

Drymonia croatii (Gesneriaceae), a new species from the Pacific slopes of the Colombian Andes

LAURA CLAVIJO¹, ALEJANDRO ZULUAGA^{1,2}, AND JOHN L. CLARK^{3,4}

¹ Grupo de Investigación Ecología y Diversidad Vegetal, Universidad del Valle, Cali, Colombia; e-mail: lauriclav@gmail.com

² Departamento de Biología, Facultad de Ciencias, Universidad del Valle, Cali, Colombia

³ Science Department, Lawrenceville School, Lawrenceville, NJ 08648, USA

⁴ Department of Biological Sciences, The University of Alabama, Tuscaloosa, AL 35486, USA

Abstract. *Drymonia croatii*, a new species of Gesneriaceae from the Pacific slopes of the Colombian Andes (department of Valle del Cauca) is described and illustrated. *Drymonia croatii* is similar to *D. ovatifolia* and *D. foliacea*; it is differentiated by the following characters: indument on stem and leaves composed of a combination of simple (septate and non-septate) and glandular hairs; peltate glandular hairs on the abaxial surfaces of leaf blades, inflorescence bracts and calyx; corolla tube white with purple veins outside and a yellow ventral canal inside, basal third of the corolla tube narrow, corolla lobes purple with fimbriate margins; and a fleshy capsule with reflexed valves that are light yellow with brown dots adaxially.

Keywords: Andes, *Drymonia*, Colombia, Columneinae, taxonomy.

Resumen. Se describe e ilustra *Drymonia croatii*, una nueva especie de Gesneriaceae de la vertiente pacífica de los Andes Colombianos (departamento del Valle del Cauca). *Drymonia croatii* es similar a *D. ovatifolia* y *D. foliacea* pero se puede diferenciar por medio de los siguientes caracteres: indumento del tallo y las hojas compuesto de tricomas simples (septados y no septados) y tricomas glandulares; tricomas glandulares peltados sobre las superficies abaxiales de la lámina, las brácteas de la inflorescencia y el cáliz; tubo de la corola blanco con venas moradas por fuera y un canal ventral amarillo por dentro, tercio basal de la corola estrecho, lóbulos de la corola morados fuertemente fimbriados; y cápsula carnosa con dos valvas reflexas amarillas claras con puntos adaxialmente.

Drymonia Mart., with at least 75 species (Möller & Clark, 2013), is the third largest genus of Neotropical Gesneriaceae. The genus is most species rich in Colombia where 38 species are found (Clavijo et al., 2016), mostly in tropical rain forest (bp-T) and premontane rain forest (bp-PM) (Holdridge, 1978) between 200 and 1400 meters elevation. *Drymonia* is characterized by a broad range of foliage shapes, induments, corolla shapes and colors, and fruit types, with growth forms including terrestrial, hemiepiphytic, or epiphytic (facultative or obligate) herbs, subshrubs, shrubs, vines or lianas. Corollas range from campanulate to tubular or hypocyrtoid (i.e., constricted apically with a ventral pouch). Anthers are usually dehiscent by basal pores, which

was long used as a defining character for *Drymonia* (Wiehler, 1983); however, within the genus two clades are represented by reversals to longitudinal dehiscence (Clark et al., 2006, 2015). Fruits range from fleshy bivalved capsules to berries.

The tropical Andes represents one of the most biodiverse regions on the planet with 30,000–35,000 species of vascular plants (Rodríguez-Maccha et al., 2004), of which, more than 15,000 occur in the Colombian Andes (Bernal, 2016). Unfortunately, this region is threatened by mining, deforestation, urban growth, hydroelectric projects, and other human activities (Myers et al., 2000). In recent years, expeditions to poorly explored areas in the Colombian Andes, particularly

on the Pacific slopes, along with the ongoing taxonomic revision of the genus *Drymonia*, have resulted in the discovery and description of several new *Drymonia* species (Clavijo & Clark, 2010, 2012, 2014, 2015a, 2015b), including the species that is described and illustrated here.

Drymonia croatii Clavijo, Zuluaga & J.L. Clark, **sp. nov.** Type: Colombia, Valle del Cauca: municipio Dagua, corregimiento El Queremal, old highway Queremal–Buenaventura, western slopes of the Cordillera Occidental, trail to cascada La Virgen (6.5 km west of Queremal), 3°32'3"N, 76°45'12"W, 1200 m, 11 May 2013 (fl), *J. L. Clark, L. Clavijo & S. Hernández 13352* (holotype: COL; isotypes: CUVC, NY, US). (Fig. 1)

Diagnosis: *Drymonia croatii* differs from *D. ovatifolia* and *D. foliacea* by the presence of simple (septate and non-septate) and glandular hairs on leaves and stems; peltate glandular hairs on the abaxial surfaces of leaf blades, bracts, and calyx; corolla tube white with purple veins outside and with a yellow ventral canal inside, purple corolla lobes with deeply fimbriate margins; and a fleshy capsule with reflexed valves that are light yellow with brown dots adaxially.

