

TAXONOMY OF *BEGONIA ALBOMACULATA* AND DESCRIPTION OF TWO NEW SPECIES ENDEMIC TO PERU

P. W. MOONLIGHT^{1,2}, M. HUGHES¹ & M. C. TEBBITT³

Begonia mayasiana L.B.Sm. & B.G.Schub. is shown to be synonymous with *Begonia albomaculata* C.DC. An emended description and lectotypification of *Begonia albomaculata* is provided, and the species is recorded from the Peruvian regions of Amazonas, Loreto, San Martín, Huánuco and Ucayali; the Brazilian state of Acre; and the Ecuadorian province of Pastaza. The use of the name *Begonia albomaculata* in the *Flora of Ecuador* and related publications is a misapplication, and the specimens cited there represent an undescribed taxon closely related to *Begonia tiliifolia* C.DC., described in a companion paper in this volume. Taxonomic study of *Begonia albomaculata* prompted a re-evaluation of related Andean species. As a result, two further new species were identified, and *Begonia longimaculata* Irmsch. and *Begonia maynensis* A.DC. were found to be conspecific. The two new species are described as *Begonia chemillenensis* Moonlight *sp. nov.* and *Begonia scorpiocaulis* Moonlight & Tebbitt *sp. nov.*, and are known only from the Pasco and Huánuco regions and the Madre de Dios region of Peru, respectively. *Begonia longimaculata* Irmsch. is newly treated here as a synonym of *B. maynensis* A.DC.

Keywords. *Begonia albomaculata*, *Begonia longimaculata*, *Begonia mayasiana*, *Begonia maynensis*, *Begonia* sect. *Knesebeckia*, Brazil, Ecuador, Peru.

INTRODUCTION

Casimir de Candolle's (1906) description of *Begonia albomaculata* was based on a single collection, *Huber* 1518, made in the Pampa del Sacramento Range near the border of the Loreto and San Martín regions of Peru. Smith & Schubert (1941) excluded the species from their account of the Begoniaceae in the *Flora of Peru* as a “*nomen subnudum*” because they considered its original description “insufficient for identification”. Later, Smith & Wasshausen (1984, 1986) published emended descriptions of *Begonia albomaculata* based solely on herbarium material collected in Ecuador. This material is distinct from the type of *Begonia albomaculata* C.DC. and

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represents an undescribed taxon closely related to *Begonia tiliifolia* C.DC., which is described in a companion paper in this volume (Tebbutt *et al.*, 2017).

Our examination of the two syntypes of *Begonia albomaculata* (Huber 1518 [2]) indicates that the species has no characters to distinguish it from *Begonia mayasiana* L.B.Sm. & B.G.Schub. Similarly, four sheets in G-BOISS that were cultivated from seed presumed to have been collected from the type gathering of *Begonia albomaculata* (Barbey s.n. [2] and Beauverd 2695 [2]) also show no features that distinguish them from *B. mayasiana*. *Begonia mayasiana* is, therefore, newly synonymised with *B. albomaculata*. An emended description and lectotypification of *Begonia albomaculata* is provided, and the known range of the species is emended to include the Amazonas, Huánuco, Loreto, San Martín and Ucayali regions of Peru; Acre state of Brazil; and the Ecuadorian province of Pastaza.

This taxonomic work on *Begonia albomaculata* C.DC. prompted a re-evaluation of Andean species and specimens related to this species. *Begonia albomaculata* belongs to a group of species within *Begonia* sect. *Knesebeckia* (Klotzsch) A.DC. that also includes *B. longimaculata* Irmsch. and *B. maynensis* A.DC. These three species are distributed in Amazonian Ecuador, Peru and Brazil, and in the case of *Begonia maynensis* and *B. longimaculata*, additionally in the foothills of the neighbouring Andes. These species are distinguished from all other species classified in *Begonia* sect. *Knesebeckia* by their combination of simple, entire leaves that in mature plants are clustered at the top of a short (< 60 cm), unbranched stem, the lower leaves having abscised, and their conspicuous persistent stipules. *Begonia maynensis* and *B. longimaculata* are readily distinguished from *B. albomaculata* by their cuneate leaf bases.

Fieldwork in Ecuador and Peru has demonstrated that individuals corresponding to the types of either *Begonia maynensis* or *B. longimaculata* frequently co-occur within single populations, with the former plants differing from the latter only by having concolorous green leaf blades rather than leaf blades that are green with elongated white markings along the central portions of their intervenal laminae. Examination of the type of *Begonia longimaculata* (Lobb s.n. [W]), similarly indicates that the only distinction between *B. longimaculata* and *B. maynensis* is this leaf coloration. Accordingly, *Begonia longimaculata* is newly recognised here as a synonym of *B. maynensis*, which is lectotypified here.

Our herbarium-based investigations also identified a new species from the Pasco region of Peru with a single collection from neighbouring Huánuco region. This species is most similar to *Begonia albomaculata* C.DC. but differs in a number of key characters. The plants are shorter, reaching only 40 cm, with smaller inflorescences dichotomous only to five times, and smaller leaves to only 25 cm long. Their male flowers have narrower, shorter petals to 10 × 5 mm, and they have c.20 stamens whereas those of *Begonia albomaculata* have c.40 and petals reaching 22 × 18 mm. Their fruits are unequally 3-winged, with the larger wing ascending over the styles, whereas those of *Begonia albomaculata* are usually equal to subequal or occasionally unequal (e.g. Croat & Sizemore 81610). This species is described here as *Begonia chemillenensis* Moonlight *sp. nov.*

We further identified a single specimen from the Madre de Dios region of Peru that represents a new species most similar to *Begonia chemillenensis*. This specimen differs from *Begonia chemillenensis* in its smaller leaves (10–12.5 cm) and in key inflorescence characteristics, including its serrate bracts and lanceolate to ovate, serrate bracteoles, and is unique among Andean species of *Begonia* sect. *Knesebeckia* in having orange flowers. We describe this specimen here as *Begonia scorpiocaulis* Moonlight & Tebbitt *sp. nov.*

We informally name *Begonia maynensis*, *B. albomaculata*, *B. chemillenensis* and *B. scorpiocaulis* the *B. maynensis* group of *Begonia* sect. *Knesebeckia*. Molecular phylogenetic data (Moonlight *et al.*, 2015) indicate that *Begonia* sect. *Knesebeckia* is polyphyletic, and that the *B. maynensis* group (represented by *B. maynensis*) is only distantly related to *B. incarnata* Link & Otto, the type species of the section. Ongoing phylogenetic work is being conducted to improve the sectional classification of the *Begonia maynensis* group and, in particular, to clarify its relationship to the *B. acerifolia* group as defined by Tebbitt (2016). Accordingly, *Begonia chemillenensis* and *B. scorpioides* are not here assigned to a section. A key is provided to the *Begonia maynensis* group.

KEY TO THE *BEGONIA MAYNENSIS* GROUP

- 1a. Leaf bases cuneate on both sides of the leaf blade _____ **3. *B. maynensis***
- 1b. Leaf bases cordate, rounded, or broadly rounded on the larger side of the leaf blade, cuneate to rounded on the narrow side of the blade _____ 2
- 2a. Leaf lamina 10–12.5 cm long; inflorescence bracts serrate; bracteoles ovate with serrate margins _____ **4. *B. scorpiocaulis***
- 2b. Leaf lamina (12–)15–30 cm long; inflorescence bracts entire, bracteoles lanceolate with entire margins _____ 3
- 3a. Petiole 8–22 cm; leaf lamina 8–17 cm wide; male flowers with c.40 stamens; upper edge of largest fruit wing ascending _____ **1. *B. albomaculata***
- 3b. Petiole 3.5–10 cm; leaf lamina 4–10 cm wide; male flowers with c.20 stamens; upper edge of largest fruit wing perpendicular to the ovary **2. *B. chemillenensis***

TAXONOMIC TREATMENT

1. *Begonia albomaculata* C.DC., Bot. Mus. Paraense Hist. Nat. 4: 593 (1906). – Type: PERU. Collinas in the Pampa del Sacramento between the río Ucayali and río Huallaga, 26 xi 1898, *Huber* 1518 (lecto G, designated here; isolecto MG [MG1518]). **Figs 1, 6A.**

Begonia mayasiana L.B.Sm. & B.G.Schub., Publ. Mus. Hist. Nat. “Javier Prado”, Ser. B. Bot. 17: 7, pl. 3, 1964. – Type: Peru. Amazonas. Provincia de Bagua. Rainforest along Quebrada Mirana (above Km. 227 of Marañón road), valley of río Marañón above Cascadas de Mayasi), alt. 450–500 m., 8 ix 1962, *J. J. Wurdack* 1902 (holo US!; iso AA!, K!, F!, NY!, S!, UC!, USM!) **syn. nov.**



FIG. 1. *Begonia albomaculata* C.DC. A, Habitat; B, habit; C, branch of inflorescence; D, male flower, front view; E, female flower, front-side view; F, fruit, side view. Scale bars: A, 50 cm; B, 15 cm; C, 5 cm; D and E, 2 cm; F, 15 mm. Photographs taken from *P.W. Moonlight & A. Daza* 126 (F), 175 (B, C and D) and 198 (A and E).

