



Miconia lorenaensis (Melastomataceae), a new species from Colombian Andes

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Abstract

A new species of Melastomataceae from the Andes of Colombia is described and illustrated. *Miconia lorenaensis* is part of *Miconia* sect. *Amblyarrhena*, and it differs from other species in this group by the combination of branches, petioles and leaves covered by scattered short dendritic trichomes, 7-nerved peltate leaves, acuminate or cuspidate apex with a circinate-thickened tip and flowers with completely inferior, 3-locular ovary. Comments about its distribution, habitat, phenology and taxonomic affinities are provided.

Keywords: *Miconia* Sect. *Amblyarrhena*, endemic species, Flora of Colombia, Tolima

Resumen

Una nueva especie de Melastomataceae de los Andes de Colombia es descrita e ilustrada. *Miconia lorenaensis* hace parte de *Miconia* sect. *Amblyarrhena* y se diferencia de las demás especies en este grupo por la combinación de ramas, pecíolos y hojas cubiertas por tricomas dendríticos cortos y dispersos, hojas peltadas 7-nervias, ápice acuminado o cuspidado con la punta engrosada y circinada y flores con ovario totalmente ínfero, 3-locular. Comentarios sobre su distribución, hábitat, fenología y afinidades taxonómicas son provistos.

Palabras clave: *Miconia* Sect. *Amblyarrhena*, especie endémica, Flora de Colombia, Tolima

Introduction

The neotropical genus *Miconia* Ruiz & Pavon (1794: 60) comprises ca. 1900 species. It is recognized as a megadiverse genus, being considered the only taxon of the tribe Miconieae Candolle (1828: 152) according to Goldenberg *et al.* (2008, 2013), Gamba & Almeda (2014), and Michelangeli *et al.* (2016, 2019, 2020). Nevertheless, authors such as Kriebel (2016), Reginato (2016) and Mendoza *et al.* (2019) present an alternative vision.

According to the traditional definition of Cogniaux (1891), *Miconia sensu stricto* is morphologically defined by the presence of terminal inflorescences and flowers with apically rounded petals (Goldenberg *et al.* 2013). *Miconia s.s.* has close to 1100 species that since Cogniaux (1891) have been divided into 11 sections, mainly based on calyx, stamen, and leaf morphology (Goldenberg *et al.* 2013). Neither the genus, nor its sections, have been recovered as monophyletic in the latest systematic proposals of the Miconieae (Goldenberg *et al.* 2008; Michelangeli *et al.* 2004, 2008, 2020), but the use of these sections remains in recent literature for classifying and describing species within *Miconia* (e.g. Goldenberg *et al.* 2013; Meirelles & Bacci 2017; Burke & Michelangeli 2018; Caddah & Meirelles 2018; Mendoza & Posada 2018; Michelangeli & Paredes 2019).

Within *Miconia s.s.*, *M.* sect. *Amblyarrhena* (Naudin 1850: 204) Triana ex Hook.f. (in Bentham & Hooker 1867: 763) is one of the most diverse groups with close to 220 species (Goldenberg *et al.* 2013). It is widely diversified in the Andes, with ca. 80 species occurring in Colombia, being the country with most reported species (Goldenberg *et al.* 2013; Almeda *et al.* 2020). This section is distinguished by several morphological characters, such as short, stout anthers with an aperture by a single small pore (Cogniaux 1891; Goldenberg *et al.* 2008).

During field explorations with the aim of registering new protected private lands as protected areas (named Civil Society Nature Reserves in Colombia), and as part of the initiative “Río Saldaña Una Cuenca de Vida” (Saldaña River, a Basin of Life), aimed at conserving biodiversity and the water-associated ecosystem services to the local communities, two gatherings of *Miconia* sect. *Amblyarrhena* were collected. These specimens did not correspond to any species described to date, therefore they are described and illustrated here as a new species. Comments about its geographical distribution, phenology, conservation status and taxonomic affinities are also made.

