



## A revision of *Begonia* (Begoniaceae) in the Solomon Islands, including four new species

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**ABSTRACT:** The Solomon Islands in Melanesian region of South Pacific lie in an equatorial climate and harbour diverse habitats covered by forests. Based on field surveys and specimens examination, six *Begonia* species were confirmed from the Solomon Islands, and a key of the species is provided for identification. Besides the two widespread species, *B. somervillei* Hemsl. and *B. weigallii* Hemsl., four new species, *B. choiseulensis*, *B. occulta*, *B. phycoduroides* and *B. rubroflabellata*, are described and illustrated. All species belong to sect. *Petermannia*, and five are endemic to the Solomon Islands. Their conservation status following IUCN criteria are also assessed.

**KEY WORDS:** Begoniaceae, biodiversity, endemism, Melanesia, new record, *Petermannia*, taxonomy.

### INTRODUCTION

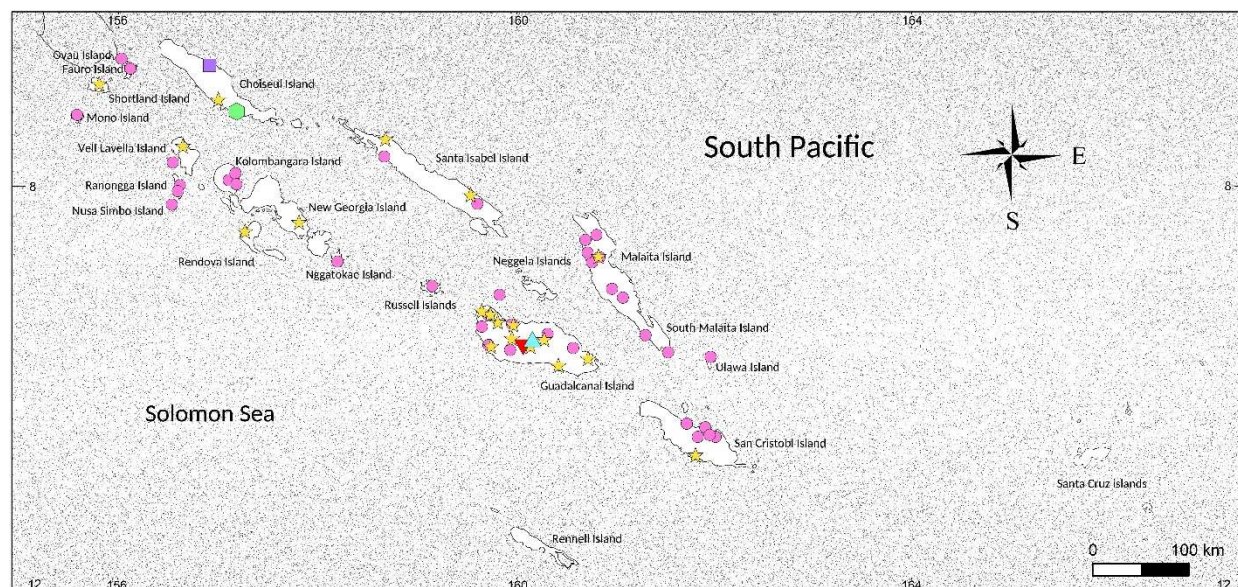
The Melanesian region includes numerous islands which scatter across thousands of kilometers between Fiji and the Moluccas. Recent researches showed a large number of new taxa explored here (e.g. Chen *et al.*, 2015; Gagul *et al.*, 2018; Hájek *et al.*, 2010; Hsu *et al.*, 2016; Johnson, 2017). The Solomon Islands (Figure 1) form an archipelago situated between longitudes 156° to 170°E, and latitudes 5° to 12°S (Peterson *et al.*, 1999), consisting of six major islands and over 900 smaller islands, which contains ten percent of the world's freshwater biota (Polhemus *et al.*, 2008). However, as one of the lesser developed countries in the world, the plant diversity in the Solomon Islands are relatively poorly investigated.

The impetus for this study comes from the 'Census and Classification of Plant resources in the Solomon Islands' project (see <http://siflora.nmns.edu.tw/> for the details), and the continuation of our research on *Begonia*. In recent years, a large number of new *Begonia* species have been published from tropical Southeastern Asia (Hughes *et al.*, 2015a,b, 2018; Lin *et al.*, 2017, 2019; Peng *et al.*, 2017; Rubite *et al.*, 2018). The species concepts used in these studies are usually quite narrow, and many species are narrowly distributed with the great majority confined to a single locality. Since the Solomon Islands' species are mostly very similar to each other in appearance and with only minor differences between different islands or groups, until more evidence becomes available, we adopt a more conservative species concept.

Prior to this revision, there were 4 species of *Begonia*,

all belonging to sect. *Petermannia*, recorded from the Solomon Islands (Henderson and Hancock, 1988), including *B. pinnatifida* Merr. & L.M. Perry (Merrill and Perry, 1943), *B. salomonensis* Merr. & L.M. Perry (Merrill and Perry, 1943), *B. somervillei* Hemsl. (Hemsley, 1896a) and *B. weigallii* Hemsl. (Hemsley, 1896b). Most local begonias are widespread species and occur in many islands including *B. somervillei*, *B. weigallii* and *B. salomonensis*, and these 3 species share similar characters including glabrous, ovate, uniformly green leaves, deciduous bracts, 2-tepaled staminate flowers and 3-tepaled pistillate flowers (Hemsley, 1896a; 1896b; Merrill and Perry, 1943). Based on detailed morphological evaluation and comparison of geographically distant populations, it showed that despite having rather different appearances, some populations appeared to be a transitional between the different morphotypes in their morphology. Therefore, we determine that *B. salomonensis* is a synonym of *B. weigallii*. Another species, *B. pinnatifida* Merr. & L.M. Perry, was originally recorded from Papua New Guinea and can be easily distinguished from other three known begonias from the Solomon Islands by having lanceolate pinnatifid leaves (Merrill and Perry, 1943). However, during this research, we did not find any specimens from the Solomon Islands that match the type of *B. pinnatifida* (holotype: A 00068333 image!), and thus we tentatively exclude this species from the Flora.

In this study, six *Begonia* species were recorded from the Solomon Islands, including four new species. The novelty and endemism of the new taxa has been confirmed



**Fig. 1.** Distribution map of *Begonia* species in the Solomon Islands. *B. choiseulensis* (■), *B. occulta* (▲), *B. phycoduroides* (●), *B. rubroflabellata* (▼), *B. somervillei* (★) and *B. weigallii* (●).

following comparison with types and specimens from neighboring countries e.g. Papua New Guinea, Fiji and Vanuatu. We provide an identification key, line drawings and color plates to distinguish those species from similar allies.

#### Key to *Begonia* species in the Solomon Islands

- |   |                              |
|---|------------------------------|
| 1a. Leaves glabrous or subglabrous .....                    | 2                            |
| 1b. Leaves covered with stiff hairs .....                   | 3                            |
| 2a. Leaf blade lacinate .....                               | 3. <i>B. phycoduroides</i>   |
| 2b. Leaf blade entire to denticulate .....                  | 4                            |
| 3a. Leaf unlobed .....                                      | 2. <i>B. occulta</i>         |
| 3b. Leaf moderately palmatifid .....                        | 4. <i>B. rubroflabellata</i> |
| 4a. Staminate tepals less than 0.6 cm long, succulent ..... | 5. <i>B. somervillei</i>     |
| 4b. Staminate tepals more than 0.6 cm long, thin .....      | 5                            |
| 5a. Leaves up to 9 cm, bracts persistent .....              | 1. <i>B. choiseulensis</i>   |
| 5b. Leaves up to 36 cm, bracts deciduous .....              | 6. <i>B. weigallii</i>       |

#### TAXONOMIC TREATMENT

##### 1. *Begonia choiseulensis* C.W. Lin, *sp. nov.*

**Type:** SOLOMON ISLANDS. Choiseul Province: Choiseul Island, Sirovaga, December 1966, *B. Eyres* 8. (holotype: BSIP!).

**Diagnosis:** Most resembling *Begonia weigallii* Hemsl. in its erect stems, glabrous ovate leaves and 2-tepaled staminate flowers, but different in its smaller stature, *ca.* 30 cm tall (vs. often to 100 cm or taller), smaller leaves that are 5–9 cm (vs. usually more than 10 cm, up to 36 cm) long, and persistent (vs. deciduous) stipules and bracts.

Evergreen perennial, monoecious, terrestrial. **Stem** erect, cane-like, few- to many-branched, *ca.* 30 cm tall, to 4 mm across, glabrous, internodes up to 7 cm long,

gradually shorter upward; nodes slightly swollen. **Stipules** persistent, ovate to lanceolate, 4–10 mm long, 2–6 mm wide, hyaline, keeled, margin entire, apex cuspidate, cusp *ca.* 3 mm long. **Petioles** terete, 0.5–3 cm long, *ca.* 2 mm across, glabrous. **Leaves** oblique, held horizontally; lamina ovate, basifixed, strongly asymmetric with a well-developed basal lobe on one side giving a cordate appearance, margin denticulate, apex attenuate, 5–9 cm long (basal lobes included), 1.7–3.2 cm wide, broad side 1–2 cm wide, base unequal, basal lobes cordate, 0.6–2 cm long, thickly chartaceous, glabrous, adaxially green, abaxially pale green; venation palmate-pinnate, midrib distinguishable, 2.8–7.5 cm long, *ca.* 2 major lateral veins on either side of midrib, other primary veins branching dichotomously or nearly so, tertiary veins reticulate. **Bracts** hyaline, persistent, at basal node of inflorescence ovate-triangular to lanceolate, up to 9 mm long, 4 mm wide, cuspidate, margin entire; bracts at apex of inflorescence ovate and smaller. **Inflorescence** a terminal and lateral, bisexual, cymosely branching panicle up to 5 cm long, pistillate flowers in pair (based on capsules) at lower part of the inflorescence; staminate cymes *ca.* 2 orders of branching and few-flowered; protogynous. **Staminate flower:** pedicel *ca.* 5 mm long, glabrous, tepals 2, pink, suborbicular, glabrous, margin entire, *ca.* 7 mm across; androecium actinomorphic, stamens *ca.* 20, filaments fused at base; anthers widely obovate, *ca.* 1 mm long, apex retuse, longer than filaments. **Pistillate flower:** not seen. **Fruits** pendent on a stalk 2–2.8 cm long, capsule body trigonous-ellipsoid, *ca.* 1 cm long, 0.5 cm across, 3-locular, placentae bilamellate; wings 3, subequal, crescent trapezoid, rounded distally, obtuse proximally, *ca.* 1.8 cm long, 5–8 mm wide.

