

NOTES ON BULBOPHYLLINAE (ORCHIDACEAE) FROM BORNEO

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SUMMARY

Nine new species of the genus *Bulbophyllum* and one of the genus *Trias* are described, all originating from Borneo. Notes on two more Bornean species of *Bulbophyllum* are given.

This paper is additional to the information on Bornean *Bulbophyllum* species given in Vermeulen (1991). It adds nine new species to the checklist. The genus *Trias* is recorded for the first time from Borneo, with one new species. Two other *Bulbophyllum* species are mentioned which appear to have been incorrectly reduced into synonymy in Vermeulen (1991).

**1. *Bulbophyllum habrotinum* J.J. Vermeulen & A. Lamb, *spec. nov.* (sect. *Cirrhopetalum*) — Fig. 1**

*Bulbophyllum habrotinum* J.J. Vermeulen & A. Lamb, a *B. makoyano* in labello adaxialiter verrucoso differt. — Typus: *Leiden cult. (De Vogel) 913245* (L).

*Rhizome* creeping, 2.5–3 mm diam. *Pseudobulbs* ovoid, 1–2.5 cm apart, 0.9–2.8 by 0.6–1.1 cm, somewhat flattened or not. *Petiole* 5–10 mm. *Leaf blade* elliptic, 7–20 by 2–3 cm, index 3.5–10, tip obtuse. *Inflorescence* usually single, 4.5–9 cm, 6–9-flowered. *Peduncle* 4.3–8.7 cm; bracts c. 4, the longest c. 8 mm. *Rhachis* nodding, 0.2–0.3 cm. *Floral bracts* ovate, 4–5 mm, tip acute. *Pedicel and ovary* 6–7 mm. *Flowers* pendulous, in a whorl, all open at the same time, little opening. *Median sepal* elliptic, 4.2–4.5 by 3.5–4 mm, index 1.1–1.3, tip acuminate, often with a terminal hair; margins long ciliate; rather thin; surface glabrous. *Lateral sepals* connate along their upper margins as well as along their lower margins in the basal third, obliquely ovate, 26–55 by 3–3.5 mm, index c. 9–16, tip subacute; rather thin; about glabrous. *Petals* obliquely ovate, 4–4.5 by 2–2.5 mm, index 1.8–2, tip acuminate, often with a terminal hair; margins long ciliate; rather thin; adaxially very finely papillose towards the tip; abaxially glabrous. *Lip* curved halfway, general outline ovate, 3.2–4 by 1.8–2 mm, index 1.7–2 (not spread), tip acute to shortly acuminate; margins finely erose, papillose towards the tip; rather thin, soft; adaxially concave near the base, with an inconspicuous median ridge, with 2 distinct convergent ridges over most of its length, towards the base protruding as small lobes, surface papillose towards the base, verrucate towards the margins elsewhere; abaxially

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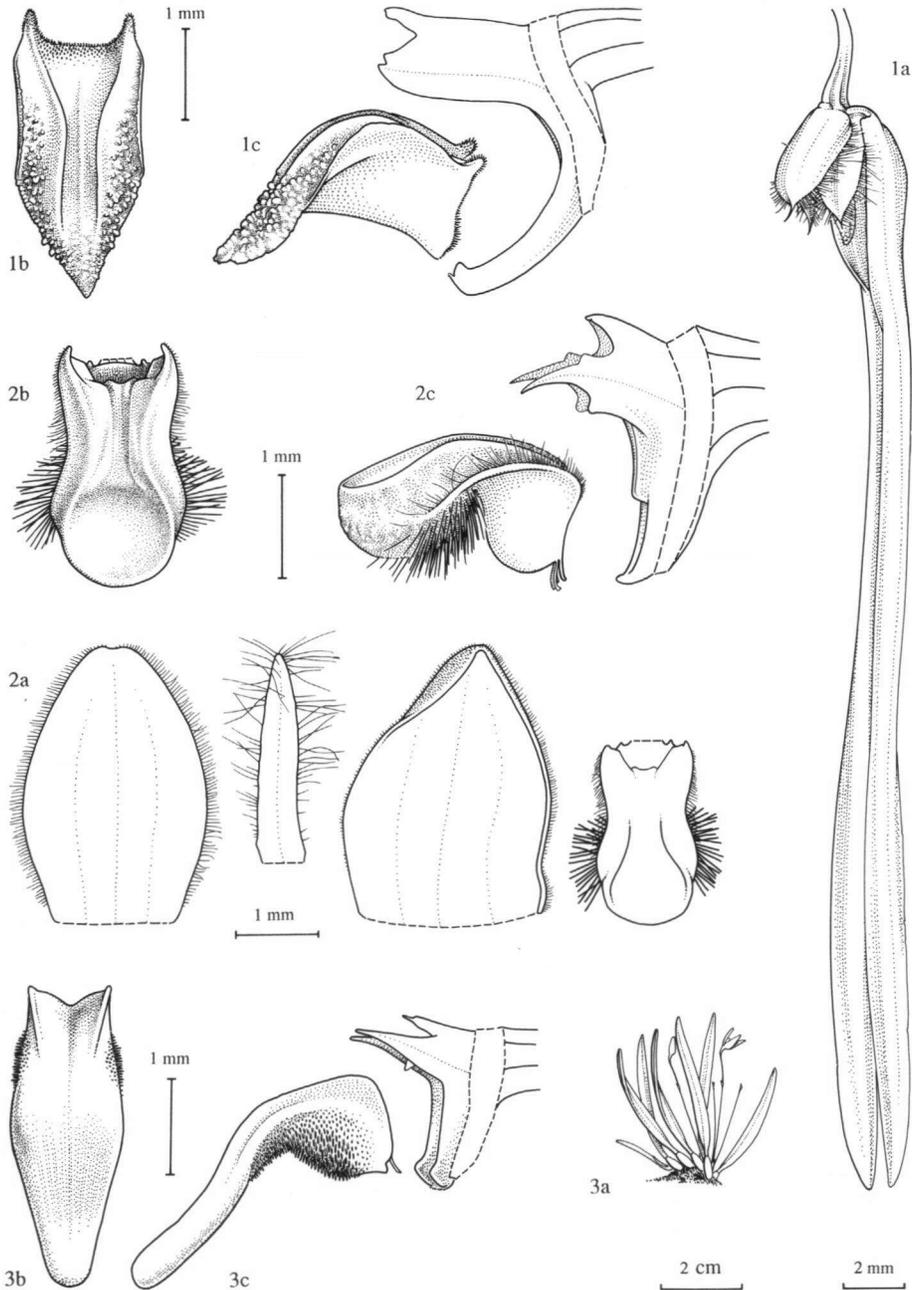


