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A New *Masdevallia* (Pleurothallidinae: Orchidaceae) from the White-Sand Forests of the Central Amazon, Brazil

Edlley M. Pessoa^{1,2,5} and Adam P. Karremans^{3,4}

¹Laboratório de Estudos Integrados de Plantas, Departamento de Botânica e Ecologia, Universidade Federal de Mato Grosso, 78060-900, Cuiabá, Mato Grosso, Brazil

²Programa de Pós-Graduação em Biodiversidade, Ambiente e Saúde, Universidade Estadual do Maranhão, 65604-375, Caxias, Maranhão, Brazil

³Lankester Botanical Garden, University of Costa Rica, P.O. Box 302-7050 Cartago, Costa Rica

⁴Naturalis Biodiversity Center, Evolutionary Ecology Group, Sylviusweg 72, Leiden 2333 BE, The Netherlands

⁵Author for correspondence (edlley_max@hotmail.com)

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Abstract—*Masdevallia britoi*, a new species in *Masdevallia* sect. *Minutae*, is described and illustrated from the central Amazon in Brazil. It is similar to *M. wendlandiana* but differs by shorter sepals that are internally white, shorter oblong petals with a delicate tooth near the middle, shorter lip with deltoid marginal folds near the middle and three-denticulate apex, and shorter ovary. The new species grows in the white-sand forests locally known with the name Campinaranas. We also provide an identification key for the species of *Masdevallia* from the Brazilian Amazon.

Keywords—Campinarana, *Masdevallia britoi*, *Masdevallia gutierrezii*, *Masdevallia minuta*, *Masdevallia wendlandiana*.

Masdevallia Ruiz & Pav. is the most ornamentally important genus in the Pleurothallidinae. As currently circumscribed, the genus is also the third most species rich in the subtribe, with about 640 species distributed from southern Mexico to southern Brazil and Bolivia (Luer 2003; Pridgeon et al. 2005; Karremans 2016; Karremans and Vieira-Uribe 2020). The highest species diversity is found in the Andes from Venezuela to Bolivia, and especially Colombia and Ecuador (Pridgeon et al. 2005). *Masdevallia* species are notoriously less prominent in the floras of the Guianas and Brazil, with only 16 species recorded for the latter (BFG 2015, 2018).

In recent decades several taxa previously considered part of *Masdevallia* s. l. have been recognized as different genera, such as *Diodonopsis* Pridgeon & Chase, *Dracula* Luer, *Dryadella* Luer, *Porroglossum* Schltr., *Scaphosepalum* Pfitzer, and *Trisetella* Luer (Karremans 2016), and new infrageneric classification for *Masdevallia* s. s. based on molecular phylogenetic data have been proposed (Matuszkiewicz and Tukullo 2006; Abele 2007). Moreover, several new species have been published in recent years (e.g. Oses-Salas and Karremans 2016; Vieira-Uribe and Bogarin 2016; Bogarin et al. 2017), but a formal taxonomic revision for the genus is still needed to reach a more comprehensive idea of the real diversity of the genus.

Among the Brazilian taxa, two belong to the *Masdevallia* subgen. *Masdevallia* sect. *Minutae* Rchb.f. ex Woolw., which according to Luer (2001) included 20 species distributed from Mexico to Bolivia. The members of this group could be recognized by a small, caespitose habit, terete peduncles, usually bearing more than one flower in succession, petals featuring “a protrusion from a callus between the middle and lower thirds above or along the labellar margin. The lip is more or less oblong with a longitudinal pair of more or less converging calli on or above the middle third of the disc” (Woolward 1896; Luer 2001; Smith and Pupulin 2012). Despite the superficial morphological similarities, this section has been amply proven as non-monophyletic, with Central American species being more closely related to other *Masdevallia* species present in the region, while *M. minuta* Lindl. and its closest relatives are closer to members of *Masdevallia* sect. *Tritosiphon* (Schltr.)

Sweet. (Matuszkiewicz and Tukullo 2006; Abele 2007; Oses-Salas 2017).

While conducting research in the field in the white-sand forests in the central Amazon, sterile specimens of *Masdevallia* were collected and cultivated. Upon flowering in cultivation, it was observed that the specimens belonged to an unknown species in the *M. minuta* group, morphologically similar to *M. gutierrezii* Luer and *M. wendlandiana* Rchb.f. However, it differs morphologically from those and all other known members of *Masdevallia* sect. *Minutae*, and is therefore described and illustrated here as new.

