



Bulbophyllum (Orchidaceae: Epidendroideae) of Indonesian Borneo: a new species and first record for *B. lyriforme*

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ABSTRACT: A new species of orchid, *Bulbophyllum pulanense*, is described based on specimens collected from Kapuas Hulu Regency, Kalimantan Barat Province of Indonesian Borneo. *Bulbophyllum lyriforme*, is also presented here as a new record for Borneo, formerly only known from cultivated plants collected from New Guinea. Both species are described and illustrated with both line drawings and photographs.

KEY WORDS: *Bulbophyllum alticaule*, *B. haematostictum*, *B. pulanense*, heath forest orchid, Malesian orchid, peatland orchid.

INTRODUCTION

Bulbophyllum Petit-Thouars (1822) is the largest genus within the Orchidaceae family (Chase *et al.*, 2015; Frodin, 2004), with perhaps over 2000 species known so far (de Vogel *et al.*, 2014; Vermeulen *et al.*, 2018). This number comprises ca. 7 percent of all known orchids and ca. 0.6 percent of all angiosperms (Christenhusz and Byng 2016). This genus has a wide distribution in the tropical and subtropical regions of the world (Chen and Vermeulen 2009), with the center of distribution found in Asia and New Guinea (Comber, 1990).

Borneo has a remarkably high diversity of *Bulbophyllum* with perhaps 288 known taxa (Vermeulen *et al.*, 2015). Further explorations yielded specimens that did not match any species described in the recent literature on Bornean *Bulbophyllum* (Vermeulen *et al.*, 2015; Kurniawan *et al.*, 2022). Careful examinations of the collected specimens by the second author showed two noteworthy findings. The first is *Bulbophyllum lyriforme* J.J.Verm. & P.O'Byrne (Vermeulen and O'Byrne, 2003), so far only recorded from New Guinea, which is a new record for Borneo, and another is a species unknown to science similar to *Bulbophyllum alticaule* Ridl. (Ridley, 1916) and *Bulbophyllum haematostictum* J.J.Verm. & A.Lamb (Vermeulen and Lamb, 2008) which is described here.

TAXONOMIC TREATMENT

New species description

Bulbophyllum pulanense Yudistira, F.H.Kurniawan & Mustaqim, *sp. nov.* **Figs. 1 & 2**

Type: INDONESIA. West Kalimantan, Kapuas Hulu Regency, Embaloh Hulu District, Batu Lintang Village,

Pulan, ca. 86 m asl, 17 December 2021, Riki Rahmansyah 01 (holotype FIPIA!).

Bulbophyllum pulanense is similar to *B. haematostictum* but differs in the flowers fully open (vs. not fully open) and fragrant (vs. smell foul), lateral sepals strongly reflexed in the upper third (vs. straight), labellum with margin entire (vs. irregular), labellum distinctly concave at the base (vs. slightly concave) with the base not drawn out (vs. drawn out), labellum with a distinct longitudinal ridge running from the base to 1/2–2/3 of its length on each side (vs. blunt), apical margin with distinct sinus on each side (vs. sinus absent), abaxial side with longitudinal median groove (vs. ridged), apex obtuse (vs. acute), and stelidia shorter (0.4–0.5 mm vs. 0.8–1.8 mm) with apical cusp (vs. cusp absent). This species is also similar to *B. alticaule* but differs in having inflorescence sub-umbellate (vs. raceme) bearing 2–3 flowers (vs. 8–22), shorter peduncle (1.5–2.8 cm vs. 13–16 cm), rachis shorter (0.5–1.1 mm vs. 3–6 cm), flower resupinate (vs. not resupinate), lateral sepals reflexed (vs. straight), petals cuspidate to shortly caudate (vs. rounded), labellum larger, 8.4–10.4 × 5.7–8.3 mm (vs. c. 5 × 4 mm), apical margin with distinct sinus on both sides (vs. absent), stelidia with apical cusp (vs. absent), tooth along the lower margin deltoid (vs. rounded); anther not drawn out in front (vs. drawn out) (Table 1).