##### Fig. 2

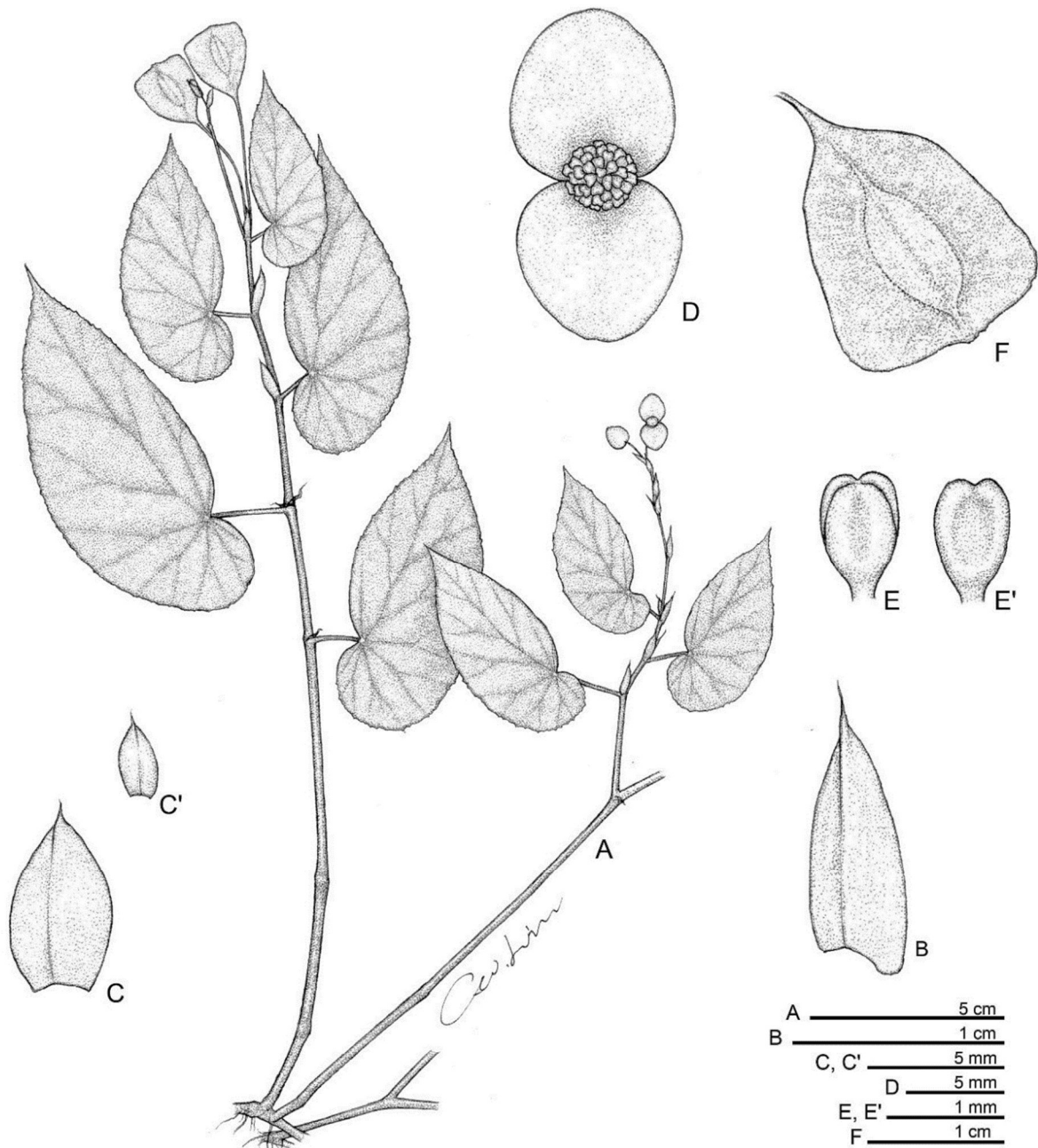


Fig. 2. *Begonia choiseulensis* C.W. Lin. A. Habit; B. Stipule; C. Bracts; D. Staminate flower; E, E'. Stamens, dorsal and ventral views; F. Capsule.

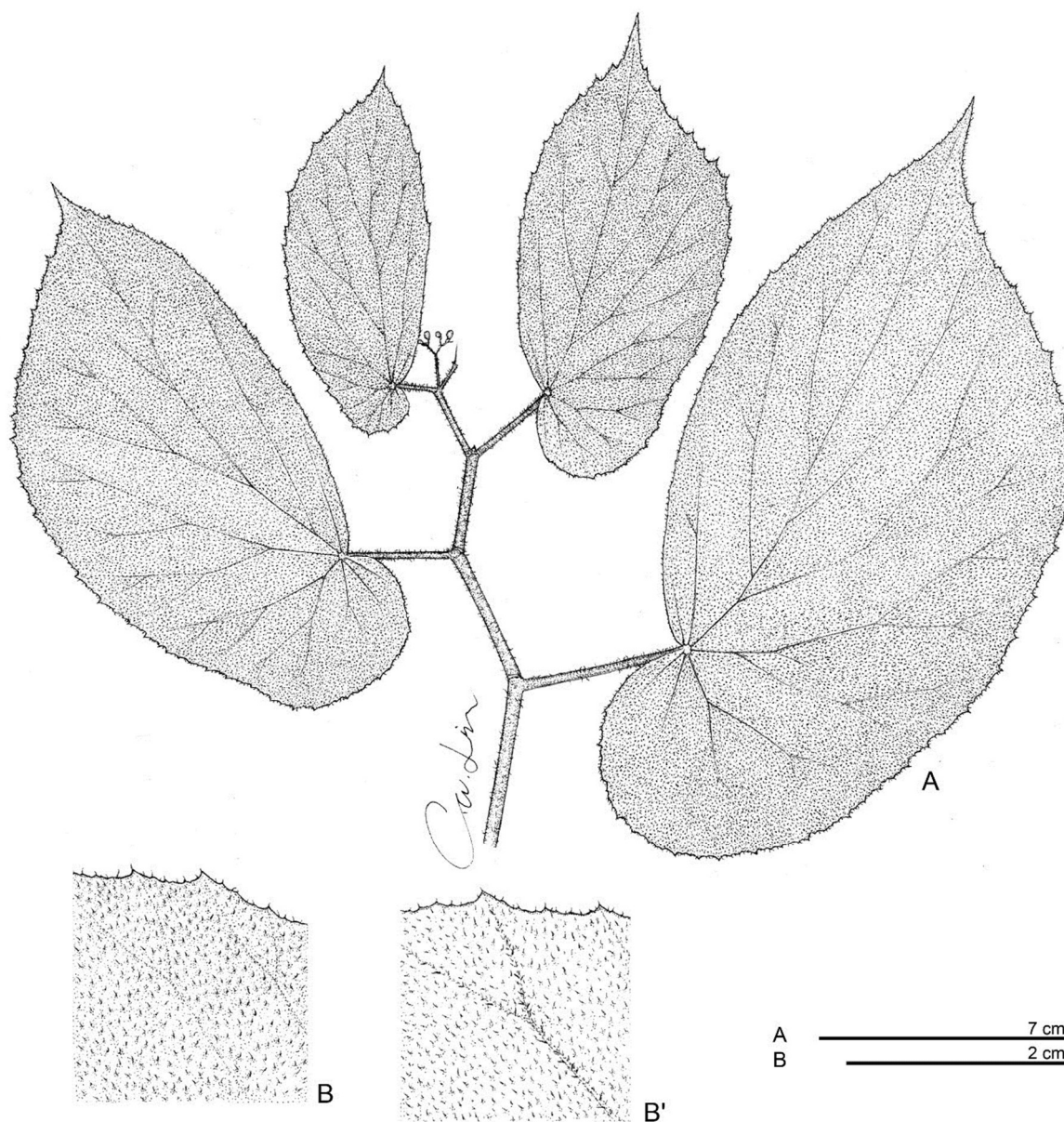
**Distribution and ecology:** *Begonia choiseulensis* is only known from the Sirovaga area of Choiseul Island. Plants growing on semi-shaded moist limestone cliffs or outcrops at lowland evergreen forest, up to 800 m elevation.

**Etymology:** Named after its type locality, Choiseul Island.

**Conservation Status:** *Begonia choiseulensis* was only known from the type specimen collected in 1966, and the

number of its population and the stability of its habitat are also unknown. The new species should be assessed as Data Deficient of IUCN (2020).

**Notes:** *Begonia choiseulensis* resembles *B. weigallii* in having cane-like habit, glabrous ovate leaves and 2-tepaled staminate flowers. However, they are distinct because the new species has a much lower habit to ca. 30 cm tall (vs. often to 100 cm or taller), smaller leaves that are 5–9 cm long (vs. usually more than 10 cm, up to 36



**Fig. 3.** *Begonia occulta* C.W. Lin. **A.** Branched habit; **B, B'.** Portion of leaf adaxial and abaxial surfaces, also showing leaf margin.

cm long (e.g. *SITW00973*), and persistent (vs. deciduous) stipules and bracts. Additionally, *B. weigallii* is the most commonly collected species in the Solomon Islands and grows on a various habitats, while *B. choiseulensis* is known only from limestone outcrops in the type locality of Choiseul Island.

## 2. *Begonia occulta* C.W. Lin, *sp. nov.*

**Type:** SOLOMON ISLANDS. Guadalcanal Province: Guadalcanal Island, Gold Ridge, ca. 750 m elev., 12 October 1962, *T.C. Whitmore BSIP655* (holotype: BSIP!).

**Diagnosis:** Similar to *Begonia torricellensis* Warb. in its habit and hairy foliage. However, *B. occulta* is sharply

distinct from *B. torricellensis* in its stem being hispid-villous up to 2 mm (vs. dense pilose ca. 4 mm) and inflorescence cymose (vs. racemose-cyme). *Begonia occulta* is also similar to *B. vitiensis* A.C.Sm., but is distinct in its short-petiololed by 1–4 cm (vs. 10–15 cm), obovate (vs. broadly orbicular) leaves and inflorescence terminal (vs. axillary).

Evergreen perennial, monoecious, terrestrial. **Stem** cane-like, 2–4.5 mm across, hispid-villous, internodes 2–5 cm long, gradually shorter toward upper stem. **Stipules** deciduous. **Petioles** 1–4 cm long, 1.5–3 mm across, densely hispid-villous. **Leaves** (largest leaf incomplete) oblique, obovate, basifixed, strongly asymmetric with a well-developed basal lobe on broad side giving a cordate





appearance, 11–22 cm long, 4.5–10 cm wide, broad side 2.7–7 cm wide, base unequal, basal lobes cordate, 1.3–4.5 cm long, margin denticulate, apex acuminate; both surfaces densely hispid; venation palmate-pinnate, midrib distinct, *ca.* 3 secondary veins on each side, other primary veins branching dichotomously or nearly so, tertiary veins reticulate. **Bracts** deciduous, ovate. **Inflorescence** terminal, bisexual, hispid-villous; cymosely branching panicle *ca.* 1.5 cm long, peduncle *ca.* 0.8 cm long, staminate cymes with up to 3 orders of branching, terminal, crimson; pistillate flowers (residual) at base of the short branch on inflorescence; protogynous. **Staminate flower:** (immature) white. **Pistillate flower:** not seen. **Fruit** not seen.

**Distribution and ecology:** Growing on deeply shaded moist rocks by a stream.

**Etymology:** The specific epithet *occulta* means “secret”, because it is known only from the type specimen and was not found in our field works.

**Conservation Status:** *Begonia occulta* is tentatively considered as Data Deficient (IUCN 2020). This new species was known only from the type specimen collected in 1962, and its population size and habitat condition remain uncertain.

**Note:** Among the Melanesian species, *B. occulta*, in its upright habit and hairy lamina, bears superficial resemblance with *B. torricellensis* Warb. (Warburg, 1905) that occurs in Papua New Guinea and *B. vitiensis* A.C.Sm. (Smith, 1936) that is endemic to Fiji and Vanuatu, while all of the above species belong to sect. *Petermannia*. However, the characteristics of those three species are distinctively different. *Begonia torricellensis* has dense pilose *ca.* 4 mm (vs. hispid-villous up to 2 mm) stem, adaxial lamina covered with long pilose *ca.* 2 mm (vs. hispid 0.5–1 mm), more robust inflorescence axis, 1 or 2 racemose cymes and many staminate flowers (vs. simply cyme with few staminate flowers). *Begonia vitiensis* has very sparsely pilosed stem, glabrescent (vs. hispid-villous), leaves long-petiolated by 10–15 cm (vs. 1–4 cm) and broadly orbicular (vs. obovate), the inflorescence borne from leaf axil (vs. terminal). Besides of the above species, several hairy leaved begonias from New Guinea are also somewhat similar with *B. occulta*, however, they are unlikely to be closely related to it, considering the geographical distribution. In addition, this species is unique because its whole plant is hairy, while all known begonias from the Solomon Islands are glabrous at stem and leaves. Therefore, the species must be identified as a novel taxon although the specimen lacks mature flowers and capsule.

