

Three new species of *Columnea* (Gesneriaceae; Gesnerieae) from the Colombian Andes

Tres especies nuevas de *Columnea* (Gesneriaceae; Gesnerieae) de los Andes colombianos

Marisol Amaya-Márquez ^{1*}, Larri Álvarez Rodas ², Yennifer Ramos Arias ², Oscar Humberto Marín-Gómez ^{1,2}

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ABSTRACT

We describe and illustrate three new species of *Columnea* (Gesneriaceae) from the Colombian Andes: *C. cogolloi* from Department of Antioquia, collected at altitudes between 3000 and 3400 m in the high Andean forests and Páramos (Western Cordillera), *C. ianthina*, endemic to the Department of Risaralda, collected at altitudes between 1600 and 1850 m (Central Cordillera), and *C. quindiorisardensis* from the Departments of Quindío, Caldas, and Risaralda, distributed in mountain forests between 1500 and 2400 m (Cordillera Central). We also describe the variety *C. quindiorisardensis* var. *porphyrocalycina*. The novelties reported in this study expand our knowledge on the diversity of neotropical epiphytic species in Gesneriaceae.

Key words: Epiphytes, Lianas, Flora of Colombia.

RESUMEN

Describimos e ilustramos tres especies de *Columnea* de los Andes colombianos nuevas para la ciencia: *C. cogolloi*, distribuida en el departamento de Antioquia entre 3000 y 3400 m de altitud en el bosque altoandino y el páramo (Cordillera Occidental), *C. ianthina* endémica del departamento de Risaralda, colectada en altitudes entre 1600 y 1850 m (Cordillera Central) y *C. quindiorisardensis*, distribuida en los departamentos de Quindío, Caldas y Risaralda, en bosques de montaña entre 1500 a 2400 m de altitud (Cordillera Central). También describimos la variedad *C. quindiorisardensis* var. *porphyrocalycina*. Las novedades aquí reportadas aumentan el conocimiento acerca de las epífitas neotropicales de la familia Gesneriaceae.

Palabras clave: Epífitas, Lianas, Flora de Colombia.

¹ Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Carrera 30 # 45-03 ed. 425, Bogotá, Colombia. Código Postal 111321. mamayam@unal.edu.co, ohmarin1@uniquindio.edu.co

² Centro de Estudios e Investigaciones en Biodiversidad y Biotecnología (CIBUQ), Universidad del Quindío, Carrera 15 Calle 12 Norte, Armenia, Colombia. lalvarez@uniquindio.edu.co, yenniferramos@hotmail.com

* Corresponding author



INTRODUCTION

The genus *Columnea* L. (Gesneriaceae) is a Neotropical lineage of flowering plants with more than 230 species distributed from Mexico to Chile and the Antilles, at elevations from sea level to 3800 m (Clark et al., 2020; Möller & Clark, 2013; Kvist & Skog, 1993; Smith, 1994). The species are woody climbers, less often suffrutescent terrestrial, with specialized pollination by hummingbirds, an ecological interaction of great relevance in Neotropical ecosystems, particularly in the montane Andean forests on the Chocó biogeographic foothills and the Antilles. The monophyly of *Columnea* is strongly supported by molecular phylogenetic analyses (Clark et al., 2012; Smith, 2000; Smith & Carroll, 1997; Smith et al., 2013a), and the number of species known for this genus has increased according to the recent reports of taxonomic novelties, mostly from Colombia and Ecuador (e.g., Amaya-Márquez, 2014; Amaya-Márquez & Marín-Gómez, 2012; Amaya-Márquez & Smith, 2013; Amaya-Márquez et al., 2013; Clark & Clavijo, 2012; Clark et al., 2021; Smith et al., 2013b). Here we describe and illustrate three new species of *Columnea* from the Cordillera Central and Cordillera Occidental of the Colombian Andes contributing to the knowledge of the vascular epiphytic flora of Colombia.

MATERIALS AND METHODS

Specimens of *Columnea quindiorisardensis* were collected on two botanical expeditions conducted in 2009 and 2016 at the departments of Quindío and Risaralda, where photographs of fertile living plants were taken *in situ*. The botanical vouchers were prepared with the respective collection labels containing the following information: geographical location, date, elevation, collector(s) and collection number, flower and fruit color were also recorded. The voucher specimens were deposited in the HUQ and COL herbaria. Additionally, a palynological study was conducted using the acetolysis method of Erdtman (1986). Pollen morphology and structure were studied using a FEI Quanta 250 Scanning Electron Microscope, up to 1,000,000x; the study was conducted at the Instituto de Investigaciones en Estratigrafía (IIES) of the Universidad de Caldas. Photographs of pollen grains were analyzed using Image-Pro Premier 9.1, with a sample

size of 25 pollen grains per species. Pollen descriptions follow standard palynological terminology (e.g., Erdtman, 1986; Faegri & Iversen, 1975; Halbritter et al., 2018; Imperatriz-Fonseca et al., 2014). The other two species: *Columnea cogolloi* and *C. ianthina* were discovered while revising herbarium specimens of the genus *Columnea* at COL. The three species were confirmed as new to science based on a detailed morphological review, including floral dissections under a stereoscope, palynological analysis of the two varieties of *Columnea quindiorisardensis* using SEM, as well as with the consultation of taxonomic literature (Clavijo, 2005; Kvist & Skog, 1993; Kvist et al., 1998). Additionally, we compared the morphology with other specimens of *Columnea* deposited in the collection of the following herbaria: COL, HUA, HUQ and MEDEL (physical specimens), Missouri Botanical Garden (MO), The United States National Herbarium (US), and the Marie Selby Botanical Gardens (SEL) (virtual herbaria) were also conducted.

RESULTS

Columnea cogolloi M. Amaya & O. H. Marín sp. nov. (Fig. 1).

Type. COLOMBIA. Antioquia: municipio Urrao, Páramo de Frontino, 5°44'50" N, 76°00' W, 3220 m, 5 Dec. 2011, Pérez-Zabala, J.A., Duque, A. & Herrera, F. 2099 (holotype: MEDEL herbarium number: 47245).

Diagnosis. *Columnea cogolloi* differs from *C. anisophylla* DC. by having a set of the following traits: yellow or red corollas with two purple lines delimiting the ventral lobe (vs. orange or rarely red-orange corolla tube), nectary formed by 5 glands (vs. formed by 2 to 5 glands), ovary glabrous (vs. villous), and a bilabiate corolla with the upper lip formed by four corolla lobes (vs. bilabiate corolla with the upper lip formed by two dorsal lobes forming a galea).

