



<https://doi.org/10.11646/phytotaxa.698.4.4>

## Morphological and molecular analyses revealed two new species of *Begonia* sect. *Baryandra* in the Eastern Mindanao Biodiversity Corridor, Philippines

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### Abstract

Two new species of *Begonia* section *Baryandra* from the province of Davao Oriental, part of the Eastern Mindanao Biodiversity Corridor (EMBC), Philippines are described and illustrated. We compared these species with two other species found in EMBC. *Begonia dorisiae* resembles *B. amparoae* but is distinct by tomentose hairs with a bulbous base on the petioles and abaxial side of the lamina. *Begonia medinae* resembles *B. elmeri*, both of which are the only peltate Mindanao species to date but is distinct mainly on the dense pilose hairs on its lamina, petioles and peduncles. Analyses of the Internal Transcribed Spacer (ITS1, ITS2 and 5.8S gene) sequences of these Eastern Mindanao species, combined with other 45 Philippine sect. *Baryandra* species and 10 other Asian species support the distinction of the two new species from their congeners. The phylogenetic placement of these plants alongside other Philippine species can further shed light on the intricate biogeographic patterns of Philippine wildlife, especially on areas less studied such as EMBC.

**Key words:** Archipelago, Begoniaceae, island endemism, orogeny, species radiation, taxonomy

### Introduction

The Eastern Mindanao Biodiversity Corridor (EMBC) is one of the Philippines' high conservation value areas being home to high percentages of both endemics and threatened species (Buebos-Esteve, *et al.* 2024). This corridor stretches along the Pacific side of the Mindanao Island, the second largest island of the archipelago. Species known to reside the area includes the country's flagship wildlife species, the Philippine eagle (*Pithecophaga jefferyi* Ogilvie-Grant 1896: 17) and other critically endangered animal species. In terms of plants, the corridor's forest is known to host 2,300 species which accounts to almost 31% of the Philippines' plant species (Philippine Eagle Foundation, 2008). The immense biodiversity in the corridor makes it a current priority area of the Philippine government for conservation, as it is not exempted from severe threats of forest denudation and rapid land use changes.

The Philippine landmasses, including EMBC, came from different origins across geologic time. The majority of the landmass that constitutes today's EMBC is of New Guinean origin. Its orogeny, or the crustal landmass movement, originated way south compared to other Philippine islands such as Palawan, Mindoro and bulk of present-day Luzon (Hall, 1996). This complex formation of the archipelago makes it a mixing pot of species 'rafting' from each island's different origins. In the case of EMBC specifically, the hypothetical track lines which forms the New Guinea-Banda-

Eastern Philippine Arc (Dickerson 1928, in Vallejo 2011) shows the connection of the Philippines island to the biogeography of other Indonesian and New Guinean islands, where EMBC might have been playing a crucial role.

In a recent expedition in the EMBC, two new rhizomatous species of *Begonia*, one of the current biggest plant genera in the world, were observed. The description of these two new species adds to the growing number of *Begonia* in the Philippines specifically in the section *Baryandra*, a *Begonia* section that has its center of diversity in the Philippine islands (Rubite *et al.* 2013, Bucay *et al.* 2024). Currently, 85 of the 95 known *Begonia* sect. *Baryandra* species are Philippine endemic (Pelser *et al.* 2011). Members of this *Begonia* section are usually rhizomatous, creeping plants that thrive in moist, lithophytic habitats (Rubite *et al.* 2013). Other *Begonia* in the Philippines belong to section *Petermannia*, the largest Asian section with species from across both Asian insular and mainland regions (Moonlight *et al.* 2018). Meanwhile, only two Philippine species belong to section *Platycentrum*, *B. halconensis* (Merrill 1911: 685) and *B. aptera*, the latter as evidenced by a recent new record in Southern Mindanao (Espeja *et al.* 2024).

In the EMBC, several *Begonia* species have been described recently such as *B. abhak* (Blasco *et al.* 2024: 48), *B. matahom* (Blasco *et al.* 2024: 63) and *B. noraunoriae* (Blasco *et al.* 2023: 194), all members of sect. *Petermannia*; and *B. makuruyot* (Rule *et al.* 2020: 227) and *B. butuanensis* (Bucay *et al.* 2025: 103) under sect. *Baryandra*. The addition of these two new species, *B. dorisiae* and *B. medinae*, is crucial in further studies on conservation biology and biogeography of the *Begonias* in EMBC.

## Materials and Methods

### Fieldwork

Fieldwork was conducted in the month of August 2023 during the conduct of a nationwide assessment of Philippine *Begonia*. The location of the type population was recorded using OruxMaps. Samples were collected for the type specimen preparation and taxonomic character diagnosis. Photographs were taken using Nikon Z6 and Olympus Stylus TG-6.

### Phylogenetic analyses

Young leaves of the specimens were preserved using silica gel. Cell lysis of preserved specimens was done using a tissue lyser and liquid nitrogen. Extraction was done using an optimized protocol of the DNEasy Plant Kit (Qiagen, Hilden Germany). The Internal transcribed spacer (ITS) region (ITS1, ITS2, and 5.8S gene) was targeted using the primer designs indicated in Table 1 and was amplified using the Polymerase Chain Reaction (PCR) conditions indicated on Table 2. The PCR products were sent to Genomics BioSci and Tech Co., Ltd (New Taipei, Taiwan) for Sanger sequencing. Resultant reads were then subjected to manual quality check. The reads were then trimmed with 0.03 Error Probability Limit prior to deriving to the consensus reads. Available sequences of other Philippine sect. *Baryandra* species and outgroups from neighboring Asian localities were downloaded from NCBI. These sequences are from earlier studies of Philippine *Begonia* biogeography, wherein identities of corresponding sequences are verified (Rubite *et al.* 2013, Hughes *et al.* 2015). Alignment of the consensus reads from the Sanger sequencing and the downloaded sequences from NCBI was done through MAFFT v7.490 using FFT-NS-I x1000 algorithm with 100 PAM/ k=2 scoring matrix, 0.123 offset value, and gap open penalty at 2.59. Aligned reads were then used to reconstruct the phylogenetic tree using RAxML and GTR GAMMA nucleotide model with 1000 bootstrap replicates. All bioinformatic processes were carried out in Geneious Prime 2022.1.1. The resultant ITS-based phylogenetic tree was annotated in FigTree v1.4.4.

**TABLE 1.** Design of the ITS primers used.

Primers	Primer Sequences (5' to 3')	References
5P	GGAAGGAGAAGTCGTAACAAGG	(Eckenrode <i>et al.</i> 1985)
26S1	CGCCTGACCTGGGGTCG	(Clement <i>et al.</i> 2004)

**TABLE 2.** PCR thermal cycling conditions for the ITS region amplification

Initial denaturation	Denaturation	Annealing	Elongation	Final extension	Number of cycles	References
94°C, 5 min	94°C, 30 sec	60°C, 30 sec	72°C, 1 min	72°C, 5 min	30	(Chung <i>et al.</i> 2014 Liu <i>et al.</i> 2019)

## Taxonomy

*Begonia dorisiae* Bucay, Tandang & K.F.Chung, *sp. nov.* § *Baryandra* (Figs. 1 & 2)

**Type:**—PHILIPPINES. Mindanao. Davao Oriental province, in limestone formation along shaded coast. *ca.* 10 masl, 14 September 2023, *MACBucay* 1244 (holotype: PNH!, isotype: HAST)

**Diagnosis:**—*Begonia dorisiae* resembles *B. amparoeae*, another species in Eastern Mindanao island by its overall foliage size and color and similar male flowers, but differs in having dense, dark brown tomentose hairs on the petioles (vs. sparse red hairs to glabrous in *B. amparoeae*), entire, glabrous leaf margins (vs. denticulate, ciliate margins), tomentose hairs on the abaxial side of lamina (vs. glabrous), rectangular bracts with an inequilaterally acuminate to acute apex (vs. widely ovate, obtuse apex) and crescent shaped capsule wing with rounded apex (vs. rectangular with truncated apex). Other differences are summarized in Table 3.

