



Bulbophyllum cryptomeriicola, a new orchid species of Taiwan

Sheng-Kun YU¹, Chiu-Mei WANG², Kuo-Hsiung WANG³, Tsan-Piao LIN^{4,*}

1. 5 Fl., No. 37, Ln. 134, Sec. 3, Xinyi Rd., Taipei 106, Taiwan. 2. Department of Biology, National Museum of Natural Science, 1 Guanchien Rd., North District, Taichung 404, Taiwan. 3. College of Life Science, National Taiwan University, Taiwan. 4. Institute of Plant Biology, National Taiwan University, 1 Roosevelt Rd., Sec. 4, Taipei 106, Taiwan. *Corresponding author's tel: +886-2-33662537; email: tpl@ntu.edu.tw.

(Manuscript received 14 March 2022; Accepted 19 June 2022; Online published 1 July 2022)

ABSTRACT: This report presents one new orchid of Taiwan, viz., *Bulbophyllum cryptomeriicola* T.P. Lin and S.K. Yu. *Bulbophyllum cryptomeriicola* is a member of the section *Ephippium* with a sub-umbellate inflorescence, ciliate upper sepal and petals, glabrous lateral sepals which are much longer than the median one, and a stelidium without a tooth.

KEY WORDS: *Bulbophyllum albociliatum*, *B. hirundinis*, *B. kuanwuensis*, *B. taiwanense*, *Cirrhopetalum*, *Ephippium*, Orchidaceae.

INTRODUCTION

Bulbophyllum Thouars is a mega-diverse genus in the orchid family and one of the largest genera of flowering plants with more than 2200 species (accepted names from WCVP, March 2022), and the largest orchid genus in Taiwan with 35 species and varieties (Lin *et al.* 2019). Within *Bulbophyllum*, the *Cirrhopetalum* alliance (Garay *et al.* 1994) comprises of species more or less resembling *Bulbophyllum longiflorum* Thouars, which is the type of the genus *Cirrhopetalum* Lindl. This genus is now considered a section of *Bulbophyllum* by most authors (e.g Vermeulen, 2015). Likewise, all species of the *Cirrhopetalum* alliance are now included in various sections of *Bulbophyllum*.

One of these sections, sect. *Ephippium* (Bl.) Schltr. (Vermeulen, 2015: 83; synonym: section *Recurvae* in Vermeulen, 2014: 21) is particularly well-represented in the Taiwan flora. Based on senior author's estimation at least 20 out of 35 *Bulbophyllum* species and varieties native in Taiwan belong to this section (after item 12 in the artificial key). The Taiwanese species of section *Ephippium* are characterized by their subumbellate inflorescence, fimbriate dorsal sepal and petals, lateral sepals which are several times longer than the median and are connate along their upper margins, and stelidia without a tooth on the inner surface. The latter character distinguishes the section from sect. *Cirrhopetalum* (Lindl.) Rchb.f., not native in Taiwan, which includes some species resembling sect. *Ephippium* apart from the presence of a tooth on the inside of the stelidia.

Bulbophyllum cryptomeriicola sp. nov. is part of a group of taxa around *B. hirundinis* (Gagnep.) Seidenf., which all look rather similar and differ in small characters. Following is a list of all similar flower color species and varieties, with relevant synonyms:

Bulbophyllum hirundinis (Gagnep.) Seidenf., Dansk Bot. Ark. 29: 76 1973 publ. 1974. *Cirrhopetalum hirundinis* Gagnep. Bull. Soc. Bot. France 78: 5 1931. *B.*

remotifolium auct. non (Fukuy.) K. Nakaj.: Seidenfaden, 1973. Dansk Bot. Arkiv. 29: 1–260. Type: Vietnam: Sept. 11, 1886, *B. Balansa 2032* (MNHN-P-P00348062). *B. hirundinis* var. *rubriflorum* W.M. Lin, Wild Orch. Taiwan, An Illustr. Guide 149 and photo 2014. nom. nud. *B. hirundinis* var. *pinlinianum* W.M. Lin, Wild Orch. Taiwan, Illustr. Guide 148 and photo 2014. nom. nud. *B. karenkoensis* T.P. Lin, Taiwania 61(2): 83. 2016. syn. nov. Type: T.C. Hsu & S.W. Chung 109 (holo. TAI211529).

