



Bulbophyllum tangerinum, a new orchid species of Taiwan

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(Manuscript received 17 December 2024; Accepted 1 April 2025; Online published 10 April 2025)

ABSTRACT: This report presents one new orchid of Taiwan, viz., *Bulbophyllum tangerinum* T.P. Lin. *Bulbophyllum tangerinum* is uniquely characterized by the presence of a long peduncle that exceeds 12 cm, orange-red flowers, and translucent twisted hairs on the lower margin of the lateral sepal. A full description, photos, and line drawings are provided. Also, a brief review of the *Cirrhopetalum* alliance of Taiwan is presented.

KEY WORDS: *Bulbophyllum albociliatum* var. *remotifolium*, *Bulbophyllum setaceum*, *Cirrhopetalum*, Ehippium, Orchidaceae.

INTRODUCTION

The *Bulbophyllum* Thouars genus exhibits great biodiversity in the orchid family and is one of the largest genera of flowering plants with 2182 species (according to accepted names from WCVP, November 2024) and the largest orchid genus in Taiwan with 41 species and varieties (Lin, 2023; Lin and Liu, 2025). Within *Bulbophyllum*, the *Cirrhopetalum* alliance (Garay *et al.*, 1994) is composed of species that can be recognized by their subumbellate inflorescences, sometimes with margin indument of the upper sepal/petals, and elongated lateral sepals that are twisted and connate for at least part of their length (Holttum, 1957; Seidenfaden, 1973). *Cirrhopetalum* is now considered a section of *Bulbophyllum* by most authors (e.g., Vermeulen *et al.*, 2015). Likewise, all species in the *Cirrhopetalum* alliance are now included in various sections of *Bulbophyllum*, which are mostly distinguished based on floral morphology (Vermeulen, 2014).

A molecular phylogenetic study changed the topologies established by the morphological view of the *Cirrhopetalum* alliance. Reconstruction of the phylogeny based on DNA sequence data (chloroplast (cp)DNA and nuclear ribosomal (nr)DNA) indicated that the *Cirrhopetalum* alliance consists of four major clades (A, B, C, and D) (Hu *et al.*, 2020). Clade D is the most complicated and consists of seven groups (D1–D7). All of the species included in D7, also known as the CIRR II group, which is located as the terminal group of the phylogenetic tree, are exclusively native to Taiwan. Many species in the D7 or CIRR II group bear hairy margins on the lateral sepal, a unique characteristic not seen in other clades of the *Cirrhopetalum* alliance.

Recently, an unknown *Bulbophyllum* was found in central Taiwan and was supposed to be a member of the section Ehippium with a very long and subumbellate inflorescence, ciliate upper sepal and petals, ciliate lower margin of the lateral sepals, and a stolidium without a

tooth. We surmised that this probably belongs to the CIRR II group based on Hu *et al.* (2020).

TAXONOMIC TREATMENT

Bulbophyllum tangerinum T.P. Lin, *sp. nov.*

丹華捲瓣蘭 Figs. 1 & 2

Type: Taiwan: Chiayi Co., Alishan Township, 2241 m, Oct. 19, 2024, Ching-Hwang Liu *s.n.* (holotype TAI 289946).

Diagnosis: *Bulbophyllum tangerinum* is uniquely characterized by a combination of 3 features: a peduncle longer than 12 cm, orange-red flowers, and lateral sepals carrying translucent, twisted hairs on the lower margin. *Bulbophyllum tangerinum* differs from *B. setaceum* T.P. Lin (Fig. 1J, K) by the orange-red flowers (vs. green flowers) and by a wider lateral sepal (vs. needle-like). *Bulbophyllum tangerinum* may also look similar to *B. maxi* W.M. Lin & Y.F. Wang ex. T.P. Lin and *B. albociliatum* var. *remotifolium* (Fukuy.) Lin, because of the similar flower color, but differs from *B. maxi* (Fig. 1I) by a longer peduncle (vs. a short peduncle), and restrictive long, translucent hairs on the lower margin of the lateral sepal (vs. long, white hairs on the entire length; Fig. 1I), and from *B. albociliatum* var. *remotifolium* by the much thicker rhizome (vs. a filiform rhizome), a rough surface on the perianth (vs. a smooth surface), and having hairs on the lower margin of the lateral sepal (vs. hairless on its entire length).

