

## **New Species and New Records of Southeast Asian *Bulbophyllum* (Orchidaceae)**

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### **Abstract**

Seventeen new species of *Bulbophyllum* are described: *B. tectipes* (sect. *Aphanobulbon*, from Sulawesi), *B. pseudopelma* and *B. simplex* (both sect. *Desmosanthes*, from Sulawesi), *B. flavorubellum* (sect. *Desmosanthes*, from Sabah), *B. decurrentilobum* and *B. iterans* (both sect. *Hybochilus*, from Sulawesi), *B. furcillatum* (sect. *Hybochilus*, from Sumatra), *B. anisopterum* (sect. *Monilibulbus*, from Sabah), *B. anakbarippui* and *B. illecebrum* (both sect. *Osyricera*, from Sulawesi), *B. uncinatum* (sect. *Polyblepharon*, from Sulawesi), *B. catillus*, *B. lyriforme* and *B. sinapis* (sect. *Sestochilus*, all from Papua New Guinea), *B. coweniorum* (sect. *Sestochilus*, from Laos), *B. incisilabrum* (sect. *Sestochilus*, from Sulawesi), and *B. turpis* (sect. *Sestochilus*, from Peninsular Malaysia). *Bulbophyllum plumatum* Ames. and *B. spissum* J.J. Verm. are newly recorded for Peninsular Malaysia.

### **Introduction**

The collection of orchid species in Singapore Botanic Gardens appears an inexhaustible source of interesting plants. In this paper new species of the genus *Bulbophyllum* that recently came to light are described. Several more new species of the same genus, based on material from different sources (L, K) are added. Two *Bulbophyllum* species that are newly recorded for Peninsular Malaysia are discussed.

### *Bulbophyllum* sect. *Aphanobulbon*

***Bulbophyllum tectipes* J.J. Verm. & P. O'Byrne, sp. nov.** – Fig. 1.

*Bulbophyllum tectipes* J.J. Verm. & P. O'Byrne, inter species rhizoma patenti adpendenti inflorescentia multiflora sect. *Aphanobulbonis* foliis 9.5–15 cm longis, pedunculo omnino bracteis 3 vel 4 in duabus seriebus imbricatis acute carinatis tecto notatum. – TYPE: Indonesia, Sulawesi, central part, *SBG-O 1953* (SING, holo.).

*Roots* creeping along the rhizome towards its point of attachment, then spreading over the substrate. *Rhizome* patent to  $\pm$  pendulous with stiff,  $\pm$  patent branches, up to 80 cm long, 2–2.5 mm diam., sections between pseudobulbs 8–9 cm long, bracts hardly persistent, distinctly keeled. *Pseudobulbs* distant, minute, cylindrical, 0.2–0.25 x 0.2–0.25 cm. *Petiole* 0.5–0.9 cm long. *Leaf blade* elliptic to ovate, 9.5–15 x 2.3–3.2 cm, index (length/width) 4.1–4.9; acute. *Inflorescence* patent, a rather dense raceme, 4.4–10.4 cm long, 14–26-flowered. *Peduncle* 1.4–2.2 cm, bracts 3–4, distichous, imbricate, the longest 14–20 mm long; acuminate, sharply keeled. *Rhachis* 3–8.2 cm. *Floral bracts* triangular, c. 3.8 x 1.5 mm, acute. *Flowers* not resupinate, not fully opening, many simultaneously. *Pedicel* and *ovary* c. 2.2 mm long, basal node  $\pm$  flush with the surface of the rhachis. *Median sepal* somewhat recurved, elliptic, c. 6 x 2 mm, index c. 3; acuminate, margins entire, base broadly attached; thin, 3-veined, glabrous. *Lateral sepals* recurved, free, oblique, triangular, c. 6 x 2.8 mm, index 2.1–2.2; acute, otherwise as the median sepal. *Petals* porrect, elliptic, c. 2.6 x 0.8 mm, index 3.2–3.3; acute, margins entire, slightly papillose towards the tip, base rather narrowly attached; thin but somewhat thickened towards the tip, 1-veined, surface glabrous. *Lip* recurved  $\pm$  half-way, general outline  $\pm$  elliptic, c. 2.8 x 1.4 mm, index c. 2 (all without artificial spreading); acuminate, margins entire; rather thin, glabrous; adaxially concave and with 2 conspicuous, rounded knobs near the base, with a median furrow up to half-way the length of the lip, surface slightly convex towards the tip; abaxially with a distinct, truncate ridge up to half-way the length of the lip. *Column* c. 1 mm long, column foot with a low ridge starting at the base of the stigma, and continuing over 2/3 of the length of the column foot, column foot without a tooth just above the ligament. *Stelidia* porrect, triangular, c. 0.5 mm long, acute, along the lower margin with a distinct, triangular, subacute tooth. *Anther* abaxially with a slight crest distally, surface  $\pm$  glabrous, front margin not drawn out. *Pollinia* 2, semi-ellipsoid; no appendages present.

**Figure 1.** *Bulbophyllum tectipes* J.J. Verm. & P. O'Byrne a. Habit; b. Flower; c. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; d. Lip, left: adaxial side, right: abaxial side; e. Column and lip, lateral view; f. Anther, above: abaxial side, below: adaxial side; g. Pollinia, left: single, right: a pair. – All from *SBG-O 1953* (living plant, spirit sample).

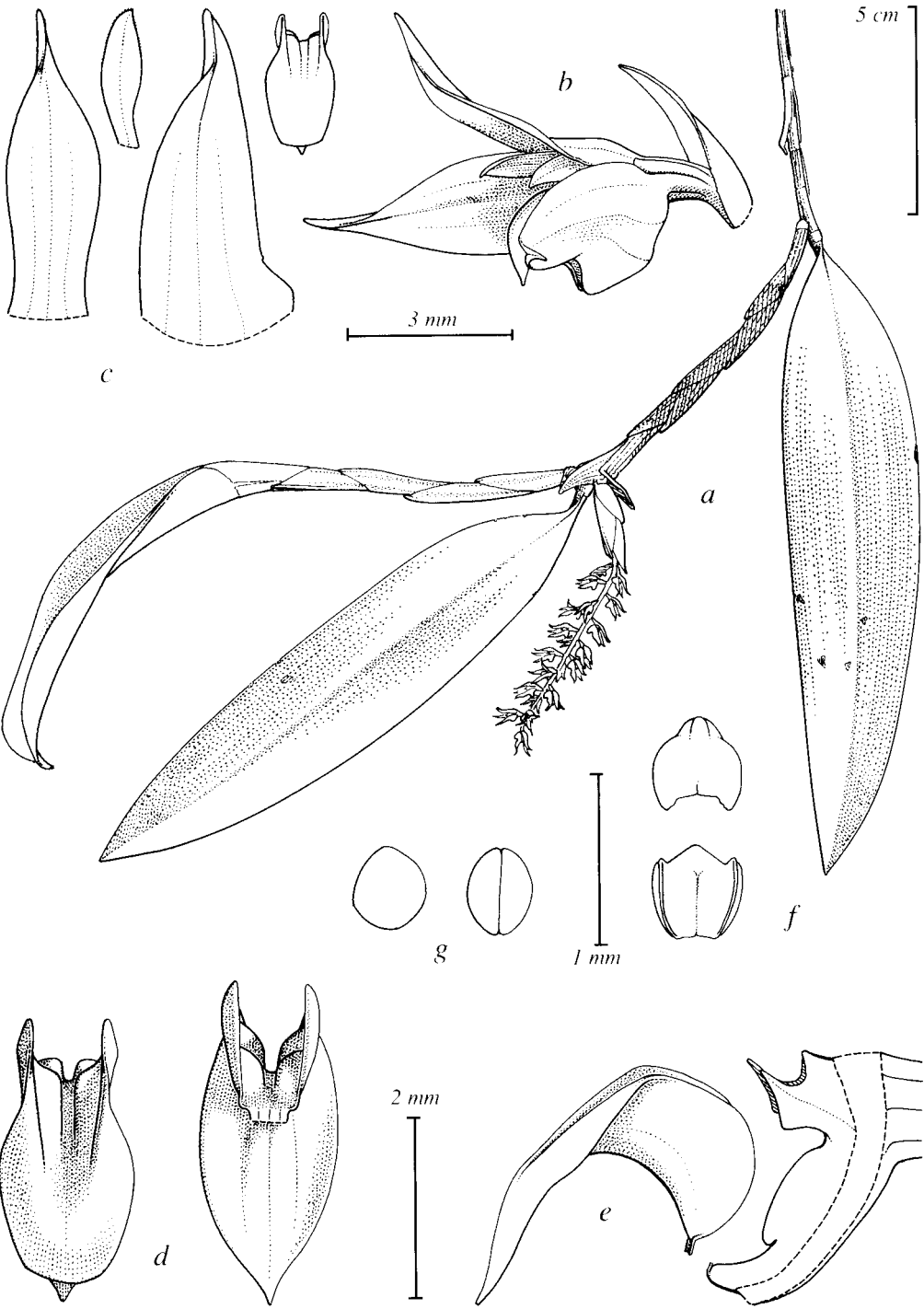


Figure 1. *Bulbophyllum tectipes* J.J. Verm. & P. O'Byrne

*Colours:* Plant glossy medium green. Flowers white.

*Habitat:* Epiphyte in montane forest, alt. 1100–1300 m.

*Distribution:* INDONESIA: Sulawesi, central part (1 specimen seen).

*Notes:* Most similar to *Bulbophyllum agapethoides* Schltr. and *B. falciculicorne* J.J. Sm., also from Sulawesi. The three species share a relatively inflexible rhizome. *B. tectipes* is much larger vegetatively; the leaves are consistently almost twice as long and more than twice as wide as in the species mentioned. Most characteristic, however, are the conspicuous distichous, sharply keeled peduncle bracts that cover most of the peduncle. *B. rhizomatosum* Ames & C. Schweinf. (Borneo, Peninsular Malaysia), *B. acuminatifolium* J.J. Sm., and *B. perpendiculare* Schltr. (both from Sulawesi) have limply pendulous rhizomes.

### *Bulbophyllum* sect. *Desmosanthes*

***Bulbophyllum flavorubellum* J.J. Verm. & P. O'Byrne, sp. nov.** – Fig. 2.

*Bulbophyllum flavorubellum* J.J. Verm. & P. O'Byrne, a *Bulbophyllo flammulifero* rhachidi 0.5–1 cm longa floribus 4–8, stelidiorum margine basali sine ala antrorsa differt. – TYPE: Malaysia, Sabah, Interior Province, Nabawan, Vermeulen & Lamb 433 (K, holo., L, iso.).

*Roots* present along the entire rhizome. *Rhizome* creeping, 1–1.4 mm diam., sections between pseudobulbs 2–5 cm long, bracts hardly persistent. *Pseudobulbs* distant, narrowly ellipsoid to subcylindrical, 1.7–3 x 0.3–0.6 cm. *Petiole* 0.3–0.4 cm long. *Leaf blade* elliptic, 3.2–4.5 x 1.2–1.9 cm, index (length/width) 2.3–2.7; obtuse. *Inflorescences* (sub-)erect, short racemes, 6–11 cm long, 4–8-flowered. *Peduncle* 5.5–10 cm, bracts 5–7, the longest 5–9 mm long. *Rhachis* 0.5–1 cm. *Floral bracts* ovate, c. 4.8 x 2.2 mm, acuminate. *Flowers* not resupinate, not fully opening, several open simultaneously. *Pedicel* and *ovary* c. 4 mm long, basal node ± flush with the surface of the rhachis. *Median sepal* somewhat recurved with an incurved top, subtriangular, c. 9.5 x 2 mm, index 4.7–4.8; acute, margins entire, base broadly attached; rather thin, 3-veined, glabrous. *Lateral sepals* recurved, free, oblique, triangular, c. 9.5 x 2 mm, index 4.7–4.8; otherwise as the median sepal. *Petals* porrect, ovate-triangular, c. 2.2 x 0.8 mm, index 2.7–2.8; obtuse, margins slightly erose distally, base broadly attached; thin, 1-veined, glabrous. *Lip* recurved distally, general outline ± ovate, c. 1.8 x 1.2 mm, index c. 1.5, acute, margins entire, very finely papillose proximally; thick, surface glabrous; adaxially slightly concave near the base.

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**Figure 2.** *Bulbophyllum flavorubellum* J.J. Verm. & P. O'Byrne – a. Habit; 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: adaxial side, below: abaxial side; g. Pollinia, above: two pairs, below: single pair. – All from Vermeulen & Lamb 433 (living plant, spirit sample).

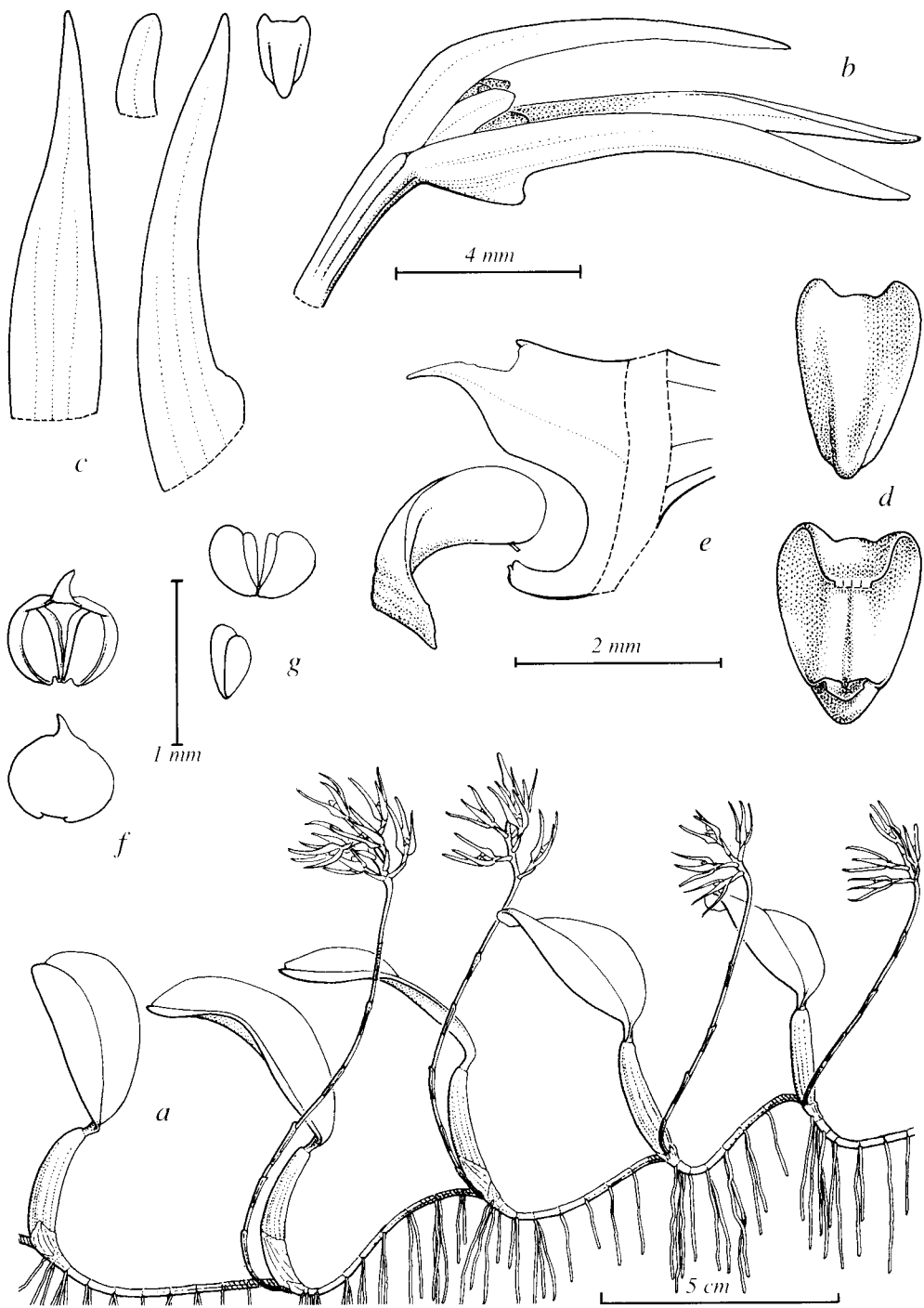


Figure 2. *Bulbophyllum flavorubellum* J.J. Verm. & P. O'Byrne

with 2 obtuse ridges over most of the length of the lip, towards the base inconspicuous and diverging, towards the tip distinct and fused to a V-shaped structure; abaxially with a distinct, retuse ridge over most of the length of the lip, surface glabrous. *Column* c. 2.2 mm long, stigma without a tooth at its base, column foot with a small, obtuse knob just above the ligament. *Stelidia* porrect, falcate, triangular, c. 1 mm long, acute, along the lower margin with an inconspicuous, deltoid, obtuse wing. *Anther* abaxially without a crest, surface  $\pm$  glabrous, front margin drawn out into a flat, triangular, acute tip. *Pollinia* 4, the inner slightly shorter than the outer, all obovoid, no appendages present.