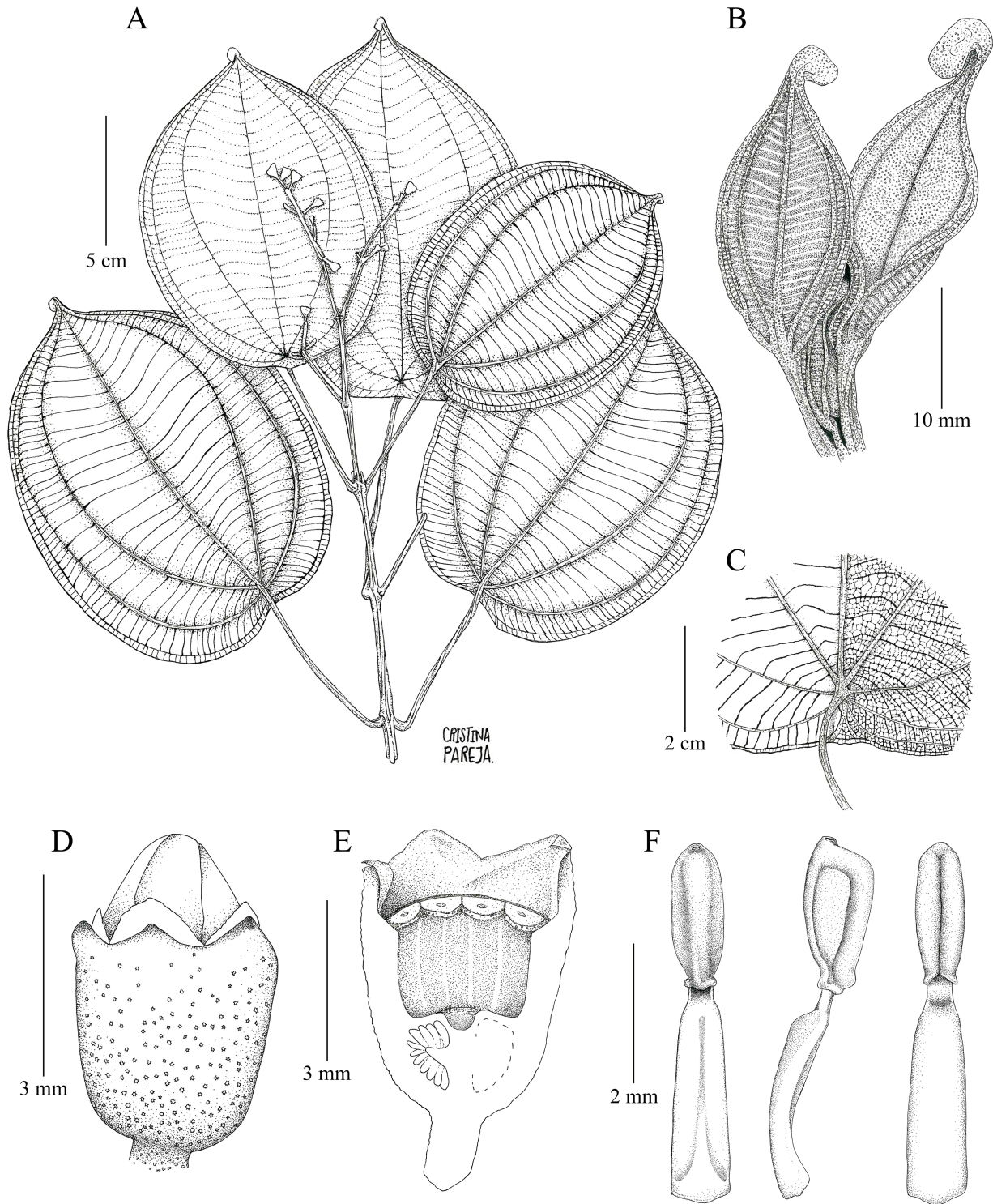


FIGURE 1. *Miconia lorenaensis*. **A.** Fertile branch. **B.** Young leaves. **C.** Petiole insertion. **D.** Hypanthium. **E.** Hypanthium in longitudinal section. **F.** Stamen in dorsal, lateral and ventral views. Illustration by Ana Pareja, based on Jiménez & Castro 1.

