



Plants of Tribe Podochileae

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Abstract

This chapter describes 59 species in 18 genera in tribe Podochileae distributed in China, including morphology, flowering period, habitat, conservation status, and distribution.

Keywords

Podochileae · *Appendicula* · *Bryobium* · *Campanulorchis* · *Ceratosylis* · *Dendrolirium* · *Cryptochilus* · *Cylindrolobus* · *Eria* · *Mycaranthes* · *Pinalia* · *Phreatia* · *Porpax* · *Thelasis*

Podochileae include 27 genera distributed in tropical areas with species biodiversity in Southeast Asia (Chase et al. 2015; Pridgeon et al. 2005; Yan Peng et al. 2018). There are 18 genera in China (Chen et al. 2009; Zhou et al. 2021).

Key to genera in Podochileae

1	Pollinia 4–6	2
–	Pollinia 8	4
2	Leaves laterally compressed, stem short	<i>Oxystophyllum</i>
–	Leaves flat, not as above	3
3	Pollinia 4	<i>Podochilus</i>
–	Pollinia 6	<i>Appendicula</i>
4	Inflorescences and often stems; leaves, and leaf sheaths ± covered with reddish brown hairs	<i>Trichotisia</i>
–	Inflorescences, stems, and leaves glabrous	5
5	Pollinia connected by a common stipe to viscidium	6
–	Pollinia often sessile, directly attached to viscidium, rarely each pollinium with a separate stipe	7
6	Column foot absent; mentum absent; anther beaked at apex	<i>Thelasis</i>
–	Column foot conspicuous; mentum present; anther obtuse at apex	<i>Phreatia</i>
7	Column without a conspicuous foot	8
–	Column with a conspicuous column foot	11
8	Stems 1-leaved; leaves terete or dorsiventrally flattened; lip mid-lobe swollen	<i>Ceratosylis</i>
–	Stems few to many leaved	9
9	Stems short, entirely enclosed by imbricate leaf sheaths; inflorescence a densely flowered raceme	<i>Phreatia</i>
–	Stems elongate, leafy throughout entire length	10
10	Inflorescence terminal or subterminal; lip densely stellate-hairy	<i>Mycaranthes</i>
–	Inflorescence axillary; lip not densely stellate-hairy	<i>Cylindrolobus</i>
11	Sepals connate into a cylindric or nearly urceolate tube	12
–	Sepals free	13

12	Inflorescence 4–10 cm long, with 10–40 flowers; pseudobulb not reticulate	<i>Cryptochilus</i>
–	Inflorescence very short, with 1 or 2 flowers; pseudobulb surface reticulate	<i>Porpax</i>
13	Pseudostem or stem with 1 distinct internode only	14
–	Stem usually with several internodes	16
14	Leaves convolute; pseudobulbs conic, 2-leaved; inflorescence many flowered	<i>Eria</i>
–	Leaves conduplicate; inflorescence 1–6-flowered	15
15	Sepals densely tomentose abaxially	<i>Campanulorchis</i>
–	Sepals glabrous abaxially	<i>Conchidium</i>
16	Leaves terete, fleshy; inflorescence 1-flowered; flower relatively large, outer surface of sepals woolly	<i>Mycaranthes</i>
–	Leaves dorsiventrally flattened, inflorescence with more than one flowers	17
17	Column with 2 erect, arm-like appendages at apex; stem not swollen to form a pseudobulb; leaf 1	<i>Ceratosylis</i>
–	Column without arm-like appendages at apex; stem often swollen to form a pseudobulb; leaves 2 to many in taxa lacking pseudobulb	18
18	Lip entire, articulate to column foot and mobile; inflorescence never bottle-brush-like; column foot at right angle to column	<i>Callostylis</i>
–	Lip 3-lobed or obscurely 3-lobed, if entire, then inflorescence bottle-brush-like	19
19	Floral bracts large, bright orange; inflorescence usually bearing 2 flowers	<i>Dendrolirium</i>
–	Floral bracts smaller, not bright orange	20
20	Pseudobulbs usually less than 1/4 as long as leaves, borne sequentially on a stout rhizome; leaves 2 or 3, apical or subapical on pseudobulb	<i>Bryobium</i>
–	Pseudobulbs usually 1/2 or more as long as leaves, clustered, not noticeably arranged along rhizome; leaves 2–6 along upper part of stem	<i>Pinalia</i>

***Eria* Lindl.**

This genus comprises about 15 species mainly distributed in mainland Asia and the whole of the Malay Archipelago (Chase et al. 2015; Pridgeon et al. 2005; Yan Peng et al. 2018). There are eight species in China (Chen et al. 2009; Zhou et al. 2021).

Key to species

1	Flowers stellate, white, fusty pubescent	<i>Eria javanica</i>
–	Flowers not stellate, flowers colorful	2
2	Lip entire	<i>Eria vittata</i>
–	Lip 3-lobed	3

(continued)

Key to species (continued)

3	Pseudobulbs ovate, less than 3 cm	4
–	Pseudobulbs narrowly cylindrical, short or elongate	6
4	Pseudobulbs borne mostly 3–6 cm apart on a creeping rhizome; disk of lip with 3 undulate-curved median keels running to apex of mid-lobe, with additional reduced keels mostly within mid-lobe	<i>Eria clausa</i>
–	Pseudobulbs borne close together; disk of lip with 3 undulate lamellae extending to base of mid-lobe	5
5	Mid-lobe of lip purple, with 5 lamellae	<i>Eria boniana</i>
–	Mid-lobe of lip purple, with 7 lamellae	<i>Eria scabrilinguis</i>
6	Pseudobulbs 2–2.5 cm long, much shorter than leaves; lip distinctly clawed	<i>Eria yanshanensis</i>
–	Pseudobulbs 10–20 cm long, longer than or ca. as long as leaves. Lip not clawed	7
7	Inflorescences 2–6-flowered; flowers white; lip lateral lobes with strong purplish red streaks and a yellow center	<i>Eria coronaria</i>
–	Inflorescences 7–12-flowered; flower yellow; sepals densely red spotted abaxially; lip lateral lobes without purplish red streaks	<i>Eria gagnepainii</i>

***Eria boniana* (Gagnep.) Tang & F. T. Wang (Figs. 1 and 2)**

Description: Plants epiphytic. Pseudobulbs clustered, ovoid, 2–4 mm long, 0.6–1.2 cm in diam., apex 1–3-leaved. Leaf blade elliptic, 5–20 cm long, 1.5–3 cm wide; petiole 1–3 cm long. Inflorescence arising from inner side of leaves, 4–10 cm long, sparsely several-flowered. Flowers yellowish green; mid-lobe of lip purple. Dorsal sepal oblong, 8–11 mm long, 2–3 mm wide; lateral sepals falcate-lanceolate, 7–10 mm



Fig. 1 *Eria boniana*. (By Deping Ye)

long, 3–3.5 mm wide, base adnate to column foot and forming a mentum; mentum ca. 4 mm long. Petals fusiform-oblong, 6–10 mm long, 2.2–2.5 mm wide. Lip obovate, ca. 8 mm long, 5–7 mm wide, 3-lobed; lateral lobes nearly oblong; mid-lobe broadly ovate, ca. 3 mm long, 2–2.5 mm wide; disk with 3 high median lamellae extending from base to apex of mid-lobe, lip mid-lobe with 5 lobed lamella. Column ca. 3 mm long.

Flowering time: August–October

Habitat: Epiphytic on tree trunks or lithophytic on rocks in forests; 7500–1600 m

Conservation status: DD

Distribution: Yunnan Province; Laos and Vietnam

***Eria yanshanensis* S. C. Chen (Figs. 3 and 4)**

Description: Plants epiphytic. Pseudobulbs cylindrical, 20–25 mm long, 2–3 mm in diam., apex 2-leaved. Leaf blade oblong-ob lanceolate, 9.5–13.8 cm long, 0.8–1.8 cm wide. Inflorescences terminal, 15–19 cm long. Flowers glabrous. Dorsal sepal lanceolate-oblong, ca. 8 mm long, 2 mm wide; lateral sepals subovate, 6–7 mm long, 2–2.5 mm wide, base adnate to column foot and forming a mentum. Petals slightly curved, narrowly oblong, ca. 6 mm long, 1.5 mm wide. Lip obovate-cuneate, ca. 9 mm long, 5–6 mm wide, with a basal claw 4–4.5 mm long, distally 3-lobed; lateral lobes subovate; mid-lobe suborbicular, ca. 1.5 mm long,

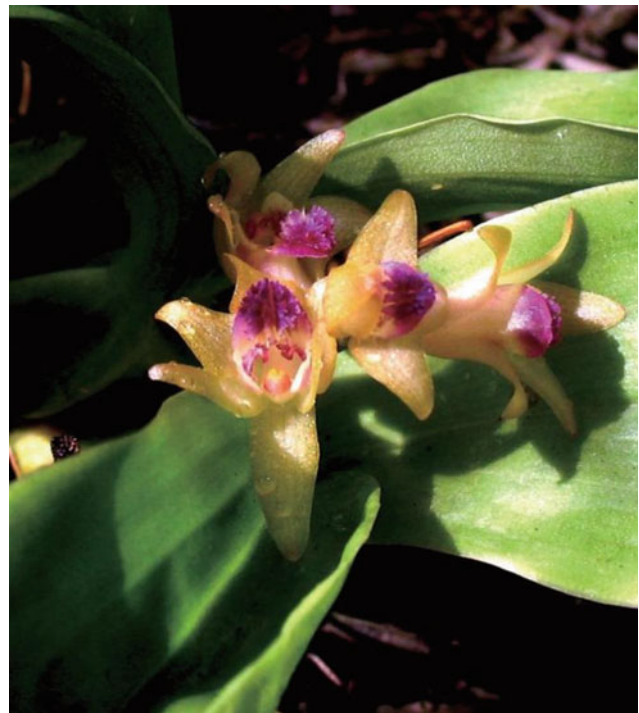


Fig. 2 *Eria boniana*. (By Deping Ye)



Fig. 3 *Eria yanshanensis*. (By Deping Ye)



Fig. 4 *Eria yanshanensis*. (By Deping Ye)

3 mm wide, margin irregularly crenate; disk with a central, suborbicular lamella in basal half and 6 or 7 irregularly fimbriate lamellae above. Column ca. 1.5 mm long.

Flowering time: August–October

Habitat: Trees in forests; ca. 1 100 m

Conservation status: EN

Distribution: Yunnan Province

***Eria clausa* King & Pantl. (Figs. 5 and 6)**

Description: Plants epiphytic. Rhizome creeping, slender. Pseudobulbs borne 1–6 cm apart on rhizome, ovoid, 1.5–3 mm long, 0.6–1 cm in diam., apex 1–3-leaved. Leaf blade elliptic, 5–15 cm long, 1.5–3 cm wide; petiole 1–3 cm



Fig. 5 *Eria clausa*. (By Deping Ye)



Fig. 6 *Eria clausa*. (By Jianwu Li)

long. Inflorescence 1, subterminal, 8–10 cm long, sparsely 2–6-flowered; floral bracts ovate, 4 mm long, 3 mm wide. Flowers yellowish green, lip with purple lamellae. Dorsal sepal oblong, 8–10 mm long, 2–3 mm wide; lateral sepals falcate-lanceolate, 7–10 mm long, 3–3.5 mm wide, base adnate to column foot and forming a mentum; mentum ca. 4 mm wide. Petals fusiform-oblong, 6–10 mm long, 2–2.5 mm wide. Lip obovate in outline, ca. 7 mm long, 5–7 mm wide, 3-lobed; lateral lobes \pm obliquely oblong; mid-lobe broadly ovate, ca. 3 mm long, 2–2.5 mm wide; disk with 3 high median lamellae extending from base to apex of mid-lobe, undulate-curved distally, with additional shorter, sinuous outer lamellae mostly restricted to mid-lobe. Column ca. 4 mm long.

Flowering time: March

Habitat: Trees in forests; 1 000–1 700 m

Conservation status: LC

Distribution: Guangxi, Yunnan, and Xizang Province; India

***Eria coronaria* (Lindl.) Rchb. f. (Figs. 7 and 8)**

Description: Plants epiphytic. Rhizome creeping. Pseudobulbs, cylindrical, 5–15 mm long, 0.3–0.6 cm long, apex 2-leaved. Leaf blade sessile, narrowly elliptic, 6–16 cm long, 1–4 cm wide. Inflorescence arising between leaves, 10–30 cm long, 2–6-flowered; floral bracts lanceolate, 5 mm long. Flowers white, with purple stripes on lip. Dorsal sepal elliptic-lanceolate, ca. 17 mm long, 5 mm wide; lateral sepals falcate-lanceolate, ca. 15 mm long, 5 mm wide. Petals oblong-lanceolate, ca. 17 mm long, 4.5 mm wide. Lip oblong in outline, 14–15 mm long, 11–12 mm wide, 3-lobed; lateral lobes divaricate, suborbicular; mid-lobe triangular, ca. 5 mm long, 4 mm wide; disk with 3 entire or undulate lamellae running from base to mid-lobe and with 2–4 additional crenate or undulate lamellae on mid-lobe. Column ca. 5 mm long.

Flowering time: May–June

Habitat: Trees in forests; 1 300–2 000 m

Conservation status: LC



Fig. 7 *Eria coronaria*. (By Deping Ye)

Distribution: Hainan, Guangxi, Yunnan, and Xizang Province; India, Bhutan, Nepal, Myanmar, and Thailand

***Eria gagnepainii* A. D. Hawkes & A. H. Heller (Figs. 9 and 10)**

Description: Plants epiphytic. Pseudobulbs cylindrical, slender, 5–23 cm mm long, 0.5 cm wide, apex 2-leaved. Leaf blade oblong-lanceolate, 10–26 cm long, 3–6 cm long, sessile. Inflorescence 1, arising between leaves, 6–40 cm long, up to 12-flowered; floral bracts ovate-lanceolate, 6–11 mm long. Flowers white and turning cream colored and then yellow as they age. Dorsal sepal oblong-elliptic, 14–16 mm long, 3–5 mm wide; lateral sepals falcate-lanceolate, 12–16 mm



Fig. 8 *Eria coronaria*. (By Jianwu Li)



Fig. 9 *Eria gagnepainii*. (By Xiaohua Jin)



Fig. 10 *Eria gagnepainii*. (By Xiaohua Jin)

long, 5–8 mm wide; mentum ca. 5 mm long. Petals oblong-lanceolate, 12 mm long, 3 mm wide. Lip suborbicular in outline, ca. 9 mm long, 8 mm wide, 3-lobed; lateral lobes parallel to mid-lobe, suboblong; mid-lobe 2–3 mm long, ca. 2 mm wide, subtriangular; disk with 2 diverging keels and 1 keel on mid-lobe, or with 2 entire lamellate keels below middle and 5 undulate lamellate keels above middle and central 3 of latter extending to mid-lobe, confluent, and reduced to a few teeth. Column ca. 5 mm long.

