

Monograph

A revision and one new species of *Begonia* L. (Begoniaceae, Cucurbitales) in Northeast India

Rebecca CAMFIELD^{1,*} & Mark HUGHES²

^{1,2} Royal Botanic Gardens Edinburgh, 20a Inverleith Row,
Edinburgh, EH5 3LR, United Kingdom.

* Corresponding author: RCamfield@rbge.org.uk

² Email: MHughes@rbge.org.uk

Abstract. Following a taxonomic revision of *Begonia* L. (Begoniaceae, Cucurbitales) from Northeast India based on 332 herbarium specimens, 38 species are confirmed to occur in the region, of which ten are endemic. One new species is described, *Begonia koelzii* R. Camfield sp. nov., in *B.* sect. *Platycentrum* (Klotzsch) A. DC. One species is reduced into synonymy; *B. barbata* Wall. is now a synonym of *B. thomsonii* A. DC. Three species, *B. difformis* (Irmsch.) W. C. Leong, C. I. Peng & K. F. Chung, *B. labordei* H. Lév. and *B. handelii* Irmsch., are reported new for India, and *B. lushaiensis* C. E. C. Fisch. is reinstated as an accepted species, having previously been synonymised under *B. modestiflora* Kurz. A key to the species in the region and preliminary conservation assessments are presented.

Keywords. *Begonia*, taxonomy, revision, Northeast India.

Camfield R. & Hughes M. 2018. A revision and one new species of *Begonia* L. (Begoniaceae, Cucurbitales) in Northeast India. *European Journal of Taxonomy* 396: 1–116. <https://doi.org/10.5852/ejt.2018.396>

Introduction

Begonia L. is a large tropical and subtropical genus of 1825 species (Hughes *et al.* 2015). There are ca 900 species described from Asia, with the *Begonia* flora of China and parts of Southeast Asia being reasonably well understood (Gu *et al.* 2007; Hughes 2008; Kiew 2010). The Himalayan region has also been the focus of recent research (Rajbhandary *et al.* 2010). However, the *Begonia* flora of Northeast India is still mostly known from the historic account by Clarke (1879) in the Flora of British India. This represents a gap in our knowledge of a diverse flora, which nestles in the biogeographic nexus between the Himalayas, northern Myanmar, Yunnan and Thailand. For the purposes of this revision, Northeast India is considered as the seven contiguous states Assam, Arunachal-Pradesh, Manipur, Meghalaya, Mizoram, Nagaland and Tripura. It is a transition zone not only between three biogeographic regions (Indian, Indo-Malayan and Indo-Chinese) but also between lowland, and highlands. This results in a high diversity of habitats with correspondingly high species diversity (Roy & Joshi 2002). The combination of high diversity and the lack of a recent checklist or revision of *Begonia* for the area prompted this study.

Much of the northern-most state, Arunachal-Pradesh, is covered by the eastern end of the Himalayas and reaches heights of 6000 m. These mountains drop to sea level along the course of the Brahmaputra River, carving through the mountains into the floodplains that make up the state of Assam. The Himalayas run into the Patkoi range which heads southwest following the border of India and Myanmar, following through Nagaland with altitudes up to 4000 m, descending down through Manipur where it becomes known as the Barail range, averaging 2000 m in height before entering Mizoram where the range averages 1000 m. Here the Lushai and Mizo Hills extend westwards across the state into the edge of Tripura. Other major areas of high topography can be found in the state of Meghalaya, where the Garo, Khasi and Jaintia Hills range in height from 150 m to almost 2000 m. These hills are almost completely isolated from the others in the region save for a link to the Barail range provided by the Cachar Hills of Assam. The area is riddled with rivers and streams which either join the Brahmaputra in India or flow into Myanmar. Some of the small rivers are purely seasonal and run only during the monsoon season. Due to the topography of the area, climate varies across the region with winter temperatures varying from around 5°C in the high mountains to 20–25°C on the river plains and summer temperatures varying from 20°C to 38°C (Deka *et al.* 2009). The rainfall is as just as varied with rain shadow areas getting just 1500 mm a year compared to the 4000 mm in the mountains (Deka *et al.* 2009). However, the Khasi Hills in Meghalaya can get on average 11000–12000 mm of rain a year (Deka *et al.* 2009), one of the wettest places on Earth. The monsoon occurs between June and September and is responsible for up to 2/3 of annual rainfall, with between 200 mm to 2600 mm of rain in a month (IMD 2010). The valleys on southern slopes of the mountains get more rain than the northern slopes from the southwest monsoon, giving a consistently humid climate with rain most months. This combination of topography and climate creates large areas of favourable habitat for begonias which can be found from 100 m to 2600 m above sea level (Fig. 1).

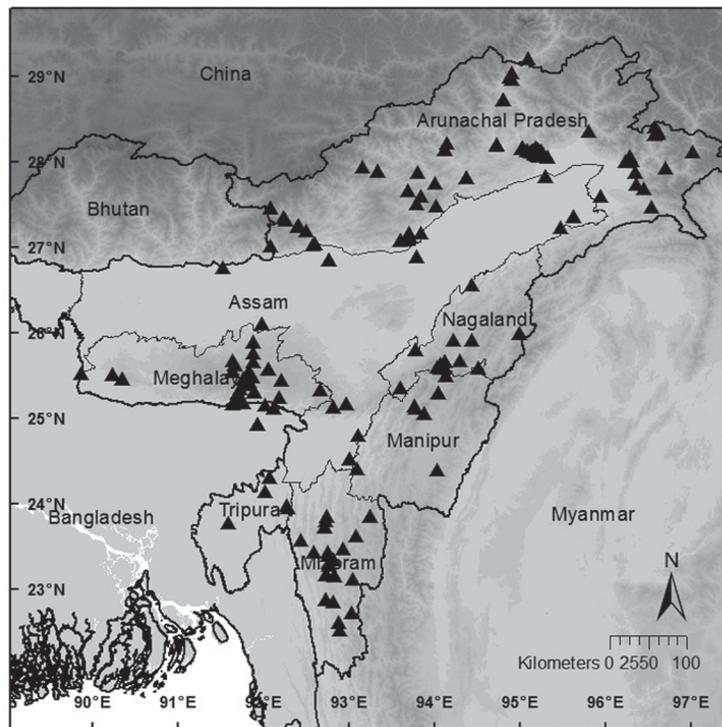


Fig. 1. Map showing the collection sites of *Begonia* specimens from the study area. Locations may represent the nearest village or town and not the exact site.

Clarke (1879) reported Northeast India to contain 14 species of *Begonia*. Since then floras have been published for five of the seven states (Kanjilal 1938; Deb 1981; Chauhan 1996, 2000; Kumar 2002), bringing the total number of species known from the region to 21. Although these regional floras represent valuable records, they are based on relatively few specimens and lack a revisionary approach. The revision presented here has found 38 species for Northeast India, which should be viewed as a baseline on which to build knowledge of the *Begonia* flora of the region, with further novelties likely to exist in the under-explored mountains (Fig. 1). The 38 species cover 5 sections of *Begonia*: sect. *Diploclinium* (Lindl.) A.DC. (de Candolle 1859; basionym: Lindley 1846), sect. *Monopteron* (A.DC.) Warb. (Warburg 1894; basionym: de Candolle 1864), sect. *Parvibegonia* A.DC. (de Candolle 1859), sect. *Platycentrum* (Klotzsch) A.DC. (de Candolle 1859; basionym: Klotzsch 1855 ['1854']) and sect. *Sphenanthera* (Hassk.) Warb. (Warburg 1894; basionym: Hasskarl 1856). Nine of the species listed are endemic to the area and half of these are under threat due to having very restricted distributions and not having been seen or collected since the 1950s or even the 1830s in the case of *B. wengeri* C.E.C.Fisch. (Fischer 1932).

Begonia sect. Diploclinium

This section occurs from Sri Lanka and the Western Ghats in India, across the Himalayas to China and into continental Southeast Asia. A small number of species occur in the Malesian region. Species in this section are monoecious (rarely dioecious), mostly tuberous, sometimes creeping, with or without an erect stem. The inflorescences are axillary to terminal, cymose, flowers white to pink. Male flowers have 2–5 tepals and oblong-ellipsoid to obovate anthers, opening via pore-like slits and connectives not extended, rarely extended. Female flowers have 3–5 tepals, 3 styles and 3-locular ovaries with 3 equal to subequal wings. Fruits pendulous and dehiscent.

Species [10]: *Begonia adscendens* C.B.Clarke (Clarke 1890), *B. dioica* Buch.-Ham. ex D.Don (Don 1825), *B. josephi* A.DC. (de Candolle 1859), *B. labordei* H.Lév. (Léveillé 1904), *B. lushaiensis* C.E.C.Fisch. (Fischer 1928), *B. ovatifolia* A.DC. (de Candolle 1859), *B. pedunculosa* Wall. (Wallich 1830), *B. picta* Sm. (Smith 1805), *B. scintillans* Dunn (Dunn 1920) and *B. wengeri*.

Begonia sect. Monopteron

This section comprises just two species and is restricted to the Himalayas; both species are recorded from the study region. They are monoecious, rhizomatous plants with erect stems. The inflorescences are axillary, cymose, flowers white to pink. Male flowers have 2–4 tepals, globose anthers, opening via pore-like slits, connective not extended. Female flowers have 4–6 tepals, 2 styles and 2-locular ovaries with 1 large wing and 2 undeveloped ridge-like wings. Fruits pendulous and dehiscent.

Species [2]: *Begonia griffithiana* (A.DC.) Warb. (Warburg 1894; basionym: de Candolle 1859) and *B. nepalensis* (A.DC.) Warb. (Warburg 1894; basionym: de Candolle 1859).

Begonia sect. Parvibegonia

This section occurs from the eastern Himalayan region and throughout continental Southeast Asia, into Java and the Lesser Sunda Islands. Species in this section are small plants, monoecious and tuberous with upright stems. The inflorescences are terminal or axillary, cymose, flowers white to pink. Male flowers have 4 tepals and narrowly elliptic or obovate anthers, opening via lateral slits and connective extended or not. Female flowers with 4–6 tepals, 2 styles and 2-locular ovaries with 3 unequal wings. Fruits nodding and dehiscent.

Species [2]: *Begonia brevicaulis* A.DC. (de Candolle 1859) and *B. wattii* C.B.Clarke (Clarke 1890).

Begonia sect. *Platycentrum*

This section is the largest section in the region in terms of species number and is distributed from Nepal eastwards into China and southwards to Sumatra and Java. Species in this section are monoecious with rhizomatous and/or upright stems. The inflorescences are axillary, cymose, the flowers white, pink or yellow. Male flowers have 4 tepals and obovate anthers opening via long side slits and with extended connectives. Female flowers have 3–8 tepals, 2–3 styles and 2-locular ovaries with 3 unequal wings. Fruits nodding and dehiscent.

Species [16]: *Begonia annulata* K.Koch (Koch 1857), *B. beddomei* Hook.f. (Hooker 1884), *B. cathcartii* Hook.f. (Hooker 1855), *B. difformis* (Irmsch.) W.C.Leong, C.I Peng & K.F.Chung (Leong *et al.* 2015; basionym: Irmscher 1939), *B. flaviflora* H.Hara (Hara 1970), *B. hatacoa* Buch.-Ham. ex D.Don (Don 1825), *B. iridescens* Dunn (Dunn 1920), *B. koelzii* R.Camfield sp. nov., *B. megaptera* A.DC. (de Candolle 1859), *B. obversa* C.B.Clark (Clarke 1890), *B. palmata* D.Don (Don 1825), *B. rex* Putz. (Putzeys 1857), *B. shilendrae* Rekha Morris & P.D.McMillan (Morris & McMillan 2012), *B. sikkimensis* A.DC. (de Candolle 1859), *B. thomsonii* A.DC. (de Candolle 1859) and *B. xanthina* Hook. (Hooker 1852).

Begonia sect. *Sphenanthera*

This section has a similar distribution to the allied sect. *Platycentrum*, but is also found further east in the Malesian region. The species are either monoecious or dioecious, and are rhizomatous with or without upright stems. The inflorescences are axillary, cymose, flowers white to pink. Male flowers have 4 tepals and oblong anthers, opening via long side slits and with extended connectives. Female flowers have 4–6 tepals, 3–4 styles and 3–4-locular ovaries which are wingless or horned. Fruits fleshy on a stiff pedicel.

Species [8]: *Begonia aborensis* Dunn (Dunn 1920), *B. acetosella* Craib (Craib 1912), *B. burkillii* Dunn (Dunn 1920), *B. handelii* Irmsch. (Irmscher 1921), *B. longifolia* Blume (Blume 1823), *B. roxburghii* (Miq.) A.DC. (de Candolle 1864; basionym: Miquel 1856, *B. silletensis* (A.DC.) C.B.Clark (Clarke 1879; basionym: de Candolle 1864) and *B. tessaricarpa* C.B.Clark (Clarke 1879).

The first plant collections to reach England from Northeast India (then Assam) during the 19th century were made by Clarke, Beddome, Buchanan-Hamilton, Griffith, Hooker & Thomson, Roxburgh and Wallich. These early collections are the material from which many type specimens for the area have been designated. In terms of *Begonia* specimens the most prolific collectors during this period were Clarke and Hooker & Thomson, whose specimens contributed greatly to the preparation of the *Begonia* account for Hooker's Flora of British India (Clarke 1879). The early 20th century saw a greater influx of specimens, and in terms of *Begonia* notable collections were made by Burkill during his 1911–1912 expedition, which contained three new species later described by Dunn (1920). Numerous *Begonia* collections were also made by Parry, who travelled with her husband as he visited tribes in Manipur and Mizoram from 1924–1930. In the early 1950s, a great number of specimens were collected by Koelz and also Chand, together contributing $\frac{1}{3}$ of the ca 300 collections used in the preparation of this account. Post 1950s, only a trickle of specimens made it out of the region, the largest number being made by Tessier-Yandell (8 collections of *Begonia*). The most recent information on Northeast Indian *Begonia* to come to light is due to the efforts of independent collectors, most notably Morris who has spent several trips botanising the northern state of Arunachal-Pradesh between 2005 and 2010 (Morris 2006, 2008, 2009b).

Material and methods

All available specimens of *Begonia* from the study region in BM, E, K (including the Wallich Herbarium, abbreviated here as K-W) and MICH (acronyms following Thiers continuously updated) were examined (332 sheets representing 295 collections), with further specimens from B and CLEMS seen as digital images, except the ones marked as n.v. (= not seen). The measurements in the descriptions are based on dried material. The terminology in the descriptions follows Beentje (2010). Species were assigned to a Red List Category following the IUCN criteria (IUCN 2012) and distribution data based on georeferenced specimens in Hughes *et al.* (2015). Area of occupancy (AOO) and extent of occurrence (EOO) was calculated using GeoCAT (Bachman *et al.* 2011), and information on protected areas was taken from UNEP-WCMC (2014). Forest cover was examined using Landsat images viewed in Google Earth (<http://earth.google.com/>).

Results

Identification keys for Begonia of Northeast India

In order to make the account easier to use by non-specialists and to aid identification of sterile material, the species are divided into seven groups based on overall leaf similarity, and each group given a key. First choose a group by comparing leaf outlines in Figs 2–4, and choosing one of the seven groups. Several species appear in more than one group due to variation in leaf morphology within species.

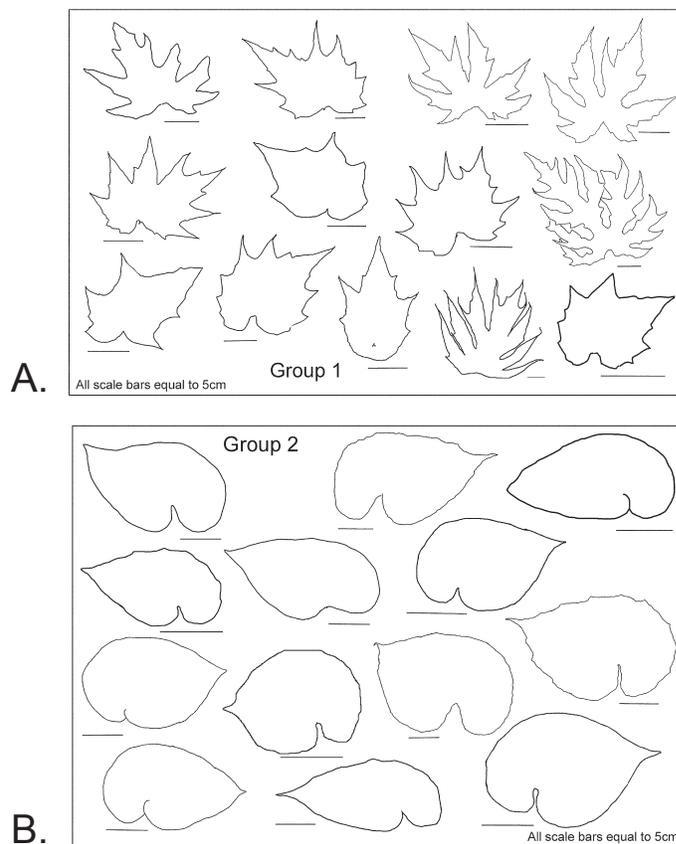


Fig. 2. Leaf tracings. **A.** Group 1: scalloped, lobed or incised leaves. **B.** Group 2: ovate, asymmetric, and entire leaves.

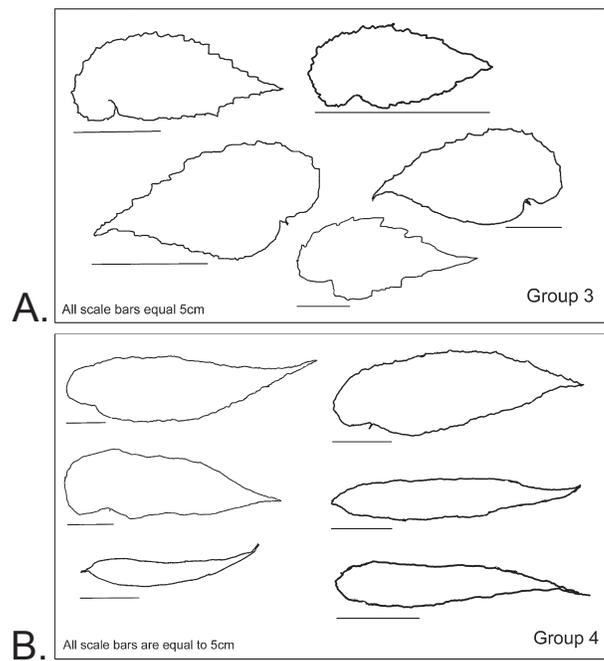


Fig. 3. Leaf tracings. **A.** Group 3: lanceolate, dentate and very asymmetric leaves. **B.** Group 4: linear to lanceolate, and entire to denticulate leaves.

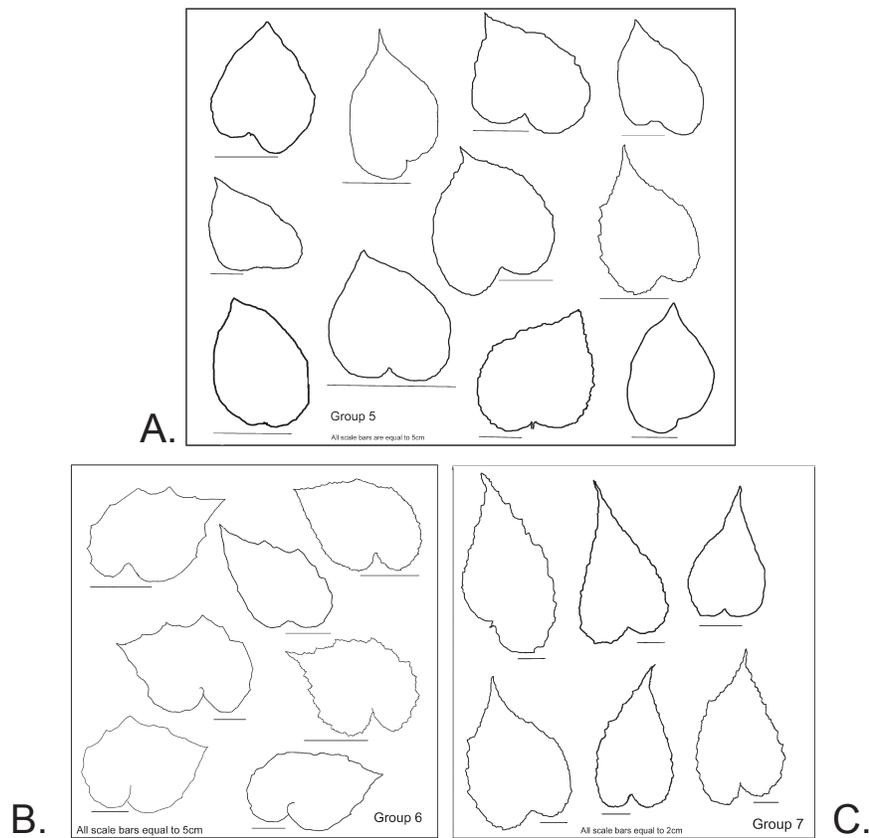


Fig. 4. Leaf tracings. **A.** Group 5: ovate and symmetric to slightly asymmetric leaves. **B.** Group 6: ovate, asymmetric and shallow dentate to denticulate leaves. **C.** Group 7: lanceolate (deltoid) and symmetric leaves.

Group 1 – Leaves scalloped, lobed or incised (Fig. 2A)

1. Leaves peltate *B. josephi* A.DC.
– Leaves basifixed 2
2. Leaves deeply incised up to $\frac{2}{3}$ of way to petiole base 3
– Leaves scalloped, lobed or shallowly incised up to $\frac{1}{3}$ of way to petiole base 6
3. Plant with main stem, leaves rarely over 20 cm long, inflorescence from leaf axils 4
– Plant stemless, leaves at least 20 cm long, inflorescence from rhizome 5
4. Plant up to 100 cm high, generally hirsute, petiole 10–30 cm long, flowers and fruit red setose *B. difformis* (Irmsch.) W.C.Leong, C.I Peng & K.F.Chung
– Plant up to 200 cm high, generally glabrous, petiole 5–15 cm long, flowers and fruit glabrous *B. sikkimensis* A.DC.
5. Petiole with sparse hairs, lobes branched with acuminate tips, male flowers with 4 tepals, female flowers with 4–6 tepals, main wing up to 3 cm long, oblong side wings 3–5 mm long that do not extend along pedicel *B. koelzii* R.Camfield sp. nov.
– Petiole with dense hairs, lobes linear with caudate tips, male flowers with 2 tepals, female flowers with 2 tepals, main wing up to 2 cm long, curved side wings 1–2 mm long that extend along pedicel *B. shilendrae* Rekha Morris & P.D.McMillan
6. Stem, petioles and tepals glabrous 7
– Stem, petioles, and tepals with hairs 8
7. Leaves broadly dentate (scalloped), anther connective not extended, styles 2 .. *B. megaptera* A.DC.
– Leaves acutely dentate, anther connective extended, styles 3 *B. sikkimensis* A.DC.
8. Stipules < 15 mm long, flowers yellow, styles 3, fruit capsule < 1 cm long *B. flaviflora* H.Hara
– Stipules > 15 mm long, flowers white to pink, styles 2, fruit capsule > 1 cm long 9
9. Leaf upper surface hispidulous on veins only, outer tepals red setulose on reverse, fruit capsule red setulose, longest wing curved and up to 3 cm long
..... *B. difformis* (Irmsch.) W.C.Leong, C.I Peng & K.F.Chung
– Leaf upper surface hirsute/strigose or verrucose all over, outer tepals tomentose on reverse, fruit capsule glabrous or with tomentose, longest wing oblong and up to 2 cm long .. *B. palmata* D.Don

Group 2 – Leaves ovate, entire/undulate and asymmetric (Fig. 2B)

1. Leaves glabrous above (or with very sparse microscopic hairs) 2
– Leaves hairy above 6
2. Plant with a main stem, up to 120 cm high, leaves not variegated, primary peduncle 2–5 mm
..... *B. roxburghii* (Miq.) A.DC.
– Plant rhizomatous, up to 30 cm high, leaves variegated or not, primary peduncle 5–20 cm 3
3. Leaves broadly ovate, smoothly bullate, styles 2, winged fruit 4
– Leaves narrowly ovate, not bullate, styles 4, wingless fruit 5
4. Lamina variegated with a broad ring, flowers white to pink *B. rex* Putz.
– Lamina variegated with markings between main veins, flowers yellow *B. xanthina* Hook.

5. Leaves usually variegated, outer tepals 1–3 cm long and acute, stamens in a globose cluster, fruit 2 cm long and rhomboid-elliptic *B. burkillii* Dunn
 - Leaves uniform pale green, outer tepals 2–5 cm long and rounded, stamens in loose rosette, fruit 1 cm long and obpyramidal *B. handelii* Irmsch.
6. Leaves variegated 7
 - Leaves not variegated 10
7. Plant 20–30 cm high, leaves ovate with ring/band markings 8
 - Plant < 20 cm, leaves ovate-orbicular with spot/dot markings 9
8. Leaf surface bullate, peduncles, flowers and fruit glabrous, anther connective acuminate, wing rounded oblong *B. rex* Putz.
 - Leaf surface with strigose/verrucose, peduncles, flowers and fruit with hairs, anther connective rounded, longest wing crenulated *B. annulata* K.Koch
9. Leaves 4–10 cm long, upper leaf surface densely villose, 2–3 flowers, male outer tepals 15–20 mm long, 30–40 stamens, 3 styles *B. scintillans* Dunn
 - Leaves 10–30 cm long, upper leaf surface sparsely puberulous, 10–20 flowers, male outer tepals 10–17 mm long, 15–25 stamens, 2 styles *B. iridescens* Dunn
10. Plants > 40 cm 11
 - Plants < 40 cm 12
11. Plant covered in long red hairs (5 mm long), peduncles 5–10 cm *B. aborensis* Dunn
 - Plant with sparse short brownish or red pubescence on petioles and under surface of leaf, peduncles 15–25 cm *B. silletensis* (A.DC.) C.B.Clarke
12. Plant with sparse puberulous hairs, styles 4, fruit wingless *B. tessaricarpa* C.B.Clarke
 - Plant with dense tomentose or villose hairs, styles 2–3, fruit winged 13
13. Leaves large, 15–20 cm long, apex acuminate, primary peduncle > 10 cm, fruit with equal wings, 2–6 mm long *B. obversa* C.B.Clarke
 - Leaves small, 5–15 cm long, apex acute, primary peduncle < 5 cm, fruit with unequal wings, longest wing 12–30 mm long *B. thomsonii* A.DC.

Group 3 – Leaves lanceolate, dentate and very asymmetric (Fig. 3A)

1. Leaves > 15 cm long, flowers white 2
 - Leaves < 15 cm long, flowers usually pink 3
2. Plant with red hirsute hairs, fruit 2-locular, covered in red hairs *B. cathcartii* Hook.f.
 - Plant with puberulous hairs, fruit 3-locular, glabrous *Begonia* × *chungii* C.I Peng & S.M.Ku
3. Leaves deltoid, male flowers with over 10 stamens *B. lushaiensis* C.E.C.Fisch.
 - Leaves lanceolate, male flowers with less than 10 stamens *B. pedunculosa* Wall.

Group 4 – Leaves linear to lanceolate, entire to denticulate (Fig. 3B)

1. Plant small, up to 20 cm high, stipules 5–7 mm long, flowers with striped outer tepals *B. hatacoa* var. *meisneri* (C.B.Clarke) Golding
 - Plant large, up to 2 m high, stipules 5–15 mm, tepals not striped 2

2. Plant pendent, petioles < 2 cm, peduncles branching many times, peduncle > 3 cm long, 20–40 stamens connective not extended, styles 2, fruit with 1 enlarged wing 3
 – Plant erect, petioles 2–10 cm long, peduncles branching only a few times, peduncle < 3 cm, around 60 or more stamens with connectives extended, styles 3–4, fruit wingless or ridged 4
3. Leaves 2–4 cm wide, male flowers with 4 tepals, pedicel on female flower 1 cm
 *B. griffithiana* (A.DC.) Warb.
 – Leaves 4–11 cm wide, male flowers with 2 tepals, pedicel on female flower 2–3 cm
 *B. nepalensis* (A.DC.) Warb.
4. Plant monoecious, styles 3, fruit spherical, with 3 locules *B. longifolia* Blume
 – Plant dioecious, styles 4, fruit rhomboid, with 4 locules *B. acetosella* Craib

Group 5 – Leaves ovate and symmetric to sub-symmetric (Fig. 4A)

1. Plant with an erect stem, peduncles arising from leaf axils 2
 – Plant without an erect stem, peduncles arising from rhizome or tuber 3
2. Leaves 2–7 cm long, tepals under 5 mm long, stamens 8–12 with a short connective, female flowers with 5–6 tepals, fruit wings oblong, straight edged *B. wengeri* C.E.C.Fisch.
 – Leaves 5–20 cm long, tepals 5–10 mm long, stamens \pm 30 with a very long connective, female flowers with 4–5 tepals, fruit wings rounded oblong *B. brevicaulis* A.DC.
3. Upper surface of leaves glabrous 4
 – Upper surface of leaves with sparse to dense hairs 7
4. Stipules over 1 cm long, flowers with striped outer tepals, > 30 stamens, styles 2
 *B. hatacoa* Buch.-Ham. ex D.Don
 – Stipules under 1 cm, flowers without stripes, up to 20 stamens, styles 3 5
5. Leaves 3–10 cm long, tepals ca 5 mm long *B. ovatifolia* A.DC.
 – Leaves (5–)10–20 cm long, tepals 5–20 mm long 6
6. Leaves puberulous below, stipules 2 mm long, tepals with pale fine hairs, stamens 20, female flowers with 4–5 tepals, longest fruit wing 2.5–3 cm *B. adscendens* C.B.Clarke
 – Leaves sparse pilose below, stipules 5–6 mm long, tepals with dark hairs, stamens 8–10, female flowers with 3–4 tepals, longest fruit wing 1–1.5 cm *B. labordei* H.Lév.
7. Stipules > 5 mm long, fruit capsule glabrous 8
 – Stipules < 5 mm long, fruit capsule covered in hairs 9
8. Leaves up to 25 cm long, tepals with dark hairs, stamens 8–10, styles 3, longest fruit wing curved *B. labordei* H.Lév.
 – Leaves 3–15 cm long, tepals with pale fine hairs, stamens 15–40, styles 2, longest wing triangular *B. wattii* C.B.Clarke
9. Leaves variegated, 3–16 cm long, petiole 5–12 cm, outer tepals serrate, pink, fruit with long fine white hairs, longest fruit wing triangular, 20–24 mm long *B. picta* Sm.
 – Leaves uniform green, 5–30 cm long, petioles 2–8 cm, outer tepals entire, white, fruit with scattered simple hairs, longest fruit wing rounded, 8–16 mm long *B. brevicaulis* A.DC.

Group 6 – Leaves ovate, shallowly dentate to denticulate and asymmetric (Fig. 4B)

1. Leaf margin denticulate 2
– Leaf margin shallowly, broadly dentate 3
2. Plant with an erect stem, with coarse red hairs, tepals 15–25 mm long, stamens 60–80, styles 3, fruit with thick red hairs, longest wing oblong *B. cathcartii* Hook.f.
– Plant stemless, with fine hairs, tepals 5–15 mm long, stamens 15–20, styles 2, fruit glabrous, longest wing triangular *B. wattii* C.B. Clarke
3. Leaves with short tomentose hairs above, 5–15 cm long *B. annulata* K. Koch
– Leaves glabrous (may have very sparse microscopic hairs) above, 10–25 cm long 4
4. Plant caulescent, styles 2 *B. megaptera* A. DC.
– Plant acaulescent, styles 3–4 5
5. Leaves unvariegated, primary peduncle under 10 cm, outer tepals 2–5 cm long, female flowers with 4 tepals, styles 4, fruit wingless *B. handelii* Irmsch.
– Leaves variegated with pale spots, primary peduncle over 10 cm, outer tepals up 2 cm long, female flowers with 5–8 tepals, styles 3, fruit winged *B. beddomei* Hook.

Group 7 – Leaves lanceolate (deltoid), symmetric (Fig. 4C)

1. Plant with an erect stem, inflorescences arising from leaf axils or terminal
..... *B. lushaiensis* C.E.C. Fisch.
– Plant stemless, inflorescences arising from rhizome 2
2. Plant hairy, tepals serrate, female flowers with 4–5 tepals, stamens 30 *B. picta* Sm.
– Plant glabrous to slightly hairy, female flowers with 2–3 tepals, stamens < 20 3
3. Leaves 3–13 × 2–7 cm, stamens 15–20, dioecious, tepals glabrous, fruit with 3 equal rounded wings, tepals persistent *B. dioica* Buch.-Ham. ex D. Don
– Leaves 9–20 × 6–16 cm, stamens 8–10, monoecious, tepals hairy, fruit with 1 long triangular wing and 2 short wings, tepals deciduous *B. labordei* H. Lév.

Taxonomic treatment

Class Equisetopsida C. Agardh (Agardh *et al.* 1825)
Subclass Magnoliidae Novák ex Takht. (Takhtajan 1967)
Superorder Rosanae Takht. (Takhtajan 1967)
Order Cucurbitales Juss. ex Bercht. & J. Presl (Von Berchtold & Presl 1820)
Family Begoniaceae C. Agardh (Agardh 1824)
Genus *Begonia* L. (Linnaeus 1753)

Begonia aborensis Dunn [sect. *Sphenanthera*]
Fig. 5

Bulletin of Miscellaneous Information, Kew 1920: 109 (Dunn 1920). – Type: India, Arunachal-Pradesh, Babuk, Nov. 1911–Mar. 1912, *Burkill* 37663 (lecto-: K, here designated).

Citations in other publications

Burkill (1924: 289), Chauhan (1996: 174), Tebbitt & Guan (2002: 133), Morris (2006: 88), Uddin (2007: 592), Dash (2010: 31), Morris (2011c: 89).

Other material

INDIA: **Arunachal-Pradesh:** Abor Hills, Bapu Mountain, Renging Camp, Nov. 1911–Mar. 1912, *Burkill* 36833 (n.v.); Abor Hills, Bapu Mountain, Rotung, Nov. 1911–Mar. 1912, *Burkill* 36225 (n.v.); *ibid.*, Nov. 1911–Mar. 1912, *Burkill* 36825 (K); Abor Hills, Dihang Valley, 12 Feb. 1928, *Ward* 7854 (K); Igar Valley, Nov. 1911–Mar. 1912, *Burkill* 37530 (n.v.); Kebang, Nov. 1911–Mar. 1912, *Burkill* 37794 (n.v.); Mariyang, *Choudhery* 18405 (ARUN n.v.); Pasighat, Nov. 1911–Mar. 1912, *Burkill* 36999 (n.v.); Puak Camp, Nov. 1911–Mar. 1912, *Burkill* 36132 (n.v.); *ibid.*, Nov. 1911–Mar. 1912, *Burkill* 37622 (K); Serpo stream, Nov. 1911–Mar. 1912, *Burkill* 36323 (n.v.); Under Rotung, Nov. 1911–Mar. 1912, *Burkill* 36138 (n.v.); Yabung Camp, Nov. 1911–Mar. 1912, *Burkill* 36025 (n.v.); Yabung River, Nov. 1911–Mar. 1912, *Burkill* 37755 (n.v.). **Assam:** Charduar forest, Apr. 1887, Mann (K); Lakhimpur District, 17 Apr. 1885, *Clarke* 37917A (K). **Nagaland:** Naga Hills, 2 Nov. 1856, *Griffith*, herb no. 2569 (K000634628); *ibid.*, Nov. 1856, *Griffith*, herb no. 2569 (K000634627).

Description

Rhizomatous, dioecious herb, 40–60 cm high. Rhizome: 10–15 mm wide, tomentose. Stipules: lanceolate, 10–20 × 4–5 mm, sparsely puberulous on reverse, persistent. Leaves: petiole 14–57 cm long, densely red villose which are longer near leaf base, up to 3 mm long; lamina ovate to broadly ovate, basifixed, base cordate with lobes not overlapping, 10–33 × 7–21 cm, asymmetric, upper surface green, sparsely red pilose, underside green, red pilose all over, longer on veins, venation palmate, midrib 8–19 cm long; margin entire to repand, with hairs; apex acute or shortly acuminate. Inflorescence: cymose, terminal, few; peduncle with red pubescence, male peduncle branching twice, primary 1–6(–10) cm long,

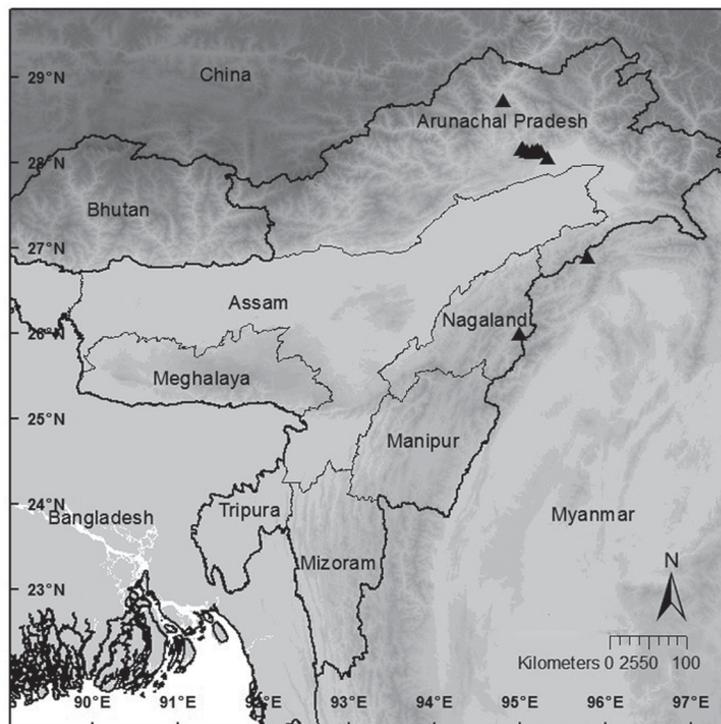


Fig. 5. Map showing the location of *B. aborensis* Dunn specimens.

secondary 1–5 mm long, 4–5 flowers; female peduncle unbranching, 5–15 cm long, 1(–2) flowers; bracts ovate-orbicular, 10–13 × 8–10 mm, glabrous, caduceous. Male flower: pedicel up to 15 mm long, red pubescence; tepals 4; outer tepals ovate-orbicular, 17–21 × 12–13 mm, white to pink, tomentose on reverse near base, margin entire; inner tepals narrowly obovate or spatulate, 13–18 × 5–12 mm, white to pink, glabrous; androecium with 70–100 stamens, symmetric; filaments 3 mm long, equal, free; anther oblong elliptic, 2–3 mm long, dehiscing through slits running nearly the entire length of the anther, not hooded, connective extended. Female flower: pedicel up to 20 mm long, red pubescence; bracteoles absent; tepals 4–6, equal, ovate, outer tepals 2, 15–20 × 8–12 mm, white to pink, tomentose on reverse near base, margin entire, inner tepals 2–4, smaller yet glabrous; ovary 3–4-locular, placentae bifid; capsule globose, red pubescence, without wings; styles 3–4, convoluted with ends slightly twisted, deciduous. Fruit: on stout pedicel, erect, capsule elliptic to globose, 8–20 × 9–15 mm, red pubescence.

Distribution and phenology

Arunachal-Pradesh, North Assam and Nagaland; 300–1200 m. Flowering: November to January; fruiting: November to April.

Conservation status

Least Concern. The calculated range of *B. aborensis* is small (AOO is 48 km² and EOO is 14,497 km²), which would suggest a status of vulnerable. However this likely reflects the lack of collections throughout the mountains of Arunachal-Pradesh and those of Nagaland, where there appears to be large areas of suitable habitat. The species is also found in the Moulling National Park.

Remarks

Begonia aborensis is very similar to *B. silletensis*; the main difference being the longer indumentum on the former. *Begonia aborensis* has dense red hairs, 2–5 mm in length on the petioles and leaf undersides, whereas *B. silletensis* has short dense curled hairs giving a velvety appearance. The male flowers of *B. aborensis* are on a slender pubescent peduncle that is rarely over 10 cm long and hence shorter than the petioles; in *B. silletensis* the peduncles are sturdier, up to 25 cm long and glabrous. *Begonia aborensis* is described as dioecious, however, further observations would be valuable. See also notes under *B. silletensis*.

One of the syntypes (*Burkill 36682*, K) is not listed here as the specimen is not *B. aborensis*. It appears to belong to *Begonia* sect. *Parvibegonia* and probably represents a new species. The material is not sufficient to furnish a description, however.

Begonia acetosella Craib [sect. *Sphenanthera*]

Figs 6–7

Bulletin of Miscellaneous Information, Kew 1912: 153 (Craib 1912). – Type: Thailand, Chiangmai, Doi Sootep, 21 Mar. 1909, 18°50' N, 98°54' E, *A.F.G. Kerr 557* (lecto-: [K000761199](#), designated by Tebbitt 2003a, sheet 2 [K000761201](#); isolecto-: B).

Begonia tetragona Irmsch., *Mitteilungen aus dem Institut für allgemeine Botanik in Hamburg* 10: 515 (Irmscher 1939). – Type: China, Yunnan, Mengtze, *Henry 10737A* (lecto-: B100238046, here designated; isolecto-: E00315022).

Begonia aptera auct. non Blume: Gagnepain in *Bulletin du Muséum d'Histoire Naturelle (Paris)* 25: 281 (Gagnepain 1919).

Citations in other publications

As *B. acetosella*: Gagnepain (1919: 282), Irmscher (1926: 347), Craib (1931: 770), Tebbitt (2003a: 22), Kress *et al.* (2003: 170), Gu *et al.* (2007: 161), Hughes (2008: 1), Morris (2010c: 6), Dash (2010: 31); as *B. tetragona*: Huang & Shui (1999: 12), Tebbitt (2003a: 22); as '*B. aptera*' *auct. non* Blume: Gagnepain (1921: 1110), Hô (1991: 729).

Other material

INDIA: **Arunachal-Pradesh**: Delei Valley, 9 May 1928, *Ward 8198* (K); *ibid.*, 25 Jul. 1928, *Ward 8487* (K); Papum Pare, Toru, *Pal. 2009* (ARUN n.v.); Parsi Parlo, *Dash 31716* (ARUN n.v.); Subansiri District, 8 Apr. 2005, *Morris 40* (CLEMS n.v.).

Description

Caulescent, erect, dioecious herb, 150–200 cm high. Stem: stout, 5–10 mm wide, sparsely puberulous; internodes (5–)10–20 cm long. Stipules: ovate 8–30 × 3–8 mm, puberulous on reverse, deciduous. Leaves: petiole 1–7(–17) cm long, tomentose; lamina ovate-lanceolate to lanceolate, basifixed, base shallowly cordate, 8–18(–30) × 2–7(–15) cm, strongly asymmetric, upper surface green, sparsely strigose, underside pale green veins tinged red, pubescence on veins, venation palmate-pinnate, midrib 7–15(–24) cm long; margin serrate, toothed at the end of the veins with smaller teeth between, with hairs; apex acuminate. Inflorescence: cymose, axillary, numerous; peduncle puberulous, branching 1–2 times, primary 2–10 mm long, secondary 1–2 mm long, with 1–3 female flowers or 3–5 male; bracts ovate, 4–10 × 3–5 mm, deciduous. Male flower: pedicel 4–10 mm long, glabrous or with minute hairs; tepals 4; outer tepals broadly elliptic, 10–18 × 6–15 mm, white to pink, glabrous; inner tepals obovate-elliptic, 6–16 × 8 mm, white to pink, glabrous; androecium with 60–100 stamens, symmetric; filaments 1–3 mm long, free; anther oblong-obovate, 1–2 mm long, dehiscent through slits less than half the length of the anther, not hooded, connective extended. Female flower: pedicel 4–10 mm long, glabrous;



Fig. 6. Map showing the location of *B. acetosella* Craib specimens.



Fig. 7. *Begonia acetosella* Craib. **A.** Plant habit. **B–C.** Leaf variation. **D.** Female bud. **E.** Female flower. **F.** Reverse of flower. **G.** Styles. Photographs by Rebecca Camfield of a plant in cultivation at the Royal Botanic Garden Edinburgh (accession 19980065).

bracteoles absent; tepals 4, equal, broadly elliptic, outer tepals 8–10 × 5–12 mm, white to pale pink, glabrous, margin entire, inner tepals as in male; ovary 4-locular, placentae bifid; capsule rhomboid, 3–15 × 4–11 mm, glabrous, with 4 equal short triangular wings, glabrous; styles 4, deeply forked once and twisted once, caduceus. Fruit: on stout pedicel, rhomboid, fleshy; capsule 12–15 × 17 mm, glabrous; without wings or with 4 horns.

Distribution and phenology

Arunachal-Pradesh; also in China, Myanmar, Thailand, Laos and Vietnam; 1200–1500 m. Flowering: mainly from February to April; fruiting: mainly from May to July.

Conservation status

Least Concern (Hughes 2008). *Begonia acetosella* is a widespread species with no significant change in recent years to warrant a change in its status.

Remarks

Most specimens from the study area were in fruit, so the floral description has been augmented with information from Tebbitt (2003a) and specimens from neighbouring countries. The horn-like structures on the fruits are formed by the short wings when they dry. This species is vegetatively most similar to *B. longifolia* which differs in being monoecious and also in having 3 styles and 3-locular fruit. When sterile *B. acetosella* can also be somewhat similar to the two species in *Begonia* sect. *Monopteron* (*B. griffithiana* and *B. nepalensis*), although they usually have shorter, narrower and more linear or oblong leaves and shorter and narrower stipules. The leaves of *B. nepalensis* can get to a similar width to those of *B. acetosella*, however, they usually have an entire margin and are hairy only on the underside or glabrous on both surfaces.

Begonia adscendens C.B.Clarke [sect. *Diploclinium*] Figs 8–9

Journal of the Linnean Society, Botany 25: 26 (Clarke 1890). – Type: India, Nagaland, Naga Hills, Jakpho, 25 Oct. 1885, Clarke 41240 (lecto-: [K000634623](#), here designated; isolecto-: CAL n.v.).

Begonia obversa auct. non C.B.Clarke: Chauhan in *Flora of Manipur*: 425 (Chauhan 2000).

Citations in other publications

As *B. adscendens*: Uddin (2007: 591), Hughes (2008: 3), Uddin *et al.* (2008: 53).

Other material

INDIA: **Manipur**: Esii Hill, 1 Sep. 2006, Mao & Gogoi 109408 (ASSAM n.v.). **Nagaland**: Naga Hills, Jakpho, Clarke 41247 (CAL n.v.).

Description

Tuberous, monoecious herb, 30–50 cm high. Stipules: ovate, 2 × 1–2 mm, glabrous, caduceus. Leaves: petiole 5–15 cm long, glabrous; lamina ovate to broadly ovate, basifixed, base cordate with lobes not overlapping, 4–16 × 2–22 cm, slightly asymmetric, upper surface green, glabrous, underside pale green or pale green with red markings, puberulous on veins mostly, venation palmate; midrib 3.5–13 cm long; margin toothed at the end of the veins with smaller teeth between, with sparse hairs; apex shortly acuminate. Inflorescence: cymose, terminal, few; peduncle glabrous, branching 1–2 times, primary 10–18 cm long, secondary 1–4 cm long, with 2–4 female and 2–6 male flowers; bracts not seen. Male

flower: pedicel 8–13 mm long, glabrous; tepals 4; outer tepals orbicular to ovate, 10–18 × (5–)9–12 mm, white to pink, sparsely pale puberulous on reverse, near the base, margin entire; inner tepals narrowly elliptic, 5–7 × 1–3 mm, white to pink, glabrous; androecium with 16–20 stamens, asymmetric; filaments 1–1.5 mm long, unequal, fused at base into a short column; anther oblong elliptic, 1 mm long, slightly hooded, connective not extended. Female flower: pedicel 8–18 mm long, glabrous; bracteoles absent; tepals 4–5, unequal, ovate, outer tepals, 8–15 × 5–7 mm, white tinted pink, sparsely puberulent on reverse, margin entire, inner tepals as in male; ovary 3-locular, placentae bifid; capsule globose-ellipsoid, glabrous, with one long triangular wing and two short triangular wings; styles 3, convoluted with slightly twisted ends, persistent. Fruit pendulous; capsule globose-ellipsoid 6–10 × 4–6 mm, glabrous; wings extending along the pedicel slightly, unequal; longest wing rounded oblong, 26–28 × 7–8 mm; shortest wings triangular, 3 × 1–3 mm.

Distribution and phenology

Manipur and Nagaland; also in Myanmar and Laos; 2400–2600 m. Flowering: September to October; fruiting: October.

Conservation status

Least Concern. Current data for *B. adscendens* gives an EOO of 113,895 km² and an AOO of 32 km². This sample size is low, but the specimens are widespread. The data would suggest this species is vulnerable but due to the distribution and supply of suitable habitat this species is classed as least concern. This species is found throughout the Arakan mountains and into the mountains of Northern Myanmar, both of which have extensive areas of suitable habitat.

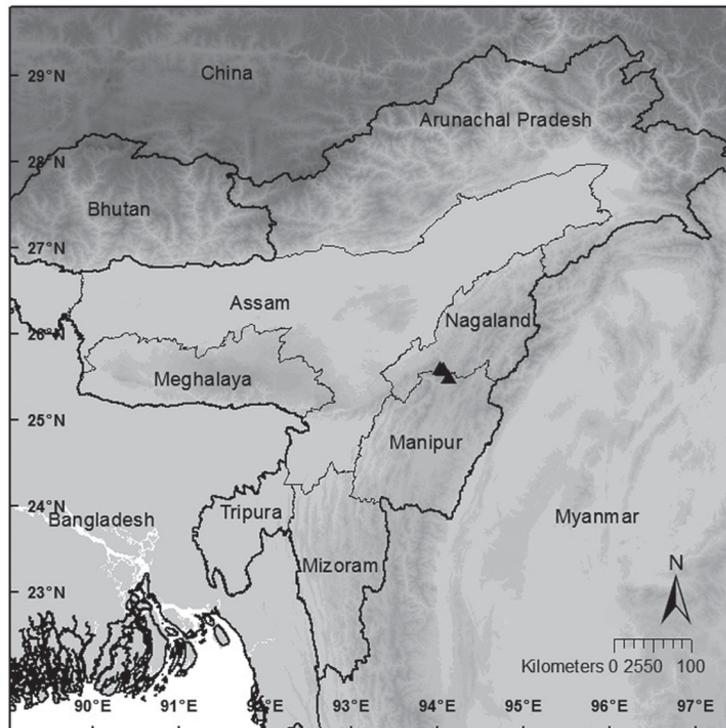


Fig. 8. Map showing the location of *B. adscendens* C.B. Clarke specimens.



