

## Taxonomic status of *Begonia promethea* (sect. *Petermannia*, Begoniaceae) in Borneo

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**ABSTRACT.** The rediscovery of *Begonia promethea* Ridl. for the first time since its description in 1906 led to the discovery that the later described *B. beccarii* Warb. is synonymous with it and that it belongs in *Begonia* sect. *Petermannia*. It is a rare, endangered species known only from three localities, two locations from the Kuching Division, Sarawak, Malaysia and another one from West Kalimantan, Indonesia. A detailed, illustrated description and a distribution map of *Begonia promethea* are provided. We suggest an IUCN conservation category of EN B2ab(iii). Lectotypes for both names are designated.

**Keywords.** *Begonia beccarii*, conservation, Sarawak, taxonomy

### Introduction

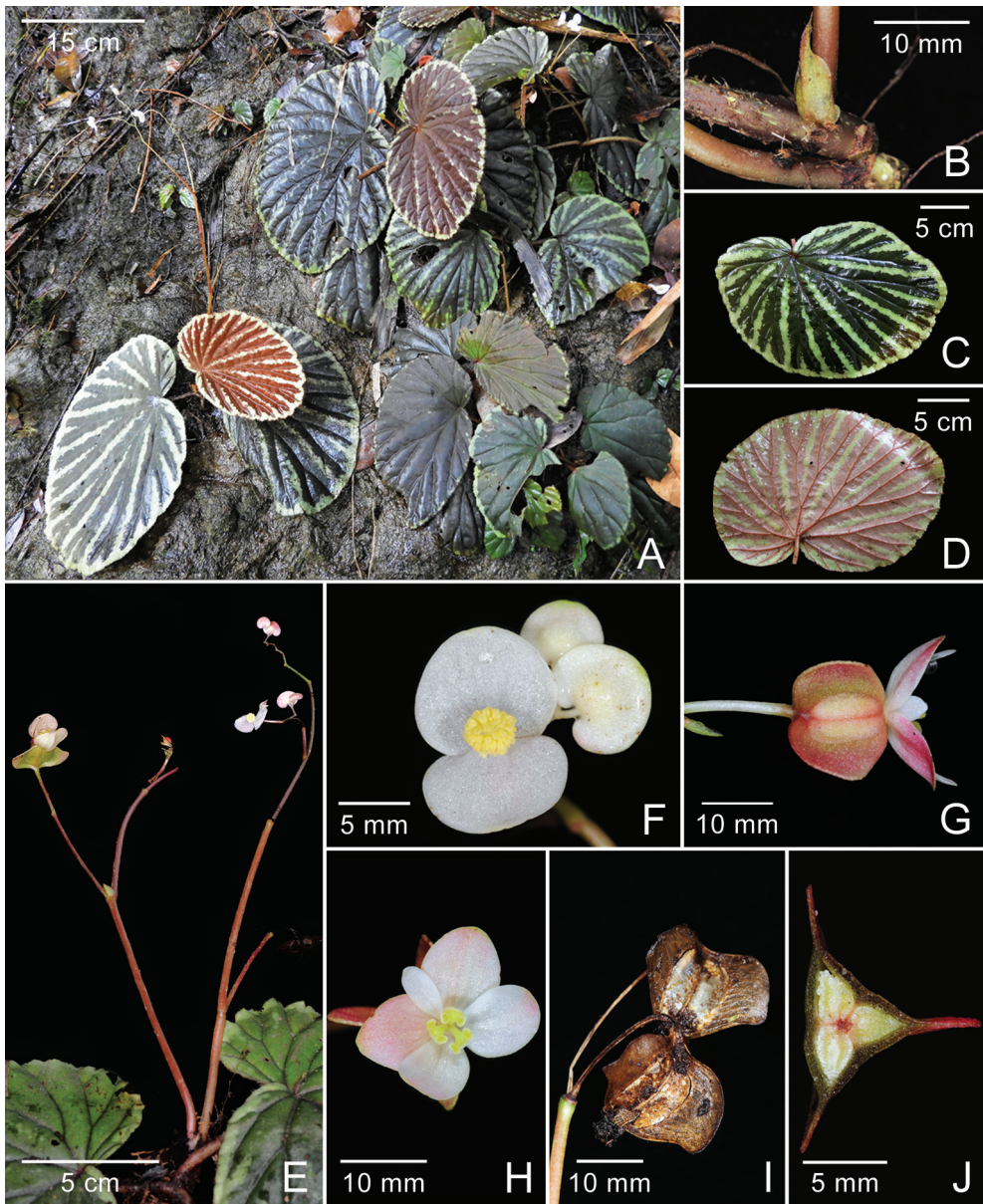
*Begonia promethea* Ridl. is an attractive, variegated species described by Ridley (1906), who suggested that among the species he had described it was a very pretty begonia ‘perhaps the most worthy of cultivation’ among the Bornean species. More than a century after its description, *Begonia promethea* was recently rediscovered in Sarawak by Michael Lo, a local naturalist, with a further population being found in West Kalimantan just south of the border with Sarawak by a joint expedition between Herbarium Bogoriense and the Royal Botanic Garden Edinburgh. These discoveries enabled us to prepare a complete description and illustration, determine that the later described *Begonia beccarii* Warb. is synonymous with *B. promethea*, and conclude that it belongs in *Begonia* sect. *Petermannia*.

