

## ***Begonia dimorpha* (Begoniaceae) and *Clerodendrum pygmaeum* (Lamiaceae), new records for the Philippines from Tawi-Tawi Island**

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**ABSTRACT.** Field work in Panglima Sugala, Tawi-Tawi, Philippines, resulted in new country records of *Begonia dimorpha* S.Julia (sect. *Petermannia*, Begoniaceae) and *Clerodendrum pygmaeum* Merr. (sect. *Clerodendrum*, Lamiaceae), both previously recorded only from Borneo. There are now 162 species of *Begonia* L. and 18 species of *Clerodendrum* L. known from the Philippines. Field observations and taxonomic notes on each species are presented and the presence of Bornean plant elements in the Sulu archipelago is discussed.

**Keywords.** Borneo, Malesia, Mindanao, Panglima Sugala, Sulu Archipelago, taxonomy

### **Introduction**

Tawi-Tawi island is located at the southern tip of the Philippines, within the Sulu Archipelago. It lies southwest of Jolo island, about 50 km from the eastern tips of the Kinabatangan and Lahad Datu districts of Sabah (Malaysian Borneo). The island has a low-lying coralline southern part and a mountainous northern section within the municipalities of Languyan, Tandubas and Panglima Sugala (Olimpos & Mansibang, 2021).

The island province is listed as an Important Plant Area (DENR-PAWB, CI & UP-CIDS, 2003) and Important Bird Area (IBA) (BirdLife International, 2021) due to its unique biodiversity. It harbours island-endemic plant species such as *Goniothalamus suluensis* Merr. (Annonaceae), *Discocalyx suluensis* Merr. (Primulaceae) and *Psychotria olsenii* Sohmer & A.P.Davis (Rubiaceae), which are only known from their type specimens. Furthermore, it is the only island where the tiny population of the critically endangered Sulu Hornbill (*Anthracoceros montani*) is known to exist (BirdLife International, 2021), with only 14 individuals observed in the wild (Paguntalan et al., 2020).

Data on Tawi-Tawi biodiversity remains scarce. The last account of the island's flora was published in 1926 by Merrill, who identified 27 species (Merrill, 1926). Since then, only two other species have been added to the flora of Tawi-Tawi, both from collections made by the Philippine Plant Inventory Project in 1994: *Hoya galenii* Kloppenb. (Gaerlan & Sagcal PPI 10085, holotype PNH) and *Dipterocarpus pseudocornutus* P.S.Ashton (Gaerlan & Sagcal PPI 10209, holotype K). Political conflict in the region has discouraged research, and logging in the 1960s and 1970s has left only c. 100 km<sup>2</sup> of forest, mostly in Panglima Sugala (BirdLife International, 2021). Given these, botanical surveys are urgently needed to better understand the island's biodiversity and thereby direct forest conservation programmes.

Explorations conducted by the Philippines Biodiversity Conservation Foundation Inc. (PhilBio) in the Municipality of Panglima Sugala, Tawi-Tawi, in 2020 have resulted in more recent botanical discoveries, such as a new species of lipstick vine, *Aeschynanthus rejieae* (Olimpos & Mansibang, 2021). These expeditions also led to the discovery of two new records for the Philippines: *Begonia dimorpha* S.Julia (sect. *Petermannia*, Begoniaceae), a cane-like *Begonia* L. with large pendent leaves that has two different growth forms for vegetative and flowering stems, and *Clerodendrum pygmaeum* Merr. (sect. *Clerodendrum*, Lamiaceae), a subshrub with yellow flowers. Both plants were previously only known to be present in Borneo. This paper presents an account of these species' occurrence in Tawi-Tawi, together with field observations.

