem and ovary pubescent ..... 3. *H. diplomema*
- 6b. Stem and ovary glabrous.
- 7a. Leaves 2, subopposite; spur ca. 7 mm ..... 6. *H. diphylla*
- 7b. Leaves 1 or 2, not as above; spur less than 2 mm.
- 8a. Inflorescence 10–20-flowered; spur ca. 1.5 mm ..... 4. *H. acianthoides*
- 8b. Inflorescence 4- or 5-flowered; spur indistinct or absent ..... 7. *H. reniformis*
- 2b. Petals bilobed, anterior lobe sometimes small and obscure.
- 9a. Leaves with yellowish white markings adaxially.
- 10a. Leaves thinly textured; sepals ciliate; petals deeply 2-lobed, lower lobe linear, 9(–13) mm ..... 8. *H. fargesii*
- 10b. Leaves relatively thickly textured; sepals not ciliate; petals shallowly 2-lobed, lower lobe ca. 0.5 mm ..... 9. *H. wolongensis*
- 9b. Leaves lacking yellowish white markings adaxially.
- 11a. Dorsal sepal 3–6(–7) mm; petals not ciliate.
- 12a. Spur 6–9 mm, shorter than pedicel and ovary ..... 10. *H. aitchisonii*
- 12b. Spur 11–13 mm, longer than pedicel and ovary ..... 11. *H. balfouriana*
- 11b. Dorsal sepal 7–13 mm; petals ciliate.
- 13a. Leaves glaucous adaxially; base of peduncle densely pubescent; dorsal sepal 10–13 mm; spur nearly as long as pedicel and ovary ..... 12. *H. glaucifolia*
- 13b. Leaves green adaxially; base of peduncle sparsely pubescent or glabrous; dorsal sepal 7–9 mm; spur longer than pedicel and ovary.
- 14a. Leaves with 5–7 white veins adaxially; lip lacking an appendage in mouth of spur ..... 13. *H. tibetica*
- 14b. Leaves with 5–7 green veins adaxially; lip with a conic appendage in mouth of spur ..... 14. *H. szechuanica*
- 1b. Leaves cauline, well spaced or tufted, never appressed to substrate, various in shape but never cordate nor orbicular.
- 15a. Petals bilobed.
- 16a. Petals shallowly bilobed; lip ± cross-shaped.
- 17a. Flowers small; petals ca. 4 mm; lateral lobes of lip obovate-oblanceolate, spreading at a right angle to mid-lobe; spur 1.4–1.5 cm, ca. as long as pedicel and ovary ..... 15. *H. schindleri*
- 17b. Flowers rather large, petals 5–5.5 mm; lateral lobes of lip linear, spreading at an acute angle to mid-lobe; spur 2.5–3.5 cm, longer than pedicel and ovary ..... 16. *H. linearifolia*
- 16b. Petals deeply bilobed; lip not cross-shaped.
- 18a. Petals usually with 6 or 7 filiform laciniae; lip with many filiform laciniae ..... 17. *H. polytricha*
- 18b. Petals and lip lacking filiform laciniae.
- 19a. Sepals long acuminate or caudate-aristate at apex.
- 20a. Petals with anterior (lower) lobe ca. 2.5 mm, shorter than posterior (upper) lobe ..... 18. *H. stenopetala*
- 20b. Petals with anterior (lower) lobe 18–25 mm, longer than posterior (upper) lobe ..... 19. *H. pantlingiana*
- 19b. Sepals neither long acuminate nor caudate-aristate at apex.
- 21a. Petals and lip not ciliate on margins of lobes; petal lobes of unequal size, with posterior lobe shorter and wider than anterior lobe ..... 20. *H. coulousii*
- 21b. Petals and/or lip ciliate, or lip pubescent along apical margins of lobes; petal lobes of equal size.
- 22a. Petals and lip with ciliate lobes; spur not lobed ..... 21. *H. petelotii*
- 22b. Petals lacking ciliate lobes; spur deeply bilobed at apex ..... 22. *H. hosokawae*

- 15b. Petals simple.
- 23a. Lateral lobes of lip with many long laciniae along outside margins.
- 24a. Petals linear, ca. 0.5 mm wide; spur thickened and geniculate-curved near middle ..... 23. *H. medioflexa*
- 24b. Petals not linear, 3–8 mm wide; spur not as above.
- 25a. Petals falcate, subovate, ca. 8 mm wide.
- 26a. Sepals not ciliate; connective ca. 8 mm wide; staminodes spatulate, ca. 2 mm; spur shorter than ovary ..... 28. *H. yuana*
- 26b. Sepals ciliate; connective 2–4 mm wide; staminodes elliptic, ca. 1 mm; spur ca. as long as or longer than ovary.
- 27a. Inflorescence 1–4-flowered; spur 7–8.5 cm, much longer than ovary; connective ca. 2 mm wide ..... 29. *H. intermedia*
- 27b. Inflorescence 5- or more flowered; spur 3.5–4 cm, ca. as long as or slightly longer than ovary; connective 3–4 mm wide ..... 30. *H. arietina*
- 25b. Petals oblong or lanceolate, 4–5 mm wide.
- 28a. Spur 4.5–6.5 cm, much longer than pedicel and ovary ..... 26. *H. davidii*
- 28b. Spur 1.7–3.5 cm, shorter than or nearly as long as pedicel and ovary.
- 29a. Connective 10–12 mm wide ..... 24. *H. limprichtii*
- 29b. Connective 2–5 mm wide.
- 30a. Petals ± hairy adaxially; spur 17–18 mm; connective ca. 2 mm wide ..... 25. *H. pectinata*
- 30b. Petals glabrous adaxially; spur 20–35 mm; connective ca. 5 mm wide ..... 27. *H. mairei*
- 23b. Lateral lobes of lip sometimes serrate but lacking long laciniae along outside margins.
- 31a. Lateral sepals strongly oblique.
- 32a. Lip with a ring-shaped or cupular structure, or sometimes a lamella near entrance of spur.
- 33a. Lateral lobes of lip much shorter than mid-lobe.
- 34a. Spur 10–17 mm, shorter than pedicel and ovary; petals oblong, 3–4 mm ..... 36. *H. acuífera*
- 34b. Spur 20–29 mm, longer than pedicel and ovary; petals narrowly ovate or narrowly elliptic, 4–5 mm ..... 37. *H. linguella*
- 33b. Lateral lobes of lip nearly as long as mid-lobe.
- 35a. Flowers white, with a brown vein on lateral sepals; spur 20–22 mm, slightly longer than pedicel and ovary ..... 38. *H. rostellifera*
- 35b. Flowers red-orange, with pale green sepals, without a brown vein on lateral sepals; spur 11–12 mm, shorter than pedicel and ovary ..... 39. *H. rostrata*
- 32b. Lip lacking a ring-shaped, cupular structure or lamella near entrance of spur.
- 36a. Dorsal sepal much smaller than lateral sepals.
- 37a. Lateral sepals obliquely axe-shaped, ca. 7 × 13 mm; petals ca. 4 mm wide; spur 5–8 cm, pendulous, longer than pedicel and ovary; ovary glabrous ..... 31. *H. commelinifolia*
- 37b. Lateral sepals obliquely triangular, ca. 5 × 8 mm; petals ca. 1 mm wide; spur 2–2.2 cm, ca. as long as or shorter than pedicel and ovary; ovary pubescent ..... 32. *H. austrosinensis*
- 36b. Dorsal sepal not or slightly smaller than lateral sepals.
- 38a. Dorsal sepal with 3 serrulate keels on abaxial surface ..... 33. *H. ciliolaris*
- 38b. Dorsal sepal without keels on abaxial surface.
- 39a. Rachis villous on ridges; petals triangular-lanceolate, ca. 6 mm; lip with a conic callus at base; spur 1.6–2 cm, ca. as long as pedicel and ovary ..... 34. *H. hystrix*
- 39b. Rachis glabrous; petals linear-lanceolate, 13–15 mm; lip without callus at base; spur 3–6 cm, much longer than pedicel and ovary ..... 35. *H. fordii*
- 31b. Lateral sepals not or slightly oblique.
- 40a. Flowers orange to red; lip mid-lobe bilobed ..... 40. *H. rhodocheila*
- 40b. Flowers not orange to red; lip or its mid-lobe simple.
- 41a. Lip often unlobed; spur often absent ..... 41. *H. malintana*
- 41b. Lip deeply 3-lobed; spur present.
- 42a. Lateral lobes of lip broad, subrhombic or suborbicular, apical margin serrate.
- 43a. Plants 9–25 cm tall; leaves cordate or ovate; spur 17–20 mm, slightly shorter or nearly as long as pedicel and ovary ..... 42. *H. finetiana*
- 43b. Plants 35–87 cm tall; leaves oblong to narrowly elliptic; spur to 4 cm, longer than pedicel and ovary ..... 43. *H. dentata*
- 42b. Lateral lobes of lip narrow, not as above, margins never serrate.

- 44a. Mid-lobe of lip suberect or curved upward, apex adnate to tip of hood formed by dorsal sepal and petals.
- 45a. Floral bracts shorter than pedicel and ovary; lateral sepals reflexed; spur cylindric, to 21 mm, much longer than pedicel and ovary ..... 44. *H. lucida*
- 45b. Floral bracts longer than flower; lateral sepals spreading, not reflexed; spur clavate, 3–6 mm, shorter than pedicel and ovary ..... 45. *H. shweliensis*
- 44b. Mid-lobe of lip never suberect or curved upward, apex never adnate to hood formed by dorsal sepal and petals.
- 46a. Leaves tufted at base of stem; spur longer than ovary.
- 47a. Leaves narrowly elliptic or broadly oblanceolate, 18–20 mm wide; flowers pale green ..... 46. *H. iyoensis*
- 47b. Leaves linear or linear-lanceolate, 4–15 mm wide; flowers yellowish green or white.
- 48a. Leaves 4 or 5, 4–6 mm wide; dorsal sepal ca. 2 mm; spur narrowly cylindric ..... 47. *H. viridiflora*
- 48b. Leaves 6–13, 8–15 mm wide; dorsal sepal ca. 5 mm; spur narrowly cylindric-clavate.
- 49a. Dorsal sepal broadly ovate; lateral sepals narrowly ovate; petals ovate-ligulate; lip with lateral lobes narrower than mid-lobe ..... 48. *H. plurifoliata*
- 49b. Dorsal sepal elliptic; lateral sepals elliptic; petals linear; lip with lateral lobes and mid-lobe equal in width ..... 49. *H. tonkinensis*
- 46b. Leaves not tufted at base of stem; spur longer or shorter than ovary.
- 50a. Dorsal sepal 7–8 mm.
- 51a. Spur narrowly cylindric, 3–5 mm, shorter than pedicel and ovary; dorsal sepal narrowly ovate, ca. 4 mm wide; petals ca. 2.5 mm wide; flowers yellow .... 50. *H. fulva*
- 51b. Spur clavate, 8–13 mm, ca. as long as pedicel and ovary; dorsal sepal cordate or broadly ovate, 5–6 mm wide; petals obliquely ovate-triangular, 3–3.8 mm wide; flowers yellowish green ..... 51. *H. marginata*
- 50b. Dorsal sepal 3–4 mm.
- 52a. Floral bracts longer than ovary; flowers pale yellowish green ..... 52. *H. leptoloba*
- 52b. Floral bracts shorter or nearly as long as ovary; flowers pinkish white or pale green.
- 53a. Floral bracts much shorter than pedicel and ovary; flowers pinkish white; lateral sepals 2-veined; petals obliquely oblong-ovate; spur ca. 21 mm ..... 53. *H. nematocera*
- 53b. Floral bracts nearly as long as pedicel and ovary; flowers pale green; lateral sepals 3-veined; petals lanceolate; spur ca. 17 mm ..... 54. *H. furcifera*

**1. *Habenaria delavayi* Finet, Rev. Gén. Bot. 13: 527. 1901.**

厚瓣玉凤花 hou ban yu feng hua

*Habenaria yunnanensis* Rolfe.

Plants 9–35 cm tall. Tubers oblong or ovoid, 1–2 × 1–1.5 cm, fleshy. Stem erect, terete, 3–5 mm in diam., glabrous, base with 1 or 2 tubular sheaths, with 3 or rarely 4(–6) leaves in a dense basal rosette, and with 1–5 bractlike leaves above. Leaf blade orbicular or ovate, 1.5–5 × 1.5–4 cm, slightly fleshy, base obtuse-rounded, abruptly narrowed and amplexicaul, apex obtuse or acute. Raceme 6–15 cm, loosely 7–20-flowered; floral

bracts lanceolate, ca. 1/2 length of ovary, apex aristate; ovary twisted, slightly arching, fusiform, glabrous, including pedicel 1.3–1.8 cm. Flowers white. Dorsal sepal erect, broadly elliptic, ca. 4 × 4 mm, concave, abaxially keeled and toward apex pubescent, 3-veined; lateral sepals reflexed, lanceolate, 4–5 × ca. 2.5 mm, 3-veined, apex acute, abaxially and along margin pubescent. Petals linear, ca. 6 × 0.8 mm, base twisted, 1-veined, apex acute; lip spurred, deeply 3-lobed above base; lobes narrow, equal in width, stout; lateral lobes linear-cuneate, 8–9 × 0.8–1 mm; mid-lobe linear, ± subcylindric, ca. 7 × 0.7 mm, adaxially channeled; spur pendulous, slightly curved, clavate, 1.2–1.4 cm, longer than ovary, with 1 slightly incurved, subu-

late appendage at front margin of mouth; pollinia obovoid; caudicles nearly oblong, slender; viscidium ovate; stigmas clavate, apex papillate. Fl. Jun–Aug.

• Forests, grassy places in forests, shrubby grasslands; 1500–3000 m. Guizhou, W Sichuan, NW to SE Yunnan.

**2. *Habenaria siamensis*** Schlechter, Repert. Spec. Nov. Regni Veg. 2: 82. 1906.

中泰玉凤花 *zhong tai yu feng hua*

Plants 14–16 cm tall. Tubers oblong, 2–3 cm × 8–10 mm, fleshy. Stem erect, terete, 2–3 mm in diam., glabrous, often with 2 spreading basal leaves, with 3–5 bractlike leaves above. Leaf blade ovate or ovate-oblong, 4–4.5 × 2.5–3.5 cm, base amplexicaul-sheathing, apex acute or acuminate. Raceme several to more than 10-flowered, erect or arching, 4–6 cm; floral bracts lanceolate, ca. 13 mm, shorter than ovary, margin finely ciliate, apex acuminate; ovary twisted, slightly arching, cylindrical, including pedicel to 15 mm, glabrous. Flowers white. Sepals 3-veined, margin finely ciliate; dorsal sepal forming a hood with petals, erect, ovate, concave, ca. 8 × 4 mm; lateral sepals reflexed, obliquely ovate-lanceolate, ca. 9 × 4 mm. Petals obliquely falcate-lanceolate, ca. 8 × 2.5 mm, 2-veined; lip spurred at base, deeply 3-lobed above base; lateral lobes linear-filiform, ± curved, 17–21 × ca. 0.5 mm, attenuate toward apex; mid-lobe straight, linear, 6–9 × 0.8–1.5 mm; spur pendulous, cylindrical-clavate, 9–10 mm, conspicuously shorter than ovary, dilated from middle to end, near end ca. 2.2 mm in diam., apex obtuse; connective narrow, ca. 1 mm wide; rostellum short; stigmas oblong-clavate, ca. 4 mm. Fl. Aug.

Grassy slopes; ca. 600 m. SE Guizhou [Thailand].

**3. *Habenaria diplonema*** Schlechter, Notes Roy. Bot. Gard. Edinburgh 5: 100. 1912.

小巧玉凤花 *xiao qiao yu feng hua*

Plants 8–13 cm tall. Tubers oblong, ca. 1 cm × 5 mm, fleshy. Stem erect or ascending, slender, pubescent, with 2 nearly opposite leaves near middle. Leaf blade orbicular, 1.5–2 × 1.4–1.7 cm, adaxially with yellowish white venation, densely finely papillate, base narrowed and amplexicaul-sheathing, margin white ciliate, apex acute. Raceme 4–14-flowered; rachis pubescent; floral bracts lanceolate, much shorter than ovary, apex acuminate; ovary twisted, terete, pubescent, including pedicel ca. 7 mm. Flowers green, small. Dorsal sepal erect, broadly ovate, ca. 3.5 × 3 mm, glabrous, 1-veined, apex obtuse-rounded; lateral sepals reflexed, obliquely ovate-elliptic, ca. 4 × 2.5 mm, glabrous, 1-veined, apex subobtuse. Petals erect, obliquely falcate-ovate, ca. 3.5 × 2.3 mm, glabrous, 1-veined, unlobed; lip spurred at base, above base 3-lobed; lateral lobes filiform, 6–7 mm, much longer than mid-lobe; mid-lobe linear-ligulate, ca. 2 mm, apex subacute; spur pendulous, clavate, ca. 4 mm. Fl. Aug.

• Forests, soil-covered rocks; 2800–4200 m. N Fujian, SW Sichuan, NW Yunnan.

**4. *Habenaria acianthoides*** Schlechter, Acta Horti Gothob. 1: 138. 1924.

小花玉凤花 *xiao hua yu feng hua*

Plants 18–20 cm tall. Tubers ovoid, ca. 1.5 cm, fleshy. Stem erect or ascending, slender, glabrous, with 1 leaf at base and 2 or 3 bractlike leaves above. Leaf blade green or purplish red, ovate-orbicular, 1.5–3 × 2.2–2.8 cm, slightly fleshy, base subcordate, apex mucronate. Raceme with 10–20 secund flowers, 8–12 cm; floral bracts ovate-lanceolate, much shorter than ovary, apex acuminate; ovary twisted, fusiform, including pedicel ca. 4.5 mm, glabrous. Flowers green, very small. Dorsal sepal forming a hood with petals, erect, ovate, ca. 1.5 × 1.2 mm, 1-veined, apex obtuse; lateral sepals reflexed, obliquely ovate, ca. 1.75 × 1 mm, 1-veined, apex obtuse. Petals obliquely ovate, ca. 1.5 × 1.5 mm, 1-veined; lip spurred at base, 3-veined, deeply 3-lobed below middle; lateral lobes divaricate, ± curved, filiform, ca. 3.5 mm; mid-lobe straight, linear, ca. 2 mm; spur pendulous, oblong-cylindrical, ca. 1.5 mm, apex obtuse. Fl. Jul.

• Forests, thickets; 900–1900 m. S Gansu, E Qinghai, W Sichuan.