MATERIALS AND METHODS

The morphological analysis of the new species was based on examination of live specimens, in addition to flowers in spirit. The flowers were dissected and the perianth was mounted to be examined under a stereomicroscope and then illustrated. A key of the *Masdevallia* species from Brazilian Amazon is provided. It was produced based on specimens deposited in the most representative herbaria of northern Brazil [IAN, INPA, MG and RB, acronyms according to Thiers (2021)], the protologues of the species and type images available in virtual herbaria. The general morphological terminology follows Harris and Harris (2001) and Stearn (1995). The geographic distribution map was produced using the software SimpleMappr (Shorthouse 2010).

TAXONOMIC TREATMENT

Masdevallia britoi E.Pessoa & Karremans, sp. nov. TYPE: BRAZIL. Amazonas: Novo Airão, campinarana near the city, 70–100 m elev., 01 June 2020 (fl. in cult. in September 2020), F.C.L. Félix 01 (holotype: RB!; isotype: INPA!);

Similar to *M. wendlandiana* but it differs in the shorter sepals (8.5–10.0 vs. 18.0–20.0 mm long) that are internally white (vs. internally purple), the shorter oblong petals (2.5–3.0 vs. 4.5–5.0 mm long, elliptical) with a delicate tooth near the middle (vs. with a prominent tooth), the shorter lip (2.8–3.0 vs. 4.0–4.5 mm long) with deltoid marginal folds near the middle (vs. folds oblong) and a 3-denticulate apex (vs. not 3-denticulate), and shorter ovary (2.0–2.2 vs. 5.0–5.5 mm long).

The new species is florally similar to *M. minuta* Lindl., but immediately distinguished by the inflorescence similar in length to (vs. significantly longer than) the oblanceolate leaf (vs. leaf narrowly obovate) and the successively multi-flowered inflorescence (vs. single-flowered).

Epiphytic, caespitose herb. **Roots** fasciculate, about 1.0 mm wide. **Rhizome** 5.0–8.0 mm long. **Ramicauls** 4.0–6.0 mm long, cylindrical, unifoliate, concealed by 1–4 whitish, membranous, close-fitting sheaths, 1.0–7.3 mm long, obtuse. **Leaves** 40.0–53.0 × 6.0–8.0 mm, oblanceolate, slightly coriaceous, with mid-vein

