



## *Begonia ostulensis* (Begoniaceae), a new species from Michoacán, Mexico

MARTHA MARTÍNEZ-GORDILLO<sup>1</sup> & MARÍA FELIX RAMOS-ORDOÑEZ<sup>2\*</sup>

<sup>1</sup> Herbario de la Facultad de Ciencias (FCME), Universidad Nacional Autónoma de México, Apartado Postal 70-399, 04510 Coyoacán, Mexico City, Mexico.

✉ [mjmg\\_unam@yahoo.com](mailto:mjmg_unam@yahoo.com); <https://orcid.org/0000-0002-3636-7416>

<sup>2</sup> Facultad de Estudios Superiores Iztacala, Universidad Nacional Autónoma de México, Av. de los Barrios 1, Los Reyes Iztacala, 54090, Tlalnepantla, Estado de México, Mexico.

✉ [marfel.ramos@ired.unam.mx](mailto:marfel.ramos@ired.unam.mx); <https://orcid.org/0000-0002-9470-6375>

\*Author for correspondence

### Abstract

*Begonia ostulensis* sp. nov. is a new species from section *Knesebeckia*, known solely from the state of Michoacán; it is similar to *Begonia monophylla*, an endemic species from Mexico with a distribution in the states of Mexico, Colima, Michoacán, Guerrero and Morelos, but *B. ostulensis* differs from it in having an orbicular, peltate, solitary leaf, with the lower and upper surfaces glabrous, a lobed and double-dentate, non-ciliate margin, inflorescences terminal, peduncle and rachis glabrous and fruit with primary wing asymmetrically triangular, glabrous.

