

Two new orchid species from the Raja Ampat Archipelago, Southwest Papua Province, Indonesia

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Abstract

Two new species of orchid, *Dendrobium siculiforme* Saputra, Schuit., & Metusala (section *Spatulata* Lindl.) and *Bulbophyllum ewamiyiuu* Saputra, Schuit., & Metusala (section *Macrouris* Schltr.), are described based on specimens from the Raja Ampat Archipelago, Southwest Papua, Indonesia. Detailed morphological descriptions and diagnoses, information on distribution and ecology, and preliminary conservation assessments are provided for each species.

Keywords: anggrek, Batanta Island, Bird's Head Peninsula, endangered, jenis baru, *Macrouris*, New Guinea, *Spatulata*.

Introduction

In terms of plant species diversity, New Guinea is the richest tropical island, with Orchidaceae representing by far its most diverse plant family, with nearly 2,900 known species (Cámara-Leret *et al.* 2020). At the same time, New Guinea has been identified as the second-most significant of 32 global plant diversity darkspots—regions with substantial gaps in knowledge about plant diversity and distribution (Ondo *et al.* 2024). Assuming that this knowledge shortfall is proportional to the number of known species in each plant family, orchids can be expected to have the largest number of undiscovered species in New Guinea.

To address these knowledge gaps, a series of field expeditions under the project *Orchids of the Bird's Head Peninsula* are being conducted, focusing on the westernmost region of New Guinea. These efforts have already significantly advanced our understanding of the area's orchid flora, resulting in the discovery and description of several new species and many new distribution records for the area. Notable examples include *Bulbophyllum abuniorum* Saputra & Schuit. (Saputra *et al.* 2025a: 10), *Bulbophyllum sandfordiorum* Saputra & Schuit. (Saputra *et al.* 2025b: 397–402), *Dendrobium wanmae* Schuit., Saputra

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& Heatubun (Schuiteman *et al.* 2024: 115), *Bulbophyllum whitteniorum* Saputra, Schuit., Metusala & Heatubun (Saputra *et al.* 2023: 37).

As part of this project, we here describe two additional new species from this region. The two largest orchid genera in New Guinea, together accounting for about 40% of all New Guinean orchid species, are *Bulbophyllum* Thouars and *Dendrobium* Sw., with the former slightly larger than the latter. Therefore, it is perhaps not surprising that the two new species described here belong to these genera, as do the majority of orchid species described from New Guinea in the last decade. These two megagenera have each been divided into dozens of sections (Pridgeon *et al.* 2014), and it is essential to determine the section in order to identify an unfamiliar species.

Dendrobium siculiforme, described below, belongs to *Dendrobium* section *Spatulata* Lindl. This section is distributed from Java to the Philippines, New Guinea, Australia, and the Pacific Islands, with most of the diversity concentrated in New Guinea, where approximately 45 species out of 61 are found (Metusala 2019; Schuiteman *et al.* 2023; de Vogel *et al.* 2024). Members of this section have erect, cane-like pseudobulbs bearing distichous leaves. The flowers are characterized by their erect, \pm twisted petals, which are often longer and narrower than the sepals. The lip is distinctly trilobed and features a prominent callus of three to five ridges (Cribb 1986; Pridgeon *et al.* 2014).

The second new species, *Bulbophyllum ewamiyuu*, belongs to *Bulbophyllum* section *Macrouris* Schltr. This section is distributed from Maluku and New Guinea, to the West Pacific, and all 23 species have been recorded from New Guinea (de Vogel *et al.* 2024). *Bulbophyllum* section *Macrouris* is categorized by its creeping, straggling, or pendulous rhizomes with thin, soon-decaying scales that leave persistent fibrous veins. The pseudobulbs are conspicuous to minute, unifoliate, with shoots sprouting from their very base. Inflorescences arise from the base of the pseudobulbs, usually bearing many flowers, but rarely only one. The flowers have free, thin-textured sepals, glabrous petals, and a mobile, undivided lip. The column features a large stigma without keels inside, proximally protruding or with a distinct tooth, and the column-foot is not dilated at the apex. The pedicel has an articulation above the base of the floral bract (Vermeulen 1993; Vermeulen *et al.* 2014; de Vogel *et al.* 2024).

Materials and Methods

Living plants of these two species were collected in vegetative state on 18 March 2022 from Batanta Island, Raja Ampat Regency, Southwest Papua Province. In cultivation in Sorong, flowers of *B. ewamiyuu* first opened on 25 December 2022, while *D. siculiforme* flowers opened on 30 May 2024. The gathering of data and specimen preparation were carried out in accordance with the Kew Herbarium Handbook (Davies *et al.* 2023). Inflorescences and flowers were preserved in 70% ethanol + a small portion of glycerine (about 5% of solution). The descriptions are based on fresh, dried and spirit material. The measurements were carried out on macro photographs with scale included, then calibrated and measured using ImageJ Software (Schneider *et al.* 2012). The morphological terminology used in the descriptions follows the Kew Plant Glossary (Beentje and Williamson 2012). The relevant protologues of *Dendrobium*

sect. *Spatulata* and *Bulbophyllum* sect. *Macrouris* from New Guinea and elsewhere were carefully studied.

