



## *Begonia depressinerva* (sect. *Baryandra*, Begoniaceae), a new species from Luzon Island, the Philippines

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### Abstract

A new peltate species of *Begonia* sect. *Baryandra* from Kidadayaig Falls, General Nakar, Quezon is described and illustrated here. The new species, *B. depressinerva*, is diagnosed against the morphologically similar *B. tayabensis*. The two species are similar by having rhizomatous stem, peltate, ovate leaf, and 5-tepalled pistillate flower, but the new species is remarkably different by having densely pilose, asymmetric leaf blade, densely pilose petiole that is inserted much closer to the basal margin, obtuse to subobtuse staminate flower outer tepal apex, and glandularly hairy ovary. *B. depressinerva* is proposed to be Vulnerable (VU) D1, following the guidelines of the IUCN.

**Keywords:** taxonomy, Philippine flora, *Begonia tayabensis*, Vulnerable, General Nakar

### Introduction

The Sierra Madre Mountain Range is one of the most important biological areas in the Philippines due to the high endemism of its flora and fauna, and General Nakar, Quezon is a municipality located at its southern portion. This town covers an extensive range of forested mountains which continue to experience anthropogenic pressures, such as illegal logging and slash-and-burn agriculture, posing threats to its biodiversity (Buot & Villanueva, 2017). This part of the mountain range is relatively botanically unexplored which led us to do a floristic assessment in Kidadayaig Falls located at the foothills of Mt. Binuang, the type locality of *Begonia binuangensis* Merrill (1918: 40).

During the authors' botanical fieldwork in the area, several species of *Begonia* were documented. These include *B. cumingii* Gray (1854: 658), *B. leptantha* Robinson (1911: 211), *B. pseudolateralis* Warburg (1904: 51), and one unidentified species. After thorough morphological examination, review of literature, comparison with the deposited specimens from the Philippine National Herbarium (PNH), and comparison with photographs from the online e-Flora of the Philippines revealed that the unidentified species is new to science. The new species, *B. depressinerva* Prana, *sp. nov.* closely resembles *B. tayabensis* Merrill (1918: 38) and falls under *Begonia* section *Baryandra* A.DC. following the recent circumscription of Rubite *et al.* (2013). A detailed description, photographs, and illustrations of this new species are provided.

### Materials and methods

*Begonia depressinerva* was first encountered on December 2017 during a preliminary survey for an undergraduate thesis along the stream of Kidadayaig Falls, General Nakar, Quezon. The new species was initially identified as *B. cf. tayabensis* Merrill until Mr. Wally Suarez confirmed that it might be an undescribed species (pers. comm. dated 21

June 2018). *B. depressinerva* was compared to the type specimens of *B. tayabensis* available on the internet (Hughes *et al.*, 2015–; NMNH – Botany Dept., Smithsonian Institution), herbarium specimens deposited at the PNH and CAHUP, and photographs of other peltate species available at the Co’s Digital Flora of the Philippines (Pelser *et al.*, 2011 onwards). The protologues of similar species were also reviewed and after thorough morphological examinations, the authors confirmed that it is indeed an undescribed species. The species is diagnosed against *B. tayabensis* using the protologue of Merrill (1918), description by Rubite (2010), and some additional morphological observations based on live plants from a population in Three Falls, Sta. Maria, Laguna. Letters requesting permission to collect and conduct the study were submitted to the Barangay Captain of Barangay Pesa and to the municipal Mayor of General Nakar, Quezon. The area is located in PP 1636, which is a protected area. Thus, the group presented the research proposal at the DENR-CENRO Real Office during the PAMB meeting last 20 September 2018 to secure a gratuitous permit (GP) prior to the conduct of the study.