Bulbophyllum hirundinis var. *calvum* (T.P. Lin & W.M. Lin) T.P. Lin, Illustr. Nat. Taiwanese Orch. 302. 2022. *B. electrinum* Seidenf. var. *calvum* T.P. Lin & W.M. Lin, Taiwania 54(4): 325, f.2B. 2009. *B. karenkoensis* var. *calvum* (T.P. Lin & W.M. Lin) T.P. Lin, Orch. Fl. Taiwan 351. 2019. Type: Taiwan: Pingtung: Shouka, 350 m, May 25, 2009, *Weimin Lin s.n.* (holo. TAI268955).

Bulbophyllum taiwanense (Fukuy.) Seidenf., Dansk Bot. Ark. 29(1): 89. 1973. *B. taiwanense* (Fukuy.) K. Nakaj., Biol. Mag. Okinawa 10: 36. 1973 (Pub. Date: May 1974). *B. taiwanense* (Fukuy.) S.S. Ying, Bull. Exp. For. Natl. Taiwan Univ. 114: 157. 1974. Type: Taiwan: praef. Takao [Kaohsiung]: prope Botan-sya, collected by K. Segawa, Feb. 1934 cult. and flowering Mar. 1935, *N. Fukuyama 4731* (iso. KPM-NA0105522, photo T00004 in PoT).

Bulbophyllum albociliatum var. *remotifolium* (Fukuy.) T.P. Lin, Orch. Fl. Taiwan 333. 2019. *Cirrhopetalum remotifolium* Fukuy., Bot. Mag. (Tokyo) 49(586): 669–670. 1935. *B. remotifolium* (Fukuy.) K. Nakaj., Biol. Mag. 10: 36 1973. *B. remotifolium* (Fukuy.) S.S. Ying, Bull. Exp. Forest Nation. Taiwan Univ. 114: 156 1974. Type: Taiwan: Karenko, Nogogoe, Sakahen, Jul. 1933, *J. Ohwi 4710* (not in TAI or TI).

Bulbophyllum kuanwuensis S.W. Chung & T.C. Hsu, Taiwania 51(2): 139–142, f.1–5. 2006. Type: Taiwan: Hsinchu: Kuanwu, 2000 m. epiphytic on *Tsuga chinensis*, July 11, 2004, *Hsu 500* (holo. TAI277952).

Bulbophyllum hirundinis, also found in China and Vietnam, is a widespread species in Taiwan and prefers

