



## Notes on *Bulbophyllum* (Dendrobiinae; Epidendroideae; Orchidaceae): two new species and the dilemmas of species discovery via illegal trade

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### Abstract

*Bulbophyllum anodon* (section *Brachystachyae*) and *B. dasystachys* (section *Hirtula*) are described. *Bulbophyllum cylindraceum* is newly recorded for Thailand. *Bulbophyllum dhaninivatii* and *B. tripaleum* (section *Lemniscatae*) are synonymized. Notably, all specimens discussed in this paper first came to scientific attention via illegal trade. Although many new species have emerged as a result of commercial ventures, it is alarming that contemporary orchidological discovery in some regions continues to be driven by trade. We briefly discuss the tensions associated with describing new species discovered via illegal trade, including some of the associated scientific and moral implications.

### Introduction

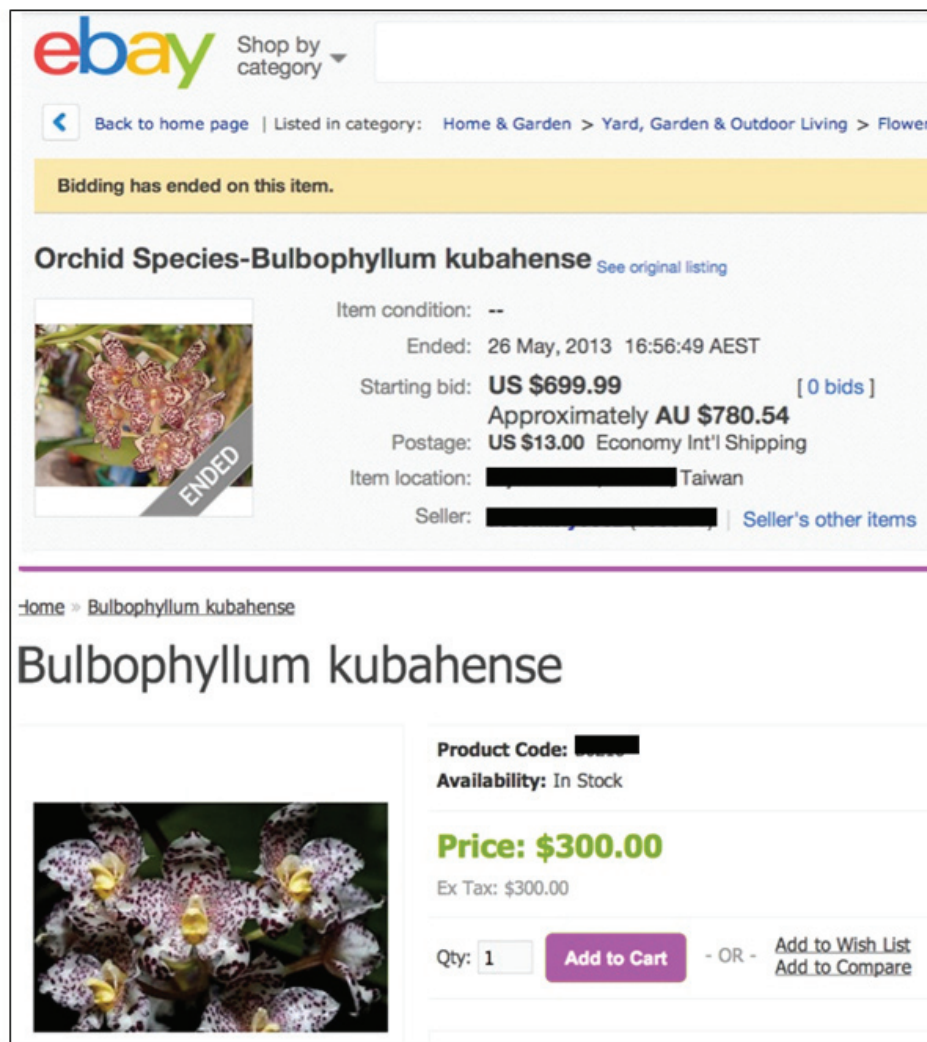
In preparation for a revision of *Bulbophyllum* Thouars (1822: t.3) for the *Flora of Thailand*, we are gathering information on local species. A regular check of the channels along which wild-collected plants are illegally traded, both close to the point of harvest (i.e., plant markets in Thailand) and among overseas nurseries, has previously yielded many new species discoveries. Botanical discovery has historically been heavily driven by commercial trade, notably by the botanical adventurers of the 19<sup>th</sup> and early 20<sup>th</sup> Centuries (Fry 2009).