Flowering time: February–April

Habitat: Trees and rocks in forests; 900–1 600 m

Conservation status: LC

Distribution: Hainan, Hong Kong, Yunnan, and Xizang; Vietnam

***Eria javanica* (Sw.) Bl. (Figs. 11 and 12)**

Description: Pseudobulbs cylindrical, 6–7 cm long, 1.2–1.5 cm in diam., 2-leaved near apex. Leaf blade obovate-lanceolate, 36–40 cm long, 5–6 cm wide, base attenuate, sessile. Inflorescences subterminal, 40–50 cm long, many flowered; floral bracts ovate-lanceolate, 1.2–1.5 cm long. Flowers white, sepals rusty pubescent abaxially. Dorsal sepal lanceolate, 15–20 mm long, ca. 4 mm wide; lateral sepals falcate-lanceolate, 15–20 mm long, 4–5 mm wide; mentum ca. 5 mm long. Petals lanceolate, 15–20 mm long, ca. 4 mm wide, long acuminate. Lip ovate-lanceolate in outline, ca. 14 mm long, 7–8 mm wide, 3-lobed; lateral lobes suberect, oblong, 6–7 mm long; mid-lobe oblong-lanceolate, 7–8 mm long, ca. 3 mm wide; disk with 3 or 5 lamellae extending to near apex of mid-lobe. Column ca. 5 mm long.



Fig. 11 *Eria javanica*. (By Jianwu Li)

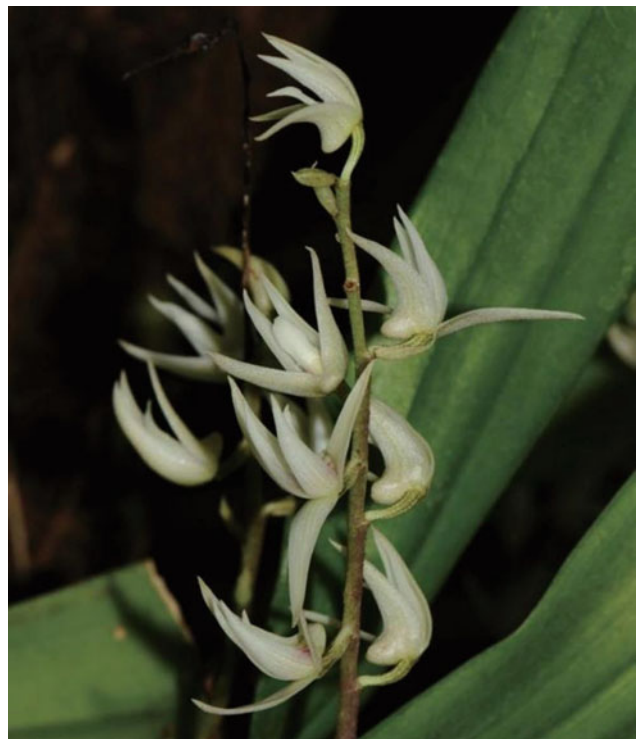


Fig. 12 *Eria javanica*. (By Jianwu Li)

Flowering time: August–October

Habitat: Trees and rocks in forests; 300–1 000 m

Conservation status: EN

Distribution: Taiwan and Yunnan Province; India, Myanmar, Thailand, Laos, Malaysia, Indonesia, the Philippines, and New Guinea

***Eria scabrilinguis* Lindl. (*Eria corneri* Rchb. f.)**
(Figs. 13 and 14)

Description: Plants epiphytic. Pseudobulbs clustered, ovate oblong, 2–5 mm long, 1.0–2.5 cm long, apex 2–3-leaved. Leaf blade elliptic-lanceolate, 15–45 cm long, 1.5–6 cm wide, peduncle 2.0–3.0 cm long. Inflorescence solitary, arising from lateral of distal leaves, 6–22 cm long, many flowered; floral bracts triangular, 1.0 mm long. Flowers white, tinged yellow, sepals and petals with white linear-shaped projection, mid-lobe of lip purple. Dorsal sepal ovate triangular, 10 mm long, 2 mm wide; lateral sepals falcate-triangular, 10 mm long, 5 mm wide; base adnate to column foot and forming a mentum. Petals linear-lanceolate, 10 mm



Fig. 13 *Eria scabrilinguis*. (By Jianwu Li)



Fig. 14 *Eria scabrilinguis*. (By Jianwu Li)

long, 1.2 mm wide. Lip ovate, 10 mm long, 6 mm wide, 3-lobed; lateral lobes subrounded; mid-lobe ovate-triangular, 3–3.5 mm long, 2 mm wide; disk with 3 undulate lamellae extending to base of mid-lobe, mid-lobe with 7 densely crested lamella. Column ca. 3 mm long.

Flowering time: August–September

Habitat: Trees or rocks in forests; 500–1 500 m

Conservation status: LC

Distribution: Fujian, Taiwan, Hainan, Guangdong, Hong Kong, Guangxi, Guizhou, and Yunnan; Japan and Vietnam

***Eria vittata* Lindl. (Figs. 15, 16, and 17)**

Description: Plants epiphytic, glabrous. Rhizome slender, glabrous, with a funnel shaped sheath on each node. Pseudobulbs 2–2.5 cm apart from each other, slightly curved, cylindrical, 6–7 cm mm long, 6–8 cm wide, apex 2-leaved. Leaf blade elliptic, 14–19 mm long, 2–4 cm wide. Inflorescence subterminal, usually pendulous, 14–18 cm long, many flowered; floral bracts persistent, lanceolate to subulate, 1–4 mm long. Flowers grayish green, with purplish brown stripes on sepals and petals. Dorsal sepal oblong, ca. 12 mm long, 3 mm wide; lateral sepals obliquely triangular oblong, falcate, ca. 10 mm long, 4 mm wide; mentum ca. 5 mm long. Petals lanceolate-oblong, ca. 12 mm long, 5 mm wide. Lip oblong in outline, ca. 12 mm long, 5 mm wide, base attenuate, with 5 undulate lamellae running nearly from base to apex. Column ca. 7 mm long.

Flowering time: November

Habitat: Trees or rocks in forests; 1 500–1 900 m

Conservation status: LC

Distribution: Yunnan and Xizang Province; India, Myanmar, and Thailand



Fig. 15 *Eria vittata*. (By Jianwu Li)



Fig. 16 *Eria vittata*. (By Jianwu Li)



Fig. 18 *Campanulorchis thao*. (By Xiaohua Jin)



Fig. 17 *Eria vittata*. (By Jianwu Li)



Fig. 19 *Campanulorchis thao*. (By Xiaohua Jin)

***Campanulorchis* Brieger**

Campanulorchis comprises about five species widespread in China, Indonesia, Laos, Malaysia, New Guinea, Thailand, and Vietnam (Chase et al. 2015; Pridgeon et al. 2005; Yan Peng et al. 2018). There is one species in China (Chen et al. 2009; Zhou et al. 2021).

***Campanulorchis thao* (Gagnep.) S. C. Chen & J. J. Wood (*Eria thao* Gugaop.) (Figs. 18 and 19)**

Description: Epiphytic. Rhizome well developed, slightly dilated at joint. Pseudobulbs borne 1–3 cm apart from each

other, ovoid, ca. 1.2 cm in diam., apex 1-leaved. Leaf blade elliptic, 5–10 cm long, 1.5–2 cm long, base attenuate into a petiole 1.5–2 cm long. Inflorescence terminal, ca. 2 cm long, 1-flowered, with dense, reddish brown, cottony hairs; floral bracts broadly triangular, ca. 1 mm long. Flowers yellow, lip yellowish red, tinged with purple. Sepals with dense, reddish brown, cottony hairs abaxially; dorsal sepal lanceolate-oblong, ca. 17 mm long, 6–8 mm wide; lateral sepals triangular-ovate, ca. 20 mm long, 6–9 mm wide. Petals elliptic, ca. 15 mm long, 5 mm wide. Lip obovate-rhombic in outline, nearly ca. 15 mm long, 10 mm wide, 3-lobed; lateral lobes subtriangular-ovate, ca. 4 mm long, 3 mm wide; mid-lobe suboblong, ca. 10 mm long, 6 mm wide, margin

conspicuously thickened; disk with 3 lamellae, central 1 inconspicuous, lateral 2 much higher. Column ca. 6 mm long, shortly winged.

Flowering time: August–October

Habitat: Trees or rocks in forests; 600–1 200 m

Conservation status: LC

Distribution: Hainan Province; Vietnam

***Conchidium* Griff.**

This genus comprises about ten species distributed in Bhutan, North India, South Japan, Laos, Myanmar, Vietnam Thailand, and China (Chase et al. 2015; Pridgeon et al. 2005; Yan Peng et al. 2018). There are five species in China (Chen et al. 2009; Zhou et al. 2021).

Key to species

1	Pseudobulbs borne 2–5 cm apart on rhizome	2
–	Pseudobulbs almost clustered along rhizome	3
2	Pseudobulbs narrowly ovoid, not surrounded by reticulate sheaths; leaves rather big, 2–5 cm long; lip 3-lobed	<i>Conchidium rhomboidale</i>
–	Pseudobulbs subglobose, surrounded by reticulate sheaths, leaves rather small, 0.7–1 cm long; lip entire	<i>Conchidium pusillum</i>
3	Pseudobulbs narrowly ovoid, 2-leaved; flowers white	<i>Conchidium japonicum</i>
–	Pseudobulbs depressed globose or subflabellate, 1–3-leaved; flowers yellowish green	4
4	Pseudobulbs covered by reticulate sheaths, compressed globose, 2–3-leaved; leaf blade 1.0–5.0 cm long; lip entire	<i>Conchidium muscicola</i>
–	Pseudobulbs without reticulate sheaths, subflabellate or subglobose, 1 leaved; leaves 0.8–1.0 cm long; lip slightly 3-lobed	<i>Conchidium spirodelum</i>

***Conchidium japonicum* (Maxim.) S. C. Chen & J. J. Wood (Figs. 20 and 21)**

Description: Epiphytic. Pseudobulbs contiguous, regularly arranged in a row on rhizome, narrowly ovoid, 10–15 mm long, 3–4 mm wide, apex 2-leaved. Leaves shortly petiolate, oblong, 4–10 cm long, 0.5–1.6 cm wide. Inflorescence subterminal, ca. 5 cm long, 1–4-flowered; floral bracts ovate, ca. 3 mm long. Flowers white. Dorsal sepal narrowly elliptic, ca. 8 mm long, 3 mm wide; lateral sepals ovate, oblique, ca. 6 mm long, 5 mm wide. Petals elliptic-lanceolate, ca. 8 mm long, 2 mm wide. Lip subovate in outline, base narrowed into a claw, 3-lobed above middle; lateral lobes erect, deltoid; mid-lobe nearly square, ca. 3 mm long, 3 mm wide, apex subtruncate and slightly emarginate; disk with



Fig. 20 Flowers of *Conchidium japonicum*. (By Shihwen Chung)



Fig. 21 Plants of *Conchidium japonicum*. (By Shihwen Chung)

3 lamellae from base, central lamella extending to apex and lateral 2 to base of mid-lobe. Column ca. 3 mm long.

Flowering time: June

Habitat: Lithophytic on rocks or epiphytic on tree trunks in forests; 700–2500 m

Conservation status: LC

Distribution: Anhui, Zhejiang, Fujian, Taiwan, and Guizhou Province; Japan

***Conchidium muscicola* (Lindl.) Rauschert (Fig. 22)**

Description: Plants epiphytic, 3–4 cm tall, glabrous. Pseudobulbs congested, depressed globose, discoid, 6–10 mm in diam., covered by reticulate membranous sheaths, apex 2- or 3-leaved. Leaf blade oblanceolate, 10–50 cm long, 4–7 mm wide, apex apiculate; petiole 0.3 cm long, articulate. Inflorescence 1, arising from upper leaf axil of pseudobulbs, 2–6-flowered; floral bracts lanceolate, ca. 5 mm long. Flowers yellowish green. Dorsal sepal lanceolate, ca. 4 mm long, 1 mm wide; lateral sepals ovate-lanceolate, slightly

falcate, ca. 4 mm long, 3 mm wide; mentum small or indistinct. Petals lanceolate, ca. 3.5 mm long, 1 mm wide. Lip subelliptic, ca. 3 mm long, 1 mm wide, entire, acuminate, contracted on both sides near middle, crenulate on apical margin; disk with 2 basal calli, central part with 3 veins running to near apex and lateral ones slightly thickened at base. Column less than 1 mm long.

Flowering time: July–August

Habitat: Trees or damp rocks in forests; 1 600–2 800 m

Conservation status: LC

Distribution: Yunnan Province; India, Nepal, Myanmar, Thailand, Laos, Vietnam, and Sri Lanka

***Conchidium pusillum* Griff. (Fig. 23)**

Description: Plants epiphytic, 2–3 cm tall. Rhizome long creeping, slender, with grayish white membranous sheaths. Pseudobulbs usually growing in pairs, each pair 2–5 cm



Fig. 22 *Conchidium muscicola*. (By Jianwu Li)



Fig. 23 Flowers of *Conchidium pusillum*. (By Jianwu Li)

apart on rhizome, nearly subglobose, 3–6 mm in diam., covered by reticulate membranous sheaths. Leaves 2 or 3, obovate-lanceolate, 7–10 mm long, 2–4 mm wide, apex with an awn 1–1.5 mm long. Inflorescence 1–5 cm long, 1- or 2-flowered; floral bracts ovate, ca. 2 mm long. Flowers yellowish green, small. Dorsal sepal ovate, 6 mm long; lateral sepals triangular, slightly oblique, 6 mm long. Petals lanceolate, ca. 4 mm long, 1 mm wide. Lip lanceolate, ca. 3.5 mm long, 1.5 mm wide, base contracted, entire, margin thinly ciliate or irregularly denticulate; disk with 2 stripes, running from base to near middle. Column ca. 1 mm long.

