



***Miconia paralimoides* (Miconieae: Melastomataceae), a new species from the Cordillera Central, Dominican Republic**

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Abstract

In the course of a taxonomic revision of *Miconia* sect. *Lima*, we discovered a previously undescribed species, *Miconia paralimoides*, from the Cordillera Central, Dominican Republic. This species is part of the *Miconia lima* species complex, and is most similar morphologically to *Miconia limoides*. We illustrate and provide a distribution map of the species, as well as a key to distinguish *M. paralimoides* from other members of the *Miconia lima* complex, i.e., species with very well-developed, bulla-based hairs on the adaxial leaf surface, which mostly or completely cover the areoles.

Resumen

En el proceso de una revisión taxonómica de *Miconia* sect. *Lima*, descubrimos una especie previamente no descrita, *Miconia paralimoides*, de la Cordillera Central, República Dominicana. Esta especie forma parte del complejo de especies de *M. lima*, y es más parecida morfológicamente a *M. limoides*. Ilustramos y proveemos un mapa de distribución para la especie, además de una clave para identificar *M. paralimoides* de los otros miembros del complejo de especies de *M. lima*, i.e., especies con pelos de base bulada bien desarrollados en el haz de la hoja, y casi o completamente cubriendo las aréolas.

Introduction

Tribe Miconieae (Melastomataceae) is composed of approximately 1800 species, which occur broadly throughout the Neotropics (Michelangeli et al. 2008). Generic delimitation in the tribe has long been considered to be problematic (Cogniaux 1891, Gleason 1932, Macbride 1941, Wurdack 1972; Judd 1986, 1989, Judd & Skean 1991) and even arbitrary (Cogniaux 1891). Recent phylogenetic analyses based on DNA sequence data have shown that most of the genera recognized within the Miconieae, including the largest genus *Miconia* Ruiz & Pavon (1794: 60) with ca. 1057 species (Goldenberg et al. 2013), are non-monophyletic (Michelangeli et al. 2004, 2008; Bécquer-Granados et al. 2008, Goldenberg et al. 2008, Martin et al. 2008, Reginato et al. 2010). Thus, the recognition of most species within Miconieae under *Miconia* s.l., which can be recognized, in part, by their berry fruit, has been proposed as a best solution to the dilemma (Ionta et al. 2012, Ionta & Judd 2012, Judd & Ionta 2013, Goldenberg et al. 2013, Majure & Judd 2013). Therefore, we describe the new species in this study under *Miconia* sect. *Lima* Majure & Judd (2013: 266).

Miconia sect. *Lima* is a clade of 17 species, including the new species described herein, distributed throughout the Greater Antilles (excluding Puerto Rico), with nine known species from Cuba, seven from Hispaniola and one from Jamaica. Species within the *Lima* clade are recognized by their striking bulla-based hairs on the adaxial leaf surface, long stemmed, clavate-dendritic hairs produced from in between bulla-based hairs on the adaxial leaf surface, sessile glandular hairs on both leaf surfaces, hypanthia, and calyx teeth, and generally acute to acuminate petal apices with slightly bulla-based hairs produced abaxially just below the

petal apex and sometimes from the medial portion of the petal (Majure & Judd 2013). The *Lima* clade also is well supported by molecular phylogenetic data (Michelangeli et al. 2008, Majure et al. unpubl. data).

The *Miconia lima* (Desrousseaux 1797: 47) Gómez (1894: 64) complex represents a group of closely related Hispaniolan species in the *Lima* clade that have very well-developed bulla-based hairs on the adaxial leaf surface, which mostly or completely cover the areoles (Fig. 1). The *Miconia lima* complex is represented by *M. lima*, *M. limoides* (Urban 1927: 50) Majure & Judd (2013: 269), *M. marigotiana* (Urban & Ekman 1929: 50) Majure & Judd (2013: 269), and *M. phrynosomaderma* Majure & Judd (2013: 269).

In the process of revising the *Lima* clade, we discovered a previously undescribed species from the Cordillera Central, Dominican Republic, *Miconia paralimoides* Majure & Judd sp. nov. This species differs from all other taxa in the *Miconia lima* complex in several morphological characters. We have provided a key below for the identification of the members of the *M. lima* complex, including the new species described here.

