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A NEW SECTION (*BEGONIA* SECT. *FLOCCIFERAE* SECT. NOV.) AND TWO NEW SPECIES IN BEGONIACEAE FROM THE WESTERN GHATS OF INDIA

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Two new species, *Begonia bracteolata* and *Begonia keralensis*, are described from the Western Ghats of India. They are placed in the newly created *Begonia* sect. *Flocciferae*, along with *B. albo-coccinea* Hook. and *B. floccifera* Bedd. Lectotypes are designated for three names within this section. Colour photoplates, illustrations and an identification key to *Begonia* sect. *Flocciferae* are also provided.

Keywords. *Begonia albo-coccinea*, *Begonia floccifera*, India, Kerala, lectotype, new section, new species, sect. *Flocciferae*.

Introduction

Begonia L. is one of the largest pantropical genera in the world, comprising around 1950 species (Hughes *et al*., 2015–). It has 69 sections worldwide, of which 11 are found in India (Moonlight *et al*., 2018). During their revisionary studies on the genus *Begonia* in India, the authors came across two interesting rhizomatous begonias from the Western Ghats of Kerala showing similarities to *B. floccifera* Bedd. in having stout, creeping rhizomes, keeled stipules and fleshy leaves. Populations of these two plants were observed in the field over three successive seasons, and specimens were grown at Calicut University Botanical Garden. Based on the observations made, we concluded that both represent new taxa, which are described and illustrated here.

At present, all the rhizomatous begonias of Peninsular India are included in *Begonia* sect. *Reichenheimia* (Klotzsch) A.DC. The rhizomatous species from continental Southeast Asia and China previously assigned to this section have been moved to a newly created section, *Begonia* sect. *Jackia* M.Hughes (Moonlight *et al.*, 2018). After the recent recircumscription by Moonlight *et al.* (2018), sect. *Reichenheimia* contains 20 species, and the seven species from the Indian region (*Begonia albo-coccinea* Hook., *B. floccifera*, *B. phrixophylla* Blatt. & McCann, *B. subpeltata* Wight, *B. tenera* Dryand., *B. thwaitesii* Hook. (Sri Lanka) and

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B. trichocarpa Dalzell) remaining in the section comprise both rhizomatous and tuberous taxa. The two novel species are placed in a new section with the rhizomatous *Begonia albococcinea* and *B. floccifera*, which were previously assigned to *Begonia* sect. *Reichenheimia* (e.g. Doorenbos *et al.*, 1998), named here as *Begonia* sect. *Flocciferae* N.Krishna & Pradeep. With the segregation of the two rhizomatous species to this new section, the residual section *Reichenheimia* now includes only tuberous species and is more natural. A key for the identification of the species of sect. *Flocciferae* is provided below.

Materials and Methods

The revision and description of the two new taxa are based on living specimens collected by the authors from various parts of India. The living collections maintained at Calicut University Botanical Garden were also used to record phonological data. A comparison was made of specimens at ASSAM, BSI, CALI, MH, SUK and TBGT. The taxonomic keys provided by Uddin (2010), Camfield & Hughes (2018) and other relevant literature dealing with the genus (Clarke, 1879; Gamble, 1919; Balakrishnan, 1981; Chauhan *et al.*, 1996; Hajra *et al.*, 1996; Singh *et al.*, 2000, 2002; Moonlight *et al.*, 2018) were also consulted. Typifications were made according to the provisions of the *International Code of Nomenclature for Algae, Fungi and Plants* (Turland *et al.*, 2018). Floral characters of male and female flowers and fruits were observed using a Leica M80 Stereo Microscope attached to a digital camera (Leica Microsystems, Wetzlar, Germany), and photographs in the field were taken using Nikon D3300 and D750 DSLR cameras (Nikon, Tokyo, Japan). IUCN categories were assigned according to the provisions of IUCN (IUCN Standards and Petitions Subcommittee, 2017).

Taxonomic Treatment

Begonia sect. **Flocciferae** N.Krishna & Pradeep, **sect. nov.** – Type species: *B. floccifera* Bedd.

Begonia sect. *Flocciferae* differs from the tuberous sect. *Reichenheimia* (Klotzsch) A.DC. in having stout, creeping rhizomes and is distinguished from sect. *Jackia* M.Hughes by its anthers, which are rounded at the apex (not retuse) and dehisce by lateral slits (not unilaterally, i.e. on one side).

Acaulescent, rhizomatous, perennial, glabrous or tomentose herbs. *Stipules* asymmetrical, keeled, apex acuminate, caudate or aristate, persistent. *Leaves* basifixed or peltate, lamina symmetrical, subsymmetrical or asymmetrical, suborbicular, densely tomentose on both surfaces especially when young, glabrescent when mature on adaxial surface, veins 8–10, palmate to pinnate, margins subentire, undulate, distantly denticulate or dentate. *Inflorescence* bisexual, axillary, dichotomously branched at base, male flowers basal, protandrous, female flowers distal; bracts broadly ovate to linear-lanceolate, persistent or caducous, markedly conspicuous often with primary and secondary bracts, margins of primary bracts entire or laciniate. *Male flowers* with 2 or 4 tepals, broadly ovate-orbicular to narrowly

FIG. 1. Distribution of *Begonia* sect. *Flocciferae* N.Krishna & Pradeep in India.

obovate; stamens 20–55; anthers broadly ovate, apex rounded, dehiscing through lateral slits. *Female flowers* with 2–4 tepals, ovary with 3 equal to subequal wings, styles 3, connate at base or fused up to halfway, bifid, stigmatic papillae in a wavy or spirally twisted band. *Fruit* a 3-winged capsule on a slender pedicel, papery, longer than broad, both ends rounded.