Taxonomy

Dendrobium siculiforme Saputra, Schuit., & Metusala, sp. nov. (Figs. 1 & 2)

Type: Indonesia: Cultivated in Sorong [from material collected in Southwest Papua Province: Raja Ampat Regency, Batanta Island, 629 m asl., precise locality withheld for conservation purposes], 30 May 2024, R. Saputra, RR295 (holotype: UIDEP!; isotype: MAN!).

Diagnosis: *Dendrobium siculiforme* flowers are similar to *Dendrobium magistratus* P.J.Cribb (1981: 274) especially in the shape of the petals, dorsal sepal, and the midlobe of the lip. The flowers differ in the lip having three longitudinal, smooth callus ridges of equal height (vs five longitudinal somewhat erose lamellae of which the outer ones are distinctly higher than the inner ones in *D. magistratus*), oblique, narrowly rhombic sidelobes (vs rounded sidelobes), decurved mid-lobe (vs porrect mid-lobe), longer but narrower lip c. 2.8×1.1 cm (vs 2.2×1.35 cm), spreading sepals (vs not spreading), and narrower leaves c. 0.9–1.7 cm wide (vs leaves 1.6–2.5 cm wide). Also, the inflorescence of *D. siculiforme* is elongated with widely spaced and widely opening flowers (vs clustered hanging flowers in *D. magistratus*) and the apical leaves reduce in size and lanceolate (vs long oval shape in *D. magistratus*).

Epiphytic sympodial herb. Roots numerous from the rhizome and base of stem, white, c. 1 mm diam. Stem erect to sub-erect, 15–50 cm tall, 0.5–1.5 cm diam., \pm cylindrical, stiff, somewhat fusiform, usually dilated slightly and terete in the lower half, green, leafless stem yellow brownish. Sheaths tightly clasping the stem, greenish or yellowish green when young and becomes greyish brown and papery when old, long-persisting. Leaves green, fleshy, articulated with a sheathing base, alternate-distichous, deciduous, coriaceous, lanceolate, $5\text{--}10 \times 0.9\text{--}1.7$ cm (l:w ratio 5.8–6.6), margin entire, apex obtuse or shortly unequally bilobed. Inflorescence with c. 6 flowers, arising from upper part of stem, erect; peduncle cylindrical, c. 13 cm long, 2–3 mm diam.; rachis c. 12 cm long, 2 mm diam., the flowers 2–3 cm apart. Floral bract triangular to narrowly triangular, c. 6×2.2 mm, acuminate, brownish cream. Pedicel (incl. ovary) cylindrical, 3–3.9 cm, pedicel c. 3.5 cm, ovary 0.4 cm long, at right angles with the pedicel; pedicel light green, ovary green with tiny purple dots. Flowers opening widely, c. 7 cm across, sepals creamy yellow with brown veins, petals creamy yellow with dense brown spots forming a median band, lip creamy yellow with brown veins and three purplish brown ridges between the lateral lobes, column yellow in side view, yellow with reddish brown dots in ventral view, anther and pollinia yellow. Dorsal sepal 5-veined, narrowly triangular, $34.4\text{--}38.4 \times 4.8\text{--}5.5$ mm (l:w ratio c. 7), margin entire, glabrous, acute or shortly acuminate, slightly twisted in natural position. Lateral sepals 5-veined, obliquely and narrowly triangular, $32.3\text{--}38.1 \times 9.5\text{--}10.5$ mm (l:w ratio 3.4–3.6), recurved, margin entire, glabrous, acute; mentum conical, 3.9 mm long, apex obtuse, greenish near apex. Petals spreading, linear, 3-veined, slightly oblique at the base, 1–3 times twisted in natural position, $38.8\text{--}50.5 \times 1.9\text{--}2.8$ mm (widest near base) (l:w ratio 18–20.4), margin entire, glabrous, apex acute. Labellum three-lobed, when