Key to the species of the *Miconia lima* complex

1. Stem hairs ascending 2
- Stem hairs descending 4
2. Leaves narrowly elliptic, ovate, narrowly ovate, or elliptic-rhomboid, abaxial leaf surface covered in erect, spreading or sparse, moderately appressed hairs (i.e., with lamina surface mostly to partly visible), inflorescence 1.9–6.5 × 1–6 cm, delicate, longest hypanthium hairs to 1.5 mm long, Hispaniola 3
- Leaves broadly elliptic to obovate, abaxial leaf surface covered in dense, strongly appressed hairs (lamina surface mostly obscured), inflorescence 0.9–2.8 × 1.2–2.8 cm, stout, longest hypanthium hairs to 2.6 mm long, restricted to the Cordillera Central, Dominican Republic *M. paralimoides*
3. Leaves ovate or narrowly elliptic, abaxial leaf surface covered in erect or spreading hairs, carpels 4 (5), widespread in Hispaniola *M. lima*
- Leaves narrowly ovate to elliptic-rhomboid, abaxial leaf surface covered in appressed hairs, carpels 2, restricted to Massif de la Selle, Haiti *M. marigotiana*
4. Areoles of adaxial leaf surface completely filled by bulla-based hairs, abaxial leaf surface completely covered in erect to slightly spreading bulla-based hairs, flowers sessile or subsessile, petals not clawed, anthers lacking dorso-basal appendage (or very poorly developed to 0.1 mm long), calyx teeth erect or spreading, not reflexed in fruit, restricted to southern Hispaniola (i.e., Massif de la Selle/Sierra de Bahoruco) *M. limoides*
- Areoles of adaxial leaf surface not completely filled by bulla-based hairs, abaxial leaf surface visible, bulla-based hairs mostly restricted to veins, appressed or slightly spreading, flowers pedicellate, petals clawed, anthers with dorso-basal appendage to 0.3 mm long, calyx teeth reflexed in fruit, restricted to Massif du Nord, Haiti *M. phrynosomaderma*

Taxonomy

Miconia paralimoides Majure & Judd sp. nov. (sect. **Lima**) (Fig. 1)

Diagnosis: *Species ab haec Miconia limoides differt indumento caulium ascendenti appresso (non declinato, effuso vel recurvo) et indumento foliorum appresso in pagina abaxiali (non effuso vel erecto).*

Type:—DOMINICAN REPUBLIC. Cordillera Central, Provincia La Vega, Constanza, 1.5 hora caminando a pie al sur de Loa Mañanguises, en el lugar llamado Sonador, 18°53'N, 70°36'Oeste, 1300 m, fr., 12 abril 1986, R. García 1186 (holotype FLAS!; isotypes JBSD!, MO!, NY!, S!, US!) (Fig. 1).

Evergreen shrub, 1–3 m tall; stems round in cross section, not ridged, the internodes 0.4–8.9 cm long, stem indumentum of bulla-based hairs 0.1–1.3 mm long, these ascending (antrorse) appressed, mostly arcuate with the tips bent towards the stem axis, making the stem appear smooth; nodal line present, with larger bulla-based hairs than those on the rest of the stem. Leaves opposite, decussate, broadly elliptic to obovate, 2.7–5.5 × 1.7–3.8 cm, slightly anisophyllous, apex widely acute to rounded, base acute to rounded, venation acrodromous, 5–7 veined, the midvein and 2–3 pairs of arching secondary veins, the outermost intramarginal, secondary veins mostly basal to slightly suprabasal, the innermost pair, ± asymmetrical at union with midvein, produced 0.3–4 mm from leaf base, positioned 3–7 mm in from margin at widest point of blade, tertiary veins

