

4. PAPHIOPEDILUM Pfitzer, Morph. Stud. Orchideenbl. 11. 1886, nom. cons.

兜兰属 *dou lan shu*

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Cordula Rafinesque; *Stimegas* Rafinesque.

Plants terrestrial, lithophytic, or epiphytic. Rhizome inconspicuous or short, rarely stoloniferous, with glabrous or hairy roots. Stem short, enclosed in distichous leaf bases, rarely elongated. Leaves usually basal, 3–7, distichous, conduplicate toward base; blade abaxially pale green or sometimes spotted or flushed with purple at base or throughout, adaxially uniformly green or tessellated with dark and light green, narrowly elliptic to suboblong. Scape suberect to arching, terminating in a solitary flower or a several- to many-flowered inflorescence; peduncle usually hairy; floral bracts conduplicate; ovary 1-locular. Flowers large, showy, variable in color. Dorsal sepal often large, margin sometimes recurved; lateral sepals usually fused to form a synsepal. Petals various in shape, suborbicular to spatulate; lip deeply pouched and inflated, globose, ellipsoid, or ovoid, basal portion narrowed and with incurved lateral lobes, hairy at inner bottom. Column short, with 2 lateral fertile stamens, a terminal staminode above, and a stigma below; anthers 2-locular, with very short filament; pollen powdery or glutinous; staminode varying in shape; stigma papillate and inconspicuously 3-lobed. Fruit a capsule.

About 80–85 species: tropical Asia to the Pacific islands, with some species extending to subtropical areas; 27 species (two endemic) in China.

- 1a. Lip subglobose, ellipsoid, or ovoid, apical margin involute, usually with a rather short basal claw.
- 2a. Lip usually ellipsoid or ovoid, longer than broad; dorsal sepal broader than petals.
 - 3a. Dorsal sepal and petals with a central longitudinal stripe composed of brown-red spots; staminode with caudate apex 1.5–2 mm 9. *P. wenshanense*
 - 3b. Dorsal sepal and petals without a central stripe as above; staminode lacking a caudate apex as above.
 - 4a. Flower yellowish to yellow; dorsal sepal and petals with maroon speckles 0.5–1 mm in diam. 7. *P. concolor*
 - 4b. Flower white or ivory, sometimes yellowish; dorsal sepal and petals with maroon spots 1.5–2 mm in diam. 8. *P. bellatulum*
- 2b. Lip usually subglobose, nearly as long as broad; dorsal sepal narrower than or ca. as broad as petals.
 - 5a. Leaves uniformly green, very rarely obscurely tessellated with dark and light green adaxially.
 - 6a. Flower white with a yellowish lip; staminode trullate, with a deep longitudinal groove centrally, 9–10 mm wide, yellow, strongly veined with red 5. *P. emersonii*
 - 6b. Flowers dull cream-colored, sometimes flushed at base with purple; staminode broadly obovate-triangular, nearly flat, 18–22 mm wide, cream-colored, heavily veined with red, and with a yellow tip 6. *P. hangianum*
 - 5b. Leaves distinctly tessellated with dark and light green adaxially.
 - 7a. Dorsal sepal apple-green or rarely yellowish green or greenish; scape usually 30–50(–65) cm 1. *P. malipoense*
 - 7b. Dorsal sepal not apple-green or yellowish green; scape usually 15–25(–30) cm.
 - 8a. Plants not stoloniferous; dorsal sepal and petals white, scarcely or obscurely spotted and veined with pale pink, particularly on dorsal surface 4. *P. delenatii*
 - 8b. Plants stoloniferous; dorsal sepal and petals yellow or whitish and conspicuously veined with red-purple.
 - 9a. Sepals, petals, and lip yellow, lip not much larger than synsepal 2. *P. armeniacum*
 - 9b. Sepals and petals white, strongly marked with purple on veins, lip much larger than synsepal, pink or rarely white 3. *P. micranthum*
- 1b. Lip helmet-shaped or slipper-shaped, lacking an involute apical margin and with a long basal claw.
 - 10a. Leaves tessellated with dark and light green adaxially; lip tuberculate on incurved lateral lobes.
 - 11a. Petals heavily spotted with blackish maroon over whole adaxial surface 26. *P. wardii*
 - 11b. Petals without or sometimes with blackish maroon speckles in basal half or a few blackish warts scattered.
 - 12a. Leaves densely spotted with purple abaxially; lip and staminode distinctly green veined 27. *P. venustum*
 - 12b. Leaves pale green abaxially or sometimes marked with purple at abaxial base; lip and staminode not green veined.
 - 13a. Leaves usually obscurely tessellated with dark and light green adaxially, and marked with purple at abaxial base; petals spatulate, with a few warts along upper margin of basal half 24. *P. appletonianum*
 - 13b. Leaves usually distinctly tessellated with green and whitish green adaxially, not marked with purple abaxially; petals suboblong or oblong-elliptic, usually with blackish maroon speckles in basal half 25. *P. purpuratum*

- 10b. Leaves uniformly green adaxially; lip not tuberculate on incurved lateral lobes.
- 14a. Inflorescence 2–6-flowered; petals more than $2 \times$ as long as lip.
- 15a. Ovary glabrous; perianth persistent until fruiting 10. *P. dianthum*
- 15b. Ovary densely pubescent; perianth deciduous after pollination 11. *P. parishii*
- 14b. Inflorescence 1- or very rarely 2-flowered; petals less than $2 \times$ as long as lip.
- 16a. Leaves rigid, leathery-succulent, usually 7–10(–12.5) cm; synsepal suborbicular; flowers yellow or ochre-yellow, dorsal sepal with a white margin 18. *P. helenae*
- 16b. Leaves neither rigid nor leathery-succulent, usually (8–)10–40 cm; synsepal ovate to elliptic; flowers not as above.
- 17a. Flower with 3 irregular longitudinal maroon bars on dorsal sepal and 2 similar bars on petals 22. *P. tigrinum*
- 17b. Flower without maroon bars as above.
- 18a. Dorsal sepal white with a maroon midvein; staminode convolute on basal margin and appearing like a pair of eyes 23. *P. spicerianum*
- 18b. Dorsal sepal not colored as above; staminode without convolute basal margin as above.
- 19a. Plants with a long and stout rhizome more than 8×1 cm 16. *P. areeanum*
- 19b. Plants lacking a long rhizome as above.
- 20a. Staminode subsquare, with a glossy convex center, lacking a distinct umbo; petals with dense blackish maroon speckles in basal half; lip \pm puberulent on outer surface 12. *P. hirsutissimum*
- 20b. Staminode obovate, with a distinct umbo centrally; petals without spots or with purple to dark maroon spots in basal half; lip glabrous on outer surface.
- 21a. Dorsal sepal very broad, 4.6–6.7 cm wide, pinkish to white, usually with reddish veins; staminode white 13. *P. charlesworthii*
- 21b. Dorsal sepal less than 4.5 cm wide, not colored as above; staminode not white.
- 22a. Leaves 8–19 \times 0.7–1.8 cm; petals 3–4 cm.
- 23a. Dorsal sepal and petals with large maroon spots; petals 14–18 mm wide 19. *P. henryanum*
- 23b. Dorsal sepal and petals without large maroon spots; petals 7–10 mm wide.
- 24a. Petals undulate at margin; staminode with a yellow umbo in central or upper part 15. *P. barbigerum*
- 24b. Petals strongly undulate at margin; staminode with a green umbo in lower part 17. *P. tranlienianum*
- 22b. Leaves (15–)20–40 \times 2–4 cm; petals 5–6 cm.
- 25a. Petals 1.5–2 cm wide, with same color on both sides of midvein, apical half slightly broader than or nearly as broad as basal half; dorsal sepal finely spotted with black 14. *P. insigne*
- 25b. Petals 2–4.5 cm wide, with different color on each side of midvein, apical half more than $2 \times$ as broad as basal half; dorsal sepal unspotted or somewhat confluent-spotted with blackish maroon.
- 26a. Peduncle shortly hairy; dorsal sepal white, often tinged with pale green or pale yellow toward its base; petals 2–2.5 cm wide 20. *P. gratixianum*
- 26b. Peduncle long hairy; dorsal sepal pale green to pale yellow, central area deep maroon and deeper striped; petals 2.2–4.5 cm wide 21. *P. villosum*
- 1. *Paphiopedilum malipoense* S. C. Chen & Z. H. Tsi, Acta Phytotax. Sin. 22: 119. 1984.**
- 麻栗坡兜兰 ma li po dou lan
- Plants terrestrial or lithophytic, with a short rhizome. Leaves 4–7, distichous; blade abaxially pale green, often spotted or marked in varying degrees with purple, adaxially tes-

abaxially white villous; pedicel and ovary 4–6.5 cm, white villous. Flower slightly scented, 5–10 cm in diam.; dorsal sepal, synsepal, and petals apple-green or very rarely yellowish green, veined or slightly spotted with brownish purple; lip pale yellow-green or rarely whitish green obscurely spotted with brownish purple adaxially; staminode white, apical half blackish purple or slightly veined with purplish. Dorsal sepal ovate to ovate-lanceolate, 3.3–7 × 1–4.5 cm, abaxially white villous, adaxially sparsely white puberulent, ciliate, acuminate at apex; synsepal similar to dorsal sepal, slightly shorter and broader. Petals narrowly oblong to broadly ovate, 3.5–7 × 0.6–5 cm, both surfaces sparsely puberulent, adaxially white villous toward base, ciliate, apex acute-obtuse; lip subglobose to sub-ellipsoid, 1.5–5 × 1–5 cm, outside puberulent, apical margin involute. Staminode suboblong to broadly ovate, 8–14 × 4–15 mm, abaxially carinate, ciliate along basal margin, apex truncate. Fl. Jan–Apr.

Grassy slopes, humus-rich soil, rocky and well-drained places, forests and thickets in limestone areas; 500–2000 m. SW Guangxi, SW Guizhou, SE Yunnan [N Vietnam].