Alarming, this remains a trend in the contemporary orchid taxonomy in some parts of the world. Notably, Southeast Asian biodiversity research has lagged behind other regions (Sodhi *et al.* 2004), where collection effort for some charismatic taxa remains heavily driven by commercial interests. Despite declining rates of species discovery (Joppa *et al.* 2011), many new Southeast Asian orchid species first come to scientific attention via illegal trade. This is particularly alarming because a recent comparison of species discovery and habitat loss rates in the region suggest that many undescribed species are likely to go extinct before they are formally identified (Giam *et al.* 2010). Moreover, these still undescribed species are more likely to have small geographic ranges, which increases extinction risks (Giam *et al.* 2012).

All information presented in this paper originates from the commercial trade of wild-collected plants. We proceed cautiously with these descriptions, and highlight two serious drawbacks to this method of scientific enquiry, both of which merit greater attention in both the taxonomic and conservation communities. One drawback is scientific: in our experience, commercial collectors rarely know the exact provenance of the plants they sell. Even if they know this information, they are often reluctant to share locality details, due both to concerns over legality and secrecy about procurement networks. Although it is sometimes possible to trace plants from markets to harvest sites, verifiable type localities are usually absent for species discovered via trade (e.g., George & George 2011; the species discussed here). Therefore, one can never be entirely certain that a plant reported to be of Thai origin was actually collected in Thailand (O'Byrne 2009). Moreover, there is considerable cross-border botanical trade in Southeast Asia, which further complicates efforts to ascertain origin data (Phelps 2014). This creates considerable potential for misinformation. Perhaps most significantly, a lack of locality and distribution data limits any potential for further ecological research or conservation planning, which can be critical in the context of highly collectible species.

Another significant drawback concerns a set of moral issues: taxonomists, by engaging with illegal trade and describing a new species, can contribute to species loss (e.g., Cribb 2005; Phimmachak *et al.* 2012). The formal

description of a new species can itself trigger increased harvest and massive price inflation, particularly where collectors are seeking rare specimens (Courchamp *et al.* 2006). This was recently illustrated for the newly described and spectacular *B. kubahense* Vermeulen & Lamb (2011: 52) from Sarawak, Malaysia. Historically traded as a luxuriant form of *B. refractilingue* Smith (1931: 145), this species received no special attention. However, following formal description as a new species, publication and associated press attention, in 2011 the species quickly acquired a ‘must have’ status among many collectors. Prices increased from tens to hundreds of dollars per plant (Fig. 1). Similar dynamics have been reported for a number of other charismatic, newly described orchid species (e.g., *Paphiopedilum vietnamense* Gruss & Perner, 1999: 3; Cribb 2005 ). As a result of this phenomenon, some recent species descriptions have purposively withheld type localities in order to limit the potential for commercial exploitation (e.g., Menegon *et al.* 2011). However, this approach is not available for species originally discovered via trade, for which illegal procurement networks are already established.



**FIGURE 1.** Screenshots of two online advertisements for *Bulbophyllum kubahense* (accessed Jan. 2014)

As such, it is with reservation that we publish the following results, cognisant of the scientific, professional and personal imperatives that drive publication, the need to ensure timely and thorough species descriptions, as well as the potential risk that publication will expose these species to exploitation. Perhaps fortunately, these are not particularly charismatic species, which will insulate them from harvest pressures. We also hope that artificially propagated plants can help to temper market price, and have plans to support efforts to introduce one into propagation. However, we also recognise that many collectors pursue species based purely on novelty and that cultivation can fail to satisfy the demand of wild-plant collectors (Phelps *et al.* 2013). As such, we have also flagged these species to the Secretariat of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and to Thailand’s CITES Secretariat for Plants prior to publication, with hopes that it will facilitate pre-emptive efforts to regulate prospective commercial trade.