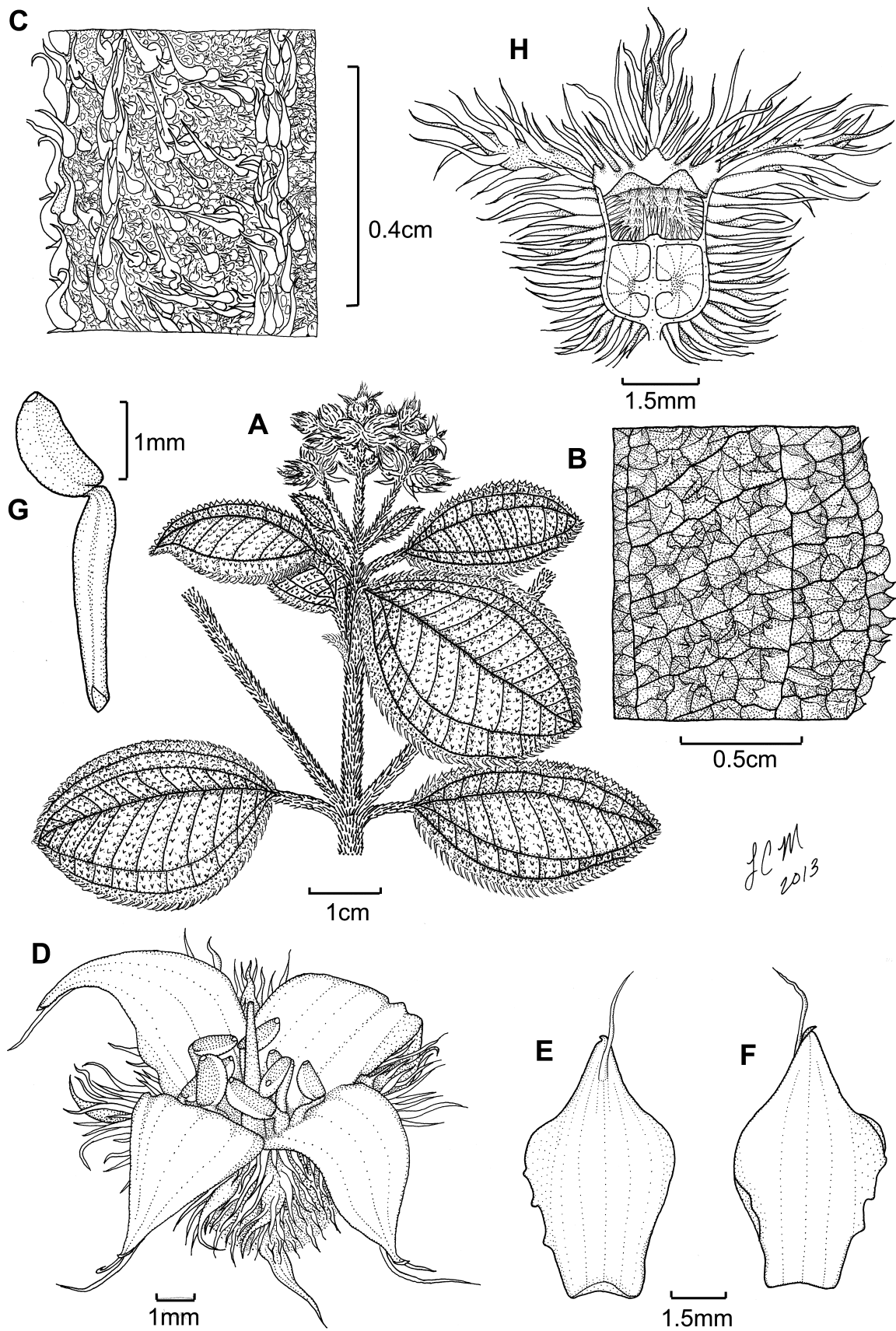


FIGURE 1. Illustration of *Miconia paralimoides*. A) habit (Veloz 4059), B) close-up of upper leaf surface (García 1186), C) close-up of lower leaf surface (García 1186), D) flower Veloz 4059), E) petal abaxial surface (Veloz 4059), F) petal adaxial surface (Veloz 4059), G) stamen (Veloz 4059), H) fruit longitudinal section (F. Jiménez 176–A).

