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Article in *Journal of the Botanical Research Institute of Texas* · July 2021

DOI: 10.17348/jbrit.v15.i1.1050

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DRYMONIA MEXICANA (GESNERIACEAE),
A NEW ENDEMIC SPECIES FROM VERACRUZ (MEXICO)

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ABSTRACT

Ongoing research on the systematics of *Drymonia* (Gesneriaceae) resulted in the discovery of a new species, ***Drymonia mexicana*** Clavijo & J.L. Clark of the Gesneriaceae (tribe: Gesnerieae, subtribe: Columneinae). The new species is distinguished by the combination of narrow leaves with large corollas, glabrous leaves adaxially, calyx lobes ovate, and campanulate flowers with the tube slightly recurved ventrally and the limb purple. The new species is endemic to high elevation forests in the the Mexican state of Veracruz. The plant is commonly cultivated, but its introduction from Mexico to the horticultural community is unknown. Here, we describe and illustrate *Drymonia mexicana* Clavijo & J.L. Clark and present a key to identify the species of *Drymonia* native to Mexico.

KEY WORDS: *Drymonia*, Gesneriaceae, Mexico, taxonomy

RESUMEN

Los estudios actuales sobre la sistemática del género *Drymonia* (Gesneriaceae) permitieron descubrir una nueva especie, ***Drymonia mexicana*** Clavijo & J.L. Clark, de Gesneriaceae (tribu: Gesnerieae, subtribu: Columneinae). La nueva especie se distingue por la combinación de hojas angostas, con corolas grandes, las hojas glabras adaxialmente, los lóbulos del cáliz ovoides, y la corola campanulada con tubo ligeramente curvo ventralmente y limbo morado. La nueva especie es endémica de los bosques montanos del estado de Veracruz, México, y aunque es comúnmente cultivada, su introducción en la horticultura desde México es desconocida. En este artículo se describe e ilustra *Drymonia mexicana* Clavijo & J.L. Clark y se presenta una clave para la identificación de las especies de *Drymonia* nativas de México.

PALABRAS CLAVE: *Drymonia*, Gesneriaceae, México, taxonomía

INTRODUCTION

Drymonia Mart., with at least 79 species (Clark et al. 2020), is the third largest genus of Neotropical Gesneriaceae. The genus is most species rich in Colombia where 38 species are located (Clavijo et al. 2016). In contrast, *Drymonia* is less diverse in Central America where it is represented by 28 species. In Mexico, *Drymonia* is represented by six species; four of them are broadly distributed in Central America, whereas *Drymonia strigosa* (Oerst.) Wiehler and *Drymonia mexicana* are endemic to Mexico.

Drymonia is a member of the subtribe Columneinae (tribe Gesnerieae), which is the largest subtribe with 26+ genera and 16% (ca. 525+ spp.) of the total species diversity in the family (Weber et al. 2013). *Drymonia* is characterized by a broad range of leaf shapes, induments, corolla shapes and colors, and fruit types. Habits range from terrestrial to hemiepiphytic or epiphytic (facultative or obligate) herbs, sub-shrubs, 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 species described here has received significant attention in the horticulture community. It is commonly cultivated by horticulturalists and botanical gardens as *Drymonia oinochrophylla* (Donn.Sm.) D.N. Gibson. The correct identification for current cultivated material is *Drymonia mexicana*. To our knowledge, there are no currently known cultivated collections of *Drymonia oinochrophylla*. The wild origin of material presently in cultivation is unknown. Hans Wiehler conducted several research expeditions to Mexico, including a 1991 trip to Veracruz. A recent search of specimens and database records of Wiehler expeditions to Mexico located a single specimen of *Drymonia oinochrophylla* from Oxaca (*H. Wiehler 9113*), but there are no known voucher specimens that represent the species described here.

A recent study by Ramírez-Aguirre et al. (2016) on floral phenotypes included morphology and nectar production patterns from a population of *Drymonia mexicana*. The authors (Ramírez-Aguirre et al. 2016) identified the wild populations as *D. oinochrophylla*, but the illustrations, images, and geography are conspecific with *Drymonia mexicana*.