Caulесcent herb; glabrous throughout, 20–60 cm tall; *stem* erect, flexuous, succulent, unbranched to rarely branching near the base; *internodes* to 6 cm long at base of stem and progressively shorter towards apex; *stipules* persistent, lanceolate, 1.2–3.5 × 0.4–0.8 cm, the apex acuminate to mucronate, the margins entire. *Leaves* alternate, clustered towards apex of stem, basifixed; *petioles* 8–22 × 0.2–0.4 cm; *lamina* strongly asymmetrical, elliptic to ovate, 15–30 × 8–17 cm, base cuneate to rounded (to cordate) on narrow side, broadly rounded on wide side, apex acuminate, margins irregularly dentate with a 1-mm tooth at end of each major vein, and a short hair at tip of each tooth, upper surface dark green, sometimes with small white flecks, lower surface green; veins palmate-pinnate, 6- to 9-veined from base, 6–9 lateral veins on the wider side of lamina, 4–6 lateral veins on narrower side. *Inflorescences*: axillary, arising from axil of most leaves and often persistent after each leaf has abscised, a dichotomous cyme branching 4–8 times, protandrous; *peduncle* 2–8.5 cm long, secondary branches to 2.5 cm long, subsequent branches decreasing in length, final branches to 1.4 cm; *bracts* tardily deciduous, lanceolate, 3–9 × 1–4 mm, apex acute to mucronate, margin entire. *Male flowers*: *pedicels* 15–20 mm long; *tepals* 4, white, margins entire, outer 2 broadly ovate to orbicular, 7–22 × 4–18 mm, apex obtuse to rounded, inner 2 narrowly oblanceolate 8–12 × 2–4 mm, apex acute; *stamens* c.40, attached along the length of a 1–2 mm long column, filaments 1–4 mm long, longer at base of column, anthers broadly obovoid, c.0.5 mm long, dehiscing by lateral slits. *Female flowers*: *pedicels* 15–22 mm long; *bracteoles* deciduous, like the bracts, *tepals* 5, deciduous in fruit, white, subequal, lanceolate to ovate, 4–9 × 3–6 mm, apex obtuse to acute, margins entire; *ovary body* ellipsoid, 15–8 × 4–8 mm, unequally 3-winged, largest wing 13–18 × 7–15 mm, triangular, base rounded, apex perpendicular to the ovary, smaller 2 wings 13–18 × 5–8 mm, triangular, base rounded, apex perpendicular to ovary; placentae axile, bilamellate, ovuliferous all over; *styles* 3, tardily deciduous in fruit, 4–6 mm long, bifid c.2 mm from base, the branches erect, twice spirally twisted. *Fruiting pedicel* elongating to 4 cm. *Fruit* ellipsoid, body enlarging to 20 × 10 mm, unequally 3-winged, wings same shape as in the ovary, the larger wing enlarging to 30 × 16 mm and ascending to 8 mm above the ovary, the smaller 2 wings enlarging to 28 × 10 mm. *Seeds* globose, c.0.2 × 0.2 mm.

Phenology. *Begonia albomaculata* has been collected in flower and fruit year-round.

Distribution. *Begonia albomaculata* has been collected in the Peruvian regions of Amazonas, Loreto, San Martín, Huánuco and Ucayali; the Brazilian state of Acre; and the Ecuadorian province of Pastaza.

Habitat. Terrestrial, usually on rocky slopes by streams in tropical forest, 220–900 m altitude.

IUCN conservation category. *Begonia albomaculata* is a widespread and locally common species throughout the region from which it has been recorded. Accordingly, we assess it as of Least Concern (LC), according to IUCN criteria (2015).

Additional specimens examined. ECUADOR. **Pastaza:** Captaine Chiriboga, río Pastaza, 2°32'S, 76°49'W, 21 vii 1988, *W.H. Lewis, M. Elvin-Lewis, C.E. Cerón, E.J. Kennelly & M.C. Gnerre* 13742 (MO).

PERU. **Amazonas:** Prov. Bagua, Dist. Imaza, Region del Marañón, Comunidad de Yamayakat, Quebrada Kusu – Chapi, río Marañón, 04°55'S, 78°18'W, ii 1995, *R. Vasquez, N. Jaramillo, R. Apanu, & R. Kugkumas* 19770 (MO, USM); Prov. Bagua, Dist. Imaza, Newvo Samaria (anexo de UVT), 19 iii 1995, *C. Diaz, A. Peña, J. Mena, & D. Kakias* 7587 (MO); Prov. Bagua, Dist. Imaza, Comunidad Aguaruna de Kampaentza (PUJAIM), Terrenos de propiedad de Jan Mayán, 6 x 1994, *C. Diaz, J. Mayán, A. Peña, & E. Mayán* 7301 (MO); Prov. Bagua, Dist. Imaza, río Cenepa Region, region nor oriental del Marion, comunidad Samaria, 4°51'S, 78°8'W, i 1995, *V. Hodges & J. Gorham* 235 (MO); Prov. Bagua, Dist. Imaza, río Cenepa Region, region nor oriental del Marion, comunidad Yamayakat, 4°55'S, 78°19'W, i 1995, *V. Hodges & J. Gorham* 59 (MO); Prov. Bagua, Yamayakat, 4°55'S, 78°19'W, 3 ii 1996, *N. Jaramillo, M. Jaramillo, & D. Chamit* 1065 (MO, NY); Prov. Bagua, Dist. Imaza: Región del Marañón, comunidad de Yamayakat, Quebrada Kusu – Chapi, río Marañón. Area permanente 500 × 500 m Parcela “E”, 4°55'S, 78°19'W, ii 1995, *R. Vasques, N. Jaramillo, R. Apanu, & R. Kugkumas* 20098 (MO); Prov. Bagua, Dist. Imaza – Yamayakat, 4°55'S, 78°19'W, 25 v 1996, *R. Vasques & A. Vasques* 20983 (MO); Prov. Bagua, Dist. Aramango, road from Bagua towards Santa Maria del Nieve, c.30 minutes by car N. of El Muyo, 5°17'S, 78°25'W, 30 i 2016, *P.W. Moonlight & A. Daza* 126 (E, MOL); Prov. Bagua, c.1 km NE of Quebrada Chinganza (0 km NE of Mayo) on bank of río Marañón, 05°25'S, 78°28'W, 11 vi 1986, *S. Knapp & P. Alcorn* 7724 (MO, USM). – **Loreto:** Prov. Coronel Portillo, Boquerón, 8 xi 1964, *R. Ferreyra* 16068 (MO, USM). – **San Martín:** Prov. Lamas, Dist. Caynarachi, route from Tarapoto to Yurimaguas, 6°22'S, 76°15'W, 4 ii 2016, *P.W. Moonlight & A. Daza* 175 (E, MOL); Achinamiza, lowland rainforest along río Huallaga, 15 v 1979, *D.C. Wasshausen & F. Encarnación* 1070 (K, MO, NY, US, USM). – **Huánuco:** Huánuco-carretera Pucallpa, viii 1943, *C.A. Ridout* 13847 (USM); Along steep cliffs W of río Huallaga above bridge over río Huallaga on road to airport, 09°14'S, 78°0'W, 5 iv 1984, *T.P. Croat* 57965 (MO, USM); Prov. Leoncio Prado; Dist. Rupa Rupa, Al oeste de Tingo María cerro frente al Aeropuerto, 3 viii 1978, *J. Schunke* 10439 (MO); Prov. Leoncio Prado, Dist. Rupa Rupa, Camino a Jacintillo, (Al oeste de Tingo María), 2 xi 1971, *J. Schunke* 5107 (G, NY, US); Valley of río Huallaga, along steep banks of río Monzón, near bridge over río Patay Rondos on road from Tingo María to Monzón, 09°17'S, 76°05'W, 2 vi 1998, *T.B. Croat & M. Sizemore* 81610 (F, MO, US, USM); Along road from Tingo María to Monson, vicinity of río Patay Rondos, cuevas de Gucharó “Parque National Tingo María”, 9°21'S, 76°12'W, 4 iv 1984, *T.B. Croat* 57921A (MO); Tingo María, across the Huallaga on trail to Monson, 30 x 1949 – 19 ii 1950, *H.A. Allard* 21854 (US); Cayumba entre Huánuco y Tingo María, 15 vii 1948, *R. Ferreyra* 4224 (MO, MOL, USM); Prov. Huánuco, Dist. Chinchao, route from Tingo María to Carpish, 9°30'S, 75°56'W, 10 ii 2016, *P.W. Moonlight & A. Daza* 213 (E, MOL). – **Ucayali:** Prov. Padre Abad., Dist. Padre Abad, Cuenca del río Aguaytia. Quebrada el Velo de la Novia, margen derecha del río Yurmac, 09°03'S, 75°48'W, 30 vi 2004, *J. Schunke Vigo & J.G. Grahams* 15771 (G, MOL); Prov. Padre Abad, Dist. Padre Abad, c.2 km N of Boqueron de Padre Abad, 9°4'S, 72°42'W, 8 ii 2016, *P.W. Moonlight & A. Daza* 204 (E, MOL); Prov. Padre Abad., Dist. Padre Abad, Boqueron de Padre Abad, 9°4'S, 75°40'W, 8 ii 2016, *P.W. Moonlight & A. Daza* 198 (E, MOL); Prov. Padre Abad., Dist. Padre Abad, Cumbre de la Divisoria, entre Ucayali y Huánuco, cabecera del río Yurac, afluente del río Aguaytia, 9°11'S, 75°47'W, 3 vii 2007, *J.G. Graham & J. Schunke Vigo* 4156 (MOL).