## Taxonomy

*Begonia promethea* Ridl., J. Straits Branch Roy. Asiat. Soc. 46: 259 (1906). – TYPE: Borneo, Sarawak, Bau District, Buso, Bukit Tundong, September 1903, *Ridley 12394* (lectotype K [K000761102], designated here). (Fig. 1 & 2)

*Begonia beccarii* Warb., **syn. nov.**, Repert. Spec. Nov. Regni Veg. 18: 329 (1922). – TYPE: Borneo, Sarawak, 'Pinindgiao' [Peninjau], November 1865, *Beccari PB1013* (lectotype FI [4494], designated here; isolectotypes B [B100238115, B100238116], FI [4494A], K [K000761103], P [P06844102]).

Low herb with short creeping stem 2–10 cm long, clinging to the rock surface. **Stem** to 0.5 cm thick, red-brown, unbranched; internodes 0.8–1.8 cm long, slightly thicker at the nodes. Stem, petiole and lower surface of veins hirsute, hairs whitish or brownish, 2–3 mm long. **Stipules** broadly lanceolate, 7–12 × 4–8 mm, pale brown or pale brown, glabrous, keeled, apex setose, seta 3–5 mm long, persistent. **Leaves** 2–3, rarely 4, the remains of rotten old leaves sometimes still present, flat on the rock surface; petiole red or reddish brown, hirsute, hairs white, c. 2 mm long, terete, 2–4.3 cm long; lamina obliquely ovate, sometimes almost orbicular, 8.5–17.5 × 8.5–17 cm, broad side 5.5–11 cm, base cordate, slightly overlapping, basal lobe 1–2.5 cm, apex obtuse, usually dark green to emerald green above with a broad pale green margin and random spots or pale green stripes between the veins or rarely plain coloured above, purple to pale purple below, glabrous above, below hirsute with rows of stiff short reddish hairs on the veins, margin ciliate, hairs reddish; young leaves red brown; venation palmate, 6–7 veins radiating from the petiole attachment, branching 1–2 times towards the margin, veins impressed above, raised below. **Inflorescences** 1–3 per plant, protogynous, racemose-cymose, 14–26 cm long, basal branch with 1–2 female flowers, upper distal branches dichasially cymose with many male flowers opening when the female flowers are almost over, peduncle 7–15 cm long, glabrous, reddish, lateral branches sometimes zig-zag. Bract pale green, keeled, ovate, 12–15 × 3–4 mm, apex setose, seta to 2 mm long, persistent; lower bracteoles pale green, slightly smaller than bract, lanceolate, 4–5 × 4 mm, upper bracteoles c. 5 × 2 mm, setose, seta to 2 mm long. **Staminate flower**: pedicel pink or white, 2–7 mm long; tepals 2, outer part pinkish, inner part white tinged pink, heart-shaped, 9–10 × 7–11 mm, stamen cluster rounded, torus rather thick, stamens 56–67, lemon yellow, filaments 0.8–1 mm long, anthers obovate, 0.6–0.8 × 0.6 mm, apex deeply emarginate. **Pistillate flower**: pedicel pinkish or pale green, 12–15 mm long; ovary pale green, 9–11 × 12–15 mm, wings pale green tinged reddish on the margin; tepals 5, outside pinkish or whitish, inside whitish, 4 outer tepals larger, ovate, c. 9 × 6–7 mm, inner tepal narrower, white, elliptic, c. 8 × 3–4 mm; styles 3, stigmas 3, rarely 4, anchor-shaped, yellow. **Fruits** 2–4 per plant, pedicel pendent, 12–14 mm long; capsules 12–15 × 12–19 mm, wings equal, rounded, c. 7 mm wide; locules 3, each with 2 placentas.



