

TAXONOMY OF *BEGONIA WOLLNYI* HERZOG AND *BEGONIA ARROGANS* IRMSCH.

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Descriptions of two sister species, *Begonia wollnyi* Herzog and *Begonia arrogans* Irmsch., are provided and their distributions mapped and discussed. *Begonia wollnyi* is newly recorded from Peru and Argentina. *Begonia parodiana* L.B.Sm. & B.G.Schub. is newly synonymised with *B. wollnyi*. *Begonia arrogans* Irmsch. and two existing synonyms of *B. wollnyi* Herzog, *Begonia acrensis* Irmsch. and *Begonia williamsii* Rusby & Nash, are lectotypified. *Begonia wollnyi* and *B. arrogans* are both assessed as Least Concern (LC), according to IUCN criteria.

Keywords. Argentina, *Begonia* sect. *Knesebeckia*, Bolivia, Brazil, Peru, Venezuela.

INTRODUCTION

The taxon currently known as *Begonia wollnyi* Herzog was originally described as *Begonia williamsii* Rusby & Nash, based on material from La Paz Department, Bolivia (Nash, 1906). Because the name *Begonia williamsii* had already been assigned in 1882 by Williams (Williams, 1882), the accepted name for the taxon became *B. wollnyi* Herzog, following the synonymisation of that species with *B. williamsii* Rusby & Nash by Golding in 1999 (Golding, 1999). This merger followed an earlier tentative suggestion that these two taxa were synonymous (Smith & Schubert, 1944). Smith and Schubert (1955) had also earlier synonymised *Begonia acrensis* Irmsch. with *B. williamsii* Rusby & Nash, and Golding (1999) also recognised this taxon as a synonym of *B. wollnyi* Herzog. With the merger of these species and further work on them, the distribution range of this taxon was enlarged to include Santa Cruz Department, Bolivia; Acre, Brazil; and Portuguesa and Cojedes States, Venezuela (Golding, 1999). Since then, additional collections of this species have been recorded from a total of five Bolivian departments (Chuquisaca, Cochabamba, La Paz, Santa Cruz and Tarija) (Jørgensen *et al.*, 2014, 2015), as well as from three Venezuelan states (Cojedes, Lara

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and Portuguesa) (Hokche *et al.*, 2008) and four Brazilian states (Acre, Amazonas, Pará and Roraima) (Kollmann, 2016), with the Amazonas record being in error (Kollmann, unpublished).

Begonia wollnyi as currently recognised has one of the largest distributions of any species in the megadiverse pantropical genus *Begonia*, and one that, very unusually for the genus, spans multiple ecoregions as defined by Olson *et al.* (2001). The vast majority of other species in this genus are narrow endemics that are often restricted to precise microhabitats (Tebbutt, 2005; Hughes *et al.*, 2015–). These intriguing anomalies prompted us to conduct a detailed taxonomic study of *Begonia wollnyi* and its closest relatives. The study aimed to determine if *Begonia wollnyi*, as currently recognised, represents a single, widespread species or if it requires recircumscription into smaller units, each with a more limited geographical and ecological range.

A detailed examination of the herbarium material available from 29 herbaria (see *Acknowledgements*), in combination with fieldwork in Ecuador, Peru, Bolivia, Argentina and Brazil, found that not only does *Begonia wollnyi* represent a coherent morphological species as currently circumscribed, and which has populations in Venezuela, Bolivia and Brazil, but that it additionally occurs in Peru (Cuzco Region) and northern Argentina (Salta Province). The study also found that the northern Andean populations (Venezuela, Peru and La Paz Department, Bolivia) usually differ from the Brazilian and southern Andean populations (southern Bolivia and Argentina) in having peltate rather than cordate leaf bases. Fitting this pattern, the types of *Begonia wollnyi* (Herzog 86: Santa Cruz Department, Bolivia) and *B. acrensis* (Ule 9649: Acre State, Brazil) both have cordate leaf bases, whereas the type of *B. williamsii* Rusby & Nash (*Williams* 600: La Paz Department, Bolivia) has peltate leaf bases. We refrain, however, from assigning infraspecific names to these two variants, given that individual plants occasionally produce both peltate and cordate leaves (Golding, 1999).

The herbarium material from Argentina that we assign here to *Begonia wollnyi* was in part previously recognised as a distinct species, *Begonia parodiana* L.B.Sm. & B.G.Schub., which we newly synonymise with *B. wollnyi*. Smith and Schubert (1941) described *Begonia parodiana* based on fertile material that lacks mature leaves. They stated that this species could be distinguished from its relatives by virtue of its erect, succulent stem and its few-flowered terminal inflorescence that matures before the leaves appear. Smith and Schubert (1941) did not, however, state what species they considered closely related to *Begonia parodiana*. All the features that they cite as distinct for this species occur in *Begonia wollnyi*, and examination of the isotype specimen of *B. parodiana* at Kew found that this sheet had young developing leaves and that these had the deeply lobed margins characteristic of *B. wollnyi*. The only other Andean *Begonia* species with leaves that are similar enough to be confused with those of *B. wollnyi* is *B. acerifolia* Kunth. This species is, however, readily distinguished from *Begonia wollnyi*, and molecular phylogenetic analyses indicate that although the two species are closely related, they are not sister taxa (Moonlight *et al.*, [in press](#)). Characters that distinguish *Begonia wollnyi* and *B. acerifolia* are presented in the key provided here. In addition

to this material of *Begonia wollnyi* that lacks mature leaves, a number of specimens of this species from Argentina with fully developed leaves, as well as flowers and fruit (e.g. *Verveorst & Cuezze 7735 C (LIL)*), were also seen. This material further confirms the presence of *Begonia wollnyi* in Argentina.