Epiphyte or terrestrial. **Roots** from nodes, some scattered along internodes. **Rhizome** creeping, 1.5–2.6 mm diam., the section between pseudobulbs 4.2–19 cm. **Pseudobulbs** cylindrical, somewhat flattened 2.7–4 × 0.4–0.7 cm. **Leaves:** petiole 1.8–2.7 cm long, drying black; lamina elliptic to ovate, 9.7–10.9 × 3.2–3.4 cm, index (length per width ratio) 3–3.2, acute, margin entire, veins 5–6 pairs, tertiary venation scalariform, glabrous. **Inflorescence** horizontal to patent, sub-umbellate, 1.8–1.9 cm long, 2–3 flowered; peduncle 1.5–2.8 cm long,

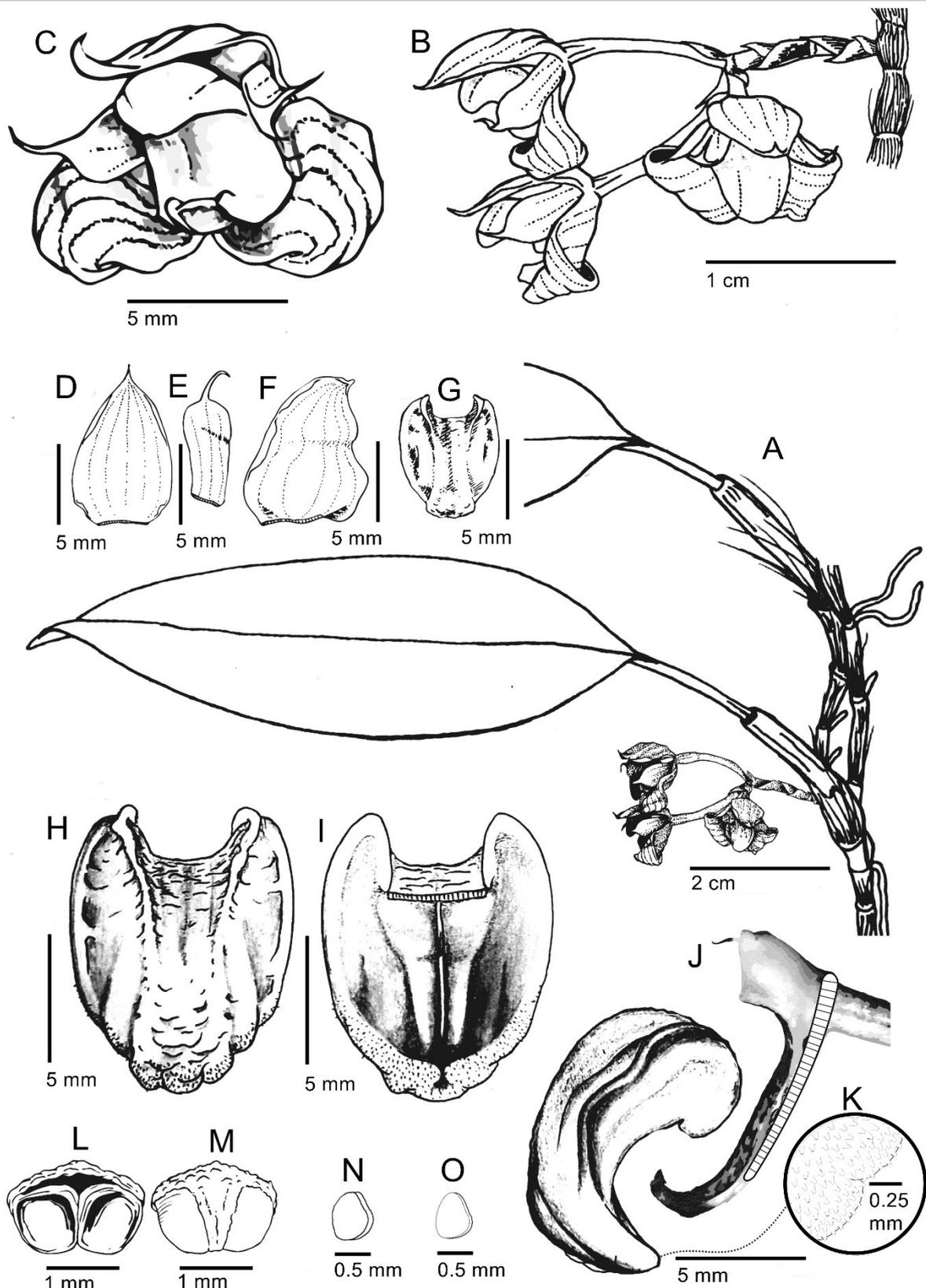
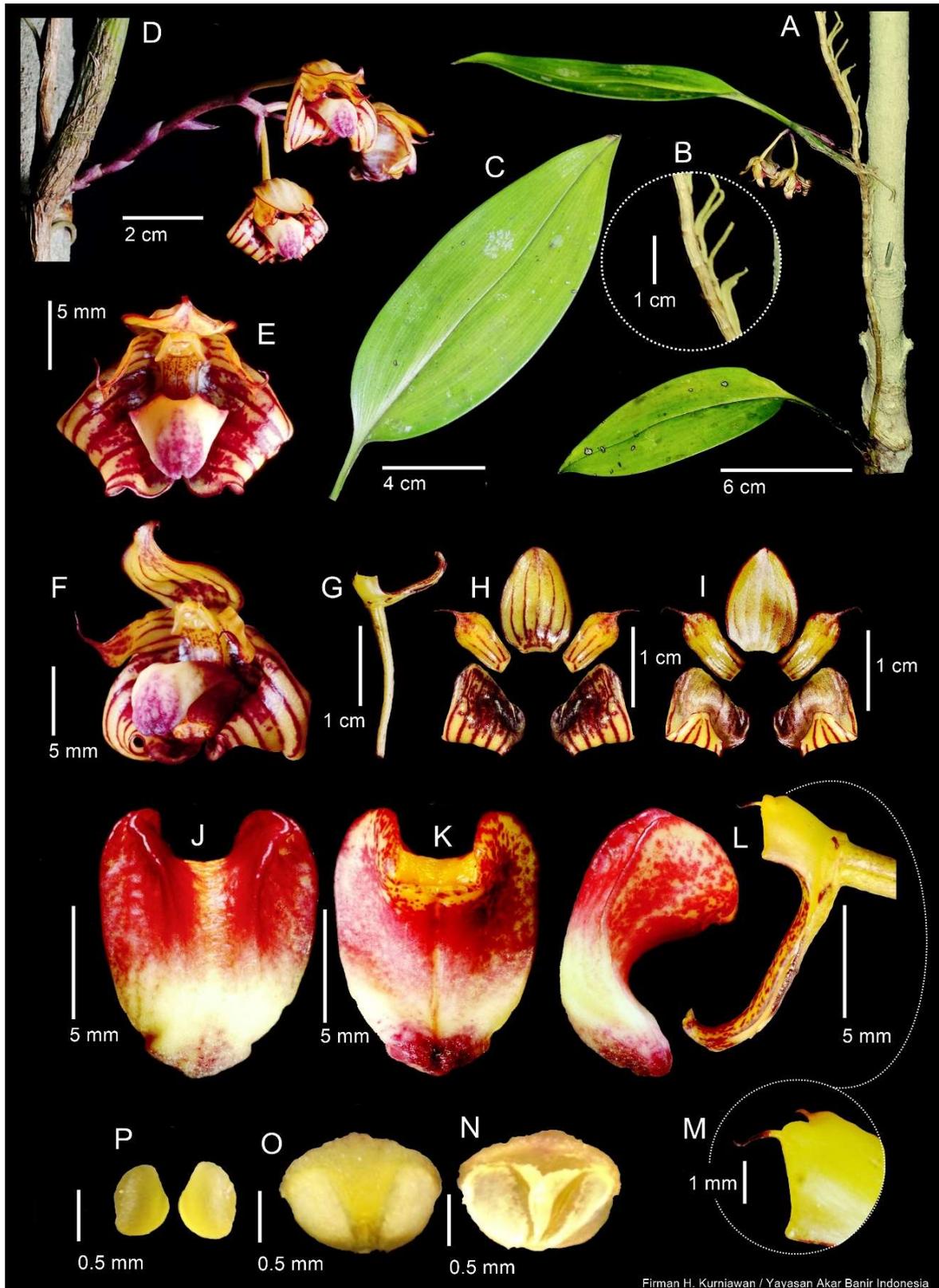