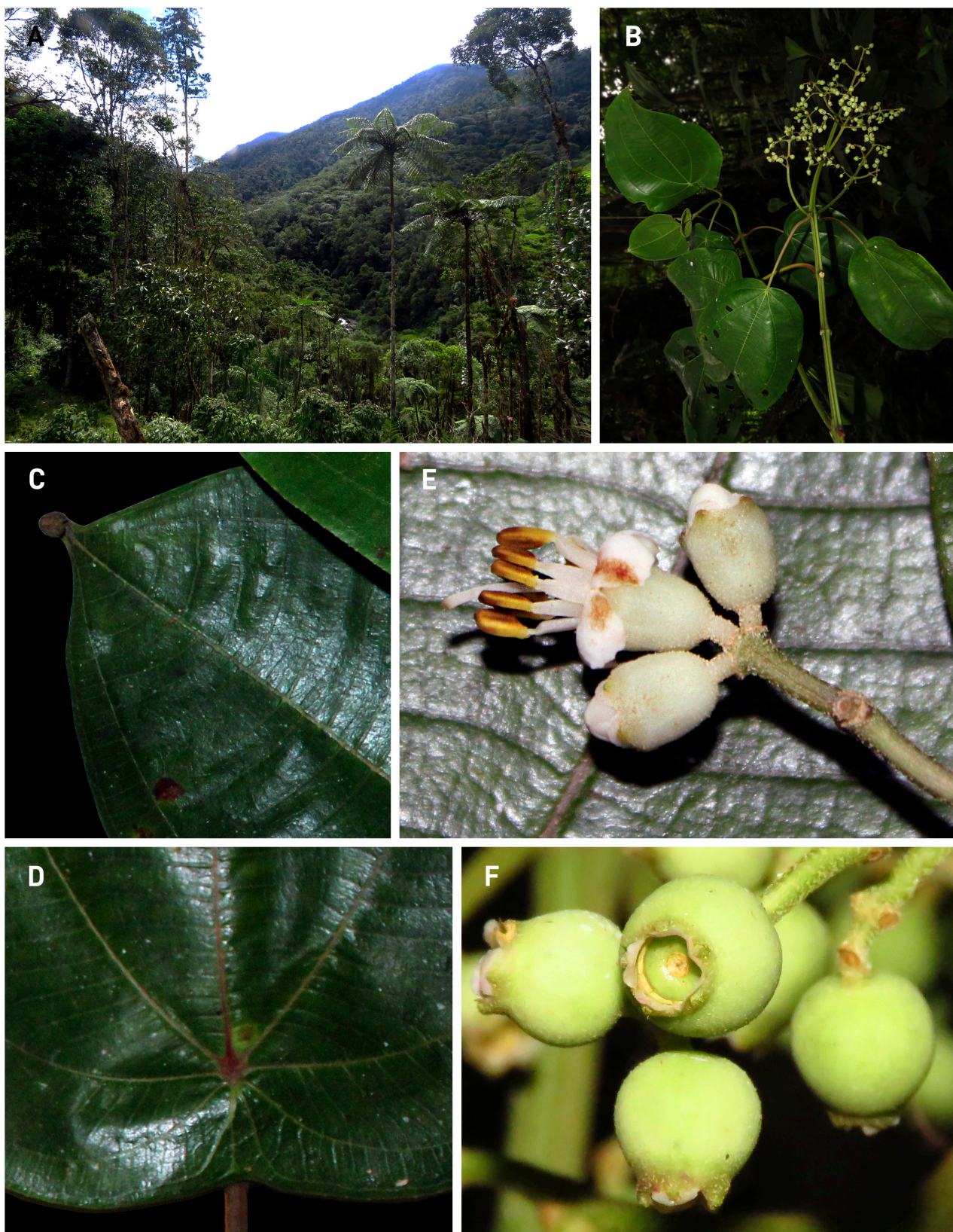


FIGURE 2. *Miconia lorenaensis* and its habitat. A. Habitat of *M. lorenaensis*. B. Fertile branch. C. Leaf apex, adaxial surface. D. Leaf base, adaxial surface. E. Inflorescence cyme, central flower in anthesis and laterals in buds. F. Immature fruits. Photographs A–B, F: Yeison Londoño (HUA), C–E: Carlos Morales (WCS Colombia).