BRAZIL. **Acre:** Cruzeiro do Sul, Basin of río Juruá, río Juruá-Mirim and Igarapé Periquito (right bank tributary) across from Santo Antônio, “Salão”, c.8°13'S, 73°02'W, 11 v 2003, *D.C. Daly, E.C. Oliveira & L. Johnson* 11700 (MO, NY); Cruzeiro do Sul, río Juruá & río Moa. Vicinity of Porangaba, río Juruá-Mirim, 21 v 1971, *P.J.M. Mass, K. Kubitzki, W.C. Steward, J.F.*

Ramos, W.S. Pinheiro & J.F. Lima P13238 (K, NY, RB); Jordão. rio Tarauacá, downstream of Jordão, “Colocação do Sebastião”, 8°48'S, 71°47'W, 10 ii 2009, R. Goldenberg, F.A. Michelangeli, P. Acevedo-Rodriguez, F. Obermuller, E.C. Oliveira & H.M. Oliveira 1382 (RB); Aldeia São Joaquim, Centro de Memória, Parque Fundo do Segrado. Terra Indígena Huni Kuin do Baixo rio Jordão, 9°22'S, 71°54'W, A. Quinet 2912 (RB).

CULTIVATED. Serres de la Pressière, Chambéry (presumed cultivated from type collection), 4 ii 1910, Barley s.n. (G-BOISS [2]); Serres de Jardin Botanique de Genève (presumed cultivated from type collection), 10 iv 1908, Beauverd 2695 (G-BOISS [2]); Serre chaude de la Pressière (presumed cultivated from type collection), 8 vi 1909, Beauverd s.n. (G-BOISS).

When in flower or fruit, *Begonia albomaculata* is easy to distinguish from *B. chemillenensis*. Male flowers have around twice the number of stamens of *Begonia chemillenensis*, and the fruits and male flowers of *B. albomaculata* are significantly larger (the largest tepals of *B. albomaculata* reach 22 mm, whereas those of *B. chemillenensis* reach 12 mm). Identification of sterile specimens may be more difficult, especially towards the south of the range of *Begonia albomaculata*, where specimens are occasionally relatively small and may overlap in size with larger plants of *B. chemillenensis*. Sterile living specimens are best distinguished by their thicker, more succulent leaves. In herbarium specimens, the thinner leaves of *Begonia chemillenensis* tend to dry light green and translucent, whereas those of *B. albomaculata* dry dark green and opaque.

The specimen *Wasshausen & Encarnación* 1070 (US) is annotated as the holotype of *Begonia phivialis* L.B.Sm. & Wassh., but this name has never been published. This epithet is now unavailable because of the later publication of *Begonia phivialis* L.B.Sm. ex S.F.Sm. & Wassh. (Smith & Wasshausen, 1999). Similarly, the collection *Allard* 21854 (US) is annotated as the holotype of *Begonia berniceana* L.B.Sm. & Wassh., but again this name has never been published. The label of this latter specimen also states that the collection was made in the San Martín region of Peru, but the locality appears to be in the Huánuco region. We see no reason to separate either specimen from *Begonia albomaculata*.

Further images of *Begonia albomaculata* are available on the *Begonia Resource Centre* (Hughes et al., 2015–).

2. *Begonia chemillenensis* Moonlight, sp. nov. – Type: Peru. Pasco: Prov. Oxapampa. Dist. Palcazú. CC NN. Loma Linda. 10°22'S, 75°04'W, 16 vi 2010. R. Vasquez, M. Huaman, & R. Rivera 36606 (holo HOXA; iso E, MO [MO-2080522], USM). **Figs 2, 3, 6B.**

Begonia chemillenensis Moonlight is most similar to *B. albomaculata* C.DC. but is best distinguished by its generally shorter petioles (those of *B. albomaculata* are 8–22 cm long); narrower leaf blades (those of *B. albomaculata* are 7–17 cm wide); smaller, lanceolate to narrowly ovate outer male tepals with acute to obtuse apices (those of *B. albomaculata* are broadly ovate to orbicular, 8–22 × 4–18 mm, with obtuse to broadly rounded apices); c.20 stamens (*B. albomaculata* has c.40); and the perpendicular angle of the upper edge of the largest ovary and fruit wing relative to the ovary (that of *B. albomaculata* is ascending).

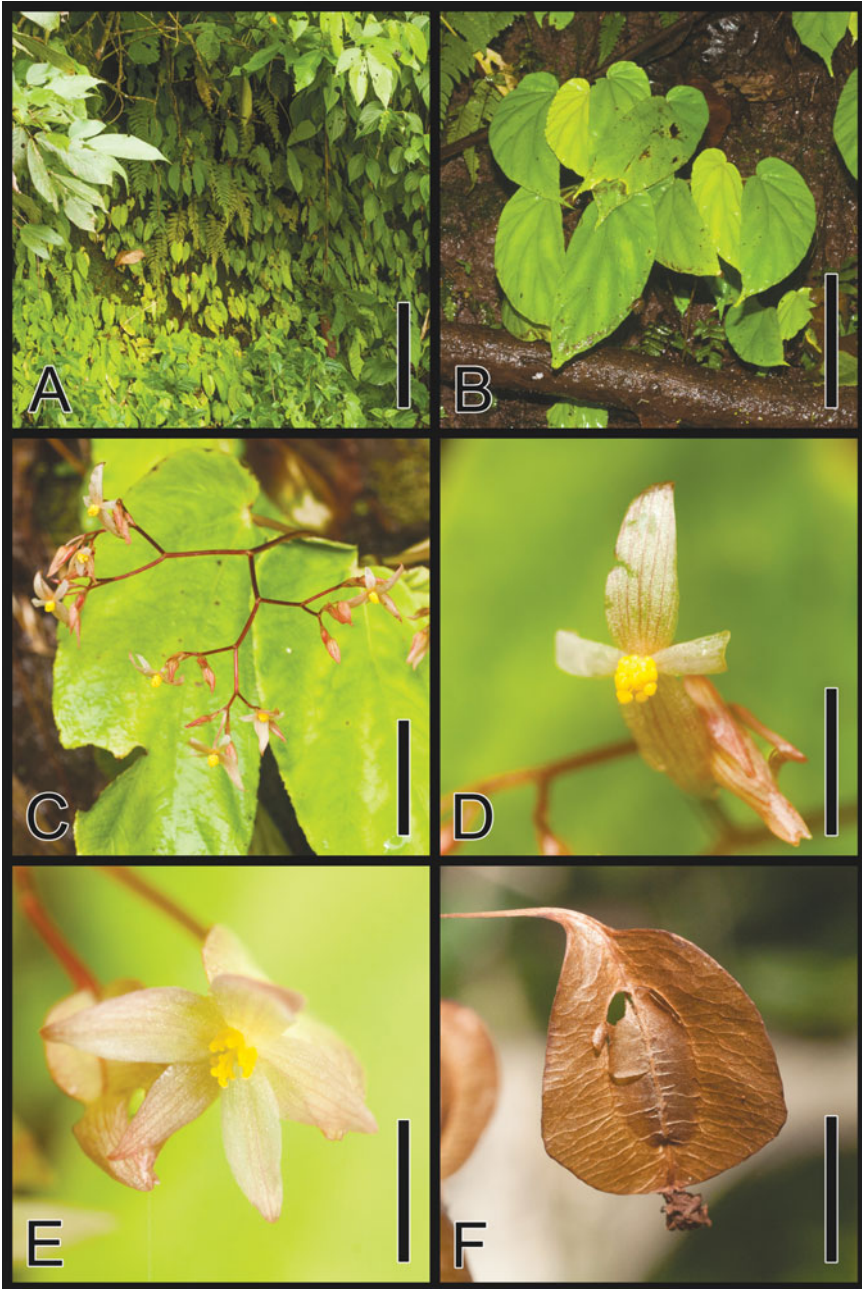


FIG. 2. *Begonia chemillenensis* Moonlight. A, Habitat; B, habit; C, branch of inflorescence; D, male flower, front view; E, female flower, front view; F, fruit, side view. Scale bars: A, 50 cm; B, 10 cm; C, 25 mm; D and F, 10 mm; E, 5 mm. Photographs taken from *P.W. Moonlight & A. Daza* 278 (F) and 314 (A–E).