- 1a. Leaf blade heavily spotted with purple abaxially; staminode deep purple to black-purple in apical half 1a. var. *malipoense*
- 1b. Leaf blade not or sparsely marked with purple abaxially; staminode green to whitish, often veined with purple-red in apical half.
 - 2a. Petals 2.5–4 cm wide; lip subglobose, 3–4 cm in diam. 1b. var. *jackii*
 - 2b. Petals 0.6–2.5 cm wide; lip not subglobose, 1–3 cm in diam.
 - 3a. Roots densely pubescent; petals 1.5–2.5 cm wide; lip hooked at apex; staminode 1–1.3 cm wide ... 1c. var. *hiepii*
 - 3b. Roots sparsely pubescent or glabrescent; petals 0.6–0.7 cm wide; lip subtruncate at apex; staminode 0.4–0.5 cm wide 1d. var. *angustatum*

1a. Paphiopedilum malipoense var. malipoense

麻栗坡兜兰(原变种) ma li po dou lan (yuan bian zhong)

Leaf blade heavily spotted with purple abaxially. Petals 3–5 cm wide; lip subglobose, 3–5 cm in diam. Staminode white, deep purple to black-purple in apical half. Fl. Jan–Apr. 2n = 26.

Grassy slopes or humus-rich soil in forests and thickets in limestone areas; 800–1600 m. SW Guangxi, SW Guizhou, SE Yunnan [N Vietnam].

1b. Paphiopedilum malipoense var. jackii (H. S. Hua) Averyanov, Orchids 66: 153. 1997.

浅斑兜兰 qian ban dou lan

Paphiopedilum jackii H. S. Hua, Orchidee (Hamburg) 46: 114. 1996.

Leaf blade light green, sparsely spotted with purple abaxi-

ally. Petals 2.5–4 cm wide; lip subglobose, 3–4 cm in diam. Staminode white, veined with pale purple in apical half. Fl. Feb–Mar.

Rocky and well-drained places in forests in limestone areas; 600–2000 m. SE Yunnan [N Vietnam].

1c. Paphiopedilum malipoense var. hiepii (Averyanov) P. J. Cribb, Gen. Paphiopedilum, ed. 2, 88. 1998.

钩唇兜兰 gou chun dou lan

Paphiopedilum hiepii Averyanov, Orchids 67: 261. 1998; *P. jackii* var. *hiepii* (Averyanov) Koopowitz.

Roots densely pubescent. Leaf blade light green, slightly marked with purple abaxially. Petals 1.5–2.5 cm wide; lip narrowly globose, 1–2.5 cm in diam., hooked at apex. Staminode white, slightly veined with pale purple, 1–1.3 cm wide. Fl. Mar–Apr.

Rocky places in forests or thickets in limestone areas; 500–1500 m. SE Yunnan [N Vietnam].

1d. Paphiopedilum malipoense var. angustatum (Z. J. Liu & S. C. Chen) Z. J. Liu & S. C. Chen, Acta Bot. Yunnan. 24: 196. 2002.

窄瓣兜兰 zhai ban dou lan

Paphiopedilum angustatum Z. J. Liu & S. C. Chen, Acta Phytotax. Sin. 38: 464. 2000.

Roots sparsely pubescent or glabrescent. Leaf blade light green, slightly marked with purple abaxially. Petals 0.6–0.7 cm wide; lip narrowly globose, ca. 1 cm in diam., subtruncate at apex. Staminode white, slightly veined with pale purple in apical half, 0.4–0.5 cm wide. Fl. Feb–Mar.

- Forests on limestone slopes. SE Yunnan.

2. Paphiopedilum armeniacum S. C. Chen & F. Y. Liu, Acta Bot. Yunnan. 4: 163. 1982.

杏黄兜兰 xing huang dou lan

Paphiopedilum armeniacum var. *mark-fun* Fowlie; *P. armeniacum* f. *markii* (O. Gruss) Braem; *P. armeniacum* var. *markii* O. Gruss; *P. armeniacum* var. *parviflorum* Z. J. Liu & J. Yong Zhang; *P. armeniacum* var. *undulatum* Z. J. Liu & J. Yong Zhang.

Plants terrestrial or lithophytic, with 1 to several creeping stolons more than 10 cm × 1.5–2.5 mm. Leaves 5–7, distichous; blade abaxially densely purple spotted and carinate, adaxially tessellated with dark and light green, oblong or linear-oblong, 6–12 × 1.8–2.3 cm, thickly leathery, margin serrulate, apex acute or sometimes tridenticulate. Scape erect, terminating in 1 or rarely 2 flowers; peduncle yellowish green, densely marked with purple, 13–28 cm, with white short hairs; floral bract yellowish green, marked with purple, ovate, conduplicate, 1.4–1.8 cm, abaxially puberulent toward base; pedicel and ovary (2–)3–4.5 cm, shortly hairy. Flower (3–)7–9 cm in diam., pale yellow to golden yellow, sometimes slightly flushed with pale green, with pale maroon veins on staminode, usually with many rows of maroon speckles on inner bottom of lip. Dorsal

sepal ovate, 1.8–4.8 × (0.8–)1.4–2.2 cm, adaxially pubescent toward base, minutely ciliate, acute at apex; synsepal similar to dorsal sepal, slightly smaller, obtusely bicarinate abaxially. Petals broadly ovate-elliptic to suborbicular, (1.5–)2.8–5.3 × 0.9–4.8 cm, adaxially white villous toward base, ciliate, slightly undulate at margin, rounded at apex; lip subglobose or somewhat flattened globose, (1–)4–6 × (0.5–)3.5–4 cm, apical margin involute. Staminode broadly ovate or ovate-orbicular, (5–)12–20 × (5–)12–20 mm, margin recurved, apex acute. Fl. Feb–Apr.

• Rocky and well-drained places or in crevices of rocks on woody or bushy slopes in limestone areas; 1400–2100 m. W Yunnan (along Nu Jiang).

3. *Paphiopedilum micranthum* Tang & F. T. Wang, Acta Phytotax. Sin. 1: 56. 1951.

硬叶兜兰 ying ye dou lan

Paphiopedilum globulosum Z. J. Liu & S. C. Chen; *P. micranthum* f. *alboflavum* (Braem) Braem; *P. micranthum* var. *alboflavum* Braem; *P. micranthum* f. *glanzeanum* (O. Gruss & Roeth) O. Gruss & Roeth; *P. micranthum* var. *glanzeanum* O. Gruss & Roeth; *P. micranthum* var. *oblatum* Z. J. Liu & J. Yong Zhang.

Plants terrestrial or lithophytic, with 1 to several creeping stolons more than 10 cm, 1.5–2.5 mm in diam. Leaves 3–5, distichous; blade abaxially densely purple spotted and carinate, adaxially tessellated with dark and light green, oblong to narrowly elliptic, 6–12 × 1.5–3.4 cm, thickly leathery, apex acute or slightly bilobulate. Scape erect, terminating in 1 or rarely 2 flowers; peduncle red-brown or yellowish green, heavily marked with red-brown, (5–)10–23 cm, white villous; floral bract yellowish green, marked with purple or nearly purple-brown, ovate, conduplicate, 1.1–1.4 cm, abaxially sparsely villous; pedicel and ovary 3.5–5 cm, white villous. Flower showy, 3.5–7 cm in diam.; dorsal sepal, synsepal, and petals yellowish to whitish, sometimes flushed with rose-pink, veined with red-purple; lip rose-pink, pale pink, or white, with purple spots at inner bottom; staminode white with purplish red speckles throughout and a yellow flush in apical half. Dorsal sepal ovate or broadly ovate, 1.5–2.5(–3.2) × 1.3–2.5 cm, abaxially white villous, minutely ciliate, acute at apex; synsepal similar to dorsal sepal, sometimes slightly smaller, obtusely bicarinate abaxially. Petals broadly ovate to suborbicular, (2–)2.5–3.2 × (1.5–)2.6–3.5 cm, abaxially slightly puberulent, adaxially white villous toward base, minutely ciliate, rounded at apex; lip ovoid-globose or ellipsoid-globose, (2.2–)5–10 × (1–)4–5.5 cm, apical margin involute. Staminode elliptic, longitudinally conduplicate, 10–15 × 7–8 mm, apex acute and slightly mucronate. Fl. Mar–May. $2n = 26$.

Rocky and bushy places or crevices of rocks in forests in limestone areas; 1000–1700 m. SW Guangxi, S and SW Guizhou, SE Yunnan [N Vietnam].

Paphiopedilum × *fanaticum* Koopowitz & Hasegawa, a hybrid of this species and *P. malipoense*, has been reported (Orchid Advocate 18(2): 50. 1992), and many infraspecific taxa have been proposed based on color variation. However, most were not validly published.

4. *Paphiopedilum delenatii* Guillaumin, Bull. Soc. Bot. France

71: 554. 1924.

德氏兜兰 de shi dou lan

Cypripedium delenatii (Guillaumin) C. H. Curtis; *Paphiopedilum xichouense* Z. J. Liu & S. C. Chen.

Plants terrestrial. Leaves 4–6, distichous; blade abaxially heavily purple spotted and carinate, adaxially tessellated with dark and light green and marked with golden pedate stripes toward apex, oblong, 8–12 × 3.5–4.2 cm, base ciliate, apex obtuse. Scape suberect, terminating in 1 or 2 flowers; peduncle purple-brown, 14–22 cm, densely white hirsute; floral bracts pale green spotted with purple-brown, ovate, conduplicate, ca. 1.5 cm, abaxially hairy; pedicel and ovary 4–5 cm, white hirsute. Flowers 6–8 cm wide; dorsal sepal, synsepal, and petals white, obscurely spotted and veined with pale pink particularly on abaxial surface; lip pink to pale purple-red; staminode whitish marked with purple-red in apical half and pale yellow centrally. Dorsal sepal ovate, 2.7–3.3 × 1.7–2.5 cm, pubescent on both surfaces, subacute at apex; synsepal similar to dorsal sepal, slightly shorter. Petals broadly elliptic, 3.5–4.4 × 2.7–3.7 cm, rounded at apex; lip subglobose, 3–3.8 × 2.2–2.8 cm, puberulent outside, apical margin involute. Staminode rhombic-ovate, 1.6–2 × 1.6–1.8 cm, ciliate. Fl. Mar–Apr. $2n = 26$.