Terrestrial herb, up to 80 cm tall. Stem erect, herbaceous, unbranched, sub-quadrangular in cross-section, 4.5–6.5 mm diameter, green to green suffused with purple, papyraceous when dry, glabrescent basally, pilose to villous with long glandular trichomes apically, the trichomes 2.6–4 mm long, unbranched, translucent; internodes 4.8–9 cm long. Leaves opposite, decussate, evenly spaced along the stem, equal to subequal in a pair; petiole 4.5–9.4 cm long, terete in cross-section, with enations at base, pilose, trichomes either simple (septate and non-septate) or glandular; blade elliptic, (7.5–)11.7–30 × (5.3–)8.7–17 cm, membranous, green adaxially, green to purple abaxially, the base cuneate to rounded, oblique, the apex acute to acuminate, the margin serrate, the adaxial surface bearing a combination of simple (septate and non-septate) and glandular trichomes, which are more abundant toward the margin, the abaxial surface with scattered peltate glandular trichomes on both sides of the mid-vein, mid and lateral veins with simple (septate and non-septate) trichomes, the lateral veins 7–11 pairs, higher order venation evident only abaxially. Inflorescence a reduced

pair-flowered axillary cyme, with 4–6 flowers; peduncle absent; inflorescence bracts opposite, lanceolate, (19–)24–35 × 9–14 mm, green, sometimes with purple venation, truncate at base, long-acuminate at apex, entire at margin, abaxial surface with simple hairs and scattered peltate glandular hairs, adaxial surface with few hairs over the midvein; floral bract lanceolate, 11–16 × 1–6 mm, green, sometimes with purple venation, truncate at base, acuminate at apex, abaxial surface with a combination of both simple and peltate glandular trichomes, glabrescent adaxially; pedicel 16–38 mm long, green to light maroon, pilose, few gland-like enations present at apex. Calyx green, persistent in fruit; lobes 5, four nearly equal, free, membranous, lanceolate, truncate at base, long-acuminate at apex, the margin sub-entire with few teeth toward the apex, only midvein visible, sometimes purple apically, the abaxial surface with a combination of simple trichomes and peltate glandular trichomes, which are more abundant on the calyx of mature flowers than in buds or in fruit, the ventral and lateral lobes 18–23(–29 when in fruit) × 4.8–8(–10 when in fruit) mm, the dorsal lobe 12–17(–22 when in fruit) × 2–2.4(–4 when in fruit) mm. Corolla zygomorphic, tubular; basal gibbosity 3.6–4.5 mm long; corolla tube narrow basally, widening towards the apex, oblique relative to calyx, 30–33 mm long, 7.4–11.8 mm wide at the mid portion, the outer surface white with purple veins, the basal two thirds glabrous, the apical third bearing both simple and long glandular hairs dorsally, the inner surface white with faint purple veins and a yellow ventral canal; throat 5–7 mm diameter, white, glandular hairs dorsally on the inner surface; limb 20–23.3 mm in diameter at its widest point, the corolla lobes 5, equal, rotund to oblong, rounded at apex, fimbriate at margin, glabrescent to pilose abaxially, glabrous adaxially, purple abaxially, purple with white margin adaxially, the ventral lobe 8–11 × 9–12 mm, the lateral and upper lobes 7–11 × 6.6–9.3 mm. Androecium of 4 didynamous stamens, the filaments 28–31 mm long, adnate to the corolla tube for 11–15 mm, white, glabrous, coiled after anthesis, the anthers rectangular, coherent at apex, dehiscent by basal pores, 2–3 × 1–2 mm. Gynoecium with a single dorsal nectary gland, the nectary ovate, acute at apex, 2–3 mm long, glabrous, the ovary superior, 4–5.5 × 1.5–2 mm, ovate, strigose, the style included, 17–24 mm long, glabrous, the stigma bilobed. Fruit a bivalved fleshy capsule, erect,

