



## Six new species of *Begonia* (Sect. *Jackia*, Begoniaceae) from Sumatra, Indonesia

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**ABSTRACT:** Six new species of *Begonia* sect. *Jackia* from Sumatra are described and illustrated: *B. araneumoides*, *B. batuphila*, *B. hijauvenia*, *B. mursalaensis*, *B. panjangfolia*, and *B. perunggufolia*. All morphological characters and measurements were observed from living plants in the Bogor Botanical Gardens greenhouse or the wild. Using IUCN criteria, 4 species are considered to be Data Deficient, 1 Vulnerable, and 1 Least Concern.

**KEY WORDS:** *Begonia araneumoides*, *B. batuphila*, *B. hijauvenia*, *B. mursalaensis*, *B. panjangfolia*, *B. perunggufolia*.

### INTRODUCTION

Currently, 72 species of *Begonia* in five sections of the genus are recorded from Sumatra, with one species unplaced to section (Hughes *et al.*, 2009, 2015a,b; Ardi and Hughes, 2018; Girmansyah *et al.*, 2019, 2020; Ardi *et al.*, 2021). *Begonia* sect. *Jackia* M. Hughes (Moonlight *et al.*, 2018) has the highest number of species in Sumatra with 27 species; the section was created to contain Southeast Asian species which used to reside in *Begonia* sect. *Reichenheimia*, which was redefined following molecular evidence and consideration of growth form (*B.* sect. *Reichenheimia* contains tuberous species, while *B.* sect. *Jackia* contains rhizomatous species). Of the 60 accepted species in *B.* sect. *Jackia*, 41 species are found in Indonesia: Java (3 species), Sumatra (27 species), Kalimantan (2 species), Sulawesi (4 species), and Lesser Sunda Islands (6 species) (Hughes *et al.*, 2015b). Morphologically, *B.* sect. *Jackia* is characterized by acaulescent rhizomatous herbs with axillary cymose inflorescences arising from the rhizome (Moonlight *et al.*, 2018). It bears most similarity to *B.* sect. *Baryandra* but differs in having entire placenta rather than bifid (Rubite *et al.*, 2013).

Based on recent acquisitions of *Begonia* in Bogor Botanic Gardens and fieldwork by one of the authors in Sumatra, six undescribed species in *B.* sect. *Jackia* have come to light, bringing the total known from Sumatra to 33. Living material has allowed for all the morphological characters of the new species to be measured and photographed.

### MATERIALS AND METHODS

The description of the species and other data used in this study are from field observations by the authors during an expedition to West Sumatra in 2009 and living plant material from Bogor Botanic Gardens Nursery. All *Begonia* specimens from Sumatra deposited in ANDA, B, BM, BO, E, FI, K, L, P, SING have been examined. Photographs of the specimens used are mostly available at Hughes *et al.* (2015b). All available type material and protologues of *Begonia* species in section *Jackia* from Sumatra, including the surrounding small islands have been observed to verify the novelty of the described species. Plant measurement, colour and shape descriptions are derived from live plant material throughout the expedition and from the live collections in Bogor Botanic Gardens.

### TAXONOMIC TREATMENT

*Begonia araneumoides* Ardi & Girm., *sp. nov.*

Sect. *Jackia*

**Type:** INDONESIA. West Sumatra, Limapuluh Kota, cultivated from material collected in the wild (vouchers made from cultivated plants), 19 November 2019, D. Girmansyah DEDEN3448 (holotype: BO).

**Diagnosis:** *Begonia araneumoides* most closely resembles *B. droopiae* (Ardi and Hughes, 2010) from Solok Ambah, West Sumatra in having strongly asymmetric

**Fig. 1**

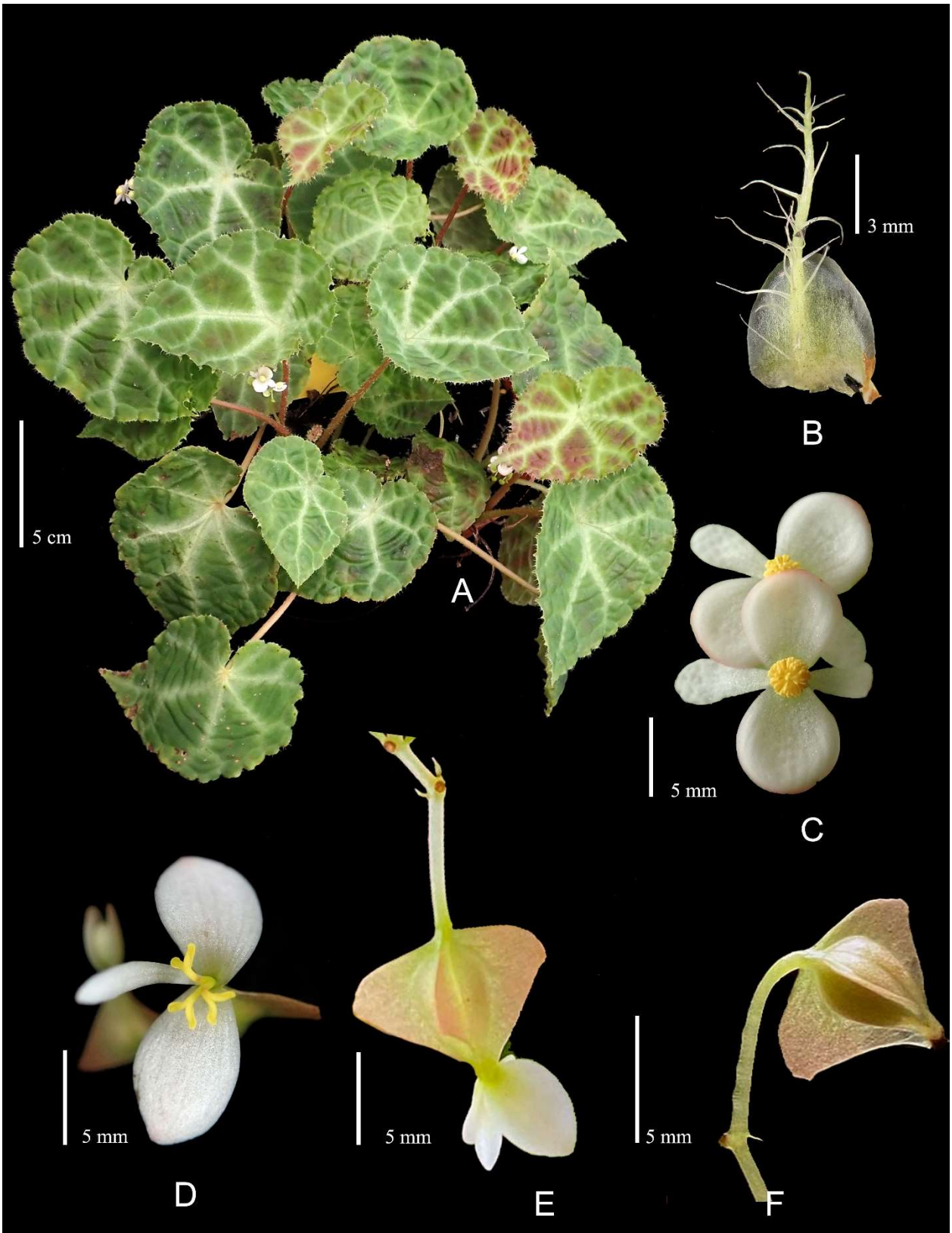


Fig. 1. *Begonia araneumoides* Ardi & Girm. A. Habit. B. Stipule. C. Male flowers with four tepals. D. Female flower with three tepals. E. Female flower and ovary. F. Fruit. Photos: Wisnu H. Ardi from *DEDEN3448* (BO).



leaves which are rugulose with a crenate and fringed margin, but it can be differentiated by its mix of basifixed and eccentrically peltate leaves (vs. purely basifixed); smaller male flower outer tepals 5–7 × 6 mm (vs. 11–17 × 6–7 mm), and an ellipsoid capsule (excluding the wings) (vs. broadly ellipsoid to subglobose).