**Keywords:** Aquila, Cucurbitales, deciduous tropical forest

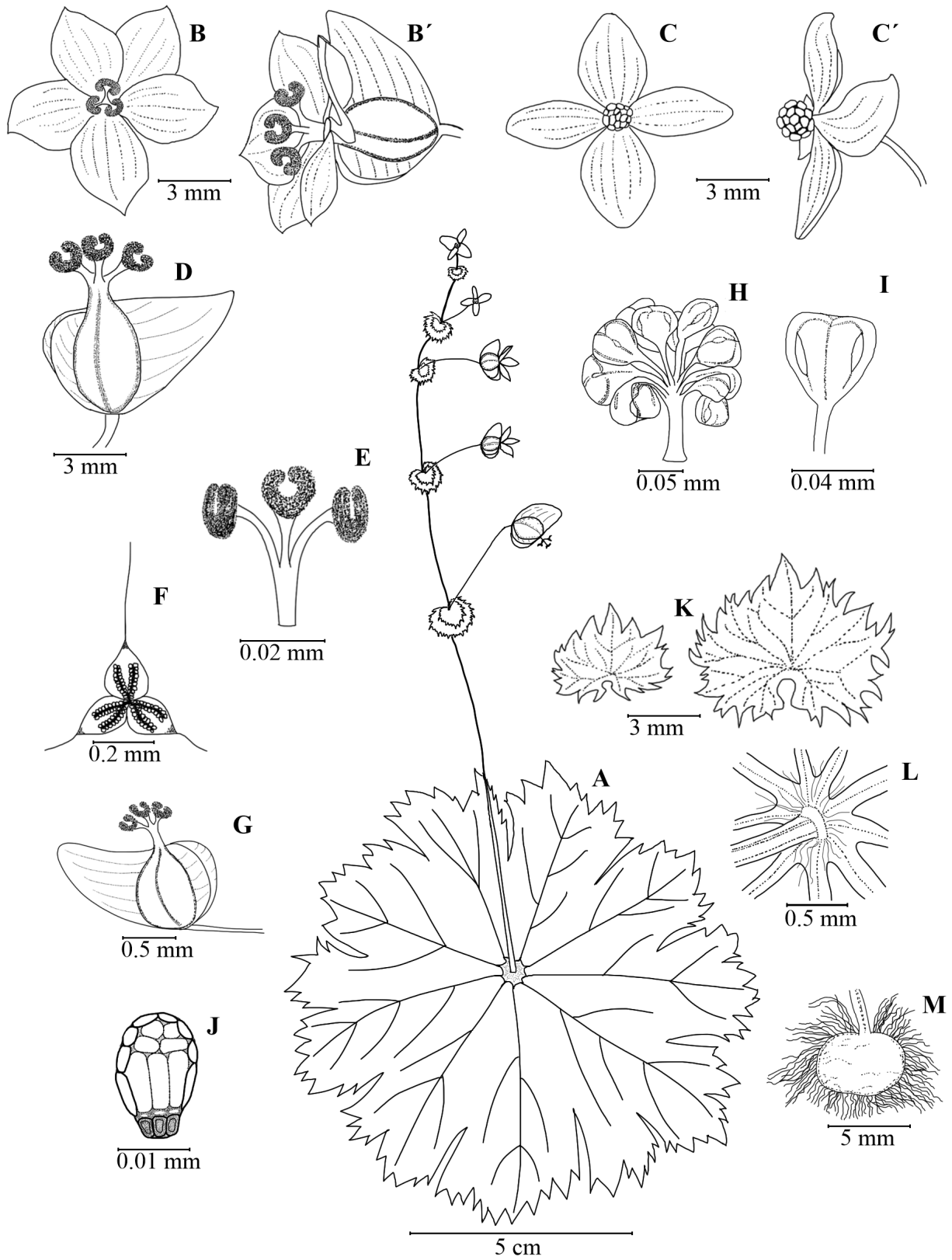
### Introduction

The Begoniaceae C.Agardh (1824:200) belongs to the order Cucurbitales (Schaefer & Renner 2011). It has a pantropical distribution, except in Australia (Forrest *et al.* 2005, Wilde 2011), and is an economically important family, widely used as ornamental plants. It is a diverse group, with more than 2000 species, included in two genera (Doorenbos *et al.* 1998): *Hillebrandia* Oliver (1866:361) and *Begonia* Linnaeus (1753:1056). The former is monotypic and endemic to Hawaii and the latter is widely distributed, with a richness of around 2070 species, distributed in 70 sections (Hughes *et al.* 2015–). The work of Moonlight *et al.* (2018) contains a phylogenetic analysis, in which a new sectional classification is proposed; 10 sections represented by 124 species are found in Mexico, two of which are introduced (*Gaerdtia* (Klotzsch) de Candolle (1859:128) and *Lepsia* (Klotzsch) de Candolle (1859:139)) (Hughes *et al.* 2015–). The new species belongs to the morphologically diverse section *Knesebeckia* (Klotzsch) A.DC., a section of 49 species (Hughes *et al.* 2015–; Moonlight *et al.* 2018), represented by species 20 in Mexico. In the country the section *Gireoudia* Klotzsch (1854:125), a section of 112 species, is the most diverse with 76 species, followed by *Knesebeckia* (Klotzsch) de Candolle (1959:125), section of 49 species, with 20, and *Quadriperigonina* Ziesenhenné (1968:257) with 20 species (Hughes *et al.* 2015–) in the Mexican Republic. Michoacán is a Mexican state with a rugged topography that makes it environmentally heterogeneous, which in turn explains its considerable plant diversity, with a richness of 5885 vascular plant species (Villaseñor, 2016). It is home to around 43 % of the species endemic to Mexico (Villaseñor 2016). In spite of numerous field trips having been made to the different regions of the state, many sites still remain under-explored, including Santa María Ostula, a location in the municipality of Aquila, on the Pacific slope. In this site, deciduous tropical forest is dominant, and a collecting program is currently being carried out in order to create a floristic list for the zone. During field work, we found specimens of the genus *Begonia* that do not fit any of the known species and are proposed here to belong to a new species.

*Begonia ostulensis* Martínez & Ramos sp. nov. § *Knesebeckia* (Fig. 1).

Similar to *B. monophylla* Pav. ex A.DC. (1859:121), but differs in having orbicular, peltate leaves (vs. suborbicular to elliptic reniform or broadly ovate, basifixed leaves with a cordate base), that are glabrous on the lower and upper surfaces (vs. sparsely pubescent), with a lobed, double-dentate, non-ciliate margin (vs. with incised-dentate, ciliate margin, occasionally lobed); stipules fugacious (vs. persistent); inflorescence terminal (vs. axillary).