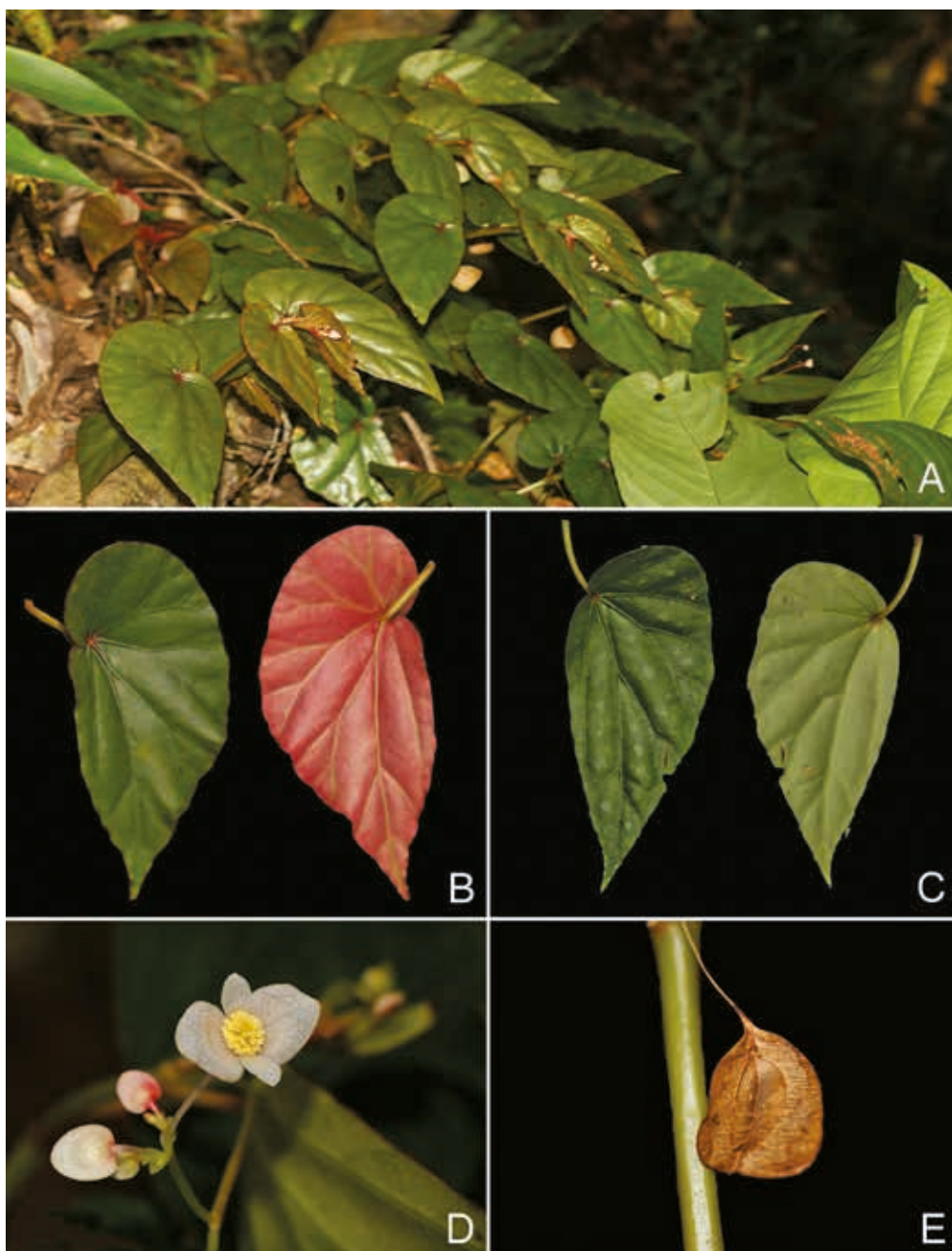
### Materials and methods

Fieldwork was conducted by PhilBio in Busay, Upper Malum Watershed, Barangay Magsagaw, Panglima Sugala, Tawi-Tawi (5°7'48.4"N 119°56'47.8"E) from 27 January to 7 February 2020. Upper Malum Watershed is a lowland limestone forest at around 135–182 m elevation, dominated by trees 10–15 m tall. In certain patches, canopy trees reaching at least 25 m tall and emergent layers as high as 40 m tall were observed. However, the majority of the area had been logged, leaving large clearings and canopy breaks.

