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Masdevallia purocafeana, a new species of Orchidaceae from Cordillera del Toisán, northwestern Ecuador

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Abstract

A new species of *Masdevallia* genus is described here. *Masdevallia purocafeana* is immediately recognized by having conspicuously broad, echinate, and strongly reflexed lateral sepals. It is compared to *Masdevallia alexandri* but differs by having an oblong, shallowly concave, yellow-green dorsal sepal variegated with purple towards the apex, oblong petals light pink suffused with yellow and spotted with purple, and ovoid-ovate, reflexed light pink lip, dotted with pale light red.

Resumen

Se describe una nueva especie del género *Masdevallia*. *Masdevallia purocafeana* se reconoce inmediatamente por tener sépalos laterales conspicuamente anchos, equinados y fuertemente reflexos. Se compara con *Masdevallia alexandri*, pero se diferencia por tener un sépalo dorsal oblongo, ligeramente cóncavo, de color amarillo verdoso variegado con púrpura hacia el ápice, pétalos oblongos de color rosa claro teñidos de amarillo, punteados de púrpura, y un labelo ovoide-ovado, reflexo de color rosa claro, punteado con rojo claro pálido.

Keywords: EcoMinga, mining, Pleurothallidinae, Reserva Río Manduriacu, *Rodrigoa*

Introduction

Masdevallia Ruiz & Pavón (1794: 122), with approximately 623 species, is the third most diverse genus in the Pleurothallidinae (Orchidaceae) after *Lepanthes* Swartz (1799: 85) and *Stelis* Swartz (1799: 239) (Karremans 2016, Mantallana-Puerto *et al.* 2022). The species of the genus are distributed from southern Mexico to Bolivia and southern Brazil, with the highest diversity in the Andes, from Venezuela to Bolivia (Luer 2000).

In 1979, Braas included eight species of *Masdevallia* in the new genus *Rodrigoa* Braas (1979: 203). Luer (1986) initially considered the species of *Rodrigoa* to fall within the subgenus *Meleagris* Luer (1986: 51), but later recognized Braas' genus with 12 species which shared certain morphological features that distinguished them from the rest of species of *Masdevallia* (Braas 1979, Luer 2003, 2006): thinly coriaceous leaves, slender peduncle ascending through a conduplicate petiole, a successively few-flowered raceme, free dorsal sepal, basally connate lateral sepals which are deflexed from a shallow cup. Subsequent DNA analyses led to a lack of a consensus to maintain *Rodrigoa* as a genus (Pridgeon & Chase 2001, Abele 2007, Karremans 2016), transferring the *Rodrigoa* species to *Masdevallia* subgenus *Meleagris* as proposed previously by Luer (1986).

In the western Andes of Ecuador, a poorly explored cloud forest is being protected by Fundación EcoMinga's

Manduriacu reserve. In a recent exploration of the reserve, a new species belonging to *Masdevallia* subgenus *Meleagris* was recently discovered and is described here.

Materials and methods

Material from the new species was collected in northern Ecuador under research permit No. MAAE-ARSFC-2021-1102. Fresh flowers were preserved in 70% ethanol and 1% glycerol. Specimens of the new species were photographed *in situ* and *ex situ* with a Canon EOS T6 camera and Canon EF-S 35mm/2.8 Macro lens. Live and preserved material was examined for morphological and taxonomic comparisons. The taxonomic revision of *Masdevallia* by Luer (2003) and other original descriptions from related species were reviewed and compared. Distribution map was prepared using ArcGis Desktop 10.8.

Taxonomic treatment

Masdevallia purocafeana M. F. Monteros & Baquero, *sp. nov.* (Figs. 1–5).