Distribution. Asia. Endemic to the Western Ghats of South India (Fig. 1).

Ecology. Occurs from 350 to 1500 m elevation, along wet evergreen forest margins, moist rocks adjacent to streams and waterfalls, occasionally as an epiphyte on tree trunks close to the ground.

Etymology. The sectional name *Flocciferae* is derived from the specific epithet of the type species (*Begonia floccifera*). The term *floccosus* refers to the tufts of soft woolly hairs present on the leaves and petioles of the members of this section.

Species list: Begonia albo-coccinea Hook., *B. bracteolata* N.Krishna, Pradeep et B.Mani, *B. floccifera* Bedd. and *B. keralensis* Pradeep, Sinj. Thomas et Britto.

Key to the species of Begonia *sect.* Flocciferae *in India*

1a. Leaves peltate; style hairy _____ **1. B. albo-coccinea**
1b. Leaves basifixed; style glabrous _____ 2

2a. Female tepals 4, ovate to elliptic, apex acute _____ **3. B. floccifera**
2b. Female tepals 2, reniform, apex rounded _____ 3

3a. Primary bracts laciniate, deeply lobed, lobes 3–6; secondary bracts ovate to elliptic, tepal-like; bracteoles 2 or 3, tepal-like, ovate to elliptic, rarely obovate _____ **2. B. bracteolata**
3b. Primary bracts ovate, entire, unlobed; secondary bracts lanceolate; bracteoles 2, filiform _____ **4. B. keralensis**

Species descriptions

1. Begonia albo-coccinea Hook., Bot. Mag. 71: t. 4172 (1845); A.DC., Prodr. XV, 389 (1864); C.B.Clarke in Hook.f., Fl. Brit. Ind. 2: 654 (1879); Gamble, Fl. Pres. Madras 1: 546 (1919). *Mitscherlichia albo-coccinea* (Hook.) Klotzsch, Abh. Königl. Akad. Wiss. Berlin 1854: 193, t. 6 A (1855) – Type: Hort. Kew 1837, Hooker (lecto K [K000739957], here designated; isolecto G-DC, Hooker, *s.n.*). **Figs 2, 3**.

Begonia grahamiana Wight Ic. t. 1811 (1852); *Mitscherlichia grahamiana* (Wight) Hassk. Hort. Bogor. Descr. 334 (1858). – Type: India. Tamil Nadu, Courtallum, viii 1835, Wight (lecto E [E00179300], here designated).

Monoecious, acaulescent, rhizomatous, perennial herb; up to 40 cm tall including the inflorescence. *Rhizomes* brown, stout, fleshy, 5–15 cm, nodes 5–18 mm apart, brown tomentose on young parts, leaf scars prominent. *Stipules* 2 at each node, persistent, asymmetrical, keeled, 2–4 × 0.7–13 cm, reddish, base truncate, apex acuminate, margins entire, abaxially sparsely tomentose, adaxially glabrous. *Leaves*: petioles 10–18 cm long, reddish, angled, slightly grooved, densely tomentose; lamina peltate, rounded, 11–15 × 13–15 cm, apex rounded, green above, pale green below, margins dentate, densely tomentose above when young, densely tomentose beneath; veins 8–10, palmate to pinnate, greenish as in petioles. *Inflorescence* bisexual, axillary, dichotomous at base, male flowers basal and female flowers distal; peduncles c.20–25 cm long, reddish, densely tomentose when young; bracts persistent, broadly ovate to lanceolate, c.7 × 3–4 mm, brownish, base truncate, apex acute, margins entire, sparsely tomentose. *Male flowers*: pedicels 1.4–2 cm long, reddish, densely tomentose; outer tepals 2, broadly ovate to rotund, 1.3–1.4 × 1.2–1.3 cm, abaxially reddish and adaxially white, base truncate, apex rounded, margins entire, abaxially sparsely tomentose; inner tepals 2, narrowly obovate, 13–14 × 8–9 mm, white, base truncate, apex rounded, margins entire, glabrous; androecium

FIG. 2. Lectotype of *Begonia albo-coccinea* Hook. (K000739957): the plant on the right side.

FIG. 3. *Begonia albo-coccinea* Hook. A, Habit; B, male flower on young inflorescence; C and D, female flower; E, male tepals (abaxial view); F, male tepals (adaxial view); G, female tepals (abaxial view); H, androecium; I, stamens; J, style; K, mature fruit; L, ovary (transverse section).

symmetrical, stamens up to 55, free, arranged on a reduced torus, filaments c.1.3–1.5 mm long, yellow; anthers obovate, c.1 mm long, apex rounded, dehiscing through longitudinal slits. *Female flowers*: pedicels c.1.5 cm long, reddish, tomentose; bracteoles 2, persistent, narrowly ovate, 1.3–1.7 × 0.5–0.7 mm, base truncate, apex acute, margins entire, sparsely tomentose; outer tepals 2, broadly ovate to rounded, 1.4–1.5 × 1.4–1.5 cm, base and apex rounded, margins entire, sparsely tomentose; inner tepals 1 or 2 (rarely 3), narrowly elliptic, 11–12 × 4–5 mm, base truncate, apex obtuse, margins entire, glabrous; ovary 1.4 cm long, 3-winged, sparsely hairy with short yellow tomentum; wings subequal, 13–14 × 3–5 mm; locules 3; placentae undivided, axile, styles 3, straight, 4–5 mm long, yellow, fused up to halfway, pubescent with translucent branched hairs, each stylodium bifurcate at the stigmatic region, stigmatic band not folded, twisted once. *Fruit* a capsule, pendent on slender pedicel, wings 3, subequal, 16–18 × 6–7 mm, longer than broad, papery with persistent bracteoles and style, apex and base rounded, dehiscent on both sides of the wings; seeds numerous, barrel-shaped, c.0.4 × 0.2 mm.