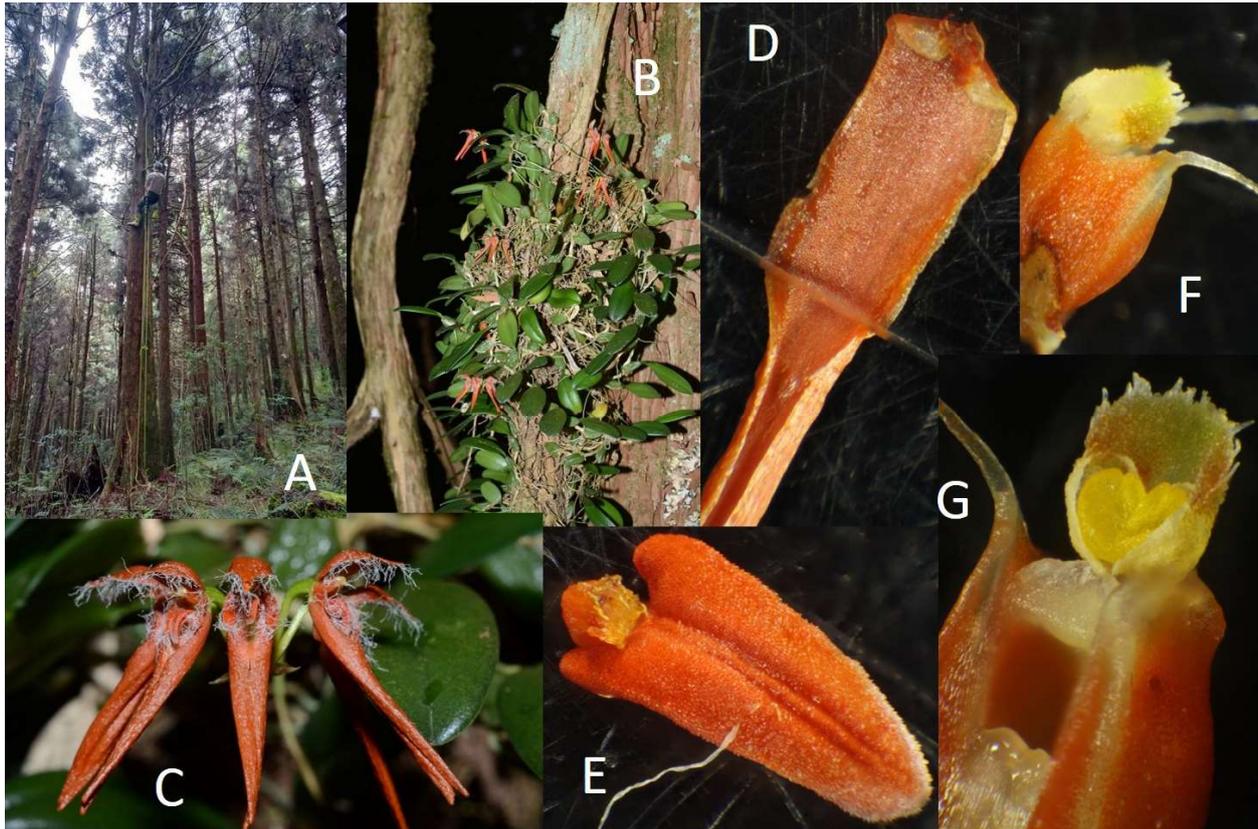


Fig. 1. Photos of *Bulbophyllum cryptomeriicola* T.P. Lin and S.K. Yu. **A:** Sheng-Kun Yu being lifted up a *Cryptomeria japonica* trunk. **B:** Habitat of the patch of *B. cryptomeriicola*. **C:** Inflorescence. **D:** Lateral sepal, spread out. **E:** Lip, view from above. **F:** Column, side view. **G:** Column with lifted anther-cap, with pollinia attached, view from below. A, B, and C provided by Sheng-Kun Yu; E-G, taken by T.P. Lin.

lower elevations below 1000 m, even though some can reach 1800 m. The other listed species are all endemic to Taiwan. *B. taiwanense* is restricted to the Hengchun Peninsula, southern Taiwan, at about 300 m, where they are overlapping with *B. hirundinis*. *B. albociliatum* var. *remotifolium* is found in northern part of Taiwan at an elevation of 1400–1800 m. *B. cryptomeriicola* and *B. kuanwuensis* both found in central mountain range at an elevation about 2000–2400 m. It seems that this group of taxa, most of them are in the section *Ephippium*, evolved from Taiwan and developed in different niches. To identify them are sometimes difficult because they have homogeneous vegetative parts. Probably the most useful diagnostic characters are lateral sepal morphology and cilia along their margins. Below, we compare *B. cryptomeriicola* with each species of the group in the “Diagnosis” and Table 1.

TAXONOMIC TREATMENT

Bulbophyllum cryptomeriicola T.P. Lin & S.K. Yu, *sp. nov.*
柳杉捲瓣蘭 Figs. 1 & 2

Type: Taiwan: Chiayi Co., Alishan Township, 2200 m, Oct. 19, 2018, *Sheng-Kun Yu s.n.* (holo. TNM, S206748), Oct. 1, 2021, *Sheng-Kun Yu s.n.* (para. TAI, TAI289896).

Diagnosis: Among the species of the group of *Bulbophyllum hirundinis*, listed above, *B. cryptomeriicola* is uniquely characterized by the rhizomes which are suspended in the air but are not prostrate on bark and are supported by thick, erect roots. *B. cryptomeriicola* also differs from each of the species above as follows: from *B. hirundinis* and *B. hirundinis* var. *calvum* by shorter inflorescence and white cilia along perianth; from *B. taiwanense* by shorter inflorescence, white cilia along perianth and folded along midvein at the basal lateral sepal. *B. cryptomeriicola* may also look similar to *B. kuanwuense* and *B. albociliatum* var. *remotifolium*, because of similar flower color, but differs from *B. kuanwuense* by longer peduncle, longer and tapering lateral sepal (see also Table 1), and from *B. albociliatum* var. *remotifolium* by much thick rhizome, thick peduncle, rough surface on and tapering lateral sepals. *B. albociliatum* var. *remotifolium* has filament-like rhizome and peduncle.