To confirm the identity of plants encountered, protologues and voucher specimens from several herbaria (BM, E, K, L, NY, SAN and SING) were carefully examined. Identification was also verified by consulting *Begonia* and *Clerodendrum* experts (see Acknowledgements).

### New records for the Philippines

***Begonia dimorpha*** S.Julia, Sandakania 20: 59 (2015). – TYPE: Malaysia, Sabah, Lahad Datu, Danum Valley, Borneo Rainforest Lodge, Coffin Trail, 5°01'04.0"N 117°44'30.0"E, c. 310 m, 27 July 2014, Chong *et al.* 157257 (holotype SAN; isotypes KEP n.v., SAR n.v., SING [SING0231193], SNP n.v.). (Fig. 1)



**Fig. 1.** *Begonia dimorpha* S. Julia from Panglima Sugala, Tawi-Tawi, Philippines. **A.** Habit. **B.** Leaves with a dark green adaxial side and a deep magenta underside. **C.** Another variation with adaxially spotted leaves and light green abaxial side. **D.** Male flower with 4 tepals. **E.** Fruit hanging on a thread-like pedicel. (Photos: S.M.B. Olimpos)

*Specimens examined.* INDONESIA: **East Kalimantan:** Karangan, Karst forest on edge of MPI Plantation, 01°11'31.5"N 117°33'33.4"E, c. 68 m, 19 Nov 2016, *EKBOE3* (E [E00983192, E00983193]); Pengadan karst, Gua Mardua, 01°13'47.0"N 117°44'32.0"E, 82 m, 22 Nov 2016, *EKBOE70* (E [E00983197]); Bangalon Trail, 01°1'31.0"N 117°15'23.0"E, 80 m, 26 Nov 2016, *EKBOE82* (E [E00983721]).

PHILIPPINES: **Tawi-Tawi:** Municipality of Panglima Sugala, Barangay Magsagaw, loco dicto Busay, Upper Malum Watershed, c. 160 m, 28 Jan 2020, *Olimpos 12* (CAHUP, CEBU, PNH).

*Taxonomy.* *Begonia* is one of the most diverse plant genera, currently comprising 2104 accepted species (Hughes et al., 2015–onwards). The Philippines is among the centres of diversity for *Begonia* with 161 species, of which 13 species and one subspecies were recently described in 2022 (Pelser et al., 2011–onwards; Ang et al., 2022; Blasco et al., 2022; Dela Cruz et al., 2022; Delos Angeles et al., 2022; Mazo & Rubite, 2022; Mazo et al., 2022; Naive et al., 2022a, 2022b; Rubite et al., 2022).

Within *Begonia*, section *Petermannia* is the most species rich section in Asia, with more than 416 known species (Moonlight et al., 2018). Among these, more than 70 species occur in the Philippines (Pelser et al., 2011–onwards; Hughes et al., 2015–onwards). Members of this section are characterised by a usually cane-like habit, protogynous inflorescences, and pistillate flowers with three-locular ovaries, each with a bilamellated placenta (Lin et al., 2017).

Fieldwork in Panglima Sugala, Tawi-Tawi, led to a new record of *Begonia* sect. *Petermannia* for the Philippines. The specimens collected most closely resemble the description of *Begonia dimorpha*, which was discovered in Danum Valley, Southeast Sabah, Malaysian Borneo (Chong et al., 2015). In the protologue, its distribution was stated as being endemic to Sabah; recently, however, it was also recorded in East Kalimantan, Indonesia (Hughes et al., 2020).

