

Two new species of *Begonia* (Begoniaceae) from Aurora Memorial National Park, Luzon Island, Philippines

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Abstract

Begonia masilig and *Begonia akaw*, both endemic to Aurora Memorial National Park, Luzon, Philippines, are described as species new to science. *Begonia masilig* is similar to *B. droseroides* in its rhizomatous habit and glandular trichomes on the inflorescence, but differs in lamina shape and overall size, and the vestiture of stipule, lamina margin, and outer tepals of staminate flowers. *Begonia akaw* is similar to *B. ramosii* in its short erect habit, ovate lamina and congested terminal inflorescence with 2-tepaled staminate flowers, but differs in inflorescence size and arrangement, and bract and ovary shape. Both new species are here proposed to be Endangered (EN) as per IUCN criteria.

Key words: *Begonia droseroides*, *Begonia ramosii*, biodiversity conservation, new species, Sierra Madre Mountain Range, Taxonomy

Introduction

Begonia Linnaeus (1753: 1056) is one of the fastest-increasing angiosperm genera in terms of species discovery, with a distribution spanning the tropics and subtropics of both the New and Old World (Moonlight *et al.* 2018). There are more than 2100 accepted species of *Begonia* worldwide, and more than 7% of the currently accepted species can be found in the Philippines (Hughes *et al.* 2015–). This diversity is reflected in the current floristic records of *Begonia* species in the country, where 158 out of the 161 species recognized are endemic (Pelser *et al.* 2011–Present).

The island of Luzon has a high degree of micro-endemism across taxa, especially herpetofauna (McLeod *et al.* 2011; Siler *et al.* 2011; Binaday *et al.* 2017; Dela Cruz *et al.* 2018), mammals (Heaney *et al.* 2016) and plants (Rubite, 2013; Paclibar & Tapioca, 2020). The regions corresponding to the former Paleo-islands (Zambales, Central Cordillera, highland volcanic areas of the Bicol Peninsula, and the Sierra Madre Mountain Range) have been identified as critical habitats for many endemic species (Brown & Fernery 1996; Brown *et al.* 2000, 2013; Rubite 2013; Heaney *et al.* 2016).

The Sierra Madre Mountain Range, on the east side of Luzon Island, is considered one of the most biologically significant areas in the country because of the high endemism of its flora and fauna (Duya *et al.* 2007; Villegas & Pollisco 2008; Pranada *et al.* 2019; Biag & Alejandro 2021). Within this range is Aurora Memorial National Park (AMNP), a protected area covering *ca.* 57 km² and spanning the provinces of Nueva Ecija and Aurora in Central Luzon (Protected Area and Wildlife Bureau, 2012). The AMNP, first established as Boñgabon-Baler National Park, was formally designated as a Protected Area in the year 1937. The AMNP contains one of the last remaining contiguous blocks of rainforest in the Philippine Archipelago. Approximately 75% of AMNP's total land area is covered in forest, with nearly half of it being old growth (Protected Area and Wildlife Bureau, 2012).

In a recent floristic survey at AMNP in February 2022, two noteworthy populations of *Begonia* were documented. To further study these plants, a return trip was made in July 2022. Careful comparison with literature and herbarium specimens supports these populations as two *Begonia* species new to science. Based on International Union for Conservation of Nature (IUCN) criteria, both *Begonia* species are here proposed to be Endangered (EN).

Methodology

The newly described *Begonia* species were found within Aurora Memorial Natural Park. Living specimens were photographed *in situ* and their morphological characteristics were recorded. The plants were collected, pressed, and dried for further study and deposited in herbaria. Herbaria acronyms follow Thiers (2022). The morphological characteristics of the leaves, flowers, stems, and other plant parts were measured and described, and compared to known species of *Begonia* with online herbarium records, databases, relevant literature, and photographs. Conservation assessments of the two species were assessed with the International Union for Conservation of Nature (IUCN) Criteria (IUCN Standards and Petitions Subcommittee, 2022).

Taxonomic treatment

Begonia masilig, J.Collantes, C.J.P.Dela Cruz & Y.P.Ang, *sp. nov.* § *Baryandra* (Figures 1–3)

Type:—PHILIPPINES. Luzon Island, Aurora Province, Municipality of Maria Aurora, Barangay Villa Aurora, Sitio Dimani, primary forest, *ca.* 560 m elevation, 15°41' 32.175"N, 121°21' 29.79"E, 30 June 2022, *AAMNP2* (holotype PNH, isotypes BRIT, CAHUP).

Diagnosis:—*Begonia masilig* belongs to *B.* sect. *Baryandra* A. de Candolle (1859: 122) in having a rhizomatous habit, axillary protandrous inflorescences with boat-shaped bracts, and an ovary with bifid placentation. *Begonia masilig* is similar to *B. droseroides* C.I Peng *et al.* (Rubite *et al.* 2018) in having brown-appressed-sericeous petioles, inflorescences with glandular trichomes, and 5-tepaled pistillate flowers with lunate ovary wings. It differs by having adaxially glabrous stipules (vs. hirsute), an ovate to narrowly ovate lamina (vs. widely ovate) up to 26 × 15 cm (vs. up to 8.2 × 7 cm), usually with a darker green tinge in the middle (vs. entirely green), and a margin with sparse minute white trichomes (vs. dense red trichomes), longer peduncle (19–50 cm long vs. 7–19 cm long), and staminate flower tepals with scattered glandular hairs abaxially (vs. glabrous) (**Table 1**).