Type:—ECUADOR. Imbabura. Reserva Río Manduriacu, 1590 m, 9 January 2021. *Marco F. Monteros MFM206* (holotype: QCNE)

Masdevallia purocafeana is similar to *Masdevallia alexandri* Luer (1980: 347) from which it differs by the ovate dorsal sepal with a reflexed tail at the apex (vs. suborbicular dorsal sepal, with an erect tail at the apex), the echinate, widely obovate lateral sepals 5–6 mm wide (vs. glabrous, obovate-oblong, 3 mm wide sepals), the oblong, not angular, petals with the apex irregularly truncate and unequal (vs. spatulate, multangular petals with an obtuse shortly apiculate apex) and the ovoid-ovate lip with three longitudinal calli on the disc (vs. oblong-subpandurate lip, the disc with a low pair of calli).

Plant epiphytic, caespitose herb up to 10 cm tall; *roots* slender ca. 0.7 mm in diameter. *Ramicauls* slender, suberect, 0.6–7.0 cm long, enclosed by 2 loose, tubular sheaths. *Leaf* green, suberect, coriaceous, elliptical-obovate, 3.0–3.5 × 1.2 cm, the apex subacute to obtuse, the base attenuate into the slender petiole. *Inflorescence* a congested, successively few-flowered raceme, borne by a slender, suberect peduncle 9 cm long, from near the apex of the ramicaul; *floral bracts* imbricating, 0.9–1.0 cm long; pedicel 1 cm long. *Ovary* smooth with 6 furrowed, 0.3 cm long. *Flower* with long, cream-colored sepaline tails, the dorsal sepal yellow-green variegated with purple towards the apex, lateral sepals cream-colored gradually turning to light pink towards the second fifth of its length and near the mid vein, and turning into deep purple red at the apical two-fifths, with pink to purple stains from the base towards the apex, the petals light pink turning yellow towards the apex with dark purple stains on the apical half, light pink lip, with light red dots, column pale yellow. *Dorsal sepal* ovate, concave with erose and widely undulating margin 0.7 × 0.4–0.5 cm, free from the lateral sepals, the apex obtuse to truncate contracted into a slender, reflexed tail 2.0–2.2 cm long. *Lateral sepals* widely obovate, oblique, echinate at the adaxial side, with entire margins, 1.0–1.2 × 0.5–0.6 cm, basally connate for 0.2 mm to form a rounded mentum along the column-foot, the apices contracted into slender tails, 2.0–2.5 mm long. *Petals* oblong, 4.0 × 1.9 mm, the apex unequally and irregularly truncate, the labellar margin with a low, longitudinal carina born at the apex and ending, slightly dilated, towards the middle of the petal. *Lip* ovoid-ovate, arcuate, 4 × 3 mm, the apex rounded, reflexed, the disc with three longitudinal calli above the middle, the base sub-truncate, thinly hinged beneath the thickened base to the under margin of the apex of the column-foot. *Column* semiterete, 3.5 mm long, the foot 5 mm long, the apex with a short, irregular clinandrium with two pollinia.

Etymology:—This species is named in honor of Puro Coffee, an organic coffee company in the United Kingdom that has made significant donations to the UK-based World Land Trust, which has financed land purchases for Fundación EcoMinga's Manduriacu reserve where this species was discovered. Puro Coffee has played a major role in facilitating support for this reserve, thereby protecting many locally endemic species of plants and animals.

Phenology:—*Masdevallia purocafeana* has been observed blooming *in situ* from November to March.

Distribution and ecology:—*Masdevallia purocafeana* is known only from the type locality, in the Manduriacu reserve of Fundación EcoMinga at around 1600 m in elevation. This species was found growing as an epiphytic in the evergreen lower montane forest of the western Andes range (BSBN04) according to the ecosystem classification

of Ministerio de Ambiente del Ecuador (2013), on the Pacific slopes of the Andes (Fig. 5). This area is part of the Cordillera del Toisán, an important area of high biodiversity and endemism influenced by the juncture of the Chocó and Tropical Andes bioregion (Guayasamin *et al.* 2019). *Masdevallia purocafeana* was found growing sympatrically with other pleurothallid species such as *M. nidifica* Reichenbach (1878: 18) *Lepanthes kuintii* Luer & Hirtz (1984: 1156), *Scaphosepalum dodsonii* Luer (1983: 390), and *Platystele pubescens* Luer (1984: 200).

