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Masdevallia × *urbanae* (Orchidaceae)—A New, Natural Hybrid between *M. floribunda* and *M. tuerckheimii* from Guatemala

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Abstract: *Masdevallia* Ruiz. & Pav. in the broad concept comprises about 350 species distributed from southern Mexico to southern Brazil with the highest diversity in the Andes of Ecuador and Colombia, Peru, and Bolivia. Until now, only six species have been found in Guatemala. While studying the diversity of the orchid flora in this megadiverse country, we came across plants that in terms of morphological characteristics, were intermediate between *M. floribunda* Lindl. and *M. tuerckheimii* Ames. All three taxa are pollinated by two so far undescribed species of *Zygothrica* fruit flies. In the presented work, we describe the new entity as a new natural hybrid. This is the first record of the hybridization within the genus *Masdevallia* from Guatemala.

Keywords: Guatemala; *Masdevallia*; Mesoamerica; Neotropics; nothospecies; orchids; taxonomy

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1. Introduction

Masdevallia Ruiz. & Pav. in the broad concept comprises about 350 species distributed from southern Mexico to southern Brazil [1], reaching the highest diversity in the Andes of Ecuador and Colombia, Peru, and Bolivia. It is probably one of the most distinguishable genera of the subtribe Pleurothallidinae. The plants are caespitose and have fleshy, smooth leaves. The often brightly colored, large, and showy flowers commonly have long-tailed sepals and the obscure, small petals.

Genus *Masdevallia* has been firstly reported for Guatemala by Ames and Correll [2], who indicated the presence of seven species. After this publication, two of these species were transferred to the genus *Dracula* Luer and two others to the genus *Dryadella* Luer, leaving only three species in *Masdevallia*: *M. floribunda* Lindl., *M. chontalensis* Rchb.f., and *M. tubuliflora* Ames. For an unknown reason, Ames did not include *M. tuerckheimii* Ames, described by him in 1908. Later, two more species were discovered in Guatemala: *M. adamsii* Archila [3] and *M. corinnea* Archila, Jiménez Rodr. & Véliz [4].

During our studies on orchid diversity carried out in the Estación Experimental de Orquídeas de la Familia Archila in Cobán (Guatemala), we came across plants that in our opinion are the result of the hybridization between two native species of the genus *Masdevallia*: *M. floribunda* and *M. tuerckheimii*. Both species were found on the trunks of numerous trees located across the area of the Station (e.g., *Coffea arabica* L., *Citrus sinensis* (L.) Osbeck, and *Eugenia paniculata* Jacq.) and propagated naturally. The flowering period of *M. floribunda* and *M. tuerckheimii* ranges from June to February, coinciding with the rainy season. What is more, we were able to document the pollination process in both species done by two still undescribed species of fruit flies belonging to the genus *Zygothrica* [5].

Masdevallia floribunda (Figures 1b and 2) is distributed from Mexico to Honduras. It can be found usually on the trees in moist to wet forests, at the elevation of about 900 to 1200 m a.s.l. [6]. Plants are epiphytic, erect-spreading, and clustered. The ramicaul is covered with short papery sheaths (when young). Leaves are somewhat glossy, broadest above the middle, leathery, with glossy petiole, rounded at the apex, and grooved along the midrib. Inflorescences are single-flowered, arising from the base of the leaf, spreading. Sepals are whitish, finely dotted, and slightly tinged with crimson. Dorsal sepal abruptly tapers into cauda. It is erect to reflexed, joined to lateral sepals. Lateral sepals are fused, yellow at the base, with brownish-yellow to greenish, pointing down to reflexed caudae. Petals are linear-oblong, white, and toothed at the truncated tip. The lip is hinged to the column-foot, reflexed at the tip, white with crimson dots and a yellow tip. The column is greenish with purple edges. The anther produces two obovoid pollinia.