percurrent, \pm perpendicular to midvein, 1.5–2.9 mm apart at midleaf, intertertiary veins present, tertiary veins often joined by quaternary veins; adaxial leaf surface covered in well developed bulla-based hairs completely filling the areoles, bases of bulla-based hairs strongly angular (mostly 4–5 angular) produced from the separation of one hair from another, widest hair bases to 2.2 mm, apices of bulla-based hairs mostly erect, young leaf adaxial surface producing long-stemmed, clavate-dendritic hairs along the primary, secondary, and tertiary veins from between the bulla-based hairs, sessile, glandular hairs produced along the primary, secondary, tertiary, and quaternary veins between the bulla-based hairs, especially toward the base of the leaf; abaxial leaf surface covered in bulla-based hairs, these strongly appressed, those along the primary, secondary, and tertiary veins larger than hairs produced throughout the lamina, the lamina completely covered in bulla-based hairs and thus obscured, lamina appearing as a series of pits from depressions of the bulla-based hairs produced from the upper leaf surface and slightly raised intertertiary veins, sessile, glandular hairs produced from between the bulla-based hairs; petioles 0.4–1.7 cm long, covered in appressed-ascending, bulla-based hairs on both surfaces. Inflorescences terminal, of condensed-short cymes, 5–15 flowered, $0.9\text{--}2.8 \times 1.2\text{--}2.8$ cm, the peduncle 0.05–1.5 cm long, proximal inflorescence branches 2–8 mm long, pedicels absent to 1.2 mm long; bracts oblong to ovate, 2.6–4.9 mm long; bracteoles narrowly ovate, $1.7\text{--}3.8 \times 0.3\text{--}0.6$ mm. Flowers mostly produced in glomerulate clusters, sessile or with pedicels to 1.2 mm long, 4–5(6) merous, when 4 or 5 merous, sometimes with one or two calyx teeth apparently aborted; hypanthium 2.9–3.5 mm long, short-oblong to globose, 4-lobed, but lobing mostly obscured by bulla-based hairs, slightly constricted below the torus, free portion of the hypanthium 0.8–1.1 mm long, hypanthium abaxial surface covered in bulla-based hairs from 0.8–2.6 mm long, and occasional, sessile, glandular hairs near the bases of the bulla-based hairs; hypanthium adaxial surface (i.e., free portion) covered in small, bulla-based hairs; calyx teeth $2.9\text{--}4.2 \times 0.8\text{--}0.9$ mm, ascending or spreading, covered in bulla-based hairs; calyx lobes acute, $1.3\text{--}1.6 \times 1.5\text{--}2$ mm, covered in bulla-based hairs abaxially and sessile, sparse, glandular hairs adaxially; calyx tube not tearing, 0.1–0.4 mm long with bulla-based hairs abaxially and sessile, glandular hairs adaxially; petals 4–5(6), red to violet-red, elliptic with an acute apex and membranous margin, $4.5\text{--}7 \times 2.6\text{--}3.6$ mm, with one or two slightly bulla-based hairs produced abaxially, just below the apex, to 2.8 mm long; stamens twice the number of petals, 8–10(12); filaments 1.8–2.8 mm long, glabrous, anthers 1.5–1.6 mm long, with one dorsally oriented pore, anther thecae 1.2–1.4 mm long, anthers with a dorso-basal appendage 0.18–0.3 mm long; style 5.0–5.3 mm long, glabrous, not or only slightly dilated in the middle, collar absent, style subtended by a crown of multicellular, linear to elongate-triangular (needle-like) hairs, which are slightly longer than the surrounding bulla-based hairs of the ovary apex, stigma punctate; ovary $1.6\text{--}2.2 \times 2.4\text{--}3.4$ mm, slightly four lobed, apex pubescent with bulla-based hairs, except for the linear or elongate-triangular hairs forming crown, placentation axile with deeply intruded placenta, 4-locular; berries globose, 4-lobed, purple at maturity, 4–5.5 mm long (including calyx tube), 5.5–7 mm wide, seeds 0.8–1 mm long, obpyramidal, often falcate, testa smooth, light brown, raphe dark brown, smooth, extending the length of the seed.

Relationships with other taxa and species concepts: — Of all of the members of the *M. lima* complex, *M. paralimoides* is likely most closely related to *M. lima* and *M. limoides*, as all three species have very well-developed bulla based hairs on the adaxial leaf surface (see Fig. 1B), which more or less entirely fill the leaf areoles and comparable leaf shapes and floral morphology. *Miconia marigotiana* has ovate, narrowly elliptic to elliptic-rhomboid leaves and 2-carpellate ovaries, which differ from the broadly elliptic to obovate leaves and 4-carpellate ovaries of *M. paralimoides*, and *M. phrynosomaderma* exhibits bulla-based hairs on the adaxial leaf surface that do not completely cover the areoles, as well as clawed petals and descending stem hairs (Majure & Judd 2013). Liogier (2000) considered populations of *M. paralimoides* to represent *M. lima*, although using his key, material of *M. paralimoides* is identifiable to *M. limoides*. Nearly all collections of *M. paralimoides*, except for those of Liogier, have been identified as *M. limoides* by previous collectors. *Miconia paralimoides* shares the ascending-appressed stem hairs (Fig. 1A) and longer (0.18–0.3 mm in *M. paralimoides* and 0.25–0.4 mm in *M. lima*) dorso-basal anther appendages with *M. lima* (Figs 1G & 2D). However, *M. paralimoides* is phenetically most similar and may be more closely related to *M. limoides*, as it shares the shaggy, long, hypanthium hairs (longest to 2.6 mm in *M. paralimoides*, 3 mm in *M. limoides*; Figs.