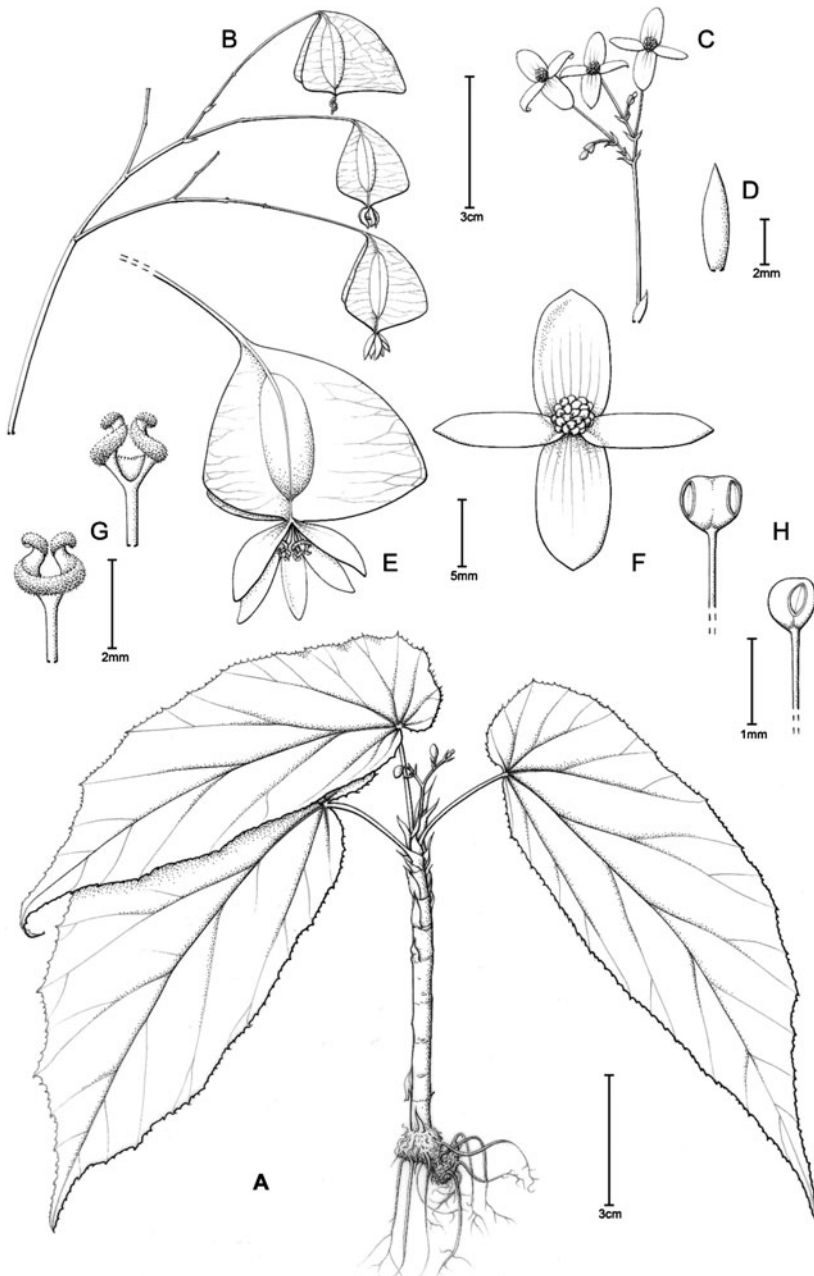


FIG. 3. *Begonia chemillenensis* Moonlight. A, Habit; B, branch of infructescence; C, branch of inflorescence; D, bract; E, female flower, side view; F, male flower, front view; G, style, back and front views; H, stamen, front and side views. Scale bars: A–C, 3 cm; D and G, 2 mm; E and F, 5 mm; H, 1 mm. Drawn from *I. Huamantupa* et al. 11435 (A), *P.W. Moonlight & A. Daza* 287 (B, F and H) and 317 (C–E, and G).

Cauliscent herb; glabrous, 20–40 cm tall; *stem* erect, flexuous, succulent, unbranched to rarely branching near base; *internodes* to 2.5 cm long at base of stem and progressively shorter towards apex; *stipules* persistent, lanceolate, 1–2 × 0.2–0.4 cm, apex acuminate to mucronate, the margins entire. *Leaves* alternate, clustered towards apex of stem, basifixed; *petioles* 3–10 × c.0.2 cm; *lamina* strongly asymmetrical, elliptic to oblanceolate, 12–25 × 4–10 cm, base cuneate to rounded (to cordate) on narrow side of lamina, broadly rounded on large side, apex acuminate, margins irregularly dentate with a short hair at tip of and between each tooth, with a 2- to 3-mm tooth at end of each major vein, upper surface green, lower surface pale green; venation palmate-pinnate, 6- to 8-veined from base, 8–10 lateral veins on the wider side, 6–8 lateral veins on the narrower side. *Inflorescences*: axillary, arising from axil of most mature leaves and often persistent after leaf has abscised, a dichotomous cyme branching to 5 times, protandrous; *peduncle* 4–8(–12) cm long, secondary branches to 2 cm long, more distal branches decreasing in length, quinary branches to 1 cm; *bracts* tardily deciduous, lanceolate, 5–8 × 1–3 mm, apex acute to mucronate, margins entire. *Male flowers*: *pedicels* 1–2 cm long; *tepals* 4, white, margins entire, outer 2 lanceolate to narrowly ovate, 7–12 × 2–6 mm, apex acute to obtuse, inner 2 narrowly lanceolate 5–11 × 2–3 mm, apex acute; *stamens* c.20, attached along a 1-mm column, filaments to 3 mm long; anthers broadly obovoid, c.0.5 mm long, dehiscing by lateral slits. *Female flowers*: *pedicels* 1–1.5 cm long; *bracteoles* deciduous, like the bracts, *tepals* 5, deciduous in fruit, white, subequal, lanceolate to ovate, 7–8 × 4–5 mm, apex acute to obtuse, margins entire; *ovary body* ellipsoid, 10–15 × 4–6 mm, unequally 3-winged, largest wing 15–17 × 5–12 mm, triangular, base rounded, apex perpendicular to the ovary to ascending 2 mm above ovary, smaller 2 wings 12–15 × 1–5 mm, triangular, base rounded apex perpendicular to the ovary; placentae axile, bilamellate, ovuliferous all over; *styles* 3, subpersistent in fruit, c.3 mm long, bifid c.1.5 mm from base, branches erect, twice spirally twisted. *Fruiting pedicel* elongating to 2.5 cm. *Fruit* ellipsoid, body enlarging to 20 × 8 mm, unequally 3-winged, larger wing enlarging to 25 × 15 mm and extending to 2 mm above ovary, base rounded, apex truncate to acute, smaller 2 wings as in ovary. *Seeds* globose, c.0.2 × 0.2 mm.

Phenology. *Begonia chemillenensis* has been collected flowering and fruiting from February to August.

Distribution. *Begonia chemillenensis* is known primarily from the Pasco region of Peru, with a single collection from the neighbouring Huánuco region.

Habitat. This species grows in primary forest at 320–1480 m altitude, typically on calcareous soils within and surrounding limestone outcrops. Associated species include ferns, Gesneriaceae spp., *Selaginella* spp. and several bryophytes.

In one location (10°3'S, 75°32'W), a population of *Begonia arrogans* Irmsch. was observed growing on patches of acidic soils intermingled with alkaline soils supporting *B. chemillenensis*. A group of c.10 individuals was observed displaying intermediate characteristics between the two species (*P.W. Moonlight & A. Daza* 276). These putative

hybrids appeared sterile. Photographs of this collection are available on the *Begonia Resource Centre* (Hughes *et al.*, 2015–).