## Taxonomic treatment

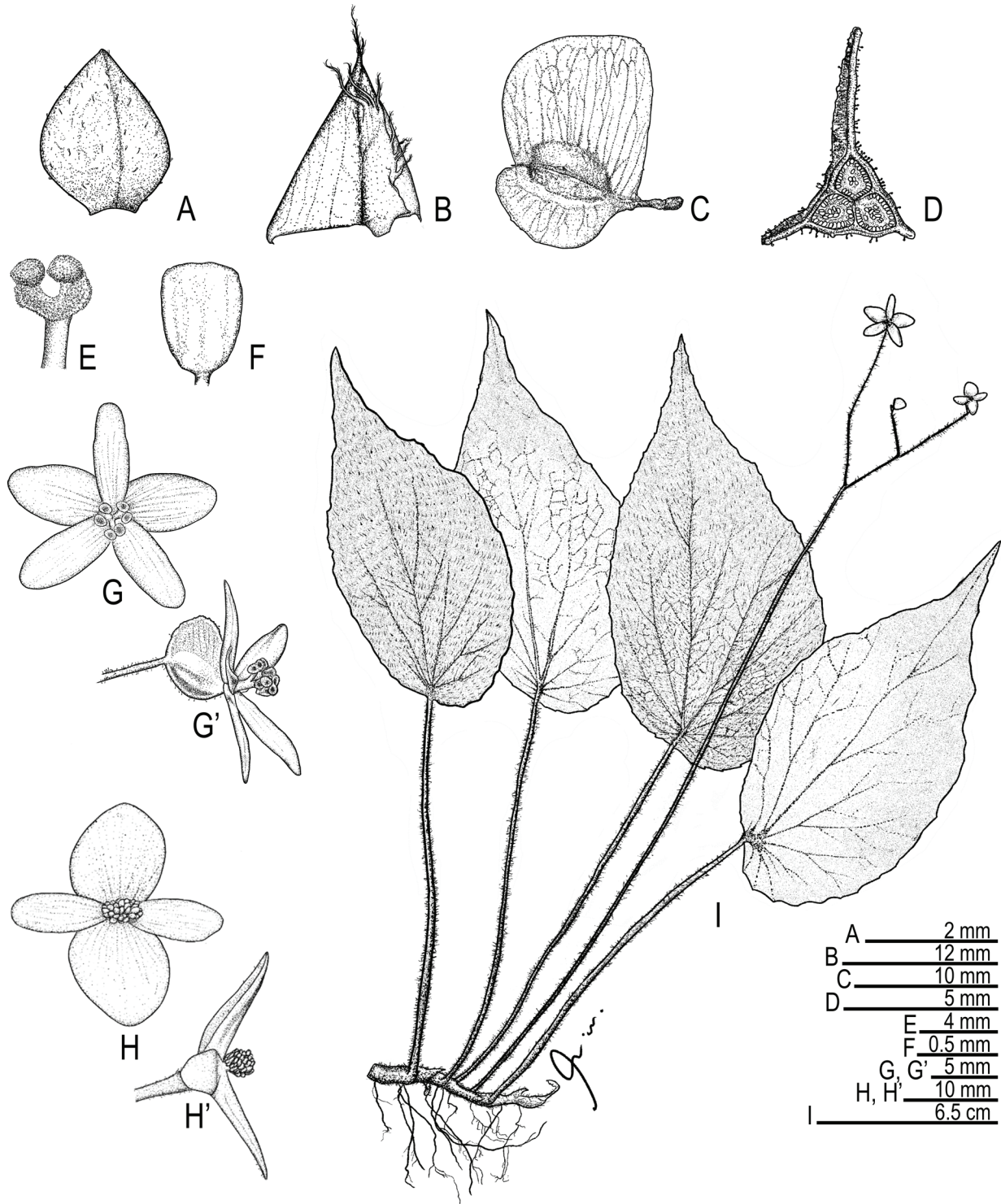
*Begonia depressinerva* Pranađa, *sp. nov.* (Figs. 1, 2, & 4).

**Type:**—PHILIPPINES. Luzon, Quezon, General Nakar, Barangay Pesa along Kidadayaig Falls on moist boulders and cliffs by the water edge, ca. 150 m elevation, 14°42’59.1”N, 121°34’40.4”E, 3 December 2018, *M.E.C. Salvador PUPH coll. no. 0098*, with Christine Joy S. Luna (Holotype: PNH; Isotypes: CAHUP, FEUH).