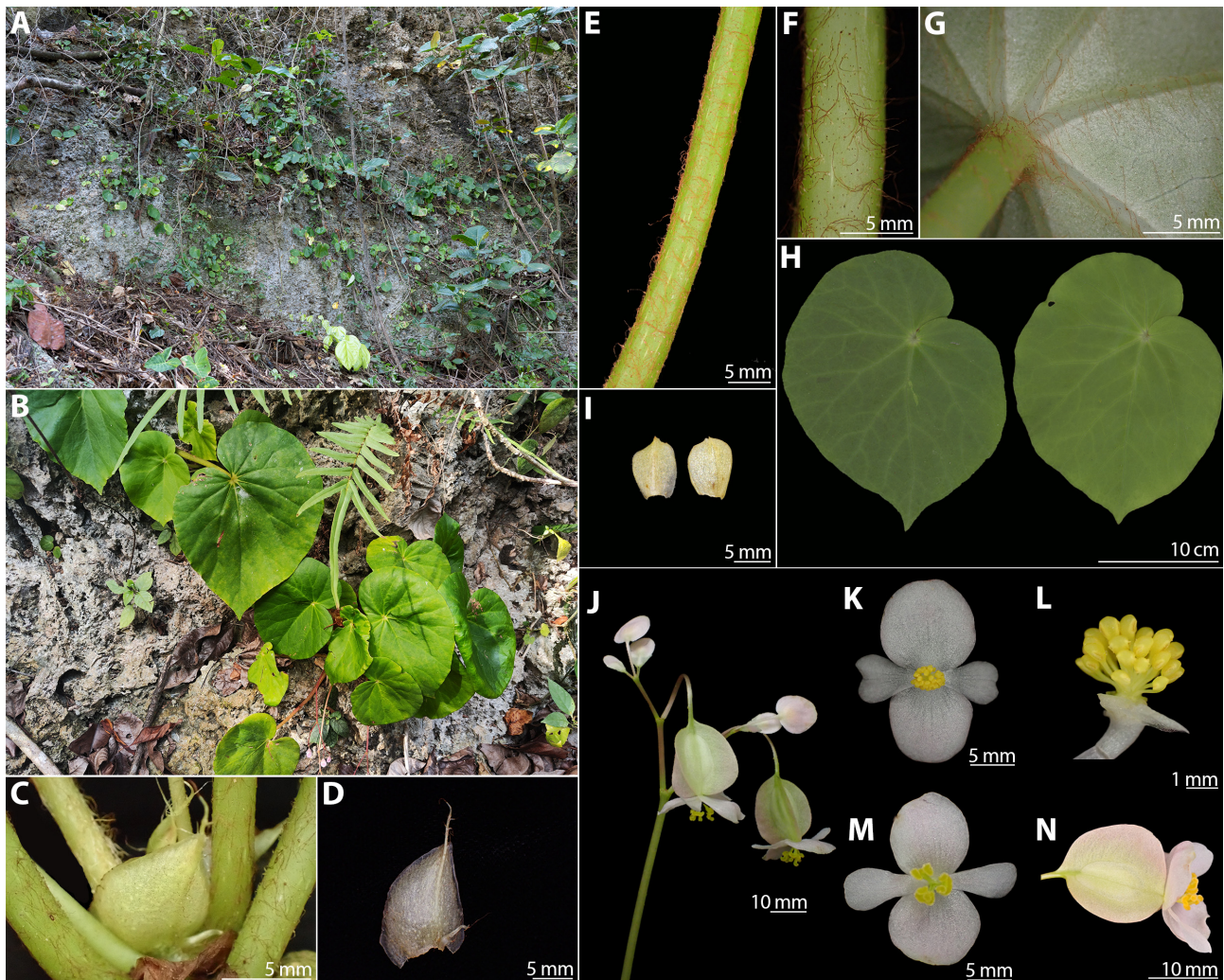
**TABLE 3.** Comparison of *B. dorisiae* and *B. amparoeae*. *B. amparoeae* characteristics were based on the protologue and sample photos of the populations from the type locality.

	<i>B. dorisiae</i>	<i>B. amparoeae</i>
<b>Stipules</b>		
Hairs	Glabrescent	Fleshy red hairs from the base to the apex
<b>Petioles</b>		
Hairs	Dense, tomentose, dark brown hairs with bulbous base	Red hairs from the top near the junction of lamina becoming glabrous down the base
<b>Lamina</b>		
Margins	Entire, glabrous	Denticulate to almost entire, reddish brown with tiny bristles
Abaxial surface	Brown tomentose hairs with bulbous base, thicker along veins	Glabrous
<b>Bracts</b>	Rectangular, acuminate apex	Broadly ovate, obtuse apex
<b>Capsule</b>		
Lateral wing	Crescent, apex rounded sometimes truncate, base obtuse	Rectangular, apex truncated, base obtuse to truncated

Monoecious, lithophytic, perennial, rhizomatous herb with creeping, stout rhizome. **Rhizome** pale green to light brown, glabrous, and lenticelate, 6.4–26 cm × 13–25 mm, internodes 6–10 mm. **Stipules** persistent, light pink, triangular, asymmetric 15–19 × 8–12 mm, herbaceous, glabrescent, keeled, margin entire, apex acute to acuminate. **Leaves** alternate; **petioles** terete, fleshy, generally ascending, light green to yellowish, 8–22 cm × 5–8 mm, with tomentose dark brown hairs with a bulbous base; **lamina** asymmetric, broadly elliptic, 11.1–17.2 cm from point of attachment to apex, 17–20 cm from basal lobes to tip, 15.3–20.6 cm wide, base cordate, 10–15 cm wide, mostly overlapping; **margins** glabrous, entire to shallowly repand, **apex** acute to attenuate, **adaxial surface** green, glabrous, **abaxial surface** light green, with setose dark brown hairs with a bulbous base more concentrated on the veins, **venation** 7–8 palmate, dichotomously branching, slightly raised in both surfaces. **Inflorescence** axillary, bisexual, 13–19 cm long, protogynous cyme, monochasially branching 6–10 times; **peduncle** erect, pale green, 9.6–13.7 cm long, glabrous; **bracts** caducous, elliptic, light green, lowest pair 7–9 × 3–5 mm, glabrous, apex inequilaterally acuminate to acute, margin entire. **Staminate flowers:** **pedicel** 16–20 mm long, light pink, glabrous, **tepals** 4; **outer tepals** 2, orbicular to elliptic, white to light pink, 10–13 × 7–11 mm, glabrous, apex rounded, margins entire; **inner tepals** 2, obovate to lanceolate, pink, 6–9 × 4–5 mm, glabrous, apex cordate, margin entire; androecium zygomorphic, 3.5–3.6 mm across; stamens 35–42, filaments 2–3 mm long, united at base; anthers obovoid, apex rounded. **Pistillate flowers:** **pedicel** 10–