Distribution and ecology. This species is confined to South India, especially towards the southernmost parts of Kerala and Tamil Nadu (see Fig. 1). It is found at forest margins, usually growing as a lithophyte in areas exposed to direct sunlight.

IUCN category. Vulnerable (VU): B1 ab (i and iii). Although this species is within a protected area, these populations are vulnerable and continue to decline in extent owing to habitat destruction.

Phenology. Flowering and fruiting from December to March and up to May in the greenhouse.

Additional specimens examined. India. **Kerala**: Kollam District, Pandimotta, 650 m, 12 i 1994, *E. S. Santhosh Kumar* 18274 (TBGT!); Tiruvananthapuram District, Bonacoud, 750 m, 21 xii 1987, *N. Mohanan* 9038 (TBGT!); Tiruvananthapuram District, Chinichal, 25 ix 2008, *C. G. Vishnu* 64723 (TBGT!); Tiruvananthapuram District, Ponmudi, 5 xii 2013, *G. Rajkumar & M. Alister* 80403 (TBGT!). **Tamil Nadu**: Tirunelveli District, Kokka Aruvi, Courtallam, 400 m, 4 xii 2015, *A. Nasarudheen & M. Alister* 88294 (TBGT!); Tirunelveli District, Mahendragiri, 28 ii 1989, *N. Mohanan* 8018 (TBGT!); Tirunelveli District, Courtallum, 10 ii 2019, *S. Reshmi & Nikhil Krishna* 168417 (CALI!).

Begonia albo-coccinea is clearly distinguished from the other members of this section by its peltate leaves and hairy styles. It has four tepals in male flowers and three or four (rarely five) tepals in female flowers. It has been observed that plants of *Begonia albo-coccinea* grown in greenhouses vary in the position of the petiole and the lamina, with leaves varying from centrally peltate to shortly eccentrically peltate. Hooker (1845), when describing this species, did not give any reference to a specimen in the protologue except for a note that "our plants were raised in the Royal Botanical Gardens of Kew, from seeds sent from India by Strachan, Esq., of Twickenham, Surrey". There are two specimens evidently consulted by Hooker while describing the species at G-DC (Hooker *s.n.*) and K (K000739957). Both specimens apparently came from Kew. The Kew sheet with two specimens mounted is well

preserved, and the specimen on the right side of the sheet bears an annotation in Hooker's own handwriting so was selected as the lectotype.

2. Begonia bracteolata N.Krishna, Pradeep & B.Mani, **sp. nov.**

Begonia bracteolata is closely similar to *B. floccifera* Bedd. but differs in having only two reniform female tepals instead of four ovate to elliptic tepals, primary bracts laciniate (not ovate) and secondary bracts ovate to oblong or elliptic and tepal-like (versus lanceolate), bracteoles ovate to elliptic, rarely obovate (not filiform), tepal-like, and fruits that are longer than broad. – Type: India, Kerala, Idukki District, Karimanal, 10°01′05.3′′N, 76°51′00.5′′E, 20 i 2018, *Nikhil Krishna* 148495 (holo CALI!; iso MH!, CAL!). **Figs 4, 5**.

Monoecious, acaulescent, rhizomatous, perennial herb, 50–90 cm tall including inflorescence. *Rhizome* brown, stout, woody, 10–30 cm long, nodes 5–15 mm, leaf scars prominent, axillary buds growing after leaf fall. *Stipules* 2 at each node, persistent, asymmetrical, keeled, widely ovate to triangular, rarely obovate, 1.3–4.2 × 2.7–3.4 cm, brownish red, base truncate, apex acute to cuspidate with 5–10 mm long arista, margins entire, abaxially sparsely hairy with brown tomentum, adaxially glabrous. *Leaves*: petiole 7–28 cm long, angular, slightly grooved, pale green with large reddish blotches, densely tomentose; lamina thick, fleshy, 13–28 × 21–35 cm, green above and pale green to pale pink beneath, suborbicular, base asymmetrically cordate, lower lobe overlapping, apex acute, margin distantly denticulate, upper surface tomentose, lower surface densely tomentose when young, sparsely tomentose when mature, leaves, 7- to 9-veined from base. *Inflorescence* axillary, bisexual, dichotomously branched at base, 5–6 times branched, protandrous with male flower basal and female flower distal; peduncle 40–85 cm long, angled, slightly grooved, bulging towards the base, reddish to pale green with reddish blotches, with dense white tomentum; primary bracts 2, caducous, pale green, laciniate, c.3.5 cm long, deeply lobed; lobes 3–6, lanceolate to narrowly ovate with short triangular sublobes, apex acuminate, base truncate, margins sparsely strigose; secondary bracts 3–5, caducous, broadly ovate to oblong or elliptic, rarely with narrow lobes, 7–10 × 3–6 mm, apex obtuse to acuminate, margins entire, glabrous. *Male flowers*: pedicel 1–1.7 cm long, pink with reddish blotches, greenish at the base, sparsely tomentose; tepals 2, orbicular, 1–1.3 × 1.1–1.4 cm, white to pale pink, base and apex rounded, margins entire, abaxial and adaxial surfaces glabrous; androecium symmetrical, stamens 37–49, monadelphous; anthers broadly obovate, 3 mm long, apex rounded, dehiscing through longitudinal slits; filaments c.2 mm long. *Female flowers*: nodding; bracteoles 2 or 3, caducous when mature, tepal-like, ovate to elliptic, rarely obovate, 11–12 × 6–10 mm, white to pale pink, base truncate, apex obtuse or with 3 small triangular lobes, margins entire; pedicel 9–12 mm long, white to pink with reddish blotches, glabrous; tepals 2, persistent, reniform, 0.9–1 × 1–1.2 cm, white to pale pink, base rounded, apex, rounded, glabrous on both surfaces; ovary white to pale pink, wings 3, equal, 11–32 × 3.5–5 mm, glabrous; locules 3, placentae undivided, axile; styles 3, connate at base, bifid from about half of their height, twisted once slightly at apex, stigmatic papillae a wavy band connecting the two stylar

