

# RECIRCUMSCRIPTION AND NEW SYNONYMS OF *BEGONIA ACERIFOLIA* (BEGONIACEAE) AND AMENDED DESCRIPTIONS OF THE POORLY KNOWN *B. HYDROPHYILLOIDES* AND *B. VELATA*

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A taxonomic study was conducted of four Andean *Begonia* species, each originally described only from its type collection: *Begonia hydrophylloides* L.B.Sm. & B.G.Schub., *B. triramosa* Irmsch., *B. velata* L.B.Sm. & B.G.Schub. and *B. xerophyta* L.B.Sm. & Wassh. Amended descriptions of *Begonia hydrophylloides* and *B. velata* are provided. The distribution range of *Begonia hydrophylloides* is extended to include the Colombian department of Meta, as well as Cundinamarca. *Begonia velata*, originally described from Huncabamba Province, of Piura Region, Peru, has its distribution range extended to include Contumazá Province, of Cajamarca Region, Peru. *Begonia triramosa*, described from Chimborazo Province, Ecuador, and *B. xerophyta*, described from Loja Province, Ecuador, are both synonymised with *B. acerifolia* Kunth. Following an in-depth taxonomic study of *Begonia acerifolia*, an additional species, *B. erythrocarpa* A.DC., is synonymised with this species. An amended description of *Begonia acerifolia* is provided, and the species is recorded from Andean Ecuador, Peru and Bolivia. *Begonia hydrophylloides*, *B. velata* and *B. acerifolia* are all affiliated with species currently classified in the polyphyletic *Begonia* sect. *Knesebeckia* (Klotzsch) A.DC. *Begonia hydrophylloides* is assessed as Data Deficient (DD), *B. velata* is assessed as Vulnerable (VU) and *B. acerifolia* is assessed as Least Concern (LC), according to IUCN criteria.

*Keywords.* *Begonia acerifolia*, *Begonia erythrocarpa*, *Begonia hydrophylloides*, *Begonia ludwigii*, *Begonia* sect. *Knesebeckia*, *Begonia triramosa*, *Begonia velata*, *Begonia xerophyta*, Bolivia, Colombia, Ecuador, IUCN, Peru.

## INTRODUCTION

As part of an ongoing taxonomic study of the Andean *Begonia* species assigned to *Begonia* sect. *Eupetalum* (Lindl.) A.DC. and *Begonia* sect. *Knesebeckia* (Klotzsch) A.DC. by Doorenbos *et al.* (1998), four species, *B. hydrophylloides* L.B.Sm. & B.G.Schub., *B. triramosa* Irmsch., *B. velata* L.B.Sm. & B.G.Schub. and *B. xerophyta* L.B.Sm. & Wassh., each originally described only from its type collection, were studied.

*Begonia hydrophylloides* was originally described from a single fragmentary specimen, consisting of one leaf and a portion of inflorescence bearing a few male flowers and one immature female flower. The specimen had been collected in 1917

by Francis W. Pennell in Cundinamarca Department, Colombia. An extensive search of herbaria located three additional collections, all made in Meta Department, Colombia. Smith & Schubert (1946, p. 8) tentatively classify *Begonia hydrophyloides* in *Begonia* sect. *Huszia* (Klotzsch) A.DC., currently recognised as a synonym of *Begonia* sect. *Eupetalum* by Doorenbos *et al.* (1998), who thought that the relatively large size of the petiole and peduncle make it “extremely probable” that this species is a “scapose plant with a tuberous base”. Based on Smith & Schubert’s (1946) original description, Doorenbos *et al.* (1998) reclassified the species in *Begonia* sect. *Knesebeckia* but offered no explanation for the sectional transfer. Additional material of *Begonia hydrophyloides* located during the current study has provided a better understanding of the morphology of this species and hence its sectional affiliation. *Begonia hydrophyloides* is confirmed to be scapose but is found to have a fleshy rhizome rather than a tuber. Among Andean *Begonia*, fleshy rhizomes in combination with a scapose habit are typically characteristic of the *B. octopetala* group (*Begonia* sect. *Eupetalum*). However, the many-flowered dichasial cymes of this species, with up to four branches, and the subequal fruit wings do not fit that group and instead suggest that it is most likely affiliated with the members of the polyphyletic *Begonia* section *Knesebeckia*.

*Begonia triramosa* was originally described from a single fragmentary specimen, consisting of a short apical portion of stem with a single leaf and two detached inflorescences bearing female flowers. The specimen had been collected in 1918 by Joseph N. Rose and George Rose in Chimborazo Province, Ecuador. Examination of the type specimen found that it lacks any features that separate it from *Begonia acerifolia* Kunth, and that it has the characteristic combination of thick stem, triangular lobed leaf blades, few-flowered inflorescences with a long peduncle and short branches, female flowers with five tepals, and markedly asymmetrical ovary wings found in that species. Fieldwork conducted in January 2014 and May 2016 at the type locality and surrounding area confirmed that *Begonia acerifolia* grows in this location (e.g. Tebbitt & Gutierrez 859).

*Begonia xerophyta* was originally described from a single fragmentary specimen, consisting of just the very top portions of two stems bearing two or three leaves, and a few mature male flowers and immature female flowers. The specimen had been collected in 1955 by Erik Asplund at 2100 m elevation between San Lucas and Loja in Loja Province, Ecuador. Fieldwork conducted in January 2014 and May 2016 found that the only *Begonia* species present in this area was *B. acerifolia*. Subsequent examination of the holotype of *Begonia xerophyta* showed that it was synonymous with *B. acerifolia*, as indicated by the combination of its unusually thick stems; shortly triangular lobed leaf margins; leaf blade undersurfaces with white tomentose hairs; few-flowered inflorescences; male flowers with four relatively large tepals, of which the outer pair are elliptic and red without and white within, and the inner pair broadly obovate and white to very pale pink; and female flowers with five tepals. The relatively high altitude (2100 m) of this collection site, coupled with the relatively dry slope on which the plants were growing, is also characteristic of *Begonia acerifolia*, which

occupies an unusual habitat for a *Begonia*, the majority of species being found at lower elevation in more humid situations.