Fig. 9. Illustration of *B. ascendens* C.B. Clarke by J. Allen (Clarke 1890). a. Dissected fruit capsule. b. Fruit cross-section diagram. Image courtesy of RBGE library and Lynsey Wilson.

Remarks

This species is similar to *B. labordei* which differs in having hairy leaves and dark purple hairs on the exterior of the male flowers that are visible without a microscope; the hairs are pale and near the base of the tepals in *B. adscendens*. The two species also differ in fruit wing shape; the longest wing curves adaxially on *B. labordei* but on *B. adscendens* it reaches up past the apex of the fruit capsule. This species is one of the highest altitude *Begonia* in Northeast India.

Begonia annulata K.Koch [sect. *Platycentrum*]

Figs 10–11

Berliner Allgemeine Gartenzeitung 10: 76 (Koch 1857). – Type: Bhutan, Buxa, *Griffith 2505* (neo-: [K000761427](#), here designated; isoneo-: BM).

Begonia griffithii Hook., *Botanical Magazine* 83: 4984 (Hooker 1857). – Type: Bhutan, Buxa, *Griffith 2505* (lecto-: [K000761427](#), here designated; isolecto-: BM).

Citations in other publications

As *B. annulata*: Koch (1858: 336, 340), Irmischer (1959: 191), Grierson (1991: 244), Kumar (2002: 643), Uddin (2007: 593), Hughes (2008: 7), Dash (2010: 32), Morris (2011b: 58); as *B. griffithii*: Regel (1857: 380), Regel (1859: 15), de Candolle (1864: 350), Clarke (1879: 647), Clarke (1881: 119), Clarke (1890: 25), Burkill (1924: 288), Irmischer (1959: 191), Hara *et al.* (1979: 181), Hynniewta (1994: 183).

Other material

INDIA: **Arunachal-Pradesh**: Apa Tani valley, 16 Apr. 1965, *Cox & Hutchinson 394* (E, K); Bapu Mountain, Feb.–Mar. 1912, *Burkill 36909* (n.v.); Bapu Mountain, Renging Camp, Feb.–Mar. 1912,

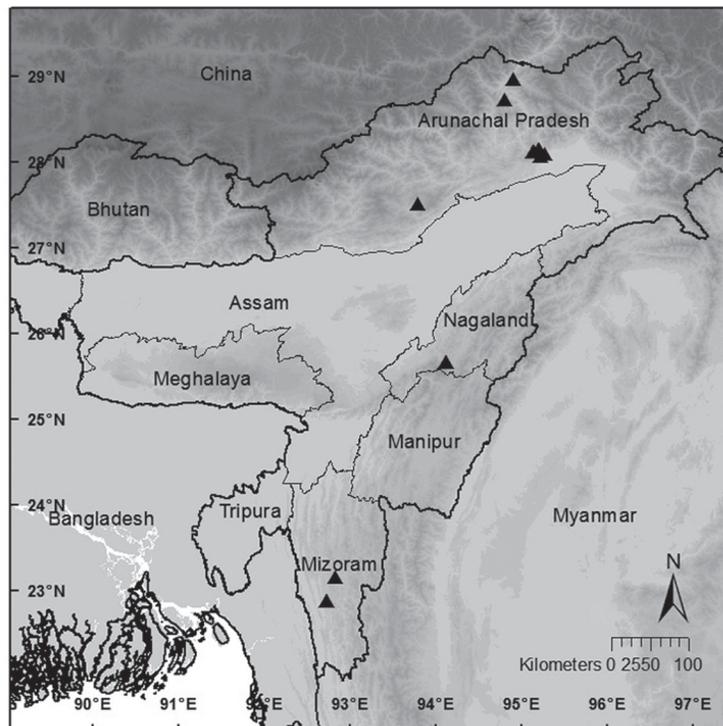


Fig. 10. Map showing the location of *B. annulata* K.Koch specimens.

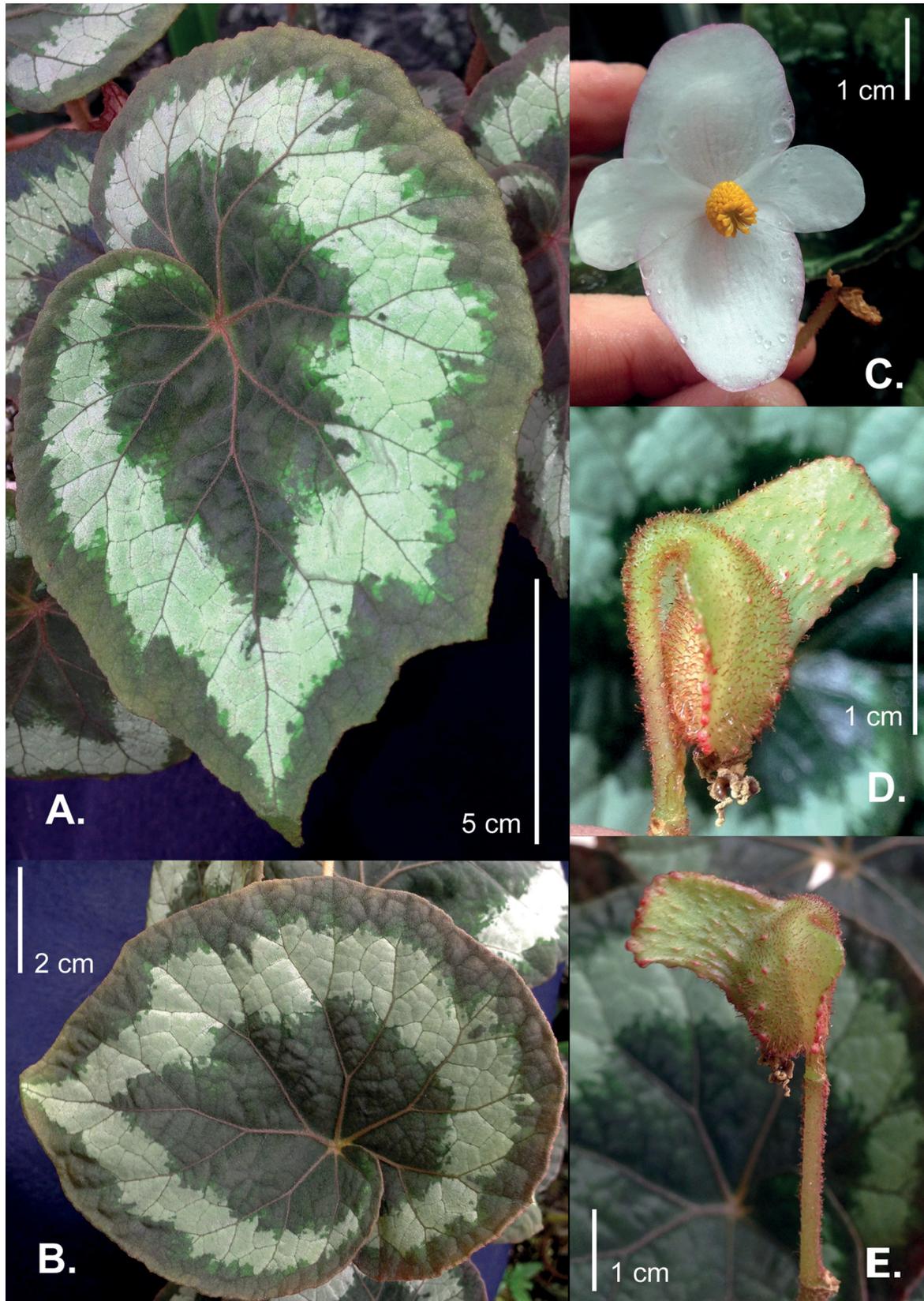


Fig. 11. *Begonia annulata* K.Koch. **A–B.** Leaf. **C.** Male flower. **D–E.** Fruit. Photographs courtesy of Darrin Norton of a plant in cultivation in a private collection.

Burkill 36257 (n.v.); Bapu Mountain, Rotung, Feb.–Mar. 1912, *Burkill* 38191 (n.v.); *ibid.*, Feb.–Mar. 1912, *Burkill* 36299 (n.v.); Janakmukh, Nov. 1911–Mar. 1912, *Burkill* 37275 (n.v.); Kekar Monying, Nov. 1911–Mar. 1912, *Burkill* 37614 (n.v.); Lalik Valley, Nov. 1911–Mar. 1912, *Burkill* 37338 (n.v.); Mariyang to Bhalukpong, *Rao* 17795 (ASSAM n.v.); Zido, *Choudhery* 18025 (ARUN n.v.). Assam: 16 Apr. 1965, *Cox & Hutchinson* 394 (E); Nilgiris, 1835, *Beddome* 3195 (BM). **Mizoram:** Lungleh, *Gage* 233 (CAL n.v.); *ibid.*, *Gage* 232 (CAL n.v., MH n.v.); Lushai Hills, *Parry* 16 (CAL n.v.). **Nagaland:** Naga Hills, Kohima, 6 Jun. 1950, *Chand* 3176 (MICH); *ibid.*, 7 Jun. 1950, *Chand* 3180 (MICH); *ibid.*, 7 Nov. 1885, *Clarke* 41801A (K); *ibid.*, 25 Jun. 1950, *Koelz* 25335 (MICH); *ibid.*, 12 Jan. 1951, *Koelz* 27247 (MICH); *ibid.*, 3 Jun. 1950, *Koelz* 25214 (MICH).

Description

Rhizomatous, erect, monoecious herb, 15–30 cm high. Rhizome: ca 10 mm wide, pubescent, internodes 7–15 mm long. Stem: not always present, 3–5 mm wide, densely pilose, internodes 2–3 cm long. Stipules: lanceolate, 4–13 × 2–6 mm, tomentose on reverse, persistent. Leaves: petiole 3–12 cm long, tomentose; lamina ovate, basifixed, base cordate with lobes almost not overlapping, 9–15 × 5–10 cm, asymmetric, upper surface dark green with a white/silver band running inside the margin, minutely tomentose-strigose or verrucose, underside red and green, strigose, denser on veins, venation palmate, midrib 8–11 cm long; margin sinuate-undulate to shallow broad dentate, with hairs; apex acute. Inflorescence: cymose, axillary, few; peduncle pubescent, branching twice, primary 9–12 cm long, secondary 9–11 mm long, with 2–4 female and 2–4 male flowers; bracts lanceolate to ovate, 6–12 × 2–5 mm, margin hairy. Male flower: pedicel 10–33 mm long, puberulous; tepals 4; outer tepals broadly obovate, 11–22 × 10–16 mm, white to pink, tomentose on reverse near base, margin entire; inner tepals oblong-obovate, 10–20 × 5–10 mm, white to pink; androecium with 60–90 stamens, symmetric; filaments 2 mm long, subequal, fused at base into a short column; anther oblong elliptic, 1–2 mm long, dehiscent through short slits near the tip, slightly hooded, connective not extended. Female flower: pedicel 25–30 mm long, puberulous; bracteoles absent; tepals 4–5, equal, obovate-orbicular, outer tepals, 10–16 × 5–11 mm, white to pale pink, puberulous on reverse to glabrous, margin entire, inner tepals similar yet smaller; ovary 2-locular, placentae bifid, capsule ellipsoid, 4–7 × 3–5 mm, tomentose, with one long oblong-triangular wing and two short oblong wings; styles 2, deeply forked once and twisted twice, caduceus. Fruit: recurved; capsule ellipsoid, 9–15 × 6–10 mm, puberulous to sparsely verrucose; wings extending along the pedicel slightly, unequal; longest rounded-oblong with a crenate tip, 10–16 × 5–9 mm; shortest crescent-shaped, 3–5 × 7–14 mm.

Distribution and phenology

Arunachal-Pradesh, Assam, Mizoram & Nagaland; also in Nepal, Sikkim, Bhutan, Myanmar and Vietnam; 600–2000 m. Flowering: December to June; fruiting: from January to July.

Conservation status

Least Concern. Although *B. annulata* has a small AOO of 68 km² due to the small number of georeferenced specimens it has an EOO of 387,500 km², with a range that takes in the Eastern Himalayas and the Arakan mountains. The species is also recorded near the Royal Manas and Black Mountain National Parks of Arunachal-Pradesh and the Annapurna conservation area in Nepal.

Remarks

This species shares similar leaf variegation with *B. rex*, but can easily be distinguished as *B. annulata* tends to have smaller leaves with a rough adaxial surface due to its strigose hairs; *B. rex* has leaves with a glabrous and smoothly bullate adaxial surface. Furthermore, *B. annulata* has hairs present on the peduncles, flowers and fruits, with *B. rex* being glabrous. *Begonia rex* has distinctive acuminate anther connectives, unlike the rounded connectives of *B. annulata*.

The type of *B. griffithii* Hook. (Hooker 1857) in Kew has two barcodes, possibly due to confusion between Griffiths' itinerary number (2505) and the herbarium number (2571) which was added later. These numbers refer to what is most probably a single gathering; there is also a second specimen in Kew with the same herbarium number (2571) but a different itinerary number of 1143.

Koch (1858) commented on Hooker at Kew naming *B. annulata* as *B. griffithii*. The protologue for *B. annulata* mentions a living plant sent from London to Germany originally collected by Griffith in Bhutan. There is, however, no mention of a herbarium specimen and none is to be found in the Berlin herbarium, where it would most likely have been stored. It seems that both Hooker and Koch independently examined living material derived from that collected by Griffith; they both also mention it being provided under the wrong name of *B. picta*. Hence using the same specimen as the type for both is appropriate.

Begonia beddomei Hook.f. [sect. *Platycentrum*]

Figs 12–13

Botanical Magazine 110: tab. 6767 (Hooker 1884). – Type: Cultivated collection, 4 Dec. 1883, *Beddome* s.n. (holo-: [K000761469](https://doi.org/10.1111/j.1365-3113.2014.000761469)). Cultivated from vegetative material collected in the wild from Assam, India by Gustav Mann.

Citations in other publications

Fischer (1938: 98), Kumar (2002: 643), Uddin (2007: 593).

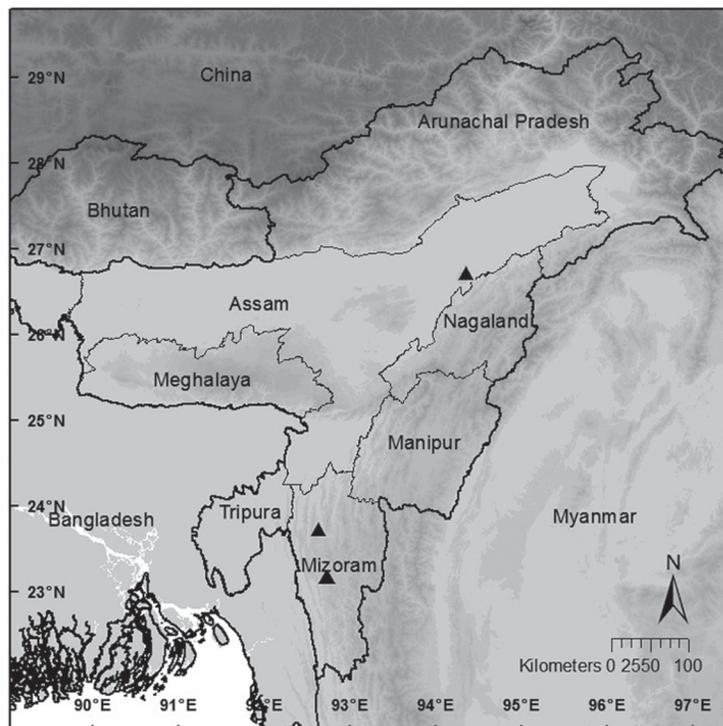


Fig. 12. Map showing the location of *B. beddomei* Hook. specimens.

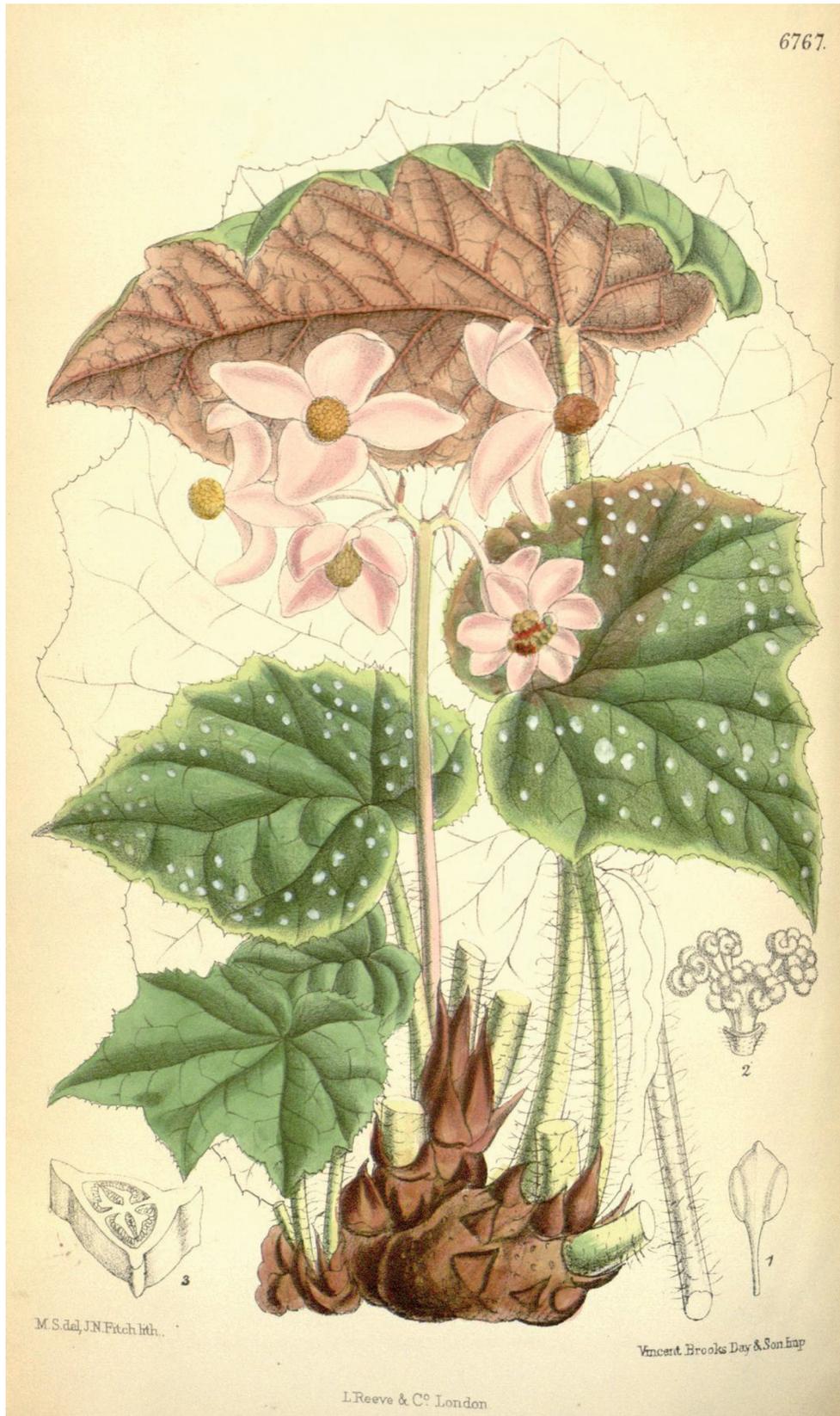


Fig. 13. Illustration of *B. beddomei* Hook.f. by M. Smith (Hooker 1884). 1. Stamen. 2. Styles. 3. Fruit cross-section. Image from the Biodiversity Heritage Library, digitized by the Peter H. Raven Library.

Other material examined

INDIA: **Assam**: Cultivated collection, Aug. 1883, *Beddome* s.n. (K), cultivated from wild material collected by Gustav Mann from Assam; Jorhat, Hoolong 'Melling' Forest Reserve, Dec. 1972, *Yandell 213* (K) [aff. *B. beddomei*]. **Mizoram**: Lushai Hills, Aijal, Sep. 1929, *Parry 252* (K); Lushai Hills, Ramlaitui, Nov. 1927, *Parry 306* (K); *ibid.*, Oct. 1927, *Parry 306* (K, CAL n.v.).

Description

Tuberous, monoecious herb, 15–30 cm high. Stipules: lanceolate, 9–11 × 3–4 mm, glabrous, deciduous. Leaves: petiole 7–16 cm long, puberulous; lamina broadly ovate, basifixed, base cordate with lobes not overlapping, 10–22 × 8–15 cm, asymmetric, upper surface green with white/silvery spots, glabrous, underside red-purple, sparsely pubescent, denser on veins, venation palmate, midrib 8–15 cm long; margin broadly dentate with fine serration, with sparse hairs; apex acute. Inflorescence: cymose, terminal, few; peduncle glabrous, branching 2–3 times, primary 12–16 cm, secondary 2–3 cm, tertiary 2–3 mm, with 1–2 female and 4–8 male flowers; bracts lanceolate, 16–18 × 4–5 mm, glabrous. Male flower: pedicel 11–25 mm long, glabrous; tepals 4; outer tepals ovate to broad ovate, 15–21 × 7–10 mm, pink to pale pink, sparsely pilose on reverse, margin entire; inner tepals elliptic, 10–15 × 4–7 mm, pink to pale pink, glabrous; androecium with 80–100 stamens, symmetric; filaments 1–2 mm long, unequal, fused at base into a long column; anther oblong elliptic, 1 mm long, dehiscing through slits longer than half the length of the anther, not hooded, connective extended. Female flower: pedicel 12–25 mm long, glabrous; bracteoles absent; tepals 8, oblong elliptic, pink; ovary 2-locular, placentae bifid, capsule obovoid, glabrous, with one long oblong wing and two short oblong wings; styles 3, convoluted with twisted ends, caduceus. Fruit: recurved; capsule ovate-triangular, 9–11 × 4–6 mm, glabrous; wings extending along the pedicel slightly, unequal; longest rounded oblong, 20–23 × 11–12 mm; shortest oblong, 2 × 12 mm.

Distribution and phenology

Possibly endemic to the Lushai Hills of Mizoram; 900–1200 m. Flowering: August to September; fruiting: October.

Conservation status

Data Deficient. The species is known only from very few collections and none of them are recent. It is possibly Vulnerable to Endangered as the Khasi Hills have areas of extensive deforestation and without an exact locality for the type and lack of recent collections it is difficult to assess accurately. The species was recorded at Hoollongapar Gibbon Sanctuary in Assam (*Yandell 213*).

Remarks

Begonia beddomei is known from only a few collections; the specimens seen lacked female flowers and the description for these is based on the protologue. This species is quite distinct amongst other members of *Begonia* sect. *Platycentrum* in having female flowers with 8 tepals and 3 styles, and a tuberous rather than rhizomatous habit.

Living material was collected by Gustav Mann in Assam and sent to Colonel Beddome, who grew the plants for the voucher specimens used by Hooker to describe the species. Mann did the majority of his collecting from the Khasi/Jaintia Hills of what is today Meghalaya into the Cachar Hills of Assam, making this the likely type locality.

Begonia brevicaulis A.DC. [sect. *Parvibegonia*]

Figs 14–15

Annales des Sciences Naturelles; Botanique, Sér. 4, 11: 135 (de Candolle 1859). – Type: India, Meghalaya, Khasi Hills, Tyrna, 23 Aug. 1850, *Hooker & Thomson 26* (lecto-: [K000634621](#), here designated).

Citations in other publications

de Candolle (1864: 350), Clarke (1879: 647), Clarke (1881: 119), Uddin (2007: 593).

Other material examined

INDIA: **Meghalaya**: Khasi Hills, Cherrapunji, 6 Jul. 1952, *Chand 6007* (MICH); *ibid.*, 6 Jun. 1952, *Chand 5819* (MICH); *ibid.*, 14 Oct. 1886, *Clarke 45351B* (BM); *ibid.*, 7 Jul. 1952, *Koelz 30496* (MICH); *ibid.*, 8 Jun. 1952, *Koelz 30224* (MICH); *ibid.*, 29 Jul. 1952, *Koelz 30887* (MICH); Khasi Hills, Tyrna to Churra, 26 Aug. 1850, *Hooker & Thomson 26* (K).

Description

Tuberous, erect, monoecious herb, 5–15 cm high. Stem: 2–4 mm wide, sparsely pilose to glabrous, internodes 2–4 cm long. Stipules: lanceolate, 1–5 × 1–2 mm, puberulous on reverse, semi-persistent. Leaves: petiole 2–8(–12) cm long, sparsely pilose to glabrous; lamina oblong-ovate to broadly ovate, basifixed, base shallowly cordate to truncate, lobes not overlapping, 2–19 × 1.5–14 cm, symmetric to slightly asymmetric, upper surface pale matt green, sparsely hirsute to glabrous, underside pale green or red-purple, sparsely puberulous hairs mostly on veins, venation palmate, midrib 1.5–11 cm long; margin entire, shallowly undulate, with very sparse short hairs; apex acute. Inflorescence: cymose, terminal and axillary, few; peduncle with puberulous hairs, branching twice, primary 3–6 cm long, secondary 9–11 mm long, 1–2 female and 2–3 male flowers; bracts not seen. Male flower: pedicel

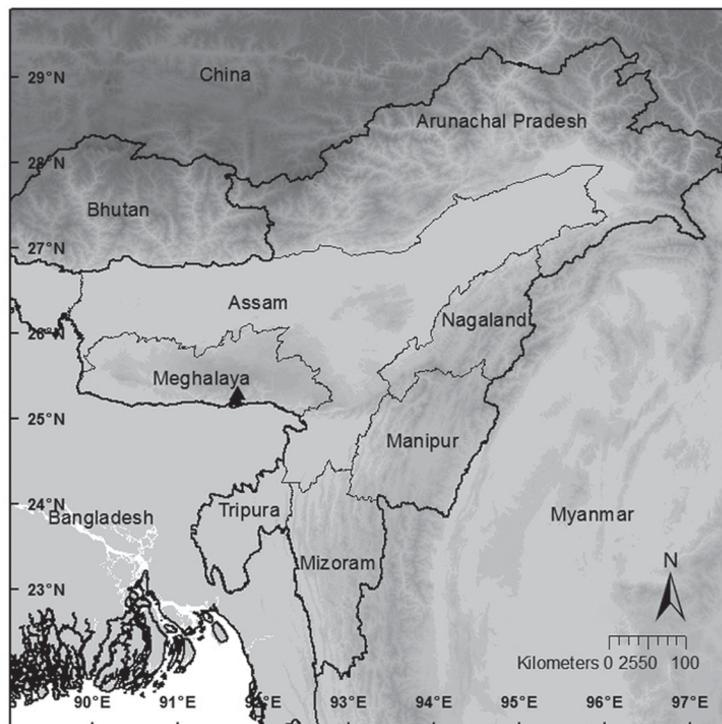


Fig. 14. Map showing the location of *B. brevicaulis* A.DC. specimens.

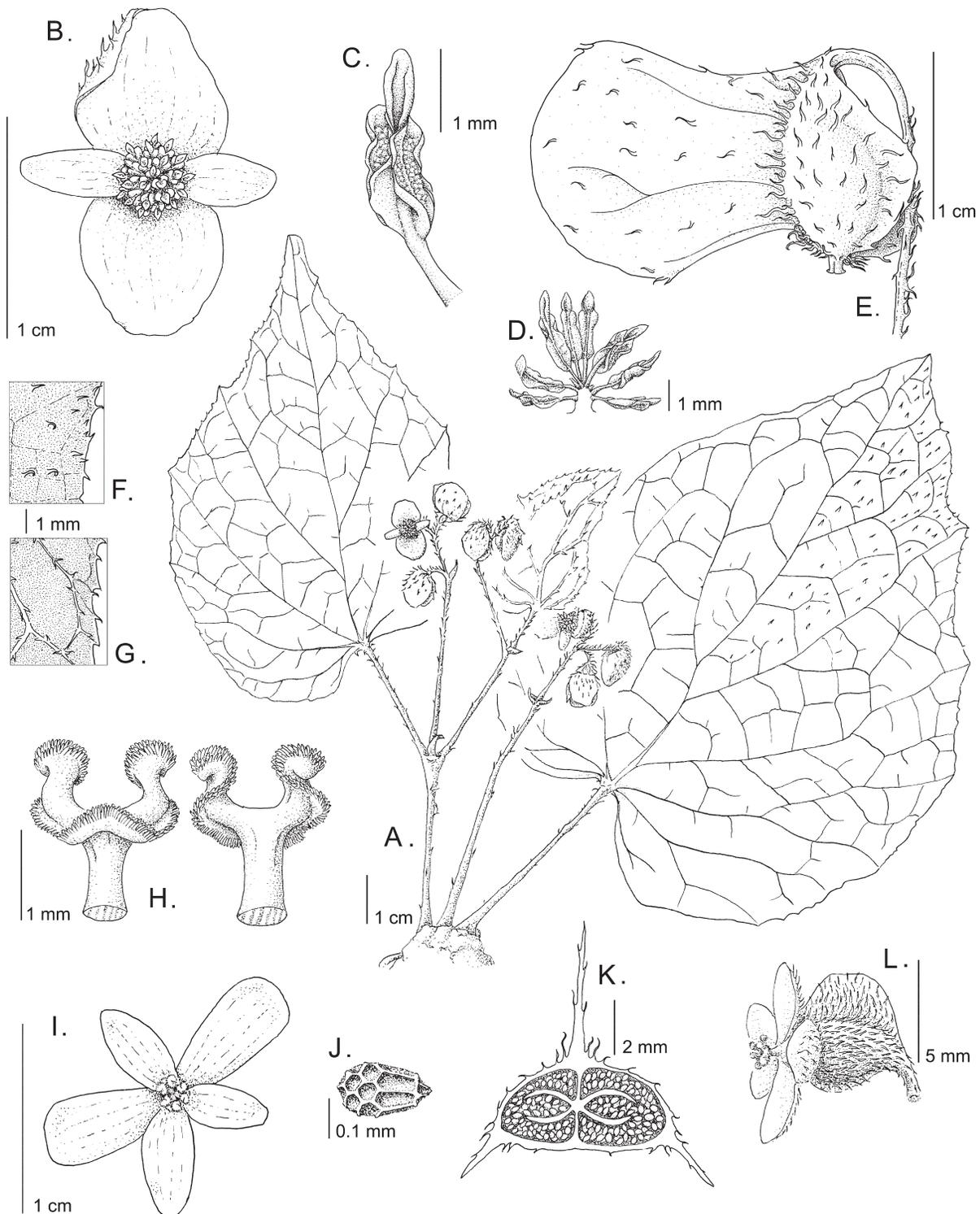


Fig. 15. Illustration of *B. brevicaulis* A.DC. **A.** Habit of plant. **B.** Male flower. **C.** Stamen. **D.** Selection of stamens. **E.** Mature fruit. **F.** Adaxial leaf surface. **G.** Abaxial leaf surface. **H.** Style. **I.** Female flower. **J.** Seed. **K.** Cross-section of fruit. **L.** Side view of female flower. Drawn by Rebecca Camfield. A–D, F–G from Chand 5819; E, J–K from Koelz 30496; H–I, L from Koelz 30887; all MICH.

5–30 mm long, sparsely pilose to glabrous; tepals 4; outer tepals broadly obovate to sub-orbicular, 5–10 × 4–7 mm, white, densely white pilose on reverse, margin entire; inner tepals narrowly elliptic to lanceolate, 3–9 × 1–2 mm, white, glabrous; androecium with 15–30 stamens, symmetric; filaments 1 mm long, equal, slightly fused at base into a short column; anther narrowly elliptic, 1.5–2 mm long, dehiscing through slits longer than half the length of the anther, not hooded, connective markedly extended. Female flower: pedicel 5–30 mm long, puberulous; bracteoles absent; tepals (4–)5, subequal, oblong-ovate, outer tepals 2, 5–9 × 3–4 mm, white, white-pilose on reverse, inner tepals 2(–3), smaller and glabrous; ovary 2-locular, placentae bifid; capsule oblong-ellipsoid, white pilose, with one long rounded-triangular wing and two short rounded wings; styles 3, deeply forked once and twisted once, deciduous or persistent. Fruit: recurved 7–13 × 12–26 mm; capsule oblong-ellipsoid, 4–11 × 3–7 mm, sparsely white pilose; wings extending along the pedicel slightly, unequal; longest wing rounded oblong, 8–16 × 7–13 mm; shortest wing crescent-shaped to triangular, 1–3 × 5–7 mm.

Distribution and phenology

Hills and valleys near Cherrapunji and Tyrna in Meghalaya, India and Sikkim; 450–1200 m. Flowering: June to August; fruiting: July to August.

Conservation status

Data Deficient. Based on material from the study area only *B. brevicaulis* would meet the criteria for Critically Endangered due to the degradation of habitat around the type locality and the fact that the species has not been collected since 1952. However, specimens at E, collected by G.H. Cave in 1915 and 1917 ([E00300429](#), [E00157125](#)) potentially expand the distribution to Sikkim, but their precise locality is unknown. The type locality is near the Cherrapunji-Mawsynram Reserve Forest along with several other national parks and reserves in which the species could reside.

Remarks

Begonia brevicaulis is one of two species in *Begonia* sect. *Parvibegonia* in the region, the other being *B. wattii*. *Begonia brevicaulis* is easily distinguished in having a distinctive extended connective on the stamens, 3 styles (not 2), a rounded (not acute) larger wing on the fruits, more symmetric leaves with an undulate (not serrulate) margin, and plant being generally less hairy.

The type material is annotated as being collected from ‘Terya to Churra’ which is mentioned in Hooker’s travel diaries (Hooker 1854). The diary refers to staying in Churra Pooji or Churra village, now known as Cherrapunji or Sohra. To the south is a neighbouring village called Tyrna, perhaps the ‘Terya’ annotated on the specimen.

The species is known from relatively few specimens in addition to the type material collected in 1850. Cave made a collection 65 years later from Sikkim, the exact location of which is unknown. The label states the locality as Tista which probably refers to the River Tista which runs through Sikkim into West Bengal, joining the Brahmaputra near the Khasi Hills. Koelz and Chand collected the species again from the type locality 100 years after Hooker.

Begonia burkillii Dunn [sect. *Sphenanthera*]

Figs 16–18

Bulletin of Miscellaneous Information, Kew 1920: 110 (Dunn 1920). – Type: India, Arunachal-Pradesh, Janak river, Nov. 1911–Mar. 1912, *Burkill* 37139 (lecto-: [K000634633](#), here designated; isolecto-: B n.v.).

Citations in other publications

Burkill (1924: 288), Tebbitt (2003b: 7), Morris (2006: 88), Uddin (2007: 593), Hughes (2008: 22), Morris (2009b: 173), Dash (2010: 32), Saika *et al.* (2011: 357), Baruah & Choudbury (2014: 41).

Other material

INDIA: **Arunachal-Pradesh:** Abor Hills, Jauamukh, Nov. 1911–Mar. 1912, *Burkill 37121* (CAL n.v.); Bapu Mountain, Renging Camp, Nov. 1911–Mar. 1912, *Burkill 36720* (K); Bapu Mountain, Rotung, *Burkill 37706* (CAL n.v.); Bapu Mountain, Talauma, Nov. 1911–Mar. 1912, *Burkill 36910* (n.v.); Changlang, Namdapha Biosphere Reserve, Anamica Falls, 30 Nov. 2004, *Amad Uddin 107934* (ASSAM); Dihang Valley, 12 Feb. 1928, *Ward 7822* (BM, K); Igar Valley, 29 Nov. 1911–11 Mar. 1912, *Burkill 16121* (n.v.); Janak river, Nov. 1911–Mar. 1912, *Burkill 37455* (K); Naharlagun, *Pal 70320* (ARUN n.v.); Papum Pare, 3 Apr. 2005, *Morris AR2* (CLEMS n.v.); Pasighat, 10 Feb. 1928, *Ward 7822* (K); Ponging, Nov. 1911–Mar. 1912, *Burkill 37375* (n.v.); Sangram to Panyu River, *Dash 32511* (ARUN n.v.); Serpo stream, Nov. 1911–Mar. 1912, *Burkill 36315* (n.v.); Shile River, *Burkill 37121* (n.v.); Subansiri District, 8 Apr. 2005, *Morris 12* (CLEMS n.v.). **Assam:** Cacchar, Sonapur, 13 Jan. 2011, *Himu Roy 143* (GUBH); Dhemaji, Silapathar, Poba Reserve Forest, 13 Jan. 2010, *Ranjit Saika 300* (GUBH).

Description

Rhizomatous, dioecious herb, 20–40 cm high. Rhizome: ca 10 mm wide, glabrous, internodes 4–6 mm long. Stipules: lanceolate, 5–17 × 2–7 mm, glabrous, persistent. Leaves: petiole 5–15(–25) cm long, glabrous; lamina ovate-lanceolate to ovate, basifixed, base cordate with lobes almost overlapping, (4–)10–20 × (3–)6–9 cm, asymmetric, upper surface variegated green and brown with a dark centre, glabrous or sparsely puberulent, underside variegated red and green, sparsely puberulent to glabrous, venation palmate-pinnate, midrib (3–)8–18 cm long; margin entire to shallow dentate, glabrous; apex

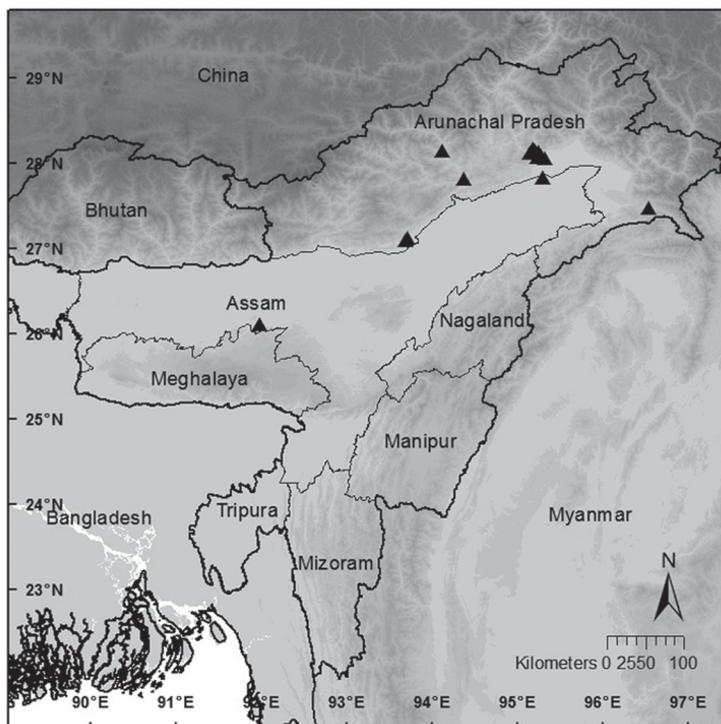


Fig. 16. Map showing the location of *B. burkillii* Dunn specimens.

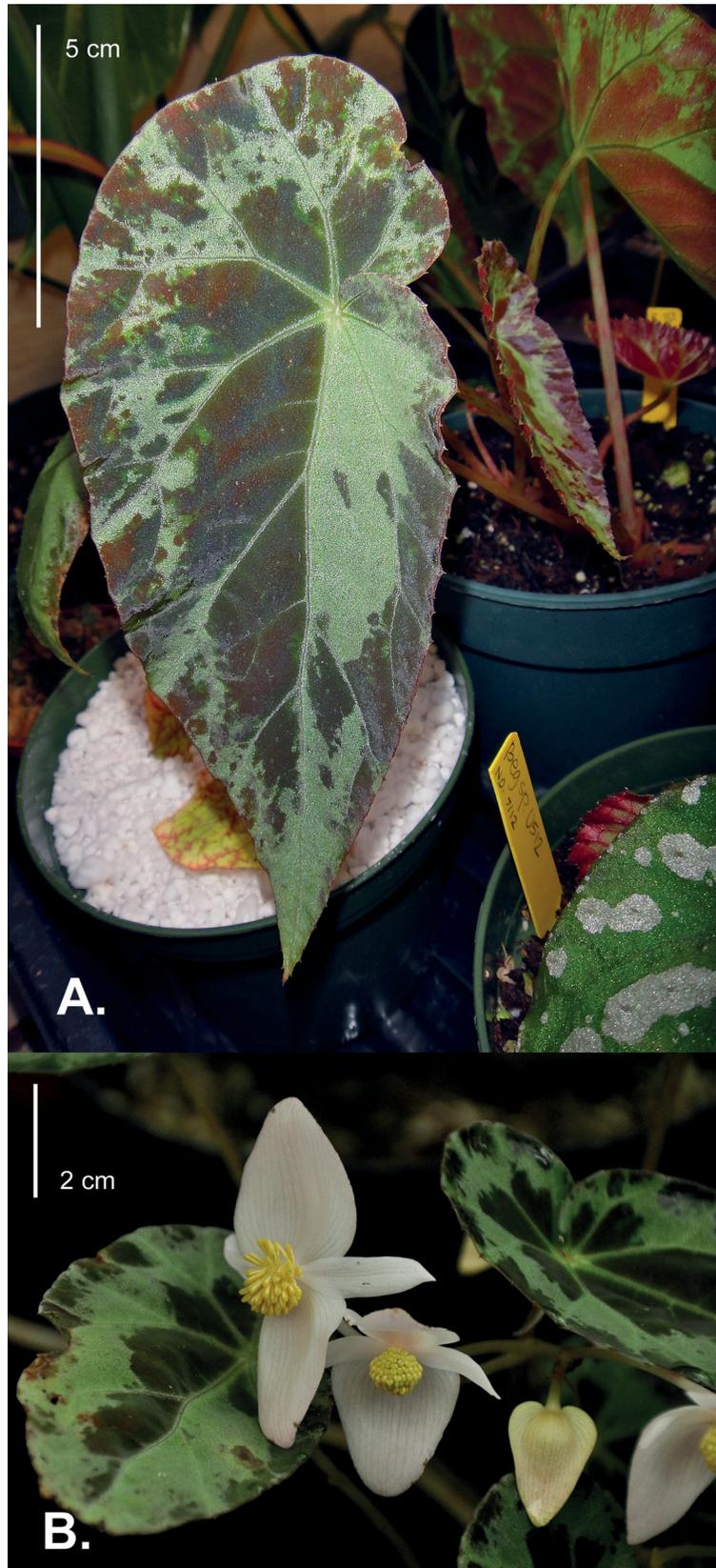


Fig. 17. *Begonia burkillii* Dunn. A. Leaf pattern. B. Male flowers. Photograph A courtesy of Aaron Matsumoto and photograph B courtesy of Earl I-Lan of plants in cultivation in private collections.

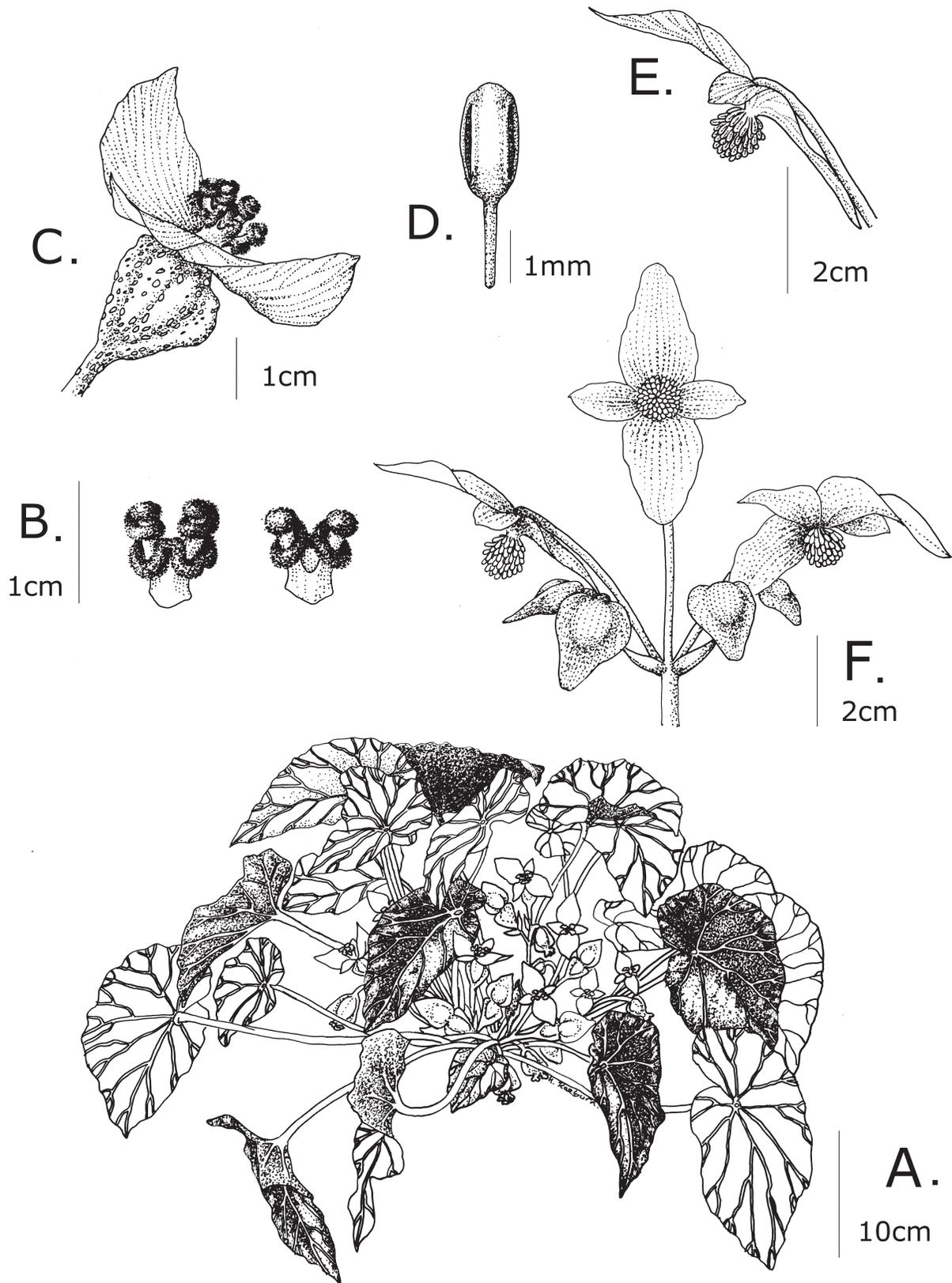


Fig. 18. Illustration of *B. burkillii* Dunn. **A.** Habit of plant. **B.** Style. **C.** Female flower. **D.** Stamen. **E.** Male flower. **F.** Male inflorescence. Drawn by Heather Raeburn. A–C from *Burkill* 36720; D from *Burkill* 37455; E–F from *Burkill* 37139; all K.

shortly acuminate. Inflorescence: cymose, axillary, several; peduncle glabrous, branching twice, male primary 5–15 cm, secondary 2–4 cm, 2–6 flowers, female primary 4–6 cm, 1(–2) flowers; bracts lanceolate, 6–20 × 1–5 mm, deciduous. Male flower: pedicel 13–25(–35) mm long, glabrous; tepals 4; outer tepals narrowly ovate, 10–30 × 7–16 mm, white to pink, glabrous, margin entire; inner tepals elliptic-obovate, 10–20 × 3–7 mm, white to pink, glabrous; androecium with 40–70 stamens, symmetric; filaments 1–3 mm long, unequal, free; anther elliptic-obovate, 2 mm long, dehiscing through slits about half the length of the anther, not hooded, connective extended. Female flower: pedicel glabrous; bracteoles absent; tepals 4, similar to those of the male flower; ovary 4-locular, placentae bifid; capsule rhomboid, with 4 fleshy triangular wings/ridges; styles 4, forked once and twisted twice, deciduous. Fruit: on a stout pedicel, rhomboid; capsule oblong-ellipsoid, 20 × 4–11 mm, puberulous to glabrous, with 4 stubby wings or horns.

Distribution and phenology

Arunachal-Pradesh and Assam; also in Myanmar; 300–1100 m. Flowering: February to March; fruiting: February to April.

Conservation status

Least Concern. *Begonia burkillii* has an EOO of 83,400 km² and an AOO of 72 km², with a wide distribution through undisturbed forest in Arunachal-Pradesh and into Northern Myanmar.

Remarks

Specimens from the region lacked female flowers, which are described based on the protologue and photographs of cultivated plants. The leaf markings can vary in colour from red to purple-brown to almost black, but keep the same pattern (Fig. 17). This species is perhaps most similar to *B. handelii* in being rhizomatous and having 4-locular fruit, but that species has large rounded outer petals (not narrowly ovate), non-variegated leaves and fruit that is more pyramidal than rhomboid.

The lectotypification by Saikia *et al.* (2011) list two specimens (*Burkill 37706* and *37121*) and hence is not valid. Here *Burkill 37139* (K) is designated as the lectotype.

Begonia cathcartii Hook.f. [sect. *Platycentrum*]

Figs 19–20

Illustrations of Himalayan Plants: 13 (Hooker 1855). – *Platycentrum cathcartii* (Hook.f.) Klotzsch, *Abhandlungen der Königlichen Akademie der Wissenschaften zu Berlin*: 245 (Klotzsch 1855 [‘1854’]). – Type: India, Sikkim, Darjeeling, *Hooker* s.n. (lecto-: [K000373057](#), here designated; isolecto-: [K000373056](#)).

Begonia nemophila Kurz, *Journal of the Asiatic Society of Bengal* 46 (2): 108 (Kurz 1877). – Type: Myanmar, East of Tounghoo, Martaban Hills, *Kurz* s.n. (n.v.).

Citations in other publications

As *B. cathcartii*: Klotzsch (1855 [‘1854’]: 245), de Candolle (1864: 349), Clarke (1879: 646), Clarke (1881: 119), Craib (1931: 772), Hara (1971: 84), Hara *et al.* (1979: 181), Grierson (1991: 244), Chauhan (1996: 175), Kress *et al.* (2003: 171), Uddin (2007: 593), Hughes (2008: 24), Dash (2010: 32); as *Platycentrum cathcartii*: Klotzsch (1855 [‘1854’]: 125); as *B. nemophila*: Clarke (1879: 646).