Fig. 1. *Bulbophyllum habrotinum* J.J. Vermeulen & A. Lamb. a. Flower; b. lip, adaxial side; d. column and lip, lateral view (*Leiden cult.* 913245). — Fig. 2. *B. trulliferum* J.J. Vermeulen & A. Lamb. a. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; b. lip, adaxial side; c. column and lip, lateral view (*T. O. C. cult.* 2321). — Fig. 3. *B. gilvum* J.J. Vermeulen & A. Lamb. a. Plant; b. lip, adaxial side; d. column and lip, lateral view (*Vermeulen* 569).

with a distinct, retuse median ridge, surface glabrous. *Column* from ovary to the tip of the steldia c. 2 mm; stigma not protruding at its base, slit-like; column foot without accessories. *Steldia* deltoid, c. 0.5 mm; tip acute; with a distinct, deltoid, acute tooth along the upper margin. *Anther* abaxially with an inconspicuous ridge towards its tip; front margin protruding. *Pollinia* 4; the inner pair more than half as long as the outer pair. *Stipes* absent.

Colours – Peduncle pale red, bracts pale green, sometimes with a pink tinge. Pedicel orange red, ovary yellow with red stripes. Median sepal dark red. Lateral sepals yellow, mottled with dark red, dark red towards the top. Petals yellowish green, veins and top dark red. Lip yellow, suffused with some brown.

Distribution – Malaysia: Sabah, Interior Zone: Crocker Range near Tambunan, *Lamb 1337/91* (L). Indonesia: Kalimantan, Kalimantan Timur, Apo Kayan, *Leiden cult. (de Vogel) 913245* (L).

Ecology – Epiphyte in primary forest. Alt. 1000–1500 m asl. Flowering observed in March.

Notes – Differs from *B. makoyanum* (Reichb. f.) Ridley in having a lip which is verrucose adaxially. In addition, it has lateral sepals which are not covered with a sticky mucus when the flowers are open, and which are only connate along their lower margins near the base.

The name refers to the elegantly shaped flowers: 'habros' (Greek) meaning 'delicate'.

## 2. *Bulbophyllum trulliferum* J.J. Vermeulen & A. Lamb, *spec. nov.* (sect. *Hirtula*) — Fig. 2

*Bulbophyllum trulliferum* J.J. Vermeulen & A. Lamb, a *B. nigrescenti* in inflorescentia nutanti, petalis triangularibus differt. — Typus: *T. O. C. cult. 2321* (L).

*Rhizome* creeping, 1.8–2.5 mm diam. *Pseudobulbs* almost discoid, 0.6–1 cm apart, 0.4–0.7 by 1.2–2 cm, distinctly dorsoventrally flattened. *Petiole* c. 10 mm. *Leaf blade* elliptic, 8.5–17 by 0.8–1.2 cm, index 10–14.2, tip acute. *Inflorescence* usually single, 29–32 cm, 10–14-flowered. *Peduncle* 27–29 cm; bracts c. 5, the longest c. 5 mm. *Rhachis* nodding, 2–3 cm. *Floral bracts* ovate, 1 mm, tip acute. *Pedicel and ovary* 2.5–3 mm, node coinciding with the attachment of the floral bract. *Flowers* scattered, many open simultaneously, little opening. *Median sepal* ovate, 3–3.2 by 2–2.6 mm, index 1.2–1.5, tip rounded to obtuse; margins ciliate; rather thin; adaxially glabrous, abaxially hirsute. *Lateral sepals* oblique, 3–3.8 by 2–3 mm, index 1.3–1.5, tip obtuse; margins papillose; otherwise as the median sepal. *Petals* oblique, triangular, 1.5–2.5 by 0.5–0.7 mm, index 3–3.6, tip subacute; margins long ciliate; thin; surface glabrous. *Lip* distinctly curved halfway, general outline obovate, somewhat constricted halfway, 2–2.5 by 1.1–1.2 mm, index 1.9–2.1 (not spread), tip rounded; margins long ciliate and with a backwards pointing, subulate auricle near the attachment to the column; thick; adaxially concave near the base, with 2 short ridges continuing as a slight median depression which is flanked by 2 more rather distinct ridges, and which ends as a circular depression near the top of the lip, surface glabrous; abaxially without a median ridge, surface towards the margins with thick long hairs. *Column* from ovary to the tip of the

stelidia c. 1.6 mm; stigma protruding at its base, triangular; column foot without accessories. *Stelidia* narrowly triangular, c. 1 mm; acute; with a small, deltoid, obtuse tooth along the upper margin and a much larger tooth of similar shape along the lower margin. *Anther* abaxially without a ridge; front margin not protruding, with stiff hairs. *Pollinia* 4; the inner pair more than half as long as the outer pair. *Stipes* absent.

Colours — Sepals cream-coloured, suffused with pale purple. Petals white, vein, margin and hairs along the margin purple. Lip orange towards the base, blackish purple towards the top; hairs white.

Distribution — Malaysia: Sabah, Interior Zone: Crocker Range near Tenom, *Lamb 830/87* (K), *T. O. C. cult. 2321* (L), *T. O. C. cult. 2429*.

Ecology — Epiphyte in primary forest. Alt. c. 900 m asl. Flowering observed in Sept.

Notes — 1. Shares a concave top part of the tip with *B. nigrescens* Rolfe. It differs from that species in having a nodding rhachis, triangular (not spatulate) petals, as well as much longer and narrower stelidia.

2. The name refers to the shape of the lip: 'trulla' meaning 'spoon' in Latin.

### 3. *Bulbophyllum gilvum* J.J. Vermeulen & A. Lamb, *spec. nov.* (sect. *Leptopus*) — Fig. 3

*Bulbophyllum gilvum* J.J. Vermeulen & A. Lamb, a *B. tenuifolio* pseudobulbis dense aggregatis, labello recurvato differt. — Typus: *Vermeulen 569* (L).