Description: Epiphytic herb. Rhizomes thick, stiff, 1.5–2 mm in diam., suspended in the air not prostrate, supported by thick roots attached to bark. **Pseudobulbs** arranged ca. 1 cm apart, ovoid-conical, green, furrowed with age, ca. 0.8–1.5 × 0.5–0.8 cm. **Leaves** subsessile, oblong, leathery, 3–3.5 × 1.0–1.5 cm, obtuse to rounded

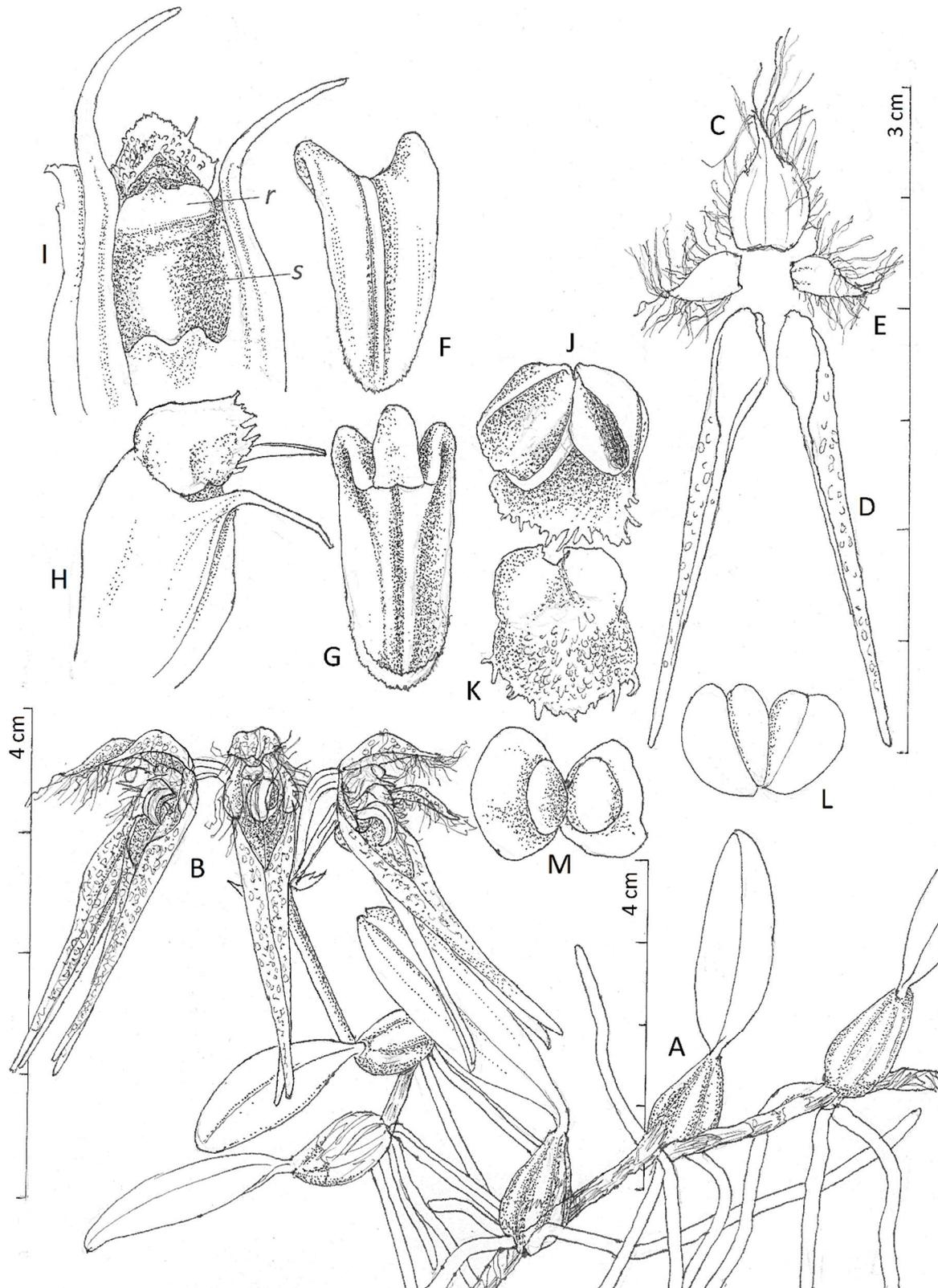


Fig. 2. *Bulbophyllum cryptomeriicola* T.P. Lin and S.K. Yu. **A:** Leaf, pseudobulb and rhizome. **B:** Inflorescence. **C:** Upper sepal. **D:** Lateral sepal. **E:** Petal. **F:** Lip, view from above. **G:** Lip, view from below. **H:** Column, side view. **I:** Upper column part, view from below. **J:** Anther-cap, view from below. **K:** Anther-cap, view from above. **L:** Pollinarium, view from below. **M:** Pollinarium, view from above. *r*, rostellum; *s*, stigma. Drawn by T.P. Lin.

**Table 1.** Comparison of *Bulbophyllum cryptomeriicola* with similar species of *Bulbophyllum* in Taiwan. Boldface text emphasizes important differences between species.

Species	<i>B. cryptomeriicola</i>	<i>B. hirundinis</i>	<i>B. hirundinis</i> var. <i>calvum</i>	<i>B. taiwanense</i>	<i>B. kuanwuensis</i>
Rhizome	Suspend (Fig. 1B)	Prostrate (Fig. 3A)	Prostrate	Prostrate	Prostrate