## Taxonomic treatment

***Bulbophyllum anodon*** J.J.Vermeulen, Thavipoke & Phelps, *sp. nov.* (Figs. 2, 3)

**Type:**—Probably northwestern Thailand, *Phelps 8078* (BKF).

*Bulbophyllum cylindricoides* Chen & Shui (2006: 217) (invalid name).

**Diagnosis:** Most similar to *B. fissibrachium* Smith (1927: 166; Sumatra) and *B. repens* Griffith (1851: 293; China, Myanmar, Thailand, Sumatra) of section *Brachystachyae*; both species differ by having a patent, triangular, acute tooth along the lower margins of the stelidia. The first also differs by having a deltoid median sepal of approx. 3.6 mm wide, as well as by the auriculate lip; the second also differs by the retuse to truncate petal apex. Shares the diverging midveins of the lateral sepals with *B. divergens* Vermeulen & O'Byrne (2011: 88; Borneo, Sulawesi and New Guinea). The last species has longer pedicels (2.0–4.5 mm long), an obtuse median sepal, and elliptic(-obovate) lateral sepals.

Short-creeping epiphyte. Rhizome c. 5 mm diam., sections between pseudobulbs c. 1 cm long, rhizome scale fibres persistent. Pseudobulbs ovoid, c. 0.5 × 0.5 cm, not angular. Leaf erect to patent; petiole 0.2–5.0 cm long; blade elliptic to obovate, 6.0–14.0 × 1.6–3.5 cm, ratio length/width 3.3–4.8, rounded to obtuse. Inflorescence a dense, cylindrical raceme, 10–19 cm long, 50–60-flowered. Peduncle 7.5–15.0 cm long, scales c. 4. Rachis nodding, 2.5–4.0 cm long. Floral bracts c. 2 mm long. Flowers with pedicel plus ovary c. 1.5 mm long. Sepals creamy white to pale pink-purple, with slightly darker purple (-brown) veins and margins; median sepal free, somewhat recurved, ovate-triangular, c. 2.8 × 1.7 mm, ratio length/width 1.6–1.7; acute-acuminate, margins entire; glabrous, 3–5-veined; lateral sepals free, porrect, oblique, ovate, c. 3.5–1.9 mm, ratio length/width 1.8–1.9, rounded, margins entire, glabrous, triveined. Petals white with purple(-brown) vein, porrect, obovate-oblong, c. 2.2 × 1.0 mm, ratio length/width c. 2.2, acuminate, margins entire, erose apically, glabrous, 1-veined. Lip yellow, suffused brown-purple, or pale green, white towards the margins and with a dark brown spot near the base, slightly recurved above half-way along its length, elliptic, c. 2.1 × 1.4 mm, ratio length/width c. 1.5 (without spreading), obtuse, margins entire, minutely papillose basally, adaxially somewhat concave near the base, with 2 ridges that start near the base close to the margin and then converge but leave a depression in between, and end at about 3/5 along the length of the lip, apical part of lip slightly convex, adaxial surface glabrous but finely papillose towards the base, abaxially with a ridge near the base with a rounded crest, somewhat concave towards the apex, surface glabrous. Column including stelidia c. 1.2 mm long, stigma transversely elliptic. Stelidia porrect, c.0.6 mm long, oblong-triangular, acute, upper margin with an inconspicuous, antrorse, rounded wing near the apex, lower margin with a slight, patent, rounded wing lower down. Anther connective in front not or hardly drawn out. Pollinia 4.

**Distribution:**—Probably northwestern Thailand (plant purchased at Jatujak Market, Bangkok, from a long-established trader who reported an origin of Mae Hon Song Province); China (see below).