Description:—Lithophytic herb, monoecious, rhizomatous. Rhizome creeping, maroon with white spots, up to *ca.* 30 × 0.5–0.9 cm in diam., glabrous, internodes 4–10 mm long, with conspicuous petiolar scars. Stipules deciduous, herbaceous, brownish red, ovate, 12–15 × 7–9 mm, keeled, keel subtended by 1 to 5 fleshy aristate trichomes fused at base, other parts glabrous, margin entire, apex apiculate, apiculae *ca.* 1 mm long. Leaves alternate; petiole terete, maroon at base, turning pale green towards lamina, 9–26 × 0.3–0.5 cm, brown-appressed-sericeous, glabrescent at maturity; lamina basifixed, ovate to narrowly ovate, asymmetrical, 13.5–26 × 7.5–15 cm, adaxially glabrous, waxy, uniformly light green, usually with a deep purplish brown or dark green tinge in middle; abaxially pale green with reddish brown tinge on variegation, brown-tomentose on veins, glabrescent, base cordate, basal lobes slightly overlapping, margin sparsely serrulate to entire, shallowly undulate, ciliate with sparse white simple trichomes (*ca.* 0.5 mm long), apex acute; venation basally *ca.* 9-palmate, branching dichotomously or nearly so, veins sunken adaxially and raised abaxially. Inflorescence axillary, protandrous, cymosely branching 3 to 5 times, panicle 22–58 cm long; peduncle 19–48 cm long, the lower half of primary peduncle sparsely brown-pubescent, rest of peduncle scattered (to densely

scattered) with simple white glandular trichomes *ca.* 0.5 mm long. Bracts caducous, pale brown to green, broadly ovate, boat-shaped, hyaline, lowest bract *ca.* 5 × 4 mm, adaxially glabrous, abaxially scattered with simple glandular trichomes (*ca.* 0.5 mm long), margin entire, apex cuspidate. Staminate flower: pedicel 8–12 mm long, scattered with simple glandular trichomes; tepals 4, white, outer tepals elliptic, abaxially scattered with simple glandular trichomes, 10–11 × 9–10 mm, apex rounded, inner tepals obovate, 9–10 × 5–6 mm, glabrous, apex rounded; androecium *ca.* 4 mm diam., stamens *ca.* 55, filaments free, 1.5–2.0 mm long, anthers yellow, *ca.* 1 mm long, obovate, with 2 lateral slits running lengthwise from base to apex, apex rounded. Pistillate flower: pedicel 10–11 mm long, sparsely scattered with simple glandular trichomes, tepals 5, pale pink, outer tepals 2, orbicular to broadly elliptic, 7–8 × 8–9 mm, abaxially scattered with simple glandular trichomes, apex rounded, inner tepals 3, obovate, 7–8 × 5–6 mm, glabrous, apex rounded; styles 3, yellow, shortly fused at base, *ca.* 2.5 mm long, spiral and papillose all around; ovary trigonous-ellipsoid, greenish pink, 7–8 × 3–4 mm (wings excluded), densely scattered with simple white glandular trichomes, locules 3, placenta bifid; wings 3, unequal, largest wing lunate, distally truncated, proximally rounded, cucullate, 7–8 mm wide, 2 lateral wings narrowly oblong to lunate, 2–3 mm wide. Capsule pendent, shape similar to ovary, 8–9 × 4–6 mm, glabrous, largest wing 11–12 × 13–15 mm, lateral wings 9–12 × 4–6 mm, recurved with largest wing pointing towards the ground, dehiscing along the attachment of the 2 lateral wings.

TABLE 1. Morphological differences between *Begonia masilig* and *B. droseroides*.

	<i>Begonia masilig</i>	<i>Begonia droseroides</i>
Rhizome		
size	up to <i>ca.</i> 30 cm long, 5–9 mm thick	3–8 cm or longer, 4.5–8 mm thick
vestiture	glabrous	subglabrous
internode (cm)	0.4–1	0.3–0.7
Stipule		
size (mm)	12–15 × 7–9	8–12 × 7–10
vestiture	keel subtended by 1–5 fleshy aristate hairs fused at base, other parts glabrous	few fleshy red hairs fused at the base of the keel, keel densely hirsute abaxially
Leaf		
petiole	9–26 cm long, 3–5 mm thick	4.3–12 cm long, 2.5–4 mm thick
lamina shape	ovate to narrowly ovate	broadly ovate
lamina size (cm)	13.5–26 × 7.5–15	5.4–8.2 × 4.4–7
margin	sparsely serrulate to entire, shallowly undulate, with sparse white trichomes <i>ca.</i> 0.5 mm long	slightly scalloped, subentire and lined with red puberulence
adaxial surface	light green uniformly to deeply purplish-brown tinged in the middle	pale green
Inflorescence		
peduncle length (cm)	19–48	7–19
peduncle vestiture	lower half of primary peduncle sparsely brown-pubescent, rest of the peduncles scattered (to densely scattered) with simple white-glandular trichomes (<i>ca.</i> 0.5 mm long)	dense white-glandular trichomes throughout

Etymology:—The epithet *masilig* is a Tagalog-Baler (Balereño) word that translates to fast, rapid, or heavy water flow. *Begonia masilig* was discovered in an area where there is fast-flowing water, hence the name.

Distribution and habitat:—The species is known within Aurora Memorial National Park (Figure 6). It was found most abundantly perching over lowland rivers on rocks. It inhabits inclined to almost vertical surfaces that are perpetually wet or moist throughout the year. Plants exposed to pockets of light were observed to grow much larger with ample flowering and fruiting. Smaller individuals scattered in deep shade and flowering and fruiting with the same frequency as the larger individuals. Because the mountains in the type locality form a continuum, further exploration and documentation may yield additional individuals from the nearby mountains and rocky outcrops.

Phenology:—Flowering and fruiting in June.