**5. *Habenaria humidicola*** Rolfe, Bull. Misc. Inform. Kew 1896: 202. 1896.

湿地玉凤花 *shi di yu feng hua*

Plants 15–20 cm tall. Tubers cylindrical, 1–4 cm × 5–15 mm, fleshy. Stem erect, terete, glabrous, with 3 or 4 rosette leaves at base and with a few bractlike leaves above. Leaf blade lanceolate-oblong, 4–6 × 1–1.5 cm, base amplexicaul, apex subacute or acuminate. Raceme laxly few to many flowered, 5–20 cm; floral bracts ovate-lanceolate, 5–14 mm, shorter to longer than ovary, apex acuminate; ovary twisted, cylindrical-fusiform, including pedicel 8–10 mm, glabrous. Flowers green, small. Dorsal sepal forming a hood with petals, erect, ovate-oblong, concave, 3.2–4 × 2–2.8 mm, 3-veined, apex obtuse; lateral sepals reflexed, obliquely ovate-oblong, 3.5–4.5 × 1.8–2 mm, 3-veined, apex obtuse. Petals straight, linear-oblong, 3.2–4 × ca. 1 mm, 1-veined, apex obtuse; lip 5–9 mm, spurred at base, deeply 3-lobed above base; lateral lobes linear-lanceolate, attenuate and filiform above middle, 4.5–9 mm; mid-lobe linear, 3.2–6 mm, apex obtuse; spur pendulous, cylindrical, 8–15 mm, ca. as long as or longer than ovary, slender, apical half slightly dilated; stigmas oblong-clavate, ca. 1.5 mm. Fl. Sep.

Forests, damp places on shaded rocks; 600–1500 m. SW Guizhou, S Yunnan, E Zhejiang [Myanmar].

**6. *Habenaria diphylla*** Dalzell, Hooker's J. Bot. Kew Gard. Misc. 2: 262. 1850.

二叶玉凤花 *er ye yu feng hua*

*Habenaria humistrata* Rolfe ex Downie; *Liparis diphyllus* Nimmo.

Plants 7–25 cm tall. Tubers ovoid or ellipsoid, 0.5–1.5 cm, fleshy. Stem erect or ascending, terete, glabrous, with 2 nearly opposite leaves at base and 2–5 bractlike leaves above. Leaf blade cordate or nearly reniform, 1.2–3.5 × 1–5 cm, base contracted into amplexicaul sheath, apex acute. Raceme loosely 1- to several flowered; rachis glabrous; floral bracts ovate-lanceolate, 4–7 mm, shorter than ovary, apex acuminate; ovary twisted, terete, including pedicel 10–11 mm, glabrous. Flowers greenish white, small. Dorsal sepal forming a hood with petals, erect, ovate, concave, ca. 5 × 4 mm, 1-veined, apex obtuse-rounded; lateral sepals reflexed, oblong, ca. 6 × 3 mm, 3-



veined, apex acute. Petals straight, linear-lanceolate, ca.  $5 \times 1$  mm, 1-veined, apex acute; lip 13–15 mm, from base deeply 3-lobed, lobes filiform; lateral lobes longer than mid-lobe, 13–15 mm, often curled upward toward apex; spur pendulous, subclavate, 5.5–9 mm, shorter than ovary, apex subacute; stigmas narrowly clavate. Fl. Jun.  $2n = 42, 42 + 2B, 108$ .

Damp places and on rocks in forests along valleys; 1000–1400 m. S Yunnan [N India, Thailand].

**7. *Habenaria reniformis*** (D. Don) J. D. Hooker, Fl. Brit. India 6: 152. 1890.

肾叶玉凤花 shen ye yu feng hua

*Listera reniformis* D. Don, Prodr. Fl. Nepal. 28. 1825; *Aopla reniformis* Lindley; *Herminium reniforme* (D. Don) Lindley; *Neottia reniformis* (D. Don) Sprengel.

Plants 18–20 cm tall. Tubers globose, ca. 1 cm in diam., fleshy. Stem rather slender, with 1 or 2 leaves at base and 3 or 4 bractlike leaves above. Leaf blade almost spreading horizontally, orbicular, ovate-cordate, or broadly ovate-orbicular,  $1.8\text{--}2.5 \times 1.5\text{--}2.7$  cm, fleshy, base often cordate, amplexicaul, apex obtuse. Raceme sparsely 4- or 5-flowered, 7–8 cm, glabrous; floral bracts lanceolate, small, 6–8 mm, much shorter than ovary; ovary twisted, cylindric-fusiform, including pedicel 13–16 mm, glabrous. Flowers green, small. Dorsal sepal erect, concave, narrowly ovate-oblong, ca.  $5 \times 1.7$  mm, 3-veined, apex obtuse; lateral sepals spreading or reflexed, obliquely ovate-lanceolate, ca.  $6 \times 1.5$  mm, 3-veined, apex acuminate. Petals oblique, narrowly lanceolate, falcate, ca.  $4.5 \times 1$  mm, 1-veined, apex subobtuse; lip linear, slightly longer than or ca. as long as sepals, usually with 1 tooth on either side below middle; spur often absent; stigmas subcylindric or clavate, ca. 1.5 mm. Fl. Oct.

Grassy places in forests. Guangdong, S Hainan [Cambodia, India, Nepal, Thailand, Vietnam].

**8. *Habenaria fargesii*** Finet, Rev. Gén. Bot. 13: 528. 1901.

雅致玉凤花 ya zhi yu feng hua

Plants 13–24 cm tall. Tubers ovoid or oblong,  $1.5\text{--}3 \times 1\text{--}1.5$  cm, fleshy. Stem erect or ascending, terete, slender, 1–2 mm in diam., finely papillate-pubescent, with 2 nearly opposite leaves at base, and 1–3 bractlike leaflets above leaves. Leaf blade spreading horizontally, adaxially with yellowish white markings, ovate-orbicular or orbicular,  $4\text{--}4.5 \times 4\text{--}5$  cm, slightly fleshy, base abruptly narrowed and amplexicaul, apex acute. Raceme 4–9-flowered, 5–15 cm; rachis finely papillate-pubescent; floral bracts lanceolate, much shorter than ovary, apex acuminate; ovary twisted, cylindric, including pedicel 7–8 mm, papillate-pubescent. Flowers yellowish green. Dorsal sepal ovate, concave,  $3\text{--}3.5 \times$  ca. 2.5 mm, 3-veined, ciliate, apex acute; lateral sepals strongly reflexed, obliquely ovate,  $5\text{--}5.5 \times$  ca. 4 mm, 4-veined, ciliate, apex acute. Petals connivent with dorsal sepal, deeply 2-lobed; upper lobe falcate-oblong, ca. 4 mm; lower lobe linear, ca. 8 mm; lip spurred at base, deeply 3-lobed above base; lateral lobes divaricate, filiform, ca. 1.5 cm, apex curled; mid-lobe linear, much shorter than lateral lobes; spur pendulous, cylindric, clavate below middle, longer than

ovary; connective broad; pollinia obcuneate; caudicles curved, linear, slender; viscidia subglobose; rostellum with slender lateral lobes. Fl. Aug.

• Forests, along valleys; 1400–3000 m. N Chongqing, SE Gansu, Sichuan.

**9. *Habenaria wolongensis*** K. Y. Lang, Acta Phytotax. Sin. 22: 314. 1984.

卧龙玉凤花 wo long yu feng hua

Plants 21–30 cm tall. Tubers oblong,  $1.5\text{--}2.5 \times 1\text{--}1.5$  cm, fleshy. Stem erect, pubescent, with 2 nearly opposite leaves at base, and sometimes 1–6 bractlike leaflets above leaves. Leaf blade spreading horizontally, adaxially with yellowish white markings, cordate or ovate,  $4\text{--}8.5 \times 3.5\text{--}9$  cm, slightly fleshy, base abruptly narrowed and amplexicaul, apex acute. Raceme many flowered, 7–10 cm; rachis pubescent; floral bracts lanceolate, shorter than ovary, ciliate, apex acuminate; ovary twisted, cylindric-fusiform, including pedicel 8–10 mm. Flowers yellowish green. Dorsal sepal erect, broadly ovate, concave, ca.  $5 \times 3.5$  mm, 3-veined, apex obtuse; lateral sepals reflexed, obliquely ovate, ca.  $6 \times 3$  mm, 3-veined, apex obtuse. Petals basally 2-lobed; upper lobe falcate-lanceolate, ca. 6 mm; lower lobe a tooth at base of upper lobe, ca. 0.5 mm; lip spurred at base, near base deeply 3-lobed, lobes linear, ca. 6.5 mm; lateral lobes lanceolate-filiform, slightly narrower than linear mid-lobe; spur pendulous, subclavate, ca. as long as ovary, apex obtuse; pollinia ovoid; viscidia elliptic; stigmas clavate. Fl. Aug.

• Forests; ca. 2200 m. W Sichuan.

**10. *Habenaria aitchisonii*** H. G. Reichenbach, Trans. Linn. Soc. London, Bot. 3: 113. 1886.

落地金钱 luo di jin qian

*Habenaria bihamata* Kraenzlin; *H. dicerias* Schlechter; *H. dicerias* var. *pubicaulis* (Schlechter) Soó; *H. pubicaulis* Schlechter.

Plants 12–33 cm tall. Tubers oblong or ellipsoid,  $1\text{--}2.5 \times 0.8\text{--}1.5$  cm, fleshy. Stem erect, terete, papillate-pubescent, with 2 nearly opposite leaves at base. Leaf blade spreading horizontally, ovate or ovate-orbicular,  $2\text{--}5 \times 1.5\text{--}4$  cm, adaxially sometimes with 5 yellowish white veins, base narrowed and amplexicaul, apex acute. Raceme several to many flowered, 5–15 cm; rachis papillate; floral bracts ovate-lanceolate, ca. as long as or shorter than ovary, apex acuminate; ovary twisted, terete, including pedicel 7–10 mm, papillate-hairy. Flowers yellowish green or green, small. Dorsal sepal forming a hood with petals, erect, ovate, concave,  $3\text{--}5 \times 2.5\text{--}3.5$  mm, 3-veined, apex obtuse or acute; lateral sepals reflexed, obliquely ovate-oblong,  $3.5\text{--}5.5 \times 2\text{--}3$  mm, 3-veined, apex obtuse or acute. Petals indistinctly 2-lobed; upper lobe obliquely falcate-lanceolate,  $3\text{--}5 \times 1.5\text{--}2$  mm; lower lobe a tooth at base of upper lobe; lip longer than sepals, above base deeply 3-lobed; lateral lobes retrorse, almost embracing erect sepals, subulate, 6–12 mm, apex slightly hooked; mid-lobe reflexed, straight, linear,  $5\text{--}9 \times 1\text{--}1.2$  mm; spur pendulous, cylindric-clavate, 6–9 mm, shorter than ovary; connective relatively narrow; stigmas subclavate. Fl. Jul–Sep.  $2n = 42$ .

Forests, thickets, grasslands; 2100–4300 m. Guizhou, S Qinghai, W Sichuan, S and SE Xizang, C and NW Yunnan [Afghanistan, Bhutan, India, Kashmir].

**11. *Habenaria balfouriana*** Schlechter, Repert. Spec. Nov. Regni Veg. 20: 381. 1924.

滇蜀玉凤花 dian shu yu feng hua

Plants 15–20 cm tall. Tubers oblong, 1–1.5 × 0.7–1 cm, fleshy. Stem erect, terete, 2–2.5 mm in diam., densely papillate-hairy, with 2 nearly opposite leaves at base. Leaf blade spreading horizontally, sometimes slightly tinged with yellowish white, ovate or broadly elliptic, 3–4 × ca. 3 cm, slightly fleshy, with 5 main veins, base obtuse-rounded, apex acuminate or acute. Raceme 3–7-flowered, erect, ca. 7 cm; rachis papillate; floral bracts lanceolate, apex acuminate; ovary twisted, fusiform, including pedicel 11–12 mm, finely papillate-hairy. Flowers yellowish green. Dorsal sepal forming a hood with petals, erect, ovate, concave, 5–6 × 3.5–4 mm, 3-veined, margin ciliate-denticulate, apex obtuse; lateral sepals reflexed, obliquely ovate-oblong, 6–7 × 3.5–4 mm, 3-veined, apex subacute. Petals 2-lobed; upper lobe obliquely ovate-lanceolate, 5–6 × 2–2.2 mm; lower lobe a tooth at base of upper lobe; lip longer than sepals, deeply 3-lobed above base; lateral lobes retrorse, almost embracing ovary, subulate, 1–1.2 cm; mid-lobe linear, ca. 1 cm; spur pendulous, slightly curved, cylindrical-clavate, ca. 1.3 cm, longer than ovary, apex subobtusate; connective relatively narrow; stigmas suboblong. Fl. Jul–Aug.

• Forests or shrubby grasslands; 2200–3600 m. SW Sichuan, NW Yunnan.

**12. *Habenaria glaucifolia*** Bureau & Franchet, J. Bot. (Morot) 5: 152. 1891.

粉叶玉凤花 fen ye yu feng hua

*Habenaria alexandrae* Schlechter; *H. gnomifera* Schlechter; *Senghasiella glaucifolia* (Bureau & Franchet) Szlachetko.

Plants 15–50 cm tall. Tubers oblong or ovoid, 1.5–3 × 1–1.5 cm, fleshy. Stem erect, terete, 3–5 mm in diam., pubescent, with 2 nearly opposite leaves at base. Leaf blade spreading horizontally, abaxially slightly tinged with grayish white, adaxially purplish green, suborbicular or ovate-orbicular, 3.5–4.6 × 3–4.7 cm, rather stout, base obtuse-rounded and amplexicaul, apex acute or subacuminate. Raceme 5–20 cm, 3–10-flowered; peduncle densely pubescent at base; rachis pubescent; floral bracts lanceolate or ovate, shorter than ovary, apex acuminate; ovary twisted, terete, including pedicel 2.5–3 cm, pubescent. Flowers white or whitish green. Dorsal sepal forming a hood with petals, erect, ovate or oblong, concave, 10–13 × 6–7 mm, 5-veined, apex obtuse; lateral sepals reflexed, obliquely ovate or oblong, 11–14 × 7–7.5 mm, 5-veined, apex acute. Petals deeply 2-lobed; upper lobe spatulate-oblong, ca. 12 × 6 mm, margin ciliate, apex obtuse; lower lobe much smaller, linear-lanceolate, 3–5 × 1–1.5 mm, apex acute or subobtusate; lip reflexed, much longer than sepals, base with a short claw, above base deeply 3-lobed; lateral lobes divaricate, linear-lanceolate, ca. 2.5 cm, circinate toward apex; mid-lobe straight, linear, ca. 1.2 cm, slightly wider than lateral lobes; spur pendulous, cylindrical-subclavate, 2.5–3 cm, nearly as long as ovary, apex slightly

obtusate; connective extremely wide; stigmas lanceolate. Fl. Jul–Aug.

• Forests, thickets, grasslands; 2000–4300 m. S Gansu, Guizhou, S Shaanxi, W Sichuan, SE Xizang, NW to SE Yunnan.

**13. *Habenaria tibetica*** Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 12: 338. 1922.

西藏玉凤花 xi zang yu feng hua

Plants 18–35 cm tall. Tubers subglobose, oblong, or ellipsoid, 2–3 × 2–2.5 cm, fleshy. Stem erect, terete, papillate-hairy, with 2 nearly opposite leaves at base. Leaf blade spreading horizontally, ovate or orbicular, 3–6.5 × 2.5–7 cm, adaxially with 5–7 white veins, base obtuse-rounded, abruptly narrowed and amplexicaul, apex acute to obtuse. Raceme 4–10 cm, loosely 3–8-flowered; rachis papillate-hairy; floral bracts lanceolate or linear-lanceolate, apex acuminate; ovary twisted, narrowly fusiform, including pedicel 1.5–2 cm, finely papillate-hairy. Flowers yellowish green to whitish. Dorsal sepal forming a hood with petals, erect, ovate, concave, 7–9 × 4.5–5 mm, 3(–5)-veined, apex subobtusate; lateral sepals reflexed, obliquely ovate, 9–11 × 4–5 mm, 3(–5)-veined, apex subacute. Petals shallowly 2-lobed; upper lobe oblique, oblong-lanceolate to ovate-lanceolate, 8–10 × 3–3.5 mm, 2-veined, margin papillate-ciliate, apex subacute; lower lobe a tooth at base of upper lobe, 1.5–2 mm; lip longer than sepals, near base deeply 3-lobed, lobes reflexed; lateral lobes divergent, linear-filiform, 25–40 mm, apically often curled; mid-lobe straight, linear, 10–19 mm, apex obtuse; spur often spreading horizontally, cylindrical-clavate, 2–2.5 cm, much longer than ovary, apex obtuse; connective rather wide; stigmas ligulate. Fl. Jul–Aug.

• Forests, thickets, grasslands; 2300–4300 m. S Gansu, NE Qinghai, W Sichuan, SE Xizang, NW Yunnan.

**14. *Habenaria szechuanica*** Schlechter, Acta Horti Gothob. 1: 140. 1924.

四川玉凤花 si chuan yu feng hua

Plants 20–30 cm tall. Tubers subglobose or ellipsoid, 1–2 × 1–1.5 cm. Stem erect or ascending, terete, 3–5 mm in diam., finely papillate-hairy, with 2 nearly opposite leaves at base. Leaf blade spreading horizontally, broadly ovate or orbicular, 3–4.5 × 3–5 cm, slightly fleshy, with 5(–7) green veins, base obtuse-rounded, abruptly narrowed and amplexicaul, apex shortly acuminate or acute. Raceme erect, with 3–7 often secund flowers, 4–12 cm; rachis finely papillate-hairy; floral bracts linear or lanceolate, apex acuminate; ovary twisted, arching, fusiform, including pedicel 1–1.5 cm, papillate-hairy. Flowers yellowish green. Dorsal sepal forming a hood with petals, erect, ovate, concave, 7–8 × ca. 3.5 mm, 3-veined, apex obtuse; lateral sepals reflexed, obliquely ovate, 8–9 × 3.5–4 mm, 3-veined, apex subobtusate. Petals shallowly 2-lobed; upper lobe obliquely oblong-lanceolate, 8–9 × 2–2.5 mm, 2-veined, margin papillate-ciliate, apex obtuse; lower lobe a tooth at base of upper lobe, 1.5–2 mm; lip reflexed, longer than sepals, spurred at base, adaxially with an appendage 5–7 mm, above base deeply 3-lobed; lateral lobes linear-filiform, 2.5–2.8(–4) cm, apex often curled; mid-lobe linear, 1.3–1.9 cm; spur cylindrical-clavate, 2–2.5 cm, longer than ovary, apex ob-

tuse; connective rather wide; stigmas narrowly clavate. Fl. Jul–Aug.

• Forests of *Pinus yunnanensis* or *Picea*; 2900–3200 m. S Shaanxi (Taibai Shan), NW Sichuan, NW Yunnan.

**15. *Habenaria schindleri*** Schlechter, Repert. Spec. Nov. Regni Veg. 16: 354. 1920.

十字兰 shi zi lan

*Fimbrorchis linearifolia* (Maximowicz) Szlachetko subsp. *schindleri* (Schlechter) Szlachetko; *Habenaria sagittifera* H. G. Reichenbach f. *lacerata* Matsuda.

