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NOTE

Bulbophyllum ×omerumbellatum, a natural hybrid of *B. umbellatum* and *B. omerandrum*

Tsan-Piao LIN*

*Institute of Plant Biology, National Taiwan University, 1 Roosevelt Rd., Sec. 4, Taipei 106, Taiwan. * Corresponding authors' tel: +886-2-33662537; email: tpl@ntu.edu.tw*

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ABSTRACT: This report presents the first natural hybrid of *Bulbophyllum* in Taiwan. *Bulbophyllum ×omerumbellatum* T.P. Lin shows some features similar to those of either purported parental species, viz., *B. umbellatum* and *B. omerandrum*, but most features are intermediate. A full description, photographs, line drawings, occurrence, ecology, and comparison of morphological characters among *Bulbophyllum ×omerumbellatum* and its parental species are presented.

KEY WORDS: *Bulbophyllum ×omerumbellatum*, *B. umbellatum*, *B. omerandrum*, Orchidaceae, Taiwan.

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). The loosely circumscribed "*Cirrhopetalum* alliance" is derived from genus *Cirrhopetalum* Lindl. and can be recognized by their subumbellate inflorescences, usually petals with fimbriate margins, lateral sepals with several times longer than upper sepal and twisted near the base so that connate along their upper margins (Holttum 1957, Seidenfaden 1973). I estimate that 19 species of a total of 35 species are in the *Cirrhopetalum* alliance. Based on morphological features, *Bulbophyllum ×omerumbellatum* was determined to be a member of the *Cirrhopetalum* alliance and a natural hybrid species which is proposed in this paper.

TAXONOMIC TREATMENT

Bulbophyllum ×omerumbellatum T.P. Lin, ***hybr. nov.***
樂氏捲瓣蘭 Figs. 1 & 2

Type: Taiwan: Chiayi Co., Alishan Township, 1650 m, Mar. 13, 2022, *Kuo-Chu Yueh s.n.* (holo. TAI, TAI289902).

Description: Epiphytic herb. Roots sprouting mainly below the pseudobulbs. Rhizomes woody, 2–3 mm in diam., prostrate to bark. **Pseudobulbs** arranged ca. 1 cm apart, ovoid-conical, green, furrowed with age, ca. 18–22 ×7–9 mm. **Leaves** solitary, terminal on pseudobulb, oblong, leathery, 80–110 × 15–17 mm, rounded and retuse at apex, green, pale-green underneath, petiole ca. 10 mm long. **Inflorescences** arising from base of pseudobulb, ca. 140–170 mm long; peduncle, green, ca. 120 mm long, with brownish-red streaks, and 3 sterile bracts in lower half, 10–12 mm long; rachis very short, bearing 2–5 flowers in a subumbellate raceme. Ovary and pedicel slender, ca. 31 mm long, light-green, speckled with reddish-brown. Floral bract ovate, green, speckled with reddish-brown, ca. 9 × 4 mm, acute. **Flowers** 14 mm across, ca. 22–24 mm long, green or yellowish-green, with dense specks on inner surface; upper sepal ovate-elliptic, concave, ca. 10–11 × 6.4–6.7 mm, apex round to mucronate, hairless, flushed with reddish-purple near apex; lateral sepals oblong, arcuate, 22–24 mm long, 4.5 mm wide at base, obtuse at apex, hairless on margins, smooth on surface, twisted near base, their edges often not joined and parallel, upper margin of each lateral sepal rolled inwards and folded in terminal half; petals ovate-elliptic, ca. 6–7 × 4.5 mm, round and slightly erose at apex, hairless, with reddish-purple specks near apex. **Lip** mobile, fleshy, recurved, triangular, linguiform top part, ca. 6 × 4 mm, with minute reddish-purple specks, disc shallowly grooved on upper side, also narrowly grooved on lower side, with 2 slight elevations along midrib, convex towards the tip. **Column** semiterete, stout, 4.5 mm long, with 2 erect and slightly forwards-curved short stelidia with acute tips (Fig. 1I), green, speckled with reddish-purple on wings and ventral side. **Stigmatic** surface deeply seated in a cavity below rostellum. Rostellum inconspicuous or insignificant. **Anther-cap** yellowish, more or less square, frontal edge of connectivum drawn out into a beak with fimbriate margins; pollinia 2, round, yellow, each with 2 unequal connate parts, attached to a round, yellowish viscidium.

Flowering time: March.

Distribution and ecology: Endemic to Taiwan at an elevation of 1650 m. In the habitat there are about 60 pseudobulbs of the hybrid growing in clumps on a single broadleaf tree trunk about 4 m above ground level. *Bulbophyllum ×omerumbellatum* and *B. umbellatum*

Table 1. Diagnostic morphological traits of ***Bulbophyllum ×omerumbellatum*** and its putative parental species ***B. omerandrum*** and ***B. umbellatum***.

