doi: 10.26492/gbs77(2).2025-08

New record and amended description of *Bulbophyllum placochilum* (Orchidaceae) with a key to *Bulbophyllum* sect. *Altisceptrum* of the Philippines

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ABSTRACT. *Bulbophyllum placochilum* J.J.Verm., endemic to Borneo, is newly recorded in the Philippines based on a specimen collected from Mt Malinao, Albay Province, Luzon Island. We provide a comprehensive account of the species, including a detailed morphological description, ecological observations, distribution range, phenology, and photographs. The species is assessed as Vulnerable under the IUCN Red List Categories and Criteria. A key to species of *Bulbophyllum* sect. *Altisceptrum* J.J.Sm. in the Philippines is also included.

Keywords. Bicol region, biodiversity, Mt Malinao, new distribution, orchids

Introduction

The orchid family (Orchidaceae) is the third most diverse vascular plant family globally, comprising about 29,520 species (Gaskett & Gallagher, 2018; Pérez-Escobar et al., 2024). *Bulbophyllum* Thouars is a megadiverse orchid genus with around 2,200 species, most of which are epiphytic (Moonlight et al., 2024) and occur in tropical and subtropical regions, especially at mid-elevations (Brieger et al., 1992; Lin et al., 2020; Metusala, 2020; Thawara et al., 2024). Asia represents the centre of diversity for the genus, with 68 recognised sections, followed by continental Africa, and the Neotropics (Pridgeon et al., 2014). In the Philippines, 208 *Bulbophyllum* species are currently recorded, of which approximately 146 (c. 70%) are endemic (Pelser et al., 2011 onwards). Numerous new taxa have been described in recent years, such as *Bulbophyllum atromaculatum* Cootes, M.Leon & Cabactulan, *B. signum* (M.Leon, Cootes & Cabactulan) J.M.H.Shaw & Idrees (as *Epicranthes signa* M.Leon, Cootes & Cabactulan), *B. barcelonae* Garrino & R.Bustam., *B. pelseri* Mansibang & R.Bustam. and *B. bokodense* M.N.Tamayo, Magtoto & R.Bustam. (Cootes et al., 2024; Garrino et al., 2024; Tamayo et al., 2024). This highlights the continuing underexplored diversity of the genus in the archipelago.

Within the genus, *Bulbophyllum* sect. *Altisceptrum* J.J.Sm. is noteworthy for its many-flowered racemose inflorescences, small lip recurved at the apex, and an awl-shaped column (Smith, 1914). Although some of its species share characters with *Bulbophyllum* sect. *Sestochilus* Schltr. (e.g., one-veined petals with a broad base tapering to a linear apex), *Bulbophyllum* sect. *Altisceptrum* is distinguished by its smaller flowers and narrower tepals (Vermeulen, 2002). Ten species are currently accepted, with the highest diversity in Borneo, Peninsular Malaysia, and the Philippines (Vermeulen et al., 2015). Prior to this study, three species of the section were known from the Philippines: *Bulbophyllum elongatum* (Blume) Hassk., *B. nemorale* L.O.Williams, and *B. penduliscapum* J.J.Sm.

Bulbophyllum placochilum J.J.Verm., a pseudobulbous epiphyte of *Bulbophyllum* sect. *Altisceptrum*, was long considered endemic to Borneo (Vermeulen et al., 2015; IPNI, 2024; POWO, 2024). It closely resembles *Bulbophyllum elongatum* but differs in its very short rachis and broader, shorter sepals. Recently, documented records from Mindanao (Nickrent et al., 2006 onwards; Pitogo & Saavedra, 2024) hinted at a broader distribution, but these remained unassessed. Here, we confirm the occurrence of *Bulbophyllum placochilum* in the Philippines, based on newly collected material from Mt Malinao, Albay Province, Luzon Island. We provide an amended description, comparative notes, ecological observations, and an updated key to Philippine species of *Bulbophyllum* sect. *Altisceptrum*.

Materials and methods

A field expedition was conducted in November 2023 on Mt Malinao, traversing the trail from Brgy. Sugcad, in the Municipality of Malinao, Albay Province, Bicol Region; follow-up fieldwork was conducted in February 2024. During the November 2023 fieldwork, an unidentified *Bulbophyllum* that had both flowers and fruits was encountered. The specimen was collected under Gratuitous Permit No. R5-168 issued by the Department of Environment and Natural Resources (DENR) Region 5. Initial field data were collected, including measurements and descriptions obtained from plants in their habitat.

Three replicates were collected, processed, and temporarily preserved following the Schweinfurth method (Bridson & Forman, 1992; Bedford, 1999). A sample of a whole inflorescence was preserved in Copenhagen solution following RBGE (2024). Measurements were obtained from fresh dissected materials. Prior to drying of Schweinfurth-preserved samples, additional measurements were obtained, and complemented, where necessary, with measurements from dried samples. The voucher specimens were then transported following the issuance of a Local Transport Permit (LTP). The specimen was deposited in the Philippine National Herbarium (PNH) and University of the Philippines Los Baños Herbarium (CAHUP) (herbarium acronyms follow Thiers, continuously updated). Identification based on initial data was determined through related taxonomic literature and online databases (Pelser et al., 2011 onwards; Vermeulen et al., 2015; IPNI, 2024). Morphological terminology was adapted from Vermeulen et al. (2015), with slight modifications (i.e., the description of capsule). The distribution map was prepared using the QGIS ver. 3.40.1. Lastly, the conservation status of the species was evaluated using Geospatial Conservation Assessment Tool (GeoCAT), an open-source platform for rapid geospatial analysis (Bachman et al., 2011), following the IUCN Categories and Criteria (IUCN Standards and Petitions Committee, 2024).