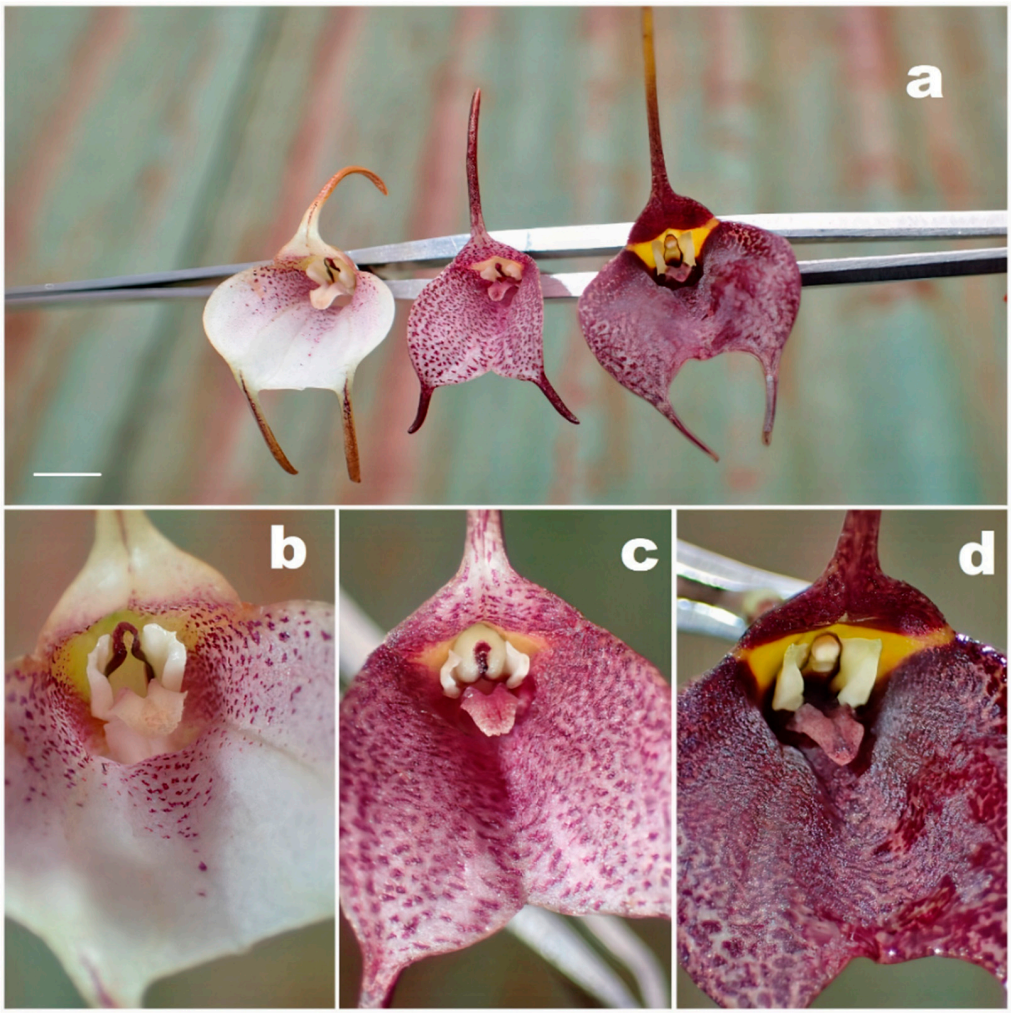

Figure 1. Flowers of the three *Masdevallia* species: (**a**) Comparison; (**b**) *Masdvallia floribunda* Lindl.; (**c**) *Masdevallia* × *urbanae* Archila, Lipińska & Szlach; (**d**) *M. tuerckheimii* Ames (phot. Lipińska, scale bar: 5 mm).

