

***COLUMNEA FIGUEROAE*, A NEW SPECIES OF
GESNERIACEAE FROM LAS ORQUÍDEAS NATIONAL
NATURAL PARK (ANTIOQUIA, COLOMBIA)**

***Columnnea figueroae*, una nueva especie de Gesneriaceae del
Parque Nacional Natural Las Orquídeas (Antioquia, Colombia)**

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ABSTRACT

A new species of *Columnnea* (Gesneriaceae) recently found in a premontane forest in the National Natural Park Las Orquídeas (Cordillera Occidental), in the Department of Antioquia in Colombia, is described and illustrated.

Key words. *Columnnea*, Gesneriaceae, Corolla appendages, Ornithophily, Antioquia, Flora of Colombia.

RESUMEN

Una nueva especie de *Columnnea* (Gesneriaceae) hallada en un bosque premontano en el Parque Nacional Natural Las Orquídeas (Cordillera Occidental), en el departamento de Antioquia, en Colombia es descrita e ilustrada.

Palabras clave. *Columnnea*, Gesneriaceae, Apéndices de la corola, Ornitofilia, Antioquia, Flora de Colombia.

INTRODUCTION

Columnnea is a neotropical genus containing over 205 species (Möller & Clark 2013) that is presumably exclusively pollinated by hummingbird species (Morley 1966, 1971; 1973; Wiehler 1983). As a consequence mutual co-adaptations between these two groups of organisms have emerged (*e.g.* Amaya-Márquez 1996). Traits of *Columnnea* species associated with ornithophilous pollination are: 1) larger leaf with extrafloral marks or red indument that functions as a secondary and lasting attractant for the birds (Jones & Rich 1972; Kastinger & Weber 2000; G. Stiles pers. com.); 2) diurnal nectar production in concentrations between 12-25 % (Amaya-Márquez 1996); 3) tubular corolla that is basally spurred, often sigmoid, the tube slightly inflated, straight or dorsally curved,

less often funnellform, and the limb bilabiate or subactinomorphic, 1 to 7 cm long (values that match most of the range in hummingbirds' bill length); 4) corolla tube color orange, red, or yellow, sometimes with contrasting nectar guides on the limb; 5) calyx and bracts may be of the same color as the corolla, in which case the reproductive structure, as a whole, contrasts with the foliage; and 6) in other cases the calyx and the bracts are colored differently than the corolla, and the final result in both cases is an increase in the visual impact. During recent years, along with discovering new species, new floral traits have been described. In particular, investigations on corolla appendages have broadened our knowledge on the architecture of the flower of *Columnnea* (Amaya-Márquez *et al.* 2004; Clark & Clavijo 2012). In this paper a new species of *Columnnea* recently found in a

premontane forest in the National Natural Park Las Orquídeas ("Cordillera Occidental") is described and illustrated. This species has a corolla limb adorned with four white, geniculate external appendages.

Columnnea figueroae M. Amaya sp. nov.
Figures 1 & 2.

TYPE: Colombia: Antioquia, municipio Urrao, corregimiento La Encarnación, vereda Calles, National Natural Park Las Orquídeas, road between Calles and La Encarnación after the confluence of Río Polo and Río Calle, before Río San Pedro, sitio La Quebra. 1600–1850 m, Jan 31–Feb 2, 2011, *Pedraza-Peñalosa, P. et al.* 2096 (holotype: COL).

Columnnea figueroae differs from *C. paraguensis* by having a red corolla with longitudinal white stripes (vs. homogeneously yellow orange); corolla limb bent downward (vs. corolla limb erect); four white corolla appendages of different size, geniculate (vs. four yellow corolla appendages of same size, not geniculate); nectary one dorsal gland (vs. two dorsal glands); and 12–13 veins on the larger leaf in a pair (vs. 9–10 veins).

Suffrutescent vine, 1.5 m tall. Stem subterete, 0.5 cm in diam., epidermis green, indument reddish pilose (of 8–12-celled trichomes); internodes 1–2 cm long. **Leaves** opposite, strongly anisophyllous in a pair, chartaceous; larger leaf in a pair with petioles 0.6–1 cm long, densely reddish-pilose (7–9-celled trichomes), blade asymmetrical, narrowly oblanceolate to falcate, 19.0–23.5 X 3.9–5.8 cm, base oblique, shorter side acute, larger side rounded, apex acuminate, margin dentate, adaxially green, reddish-pilose (6–12-celled trichomes), abaxially green, reddish-pilose (6–12-celled trichomes) more dense on the veins, 12–13 veins on the larger side of the blade; smaller leaf in a