**Diagnosis:**—*B. depressinerva* is most similar to *B. tayabensis* among the species of *Begonia* sect. *Baryandra*. Both are rhizomatous and have peltate, ovate leaf blades with entire to subentire margins and acuminate apices. However, the former is distinct by having a densely pilose and asymmetric lamina (vs. glabrous or with short hairs and symmetric, or almost); and a densely pilose petiole (vs. glabrous to sparsely hairy) that is inserted nearer to the basal margin (7–13 mm vs. 20–40 mm). For the inflorescence, Rubite (2010) reported that the peduncle of *B. tayabensis* has few hairs while Merrill (1918: 38) reported that it was “sparingly ciliate with short, pale, spreading, scattered hairs”, in the protologue. However, glandular hairs were observed in the peduncle and pedicel of the live plants found at Three Falls in Sta. Maria, Laguna (Fig. 3H). Notably, the presence of glandular hairs in the peduncle and pedicel is similar to *B. depressinerva* but it is rather sparse (vs. dense). Both species are similar in having dichasial cymes, 4-tepalled staminate flowers and 5-tepalled pistillate flowers. However, *B. depressinerva* is different by having elliptic to ovate staminate flower outer tepal (vs. elliptic-ovate to broadly obovate or almost circular) with obtuse to subobtuse apex (vs. rounded); fewer anthers (31–44 vs. 40–50); and ovary covered in glandular hairs (vs. glabrous).