Molecular data (Moonlight *et al.*, [in press](#)) indicates that the sister species of *Begonia wollnyi* is *B. arrogans* Irmsch. *Begonia arrogans* is a narrow endemic that was described from the Junín Region of Peru (Irmscher, 1949) and which is morphologically similar to *B. wollnyi*, differing most noticeably in its leaf shape and tepal colour. Recent fieldwork has expanded the known range of *Begonia arrogans* to include the Ucayali and Pasco Regions of Peru. This additional material allows us to present here a more comprehensive description of this species than Irmscher (1949) was able to provide.

The distribution of *Begonia wollnyi* is of considerable interest because among *Begonia* it is unusually large, disjunct, and atypical in that the species occurs both in the Andes and in the Amazon Basin of Brazil. Molecular phylogenetic analyses (Moonlight *et al.*, [in press](#)) indicate that *Begonia wollnyi* is nested within a large clade otherwise consisting of species that are restricted to the Andean region. This suggests that *Begonia wollnyi* probably originated in the Andean region and then colonised eastern Brazil via long-distance dispersal. *Begonia wollnyi*, by virtue of its thick, drought-tolerant stems and deciduous leaves, is adapted to grow in environments with alternating wet and dry seasons, such as occur throughout the species' range both in the Andes and in Brazil. These features would have preadapted the species to the conditions found in the parts of Brazil that the species has colonised. Interestingly, this distribution pattern is similar to that of *Begonia ulmifolia* Willd., which was recently found in seasonally dry environments in central Peru (Moonlight, unpublished data) but is most commonly found in similar environments in the Guiana Shield region (Funk *et al.*, 2007; Hokche *et al.*, 2008) and on Trinidad (Baksh-Comeau *et al.*, 2016), with a further disjunction to south-eastern Brazil (Brazilian Flora, 2020 [under construction](#)). Molecular phylogenetic analyses (Moonlight *et al.*, [in press](#)) indicate *Begonia ulmifolia* colonised south-eastern Brazil and central Peru from the Guiana Shield region and thus has migrated in the opposite direction to *B. wollnyi*.

Many questions regarding the distribution patterns of *Begonia wollnyi* and *B. ulmifolia*, however, remain unanswered. For example, why did these species expand their ranges while other similar drought-adapted Andean *Begonia* species did not? And were the isolated populations of *Begonia wollnyi* and *B. ulmifolia* once part of larger populations that occurred continuously throughout the Andes and around the Amazon, or are these disjunctions the result of long-distance dispersal? Similarly, how have *Begonia wollnyi* and *B. ulmifolia* managed to largely maintain their integrity despite having a large, disjunct distribution, whereas other *Begonia* species have apparently fragmented into numerous infraspecific taxa or even segregate species (Hughes & Hollingsworth, 2008)? Perhaps these species' large, disjunct distributions are of relatively recent origin? If so, what led to their recent expansion? We suggest that it would be worth the effort of future researchers to expand both the ecological and the molecular data sets available for both *Begonia wollnyi* and *B. ulmifolia* to better

understand the biogeography of these unusual *Begonia* species. Such a study could shed light on not only the biogeography of these species but also on how *Begonia* as a whole has managed to colonise such a large portion of the tropics, especially because drought-tolerant species such as these probably played a key role in the process.

KEY TO *BEGONIA WOLLNYI* AND ITS RELATIVES

- 1a. Margin of leaf blade with irregular \pm triangular lobes or lobes lacking, lobes when present up to one-third length of blade, crenate; stamens 30–40 _____ **2. *B. arrogans***
- 1b. Margin of leaf blade usually deeply 5- to 8-lobed, lobes usually about half length of blade, rarely with 6–8 shallow angular lobes, lobes lanceolate to lanceolate-triangular or narrowly triangular, serrulate to serrate; stamens 50–100 _____ **2**
- 2a. Rhizome present; ovary and fruit with one long wing and two rib-like wings, longest wing ligulate, ligulate-triangular or triangular _____ *B. acerifolia*
- 2b. Rhizome absent but stem base often swollen; ovary and fruit with 3 subequal wings, wings rounded triangular, front edge \pm truncate, rear edge gently convex curved _____ **1. *B. wollnyi***

TAXONOMIC TREATMENT

1. *Begonia wollnyi* Herzog § *Knesebeckia*, Repert. Spec. Nov. Regni Veg. 7: 63 (1909). – Type: Bolivia, Im Bergwald der Quebrada de Cuñucú (Cordillera de Sta. Cruz), c.800 m, x 1907, *T. C. J. Herzog* 86 (holo Z!). **Fig. 1.**

Begonia williamsii Rusby & Nash, *Torreya* 6: 47 (1906), non *B. williamsii* B.S. Williams (1882). – Type: Bolivia, San Buena Ventura, 14°27'29"S, 67°35'12"W, 420 m, 14 xi 1901, *R. S. Williams* 600 (lecto NY! [barcode 00118714], here designated; isolecto BM!, K!, US!).