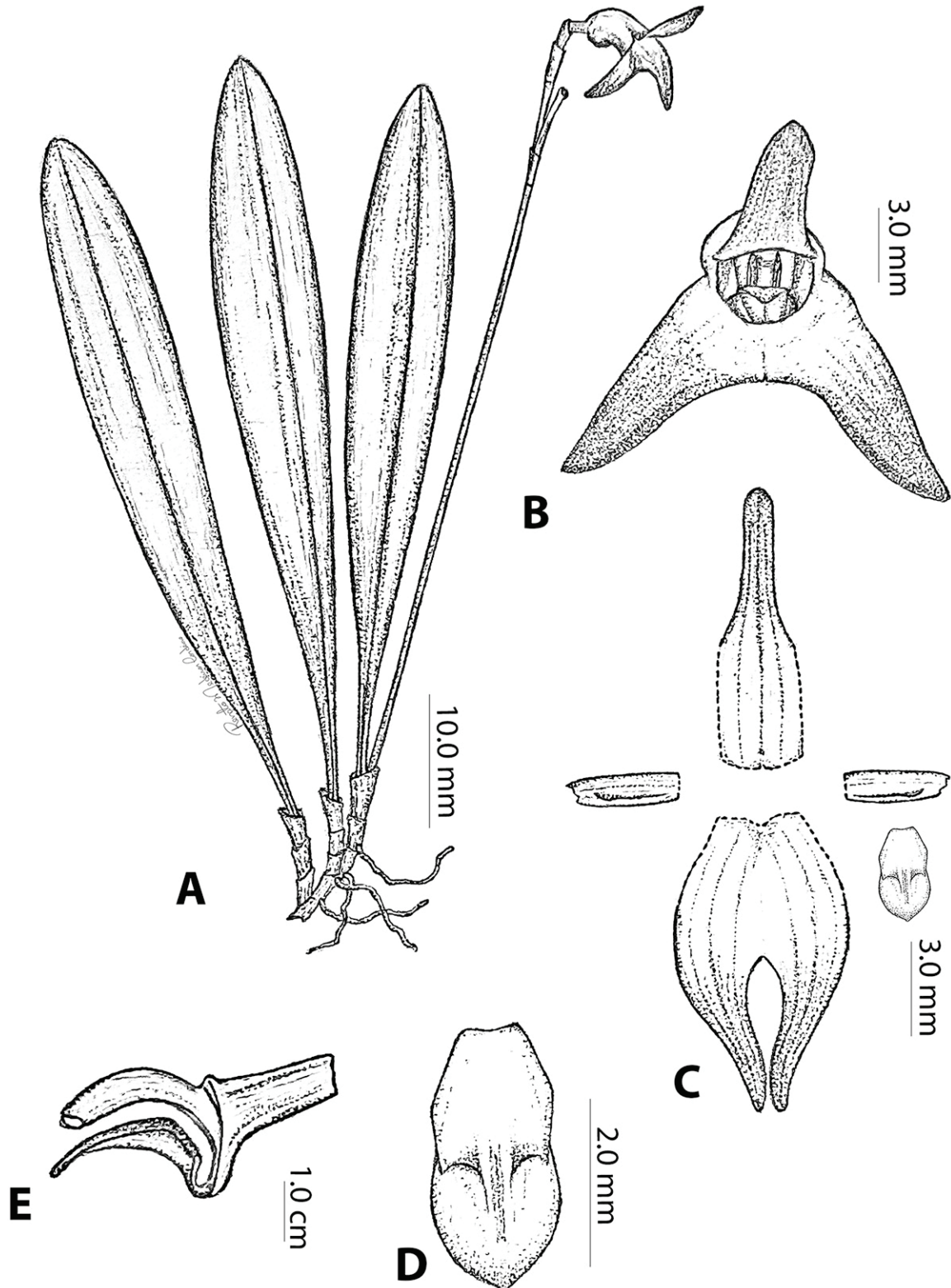


FIG. 1. Illustration of *Masdevallia britoi* E.Pessoa & Karremans. A. Habit. B. Flower in natural position. C. Dissected perianth. D. Lip. E. Column and lip in lateral view. Drawn by R. Medeiros based on the plant that served as type.

lightly sulcate, minutely 3-denticulate at apex, attenuate at base. **Inflorescence** terminal, erect, cylindric, successively flowered; peduncle 40.0–44.0 mm long, bearing 1 sheath at apex, about 0.4–0.5 mm long, membranous, acute to obtuse; rachis 0.5–8.0 mm long; floral bracts 3.5–4.5 mm long, amplexicaul, membranous, acute to obtuse. **Flowers** 1–3, tubular, opening successively; pedicel 3–4 mm long, glabrous; **ovary** 2.0–2.2 × 1.0 mm, articulated with the pedicel, glabrous, slightly 6-ribbed; **sepals** laterally fused until the proximal half, externally glabrous, whitish with the apexes yellow; **dorsal sepal** 9–10 × 2.3–2.5 mm, free portion 4.5–5.5 mm long, lanceolate, slightly concave, membranous, attenuate at apex, entire, 3-veined, internally minutely pubescent; **lateral sepals** 8.5–9.0 × 2.5–3.0 mm, free portion 4.0–5.0 mm long, lanceolate,

membranous, attenuate at apex, entire, 3-veined, internally minutely pubescent; **petals** 2.5–3.0 × 0.8–1.0 mm, whitish-yellow, free, oblong, membranous, 1-veined, with a longitudinal fleshy ridge and a delicate tooth near the middle, asymmetrically 3-lobed at apex, margin entire, glabrous; **lip** 2.8–3.0 × 1.0–1.2 mm, whitish-yellow, free, oblong, convex, membranous, 3-veined, articulated with the column foot, deltoid marginal folds near the middle, 3-denticulate at apex, margin entire, glabrous; **column** 2.0–2.2 mm long, clinandrium rounded to retuse, column foot ca. 1.0 mm long; **pollinia** two, ovoid. **Fruits** not seen. Figures 1A–E, 2A–C.