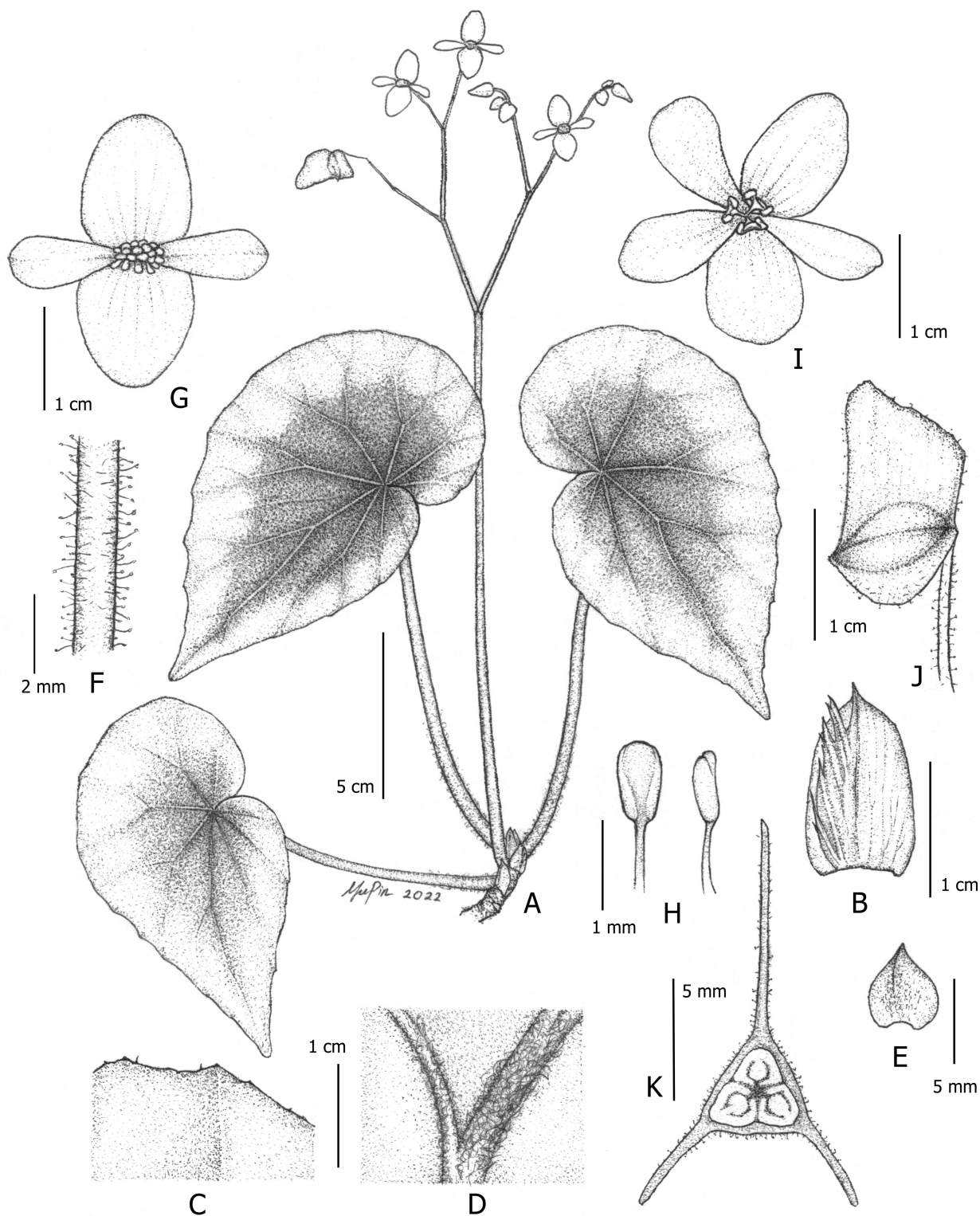


FIGURE 1. *Begonia masilig*. **A.** Habit; **B.** Stipule; **C.** Leaf adaxial surface showing margin; **D.** Leaf abaxial surface showing veins; **E.** Bract; **F.** Peduncle; **G.** Staminate flower ventral view; **H.** Stamens dorsal and lateral view, from left to right; **I.** Pistillate flower ventral view; **J.** Ovary lateral view; **K.** Ovary cross section. *Illustrated by Y.P. Ang based on AAMNP2 (PNH, BRIT, CAHUP).*

Proposed conservation assessment:—The area in which *Begonia masilig* occurs is an initial component of the National Integrated Protected Area Systems (NIPAS) Law, a Philippine Law that governs the protection, conservation and management of Protected Areas (DENR-BMB 2018). Nonetheless, the species faces natural and anthropogenic threats, e.g., landslides and illegal collection of forest resources. The trail where the species occurs is frequently disturbed

by tourists visiting a nearby waterfall. Moreover, local reports on the unregulated collection of *B. masilig* have led to the extirpation of some easily accessible subpopulations. In our surveys, the population count was estimated to be < 250 mature individuals within an Extent of occurrence (EOO) of < 200 km² and Area of occurrence (AOO) of about 10 km². *In situ* observations indicate that there has been a recent decline that is projected to continue. Consequently, the criteria for IUCN 15.1 Red List EN (Endangered) Criteria *B1ab(ii,iii,iv)+2ab(ii,iii,iv)* are satisfied (IUCN Standards and Petitions Subcommittee 2022).