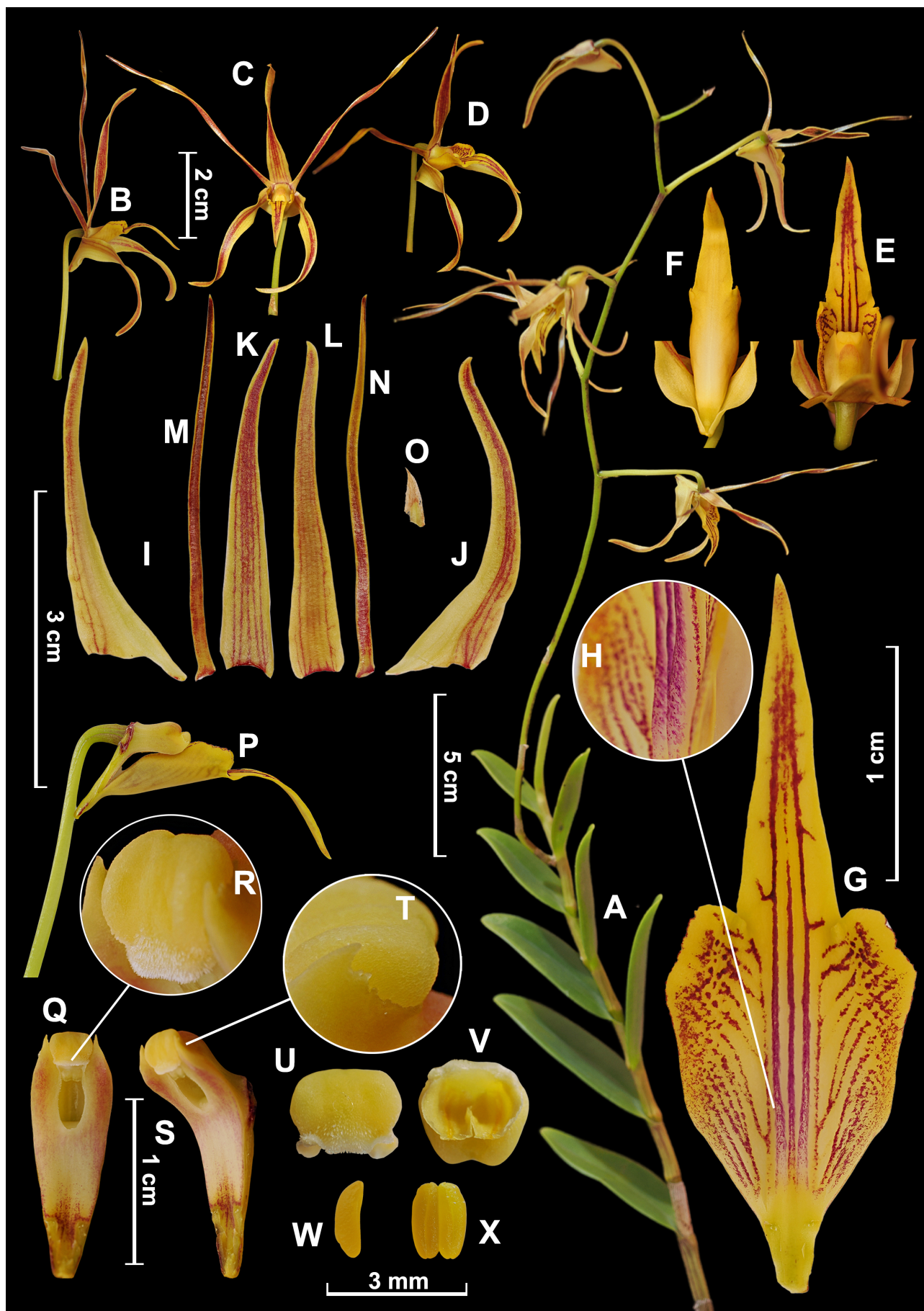


Figure 1. Morphology of *Dendrobium siculiforme*. **A.** Plant with inflorescence. **B–D.** Flowers (side, front, oblique). **E–H.** Labellum (natural shape abaxial, natural shape adaxial, flattened shape adaxial, ridge close-up). **I, J.** Lateral sepal (abaxial, adaxial). **K, L.** Dorsal sepal (adaxial, abaxial). **M, N.** Petal (adaxial, abaxial). **O.** Bract. **P.** Column with labellum (side). **Q–T.** Column (ventral, papillate anther cap close-up, oblique, stamens). **U, V.** Anther cap (dorsal, front). **W, X.** Pollinia (side single, front two pairs). Photographs by Reza Saputra.