Description. Woody climber. Stem terete, 0.4–0.7 cm diam. with reddish papillose-hispid indument, older parts with ebony bark; internodes 0.8–2.5 cm long. Leaves opposite, anisophyllous in a pair, papyraceous; larger leaf subsessile, petiole 0.2–0.5 cm long, papillose-hispid indument (7–11-celled uniseriate trichomes); blade asymmetrical, oblong to narrow ovate, 4.5–12 × 2–5 cm,

base asymmetrical, longer side rounded, apex acuminate, margin dentate and ciliate, adaxial surface green and hispid to densely hispid 11–14-celled uniseriate translucent trichomes), lower surface green with contrasting deep purple at the apical fifth, indument hispid more dense and with longer trichomes on the veins, 8–10 lateral veins on the larger side of the blade; smaller leaf subsessile, petiole 0.2–0.5 cm, ovate to narrow ovate, $1.8\text{--}5 \times 1.5\text{--}3.7$ cm, base asymmetrical with longer side rounded or sagittate, apex attenuate to acuminate, indument hispid on adaxial and abaxial faces. Inflorescence fasciculate, with 1–4 flower(s) per axil; two equally inconspicuous, bracts, ca. 0.3×0.2 cm, green, hispid, caducous. Flowers pedicellate, pedicel 2–3 cm long, distally curved below the calyx epidermis pale green to reddish, indument translucent or reddish, hispid. Calyx green and reddish, 5 sepals subequal, lanceolate, ca. 1.5×0.3 cm, margin with subulate glandular teeth, sparsely glandular adaxially, hispid abaxially. Corolla yellow or red with two ventral deep purple nectar guides, sparsely hispid outside, glabrous inside except below the dorsal lobes; tubular, inflated, 4–4.5 cm long, 1.2–1.5 cm at the widest middle part, constricted near at the base to 3 mm; base gibbous, gibbosity $3 \times 4\text{--}5$ mm; limb bilabiate; upper lip formed by 4 obtuse lobes of equal size (0.5×0.5 cm), margin erose, lower lip formed by a ventral lobe, oblong $1.5 \times 0.4\text{--}0.5$ cm. Androecium of 4 stamens didynamous; filaments 3.8–4 cm long, glabrous, connate at the base for ca. 4 mm, forming a folded dorsally open blade; anthers dorsally subquadrate ca. 2.5×3 mm. Gynoecium with 5 nectary glands of $1.5\text{--}2 \times 2$ mm; ovary conical, ca. 2×1 mm, glabrous; style 4–4.5 cm long, glabrous; stigma stomatomorphic. Nectary five glands, ca. $1.5\text{--}2 \times 2$ mm. Fruit not seen.

Distribution and habitat. *Columnea cogolloi* is, as far as we know, endemic to Colombia, known only from the Cordillera Occidental, in the Department of Antioquia. This species has been collected in the high Andean forests (bp-M), Páramos (Holdridge, 1978), and subpáramos at elevations of 3000–3440 m.

Phenology. Flowers were recorded in September, November, December, and February.

Etymology. This species is named in honor of Álvaro Cogollo, a distinguished Colombian botanist, in recognition of his major contributions through field collections, publications, leadership, and his work fostering the integration of scientific and traditional knowledge among regional communities throughout Colombia. His efforts have been instrumental in advancing botanical research in the country.

Paratypes: COLOMBIA. **Antioquia:** Abriaquí, Parque Nacional Natural Las Orquídeas, sector cuchilla de Morro Pelao, $06^{\circ}37'15.2''$ N, $76^{\circ}09'28.8''$ W, 3400–3450 m, 3 Feb. 2012, González, M. et al. 820 (COL, MEDEL, HUA). Urrao, Páramo Frontino, vertiente norte hacia la planicie, $05^{\circ}44'50''$ N $76^{\circ}00'00''$ W 3220 m, 4 Dec. 2001, Pérez-Zabala J. A. et al. 2069 (MEDEL). Urrao, Páramo Frontino RAP.1, parcela 10 #11, $06^{\circ}30' N 76^{\circ}07' W$, 3340 m, 11 Sep. 2000, Pérez J. A. & N. Parra 1433 (MEDEL). Urrao, on the trail to Páramo de Frontino15, $06^{\circ}30' N 76^{\circ}10' W$, 3000–3300 m, 20 Nov. 1988, McPherson G. et al. 13192 (HUA).

Columnea ianthina M. Amaya & Y. Ramos sp. nov. (Fig. 2).

Type. COLOMBIA. **Risaralda:** Pereira, Parque Regional Natural Ucumari, 2400 m, 2 Dec. 1989, Franco, P., Londoño, E. & Rangel, O. 2751 (holotype: COL herbarium number: 348351).

Diagnosis. *Columnea ianthina* is a woody climber with anisophyllous leaves in a pair, and tubular corollas; differs from *Columnea sanguinea* (Pers.) Hanst. by having smaller leaves of 8–13 cm long, oblong, apex attenuate, larger leaf abaxially green without red spots (vs. 11–26 cm long, oblanceolate, apex acuminate, larger leaf abaxially green with red spots); petioles 10–20 mm long (vs. 2–8 mm long), smaller leaf within a pair oblong with petioles of 4–7 mm (vs. lanceolate, sessile); lilac corollas (vs. yellow).