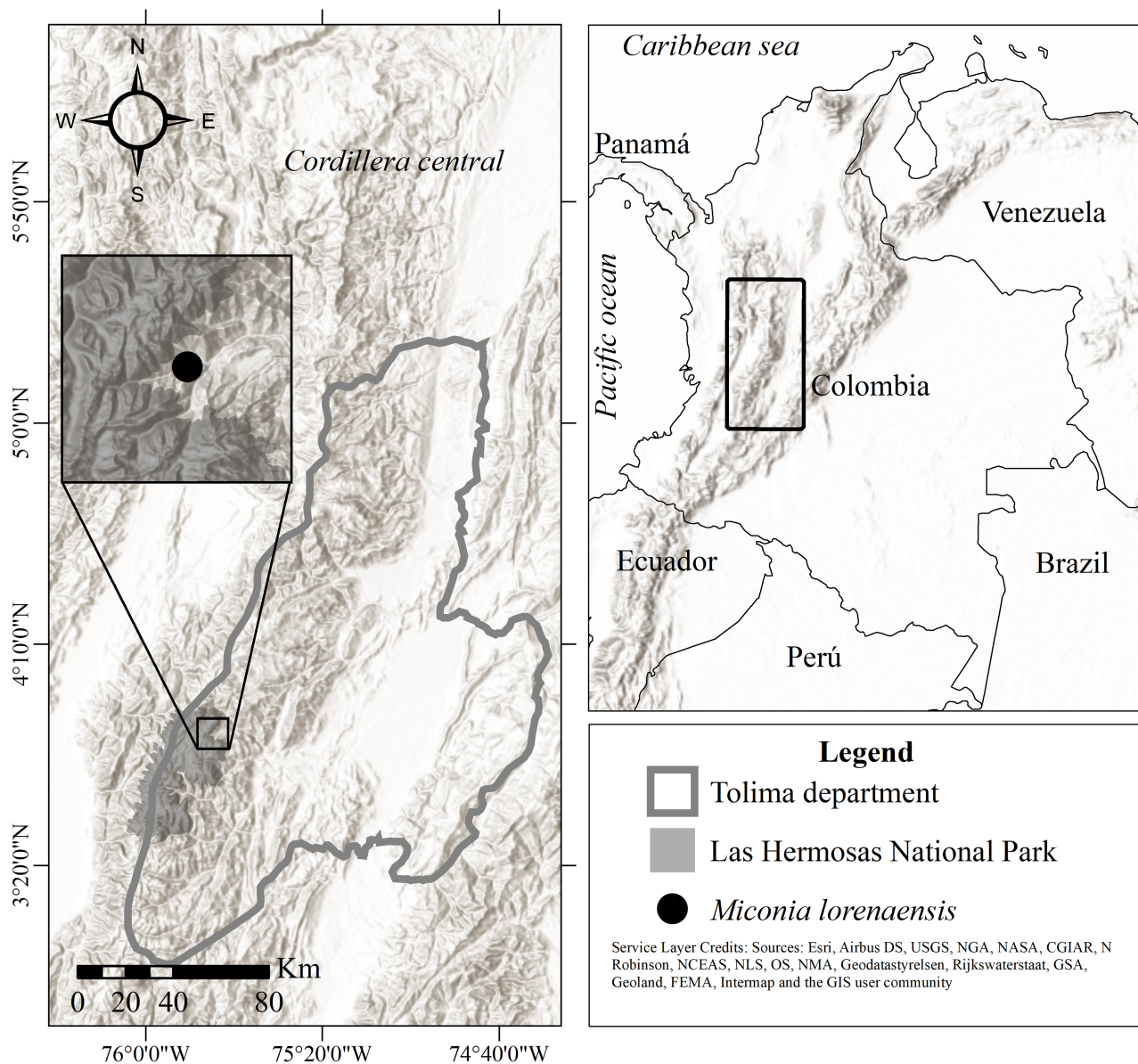


FIGURE 3. Distribution map of *Miconia lorenaensis*.