Flowering time: October–November

Habitat: Trees or damp rocks in forests; 600–1 500 m

Conservation status: LC

Distribution: Fujian, Hong Kong, Guangxi, Yunnan, and Xizang; India, Myanmar, Thailand, and Vietnam

***Conchidium rhomboidale* (Tang & F. T. Wang) S. C. Chen & J. J. Wood (Figs. 24 and 25)**

Description: Lithophytic. Pseudobulbs borne 2–4 cm apart from each other, cylindrical, 10–15 mm long, 4–6 mm in diam., apex 2-leaved. Leaves shortly petiolate, narrowly elliptic, 2–6 cm long, 0.6–1.5 cm wide. Inflorescence subterminal, on outer side of leaves, ca. 2.5 cm long, 1-flowered, with 1 or 2 sheaths at base; floral bracts ovate, ca. 1 mm wide.



Fig. 24 Plants of *Conchidium rhomboidale*. (By Deping Ye)



Fig. 25 Plant of *Conchidium rhomboidale*. (By Deping Ye)

Flowers cream-colored and lavender or red. Dorsal sepal elliptic, ca. 11 mm long, 4 mm wide; lateral sepals ovate-lanceolate, oblique, ca. 18 mm long, 6–7 mm wide; mentum ca. 6 mm wide. Petals slightly curved, oblong-lanceolate, ca. 10 mm long, 3 mm wide. Lip subrhombic, 10–17 mm long, 7–10 mm wide, base narrowed into a claw, apical quarter 3-lobed; lateral lobes oblong, margins slightly obtusely toothed or entire; mid-lobe trapezoid, ca. 4 mm long, 5–6 mm wide, barbate on adaxial veins, margin irregularly dentate, subtruncate; disk with 2 lamellae extending from base to near base of mid-lobe. Column ca. 4 mm long.

Flowering time: April–May

Habitat: Trees or rocks in forests; 700–1 300 m

Conservation status: NT

Distribution: Hainan, Guangxi, and Yunnan Province

***Conchidium spirodelum* (Aver.) Ormerod (*Porpax spirodela* (Aver.) Schuit., Y. P. Ng & H. A. Pedersen) (Figs. 26 and 27)**

Description: Plants epiphytic. Pseudobulbs congested, duckweed-like, subflabellate or subrounded, 4–10 mm long, terminal 1-leaved. Leaves ovate, 8–10 mm long, 4–5 mm wide. Inflorescence lateral, 5.0–5.5 mm long, 2-flowered; floral bracts ovate, 2 mm long, 2.2 mm wide. Flowers light green. Dorsal sepal lanceolate, 6.5–7.0 mm long, 1.5–1.7 mm wide; lateral sepals triangular, oblique, 6.0–6.5 mm long, 2.7–3.0 mm wide. Petals lanceolate, 4–4.2 mm long, 1–1.1 mm wide. Lip lanceolate, 4.0–4.2 mm long, 1.1–12 mm wide, slightly 3-lobed; lateral lobes erect; mid-lobe lanceolate, disk with 2 thick fleshy lamellae.

Flowering time: June–July

Habitat: Trees or rocks in limestone forests; ca. 900 m

Conservation status: EN

Distribution: Yunnan Province; Thailand, Laos, and Vietnam



Fig. 26 Plants of *Conchidium spirodelum*. (By Deping Ye)



Fig. 27 Flowers of *Conchidium spirodelum*. (By Jianwu Li)

***Mycaranthes* Bl.**

Mycaranthes comprises about 25 species distributed in South and Southeast Asia (Chase et al. 2015; Pridgeon et al. 2005; Yan Peng et al. 2018). There are two species in China (Chen et al. 2009; Zhou et al. 2021).

Key to species

1	Plants lacking rhizome; pseudobulbs congested; leaves narrowly lanceolate; lip 3-lobed	<i>Mycaranthes paniculata</i>
–	Plants with distinct rhizome; pseudobulbs 2.0–5.0 cm apart from each other; leaves cylindric; lip entire	<i>Mycaranthes pannea</i>

***Mycaranthes paniculata* (Lindl.) Schuit., Y. P. Ng & H. A. Pedersen [*Mycaranthes floribunda* (D. Don) S. C. Chen & J. J. Wood] (Figs. 28 and 29)**

Description: Plants epiphytic, 20–60 cm tall. Stems nearly clustered, erect, terete, slightly swollen at base, cylindric, 15–50 cm long, 3–5 mm in diam. Leaves many, 10–20 cm long, 0.3–0.6 cm wide. Inflorescences 1 or 2, subterminal,

10–15 cm long, with dense grayish white cottony hairs; floral bracts ovate-lanceolate, 5–6 mm long. Flowers yellowish green. Sepals densely grayish white cottony abaxially; dorsal sepal ovate-elliptic, ca. 3 mm long, 1 mm wide; lateral sepals \pm obliquely triangular, ca. 3 mm long, 2.5 mm wide; mentum ca. 2 mm long. Petals oblong, ca. 3 mm long, 1.5 mm wide. Lip subflabellate in outline, base shortly clawed, distally 3-lobed; lateral lobes subovate-triangular; mid-lobe \pm reniform, ca. 1.5 mm long, 2.5 mm wide; disk with a white, somewhat umbel-shaped projection from base to near apex and 2 smaller projections on both basal sides; umbel-shaped projections ca. 1 mm long, globose proximally and ellipsoid-cuneate distally. Column 1 mm long.

Flowering time: April–June

Habitat: Trees in forests; ca. 800 m

Conservation status: VU

Distribution: Yunnan Province; India, Bhutan, Nepal, Myanmar, Thailand, Laos, Vietnam, and Cambodia



Fig. 28 Plants and habitat of *Mycaranthes paniculata*. (By Jianwu Li)



Fig. 29 Inflorescence of *Mycaranthes paniculata*. (By Deping Ye)

***Mycaranthes pannea* (Lindl.) S. C. Chen & J. J. Wood (Figs. 30 and 31) (*Strongyleria pannea* (Lindl.) Schuit., Y. P. Ng & H. A. Pedersen)**

Description: Plants epiphytic. Rhizome creeping, elongate, slender, noded. Stems borne 2–5 cm apart on rhizome, terete, 1–2 cm long, 3–4 mm in diam., with 3 or 4 leaves near apex. Leaves terete, slightly laterally compressed, 4–20 cm long, ca. 0.3 cm in diam., adaxially grooved and often with white hairs along margins of grooves. Inflorescence arising from between leaves, 3–5 cm long, 1–4-flowered; floral bracts



Fig. 30 Plants of *Mycaranthes pannea*. (By Jianwu Li)



Fig. 31 Flowers of *Mycaranthes pannea*. (By Deping Ye)

ovate-triangular, ca. 6 mm long, 4 mm wide. Flowers vanilla-scented, pale yellowish green, lip dark purplish. Sepals densely hairy abaxially, sparsely hairy adaxially; dorsal sepal oblong-elliptic, ca. 6 mm long, 3 mm wide; lateral sepals obliquely ovate-triangular, ca. 6 mm long, 5 mm wide. Petals oblong, ca. 5 mm long, 2 mm wide, both surfaces sparsely white hairy. Lip subovate elliptic, ca. 7 mm long, 4 mm wide, apical part slightly fleshy, both surfaces white tomentose, margin entire, apex obtuse-rounded, base narrowed and with a linear callus, apex with 1 conspicuous elongate-elliptic callus. Column ca. 1.5 mm long.

Flowering time: April–May

Habitat: Trees in forests; 800–2 200 m

Conservation status: NT

Distribution: Hainan, Guangxi, Guizhou, Yunnan, and Xizang Province; India, Bhutan, Myanmar, Thailand, Laos, Vietnam, Cambodia, Singapore, Malaysia, and Indonesia

***Cylindrolobus* Bl.**

This genus comprises about 30 species distributed in South-west China and Southeast Asia (Chase et al. 2015; Pridgeon et al. 2005; Yan Peng et al. 2018; Van Canh et al. 2020; Ya et al. 2019). There are seven species in China (Chen et al. 2009; Zhou et al. 2021; Ya et al. 2019).

Key to species

1	Stems slender, terete, not fleshy, 1–2 mm in diam.; lip ca. 3.5 mm long	<i>Cylindrolobus tenuicaulis</i>
–	Stems stout, clavate, fleshy, 2–6 mm in diam.; lip nearly 1 cm long	2
2	Floral bracts dark red and elliptic; mid-lobe papillate on margin	<i>Cylindrolobus motuoensis</i>
–	Floral bracts yellow, greenish yellow, or green; mid-lobe not papillate	3
3	Lip yellow	4
–	Lip lateral lobes with purple edges, mid-lobe with lighter purple edges and patch	5
4	Floral bracts yellowish green; flowers white, oblong-ovate; lip with three obscure keels	<i>Cylindrolobus cristatus</i>
–	Flowers yellow, yellowish green and obovate bracts; lip with three calli	<i>Cylindrolobus glabriflorus</i>
5	Floral bracts light yellow; pseudobulbs rather long, to 30.0 cm	<i>Cylindrolobus clavicaulis</i>
–	Pseudobulbs 5.0–10.0 cm long	<i>Cylindrolobus marginatus</i>

***Cylindrolobus clavicaulis* (Wall. ex Lindl.) Rauschert (Fig. 32)**

Description: Plants epiphytic. Pseudobulbs clustered, erect, 30.0 cm long, 0.5 cm wide, 3–4 leaved. Leaves ovate-lanceolate, 9–12 cm long, 1.8–2.2 cm wide. Inflorescence



Fig. 32 *Cylindrolobus clavicaulis*. (By Jianwu Li)

arising from axil of apical leaf, 1- or 2-flowered; floral bracts 2, alternate, ovate, 1.9 cm long, 1.0 cm wide, light yellow; lateral lobes of lip and mid-lobe with adaxially red edges, mid-lobe yellowish green. Flower white; dorsal sepal ovate lanceolate, 14.0 mm long, 7.0 mm wide, lateral sepals ovate triangular, 12.0 mm long, 9.0 mm wide, base slightly oblique. Petals lanceolate, 14.0 mm long, 6.0 mm wide. Lip 3-lobed; lateral lobes suberect, ovate, 9.0 mm long, 4.0 mm wide; mid-lobe oblong, 4.8 mm long, 5.8 mm wide, apex slightly recurved; disk with 2 lamellae, column 4.0 mm long.

Flowering time: October–November

Habitat: Trees in forests; ca. 1 500 m

Conservation status: EN

Distribution: Yunnan Province; India, Myanmar and Thailand

***Cylindrolobus cristatus* (Rolfe) S. C. Chen & J. J. Wood (Fig. 33)**

Description: Plant epiphytic. Pseudobulbs terete, 9–11 cm long, 3–6 mm in diam. Leaves 3 or 4, subterminal, lanceolate, 6–8.5 cm long, 1–1.4 cm wide. Inflorescences subterminal,



Fig. 33 Flowers of *Cylindrolobus cristatus*. (By Lin Li)

2-flowered; rachis white tomentose; floral bracts yellowish green, oblong-ovate, recurved, 1.2–1.3 mm long, 0.8–0.9 cm wide. Flowers white; lip yellow, somewhat darker on disk and margins of lateral lobes. Dorsal sepal ovate-lanceolate, 13–14 mm long, 6–7 mm wide; lateral sepals triangular-ovate, carinate, ca. 15 mm long, 7–8 mm wide, base oblique. Petals lanceolate, 11–13 mm long, ca. 6 mm wide. Lip 3-lobed, 8–9 mm wide; lateral lobes erect, oblong; mid-lobe obovate, apex slightly denticulate; disk hairy, with 3 obscure keels, lateral keels terminating in 2 truncate fleshy crests, in front of which are 2 concavities partitioned by a median hairy keel, and elevated plates covered with yellow hairs forming 3 crests at apex.

Flowering time: October

Habitat: Trees in forests; 1 400–1 500 m

Conservation status: VU

Distribution: Yunnan Province; Myanmar and Thailand

***Cylindrolobus marginatus* (Rolfe) S. C. Chen & J. J. Wood (Fig. 34)**

Description: Plants epiphytic, 10–20 cm tall. Pseudobulbs tufted, clavate, 5–10 cm long, 2–6 mm wide, above middle conspicuously dilated. Leaves sessile, oblong-lanceolate, 5–11 cm long, 1–2 cm wide. Inflorescences 1 or 2, subterminal, usually with 2 flowers on a short peduncle ca. 5 mm long. Flowers white; lip lateral lobes with purple edges, mid-lobe with lighter purple edges and patch, with dense white cottony hairs. Sepals with white cottony hairs abaxially; dorsal sepal ovate-lanceolate, ca. 15 mm long, 5 mm wide, obtuse; lateral sepals falcate-lanceolate, nearly as long as dorsal sepal, ca. 6 mm wide. Petals oblong-lanceolate, ca. 12 mm long, 4 mm wide, obtuse, glabrous. Lip obovate in outline, nearly 1 cm long, 3-lobed; lateral lobes suberect, subovate, apex incurved and slightly covering



Fig. 34 Plants of *Cylindrolobus marginatus*. (By Jianwu Li)

mid-lobe; mid-lobe subrhombic-flabellate, ca. 5 mm long, 5 mm wide, thickened and papillate except on margin, base with a suborbicular projection, apex emarginate; disk with a longitudinal thickened band running from base to mid-lobe and a central keel. Column ca. 3 mm long.