Shrubby and grassy places in limestone areas; 1000–1300 m. N Guangxi (N of Liuzhou), SE Yunnan (Funing, Malipo, Xichou) [Vietnam].

5. *Paphiopedilum emersonii* Koopowitz & P. J. Cribb, Orchid Advocate 12(3): 86. 1986.

白花兜兰 bai hua dou lan

Paphiopedilum emersonii f. *album* O. Gruss & Petchleung.

Plants lithophytic. Leaves 5–7, distichous; blade abaxially pale green and with purple-red spots toward base, adaxially uniformly green or sometimes very obscurely tessellated with deep and light green, narrowly elliptic, 8–23 × 2.5–4(–5) cm, leathery, ciliate along basal margin. Scape erect, terminating in a solitary flower; peduncle green or yellowish green, 8–15 cm, white pubescent, usually with a greenish sheath at base; floral bract whitish, usually flushed with brown, elliptic, conduplicate, 2.8–3.8 cm, pubescent, ciliate; pedicel and ovary 2.5–3.5 cm, greenish white, white pubescent. Flower slightly fragrant, 8–9(–10) cm in diam.; dorsal sepal, synsepal, and petals white, sometimes flushed with pale purple-red toward adaxial base of petals; lip yellowish to whitish, with deep purple spots inside; staminode yellow or whitish yellow, with pale red-brown markings. Dorsal sepal elliptic-ovate, 3–5 × 2–3.5 cm, both surfaces puberulent, margin recurved, apex obtuse; synsepal broadly elliptic or suborbicular, 3–4.8 × 3–4.8 cm, both surfaces puberulent, apex obtuse. Petals obovate-elliptic to suborbicular, 3.5–6 × 2.5–5 cm, both surfaces sparsely puberulent, adaxially villous toward base, apex obtuse or rounded; lip subglobose or obovoid-globose, 3.5–4.5 × 2–3 cm, apical margin involute and slightly grooved along veins. Staminode trullate, appearing like a crocodile head, 15–20 × 9–10 mm, with a deep longitudinal groove centrally, obtuse at apex. Fl. Apr–Jun. $2n = 26$.

Shaded cliffs or crevices of steep rocks in evergreen broad-leaved forests or thickets in limestone areas; 300–800 m. Guangxi, S Guizhou [N Vietnam].

Paphiopedilum ×glanzii O. Gruss & Perner (Orchidee (Hamburg) 57(3): 315. 2006), a natural hybrid between this species and *P. micranthum*, was described recently from China (without precise locality).

6. *Paphiopedilum hangianum* Perner & O. Gruss, *Orchidee* (Hamburg) Suppl. 6: 3. 1999.

绿叶兜兰 lü ye dou lan

Paphiopedilum hangianum f. *album* O. Gruss & Petchleung; *P. singchii* Z. J. Liu & J. Yong Zhang.

Plants lithophytic. Leaves 4–6, distichous, spreading horizontally; blade abaxially pale green and carinate, adaxially uniformly deep green and glossy, narrowly oblong, 12–28 × 3.5–5.9 cm, leathery, basal margin purple ciliate, apex obtuse. Scape suberect or slightly arching, terminating in a solitary flower; peduncle yellowish green with purple speckles, 8–20 cm, densely white pubescent; floral bract yellowish green with purplish speckles, ovate-elliptic, conduplicate, 4.5–6 cm, abaxially puberulent, ciliate; pedicel and ovary green with purplish speckles, 3–4.5 cm, densely puberulent. Flower scented, 11–14 cm in diam., yellowish, obscurely with greenish reticulate veins, flushed with purple toward base of petals, with dense purple spots at inner bottom of lip and many purple irregular transverse stripes or net on adaxial surface of staminode. Dorsal sepal suberect to curving forward over lip, broadly ovate-elliptic or elliptic, 4.8–6.2 × 3–4.6 cm, both surfaces puberulent, abaxially carinate, minutely ciliate, acute at apex; synsepal broadly elliptic, 4.8–6.4 × 3.6–5.7 cm, both surfaces puberulent, minutely ciliate, obtuse and slightly bilobulate at apex. Petals broadly obovate-elliptic, slightly oblique, 5.5–7.3 × 3.5–6.4 cm, both surfaces puberulent, adaxially densely white villous toward base, minutely ciliate; lip subglobose, 4–5 × ca. 3.4 cm, outside glabrous, apical margin involute. Staminode broadly obovate-triangular, 1.6–2.1 × 1.8–2.2 cm, abruptly narrowed at base into a claw, obtuse-rounded at apex. Fl. Apr–May.

Very wet but well-drained rocky places or crevices of rocks, usually behind waterfalls; 600–800 m. S Yunnan (Jinping) [N Vietnam].

Paphiopedilum hangianum f. *album* was described based on a cultivated plant with a pure yellowish flower (*Orchidee* (Hamburg) 53: 384. 2002). Its origin is unknown.

7. *Paphiopedilum concolor* (Lindley ex Bateman) Pfitzer in Engler & Prantl, *Nat. Pflanzenfam.* 2(6): 84. 1888.

同色兜兰 tong se dou lan

Cypripedium concolor Bateman, *Bot. Mag.* 91: ad t. 5513. 1865; *Cordula concolor* (Lindley ex Bateman) Rolfe; *Paphiopedilum concolor* var. *dahuaense* Z. J. Liu & J. Yong Zhang; *P. concolor* var. *immaculatum* Z. J. Liu & J. Yong Zhang; *P. wenshanense* Z. J. Liu & J. Yong Zhang f. *album* O. Gruss & Petchleung.

Plants lithophytic or terrestrial. Leaves 4–6, distichous; blade abaxially purple or densely marked with purple speckles, adaxially tessellated with dark and whitish or light green, ob-

long or oblong-elliptic, 7–21 × 3.5–5.5(–7.5) cm, leathery, rounded and minutely bilobulate at apex. Scape suberect or arching, terminating in 1 or 2(or 3) flowers; peduncle green, heavily spotted purple, 5–7(–8) cm, densely white pubescent; floral bract green, ovate, conduplicate, 1–3(–4) × 1–2 cm, abaxially with purple speckles and along midvein hairy, ciliate; pedicel and ovary 3–4.5 cm, densely white pubescent. Flowers slightly scented, 5–7 cm in diam., usually yellowish to ivory-white ± finely spotted with purple or brown-purple throughout. Dorsal sepal broadly ovate, 2.5–4.2 × 2.4–4.4 cm, abaxially slightly puberulent on midvein, ciliate, apex obtuse to retuse; synsepal similar to dorsal sepal, slightly smaller. Petals obliquely elliptic to rhombic-elliptic, 3–5 × 1.8–3.1 cm, both surfaces very minutely puberulent, ciliate, rounded at apex; lip ellipsoid to ovoid, 3.5–4.5 cm; pouch 2.2–3 × 1.4–1.7 cm, outside very minutely puberulent, apical margin incurved. Staminode ovate to ovate-triangular, 10–12 × 8–11 mm, basal margin sometimes minutely ciliate. Fl. May–Aug. $2n = 26$.

Crevices of shaded cliffs or rocky and well-drained places in limestone areas; 300–1400 m. W Guangxi, S Guizhou, S Yunnan [Cambodia, Laos, Myanmar, Thailand, Vietnam].

Paphiopedilum concolor is a widespread species very variable in leaf markings and floral morphology and coloring. Based on these variations, many varieties were described recently, including *P. concolor* var. *dahuaense* and *P. concolor* var. *immaculatum* from Guangxi (*Acta Bot. Yunnan.* 22: 393. 2000). *Paphiopedilum wenshanense* f. *album* (*Orchidee* (Hamburg) 53: 383. 2002) seems to be the same taxon as *P. concolor* var. *dahuaense*.

8. *Paphiopedilum bellatulum* (H. G. Reichenbach) Stein, *Orchideenbuch*, 456. 1892.

巨瓣兜兰 ju ban dou lan

Cypripedium bellatulum H. G. Reichenbach, *Gard. Chron.*, ser. 3, 3: 648. 1888; *Cordula bellatula* (H. G. Reichenbach) Rolfe.

Plants lithophytic or terrestrial. Leaves 4 or 5, distichous; blade abaxially heavily purple spotted and carinate, adaxially tessellated with dark and pale green or green and whitish green, sometimes dark green and slightly mottled with whitish green, oblong-elliptic or narrowly elliptic, 11–18 × 2.9–4.2(–6) cm, apex acute or obtuse and unequally bilobulate. Scape arching, terminating in 1 or rarely 2 flowers; peduncle deep purple or green spotted with purple, 2.5–5 cm, white pubescent; floral bract green, spotted with purple, ovate or elliptic, conduplicate, 2–2.6 × 1.5–2 cm, abaxially ± hairy on midvein, minutely ciliate; pedicel and ovary 3–3.5 cm, white pubescent. Flower white or rarely yellowish white, 6–8 cm in diam.; dorsal sepal and petals usually with large maroon spots 1.5–2 mm in diam.; synsepal, lip, and staminode with smaller spots. Dorsal sepal broadly ovate, 2.6–3.5 × 3.5–5 cm, slightly concave, minutely ciliate, rounded, slightly mucronate or retuse at apex; synsepal ovate-orbicular, 2–3 × 2–3 cm, concave, minutely ciliate. Petals broadly elliptic or broadly ovate-elliptic, 4.5–6 × 3–5 cm, adaxially hairy toward base, minutely ciliate, rounded at apex; lip ellipsoid-ovoid, usually 3–3.5 × 1.5–2 cm, apical margin incurved. Staminode suborbicular or subsquare, 8–10 × 8–10 mm, usually slightly tridentate at apex. Fl. Apr–Aug. $2n =$

26.