Material and methods

Type and representative specimens from all species of *Miconia s.s.* reported for Colombia (Almeda *et al.* 2020), along with all described species for *Miconia* sect. *Amblyarrhena* listed in Goldenberg *et al.* (2013), as well as recent novelties in the section, were examined from digital images available online through the Global Plants project (<http://plants.jstor.org>) and from websites of A, AUU, BM, F, G, GH, K, NY, P, PMA, S, U, US herbaria (acronyms according to Thiers 2020).

Vegetative morphology was described from dried material, floral characteristics were observed and measured from alcohol-preserved flowers and buds. Measurements and characters from similar species were obtained from digital images and protologue information. Descriptive terminology follows Wurdack (1973, 1980, 1986) and Beentje (2016). The threat status was evaluated according to IUCN criteria (2012, 2019) and assessed by the R package “ConR” (Dauby, 2017). A distribution map was generated using ArcGIS v. 10.5.1 software (ESRI 2018).

Taxonomic treatment

Miconia lorenaensis J.S.Murillo, Londono-E. & H.David, *sp. nov.*

Type:—COLOMBIA. Tolima: Municipio de El Chaparral, vereda Aurora-Hermosas, finca La Lorena, inmediaciones del PNN Las Hermosas-Gloria Valencia de Castaño, 3°49'51.78"N, 75°44'27.67"W, 2500 m, 6 August 2018, (fl.), *M. Jiménez & N. Castro* 1 (holotype: FAUC-30073; isotype: HUA!). Figures 1, 2, 3.

Diagnosis:—A species of *Miconia* sect. *Amblyarrhena* that can be distinguished by the combination of branches, petioles and leaves covered by scattered short dendritic trichomes; 7-nerved peltate leaves, acuminate or cuspidate apex with a circinate-thickened tip and flowers with 3-locular ovary, completely inferior. *Miconia lorenaensis* is similar to *Miconia clypeata* Wurdack (1982: 302) but differs by its branches sulcate-quadrangular with nodes without stipuliform-flaps (vs. winged-quadrangular and nodes with conspicuous stipuliform-flaps in *M. clypeata*), and peltate leaves without scutum in the base of blade (vs. leaves with marginal petioles with a conspicuous scutum in the blade's petiole insertion point).