During the course of examining material of *Begonia acerifolia* for this study, it was also determined that *B. erythrocarpa* could not be distinguished from *B. acerifolia*. This discovery was surprising, because the type specimens of *Begonia acerifolia* and *B. erythrocarpa* differ substantially. Most notably, the type of *Begonia acerifolia*, which was collected in Loja Province, Ecuador, has cordate leaf bases and tepals with acute apices and serrate margins, whereas the type of *B. erythrocarpa*, which was collected in La Paz Department, Bolivia, has peltate leaf blades and tepals with obtuse apices and entire margins. Furthermore, fieldwork has shown that plants from southern Peru and Bolivia additionally differ in having thicker leaf blades with a tomentose covering of silvery white hairs on both surfaces and a fruit wing with a rounded apex. In contrast, the leaves of plants in Ecuador and northern Peru are often thinner and pubescent, and the hairs a paler white and therefore much less prominent, and the longest wing apex is subacute. However, fieldwork conducted throughout the range of these taxa, as well as examination of available herbarium material, shows that all these character combinations represent extremes in a single, highly variable species. When material in addition to the types is examined, every possible combination of these characters is observed. Furthermore, some populations in northern Peru contain individuals with either peltate or cordate leaf bases and/or either entire or serrate tepals. Similarly, greenhouse experiments have shown that seed collected from a population in Chota Province, Cajamarca Region, Peru, that closely matched the morphology of the *Begonia erythrocarpa* type collection, when grown, produced a mixture of progeny, some plants closely resembling the *B. acerifolia* type collection and others the *B. erythrocarpa* type collection (P. W. Moonlight, Royal Botanic Garden Edinburgh and University of Glasgow, personal communication). The variable nature of this species is further highlighted by the large number of synonyms previously recognised under *Begonia erythrocarpa* (Golding & Wasshausen, 2002), and which are transferred here to *B. acerifolia*. *Begonia acerifolia* as circumscribed here is therefore a common, widespread and highly variable species that occurs from the Andes of central Ecuador to northern Bolivia. *Begonia acerifolia* is currently classified in the polyphyletic *Begonia* sect. *Knesebeckia* (Doorenbos *et al.*, 1998; Tebbitt, 2016).

*Begonia velata* was originally described from a single collection composed of five sheets bearing male and female flowers. The collection was made in 1912 by Augusto Weberbauer in Piura Region, Peru, along the mountain pass leading from Palambra to Huancabamba. A combination of herbarium-based studies and fieldwork found that the species is relatively abundant at this site and also occurs much less frequently at Bosque Cachil in Contumazá Province, Cajamarca Region, Peru. Interestingly, this unusual disjunct distribution, which spans the Huancabamba deflection, is also mirrored by *Begonia pseudopleiopetala* Tebbitt (Tebbit, 2015). Molecular data (P. W. Moonlight *et al.*, unpublished) indicate that *Begonia velata* is nested within *B. acerifolia*, suggesting that the former may have evolved from within *B. acerifolia*. Given the morphology of *Begonia velata*, it is suggested that this species may have

arisen as a stabilised hybrid between *B. acerifolia* and *B. ludwigii* Irmsch. Evidence for this comes from the observation that *Begonia velata* has a combination of the morphological characteristics found in *B. acerifolia* and *B. ludwigii*. In general, *Begonia velata* is morphologically very similar to *B. acerifolia*; however, it shares with *B. ludwigii* a symmetrical leaf blade, which is circular in outline (ovate in *B. acerifolia*), and also has a full or partial ring of hairs at the top of the petiole near the point of attachment to the leaf blade. The latter feature is unusual within Andean *Begonia*, being found within Peruvian *Begonia* sect. *Knesebeckia* only in *B. ludwigii*. *Begonia ludwigii* was originally described from Ecuador (Irmscher, 1937) and has not previously been documented from Peru (Smith & Schubert, 1941; Brako & Zarucchi, 1993). Recent fieldwork, however, found that *Begonia ludwigii* occurs both in Ecuador and in northern Peru, including in the vicinity of La Florida, Cajamarca Region, Peru (e.g. Tebbitt & Daza 846 (MOL), 6°52'S, 79°05'W). Furthermore, it hybridises with *Begonia acerifolia*, where the distributions of these two taxa overlap (e.g. Tebbitt & Daza 849 (MOL), 6°53'S, 79°03'W). Given that hybrid speciation is thought likely to have been an important mechanism of species formation in *Begonia* (Dewitte *et al.*, 2011), but that very little supporting data has been collected from natural populations of this genus, it would be of interest to investigate the potential hybrid origin of *B. velata* further.

#### TAXONOMIC TREATMENT

***Begonia hydrophyloides*** L.B.Sm. & B.G.Schub., *Caldasia*, 4, no. 16: 7, 1946. – Type: Colombia, Cundinamarca, Moist bank, Guayabetal to “Monte Redondo” (= Monterredondo) south-east of Quetame, 1300–1500 m, 6 ix 1917, *F. W. Pennell* 1803 (holo NY!).