*Colours*: Sepals yellow proximally, bright orange red distally. Petals very pale yellow. Lip orange. Column yellow. Flowers slightly scented.

*Habitat*: Terrestrial or as an epiphyte close to the forest floor, in lowland *kerangas* forest. Alt. c. 300 m.

*Distribution*: MALAYSIA: Sabah (1 specimen seen).

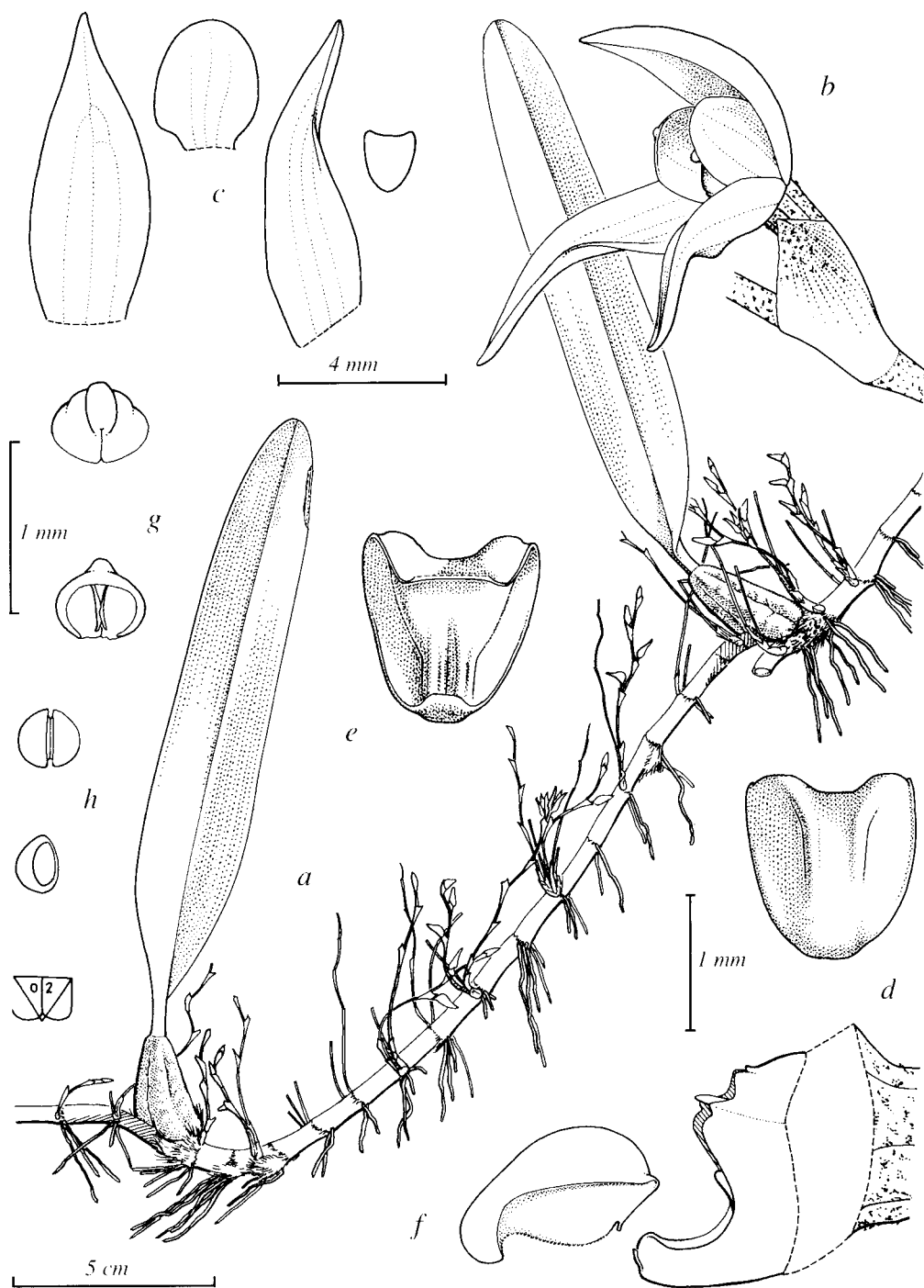
*Notes*: On first sight, this could be taken for a exceptionally small form of *Bulbophyllum flammuliferum* Ridl., from Peninsular Malaysia and Borneo. That species, however, has a 2.5–10 cm long rhachis with 12–25 flowers, and a distinct, antrorse, rounded wing along the lower margin of the stelidia.

***Bulbophyllum pseudopelma* J.J. Verm. & P. O'Byrne, *sp. nov.* – Fig. 3.**

*Bulbophyllum pseudopelma* J.J. Verm. & P. O'Byrne, inter series speciebus inflorescentiis racemosis Sect. *Desmosanthes* labello brevi lato, stelidiis brevissimis notatum. – TYPE: Indonesia, Sulawesi, central part, *SBG-O 3216* (SING, holo).

*Roots* present along the entire rhizome. *Rhizome* creeping or straggling away from the substrate, 3–4.5 mm diam., sections between pseudobulbs 4.5–26 cm long, bracts little persistent. *Pseudobulbs* distant, ovoid, 2.5–4 x 1.5–2 cm. *Petiole* 0.6–1.1 cm long. *Leaf blade* elliptic-ovate, 9.5–17.5 x 1.9–2.5 cm, index (length/width) 5–7; obtuse. *Inflorescences* many, often tufted, along the entire rhizome, (sub-)erect, lax racemes, 2–5.5 cm long, 2–4-flowered. *Peduncle* 1–1.8 cm, bracts c. 3, the longest 4–5.5 mm long. *Rhachis* 0.4–3.5 cm. *Floral bracts* tubular proximally, 4–5 mm long, acute. *Flowers* not resupinate, not fully opening, several open simultaneously. *Pedicel* and *ovary* c. 4.5 mm long, basal node  $\pm$  flush with the surface of the rhachis. *Median sepal* somewhat recurved with an incurved top, elliptic-ovate, c. 7 x 3 mm, index c. 2.3–2.4; acuminate, margins entire, base rather broadly attached; thin, 3-veined, glabrous. *Lateral sepals* recurved, free, oblique, triangular, c. 7 x 2.5 mm, index c. 2.8; acute, base broadly

**Figure 3.** *Bulbophyllum pseudopelma* J.J. Verm. & P. O'Byrne – a. Habit; b. Flower; c. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; d. Lip, adaxial side; e. Lip, abaxial side; f. Column and lip, lateral view; g. Anther, above: abaxial side, below: adaxial side; h. Pollinia, above: two pairs, below: single pair. – All from *SBG-O 3216* (living plant, spirit sample).



**Figure 3.** *Bulbophyllum pseudopelma* J.J. Verm. & P. O'Byrne

attached; otherwise as the median sepal. *Petals* porrect, ovate, c. 3.2 x 2.8 mm, index 1.1–1.2; rounded, margins entire, base rather narrowly attached; thin, 3-veined, glabrous. *Lip* recurved distally, general outline ovate, c. 1.4 x 1.2 mm, index 1.1–1.2; rounded, margins entire; thick and soft; adaxially slightly concave near the base, with 2 rather distinct, obtuse ridges proximally somewhat diverging and running parallel up to c. 2/3 of the length of the lip, surface slightly convex towards the tip, glabrous; abaxially with a distinct, retuse ridge over most of the length of the lip, surface finely papillose in centre. *Column* c. 0.7 mm long, stigma with a transverse ridge at its base, column foot with an obtuse knob just above the ligament. *Stelidia* minute, porrect, triangular, acute, along the lower margin with a distinct, antrorse, rounded wing. *Anther* abaxially with a distinct crest, surface  $\pm$  glabrous, front margin not drawn out. *Pollinia* 4, the inner slightly shorter than the outer, ellipsoid, the outer obovoid; no appendages present.

*Colours*: Floral bracts greyish white. Flowers very pale greenish, pale yellow towards the base.

*Habitat*: Epiphyte in montane forest, on the trunk and in the crown of a small tree.

*Distribution*: INDONESIA: Sulawesi, central part (1 specimen seen).

*Notes*: Among the racemose species of sect. *Desmosanthes*, *Bulbophyllum pseudopelma* is easily distinguished by the short and wide, fleshy lip and the very short stelidia. In its general aspect this plant is reminiscent of *B. reptans* Lindl., a species widespread in continental SE Asia. Apart from being sturdier, it is distinct in the those characters mentioned above.

In the general aspect of its inflorescence, *B. pseudopelma* resembles some species of sect. *Pelma*.

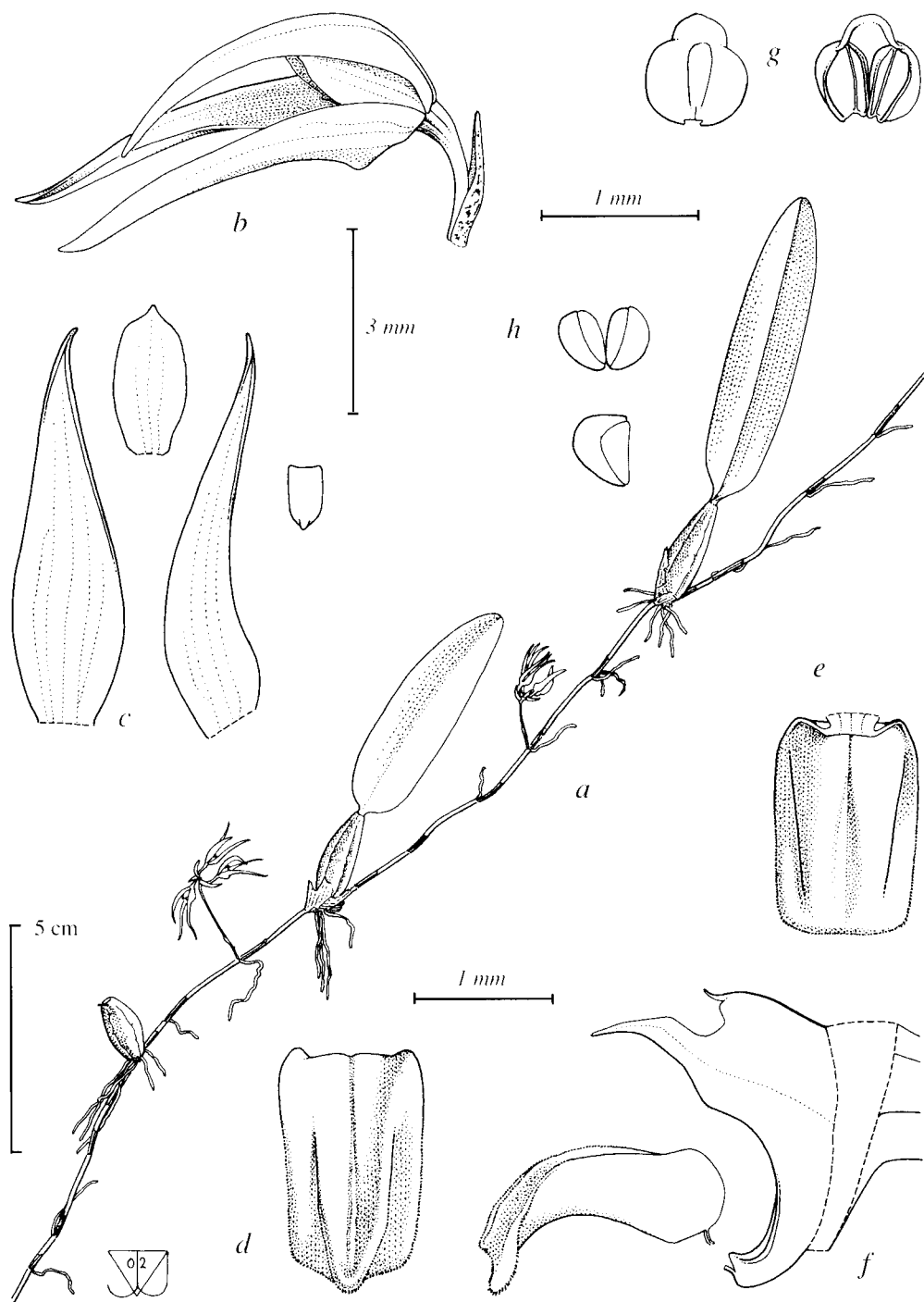
***Bulbophyllum simplex* J.J. Verm. & P. O'Byrne, sp. nov.** – Fig. 4.

*Bulbophyllum simplex* J.J. Verm. & P. O'Byrne, a *Bulbophyllo trifloro* J.J. Sm. sepalis 9–10 mm longis sine apice incrassato differt. – TYPE: Indonesia, Sulawesi, central part, SBG-O 3210 (SING, holo.).

*Roots* present along the entire rhizome. *Rhizome* creeping or straggling away from the substrate, 0.8–1.5 mm diam., sections between pseudobulbs 5–28 cm long, bracts moderately persistent. *Pseudobulbs* distant, ovoid, 1.5–2.4 x 0.6–0.9 cm. *Petiole* 0.1–0.3 cm long. *Leaf blade* elliptic-ovate, 3.5–6.5 x 1.1–1.5 cm, index (length/width) 3.1–5; obtuse. *Inflorescences* often along the entire rhizome, (sub-)erect, subumbellate racemes, 1.8–2.5 cm long, 3–5-flowered. *Peduncle* 1.2–1.6 cm, bracts c. 2, the longest

**Figure 4.** *Bulbophyllum simplex* J.J. Verm. & P. O'Byrne – a. Habit; b. Flower; c. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; d. Lip, adaxial side; e. Lip, abaxial side; f. Column and lip, lateral view; g. Anther, left: abaxial side, right: adaxial side; h. Pollinia, above: two pairs, below: single pair. – All from SBG-O 3210 (living plant, spirit sample).





**Figure 4.** *Bulbophyllum simplex* J.J. Verm. & P. O'Byrne

4–5 mm long. *Rhachis* 0.2–0.25 cm. *Floral bracts* triangular, 3.2–3.6 x 1.2 mm, acute. *Flowers* partly resupinate, not fully opening, several open simultaneously. *Pedicel* and *ovary* 2.6–4.2 mm long, basal node  $\pm$  flush with the surface of the rhachis. *Median sepal* somewhat recurved with an incurved top, ovate, 9–10.5 x 3–3.3 mm, index 3–3.2; acuminate, margins entire, base rather narrowly attached; thin, 5-veined, glabrous. *Lateral sepals* recurved, free, oblique, triangular, 8–11.3 x 2.3–2.4 mm, index 3.4–4.4; acute-acuminate, base broadly attached; 3–4veined, otherwise as the median sepal. *Petals* porrect, elliptic, 3.5–4 x 2–2.2 mm, index 1.7–1.9; acuminate, margins slightly erose, base narrowly attached; thin, 3-veined, glabrous. *Lip* recurved, general outline  $\pm$  oblong, 1.6–1.8 x 0.9–1.2 mm, index 1.5–1.8 (all without artificial spreading), obtuse, margins finely papillose distally; rather thick; adaxially  $\pm$  flat near the base, with 2 obtuse ridges over most of the length of the lip, towards the base inconspicuous and diverging, towards the tip distinct and fused to a v-shaped structure, adaxial surface finely papillose distally; abaxially with a distinct, retuse ridge over most of the length of the lip, surface glabrous. *Column* c. 2 mm long, stigma without a tooth at its base, column foot with a small, obtuse knob just above the ligament. *Stelidia* porrect, falcate, triangular, c. 1 mm long, acute, along the lower margin with an inconspicuous, deltoid, obtuse wing. *Anther* abaxially with a distinct crest, surface  $\pm$  glabrous, front margin drawn out into a concave, rounded beak. *Pollinia* 4, the inner  $\pm$  as long as the outer, all subtriangular, no appendages present.

*Colours*: Flowers completely white.

*Habitat*: Epiphyte in montane forest, in the crown of a small tree.

*Distribution*: INDONESIA: Sulawesi, central part (1 specimen seen).