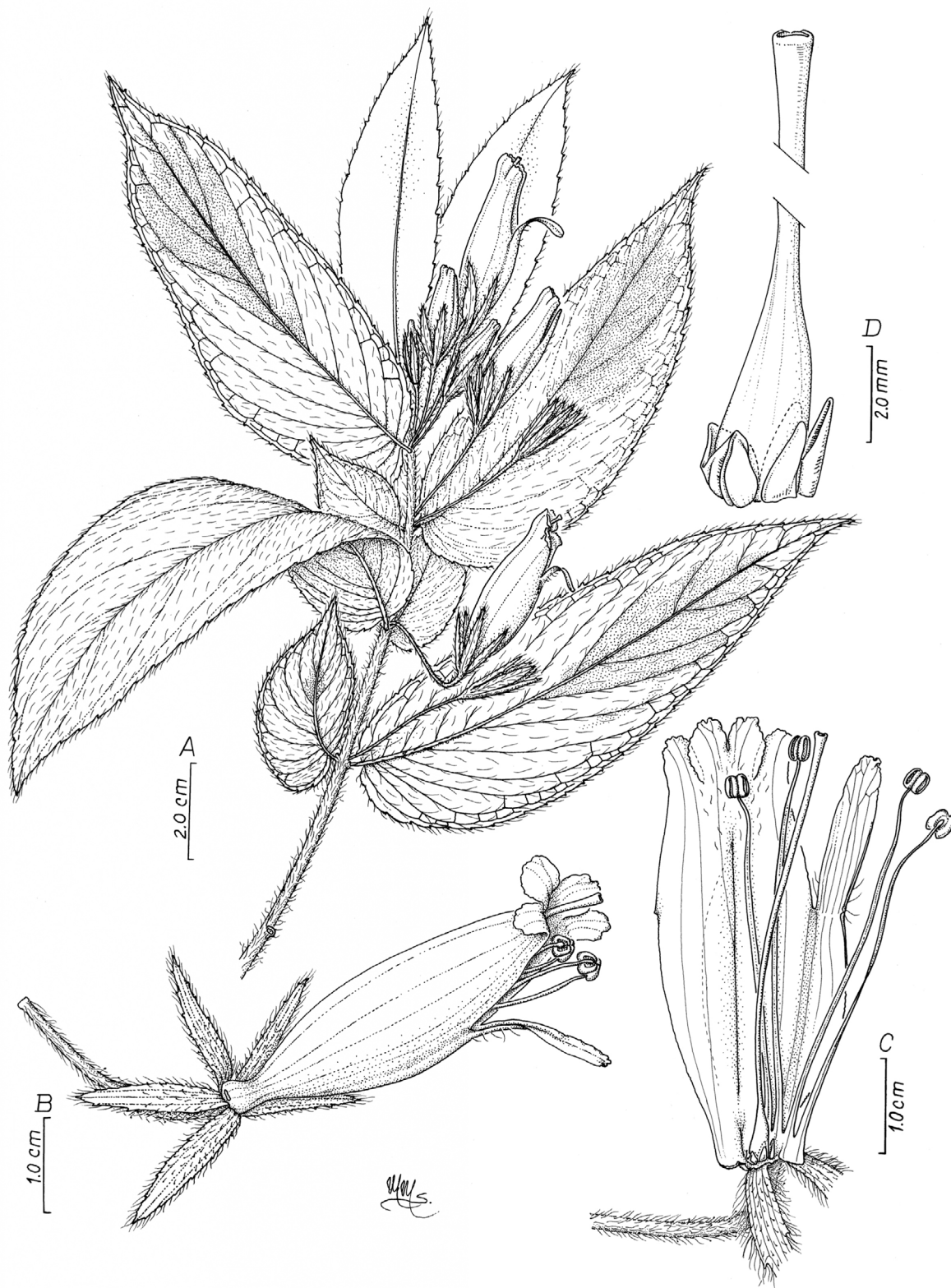


Figure 1. *Columnnea cogolloi*. **A.** Habit. **B.** Flower, lateral view showing the bilabiate corolla-limb. **C.** Corolla dissected showing internal indument, nectar guides, androecium, and gynoecium. **D.** Detail of pistil and nectary. (A–D from Pérez J. A. & N. Parra 1433 MEDEL). Illustration by Marcela Morales.



Figure 2. *Columnnea ianthina*. **A.** Habit. **B.** Detail of the indumentum on the abaxial side of the larger leaf. **C.** Flower. **D.** Corolla dissected to show the androecium. **E.** Pistil and nectary. (A–E from holotype, Franco, P., Londoño, E. & Rangel, O. 2751 (COL)). Illustration by Marcela Morales.

Description. Woody climber. Stem terete, 0.5–1 cm diam., epidermis reddish, distally densely pilose (reddish uniseriate 7–9-celled trichomes), basally ebony bark; internodes 1–5 cm long. Leaves opposite, anisophyllous in a pair, membranous to papyraceous; larger leaf petiolate, petiole 1–2 cm long, reddish pilose (7–11-celled trichomes); blade slightly asymmetrical; oblong to narrow oblong, 8.5–13.2 × 3.2–4.1 cm, base asymmetrical, longer side rounded and shorter side acute, apex attenuate, margin serrate, irregularly spaced; green adaxially, sparsely pilose (4–6-celled uniseriate trichomes), 5–6 veins on the larger side of the blade, venation semicraspedodromous, tertiary veins at the margin ending in a glandular teeth; smaller leaf shortly petiolate, petioles 0.4–0.7 cm; ovate to lanceolate, 2–5.5 × 0.9–2.2 cm. Inflorescence fasciculate, with 2 flowers per axil; 2 inconspicuous reduced bracts, 3 × 2 mm, caducous. Flowers shortly pedicellate, pedicel 3–4 mm long, epidermis green reddish, sericeous (5–7-celled trichomes). Calyx green, sepals free, subequal, lanceolate, 0.7–0.8 × 0.2 cm, glabrous adaxially (inside), densely pilose abaxially; margin with subulate teeth, 3 per side. Corolla lilac, pilose outside, 7–11-celled glandular trichomes, glabrous inside; tubular, 2–2.2 cm long, 0.3–0.5 cm at the widest middle part, constricted at the base 0.2 cm; base dorsally gibbous, gibbosity 4 × 3 mm; limb subactinomorphic, 8 mm wide; lobes patent, obtuse, margin erose, equal 2 × 2 mm. Androecium of 4 stamens, didynamous; filaments 1.8–2 cm long, laminar, sparsely pilose with short trichomes along its entire length; at the base connate for 4 mm of their length forming a folded dorsally open blade; anther subquadrate, ca. 1.8 × 1.5 mm. Gynoecium with ovary conical, 6 × 3 mm, densely pilose with long uniseriate 7–11-celled glandular trichomes; style 1.7 cm long, glabrous; stigma bilobed. Nectary formed by 2 connate bidentate glands, 1.4 × 0.9 mm. Fruit a globose berry, 1 × 0.8 cm. Seeds amber, obliquely striated, 1.5 × 0.5 mm.

Distribution and habitat. *Columnnea ianthina* is, as far as known, endemic to Colombia, and known only

from the western slopes of the Cordillera Central, in the Department of Risaralda. The species has been collected in the premontane forests (bp-PM) (Holdridge, 1978) at elevations of 1600 to 1850 m. It is a rare species known only from the three collections cited here. **Phenology.** Flowers recorded in January, February, and April; specimens with immature fruits recorded in May.

Etymology. The specific epithet *ianthina*, meaning violet- or light purple-colored, refers to the pale purple corolla of the species.

Paratypes: COLOMBIA. Risaralda: Pereira, Parque Regional Ucumari, vereda La Pastora, under waterfall Veira, 2450 m, 27 Jul 1989, Galeano, M. P. 167 (COL). Pereira, Parque Regional Natural Ucumari, 04°43'28.3" N, 75°29'27.4" W, 22 Jan. 2005, Murcia, C. 1361 (CUVC).

Columnnea quindiorisardensis M. Amaya, L. Álvarez & Y. Ramos sp. nov. (Fig. 3).

Type. COLOMBIA. Quindío. Municipio de Filandia, Vereda Cruces, Cañón del río Barbas 4°42' N, 75°38' W, 1750–1850m, 19 Jan. 2013, O. H. Marín-Gómez & L. Álvarez 499 (holotype: COL herbarium number: 649347; isotype: HUQ herbarium number: 047365).

Diagnosis. *Columnnea quindiorisardensis* is morphologically similar to *Columnnea sanguinea* (Pers.) Hanst., both species are woody climbers with opposite leaves strongly anisophyllous, the larger leaf in each node has 7–9 secondary veins, and both species present tubular corollas. However, *C. quindiorisardensis* can be differentiated by a pink corollas (vs. yellow), a corolla:calyx length ratio of 4:1 (vs. 1.5–2:1), the red spot on the abaxial side of the leaves has oval shape, apically located, within the three apical veins (Fig. 4), (vs. a larger leaf that present red spots spread along the center of the foliar blade without exhibiting a particular geometric shape).