*Notes.* The *Begonia* collected from Tawi-Tawi was determined to be *B. dimorpha* on account of its large, glabrous, pendent leaves (12–17.8 × 6–7.4 cm) that have two adaxial leaf forms: one having white spots between veins and the other plain dark green. The reddish-pink line around the margin and the red blotch at the junction of the lamina and petiole were also evident (Fig. 1). Furthermore, its flowers were borne on the lateral branches and male cymose inflorescences were terminal. Although no female flowers were observed, fruits were present, characterised by broadly triangular capsules (1.5–2 × 1.3–2.5 cm) dangling along the lateral branches on a fine thread-like pedicel (c. 2.5 cm long).

The Tawi-Tawi specimens exhibited minor morphological variations from the Sabah and East Kalimantan populations. While the white or pink adaxial spots on the young leaves of Bornean specimens disappeared at maturity, the Tawi-Tawi plants did not have distinct juvenile and mature leaf forms, having both spotted and unspotted leaves regardless of age. Additionally, Bornean specimens consistently had magenta-coloured abaxial surfaces (Chong et al., 2015; Hughes et al., 2020), while leaves from the Tawi-Tawi plants had two colour variations—either the typical magenta (unspotted) or light green (spotted; Fig. 1). The lamina of the lateral branches was smaller in Sabah and East Kalimantan specimens (Chong et al., 2015; Hughes et al., 2020), whereas leaf

sizes on the Tawi-Tawi plants appeared to be consistent regardless of their position. Finally, the tepal number (4) for the male flowers of *Begonia dimorpha* from Tawi-Tawi did not coincide with the type and population from Sabah, although this variation has been observed in East Kalimantan, where tepals range from 2–4 (Hughes et al., 2020).

These differences were considered likely to be within-species variation (M. Hughes, pers. comm., 31 Aug 2020), given that the populations were geographically isolated and growing on differing substrates (limestone forest on Tawi-Tawi and in East Kalimantan, as opposed to alluvial soil in Sabah), which may have altered their morphology to a certain degree.

***Clerodendrum pygmaeum*** Merr., Univ. Calif. Publ. Bot. 15: 265 (1929); Wearn & Mabb., Sys. Bot. 36: 1056 (2011). – TYPE: Malaysia, Sabah, Myburgh Province, Sandakan, *Elmer 20091* (lectotype K [K000607501], designated here; isolectotypes BM [BM000950222], NY [NY137461]). (Fig. 2)

*Specimens examined.* MALAYSIA: **Sabah:** Sandakan, 30 Aug 1984, *Sigin et al. 60270* (SAN [acc. no. 069342]); Sandakan, Sepilok Forest Reserve, 21 Nov 1986, *Van Welzen 925* (L [L.2757915]); Kinabatangan, Tamegang Timber Camp near Kpg Pangkalan, 21 Nov 1968, *Kokawa & Hotta 1384* (L [L.2757914]).