*Notes*: Vegetatively and in the general aspect of the flowers *Bulbophyllum simplex* is fairly similar to *B. triflorum* J.J. Sm., from Java. That species differs in having consistently smaller flowers, with shorter sepals (3–4 mm long) with a thickened tip. *B. concinnum* Hook.f., from Thailand and west Malesia, differs in the same characters, as well as in having the pseudobulbs closer together and in having a narrower, ovate lip.

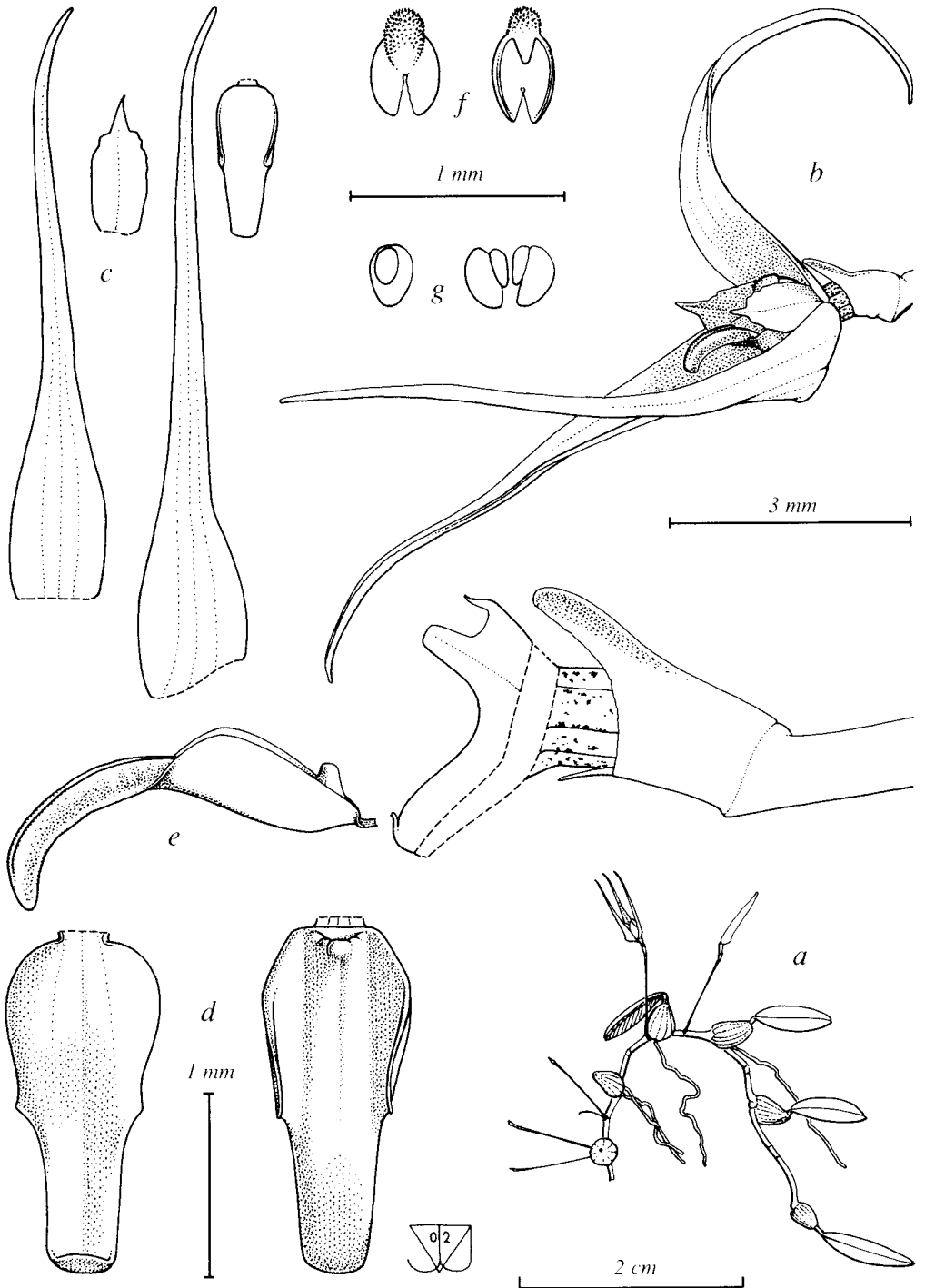
### *Bulbophyllum* sect. *Hybochilus*

***Bulbophyllum decurrentilobum* J.J. Verm. & P. O'Byrne, sp. nov.** – Fig. 5.

*Bulbophyllum decurrentilobum* J.J. Verm. & P. O'Byrne, a *Bulbophyllo masarangico* Schltr. labello lobis lateralibus distaliter lobo mediali sine sinu transientibus

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**Figure 5.** *Bulbophyllum decurrentilobum* J.J. Verm. & P. O'Byrne – a. Habit; b. Flower; c. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; d. Lip, left: abaxial side, right: adaxial side; e. Column and lip, lateral view; f. Anther, left: abaxial side, right: adaxial side; g. Pollinia, left: single pair, right: two pairs. – All from SBG-O 3206 (spirit sample).



**Figure 5.** *Bulbophyllum decurrentilobum* J.J. Verm. & P. O'Byrne

differt. – TYPE: Indonesia, Sulawesi, central part, *SBG-O 3206* (SING, holo.).

*Roots* mainly below the pseudobulbs. *Rhizome* creeping, 0.7–0.9 mm diam., sections between pseudobulbs 0.4–1 cm long, bracts not persistent. *Pseudobulbs* distant, ovoid, 0.3–0.5 x 0.2–0.45 cm. *Petiole* up to 0.05 cm long. *Leaf blade* elliptic, 0.6–1 x 0.2–0.25 cm, index (length/width) 3–4; acuminate. *Inflorescence* erect to patent, 1.5–1.7 cm long, 1-flowered. *Peduncle* 0.8–0.9 cm, bracts 1, c. 1.5 mm long. *Floral bracts* tubular proximally, c. 1.3 mm long,  $\pm$  acute. *Flowers* not fully opening. *Pedicel* and *ovary* 1.1–1.2 mm long, basal node coinciding with the floral bract. *Median sepal* recurved, ovate, c. 7 x 1.3 mm, index 5.3–5.4; long acuminate, margins entire, base rather broadly attached; thin, 3-veined, glabrous. *Lateral sepals* oblique, c. 8 x 1.3 mm, index c. 6.1–6.2; otherwise as the median sepal. *Petals* porrect, elliptic, c. 1.8 x 0.7 mm, index c. 2.5–2.6; acuminate, margins erose distally, base rather narrowly attached; thin, 1-veined, glabrous. *Lip* recurved in the distal half, general outline ovate, c. 1.9 x 0.9 mm, index 2.1–2.2 (all without artificial spreading), margins entire; glabrous, 3-lobed; *midlobe* ovate, rounded, rather thin; adaxially somewhat convex and with a distinct, conical, obtuse knob near the base; abaxially without a ridge; *lateral lobes* erect, attached along the proximal half, c. 0.5 mm wide at c. 1/3 of the length of the lip, decurrent in front, rounded, thin. *Column* c. 0.6 mm long, stigma without a ridge at its base, column foot without teeth. *Stelidia* porrect, ovate, c. 0.3 mm long,  $\pm$  truncate. *Anther* abaxially with a distinct, finely papillose crest, surface otherwise  $\pm$  glabrous, front margin drawn out into an incurved, triangular, subacute beak with entire margins. *Pollinia* 4, the inner slightly more than half as long as the outer, all obovoid; no appendages present.

*Colours*: Sepals and petals purple, whitish near the base. Lip purplish.

*Habitat*: Epiphyte in montane forest, on the trunk and on thin branches in the crown of small trees. Alt. 1800–2500 m.

*Distribution*: INDONESIA: Sulawesi, central part (1 specimen seen).

*Notes*: Most similar to *Bulbophyllum masarangicum* Schltr., from the northern part of Sulawesi (Minahassa). The main difference between the two is in the shape of the lip: in *B. decurrentilobum* the front margin of the lateral lobes of the lip gradually merges with the midlobe, in *B. masarangicum* it does so with a distinct sinus. *B. masarangicum* also has smaller flowers, the sepals being 3–5 mm long.

***Bulbophyllum furcillatum* J.J. Verm. & P. O'Byrne, sp. nov.** – Fig. 6.

*Bulbophyllum furcillatum* J.J. Verm. & P. O'Byrne, a *Bulbophyllo camptochilo* J.J.

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**Figure 6.** *Bulbophyllum furcillatum* J.J. Verm. & P. O'Byrne – a. Habit; 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: two pairs, below: single pair. – All from *SBG-O 0922* (spirit sample).

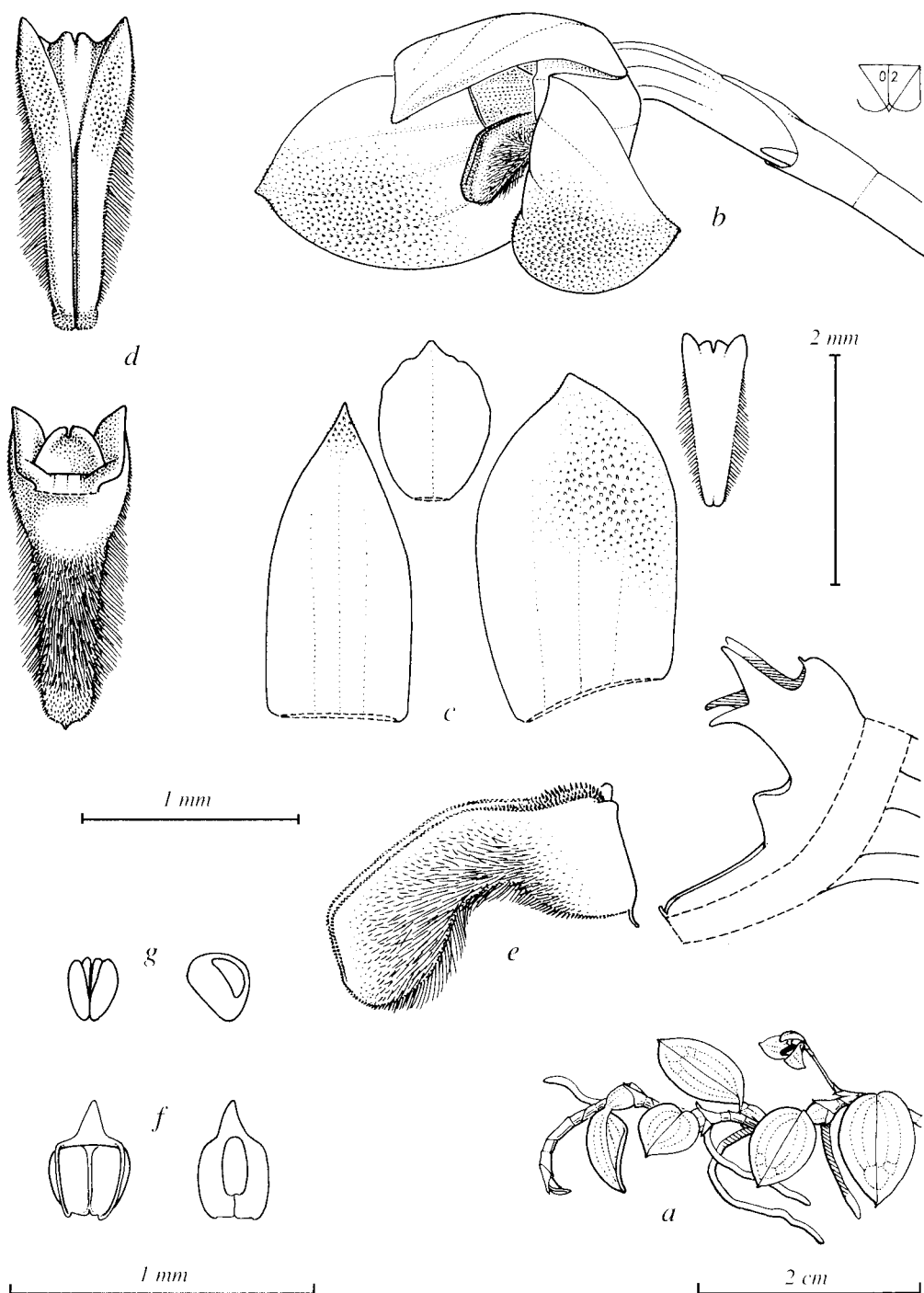


Figure 6. *Bulbophyllum furcillatum* J.J. Ve rm. & P. O'Byrne

Verm. sepalis lateralibus papillosis, labello longioribus angustioribusque differt.  
– TYPE: Indonesia, Sumatra, Barisan Range, *SBG-O 922* (SING, holo.).

*Roots* usually one below each pseudobulb. *Rhizome* creeping, 0.8–1 mm diam., sections between pseudobulbs 0.35–1 cm long, bracts not persistent. *Pseudobulbs* distant, ovoid, 0.15–0.32 x 0.15–0.25 cm. *Petiole* up to 0.05–0.13 cm long. *Leaf blade* elliptic to ovate, 0.6–1.2 x 0.4–0.7 cm, index (length/width) 1.5–2.3; mucronate. *Inflorescence* erect to patent, 9–14 mm long, 1-flowered. *Peduncle* 0.3–0.7 cm, bracts 2, the longest 1.3–2.2 mm long. *Floral bracts* tubular proximally, c. 1.6 mm long, acuminate. *Flowers* not fully opening. *Pedicel* and *ovary* 2.8–4 mm long, basal node coinciding with the attachment of the floral bract. *Median sepal*  $\pm$  porrect, subtriangular, c. 2.8 x 1.3 mm, index 2.1–2.2; acuminate, margins finely papillose distally, base rather broadly attached; rather thin, thickened distally, 3-veined, adaxially finely papillose distally. *Lateral sepals* slightly oblique, obovate, c. 2.9 x 1.8 mm, index c. 1.6–1.7;  $\pm$  acute, base broadly attached; adaxially finely papillose except the proximal part of the upper half; otherwise as the median sepal. *Petals* porrect,  $\pm$  elliptic, c. 1.3 x 1 mm, index c. 1.3; subacute, margins erose distally, base narrowly attached; thin, 1-veined, glabrous. *Lip* recurved  $\pm$  half-way, general outline triangular, c. 1.5 x 0.5 mm, index c. 3;  $\pm$  obtuse, margins ciliate; thick; adaxially slightly concave near the base and with a rounded, glabrous ridge that is bifurcate proximally and runs up to c. 1/3 of the length of the lip, with 2 more distinct, rounded, papillose ridges diverging proximally and running up to c. 2/3 of the length of the lip, leaving a thin furrow in between them; abaxially without a ridge, surface glabrous in the proximal third, with long hairs elsewhere but with short hairs close to the tip. *Column* c. 0.9 mm long, stigma with a distinct, conical, obtuse tooth at its base, column foot without teeth. *Stelidia* porrect, triangular, c. 0.4 mm long, subacute, with a distinct, antrorse, triangular, subacute tooth along the lower margin. *Anther* abaxially with a distinct crest, surface  $\pm$  glabrous, front margin drawn out into a triangular, acute beak with entire margins. *Pollinia* 4, the inner slightly more than half as long as the outer, narrowly elliptic, the outer obovoid; no appendages present.

*Colours*: Sepals and petals yellowish green, but lateral sepals blackish purple in the distal half except for the yellowish margins. Lip blackish purple.