Other material examined

INDIA: **Arunachal-Pradesh**: Delei Valley, 16 Jul. 1928, *Ward 8459* (K).

Description

Rhizomatous, erect, monoecious herb, 30–60 cm high. Rhizome: ca 10 mm wide, densely strigose. Stem: stout, ca 5 mm wide, red reflexed strigose, internodes up to 23 cm long, much shorter at the rhizomatous base of the plant. Stipules: ovate, 9–10 × 3–4 mm, glabrous, semi-persistent. Leaves: petiole (3–)6–13(–20) cm long, red strigose; lamina ovate to broadly ovate, basifixed, base cordate with lobes not overlapping, 15–21 × 9–15 cm, asymmetric, upper surface green, sparsely red strigose all over, underside green, sparsely red strigose mostly on the veins, venation palmate, midrib 10–15 cm long; margin minutely serrate, with hairs; apex acuminate. Inflorescence: sometimes subtended with a pair of leaves; cymose, axillary, few; peduncles sparsely red strigose, branching 2–3 times, primary 4–8 cm long, secondary and tertiary peduncles ca 1 cm long, with 1–3 female flowers and 1–3 male flowers; bracts lanceolate, 7–11 × 2–4 mm, fimbriate. Male flower: pedicel 18–20 mm long, pilose; tepals 4; outer tepals ovate, 15–24 × 10–20 mm, white, red pilose on reverse near the base; inner tepals lanceolate-ovate, 10–15 × 8–12 mm, white, glabrous; androecium with 60–80 stamens, symmetric; filaments ca 2 mm, anther oblong elliptic, 2 mm long, not hooded, connective extended. Female flower: pedicel 16–21 mm long, pilose; bracteoles absent; tepals 5, equal, ovate, outer tepals 20–25 × 12–15 mm, white, red pilose on reverse near base, inner tepals similar but smaller; ovary 2-locular, placentae bifid, capsule ellipsoid, densely red strigose, with one long oblong wing and two short triangular wings; styles 3, deeply forked once and twisted once. Fruit: recurved, 29–42 × 12–16 mm; capsule ellipsoid, 18–20 × 7–9 mm, sparsely red strigose; wings extending along the pedicel slightly, subequal; longest rounded oblong, 15–24 × 11–15 mm; shortest triangular, 7–9 × 12–16 mm.

Distribution and phenology

Arunachal-Pradesh; also in Nepal, Sikkim, Bhutan, Myanmar and Thailand; 1800–2100 m. Flowering: April to June; fruiting: May to July.

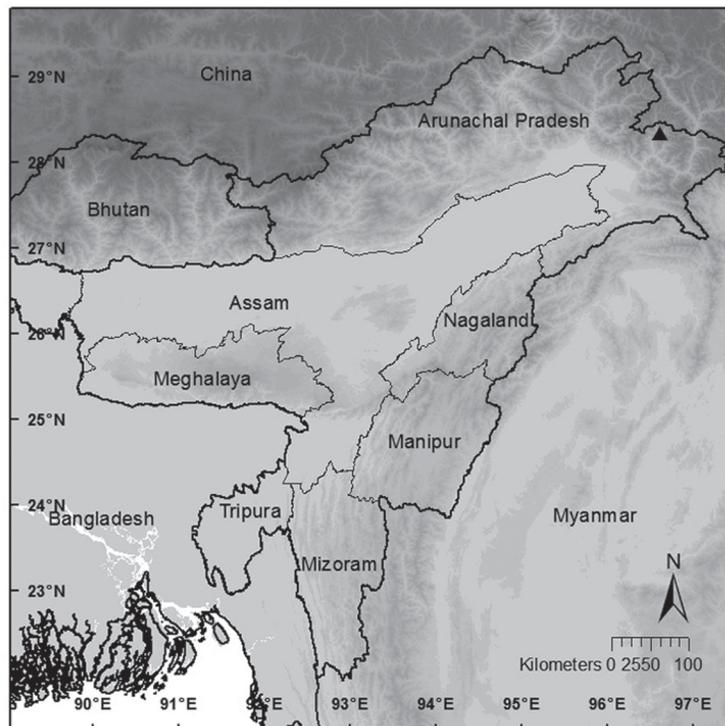


Fig. 19. Map showing the location of *B. cathcartii* Hook.f. specimens.



Fig. 20. Illustration of *B. cathcartii* Hook.f. by W.H. Fitch (Hooker 1855). 1–3. Stamen, front, back and side view. 4. Pollen. 5. Immature fruit. 6. Cross-section of fruit showing ovary placentation. Image from the Biodiversity Heritage Library, digitized by the Peter H. Raven Library.

Conservation status

Least Concern (Hughes 2008). *Begonia cathcartii* is a widespread species with no significant change in distribution in recent years to warrant a change in its status. This species is known to occur in Doi Inthanon National Park in Thailand.

Remarks

Known in the study area from one specimen that lacked female flowers; the description was augmented using the protologue and specimens from the Eastern Himalayas. *Begonia cathcartii* is characterized by red reflexed hairs more or less all over the plant; *B. thomsonii*, also in *B. sect. Platycentrum*, shares having red hairs, but is a much smaller plant and the indumentum is denser and finer.

Begonia difformis (Irmisch.) W.C.Leong, C.I Peng & K.F.Chung [sect. *Platycentrum*]

Fig. 21

Phytotaxa 227 (1): 86 (Leong *et al.* 2015). – *Begonia lacinata* Roxb. var. *difformis* Irmisch., *Mitteilungen aus dem Institut für allgemeine Botanik in Hamburg* 10: 531 (Irmischer 1939). – *Begonia palmata* D. Don var. *difformis* (Irmisch.) Golding & Kareg., *Phytologia* 54 (7): 495 (Golding & Karegeannes 1984). – Type: China, Yunnan, Sep. 1912, *Forrest 16098* (lecto-: E00299196, designated by Leong *et al.* 2015; isolecto-: K n.v.).

Other material examined

INDIA: **Assam**: Cachar, Boro Lakha, 1 May 1951, *Koelz 27847* (MICH1225785). **Manipur**: Karong, 8 Oct. 1950, *Koelz 26470* (MICH1225756). **Meghalaya**: Khasi Hills, Cherrapunji, 17 Apr. 1952, *Chand 5380* (MICH1225702); *ibid.*, 14 May 1952, *Koelz 29907* (MICH1225690); *ibid.*, 29 May 1952, *Chand 5779* (MICH1225812); *ibid.*, 2 Jun. 1952, *Koelz 30159* (MICH1225720); *ibid.*, 18 Jun. 1952, *Koelz 30311* (MICH1225719); Mawphlang, 15 Jul. 1953, *Koelz 33304* (MICH1225704); Pynursla, 3 Aug. 1949, *Chand 2127* (MICH1225687); *ibid.*, 5 Sep. 1949, *Chand 2170* (MICH1225688); *ibid.*, *Koelz 23758* (MICH1225747).

Description

Rhizomatous, erect, monoecious herb, 20–80 cm high. Rhizome: ca 2 cm wide, internodes 1–2.5 cm long. Stem: 10–20 mm wide, sparsely hirsute, internodes 5–15 cm long. Stipules: narrowly ovate or ovate, 30 × 20 mm, caduceus. Leaves: petiole 10–30 cm long, sparsely to densely hirsute, ovate or oblate-orbicular, base cordate, lobes not overlapping, 7–17 × 5–11 cm, asymmetric, upper surface green, hispidulous along veins, lower surface paler green, hirsute; venation palmate, midrib 5–14 cm long; margin shallowly denticulate, usually divided to 1/3 of the blade or more, apex acuminate to long-acuminate. Inflorescences: cymose, protandrous; axillary, few; peduncle red pubescent, branching 1–2 times, primary 10–15 cm long, secondary 1–2 cm long, with 3–4 female and 3–4 male flowers; bracts ovate, 10–15 × 5–8 mm, upper surface sparingly hispidulous to nearly glabrous, margin ciliate, caduceus. Male flowers: pedicel 10–20 mm long, densely red puberulous; tepals 4, outer tepals obovate to orbicular, 12–23 × 8–20 mm, white to pink, red setulose on reverse, margin entire, inner tepals oblanceolate to narrowly obovate, 10–23 × 5–10 mm, white, glabrous, entire; androecium with 80–200 stamens, symmetric; filaments 1–2.5 mm long, unequal, fused at base into short column; anther narrowly obovate, 2 mm long, dehiscing through slits, not hooded, connective extended, acute. Female flowers: pedicel 10–20 mm long, densely red puberulous; bracteoles absent; tepals 5, unequal, oblanceolate to orbicular, 8–24 × 4–21 mm, red setulose on reverse to almost glabrous, entire, inner tepals similar but smaller; ovary 2-locular, placentae bifid; capsule oblong-ellipsoid, 5–8 × 3–4 mm, very sparse to dense red setulose, with one long wing and two short rounded wings; styles 2, forked once and twisted, caduceus. Fruit: recurved, capsule obovoid, ca 1.5 × 1 cm, sparse red setulose to glabrous;

wings extending along pedicel, unequal; longest wing obliquely oblong, $10\text{--}30 \times 5\text{--}10$ mm; shorter wings oblong, ca 5×10 mm.

Distribution and phenology

Assam, Meghalaya and Manipur; also in China and Myanmar. Flowering: June to October; fruiting: August to November.

Conservation status

Least Concern. The species has an EOO of $179,130$ km² and an AOO of 108 km². The range of this recently described species could possibly be extended further, as it is likely more specimens will be found which are currently identified as the similar *B. palmata*. The specimens we have cited are split between Yunnan, China and the study area which are linked by the Arakan Mountains and the eastern end of the Himalayas, providing suitable habitat which is currently under-explored botanically.

Remarks

Begonia difformis is very similar to *B. palmata* but differs in having leaves with deeper lobes and with the hairs on the upper leaf surface being restricted to the veins (*B. palmata* has hairs all over). The most notable difference are the red setose hairs on the flowers and fruit; *B. palmata* has fine villose hairs. Also the largest wing of the fruit in *B. difformis* has a verrucose texture, unlike the smooth surface of the wings in the fruit of *B. palmata*. The description is augmented with information from the protologue.

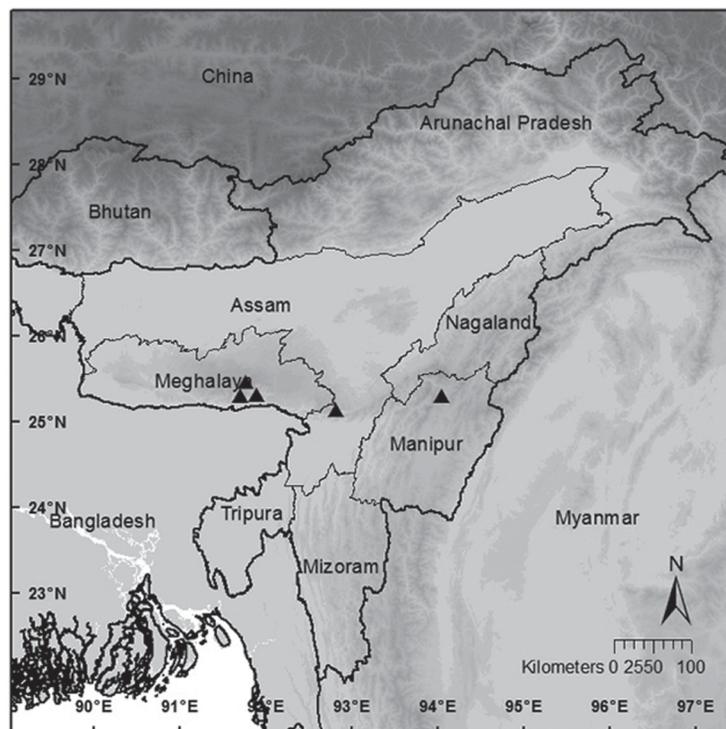


Fig. 21. Map showing the location of *B. difformis* (Irmsch.) W.C.Leong, C.I Peng & K.F.Chung specimens.

***Begonia dioica* Buch.-Ham. ex D.Don [sect. *Diploclinium*]**

Figs 22–23

Prodromus Florae Nepalensis: 223 (Don 1825). – Type: Nepal, Kathmandu, Naraianhetty, 8 Aug. 1802, Buchanan-Hamilton (lecto-: [BM000043986](#), here designated).

Begonia tenella D.Don, *Prodromus Florae Nepalensis*: 223 (Don 1825). – Type: Nepal, Gosain Than, 3000–4830 m, 1821, *Wallich Cat. No. 3681B* (lecto-: K-W, barcode [K001110783](#), here designated).

Begonia amoena Wall. ex A.DC., *Prodromus Systematis Naturalis Regni Vegetabilis* 15 (1): 327 (de Candolle 1864). – Type: Nepal, 1821, *Wallich Cat. No. 3682A* (lecto-: K-W, barcode [K000761417](#), here designated).

Begonia erosa Wall., *A numerical list of dried specimens of plants in the East India Company's Museum*: 129, 3688 (Wallich 1831), nom. nud.

Citations in other publications

As *B. dioica*: Hara (1975: 85), Hara *et al.* (1979: 181), Grierson (1991: 241), Kumar (2002: 644), Uddin (2007: 593), Dash (2010: 33); as *B. tenella*: de Candolle (1864: 327), Ghazanfar & Aziz (1976: 3); as *B. amoena*: Fischer (1938: 97).

Other material examined

INDIA: **Arunachal-Pradesh**: Dirang Dzong, 8 Aug. 1938, *Ward 14055* (BM); Senge Dzong, 18 Aug. 1938, *Ward 14091* (BM). **Mizoram**: Hmuifang, Jul. 1926, *Parry 45* (K); *ibid.*, Jul. 1926, *Parry 46* (K); *ibid.*, Jul. 1926, *Parry 47* (K); Lungleh, 1 Sep. 1931, *Wenger 320* (K).

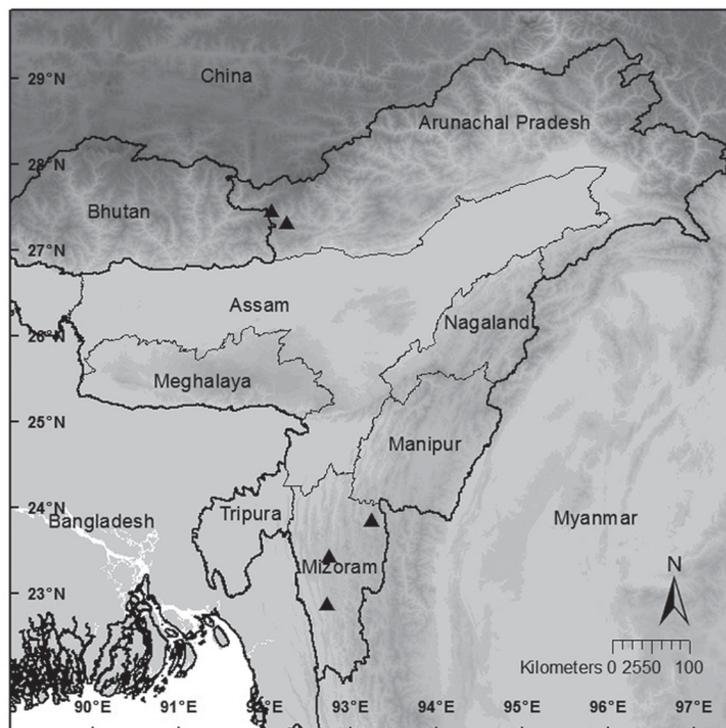


Fig. 22. Map showing the location of *B. dioica* Buch.-Ham. ex D.Don specimens.



Fig. 23. Photograph showing habit and female flowers of *B. dioica* Buch.-Ham. ex D. Don. Photograph courtesy of Sangeeta Rajbhandary of a plant in Nepal.

Description

Tuberous, creeping, stoloniferous, dioecious herb, 5–11 cm high. Stolons: red, glabrous, slender, 5–15 cm long. Stipules: lanceolate, 3–4 × 1–2 mm, glabrous, caduceus. Leaves: petiole 1–5 cm long, glabrous; lamina deltate-ovate, basifixed, base shallowly cordate, 3–12.5 × 1.5–7 cm, symmetric, upper surface green with red veins or red centre, glabrous, underside red, glabrous, venation palmate, midrib 2.5–12 cm long; margin crenate to dentate, glabrous; apex acuminate. Inflorescence: cymose, terminal, few; peduncle glabrous, branching up to three times, primary 5–10 cm long, secondary and tertiary 3–5 mm long, with 2–5 female flowers or 3–5 male flowers; bracts lanceolate 4–5 × 2 mm, glabrous, caduceus. Male flower: pedicel 10–25 mm long, glabrous; tepals 4; outer tepals ovate-orbicular, 6–15 × 5–10 mm, pink to deep pink, glabrous, margin entire; inner tepals elliptic, 4–8 × 2–4 mm, white to pale pink, glabrous; androecium with 15–20 stamens, symmetric; filaments 1–2 mm long, unequal, fused at base into a short column; anther obovate, 1 mm long, dehiscing through short slits near the tip, not hooded, connective not extended. Female flower: pedicel 17–20 mm long, glabrous; bracteoles absent; tepals 2–3, unequal, outer two elliptic-ovate, third lanceolate, 8–15 × 3–10 mm, white to pink, glabrous; ovary 3-locular, placentae bifid; capsule ellipsoid, glabrous, with three equal rounded triangular wings; styles 3, deeply forked once and twisted once, persistent. Fruit: pendulous; capsule ellipsoid, 10 × 6 mm, glabrous; wings equal, rounded-triangular, wings 3–6 × 7–8 mm.

Distribution and phenology

Arunachal-Pradesh; also in northern Pakistan, northern India, Nepal, Sikkim and Bhutan; 1350–1850 m. Flowering: July to September; fruiting: August to October.

Conservation status

Least Concern. *Begonia dioica* has an AOO of 204 km² and an EOO of 344,000 km² with plenty of suitable habitat throughout its range in the Eastern Himalayas and Arakan Mountains. This species is also present in several National parks in Nepal and Bhutan along with the Lengteng Wildlife Sanctuary and Blue Mountain National Park of Mizoram.

Remarks

Distinctive characters for *B. dioica* are the persistent tepals on the maturing fruit, and the bright red/crimson stolons, petioles and peduncles. *Begonia labordei* is the closest ally in the study area, which differs in having more denticulate leaves and more congested inflorescences; the fruits of *B. dioica* are further distinctive in having equal, rounded wings.

Begonia flaviflora H.Hara [sect. *Platycentrum*]

Fig. 24

Journal of Japanese Botany 45: 91 (Hara 1970). – Type: India, Sikkim, Darjeeling, 5 Jul. 1969, Hara, Kurosawa & Ohashi 69218 (holo-: TI n.v.; iso-: [BM000839167](#)).

Citations in other publications

Grierson (1991: 245), Gu *et al.* (2007: 174), Uddin (2007: 593), Hughes (2008: 40), Dash (2010: 33).

Other material

INDIA: **Arunachal-Pradesh:** Bomte La, 15 Jul. 1938, *Ward 13938* (BM); Delei Valley, 16 Jul. 1928, *Ward 8458* (K); Lee to Purchi, *Dash 31469* (ARUN n.v.). **Nagaland:** Naga Hills, Takubama, 1 Sep. 1950, *Chand 3614* (MICH); *ibid.*, 12 Aug. 1950, *Koelz 25733* (MICH); Samtakha, 6 Aug. 2002, *Lyon 15089* (E).

Description

Rhizomatous, erect, monoecious herb, 20–60 cm. Rhizome: ca 5 mm wide, pubescent, internodes 1–3 cm long. Stem: stout, ca 5 mm wide, pubescent, internodes 7–18 cm long. Stipules: broadly lanceolate, 10–15 × 3–5 mm, puberulous, persistent. Leaves: petiole 4–10(–18) cm long, pubescent; lamina ovate, basifixed, base cordate with lobes not overlapping, 5–20(–30) × 5–15(–20) cm, asymmetric, upper surface green with a darker centre, sparsely hispid or glabrous, underside red-purple, pubescent to puberulous mostly on the veins, venation palmate, midrib 4–15(–25) cm long; margin acutely deeply lobed, dentate with finer serration, with sparse hairs; apex acute. Inflorescence: cymose, axillary, several; peduncle pilose, branching up to three times, primary 5–15 cm long, secondary 2–3 cm long and tertiary 4–6 mm long, with 3–4 female flowers and 2–3 male flowers; bracts not seen. Male flower: pedicel 20–30 mm long, pubescent; tepals 4; outer tepals ovate-orbicular, (6–)10–15 × 4–7 mm, yellow, tomentose on reverse, margin entire; inner tepals obovate, 8–12 × 3–4 mm, yellow, glabrous; androecium with 40–60 stamens, symmetric; filaments 1–1.5 mm long, fused at the base; anther elliptic-globose, 1–2 mm long, dehiscing through slits longer than half the length of the anther, not hooded, connective extended. Female flower: pedicel 8–15 mm long, pubescent; bracteoles absent; tepals 5, equal, broadly ovate to oblong, outer tepals 10–13 × 5–10 mm, yellow, tomentose on reverse, margin entire, inner tepals smaller and glabrous; ovary 2-locular, placentae bifid; capsule ellipsoid, tomentose, with one long rounded oblong wing and two short triangular wings; styles 3, deeply forked once and twisted once, persistent. Fruit: recurved; capsule ellipsoid, 5–7 × 4–6 mm, short tomentose; wings extending along the pedicel slightly, unequal; longest round oblong with crenate tip, 6–12 × 2–4 mm; shortest triangular, 1–2 × 3–4 mm.

Distribution and phenology

Arunachal-Pradesh; also in South Tibet, China and Myanmar; 1800–2150 m. Flowering: June to August; fruiting: August.



Fig. 24. Map showing the location of *B. flaviflora* H.Hara specimens.

Conservation status

Least Concern (Hughes 2008), with no significant change in recent years to warrant a change in its status. *Begonia flaviflora* is a widespread species, and has been recorded in the Gaoligongshan Nature Reserve of China.

Remarks

This species is most similar to *B. palmata* vegetatively but *B. flaviflora* has an almost glabrous adaxial leaf surface, shorter stipules and shorter wings on the fruit when compared to *B. palmata*. When fertile the yellow flowers are instantly distinctive. *Begonia xanthina* also has yellow flowers, but is distinct in having ovate leaves with an entire margin.

Begonia griffithiana (A.DC.) Warb. [sect. *Monopteron*]

Figs 25, 26A

Naturlichen Pflanzenfamilien 3 (abt. 6a): 142 (Warburg 1894). – *Mezierea griffithiana* A.DC., *Annales des Sciences Naturelles; Botanique, Sér. 4*, 11: 144 (de Candolle 1859). – Type: Bhutan, *Griffith 2504* (lecto-: [K000761416](#), here designated; isolecto-: [BM001122242](#)).

Begonia episcopalis C.B. Clarke, *The Flora of British India* 2: 644 (Clarke 1879), *nom. illegit. superfl.*

Citations in other publications

As *B. griffithiana*: Grierson (1991: 244), Morris & McMillan (2006: 174), Uddin (2007: 594), Hughes (2008: 46), Dash (2010: 33), Morris (2011d: 142); as *Mezierea griffithiana*: Clarke (1879: 644); as *B. episcopalis*: Clarke (1881: 119).

Other material

INDIA: **Arunachal-Pradesh**: Lohit Valley, Dening, 3 Feb. 1950, *Ward 19120* (BM, E); Pango to Mariyang, *Rao 17711* (ASSAM n.v.); Sangram to Panyu River, *Dash 32547* (ARUN n.v.); Sarli to Milli, *Dash 32547* (ARUN n.v.); Tamen, *Pal 78498* (ARUN n.v.). **Meghalaya**: Khasia, *Hooker & Thomson 2* (K); Shillong, 24 Oct. 1872, *Clarke 19046A* (K); *ibid.*, *Clarke 19046D* (BM).

Description

Caulescent, erect/cascading, monoecious herb, 50–100 cm high. Stem: slightly woody, stout at the base, more slender distally, 5–10 mm wide, puberulous, internodes 3–9 cm long. Stipules: lanceolate, 4–13 × 1–2 mm, puberulous on reverse, persistent. Leaves: petiole 0.2–1(–5) cm long, tomentose; lamina oblong-lanceolate to lanceolate, basifixed, base shallowly cordate, 5–18 × 2–5 cm, strongly asymmetric, upper surface green, sparsely pilose to glabrous, underside green, pilose on the veins only, venation pinnate to pinnate-palmate, midrib 4–16 cm long; margin serrulate or with small teeth at ends of the main veins only, with very sparse short hairs; apex acuminate. Inflorescence: cymose, axillary to terminal, numerous; peduncle glabrous, branching 2–3 times, primary 3–5 cm, secondary 2–4 cm, tertiary 1–1.5 cm, with 2–4 female and 4–8 male flowers; bracts lanceolate 2–3 × 1 mm, glabrous, caduceous. Male flower: pedicel 6–10 mm long, puberulous to glabrous; tepals 4; outer tepals orbicular to oblong, 4–14 × 2–11 mm, pale pink to white, glabrous, margin entire; inner tepals lanceolate to linear, 3–9 × 1–4 mm, pale pink, glabrous; androecium with 20–30 stamens, symmetric; filaments 1–2 mm long, unequal, fused at base into a column; anther elliptic-globose, 1 mm long, dehiscing through short slits near the tip, connective slightly extended. Female flower: pedicel 10–15 mm long, puberulous to glabrous; bracteoles absent; tepals 5–6, equal, 3–4 larger and 1–2 smaller, oblong elliptic to obovate-orbicular, outer tepals 6–11 × 5–7 mm, pale pink to white, glabrous, margin entire, inner tepals similar but smaller; ovary capsule oblong-ellipsoid, 5–7 × 2–3 mm, pink, glabrous, with one long triangular wing;

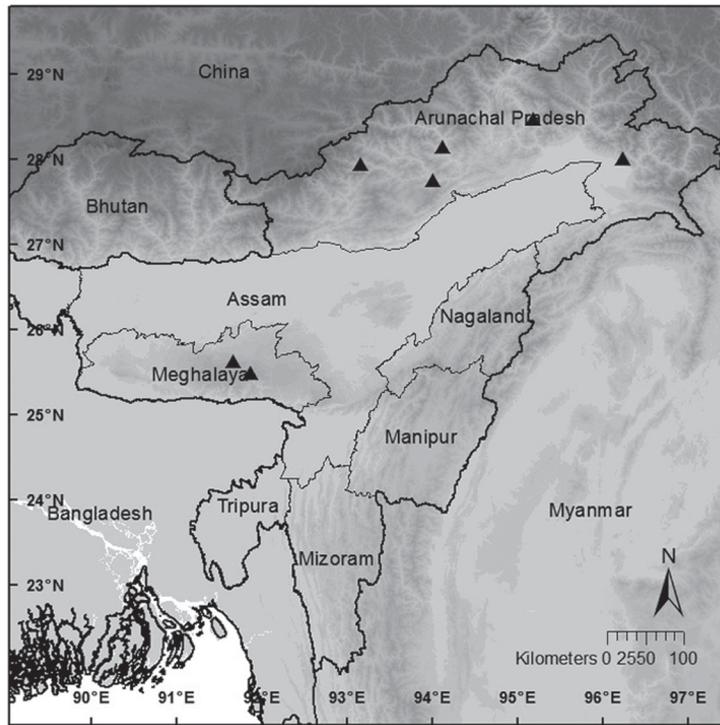


Fig. 25. Map showing the location of *B. griffithiana* (A.DC.) Warb. specimens.

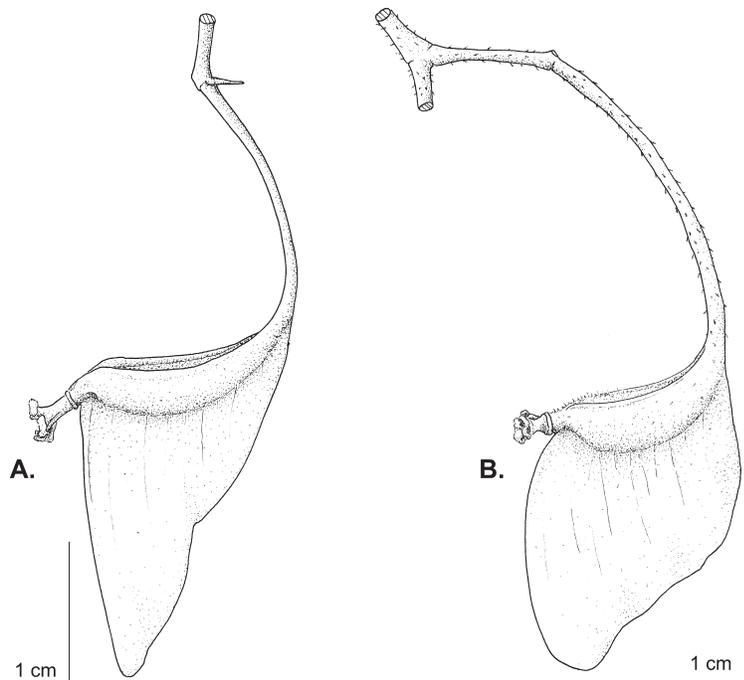


Fig. 26. Difference in fruit shape. **A.** *B. griffithiana* (A.DC.) Warb. **B.** *B. nepalensis* (A.DC.) Warb. Drawn by Rebecca Camfield. A from *Griffith* 203 (K) and 2504 (K); B from *Stainton* 8906 (E) and *Cave* s.n. (E00013877).

styles 2, convoluted with slightly twisted ends, deciduous. Fruit: pendulous; capsule oblong-ellipsoid, 14–18 × 4–6 mm, red, glabrous; wing extending along the pedicel slightly, unequal, rounded triangle, 12–18 × 14–18 mm.

Distribution and phenology

Arunachal-Pradesh to Meghalaya; also in Bhutan and Myanmar; 750–1400 m. Flowering: October to December; fruiting: December.

Conservation status

Least Concern. Although *B. griffithiana* has a small AOO of 28 km² it has an EOO of 64,570 km² and is found primarily in the mountains of Arunachal-Pradesh that are fairly undisturbed with plenty of suitable habitat. The species has also been found near the Dibang Wildlife Sanctuary of Arunachal-Pradesh.

Remarks

The flowers can be either pink or white (Morris & McMillan 2006, Morris 2011d), and the fruits vary from green to pink to bright red. In the wild *B. griffithiana* prefers to grow on cliff faces, allowing the many branched peduncles to cascade down the cliff (Morris 2011d). This species is vegetatively most similar to *B. nepalensis* which has only 2 tepals on the male flowers and has leaves which are adaxially glabrous. The leaves of *B. nepalensis* can get much longer and broader than those of *B. griffithiana* which are always linear in shape. The wing on the fruit is larger and broader on *B. nepalensis* (see Fig. 26) and the female flowers are about 1 cm wider.

Begonia handelii Irmsch. [sect. *Sphenanthera*]

Fig. 27

Anzeiger der Akademie der Wissenschaften in Wien. Mathematische-naturwissenschaftliche Klasse 58: 24 (Irmscher 1921). – Type: Vietnam, Tonkin, 1 Nov. 1914, *Handel-Mazzetti 12* (lecto-: [WU0038802](#), here designated; isolecto-: [B100169832](#), [E00051632](#) n.v., [WU1924-0004735](#)).

Begonia tessaricarpa auct. non. C.B. Clarke: Dash in *Bulletin of Arunachal Forest Research* 26: 41 (Dash 2010).

Citations in other publications

As *B. handelii*: Irmscher (1927: 348), Handel-Mazzetti (1931: 385), Irmscher (1939: 517), Chun & Chun (1939: 22), Yu (1948: 115), Hô (1991: 733), Tebbitt (2003b: 1), Tebbitt (2005: 208), Hughes (2008: 47).

Other material

INDIA: **Arunachal-Pradesh**: Palin to Yanglang village, *Dash 31147* (ARUN n.v.). **Assam**: Digboi, 9 Mar. 1947, *Ward 16090* (BM000017315).

Description

Rhizomatous, dioecious herb, 20–40 cm high. Rhizome: ca 10 mm wide, glabrous, internodes 10–15 mm long. Stipules: ovate, 9–14 × 4–5 mm, glabrous, persistent. Leaves: petiole (5–)10–25 cm long, puberulent to glabrous; lamina ovate to lanceolate-ovate, basifixed, base cordate with lobes not overlapping, 12–20 × 6–11 cm, asymmetric, upper surface green, glabrous or sparsely puberulent, underside pale green, glabrous or sparsely puberulous, denser on veins, venation palmate, midrib 8–16 cm long; margin entire to sparsely dentate, glabrous, apex acute to acuminate. Inflorescence: cymose, axillary, many, secondary branches reduced and appearing sub-umbellate; peduncle glabrous, male primary 3–8 cm,

3–5 flowers, female primary 3–6 cm, 2–4 flowers; bracts ovate, 10–20 × 5–10 mm. Male flower: pedicel 4–10 mm long, with minute hairs; tepals 4; outer tepals orbicular to broad ovate, (15–)20–55 × (10–)20–50 mm, white to pale pink, minute hairs on reverse, margin entire; inner tepals oblong-elliptic, (10–)15–30 × 5–17 mm, white, glabrous; androecium with 70–100 stamens, symmetric; filaments 2–3 mm long, subequal, free; anther linear-oblong, 2–3 mm long, dehiscing through slits running nearly the entire length of the anther, not hooded, connective extended. Female flower: pedicel 20–30 mm long, with minute hairs; bracteoles absent; tepals 4, unequal, ovate to elliptic, outer tepals 20–50 × 8–10 mm, pale pink, minute hairs on reverse, margin entire, inner tepals as in male flowers; ovary 4-locular, placentae bifid; capsule obovoid to obpyramidal, 6–12 × 6–10 mm, sparsely red pubescent, with 4 small fleshy wings/ridges; styles 4, forked and twisted twice, deciduous. Fruit: on a stout pedicel; pyramidal-turbinate, fleshy; ca 12 × 10 mm, sparsely red pubescent to glabrous, with 4 ridges.

Distribution and phenology

Arunachal-Pradesh and Assam; also in Southern China, Myanmar, Thailand and Vietnam; 200–900 m. Flowering: January to March; fruiting: February to April.

Conservation status

Least Concern (Hughes 2008). *Begonia handelii* is a widespread species with no significant change in distribution in recent years to warrant a change in its status.

Remarks

Begonia handelii is remarkable for the size of its flowers, which measure 10 cm across on the holotype of the type variety. This species is variable across its broad geographic range, especially with respect to the indumentum on the petioles and leaves. It is allied to the other dioecious species in sect. *Sphenanthera*

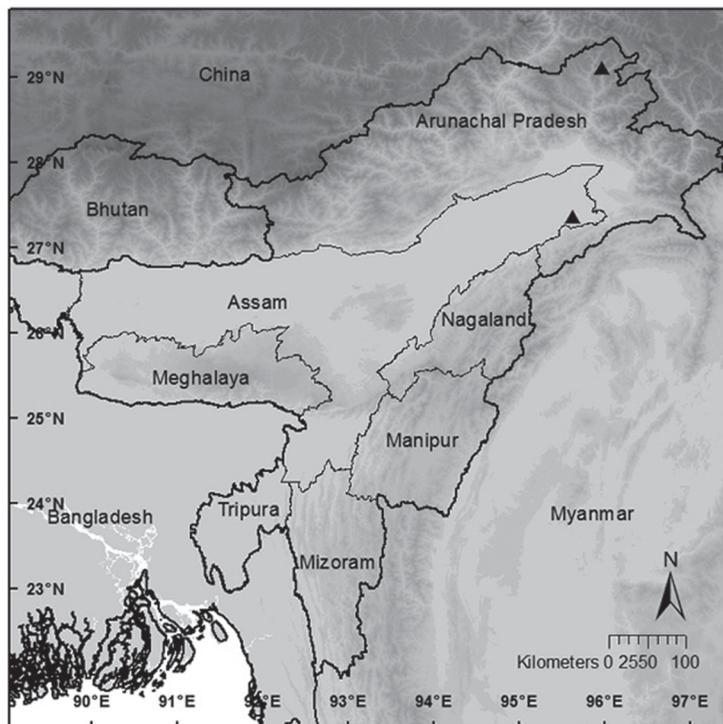


Fig. 27. Map showing the location of *B. handelii* Irmsch. specimens.

with 4-locular fruit, in the study area represented by *B. burkillii* and *B. tessaricarpa*. *Begonia burkillii* differs in having variegated leaves, male inflorescences with some second-order branching (sub-umbellate in *B. handelii*) outer tepals acute (rounded in *B. handelii*) the stamens in a globose cluster (lax and rosette-like in *B. handelii*); the shape of the fruit also differs with *B. burkillii* having a more elongate capsule than the shorter obpyramidal fruit of *B. handelii*.

The fruit of *B. handelii* is very similar to that of the poorly understood *B. tessaricarpa* but the flowers and leaves on the type of the latter are smaller and have much longer petioles; the latter is potentially synonymous with *B. handelii* var. *prostrata* (Irmsch.) Tebbitt (Tebbutt 2003b, basionym: Irmscher 1939) but we refrain from reducing the name here until better material becomes available. *Begonia handelii* var. *prostrata* is likely to occur in the study region but lacks any herbaria records. This variety differs from *B. handelii* var. *handelii* by having flowers half the size.

Although Tebbitt (2003: 1) cites the WU specimen as the holotype, the B specimen is annotated as such. As the protologue does not cite any herbaria, we have lectotypified the name here to clarify the status of the material in B and WU.

Begonia hatacoa Buch.-Ham. ex D.Don [sect. *Platycentrum*]

Figs 28–29

Prodromus Florae Nepalensis: 223 (Don 1825). – Type: Nepal, Sembu, 8 Jul. 1802, *Buchanan-Hamilton* (lecto-: [BM000521516](#), here designated).

Begonia rubrovenia Hook., *Botanical Magazine* 79: 4689 (Hooker 1853). – *Platycentrum rubrovenium* (Hook.) Klotzsch, *Abhandlungen der Königl. Akademie der Wissenschaften zu Berlin*: 244 (Klotzsch 1855 [‘1854’]). – Type: Cultivated specimen, grown by Nuttall in Preston, UK, from material collected in East Bhutan, *Booth* s.n. (lecto-: [K000739936](#), here designated).

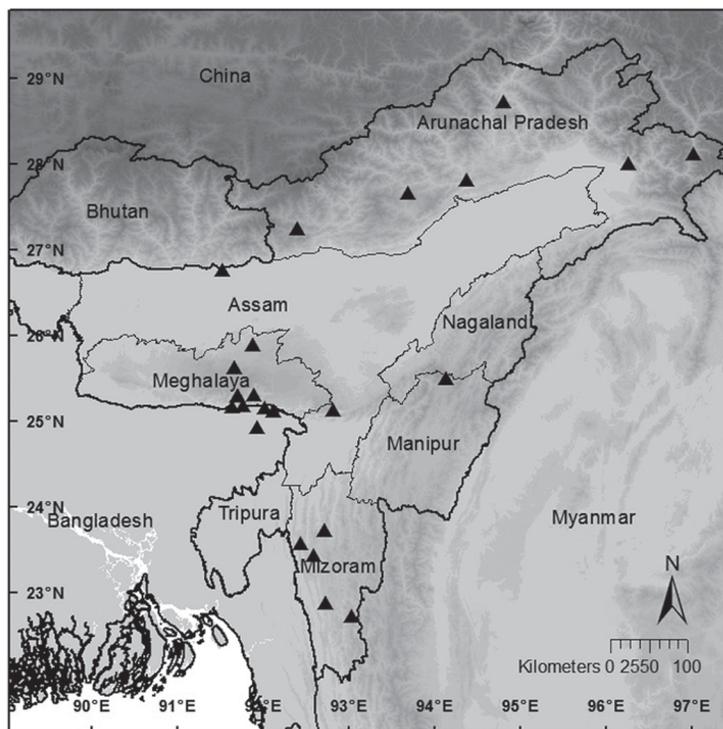


Fig. 28. Map showing the location of *B. hatacoa* Buch.-Ham. ex D.Don specimens.

Citations in other publications

As *B. hatacoa*: Hara (1972: 143), Hara (1975: 85), Hara *et al.* (1979: 181), Grierson (1991: 243), Chauhan (1996: 175), Chauhan (2000: 424), Kumar (2002: 644), Gu *et al.* (2007: 178), Uddin (2007: 594), Hughes (2008: 49), Dash (2010: 34), Morris (2011e: 214), Verma *et al.* (2013: 179), Baruah & Choudbury (2014: 41); as *B. rubrovenia* Koch (1858: 341), de Candolle (1864: 347), Clarke (1879: 645), Clarke (1881: 119), Gagnepain (1921: 1102), Craib (1931: 778), Fischer (1938: 98), Deb (1961: 285), Deb (1981: 269); as *Platycentrum rubrovenium*: Klotzsch (1855 [‘1854’]: 124), de Candolle (1864: 347), Hara (1972: 143).

Description

Rhizomatous, monoecious herb, some portions of stem erect, 8–35 cm high. Rhizome: ca 10 mm wide, glabrous, internodes 8–10 mm long. Stem: slender, 2–11 mm wide, dense to sparsely puberulent, internodes on erect stem, 5–15 cm long. Stipules: lanceolate, 5–24 × 2–6 mm, pubescent, persistent. Leaves: petiole 4–15(–20) cm long, tomentose to subglabrous; lamina ovate to lanceolate to linear, basifixed, base cuneate to rounded, (4–)9–20 × 3–10(–15) cm, slightly asymmetric to asymmetric, upper surface dark green with white spots between the veins or dark green without spots, glabrous or puberulous on the veins near petiole attachment, underside red-purple, sparsely to densely puberulous on veins mostly, venation pinnate to palmate-pinnate, midrib (3.5–)8–19 cm long; margin entire to

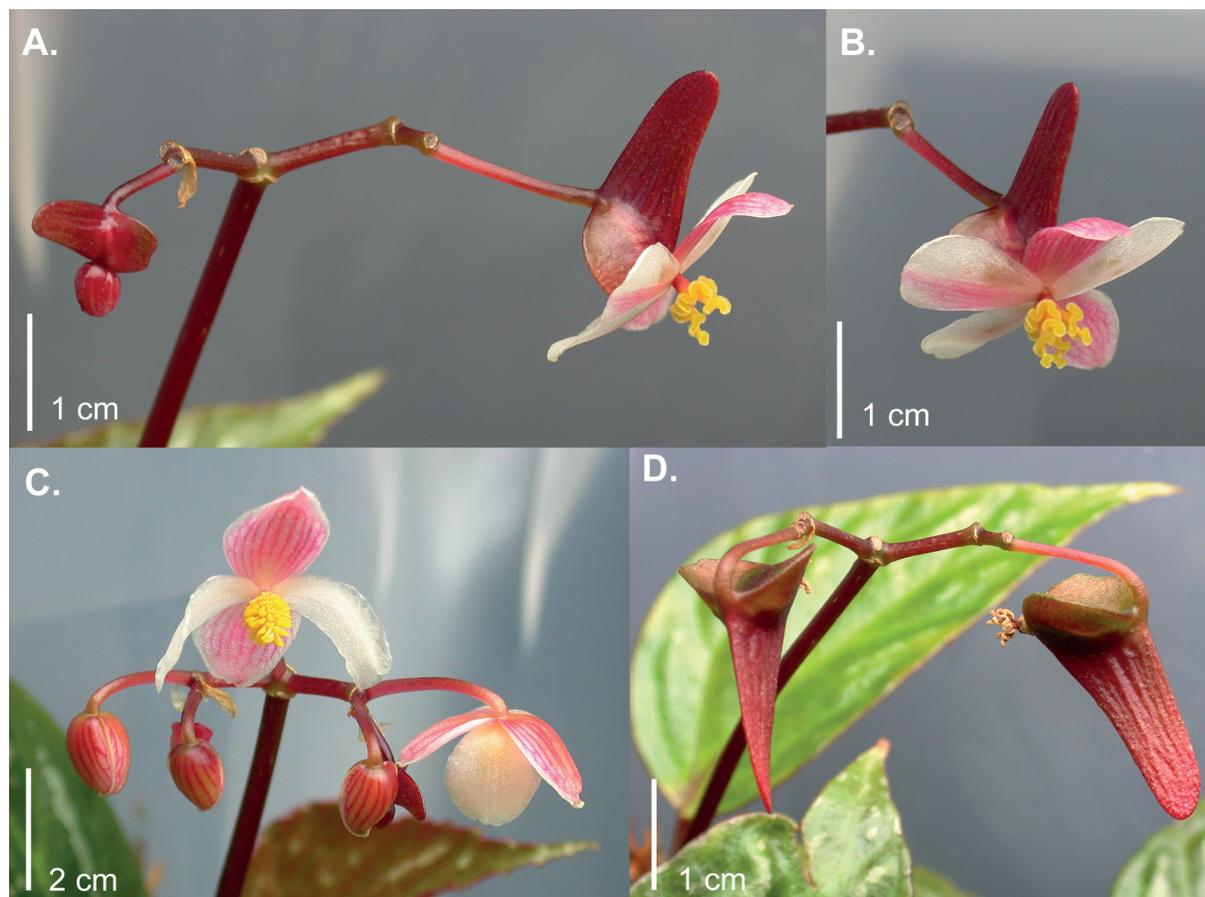


Fig. 29. *Begonia hatacoa* Buch.-Ham. ex D.Don. **A.** Female bud and side view of flower. **B.** Female flower front view. **C.** Male flower. **D.** Fruit. Photographs courtesy of John Boggan of a plant in cultivation in a private collection.

denticulate to shallowly broadly dentate, glabrous; apex acuminate. Inflorescence: cymose, terminal or axillary, few; peduncle glabrous, branching 2–3 times, primary 5–15 cm, secondary 1–3 cm, with 4–6 female and 4–8 male flowers; bracts lanceolate to ovate with an extended tip, 12–20 × 8–10 mm, margin entire, persistent. Male flower: pedicel 5–15 mm long, glabrous; tepals 4; outer tepals obovate, 5–13 × 3–7 mm, white to pale pink, with dark pink veins, glabrous, margin entire; inner tepals oblong or elliptic, 5–12 × 2–6 mm, white to pale pink, glabrous; androecium with 30–60 stamens, symmetric; filaments 1–2 mm long, unequal; anther narrowly elliptic, 2 mm long, dehiscing through slits longer than half the length of the anther, not hooded, connective extended. Female flower: pedicel 11–36 mm long, glabrous; bracteoles absent; tepals 4–5, equal, obovate, outer tepals 8–12 × 5–7 mm, white to pale pink, with darker veins, glabrous, inner tepals similar but smaller; ovary 2-locular, placentae bifid, capsule ellipsoid, glabrous, with one long triangular wing and two short oblong wings; styles 2, deeply forked once and twisted once, deciduous. Fruit: recurved; capsule ellipsoid, 6–14 × 2–8 mm, glabrous; wings extending along the pedicel slightly, subequal; longest wing triangular to rounded oblong, 10–20(–27) × 5–13 mm; shortest semi-circular, 3–7 × 8–13 mm.

Distribution and phenology

Arunachal-Pradesh, Assam, Meghalaya, Mizoram and Manipur; also in China, Nepal, Sikkim, Bhutan, Myanmar, Thailand and Vietnam; 600–1850 m. Flowering: mainly from June to September (but can flower at any time of the year); fruiting: mainly between August and November.

Conservation status

Least Concern. *Begonia hatacoa* has an AOO of 132 km² and an EOO of 416,730 km². This species is widespread and common throughout continental eastern Asia.

Remarks

This is a variable species in leaf shape and colour but the flowers are characterized by having dark pink veins on the outer tepals. These stripes appear darker on the buds and fade as the flower ages; occasionally you get pure white flowers.

Key to varieties:

1. Leaves ovate and asymmetric, margin entire, underside with scattered hairs mostly on veins var. *hatacoa*
- Leaves linear and symmetric, margin wide spaced shallow dentate, underside with dense hairs on veins..... var. *meisneri*

Begonia hatacoa var. *hatacoa*

Other material

INDIA: **Arunachal-Pradesh:** Amjee to Palin, *Dash 32832* (ARUN n.v.); Lohit Valley, Tidding Saddle, *Ward 19127* (BM, E); Mariyang, *Choudhery 18470* (ARUN n.v.); Subansiri District, 8 Apr. 2005, *Morris 13* (CLEMS n.v.); West Kamang District, 10 Apr. 2005, *Morris 18* (CLEMS n.v.); *ibid.*, 10 Apr. 2005, *Morris 20* (CLEMS n.v.); *ibid.*, 11 Apr. 2005, *Morris 24* (CLEMS n.v.). **Assam:** Cachar, Laikul, 1 May 1951, *Koelz 27838* (MICH); Menoka, 20 Feb. 1952, *Koelz 29290* (MICH). **Manipur:** Mao, *Deb 1771* (CAL n.v.); *ibid.*, *Deb 1773* (CAL n.v.). **Meghalaya:** Khasi Hills, Sep. 1878, *Mann s.n.* (ASSAM n.v.); Khasi Hills, Chela, 5 Sep. 1850, *Hooker & Thomson s.n.* (K); Khasi Hills, Cherrapunji, 2 Jun. 1952, *Chand 5805* (MICH); *ibid.*, 24 Apr. 1952, *Chand 5455* (MICH); *ibid.*, 19 Oct. 1871, *Clarke 16013* (BM); *ibid.*, 13 Jun. 1850, *Hooker & Thomson 637* (K); *ibid.*, 13 Jun. 1850, *Hooker & Thomson 715* (K); *ibid.*, 1 Nov. 1850, *Hooker & Thomson s.n.* (K); *ibid.*, 1 Jun. 1952, *Koelz 30157* (MICH); *ibid.*, 3 May 1952, *Koelz 29630* (MICH); *ibid.*, 1 May 1952, *Koelz 29586* (MICH); *ibid.*, 21 Jul. 1952, *Koelz 30731*

(MICH); *ibid.*, 29 Jul. 1952, *Koelz 30911* (MICH); *ibid.*, 22 Jul. 1952, *Koelz 30771* (MICH); *ibid.*, 14 Aug. 1952, *Koelz 31118A* (MICH); Khasi Hills, Nongphoh, 5 Jul. 1949, *Koelz 23064* (MICH); *ibid.*, 3 May 1949, *Koelz 22640* (MICH); Khasi Hills, Pynursla, 28 Aug. 1949, *Chand 2083* (MICH); *ibid.*, 16 Aug. 1949, *Koelz 23514* (MICH); Khasi Hills, Walong, 21 Oct. 1871, *Clarke 16234B* (BM); Khasia, 11 Nov. 1850, *Hooker & Thomson s.n.* (BM, E, K); Sillet Hills, 1832, *Silva & Bruce s.n.*, *Wallich Cat. No. 3679B* (K-W, barcode [K001112054](#)); Sillet Hills, Jaflong, 25 Aug. 1908, *Craib 443* (K). **Mizoram:** Lungleh, Jan. 1927, *Parry 90* (K); *ibid.*, Jul. 1927, *Parry 90* (K); Lushai Hills, Aijal, 23 Mar. 1951, *Chand 4279* (MICH); *ibid.*, 26 Jan. 1953, *Chand 6741* (MICH); Lushai Hills, Chekawn, 10 Jul. 1927, *Parry 249* (K); Lushai Hills, Sangau, 21 Feb. 1953, *Chand 6883* (MICH); Sabual, *Deb 27263* (CAL n.v.); Saithah, *Singh 92945* (CAL n.v.).