*Rhizome* creeping, c. 0.8 mm diam. *Pseudobulbs* ovoid, 0.08–0.2 cm apart, 0.15–0.5 by 0.08–0.18 cm, hardly flattened. *Petiole* 0.5–1 mm. *Leaf blade* elliptic, 1.5–3.4 by 0.3–0.35 cm, index 5–10, tip acute. *Inflorescence* usually few together on a short sympodium, 2–3 cm, 1-flowered. *Peduncle* 1–1.8 cm; bracts 2, the longest 1–1.8 mm. *Floral bracts* tubular, 1–1.5 mm, tip acute. *Pedicel and ovary* c. 8 mm, with the node c. 0.6 mm from the floral bract. *Flowers* moderately opening. *Median sepal* ovate, c. 6.3 by 2.2 mm, index 2.8–2.9, tip acute; rather thin; glabrous. *Lateral sepals* oblique, c. 6.7 by 2.4 mm, index c. 2.8; otherwise as the median sepal. *Petals* obliquely obovate, c. 2.2 by 1.2 mm, index 1.8–1.9, tip obtuse; margins finely papillose; thin; surface glabrous. *Lip* curved halfway, general outline ovate, c. 3.2 by 1.2 mm, index 2.6–2.7 (not spread), tip rounded; margins partially papillose in the lower half of the lip, otherwise glabrous; rather thick; adaxially concave and with 2 convergent ridges near its base, elsewhere slightly convex, surface glabrous; abaxially with an inconspicuous, truncate median ridge near the base, surface with a transverse papillose band in the basal half. *Column* from ovary to the tip of the stelidia c. 1.3 mm; stigma not protruding at its base, obovate; column foot with small lateral wings close to the attachment of the lip. *Stelidia* narrowly triangular, c. 0.9 mm; tip acute. *Anther* abaxially with a ridge towards its tip; front margin protruding. *Pollinia* 4; the inner pair more than half as long as the outer pair. *Stipes* present, thin.

Colours — Flowers yellow. Lip sometimes with some purple along the margins and in the centre on the abaxial side.

Distribution — Malaysia: Sabah, Interior Zone: Ulu Padas, near Long Pa Sia, *Vermeulen 596* (L), *Vermeulen & Duistermaat 1022* (L), *1036* (L).

Ecology – An epiphyte on mossy trunks and branches of small trees in low and open, very wet, mossy podzolic forest. Alt. 1300–1600 m asl. Flowering Oct., Dec.

Notes – 1. Similar to some forms of the variable species *B. tenuifolium* (Blume) Lindl. It differs in having more closely packed pseudobulbs, as well as a more distinctly curved lip of a firm, not a very spongy, texture.

2. The name refers to the yellowish flowers: 'gilvum' (Latin) meaning 'pale yellow'.

**4. *Bulbophyllum lohokii* J.J. Vermeulen & A. Lamb, *spec. nov.* (sect. *Hapalochilus*) — Fig. 4**

*Bulbophyllum lohokii* J.J. Vermeulen & A. Lamb, a *B. aureoapaci* in rhizomate repente et petalis ellipticis, a *Bulbophylli* sect. *Leptopodis* speciebus borneensibus labello immobiliter affixo differt. — Typus: Lamb 569/86 (L).

*Rhizome* creeping, 1.5–2 mm diam. *Pseudobulbs* ovoid, 0.7–1.2 cm apart, 0.8–2 by 0.5–0.9 cm, hardly flattened. *Petiole* 0.5–2 mm. *Leaf blade* elliptic, 2–6 by 0.8–1.4 cm, index 2–4, tip acute. *Inflorescence* usually some together on a short sympodium, 3–5 cm, 1-flowered. *Peduncle* 2.5–4.5 cm; bracts 5 or 6, the longest 2.5–3 mm. *Floral bracts* tubular, 1.8–2.5 mm, tip acute to acuminate. *Pedicel and ovary* 14–18 mm, with the node c. 0.8 mm from the floral bract. *Flowers* widely opening. *Median sepal* ovate, 10.5–13 by 3–4 mm, index 2.5–4.3, tip acute to acuminate; margins finely papillose; thin; surface glabrous. *Lateral sepals* obliquely ovate, 10–13 by 3.2–3.5 mm, index 3–4, margins only little papillose; otherwise as the median sepal. *Petals* elliptic, 4–5.8 by 1.2–2 mm, index 2.9–4.3, tip acuminate; margins finely papillose near the tip; thin; surface glabrous. *Lip* firmly fused to the column-foot, immobile, 3-lobed, median lobe approximately straight, general outline obovate, 8–10.5 by 1.6–2.4 mm, index 2.9–4.3 (not spread), tip rounded to subacute; margins glabrous; thick but very soft; adaxially concave near the base, convex towards the tip, surface glabrous; abaxially without a median ridge, surface papillose halfway towards the margins; lateral lobes inserted near the base of the lip, pointing backwards, triangular, tip obtuse; thin; glabrous. *Column* from ovary to the tip of the stelia 2–2.3 mm; stigma protruding at its base, slit-like; column foot with two small lateral wings close to the attachment of the lip. *Stelidia* subulate, 0.5–0.7 mm; tip acute; with an inconspicuous, obtuse tooth along the upper margin. *Anther* abaxially with a ridge towards its tip; front margin not protruding. *Pollinia* 4; the inner pair more than half as long as the outer pair. *Stipes* absent.

Colours – Sepals and petals yellowish or translucent white, with dark purple blotches. Lip yellow, sometimes with a few tiny purple specks.

Distribution – Malaysia: Sabah, West Coast Zone and Interior Zone: Mt Kinabalu, Carr SFN 27564 (L), Phillips SNP 2393 (L), Vermeulen & Chan 398 (L); Crocker Range near Tambunan, Lamb SAN 92317 (K), Vermeulen 651 (L).

Ecology – Epiphyte in forest, usually on small branches near the forest floor. Alt. 1700–2000 m asl. Flowering March, June, July, Sept., Oct.

Notes – 1. This species belongs to sect. *Hapalochilus*, of which most species occur in New Guinea. The flowers are most similar to *B. aureoapex* Schltr., which, however, has a patent rhizome and distinctly ovate petals.