Taxonomy

Bulbophyllum placochilum J.J.Verm., Orchids Borneo 2: 29 (1991). – TYPE: Malaysia, Sabah, Mt Kinabalu, 21 July 1933, *J. Clemens & M.S. Clemens 34056* (holotype L [L0062212]; isotypes BM [BM000062544], HBG [HBG524865]). (Figs 1, 2).

Medium-sized creeping epiphyte with spreading roots. ***Rhizome*** 5–10 mm diam., sections between pseudobulbs 4–11 cm long; *rhizome scales* rather persistent. ***Pseudobulbs*** ovoid, 0.9–2 × 0.7–1 cm, ratio (length/width) 1.25–1.3. ***Leaf:*** *petiole* (8.25–)10–20 × c. 0.5 cm, ratio 16.35–16.5; *blade* elliptic, 21.65–38 × 4.5–11 cm, ratio 3.2–5.1, acuminate. ***Inflorescences*** erect to patent, rather congested, dense raceme, (18.84–)24.0–36 cm long, (11–)15–20-flowered. ***Peduncle*** (15.5–)21–32 cm long, scales 6–9, the longest (22.5–)30–42 mm long. ***Rachis*** arching or nodding near its base, 3–4.5 cm long. ***Floral bracts*** ovate-triangular, (5.57–)8–10 × 3.6–4.63 mm, ratio 1.3–1.55. ***Flowers*** cream-yellow to yellowish green, sepals and petals minutely speckled pale purple in the apical half; *pedicel plus ovary* 6–10 × 3.5–4.4 mm, ratio 1.61–1.71; *median sepal* free, somewhat recurved, elliptic(-oblong), 11–14.2 × 4–5.5 mm, ratio 2.5–2.6(–2.93), rounded to obtuse-subacute, margins entire, glabrous, 3-veined; *lateral sepals* same as the median but oblique, elliptic to ovate-triangular, 10.5–14.5 × 4.5–5.1 mm, ratio 2.3–2.9, obtuse to subacute; *petals* porrect, separating from a wide base, 11–13(–15) × 2–2.5(–2.8) mm, ratio (4.83–)5.5–5.9, obtuse, margins merely erose towards the apex, glabrous, 1-veined; *lip* recurved near the base and reflexed near the apex, orbicular to transversely elliptic, 2.9–3.5 × 3.5–4.15 mm, ratio 0.7–1 (without spreading), acute, margins entire, glabrous, minutely speckled pale purple except for the top, adaxially slightly concave and with a central callus near the base, with 2 distinct, obtuse ridges without protruding knobs, which start near the base close to the margins and then gradually converge until they almost meet at c. 3/4 along the length of the lip, the space in between grooved, abaxially with a grooved ridge to c. halfway along the length of the lip; *column including stelidia* 4.5–4.8(–5.25) mm long, white, frontal view either crimson or with 2 crimson streaks; *stelidia* somewhat downwards falcate, triangular, 1.3–2(–2.3) mm long, acute, with a broadly rounded wing along the lower margin, at the base; *anther* c. 1.5 × 1 mm, ratio c. 1.49, ovoid, densely papillose at the distal portion coinciding mostly with the dark reddish patch, off-white with dark reddish patch at the distal part. ***Fruit*** a capsule, 1.4–1.55 × 0.8–0.85 cm, ratio 1.75–1.82, obovoid, sulcate, glabrous, shiny, senescent floral parts rather persistent, light green to red-suffused, sulci red.