### 3. *Begonia phycoduroides* C.W. Lin, *sp. nov.*

#### Fig. 4

**Type:** SOLOMON ISLANDS. Choiseul Province: Choiseul Island, Zongga, Mt. Sanabe, *ca.* 300 m elev., 18 March 1970, *I. Gafui* BSIP 14785. (holotype: BSIP!).

**Diagnosis:** In habit and multi-branched stems and

pinnately divided laminae, *Begonia phycoduroides* is most similar to *B. pinnatifida* Merr. & L.M. Perry, but the former is different in its 2-pinnatifid (vs. pinnatipartite on the upper half, entire on the lower half) foliage and deciduous (vs. persistent) stipules.

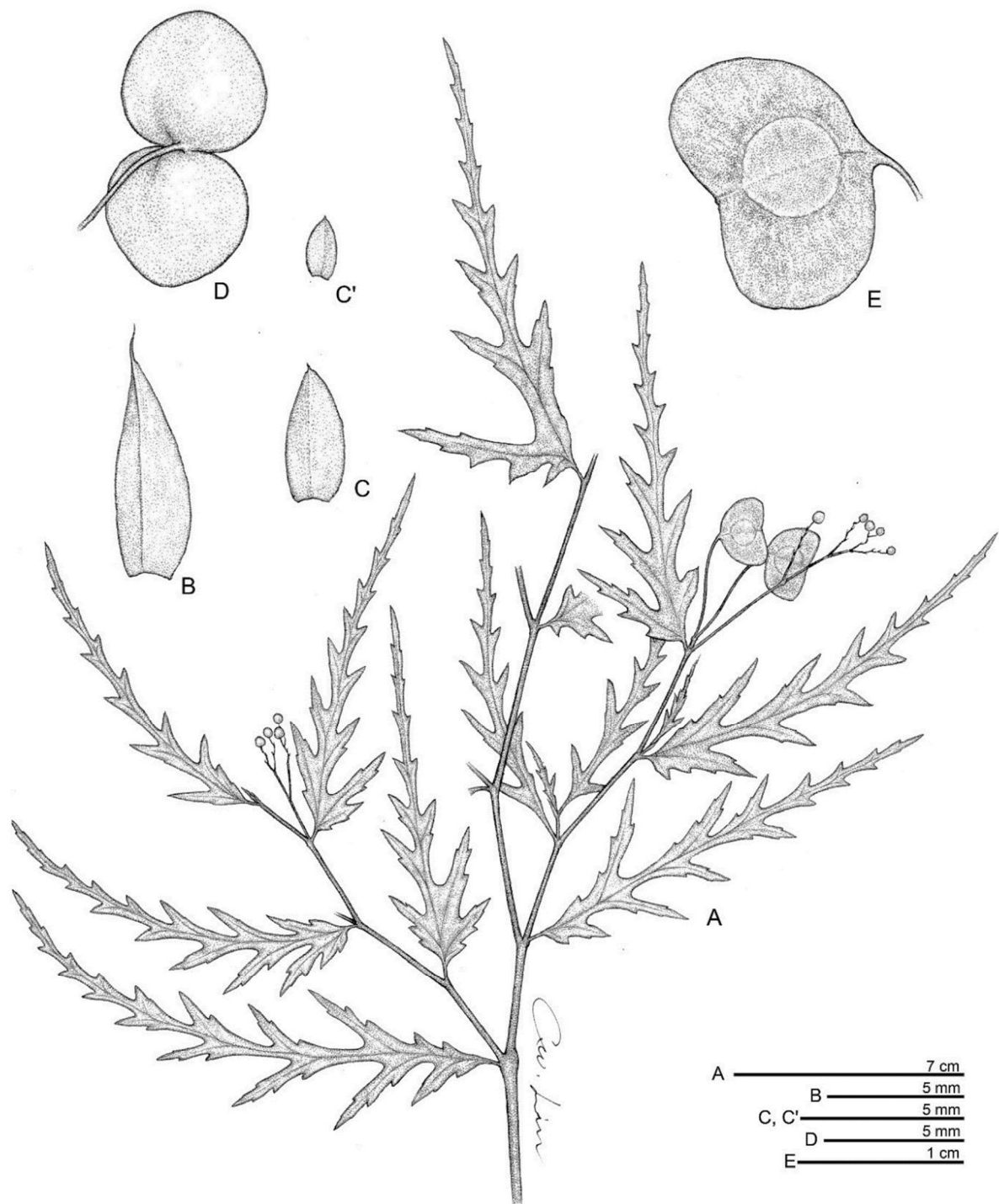
Evergreen perennial, monoecious, terrestrial. **Stem** erect, cane-like, much-branched, brownish-purple, *ca.* 120 cm tall, to 5 mm across, glabrous, internodes up to 5 cm or longer, gradually shorter toward upper stems; nodes swollen. **Stipules** deciduous, narrowly triangular, 4–12 mm long, 2.5–7 mm wide, hyaline, keeled, margin entire, apex cuspidate, mucro *ca.* 2 mm long. **Petioles** terete, 3–8 mm long, 1–1.5 mm across, glabrous. **Leaves** subsymmetrical, held horizontally; lamina ovate-lanceolate, basifixed, bipinnatiparted, slightly asymmetric, 5–10 cm long, (0.8–)2–5 cm wide, broad side 1.3–3 cm wide, base subequal, attenuate to cuneate, margin sparsely denticulate and 4 or 5 lobes on either side of midrib, apex long caudate; chartaceous, venation pinnate, *ca.* 4 secondary veins on each side of midrib, tertiary veins reticulate. **Bracts** hyaline, deciduous, at basal node of inflorescence similar to stipule; bracts at the apex of inflorescence ovate-triangular to lanceolate, 1–2 mm long, 0.5–1 mm wide. **Inflorescence** terminal and lateral, bisexual, cymosely branching panicle 2.5–5 cm long, pistillate flowers in pair on a very short peduncle at lower part of the inflorescence; staminate cymes up to 4 orders of branching and with many flowers; protogynous. **Staminate flower:** pedicel 7–10 mm long, glabrous, tepals 2, yellow with a purplish-brown tinge (based on label information of type specimen), glabrous, suborbicular, margin entire, *ca.* 6 mm across; androecium actinomorphic, stamens numerous, filaments fused at base; anthers *ca.* 1 mm long, subequal at filaments. **Pistillate flower:** not seen. **Fruits** pendent on a stalk 1.8–2.3 cm long, capsule body trigonous-orbicular, capsule *ca.* 0.7 cm long, 0.7 cm across, 3-locular, placentae bilamellate; wings 3, subequal, crescent-shaped, rounded distally, rounded or obtuse proximally, 1–1.4 cm long, 0.5–0.7 mm wide.

**Distribution and ecology:** *Begonia phycoduroides* is endemic to Mt. Sanabe in Choiseul Island. Growing on steep slopes in primary forest at 300 m elevation.

**Etymology:** The specific epithet is derived from the genus name of *Phycodurus eques*, the leafy seadragon, and *oides*, resembling, referring to the deeply pinnatifid leaves which resemble the leaf-like protrusions on the body of *P. eques*.

**Conservation Status:** The new species is known only from the type specimen collected in 1970, and the number of its population and the stability of its habitat are also unknown. An IUCN Red List criteria for *B. phycoduroides* would be Data Deficient (DD) (IUCN 2020).

**Notes:** *Beonia phycoduroides* is distinct among the congeners in the Solomon Islands in its bipinnatifid foliage and yellow staminate flower. Hancock and Henderson



**Fig. 4.** *Begonia phycoduroides* C.W. Lin. **A.** Branched habit; **B.** Stipule; **C, C'.** Bracts; **D.** Staminate flower, back view; **E.** Capsule.

(1988) recorded that *B. pinnatifida* was distributed in the Solomon Islands, however, lacking cited specimen, it has never been found again in later botanical explorations, not to mention any herbarium specimens that match the description. According to the type of *B. pinnatifida* (holotype: A 00068333 image!), it shares similar

characters with *B. phycoduroides*, so that it is likely that *B. phycoduroides* was misidentified as *B. pinnatifida* by Hancock & Henderson. Hence, *B. pinnatifida* should be treated as doubtful distribution in the Solomon Islands. The new species is most similar to *B. pinnatifida* as they share cane-like habits, glabrous and multi-branched stems



and pinnately divided laminae. However, *B. phycoduroides* differs in its 2-pinnatifid (vs. pinnatifid) on the upper half, entire on the lower half) foliage and deciduous (vs. persistent) stipules. Considering the pinnately divided laminae and 2-tepaled staminate flowers, the new species also resembles *B. bipinnatifida* J.J.Sm. (Smith, 1906), but *B. phycoduroides* is different in having 2-pinnatifid (vs. tripinnate) laminae, inflorescences with paired (vs. solitary) pistillate flowers and > 5 (vs. 1–3) staminate flowers, and smaller staminate flowers (tepals ca. 6 × 6 mm vs. ca. 10 × 12 mm).

#### 4. *Begonia rubroflabellata* C.W. Lin & T.C. Hsu, *sp. nov.*

Fig. 5, 6

**Type:** SOLOMON ISLANDS. Guadalcanal Province: Guadalcanal Island, Mt. Popomanaseu, 9°39'31.7"S, 160°3'12.7"E, 800–1,000 m elev., 10 September 2015, H.C. Hung, T.C. Hsu & M. Fanerii SITW09608. (holotype: TNM!; isotypes: BSIP!, TAIF 520826!).

**Diagnosis:** In sharing moderately dissected lamina and 2-tepaled staminate flower, this new species resembles *Begonia serratipetala* Irmsch. However, *B. rubroflabellata* is different in its palmatifid (vs. pinnatifid) leaf blades, entire (vs. toothed) pistillate tepals, and bracteoles present (vs. absent) in the base of ovary.