IUCN conservation category. *Begonia chemillenensis* has an area of occupancy of > 1000 km², a large proportion of which falls within the well-protected Parque Nacional Yanachaga-Chemillén. Fieldwork during February 2016 identified a large number of seemingly stable populations of the species, both within and around Parque Nacional Yanachaga-Chemillén. Accordingly, we classify *Begonia chemillenensis* as Least Concern (LC), according to IUCN criteria (2015).

Etymology. *Begonia chemillenensis* is named for the Chemillén cordillera at the centre of the range of the species. The name ‘Chemillén’ is in the local indigenous Yanachaga language.

Additional specimens examined. PERU. **Huánuco:** Prov. Puerto Inca, Dist. Codo de Pozuzo, Route from Pozuzo to Codo de Pozuzo, c.3.5 km from Puente Paujil, 9°56’S, 75°31’W, 20 ii 2016, *P.W. Moonlight & A. Daza* 283 (E, MOL); **Pasco:** Prov. Oxapampa, Dist. Pozuzo, Route from Pozuzo to Codo de Pozuzo, 10°1’S, 75°30’W, 20 ii 2016, *P.W. Moonlight & A. Daza* 287 (E, MOL); Prov. Oxapampa, Pozuzo, 10°04’S, 75°31’W, 19 viii 2010, *Xue-Jun Ge et al.* 441 (USM); Prov. Oxapampa, Dist. Huancabamba, Camino a Pozuzo, 10°04’S, 75°32’W, 2 vi 2004, *R. Rojas, M. Huaman, A. Peña, & J. Mateo* 2496 (HOXA, MO, USM); Prov. Oxapampa, Dist. Pozuzo, camino to mirador from Pozuzo, 10°4’S, 75°32’W, 20 ii 2016, *P.W. Moonlight & A. Daza* 274 (E, MOL); *ibid.*, *P.W. Moonlight & A. Daza* 278 (E, MOL); Prov. Oxapampa, Dist. Pozuzo, road from Pozuzo to Oxapampa, 10°9’S, 75°33’W, 21 ii 2016, *P.W. Moonlight & A. Daza* 292 (E, MOL); Parque Nacional Yanachaga-Chemillén, Path from Huampal Control Centre “camino de colonos”, 10°10’S, 75°34’W, 21 ii 2016, *P.W. Moonlight & A. Daza* 294 (E, MOL); Parque Nacional Yanachaga-Chemillén, El Huampal. 10°11’S, 75°34’W, 1 vii 2003, *H. van der Werff, R. Vásquez, B. Gray, R. Ortiz, & N. Davila* 17924 (HOXA, MO); Dist. Pozuzo, Parque Nacional Yanachaga-Chemillén. Sector Huampal. Trocha entre el PC Huampal y pastizales del Sr Shuller. 10°11’15’’S, 75°34’9’’W, 19 iv 2012, *K. V. Durand, T. R. Zender, & F. G. Shareva* 202 (HOXA, MO); Prov. Oxapampa, Dist. Palcazú, Sector San Francisco de Pichanaz (Puente Albariño), 10°15’S, 75°15’W, 12 ii 2005, *R. Rojas, R. Vásquez, M. Huaman, R. Francis & B. Vásquez* 3490 (HOXA, MO); Prov. Oxapampa, Dist. Palcazú, Parque Nacional Yanachaga-Chemillén, Sector Paujil, trail from Pampa Pescado to “las cavernas”, 10°20’S, 75°15’W, 25 ii 2016, *P.W. Moonlight & A. Daza* 317 (E, MOL); Prov. Oxapampa, Dist. Palcazú, Route to Izcosacin, km 30, 10°20’S, 75°6’W, 24 ii 2016, *P.W. Moonlight & A. Daza* 314 (E, MOL); Prov. Oxapampa, Dist. Palcazú, Parque Nacional Yanachaga-Chemillén, Estación Biológica Paujil, boca del río pescado, 10°20’S, 75°4’W, 10 iii 2012, *R. Vásquez, L. Valenzuela & M. Ureta* 37853 (HOXA); Prov. Oxapampa, Dist. Palcazú, Parque Nacional Yanachaga-Chemillén. Sector Paukil. Parcela RAINFOR 2, 10°21’S, 75°15’W, 23 iv 2008, *I. Huamantupa, A. Peña, J. Mateo, A. Sebastian, & L. Rios* 11435 (HOXA, MO [2], USM [2]); Dist. Palcazú, Parque Nacional Yanachaga-Chemillén. Quebrada David. 10°23’S, 75°17’W, 28 v 2011, *R. Vásquez, M. Villalba, & C. Mateo* 37411 (HOXA, MO); Oxapampa. Along road Chatarra-Cacazu, 10°32’S, 75°04’W, 11 vii 2003, *H. van der Werff, R. Vásquez, B. Gray, R. Ortiz, & N. Davila* 18298 (HOXA, MO); Prov. Oxapampa, Dist. Villa Rica, Route from Villa Rica to Puerto Berudez, km. 88, 10°33’S, 75°5’W, 24 ii 2016, *P.W. Moonlight & A. Daza* 313 (E, MOL).

Further images of *Begonia chemillenensis* are available on the *Begonia Resource Centre* (Hughes *et al.*, 2015–).

3. *Begonia maynensis* A.DC., Ann. Sci. Nat., Bot., IV, 11: 126–127, 1859; L.B. Smith & B.G. Schubert (1941) *Flora of Peru* 13(4): 194; L.B. Smith & D.C. Wasshausen (1986) *Flora of Ecuador* 25(133): 49–50. – Type: PERU. near Tarapoto, vi 1855. *Spruce* 4859 (lecto (designated here): G-DC [G00675969], (Photo F, K, MO); isolecto BM, E [E00157075], G [G00237559], G-BOIS, G-DC [G00676066], K [2: K000006031; K000006032], MG [MG019634], NY [NY00118630], OXF, TCD [TCD0005563]). **Figs 4, 6C.**

Begonia longimaculata Irmsch., Bot. Jahrb. Syst., 76: 89–90, 1953. – Type: PERU. Without further locality, *W. Lobb* s.n. (holo: W [W 1889-0159133]) **syn. nov.**

Cauliscent herb; glabrous throughout, 20–40 cm tall; *stem* erect, flexuous, succulent, unbranched to rarely branching near base; *internodes* to 3 cm long at base of stem and progressively shorter towards apex; *stipules* tardily deciduous, lanceolate, 1–1.5(–2.2) × 0.4–0.6 cm, apex acuminate to mucronate, margins entire. *Leaves* alternate, clustered towards apex of stem, basifixed; *petioles* 0.5–3 × c.0.2 cm; *lamina* asymmetrical, elliptic to oblanceolate, (8–)10–22 × 2.5–10 cm, base cuneate at both sides of lamina, apex acuminate, margins irregularly dentate, eciliate to sparsely ciliate, occasionally with a 1-mm tooth at end of each major vein, upper surface green or green with silver blotches between veins, lower surface pale green to purple; venation palmate-pinnate, 3-veined from base, 6–8 lateral veins on wider side of lamina, 6–8 lateral veins on narrower side. *Inflorescences*: axillary, arising from axil of most mature leaves and often persistent after leaf has abscised, a dichotomous cyme branching to 5 times, protandrous; *peduncle* 1–3.5(–4.5) cm long, secondary branches to 1.5 cm long, more distal branches decreasing in length, quinary branches to 0.5 cm; *bracts* tardily deciduous, lanceolate, 3–5 × 1–2 mm, apex acute to mucronate, margins entire. *Male flowers*: *pedicels* 0.6–1.5 cm long; *tepals* 4, white, margins entire, outer 2 lanceolate to ovate, 4–8 × 4–7 mm, apex acute, inner 2 narrowly lanceolate 4–6 × 2 mm; *stamens* 20–25, attached along the length of a 2 mm long column, filaments to 2 mm long; anthers broadly obovoid, c.0.5 mm long, dehiscing by lateral slits. *Female flowers*: *pedicels* 0.5–1 cm long; *bracteoles* deciduous, like the bracts, *tepals* 5, persistent in fruit, white, subequal, lanceolate to ovate, 5–11 × 3–5 mm, apex obtuse to acute, margins entire; *ovary body* ellipsoid, 7–15 × 2–4 mm, unequally 3-winged, base cuneate, apex truncate, largest wing 12–20 × 5–10 mm, triangular, base cuneate to rounded, apex perpendicular to the ovary, smaller 2 wings 10–12 × 2–5 mm, triangular, base rounded, apex perpendicular to ovary; placentae axile, bilamellate, ovuliferous all over; *styles* 3, subpersistent in fruit, c.4 mm long, bifid c.2 mm from base, the branches erect, twice spirally twisted. *Fruiting pedicel* elongating to 2.5 cm. *Fruit* ellipsoid, enlarging to 20 × 8 mm, unequally 3-winged, larger wing enlarging to 25 × 15 mm and extending to 4 mm above ovary, base rounded, apex obtuse to acute, smaller 2 wings as in ovary. *Seeds* globose, c.0.2 × 0.2 mm.