Shaded cliffs or rocky and well-drained places in forests in limestone areas; 1000–1800 m. W Guangxi, SW Guizhou, S Yunnan [Myanmar, Thailand].

9. *Paphiopedilum wenshanense* Z. J. Liu & J. Yong Zhang, Acta Bot. Yunnan. 22: 391. 2000.

文山兜兰 wen shan dou lan

Paphiopedilum concobellatum Hort.

Plants terrestrial. Leaves 4 or 5, distichous; blade abaxially purple except for green and purple-spotted base, adaxially tessellated with dark and pale green and somewhat mottled with dull whitish, subelliptic, 5–10 × 3.5–4.5 cm, obtuse-rounded and unequally bilobed at apex. Scape suberect, terminating in 1–3 flowers; peduncle green spotted with purple-brown, 2.5–3.5 cm, pubescent; floral bracts ovate-elliptic, duplicate, 1.6–2 × 1.5–2 cm, abaxially hairy on midvein, minutely ciliate; pedicel and ovary 4–4.5 cm, hairy. Flowers whitish or yellow-white, 5–7 cm in diam.; dorsal sepal and petals with brown-red spots 2–2.5 mm in diam., and each with a central longitudinal stripe composed of brown-red spots; synsepal, lip, and staminode with smaller brown-red spots. Dorsal sepal broadly ovate to suborbicular, 2.5–3.5 × 2.5–3.5 cm, obtuse-rounded at apex; synsepal ovate, 2–2.5 × ca. 2 cm. Petals broadly elliptic or oblong-elliptic, 3.5–4 × 2.5–3 cm, adaxially hairy toward base; lip ellipsoid, 3.5–4 × 2–2.5 cm, white puberulent outside, apical margin narrowly incurved. Staminode broadly elliptic, 8–9 × 8–9 mm, with a caudate apex 1.5–2 mm. Fl. May.

• Densely shrubby and grassy slopes in limestone areas. SE Yunnan.

10. *Paphiopedilum dianthum* Tang & F. T. Wang, Bull. Fan Mem. Inst. Biol. Bot. 10: 24. 1940.

长瓣兜兰 chang ban dou lan

Paphiopedilum parishii (H. G. Reichenbach) Stein var. *dianthum* (Tang & F. T. Wang) Karasawa & Saito.

Plants lithophytic. Leaves 4–6, distichous; blade abaxially pale green and carinate, adaxially uniformly dark green, usually 15–30 × 2.7–5 cm, thickly leathery, obtuse-rounded and slightly unequally bilobulate at apex. Scape arching to suberect, 30–80 cm; peduncle green, glabrous or very sparsely pubescent; raceme (1 or) 2–5-flowered; floral bracts greenish or yellowish green, broadly ovate, conduplicate, 1.3–2.9 cm, glabrous; pedicel and ovary green, 4–5 cm, glabrous. Flowers 8–10 cm in diam., persistent until fruiting; dorsal sepal white tinged and veined with green toward base; synsepal pale green-yellow or greenish white with darker green veins; petals whitish green or brownish green, with darker stripes; lip yellowish brownish with darker veins; staminode white with a dark green center. Dorsal sepal subelliptic or obovate-elliptic, 3–5.5 × 1.8–2.5 cm, adaxially shortly hirsute toward base, sometimes very slightly puberulent on both surfaces, basal margin recurved, apex shortly acuminate; synsepal similar to dorsal sepal, slightly shorter and broader. Petals pendulous, strongly twisted, linear-lanceolate or linear-tapering, 7–10(–12) × 0.7–1 cm, often with a few blackish warts along lower margin or toward adaxial base, mi-

nutely papillose-puberulent toward adaxial base and apex; warts often with a cluster of long hairs, sometimes becoming very small or disappearing, replaced by a few clusters of long hairs; lip helmet-shaped, 4–5 cm; pouch 2–3 × 2–2.5 cm, pointed at apex. Staminode obcordate or obovate, 10–12 × 7–9 mm, carinate abaxially, slightly puberulent toward adaxial base, with a small umbo near base, minutely ciliate, with a deep sinus or 3-lobed at apex. Fl. Jul–Oct. $2n = 26$.

Steep rocks in evergreen broad-leaved forests or shaded limestone cliffs; 1000–2300 m. SW Guangxi, SW Guizhou, SE Yunnan [N Vietnam].

11. *Paphiopedilum parishii* (H. G. Reichenbach) Stein, Orchideenbuch, 479. 1892.

飘带兜兰 piao dai dou lan

Cypripedium parishii H. G. Reichenbach, Flora 52: 322. 1869; *Cordula parishii* (H. G. Reichenbach) Rolfe; *Selenipedium parishii* (H. G. Reichenbach) André.

Plants epiphytic. Leaves 5–7, distichous; blade pale green or yellowish green abaxially, uniformly dark green adaxially, narrowly elliptic, (8–)20–40 × 2.7–3.5 cm, thickly leathery, rounded and slightly unequally bilobulate at apex. Scape arching or suberect, 28–35 cm; peduncle green, densely white pubescent; raceme 3–5-flowered; floral bracts green, broadly ovate-elliptic, conduplicate, 2.5–3 cm, glabrous; pedicel and ovary 3–4 cm, densely white pubescent. Flowers 8–10 cm in diam., deciduous after pollination; dorsal sepal and synsepal yellowish green to greenish with darker veins; petals pale yellow-green and spotted with blackish maroon in basal half, dark maroon along margin and in apical half; lip yellowish green or green, sometimes flushed purplish, with darker veins; staminode whitish with a dark green center. Dorsal sepal elliptic, 3–5 × 2–3 cm, adaxially puberulent toward base and apex, basal margin recurved, acute at apex; synsepal similar to dorsal sepal, slightly smaller, obtuse at apex. Petals decurved-pendulous, twisted particularly in apical half, linear-lanceolate or linear-tapering, 7–9.5 × 0.6–0.8(–1) cm, margin undulate in basal half, apex rounded, both surfaces ± puberulent, abaxially with several maroon spots or warts near or along lower or rarely also upper margin in basal half; warts usually with a cluster of hairs; lip helmet-shaped, 3–4 cm; pouch 1.5–2.5 × 1.5–2 cm. Staminode obcordate or obovate, 10–13 × 7–8 mm, with a deep sinus at apex and a small umbo near base, slightly puberulent at adaxial base. Fl. Jun–Jul. $2n = 26$.

Tree trunks or forks in broad-leaved forests; 1000–1100 m. S and SW Yunnan (Mengla, Gengma) [Laos, Myanmar, Thailand].

12. *Paphiopedilum hirsutissimum* (Lindley ex Hooker) Stein, Orchideenbuch, 470. 1892.

带叶兜兰 dai ye dou lan

Cypripedium hirsutissimum Lindley ex Hooker, Bot. Mag. 83: ad t. 4990. 1857; *Cordula esquirolei* (Schlechter) Hu; *C. hirsutissima* (Lindley ex Hooker) Rolfe; *Paphiopedilum chiwuanum* Tang & F. T. Wang; *P. esquirolei* Schlechter; *P. esquirolei* var. *chiwuanum* (Tang & F. T. Wang) Braem & Chiron; *P. hirsutissimum* var. *chiwuanum* (Tang & F. T. Wang)

Cribb; *P. hirsutissimum* var. *esquirolei* (Schlechter) Karasawa & Saito; *P. saccopetalum* S. H. Hu.

Plants lithophytic or terrestrial. Leaves 5 or 6, distichous; blade abaxially usually without purple marks at base, adaxially uniformly dark green, lorate or linear, 23–44 × 1.4–2.2 cm, leathery, usually acuminate and tridenticulate at apex. Scape suberect or arching, usually terminating in a solitary flower; peduncle brown-purple, 13–24(–30) cm, densely long hairy; floral bract ovate, 8–15 mm, abaxially densely hairy, ciliate; pedicel and ovary 6–8.5 cm, pubescent. Flower 8–16 cm in diam., initially dorsal sepal curving forward and petals not undulate at margins and then dorsal sepal erect and petals elongating and undulate along basal margin; dorsal sepal and synsepal dark brown, with yellowish or greenish margin; petals yellowish, with dense purple-brown speckles in basal half and purplish rose in apical half; lip yellowish to greenish, with dense brownish or purplish rose speckles; staminode dark brown with narrow yellowish margin and 2 large whitish spots and a yellowish blotch centrally. Dorsal sepal broadly ovate or ovate-elliptic, 3.7–4.4 × 2.6–3.5 cm, abaxially sparsely pubescent mainly on veins, ciliate, undulate at margin, obtuse or emarginate at apex; synsepal similar to dorsal sepal, slightly narrower. Petals often slightly twisted toward apex, spatulate, (4–)6–8 × 1.5–2.5 cm, both surfaces slightly or scarcely puberulent, basal half undulate at margin, ciliate, rounded or subtruncate at apex; lip helmet-shaped, 3–5 cm; pouch 2.5–3(–3.5) × 1.5–2.5 cm, slightly puberulent outside particularly along margin and veins. Staminode subsquare, 8–10 × 8–10 mm, adaxially convex, apex obtuse. Fl. Apr–May. $2n = 26$.

Crevices on shaded cliffs or rocky and well-drained places in forests or thickets in limestone areas; 700–1500 m. N and W Guangxi, SW Guizhou, SE Yunnan [NE India, Laos, Thailand, N Vietnam].

Paphiopedilum × *grussianum* H. S. Hua (Orchidee (Hamburg) 49: 180. 1998), described from Guangxi, may be a hybrid of this species and *P. villosum* rather than of *P. dianthum* and *P. villosum*.