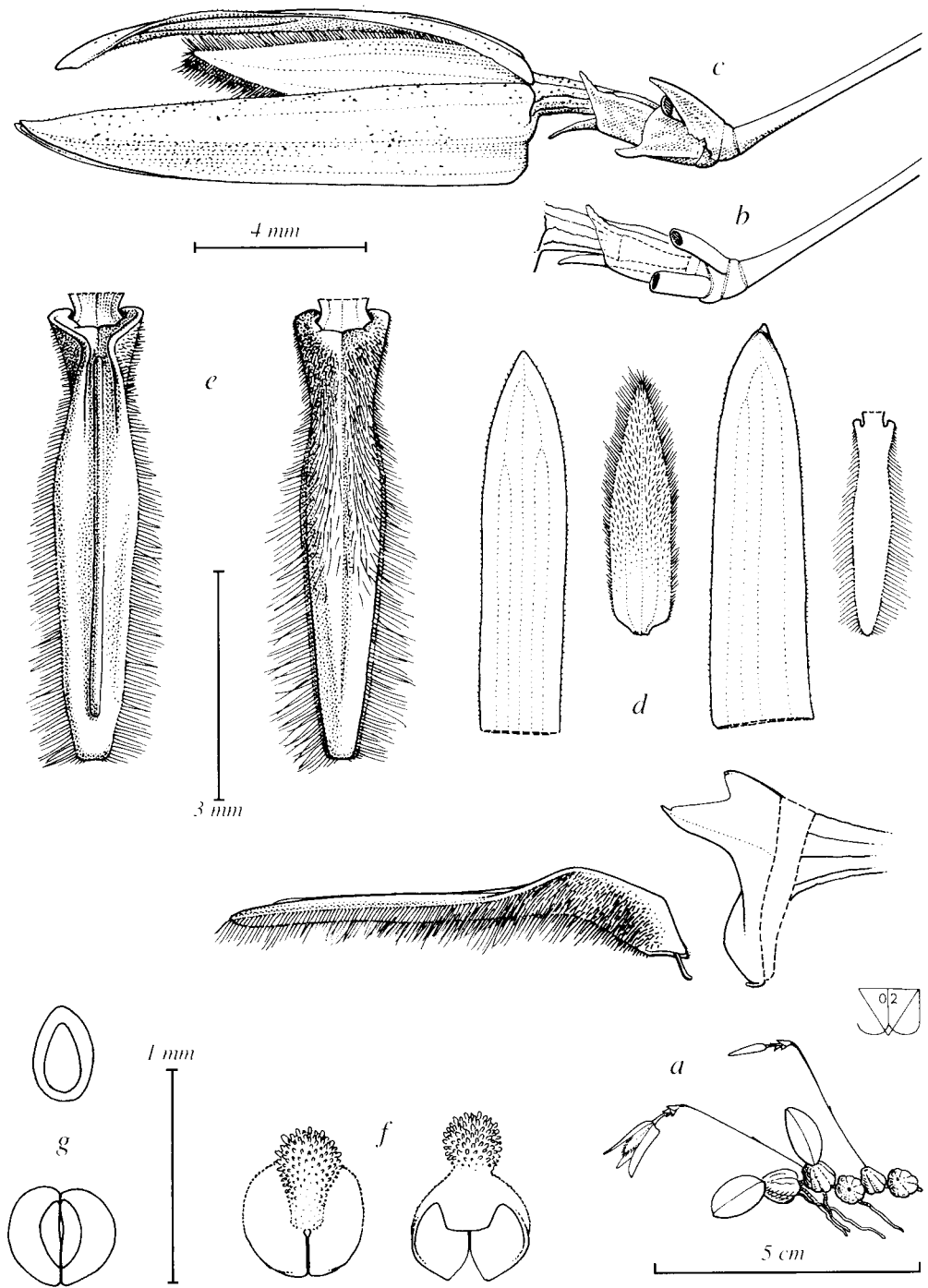
*Habitat*: Understorey epiphyte on tree trunks and branches. Alt. 1400–1500 m.

*Distribution*: INDONESIA: Sumatra, Barisan Range (1 specimen seen).

*Notes*: Most similar to *Bulbophyllum camptochilum* J.J. Verm., from Brunei. This species, however, has glabrous sepals, much narrower petals (index 2.4–2.5), and a wider lip (index 1.3–1.4) that is subrectangular in general outline.

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**Figure 7.** *Bulbophyllum iterans* J.J. Verm. & P. O'Byrne – a. Habit; b. top inflorescence; c. Flower; d. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; e. Lip, left: adaxial side, right: abaxial side; f. Column and lip, lateral view; g. Anther, left: abaxial side, right: adaxial side; h. Pollinia, above: single pair, below: two pairs. – All from *SBG-O 3211* (spirit sample).



**Figure 7.** *Bulbophyllum iterans* J.J. Verm. & P. O'Byrne

**Bulbophyllum iterans J.J. Verm. & P. O'Byrne, *sp. nov.* – Fig. 7.**

*Bulbophyllum iterans* J.J. Verm. & P. O'Byrne, a *Bulbophyllo errato* Ames floribus c. 11 mm longis, petalis adaxialiter distincte pubescentibus, labello longo gracili differt. – TYPE: Indonesia, Sulawesi, central part, SBG-O 3211 (SING, holo.).

*Roots* below the pseudobulbs. *Rhizome* creeping, 0.9–1.4 mm diam., sections between pseudobulbs 0.4–0.9 cm long, bracts not persistent. *Pseudobulbs* close or distant, ovoid, 0.4–0.9 x 0.3–0.8 cm. *Petiole* up to 0.06 cm long. *Leaf blade* elliptic to ovate, 0.8–1.5 x 0.5–0.8 cm, index (length/width) 1.6–2; obtuse to acute. *Inflorescence* a congested raceme, 3.5–4.3 cm long, 1–7-flowered. *Peduncle* erect to patent, 2.3–2.8 cm, bracts 2–3, the longest 1.8–2.5 mm long. *Rhachis* slightly nodding, spindle-shaped, up to 0.3 x 0.1 cm. *Floral bracts* triangular, 2.2–3 x 2–3 mm, acuminate. *Flowers* not fully opening, each one developing only after anthesis of the previous. *Pedicel* and *ovary* c. 2 mm long, basal node on a 1.5–2 mm long stump. *Median sepal* slightly recurved, elliptic, 10.5–11.2 x 2.1 mm, index 5–5.4; acute, margins ciliate, base broadly attached; thin, 3–5-veined, glabrous. *Lateral sepals* subtriangular, 11–12.2 x 2.5–2.7 mm, index 4.4–4.6; otherwise as the median sepal. *Petals* porrect, ovate, 7.6–7.9 x c. 1.9 mm, index 4–4.2; acute, margins ciliate, base narrowly attached; thin, 3-veined, adaxial surface with hairs except near the base. *Lip* slightly recurved near the base, general outline ovate, slightly constricted near the base where the margins approach each other over the adaxial surface, c. 5.8 x 1.2 mm, index 4.8–4.9; truncate, margins ciliate; rather thick; adaxially concave near the base and with a distinct, narrow, rounded, ridge running from the constricted part of the lip, near the base, almost to the tip, adaxial surface glabrous; abaxially without a ridge, surface with stiff hairs near the base, and with softer hairs up to + half way the length of the lip. *Column* c. 1.8 mm long, stigma without a tooth at its base, column foot without teeth. *Stelidia* porrect, triangular, c. 1 mm long, acute, with minute, antrorse, triangular, obtuse tooth along the upper margin, close to the tip. *Anther* abaxially with a distinct, papillose crest, surface otherwise finely papillose, front margin drawn out into an incurved, truncate beak with entire margins. *Pollinia* 4, the inner c. 3/4 as long as the outer, ovoid, the outer ellipsoid; no appendages present.

*Colours*: Flowers entirely dark purple.

*Habitat*: Epiphyte in montane forest, on the trunk and in the crown of small trees. Alt. 1800–2500 m.

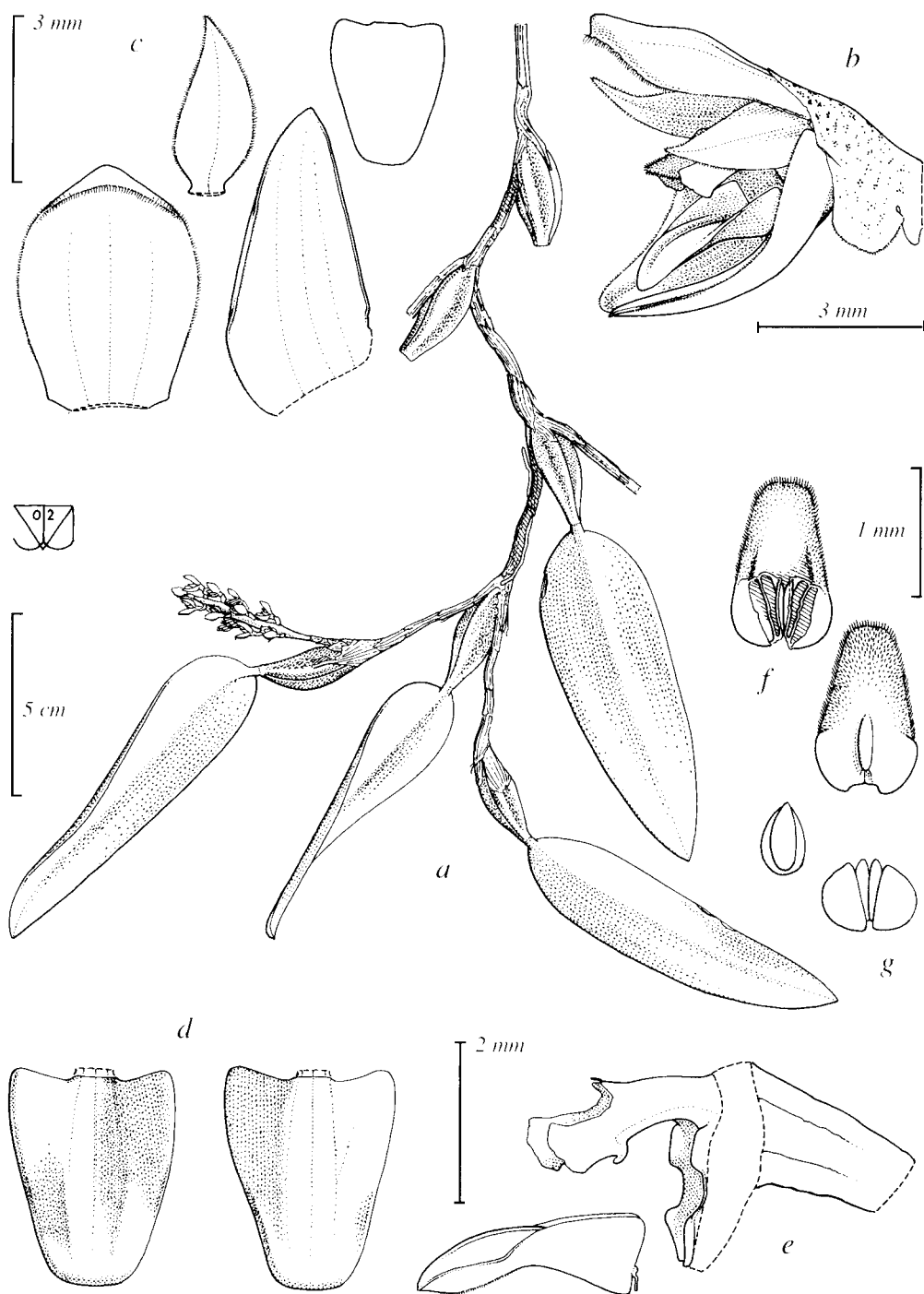
*Distribution*: INDONESIA: Sulawesi, central part (1 specimen seen).

*Notes*: While this species fits very well in sect. *Hybochilus* on account of the floral characters it has a racemose inflorescence, a character that is very rare in that

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**Figure 8.** *Bulbophyllum anakbaruppui* J.J. Verm. & P. O'Byrne – a. Habit; b. Flower; c. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; d. Lip, left: adaxial side, right: abaxial side; e. Column and lip, lateral view; f. Anther, above: adaxial side, below: abaxial side; g. Pollinia, left: single pair, right: two pairs. – All from SBG-O 3287 (spirit sample).





**Figure 8.** *Bulbophyllum anakbaruppui* J.J. Verm. & P. O'Byrne

section and the assumedly related sect. *Polyblepharon*. Only two other species in these sections display this character: *Bulbophyllum erratum* Ames (sect. *Hybochilus*, from the Philippines) and *B. vexillarium* Ridl. (sect. *Polyblepharon*, from Papua New Guinea). *B. iterans* differs from both in having petals that are distinctly hairy on the adaxial side, and the long, slender lip.

The name refers to the flowers that appear in succession on the inflorescence.

### ***Bulbophyllum* sect. *Leptopus***

#### ***Bulbophyllum spissum* J.J. Verm.**

*Bulbophyllum spissum* J.J. Verm., Blumea 41 (1996): 360. – TYPE: Indonesia, Lingga Archipelago, Pulau Riau, O'Byrne LING 010 (L, holo.)

*Habitat*: Epiphyte in forest. Alt. 200–1000 m.

*Distribution*: MALAYSIA: Pahang, Pulau Tioman. INDONESIA: Lingga Archipelago, Pulau Riau.

*Notes*: The Tioman plants represent the first record of this species for Malaysia.

*Material seen*: MALAYSIA. Pahang, Pulau Tioman, SBG-O 737 (SING), 739 (SING).

### ***Bulbophyllum* sect. *Monilibulbus***

#### ***Bulbophyllum anisopterum* J.J. Verm. & P. O'Byrne, sp. nov.**

*Bulbophyllum anisopterum* J.J. Verm. & P. O'Byrne, a *Bulbophyllo stormii* sepalo medio sepalis lateralibus 1/4-plo longiore differt. – TYPE: Malaysia, Sabah, Lamb 563/86 (K, holo.).

*Bulbophyllum stormii sensu* J.J. Vermeulen, Orch. Borneo 2 (1991) 227 (*pro parte*, **plate included**), *non* J.J. Smith.

*Roots* below the pseudobulbs. *Rhizome* creeping, c. 1 mm diam., sections between pseudobulbs c. 0.5 cm long, bracts not persistent. *Pseudobulbs* ovoid, basal half prostrate on and fused to the rhizome so that the new pseudobulbs arise c. half-way up the old, c. 0.9 x 0.4–0.5 cm. *Petiole* 0.5–0.8 mm long. *Leaf blade* elliptic, 1.8–2.5 x c. 0.5 cm, index (length/width) 3.5–5; obtuse. *Inflorescence* c. 6 cm long, 1-flowered. *Peduncle* erect to patent, 3.5–4 cm, bracts c. 3, the longest c. 2.5 mm long. *Floral bracts* tubular, c. 2.5 mm, acute. *Flowers* not fully opening. *Pedicel* and *ovary* c. 18 mm long, basal node on a c. 2 mm long stump. *Median sepal* porrect, ovate, c. 9.5 x 2.8 mm, index c. 3.4; acuminate, margins entire, base rather widely attached; thin,

glabrous. *Lateral sepals* recurved, free, oblique, c. 32 x 6 mm, index 5.3–5.4; caudate; otherwise as the median sepal. *Petals* porrect, ovate, c. 2 x 0.8 mm, index c. 2.5; obtuse, margins entire, base widely attached; thin, glabrous. *Lip* slightly recurved c. half-way, general outline ovate with a drawn-out top, c. 4.5 x 1.5 mm, index c. 3; rounded, margins entire; rather thick, glabrous; adaxially concave towards the base, convex and with the margins strongly recurved elsewhere; abaxially with a short, retuse ridge near the base. *Column* c. 2 mm long, stigma with a slight callus at its base, column foot without teeth. *Stelidia* subulate, c. 1.5 mm long, acute. *Anther* abaxially with a distinct, rounded, papillose crest, surface  $\pm$  glabrous, front margin not drawn out. *Pollinia* 4, the inner less than half as long as the outer, all about ovoid, without appendages.

*Colours*: Lateral sepals yellow, orange near the base. Petals translucent orange. Lip purple red.

*Habitat*: Understorey epiphyte in wet montane forest, at 1200–1900 m alt. Flowering observed in Jan, and Jun–Jul.

*Distribution*: MALAYSIA. Sabah, Ulu Padas (2 specimens seen).

*Notes*: In Vermeulen (1991) I thought this was an aberrant form of the widespread and variable *Bulbophyllum stormii* J.J. Sm. Since then, I have found it again several times, and it is now clear that it is a distinct species. It differs from *B. stormii* in having a much shorter median sepal (about 1/3 to 1/4 of the length of the lateral sepals. *B. anisopterum* is most similar to *B. hodgsonii* Henders., from Peninsular Malaysia, but differs in having a much shorter median sepal, and caudate lateral sepals.

### ***Bulbophyllum* sect. *Osyricera* (= sect. *Globiceps*)**

***Bulbophyllum anakbaruppui* J.J. Verm. & P. O'Byrne, *sp. nov.* – Fig. 8.**

*Bulbophyllum anakbaruppui* J.J. Verm. & P. O'Byrne, a *Bulbophyllo hastifero* Schltr. pseudobulbis quadrangulatis, petalis latioribus, labello ovato differt. – TYPE: Indonesia, Sulawesi, central part, SBG-O 3287 (SING, holo.).