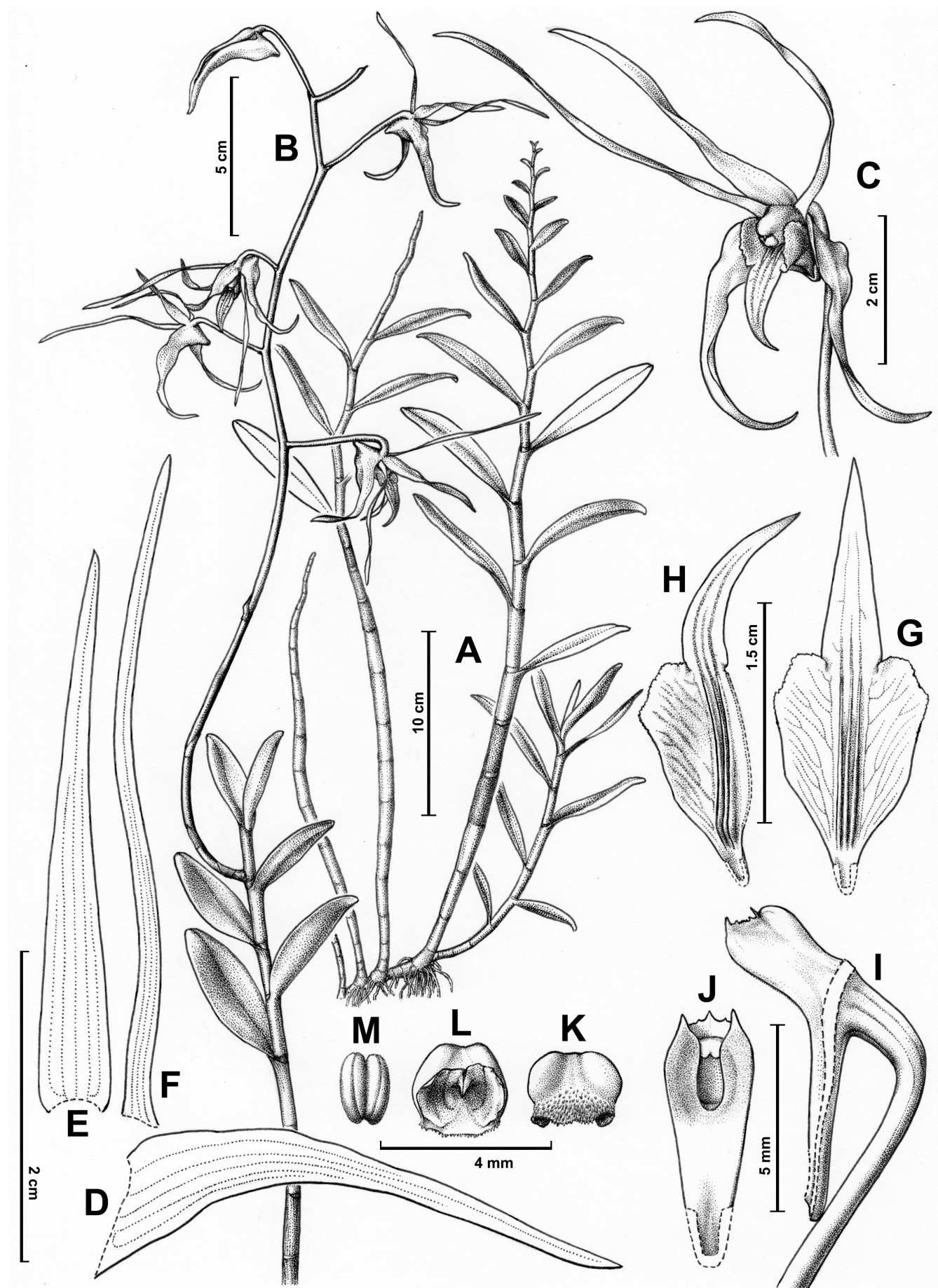


Figure 2. Botanical illustration of *Dendrobium siculiforme*. **A.** Plant. **B.** Inflorescence. **C.** Flower oblique view. **D.** Lateral sepal. **E.** Dorsal sepal. **F.** Petal. **G.** Labellum flattened shape (adaxial). **H.** Labellum natural shape (lateral view). **I, J.** Column (lateral, ventral view). **K, L.** Anther (dorsal, ventral view). **M.** Pollinia. Illustrated by Yuanito Eliazar.

flattened c. 28×11 mm, with three low, smooth, straight callus ridges extending from the base of the lip to the base of mid-lobe; side-lobes obliquely narrowly rhomboid, c. 13.3–13.7 cm long, veins irregularly prominent, basal margin entire, front margin erose, apex rounded; mid-lobe narrowly triangular (dagger-shaped), $15.3\text{--}16.2 \times 4.5$ mm, slightly recurved, margin entire, apex acuminate. Column c. 7 mm long, 5 mm wide, dorsally swollen; column-foot 8.8 mm long; stigma oblong-elliptic c. 3×1.6 mm, papillose along the upper margin; stelidia small, correct, c. 0.35 mm long, apex irregularly denticulate; anther rectangular-cucullate, greenish or yellowish, 2.44×1.89 mm, papillose towards the front margin; pollinia four, narrowly obloid and slightly falcate, arranged in two pairs, each pair c. 1.68×0.55 mm. Fruit not seen.