Begonia acrensis Irmsch., *Bot. Jahrb. Syst.* 74: 605 (1949). – Type: Brazil, Acre State, Rio Acre, Seringal S. Francisco, 9°0'37"S, 71°35'42"W, vi 1911, *E. H. G. Ule* 9649 (lecto US! [barcode US00115231], here designated; isolecto B, G!, K!, U!, US!).

Begonia parodiana L.B.Sm. & B.G.Schub., *Darwiniana* 5: 88 (1941) – Type: Argentina, Prov. Salta, Dep. Oran, Cerros de Río Ytau, 54 km oeste de Manuela Pedraza, 800 m, 29 x 1938, *W. J. Eyerdam* & *A. A. Beetle* 22726 (holo GH!; iso G!, K!, US!), **syn. nov.**

Cauliscent herb, often with a swollen stem base but usually lacking a tuber or rhizome, very rarely a tuber present. *Stem* erect, becoming somewhat woody at maturity, 0.1–2 m tall, 1–3 cm diameter at base, gradually tapering from base to apex, unbranched or few-branched, internodes (0.3–)2–5 cm long, glabrous. *Stipules* persistent, oblong or ovate-oblong to triangular, 0.8–2.1 \times 0.3–0.8 cm, apex acute, setose, margin entire. *Leaves* 3–8, alternate, basifixed or peltate with umbo 2.5–6 mm from the margin; petiole joining blade at an angle, 5–16 cm long, glabrous; blade asymmetric, broadly ovate to

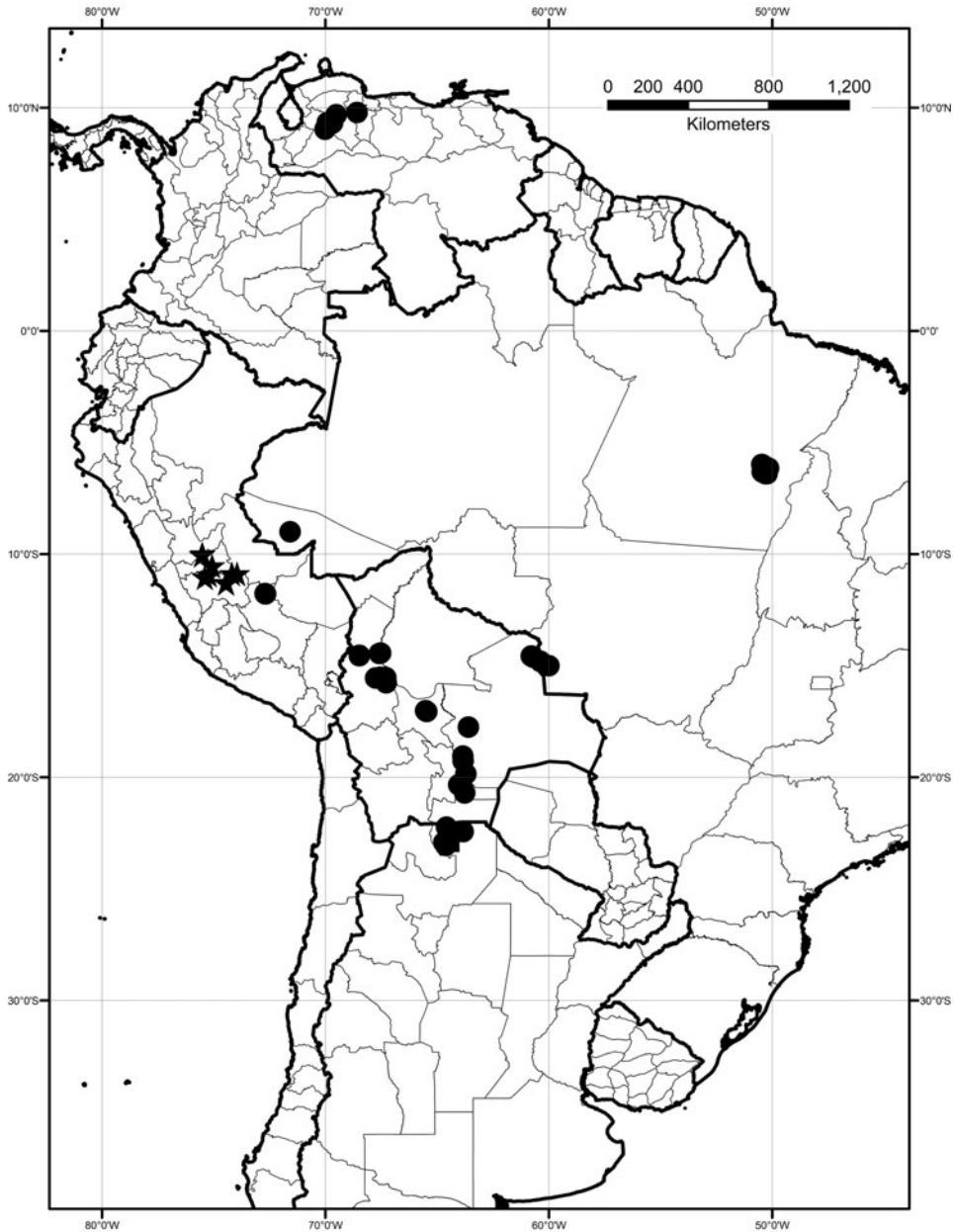


FIG. 1. Distribution of *Begonia wollnyi* (circles) and *Begonia arrogans* (stars).

