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Burmeistera minutiflora (Campanulaceae-Lobelioideae), a new species from the high Andes of Antioquia (Colombia) with the smallest flowers in the genus

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Abstract

Garzón Venegas, J., González, F. & Vélez Puerta, J.M. *Burmeistera minutiflora* (Campanulaceae-Lobelioideae), a new species from the high Andes of Antioquia (Colombia) with the smallest flowers in the genus. *Anales Jard. Bot. Madrid* 69(2): 243-246.

Burmeistera minutiflora (Campanulaceae-Lobelioideae), a new species of sect. *Barbatae*, is here described, illustrated, and keyed out with respect to other species of the genus with small flowers (i.e. corolla tube <1 cm long). The new species is a small herb that grows in the understory of remnants of cloud montane forests of the Western cordillera of Antioquia, Colombia. The dimensions of the corolla and the berries correspond without doubts to the smallest size of reproductive structures in the genus. The small floral size contrasts with the colorful, bright red and yellow corollas.

Key Words: Flora of Antioquia, Flora of Colombia, cloud forests, paramo, subparamo, Las Orquídeas National Natural Park.

Resumen

Garzón Venegas, J., González, F. & Vélez Puerta, J.M. *Burmeistera minutiflora* (Campanulaceae-Lobelioideae), una nueva especie de los Andes de Antioquia (Colombia) con las flores más pequeñas del género. *Anales Jard. Bot. Madrid* 69(2): 243-246 (en inglés).

Se describe *Burmeistera minutiflora* (Campanulaceae-Lobelioideae), una nueva especie de la sect. *Barbatae*, y se ilustra e incluye en una clave en la que se contrasta con otras especies de flores diminutas (i.e. con corola < 1 cm). La nueva especie es una hierba pequeña, que crece en el sotobosque de remanentes de bosques nublados de la Cordillera Occidental de Antioquia, Colombia. Las pequeñas dimensiones de la corola y de las bayas corresponden si lugar a dudas a las estructuras reproductivas de menor tamaño conocidas en el género. El pequeño tamaño de las flores contrasta con la vivacidad de las corolas rojas brillantes y amarillas.

Palabras Clave: Flora de Antioquia, Flora de Colombia, bosques nublados, páramos, subpáramos, Parque Nacional Natural Las Orquídeas.

INTRODUCTION

Burmeistera, described by J.J. Triana (1854), is the fourth largest genus of the Lobelioideae. Karsten & Triana (1856), Zahlbruckner (1906, 1915), Gleason (1925), Wimmer (1931, 1932, 1943, 1953, 1968), McVaugh (1949, 1965), Nash (1976), Wilbur (1976a, 1976b, 1981), Jeppesen (1981), Stein (1987), Lammers (1998, 2007a, 2007b), and Lammers & Maas (1998), among others, have contributed to the knowledge of the genus. In the ongoing treatment of the genus for Flora of Colombia the estimated number of *Burmeistera* species has increased to 112 (Garzón & al. 2012; Garzón & González, in prep.). *Burmeistera* occurs in Honduras, Guatemala, Costa Rica, Panama, Colombia, Venezuela, Ecuador, and Peru (Lammers, 2002). The species of *Burmeistera* are herbs, subshrubs or shrubs, rarely hemi-epiphytic. Most of the species grow in cloud montane forests between 1000-3000 m in elevation with extremely narrow distributions.

The most comprehensive revisions of *Burmeistera* were written by Wimmer (1931, 1932, 1943, 1953, 1968), who recognized about 80 species arranged in two sections, *Barbatae* E. Wimm., and *Imberbes* (*nom. invalid.* = sect. *Burmeistera* Lammers; see Lammers, 1998), based on the indument of the apical margin of the anther tube. Although the monophyly of these two sections has been questioned by Knox & al. (2008), the presence of a tuft of trichomes in the apex of the ventral anthers in preanthetic flowers remains as a reliable diagnostic field character at a specific level (Garzón & al., 2012).