Distribution: Indonesia, Bird's Head Peninsula, Raja Ampat Archipelago. Endemic to Batanta Island.

Habitat and ecology: Epiphyte in primary lowland forest in both shaded and sunny positions at elevations of c. 630 m asl.

Phenology: Flowering in May to June.

Etymology: From the Latin *sicula*, a small dagger, referring to the dagger-shaped mid-lobe of this species.

Conservation Status: *Dendrobium siculiforme* was provisionally assessed as Critically Endangered (CR) under the IUCN Standards and Petition Subcommittee criteria (2024). The assessment was based on the discovery of just a single individual with three leafless stems. No other specimens were found in the area. Although the species is presumed to still occur in its habitat, significant threats exist even within the nature reserve where it was collected. These threats include hunting activities by local people, limited recreational use, and site disturbances, which contribute to ongoing declines in habitat extent and quality. The extent of occurrence (EOO) and area of occupancy (AOO) are likely within the thresholds for Critically Endangered status.

The species was recorded from a pristine forest area with minimal current threats, suggesting that more than half of its potential population might exist in undisturbed regions. However, the close proximity of the only known individual to the edge of the protected area raises concerns about its vulnerability to potential threats. Uncertainty about the number and distribution of locations, coupled with projected habitat declines, supports its qualification for Endangered status under criterion B. However, it is given a precautionary assessment, using the highest category of Critically Endangered under criterion D based on the potentially tiny population size.

Further surveys in the West Batanta Nature Reserve and surrounding areas are necessary to identify additional occurrences, confirm population size, and monitor any signs of decline. This ongoing research will help refine the conservation status and guide efforts to protect this highly threatened orchid.

Notes: Using the key in Cribb's (1986) revision of *Dendrobium* sect. *Spatulata*, *D. siculiforme* fails to key out to any particular species, as one arrives at couplet 13, where both options are incompatible with it. The most similar species among the members of sect. *Spatulata* appears to be *D. magistratus*, especially because of the shape of the mid-lobe. The morphological differences have

been noted above. In addition, *D. magistratus* has been recorded from montane forest at 1500 m, whereas *D. siculiforme* was found in the lowlands just above 600 m.

Dendrobium sect. *Spatulata* are well known for the formation of natural hybrids (Cribb 1986; Tkatchenko and Kami 2006). Although the newly described species is currently known from a single collection, we are confident that it does not represent a natural hybrid. This conclusion is based on the presence of several unique morphological features not found in any other member of section *Spatulata* occurring in the region. Only one species of *Dendrobium* section *Spatulata* has been recorded from Batanta Island, i.e. *Dendrobium antennatum*. Furthermore, several additional species occur in nearby areas, including the Raja Ampat Islands and Sorong: *D. cochliodes*, *D. conanthum*, *D. hamiferum*, *D. jennyannum*, *D. lasianthera*, *D. odoardi*, *D. stratiotes*, and *D. sutiknoi*. However, none of these species exhibit key diagnostic characters, particularly in the morphology of the labellum, that are similar to those of our newly described taxon, *Dendrobium siculiforme*, further supporting its recognition as a distinct and previously undescribed species.

Bulbophyllum ewamiyuu Saputra, Schuit., & Metusala, sp. nov. (Figs. 3 & 4)

Type: Indonesia: Cultivated in Sorong [from material collected in Southwest Papua Province: Raja Ampat Regency, Batanta Island, 11 m asl., precise locality withheld for conservation purposes], 25 December 2022, R. Saputra, D. Metusala, M.W. Hasibuan RR348 (holotype: UIDEP!).

Diagnosis: *Bulbophyllum ewamiyuu* somewhat resembles *B. graciliscapum* Schltr. (1905: 203) in having a similar shape of lip, petals, and sepals, but differs in having cohering lateral sepals (vs. divergent lateral sepals in *B. graciliscapum*), larger petals c. $4.2\text{--}5.4 \times 1.8\text{--}1.9$ mm (vs $1\text{--}1.8 \times 0.6\text{--}1.7$ mm), longer and relatively narrower sepals c. $5.8\text{--}7.3 \times 2\text{--}2.4$ mm (l:w ratio c. 3) (vs $2.2\text{--}4.2 \times 1.3\text{--}2$ mm (l:w ratio 1.2–2)), lip without callus or ridges (vs lip with distinct median ridge, and with 2 ridges converging in front), ridged and striped pseudobulbs (vs pseudobulbs smooth, not striped), and roots emerging from rhizome internode and below pseudobulb (vs only emerging from below pseudobulb in *B. graciliscapum*).