Evergreen perennial, monoecious, terrestrial. **Stem** erect, cane-like, much-branched, reddish-green to crimson, 20–80 cm tall, to 7 mm across or wider, villous to glabrous, internodes longer at lower stems, gradually shorter upwards; nodes swollen. **Stipules** deciduous, narrowly ovate, pinkish, to 2.5 cm or longer, ca. 1 cm wide, hyaline, keeled, margin entire, apex cuspidate, cusp ca. 5 mm long. **Petioles** terete, red to olive green, 1.5–3.7 cm long, 1–2 mm across, sparsely villous, glabrescent. **Leaves** oblique, held horizontally; lamina ovate-lanceolate, basifixed, palmatifid, strongly asymmetric with a well-developed basal lobe on broad side giving a cordate appearance, 9–23.5 cm long, 5–10 cm wide, broad side 3.2–7 cm wide, base unequal, basal lobes cordate, 1.8–4.5 cm long, margin denticulate or biserrate with a triangular to caudate lobes at end of veins, apex long caudate; chartaceous, adaxially olive green, reddish-green to maroon, sometimes with narrowly lime green zones along primary and secondary veins, very sparsely minutely scabrous between veins, abaxially magenta to crimson, sparsely villous on veins, glabrescent; venation palmate-pinnate, midrib distinct, ca. 3 secondary veins on each side, other primary veins branching dichotomously or nearly so, tertiary veins reticulate. **Bracts** hyaline, deciduous, pinkish, ovate, at basal node of inflorescence ca. 3 mm long, 2 mm wide; bracts at the apex of inflorescence ovate-triangular, gradually smaller upward. **Inflorescence** terminal and axillary, bisexual, cymosely branching panicle 5–10 cm long, peduncle 1.7–2.8 cm long, comprising 2 pistillate flowers with a staminate flower in-between, or pistillate flowers at lower part of

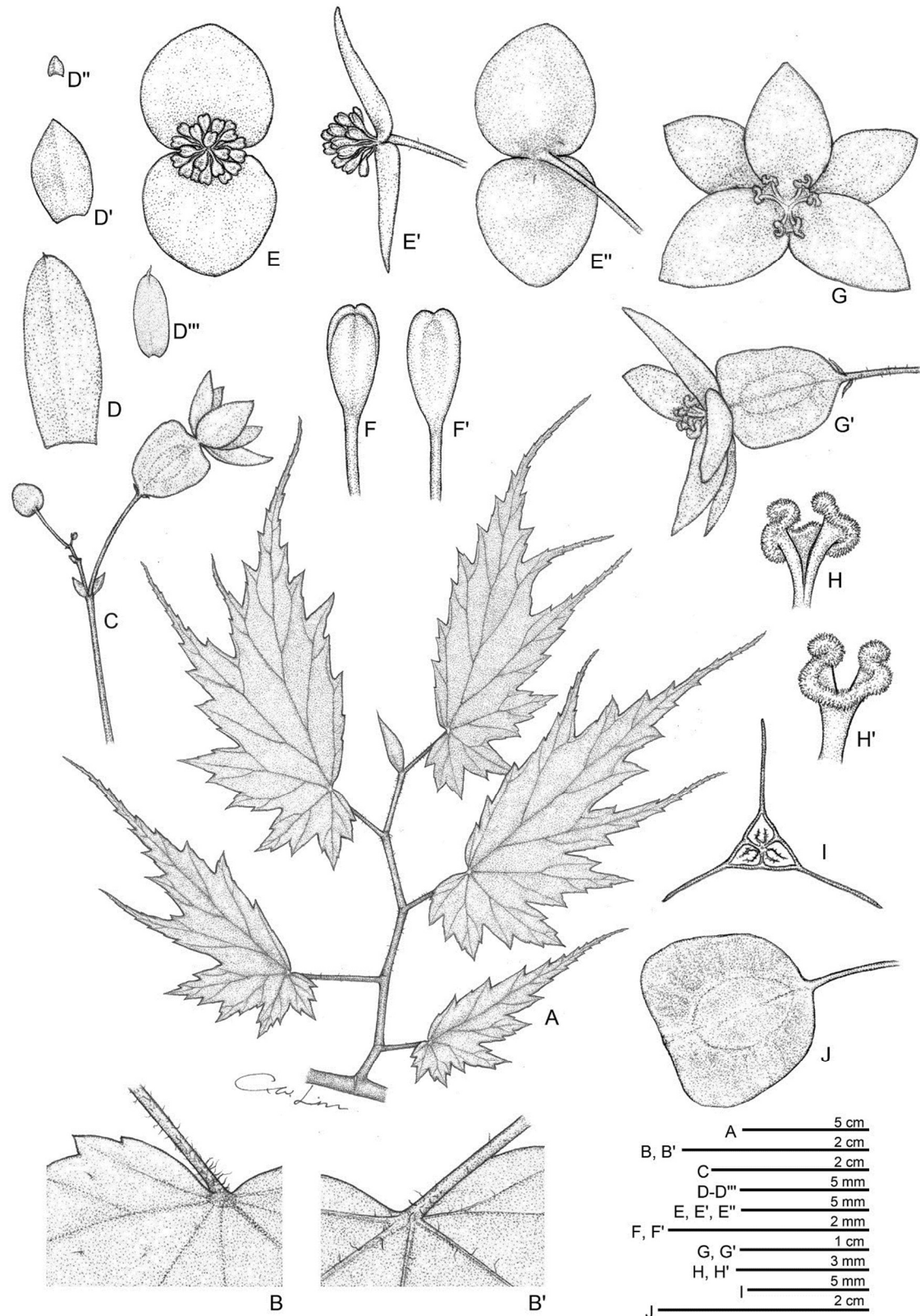
the inflorescence; staminate cymes up to 3 orders of branching and few-flowered; protogynous. **Staminate flower:** pedicel creamy white to pink, up to 4 cm long, sparsely villous or glabrous; tepals 2, pink, suborbicular, abaxially subglabrous, margin entire, 6–11 mm across; androecium actinomorphic, stamens 15–20, filaments fused at base; anthers obovate to elliptic, 1–1.7 mm long, apex retuse, subequal at filaments. **Pistillate flower:** pedicel pinkish-white to pale greenish-pink, up to 3.5 cm long with a pairs alternate bracteoles nearly base of ovary, bracteoles ca. 3 mm long, 1 mm wide, deciduous; sparsely villous or glabrous; tepals 5, rosy pink to pinkish-white, ovate, 8–12 mm long, 4–6 mm wide, glabrous; ovary trigonous-ellipsoid, 5–9 mm long, 3 mm thick (wings excluded), pinkish-white to pale creamy green, glabrous; 3-winged, wings subequal, pinkish, crescent trapezoid to triangular, glabrous, ca. 10 mm long, 3–8 mm wide, margin entire or subentire; ovary 3-locular, placenta bilamellate; styles 3, fused at base, yellow to orange, ca. 3.5 mm long, stigma spirally twisted. **Fruits (immature)** pendent on a stalk ca. 2.5 cm long, capsule body trigonous-ellipsoid, capsule ca. 8 mm long, 5 mm across, 3-locular, placenta bilamellate; wings 3, subequal, crescent trapezoid, rounded distally, rounded or obtuse proximally, ca. 15 mm long, 5 mm wide.

**Distribution and ecology:** *Begonia rubroflabellata* is endemic to the mountainous area around Mt. Popomanaseu in Guadalcanal Island. Plants grow under deeply shaded lower montane forests at elevation 800–1,000 m.

**Etymology:** The specific epithet *rubroflabellata* is derived from the reddish foliage that is fan-shaped.

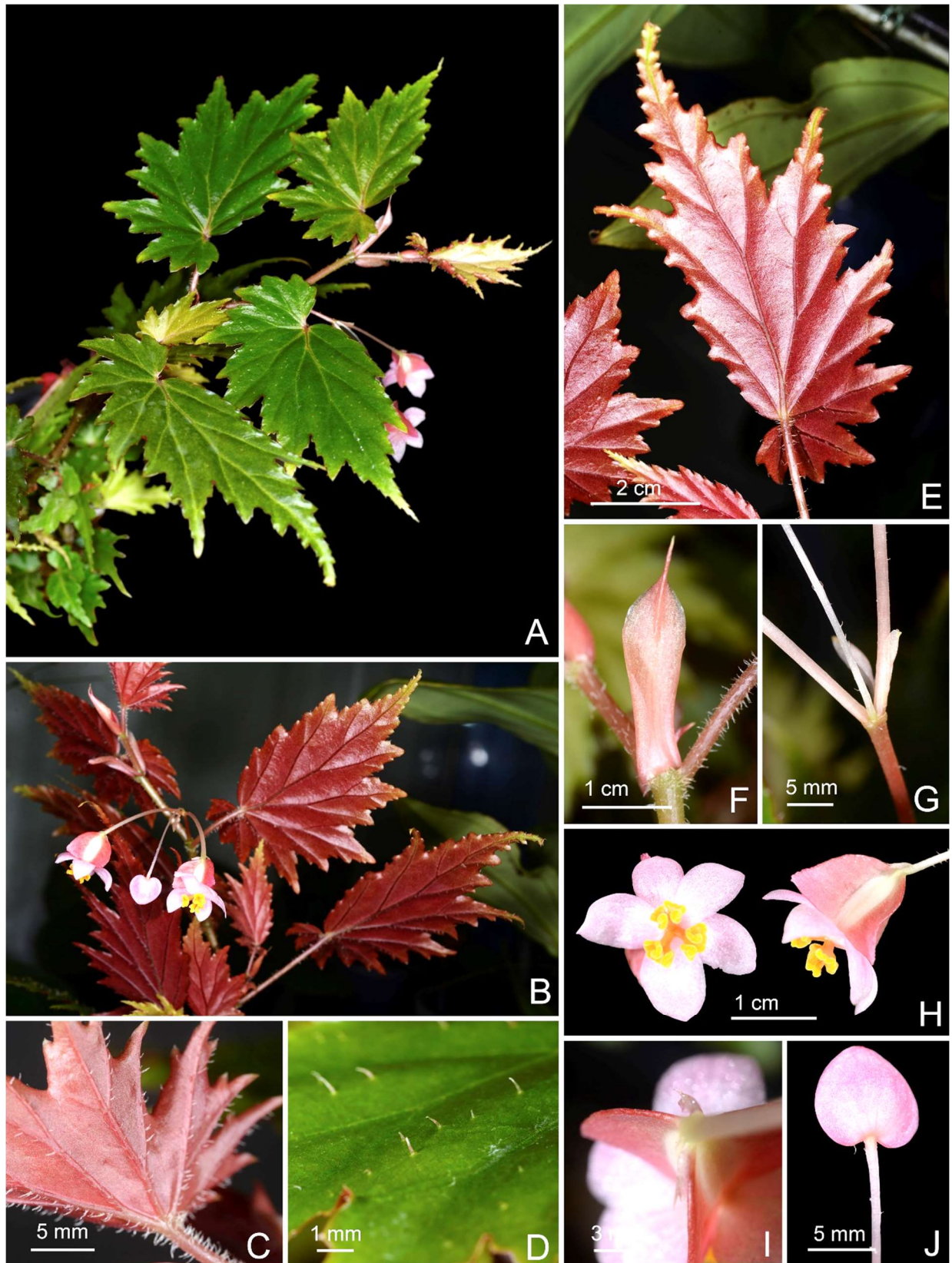
**Conservation Status:** This species is currently known only from its type locality, Mt. Popomanaseu. This mountainous region is largely undisturbed but also botanically unexplored, and more field data are needed toward a precise evaluation of its detailed population size and dynamics. An IUCN Red List assessment for *Begonia rubroflabellata* would be Data Deficient (IUCN 2020).

**Notes:** The new species is characterized by its lacinate lamina that is distinct from all the other begonias in the Solomon Islands. It resembles *Begonia serratipetala* Irmsch. in its erect and multi-branched stem, moderately dissected lamina and 2-tepaled staminate flower (Irmscher, 1913), but the new species is distinguishable by the leaf blade palmatifid (vs. pinnatifid), adaxially uniformly olive green to maroon, sometimes with narrowly lime green zones along primary and secondary veins (vs. brownish-green with pink patches), inflorescences with few (vs. many) staminate flowers and the pedicel up to 4 (vs. ca. 1) cm long, stamens 15–20 (vs. ca. 50), and the pistillate flowers have entire (vs. toothed) tepals, bracteoles present (vs. absent) in the base of ovary. Geographically, *B. rubroflabellata* is endemic to Mt. Popomanaseu, the highest mountain in the Solomon Islands, whereas *B. serratipetala* occurs in Western New Guinea.