Distance between pseudobulbs	ca. 1 cm	0–0.5 cm* (Fig. 3A)	< 0.3 cm	0.5–1 cm	1 cm
Inflorescence length	4 cm	4.5–8 cm	6–11 cm	10 cm	1.5–2.0 cm
Flower color	Crimson-red (Fig. 1)	Aureate-orange (Fig. 3A)	Crimson to orange-red	Orange	Reddish-orange
Color of cilia of upper sepal and petals	White (Fig. 1C)	Orange-red (Fig. 3B)	Orange-red	Orange	White
Length of lateral sepal	1.7–2 cm	2.2–4.3 cm	1.8–2.3 cm	1.0–1.3 cm	1.2–1.5 cm
Base of lateral sepal	Folded along midvein	Folded along midvein	Folded along midvein	Not folded along midvein	Folded along midvein
Shape of lateral sepals	Tapering with narrow ends (Fig. 1C)	Tapering with narrow ends	Tapering with narrow ends	Tapering with narrow ends	Parallel with broad ends
Surface on lateral sepal	Rough (Fig. 1C)	Smooth (Fig. 3C)	Smooth	Smooth	Rough
Lip apex	Rounded (Fig. 1E)	Acute/obtuse (Fig. 3C)	Acute/obtuse	Acute/obtuse	Acute/obtuse
Anther-cap	Frontal edge of connectivum distinctly drawn out into a square beak (Fig. 1G)	Frontal edge of connectivum hardly drawn out into a beak	Frontal edge of connectivum hardly drawn out into a beak	Frontal edge of connectivum hardly drawn out into a beak	Frontal edge of connectivum drawn out into a narrow beak

*, This distance can reach 1.5 cm according to the type (*Balansa 2032* in Seidenfaden, 1973).

