

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

斑叶兰属 ban ye lan shu

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*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 cylindric; 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

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- 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 ob-

tuse; lateral sepals oblong, slightly oblique, ca.  $3 \times 1.6$  mm, apex obtuse. Petals rhombic-oblancoate, oblique, ca.  $2.5 \times 1.2$  mm, 1-veined, apex obtuse or subacute; lip broadly ovate, ca. 2.5 mm; hypochile concave-saccate, ca.  $1.2 \times 2.5$  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,  $1.5\text{--}3.5 \times 0.8\text{--}2$  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,  $4\text{--}7 \times 1.5\text{--}2$  mm, concave, apex obtuse; lateral sepals oblong, oblique,  $4\text{--}7 \times 1.8\text{--}2.2$  mm, apex subacute. Petals linear-oblong, falcate,  $4\text{--}7 \times 1.5\text{--}2$  mm, 1-veined, apex obtuse; lip broadly ovate,  $3\text{--}5 \times 2\text{--}2.5$  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. melinostele* (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. melinostele* Schlechter; *G. schlechtendaliana* f. *similis* (Blume) Makino; *G. secundiflora* Griffith; *G. similis* Blume; *Orchiodes schlechtendaliana* (H. G. Reichenbach) Kuntze; *Peramium schlechtendalianum* (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,  $2.5\text{--}5 \times 0.8\text{--}2.2$  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,  $7\text{--}10 \times 3\text{--}3.5$  mm, apex acute; lateral sepals ovate-lanceolate,  $7\text{--}9 \times 3.5\text{--}4$  mm, apex acute. Petals rhombic-oblancoate,  $7\text{--}10 \times 2.5\text{--}3$  mm, 1-veined, apex obtuse or subacute; lip ovate,  $6\text{--}8.5 \times 3\text{--}4$  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.  $2n = 30 + 0\text{--}2B, 60$ .

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,  $1.8\text{--}3.2 \times 1.3\text{--}2.5$  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,  $3\text{--}3.5 \times 1.5\text{--}2$  mm, outer surface sparsely pubescent at base, apex obtuse; lateral sepals narrowly elliptic,  $3.5\text{--}4 \times 1.5\text{--}2$  mm, glabrous, apex obtuse. Petals white, rhombic-oblancoate, oblique,  $3\text{--}3.8 \times 1\text{--}1.2$  mm, 1-veined, apex obtuse; lip ovate-elliptic,  $3.5\text{--}4 \times 2\text{--}2.5$  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; *Elasmatium repens* (Linnaeus) Dulac; *Epipactis chinensis* (Schlech-

ter) 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 Poirét; *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 subobtusely. 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 lu hua ban ye lan

*Neottia viridiflora* Blume, Bijdr. 408. 1825; *Epipactis cordata* (Lindley) A. A. Eaton; *E. viridiflora* (Blume) Ames; *Erythodes 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-surus 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 reddish 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 yan se ban ye lan

*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 hong hua ban ye lan

*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; *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) Hoffmannsegge; *Orchiodes procera* (Ker Gawler) Kuntze; *Peramium procera* (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. *comelinoides* (Fukuyama) Hiroe; *G. maximowicziana* var. *comelinoides* (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) Bentham 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, cylindrical-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, tubular, large; pedicel and ovary cylindrical-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-oblongate, 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 oblongate, 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 cylindrical; floral bracts lanceolate, ca. 17 × 5 mm, pubescent, apex acuminate. Flowers barely opening, pale greenish white or white, medium-sized; pedicel and ovary cylindrical-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, velvetlike, 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) Bentham 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 tubular 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, white 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,  $1.3\text{--}1.5 \times$

$0.6\text{--}0.7$  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.  $4.2 \times 1.5\text{--}1.8$  mm, apex obtuse; lateral sepals ovate, oblique,  $4\text{--}4.5 \times 2.3\text{--}2.5$  mm, apex obtuse. Petals spatulate, oblique,  $4\text{--}4.2 \times$  ca. 1.2 mm, 1-veined, apex obtuse; lip ovate,  $3.8\text{--}4 \times$  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 midvein, ovate to oblong-lanceolate,  $1.5\text{--}5 \times 0.9\text{--}2$  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,  $6\text{--}7.5 \times$  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,  $3\text{--}3.8 \times 2.2\text{--}2.5$  mm, concave, apex obtuse; lateral sepals pale reddish brown, tinged white at apex, ovate, oblique,  $4\text{--}4.5 \times 2\text{--}2.8$  mm, apex obtuse. Petals white, rhombic-oblongate, oblique, ca.  $3 \times 1$  mm, glabrous, 1-veined, apical margin denticulate, apex obtuse; lip ovate,  $4\text{--}5 \times$  ca. 4 mm, fleshy; hypochile deeply concave-saccate, ca.  $3 \times 3.5$  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.

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