**Etymology:**—Anodous (Gr.) = toothless.

**Ecology:**—Unknown.

**Conservation status:**—Unknown, but occasionally found in the commercial trade in Thailand.

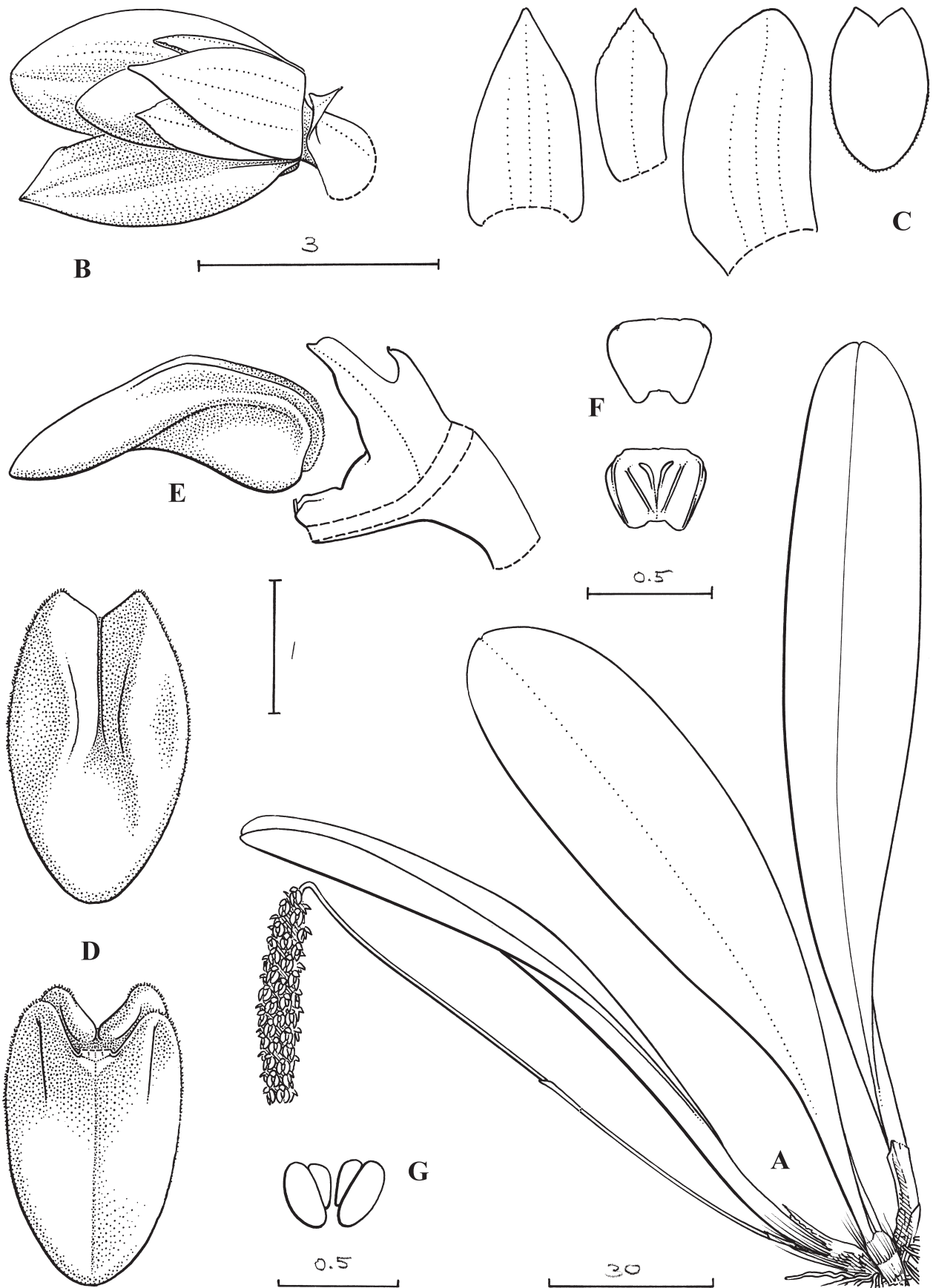
**Notes:**—Species indigenous to Thailand showing some similarity to *B. anodon* are *B. cylindraceum* Lindley (1830: 53; see below), which has a large bract just below the rachis, and *B. khasyanum* Griffith (1851: 284), which has flowers approximately twice as large as *B. anodon*. *Bulbophyllum cylindraceum* Lindley (1830–1840: 53) differs from *B. khasyanum* Griffith (1851: 284) by having a large bract just below the base of the rachis. Seidenfaden (1979: 180) erroneously lists the single Thai specimen of *B. cylindraceum* (*Kerr 187* from Doi Suthep) under *B. khasyanum*.