pair sessile, lanceolate, 1.5 X 0.3 cm, base oblique, apex attenuate, adaxially reddish-pilose (6–12-celled trichomes), abaxially reddish-pilose (6–12-celled trichomes). **Inflorescence** fasciculate, up to 5 flowers and 8 bracts per axil; bracts lanceolate (basally cuneate), unequal, ranging from 1.1 X 0.1 cm to 3.4 X 0.8 cm, adaxially glabrous, abaxially reddish-pilose (5–8-celled trichomes), margin denticulate. **Flower** shortly pedicellate, pedicel 0.3–0.4 mm with white glands near the calyx. **Calyx** apically red, white-pale green at the base; lobes connate basally by 0.1 cm of their length, subequal, lanceolate, 1.8–2.5 X 0.2–0.3 cm, adaxially glabrescent, abaxially reddish-pilose (7–10-celled trichomes), margin dentate with 2–3 subulate teeth per side. **Corolla** red with longitudinal white lines on the exterior surface of the tube, corolla tube slightly curved dorsally, 2.8–3.3 cm long, 0.7 cm wide at the middle, constricted at the base 0.4 cm, base dorsally gibbous, gibbosity 0.3 X 0.5 cm, limb zygomorphic, 0.5 cm wide, lobes bent inward, unequal, the two dorsal lobes obtuse, 3–5 X 3 mm, the three ventral lobes acute, 1.3–1.5 X 1.3–2.3 mm, margin erose; pilose, except on longitudinal stripes that are white and glabrous, inside glabrescent, glandular in the throat; 4 white external reflexed and geniculate appendages outside the lobes, two of the appendages 7–9 mm long, 1 mm wide, pilose (2–5-celled trichomes), two lateral appendages 4 mm long, 1 mm wide. **Androecium** of 4 stamens, filaments glabrous, basally connate by 0.3 cm of their length forming a staminal blade; anthers subquadrate 2.1 X 2.0 mm. **Gynoecium** with ovary conical, 4.0 X 2.5 mm, apically pilose (7–11-celled trichomes), style 2 cm long, glandular (2-celled trichomes) along its length; stigma bilobed. **Nectary** of one dorsal tridentate gland, 2 X 2 mm. **Fruit** an ovoid berry, 1.3 X 1.0 cm. **Seeds** honey colored, obliquely striated, 2.0 X 0.5 mm.