Plants 25–70 cm tall. Tubers oblong or ovoid, 5–15 mm in diam., fleshy. Stem erect, terete, with 4–7 leaves below middle. Leaf blade linear, 5–23 × 0.3–0.9 cm, base amplexicaul-sheathing, apex acuminate. Raceme 5.5–18 cm, 6–25-flowered; rachis glabrous; floral bracts linear-lanceolate to ovate-lanceolate, basal ones 15–20 mm, longer than ovary, glabrous; ovary twisted, slightly arching, terete, including pedicel 1.4–1.5 cm. Flowers white, glabrous. Dorsal sepal forming a hood with petals, erect, ovate-orbicular, concave, 4.5–5 × 4–4.5 mm, 5-veined, apex obtuse; lateral sepals strongly reflexed, obliquely oblong-ovate, 6–7 × 4–5 mm, 4(or 5)-veined, apex subacute. Petals 2-lobed; upper lobe ovate-triangular, ca. 4 × 2 mm, 2-veined; lower lobe triangular-lanceolate, 1.5–1.8 mm, apex shallowly bilobed; lip spreading, (11–)13–15 mm, below middle deeply 3-lobed and ± cross-shaped; lobes 7–9 mm; lateral lobes spreading at right angles to mid-lobe, obovate-oblancoate, 1–1.5 mm wide, apex fimbriate; mid-lobe linear, ca. 0.8 mm wide, toward apex contracted; spur pendulous, 1.4–1.5 cm, nearly as long as ovary, abruptly dilated near apex; stigmas oblong. Fl. Jul–Oct.  $2n = 28$ .

Forests or grasslands along valleys; 200–1700 m. Anhui, Fujian, Guangdong, Hebei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Zhejiang [Japan, Korea].

**16. *Habenaria linearifolia*** Maximowicz, Mém. Acad. Imp. Sci. St. Pétersbourg Divers Savans 9 [Prim. Fl. Amur.]: 269. 1859.

线叶十字兰 xian ye shi zi lan

*Fimbrorchis linearifolia* (Maximowicz) Szlachetko.

Plants 25–80 cm tall. Tubers ovoid or globose, fleshy. Stem erect, terete, with 5–7 leaves below middle. Leaf blade linear, 9–20 × 3–7 cm, base amplexicaul-sheathing, apex acuminate. Raceme 8–20-flowered, 5–16 cm; rachis glabrous; floral bracts lanceolate to ovate-lanceolate, basal ones ca. 1.5 cm, shorter than ovary, apex long acuminate; ovary twisted, slightly arching, cylindrical, including pedicel 1.8–2 cm, glabrous. Flowers white or greenish white, glabrous. Dorsal sepal forming a hood with petals, erect, ovate or broadly ovate, concave, 5.5–6 × 3.5–4 mm, 5-veined; lateral sepals reflexed, obliquely ovate, 6–7 × 4–5 mm, 4- or 5-veined, apex subacute. Petals 2-lobed; upper lobe 5–5.5 × 3.5–4 mm; lower lobe a short tooth, apex shallowly 2-lobed; lip spreading, ca. 15 mm, deeply 3-lobed near middle and ± cross-shaped; lobes linear, 8–9 × 0.5–0.6 mm; lateral lobes spreading at acute angles to mid-lobe, apex fimbriate; mid-lobe entire; spur pendulous, 2.5–3.5 cm, longer than ovary, slightly thickened toward end, apex obtuse; stigmas

oblong. Fl. Jul–Sep.  $2n = 28$ .

Forests or grasslands along valleys; 200–1500 m. Anhui, N Fujian, Hebei, Heilongjiang, Henan, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shandong, Zhejiang [Japan, Korea, Russia (Far East)].

**17. *Habenaria polytricha*** Rolfe, Hooker's Icon. Pl. 25: ad t. 2496. 1896.

丝裂玉凤花 si lie yu feng hua

*Medusorchis polytricha* (Rolfe) Szlachetko.

Plants 40–80 cm tall. Tubers oblong, 3–5 × 1–2.5 cm, fleshy. Stem erect, terete, stout, with 7 or 8(–10) leaves near middle and 3 to many bractlike leaflets above leaves. Leaf blade narrowly elliptic to oblong-lanceolate, 4–20 × 2–6 cm, base contracted into amplexicaul sheath, apex acuminate. Raceme 6–15(–40)-flowered, 15–30 cm; floral bracts lanceolate, 10–12 mm, apex long acuminate; ovary twisted, terete, including pedicel 14–15 mm, glabrous. Flowers greenish white; sepals green. Dorsal sepal elliptic-lanceolate, concave, 8–9 × 3–4 mm, 3-veined, apex aristate; lateral sepals reflexed, obliquely ovate, 9–12 × 5–6 mm, 3-veined, apex aristate. Petals pale green or white, deeply 2-lobed; upper lobe 2-lobed and lower lobe 3–5-lobed once again, lobules all filiform, 14–17 mm; lip pale green or white, above base 3-lobed, each lobe divided once more into more than 20 lobules; lobules filiform, 14–18 mm; spur pendulous, white, cylindrical-clavate, 12–14 mm, shorter than ovary, slightly dilated toward end, apex obtuse; stigmas oblong. Fl. Aug–Oct.

Forests; 300–1100 m. Guangxi, Jiangsu, SW Sichuan, Taiwan, Zhejiang [Japan (Ryukyu Islands), Philippines].

**18. *Habenaria stenopetala*** Lindley, Gen. Sp. Orchid. Pl. 319. 1835.

狭瓣玉凤花 xia ban yu feng hua

*Habenaria amanoana* Ohwi; *H. delessertiana* Kraenzlin; *H. linearipetala* Hayata; *H. rhynchocarpa* (Thwaites) J. D. Hooker; *H. sutepensis* Rolfe ex Downie; *Platanthera rhynchocarpa* Thwaites.

Plants 40–89 cm tall. Tubers oblong or narrowly ellipsoid, 2–5 × 1–2 cm, fleshy. Stem erect, terete, stout, with 5–8 leaves near middle and many bractlike leaves above. Leaf blade elliptic or oblong to oblong-lanceolate, 8–16 × 3–5.5 cm, base contracted into amplexicaul sheath, apex acute or acuminate. Raceme densely many flowered, 10–20 cm; floral bracts lanceolate or ovate-lanceolate, 1.5–2.8 × 0.4–0.6 cm, often longer than flowers, apex aristate; ovary twisted, cylindrical-fusiform, including pedicel 1.5–2.2 cm, glabrous. Flowers green or greenish white. Dorsal sepal erect, ovate-elliptic, concave, 1.4–1.6 × 0.4–0.5 cm, 3-veined, apex long acuminate or caudate-aristate; lateral sepals reflexed, obliquely ovate, 1.6–1.8 × 0.5–0.6 cm, 3-veined, apex long acuminate or caudate-aristate. Petals slightly shorter and narrower than dorsal sepal, 2-lobed; upper lobe linear, 10–13 × 1–1.8 mm, 1-veined, apex acuminate; lower lobe narrowly falcate, small, ca. 2.5 mm; lip brownish, 10–15 mm, deeply 3-lobed from base; lateral lobes linear or subulate, shorter than mid-lobe; mid-lobe linear or

ligulate, wider than lateral lobes; spur pendulous, cylindrical, 15–26 mm, ca. as long as or longer than ovary, apex obtuse; stigmas oblong-clavate. Fl. Aug–Oct.  $2n = 40, 42$ .

Broad-leaved forests or forest margins; 300–1800 m. Guizhou, Taiwan, SE Xizang [India, Japan (Ryukyu Islands), Kashmir, Nepal, Philippines, Thailand, Vietnam].

**19. *Habenaria pantlingiana*** Kraenzlin, *Orchid. Gen. Sp.* 1: 892. 1900.

丝瓣玉凤花 si ban yu feng hua

*Habenaria cirrhifera* Ohwi; *H. longitentaculata* Hayata; *H. polytricha* (J. D. Hooker) Pradhan (1979), not Rolfe (1896); *H. stenopetala* Lindley var. *polytricha* J. D. Hooker.

Plants 40–70 cm tall. Tubers oblong, 3–5 × 1–2.5 cm, fleshy. Stem erect, terete, stout, with 6 or 7 leaves near middle and 2–7 bractlike leaves above. Leaf blade oblong-lanceolate or obovate-lanceolate, 13–15 × 3.5–4.5 cm, base contracted into amplexicaul sheath, apex acute or acuminate. Raceme densely many flowered, 8–20 cm; floral bracts lanceolate, 18–24 × 2.5–4 mm, ca. as long as or longer than ovary, apex long acuminate; ovary twisted, cylindrical, including pedicel 1.8–2.2 cm, glabrous. Flowers green. Dorsal sepal erect, ovate-lanceolate, concave, 1.2–1.5 × 0.4–0.6 cm, 3-veined, apex long acuminate-caudate; lateral sepals reflexed, slightly oblique, ovate-lanceolate, 1.4–1.5 × 0.4–0.6 cm, 3-veined, apex long acuminate-caudate. Petals deeply 2-lobed from base; lobes divaricate, filiform; upper lobe 1.1–1.4 cm; lower lobe 1.8–2 cm; lip deeply 3-lobed from base; lobes filiform, 1.8–2.5 cm × ca. 0.8 mm, sometimes mid-lobe shorter than lateral lobes; spur pendulous, cylindrical, 1.8–2.3 cm, ca. as long as or longer than ovary, slightly thickened toward end; pollinia oblong; viscidia orbicular, small; stigmas clavate. Fl. Aug–Oct.  $2n = 42, 42 + 2B$ .

Broad-leaved forests; 400–700 m. SW Guangxi, SE Hainan, N Taiwan [India (Sikkim), Japan (Ryukyu Islands), Nepal, Vietnam].

**20. *Habenaria coulousii*** Barretto, *Orchadian* 7: 10. 1981.

香港玉凤花 xiang gang yu feng hua

Plants 15–45 cm tall. Tubers oblong, to 3.5 × ca. 1.5 cm, fleshy. Stem erect, terete, slender, with 3 or 4 leaves near middle and 2 or 3 bractlike leaves above. Leaf blade lanceolate or ovate-lanceolate, 2.5–5.2 × 0.8–1.2 cm, base contracted into amplexicaul sheath, margin very narrow and membranous, apex acuminate. Raceme 2–9-flowered; floral bracts ovate-lanceolate, concave, ca. 2.4 cm, often longer than ovary, apex long acuminate; ovary twisted, cylindrical-fusiform, including pedicel 18–20 mm, glabrous. Flowers whitish green. Sepals abaxially green, adaxially white, 8–9 × 3.5–4.5 mm, 3-veined, apex acute; dorsal sepal concave-hooded, erect, narrowly ovate; lateral sepals reflexed, obliquely ovate, concave. Petals white, obliquely ovate, 9–11 × ca. 2 mm, deeply 2-lobed from base; upper lobe shorter and broader than lower lobe, basal half connivent with dorsal sepal, apical half spreading, knife-shaped; lower lobe filiform, apex often curved; lip pale green, 9–12 mm, deeply 3-lobed from base; lobes linear-filiform; lateral lobes ca. as long as but narrower than mid-lobe; spur pendulous, yellowish green, base narrow and whitish, 22–24 mm, longer than ovary, slender, with widest part near middle, becoming narrower

toward both ends; pollinia subglobose; caudicles 3.5–4 mm; viscidia narrowly elliptic, ca. 0.5 mm; stigmas yellowish white, broadly bean-shaped. Fl. Oct.

• Forests, along valleys; ca. 300 m. Hong Kong.

**21. *Habenaria petelotii*** Gagnepain, *Bull. Soc. Bot. France* 78: 73. 1931.

裂瓣玉凤花 lie ban yu feng hua

*Habenaria pseudodenticulata* Handel-Mazzetti.

Plants 35–60 cm tall. Tubers oblong, 3–4 × 1–2 cm, fleshy. Stem erect, terete, stout, with 5 or 6 leaves near middle and many bractlike leaves above. Leaf blade elliptic or elliptic-lanceolate, 3–15 × 2–4 cm, base contracted into amplexicaul sheath, apex acuminate. Raceme loosely 3–12-flowered, 4–12 cm; floral bracts narrowly lanceolate, ca. 15 × 3–4 mm, apex acuminate; ovary twisted, slightly arching, cylindrical-fusiform, including pedicel 1.5–3 cm, glabrous. Flowers greenish or white. Dorsal sepal concave-hooded, ovate, 10–12 × ca. 6 mm, 3-veined, apex acuminate; lateral sepals spreading, oblong-ovate, 11–13 × ca. 6 mm, 3-veined, apex acuminate. Petals deeply 2-lobed from base; lobes divergent, linear, 1.5–2 mm wide, margin ciliate; upper lobe erect, 14–16 mm; lower lobe ca. 20 mm; lip deeply 3-lobed above base; lobes linear, nearly equal in length and width, 15–20 × 1.5–2 mm, margin ciliate; spur pendulous, slightly bent forward, cylindrical-clavate, 1.3–2.5 cm, thickened from middle to end, apex obtuse; stigmas oblong, ca. 2 mm. Fl. Jul–Sep.

Forests, along valleys; 300–1600 m. Anhui, N Fujian, Guangdong, Guangxi, Guizhou, Hunan, Jiangxi, Sichuan, SE Yunnan, Zhejiang [Vietnam].

**22. *Habenaria hosokawae*** Fukuyama, *Bot. Mag. (Tokyo)* 48: 297. 1934.

毛唇玉凤花 mao chun yu feng hua

Plants 35–40 cm tall. Stem with 5 or 6 leaves near middle and 3 or 4 bractlike leaves above. Leaf blade oblanceolate or oblong, 5–8 × ca. 2 cm, apex acute. Raceme loosely 6-flowered, ca. 5 cm; floral bracts ovate-lanceolate, 5–8 × ca. 2 mm; ovary ca. 3 cm. Flowers nodding, greenish white. Dorsal sepal concave, lanceolate or oblanceolate, ca. 13 × 3.5–4 mm, 3-veined; lateral sepals similar to dorsal sepal, but wider. Petals deeply 2-lobed, ca. 14 × 1.5 mm; lip deeply 3-lobed; mid-lobe linear, ca. 12 × 2 mm; lateral lobes longer than mid-lobe, apical margin densely pubescent; spur ca. 1.4 cm, apex dilated and deeply 2-lobed. Fl. Jul–Aug.

• 1000–1500 m. C and S Taiwan.

**23. *Habenaria medioflexa*** Turrill, *Bull. Misc. Inform. Kew* 1923: 118. 1923.

版纳玉凤花 ban na yu feng hua

*Habenaria trichochila* Rolfe ex Downie.

Plants 30–48 cm tall. Tubers oblong, 2.5–3 × 1.5–2 cm, fleshy. Stem erect, terete, stout, with 4 or 5 leaves and 3–7 bractlike leaves above. Leaf blade narrowly elliptic, oblong, or lanceolate, 5–15 × 1.7–5 cm, base contracted into amplexicaul

sheath, apex acuminate or acute. Raceme 9–18-flowered, 9–15 cm; floral bracts lanceolate to linear-lanceolate, 2–3 cm, apex acuminate; ovary twisted, arching, cylindrical-fusiform, including pedicel 2.2–2.5 cm. Flowers with yellowish green sepals and white petals and lip. Dorsal sepal concave-hooded, ovate, ca. 6 × 4 mm, 3-veined, apex obtuse; lateral sepals spreading, obliquely ovate, ca. 7 × 5 mm, 3-veined, apex acute. Petals forming a hood with dorsal sepal, linear, ca. 5 × 0.5 mm, 1-veined, apex acuminate; lip spurred at base, 3-lobed above base; lateral lobes ca. 1.4 cm, divided into many filiform lobules; mid-lobe linear, ca. 1 cm, unlobed; spur pendulous, yellowish green, cylindrical, to 3.5 cm, much longer than ovary, thickened and geniculate-curved near middle; stigmas globose. Fl. Sep.

Forests; 700–800 m. S Yunnan [Thailand, Vietnam].

**24. *Habenaria limprichtii*** Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 4: 50. 1919.

宽药隔玉凤花 kuan yao ge yu feng hua

*Habenaria oligoschista* Schlechter; *H. pectinata* D. Don var. *limprichtii* (Schlechter) Pradhan; *Kryptostoma limprichtii* (Schlechter) Szlachetko & Olszewski; *K. oligoschistum* (Schlechter) Szlachetko & Olszewski; *Ochyrorchis limprichtii* (Schlechter) Szlachetko; *O. oligoschista* (Schlechter) Szlachetko.

Plants turning black when dried, 18–60 cm tall. Tubers ovoid-ellipsoid or oblong, 1.5–3 × 1–1.5 cm, fleshy. Stem erect, terete, stout, with 4–7 leaves. Leaf blade ovate to oblong-lanceolate, 4–10 × 1.5–3 cm, base amplexicaul, apex acuminate or acute. Raceme loosely 3–20-flowered, 5–20 cm; floral bracts ovate-lanceolate, 3–4 × ca. 1 cm, apex acuminate, basal ones ca. as long as ovary; ovary twisted, terete, including pedicel 2–2.5 cm. Sepals green or whitish green, apical margin ciliate; dorsal sepal forming a hood with petals, erect, concave, ovate-elliptic, 18–20 × 9–10 mm, 5-veined, apex obtuse; lateral sepals reflexed, obliquely ovate, 19–21 × 9–10 mm, 5- or 6-veined, apex acute. Petals erect, white, obliquely oblong, falcate, 18–20 × 5–7 mm, 3-veined, unlobed, margin ciliate; lip white, slightly longer than sepal, spurred at base, deeply 3-lobed above base; lobes nearly equal in length, hairy; lateral lobes linear, outer margins with 8–10 filiform lobules; mid-lobe linear, ca. 15 × 1 mm, apex obtuse; spur pendulous, cylindrical, 2–3 cm, ca. as long as or shorter than ovary, apex obtuse; connective very broad, 10–12 mm wide; pollinia ovoid; caudicles linear, slender; viscidia orbicular, small, rostellum with elongate arms; stigmas clavate. Fl. Jun–Aug.

Forests, thickets, grasslands; 1900–3500 m. W Hubei, Sichuan, NW to S Yunnan [Vietnam].

**25. *Habenaria pectinata*** D. Don, Prodr. Fl. Nepal. 24. 1825.

剑叶玉凤花 jian ye yu feng hua

*Orchis pectinata* Smith, Exot. Bot. 2: 77. 1806, not Thunberg (1794); *Habenaria ensifolia* Lindley; *Kryptostoma pectinatum* (D. Don) Szlachetko & Olszewski; *Ochyrorchis ensifolia* (Lindley) Szlachetko; *O. pectinata* (D. Don) Szlachetko.