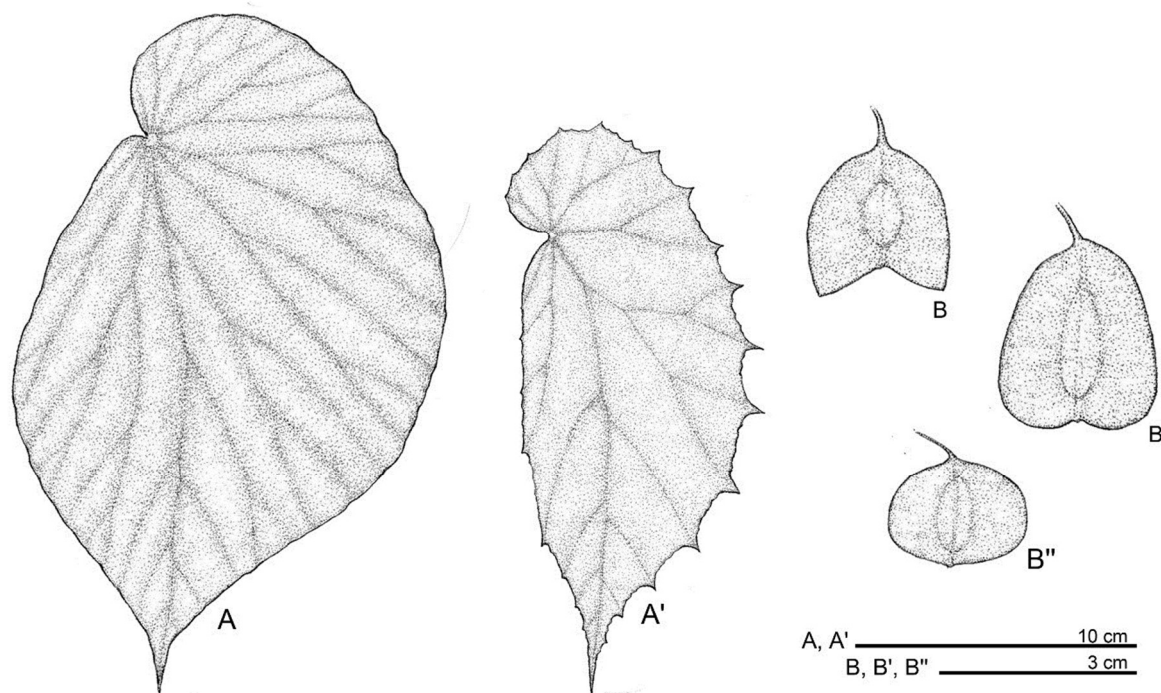


**Fig. 5. *Begonia rubroflabellata*** C.W. Lin & T.C. Hsu. **A.** Branched habit; **B, B'.** Portion of leaf adaxial and abaxial surfaces; **C.** Inflorescence; **D, D', D''.** Bracts, **D'''.** bracteoles; **E, E', E''.** Staminate flower, face, side and back views; **F, F'.** Stamens, dorsal and ventral views; **G, G'.** Pistillate flower, face and side views; **H, H'.** Style and stigmatic band, ventral and dorsal views; **I.** Cross section of an immature capsule; **J.** Capsule.





**Fig. 6.** *Begonia rubroflabellata* C.W. Lin & T.C. Hsu.. **A.** Habit; **B.** Upper branch with inflorescence, abaxial surface; **C.** Portion of young leaf, abaxial surface; **D.** Portion of leaf, adaxial surface; **E.** Leaf, abaxial surface; **F.** Stipule; **G.** Bracts; **H.** Pistillate flower, face and side views; **I.** Bracteoles; **J.** Immature staminate flower. All from *KBCC living collection K059258* by T.C.Hsu.



**Fig. 7.** *Begonia somervillei* Hemsl. **A, A'**. Leaf, different shape exhibited by two individuals (A: SITW07396, A': SITW11239); **B, B', B''**. Capsule, showing varied size and shape (B: SITW02678, B': SITW11239, B'': SITW04510).

**5. *Begonia somervillei*** Hemsl., Bull. Misc. Inform. Kew 109: 17 (1896). **Type:** SOLOMON ISLANDS. Western Province, New Georgia Island, May 1894, *B.T. Somerville et al.* 222 (holotype K 000761001!).

**Figs. 7, 8, 9**

Evergreen perennial, monoecious, terrestrial. **Stem** erect or ascending, much-branched, green to red, to 70 cm or taller, (0.2–)0.5–1 cm across, internodes 2.5–10 cm long, nodes swollen. **Stipules** pale green to reddish, hyaline, narrowly ovate to ovate-triangular, 10–25 mm long, 5–7 mm wide, strongly keeled, margin entire, apex cuspidate. **Petioles** subterete, pale green to yellowish-red, 1–5 cm long at upper stem, prolong at lower stem to 11 cm long, (1.2–)2–5 mm across. **Leaves** oblique, held more or less horizontally; lamina elliptic, lanceolate-ovate, widely ovate to obovate, basifixed, asymmetric with a well-developed basal lobe on one side giving a cordate appearance on broad side, margin subentire to denticulate, sometimes serrate and irregularly shallowly triangular lobes at vein endings, apex caudate to acuminate; leaf blade (6–)9–21(–28.5) cm long (basal lobes included), (2.3–)4.2–12(–15) cm wide, broad side (1.5–)2.7–8(–10.2) cm wide, base unequal, basal lobes cordate, 0.5–6 cm long, slightly succulent, adaxially yellowish-green to reddish-olive, venation green or reddish toward base, abaxially pale green to crimson; venation palmate-pinnate, midrib distinguishable, (5–)8–17(–22) cm long, with *ca.* 3 major lateral veins on each side, other primary veins branching dichotomously. **Bracts** hyaline, deciduous, pale green to pinkish, slightly

keeled, those at base of inflorescence ovate to narrowly ovate, 1.5–2.5 cm long, 0.5–1.2 cm wide, margin entire, apex cuspidate, at summit of inflorescence similar but smaller. **Inflorescence** terminal, lateral or axillary, bisexual, cymosely branching panicle 7–18 cm long, peduncle (2–)3.5–10 cm long, staminate cymes terminal, with 4–7 orders of branching, reddish-green to magenta, glabrous; pistillate flowers in pairs, sometimes solitary, on a peduncle up to 3 cm at lower part of the inflorescence or upper leaf axils, sometimes subsessile; protogynous. **Staminate flower:** pedicel (5–)10(–25) mm long, tepals 2, pink to white, orbicular, thick fleshy, cucullate, (3–)5(–6) mm across, margin entire; androecium actinomorphic, stamens 13–45, filaments subequal, fused at base; anthers *ca.* 0.8 mm long, obovate, longer than filaments. **Pistillate flower:** pedicel 12–18 mm long, glabrous, ovary pale green to reddish, narrowly trigonous-ellipsoid, 5–12 mm long, 2–3 mm across, glabrous, 3-winged, wings narrowly triangular, trapezium to crescent-shaped, equal, 12–20 mm long, 3–8 mm wide, rounded to truncate distally, cuneate to rounded proximally, margin entire, glabrous; ovary 3-locular, placenta bilamellate; tepals 3 (rarely 4), creamy white to pink, ovate, apex obtuse to acute, base rounded, 7–13 mm long, 4–8 mm wide; styles 3, yellow, bifid, 2.5–4.5 mm long, Y-shaped; stigmas in a spiral band and papillose all around. **Fruits** recurved on a stalk 1.7–4.2 cm long, capsule 1.5–3.2 cm long, 1.7–3 cm across (wings included), wings 3, equal, margin entire, sometimes tip pointed, rounded to truncate distally, cuneate to rounded proximally.



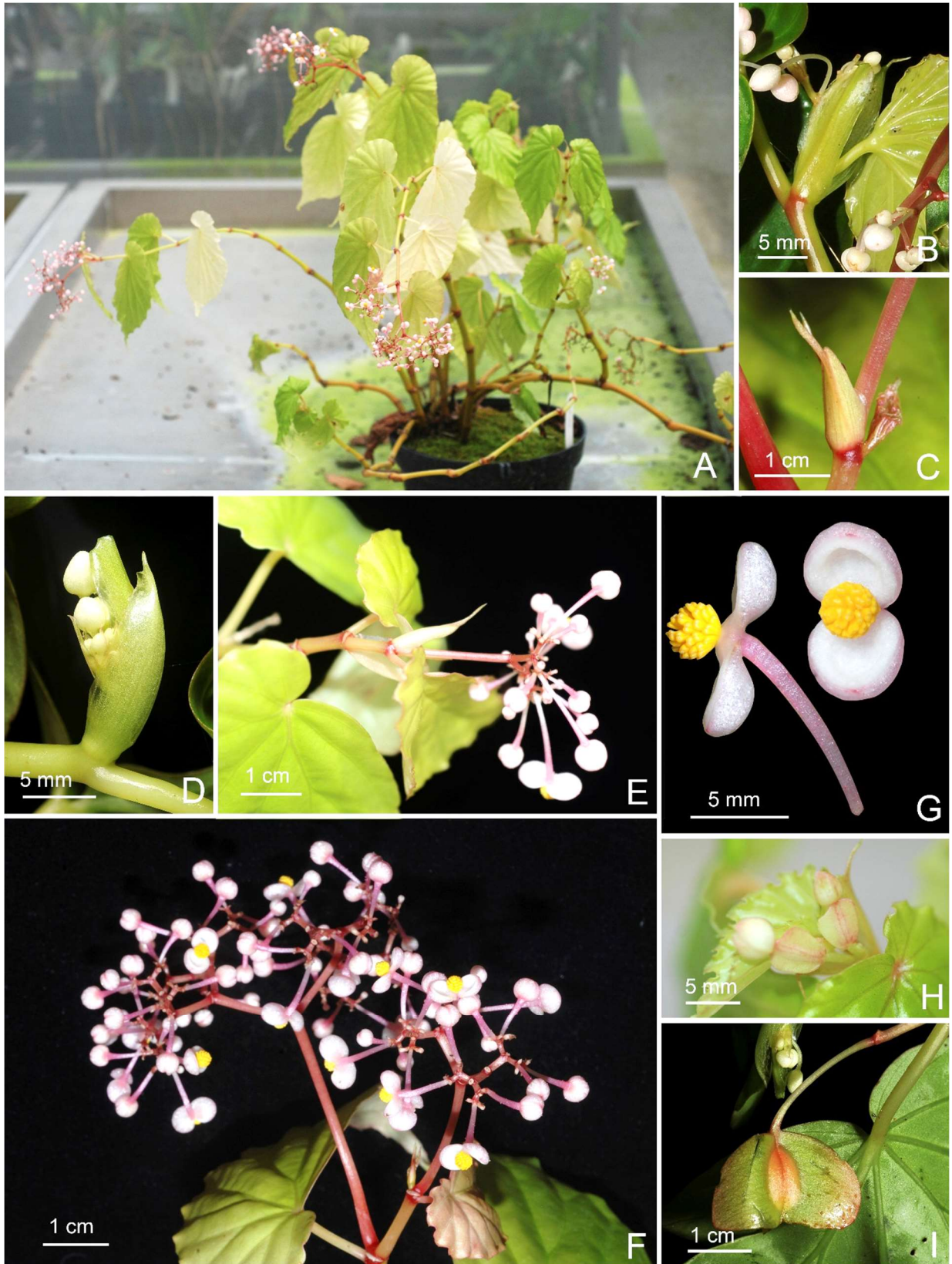
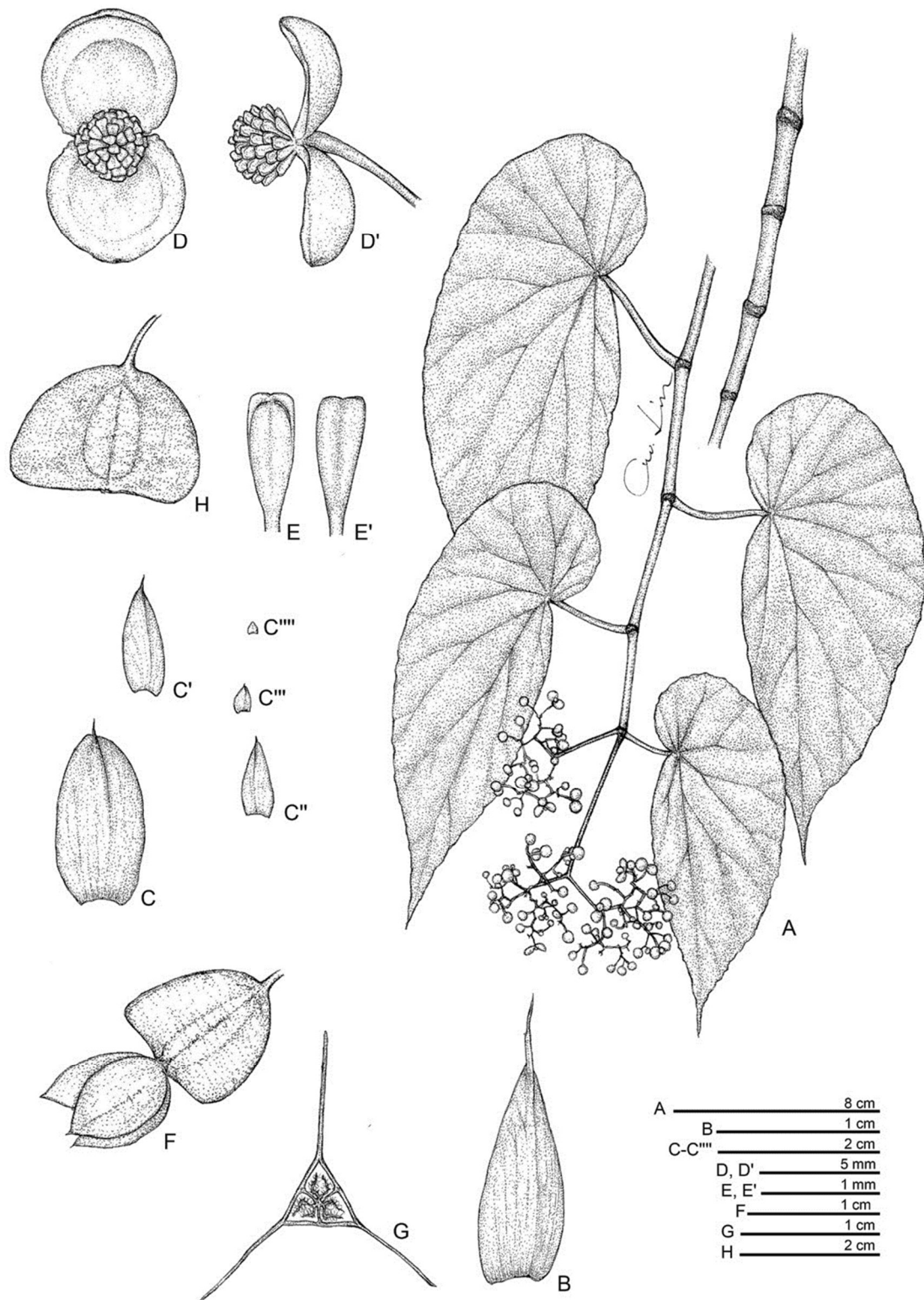