*Roots* creeping along the rhizome towards its point of attachment, then spreading over the substrate. *Rhizome*  $\pm$  pendulous with  $\pm$  patent branches, up to 80 cm long, 2.5–4 mm diam., sections between pseudobulbs 3.8–7.4 cm long, bracts moderately persistent. *Pseudobulbs* distant, ovate, 2–3.4 x 0.9–1.3 cm, distinctly and obtusely 4-angled. *Petiole* 0.2–0.3 cm long. *Leaf blade* ovate, 8.5–12 x 2.1–3.1 cm, index (length/width) 2.8–5.3; acute. *Inflorescence* porrect, a rather dense raceme, 3.8–6.2 cm long, 13–17-flowered. *Peduncle* 2–2.5 cm, bracts c. 4, the longest c. 6.5 mm long. *Rhachis*, spindle-shaped, 2.2–3.2 x 0.38–0.43 cm. *Floral bracts* cordate, c. 4 x 5 mm, acute. *Flowers* not resupinate, arranged in regular spirals, not fully opening, many open simultaneously. *Pedicel* and *ovary* c. 2.2 mm long, basal node  $\pm$  flush with the surface of the rhachis. *Median sepal*  $\pm$  porrect, obovate, c. 4.3 x 3.3 mm, index c. 1.3;

top cucullate, rounded, margins entire, ciliolate, base rather narrowly attached; rather thick, 3-veined, surface very finely papillose adaxially towards the tip. *Lateral sepals* adnate along the lower margins, oblique, ovate-triangular, c. 5.8 x 3.2 mm, index 1.8–1.9, top flat, subacute, margins slightly papillose, base broadly attached; thick, otherwise as the median sepal. *Petals* porrect, ovate, c. 3.4 x 1.7 mm, index c. 2; acute, margins entire, ciliolate, base narrowly attached; rather thin, 1-veined, surface very finely papillose. *Lip* slightly recurved  $\pm$  half-way, general outline ovate, c. 3 x 2.2 mm, index 1.3–1.4; rounded, margins entire; rather thick, glabrous; adaxially slightly concave near the base, with 2 inconspicuous, rounded ridges proximally somewhat diverging and running from c. 1/3 of the length of the lip up to near the tip; abaxially  $\pm$  without a ridge near the base. *Column* c. 2.2 mm long, stigma without a tooth at its base, column foot with 2 truncate wings near its base, and two more, retrorse, triangular, obtuse ones just above the ligament. *Stelidia* minute, abruptly bent downwards but with an antrorse.  $\pm$  acute tip, along the upper margin with a very large (far more conspicuous than the stelidia themselves), antrorse, wedge-shaped wing with a broadly rounded, erose top margin. *Anther* abaxially with a crest near its base, surface  $\pm$  glabrous towards the base, coarsely papillose towards the tip, front margin drawn out into a distinct, concave, triangular, rounded, coarsely papillose beak. *Pollinia* 4, the inner  $\pm$  as long as the outer, all ellipsoid-ovoid; no appendages present.

*Colours*: Plant medium green. Flowers yellow, median sepal with thin red veins, petals with thin red veins and margins, lip slightly suffused with red proximally.

*Habitat*: Epiphyte in a large tree in coffee and cocoa gardens near a village. Alt. c. 1800 m.

*Distribution*: INDONESIA: Sulawesi, central part (1 specimen seen).

*Notes*: Suberect, patent or pendulous rhizomes occur only in two species of sect. *Osyricera*: *Bulbophyllum salaccense* Rehb.f., from West Malesia, and *B. hastiferum* Schltr. from Sulawesi. The latter is most similar to *B. anakbarupui*, but differs in having well rounded, not angular pseudobulbs, much narrower petals and a hastate lip. In flower structure *B. anakbarupui* resembles *B. trigonobulbum* J.J. Sm., from Sulawesi. That species, however, has a creeping or straggling rhizome, with many spreading roots. It also has narrower petals.

Named after the children of the Toraja village Baruppu, who collected the plant from a large tree in the village gardens.

***Bulbophyllum illecebrum* J.J. Verm. & P. O'Byrne, sp. nov.** – Fig. 9.

*Bulbophyllum illecebrum* J.J. Verm. & P. O'Byrne, a *Bulbophyllo osyricera* Schltr. et

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**Figure 9.** *Bulbophyllum illecebrum* J.J. Verm. & P. O'Byrne – a. Habit; b. Flower; c. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; d. Lip, left: adaxial side, right: abaxial side; e. Column and lip, lateral view; f. Anther, left: adaxial side, below: adaxial side; g. Pollinia, left: two pairs, right: single pair. – All from *SBG-O 3215* (living plant, spirit sample).

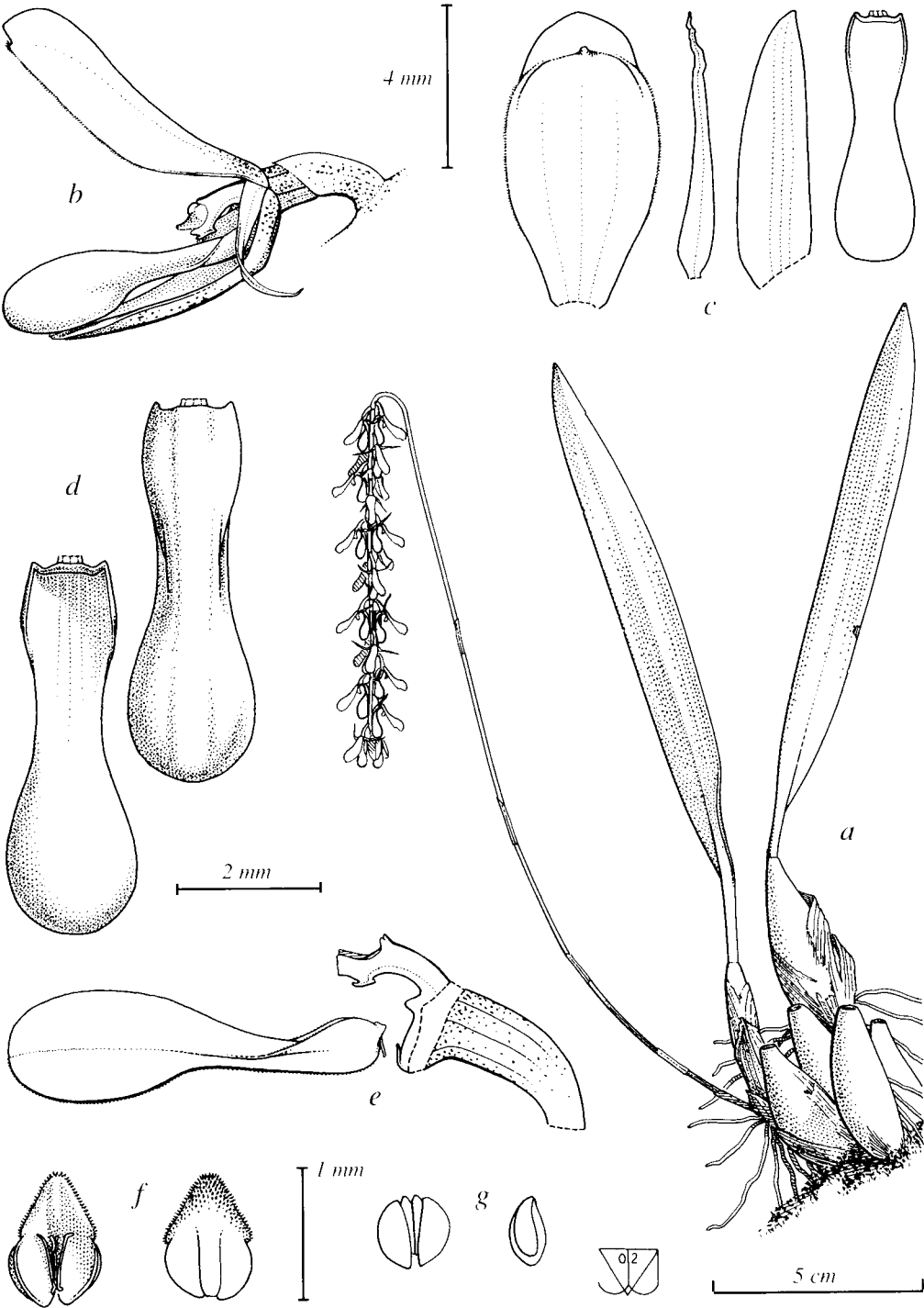


Figure 9. *Bulbophyllum illecebrum* J.J. Verm. & P. O'Byrne

*B. osyriceroidi* J.J. Sm. sepal medial distincte concavo, petalis multo longioribus angustioribusque, labello parte apicali spathulato differt. – TYPE: Indonesia, Sulawesi, Central part, *SBG-O 3215* (SING, holo.).

*Roots* mainly below the pseudobulbs. *Rhizome* creeping, 1.8–2 mm diam., sections between pseudobulbs 0.8–2 cm long, bracts barely persistent. *Pseudobulbs* close together, ovate, 1–3.5 x 0.7–1.1 cm, not angular. *Petiole* 0.7–2.8 cm long. *Leaf blade* obovate-elliptic, 5.5–12 x 0.8–1.3 cm, index (length/width) 4.2–12.8; acute. *Inflorescence* a rather dense raceme, c. 30 cm long, c. 24-flowered. *Peduncle* erect to patent, c. 21 cm, bracts c. 5, the longest c. 9 mm long. *Rhachis* nodding at the base, limply pendulous, not thickened, c. 9 cm long. *Floral bracts* ± triangular, c. 3 x 3 mm, acute. *Flowers* not resupinate, not fully opening, many open simultaneously. *Pedice*l and *ovary* c. 3.2 mm long, basal node ± flush with the surface of the rhachis. *Median sepal* somewhat recurved, elliptic-obovate, c. 7 x 3.5 mm, index c. 2; top cucullate, rounded, margins entire, papillose-ciliolate distally, base narrowly attached; very thin, 3-veined, surface glabrous. *Lateral sepals* adnate along the lower margins, recurved, top part slightly incurved, oblique, ovate-triangular, c. 7.5 x 2.1 mm, index 3.5–3.6, top flat, (sub-)acute, base broadly attached; thin, otherwise as the median sepal. *Petals* recurved to spreading, ovate, c. 7 x 0.9 mm, index 12–13; acute, margins entire, slightly erose near the tip, base narrowly attached; very thin, 1-veined, glabrous. *Lip* almost straight, general outline subspathulate with a slightly widened base, c. 6 x 2 mm, index c. 3, rounded, margins entire; proximally rather thick, distally very thick, almost circular in section, glabrous; adaxially concave near the base, with a transverse wall connecting the sides just above the ligament, top part distinctly convex; abaxially ± without a ridge near the base, top part distinctly convex. *Column* c. 2 mm long, stigma without a tooth at its base, column foot with a distinct, transverse ridge near its base. *Stelidia* minute, abruptly bent downwards but with an antrorse, ± acute tip, along the upper margin with a very large (far more conspicuous than the stelidia themselves), antrorse ± rectangular wing with a truncate, slightly erose top margin. *Anther* abaxially with a crest near its base, surface ± glabrous towards the base, papillose towards the tip, front margin drawn out into a distinct, concave, triangular, obtuse, papillose beak. *Pollinia* 4, the inner slightly shorter than the outer, ovoid; the outer ellipsoid; no appendages present.

*Colours*: Sepals and petals translucent with thin, red veins. Lip greenish yellow, margins red distally.

*Habitat*: Epiphyte in fairly mossy montane forest, on the trunk and in the crown of small trees. Alt. 2300 m.

*Distribution*: INDONESIA: Sulawesi, central part (1 specimen seen).

*Notes*: *Bulbophyllum osyricera* Schltr., from Java and Sumatra, and *B. osyriceroides* J.J. Sm., from Sumatra, are most similar to *B. illecebrum*. Both differ, however, in having a more or less flat median sepal, much shorter (less than half as

long as the median sepal) and wider petals, as well as a lip with an ovate, rather than a spatulate top part.

The diaphanous, widely spreading, antenna-like petals and the highly mobile, very thick and brightly coloured lip suggest a baiting of pollinators by simulating either prey or a sexual partner. The name refers to this.

### ***Bulbophyllum* sect. *Polyblepharon***

***Bulbophyllum uncinatum* J.J. Verm. & P. O'Byrne, *sp. nov.* – Fig. 10.**

*Bulbophyllum uncinatum* J.J. Verm. & P. O'Byrne, a *Bulbophyllo biseipalo* et *B. stenochilo* sepalis deorsum unciformibus, labello proximaliter gradatim dilatato differt. – TYPE: Indonesia, Sulawesi, SBG-O 3835 (SING, holo.).

*Roots* all close to the base of the rhizome. *Rhizome* patent to hanging down perpendicularly, up to 25 cm long, c. 1 mm diam., bracts not persistent. *Pseudobulbs* ovoid-cylindrical, prostrate on and fused to the rhizome, so that the new pseudobulbs arise from near the top of the old, 0.9–1.3 x 0.2–0.3 cm. *Petiole* up to 0.5 mm long. *Leafblade* ovate, 2–2.7 x 0.8–1.1 cm, index (length/width) 2.4–2.5; acute. *Inflorescence* c. 0.6 cm long, 1-flowered. *Peduncle* porrect, c. 0.1 cm, bracts 1, c. 2 mm long. *Floral bracts* tubular, c. 1.7 mm, acute. *Flowers* not fully opening. *Pedicel* and *ovary* c. 1.3 mm long, basal node coinciding with the attachment of the floral bract. *Median sepal* incurved at the top, ovate, c. 3.8 x 1.3 mm, index 2.9–3; subacute, margins entire, ciliate towards the tip, base widely attached; thin, surface glabrous. *Lateral sepals* recurved, fused along the lower margin, oblique, c. 3.3 x 1.2 mm, index 2.7–2.8; obtuse; margins sparsely ciliate; otherwise as the median sepal. *Petals* porrect, ovate, c. 1 x 0.7 mm, index 1.4–1.5; acuminate, margins entire, base widely attached; thin, glabrous. *Lip* recurved at about 1/3 of its length, general outline ovate with a slightly narrowed top, c. 2.3 x 0.6 mm, index 3.8–3.9; acute, margins ciliate towards the base, ciliolate-papillose towards the tip; thin; adaxially slightly concave towards the base and with a median ridge starting near the base and running over about 1/4 of the length of the lip, surface convex and with the margins recurved towards the tip, entire surface finely papillose; abaxially without a ridge near the base, glabrous. *Column* c. 0.9 mm long, stigma without basal tooth, column foot distinctly thickened and with a retrorse, conical tooth near the base. *Stelidia* triangular, c. 0.7 mm long, acute, with a slightly antrorse, obliquely deltoid, obtuse tooth along the lower margin. *Anther* abaxially with a distinct, rounded, papillose crest, surface  $\pm$  glabrous, front margin drawn out into a truncate beak with glabrous margins. *Pollinia*: 2, ovoid.

*Colours*: Sepals and petals yellowish near the base, purple towards the tip, abaxially with minute, blackish spots. Petals translucent white. Lip purple.

*Habitat*: Found in coppiced roadside trees, at 500 m alt. Flowering observed in

Jan–Mar and Dec.

*Distribution:* INDONESIA. Sulawesi: central part (1 specimen seen).

*Notes:* Similar to *Bulbophyllum stenochilum* Schltr., from Papua New Guinea. *B. uncinatum* differs in having only a low median ridge on the adaxial side of the lip, without a retrorse tooth near the base of the lip.