*Bulbophyllum cylindricoides* (Yunnan, China) is the same but was not validly published because no Latin description or diagnosis was provided and no type was indicated (*Vienna Code*, Art. 36.1 and 37.1); Chen & Vermeulen (2009: 436) incorrectly list *B. cylindricoides* as a synonym of *B. repens*.

***Bulbophyllum dasystachys*** J.J.Verm., Thavipoke & Phelps, *sp. nov.* (Figs. 4–7)

**Type:**—Origin unknown, *Vermeulen 3144, cult. Christiansen* (holotype L!, isotype BKF!).

**Diagnosis:** Most similar to *B. lindleyanum* Griffith (1851: 287; section *Hirtula*). This species differs by having larger flowers (median sepal 5.1–6.5 mm long), as well as a lip that is glabrous adaxially.

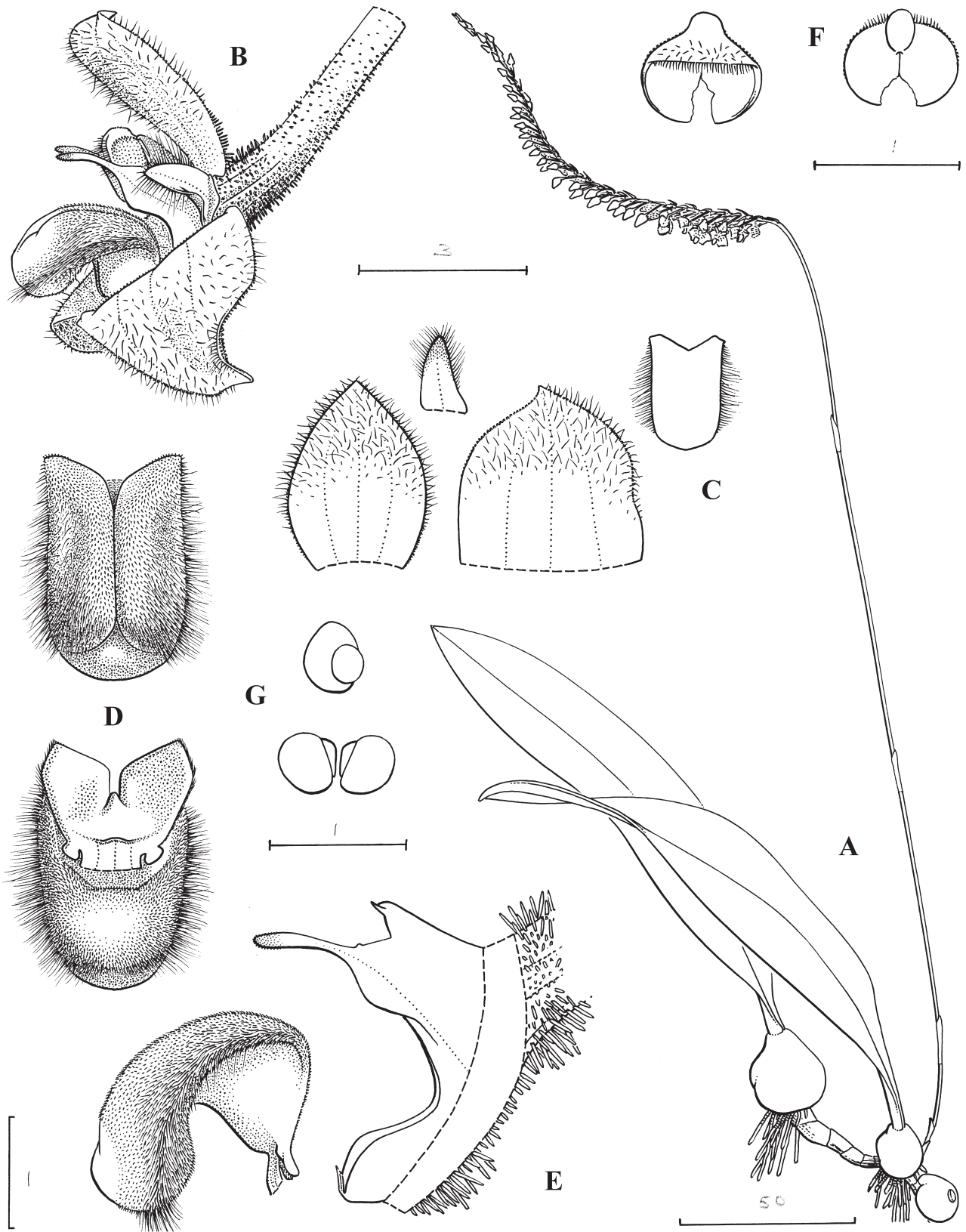


**FIGURE 2.** *Bulbophyllum anodon*. A. Plant. B. Flower. C. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip. D. Lip, above: adaxial side, below: abaxial side. E. Column and lip, lateral view. F. Anther, above: abaxial side, below: adaxial side. G. Pollinia, two pairs (origin: probably Thailand, *Phelps 8078*). Illustration: J.J. Vermeulen



**FIGURE 3.** *Bulbophyllum anodon* (origin: probably northwestern Thailand, *Phelps 8078*). Photo: P. Thavipoke

Creeping epiphyte with spreading roots. Rhizome 4–7 mm diam., sections between pseudobulbs 1.0–3.5 cm long. Pseudobulbs ovoid to depressed-conical, 1.3–2.8 × 1.5–2.6 cm. Leaf with petiole 1.8–3.0 cm long, blade elliptic, 14.0–15.0 × 