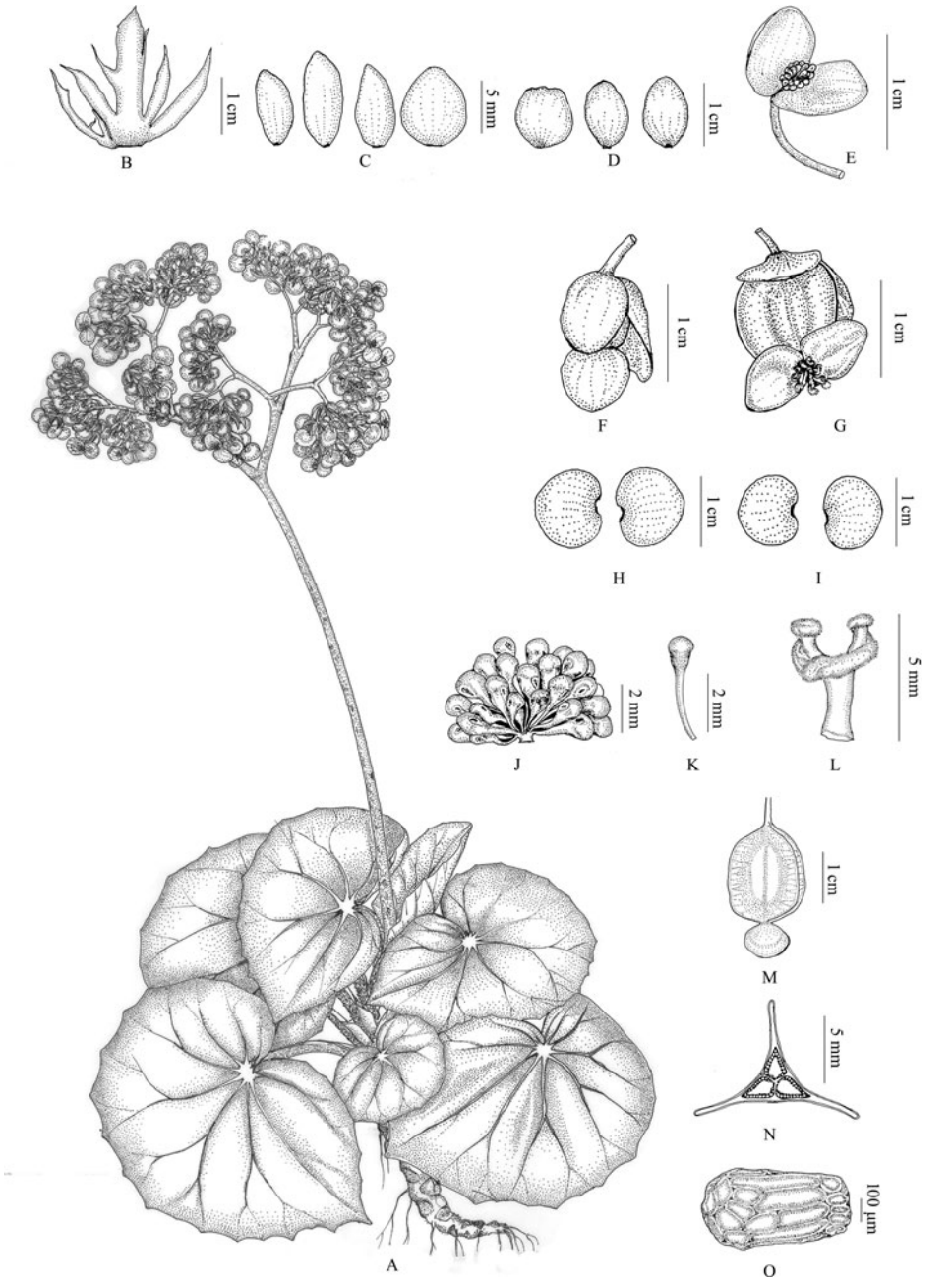

FIG. 4. *Begonia bracteolata* N.Krishna, Pradeep & B.Mani, sp. nov. A, Habit; B, primary bracts; C, secondary bracts; D, bracteoles; E, male flower; F, female flower bud; G, female flower; H, male tepals; I, female tepals; J, androecium; K, stamen; L, style; M, mature fruit; N, ovary (transverse section); O, seed. Drawn from *Nikhil Krishna* 148495.