Acaulescent herb, with a fleshy rhizome. *Rhizome* probably horizontal but only known from a fragment, 2–4 cm in diameter. *Stipules* persistent, ovate 0.5–2 × 0.3–1.2 cm, apex acute, margin entire. *Leaves* few, alternate, basifixed; petiole ± continuing straight into main vein of blade, 20–50 cm long, glabrous; blade subsymmetrical, broadly ovate to almost orbicular in outline, 14–25 × 20–24 cm, base cordate, basal lobes spreading, sinus 2.5–5 cm deep, apex acute, margin triangular lobed, lobes 2–6.3 cm deep, lobes denticulate, teeth tipped with a short hair, membranous (when dried), green on both surfaces, upper surface glabrous, lower surface sparsely pubescent or glabrous, veins palmate, 6–8. *Inflorescence* solitary, erect, a dichasial cyme, with up to 4 branches, many-flowered, bisexual but strongly protandrous; peduncle 40–80 cm long, primary branches 0.6–3 cm long, secondary branches 0.35–1.5 cm long, glabrous; pedicels of male flowers 1.3–3.5 cm long, glabrous; pedicels of female flowers not observed; bracts deciduous, ovate or elliptic, 0.5–1.6 × 0.2–1.2 cm, apex acute, apiculate, margin entire, surfaces glabrous. *Male flowers*: tepals 4, spreading, white, white with a pink tinge, or pink, glabrous, outer two broadly ovate, 9–11 × 7–9 mm, apex acute, margin entire, glabrous, inner pair oblong, c.8 × 2 mm, apex obtuse, margin entire, glabrous; stamens c.50, attached along the length of a c.1.5 mm long torus, filaments 2–3 mm long,

anthers symmetrically basifixed, obovoid, c.0.75 mm long, dehiscent by long unilateral slits, connectives not extended. *Female flowers*: (known only from immature specimens) bracteoles absent; tepals persisting in fruit, tepals 5, spreading, same colour as males, ovate, subequal, apex obtuse, margin entire; ovary 3-winged, wings subequal; styles 3, bifid. *Fruiting pedicel* to 4 cm. *Fruit* erect, body ellipsoid, to 1 × 0.7 cm, glabrous, longest wing marginiform, to 1 cm long, apex obtuse, shorter two wings marginiform, to 0.65 cm long, apex obtuse.

*Phenology*. Flowering August to December.

*Distribution*. Foothills of western Cordillera Oriental in central Colombia (Cundinamarca and Meta).

*Habitat*. Found at 500–1500 m, on shady, moist slopes in montane forest, often by rivers.

*IUCN conservation category*. The area of Colombia where this species occurs has seen limited botanical activity in recent years, so it is likely that the species is both more widespread and more common than is suggested by the low number of current collections. The lack of information related to both the distribution and the abundance of this species necessitates assigning an IUCN (2016) category of Data Deficient (DD).

*Additional specimens examined*. COLOMBIA. **Meta**: Sabanas de San Juan de Arama, margen Izquierda del río Güejar, alrededores del alerrizaje “Los Micos”, 14 ii 2007, *J.M. Idrobo* 560 (COL); San Juan de Arama, margen Izquierda del río Güejar, paso de “Los Puercos”, 24 viii 2007, *J.M. Idrobo* 471 (COL [2]); Parque Nacional Natural Tinigua, Río Duda, Serranía Chamusa, Centro de Investigaciones Ecológicas La Macarena, Trocha Baño Chamusa, ca mirador W, *D.W. Stevenson* 1884 (NY).

A photograph of the holotype (*Pennell* 1803) of *Begonia hydrophylloides* is available via the Begonia Resource Centre (*Hughes et al.*, 2015–).

***Begonia acerifolia*** Kunth, Nov. Gen. Sp. (quarto ed.) 7: 186, t. 644, 1825. – Type: Ecuador, [Loja Province], Loxam, 1060 m, *A.J.A. Bonpland* 3333 (holo P! [barcode: P00679517], photo E! [barcode: E00157074], photo G! [barcode: 358682]).

*Begonia erythrocarpa* A.DC., Ann. Sci. Nat. Bot., IV, 11: 121, 1859. – Type: Bolivia, Dep. La Paz, Prov. Larecaja, v 1847, *H.A. Weddell* 4729 (lecto P! [barcode: P01900755], designated here; klepto G-DC, isolecto P! [barcode: P01900754]), *syn. nov.*

*Begonia dolabrifera* C.DC., Bull. Herb. Boissier, sér. 2, 8: 324, 1908. – Type: Ecuador, Pallatanga, [2°1'S, 78°58'W], ix 1891, *L. Sodiro* 594 (holo G! [barcode: G00237358] [photo K!, F!, MO!], iso F [barcode: v0052627F], iso G, iso P! [barcode: P01900768], iso QPLS!).

*Begonia griseocaulis* Irmsch., Biblioth. Bot., 116: 112, 1937. – Type: Ecuador, Prov. Chimborazo, Tal des Rio Chanchan, oberhalb Huigra, um 1600 m, 23 ix 1933, *L. Diels* 1173 (holo B), *syn. nov.*