Monoecious rhizomatous herb. Rhizomes creeping, green with white spots, rooting at nodes, *c.* 10 cm long, diameter 5–7 mm, internodes congested, 3–5 mm long, glabrous or puberulent. Stipules persistent, pale green, ovate, 5–7 × 3.5–10 mm, herbaceous, not keeled, villose along midrib abaxially, margin entire, apex aristate, arista villose, 6–9 mm long. Leaves alternate; petiole terete, reddish brown, 10–20 cm long, white villous; lamina strongly asymmetric, ovate, 8.5–13 × 5.5–9 cm, basifixed, leaf base slightly overlapped, margins with rigid teeth bent downwards at the ends of veins, slightly protruding with a pseudo-crenate appearance, tooth *c.* 1.5 mm length, apex acuminate, upper surface variegated with white primary veins against a green lamina (brownish-green lamina when young), glabrous, rugulose, lower surface sparsely hairy along the vein, venation palmate-pinnate, primary veins 6–7, actinodromous, secondary craspedrodromous, midrib distinct, with *c.* 2 secondary veins on each side, tertiary veins arranged like a spiders web. Inflorescences bisexual, axillary, dischiasial, arising directly from rhizome, branched 2 times; peduncle pale green, total length 7–9 cm; bracts pale green, elliptic, 1–3 × 0.5–2 mm, becoming smaller towards the apex of the inflorescence, margin sparsely ciliate. Male flowers: pedicel 0.5–1 cm long, glabrous; tepals 4, white, outer tepals 2, broadly elliptic, *c.* 5–7 × 6 mm, inner tepals 2, narrowly obovate, *c.* 6 × 3 mm; androecium globose, yellow, stamens *c.* 35, on a 1 mm long column, filaments 0.5–1 mm long, anther yellow, broadly obovate to oblong, 0.5–1 mm long, tip notched, opening by slits. Female flowers: pedicel *c.* 7 mm long, glabrous; tepals 3, larger tepals 2, broadly ovate to suborbicular, 5.5–7.5 × 5.5–7 mm, smaller one narrowly obovate, 6–7 × 3–3.5 mm; ovary (excluding wings) ellipsoid, 5–8 × 2.5–5 mm, green, glabrous, locules 3, placentation axile, placentae entire, total size including the wings 10 × 15 mm; wings 3, equal, base rounded, apex cuneate, widest point at the middle part up to *c.* 3 mm long; stigmas 3, yellow, Y-shaped, *c.* 3 mm long, surface once spirally twisted. Fruit on a thin up to 8 mm long recurved pedicel, locular part 5.5–9 × 3–5.5 mm (exclude wings), tip beaked, wings shape as for ovary, widest point up to 3 mm long (middle part), capsule include wings *c.* 9 × 13 mm. Seed barrel shaped, rather oblong 0.19–0.22 mm long (immature seed), collar cell more than half the seed length.

**Distribution and habitat:** Endemic to Sumatra, West Sumatra, Limapuluh Kota Regency, in lowland forest.

**Etymology:** Latin (*araneum*: spiderweb; *oides*: resembling), referring to the pattern of tertiary veins which are arranged like a spiderweb.

**Provisional IUCN conservation assessment:** The species is currently known from a single collection, and it seems reasonable to assume it is rare and endemic to Limapuluh Kota. However there is inadequate information to make a direct or indirect assessment of its risk of extinction based on its distribution and/or population status, hence we consider *Begonia araneumoides* as Data Deficient (DD) following the Red List criteria of the IUCN (IUCN Standards and Petitions Subcommittee 2019).

**Notes:** *Begonia araneumoides* is a distinctive and beautiful species. It has some morphological similarity with *Begonia nurii* (Irmischer 1929) from Peninsular Malaysia in having crenate leaves with a fringed margin, and four-tepalled male flowers; however, it can be easily distinguished by its acuminate leaf apex (vs. rounded), and three-tepalled female flowers (vs. two-tepalled).

### *Begonia batuphila* Girm., *sp. nov.*

**Figs. 2 & 3**

Sect. *Jackia*

**Type:** INDONESIA. West Sumatra, BungteKab, Cindakir village, 4 July 2009, Lubuk Hitam, D. Girmansyah *DEDEN1299* (holotype: BO).

**Diagnosis:** *Begonia batuphila* resembles *Begonia inversa* Irmischer (Irmischer 1953) in its diminutive habit but differs in having suborbicular-ovate leaves (vs. obovate-cuneate) which are widest at the middle (vs. the apical third of the lamina) and larger male flowers with orbicular tepals 1–1.4 × 0.8–1 cm, (vs. oval tepals 7 × 4 mm).

Monoecious rhizomatous herb. Rhizomes creeping, to 3–5 cm, diameter *c.* 3 mm in diameter, internodes very close, 2–4 mm long, reddish, glabrous. Stipules persistent, reddish brown, broadly triangular, *c.* 5 × 5 mm, herbaceous, not keeled, glabrous, margin entire, apex acute with short aristate, arista glabrous, *c.* 1 mm long. Leaves alternate; petiole terete, 1.5–8 cm long, red to reddish green, sparsely short-pilose; lamina asymmetric, orbicular to broadly ovate, not oblique, barely peltate, margin entire, slightly undulate to sparsely dentate, glabrous to ciliate, apex rounded to obtuse to acuminate, 2.5–7 × 2–5 cm, upper surface uniform green to pale brown with pale green veins, glabrous, lower surface pale green, venation palmate, 6 pairs at base, sparsely hairs along the veins. Inflorescences bisexual, axillary, dischiasial arising directly from rhizome, branched 2 times; peduncle pale purple, total length 3–15 cm, primary peduncle 2–13 cm long, sparsely shortly pilose; bracts caducous. Male flowers: pedicel 10–14 mm long, glabrous, pale green; tepals 4, outer tepals 2, not keeled, broadly obovate, apex obtuse to rounded, dorsal side glabrous, white, 10–14 × 8–10 mm, inner tepals 2, elliptic, apex acute or obtuse, 8–10 × 3–5 mm; androecium globose, yellow, stamens *c.* 95, outer anthers sessile, inner anthers on filaments about the same length as the