Flowering time: February–March

Habitat: Trees in forests; 1 000–2 000 m

Conservation status: LC

Distribution: Yunnan Province; Myanmar and Thailand

***Cylindrolobus glabriflorus* X. H. Jin & J. D. Ya
(Figs. 35 and 36)**

Description: Epiphytic herbs. Roots slender, pubescent, 0.8–1.0 mm in diam. Stems clustered, terete, 4-leaved 13–25 cm long, 3–4 mm in diam. Leaves lanceolate, 4.5–6.5 cm long, 0.8–1.5 cm wide. Inflorescences axillary, arising from the apical of the stem, 1.3 cm long, 2-flowered; sterile bracts 1–2, smaller. Flowers yellow; peduncle and ovary 4–6 mm long. Dorsal sepal lanceolate, obtuse, 6 mm long, 2 mm wide; lateral sepals falcate-ovate, 5 mm long, 3.5 mm wide, base adnate to column foot form a subglobose and obtuse mentum. Petals oblong-ovate, slightly oblique,



Fig. 35 Plants of *Cylindrolobus glabriflorus*. (By Hong Jiang)



Fig. 36 *Cylindrolobus glabriflorus*. (By Jidong Ya)

5 mm long, 2 mm wide; labellum oblong in outline, 3-lobed, base hinged to the apex of the column foot, apex emarginate, 3.5 mm long, 1.5 mm wide; lateral lobes suberect, subovate, apex slightly introvert, disk with 2 reddish brown calli; mid-lobe sub-square, ca. 3.3 mm long, 2 mm wide, with a central papillate keel, reddish brown, ca. 0.5 mm high; apex emarginate. Column ca. 3.5 mm long; rostellum triangle, 0.2 mm long, a hook-like protrusion under the stigma.

Flowering time: April–May

Habitat: Trees in forests; 1 000–2 000 m

Conservation status: LC

Distribution: Yunnan Province; Myanmar and Thailand

***Cylindrolobus motuoensis* X. H. Jin & J. D. Ya
(Fig. 37)**

Description: Epiphytic herb. Roots pubescent, 1.0–1.5 mm in diam. Stem terete, 3(2) leaved apically, 18–24 cm long, 3–6 mm in diam. Leaves ligulate-lanceolate 10–13 cm long,



Fig. 37 Flowers of *Cylindrolobus motuoensis*. (By Xiaohua Jin)

1.5–2.0 cm wide. Inflorescences, pubescent, borne on near the apical of the stem, 2–3 cm long, 2-flowered; two sterile bracts, smaller, amplexicaul; floral bracts dark red, elliptic, sparsely tomentum, 7 mm long, 3 mm wide. Flowers white, sepals externally with brown tomentum, peduncle and ovary ca. 1.0–1.5 cm long, densely brown tomentum. Dorsal sepal lanceolate, acute, 5-veined, 11 mm long, 4 mm wide; lateral sepals falcate-lanceolate, 9 mm long, 5 mm wide, base adnate to column foot form a subglobose and obtuse mentum. Petals lanceolate, slightly oblique, acute, 3-veined, 10 mm long, 3 mm wide; labellum ovate in outline, 3-lobed, base hinged to the apex of the column foot, apex obtuse and emarginate, curved, 6 mm long, 3 mm wide; lateral lobes suberect, subovate, apex slightly introvert; mid-lobe ligulate, ca. 3 mm long, 3 mm wide, thickened and papillate on margin, apex emarginate; disk with 3 keels, central keel longitudinal thickened, with orange papilla, running from base to the tip of mid-lobe, lateral keels glabrous, running from base to middle of mid-lobe. Column ca. 4 mm long. Anther cap ovate, pollinia 8, yellowish white.

Flowering time: February–March

Habitat: Trees in forests; 1 000–2 000 m

Conservation status: LC

Distribution: Yunnan Province; Myanmar and Thailand

***Cylindrolobus tenuicaulis* (S. C. Chen & Z. H. Tsi)
S. C. Chen & J. J. Wood (Fig. 38)**

Description: Epiphytic. Rhizome often slightly flexuous. Stem more or less flexuous, terete, 1–2 mm in diam., usually with 3 or 4 leaves at apex. Leaves oblong or lanceolate-oblong, 4–5 cm long, 0.6–1 cm wide, apex acuminate; petiole 2–4 cm long, articulate. Inflorescence arising from axil of apical leaf or a lower node, 5–6 mm long, usually 2-flowered; floral bracts broadly elliptic, cuspidate-acuminate. Flowers 4–5 mm across, glabrous; pedicel and ovary ca. 3 mm long, glabrous. Dorsal sepal oblong-ovate or suboblong, 3–3.5 mm



Fig. 38 *Cylindrolobus tenuicaulis*. (By Xiaohua Jin)

long, ca. 1.2 mm wide, acute; lateral sepals broadly triangular-ovate, oblique, ca. 4 mm long, 2 mm wide, sub-acute. Petals subovate, slightly shorter than dorsal sepal, acute. Lip subovate in outline, ca. 3.5 mm long, base sub-cuneate, 3-lobed; lateral lobes ca. 1.5 mm long, ovate; mid-lobe subquadrate, ca. 1 mm long, 1 mm wide, with a central suborbicular lamella ca. 0.5 mm high; disk with 2 suborbicular lamellae. Column slightly arcuate, apex slightly enlarged; foot ca. 1.5 mm long.

Flowering time: April

Habitat: Trees in forests; 1 000–2 000 m

Conservation status: LC

Distribution: Yunnan Province; Myanmar and Thailand

***Dendrolirium* Bl.**

This genus comprises about 12 species distributed in Eastern Himalayas, Southeast Asia, and China (Chase et al. 2015; Pridgeon et al. 2005; Yan Peng et al. 2018). There are four species in China (Chen et al. 2009; Zhou et al. 2021).

Key to species

1	Inflorescence light brown cottony-hairy; flower light yellowish brown	<i>Dendrolirium tomentosum</i>
–	Inflorescence white cottony-hairy; flower light yellowish green or white	2
2	Lip entire	<i>Dendrolirium lanigerum</i>
–	Lip 3-lobed	<i>Dendrolirium lasiopetalum</i>

***Dendrolirium lanigerum* (Seidenf.) J. M. H. Shaw
(Figs. 39 and 40)**

Description: Epiphytic. Rhizome creeping, many nodes; roots from nodes. Pseudobulbs borne 2–5 cm apart on rhizome, ovoid, 3–4 mm long, 2–3 cm in diam., apex with

3 leaves. Leaf blade elliptic or oblong-lanceolate, 12–30 cm long, 1.5–5 cm wide, with 8–14 main veins, apex acuminate. Inflorescences 4–5 cm long, laxly 3–6 flowered; flower yellowish green, rachis densely white cottony-hairy; floral bracts oblong, 3–5 cm long; pedicel and ovary densely white cottony-hairy. Sepals densely white cottony-hairy abaxially; dorsal sepal elliptic, 8 mm long, 4 mm wide; lateral sepals triangular, oblique, 6 mm long, 6 mm wide, base adnate to column foot and forming a 3.0 mm mentum. Petals falcate, 5 mm long, 2 mm wide. Lip horn-like, entire, 5 mm long,

6 mm wide, disk with a divergent ridge. Column ca. 3 mm long.

Flowering time: March

Habitat: Trees or rocks in forests; 1 000–1 200 m

Conservation status: VU

Distribution: Yunnan Province; Vietnam

***Dendrolirium lasiopetalum* (Willd.) S. C. Chen & J. J. Wood (Figs. 41 and 42)**

Description: Rhizome creeping, ca. 5 mm in diam. Pseudobulbs borne 1.5–5 cm apart on rhizome, fusiform, 3–7.5 cm long, 1.5–3.5 cm wide, apex with 3–5 leaves. Leaf blade elliptic, 12–30 cm long, 1.5–5 cm wide. Inflorescences 1 or



Fig. 39 Flowers of *Dendrolirium lanigerum*. (By Jianwu Li)



Fig. 41 Plants and habitat of *Dendrolirium lasiopetalum*. (By Jianwu Li)



Fig. 40 Plants and habitat of *Dendrolirium lanigerum*. (By Jianwu Li)



Fig. 42 Flowers of *Dendrolirium lasiopetalum*. (By Jianwu Li)

2; rachis densely white or grayish yellowish cottony-hairy; floral bracts abaxially with white or grayish yellowish cottony hairs. Sepals densely white or grayish yellowish cottony-hairy abaxially; dorsal sepal lanceolate, ca. 12 mm long, 2 mm wide, obtuse; lateral sepals triangular-lanceolate, slightly oblique, ca. 13 mm long, 5 mm wide. Petals linear, ca. 14 mm long, 1 mm wide, acuminate. Lip ovate in outline, ca. 11 mm long, 5 mm wide, base contracted into a claw, 3-lobed; margins of lobes undulate; lateral lobes subovate; mid-lobe suboblong; disk with an obovate-lanceolate thickened area extending from base to mid-lobe. Column ca. 4 mm long.

Flowering time: January–April

Habitat: Trees or rocks in forests; 1 000–1 700 m

Conservation status: VU

Distribution: Hainan and Yunnan Province; India, Bhutan, Nepal, Myanmar, Thailand, Laos, Vietnam, and Cambodia

***Dendrolirium tomentosum* (J. Koenig) S. C. Chen & J. J. Wood (Figs. 43 and 44)**

Description: Rhizome ca. 5 mm in diam. Pseudobulbs slightly compressed, ellipsoid, 2–7 cm long, 1.5–2.5 cm in



Fig. 43 Plants and habitat of *Dendrolirium tomentosum*. (By Deping Ye)

diam., distally 3- or 4-leaved. Leaf blade elliptic, 10–24 cm long, 1–5 cm wide, base articulate; petiole 1–1.5 cm long. Inflorescence arising from near base of an old pseudobulb, 10–30 cm long, stout, densely light brown cottony-hairy, many flowered; floral bracts ovate, 1.2–2 cm long, abaxially densely light brown cottony-hairy, adaxially sparsely hairy; pedicel and ovary densely light brown cottony-hairy. Sepals densely light brown cottony-hairy abaxially; dorsal sepal oblong-lanceolate, 10–15 mm long, ca. 3 mm wide; lateral sepals obliquely ovate-lanceolate, 10–15 mm long, 4–5 mm wide. Petals linear-lanceolate, 9–13 mm long, ca. 2 mm wide. Lip recurved, suboblong in outline, 10–13 mm long, ca. 4 mm wide, 3-lobed; lateral lobes suberect, small; mid-lobe subovate-oblong, 6–7 mm long, 2–4 mm wide, margin strongly undulate; disk with a broad and thick band ca. 7 mm long from base to mid-lobe and often finely papillate around band. Column ca. 4 mm long.

Flowering time: April–May

Habitat: Trees or rocks in forests; 800–1 500 m

Conservation status: VU

Distribution: Hainan and Yunnan Province; India, Myanmar, Thailand, Laos, and Vietnam

***Bryobium* Lindl.**

Bryobium comprises about 20 species distributed from Sri Lanka and Southeast Asia to New Guinea, Northeast Australia, and Southwest Pacific Islands (Chase et al. 2015; Pridgeon et al. 2005; Yan Peng et al. 2018). There is one species in China (Chen et al. 2009; Zhou et al. 2021).

***Bryobium pudicum* (Ridl.) Y. P. Ng & P. J. Cribb (Figs. 45 and 46)**

Description: Epiphytic. Rhizome 3–4 mm in diam. Pseudobulbs 0.5–1 cm apart on rhizome, ± fusiform, 3–4 cm long, 5–7 mm in diam., 2- or 3-noded, apex 1- or rarely 2-leaved.



Fig. 44 Flowers of *Dendrolirium tomentosum*. (By Jianwu Li)



Fig. 45 *Bryobium pudicum*. (By Jianwu Li)



Fig. 46 Inflorescence of *Bryobium pudicum*. (By Jianwu Li)

Leaf blade oblanceolate, 10–15 cm long, 1.4–2.4 cm wide. Inflorescence arising from near apex of pseudobulb, 3–4 cm long, densely grayish white pubescent, more than 10-flowered; floral bracts ovate, ca. 3 mm long, abaxially

sparsely grayish white pubescent. Flowers greenish white, sepals and petals with red veins, abaxially sparsely grayish white pubescent; pedicel and ovary densely grayish white pubescent. Dorsal sepal elliptic, ca. 3 mm long, 1.5 mm wide; lateral sepals obliquely ovate, ca. 3.5 mm long, 2.2 mm wide. Petals ovate-lanceolate, ca. 3 mm long, 1.5 mm wide, glabrous. Lip rhombic or broadly elliptic in outline, ca. 3 mm long, 2.5–3 mm wide, base with 1 reddish brown oblong callus ca. 1 mm wide, on either side with a rounded and a subovate-rounded reddish brown callus, and near apex with a reddish brown anchor-shaped median appendage. Column ca. 1 mm long.

Flowering time: June–July

Habitat: Trees or rocks in forests; ca. 1 500 m

Conservation status: NT

Distribution: Yunnan Province; Singapore and Malaysia

Pinalia Lindl.

Pinalia comprises about 160 species distributed in Eastern Himalayas, Southeast Asia, Malay Archipelago, Northeast Australia, and the Pacific Islands (Chase et al. 2015; Pridgeon et al. 2005; Yan Peng et al. 2018). There are 19 species in China (Chen et al. 2009; Zhou et al. 2021).