Description: Epiphytic herb. Rhizomes prostrate, thick, stiff, ca. 2 mm in diam. **Pseudobulbs** arranged ca. 1–2 cm apart, spindle-like or oblongoid, green, slightly furrowed with age, ca. 1.7–2.0 cm long, 1.1 cm in diam. **Leaves** shortly stalked, elliptic to oblong, leathery, 2.3–3.5 × 1.5–1.6 cm, obtuse to rounded at apex, dark-green, pale-green underneath. **Inflorescences** arising from base of pseudobulb, ca. 13–14 cm long; peduncle straight, ca. 1.2 mm thick, green, 12–13 cm long, with at least 3 sterile bracts; rachis very short, bearing ca. 8 flowers in a subumbellate raceme.

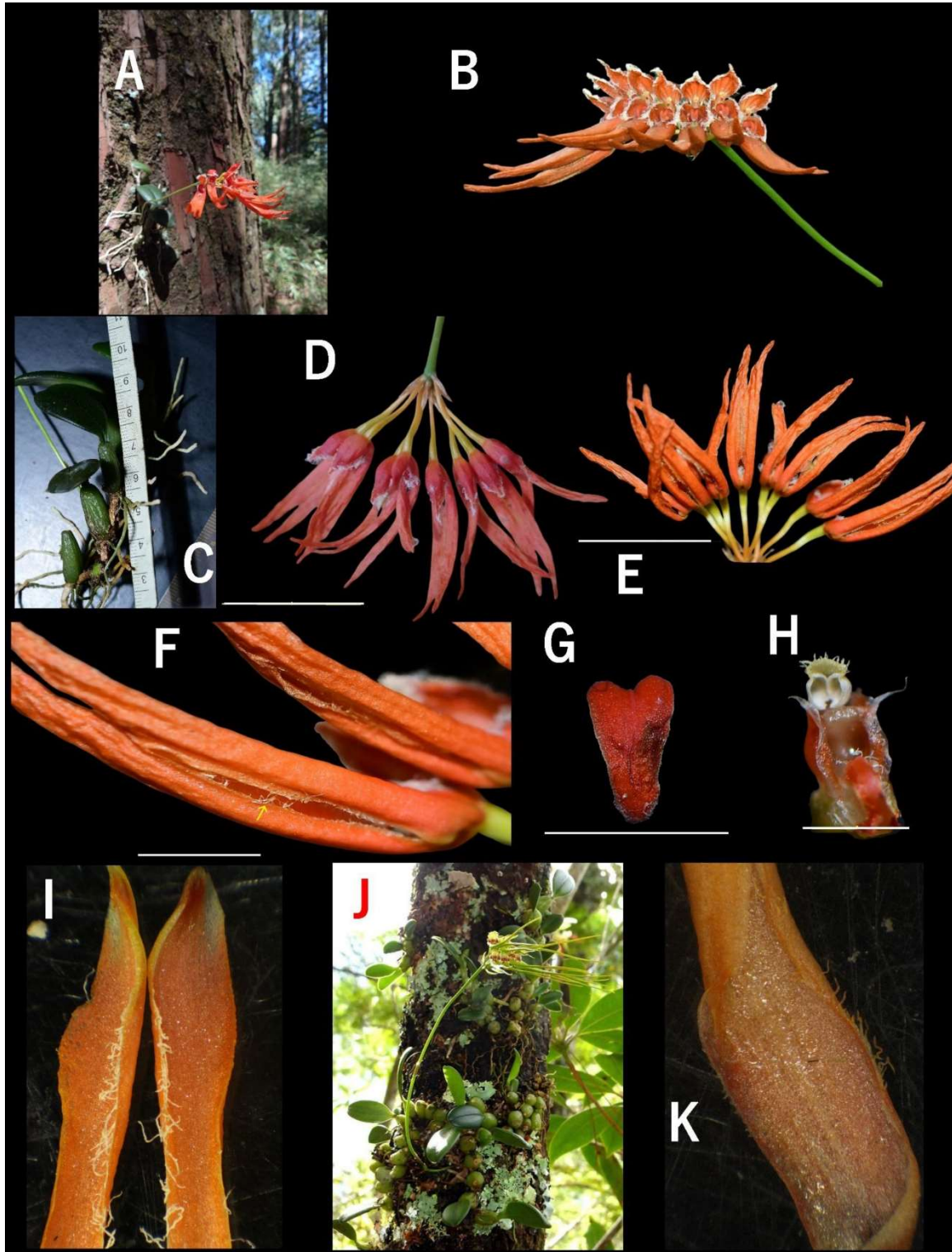


Fig. 1. Flower comparisons among *Bulbophyllum tangerinum* T.P. Lin (A–H), *B. maxi* W.M. Lin & Y.F. Wang ex. T.P. Lin (I) and *B. setaceum* T.P. Lin (J, K). **A.** *Bulbophyllum tangerinum* epiphytic on *Chamaecyparis formosensis*. **B.** Frontal view of the inflorescence. **C.** Plant and rhizome. **D.** Top view of the inflorescence. **E.** Bottom view of the inflorescence. **F.** Bottom oblique view of the inflorescence of *B. tangerinum* showing the long, twisted cilia (arrow) on a limited region of the lower margins of the lateral sepals. **G.** Top view of the lip. **H.** Ventral view of the column. **I.** Twisted white cilia along the entire lower margins of the lateral sepals (c. 2.7 mm wide) of *B. maxi*. **J.** Habitat of *B. setaceum*. **K.** Short cilia along upper and lower (right hand side) margins of the lateral sepals (c. 2.2 mm wide) of *B. setaceum*. Scale bar: D, E. = 2 cm, F. = 4 mm; G, H. = 2 mm; Photos taken by Fang-Mei Hsieh (A and D), Kuo-Chu Yueh (B), Ching-Hwang Liu (C, E–H), T.P. Lin (K) and Da-Ming Huang (J).