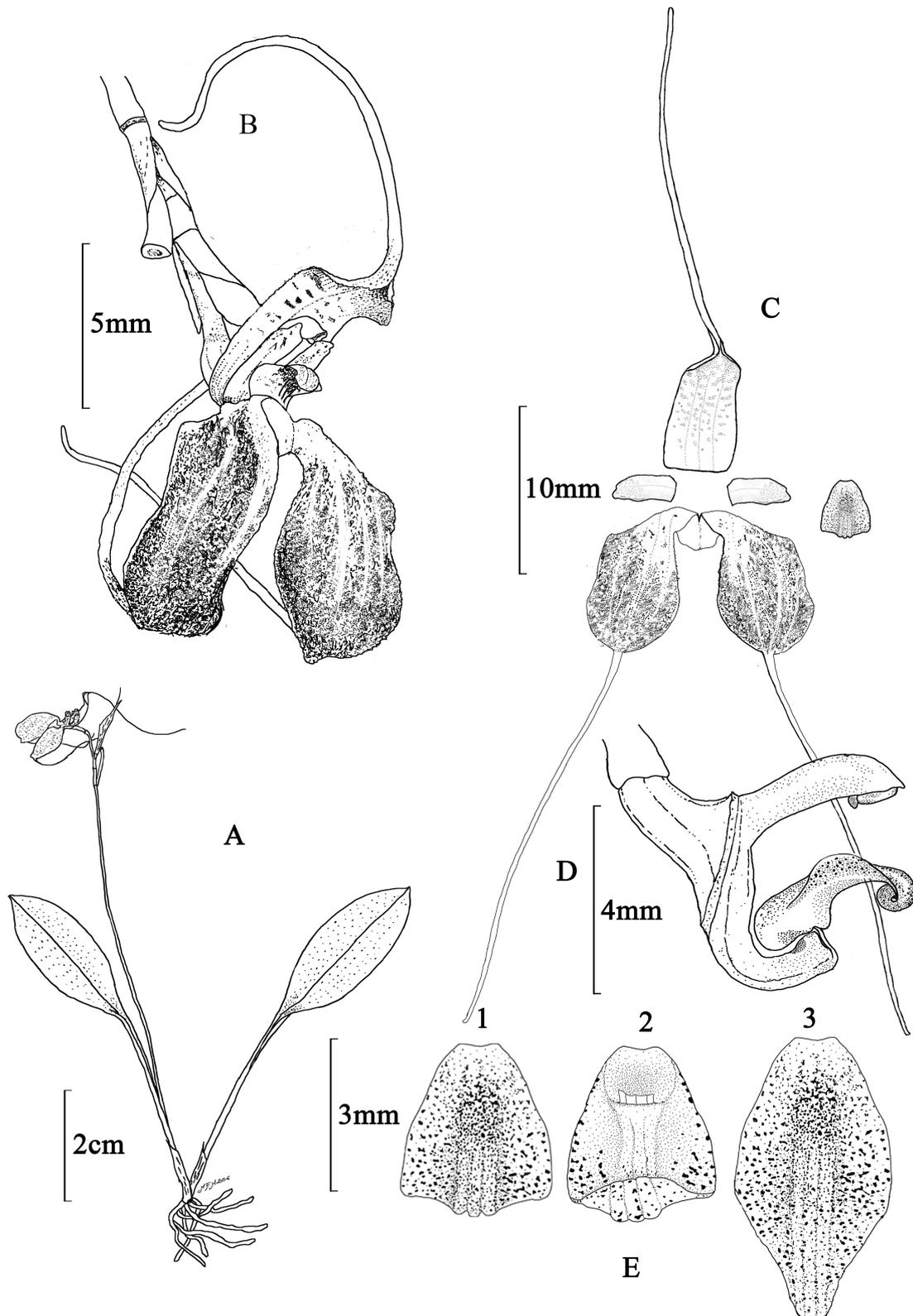


FIGURE 1. Illustration of *Masdevallia purocafeana* M. F. Monteros & Baquero. A. Habit. B. Flower. C. Dissected perianth. D. Column and lip lateral view. E1. Lip dorsal view. E2. Lip ventral view. E3. Lip extended dorsal view. Drawn by Marco F. Monteros from the plant that served as the type.