19 mm long, glabrous; tepals 4; *outer tepals* 2, orbicular, white to light pink, 9–10 × 8–13 mm, apex rounded, margins entire, glabrous; *inner tepals* 2, lanceolate, 9–10 × 5–7 mm, pink, apex rounded, margins entire, glabrous; **styles** 3, yellow to light green, *ca.* 2 mm long, united at base; **stigmas** spiral and densely setose-papillose, pale green, oblong in general outline; **ovary**: locular part oblong, rounded apex and base, green, 9–12 × 5–6 mm, 3-locular, placentae axial bifid, glabrous; with three subequal crescent wings with obtuse base, and rounded sometimes truncate apex; **Capsule**: locular part rounded to oblong, subequal wings, abaxial wing crescent shape, apex rounded, base obtuse, 12–17 × 9–11 mm.



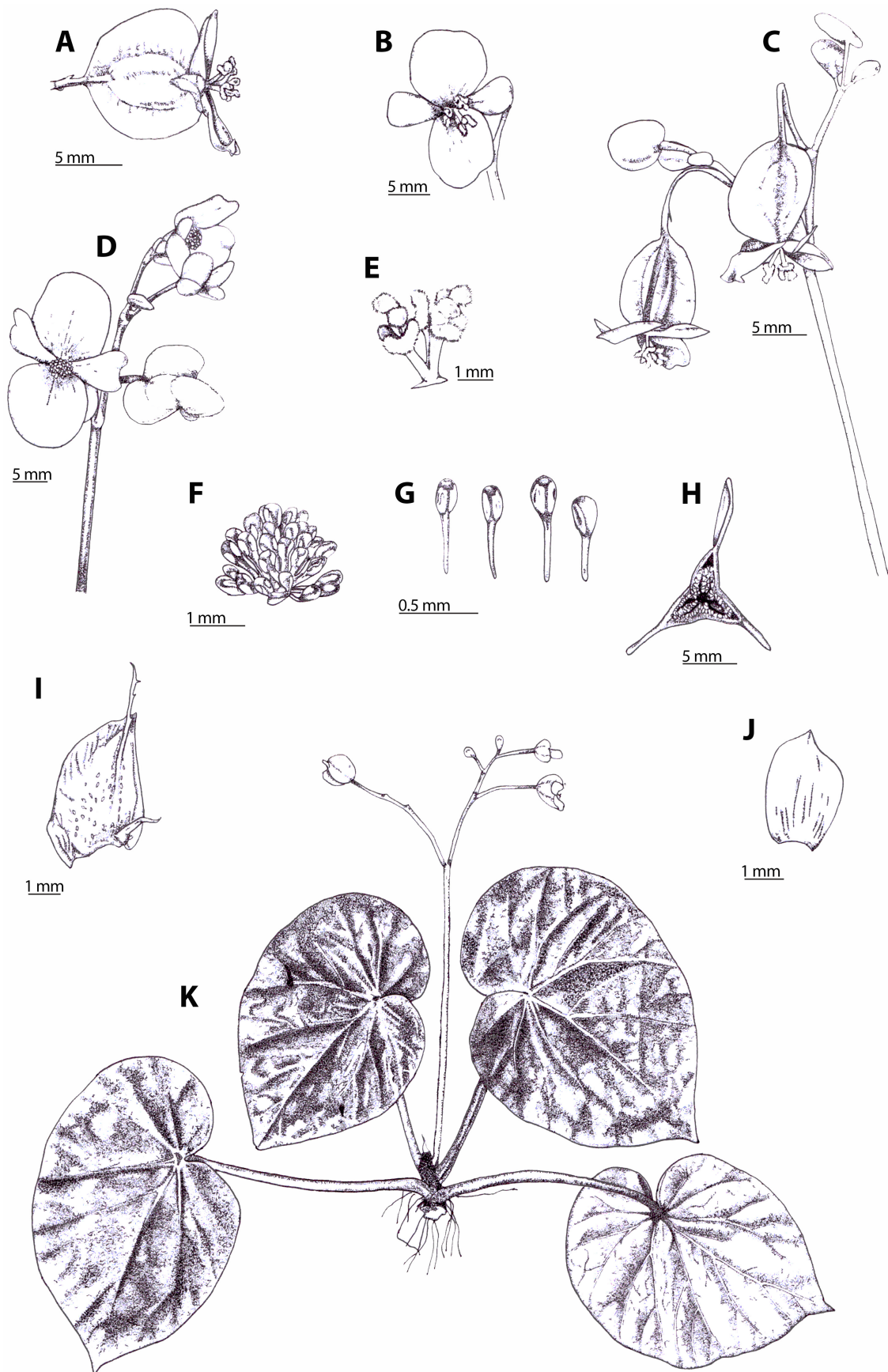
**FIGURE 1.** *Begonia dorisiae* Bucay, Tandang & K.F.Chung. A. Limestone wall habitat; B. Habit; C-D. Stipules; E. Petiole; F. Petiole close up showing hairs with bulbous base; G. Leaf base; H. Lamina; I. Bracts; J. Inflorescence; K. Staminate flower; L. Anthers; M. Pistillate flower; N. Pistillate flower showing ovary.

**Distribution and Ecology:**—The species was found thriving on shaded rocky surfaces along cliffsides near the shore. The species was observed only on its type locality in Caraga, Davao Oriental (Fig. 3).

**Etymology:**—The specific epithet *dorisiae* is a tribute to broadcaster Doris Bigornia whose name became an informal, yet very useful monicker of the genus *Begonia* especially for local communities. Many Filipino botanists, particularly in this series of expeditions, find that the easiest way to make citizens remember the genus *Begonia* is to associate it with ‘Bigornia’. Across different islands and demographics, the best way to capture citizens’ interest when communicating the biology of Philippine *Begonia* is, in fact, Doris Bigornia.

**Phenology:**—The species is observed to be flowering during the months of July to August.





**FIGURE 2.** *Begonia dorisiae* Bucay, Tandang & K.F.Chung. A. Ovary; B–C. Pistillate flower; D. Staminate flower; E. Gynoecium; F. Androecium; G. Stamens; H. Capsule cross-section; I. Stipule; J. Bract; K. Habit.

**Proposed Conservation Status:**—The species is observed to have a restricted Area of Occupancy (AOO) on its type locality only covering less than 500 square metres. Other limestone areas along the coasts were assessed but no other populations of the plant were observed. Around 300 individuals were found, most are mature individuals and are attested to be stable in numbers by nearby local communities. The type locality is not foreseen to be in danger of immediate human activity encroachment or further degradation. The only possible threat to the population is possible clearing of the beach vegetation over the limestone formation which is not foreseen to happen in the near future as the vicinity is protected by a local church. Despite this stability, we recommend the species to be listed as Vulnerable D1D2 by having <1,000 mature individual count (D1) and restricted AOO that may be threatened in the future especially the possible typhoon effects on the area, given that the populations observed were just few meters away from the coast (D2).