- Begonia pennellii* L.B.Sm. & B.G.Schub., Publ. Field Mus. Nat. Hist, Bot. Ser. 13: 196, 1941. – Type: Peru, Cuzco Region, Pillahuata, Cerro de Cusilluyoc, thickets above Pillahuata, 13°10'30''S, 71°35'53''W, 2800–3100 m, 3–6 v 1925, *F.W. Pennell* 14126 (holo GH!, iso B), *syn. nov.*
- Begonia triramosa* Irmsch., Bot. Jahrb. Syst. 74: 613, 1949. – Type: Ecuador, vicinity of Huigra, mostly on the Hacienda de Licay, 3 ix 1918, *J. N. Rose & G. Rose* 22493b (holo US!, photo NY!), *syn. nov.*
- Begonia pennellii* subsp. *lobato-ovata* Irmsch., Bot. Jahrb. Syst., 76: 84, 1953. – Type: Peru, Cuzco Region, Prov. Calca, Distr. Lares, Lares valley above Mantoc, 2400–2500 m, 8 iii 1929, *A. Weberbauer* 7906 (syn B, BM!, F, GH!), *syn. nov.*
- Begonia pennellii* var. *longiloba* Irmsch., Bot. Jahrb. Syst., 76: 85, 1953. – Type: Peru, Prov. Huanta, Dep. Ayacucho, Weg von Tambo über Osno zum Flusse Apurimac, 2700–2800 m, 1 vi 1910, *A. Weberbauer* 5622 (syn B, F; photo F!, K!, P [barcode: P06841739]) *syn. nov.*
- Begonia pennellii* forma *macrantha* Irmsch., Bot. Jahrb. Syst., 76: 86, 1953. – Type: Peru, Piura, Prov. Ayabaca, Westabhänge der Anden über Frias, Geogr. Br. 4°50'–5°S, 2900–3000 m, 20 v 1912, *A. Weberbauer* 6402 (holo B!), *syn. nov.*
- Begonia lobato-peltata* Irmsch., Bot. Jahrb. Syst., 76: 86, 1953. – Type: Peru, Puno Region, Prov. Sandía, 10 vii 1903, *A. Weberbauer* 503 (lecto B! [barcode: B100243008] designated here; isolecto B! [barcode: B100243009], G!), *syn. nov.*
- Begonia macbrideana* Irmsch., Bot. Jahrb. Syst., 76: 87, 1953. – Type: Peru, Junín Region, Tarma, entre Huacapistana y Palca, [11°14'S, 75°32'W], 2200 m, *A. Weberbauer* 2011 (holo B, iso MOL!, iso herbarium of Universidad Nacional Agraria La Molina!), *syn. nov.*
- Begonia xerophyta* L.B.Sm. & Wassh., Phytologia, 44: 245, pl. 7, 1979. – Type: ECUADOR, Prov. Loja, between Loja and San Lucas, very steep and dry slope, c.2100 m, [3°45'S, 79°15'W], 8 x 1955, *E. Asplund* 18036 (holo S!), *syn. nov.*

Caulесcent, rhizomatous herb. *Rhizome* horizontal, 7–20 cm long, 0.75–1.25 cm in diameter, unbranched. *Stem* erect to sprawling, becoming somewhat woody at maturity, usually 0.5–2 m tall, 0.75–1.25 cm in diameter, unbranched, internodes 1–20 cm long, usually glabrous, occasionally tomentose. *Stipules* persistent, ovate, 1.5–1.8 × 0.8–1.4 cm, apex subacute, margin entire. *Leaves* alternate, basifixed or peltate; petiole usually joining blade at a transverse angle but occasionally continuing straight into main vein of blade, 5.5–13 cm long, glabrous; blade juicy to subcoriaceous, asymmetrical, usually ovate or occasionally suborbicular in outline, 5.5–18 × 4.5–20 cm, base peltate or cordate, basal lobes when present overlapping to spreading, sinus to 4.5 cm deep, apex acute, margin usually deeply 6- to 8-lobed, rarely with 6–8 shallow angular lobes, lobes usually narrowly triangular, 1–5.5 cm deep, serrulate to serrate, teeth to 1.5 mm long, teeth sometimes tipped with a short hair, upper surface usually pale green, occasionally olive green with silvery white stripes along part of or the entire length of the main veins, glabrous or moderately pubescent, hairs white, simple, lower surface green or red, moderately pubescent or tomentose, hairs white to silvery white, veins palmate, 6–9. *Inflorescences* few, axillary from the upper portion of the stem, erect, symmetrical cymes, 2- or 3-branched, branches 0.9–6.5 cm, usually bearing 12

flowers, bisexual, male flowers beginning to open before the first female flowers but both sexes eventually open concurrently; peduncle 15–40 cm long, glabrous; pedicels of male flowers 1.5–6 cm long, glabrous to tomentose; pedicels of female flowers 0.5–1.65 cm long, glabrous to tomentose; bracts caducous, ovate, 1.1–1.6 × 0.9–1 cm, apex obtuse, margin entire. *Male flowers*: tepals 4, spreading, white, sometimes reddish pink flushed on the outer surfaces or rarely both surfaces, outer two transversely ovate to broadly elliptic, 2.1–2.4 × 1.85–2.4 cm, apex subacute to rounded, margin entire to serrate, glabrous, inner two elliptic or obovate to rhomboid-obovate, 0.7–2.5 × 0.85–1.8 cm, apex subacute to rounded, margin entire to serrate, glabrous; stamens 50–100, attached along the length of a 2–3 mm long torus, filaments 1–2.5 mm long, anthers symmetrically basifixed, obovoid to obovoid-cuboid, 1–2 mm long, dehiscing by unilateral slits, connectives not extended. *Female flowers*: bracteoles absent; tepals not persisting in fruit, 5, spreading, same colour as males, usually elliptic to rhomboid, inner one or two sometimes obovate, subequal, 1.5–1.9 × 0.9–1.7 cm, glabrous, apex subacute to rounded, margin entire to serrate; ovary body ellipsoid to broadly ellipsoid, 5.25–15 × 5–9 mm, pale green to pink, glabrous, with one long wing and two rib-like wings, longest wing ligulate, ligulate-triangular or triangular, apex rounded to subacute, to 2.4 × 2.1 cm, 3-locular; placentae bifid, bearing ovules on both surfaces of placental branches; styles 3, shortly fused at base, 5–7 mm long, bifid from about one-third to almost half their height, branches erect, stigmatic papillae in a once-spiralled band. *Fruiting pedicel* to 1.2 cm long. *Fruit* subnutant, body broadly ellipsoid, to 1.5 × 1 cm, glabrous, wings as in ovary.

*Phenology*. Typically flowering March to July, with a peak during April and May, but producing a few flowers throughout the year.

*Distribution*. Andes of Ecuador (Azuay, Bolívar, Cañar, Chimborazo, El Oro and Loja), Peru (Amazonas, Cajamarca, Cuzco, Junín, Píura and Puno) and Bolivia (La Paz).