FIGURE 2. Photographs of *Masdevallia purocafeana* M. F. Monteros & Baquero. A. Habitat. B. Plant with flower lateral view *in situ*. C. Plant with flower frontal view *in situ*. Photographs by Marco F. Monteros.

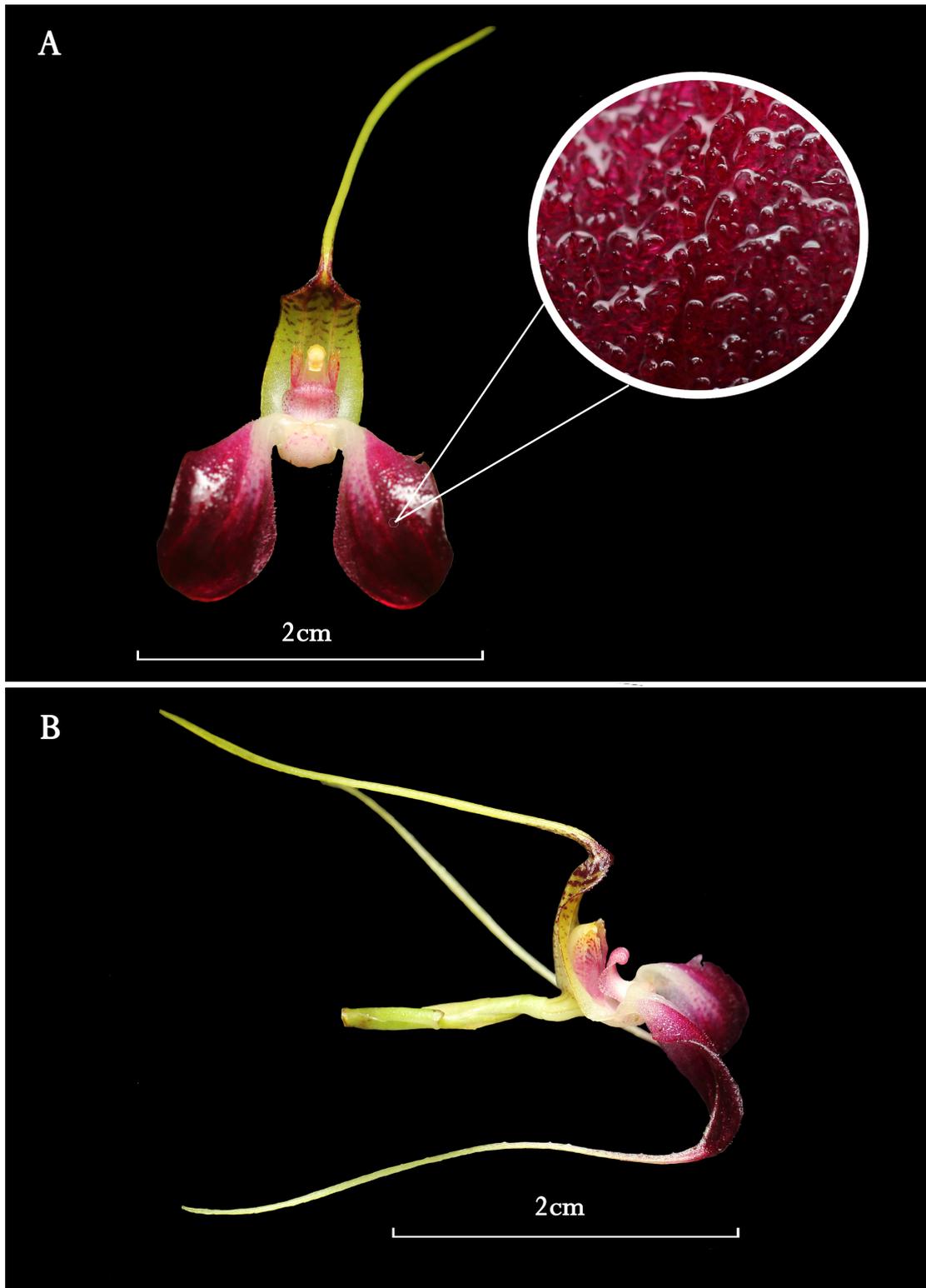


FIGURE 3. *Masdevallia purocafeana* M. F. Monteros & Baquero. A. Flower frontal view with lateral sepal texture. B. Flower lateral view. Photographs by Marco F. Monteros.