TAXONOMIC TREATMENT

Drymonia mexicana Clavijo & J.L. Clark, **sp. nov.** (Figs. 1 & 2). TYPE: MEXICO. VERACRUZ: Mpio. San Andrés Tuxtla, Estación de Biología Tropical Los Tuxtlas, Lote 71, "Pedregal" Selva alta perennifolia, 18°34'-18°36'N 95°04'-95°09'W, 500 m, 1 Aug 1986 (fl), G. Ibarra-M., L. González G., A. Ambros A., S. Sinaca C. 2990 (HOLOTYPE: MEXU!; ISOTYPE: US!).

Differs from its congeners by the combination of narrow leaves and large corollas; leaves glabrous adaxially; bracts light green, widely ovate and entire; calyx cream to light green with ovate lobes; and flowers campanulate, with slightly ventrally recurved tube and purple limb.

Facultative epiphytic herb or shrub. **Stem** scandent, branched, sometimes with adventitious roots, subquadrangular in cross-section, green, bark papyraceous, strigillose to glabrescent (more so at base); internodes 2.9–34.0 mm long. **Leaves** opposite, decussate, clustered apically, equal to subequal in a pair; petiole 3.7–19.0 mm, terete in cross-section, strigillose to glabrescent, usually with enations at base; blade elliptic to oblanceolate, 1.81–7.93 × 1.0–2.91 cm, coriaceous, apex acuminate, base attenuate to cuneate, symmetrical, margin entire, light green and usually drying brown-reddish abaxially, strigillose to glabrescent abaxially, glabrous adaxially, (3–)4 pairs of primary lateral veins, slightly visible on both sides, strigillose to glabrescent, higher order of venation not evident. **Inflorescence** axillary, reduced from a pair-flowered cyme, 1–3 flowers per axil. **Flowers** subtended by a pair of bracts, 7.1–11.5 × 3.5–6.8 mm, light green, widely ovate, apex acuminate, margin entire, strigillose at the base abaxially; pedicel 7–19.3 mm long, green, strigillose. **Calyx** cream to light green, membranous to coriaceous, persistent in fruit, venation not evident when live, reticulate when dry; calyx lobes 5, 4 nearly equal, ovate, apex acute, base cordate, margin entire, glabrous, but sometimes strigillose at the base abaxially, glabrous adaxially; ventral and lateral lobes 14.8–32.0(–38) × 10.6–25.0(–28.5) mm, dorsal lobe ca. 21.4 × 15.0 mm. **Corolla** zygomorphic, campanulate, 50.0–70.0(–80) mm long; tube slightly ventrally recurved, oblique relative to calyx, 35.5–70.0 mm long, 10.4–17.0 mm wide at the middle, 12.7–21.7 mm toward the throat, white suffused with purple and glabrescent to strigillose outside, white with longitudinal purple lines, particularly toward the throat inside; throat purple and glabrescent to strigillose outside, purple with glandular trichomes dorsally inside; corolla lobes 5, subequal, purple, spreading, apices rounded, margin slightly erose, glabrescent abaxially, glabrous adaxially, 6.2–9.3 × 6.0–12.6 mm, ventral lobe slightly larger than the others. Androecium of 4 didynamous stamens; filaments included, 27–50 mm long, glabrescent, coiling after anthesis, staminode absent; anthers oblong, dehiscent by a basal pore that develops into a longitudinal slit. **Gynoeceum** with a single dorsal nectary gland; ovary superior and ovate, pilose; style included, pilose with few scattered glandular trichomes, 19.8–37 mm long; stigma clavate. **Fruit** a bivalved fleshy capsule, dehiscent into two reflexed valves, 18.0–21.6 × 17.3–22.2 mm, globose, yellow to orange, strigose; seeds numerous, 1.02–1.17 × 0.27–0.37 mm, black.