Key to species

1	Inflorescence secund	<i>Pinalia stricta</i>
–	Inflorescence not secund, usually spirally arranged on axis	2
2	Lip base attenuate into a claw, contiguously joined to column foot, base contracted into a claw, adnate to column foot	3
–	Lip without claw at base, attached by a hinge to column foot	5
3	Pseudobulbs narrowly obovate; leaves 3.0–6.0 cm long; flowers sparse; lip rhombic	<i>Pinalia bipunctata</i>
–	Inflorescence densely flowered	4
4	Leaves elliptic, 5.0–22.0 cm long, 1.0–4.0 cm wide; lip subrhombic; mid-lobe triangular	<i>Pinalia spicata</i>
–	Leaves lanceolate, 5.0–10.0 cm long, 0.8–1.3 cm wide; lip oblanceolate; mid-lobe suboblate	<i>Pinalia salwinensis</i>
5	Pseudobulbs consisting of 1 or 2 distinct internodes	6
–	Pseudobulbs consisting of several internodes	8
6	Pseudobulbs 8–17 cm long; leaves rather thick; lip 5-lobed	<i>Pinalia pachyphylla</i>
–	Pseudobulbs 2.5–3.5 cm in diam.; leaves rather thin	7
7	Pseudobulbs cylindrical; lip mid-lobe warty-rugulose	<i>Pinalia excavata</i>
–	Pseudobulbs ellipsoid; lip mid-lobe not warty-rugulose	<i>Pinalia yunnanensis</i>
8	Pseudobulbs cylindrical, 8–17 cm long; sepals and petals pure white	<i>Pinalia graminifolia</i>

(continued)

Key to species (continued)

–	Pseudobulbs flask-like or ovoid; sepals and petals variably colored	9
9	Pedicel and ovary glabrous; pseudobulbs fusiform; leaves 4–10 cm	<i>Pinalia acervata</i>
–	Pedicel and ovary pubescent or puberulent	10
10	Plants small, 4–10 cm tall; inflorescence 1–3-flowered; lip mid-lobe thickly verruculose-rugose	<i>Pinalia szetschuanica</i>
–	Plants larger, 12–27 cm tall; leaves 10–25 cm wide; inflorescence ca. 6- to many flowered; lip with 3 lamellae	11
11	Sepals and petals yellow with purplish brown stripes; lip 8–10 mm	<i>Pinalia amica</i>
–	Sepals and petals pure white; lip 5–7 mm	<i>Pinalia obvia</i>

***Pinalia acervata* (Lindl.) Kuntze (Figs. 47 and 48)**

Description: Epiphytic. Pseudobulbs usually 2–8, closely and regularly arranged into a row, fusiform, 2–4 cm long, 0.6–1.5 cm wide, apex 2–4-leaved. Leaves sessile, oblong-lanceolate, 4–10 cm long, 0.8–2 cm wide, apex slightly unequally 2-lobed. Inflorescences 1–3, subterminal, 3–6 cm long, 4–7-flowered; rachis glabrous; floral bracts ovate, 5–10 mm long, 2.0–3.0 mm wide, margin sparsely denticulate. Flowers white, sepals tinged green at apex, lip yellow; pedicel and ovary ca. 1 cm long. Dorsal sepal narrowly ovate, ca. 6 mm long, 2 mm wide; lateral sepals falcate-lanceolate, ca. 7 mm long, 5–6 mm wide. Petals lanceolate, ca. 6 mm long, 2 mm wide, obtuse. Lip broadly cuneate in outline, ca. 7 mm long, 6 mm wide, base attached to column foot at a right angle, 3-lobed; lateral lobes falcate-oblong, ca. 2 mm long; mid-lobe orbicular, ca. 3 mm long, 3 mm wide; disk with 3 keeled lamellae from base to middle of mid-lobe. Column ca. 3 mm long.



Fig. 47 Plants of *Pinalia acervata*. (By Jianwu Li)

Flowering time: August

Habitat: Epiphytic on tree trunks or rocks in forests

Conservation status: VU

Distribution: Yunnan and Xizang Province; India, Myanmar, Thailand, Laos, Vietnam, and Cambodia

***Pinalia stricta* (Lindl.) Kuntze (Figs. 49 and 50) (*Cryptochilus strictus* (Lindl.) Schuit., Y. P. Ng & H. A. Pedersen)**

Description: Epiphytic. Rhizome inconspicuous. Pseudobulbs clustered, cylindrical, 2–10 cm long, 1–4 mm in diam., apex 2-leaved. Leaf blade lanceolate, 8–10 cm long, 0.6–2 cm wide; petiole ca. 6 mm long. Inflorescences 1–3, subterminal, 8–10 cm long, secund, densely many flowered; rachis and pedicel and ovary white cottony-hairy; floral bracts rhombic, ca. 1 mm long, glabrous. Sepals densely white cottony-hairy abaxially; dorsal sepal ovate, ca. 2 mm long, 1.5 mm wide; lateral sepals ovate-triangular, ca. 2 mm long, 2 mm wide; mentum ca. 1 mm long. Petals ovate, ca. 2 mm long, 1.5 mm wide, glabrous, obtuse. Lip subsquare-orbicular in outline, ca. 2 mm long, 2 mm wide, distally shallowly 3-lobed; lateral lobes small; mid-lobe ± oblate, ca. 0.5 mm long, 1–1.5 mm wide, obtuse-rounded; disk with 3 thickened lamellae from base to base of mid-lobe and a globose callus between 2 lateral lobes near mid-lobe base. Column ca. 1.5 mm long.

Flowering time: November to next February

Habitat: Trees in forests; 800–1 300 m

Conservation status: LC

Distribution: Yunnan and Xizang Province; India, Nepal, and Myanmar



Fig. 48 Flowers of *Pinalia acervata*. (By Jianwu Li)



Fig. 49 Inflorescence of *Pinalia stricta*. (By Jianwu Li)



Fig. 51 *Pinalia amica*. (By Jianwu Li)



Fig. 50 Plants of *Pinalia stricta*. (By Deping Ye)

***Pinalia amica* (Rchb. f.) Kuntze (Figs. 51 and 52)**

Description: Epiphytic. Pseudobulbs fusiform, 3.5–14 cm long, 0.4–1.6 cm in diam., apex 1–3-leaved. Leaf blade narrowly elliptic, 10–15 cm long, 1.3–2.3 cm wide. Inflorescences 1 or 2, arising from middle or upper part of pseudobulb, rarely near base, suberect, 3–7 cm long, sparsely 6–10-



Fig. 52 Flowers of *Pinalia amica*. (By Jianwu Li)

flowered; rachis with dense rusty hairs; floral bracts elliptic, 8–12 mm long, 3–5 mm wide, glabrous. Flowers buff-yellow, with red veins and yellow apices, lip pink with bright yellow apex, lateral lobes and keels red; pedicel and ovary with dense rusty hairs. Sepals with rusty hairs; dorsal sepal oblong-lanceolate, ca. 10 mm long, 2 mm wide; lateral sepals obliquely ovate-triangular, ca. 10 mm long, 4 mm wide, acuminate; mentum ca. 3 mm wide. Petals obovate-lanceolate, 8–9 mm long, ca. 2 mm wide. Lip subovate-elliptic in outline, ca. 8 mm long, 6 mm wide, 3-lobed; lateral lobes incurved, ovate-elliptic, ca. 3 mm long, 1.5 mm wide;

mid-lobe reniform, 3–4 mm long, ca. 4.5 mm wide, fleshy except for middle part, apex emarginate; disk with 3 lamellae; central lamella extending to mid-lobe and thickened there, lateral 2 to near base of mid-lobe and thickened in apical half. Column ca. 4 mm long.

Flowering time: March–April

Habitat: Epiphytic on trees in forests; 900–2 200 m

Conservation status: LC

Distribution: Taiwan and Yunnan Province; India, Bhutan, Nepal, Myanmar, Thailand, Laos, Vietnam, and Cambodia

***Pinalia bipunctata* (Lindl.) Kuntze (Figs. 53 and 54)**

Description: Epiphytic. Pseudobulbs contiguous, narrowly obovoid, 3–4 cm mm long, 8–12 mm in diam., usually with 1 or 2 nodes, apex usually 4-leaved. Leaves shortly petiolate, 3–6 cm long, 1–2 cm wide. Inflorescences arising from near apex of pseudobulb, arching, 3–4 cm long, sparsely pubescent, sparsely 10- or more flowered; floral bracts reflexed, broadly elliptic, ca. 5 mm long. Flowers white, glabrous; pedicel and ovary ca. 5 mm long, sparsely pubescent. Dorsal sepal broadly elliptic, ca. 5 mm long, 2 mm wide; lateral sepals oblong-elliptic, ca. 6 mm long, 4 mm wide; mentum ca. 3 mm wide. Petals oblong, ca. 4 mm long, 1.5 mm wide. Lip rhombic in outline, ca. 4 mm long, 4 mm wide, 3-lobed; lateral lobes perpendicular to mid-lobe, subtriangular, ca. 3 mm long; mid-lobe subtriangular, ca. 1 mm long,



Fig. 53 Plants and habitat of *Pinalia bipunctata*. (By Jianwu Li)

1 mm wide, conspicuously thickened. Column ca. 2 mm long.

Flowering time: July

Habitat: Epiphytic on tree trunks in forests; ca. 1700 m

Conservation status: LC

Distribution: Yunnan Province; India, Thailand, and Vietnam

***Pinalia excavata* (Lindl.) Kuntze (Figs. 55 and 56)**

Description: Epiphytic. Pseudobulbs borne ca. 1 cm apart from each other, cylindrical, ca. 3 cm long, consisting of 1 distinct internode, sheathing at base, apex 4- or 5-leaved. Leaf blade elliptic-oblancoate, 16–18 cm long, 2–3.4 cm wide, base contracted into petiole. Inflorescence arising from leaf axil, 15–18 cm long, reddish brown pubescent, sparsely few flowered; floral bracts lanceolate, 7–8 mm long. Flowers white; sepals and petals brown pubescent abaxially. Dorsal



Fig. 54 Flowers of *Pinalia bipunctata*. (By Deping Ye)



Fig. 55 *Pinalia excavata*. (By Xiaohua Jin)



Fig. 56 Close up of flowers of *Pinalia excavata*. (By Xiaohua Jin)

sepal subelliptic, ca. 9 mm long, 3 mm wide; lateral sepals falcate-lanceolate, ca. 9 mm long, 4 mm wide. Petals elliptic, ca. 6 mm long, 2 mm wide. Lip suborbicular, nearly 5 mm wide, concave at base, 3-lobed from near base; lateral lobes ovate-triangular, small, each with an erect callus adaxially; mid-lobe subreniform, ca. 4 mm long, 5 mm wide, apex emarginate, warty-rugulose, with variable calli, usually 2-callose basally, sometimes with 5 flabellate, lamellate or thickened veins from base; central one extending to apex forming an apiculum. Column ca. 1 mm long.

Flowering time: June

Habitat: Epiphytic on tree trunks in forests; 1700–2100 m

Conservation status: VU

Distribution: Yunnan and Xizang Province; Nepal and India

***Pinalia graminifolia* (Lindl.) Kuntze (Figs. 57 and 58)**

Description: Epiphytic. Rhizome short. Pseudobulbs densely arranged in a row on rhizome, cylindrical, 8–17 cm long, 3–8 mm in diam., apex 5- or 6-leaved. Leaves sessile, elliptic, 5–16 cm long, 0.8–3 cm wide, base contracted. Inflorescences 1–3, subterminal, shorter than leaves, more than 10-flowered; rachis and ovary densely yellowish brown pubescent; floral bracts ovate, 5–10 mm long. Flowers white, spotted with yellow on lip. Dorsal sepal oblong, 6–8 mm long, ca. 2 mm wide; lateral sepals subfalcate, ca. 8 mm long, 3 mm wide. Petals narrowly oblong, 5–6 mm long, ca. 2 mm wide. Lip obovate in outline, ca. 5 mm long, 4 mm wide, 3-lobed from near middle; lateral lobes divaricate, oblong, apex reflexed; mid-lobe nearly oblate, rounded or acute, with a high central lamella from base to apical 2/3; disk with 3 thickened veins, lateral veins each with a triangular callus halfway. Column ca. 2 mm long.



Fig. 57 Plants and habitat of *Pinalia graminifolia*. (By Xiaohua Jin)



Fig. 58 *Pinalia graminifolia*. (By Xiaohua Jin)

Flowering time: June–July

Habitat: Epiphytic on tree trunks or lithophytic on rocks in forests; 1600–2500 m

Conservation status: LC

Distribution: Yunnan and Xizang Province and regions; India, Bhutan, and Nepal

***Pinalia obvia* (W. W. Sm.) S. C. Chen & J. J. Wood (Figs. 59 and 60)**

Description: Epiphytic. Pseudobulbs ± tufted, fusiform, 4–6.5 cm long, 1–1.4 cm in diam., apex 3- or 4-leaved. Leaves subsessile, elliptic, 5–20 cm long, 1.5–3 cm wide, base

attenuate. Inflorescences 1–3, subterminal, many flowered; rachis with yellowish brown hairs or nearly glabrous; floral bracts lanceolate, 1–2 cm long. Flowers white. Dorsal sepal lanceolate, 8–10 mm long, 2–3 mm wide; lateral sepals lanceolate, 7–9 mm long, 3–5 mm wide. Petals linear-lanceolate, 7–8 mm long, 1–2 mm wide. Lip suboblong in outline, 3–7 mm long, 3–5 mm wide, 3-lobed above middle; lateral lobes subovate, 1–2 mm long; mid-lobe oblong, 2–3 mm long, 1–2 mm wide, rounded; disk with 3 lamellae, central lamella running to base of mid-lobe. Column 2–4 mm long.

Flowering time: April–May

Habitat: Epiphytic on tree trunks or rocks in forests; 700–2000 m

Conservation status: VU

Distribution: Hainan, Guangxi, and Yunnan Province



Fig. 59 *Pinalia obvia*. (By Deping Ye)



Fig. 60 Plants and habitat of *Pinalia obvia*. (By Jianwu Li)

***Pinalia pachyphylla* (Aver.) S. C. Chen & J. J. Wood (Figs. 61 and 62)**

Description: Epiphytic. Rhizome stout, densely covered with membranous sheaths. Pseudobulbs oblong, 8–17 cm long, nearly 1 cm in diam., 1-noded, young pseudobulb arising from near middle of an old pseudobulb, apex 2–4-leaved. Leaves subsessile, oblong, 13–23 cm long, ca. 2 cm wide, fleshy, base narrowed, articulate. Inflorescence subterminal, ca. 24 cm long, yellowish brown hairs, many flowered; floral bracts lanceolate, 1.5–3 cm long, both surfaces yellowish brown hairs. Flowers yellowish brown, ± fleshy. Sepals



Fig. 61 Plants of *Pinalia pachyphylla*. (By Jianwu Li)



Fig. 62 Flowers of *Pinalia pachyphylla*. (By Jianwu Li)

densely yellowish brown tomentose abaxially; dorsal sepal oblong, 12–15 mm long, 6–8 mm wide; lateral sepals subtriangular, 10–12 mm long, 8–10 mm wide. Petals oblong, 12–13 mm long, 4–5 mm wide, glabrous. Lip 5-lobed, 2 basal lobes \pm auriculate; 2 lateral lobes conduplicate; mid-lobe recurved, oblong, truncate; disk thickened, strongly convex, adaxially papillate, near base with 3 transverse channels. Column ca. 4 mm long.