Epiphytic herb. Roots mainly below the pseudobulbs, but also a few emerging from the rhizome internodes. Rhizome creeping, c. 1.2–2.4 mm diam.; rhizome scales on the longest internodes shorter than the internodes, leaving large portions of the rhizome bare; internodes c. 1–2 cm long. Pseudobulbs ovoid, usually c. 6 cm apart, rarely up to 23 cm apart, c. $1.6\text{--}2.2 \times 0.5\text{--}0.8$ cm, 5–9 ridged, densely brownish spotted between the yellowish green ridges, making the pseudobulbs appear striped. Leaf petiolate, petiole c. 1.5–5 mm, blade narrowly elliptic to lanceolate, c. $7\text{--}8.8 \times 1.2\text{--}1.3$ cm (l:w ratio 5.8–6.1), when dried with tiny orbicular dots on both surface, margin entire, apex shortly unequally bilobed. Inflorescence c. 5.4 cm long, with 3–5 flowers. Peduncle c. 2.8 cm; rachis erect to arching; floral bracts triangular, c. $2.5\text{--}2.9 \times 1.8$ mm, margin entire, apex acuminate. Pedicel (incl. ovary) cylindrical, c. 6.3–6.8 mm long; pedicel light green, ovary green with tiny purple reddish markings, glabrous. Flowers opening widely, c. 6 mm across, sepals creamy yellow to greenish with a large, reddish purple patch in the middle which is