Fig. 8. *Begonia somervillei* Hemsl. A. Habit; B, C. Stipules; D. Bracts; E. Upper branch with staminate flowers; F. Inflorescence; G. Staminate flower, face and side views; H. Immature pistillate flower, face and side views; I. Capsule. A,C,E - H from *KBCC living collection K101104* by C.W.Lin; B,D,I from *SITW10086* by W.Y.Wang



**Fig. 9.** *Begonia somervillei* Hemsl. **A.** Branched habit; **B.** Stipule; **C - C'''**. Bracts; **D, D'.** Staminate flower, face and side views; **E, E'.** Stamens, dorsal and ventral views; **F.** Immature pistillate flower; **G.** Cross section of an immature capsule; **H.** Capsule.





**Distribution and ecology:** *Begonia somervillei* is endemic to the Solomon Islands. It is commonly found growing on steep slopes or along streams from sea level to ca. 850 m elevation.

**Conservation Status:** According to IUCN Red List criteria, *Begonia somervillei* is assessed as Least Concern (IUCN 2020), as it is widespread in the Solomon Islands.

**Note:** *Begonia somervillei* is endemic to the Solomon Islands and variable in the appearance, especially in its leaf shape and size. Moreover, the coloration of leaves also ranges from yellowish-green to reddish-olive adaxially and pale green to crimson abaxially. Meanwhile, it is sharply distinct among congeners in its staminate flowers bearing two small, thick fleshy, distinctly cucullate tepals (vs. thin-textured and relatively flat in other species). Such tepal morphology is uniform across the populations from different islands in our field survey. However, there are still slight differences in leaf morphology among different populations. It is worthy to mention that a population in central Guadalcanal (SITW11239) has pointed short lobes on margin of leaves, while most other populations generally has ovate to lanceolate leaves with subentire or denticulate margins. The capsules also vary in size, aspect ratio and wing profiles (Fig. 7) but usually more rounded than *B. weigallii*, the only species with similar habits from the Solomon Islands.

**Additional specimens examined:** SOLOMON ISLANDS. **Choiseul Province: Choiseul Island:** Tuzu, 30–70 m elev., 15 June 2013, *Hu et al. SITW02678* (BSIP, TAIF, TNM); Tasure, sea level, 14 June 2013, *Hu et al. SITW02618* (as *Begonia* sp., Chiou *et al.*, 2016); *SITW02619* (BSIP, TAIF, TNM).

**Guadalcanal Province: Guadalcanal Island:** Small waterfall near Bomb Load village, 200–250 m elev., 21 August 2012, *Hsu & Chen SITW00195* (BSIP, TAIF, TNM); Nuhukama river to Savuna river, 600–850 m elev., 16 July 2016, *Hsu et al. SITW11239* (BSIP, TNM); Gifu village, from ridge to waterfall, 150 m elev., 28 July 2016, *Chang et al. SITW11349* (TNM); Marau, Poposa camp areas, Coastland, 250 m elev., 7 September 2016, *Lee et al. SITW12163* (TNM); Visale village, 112 m elev., 8 July 2015, *Huang et al. SITW07396* (BSIP, TAIF, TNM); Avu Avu, 28 January 1987, *Henderson 121* (BSIP); ca. 10.5 km up Umusami river, ca. 137 m elev., 5 July 1965, *Hunt 2019* (BSIP); Eastern slopes of Mt. Gallego, ca. 400 m elev., 8 July 1965, *Hunt 2092* (BSIP); Mt. Mambulu, ca. 300 m elev., 20 July 1967, *Nakisi BSIP8022* (BSIP); Upper reaches of Monitor creek, ca. 333 m elev., 6 July 1965, *Whitmore 6058* (BSIP); Sangava river, 27 June 1956, *Brown 5348* (BSIP); Hidden valley, Mt. Gallego, ca. 667 m elev., 16 September 1966, *Dennis BSIP4633* (BSIP); Wanderer bay, Vuragoba area, ca. 40 m elev., 30 March 1968, *Gafui & collectors BSIP9036* (BSIP); Lungga river area, about 10 km south of Honiara, 16 July 1993, *Regalado & Sirikolo 697* (BSIP); Mission station (Avu Avu), 12 m elev., 27 May 1968, *Runikera & collectors BSIP 9909* (BSIP); Tina river, foothills about 19 km inland from coast, ca. 61 m elev., 12 November 1962, *Womersley & Whitmore 1101* (BSIP).

**Isabel Province: Santa Isabel Island:** Vuhulu, 292 m elev., 14 October 2013, *Yang et al. SITW04500* (BSIP, TNM), *SITW04510* (BSIP, TAIF, TNM); Vuhulu, 379 m elev., 14 October 2013, *Yang et al. SITW04469* (BSIP, TAIF, TNM); Potoro bay, 30 August 1966, *Beer BSIP7679* (BSIP).

**Makira Ulawa Province: Makira Island:** Anganawai, ca. 3 m elev., 11 October 1968, *Runikera & collectors BSIP10890* (BSIP); Marogu area, ca. 454 m elev., 18 October 1968, *Runikera & collectors BSIP11098* (BSIP).

**Malaita Province: Malaita Island:** Central Malaita, near Saruvi village, Fiu river, 400–500 m elev., 13 September 2015, *Chen et al. SITW10086* (as *Begonia* sp., Chiou *et al.*, 2016) (BSIP, TNM).

**Western Province: New Georgia Island:** Muda, Arara camp areas, 50 m elev., 30 August 2016, *Lee et al. SITW13659* (BSIP, TNM).

**Rendova Island:** West coast, Zaimane river, 12 September 1963, *Whitmore BSIP1865* (BSIP). **Shortlands Island:** Koiaie area, ca. 30 m elev., 13 March 1969, *Mauriasi & collectors BSIP13297* (BSIP).

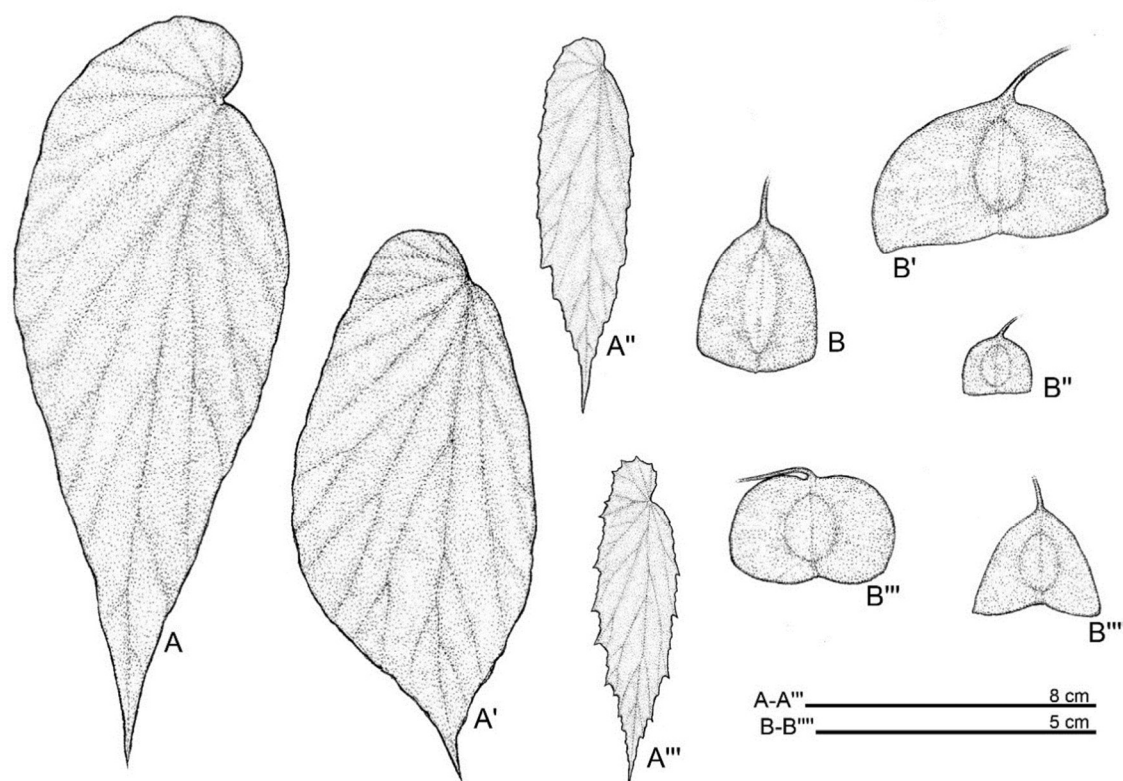
**Vella Lavella Island:** Eel camp to Mt. Tabisala, 312–775 m elev., 28 October 2013, *Hsu et al. SITW04379* (BSIP, TNM).

**6. *Begonia weigallii* Hemsl., Bull. Misc. Inform. Kew 109: 17 (1896). Type:** SOLOMON ISLANDS. Western Province, New Georgia Island, May 1894, *S. Weigall et al. 223* (holotype K 000761002!).