suborbicular in outline, 8–20 × 8–26 cm, base obliquely cordate, basal lobes spreading, sinus 2–3.5 cm deep, margin with (4–)5–7 lanceolate to lanceolate-triangular lobes, lobes usually about half length of blade, apex of lobes acute or acuminate and often curved, margin serrate toothed, teeth 0.25–2 mm long, ciliate, upper surface green or

green with silver white splotches between veins, with a sparse cover of short white hairs, lower surface green or green with a purple tinge, glabrous or with a sparse cover of short white hairs, veins palmate, 5–7. *Inflorescences* 1–4, axillary, arising from close to apex of stem, \pm erect, symmetric 2- to 6-branched dichasial cyme, often produced just before the emergence of the new leaves or shortly after the new leaves have emerged, male flowers usually developing ahead of females but both sexes open concurrently; peduncle 8.5–19 cm long, glabrous or minutely glandular-pubescent; pedicels of male flowers 1.2–1.4 cm long, glabrous or minutely glandular-pubescent; pedicels of female flowers 0.6–1.5 cm long, glabrous or minutely glandular-pubescent; bracts caducous, elliptic, sublanceolate, or oblong, 4.8–8.5 \times 1.5–4.8 cm, apex acute, margin and outer surface with minute glandular hairs. *Male flowers*: tepals (2–)4, spreading, pellucid, green, outer pair \pm orbicular, ovate, or obovate, subequal, 0.5–1.25 \times 0.7–1 cm, apex rounded, margin entire, outer surface glabrous or with minute glandular hairs, inner pair elliptic, 5–7 \times 2–3 mm, apex rounded, margin entire, glabrous; stamens 75–100, golden-yellow to orange, attached to a rounded receptacle, filaments 1.25–2 mm long, those near the centre of the androecium longer than those on the margin, anthers basifixed, obovoid, 0.5–0.75 mm long, dehiscing via unilateral slits, connectives not extended. *Female flowers*: bracteoles present or absent, when present 2, c.3 mm long, deciduous; tepals usually persisting in fruit, occasionally tardily deciduous, 5, spreading, pellucid, green, ovate to broadly ovate, subequal, 5–9 \times 2–6 mm, apex acute, margin entire, glabrous; ovary body ellipsoid, 0.4–1 \times 0.3–0.7 cm, green with a pinkish tinge, glandular-pubescent, 3-winged, wings equal to subequal, rounded triangular, front edge \pm truncate, rear edge gently convex curved, apex subacute to obtuse, longest wing 0.2–0.9 cm tall, 0.8–1.2 cm wide, shorter two wings 0.1–0.7 mm tall, 0.8–1.2 cm wide, apex obtuse; 3-locular, placentas bifid, bearing ovules on both surfaces; styles 3, free or shortly fused at base, 3–3.5 mm long, bifid from about half their height, branches erect, stigmatic papillae in a once or twice spirally twisted band. *Fruiting peduncle* 8.5–19.5 cm long; fruiting pedicel elongating as fruit matures, becoming up to 3 cm long. *Fruit* \pm erect, body ovoid or ellipsoid, to 1.1 \times 0.8 cm, glabrous, longest wing to 1.5 cm tall, 1.8 cm wide, apex obtuse to acute, shorter two wings to 1.2 cm tall, 1.8 cm wide, apex obtuse to acute.

Phenology. Flowering year-round throughout its range.

Distribution and habitat. A scattered and locally common species of Venezuela (Lara, Portuguesa and Cojedes), Peru (Cuzco), Brazil (Acre, Mato Grosso, Pará and probably Roraima; Kollmann, unpublished), Bolivia (La Paz, Cochabamba, Santa Cruz, Chuquisaca and Tarija) and Argentina (Salta). Occurring on shady, steep rocky banks in humid primary and disturbed forest, from 200 to 1320 m.

IUCN conservation category. *Begonia wollnyi* is a widespread and often locally common species that occurs in the Andes from Venezuela to Argentina and in Brazil. An IUCN category of Least Concern (LC) is assigned, according to IUCN criteria (IUCN, 2015).

Additional specimens examined. VENEZUELA. **Lara:** Distr. Jiménez, Paso de Angostura, sitio de represa de Yacambú, en la confluencia de la Quebrada Honda con el Río Yacambu, 33 km Sureste de Sanare, 9°41'N, 69°31'W, 500 m, 28–31 vii 1973, *J. A. Steyermark & V. Carreño Espinoza* 107599 (NY, US), 27–28 xii 1973, 108742 (F, MO, NY, US [2]). **Portuguesa:** En riberas del Río Guanare, km 4 antes de Biscucuy, entrando a Quanare, 9°20'N, 69°55'W, 500 m, 22 i 1982, *E. Rutkis* 420 (US); faldas pedre-gosas arriba del puent sobre er Río María, NE de Boca de Monte, 28–32 kms al NNE de Guanare, 9°18–19'N, 69°42–43'W, 400–500 m, 2 xi 1982, *J. A. Steyermark, R. Liesner & G. Aymard* 127054 (MO [2], US, VEN); Selva en valle de la Quebrada Algarrobo, afluente del Río Morador, 7 kms al NE de Boca de Monte, 22 kms al NE del vado del Río Suruguapo, 45 kms al NE por la autopista Guanare-Ospino, en el sitio Las Marias al este de guanare, 9°19'N, 69°41'30''W, 400 m, 3 xi 1982, *J. A. Steyermark, R. Liesner & G. Aymard* C. 127239 (MO); 30 km west of Guanare by air, along Río Tucupido, 9°2'N, 70°1'W, 200–300 m, 13 iii 1982, *R. Liesner, A. González & B. Stergios* 12648 (MO, US); Municipio Guanare, Río Las Nariás camino hacia San José de Montaña, 350–1200 m, 27 ix 1981, *B. Stergios & F. Ortega* 2949 (US). **Cojedes:** Dept. San Carlos, Cigarron, orillas del rio San Carlos, 9°47'46''N, 68°35'22''W, 230 m, 28 xi 1986, *F. Delascio Chitty & R. Lopez* 12940 (MO).