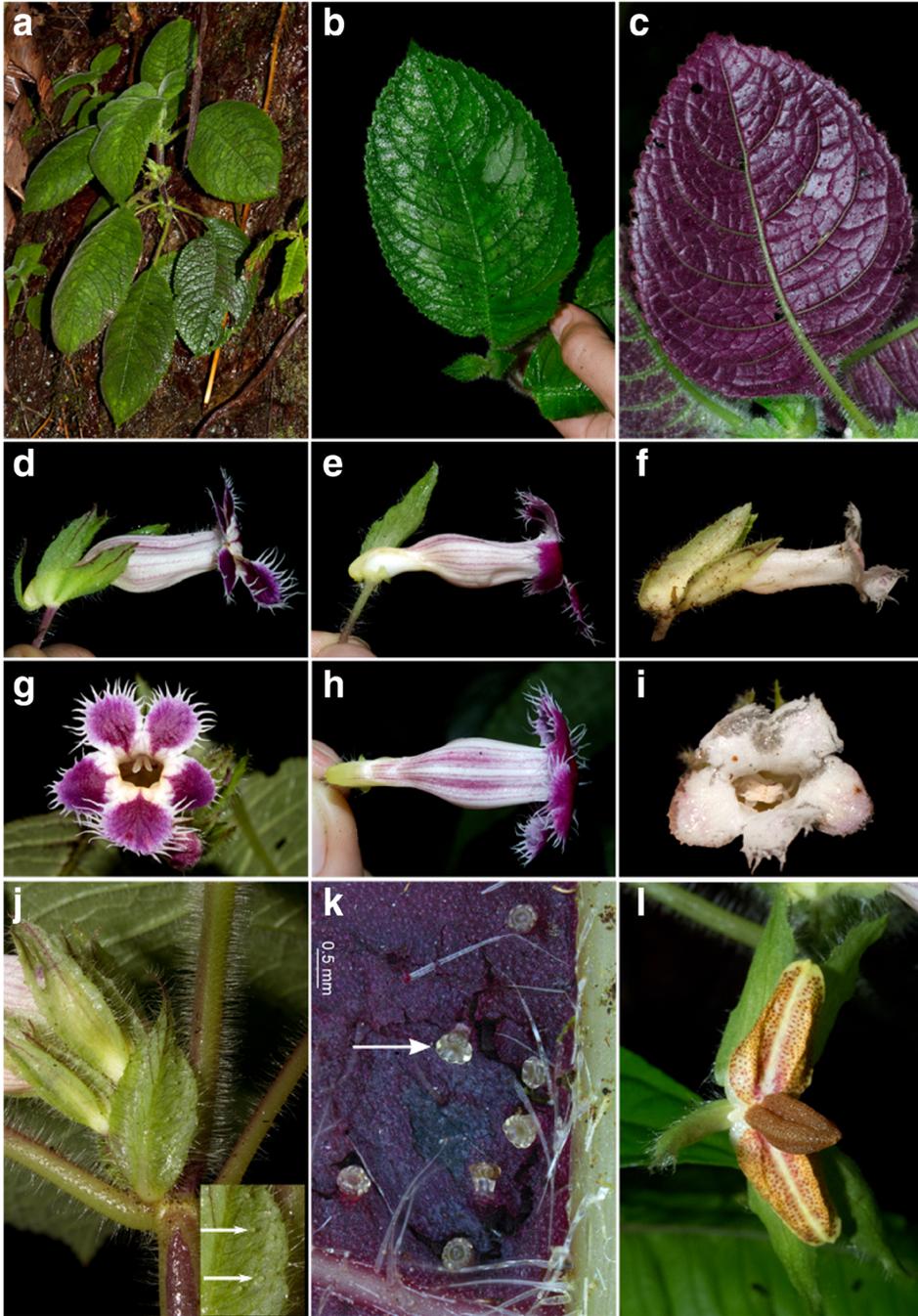


FIG. 1. *Drymonia croatii* (A–E, G, H, J–L) and *D. ovatifolia* (F, I). **A.** Habit. **B.** Upper leaf surface. **C.** Lower leaf surface. **D.** Lateral view of flower with calyx. **E.** Lateral view of corolla showing basal constriction. **F.** Lateral view of flower (*D. ovatifolia*). **G.** Front view of flower showing fimbriate corolla lobes. **H.** Upper view of flower. **I.** Front view of flower (*D. ovatifolia*). **J.** Inflorescence bracts and calyx lobes featuring pilose indument (arrows in the inset indicate peltate glandular trichomes). **K.** Lower leaf surface showing long glandular trichomes and peltate glandular trichomes (white arrow). **L.** Fleshy dehiscent capsule with a central cone of seeds. (A and K, from *L. Clavijo 1939*; B–D, G and J, from the holotype; E, H and L, from *M. Perret 183*; F and I, from *A. Zuluaga 903*; Photos: A, G and J, by *L. Clavijo*; B–D, by *J. L. Clark*; E, F, H, I and L, by *A. Zuluaga*; K, by *J. F. Ortega*.)