The first Colombian species were described by Kunth (1818, under *Lobelia*), but then Karsten & Triana (1856),

Zahlbruckner (1906, 1915), Wimmer (1931, 1932, 1943, 1953, 1968), and most recently McVaugh (1965), Luteyn (1986), Lozano and Galeano (1986), Lammers & Maas (1998) and Lammers (2002) have described most of the species present in Colombia, where the genus reaches its highest diversity. The main species-level diagnostic characters in *Burmeistera* are the overall pubescence of the plant, the leaf architecture, the presence or absence of bracts at the base or the proximal third of the floral peduncle, the shape and size of the hypanthium, the calyx lobes, the shape, size and color of the corolla, and the size, shape, color, and consistency of the berries.

MATERIAL AND METHODS

Specimens examined are deposited in the following herbaria: COL, HUA, JAUM, and MEDEL (abbreviations following Holmgren & al., 1990, Index Herbariorum). Isotypes of the new species will be distributed to HUA, MA, and NY. The photographs that illustrate the new species were taken with a Canon EOS 7D digital camera. Measurements below 5 mm were taken using a Metric Mini Scale #1 by Electron Microscopy Sciences (EMS).

RESULTS AND DISCUSSION

While working on a taxonomic revision of the Colombian *Burmeistera*, we found several unidentified specimens collected in the department of Antioquia, mostly at the northern slopes of the Western Cordillera (including Las Orquídeas National Natural Park). These specimens with remarkably

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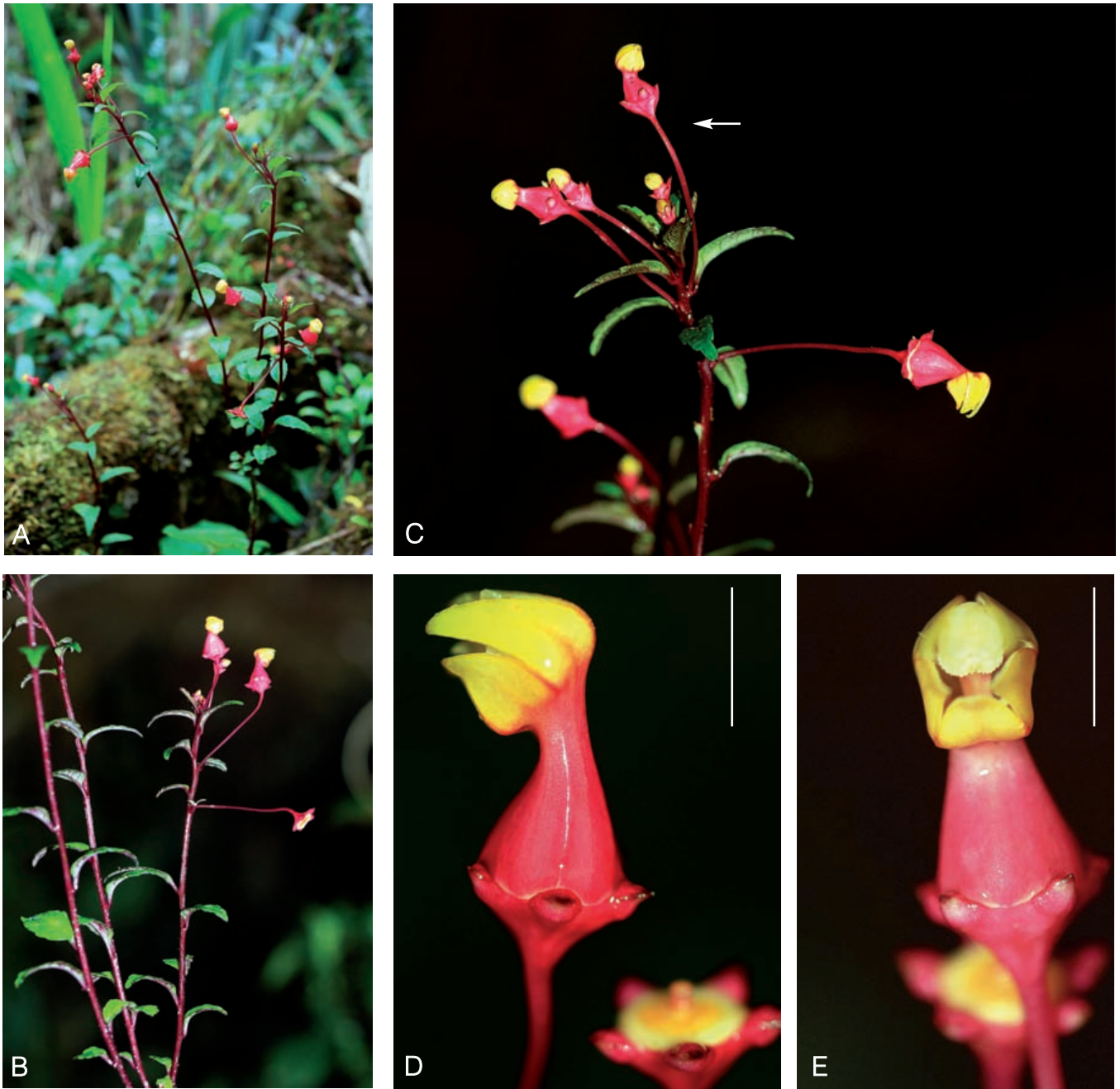