Masdevallia tuerckheimii (Figures 1d and 3) has been reported in Mexico (Chiapas) and Guatemala, in the wet lower mountain rain forest, at the altitude of about 350–800 m a.s.l. This species is locally abundant along creeks and in gallery forest, on shaded tree trunks. Plants of *M. tuerckheimii* are epiphytic, caespitose herbs. Their ramicauls are terete, sulcate, very short, and covered by two membranaceous sheaths. Leaves' blades are convex, arcuate, oblanceolate-spatulate with the apex obtuse-subacute and the base attenuate into a sulcate petiole. Inflorescences are short, pendulous, and facultatively bifloral—when

the first flower falls off, the second one develops, but in the case when the first one has been pollinated, the plant does not produce the second flower. Sepals form a basal tube. The dorsal sepal is usually yellowish, slightly tinged with purple at the opening of the tube. Lateral sepals are usually pinkish or creamy-white with many clustered dots and/or short, transverse, purple stripes and yellow caudae. Petals are white, same as the lip, which additionally is spotted with purple. The dorsal sepal is partially united to the laterals, rhombic, abruptly caudate. Lateral sepals are connate, forming an obovate to transversely elliptic-oblong blade, abruptly bicaudate. Petals are oblong, truncate, erose-dentate at the apex, with a marginal keel in the lower margin. The lip is shortly clawed, oblong, with two plates separated by an axial groove, truncate-obtuse, deflexed, thickened, and erose-dentate at the apex. The column is slender, subclavate, slightly arcuate, cream-white with a solid purple line on the ventral margins and the clinandrium. Pollinia are two, ovoid-subclavate, compressed, with a small viscidium.