Although the Manduriacu Reserve is still poorly surveyed, other nearby areas have been well explored, such as Los Cedros reserve, where a diverse assemblage of Orchidaceae, especially species of Pleurothallidinae, has been recorded. Nevertheless, *Masdevallia purocafeana* has not been registered in Los Cedros reserve, and the only species of *Masdevallia* subgenus *Meleagris* (*sensu* Luer 2000) recorded in that area is *M. ximena* Luer & Hirtz (1991: 171). The exact coordinates where the type specimen was collected are excluded due to the risk of illegal collecting of the species.

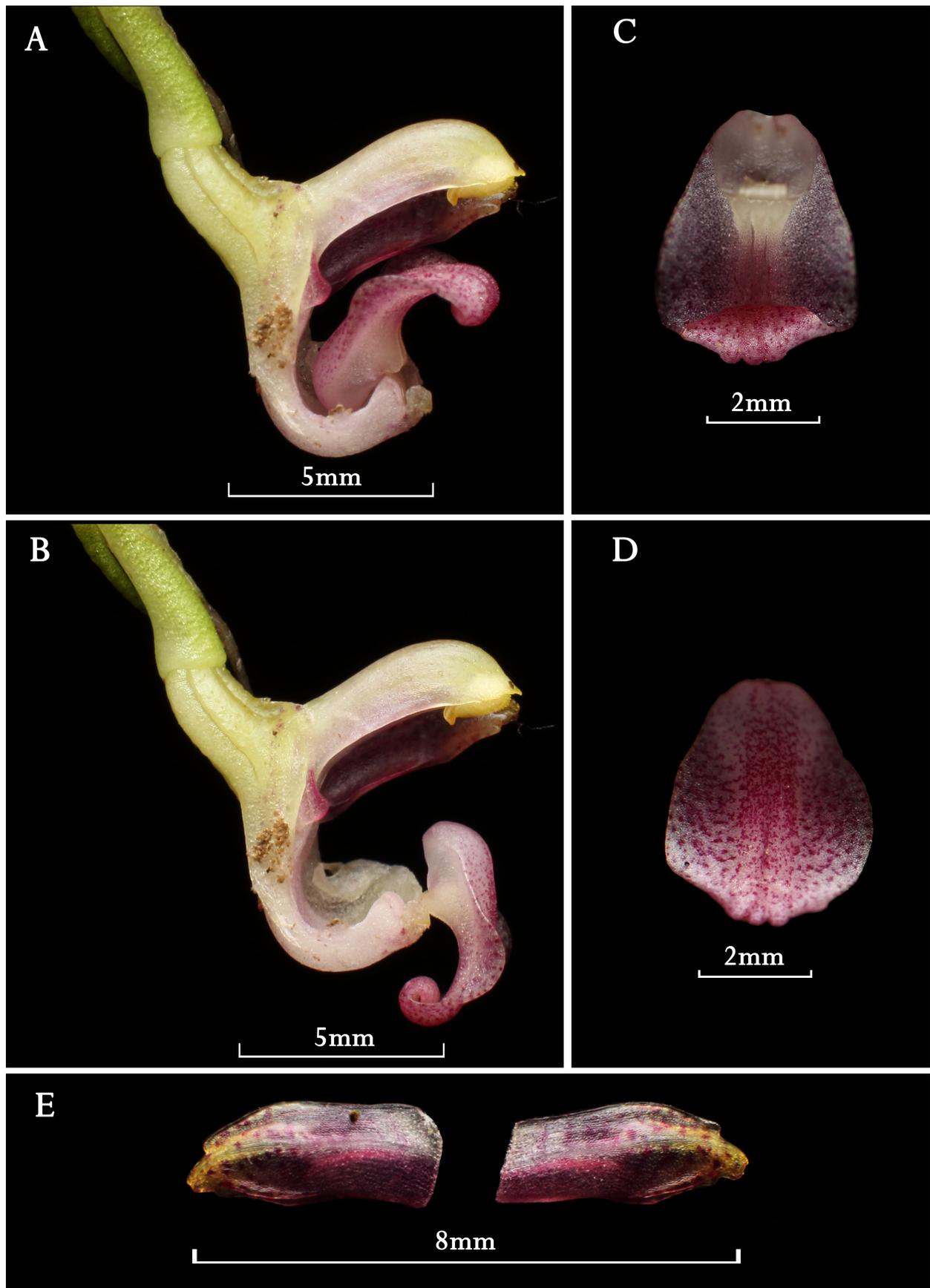


FIGURE 4. Details of *Masdevallia purocafeana* M. F. Monteros & Baquero. A. Column and lip closed lateral view. B. Column and lip opened. C. Lip ventral view. D. Lip dorsal view. E. Petals. Photographs by Marco F. Monteros.