***Begonia medinae*** Bucay, Tandang & K.F.Chung, *sp. nov.* § *Baryandra* (Figs. 4 & 5)

Type:—PHILIPPINES. Mindanao. Davao Oriental province, in rocky walls inside forest formation along cliffside. ca. 400 masl, 14 September 2023, *MACBucay* 1247 (holotype: PNH!, isotype: HAST!)

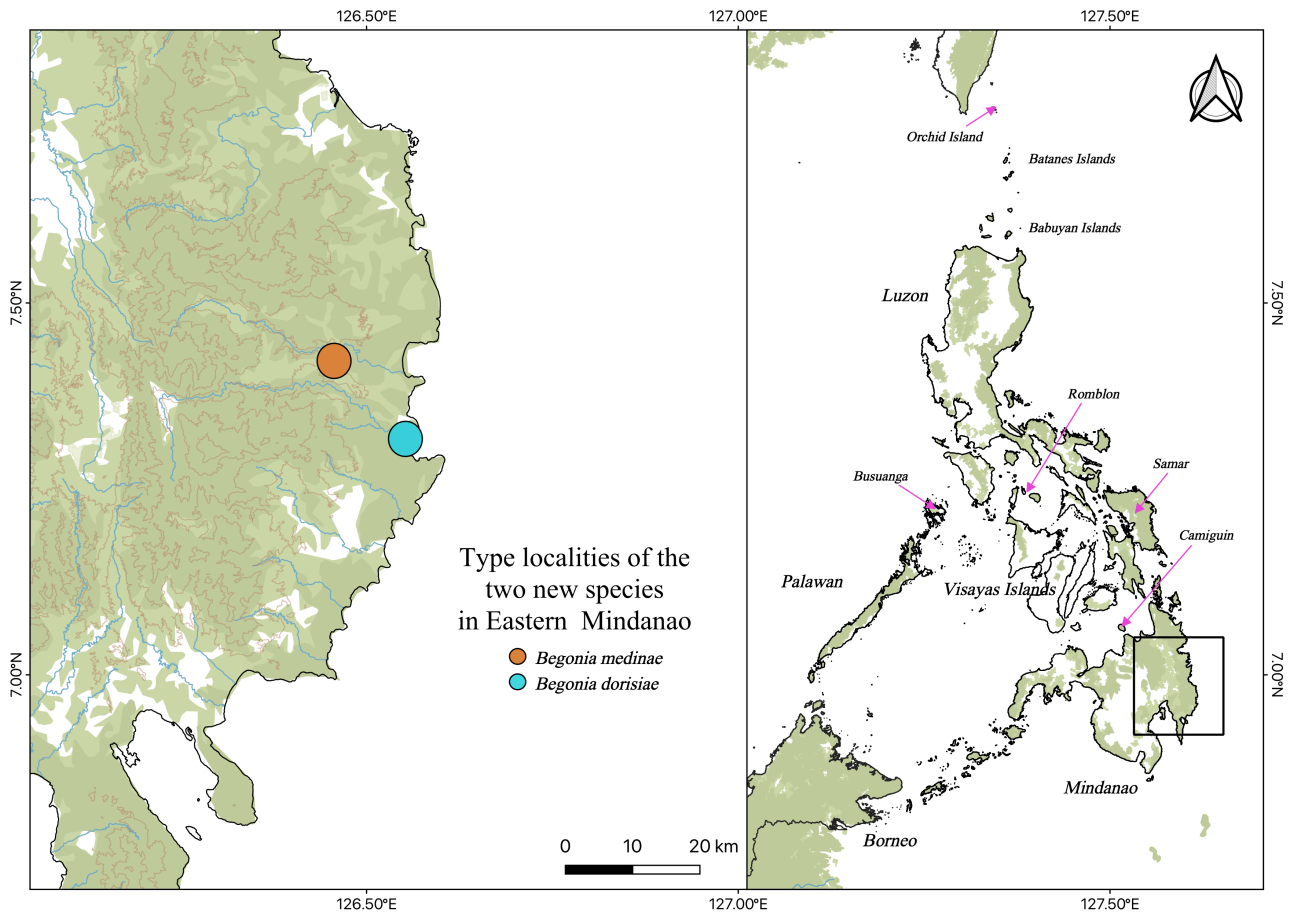
Diagnosis:—*Begonia medinae* resembles *B. elmeri*, another species originally described in Agusan del Norte, also part of the Eastern Mindanao Biodiversity Corridor. Both species are the only peltate species described from the island to date. However, *B. medinae* is significantly different from *B. elmeri* in terms of vestition. A distinctive character of *B. medinae* is the dense white pilose hairs on the lamina (vs. glabrous to sometimes sparsely ciliate in *B. elmeri*). *Begonia medinae* also has the same hairs in the petioles (vs. fulvus hairs), and peduncle (vs. glabrous). Other differences are summarized in Table 4.

**TABLE 4.** Comparison of *B. medinae* and *B. elmeri*. *Begonia elmeri* characters were based on the protologue and photos of population in its type locality.

	<i>B. medinae</i>	<i>B. elmeri</i>
<b>Petioles</b>	Dense pilose white hairs	Dense fulvus hairs
<b>Stipules</b>	Triangular with acute to acuminate apex	Broadly oblong with mucronate apex
<b>Lamina</b>		
Surface	Dense pilose white hairs on both sides	Some hairs in venation but generally glabrous on both sides
<b>Peduncle</b>		
Hairs	Dense pilose white hairs	Glabrous
<b>Capsule</b>		
Abaxial Wing	Elongated-triangular, truncate apex, rounded base	Truncate apex, broadly rounded base
Lateral Wing	Triangular, truncate apex, rounded base	Crescent shaped

Monoecious, lithophytic, perennial, rhizomatous herb with creeping, stout rhizome. **Rhizome** brown to dark red, glabrous, lenticelate, 14–24 cm × 6–11 cm, internode 7–10 mm. **Stipules** persistent, cream, ovate, 13–22 × 5–9 mm, herbaceous, glabrescent, keeled, margin entire, apex acute to acuminate. **Leaves** alternate; **petioles** terete, fleshy, dark red, 11.4–19.3 cm × 3–6 mm, with pilose white hairs; **lamina** asymmetric, ovate to elliptic, 6.3–12.3 cm from point of attachment to apex, 8.9–18.3 cm from basal lobes to tip, 8–12 cm wide, **margins** entire, with white dense pilose hairs, **apex** obtuse to rounded, peltate, **adaxial surface** dark green to dark red, with dense pilose to strigose white hairs, **abaxial surface** dark red, with pilose to strigose white hairs, **venation** 7–8 palmate, lighter coloration along the veins, dichotomously branching, slightly raised in both surfaces. **Inflorescence** axillary, bisexual, 27.4–38.9 cm long, dichasial cyme, dichotomously branching 7–10 times; **peduncle** erect, reddish at base, pale green to white at tip, 24.2–31.9 cm long, sparse pilose white hairs; **bracts** caducous, white to translucent, keeled, lowest pair 2–3 ×