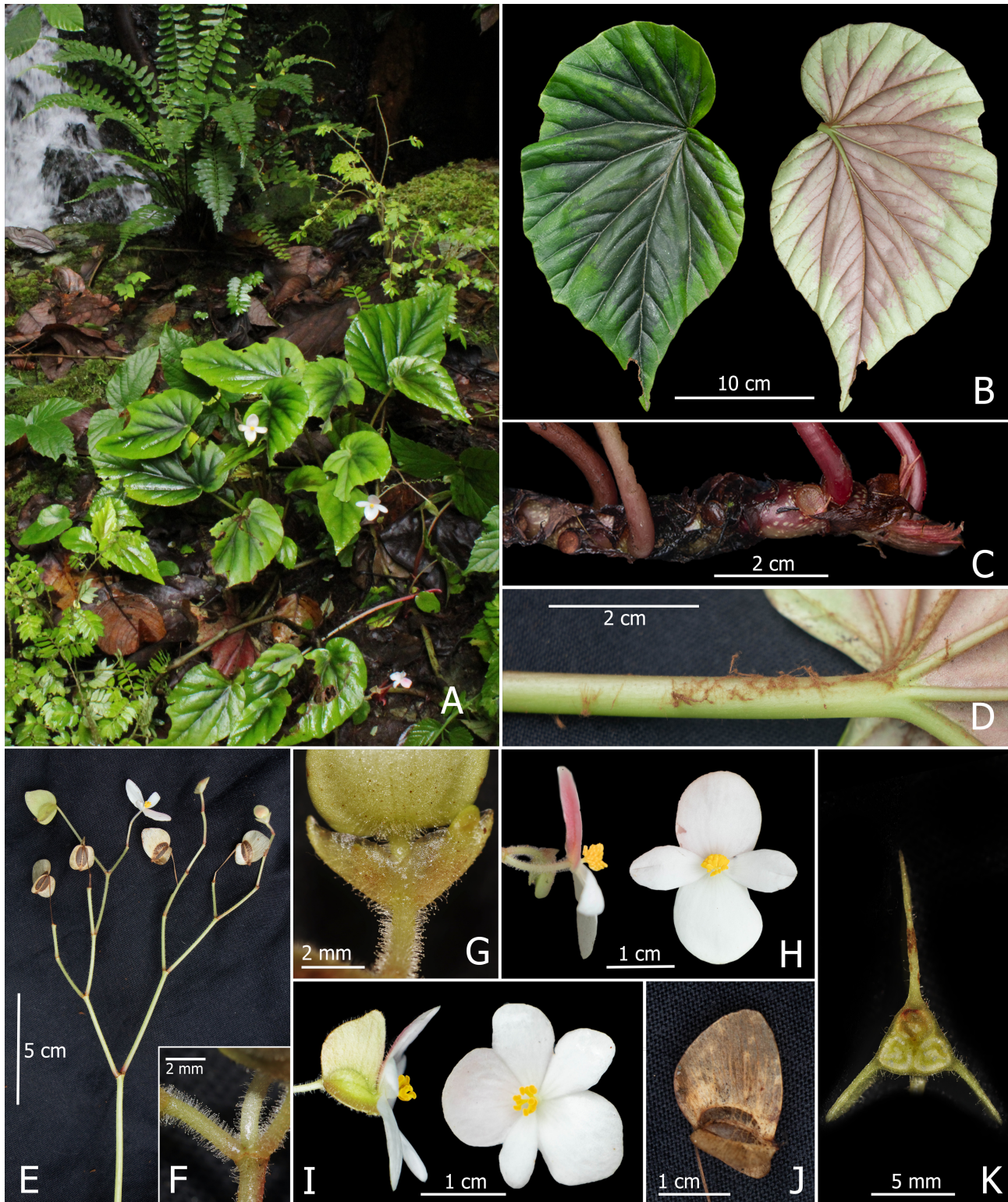


FIGURE 2. *Begonia masilig*. A. Habitat and habit; B. Leaf adaxial (left) and abaxial (right) surfaces; C. Rhizome showing stipule and base of petiole; D. Petiole and leaf abaxial surface; E. Panicle; F. Peduncle showing glandular trichomes; G. Bracts; H. Staminate flower lateral and ventral view; I. Pistillate flower lateral and ventral view; J. Capsule; K. Ovary cross section. Photos: A by M.N. Tamayo; B–E, H–J by Y.P. Ang; F, G & K by R. Bustamante.

Notes:—A plant of what is now considered *Begonia masilig* was first documented in 2012 by Pelser *et al.* (2011–Present) with a photograph stored in Phytoimages (Nickrent *et al.* 2006–Present). Subsequently, the same photograph by Pelser *et al.* (2011–Present) was included by Tandang *et al.* (2016), albeit identified as *B. neopurpurea* *nom. inval.*, based on the earlier published name *B. purpurea* (Elmer, 1939), which is a later homonym and also a *nomen nudum* as it lacked a Latin diagnosis. The description of *B. purpurea* was based on a single collection by Elmer from elevations of *ca.* 230 m on Mount Bulusan, Irosin, Sorsogon, on July 1916 (*A.D.E. Elmer 16565*). There are some morphological similarities between *B. masilig* with the species in Tandang *et al.* (2016), with both bearing ovate leaves with a dark purplish center, 4-tepaled staminate flowers, 5-tepaled pistillate flowers, as well as occurring in the same region as AMNP. Although *B. masilig* is similar to *B. neopurpurea*, as based on the literature (Elmer 1939) and the specimen there are some morphological distinctions and we do not consider them to represent the same taxon. It differs from *B. masilig* by having a more prominent rhizome up to *ca.* 1 m long (vs. up to *ca.* 30 cm long), elongated internodes *ca.* 7 cm long (vs. 4–10 mm long), smaller lamina (*ca.* 12 × 7 cm vs. 13.5–26 × 7.5–15 cm), lower half of peduncle sparsely ciliate (vs. sparse brown pubescent), and upper half of peduncle glabrous (vs. densely white glandular) (Elmer, 1939).

Begonia masilig is a member of a group of Luzon begonias that develop glandular trichomes on their inflorescences. This group includes *B. droseroides*, *B. caramoanensis* Rubite *et al.* (2020), *B. tayabensis* Merr. and *B. depressinerva* Prunada *et al.* (2019). As more areas in Luzon are explored, additional *Begonia* species with such characters may be discovered.

Other specimen examined:—PHILIPPINES. Luzon, Aurora Province, Municipality of Maria Aurora, Barangay Villa Aurora, Sitio Kamatis, Mt. Kamatis, primary forest, elevation 683 m, 15°40'24.96"N, 121°18'42.4188"E, 27 February 2022, *PTI-AMNP-1-148* (PNH, CAHUP, PPC).