Distribution and habitat.—*Drymonia mexicana* is endemic to the Gulf of Mexico coastal state of Veracruz. All collections of *Drymonia mexicana* are from higher elevations (500 to 1350 m) of the Sierra de los Tuxtlas (Tuxtla Mountains) and the Sierra de Santa Martha in the municipalities (municipios) of Catemaco, San Andrés Tuxtla and Sotepan. These forests are described by collectors as selva alta perennifolia (evergreen high

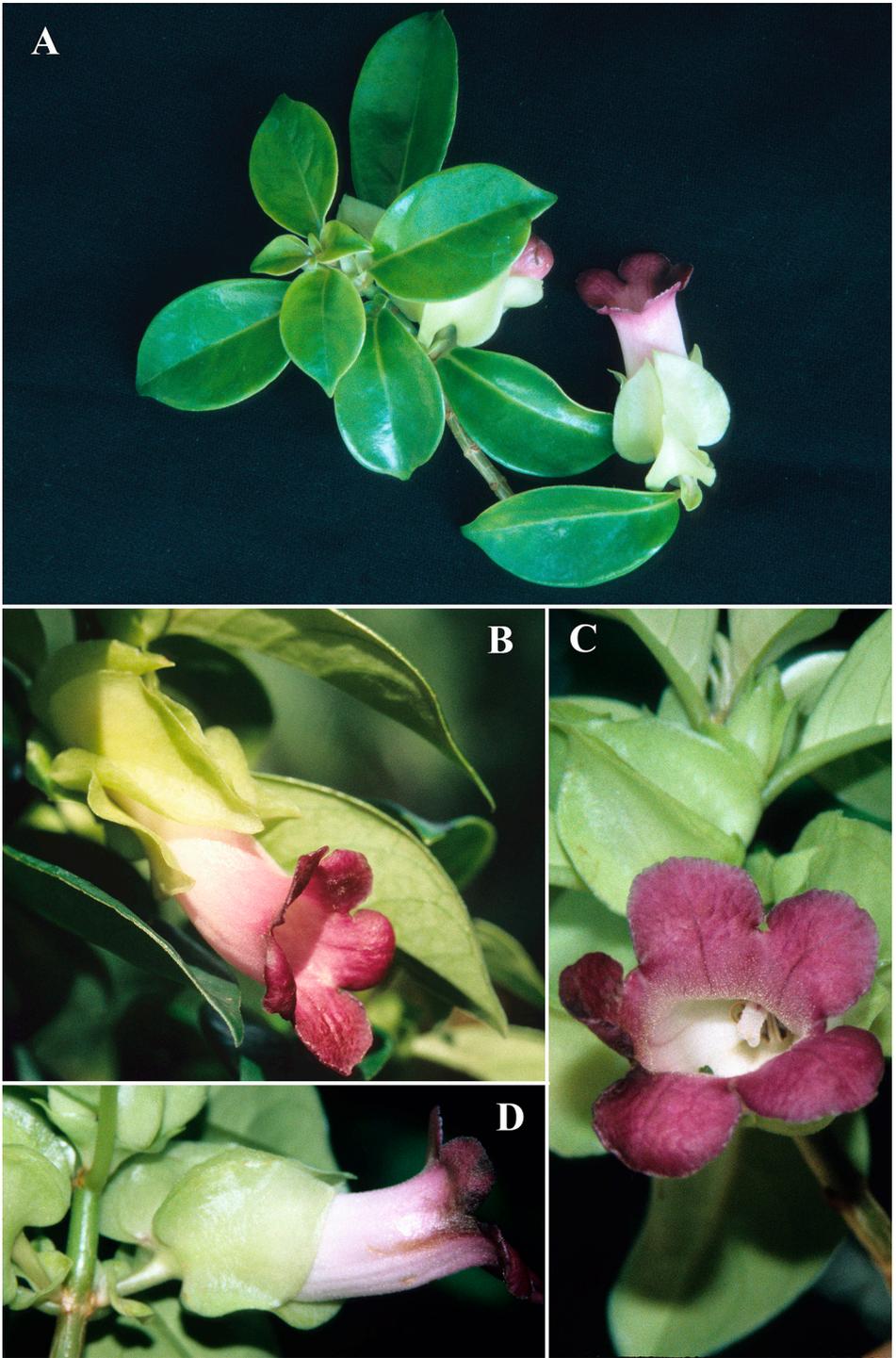


FIG. 1. *Drymonia mexicana* Clavijo & J.L. Clark. A. Habit featuring glabrous foliage and dorsal view of the flower. B. Lateral view of flower. C. Front view of corolla. D. Lateral view of flower. (Photographic images of cultivated material: A, C, D, *J.L. Clark* 6282; B, Richard Dunn, without collection number).