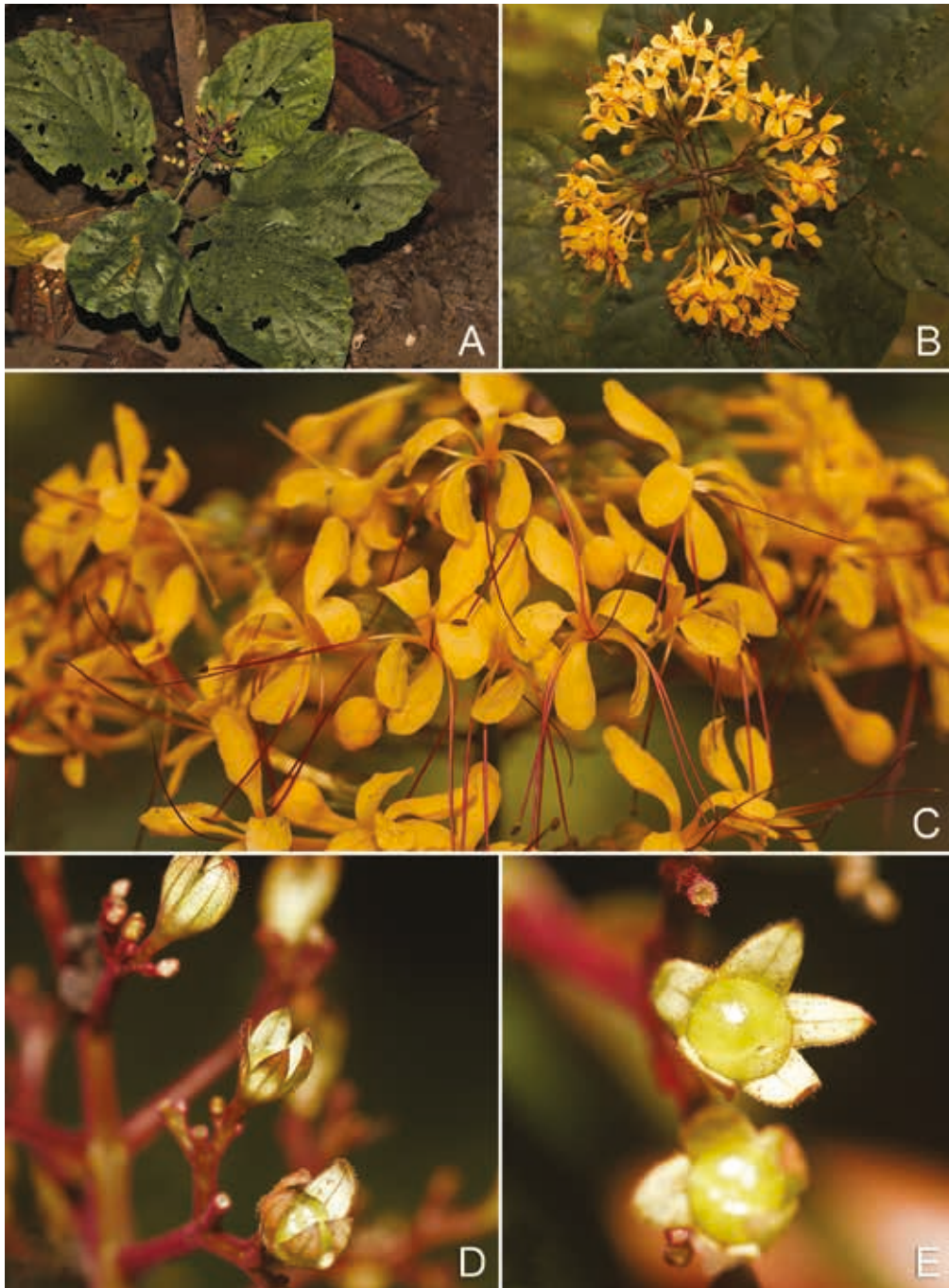
INDONESIA: **North Kalimantan:** Nunukan, N of Tarakan, Nov 1953, *Meijer 2103* (L [L.2757916]).

PHILIPPINES: **Tawi-Tawi:** Municipality of Panglima Sugala, Barangay Magsagaw, loco dicto Busay, Upper Malum Watershed, c. 160 m, 28 Jan 2020, *Olimpos 25* (CAHUP, CEBU, PNH).

*Taxonomy.* There are about 150 species in the genus *Clerodendrum* L. (Lamiaceae), distributed from Africa to Asia and Australia (Wearn & Mabberley, 2011a; Wearn et al., 2019). Within the Malesian biogeographic region, the Philippines has been recognised as a centre of diversity, with 17 native species, six of which are endemic (Wearn et al., 2019).