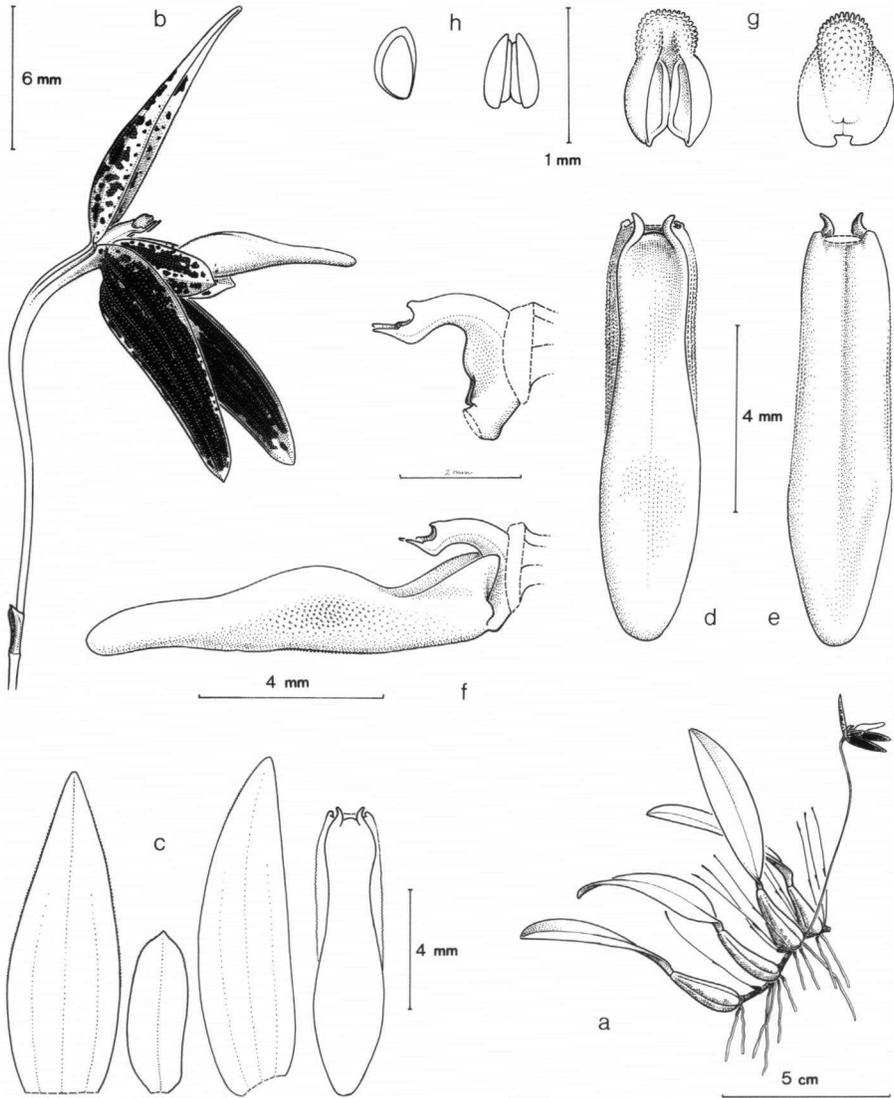


Fig. 4. *Bulbophyllum lohokii* J.J. Vermeulen & A. Lamb. a. Plant; b. flower; c. flower analysis, from left to right: median sepal, petal, lateral sepal, lip; d. lip, adaxial side; e. lip, abaxial side; f. column and lip, lateral view; g. anther, left adaxial side, right: abaxial side; h. pollinia, left: one pair, right: two pairs (Lamb 459/86).

2. This is the first species of sect. *Hapalochilus* found on Borneo. More or less similar looking species, such as *B. crepidiferum* J.J. Smith (sect. *Leptopus*) differ in having a mobile lip.

3. Named after Mr. H. Lohok, curator of the orchid garden at Poring, Sabah.

**5. *Bulbophyllum lordoglossum* J.J. Vermeulen & A. Lamb, *spec. nov.* (sect. *Hybochilus*) — Fig. 5**

*Bulbophyllum lordoglossum* J.J. Vermeulen & A. Lamb, *intra sect. Hybochilum* labello elliptico basi adaxialiter carina mediali brevissima ornato notata. — Typus: *Vermeulen 900* (L).

*Rhizome* creeping, c. 0.8 mm diam. *Pseudobulbs* ovoid, 0.7–1.4 cm apart, 0.1–0.8 by 0.08–0.12 cm, not flattened. *Petiole* 0.2 mm. *Leaf blade* elliptic, 0.5–0.9 by 0.3–0.4 cm, index 1.6–2.5, tip acute. *Inflorescence* usually single, c. 0.6 cm, 1-flowered. *Peduncle* c. 0.2 cm; bracts 3, the longest c. 0.9 mm. *Floral bracts* tubular, c. 1 mm, tip acuminate. *Pedicel and ovary* c. 1.8 mm, with the node c. 0.4 mm from the floral bract. *Flowers* moderately opening. *Median sepal* ovate, c. 2.8 by 1.2 mm, index 2.3–2.4, tip subacute; thin; glabrous. *Lateral sepals* obliquely triangular, c. 2.7 by 1.5 mm, index c. 1.8; otherwise as the median sepal. *Petals* elliptic, c. 1.1 by 0.7 mm, index 1.5–1.6, tip emarginate; very thin; glabrous. *Lip* distinctly curved about halfway, general outline elliptic, c. 1 by 0.7 mm, index 1.4–1.5 (not spread), tip rounded; margins with elongated papillae except near the base; rather thin; glabrous but slightly papillose towards the margins; adaxially somewhat concave except near the top, with a rather distinct, short median ridge near the base; abaxially without a median ridge. *Column* from ovary to the tip of the stelia c. 1.4 mm; stigma not protruding at its base, elliptic; column foot without accessories. *Stelidia* narrowly triangular, c. 1.1 mm; tip acute. *Anther* abaxially with a slight ridge towards its tip; front margin not protruding. *Pollinia* (not seen).

Colours – Sepals white, the laterals with a dark red blotch in the centre. Petals white. Lip dark red. Column white.

Distribution – Malaysia: Sabah, Sandakan Zone: Tawai Plateau near Telupid, *Vermeulen 900* (L).