*Habitat*. Locally common and often forming large populations in open disturbed sites, such as roadsides, pastureland or along trails in disturbed montane forest. Typically growing at altitudes between 2000 and 3100 m but down to 1500 m and up to 3250 m. Usually terrestrial and growing in soil or moss but occasionally epiphytic on the trunks of trees and shrubs. Frequently growing among tall herbs or shrubs and using these for support.

*IUCN conservation category*. *Begonia acerifolia* is a widespread and common species that prefers disturbed areas and is therefore assessed as Least Concern according to IUCN criteria (2016).

*Representative specimens examined*. ECUADOR. **Bolívar**: road Balsapampa–San Miguel, La Guardia, [1°48'S, 79°6'W], 2500 m, 16–17 v 1968, G.W. Harling, G. Storm & B. Ström 9571 (GB, MO, NY). **Chimborazo**: Juan de Velasco – Pallatanga, km 9, 1°52'S, 78°54'W, 2610 m, 22 v 1990, P.M. Jørgensen, R. King, P. Peterson & E. Judziewicz 91827 (AAU, MO, QCA, QCNE); Pallatanga, Comunidad Jesús del Gran Poder, from Panza Redonda (South Pan American

Highway), 2 km S on cobble/dirt road, c.4 km NE of Pallatanga, 1°58'S, 78°56'W, 2800–3200 m, 10–14 vii 1995, *J.L. Clark, Z. Aguirre, B. Greene, T. Harris & C. Watt* 1263 (MO, QCNE); Pallatanga, x 1858, *R. Spruce* 5539 (K [2] = paratype: *B. griseocaulis* Irmsch.); Cañon of the río Chanchan, about 5 km N of Huigra, 5000–6500 ft, 19–28 v 1945, *W.H. Camp E-3435* (BM, NY); Cantón Alausí, roadside bank between Alausi and Huigra, 02°14'S, 78°55'W, 2108 m, 20 v 2016, *M.C. Tebbitt & D. Gutierrez* 859 (QCA); Alausi Canton, parroquia Huigra, sector Chasmay, 2°16'28"S, 78°59'21"W, 1500 m, 27 v 2006, *C.E. Ceron & C.I. Reyes* 57504 (MO [2]); Prov. Chimborazo, Chimborazo–Cañar border, between Sta. Rosa (8300 ft) and Joyagshi (9000 ft), 6 vii 1945, *W.H. Camp E-4023* (G [2], GH [2], K [2], MO [2], NY, P [2], US). **Cañar**: between Suscal and Chontamarca, north rim of the valley of the Río de Cañar, [2°26'S, 79°4'W], 23 iv 1943, *W.H. Camp E-2853* (GH); route de Zhud à la Côte, 1 km après l'embranchement de Zhud, 2°29'S, 79°1'W, 2700 m, 19 v 1988, *C. Huttel* 1339 (QCA, QCNE). **Azuay**: between Río Molleturo at Huigra and Cruz Pamba crossing Río Mehuir, north of Molleturo, 1645–2315 m, 2 vi 1943, *J.A. Steyermark* 52926 (GH); west of Patul 3 kms between Huahualcay and Río Patul below Pajas de Pinglioni, 2670–3275 m, 19 v 1943, *J.A. Steyermark* 52609 (GH, NY); Portete del Tarqui, Cuenca-Girón, 3°6'10"S, 79°7'41"W, 2700–2950 m, 5 iv 1974, *G. Harling & L. Andersson* 13223 (GB, MO); Vallée du río Jubones, route de Pasaje a Cuenca, 8 km après Giron, 3°17'S, 79°20'W, 2550 m, 9 v 1988, *C. Huttel* 1110 (QCA, QCNE). **El Oro**: along Quebrada de Pampa de Los Cedros, tributary to Río Palma, NE of San Pablo, 2285 m, 12 viii 1943, *J.A. Steyermark* 53801 (GH); Cantón Atahualpa, Piñas to Machala road, c.2 km S of Mirador, 03°32'S, 79°40'W, 26 v 2016, 2119 m, *M.C. Tebbitt & D. Gutierrez* 865 (QCA). **Loja**: Cerro de Chilla, Saraguro-Manú, Km 45.4, 3°33'37"S, 79°22'12"W, 2760 m, 2 v 1994, *P.M. Jorgensen, C. Ulloa, H. Vargas & G. Abendaño* 703 (AAU, MO, NOLS, QCA, QCNE); road Loja – Saraguro, km 30 La Contradía, 3°51'S, 79°14'W, 2600 m, 7 ix 2000, *J.E. Madsen & P. Lozano* 7225 (AAU, QCNE); road from Celica to Alamor, northern and shorter route, passing through Mercadillo, km 8.75 from Plaza Central in Celica, c.3°58'S, 80°00'W, 1987 m, 5 v 1989, *J. Smith* 1968 (QCA, QCNE); summit and upper slopes of Cerro Villonaco, [3°58'8"S, 79°16'1"W], 2600–2750 m, 12 iv 1974, *G.W. Harling & L. Andersson* 13446 (GB, NY); old road Loja–Catamayo, c. km 10, 2700 m, 24 v 1988, *J.E. Madsen, B. León, K. Young & S.S. Renner* 74414 (AAU, MO, NY, QCA, QCNE); Loma Santiago, 3 km S of Santiago and 14 km S of San Lucas, 2900 m, 4°0'S, 79°58'W, 2900 m, 18 ii 1993, *G. Harling & B. Ståhl* 26489 (GB, QCA); Loja – Las Palmas, Cerro El Tambo, just S of Cerro Villonaco, 4°4'S, 79°14'W, 2750–3020 m, 23 vii 1990, *P.M. Jorgensen, C. Ulloa, M. Gavilanes, P. Mena & L. Suarez* 92094 (QCA, QCNE); Parque Nacional Podocarpus, 4°5'S, 79°11'W, 2750–2850 m, 15 v 1988, *B. Øllgaard, J.E. Madsen & L. Christenson* 74206 (AAU, E, MO, NY, QCA, QCNE); Nudo de Cajanuma, 7 km S of Loja, [4°5'36"S, 79°12'W], 8000–8400 ft, *W.H. Camp E-121* (GH, NY); Env. 10 km au sud de Loja sur la route de Malacatos, 4°14'S, 79°15'W, 2250 m, 12 v 1988, *C. Huttel* 1181 (QCA, QCNE); Cía. Agrominera Curishiro, cerca a Parque Nacional Podocarpus, 4 horas a pie desde Masanamaca, 4°16'S, 79°5'W, 2400 m, 2–4 iv 1990, *P. Mena* 2745 (QCA); Cerro Sozoranga, Colaisaca-Utuana, Km 0.5, 4°19'14"S, 79°41'16"W, 2340 m, 24 iv 1994, *P.M. Jorgensen et al.* 569 (AAU, MO, QCA, QCNE); Sur la route de Lauro Guerrero à Orianga, versant occidental très humide et souvent couvert de brouillard du Cerro Negro, 4°20'S, 79°5'W, 2450 m, 15 v 1988, *C. Huttel* 1267 (MO, QCA, QCNE); Huacabamba, 1 xi 1876, *É.-F. André* 4396 (NY [photo MO]).