Fig. 1. Morphology of *Bulbophyllum pulanense* sp. nov. **A.** Plant habit; **B.** Inflorescence; **C.** Flower; **D.** Median sepal; **E.** Petal; **F.** Lateral sepal; **G.** Labellum; **H.** Labellum adaxial view; **I.** Labellum abaxial view; **J.** Labellum lateral view with column; **K.** Labellum detailed surface; **L.** Anther abaxial view; **M.** Anther adaxial view; **N.** Pollinia in pairs; **O.** Pollinia single. Illustrated by F.H.Kurniawan.



Firman H. Kurniawan / Yayasan Akar Banir Indonesia

Fig. 2. *Bulbophyllum pulanense* sp. nov. **A.** Habits; **B.** Roots from internode; **C.** Leaf blade; **D.** Inflorescence; **E.** Flower front view; **F.** Flower side view; **G.** Pedicel with column; **H.** Perianth adaxial view; **I.** Perianth abaxial view; **J.** Labellum adaxial view; **K.** Labellum abaxial view; **L.** Labellum lateral view with column; **M.** Stelidia; **N.** Anther adaxial view; **O.** Anther abaxial view; **P.** Pollinia. Photographed by F.H. Kurniawan / Yayasan Akar Banir Indonesia

**Table 1.** The morphological characters used to distinguish *Bulbophyllum pulanense* from *B. haematostictum* and *B. alticaule*.

Character	<i>B. pulanense</i>	<i>B. haematostictum</i> ¹	<i>B. alticaule</i> ²
Inflorescence			
Peduncle length	1.5–2.8 cm	2.7–5.0 cm	13–16 cm
Number of flower	3	3	8–22
Flower			
Opening	fully	not fully	not fully
Resupinate	yes	yes	no
Median sepals			
Shape	ovate	elliptic	ovate
Apex	acuminate	acuminate	obtuse
Lateral sepals			
Shape	ovate to ovate-triangular	elliptic to ovate	triangular
Orientation	strongly reflexed for the upper 1/3	not reflexed	not reflexed
Petal			
Apex	cuspidate to shortly caudate	caudate	rounded
Labellum			
Size	8.4–10.4 × 5.7–8.3 mm	5.5–8.0 × 5.0–6.0 mm	c. 5 × 4 mm
Ridge on adaxial	longitudinal ridge from base to ½– 2/3 its length	blunt	longitudinal ridge over most of the length
Base	concave and not drawn out	slightly concave and drawn out	concave and slightly drawn out
Margin	entire	irregular	entire
Apical margin	with sinus	sinus absent	sinus absent
Apex	obtuse	acute	rounded
Abaxial side	with longitudinal median groove	with longitudinal median ridge	with longitudinal median ridge
Anther			
Cap shape	triangular	obovate in outline	triangular ovate
Front part	not drawn out	not drawn out	drawn out
Stigma			
Shape	ovate	sub-elliptic	elliptic
Stelidia			
Shape	deltoid	triangular	deltoid
Length	0.4–0.5 mm	0.8–1.8 mm	c. 0.6 mm
Apical cusp	present	absent	absent
Tooth on the lower margin	deltoid	rounded	broadly deltoid

NOTE: 1. partly from Vermeulen *et al.* 2005. 2. from de Vogel *et al.* 2014; including illustration by J.J. Vermeulen in Schuiteman *et al.* 2001.

scales sheathing, 6–7, the longest 7–9 mm, rachis 0.5–1.1 mm long. **Floral bracts** 2/3 amplexicaul, ovate, 4.6–7.8 × 1.5–2.5 cm, acuminate, attachment approx. level with the basal node. **Flowers** open widely and simultaneously, c. 2 cm across, fragrant; cream to pale yellow with dark red–purplish at the apex and vein. **Pedicel** and **ovary** 16.7–20 mm long, ovary straight, 5.0–6.1 × 1.8–1.9 mm, ribs rounded. **Median sepal** free, ovate, 9–13.7 × 7–9.1 mm, acuminate, strongly reflexed, margins entire, glabrous, 5-veined, veins prominent. **Lateral sepals** similar to the median but larger and oblique, ovate to ovate-triangular, 12.1–15.6 × 8.2–11.6 mm, index 1.5–1.6, upper third strongly reflexed, acuminate, margins entire, glabrous, prominently 5-veined adaxially. **Petals** obovate, 9.3–12.5 × 2.8–4.7 mm, index 2.6–3.3, cuspidate to shortly caudate, margins entire, glabrous, 3-veined. **Labellum** recurved, ovate, 8.4–10.4 × 5.7–8.3 mm (not flattened), index 1.3–1.5, apical margin with a distinct sinus on each side, obtuse to rather retuse, margin entire to rather undulate; adaxially concave near the base, convex at the apex, surface papillose at apical and marginal zone, with rounded wrinkles near the apex, flat at the basal portion, on each side with distinct ridges running from the base to

1/2–2/3 its length; abaxially grooved at the base towards halfway its length, surface smooth, glabrous; cream-colored at the middle, gradually purplish-red toward the apex and the base. **Column** triangular, arcuate, including stelidia 3.7–5.0 mm long; column foot 6.6–7.5 mm (not flattened). **Stelidia** deltoid, with apical cusp; tooth porrect, deltoid, blunt, 0.4–0.5 mm long, along the lower margins. **Stigma** ovate. **Anther** triangular with connective not drawn out, papillose; **pollinia** ovate, 4 as 2 pairs. **Capsule** not seen.