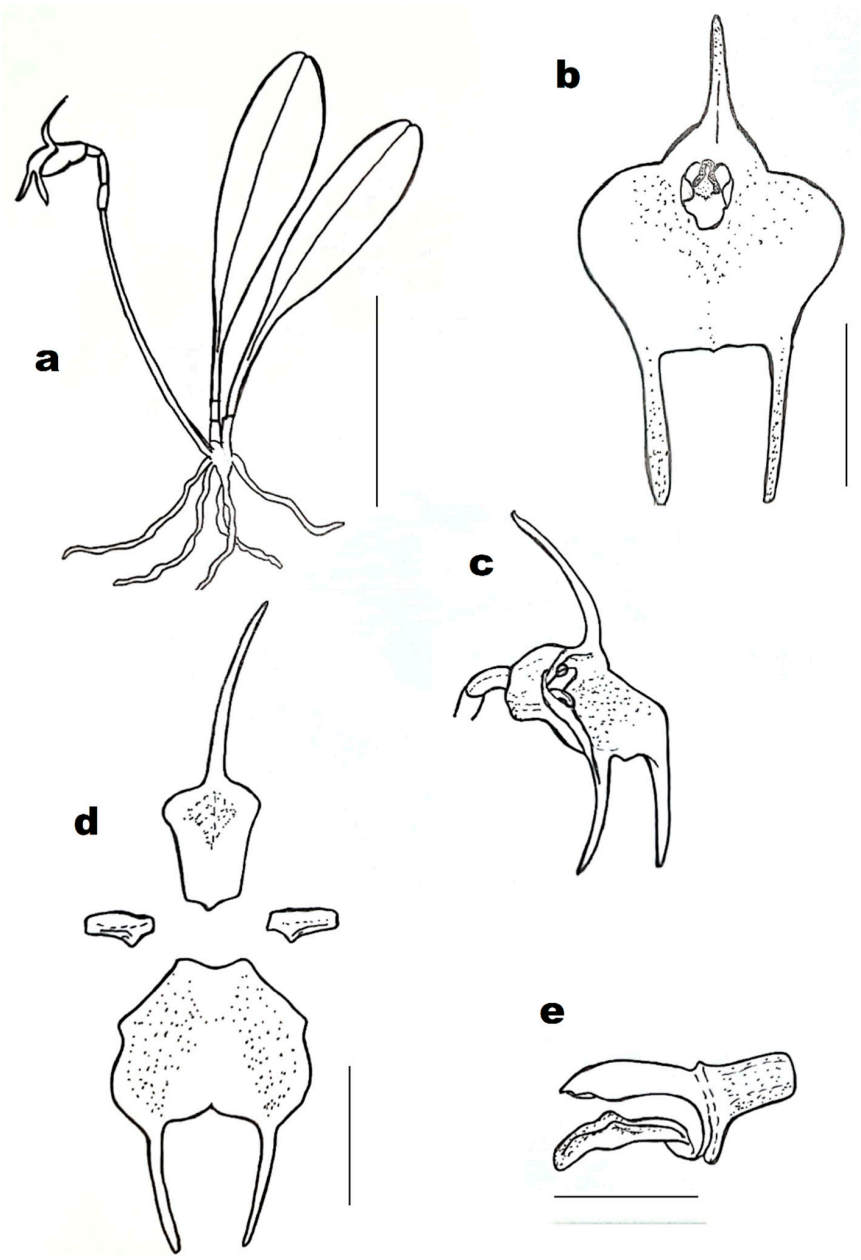

Figure 2. *Masdevallia floribunda*: (**a**) habit; (**b**) front view of the flower; (**c**) side view of the flower; (**d**) perianth parts; (**e**) side view on column and lip (redrawn by Lipińska, scale bars: (**a**) 5 cm; (**b**,**d**) 1 cm; (**e**) 1 cm).

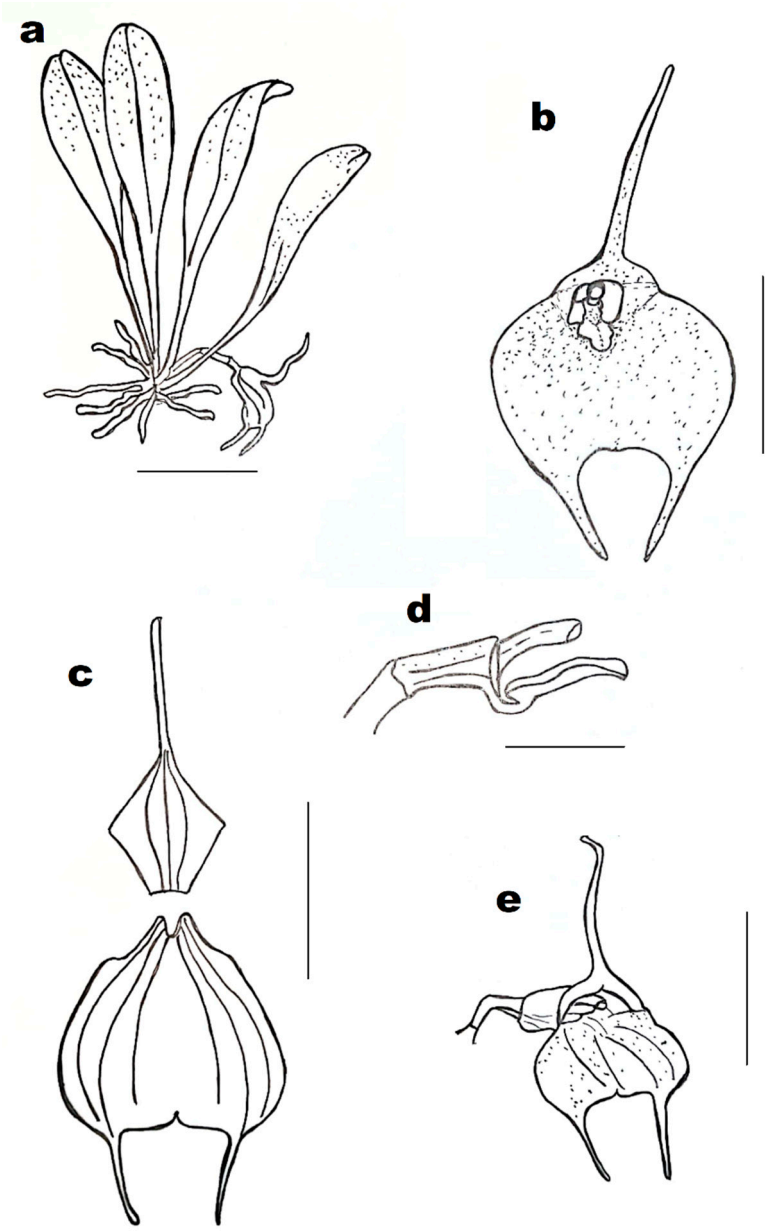

Figure 3. *Masdevallia tuerckheimii*: (**a**) habit; (**b**) front view of the flower; (**c**) perianth parts; (**d**) side view on column and lip; (**e**) side view of the flower (redrawn by Lipińska, scale bars: (**a**) 3 cm; (**b**,**d**) 1 cm; (**e**) 1 cm).