### *Bulbophyllum* sect. *Sestochilus*

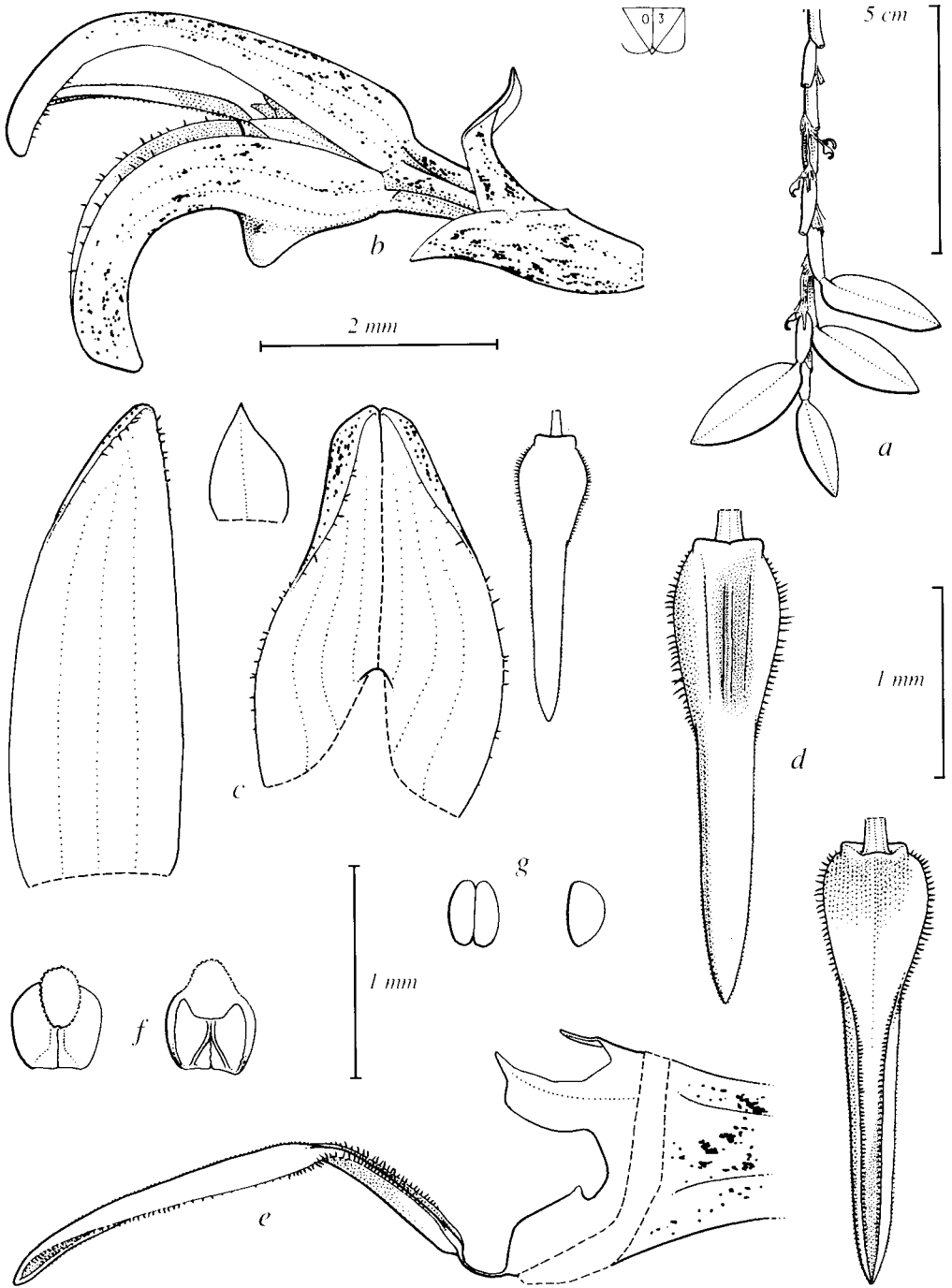
***Bulbophyllum catillus* J.J. Verm. & P. O'Byrne, sp. nov.** – Fig. 11.

*Bulbophyllum catillus* J.J. Verm. & P. O'Byrne, a *Bulbophyllo lyriforme* et *B. cheiri* columella lateraliter aspectu aliquot sigmatoide curvato differt. – TYPE: Papua New Guinea, *Jongejan, P. cult. 614* (L, holo).

*Roots* along the entire rhizome. *Rhizome* creeping, 4–5 mm diam., sections between pseudobulbs 4–6 cm long, bracts with veins persistent as coarse fibres. *Pseudobulbs* distant, ovoid, suberect, 1.5–2.0 x 0.8–1.2 cm. *Petiole* 1.8–2.5 cm long. *Leaf blade* elliptic, 11–13.5 x 5.5–6.5 cm, index (length/width) 1.8–2.3; rounded. *Inflorescence* c. 7 cm long, 1-flowered. *Peduncle* (sub-)erect, 1.2 cm, bracts c. 3, the longest c. 12 mm long. *Floral bracts* tubular, c. 14 mm, cuspidate. *Flowers* not resupinate, not fully opening. *Pedicel* and *ovary* 53–78 mm long, basal node on a 8–10 mm long stump, juga and valvae well-rounded. *Median sepal* somewhat incurved, elliptic to obovate, 21–31 x 8–11.5 mm, index 2.2–2.9; acute to acuminate, margins entire, base rather widely attached; rather thick, c. 11-veined, glabrous. *Lateral sepals* with the lower margins running more or less parallel, free, oblique, subtriangular, 20–28 x 9–16 mm, index 1.7–2.2, base widely attached; otherwise as the median sepal. *Petals* recurved to spreading, elliptic to obovate, 20–25 x 5.5–8 mm, index 3.2–3.8; (sub-)acute, margins entire, base rather narrowly attached; rather thin, c. 7-veined, glabrous. *Lip* recurved near the base, general outline ovate with a drawn-out top, 10–11 x 6–7 mm, index c. 1.4–1.9; obtuse, margins entire; top part thick, elsewhere thin, surface glabrous; adaxially widely concave towards the base; abaxially with a distinct, emarginate ridge over most of the length of the lip. *Column* 7–9 mm long, slightly sigmoid in profile, stigma without basal tooth, column foot without a tooth just above the ligament. *Stelidia* porrect, triangular, 1.5–2 mm long, obtuse, without teeth along the lower margin. *Anther* abaxially with a very distinct, conical crest, surface + glabrous, front margin drawn out into a rounded beak with erose margins. *Pollinia* 4, the inner as long as the outer, all sub-triangular, without appendages.

**Figure 10.** *Bulbophyllum uncinatum* J.J. Verm. & P. O'Byrne – a. Habit; b. Flower; c. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; d. Lip, left: adaxial side, right: abaxial side; e. Column and lip, lateral view; f. Anther, left: abaxial side, right: adaxial side; g. Pollinia, left: a pair, right: single. – All from SBG-O 3835 (spirit sample).





**Figure 10.** *Bulbophyllum uncinatum* J.J. Verm. & P. O'Byrne

*Colours:* Unknown.

*Habitat:* Unknown.

*Distribution:* PAPUA NEW GUINEA (4 specimens seen).

*Notes:* The slightly sigmoid profile of the column is diagnostic within the group of sect. *Sestochilus* with single, non-resupinate flowers. The lip widens abruptly towards the base into two thin wings, as in *Bulbophyllum lyriforme*, and *B. cheiri*. The top part, however, much shorter than in these species.

***Bulbophyllum cowniorum* J.J. Verm. & P. O'Byrne, sp. nov. – Fig. 12.**

*Bulbophyllum cowniorum* J.J. Verm. & P. O'Byrne, a *Bulbophyllo microglosso* in labelli latere adaxiali proximaliter pubescenti differt. – TYPE: Laos, SBG-O 3622 (SING, holo.).

*Roots* mainly below the pseudobulbs. *Rhizome* creeping, 5–6 mm diam., sections between pseudobulbs 8–9 cm long, bracts with veins persistent as fibres. *Pseudobulbs* distant, ovoid to ellipsoid, erect, 4–4.5 x 2.3–2.8 cm. *Petiole* 4–4.5 cm long. *Leaf blade* elliptic, 9.5–19 x 4–5.7 cm, index (length/width) 2.3–3.4; obtuse. *Inflorescence* 9.5–11.5 cm long, 1-flowered. *Peduncle* erect to patent, 1.1–1.4 cm, bracts c. 2, the longest c. 11 mm long. *Floral bracts* tubular, 15–18 mm, cuspidate. *Flowers* resupinate, not fully opening. *Pedicel* and *ovary* 80–95 mm long, basal node on a 9–11 mm long stump, juga and valvae well-rounded. *Median sepal* somewhat incurved, ovate, c. 23 x 9 mm, index 2.5–2.6; acute, margins entire, base widely attached; rather thin, 8–9-veined, glabrous. *Lateral sepals* recurved, lower margin without a fold, free, oblique, ovate, c. 22 x 13 mm, index c. 1.7; acute-apiculate; otherwise as the median sepal. *Petals* recurved to almost spreading, ovate, c. 18 x 6 mm, index c. 3; acute, margins entire, base widely attached; rather thin, c. 5-veined, glabrous. *Lip* recurved near the base, general outline  $\pm$  ovate, c. 8 x 8 mm, index c. 1; subacute, margins entire; rather thin; adaxially concave towards the base, surface finely papillose-pubescent towards the base, glabrous elsewhere; abaxially with a distinct, emarginate ridge from base to tip, surface glabrous. *Column* c. 4 mm long, stigma without basal tooth, column foot without a tooth just above the ligament. *Stelidia* minute, porrect, deltoid, subacute, without teeth along the lower margin. *Anther* abaxially with a very inconspicuous crest, surface  $\pm$  glabrous, front margin drawn out into a deltoid beak with glabrous margins. *Pollinia* 4, the inner slightly shorter than the outer, all ovoid; a large, fleshy lump of tissue attached to the inner pair.

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**Figure 11.** *Bulbophyllum catillus* J.J. Verm. & P. O'Byrne – a. Habit; 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, left: a single pair, right: two pairs. – a. From LAE 77443 (herbarium material), with the flower reconstructed from *Jongejan cult.* 1216; b. From *Jongejan cult.* 1216; c–g. From *Jongejan cult.* 614 (all spirit samples).

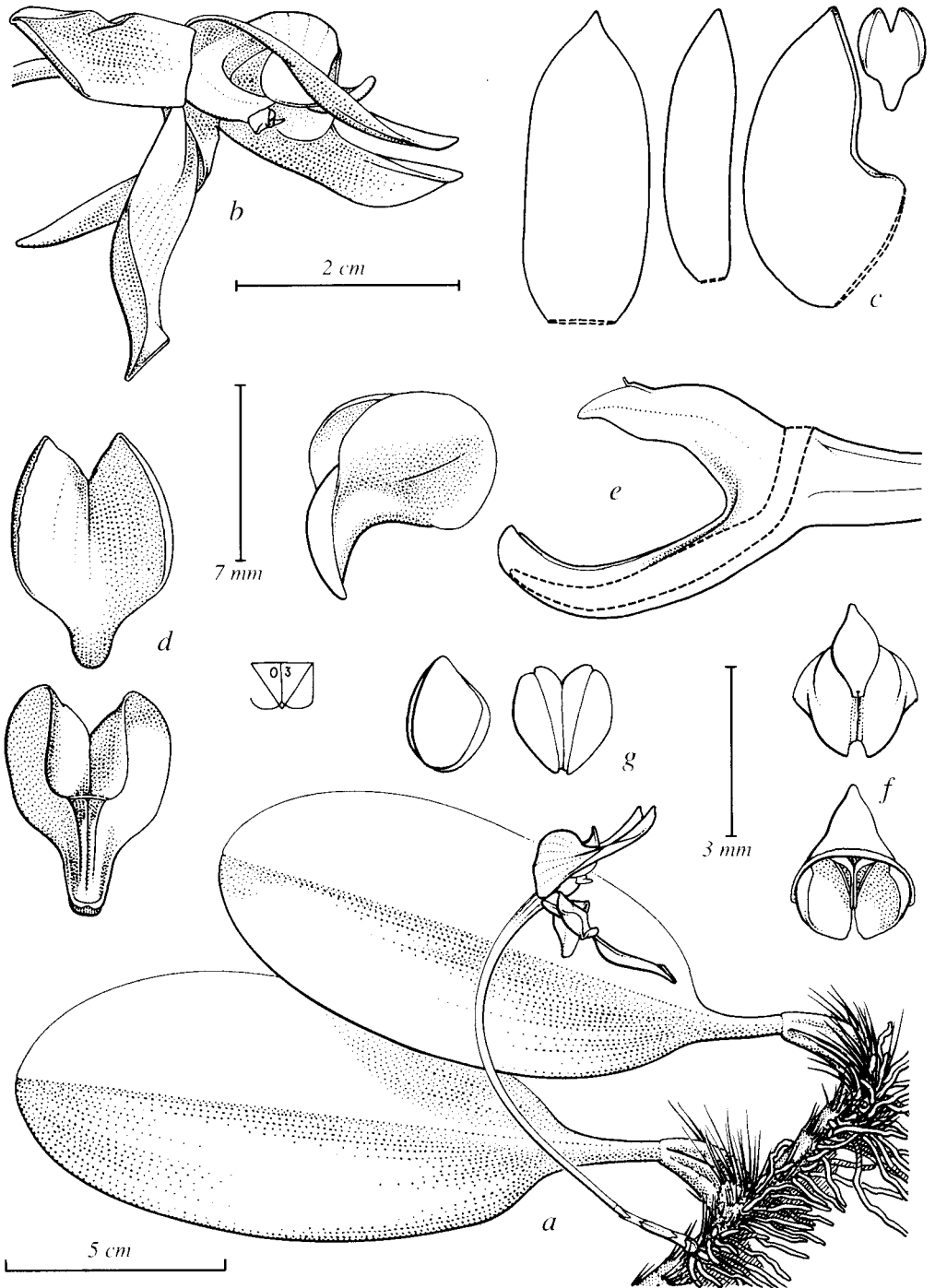


Figure 11. *Bulbophyllum catillus* J.J. Verm. & P. O'Byrne

**Colours:** Sepals and petals greenish with purple veins. Lip white, suffused with pinkish purple.

**Habitat:** Unknown. Grows and flowers well in cultivation in lowland conditions as well as at 1000 m alt. Flowering observed in Jan–Mar and Dec.

**Distribution:** LAOS: Locality unknown (1 specimen seen).

**Notes:** Most similar to *Bulbophyllum microglossum* Ridl. which, however, has a glabrous lip. *B. smitinandii* differs in having two distinct patches of much longer hairs on the adaxial side of the lip, as well as a distinct central callus.

Named after Bob and Chittima Cowen, Bangkok, Thailand, who successfully flowered this species in their nursery.

***Bulbophyllum incisilabrum* J.J. Verm. & P. O'Byrne, sp. nov.** – Fig. 13.

*Bulbophyllum incisilabrum* J.J. Verm. & P. O'Byrne, a *Bulbophyllo rugoso* Ridl. ovario cristis non-sinuosis, sepalo mediali petalisque rotundato differt. – TYPE: Indonesia, Sulawesi, central part, SBG-O 1879 (SING, holo.).

**Roots** mainly below the pseudobulbs. **Rhizome** creeping, 4.5–6 mm diam., sections between pseudobulbs 0.9–1.6 cm long, bracts with veins persistent as fine fibres. **Pseudobulbs** close, ovoid-cylindrical, erect, 3.5–5.5 x 1.2–1.6 cm. **Petiole** 3–5.5 cm long. **Leaf blade** elliptic to obovate, 10–16.5 x 2.7–4.2 cm, index (length/width) 3.2–4; obtuse. **Inflorescence** 11–12 cm long, 1-flowered. **Peduncle** erect to patent, 2.6–3 cm, bracts c. 3, the longest 14–18 mm long. **Floral bracts** tubular, 15–18 mm, cuspidate. **Flowers** resupinate, not fully opening. **Pedicel** and **ovary** 75–80 mm long, basal node coinciding with the floral bract, juga and valvae sharply crested, crests slightly curved towards the base of the flower. **Median sepal** somewhat recurved, ovate, c. 20 x 12 mm, index 1.6–1.7; rounded, margins entire, base narrowly attached; rather thick, 8–9-veined, glabrous. **Lateral sepals** ± spreading, lower margin with a distinct fold slightly below half-way the sepal, free, oblique, ovate-triangular, c. 23 x 12 mm, index c. 1.9–2; subacute, base broadly attached; otherwise as the median sepal. **Petals** ± recurved, ovate, c. 19 x 6 mm, index 3.1–3.2; rounded, margins entire, base broadly attached; rather thick, 8–9-veined, glabrous. **Lip** sharply recurved near the base and near the tip, general outline ± ovate, c. 10.5 x 7.5 mm, index c. 1.4; rounded, margins entire; thick, surface very coarsely warty near the tip; adaxially concave near the base, with a median slit from base to tip, with 2 rather conspicuous, rounded ridges diverging proximally and running up to c. 2/3 of the length of the lip, surface glabrous; abaxially with a distinct, emarginate ridge from base to tip, surface glabrous but with a finely papillose patch proximally along the median line. **Column**

**Figure 12.** *Bulbophyllum coweniorum* J.J. Verm. & P. O'Byrne – a. Habit; b. Flower; c. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; d. Lip, left: abaxial side, right: adaxial side; e. Column and lip, lateral view; f. Anther, above: adaxial side, below: abaxial side; g. Pollinia, left: two pairs, right: a single pair. – All from SBG-O 3622 (spirit sample).