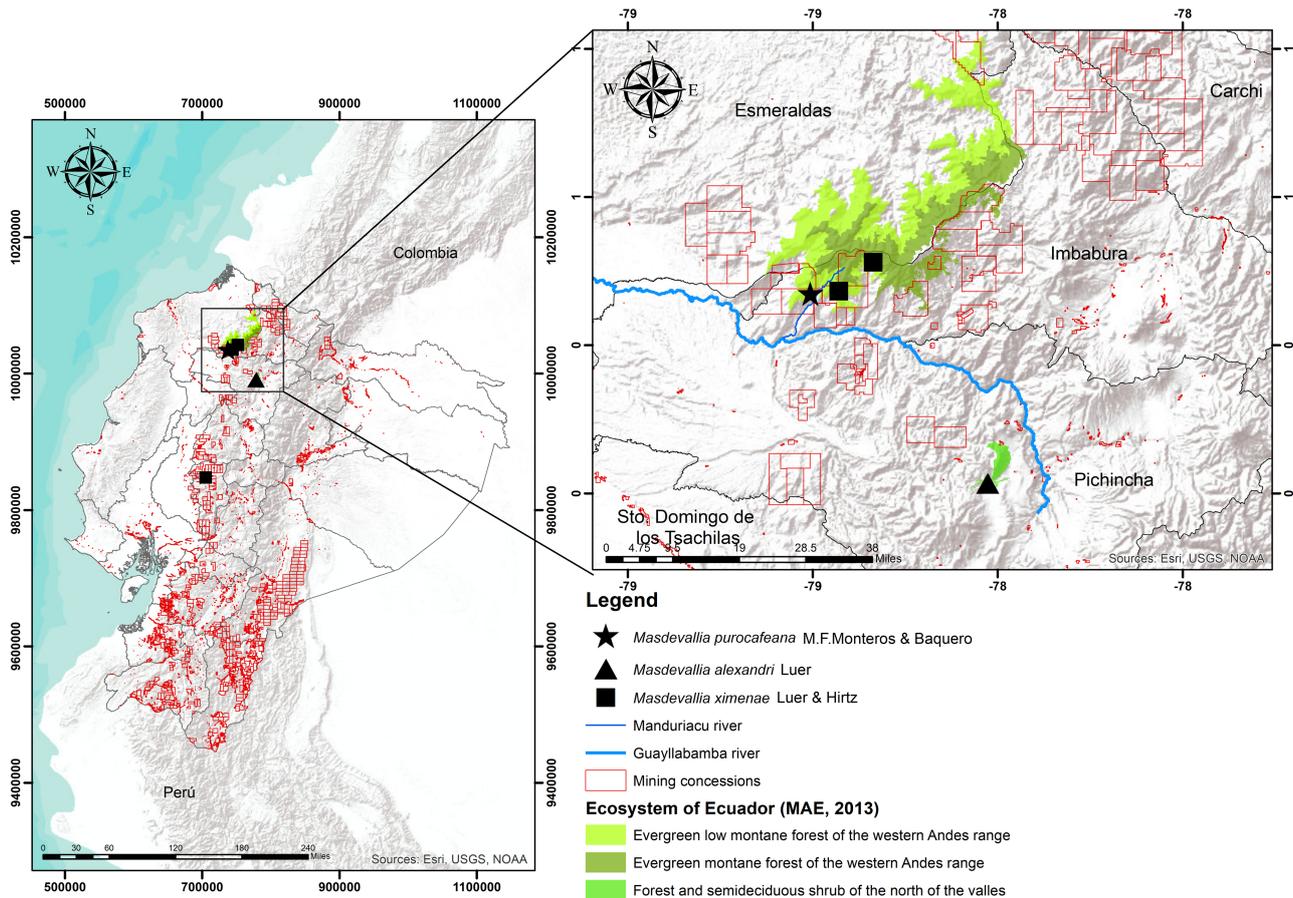


FIGURE 5. Distribution and threats map of *Masdevallia purocafeana* M. F. Monteros & Baquero and related species. Map generated by Marco F. Monteros.

Conservation status:—The two sister species *Masdevallia alexandri* and *M. ximenae* grow close to *M. purocafeana*. Considering that *Masdevallia ximenae* grows in Los Cedros reserve (slightly east of the locality for *M. purocafeana*), and this reserve is one of the most explored areas in Ecuador orchidwise and considering that no specimens of *M. purocafeana* have been found in Los Cedros, we conclude that most likely *M. purocafeana* does not grow in Los Cedros. The same applies where *M. alexandri* has been found growing, further south in the western slopes of Pichincha volcano near Quito. Although the Manduriacu Reserve has not been explored for orchids as extensively as Los Cedros or Pichincha volcano, nevertheless four years of research have been conducted around the area, and still only one locality is known for *M. purocafeana*. The known area of occupation (AOO) estimated using GeoCAT (Bachman *et al.* 2011) is 4 km² based on years of research not only in the Manduriacu reserve but in the whole Cordillera del Toisán (where Los Cedros and Manduriacu Reserves are located). The area is also under imminent threat of mining, with much of the area concessioned to multinational mining companies which are currently doing exploratory operations (Roy *et al.* 2018). For these reasons we recommend that *M. purocafeana* should be classified as Critically Endangered, following IUCN (2019) criteria B2ab(ii).