Description

Plant 15–35 cm high. Stem: ca 10 mm wide, internodes 3–15 cm long. Stipules: 5–24 mm long. Leaves: petiole 4–15(–20) cm long, lamina slightly asymmetric to asymmetric, upper surface dark green with white spots between the veins or green without spots, underside red-purple, sparsely puberulous hairs on veins mostly; margin entire to minutely denticulate. Inflorescence: bracts 12–20 × 8–10 mm. Fruit: capsule 6–14 × 2–8 mm.

Begonia hatacoa var. *meisneri* (C.B. Clarke) Golding

Phytologia 40: 19 (Golding 1978). – *Begonia rubrovenia* var. *meisneri* C.B. Clarke, *The Flora of British India* 2: 645 (Clarke 1879). – Type: India, Meghalaya, Sillet Hills, *Gomez s.n.*, *Wallich Cat. No. 6294* (lecto-: K-W, barcode [K000542891](#), here designated).

Begonia meisneri Wall., *A numerical list of dried specimens of plants in the East India Company's Museum*: 213, 6294 (Wallich 1831), nom. nud.

Other material examined

INDIA: **Meghalaya:** Jaintia Hills, Jaintiapur, 26 Oct. 1946, *Ward 16046* (BM, E); Khasia, 23 Oct. 1871, *Clarke 15869* (K).

Description

Plant ca 10 cm high. Stem: 2–4 mm wide when dry, internodes 0.5–3 cm long. Stipules: 5–7 mm long. Leaves: petiole 1–4 cm long, densely pubescent; lamina symmetric, upper surface dark green, underside red, dense red tomentose on veins only; margin shallow wide dentate. Inflorescence: bracts 2–5 × 2 mm. Fruit: capsule 7–9 × 3 mm.

Distribution and phenology

Endemic to the Sillet and Jaintia Hills; 450–1150 m. Flowering: July to August; fruiting: July to October.

Remarks

This variety is characterized by small linear leaves with broadly spaced dentitions. The specimen *Clarke 15869* cited in the protologue was located at Kew with a label that reads ‘halfway to *B. meisneri*’. The leaves when dried can look metallic blue on the underside. *Ward 16046* (BM) is a good representative specimen of this variety. Kumaria *et al.* (2012) report *B. hatacoa* var. *meisneri* in cultivation, however, the photograph shows a plant likely to be *B. palmata*.

Begonia iridescens Dunn [sect. *Platycentrum*]

Fig. 30

Bulletin of Miscellaneous Information, Kew 1920: 110 (Dunn 1920). – Type: India, Arunachal-Pradesh, Lalik Valley, Nov. 1911–Mar. 1912, *Burkill* 37336 (lecto-: [K000634615](#), here designated).

Citations in other publications

Burkill (1924: 289), Chauhan (1996: 175), Uddin (2007: 594), Hughes (2008: 57), Morris (2009c: 210), Dash (2010: 34).

Other material

INDIA: **Arunachal-Pradesh:** Bapu Mountain, Renging Camp, Nov. 1911–Mar. 1912, *Burkill* 36246 (n.v.); *ibid.*, Nov. 1911–Mar. 1912, *Burkill* 36831 ([K000634616](#)); *ibid.*, Nov. 1911–Mar. 1912, *Burkill* 38821 (n.v.); *ibid.*, Nov. 1911–Mar. 1912, *Burkill* 37315 (n.v.); *ibid.*, Nov. 1911–Mar. 1912, *Burkill* 36673 ([K000634617](#)); *ibid.*, Nov. 1911–Mar. 1912, *Burkill* 36247 (n.v.); Igar Valley, Nov. 1911–Mar. 1912, *Burkill* 36111 (n.v.); Lohit Valley, Shoehang to Paya, *Rao* 10627 (ASSAM n.v.); Pasighat, 10 Feb. 1928, *Ward* 7823 (K); Taliha, *Malhotra* 57817 (ASSAM n.v.); Vatica Shingkeng Forest, Nov. 1911–Mar. 1912, *Burkill* 36270 (n.v.).

Description

Rhizomatous, monoecious herb, 10–15 cm high. Rhizome: ca 10 mm wide, villose, internodes 5–10 mm long. Stipules: lanceolate, 3–12 × 2–5 mm, pubescent to glabrous, persistent. Leaves: petiole 5–12 cm long, red villose; lamina ovate to ovate-orbicular, basifixed, base cordate with lobes overlapping, 7.5–30 × 6–20 cm, asymmetric, upper surface green with blue iridescence and large silver spots between the veins, sparsely puberulous all over, underside green, pubescence on veins only, venation palmate, midrib

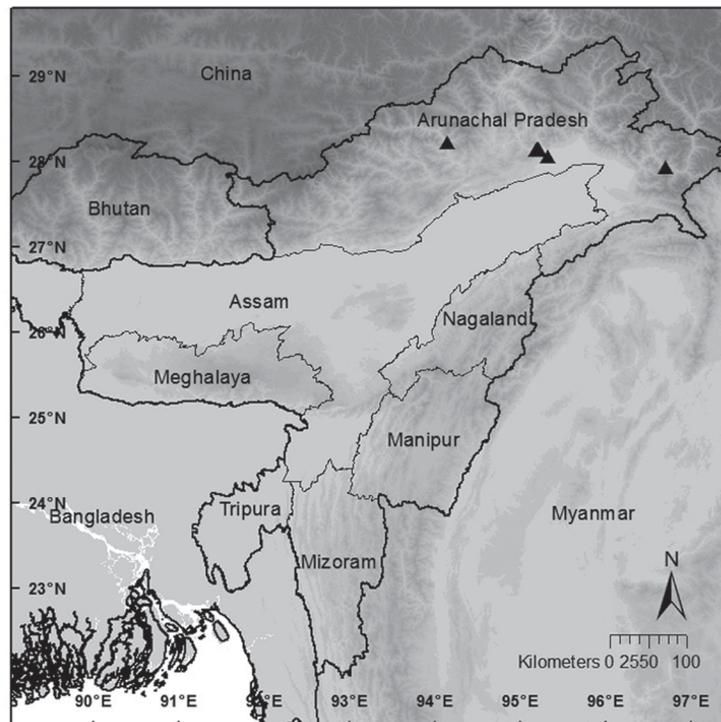


Fig. 30. Map showing the location of *B. iridescens* Dunn specimens.

5–21 cm long; margin entire to undulate, with dense hairs; apex acute. Inflorescences: cymose, terminal, few; peduncle densely pilose, branching 3–4 times, primary 3–8 cm, secondary 2–4 cm, tertiary and quaternary 1–2 cm, with 5–6 female and 5–12 male flowers; bracts lanceolate, 3–6 × 1–2 mm, glabrous, margin pilose, persistent. Male flower: pedicel 10–26 mm long, sparsely pilose; tepals 4; outer tepals broadly ovate, 9–17 × 6–9 mm, pink, pilose on reverse, margin entire; inner tepals linear to spatulate, 6–12 × 3–5 mm, pink, glabrous; androecium with 15–25 stamens, asymmetric; filaments 1–3 mm long, unequal, fused at base; anther oblong-elliptic, 2–2.5 mm long, dehiscing through slits running nearly the entire length of the anther, not hooded, connective not extended. Female flower: pedicel 8–14 mm long, pilose; bracteoles absent; tepals 4–5, unequal, obovate to oblong elliptic, outer tepals 10–15 × 5–10 mm, pink, pilose on reverse, margin entire, inner tepals as in male flowers; ovary 2-locular, placentae bifid, capsule obovoid, sparsely pilose, one long oblong wing and two short triangular wings; styles 2, convoluted with slightly twisted ends, persistent. Fruit: recurved; capsule obovoid, 8–10 × 6–8 mm, sparsely red tomentose; wings not extending along pedicel, unequal; longest wing rounded oblong, 8 × 3 mm; shortest wings crescent shaped, 1–2 × 3–4 mm.

Distribution and phenology

Arunachal-Pradesh; also in Myanmar; 500–1550 m. Flowering: January to February; fruiting: February to March.

Conservation status

Least Concern. *Begonia iridescens* has a small AOO of 28 km² and an EOO of 4,630 km², but this is likely to reflect the very low collection density of the area. There is plenty of suitable habitat in the mountains of Arunachal-Pradesh and Northern Myanmar. The status is considered here as Least Concern.

Remarks

The leaves vary considerably in size, and are usually only 2–3 per plant, if a third is present it is often smaller. Burkill's notes on the type specimen state the leaves lie flat against the substrate. The name refers to the blue iridescence of the upper leaf surface, also noted in *B. xanthina* which otherwise differs considerably in having yellow flowers and more acuminate leaf tips. A blue iridescence can also be observed on the underside of dried specimens.

Begonia josephi A.DC. [sect. *Diploclinium*]
Figs 31–32

Annales des Sciences Naturelles; Botanique, Sér. 4, 11: 126 (de Candolle 1859). – Type: India, Meghalaya, Khasia, *Hooker & Thomson 34* (lecto-: [K000761410](https://doi.org/10.1111/j.1365-3113.2011.00410.x), here designated).

Citations in other publications

de Candolle (1864: 313), Clarke (1879: 639), Clarke (1881: 118), Clarke (1890: 25), Kanjilal (1938: 334), Hara (1966: 214), Hara (1971: 84), Hara *et al.* (1979: 181), Grierson (1991: 240), Gu *et al.* (2007: 180), Uddin (2007: 594), Hughes (2008: 61), Dash (2010: 35), Verma *et al.* (2013: 179).

Other material

INDIA: **Arunachal-Pradesh:** Bomdilla, *Joseph 40322* (ARUN n.v.); Senge Dzong, 16 Aug. 1938, *Ward 14092* (BM, E). **Assam:** Tsuga, 25 Aug. 1928, *Ward 8579* (K). **Meghalaya:** Khasi Hills, Sep. 1885, *Mann* s.n. (ASSAM n.v.); Khasi Hills, Laitlyngkot, 17 Jul. 1946, *Ward 16047* (BM, E); Khasi Hills, Mairang, 12 Sep. 1886, *Clarke 45693C* (BM); Khasi Hills, Mawphlang, 14 Sep. 1953, *Chand*

7223 (MICH); *ibid.*, 20 Oct. 1952, *Chand 6498* (MICH); *ibid.*, 10 Sep. 1949, *Koelz 23790* (MICH); *ibid.*, 20 Aug. 1952, *Koelz 31179* (MICH); *ibid.*, 16 Oct. 1946, *Ward 16049* (BM); *ibid.*, 10 Aug. 1949, *Ward 18744* (BM); Khasia, *Hooker & Thomson 34* (iso-: B, BM, K, L, NY); *ibid.*, 5 Jul. 1850, *Hooker & Thomson 34* (iso-: K); *ibid.*, 2 Apr. 1850, *Hooker & Thomson 34* (iso-: K). **Nagaland**: Naga Hills, Pulebudge, 4 Aug. 1935, *Bon 5304* (K).

Description

Tuberous, stemless, monoecious herb, 15–25 cm high. Stipules: lanceolate, 2–3 mm long, glabrous, deciduous. Leaves: petiole (5–)10–20(–30) cm long, glabrous or sparsely puberulous; lamina oblong-ovate to broadly ovate, peltate, base rounded to truncate, 7–20(–29) × 4–15(–23) cm, symmetric, upper surface green, hispid all over, underside red-purple, sparsely hispid mostly on the veins, venation palmate-pinnate; midrib 5–18 cm long; margin with acute lobes, denticulate, with very sparse short hairs; apex acute to acuminate. Inflorescences: cymose, terminal, few; peduncle glabrous, branching 2–3 times, primary 9–15(–25), secondary 2–10 cm, tertiary 1–2 cm, with 2–6 female and 4–10 male flowers; bracts lanceolate, 3 mm long, glabrous. Male flowers: pedicel 9–15 mm long, glabrous; tepals 4; outer tepals broadly obovate, 5–10 × 3–5 mm, white, sparsely villose on reverse, margin entire; inner tepals spatulate, 3–5 × 1–3 mm, white, glabrous; androecium with 9–15 stamens, symmetric; filaments 1–2 mm long, subequal, fused at base into a short column; anther ellipsoid, 1–2 mm long, dehiscing through slits about half the length of the anther, not hooded, connective not extended. Female flower: pedicel 4–17 mm long, glabrous; bracteoles absent; tepals 4–5, unequal, 4 ovate, 1 lanceolate (not always present), outer tepals 5–10 × 4–7 mm, white, glabrous, margin entire, inner tepals similar but smaller; ovary 3-locular, placentae bifid; capsule oblong-ellipsoid, 3–5 × 2–4 mm, glabrous, with one long triangular wing and two short oblong wings; styles 3, shallowly U-shaped, persistent. Fruit: pendulous; capsule oblong-ellipsoid, 7–9 × 9–11 mm, glabrous; wings extending along the pedicel,



Fig. 31. Map showing the location of *B. josephi* A.DC. specimens.

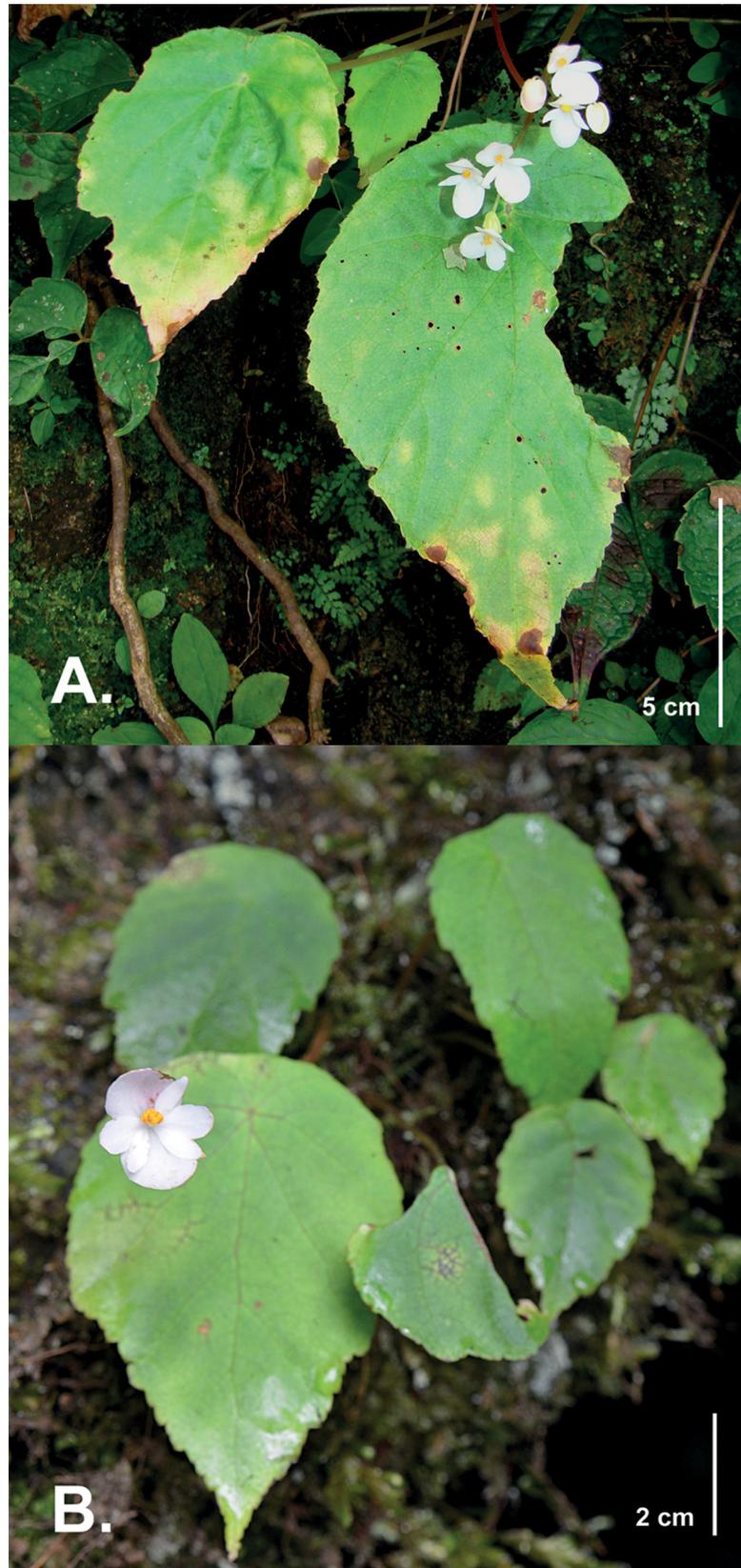


Fig. 32. *Begonia josephi* A.DC. A. Plant habit. B. Male flower. Photographs courtesy of Sangeeta Rajbhandary of plants in Nepal.

unequal, rounded at the tips; longest wing rounded-oblong, 10–14 × 10–11 mm; shortest wings oblong, 1–3 × 7–9 mm.

Distribution and phenology

Arunachal-Pradesh, Assam, Meghalaya and Nagaland; also in China, Nepal, Sikkim, Bhutan and Myanmar; 1500–2450 m. Flowering and fruiting: June to October.

Conservation status

Least Concern. *Begonia josephi* has an AOO of 172 km² and an EOO of 270,000 km² with plenty of suitable habitat from which it is commonly collected in the Eastern Himalayas. The species has been found in several national parks in Nepal and from Sakteng National Park in Bhutan.

Remarks

This is the only species known in the area with a peltate leaf. *Koelz 31179* has a larger and a barely peltate leaf with a deeply cordate leaf base; however, the flowers compare very well to other specimens.

Begonia koelzii R.Camfield sp. nov. [sect. *Platycentrum*]

urn:lsid:ipni.org:names:77175032-1

Figs 33–35; Table 1

Diagnosis

Similar to *B. macrotoma* Irmisch. (1951: 41) in having lacerate leaves, but differs in having a larger lamina (20–40 cm long, not 12–15 cm) and female flowers with 4–6 (not 3) tepals.

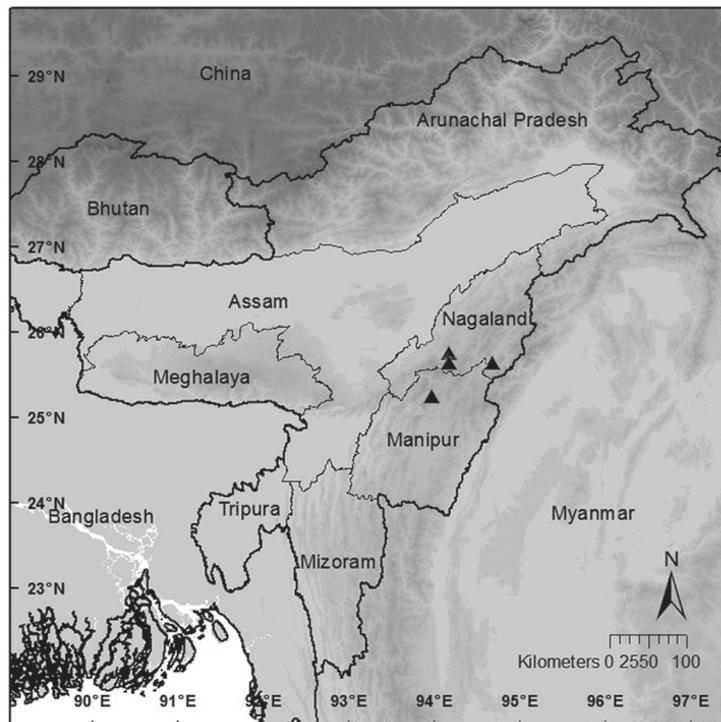


Fig. 33. Map showing the location of *B. koelzii* R.Camfield sp. nov. specimens.

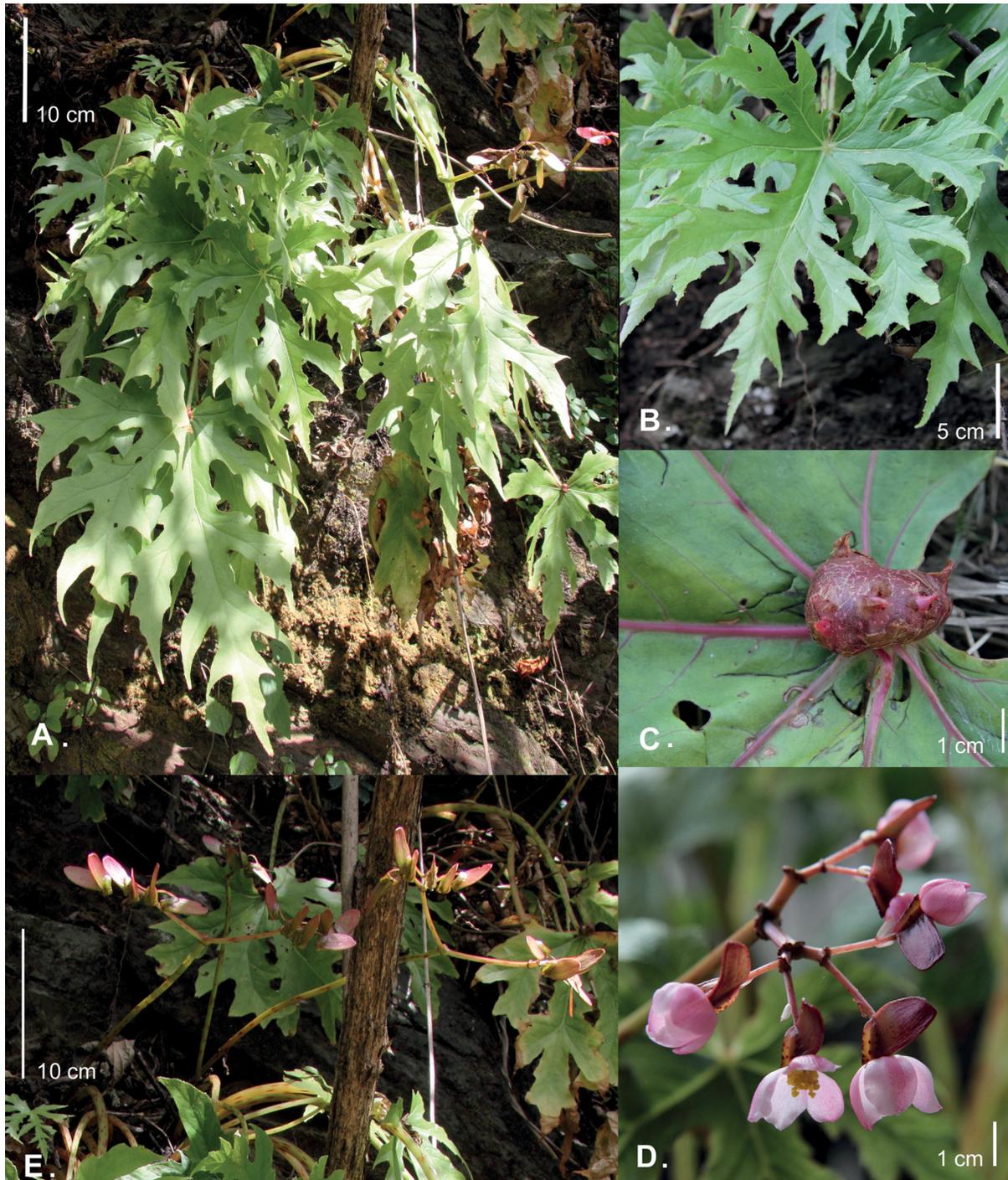


Fig. 34. *Begonia koelzii* R. Camfield sp. nov. **A.** Plant habit. **B.** Leaf. **C.** Bulbil. **D.** Young female flowers. **E.** Fruit. Photographs courtesy of Nick Macer, of a plant in Manipur.

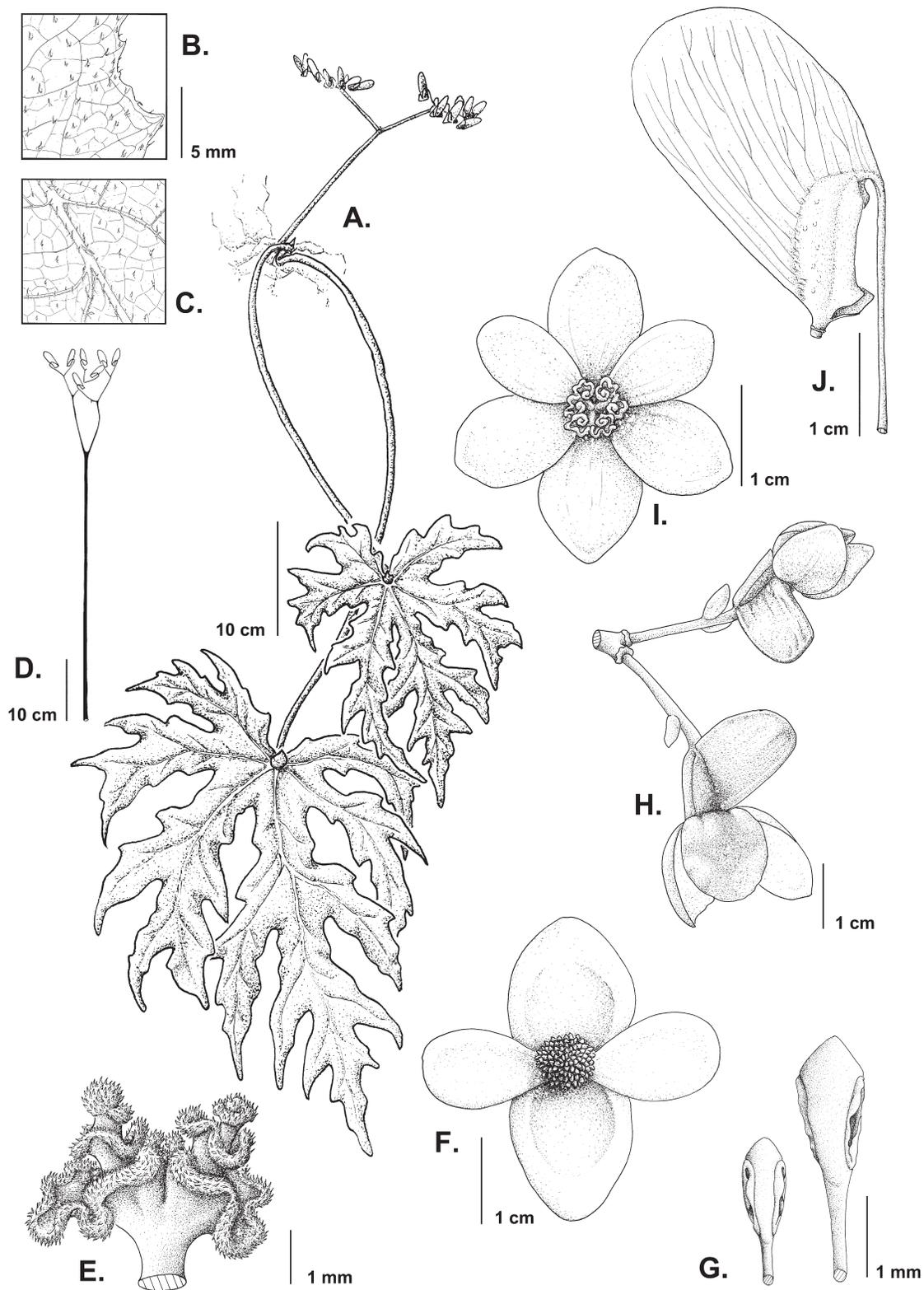


Fig. 35. Illustration of *B. koelzii* R. Camfield sp. nov. **A.** Plant habit. **B.** Adaxial leaf surface. **C.** Abaxial leaf surface. **D.** Inflorescence. **E.** Style. **F.** Male flower. **G.** Stamens. **H.** Female buds. **I.** Female flower. **J.** Mature fruit. Drawn by Rebecca Camfield. A, H from photographs by Nick Macer. B–D, J from *Koelz* 267739; E–G, I from *Koelz* 26053; all MICH.

Table 1. Comparison of the key vegetative and floral characters of the new species *B. koelzii* R. Camfield sp. nov. and several similar species. Data collected from herbarium specimens at E, HAST and K, species protologues and the Flora of China (Gu *et al.* 2007).

Characters	<i>B. koelzii</i> R. Camfield sp. nov.	<i>B. longialata</i> K.Y.Guan & D.K. Tian	<i>B. macrotoma</i> Irmseh.	<i>B. panchtharensis</i> S. Rajbh.	<i>B. pedatifida</i> H.L.év	<i>B. rubropunctata</i> S.H.Huang & Y.M.Shui	<i>B. shilendruae</i> Rekha Morris & P.D.McMillan
cauline leaves	no	yes	yes	no	no	no	no
bulbils	yes, frequently	no	no	very occasionally?	very occasionally?	very occasionally?	no
lamina shape	ovate	suborbicular	broad ovate	suborbicular	suborbicular	suborbicular	broad ovate
lamina lobes	deeply incised	incised	shallowly incised	deeply incised	deeply incised	deeply incised	linear
lamina upper surface	sparsely strigose	glabrous	sparsely hirsute	sparsely hirsute	sparsely strigose	sparsely strigose	glabrous
lamina length (cm)	20–50	25–45	12–15	25–40	10–40	15–20	18–35
petiole length (cm)	30–50	10–30	5–15	30–45	10–55	15–25	up to 40
inflorescence structure	cymose	cymose	cymose	cymose	cymose	cymose	paniculate or raceme of cymes
peduncle length (cm)	30–60	5–10	5–15	40–50	15–20	50–60	10–30
male tepal no.	4	4	4	4	4	4	2
female tepal no.	4–6	5	3	5	5	4 to 5	2
stamen no.	60–90	150–180	n/a	120–150	80–100	100–120	30–40
styles	3	2–3	2	2	2	2	2–3
longest wing shape	rounded-oblong	rounded-oblong	n/a	oblong-triangular	triangular	rounded-oblong	rounded-oblong
longest wing length (cm)	1–3	3–5	n/a	1–2.5	1–2.5	1–1.5	1.5–2
side wing shape	thin oblong	thin oblong	n/a	thin oblong	curved triangle	thin oblong	curved oblong
wings extend along pedicel	no	slightly	n/a	no	yes and in front	slightly	yes and in front

Etymology

The epithet honours Walter N. Koelz (1895–1989), the American zoologist who collected the type.

Type

India, Nagaland, Takubama, 4 Sep. 1950, *Koelz 26053* (holo-: MICH1225736).

Other material examined

INDIA: **Manipur**: Karong, 26 Oct. 1950, *Koelz 26739* (MICH1225781). **Nagaland**: Naga Hills, Kojima, 26 Oct. 1885, *Clarke 41163A* (K); Naga Hills, Zakhama, 22 Oct. 1949, *Ward 18912* (BM).

Description

Rhizomatous, monoecious herb, 25–90 cm high. Rhizome: 10–15 mm wide, glabrous, internodes 15–20 mm long. Stipules: ovate, 10–19 × 8–12 mm, glabrous, deciduous. Leaves: petiole 30–50 cm long, sparsely puberulous; lamina ovate to broadly ovate, basifixed, cordate, 20–40(–50) × 20–30 cm, asymmetric, upper surface green, sparsely strigose all over, denser near the margin, underside green to pale green, sparsely strigose, denser on the veins, venation palmate, midrib 16–22(–40) cm long; margin deeply lobed, with ca 6 major lobes with further smaller lobelets, irregularly serrulate, with sparse hairs; apex acuminate. Inflorescences: cymose, axillary or terminal, few; peduncle sparsely puberulous, branching 3–4 times, primary peduncle 30–60 cm long, secondary 5–10 cm, tertiary 1–3 cm, quaternary ca 1 cm, with 8–12 female and 2–6 male flowers; bracts ovate-orbicular, 9–15 × 6–11 mm, deciduous. Male flower: pedicel 12–20 mm long, glabrous; tepals 4, outer tepals ovate, 10–14 × 7–10 mm, pink, glabrous, margin entire; inner tepals oblong to narrowly obovate, 7–14 × 5–9 mm, pink, glabrous, entire; androecium with 60–90 stamens, symmetric; filaments 1–2 mm long, unequal, fused at base; anther oblong-cuneate to oblong-elliptic, 1–1.5 mm long, dehiscent through slits longer than half the length of the anther, not hooded, connective extended. Female flower: pedicel 12–15 mm long, glabrous; bracteoles present; tepals (4–)6, equal, ovate to elliptic, outer tepals 10–15 × 8–11 mm, pale pink, glabrous, margin entire, inner tepals similar but smaller; ovary 2-locular, placentae bifid; capsule ellipsoid, 6–8 × 3–6 mm, strigose along the base of the main wing otherwise glabrous, with one long oblong wing and two short triangular wings; styles 3, convoluted with ends twisted twice. Fruit: pedicel 20–25 mm long, recurved; capsule ellipsoid, 12–15 × 4–6 mm, strigose near base of main wing otherwise glabrous; wings extending along the pedicel slightly, unequal; longest wing oblong-elliptic, 10–30 × 5–15 mm; shortest wings triangular-oblong, 3–5 × 9–11 mm.

Distribution and phenology

Endemic to the Arakan Mountain Range, usually found growing on cliff faces; 1000–2100 m. Flowering: September to October; fruiting: October to November.

Conservation status

Data Deficient. The full distribution of *B. koelzii* in the Arakan mountains is unknown.

Remarks

The female flowers on the material we have seen of this species had 3 styles; allied species can have either 2 or 3 styles; hence we consider there is the potential for *B. koelzii* to also be polymorphic for style number, which may be revealed given more material. The size of the female flowers is based on measurements from unopened buds, and we would expect the mature flowers to be larger. The bulbils are seen on larger, older leaves and are quite commonly observed.

This species is allied to several others which share lacerate leaves; *B. panchatharensis* S.Rajbh. (Rajbhandary *et al.* 2010) from Nepal and Bhutan, *B. pedatifida* H.Lév. (Léveillé 1909) from Yunnan, *B. shilendrae* from Arunachal-Pradesh, *B. rubropunctata* S.H.Huang & Y.M.Shui (Huang & Shui 1994) from Yunnan, *B. macrotoma* Irmsch. (Irmscher 1951) from Yunnan and *B. longialata* K.Y.Guan & D.K.Tian (Guan & Tian 2000) from Yunnan. *Begonia koelzii* is distinct from these in a number of vegetative and floral characters (Table 1). *Begonia macrotoma* is recorded from Northeast India by Gu *et al.* (2007) but no specimens were seen during this revision to confirm this. *Begonia longialata* is reported by Gu *et al.* (2007) as endemic to Yunnan; however, photographs have been taken in Manipur, on route to Khayang from Ukhrul (Macer 2013) of a caulescent plant with lacerate leaves which could potentially represent it in our study region; however, no herbarium material has been seen. *Begonia shilendrae* is the only other allied species currently known to occur within the study area, but their distributions do not overlap; *B. shilendrae* is known only from the type locality of Itanagar in Arunachal-Pradesh, whereas *B. koelzii* is recorded from Manipur and Nagaland.

***Begonia labordei* H.Lév. [sect. *Diploclinium*]**

Fig. 36

Bulletin de la Société d'Agriculture, Sciences et Arts de la Sarthe 39: 323 (Léveillé 1904). – Type: China, Kouy-Tcheou, 11 Sep. 1899, *Laborde & Bodinier* 1952 (lecto-: [B100366084](#), here designated; isolecto-: P n.v.).

Begonia harrowiana Diels, *Notes of the Royal Botanic Gardens Edinburgh* 5 (25): 166 (Diels 1912). – Type: China, Yunnan, Tali Valley, Sep. 1906, *Forrest* 4390 (lecto-: [E00022115](#), here designated; isolecto-: [BM000075818](#)).

Begonia polyantha H.Lév., *Catalogue des Plantes du Yun-Nan*: 17 (Léveillé 1916). – Type: China, Kouy-Tcheou, *Cavalerie* s.n. (lecto-: [E00022111](#), here designated).

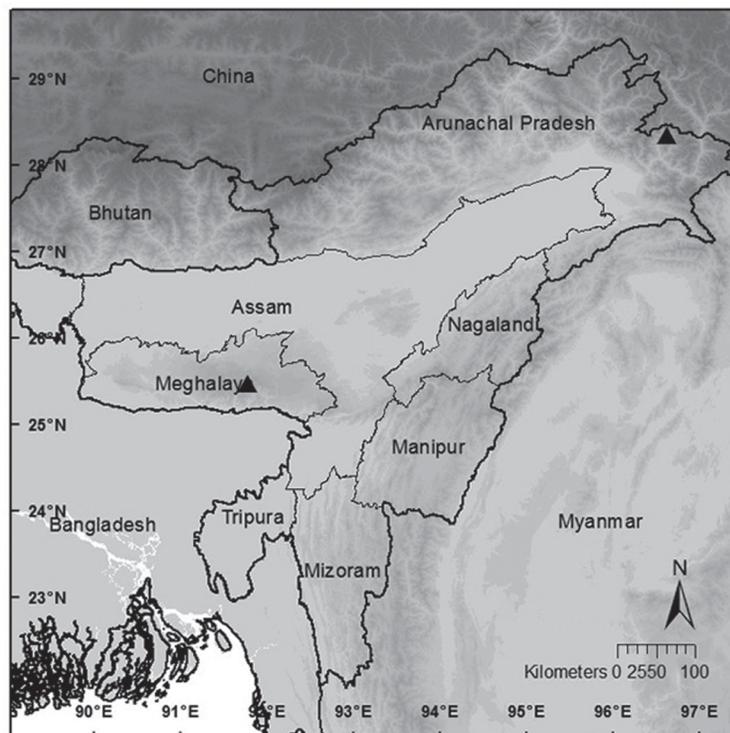


Fig. 36. Map showing the location of *B. labordei* H.Lév. specimens.

Citations in other publications

As *B. labordei*: Gu *et al.* (2007: 181), Hughes (2008: 66).

Other material examined

INDIA: **Arunachal-Pradesh**: Delei Valley, 29 Apr. 1928, *Ward 8241* (K); *ibid.*, 4 May 1928, *Ward 8156* (K); *ibid.*, 18 Aug. 1928, *Ward 8539* (K); Dirang Dzong, 2 Sep. 1938, *Ward 14194* (BM000075876); *ibid.*, 8 Sep. 1938, *Ward 14224* (BM). **Meghalaya**: Khasi Hills, Mawphlang, 16 Oct. 1946, *Ward 16045* (BM000075875, E).

Description

Tuberous, monoecious herb, 10–20 cm high. Stipules: lanceolate, 5–6 × 2 mm, glabrous, deciduous. Leaves: petiole 4–15 cm long, glabrous to sparsely pilose; lamina ovate to ovate-orbicular, basifixed, base cordate with lobes not overlapping, 9–20 × 6–16 cm, slightly asymmetric, upper surface green, glabrous or hispid all over, underside paler green or green and red, sparsely hispid on veins mostly, venation palmate, midrib 5–14 cm long; margin toothed at the end of the veins with smaller teeth between, with short hairs; apex acuminate. Inflorescence: raceme of cymes, terminal; peduncle sparsely pilose, branching 2(–3) times, primary 5–10 cm, secondary 5–15 mm, tertiary 1–2 mm, with 2–4 female and 3–6 male flowers; bracts lance-ovate, 3–4 × 1–2 mm, sparsely puberulous. Male flower: pedicel 7–8 mm long, glabrous; tepals 4; outer tepals sub-orbicular, 5–10 × 4–7 mm, white to pale pink, sparsely dark hispid on reverse, margin entire; inner tepals elliptic, 5–7 × 1–5 mm, white to pale pink, glabrous; androecium with 8–10 stamens, asymmetric; filaments 1 mm long, unequal, fused at base into a short column; anther oblong, 1–2 mm long, slightly hooded, connective not extended. Female flower: pedicel 8–9 mm long, glabrous; bracteoles absent; tepals 2–3, unequal, oblong, 6–10 × 2–6 mm, white to pale pink, glabrous, inner tepals as in male flowers; ovary 3-locular, placentae bifid; capsule oblong-ellipsoid, sparsely pilose, with one long triangular wing and two short triangular wings; styles 3, shallowly forked once and twisted twice, persistent. Fruit: pendulous; capsule oblong-ellipsoid, 8–10 × 5–7 mm, sparsely dark pilose; wings not extending along the pedicel, unequal; longest wing triangular arched away from the apex, 10–15 × 4–8 mm; shortest wings triangular 3 × 8 mm.

Distribution and phenology

Arunachal-Pradesh and Meghalaya; also in China, Myanmar and Vietnam; 1500–1850 m. Flowering: June to October; fruiting: September to October.

Conservation status

Least Concern (Hughes 2008). *Begonia labordei* is a widespread species in southeast Asia, with no significant change in recent years to warrant a change in its status.

Remarks

A widespread and vegetatively variable species though the fruits are distinctive, with the largest wing curving away from the apex of the fruit and resembling a bird's wing. *Begonia adscendens* is somewhat similar, but differs in having glabrous leaves and pale hairs near the base of the tepals, whereas in *B. labordei* the hairs are dark purple and visible with the naked eye. The two species also differ in fruit wing shape; the longest wing curves back adaxially on *B. labordei* but on *B. adscendens* it reaches up past the apex of the fruit capsule. A new record for India.

Begonia longifolia Blume [sect. *Sphenanthera*]

Fig. 37

Catalogus: 102 (Blume 1823). – *Diploclinium longifolium* (Blume) Miq., *Flora van Nederlandsch Indie* 1 (1): 687 (Miquel 1856). – Type: Indonesia, Sumatra, Salak, *Blume 740* (lecto-: [B100238313](#), here designated).

Casparya trisulcata A.DC., *Annales des Sciences Naturelles; Botanique, Sér. 4*, 11: 119 (de Candolle 1859). – *Begonia trisulcata* (A.DC.) Warb., *Natürlichen Pflanzenfamilien* 3 (abt. 6a): 142 (Warburg 1894). – Type: Indonesia, Java, Mt. Jojing, 1 May 1845, *Zollinger 2850* (lecto-: G-DC, here designated; isolecto-: B, BM, P01900669).

Begonia inflata C.B. Clarke, *Flora of British India* 2: 636 (Clarke 1879). – Type: Myanmar ‘Birma’, *Griffith 2587* (lecto-: [K000761388](#); isolecto-: B, GH00091698, [K000761387](#), [P05587760](#)).

Begonia sarcocarpa Ridl., *Journal of the Federated Malay States Museums* 8 (4): 38 (Ridley 1917a). – Type: Indonesia, West Sumatra, Korinchi, Barong Baru, 5 Jun. 1914, *Robinson & Kloss 61* (lecto-: [BM000017330](#), here designated).

Begonia turbinata Ridl., *Journal of the Federated Malay States Museums* 8 (4): 37 (Ridley 1917a). – Type: Indonesia, West Sumatra, Korinchi, Siolak Dras, 15 Mar. 1914, *Robinson & Kloss s.n.* (lecto-: [BM000017335](#); isolecto-: BM, [K000761216](#)).

Begonia tricornis Ridl., *Journal of the Straits Branch of the Royal Asiatic Society* 75: 35 (Ridley 1917b). – Type: Malaysia, Pahang, Telom, Nov. 1900, *Ridley 14123* (lecto-: SING0055970, here designated; isolecto-: [K000501077](#)).

Begonia crassirostris Irmsch., *Mitteilungen aus dem Institut für allgemeine Botanik in Hamburg* 10: 513 (Irmscher 1939). – Type: China, Hainan, Lam Ko District, Lin Fa Shan, 2 Aug. 1927, *Tsang Wai Tak 278* (lecto-: [E00051639](#); isolecto-: , G n.v., [K000761123](#), MO n.v., UC n.v.).

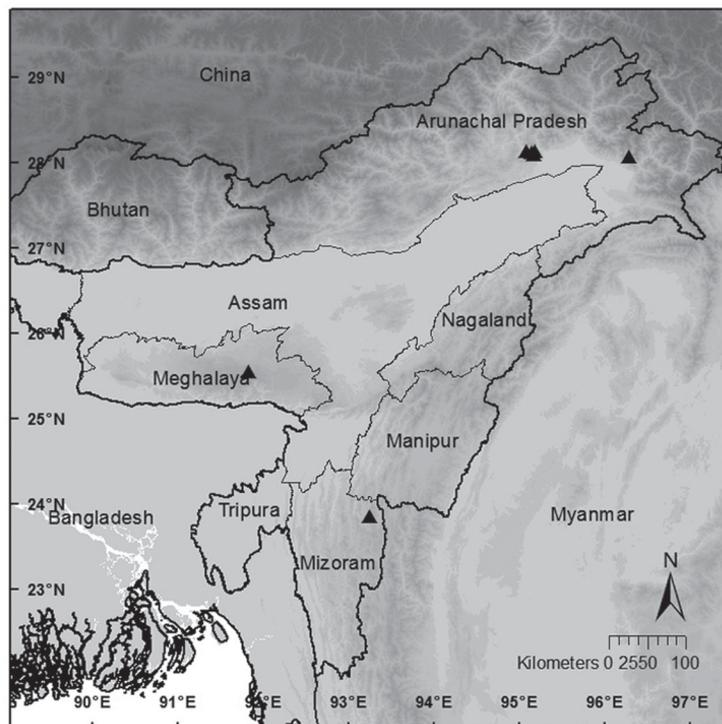


Fig. 37. Map showing the location of *B. longifolia* Blume specimens.

Begonia roxburghii auct. non (Miq.) A.DC.: Ridley in *Journal of the Federated Malay States Museums* 4: 20 (Ridley 1909).

Begonia roxburghii auct. non (Miq.) A.DC.: Ridley in *Flora of the Malay Peninsula* 1: 854 (Ridley 1922).

Citations in other publications

As *B. longifolia*: Blume (1827: 97), de Candolle (1864: 398), Koorders (1912: 650), Tebbitt (2003a: 25), Tebbitt (2005: 168), Kiew (2005: 107), Gu *et al.* (2007: 184), Hughes (2008: 72), Peng & Ku (2009: 241), Morris (2010c: 6), Hughes & Girmansyah (2011: 29); as *Casparya trisulcata*: de Candolle (1864: 277), Warburg (1894: 142); as *B. inflata*: Clarke (1881: 115), Burkill (1924: 412), Craib (1931: 774), Grierson (1991: 242), Tebbitt (2003a: 25), Uddin (2007: 594), Dash (2010: 34); as *B. sarcocarpa*: Tebbitt (2003a: 27); as *B. turbinata*: Tebbitt (2003a: 28); as *B. tricornis*: Tebbitt (2003a: 25); as *B. crassirostris*: Tebbitt (2003a: 25).

Other material

INDIA: **Arunachal-Pradesh**: Babuk, Nov. 1911–Mar. 1912, *Burkill* 37656 (n.v.); Igar Valley, Nov. 1911–Mar. 1912, *Burkill* 37523 (n.v.); Kalek, Nov. 1911–Mar. 1912, *Burkill* 37564 (n.v.); Mouth of the Sirsug River, 30 Dec. 1911, *Burkill* 37586 (K); Tidding Valley, Theronhaing, 9 Mar. 1927, *Ward* 7936 (K). **Meghalaya**: Shillong, Pangu-Minguing, 16 May 1958, *Rao* 17711 (CAL n.v.). **Mizoram**: Hmuifang, Dec. 1927, *Parry* 430 (K).

Description

Caulescent, erect, monoecious herb, 50–200 cm high. Stem: stout, ca 10 mm wide, glabrous, internodes 3–8 cm long. Stipules: lanceolate to linear, 7–15 × 2–5 mm, glabrous, deciduous. Leaves: petiole 2–7(–14) cm long, glabrous or very sparsely puberulous; lamina lanceolate-oblong, basifixed, base shallowly cordate to subcordate, 4.5–22 × 1.5–10 cm, strongly asymmetric, upper surface dark green, glabrous, underside pale green, glabrous or sparsely puberulous on veins mostly, venation palmate-pinnate, midrib 4.5–15 cm long; margin broadly dentate to denticulate; margin with sparse hairs to glabrous; apex acuminate. Inflorescence: cymose, axillary, numerous; peduncle glabrous, branching 1–2 times, primary and secondary 2–10 mm long, with 1–2 female and 1–3 male flowers; bracts lanceolate, 2–12 × 1–5 mm, entire, caduceous. Male flower: pedicel 5–13 mm long, glabrous; tepals 4; outer tepals orbicular to obovate, ca 10 × 9 mm, white to pink, glabrous; inner tepals spatulate, 4–8 × 2–7 mm, white to pink, glabrous; androecium with 30–60 stamens, symmetric; filaments 1–1.5 mm long, free; anthers oblong elliptic, 1–3 mm long, dehiscing through slits about half the length of the anther, not hooded, connective extended. Female flower: pedicel ca 14 mm long, glabrous; bracteoles absent; tepals 4–6, equal, elliptic, 5–16 × 2–6 mm, white to pale pink, glabrous, inner tepals similar yet smaller; ovary 3-locular, placentae bifid; capsule globose, 3–10 × 3–7 mm, glabrous, without wings; styles 3, deeply forked once and twisted twice, deciduous. Fruit: on stout pedicel, globose; capsule spherical, fleshy, glabrous, 6–12 × 8–15 mm.