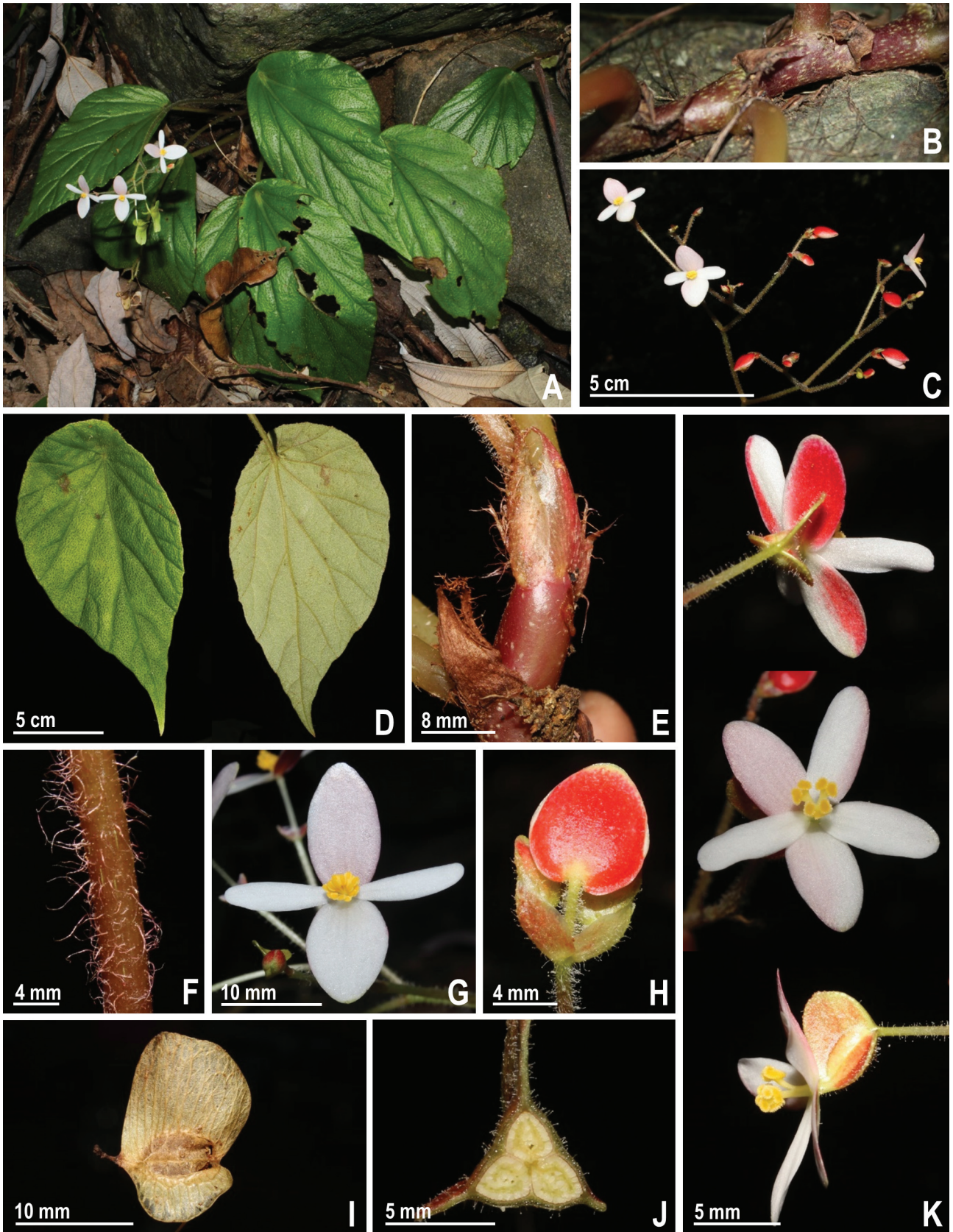
Monoecious, rhizomatous, perennial herb. **Rhizome** long creeping, 15–32 cm or longer, 7–10 mm wide, red to brown-red, glabrous, internodes 8–15 mm. **Stipules** persistent, red, ovate-triangular, 12–15 mm long, 5–12 mm wide, herbaceous, glabrous, strongly keeled, keel attached near the left or right side more than the center, with fleshy red hairs from the base to the apex, each with secondary hairs, margin entire, aristate, arista 1–3 mm. **Leaves** alternate, peltate, petiole inserted 7–13 mm from the base, terete, greenish or reddish, 8–17 cm long, 4–5 mm wide, densely pilose, hairs whitish; leaf blade asymmetric, either the left or right side smaller, ovate, 11–15 cm long, 6.5–10 cm wide, apex acuminate, base oblique, margin slightly and widely dentate in young, smaller leaves, becoming entire to subentire in mature, bigger leaves, some undulating at maturity, with few white hairs; leaf chartaceous, densely pilose on both surface, adaxially green, abaxially pale green, hairy on all veins; venation basally 8–10, palmate, midrib distinct, primary and secondary veins prominent, sunken above, raised below, reticulations faint. **Inflorescence** axillary, bisexual, dichasial cymes, 15–36.2 cm long, peduncle greenish or reddish, 13–36 cm long, arising directly from the rhizome, ascending, with dense white glandular hairs; protandrous. **Bracts** red and white, deciduous, ovate, boat-shaped, 3–5 mm long, 2–3 mm wide, apex acute, margin entire, with a few white glandular hairs. **Staminate flower** pedicel 6–8 mm long, with dense white glandular hairs; tepals 4, adaxially red and white, abaxially white; outer 2 elliptic to ovate, 9–12 mm long, 7.5–9 mm wide, apex obtuse to subobtuse, glabrous or with a few white glandular hairs adaxially; inner 2, oblanceolate, 8–12 mm long, 3–4 wide, apex obtuse to rounded, glabrous; androecium actinomorphic, 2.5–4 mm across; stamens, yellow, 31–44; filaments shortly fused at base, anthers widely obovate to widely elliptic, 0.5–3 mm long, 2-locular, apex obtuse to rounded. **Pistillate flower** pedicel 13–17 mm long, with dense white glandular hairs; tepals 5, adaxially red and white, abaxially white; outer 2 subrhombic or obovate, 10–12 mm long, 5–8 mm wide, apex obtuse to subobtuse, glabrous or sometimes with very few white glandular hairs adaxially; inner 3 subrhombic or