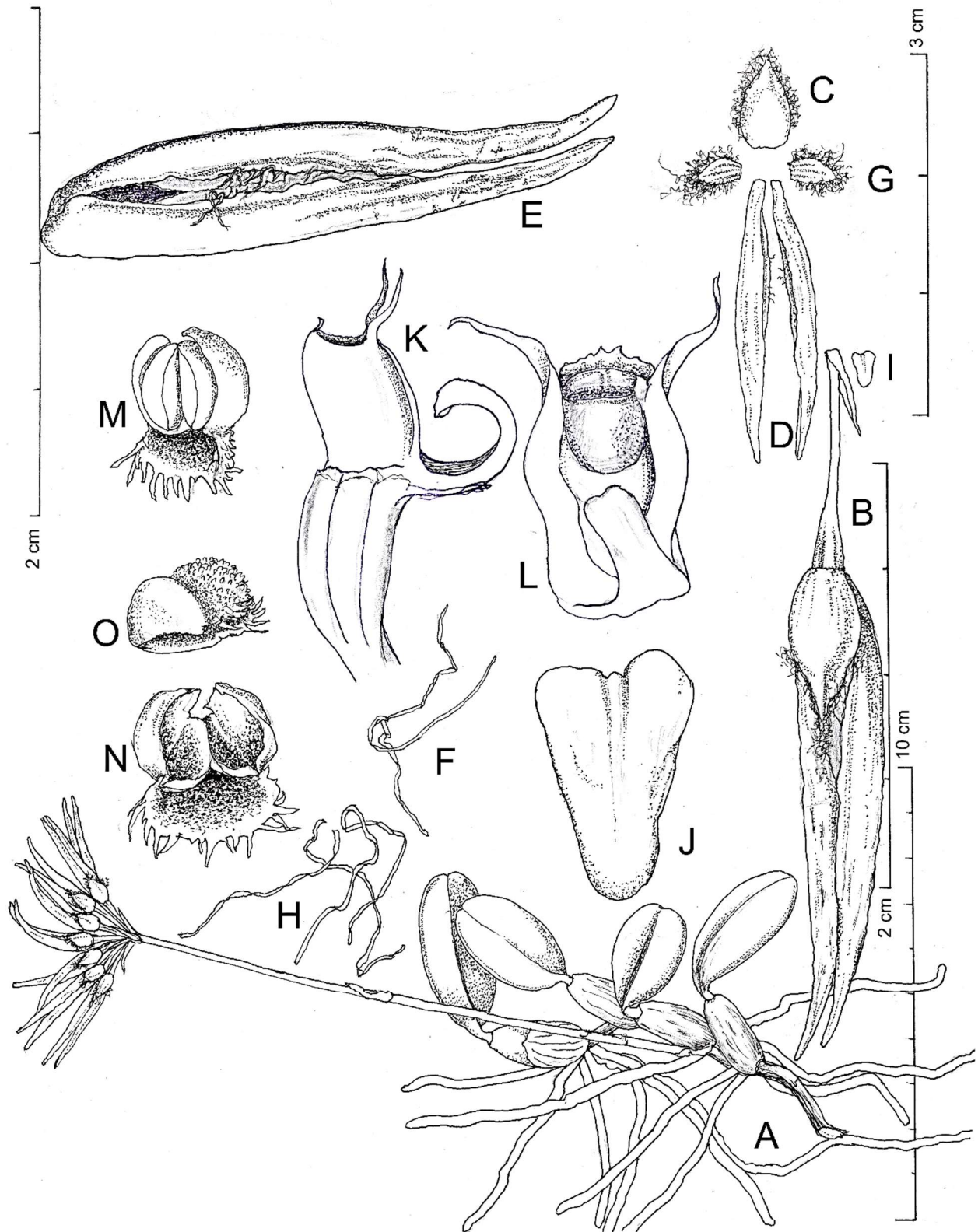


Fig. 2. Line drawing of *Bulbophyllum tangerinum* T.P. Lin. **A.** Flowering plant. **B.** Flower, view from above. **C.** Upper sepal. **D.** Lateral sepal, view from above. **E.** Lateral sepal, view from below. **F.** Hair on lower margin of lateral sepal. **G.** Petals. **H.** Hair on margin of petal. **I & J.** Lip. **K.** Column, side view. **L.** Column, view from below. **M.** Anther-cap and pollinia, view from below. **N.** Anther-cap, view from below. **O.** Anther-cap, side view. Drawn by T.P. Lin.

**Table 1.** Comparison of *Bulbophyllum tangerinum* with similar species of *Bulbophyllum* in Taiwan. Shading indicates shared features.

Species	<i>B. setaceum</i>	<i>B. tangerinum</i>	<i>B. maxi</i>	<i>B. albociliatum</i> var. <i>remotifolium</i>
Rhizome thickness	2 mm	2 mm	1.5–2 mm	0.65 mm
Peduncle length	12–16 cm	ca. 12 cm	2.2–2.5 cm	3–6 cm
Peduncle thickness	1.2–1.5 mm	1.2 mm	1.0 mm	0.5–0.6 mm
Flower color	Green, turning light orangish with age	Orangish-red	Orange or pale-green with orange tint	Orangish-red
Color of cilia of upper sepal and petals	White, yellowish-white, or greenish-white	White	White	White
Length of lateral sepal	3.4–4.4 cm	2.3–2.5 cm	2.1–3.0 cm	1.4–2.7 cm
Cilia on lower margin of lateral sepal	Short but mixed with a few long, twisted hairs	Minute but mixed with a few long, translucent, twisted hairs	Long, white cilia, hair with tiny branching	Glabrous
Shape of lateral sepals	Tapering and needle-like	Wider and strap-like with narrow ends	Wider and strap-like with narrow ends	Wider and strap-like with narrow ends
Anther-cap	Frontal edge of connectivum drawn out into a square beak	Frontal edge of connectivum drawn out into a square beak	Frontal edge of connectivum drawn out into a square beak	Frontal connectivum short