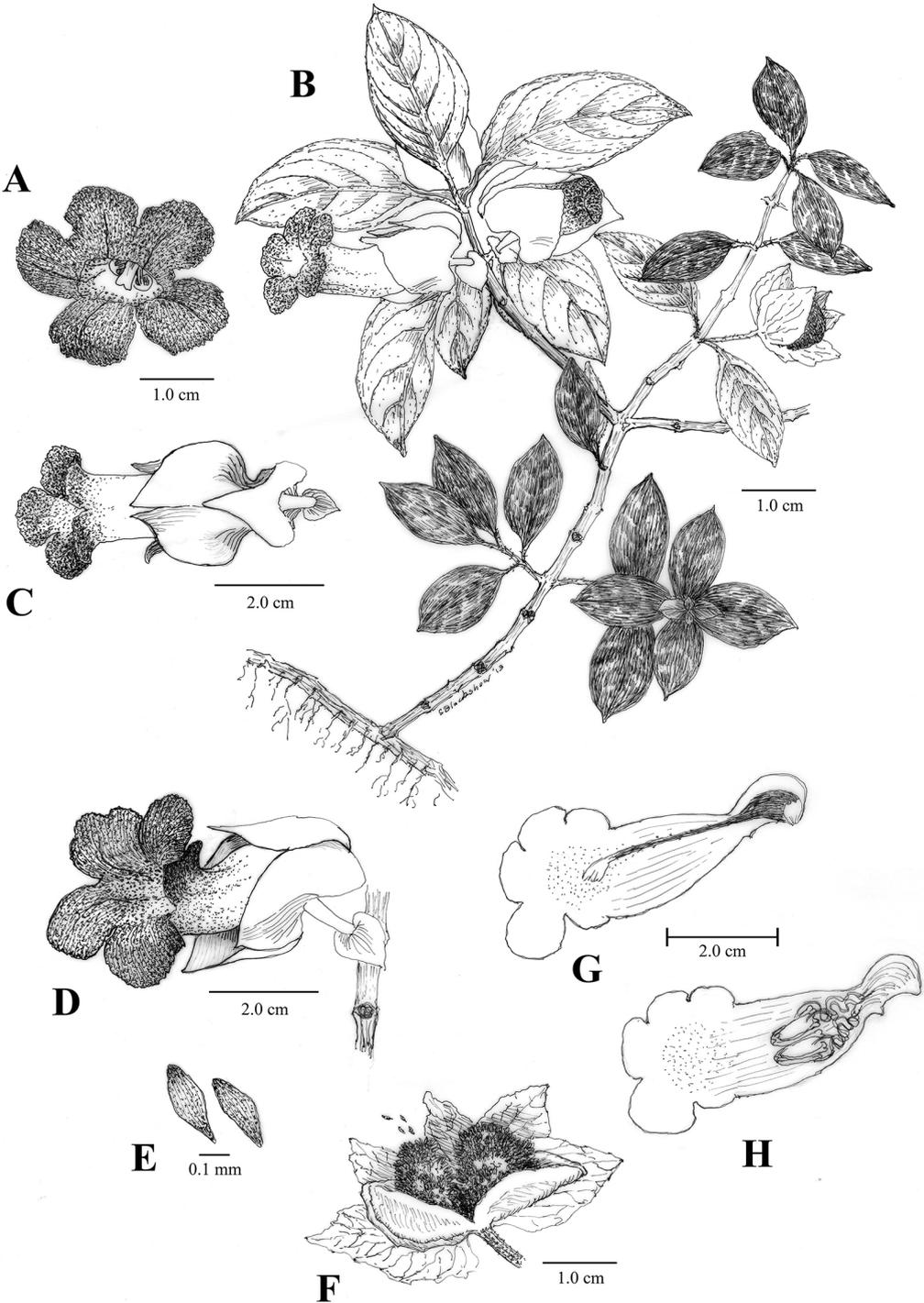


FIG. 2. *Drymonia mexicana* Clavijo & J.L. Clark. **A**. Front view of corolla. **B**. Scandent habit featuring adventitious roots. **C**. Dorsal view of flower. **D**. Lateral view of flower. **E**. Seeds. **F**. Fleshy bivalved capsule. **G**. Lateral view of open flower featuring gynoecium. **H**. Lateral view of open flower featuring androecium. Illustration by Sue Blackshear.

forest) or bosque mesófilo de montaña (cloud forest). An additional population could be represented in a remnant tract of forest located 10–15 km east of the Sierra de Santa Martha range in San Martín on the border of the municipalities of Pajapan and Mecayapan (ca. 6–10 km northwest of the city of Pajapan), but no collections of *D. mexicana* are currently known from this locality.

Drymonia mexicana is distinguished from other congeners from Mexico by the combination of narrow leaves (rarely exceed 3 cm wide) with large corollas (up to 70 mm long); leaves with (3–)4 pairs of primary lateral veins, and adaxial surface glabrous (Fig. 1A); bracts light green, widely ovate and entire (Fig. 1D); calyx cream to light green, with ovate lobes (Fig. 1); and campanulate flowers, with slightly ventral recurved tube and purple limb (Fig. 1, Fig. 2C). Among the species of *Drymonia* in Mexico, *D. mexicana* is more similar to *D. oinocrophylla* due to their relatively small leaves (< 12 cm long and 6 cm wide), with fewer pairs of primary lateral veins (3–5), and entire to subentire margins. However, they can be differentiated by the strigillose indument toward the apex of the branches in *D. mexicana* (vs. pilose in *D. oinocrophylla*), the leaves glabrous adaxially and light green abaxially in *D. mexicana* (vs. strigose and purplish-red in *D. oinocrophylla*), the bracts widely ovate and light green in *D. mexicana* (vs. lanceolate and red in *D. oinocrophylla*), the calyx lobes ovate in *D. mexicana* (vs. lanceolate in *D. oinocrophylla*), and the corolla 50–70 mm long with purple limb in *D. mexicana* (vs. 30–40 mm long with cream, sometimes suffused with pink, limb in *D. oinocrophylla*).

Phenology.—*Drymonia mexicana* has been observed in flower and fruit from July through December.

Etymology.—The specific epithet is in reference to the country of Mexico where *Drymonia mexicana* is endemic.

Conservation and IUCN Red List category.—*Drymonia mexicana* is geographically limited to three populations in the Mexican state of Veracruz. More than 12% of Mexico's native forest has been lost since the 1950s (Velázquez et al. 2002). The state of Veracruz is reported to have one of the highest rates of deforestation in Mexico (Muñiz-Castro et al. 2015; Gómez-Díaz et al. 2018) where more than 80% of its primary vegetation has been converted to pastures, plantations, and secondary vegetation (Ellis et al. 2011). The Sierra de los Tuxtlas (Tuxtlas Mountains) corresponds to the range of *Drymonia mexicana* and is an important biodiversity hotspot. This area is represented by 2,548 species with more than 600 occurring in an area of less than 116 km² (Villaseñor et al. 2018). Therefore, we provisionally assess this new species as Endangered (EN), according to the IUCN Red List criteria (IUCN 2012) for restricted geographic range (B1 ab + B2 ab).