Trait	***B. omerandrum***	***B. ×omerumbellatum***	***B. umbellatum***
Flower length	3.4 cm (Fig. 1B)	2.2–2.4 cm (Fig. 1B)	1.6 cm (Fig. 1B)
Sepals and petals	Dark reddish-purple spots (Fig. 1H)	Reddish-purple spots (Fig. 1F)	Faint reddish-purple spots (Fig. 1G)
Upper sepal apex	Reddish-purple, acute, often with 1 long hair (Fig. 1H)	With some reddish-purple spots, round to mucronate (Fig. 1F)	No reddish-purple spots, round or obtuse (Fig. 1G)
Lateral sepals, color	Yellowish-brown (Fig. 1E) or yellowish green (Fig. 1B)	Yellowish-green (Fig. 1B, C)	Yellowish-green (Fig. 1B, D)
Lateral sepal fold in terminal part	Flat (Fig. 1B, E)	Conduplicate (Fig. 1B, C)	Conduplicate (Fig. 1B, D)
Length ratio of petal to upper sepal	0.40 (Fig. 1H)	0.62 (Fig. 1F)	0.78 (Fig. 1G)
Petal shape	Oblong (Fig. 1H)	Ovate-elliptic (Fig. 1F)	Ovate-round (Fig. 1G)
Petal, hairiness at apex	Hairy (Fig. 1H)	Slightly erose (Fig. 1F)	Hairless (Fig. 1G)
Petal, color at apex	Dark reddish-purple (Fig. 1H)	Reddish-purple (Fig. 1F)	No reddish-purple (Fig. 1G)
Petal position	Spreading (Fig. 1E)	Moderately spreading (Fig. 1C)	Less spreading (Fig. 1D)
Lip length	Long (Fig. 2I)	Medium (Fig. 2G)	Small (Fig. 2H)
Lip surface	Hairless	Dense minute hairs	Dense minute hairs
Lip central groove	2 keels (Fig. 2I)	2 elevations (Fig. 2G)	Flat (Fig. 2H)
Lip decoration	Dense dots (Fig. 2I)	Dense dots (Fig. 2G)	Faint dots (Fig. 2H)
Anther-cap	Frontal edge of connectivum drawn out into a beak with fimbriate margins	Frontal edge of connectivum drawn out into a beak with fimbriate margins (Fig. 2K, L)	Fimbriate-free