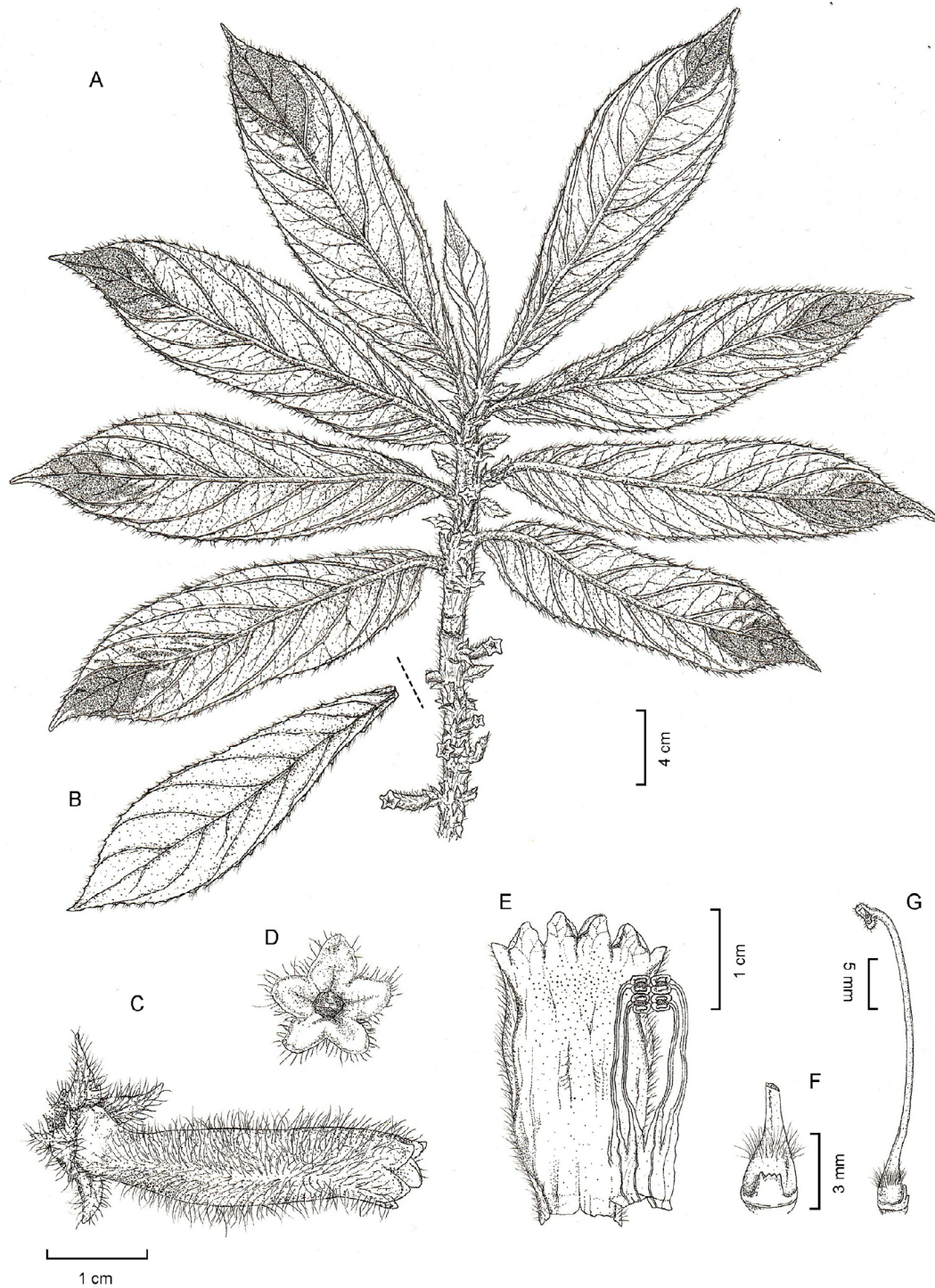


Figure 3. *Columnnea quindiorisardensis* var. *quindiorisardensis*. **A.** Habit, ventral view of dorsiventral shoot. **B.** Leaf showing adaxial surface. **C.** Lateral view of the flower. **D.** Frontal view of the corolla limb. **E.** Corolla dissected to show internal surface and indument, and the androecium. **F.** Ovary showing apical indument and nectary reduced to a dorsal gland. **G.** Pistil (A–G From Arbelaez et al.1126 (HUQ)). Illustration: Naren Mauricio Téllez Carretero.