In the past, *M. tuerckheimii* has been considered as subspecies [1] or variety [7] of *M. floribunda*. However, *M. tuerckheimii* can be easily distinguished by the larger, darker, and more showily colored flowers (yellow caudae and densely purple-spotted sepals), less floriferous habit, and short, pendulous inflorescences. The appearance of the flowers of *M. tuerckheimii* is very different from that of *M. floribunda*. It is clear that both species are ecologically parapatric; *M. floribunda* is a species of cloud forest, while *M. tuerckheimii* grows in tropical rain forests. However, there are ecotone zones between these two ecosystems where both species and some intermediate individuals can be found growing together and hereby, we describe them as a new natural hybrid.

2. Materials and Methods

The plant material has been collected in the Estación Experimental de Orquídeas de la Familia Archila, Cobán (Guatemala), in December 2017. Morphological analysis has been performed by means of classical taxonomy. The standard procedure of preparing the plant

material to facilitate stereomicroscopic observation was applied. Particular parts of the flower were dissected, measured, and drawn under a stereomicroscope. The results were then analyzed and compared with the type material, diagnoses, and original illustrations. The morphological features of all three taxa have been compered in Table 1.

Table 1. Table showing the morphological differences of *Masdevallia* × *urbanae* by its parental species.

	M. floribunda	***M.* × *urbanae***	***M. tuerckheimii***
Habit	Erect-spreading, clustered	Caespitose	Caespitose
Leaves	Petiolate	Petiolate	Petiolate
	6–11 × 1.9 cm	6–8.5 × 1.6 cm	6–10 cm
Inflorescence	Single-flowered, arising from the base of the leaf, spreading	Single-flowered, arising from the base of the leaf, spreading	Facultively bifloral, arising from the base of the leaf, spreading
Peduncle	5.2 cm	2.2 cm	2.5–5 cm
Color of flowers	Pink with inconspicuous purple spots	Variable in color but usually white with purple spots or purple with spots	Densely purple-spotted sepals with yellow caudae
Sepals	United, separated apically	United, separated apically	United, separated apically
Dorsal sepal	Ovate	Triangular	Subrotundate
	6 × 5.5 mm	3 × 3.5 mm	19 mm × 17 mm
Lateral sepal	United, ovate-orbicularis	United, forming ovate synsepal	United, ovate
	8 mm	15 mm	17 mm
Petals	Oblong with subacute apex	Oblong with internal part ornamented and apiculate-truncated apex	Linear-oblong
	4.5 × 1.8 mm	2.5 × 1 mm	5 × 1.5 mm
Lip	Ovate-oblong	Oblong with subcarinate surface	Linear-oblong, obtuse
	5 × 1.7 mm	3 × 1 mm	5 × 1.5 mm

3. Results

3.1. Taxonomic Treatment

Masdevallia × *urbanae* Archila, Lipińska & Szlach., hybr. nov. (Figures 1c and 4).

HABITAT AND DISTRIBUTION: Cloud forest, at type locality

ETYMOLOGY: The name refers to the place where the first plants of the new notho-taxon have been found—the urban area of the city of Cobán.

DIAGNOSIS: *Masdevallia* × *urbanae* can be easily distinguished from parental species by the shape of synsepal with shorter and thicker sepaline tails directed outward.

TYPE: FA s.n.; deposited in herbario BIGU

TYPE LOCALITY: Guatemala, Alta Verapaz, Municipio de Cobán, ciudad de Cobán, en jardines de la Estación Experimental de Orquídeas de la Familia Archila, 1300 m asl, Noviembre 2017.