Distribution: Endemic to Indonesian Borneo: Kalimantan Barat Province, only known from Kapuas Hulu Regency (Fig. 3).

Ecology: Lowland heath and peat swamp forest, from 45–90 m asl.

Phenology: Flowering in March, November and December.

Etymology: The epithet refers to the Pulan hamlet where the type specimen was collected.

Conservation status: The current data are not enough to assign conservation status because forests surrounding the two collecting localities are poorly explored. However, the forests are threatened by timber extraction.



Meanwhile, this species is also collected and sold as an ornamental plant. Following IUCN (2012) and IUCN Standards and Petitions Committee (2022), data deficient (DD) is the most suitable conservation status until further data is available.

Notes: *Bulbophyllum pulanense* is a member of the section *Beccariana* by the well-spaced, 1-leafed pseudobulbs, 3-flowered inflorescence, basal pedicel nodes level with bract attachment, lowermost flowers' pedicel and ovary more than 2-times length of rachis, entire petals, non-twisted lateral sepals, and tooth or wing absent from the adaxial side of stelidia (Vermeulen *et al.*, 2015). The 3-veined petal is used by Vermeulen *et al.* (2015) to separate some of the Bornean species from the sect. *Rhytionanthos* and *Desmosanthes*, but the characters still fall within the scope of sect. *Beccariana*. Although the key of Bornean *Bulbophyllum* by Vermeulen *et al.* (2015) guides the new species into *B. haematostictum*, the characters mentioned in the diagnosis is appropriate to separate *B. pulanense* into an independent species.

Other specimen examined: INDONESIA. West Kalimantan, Kapuas Hulu Regency, Putussibau Selatan District, Kedamin Darat village, 45 m asl, 17 March 2022, F.H. Kurniawan 03 (FIPIA).

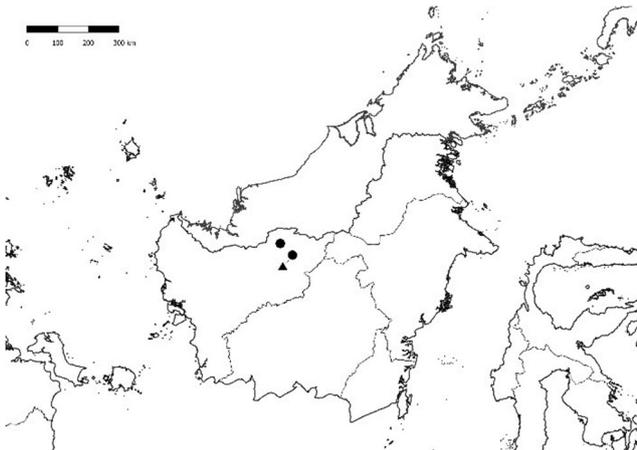


Fig. 3. Geographical distribution of *Bulbophyllum pulanense* (●) and *Bulbophyllum lyriforme* (▲) in Indonesian Borneo.

Amendments to Key of Bornean *Bulbophyllum* sect. *Beccariana* modified from Vermeulen *et al.* (2015)

- 17a. Labellum adaxially densely verrucate with small, conical verrucae partly fused to narrow, irregular ridges. Labellum margins distinctly and irregularly denticulate *B. subumbellatum*
 17b. Labellum adaxially with coarse, shallow, rounded wrinkles. Labellum margins entire to slightly irregular 18
 18a. Tooth along the lower margin of the stelidia slightly falcate
 *B. nabawanense*
 18b. Tooth along the lower margin of the stelidia porrect 18'
 18'a. Lateral sepals strongly reflexed. Labellum without drawn-out part at the base, apical margin with distinct sinus on each side, surface papillose at apical and marginal zone *B. pulanense*
 18'b. Lateral sepals straight or nearly so. Labellum with drawn-out part at the base, without distinct sinus on each side of apical margin, surface smooth *B. haematostictum*

New record of *Bulbophyllum lyriforme* in Borneo

Bulbophyllum lyriforme JJ.Verm. & P.O'Byrne, Gard. Bull. Singapore. 55 (2003) 154. — **Type:** *P. Jongejan cult.* 282 (holotype L n.v.), Papua New Guinea.