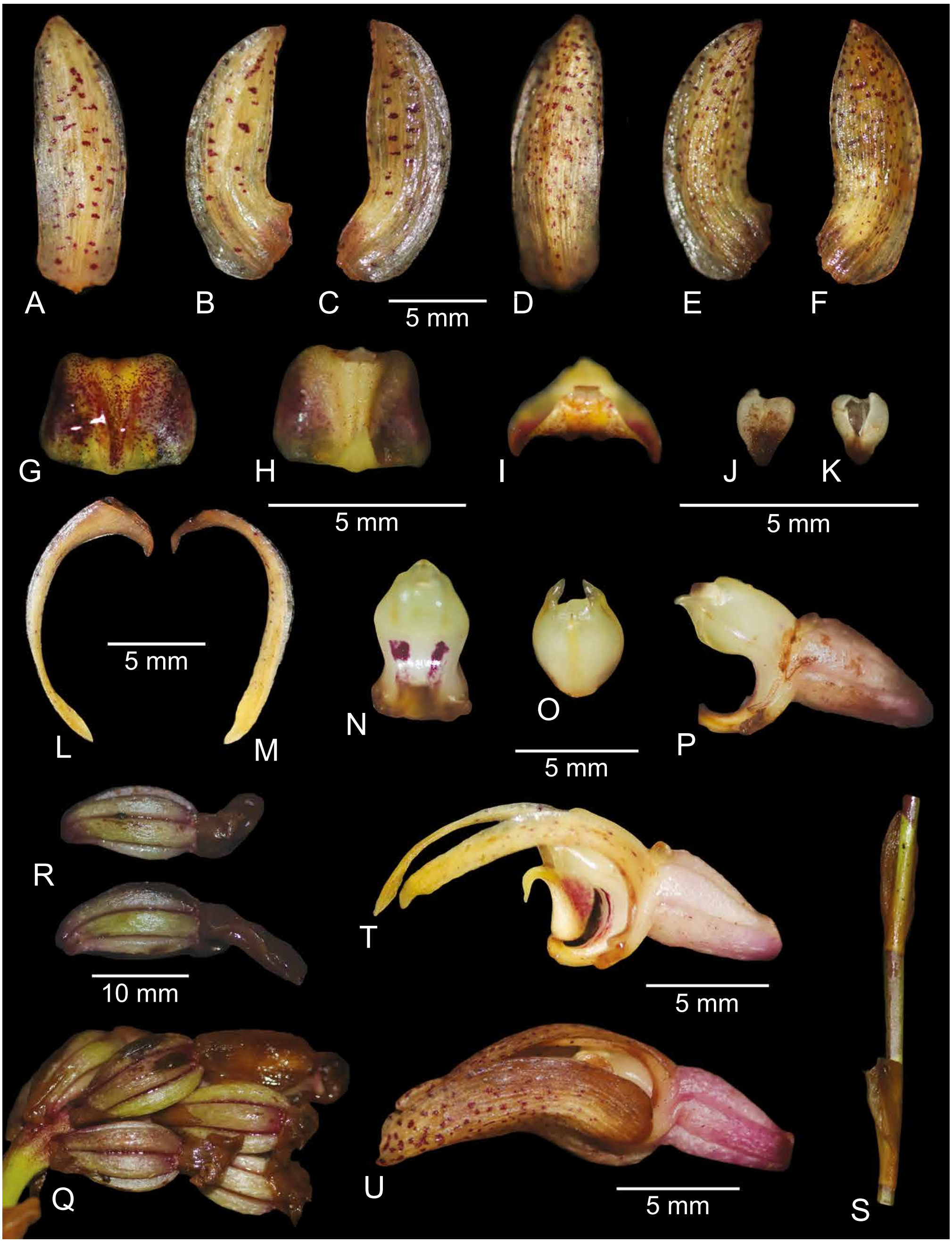

Fig. 1. *Bulbophyllum placochilum* J.J.Verm. from Mt Malinao. **A.** Median sepal, adaxial view. **B, C.** Lateral sepals, adaxial view. **D.** Median sepal, abaxial view. **E, F.** Lateral sepals, abaxial view. **G.** Lip, adaxial view. **H.** Lip, abaxial view. **I.** Lip, view of the basal part, showing ridges. **J.** Anther, abaxial view. **K.** Anther, adaxial view, pollinia removed. **L, M.** Petals, adaxial view. **N.** Column, frontal view. **O.** Column, abaxial view. **P.** Ovary and column, side view. **Q.** Infructescence. **R.** Capsules. **S.** Peduncle, showing bracts. **T.** Flower, side view, lateral sepals removed. **U.** Flower, side view. Based on *PTI SLP4 029*. (Photos: J.P.R. Collantes)