PERU. **Piura**: Prov. Ayabaca, Distr. Ayabaca, Las Lomas to Ayabaca road, above Chinchinpampa, 4°40'S, 79°45'W, c.2710 m, 28 v 2015, *M.C. Tebbitt & A. Daza* 843 (MOL); Prov. Ayabaca, Yacupampa-Cuyas (Ayabaca), 2500 m, 26 v 1971, *A.M. Lopez, H. Fabris, A. Sagástegui & H. Aguado* 7777 (HUT); Prov. Huancabamba, above Canchaque on the Huancabamba Pass, 5°22'39"S, 79°33'32"W, 2371 m, 27 i 2016, *P.W. Moonlight & A. Daza* 120 (E); Cerro Porculla 3 km to 11 km W of Continental Divide down W coast of Cerro, 5°51'41"S, 79°31'14"W, 12 vi 1966, *G. Edwin & J.V. Schunke* 3763 (USM). **Amazonas**: Prov. Chachapoyas,

ladera del Cerro Tambo Viejo, road between Balsas and Leymebamba, 6°47'S, 77°56'W, 2810 m, 24 v 2015, *M.C. Tebbitt & A. Daza* 831 (E, MOL). **Cajamarca:** Prov. Chota, near Las Palmas, c.24 km NE of Chota, 6°9'28"S, 78°35'47"W, 2024 m, 25 vii 2014, *P.W. Moonlight & A. Daza* 68 (E); Prov. Santa Cruz, Distr. Pulan, El Cedro, 6°47'35"S, 79°5'16"W, 2600 m, 31 i 2008, *L. Santa Cruz* 2113 (USM); Santa Cruz Province, c.3 km (por aire) ENE Montesecco, [6°50'36"S, 79°6'18"W], 1800 m, 9 v 1987, *J.C. Santisteban C. & J.B. Guevara B.* 34 (F, HUT, MO, NY); Prov. San Miguel, Distr. La Florida, above La Florida, 6°53'S, 79°03'W, 1787 m, 30 v 2015, *M.C. Tebbitt & A. Daza* 847 (MOL); Prov. San Miguel, Bosque de Quellahoreo, de noreste de la localidad de Tongod, 2700 m, 14 ix 1991, *J. Sánchez Vega & A. Brónes* 5800 (CPUN). **Cuzco:** Prov. La Convención, Distr. Santa Ana, Madre Selva, 12°53'49"S, 72°45'2"W, 1500 m, 21 iii 2004, *L.G. Valenzuela, E. Suelli & G. Calatayud* 3090 (MO); Prov. La Convención, Distr. Maranura, Mesa Pelada, 12°32'S, 72°22'W, 2547 m, 20 iv 2005, *L. Valenzuela, E. Suelli, I. Huamantupa, J. Farfán, L. Cardenas, V. Chama & J. Latorre* 5546 (AMAZ, CUZ, HUT, MO, MOL, US, USM); Prov. La Convención, Distr. Vilcabamba, Vilcabamba, Pajonal, 13°7'27"S, 72°58'55"W, 3470 m, 31 v 2002, *W.L. Galiano, L.G. Valenzuela, E. Suelli, I.C. Huamantupa & A. Carazas* 4108 (MO); Prov. La Convención, Distr. Huayopata, Balconpata, 12°52'1"S, 72°32'46"W, 2200 m, 15 iv 2004, *G. Calatayud, I. Huamantupa, L. Cardenas, H. Coasaca & E. Apaza* 2178 (CUZ, MO, US); Prov. Calca, Distr. Yanatile, above intersection of roads coming from Amparaes, Quebrada Honda, and Lares, along road to Amparaes, 12°58'S, 72°03'W, 3660 m, 5 i 2015, *M.C. Tebbitt & A. Daza* 797 (MOL); Prov. Urubamba, Distr. Ollytaytambo, Road from Quillabamba to Ollytaytambo, 13°5'7"S, 72°22'52"W, 3173 m, 7 viii 2014, *P.W. Moonlight & A. Daza* 96 (E); Prov. Urubamba, Huiñaihuaina, [13°11'S, 72°32'W], 3000 m, 22 vi 1948, *C. Vargas C.* 7243 (CUZ, US); Prov. Urubamba, on trail between Machupichu–Lucmayoc, 2000 m, vii 1941, *C. Vargas Calderón* 2075 (CUZ [photo MO]); Prov. Urubamba, Distr. Machu Pichu, Alcamayo, nacientes del río, 13°9'S, 72°30'W, 2900 m, 19 v 2003, *I. Huamantupa, J. Farfán & G. Huallparimachi* 3227 (CUZ, MO, US); Prov. Paucartambo, Hacienda Pillco, 2800 m, 12 iv 1967, *C. Vargas C.* 019239 (CUZ); Prov. Paucartambo, Distr. Kosnipata, Pillahuata, Parque Nacional Manu, 13°9'42"S, 71°35'39"W, 2700 m, 24 iii 1992, *A.E. Cano* 5296 (USM); Prov. Quispicanchi, Marcapata, En los alrededores de la mina cerca de la ciudad de Marcapata, en la carretera Cuzco-Maldonado, 13°25'25"S, 70°54'15"W, 1200 m, 20 vii 1987, *P. Núñez & N. Núñez* 8200 (MO); Prov. Quispicanchi, Distr. Marcapata, Limacpunko, Community of Union Arasa, Cullebrayoc Trail, 13°29'30"S, 70°52'50"W, 2674 m, 12 x 2011, *J.D. Wells* 941 (USM), *J.D. Wells* 963 (BRIT); Prov. Quispicanchi, 33 km past the peak (4750 m), on road from Ocongate to Marcapata, just before Opispata, 3110 m, 21 vii 1978, *J. Aronson & P.E. Berry* 525 (MO). **Puno:** Prov. Carabaya, Distr. Ollachea, road directly below Ollachea, 13°47'S, 70°28'W, 1949 m, 9 i 2015, *M.C. Tebbitt & A. Daza* 810 (MOL); Prov. Sandia, 10 vii 1903, 2100–2300 m, *A. Weberbauer* 503 (B, G); Prov. Sandia, 8 km N of Limbani, on trail, [14°4'40"S, 69°41'17"W], 3000 m, 19 v 1942, *R.D. Metcalf* 30543 (G, MO, US); Prov. Sandia, 2–6 km from Oconeque, 1800–2100 m, 22–25 v 1942, *R.D. Metcalf* 30607 (MO, US); Prov. Sandia, c.15 km on road below Sandia, 14°14'38"S, 69°24'78"W, 1600 m, 16 ii 2002, *R.T. Pennington, T.D. Pennington & A. Daza* 1112 (K, MOL); Prov. Sandia, entre Sandia y Cuyocuyo, 14°25'43"S, 69°30'58"W, 3100 m, 16 v 1966, *R.A. Ferreyra* 16771 (MO, USM [2]).