PERU. **Cuzco:** Prov. Cuzco, Distr. Camisea, Campamento San Martin-C, Camisea Production unit, west of camp, 11°47'08''S, 72°41'57''W, 467 m, 13 i 1997, *P. Acevedo-Rdgz* 8682 (CUZ, MO, NY, US, USM); Prov. La Convencion, Distr. Echarati San Martin, 3 well site, 11°46'89''S, 72°42'10''W, 400 m, 15 ii 1997, *P. Nuñez, S. Baldeon, A. Alonso, J. Santisteban, G. Valencia, K. Anderson, J. Luton, J. Pacaya V. & F. Ramos* R. 19107 (USM).

BRAZIL. **Mato Grosso:** Serra Ricardo Franco, 15°S, 60°W, 600–700 m, 19 vii 1977, *Windisch* 1368 (RB). **Pará:** Serra dos Carajás, “Azul”, near camp at Serra Norte (22 km NW, then 10–15 km SW), 5°59'S, 50°28'W, 500–550 m, 8–12 xii 1981, *D. C. Daly, R. Callejas, M. G. da Silva, E. L. Taylor, C. Rosario & M. R. dos Santos* 1861 (MG, NY, US); Serra dos Carajás, AMZA camp AZUL, an abandoned manganese exploration camp, 6°06'S, 50°17'W, 500–550 m, 31 v 1982, *C. R. Sperling, R. S. Secco, M. Condon & A. L. Mesquita* 5903 (K, MG, MO, NY [2], US); Canaã dos Carajás, S11-D, 6°23'31.3''S, 50°19'9.06''W, 22 vii 2012, *A. J. Arruda, L. F. A. Paula, L. V. Costa & L. J. Batitucci* 1217 (BHCB); S11-D, 6°23'31''S, 50°19'9''W, 23 v 2012, *A. J. Arruda, A. Salino. & L. J. Arruda* 1176 (BHCB, MG); S11-D, 6°23'29''S, 50°19'04''W, 26 i 2012, *L. F. A. Paula, L. V. Costa, M. O. Pivari, L. J. Batitucci & A. J. Arruda* 450 (BHCB); Serra Sul, S11-D, 6°24'00''S, 50°18'56''W, 12 vi 2014, *R. S. Santos, P. G. C. Lima, L. C. B. Lobato & M. R. Coelho-Ferreira* 184 (MG); rise of the waterfall, 6°24'29.6''S, 50°14'52.35''W, 27 iv 2010, *F. D. Gontijo, T. E. Almeida & M. E. Megale* 159 (BHCB); Serra Sul, Corpo A, 6°18'33''S, 50°27'19''W, 29 vi 2010, *T. F. Almeida, F. Marino, M. Megl & A. J. Arruda* 2427 (BHCB); Serra Sul, Corpo B, 6°21'18''S, 50°23'16''W, 6 x 2009, *V. T. Giorni, F. Marino & P. Viana* 363 (BHCB); Serra Sul, S/SW do Corpo A, 6°19'43.14''S, 50°27'17.68''W, 15 ii 2010, *F. D. Gontijo* 82 (BHCB, MG); Parauapebas, N7, 6°09'10''S, 50°10'42''W, 24 vi 2012, *L. V. C. Silva, T. B. Jorge, F. M. G. Santos & R. A. Pereira* 1319 (BHCB, MG).

BOLIVIA. **La Paz:** Prov. Abel Iturralde, Madidi, Cerranias de los alrededores de San Buenaventura, 14°26'20''S, 67°32'11''W, 250 m, 3 xii 2004, *A. Araujo-Murakami, P. Gismondi & N. Flores* 1381 (MO); Prov. Franz Tamayo, Area Natural de Manejo Integrado Madidi; Unapa, 21 km en linea recta al N de Apolo, 14°32'26''S, 068°29'46''W, 1022 m, 1 ix 2004, *A. F. Fuentes & C. Aldana* 6376 (LPB, MO, NOLS); Prov. Franz Tamayo, Area Natural de Manejo Integrado Madidi, 3 km al norte de Unapa, 14°32'35''S, 68°29'38''W, 969 m, 3 ix 2004, *L. Cayola, A. Antezana, F. Miranda, C. Quevas & D. Quevas* 861 (USZ); Prov. Franz Tamayo, Chaquimayo-Tuichi trail, c.20 km NW of Apolo, just above Río Machariapo, 1100 m, 7 viii 2000, *D. C. Wasshausen & J. R. I. Wood* 2279 (US); Prov. Larecaja, along road between Caranavi and guanay, 27.8 km N of Caranavi, 15°33'S, 67°45'W, 865 m, 28 xi 1980, *T. B. Croat* 51640 (MO); Prov. Nor Yungas, Caranavi c.15 kms hacia Puerto Linares, subiendo por el rio Yara, 850 m, 15 ix 1981,