Distribution and phenology

Arunachal-Pradesh and Meghalaya; also in China, Myanmar, Thailand, Malaysia Peninsular, Vietnam, Sumatra, Java, Lesser Sunda Islands, Sulawesi and the Moluccas; 200–1550 m. Flowering: May to November; fruiting: June to December.

Conservation status

Least Concern (Hughes 2008). *Begonia longifolia* is a very widespread and ecologically tolerant species found throughout Southeast Asia, with no significant change in recent years to warrant a change in its status.

Remarks

Begonia longifolia is most similar to *B. acetosella* in vegetative appearance; when fertile it can be easily distinguished as it is monoecious and has 3- (not 4-)locular fruit. The leaves of *B. longifolia* can approach those of *B. sect. Monopteron* (*B. griffithiana* and *B. nepalensis*), but *B. longifolia* has an upright habit rather than the pendulous habit of those species. *Begonia longifolia* forms a natural hybrid with *B. palmata* where the two are growing together, *Begonia* × *chungii* C.I Peng & S.-M.Ku (Peng & Ku 2009) which has been reported from the study area (Morris 2011a). This hybrid has baccate fruit with wings, intermediate in form between the parents.

Begonia longifolia is lectotypified here as others (Tebbutt 2003a; Kiew 2005; Gu *et al.* 2007; Hughes & Girmansyah 2011) have listed a holotype in error as there is no herbarium mentioned in the protologue (McNeill 2014). This is also true of *Casparaya trisulcata*, *B. sarcocarpa* and *B. tricornis*.

Begonia lushaiensis C.E.C.Fisch. [sect. *Diploclinium*]

Fig. 38

Bulletin of Miscellaneous Information Kew 1928: 273 (Fischer 1928). – Type: India, Mizoram, Lushai Hills, Sialsuk, Jul. 1927, *Parry* 39 (lecto-: [K000761472](#)).

Citations in other publications

Fischer (1938: 98), Kumar (2002: 645), Uddin (2007: 594), Hughes (2008: 83).

Other material examined

INDIA: **Mizoram**: Lushai Hills, Nov. 1927, *Parry* 700 (K); Lushai Hills, Aijal, Sep. 1927, *Parry* 39 ([K000761471](#)).

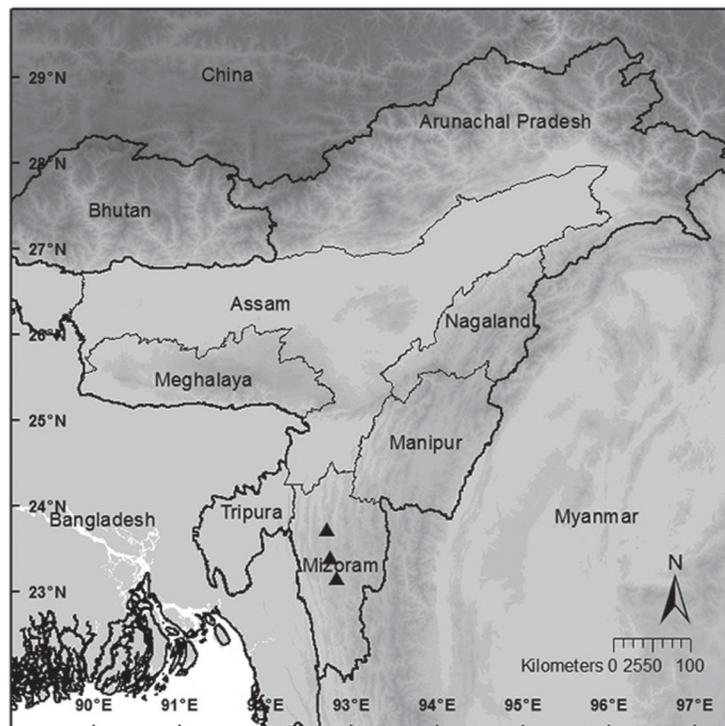


Fig. 38. Map showing the location of *B. lushaiensis* C.E.C.Fisch. specimens.

Description

Tuberous, erect, monoecious herb, 10–30 cm high. Stem: slender, 2–5 mm wide, sparsely to densely pilose, internodes 3–10 cm long. Stipules: ovate, ca 10 × 5 mm, puberulent on the reverse, semi-persistent. Leaves: petioles 2–5 cm long, pilose; lamina deltoid-ovate, basifixed, base cordate with lobes not overlapping, 2–8 × 1–4 cm, asymmetric, upper surface green, sparsely puberulous, underside green, sparsely pilose on veins mostly, venation palmate, midrib 1.5–5 cm long; margin crenate to dentate, with sparse hairs; apex short acuminate. Inflorescence: racemose, axillary to terminal, several; peduncle densely pilose, central axis 5–12 cm long, branching up to 15 times, secondary cymes branching ca 3 times, primary 3–11 mm long, secondary 1–4 mm long, with 2–4 female flowers and 4–10 male flowers, protandrous, becoming male towards the apex of the inflorescence; bracts sub-orbicular, 7–8 × 5–7 mm, densely puberulous, margin dentate, semi-persistent. Male flower: pedicel 10 mm long, sparsely puberulous to glabrous; tepals 4; outer tepals orbicular, 5–10 × 5–10 mm, dark pink, pilose on reverse near base, margin entire; inner tepals lanceolate, ca 5 × 3 mm, dark pink, glabrous; androecium with 10–15 stamens, symmetric; filaments 1 mm long, unequal, slightly fused at base; anther oblong-elliptic, 2 mm long, not hooded, connective not extended. Female flower: pedicel 10–15 mm long, glabrous; bracteoles absent; tepals 4–5, equal, rounded to oblong-ovate, outer tepals 5–10 × 4–6 mm, dark pink, pilose on reverse near base, margin entire, inner tepals similar yet smaller and glabrous; ovary 3-locular, placentae bifid; capsule oblong-ellipsoid, ca 5 mm long, glabrous, with one long triangular wing and two short triangular-oblong wings; styles 3, shallowly forked, U-shaped, deciduous. Fruit: pendulous; capsule oblong-ellipsoid, 7–10 × 3–4 mm, glabrous; wings extending along the pedicel, subequal; longest wing triangular, 5–15 × 5–10 mm; shortest wings triangular-oblong, 4–8 × 7–10 mm.

Distribution and phenology

Mizoram; also in Myanmar; 1200–1300 m. Flowering: July to September; fruiting: September to October.

Conservation status

Least Concern. The species has an EOO of 4,360 km² and an AOO of 32 km² potentially categorising this species as endangered. However, it is found in two national parks and has had several recent collections made in Myanmar. The specimens are split between two locations along the Arakan Mountains which has ample suitable habitat for this species suggesting it is under collected. The species has also been collected from the Natma Taung National Park of Myanmar and the Blue Mountain National Park of Mizoram.

Remarks

This species is endemic to the Arakan mountain range which borders India and Myanmar. The description is also based on specimens from Myanmar. *Begonia lushaiensis* is most closely allied to *B. pedunculosa*, but can easily be distinguished by its deltoid-ovate rather than lanceolate leaves.

The species is here reinstated as a separate species from *B. modestiflora* Kurz (Kurz 1871) after being erroneously synonymised (Hughes 2008). *Begonia lushaiensis* is quite distinct in having larger flowers that are dark pink, and more conspicuous broader dentate bracts.

Begonia megaptera A.DC. [sect. *Platycentrum*]

Fig. 39

Annales des Sciences Naturelles; Botanique, Sér. 4, 11: 134 (de Candolle 1859). – Type: India, Sikkim, 1820–2420 m, *Hooker 8* (lecto-: K, here designated).

Citations in other publications

de Candolle (1864: 348), Clarke (1879: 646), Clarke (1881: 119), Clarke (1890: 25), Fischer (1938: 98), Hara (1966: 214), Hara *et al.* (1979: 182), Grierson (1991: 245), Kumar (2002: 647), Kress *et al.* (2003: 171), Uddin (2007: 594), Hughes (2008: 80), Khatun (2008: 10), Dash (2010: 35).

Other material examined

INDIA: **Arunachal-Pradesh:** Lohit Valley, 13 Feb. 1950, *Ward 19146* (BM); Mishmi Hills, Kamlang River, 18 Mar. 1949, *Ward 18420* (BM). **Meghalaya:** Garo Hills, Nokrek, 7 Mar. 1950, *Chand 2753* (MICH); *ibid.*, 7 Mar. 1950, *Chand 2759* (MICH); *ibid.*, 7 Mar. 1950, *Koelz 24605* (MICH); Garo Hills, Tura Mountain, 20 Nov. 1929, *Parry 839* (K); *ibid.*, Oct. 1929, *Parry 839* (K). **Mizoram:** Lushai Hills, 1929, *Parry 839* (K); *ibid.*, 1934, *Parry s.n.* (K); Lushai Hills, Thenzawl, May 1928, *Parry 253a* (K). **Nagaland:** Naga Hills, Nichuguard, 17 Oct. 1885, *Clarke 40854A* (BM); *ibid.*, *Clarke 40854D* (K); *ibid.*, *Clarke 40854G* (K).

Description

Rhizomatous, erect, monoecious herb, to ca 40 cm high. Stem: stout, ca 5 mm wide, glabrous, internodes 8–13 cm long. Stipules: lanceolate, 12–15 × 6–9 mm, glabrous, semi persistent. Leaves: petiole 4–20 cm long, glabrous; lamina ovate-orbicular to ovate, basifixed, base cordate with lobes overlapping or not, 8.5–25 × 5–16 cm, asymmetric, upper surface green, glabrous, underside green, glabrous or sparsely puberulent on the veins, venation palmate, midrib 6–18 cm long; margin broadly dentate, appearing scalloped between main veins, with sparse hairs; apex acuminate. Inflorescence: cymose, axillary, few; peduncle glabrous, branching 2–3 times, primary 10–25 cm, secondary 3–8 cm, tertiary 3–5 mm, with 2–4 female and 4–6 male flowers; bracts ovate to lanceolate, 10–20 × 3–14 mm, margin entire, deciduous. Male flower: pedicel ca 20 mm long, glabrous; tepals 4; outer tepals broadly ovate to orbicular, 7–15 × 4–9 mm, pink to white, glabrous, margin entire; inner tepals ovate to lanceolate, 4–7 × 2–6 mm,

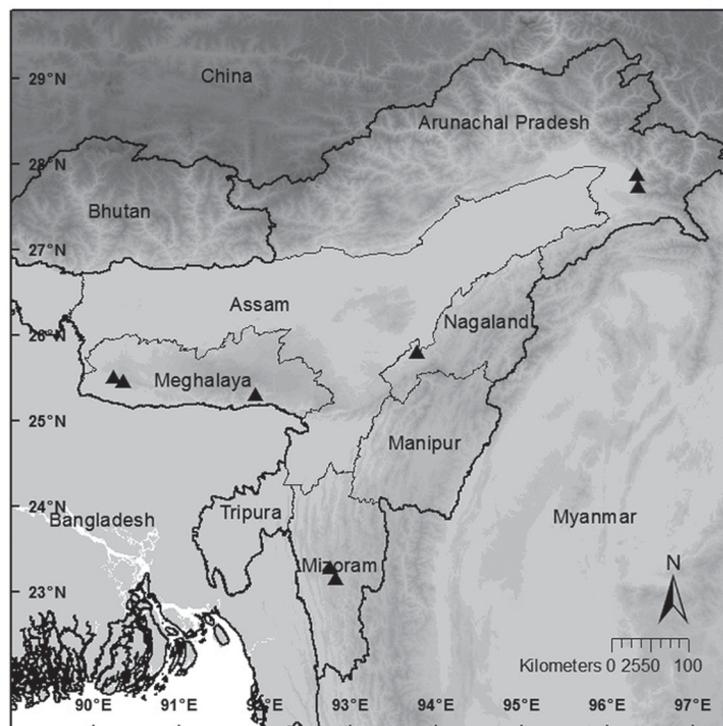


Fig. 39. Map showing the location of *B. megaptera* A.DC. specimens.

pink to white, glabrous; androecium with 50–60 stamens, symmetric; filaments 1–3 mm long, unequal, slightly fused at the base into a column; anther oblong elliptic, 1–2 mm long, dehiscing through slits longer than half the length of the anther, not hooded, connective not extended. Female flower: pedicel 12–16 mm long, glabrous, bracteoles absent; tepals 5, equal, ovate, outer tepals 10–12 × 5–9 mm, pink to white, glabrous, margin entire, inner tepals similar yet smaller; ovary 2-locular, placentae bifid; capsule oblong-ellipsoid, glabrous, with one long oblong wing and two short rounded wings; styles 2, forked once and twisted twice, deciduous. Fruit: recurved; capsule oblong-ellipsoid, 14–18 × 3–10 mm, glabrous; wings extending along the pedicel slightly, unequal; longest wing rounded oblong, 15–34 × 8–12 mm; shortest wing semi-circular, 3–7 × 10–15 mm.

Distribution and phenology

Arunachal-Pradesh, Meghalaya, Mizoram and Nagaland; also in Nepal, Sikkim, Bhutan, Bangladesh and Myanmar; 500–1250 m. Flowering: August to November; fruiting: October to March.

Conservation status

Least Concern. *Begonia megaptera* has an AOO of 40 km² and an EOO of 220,500 km² with ample suitable habitat in the Himalayas and Arakan mountains. The populations in the Garo-Khasi Hills of Meghalaya are at risk due to deforestation. The species has been found near the Blue Mountain National Park of Mizoram, Nokrek National Park of Meghalaya and Namphada Reserve of Arunachal-Pradesh.

Remarks

Begonia megaptera is superficially similar to *B. palmata* but can instantly be distinguished as it lacks the reddish brown silky indumentum. The rather poorly known *B. beddomei* also has similar scalloped leaves, but has female flowers with 8 tepals and hairs on the petioles and leaf lamina underside.

Begonia nepalensis (A.DC.) Warb. [sect. *Monopteron*] Figs 26B, 40

Naturlichen Pflanzenfamilien 3 (abt. 6a): 142 (Warburg 1894). – *Mezierea nepalensis* A.DC., *Annales des Sciences Naturelles; Botanique, Sér. 4*, 11: 144 (de Candolle 1859). – Type: Nepal, Chireeaghatte, 1820, *Wallich Cat. No. 3677* (lecto-: K-W, barcode [K000761414](#), here designated; isolecto-: [BM001122244](#), [BM001122245](#), [E00300428](#), [K000761415](#)).

Begonia gigantea Wall. ex C.B. Clarke, *The Flora of British India* 2: 643 (Clarke 1879) *nom. illegit. superfl.* – Type: Nepal, Chireeaghatte, 1820, *Wallich Cat. No. 3677* (lecto-: K-W, barcode [K000761414](#); isolecto-: [BM001122244](#), [BM001122245](#), [E00300428](#), [K000761415](#)).

Begonia gigantea Wall., *A numerical list of dried specimens of plants in the East India Company's Museum*: 129, 3677B (Wallich 1831), *nom. nud.*

Citations in other publications

As *B. nepalensis*: Hara *et al.* (1979: 182), Grierson (1991: 243), Morris (2006: 88), Morris & McMillan (2006: 174), Uddin (2007: 594), Hughes (2008: 89), Dash (2010: 35), Saika *et al.* (2011: 357); as *Mezierea nepalensis*: de Candolle (1864: 406); as *B. gigantea*: Clarke (1881: 119), Burkill (1910: 110).

Other material

INDIA: **Arunachal-Pradesh**: Chopia Forest, *Rao 56411* (ASSAM n.v.); Kameng District, Aka Hills, *Bor 15703* (ASSAM n.v.); Kameng District, Sessa Forest, *Singh 97230* (n.v.).

Description

Caulicent, cascading, monoecious herb, 75–100 cm. Stem: stout, 5–10 mm wide, glabrous. Stipules: lanceolate, deciduous. Leaves: petiole 1–3 cm long, glabrous; lamina ovate-lanceolate, basifixed, base cordate with lobes not overlapping, 15–27 × 4–11 cm, strongly asymmetric, upper surface green, glabrous, underside green, puberulous on veins only, venation palmate-pinnate; margin shallowly dentate; apex caudate-acuminate. Inflorescence: cymose, axillary, numerous; peduncle glabrous, branching 2–3 times, primary 2–4 cm, secondary 0.5–2 cm, tertiary 0.5–1 cm, with 6–8 female and 2–6 male flowers; bracts not seen. Male flower: pedicel 1–2 cm long, glabrous or puberulent; tepals 2, ovate, 7–10 × 7–9 mm, white to pale pink, glabrous; inner tepals usually absent, one if present, narrowly elliptic, 7 × 2 mm, glabrous; androecium with 20–40 stamens, symmetric; filament 1 mm long, fused at base into a short column; anther elliptic globose, 1 mm long, dehiscing through short slits near the tip, connective slightly extended. Female flower: pedicel 2–3 cm, glabrous or puberulent; bracteoles absent; tepals 4–5, equal, ovate, outer tepals 10–15 × 7–10 mm, white to pale pink, glabrous, margin entire, inner tepals similar yet smaller; ovary 2-locular, placentae bifid, capsule narrowly ellipsoid, glabrous, with one long triangular-oblong wing and two very narrow ridges; styles 2, convoluted with ends twisted once. Fruit: pendulous; capsule narrow ellipsoid, 12–15 × 5 mm; wing oblong, 15–23 × 10–15 mm.

Distribution and phenology

Arunachal-Pradesh, Assam, Meghalaya and Mizoram; also in Nepal, Sikkim, Bhutan and Myanmar. Flowering: November to February; fruiting: December to February.

Conservation status

Least Concern. *Begonia nepalensis* has an AOO of 48 km² and an EOO of 160,000 km² with ample suitable habitat within its range in the Eastern Himalayas. The species has been found near Makalu

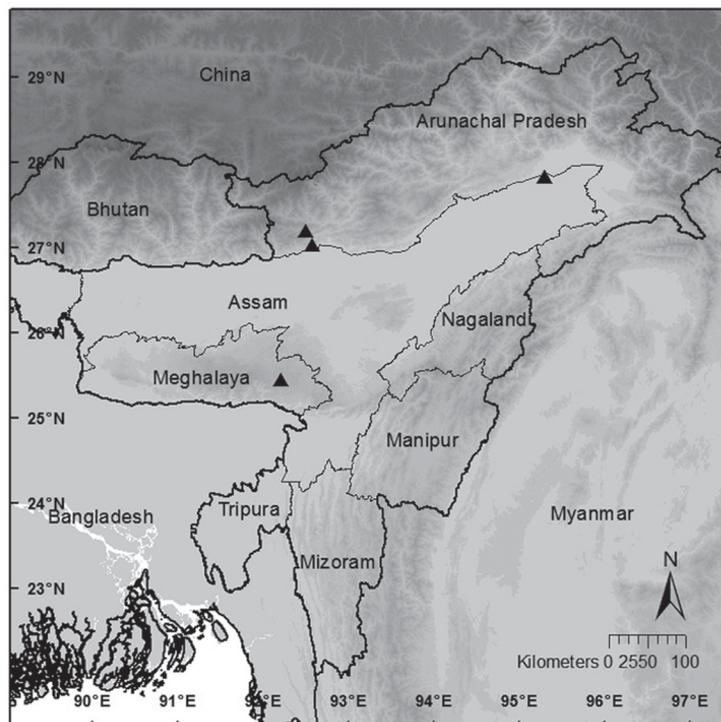


Fig. 40. Map showing the location of *B. nepalensis* (A.DC.) Warb. specimens.

Baran National Park of Nepal, Pakke Tiger Reserve of Arunachal-Pradesh and Buxa Wildlife Sanctuary of West Bengal.

Remarks

The species is illustrated in Morris & McMillan (2006) and Morris (2011d). *Begonia nepalensis* is most similar to *B. griffithiana*; see diagnostic notes under that species.

Begonia obversa C.B.Clarke [sect. *Platycentrum*]

Figs 41–42

Journal of the Linnean Society, Botany 25: 26 (Clarke 1890). – Type: India, Manipur, West Manipur, Makui [Mookoo], 30 Nov. 1885, *Clarke 42315A* (holo-: [K000634619](https://www.zobodat.at/K000634619)).

Citations in other publications

Deb (1961: 285), Kumar (2002: 647), Uddin (2007: 594), Dash (2010: 39).

Other material

INDIA: **Mizoram**: Zotethlang, *Singh 94594* (n.v.).

Description

Rhizomatous, monoecious herb, 15–25 cm high. Rhizome: 5–10 mm wide, tomentose. Stipules: not seen. Leaves: petiole 20–24 cm long, red tomentose; lamina broadly ovate to ovate, basifixed, base cordate with lobes not overlapping, 15–21 × 14 cm, slightly asymmetric, upper surface green, pilose all over, underside pale green, tomentose on veins, venation palmate, midrib ca 15.5 cm long; margin

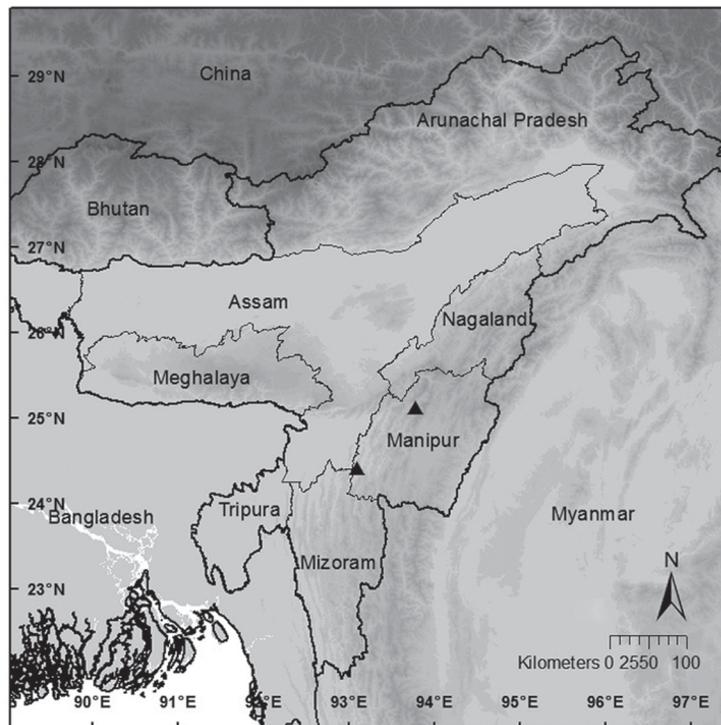


Fig. 41. Map showing the location of *B. obversa* C.B.Clarke specimens.

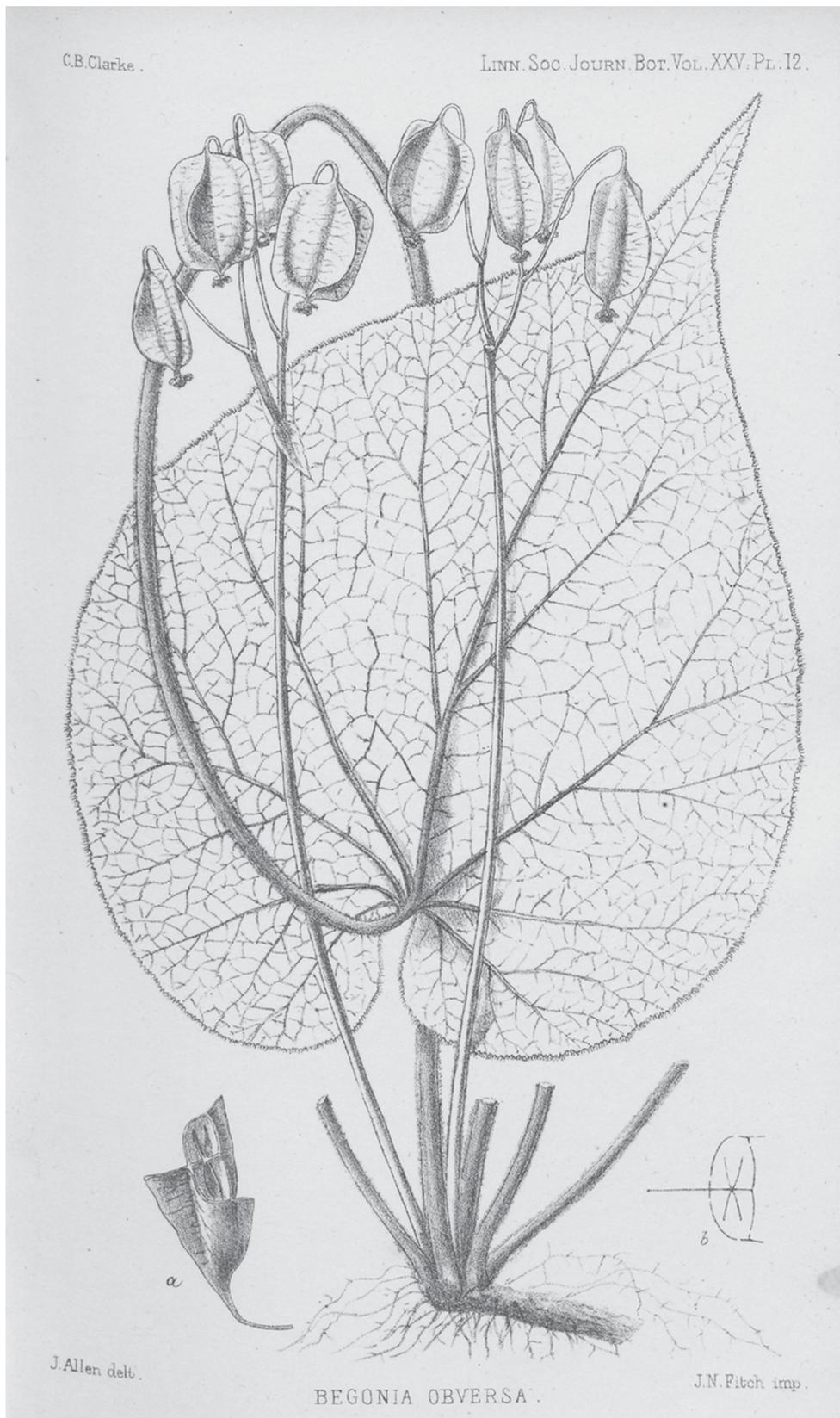


Fig. 42. Illustration of *B. obversa* C.B. Clarke by J. Allen (Clarke 1890). a. Fruit dissection. b. Diagram of fruit cross-section. Image courtesy of RBGE library and Lynsey Wilson.

denticulate; very hairy, apex acuminate. Inflorescence: cymose, axillary, few; peduncle puberulous, branching twice, primary peduncle 13–15 cm, secondary 5–10 mm, with 2–4 female and 2–4 male flowers; bracts lanceolate. Male flower: flowers not seen. Female flower: flowers not seen; ovary capsule oblate-obovoid, puberulous, with three subequal oblong wings; 2-locular, placentae bifid; stigma deciduous. Fruit: recurved; capsule oblate, 10–15 × 8–10 mm, puberulous; wings extending along the pedicel slightly, subequal, dorsal wing oblong rounded, 2–6 × 10–15 mm, side wings oblong, ca 4 × 10 mm.

Distribution and phenology

Manipur and Mizoram; ca 350 m. Flowering: September to October; fruiting: November.

Conservation status

Data Deficient. Type exact locality of the type collection at ‘Mookoo’ is not confirmed, and we have not seen the second specimen to confirm its identity.

Remarks

Begonia obversa is known from two collections; the type collection from Manipur and one recent record from Mizoram which we have not been able to confirm. The subequal wings and fruit shape are quite distinct from the other species in *Begonia* sect. *Platycentrum*, as depicted in Clarke (1890). We have interpreted Makui as being the type locality, spelt ‘Mookoo’ on the herbarium label.

This species name is wrongly applied in Chauhan (2000) as the specimens cited are the syntypes for *B. adscendens*.

Begonia ovatifolia A.DC. [sect. *Diploclinium*]

Figs 43–44

Annales des Sciences Naturelles; Botanique, Sér. 4, 11: 132 (de Candolle 1859). – Type: India, Meghalaya, Khasia, Bev Pauree, 16 Jul. 1850, *Hooker & Thomson 27* (lecto-: K, here designated).

Begonia ovatifolia var. *cretacea* C.B. Clarke, *The Flora of British India 2*: 643 (Clarke 1879). – Type: Bhutan, *Griffith 2583* (lecto-: K000761422, here designated).

Begonia subovata Wall., *A numerical list of dried specimens of plants in the East India Company's Museum*: 129, 3683 (Wallich 1831), nom. nud.

Citations in other publications

As *B. ovatifolia*: de Candolle (1864: 328), Clarke (1879: 642), Clarke (1881: 118), Hara *et al.* (1979: 182), Grierson (1991: 241), Hynniewta (1994: 183), Uddin (2007: 594), Dash (2010: 38), Morris (2012a: 9); as *B. subovata*: Clarke (1879: 642), Golding (1978: 15).

Other material

INDIA: **Arunachal-Pradesh**: Kapu to Gelling, *Choudhery 18053* (ARUN n.v.). **Meghalaya**: Garo Hills, Tura Mountain, Dec. 1929, *Parry 731* (K); Khasi Hills, Cherrapunji, 10 Aug. 1850, *Hooker & Thomson 27* (syn K); *ibid.*, 16 Aug. 1850, *Hooker & Thomson 27* (syn K); *ibid.*, 26 Jul. 1952, *Koelz 30838* (MICH); Khasi Hills, Mawphlang, 24 Sep. 1886, *Clarke 45107A* (K); *ibid.*, *Clarke 45107D* (BM); Khasia, 1 Oct. 1855–30 Oct. 1855, s.n. (E); *ibid.*, *Hooker & Thomson 33* (BM, E00300439); *ibid.*, *Hooker & Thomson* s.n. (syn P); *ibid.*, *Griffith* s.n. (K000761423); Sillet Hills, 1821, *Wallich Cat. No. 3683* (K-W n.v.). **Nagaland**: Zekera, 31 Aug. 1935, *Bor 6227* (K).

Description

Tuberous, monoecious herb, 10–20 cm high. Stipules: lanceolate, ca 3×1 mm, glabrous, deciduous. Leaves: petiole 5–12 cm long, glabrous or sparsely puberulent; lamina ovate to broadly ovate, basifixed, base shallowly cordate or rounded, $3\text{--}10.5 \times 2.5\text{--}8$ cm, slightly asymmetric to symmetric, upper surface green, glabrous or puberulous on veins near petiole attachment, underside green or green and red, sparsely puberulous on veins mostly, venation palmate-pinnate, midrib 3–10 cm long; margin shallowly dentate-denticulate, with very sparse short hairs; apex shortly acuminate. Inflorescence: cymose, axillary or terminal, few; peduncle glabrous, branching 2–3 times, primary 3–7 cm, secondary 1–4 cm, tertiary 3–5 mm, with 4–5 female and 4–8 male flowers; bracts lanceolate, $2\text{--}3 \times 1$ mm, glabrous, persistent. Male flower: pedicel 2–10 mm long, glabrous; tepals 4; outer tepals broadly ovate to ovate-orbicular, $2\text{--}7 \times 2\text{--}6$ mm, deep pink to white, glabrous, margin entire; inner tepals spatulate to narrowly elliptic, $2\text{--}6 \times 1\text{--}4$ mm, white to pink, glabrous; androecium with 10–20 stamens, symmetric; filaments 0.5 mm long, fused at base into a short column; anther oblong-obovate, 0.5–1 mm long, dehiscing through slits about half the length of the anther, not hooded, connective extended, with the apical few stamens being larger and having a broader connective. Female flower: pedicel 4–6 mm long, glabrous; bracteoles absent; tepals 2–4, unequal, obovate-orbicular, outer tepals $5\text{--}7 \times 3\text{--}7$ mm, white to pink, glabrous, margin entire, inner tepals as in male flowers; ovary 3-locular, placentae bifid; capsule ellipsoid, $2\text{--}4 \times 1\text{--}1.5$ mm, glabrous, with three unequal triangular wings; styles 3, forked once and twisted once, persistent. Fruit: pendulous; capsule ellipsoid, $7\text{--}12 \times 2\text{--}7$ mm, glabrous; wings extending along the pedicel slightly, unequal; longest wing triangular with curved edge, $8\text{--}15 \times 4\text{--}11$ mm; shortest wings triangular with one curved edged, $3\text{--}9 \times 5\text{--}8$ mm.

Distribution and phenology

Arunachal-Pradesh, Meghalaya and Nagaland; also in Nepal, Sikkim and Bhutan; 350–1400 m. Flowering: July to October; fruiting: August to October.



Fig. 43. Map showing the location of *B. ovatifolia* A.DC. specimens.

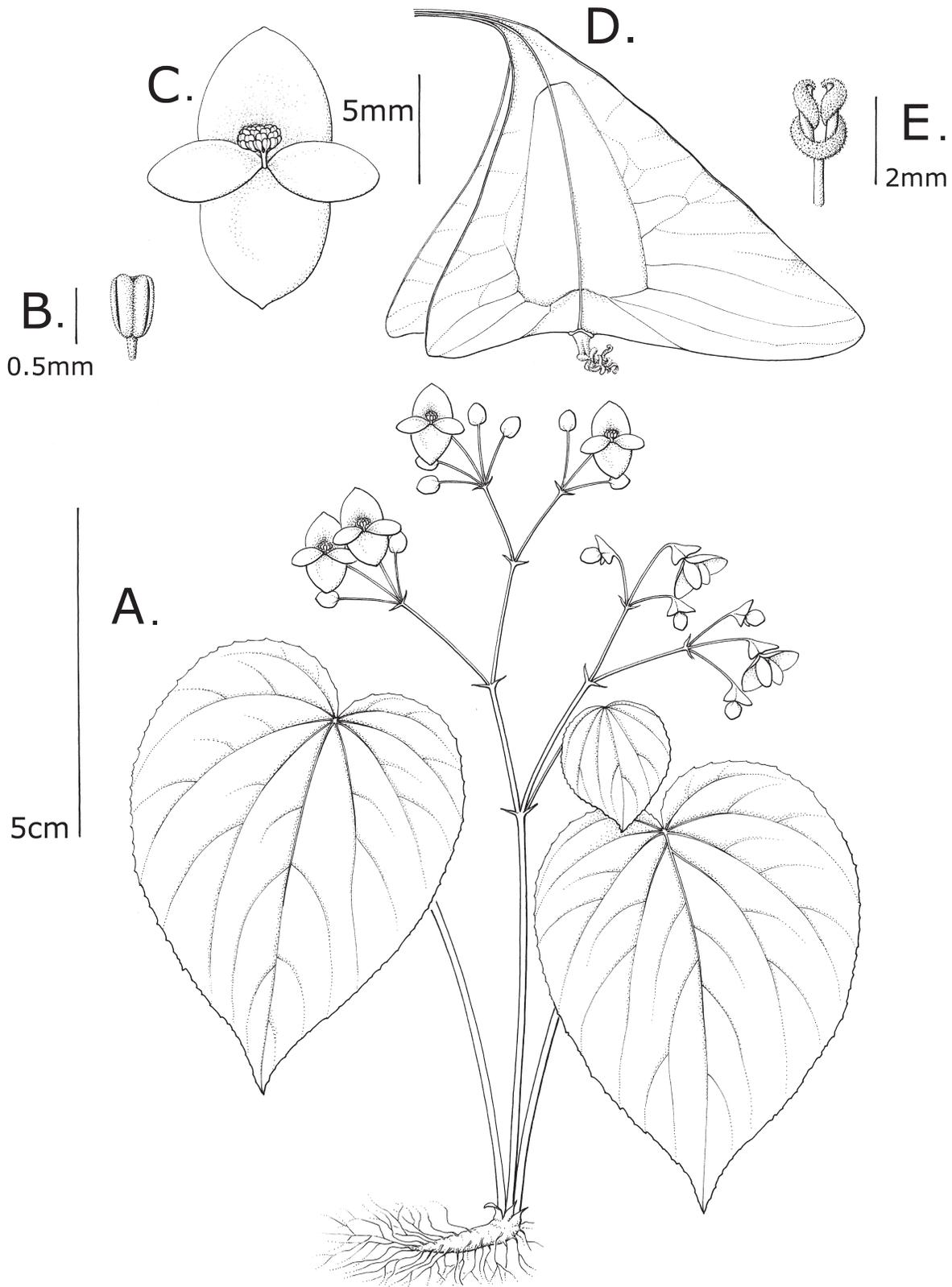


Fig. 44. Illustration of *B. ovatifolia* A.DC. **A.** Habit of plant. **B.** Stamen. **C.** Male flower. **D.** Mature fruit. **E.** Style. Drawn by Claire Banks. A from Parry 731; B–C, E from Hooker & Thomson 27; D from Clarke 45107A; all K.

Conservation status

Least Concern. *Begonia ovatifolia* has an AOO of 52 km² and an EOO of 220,700 km² with suitable habitat through its range in the eastern Himalayas. The population in the Khasi Hills is at risk due to deforestation but there is hope due to several national parks within the hills and reserved forests, such as the Cherrapunji-Mawsynram Reserved Forest.

Remarks

Begonia ovatifolia is allied to *B. labordei* and *B. adscendens* but the leaves are smaller and more symmetric than either of those species. The minute flowers of *B. ovatifolia* are characteristic, with glabrous tepals ca 5 mm long, unlike those of *B. adscendens* and *B. labordei* which are ca 10 mm long with hairs present on the outer surface. The variety *B. ovatifolia* var. *cretaceae* C.B. Clarke has types from Bhutan (*Griffith herb. no. 2583*, K) and Khasia, collected by Clarke from Churra (Cherrapunji); the latter has not been located.

Begonia palmata D. Don [sect. *Platycentrum*]

Fig. 45

Prodromus Florae Nepalensis: 223 (Don 1825). – Type: Nepal, 1818, *Wallich* (lecto-: [BM000521518](#)).

Begonia laciniata Roxb., *Flora Indica* 3: 649 (Roxburgh 1832). – Type: Nepal, 1821, *Wallich Cat. No. 3678b* (lecto-: K-W, barcode [K001110780](#), here designated; isolecto-: [E00265066](#)).

Citations in other publications

As *B. palmata*: Hara (1966: 215), Hara (1968: 60), Hara (1971: 84), Hara *et al.* (1979: 182), Grierson (1991: 245), Chauhan (1996: 176), Chauhan (2000: 425), Kumar (2002: 648), Kress *et al.* (2003: 171), Gu *et al.* (2007: 189), Uddin (2007: 594), Hughes (2008: 94), Peng & Ku (2009: 241), Morris (2010d:

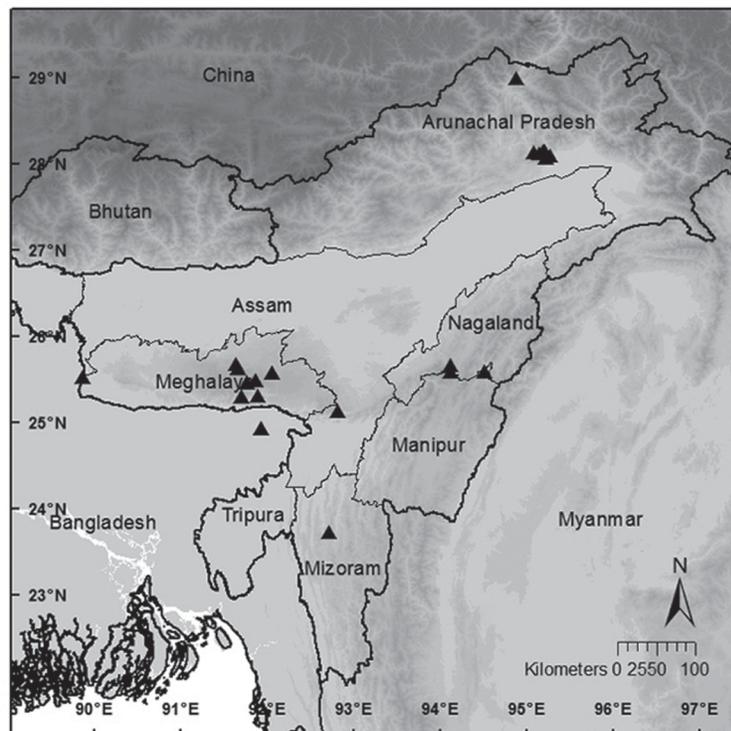


Fig. 45. Map showing the location of *B. palmata* D. Don specimens.

138), Dash (2010: 38), Verma *et al.* (2013: 179), Baruah & Choudbury (2014: 41); as *B. laciniata*: de Candolle (1864: 347), Clarke (1879: 645), Clarke (1881: 119), Clarke (1890: 25), Koorders (1912: 645), Gagnepain (1921: 1107), Burkill (1924: 287), Craib (1931: 775), Kanjilal (1938: 334), Fischer (1938: 98), Deb (1961: 285), Kress *et al.* (2003: 171), Khatun (2008: 9).

Description

Rhizomatous, erect, monoecious herb, 45–100 cm high. Rhizome: 5–15 mm wide, sparsely to densely tomentose, internodes 1–3 cm long. Stem: stout, 5–15 mm wide, sparsely to densely tomentose to villose, internodes 5–13(–20) cm long. Stipules: lanceolate to broadly lanceolate, 10–30 × 3–10 mm, glabrous to villose on main vein, semi persistent to persistent. Leaves: petiole 1.5–19 cm long, densely tomentose to sparsely puberulous, lamina narrowly to broadly ovate, to almost orbicular, basifixed, base truncate, or base cordate to shallowly cordate, lobes not overlapping, 5–20 × 2–20 cm, strongly asymmetric to slightly asymmetric, upper surface green, or green with pale ring marking, hirsute to strigose all over denser on veins or hairs on veins only, or verrucose, underside green or reddish, pubescent to pilose all over being denser on veins or on veins only; venation palmate, midrib 3.5–18 cm long; margin broadly lobed-dentate with fine serration to deeply scalloped between veins with fine serrations; with several lobes, short to long, wide to narrow, triangular, curved or not curved, acuminate or acute, with sparse short hairs to glabrous; apex acute to acuminate. Inflorescence: cymose, axillary to terminal, few; peduncle tomentose, branching 2–3 times, primary 7–15(–20) cm, secondary 0.5–2 cm, tertiary 1–5 mm long, with 2–6 female and 2–6 male flowers; bracts lanceolate or sub-orbicular or triangular, 6–17 × 3–13 mm, margin with hairs or glabrous, deciduous or persistent. Male flower: pedicel 8–30 mm long, glabrous or densely to sparsely tomentose; tepals 4; outer tepals obovate or ovate or orbicular, 8–22 × 4–17 mm, white to pink, tomentose to puberulous on reverse, denser near base, margin entire; inner tepals elliptic or obovate or oblong, 6–15 × 3–8 mm, white to pink, glabrous, entire; androecium with 40–80 stamens, symmetric; filaments 1–3 mm long, unequal, fused at base into a short column; anther oblong elliptic to oblong obovate, 1–1.5 mm long, dehiscing through slits longer than half the length of the anther, not hooded, connective extended. Female flower: pedicel 9–30 mm long, glabrous or densely to sparsely tomentose; bracteoles absent; tepals 5, equal, elliptic-ovate, outer tepals 10–15 × 7–10 mm, white to pale pink, glabrous or tomentose to puberulous on reverse, denser near base, margin entire, inner tepals similar yet smaller and glabrous; ovary 2-locular, placentae bifid, capsule oblong-ellipsoid, 6–8 × 4–5 mm, tomentose, with one long oblong wing and two short rounded wings; styles 2, forked once and twisted twice, persistent. Fruit: recurved 10–18 × 12–34 mm; capsule oblong-ellipsoid, 7–18 × 2–9 mm, glabrous or sparsely tomentose all over or just at base of wings; wings sometimes extending along the pedicel slightly, unequal; longest wing triangular to rounded oblong, 9–20 × 3–13 mm; shortest wings oblong to half-ovoid, 1–5 × 10–15 mm.

Distribution and phenology

Northeast India; also in China, Nepal, Sikkim, Bhutan, Bangladesh, Myanmar, Thailand, Laos and Vietnam; 200–2150 m. Flowering: April to October; fruiting: May to November.

Conservation status

Least Concern (Hughes 2008). *Begonia palmata* is a very widespread species found throughout eastern Asia, with no significant change in recent years to warrant a change in its status.

Key to varieties

1. Stem petioles and peduncles sparsely to densely short brown tomentose, leaves with curved lobes, upper surface hirsute..... *B. palmata* D. Don var. *palmata*
- Stem petioles and peduncles densely long red villose, leaves with straight triangular lobes, and upper surface verruculose..... *B. palmata* D. Don var. *khasiana* (Irmsch.) Golding & Kareg.

Begonia palmata D. Don var. *palmata*

Other material

INDIA: **Arunachal-Pradesh:** Tuting, *Choudhery 18213* (ARUN n.v.); Babuk, Nov. 1911–Mar. 1912, *Burkill 37666* (n.v.); Bapu Mountain, Feb.–Mar. 1912, *Burkill 36553* (n.v.); *ibid.*, Nov. 1911–Mar. 1912, *Burkill 36531* (n.v.); Bapu Mountain, Renging Camp, Feb.–Mar. 1912, *Burkill 36338* (n.v.); *ibid.*, Nov. 1911–Mar. 1912, *Burkill 36261* (n.v.); Bapu Mountain, Rotung, Feb.–Mar. 1912, *Burkill 36237* (n.v.); Igar Valley, Nov. 1911–Mar. 1912, *Burkill 36108* (n.v.); *ibid.*, Nov. 1911–Mar. 1912, *Burkill 36102* (n.v.); Janakmukh, Nov.–Dec. 1911, *Burkill 37165* (n.v.); Lalik Valley, Nov. 1911–Mar. 1912, *Burkill 37339* (n.v.). **Assam:** Jun.–Sep. 1913, *Bailey s.n.* (E); Cachar, Laikul, 6 May 1951, *Koelz 27902* (MICH). **Manipur:** Karong, 27 Oct. 1950, *Koelz 26759* (MICH). **Meghalaya,** Khasi Hills, Sep. 1878, *Mann s.n.* (ASSAM n.v.); Khasi Hills, Cherrapunji, 14 Apr. 1952, *Koelz 33555* (MICH); *ibid.*, 19 Jun. 1952, *Koelz 30315* (MICH); Khasi Hills, Cherrapunji ‘Chora Poonji’, May 1829, *De Silva, Wallich Cat. No. 3678a* (K-W, barcode [K001110779](#)); Khasi Hills, Manksandraw, 7 Dec. 1871, *Clarke 14410* (BM); *ibid.*, *Clarke 14410B* (BM); *ibid.*, 15 Sep. 1949, *Chand 2306* (MICH); *ibid.*, 16 Sep. 1949, *Koelz 23973* (MICH); *ibid.*, 21 Oct. 1952, *Koelz 31399* (MICH); Khasi Hills, Mawryngkneng, 24 Sep. 1951, *Koelz 28595* (MICH); Khasi Hills, Nongkhlaw, 30 Oct. 1872, *Clarke 18910* (BM); Khasia, 1837, *Griffith 429* (BM); *ibid.*, *Hooker & Thomson s.n.* (BM, E, K); *ibid.*, *Wallich Cat. No. 3678A* (BM); Shillong, 10 Aug. 1885, *Clarke 38696A* (BM); Sillet Hills, *Blinkworth s.n.*, *Wallich Cat. No. 3678* (K-W, barcode [K000035489](#)). **Mizoram:** Lushai Hills, Aijal, *Parry 77* (n.v.). **Nagaland:** Naga Hills, 19 Oct. 1885, *Clarke 40906* (K); Naga Hills, Kohima, Sep. 1950, *Chand 3627* (MICH); Naga Hills, Takubama, 12 Aug. 1950, *Koelz 25731* (MICH); *ibid.*, 23 Jul. 1950, *Koelz 25568* (MICH); Naga Hills, Zakhoma, 1 Nov. 1949, *Ward 18975* (BM).

Description

Stem: tomentose. Stipules: 10–17 mm long, sparsely puberulous. Leaves: petiole puberulous; lamina broadly ovate to orbicular, upper surface hirsute/strigose all over, underside red and green to purple, pilose on veins mostly; several lobes, linear to triangular, curved; margin hairy, apex very acuminate.

Begonia palmata var. *khasiana* (Irmsch.) Golding & Kareg.

Phytologia 54: 495 (Golding & Karegeannes 1984). – *Begonia laciniata* subsp. *khasiana* Irmsch., *Mitteilungen aus dem Institut für allgemeine Botanik in Hamburg* 10: 529 (Irmscher 1939). – Type: India, Meghalaya, Khasia mountains, *Hooker & Thomson 10* (lecto-: E00265074, here designated).

Other material

INDIA: **Arunachal-Pradesh:** 20 Oct. 2002, *Hutchinson & Cox et al. 10081* (E). **Manipur:** *Meebold 6395* (syn B n.v.). **Meghalaya:** Khasi Hills, Cherrapunji, 15 Apr. 1952, *Chand 5356* (MICH); *ibid.*, 15 Aug. 1952, *Koelz 31101A* (MICH); Khasi Hills, Mawphlang, 8 Apr. 1954, *Chand 7503* (MICH); Khasi Hills, Mawryngkneng, 18 Oct. 1951, *Koelz 28876* (MICH); *ibid.*, 4 Sep. 1951, *Koelz 28337* (MICH); Khasi Hills, Pynursla, 17 Aug. 1949, *Koelz 23516* (MICH); Khasia, *Clarke 54285B* (syn B n.v.); *ibid.*, *Griffith 2560* (syn B n.v.); Khasia mountains, *Hooker & Thomson 10* (BM, K); Shillong, 2 Apr. 1965, *Cox & Hutchinson 306* (E, K).

Description

Stem: red tomentose. Stipules: 10–27 mm long, red tomentose. Leaves: petiole densely red tomentose; lamina ovate, upper surface with short red pubescence all over, denser on veins, underside red, red pubescence all over, denser on veins; several lobes, long, triangular, not curved; apex acuminate or acute.