Plants turning black when dried, 55–70 cm tall. Tubers

oblong, 2–3 × 1–1.5 cm, fleshy. Stem erect, terete, stout, glabrous, with several tubular sheaths and many leaves. Leaf blade oblong to linear-lanceolate, 6–15 × 1.5–2 cm, base amplexicaul, apex acuminate. Raceme 6–13-flowered, 10–20 cm; floral bracts lanceolate to linear-lanceolate, 2.5–3.2 cm, much longer than ovary, apex acuminate; ovary twisted, slightly arching, terete, including pedicel 1.8–2 cm. Sepals greenish, 5-veined, apical margin ciliate, apex often recurved; dorsal sepal erect, concave, lanceolate, ca. 17 × 5 mm, apex subacute; lateral sepals spreading, obliquely oblong, subfalcate, ca. 19 × 5 mm, apex acute. Petals forming a hood with dorsal sepal, greenish or white, obliquely falcate, ca. 17 × 3 mm, adaxially ± hairy, margin ciliate, unlobed, apex acute; lip white, slightly longer than sepal, spurred at base, deeply 3-lobed; lateral lobes linear, ca. 2 cm, outer margin with 6 or 7 filiform lobules; mid-lobe linear, ca. 1.8 cm; spur pendulous, cylindrical-clavate, 17–18 mm, slightly dilated toward apex; connective ca. 2 mm wide; pollinia narrowly ellipsoid; caudicles curved, slender; viscidia discoid; stigma thinly clavate. Fl. Aug.  $2n = 42, 42 + 2B$ .

Forests; ca. 1800 m. S Yunnan [India, Nepal].

**26. *Habenaria davidii*** Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 10: 86. 1888 [“*davidii*”].

长距玉凤花 chang ju yu feng hua

*Habenaria chloropecten* Schlechter; *H. leucopecten* Schlechter; *H. pectinata* D. Don var. *davidii* (Franchet) Finet; *Kryptostoma davidii* (Franchet) Szlachetko & Olszewski; *Ochyrorchis davidii* (Franchet) Szlachetko.

Plants turning black when dried, 65–75 cm tall. Tubers oblong, 2–5 × 0.8–1.5 cm, fleshy. Stem erect, terete, stout, 4–6 mm in diam., with 5–7 leaves. Leaf blade ovate, ovate-oblong, or oblong-lanceolate, 5–12 × 1.5–4.5 cm, base amplexicaul, apex acuminate. Raceme 4–15-flowered, 4–21 cm; floral bracts lanceolate, ca. 4.5 cm, apex acuminate, basal ones longer than ovary; ovary twisted, terete, including pedicel 2.5–3.5 cm. Sepals greenish or white, margin ciliate; dorsal sepal erect, oblong, concave, 15–18 × 6–7 mm, 5-veined, apex obtuse; lateral sepals reflexed, obliquely ovate-lanceolate, 17–20 × 6–8 mm, 5–7-veined, apex acuminate. Petals forming a hood with dorsal sepal, erect, white, obliquely lanceolate, subfalcate, 14–17 × 3–4 mm, 3–5-veined, margin ciliate, unlobed, apex subacute; lip white or yellowish, 2.5–3 cm, spurred at base, deeply 3-lobed above base; lobes linear, margin ciliate; lateral lobes 2–2.5 cm, outer margin with 7–10 filiform lobules, lobules usually branching; mid-lobe nearly as long as lateral lobe, apex acute; spur pendulous, curved inward, cylindrical, 4.5–6.5 cm, longer than ovary, slightly dilated toward apex; connective ca. 4 mm wide; pollinia narrowly ellipsoid, ca. 4 mm; caudicles linear, ca. 5 mm; viscidia suborbicular, small; stigmas clavate, ca. 5 mm. Fl. Jun–Aug.

• Forests, thickets, grasslands; 600–3200 m. Guizhou, Hubei, Hunan, Sichuan, E and S Xizang, C and NW Yunnan.

**27. *Habenaria mairei*** Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 4: 50. 1919.

棒距玉凤花 bang ju yu feng hua

*Ochyrorchis mairei* (Schlechter) Szlachetko.

Plants turning black when dried, 18–65 cm tall. Tubers oblong or ovoid, 1.5–2.5 × 1–1.5 cm, fleshy. Stem erect, terete, robust, with 2 or 3 tubular sheaths and 5 or 6 leaves. Leaf blade elliptic-ligulate or oblong-lanceolate, 2.5–12 × 1.5–4 cm, base amplexicaul, apex acuminate. Raceme 4–19-flowered, 6–18 cm; floral bracts elliptic-lanceolate, margin ciliate, apex acuminate; ovary twisted, terete, including pedicel 2–3 cm. Sepals yellowish green, margin ciliate; dorsal sepal erect, narrowly ovate, concave, 1.3–1.5 × 0.6–0.7 cm, 5-veined, apex obtuse; lateral sepals spreading, slightly oblique, ovate-lanceolate, 1.4–1.7 × 0.5–0.6 cm, 5-veined, apex acute. Petals forming a hood with dorsal sepal, erect, white, obliquely oblong, 1.3–1.5 × ca. 0.4 cm, 3-veined, margin ciliate, unlobed, apex obtuse; lip white or yellowish white, 20–25 mm, base spurred, deeply 3-lobed above base, lobes ciliate; lateral lobes linear, 19–22 mm, outer margin comblike, with 8–10 filiform lobules; mid-lobe linear, 18–20 mm; spur pendulous, cylindrical-clavate, 20–35 mm, ca. as long as or slightly shorter than ovary, thickened toward end; connective 4–5 mm wide; pollinia narrowly ellipsoid, ca. 4 mm; caudicles linear, ca. 4 mm; viscidia ovate, small; stigmas clavate. Fl. Jul–Aug.

• Forests, shrubby grasslands; 2400–3500 m. W Sichuan, SE Xizang, N Yunnan.

**28. *Habenaria yuana*** Tang & F. T. Wang, Bull. Fan Mem. Inst. Biol. Bot. 7: 135. 1936.

川滇玉凤花 chuan dian yu feng hua

Plants turning black when dried, 40–57 cm tall. Tubers oblong, ca. 2 × 1 cm, fleshy. Stem erect, terete, stout, with 5 or 6 laxly arranged leaves. Leaf blade ovate or ovate-elliptic, 2.5–9 × 2–4 cm, base amplexicaul, apex acute. Raceme 7–9-flowered, 10–12 cm; floral bracts elliptic-ovate, 2.5–3.5 × 0.7–1.2 cm, longer than ovary, apex acuminate; ovary twisted, cylindrical-fusiform, including pedicel 2–2.5 cm. Flowers greenish, large. Dorsal sepal erect, oblong-elliptic, concave, 2–2.1 × 1–1.1 cm, 5-veined, apex obtuse; lateral sepals spreading, obliquely oblong, 2.1–2.2 × ca. 0.8 cm, 5-veined, apex acute. Petals forming a hood with dorsal sepal, obliquely subovate-falcate, 2–2.1 × ca. 0.8 cm, 5- or 6-veined, margin slightly ciliate, unlobed, apex obtuse; lip ca. 2.5 cm, base spurred, deeply 3-lobed above base, lobes ciliate; lateral lobes linear, 1.8–2 cm, outer margin with more than 10 filiform lobules; mid-lobe linear, 1.5–1.7 cm; spur pendulous, cylindrical-clavate, 1.4–2.5 cm, slightly dilated toward end, shorter than ovary; connective 12–15 mm wide; pollinia narrowly ellipsoid, ca. 3 mm; caudicles linear, ca. 5 mm; viscidia subglobose, small; stigmas clavate. Fl. Aug.

• Forests; 1800–2600 m. W Sichuan, S Yunnan.

**29. *Habenaria intermedia*** D. Don, Prodr. Fl. Nepal. 24. 1825.

大花玉凤花 da hua yu feng hua

*Kryptostoma intermedium* (D. Don) Olszewski & Szlachetko; *Ochyrorchis intermedia* (D. Don) Szlachetko.

Plants turning black when dried, 23–30 cm tall. Tubers ellipsoid, 1.5–3 × 1–2 cm, fleshy. Stem erect, terete, stout, with 3–5 laxly arranged leaves. Leaf blade ovate-lanceolate, 3.5–8 ×

2–4 cm, base amplexicaul, apex acute. Raceme 1–4-flowered, 6–15 cm; floral bracts ovate, 4–5 cm, nearly as long as ovary, apex acuminate; ovary twisted, terete, including pedicel 3.8–4.5 cm. Flowers white or greenish. Sepals ciliate; dorsal sepal erect, ovate-oblong, concave, ca. 2.2 × 1.2 cm, 7-veined, apex acute; lateral sepals reflexed, obliquely falcate-lanceolate, ca. 3 × 0.6 cm, 7-veined, apex acute. Petals forming a hood with dorsal sepal, erect, white, obliquely subovate-falcate, ca. 2.2 × 0.8 cm, 5-veined, margin ciliate, unlobed, apex acute; lip 2.8–3 cm, base spurred, deeply 3-lobed above base, lobes ciliate; lateral lobes linear, outer margin with 10 filiform lobules; mid-lobe linear, 18–20 mm, slightly shorter than lateral lobes, apex acute; spur pendulous, cylindrical, 7–8.5 cm, much longer than ovary, slightly dilated near end, apex obtuse; connective ca. 2 mm wide; pollinia ovoid; caudicles linear; viscidia orbicular, small; rostellum with elongate arms; stigmas clavate. Fl. Jul.  $2n = 42$ .

Forests; 2600–3000 m. S Xizang [India, Kashmir, Nepal].

**30. *Habenaria arietina*** J. D. Hooker, Fl. Brit. India 6: 138. 1890.

毛瓣玉凤花 mao ban yu feng hua

*Habenaria intermedia* D. Don var. *arietina* (J. D. Hooker) Finet; *H. pectinata* D. Don var. *arietina* (J. D. Hooker) Kraenzlin; *Ochyrorchis arietina* (J. D. Hooker) Szlachetko.

Plants turning black when dried, 57–65 cm tall. Tubers oblong, 3–5 × 1–2 cm, fleshy. Stem erect, terete, robust, with 5–7 laxly arranged leaves. Leaf blade ovate-lanceolate or oblong-lanceolate, 5.5–10 × 2–3 cm, base amplexicaul, apex acuminate. Raceme densely many (more than 5-) flowered, to 30 cm; floral bracts ovate-lanceolate, 1.8–2 cm, nearly as long as ovary, apex acuminate; ovary twisted, terete, including pedicel 3–3.5 cm. Flowers white or greenish white. Sepals 5-veined, ciliate; dorsal sepal erect, oblong, concave, ca. 1.9 × 6 mm, apex acute; lateral sepals reflexed, obliquely falcate-lanceolate, ca. 2.0 × 6 mm, apex acute. Petals forming a hood with dorsal sepal, obliquely subovate-falcate, ca. 1.9 × 8 mm, 5-veined, adaxially pubescent, margin ciliate, unlobed; lip ca. 3 cm, base spurred, deeply 3-lobed above base; lobes linear, nearly equal in length, ciliate; lateral lobes ca. 2.2 cm, outer margin with 10 filiform lobules; mid-lobe ca. 2 mm wide; spur pendulous, cylindrical-clavate, 3.5–4 cm, ca. as long as or slightly longer than ovary, slightly dilated below middle, apex obtuse; connective 3.5–4 mm wide; pollinia ovoid; caudicles linear; viscidia orbicular, small; rostellum with elongate arms; stigmas clavate. Fl. Aug.  $2n = 21, 42, 46, 48, 56$ .

Grassy slopes; 2300–2400 m. SE Xizang [Bhutan, India, Nepal].

**31. *Habenaria commelinifolia*** (Roxburgh) Wallich ex Lindley, Gen. Sp. Orchid. Pl. 325. 1835.

斧萼玉凤花 fu e yu feng hua

*Orchis commelinifolia* Roxburgh, Fl. Ind., ed. 1832, 3: 451. 1832 [*commelinaefolia*].

Plants 60–75 cm tall. Tubers ellipsoid, 5–8 × 3–5 cm, fleshy. Stem erect, stout, with 4–6 well-spaced leaves and several bractlike leaves above. Leaf blade narrowly oblong-lanceolate to linear-lanceolate, 7–15 × 1.5–2.5 cm, base contracted

into amplexicaul sheath, apex acuminate. Raceme many flowered, 9–11 cm; floral bracts linear-lanceolate, ca. as long as or longer than flowers, margin ciliate, apex acuminate; ovary twisted, slender, including pedicel 3–4 cm. Flowers white. Dorsal sepal concave-hooded, broadly obovate, ca. 7 × 9 mm, 5-veined, apex acute; lateral sepals reflexed, strongly oblique, axe-shaped, ca. 7 mm, strongly dilated toward apex and ca. 13 mm wide, with 3 strongly curved veins. Petals connivent with dorsal sepal, obliquely oblong, subfalcate, ca. 6.5 × 4 mm, 2-veined, apex acute or obtuse; lip ca. 4 cm, with linear base 4–6 mm, then deeply 3-lobed, lobes filiform-linear; lateral lobes 2.5–3.2 cm; mid-lobe pendulous, 1.8–2.2 cm, slightly wider than lateral lobes; spur pendulous, cylindrical-clavate, 5–8 cm, slender, near apex dilated, with a bristle projection on front margin of mouth; pollinia ellipsoid; caudicles linear; viscidia orbicular; stigmas clavate. Fl. Aug.  $2n = 42$ .

Forests; 900–1200 m. SW Yunnan [India, Myanmar, Nepal, Thailand, Vietnam].

**32. *Habenaria austrosinensis*** Tang & F. T. Wang, Bull. Fan Mem. Inst. Biol. Bot. 7: 134. 1936.

薄叶玉凤花 *bao ye yu feng hua*

Plants 30–60 cm tall. Tubers narrowly ellipsoid, 3–5 × 1–3 cm, fleshy. Stem erect, terete, stout, pubescent, with 3–5 leaves below middle and 9–13 bractlike leaves above. Leaf blade narrowly elliptic to oblong-oblong, 13–25 × 2.5–6 cm, relatively thin, base contracted into amplexicaul sheath, apex acuminate. Raceme many flowered, 9–14 cm; rachis pubescent; floral bracts lanceolate, ca. 15 mm, shorter than ovary, ciliate, apex acuminate; ovary twisted, cylindrical-fusiform, pubescent, including pedicel 15–27 mm. Flowers white. Dorsal sepal concave-hooded, broadly ovate, ca. 3.5 × 5 mm, abaxially pubescent, 3-veined, apex acute; lateral sepals reflexed, strongly obliquely triangular, ca. 5 mm, toward apex strongly dilated and ca. 8 mm wide, with 3 strongly curved veins. Petals forming a hood with dorsal sepal, obliquely linear, ca. 4 × 1 mm, 1-veined, apex obtuse; lip longer than sepals, above base deeply 3-lobed; lobes similar, linear, ca. 8 mm; spur curving upward above ovary, cylindrical-clavate, 20–22 mm, ca. as long as or slightly shorter than ovary, apex dilated; connective narrow; stigmas elliptic, ca. 1 mm. Fl. Jul–Aug.

Damp places in forests along valleys; 700–1400 m. S Yunnan [Thailand].

**33. *Habenaria ciliolaris*** Kraenzlin, Bot. Jahrb. Syst. 16: 169. 1892.

毛萼玉凤花 *mao ting yu feng hua*

*Habenaria kweitschuensis* Schlechter.

Plants 25–60 cm tall. Tubers narrowly ellipsoid or oblong, 3–5 × 1.5–2.5 cm, fleshy. Stem erect, terete, stout, with 5 or 6 leaves near middle and 5–10 bractlike leaves above. Leaf blade elliptic-lanceolate, obovate-spatulate, or narrowly elliptic, 5–16 × 2–5 cm, base contracted and amplexicaul, apex acuminate or acute. Raceme 6–30-flowered, 9–23 cm; peduncle and rachis ridged, ridges villous; floral bracts ovate, 13–15 mm, shorter than ovary, ciliate, apex acuminate; ovary twisted, cylindrical-fusiform, denticulate-ridged, including pedicel 23–25 mm.

Flowers white or greenish white, rarely tinged with pink. Dorsal sepal forming a concave hood with petals, saccate, broadly ovate, 6–9 × 5.5–8 mm, abaxially 3-keeled, 5-veined, toward apical margin ciliate; lateral sepals reflexed, strongly oblique, ovate, 6.5–10 × 4–7 mm, 3- or 4-veined, apex acute. Petals obliquely lanceolate, 6–7 × 2–3 mm, unlobed, 1-veined, apex acuminate; lip longer than sepals, deeply 3-lobed from base; lobes parallel, filiform; lateral lobes 20–22 mm; mid-lobe pendulous, 16–18 mm; spur pendulous, curved, cylindrical-clavate, 21–27 mm, slightly longer or shorter than ovary, dilated toward end, apex obtuse; stigmas oblong, ca. 1.5 mm. Fl. Jul–Sep.

Shaded places in forests or along valleys; 100–1800 m. N Fujian, SE Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, S Yunnan, Zhejiang [Vietnam].

**34. *Habenaria hystrix*** Ames, Orchidaceae 2: 35. 1908.

粤琼玉凤花 *yue qiong yu feng hua*

Plants 28–45 cm tall. Tubers oblong, ca. 3 × 1 cm, fleshy. Stem erect, terete, stout, with 5 or 6 leaves below middle and 5–8 bractlike leaves above. Leaf blade narrowly elliptic or oblong, 9–16 × 3–5 cm, base contracted and amplexicaul, apex acuminate or acute. Raceme 6–10-flowered, 8–11 cm; peduncle and rachis ridged, ridges villous; floral bracts ovate, ca. 1.5 cm, shorter than ovary, ciliate, apex acuminate; ovary twisted, cylindrical-fusiform, slightly ridged, including pedicel ca. 18 mm. Flowers white or greenish white. Dorsal sepal forming a concave hood with petals, broadly ovate, ca. 6 × 6–6.5 mm, 3-veined; lateral sepals reflexed, strongly oblique, ovate, ca. 7 × 6 mm, 3-veined, apex acute. Petals obliquely triangular-lanceolate, ca. 6 × 2 mm, simple, 1-veined, apex long acuminate; lip longer than sepals, deeply 3-lobed from base; lobes parallel, filiform; lateral lobes 20–22 mm; mid-lobe 20–24 mm, base with 1 obtusely conic callus; spur spreading horizontally, cylindrical-clavate, 16–20 mm, ca. as long as ovary, slightly dilated toward apex; stigmas narrowly elliptic, ca. 1.5 mm. Fl. Aug–Sep.  $2n = 42$ .

Forests, along valleys; 300–400 m. Guangdong, W Hainan [Indonesia (Kalimantan), Philippines].

**35. *Habenaria fordii*** Rolfe, Bull. Misc. Inform. Kew 1896: 202. 1896.

线瓣玉凤花 *xian ban yu feng hua*

Plants 30–60 cm tall. Tubers narrowly elliptic, 3–4 × 2–3 cm, fleshy. Stem erect, stout, base with 4 or 5 ± tufted leaves and above leaves several bractlike leaflets. Leaf blade oblong-lanceolate or narrowly elliptic, 14–25 × 3–6 cm, base contracted and amplexicaul, apex acute. Raceme many flowered, 8–16 cm; floral bracts ovate-lanceolate, 2–4 cm, apex acute or acuminate; ovary twisted, cylindrical-fusiform, including pedicel 1.5–2 cm. Flowers white. Dorsal sepal forming a hood with petals, broadly ovate, concave, 1.3–1.5 cm; lateral sepals spreading or reflexed, obliquely subovate, 14–16 × 6–7 mm. Petals linear-lanceolate, 1.3–1.5 cm, apex acute; lip 2.3–2.5 cm, narrow, below middle deeply 3-lobed; lobes linear, 1.5–1.7 cm; lateral lobes filiform, narrower and slightly longer than linear mid-lobe; spur pendulous, cylindrical-clavate, slightly thickened toward end, 3–6 cm. Fl. Jul–Aug.