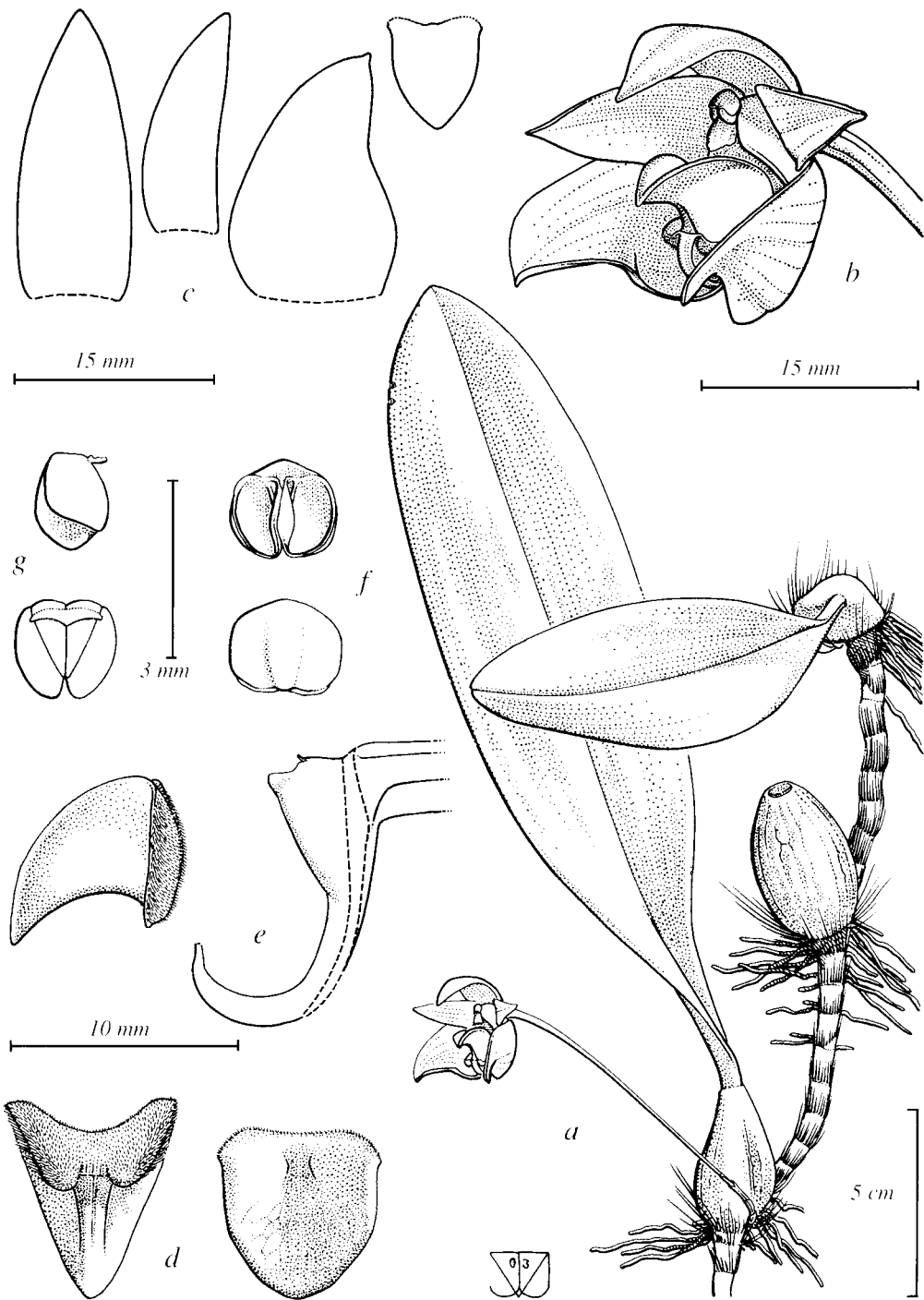


Figure 12. *Bulbophyllum coweniorum* J.J. Verm. & P. O'Byrne

c. 4 mm long, stigma without basal tooth, column foot without a tooth just above the ligament. *Stelidia* minute, porrect, triangular, acute, along the lower margin below the base with a distinct, subtriangular, 3–3.5 mm long, obtuse tooth. *Anther* abaxially with a rather distinct crest, surface  $\pm$  glabrous, front margin drawn out into a concave, rounded beak with erose and papillose margins. *Pollinia* 4, the inner  $\pm$  as long as the outer, all ovoid; no appendages present.

*Colours*: Sepals and petals yellow with red spots. Lip white, adaxially pink towards the margins.

*Habitat*: Epiphyte in forest. Alt. 1100–1200 m. Flowering observed in Feb.

*Distribution*: INDONESIA: Sulawesi, central part (1 specimen seen).

*Notes*: This pretty species is most similar to *Bulbophyllum rugosum* Ridl. It differs in having the crests on the ovary only slightly curved distally (not distinctly sinuous), in having a rounded median sepal and petals, and in having widely spreading lateral sepals.

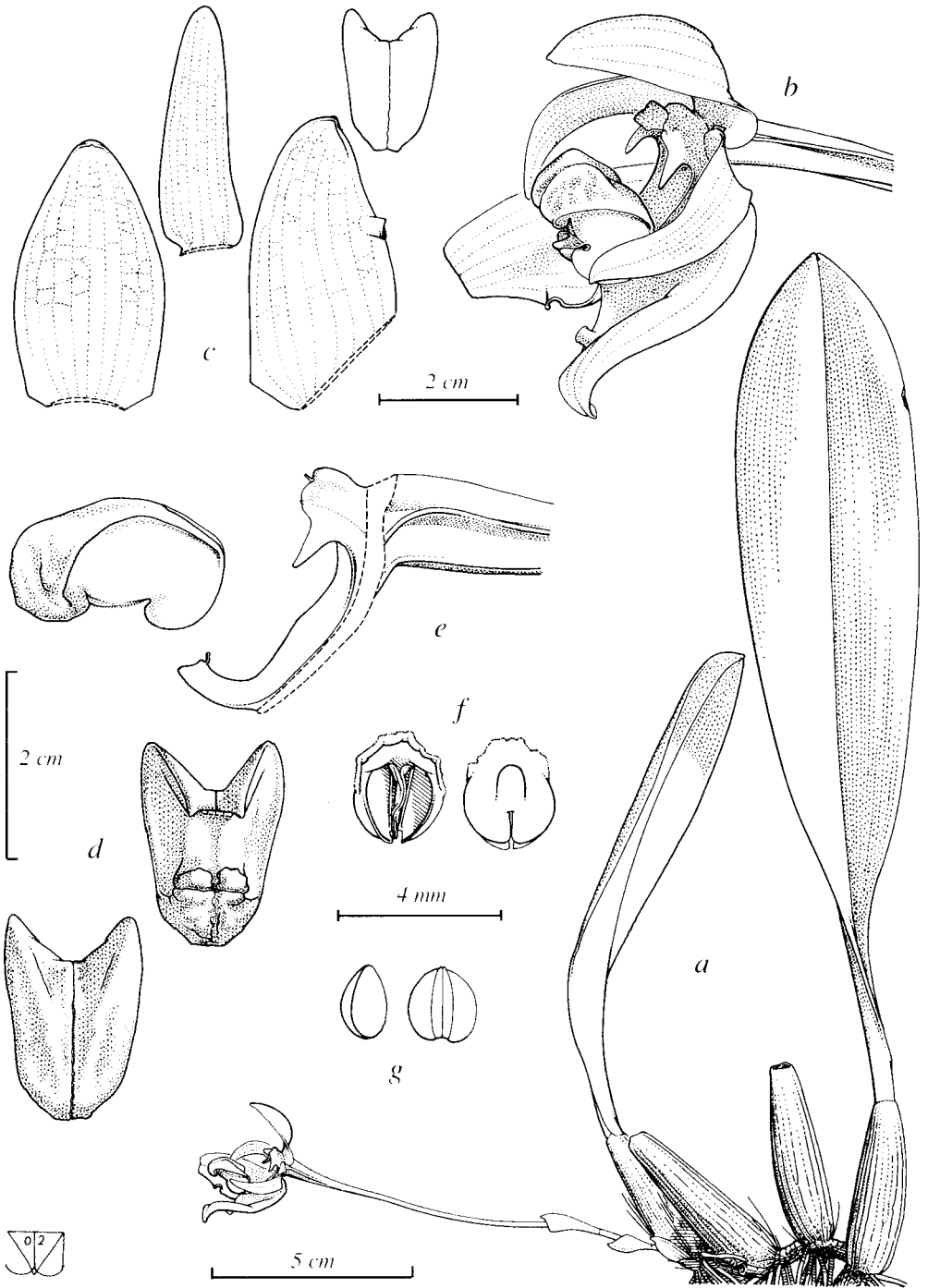
***Bulbophyllum lyriforme* J.J. Verm. & P. O'Byrne, sp. nov.** – Fig. 14.

*Bulbophyllum lyriforme* J.J. Verm. & P. O'Byrne, a *Bulbophylo cheiri* loborum lateralium margine dorsali (proximali) concava labelli basi differt. – TYPE: Papua New Guinea, Jongejan, *P. cult.* 282 (L, holo).

*Vegetative parts not seen. Inflorescence* c. 5 cm long, 1-flowered. *Floral bracts* tubular, c. 6 mm, cuspidate. *Flowers* not resupinate, not fully opening. *Pedicel* and *ovary* c. 40 mm long, basal node on a c. 5 mm long stump, juga and valvae well-rounded. *Median sepal* somewhat incurved, subtriangular, 23–31 x 6–8 mm, index 3.8–4.5; acute, margins entire, base rather widely attached; rather thick, c. 9-veined, glabrous. *Lateral sepals* recurved, free, oblique, 22–30 x 8–10 mm, index 2.5–3.4, base widely attached; otherwise as the median sepal. *Petals* spreading to reflexed, subtriangular, 21–28 x 2.2–4 mm, index 7–10.5; acute, margins entire, base widely attached; rather thin, c. 5-veined, glabrous. *Lip* slightly recurved near the base, general outline hastate-lyrate with a long drawn-out top part, margins slightly concave near the base of the lip, 17–19 x 7–8 mm, index c. 2.2–2.4; obtuse, margins entire; drawn out top part thick, elsewhere thin, surface glabrous; adaxially widely concave towards the base; abaxially with a distinct, emarginate ridge over c. 1/5–1/4 of the length of the lip. *Column* 6–8.5 mm long, stigma without basal tooth, column foot with a slight callus just above the ligament. *Stelidia* porrect, triangular, 1–1.8 mm long, obtuse, without teeth along the lower margin. *Anther* abaxially with a very distinct, flat crest.

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**Figure 13.** *Bulbophyllum incisilabrum* J.J. Verm. & P. O'Byrne – a. Habit; b. Flower; c. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; d. Lip, left: adaxial side, right: abaxial side; e. Column and lip, lateral view; f. Anther, left: adaxial side, right: abaxial side; g. Pollinia, left: single pair, right: two pairs. – All from SBG-O 1879 (living plant, spirit sample).



**Figure 13.** *Bulbophyllum incisilabrum* J.J. Verm. & P. O'Byrne

surface  $\pm$  glabrous, front margin drawn out into a widely rounded beak with entire margins. *Pollinia* 4, the inner as long as the outer, all about drop-shaped, without appendages.

*Colours*: Unknown.

*Habitat*: Unknown.

*Distribution*: INDONESIA: Irian Jaya (4 specimens distributed from BO by J.J. Smith, presumably from Irian Jaya). PAPUA NEW GUINEA (1 specimen seen).

*Notes*: *Bulbophyllum lyriforme* is most similar to *B. cheiri* Lindl.: it differs in having the lateral lobes at the base of the lip slightly bent backwards, so that their proximal margin is slightly concave. In *B. cheiri* this is invariably convex.

***Bulbophyllum sinapis* J.J. Verm. & P. O'Byrne, *sp. nov.* – Fig. 15.**

*Bulbophyllum sinapis* J.J. Verm. & P. O'Byrne, a *Bulbophyllum macrantho* in sepalis lateralibus latioribus (indice 2–3.5 versus 1.5–1.7) differt. – TYPE: Papua New Guinea, *Jongejan, P. cult. 171* (L, holo).

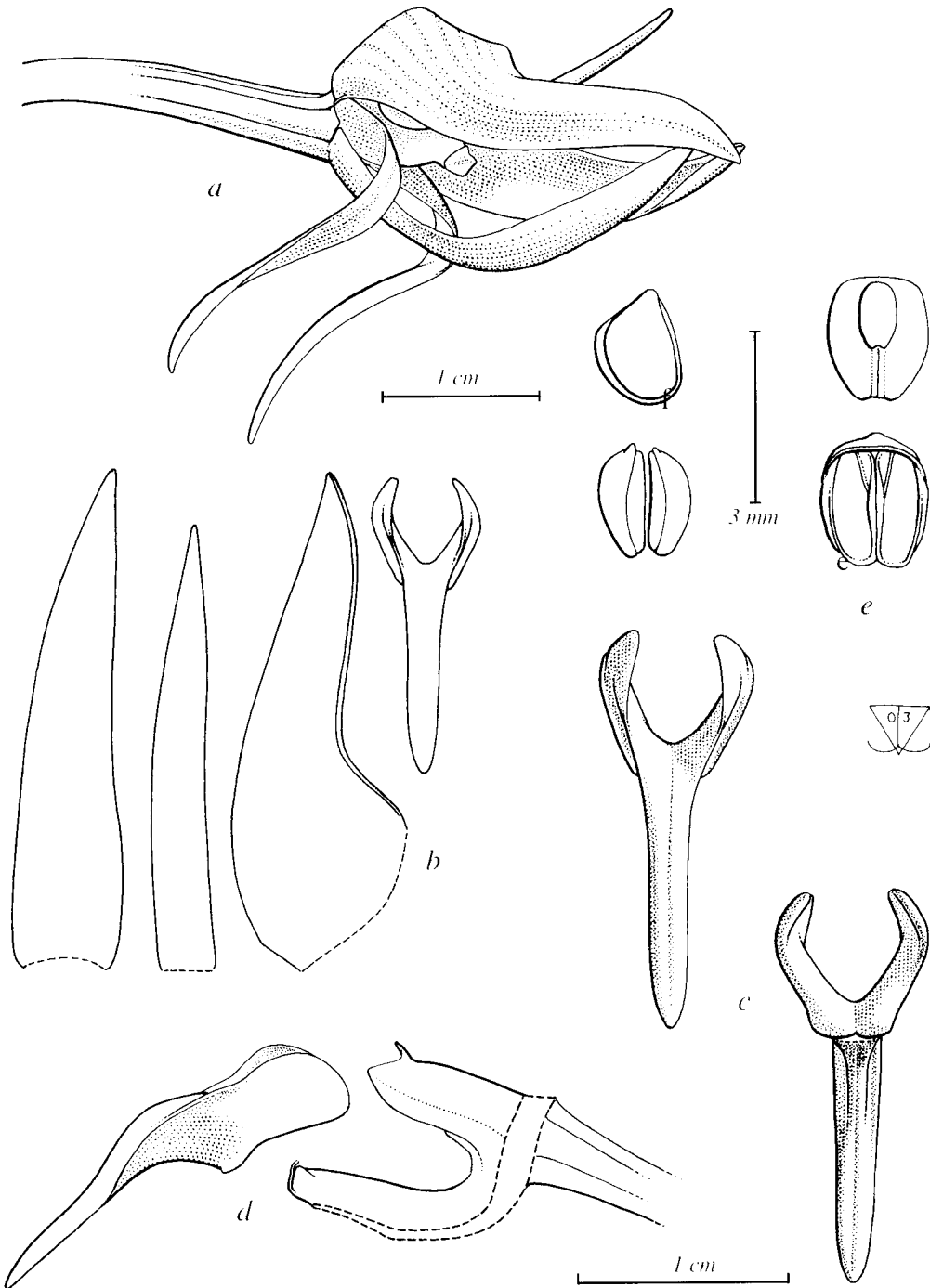
*Bulbophyllum* aff. *hahlianum* Schltr.: O'Byrne, *Lowland Orchids Papua New Guinea* (1994) 456.