at apex, green, pale-green underneath. **Inflorescences** arising from base of pseudobulb, ca. 4 cm long, straight; peduncle thick, green, ca. 2.5 cm long and shorter than leaf length, with one sterile bract in middle; rachis very short, bearing 2–5 flowers in a subumbellate raceme. Ovary and pedicel ca. 1.2 cm long, light-green. Floral bract ovate, pale-orange, ca. 4 × 1.5 mm, erect, apex acute. **Flowers** ca. 1.8–2 cm long, brilliant crimson-red; upper sepal ovate-orbicular, concave, acuminate, ca. 5.5–6.3 × 3.5–4.0 mm, 3-veined, margin with long white cilia, cilia longer towards apex (3–3.6 mm long); lateral sepals obliquely lanceolate, tapering towards their tip, 1.7–2 cm long, 2.7 mm wide at base, hairless at upper and lower margins (Fig. 1D), folded longitudinally, obtuse at apex, surface rough, their upper edges often joined, opening of basal part of lateral sepals just below lip ca. 0.7 cm long or 1/3 length of lateral sepal; petals ca. 3.5 × 1.8 mm, with long white cilia, ca. 2.2 mm long, vein not visible. **Lip** fleshy and recurved, ligulate, tapering, ca. 2.5 × 1 mm, disc shallowly grooved, also grooved deeply on lower side. **Column** semiterete, with two upwards and forwards curving stelia. Stigmatic surface deeply seated in a cavity below the rostellum. Rostellum erect, semi-orbicular. Anther-cap yellowish, frontal edge of connectivum distinctly drawn out into a square beak, margin serrulate; pollinia two, yellow, each with two unequal connate parts.

Flowering time: October.

Distribution and Ecology: Endemic to Taiwan. This species grows in clumps on conifer trunks at an elevation of 2200 m. The growth habitat is similar to that of *B. kuanwuensis* S.W. Chung & T.C. Hsu which has a very short inflorescence, shorter than 2 cm long (Table 1).

Etymology: The scientific name refers to the fact that the species grows as an epiphyte on *Cryptomeria japonica* (Thunb. ex L.f.) D. Don.

A key to the *Bulbophyllum* of Taiwan was provided as follows. To simplify the scheme, varieties were not included.

Artificial key to the Taiwanese species of the genus *Bulbophyllum*

- Pseudobulbs very small, inconspicuous, not much thicker than the rhizome 2
- Pseudobulbs conspicuous, much thicker than the rhizome 6
- Rhizomes very short; leaves clustered *B. pauciflorum*
- Rhizome long creeping, with distant pseudobulbs 3
- Inflorescences with 1 flower *B. drymoglossum*
- Inflorescences with 2–3 flowers 4
- Leaves elliptic, 1–2 cm long; lip limb cordate-orbicular *B. curranii*
- Leaves elliptic-orbicular, < 1 cm long; lip limb triangular 5
- Flowers yellowish-white; lip gradually curved at basal part .. *B. tokioi*
- Flowers yellowish-white tinged rose; lip abruptly reflexed at basal part *B. tenuislinguae*
- Inflorescence with several flowers, racemose. *B. insuloides*
- Inflorescence with 1 flower or inflorescence umbel-like 7
- Flowers solitary 8
- Flowers 2 or subumbellate 10
- Rhizome long creeping, with distant pseudobulbs *B. affine*
- Rhizome short, with pseudobulbs clustered or almost so 9
- Flowers green to yellowish-green; column long, stelia inconspicuous *B. pectinatum*
- Flowers yellowish-green, with dense reddish-purple dots; column stout, square or rectangular, stelia triangular *B. griffithii*
- Inflorescence with 2 flowers *B. sasakii*
- Inflorescence subcapitate or subumbellate 11
- Inflorescence subcapitate, flower about 10 and densely placed *B. rubrolabellum*
- Inflorescence subumbellate, flower number 2 or more 12
- Peduncle short, < 2 cm long *B. kuanwuensis*
- Peduncle longer than 2 cm 13