*Begonia salomonensis* Merr. & L.M.Perry, J. Arnold Arbor. 24: 56 (1943), *syn. nov.* **Type:** SOLOMON ISLANDS. Makira-Ulawa Province, Ulawa Island, swampy rain-forest on coral, October 1932, *L.J. Brass 2950* (lectotype: A 00068338 image!, designated by Hughes (2008: 112, as “holo A”); isolectotype: BO 1854172 image!).

### Figs. 10, 11, 12

Evergreen perennial, monoecious, terrestrial. **Stem** erect or ascending, much-branched, green or reddish-green, to 100 cm or taller, (0.2–)5–10 mm across, internodes (1.5–)3–13 cm long. **Stipules** pale green to pinkish, hyaline, ovate to ovate-triangular, 13–40 mm long, 4–20 mm wide, strongly keeled, margin entire, apex cuspidate. **Petioles** subterete, pale green to reddish-green, (0.3–)1–5 cm long at upper stem, prolong at lower stem to 10 cm long, (1–)2–5 mm across. **Leaves** oblique, held more or less horizontally; lamina lanceolate, widely ovate to obovate, basifixed, asymmetric with a well-developed basal lobe on one side giving a cordate appearance on broad side, margin subentire to denticulate, sometimes biserrate and shallowly triangular lobes at vein endings, apex caudate to acuminate; leaf blade (5–)9.5–25.5(–36) cm long (basal lobes included), (1.5–)3.6–12.5(–16.3) cm wide, broad side (0.8–)2.5–7.7(–10) cm wide, base unequal, basal lobes cordate, 0.2–7.5 cm long, slightly succulent, adaxially bright green to emerald green, abaxially pale green; venation palmate-pinnate, midrib distinguishable, (4.5–)8.5–21(–28) cm long, with ca. 3 major lateral veins on each side, other primary veins branching dichotomously. **Bracts** hyaline, deciduous, pale green to pinkish, slightly keeled, those at base of inflorescence ovate, 0.8–2.5 cm long, 0.3–1 cm wide, margin entire, apex cuspidate, at summit of inflorescence similar but smaller. **Inflorescence** terminal, lateral or axillary, bisexual, cymosely branching panicle 5–19 cm long, peduncle 2–8 cm long, staminate cymes terminal, with 3–9 orders of branching, pale green to magenta, glabrous; pistillate flowers in pairs, on a peduncle up to 3 cm at lower part of the inflorescence or upper leaf axils, sometimes subsessile; protogynous. **Staminate flower:** pedicel 5–17 mm long, tepals 2, white to pinkish, orbicular to very widely ovate, 0.3–1.3 cm long, 0.3–1 cm wide, margin entire, apex acute to rounded; androecium actinomorphic, stamens 15–40, filaments subequal, fused



**Fig. 10.** *Begonia weigallii* Hemsl. **A - A'''**. Leaf, different shape exhibited by four individuals (A: SITW13996, A': SITW05573, A'': SITW007851, A''': SITW07944); **B - B'''**. Capsule, showing varied size and shape (B: SITW05573, B': SITW08217, B'': SITW07944, B''': SITW04136, B''': BSIP15756).

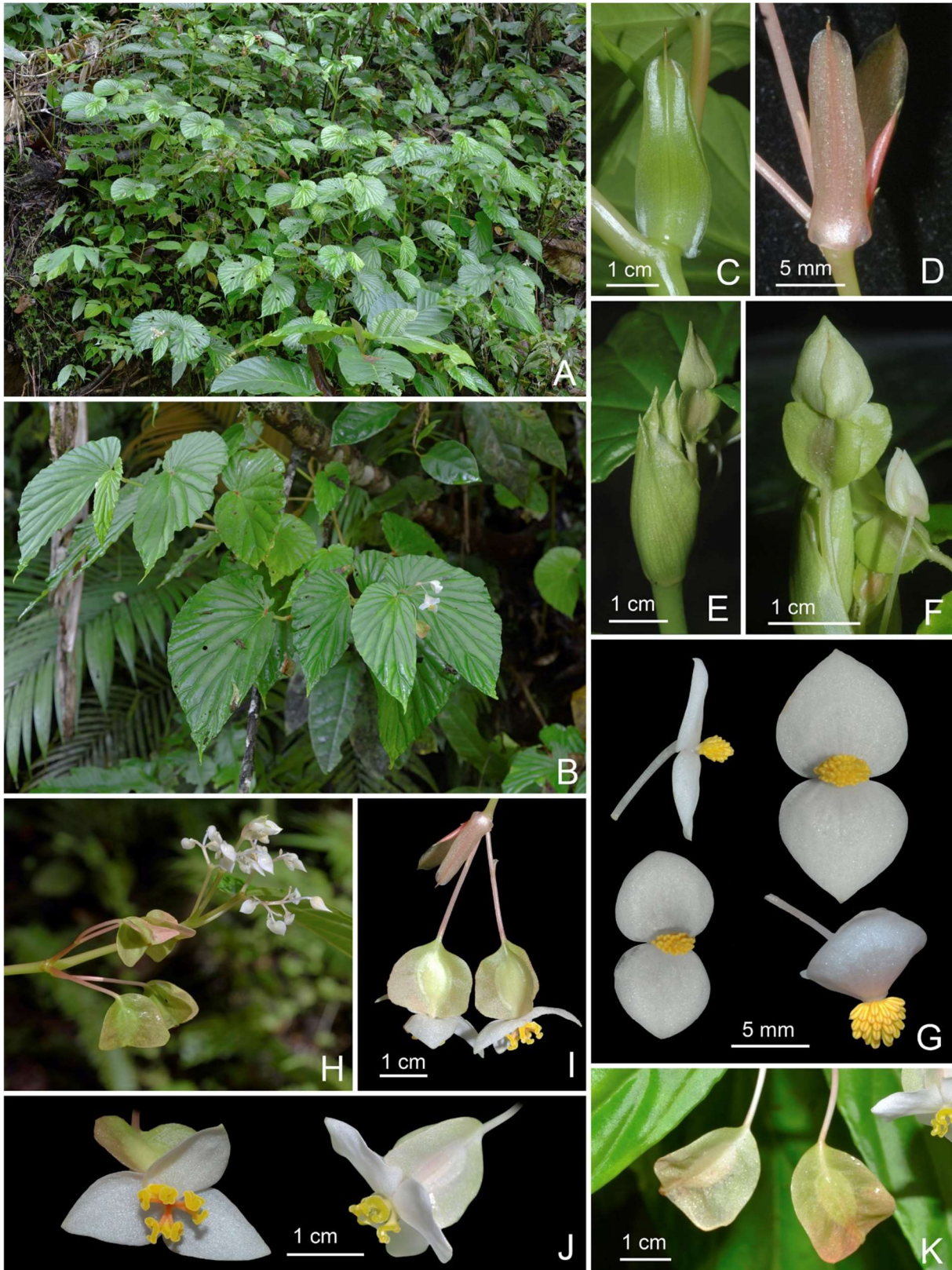
at base; anthers *ca.* 0.8 mm long, obovate, longer than filaments. **Pistillate flower:** pedicel 15–30 mm long, glabrous or puberulous, ovary pale green to reddish, narrowly trigonous-ellipsoid, 7–10 mm long, 5–7 mm across, glabrous or puberulous, 3-winged, wings triangular, trapezium to crescent-shaped, equal, 12–17 mm long, 4–8 mm wide, rounded to truncate distally, cuneate to rounded proximally, margin entire, glabrous or sparsely puberulous; ovary 3-locular, placenta bilamellate; tepals 3, white to pink, ovate, apex obtuse to acute, base rounded, 12–22 mm long, 7–12 mm wide; styles 3, yellow to reddish-yellow, bifid, 4–6 mm long, Y-shaped; stigmas in a spiral band and papillose all around. **Fruits** recurved on a stalk 1.7–5 cm long, capsule 1–2.8 cm long, 1.5–3.2 cm across (wings included), wings 3, equal, margin entire, sometimes tip pointed, rounded to truncate distally, cuneate to rounded proximally.

**Distribution and ecology:** *Begonia weigallii* is widespread in the Solomon Islands and Papua New Guinea, including Bougainville and the Bismarck Archipelago (Hughes, 2008). Growing on gentle soil slopes, sandstone or limestone boulders, or on the edge of primeval or secondary forests, from sea level to *ca.* 1,000 m elevation.

**Conservation Status:** This species is widespread in the Solomon Islands and Papua New Guinea. We consider an IUCN Red List criteria as Least Concern (LC)

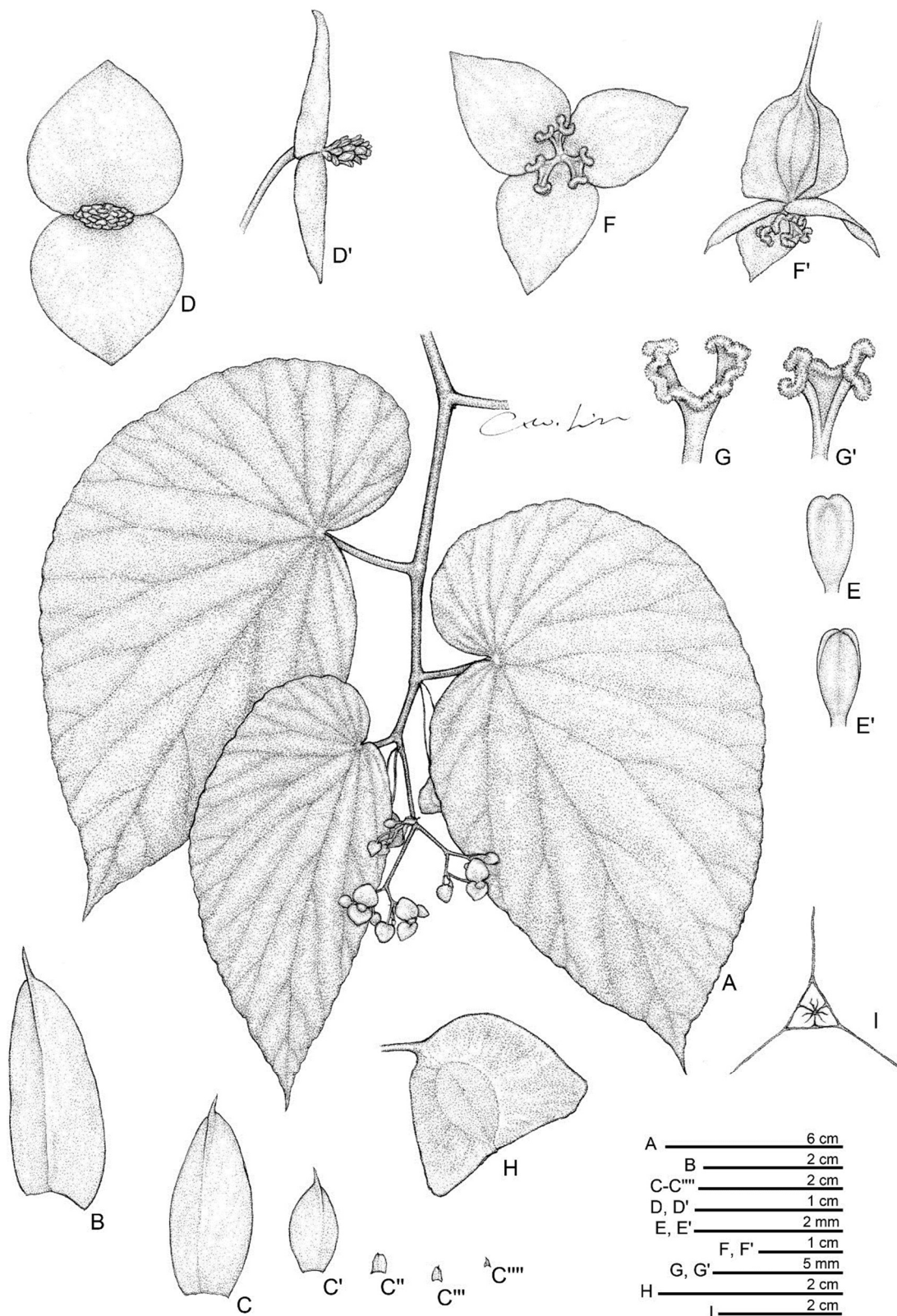
to be appropriate.