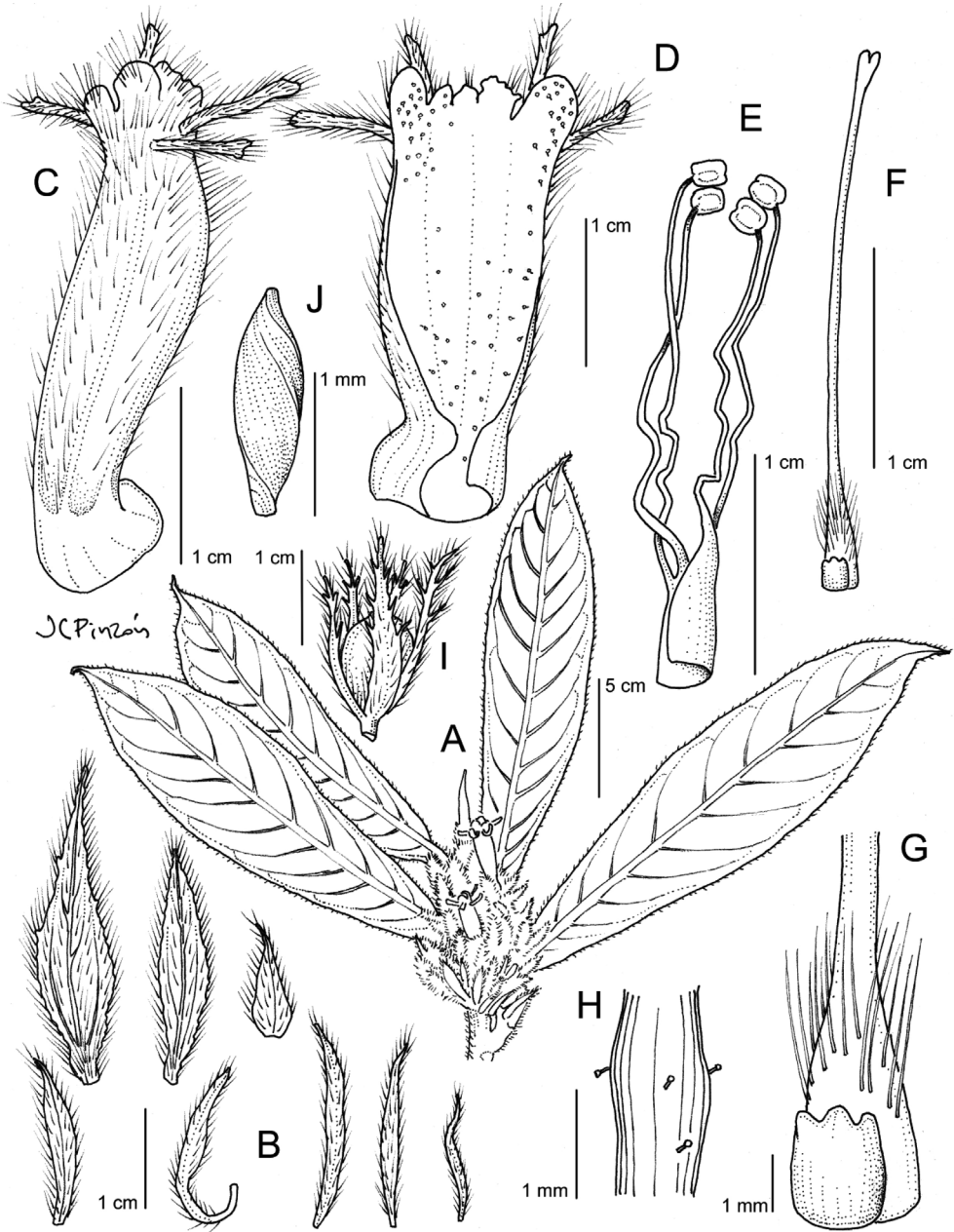


Figure 1. *Columnea figueroae* M. Amaya. **A.** Habit. **B.** Bracts of one inflorescence. **C.** Corolla. **D.** Detail of corolla interior showing the distribution of glandular trichomes. **E.** Androecium. **F.** Gynoecium and nectary. **G.** Detail of the ovary and nectary. **H.** Detail of the style with two-celled glandular trichomes. **I.** Calyx and fruit. **J.** Seed.



Figure 2. *Columnnea figueroae* M. Amaya. Dorsiventral shoot in reproductive stage. The inflorescences are congested with eight colored bracts and five flowers per inflorescence but only one flower matures at a time. The external white and geniculate corolla appendages, and the vertical white lines along the corolla tube, differentiate the corolla from the rest of reproductive structures (Photo: Julio Betancur).

Etymology. The species is named for my husband, Jorge Luis Figueroa, to whom this species is dedicated as an expression of love and admiration for him, and also in acknowledgment of his great value as a person who is kind, compassionate, responsible, very intelligent, and who seeks to help those around him as much as is possible. He has given me invaluable support through the entirety of my career.

Phenology: Flowers and fruits have been recorded on the holotype specimen collected between January and February of 2011.

Distribution: A rare species collected in a premontane wet forest in the Cordillera Occidental of Colombia in the department of Antioquia at an elevation between 1600-1850 m. The species can be considered vulnerable because it is known from only one locality in a relic of a premontane forest surrounded by disturbed vegetation. The relic is probably in good shape because it is found on steep terrain of difficult access. The species has not been collected before despite the fact that several botanists have visited the region over many years. According to the IUCN these two criteria will place the species in the category of endangered, however in this paper the species is considered in the category of vulnerable due to two factors: (1) around the area where the species was collected the natural habitat was disturbed, but the locality is found within the limits of a National Natural Park, therefore there is hope that the deforestation does not advance; (2) due to the fact that the vegetative shoot of the species looks similar to the specimens of the complex of species *C.sanguinea/C.purpurata*, it might happen that the species is not rare, but that it has been collected before in a sterile phase, and the specimens might be misplaced in the herbaria. If the last were the case then the population of *C. figueroa* might be in good shape in other well conserved places of the National Natural Park “Las Orquídeas”. Thus, further

investigation on the status of this species is required.

Representative specimens: COLOMBIA: The species is known only from the holotype.

Distinctive characters

Columnea figueroae has a dorsiventral shoot, the leaves are chartaceous, adaxially green and abaxially pale green with a reddish indument throughout the blade. The red bracts from different leaf axils overlap forming a structure that contrast with the rest of the plant. The corolla is red with white longitudinal stripes, tubular with the limb bent downward, and it has 4 white geniculate appendages (Figure 2).