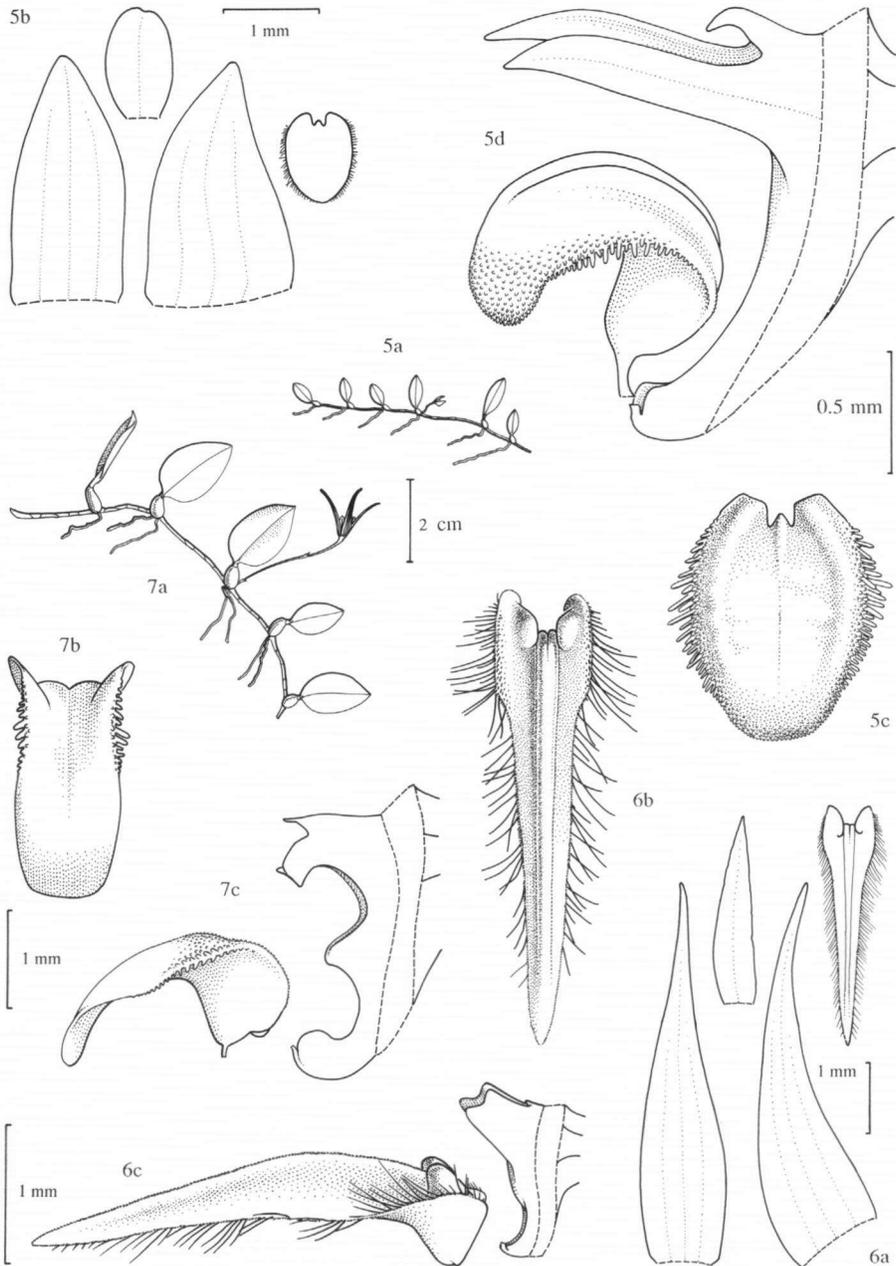
Ecology – Found as an epiphyte on a small branch near the forest floor, in forest on ultrabasic rock. Alt. 700 m asl. Flowering observed in Nov.

Note – This species is probably best included in sect. *Hybochilus*. Within this section, it is well characterized by its wide elliptic lip, with only a very short median ridge near its base. The name refers to the distinctly recurved lip: 'lordos' (Greek): 'bent backwards'.

**6. *Bulbophyllum tryssum* J.J. Vermeulen & A. Lamb, *spec. nov.* (sect. *Hybochilus*) — Fig. 6**

*Bulbophyllum tryssum* J.J. Vermeulen & A. Lamb, a *B. lordoglossum* in labelli carina mediali, labello basi utrimque tuberculis ornato differt. — Typus: *Vermeulen 508* (L).

*Rhizome* creeping, c. 0.4 mm diam. *Pseudobulbs* ellipsoid to spherical, 0.3–1.2 cm apart, 0.13–0.2 by 0.1–0.15 cm, not flattened. *Petiole* c. 0.5 mm. *Leaf blade* ovate



**Fig. 5.** *Bulbophyllum lordoglossum* J.J. Vermeulen & A. Lamb. a. Plant; b. flower analysis, from left to right: median sepal, petal, lateral sepal, lip; c. lip, adaxial side; d. column and lip, lateral view (Vermeulen 900). — **Fig. 6.** *B. tryssum* J.J. Vermeulen & A. Lamb. a. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; b. lip, adaxial side; c. column and lip, lateral view (Vermeulen 508). — **Fig. 7.** *B. hemiprionotum* J.J. Vermeulen & A. Lamb. a. Plant; b. lip, adaxial side; c. column and lip, lateral view (Vermeulen 467).

to elliptic, 0.35–1.5 by 0.18–0.4 cm, index 2.5–5, tip acuminate. *Inflorescence* usually single, c. 0.7–1.4 cm, 1-flowered. *Peduncle* 0.4–0.8 cm; bracts 1 or 2, 1–1.5 mm. *Floral bracts* tubular, 0.8–1.2 mm, tip acute to acuminate. *Pedicel and ovary* 1–2 mm, with the node 0.3–0.8 mm from the floral bract. *Flowers* widely opening. *Median sepal* ovate, 3–6 by 0.9–1.6 mm, index 3.7–4.5, tip acuminate; thin; glabrous. *Lateral sepals* obliquely triangular, 3–6.2 by 1–1.8 mm, index 3.4–4.5; otherwise as the median sepal. *Petals* obliquely ovate, c. 1.5–3 by 0.5–1 mm, index c. 5, tip acute; margins slightly erose towards the tip; thin; surface glabrous. *Lip* curved near the base, general outline triangular, 2–3.5 by 0.5–0.7 mm, index 4.2–5 (not spread), tip subacute; margins ciliate; rather thin; surface very finely papillose; adaxially somewhat concave near the base, with a distinct median ridge from the base to the tip, with 2 more distinct, short ridges near its base, close to the median ridge; abaxially without a median ridge. *Column* from ovary to the tip of the stelia 0.5–0.8 mm; stigma slightly protruding at its base, elliptic; column foot without accessories. *Stelidia* triangular, c. 0.4 mm; tip obtuse; with a distinct, triangular, obtuse tooth along the upper margin. *Anther* abaxially with a ridge towards its tip; front margin slightly protruding. *Pollinia* 2. *Stipes* absent.

Colours – Sepals and petals pale translucent green. Lip bronze green, with white ciliae, midvein often bright green. Column white.

Distribution – Malaysia: Sabah, West Coast Zone and Interior Zone: Crocker Range near Kimanis, *Vermeulen 508* (L); Sandakan Zone: Tawai Plateau near Telupid, *Vermeulen & Lamb 733* (L), *Vermeulen 866* (L); Kuamut Highlands, Maliau Basin, *Lamb 1487/92* (L). Indonesia: Kalimantan, Kalimantan Timur: Apo Kayan, *de Vogel & Cribb 9215* (K, L).

Ecology – Epiphyte on trunks and branches near the forest floor. Alt. 400–1600 m asl. Flowering observed in Oct., Nov.

Notes – 1. Collection *de Vogel & Cribb 9215*, Kalimantan, has shorter petals and a relatively short and wide lip. Otherwise it does not differ from the other specimens.

2. This species belongs to sect. *Hybochilus*. The general habit is similar to *B. lordoglossum*. Within this section it is well characterized by the long median ridge on the lip, which is flanked at the base by two knobs. The name refers to the delicate shape of this species: ‘tryssos’ (Greek): ‘delicate’.