**BOLIVIA. La Paz:** Prov. Franz Tamayo, Madidi, Pelechuco-Apolo, Coranara Parque Nacional Madidi, sector Coranara, al lado del río Pelechuco, 14°46'21"S, 68°59'9"W, 2300 m, 15 vi 2008, *A.F. Fuentes & H. Huaylla* 13066 (MO); Prov. Bautista Saavedra, ANMI Apolobamba, Carpa Primeros restos de casas al lado de carretera bajando de Charazani, 15°11'24"S, 68°53'8"W, 2530 m, 17 iv 2005, *A.F. Fuentes, R. Cuevas, E. Cuevas & H. Pariamo* 6882 (MO); Prov. Sud Yungas, 16°19'37"S, 67°49'55"W, 2000 m, 24 iii 2007, *T. Särkinen, C.E. Hughes, A. Wortley & P. Duchan* 2058 (FHO).

In the original publication of *Begonia dolabrifera* (de Candolle, 1908), there is a typographic error regarding the author name. It should read 'C. DC' instead of 'D. DC'.

In the original publication of *Begonia triramosa* (Irmscher, 1949), there is a typographic error regarding the collection number of the holotype. It should read '22493b' instead of '224936'.

Photographs of representative specimens of both living and dried plants of *Begonia acerifolia* are available via the Begonia Resource Centre (Hughes *et al.*, (2015–)).

**Begonia velata** L.B.Sm. & B.G.Schub., Publ. Field Mus. Nat. Hist., Bot Ser. 13(4/1): 201. 1941. – Type: Peru, Piura Region, Prov. Huancabamba, above Palambla, 2700 m, iv 1912, *A. Weberbauer* 6021 (holo GH!; iso F [2]!, NY!, US!).

Cauliscent, rhizomatous herb. *Rhizome* horizontal, 5–20 cm long, 0.75–2 cm in diameter, unbranched. *Stem* erect to sprawling, usually 0.5–2 m tall, 0.75–2 cm in diameter, unbranched, internodes 1–19 cm long, glabrous. *Stipules* persistent, ovate to ovate-triangular, 1–1.5 × 0.6–0.9 cm, apex acute, margin entire. *Leaves* alternate, basifixed; petiole running straight into main vein of blade, 7.5–23 cm long, glabrous, bearing a dense ring of or a few scattered simple, translucent hairs around the top of the petiole at the position where it joins the blade; blade juicy, symmetrical, orbicular, 7.5–17 × 7.5–15 cm, base cordate, basal lobes spreading, sinus to 12 cm deep, apex acute, margin deeply 6-lobed, lobes ovate-triangular, 3.5–13 cm deep, serrulate, teeth sometimes tipped with a short hair, upper surface green, moderately pubescent, hairs pink, simple, lower surface silvery green, moderately pubescent, hairs white, veins palmate, 6–8. *Inflorescence* axillary from the upper portion of the stem, erect, a symmetrical cyme, 3-branched, branches 0.5–5 cm, bearing up to 12 flowers, bisexual, male flowers beginning to open before the first female flowers but both sexes eventually open concurrently; peduncle 15–40 cm long, glabrous; pedicels of male flowers 1.1–3.5 cm long, glabrous; pedicels of female flowers c.1 cm long, glabrous; bracts deciduous, ovate, 0.7–1.4 × 0.5–0.7 cm, apex acute, margin entire. *Male flowers*: tepals 4, spreading, white, sometimes reddish pink flushed on the outer surfaces or rarely on both surfaces and sometimes additionally with a green tinge on the outer surfaces of the outer two tepals, outer two elliptic to broadly elliptic, 1.4–1.6 × 1.2–1.4 cm, apex rounded, margin entire, glabrous, inner two obovate, c.1.5 × c.1.1 cm, apex rounded, margin entire, glabrous; stamens 45–75, attached along the length of a 1–2 mm long torus, filaments 1–2.5 mm long, anthers symmetrically basifixed, obovoid, c.1 mm long, dehiscing by unilateral slits, connectives not extended. *Female flowers*: bracteoles absent; tepals not persisting in fruit, 5, spreading, white, sometimes reddish pink flushed on the outer surfaces, obovate, subequal, 0.7–0.9 × 0.8–1 cm, glabrous, apex subacute, margin entire; ovary body broadly ellipsoid, 5.25–10 × c.6 mm, pale green to pink, glabrous, with one long wing and two rib-like wings, longest wing usually ligulate to occasionally triangular-ligulate, apex rounded to almost truncate, to 1.6 × 1 cm, 3-locular; placentae bifid, bearing ovules on both surfaces of placental branches; styles 3, shortly fused at