2–3 mm, glabrous, apex acuminate, margin entire. **Staminate flower:** *pedicel* 18–22 mm long, light brown to light pink, glabrous, **tepals** 4; *outer tepals* 2, orbicular, pink, 12–16 × 11–16 mm, glabrous, apex round, margins sinuate; *inner tepals* 2, oblanceolate, pink, 9–12 × 5–7 mm, glabrous, apex cordate, margin entire; androecium zygomorphic, 2–3 mm across; stamens 28–32, filament 0.5–0.6 mm long, united at base; anthers obovoid, apex rounded. **Pistillate flowers:** *pedicel* 10–11 mm long, glabrous; tepals 4; *outer tepals* 2, obovate, light pink, 10–11 × 10–11 mm, apex rounded, margins entire, glabrous; *inner tepals* 2, oblanceolate, 5–7 × 5–6 mm, pink, apex rounded, margins entire, glabrous; **styles** 3, light green, 4 mm long, united at base; **stigmas**, spiral and densely setose-papillose, yellow; **ovary:** locular part ellipsoidal, apex rounded, base cordate, white, 6 × 4 mm, 3-locular, placentae axial bifid, glabrous, with three subequal cup-shaped wings, abaxial wing slightly bigger than both lateral wing, base rounded to truncate, apex rounded to truncate, light pink to white; **Capsule:** trigonous-ellipsoid, with subequal wings, abaxial wing elongated-triangular, apex truncated, base acute, lateral wings, same shape but smaller than abaxial wing, base rounded to obtuse, 12–28 × 45–11 mm.



**FIGURE 3.** General location of the type locality of *B. medinae* and *B. dorisiae* in the eastern portion of Mindanao Island, Philippines. Map by MACB.

**Distribution and Ecology:**—The species is observed further inland, thriving on shaded rocky areas near a cliff leading to a river. The species is found only on the type locality in Caraga, Davao Oriental (Fig. 3).

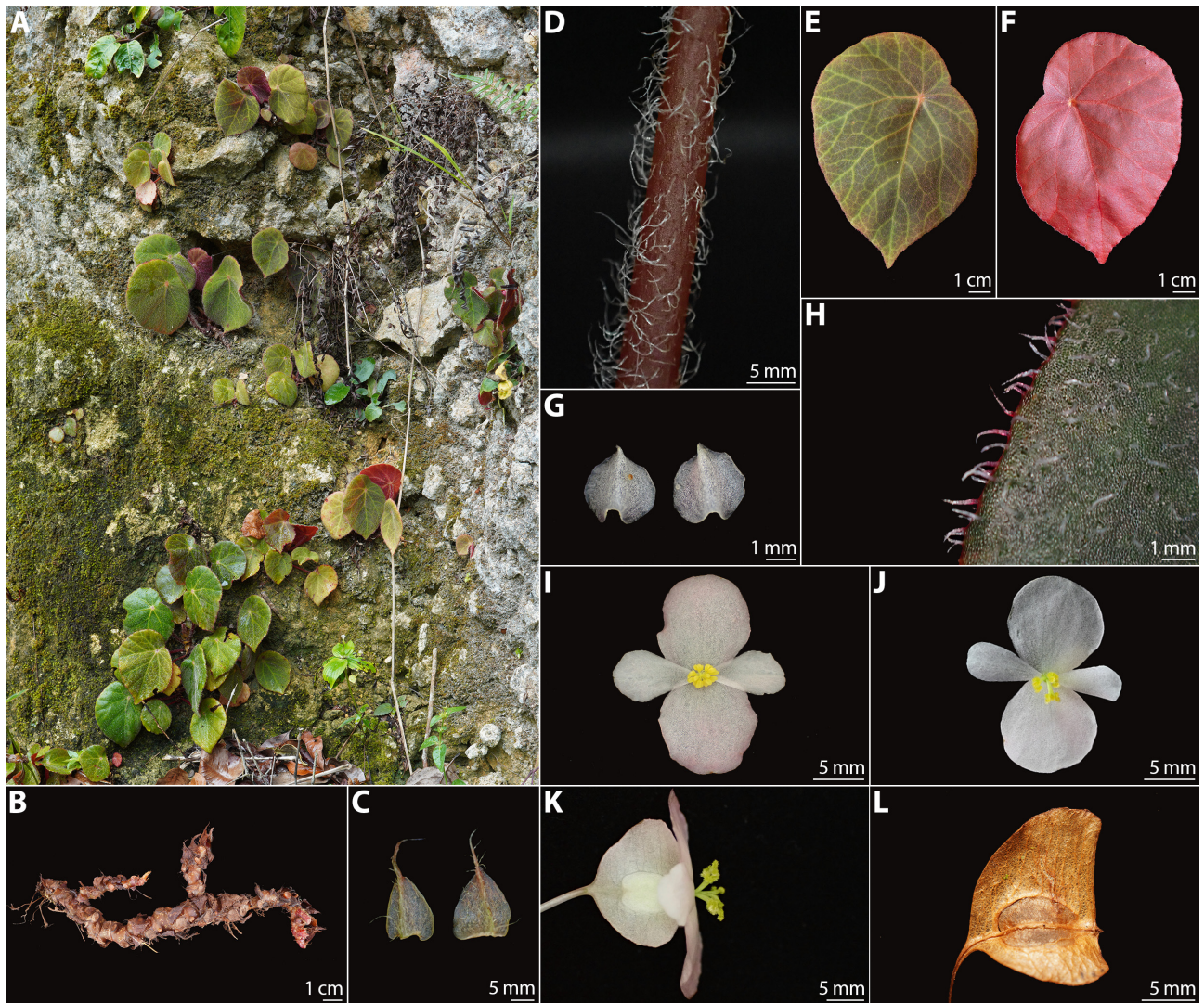
**Etymology:**—The specific epithet “*medinae*” is to acknowledge the Filipino entomologist Dr. Milton Medina who originally observed this *Begonia* during their biodiversity studies in the area. This also commemorates their efforts in their conservation studies of the Philippine biodiversity, particularly the ecosystems in Davao Oriental province and the whole of Mindanao Island.

**Phenology:**—The species is observed to be flowering during the months of August to September.

**Proposed Conservation Status:**—The species is observed to have a very limited population. Residents who stayed in the locality for decades have not documented the species outside the locality and observed declining individuals of the plants (A2a). Less than 100 individuals were found, only about half are mature individuals (C2ai). The type locality is foreseen to be in danger of future degradation as trail clearing for trekking may devoid the plants with shade, and the plants’ appearance might subject it to possible exploitation (A2d). The species is observed to have a restricted Area of



Occupancy (AOO) on its type locality only covering less than 100 square metres. Other rocky areas along the forests where assessed but no other populations of the plant were observed (B2aii, iv, v). We then recommend the species to be listed as Critically Endangered A2ad, B2aii,iv,v, C2ai.