Additional specimens studied. **MEXICO. Veracruz, Mpio. Catamaco:** Cerro Egegald, N de Catemaco, carr. a Sotecomapan, 700, 16 Nov 1985 (fr), G. Castillo-C et al. 4439 (XAL!); Rancho La Chingada, 10 km al SE de Tebanca camino de Bastonal, Encinar con *Liquidambar* y elementos de selva alta perennifolia, 22 Nov 1984 (fr), R. Cedillo-T. et al. 2892 (MEXU! MO); road from Coyame to Bastonal, E of Laguna de Catemaco, 700 m, 28 Jul 1973 (fl), R.L. Dressler 4442 (PMA, SEL!, US!); Cumbres de Bastonal, 10 Jul 1978 (fl), R. Cedillo-T. et al. 3278 (MEXU!); Ejido Ruiz Cortínez, falda del Volcán San Martín Tuxtla, bosque mesófilo de montaña, 18°34'N, 95°08'W, 1110 m, 1 Jul 2005 (fl), T. Krömer & A. Acebey 2300 (MEXU!, SEL! XAL!); Camino Bstonal a Santa Martha, 920 m, 26 Nov 1978 (fr), A. Gómez-P. et al. 5426 (XAL!); 4.8 Km E of Tebanca (4.8 km E side of Laguna de Catemaco) on road to Bastonal, 740 m, 5 Jul 1980 (fl), M. Nee & B.F. Hansen 18766 (XAL!); Coyame, cerca Cerro Cochinitos, selva alta perennifolia, alterada, 3 Aug 1982 (fl), T.P. Ramamoorthy et al. 3892 (MEXU!, US!); Bastonal, 12 Km NE de Catemaco, camino Catemaco-Tebanca, 950 m, 30 Jul 1985 (fl), S. Sinaca-Colín 154 (MEXU!); Bastonal, 10 Km NE de Tebanca, camino al poblado de Coyame, 950 m, 30 Jul 1980 (fl, fr), S. Sinaca Colín 162 (MEXU!); Cerro Buenavisata, 3 km al N de Catemaco, carr. a Sotecomapan, 600 m, 25 Sep 1999 (fr), A. Torres-R. 346 (XAL!). **Mpio. San Andrés Tuxtla:** Cerro Coyolar, al N de Catemaco, 29 May 1985 (fl), J.I. Calzada 11813 (XAL!); Arriba de Bastonal, 700 m, 29 Jul 1973 (fl), A. Gómez-P. 5136 (XAL!). **Mpio. Sotapan:** Ejido Santa Martha, 2 km al oeste, 950 m, 15 Jul 1987 (fl), R. Acosta-P. 1695 (NY!); Cerro Platanillo, falda del cerro, Sierra Santa Martha, 1350 m, 20 Dic 1978 (fr), J.L. Calzada 5092 (XAL!); Alrededores del poblado de Santa Martha, 1240 m, 20 Dic 1978 (fl, fr), R. Ortega-O. et al. 1098 (XAL!); Ejido Santa Martha, 1250 m, 11 Nov 1980 (fl), F. Vázquez B. 6 (XAL!); Ejido Santa Martha, 1250 m, 11 Nov 1980 (fr), F. Vázquez-B. 12 (F!).

KEY TO THE SPECIES OF *DRYMONIA* IN MEXICO

All species in this key reflect an ongoing monograph of *Drymonia* and are documented by recently annotated specimens from the Universidad Nacional Autónoma de México (MEXU) and other herbaria. The presence of *D. macrophylla* in Mexico is based on a single collection from Chiapas. Several specimens are present in Guatemala along the border with Mexico and it is likely that documented populations of *D. macrophylla* along the Guatemalan border extend into Mexico.