base, c.6 mm long, bifid from about half their height, branches upright to flattened and somewhat spreading, stigmatic papillae in a once-spiralled band. *Fruiting pedicel* c.1 cm long. *Fruit* subnutant, body broadly ellipsoid, to  $1.5 \times 1$  cm, glabrous, wings as in ovary.

*Phenology.* Flowering from April to June.

*Distribution.* Andes of Peru (Cajamarca and Piura).

*Habitat.* Typically growing as an epiphyte on trunks of trees and shrubs, occasionally terrestrial. Found at altitudes between 1500 and 3100 m.

*IUCN conservation category.* *Begonia velata* is known from two locations within a total area measuring 150 km<sup>2</sup>. Within these two locations, ongoing conversion of the local forest to agricultural land has caused a decline in the quality of available habitat. The current population size of the species is estimated to consist of no more than 10,000 individuals. *Begonia velata* is according assessed using IUCN criteria as Vulnerable (VU B2) (2016).

*Additional specimens examined.* PERU. **Piura:** Region, Prov. Morropon, Dist. Chalaco, Cima del cerro Mijal, Pajonal de jalca, 5°4'56''S, 79°44'47''W, 3100 m, 10 v 2003, *I. Sánchez Vega, R. Cruz Córdova & E. Peña Cruz* 11952 (CPUN); Prov. Huancabamba, El Tambo, [5°21'34''S, 79°33'3''W], 3000 m, 2 vi 1961, *C. Acleto* 228 (USM); Prov. Huancabamba, Distr. Canchaque, Canchaque – Minas Turmalina, [5°22'21''S, 79°34'32''W], 2200 m, 23 vii 1975, *A. Sagástegui A., J. Cabanillas S. & O.C. Dios* 8279 (HUT, MO); Huancabamba Province, above Canchaque on the Huancabamba Pass, 5°22'35''S, 79°34'59''W, 1758 m, 26 i 2016, *P.W. Moonlight & A. Daza* 107 (E); Prov. Huancabamba, Distr. Canchaque, above Palambla, 5°22'S, 79°35'W, 1710 m, 27 v 2015, *M.C. Tebbitt & A. Daza* 838 (E); Prov. Huancabamba, Distr. Canchaque, “Chorro blanco”, [5°23'S, 79°35'W], 1500–1900 m, 18 iv 1987, *C. Díaz & S. Baldeón* 2457 (USM); Prov. Huancabamba, Distr. Canchaque, Chorro Blanco, 5°23'S, 79°35'22''W, 1500 m, 18 iv 1987, *C. Díaz & S. Baldeon* 2457 (MO). **Cajamarca:** Prov. Contumazá, Bosque Cachil, 6°23'18''S, 79°17'28''W, 2500 m, 16 vi 1994, *A. Sagástegui, S. Leiva G. & P. Lezama* 15307 (MO).

On the type sheets and in the original description (Smith & Schubert, 1941) of *Begonia velata*, the species is described as having “fiery red” tepals. Fieldwork found that the species never has red tepals but instead has tepals that are white, although these are sometimes reddish pink flushed on the outer surfaces or rarely on both surfaces and sometimes additionally have a green tinge on the outer surfaces of the outer two tepals. Presumably this inconsistency resulted from a mix-up with collection notes. It is easy to see where this mistake could have originated, because at its type locality *Begonia velata* grows close to *B. polypetala*, which does have vivid scarlet tepals.

A photograph of the collection *Tebbitt & Daza* 838 in the living state is available via the Begonia Resource Centre (Hughes *et al.*, 2015–).

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HUT, K, LIL, LP, LPB, MEDEL, MO, MOL, MOL-WEB, NY, OXF, P, QCA, QCNE, QPLS, S, SEL, SI, TEX, UC, US, USM, USZ, W and Z for loaning material or allowing me to work in their herbaria. Fieldwork was funded by a series of grants from the American Begonia Society. I thank the Ecuadorian Ministerio del Ambiente and the Ministerio del Ambiente del Perú for granting me permission to conduct the fieldwork and collect specimens. Álvaro J. Pérez (QCA), Carlos Augusto Reynel Rodriguez (MOL) and Tiina Särkinen (E) assisted with obtaining permits and gave advice regarding fieldwork, and Aniceto Daza Yomona (MOL), Adolfo Jara Muñoz (ANDES), Cristina Toapanta (QCA) and David Gutierrez (Ecuador) are gratefully acknowledged for their assistance in the field.

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