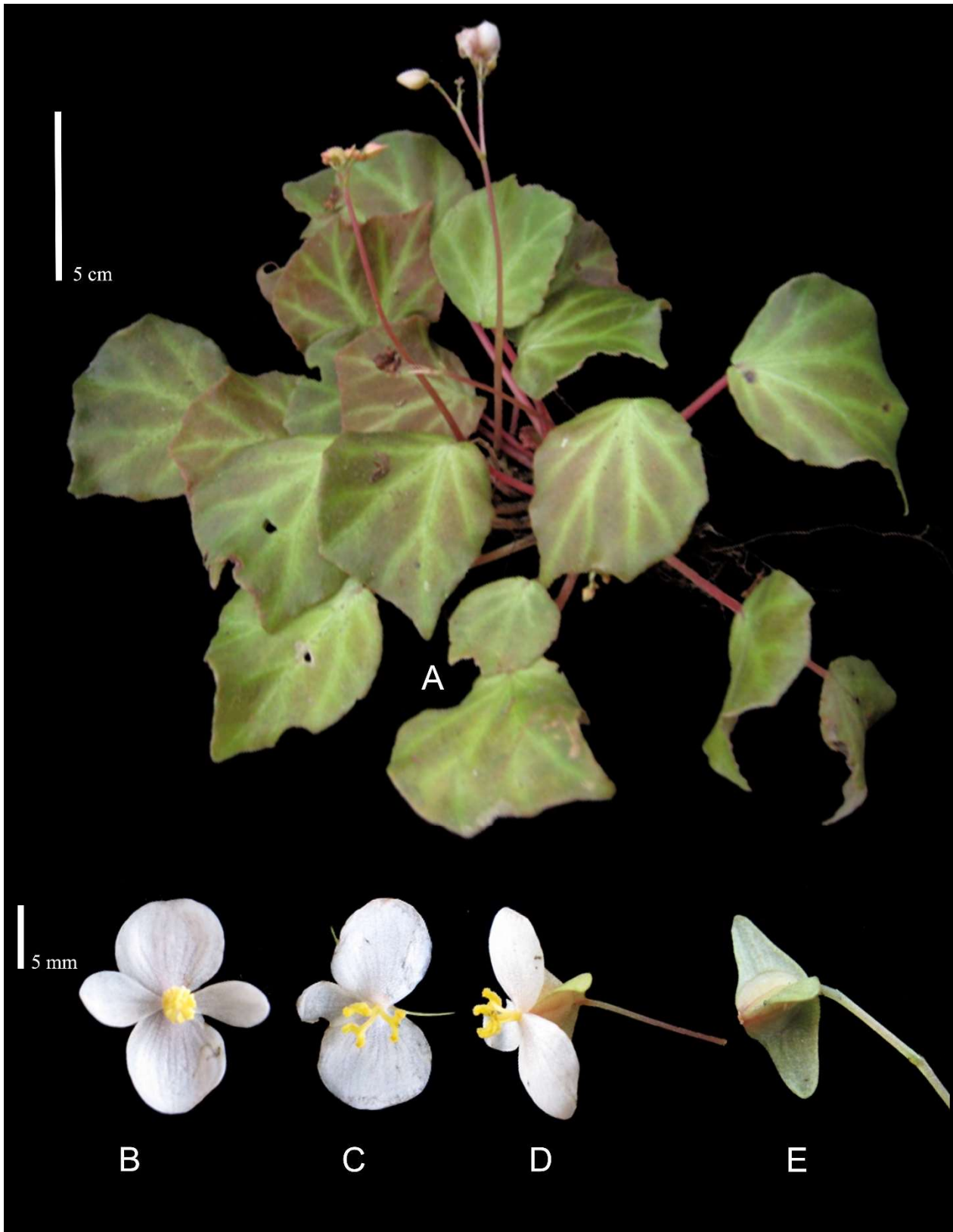


Fig. 2. *Begonia batuphila* Girm. A. Habit. B. Male flower with four tepals. C. Female flower with three tepals. D. Female flower with ovary. E. Fruit. Photos: D. Girmansyah from *DE DEN1299* (BO).



**Fig. 3.** *Begonia batuphila* Girm. shows variation in leaf shape between populations in Bukit Sebelah (left; leaves basifixed and orbicular) (voucher MH1542 [E]) and Batang Sinamar (right; leaves ovate and peltate) (voucher CP66 [E]). Photos M. Hughes.

anther, anthers *c.* 0.5 mm long, broadly obovoid, apex retuse, dehiscing through lateral slits about half the length of the anther. Female flowers: pedicel *c.* 10 mm long, glabrous; ovary reddish green, glabrous, total size including the wings *c.* 7 × 17 mm, apex obtuse, base rounded; capsule ellipsoid, *c.* 7 × 5 mm without wings, three locular, placentae entire; wings three, subequal, retuse; tepals 3(–4), bigger tepals 2, elliptic to suborbicular, 8 × 7–9 mm, smaller one elongate, *c.* 7 × 4 mm; stigmas 3, yellow, Y-shaped, *c.* 2 mm long, surface once spirally twisted. Fruit on a thin 5–10 mm long recurved pedicel, pale green, glabrous; seed bearing part (excluding wings) ellipsoid, 3 subequal wings, *c.* 9 × 17 mm (wings included). Seeds barrel-shaped, 0.26–0.27 mm long, collar cell more than half the seed length.

**Distribution and habitat:** Sumatra, West Sumatra, on the coast near Padang, and in the hills surrounding Payakumbuh and Sijunjung, growing on damp, shaded cliff faces or large boulders below the tree canopy at 50–800 m altitude. Frequently found on limestone.

**Etymology:** Derived from the Indonesia word for rock (*batu*), referring to the lithophytic habit of this species.

**Provisional IUCN conservation assessment:** *Begonia batuphila* is widespread in West Sumatra in

rocky areas in moist lowland forest, forming colonies of many individuals. Specimen records are numerous, and the species can be found growing in disturbed areas providing the damp rocky microhabitat remains intact. The area of occupancy (AOO) for this species is 28 km<sup>2</sup> based on a cell width of 2 km, and the extent of occurrence is 4711 km<sup>2</sup>. Although the AOO potentially qualifies the species as Endangered, there are some collections we could not georeferenced, and the true AOO is likely to be larger. Given that there are no specific threats to the species and it has many populations, we assess it as Least Concern (LC).

**Notes:** *Begonia batuphila* is variable in petiole attachment. Some populations have eccentrically peltate leaves, and some subpeltate or basifixed. This character appears to be variable between, rather than within a population. Although allied to *B. inversa*, the leaf shape of *B. batuphila* is quite distinct and appears more rounded and more translucent on a herbarium sheet. The type locality of *B. inversa* is Sungei Bulu ± *al livello del mare*, *Provincia di Padang* (more or less at sea level near Padang) according to the specimen labels of O. Beccari. This data would put it very close to or inside the range of *B. batuphila*; however, we have not observed it in the region.