Phenology. This species has been collected in flower and fruit year-round.

Distribution. *Begonia maynensis* has been collected in the Ecuadorian provinces of Pastaza, Tungurahua, Napo, Orellana, Morona-Santiago, Sucumbios and



FIG. 4. *Begonia maynensis* A.DC. A, Habit, non-variegated individual; B, habit, variegated individual); C, branch of inflorescence; D, male flower, front view; E, female flower, front-side view; F, fruit, side view. Scale bars: A and B, 15 cm; C, 2 cm; D, 5 mm; E, 8 mm; F, 10 mm. Photographs taken from *P.W. Moonlight & A. Daza* 20 (B), 65 (E and F) and 185 (A, C and D).

Zamora-Chinchipec; the Peruvian regions of Amazonas, Huánuco, Ucayali, Pasco, Junín, Cuzco, Loreto, San Martín and Madre de Dios; and the Brazilian state of Acre.

Habitat. *Begonia maynensis* is recorded from both primary and disturbed forest. It usually grows in moist places, and can be epiphytic, lithophytic or terrestrial. The species usually occurs in tropical forests at 200–500 m altitude but occasionally may grow at higher altitudes in montane forests, up to 1050 m.

IUCN conservation category. *Begonia maynensis* is often locally abundant throughout the region from which it has been recorded. Accordingly, we assess this species as Least Concern (LC), according to IUCN criteria (2015).

Representative specimens examined. ECUADOR. **Sucumbios:** río Aguarico, Dueno, 30 km E of Santa Cecilia, 14 iii 1968, *G. Harling, G. Storm & B. Strom* 7650 (MO, NY). – **Sucumbios-Napo:** Road Lago Agrio – El Chaco, 23 xi 1973, *H. Lugo* 3527 (GB, MO). – **Napo:** Estación Experimental de INIAP, San Carlos 6 km al SE de Los Sachas, 5 iv 1985, *M.A. Baker* 5895 (MO [2], QCNE); Chonta Punta at río Napo, in the vicinity of Santa Rosa, 5 v 1972, *H. Lugo* 2152 (K, NY); Reserva Biológica Jatun Sacha, río Napo, 8 km abajo de Misahualli, 1°04'S, 77°36'W, 17 i – 6 ii 1987, *C. Cerón* 611 (MO, QCA, QCNE); Campana Cocha, Comunidad Quicha, margen izquierdo del río Napo, 1°05'S, 77°30'W, 22 viii 1980, *J.A. Jaramillo & F. Coello* 3744 (MO, QCA [2]); río Bueno, tributary of the río Suno, 4–5 km N of Santa Rosa, 7 v 1972, *H. Lugo* 2176 (MO). – **Napo-Orellana:** Tena-Pano road, 18–19 vii 1982, *L. Besse, H. Kennedy & R. Baker* 1656 (MO). – **Orellana:** Shushufindi [Nuevo Leja], road Coca, [Puerto Francisco de Orellana], *L.S. Holguer* 3295 (QCA); c.10 km NW of Coca, 25 ii 1980, *C.C. Berg & R.W.A.P. Akkermans* 1082 (AAU, MO, QCA); Anangu, río Napo, trail to terra firma line, 0°31'S, 76°23'W, *J.E. Lawesson, T. Læssøe & P.M. Jørgensen* 39609 (MO, QCA, QCNE); Laguna de Yuturi, 0°36'S, 76°1'W, *N. Jaramillo & Grijalva* 11532 (QCA); Reserva Etnica Huaorani, comunidad Guiyero, bloque 16 petrolero de Repsol, km 32, al lado del río Tiputini, 00°36'S, 76°27'W, 17 ii 2005, *B. Freire & D. Naranjo* 567 (MO); Yasuni National Park, Estación Científica Yasuni, at río Tiputini and surroundings, 26 km along the road from Napo (Plot 18), 0°40'S, 76°24'W, 20 iv 1996, *A.D. Poulsen, R. Moran, H. Tuomisto & K. Ruokolainen* 1235 (QCA, QCNE); Via de acceso Chiruisla-río Tiputini, colecciones en los alrededores de km 12+786, 00°41'S, 75°55'W, *Pérez et al.* 1274 (QCA); Aguarico, Parroquia Nuevo Rocafuerte, comunidad Martinica (Kichwa), *D. Reyes & L. Carrillo* 963 (MO, QCNE); Parque Nacional Yasuni, Comunidad Miwaguno a 140 km al sur del Coca, via al Pindo, Bloque 14 (ENCAN), río Shiripuno, 00°43'S, 76°43'W, 11 v 2004, *B. Freire & D. Naranjo* 729 (MO, QCNE); Aguarico, Reserva Etnica Huaorani, carretera y oleoducto de Maxus en construcción km 67–69, 0°49'S, 76°22'W, 1–3 xii 1993, *M. Aulestia, N. Andi & E. Nenquerei* 1394 (MO); Parque Nacional Yasuni, POZO PETROLERO DAIMI 2, 00°55'S, 76°11'W, 26 v – 8 vi 1988, *C.E. Cerón & F. Hurtado* 4073 (MO, QCNE). – **Tungurahua:** Quito, 51 km from Puyo on road to Tena, 1°20'S, 77°56'W, 2 ii 1984, *W.S. Hoover* 498 (MO, QCA). – **Pastaza:** Pastaza Canton, Pozo Villano, 2 km del pueblo de Villano, 01°25'S, 77°20'W, 3 xii 1991, *G. Tipaz, S. Espinoza & C. Gualinga* 483 (MO); Pastaza, Villano, Pozo petrolero Villano 2 de ARCO, al sur del río Lliquino, 01°28'S, 77°27'W, 28 viii 1997, *A. Alvarez, E. Freire & H. Vargas* 2187A (QCNE, MO); Parque Pedagógico Etnobotánico Omaer, río Villano, *Blanc et al.* BLLM-96-538 (QCA); Loracachi, on the path to Lagartococha, 1°38'S, 75°58'W, *J. Jaramillo, F. Coello & A. Freire* 30974 (MO, QCA); Pozo petrolero “Corrientes” de UNOCAL, 35 km al sur-orientado de Curaray, 01°43'S, 76°49'W, 1–15 ix 1990, *S. Espinoza* 274 (MO, QCNE); Pacayacu on the río Bobonaza, c.16 km NW of Barayacu, *L.S. Holguer* 5257 (MO, QCA); Pastaza Canton, 01°43'S, 76°49'W, 1–31 viii 1990, *E. Gudiño* 565 (QCNE);

ri o Capihuari, tributary of ri o Pastaza, 2 30–31’S, 76 50–55’W, 23 vii 1980, *B.  llgaard, E. Asanza S., J.S. Brandbyge, S. Roth & C.R. Sperling* 35122 (AAU, QCA); ri o Pastaza between Destacamento Chiriboga and Apachi Entza, 2 20–32’S, 76 55’–77 8’W, 24 xii 1980, *B.  llgaard, E.C. Asanza, J. Brandbyge, S. Roth & C. Sperling* 35228 (MO, QCA). – **Morona-Santiago**: Regi n de la Cordillera del C ndor, Centro Shuar Chimius, 3 v 2006, *C. Kajekai & A. Wisum* 443 (MO); Canton Santiago de Mendez, between Patuca and Santiago, 2 59’S, 78 13’W, 12 i 2014, *A. Jara* 2649 (ANDES, QCA). – **Zamora-Chinchipe**: Nangaritza Canton, ri o Nangaritza, Shaime, Orilla derecha del ri o, 04 20’S, 78 40’W, 8 xii 1990, *W. Palacios* 6664 (MO, QCNE); ri o Nangaritza, Colina Salade, c.2 km E of Destacamento Shaime, 04 22’S, 78 40’W, * llgaard* 98480 (QCA).