Ovary and pedicel ca. 1.0 cm long, light-green. Floral bract ovate, pale-orange, ca. 4–5 × 1.5 mm, erect, apex acute. **Flowers** ca. 2.3–2.5 cm long, brilliant tangerine; upper sepal cymbiform, elliptic, acuminate, ca. 7.0–7.5 × 3.5–4.0 mm, margin with long and dense twisted white cilia, cilia longer towards apex; lateral sepals oblong in profile, longitudinally folded, tapering towards their tip, 2.3–2.5 cm long, 4.5 mm wide at middle, obtuse at apex, surface not smooth, their edges often close but not entirely joined, nearly hairless on upper margin or with very short hairs near basal half, lower margin decorated with minute hairs mixed with long, translucent, twisted hairs (Fig. 1F arrow, Fig. 2E); petals ca. 4.5 × 2.6 mm, acute, with long, twisted, white cilia, with 3 major veins. **Lip** fleshy and recurved, ligulate, tapering, ca. 2.7 × 1.6 mm, rounded at apex, disc shallowly grooved, also grooved deeply on lower side. **Column** semiterete, 2–2.5 mm long, with 2 long needle-like curving steldia. Stigmatic surface deeply seated in a cavity below rostellum. Rostellum thick, semi-orbicular. Anther-cap whitish, frontal edge of connectivum distinctly drawn out into a square beak, margin serrulate; pollinia 2, yellow, each with 2 unequal connate parts.

Flowering time: September to October.

Distribution and ecology: Endemic to central Taiwan. This species grows in clumps on broadleaf or conifer trunks (Fig. 1A) at an elevation of 2200 m. In the vicinity, *B. insuloides*, *B. kuanwuense*, *B. maxi*, *B. retusiusculum*, and *B. setaceum* also occur. The growth habitat is similar to that of *B. maxi* which has a very short peduncle, about 2.2 cm long (Lin, 2021).

Etymology: The scientific name refers to the orange-red color of flowers.

Note: Among the 3 characteristics of *Bulbophyllum tangerinum* mentioned in the Diagnosis, both the orangish-red flowers and long peduncle are less diagnostic. A long peduncle reaching 10 cm is shared by *B. electrinum* var. *sui* T.P. Lin & W.M. Lin, *B. flaviflorum* (T.S. Liu & H.J. Su) Seidenf., *B. hirundinis* (Gagnep.) Seidenf., *B. macraei* (Lindl.) Rchb. f., *B. melanoglossum*

Hayata, *B. omerandrum* Hayata, *B. pingtungense* S.S. Ying & S.C. Chen, *B. setaceum* T.P. Lin (Fig. 1J, K) and *B. umbellatum* Lindl. among the 40-some species and varieties of *Bulbophyllum* in Taiwan (according to Lin, 2019), but only *B. electrinum* var. *sui* and *B. hirundinis* have orangish-red flowers. Orangish-red flowers are shared by at least 7 species, including *B. maxi* (Fig. 1I). Long, translucent, and twisted hairs appear in certain regions (Figure 1F arrow), while otherwise minute hairs are found along the lower margin of the lateral sepal, which is the most diagnostic and more or less similar to *B. setaceum*. When these 3 features are combined into a single species, they only occur in *B. tangerinum* (Table 1).

Identification of *Bulbophyllum* spp. is difficult because they have homogeneous vegetative parts. The most useful diagnostic characters are the lateral sepal morphology and cilia along their lower margins. The latter is unique and seems only to be reported in *Bulbophyllum* from Taiwan. Cilia on the lateral sepals usually differ between the upper and lower margins; the placement of cilia and the color shade and morphology of the hairs vary with species of *Bulbophyllum* (Lin, 2023). *Bulbophyllum cilisepalum* T.C. Hsu & S.W. Chung has the most complicated hair morphology. Each unit of hair on the lower margins consists of several long, yellow hairs grouped together, and each individual hair is branched (Lin, 2023). Since the D or CIRR II group is located at the terminal node of the phylogenetic tree of the *Cirrhopetalum* alliance (Hu *et al.*, 2020; Thawara *et al.*, 2024), the hairs on the lateral sepals would have only evolved in Taiwan. In the following, an artificial key is provided to differentiate species in the *Cirrhopetalum* alliance, which includes at least 20 species but not most of the varieties.