Fig. 1. *Burmeistera minutiflora*. **A, B**, plant in its natural habitat; **C**, detail of a flowering shoot; note resupination from flower four (arrow) onwards; **D, E**, flower in lateral (D), and frontal (E) views. Scale bars = 5 mm (All from the holotype).

small flowers did not match any of the known species to date. Here we describe this new species, which belongs to series *Barbatae sensu* E. Wimmer (1931, 1932, 1943).

***Burmeistera minutiflora* Garzón & F. González, sp. nov.**

Type: Colombia. Antioquia: Abriaquí, Parque Nacional Natural Las Orquídeas, vereda Piedras, entre el extremo norte de la cuchilla de Morro Pelao y La Mina, 6°37'N-6°40'N, 76°9'W-76°11'W, 2800-3350 m, 8 Feb 2012 (fl, fr), M. González, J. Betancur, A. Duque, W. Galvis, F. Gómez, O. Laverde, M. Londoño, M. Ríos & J. Serna 945 (holotype, COL; isotypes, HUA, MA, NY, to be distributed). (Fig. 1).

Small erect, terrestrial herbs to 30 cm high, branching from the base, with milky latex. Stems fleshy, terete, slender, glabrous, maroon, internodes 0.5-1.5(2) cm long. Leaves spirally arranged; petiole 3-10 mm long, maroon, glabrous; distal leaves isomorphic but slightly reduced with respect to the proximal leaves; lamina ovate to narrowly ovate, (1.5)1.8-2.8(3.8) × (0.6)1-1.5 cm, slightly fleshy, adaxial surface bright green, abaxial surface pale green or maroon-veined, glabrous on both sides, base slightly asymmetric, convex to rounded, apex acute, margin entire basally, serrulate along the distal 1/3, with 6-10(16) teeth on each side, in one size class, each tooth with a distal callosity, venation semicraspedodromous,