FIG. 5. *Begonia bracteolata* N.Krishna, Pradeep & B.Mani, sp. nov. A and B, Habit; C and D, inflorescence; E, primary bracts; F, secondary bracts; G, bracteoles; H, male flower; I, female flowers; J, male tepals; K, female tepals; L, androecium; M, stamens; N, style; O, stylar branches (detached); P, mature fruit; Q, ovary (transverse section).

lobes. *Fruit* a capsule, pendent on slender pedicel, longer than broad, wings 3, equal, c.1.5 × 0.7 cm, pale green to pale pink, dehiscent on both sides of the wings; seeds numerous, oblong in outline, c.0.5 × 0.25 mm.

Distribution and ecology. Currently known only from Karimanal, Kerala, in South India (see Fig. 1) at an elevation of 500 m. It is found on forest margins, where it usually grows on moist rocks and adjacent wet areas exposed to direct sunlight, in association with *Pouzolzia pentandra* (Roxb.) Benn. and *Apluda mutica* L.

IUCN category. Data Deficient (DD). Known only from the type locality; further distribution information is needed.

Etymology. The specific epithet *bracteolata* refers to its tepal-like bracteoles in female flowers.

Phenology. Flowering and fruiting from December to March and up to May in the greenhouse.

Additional specimens examined. India. **Kerala**: Idukki District, Karimanal, 17 ii 2016, *S. J. Britto, S. Thomas & B. Mani* 67637 (RHT!); 13 i 2019, *S. J. Britto, S. Thomas & B. Mani* 68847 (RHT!).

3. Begonia floccifera Bedd. Icon. Pl. Ind. Or. 23, t. 111 (1874); C.B.Clarke in Hook.f., Fl. Brit. Ind. 2: 654 (1879); Gamble, Fl. Pres. Madras, 1: 546 (1919). – Type: India, Tamil Nadu, Tirunelveli xii 1871, *R. H. Beddome* 217 (lecto K [K000761458], here designated). **Fig. 6**.

Monoecious, acaulescent, rhizomatous, perennial herb; usually growing on rocks directly exposed to sunlight, 50–70 cm tall including inflorescence. *Rhizomes* brown, stout, fleshy, 5–30 cm, nodes 5–20 mm apart, brown tomentose on young parts, leaf scars prominent. *Stipules* persistent, symmetrical, oblong, keeled, c.5 × 2 cm, reddish at keel, base truncate, apex caudate, margins entire, abaxially sparsely tomentose, adaxially glabrous. *Leaves* distichous; petioles 8–22 cm long, pale green to reddish brown, rarely with reddish blotches, upper surface slightly grooved, densely tomentose when young, glabrous at maturity; lamina basifixed, suborbicular, 17–28 × 11–20 cm, broader than long, base asymmetrically cordate, lamina lobes slightly overlapping, apex acute, obtuse when mature, dark green above, pale green below, margins dentate to subentire, densely tomentose above when young, glabrous or glabrescent at maturity, densely tomentose below; veins 8–10, palmate to pinnate. *Inflorescence* bisexual, axillary, dichotomously branched at base, male flowers basal and female flowers distal; peduncle terete, c.60 cm long, brownish red, densely tomentose; primary bracts caducous, ovate, c.6 × 4 mm, pale green, base truncate, apex acute to obtuse, margins entire, sparsely tomentose; secondary bracts persistent, linear to lanceolate, c.2.5–5.5 × 0.4–1.2 mm, pale pink to pale green, base truncate, apex acuminate, margins entire, sparsely tomentose. *Male flowers*: pedicels 8–10 mm long, pale pink, with sparse tomentose hairs; tepals 2, broadly ovate, c.8 × 7 mm, white, base rounded, apex acute, margins entire,