13. *Paphiopedilum charlesworthii* (Rolfe) Pfitzer, Bot. Jahrb. Syst. 19: 40. 1894.

红旗兜兰 hong qi dou lan

Cypripedium charlesworthii Rolfe, Orchid Rev. 1: 303. 1893; *Cordula charlesworthii* (Rolfe) Rolfe.

Plants terrestrial. Leaves 4 or 5, distichous; blade abaxially pale green and with blackish purple spots near base, adaxially uniformly green or sometimes very obscurely tessellated with dark and light green, linear-oblong, 14–16 × 1.5–2 cm, apex acute and unequally bilobulate. Scape erect, terminating in a solitary flower; peduncle 8–12 cm, green, mottled with purple-brown, shortly pubescent; floral bract green spotted or mottled with deep purple, subelliptic-obovate, conduplicate, 2.1–2.8 × 1.4–1.8 cm, minutely ciliate; pedicel and ovary 2.9–3.4 cm, densely pubescent, 3-ribbed. Flower 6–8 cm in diam.; dorsal sepal pink or pinkish white, with darker veins; synsepal greenish, veined with brownish; petals pale green-yellow, with dense brown reticulate venation; lip pale yellow-brown, with darker veins; staminode white. Dorsal sepal erect, suborbicular to transversely elliptic, 3.9–4.6 × 4.5–6.7 cm, abaxially minutely puberulent particularly on midvein, adaxially purple

hairy toward base, minutely ciliate, subtruncate or slightly mucronate at apex; synsepal elliptic-ovate, 3–3.5 × 1.6–2.3 cm, abaxially puberulent, minutely ciliate. Petals oblong-spatulate, 3.8–4.4 × 0.9–1.4 cm, adaxially purple villous toward base, ciliate, slightly undulate at margin; lip helmet-shaped, 3.4–4 cm; pouch 2.2–2.5 × 2–2.4 cm, with a very wide mouth. Staminode obovate, 9–10 × 8–9 mm, with a central umbo. Fl. Sep–Oct.

Rocky and humus-rich places in evergreen broad-leaved forests; 1300–1600 m. W Yunnan (W-facing slope of Gaoligong Shan) [Yunnan, Thailand].

14. *Paphiopedilum insigne* (Wallich ex Lindley) Pfitzer, Morph. Stud. Orchideenbl. 11. 1886.

波瓣兜兰 bo ban dou lan

Cypripedium insigne Wallich ex Lindley, Coll. Bot. ad t. 32. 1821; *Cordula insignis* (Wallich ex Lindley) Rafinesque.

Plants terrestrial. Leaves 5 or 6, distichous; blade abaxially pale green and with purple speckles toward base, adaxially uniformly deep green, narrowly elliptic or linear-oblong, 18–30 × 2.5–3.5 cm, leathery, obtuse and minutely tridenticulate at apex. Scape erect, terminating in a solitary flower; peduncle green-purple, 19–25 cm, densely purple pubescent; floral bract purple spotted, ovate-elliptic, conduplicate, 4–5.5 × 2–3 cm, glabrous; pedicel and ovary 5–6 cm, densely purple pubescent. Flower 7–10 cm in diam.; dorsal sepal greenish yellow in center, broadly white margined, with purple-brown spots; synsepal pale green-yellow, with purple-red or purple-brown spots and white margin; petals yellowish brown, with darker veins; lip yellow-brown or yellowish green, flushed and veined with brown, with a narrow greenish margin; staminode yellowish. Dorsal sepal broadly ovate or ovate-orbicular, 5–6 × 4–4.5 cm, abaxially pubescent, apical margin incurved, ciliate, obtuse at apex; synsepal ovate-elliptic, 3.8–5.5 × 1.8–3.5 cm, pubescent abaxially. Petals spatulate or oblong-spatulate, 4.9–5.5 × 1.2–2.2 cm, adaxially purple villous toward base, margin undulate, apex obtuse or slightly tridenticulate; lip helmet-shaped, 3.5–5 cm; pouch 2.5–3 × 1.5–2 cm. Staminode obovate, 9–10 × 8–9 mm, purple puberulent on both surfaces, with a central umbo. Fl. Oct–Dec. $2n = 10, 21, 24, 26, 27, 28, 36, 39, 40$.

Rocky and litter-rich places on grassy and bushy slopes; 1200–1600 m. NW Yunnan [NE India].

15. *Paphiopedilum barbigerum* Tang & F. T. Wang, Bull. Fan Mem. Inst. Biol. Bot. 10: 23. 1940.

小叶兜兰 xiao ye dou lan

Paphiopedilum barbigerum var. *lockianum* Averyanov; *P. insigne* (Wallich ex Lindley) Pfitzer var. *barbigerum* (Tang & F. T. Wang) Braem.

Plants lithophytic or terrestrial. Leaves 4–6, distichous; blade slightly paler and carinate abaxially, uniformly green or sometimes very obscurely tessellated dark and light green adaxially, linear, 12–19 × 0.7–1.3 cm, acute and usually minutely tridenticulate at apex. Scape suberect or arching, terminating in a solitary flower; peduncle brownish green, 10–14 cm, with dense purple-brown hairs; floral bract suboblong, 1.4–3.2(–3.6)

cm, pubescent toward abaxial base; pedicel and ovary 3–4.2 cm, densely pubescent. Flower 6–7(–8) cm in diam.; dorsal sepal white, with a green, red-brown, or blackish brown central area in basal half; synsepal usually whitish green; petals brownish with paler margin; lip brownish with yellowish margin; staminode yellowish with orange umbo. Dorsal sepal suborbicular, 2.8–3.4(–4.5) × 2.6–3(–4) cm, puberulent abaxially, basal margin usually recurved, apical margin incurved or strongly undulate, obtuse or retuse at apex; synsepal elliptic, 2.5–3.3(–4) × 1.4–1.8 cm, puberulent abaxially. Petals spatulate or narrowly oblong, 3–4(–5) × 1–1.3 cm, adaxially pilose toward base, sparsely ciliate, undulate at margin, obtuse at apex; lip helmet-shaped, 3.5–4 cm; pouch 2–2.5 × 1.5–2 cm, outside glabrous. Staminode obovate-obcordate, 6–10 × 7–10 mm, umbonate centrally. Fl. Sep–Oct.

Crevices of limestone cliffs, rocks or tree trunks in open forests; 800–1500 m. N and W Guangxi, S Guizhou, SE Yunnan [N Vietnam].

16. *Paphiopedilum arecanum* O. Gruss, Orchidee (Hamburg) 52: 645. 2001, pro hybr.

根茎兜兰 gen jing dou lan

Paphiopedilum rhizomatosum S. C. Chen & Z. J. Liu.

Plants terrestrial, with a straight rhizome 8–10 cm × 8–12 mm. Rhizomes stemlike, linking up with each other, with nodes 5–20 mm apart, usually with several tufts of leaves at summit. Leaf blade abaxially pale green and marked with purple toward base, adaxially uniformly dark green, narrowly oblong, 15–35 × 2.5–3.5 cm, usually slightly bilobulate at apex. Scape suberect, terminating in a solitary flower; peduncle greenish brown, 15–25 cm, pubescent; floral bract greenish, ovate, conduplicate, 3.7–4.2 × 2–2.2 cm, subglabrous; pedicel and ovary 5.5–6 cm, with dense purple-brown hairs. Flower 8–9 cm in diam.; dorsal sepal brownish green with broad white margin and brown stripes in basal half; synsepal pale yellow-green, obscurely with deeper veins; petals yellowish green with purple-brown veins; lip pale green-brown with darker veins; staminode yellowish. Dorsal sepal broadly elliptic, 4.9–5.5 × 3.5–3.7 cm, densely puberulent abaxially, purplish villous toward adaxial base, basal margin recurved, apex emarginate; synsepal ovate-oblong, 4.5–4.8 × 2.2–2.4 cm, purplish puberulent abaxially. Petals narrowly oblong-spatulate, 4.5–5.5 × 1.4–1.6 cm, ciliate, slightly undulate at margin, obtuse-acute at apex; lip helmet-shaped, 4–4.5 cm; pouch 2.4–2.8 × 1.8–2.1 cm. Staminode subovate, 13–14 × 11–12 mm, with a raised umbo centrally. Fl. Oct–Nov.

Forests. W Yunnan (Gaoligong Shan) [Myanmar].

This species was described as a hybrid between *Paphiopedilum villosum* and *P. barbigerum*.

17. *Paphiopedilum tranlienianum* O. Gruss & Perner, Caesiana 11: 66. 1998.

天伦兜兰 tian lun dou lan

Paphiopedilum tranlienianum var. *alboviride* O. Gruss; *P. tranlienianum* var. *saxosum* X. M. Xu.

Plants terrestrial or lithophytic. Leaves 4–6, distichous; blade abaxially light green, adaxially deep green with paler

margin, narrowly oblong, 10–24 × 1.6–2.7 cm, unequally bilobulate or tridentate at apex. Scape suberect or arching, terminating in a flower; peduncle green, 6–15 cm, with purple-red hairs; floral bract green spotted with purple-red, ovate, 1.8–3 × 1.2–1.4 cm; pedicel and ovary 3–4 mm, densely purple pubescent. Flower 6–6.5 cm in diam.; dorsal sepal white longitudinally striped with purple-brown in basal 2/3; synsepal pale green, ± veined with purple-brown; petals and lip pale green clearly flushed and veined with purple-brown; staminode pale yellow-green, with a green umbo. Dorsal sepal suborbicular, 2.5–3.5 × 2.5–3.5 cm, minutely ciliate, basal margin recurved, apex acute; synsepal subovate, 2.2–3 × 1.7–2 cm. Petals narrowly oblong, 2.7–3.9 × 0.8–1 cm, margin strongly undulate, white ciliate, apex obtuse; lip helmet-shaped; pouch ellipsoid, 2.2–2.4 × 1.5–1.8 cm. Staminode broadly obovate, ca. 1 × 1 cm, with an umbo in lower part. Fl. Sep.