### 7. *Bulbophyllum hemiprionotum* J.J. Vermeulen & A. Lamb, *spec. nov.* — Fig. 7

*Bulbophyllum hemiprionotum* J.J. Vermeulen & A. Lamb, stelidiorum absentia, stigmatis basi tuberculo magno ornata, basi labelli adaxialiter tuberculis duobus provisa notata. — Typus: *Vermeulen 467* (L).

*Rhizome* creeping, 0.7–1 mm diam. *Pseudobulbs* ovoid, 0.8–2.5 cm apart, 0.2–0.6 by 0.2–0.4 cm, hardly flattened. *Petiole* 0.5–1.5 mm. *Leaf blade* ovate, 0.9–3 by 0.5–1.3 cm, index 1.5–5, tip acuminate. *Inflorescence* usually single, 2.5–3 cm, 1-flowered. *Peduncle* 1.2–2.2 cm; bracts 1–3, the longest 1.5–3 mm. *Floral bracts* tubular, 1.8–2 mm, tip acuminate. *Pedicel and ovary* c. 9–11 mm, with the node 0.8–1.5 mm from the floral bract. *Flowers* moderately opening. *Median sepal* ovate, 10–14 by 2–2.8 mm, index 4.3–7, tip (sub)acute; rather thin; thickened to

wards the tip; glabrous. *Lateral sepals* ovate to triangular, 10–14 by 2–3.3 mm, index 3.6–5, otherwise as the median sepal. *Petals* ovate, 3.5–4 by 0.6–1 mm, index 3.6–6, tip (sub)acute; thin; glabrous. *Lip* curved halfway, general outline elliptic, 2.5–3 by 1 mm, index 2.5–3 (not spread), tip rounded; margins papillose or dentate to slightly over halfway the lip, rather thick; adaxially concave towards the base, with two distinct knobs which together form a transverse ridge near the base, surface somewhat papillose towards the margins; abaxially without a median ridge, surface glabrous. *Column* from ovary to the tip of the steldia 1–1.5 mm; stigma distinctly protruding at its base, obovate; column foot without accessories. *Steldia* inconspicuous, rounded wings not protruding beyond rostellum, with a distinct acute tooth along the lower margin. *Anther* abaxially with a ridge; front margin not protruding. *Pollinia* 4; the inner pair less than half as long as the outer pair. *Stipes* absent.

Colours — Sepals white or greenish, usually with purple veins, tip green or purple. Petals white with a purple vein. Lip yellowish green, usually with purple margins, top sometimes yellow. Column white.

Distribution — Malaysia: Sabah, West Coast Zone: Mt. Kinabalu, *Clemens 34107* (BO, E, NY), *Lamb 743/87* (L), *Vermeulen 467* (L), *Vermeulen, van Welzen & Lamb 1329* (L); Interior Zone: Ulu Padas, near Sarawak border, *Vermeulen 613* (L).

Ecology — Epiphyte on trunks and branches near the forest floor. Observed in mixed high forest and in mossy, low and open forest with many rattans. Alt. 1700–2000 m asl. Flowering Jan., March, July, Sept., Oct.

Notes — 1. Characterized by the column which lacks steldia and has a large knob at the base of the stigma, as well as by the two knobs near the base of the lip.

2. Difficult to place in any section. The shape of the column is reminiscent of species of sect. *Macrouris* (mainly occurring on New Guinea), but species of this section have racemose inflorescences in most cases.

3. The name refers to the partially dentate lip: 'hemi' (Greek), meaning 'half', and 'prionotos' meaning 'serrate'.

### 8. *Bulbophyllum dibothron* J.J. Vermeulen & A. Lamb, *spec. nov.* (sect. *Monilibulus*) — Fig. 8

*Bulbophyllum dibothron* J.J. Vermeulen & A. Lamb, a *B. lambii* in petalis obovatis, labello in parte basali adaxialiter duabus carinis ornato differt. — Typus: *Jongejan cult. 1956* (L).

*Rhizome* creeping, 0.6–0.8 mm diam. *Pseudobulbs* prostrate on the rhizome, ovoid, touching, 0.2–0.5 by 0.2–0.3 cm, distinctly flattened. *Petiole* 0.8–2 mm. *Leaf blade* elliptic to obovate, 0.5–1.3 by 0.3–0.6 cm, index 1.6–2.1, tip acute. *Inflorescence* usually single, 3.5–5.5 cm, 1-flowered. *Peduncle* 2–3.5 cm; bracts 2 or 3, the longest c. 2 mm. *Floral bracts* tubular, 1.5–2.5 mm, tip acuminate. *Pedical and ovary* 10–13 mm, with the node 0.5–1.5 mm from the floral bract. *Flowers* widely opening. *Median sepal* ovate to elliptic, 7 by 2–2.7 mm, index 2.6–3.5, tip acuminate; thin; glabrous. *Lateral sepals* oblique, ovate, 7–11 by 2.2–4 mm, index 2.5–3.2, tip (sub)acute; thin; glabrous. *Petals* obovate, 3–4 by 0.8–1.2 mm, index 3.1–3.9, tip acuminate; margins erose towards the tip; thin; surface glabrous. *Lip* somewhat curved, clawed, general outline ovate with a drawn-out top part, 9–11 by 1.8–2.2 mm, index c. 5 (not spread), tip obtuse; margins erose-dentate in the

basal half, but glabrous close to the base; rather thin; surface glabrous; adaxially concave in the basal half, with one deeper median depression close to the base and a second at about one third of the lip, with 2 distinct parallel ridges with an erose crest in the basal half; abaxially without a median ridge. *Column* from ovary to the tip of the stelidia 2.8–3 mm; stigma not protruding at its base, obovate; column foot with a rounded central swelling close to the attachment of the lip. *Stelidia* triangular, 0.8–1 mm; tip acute. *Anther* abaxially with an inconspicuous ridge towards its tip; front margin not protruding. *Pollinia* 2. *Stipes* present, thin, lacerated.

Colours – Peduncle and pedicel brownish yellow. Floral bract white. Ovary green. Sepals yellowish with orange veins. Petals translucent pale yellow with orange vein. Lip yellow with a green tinge near its base, orange up to halfway, drawn-out top part white. Column greenish with an orange foot.

Distribution – Malaysia: Sabah, West Coast Zone/Interior Zone: Mt Kinabalu, Vermeulen, van Welzen & Lamb 1330 (L); Crocker Range near Tambunan, Jongejan cult. 1956 (L), Lamb 1294/91 (L).

Ecology – Epiphyte on tree trunks and branches in montane forest. Alt. 1500–2000 m asl. Flowering observed in Jan.