• Damp places or soil-covered rocks in forests or along valleys; 600–2200 m. Guangdong, Guangxi, S Yunnan.

**36. *Habenaria acuifera*** Wallich ex Lindley, Gen. Sp. Orchid. Pl. 325. 1835.

凸孔坡参 tu kong po shen

*Habenaria loloorum* Schlechter.

Plants 14–38 cm tall. Tubers oblong or narrowly ellipsoid, 2.5–4 × 1–2.5 cm, fleshy. Stem erect, terete, glabrous, with 3 or 4 leaves and many bractlike leaflets. Leaf blade oblong or oblong-lanceolate, 4–12 × 1–1.5 cm, base amplexicaul, apex acuminate or acute. Raceme 8–20-flowered, 3–8 cm; floral bracts lanceolate, basal ones 1.5–1.7 cm, longer than ovary, ciliate; ovary twisted, cylindrical-fusiform, including pedicel 15–18 mm. Flowers yellow, small. Dorsal sepal forming a hood with petals, erect, broadly ovate, concave, 3–4.5 × 3–3.5 mm, 3-veined, apex obtuse; lateral sepals reflexed, obliquely ovate-elliptic, 5–6 × 3.5–4 mm, 3-veined, apex obtuse. Petals obliquely oblong, 3–4 × 1.8–2 mm, 1-veined, unlobed; lip 9–10 mm, spurred at base, with a cupular structure near mouth of spur, spreading, 3-lobed from base; lateral lobes subulate, 1.5–3.5 mm; mid-lobe straight, linear, 7–8 × ca. 1 mm, apex obtuse; spur pendulous, cylindrical-clavate, 10–17 mm, shorter than ovary, near middle geniculate-curved, slightly thickened from middle to apex; connective narrow; pollinia narrowly ellipsoid; caudicles linear, longer than pollinia; viscidia orbicular, small; stigmas suberect, exerted along both sides of spur mouth, oblong, 2–2.5 mm. Fl. Jun–Aug.  $2n = 42 + 0-2B$ .

Forests, thickets, grasslands; 200–2000 m. Guangxi, SW and W Sichuan, Yunnan [NE India, Laos, Malaysia (Peninsular), Myanmar, Thailand, Vietnam].

**37. *Habenaria linguella*** Lindley, Gen. Sp. Orchid. Pl. 325. 1835.

坡参 po shen

*Centrochilus gracilis* Schauer; *Habenaria acuifera* Lindley var. *linguella* (Lindley) Finet; *H. chrysantha* Schlechter; *H. endothis* Miquel; *H. simeonis* Kraenzlin.

Plants 20–50(–75) cm tall. Tubers 3–5 × 1–2 cm, fleshy. Stem erect, terete, glabrous, with 3 or 4 leaves and 3–9 bractlike leaflets. Leaf blade narrowly oblong to narrowly oblong-lanceolate, 5–12(–27) × 1.2–2 cm, base amplexicaul, apex acuminate. Raceme densely 9–20-flowered, 2.5–6 cm; floral bracts linear-lanceolate, 1.2–2.5 cm, ciliate; ovary twisted, cylindrical-fusiform, including pedicel 1.8–2.3 cm. Flowers yellow or brownish yellow. Dorsal sepal forming a hood with petals, erect, broadly elliptic, concave, 4–5 × 3–3.5 mm, 3-veined, apex obtuse; lateral sepals reflexed, oblique, broadly obovate, 6–7 × 4–4.5 mm, 3- or 4-veined, apex obtuse or subacute. Petals oblique, narrowly ovate or obliquely narrowly elliptic, 4–5 × 2–2.5 mm, 1-veined, apex obtuse; lip 9–10 mm, spurred at base, with a ring-shaped rim at mouth of spur, 3-lobed from base; lateral lobes subulate, 1.5–2.75 mm, apex acuminate; mid-lobe linear, 8–9 mm, apex obtuse; spur pendulous, cylindrical, 2–2.9 cm, longer than ovary, slender, slightly thickened toward end, 1–1.5 mm in diam., apex obtuse; connective narrow; pollinia

narrowly obovoid; caudicles linear, longer than pollinia; viscidia ovate; stigmas oblong, ca. 1.5 mm. Fl. Jun–Aug.

Forests, grasslands; 500–2500 m. Guangdong, Guangxi, Guizhou, Hainan, Yunnan [Vietnam].

**38. *Habenaria rostellifera*** H. G. Reichenbach, Otia Bot. Hamburg. 2: 34. 1878.

齿片坡参 chi pian po shen

*Habenaria hancockii* Rolfe.

Plants 17–40 cm tall. Tubers oblong, 2–5 × 1–2 cm, fleshy. Stem erect, terete, stout, glabrous, with 4 or 5 leaves and 5–9 bractlike leaflets. Leaf blade narrowly elliptic or oblong to oblong-lanceolate, 5–10 × 1–2 cm, base amplexicaul, apex acuminate. Raceme densely many flowered, 3.5–6 cm; floral bracts lanceolate, 2–2.5 cm, ciliate, apex acuminate; ovary twisted, cylindrical-fusiform, including pedicel 1.8–1.9 cm. Flowers white, lateral sepals with brown markings. Dorsal sepal forming a hood with petals, erect, broadly elliptic, concave, ca. 6 × 4 mm, 3-veined, apex obtuse; lateral sepals reflexed, obliquely elliptic, ca. 9 × 4.5 mm, 4-veined. Petals oblique, narrowly ovate or narrowly elliptic, ca. 6 × 3 mm, 3-veined, unlobed, apical margin ciliate; lip spurred at base, with a 3-toothed, subcylindrical lamella near mouth of spur, deeply 3-lobed from base, lobes linear; lateral lobes divaricate, 6–8 × ca. 1 mm, attenuate toward apex; mid-lobe ca. 10 × 2 mm, apex obtuse; spur pendulous, cylindrical-clavate, 2–2.2 cm, slightly longer than ovary, apical half slightly dilated, apex obtuse; connective relatively narrow; pollinia narrowly ellipsoid; caudicles linear, longer than pollinia; viscidium elliptic, small; stigmas oblong, ca. 2.5 mm. Fl. Jul–Aug.

Grassy slopes; 1000–2200 m. C Guizhou, C, NW, and SE Yunnan [Cambodia, Malaysia (Peninsular), Thailand, Vietnam].

**39. *Habenaria rostrata*** Lindley, Gen. Sp. Orchid. Pl. 325. 1835.

喙房坡参 hui fang po shen

*Habenaria acuifera* Lindley var. *rostrata* (Lindley) Finet.

Plants 20–30 cm tall. Tubers oblong, 2–3 × 0.8–1 cm, fleshy. Stem erect, terete, glabrous, with 4 or 5 leaves and 4–8 bractlike leaflets. Leaf blade oblong or oblong-lanceolate, 5–10 × 0.7–1 cm, base amplexicaul, apex acute. Raceme many flowered, sometimes nearly corymbiform, 4–6 cm; floral bracts lanceolate, shorter than ovary, ciliate, apex aristate; ovary twisted, arching, cylindrical-fusiform, including pedicel 15–16 mm. Flowers reddish orange, with greenish sepals. Dorsal sepal forming a hood with petals, erect, broadly elliptic, concave, ca. 4.5 × 3 mm, 3-veined, apex obtuse; lateral sepals reflexed, obliquely ovate-elliptic, ca. 6.5 × 4 mm, 3-veined, apex obtuse. Petals obliquely broadly oblong, falcate, ca. 4.5 × 2 mm, 1-veined, margin ciliate, apex obtuse; lip ca. 10 mm, spurred at base, with a 3-lobed, ring-shaped structure near mouth of spur, shortly 3-lobed, lobes linear; lateral lobes extremely bifid, ca. 7 × 0.6 mm, apex acuminate; mid-lobe ca. 8 × 1 mm, apex obtuse; spur pendulous, cylindrical-clavate, 11–12 mm, slightly shorter than ovary, slightly dilated toward apex; connective narrow; pollinia



ellipsoid; caudicles linear, slender; viscidia linear; stigmas oblong, ca. 2 mm. Fl. Jul–Aug.

Forests, forest margins, thickets; 900–2000 m. S Sichuan, C and S Yunnan [Laos, Myanmar, Thailand, Vietnam].

**40. *Habenaria rhodocheila*** Hance, Ann. Sci. Nat., Bot., sér. 5, 5: 243. 1866.

橙黄玉凤花 cheng huang yu feng hua

*Smithanthe rhodocheila* (Hance) Szlachetko & Margońska.

Plants 8–35 cm tall. Tubers oblong-cylindric, 2–4 × 1–2 cm, fleshy. Stem erect, terete, stout, with 4–6 leaves below middle and 1–3 bractlike leaflets above leaves. Leaf blade linear-lanceolate to suboblong, 10–15 × 1.5–2 cm, base amplexicaul, apex acuminate. Raceme loosely 2–10-flowered, 3–8 cm; floral bracts ovate-lanceolate, 1.5–1.7 cm, shorter than ovary, apex acuminate; ovary twisted, terete, including pedicel 2–3 cm. Flowers with green sepals and petals and orange-yellow to red lip. Dorsal sepal forming a hood with petals, erect, suborbicular, concave, ca. 9 × 8 mm, 3-veined, apex obtuse; lateral sepals reflexed, oblong, 9–10 × ca. 5 mm, 5-veined, apex obtuse. Petals spatulate-linear, ca. 8 × 2 mm, 1-veined, apex obtuse; lip spreading, ovate in outline, 1.8–2 × ca. 1.5 cm, 4-lobed, with short claw at base, spurred; lateral lobes spreading, oblong, ca. 7 × 5 mm, apex obtuse; mid-lobe bilobed, lobules nearly subovate, ca. 4 × 3 mm, apex obliquely truncate; spur pendulous, dull yellow, cylindric, 2–3 cm × ca. 1 mm, apex often upcurved; rostellum deltoid, large, with elongated arms; stigmas clavate. Capsule fusiform, ca. 1.5 cm, apex beaked. Fl. Jul–Aug, fr. Oct–Nov.  $2n = 38, 42$ .

Shaded places or soil-covered rocks in forests or along valleys; 300–1500 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi [Cambodia, Laos, Malaysia, Philippines, Thailand, Vietnam].

**41. *Habenaria malintana*** (Blanco) Merrill, Sp. Blancoan. 112. 1918.

南方玉凤花 nan fang yu feng hua

*Thelymitra malintana* Blanco, Fl. Filip. 642. 1837; *Habenaria dentata* (Swartz) Schlechter f. *ecalcarata* (King & Pantling) Tuyama; *H. dentata* subsp. *ecalcarata* (King & Pantling) Panigrahi & Murti; *H. dentata* var. *ecalcarata* (King & Pantling) Handel-Mazzetti; *H. geniculata* D. Don var. *ecalcarata* King & Pantling; *Kraenzlinorchis malintana* (Blanco) Szlachetko.

Plants 40–55 cm tall. Tubers ellipsoid, 2–4 × 1.5–2.5 cm, fleshy. Stem erect, terete, stout, with 3 or 4 leaves and 5 or 6 bractlike leaflets. Leaf blade oblong or oblong-lanceolate, 6–13 × 1.5–4.5 cm, base amplexicaul, apex acute or acuminate. Raceme densely more than 10-flowered; floral bracts narrowly lanceolate, ca. 2 cm, margin ciliate; ovary twisted, cylindric-fusiform, including pedicel 2–2.5 cm. Flowers white, ca. 1.5 cm in diam. Sepals subsimilar, oblong-lanceolate to ovate-lanceolate, 11–13 × 3–5 mm, 3-veined, margin finely ciliate, apex acute; lateral sepals spreading, slightly oblique. Petals narrowly oblong-lanceolate, 7–8 × ca. 2 mm, 1- or rarely 3-veined, unlobed, margin finely ciliate, apex acuminate; lip ligulate-lan-

ceolate, 11–12 mm, margin finely ciliate, usually unlobed, with very small lateral lobes on both basal sides, spurless or rarely with a short spur 2–8 mm. Fl. Oct–Nov.  $2n = 42, 84, 168$ .

Forests, grasslands; 500–1300 m. S Guangxi, Hainan, SW Sichuan, W to SE Yunnan, N Zhejiang [India, Malaysia, Myanmar, Nepal, Philippines, Thailand, Vietnam].

**42. *Habenaria finetiana*** Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 4: 126. 1919.

齿片玉凤花 chi pian yu feng hua

*Habenaria geniculata* D. Don var. *yunnanensis* (Finet) Finet; *H. miersiana* Champion ex Benth. var. *yunnanensis* Finet; *H. peyentsinensis* Kraenzlin; *H. tienensis* Tang & F. T. Wang; *Plantaginorchis finetiana* (Schlechter) Szlachetko.

Plants 9–25 cm tall. Tubers oblong, 1.5–2 cm × 8–10 mm, fleshy. Stem erect, glabrous, below middle with 2 or 3 leaves, with 1–4 bractlike leaves above. Leaf blade cordate or ovate, 2.5–5 × 1.8–3.5 cm, with white margin when dried, apex acute. Raceme 2–8-flowered, 3–5 cm; floral bracts lanceolate, ca. 2 cm, nearly as long as ovary, apex acuminate; ovary twisted, terete, including pedicel 1.8–2 cm. Flowers white, sometimes secund. Sepal and petal margins ciliate; dorsal sepal forming a hood with petals, erect, ovate or elliptic, concave, ca. 8 × 5 mm, 5-veined, apex acute; lateral sepals reflexed, obliquely ovate, 9–10 × ca. 5 mm, 5-veined, apex acute. Petals linear, subfalcate, ca. 6 × 2 mm, 1-veined, unlobed, apex obtuse; lip broadly obovate, ca. 12 × 10 mm, 3-lobed; lateral lobes rhombic, ca. 4 mm wide, margins serrate; mid-lobe ligulate, ca. 4 × 2 mm, slightly longer than lateral lobes, apex subobtusely; spur pendulous, cylindric, 17–20 mm, slightly shorter than or nearly as long as ovary, apex slightly dilated, obtuse, slightly curved; stigmas oblong. Fl. Aug–Oct.  $2n = 64^*$ .

• Forests, grasslands; 2000–3500 m. W Sichuan, C and NW Yunnan.

**43. *Habenaria dentata*** (Swartz) Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 4: 125. 1919.

鹅毛玉凤花 e mao yu feng hua

*Orchis dentata* Swartz, Kongl. Vetensk. Acad. Nya Handl. 21: 207. 1800; *Habenaria dentata* var. *tohoensis* (Hayata) S. S. Ying; *H. geniculata* D. Don; *H. miersiana* Champion ex Benth.; *H. tohoensis* Hayata; *Plantaginorchis dentata* (Swartz) Szlachetko; *Platanthera dentata* (Swartz) Lindley; *P. geniculata* (D. Don) Lindley.

Plants 35–87 cm tall. Tubers oblong-ovoid to oblong, 2–5 × 1–3 cm, fleshy. Stem erect, terete, stout, loosely with 3–5 leaves and several bractlike leaflets. Leaf blade oblong to narrowly elliptic, 5–15 × 1.5–4 cm, base amplexicaul, margin white when dried, apex acute or acuminate. Raceme often many flowered, 5–12 cm; floral bracts lanceolate, 2–3 cm, basal ones ca. as long as ovary, apex acuminate; ovary twisted, terete, including pedicel 2–3 cm. Flowers white. Sepals and petals ciliate; dorsal sepal forming a hood with petals, erect, broadly ovate, concave, 10–13 × 7–8 mm, 5-veined, apex acute; lateral sepals spreading or reflexed, obliquely ovate, 14–16 mm, 5-veined, apex acute. Petals falcate-lanceolate, 8–9 × 2–2.5 mm,

2-veined, unlobed; lip broadly obovate, 15–18 × 12–16 mm, 3-lobed; lateral lobes subrhombic or flabellate, 7–8 mm wide, apical margin serrate; mid-lobe linear-lanceolate or ligulate-lanceolate, 5–7 × 1.5–3 mm, 3-veined, apex obtuse; spur pendulous, green below middle, cylindric-clavate, 3.5–4 cm, longer than ovary, somewhat geniculate in basal half, slightly curved, gradually dilated toward end, apex obtuse, with conspicuously raised structure surrounding mouth; stigmas oblong. Fl. Aug–Oct.  $2n = 64$ .

Forests on slopes or along valleys; 200–2300 m. Anhui, N Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Cambodia, India, Japan, Laos, Myanmar, Nepal, Thailand, Vietnam].

**44. *Habenaria lucida*** Wallich ex Lindley, Gen. Sp. Orchid. Pl. 319. 1835.

细花玉凤花 xi hua yu feng hua

*Habenaria dilatata* (Pursh) Hooker subsp. *lucida* (Wallich ex Lindley) S. S. Ying; *H. longiracema* Fukuyama; *H. recurva* Rolfe ex Downie var. *erectiflora* Tang & F. T. Wang; *Habenella lucida* (Wallich ex Lindley) Szlachetko & Kras-Lapinska; *Hetaeria taiwaniana* S. S. Ying; *Peristylus longiracemus* (Fukuyama) K. Y. Lang; *Platantheroides lucida* (Wallich ex Lindley) Szlachetko; *Rhomboda taiwaniana* (S. S. Ying) Ormerod.

Plants 40–61 cm tall. Tubers oblong or ellipsoid, 3–5 × 1–3 cm, fleshy. Stem erect, terete, slender, with 4–6 ± clustered leaves and 3–6 bractlike leaflets. Leaf blade oblanceolate, subspatulate, or oblong-lanceolate, 8–18 × 2.5–4.5 cm, base contracted into amplexicaul sheath, apex acute or acuminate. Raceme 25–43-flowered, 15–23 cm; floral bracts lanceolate to ovate-lanceolate, 8–10 × 3–4 mm, shorter than ovary, apex acuminate; ovary twisted, cylindric, including pedicel 16–18 mm. Sepals green, 3-veined; dorsal sepal forming a hood with petals, ovate, concave, 3.5–4 × 2.5–3 mm, apex obtuse; lateral sepals reflexed, obliquely ovate or ovate-oblong, 4–4.5 × ca. 2.5 mm, apex obtuse. Petals yellow, narrowly ovate-oblong, 3–3.5 × ca. 1.5 mm, 2-veined, apex obtuse; lip yellow, ca. 5 mm, thickly textured, 3-lobed from base; lobes narrowly oblong; lateral lobes reflexed, 3–4.5 × 1–1.5 mm, apex obtuse; mid-lobe suberect, 3.5–4.5 × 1–1.5 mm, apex adnate to tip of hood formed by dorsal sepal and petals; spur cylindric, ca. 21 × 1 mm, slender; connective narrow; pollinia ovoid; viscidia lanceolate, ca. 1.2 mm. Fl. Jul–Sep.  $2n = 42$ .