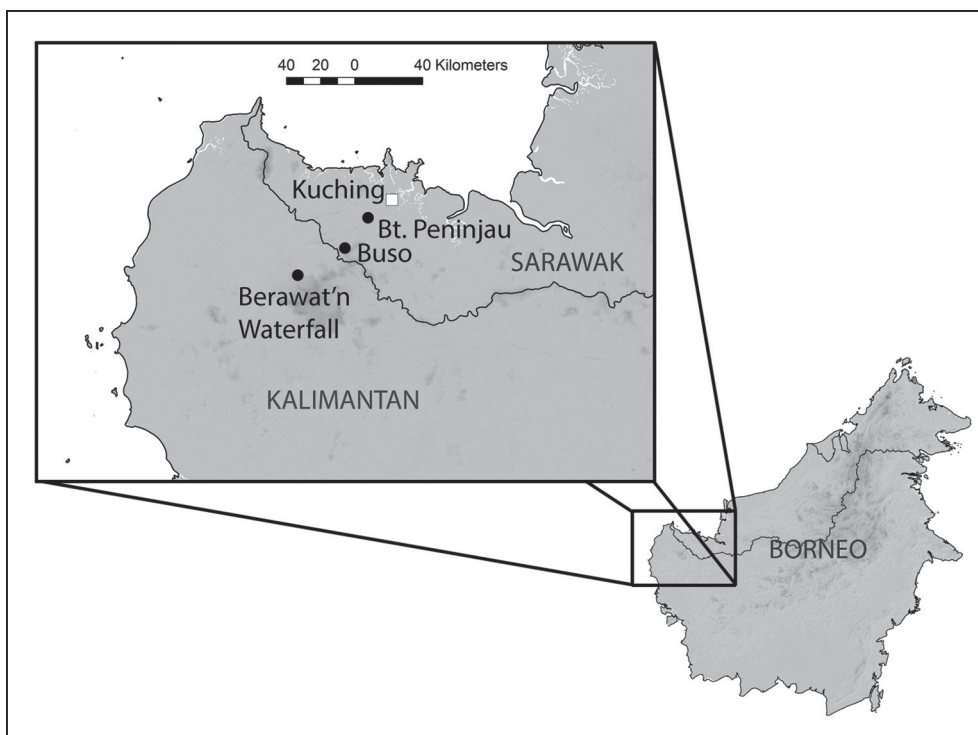
**Fig. 1.** *Begonia promethea* Ridl. **A.** Habit. **B.** Stipule and stem. **C.** Upper surface of leaf. **D.** Lower surface of leaf. **E.** Inflorescence. **F.** Male flower. **G–H.** Female flower. **I.** Dehiscent fruits. **J.** Cross-section of female flower. All from *SFC* 8354. (Photos: C.-Y. Ling)

*Distribution.* Known from only three sites, two in the Bau District, Sarawak (Bukit Peninjau, near Mt Serambu, and Buso), and one in the Bengkayang Regency, West Kalimantan (Berawat'n Waterfall near Gunung Niut) (Fig. 3).