3.2. Description

Plants small, caespitose. Leaves petiolate with basal bract sheaths 6 to 8.5 cm long, and 1.6 cm wide, minutely tridentate at the apex. Inflorescence single-flowered (although this is relative in this group and depends on nutritional and humidity conditions, if the first flower is not fertilized, a second flower is produced). Axil 2.2 cm long, petiole 0.8 cm

long, ovary 0.4 cm long and 0.15 cm wide. Flowers variable in color but usually white with purple spots or purple with spots. Sepals united in a tube, separated apically. Tube 0.5 cm long and 0.45 cm wide. Dorsal sepal in its free part triangular, 0.3 cm long and 0.35 cm wide, apically aciculate-attenuated, 0.9 cm long. Lateral sepals united, forming a broadly ovate synsepal, 1.5 cm long and 1.4 cm wide. Petals oblong with the internal part ornamented and the apiculate-truncated apex 0.25 cm long and 0.1 cm wide. Lip oblong with subcarinate surface, 0.3 cm long and 0.1 cm wide.

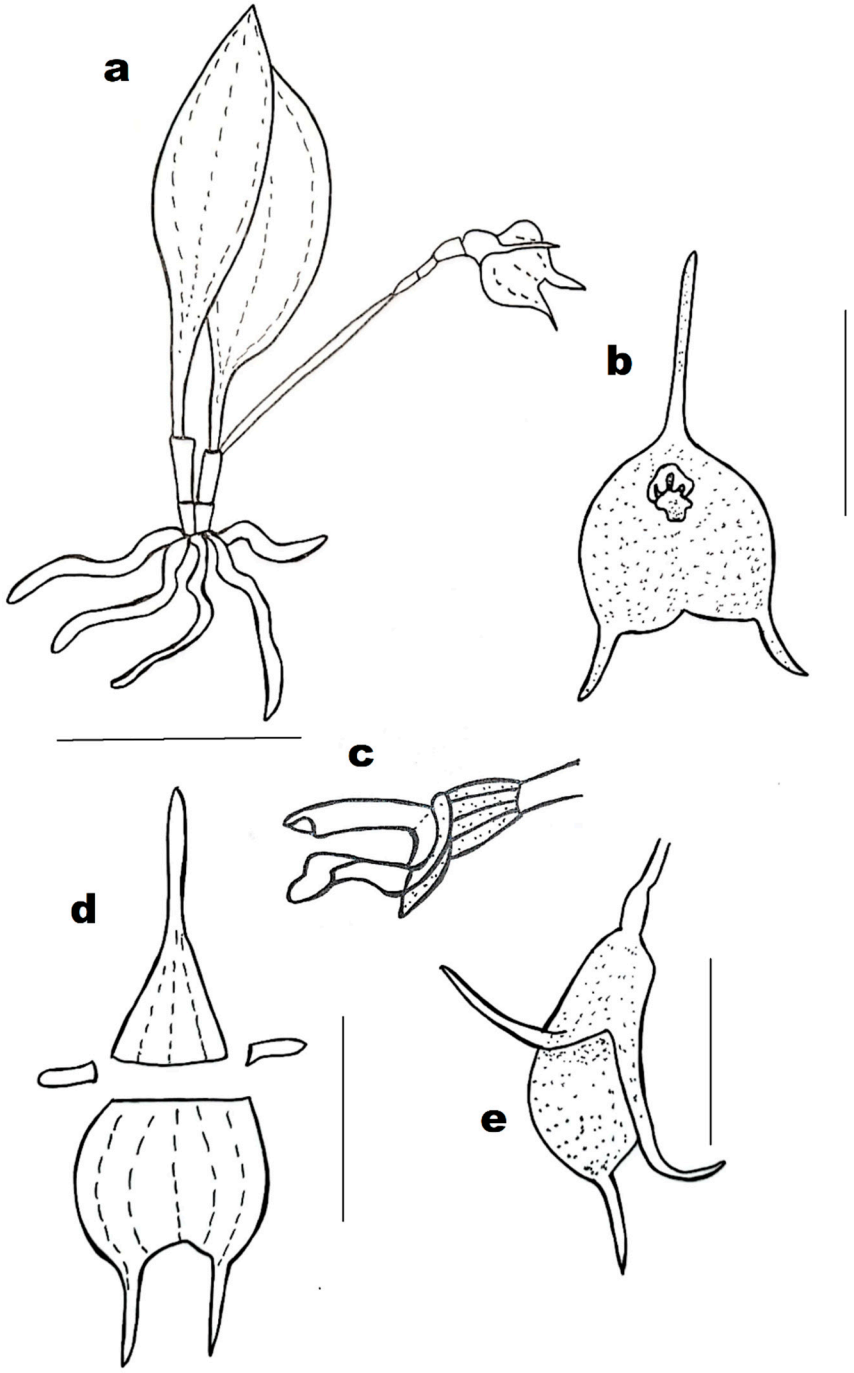

Figure 4. *Masdevallia* × *urbanae*: (**a**) habit; (**b**) front view of the flower; (**c**) side view on column and lip; (**d**) perianth parts; (**e**) side view of the flower (redrawn by Lipińska, scale bars: (**a**) 5 cm; (**b**,**d**) 1 cm; (**e**) 1 cm).

4. Discussion

Both *M. floribunda* and *M. tuerckheimii* are thought to be extremely variable species in terms of coloration. As it is stated in type protologue of *M. floribunda*, it probably has been collected in Mexico (possibly by H. Galeotti in Veracruz in 1840) and later cultivated in Sevenoaks, England by J. Rogers. With time, other specimens with different color patterns or regions of the collection were described by the different scientists. These were for example *Masdevallia galeottiana* A. Rich. & Galeotti with purple flowers and *M. lindeniana* A. Rich. & Galeotti with pale yellow flowers, both found in Mexico and both with time reduced to synonymy under *M. floribunda*. *M. tuerckheimii*, described from Guatemala, is sometimes wrongly considered by some taxonomists to be just a synonym or color variation of *M. floribunda*. It tends to be more brightly colored, white-spotted purple or cream speckled red, but still quite variable. The ecological niches of both species are rather separated, as in general, *M. floribunda* is considered to be a species of the cloud forest and *M. tuerckheimii* grows in tropical rain forests.