narrowly obovate, 8–15 mm long, 4–6 mm wide, apex obtuse to subobtuse, glabrous; ovary greenish to reddish, body trigonous-ellipsoid, 5–6 mm long, 3–5 mm wide, with a few white glandular hairs; unequally 3-winged, abaxial wing much larger, trapezoid, apex truncate, 6 mm long, 5–6 mm wide, lateral wings equal or sometimes one wing smaller, 6 mm long, 2–3 mm wide, crescent shaped, margin entire; ovary 3-locular, placenta bilamellate; styles 3, fused at the base for ca. 2 mm, yellow, 4 mm long, stigma kidney-shaped. **Capsule** pendent, pedicel 2.4–2.5 cm long, tepals deciduous, body trigonous-ellipsoid, 10–12 mm long, 5–6 mm thick, greenish or reddish when fresh, brown when mature; wings unequal, 14–15 mm long; lateral wings equal or sometimes one wing smaller, 3–4 mm wide, abaxial wing 10–12 mm wide.



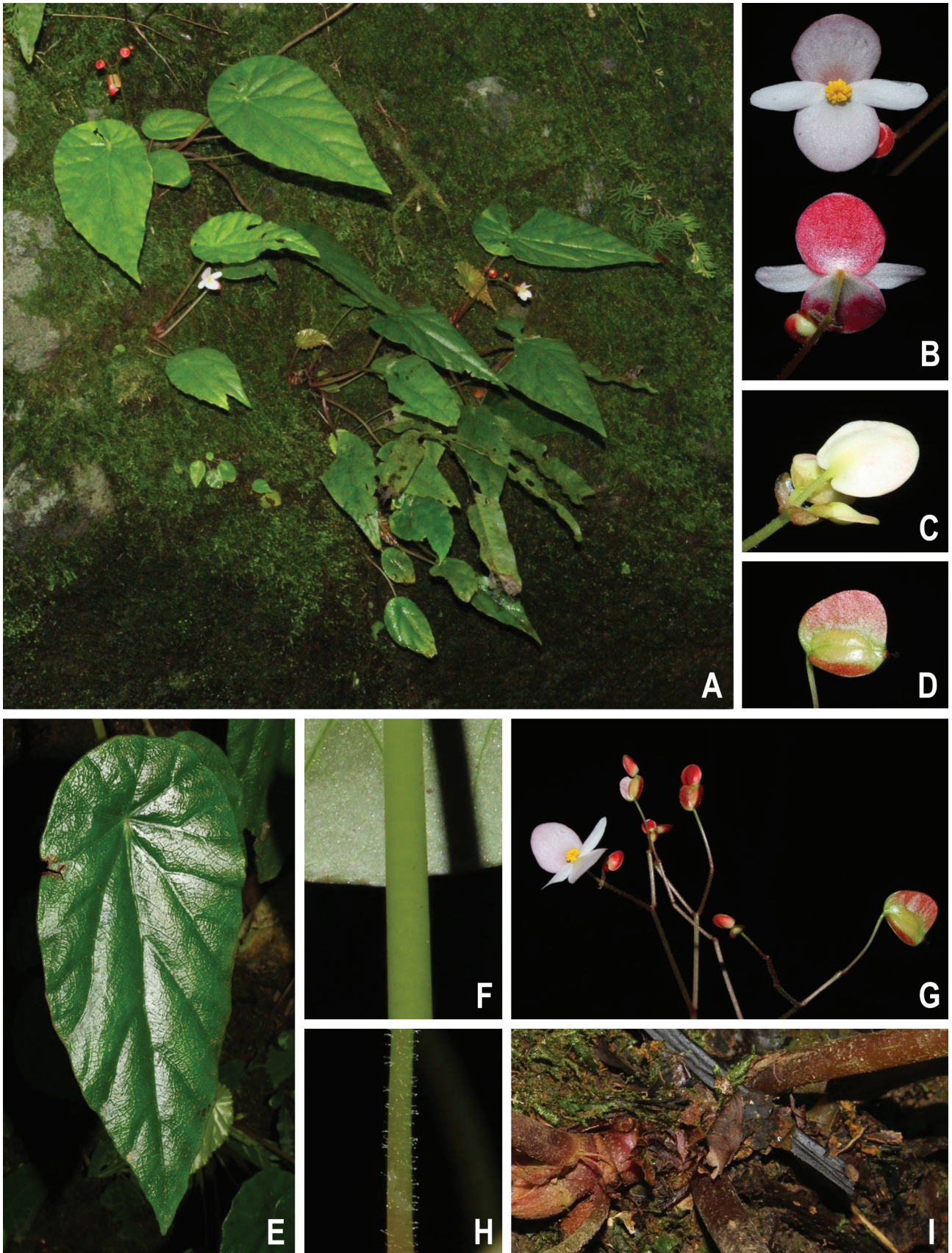
**FIGURE 1.** *Begonia depressinerva* Pranada, *sp. nov.* A. Bract; B. Stipule; C. Mature Capsule; D. Cross section of immature capsule; E. Stigma; F. Anther; G, G'. Pistillate flower, anterior and lateral views; H, H'. Staminate flower, anterior and lateral views; I. Habit. Illustrated by Jero Christ P. Manulat.