Figs. 4 & 5

Epiphytes, **roots** mainly near the base of the pseudobulb. **Rhizome** creeping, 3.2–3.8 mm diam., the section between pseudobulbs 4.2–6 cm, scale with fibers persistent. **Pseudobulbs** ovoid, 1.1–1.4 × 0.7–0.8 cm. **Leaves:** petiole 9.6–12.0 mm long; leaf blade elliptic, 18.6–19.7 × 3.7–3.9 cm, index ca. 5, obtuse to rounded. **Inflorescence** varies from erect to horizontal, 1-flowered; peduncle 3–3.2 cm long. **Floral bract** 3, tubular, the longest ca. 9.6 mm long, sheathing, acuminate to shortly cuspidate. **Flower** fragrant, not resupinate and not fully opening. **Pedicel** and **ovary** ca. 34.8 mm long, ovary straight, ribs rounded, with dark purple spots near the sepal. **Median sepal** somewhat incurved, triangular, 33.6–36.3 × 6.8–7.1 mm, index 4.9–5.1, acute, margins entire, rather incurved, basal attachment narrowed, glabrous, 9-veined, pale pink to whitish, with scattered purple-red spots, faded towards along the middle part, paler in adaxial view. **Lateral sepals** incurved, free, oblique, triangular to rather ovate, 33.2–35.1 × 10.8–11.0 mm, index 3.1–3.3, gradually thickened towards the lower margin, 9-veined, the colors as same as the median with additional yellow adaxially along the lower margins. **Petals** reflexed, linear, subtriangular, 26.8–27.6 × 3.5–3.6 mm, index 7.6–7.7, acute, margins entire, glabrous, 5-veined, light pink with many purple-red spots. **Labellum** mobile, slightly recurved at the base, hastately-lirate, 19.2–20.8 × 7.2 mm (not flattened), index 2.7–2.9, long drawn-out at the top, margin slightly concave near the base, lateral lobes present, obovate-subquadrangular, rounded, margin entire; the drawn-out top part thicker than the rest, glabrous; adaxially concave towards the base; abaxially with a distinct, emarginated ridge over ca. 1/4–1/3 of the length of the lip, cream colored with dense purple-red spots, apex and abaxial ridge yellow. **Column** including stelidia ca. 8.5 mm long, column foot ca. 11.3 mm long (not flattened). **Stelidia** porrect, deltoid to triangular, apex obtuse, wings or tooth absent along the lower margins. **Anther** abaxially having a distinct, flat crest, surface glabrous to rather undulate, ca. 2.1 × 2 mm. **Pollinia** 4, as two pairs, without appendages.

Distribution: Malesia: Borneo (Kalimantan) and Papua New Guinea. The distribution in Indonesian Borneo can be seen in Fig. 3.

Ecology: Heath and peat swamp forest, on the tree trunk, 44–90 m asl. Relative humidity varies from 80–90% and canopy cover range is 75–85%. The forest is dominated by *Shorea pachyphylla* Ridl. ex Symington (1941), family Dipterocarpaceae.

Phenology: Flowering all year round.