Tree 4–6 m tall. Branches, vegetative buds and petioles covered with short dendritic trichomes ca. 0.05 mm diam. *Internodes* 4.2–6.2 cm long, 1.6–3.3 mm diam., sulcate-quadrangular. *Leaves* peltate, slightly unequal at the same node, the smaller ones 63.6–90.5 % as long as their larger ones, papyraceous, acrodromous, 3 pairs of secondary veins (including the marginal pair), slightly plinerved, impressed on adaxial surface, raised on abaxial surface; *larger leaves* with the petiole attached 4.5–15.5 mm from the basal edge, petioles 3.3–13.1 cm long, 1.3–2.7 mm diam., terete and grooved; leaf blades 12.6–22.5 × 8.6–17.5 cm, L/W ratio 1.2–1.5, elliptic (-suborbicular), base rounded or subcordate, apex acuminate to cuspidate, the tip thickened and circinate, margin entire; 26–32 tertiary veins adjacent to the middle vein, 1.2–8.6 mm apart; *smaller leaves*, with the petiole attached 3–8.9 mm from the basal edge, petioles 2.8–6.8 cm long, 1–2.3 mm diam., terete and grooved; leaf blades 8.2–15.4 × 5.5–11.5 cm, L/W ratio, general shape, apex, base and margin as in the bigger leaves, with 24–30 tertiary veins adjacent to the middle vein, 1–7.3 mm apart; adaxial surface of both type of leaves covered with scattered, caducous, sessile, short dendritic trichomes and abaxial surface moderately covered with same indumentum as adaxial surface, more dense on the nerves and proximal and distal regions. *Inflorescence* a terminal panicle, 13–33 cm long, pyramidal, multiflorous; axes covered with sessile, short dendritic trichomes; peduncle 3.2–7.3 cm long, rachis with 5–6 internodes, first internode 3.9–8.3 cm long, first paracladia 4–18 cm long; proximal bracts foliose (as the leaves, but shorter), petioles 2–9 cm long, 0.9–1.7 mm diam., leaf blades 4.8–15.7 × 2.5–13.9 cm; bracteoles not seen. *Flowers* 5-merous, pedicel 0.5–0.9 mm long, 0.9–1 mm diam. *Hypanthium* 3–3.7 mm long up to the torus, 3.2–3.5 mm diam. at the torus, cupuliform, dull-green to whitish, internally glabrous, externally covered with scattered, sessile and short dendritic trichomes. *Calyx* open in bud, persistent in fruit, internally glabrous, externally with trichomes similar to the ones on the hypanthium; tube 0.9–1.1 mm long; calyx lobes 0.6–0.9 mm long, membranous, slightly undulate-lobed, hyaline; outer calyx teeth marginal, deltoid, 0.3–0.4 × 0.3–0.4 mm. *Petals* white at anthesis, 3–3.8 × 2.4–3.2 mm, asymmetrical, obovate, orbicular or elliptical, apex truncate, rounded or obtuse, margin entire to irregularly sinuate, glabrous, reflexed at anthesis. *Stamens* 10, isomorphic, actinomorphic; filaments white, glabrous, 2.9–3.3 mm long, 0.7–0.9 mm wide in dorsal position, 0.3–0.6 mm wide in lateral position; anthers with 2 locules, thecae yellow at anthesis, 2.1–2.3 mm long, 0.6–1 mm diam., cuneate, slightly tapering apically, opening by 1 dorsally inclined pore, 0.1 mm diam, connective not extended below thecae. *Ovary* 3-locular, completely inferior, apex with sparsely glandular trichomes, without a corona, 1.3–1.9 mm long, 1.9–2.2 mm diam. in longitudinal section, hypanthium diameter in the middle of the locules 2.7–3.1 mm; *style* 7.5–8.7 mm long, base 0.4–0.5 mm diam, slightly arcuate, glabrous; stigma punctiform, 0.5–0.7 mm wide. *Berries* green when immature (mature not seen), 3.5–4.3 × 3.4–3.7 mm, globose and crowned by the remaining calyx; seeds not seen.

Distribution and habitat:—*Miconia lorenaensis* is endemic to the Cordillera Central of the Colombian Andes, where it has been collected only at the department of Tolima, on El Chaparral municipality, at an elevation close to 2500 m (Fig. 3). It grows in the understory of riparian forests, in lower montane wet forests.

Phenology:—Collected with flowers in August and with immature fruits in September.

Conservation status:—*Miconia lorenaensis* is known only from its type locality. The only population known grows in the vicinity of Las Hermosas-Gloria Valencia de Castaño National Natural Park (figure 3), but outside of the protected area. Based on the small area of occupancy (< 10 km²), few number of locations (= 1), and the decrease in habitat quality due to forest clearing, in addition to being less than 25 km from oil concessions, less than 15 km from a populated center and less than 1 km from the agricultural border, we suggest the “Critically Endangered” (CR) category, following the IUCN guidelines and criteria B2ab(iii) (IUCN 2012, 2019).

TABLE 1. Comparison of morphological characters and distribution of *Miconia lorenaensis* and similar species.