1D & H, & 2J–K), large fruit (4–5.5 mm × 5–7 mm in *M. paralimoides*, 3.9–7 × 5–9 mm in *M. limoides*), bulla-based hairs with sharp-angled bases on the adaxial leaf surface (rather than the generally smooth-angled to rounded bases of the bulla-based hairs in *M. lima*; Fig. 1B), the more robust growth form, a more tightly overlapping leaf length/width quotient (1.2–1.6 in *M. paralimoides* and 1.0–1.8 in *M. limoides*), as compared to *M. lima* (see below), a very dense indumentum of bulla-based hairs mostly obscuring the lamina of the abaxial leaf surface (Fig. 1C), and longer petal hairs than *M. lima* (Figs. 1D–F, 2H).

This species is easily distinguished from *M. limoides* in having ascending-appressed, arcuate stem hairs (Fig. 1A), as well as dense, appressed, bulla-based hairs on the abaxial leaf surface (Fig. 1C). The stem hairs of *M. limoides* are descending-appressed to spreading and slightly recurved at the tips and the dense, abaxial leaf surface hairs are erect to spreading. *Miconia paralimoides* has a dorso-basal anther appendage 0.18–0.3 mm long (Fig. 1G), while *M. limoides* lacks or only has a poorly developed dorso-basal appendage to 0.1 mm long (Fig. 2I).

Miconia paralimoides is distinguished from *M. lima* by its densely pubescent abaxial leaf surface with strongly appressed hairs (Fig. 1C). It also differs from *M. lima* by the leaf length/width quotient (1.5–2.6 for *M. lima* vs. 1.2–1.6 for *M. paralimoides*), longer overall bulla-based hairs of the hypanthium (to 2.6 mm in *M. paralimoides* vs. 1.5 mm in *M. lima*; Figs. 1H & 2E–F), larger fruit (4–5.5 mm × 5–7 mm in *M. paralimoides* vs. 2–3.5 mm × 3–4.1 mm in *M. lima*), longer petals (4.5–7 mm vs. 3–4.3 mm; Figs. 1D–F & 2–C), and longer average petal hairs (2.6 mm vs. 1.1 mm; Figs. 1 & 2).

Miconia paralimoides is morphologically diagnosable from its putative closest relative *M. limoides* (Fig. 2) and their ranges are allopatric, thus satisfying the morphological-phenetic (Judd 2007) and diagnostic (Wheeler & Platnick 2000) species concepts. The two species also are presumably reproductively isolated.

Etymology:—As stated above, *Miconia paralimoides* is most phenetically similar to *M. limoides*, and the specific epithet “*paralimoides*” is meant to reflect this similarity. *Miconia paralimoides*, has, by most collectors, been identified as *M. limoides*.

Distribution and Habitat:—*Miconia paralimoides* is restricted to the Cordillera Central of the Dominican Republic, while its putative sister species, *M. limoides*, is restricted to southern Hispaniola, occurring in the Massif de la Selle and the Sierra de Bahoruco (Fig. 3). The species occurs in humid, broad leaved, mixed forests or cloud forests from 1000–1950 m in elevation. Some associate species include *Brunellia comocladifolia* Bonpland (1808: 211; Brunelliaceae), *Lyonia buchii* Urban (1921: 515; Ericaceae), *Magnolia pallescens* Urban & Ekman (1931: 10; Magnoliaceae), *Myrsine coriacea* (Swartz) Browne (1819: 511; Primulaceae), *Ocotea floribunda* Bentham & Hooker (1880: 158; Lauraceae), *Tabebuia vinosa* Gentry (1989: 137; Bignoniaceae), as well as other species of *Miconia*. *Miconia lima* is sympatric with *M. paralimoides*.

Phenology:—*Miconia paralimoides* has been collected in bud, at anthesis and in immature fruit from September through December, and has been collected in immature and mature fruit from February through April.