Forests; 400–1200 m. Guangdong, Hainan, Taiwan, S Yunnan [Cambodia, E India, Laos, Myanmar, Thailand, Vietnam].

**45. *Habenaria shweliensis*** W. W. Smith & Banerji, Rec. Bot. Surv. India 6: 33. 1913.

中缅玉凤花 zhong mian yu feng hua

*Habenaria crassilabia* Kraenzlin.

Plants 35–50 cm tall. Tubers ellipsoid, 2.5–3 × 1.2–2 cm, fleshy. Stem erect, terete, with 4 or 5(–7) somewhat clustered leaves below and 3 to many bractlike leaves above. Leaf blade elliptic, elliptic-lanceolate, lanceolate, or oblong, 5–10 × 1.8–4 cm, thinly textured, base contracted into amplexicaul sheath, apex acute. Raceme loosely 14–30-flowered, 10–15 cm; floral

bracts ovate-lanceolate, 1.5–2 × 0.3–0.4 cm, longer than flowers, apex acuminate; ovary twisted, slightly arching, cylindric, 1–1.2 cm. Flowers spreading horizontally, yellowish green. Sepals green, 3-veined; dorsal sepal broadly ovate, concave, 3–4 × 2.8–3 mm, apex obtuse; lateral sepals spreading, obliquely ovate, concave, 3–4 × 2.5–2.8 mm, apex obtuse. Petals forming a hood with dorsal sepal, erect, yellow, obliquely ovate, 2.8–3.5 × ca. 2 mm, 3-veined, apex obtuse or emarginate; lip yellowish green, thickly textured, ca. 4 mm, 3-lobed from base; lateral lobes pendulous, narrowly oblong, ca. 3 × 1 mm, apex obtuse, reflexed; mid-lobe suberect, narrowly ovate-lanceolate, ca. 3 × 2 mm, apex adnate to tip of hood formed by dorsal sepal and petals; spur pendulous, slightly curved, cylindric-clavate, 3–6 mm, shorter than ovary, conspicuously dilated toward apex; connective narrow; pollinia ovoid; viscidia linear-oblong, ca. 0.8 mm. Fl. Jul–Sep.

Grassy slopes; 1300–2000 m. SW Guizhou, N Yunnan [Myanmar].

**46. *Habenaria iyoensis*** Ohwi, J. Jap. Bot. 12: 382. 1936.

岩坡玉凤花 yan po yu feng hua

*Habenaria minor* Fukuyama & Masamune; *H. rupestris* T. P. Lin & T. W. Hu.

Plants 15–40 cm tall. Tubers oblong, 2–4 × 1–1.5 cm, fleshy. Stem erect, terete, with 5–7 tufted leaves at base and 2 bractlike leaves above. Leaf blade narrowly elliptic or broadly oblanceolate, 8–10 × 1.8–2 cm, base contracted into amplexicaul sheath, apex acute. Raceme densely many flowered, 8–10 cm; floral bracts ovate-lanceolate, 8–12 × ca. 3 mm, basal ones nearly as long as ovary; ovary twisted, cylindric-fusiform, including pedicel 8–12 mm. Flowers greenish. Dorsal sepal forming a hood with petals, erect, broadly ovate, concave, 5–6 × 3.8–4 mm, 3-veined, apex obtuse; lateral sepals reflexed, obliquely ovate, 5–6 × 2.2–3 mm, 3-veined, apex acute. Petals narrowly falcate-lanceolate, 5–6 × ca. 2 mm, 1-veined, apex obtuse; lip spurred, deeply 3-lobed above base; lateral lobes spreading, almost at right angles to mid-lobe, filiform, 7–15 mm; mid-lobe linear, 7–9 mm, apex obtuse; spur pendulous, slightly curved, cylindric, 11–20 mm, longer than ovary, apex obtuse; connective rather broad; stigmas oblong. Fl. Sep–Oct.  $2n = 42$ .

Rocky slopes, sparse forests; below 700 m. C and S Taiwan [Japan].

**47. *Habenaria viridiflora*** (Rottler ex Swartz) R. Brown, Prodr. 312. 1810.

绿花玉凤花 lü hua yu feng hua

*Orchis viridiflora* Rottler ex Swartz, Kongl. Vetensk. Acad. Nya Handl. 21: 206. 1800.

Plants 13–20 cm tall. Tubers oblong, 1.5–2 × 0.8–1 cm, fleshy. Stem erect, slender, rigid, glabrous, base with 4 or 5 leaves, with 4 or 5 bractlike leaves above. Leaf blade linear, 5–10 × 0.4–0.6 cm, base amplexicaul, apex acuminate or acute. Raceme several to more than 10-flowered, 2–4 cm, glabrous; floral bracts ovate-lanceolate, ca. 4 mm, much shorter than ovary, apex long acuminate; ovary twisted, terete, slender, in-

cluding pedicel ca. 1 cm. Flowers yellowish green, small, glabrous. Dorsal sepal forming a hood with petals, ovate, concave, ca.  $2 \times 1.3$  mm, 3-veined, apex obtuse; lateral sepals reflexed, obliquely ovate-oblong, ca.  $2.8 \times 1.3$  mm, 3-veined, apex obtuse. Petals obliquely ovate, ca.  $2 \times 1.1$  mm, 1-veined, apex acute; lip ca. 3.2 mm, fleshy, near base deeply 3-lobed; lobes linear, apex obtuse; lateral lobes perpendicular to mid-lobe, often ca. 2 mm; mid-lobe ca. 3 mm; spur pendulous, cylindrical, to 1.6 cm, much longer than ovary, slender; pollinia obovoid; caudicles short; stigmas clavate. Fl. Jun.  $2n = 42, 44, 84$ .

Forests. N Guangxi [Cambodia, India, Laos, Sri Lanka, Thailand, Vietnam].

**48. *Habenaria plurifoliata*** Tang & F. T. Wang, Bull. Fan Mem. Inst. Biol. Bot. 10: 40. 1940.

莲座玉凤花 *lian zuo yu feng hua*

Plants 28–33 cm tall. Tubers cylindrical-oblong, ca.  $2.5$  cm  $\times$   $8$  mm, fleshy. Stem erect, terete, stout, ca. 3 mm in diam., with 1 or 2 tubular sheaths at base, with (4–)6–10 leaves  $\pm$  in a rosette and many bractlike leaves above. Leaf blade linear-lanceolate,  $7\text{--}9 \times 0.8\text{--}1.1$  cm, base contracted into amplexicaul sheath, apex acute or acuminate. Raceme 10–25-flowered, 6–17 cm; floral bracts lanceolate, basal ones nearly as long as ovary, apex acuminate; ovary twisted, terete, including pedicel 8–12 mm. Flowers yellowish green or white. Dorsal sepal forming a hood with petals, erect, broadly ovate, concave, ca.  $5 \times 2.9$  mm, 3-veined, apex obtuse; lateral sepals reflexed, narrowly ovate, ca.  $6 \times 2.4$  mm, 2-veined, apex subobtuse. Petals obliquely ovate-ligulate, falcate, ca.  $4.5 \times 1.2$  mm, 1-veined, apex acute; lip deeply 3-lobed from base; lateral lobes spreading at right angles to mid-lobe, filiform, ca. 14 mm; mid-lobe linear, ca. 7 mm, wider than lateral lobes; spur pendulous, cylindrical-clavate, ca. 14 mm, longer than ovary, slender, apical half ca. 1.4 mm in diam., slightly thickened toward end, apex acute or obtuse; connective wide; stigmas clavate. Fl. Oct.

• Forests, along rivers; 700–1600 m. S Guangxi, S Yunnan.

**49. *Habenaria tonkinensis*** Seidenfaden, Dansk Bot. Ark. 31(3): 114. 1977.

丛叶玉凤花 *cong ye yu feng hua*

Plants 24–40 cm tall. Tubers oblong,  $3\text{--}4 \times 1\text{--}1.5$  cm, fleshy. Stem erect, terete, stout, glabrous, with 10–13  $\pm$  clustered leaves at base and 5–13 bractlike leaves above. Leaf blade linear to linear-lanceolate,  $7\text{--}13 \times 0.8\text{--}1.5$  cm, base contracted, apex acuminate or acute. Raceme many flowered, 11–21 cm; floral bracts lanceolate to ovate-lanceolate, 13–17 mm, apex long acuminate; ovary twisted, cylindrical-fusiform, including pedicel 13–15 mm. Flowers fragrant, white. Dorsal sepal forming a hood with petals, erect, elliptic, concave, ca.  $5 \times 3\text{--}3.5$  mm, 3-veined, apex obtuse; lateral sepals reflexed, obliquely elliptic, ca.  $6 \times 2.5\text{--}3$  mm, 3-veined, apex obtuse. Petals linear, slightly oblique, ca.  $5 \times 1$  mm, 1-veined, apex acute; lip deeply 3-lobed from base; lobes linear, base ca. 0.5 mm wide; lateral lobes spreading nearly at right angles to mid-lobe, 10–11 mm; mid-lobe 7–8 mm, apex obtuse; spur pendulous, slightly curved, cylindrical-clavate, ca. 17 mm, longer than ovary, thickened toward end; pollinia obovoid; caudicles slen-

der; viscidia orbicular, small; stigmas clavate. Fl. Sep–Oct.

Broad-leaved forests; 600–1200 m. S Guangxi (Dongxing), S Yunnan [Cambodia, Laos, N Vietnam].

**50. *Habenaria fulva*** Tang & F. T. Wang, Bull. Fan Mem. Inst. Biol. Bot. 7: 138. 1936.

褐黄玉凤花 *he huang yu feng hua*

Plants 21–40 cm tall. Tubers oblong,  $1\text{--}2$  cm  $\times$   $5\text{--}10$  mm, fleshy. Stem erect, terete, glabrous, with 3–5 leaves below middle, with 3–10 bractlike leaves above. Leaf blade oblong-lanceolate,  $4\text{--}8 \times 0.6\text{--}1.8$  cm, base amplexicaul, apex acute. Raceme densely many flowered, ca. 6 cm; floral bracts lanceolate, ca. as long as or longer than flower, apex acuminate; ovary twisted, cylindrical-fusiform, including pedicel 8–10 mm. Flowers yellow or yellowish brown. Dorsal sepal erect, narrowly ovate, concave,  $6.5\text{--}8 \times 3.5\text{--}4$  mm, 3-veined, apex obtuse; lateral sepals obliquely oblong-lanceolate, ca.  $9 \times 3$  mm, 3-veined, apex obtuse. Petals forming a hood with dorsal sepal, falcate-lanceolate, ca.  $8 \times 2.5$  mm, oblique, 2-veined, apex acuminate; lip ca. 1 cm, deeply 3-lobed from base; lobes similar, linear; mid-lobe slightly longer and wider than lateral lobes; spur pendulous, straight, cylindrical, 3–5 mm, apex obtuse; stigmas arching, cylindrical. Fl. Aug–Sep.

Forests; 900–1000 m. SW Guangxi, S Yunnan [Myanmar].

**51. *Habenaria marginata*** Colebrooke in Hooker, Exot. Fl. 2: ad t. 136. 1824.

滇南玉凤花 *dian nan yu feng hua*

*Platanthera marginata* (Colebrooke) Lindley.

Plants 8–37 cm tall. Tubers ellipsoid or narrowly ellipsoid,  $2\text{--}4 \times 1\text{--}2.5$  cm, fleshy. Stem erect, terete, glabrous, with 1 or 2 tubular sheaths at base, 3–5 leaves below middle, and 3–5 bractlike leaves above. Leaf blade narrowly oblong or oblong-lanceolate,  $4\text{--}9 \times 1\text{--}2$  cm, base contracted into amplexicaul sheath, margin yellow when dried, apex acuminate or subobtuse. Raceme 3–15-flowered, 2.5–10 cm; floral bracts lanceolate, apex long acuminate; ovary twisted, arching, cylindrical-fusiform, including pedicel 8–13 mm. Sepals green, petals and lip yellow. Dorsal sepal forming a hood with petals, erect, cordate or broadly ovate, concave,  $7\text{--}7.5 \times 5\text{--}6$  mm, 3-veined, apex acute; lateral sepals reflexed, obliquely ovate or narrowly ovate-oblong,  $7.5\text{--}8.5 \times 2.5\text{--}3.5$  mm, 3-veined, apex acute. Petals obliquely ovate-triangular,  $6.5\text{--}7.3 \times 3\text{--}3.8$  mm, 2-veined, apex acute; lip spreading, 11–13 mm, deeply 3-lobed above base; lateral lobes spreading at acute angles to mid-lobe, linear or linear-lanceolate,  $7\text{--}8 \times 1\text{--}1.4$  mm; mid-lobe ligulate,  $8\text{--}9 \times 2\text{--}2.3$  mm; spur pendulous, clavate, 8–13 mm, apical half dilated and 1.5–2 mm in diam.; stigmas falcate, long. Fl. Oct–Nov.  $2n = 42$ .

Forests, grasslands at forest margins; 500–1200 m. S Yunnan [Bhutan, India, Kashmir, Myanmar, Nepal, Thailand].

**52. *Habenaria leptoloba*** Benth, Fl. Hongk. 362. 1861.

细裂玉凤花 *xi lie yu feng hua*

Plants 15–31 cm tall. Tubers oblong, ca.  $2$  cm  $\times$   $8$  mm,

fleshy. Stem erect, terete, slender, near base with 3–6 leaves, with 2–5 bractlike leaves above. Leaf blade lanceolate or linear, 6–15 × 1–1.8 cm, base contracted into amplexicaul sheath, apex acuminate or acute. Raceme 8–19-flowered, 8–14 cm; floral bracts lanceolate, 4–12 mm, longer than ovary, apex acuminate; ovary twisted, cylindrical-fusiform, glabrous, including pedicel 7–8 mm. Flowers yellowish greenish; sepals greenish. Dorsal sepal forming a hood with petals, broadly ovate, concave, ca. 3 × 2.8 mm, 1-veined, apex obtuse; lateral sepals spreading or reflexed, obliquely ovate-lanceolate, ca. 4.5 × 2 mm, 1-veined, apex obtuse. Petals erect, whitish green, obliquely ovate, concave, ca. 3.8 × 2 mm, 1-veined, apex obtuse; lip yellow, relatively long, deeply 3-lobed from base, lobes linear; lateral lobes divergent, ca. 6 mm, narrowed toward apex, apex obtuse; mid-lobe ca. 4 mm, apex obtuse; spur pendulous or slightly curved, cylindrical, 8–11 mm, longer than ovary, slender, slightly thickened near end, apex obtuse. Fl. Aug–Sep.

- Humid places in forests or grasslands. Hong Kong.

**53. *Habenaria nematocera*** Tang & F. T. Wang, Bull. Fan Mem. Inst. Biol. Bot. 10: 39. 1940.

细距玉凤花 xi ju yu feng hua

Plants 40–45 cm tall. Stem terete, with 3 tubular sheaths at base, 3 or 4 leaves near base, and 6–8 bractlike leaves above. Leaf blade narrowly oblong, narrowly elliptic, or narrowly spatulate, 9–15 × 2–2.5 cm, papery, base attenuate into amplexicaul sheath, apex acuminate or acute. Raceme loosely 15–30-flowered, 10–18 cm; floral bracts lanceolate, much shorter than ovary, apex aristate; ovary twisted, cylindrical-fusiform, glabrous, including pedicel ca. 15 mm. Flowers pinkish white. Dorsal sepal forming a hood with petals, erect, oblong-ovate, concave, ca. 4 × 2.5 mm, 3-veined, apex obtuse; lateral sepals reflexed,

oblique, narrowly ovate, ca. 4.5 × 2 mm, 2-veined, apex obtuse. Petals obliquely oblong-ovate, ca. 4 × 1.7 mm, with 1 vein, apex obtuse; lip deeply 3-lobed above base; lateral lobes divergent, pendulous, filiform, 9–10 mm; mid-lobe narrowly ligulate, 4–5 × ca. 1 mm; spur pendulous, curved, ca. 21 mm, much longer than ovary, slender, slightly dilated toward end; connective very narrow; pollinia inversely pear-shaped; caudicles long; viscidia ovate-elliptic. Fl. Oct.

- Forests; ca. 1200 m. SW Yunnan.

**54. *Habenaria furcifera*** Lindley, Gen. Sp. Orchid. Pl. 319. 1835.

密花玉凤花 mi hua yu feng hua

Plants to 50 cm tall. Tubers oblong, 4–5 × 2–2.5 cm, fleshy. Stem erect, terete, slender, glabrous, with 6 leaves below middle and 11 sparse bractlike leaves above. Leaf blade elliptic to narrowly elliptic, 8–18 × 3–6.5 cm, base contracted into amplexicaul sheath, apex acuminate or acute. Raceme densely many flowered, 9.5–13 cm, glabrous; floral bracts lanceolate, 7–15 mm, slightly shorter than or nearly as long as ovary, apex long acuminate. Flowers greenish, small, glabrous. Dorsal sepal forming a concave hood with petals, ovate, ca. 4 × 3 mm, 3-veined, apex acute; lateral sepals reflexed, obliquely oblong-lanceolate, ca. 4.5 × 2 mm, 3-veined, apex subobtuse. Petals lanceolate, concave, ca. 4 × 1.7 mm, with 1 vein, attenuate toward apex, apex subobtuse; lip 3-lobed from base; lobes linear; lateral lobes slightly curved, ca. 7 mm; mid-lobe erect, ca. 5 mm; spur pendulous, curved, ca. 17 mm, much longer than ovary, slender; stigmas suboblong, small. Fl. Sep.  $2n = 42$ .

Forest margins, forests; 1100–1200 m. S Yunnan [Bhutan, India, Myanmar, Nepal, Thailand].

### 43. *HEMIPILIOPSIS* Y. B. Luo & S. C. Chen, Novon 13: 450. 2003.

紫斑兰属 zi ban lan shu

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

Herbs, terrestrial. Tubers ellipsoid to subellipsoid, fleshy; roots filiform. Stem erect, spotted with purple, usually with 1 or rarely 2 leaves near base. Leaves elliptic to ovate-oblong, base shortly petiolate and sheathing stem, apex acute or acuminate. Inflorescence a terminal raceme, with several to many well-spaced flowers; peduncle, rachis, floral bracts, pedicel, and ovary all spotted with purple. Flowers resupinate, all parts apart from lip pale purple, spotted with purple. Dorsal sepal connivent with petals and forming a hood, erect, obovate; lateral sepals spreading or reflexed, obliquely ovate-elliptic. Petals ovate; lip subovate to flabellate, base spurred, apex 3-lobed; spur conic, abruptly contracted near tip and then swollen to form a globose apex. Column short, with 2 lateral appendages (1 on either side of anther); anther sessile, erect, with 2 parallel locules; rostellum shallowly 3-lobed; lateral lobes protruding, not converging; pollinia 2, granular-farinaceous, sectile, each attached by a slender caudicle to a viscidium; viscidia small, naked, borne directly above spur mouth at apices of lateral rostellum lobes; stigma 2-lobed, set in cavity at posterior margin of rostellum. Capsule ellipsoid.