Etymology—The specific epithet honors Humberto Brito, a Brazilian physician and orchid enthusiast from the Brazilian state of Paraíba, who successfully cultivated the specimens

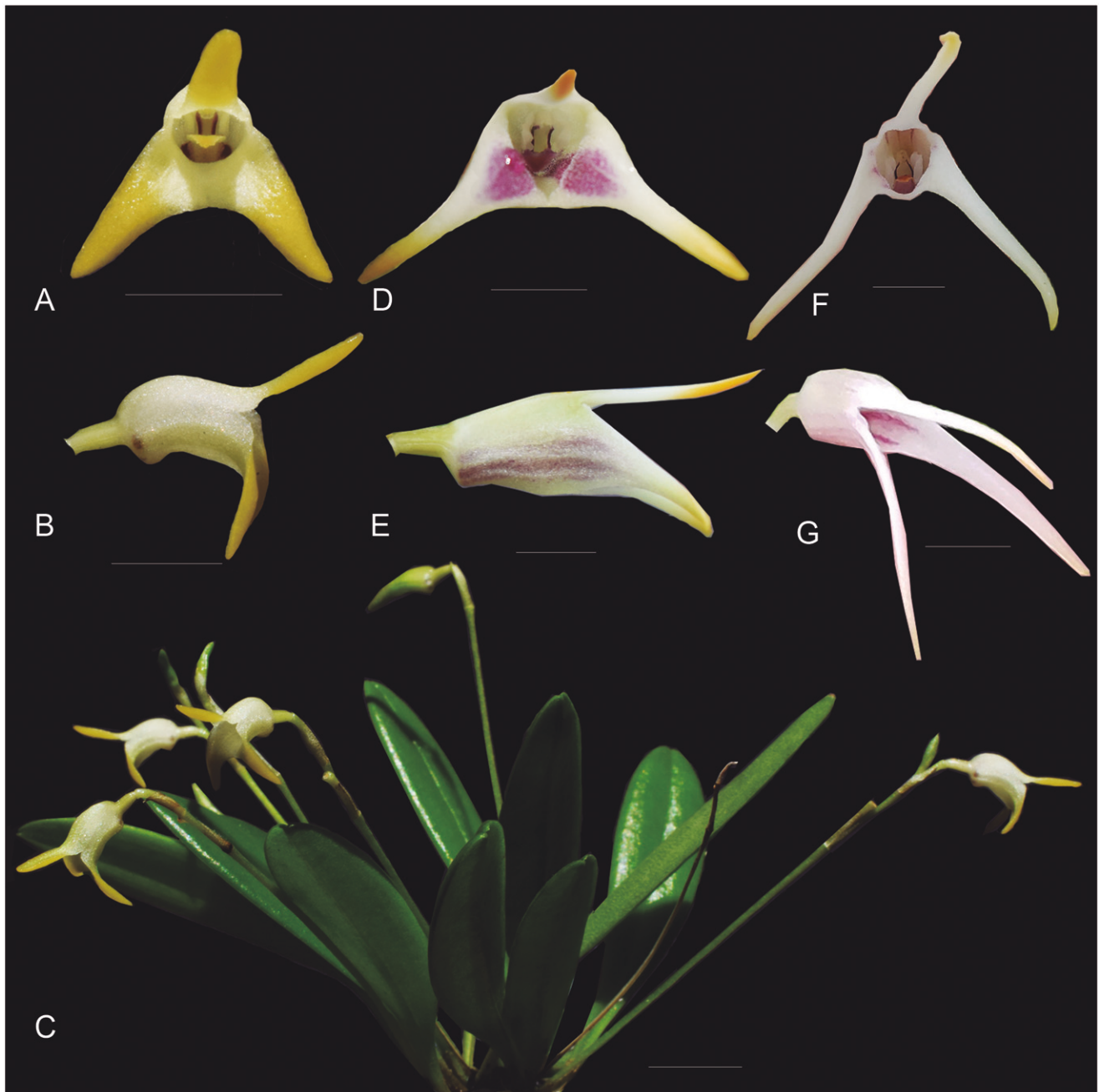


FIG. 2. Composite color plate of *Masdevallia britoi* E.Pessoa & Karremans and its closest relatives. A–C. *Masdevallia britoi*. D, E. *Masdevallia wendlandiana*. F, G. *Masdevallia gutierrezii*. Photographs by H. Brito.

described here in his large collection of Pleurothallidinae until flowering.