18–20 mm long, the valves reflexed 180° upon dehiscence, green abaxially, light yellow with brown dots adaxially; seeds numerous, immersed in a mass of light brown fleshy funicular tissue that forms a central cone, 0.4–0.5 × 0.2–0.3 mm, brown, subglobose, pointed at both ends, striate.

Distribution and habitat.—*Drymonia croatii* is only known from the Pacific slopes of the Cordillera Occidental in the department of Valle del Cauca (Fig. 2), where it grows in humid areas at 1000–1200 m in elevation. The species has been collected in shaded areas on the roadside, the forest edge, and near creeks and waterfalls.

Phenology.—*Drymonia croatii* has been collected in flower in January, March, May, and July, and in fruit in January and July.

Etymology.—This species is named in honor of Thomas Croat, Curator of Botany at the Missouri Botanical Garden, taxonomist of the family Araceae, and avid collector of numerous Gesneriaceae throughout the Neotropics. The 2013 expedition that resulted in its discovery was because of Dr. Croat's detailed description and suggestion that we explore the trail leading to the cascada La Virgen near Queremal.

Additional specimens examined. COLOMBIA. Valle del Cauca: municipio Dagua: corregimiento El Queremal, carretera vieja Cali-Buenaventura; desde la cascada Las Chorreras (km 10) hasta la quebrada el Engaño, borde de carretera y de quebrada, 3°35'3.3"N, 76°34'59"W, 1200 m, 9 July 2017 (fl, fr), *L. Clavijo & A. Zuluaga 1939* (COL, CUV, HUA, MO, NY, US); corregimiento El Queremal, old road from El Queremal to Buenaventura, Las Chorreras waterfall, 3°33'56.16"N, 76°45'25.92"W, 1053 m, 29 Jan 2016 (fl, fr), *M. Perret, A. Chautems, E.G. Ferreira & A. Zuluaga 183* (COL, CUV, G); 17 Mar 2018 (fl), *A. Zuluaga, L. Clavijo & O. Pérez 2334* (CUVC).

One of the unusual characteristics of *Drymonia croatii* is the presence of peltate glandular trichomes on the abaxial surfaces of the leaf blades, bracts, and calyx (Fig. 1J, K). Wiehler (1983) characterized four primary types of trichomes in Neotropical Gesneriaceae: non-glandular ending in a pointed tip, small glandular with a mushroom-shaped head of one to four cells, glandular with longer uniseriate stalks, and multiseriate trichomes. Furthermore, in several species of *Nautilocalyx*, a close relative of *Drymonia*, Wiehler (1983) observed peltate glandular trichomes with the stalks depressed into the epidermis and the heads appressed to the