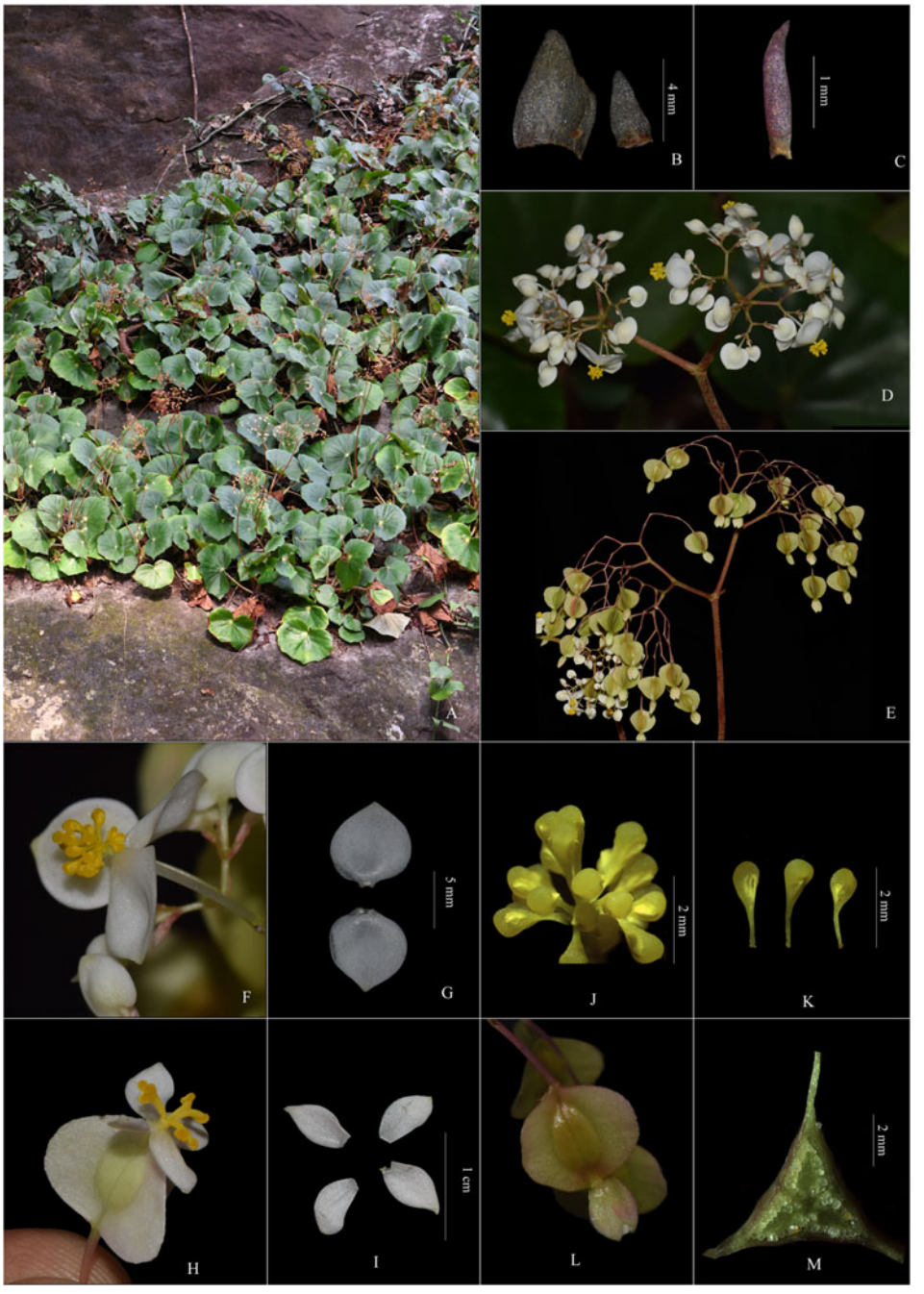

FIG. 6. *Begonia floccifera* Bedd. A, Habit; B, bracts; C, bracteole; D, inflorescence; E, infructescence; F, male flowers; G, male tepals; H, female flower; I, female tepals; J, androecium; K, stamens; L, mature fruit; M, ovary (transverse section).

glabrous; androecium symmetrical, stamens up to 25, free, arranged on a torus, filaments c.1 mm long, yellow; anthers broadly obovate in outline, c.1 mm long, apex rounded, dehiscing through longitudinal slits. *Female flowers*: pedicels c.5 mm long, white to pale pink, glabrous; bracteoles 2, filiform, c.2.7–3 × 0.4–0.5 mm, pale pink to greenish, base truncate, apex acuminate, margins entire, sparsely tomentose to glabrous; tepals 4, ovate to elliptic, 4–5 × 2–3 mm, base truncate, apex acute, margins entire, glabrous; ovary c.1 cm long, 3-winged; wings subequal, broadest at middle, c.10 × 5 mm; locules 3; placentae undivided, axile; styles 3, straight, c.3 mm long, yellow, one-third fused, each stylodium bifurcate at the stigmatic region, stigmatic band wavy, not twisted. *Fruit* a capsule, pendent on slender pedicel, wings 3, subequal, c.12 × 5 mm, papery with persistent tepals and style, apex and base rounded, dehiscent on both sides of the wings; seeds numerous, obovoid, c.0.37 × 0.21 mm.

Distribution and ecology. This species is endemic to the Western Ghats of Southern Kerala and Tamil Nadu, India (see Fig. 1). It grows lithophytically in exposed areas, occasionally as an epiphyte in primary rain forest between 350 and 1200 m above sea level.

IUCN category. Vulnerable (VU): B1 ab (i and iii). This species is so far reported from protected forests and forest margins in the southernmost parts of the Western Ghats. The populations are severely fragmented and continuing to decline, as observed in the extent of occurrence and the area and quality of the habitat.

Phenology. Flowering and fruiting from December to March in the field and up to May in the greenhouse.

Additional specimens examined. India. **Kerala**: Kollam District, Palaruvi, 19 viii 2016, *Janeesha & Nikhil Krishna* 148436 (CALI!); Tiruvananthapuram District, Meenmutty Waterfalls, 12 ii 2019, *Nikhil Krishna* 168411 (CALI!); Tiruvananthapuram District, Near Bonacaud 13 ii 2019, *Nikhil Krishna* 168412 (CALI!); **Tamil Nadu**: Tirunelveli District, Karayar, 350 m, 30 iii 2017, *G. Rajkumar* 90730 (TBGT!); Tirunelveli District, Kannikatti, 5 vi 1901, *C. A. Barber* 3115 (MH!); ibid., 5 vi 1901, *C. A. Barber* 3116 (MH!); Tirunelveli District, Kappandi, Way to Kannikathy, 350 m, 21 v 1988, *R. Gopalan* 88624 (MH!); Tirunelveli District, Way to Kannikatti, 29 viii 1963, *A. N. Henry* 16363 (MH!); Tirunelveli District, Sengaltheri, 18 ix 1967,*Vajravelu* 29109 (MH!); Kanyakumari District, Lower Kothayar, 340 m, 3 viii 1999, *A. N. Henry* 49587 (MH!).