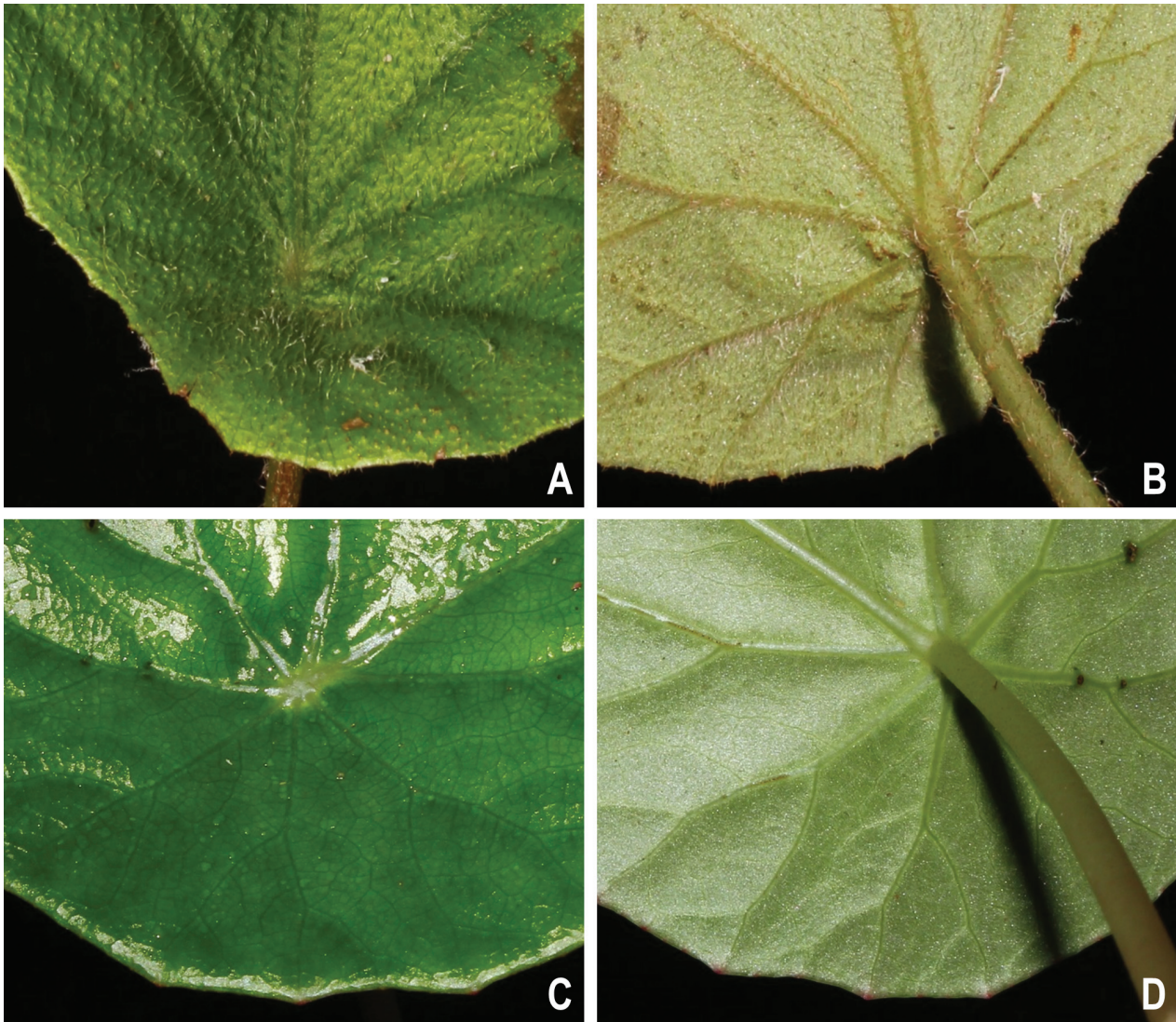
**FIGURE 2.** *Begonia depressinerva* Pranada, *sp. nov.* A. Habit and habitat; B & E. Rhizome and stipules; C. Inflorescence; D. Leaf, adaxial and abaxial surfaces; F. Petiole; G. Staminate flower; H. Staminate flower bud and bracts, showing pedicel covered in dense glandular hairs; I. Mature capsule; J. Cross section of immature capsule; K. Pistillate flower, posterior, anterior, and lateral views. *All photos by M.A.K. Pranada.*