Notes – 1. Differs from *B. lambii* J.J. Vermeulen in having obovate (not spatulate) petals, and a lip with a distinctly drawn-out top part, as well as two ridges in the basal part (rather than scattered irregular teeth).

2. The name refers to the two depressions in the basal half of the lip: ‘bothros’ (Greek) meaning ‘a hollow’.

**9. *Bulbophyllum muscohaerens* J.J. Vermeulen & A. Lamb, *spec. nov.* (sect. *Polyblepharon*) — Fig. 9**

*Bulbophyllum muscohaerens* J.J. Vermeulen & A. Lamb, a *B. tortuoso* labello lineari basaliter tuberculo ornato differt. — Typus: Vermeulen 647 (L).

*Rhizome* pendulous, up to 30 cm long, c. 1 mm diam. *Roots* spreading. *Pseudobulbs* ovoid, 1.5–2.3 cm apart, 0.5–0.6 by 0.2–0.3 cm, somewhat flattened. *Petiole* c. 0.5 mm. *Leaf blade* ovate, 1.5–2.2 by 0.6–0.9 cm, index 2.4–2.5, acuminate. *Inflorescence* few together on a short sympodium, 0.7 cm, 1-flowered. *Peduncle* 0.2 cm; bracts 3, the longest 1.5 mm. *Floral bracts* tubular, c. 1.5 mm, tip acuminate. *Pedicel and ovary* 1.5 mm, with the node 0.5 mm from the floral bract. *Flowers* moderately opening. *Median sepal* ovate, c. 4.5 by 1.7 mm, index 2.6–2.7, tip subacute; thin, slightly thickened towards the tip; glabrous. *Lateral sepals* adherent along their lower margins over most of their length, obliquely triangular, c. 4.3 by 1.7 mm, index 2.5–2.6; otherwise as the median sepal. *Petals* about obliquely ovate, c. 1.5 by 0.5 mm, index c. 3, tip acute; thin; glabrous. *Lip* somewhat curved halfway, general outline ovate, c. 2.7 by 0.35 mm, index 7–8 (not spread), tip rounded; margins ciliate except in the basal third; rather thick; surface glabrous; adaxially with a distinct conical knob near the base, otherwise convex; abaxially without a median ridge. *Column* from ovary to the tip of the stelidia c. 1 mm; stigma not protruding at its base, elliptic; column foot without accessories. *Stelidia* triangular, c. 0.5 mm; tip acute. *Anther* abaxially with a ridge towards its tip; front margin not protruding. *Pollinia* 4; the inner pair less than half as long as the outer pair. *Stipes* absent.

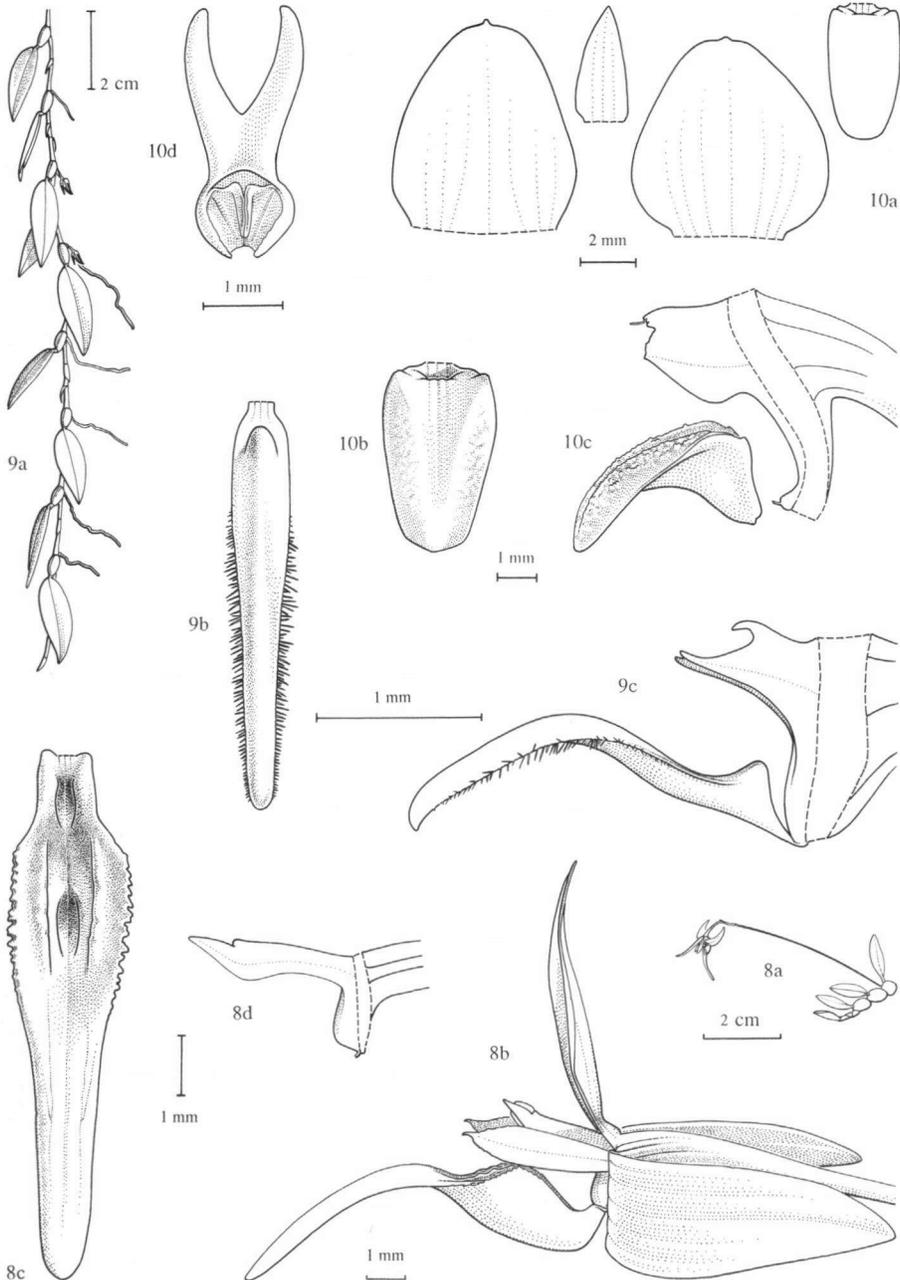


Fig. 8. *Bulbophyllum dibothron* J.J. Vermeulen & A. Lamb. a. Plant; b. flower; c. lip, adaxial side; d. column, lateral view (*Jongejan cult. 1956*). — Fig. 9. *B. muscohaerens* J.J. Vermeulen & A. Lamb. a. Plant; b. lip, adaxial side; c. column and lip, lateral view (*Vermeulen 647*). — Fig. 10. *Trias antheae* J.J. Vermeulen & A. Lamb. a. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; b. lip, adaxial side; c. column and lip, lateral view; d. anther, adaxial side (*T.O.C. cult. 2600*).