Additional specimens examined: Dominican Republic. LA VEGA. Cordillera Central, Municipio Jarabacoa, Distrito Municipal Manabao, Los Tablones, al pie de la Subida de La Cotorra, Parque A. Bermudez; UTM 301221E, 2107542N, 21 Feb 2011, *Clase 6739* (FLAS, JBSD). Reserva Científica Ébano Verde, en el camino viejo entre la caseta principal (a la orilla del Arroyo La Sal), y la cima de Loma Golondrina, 19°04'N, 70°34'O, 12 Mar 1992, *F. Jiménez 176–A* (JBSD). Ciénaga de la Culata, Constanza, 15–16 Oct 1968, *Liogier 13013* (NY, US). Loma Redonda, Ciénaga de la Culata, Constanza, 12 Sept 1969, *Liogier 15998* (GH, NY, P, US). Municipio de Constanza, Loma el Paragua, en el lugar denominado el Chiflito, 19°00'06.8"N, 70°43'39.6"O, 10 Nov 2006, *Veloz 4059* (JBSD). SANTIAGO RODRÍGUEZ, Cordillera Central, Parque Nacional J. C. Ramírez, entre Monte Llano & Los Descansaderos, 19°14'N, 71°17'O, 10 Jul 1988, *Zanoni 41982* (FLAS, JBSD, NY).