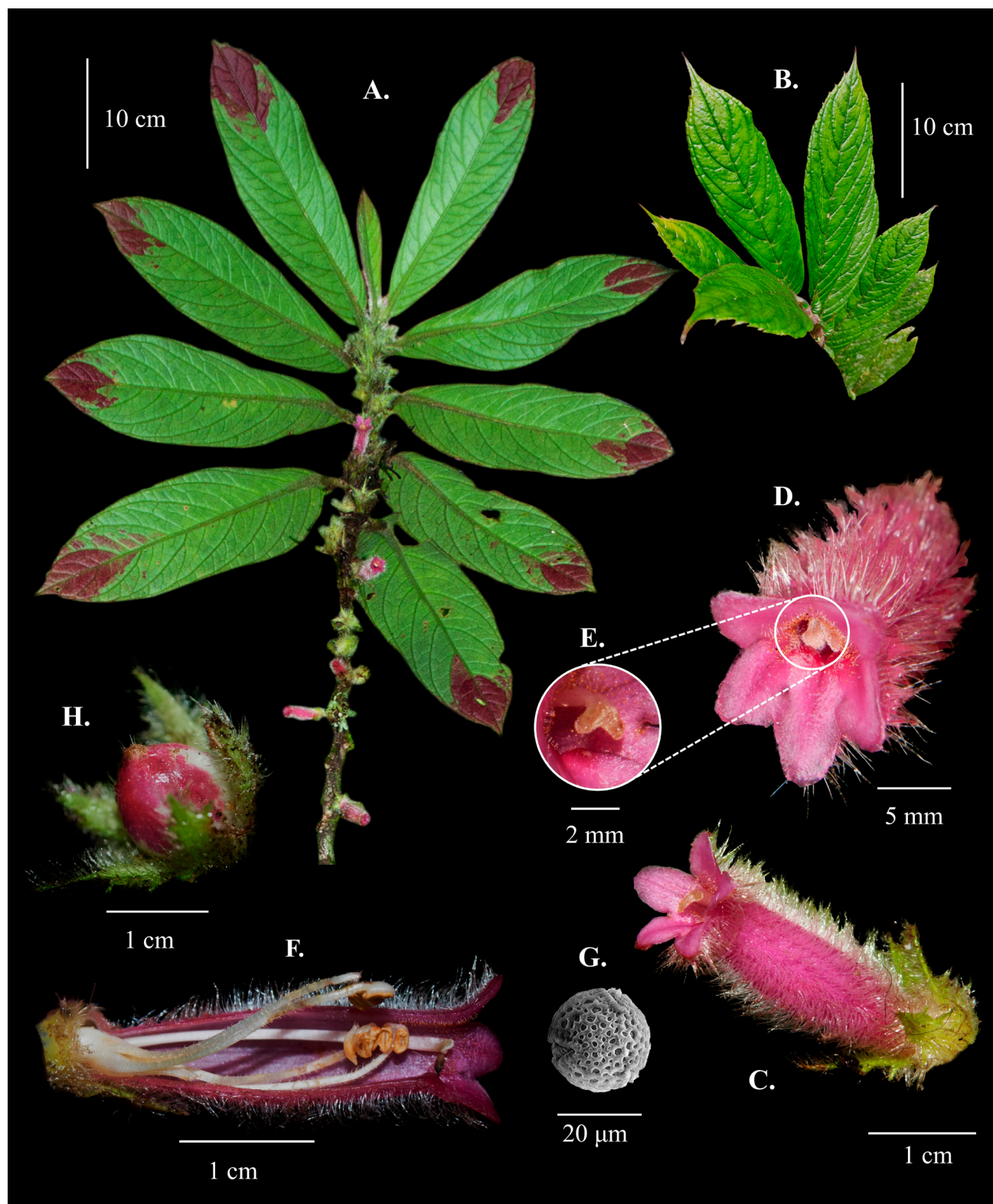


Figure 4. *Columnea quindiorisardensis* - var. *quindiorisardensis*. **A.** Habit. Abaxial view of the dorsiventral shoot showing vegetative and reproductive structures. **B.** Adaxial view of dorsiventral shoot. **C.** Flower showing the pink corolla and the green calyx characteristic of the typical variety **D.** Corolla limb showing the subactinomorphic symmetry. **E.** Detail of the mature stigma inserted in the corolla tube. **F.** Corolla longitudinally dissected to show the androecium and pistil. **G.** Pollen-grain showing the reticulate sculpture and part of one of the colpi (SEM photo). Figure elaborated by: Y. Ramos. Photos by: L. Álvarez and O. H. Marín.

Description. Woody climber. Stem terete, 0.5–1.2 cm diam., with reddish hirsute indument., apically, older parts with light brown bark; internodes 1.5–7 cm long. Leaves opposite, strongly anisophyllous in a pair, papyraceous to chartaceous; larger leaf petiolate, petiole 1–2 cm long, hirsute (7–7–11 -celled uniseriate trichomes); blade asymmetrical, oblanceolate to narrow oblong, 12.5–26 × 3.8–6.4 cm, base oblique, apex acuminate, margin dentate and ciliate, green and sparsely hirsute (7–11-celled uniseriate trichomes) abaxially green with contrasting deep purple at the apical fifth, hirsute, denser on the veins, 7–9 veins on the larger side of the blade; smaller leaf stipule-like, subsessile, narrow ovate to lanceolate, 1.5–2.5 × 0.4–1.1 cm. Inflorescence fasciculate with 1–3 flower(s) per axil; 2–5 bracts unequal in size, ovate to narrow ovate, 0.5–1.5 × 0.3–0.7 cm, green, densely hirsute, caducous. Flowers shortly pedicellate, pedicel 3–4 mm long, epidermis dark green to brown, hirsute. Calyx green, sepals free, unequal, lanceolate, 0.9–1.6 × 0.3 cm, densely hirsute adaxially with white uniseriate 7–10-celled trichomes, hirsute abaxially with 10-celled trichomes; margin laciniate with 3 segments per side. Corolla pink, hirsute outside, with white uniseriate trichomes, basally, inside glabrescent, glandular indument located apically under the corolla lobes; tube sigmoid, 3–3.6 cm long, 0.8 cm at the widest apical part, constricted at the base 0.4 cm, and below the limb 6 mm; base dorsally gibbous, gibbosity ca. 6 × 5 mm; limb subactinomorphic, ca. 0.9 cm wide; lobes patent, obtuse, margin entire, equal in size, ca. 5 × 5 mm. Androecium of 4 stamens, didynamous; filament 2.2–2.7 cm long, at the base connate for 5 mm of their length forming a folded dorsally open blade; anther dorsally subquadrate ca. 2.5 × 2.3 mm. Gynoecium with ovary conical, ca. 3.5 × 2.5 mm, apically pubescent; style 2.5–2.8 cm long, pubescent; stigma bilobed. Nectary formed by one tetradentate gland, ca. 1.4 × 2 mm. Fruit a fuchsia ovoid berry, 1.1 × 1.3 cm. Seeds dark brown, 1 mm long, obliquely striated.

Distribution and habitat. *Columnnea quindiorisaraldensis* is, as far as known, endemic to Colombia and known only from the Cordillera Central, in the Departments of Caldas, Quindío, and Risaralda. This species has been collected in the premontane wet forests (bh-PM) (Holdridge, 1978), found at elevations of 1500–2400 m. It is a rare species that grows in the interior of the forest, where their flowers are commonly visited by hummingbirds, including the Green

hermit (*Phaethornis guy* R. Lesson, 1833) and the Bronzy inca (*Coeligena coeligena* R. Lesson, 1833).

Phenology. Flowers recorded throughout the year.

Etymology. The specific epithet is a compound formed from the names of two of the three Colombian departments where the species is known to occur, Quindío and Risaralda. It was chosen to emphasize the species' geographic distribution in this region of the Central Andes.

Paratypes. COLOMBIA: Caldas: Manizales, km 12 via Magdalena, reserva torre IV, road toward the waterfalls, 2400 m, 11 Nov. 2008, Sanín D. 2649 (COL). Manizales, Monte León Cordillera Central, 2250 m, 28 Apr. 1984, Fraume M. et al. 169 (US). Manizales, Monte León Cordillera Central, 3 Nov. 1984, Fraume M. et al. 303 (US). **Quindío:** Calarcá, cerro de Peñas Blancas, 2230 m, 25 Sep. 1983, Arbelaez G. et al. 22 (HUQ). Circasia, reserva forestal Bremen, 1915 m, 8 Sep. 1985, Arbelaez G. et al. 1126. Filandia, vereda el Roble, forest of the Botanical Garden, 2000 m, 22 Sep 1988, Arbelaez G. et al. 2747 (HUQ, US). Filandia, granja Bengala, 1935 m, 21 Sep. 2010, Yuda A. Z. & F. Henao 36 (HUQ). Filandia, vereda Cruces, cañón del río Barbas, 04°42' N, 75°38' W, 1750–1850 m, 19 Jan. 2013, Marín-Gómez O-H. & L. Álvarez 498 (HUQ, COL). Génova, Alto de las Guacas, carretera río Rojo Alto, 2210 m, 7 Mar. 1989, Arbelaez G. et al. 2812 (HUQ, COL). Salento, vereda el Roble, camino que conduce a Morro Azul, 2040 m, 5 May 1985, Arbelaez G. et al. 866 (HUQ). Salento, bosque frente al molino, 2200 m, 9 May. 1997, Vargas W. 3815 (HUQ). Salento, vereda el Agrado, finca Alto Bonito, 1860 m, 12 Aug. 2003, Viveros P. et al. 519 (HUQ). La Gironda, 1750 m, 21 Jul. 1996, Vargas W. 3250 (HUQ, COL). **Risaralda:** Marsella, corregimiento la Nona, convención, reserve la Nona, 1700–2000 m, 17 Mar 1999, Vargas W. 5499 (COL). Santuario, vereda la Esmeralda, basin of creek la Esmeralda. 1750 m, Apr. 1998, Amaya M. & J. F. Smith 526 (COL, US). Regional Natural Park Ucumari. refugio la Suisa, 2365 m, 31 Oct. 1992, Otero J. T. 281 (CUCV).