Remarks

A very variable species which has a wide distribution throughout Eastern Asia and Indochina. The lobes on the leaf margin vary from elongate acuminate to shortly triangular. Young leaves have very dense hairs which become less dense as the leaf matures. The leaves can also bear markings (*Koelz 33555*) ranging from a few simple spots to larger bands of colour similar to *B. annulata* or *B. rex*, although the deeply lobed margin separates *B. palmata* from these two species. This species is also vegetatively very similar to *B. flaviflora*, which is distinguished by its smaller yellow flowers. *Begonia flaviflora* also has shorter stipules and the upper surface of the leaves are almost glabrous with a few sparse hairs on veins, unlike those of *B. palmata* which usually has bristles scattered all over leaf from sparse to very dense. The longest wing on the fruit is only 1 cm long in *B. flaviflora* and has a crenate tip which is not seen on *B. palmata*.

Begonia palmata forms a natural hybrid with *B. longifolia* where the two are growing together, known as *Begonia* × *chungii* (Peng & Ku 2009; Morris 2011a). This hybrid has baccate fruit with wings, and is intermediate in form between the two parents. The leaves are deltoid and lobed like *B. palmata* with red margin and centre, sometimes with light green spots between the red veins.

There are several infra-specific taxa under *B. palmata*. Two are present in the study area, with the type variety being far more common. *Begonia palmata* var. *khasiana* is distinct for having densely red villose stems, petioles and peduncles. The upper surface of the leaves is quite rough, and feels like sandpaper to the touch when dried, due to the short bristles about 200 µm long, in *B. palmata* var. *palmata* the hairs are softer and 400–700 µm long (Irmscher 1939).

There is potential for other varieties to be present in the study area, such as *B. palmata* var. *bowringiana* (Champ. ex Benth.) Golding & Kareg. (Golding & Karegeannes 1984; basionym: Bentham 1852), which are recorded from nearby Yunnan. However, given the variation we see in *B. palmata* applying these names is extremely difficult, and may not be biologically meaningful.

Begonia pedunculosa Wall. [sect. *Diploclinium*]

Figs 46–47

Plantae Asiaticae Rariores: 82 (Wallich 1830). – Type: India, Meghalaya, Khasi Hills, Cherrapunji ‘Chura Poonji’, Aug. 1836, *Smith 653*, *Wallich Cat. No. 3672A* (lecto-: K-W, barcode [K001110761](#), here designated; isolecto-: [K000761406](#)).

Citations in other publications

Wallich (1831: 129, 3672), Clarke (1879: 639), Clarke (1881: 118), Fischer (1938: 98), Grierson (1991: 243), Kumar (2002: 648), Uddin (2007: 594), Dash (2010: 38), Das *et al.* (2013: 236), Verma *et al.* (2013: 179).

Other material

INDIA: **Meghalaya**: Jaintia Hills, 20 Nov. 1872, *Clarke 18328* (E); Khasi Hills, Sep. 1885, *Mann* s.n. (ASSAM n.v.); Khasi Hills, Cherrapunji, 15 Jul. 1952, *Koelz 30572* (MICH); *ibid.*, 6 Jul. 1952, *Koelz 30457* (MICH); *ibid.*, 28 Sep. 1868, *Clarke 5141* (BM); *ibid.*, 28 Jul. 1946, *Ward 16026* (BM000075861, E); *ibid.*, Aug. 1828, *Smith 202* ([K001110762](#)); Khasi Hills, Dumpep, 23 Aug. 1949, *Ward 18794A* (BM); Khasi Hills, Laitlyngkot, 28 Jul. 1949, *Koelz 23280* (MICH); Khasi Hills, Mairang, 30 Oct. 1872, *Clarke 19154A* (BM); *ibid.*, Oct. 1855, *Schlag* s.n. (BM); Khasi Hills, Mansmai, 23 Sep. 1886, *Clarke 45100* (BM); Khasi Hills, Mawphlang, 20 Sep. 1953, *Chand 7235* (MICH); *ibid.*, 20 Oct. 1952, *Chand 6497* (MICH); *ibid.*, 21 Aug. 1952, *Chand 6436* (MICH); *ibid.*, 24 Aug. 1954, *Chand 8042* (MICH);

ibid., 10 Sep. 1949, *Chand 2201* (MICH); ibid., 17 Sep. 1952, *Chand 6465* (MICH); ibid., 17 Jul. 1953, *Koelz 33319* (MICH); ibid., 18 Aug. 1952, *Koelz 31154* (MICH); ibid., 8 Aug. 1949, *Ward 18728* (BM); ibid., Aug. 1973, *Yandell 279* (K); Khasi Hills, Mawryngkneng, 24 Sep. 1951, *Koelz 28599* (MICH); ibid., 18 Oct. 1951, *Koelz 28882* (MICH); ibid., 31 Oct. 1951, *Koelz 28966* (MICH); ibid., 31 Oct. 1951, *Koelz 28962* (MICH); Khasi Hills, Sohra Rin, 17 Nov. 1872, *Clarke 19034* (K); Khasia, *Hooker & Thomson* s.n. (BM000075871, E, K); Shillong, 12 Jul. 1949, *Ward 18647* (BM). **Mizoram**: Lumtai, Jun. 1926, *Parry 43* (K); ibid., *Parry 44* (K n.v.).

Description

Tuberous, erect, monoecious herb, (5–)10–20 cm high. Stem: slightly woody at the base, slender, 1–3 mm wide, sparsely pilose, internodes 2–6 cm long. Stipules: lanceolate, 2–5 × 1–3 mm, glabrous, semi persistent. Leaves: petiole 5–18 mm long, pilose; lamina lanceolate to ovate-lanceolate, basifixed, base truncate to shallow cordate or cuneate on one side cordate on the other, 4–12 × 2–5 cm, asymmetric, upper surface green, sometimes with a red centre along the midvein, sparsely pilose all over or on veins only, underside red-purple, pilose all over, denser on veins, venation palmate-pinnate, midrib 3.5–11 cm long; margin double-dentate or dentate, with hairs; apex acuminate. Inflorescence: cymose, axillary to terminal, many; peduncle puberulous, branching 2–4 times, primary 6–13 cm, secondary 4–9 mm, tertiary 3–8 mm, quaternary 3–4 mm, with 4–8 female and 4–6 male flowers; bracts lanceolate, 2–8 × 1–2 mm, margin with hairs, deciduous. Male flower: pedicel 3–16 mm long, puberulous to glabrous; tepals 4; outer tepals oblong-elliptic to orbicular, 4–8 × 3–6 mm, white to dark pink, glabrous, margin entire; inner tepals oblanceolate to narrowly elliptic, 3–6 × 1–2 mm, white to dark pink, glabrous, entire; androecium with 10–13 stamens, symmetric; filaments 0.5–1 mm long, unequal, fused at base into a short column; anthers oblong elliptic, 1 mm long, dehiscing through slits longer than half the length of the anther, not hooded, connective not extended. Female flower: pedicel 6–10 mm long, puberulous to glabrous; bracteoles absent; tepals 4–5, equal, oblong elliptic to obovate-

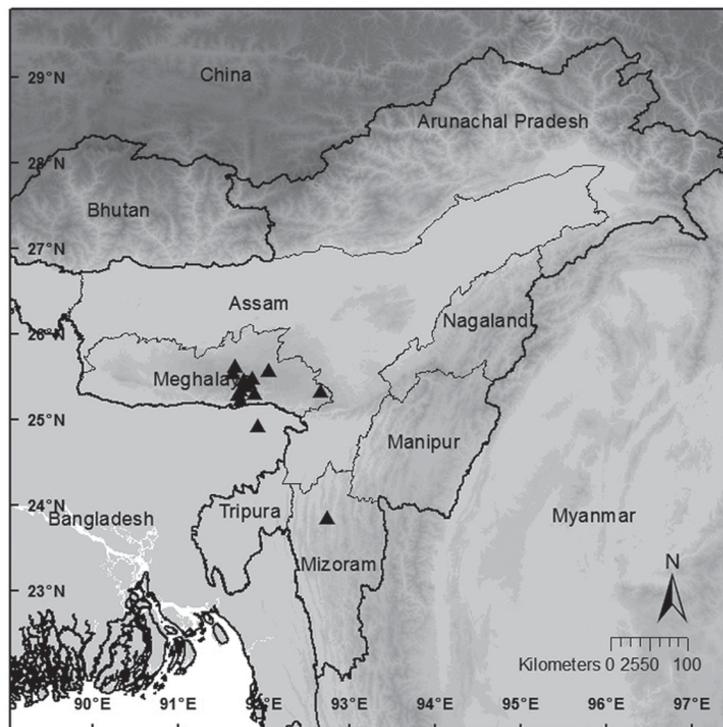


Fig. 46. Map showing the location of *B. pedunculosa* Wall. specimens.



Fig. 47. Illustration of *B. pedunculosa* Wall. by Vishnupersaud (Wallich 1830). 1. Male flower, front view. 2. Male flower, reverse view. 3. Female flower, front view. 4. Female flower, reverse view. Image from the Biodiversity Heritage Library, digitized by the Peter H. Raven Library.

orbicular, outer tepals 4–6 × 2–4 mm, pink to dark pink, glabrous, margin entire, inner tepals similar yet smaller; ovary 3-locular, capsule oblong-ellipsoid, 2–5 × 2–4 mm, glabrous, with three unequal triangular wings; styles 3, shallowly forked once and twisted once, persistent. Fruit: pendulous; capsule oblong-ellipsoid, 3–9 × 3–7 mm, glabrous; wings extending along the pedicel, subequal, rounded at the tips, longest wing rounded triangle, 7–12 × 5–9 mm, shortest wings oblong, 4–6 × 5–9 mm.

Distribution and phenology

Arunachal-Pradesh, Mizoram and Meghalaya; also in Bhutan; 400–1850 m. Flowering: June to October; fruiting: July to October.

Conservation status

Data Deficient. More data is required on the populations of the Khasi Hills where there has been extensive deforestation, although there is still some remaining habitat in this area due to several national parks and reserved forests.

Remarks

This species has a characteristic leaf shape and is relatively easily identifiable vegetatively. Its closest ally in the study area is *B. lushaiensis* which has leaves that are glabrous below and more triangular in shape. *Begonia lushaiensis* differs further in having a distinctive terminal paniculate inflorescence.

Begonia picta Sm. [sect. *Diploclinium*] Figs 48–49

Exotic Botany 2: 81 (Smith 1805). – Type: Nepal, 21 Jul. 1802, *Buchanan-Hamilton* (lecto: BM000043985, here designated).



Fig. 48. Map showing the location of *B. picta* Sm. specimens.

Begonia echinata Royle, *Illustrations of the botany and other branches of the natural history of the Himalayan Mountains: and of the flora of Cashmere*: 313 (Royle 1839). – Type: Royle (1839) tab. 80 [illustration].

Citations in other publications

As *B. picta*: Don (1825: 223), Hooker (1830: 2962), Wallich (1831: 129, 3685), Clarke (1879: 638), Clarke (1881: 118), Haines (1925: 400), Kanjilal (1938: 334), Fischer (1938: 98), Mooney (1950: 68), Kitamura (1955: 183), Deb (1961: 285), Nakao (1964: 140, fig. 184), Hara (1966: 215), Hara (1971: 84), Ghazanfar & Aziz (1976: 96), Hara *et al.* (1979: 182), Grierson (1991: 242), Chauhan (2000: 425), Kumar (2002: 650), Kress *et al.* (2003: 171), Panda & Das (2004: 159), Gu *et al.* (2007: 192), Uddin (2007: 594), Hughes (2008: 100), Dash (2010: 38).



Fig. 49. *Begonia picta* Sm. **A.** Male and female flowers and light leaf form. **B.** Male and female flowers and buds. **C.** Male flowers and dark leaf form. Photographs A & B courtesy of Sangeeta Rajbhandary of wild plants in Nepal, photograph C courtesy of Darrin Norton of a cultivated plant in a private collection.

Other material

INDIA: **Arunachal-Pradesh**: Mariyang to Takekpong, *Rao 17795* (ASSAM n.v.); Paji, *Dash 32492* (ARUN n.v.). **Manipur**: Karong, 30 Sep. 1950, *Koelz 26363* (MICH). **Meghalaya**: Khasi Hills, Cherrapunji, 6 Jul. 1952, *Koelz 30209A* (MICH); *ibid.*, 29 Jul. 1946, *Ward 16048* (BM). **Nagaland**: Naga Hills, Takubama, 24 Aug. 1950, *Koelz 25892* (MICH).

Description

Tuberous, erect, monoecious herb, 10–15(–25) cm high. Stem: not always present, slender, 2–4 mm wide, puberulous, internodes 5–12 cm long. Stipules: lanceolate, 1–3 × 1 mm, sparsely puberulous, semi persistent. Leaves: petiole 5–12(–20) cm long, sparsely puberulous; lamina ovate-orbicular to broadly triangular, basifixed, base shallowly cordate to subtruncate, 3–16 × 2–13 cm, slightly asymmetric, upper surface green or green with red about the veins, pale pilose all over, lower surface green or mottled with red, puberulous on veins only, venation palmate-pinnate, midrib 2–15 cm long; margin double-dentate to denticulate, with hairs; apex acute to acuminate. Inflorescence: cymose, terminal, few; peduncle pilose, branching twice, primary 3–12 cm, secondary 1–4 cm, with 2–4 female and 2–6 male flowers; bracts lanceolate, 3–4 × 1–2 mm, margin with dense hairs, entire. Male flower: pedicel 9–14 mm long, villose; tepals 4; outer tepals sub-orbicular, 6–10 × 6–10 mm, white or pink, pilose on reverse, margin serrate, with hairs; inner tepals elliptic, 5–10 × 3–7 mm, white or pink, glabrous, entire; androecium with 25–35 stamens, symmetric; filaments 2 mm long, equal, slightly fused at base; anther oblong elliptic, 1–2 mm long, dehiscing through short slits near the tip, hooded, connective not extended. Female flower: pedicel 8–12 mm long, pilose; bracteoles absent; tepals (4–)5, equal, obovate-orbicular, outer tepals 4–6 × 3–4 mm, pink to white, glabrous or sparsely pilose on reverse, margin with hairs, inner tepals similar yet smaller, 5th tepal if present like male inner tepals; ovary 3-locular, placentae bifid, capsule oblong-ellipsoid, 4 × 2 mm, white branched villose, with one long triangular wing and two short triangular wings; styles 3, deeply forked once and twisted once. Fruit: pendulous; capsule oblong-ellipsoid, 10–13 × 7–9 mm, with white branched hairs; wings extending along the pedicel, unequal, triangular; longest wing triangular, 19–24 × 11–17 mm; shortest wings triangular 7–12 × 7–11 mm.

Distribution and phenology

Arunachal-Pradesh, Meghalaya, Mizoram, Manipur and Nagaland; also in China, Tibet, Nepal, Sikkim, Bhutan and Myanmar; 1000–2150 m. Flowering: July to September; fruiting: August to October.

Conservation status

Least Concern (Hughes 2008). *Begonia picta* is a widespread species that is commonly collected from the Himalayas, with no significant change in recent years to warrant a change in its status.

Remarks

This is a very variable species but can be distinguished by the large triangular-winged fruit covered in long white branched hairs and tepals with a serrate margin. *Begonia wattii* also has leaves with dark variegation along the veins, but they are more asymmetric and the fruits differ from those of *B. picta* in having two of the wings very much reduced.

Begonia rex Putz. [sect. *Platycentrum*]
Figs 50–51

Flores des Serres et des Jardins de l'Europe 12: 141 (Putzey 1857). – Type: Fl. Serr. Jard. 12: 141-[illustration]; India, Nagaland, Naga Hills, Digboi, Jan. 1969, *Yandall 109* (epi.: K, here designated).

Citations in other publications

Koch (1858: 337), Hooker (1859: tab. 5107), de Candolle (1864: 350), Clarke (1879: 647), Clarke (1881: 119), Clarke (1890: 25), Gagnepain (1921: 1112), Burkill (1924: 288), Fischer (1938: 98), Deb (1961: 285), Kumar (2002: 650), Kress *et al.* (2003: 171), Gu *et al.* (2007: 195), Uddin (2007: 594), Hughes (2008: 107), Khatun (2008: 11), Morris (2009a: 133), Dash (2010: 39).

Other material

INDIA: **Arunachal-Pradesh:** Bapu Mountain, Rotung, Nov. 1911–Mar. 1912, *Burkill 37374* (n.v.); Chambang to Kurung River, *Dash 32963* (ARUN n.v.); Deban, *Pal 7333* (ARUN n.v.); Delei Valley, 14 Aug. 1928, *Ward 8518* (K). **Assam:** *Griffith 2588* (K); *ibid.*, *Griffith 2589* (K); Khasia, *Griffith 2592* (K); Königreich [Assam Kingdom], *Lips. s.n.* (B). **Nagaland:** Naga Hills, Digboi, Jan. 1969, *Yandell 108* (K); *ibid.*, Jan. 1969, *Yandall 109* (K); Naga Hills, Mariani District, Lakhuni, 2 Jan. 1949, *Ward 18376* (BM) [cf. *B. rex*].

Description

Rhizomatous, monoecious herb, 20–40 cm high. Rhizome: 5–10 mm wide, pilose. Stipules: ovate to lanceolate, 7–15 × 2–18 mm, sparsely villose, persistent. Leaves: petiole 10–20 cm long, densely to sparsely red villose; lamina ovate, basifixed, base cordate with lobes almost overlapping, (5–)10–20 × 5–15 cm, asymmetric, upper surface dark green with pale ring marking or dark green/red edges with pale ring and dark centre, glabrous or very sparsely pilose, underside green and red about veins, or with red veins, red villose denser on veins, venation palmate, midrib (4–)6.5–18 cm long; margin entire to repand, with long hairs; apex acute. Inflorescence: cymose, terminal, few; peduncle glabrous, branching 1–2 times, primary 4–10 cm long, secondary 7–9 mm long, with 2–4 female and 2–6 male flowers; bracts ovate, 5–12 × 3–5 mm, glabrous, margin entire, deciduous. Male flower: pedicel 18–35 mm long, glabrous; tepals 4; outer tepals ovate, 12–20 × 8–17 mm, pink to dark pink, glabrous, margin

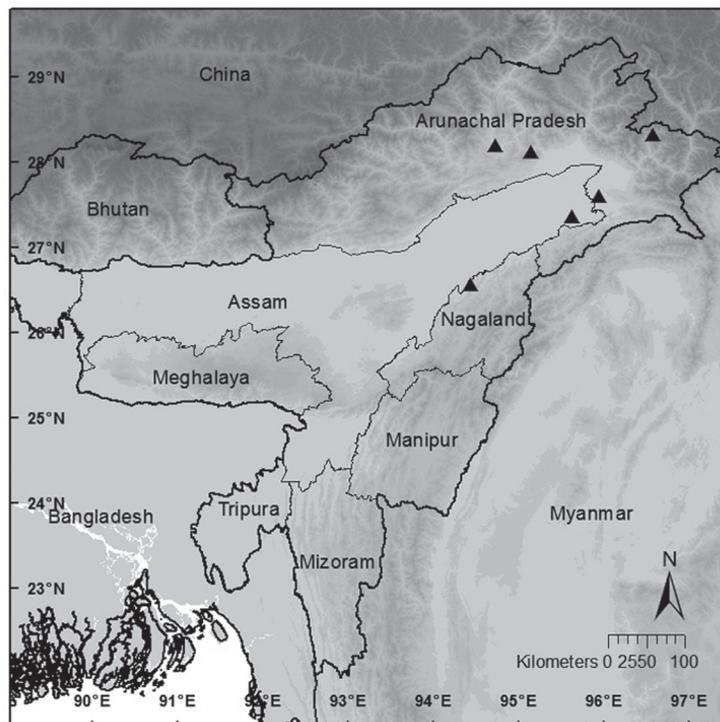


Fig. 50. Map showing the location of *B. rex* Putz. specimens.



Fig. 51. The type illustrations of *B. rex* Putz. by G. Severeys (Putzey 1857). Image from the Biodiversity Heritage Library, digitized by the Peter H. Raven Library.

entire; inner tepals spatulate, 8–18 × 3–8 mm, pink to pale pink, glabrous; androecium with 70–120 stamens, symmetric; filaments 2–5 mm long, unequal, fused at base into a long column; anther elliptic-globose, 1–3 mm long, dehiscent through slits running nearly the entire length of the anther, not hooded, connective extended, acuminate on apical stamens. Female flower: pedicel 11–31 mm long, glabrous; bracteoles absent; tepals 5, equal, oblong-ovate, 9–20 × 3–17 mm, pink, glabrous, margin entire, inner tepals similar but smaller; ovary 2-locular, placentae bifid; capsule ellipsoid, glabrous, with one long oblong wing and two short triangular wings; styles 2, deeply forked once and twisted twice, persistent. Fruit: recurved, 9–13 × 21–31 mm; capsule ellipsoid to broadly ellipsoid, 9–13 × 4–6 mm, glabrous; wings extending along the pedicel slightly, subequal; longest rounded oblong, 15–20 × 5–7 mm; shortest semi-circular, 2–5 × 8–10 mm.

Distribution and phenology

Arunachal-Pradesh, Assam and Nagaland; also in China, Bangladesh and Myanmar; 200–1250 m. Flowering: January; fruiting: January to February.

Conservation status

Data Deficient. Although this species is well known in cultivation, there are very few wild collections making calculating the AOO and EOO difficult. However, it is assigned to Least Concern due to the species having a wide distribution with ample habitat in Arunachal-Pradesh, Myanmar and China. The species has been found in the Namphada Reserve and Wallong National Park within the study area.

Remarks

The leaves usually have distinctive three-coloured variegation, with the paler central lamina contrasting with the darker margin and basal area; some bi-coloured and darker forms exist. The epitype *Yandall 109* (K) was chosen as it shows similar leaf patterning to the type illustration. The acuminate anthers are distinctive, and also found in *B. xanthina*, which differs in having yellow flowers and spotted leaves. *Begonia rex* shares banded variegation with *B. annulata*, which differs considerably in leaf shape.

Begonia roxburghii (Miq.) A.DC. [sect. *Sphenanthera*] Figs 52–53

Prodromus Systematis Naturalis Regni Vegetabilis 15 (1): 398 (de Candolle 1864). – *Diploclinium roxburghii* Miq., *Flora van Nederlandsch Indie* 1 (1): 692 (Miquel 1856). – Type: Bangladesh, Chittagong, *Hooker & Thomson 40* (lecto-: [K000634807](#); isolecto-: K).

Casparya oligocarpa A.DC., *Annales des Sciences Naturelles; Botanique, Sér.* 4, 11: 118 (de Candolle 1859). – Type: Northeast India, Meghalaya, Khasia, 610–1210 m, *Hooker & Thomson 40* (lecto-: [K000761501](#), here designated; isolecto-: BM, K).

Casparya polycarpa A.DC., *Annales des Sciences Naturelles; Botanique, Sér.* 4, 11: 118 (de Candolle 1859). – Type: India, Meghalaya, Assam, Assam Plains, *Griffith* s.n. (lecto-: K, here designated; isolecto-: K).

Begonia malabarica auct. non Lam.: Roxburgh in *Flora Indica* 3: 648 (Roxburgh 1832).

Citations in other publications

As *B. roxburghii*: Clarke (1879: 635), Clarke (1881: 115), Gagnepain (1921: 1119), Kanjilal (1938: 333), Fischer (1938: 98), Deb (1961: 285), Hara *et al.* (1979: 182), Deb (1981: 269), Grierson (1991: 243), Chauhan (1996: 176), Chauhan (2000: 427), Kumar (2002: 651), Kress *et al.* (2003: 172), Tebbitt (2005: 207), Uddin (2007: 594), Hughes (2008: 111), Khatun (2008: 11), Dash (2010: 39), Das *et al.* (2013: 236), Verma *et al.* (2013: 179); as *Diploclinium roxburghii*: de Candolle (1864: 399); as *Casparya*

oligocarpa: de Candolle (1864: 276), Clarke (1879: 635); as *Casparya polycarpa*: de Candolle (1864: 277), Kurz (1871: 295).

Other material

INDIA: **Arunachal-Pradesh**: Mishmi Hills, 22 Apr. 1949, *Ward 18528* (BM); Pango to Ninguing, *Rao 17667* (ASSAM n.v.); Tidding Valley, Theronhaing, 8 Mar. 1928, *Ward 7934* (K); *ibid.*, 8 Feb. 1950, *Ward 19131* (BM); Tuting to Kapu, *Rao 17416* (ASSAM n.v.). **Assam**: Upper Assam, 1841, *Hooker 515* (K); Assam, *Beddome 3194* (BM); Cachar, Khozungma, 2 Jun. 1951, *Chand 4672* (MICH). **Manipur**: Koupru, *Deb 2340* (CAL n.v.); *ibid.*, *Deb 2340* (CAL n.v.). **Meghalaya**: Garo Hills, Tura Mountain, 1929, *Parry 866* (K); Jaintia Hills, Apr. 1968, *Yandell 45* (K); Khasi Hills, Jul. 1879, *Mann s.n.* (ASSAM n.v.); Khasi Hills, Barapani, 16 Jun. 1949, *Koelz 22985* (MICH); Khasi Hills, Cherrapunji, 4 Aug. 1952, *Chand 6293* (MICH); *ibid.*, 6 Jul. 1952, *Chand 5998* (MICH); *ibid.*, 18 Jul. 1952, *Chand 6158* (MICH); *ibid.*, 23 Jul. 1952, *Koelz 30791* (MICH); Khasi Hills, Jyrna, 2 Oct. 1867, *Clarke 5462* (K); Khasi Hills, Mawryngkneng, 4 Sep. 1951, *Koelz 28338* (MICH); Khasi Hills, Nongphoh, 2 May 1949, *Koelz 22620* (MICH); Khasia, *Hooker & Thomson 40* (K); *ibid.*, 610–1210 m, *Hooker & Thomson s.n.* (K); Shillong, 1 Aug. 1886, *Clarke 44383* (K); *ibid.*, 1 Aug. 1886, *Clarke 44383C* (BM). **Mizoram**: Hmuifang, Aug. 1929, *Parry 264* (K); Lushai Hills, Jul. 1927, *Parry 186* (K); Lushai Hills, Kaultan, Jul. 1929, *Parry 186* (K). **Nagaland**: Naga Hills, Digboi, 5 Jan. 1936, *Barnard B1A3* (BM000017299); Naga Hills, Henima, 19 Sep. 1935, *Bon 6477* (K). **Tripura**: Sardukchara, *Deb 1484* (CAL n.v.); Tlangsang, *Deb 27175* (CAL n.v.).

Description

Caulescent, erect, dioecious herb, 60–120 cm high. Stem: slightly woody, stout, 5–20 mm wide, glabrous, internodes 5–13 cm long. Stipules: lanceolate, 14–17 × 3–6 mm, glabrous, deciduous. Leaves: petiole 5–15(–26) cm long, glabrous; lamina ovate to broadly ovate, basifixed, base cordate with lobes not overlapping, (5–)15–30 × 5–23 cm, asymmetric, upper surface green, glabrous,

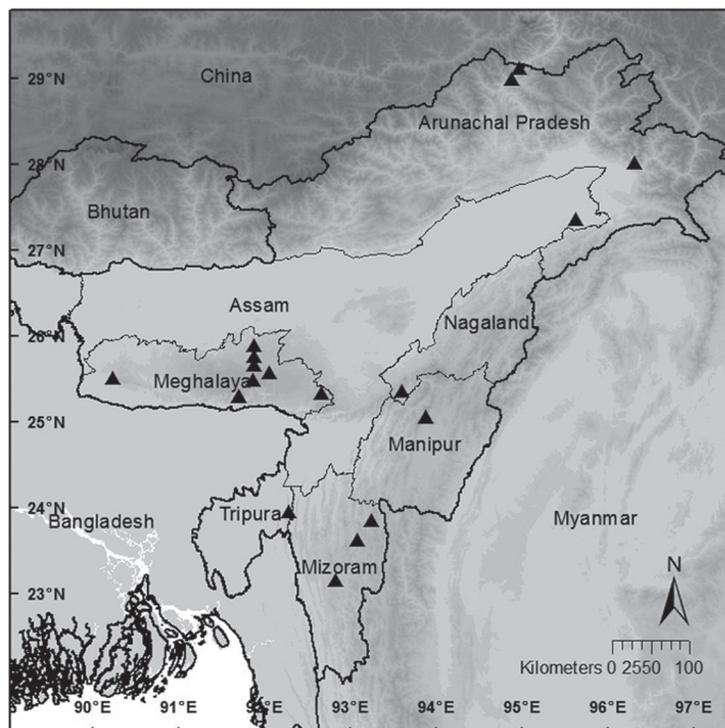


Fig. 52. Map showing the location of *B. roxburghii* (Miq.) A.DC. specimens.

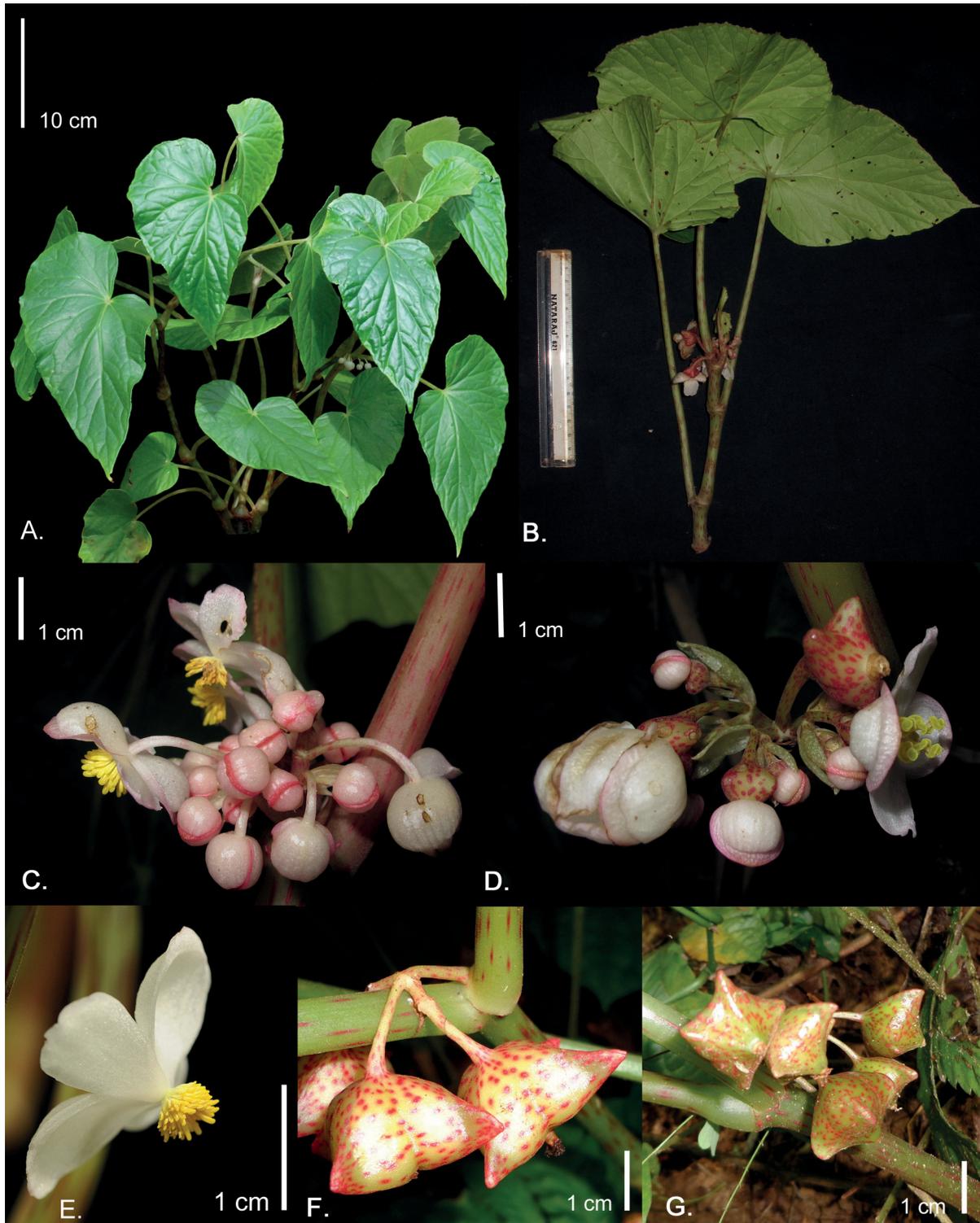


Fig. 53. *Begonia roxburghii* (Miq.) A.DC. **A–B.** Plant habit. **C.** Male inflorescence. **D.** Female inflorescence. **E.** Male flower. **F–G.** Fruit. Photographs A & E by Mark Hughes from a plant in cultivation at Glasgow Botanic Garden (accession 011 007 97), photograph F courtesy of Harun Rashid of a plant in Bangladesh, photograph G courtesy of Pradrip of a plant in Bangladesh, and B–D courtesy of Alfred Joe from a plant in Northeast India.

underside green, glabrous, venation palmate-pinnate, midrib 4–24 cm long; margin entire to denticulate, glabrous; apex acuminate. Inflorescence: cymose, axillary, many; peduncle puberulous; male branching 2–3 times, primary 2–5 mm long, secondary 1–2 mm long, tertiary up to 1 mm long, 8–10 flowers; female branching twice, primary 10–16 mm long, secondary 4–6 mm long, 2–5 flowers; bracts ovate, 10–13 × 3–4 mm, glabrous, margin entire. Male flower: pedicel 8–30 mm long, glabrous; tepals 4; outer tepals ovate to oblong-elliptic, 9–12 × 4–6 mm, white to pink, glabrous, margin entire; inner tepals elliptic, 6–12 × 2–5 mm, white to pink, glabrous; androecium with 40–65 stamens, symmetric; filaments 2 mm long, fused at base; anther oblong elliptic, 1–2 mm long, dehiscing through slits longer than half the length of the anther, not hooded, connective extended. Female flower: pedicel 7–17 mm long, glabrous to puberulous; bracteoles absent; tepals 4(–6), equal, obovate, 7–13 × 3–10 mm, white to pale pink, glabrous, margin entire, inner tepals similar but smaller; ovary 4-locular, placentae bifid; capsule pyramidal-ovoid, 3–5 × 4–7 mm, puberulous, without wings, with 4 horn-like projections; styles 4, deeply forked once and twisted twice, persistent. Fruit: pendulous; capsule pyramidal-ovoid, 18 × 16 mm, glabrous to sparsely puberulous.

Distribution and phenology

Northeast India; also in Nepal, Sikkim, Bangladesh and Myanmar; 300–1850 m. Flowering: February to October; fruiting: July to October.

Conservation status

Least Concern. *Begonia roxburghii* has an AOO of 96 km² and an EOO of 277,400 km² with ample suitable habitat. The species has been found near Dibang Wildlife Sanctuary, and within the Lengteng Wildlife Sanctuary, Nongkhylllem Wildlife Sanctuary and Namphada Forest Reserve.

Remarks

The closest ally to *B. roxburghii* in the study area is *B. silletensis*, but the former is distinct in having a main stem and inflorescences in the leaf axils, not on peduncles arising from the rhizome. The species is completely glabrous apart from occasionally some small hairs on the inflorescences, again unlike *B. silletensis* which has fine hairs on petioles and leaves.

It is possible for natural hybrids to occur with species of *B. sect. Platycentrum*, as represented by *Ward 19131* (BM). This collection bears female flowers in clusters in the leaf axils with small wings. It was initially determined as *B. dux* but the flowers are rather small and the specimen is best interpreted as a hybrid of *B. roxburghii*.

Begonia scintillans Dunn [sect. *Diploclinium*]

Figs 54–55

Bulletin of Miscellaneous Information, Kew 1920: 111 (Dunn 1920). – Type: India, Arunachal-Pradesh, Bapu Mountain, Rotung, Nov. 1911–Mar. 1912, *Burkill* s.n. (lecto-: [K000761475](#), here designated).

Citations in other publications

Burkill (1924: 289), Uddin (2007: 595), Dash (2010: 39).

Other material

INDIA: **Arunachal-Pradesh:** Bapu Mountain, Nov. 1911–Mar. 1912, *Burkill* 36928 ([K000634618](#)); Bapu Mountain, Ripshing Sieng, Nov. 1911–Mar. 1912, *Burkill* 36543 (n.v.); Bapu Mountain, Rotung, Nov. 1911–Mar. 1912, *Burkill* 36219 (n.v.); Bapu Mountain, Rotung-Ripshing Sienge Ridge, Nov.

1911–Mar. 1912, *Burkill* 36820 (n.v.); Palin to Deed, *Pal* 513 (ARUN n.v.). **Meghalaya:** Sillet Hills, *De Silva* s.n., *Wallich Cat. No.* 3679 p.p. (K-W, barcode [K000761430](#)).

Description

Rhizomatous, creeping, monoecious herb, 7–15 cm high. Rhizome: 4–6 mm wide, red villose, internodes 3–5 cm long. Stipules: lanceolate, 6–11 × 4–6 mm, villose on reverse, persistent. Leaves: petiole 4–11 cm long, densely red villose; lamina ovate-orbicular, basifixed, base cordate with lobes not overlapping, 4.5–10 × 3.5–7 cm, asymmetric, upper surface dark green with small silver spots, densely pale strigose all over, underside red, red tomentose all over, denser on the veins, venation palmate, midrib 3–5.5 cm long; margin with minute serration, with dense red hairs; apex acuminate to acute. Inflorescence: axillary, few; peduncle red villose, branching 1–2 times, primary 3–7 cm, secondary 5–10 mm, with 1 female and 1–2 male flowers; bracts ovate, 7–9 × 4–6 mm, pilose, margin pilose, persistent. Male flower: pedicel 20–30 mm long, red villose; tepals 4; outer tepals broad ovate, 15–20 × 13–16 mm, coral pink, pilose on reverse, margin entire; inner tepals obovate, 10–16 × 10–14 mm, coral pink, glabrous; androecium with 30–40 stamens, symmetric; filaments 2 mm long, fused into column; anther obovate, 1 mm long, dehiscing through slits along the length of anther, not hooded, connective retuse. Female flower: pedicel 7–10 mm long, red villose; bracteoles absent; tepals 4–5, obovate, 10–11 × 7–9 mm, coral pink, pilose on reverse, margin entire; ovary capsule obovoid, 9 × 5–6 mm, red villose, with one long triangular wing and two short crescent shaped wings; styles 3, deeply forked once and twisted once. Fruit: pendulous; capsule obovoid, 8–10 × 4–6 mm, red villose; wings extending slightly along the pedicel; longest wing rounded oblong 5 × 4–6 mm; shortest wings crescent shaped, 1–3 × 8–10 mm.

Distribution and phenology

Arunachal-Pradesh and Meghalaya; 500–2000 m. Flowering and fruiting: February to March.

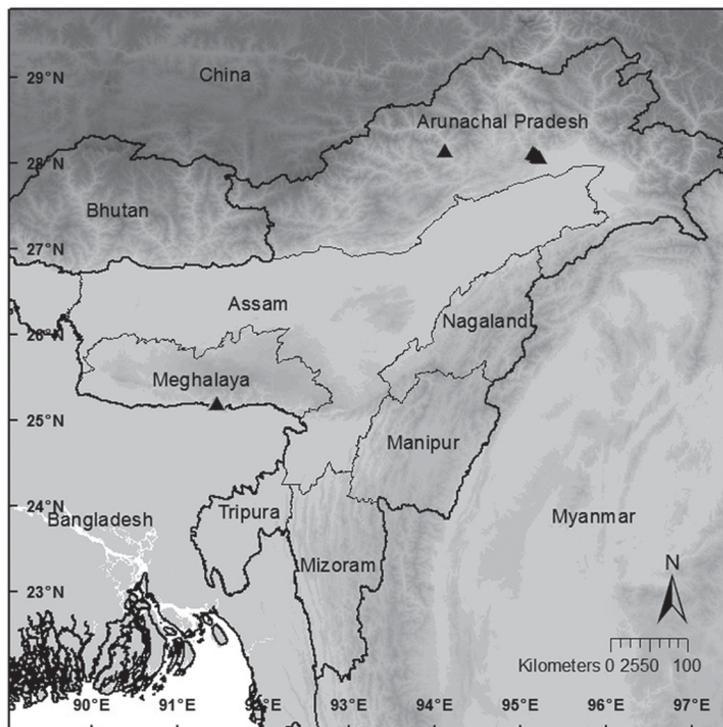


Fig. 54. Map showing the location of *B. scintillans* Dunn specimens.

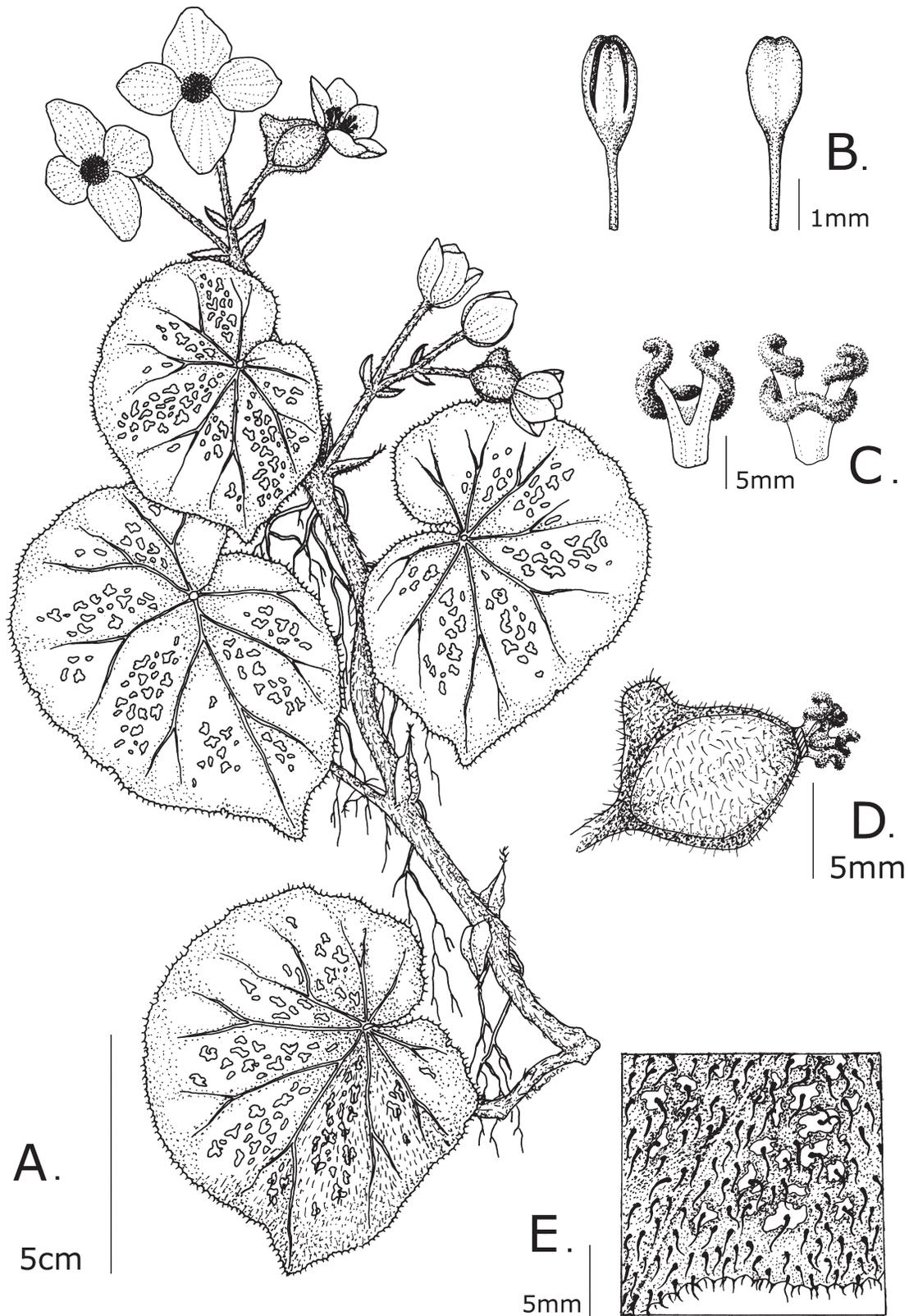


Fig. 55. Illustration of *B. scintillans* Dunn. **A.** Habit of plant. **B.** Stamen. **C.** Style. **D.** Immature fruit. **E.** Close up showing hairs. Drawn by Heather Raeburn. A, D–E from *Burkill* 36928; B–C from *Burkill* s.n. (K000761475); all K.

Conservation status

Least Concern. *Begonia scintillans* has an AOO of 24 km² and an EOO of 20,378 km² suggesting a status of near threatened. However, this species is probably under-collected and is likely to have a wider distribution in the surrounding extensive undisturbed forests of Arunachal-Pradesh, the Silet Hills and further afield. The species has been found near the Mouling National Park.

Remarks

This species was previously known only from the original material but one other specimen from the Silet Hills has been located (*De Silva* s.n.). The fruit measurements were based on immature fruits as no mature fruits were present on the specimens. *Begonia scintillans* has a distinctive inflorescence, with a pair of male and female flowers often subtended by a single male flower (Fig. 55).

Begonia scintillans is allied to *B. thomsonii*, which has a dense red indumentum all over; *B. scintillans* has a red indumentum on much of the plant, but white hairs on the upper leaf surface. *Begonia thomsonii* differs further in having more flowers per inflorescence, with the inflorescences being unisexual as far as can be observed from the available material. The habit also differs: *B. scintillans* has an elongate, creeping rhizome with the leaves evenly spaced; *B. thomsonii* has the leaves arising from a short rhizome, appearing fasciculate. The specimen from Meghalaya (*De Silva* s.n., *Wallich Cat. No. 3679*) is on a mixed sheet, and hence the locality should be treated with caution.

Begonia shilendrae Rekha Morris & P.D.McMillan [sect. *Platycentrum*]

Fig. 56; Table 1

The Begonian 79 (3–4): 63 (Morris & McMillan 2012). – Type: India, Arunachal-Pradesh, Itanagar, 3 Apr. 2005, *Morris ARI* (holo-: CLEMS).

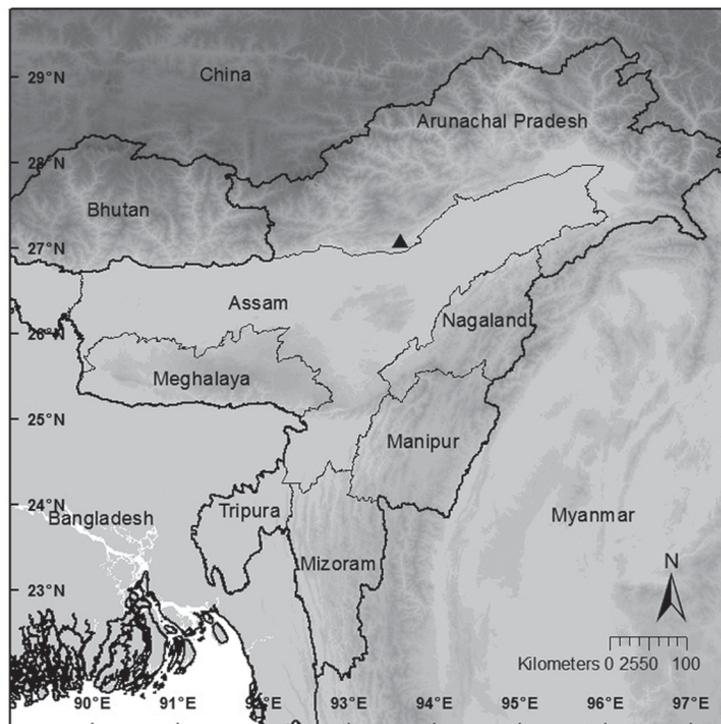


Fig. 56. Map showing the location of *B. shilendrae* Rekha Morris & P.D.McMillan specimens.

Other material

INDIA: **Arunachal-Pradesh**: Itanagar, 3 Apr. 2005, *Morris AR-1A* (CLEMS); *ibid.*, 3 Apr. 2005, *Morris AR-1B* (CLEMS); *ibid.*, 3 Apr. 2005, *Morris AR-1C* (CLEMS); *ibid.*, 17 Dec. 2005, *Morris AR108* (CLEMS n.v.); *ibid.*, 17 Dec. 2005, *Morris AR109* (CLEMS n.v.); *ibid.*, 17 Dec. 2005, *Morris AR110* (CLEMS n.v.); *ibid.*, 17 Dec. 2005, *Morris AR111* (CLEMS n.v.).

Description

Rhizomatous, monoecious herb, 20–50 cm high. Rhizome: 10–20 mm wide, glabrous, internodes 5–25 mm long. Stipules: unseen. Leaves: petiole up to 40 cm, densely to sparsely villose; lamina broadly ovate, basifixed, base shallowly cordate to truncate, 18–35 × 8–30 cm, slightly asymmetric, upper surface matt green, glabrous, underside green, pubescent on veins near petiole, venation palmate; margin very deeply lobed, with 5–7 lobes, entire, glabrous; apex acuminate. Inflorescence: panicle or raceme of cymes, terminal, few; peduncle glabrous with hairs near base, branching 1–3 times, primary 10–30 cm long, secondary and tertiary ca 1 cm, up to 15 flowers; bracts unseen. Male flower: pedicel 5–15 mm long, glabrous; tepals 2; outer tepals cordate-ovate, 5–10 × 4–6 mm, rose pink to pale pink, glabrous, margin entire; androecium with 30–40 stamens, symmetric; filaments 1–3 mm long; fused at base; anther globose, 1 mm long, not hooded, connective not extended. Female flower: pedicel 10–35 mm long, glabrous; bracteoles absent; tepals 2, ovate, 5–10 × 4–9 mm, rose pink to pale pink, glabrous, margin entire; ovary 2(–3)-locular, placentae bifid; capsule oblong-elliptic, with one long oblong wing and two very small oblong wings; styles 2–3, forked once and twisted once, persistent. Fruit: recurved; capsule elliptic, 9–13 × 3–5 mm, glabrous; wings extending along the pedicel and in front of capsule, unequal; longest wing rounded triangle, 15–20 × 10–14 mm; shortest wings oblong, 1–2 × 11–17 mm.

Distribution and phenology

Endemic to Arunachal-Pradesh; ca 450 m. Flowering: December to January; fruiting: December to February.

Conservation status

Data Deficient. *Begonia shilendrae* is only known from the type location in the lower mountains of Arunachal-Pradesh.

Remarks

The description is based on the protologue and photographs of the type; the notes therein describe the species as protandrous. This species is vegetatively similar to *B. sikkimensis* and *B. koelzii* in terms of having lacerate leaves; see notes under those species.