PERU. Loreto: Prov. Alto Amazonas Puranchim, ri o Sinchiyacu, 2 50’S, 76 55’W, 30 iii – 1 iv 1987, *W.H. Lewis, M. Elvin-Lewis, D. Fast & J.R. Campos* 13392 (MO); Prov. Maynas, Roca Fuerte (Momon), 03 40’S, 73 30’W, 7 vii 1984, *R. V squez & N. Jaramillo* 5230 (MO, NY, USM); Above Pongo de Manseriche, mouth of ri o Santiago, 21 xi 1931, *Y. Mexia* 6130 (BM, G, GH, MO, NY); Prov. Mariscal Ramon Castilla. Margen izquierda del ri o Yavari, entre Colonia Angamos y Lago Preto. Siteo 3 Quebrada Limeria, 9 iv 2003, *H. Beltr n, N. Pitman, R. Garcia, C. Vriesendorp & M. Huite* 5699 (USM); Prov. Alto Amazonas, Shucushuyacu (ri o Huallaga), 06 02’S, 75 50’W, 13 ix 1981, *R. V squez & N. Jaramillo* 2452 (MO). – **Amazonas**: Prov. Condorcanqui, Dist. Santiago, Cerros Kampankis: Serran a entre los ri os Santiago y Morena, desde ri o Mara n n hasta frontera con Ecuador, Campamento 2, Qda. Katerpisa, 04 02’S, 77 33’W, 9 viii 2011, *I. Huamantupa, D. Neill, N. Pitman & C. Kajekai* 15556 (USM); Prov. Condorcanqui, Dist. El Cenepa, Comunidad de Mamayaque, ri o Cenepa, Quebrada Saasa, 04 31’S, 78 11’W, 26 i 1997, *R. V squez, R. Rojas, A. Pe a, E. Ch vez & E. Quiaco* 22336 (HUT, MO, MOL, USM) Prov. Bagua, Dist. Imaza, Comunidad Aguaruna de Putuim, Arriba ri o Shimutaz, 04 55’S, 078 19’W, 19 vi 1996, *E.R. Rodr guez, P. Mtamain, E. Chavez-Aguash & W. Atamain* 1114 (HUT, MO, USM [2]); Prov. Bagua, Dist. Bagua, entre Mesones Muro y Uraguza, 05 03’S, 78 20’W, 21 vii 2004, *R. Rojas, R. V squez & R. Apanu* 3190 (HOXA, MO). – **San Mart n**: Zepelacio, near Moyobamba, vii 1934, *G. Klug* 3716 (BM, GH, K, MO, NY); Dist. Tarapoto. Carretera Tarapoto-Yurimaguas, c. km 13.5, 17 vii 1980, *M. Rimanchi* 5243 (USM [2]); Tarapoto, vi 1855, *Spruce* 3959 (K [2]); Prov. Mariscal Caceros, Dist. Campanilla. Route from Tarapoto to Tocache, 7 35’S, 76 41’W, 6 ii 2016, *P.W. Moonlight & A. Daza* 185 (E, MOL). – **Hu nuco**: Pachitea; Puerto Inca. Forest along small river just N of town, 9 18’S, 74 58’W, 15 ix 1982, *R.B. Foster* 8830 (F, MO, USM). – **Ucayali**: Prov. Pur s, Dist. Pur s, Cuenca del ri o Pur s. ri o Curanja, cerca la comunidad native de Colombiana, 10 04’S, 71 06’W, 15 ii 2000, *J.G. Graham & J. Schunke Vigo* 900 (F, G). – **Pasco**: Prov. Oxapampa, Dist. Palcaz . Comunidad Nativa Alto Lagarto. Reserva Comunal Yanesha, 10 8’S, 75 22’W, *R. Rojas & G. Ortiz* 8195 (HOXA). – **Jun n**: Prov. Satipo. La Molina University Field Station, c.10 km N of Satpio on 5S, c.1 km E of field station, 11 10’S, 74 38’W, 8 vii 2014, *P.W. Moonlight* 65 (E, MOL). – **Cuzco**: Prov. La Convenci n, Dist. Echarati. Pagoreni well site, 11 41’S, 73 00’W, 18 iv 1998, *P. Nu ez, H. Beltr n, W. Nauray, L. Acurio, R. de la Colina, N. Llerena & A. Salsas* 21572 (USM); Prov. Cuzco, Dist. Camisea, Campamento San Mart n–C., Camimisea Production Unit, S and SW of Camp, 11 47’S, 72 41’W, 24 i 1997, *P. Acevedo-Rodr guez, D. Bell, K. Rankin & S.F. Smith* 9050 (CUZ, G, K, MO, NY, USM). – **Madre de Dios**: Prov. Manu, Parque Nacional del Manu, ri o Manu, Cocha Cashu Station, 11 50’S, 71 25’W, 21 vii 1984, *R. Foster* 9668 (F, MO, NY, USM).

BRAZIL. Acre: Municipality of Tarauac . ri o Mury, 12 km above confluence with ri o Tarauac , 20 ix 1958, *G.T. Prance, J.F. Ramos & L.G. Farias* 7409 (GH, K, NY, P); Tarauac , ri o Tarauac . Seringal Universo, Coloca o Camaru, c.8 25’S, 71 18’W, 21 ix 1994, *D.C. Daly, M. Silveira, R. Saraiva, L.A. Lima & N. Goldstein* 8289 (NY); Sena Madureira. Basin of ri o Iaco (tributary of ri o Purus), Fazenda S o Jorge I, property of Acre Brasil Verde, timber concession of Laminados Triunfo Ltda., 107 km NW of ri o Branco on BR-364, then c.22 km E on Toco Preto

access road, 9°25'S, 68°36'W, 8 vii 2008, D.C. Daly, M. Silveira, E.C. Oliveira & D.A. Martins 13258 (RB).

Further images of *Begonia maynensis* are available on the *Begonia Resource Centre* (Hughes *et al.*, 2015–).

4. *Begonia scorpiocaulis* Moonlight & Tebbitt, sp. nov. – Type: Peru. Madre de Dios: Pantiacolla, serrania across río Alto Madre de Dios from Shintuya, 29 x 1979. A. Gentry, J. Terborgh, J. Aronson & R. Ramirez 27367 (holo: MO [MO-2154624]). **Figs 5, 6D.**

Begonia scorpiocaulis Moonlight & Tebbitt is most similar to *B. chemillenensis*, differing in its smaller size (*B. scorpiocaulis* is up to 20 cm tall, whereas *B. chemillenensis* reaches maturity at over 20 cm tall) and leaves (leaves in *B. chemillenensis* are rarely shorter than 15 cm and narrower than 5 cm; those of *B. scorpiocaulis* are known only to 12.5 × 3.5 cm), by its serrate bracts (*B. chemillenensis* has entire bracts), serrate, ovate bracteoles (*B. chemillenensis* has lanceolate, entire bracteoles), its bright orange female flowers (those of *B. chemillenensis* are white), and its largest fruit wing with a straight top edge ascending to 2 mm above the ovary (*B. chemillenensis* has straight, horizontal or convex top edge ascending to c.2 mm above the ovary).

Caulescent herb; glabrous throughout, 15–20 cm tall; *stem* erect, flexuous, succulent, unbranched; *internodes* to 2 cm long at base of stem and progressively shorter towards apex; *stipules* persistent, lanceolate, 0.4–1 × 0.2–0.4 cm, apex acuminate to mucronate, margins entire. *Leaves* alternate, clustered towards apex of stem, basifixed; *petioles* 3–4 × 0.1–0.2 cm; *lamina* strongly asymmetrical, elliptic to oblanceolate, 10–12.5 × 2.5–3.5 cm, base cuneate on narrow side of lamina, broadly rounded on large side, apex acuminate, margins irregularly dentate with a short hair at tip of and between each tooth, with a c.2-mm tooth at end of each major vein; venation palmate-pinnate, 6- to 8-veined from base, 6–8 lateral veins on wider side of lamina, 2–5 lateral veins on narrower side. *Inflorescences*: axillary, arising from axil of most mature leaves and often persistent after leaf has abscised, a dichotomous cyme branching c.4 times, protandrous; *peduncle* to 6 cm long, secondary branches to 2 cm long, subsequent branches decreasing in length, final branches to 0.8 cm; *bracts* tardily deciduous, narrowly lanceolate, c.3 × 1 mm, apex acute, margins serrate. *Male flowers*: unknown. *Female flowers*: *pedicels* c.15 mm long; *bracteoles* persistent, lanceolate to ovate, c.3 × 5 mm, apex acute to rounded, sometimes incised to 2 mm, margins serrate; *tepals* 5, orange, subequal, lanceolate to ovate, 4–7 × 2–3 mm, apex obtuse to rounded, margins entire; *ovary body* ellipsoid, c.6 × 4 mm, unequally 3-winged, largest wing 7–9 × 10–13 mm, triangular, base rounded, apex ascending to c.2 mm above ovary, smaller 2 wings 6–8 × 5–6 mm, triangular, base rounded, apex perpendicular to ovary, rounded; *placentae* axile, bilamellate, axile, ovuliferous all over; *styles* 3, subsistent in fruit, c.5 mm long, bifid c.1 mm from base,