**Fig. 2.** Habit of *Begonia promethea* Ridl. in Bengkayang, West Kalimantan (inset: inflorescence showing basal female flower and distal male flowers). All from *WEKBOE 185*. (Photos: A. Randi)

*Habitat.* Lowland forest at 50–150 m elevation, growing on wet, shaded and almost vertical sandstone cliffs (Buso) or basalt cliffs with water spray, sometimes in direct sunlight (Berawat'n Waterfall). Very local but can densely cover the rock face in small



**Fig. 3.** Distribution of *Begonia promethea* Ridl. in Borneo based on confirmed herbarium specimen records.

patches. It apparently flowers seasonally with peak flowering towards the end of the year in the rainy season. Ridley (1906) had noted that plants he grew in the Botanic Gardens, Singapore ‘grew very readily and flowered in December and January’. Recent visits to the wild populations in Sarawak showed flowering increased from November to December suggesting that it flowers seasonally in the rainy season; flowering plants were seen in West Kalimantan in December.

*Etymology.* The meaning of the specific epithet is obscure. Prometheus was the Greek god who fashioned clay to create the first people, and who was chained to a rock to have his liver pecked out by an eagle for all eternity as a punishment for stealing fire from the gods and giving it to humanity. Ridley gives no hint as to the connection between him and this begonia, but we speculate it may be due to the isolated sandstone rocks on which the species grows, where Ridley noted he ‘could reach but few plants of it’.

*Provisional IUCN conservation assessment.* Endangered (EN B2ab(iii)), based on there being only three known localities with a total area of occupancy <500 km<sup>2</sup> and a continued observed decline in the quality of habitat (IUCN, 2012). All known

localities are located outside of Totally Protected Areas and populations are threatened by habitat disturbance, although the inaccessible cliff habitat will afford the species some protection. Only five mature individuals were noted in West Kalimantan at Berawat'n Waterfall although much of the cliff was out of reach and it is likely further individuals exist. Many individuals with all life stages such as seedlings, flowering and fruiting individuals were observed in its habitat in Sarawak.

*Additional specimens examined.* BORNEO. **Sarawak:** Bau District, Buso (1.2719 N 110.0947 E), 10 April 2017, *Julia et al. SFC 8354* (SAR). **West Kalimantan:** Bengkayang Regency, Berawan Waterfall, 10 December 2017, *Randi et al. WEKBOE 185* (BO).

*Notes.* The similarity of *Begonia beccarii* to *B. promethea* had already been indicated because the FI duplicate of the type collection of *B. beccarii* had been determined as *B. promethea* by E. Irmscher (Hughes et al., 2015, continuously updated). The protologues of the species are similar apart from the length of the inflorescence (c. 22 cm in Ridley's description and 12 cm in Warburg's) but this is likely due to the state of development of the inflorescence. However, *Begonia promethea* was problematic because the type could not be located (Hughes, 2008) and the description of *B. beccarii* was incomplete, lacking data for the pistillate flower and fruit. Discovery of wild populations with individuals in all stages of development has enabled a reassessment of these two species, with the conclusion that they are the same and that *Begonia promethea* takes priority over *B. beccarii*.

Hughes (2008) stated that the syntypes of *Begonia promethea* were *Haviland 188* and *485* and that they had not been located. However, Ridley (1906) also noted the plant was found on 'sandstone rocks at Bukit Tendong near Busau' (now spelled Bukit Tundong and Buso), and it is obvious his detailed description was based on living plants. This indicates that Ridley's own collection (*Ridley 12394*) is also a syntype, which we therefore designate as the lectotype. A further specimen of *Begonia promethea* was collected by Beccari from Gunung Skunyet in Sarawak (*Beccari PB1050*, FI); the sheet is a mixed collection with *B. pendula* Ridl. We are not sure whether this represents a reliable locality record for *B. promethea*, or whether it was mounted with the superficially similar *B. pendula* collections in error.

*Begonia promethea* and *B. beccarii* were unplaced to section in Hughes (2008) while Hughes et al. (2015, continuously updated) noted that *B. promethea* belonged to *Begonia* sect. ?*Petermannia*. Ridley (1906) included *Begonia promethea* in *Begonia* sect. *Bractibegoniae*, whilst Warburg (1922) suggested that *B. beccarii* might belong to *Begonia* sect. *Reichenheimia* based on its habit. Indeed, this species is unusual for *Begonia* sect. *Petermannia* because it grows on vertical cliffs with its leaves flat against the rock surface. However, its protogynous inflorescence and ovary with two placentas per locule show without a doubt that it belongs in *Begonia* sect. *Petermannia*.

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