S. G. Beck 31982 (NY), 4822 (US); Prov. Sud Yungas, Alto Beni, arriba de Sapecho, [15°32'S, 67°18'W], 550 m, 29 xi 1993, *R. Seidel* 7478 (US); Prov. South Yungas, Basin of Rio Bopi, San Bartolome (near Calisaya), 750–900 m, 1–22 vii 1939, *B. A. Krukoff* 10493 (F, NY). **Cochabamba:** Prov. Chapare, Avispas-Río Putintiri, zona muy proxima a Villa Tunari, a 152 km de la ciudad de Cochabamba, 17°1'9"S, 65°31'25"W, 16 ix 2007, *J. A. Terán, D. O. Soux Pol & E. Rodríguez* 974 (MO); Prov. Chaparé, Parque Nacional Carrasco, La Cueva de Guacheros, near road from Villa Tunari to Comunidad El Palmer, small stream near administration building (behind parking lot), 17°3'51.6"S, 65°28'34.3"W, 460 m, 4 viii 2002, *J. L. Clark* 6806 (US [2]); Prov. Carrasco, localidad Guacharos, 17°4'14"S, 65°27'48"W, 550 m, 10 ix 2003, *S. Altamirano, M. Alem, E. Zurita & C. Orosco* 1548 (MO); **Santa Cruz:** Prov. Jose Miguel de Velasco, Parque Nacional Noel Kempff M., Campamento Las Gamas, Campo Rupestre, 14°48'14"S, 60°23'59"W, 850 m, 13 vi 1994, *L. P. Arroyo, J. Wellens & E. Gutierrez* 815 (MO); Prov. Velasco, Parque Noel Kempff Mercado, Serrania de Huanchaca, trail between Los Fierros and base of Meseta de Caparusch., 300 m, 31 vii 2000, *D. C. Wasshausen & J. R. I. Wood* 2246 (US); Prov. Velasco, Serrania de Huanchaca Farallon Sur Oeste, senda a Catarata El Encanto, desde el camino del Estación Los Fierros, Parque Nacional Noel Kempff M., 14°37'S, 60°42'W, 200–300 m, 4 xi 1991, *R. Foster* 13659 (USZ); Prov. Velasco, Parque Noel Kempff Mercado, vicinity of catarata El Encanto, 450 m, 1 viii 2000, *D. C. Wasshausen & J. R. I. Wood* 2251 (US); Prov. Velasco, Parque Nacional Noel Kempff Mercado, 14°39'38"S, 60°42'43"W, 300 m, 19 viii 1996, *P. F. Foster, C. Sims & R. Roca* 778 (MO); Prov. Ichilo, Parque Nacional Amboró, SE side of gorge of Río Macuñucú, 17°45'S, 63°36'W, 900 m, 6 xii 1991, *M. Nee* 41976 (NY); Prov. Sara, Buena Vista, Campos región, 17°36'0"S, 63°45'0"W, 450 m, 9 v 1925, *J. Steinbach* 7218a (BM, F, G, K, MO); Prov. Florida, Bella Vista, circuito ecoturístico el "Chorro del Fraile", 18°19'26"S, 63°40'28.7"W, 1249 m, 13 ix 2007, *M. Vargas, Y. Inturias & M. Mendizabal* 448 (MO). **Tarija:** Prov. Aniceto Arce Ruíz, 108 kms de Tarija hacia Bermejo, 5 iii 1988, *R. Ehrlich* 447 (B, LPB); Prov. Aniceto Arce, Bermejo, 109 kms hacia Tarija, 1000 m, 20 x 1983 *S. G. Beck & M. Liberman* 9607 (US). **Chuquisaca:** Prov. Hernando Siles, Huacareta Municipality, Serrania Los Milagros. Trayecto Canon – Largo, 20°20'16"S, 64°2'42"W, 1575 m, 23 xii 2005, *M. Serrano, J. Villalobos, A. Lliully, J. A. Peñaranda & R. Lozano* 6875 (MO); Prov. Hernando Siles, Municipio Huacareta, Canton, Rosario del Ingre, comunidad Villa Hermosa, al borde de la quebrada, 20°30'43.6"S, 63°51'27.4"W, 973 m, 1 i 2008, *A. Flores & M. Jimenez* 29 (HSB, MO, US); [Prov. Luis Calvo], Bridge over Río Asero, 19°3'28"S, 63°51'48"W, 1210 m, 29 ix 1949, *W. M. A. Brooke* 5707 (BM); Prov. Luis Calvo, Villa Vaca Guzman Municipality, PN y Área de Manejo Integrado "Serrania del Inao" Comunidad de Monte Grande, Serrania Nawnaca, 19°16'20"S, 63°50'33"W, 1126 m, 24 x 2008, *J. L. Villalobos, H. Panique, E. Portales & L. Portales* 1680 (MO); Prov. Hernando Siles, Municipio de Monteagudo, parque nacional y área de Manejo integrado de la Serrania del Inao, 19°43'49"S, 63°54'56"W, 1275 m, 10 xii 2008, *A. Lliully, J. Peñaranda, E. Mamani, E. Coa & M. Barrientos* 1420 (MO); Prov. Luis Calvo, Villa Vaca Guzman Municipality, Serrania del Incahuasi, 19°51'13"S, 63°43'38"W, 1318 m, 19 x 2005, *A. Lliully, R. León, F. Ortega & J. Vedia* 436 (MO); Prov. Luis Calvo, Municipio Villa Vaca Guzman, Canton Iguembe, 20°42'06.2"S, 63°46'49.7"W, 1090 m, 16 x 2007, *M. Jiménez, C. Ortiz & A. Flores* 442 (HSB, MO, US).