2.3–2.8 cm, ratio length/width 5.3–6.1, acute. Inflorescence an erect to patent, elongate, dense raceme with the flowers spirally arranged, c. 34 cm long, c. 42-flowered. Peduncle c. 24 cm long, scales c. 5. Rachis green or blackish purple, with white or blackish purple papillae, approximately as thick as peduncle, slightly nodding at the base, c. 10 cm long, coarsely papillose with patent, elongate papillae; floral bracts 5–6 mm long. Flowers only opening a few simultaneously. Pedicel plus ovary 5–6 mm long, particularly towards the apex coarsely papillose with patent, elongate papillae, basal node c. 0.5 mm above the floral bract attachment. Sepals and petals pale green towards the base, yellow-green to blackish-purple towards the apex, with green or blackish-purple veins; papillae white to blackish-purple, long hairs yellow; median sepal free, recurved to spreading, apex reflexed, ovate, c. 3.3 × 2.6 mm, ratio length/width 1.2–1.3, acute, margins entire, papillose, towards the base with elongate papillae, as well as long-ciliate, adaxially hirsute with short hairs as well as pilose with scattered long hairs, abaxially coarsely papillose with patent, elongated papillae, triveined; lateral sepals as the median but ovate-triangular, c. 3.5 × 3.5 mm, ratio length/width c. 1, acute-acuminate, upper margin not long-ciliate. Petals porrect, triangular with a slightly widened base, c. 1.4 × 0.8 mm, ratio length/width