with 4-6 pairs of secondary veins, irregularly spaced, generally excurrent with the primary vein, higher order veins reticulate. Flowers solitary in the axils of upper leaves, resupinated; peduncles ebracteate, bright red, glabrous, 1.8-3.1 cm long at anthesis; hypanthium obconic, 2-3 mm long, 3-5(7) mm diam., glabrous, calyx lobes five, triangular, patent, 1.5-2 × 1.5-2 mm, margins entire, leaving broad (1.5-2 mm wide) sinuses between lobes; corolla suberect, glabrous, 0.8-1.1 cm long, tube conical, 5-7 mm long, 4-6 mm basal diameter, 2-3 mm distal diameter, bright red, lobes five, bright yellow, glabrous, all lobes ovate-triangular, slightly falcate, with apices acute to shortly acuminate, dorsal lobes 4.5-5.5 × 2-2.5 mm, lateral lobes 3-4 × 1.5-2 mm, ventral lobe 4-5 × 1.5-2 mm; androecium shortly exerted (by c 1.5 mm) between the dorsal lobes, filament tube erect, 6-7 mm long, glabrous, anther tube 1.8-2 mm diam., obliquely cup-shaped, glabrous, dorsal anthers three, 4-4.5 mm long, ventral anthers two, 2-3.5 mm long, sparsely pubescent with an apical tuft of white woolly hairs to 0.5 mm long. Berry turbinate, 3-5(7) mm × 6-8 mm (*in sicco*), bright red, lobes triangular 1.5-2 × 1-5; seeds rhomboid, to 1 × 0.3 mm.

Etymology. The specific epithet refers to the size of the flowers, which corresponds to the smallest flower size of any known species in the genus *Burmeistera*.

Burmeistera minutiflora is easily distinguished by the bicolor (bright red and yellow) and the small corollas (<1.1 cm long), the smallest of the genus. Overall, it is similar to *B. antioquiensis* Garzón & J.M. Vélez (Garzón & al., 2012, in press), but the corolla alone is similar to that of *B. kirkebridei* Wilbur, from Panama. However, the latter species falls into sect. *Imberbes*, as the apex of the two ventral anthers does not possess a tuft of apical hairs. The key below summarizes the main differences between the species with corolla tube < 1 cm from Costa Rica, Panama, Colombia, and Ecuador.

Distribution and ecology. With 23 species of *Burmeistera* (Idárraga, 2011), plus the recently described new species (Garzón & al., 2012), Antioquia is most likely the department of Colombia with the highest diversity of the genus. *B. minutiflora* has been collected in elevations between 2800-3550 m, in some of the few remnants of paramo and subparamo existing in the department. The localities where the new species has been collected fall into the superhumid paramo ecosystems, corresponding to the bp-M category, following Espinal (2011). The species could be under critical threat, because of the narrow distribution in fragile habitats that undergoes continuous fragmentation and destruction.

The species has been collected in flower in September, and in flower and fruit in February, April and November, which indicates that it has a long flowering season. Another interesting issue for discussion is the type of pollination of the new species. There is an overwhelming dominance of species of *Burmeistera* visited by bats and hummingbirds (Muchhala, 2006) with a considerable amount of variation in traits like the length and color of the corolla tube and lobes, odor, and the stigma exertion, being the width of the corolla aperture the most critical for pollinator specialization. The reduction observed in corolla sizes in *B. minutiflora* strongly precludes that most of possible visitors in other species could act as effective

pollinators. Instead, the display of the yellow lobes and stigma as well as the narrow corolla aperture suggests an evolution towards an entomophilous pollination syndrome, yet undescribed for this genus.

Additional specimens examined

COLOMBIA. **Antioquia:** Urrao, inspección Jaiperá, vereda El Chuscal, páramo de Frontino, sitio Llanogrande, 3000-3390 m, 6°27'N, 76°4.6'W, 4-IV-1989 (fl, fr), *R. Callejas & al. 7498* (HUA). Near Summit of Morro Pelado, 3300 m, along Anocosca-Abriaquí camino, 15 Mar 1944 (fl), *E. L. Core 464* (US). Abriaquí, Parque Nacional Natural Las Orquídeas, sector Cuchilla de Morro Pelao (accediendo por La Mina, Río Piedras arriba), 6°37'15.22"N, 76°9'28.8"W, 3400-3450 m, 5-II-2012 (fl, fr), *M. González & al. 879* (COL, NY). Urrao, páramo de Frontino, El Río, 3115 m, 10/19-XI-1984 (fl, fr), *R. Londoño & al. 365* (COL, MEDEL). Urrao, páramo de Frontino, vertiente oriental, cuchilla de Frontino, 6°30'N, 76°7'W, 3550 m, 10-IX-2000 (fl), *J.A. Pérez & N. Parra 1514* (MEDEL). Abriaquí, vereda San José, Parque Nacional Natural "Las Orquídeas", camino de San José a La Quiebra, 6°35' N, 76°10'W, 2980 m, 30-IV-1990 (fl, fr), *J.G. Ramírez & al. 3874* (JAUM, MEDEL).