Artificial key to the Taiwanese species of the genus *Bulbophyllum* with a subumbellate inflorescence and a longer lateral sepal than upper sepal (*, refers to the D or CIRR II group). This key separates species mainly based on whether the margins of the lateral sepals are hairy or hairless.



1. Lateral sepals hairless 2
– Lateral sepals hairy 13
2. Peduncle short, ≤ 3.0 cm long 3
– Peduncle longer than 3.0 cm 4
3. Rhizome suspended above thick, erect root, >1.5 mm in diameter *B. cryptomericola*
– Rhizome prostrate, adpressed to trunk, ca. 0.65 mm in diameter *B. albociliatum* var. *brevipedunculatum**
4. Rhizome ca. 0.65 mm in diameter *B. albociliatum* var. *albociliatum**
– Rhizome > 1.0 mm in diameter 5
5. Leaf elliptic to oblong, $10\text{--}18 \times 3\text{--}6$ cm *B. macraei*
– Leaf elliptic, oblong to linear-oblong, much smaller 6
6. Upper sepal and petals with cilia on margins 7
– Upper sepal and petals glabrous 10
7. Apex of upper sepal hairy and often with 1 long hair; petals purplish-red near apex, with dark cilia on margins *B. omerandrum*
– Upper sepal and petal with ciliate margins 8
8. Flowers small, lateral sepals < 1.6 cm 9
– Flowers larger, lateral sepals an 3–4 cm *B. pingtungense*
9. Lateral sepals spreading, not connate along their margins
– Lateral sepals connate along upper margins, with purple parallel striations *B. taiwanense**
– Lateral sepals connate along upper margins, with purple parallel striations *B. melanoglossum**
10. Lip with a globose thickening at apex *B. japonicum*
– Lip without globose thickening at apex 11
11. Lateral sepals bright-yellow to orange and connate margins; upper sepal and petals scarlet with dark-purplish veins ... *B. retusiusculum*
– Lateral sepals connate along their upper margin; sepal and petal brownish or pale-yellow 12
12. Lateral sepals connate along their upper margin, obtuse at apex *B. linearibractium*
– Lateral sepals not connate along and parallel, acute at apex *B. umbellatum*
13. Peduncle ≤ 3.0 cm long 14
– Peduncle longer than 3.0 cm 16
14. Lateral sepal shorter than 1.5 cm long, with only a few minute cilia on upper and lower margins *B. kuanwuensis* var. *kuanwuensis**
– Lateral sepals longer than 1.8 cm, with dense long hairs 15
15. Lateral and upper sepals with yellow dense cilia along margins *B. cilisepalum*
– Lateral sepals with white hairs along margins, upper sepal hairless *B. maxi*
16. Sepals & petals with rounded apex; cilia of lateral sepals thick yellow and twisted *B. fimbriperianthium*
– Sepals & petals with acute apex; cilia of lateral sepals short or long, slender or thick 17
17. Lateral sepal with only a few minute cilia on basal upper margin 18
– Lateral sepal with long cilia on lower margins 19
18. Flower aureate-orange; upper sepal & petals with long reddish cilia along margins *B. hirundinis**
– Flowers greenish turning yellow; upper sepal and petals with long greenish cilia *B. flaviflorum**
19. Upper margin of lateral sepal nearly hairless *B. tangerinum*
– Upper margin of lateral sepal hairy 20
20. Flowers green turning orangish with age; sepals & petals decorated with yellowish to light greenish slender cilia on margins *B. setaceum*
– Flowers greenish to orangish-yellow; sepals & petals decorated with thick twisted yellow cilia on margins *B. electrinum* var. *sui**

ACKNOWLEDGMENTS

Bulbophyllum tangerinum was first discovered in the type locality by Mr. Kuo-Chu Yueh in 2023. We thank Dr. Ho-Yi Liu for comments on the new scientific names and Yu-Xuan Li for editing the images.

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