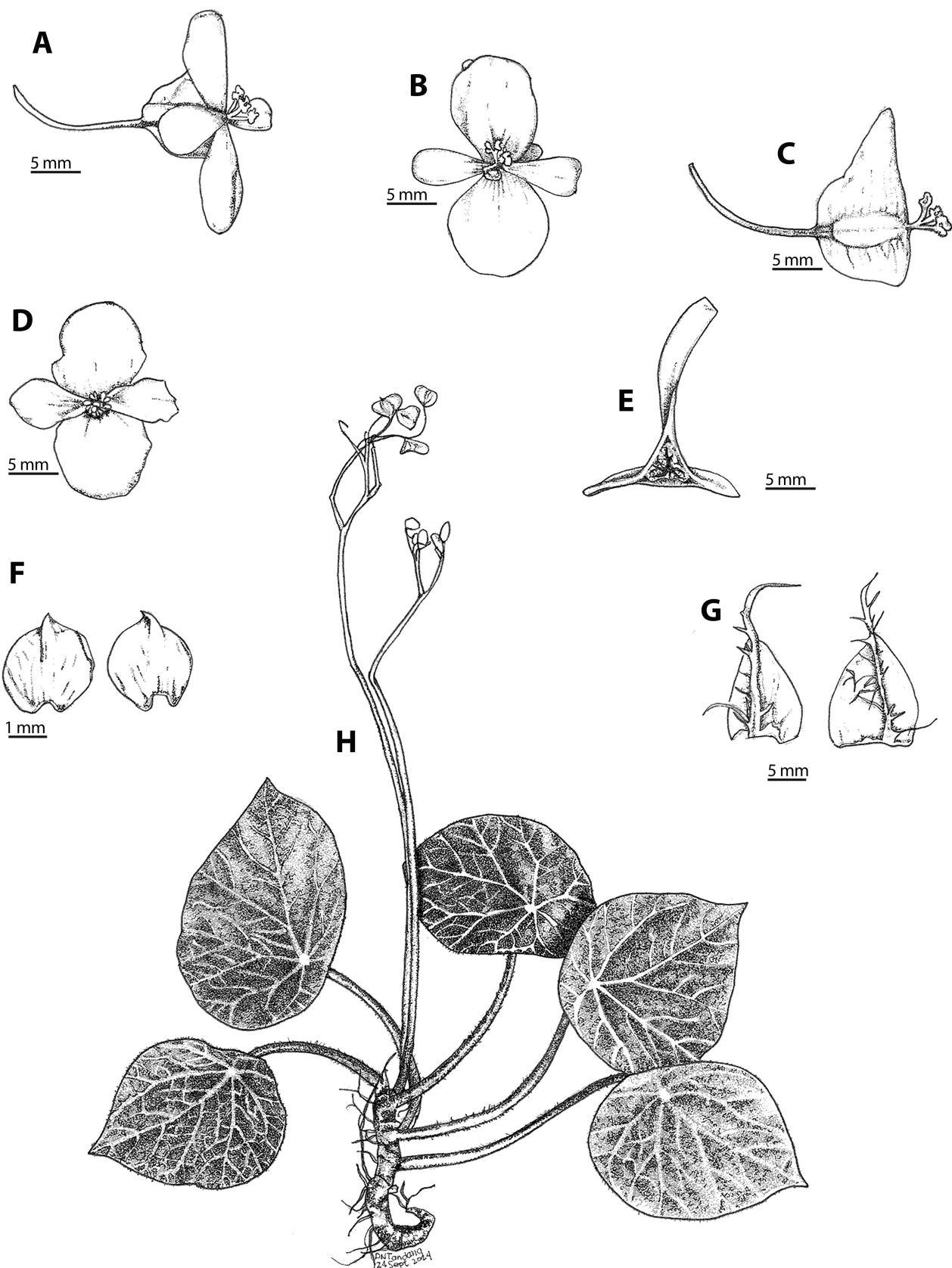


**FIGURE 4.** *Begonia medinae* Bucay, Tandang & K.F.Chung. A. Habit; B. Rhizome; C. Stipules; D. Petioles; E. Adaxial leaf surface; F. Abaxial leaf surface; G. Bracts; H. Leaf margin; I. Staminate flower; J. Pistillate flower; K. Ovary; L. Capsule.

### Phylogenetic analyses

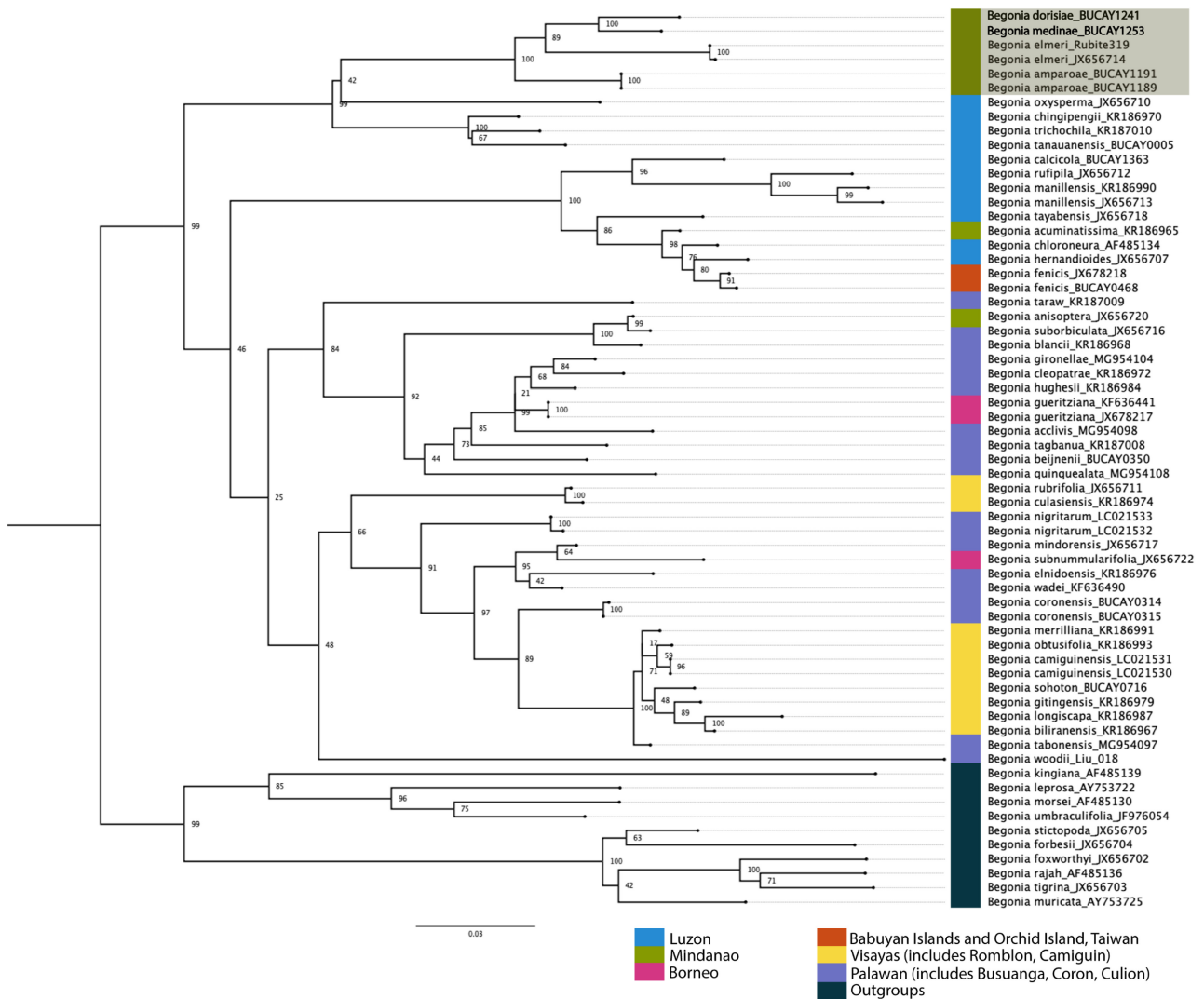
The Maximum Likelihood tree generated using Internal Transcribed Spacer sequences of Philippine *Begonia* species shows the phylogenetic position of the two new species being described (Fig. 6). In total, 63 sequences belonging to 45 species were analyzed, with an additional 10 species from neighboring Asian localities serving as the outgroup. Overall, the monophyly of sect. *Baryandra*, which includes the two new species being described here is still observed, congruent to previous studies (Rubite *et al.* 2013, Hughes *et al.* 2015, Moonlight *et al.* 2018). The two new species form a clade with other Eastern Mindanao species such as *B. amparoeae* and *B. elmeri*, both of which are the congeners of *B. dorisiae* and *B. medinae*. The sampled sequences from the two new species are from the single localities where they were observed.