Flowering time: April–June

Habitat: Epiphytic on trees or lithophytic on rocks in forests; 650–1000 m

Conservation status: VU

Distribution: Yunnan and Guangxi Province

***Pinalia salwinensis* (Hand.-Mazz.) Ormerod**
(Figs. 63 and 64)

Description: Epiphytic. Pseudobulbs densely arranged along rhizome, cylindric, 5–20 cm long, 0.3–0.4 cm in diam., apex 2–6-leaved. Leaves lanceolate, 5–10 cm long, 0.8–1.3 cm wide, sessile. Inflorescences 1–5, arising from subapex of rhizome, shorter than leaves, densely many flowered. Flowers yellow, lip dark yellow, pedicel and ovary yellowish brown pubescent. Lip oblanceolate, 3-lobed, mid-lobe nearly oblate. Column ca. 2.0 mm long.

Flowering time: June–July

Habitat: Epiphytic on tree trunks or rocks in forests; 800–1500 m

Conservation status: EN

Distribution: Yunnan Province

***Pinalia spicata* (D. Don) S. C. Chen & J. J. Wood**
(Figs. 65 and 66)

Description: Epiphytic. Pseudobulbs cylindric, 3–16 cm long, 0.5–1.5 cm in diam., apex 2–4-leaved. Leaves elliptic,

5–22 cm long, 1–4 cm wide. Inflorescences 1–3, arising from near apex of pseudobulb, 3–5 cm long, densely many flowered, with 2 basal sheaths; rachis, pedicel, and ovary densely rusty puberulent; floral bracts lanceolate, ca. 8 mm long. Flowers white, lip apex yellow. Dorsal sepal elliptic, ca. 6 mm long, 2.5 mm wide; lateral sepals ovate-triangular, oblique, ca. 6 mm long, 3.5 mm wide. Petals elliptic, ca. 5 mm long, 2 mm wide. Lip subrhombic in outline, ca. 5 mm long, 5 mm wide, base narrowed into a claw, 3-lobed; lateral lobes perpendicular to mid-lobe, ovate-triangular; mid-lobe deltoid, ca. 1 mm long, 1.5 mm wide, thickened. Column ca. 2 mm long.



Fig. 64 Plants of *Pinalia salwinensis*. (By Xiaohua Jin)



Fig. 63 Close up of flowers of *Pinalia salwinensis*. (By Xiaohua Jin)



Fig. 65 *Pinalia spicata*. (By Jianwu Li)

Flowering time: July–October

Habitat: Epiphytic on trees or on rocks in forests; 800–2800 m

Conservation status: LC

Distribution: Yunnan and Xizang Province; India, Nepal, Myanmar, and Thailand

***Pinalia szetschuanica* (Schltr.) S. C. Chen & J. J. Wood (Figs. 67 and 68)**

Description: Epiphytic. Pseudobulbs oblong, slightly curved, 10–30 cm long, 5–10 mm wide, apex 2–4-leaved. Leaves



Fig. 66 Inflorescence of *Pinalia spicata*. (By Deping Ye)



Fig. 67 *Pinalia szetschuanica*. (By Xiaohua Jin)

shortly petiolate, oblong lanceolate, 3.5–5 mm long, 0.4–0.7 cm wide. Inflorescences 1 or 2, 1–3-flowered; peduncle ca. 2 cm long, with small sheaths at base; rachis often brownish villous; floral bracts lanceolate, ca. 6 mm long. Flowers white, lip yellow; pedicel and ovary longer than floral bract, brown villous. Dorsal sepal elliptic, ca. 8 mm long, 3 mm wide; lateral sepals obliquely oblong, ca. 8 mm long, 4 mm wide. Petals obovate-oblong, ca. 8 mm long, 2 mm wide. Lip obovate, ca. 6 mm long, 5 mm wide, 3-lobed; lateral lobes \pm suborbicular, ca. 2.5 mm long, 2.5 mm wide; mid-lobe ovate, 2–3 mm long, ca. 2 mm wide, \pm thickened, adaxially papillate; disk with 3 veins from base to base of mid-lobe. Column ca. 3 mm long.

Flowering time: May–June

Habitat: Epiphytic on tree trunks or rocks in forests; ca. 2300 m

Conservation status: LC

Distribution: Guangdong, Sichuan, and Yunnan Province

***Pinalia yunnanensis* (S. C. Chen & Z. H. Tsi) S. C. Chen & J. J. Wood (Figs. 69 and 70)**

Description: Epiphytic. Pseudobulbs ellipsoid, 2.5–3 mm long, 1–1.5 cm in diam., 1- or 2-noded, usually with a smaller leaf near or above middle and 3 or 4 much larger leaves at apex. Apical leaves narrowly oblong-lanceolate, 8–16.5 cm long, 0.6–1.4 cm wide. Inflorescences 1 or 2, subterminal, 4.5–7.5 cm long, many flowered; floral bracts reflexed. Flowers greenish white, ca. 3 mm in diam. Dorsal sepal broadly ovate, ca. 3 mm long, 2 mm wide; lateral sepals obliquely ovate, similar in size to dorsal sepal. Petals ovate, ca. 2 mm long, 1.5–1.8 mm wide. Lip \pm cross-shaped in outline, 2–2.5 mm wide, base with a grooved claw 0.6–0.8 mm long, 3-lobed; lateral lobes more or less quadrate-flabellate, ca. 1 mm long, 1 mm wide, margins undulate;

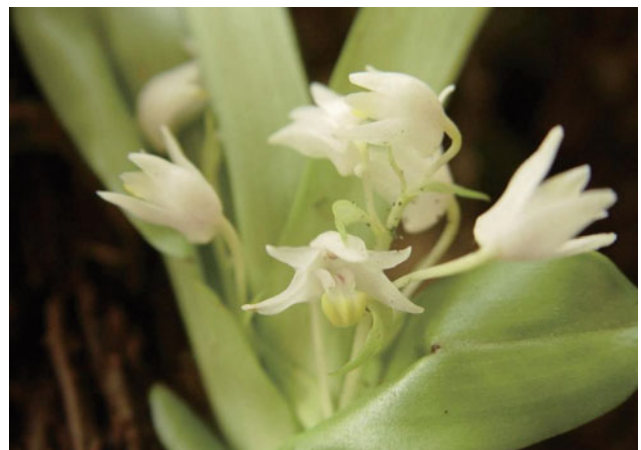


Fig. 68 Flowers of *Pinalia szetschuanica*. (By Xiaohua Jin)



Fig. 69 Plants and habitat of *Pinalia yunnanensis*. (By Jianwu Li)



Fig. 70 *Pinalia yunnanensis*. (By Jianwu Li)

mid-lobe oblong, ca. 1.2 mm long, 1 mm wide; disk with 4 or 5 slightly thickened veins. Column ca. 0.7 mm long.

Flowering time: July–August

Habitat: Trees in forests; ca. 1500 m

Conservation status: EN

Distribution: Yunnan Province

***Trichotosia* Bl.**

Trichotosia comprises about 50 species distributed from mainland Asia through Southeast Asia to New Guinea and Pacific islands (Chase et al. 2015; Pridgeon et al. 2005; Yan

Peng et al. 2018). There are five species in China (Chen et al. 2009; Zhou et al. 2021).

Key to species

1	Stems creeping, less than 6 cm long; inflorescence 1-flowered	2
–	Stems erect or pendulous; inflorescence 1–6-flowered	3
2	Leaves 5–10, alternate; plant erect, stem 4.0–6.0 cm long; lip with 5 abaxial conical apical calli	<i>Trichotosia microphylla</i>
–	Leaves 2–5; stems inconspicuous; lip without callus	<i>Trichotosia dasyphylla</i>
3	Stems pendulous, up to 100 cm long, old growth brown hispid; inflorescence 3–6-flowered; flowers white	<i>Trichotosia pulvinata</i>
–	Stems erect, 3–8 cm long, white hirsute; leaves slightly narrower, 3–5 mm wide; inflorescence 1-flowered; flowers yellowish green; lip with 2 purple central calli	<i>Trichotosia dongfangensis</i>

***Trichotosia dasyphylla* (E. C. Parish & Rchb. f.) Kraenzl. (Figs. 71 and 72)**

Description: Epiphytic. Plants 2–3 cm tall, with ± tufted rhizomes. Stem very short. Leaves 2–5, tufted, elliptic, 10–15 cm long, 4–6 mm wide; petiole 3–4 cm long, running down to a trumpet-shaped basal sheath. Inflorescences axillary, with a solitary flower; floral bracts triangular, persistent, ca. 2 mm long. Flowers pale yellow. Sepals with dense long white hairs abaxially; dorsal sepal ovate lanceolate, 3–4 mm long, 1–2 mm wide; lateral sepals obliquely triangular, 5–6 mm long, ca. 4 mm wide; mentum ca. 4 mm long, 2 mm wide. Petals oblong, 3–4 mm long, ca. 1 mm wide, abaxially with dense white long hairs. Lip obovate-oblong, 5–6 mm long, ca. 3 mm wide, slightly contracted at middle, thickened, abaxially with white long hairs, margin ciliate, with 2 suboblong calli on both sides, with a slightly thickened area between calli. Column ca. 1.5 mm long; foot ca. 4 mm long.

Flowering time: March–May

Habitat: Trees in forests; 900–1600 m

Conservation status: VU

Distribution: Yunnan Province; India, Nepal, Myanmar, Thailand, Laos, and Vietnam

***Trichotosia dongfangensis* X. H. Jin & L. P. Siu (Figs. 73 and 74)**

Description: Epiphytic. Rhizome creeping, branching, ca. 1.5 mm in diam. Stems borne ca. 1 cm apart, 3–8 cm long, bearing 5–7 leaves closely arranged in 2 rows. Leaves fleshy, oblong to lanceolate, ca. 10 mm long, 5 mm wide,



Fig. 71 Flower of *Trichotosia dasyphylla*. (By Deping Ye)



Fig. 72 Plants of *Trichotosia dasyphylla*. (By Jianwu Li)

blade and sheath densely covered with white hairs. Inflorescence lateral, 1-flowered; floral bracts 4, subulate, 1–3 mm long, ca. 1 mm wide, hairy. Flower yellowish green. Sepals coarsely hairy abaxially; dorsal sepal narrowly elliptic, ca. 3 mm long, 2 mm wide; lateral sepals obliquely triangular, ca. 5 mm long, 3 mm wide, truncate. Petals lanceolate, ca. 2.5 mm long, 1.5 mm wide, glabrous. Lip entire, ligulate, ca. 7 mm long, 3 mm wide, shortly hairy, slightly concave at base, with a subglobose basal callus and 2 purple calli at center. Column ca. 1.2 mm long.

Flowering time: October–November
Habitat: Trees in forests; 1300–1500 m
Conservation status: DD
Distribution: Hainan Province

***Trichotosia microphylla* Bl. (Fig. 75)**

Description: Plants epiphytic, 4–6 cm tall, white hirsute. Rhizome long. Stems ± tufted or 1–1.5 cm apart, erect,



Fig. 73 Plants of *Trichotosia dongfangensis*. (By Xiaohua Jin)



Fig. 74 *Trichotosia dongfangensis*. (By Xiaohua Jin)

cylindric, 4–12 cm long, ca. 2 mm in diam., covered with leaf sheaths. Leaves 5–10, alternate leaf blade narrowly elliptic, 8–17 cm long, 3–5 mm wide. Inflorescence arising from upper portion of stem, opposite a leaf, 1-flowered; peduncle covered by 1 or 2 sheaths; floral bracts densely arranged, lanceolate, ca. 6 mm long, covered with long hairs, acuminate. Flowers yellow. Sepals white hirsute abaxially; dorsal sepal ovate, ca. 3 mm long, 1.5–2 mm wide; lateral sepals oblong, ca. 5 mm long, 3 mm wide; mentum ca. 4 mm long. Petals oblong, ca. 2.5 mm long, 1.5 mm wide. Lip subovate-oblong, ca. 5 mm long, 2.5 mm wide, slightly contracted near middle, abaxially hirsute,



Fig. 75 Plants of *Trichotosia microphylla*. (By Mingzhong Huang)



Fig. 76 *Trichotosia pulvinata*. (By Jianwu Li)

base connected at a right angle with column foot, margin entire; disk with 5 lamellae extending from base to near apex, near middle with a purple ellipsoid callus on either side.

Flowering time: April–June

Habitat: Trees in forests; 1000–1500 m

Conservation status: LC

Distribution: Hainan and Yunnan Province; Thailand, Vietnam, Malaysia, and Indonesia

***Trichotosia pulvinata* (Lindl.) Kraenzl. (Figs. 76 and 77)**

Description: Plants epiphytic, reddish brown tomentose. Stem pendulous, cylindrical, often to 50–100 cm long, 6–8 mm in diam., with many nodes, internodes ca. 2 cm. Leaves alternate along stem, lanceolate, oblique, 6–10 cm long, 1–1.8 cm wide, both surfaces reddish brown tomentose, sheathing at base; reddish brown tomentose. Inflorescence borne above middle of stem, arising opposite leaves, ca. 2 cm long, 3–6-flowered; floral bracts ovate-lanceolate, 5–6 mm long, reddish brown tomentose abaxially. Flowers white, flushed pink. Sepals reddish brown tomentose abaxially; dorsal sepal oblong, ca. 10 mm long, 3 mm wide; lateral sepals ovate-triangular, oblique, ca. 10 mm long, 4 mm wide. Petals lanceolate, ca. 8 mm long, 2 mm wide, glabrous. Lip subspatulate in outline, ca. 13 mm long, 4 mm wide, entire, margin reflexed; disk with an elongate pulvinate callus toward apex. Column ca. 4 mm long.

Flowering time: July

Habitat: Trees or rocks in forests; 800–2000 m

Conservation status: LC

Distribution: Guangxi and Yunnan Province; India, Myanmar, Thailand, Laos, Vietnam, Cambodia, and Malaysia



Fig. 77 Plants and habitat of *Trichotosia pulvinata*. (By Jianwu Li)

***Oxystophyllum* Bl.**

Oxystophyllum comprises about 36 species distributed from Southeast Asia to New Guinea and the Solomon Islands. There is one species in China (Chen et al. 2009; Zhou et al. 2021).