**FIGURE 3.** *Begonia tayabensis* Merr. A. Habit and habitat; B. Staminate flower, anterior and posterior views. C. Staminate flower buds and bracts; D. Immature fruit; E. Leaf adaxial surface; F. Section of the petiole; G. Inflorescence; H. Section of pedicel, showing glandular hairs. I. Rhizome and stipules. All photos by M.A.K. Pranada.





**FIGURE 4.** Leaf surface comparison of *B. depressinerva* (A. Leaf adaxial surface; B. Leaf abaxial surface) and *B. tayabensis* (C. Leaf adaxial surface; D. Leaf abaxial surface). All photos by M.A.K. Pranada.

**Etymology:**—The specific epithet, *depressinerva*, is derived from the Latin translations of “depression” and “nerve” which are *depressio* and *nervus*, respectively. It refers to the depressed primary and secondary veins forming a grooved leaf upper surface.

**Distribution and habitat:**—Only known to occur from the type locality. The species grows on shaded moist boulders and cliffs along the stream in a secondary forest between 150–250 m elevation.

**Phenology:**—Observed flowering and fruiting from April to January, probably flowering and fruiting all year round.

**Proposed IUCN category:**—The populations of *B. depressinerva* were found a few hundred meters apart at the same general habitat, making it rare from the type locality. The authors observed that mature individuals in the area are <1000, thus it is considered ‘Vulnerable’ (VU) D1 (IUCN Standards and Petitions Subcommittee, 2017), since populations face a high risk of extinction due to increasing anthropogenic pressures in the area.

**Notes:**—*B. depressinerva* can be easily distinguished from other peltate species of *Begonia* sect. *Baryandra* by the appearance of its leaf upper surface. Most peltate species have flat upper leaf surfaces, e.g., *B. adamsensis* Magtoto *et al.* (2018: 290), *B. taraw* Peng *et al.* (2015: 19), *B. gutierrezii* Coyle (2010: 131), *B. rufipila* Merrill (1911: 393), *B. elmeri* Merrill (1918: 39), and *B. hernandioides* Merrill (1911: 392). In *B. depressinerva*, the primary and secondary veins are sunken, forming grooves on the leaf upper surface. In *B. tayabensis*, the veins are also sunken but shallower, making the upper leaf surface appear almost flat. Moreover, *B. depressinerva* can be readily distinguished from *B. tayabensis* by the symmetry and texture of their leaves, with the former being asymmetric and densely pilose and the latter being symmetric (or almost) and glabrous (or nearly so).