**Additional specimens examined:** INDONESIA: West Sumatra: Kabupaten Tanah Datar, Ngalau Pangian, 31 Aug. 2005, *Nia & Fera 8* (ANDA); Kabupaten Pesisir Selatan, Ds. Taratak, 9 Apr. 1989, *R. Tamin 2404* (ANDA); Lubuk Sikaping. Ds. Garingging Malampah, 4 Nov. 1995, *Hilda et al. s.n.* (ANDA); Kota Padang, Kecamatan Bungtekeb, Ds. Cindakir, 5-7 May 2000, *Yossi et al. 35* (ANDA); *ibid.*, 5-7 May 2000, *Heri et al. 34* (ANDA); *ibid.*, 5-7 May 2000, *Andi M et al. 3* (ANDA); *ibid.*, 5-7 May 2000, *Iin et al. 20* (ANDA); *ibid.*, 5-7 May 2000, *Donna et al. s.n.* (ANDA); *ibid.*, 5-7 May 2000, *Andri et al. 35* (ANDA); *ibid.*, 5-7 May 2000, *Devi et al. 26* (ANDA); *ibid.*, 26 May 2002, *Maya et al. 19* (ANDA); *ibid.*, 25-26 May 2002, *Devit et al. 44* (ANDA); *ibid.*, 20 Nov. 1994, *Con et al. s.n.* (ANDA); *ibid.*, 25-26 May 2002, *Ririn et al. 54* (ANDA); *ibid.*, 3 May 1997, *Yel et al. 241* (ANDA); *ibid.*, 25-26 May 2002, *Despina et al. 34* (ANDA); *ibid.*, 25 May 2002, *Anum et al. 14* (ANDA); *ibid.*, 11 Aug. 2010, *Girmansyah & Hughes DEDEN1487* (BO, E); Sungei Pinang, 12 Aug. 2010, *Girmansyah, Hughes & Nurainas DEDEN1488* (BO, E); *ibid.*, 12 Aug. 2010, *Girmansyah et al. DEDEN1491* (BO, E); Ngalau Tinggi, 31 Jan. 2016, *Hughes et al. SUBOE49* (BO, E); Batang Sinamar, 19 Jun. 2011, *Puglisi et al. CP66* (BO, E); Bukit Batu Ranjau, 21 Jun. 2011, *Puglisi et al. CP97* (BO, E); Gua Perkaulan, 23 Jun. 2011, *Puglisi et al. CP116* (BO, E); Sawah Lunto District, Nagari Solok Ambah, 24 Jun. 2011, *Puglisi et al. CP129* (BO, E); 15 km east from Payakumbuh, Bukit Ngalau Kesemeh, Ds. Atas Halaban, 26 May 1994, *Deti 56* (ANDA); *ibid.*, 26 May 1994, *Nur Avrila 163* (ANDA); *ibid.*, 27 May 1994, *Elvi 142* (ANDA); Bkt. Sabalah, Tj. Lolo, 13 Jul. 1991, *Isman Afandi 288* (ANDA); Bukit Sebelah, 22 Jul. 2009, *Hughes & Taufiq MH1542* (BO, E); *ibid.*, 23 Jul. 2009, *Hughes & Taufiq MH1545* (BO, E); *ibid.*, 26 Jul. 2009, *Hughes & Rubite MH1550* (BO, E); Kabupaten Tanah Datar, Lintau Buo, around Bukit Ngalau Pangian, 6 Nov. 1993, *Nana et al. 14* (ANDA); *ibid.*, 6 Nov. 1993, *Daus et al. 24* (ANDA); *ibid.*, 6 Nov. 1993, *Ade et al. 41* (ANDA); *ibid.*, 6 Nov. 1993, *Anton et al. 29* (ANDA); *ibid.*, 6 Nov. 1993, *Andri et al. 43* (ANDA); *ibid.*, 6 Nov. 1993, *Rika et al. 33* (ANDA); *ibid.*, 6 Nov. 1993, *Sari et al. 4* (ANDA); *ibid.*, 6 Nov. 1993, *Zal et al. 31* (ANDA) *ibid.*, 7 Nov. 1993, *Yanti et al. 82* (ANDA); Buo, near Payakumbuh, Nov. 1905, *W. Meijer 4563a* (L.); Res. Padang, above Teluk Kabung, 5 Jun. 1953, *J. v. Borssum 1494* (BO, L); *ibid.*, 5 Jun. 1953, *J. v. Borssum 1519* (BO).

***Begonia hijauvenia*** Girm., Ardi & M.Hughes, *sp. nov.*

**Fig. 4**

*Sect. Jackia*

**Type:** INDONESIA. North Sumatra, cultivated from material collected in the wild (vouchers made from cultivated plants), 9 September 2020, *D. Girmansyah DEDEN3451* (holotype: BO).

**Diagnosis:** *Begonia hijauvenia* is similar in habit and leaf shape to *Begonia raoensis* M.Hughes (Hughes *et al.* 2015a) but differs in having a purple-brownish lamina with pale green veins (vs. uniform green) with a broadly scalloped margin (not subentire), longer peduncles up to 40 cm (vs. *c.* 20 cm) which are white pilose (vs. red pilose with fleshy red hairs at the petiole apex) and 115 stamens (vs. *c.* 50).

Monoecious rhizomatous herb. Rhizomes creeping, up to 30 cm long, *c.* 10 mm in diameter, internodes loose 10–15 mm long, pale green with white stripes, sparsely villous. Stipules persistent, triangular, 1.2–2 × 1–1.5 cm, midrib prominent, dimorphic, dorsal stipule densely hairs on the upper surface including along the midrib, ventral stipules slightly smaller, hairy on the midrib only, apex extended up to 6 mm long. Leaves alternate; Petioles

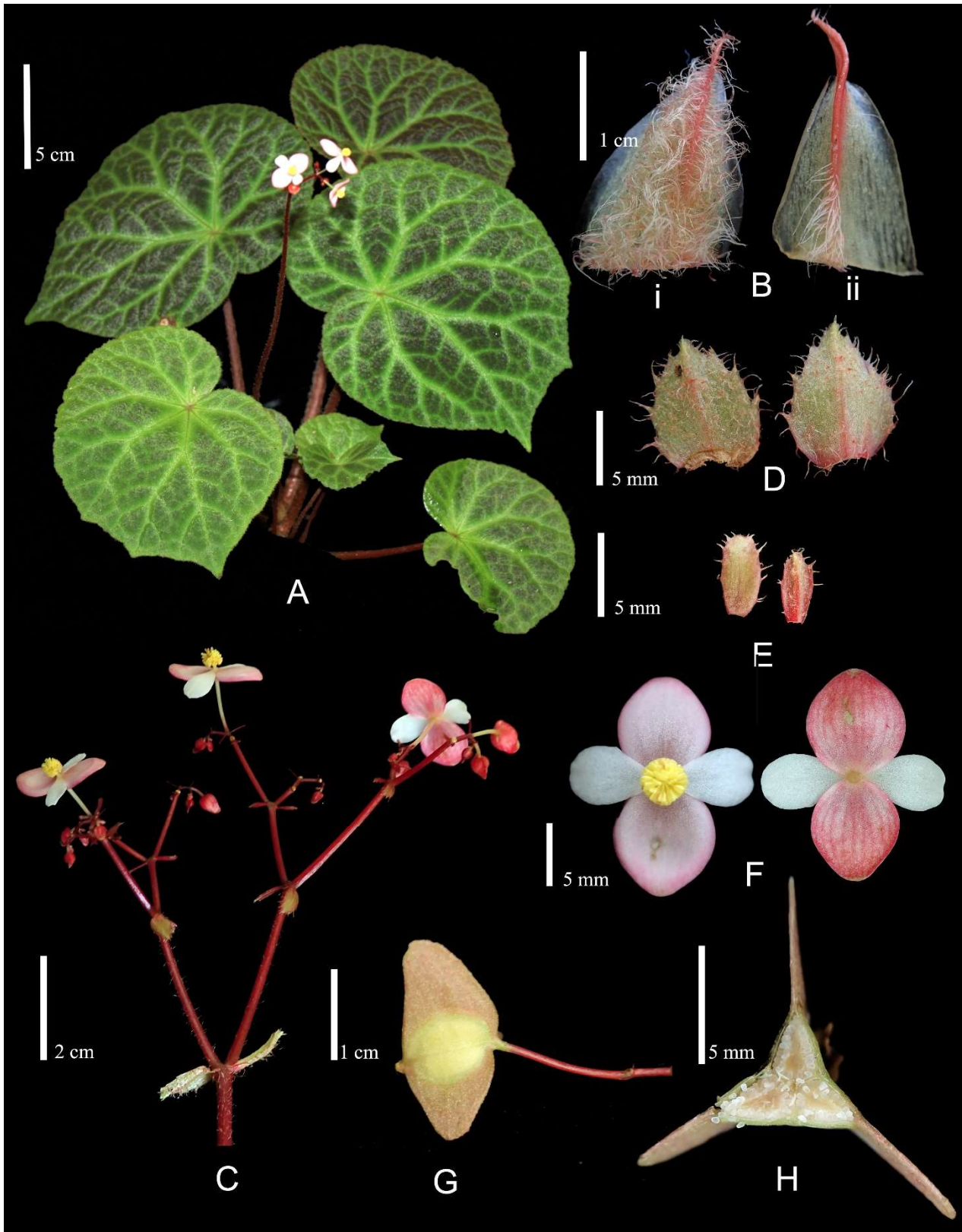
terete, reddish, densely villose, 10–22 cm long; lamina basifixed, ovate, 12–18 × 6–14 cm, asymmetric, margin broadly scalloped and crenulate with minutely recurved stiff teeth at the end of the veins, base cordate, lobes overlapped, apex acuminate, adaxially pale green on the veins, purple-brown between the veins, moderately hairy; venation palmate pinnate, primary veins 6–7, actinodromous, secondary craspedrodromous. Inflorescences bisexual, axillary, protandrous, dichasial cymes, branching around 3 times; primary peduncle 14.5–38 cm long, reddish, pilose; lower bracts elliptic, *c.* 7–10 × 5–7 mm, margin serrate, sparsely hairy, upper bracts smaller, 4–7 × 1–2 mm, semi-persistent. Male flowers: pedicels 5–12 mm long; tepals 4, unequal, white, outer tepals 2, elliptic, 5.5–9 × 6–8 mm, margin entire, apex rounded, abaxially pink, adaxially red, hairy, inner tepals 2, elliptic, 4–5 × 2–5 mm, margin entire, apex rounded; androecium globose, yellow, stamens *c.* 95, outer anthers subsessile, inner anthers on filaments about the same length as the anther, anthers 0.5 mm long, obovate, apex retuse, dehiscing through lateral slits about half the length of the anther. Female flowers: pedicels 7–13 mm long reddish greenish, glabrous; tepals 3, unequal, outer tepals 2, broadly ovate to suborbicular, 5.5–7.5 × 5.5–7 mm, white tinged pink, margin entire, apex rounded, inner tepals obovate, 6–7 × 3–3.5 mm, white, margin entire, apex rounded; ovary (excluding wings), ovoid, 6–7.5 × 4–5 mm, green, glabrous, locules 3, placentation axile, placentae entire, wings 3, subequal, reddish, glabrous, base rounded, apex cuneate, widest point (at the middle) up to 5.5 mm long, stigmas 3, yellow, Y-shaped, *c.* 3 mm long, surface once spirally twisted. Fruit on a thin 13–15.5 mm long recurved pedicel, seed bearing part (excluding wings) ovoid, 8.5–9 × 5–5.5 mm, green, glabrous, wing shape as ovary, widest point (at the middle part) 7 mm. Seed ellipsoid to obovoid 0.45–0.47 mm long, collar cell more than half the seed length.