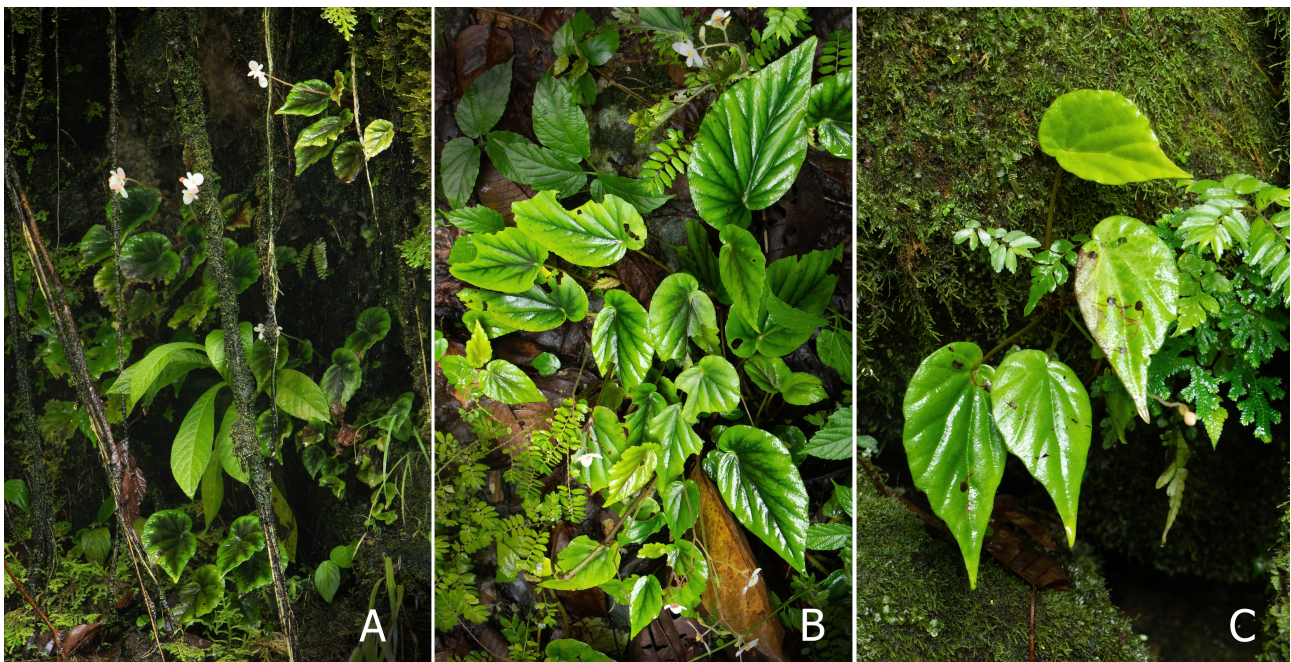


FIGURE 3. *Begonia masilig*. A, B, C. Color variation in lamina adaxial surface at the type locality. All photos by Y.P. Ang.

Begonia akaw Mansibang, Aumentado & Y.P. Ang, *sp. nov.* § *Petermannia* (Figure 4 & 5).

Type:—PHILIPPINES. Luzon, Aurora Province, Municipality of Maria Aurora, Barangay Villa Aurora, Sitio Dimani, primary forest, elevation *ca.* 500 m, 15°41' 36.5274"N, 121°21'32.0106"E, 29 June 2022, *AAMNP173* (holotype PNH, isotypes BRIT, CAHUP).

Diagnosis:—*Begonia akaw* belongs to *B.* sect. *Petermannia* (Klotzsch 1854: 124; de Candolle (1859:128) in having an erect habit and protogynous inflorescence (Doorenbos *et al.* 1998). It resembles *B. ramosii* Merr. (1911: 388) in having erect, rarely branched stems, few glabrous, long-ovate leaves, and a clustered terminal inflorescence of staminate flowers with two tepals. *Begonia akaw* differs from *B. ramosii* by having larger stipules [(10–)15–21 × 8–10 mm (vs. 10–15 × *ca.* 5 mm)], longer inflorescences (4.5–12 cm vs. < 4 cm), obliquely ovate bracts (vs. orbicular), larger tepals on staminate flowers (12–17 × 10–13 mm vs. *ca.* 8 × 7 mm), a solitary pistillate flower (vs. in pairs), larger tepals on pistillate flowers (14–15 × 8–13 mm vs. 9–10 × *ca.* 6 mm), and a larger ovary (*ca.* 18.5 × 8 mm vs. *ca.* 10 × 4 mm) (Table 2).