Begonia sikkimensis A.DC. [sect. *Platycentrum*]

Fig. 57

Annales des Sciences Naturelles; Botanique, Sér. 4, 11: 134 (de Candolle 1859). – Type: India, Sikkim, 1850, *Hooker 14* (lecto-: [K000761425](#), here designated; isolecto-: [K000761424](#)).

Citations in other publications

de Candolle (1864: 349), Clarke (1879: 646), Clarke (1881: 119), Clarke (1890: 25), Fischer (1938: 98), Hara (1966: 215), Hara *et al.* (1979: 182), Grierson (1991: 241), Hynniewta (1994: 183), Kumar (2002: 652), Kress *et al.* (2003: 172), Gu *et al.* (2007: 198), Uddin (2007: 595), Hughes (2008: 116), Dash (2010: 40).

Other material

INDIA: **Arunachal-Pradesh:** Buyang, *Dash 32658* (ARUN n.v.); *ibid.*, *Dash 32654* (ARUN n.v.); Dirang dzong, 14 Aug. 1938, *Ward 14074* (BM); Mariyang, *Choudhery 18489* (ARUN n.v.); Palin, *Pal 478* (ARUN n.v.). **Mizoram:** Lushai Hills, Aijal, Sep. 1927, *Parry 253* (K); Vanlaiphai, *Parry 253* (n.v.). **Nagaland:** Naga Hills, Kohima, 8 Jul. 1950, *Koelz 25465* (MICH); *ibid.*, 12 Sep. 1950, *Koelz 26170* (MICH); Naga Hills, Takubama, 27 Aug. 1950, *Chand 3467* (MICH).

Description

Rhizomatous, erect, monoecious herb, 30–200 cm high. Rhizome: 10–15 mm wide, glabrous, internodes 1–3 cm apart. Stem: slightly woody, stout, ca 1 cm wide, glabrous, internodes 5–9 cm long. Stipules: lanceolate, 18–27 × 3–7 mm, glabrous, caduceous. Leaves: petiole 5–15(–20) cm long, glabrous; lamina ovate-orbicular to broadly ovate, basifixed, base shallowly cordate, 10–24 × 11–25 cm, slightly asymmetric, upper surface green, or green with darker margin, glabrous, underside green, sparsely puberulous hairs on veins to glabrous, venation palmate, midrib 8–21 cm long; margin deeply lobed about main veins with fine serrations, mostly glabrous; apex acuminate. Inflorescence: cymose, axillary, few; peduncle glabrous, branching 2–3 times, primary 10–20 cm, secondary 2–8 cm, tertiary 3–4 cm, with 2–6 female and 2–4 male flowers; bracts ovate to ovate-orbicular, 15–20 × 8–15 mm, margin entire, deciduous. Male flower: pedicel 10–22 mm long, glabrous; tepals 4; outer tepals ovate, 10–15 × 5–10 mm, pale pink to red, glabrous, entire; inner tepals ovate to oblong, 7–14 × 3–9 mm, pale pink, glabrous; androecium with 40–80 stamens, symmetric; filaments 1–2 mm long, unequal, fused at base; anther oblong elliptic, 1–1.5 mm long, dehiscing through slits longer than half the length of the anther, not hooded, connective extended. Female flower: pedicel 9–24 mm long, glabrous; bracteoles absent; tepals 5, equal, ovate, outer tepals 4–9 × 3–5 mm, pale pink to red, margin entire, inner tepals similar yet smaller; ovary 2-locular, placentae bifid; capsule oblong-ellipsoid, 4–7 × 2–5 mm, with one long oblong wing and two short oblong wings; styles 2, deeply forked once and twisted once, deciduous.

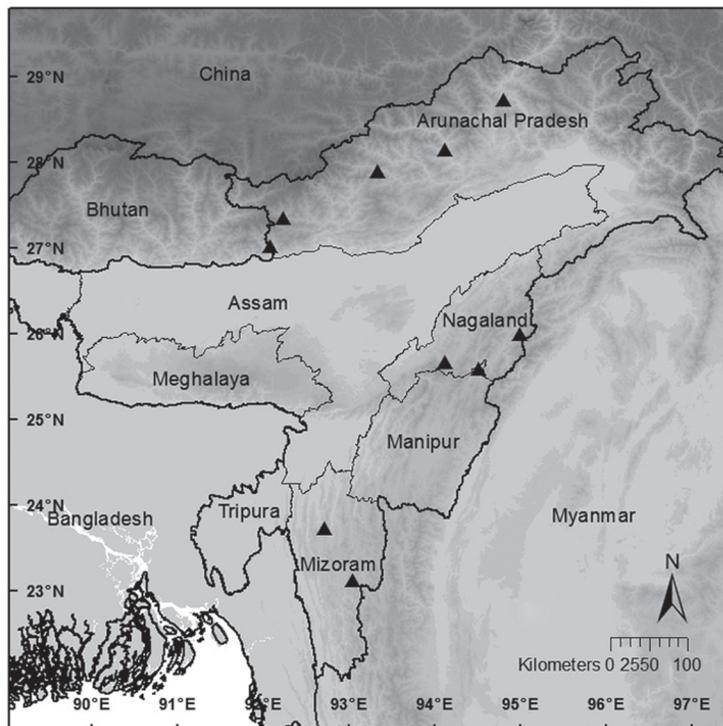


Fig. 57. Map showing the location of *B. sikkimensis* A.DC. specimens.

Fruit: recurved, 12–17 × 17–43 mm; capsule oblong-ellipsoid, 12–15 × 4–6 mm, glabrous; wings extending along the pedicel slightly, unequal; longest rounded oblong, 12–32 × 5–17 mm; shortest oblong, 1–5 × 7–11 mm.

Distribution and phenology

Arunachal-Pradesh, Mizoram and Nagaland; also in China, Tibet, Nepal, Sikkim and Myanmar; 150–2150 m. Flowering: July to September; fruiting: August to October.

Conservation status

Least Concern. *Begonia sikkimensis* has an AOO of 76 km² and an EOO of 494,000 km² with a distribution encompassing ample suitable habitat. The species is found in several national parks in Nepal and near Moulling National Park in Arunachal-Pradesh and near the Khawnglung Wildlife Sanctuary in Mizoram.

Key to varieties:

1. Plant up to 1 m high, stems green, petioles 10–27 cm, leaves under 20 cm long, male flowers uniform pale pink, female flowers pale pink *B. sikkimensis* A.DC. var. *sikkimensis*
– Plant up to 2 m high, stems red to dark pink, petioles 3–23 cm, leaves can be over 20 cm long, male flowers outer tepals dark pink to red, inner tepals pale pink, female flowers tepals dark pink
B. sikkimensis A.DC. var. *kamengensis* Rekha Morris, P.D.McMillan & Golding ex Golding

Begonia sikkimensis A.DC. var. *sikkimensis*

Other material examined

INDIA: **Mizoram**: Lushai Hills, Aijal, Sep. 1927, *Parry* 253 (K). **Nagaland**: Naga Hills, 19 Oct. 1885, *Clarke* 40906 (K); Naga Hills, Kohima, 8 Jul. 1950, *Koelz* 25465 (MICH).

Description

Plant up to 100 cm. Stem: green. Male flower: outer tepals white to pale pink; inner tepals white to pale pink. Female flower: tepals white to pale pink.

Remarks

This species shares lacerated leaves with *B. koelzii* and *B. shilendrae*. *Begonia sikkimensis* tends to have smaller glabrous leaves with shallower lacerations; also the inflorescences arise from the leaf axils rather than from the rhizome as with *B. shilendrae* and *B. koelzii*. The leaves of specimens from the study area are somewhat coarser than those of the type.

Begonia sikkimensis var. *kamengensis*

Rekha Morris, P.D.McMillan & Golding ex Golding

The Begonian 76: 33 (Golding 2009). – Type: India, Arunachal-Pradesh, West Kamang District, Sessa, 24 Dec. 2005, *Morris RM-AR 57* (holo-: CLEMS; iso-: US n.v.).

Other material examined

INDIA: **Arunachal-Pradesh**: West Kamang District, Sessa, 24 Dec. 2005, *R. Morris RM-AR 53* (CLEMS). **Nagaland**: Naga Hills, Kohima, 12 Sep. 1950, *Koelz* 26170 (MICH); Naga Hills, Takubama, 27 Aug. 1950, *Chand* 3467 (MICH).

Description

Plant up to 200 cm. Stem: dark pink to red. Male flower: outer tepals deep pink to crimson, inner tepals pale pink. Female flower: tepals deep pink to pink.

Remarks

The collections by both Koelz and Chand are new records for this variety in Nagaland.

Begonia silletensis (A.DC.) C.B. Clarke [sect. *Sphenanthera*]

Fig. 58

The Flora of British India 2: 636 (Clarke 1879). – *Casparya silletensis* A.DC., *Prodromus Systematis Naturalis Regni Vegetabilis* 15 (1): 277 (de Candolle 1864). – Type: India, Meghalaya, Sillet Hills, *Wallich Cat. No. 9107* (lecto-: K-W, barcode [K000634631](#), here designated; isolecto-: [BM000017324](#), G-DC, K-W, barcode [K000634630](#)).

Citations in other publications

As *B. silletensis*: Clarke (1881: 115), Chauhan (1996: 176), Tebbitt & Guan (2002: 134), Uddin (2007: 595), Hughes (2008: 116), Khatun (2008: 13), Dash (2010: 40), Dash & Mao (2011: 2095), Morris (2012b: 146); as *Casparya silletensis*: Baruah & Choudbury (2014: 41).

Other material

INDIA: **Arunachal-Pradesh**: Amjee, *Sastry 40556* (ARUN n.v.); Bapu Mountain, Rotung, 24 Nov. 1911, *Burkill 37376* (CAL n.v.); *ibid.*, Nov. 1911–Mar. 1912, *Burkill 36700* (K); Buyang, *Dash 32695* (ARUN n.v.); Kameng District, 24 Mar. 1957, *Panigrahi 6029* (CAL n.v.); Mishmi Hills, Kamlang Valley, Glo, 22 Mar. 1949, *Ward 18439* (BM); Sangram to Koloring, *Dash 31223* (ARUN n.v.). **Assam**: Cachar, Oct. 1873, *Keenan* s.n. (K); Cachar, Katakhal Forest, Mar. 1888, *Mann* s.n. (K); Charduar Forest, Apr. 1887, *Mann* s.n. (K); *ibid.*, Apr. 1887, *Mann* s.n. (K); Namchung, 18 Apr. 1885, *Clarke 37937A* (K). **Manipur**: *Watt 6875* (E).

Description

Rhizomatous, stemless, monoecious herb, 40–60 cm high. Rhizome: 8–10 mm wide, glabrous. Stipules: lanceolate, 10–20 × 4 mm, puberulent hairs on reverse, persistent. Leaves: petiole 10–60 cm long, short red tomentose or pubescent; lamina ovate to broadly ovate, basifixed, base cordate with lobes not overlapping, 10–33 × 8.5–21 cm, asymmetric, upper surface green, very sparsely puberulous all over or on veins mostly near petiole attachment or glabrous, underside green, red puberulous all over, denser on veins, venation palmate, midrib 7–23 cm long; margin entire or with small teeth at ends of main veins, with sparse short hairs; apex short acuminate or acute. Inflorescence: cymose, terminal, few; peduncle with puberulous hairs, branching once; male primary 12–25 cm long, secondary 1–2 mm long, 6–8 flowers; female primary 5–15 cm long, secondary 0.5(–4) cm long, 1–4 flowers; bracts ovate, 11–35 × 2–35 mm, margin entire, deciduous. Male flower: pedicel 1–4 cm long, red puberulous; tepals 4; outer tepals obovate, 4–20 × 10–15 mm, white to pink, red puberulous on reverse denser near base, margin entire; inner tepals spatulate, 13–17 × 7–12 mm, white to pink, glabrous; androecium with 70–100 stamens, symmetric; filaments 1–3 mm long, unequal, slightly fused at base or free; anther oblong elliptic, 1–2 mm long, dehiscing through slits running nearly the entire length of the anther, not hooded, connective extended. Female flower: pedicel 2–5 cm long, red puberulous hairs; bracteoles absent; tepals 4, equal obovate-orbicular, ca 16 × 15 mm, white to pink, puberulous on reverse denser near base, inner tepals similar yet smaller; ovary 3–4-locular, placentae bifid; capsule globose, densely red tomentose, without wings; styles 3–4, convoluted with twisted ends,

caduceus. Fruit: upright, globose; capsule spherical, 8–23 × 10–15 mm, sparsely red tomentose to glabrous.

Distribution and phenology

Arunachal-Pradesh, Assam and Manipur; also in China, Bangladesh and Myanmar; 450–1000 m. Flowering: April to September; fruiting: April to October.

Conservation status

Least Concern. *Begonia silletensis* has an AOO of 44 km² and an EOO of 87,700 km² suggesting the species could be Vulnerable. There is, however, suitable habitat available in Northeast India, particularly the mountains of Arunachal-Pradesh and down into the Arakan mountain range. The species has been recorded near the Namphada Reserve and the Pakke Tiger Reserve.

Remarks

There has been much confusion over the delimitation of this species and how it can be separated from its nearest relative, *B. aborensis*, by using hair characters. *Begonia silletensis* is described as being glabrous (Tebbutt & Guan 2002; Dash & Mao 2011; Morris 2011c, 2012b), however, close examination of specimens cited in Tebbutt & Guan (2002) reveal some with short sparse pubescence, and one (*Mann* s.n.) with 5 mm long hairs we consider to belong to *B. aborensis*. After consulting all available specimens including two sheets of type material and the Kew specimen (K000634631) designated as the lectotype, it is clear that *B. silletensis* has soft short tomentose hairs along the veins on the lamina underside and petiole. The upper surface of the leaf looks glabrous at a glance, but with a hand lens or microscope small, sparsely spread hairs are often visible especially near the petiole attachment and along the veins. The same short tomentose pubescence is also found on the young ovaries but lost as the fruit ripens. The most reliable character for separating the two species is the longer peduncle in *B. silletensis*, and the

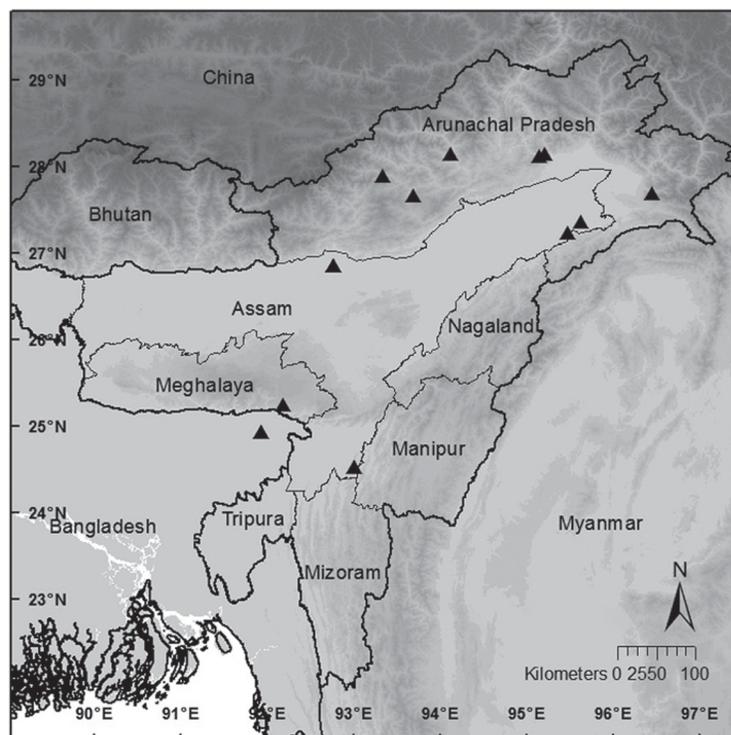


Fig. 58. Map showing the location of *B. silletensis* (A.DC.) C.B.Clarke specimens.

longer, red indumentum on *B. aborensis*. In this account it has been decided to leave them as separate but very closely related species. Further studies on good flowering material and possibly a genetic analysis would be useful to give insight into whether they could be considered as a single, variable taxon. The plant photographed in Morris (2011c) identified as *B. aborensis* is referable to our concept of *B. silletensis* considering its very short indumentum and distinct peduncle.

Morris (2012b) shows photographs of a very large glabrous *Begonia* from Arunachal-Pradesh, referred to as *B. silletensis*. The plant has 5-locular fruit and flowers with 5–6 styles, and very large solitary female flowers over 10 cm diameter with up to 10 fringed tepals. This differs considerably from the type of *B. silletensis* and raises the possibility that the plant in the photograph is a new species.

There is variety of this species, *B. silletensis* var. *mengyangensis* Tebbitt & K.Y.Guan (Tebbit & Guan 2002), found in Yunnan, China. All specimens viewed for this account are of the type variety *B. silletensis* var. *silletensis*.

Begonia tessaricarpa C.B.Clarke [sect. *Sphenanthera*]

Fig. 59

The Flora of British India 2: 636 (Clarke 1879). – Type: India, East Bengal, Assam, *Griffith 2586* (lecto-: [K000251117](#), here designated).

Citations in other publications

Clarke (1881: 115), Ambrish & Amadudin (2006: 997), Uddin (2007: 595), Morris (2009d: 88).

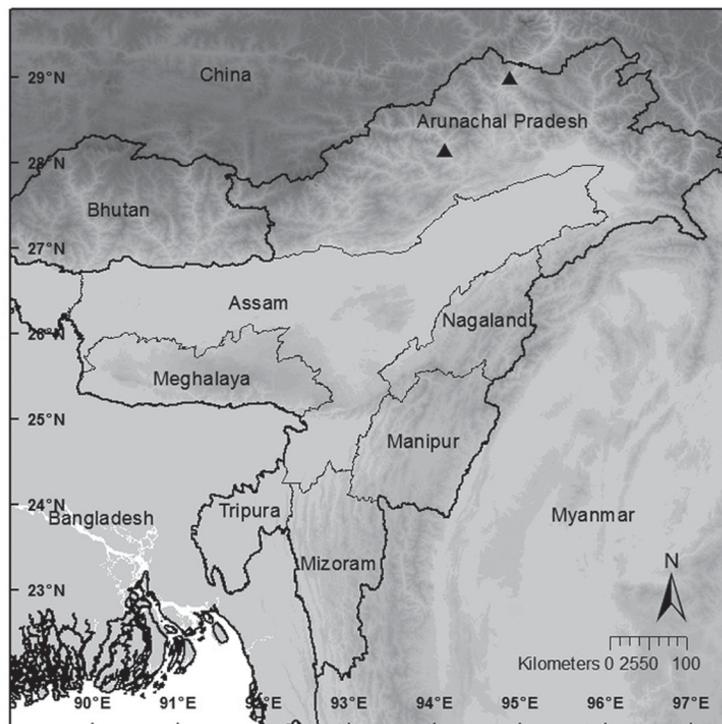


Fig. 59. Map showing the location of *B. tessaricarpa* C.B.Clarke specimens.

Other material

INDIA: **Arunachal-Pradesh:** *Ambrish 17304* (CAL n.v.); Tuting to Ningging, *Choudhery 18111* (ARUN n.v.). **Assam:** *Amadudin 107306* (CAL n.v.).

Description

Rhizomatous, dioecious herb, 15–30 cm high. Rhizome: unseen. Stipules: ovate, 2.5–8 × 2–5 mm, puberulous, persistent. Leaves: petiole 14–31 cm long, tomentose denser near leaf; lamina ovate, basifixed, base cordate with lobes not overlapping, 7–10.5 × 4–8 cm, upper surface dark green, puberulous, underside pale green, tomentose on veins mostly; margin entire-repand, occasionally with teeth at end of veins, with sparse hairs or glabrous; apex acute. Inflorescence: cymose, terminal, few; peduncle puberulous; male branching once, 2–7 cm long, 2 male flowers; female branching once, 2–3 cm long, 2 female flowers; bracts lanceolate, 5 × 2 mm, glabrous, persistent. Male flower: pedicel 10–17 mm long, tomentose; tepals 4; outer tepals obovate, 5–6 × 3–4 mm, white to pink, puberulous hairs on reverse, entire; inner tepals obovate-elliptic, 5–6 × 2–3 mm, white to pink, glabrous; androecium with 12–20 stamens, symmetric; filaments 1 mm long, free; anther oblong elliptic, 2–3 mm long, dehiscing through slits longer than half the length of the anther, not hooded, connective extended. Female flower: pedicel 7–12 mm long, tomentose; bracteoles absent; tepals 4–5, white to pink, puberulous on reverse; ovary 4-locular, placentae bifid; capsule pyramidal, 6 × 5.5 mm, tomentose, without wings, with four horn-like projections; styles 4, deeply forked once and twisted twice, deciduous or persistent. Fruit: on stout pedicel; capsule pyramidal, 10–11 × 9–11 mm, sparsely tomentose to glabrous.

Distribution and phenology

Endemic to north Assam and Arunachal-Pradesh. Flowering and fruiting: November to February.

Conservation status

Data Deficient. *Begonia tessaricarpa* is a poorly understood species.

Remarks

Only known reliably from the rather poor type, which has a partially open male flower bud and a fragment of a female flower. The description is augmented from the protologue. The type has three separate inflorescences, 2 male and 1 female, possibly from the same plant but most likely from the same colony; the species could potentially be dioecious. *Begonia tessaricarpa* is extremely similar to *B. handelii* var. *prostrata* and we suggest the possibility it may be synonymous with it.

The photograph in Dash (2010) labelled as *B. tessaricarpa* is *B. handelii* var. *handelii* as it has the characteristically large flowers of that species. The plant photographed in Ambrish & Amadudin (2006) does indeed resemble *B. tessaricarpa*, however, the photograph lacks detail and is indistinguishable from *B. handelii* var. *prostrata*. The determination as *B. tessaricarpa* has also been doubted by Morris (2009d). To confirm the delimitation and concept of *B. tessaricarpa*, further material from the type locality is needed, however, the exact location of this is unknown. The lack of an itinerary number suggests it was collected prior to 1837, when Griffith started using itinerary numbers for his collections. Griffith spent most of 1836 in Assam (referring to the whole region), and in his journal he mentions collecting 6 species of *Begonia* from the Mishmi Hills during November, and also mentions collecting *Begonia* in late February 1837 in the Patkai range.

***Begonia thomsonii* A.DC. [sect. *Platycentrum*]**

Fig. 60

Annales des Sciences Naturelles; Botanique, Sér. 4, 11: 135 (de Candolle 1859). – Type: India, Meghalaya, Khasia, *Hooker & Thomson 16* (lecto-: [K000761433](#), here designated; isolecto-: [B100365194](#)).

Begonia barbata Wall. ex A.DC., *Prodromus Systematis Naturalis Regni Vegetabilis* 15 (1): 348 (de Candolle 1864), syn. nov. – Type: India, Meghalaya, Sillet Hills, 1832, *Silva & Bruce* s.n., *Wallich Cat. No. 3679A* (lecto-: K-W, barcode [K000542893](#), here designated; isolecto-: B n.v., [BM001122246](#), G-DC).

Begonia barbata Wall., *A numerical list of dried specimens of plants in the East India Company's Museum*: 129, 3679 (Wallich 1831), nom. nud.

Citations in other publications

As *B. thomsonii*: de Candolle (1864: 349), Clarke (1879: 647), Clarke (1881: 119), Kanjilal (1938: 334), Fischer (1938: 98), Deb (1961: 285), Chauhan (2000: 427), Kumar (2002: 653), Kress *et al.* (2003: 172), Uddin (2007: 595), Hughes (2008: 132), Dash (2010: 41), Das *et al.* (2013: 236); as *B. barbata*: Clarke (1879: 646), Clarke (1881: 119), Clarke (1890: 25), Burkill (1924: 289), Fischer (1938: 97), Irmischer (1959: 191), Deb (1961: 285), Deb (1981: 268), Chauhan (1996: 174), Chauhan (2000: 424), Kress *et al.* (2003: 171), Khatun (2008: 9).

Other material

INDIA: **Arunachal-Pradesh**: Geku, *Choudhery 18642* (ARUN n.v.); Puak Camp, Nov. 1911–Mar. 1912, *Burkill 37637* (n.v.); *ibid.*, Nov. 1911–Mar. 1912, *Burkill 36130* (n.v.); Side River, 29 Nov. 1911–11 Mar. 1912, *Burkill 36080* (n.v.). **Assam**: Cachar, Jun. 1874, *Keenan* s.n. (K); *ibid.*, Oct. 1971, *Yandell 21* (K); *ibid.*, Dec. 1971, *Yandell 65* (K); Cachar, North Cachar Hills, May 1968, *Yandell 113* (K); *ibid.*,

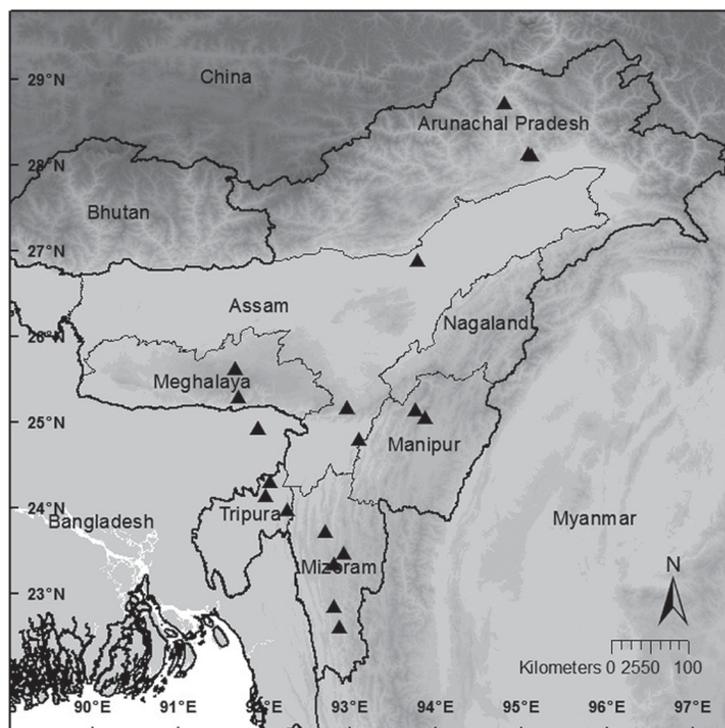


Fig. 60. Map showing the location of *B. thomsonii* A.DC. specimens.

May 1968, *Yandell 114* (K); *ibid.*, Oct. 1971, *Yandell 22* (K); *ibid.*, Oct 1971, *Yandell 23* (K); *ibid.*, Oct. 1971, *Yandell 24* (K); *ibid.*, Nov. 1971, *Yandell 48* (K); *ibid.*, Jan. 1972, *Yandell 311* (K); Lakhimpur District, Makum, 12 Apr. 1885, *Clarke 37809A* (BM). **Manipur:** Eerung River, 27 Nov. 1885, *Clarke 42192* (K); *ibid.*, *Clarke 42192B* (BM); Koupru, *Deb 1523* (CAL n.v.); Yhirighat, Nov. 1907, *Meebold 5792* (K) [cf. *B. thomsonii*]. **Meghalaya:** Khasi Hills, Cherrapunji, 13 Jun. 1850, *Hooker & Thomson 16* (syn [K000761431](#), P); Khasia, *Griffith 2576* (K); Jaspa Hill, 20 Jun. 1850, *Hooker & Thomson 16* (syn [K000761432](#)); Sillet Hills, 1832, *Wallich Cat. No. 3619* (BM). **Mizoram:** Lushai Hills, Aijal, Sep. 1927, *Parry 41* (K); Lushai Hills, Hmuntha, 5 Apr. 1951, *Chand 4386* (MICH); Lushai Hills, Sailem, 26 Aug. 1927, *Parry 250* (K) [cf. *B. thomsonii*]; *ibid.*, Jul. 1927, *Parry 40a* (K); Lushai Hills, Siletalong, Oct. 1926, *Parry 36* (K); Lushai Hills, Tingtal, Jan. 1927, *Parry 40c* (K); Lushai Hills, Zobawk, 5 Jul. 1927, *Parry 40b* (K) [cf. *B. thomsonii*]. **Tripura:** Kumarghat, *Deb 2570* (CAL n.v.); Tibruari, *Deb 1602* (CAL n.v.); Unokoti Hill, *Deb 1139* (CAL n.v.); Vanghmun, *Deb 29040* (CAL n.v.).

Description

Rhizomatous, sprawling, monoecious herb, 10–30 cm high. Rhizome: ca 10 mm, villose, internodes 8–12 mm long. Stem: slender, 2–4 mm wide, densely red villose, unbranching. Stipules: lanceolate, 9–20 × 2–6 mm, red villose, persistent. Leaves: petiole 4–14 cm long, densely red villose; lamina ovate to ovate-orbicular, basifixed, base cordate with lobes not overlapping, (3–)6–14 × (2–)4–10 cm, asymmetric, upper surface dark red to green, densely red strigose all over, underside green to purple, red strigose all over with longer hairs on veins, venation palmate, midrib (2–)4–12 cm long; margin entire with teeth at end of veins to denticulate, with long hairs; apex acute. Inflorescence: cymose, terminal and axillary, few; peduncle densely villose, branching twice, primary 1.5–3.5 cm long, secondary 3–5 mm long, with 2–4 female and 5–8 male flowers; bracts lanceolate, 7–8 × 2 mm, densely villose, persistent. Male flower: pedicel 8–15 mm long, red villose; tepals 4; outer tepals ovate to oblong-elliptic, 8–13 × 5–8 mm, pale pink to pink, red villose on reverse, margin entire, with hairs; inner tepals elliptic, 4–9 × 2–4 mm, pale pink to pink, glabrous; androecium with 35–70 stamens, symmetric; filaments 1–2 mm long, unequal, fused at base; anther oblong elliptic, 1–2 mm long, dehiscing through slits running nearly the entire length of the anther, not hooded, connective extended. Female flower: not seen; ovary 2-locular, placentae bifid; capsule obovoid-ellipsoid, villose, with one long triangular wing and two short crescent wings; styles caduceous. Fruit: recurved; capsule obovoid, 6–14 × 6–9 mm, sparsely villose; wings extending along the pedicel slightly, subequal; longest rounded triangle, 12–30 × 9–18 mm; shortest semi-circular, 2–10 × 8–15 mm.

Distribution and phenology

Northeast India; also in Bangladesh and Myanmar; 250–1800 m. Flowering: October to December; fruiting: November to January.

Conservation status

Least Concern. *Begonia thomsonii* has an AOO of 80 km² and an EOO of 178,250 km² with plenty of suitable habitat available. The species has been found in Bumphabum Forest, Moulling National Park, Khadimnagar National Park and near Muraichhara Eco Park, Blue Mountain National Park and Tawi Wildlife Sanctuary.

Remarks

No specimen was seen with both male and female flowers; however, there is no record of the species being dioecious. *Begonia thomsonii* is somewhat vegetatively similar to *B. scintillans* in the herbarium, which is a species with white hairs (not red) on the upper leaf surface and is in general a much smaller species. The inflorescences also differ, bearing only 2–3 flowers per peduncle in *B. scintillans* (see Fig. 55), unlike the clusters of 5–8 in *B. thomsonii*. *Begonia cathcartii* has similar red hairs, although sparser,

and is a larger plant, ca 30–60 cm high (not less than 30 cm), with longer inflorescences (ca 10 cm, not less than 4 cm). On some specimens of *B. thomsonii* the outer tepals have hairs on both sides (Hmuntha, *Chand 4386* (MICH), Lushai Hills, *Parry 40* (K) and Sillet Hills, *J.D.Hooker & Thomson s.n.* (K)).

Here we consider *B. barbata* Wall. ex A.DC (de Candolle 1864) to be a synonym of *B. thomsonii*, as the only differences are in the density of the indumentum, as noted by Irmscher (1959). *Begonia barbata* was previously considered a synonym of *B. annulata* (Kumar 2002); however, the lectotype chosen here is most definitely not that species. Clarke (1879) mentions the possibility of *B. barbata*, *B. griffithii* (= *B. annulata*) and *B. thomsonii* being conspecific, although here we consider *B. annulata* to be very distinct. *Begonia annulata* has a more broadly dentate leaf margin with a silver ring and rough hairs on the upper leaf surface compared to the plain leaves covered in dense soft red hairs in *B. thomsonii*.

The types for *B. barbata* (*Wallich Cat. No. 3679*) consist of several different collections, some of which have been identified as other species; [K001112054](#) is *B. hatacoa*; [K000761430](#) is a mixed sheet with the specimen in the top left with variegated leaves belonging to *B. scintillans*, whereas the rest is identified as *B. thomsonii*. Clarke (1879) noted this in his description of *B. barbata* and labelled them as *3679A* and *3679B*, the latter being identified as *B. hatacoa* (*B. rubroveina*). Here we decided to lectotypify using *Wallich Cat. No. 3679A* as this number is clearly marked on the sheet and the material matches the original description; this is on a mixed sheet with *B. hatacoa* (*3679B*).

Begonia wattii C.B.Clarke [sect. *Parvibegonia*]

Figs 61–62

Journal of the Linnean Society, Botany 25: 26 (Clarke 1890). – Type: India, Nagaland, Naga Hills, Nichuguard, 1885, *Clarke 40859* (lecto-: [K000761474](#), here designated; isolecto-: BM).

Citations in other publications

Fischer (1938: 98), Deb (1961: 285), Chauhan (2000: 427), Kumar (2002: 655), Uddin (2007: 595).

Other material

INDIA: **Manipur**: North Manipur, Moa, 27 Oct. 1880, *Clarke 41414A* (K); *ibid.*, 27 Oct. 1880, *Clarke 41414C* (BM); Haitook Mokeng, 25 Nov. 1885, *Clarke 42124* (K). **Mizoram**: Lawngtalai-Kawlwah, *Singh 92853* (n.v.). **Nagaland**: Cheswezumi, 24 Nov. 1935, *Ward 12543* (BM); Naga Hills, Kohima, 2 Sep. 1950, *Koelz 26212* (MICH); *ibid.*, 2 Sep. 1950, *Koelz 26231* (MICH); Naga Hills, Nichuguard, 17 Oct. 1885, *Clarke 40873* (syn K); *ibid.*, *Clarke 40873B* (BM); Naga Hills, Themoketsa, 19 Sep. 1955, *Bor 6176* (K).

Description

Tuberous, monoecious herb, up to 20 cm high. Stipules: lanceolate, ca 7 × 2 mm, villose, caduceus. Leaves: petiole 5–11 cm long, densely to sparsely pale villose; lamina ovate to broadly ovate, basifixed, base cordate with lobes not overlapping, 3–15.5 × 2–11.5 cm, slightly asymmetric, upper surface green, or green with red markings following the veins, strigose to hirsute all over, underside green with red about veins, villose all over, denser on main veins, venation palmate, midrib 2–14 cm long; margin denticulate with larger teeth at end of main veins, with long hairs; apex short acuminate. Inflorescence: cymose, terminal, few to many; peduncle sparsely pilose, branching 2–3 times, primary 3–7 cm, secondary 1–2 cm, tertiary 5–10 mm, with 2–4 female and 4–6 male flowers; bracts lanceolate, 3–4 × 1–2 mm, villose, margin entire, with long hairs, persistent. Male flower: pedicel 9–15 mm long, villose; tepals 4; outer tepals ovate to orbicular, 7–13 × 5–9 mm, white to pale pink, pilose on reverse, denser near base, margin finely denticulate to entire; inner tepals obovate, 6–10 × 4–6 mm, white to pale pink, glabrous;

androecium with 20–30 stamens, symmetric; filaments 0.5–1.5 mm long, unequal, fused at base into a short column; anther oblong-obovate to elliptic, 1 mm long, dehiscent through short slits near the tip, not hooded, connective not extended. Female flower: pedicel 4–12 mm long, densely pilose; bracteoles absent; tepals 5, equal, ovate, 7–9 × 4–6 mm, white to pink, sparsely pilose on reverse or glabrous, margin entire, inner tepals similar yet smaller and glabrous; ovary 2-locular, placentae bifid, capsule turbinate, 4–5 × 2–3 mm, sparsely pilose, with one long triangular wing and two very small oblong-triangular wings; styles 2, convoluted with ends twisted once, persistent. Fruit: pendulous; capsule narrowly ellipsoid to turbinate, 8–15 × 3–5 mm, sparsely pilose to glabrous; wings extending along the pedicel slightly, unequal, triangular; longest wing broad triangle, 9–20 × 8–14 mm; shortest wing oblong or triangular-oblong, 1–3 × 2–10 mm.

Distribution and phenology

Endemic to the hills bordering Northeast India and Myanmar; 150–1650 m. Flowering: September to October; fruiting: September to November.

Conservation status

Data Deficient. Due to habitat loss around Kohima more recent data is required for the distribution of *B. watti*. Data is also required on the distribution of this species in the Arakan Mountains.

Remarks

The peduncle can easily double in length between flowering and fruiting; due to this elongation it appears almost glabrous. The closest ally to *B. watti* in the study area is *B. brevicaulis*; see notes under that species for distinguishing characters. Due to the patterned leaves it could potentially be confused with *B. picta* but this species has larger fruit with longer denser hairs and outer tepals that have a serrated margin.

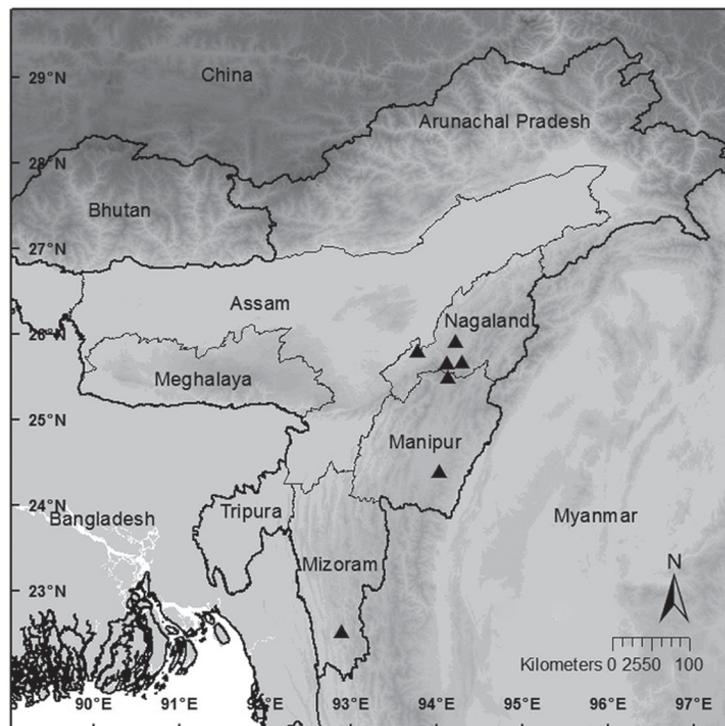


Fig. 61. Map showing the location of *B. watti* C.B. Clarke specimens.

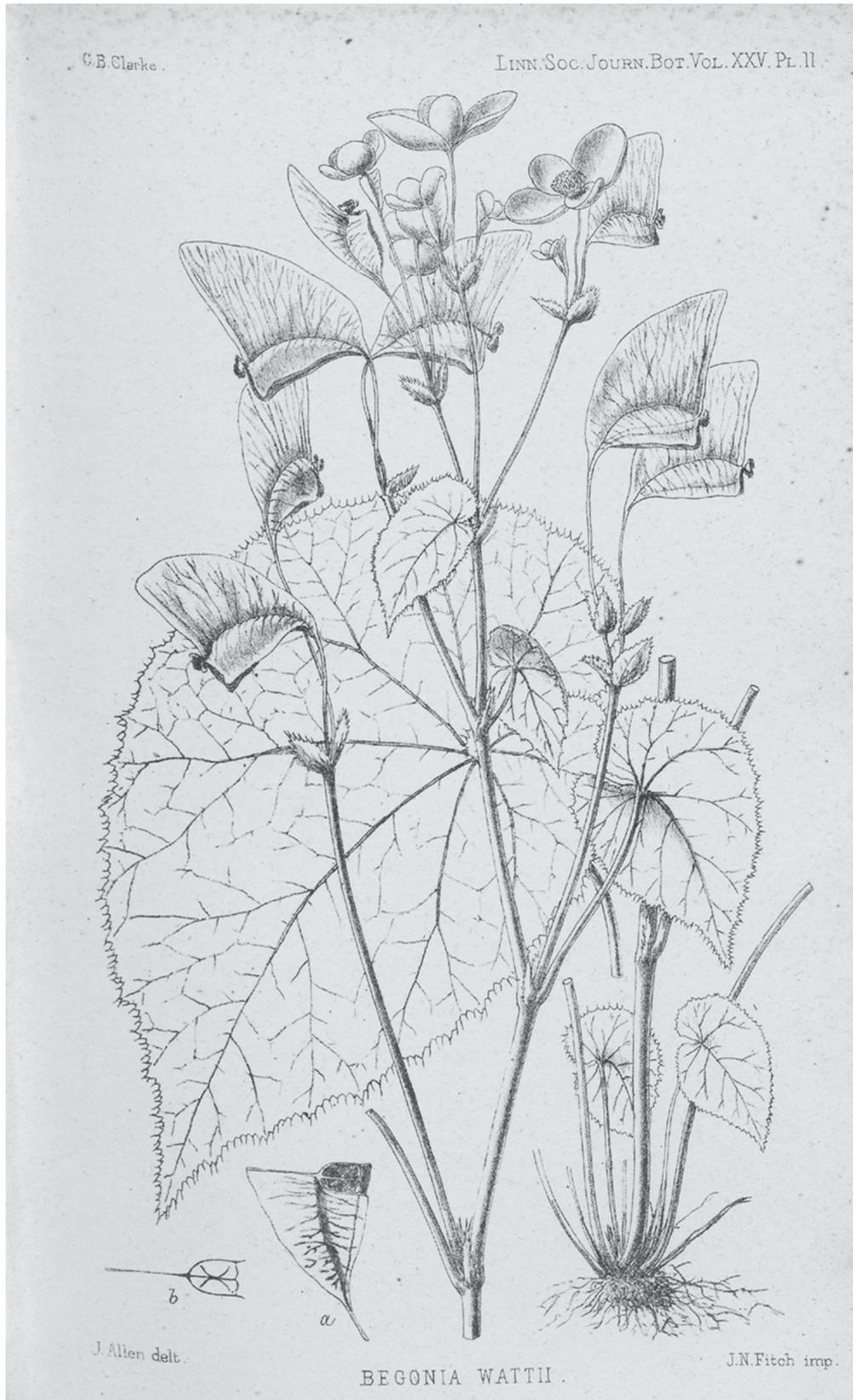


Fig. 62. Illustration of *B. wattii* C.B. Clarke by J. Allen (Clarke 1890). a. Fruit dissection. b. Diagram of fruit cross-section. Image courtesy of RBGE library and Lynsey Wilson.

Clarke 40859 was chosen as the lectotype as it has both flowers and fruit present on the specimen and the fruit resemble the drawing from the protologue (see Fig. 62).

Nichuguard is now part of the growing town Chumukedima near Dimapur and the type locality is most likely lost for this species.

Begonia wengeri C.E.C.Fisch. [sect. *Diploclinium*]
Figs 63, 64A

Bulletin of Miscellaneous Information, Kew 1932: 200 (Fischer 1932). – Type: India, Mizoram, Lungleh, Aug. 1831, *Wenger 324* (lecto-: [K000634614](#), here designated; isolecto-: [K000820109](#)).

Citations in other publications

Fischer (1938: 98), Uddin (2007: 595).

Description

Tuberous, erect, monoecious herb, 10–20 cm high. Stem: slender, 2–3 mm wide, red-brown tomentose, internodes 2–4 cm long. Stipules: lanceolate, 3–4 × 1–2 mm, sparsely tomentose, persistent. Leaves: petiole 1.5–4 cm long, tomentose; lamina ovate-orbicular, basifixed, base cordate with lobes not overlapping, 2–6.5 × 2–6 cm, slightly asymmetric, upper surface dark green, sparsely red hispid all over, underside green, red tomentose on veins only, venation palmate, midrib 1.5–5 cm long; margin crenate, with hairs; apex acute. Inflorescence: cyme to a raceme of cymes, axillary to terminal, few; peduncle red puberulous, branching 2–3 times, primary 9–14 mm long, secondary 3–6 mm long, tertiary 1–2 mm long, with 2–4 female and 4–6 male flowers per cyme; bracts ovate, 3–4 × 2 mm long, margin dentate, with hairs, persistent. Male flower: pedicel 3–8 mm long, red puberulous; tepals 4; outer tepals broadly obovate to ovate-orbicular, 3–4 × 3 mm, white, puberulous on reverse, margin entire; inner tepals oblanceolate, 2–3 × 1 mm, white, glabrous; androecium with 8–12 stamens, symmetric; filaments 0.2 mm long, subequal, fused at base into a short column; anther elliptic-globose to oblong, 1 mm long, dehiscing through short slits near the tip, not hooded, connective extended slightly. Female flower: pedicel 5 mm long, red puberulous; bracteoles present, 1–2, spaced from the ovary; tepals 6, equal, oblong elliptic to obovate, 2–4 × 1–2 mm, white, sparsely puberulous on reverse to glabrous, inner tepals similar yet smaller and glabrous; ovary 2-locular, capsule oblate 2 × 1 mm, tomentose, with one long oblong wing and two very small oblong wings; styles 2, shallowly forked once, caduceus. Fruit: pendulous; capsule oblate 4–6 × 2–3 mm, sparsely red puberulous to glabrous; wings extending along the pedicel, longest wing broad oblong, 6–8 × 8–10 mm; shortest wings broad oblong, 4–3 × 9–6 mm.

Distribution and phenology

Endemic to the hills about Lungleh; 450–650 m. Flowering and fruiting: around August.

Conservation status

Data Deficient. Known only from the type collection, near to one of the main roads through Mizoram.

Remarks

Begonia wengeri is known only from the type collection, but has distinct fruit which distinguish it from the vegetatively similar *B. surculigera* Kurz (Kurz 1871) from Myanmar, which has been considered synonymous by some authors (Kumar 2002; Dash 2010). However the fruits are very different (Fig. 64); those of *B. surculigera* have wings that are small, rounded and extended basally, whereas *B. wengeri* has fruit almost twice the size with wings that are apically broader and oblong. Both species have cordate leaves but those of *B. wengeri* have scattered red hairs on the upper surface (as well on pedicels, tepals

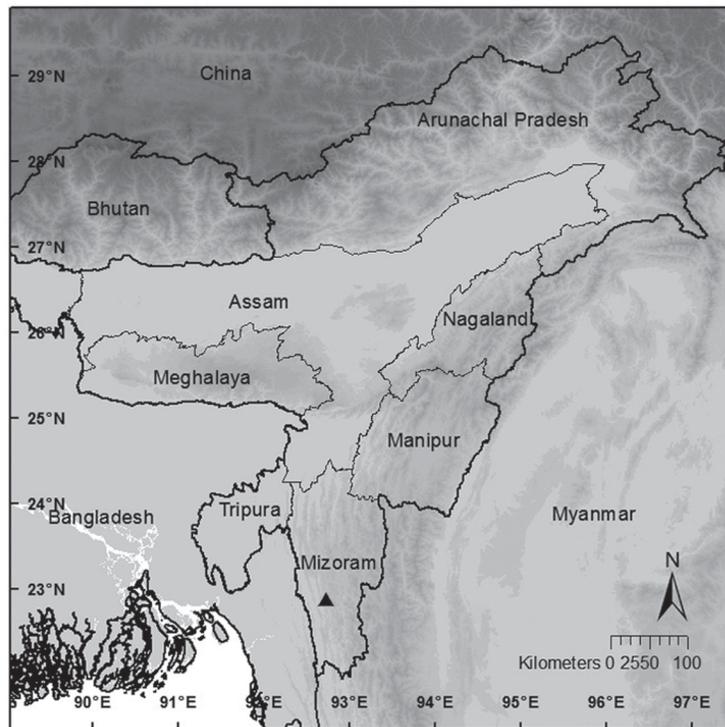


Fig. 63. Map showing the location of *B. wengeri* C.E.C.Fisch. specimens.

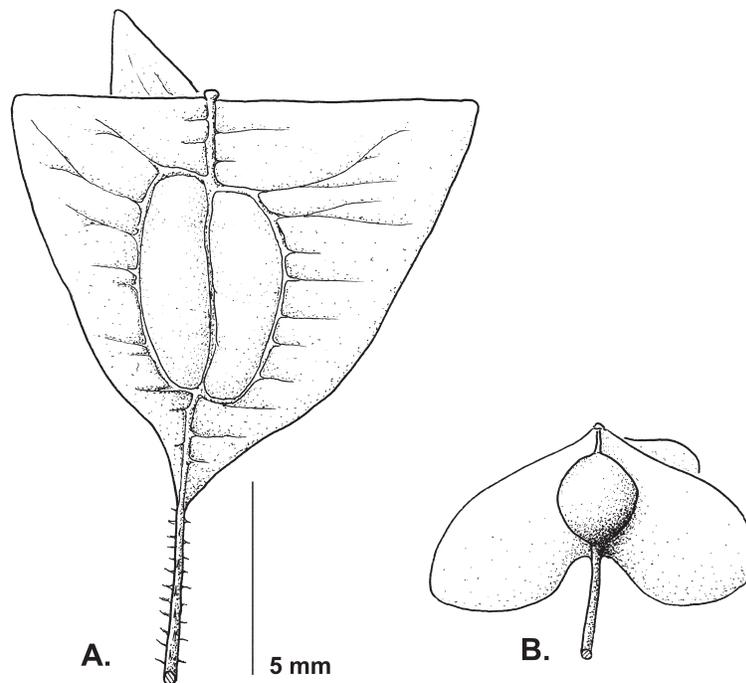


Fig. 64. Mature fruit from the types of **A.** *B. wengeri* C.E.C.Fisch. **B.** *B. surculigera*. Drawn by Rebecca Camfield. A from *Wenger 324* (K); B from *Kurz s.n.* (K000761405).

and ovary) with a hairy, crenate margin. *Begonia surculigera* has glabrous leaves (and flowers) with an entire margin. The stamens also differ with *B. surculigera* having 8 anthers which are obovate with a connective that is barely extended, whereas *B. wengeri* has up to 12 anthers that are narrowly oblong with a conical extended connective.