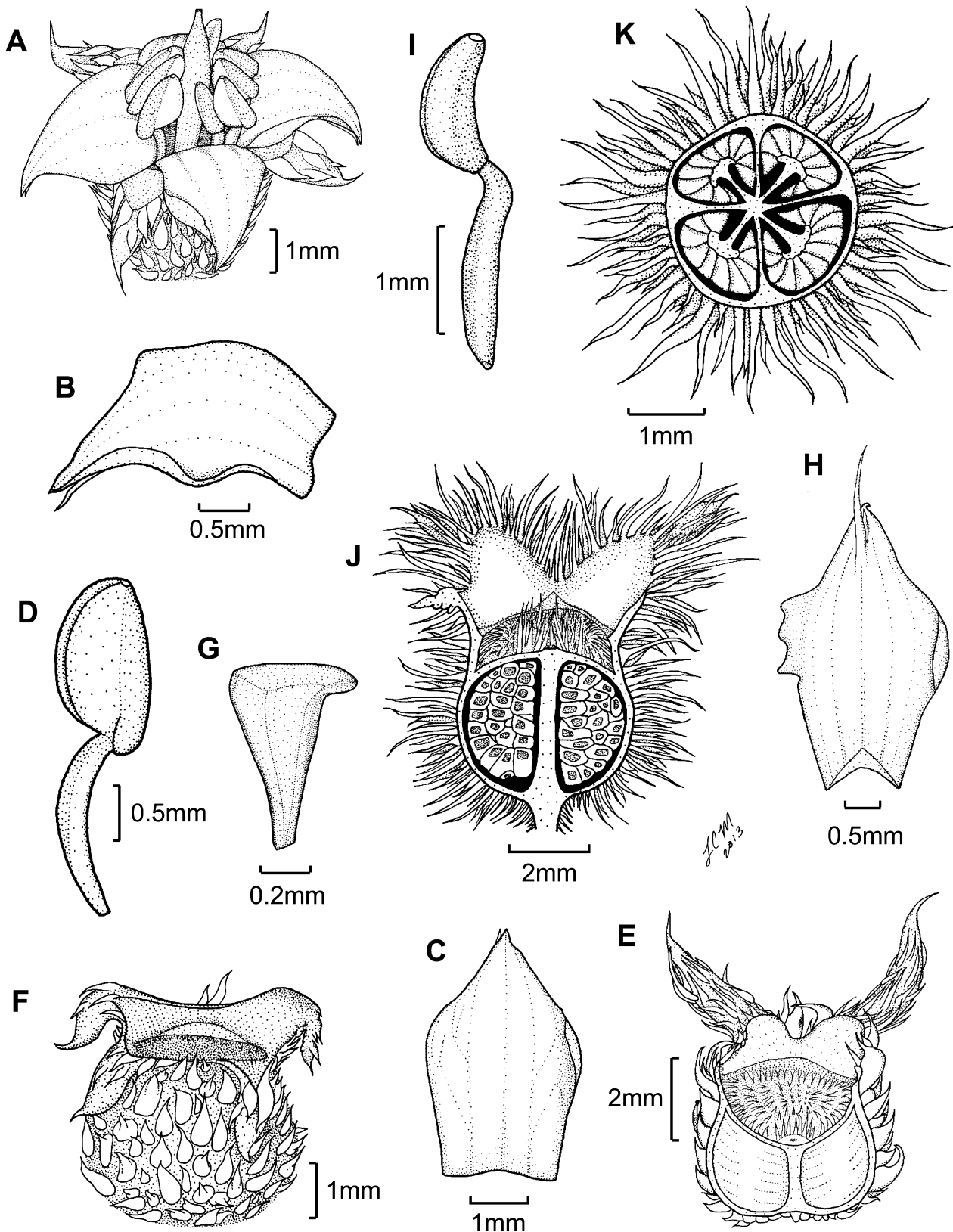


FIGURE 2. Reproductive structures of *Miconia lima* (A–G) and *M. limoides* H–K). A) flower (Judd 6587), B) petal side view (Clase 935), C) petal adaxial surface (Judd 6587), D) stamen (Howard 12300), E) fruit longitudinal section (Judd 5172), F) fruit (Holdridge 1404), G) seed (Judd 5172), H) petal abaxial surface (Zanoni 18900), I) stamen (Zanoni 18900), J) fruit longitudinal section (Ekman H9519), K) fruit cross section (Zanoni 20367).

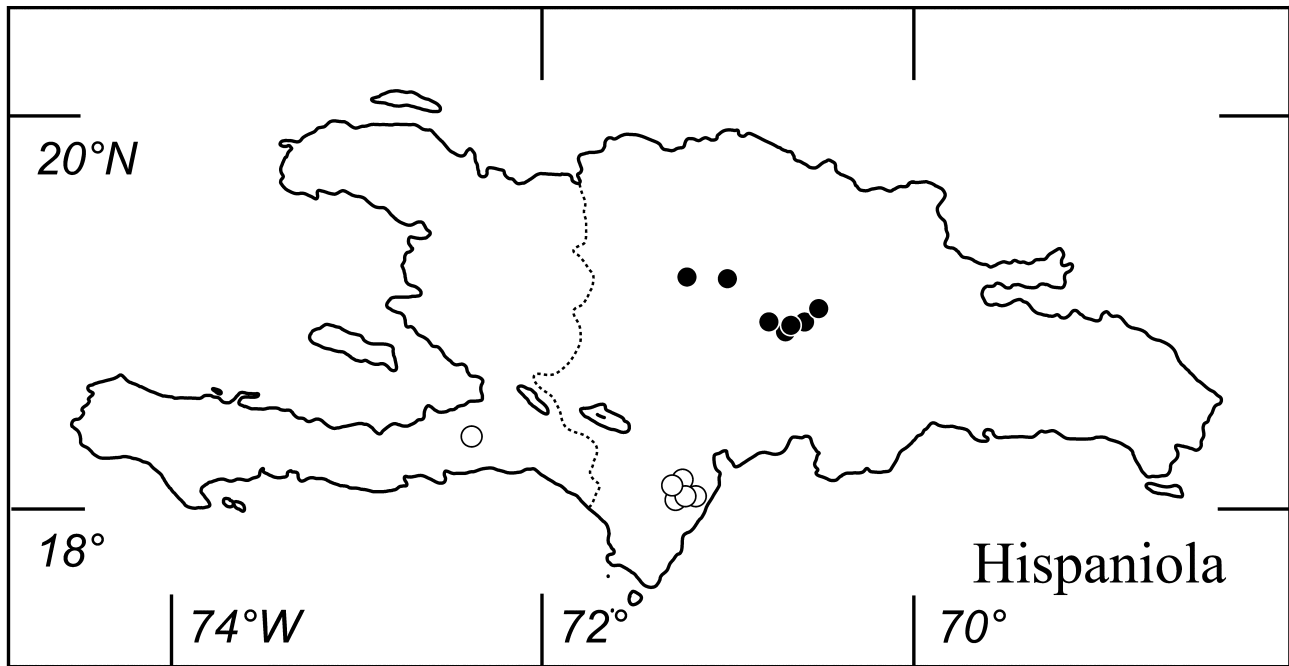


FIGURE 3. Distribution of *Miconia parolimoides* (black circles) and *Miconia limoides* (open circles).

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