**Type:**—MEXICO: Michoacán de Ocampo, Municipality of Aquila, 2.4 km NW to Santa María Ostula, road to Potrerito, 18°31'14.34" N, 103°29'28.29" W, 827 m, 16 Jul 2021, *O.D.Calderón 1* (holotype FCME, isotype MEXU).



**FIGURE 1.** *Begonia ostulensis*. A: Habit. B, B': Pistillate flower (face and side views). C, C': Staminate flower (face and side view). D: Ovary. E: Styles and stigmas. F: Cross section of the ovary. G: Fruit. H: Androecium. I: Stamen. J: Seed. K: Bract. L: Trichome ring. M: Tuber. Based on live plants in Santa María Ostula, by D. López-Guerrero and M.F. Ramos-Ordoñez.



FIGURE 2. *Begonia ostulensis* in its habitat. Photographs by D. López-Guerrero.

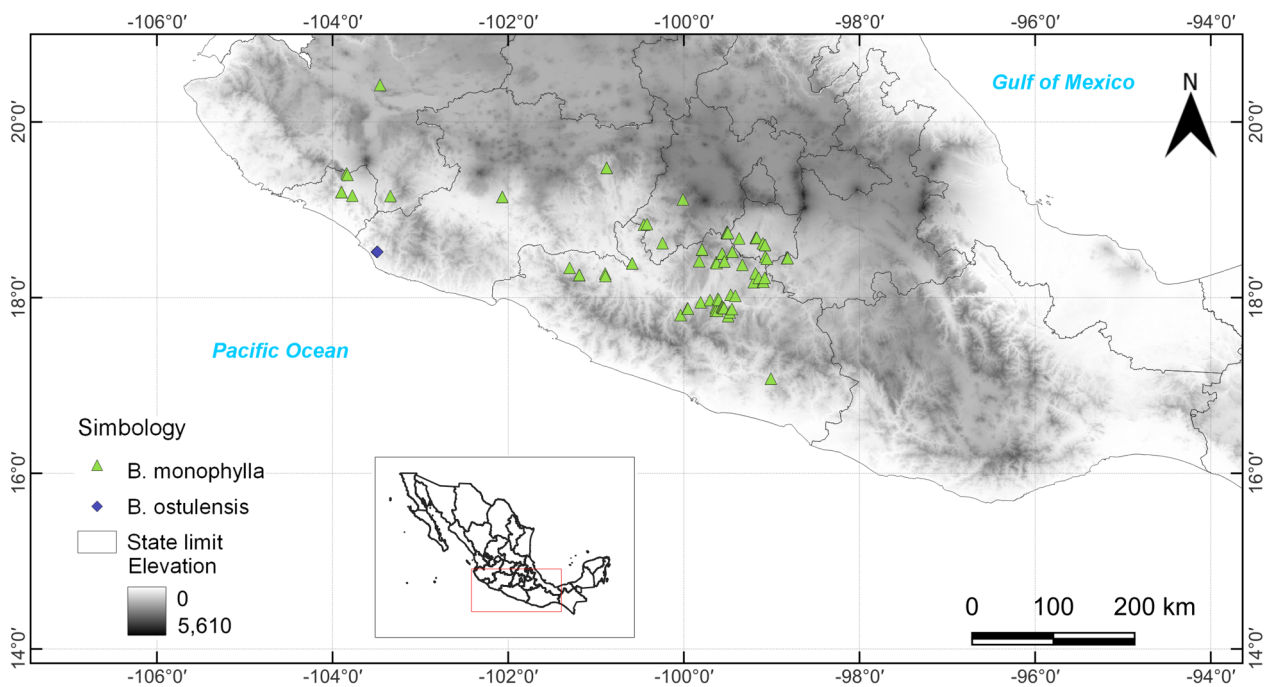


FIGURE 3. Distribution map of *Begonia ostulensis* and *B. monophylla* in Mexico. *B. monophylla* distribution data taken from GBIF (2022), elevation range was obtained from INEGI (2013).