The results of this analysis can give more insights on the biogeography of the Philippine flora, specifically in the EMBC. This analysis represents one of the first molecular analyses of the *Begonia* from this specific region in comparison with species from other Philippine islands. Initial study of Philippine *Baryandra* biogeography already showed how long-distance dispersal from mainland Asia, followed by chains of radiations along Philippine archipelago shaped the distribution patterns of Philippine *Begonia* (Hughes *et al.* 2015). However, in these prior studies, representation



**FIGURE 5.** *Begonia medinae* Bucay, Tandang & K.F.Chung. A-B. Pistillate flower; C. Ovary; D. Staminate flower; E. Capsule cross-section; F. Bracts; G. Stipules; H. Habit.





**FIGURE 6.** Maximum likelihood tree created using RAXML from ITS sequences, including the newly described *B. dorisiae* and *B. medinae*. Highlighted are the position of the new species and other species from Eastern Mindanao Biodiversity Corridor such as *B. amparoe* and *B. elmeri*. Corresponding GenBank accession numbers are indicated on the labels.

of EMBC remains limited. Of the Mindanao species, only *B. elmeri* from EMBC was included in these past studies since other *Baryandra* species such as *B. makuruyot* or *B. amparoe* were not yet described. Other Mindanao species included on previous studies were *B. acuminatissima* (Merr 1911: 395) with samples found in Northern Mindanao which forms a clade with other Luzon species. Also included was *B. anisoptera* (Blume 1827: 97) from Zamboanga Peninsula, western Mindanao which was known to be phylogenetically related to other Palawan species (Hughes *et al.* 2015). These observations for both *B. acuminatissima* and *B. anisoptera* from previous studies were also observed in the phylogenetic tree constructed in this study.

Another apparent observation is the grouping of the Eastern Mindanao species with some Luzon species. This includes *B. chingipengii* (Rubite *et al.* 2014: 177) from Eastern Luzon, and *B. oxysperma* (Lobb 1859: 465), *B. tanauanensis* (Bucay *et al.* 2024: 278) and *B. trichochila* (Warb 1904: 53) from South Luzon. The species *B. sohoton* (Rubite *et al.* 2021: 265), the single sample from Samar, the island in-between northeastern Mindanao and the tip of southern Luzon is also nested outside the EMBC + Luzon clade and was clustered with other Visayas islands species. Further addition of samples from the known sect. *Baryandra* range will give more plausible hypotheses on the intricate connection of these species.



## Acknowledgement

The team would like to acknowledge the Department of Environment and Natural Resources - Biodiversity Management Bureau (DENR-BMB) for their assistance in securing a Gratuitous Permit (#320), and corresponding memorandum of agreements for the nationwide conduct of the *Begonia* sect. *Baryandra* survey across different Philippine regions. The team would also like to give credit to the National Museum of the Philippines for issuance of the botanical collection to DNT. The study would not be possible without the help of the Local Government of Caraga particularly Mayor Ronie Osnan, all the personnel of the Municipal Tourism Office and all local Barangay officials. We would like to thank the administrators of San Salvador Del Mundo Parish Church for assistance. We would also like to thank the DENR CENRO Manay for their utmost support and issuance of corresponding travel permits. We also would like to thank the national and local offices of the DENR-NCR and Bureau of Plant Industry, Department of Agriculture of the Philippines, and Animal and Plant Health Inspection Agency of Taiwan for the assistance on the quarantine and transport clearances. We are also grateful for the support of Experimental Greenhouse, Academia Sinica, Taiwan. This study was funded by the following research funds: National Science and Technology Council (NSTC) of the government of Taiwan under grant number MOST 111-2621-B-001-004-MY3 awarded to K-FC; International Association for Plant Taxonomy (IAPT) through the Biodiversity Challenge 2022 awarded to MACB, DNT and K-FC; Society of Systematic Biologists (SSB) through the Graduate Student Research Award 2022 awarded to MACB; and the Linnean Society of London and Systematics Association (LinneSys) through the Systematics Research Fund 2023 awarded to MACB.

## References

- Ang, Y.P., Collantes, J.P.R., Mansibang, J., Cruz, C.J.P.D., Aumentado, J.A.M., Bimeda, S.B., Callado, J.R., Fritsch, P.W. & Bustamante, R.A.A. (2023) Two new species of *Begonia* (Begoniaceae) from Aurora Memorial National Park, Luzon Island, Philippines. *Phytotaxa* 609: 253–264.  
<https://doi.org/10.11646/phytotaxa.609.4.1>
- Blasco, F.A., Alejandro, G.J.D., Tandang, D.N. & Rubite, R.R. (2024) *Begonia abhak* (section *Petermannia*, Begoniaceae) a new species from Lanuza, Surigao del Sur, Philippines. *Webbia* 79: 47–50.  
<https://doi.org/10.36253/jopt-15356>
- Blasco, F.A., Alejandro, G.J.D., Tandang, D.N. & Rubite, R.R. (2024) *Begonia matahom* (section *Petermannia*, Begoniaceae), a new species from Tago, Surigao del Sur, Philippines. *Taiwania* 69 (1): 62–66.  
<https://doi.org/10.6165/tai.2024.69.62>
- Blasco, F.A., Tandang, D.N., Alejandro, G.J.D., Bucay, M.A.C., Cortes, J.C. & Rubite, R.R. (2023) *Begonia noraaurorae* (section *Petermannia*, Begoniaceae) a new species endemic to Surigao del Sur, Mindanao Island, Philippines. *Phytotaxa* 620: 193–197.  
<https://doi.org/10.11646/phytotaxa.620.2.8>
- Blume, C.L. (1827) *Enumeratio plantarum Javae et insularum adjacentium minus cognitarum vel novarum ex herbariis Reinwardtii, Kuhlîi, Hasseltii et Blumii*. Van Leeuwen, Leiden.
- Bucay, M.A.C., Tandang, D.N., Rubite, R.R., Jallores Jr, E. & Chung, K.-F. (2024) A new *Begonia* species (sect. *Baryandra*, Begoniaceae) from Batangas Province, Luzon Island, Philippines. *Phytotaxa* 641: 277–85.  
<https://doi.org/10.11646/phytotaxa.641.4.4>
- Bucay, M.A.C., Tandang, D.N., Chen, H.-W., Rubite, R.R. & Chung, K.-F. (2025) Morpho-anatomical description of new *Begonia* species (sect. *Baryandra*, Begoniaceae) from Butuan City, Mindanao Island, Philippines. *Phytotaxa* 681: 102–108.  
<https://doi.org/10.11646/phytotaxa.681.1.8>
- Candolle, A.P. de (1859) Mémoire sur la famille des Bégoniacées. *Annales des Sciences Naturelles, Botanique, sér 4* 11: 128–134.
- Chung, K.-F., Leong, W.-C., Rubite, R.R., Repin, R., Kiew, R., Liu, Y. & Peng, C.-I. (2014) Phylogenetic analyses of *Begonia* sect. *Coelocentrum* and allied limestone species of China shed light on the evolution of Sino-Vietnamese karst flora. *Botanical Studies* 55: e1.  
<https://doi.org/10.1186/1999-3110-55-1>
- Clement, W.L., Tebbitt, M.C., Forrest, L.L., Blair, J.E., Brouillet, L., Eriksson, T. & Swensen, S.M. (2004) Phylogenetic position and biogeography of *Hillebrandia sandwicensis* (Begoniaceae): a rare Hawaiian relict. *American Journal of Botany* 91: 905–917.  
<https://doi.org/10.3732/ajb.91.6.905>
- Eckenrode, V.K., Arnold, J. & Meagher, R.B. (1985) Comparison of the nucleotide sequence of soybean 18S rRNA with the sequences of other small-subunit rRNAs. *Journal of Molecular Evolution* 21: 259–269.