*B. tayabensis* was first collected along Umiray River (Ramos & Edaño 29054), on the former Tayabas Province. This river flows through the southern Sierra Madre Mountain Range and now borders the municipalities of Dingalan, Aurora to the north and General Nakar, Quezon to the south. Populations of *B. tayabensis* were also found in Sta. Maria, Laguna, where a number of specimens have been collected (Shih-Hui Liu 2074; Rubite 362; B.F. Hernaes 3904). Meanwhile, the only known population of *B. depressinerva* was found downstream in Kidadayaig Falls, which is located at the lowlands of Mt. Binuang, also in General Nakar, Quezon. The two species occur in the same geographic area but their known populations are separated.

### Key to the peltate species of *Begonia* section *Baryandra* of the Philippines

- 1a. Petiole hairy .....2
- 1b. Petiole glabrous or nearly so .....3
- 2a. Petiole hair glabrescent or rubbing off easily, leaf blade apex obtuse .....*B. taraw* (Palawan)
- 2b. Petiole hair persistent, leaf blade apex acuminate or pointed .....4
- 3a. Leaf blade suborbicular or orbicular-ovate, petiole inserted 15–20 mm from the basal margin..... *B. hernandioides* (Luzon)
- 3b. Leaf blade ovate to oblong-ovate, petiole inserted 20–40 mm from the basal margin ..... *B. tayabensis* (Luzon)
- 4a. Leaf blade glabrous except the veins on the lower surface, apex shortly acuminate or with a short rather sharp point .....5
- 4b. Leaf blade hairy, apex not shortly acuminate .....6
- 5a. Petiole 3–6 cm long, hairs long, reddish brown when dry, leaf blade apex shortly acuminate..... *B. gutierrezii* (Palawan)
- 5b. Petiole 10–20 cm long, hairs dense, fulvus, leaf blade apex with a short rather sharp point.....*B. elmeri* (Mindanao)
- 6a. Leaf blade pilose on both surfaces, asymmetric, peduncle with dense white glandular hairs .....*B. depressinerva* (Luzon)
- 6b. Leaf blade with numerous, long, brown hairs on the lower surface only, symmetric or almost, peduncle glabrous.....7
- 7a. Stipule linear or linear-lanceolate, leaf blade ovate or suborbicular ovate, 6–9 × 4–6 cm ..... *B. rufipila* (Luzon)
- 7b. Stipule broadly ovate, leaf blade elliptic, 12–27.5 × 6–16.5 cm .....*B. adamsensis* (Luzon)

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**Appendix 1.** *Begonia* specimens examined for morphological comparison.

*Begonia depressinerva* Prunada. PHILIPPINES. Luzon: Quezon, General Nakar, Barangay Pesa, downstream Kidadayaig Falls, 21 July 2019, *M.A.K. Prunada 001* (FEUH); Quezon, General Nakar, Barangay Pesa, downstream Kidadayaig Falls, 3 December, 2018, *M.E.C. Salvador PUPH coll. no. 0098* (PNH, CAHUP, FEUH).

*Begonia hernandioides* Merr. PHILIPPINES. Luzon: Cagayan, Bagio Cove, 20 March 1981, *M.S. Allen 30-81* (PNH 150006); Ilocos Norte, Pagudpud, 16 February 2006, *R.R. Rubite 119* (PNH 252696).

*Begonia rufipila* Merr. PHILIPPINES. Luzon: Quezon Province, 11 February 1976, *M.J.S. Sands 3117* (PNH 169888); Quezon, Atimonan, Quezon National Park, 20 May 2006. *R.R. Rubite* (PNH 252707).

*Begonia tayabensis* Merr. PHILIPPINES. Luzon: Laguna, Santa Maria, Santiago, 19 December 2017, *Shih-Hui Liu 2074* (HAST 142910); Laguna, Sta. Maria, 7 June 2007, *R.R. Rubite 362* (PNH 252709); Laguna, Sta. Maria, Marcos Highway, on stone along creek, 8 February 1986, *B.F. Hernaez 3904* (CAHUP 40870, CAHUP 40871); Tayabas, Umiray River, on ledges and steep slopes along the river, 3 June 1917, *M. Ramos & G. Edaño 29054* (P, US 115464).