Monoecious herbs, perennial, acaulescent, developing annually from underground tubers; tuber globose to obovoid, 2–5 × 3–7 mm, covered by yellowish-white scales. Leaves solitary, simple, green, orbicular, 2.1–11 cm in diameter, peltate, margin lobed and double-dentate, non-ciliate, lower surface glabrous, upper surface glabrous, venation 7–10-palmatinerved, conspicuous; petiole 0.5–2.7 cm, with a trichome ring at the petiole-blade union, trichomes 0.4–0.5 mm, simple; stipules fugacious. Inflorescence terminal, solitary, arising from the centre of the leaf, 3.5–18 cm long, racemose, bisexual, 1(–2) flowers per node; pistillate flowers 1–6, in the proximal nodes, staminate flowers 1–2(–4), generally in the distal nodes; peduncle 3.2–10 cm, glabrous; bracts in pairs, 2.5–8.3 × 2.5–9 mm, persistent, broadly obovate, amplexicaul, margin fimbriate, glabrous. Staminate flower with pedicels 0.7–8 mm long, glabrous; tepals 4, outer 2 white, sometimes blushed pink at the apex, 3.8–4 × 3.3–3.6 mm, ovate, white, apically acute to rounded, glabrous; inner 2 white, 4–5 × 2–2.4 mm, oblong, apically rounded to acute, margin entire, glabrous; receptacle flat; androecium monadelphous, actinomorphic, 2.1–2.7 mm, filaments 1.5–2.3 mm, anthers turbinate, 0.4–0.6 × 0.4–0.6 mm, shorter than the filament, dehiscence longitudinal. Pistillate flowers with pedicels 0.4–2.7 mm long, glabrous,

perianth with 5 tepals, in 2 verticils, subequal, 4–4.5 × 3–3.5 mm, ovate, apically acute, margin entire, glabrous, white; receptacle flat; ovary trilocular with bipartite placentae, glabrous, alate, wings 3, unequal, styles 3, simple, joined only at the base, persistent in the fruit, stigmas lunate, covered by stigmatic papillae. Capsules with pedicels 0.5–2.4 mm, slightly pendulous, tepals deciduous; locular chamber ellipsoid; wings 3, the primary wing asymmetrically triangular, 0.8–1.3 × 0.6–1 cm, glabrous, the other two smaller, dimidiate. Seeds ellipsoid, light brown.

**TABLE 1.** Comparison of the main morphological characters among *Begonia ostulensis* and *B. monophylla*.

Character	<i>Begonia ostulensis</i>	<i>Begonia monophylla</i>
Tuber size (width, cm)	0.3–0.7	1.5–3
Plant height (cm)	ca. 20	up to 50
LEAF		
Stipules	fugaceous	persistent
Number of leaves	1	1 or more
Leaf shape	orbicular	suborbicular, elliptic-reniform or broadly ovate
Petiole length (cm)	0.5–2.7	absent or when present up to 2.6
Petiole insertion	peltate	non-peltate
Blade size (cm)	2.1–11 × 2.1–11	5.8–28 × 7.5–37.9
Base	peltate	cordate
Margin	lobed, double-dentate, non-ciliate	incised-dentate, ciliate, occasionally lobed
Lower surface	glabrous	pubescent
Upper surface	glabrous	sparsely pubescent
INFLORESCENCE		
Number of flowers/node	1	1–2
Length (cm)	3.5–18	4.7–32
Peduncle	glabrous	pubescent
STAMINATE FLOWER		
Tepals	4	4
Apex	rounded or acute	rounded or acute
Staminate flower tepal Margins	entire	finely crenulate distally
PISTILLATE FLOWER		
Pedicel length (mm)	0.4–2.7	12–14.6
Tepals	5	5
Apex	rounded	acute to widely rounded
Tepal margins	entire	finely crenulate distally
FRUIT		
Fruit shape	oblong	oblong
Wings	unequal	subequal
Wing shape	asymmetrically triangular	asymmetrically triangular

**Additional specimens examined (paratypes):**—MEXICO: Michoacán, Aquila, 2.8 km NW of Santa María Ostula, way to Palmita, 759 m, 18°31'04.8"N, 103°29'55.3"W, 17 Jul 2021, *Calderón OD 2–11* (FCME, MEXU); 2.2 km NW of Santa María Ostula, way to Potrerito, 604 m, 18°31'10.47"N, 103°29'22.5"W, 07 Sep 2021, *Villalobos D 1* (FCME, MEXU); 2.2 km NW of Santa María Ostula, way to Potrerito, 788 m, 18°31'11.47"N, 103°29'22.5"W, 07 Sep