Rocky and well-drained places in thickets; ca. 1000 m. SE Yunnan (Malipo) [N Vietnam].

18. *Paphiopedilum helenae* Averyanov, Bot. Zhurn. (Moscow & Leningrad) 81(9): 109. 1996.

巧花兜兰 qiao hua dou lan

Paphiopedilum delicatum Z. J. Liu & J. Yong Zhang.

Plants lithophytic. Leaves 2–4, distichous; blade abaxially light green and with purple speckles toward base, adaxially uniformly dark green, linear-oblong to linear-oblongate, 8–12.5 cm × 8–16 mm, leathery or leathery-fleshy, acute or unequally bilobate at apex. Scape arching or spreading horizontally, terminating in a solitary flower; peduncle green, purple spotted, 5–7 cm, with black-purple or white hairs; floral bract green, purple spotted, broadly ovate, conduplicate, 10–13 × 7–10 mm, purple hairy toward adaxial base; pedicel and ovary 2.9–3.1 cm, with black-purple or white hairs. Flower 4.5–5 cm in diam.; dorsal sepal yellowish or somewhat golden yellow, whitish margined; synsepal yellowish white; petals pale yellow-green or pale brown-yellow, upper side of midvein usually flushed with pale purple-red; lip pale yellow-green, tinged with purple-red; staminode pale yellow-green with a central green umbo. Dorsal sepal broadly elliptic, 4.2–5 × 2–2.8 cm, abaxially with black-purple hairs toward base, minutely ciliate, slightly undulate at margin, obtuse-rounded at apex; synsepal suborbicular or broadly elliptic, 2.2–2.4 × 2–2.2 cm, abaxially with black-purple hairs toward base, obtuse at apex. Petals linear-spatulate or linear-oblong, 2.5–3.2 × 0.4–0.8 cm, adaxially with black-purple hairs toward base, minutely ciliate along apical margin, obtuse or subtruncate at apex; lip helmet-shaped, 2.5–2.8 cm; pouch 1.5–1.8 cm in diam., usually convex-inflated on front surface. Staminode broadly obovate to obovate-orbicular, 6–7 × 6–7 mm, adaxially with small bubble-shaped papillae and a central umbo. Fl. Sep–Nov.

Crevices of bushy cliffs; 700–1100 m. SW Guangxi (Napo) [N Vietnam].

19. *Paphiopedilum henryanum* Braem, Schlechteriana 1: [4]. 1987.

亨利兜兰 heng li dou lan

Paphiopedilum chaoi S. H. Hu; *P. dollii* Lückel.

Plants lithophytic or terrestrial. Leaves 3–6, distichous; blade abaxially carinate and pale green with purple-brown speckles at very base, adaxially uniformly deep green or rarely obscurely tessellated with deep and pale green, narrowly oblong, 12–23 × 1.1–1.8(–2.4) cm, leathery, unequally bilobulate or minutely tridenticulate at apex. Scape arching, terminating in a solitary flower; peduncle green to brownish green, 12–17 cm, brown-purple pubescent; floral bract brownish or brownish green, narrowly ovate, conduplicate, 2–2.6 × 0.6–1.8 cm, ciliate; pedicel and ovary 3.5–5 cm, purple-brown pubescent. Flower 6–8 cm in diam.; dorsal sepal yellowish green to dull yellow with large purple-brown spots; synsepal similar in color to dorsal sepal with much fewer spots; petals pink-violet to light purple-red, with dark purple or blackish purple large spots in basal half or throughout; lip pink-violet or light purple-red, with a yellowish rim; staminode yellowish, slightly flushed with purple or brownish, with a green or brown-yellow umbo. Dorsal sepal usually erect, broadly ovate to suborbicular-ovate, 3–3.5 × 3.2–3.8 cm, abaxially puberulent, minutely ciliate, recurved at basal margin, margin undulate, apex obtuse; synsepal elliptic-ovate, 2.7–3.2 × 1.4–1.8 cm, slightly concave, abaxially puberulent, minutely ciliate. Petals spreading horizontally, spatulate, 3.2–3.9 × 1.4–1.8 cm, purple hirsute at adaxial base, minutely ciliate, obtuse or obscurely tridenticulate at apex; lip helmet-shaped, 3.7–4.3 cm; pouch ellipsoid, 2.3–2.8 × 2.2–2.5 cm. Staminode obcordate or broadly obovate, 6–8 × 7–8 mm, with bubblelike papillae and a small umbo adaxially, apex emarginate. Fl. Sep–Nov.

Crevices of shaded cliffs or rocky and well-drained places in evergreen broad-leaved forests or in thickets in limestone areas; 900–1300 m. SW Guangxi, SE Yunnan [N Vietnam].

This species is variable in floral coloring and petal shape. *Paphiopedilum henryanum* var. *christae* Braem (Schlechteriana 2: 157. 1991) was described as lacking the heavy spotting on the dorsal sepal and petals. In 1999, the variety was reduced to a form (f. *christae*) by the same author (in G. J. Braem, C. O. Baker & M. L. Baker, Gen. Paphiopedilum Nat. Hist. & Cult. 2: 206. 1999).

Paphiopedilum tigrinum f. *huberae* Koopowitz (Orchidee (Hamburg) 53: 518. 2001) may be of Chinese origin. It seems to be a variant of this species rather than of *P. tigrinum*.

20. *Paphiopedilum gratixianum* Rolfe, Orchid Rev. 13: 63. 1905.

格力兜兰 ge li dou lan

Cypripedium gratixianum Masters, Gard. Chron., ser. 3, 37: 76. 1905, not B. S. Williams (1897); *Cordula gratixiana* (Rolfe) Rolfe; *Paphiopedilum affine* De Wildeman; *P. villosum* (Lindley) Stein f. *affine* (De Wildeman) O. Gruss & Roellke; *P. villosum* var. *affine* (De Wildeman) Braem; *P. villosum* var. *gratixianum* (Rolfe) Braem.

Plants terrestrial or lithophytic. Leaves 4–8, distichous; blade abaxially green and toward base spotted with purple, adaxially deep green, oblanceolate-oblong to narrowly oblong, 28–40 × 2.6–3.4 cm, unequally bilobulate or tridenticulate at apex. Scape suberect, terminating in a solitary flower; peduncle

green, 13–28 cm, purple pubescent; floral bract green, sub-elliptic-ovate, 3.5–4.7 × 2–2.5 cm; pedicel and ovary 5–6.5 cm, purple pubescent. Flower 7–8 cm in diam.; dorsal sepal white, often pale green or brown-green toward its base, spotted with deep purple in basal 2/3; synsepal white, often with 2 rows of purple spots centrally; petals yellow-brown, with deeper color on upper side of midvein than on lower side; lip pale yellow-brown; staminode pale yellow, slightly flushed with brown. Dorsal sepal broadly elliptic or suborbicular, 5–5.5 × 3.8–4.6 cm, ± puberulent abaxially, ciliate, basal margin recurved, apex acute; synsepal elliptic or ovate-elliptic, 4.2–5 × 2.2–2.7 cm. Petals spatulate, 5.2–5.5 × 2–2.5 cm, margin often undulate and recurved, apex retuse to 3-dentate; lip helmet-shaped; pouch ovoid, 2.8–3.1 × 2.4–2.7 cm. Staminode obcordate, 10–11 × 10–11 mm, adaxially with bubblelike papillae and a central umbo, purple hairy toward its base. Fl. Sep–Dec. $2n = 26$.

Rocky places in forests; 1800–1900 m. SE Yunnan (Malipo) [Laos, N Vietnam].

Paphiopedilum ×vietenryanum O. Gruss & Petchleung (Orchidee (Hamburg) 53: 221. 2002), a natural hybrid between this species and *P. henryanum*, was described recently from SE Yunnan.

21. *Paphiopedilum villosum* (Lindley) Stein, Orchideenbuch, 490. 1892.

紫毛兜兰 zi mao dou lan

Plants epiphytic or sometimes lithophytic. Leaves 4–7, distichous; blade abaxially green and with purple speckles toward base, adaxially uniformly dark green, linear-oblong or loriate, 20–32(–40) × 2.2–3.5(–4) cm, leathery, acute to obtuse and bilobulate at apex. Scape suberect to arching, terminating in a solitary flower; peduncle green, 10–18(–24) cm, with purple or rarely whitish hairs; floral bract green, elliptic, conduplicate, 4–5 × 2–3 cm, abaxially purple spotted and hairy toward base; pedicel and ovary 4–5 cm, with purple or rarely whitish hairs. Flower 8–13 cm in diam.; dorsal sepal greenish or yellowish to whitish, centrally blackish maroon spotted or with a deep maroon or blackish maroon area; synsepal greenish to yellowish white; petals with a deep maroon central stripe, on upper side of central stripe pale maroon with deep maroon veins, on lower side paler in color; lip pale maroon obscurely with darker veins; staminode yellowish, flushed with pale maroon, centrally with a yellow or green umbo. Dorsal sepal broadly elliptic to obovate, 4–6.5 × 2.2–4.5 cm, abaxially ± minutely hairy throughout and with rather long hairs on midvein and toward base and apex, ciliate, recurved on basal margin, apex obtuse; synsepal elliptic-ovate to narrowly ovate, usually 4–5 × 1.7–2.8 cm. Petals spatulate-obovate, 5–6.5 × 2.2–4.5 cm, adaxially purple villous at base, ciliate, obtuse to retuse at apex; lip helmet-shaped, 5–6.5 cm; pouch 2.5–4 × 2.5–3.5 cm. Staminode obcordate-obovate, 10–15 × 8–11 mm, adaxially with bubblelike papillae and a central umbo, subtruncate at apex.

Tree trunks or branches in open forests, sunny cliffs, crevices of rocks, rocky places; 1100–1800(–2000) m. Yunnan [NE India, Laos, Myanmar, Thailand, Vietnam].