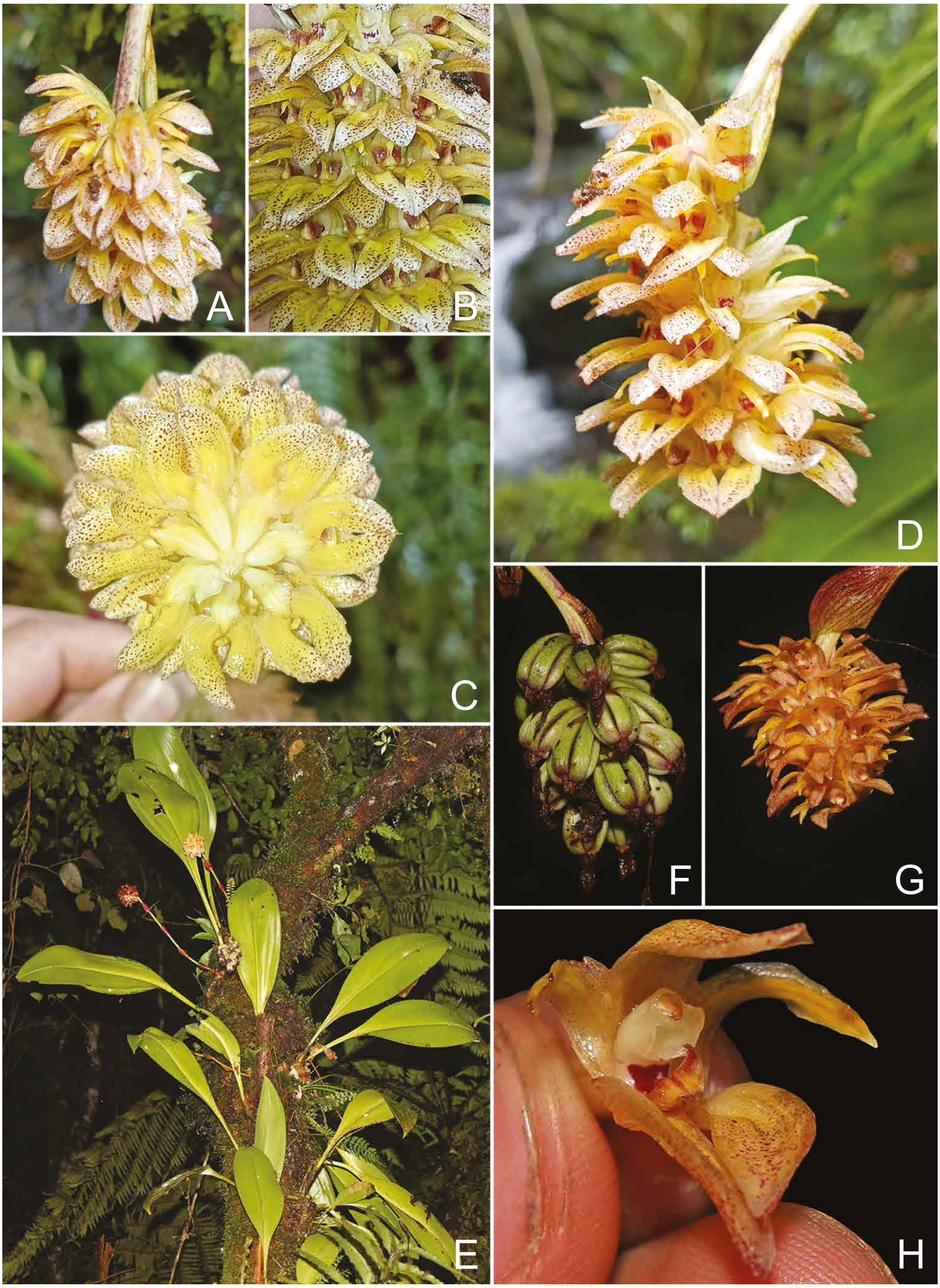

Fig. 2. *Bulbophyllum placochilum* J.J.Verm. **A–D.** Inflorescences. **E.** Habit. **F.** Fruits. **G.** Inflorescence. **H.** Flower. A–D from Misamis Oriental; E–H from South Cotabato. (Photos: A–D, R. Cahiles; E–H, A.J. Saavedra)

Distribution. Borneo (Sarawak and Sabah, 1400–1700 m elevation), and the Philippines in Luzon (Albay) and Mindanao (Misamis Oriental and South Cotabato) (Fig. 3). In Mt Malinao, Luzon, the species is quite restricted to 1100–1270 m elevation. The species was also documented to occur in Misamis Oriental (PhytoImages DOL 246163, 246183, 246214, 246223) and South Cotabato (PhytoImages DOL 248715, 248721, 248723, 248727, 248742) in Mindanao Island through photographic evidence (Pelser et al., 2011 onwards).

Habitat and ecology. The collected specimen from Mt Malinao in November 2023 was found on a dead branch of a fallen tree in a rather open canopy with trees from the genera *Flacourtia* Comm. ex L'Hér., *Lithocarpus* Blume, and *Syzygium* Gaertn. Additionally, there were large (i.e., > 40 cm in diameter) fallen trees across the trail, and based on accounts by mountain guides, these were knocked down by Super Typhoon Rolly (International Name: Goni), which explains the rather open canopy cover. The species grows in deeply shaded areas. Among the Philippine endemic species inhabiting the area are *Begonia cumingiana* (Klotzsch) A.DC., *Begonia jagori* Warb., *Begonia* cf. *lagunensis* Elmer, *Begonia gracilipes* Merr., *Bulbophyllum aestivale* Ames, *Bulbophyllum* cf. *williamsii* A.D.Hawkes, *Cyrtandra* J.R.Forst. & G.Forst. sp., and *Dendrobium chameleon* Ames, among others. The second sighting of the species in Mt Malinao in February 2024, from which we have not prepared a voucher, is at a shaded mossy forest observed on a live thinly moss-covered bark, in fruiting stage, at about 1.5 m vertical distance from the ground.

Phenology. The species was documented and collected in both flowering and fruiting stages during October–November and May–June; and documented in fruit in February.