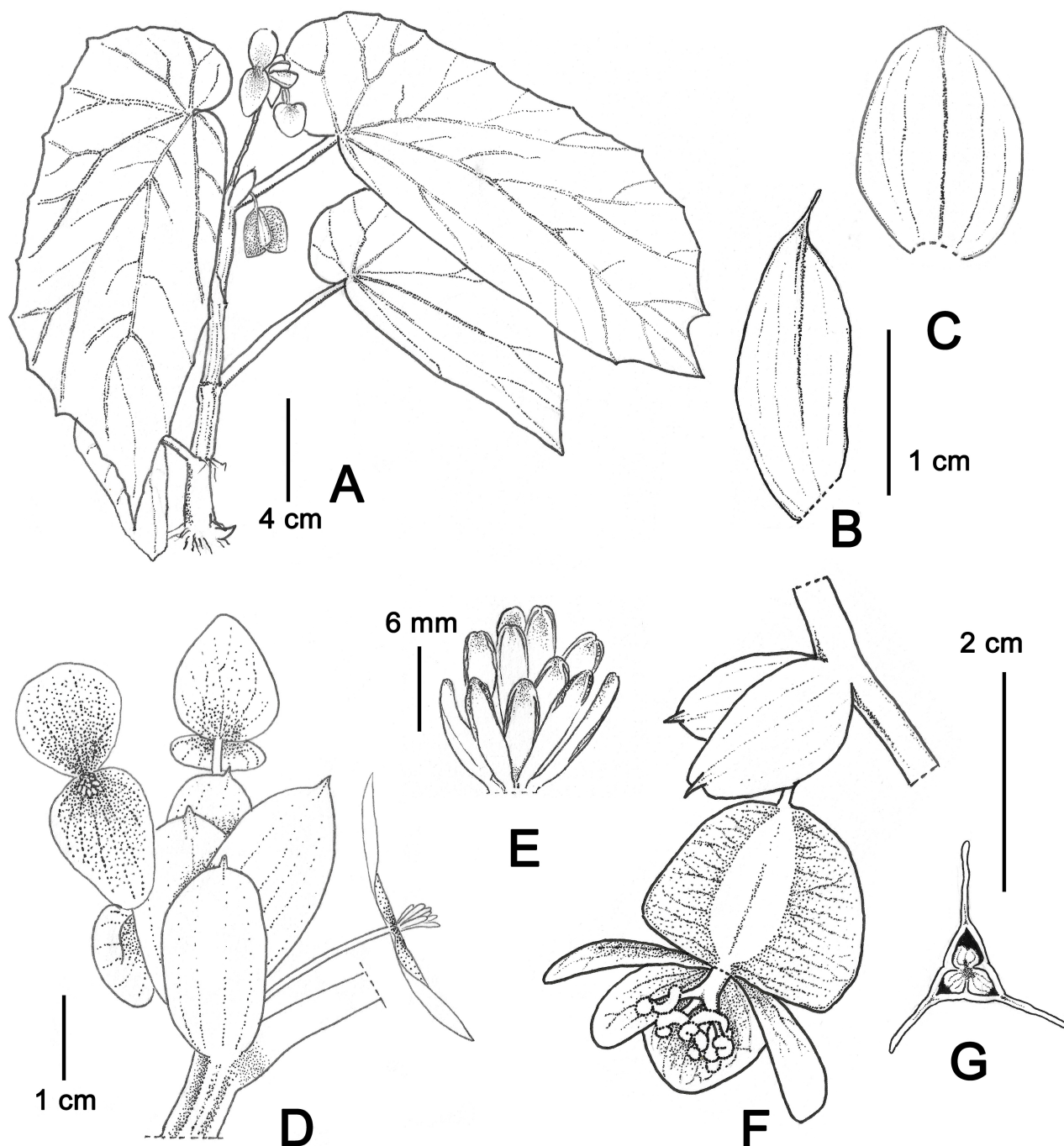


FIGURE 4. *Begonia akaw*. A. Habit; B. Stipule; C. Bract; D. Inflorescence; E. Androecium; F. Pistillate flower lateral view; G. Ovary cross section. Illustrated by J. Mansibang based on AAMNP173 (PNH, BRIT, CAHUP).

Description:—Lithophytic herb, monoecious, erect, lower parts of the stems prostrate or ascending, *ca.* 30 cm high. *Stem* terete, unbranched, with occasional shallow and longitudinal groove, pale green, 3–5 mm in diam., subglabrous, glabrescent, with inconspicuous microscopic indumentum, internodes (1.5–)25–60(–85) mm long. *Stipules* persistent, pale green, hyaline, ovate to oblong-ovate, obliquely inequilateral, (10–)15–21 × 8–10 mm, abaxially and adaxially glabrous, shallowly keeled, margin entire, apex cuspidate, cusp *ca.* 1.5 mm long. *Leaves* alternate; petiole terete, pale green, succulent, 4.0–9.0 × 0.3–0.4 mm, glabrous; lamina asymmetric, basifixed, oblong-ovate, 13.3–17.2 × 4.3–8.0(–10.0) cm, glabrous, adaxially olive green, abaxially pale green, veins raised prominently; base obliquely and prominently cordate on one side of lamina, both lobes rounded, unequal in length, margin very shallowly serrate, apex acuminate; venation basally *ca.* 8-palmate, branching dichotomously or nearly so, veins sunken adaxially and raised abaxially. *Inflorescence* terminal, bisexual, protogynous, panicle 4.5–12 cm long, staminate flowers initially clustered,

maturing into a solitary monochasial raceme, peduncle 24–50 mm long, glabrous, green, reddish pink at nodes, pistillate flower solitary, axillary on terminal leaf node, basal to staminate flowers along the same panicle. *Bracts* sub-persistent, hyaline, white, obliquely ovate, consistent in size throughout inflorescence, (12–)18–22 × (12–)15–18 mm, glabrous, margin entire, apex mucronate. *Staminate inflorescence*: pedicel 11–21 mm long, glabrous, tepals 2, predominantly white suffused with pink at base, venation distinct, pinkish, oblong-ovate to elliptic, 12–17 × 10–13 mm, glabrous, margin entire, apex rounded, *androecium* zygomorphic, filament 0.3–1 mm long, fused at base; stamens yellow, 18 to 20, oblong in outline, apex rounded, 1.5–2.0 mm long, locules 2. *Pistillate inflorescence*: pedicel 16–17 mm long, glabrous; tepals 5, white to pale pink with distinct pinkish venation, subequal, glabrous, margin entire, inner tepals orbicular-obovate, *ca.* 15 mm × 8–11 mm, apex rounded, outer tepals somewhat broader, orbicular-ovate, 14–15 × 12–13 mm, apex rounded; styles yellow, forming 3 divided arms, each arm forked at distal half, *ca.* 8 mm long, twisted and papillose all around; ovary trigonous-ellipsoid, *ca.* 18.5 × 8 mm; locules 3, placenta bifid, wings 3, subequal, dorsal wing oblong-lunate, larger than 2 lateral wings, rounded proximally, truncate to subtruncate distally, 17–20 × *ca.* 9 mm, lateral wings triangular, acute to obtuse proximally, truncate distally, *ca.* 17 mm × 8 mm, base rounded to subacute. *Capsule* recurved on stiff pedicel, pedicel 16–17 mm long, dorsal wing distinctly larger than lateral wings, nodding when mature, 2 lateral wings cucullate to form a splash cup, dehiscing along ovary wing attachments when dried, 16–20 × *ca.* 18 mm.