R. H. Beddome (1874) did not cite any specimens when describing *Begonia floccifera*; there is only an indirect reference in the protologue to two collection localities, Tirunelvelly and Courtallum. There are five specimens available from the Travancore and Tirunelvelly hills: one at K (K000761458); two at BM (BM000944668 and BM000944669), mounted on a single sheet; and two at CAL (CAL0000015336 and CAL0000015337). K000761458 is a well-preserved specimen agreeing perfectly with the original description and evidently consulted by Beddome (it bears labels apparently in Beddome's handwriting). It is therefore designated here as the lectotype.

4. Begonia keralensis Pradeep, Sinj. Thomas & Britto, **sp. nov.**

Begonia keralensis is similar to *B. bracteolata* N.Krishna, Pradeep & B.Mani in habit and leaf shape but differs in having ovate primary bracts (not laciniate), secondary bracts that are lanceolate (not broadly ovate to oblong or elliptic and tepal-like) and filiform bracteoles (not tepal-like, ovate to elliptic or obovate). – Type: India. Kerala, Palakkad District, Nelliyampathy, 10°32′03.8′′N, 76°40′51.6′′E, 20 xii 2017, *Nikhil Krishna* 168413 (holo CALI!; iso MH!, CALI!). **Figs 7, 8**.

Monoecious, acaulescent, rhizomatous, perennial herb; 30–70 cm tall (including inflorescence), acaulescent. *Rhizomes* brown, stout, fleshy, 7–80 cm, 13–30 mm thick, nodes 5–20 mm apart, brown tomentose on young parts, lenticellate, leaf scars prominent. *Stipules* 2 at each node, persistent, asymmetrical, keeled, oblong to triangular, 0.8–4 × 0.6–2.3 cm, pink to reddish brown, base truncate, apex acuminate to retuse with 6–12 mm long arista, margins entire, abaxially sparsely hairy with brown tomentum, adaxially glabrous. *Leaves*: petiole terete, slightly grooved, 16–50 cm long, pale green to reddish brown with minute white spots and streaks, dense brown tomentum when young, glabrescent at maturity; lamina fleshy, green above and pale green beneath, suborbicular, 18–20 × 21–30 cm, base asymmetrically cordate, lower lobe slightly overlapping, apex acute, margins undulate to subentire, upper surface sparsely tomentose, glabrous when mature, lower surface densely tomentose when young, sparser when mature, 8- to 11-veined, palmate to pinnate. *Inflorescence* axillary, bisexual, dichotomously branched at base, 5–6 times branched, protandrous with male flower basal and female flower distal; peduncle c.27–70 cm long, terete, with dense brown tomentum, reddish to pale green; primary bracts caducous, ovate, apex obtuse to acute, base truncate, margins entire, sparsely tomentose; secondary bracts persistent 2.5–3 × 0.4–0.5 mm, lanceolate, pink to reddish brown, base truncate, apex acute to acuminate, margins entire, abaxially sparsely tomentose. *Male flowers*: pedicel c.1 cm long, pink, sparsely tomentose; tepals 2, orbicular, 0.9–1 × 1–1.3 cm, pink, base rounded, apex rounded to obtuse, margins entire, abaxial and adaxial surfaces glabrous; androecium symmetrical, stamens monadelphous, 25–30; anthers obovate, 2–3 mm long, connective not produced beyond the thecae, apex rounded, dehiscence through longitudinal slits; filaments c.7–1.5 mm long. *Female flowers* suberect; bracteoles 2, persistent, c.2 × 0.5 mm, shorter than ovary, filiform, reddish pink, base truncate, apex acute, margins entire, sparsely tomentose as in pedicels; pedicel c.1–1.2 cm long, pink, sparsely tomentose; tepals 2, reniform, 0.8–1 × 0.9–1.2 cm, pink, base rounded, apex acute to rounded, margins entire, glabrous on both surfaces; ovary pink when young, wings 3, equal, glabrous; locules 3, placenta undivided, ovules arranged on an axile placenta; styles 3, connate at base, bifid from about half their length, stigmatic papillae forming a band connecting the two lobes. *Fruit* a capsule, more or less erect, oblong, pink, wings 3, equal, c.1–1.5 × 0.7 cm, both ends rounded, dehiscent on both sides of the wings; seeds numerous, ellipsoid, 0.36 × 0.18 mm.

Distribution and ecology. This species is distributed in the forests of Kerala, India, ranging from Idukki to Kasaragod (see Fig. 1). It is usually found growing as a lithophyte in areas directly exposed to sunlight at elevations between 400 and 1000 m.