One species: SW China, NE India.

The sole species was referred initially to *Habenaria*, but it differs from other members of that genus in habit, structure of the stigma, and lack of obvious anther canals. The shallowly 3-lobed rostellum, the orientation of the rostellum lobes, and the positioning of the viscidia appear to distinguish it from *Hemipilia*, while the shape of the lip, the non-converging lateral rostellum lobes, and various vegetative characters distinguish it also from *Brachycorythis*.

**1. *Hemipiliopsis purpureopunctata*** (K. Y. Lang) Y. B. Luo & S. C. Chen, Novon 13: 450. 2003.

紫斑兰 zi ban lan

*Habenaria purpureopunctata* K. Y. Lang, Acta Phytotax. Sin. 16(4): 127. 1978.

Plants 20–50 cm tall, with purple spots throughout. Tubers

2–4 × 1.5–2 cm. Stem erect, with 2–5 sterile scalelike bracts above leaf. Leaf usually 1, light purple abaxially, green spotted with purple adaxially, elliptic to ovate-oblong, 2–15 × 2–5 cm. Rachis 8–20 cm, 2–20-flowered; floral bracts shorter than ovary. Flowers pale purple; pedicel and ovary 1.3–1.5 cm. Dorsal sepal ca. 5 × 2 mm, 3-veined, apex rounded or obtuse; lateral sepals ca. 6 × 4 mm, apex obtuse. Petals ca. 5 × 4 mm, apex obtuse; lip subovate to flabellate, 10–11 × 9–10 mm, 3-

lobed at apex; lateral lobes oblong, usually larger than mid-lobe, apical margin irregularly undulate; mid-lobe ovate, ca. 3 × 2 mm; spur 9–10 × 2–3 mm, with a large mouth, globose apex 2–3 mm in diam. Capsule with purple spots, ellipsoid, ca. 15 × 2–3 mm. Fl. Jun–Jul, fr. Aug–Sep.

Broad-leaved evergreen forests, grasslands, sandy soils along rivers; 2100–3400 m. SE Xizang [NE India (Assam)].

#### 44. BHUTANTHERA Renz, Edinburgh J. Bot. 58: 99. 2001.

高山兰属 gao shan lan shu

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

Herbs, terrestrial, small, slender to stout. Tubers subglobose to ovoid, fleshy, neck with a few filiform roots. Stem erect, short, covered with tubular sheaths and sheathing leaf bases, glabrous. Leaves 2 or more, subopposite or clustered toward apex of stem, ovate, elliptic, or lanceolate, base tapering into amplexicaul sheath. Inflorescence terminal, racemose, 1–20-flowered, glabrous. Flowers resupinate; ovary twisted, fusiform to obovoid. Sepals free, similar. Petals usually smaller than sepals; lip 3-lobed though lateral lobes sometimes reduced and obscure, spurred at base; spur conic to cylindrical. Column short, stout; anther with distinct connective and 2 divergent locules; stigma 2-lobed, conjoined, pulvinate; rostellum with 2 distinct arms; pollinia 2, granular-farinaceous, sectile, each attached by a short caudicle to a small naked viscidium; rostellum relatively large.

Five species: all found in the alpine zone of the E Himalayas; one species in China.

*Bhutanthera albomarginata* (King & Pantling) Renz (Edinburgh J. Bot. 58: 101. 2001; *Habenaria albomarginata* King & Pantling, Ann. Roy. Bot. Gard. Calcutta 8: 322. 1898) has been noted from Xizang (Press et al., Annot. Checkl. Fl. Pl. Nepal, 217. 2000). However, the present authors found no relevant specimens and therefore could not substantiate the occurrence of this species in China.

**1. *Bhutanthera alpina*** (Handel-Mazzetti) Renz, Edinburgh J. Bot. 58: 102. 2001.

高山兰 gao shan lan

*Habenaria alpina* Handel-Mazzetti, Symb. Sin. 7: 1336. 1936; *Peristylus alpinus* (Handel-Mazzetti) K. Y. Lang.

Plants slender, 4–7 cm tall. Tubers subglobose, to ca. 5 mm in diam. Stem with 1–3 tubular sheaths at base, 2-leaved. Leaves subopposite, elliptic, elliptic-lanceolate, or obovate, 1–2.5 × 0.5–1 cm, apex acute to obtuse. Inflorescence 1–5-flowered; peduncle ridged, 3–5 cm, free of leaf bases and visible beyond stem apex; floral bracts triangular, very small. Flowers suberect, green; sepals and petals tinged white along apical

margin; pedicel and ovary fusiform, 2–3 mm, slender. Dorsal sepal erect, broadly ovate, 2–3 × 1.5–2 mm, apex obtuse to subrounded; lateral sepals spreading, ovate, oblique, 3–3.5 × 2–2.5 mm, apex acute. Petals loosely connivent with dorsal sepal, erect, broadly ovate, 1–1.5 × 0.7–1 mm, fleshy, apex obtuse; lip spreading, ovate-lanceolate, 1–1.5 × ca. 0.5 mm, fleshy, 3-lobed below middle; lateral lobes orbicular-ovate, very small, apex obtuse; mid-lobe ligulate-lanceolate, 0.8–1 mm, apex acute; spur cylindrical, 2–3 mm, apex obtuse. Column ca. 1 mm. Fl. Jul–Aug.

Damp alpine meadows; 4200–4300 m. SE Xizang [Bhutan, India (Sikkim)].

#### 45. FRIGIDORCHIS Z. J. Liu & S. C. Chen, J. Fairylake Bot. Gard. 6(3): 14. 2007.

冷兰属 leng lan shu

Chen Xinqi (陈心启 Chen Sing-chi); Stephan W. Gale

Herbs terrestrial, small. Tubers rather large. Stem very short. Leaves basal, ovate-elliptic to ovate-lanceolate, base petiolate; petioles enclosed in tubular sheaths forming a pseudostem. Inflorescence ebracteate, ± broadly corymbose, 1–8-flowered; each flower at end of a peduncle, and all peduncles fused with each other in lower part. Flowers resupinate, small, often not fully opening. Sepals and petals free; sepals slightly larger than petals; lip fleshy, spurred, 3-lobed toward base; lateral lobes small; mid-lobe much larger; spur ellipsoidal. Column short; anther erect, with 2 divergent locules; pollinia 2, granular-farinaceous, sectile, each attached to a viscidium; caudicle inconspicuous; viscidium large, naked, attached to both sides of rostellum arms; rostellum shortly armed; stigmas 2, separate, just below rostellum arms, shortly clavate; staminodes 2.

• One species: China.

**1. *Frigidorchis humidicola*** (K. Y. Lang & D. S. Deng) Z. J. Liu & S. C. Chen, J. Fairylake Bot. Gard. 6(3): 17. 2007.

冷兰 leng lan

*Peristylus humidicola* K. Y. Lang & D. S. Deng, Novon 6:

190. 1996; *Bhutanthera humidicola* (K. Y. Lang & D. S. Deng) Ormerod.

Plants 3–4 cm tall. Tuber somewhat calabash-shaped, 1.2–1.5 cm × 6–8 mm. Stem 1–2 mm thick. Leaves 2 or 3, nearly

tufted, ovate-elliptic to ovate-lanceolate, slightly concave, 1.5–3.3 × 1–3 cm, base contracted into a petiole, apex acute; petioles enclosed by 2 tubular sheaths forming a pseudostem 8–12 mm. Inflorescence short, scarcely exceeding leaves, ± broadly corymbose, 1–8-flowered. Flowers green-yellow; sepals white margined apically; petals and lip becoming deep purple after pollination; pedicel 3–5 mm; ovary 4–6 mm. Dorsal sepal suborbicular, 3–4.5 mm, margin denticulate toward apex; lateral

sepals ovate-elliptic, slightly longer than dorsal sepal. Petals orbicular, 2–2.5 mm, fleshy, apex rounded-obtuse; lip 3–3.5 cm, fleshy, spurred, 3-lobed toward its base; lateral lobes triangular, small; mid-lobe ligulate-linear, 2–2.7 mm; spur 1–2 × 0.5–1 mm, rounded-obtuse at end. Fl. Aug.

• Sides of tall sedge tussocks, soil-covered rocks in swampy meadows; 3600–4500 m. SE Qinghai.

#### 46. DIPLOMERIS D. Don, Prodr. Fl. Nepal. 26. 1825.

合柱兰属 he zhu lan shu

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

*Diplochilus* Lindley; *Paragnathis* Sprengel.

Herbs, terrestrial. Tubers subglobose, fleshy, unlobed, neck with several slender roots. Stem short, with 1 or 2 leaves. Leaves basal, ensiform to oblong, pubescent or glabrous. Inflorescence suberect, terminal, 1- or 2-flowered; floral bracts lanceolate, green. Flowers resupinate, large; ovary twisted, cylindrical-fusiform. Sepals spreading, free, lanceolate, nearly equal in size. Petals longer and wider than sepals; lip flabellate, large, unlobed, glabrous, sessile or shortly clawed at base, spurred; spur decurved, elongate, cylindrical, slender. Column very short, with 2 lateral appendages; anther with 2 slightly divergent locules; pollinia 2, clavate, granular-farinaceous, sectile, each attached by a long, slender caudicle to a viscidium; viscidia oblate, small, naked; rostellum erect, large, membranous, protruding between locules of anther; stigma lobes 2, elongate, oblong, convex, basally connate, diverging. Capsule ellipsoid.

Four species: Bhutan, Cambodia, China, NE India, Laos, N Myanmar, Nepal, Thailand, Vietnam; two species in China.

- 1a. Leaves usually 2, ensiform to linear-lanceolate, 0.5–1.8 cm wide; leaf, inflorescence, pedicel, and ovary glabrous ..... 1. *D. pulchella*  
 1b. Leaf usually solitary, oblong, 1.4–3.8 cm wide; leaf, inflorescence, pedicel, and ovary pubescent ..... 2. *D. hirsuta*

##### 1. *Diplomeris pulchella* D. Don, Prodr. Fl. Nepal. 26. 1825.

合柱兰 he zhu lan

*Diplochilus longifolius* Lindley; *Diplomeris boxallii* Rolfe; *Habenaria uniflora* (Roxburgh) Griffith; *Orchis uniflora* Roxburgh; *Paragnathis pulchella* (D. Don) Sprengel.

Plants 7.5–22.5 cm tall. Tubers ellipsoid, ca. 10 × 5 mm. Leaves usually 2, basal, 1 larger than other, ensiform to linear-lanceolate, 3–10 × 0.5–1.8 cm, glabrous, base contracted into amplexicaul sheath, apex acuminate. Inflorescence erect, 6–18 cm, glabrous; floral bract broadly ovate, ca. as long as to slightly exceeding ovary, glabrous, apex acute. Flower usually solitary, erect, white, large; ovary and pedicel 10–12 mm, glabrous. Sepals spreading, oblong-lanceolate or ovate-lanceolate, 15–18 × ca. 6 mm, outer surface carinate, glabrous, apex acute or acuminate. Petals spreading, broadly obovate or ovate-oblong, 1.5–2.5 × 1–1.5 cm, apex acute; lip spreading, broadly obcordate, 1.8–2.8 × 1.5–2.2 cm, apex entire to shallowly emarginate and with a small acute tooth; spur pendulous, strongly incurved, cylindrical, ca. 3.5 cm, slender, slightly thickened from middle toward apex, apex subacute to obtuse. Fl. Jul–Sep, fr. Oct.

Forests, grasslands; 600–2600 m. SW Guizhou, SW Sichuan, SE Xizang, NW Yunnan [NE India, Myanmar, Vietnam].

##### 2. *Diplomeris hirsuta* (Lindley) Lindley, Gen. Sp. Orchid. Pl. 331. 1835.

毛叶合柱兰 mao ye he zhu lan

*Diplochilus hirsutus* Lindley, Edwards's Bot. Reg. 18: ad t. 1499. 1832; *D. hirsutus* var. *biflorus* Pradhan.

Plants 5–7 cm tall. Tubers subglobose to ellipsoid, 7–10 × 5–7 mm. Leaf usually solitary, or occasionally with a second smaller subopposite leaf, basal, oblong, 3.5–8 × 1.4–3.8 cm, pubescent, base directly sheathing stem, apex subacute. Inflorescence erect, 5–6 cm, pubescent; floral bracts broadly ovate, shorter than ovary, pubescent, apex acute. Flower solitary, erect, white, large; ovary and pedicel 11–15 mm, pubescent. Sepals spreading, ovate-oblong, 11–16 × 8–12 mm, outer surface sparsely pubescent, apex acute. Petals spreading, orbicular-reniform, 10–21 × 7–17 mm, apex subacute; lip spreading, broadly obovate, 16–22 × 15–23 mm, apex entire to shallowly emarginate and with a small acute tooth; spur pendulous, strongly incurved, cylindrical, 3.5–4.5 cm, slender, attenuate, apex acute. Fl. Jul–Aug.

Grasslands. S China [NE India, Nepal].

#### 47. ANDROCORYS Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 4: 52. 1919.

兜蕊兰属 dou rui lan shu

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

Herbs, terrestrial, small. Tuber globose to ovoid, fleshy, pubescent. Stem erect, slender, glabrous, with 1 basal leaf. Leaf ovate to

narrowly elliptic, base attenuate into amplexicaul sheath. Inflorescence erect, terminal, with several to more than 10 flowers arranged in a short, ± dense raceme; floral bracts very small, scalelike. Flowers resupinate, usually yellowish to green, small; ovary twisted, fusiform. Sepals free; dorsal sepal erect, often broad, concave, forming a hood with petals; lateral sepals longer and narrower than dorsal sepal. Petals concave; lip reflexed, ligulate or linear, small, base often dilated, spurless, entire. Column short, with 2 lateral appendages; anther erect, with 2 divergent, hooded locules and broad connective; pollinia 2, clavate, granular-farinoaceous, sectile, each attached to a small viscidium; rostellum triangular; stigma 2-gibbous, attached to base of rostellum.

Six species: from the Himalayas through S China to Japan; five species (three endemic) in China.

- 1a. Lateral sepals pendulous and parallel to lip, lower margins connivent with each other ..... 1. *A. ophioglossoides*
- 1b. Lateral sepals spreading, not parallel to lip, lower margins not connivent with each other.
  - 2a. Sepal margins entire; petals shorter than or ca. as long as dorsal sepal.
    - 3a. Floral bracts broadly ovate, not spirally twisted; dorsal sepal 1–1.2 mm wide, apex obtuse ..... 2. *A. pugioniformis*
    - 3b. Floral bracts linear, spirally twisted; dorsal sepal 1.3–1.8 mm wide, apex apiculate ..... 3. *A. spiralis*
  - 2b. Sepal margins denticulate; petals longer than dorsal sepal.
    - 4a. Floral bracts ovate, ca. 1.5 mm; petals elliptic or obliquely orbicular, ca. as broad as dorsal sepal ..... 4. *A. pusillus*
    - 4b. Floral bracts broadly ovate, ca. 0.8 mm; petals obliquely oblong-lanceolate, narrower than dorsal sepal ..... 5. *A. oxysepalus*

**1. *Androcorys ophioglossoides*** Schlechter, Repert. Spec. Nov. Regni Veg. Beih. 4: 53. 1919.

兜蕊兰 dou rui lan

Plants 8–21 cm tall. Tuber globose, 5–8 mm in diam. Stem erect, slender, with 2 tubular sheaths and 1 leaf at base. Leaf narrowly elliptic to oblong-spatulate, 3–9 × 0.8–2 cm, apex obtuse. Rachis 2.5–9 cm, 6–20-flowered; floral bracts ca. 1 mm, apex subtruncate. Flowers yellowish green or green; ovary and pedicel 4–4.5 mm. Dorsal sepal erect, broadly ovate, concave, 1–1.2 × 0.9–1.1 mm, 1-veined, entire, apex obtuse or subacute; lateral sepals parallel to lip, pendulous, obliquely elliptic, ca. 2 × 1 mm, entire, lower margins connivent with each other, 1-veined, apex obtuse. Petals erect, oblique, broadly ovate, unequally sided, concave, large, ca. 1.5 × 1.3 mm, apex obtuse; lip linear-ligulate, small, 1.2–1.8 mm, base slightly dilated and ca. 0.7 mm wide, apex obtuse; connective ca. 1 mm wide. Fl. Jul–Aug, fr. Sep.

• Alpine forests, damp alpine grasslands; 1600–3900 m. Gansu, Guizhou, Qinghai, Shaanxi.

**2. *Androcorys pugioniformis*** (Lindley ex J. D. Hooker) K. Y. Lang, Guihaia 16: 105. 1996.

剑唇兜蕊兰 jian chun dou rui lan

*Herminium pugioniforme* Lindley ex J. D. Hooker, Fl. Brit. India 6: 130. 1890; *H. nivale* Schlechter; *Monorchis pugioniformis* (Lindley ex J. D. Hooker) O. Schwarz.

Plants 5.5–18 cm tall. Tuber globose, 6–10 mm in diam. Stem erect or ascending, slender to relatively stout, with 1 or 2 tubular sheaths and 1 leaf at base. Leaf oblanceolate, oblong, narrowly elliptic, or elliptic, 2–4 × 0.4–1.2 cm, apex obtuse or acute. Rachis 0.8–2.5 cm, 3–10-flowered; floral bracts broadly ovate, much shorter than ovary, apex acute. Flowers green; ovary and pedicel 4–5 mm. Dorsal sepal erect, ovate or ovate-orbicular, concave, ca. 1.5 × 1–1.2 mm, 1-veined, entire, apex obtuse; lateral sepals spreading, obliquely obovate to elliptic, 1.7–2.2 × 1–1.2 mm, entire, 1-veined, apex obtuse. Petals obliquely obovate, concave, 1.3–1.5 × 0.5–0.8 mm, 1-veined, entire, apex obtuse or subacute; lip linear-oblong, 1.7–2.5 mm, fleshy, base conspicuously dilated and 0.5–1 mm wide, apex

obtuse; connective ca. 0.6 mm wide; viscidia ellipsoid. Fl. Aug–Sep, fr. Sep.

*Abies* forests, alpine thickets and meadows; 2700–5200 m. E and S Qinghai, NW Sichuan, Xizang, NW Yunnan [Bhutan, India, Kashmir, Nepal].

**3. *Androcorys spiralis*** Tang & F. T. Wang, Bull. Fan Mem. Inst. Biol. Bot. 10: 38. 1940.

蜀藏兜蕊兰 shu zang dou rui lan

Plants 5–12 cm tall. Tuber globose, 5–8 mm in diam. Stem erect or ascending, slender, with 2 tubular sheaths and 1 leaf at base. Leaf oblong, 2–2.5 × 0.8–1 cm, apex obtuse. Rachis 2–2.5 cm, 3–8-flowered; floral bracts spirally twisted, linear, shorter than ovary, apex acuminate. Flowers green; ovary and pedicel 3–7 mm. Dorsal sepal erect, broadly ovate, concave, 1.5–2 × 1.3–1.8 mm, 1-veined, entire, apex apiculate; lateral sepals spreading, oblong, 2–2.75 × 1–1.2 mm, 1-veined, entire, apex obtuse. Petals obliquely oblong, concave, 1.3–2 × 0.5–0.7 mm, 1-veined, margin incurved, apex obtuse or acuminate; lip linear-ligulate, 1.8–2.1 mm, fleshy, base dilated and ca. 0.8 mm wide, apex obtuse; connective very broad. Fl. Sep.