Provisional IUCN conservation assessment. The Extent of Occurrence (EOO) was estimated at 421,345.44 km², a wide area covering northern Borneo (Sarawak and Sabah) and the Philippines (Luzon and Mindanao). However, the Area of Occupancy (AOO) was estimated at only 28 km², highlighting the presence of the species in a few localities. Our recent surveys in Mt Malinao (2023–2024) recorded a sparse population of 21 individuals between 1100 and 1270 meters above sea level, where increasing frequency of typhoons and potential secondary effects of volcanic activities from nearby Mt Malinao and Mt Mayon may pose significant threats. Deforestation, habitat fragmentation, and stochastic environmental disturbances exacerbate its vulnerability in the Philippines (Gabriel et al., 2025; Rivera & Dela Vega, 2025), while in Borneo, ongoing deforestation and habitat conversion may further limit its viable habitats (Santoro et al., 2023). Due to the limited AOO and ongoing declines in habitat quality, size, and subpopulation stability, *Bulbophyllum placochilum* is here assessed as Vulnerable (VU) under Criterion B2ab(i,ii,iii,iv).

Additional specimens examined. PHILIPPINES: **Luzon Island:** Albay Province, Municipality of Malinao, Brgy. Sugcad, Mt Malinao, 1103 m, Nov. 2023, *Collantes PTI SLP4 029* [*Philippine Taxonomic Initiative - Southern Luzon Project4 029*] (CAHUP, PNH [sheet in flower and fruit, flowers in spirit]).

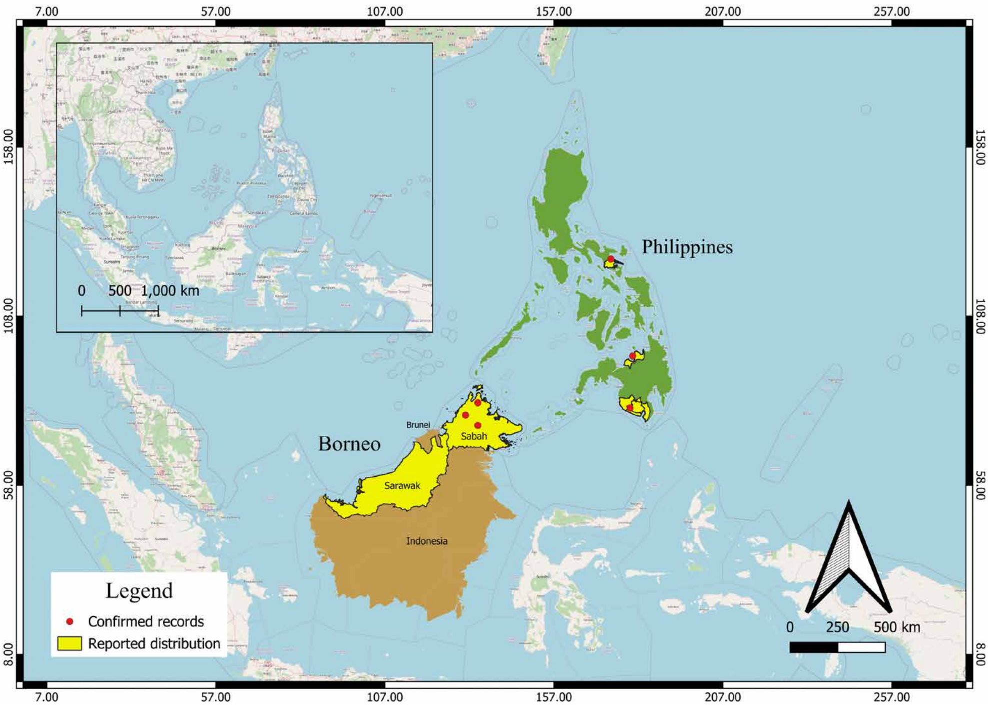

Fig. 3. Geographical distribution of *Bulbophyllum placochilum* based on reported distribution shaded in yellow (Vermeulen et al., 2015) and confirmed records represented by dots (Pelser et al., 2011 onwards; GBIF, 2024).

Discussion

Field observations suggest that *Bulbophyllum placochilum* is rare. In Borneo, the species was once presumed extinct until it was rediscovered in East Sarawak and Kinabalu National Park (Vermeulen et al., 2015). In the Philippines, the presence of the species was first recorded in South Cotabato in September 2020. Subsequent sightings occurred in Mt Malinao in November 2023, where its morphological characteristics were thoroughly measured. In 2024, additional field observations were reported in Misamis Oriental, and another population in Mt Malinao. The wide geographical gap between the populations in Luzon (Mt Malinao) and Mindanao (Misamis Oriental and South Cotabato) raises the possibility of undiscovered populations in other regions in the Philippines. However, distribution data (Nickrent et al., 2006 onwards; Vermeulen et al., 2015) and our observations suggest that *Bulbophyllum placochilum* may be elevation-restricted.

The Philippine populations of *Bulbophyllum placochilum* show slight divergence from the range of measurements reported from Borneo. Specifically, the records from Luzon Island exhibited shorter petioles, inflorescences, peduncles, and floral bracts and longer petals and column length; for a full list of characters, see Table 1. Such morphological deviations are common among species with broader distribution on a range edge, where environmental factors drive morphological variation (Antonovics, 1976; Garcia-Ramos & Kirkpatrick, 1997; Jonas & Geber, 1999; Kretzschmar et al., 2007; Blinova, 2012). Nevertheless, all other measurements fall within the known variation of the type specimen of *Bulbophyllum placochilum*, although observations for the fruit (capsules) are described here for the first time since the species' discovery. Thus, despite minor morphological deviations, the Philippine material falls within the range of variation of *Bulbophyllum placochilum*, and does not warrant taxonomic separation.