Ecological evidence, such as the coexistence of both orchid species in a relatively small area, the same habitat and flowering time, as well as common pollinators, strongly support our theory that hybridization was the source of plants with intermediate features. The Estación Experimental de Orquídeas de la Familia Archila is located in a cloud forest, at the altitude of 1320 m asl, from where the plants of *M. tuerckheimii* are taken to the stacion's facilities. This apparently is a reason for a greater intensity of pollination of both orchid species and the hybridization process stimulated effectively by the *Zygothrica* fruit flies.

During our study, a population of ca. 50 individuals of *Masdevallia* × *urbanae* have been carefully examined. Field observations suggested that seeds produced by most of them are vivid and during the past five years *M.* × *urbanae* successfully populated trees in the area of Station, forming dense, regularly expanding clumps. We were not able to observe whether cross-pollination between the hybrid and parental species occurs, thus we leave it as a possible hypothesis until further investigation, also experimental, will be performed.

Author Contributions: Conceptualization, F.L.A.M. and M.M.L.; validation, F.L.A.M., M.M.L., and D.L.S.; formal analysis, F.L.A.M., M.M.L., and D.L.S.; investigation, F.L.A.M., M.M.L. and D.L.S.; resources, F.L.A.M. and M.M.L.; data curation, F.L.A.M. and M.M.L.; writing—original draft preparation, M.M.L. and F.L.A.M.; writing—review and editing, F.L.A.M., M.M.L. and D.L.S.; visualization, M.M.L.; supervision, M.M.L. and D.L.S.; funding acquisition, M.M.L. and D.L.S. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest: The authors declare no conflict of interest.

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