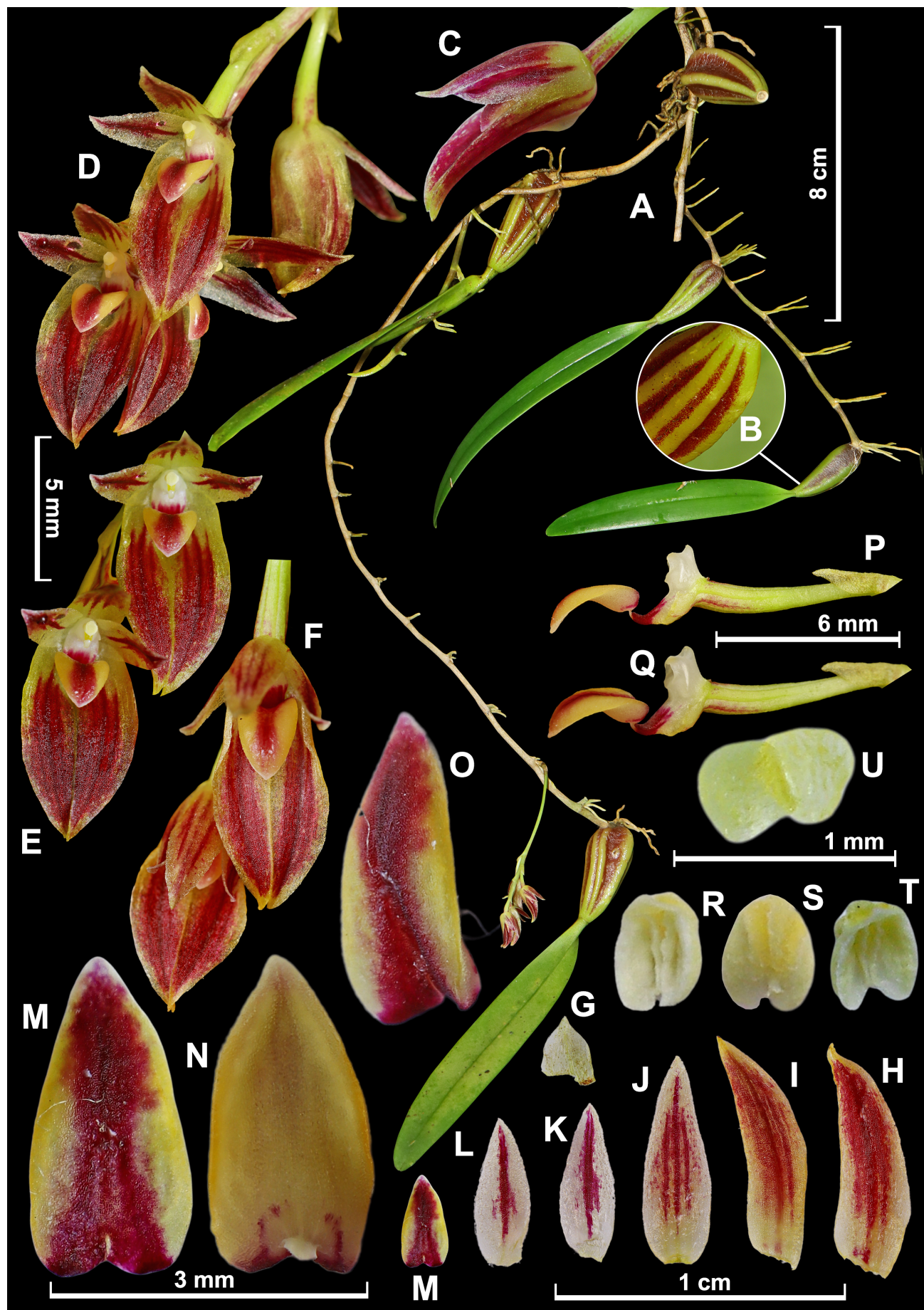


Figure 3. Morphology of *Bulbophyllum ewamiyuui*. **A.** Plant with inflorescence. **B.** Pseudobulb close-up. **C–F.** Inflorescence (side, oblique, front, above). **G.** Bract. **H, I.** Lateral sepals (abaxial, adaxial). **J.** Dorsal sepal (abaxial). **K, L.** Petals (adaxial, abaxial). **M, O.** Labellum (adaxial, abaxial, oblique). **P, Q.** Pedicel, ovary, column (without apex rostellum), lip (side, slight oblique). **R–T.** Pollinia (inner, outer, oblique inner). **U.** Pollinia (one pair). Photographs by Reza Saputra.

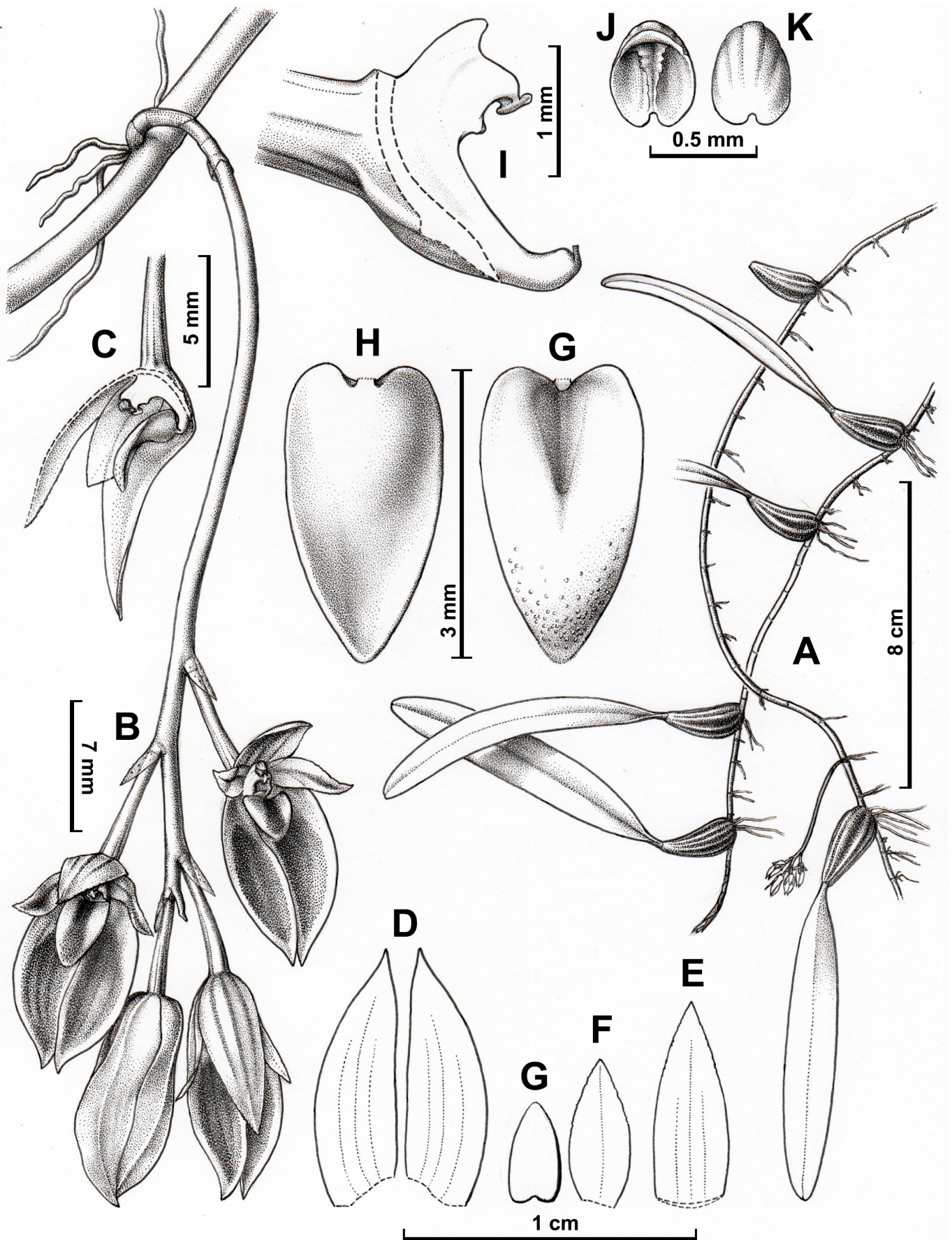


Figure 4. Botanical illustration of *Bulbophyllum ewamiyu*. **A.** Plant with inflorescence. **B.** Close up inflorescence. **C.** Flower side view. **D.** Lateral sepal. **E.** Dorsal sepal. **F.** Petal. **G, H.** Labellum (adaxial, abaxial). **I.** Column (side view). **J–K.** Anther (dorsal, ventral view). Illustrated by Yuanito Eliazar.