• Forests; 2800–3500 m. SW Sichuan, SE Xizang, NW Yunnan.

**4. *Androcorys pusillus*** (Ohwi & Fukuyama) Masamune, Hokuriku J. Bot. 12: 88. 1963.

小兜蕊兰 xiao dou rui lan

*Herminium pusillum* Ohwi & Fukuyama, Bot. Mag. (Tokyo) 48: 430. 1934; *Androcorys japonensis* F. Maekawa.

Plants 10–22 cm tall. Tuber ovoid or globose, 5–7 mm in diam. Stem erect, slender, with 1–3 tubular sheaths and 1 leaf at base. Leaf ovate to oblong, 2–4.5 × 1–2.2 cm, apex obtuse. Rachis ca. 2.5 cm, 8–13-flowered; floral bracts ovate, ca. 1.5 mm, shorter than ovary. Flowers green; ovary and pedicel 3–4 mm. Dorsal sepal erect, triangular-ovate, orbicular, or broadly ligulate, concave, 1–1.2 × ca. 1 mm, 1-veined, margin irregularly denticulate, apex obtuse; lateral sepals spreading, narrowly oblong, 2–3 × 0.7–1 mm, 1-veined, margin slightly denticulate, apex obtuse or subacute. Petals elliptic to obliquely orbicular, concave, 1.2–1.5 × ca. 1 mm, 1-veined, base cuneate, margin

entire or slightly denticulate, apex rounded; lip ligulate, 2–2.2 × ca. 0.7 mm, fleshy, base dilated, apex obtuse; connective broad. Fl. Jul.

Forests, alpine meadows; 2500–3500 m. C Taiwan [Japan].

**5. *Androcorys oxyspalus*** K. Y. Lang, *Guihaia* 16: 106. 1996.

尖萼兜蕊兰 *jian e dou rui lan*

Plants 6–7 cm tall. Tuber globose, ca. 5 mm in diam. Stem erect or ascending, slender, with 2 tubular sheaths and 1 leaf at base. Leaf elliptic to oblong, 1.5–1.7 × 0.8–0.9 cm, apex obtuse. Rachis 1.8–2 cm, 6- or 7-flowered; floral bracts broadly

ovate, ca. 0.8 mm, much shorter than ovary, apex acute. Flowers green, small; ovary and pedicel ca. 3 mm. Dorsal sepal erect, broadly ovate, concave, ca. 1.6 × 1.2 mm, 1-veined, margin denticulate, apex acuminate; lateral sepals spreading, narrowly oblong-lanceolate, ca. 3 × 1 mm, 1-veined, margin denticulate, apex acuminate and thickened. Petals erect, obliquely oblong-lanceolate, concave, ca. 2 × 0.8 mm, 1-veined, entire, apex obtuse; lip pendulous, linear-lanceolate, ca. 1.5 mm, fleshy, base dilated and ca. 0.6 mm wide, apex obtuse; connective broad. Fl. Aug.

• *Abies* forests; ca. 3900 m. NW Yunnan.

#### 48. **POROLABIUM** Tang & F. T. Wang, *Bull. Fan Mem. Inst. Biol. Bot.* 10: 36. 1940.

孔唇兰属 *kong chun lan shu*

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

Herbs, terrestrial, small. Tubers subglobose, small. Stem erect, with 2 or 3 sheathing cataphylls at base and 1 cauline leaf. Leaf linear-lanceolate, base vaginate and sheathing stem, apex obtuse. Inflorescence terminal, ebracteate, racemose, 6–8-flowered; floral bracts broadly ovate, small, much shorter than ovary. Flowers resupinate, yellowish green to green. Dorsal sepal connivent with petals, erect, ovate, concave; lateral sepals spreading or deflexed, narrowly ovate, apex obtuse. Petals erect, obliquely ovate, apex obtuse; lip ligulate, entire, apex obtuse, dilated and with 2 glands at base, spurless. Column short; anther large, 2-locular, with narrow connective; pollinia 2; rostellum prominent; lateral lobes spreading; stigma simple, pulvinate, not adnate to rostellum.

• One species: China.

In habit, *Porolabium* is similar to the genus *Herminium* (to which the sole species was referred initially), but it differs in its solitary leaf; its unlobed, ligulate, and spurless lip, which bears 2 depressions at its swollen base; its large rostellum; and its simple, cushionlike stigma. Further analysis of fresh material is required to better resolve generic affinities.

**1. *Porolabium biporosum*** (Maximowicz) Tang & F. T. Wang, *Bull. Fan Mem. Inst. Biol. Bot.* 10: 38. 1940.

孔唇兰 *kong chun lan*

*Herminium biporosum* Maximowicz, *Bull. Acad. Imp. Sci. Saint-Petersbourg* 31: 106. 1887; *Monorchis biporosa* (Maximowicz) O. Schwarz.

Plants 10–12 cm tall. Tubers globose, ca. 1 cm in diam., fleshy, unlobed. Stem slender, with 2 or 3 tubular sheaths and 1 leaf. Leaf linear-lanceolate, ca. 7 × 0.8 cm, base amplexicaul, apex obtuse. Inflorescence 6–8-flowered; floral bracts small. Flowers yellowish green or greenish, small; ovary twisted,

fusiform, including pedicel 5–6 mm. Dorsal sepal forming a hood with petals, ca. 2.5 × 1.5 mm, 1-veined; lateral sepals ca. 3 × 1.5 mm, 1-veined. Petals ca. 2 × 1 mm, 1-veined; lip spreading, ca. 2.8 × 1.5 mm, base dilated and with 2 concave glands, attenuate toward apex. Column short, with 2 lateral appendages at base of anther; anther cucullate, large, 2-locular; pollinia 2, each attached to a viscidium by a short caudicle; rostellum deltoid, very large, with spreading lateral lobes; stigma cushionlike. Fl. Jul.

• Montane grasslands and lakesides; 3000–3300 m. E Qinghai, NE Shanxi.

#### 49. **DISPERIS** Swartz, *Kongl. Vetensk. Acad. Nya Handl.* 21: 218. 1800.

双袋兰属 *shuang dai lan shu*

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

Herbs, terrestrial, slender. Tuber ovoid to globose. Stem erect, unbranched, fleshy, glabrous or pubescent, with a few scattered or clustered leaves. Leaves basal or cauline, lanceolate, ovate, or subcordate, often very small, base amplexicaul, margin entire. Inflorescence terminal, racemose, 1- to several flowered; floral bracts foliaceous, similar to leaves. Flowers resupinate; ovary twisted. Dorsal sepal connate to or connivent with petals and forming a hood, usually erect, narrow; lateral sepals often connate at base, saccate or spurred near middle. Petals falcate, broader than dorsal sepal; lip narrowly clawed; claw adnate to base of column; blade variable in shape, often 3-lobed, smooth, verrucose or pubescent. Column short, sessile; anther 2-locular, attached to column by a short filament; pollinia 2, granular-farinaceous, sectile, attached by slender caudicles to large viscidia, borne at apices of rostellum arms; stigma 2-lobed, confluent or consisting of 2 separate areas, located toward apex of column or dorsally near base of rostellum arms; rostellum with 2 long, twisted arms and flat central lobe. Capsule fusiform.

About 75 species: mainly in S and tropical Africa, with a few species extending to tropical and subtropical Asia; one species in China.



**1. *Disperis neilgherrensis*** Wight, Icon. Pl. Ind. Orient. 5: t. 1719. 1851.

双袋兰 *shuang dai lan*

*Disperis javanica* J. J. Smith; *D. lantauensis* S. Y. Hu; *D. orientalis* Fukuyama; *D. palawensis* (Tuyama) Tuyama; *D. papuana* Micholitz & Kraenzlin; *D. philippinensis* Schlechter; *D. rhodoneura* Schlechter; *D. siamensis* Rolfe ex Downie; *D. teleplana* F. Maekawa; *D. walkerae* H. G. Reichenbach; *D. zeylanica* Trimen; *D. zeylanica* var. *neilgherrensis* (Wight) Pradhan; *Pantlingia palawensis* (Tuyama) Rauschert; *Stigmatodactylus palawensis* Tuyama.

Plants 4–17 cm tall. Tuber ovoid, 0.5–1(–2) cm, puberulent. Subterranean stem with a few sheathing cataphylls. Stem dark green to purple, terete, 3–15 cm, with 1–3 cauline leaves usually above middle. Leaves abaxially purplish, adaxially green, sometimes with large dark green patches, ovate to cordate, 4–17 × 4–13 mm, with anastomosing venation, base directly sheathing stem, apex acute. Rachis 1–3-flowered,

pinkish green, 1–1.5 cm; floral bracts ovate, 4–10 × 2–5 mm. Flowers pink to pale purple; pedicel and ovary cylindric, 8–12 mm. Dorsal sepal forming a hood with petals, erect, lanceolate, 4–7 × 1–1.5 mm, 1-veined, apex acute; lateral sepals pendulous, obliquely ovate, 5–7 × ca. 3.5 mm, connate at base, with conic sac at center. Petals connivent with dorsal sepal, obliquely obovate, 5–6 × 2–3.5 mm; lip whitish, ca. 5 mm, consisting of a narrow claw at base and a narrowly 3-lobed blade, cross-shaped when expanded; claw adnate to base of column, erect, 1–2 mm; lateral lobes spreading at right angles to mid-lobe, adaxially yellow, linear, ca. 2.5 mm, minutely hairy; mid-lobe pendulous, linear, ca. 2 mm, terminating in a swollen papillose appendage. Column ca. 1.2 mm; rostellum rhomboid, stipitate at base, with 2 curved or coiled ribbonlike arms projecting in opposite directions; pollinia attached to apex of rostellum arms; stigma lobes separate. Capsule ca. 14 × 2.5 mm. Fl. May–Aug.

Woodlands, scrub; 200–900 m. Hong Kong, S Taiwan [India, Indonesia, Japan (Ryukyu Islands), New Guinea, Philippines, Sri Lanka, Thailand; SW Pacific islands].

**50. SATYRIUM** Swartz, Kongl. Vetensk. Acad. Nya Handl. 21: 214. 1800, nom. cons., not Linnaeus (1753).

鸟足兰属 *niao zu lan shu*

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

Herbs, terrestrial, slender or robust. Tubers solitary or paired, ellipsoid, fleshy; roots few, fasciculate, filiform. Stem erect, with a few sheaths at base and 1 to few leaves above, glabrous. Leaves basal or cauline, ovate to lanceolate, membranous to slightly fleshy, amplexicaul at base. Inflorescence terminal, with several scattered, sheathing foliaceous or reduced sterile bracts along peduncle, laxly to densely few to many flowered above; floral bracts reflexed, usually foliaceous, ovate to lanceolate, often longer than ovary. Flowers not resupinate, bisexual or unisexual; ovary fusiform, shortly pedicellate, usually glabrous. Sepals and petals free, spreading, subequal. Petals often slightly smaller than sepals; lip superior, deeply hooded, adnate to column at base, with 2 elongate or saccate spurs at base, or rarely spurless. Column short to elongate, usually incurved, with 2 prominent auricles near anther base; anther on ventral surface of column, with 2 parallel locules, base entirely connate with column, usually with well-developed connective; pollinia 2, granular-farinaceous, sectile, each attached to a viscidium by a short, slender caudicle; rostellum spreading, rather large, 3-lobed; stigma lobes confluent, large, flat or concave.

About 90 species: mainly in Africa (especially S Africa), with a few species also found in S Asia; two species (one endemic) in China.

- 1a. Rachis 2–4.5 cm, subdensely to densely flowered; flowers yellow ..... 2. *S. yunnanense*
- 1b. Rachis 4–20 cm, laxly to subdensely flowered; flowers whitish, pink, or pale rose-purple ..... 1. *S. nepalense*

**1. *Satyrium nepalense*** D. Don, Prodr. Fl. Nepal. 26. 1825.

鸟足兰 *niao zu lan*

Plants (11–)20–70 cm tall. Tubers oblong-ellipsoid to ellipsoid, 2–5 × 0.5–1.5 cm. Stem with 1–3 membranous sheaths at base, 1–3-leaved. Leaves usually basal and subopposite, or sometimes cauline and widely spaced and alternate, broadly ovate, ovate-lanceolate, or lanceolate-oblong, 4–19 × 2–5.5(–8) cm, slightly fleshy, margin somewhat crisped, apex acute or acuminate. Peduncle 6–30 cm, slender to stout, with several large, foliaceous, tubular bracts, glabrous; rachis 4–20 cm, laxly 10- to subdensely more than 20-flowered; floral bracts reflexed, ovate-lanceolate, 8–35 × 4–10 mm. Flowers fragrant, widely spreading, whitish, pink, or pale purple, glabrous, hermaphroditic or with reduced stamen and functionally female; pedicel and ovary 6–10 mm, glabrous. Dorsal sepal narrowly oblong-elliptic, 4–6 × 1–1.8 mm, apex obtuse; lateral

sepals oblong to subovate, slightly oblique, 4–6 × 1.5–2 mm, apex obtuse. Petals narrowly oblong to narrowly elliptic, 3.5–5 × 1–1.2 mm, outer surface carinate, margin sometimes finely ciliate, apex acute to obtuse and sometimes incised; lip hooded, subglobose, 5–6 × 4–6 mm, outer surface carinate, 2-spurred, margin sometimes irregularly dentate, apex acute or obtuse and often deflexed; spurs parallel, slender and cylindric, to stout and conic, curving downward, 3–13 mm, or reduced and saclike, or rarely absent altogether. Column incurved, 4–5 mm.

Open forests, alpine slopes; 1000–4000 m. SW Guizhou, NW Hunan, SW and W Sichuan, S and SE Xizang, NW, S, and SE Yunnan [Bhutan, India, Myanmar, Nepal, Sri Lanka].

- 1a. Spurs slender, cylindric, 8–13 mm, ca. as long as or exceeding ovary ..... 1a. var. *nepalense*
- 1b. Spurs stout, conic, not more than 6 mm, shorter than ovary, rarely saclike or absent altogether ..... 1b. var. *ciliatum*

**1a. *Satyrium nepalense* var. *nepalense***

鸟足兰(原变种) niao zu lan (yuan bian zhong)

*Satyrium albiflorum* A. Richard; *S. henryi* Schlechter; *S. pallidum* A. Richard; *S. perrottetianum* A. Richard.

Plants usually robust, 25–60 cm tall. Stem 2- or 3-leaved. Leaves basal or rarely cauline, broadly ovate to ovate-lanceolate, 7–19 × 2–5.5(–8) cm, apex acute. Peduncle 10–30 cm, stout; rachis 7–20 cm; floral bracts to 35 mm. Flowers hermaphroditic. Dorsal sepal 4–5 × 1–1.8 mm; lateral sepals oblong to subovate, slightly oblique, ca. 4 × 2 mm. Petals narrowly oblong to narrowly elliptic, ca. 3.5 × 1 mm, glabrous; spurs downcurved, cylindric, 8–13 mm, ca. as long as or exceeding ovary, slender. Fl. Sep–Dec.  $2n = 82, 123, 164$ .

Forests, open forests, grassy slopes; 1000–3200 m. SW Guizhou, S Xizang, S and SE Yunnan [Bhutan, India, Myanmar, Nepal, Sri Lanka].

**1b. *Satyrium nepalense* var. *ciliatum*** (Lindley) J. D. Hooker, Fl. Brit. India 6: 168. 1890.

缘毛鸟足兰 yuan mao niao zu lan

*Satyrium ciliatum* Lindley, Gen. Sp. Orchid. Pl. 341. 1838; *S. aceras* Schlechter ex Limpricht; *S. mairei* Schlechter; *S. setchuenicum* Kraenzlin; *S. tenii* Schlechter; *S. tschangii* Schlechter.

Plants usually slender, 12–35 cm tall. Stem slender, 1- or 2-leaved. Leaves basal, lanceolate-oblong to narrowly ovate, 4–15 × 2–5 cm, apex acuminate to acute. Peduncle 6–17 cm; rachis 4–13 cm; floral bracts to 2 cm. Flowers usually hermaphroditic or rarely with stamen abortive or absent. Dorsal sepal 5–6 × ca. 1.3 mm; lateral sepals oblong-spatulate, 5–6 × ca. 1.5 mm. Petals narrowly oblong-ob lanceolate, 4–5 × ca. 1.2 mm, margin often ciliate; spurs conic, 3–6 mm, shorter than ovary, stout,

rarely saclike or absent altogether (in spurless or shortly spurred flowers, male organs reduced to varying degrees; in extreme cases column entirely pistillate and lip absent). Fl. and fr. Aug–Oct.

Alpine *Pinus* forests, open forests, grassy slopes; 1200–4000 m. SW Guizhou, NW Hunan, SW and W Sichuan, S and SE Xizang, NW and SE Yunnan [Bhutan, India (Sikkim), Nepal].

**2. *Satyrium yunnanense*** Rolfe, Notes Roy. Bot. Gard. Edinburgh 8: 28. 1913.

云南鸟足兰 yun nan niao zu lan

*Satyrium microcephalum* Kraenzlin; *S. nepalense* D. Don subsp. *yunnanense* (Rolfe) Soó; *S. pycnostachyum* Schlechter.

Plants 11–35 cm tall. Tubers ellipsoid to subovoid, 1–2.5 × 0.5–1.4 cm. Stem with 1 or 2 membranous sheaths at base, 1- or 2-leaved. Leaves basal and subopposite, or cauline, somewhat spaced and alternate, broadly ovate to subelliptic, 3.5–11 × 2–5 cm, margin sometimes crisped, apex obtuse to acute. Peduncle 5–25 cm, stout, with 1 or 2 foliaceous sheathing bracts, glabrous; rachis 2–4.5 cm, subdensely to densely 10- to more than 20-flowered; floral bracts reflexed, ovate, 8–15 × 5–7 mm. Flowers usually widely spreading, yellow to golden yellow, glabrous, hermaphroditic; pedicel and ovary 5–7 mm, glabrous. Dorsal sepal oblong, 4–6 × 1.5–2 mm, apex obtuse; lateral sepals oblong, slightly oblique, ca. 5 × 2 mm, apex obtuse to acute. Petals suboblong-spatulate, ca. 3.5 × 1.2 mm, apex obtuse; lip subglobose, 4–5.5 × 3.5–5 mm, outer surface somewhat carinate, inner surface pubescent at base, 2-spurred, apex obtuse to slightly apiculate; spurs parallel, straight or slightly curved downward, cylindric, 3.5–6 mm, slender. Column erect, 2–3.5 mm. Fl. Jul–Sep, fr. Nov.

• Open forests, rocky places; 2000–3700 m. SW Sichuan, C and NW Yunnan.