**Note:** *Begonia weigallii* is the most common species of *Begonia* in the Solomon Islands and occurs frequently in various forest habitats. This species is distinguishable by its ovate and uniformly green leaves and relatively larger flowers, though the number of flowers and leaf size are variable. The shape of its capsule wings, which is usually an important diagnostic character for *Begonia*, is extremely polymorphic even in the same population (Fig. 10). In addition, different populations and individuals also show some variation in the leaf margin: most plants have ovate laminae with subentire (e.g. *SITW13996*) or denticulate margin (e.g. *SITW12447*; *SITW12906*; *SITW11753*; *SITW12761*); while few plants collected from the higher montane region (960 m) of Malaita Island (*SITW07944*) show lanceolate leaves and biserrate margin, and the sizes of leaves and capsules are also smaller than the lowland populations. However, a collection at slightly lower altitudes (400–500 m) from the same area (*SITW08752*) shows intermediate leaf morphology, and hence the morphologically characters between populations of lowland and highland seem to show an ecocline. Additionally, the surface of ovary is also variable from glabrous (e.g. *SITW1191*) to puberulent (e.g. *K100154*). Merrill and Perry (1943) described a new species *Begonia salomonensis* from



**Fig. 11.** *Begonia weigallii* Hemsl. **A, B.** Habit and habitats; **C, D.** Stipules; **E.** Bracts; **F.** Immature inflorescence, showing hairy ovary; **G.** Staminate flowers, varied size of tepals; **H.** Inflorescence and capsules; **I.** A pair of pistillate flowers; **J.** Pistillate flowers; **K.** Capsules. A,B,H,J (right),K from *SITW02520* by C.F.Chen; C from *KBCC living collection K022988*; E,F,G (upper & lower left) from *KBCC living collection K100154*; G (lower right),I,J (left) from *SITW1191* by C.W.Lin





**Fig. 12.** *Begonia weigallii* Hems. **A.** Branched habit; **B.** Stipule; **C - C'''**. Bracts; **D, D'**. Staminate flower, face and side views; **E, E'**. Stamens, ventral and dorsal views; **F, F'**. Pistillate flower, face and side views; **G, G'**. Style and stigmatic band, dorsal and ventral views; **H.** Capsule; **I.** Cross section of an immature capsule.





Ulawa Island based on a single gathering (*Brass* 2950) without explaining any differences between similar species. Since the morphological characters showed in the type and protologue fall within our current circumscription of *B. weigallii*, we herein treat *B. salomonensis* as a synonym of *B. weigallii*. Although this study adopted a more conservative species concept, there is still a certain possibility that morphologically cryptic species exist among the *B. weigallii* complex, and more detailed studies based on living materials and molecular data are urgently needed to clarify this issue.

**Additional specimens examined:** SOLOMON ISLANDS.

**Central Province: Russell Islands:** Kalan camp, 220 m elev., 9 October 2016, *Hung & Chen SITW12447* (TAIF, TNM). **Savo Island:** Pokilo, Veusu river area, ca. 91 m elev., 10 April 1969, *Gafui & collectors BSIP14578* (BSIP); Sapasiata area, Tonginakulu R., ca. 117 m elev., 14 April 1969, *Gafui & collectors BSIP12970* (BSIP).

**Guadalcanal Province: Guadalcanal Island:** Vunga Tabu, 100–500 m elev., 27 July 2014, *Chung et al. SITW05573* (BSIP, TAIF, TNM); Hidden Valley, Mt. Gallego, ca. 610 m elev., 16 September 1966, *Dennis BSIP4618* (BSIP); Wanderer bay area, 21 October 1968, *Fa'arodo & collectors BSIP12156* (BSIP); Big Nggela, Rove area, ca. 67 m elev., 26 July 1969, *Gafui & collectors BSIP14770* (BSIP); Rere river, 20 November 1963, *Lipaqeto BSIP3370* (BSIP); Duidui area, ca. 23 m elev., 4 October 1968, *Maurisai & collectors BSIP11756* (BSIP); Lambi bay area, ca. 23 m elev., 6 November 1968, *Maurisai & collectors BSIP12489* (BSIP); Tabale village side west coast, ca. 13 m elev., 14 June 1968, *Sirute'e & collectors BSIP10127* (BSIP).

**Isabel Province: Santa Isabel Island:** Mt. Kobinitu, 600–800 m elev., 17 July 2014, *Hsu et al. SITW05448* (BSIP, TAIF, TNM); *SITW05521* (BSIP, TAIF, TNM); Allardyce harbour, ca. 8 m elevation, 9 November 1967, *Kinifu & Susui BSIP8299* (BSIP).

**Makira Ulawa Province: Makira Island:** Manibena village, 362 m elev., 28 May 2017, *Yang et al. SITW12871* (TNM); Maderado village, 200 m elev., 8 May 2017, *Hsu et al. SITW12906* (BSIP, TAIF, TNM); Kirakra, 10°45'12.4"S, 161°89'40.1"E, 10 m elev., 6 July 2015, *Hung et al. SITW07120* (TAIF, TNM); Mangana village, village near the mountain, 324 m elev., 30 September 2016, *Wang et al. SITW12772* (BSIP, TNM); *SITW12773* (BSIP, TAIF, TNM), Mangana Stream, 47 m elev., 1 October 2016, *Yang et al. SITW12592* (BSIP, TAIF, TNM); Kirakira city, side road to the stream, 38 m elev., 28 September 2016, *Wang et al. SITW12751* (BSIP, TAIF, TNM); *SITW12761* (TNM), Muas village, Puapua river, 33 m elev., 15 October 2012, *Chen SITW01191* (TNM); Forestry branch office of Kirakira to Hagataro ridge top, 70 m elev., 6 September 2011, *Watanabe et al. SIMB1721* (TNM); Ngongangongamela, above Arohane, 488 m elev., 30 April 1972, *Powell BSIP19433* (BSIP); Ngongangongamela, above Arohane, 610 m elev., 1 May 1972, *Powell BSIP19445* (BSIP); Warahito river, 1 August 1965, *Whitmore 6270* (BSIP); ca. 402 m up Warahito river, 67 m elev., 26 July 1965, *Hunt 2245* (BSIP); ca. 1.6 km up Pegato river, 67 m elev., 23 August 1965, *Hunt 2215* (BSIP); Wairaha river, ca. 8 km from north coast, 12 May 1964, *Whitmore BSIP4314* (BSIP). **Ulawa Island:** Aroaha, 2–3 m elev., 4 February 1965, *Teona BSIP6221* (BSIP).

**Malaita Province: Malaita Island:** North region, Mt. Saranifilu, 400–700 m elev., 1 August 2015, *Hung et al. SITW08700* (BSIP, TAIF, TNM), 400–500 m elev., 1 August 2015, *Hung et al. SITW08752* (BSIP, TAIF, TNM), 960 m elev., 1 August 2015, *Hung et al. SITW07944* (BSIP, TAIF, TNM), *SITW08040* (BSIP, TAIF, TNM); Elifolo village, 150–350 m elev., 22 July 2015, *Hung et al. SITW07850* (BSIP, TAIF, TNM), *SITW07851* (BSIP, TAIF, TNM); Faisukui village, 400–750 m elev., 20 August 2015, *Hsu et al. SITW08234* (BSIP, TAIF, TNM), *SITW08217* (BSIP, TAIF, TNM); Auki region, Rualiu village, 400 m elev., 11 August 2015, *Hung et al. SITW09098* (BSIP, TAIF, TNM); Mt. Alasa'a, ca. 600 m elev., 22 November 1965, *Hunt 3049* (BSIP); Mt. Alasa'a, ca. 762 m elev., 22 November 1965, *Hunt 3051* (BSIP); Harumou, ca. 3 m elev., 7 September 1968, *Fa'arodo & collectors BSIP13715* (BSIP); Dala, ca. 61 m elev., 17 August 1968, *Gafui &*

*collectors BSIP10587* (BSIP). **South Malaita Island:** North of Palasu'u School, ca. 50 m elev., 29 September 1969, *Gafui & collectors BSIP17319* (BSIP).

**Western Province: Baga Island:** ca. 150 m elev., 9 January 1963, *Whitmore BSIP1315* (BSIP). **Kolombangara Island:** Imbu Rano lodge to Myles falls, ca. 233 m elev., 19 October 2012, *Yang et al. SITW00973* (BSIP, TAIF, TNM); Imbu lodge to waterfalls, 150–250 m elev., 19 May 2013, *Chen et al. SITW02520* (BSIP, TNM); Conku Rano hut to crater waterfalls, 600–700 m elev., 6 November 2013, *Hsu et al. SITW04520* (BSIP, TAIF, TNM); En route from Imbu Rano lodge to side creek waterfall (Vila river), Ringgi village, 260–360 m elev., 30 April 2013, *Chen et al. SITW01890* (BSIP, TNM); Nusatuva, 57 m elev., 18 June 2017, *Hung et al. SITW13996* (BSIP, TAIF, TNM); 300–400 m elev., 3 September 2015, *Hung et al. SITW09488* (BSIP, TNM); ca. 30 m elev., 27 August 1965, *Hunt 2447* (BSIP); Kokove area, ca. 975 m elev., 12 January 1968, *Maurisai & collectors BSIP8602* (BSIP); Southeastern area, ca. 30 m elev., 29 May 1968, *Maurisai & collectors BSIP9592* (BSIP). **Mono Island:** Palusua, ca. 33 m elev., 1 May 1969, *Maurisai & collectors BSIP14171* (BSIP); Maloaini area, ca. 17 m elev., 3 June 1969, *Maurisai & collectors BSIP14275* (BSIP); Palusua, ca. 30 m elev., 16 November 1990, *Qusa 73, BSIP21165* (BSIP). **Nggatokae Island:** Mbiche village to Mt. Mariu, 300–600 m elev., 9 October 2013, *Hsu et al. SITW04136* (BSIP, TNM). **Ovau Island:** Savaava area, 142 m elev., 26 March 1969, *Maurisai & collectors BSIP13385* (BSIP). **Ranongga Island:** Qiloe village to Mt. Kela, 400–710 m elev., 16 August 2013, *Hsu et al. SITW03197* (BSIP, TAIF, TNM); Dae area, ca. 50 m elev., 10 June 1969, *Maurisai & collectors BSIP14397* (BSIP); None area, ca. 33 m elev., 19 June 1969, *Maurisai & collectors BSIP14484* (BSIP); Southwestern area, ca. 25 m elev., 23 June 1969, *Maurisai & collectors BSIP15589* (BSIP); Palaina area, ca. 183 m elev., 28 June 1969, *Maurisai & collectors BSIP15703* (BSIP); Southwestern area, ca. 117 m elev., 1 July 1969, *Maurisai & collectors BSIP15756* (BSIP). **Shortland Island:** Kariki, 300–400 m elev., 17 June 2013, *Hu et al. SITW02738* (BSIP, TAIF, TNM), *SITW02748* (BSIP, TAIF, TNM). **Simbo Island:** Simbo Mainland, Duni village, 4 m elev., 6 April 2013, *Yang et al. SITW01475* (BSIP, TAIF, TNM).

## ACKNOWLEDGMENTS

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