Key to the Philippine species of *Bulbophyllum* sect. *Altisceptrum* (modified from Vermeulen et al., 2015)

1a. Leaf apex rounded to obtuse; inflorescences pendulous, 50–250-flowered .... *Bulbophyllum penduliscapum*
1b. Leaf apex acute to acuminate; inflorescences erect to patent, ≤ 100-flowered 2

2a. Petals 3-veined, margins finely erose ± halfway; median sepal ovate to triangular; lip 3-lobed, midlobe ± triangular .... *Bulbophyllum nemorale*
2b. Petals 1-veined, margins entire; median sepal elliptic; lip undivided 3

3a. Lip triangular with a projecting, linguiform top, reflexed in the basal half, c. 3 mm in width .... *Bulbophyllum elongatum*
3b. Lip orbicular to transversely elliptic (without spreading), recurved near the base and reflexed near the apex, wider than 4 mm .... *Bulbophyllum placochilum*

ACKNOWLEDGMENTS. The authors extend their sincere gratitude to the Local Government Unit of the Municipality of Malinao, under the leadership of Mayor Lenybelle Ceriola-Santos, for permitting the conduct of the study, the Barangay Council of Barangay Sugcad for their support, Engr. Maria Luisa Borlagdan and Engr. Joan Callos of MAENRO-Malinao for their assistance. We also acknowledge the DENR R5 headed by Francisco E. Milla Jr. for the Gratuitous Permit needed to conduct the study, Lorenz Kurt Abrasaldo and Melita Aberca for accommodating the requests. The PENRO Albay headed by Engr. Jerry Arena is also acknowledged for issuing the LTP, and For. Sherwen Alcantara, and Charlemagne Andes for accommodating the requests. Special appreciation is extended to Mr Jhun Corteza, and Crisanto and Jayson Mendoza for their invaluable expertise and support as local guides of Barangay Sugcad. The authors also acknowledge Zenas Balang, Chariss Balderama, Mary Rose Collantes, Jennifer Monforte, Adrian Riñon, Angelito Riñon, and Jerald Saralde during the processing of specimens. Appreciation is likewise extended to Aljohn Jay Saavedra and Kier Michael Pitogo for generously sharing their data on the distribution of *Bulbophyllum placochilum* in Mt Busa. The authors further express their profound gratitude to Maverick Tamayo, Jayson Mansibang, and Dr Pieter Pelser for their insightful feedback and constructive comments, which greatly enhanced the manuscript. Finally, the authors express their appreciation to Jean Marie L. Diego of Palawan State University for her generous support.

Table 1. Morphological differences between *Bulbophyllum placochilum* from Borneo and Luzon (Mt Malinao).

Characteristics		***Bulbophyllum placochilum* (Borneo)**	***Bulbophyllum placochilum* (Malinao)**
Pseudobulbs	Shape	Ovoid	Ovoid
	Size (cm)	1–2 × 0.8–1	0.9–1 × 0.7–0.8
	Ratio l/w	1–2.5	1.25–1.29
Leaf	Petiole length (cm)	10–20	8.25–8.5 × 0.5–0.52
	Ratio l/w	-	16.35–16.5
	Blade size (cm)	23–38 × 4.5–11	21.65–23.25 × 6.65–6.71
	Blade size ratio l/w	3.2–5.1	3.23–3.5
Inflorescence	Density	Dense raceme	Much congested, dense raceme
	Length (cm)	25–36	18.84–19.06
Flower number	Count	15–20	(11–)15–20
Peduncle	Length (cm)	21–32	15.5–16.15
	Scale count	7–9	6–7
	Scale length (mm)	30–42	22.5–25
Rachis	Shape	Nodding near its base	Arching or nodding near its base
	Length (cm)	3–4.5	3.34–3.5
Floral bracts	Dimensions	8–10 mm long	5.57–6.17 × 3.6–4.63 mm, ratio: 1.3–1.55
Pedicel and ovary	Dimensions	6–10 mm long	6–7.1 × 3.5–4.4 mm, ratio: 1.61–1.71
Median sepal	Attachment	Base broadly attached	Free
	Orientation	Somewhat recurved	Somewhat recurved
	Size (mm)	11–14 × 4–5.5	14–14.2 × 4.85–5
	Ratio l/w	2.5–2.6	c. 2.8
	Apex	Rounded to obtuse	Rounded to subacute

Table 1 (continued).