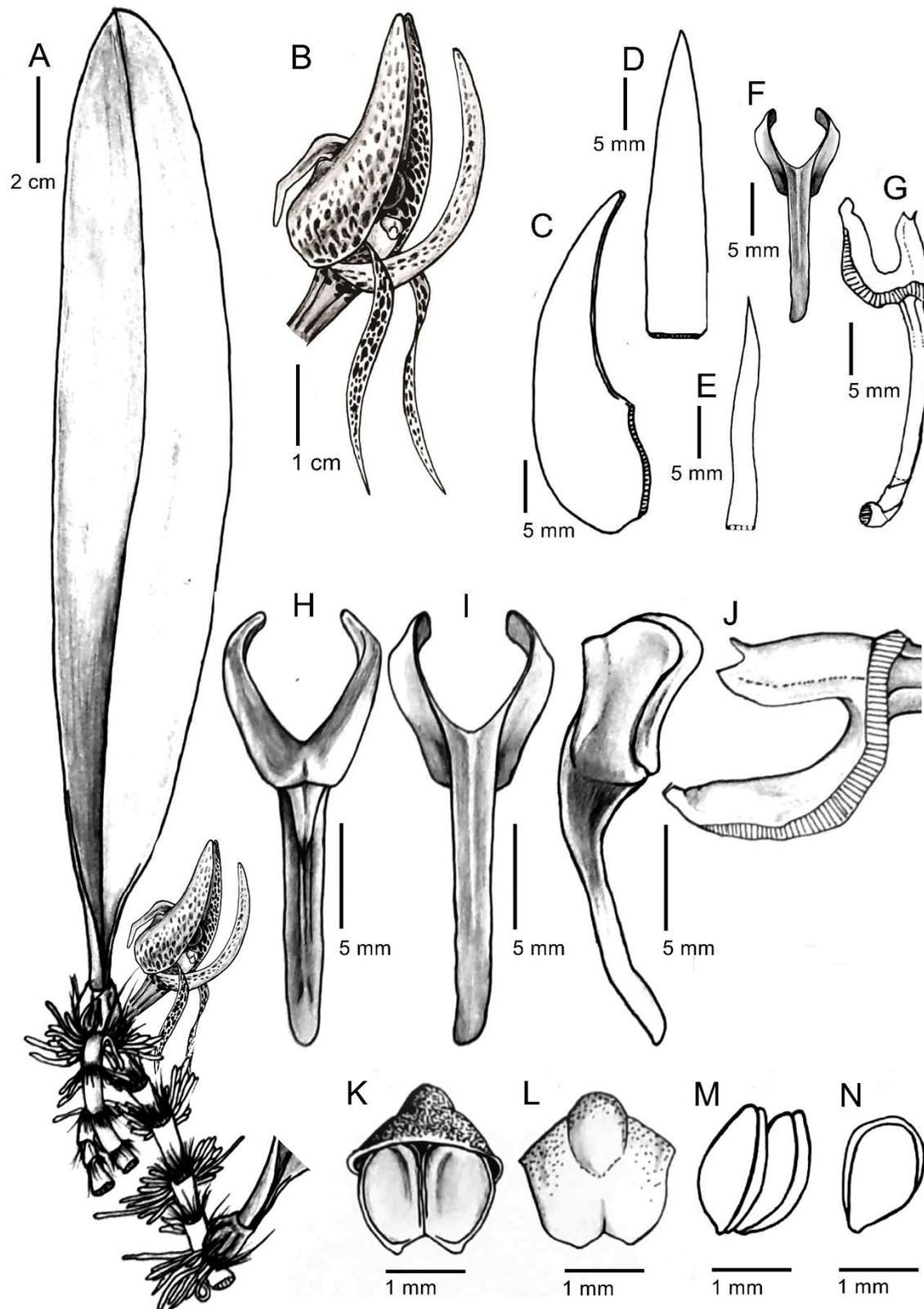


Fig. 4. Morphology of *Bulbophyllum lyriforme* **A.** Habits; **B.** Flower; **C.** Lateral sepal; **D.** Median sepal; **E.** Petal; **F.** Labellum; **G.** Column, pedicel, and peduncle; **H.** Labellum abaxial view; **I.** Labellum, adaxial view; **J.** Labellum lateral view with column; **K.** Anther adaxial view; **L.** Anther abaxial view; **M.** Pollinia: pairs; **N.** Pollinia single. Illustrated by F.H. Kurniawan.