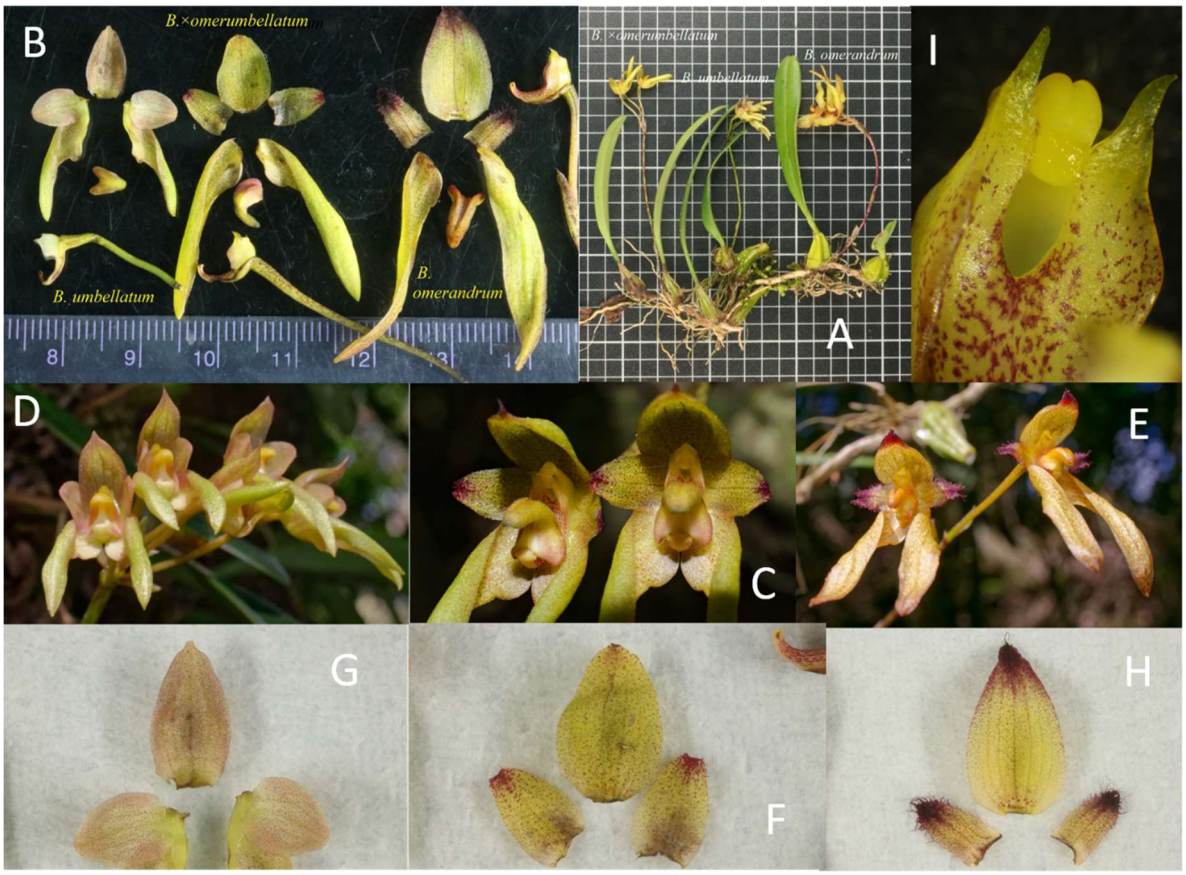

Fig. 1. ***Bulbophyllum ×omerumbellatum*** T.P. Lin, hybr. nov. and the purported parental species, ***B. umbellatum*** and ***B. omerandrum***. **A**. ***B. ×omerumbellatum*** (left) and parental species, ***B. umbellatum*** (center) and ***B. omerandrum*** (right). Square, 1 cm^2. **B**. Dissected flowers of these three species. **C**. Front view of flowers of ***B. ×omerumbellatum***. **D**. Front view of flowers of ***B. umbellatum***. **E**. Front view of flowers of ***B. omerandrum***. **F**. Upper sepal and petals of ***B. ×omerumbellatum***. **G**. Upper sepal and petals of ***B. umbellatum***. **H**. Upper sepal and petals of ***B. omerandrum***. **I**. Ventral view of top part of column of ***B. ×omerumbellatum***, showing the stelidia, pollinia and viscidium. A, B and G-H, photographs taken by TP Lin; C, D, and E, photographs taken by Kuo-Chu Yueh.