Begonia wengeri shares a terminal racemose inflorescence with the allied *B. lushaiensis* and *B. pedunculosa*, however, the three are easily distinguishable based on leaf shape.

***Begonia xanthina* Hook. [sect. *Platycentrum*]**

Figs 65–66

Botanical Magazine 78: tab. 4683 (Hooker 1852). – Type: Cultivated collection, 1852, *Nuttall* s.n. (lecto-: [K000739937](#), here designated). Cultivated at Rainhill, near Preston, from vegetative material collected in the wild from Bhutan in 1850 by *Booth*.

Begonia xanthina var. *lazuli* Hook., *Botanical Magazine* 85: tab. 5107 (Hooker 1859). – *Begonia lazuli* Linden, *La Belgique Horticole* 8: 166 (Linden 1858), nom. nud. – *Begonia lazuli* Linden & C.Koch ex K.Koch, *Wochenschrift für Gärtnerei und Pflanzenkunde* 1: 339 (Koch 1858). – Type: Hooker (1859) tab. 5107 [illustration].

Begonia xanthina var. *pictifolia* Hook., *Botanical Magazine* 85: tab. 5102 (Hooker 1859). – Type: Hooker (1859) tab. 5102 [illustration].

Begonia poecila C.Koch ex K.Koch, *Wochenschrift für Gärtnerei und Pflanzenkunde* 1: 338 (Koch 1858). – Type: unknown.

Citations in other publications

As *B. xanthina*: Koch (1858: 340), Clarke (1879: 644), Clarke (1881: 119), Grierson (1991: 245), Gu *et al.* (2007: 204), Uddin (2007: 595), Dash (2010: 41).

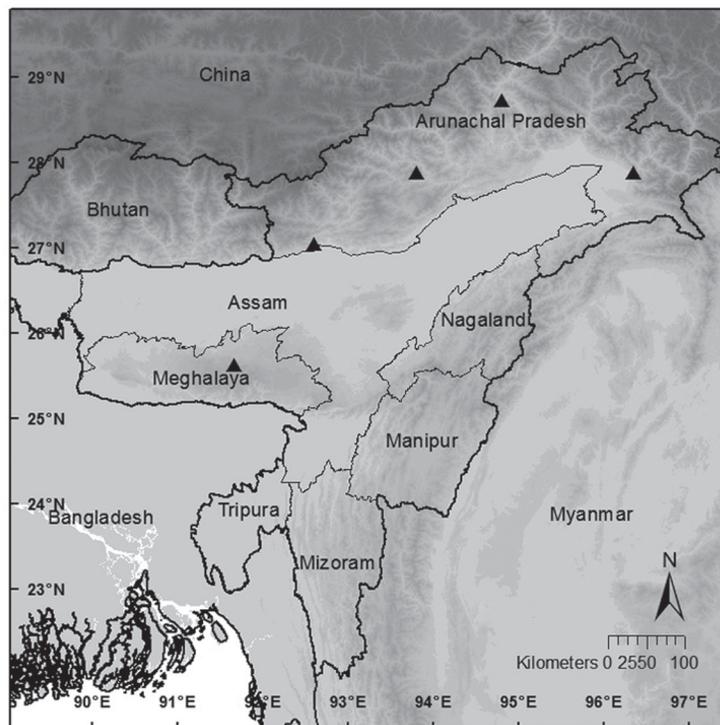


Fig. 65. Map showing the location of *B. xanthina* Hook. specimens.

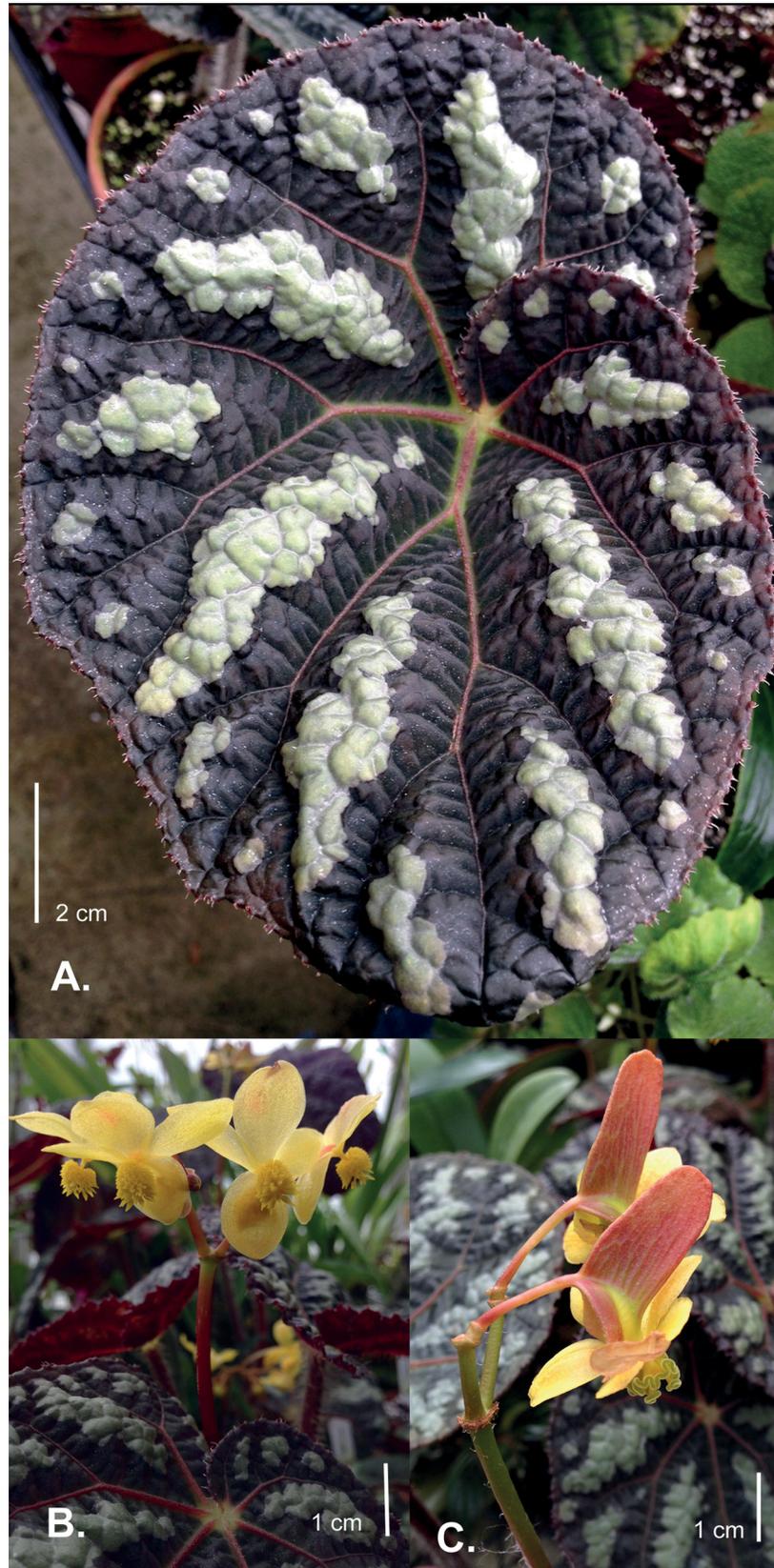


Fig. 66. *Begonia xanthina* Hook. **A.** Dark leaf form. **B.** Male flowers. **C.** Female flowers. Photographs courtesy of Darrin Norton of a plant in cultivation in a private collection.

Other material

INDIA: **Arunachal-Pradesh**: Bhalukpong, Jul. 1970, *Yandell 116* (K); Geku, *Choudhery 16395* (ARUN n.v.); Lohit Valley, 17 Feb. 1950, *Ward 19163* (BM) [aff. *B. xanthina*]; Mirir Hills, Jan. 1973, *Yandell 225* (K); Mishmi Hills, 1862–1863, *Griffith 2591* (K). **Meghalaya**: Khasi Hills, Nov. 1886, *Mann s.n.* (K).

Description

Rhizomatous, monoecious herb, 30–60 cm high. Rhizome: 15–20 mm wide, pilose. Stipules: lanceolate, 15–20 × 8–10 mm, puberulous on midrib, caduceous. Leaves: petiole 12–25 cm long, pilose to villose; lamina ovate to broadly ovate, broadly bullate, basifixed, base cordate with lobes not overlapping, 14–21 × 10–14 cm, slightly asymmetric to asymmetric, upper surface dark green with white/pale green spots between veins, or dark green without spots, sometimes with blue iridescence, glabrous or very sparsely pilose, underside dark red/purple, with or without metallic blue shine, pilose all over, denser on main veins, venation palmate, midrib 10–15 cm long; margin entire to undulate, with sparse hairs; apex acute. Inflorescence: cymose, terminal, few; peduncle glabrous, branching 2–3 times, primary 13–19 cm, secondary 1–5 cm, tertiary 3–6 mm, with 2–4 female and 4–6 male flowers; bracts ovate, 20–22 × 18–20 mm, glabrous. Male flower: pedicel 35 mm long, glabrous; tepals 4; outer tepals 10–12 × 5 mm, yellow, puberulous on reverse, entire; inner tepals ovate, 7–12 × 4–6 mm, yellow, glabrous; androecium with 80–160 stamens, symmetric; filaments 1 mm long, fused at base into a short column; anther oblong, 1 mm long, dehiscing through slits about half the length of the anther, connective extended, acuminate on apical stamens. Female flower: pedicel 15–30 mm long, glabrous, bracteoles absent; tepals 5, equal, obovate, outer tepals 16–20 × 7–11 mm, yellow, puberulous on reverse to glabrous, inner tepals similar yet smaller; ovary 2-locular, placentae bifid, ellipsoid, with one long triangular wing and two short crescent wings, glabrous, styles 2, forked once and twisted twice, deciduous. Fruit: recurved; capsule ovate-triangular, 15 × 7–9 mm, glabrous; wings extending along the pedicel slightly, subequal; longest rounded triangle, 20–23 × 10–14 mm; shortest semi-circular, 4–6 × 11–14 mm.

Distribution and phenology

Arunachal-Pradesh and Meghalaya; also in China, Nepal, Sikkim, West Bengal and Bhutan; 600–1800 m. Flowering: June to September; fruiting: June to October.

Conservation status

Least Concern. *Begonia xanthina* is found throughout the Eastern Himalayas and into China where there is plenty of suitable habitat. This species has been found in Pakke Tiger Reserve of Bhutan and near the Moulling National Park of Arunachal-Pradesh.

Remarks

The stamens have distinctive very long connectives and are arranged in a cylindrical androecium. The description for the female flowers was augmented using Peng & Leong (2006). The only other yellow flowered *Begonia* in the study areas is *B. flaviflora* which has deeply lobed leaves. The leaves can appear similar to *B. iridescens* (which has pink flowers) as they share white markings on the upper surface and a blue iridescence, but *B. iridescens* has a more rounded leaf lamina with denser hairs on the veins and shorter petioles.

There are two varieties listed by Hooker (1859) which are no longer recognised; var. *pictifolia* having white spots/stripes on the surface of leaves and var. *lazuli* with a blue iridescence. Specimens can also gain a metallic blue shimmer on the underside of their leaves upon drying as seen in *Yandall 225*, even though that was noted as being dark red when collected. *Begonia lazuli* was described from living plants

grown by Linden so no type specimen exists, thus the drawing of *B. xanthina* var. *lazuli* in the Botanical Magazine becomes the type.

The two Koch names *B. poecila* and *B. lazuli* have no type specimens mentioned in the protologues and the descriptions were most likely based on cultivated living material. *Begonia* × *marmorea* Van Houtte ex Planch. (Planch 1854) is *B. xanthina* × *B. rubroveinia* (*B. hatacoa*), erroneously considered a synonym (Govaerts 1996). The type for this hybrid is the colour plate included in Planch (1854), which lacks the yellow flowers of *B. xanthina*.

Species likely to occur in Northeast India

***Begonia limprichtii* Irmsch. [sect. *Platycentrum*]**

Repertorium Specierum Novarum Regni Vegetabilis. Centralblatt für Sammlung und Veröffentlichung von Einzeldiagnosen neuer Pflanzen. Beihefte 12: 440 (Irmscher 1922). – Type: China, Sichuan [Szetschwan], 31 May 1914, *Limpricht 1535* (holo-: WRSL n.v.; iso-: WU0038811).

Citation in other publications

Morris (2010b: 214).

Description

This species is characterized by very long sparse hairs/bristles on the top of its leaves. It is somewhat similar to *B. thomsonii* as both are very hairy plants but *B. limprichtii* has a more dentate leaf margin and longer sparser hairs on the upper surface. The species is not included above as no herbarium specimens have been seen, however, photographs from East and West Siang, Arunachal-Pradesh (Morris 2010b) are potential records for the study area.

***Begonia longialata* K.Y.Guan & D.K.Tian [sect. *Platycentrum*]**

Acta Botanica Yunnanica 22: 132 (Guan & Tian 2000). – Type: China, Yunnan, Gengma Xian, *Tian 98201* (holo-: KUN n.v.).

Citation in other publications

Gu *et al.* (2007: 182).

Description

A lacerate-leaved *Begonia* which has a main stem, triangular lobes to the leaf blade and fruit with a main wing that is 4–5 cm long. *Begonia longialata* is reported by Gu *et al.* (2007) as endemic to Yunnan, however, photographs have been taken in Manipur, on route to Khayang from Ukhrul (Macer 2013) of a caulescent plant with lacerate leaves which could potentially represent this species in our study region; no herbarium material has been seen.

***Begonia rubella* Buch.-Ham. ex D.Don [sect. *Diploclinium*]**

Prodromus Florae Nepalensis: 223 (Don 1825). – Type: Nepal, 10 Sep. 1802, *Buchanan-Hamilton* s.n. (holo-: [BM000521517](#)).

Description

This species is similar to *B. dioica*, and both species can be found in the neighbouring countries of Nepal and Myanmar. They are similar vegetatively but *B. rubella* has much smaller flowers that are similar in size to those of *B. ovatifolia*.

Doubtful and excluded species

Begonia khasiana C.B. Clarke [sect. *Diploclinium*]

Flora of British India 2: 656 (Clarke 1879). – Type: India: Maghalaya, Khasia mountains, Wallich *Cat. No.* 3672 B (holo-: [K001110763](#)).

Citation in other publications

Uddin (2007: 594).

Taxonomic remarks

Begonia khasiana is only known from its type collection from Sillet (Clarke mentions both Sillet and Khasia in the protologue) or HBC (Hortus Botanic Calcutta) the specimen actually has both on it. The plants at first glance resemble *B. pedunculosa* but differ by having more membranous leaves, axillary inflorescences that do not branch as much and much smaller flowers and fruit, and the male flowers seemingly have only two tepals. Clarke published the species under ‘doubtful and excluded species’ as without more specimens to clarify the species the specimens could pass as an impoverished specimen of *B. pedunculosa*.

Begonia macrotoma Irmsch. [sect. *Platycentrum*]

Table 1

Notes from the Royal Botanic Gardens Edinburgh 21: 41 (Irmscher 1951). – Type: China: Yunnan, Mianning, Hsiao-kuan-shan, in ravine near stream, 2350 m, 29 Sep. 1938, *T.T. Yü* 7778 (HT n.v., KUN n.v.).

Citation in other publications

Gu *et al.* (2007: 185).

Taxonomic remarks

The *Flora of China* (Gu *et al.* 2007) records this species as present in Northeast India but we have seen no specimens to confirm this. The origin of the record is not known, but this species could easily be confused with other lacerated leaved species such as *B. koelzii* and *B. shilendrae*.

Begonia orchidiflora Griff. [sect. *unknown*]

Posthumous Papers bequeathed to the Honorable, the East India Company, and printed by order of the government of Bengal. Vol. 2: 38 (Griffith 1848). – Type: India: Assam, Khasia mountains, Mamloo (1837) *Griffith* 627 (n.v.).

Taxonomic remarks

The type locality of Mamloo (Mawmluh) of this species is in the study area but the type or any other specimens could not be located, and the description is too brief to permit accurate application of the name. The flowers of *B. labordei* and allied species in sect. *Diploclinium* have a slight asymmetry and

hence a passing resemblance to the outline of an orchid flower. It is important to note that the itinerary number given in the protologue (627) will differ to the East Indian Company's Herbarium number, usually listed or cited with Griffith specimens.

***Begonia surculigera* Kurz [sect. *Diploclinium*]**

Fig. 64B

Flora oder Botanische Zeitung 54: 296 (Kurz 1871). – Type: Myanmar: Arracan district, hills opposite Akyab (Oct. 1869) Kurz s.n. (holo-: [K000761405](#); iso-: [K000761404](#)).

Citation in other publications

Deb (1981: 269); Kumar (2002: 652); Uddin (2007: 595).

Material cited

INDIA: **Mizoram**: Sairang road, *Godfrey 503* (CAL n.v.). **Tripura**: Unokoti Hill, *Deb 2597* (CAL n.v.).

Taxonomic remarks

The type is from Myanmar from sandstone hills opposite 'Akyab' (now Sittwe) which is on the coast, on terrain unlike that of the Mizoram and Tripura localities. The two specimens in the Calcutta herbarium from the study area have not been verified by the authors. This species is similar to *B. wengeri* but differs by having descending wings on its fruit, which are shown nicely in Clarke (1881). It is possible the two specimens listed are in fact *B. wengeri* as they are very similar looking without fruit or flowers to help distinguish – see under *B. wengeri* for more information.

***Begonia trichocarpa* Dalzell [sect. *Reichenheimia*]**

Hooker's Journal of Botany and Kew Garden Miscellany 3: 230 (Dalzell 1851). – Type: India: Bombay, Dalzell s.n. (iso-: [K000761461](#)).

Citation in other publications

Dash (2010: 41).

Material cited

INDIA: **Arunachal-Pradesh**: Lee to Purchi village, *Dash 31492* (ARUN n.v.).

Taxonomic remarks

This species is native to Southern India, near Bombay and its occurrence in Northeast India is unlikely.

Discussion

This study confirms the presence of 38 species of *Begonia* in Northeast India, 16 belonging to section *Platycentrum*, 10 to sect. *Diploclinium*, 8 to sect. *Sphenanthera* and 2 each to sect. *Monopteron* and sect. *Parvibegonia*. Given the narrow endemism seen in many *Begonia* species this figure should be taken as a baseline which is likely to rise if collections are made available from areas of suitable habitat that lack any current records (Fig 1). In particular the Arakan mountains that pass through Nagaland, Manipur and Mizoram appear to represent ideal habitat and it would not be surprising to find new species in the valleys of these mountains.

Nearly three-quarters of the species are assessed as belonging to the IUCN conservation category of Least Concern (28 species), due to their range being in areas which are currently under forest cover and not undergoing decline. This is particularly the case with species found in the rugged topography of Arunachal-Pradesh. About one quarter (10 species) are in the Data Deficient category, due to lack of recent collections from the region which are needed to provide information on the current status of species in areas which are not pristine.

Das *et al.* (2013) mention how the flora of the Northeast region of India is under threat of being lost before it is even discovered. The study here may appear to suggest otherwise, however, it is the DD species that are also the ones that could be critically endangered. Further work is urgently needed by local botanists to fully understand the diversity and conservation status of the Northeast Indian *Begonia* flora.

Acknowledgements

The authors thanks the herbaria BM, E, K and MICH for loans of specimens used in this account or for allowing access to their collections, and B and CLEMS for providing photographs of specimens. We are grateful to Aaron Matsumoto, Nick Macer, Earl I-Lan, John Boggan and Darrin Norton for providing photographs of living plants, to Lynsey Wilson for photography of historical prints, to Louise Olley for guidance on the botanical drawings, to Claire Banks, Heather Raeburn and the Eve Bennett Trust for the illustrations, to Graham Hardy for locating literature and to Connie Baak, Natacha Beau and Alejandro Quintanar the desk editors for the manuscript. The research for this publication was carried out at the Royal Botanic Garden Edinburgh, supported by the Scottish Government's Rural and Environment Science and Analytical Services Division.

References

- Agardh C.A. 1824. *Aphorismi Botanici*. Literis Berlingianis, Lundae [Lund].
<https://doi.org/10.5962/bhl.title.44857>
- Agardh C.A., Holmberg L.P. & Lundstrom P.M. 1825. *Classes Plantarum*. Literis Berlingianis, Lundae [Lund]. <https://doi.org/10.5962/bhl.title.7657>
- Ambrish K. & Amadudin M. 2006. Rediscovery of an endemic and endangered plant (*B. tessaricarpa*) from Arunachal-Pradesh, India, after a century. *Current Science* 91 (8): 997–998. Available from <http://www.iisc.ernet.in/~currsci/oct252006/997.pdf> [accessed Jun. 2009].
- Bachman S., Moat J., Hill A.W., Torre J. de la & Scott B. 2011. Supporting red list threat assessments with GeoCAT: Geospatial conservation assessment tool. *ZooKeys* 150: 117–126.
<https://doi.org/10.3897/zookeys.150.2109>
- Baruah M.K. & Choudhury M.D. 2014. Addition to the Flora of Barak Valley of Assam, India. *Pleione* 8 (1): 37–48.
- Beentje H.J. 2010. *The Kew Plant Glossary: An Illustrated Dictionary of Plant Terms*. Royal Botanic Gardens Kew, Surrey.
- Bentham G. 1852. Florula Hongkongensis: an enumeration of the plants collected in the island of Hong-Kong, by Major J.G. Champion, 95th regiment; the determination revised and the new species described by George Bentham, Esq. *Hooker's journal of botany and Kew Garden miscellany* 4: 116–123. Available from <http://biodiversitylibrary.org/page/786773> [accessed May 2009].

- Blume C.L. 1823. *Catalogus van eenige der merkwaardigste zoo in-als uit-heemsche gewassen, te vinden in 's lands plantentuin te Buitenzorg*. Batavia. Available from https://books.google.nl/books?id=fyxTAAAcAAJ&printsec=frontcover&hl=nl&source=gb_s_ge_summary_r&cad=0#v=onepage&q&f=false [accessed May 2009].
- Blume C.L. 1827. Enumeratio Plantarum Javae et insularum adjacentium 1: 97. Lugduni Batavorum, Apud J.W. van Leeuwen. Available from <https://biodiversitylibrary.org/page/31162912> [accessed May 2009].
- Burkill I.H. 1910. Notes from a journey to Nepal. *Records of the Botanical Survey India* 4 (4): 59–140. Available from <https://biodiversitylibrary.org/page/53526769> [accessed Jun. 2009].
- Burkill I.H. 1924. Botany of the Abor Expedition. *Records of the Botanical Survey of India* 10: 1–420.
- Candolle A.L.P.P. de. 1859. Memoire sur la famille des Begoniaceae. *Annales des sciences naturelles. Botanique* 4 (11): 93–149. Available from <http://biodiversitylibrary.org/page/41585740> [accessed May 2009].
- Candolle A.L.P.P. de. 1864. Begoniaceae. In: Candolle A.L.P.P. de (ed.) *Prodromus systematis naturalis regni vegetabilis*. Vol. 15 (1): 266–408.
- Chauhan A.S. 1996. Begoniaceae. In: Hajra P.K. (ed.) *Flora of Namdapha, Arunachal-Pradesh*: 174–176. Botanical Survey of India, Calcutta.
- Chauhan A.S. 2000. Begoniaceae. In: Singh N.P, Chauhan A.S. & Mondal M.S. (eds) *Flora of Manipur*: 424–429. Botanical Survey of India, Calcutta.
- Chun W.Y. & Chun F. 1939. Notes on *Begonia*. *Sunyatsenia* 4: 20–25.
- Clarke C.B. 1879. Begoniaceae. In: Hooker J.D. (ed.) *Flora of British India* 2: 636–656. London.
- Clarke C.B. 1881. On Indian Begonias. *Journal of the Linnean Society, Botany* 18: 114–122, pl. 1–3. Available from <http://biodiversitylibrary.org/page/230642> [accessed May 2009].
- Clarke C.B. 1890. On the plants of Kohima and Muneypore. *Journal of the Linnean Society, Botany* 25: 1–107. Available from <http://biodiversitylibrary.org/page/180617> [accessed May 2009].
- Craib W.G. 1912. Contributions to the Flora of Siam. *Bulletin of Miscellaneous Information, Kew* 1912: 144–154. Available from <http://biodiversitylibrary.org/page/11630094> [accessed Jun. 2009].
- Craib W.G. 1931. Florae siamensis enumeratio: a list of the plants known from Siam, with records of their occurrence 1: 772. Bangkok Time Press, Bangkok.
- Dalzell N.A. 1851. Contributions to the botany of Western India. *Hooker's Journal of Botany and Kew Garden Miscellany* 3: 230. Available from <http://biodiversitylibrary.org/page/781044> [accessed Jun. 2009].
- Das P.S., Choudhury M.D. & Dutta B.K. 2013. *The Flora of Barak Valley, Assam* 1: 235–236. Regency Publications, New Delhi.
- Dash S.S. 2010. Native species of *Begonia* L. (Begoniaceae) in Arunachal-Pradesh-diversity and distribution. *Bulletin of Arunachal Forest Research* 26: 29–43.
- Dash S.S. & Mao A.A. 2011. Distribution of six little known plant species from Arunachal-Pradesh, India. *Journal of Threatened Taxa* 3 (9): 2095–2099. <https://doi.org/10.11609/jott.o2688.2095-9>
- Deb D.B. 1961. Dicotyledonous plants of Manipur Territory. *Bulletin of the Botanical Survey of India* 3 (3): 253–350.
- Deb B. 1981. Begoniaceae. In: Deb B. *The Flora of Tripura State* 1: 267–270. Eskay Printers, New Delhi.

- Deka S., Borah M. & Kakaty S.C. 2009. Distributions of annual maximum rainfall series of North-East India. *European Water* 27/28: 3–14. Available from http://www.ewra.net/ew/pdf/EW_2009_27-28_01.pdf [accessed Sep. 2011].
- Diels L. 1912. Plantae Chinenses Forrestianae: New and imperfectly known species. *Notes of the Royal Botanic Gardens Edinburgh* 5 (25): 161–304. Available from <https://biodiversitylibrary.org/page/30822419> [accessed Jun. 2009].
- Don D. 1825. *Prodromus florum Nepalensis*. London. <https://doi.org/10.5962/bhl.title.86>
- Dunn S.T. 1920. Decades Kewensis: Plantarum Novarum in Herbario Horti Regii Conservatarum. Decas XCVI. *Bulletin of Miscellaneous Information, Kew* 1920: 108–111. Available from <http://biodiversitylibrary.org/page/11269649> [accessed May 2009].
- Fischer C.E.C. 1928. Decades Kewenses: Plantarum Novarum in Herbario Horti Regii Conservatarum. Decas CXXI. *Bulletin of Miscellaneous Information, Kew* 1928 (7): 272–277. Available from <http://www.jstor.org/stable/4107084> [accessed May 2009].
- Fischer C.E.C. 1932. Plants new to Assam IV. *Bulletin of Miscellaneous Information, Kew* 1932 (4): 198–203. Available from <http://www.jstor.org/stable/4118529> [accessed May 2009].
- Fischer C.E.C. 1938. The Flora of the Lushai Hills. *Records of the Botanical Survey of India* 12: 75–162.
- Gagnepain F. 1921. Begoniaceae. In: Gagnepain F., Humbert H. & Lecomte H. *Flore générale de l'Indo-Chine* 2: 1107. Masson, Paris. Available from <https://biodiversitylibrary.org/page/31329603> [accessed Jun. 2009].
- Ghazanfar S. & Aziz P. 1976. Begoniaceae In: Nasir E. & Ali S.I. *Flora of West Pakistan* 96: 1–4. University of Karachi, Pakistan.
- Golding J. 1978. *Begonia* nomenclature notes 2: the *Begonia* in Wallich's Numerical List. *Phytologia* 40: 7–20. Available from <https://biodiversitylibrary.org/page/12942269> [accessed Jul. 2009].
- Golding J. 2009. Designation of the type for *Begonia sikkimensis* A.DC. var. *kamengensis* Rekha Morris, P.D. McMillan & Golding. *The Begonian* 76: 33.
- Golding J. & Karegeannes C. 1984. *Begonia* nomenclature Notes, 7. *Phytologia* 54 (7): 493–499. Available from <http://www.biodiversitylibrary.org/page/12978493#page/513/mode/1up> [accessed Jun. 2009].
- Govaerts R. 1996. *World Checklist of Seed Plants* 2: 290. Continental Publishing, Deurne.
- Grierson A.J.C. 1991. Begoniaceae. In: Grierson A.J.C. & Long D.J. *Flora of Bhutan* 2: 237–246. Royal Botanic Gardens Edinburgh, Edinburgh.
- Griffith W. 1848. Itinerary notes of plants collected in the Khasyah and Bootan Mountains 1837–38 in Afghanistan and neighbouring countries 1839–1841. In: M'Clelland J. (ed.) *Posthumous Papers bequeathed to the Honorable, the East India Company, and printed by order of the government of Bengal*. Vol. 2. J.F. Bellamy, Calcutta. <https://doi.org/10.5962/bhl.title.70351>
- Gu C., Peng C.-I & Turland N.J. 2007. Begoniaceae. In: Wu Z.Y., Raven P.H. & Hong D.Y. (eds) *Flora of China* 13: 153–207. Missouri Botanical Garden Press, Missouri.
- Guan K.Y. & Tian D.K. 2000. Three new species of *Begonia* from Yunnan. *Acta Botanica Yunnanica* 22 (2): 129–134.
- Haines H.H. 1925. The botany of Bihar and Orissa: 400. Adlard, London.
- Handel-Mazzetti H.F. von 1931. *Symbolae Sinicae* 3: *botanische Ergebnisse der Expedition der Akademie der Wissenschaften in Wein nach Sudwest-China, 1914–1918*: 385. Springer, Wein.

- Hara H. 1966. *The Flora of Eastern Himalaya*: 214. University of Tokyo Press, Tokyo.
- Hara H. 1970. New or noteworthy flowering plants from Eastern Himalaya (8). *Journal of Japanese Botany* 45: 91–92.
- Hara H. 1971. *The Flora of Eastern Himalaya; 2nd Report* 1: 84. University of Tokyo Press, Tokyo.
- Hara H. 1972. New or noteworthy flowering plants from Eastern Himalaya (10). *Journal of Japanese Botany* 47: 137–143. Available from http://www.jjbotany.com/pdf/JJB_047_137_143.pdf [accessed May 2009].
- Hara H. 1975. *The Flora of Eastern Himalaya; 3rd Report* 3: 85. University of Tokyo Press, Tokyo.
- Hara H., Williams T.S. & Williams L.H.J. 1979. *An enumeration of the flowering plants of Nepal* 2: 181–182. British Museum (Natural History), London.
- Hasskarl J.C. 1856. Brief van den heer Hasskarl, aan den secretaris der natuurkundige afdeeling van de Koninklijke Akademie van Wetenschappen te Amsterdam. *Verslagen en mededeelingen der Koninklijke Akademie van Wetenschappen* 4: 135–141. Available from <http://biodiversitylibrary.org/page/16184220> [accessed Jun. 2009].
- Ho P.H. 1991. *An illustrated Flora of Vietnam* 1 (2): 733. Phamhoàng Ho, Santa Ana, California.
- Hooker J.D. 1852. *Begonia xanthina*. *Curtis's Botanical Magazine* 78: tab. 4683. Available from <http://biodiversitylibrary.org/page/467300> [accessed Jun. 2009].
- Hooker J.D. 1854. *Himalayan journals, or Notes of a Naturalist, in Bengal, the Sikkim and Nepal Himalayas, Khasia Mountains, &c.* John Murray, London.
- Hooker J.D. 1855. *Illustrations of Himalayan plants: chiefly selected from drawings made for the late J.F. Cathcart, Esq. re of the Bengal Civil Service / the descriptions and analyses by J.D. Hooker; the plates executed by W.H. Fitch.* Reeve, London. <https://doi.org/10.5962/bhl.title.355>
- Hooker J.D. 1857. *Begonia griffithii*. *Curtis's Botanical Magazine* 83: tab. 4984. Available from <http://biodiversitylibrary.org/page/438601> [accessed May 2009].
- Hooker J.D. 1884. *Begonia beddomei*. *Curtis's Botanical Magazine* 110: tab. 6767. Available from <http://biodiversitylibrary.org/page/437229> [accessed May 2009].
- Hooker W.J. 1830. *Begonia picta*. *Curtis's Botanical Magazine* 57: tab. 2962. Available from <https://biodiversitylibrary.org/page/494871> [accessed May 2009].
- Hooker W.J. 1859. *Begonia xanthina* var. *lazuli*. *Curtis's Botanical Magazine* 85: tab. 5107. Available from <https://biodiversitylibrary.org/page/435630> [accessed May 2009].
- Huang S.H. & Shui Y.M. 1994. New taxa of *Begonia* from Yunnan. *Acta Botanica Yunnanica* 16 (4): 333–342.
- Hughes M. 2008. *An annotated checklist of Southeast Asian Begonia*. Royal Botanic Garden Edinburgh.
- Hughes M. & Girmansyah D. 2011. A revision of *Begonia* sect. *Sphenanthera* (Hassk.) Warb. (Begoniaceae) from Sumatra. *Garden's Bulletin Singapore* 62 (2): 239–251. Available from <https://www.biodiversitylibrary.org/page/43635271> [accessed Sep. 2012].
- Hughes M., Moonlight P., Jara A. & Pullan M. 2015. *Begonia Resource Centre*. Available from <http://padme.rbge.org.uk/begonia/> [accessed 24 Mar. 2016].
- Hynniewta T.M. 1994. Botany of Mt. Saramati and its environs. *Bulletin of the Botanical Survey of India* 36: 178–188.

- IMD 2010. Monthly mean maximum & minimum temperature and total rainfall based upon 1901–2000 data. India Meteorological Department.
- Irmscher E. 1921. *Plantae novae sinenses, diagnosibus brevibus descriptae a Dr. Henry Handel-Mazzetti. Anzeiger der Akademie der Wissenschaften in Wien. Mathematische-naturwissenschaftliche Klasse* 58: 24–27. Available from <http://biodiversitylibrary.org/page/27808647> [accessed May 2009].
- Irmscher E. 1922. Begoniaceae. In: Pax F., *Aufzählung der von Dr. Limpricht in Ostasien gesammelten Pflanzen, Repertorium Specierum Novarum Regni Vegetabilis. Beihefte*. 12: 440–441. Available from <http://biodiversitylibrary.org/page/33526448> [accessed Jun. 2009].
- Irmscher E. 1927. Beiträge zur Kenntnis der ostasiatischen Begonien. *Mitteilungen aus dem Institut für allgemeine Botanik in Hamburg* 6 (3): 343–360.
- Irmscher E. 1939. Die Begoniaceen Chinas. *Mitteilungen aus dem Institut für allgemeine Botanik in Hamburg* 10: 525–534.
- Irmscher E. 1951. Some new Chinese species of *Begonia*. *Notes from the Royal Botanic Gardens Edinburgh* 21: 35–45.
- Irmscher E. 1959. Begoniaceenstudien. *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 78: 171–194.
- IUCN 2012. *IUCN Red List Categories and Criteria: Version 3.1. Second Edition*. IUCN, Gland, Switzerland and Cambridge, UK.
- Kanjilal P.C. 1938. Begoniaceae. In: Kanjilal U.N., Kanjilal P.C. & Das A. *Flora of Assam* 2: 333–334. Government of Assam, Prabasi Press, Calcutta.
- Khatun B.M.R. 2008. Begoniaceae. In: Ahmed Z.U. *Encyclopedia of Flora and Fauna of Bangladesh 7: Angiosperms: Dicotyledons: Balsaminaceae-Euphorbiaceae*: 10. Asiatic Society of Bangladesh, Bangladesh.
- Kiew R. 2005. *Begonias of Peninsular Malaysia*: 107. Natural History Publications (Borneo), Malaysia.
- Kiew R. 2010. *Flora of Peninsular Malaysia: Series II: seed plants*: 49. Malayan Forest Records, Kuala Lumpur.
- Kitamura S. 1955. *Fauna and flora of Nepal Himalaya*: 183. Fauna and Flora Research Society, Kyoto, Japan.
- Klotzsch J.F. 1855 [‘1845’]. Begoniaceen-Gattungen und Arten. *Abhandlungen der Königlichen Akademie der Wissenschaften zu Berlin*: 121–255. Available from <http://biodiversitylibrary.org/page/29200453> [accessed May 2009].
- Koch K. 1857. Drei neue Schiefblätter oder Begonien. *Berliner Allgemeine Gartenzeitung* 25 (10): 76.
- Koch K. 1858. Buntblättrige Schiefblätter oder Begonien mit zweifähriger Kapsel (Fortsetzung) *Wochenschrift für Gärtnerei und Pflanzenkunde* 1 (43): 337–341.
- Koorders S.H. 1912. *Exkursionsflora von Java* 2: 650. Fischer, Jena.
- Kress J.W., DeFilipps R.A., Farr E. & Kyi D.Y.Y. 2003. A checklist of the trees, shrubs, herbs, and climbers of Myanmar. *Contributions from the United States National Herbarium* 45: 1–590. Available from <http://www.jstor.org/stable/23493222> [accessed Jun. 2009].
- Kumar K.D. 2002. Begoniaceae. In: Singh N.P., Singh K.P. & Singh D.K. (eds) *Flora of Mizoram* 1: 641–655. Botanical Survey of India, Calcutta.

- Kumaria S., Kehie M., Bhowmig S.S.D., Singh M. & Tandon P. 2012. In vitro regeneration of *Begonia rubrovenia* var. *meisneri* C.B. Clarke – A rare and endemic ornamental plant of Meghalaya, India. *Indian Journal of Biotechnology* 11: 300–303. Available from <http://nopr.niscair.res.in/bitstream/123456789/14570/1/IJBT%2011%283%29%20300-303.pdf> [accessed Mar. 2013].
- Kurz S. 1871. Ueber einige neue und unvollkommen bekannte Indische Pflanzen von Sulpiz Kurz, Conservator des herbariums zu Calcutta. *Flora oder Botanische Zeitung* 54: 289–298. Available from <http://biodiversitylibrary.org/page/60542> [accessed Jun. 2009].
- Kurz S. 1877. Contributions towards a knowledge of the Burmese Flora. *Journal of the Asiatic Society of Bengal* 46 (2): 49–258. Available from <https://biodiversitylibrary.org/page/35548194> [accessed Jun. 2009].
- Leong W.C., Deng T., Sun H., Peng C.-I & Chung K.F. 2015. *Begonia difformis* comb. & stat. nov. (sect. *Platycentrum*, Begoniaceae), a new species segregated from *B. palmata* D. Don. *Phytotaxa* 227: 83–91. <https://doi.org/10.11646/phytotaxa.227.1.9>
- Léveillé H. 1904. Bouquet de Fleurs de Chine. *Bulletin de la Société d'Agriculture, Sciences et Arts de la Sarthe* 39: 316–326. Available from <http://gallica.bnf.fr/ark:/12148/bpt6k453972s/f315.image> [accessed Jun. 2009].
- Léveillé H. 1909. Decades plantarum novarum XVI. *Repertorium Specierum Novarum Regni Vegetabilis* 7: 20–23. Available from <http://biodiversitylibrary.org/page/265226> [accessed May 2009].
- Léveillé H. 1916. Catalogue des Plantes du Yun-Nan avec renvoi aux diagnoses originales, observations et descriptions d'espèces nouvelles: 17. Le Mans. <https://doi.org/10.5962/bhl.title.601>
- Linden M. 1858. Plantes nouvelles mises dans le commerce en 1858. *La Belgique Horticole* 8: 165–169. Available from <https://biodiversitylibrary.org/page/42990374> [accessed Jul. 2009].
- Lindley J. 1846. Begoniaceae. In: *The Vegetable Kingdom, or, The structure, classification, and uses of plants illustrated upon the natural system. Second Edition*: 318–319. Bradbury & Evans, London. <https://doi.org/10.5962/bhl.title.109531>
- Linnaeus C. 1753. *Species plantarum*. Laurentii Salvii, Holmiae [Stockholm]. <https://doi.org/10.5962/bhl.title.727>
- Macer N. 2013. *No Whiteys since Kingdon-Ward – Planthunting in darkest Manipur, November 2012*. Available from <http://www.panglobalplants.com/2013/02/13/no-whiteys-since-kingdon-ward-planthunting-in-darkest-manipur/> [accessed Nov. 2014].
- McNeill J. 2014. Holotype specimens and type citations: General issues. *Taxon* 63 (5): 1112–1113. <https://doi.org/10.12705/635.7>
- Miquel F.A.W. 1856. Begoniaceae. In: *Flora van Nederlandsch Indie* 1 (1): 683–696. Van der Post, Amsterdam. <https://doi.org/10.5962/bhl.title.93>
- Mooney H.A. 1950. *Supplement of Botany of Bihar & Orissa*: 68. Catholic Press, Ranchi.
- Morris R. 2006. Some Begonias from India. *The Begonian* 73: 88–95.
- Morris R. 2008. Begonias in the hanging gardens of Mishmi hills. *The Begonian* 75: 86–92.
- Morris R. 2009a. *B. rex* Putzeys: The chameleon among Indian Begonias. *The Begonian* 76: 133–136.
- Morris R. 2009b. Announcement of 2009–2010 trip to India to document *Begonias*. *The Begonian* 76: 173.
- Morris R. 2009c. *B. iridescens* Dunn and *B. scintillans* Dunn. *The Begonian* 76: 210–213.
- Morris R. 2009d. *Begonia tessaricarpa* – a response. *Begonia Australis* 19 (3): 88–93.

- Morris R. 2010a. *Begonia acetosella* Craib and *Begonia longifolia* Blume giants among Indian Begonias. *The Begonian* 77: 6–9, 27–29.
- Morris R. 2010b. A ‘new’ *Begonia* species from India. *The Begonian* 77: 214–218.
- Morris R. 2010c. *B. acetosella* Craib. and *B. longifolia* Blume: Giants among Indian Begonias. *The Begonian* 77: 6–9.
- Morris, R. 2010d. ‘What’s in a name?’ *Begonia palmata* D.Don [Platycentrum]. *The Begonian* 77: 138–142.
- Morris R. 2011a. *Begonia* × *chungii* natural hybrid in Arunachal-Pradesh. *The Begonian* 78: 18–1.
- Morris R. 2011b. *Begonia annulata* K.Koch. *The Begonian* 78: 58–63.
- Morris R. 2011c. *Begonia aborensis* Dunn. *The Begonian* 78: 89–93.
- Morris R. 2011d. *Begonia griffithiana* (A.DC.) Warb. *The Begonian* 78: 142–146.
- Morris R. 2011e. *B. hatacoa* Hamillton ex Don: Four varieties ‘new’ for Arunachal Pradesh. *The Begonian* 78: 214–217.
- Morris R. 2012a. *B. ovatifolia* A. de Candolle: yet another new *Begonia* find from Arunachal Pradesh. *The Begonian* 79: 9–13.
- Morris R. 2012b. *Begonia silletensis* (A.DC.) C.B.Clarke. *The Begonian* 79: 146–149.
- Morris R. & McMillan P.D. 2006. Two eastern Himalayan species from India: *Begonia griffithiana* and *B. nepalensis*. *The Begonian* 73: 174–178.
- Morris R. & McMillan P.D. 2012. *Begonia shilendrii* R.Morris & P.D.McMillan: A new species from Arunachal Pradesh, India. *The Begonian* 79 (3–4): 60–64.
- Nakao S. 1964. *Living Himalayan flowers*: 139–140. The Mainichi Newspapers, Tokyo.
- Panda S. & Das A.P. 2004. Flora of Sambalpur (Orissa): 159. Bishen Singh Mahendra Pal Singh, India.
- Peng C.-I & Ku S.-M. 2009. *Begonia* × *chungii* (Begoniaceae), a new natural hybrid in Taiwan. *Botanical Studies* 50 (2): 241–250.
- Peng C.-I & Leong W.-C. 2006. Novelties in *Begonia* sect. *Platycentrum* for China: *B. crocea*, sp. nov. and *B. xanthina* Hook., a new distributional record. *Botanical Studies* 47: 89–96.
- Planchon J.É. 1854. *Begonia* (hybrid) *marmorea*, Hort van Houtt. *Flore des Serres et des Jardins de l’Europe* 9: 243–245. Available from <http://biodiversitylibrary.org/page/27910469> [accessed Jul. 2009].
- Putzey J.A.A.H. 1857. *Begonia rex*. In: Van Houtte L. *Flores des Serres et des Jardins de l’Europe* 12: 141–146. Available from <http://biodiversitylibrary.org/page/27803796> [accessed May 2009].
- Rajbhandary S., Hughes M. & Shrestha K.K. 2010. Three new species of *Begonia* sect. *Platycentrum* from Nepal. *Gardens’ Bulletin Singapore* 62 (1): 151–162.
- Ridley H.N. 1909. The flora of the Telom and Batang Padang valleys. *Journal of the Federated Malay States Museums* 4: 1–98. Available from <https://biodiversitylibrary.org/page/19042968> [accessed Jun. 2009].
- Ridley H.N. 1917a. Results of an expedition to Korinchi Peak, Sumatra. *Journal of the Federated Malay States Museums* 8 (4): 13–135.
- Ridley H.N. 1917b. New and rare Malayan plants. Series IX. *Journal of the Straits Branch of the Royal Asiatic Society* 75: 5–38.

- Ridley H.N. 1922. *Flora of the Malay Peninsula* 1: 854. Reeve & Co., London.
<https://doi.org/10.5962/bhl.title.10921>
- Roxburgh W. 1832. *Flora Indica* 3: 649. Thatcher, Serampore.
- Roy P.S. & Joshi P.K. 2002. *Forest cover and assessment in North East India – issues and policies*: 26–34. Indian Institute of Remote Sensing (NRSA), Dehradun.
- Royle J.F. 1839. *Illustrations of the botany and other branches of the natural history of the Himalayan Mountains: and of the flora of Cashmere*: 313. Wm H. Allen, London.
<https://doi.org/10.5962/bhl.title.449>
- Saikia R., Roy H. & Borthakur S.K. 2011. New report of occurrence of two species of *Begonia* L. (Begoniaceae) from Assam, India. *Pleione* 5 (2): 357–360.
- Smith J.E. 1805. *Exotic botany*. Vol. 2. Taylor, London.
- Takhtajan A.L. 1967. *Sistema i filogeniia tsvetkovykh rastenii (Systema et Phylogenia Magnoliophytorum)*. Soviet Science Press, Leningrad and Nauka, Moscow.
- Tebbitt M.C. 2003a. Taxonomy of *B. longifolia* and related species. *Brittonia* 55: 19–29.
[https://doi.org/10.1663/0007-196X\(2003\)055%5B0019:TOBLBB%5D2.0.CO;2](https://doi.org/10.1663/0007-196X(2003)055%5B0019:TOBLBB%5D2.0.CO;2)
- Tebbitt M.C. 2003b. Notes on South Asian *Begonia*. *Edinburgh Journal of Botany* 60: 1–9.
<https://doi.org/10.1017/S0960428603000015>
- Tebbitt M.C. 2005. *Begonias*: cultivation, identification and natural history. 208. Timber Press Incorporated.
- Tebbitt M.C. & Guan K.Y. 2002. Emended circumscription of *Begonia silletensis* (Begoniaceae) and description of a new subspecies from Yunnan, China. *Novon* 12: 133–136.
<https://doi.org/10.2307/3393252>
- Thiers B. [continuously updated]. Index Herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. Available from <http://sweetgum.nybg.org/ih/> [accessed Jun. 2009].
- Uddin A. 2007. Distribution and status of India *Begonia* species. *Journal of Economic and Taxonomic Botany* 31 (3): 591–597.
- Uddin A., Gogoi R., Mao A.A. & Phukan S. 2008. Rediscovery of *Begonia adscendens* C.B. Clarke. *Rheedea* 18 (1): 53–55.
- UNEP-WCMC 2014. *Data standards for the World Database on Protected Areas*. UNEP-WCMC, Cambridge, UK.
- Verma D., Roy D.K. & Sinha B.K. 2013. Gustav Mann's contribution to 'ASSAM' herbarium, Shillong, Meghalaya, India. *Pleione* 7 (1): 175–218.
- Von Berchtold B.V. & Presl J.S. 1820. *O přirozenosti Rostlin, obsahujc j gednánj o žiwobytj rostlin pro sebe a z ohledu giných žiwoků, podlé stawu nyněgss ylo znanj, pýtww rostlin; názwoslowj audů; hospodárstw j gegich; rozssjřenj po semi a způsob rostlinář zřjdit i a zacowati*. Enders, Prague.
- Wallich N. 1830. *Plantae Asiaticae Rariores*. Treuttel & Würtz, London.
<https://doi.org/10.5962/bhl.title.468>
- Wallich N. 1831. *A numerical list of dried specimens of plants in the East India Company's Museum: collected under the superintendence of Dr. Wallich of the Company's Botanic Garden at Calcutta (1829 [as 1828]–1849)*. London.

Warburg O. 1894. Begoniaceae. In: Engler A. & Prantl K.A.E. *Die Natürlichen Pflanzenfamilien nebst ihren Gattungen und wichtigeren Arten, insbesondere den Nutzpflanzen, unter Mitwirkung zahlreicher hervorragender Fachgelehrten* Teil 3: Abteilung 6 und 6a: 121–150. Engelmann, Leipzig.

<https://doi.org/10.5962/bhl.title.4635>

Yu T.T. 1948. An enumeration of *Begonias* of South Western China. *Bulletin of the Fan Memorial Institute of Biology* 1: 113–130.

Manuscript received: 11 May 2016

Manuscript accepted: 7 October 2016

Published on: 19 January 2018

Topic editor: Koen Martens

Desk editor: Connie Baak

Printed versions of all papers are also deposited in the libraries of the institutes that are members of the EJT consortium: Muséum national d'Histoire naturelle, Paris, France; Botanic Garden Meise, Belgium; Royal Museum for Central Africa, Tervuren, Belgium; Natural History Museum, London, United Kingdom; Royal Belgian Institute of Natural Sciences, Brussels, Belgium; Natural History Museum of Denmark, Copenhagen, Denmark; Naturalis Biodiversity Center, Leiden, the Netherlands; Museo Nacional de Ciencias Naturales-CSIC, Madrid, Spain; Real Jardín Botánico de Madrid CSIC, Spain.