Characteristics		***Bulbophyllum placochilum*** **(Borneo)**	***Bulbophyllum placochilum*** **(Malinao)**
Lateral sepals	Shape	Ovate, slightly falcate	Oblique, elliptic to ovate-triangular, slightly falcate
	Size (mm)	10.5–14 × 4.5–4.8	13.5–14.5 × 4.9–5.1
	Ratio l/w	2.3–2.9	2.65–2.96
Petals	Size (mm)	11–13 × 2–2.2	13.51–15.0 × 2.6–2.8
	Ratio l/w	5.5–5.9	4.83–5.77
Lip	Description	Recurved near the base, reflexed near the apex	Recurved near the base, reflexed near the apex
	Shape	Orbicular to transversely elliptic	Orbicular to transversely elliptic
	Dimension (mm)	3–3.5 × 3.5–4	2.9–3.3 × 4.1–4.15
	Ratio l/w (without spreading)	0.7–1	0.71–0.8
	Adaxial surface feature	Slightly concave and with a central callus near the base, with 2 distinct, obtuse ridges without protruding knobs, diverging proximally and running from about ¼ to ¾ of the length of the lip, the space in between channelled	Slightly concave and with central callus near the base with 2 distinct, obtuse ridges without protruding knobs, which start near the base close to the margins and then gradually converge until they almost meet at c. ¾ along the length of the lip, the space in between grooved
	Abaxial surface feature	With a retuse ridge up to about ½ of the lip	With a groove ridge to about halfway along the length of the lip
Column incl. stelidia	Length (mm)	4.5–4.8	5–5.25 × 3
	Ratio l/w	-	1.5–1.67
Stelidia	Shape	Somewhat falcate, triangular	Somewhat downwards falcate
	Size (mm)	1.3–2	1.5–2.3

Table 1 (continued).

Characteristics		***Bulbophyllum placochilum*** **(Borneo)**	***Bulbophyllum placochilum*** **(Malinao)**
Colour	Flower	Cream-yellow	Cream-yellow to yellowish green
	Sepals & petals	Minutely speckled pale purple in the top half	Minutely speckled pale purple in the apical half
	Lip	Minutely speckled pale purple except for the top	Minutely speckled pale purple except for the top
	Column	White, front with two crimson streaks	White, face with 2 crimson streaks
Anther	Dimensions	-	c. 1.5 × 1.01 mm, ratio: c. 1.49
	Shape	-	Ovoid
	Colour	-	Off-white, with dark reddish patch at the distal part
	Texture	-	Densely papillose at the distal portion coinciding mostly with the dark reddish patch
Fruit	Type	-	Capsule
	Size	-	1.4–1.55 × 0.8–0.85 cm
	Ratio l/w	-	1.75–1.82
	Shape	-	Obovoid, sulcate
	Texture	-	Glabrous, shiny
	Colour	-	Light green to red-suffused; sulci red

References

Antonovics, J. (1976). The nature of limits to natural selection. *Ann. Missouri Bot. Gard.* 63: 224–247.

Bachman, S., Moat, J., Hill, A., de la Torre, J. & Scott, B. (2011). Supporting Red List threat assessments with GeoCAT: Geospatial conservation assessment tool. *ZooKeys* 150: 117–126.

Bedford, D.J. (1999). Vascular plants. In: Carter, D. & Walker, A. (eds), *Care and Conservation of Natural History Collections*, pp. 61–80. Oxford: Butterwoth Heinemann.

Blinova, I.V. (2012). Intra- and interspecific morphological variation of some European terrestrial orchids along a latitudinal gradient. *Russian J. Ecol.* 43(2): 111–116.

Bridson, D. & Forman, L. (1992). *The Herbarium Handbook*. London: Royal Botanic Gardens, Kew.

Brieger, F.G., Maatsch, R. & Senghas, K. (1992). *Rudolf Schlechter: Die Orchideen*, 3rd ed. Berlin-Hamburg: Verlag Paul Parey.

Cootes, J.E., de Leon, M.D. & Cabactulan, D. (2024). *Bulbophyllum atromaculatum* and *Epicrianthes signa*, two new species of the subtribus Bulbophyllinae from the southern Philippines. *Orchidee, Taxon. Mitt.* 10: 116–123.

Gabriel, M.J., Israel, K.P., Ugat, B.Z., Hintural, W. & Baldonado, M.M. (2025). Analysis of the contemporary drivers of deforestation and forest degradation in Southern Sierra Madre Region, Philippines. *SciEnggJ* 18(Supplement): 225–234.

Garcia-Ramos, G. & Kirkpatrick, M. (1997). Genetic models of adaptation and gene flow in peripheral populations. *Evolution* 51: 21–28.

Garrino, A.L., Mansibang, J.A., Aumentado, J.A.M., Ang, Y.P., Udasco, L.C., Diego, J.M., Altomonte, J.C., Tamayo, M.N., Magtoto, L.M. & Bustamante, R.A. (2024). Two new species of *Bulbophyllum* (Orchidaceae, sect. Polymeres) from Pantabangan-Carranglan Watershed Forest Reserve, Luzon Island, Philippines. *Nordic J. Bot.* 2024(2): Article e04187.

Gaskett, A.C. & Gallagher, R.V. (2018). Orchid diversity: Spatial and climatic patterns from herbarium records. *Ecol. Evol*. 8(22), 11235–11245.

GBIF (2024). *Global Biodiversity Information Facility Home Page*. https://www.gbif.org. Accessed 5 Jul. 2024.

IPNI (2024). *International Plant Names Index*. The Royal Botanic Gardens, Kew, Harvard University Herbaria & Libraries and Australian National Herbarium. http://www.ipni.org. Accessed 25 Jul. 2024.