Paphiopedilum ×sinovillosum Z. J. Liu & S. C. Chen (J. S. China Agric. Univ. 25: 123. 2004), a natural hybrid between *P. villosum* and *P. henryanum*, was described recently from Malipo of SE Yunnan.

- 1a. Dorsal sepal heavily spotted with large blackish maroon marks 21d. var. *boxallii*
- 1b. Dorsal sepal not spotted with large blackish maroon marks.
- 2a. Dorsal sepal with a broad white margin particularly in apical half 21b. var. *annamense*
- 2b. Dorsal sepal with a yellowish to greenish margin.
- 3a. Pedicel and ovary with purple or sometimes whitish hairs; dorsal sepal 3.5–4.5 cm wide; floral bract slightly longer than pedicel and ovary 21a. var. *villosum*
- 3b. Pedicel and ovary with very dense long white hairs; dorsal sepal 2.2–2.9 cm wide; floral bract much longer than pedicel and ovary 21c. var. *densissimum*

21a. Paphiopedilum villosum var. villosum

紫毛兜兰(原变种) *zi mao dou lan* (yuan bian zhong)

Cypripedium villosum Lindley, Gard. Chron. 1854: 135. 1854; *Cordula villosa* (Lindley) Rolfe.

Peduncle, pedicel, and ovary with purple or sometimes whitish hairs. Dorsal sepal 3.5–4.5 cm wide, greenish to yellowish, centrally with a deep maroon or blackish maroon and darker-veined area. Floral bract slightly longer than pedicel and ovary. Fl. Nov–Mar. $2n = 26$.

Tree trunks or branches in open forests, sunny cliffs; 1200–1800 m. SE Yunnan (Malipo) [NE India, Myanmar, Thailand, Vietnam].

Paphiopedilum × *petchleungianum* O. Gruss (Orchidee (Hamburg) 52: 611. 2001), a natural hybrid between this taxon and *P. dianthum*, was described from Wenshan of SE Yunnan. Its flower is similar to that of this taxon, but its petals are narrower and longer and its staminode very similar to that of *P. dianthum*.

21b. Paphiopedilum villosum var. annamense Rolfe, Bot. Mag. 133: ad t. 8216. 1907.

白边兜兰 *bai bian dou lan*

Paphiopedilum villosum f. *annamense* (Rolfe) Braem.

Peduncle, pedicel, and ovary with purple or sometimes whitish hairs. Dorsal sepal 3.5–4 cm wide, white, centrally with a maroon or blackish maroon and darker-veined and yellow flushed area. Floral bract ca. as long as or slightly longer than pedicel and ovary. Fl. Apr–May.

Crevices of rocks, rocky places; 1200–1500 m. SE Yunnan (Malipo) [N Vietnam].

21c. Paphiopedilum villosum var. densissimum (Z. J. Liu & S. C. Chen) Z. J. Liu & S. C. Chen in Z. J. Liu et al., Gen. Paphiopedilum China, 148. 2009.

密毛兜兰 *mi mao dou lan*

Paphiopedilum densissimum Z. J. Liu & S. C. Chen, Acta Phytotax. Sin. 40: 283. 2002.

Peduncle, pedicel, and ovary with very dense long white hairs. Dorsal sepal 2.2–2.9 cm wide, pale green-yellow, centrally with a deep maroon and darker-veined area. Floral bract much longer than pedicel and ovary. Fl. Sep–Nov.

• Crevices of rocks in forests or shaded cliffs; 1200–1500 m. C and W Yunnan (Fugong, Mojiang).

21d. Paphiopedilum villosum var. boxallii (H. G. Reichenbach) Pfitzer in Engler, Pflanzenr. 12(IV. 50): 73. 1903.

包氏兜兰 *bao shi dou lan*

Cypripedium boxallii H. G. Reichenbach, Gard. Chron., n.s., 7: 367. 1877; *Cordula boxallii* (H. G. Reichenbach) Rolfe; *Cypripedium villosum* var. *boxallii* (H. G. Reichenbach) Veitch; *Paphiopedilum boxallii* (H. G. Reichenbach) Pfitzer.

Peduncle, pedicel, and ovary with dense purple hairs. Dorsal sepal 2.3–2.6 cm wide, heavily spotted with large blackish maroon marks centrally and with narrow white margin particularly in apical part. Fl. Nov.

Rocks or rocky places in forests; 1200–1300(–2000) m. SW Yunnan (Yingjiang) [Myanmar, N Vietnam].

22. Paphiopedilum tigrinum Koopowitz & N. Hasegawa, Orchid Advocate 16(3): 78. 1990.

虎斑兜兰 *hu ban dou lan*

Paphiopedilum markianum Fowlie.

Plants terrestrial, epiphytic, or lithophytic. Leaves 2–5, distichous; blade abaxially pale green and carinate, adaxially green or sometimes very obscurely tessellate with deep and light green, linear-ligulate, 13–27 × 2.1–2.7(–3.5) cm, leathery, rounded and tridentulate at apex. Scape erect or suberect, terminating in a solitary flower; peduncle green, 20–25 cm, densely purple pubescent; floral bract green spotted or flushed with purple toward base and apex, elliptic-oblong, 3.5–6 cm, purple pubescent toward abaxial base; pedicel and ovary green, 3.5–5.5 cm, densely purple pubescent. Flower 9–12 cm in diam.; dorsal sepal yellowish green, marked with 3 longitudinal maroon bars; synsepal yellowish green with maroon stripes or spots toward base; petals yellowish green in basal half and purplish in apical half, with 2 longitudinal maroon bars in basal 2/5; lip pale yellow-green flushed with brownish or pale purple-brown; staminode whitish yellow, with a purple-brown center. Dorsal sepal broadly obovate or broadly ovate, 4–4.5 × 2.8–4 cm, puberulent abaxially and toward adaxial apex, basal margin recurved, minutely ciliate, acute-obtuse at apex; synsepal elliptic, 3–4.5 × 1.9–2.5 cm, puberulent abaxially and toward adaxial apex, obtuse to bilobulate at apex. Petals half-twisted, spatulate, 5.5–7 × 2.3–4 cm, adaxially purple pubescent at base, minutely ciliate, undulate at margin, rounded and obtusely tridentulate at apex; lip helmet-shaped, 3.5–4.5 cm; pouch 2.5–3 × 2–2.5 cm, tapering toward apex. Staminode obovate-elliptic, 12–14 × 8–9 mm, obscurely tridentulate or slightly mucronate at apex, with a central umbo. Fl. Jun–Aug. $2n = 26$.

Shaded and rocky places in forests or thicket margins along valleys; 1400–2200 m. SE and W Yunnan (Lushui, Malipo) [NE Myanmar].

A closely related species, *Paphiopedilum smaragdinum* Z. J. Liu & S. C. Chen (J. Wuhan Bot. Res. 21: 489. 2003; *P. tigrinum* f. *smaragdinum* (Z. J. Liu & S. C. Chen) O. Gruss), was described recently from Lushui of W Yunnan. It is similar in floral appearance to, but different in color from, *P. tigrinum*. Its flower is pale yellow-green, lacking any deep-colored striping or spotting on the sepals and petals. It is probably best regarded as a variety of *P. tigrinum*.

23. Paphiopedilum spicerianum (H. G. Reichenbach) Pfitzer, Jahrb. Wiss. Bot. 19: 164. 1888.

白旗兜兰 bai qi dou lan

Cypripedium spicerianum H. G. Reichenbach, Gard. Chron., n.s., 13: 41, 363. 1880; *Cordula spiceriana* (H. G. Reichenbach) Rolfe.

Plants terrestrial or lithophytic. Leaves 4–6, distichous; blade abaxially pale green and spotted with purple toward base, adaxially uniformly dark green, narrowly oblong-elliptic, usually 14–27 × 1.8–2.5(–6) cm, leathery, slightly undulate along basal margin, acute and slightly bilobulate at apex. Scape suberect, terminating in 1 or rarely 2 flowers; peduncle purple, 9–22 cm, sparsely pubescent above; floral bract greenish yellow, with a maroon midvein abaxially, elliptic, 1.7–2.9 cm; pedicel and ovary purplish to brownish, 2.5–4.3 cm, glabrous. Flower 5–7.5 cm in diam.; dorsal sepal white with a maroon midvein and greenish base; synsepal yellowish green or whitish green; petals yellowish green with a brown-purple midvein and many paler speckles along lateral veins; lip pale green-brown or pale yellow-brown with dark brown veins; staminode white with a large purple circle centrally. Dorsal sepal curving forward, broadly ovate-orbicular or suborbicular, 2.8–4.9 × 3.2–4.1 cm, both surfaces puberulent, basal margin recurved, minutely ciliate, obtuse to rounded at apex; synsepal ovate, 2.5–4 × 1.4–3 cm, puberulent on both surfaces or glabrescent adaxially, obtuse at apex. Petals linear-spatulate or narrowly oblong, 2.6–5.2 × 0.6–1.8 cm, adaxially white villous at base, margin undulate, apex rounded or obtuse; lip helmet-shaped, 3.2–3.9 cm; pouch 3–3.8 × 1.8–2.8 cm. Staminode obovate or obovate-suborbicular, 9–10 × 6–7 mm, convolute on basal margin and appearing like a pair of eyes, obtuse-acute at apex. Fl. Sep–Nov.

Rocky places, cliffs or crevices of limestone rocks in forests or on bushy slopes; 900–1400 m. Yunnan (Gaoligong Shan, Simao) [N Myanmar].

24. Paphiopedilum appletonianum (Gower) Rolfe, Orchid Rev. 4: 364. 1896.

卷萼兜兰 juan e dou lan

Cypripedium appletonianum Gower, Garden (London, 1871–1927) 43: 95. 1893; *Cordula appletoniana* (Gower) Rolfe; *Cypripedium bullenianum* H. G. Reichenbach var. *appletonianum* (Gower) Rolfe; *Paphiopedilum appletonianum* var. *hainanense* (Fowlie) Braem; *P. hainanense* Fowlie; *P. hookerianum* (H. G. Reichenbach ex J. D. Hooker) Stein subsp. *appletonianum* (Gower) M. W. Wood.