<https://doi.org/10.1007/BF02102358>

- Espeja, B.L., Bucay, M.A.C., Tandang, D.N., Rubite, R.R., Chen, H.-W., Chung, K.-F. & Bautista, M.G. (2024) A new record of *Begonia aptera* in Southern Mindanao: the second species of *Begonia* sect. *Platycentrum* recorded from the Philippines. *Phytotaxa* 670: 181–186.  
<https://doi.org/10.11646/phytotaxa.670.3.4>
- Hall, R. (2002) Cenozoic geological and plate tectonic evolution of SE Asia and the SW Pacific: Computer-based reconstructions, model and animations. *Journal of Asian Earth Sciences* 20: 353–431.  
[https://doi.org/10.1016/S1367-9120\(01\)00069-4](https://doi.org/10.1016/S1367-9120(01)00069-4)
- Hughes, M., Rubite, R.R., Blanc, P., Chung, K.-F. & Peng, C.-I. (2015) The Miocene to Pleistocene colonization of the Philippine archipelago by *Begonia* sect. *Baryandra* (Begoniaceae). *American Journal of Botany* 102: 695–706.  
<https://doi.org/10.3732/ajb.1400428>
- IUCN Standards and Petitions Subcommittee (2024) Guidelines for using the IUCN Red List Categories and Criteria. Version 16. Available from: <https://www.iucnredlist.org/documents/RedListGuidelines.pdf> (accessed on 22 April 2025)
- Liu, S.-H., Tseng, Y.-H., Zure, D., Rubite, R.R., Balangcod, T.D., Peng, C.-I. & Chung, K.-F. (2019) *Begonia balangcodiae* sp. nov. from northern Luzon, the Philippines and its natural hybrid with *B. crispipila*, *B. × kapangan* nothosp. nov. *Phytotaxa* 407: 5–21.  
<https://doi.org/10.11646/phytotaxa.407.1.3>
- Merrill, E.D. (1912 [1911]) The Philippine species of *Begonia*. *Philippine Journal of Science, section C, Botany* 6 (6): 369–406.
- Moonlight, P.W., Ardi, W.H., Padilla, L.A., Chung, K.-F., Fuller, D., Girmansyah, D., Hollands, R., Jara-Muñoz, A., Kiew, R., Leong, W.-C., Liu, Y., Mahardika, A., Marasinghe, L.D.K., O'Connor, M., Peng, C.-I., Pérez, Á.J., Phutthai, T., Pullan, M., Rajbhandary, S., Reynel, C., Rubite, R.R., Sang, J., Scherberich, D., Shui, Y.-M., Tebbitt, M.C., Thomas, D.C., Wilson, H.P. & Hughes, M. (2018) Dividing and conquering the fastest-growing genus: Towards a natural sectional classification of the mega-diverse genus *Begonia* (Begoniaceae). *Taxon* 67: 267–323.  
<https://doi.org/10.12705/672.3>
- Ogilvie-Grant, W.R. (1896) *Bulletin of the British Ornithologists' Club* 40: 17. Available from: <https://www.biodiversitylibrary.org/page/32475492> (accessed on 22/04/2025)
- Pelser, P.B., Barcelona, J.F. & Nickrent, D.L. (eds.) (2011 onwards) Co's Digital Flora of the Philippines. Available from: [www.philippineplants.org](http://www.philippineplants.org) (accessed 1 May 2025)
- Perkins, J.R. (1904) *Fragmenta Florae Philippinae: contributions to the flora of the Philippine Islands*. Gebr. Borntraeger.
- Philippine Eagle Foundation, Conservation International-Philippines & Department of Environment and Natural Resources (2008) *Eastern Mindanao Biodiversity Corridor Conservation Framework*. Davao City, Philippines, 95 pp.
- Rubite, R.R., Hughes, M., Alejandro, G.J. & Peng, C.-I. (2013) Recircumscription of *Begonia* sect. *Baryandra* (Begoniaceae): evidence from molecular data. *Botanical Studies* 54: 38.  
<https://doi.org/10.1186/1999-3110-54-38>
- Rubite, R.R., Callado, J.R.C., Kono, Y. & Yang, H.A. (2014) *Begonia chingipengii* (sect. *Baryandra*, Begoniaceae), a new species from Luzon Island, Philippines. *Phytotaxa* 164: 175–182.  
<https://doi.org/10.11646/phytotaxa.164.3.2>
- Rubite, R.R., Justo, C.A.D., Villasenor, P.C., Delos Angeles, M.D., Tandang, D.N. & Lin, C.W. (2021) Three new species of *Begonia* (section *Baryandra*, Begoniaceae) from Samar Island, the Philippines. *Phytotaxa* 516: 263–274.  
<https://doi.org/10.11646/phytotaxa.516.3.5>
- Rule, M.G.Q., Ang, Y.P., Rubite, R.R., Docot, R.V.A., Bustamante, R.A.A. & Robinson, A.S. (2020) *Begonia makuruyot* (Begoniaceae, section *Baryandra*), a new species from Surigao del Norte Province, Philippines. *Phytotaxa* 470: 226–234.  
<https://doi.org/10.11646/phytotaxa.470.3.2>
- Vallejo, B. (2011) The Philippines in Wallacea. In: Telnov, D. (Ed.) *Biodiversity, biogeography and nature conservation in Wallacea and New Guinea*. The Entomological Society of Latvia, pp. 27–42.  
<https://doi.org/10.5962/bhl.title.150137>