Classification

The four external appendages in the corolla of *C. figueroae* are similar to those found in some species of section *Ortholoma* Benth. However, *C. figueroae* and *C. paraguensis* – a recently described species (Amaya-Márquez & Smith 2012) – are unique within the genus *Columnea* by having a mix of traits typical of section *Ortholoma* (*i.e.*, external corolla appendages) and of section *Collandra* (Lem.) Benth. (*i.e.*, vegetative dorsiventral shoots with short internodes). In the description of *C. paraguensis* the species was considered unique within the genus due to this combination of traits. In fact, a sterile specimen of *C. paraguensis* can be confused with a specimen of *C. fuscihirta* (sect. *Collandra*). The same situation occurs with *C. figueroae* where the vegetative shoots without flowers can be confused with specimens of the *Columnea sanguinea/Columnea purpurata* complex. However, *C. figueroae* when seen with flowers is a unique species, distinct from any other species of *Columnea* known so far; the four external appendages, homogeneously white, long, and geniculate give the corolla an impressive visual impact (Figure 2).

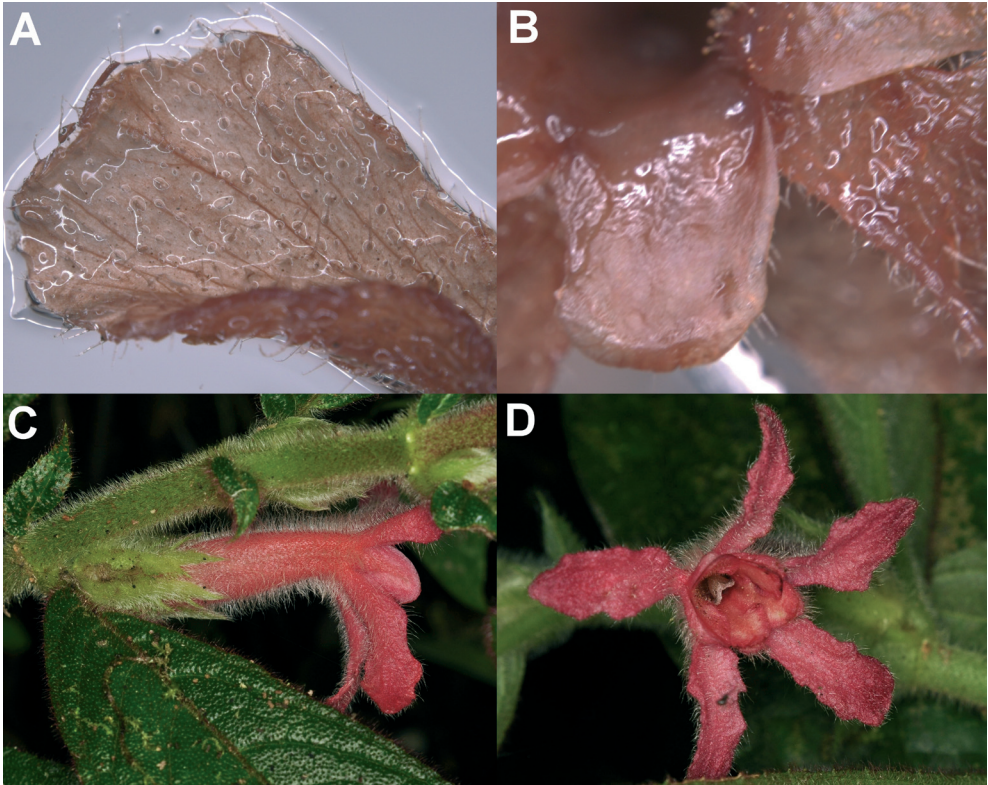


Figure 3. *Columnnea coronata* M. Amaya, L.E. Skog & L. P. Kvist. **A.** Detail of a laminar (petaloid) external appendage (Photo: Marisol Amaya Márquez). **B.** Insertion of the laminar appendage outside the corolla, in a position under the corolla limb and located between two corolla lobes (Photo: Marisol Amaya Márquez). **C.** Lateral view of a flower showing the external corolla appendages (Photo: Oscar Humberto Marín Gómez). **D.** Corolla limb zygomorphic, the corolla lobes resemble a corona, while the external appendages resemble the corolla lobes (Photo: Oscar Humberto Marín Gómez).

There are other species of section *Collandra* that also have appendages in the corolla, for example *Columnnea coronata*. In *C. coronata* there are five external appendages, laminar, and set in whorls that resemble the corolla limb, while the real corolla limb is in an inner position resembling a corona (Figure 3). In fact, this corolla limb was interpreted as a corona by Amaya-Márquez *et al.* (2004), based on the continuity of the petal veins in the appendages. However, additional morphological observations of live *C. coronata* flowers have shown that the external

appendages are located under the corolla limb, at the sinuses of the corolla (Figures 3A, 3B). The position of these appendages is equivalent to those found in some species of section *Ortholoma*, as is the case for *Columnnea minor*. Additionally, there are other species in section *Collandra* for which the corolla lobes are long, free, and filiform (*C. nematoloba*, *C. filifera*, and *C. incredibilis*). In two of these species, *C. filifera* and *C. incredibilis* the corolla appendages are located in front of each corolla lobe (Figure 4).