Plants terrestrial or lithophytic. Leaves 7 or 8, distichous; blade pale green and often marked with purple toward base abaxially, distinctly or sometimes obscurely tessellated with dark and light green adaxially, narrowly elliptic or suboblong,

9–20(–25) × 1.5–3.5(–4) cm, bilobulate or tridenticulate at acute apex. Scape erect, terminating in 1 or very rarely 2 flowers; peduncle purple, 20–60 cm, white pubescent; floral bract green, ovate-lanceolate, 1.5–2.6 cm, abaxially puberulent especially in basal half, ciliate, acuminate at apex; pedicel and ovary 4–7 cm, pubescent. Flower 6–8(–10) cm in diam.; dorsal sepal and synsepal greenish or whitish green, with green veins; dorsal sepal with brown-purple stripes at base; petals greenish at base, turning to a rose-red or dull pink toward apex, with scattered dark brown spots or sometimes green-brown stripes in basal half; lip olive-green, rose-red, or purplish, with a green or pale green-yellow margin; staminode dull yellowish with a green center. Dorsal sepal ovate or broadly ovate, 3.5–4 × 2–3 cm, abaxially puberulent on veins and margin, minutely ciliate, acute at apex; synsepal elliptic-lanceolate, 2–3 × 1–1.5 cm, abaxially puberulent on veins, minutely ciliate, acuminate at apex. Petals spatulate, 4–6 × 1.3–2 cm, with blackish brown warts along upper margin and sometimes fewer along lower margin in basal half, often half-twisted in apical half; lip helmet-shaped, 3.5–4.5 cm; pouch 2–3 × 1.5–2.5 cm, apical margin with a deep incisure centrally with usually 1–3 teeth on either side. Staminode broadly obcordate, lunate, or transversely elliptic-oblong, mucronate or with 2–5 teeth at apex. Fl. Jan–May. $2n = 26, 28, 38$.

Rocky and humus-rich places or crevices of rocks in forests; 300–1200 m. SW Guangxi, Hainan [Cambodia, Laos, Thailand, Vietnam].

25. Paphiopedilum purpuratum (Lindley) Stein, Orchideenbuch, 481. 1892.

紫纹兜兰 zi wen dou lan

Cypripedium purpuratum Lindley, Edwards's Bot. Reg. 23: ad t. 1991. 1837; *Cordula purpurata* (Lindley) Rolfe; *Cypripedium sinicum* Hance ex H. G. Reichenbach; *Paphiopedilum aestivum* Z. J. Liu & J. Yong Zhang; *P. purpuratum* var. *hainanense* F. Y. Liu & Perner; *P. sinicum* (Hance ex H. G. Reichenbach) Stein.

Plants terrestrial. Leaves 4–6, distichous; blade pale green and carinate abaxially, distinctly or obscurely tessellated with dark and light green adaxially, narrowly elliptic or suboblong, 9–15(–17) × 2.3–4.2 cm, acute and slightly tridenticulate at apex. Scape erect or suberect, terminating in a solitary flower; peduncle purple-violet, 9–19 cm, white pubescent; floral bract narrowly ovate-elliptic, 1.7–2.5 × 0.7–0.9 cm, ciliate, abaxially white pubescent particularly on midvein; pedicel and ovary 4–6 cm, pubescent. Flower 8–10 cm in diam.; dorsal sepal white, with broad maroon veins, greenish toward base; synsepal white with green veins; petals glossy purple-maroon, veined with dark purple, tinged with greenish or yellowish toward base and apex, and spotted with blackish maroon in basal half; lip purple-maroon, greenish on back of pouch; staminode pale yellow-purple, with 2 green-veined blotches on both sides of whitish center. Dorsal sepal broadly ovate, 3–4 × 3–4.2 cm, abaxially puberulent, minutely ciliate, acuminate at apex; synsepal ovate to ovate-lanceolate, 2–3.5 × 0.9–1.6 cm, abaxially puberulent, minutely ciliate, acuminate at apex. Petals suboblong, 3.5–5 × 1–1.4 cm, blackish ciliate, with blackish maroon spots somewhat wartlike, acute or unequally bilobulate at apex; lip helmet-

shaped, 3.5–4.5 cm, verrucose on incurved lateral lobes; pouch 2–3 × 2.2–2.8 cm, outside minutely warty. Staminode lunate, 7–8 × 10–11 mm, puberulent adaxially, with inwardly pointed lateral lobes and an acute tooth at apex. Fl. Jun–Dec. $2n = 40$.

Rocky places in forests or thickets along valleys; 100–1200 m. S Guangdong, S Guangxi, Hainan, SE Yunnan [N Vietnam].

26. *Paphiopedilum wardii* Summerhayes, Gard. Chron., ser. 3, 92: 446. 1932.

彩云兜兰 cai yun dou lan

Cypripedium wardii (Summerhayes) C. Curtis (1933), not Rolfe (1913); *Paphiopedilum brevilabium* Z. J. Liu & J. Yong Zhang; *P. microchilum* Z. J. Liu & S. C. Chen; *P. multifolium* Z. J. Liu & J. Yong Zhang.

Plants terrestrial. Leaves 2–5, distichous; blade abaxially rather densely mottled with purple, adaxially tessellated with light or bluish and dark green, oblong or elliptic, 8–23 × 2.5–4.1 cm, sparsely ciliate toward basal margin, slightly bilobulate or tridenticulate at acute apex. Scape erect, terminating in a solitary flower; peduncle purple-red, 15–40 cm, pubescent; floral bract ovate-lanceolate, conduplicate, 1.8–2.3 cm, abaxially pubescent, ciliate; pedicel and ovary 4–5.5 cm, pubescent. Flower 7–10 cm in diam.; dorsal sepal and synsepal white or whitish green, veined with deep green; petals greenish white, flushed with purplish brown and spotted throughout with blackish brown; lip greenish to pale yellow-brown, veined and finely spotted with brown; staminode greenish marbled, deep green centrally. Dorsal sepal ovate, 3–4.5 × 2–3.5 cm, both surfaces puberulent particularly on veins, ciliate, acuminate at apex; synsepal ovate-lanceolate or lanceolate, 3.5–4.5 × 1.4–2.5 cm, both surfaces puberulent, ciliate, acute or acuminate at apex. Petals usually spreading horizontally, suboblong or oblong-lanceolate, 4.5–6 × 1.5–2 cm, adaxially minutely puberulent particularly in basal half, long ciliate, shortly acuminate at apex; lip helmet-shaped, 3.4–4.6 cm, warty on incurved lateral lobes; pouch 2.2–2.5 × 2–2.4 cm, outside slightly puberulent. Staminode obcordate-lunate, 9–10 × 13–15 mm, puberulent

adaxially, apical sinus with a small central tooth and 2 incurved lateral teeth. Fl. Dec–Mar. $2n = 41, 44$.

Shaded and steep rocks or near roots of large trees at forest margins or in forests along streams (1–3 m from water); ca. 2000 m. SW Yunnan (Lushui) [Myanmar].

Paphiopedilum xyingjiangense Z. J. Liu & S. C. Chen (Acta Bot. Yunnan. 29: 289. 2007) was recently described as a natural hybrid from W Yunnan (Yingjiang). In the protologue, *P. villosum* and *P. wardii* were suggested as the putative parents. However, a more likely parentage is *P. spicerianum* and *P. wardii*.

27. *Paphiopedilum venustum* (Wallich ex Sims) Pfitzer, Jahrb. Wiss. Bot. 19: 163. 1888.

秀丽兜兰 xiu li dou lan

Cypripedium venustum Wallich ex Sims, Bot. Mag. 47: ad t. 2129. 1820; *Cordula venusta* (Wallich ex Sims) Rolfe; *Stimegas venustum* (Wallich ex Sims) Rafinesque.

Plants terrestrial. Leaves 4 or 5, distichous; blade abaxially densely purple spotted, adaxially tessellated with dark green and gray- or yellow-brownish green, oblong-elliptic or narrowly oblong, 10–21.5 × 2.5–5.7 cm, acute and bilobulate or tricuspidate at apex. Scape erect, terminating in 1 or rarely 2 flowers; peduncle purple-brown, 12–19 cm, densely hirsute; floral bract ovate, 1.7–2.5 cm, conduplicate, abaxially sparsely pubescent, ciliate; pedicel and ovary 4.2–5.3 cm, pubescent. Flower 7–8 cm in diam.; dorsal sepal and synsepal white with green veins; petals yellow-whitish with green veins, flushed with purple in apical half, with a few large maroon warts mainly in basal half; lip and staminode yellowish, slightly tinged with purple-red and distinctly veined with green. Dorsal sepal broadly ovate or ovate-cordate, 2.7–3 × 2.1–2.3 cm, abaxially pubescent particularly on midvein, ciliate, acuminate at apex; synsepal ovate, 2.3–3.6 × 1.4–1.6 cm, abaxially pubescent, ciliate, acute at apex. Petals suboblong-obovate, 3.5–4 × 1.2–1.4 cm, margin undulate in apical half, long ciliate, acute or obtuse at apex; lip helmet-shaped, 3.3–4.2 cm, verrucose on lateral lobes; pouch 2.2–2.4 × 2–2.8 cm, outside usually minutely papillate-puberulent. Staminode reniform-obcordate, 6–7 × 9–13 mm, puberulent, with a broad sinus and a broad mucro at apex. Fl. Jan–Mar. $2n = 38, 40, 40 + 2B, 41, 42$.

Humus-rich and rocky places in thickets or at forest margins; 1100–1600 m. S and SE Xizang (Dinggyê, Mêdog) [Bhutan, NE India, Nepal].