Columnnea quindiorisaraldensis M. Amaya, L. Álvarez & Y. Ramos var. ***porphyrocalycina*** M. Amaya (Fig. 5).

Type. COLOMBIA. Quindío: municipio de Filandia, vereda Cruces, cañón del río Barbas. 4°67' N, 75°62' W, 1800 m, 16 Apr. 2011, L. Álvarez Rodas & O. H. Marín-Gómez 197 (holotype: HUQ herbarium number: 037088).

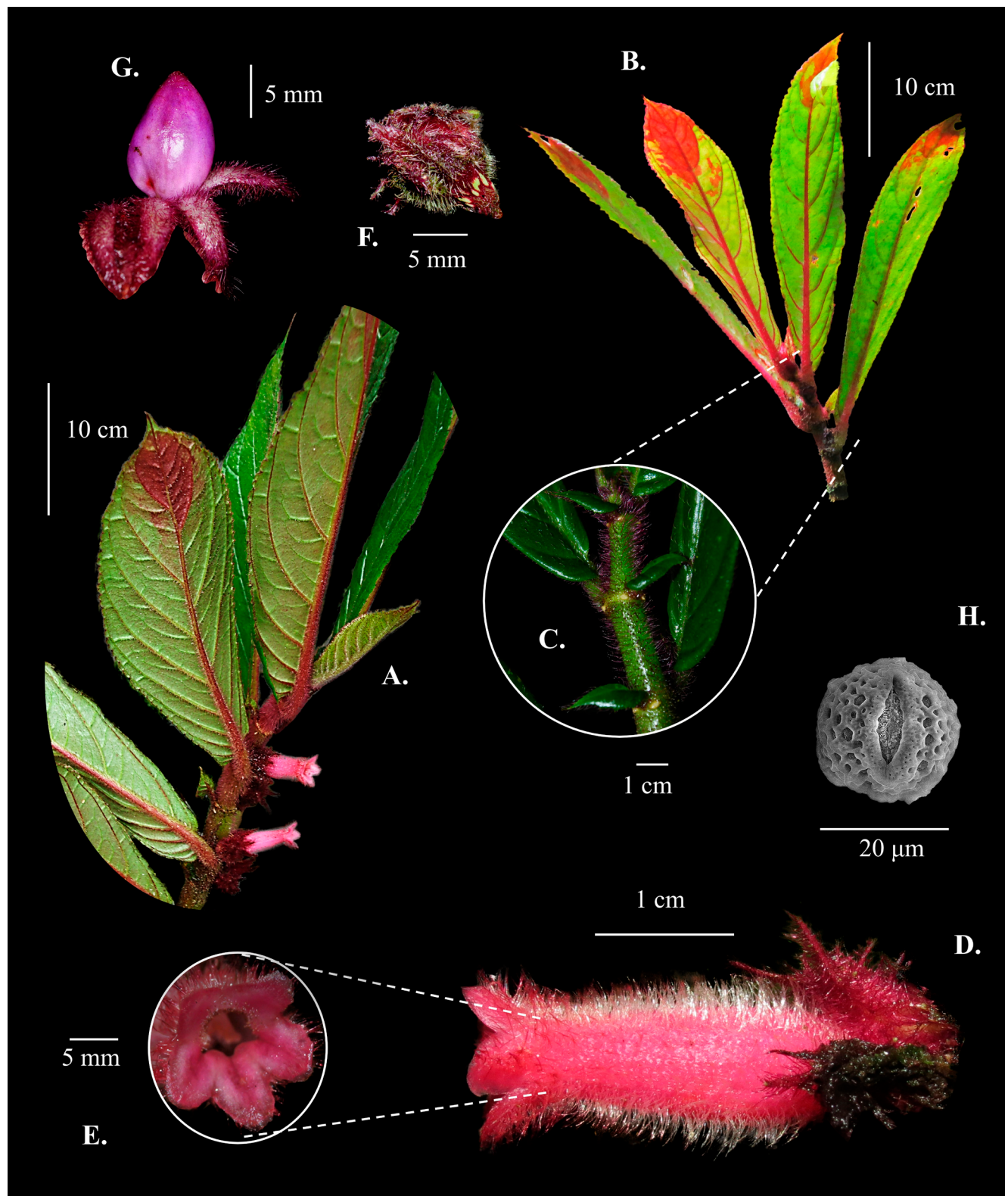


Figure 5. *Columnnea quindiorisardensis* var. *porphyrocalycina*. **A.** Habit: Lateral view showing vegetative and reproductive shoots. **B.** Lateral view of dorsi-ventral shoot showing contrasting colors between green leaf's blade and apical red spots and red main vein. **C.** Stem showing leaves strongly anisophyllous at the node. **D.** Flower. **E.** Corolla's limb. **F.** Calyx showing deep purple color, characteristic of this taxonomic variety. **G.** Fruit. **H.** Pollen grain showing the reticulate exine and colpi in equatorial view (SEM photo). Figure elaborated by Y. Ramos, Photos by L. Álvarez and O. H. Marín.

Table 1. Comparison of pollen traits between *Columnnea quindiorisardensis* var. *porphyrocalycina* and *C. quindiorisardensis* var. *quindiorisardensis*. Note: the (*) indicates statistically significant differences between the two varieties.