Taxonomic Discussion:—*Masdevallia purocafeana* shares morphological characteristics with other species of *Masdevallia* subgenus *Meleagris*, such as *M. alexandri* and *M. ximenae* (sensu Luer 2000). These species are distributed in northwestern Ecuador between the Imbabura and Pichincha provinces (Luer 2003, 2006), in a hyperdiverse and threatened Andean Forest Zone (Roy *et al.* 2018) (Fig. 5).

Masdevallia purocafeana is most similar to *M. alexandri* but is recognized by the oblong, shallowly concave, yellow-green dorsal sepal variegated with purple towards the apex (vs. broad, deeply concave, light greenish-brown in *M. alexandri*); the lateral sepals broad, muricate, strongly reflexed, cream-colored, gradually turning to light pink and deep purple red with pink to purple stains, broader than the dorsal sepal (vs. light yellow-brown, narrow, non-reflexed); the oblong, not angular, petals with the apex irregularly truncate and unequal (vs. spatulate, multiangular petals with an obtuse shortly apiculate apex); and the light pink ovoid-ovate lip dotted with pale light red, with three longitudinal calli on the disc (vs. brown, oblong-subpandurate lip, the disc with a low pair of calli in *M. alexandri*).

The known occupancy area and potential distribution area of *Masdevallia purocafeana* in northwestern Ecuador is an important and diverse region for the conservation of biodiversity. However, this region is severely threatened by deforestation and mining projects threatening the habitat and conservation of this species (Roy *et al.* 2018) (Fig. 5).

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