Distribution, Habitat, and Ecology—The new species is known only from the type locality in the central Amazon (Fig. 3), growing in the white-sand vegetation locally known as “Campinarana.” A small population was observed growing on thin branches of trees covered with lichens and with intermediate sunlight exposure. *Masdevallia britoi* grows in sympatry with other epiphytic orchids such as *Cattleya violacea* (Kunth) Rolfe, *Octomeria scirpodea* (Poepp. & Endl.) Rchb.f., *Polystachya stenophylla* Schltr., and *Specklinia picta* (Lindl.) Pridgeon & M.W.Chase (EMP pers. obs.). Other new species of Orchidaceae have been recently discovered in this unique habitat, for example *Dichaea fusca* Valsko, Holanda & Krahl (Valsko et al. 2014) and *Lockhartia virensis* E. Pessoa & M. Alves (Pessoa and Alves 2012). This highlights the importance of white-sand forests in the Brazilian Amazon as a habitat relatively neglected by botanists (Pessoa et al. 2015; Klein and Piedade 2019; Klein et al. 2019), and of concern given the constant threat of illegal extraction of high-quality sand (Ferreira et al. 2013).

Phenology—Under cultivation, the new species flowers continuously throughout the year.

Morphological Affinities—The vegetative and floral features of *M. britoi* suggest it is a member of *Masdevallia* sect. *Minutae*, but most of these characters are also present in other sections in the genus (Smith and Pupulin 2012). Overall, the new species is similar to the South American *M. wendlandiana* (Figs. 2D, E, 4F) and *M. gutierrezii* (Figs. 2F, G, 4C), but the smaller flowers superficially resemble those of the widespread *M. minuta* (Fig. 4A, B), and the color of the flowers is similar to *M. venezuelana* H.R.Sweet that also grows in the Brazilian Amazon. *Masdevallia wendlandiana* is known from Bolivia, Brazil, Colombia, Ecuador, and Peru (Luer 2001, 2003), and includes among its synonyms *M. yauaperyensis* Barb.Rodr. and *M. ulei* Schltr., both described from the Brazilian Amazon. The new species differs by shorter sepals that are internally white, shorter oblong petals with a delicate tooth near the middle, shorter lip with deltoid marginal folds near the middle and 3-denticulate apex, and shorter ovary. *Masdevallia gutierrezii* is known from Bolivia (Luer 2001, 2003), it has much longer sepals (≥ 20.0 vs. ≤ 10.0 mm long) with calyx tube at least twice shorter than the free portion of the sepals (vs. slightly shorter). *Masdevallia minuta*, a more widespread species, may be distinguished by the thinner leaves (≤ 3.0 vs. ≥ 6.0 mm wide), and longer calyx tube