darker along the veins, petals translucent yellow with a reddish purple patch in the middle which is darker along the veins, lip creamy yellow with a reddish purple median band throughout its length, column white, column foot white with purple spot at the tip, anther white suffused with creamy yellow to greenish, pollinia light greenish yellow. Dorsal sepal narrowly ovate, 5.8–7.3 × 2–2.4 mm (l:w ratio c. 3), 3-veined, slightly recurved, margin entire at the base and slightly erose towards the apex, glabrous, apex acute. Lateral sepals cohering along their length but not connate, obliquely ovate-triangular to slightly falcate, 5.5–8.5 × 2.3–2.7 mm (l:w ratio 2.4–3), 3-veined, slightly recurved, margin entire, glabrous, apex acute. Petals narrowly ovate, c. 4.2–5.4 × 1.8–2 mm (l:w ratio 2.5), 1-veined, flat, margin entire at the base and slightly erose toward the apex, glabrous, apex acute. Lip narrowly cordate, c. 3 × 1.65 mm (l:w ratio c. 2), adaxially concave towards the base, margins entire, surface glabrous to finely papillose, apex obtuse to subacute, apex decurved in natural position. Column from ovary to the tip of the stelia c. 1.9 mm long; stigma protruding at its base, transversely elliptic; rostellum apex with a minute, shield-like, upright appendage; column-foot without ornaments; stelia inconspicuous, rounded, obtuse. Anther cordate-cucullate, c. 0.53 × 0.43 mm, abaxially with 3 ridges towards its apex. Pollinia 2, obovate to rectangular, c. 0.44 × 0.46 mm, flat. Fruit not seen.

Distribution: Indonesia, Bird's Head Peninsula, Raja Ampat Archipelago. Endemic to Batanta Island.

Habitat and ecology: Epiphyte in primary lowland forest in both shaded and open positions at elevations of c. 11 m asl.

Phenology: Flowering in December to January.

Etymology: The specific epithet *ewamiyuu* is derived from the Batta language, spoken by the Batanta Tribe, and means 'striped', referring to the brownish stripes between the ridges on the pseudobulb. The Batta language is one of the most critically endangered languages in Raja Ampat, spoken by only approximately 150 Batanta elders. Naming this species in the Batta language highlights the vital role of local communities in nature conservation and honours the Batanta Tribe for their efforts in protecting the forests of Batanta Island, particularly within the West Batanta Nature Reserve.

Conservation Status: *Bulbophyllum ewamiyuu* has been assessed as Data Deficient (DD) under the IUCN Standards and Petition Subcommittee criteria (2024). The species is recorded from a pristine forest area with minimal current threats, suggesting that a significant portion of its potential population might exist in undisturbed regions. Despite being presumed to persist in its habitat, the species faces notable threats, even within the nature reserve. These include illegal collection, as evidence suggests the species is being sold online, and site disturbances that contribute to habitat degradation and loss. Based on the single individual collected from the type locality, the EOO and AOO may fall within the thresholds for Critically Endangered status. However, reports of cultivated specimens shared online indicate the potential existence of other populations nearby. Due to the lack of precise locality data and incomplete knowledge of its distribution, *B. ewamiyuu* is provisionally categorized as Data Deficient. However, further surveys in the West Batanta Nature Reserve and surrounding areas are necessary to confirm

its population size, identify additional occurrences, and monitor any indications of decline. These efforts will provide critical data to refine its conservation status and guide better protection measures for this orchid.

Notes: In Vermeulen's (1993) key to the species of *Bulbophyllum* sect. *Macrouris*, *B. ewamiyuu* keys out to *B. dendrochiloides* Schltr. and *B. phormion* J.J.Verm. These two species differ in the taller inflorescence, exceeding the leaves, with free, divergent sepals that taper to a long narrow tip, and a relatively narrower lip. *Bulbophyllum callichroma* Schltr. has connate or sometimes free lateral sepals causing the flowers to look superficially similar to those of *B. ewamiyuu*, but they are much larger, with lateral sepals 10–24 mm long (Vermeulen 1993) and the inflorescences much exceed the leaves. None of these species have the ribbed and striped pseudobulbs of *B. ewamiyuu*.

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