2021, *Villalobos D 2* (FCME, MEXU); 2.2 km NW of Santa María Ostula, way to Potrerito, 791 m, 18°31'10.98"N, 103°29'22.38"W, 07 Sep 2021, *Villalobos D 3* (FCME, MEXU); 2.2 km NW of Santa María Ostula, way to Potrerito, 782 m, 18°31'11.04"N, 103°29'22.24"W, 07 Sep 2021, *Villalobos D 4* (FCME, MEXU); 2.2 km NW of Santa María Ostula, way to Potrerito, 785 m, 18°31'10.95"N, 103°29'21.81"W, 07 Sep 2021, *Villalobos D 5* (FCME, MEXU); 2.2 km NW of Santa María Ostula, way to Potrerito, 776 m, 18°31'10.78"N, 103°29'21.42"W, 07 Sep 2021, *Villalobos D 6* (FCME, MEXU); 2.2 km NW of Santa María Ostula, way to Potrerito, 604 m, 18°31'10.47"N, 103°29'22.5"W, 18 Nov 2021, *Villalobos D 7* (FCME, MEXU); 2.2 km NW of Santa María Ostula, way to Potrerito, 788 m, 18°31'11.47"N, 103°29'22.5"W, 18 Nov 2021, *Villalobos D 8* (FCME, MEXU).

**Etymology:**—The name honors the type locality: Santa María Ostula, Aquila Municipality, Michoacan State, Mexico.

**Distribution and habitat:**—The species is only known from the type locality, on limestone rock ridges. Due to its size it is an inconspicuous species. It grows in cracks or lateral cavities of rocks (Fig. 2), never on the surface exposed to the sun, which makes it difficult to collect the tubers. Its life cycle is constrained by the rainy season (June to October); the leaf is observed in the first week of July, flowering occurs from July to September, in the month of November no flowers are found, only senescent leaves with dry fruits are observed. The type of vegetation is tropical deciduous forest, at elevations ranging from 604 to 828 m above sea level. It has been found in sites inhabited by *Beiselia mexicana* Forman (Burseraceae), another species endemic to the municipality of Aquila.

**Taxonomic comments:**—This species is placed within *B.* section *Knesebeckia*, a section originally defined as a genus showing its filaments joined at the base, forming a column, anthers obovate, stigmas bifid, dilated at the base and placentas divided in two branches (Klotzsch 1854), but which was determined to be polyphyletic in later molecular studies (Moonlight *et al.*, 2018); this section is distributed in the Americas, with one of its main centers of diversity in Mexico. Morphologically, the new species is at first sight similar to *Begonia monophylla* Pav. ex de Candolle (1859:121), which is distributed in the states of Mexico, Colima, Michoacán, Guerrero and Morelos (Fig. 3), since it has one conspicuous, solitary leaf lying on the ground, but it is easily distinguished by the orbicular, peltate leaves and several other characters (Table 1). It grows in rocky zones, generally with the tubers emerging through crevices in the rocks. *B. monophylla* is found in dry deciduous woodlands, oak forest, grassy summit slopes, steep ravines and shaded cliff-faces and talus slopes on calcareous or gypseous rocks (Burt-Utley and McVaugh, 2001); it has quite a variable leaf size as it depends on the tuber size and environmental conditions (Burt-Utley and McVaugh, 2001).

## Acknowledgements

We are thankful to the indigenous community of Santa María Ostula for their willingness to permit our collecting. Carlos Verdia and Dilfonso Villalobos obtained permits for field work. José J. Nolasco and Daniela López Guerrero for their valuable help during the field work and photographic record. The collections were made by Óscar D. Calderón García and Dilfonso Villalobos Sebastián. The illustration was made by Daniela López-Guerrero and María F. Ramos-Ordoñez.