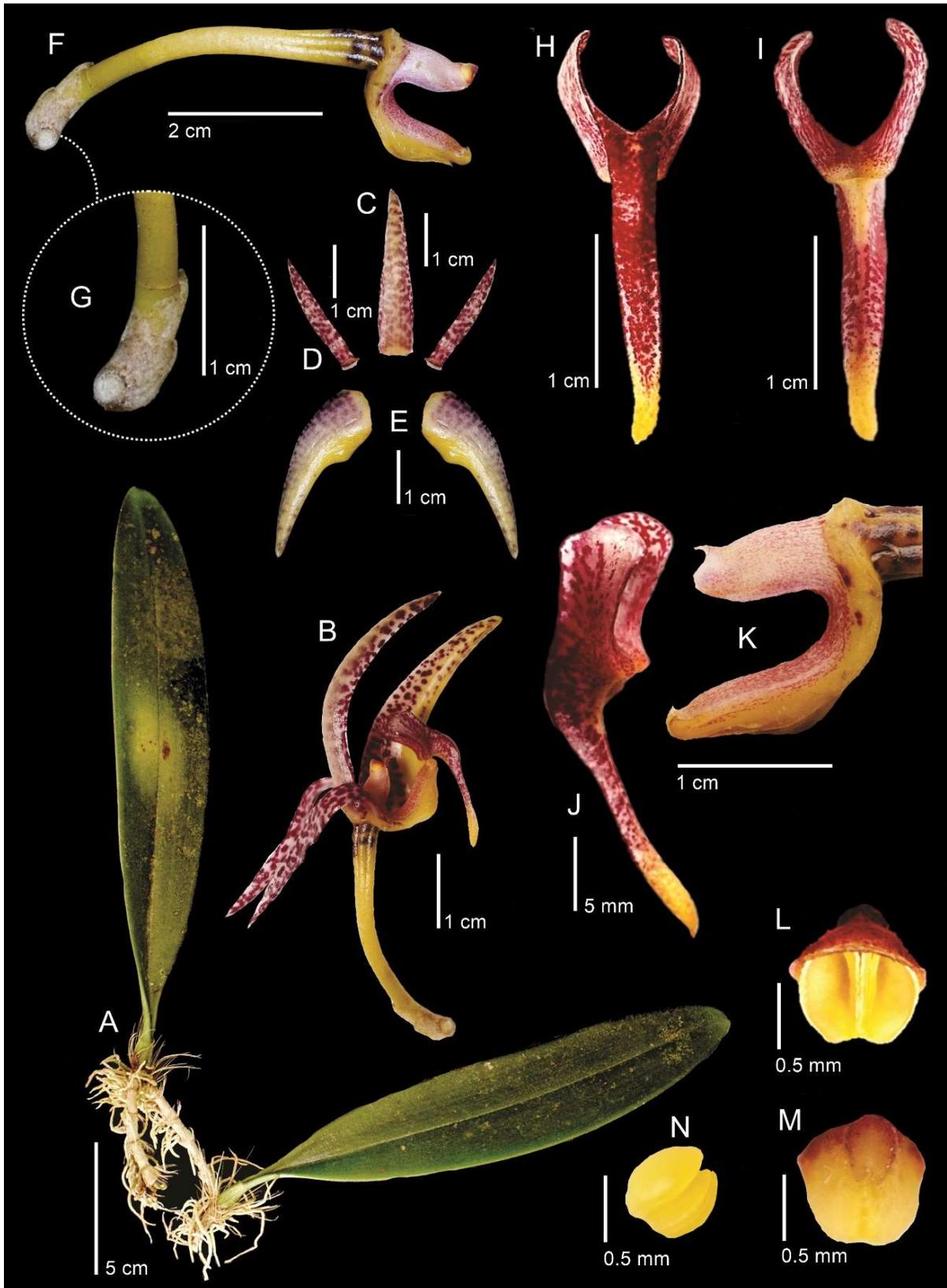


Fig. 5. *Bulbophyllum lyriforme* A. Rhizome and leaves; B. Flower with peduncle; C. Median sepal; D. Petal; E. Lateral sepals; F. Peduncle with column; G. Floral bracts; H. Labellum, adaxial view; I. Labellum, abaxial view; J. Labellum, lateral view; K. Column; L. Anther adaxial view; M. Anther, abaxial view; N. Pollinia. Photographed by F.H. Kurniawan/Yayasan Akar Banir Indonesia.



Fig. 6. The habitat of *Bulbophyllum lyriforme* in Kapuas Hulu, Kalimantan Barat, Indonesia. Photographed by F.H. Kurniawan/Yayasan Akar Banir Indonesia.

Notes: *Bulbophyllum lyriforme* belonging to sect. *Sestochilos* due to the distance of basal nodes equal to 0.5 or more times its diameter, 5-veined petals, and four pollinia (Vermeulen *et al.*, 2015). The most morphologically similar species is *B. cheiri* Lindl., also native to Borneo, but *B. lyriforme* differs by winglike and backward-pointing labellum basal lateral lobes.

We counted at least 25 plants from the collecting locality, a relatively undisturbed and locally sacred forest (Fig. 6). It is unlikely that the plant is a result of introduction despite its high potential as an ornamental plant. This situation suggests that this species is native to Borneo.

Other specimens examined: INDONESIA. Kalimantan Barat Province, Kapuas Hulu Regency, Putussibau Selatan District, Kedamin Darat Village, 44 mm asl, 5 Feb 2022, *FH Kurniawan 04* (FIPIA).

Amendments to Key of Bornean *Bulbophyllum* sect. *Sestochilos* modified from Vermeulen *et al.* (2015)

- 8a. Labellum 15–35 mm long 8'
 8b. Labellum 3.5–9.0 mm long 9
 8'a. Labellum hastate-lyrate, basal lateral lobes winglike and pointing backward *B. lyriforme*
 8'b. Labellum elliptic, without basal lateral lobes *B. cheiri*

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