ARGENTINA. **Salta:** Yariguarenda, 3 vii 1944, *Schulz-Varela* 5178 (LIL); Orán Department, Balapuca [Bala Puca], 20 iii 1972, *T. Meyer & A. A. Vaca* 23511 (LIL); Orán Department, Pintoscayo, 7 iv 1947, *S. A. Pierotti* 6576 (LIL); Orán Department, San José, Río Iruya, 858 m, 29 viii 1944, *B. Willink* 328 (LIL); Orán Department, Río Cañas, 870 m, 25 viii 1944, *B. Willink* 356 (LIL); Orán Department, Cornisa Río Bermejo, camino a la Quebra. El Arasayal, km 7–8 de Aguas Blancas, 600 m, 26 x 1970, *F. Vervoorst & A. R. Cuezze* 7735 C (LIL [2]); Orán Department, a 3 km del Puente Intern. Agua Blanca, camino a la Quebra. El Arasayal, *P. R. Legname & A. R. Cuezze* 7226 C (LIL); Sierras de Ramos, 502 m, 19 iii 1944, s.c. 5463 (LIL); Orán Department, Tartagal River, 14 km W of Manuela Pedraza, 23°3'22"S, 64°37'18"W, 900 m, 26 x 1938, *W. J. Eyerdam & A. A. Beetle* 22635 (GH, K, UC).

CULTIVATED. New York Botanical Garden, 16 i 1906, *G. V. Nash* 2795 (NY); New York Botanical Garden, 22 i 1906, *G. V. Nash* 2795 (NY).

Begonia williamsii Rusby & Nash is herein lectotypified. The original herbarium collection of *Begonia williamsii* Rusby & Nash (*Williams* 600, NY barcode 00118714) was collected by R. S. Williams in Bolivia on 14 November 1901, bearing fruit but no flowers (Nash, 1906). Seed from this herbarium collection was sown at the New York Botanical Garden, and from the resulting living plants male flowers were collected on 16 January 1906 and female flowers on 22 January 1906. These living collections were used to describe the floral parts of *Begonia williamsii* Rusby & Nash, and a voucher was deposited at the New York Botanical Garden herbarium (*Nash* 2795, NY barcode 00118715). According to the International Code of Botanical Nomenclature (Article 9.4; McNeill *et al.*, 2012), there are three syntypes: *Williams* 600, the original collection from Bolivia, and *Nash* 2795, from New York Botanical Garden, which comprises two syntypes because the male and female flowers were collected on different dates. The first material collected by Williams (*Williams* 600) we designate as the lectotype, according to Article 9.12, and the remaining two collections represent syntypes.

Begonia acrensis Irmsch. is herein lectotypified. Irmscher (1949) cites two syntypes of *Begonia acrensis* in the protologue for his new taxon, one in Berlin herbarium (B) and one in the United States National Herbarium (US). We designate the specimen at US as the lectotype, because we were unable to locate the Berlin specimen and suspect that it may have been destroyed.

In the protologue for *Begonia parodiana* Smith and Schubert (1941) cite the holotype as being located at G, by which they mean Harvard University's Gray Herbarium rather than Geneva.

The specimen *Pierotti* 6576 (LIL) represents a mixed collection. The sheet consists of the top portion of a stem of *Begonia wollnyi* bearing three leaves and also two detached infructescences of that species, along with three detached leaves and a single fruit of *Begonia micranthera* Griseb. The specimen *Vargas* et al. 448 (MO) represents a mixed collection with a stem and two detached inflorescences of *Begonia wollnyi* with a leaf of an unknown plant (not *Begonia*).

2. *Begonia arrogans* Irmsch. § *Knesebeckia*, Bot. Jahrb. Syst. 74: 606 (1949). – Type: Peru, Dept. Junín, Pichis trail between Azupizu and Santa Rosa, 650 m, 28 vi–8vii 1929, *E. P. Killip* & *A. C. Smith* 26137 (lecto US! [barcode US00115245], here designated; isolecto F!, NY!). **Fig. 1.**

Caulescent herb, lacking a tuber or rhizome. *Stem* erect, becoming somewhat woody at maturity, 0.75–1 m tall, 5–8 mm diameter, few-branched, internodes 0.5–5.5 cm long, glabrous. *Stipules* tardily deciduous, oblong-ovate, 1.1–2.2 × 0.4–0.9 cm, apex acute, setose, margin entire. *Leaves* few, alternate, basifixed; petiole joining blade at an angle, 10–17 cm long, glabrous; blade asymmetric, ovate to oblong-ovate, 13–42 × 5.5–21 cm, apex acute or acuminate, base obliquely cordate, basal lobes spreading, sinus 0.8–5.5 cm deep, margin with up to irregular ± triangular lobes, lengthening towards