TABLE 2. Morphological differences between *Begonia akaw* and *B. ramosii*

	<i>Begonia akaw</i>	<i>Begonia ramosii</i>
Stipule		
size (mm)	(10–)15–21 × 8–10	10–15 × <i>ca.</i> 5
Inflorescence		
length (cm)	4.5–12	< 4
Peduncle		
color	green, reddish pink at nodes	greenish brown
Bract		
shape	obliquely ovate	orbicular
dimension (mm)	(12–)18–22 × (12–)15–18	10–15 × <i>ca.</i> 10
Staminate inflorescence		
tepal size (mm)	12–17 × 10–13	<i>ca.</i> 8 × 7
stamen number	18–20	20–30
stamen length (mm)	1.5–2	<i>ca.</i> 1
Pistillate inflorescence		
habit	solitary	in pairs
pedicel length (mm)	16–17	5–10
tepal size (mm)	14–15 × 8–13	9–10 × 6
ovary size (mm)	<i>ca.</i> 18.5 × 8	<i>ca.</i> 10 × 4
capsule wing dimension (mm)	17–20 × <i>ca.</i> 9	10–13 × 4–6

Etymology:—The epithet “*akaw*” is a Balereño word used to convey awe, disbelief, or surprise. The species had been documented and observed on multiple occasions, being misidentified as *B. ramosii*. This can be considered as a case of an overlooked undescribed species, which is true for other threatened flora in the country (Daipan *et al.* 2022).

Distribution and habitat:—Aside from the locality from which the type was collected in AMNP (Figure 6), local populations were also found in the Caunayan Falls and Ditumabo Falls areas, San Luis; the vicinity of Bulawan Falls, Dimayuga; and Amro River Protected Landscape, Dilasag. It occurs locally on rock walls with dripping water, streams, waterfall areas, deeply shaded humus-rich forest soil, and along forest trails. This taxon was often observed growing sympatrically with *B. droseroides*, *B. cf. megacarpa* Merr. (1914: 378), and *B. aff. negrosensis* Elmer (1910: 736), among other shade-tolerant herbs and rock wall associates.

Phenology:—This species flowers and fruits year-round.

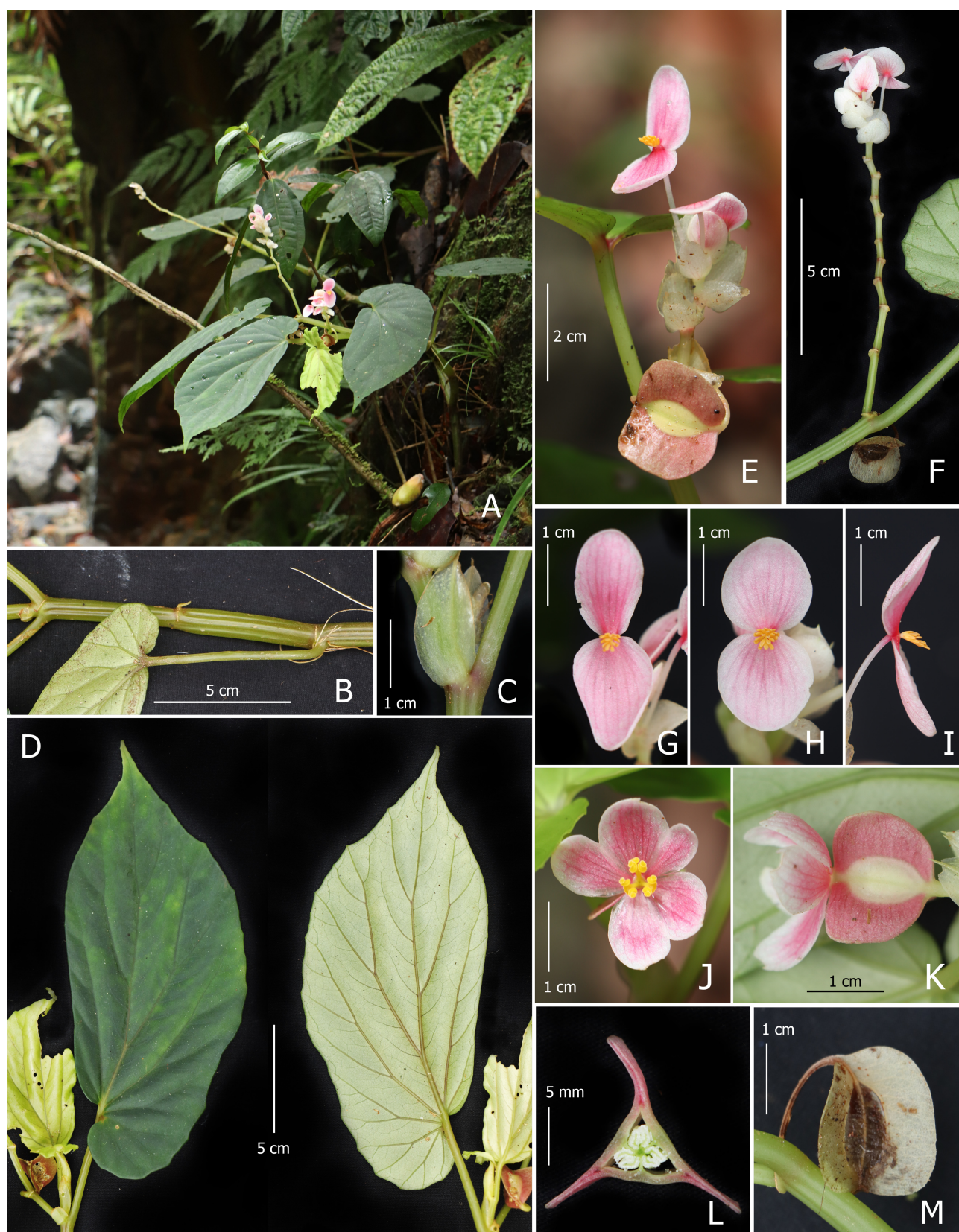


FIGURE 5. *Begonia akaw*. A. Habitat and habit; B. Stem; C. Stipule; D. Leaf adaxial (left) and abaxial (right) surface; E. Inflorescence showing bracts; F. Inflorescence showing peduncle; G. Staminate flower ventral view; H. Staminate flower ventral view, a variant with rounder tepals; I. Staminate flower lateral view; J. Pistillate flower ventral view; K. Pistillate flower lateral view showing ovary; L. Ovary cross section; M. capsule. All photos by Y.P. Ang.