**Distribution and habitat:** Endemic to Sumatra, North Sumatra, in lowland forest.

**Etymology:** Derived from the Indonesian word for green (*hijau*), referring to the green veins of the leaves.

**Provisional IUCN conservation assessment:** *Begonia hijauvenia* is known only from the type locality in North Sumatra, but the exact location is unclear. Therefore, this species is currently assessed as Data Deficient (DD).

**Notes:** This species is one of three species described in this paper with dimorphic stipules, the other two being *B. panjangfolia* and *B. perunggufolia*. This character has not been observed previously in any *Begonia* from Sumatra, but has been seen in *B. hughesii* Rubite & C.-I Peng (*B. sect. Baryandra*) from Palawan (Rubite *et al.*, 2015).



**Fig. 4.** *Begonia hijauvenia* Girm. Ardi. & M.Hughes. **A.** Habit. **B.** (i) Stipule with dense hairs, (ii) Stipule with hairs on the midrib only. **C.** Inflorescence. **D.** Basal bracts. **E.** Upper bracts. **F.** Male flower (face and back view). **G.** Female flower. **H.** Fruit. **I.** Ovary in cross section. Photos A–F, H & I: Wisnu H. Ardi; G: D. Girmansyah from *DEDEN3451* (BO).



*Begonia mursalaensis* Girm., M.Hughes & Ardi., *sp. nov.*  
Fig. 5

*Sect. Jackia*

**Type:** INDONESIA. North Sumatra, Mursala Island, cultivated from material collected in the wild (vouchers made from cultivated plants), 17 September 2020, *D. Girmansyah DEDEN3452* (holotype: BO).

**Diagnosis:** *Begonia mursalaensis* is most similar to *B. raoensis* M.Hughes (Hughes *et al.*, 2015a) in habit, mature leaf colour, and red-pilose petioles with hairs denser at the apex, but differs in having leaf lamina ovate to broadly ovate (*vs.* suborbicular), larger male flower tepals 12–15 × 11–12 mm (*vs.* *c.* 8 × 7 mm) with more stamens (122 *vs.* 50), fruit which are on a ca. 10 mm stiff recurved pedicel (not pendent on a ca. 20 mm hair-like pedicel) and more elongate triangular fruit wings (*vs.* rounded triangular). Also similar to *B. stictopoda* in habit and leaf shape but differs in having petioles which are red-pilose (*vs.* white sparsely tomentose) and more elongate triangular fruit wings (*vs.* rounded fruit wings).

Monoecious rhizomatous herb. Rhizomes creeping, up to 20 cm long, *c.* 10 mm in diameter, internodes compressed *c.* 3 mm long, pale green with white stripes, glabrous. Stipules persistent, triangular, 8–10 × 6–10 mm, asymmetric, reddish, margin entire, midrib prominent, hairy along the midrib, apex extended up to 7 mm long. Leaves alternate; petioles with sparse erect hairs denser at the apex, 7–12 cm long, red, terete; lamina basifixed, ovate, 10–15 × 7–11 cm, thick and coriaceous, asymmetric, margin denticulate, with minutely recurved stiff teeth at the end of the veins, base deeply cordate, lobes overlapped, apex acute. Adaxially green, glabrous, abaxially pale green, sparsely hairy along veins; venation palmate pinnate, primary veins 6–7, actinodromous, secondary craspedrodromous. Inflorescences bisexual, axillary, protandrous, dichasial cymose, branching around 2 times; primary peduncle 14–16 cm long, lower bracts cymbiform, *c.* 7 × 2 mm, glabrous, reddish, margin entire, apex rounded, semi-persistent. Male flowers: pedicels 10–15 mm long, red, glabrous; tepals 4, unequal, outer tepals 2, elliptic, 9–15 × 8.5–12 mm, white tinged pink, margin entire, apex obtuse, abaxially glabrous, inner tepals 2, elliptic, 8–10 × 2–3 mm, margin entire, apex acute; androecium globose, yellow, stamens *c.* 95, outer anthers sessile, inner anthers on filaments about the same length as the anther, anthers 0.5 mm long, elliptic, apex retuse, dehiscing through lateral slits about half the length of the anther. Female flowers: pedicels *c.* 10 mm long, reddish, glabrous; tepals 3, unequal, outer tepals 2, elliptic, 7–10 × 5–8 mm, white tinged pink, margin entire, apex rounded, abaxially glabrous, inner tepal, elliptic, 5–6 × 1.5–2 mm, white, margin entire, apex rounded; ovary (excluded wings) ellipsoid, *c.* 7–8 × 4 mm, pale green, glabrous, locules 3, placentation axile, placentae entire, wings 3 subequal, reddish green, base rounded apex subtruncate, widest point (subapically) up

to 9 mm long. Stigmas 3, yellowish green, Y-shaped, *c.* up to 3 mm long, surface once spirally twisted. Fruit on a thin 9–12 mm long recurved pedicel, seed bearing part (excluding wings) ellipsoid, 10 × 5 mm, light green, glabrous, wings 3, unequal in fruit stage, similar with ovary, widest point (subapically) up to 10 mm. Seed obovoid to ellipsoid 0.43–0.47 mm long, collar cell more than half the seed length.