## Literature cited

- Agardh, C.A. (1824) *Begoniaceae*. Aporismi Botanici, New York, USA, 246 pp.
- Candolle, A. de (1859) Mémoire sur la famille des Bégoniées. *Annales des Sciences Naturelles; Botanique*, série 4 11: 116–145.
- Burt-Utley, K. & McVaugh, R. (2001) Begoniaceae. *Flora Novo-Galiciana* 3: 653–695.
- Doorenbos, J., Sosef, M.S.M. & Wilde, J.J.F.E. de (1998) The sections of *Begonia*, including descriptions, keys and species lists (Studies in Begoniaceae VI). *Wageningen Agricultural University Papers* 98 (2): 1–266.
- Forrest, L.L. & Hollingsworth, P.M. (2003) A recircumscription of *Begonia* based on nuclear ribosomal sequences. *Plant Systematics and Evolution* 241: 193–211.  
<https://doi.org/10.1007/s00606-002-0033-y>
- GBIF (2022) GBIF Occurrence Download *Begonia monophylla* Pav. ex A.DC.  
<https://doi.org/10.15468/dl.uyxewy>
- Hughes, M., Moonlight, P.W., Jara-Muñoz, A., Tebbitt, M.C., Wilson, H.P. & Pullan, M. (2015–) *Begonia* Resource Centre. Available

- from: <http://padme.rbge.org.uk/begonia/> (accessed 26 November 2021)
- INEGI—Instituto Nacional de Estadística, Geografía e Informática (2013) Continuo de Elevaciones Mexicano (CEM 3.0). Available from: <https://www.inegi.org.mx/app/geo2/elevacionesmex/> (accessed 20 March 2022)
- Klotzsch, J.F. (1854) Ordo Begoniaceae R. Brown, Bonpland. *Bericht über die zur Bekanntmachung geeigneten Verhandlungen der Königlich Preussischen Akademie der Wissenschaften zu Berlin* 1854: 121–125.
- Linnaeus, C. (1753) *Species plantarum*. Vol. 2. Laurentii Salvii, Stockholm, 1056 pp.
- Moonlight, P.W., Ardi, W.H., Arroyo, L.A., Chung, K.-F., Fuller, D., Girmansyah, D., Hollands, A., Jara-Muñoz, A., Kiew, R., Leong, W.C., Liu, Y., Mahardika, A., Marasinghe, L., O'Connor, M., Peng, C.-I., Pérez, Á.J., Phutthai, T., Pullan, M., Rajbhandary, S., Reynel, C., Rubite, R.R., Sang, J., Scherberich, D., Shui, Y.-M., Tebbitt, M.C., Thomas, D.C., Wilson, H.P., Zaini, N.H. & Hughes, M. (2018) Dividing and conquering the fastest growing genus: Towards a natural sectional classification of the mega-diverse genus *Begonia* (Begoniaceae). *Taxon* 67: 267–323.  
<https://doi.org/10.12705/672.3>
- Moonlight, P.W., Richardson, J.E., Tebbitt, M.C., Thomas, D.C., Hollands, R., Peng, C.-I. & Hughes, M. (2015) Continental-scale diversification patterns in a megadiverse genus: The biogeography of Neotropical *Begonia*. *Journal of Biogeography* 42 (6): 1137–1149.  
<https://doi.org/10.1111/jbi.12496>
- Oliver, D. (1866) *Hillebrandia*. *Transactions of the Linnean Society of London* 25: 361–363.  
<https://doi.org/10.1111/j.1096-3642.1865.tb00188.x>
- Shaeffer, H. & Renner, S. (2011) Phylogenetic relationships in the order Cucurbitales and a new classification of the gourd family (Cucurbitaceae). *Taxon* 60 (1): 122–138.  
<https://doi.org/10.1002/tax.601011>
- Villaseñor, J.L. (2016) Checklist of the native vascular plants of Mexico. *Revista Mexicana de Biodiversidad* 87 (3): 559–902.  
<https://doi.org/10.1016/j.rmb.2016.06.017>
- Wilde, J.J.F.E. de (2011) *Begoniaceae*. In: Kubitzki, K. (Eds.) *The families and genera of vascular plants*. Volume 10. *Flowering plants. Eudicots: Sapindales, Cucurbitales, Myrtaceae*. Springer, Berlin, pp. 56–71.  
[https://doi.org/10.1007/978-3-642-14397-7\\_5](https://doi.org/10.1007/978-3-642-14397-7_5)
- Ziesenhenné, R. (1968) *Begonia alabaculoides* Zies. *The Begonian* 35: 256–258.