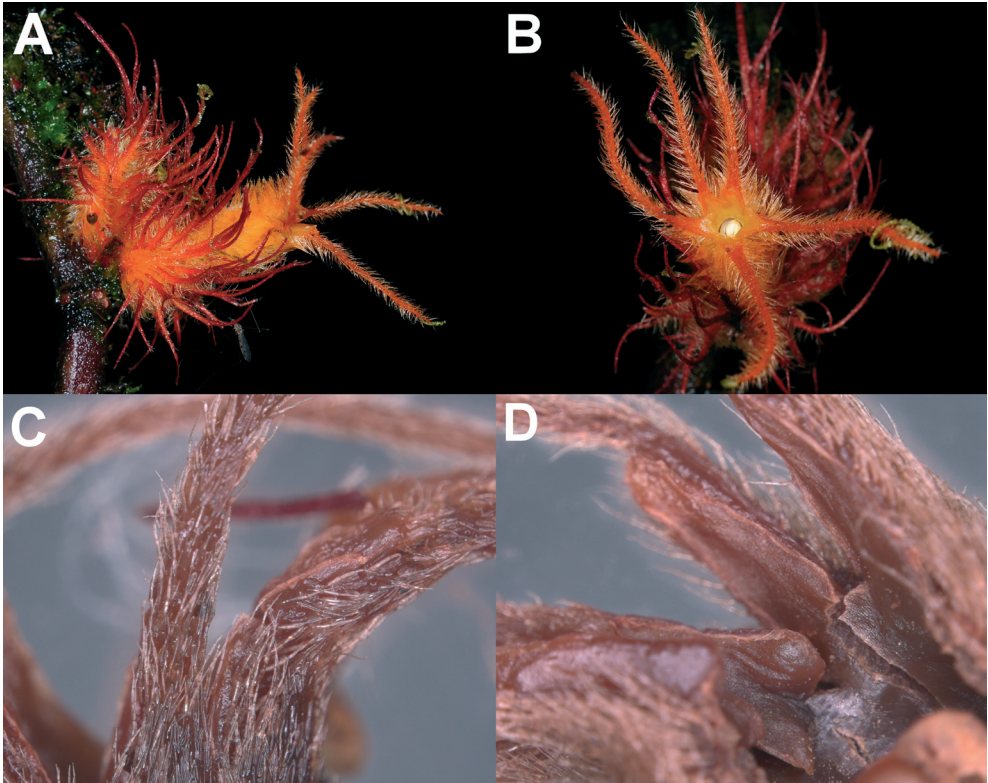


Figure 4. *Columnea incredibilis* L. P. Kvist & L. E. Skog. **A.** Lateral view of a flower showing the calyx and the corolla with the corolla lobes free, long, and filiform (Photo: Oscar Humberto Marín Gómez). **B.** Corolla limb, actinomorphic, the internal outgrowths at the base of each corolla lobe, in a position in front of each corolla lobe (Photo: Oscar Humberto Marín Gómez). **C.** Detail of the corolla limb showing the corolla lobes (Photo: Marisol Amaya Márquez). **D.** Detail of the internal basal outgrowths at the base of each corolla lobe (Photo: Marisol Amaya Márquez).

Here *C. figueroae* is not assigned to any section of *Columnea*. It likely belongs to clade C of the phylogeny obtained by Smith *et al.* (2013) based on the shared morphological traits: corolla shape, stripes along the corolla, leaves oblanceolate, slightly falcate with a dorsiventral arrangement similar to those of section *Collandra*, and the stem and the leaves often with a tawny hispid indumenta. However, the species in Clade C such as *C. brenneri*, have five external appendages, while *C. figueroae* has four. Given the different position, number, shape and texture of the

corolla appendages found within the species of *Columnea*, a detailed study about these structures is needed.

As far as we know, *Columnea* is a genus strictly pollinated by hummingbirds (Morley 1971; Jones & Rich 1972; Wiehler 1983; Amaya-Márquez 1996; Kastinger & Weber 2000). However, floral phenotypes with external appendages on the corolla have not been acknowledged within the syndrome of ornithophily (*e.g.*, Proctor *et al.* 1996).

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