**Distribution and habitat:** Endemic to Sumatra, North Sumatra, Mursala Island, growing on the rocky banks of streams.

**Etymology:** The epithet refers to the name of Mursala Island in North Sumatra, the type locality of the species.

**Provisional IUCN conservation assessment:** *Begonia mursalaensis* is known only from the type locality of Mursala Island. The island is inhabited, and although commercial logging ended in the 1990's, logging by indigenous islanders continues, along with small scale clearance for crops (Fambayun *et al.* 2019). No information is available on the population size or number of populations on the island of *B. mursalaensis*. Still, given the ongoing habitat change and a small area of occurrence, which we estimate to be less than 20 km<sup>2</sup>, it is prudent to assess this species as Vulnerable under criterion VUD2.

*Begonia panjangfolia* Girm., Ardi & M.Hughes, *sp. nov.*  
Fig. 6

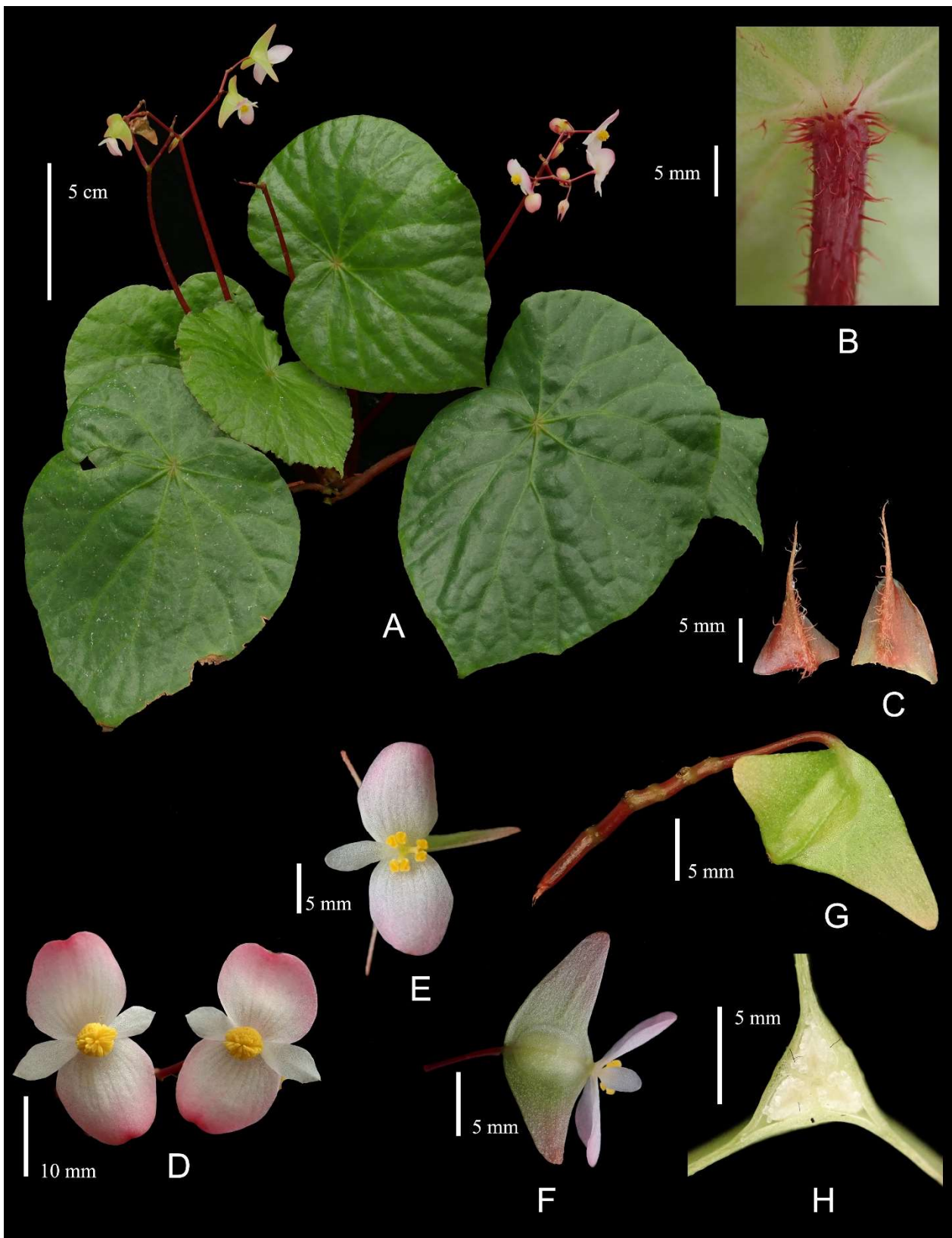
*Sect. Jackia*

**Type:** INDONESIA. West Sumatra, Pasaman, Batang Landu, cultivated from material collected in the wild (vouchers made from cultivated plants), 19 November 2019, *D. Girmansyah DEDEN3449* (holotype: BO).

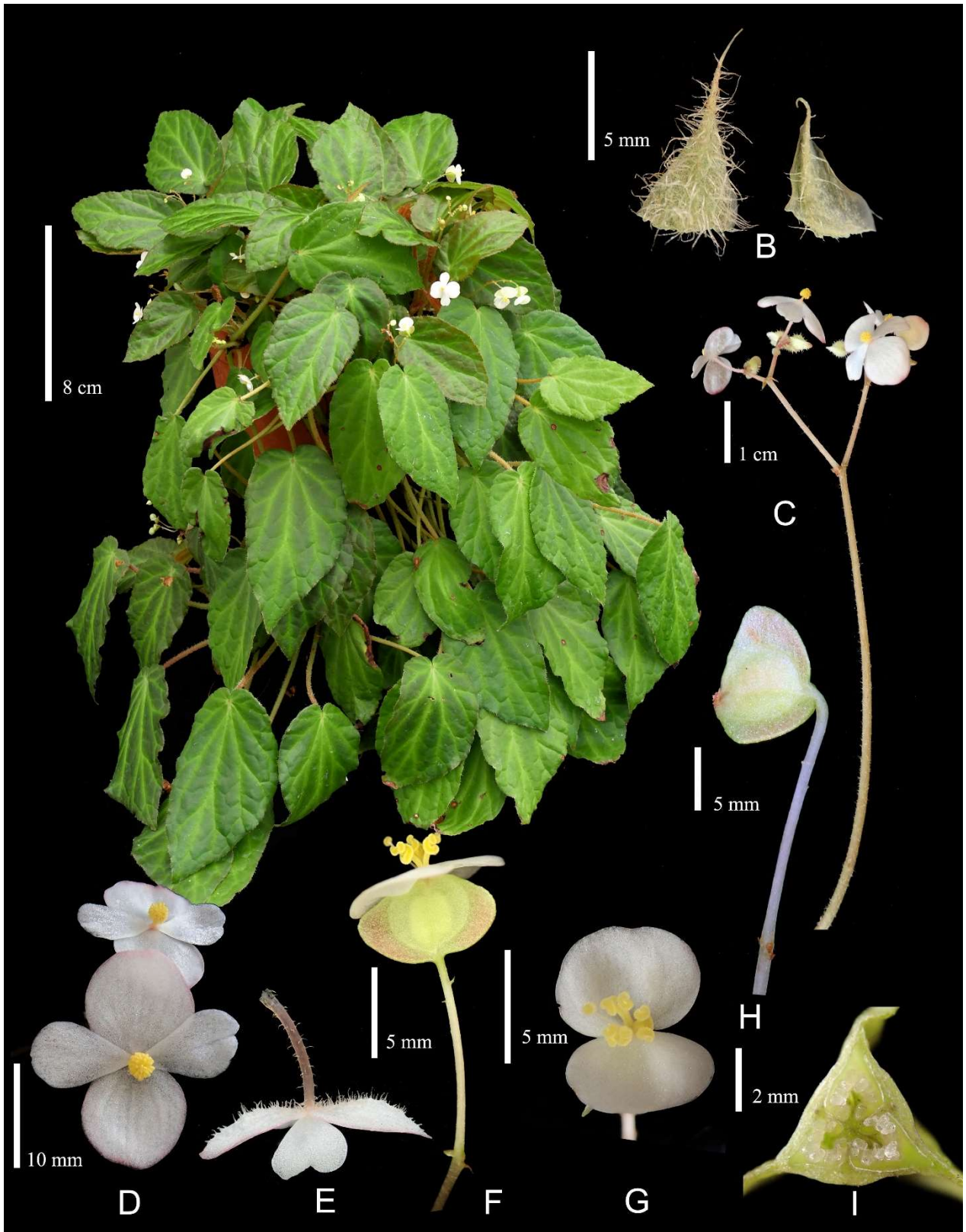
**Diagnosis:** The combination of dimorphic stipules and elongate elliptic-lanceolate leaves differentiates *Begonia panjangfolia* differentiate this species from all other species in *Begonia* *sect. Jackia*.