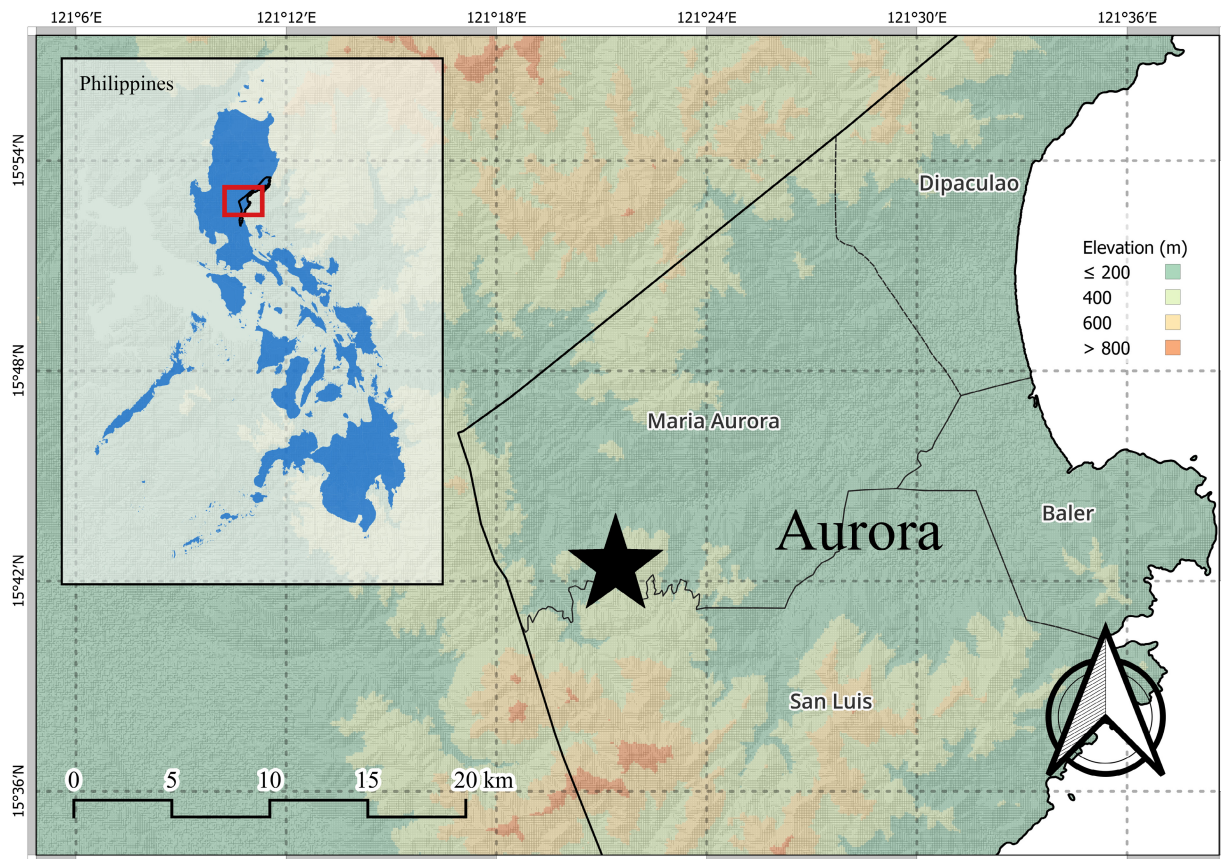


FIGURE 6. Map of Aurora Province showing the locality of *B. masilig* and *B. akaw* (star).

Proposed conservation assessment:—Because the localities of *Begonia akaw* have developed into tourism spots, the local rock wall populations of Caunayan Falls and Ditumabo Falls, Barangay San Luis have been observed to be largely removed. Furthermore, the creation of logging trails, forest conversion, and clearing also devastate localities where *B. akaw* occurs. From our surveys, we estimate the EOO is to be < 800 km² with an AOO of about 20 km². These threats for *B. akaw* satisfy the IUCN 15.1 Red List EN (Endangered) Criteria *B1ab(ii,iii)+2ab(ii,iii)* (IUCN Standards and Petitions Subcommittee, 2022).

Notes:—The stem and stipule may appear glabrous in fresh specimens. However, there are minute trichomes that can only be seen with a dissecting scope at 160×.

Other specimen examined:—PHILIPPINES. Luzon, Aurora Province, Municipality of Maria Aurora, Barangay Villa Aurora, Sitio Dimani, primary forest, elevation 535 m, 15°40'51.654"N, 121°23'37.9932"E, 26 February 2022, PTI-AMNP-1-46 (PNH, CAHUP, PPC).

Conclusion

With growing anthropogenic pressures on the remaining pristine habitats in the Philippines, stricter enforcement of Philippine Republic Act 9147 known as the Wildlife Resources Conservation and Protection Act, would ensure the preservation and protection of local biodiversity. This is especially relevant specifically for species which are narrowly endemic and unique to the Philippines, such as the new species described here and others in the flora of Aurora Province.

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