Colours – Sepals white towards the base, purple or green towards the tip. Petals translucent white, often with a purple midvein. Lip dark purple.

Distribution – Malaysia: Sabah, Interior Zone: Crocker Range near Tambunan, *Vermeulen 647* (L); Ulu Padas near Sarawak border, *Vermeulen 612*, peloric form (L).

Ecology – Found on a mossy tree-trunk, approximately 2 m above the forest floor. Alt. 1800–2000 m asl. Flowering observed in Oct.

Notes – 1. *Bulbophyllum muscohaerens* grows hanging down along mossy tree-trunks. Its roots do not grow along the rhizome towards the point where the plant is attached to the substratum (as in many other *Bulbophyllum* species with a hanging rhizome), but grow away from the plant, towards the substrate. The name refers to this character: 'muscohaerens' (Latin) meaning 'clinging to moss'.

2. The species belongs to section *Polyblepharon*. It differs from the sympatric *B. tortuosum* (Blume) Lindl. in having a long linear lip with a distinct knob near the base.

#### 10. *Bulbophyllum tardeflorens* Ridley (sect. *Intervallatae*)

*Bulbophyllum tardeflorens* Ridley, J. Linn. Soc. 31 (1896) 276. — Type: *Singapore cult. s.n.* (SING, not seen).

Note – In Vermeulen (1991: 153) *B. tardeflorens* is incorrectly synonymized with *B. macrochilum*. Two different taxa are involved. *Bulbophyllum tardeflorens* differs from *B. macrochilum* in having longer rhizomes with smaller, widely spaced pseudobulbs.

#### 11. *Bulbophyllum megalanthum* Griff. (sect. *Sestochilus*)

*Bulbophyllum megalanthum* Griff., Notul. 3 (1851) 286. — Typus: *Griffith s.n.* (K).

Note – In Vermeulen (1991: 247) *B. megalanthum* is incorrectly synonymized with *B. cheiri*. Two different taxa are involved. *Bulbophyllum megalanthum* differs from *B. cheiri* in having rhizome bracts which leave persistent fibres around the rhizome, as well as in the lip which is distinctly rounded on the back. The flowers are also differently coloured: the sepals are yellowish or brownish with conspicuous purple spots.

#### 12. *Trias antheae* J.J. Vermeulen & A. Lamb, *spec. nov.* — Fig. 10

*Trias antheae* J.J. Vermeulen & A. Lamb, a *T. intermedia* in labelli lobis lateralibus minoribus, columnae secus margines inferiores alis rotundatis differt. — Typus: *T. O. C. cult. 2600* (L).

*Rhizome* creeping, c. 1.5 mm diam. *Pseudobulbs* ellipsoid, 0.8–1.5 cm apart, c. 0.9 by 0.8 cm, distinctly flattened. *Petiole* about absent. *Leaf blade* elliptic, 1.8–2.3 by 1.1 cm, index 1.8–2.1, tip rounded. *Inflorescence* usually single, c. 1.8 cm, 1-flowered. *Peduncle* c. 0.5 cm; bracts 3, the longest 3.5 mm. *Floral bracts* tubular, c. 2 mm, tip acuminate. *Pedicel and ovary* c. 6 mm, node coinciding with the attachment of the floral bract. *Flowers* widely opening. *Median sepal* ovate, c. 7.5 by 7.5 mm, index c. 1, tip apiculate; rather thin; glabrous. *Lateral sepals* c. 8 by 7 mm, index c. 1.4; otherwise as the median sepal. *Petals* about triangular, c. 4.5 by 2.5 mm, index c. 1.8, tip acute; thin; glabrous. *Lip* 3-lobed, median lobe curved, general out

line ovate, c. 4.5 by 3 mm, index c. 1.5 (not spread), tip rounded; margins glabrous; thick; adaxially concave towards the base, convex towards the tip, surface slightly verrucate; abaxially with retuse median ridge, surface glabrous; lateral lobes along the margins in the lower third of the lip, very small and inconspicuous, triangular, tip acute. *Column* from ovary to the tip of the stelia c. 2.5 mm; stigma not protruding at its base, reniform, column foot without accessories. *Stelidia* inconspicuous, deltoid, c. 0.5 mm; tip acute; upper margin erose; with a broadly rounded wing along the lower margin. *Anther* abaxially with a ridge which is deeply bifurcate at its tip and which distinctly protrudes beyond the front margin; front margin not protruding. *Pollinia* 4; the inner pair more than half as long as the outer pair. *Stipes* absent.

Colours – Flowers cream-coloured, with some purple.

Distribution – Malaysia: Sabah, Interior Zone: Nabawan, *T. O. C. cult.* 2600 (L).

Ecology – Found as an epiphyte on a branch in wet podzolic forest. Altitude c. 400 m asl.

Notes – 1. Similar to *T. intermedia* Seidenf. & Smitin., from Thailand. *Trias antheae* differs in having distinctly larger flowers, more inconspicuous lateral lobes along the margin of the lip, as well as broadly rounded wings along the lower margins of the stelia.

2. The genus *Trias* is only marginally different from *Bulbophyllum*. The supposedly diagnostic ‘horn’ on the anther which distinctly protrudes beyond the front margin of the anther is not unique to *Trias*, but occurs in a number of *Bulbophyllum* species as well. Besides, in *Trias* they are possibly not homologous in all species: in e.g. *T. oblonga* Lindl. the front margin of the anther is drawn out, whereas in e.g. *T. rosea* and *T. picta* it is the ridge on the abaxial side of the anther which is drawn out. Only the presence of two distinct ‘horns’ on the anther, as in *T. mollis* (consisting of the front margin of the anther), *T. intermedia* and *T. antheae* (consisting of the ridge on the abaxial side of the anther) is a unique character within the *Bulbophyllinae*. The genus *Trias* is best regarded as a section of *Bulbophyllum*. Here, it is maintained only because a formal synonymization of the two genera reaches beyond the scope of this paper.

3. Named after Mrs. Anthea Lamb, Tenom, Sabah.

#### REFERENCE

- Vermeulen, J.J. 1991. *Bulbophyllum*. In: P.J. Cribb (ed.), *Orchids of Borneo*, Vol. 2. Bentham-Moxon Trust, Royal Botanic Gardens, Kew & Toihaan Publishing Company Sdn. Bhd., Kota Kinabalu.

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