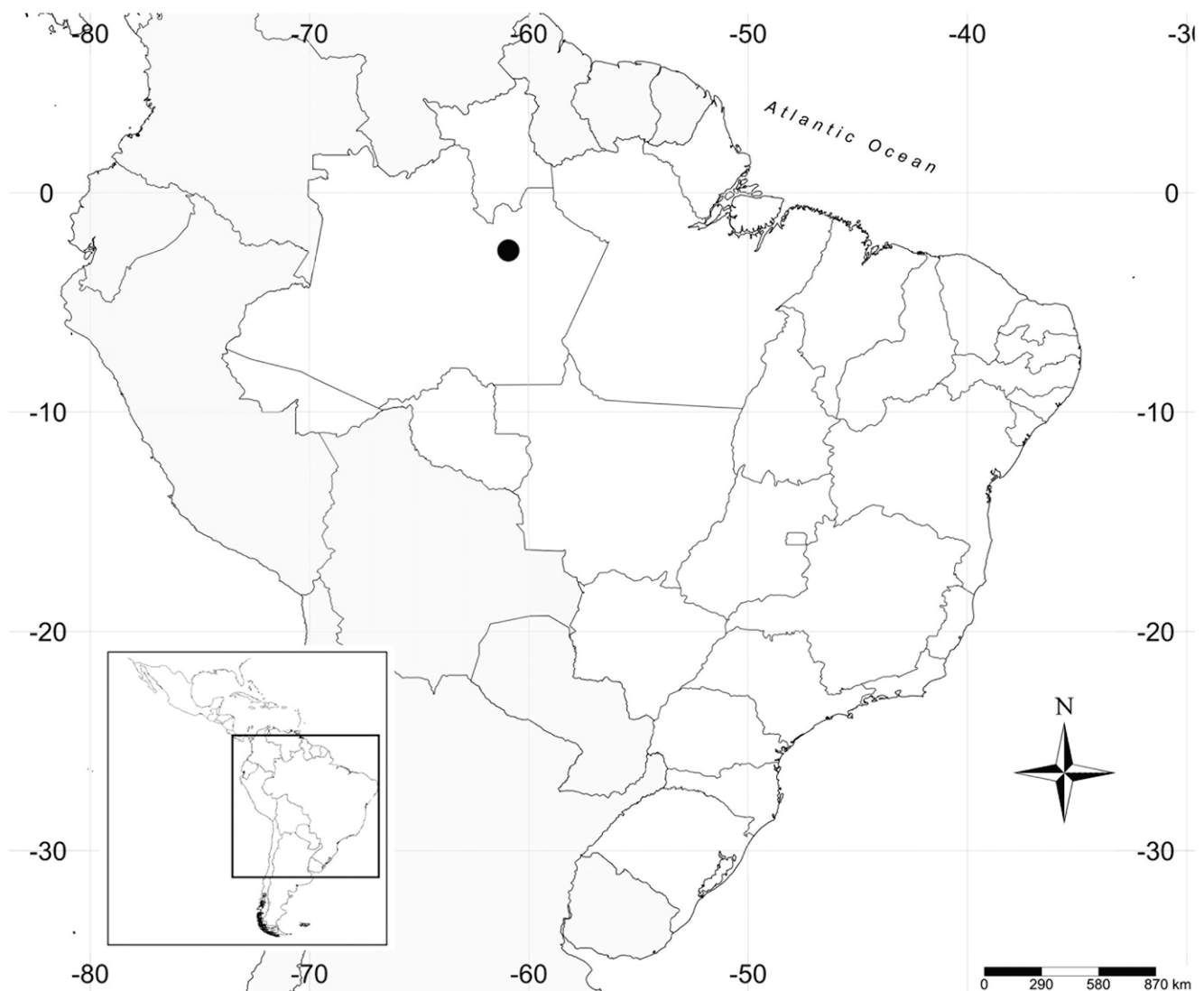


FIG. 3. Map with the type locality of *Masdevallia britoi* (circle).



FIG. 4. Composite color plate of selected members of *Masdevallia* sect. *Minutae*. A–B. *Masdevallia minuta*. C. *Masdevallia gutierrezii*. D. *Masdevallia floribunda*. E. *Masdevallia chontalensis*. F. *Masdevallia wendlandiana*. Photographs by R. Parsons (A–C, F) and F. Pupulin (D, E).

(≥ 5.5 mm vs. ≤ 4.5 mm long), while *M. venezuelana*, a native species from Brazil and Venezuela (Luer 2001, 2003; BFG 2015, 2018), has the fused portion of each sepal (≤ 1.2) thinner than

the free portion (≥ 1.8 mm long) (vs. fused portion wider than the free portion) and calyx tube $2 \times$ longer than the lip (vs. slightly longer).

KEY TO THE SPECIES OF *MASDEVALLIA* FROM THE BRAZILIAN AMAZON

1. Free portion of the lateral sepals shorter than the fused portion 2
1. Free portion of the lateral sepals as long as to longer than the fused 4
2. Dorsal sepal ≤ 2.0 cm long *M. cuprea* Lindl.
2. Dorsal sepal ≥ 3.0 cm long 3
3. Lip apex acuminate or apiculate *M. vargasii* C.Schweinf.
3. Lip apex rounded *M. norae* Luer
4. Calyx tube twice longer than the lip *M. venezuelana* H.R.Sweet
4. Calyx tube slightly longer or shorter than the lip 5
5. Sepals ≥ 3.5 cm long *M. guayanensis* Lindl. ex Benth.
5. Sepals ≤ 2.5 cm long 6
6. Leaves ≤ 0.4 cm wide, linear-oblongate *M. minuta* Lindl.
6. Leaves ≥ 0.6 cm wide, oblanceolate 7
7. Sepals caudate or aristate 8
7. Sepals acuminate or attenuate 9
8. Lateral sepals mainly brown *M. peruviana* Rolfe
8. Lateral sepals mainly yellow *M. sprucei* Rchb.f.
9. Lip as long as to slightly longer than the fused portion of the lateral sepals *M. striatella* Rchb.f.
9. Lip shorter than the fused portion of the lateral sepals 10
10. Sepals ≥ 1.8 cm long, internally purple, petals ≥ 0.45 cm long, lip ≥ 0.4 cm long *M. wendlandiana* Rchb.f.
10. Sepals ≤ 1.0 cm long, internally white, petals ≤ 0.3 cm long, lip ≤ 0.3 cm long *M. britoi*

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AUTHOR CONTRIBUTIONS

EMP visited the herbaria and analyzed the specimens, EMP and APK wrote and discussed the results, contributing equally to the final version of the manuscript.

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