***Oxystophyllum changjiangense* (S. J. Cheng & C. Z. Tang) M. A. Clements (Figs. 78 and 79)**

Description: Epiphytic. Rhizome creeping. Stems erect or decumbent, 6–9 cm long, 2–4 mm in diam., branched or



Fig. 78 Plants of *Oxystophyllum changjiangense*. (By Mingzhong Huang)



Fig. 79 Plants and habit of *Oxystophyllum changjiangense*. (By Mingzhong Huang)

unbranched, completely enclosed in leaf sheaths. Leaves distichous, laterally compressed and shortly sword-shaped, 3–5 cm long, 6–10 mm wide, thickly fleshy, sheathing at base. Inflorescences often subterminal, ca. 1 cm long, flowers opening one at a time in succession; floral bracts broadly ovate, 4–7 mm long. Flowers spreading, purplish black. Dorsal sepal elliptic, 4–5 mm long, 2–2.5 mm wide; lateral sepals obliquely ovate-triangular, ca. as long as dorsal sepal and slightly broader, base oblique; mentum large. Petals oblong, 4–4.5 mm long, ca. 1 mm wide, rounded and mucronulate. Lip ligulate, 6–7 mm long, 2.5–3 mm wide, thickly fleshy, with a subapical wart abaxially, lateral margins slightly lacerate at middle, rounded, adnate to column foot at apex, recurved above middle. Column ca. 1.5 mm long.

Flowering time: May–December

Habitat: Trees or rocks in forests; under 1000 m

Conservation status: EN

Distribution: Hainan province; Indonesia

***Callostylis* Bl.**

Callostylis comprises about five species distributed in China, Eastern Himalayas, and Southeast Asia (Chase et al. 2015; Pridgeon et al. 2005; Yan Peng et al. 2018). There are two species in China (Chen et al. 2009; Zhou et al. 2021).

Key to species

1	Plants without pseudobulbs; rhizomes tufted, terete; stem long	<i>Callostylis bambusifolia</i>
–	Pseudobulbs well spaced along rhizome, 5–10 cm long, clavate to flask-shaped	<i>Callostylis rigida</i>

***Callostylis bambusifolia* (Lindl.) S. C. Chen & J. J. Wood (Figs. 80, 81, and 82)**

Description: Lithophytic. Stems clustered, cylindrical, 20–70 cm long, 3–7 mm in diam., with many internodes and leaves. Leaves distichous, mostly on upper part of stem; blade narrowly lanceolate, 10–22 cm long, 1–3 cm long. Inflorescences 2–7, arising from near apex of stem, opposite to leaves, 10–22 cm long; rachis usually zigzag; rachis, pedicel, ovary, and abaxial surface of floral bracts and sepals densely grayish brown hairy; floral bracts reflexed, obovate-oblong, ca. 5 mm long, adaxially sparsely hairy. Flowers white, with brownish red veins. Dorsal sepal oblong-lanceolate, ca. 12 mm long, 3 mm wide; lateral sepals obliquely oblong-lanceolate, ca. 10 mm long, 5 mm wide, obtuse. Petals oblong-lanceolate, ca. 11 mm long, 2.5 mm wide. Lip ovate-oblong in outline, ca. 10 mm long, 5–6 mm wide, subentire; lateral lobes rudimentary, base and apex ± thickened, mucronate, base with an upcurved claw ca. 2 mm

long; disk brownish red, with 3 densely white pubescent lamellae extending from base to apex, lamellae thickened at base, distally becoming thinner and disappearing. Column ca. 8 mm long.



Fig. 80 Plant and habitat of *Callostylis bambusifolia*. (By Deping Ye)



Fig. 81 *Callostylis bambusifolia*. (By Jianwu Li)



Fig. 82 Flowers of *Callostylis bambusifolia*. (By Jianwu Li)

Flowering time: November–December

Habitat: Trees or rocks in forests; 950–1 200 m

Conservation status: LC

Distribution: Guangxi and Yunnan Province; India, Myanmar, Thailand, and Vietnam

***Callostylis rigida* Bl. (Figs. 83 and 84)**

Description: Epiphytic. Rhizome creeping, 4–8 mm in diam.; internodes 1–2 cm long; cylindric sheaths 1–1.5 cm long. Pseudobulbs oblong-fusiform, 6–16 cm long, 2–3 cm in



Fig. 83 Plants and habitat of *Callostylis rigida*. (By Jianwu Li)



Fig. 84 Flowers of *Callostylis rigida*. (By Jianwu Li)

diam., distally 4- or 5-leaved. Leaf blade suboblong 12–17 cm long, 2.4–4.3 cm wide. Inflorescences often 2–4, racemose, 1.5–4.5 cm long, more than 10-flowered; peduncle 2.5–3.5 cm long, shortly brown tomentose; floral bracts reflexed, suborbicular, 3–4 mm long, both surfaces shortly tomentose. Flowers greenish yellow; sepals with grayish brown hairs abaxially and sparsely white pubescent adaxially; lip brown. Dorsal sepal elliptic, 8–10 mm long, 4–5 mm wide; lateral sepals slightly shorter and broader. Petals narrowly elliptic-obovate, 7–8 mm long, 3.5–4 mm wide. Lip \pm broadly cordate, 3.5–4 mm long, 2–3 mm wide, mucronate, with a cushion-like callus in basal half. Column curved forward at right angle.

Flowering time: May–June

Habitat: On trees or rocks in forests; 1100–1700 m

Conservation status: LC

Distribution: Yunnan Province; India, Myanmar, Thailand, Laos, Vietnam, Malaysia, and Indonesia

***Porpax* Lindl.**

Porpax comprises about 13 species distributed in mainland Asia with few species extending into Borneo. There are two species in China (Chen et al. 2009; Zhou et al. 2021).

***Porpax ustulata* (E. C. Parish & Rchb. f.) Rolfe (Figs. 85 and 86)**

Description: Epiphytic. Pseudobulbs flattened globose, 4–5 mm long, 5–6 mm in diam., covered with strongly reticulate-veined sheaths; reticulate veins convex. Leaves 2, developing at anthesis; leaf blade obovate, 1.5–2.5 cm long, 0.8–1.4 cm wide, base contracted into a short petiole,



Fig. 85 Plants of *Porpax ustulata*. (By Jianwu Li)

margin thinly ciliate, apex rounded or slightly acute; petiole 2–4 cm long. Inflorescence arising between 2 apical leaves, very short, 1- or 2-flowered. Flowers suberect, red, 6–7 mm long. Dorsal sepal ovate, 6–7 mm long, 3–4 mm wide, abaxially pubescent, connate to lateral sepals shortly at base; lateral sepals fused with each other at 1/2–2/3 their length, base dilated forming a subglobose sac, abaxially hairy. Petals spatulate, 5–6 mm long, ca. 2 mm wide, margin \pm erose, adaxially with faint small silvery white dots. Lip recurved, suboblong-lanceolate, ca. 2 mm long, 0.7 mm wide, base contracted, distal margin shortly fimbriate.

Flowering time: June

Habitat: Trees or rocks in forests; 1200–1500 m

Conservation status: LC

Distribution: Yunnan Province; Myanmar, Thailand, and Laos

***Ceratostylis* Bl.**

Ceratostylis comprises about 147 species distributed in tropical Asia to New Guinea and the Pacific Islands (Chase et al. 2015; Pridgeon et al. 2005; Yan Peng et al. 2018). There are four species in China (Chen et al. 2009; Zhou et al. 2021).

Key to species

1	Leaves subterete, grooved on one side; stem 6.0–18.0 cm long, only base enclosed in scale-like sheaths	<i>Ceratostylis subulata</i>
–	Leaves linear to narrowly oblong; stem less than 10.0 cm long, completely enclosed in scale-like sheaths	2
2	Leaves rather big, 35.0–65.0 mm long; flower big, dorsal sepal 5.0–6.0 mm long, ovary and sepals abaxially pubescent	<i>Ceratostylis himalaica</i>
–	Leaves small, 25.0 mm long; flower small, sepals 3.0 mm wide, ovary and sepals abaxially pubescent	<i>Ceratostylis siamensis</i>



Fig. 86 Plants of *Porpax ustulata*. (By Jianwu Li)

***Ceratostylis himalaica* Hook. f. (Figs. 87 and 88)**

Description: Plants epiphytic or lithophytic. Stems clustered, pendulous, dichotomously branched, completely enclosed in scale-like sheaths. Leaf blade linear, 3.5–6.5 cm long, 0.3–0.7 cm wide, obliquely notched; petiole 4–6 cm long. Inflorescence arising from leaf base, subcapitate, 2- or 3-flowered; floral bracts ovate, 4–5 mm long, 1.5–2 mm wide. Flowers small, white spotted with purplish red. Dorsal sepal oblong-ovate, 5–6 mm long, 2–3.5 mm wide, abaxially pubescent; lateral sepals broadly ovate, 3.5–4.5 mm long, abaxially pubescent. Petals linear, 3.5–4.5 mm long, ca. 1 mm wide, glabrous. Lip suboblong, cymbiform, 2–3 mm long, thickened, base deeply saccate, margin entire, apex with a cushion-like callus abaxially; disk slightly hairy.

Flowering time: April–June

Habitat: Trees or rocks in forests; 900–1700 m

Conservation status: LC

Distribution: Yunnan and Xizang Province; India, Bhutan, Nepal, Myanmar, Laos, and Vietnam



Fig. 87 Plants of *Ceratostylis himalaica*. (By Jianwu Li)



Fig. 88 *Ceratostylis himalaica*. (By Deping Ye)

***Ceratostylis siamensis* Rolfe ex Downie (Figs. 89 and 90)**

Description: Plants epiphytic. Stems clustered, stout, terminal 1-leaved. Leaf blade linear, 25 cm long, 3–4 mm wide, apex unequally 2-lobed. Inflorescence terminal, 1- or 2-flowered; floral bracts ovate, 4–5 mm long, 1.5–2 mm wide. Flowers white spotted with purplish red, lip pale yellow. Sepals abaxially pubescent; dorsal sepal oblong-lanceolate, 3 mm long, 1.5 mm wide; lateral sepals broadly ovate, 2.2 mm long, 3.0 mm wide. Petals narrowly oblong, 2.5 mm long, 1.0 mm wide. Lip oblong, 2.5–3.0 mm long, cymbiform, base deeply saccate, margin entire, apex with a cushion-like callus.



Fig. 89 Plants and habitat of *Ceratostylis siamensis*. (By Jianwu Li)



Fig. 90 Close up of flowers of *Ceratostylis siamensis*. (By Jianwu Li)

Flowering time: October–November

Habitat: Epiphytic on tree trunks or lithophytic on rocks in forests; 1500–1900 m

Conservation status: VU

Distribution: Yunnan Province; Thailand and Indonesia

***Ceratostylis subulata* Bl. (Fig. 91)**

Description: Plants epiphytic or lithophytic. Rhizome short. Stems clustered, cylindrical, rushlike, 6–18 cm long, apex with 1 leaf and 1 shortened inflorescence. Leaf subcylindric, 10–15 cm long, ca. 2 mm wide, attenuate toward apex. Inflorescence terminal, capitate, sessile, several flowered, base with several sterile bracts 5–7 mm long; floral bracts 4–6 mm wide. Flowers greenish yellow or yellow. Sepals oblong, ca. 2.5 mm long, 1 mm wide, abaxially hairy; lateral sepals slightly wider than dorsal sepal; mentum subclavate, ca. 0.5 mm wide, slightly 2-lobed, outer surface shortly hairy. Petals lanceolate-rhombic, ca. 3 mm long, 0.7 mm wide, glabrous. Lip somewhat spatulate, 2–3 mm long, ca. 1.5 mm wide, distal part thickened and fleshy, base narrowed into a claw; claw with 2 longitudinal lamellae adaxially.

Flowering time: June–November

Habitat: Trees or rocks in forests; 750–1100 m

Conservation status: LC

Distribution: Hainan Province; India, Myanmar, Thailand, Laos, Vietnam, Cambodia, Malaysia, Indonesia, and the Philippines



Fig. 91 Plants and habitat of *Ceratostylis subulata*. (By Xiaohua Jin)

***Cryptochilus* Wall.**

Cryptochilus comprises about ten species distributed in Eastern Himalayas, China, Laos, Myanmar, Thailand, and Vietnam (Chase et al. 2015; Pridgeon et al. 2005; Yan Peng et al. 2018). There are three species in China (Chen et al. 2009; Zhou et al. 2021).

Key to species

1	Pseudobulbs 1-leaved; sepals free, dorsally carinate	<i>Cryptochilus roseus</i>
–	Pseudobulbs 2-leaved; sepals connate into an urceolate tube, not dorsally carinate	2
2	Flower red; sepaline tube densely white pubescent abaxially	<i>Cryptochilus sanguinea</i>
–	Flower yellowish green; sepaline tube glabrous abaxially	<i>Cryptochilus lutea</i>

***Cryptochilus lutea* Lindl. (Figs. 92 and 93)**

Description: Epiphytic. Pseudobulbs clustered on a short rhizome, cylindrical, 1.5–3.5 cm long, 5–10 mm in diam., 2-leaved. Leaf blade narrowly oblong, 5–16.5 cm long, 1–2.5 cm wide; petiole 1–3 cm long. Inflorescence subdensely 20–40-flowered; floral bracts alternate, narrowly lanceolate, 6–14 mm long, grooved. Flowers yellowish green. Sepals connate into an urceolate tube, 3–5 mm wide, outer



Fig. 92 Plants of *Cryptochilus lutea*. (By Jianwu Li)

surface glabrous; free apical lobes ovate-triangular, ca. 1 mm wide; lateral sepals convex on one side; mentum saccate, short. Petals hidden in mentum, obovate-lanceolate, 3.5–4 mm long, ca. 0.8 mm wide. Lip subrhombic-cuneate, 3.5–4 mm long, ca. 0.8 mm wide, base slightly curved. Column short.

Flowering time: June–July

Habitat: Trees in forests; 1500–2300 m

Conservation status: LC

Distribution: Yunnan Province; Bhutan and India

***Cryptochilus roseus* (Lindl.) S. C. Chen & J. J. Wood (Figs. 94 and 95)**

Description: Lithophytic or epiphytic. Rhizome stout, ca. 1 cm in diam. Pseudobulbs contiguous, or 1–2 cm apart from each other, ovoid, 2–5 cm long, 1–2 cm wide, enclosed in sheaths when young, apex 1-leaved. Leaf blade lanceolate, 16–40 cm long, 2–5 cm wide; petiole 3–6 cm long. Inflorescence nearly as long as leaf, laxly 2–5-flowered. Flowers white or pink. Dorsal sepal ovate-oblong, ca. 12 mm long, 5 mm wide, dorsally carinate; lateral sepals triangular-lanceolate, ca. 14 mm long, 8–9 mm wide, dorsally carinate; mentum ca. 4 mm long. Petals subrhombic, ca. 11 mm long, 6 mm wide. Lip obovate-elliptic or subovate in outline, 13–14 mm long, 8–10 mm wide, base narrowed, 3-lobed; lateral lobes incurved, subovate; mid-lobe subspatulate, 4–6 mm long, 4–5 mm wide, apex emarginate; disk with 2 or 3 thickened lamellae running from base to base of mid-lobe, further divided into 7 thinner lamellae. Column ca. 6 mm long.