the apex of the leaf, or lobes lacking, lobes when present up to one-third length of blade, lobes to 16 cm deep, apex of lobes acute and often slightly curved towards the apex of the leaf, margin crenate toothed, teeth 0.2–2.5 mm long, ciliate, upper surface green with silver white splotches between veins in immature plants, green in mature plants, glabrous, lower surface wine red in immature plants or pale green in mature plants, glabrous, veins palmate-pinnate, 6–8. *Inflorescences* few, axillary, arising from close to apex of stem, \pm erect, \pm symmetric, 3- to 6-branched dichasial cyme, male flowers usually developing ahead of females but both sexes open concurrently; peduncle 11–14 cm long, glabrous; pedicels of male flowers 6–8 mm long, glabrous; pedicels of female flowers 0.6–1.8 cm long, glabrous; bracts deciduous, ovate or oblong, $0.6\text{--}1 \times 0.25\text{--}0.42$ cm, apex acute, margin entire, glabrous. *Male flowers*: tepals 4, spreading, white with a pinkish flush on outer surfaces, outer pair subcordate, $6\text{--}7 \times 6\text{--}7$ mm, apex subacute, margin entire, glabrous, inner pair elliptic, $c.4 \times 1.8$ mm, apex shape, margin entire, glabrous; stamens 30–40, yellow, attached to a flat receptacle, filaments 0.5–2 mm long, anthers symmetrically basifixed, obovoid, $c.0.5$ mm long, dehiscing via unilateral slits, connectives shortly extended. *Female flowers*: bracteoles absent; tepals persisting in fruit, 5, spreading, white with a pinkish flush on outer surfaces, outer two ovate, $5\text{--}12 \times 2.8\text{--}6$ mm, inner three elliptic, $5\text{--}7 \times 2\text{--}3$ mm, apex of all tepals acute, margin entire, glabrous; ovary body ovoid to ellipsoid, $8\text{--}12 \times 5\text{--}7$ mm, pinkish white, glabrous, 3-winged, one wing slightly longer than the other two, longest wing, semicircular, front edge gently curved to \pm truncate, apex obtuse, 12–15 mm long, 6–8 mm wide, two shorter wings semicircular, 11–14 mm long, 4–6 mm wide, front edge gently curved, apex rounded; 3-locular, placentas bifid, bearing ovules on both surfaces; styles 3, shortly fused at base, 1.8–3.5 mm long, bifid from about half their height, branches erect, stigmatic papillae in a once to twice spirally twisted band. *Fruiting peduncle* $c.14$ cm long; fruiting pedicel to 1.8 cm long. *Fruit* almost erect to nutant, body ovoid to ellipsoid, to 1.4×0.8 cm, glabrous, longest wing to 2 cm long, 1.3 cm wide, apex obtuse, shorter two wings to 1.8 cm long, 0.9 cm wide, apex rounded.

Phenology. Collected in flower in February and in June to September.

Distribution and habitat. A narrow endemic of central Andean Peru (Ucayali, Pasco, and Junín). Occurring on shaded, rocky slopes in dense forest, from 550 to 1040 m.

IUCN conservation category. *Begonia arrogans* is common within its range and has been collected in disturbed areas, including regularly cut roadside banks. Although the species has not been collected within any protected areas, it has tentatively been identified from photographs taken within Parque Nacional Yanachaga-Chemillén (Moonlight, unpublished). The population of the species appears stable, therefore we assess the species as Least Concern (LC) under IUCN criteria despite its relatively small extent of occurrence of $c.13,000$ km².

Additional specimens examined. PERU. **Ucayali**: Prov. Atalaya, road from Puerto Ocolpa to Atalaya, $c.$ km 105, $10^{\circ}53'23''\text{S}$, $73^{\circ}57'1''\text{W}$, 553 m, 15 ii 2016, *P. W. Moonlight & A. Daza* 250 (E); Prov. Atalaya, km 53 of road from Puerto Ocalpa to Atalaya, $10^{\circ}53'50''\text{S}$, $74^{\circ}11'39''\text{W}$, 835 m, 14 ii 2016, *P. W. Moonlight & A. Daza* 242 (E). **Pasco**: Prov. Oxapampa, route from Pozuzo to Cado

de Pozuzo, 10°0'22''S, 75°30'31''W, 655 m, 20 ii 2016, *P. W. Moonlight & A. Daza* 285 (E); Prov. Oxapampa, Camino to mirador from Pozuzo, 10°3'59''S, 75°32'57''W, 792 m, 20 ii 2016, *P. W. Moonlight & A. Daza* 277 (E); Prov. Oxapampa, along road Chatarra–Cacazu, disturbed forest, 10°32'S, 75°4'W, 700 m, 13 viii 2003, *H. van der Werff* 18425 (MO). **Junín:** Prov. Chanchamayo, c.9.5 km NW of San Ramon on dirt road along E side of Rio Oxabamba valley, 11°3'22''S, 75°24'30''W, 1042 m, 22 vi 2014, *P. W. Moonlight & A. Daza* 27 (E); Road Mazamari–Puerto Ocopa, path to waterfall, 11°17'8''S, 74°27'45''W, 610 m, 30 ix 2007, *R. T. Pennington & A. Daza* 1982 (E); Prov. Satipo, Route from Mazamari to Puerto Ocopa. Path to catarata Arco Ibis, c.25 m on to trail, 11°18'1''S, 74°27'26''W, 562 m, 14 ii 2016, *P. W. Moonlight & A. Daza* 239 (E).

Irmscher (1949) in his protologue of *Begonia arrogans* cites two syntypes, one in US and one in F. We designate here the specimen in US as the lectotype, because it includes the best-preserved floral material of the two specimens.

Colour photographs of the collections *Moonlight & Daza* 27, 239, 242 and 250 and of *Pennington & Daza* 1982 growing *in situ* are available on Hughes *et al.* (2015–).

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