1. Plants subwoody; blades exceeding 20 cm long and 10 cm wide; inflorescence of several (> 3) flowers congested in the upper leaf axils, peduncle 5–9 mm long, bracts > 2.5 cm long; calyx lobes with obtuse apex; fruits with a red cone of seeds _____ **Drymonia macrantha** (Donn.Sm.) D.N. Gibson
1. Plants mostly herbaceous, rarely subwoody; blades rarely exceeding 20 cm long and 10 cm wide, if so, calyx lobes serrate, dentate or fimbriate; inflorescence reduced to 1–3 flowers per axil, peduncle absent, bracts absent or < 2.5 cm long; calyx lobes with acute to attenuate apex, sometimes mucronate; fruits with yellow to black, never red, cone of seeds.
 2. Leaves entire, rarely exceeding 3 cm wide, glabrous above, (3–)4 pairs of primary lateral veins; calyx uniformly cream to pale green; corolla throat and limb purple _____ **Drymonia mexicana** Clavijo & J.L. Clark
 2. Leaves subentire, crenate, denticulate, serrulate or serrate, usually exceeding 3 cm wide, puberulous to strigose or scabrous above, 4–9 pairs of primary lateral veins; calyx green to green suffused with reddish, orange, or completely pink or dark red; corolla throat and limb white to bright yellow or pink, often with orange, dark red, purple or maroon areas.
 3. Leaves light green below, base attenuate or decurrent; pedicel with apex engrossed, 5-winged, up to 34 mm long; calyx pink to blood red, lobes equal; corolla uniformly bright yellow, throat laterally compressed _____ **Drymonia strigosa** (Oerst.) Wiehler
 3. Leaves light green to purplish-red below, base rounded to cuneate, sometimes oblique; pedicel terete, rarely exceeding 25 mm long; calyx green suffused with red or maroon, sometimes all maroon, lobes subequal; corolla white to pink, often with orange, dark red, purple or maroon areas in throat and limb, throat amplified.
 4. Younger parts of the branches and petioles pilose; blades subentire, 4–5 pairs of primary lateral veins; calyx lobes with attenuate apex; corolla 30–40 mm long, white to yellow, limb sometimes suffused with pink _____ **Drymonia oinochrophylla** (Donn.Sm.) D.N. Gibson
 4. Younger parts of the branches and petioles puberulous to strigose; blades crenate to serrate or dentate, 6–9 pairs of primary lateral veins; calyx lobes with acute or acuminate apex, sometimes mucronate; corolla 30–70 mm long, white to pink, limb often with orange, dark red, purple or maroon veins or spots.
 5. Leaves ovate, oblong, or oblanceolate, sometimes falcate; calyx ovate, serrate, dentate or fimbriate, apex acuminate, sometimes mucronate, 10–15(–28) × 6.6–7.5 mm; corolla pale yellow or cream, usually more yellow inside and with a red or orange areas on the lower surface in the throat, tube with a short spur; style puberulent, stigma stomatomorphic _____ **Drymonia macrophylla** (Donn.Sm.) D.N. Gibson
 5. Leaves elliptic or oblong to obovate, never falcate; calyx lanceolate to oblong, entire to serrulate, apex acute or acuminate, 20–50 × 5–30 mm; corolla white, cream or pink, often with dark red, purple or maroon veins or spots in the throat and lobes, tube with a globose spur, then contracted above the spur, ventricose dorsally above; style glandular pubescent, stigma bilobed _____ **Drymonia serrulata** (Jacq.) Mart.

ACKNOWLEDGMENTS

Bob and Dee Stewart (Stow, MA, USA) are acknowledged for their astute observations comparing cultivated material to herbarium specimens. Their observations in 2002 and a voucher specimen in 2011 played important roles in recognizing that material widely cultivated by members of the Gesneriad Society was different from specimens at the Smithsonian Institution's National Museum of Natural History. We thank Chas Huston from the University of Minnesota's CBS Conservatory for sharing images and providing a voucher specimen. We are grateful to the directors of the MEXU, MO, SEL, US and XAL herbaria for granting us access to their collections, to Sue Blackshear for preparing the illustration, and to Alejandro Zuluaga for providing comments on the key. This research was supported by the National Science Foundation (DEB-841958 and DEB-0949169) to JLC. Alain Chautems, Christian Feuillet, and Fred Barrie are acknowledged for their helpful reviews.

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