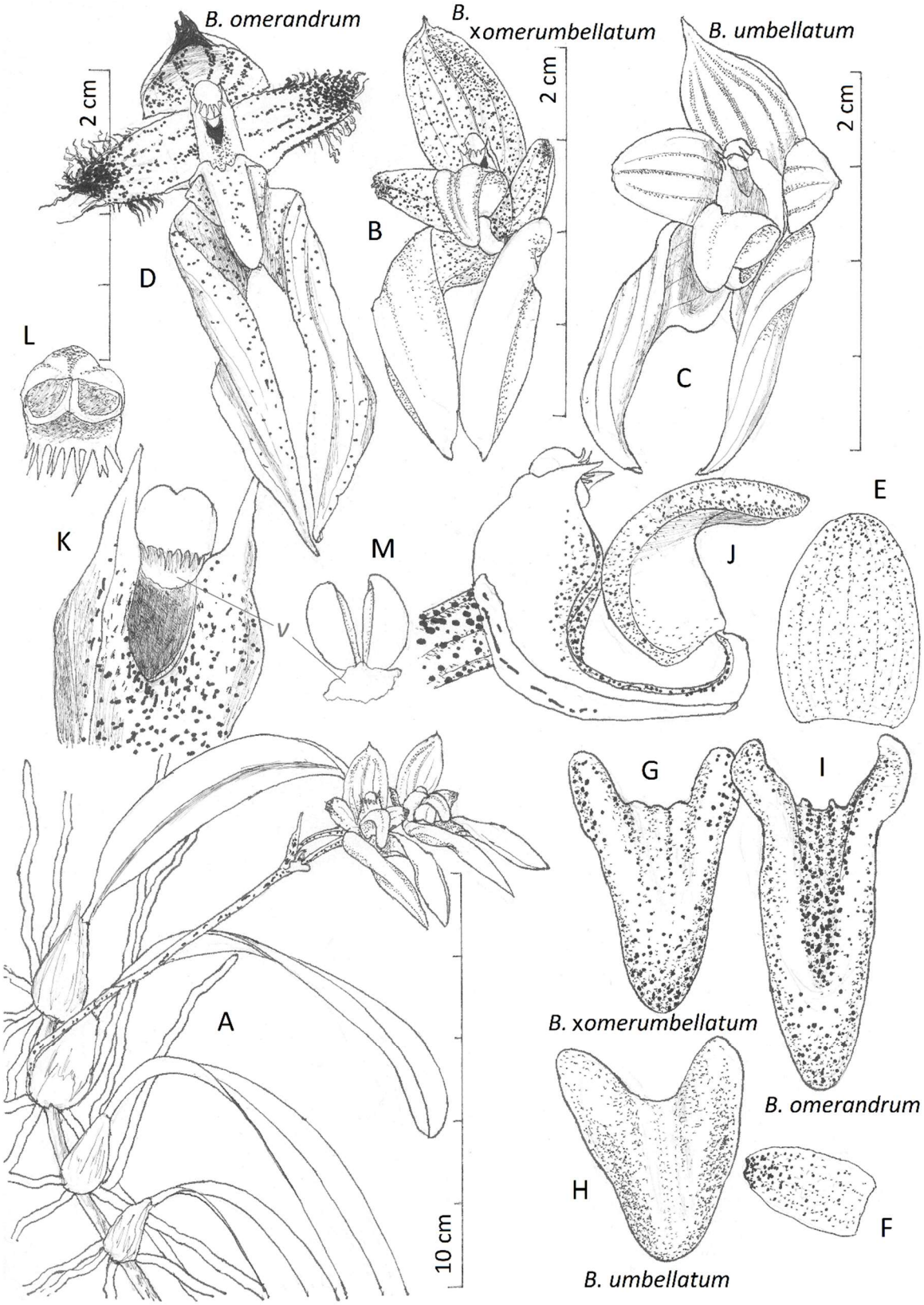

Fig. 2. ***Bulbophyllum* ×*omerumbellatum*** T.P.Lin. **A**: Habit. **B**: Flower. **C**: Flower of ***B. umbellatum***. **D**: Flower of ***B. omerandrum***. **E**: Upper sepal. **F**: Petal. **G**: Lip, view from above. **H**: Lip of ***B. umbellatum***. **I**: Lip of ***B. omerandrum***. **J**: Column and lip, side view. **K**: Top part of column. **L**: Anther-cap, view from below. **M**: Pollinarium. *v*, viscidium.

shared the same habitat but were on different trees; however *B. omerandrum* was not found in nearby trees, even though it only occurs in central Taiwan. Both *B. umbellatum* and *B. omerandrum* possess similar flowering phenology. They sometimes occur sympatrically but the latter is always found at slightly higher elevations.

Note: At first glance, *Bulbophyllum* ×*omerumbellatum*is is similar to *B. umbellatum* because of the greenish lateral sepal, and the appearance of the lateral sepals which are parallel and longitudinally folded near the tips (Fig 1B, C, D). Traits that are intermediate among *Bulbophyllum* ×*omerumbellatum*, *B. umbellatum,* and *B. omerandrum* were found when the flowers were closely examined (Table 1). For a comparison study, *B. umbellatum* was collected from a nearby tree (Chiayi Co., Alishan Township, 1650 m, Mar. 13, 2022, *Kuo-Chu Yueh s.n*. TAI289901), while *B. omerandrum* was collected from a nearby mountain (Nantou Co.: Dongpu Village, Mt. Wàng-Xiāng, 1800 m, Mar. 12, 2022, *Kuo-Chu Yueh s.n*. TAI289903).

Shading in Table 1 indicates traits shared between *Bulbophyllum* ×*omerumbellatum* and either parental species, while entries without shading of *B.* ×*omerumbellatum* indicate intermediate traits. Most of the 15 traits surveyed are considered intermediate, thus supporting the conclusion that *Bulbophyllum* ×*omerumbellatum* is a natural hybrid of *B. umbellatum* and *B. omerandrum*.

In a phylogenetic study of 28 Taiwanese and other Asian *Bulbophyllum* species, *B. umbellatum* was grouped together with *B. omerandrum* (Lin, 2010). In another study of 117 taxa, including all sections associated with the *Cirrhopetalum* alliance in Asia, *B. umbellatum* and *B. omerandrum* were placed in the same small CIRR1 group (Hu et al. 2020). These results indicate that a close genetic relationship exists between them. At elevations of 1500–2000 m in Alishan Township, about 10 native species of *Bulbophyllum* were found according to K.C. Yueh (pers. comm.), but no hybrid was previously documented. Although these two species are genetically closely related and abundant in central Taiwan, hybridization would still be difficult, because both species lack a functional rostellum, and have large pollinia and viscidia (Lin 2019). The pollinia and viscidia of both *B. umbellatum* and *B. omerandrum* became swollen and extended downwards to the area of stigma cavity when in the process of floral bud development which favors selfing. This same situation was observed in *B.* ×*omerumbellatum,* in which large pollinia and viscidia were also observed (Figs. 1I, 2K). The discovery of *B.* ×*omerumbellatum* indicates that hybridization is still possible when a pollinator is present. So far, *Bulbophyllum* ×*omerumbellatum* might be the only case of natural hybridization of *Bulbophyllum* found in Asia, and *B.* ×*cipoense* Borba & Semir of Brazil (Borba and Semir 1998) is the first case of natural hybridization registered for *Bulbophyllum* (WCVP 2022).

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