Monoecious rhizomatous herb. Rhizomes creeping, up to 20 cm long, 5–7 mm in diameter, internodes congested 5–15 mm long, pink, white villous. Stipules persistent, pale green, triangular, 5–9 × 3.5–4 mm, herbaceous, slightly asymmetric, pale green, dimorphic, dorsal stipule larger, 6–9 mm long, upper surface densely covered with white hairs, apex with a filiform extension, ventral stipules smaller, sparsely hairy on the midrib only. Leaves alternate; petiole terete, reddish brown to yellowish green, 3–15 cm long, densely hairy with white pilose hairs up to 1.5 mm long; lamina basifixed, asymmetric, rather oblique, elliptic, 5–13 × 3–7 cm, not peltate, base shallowly cordate, lobes rarely overlapped, margin crenulate with minutely recurved stiff teeth at the end of the veins, ciliate, teeth pointed, *c.* 1 mm long, apex acute to shortly acuminate, upper surface pale green on the veins, light to mid-green with faint purplish tinge between the veins, glabrous, lower surface pale green, hairy on the veins only, prominent, reddish, young leave





**Fig. 5.** *Begonia mursalaensis* Girm., M. Hughes & Ardi. **A.** Habit. **B.** Petiole with red hairs. **C.** Stipules with hairs along the midrib. **D.** Male flowers with four tepals. **E.** Female flower with three tepals. **F.** Fruit. **G.** Female flower with ovary. **H.** Ovary in cross section. Photos: Wisnu H. Ardi from *DEDEN3452* (BO).



**Fig. 6.** *Begonia panjangfolia* Girm., Ardi & M.Hughes. **A.** Habit. **B.** Stipules with hairs along the midrib. **C.** Inflorescence. **D.** Male flower with four tepals. **E.** Side view of male flower showing white hairs. **F.** Female flower and ovary. **G.** Female flower with 2 tepals. **H.** Cross section of ovary. Photos: Wisnu H. Ardi from *DEDEN3449* (BO).



reddish brown between the veins, sparsely hairy along the veins, venation palmate pinnate, primary veins 7(–9), actinodromous, secondary craspedrodomous. Inflorescences bisexual, axillary, protandrous, dichasial cymes, branched up to two times, each branch arranged as a raceme with up to 5 male flowers and one female at the end, total length 7–12 cm, peduncle 6–9 cm long; sparsely hairy; bracts ovate, *c.* 4 × 3 mm, caducous, becoming minute towards the apex of the inflorescence, *c.* 2 × 1 mm, persistent. Male flowers: pedicel 5–15 mm long, white, sparsely hairy; tepals 4, white with tinged pink in the margin, 2 outer tepals, broadly elliptic or orbicular, 5–9 × 5–8 mm, margin entire, apex rather retuse, outer surface hairy, inner tepals 2, broadly elliptic, 4–8 × 3–5 mm, inner tepals 2, obovate, apex rounded to emarginate; androecium globose, yellow; stamens *c.* 50, outer anthers subsessile, inner anthers on filaments about the same length as the anther, anthers 0.5 mm long, obovate, apex retuse, dehiscing through lateral slits about half the length of the anther. Female flowers: pedicel 10–15 mm long, pale green, glabrous, bracteoles 2, hair like, persistent; tepals 2–3, 2 outer tepals broadly ovate to orbicular, 6–7 × 7–9 mm, margin entire, apex rounded, the inner tepals elliptic, *c.* 7 × 3 mm; ovary (excluding wings) suborbicular *c.* 6 × 5 mm, pale green, glabrous; locules 3, placentae entire; wings three, equal, reddish, glabrous, rounded at base, cuneate to subtruncate at the apex; stigmas 3, yellow, Y-shaped, *c.* 3 mm long, surface once spirally twisted. Fruit on a thin recurved pedicel up to 16 mm, seed bearing part (excluding wings) subglobose *c.* 7 × 6 mm; wing shape as ovary, widest point up to 3 mm (middle part). Seed obovoid to ellipsoid 0.32–0.36 mm long, collar cell more than half the seed length.

**Distribution and habitat:** Endemic to Sumatra, West Sumatra, Pasaman, Batang Landu. On the banks of the Batang Lindu river at *c.* 150 m altitude.

**Etymology:** Derived from the Indonesia word panjang, meaning long, referring to the quite elongate leaf shape which is unique in *Begonia* sect. *Jackia* in Sumatra.

**Provisional IUCN conservation assessment:** *Begonia panjangfolia* is known only from the type locality in Batang Landu, West Sumatra, but the exact location is unclear. Therefore, this species is currently assessed as Data Deficient (DD).

**Notes:** The Peninsular Malaysia species *Begonia yapii* Ridley (Ridley 1929) from Kuala Aring also has slightly elongate leaves but differs in having ovate-obovate (not elliptic-lanceolate leaves), with an entire lamina with a ciliate fringe (not a serrulate margin and stiff recurved teeth at the end of the veins), male flowers with four tepals (not two), and female flowers with 3 tepals (not 2). The specimen in Leiden is annotated with the unpublished name *B. stictopoda* var. *elongata* Miq.

**Additional specimen examined:** INDONESIA: Sumatra, without precise locality, *sine num.*, *sine coll.* (L 898.195-166).

***Begonia perunggufolia*** M.Hughes & Girm., *sp. nov.*

**Fig. 7**

Sect. *Jackia*

**Type:** INDONESIA. North Sumatra, Cultivated from material collected in the wild (vouchers made from cultivated plants), 9 September 2020, *D. Girmansyah*, *DEDEN3450* (holotype: BO).

**Diagnosis:** *Begonia perunggufolia* is most similar to *B. kemumuensis* M.Hughes (Hughes, 2015) in habit, but differs in having an unlobed leaf margin (*vs.* with 2–6 pointed short lobes), upper leaf surface bright green along the primary veins and brownish green in between (*vs.* uniform green), male flower tepals broadly ovate-orbicular (*vs.* ovate), and a globose androecium with *c.* 50 anthers (*vs.* globose-cylindrical with *c.* 100 anthers).