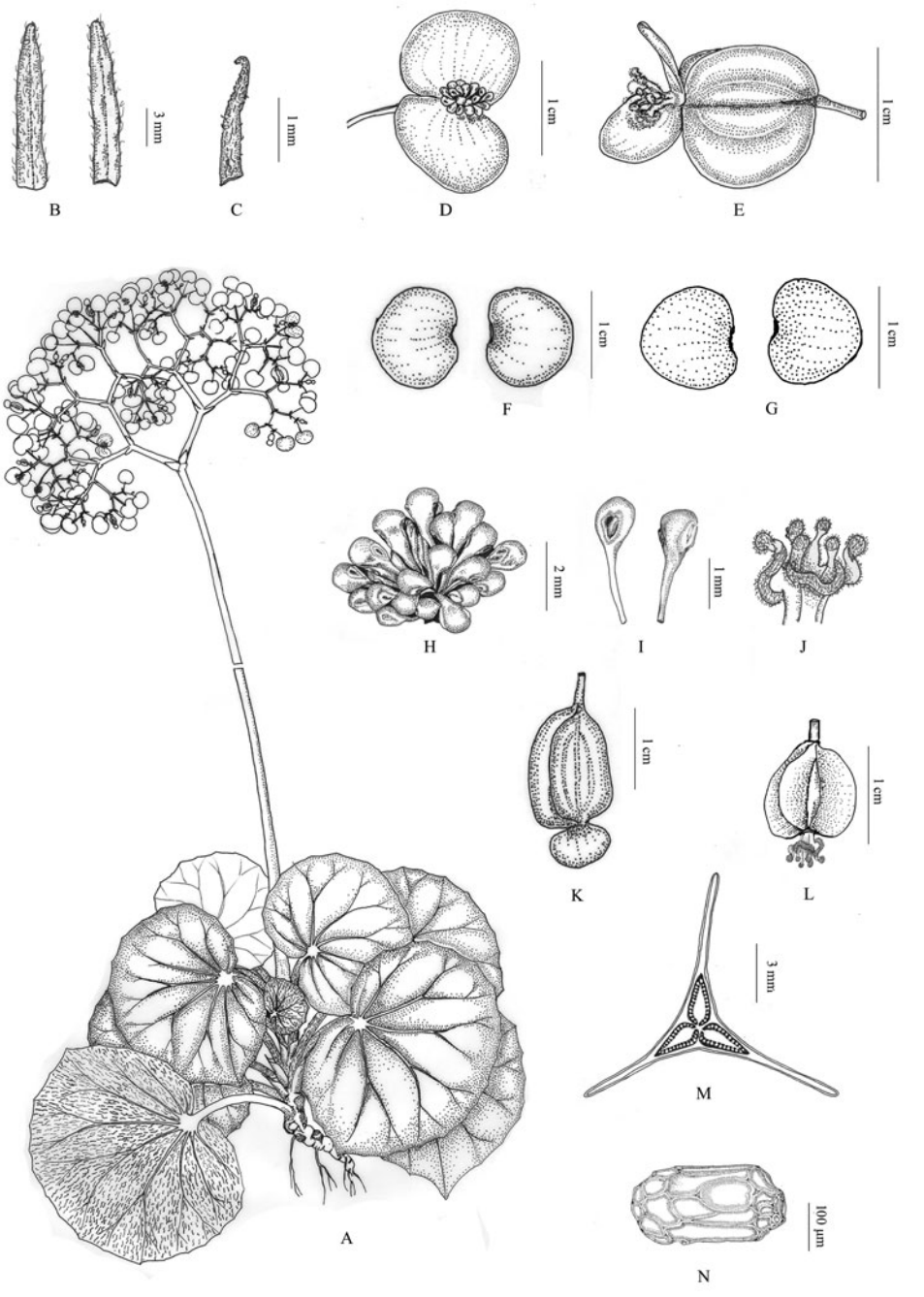

FIG. 7. *Begonia keralensis* Pradeep, Sinj. Thomas & Britto, sp. nov. A, Habit; B, bracts; C, bracteole; D, male flower; E, female flower; F, male tepals; G, female tepals; H, androecium; I, stamens; J, style; K and L, fruits; M, ovary (transverse section); N, seed. Drawn from *Nikhil Krishna* 168413 (A–I, K, M and N) and *S.J. Britto, S. Thomas & B. Mani* 67657 (J and L).

FIG. 8. *Begonia keralensis* Pradeep, S. Thomas & Britto, sp. nov. A, Habit; B, inflorescence; C, bract; D, bracteole; E, male flowers; F, female flowers; G, male tepals; H, female tepals; I, androecium; J, stamens; K, style; L, stylar branches (detached); M, dried fruits; N, ovary (transverse section).

IUCN category. Data Deficient (DD). Even though this species is placed under the Data Deficient category, it is reported from five localities in addition to the type locality.

Etymology. The specific epithet *keralensis* is derived from the area of distribution of the species, Kerala in India.

Phenology. Flowering and fruiting from December to March in the field and up to May in the greenhouse.

Additional specimens examined. India. **Kerala**: Thrissur District, Sholayar, 31 xii 2016, *Nikhil Krishna, Manu Philip & S. Reshmi* 148466 (CALI!); Palakkad District, Nelliyambathi, 10 xii 2017, *Shinoj K. & Nikhil Krishna* 14456 (CALI!); Palakkad District, Thippallikkayam, 12 i 2011, *Manudev K.M., A. K. Pradeep & Santhosh Nampy* 4310 (DEV!); Idukki District, Vagamon, 3 xi 2016, *S. J. Britto, S. Thomas & B. Mani* 67657 (RHT!); 15 xii 2018, *S. J. Britto, S. Thomas & B. Mani* 68845 (RHT!); Kottayam District, Mavadi, 13 i 2019, *S.J. Britto, S. Thomas & B. Mani* 68843 (RHT!).

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