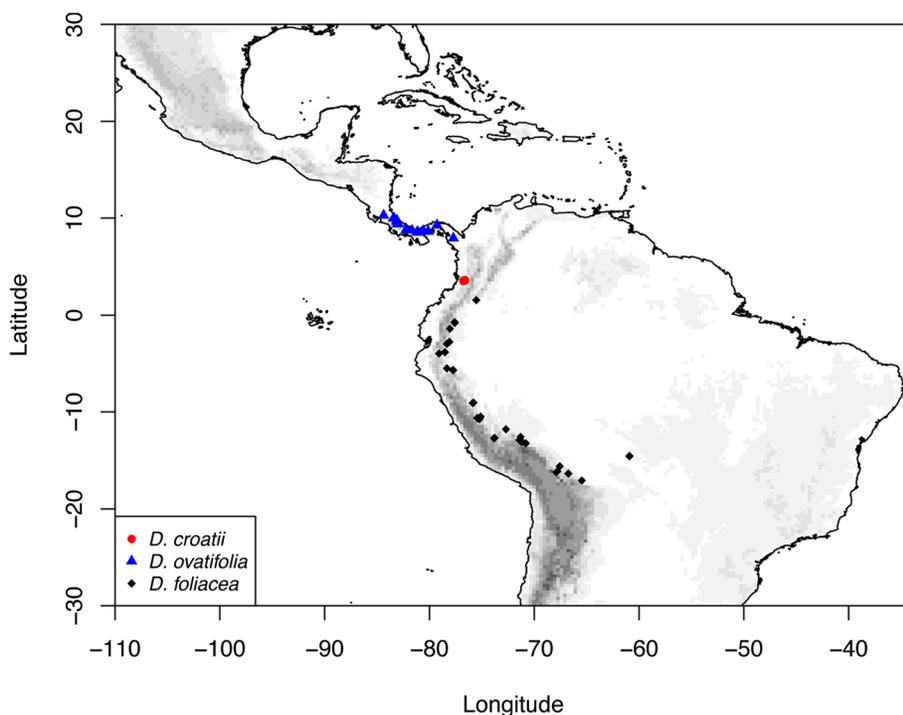


FIG. 2. Geographic distribution of *Drymonia croatii* (red circle), *D. ovatifolia* (blue triangle), and *D. foliacea* (black rhombus).

TABLE 1. COMPARISON OF CHARACTERS OF *DRYMONIA CROATII*, *D. OVATIFOLIA*, AND *D. FOLIACEA*.

Character	<i>Drymonia croatii</i>	<i>Drymonia ovatifolia</i>	<i>Drymonia foliacea</i>
Stem shape in cross-section	Sub-quadrangular, non-sulcate	Sub-quadrangular, non-sulcate	Quadrangular, deeply sulcate
Stem indument	Pilose to villous	Hirsute	Glabrous
Petiole length	4.5–9.4 cm	2–6 cm	2–4.5(–6.2) cm
Leaf base	Cuneate to rounded	Obtuse	Decurrent
Peltate glandular hairs	On the abaxial surfaces of leaf blades, bracts and calyx	Absent	Absent
Calyx length	12–23 mm	20–25 mm	30–40 mm
Corolla length	38–44 mm	40–50 mm	25 mm
Corolla tube color	White with purple veins	White	White
Inner corolla tube	White with faint purple veins and a yellow ventral canal	White without a ventral canal	Pale yellow-cream without a ventral canal
Corolla lobes	Fimbriate, purple with base and margin white	Erose, entirely white or white with pink tips	Crenate, red to purple
Seed surface and shape	Smooth and pointed at both ends	Striate and pointed at both ends	Smooth(?) and obtuse at both ends

epidermis. Wiehler (1983) mentioned that these unusual trichomes are limited to the abaxial surface of leaves, particularly around the veins, and classified them as a sub-type of the mushroom-shaped glandular hairs. The peltate trichomes in *D. croatii* (Fig. 1J, K) are similar in shape and location to those described by Wiehler in *Nautilocalyx*, but differ in that the stalks are not depressed into the epidermis.

Drymonia croatii is similar to *D. ovatifolia* J.L. Clark (Fig. 1F, I) and *D. foliacea* (Rusby) Wiehler. These three species are closely related based on nuclear (e.g., ETS and ITS) and plastid markers (e.g., *trnK-matK* and *psbA-trnH*) (unpubl. data). In addition, they are terrestrial herbs that share blades with serrate margins, relatively large inflorescence bracts ($1.2\text{--}3.5 \times 0.9\text{--}1.5$ cm) that are lanceolate and persistent, relatively short peduncles (< 2 mm long), and anthers that are coherent by their apex rather than by their ventral surface. Their geographic ranges do not overlap (Fig. 2) and it is unlikely that they would be confused; *Drymonia foliacea* grows on the eastern slopes of the Andes and in the Amazon from southern Colombia to Bolivia, *D. ovatifolia* ranges from Costa Rica to Panama, and *D. croatii* is only known from the Pacific slopes of the Colombian Andes.

Drymonia croatii is distinguished from *D. foliacea* by pilose to villous stems (vs. glabrous stems), sub-quadrangular and non-sulcate stems (vs. quadrangular and deeply sulcate stems), cuneate to rounded leaf base (vs. decurrent

leaf base), pilose bracts and calyx lobes (vs. glabrescent bracts and calyx lobes), corolla 38–44 mm long (vs. 25 mm long), and corolla with fimbriate margins (vs. crenate margins). *Drymonia croatii* and *D. ovatifolia* appear similar when dried, but herbarium specimens of the two species can be readily differentiated by habit descriptions and leaf indument: *D. croatii* reaches 80 cm tall and has a combination of simple (septate and non-septate) and glandular (peltate and non-peltate) hairs, whereas *Drymonia ovatifolia* rarely reaches 50 cm in height and is limited to simple (septate and non-septate) hairs. A comparison of the three species is summarized in Table 1.

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