Monoecious rhizomatous herb. Rhizomes creeping, up to 20 cm long, *c.* 5 mm in diameter, internodes congested *c.* 5 mm long, pale green with white stripes, densely hairy when young becoming glabrous when mature. Stipules persistent, triangular, 10 × 5–7 mm, creamy, dimorphic, dorsal stipule densely hairy on the upper surface including along the midrib, ventral stipules hairy on the midrib only, apex with filiform extension *c.* 5 mm long. Leaves alternate; petioles 4–15 cm long, greenish reddish, terete, moderately covered by pilose hairs; lamina basifixed, ovate, 7–11 × 5–8 cm, asymmetric, margin denticulate with minutely recurved stiff teeth at the end of the veins, base cordate, lobes sometimes overlapped, apex acuminate, abaxial surface bronze with pale green veins, glabrous; abaxially paler, hairy on the veins only; venation palmate pinnate, primary veins 6–7, actinodromous, secondary craspedrodomous. Inflorescences: bisexual, axillary, protandrous; dichasial cymes, branching around 3 times, with up to 10 male flower, 5 female flowers, primary peduncle 4.5–18 cm long, reddish, glabrescent; lower bracts elliptic, *c.* 6 × 2–3 mm, margin entire, sparsely hairy, upper bracts elongate, 4 × 1 mm, persistent, bracteoles minute, hair-like, persistent. Male flowers: pedicels 5–10 mm long, whitish, glabrous; tepals 4, unequal, white, 2 outer tepals, broadly ovate, 5–10 × 4–9 mm, margin entire, apex rounded, abaxially white tinged with pink, glabrous, 2 inner tepals, obovate, 5–7 × 3–4 mm, margin entire, apex rounded to slightly acute; androecium globose, yellow, stamens *c.* 50, outer anthers subsessile, inner anthers on filaments about the same length as the anther, anthers 0.5 mm long, obovate, apex retuse, dehiscing through lateral slits about half the length of the anther. Female flowers: pedicels up to 17 mm long, reddish pale green near ovary, glabrous; tepals 3, unequal, white, 2 outer tepals broadly ovate, *c.* 5 × 7 mm, margin entire, apex rounded, smaller one elliptic, *c.* 5 × 4 mm, margin entire, apex rounded; ovary (excluding wings) ellipsoid, *c.* 9 × 5 mm, pale green, glabrous, total size including the wings *c.* 9 × 11 mm, apex beaked, locules 3, placentation axile, placentae entire; wings 3, subequal,

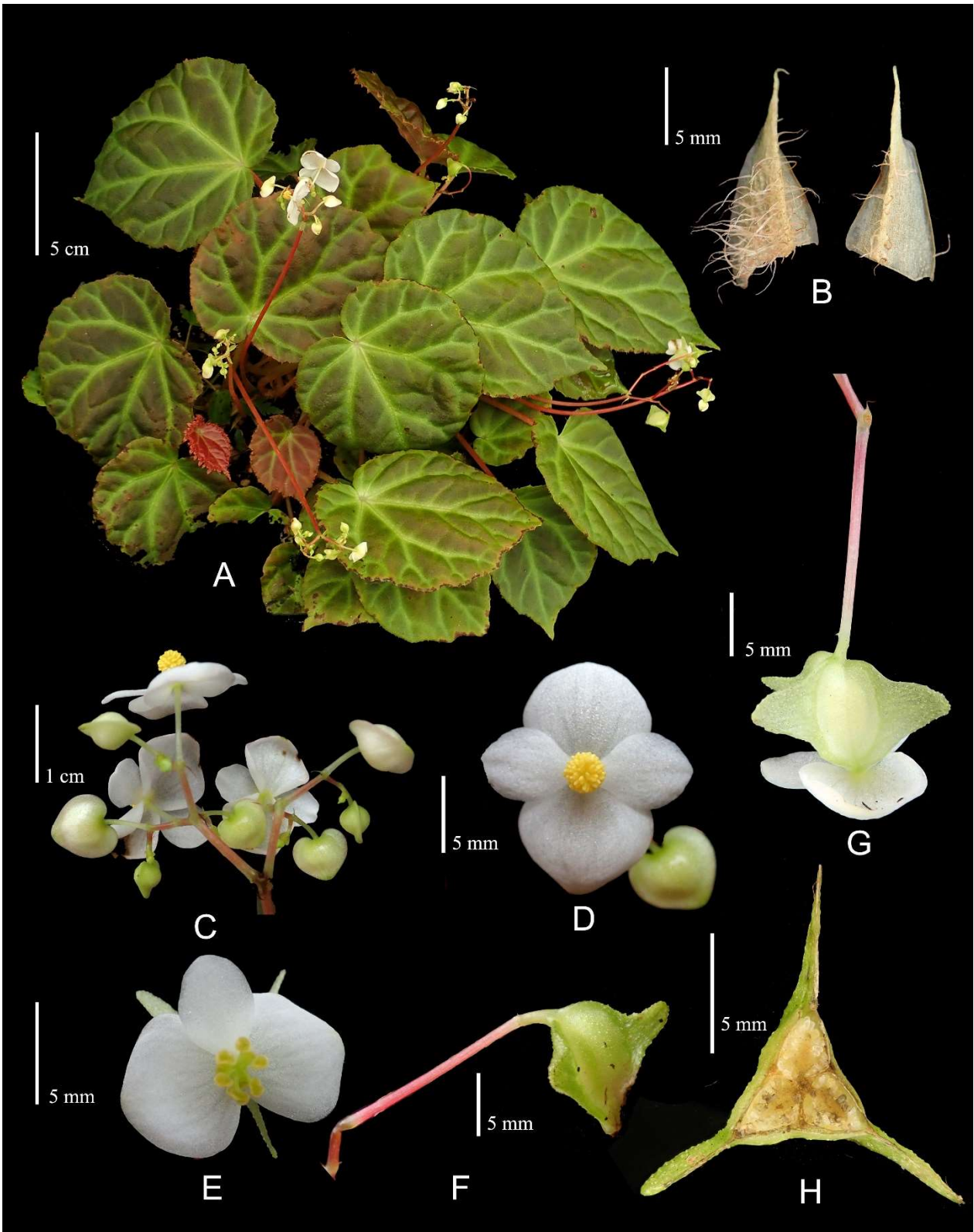


Fig. 7. *Begonia perunggufolia* Girm. & M.Hughes. A. Habit. B. Stipules showing dimorphism. C. Inflorescence. D. Male flower with four tepals. E. Female flower with three tepals. F. Fruit. G. Female flower with ovary. H. Cross section of ovary. Photos: Wisnu H. Ardi from DE DEN3450 (BO).



base cuneate to rounded, and at one third of the base rounded or sub truncate, stigmas 3, yellow, Y-shaped, *c.* 2 mm long, surface once spirally twisted. Fruit on a thin 19–20 mm long recurved pedicel, seed bearing part (excluding wings) ellipsoid, 9–11 × 4–6 mm, wing shape as for the ovary, widest point up to 7 mm (1/3 from the base of the locules), fruit apex beake. Seed oblong 0.39–0.39 μm long, collar cell more than half the seed length.

**Distribution and habitat:** Endemic to Sumatra, North Sumatra, in lowland forest.

**Etymology:** Derived from the Indonesian word for bronze (*perunggu*), referring to the bronze colour on the leaves.

**Provisional IUCN conservation assessment:** *Begonia perungguifolia* is known only from the type locality in Sumatra, but the exact location is unclear. Therefore, this species is currently assessed as Data Deficient (DD).

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