*Roots* along the entire rhizome. *Rhizome* creeping, 4–5 mm diam., sections between pseudobulbs 8–12 cm long, bracts with veins persistent as coarse fibres. *Pseudobulbs* distant, ovoid-cylindrical, suberect, 1.5–2.0 x 0.5–0.8 cm. *Petiole* 2–4.5 cm long. *Leaf blade* elliptic to obovate, 12–19.5 x 3.3–7.4 cm, index (length/width) 1.9–5.4; obtuse. *Inflorescence* 5–12 cm long, 1-flowered. *Peduncle* (sub-)erect, 0.6–2 cm, bracts 3–5, the longest 9–19 mm long. *Floral bracts* tubular, 10–16 mm, cuspidate. *Flowers* not resupinate, not fully opening. *Pedicel* and *ovary* 65–88 mm long, basal node on a 13–16 mm long stump, juga and valvae well-rounded. *Median sepal* somewhat incurved, elliptic to ovate, 26–28 x 8–12 mm, index 2.1–3.5; acuminate, margins entire, base narrowly attached; rather thick, c. 11-veined, glabrous. *Lateral sepals* with the lower margins running more or less parallel, often touching at the tip, free, oblique, ovate-triangular, 16–22 x 10–13 mm, index 1.5–1.7, base widely attached; otherwise as the median sepal. *Petals* recurved to spreading, elliptic to obovate, 18–30 x 4.8–8 mm, index 2.7–5; acute to acuminate, margins entire, base narrowly attached; rather thin, c. 7-veined, glabrous. *Lip* recurved near the base, general outline almost hastate, 5–6.5 x 5–6 mm, index c. 0.8–1.2; obtuse, margins entire; thick, surface glabrous; adaxially hardly concave towards the base; abaxially with a distinct, emarginate ridge from base to tip. *Column* 4.5–6 mm long, stigma without basal

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**Figure 14.** *Bulbophyllum lyriforme* J.J. Verm. & P. O'Byrne – a. Flower; b. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; c. Lip, above: adaxial side, below: abaxial side; d. Column and lip, lateral view; e. Anther, above: adaxial side, below: abaxial side; f. Pollinia, above: a single pair, below: two pairs. – All from *Jongejan cult. 282* (spirit sample).





**Figure 14.** *Bulbophyllum lyriforme* J.J. Verm. & P. O'Byrne

tooth, column foot without a tooth just above the ligament. *Stelidia* porrect, triangular, 1–1.5 mm long, obtuse, without teeth along the lower margin. *Anther* abaxially with a flat crest, surface  $\pm$  glabrous, front margin drawn out into a rectangular beak with erose margins. *Pollinia* 4, the inner as long as the outer, all sub-triangular, without appendages.

*Colours*: Flowers yellow.

*Habitat*: Epiphyte in lowland forest, coastal woodland. Alt. 0–100 m. Flowering observed in Nov.

*Distribution*: PAPUA NEW GUINEA: New Britain (2 specimen seen).

*Notes*: Most similar to *Bulbophyllum macranthum* Lindl.; differs in having shorter and wider lateral sepals (index 1.5–1.7; in *B. macranthum* 2–3.5). *Bulbophyllum sinapis* has uniformly mustard-yellow flowers (hence the name), differing conspicuously from the cream-coloured, heavily spotted flowers of *B. macranthum*.

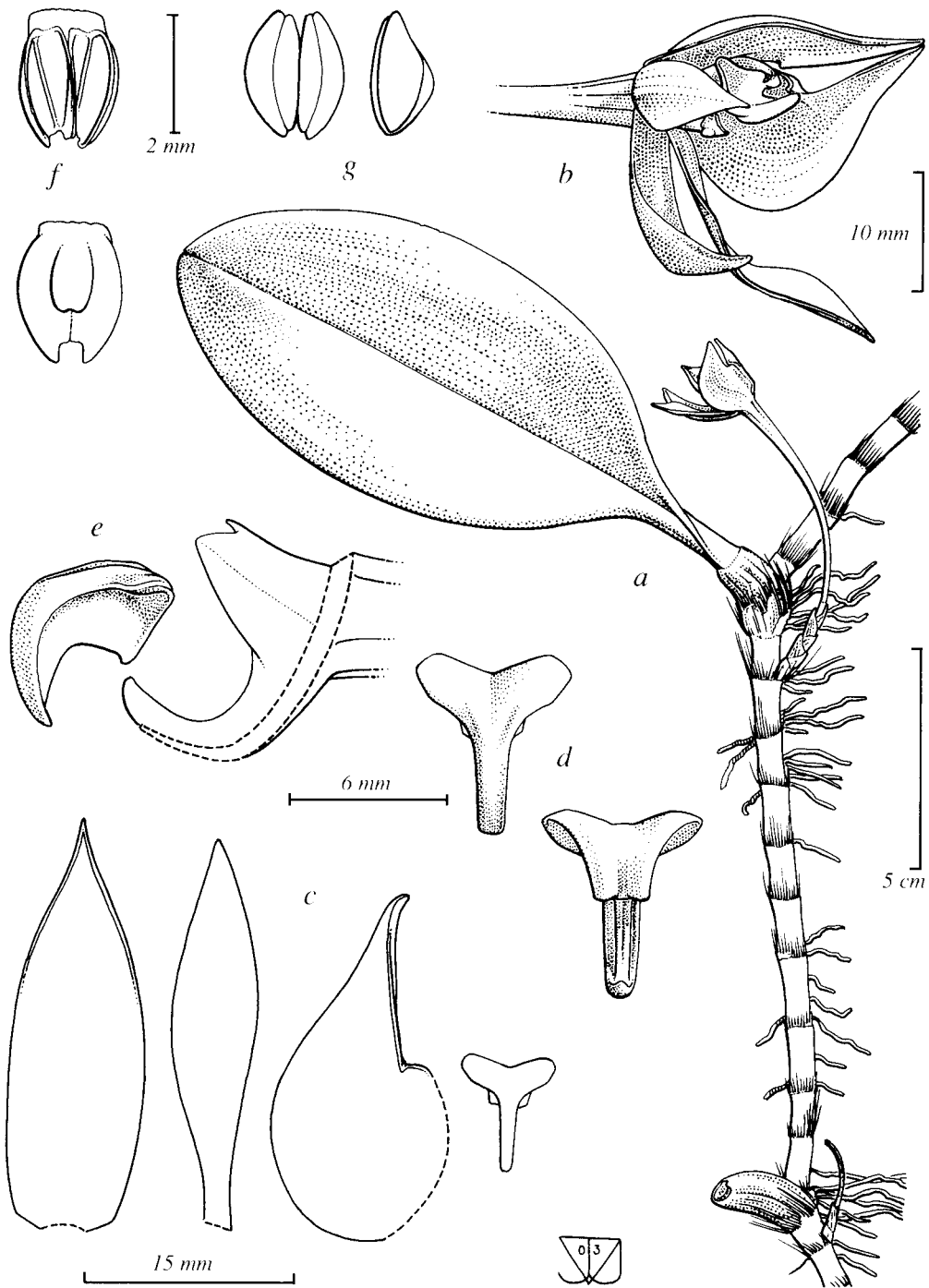
***Bulbophyllum turpis* J.J. Verm. & P. O'Byrne, *sp. nov.* – Fig. 16.**

*Bulbophyllum turpis* J.J. Verm. & P. O'Byrne, a *Bulbophyllo wrayi* Hook. f. sepalomateriali acuto, columna basi dente clitoriformi differt. – TYPE: Malaysia, Pahang, Gunung Brinchang, SBG-O 060 (SING, holo.).

*Roots* mainly below the pseudobulbs. *Rhizome* creeping, 7–8 mm diam., sections between pseudobulbs 2.8–3.5 cm long, bracts with veins persistent as fine fibres. *Pseudobulbs* close or distant, ovoid, erect, 4–5 x 2.2–3 cm. *Petiole* 16–18 cm long. *Leaf blade* elliptic, 28–29 x 4.8–5 cm, index (length/width) 5.6–5.9; acute. *Inflorescence* a rather dense raceme, 40–47 cm long, 40–50-flowered. *Peduncle* erect to patent, 23–28 cm, bracts c. 7, the longest c. 28 mm long. *Rhachis* arching, 17–19 cm. *Floral bracts* triangular, 4.5–15 x 2–2.5 mm, subacute. *Flowers*  $\pm$  resupinate,  $\pm$  secund, not fully opening, many open simultaneously. *Pedicel* and *ovary* 5–11 mm long, basal node  $\pm$  flush with the surface of the rhachis. *Median sepal* + porrect, ovate, c. 9.2 x 4.8 mm, index 1.9–2; acute, margins entire, base rather widely attached; rather thick, 3-veined, glabrous. *Lateral sepals* somewhat recurved, oblique, triangular, c. 9 x 5 mm, index c. 1.8, base rather narrowly attached; otherwise as the median sepal. *Petals* porrect, subtriangular, c. 4 x 2 mm, index c. 2; obtuse, margins entire, base broadly attached; thin, 1-veined, glabrous. *Lip* reflexed at c. 3/5 of its length, general outline ovate with an oblong, drawn-out top part, c. 3 x 2 mm, index c. 1.5 (all without artificial spreading), margins entire; glabrous,  $\pm$  3-lobed; *midlobe* oblong, truncate-emarginate, rather thick; adaxially concave and with 2 knob-shaped ridges

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**Figure 15.** *Bulbophyllum sinapis* J.J. Verm. & P. O'Byrne – a. Habit; 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: adaxial side, below: abaxial side; g. Pollinia, left: two pairs, right: a single pairs. – All from *Jongejan cult. 171* (spirit sample).



**Figure 15.** *Bulbophyllum sinapis* J.J. Verm. & P. O’Byrne

touching over a median furrow near the base, with 2 more rather inconspicuous, obtuse ridges proximally somewhat diverging and running parallel from about 1/3 to 2/3 of the length of the lip, the space in between channelled; abaxially with an inconspicuous, retuse ridge up to about 1/3 of the length of the lip; *lateral lobes* erect, attached along the proximal third of the lip, semi-circular, c. 1 mm high, rounded, thin. *Column* c. 2.8 mm long, stigma with a transverse ridge at its base, a longitudinal median ridge issuing from this, continuing up to  $\pm$  half-way the column foot, then splitting into two spreading lobes ending in a retuse tooth just above the ligament. *Stelidia* porrect, triangular, c. 1.2 mm long, obtuse to subacute, with a deltoid, acute tooth along the upper margin and a similar, obtuse tooth along the lower. *Anther* abaxially with a finely papillose crest, surface otherwise  $\pm$  glabrous, front margin drawn out into a porrect, triangular, acuminate beak with papillose margins. *Pollinia* 4, the inner slightly shorter than the outer, narrowly drop-shaped, the outer ovoid; no appendages present.

*Colours*: Rhizome scales densely spotted with dark red. Sepals yellow, stained with red except near the base. Petals yellow. Lip yellowish green, top part yellow. Flowers strongly scented, reminiscent of overripe apples.

*Habitat*: An understory epiphyte in thick moss cushions in permanently wet montane forest. *Bulbophyllum tahanense* Carr and *B. evansii* Henders., like similar conditions and grow in the same area. Alt. 1600-2000 m. Flowering observed in Mar.

*Distribution*: MALAYSIA: Peninsula (1 specimen seen).

*Notes*: This species differs from *Bulbophyllum wrayi* Hook.f. in having acute leaf tips, as well as a distinct bifurcate tooth on the column foot.

### ***Bulbophyllum* Incertae Sedis**

#### ***Bulbophyllum plumatum* Ames**

*Bulbophyllum plumatum* Ames, Orch. 5 (1915) 184. – TYPE: Philippines, Mindanao, Bukidnon Subprovince, BSC (L. Escritor) 21479 (not seen).

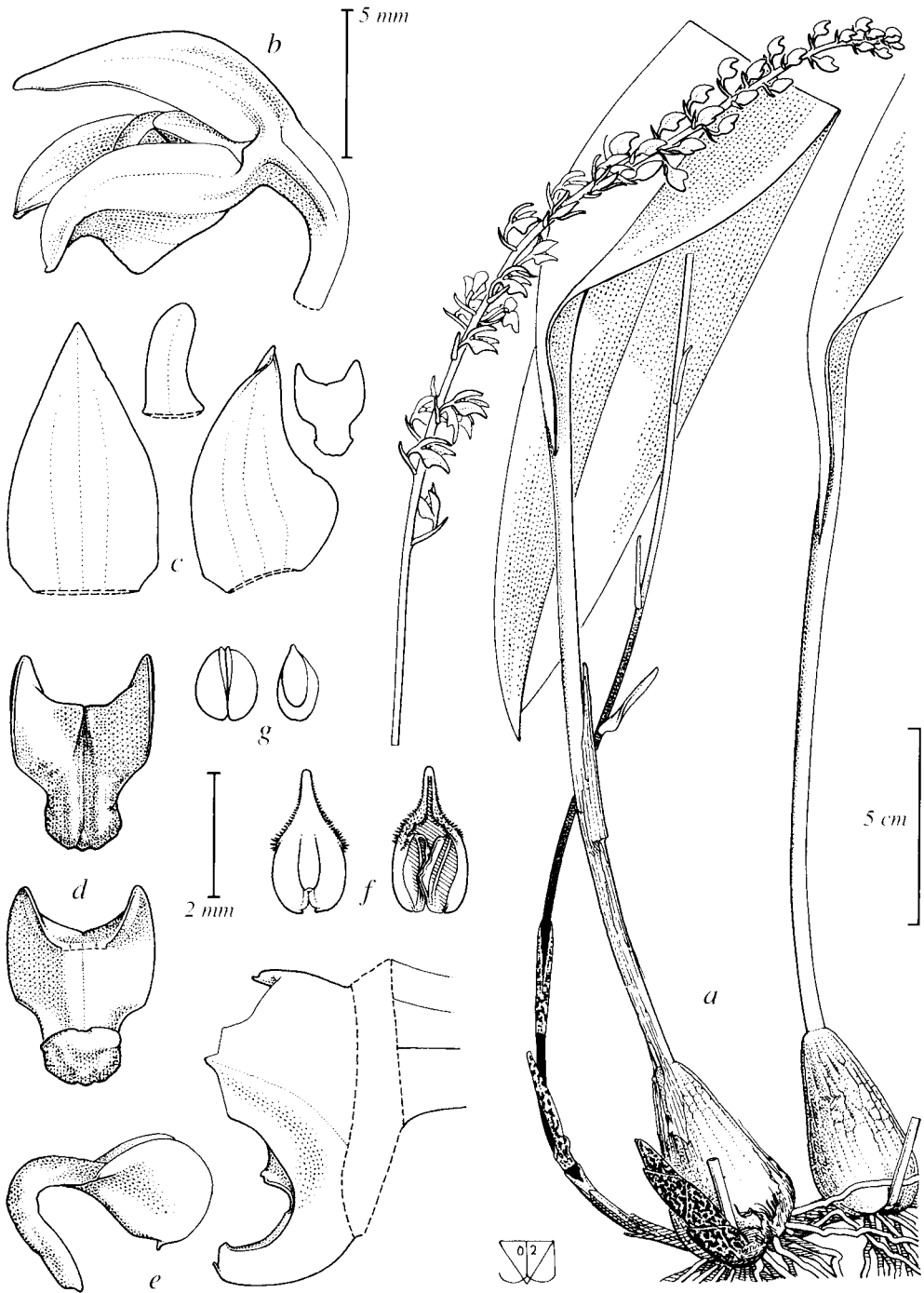
*Bulbophyllum jacobsonii* J.J. Sm., Blumea 1 (1935) 320. – TYPE: Indonesia, Sumatra, West Coast, Soengai Dareh, *Jacobson E.R. cult.* 2202 (*Theunissen*) (not seen).

*Habitat*: In Malaysia found as an epiphyte in lowland swamp forest; in Sumatra found at 1000 m altitude.

*Distribution*: MALAYSIA: Peninsula, Johor. INDONESIA: Sumatra. PHILIPPINES: Mindanao.

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**Figure 16.** *Bulbophyllum turpis* J.J. Verm. & P. O'Byrne – a. Habit; 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: abaxial side, right: adaxial side; g. Pollinia, left: two pairs, right: single pair. – All from SBG-O 0060 (living plant, spirit sample).



**Figure 16.** *Bulbophyllum turpis* J.J. Verm. & P. O'Byrne

*Notes:* The Johor plants represent the first records of this species for Malaysia and are the first fully documented records of this species in about 90 years. Plants of *Bulbophyllum plumatum* probably originating from Indonesia appeared in trade in some quantity a few years ago. The Johor plants differ slightly from these in having the lateral sepals coarsely transversely wrinkled.

*Material seen:* MALAYSIA. Johor, Endau basin, km 56 on road to Mersing, SBG-O 2533 (SING), Johor, Rompin area, *Hon Quik Pin* (WOC 17, 2002) 01 (SING).