KEY FOR THE SPECIES OF *BURMEISTERA* WITH COROLLA TUBE < 1 CM LONG.

1. Apex of the ventral anthers glabrous or all the anthers with evenly distributed short trichomes (Sect. **Imberbes**) **2**
1. Apex of the ventral anthers with a long tuft of barbate trichomes (Sect. **Barbatae**) **5**
2. Lamina of the leaf elliptic, oblong or ovate. Lobes of corolla triangular or ovate-lanceolate **3**
2. Lamina of the leaf lanceolate. Lobes of corolla filiform. Colombia and Ecuador **B. rostrata** Jeppesen
3. Flowers sparsely arranged in the axils of upper leaves. Corollas with bright colors **4**
3. Flowers tightly arranged along the axils of very reduced (bracteiform) leaves, appearing corymbiform. Corolla dull. Colombia and Ecuador **B. multiflora** Zahlbr.
4. Lamina of the leaf elliptic, to 7 cm long, with 5 or 6 secondary veins. Panama **B. kirkebridei** Wilbur
4. Lamina of the leaf ovate to oblong, 7.5-12 cm long, with ca. 12 secondary veins. Ecuador **B. rubrosepala** (E. Wimm.) E. Wimm.
5. Corollas with bright colors, fuchsia, pink, or bright red **10**
5. Corollas with dull colors, green or pale yellow **6**
6. Flowers solitary in the axis of upper leaves. Corolla glabrous or puberulent **7**
6. Flowers in terminal corymbiform inflorescences. Corolla villous. Colombia, Ecuador **B. lutosa** E. Wimm.
7. Plants glabrous. Sepals 1-3 mm long **8**
7. Plants puberulent. Sepals 3.5-5 mm long. Panama **B. dukei** Wilbur
8. Leaves with a submarginal vein. Hypanthium as long as wide, to 5 mm long **9**
8. Leaves lacking a submarginal vein. Hypanthium longer than wide, to 8 mm long. Colombia **B. xerampelina** E. Wimm.
9. Lamina of the leaf 5-9 cm long, with 9 to 11 secondary veins. Costa Rica **B. coleoides** (Vatke) E. Wimm.
9. Lamina of the leaf 9-12 cm long, with 8 or 9 secondary veins. Costa Rica, Panama **B. parviflora** E. Wimm.
10. Plants glabrous. Lobes of the corolla forming an obtuse angle with respect to the tube **11**
10. Plants puberulous. Lobes of the corolla forming an angle of 90° with respect to the tube. Colombia **Burmeistera sp. 1**
(=*B. luteyana* Garzón & J.M. Vélez, in press)
11. Leaves distichous. Lamina of the leaf oblong to elliptic, with 6-8 secondary veins. Lobes of the calyx 3-7 mm long, leaving a narrow sinus (1/3 of the width of the calyx lobe) between them. Corolla 1.5-2 cm long, homogeneously bright red, dorsal lobes 9-13 mm long, lateral lobes 7.3-11 mm long. Filament tube woolly. Colombia **Burmeistera sp. 2**
(=*B. antioquiensis* Garzón & J.M. Vélez, in press)

11. Leaves spirally arranged. Lamina of the leaf ovate to narrowly ovate, with 4-6 secondary veins. Calyx lobes 1.5-2 mm long, leaving a sinus as broad as the calyx lobe between them. Corolla 0.8-1.1 cm long, bi-color, bright red, the limb yellow, dorsal lobes 4.5-5.5 mm long, lateral lobes 3-4 mm long. Filament tube glabrous **B. minutiflora**

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