Flowering time: November to next February

Habitat: Trees or rocks in forests; ca. 1300 m

Conservation status: LC

Distribution: Hong Kong, Hainan, and Yunnan; Myanmar

***Cryptochilus sanguinea* Wall. (Figs. 96 and 97)**

Description: Epiphytic. Rhizome short. Pseudobulbs cylindrical, 1.5–3 cm long, 5–8 mm wide, 2-leaved. Leaf blade narrowly oblong, 6–15 mm long, 1.5–3 cm wide.



Fig. 94 Plants and habitat of *Cryptochilus roseus*. (By Xiaohua Jin)



Fig. 95 *Cryptochilus roseus*. (By Xiaohua Jin)



Fig. 93 Flowers of *Cryptochilus lutea*. (By Xiaohua Jin)



Fig. 96 Plants and habitat of *Cryptochilus sanguinea*. (By Xiaohua Jin)



Fig. 97 *Cryptochilus sanguinea*. (By Xiaohua Jin)

Inflorescence subdensely 10–30-flowered; rachis 4–9 cm long, glabrous; floral bracts distichous, subulate-lanceolate, 5–21 mm long, grooved, pubescent externally. Flowers 6–11 mm long, sepaline tube scarlet with purple apices, densely white pubescent; petals, lip, and column yellow. Sepals connate into a tube 6–9 mm long, outer surface densely white villous; free apical lobes ovate-triangular, 3–4 mm long; lateral sepals conspicuously convex on one side at base forming a saccate mentum. Petals hidden in mentum, oblanceolate, 5–6 mm long, ca. 1 mm wide. Lip completely hidden in sepaline tube, suboblong, ca. 7 mm long, 2 mm wide. Column short.

Flowering time: June–August

Habitat: Trees in forests; 1800–2100 m

Conservation status: EN

Distribution: Yunnan and Xizang Province; India and Nepal

***Appendicula* Bl.**

Appendicula comprises about 60 species distributed in tropical Asia and Oceania (Chase et al. 2015; Pridgeon et al. 2005; Yan Peng et al. 2018). There are four species in China (Chen et al. 2009; Zhou et al. 2021).

Key to species

1	Leaves rather small, 0.8–1.7 cm long; flower small; dorsal sepal ca. 2.5 mm	<i>Appendicula annamensis</i>
–	Leaves rather big, 2.5–3.5 cm long; flower big; dorsal sepal ca. 3.5 mm	<i>Appendicula cornuta</i>

***Appendicula annamensis* Guillaum. (Figs. 98 and 99)**

Description: Plants lithophytic. Stems tufted, densely leafy, to 33 cm long, ca. 1.5 mm in diam. Leaves spreading,



Fig. 98 Flowers of *Appendicula annamensis*. (By Mingzhong Huang)



Fig. 99 Plants and habitat of *Appendicula annamensis*. (By Mingzhong Huang)

distichous; blade pale green, ovate-oblong, 0.8–1.7 cm long, 0.5–0.8 cm long. Inflorescences usually pseudo-terminal, 5–20 mm long, successively ca. 20-flowered but usually with 1–3 flowers open at once; floral bracts ovate,

2–2.5 mm long, 1.5–2 mm wide. Flowers white. Dorsal sepal broadly ovate, ca. 2.5 mm long, 1.8 mm wide, weakly dorsally carinate; lateral sepals broadly obliquely ovate, ca. 3 mm long, 2.1 mm wide; mentum rather tapered, ca. 1 mm wide. Petals oblong-elliptic, ca. 2 mm long, 1 mm wide. Lip ca. 3 mm long, 2 mm wide, subglobose in basal half, in upper half a broadly ovate, subacute epichile; callus retrorse, subquadrate. Column ca. 1.5 mm long.

Flowering time: April–May

Habitat: Trees or rocks in forests; 300–700 m

Conservation status: LC

Distribution: Hainan Province; Vietnam

***Appendicula cornuta* Bl. (Figs. 100 and 101)**

Description: Plants epiphytic or lithophytic. Stems tufted, 20–50 cm long, 2–3 mm in diam., unbranched, internodes ca. 1 cm long, completely enclosed in tubular sheaths of leaves. Leaves many, distichous, alternate; blade narrowly ovate-elliptic, 25–35 mm long, 6–12 mm wide, apex unequally 2-lobed or emarginate, often apiculate, tubular-sheathed at base; sheaths persistent, ca. 1 cm long, amplexicaul. Inflorescence shorter than leaves, usually 1–1.5 cm long, 2–6-flowered; floral bracts lanceolate, 4–5 mm long. Flowers white, ca. 5 mm in diam. Dorsal sepal elliptic, ca. 3.5 mm long, 1.8–2 mm wide, concave; lateral sepals obliquely triangular, 4–5 mm long, 2–2.5 mm wide; mentum ca. 1 mm long. Petals ovate-oblong, 2.5–3 mm long, ca. 1.5 mm wide. Lip suboblong, 3.5–4 mm long, ca. 1.5 mm wide, slightly contracted near middle, margin



Fig. 100 Plants and habitat of *Appendicula cornuta*. (By Jianwu Li)

crisped, distal part with a thickened lamellate appendage, with another large appendage near base; basal appendage spreading backward, suborbicular. Column ca. 2 mm long.

Flowering time: July–August

Habitat: Trees or rocks in forests; ca. 800 m

Conservation status: LC

Distribution: Guangdong, Hong Kong, Hainan, and Yunnan; India, Myanmar, Thailand, Laos, Vietnam, Cambodia, Malaysia, Singapore, Indonesia, the Philippines, etc

***Podochilus* Bl.**

Podochilus comprises about 62 species distributed from India, Sri Lanka to China, south and east through Indonesia and New Guinea to the Pacific Islands (Chase et al. 2015; Pridgeon et al. 2005; Yan Peng et al. 2018). There are two species in China (Chen et al. 2009; Zhou et al. 2021).

***Podochilus khasianus* Hook. f. (Figs. 102 and 103)**

Description: Stems tufted, ascending, subterete, 4–12 cm long, internodes 3–4 mm long. Leaves many, distichous; blade narrowly oblong, often \pm falcately curved, 6–7 mm long, 1.5–2.5 mm wide, somewhat fleshy, with amplexicaul tubular sheaths at base, articulate, margin incurved. Inflorescence terminal or lateral, usually 2–4-flowered; floral bracts ovate-lanceolate, 1.5–2 mm long. Flowers white or tinged with green, very small. Dorsal sepal ovate-lanceolate, 2–2.2 mm long, 1–1.2 mm wide; lateral sepals ovate-triangular, 2.2–2.5 mm long. Petals suboblong, ca. 1.6 mm long, 0.7 mm wide. Lip oblong, 1–2.4 mm long, 0.8–0.9 mm wide, slightly thickened and incurved, attached at base to column foot by a distinct claw. Column short.

Flowering time: July–September

Habitat: Trees in forests; 450–1900 m



Fig. 101 Flowers of *Appendicula cornuta*. (By Jianwu Li)

Conservation status: NT

Distribution: Guangdong, Guangxi, and Yunnan Province and regions; India and Myanmar

***Thelasis* Bl.**

Thelasis comprises about 26 species mainly distributed from India eastward to New Guinea and Pacific Islands (Chase et al. 2015; Pridgeon et al. 2005; Yan Peng et al. 2018). There are two species in China (Chen et al. 2009; Zhou et al. 2021).

Key to species

1	Lateral sepals strongly carinate abaxially; lip incurved at margin	<i>Thelasis pygmaea</i>
–	Lateral sepals not carinate abaxially; lip not incurved at margin	<i>Thelasis khasiana</i>

***Thelasis khasiana* Hook. f. (Figs. 104 and 105)**

Description: Pseudobulbs contiguous, ovoid, 1–1.5 mm long, 1–1.5 cm in diam., apex with 1 leaf or sometimes with another smaller leaf. Larger leaf blade oblanceolate-linear, 9–12 cm long, 1.2–1.5 cm wide, base contracted into petiole 1.5–2 cm wide; smaller leaf blade (if present) subelliptic, ca. 1 cm long. Inflorescence arising from base of pseudobulb, 16–19 cm long; rachis slightly arching, 6–7 cm long, 20- or more flowered; floral bracts ovate-lanceolate, 2–2.5 mm long. Flowers yellowish green, not opening widely. Dorsal sepal ovate, 2.5–3.1 mm long, ca. 1.5 mm wide; lateral sepals similar to dorsal sepal, slightly cymbiform, abaxially not keeled or sometimes base slightly ridged. Petals narrowly oblong, 2.1–2.4 mm long, ca. 0.8 mm wide. Lip ovate lanceolate, ca. 3 mm long, 1.3 mm wide, margin not involute. Column short.

Flowering time: July

Habitat: Trees in forests; 800–2000 m

Conservation status: LC



Fig. 102 Plants of *Podochilus khasianus*. (By Jianwu Li)



Fig. 103 Flowers of *Podochilus khasianus*. (By Deping Ye)



Fig. 104 Flowers of *Thelasis khasiana*. (By Jianwu Li)



Fig. 105 Plants and habitat of *Thelasis khasiana*. (By Deping Ye)

Distribution: Yunnan Province; India, Myanmar, Thailand, Laos, Vietnam, Malaysia, Indonesia, the Philippines, etc

***Thelasis pygmaea* (Griff.) Bl. (Figs. 106 and 107)**

Description: Epiphytic. Pseudobulbs tufted, flattened globose, 3–10 cm long, 7–18 mm wide, apex often with 1 large leaf and 1 smaller leaf. Larger leaf blade narrowly oblong-oblongate, 4–8 cm long, 0.6–1.3 cm wide; smaller leaf blade suboblong, 0.7–1.5 cm long, sometimes absent. Inflorescence 10–20 cm long, slender; rachis \pm arching, 5–10 cm long, often thickened, densely many flowered. Flowers yellowish green, not opening widely. Dorsal sepal ovate-lanceolate, 2–2.5 mm long, ca. 1 mm wide; lateral sepals similar to dorsal sepal, cymbiform, abaxially keeled or sometimes narrowly winged. Petals suboblong, ca. 2 mm long, 0.7 mm wide. Lip ovate triangular, ca. 1.8 mm long, 1.2 mm wide, margin incurved. Column short.

Flowering time: April–October

Habitat: Trees or rocks in forests; under 1100 m



Fig. 106 *Thelasis pygmaea*. (By Jianwu Li)



Fig. 107 Flowers of *Thelasis pygmaea*. (By Deping Ye)

Conservation status: LC

Distribution: Taiwan, Hainan and Yunnan Province; India, Nepal, Myanmar, Thailand, Laos, Vietnam, Malaysia, Indonesia, and the Philippines

***Phreatia* Lindl.**

Phreatia comprises about 211 species mainly distributed in Indonesia and New Guinea with a few species extending into Australia and Pacific Islands (Chase et al. 2015; Pridgeon

et al. 2005; Yan Peng et al. 2018). There are five species in China (Chen et al. 2009; Zhou et al. 2021).

Key to species

1	Stem 4.0–10.0 cm long; leaves 7.0–20.0 cm long; lip suborbicular	<i>Phreatia elegans</i>
–	Stem very short; leaves 2–9 cm long; lip suboblate	<i>Phreatia formosana</i>

***Phreatia elegans* Lindl. (Figs. 108 and 109)**

Description: Plants epiphytic. Stems 4–10 cm long. Leaves elliptic-lanceolate, 7–20 cm long, 0.4–1.5 cm wide, articulate. Inflorescence 5–15 cm long, densely many-flowered with 3–5 tubular sheaths; floral bracts subovate, 1–1.5 mm long. Flowers white; pedicel and ovary slightly curved, ca. 0.3 mm in diam. Dorsal sepal broadly ovate, ca. 0.2 mm



Fig. 108 Plants and habitat of *Phreatia elegans*. (By Xiaohua Jin)



Fig. 109 Flowers of *Phreatia elegans*. (By Xiaohua Jin)

long; lateral sepals obliquely triangular, ca. 0.2 cm long. Petals ovate, ca. 1.5 mm long. Lip with a claw, disk suborbicular, pubescent, ca. 2.5 mm long, mentum saccate, ca. 0.1 cm long. Column truncate and short, apex with 2 horns, horn ca. 1 mm long.

Flowering time: July–August

Habitat: Rain forests; ca. 1100 m

Conservation status: DD

Distribution: Yunnan Province; India and Indonesia

***Phreatia formosana* Rolfe ex Hemsl. (Figs. 110 and 111)**

Description: Stems tufted, very short, not pseudobulbous, enclosed in leaf sheaths. Leaves subbasal, 4–6, distichous on short stem; leaf blade linear, 2.5–9 cm long, 2.5–6.5 cm wide. Inflorescence axillary, erect, 6–7 cm long, with 3 ovate-lanceolate sheaths below middle; rachis 2–5 cm long, many flowered; floral bracts subovate, 1–1.5 mm long. Flowers white or greenish white, ca. 2 mm in diam. Dorsal sepal elliptic-ovate, ca. 1.5 mm long, 1 mm wide; lateral sepals obliquely ovate-triangular, ca. 1.5 mm long, 1.5 mm wide, adnate to column foot and forming a mentum. Petals subelliptic, ca. 1 mm long, 0.6 mm wide. Lip suboblate, ca. 1 mm long, 1.3 mm wide, base with a short claw and slightly saccate. Column short, foot distinct.

Flowering time: August

Habitat: Trees in forests; 800–1800 m

Conservation status: VU

Distribution: Taiwan, Yunnan and Hainan Province; Vietnam and Thailand



Fig. 110 *Phreatia formosana*. (By Mingzhong Huang)



Fig. 111 Flowers of *Phreatia formosana*. (By Mingzhong Huang)

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