Taxonomic species variety	<i>Columnnea quindiorisardensis</i> - var. <i>quindiorisardensis</i> .	<i>Columnnea quindiorisardensis</i> var. <i>porphyrocalycina</i> -
Character	Monad	Monad
Size	Median*	Small*
Polar Axis (PA)	26,12 $\mu\text{m} \pm 0,31$ (25,47 – 26,77)	23,41 $\mu\text{m} \pm 0,40$ (22,56 – 24,26)
Equatorial Axis length (EA)	24,65 $\mu\text{m} \pm 0,16$ (24,27 – 25,02),	23,74 $\mu\text{m} \pm 0,36$ (23,03 – 24,46)
Equatorial Diameter (ED)	22,28 $\mu\text{m} \pm 0,33$ (21,64 – 22,92)	23,16 $\mu\text{m} \pm 0,45$ (22,16 – 24,15)
Polarity	Isopolar	Isopolar
Amb.	Subcircular	Subcircular
Shape	Prolate spheroidal*	Oblate spheroidal*
Axis ratio (P/E)	1.05	0.98
Polar Area Index	0.80 μm^2 *	0.60 μm^2 *
Aperture type	Colpate	Colpate
Apertures	Tricolpate	Tricolpate
Margo	Present	Present
Exine	Reticulate	Reticulate
Brochi type	Heterobrochate	Heterobrochate
Lumina per 25 μm^2	≈ 4	≈ 6

Diagnosis. *Columnnea quindiorisardensis* var. *porphyrocalycina* differs from the typical variety by having deep purple calyx (vs. pale green), pollen grain prolate, polar area 80 μm^2 , and exine with smaller number of lumina per area (vs. pollen oblate, polar area of 60 μm^2 , and exine with greater number of lumina per area). Plants of the variety *porphyrocalycina* growth as terrestrial in contrast with the typical variety *quindiorisardensis* which is a liana (Fig. 5, Table 1).

Distribution and habitat. *Columnnea quindiorisardensis* var. *porphyrocalycina* has a restricted distribution in the Department of Quindío, in premontane wet forests (bp-PM) (Holdridge, 1978) at elevations of 1600–1850 m. This species grows in forest margins where it is exposed to more solar radiation. Flowers are visited by the Bronzy Inca (*C. coeligena*).

Phenology. Flowers recorded throughout the year.

Etymology. Named for the deep purple calyx characteristic of this variety.

Additional specimens examined (paratypes).

COLOMBIA: Quindío: Circasia, urbanización la Aladea, 1600 m, 20 Sep. 1994, Vélez M. C. et al. 4418 (HUQ). Circasia, vereda los Pinos, finca Villa Ligia, 1765 m, 28 Dec. 1989, Vélez M. C. et al. 909 (HUQ). Circasia, sector Bremen, 1925 m, 7 Sep. 1985, Arbelaez G. et al. 1140 (HUQ). Circasia, monte reserva forestal de Bremen, 1960 m, 1 Nov. 1980, Arbelaez G. et al. s.n. (HUQ). Circasia, vereda la Pola, finca las Alegrías, 1700 m, 9 May 1997, Vélez C. et al. 5222 (HUQ). Filandia, vereda el Paraíso, finca la Edelia, 1445 m, 30 Nov. 2009, Agudelo C. A. et al. 6134 (HUQ). Filandia, vereda la Julia, carretera Filandia- la India, 1600 m, 3 Feb. 1995, Vélez M. C. et al. 4825 (HUQ). Filandia, vereda Lusitania, 1954 m, 2 Apr. 2004, Viveros P. et al. 665 (HUQ). Filandia, 1800 m, 16 Apr. 2011, Álvarez Rodas L. & O. H. Marín 196 (HUQ). Filandia, 1800 m, 16 Apr.

2011, Álvarez Rodas L. & Y. Ramos 178 (HUQ). Filandia, vereda la Julia, finca Villa Neyla, 1700 m, 12 Sep. 2008, López A. L. et al. 247 (HUQ). Filandia, corredor biológico de los Monos Aulladores, 1950 m, 13 Sep. 2014, Ramos Y. 2 (HUQ). Filandia, corredor biológico de los Monos Aulladores, 1950 m, 13 Sep. 2014, Ramos Y. 6 (HUQ). Filandia, Bremen, bosque jardín botánico, 1950 m, 18 Nov. 1999, Macías D. et al. 1364 (HUQ). Filandia, bosque aledaño a la granja Bengala, 2033 m, 12 Aug. 2009, Maya L. 61 (HUQ). Filandia, vereda los Tanques, finca el Guayabo, 1660 m, 15 Nov. 2009, Maya L. et al. 343 (HUQ). Pereira, 2 km ahead of finca la Suiza, camino a Salento, 2150 m, 15 Oct. 1989, Agudelo C. A. & M. C. Vélez 280 (HUQ). Pereira, vereda las Delicias, 1970 m, 11 May. 1990, Vélez M. C. et al. 1658 (HUQ). Pijao, vereda la Mina, 1600 m, 7 Mar. 2007, Rodas L. A. & O. H. Marín 213 (HUQ). Salento, vereda la Playa, finca el Cairo, interior del bosque, 1950–2010 m, 2 Apr. 1995, Macías D. et al. 267 (HUQ). Bremen, 15 km N of Armenia, 04°35' N 75°45' W, 1950 m, 29 Jan. 1989, Gentry A. et al. 65310 (HUQ).

The typical variety of *Columnea quindiorisardensis* is a rare species that grows in the interior of well-preserved forests while *C. quindiorisardensis* var. *porphyrocalycina* is relatively common in secondary montane forests, mainly in the forest borders between native and planted pine forests. The two varieties can be easily distinguished based on calyx color and pollen characteristics. (Figs. 4–5 and Table 1). Future studies could indicate whether the calyx-corolla color combination affects pollinator assemblages, choice, and efficiency. Further, the identification of the genes responsible for the morphological variation between the phenotypes of the two varieties described here will be useful to understand the ecology and the evolution of these two varieties specifically, and the genus *Columnea* (Gesneriaceae) in general.

DISCUSSION

Here, we describe three new species of *Columnea*, all with narrow endemic geographic distributions. This finding supports a pattern observed in several genera of Gesneriaceae, in which most species have restricted distributions and only a few are widespread (Kvist & Skog, 1993). The new climbing species reported here enrich the knowledge of the flora of Colombia and highlight the importance of the vascular epiphytes, which according to

Taylor et al., (2022) account for approximately 39% of flora plant biodiversity in the Neotropics.

Species of *Columnea* have evolved specialized floral and vegetative traits associated with hummingbird pollination. During field observations, we observed the Green Hermit (*P. guy*) and the Bronzy Inca (*C. coeligena*) visiting the flowers of the two varieties of *C. quindiorisardensis*, supporting the ecological interactions between *Columnea* and Trochilidae hummingbirds. Colombia harbors the highest species richness of both Gesneriaceae and hummingbirds worldwide, in the world suggesting coevolution between these groups.

By naming and describing these new species, we aim to contribute to the conservation of the flora in the Andean forest and the páramo forests. Recognizing and documenting species diversity is a fundamental step toward protecting the biodiversity and ecological interactions associated with *Columnea*–hummingbird systems, as well as the ecosystem services derived from these interactions. Effective conservation will depend on protecting large areas of suitable habitat and maintaining healthy populations of phorophyte trees, which provide structural support for epiphytic plants and their vertebrate pollinators. As noted by Taylor et al. (2022), conserving epiphytic flora helps preserve important centers of plant biodiversity.