IUCN Standards and Petitions Committee (2024). *Guidelines for Using the IUCN Red List Categories and Criteria*, ver. 16. Prepared by the Standards and Petitions Committee. Available from https://iucnredlist.org/documents/RedListGuidelines.pdf

Jonas, C.S. & Geber, M.A. (1999). Variation among populations of *Clarkia unguiculata* (Onagraceae) along altitudinal and latitudinal gradients. *Amer. J. Bot.* 86(3): 333–343.

Kretzschmar, H., Eccarius, W. & Dietrich, H. (2007). *The Orchid Genera Anacamptis, Orchis and Neotinea: Phylogeny, Taxonomy, Morphology, Biology, Distribution, Ecology and Hybridisation*, 2nd ed. Bürgel, Germany: EchinoMedia Verlag.

Lin, D., Zhou, K., Hidayat, A. & Jin, X.-H. (2020). *Bulbophyllum papuaense* (Orchidaceae), a new species from Indonesia. *PhytoKeys* 138: 125–130.

Metusala, D. (2020). *Bulbophyllum acehense* (Orchidaceae), a new species of section *Beccariana* from Aceh, Sumatra, Indonesia. *J. Biol. Tropis* 20(1): 111–115.

Moonlight, P.W., Baldaszti, L., Cardoso, D., Elliott, A., Särkinen, T. & Knapp, S. (2024). Twenty years of big plant genera. *Proc. Roy. Soc. B* 291: Article 20240702.

Nickrent, D.L., Costea, M., Barcelona, J.F., Pelser, P.B. & Nixon, K. (2006 onwards). *PhytoImages*. http://www.phytoimages.siu.edu. Accessed 27 Aug. 2024.

Pelser, P.B., Barcelona, J.F. & Nickrent, D.L. (eds) (2011 onwards). *Co's Digital Flora of the Philippines.* www.philippineplants.org. Accessed 5 Jul. 2024.

Pérez-Escobar, O.A., Bogarín, D., Przelomska, N.A.S., Ackerman, J.D., Balbuena, J.A., Bellot, S., Bühlmann, R.P., Cabrera, B., Cano, J.A., Charitonidou, M. et al. (2024). The origin and speciation of orchids. *New Phytologist* 242: 700–716.

Pitogo, K.M. & Saavedra, A.J. (2024). Orchid trade at the source: Epiphytic species with conspicuous flowers in low-elevation forests are more locally collected in a Philippine key biodiversity area. *Biotropica* 56(4): Article e13336.

POWO (2024). *Plants of the World Online*. Facilitated by the Royal Botanic Gardens, Kew. http://powo.science.kew.org/. Accessed 5 Jul. 2024.

Pridgeon, A.M., Rasmussen, F.N., Chase, M.W. & Cribb, P.J. (2014). *Genera Orchidacearum volume 6; Epidendroideae (Part 3)*, pp. 4–51. Oxford: Oxford University Press.

RBGE (2024). *Spirit Preserved Collections*. Royal Botanic Garden Edinburgh. https://www.rbge.org.uk/science-and-conservation/herbarium/our-collections/spirit/. Accessed 9 Feb. 2024.

Rivera, A.T. & Dela Vega, J.B.G. (2025). From vulnerability to resilience: Addressing the causes, impacts, and solutions for recurrent flash floods in the Philippines. *Trop. Cyclone Res. Rev*. 14(3): 301–310.

Santoro, A., Piras, F. & Yu, Q. (2023). Spatial analysis of deforestation in Indonesia in the period 1950–2017 and the role of protected areas. *Biodivers. Conservation* 34: 3119–3145.

Smith, J.J. (1914). Neue Orchideen des Malaiischen Archipels. VII. *Bull. Jard. Bot. Buitenzorg* 13(2): 34–35.

Tamayo, M.N., Magtoto, L.M., Penales, P.J.F., Baquiran, E.R.A. & Bustamante, R.A. (2024). *Bulbophyllum bokodense* (section Polymeres, Orchidaceae), a new species from Benguet Province, Luzon Island, Philippines. *Phytotaxa* 662(2): 187–194.

Thawara, N., Kongsawadworakul, P., Suksathan, P., Watthana, S., Pingyot, T., Merckx, V.S. & Ruchisansakun, S. (2024). An overview of floral and vegetative evolution in the Asian clade of *Bulbophyllum* (Orchidaceae). *Pl. Ecol. Evol.* 157(3): 313–326.

Thiers, B. (continuously updated). *Index Herbariorum: A global directory of public herbaria and associated staff*. New York Botanical Garden. http://sweetgum.nybg.org/science/ih/. Accessed 9 Feb. 2024.

Vermeulen, J.J. (2002). A taxonomic revision of *Bulbophyllum* (Orchidaceae) 2: Sections *Altisceptrum* and *Hirtula*. *Gard. Bull. Singapore* 54: 1–151.

Vermeulen, J.J., O'Bryne, P. & Lamb, A. (2015). *Bulbophyllum of Borneo*. Kota Kinabalu: Natural History Publications (Borneo).