13. Distance between pseudobulbs ≥ 1 pseudobulb length 14
 – Distance between pseudobulbs < 1 pseudobulb length 23
14. Rhizome ca. 0.65 mm in diameter *B. albociliatum*
 – Rhizome > 1 mm in diameter 15
15. Rhizome suspended above erect thick root *B. cryptomeriicola*
 – Rhizome prostrate, adpress to trunk 16
16. Lateral sepals hairy on margins 17
 – Lateral sepals glabrous 18
17. Peduncle 1.8–3.5 cm long; lateral sepals with yellow cilia on margins *B. cilisepalum*
 – Peduncle < 3 cm long; lateral sepals with white hairs on margins
 *B. maxii*
18. Margins of upper sepal and petals with cilia 19
 – Margins of upper sepal glabrous 21
19. Lip limb narrowly triangular, apex acute *B. hirundinis*
 – Lip limb triangular, apex rounded 20
20. Lateral sepals green with red-brown streaks and spots; column with 2 conspicuous triangular wings on ventral side *B. pingtungense*
 – Lateral sepals with purple parallel striations; column without wings *B. melanoglossum*
21. Upper sepal and petals scarlet with dark-purplish-brown veins; lateral sepals bright yellow to orange; viscidium absent
 *B. retusiusculum*
 – Upper sepal and petals yellowish-brown; lateral sepals greenish-brown or brown; pollinia with large viscidium 22
22. Petals purple-red near apex, with dark cilia on margins
 *B. omerandrum*
 – Petals with purple-red spots, glabrous *B. umbellatum*
23. Leaf elliptic to oblong, 10–18 \times 3–6 cm *B. macraei*
 – Leaf oblong to linear-oblong, much smaller 24
24. Lateral sepals glabrous or nearly so 25
 – Lateral sepals ciliate 28
25. Lip with a globose thickening at apex *B. japonicum*
 – Lip without globose thickening 26
26. Lateral sepals spreading, not connate along their upper margins
 *B. taiwanense*
 – Lateral sepals twisted at base, connate along their upper margins ... 27
27. Flowers green; lip limb triangular *B. flaviflorum*
 – Flowers orange-red; lip limb narrowly triangular *B. hirundinis*
28. Upper sepal with rounded apex *B. fimbriperianthium*
 – Upper sepal with acute or acuminate apex 29
29. Lateral sepals < 3 cm long, with yellow thick cilia on margins *B. electrinum* var. *sui*
 – Lateral sepals often > 3 cm long, with minute greenish-yellow cilia on basal margins *B. setaceum*

ACKNOWLEDGMENTS

Bulbophyllum cryptomeriicola was first discovered in the type locality by Mr. Chi-Tung Hsu. We thank Dr. Ho-Yi Liu for comments on the new scientific names. We appreciate the constructive comments and editing received from Dr. Jaap Vermeulen, which greatly improved the manuscript.

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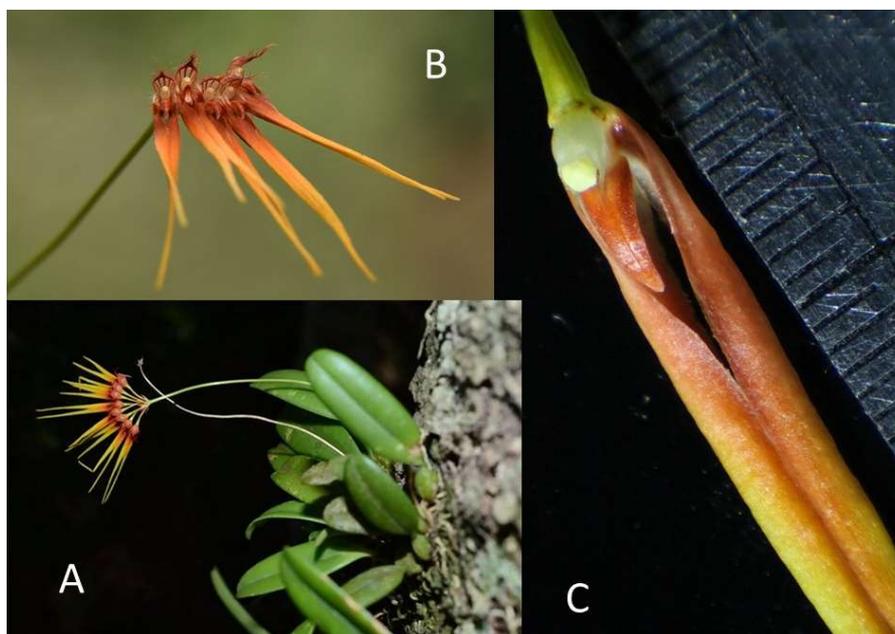


Fig. 3. Photos of *Bulbophyllum hirundinis* (Gagnep.) Seidenf. **A:** Habitat. **B:** Inflorescence. **C:** Lip, column and lateral sepals after removing the upper sepal and petals. A, taken by Sheng-Kun Yu; B, taken by Hsi-Chi Tsai; C, taken by T.P. Lin.