*Notes.* Fieldwork in Panglima Sugala, Tawi-Tawi revealed a potential 18th species, identified here as *Clerodendrum pygmaeum*. The specimen was distinct from other known Philippine species in being a subshrub and possessing yellow corolla lobes and tubes (Fig. 2); other *Clerodendrum* species in the country are shrubs to small trees that bear flowers in varying shades of white, pink, red and orange.

Most characters in the two individuals of *Clerodendrum pygmaeum* that were photographed were found to match those described in recent treatments (Wearn & Mabberley, 2011b; Wearn et al., 2019): leaf shape and size (broadly ovate to obovate; c. 12 × 8.5 cm), petiole length (c. 1.5 cm), corolla colour (whitish yellow tube with pale yellow lobes), and stamen colour (crimson). Minor differences included inflorescence length (10.5 cm rather than the maximum recorded 8 cm), leaf length-width ratio (1.41 rather than 1.5–1.9), and stamen length (up to 20 mm rather than the maximum recorded 16 mm).



**Fig. 2.** *Clerodendrum pygmaeum* Merr. from Panglima Sugala, Tawi-Tawi, Philippines. **A.** Habit. **B.** Inflorescence. **C.** Corolla lobes and stamens. **D.** Fruiting calyces with indumentum. **E.** Developing fruit. (Photos: S.M.B. Olimpos)

One concern was that the calyces in the specimen appeared to be green/yellow-green when young and then became pale yellow as the fruit, also pale yellow and undivided, began to develop. It is unknown if the calyces for these plants turn dark red or if its fruits turn black, as described in the treatment (Wearn et al., 2019); the former character can be observed in herbarium specimens. However, the dark red indumentum distinctive of *Clerodendrum pygmaeum* calyces was found to be present.

Other Bornean *Clerodendrum* species of similar habit were ruled out: the specimen did not share the shorter petioles, compact cymes, or lengthy corolla tubes of *C. fistulosum* Becc.; the erect, elongated thyrses of *C. myrmecophilum* Ridl.; or the leaf shape and fistulose internodes of either. Wearn & Mabberley (2011b) noted the similarities between *Clerodendrum pygmaeum* and *C. sarawakanum* H.J.Lam., but the leaf shape, corolla colour, and geographic location of our collection more closely conform with the former.

### Notes on Bornean plant elements in Tawi-Tawi

The discovery of the Bornean species *Begonia dimorpha* and *Clerodendrum pygmaeum* on Tawi-Tawi appears to be consistent with the current hypothesis that the Sulu archipelago represents one of two biological colonisation routes into the Philippines from Borneo (Dickerson et al., 1928; Moss & Wilson, 1998; Jones & Kennedy, 2008; Brown et al., 2013). As with the Palawan island group, the Sulu archipelago shares multiple species with Borneo and is considered a centre of endemism in the country (Brown et al., 2013). For example, Bornean species found in both Palawan and Tawi-Tawi (and nowhere else in the Philippines) include *Elaeocarpus stipularis* var. *longipetiolatus* (Merr.) Coode (Elaeocarpaceae), *Airyantha borneensis* (Oliv.) Brummitt (Fabaceae), *Licuala spinosa* Wurm. (Arecaceae), and *Salacca ramosiana* Moge (Arecaceae) (Pelser et al., 2011–onwards).

Additionally, Merrill (1926) noted six Bornean species recorded in Tawi-Tawi and nowhere else in the Philippines: *Pseuderanthemum confusum* Merr. (Acanthaceae), *Diospyros elliptifolia* Merr. (Ebenaceae), *Mallotus connatus* M.Aparicio (Euphorbiaceae), *Fordia brachybotrys* Merr. (Fabaceae), *Elaeocarpus stipularis* var. *nutans* (R.Knuth) Coode (Elaeocarpaceae) and *Ziziphus suluensis* Merr. (Rhamnaceae). Further botanical exploration in the province is likely to yield greater numbers of shared species and may be helpful in testing the dominant biogeographic and evolutionary hypotheses in the context of the Philippine flora.

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