AUTHOR CONTRIBUTIONS

LAR, OHMG, YRA carried out field work, sampling, entry of specimens to collections and primary identification of *Columnea quindiorisardensis*; MAM participated in the identification of the species, made the descriptions, outlined the discussion, and drafted the manuscript; YRA elaborated the Lankester images; MAM, LAR, OHMG, YRA participated in writing the final version of the manuscript, designing, revising, and correcting the document.

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LITERATURE CITED

- Amaya-Márquez M. (2014). *Columnnea figueroae*, a new species of Gesneriaceae from Las Orquídeas Natural National Park (Antioquia, Colombia). *Caldasia*, 36(2), 261–268. <https://doi.org/10.15446/caldasia.v36n2.47485>
- Amaya-Márquez, M. & Marín-Gómez, O. H. (2012). *Columnnea rangelii* (Gesneriaceae), a new species from the Serranía de los Paraguas in the Colombian Andes. *Caldasia*, 34(1), 69–74. <https://revistas.unal.edu.co/index.php/cal/article/view/36427>
- Amaya-Márquez, M. & Smith, J. F. (2013). *Columnnea corralesii*, a new species of Gesneriaceae from Colombia. *Revista de la Academia Colombiana de Ciencias Exactas, Físicas y Naturales*, 32(144), 307–310. <https://doi.org/10.18257/raccefyn.11>
- Amaya-Márquez, M., Skog, L. E. & Kvist, L. P. (2013). *Columnnea caudata* and *Columnnea megafolia*, two new species of Gesneriaceae. *Caldasia*, 35(2), 273–280. <https://revistas.unal.edu.co/index.php/cal/article/view/41197>
- Clark, J. L. & Clavijo, L. (2012). *Columnnea antennifera*, a new species of Gesneriaceae from the Cordillera Central of the Colombian Andes. *Journal of the Botanical Research Institute of Texas*, 6(2), 385–389. <https://www.jstor.org/stable/41972426>
- Clark, J. L., Funke, M. M., Duffy, A. M. & Smith, J. F. (2012). Phylogeny of a Neotropical Clade in the Gesneriaceae: More Tales of Convergent Evolution. *International Journal of Plant Sciences*, 173(8), 894–916. <https://doi.org/10.1086/667229>
- Clark, J. L., Skog, L., Boggan, J.K. & Ginzburg, S. (2020). Index to names of New World members of the Gesneriaceae (Subfamilies Sanangoideae and Gesnerioideae). *Rheedeia*, 30(1), 190–256. <https://doi.org/10.22244/rheedeia.2020.30.01.14>
- Clark, J. L., Tobar, F., Clavijo, L., Perret, M., & Graham, C. H. (2021). Three new species of *Columnnea* (Gesneriaceae) from the western Andean slopes of Ecuador and Colombia. *PhytoKeys*, 182, 67–82. <https://doi.org/10.3897/phytokeys.182.69016>
- Clavijo, L. (2005). Las gesneriáceas de los departamentos de Boyacá y Cundinamarca. Cordillera Oriental Colombiana. *Acta Biológica Colombiana*, 10(2), 200–201. <https://revistas.unal.edu.co/index.php/actabiol/article/view/27444>
- Erdtman, G. (1986). *Pollen Morphology and Plant Taxonomy*. Brill Publishing. https://doi.org/10.1163/9789004612150_001
- Faegri, K. & Iversen, J. (1975). *Textbook of Pollen Analysis* (Third edition). Munksgaard.
- Halbritter, H., Ullrich, S., Grímsson, F., Weber, M., Zetter, R., Hesse, M., Buchner, R., Svotjka, M. & Frosch-Radivo, A. (2018). *Illustrated Pollen terminology*. Springer Publishing. <https://doi.org/10.1007/978-3-319-71365-6>
- Holdridge, L. R. (1978). *Life Zone Ecology*. Tropical Science Center.
- Imperatriz-Fonseca, V. L., Groppo, M., Bauermann, S. G., Saravia, A. M., Queiroz, E. P., Evaldt, A. C. P., Aleixo, K. P., Castro, J. P., Castro, M. M. N., Faria, L. B., Caliman, M. J. F., Wolff, J. L., Paulino Neto, H. F. & Garófalo, C. A. (2014). *Catálogo polínico das plantas usadas por abelhas no campus da USP de Ribeirão Preto*. Holos, editora.
- Kvist, L. P. & Skog, L. E. (1993). The genus *Columnnea* (Gesneriaceae) in Ecuador. *Allertonia* 6, 327–400. <https://www.jstor.org/stable/23188176>
- Kvist, L. P., Skog, L. E. y Amaya-Márquez, M. (1998). Los géneros de gesneriáceas de Colombia. *Caldasia*, 20(1), 12–28. <https://revistas.unal.edu.co/index.php/cal/article/view/17467>
- Möller, M. & Clark, J. L. (2013). The state of molecular studies in the family Gesneriaceae: a review. *Selbyana* 31, 95–125. <https://www.jstor.org/stable/24894284>
- Smith, J. F. (1994). Systematics of *Columnnea* section *Pentadenia* and section *Stygnanthe* (Gesneriaceae). *Systematic Botany Monographs*, 44, 1–88. <https://doi.org/10.2307/25027846>
- Smith, J. F. (2000). Phylogenetic resolution within the tribe Episcieae (Gesneriaceae): congruence of ITS and *ndhF* sequences from parsimony and maximum likelihood analysis. *American Journal of Botany*, 87(6), 883–897. <https://doi.org/10.2307/2656896>
- Smith, J. F. & Carroll, C. L. (1997). A cladistics analysis of the tribe Episcieae (Gesneriaceae) based on *ndhF* sequences: origin of morphological characters. *Systematic Botany*, 22(4), 713–724. <https://doi.org/10.2307/2419437>
- Smith, J. F., Ooi, M. T., Schulte, L., Amaya-Márquez, M., Pritchard, R. & Clark, J. L. (2013a). Searching for Monophyly in the Subgeneric Classification Systems of *Columnnea* (Gesneriaceae). *Selbyana* 3(2), 126–142. <https://www.jstor.org/stable/24894285>
- Smith, J. F., Amaya-Márquez, M., Marín-Gómez, O. H. & Clark, J. L. (2013b). Four new species of *Columnnea* (Gesneriaceae) with primary distributions in Colombia. *Journal of the Botanical Research Institute of Texas*, 7(2), 667–679. <https://www.jstor.org/stable/24621151>
- Taylor, A., Zotz, G., Weigelt, P., Cai, L., Karger, D. N., König, C. & Kreft, H. (2022). Vascular epiphytes contribute disproportionately to global centers of plant biodiversity. *Global Ecology and Biogeography*, 31, 62–74. doi: <https://doi.org/10.1111/geb.13411>