**FIGURE 4.** *Bulbophyllum dasystachys*. A. Plant. B. Flower. C. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip. D. Lip, above: adaxial side, below: abaxial side. E. Column and lip, lateral view. F. Anther, left: adaxial side, right: abaxial side. G. Pollinia, above: single pair, below: two pairs (origin unknown, Vermeulen 3144, cult. Christiansen). Illustration: J.J. Vermeulen



**FIGURE 5.** *Bulbophyllum dasystachys* (Vermeulen 3144, cult. Christiansen). Photo: J.J. Vermeulen

1.7–1.8, subacute, margins entire, minutely papillose and ciliate towards the apex, adaxially minutely papillose towards the apex, abaxially glabrous, 1-veined. Lip pale green, yellow-green or pale red towards the apex, apical callus green, abruptly recurved half-way along its length, distinctly auriculate near the ligament, (ovate-)oblong, c.  $2.1 \times 1.5$  mm, ratio length/width c. 1.4 (without spreading), rounded, margins entire, short-ciliolate as well as long-ciliate, less distinctly so near the apex, adaxially concave and with a short median ridge in a deep furrow near the base, this ridge in front enclosed by the sides of the furrow that converge and touch to form a median slit that continues until it abruptly opens widely again near the apex of the lip to allow space for a somewhat raised median callus, adaxial surface densely and finely hirsute except for the apical callus and the area near the base, this indument grading into coarser and longer hairs towards the margins, abaxially with a short, wide ridge near the base, convex towards the apex, surface glabrous but finely hirsute towards the apex. Column including stelidia c. 2.3 mm long, column foot somewhat swollen distally. Stelidia slightly downwards falcate, subulate with a slightly swollen, minutely papillose apex, c. 1.2 mm long, obtuse, upper margin with a minute, deltoid, acute tooth near the base, lower margin with a distinct, deltoid, rounded wing near the base. Anther with connective in front papillose-ciliate, abaxial ridge papillose.

**Distribution:**—Thailand, Prachinburi Prov., Khao Yai National Park, *Tripetch s.n.* (a photographic record), 25/11/2007.

**Ecology:**—*Tripetch s.n.* was found close to the forest floor on a tree bordering a stream, near a waterfall, at c. 700 m asl.

**Etymology:**—Dasys (Greek) = rough, stachys (Greek) = raceme.

**Conservation status:**—Unknown. Recorded from within a national park, albeit one that is a known source of wild plants for trade.

### *Bulbophyllum dhaninivatii* Seidenfaden (Section *Lemniscatae*)

Seidenfaden (1965: 154).

**Type:**—Thailand, Phu Mieng, *GT 5469* (C, not seen).

Heterotypic synonym: *Bulbophyllum tripaleum* Seidenfaden (1979: 203).

**Type:**—Thailand, Ban Mussoe, *GT 7279* (C, not seen).



**FIGURE 6.** *Bulbophyllum dasystachys* (Thailand, Khaoyai National Park, Tripetch s.n., 25/11/2007). Photo: P. Tripetch





FIGURE 7. *Bulbophyllum dasystachys*, in situ (Thailand, Khaoyai National Park, Tripetch s.n., 25/11/2007). Photo: P. Tripetch

**Notes:**—*Bulbophyllum dhaninivatii* and *B. tripaleum* are similar, except for the presence of the paleae on the sepals in the latter species. Next to this, the drawing of *B. tripaleum* in Seidenfaden (1979: 203) shows a lip with keels, but the description only mentions a ‘v-shaped concavity on upper surface’ We assume that he meant to describe the v-shaped ridge surrounding the basal cavity. If so, the lip is about identical to that of *B. dhaninivatii*. The sample *Phelps 2012* (Thailand) is intermediate between the two types. It has some flowers without paleae on the sepals, and others with much smaller paleae than in *B. tripaleum*. We identify *Phelps 2012* as *B. dhaninivatii* and conclude that both names refer to the same species. Plants lacking the paleae are occasionally found in other species in section *Lemniscatae* with paleate sepals, e.g. in *B. lemniscatoides* Rolfe (1890: 672) (var. *exappendiculatum* Smith, 1920: 92).

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