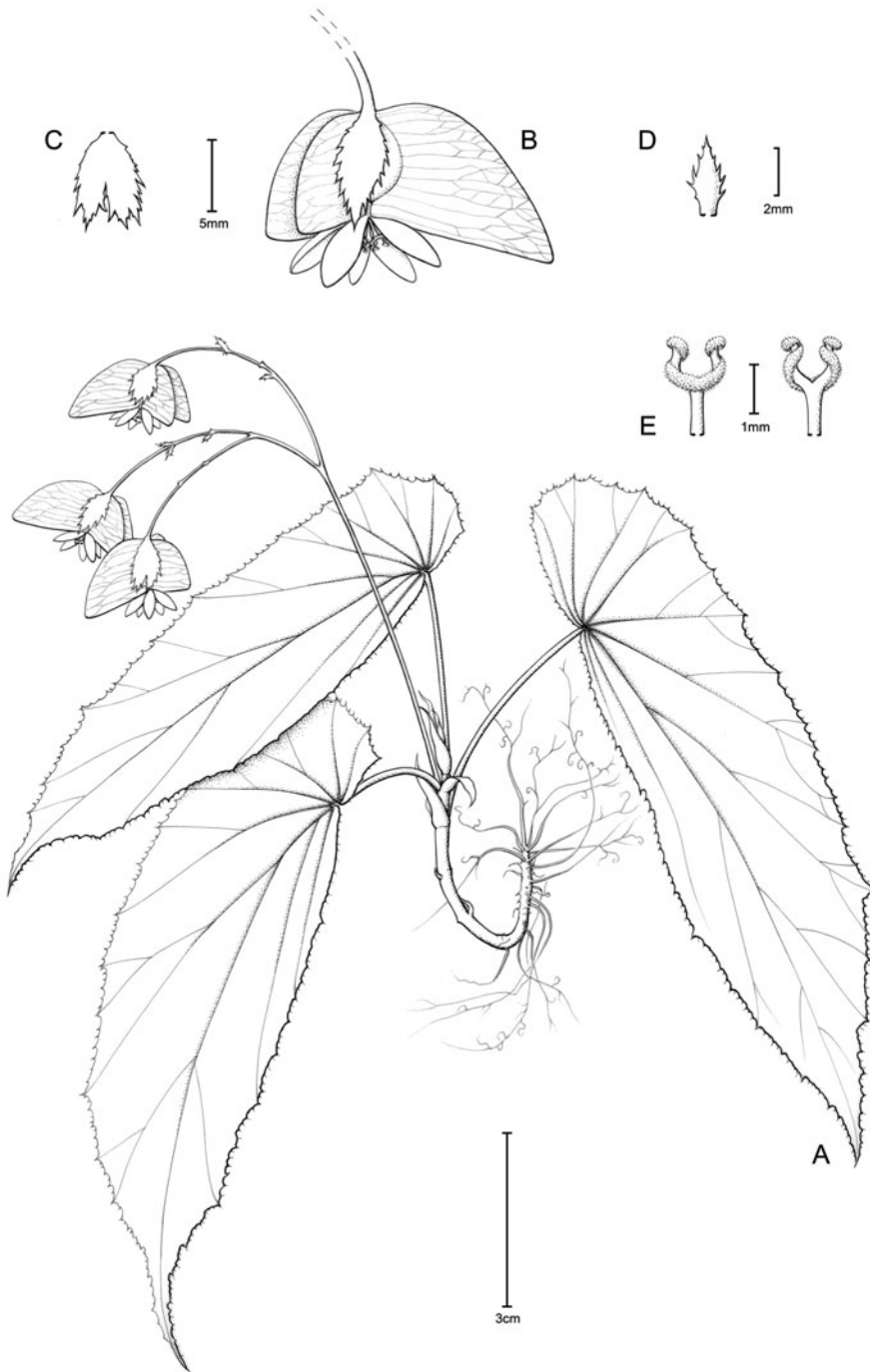


FIG. 5. *Begonia scorpiocaulis* Moonlight & Tebbitt. A, Habit; B, female flower, side view; C, bracteole; D, bract; E, style, back and front views. Scale bars: A, 3 cm; B and C, 5 mm; D, 2 mm; E, 1 mm. Drawn from holotype *A.H. Gentry* 27367 (MO).

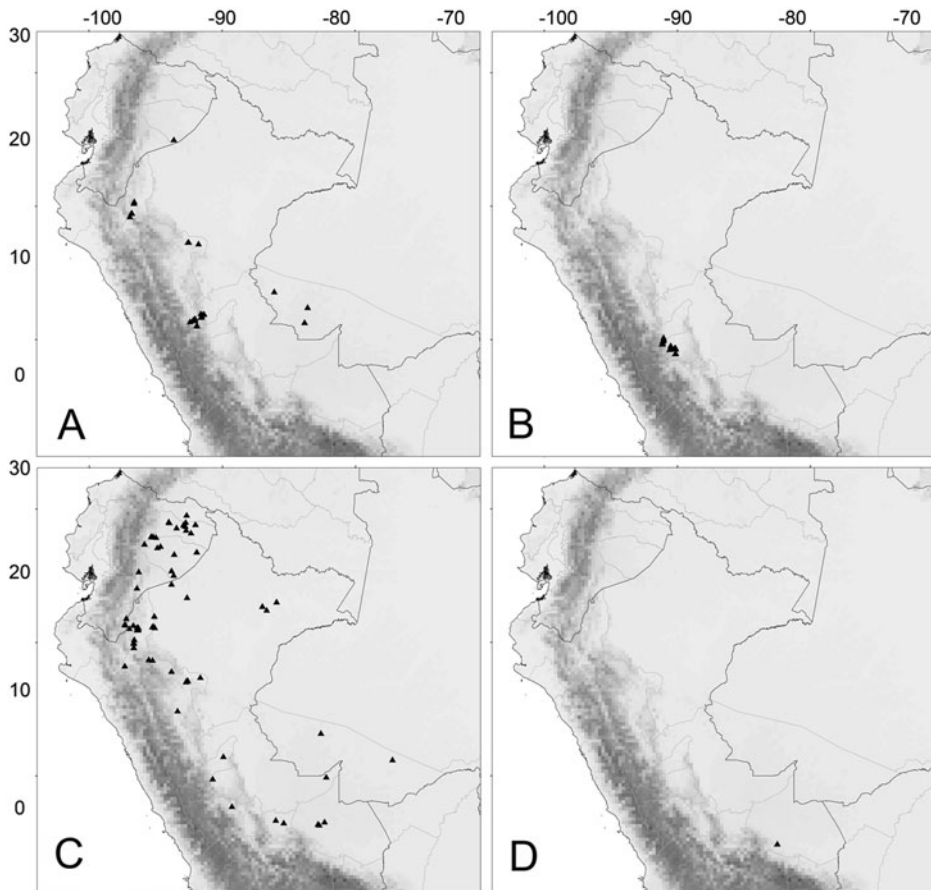


FIG. 6. Distribution of species of the *Begonia maynensis* group of *Begonia* sect. *Knesebeckia* (Klotzsch) A.DC. A, *Begonia albomaculata* C.DC.; B, *B. chemillenensis* Moonlight; C, *B. maynensis* A.DC.; D, *B. scorpiocaulis* Moonlight & Tebbitt.

branches erect, twice spirally twisted. *Fruiting pedicel* unknown. *Fruit* unknown. *Seeds* unknown.

Begonia scorpiocaulis is a poorly known species and its male flowers, fruits and seeds are unknown. However, it is readily identified by its serrate bracts and bracteoles, its unusual orange flowers, and its smaller leaves than the closely related *Begonia chemillenensis*.

Phenology. *Begonia scorpiocaulis* was collected in flower in October.

Distribution. *Begonia scorpiocaulis* is known only from the type locality near Shintuya, Madre de Dios.

Habitat. *Begonia scorpiocaulis* is believed to be an epiphyte but it is unclear upon what. The altitude of the collection (480–840 m) suggests the species inhabits humid, premontane forest.

IUCN conservation category. The type locality of *Begonia scorpiocaulis* is situated within a protected area. There is no information available on the abundance of the species, and therefore the species is classified as Data Deficient (DD) under IUCN criteria (2015).

Etymology. The name *scorpiocaulis* emphasises the scorpioid form of the stems of the type collection, which spiral markedly towards the base of the stem. This stem form is also frequently found in the closely related species *Begonia chemillenensis* and *B. maynensis*.

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