	<i>M. clypeata</i>	<i>M. perobscura</i>	<i>M. peltata</i>	<i>M. lorenaensis</i>
Shape of branches	winged-quadrangular	sulcate-quadrangular	compressed on two-side, becoming teretes	sulcate-quadrangular
Nodes	with well developed stipuliform flaps, forming a continuous ring around the nodes	without stipuliform flaps	without stipuliform flaps	without stipuliform flaps
Indumentum on branches	stellate-lepidote	stellate, briefly stipitate	pinoid trichomes	short dendritic trichomes
Length of leaf petioles	4–6 cm	4–13 cm	1.3–5 cm	2.8–13.1 cm
Petiole insertion point	marginal	marginal	peltate, attached 5–8 mm from the basal edge	peltate, attached 3–15.5 mm from the basal edge
Indumentum on petioles	dendroid trichomes	stellate, briefly stipitate	pinoid trichomes	short dendritic trichomes
Leaf blade shape	ovate	widely elliptical	ovate to elliptic-ovate	elliptic (-suborbicular)
Leaf blade apex	acuminate	acuminate	acuminate	acuminate to cuspidate, the tip thickened and circinate
Leaf blade base	cordate with a conspicuous scutum	obtuse or truncate	rounded to subcordate	rounded or subcordate
Leaf blade margin	calloused-denticulate	crenulate	undulate-denticulate to subentire	entire
Indumentum on leaf blade (abaxial surface)	scattered stellate-lepidote	stellate, briefly stipitate	pinoid trichomes and appressed glandular trichomes	short dendritic trichomes
Venation (including marginal pair)	5-nerved	7-plinerved	5–7-nerved	7-nerved, slightly plinerved
Hypanthium shape	campanulate	campanulate	campanulate to subglobose	cupuliform
Indumentum on hypanthium	stellate-lepidote	stellate-puberulous	stipitate-stellate or pinoid trichomes	Sessile and short dendritic trichomes
Ovary	3-locular, 1/2-inferior	3-locular, 1/2-inferior	5-locular, 2/3-inferior	3-locular, completely inferior
Distribution	Colombia, western slope of the Western Cordillera, between Choco and Andean biogeographic regions	Venezuela, Guiana Shield, Cerro de la Neblina	Panamá, endemic to Cerro Jefe	Colombia, Central Cordillera, Andean biogeographic region

Etymology:—The epithet *loreanaensis* makes reference to the name of the property “La Lorena” which is in the registration process as a private protected area. This is the type locality of the new species.

Additional specimen examined (paratype):—COLOMBIA. Tolima: Municipio de Chaparral: vereda Aurora-Hermosas, finca La Lorena, inmediaciones del PNN Las Hermosas-Gloria Valencia de Castaño, 3°49′51.78″N, 75°44′27.67″W, 2500 m, 5 Sep 2018 (im. fr.), Y. Londoño & C. Portela 457 (FAUC!).

Miconia loreanaensis belongs to *Miconia* sect. *Amblyarrhena* because of its stamens with short, stout anthers with a slightly tapering apex, opening by a small terminal pore. Among the species in this alliance, *Miconia loreanaensis* is morphologically similar to *Miconia chypeata* and *Miconia perobscura* Wurdack (1961: 42–43); *Miconia loreanaensis* has branches, petioles, leaf blades and flowers covered by scattered short dendritic trichomes; the leaf blades are peltate, with an acuminate or cuspidate apex and a circinate-thickened tip; its flowers have a completely inferior ovary. In contrast, the indumentum of *M. chypeata* has stellate-lepidote and dendroid hairs, the petioles have a marginal insertion point, the leaves have a scutum in the base of the blade (not present in *M. loreanaensis*), and the flowers have a ½ inferior ovary (Wurdack 1982). *Miconia perobscura* has 7-markedly plinerved leaves (not peltate) and indumentum with stellate, briefly stipitate hairs in vegetative parts, and stellate-puberulous trichomes in flowers (Wurdack 1961); in addition to that, this species is endemic to Venezuela (Goldenberg *et al.* 2013).

Miconia loreanaensis is also similar to *Miconia peltata* Almeda (1989: 217) in having peltate leaves with rounded or subcordate leaf blades, but this species is densely covered with rusty-brown, pinoid hairs on axes and leaves and it has flowers with a 5-locular, ⅔ inferior ovary (Almeda 1989); in addition to that, Goldenberg *et al.* (2013) report this species as endemic to Panama and includes *M. peltata* in *Miconia* sect. *Miconia* Candolle (1828: 183). Nevertheless, this species has been found to be part of the *Conostegia* clade (Kriebel *et al.* 2015) and was studied in detail in the Kriebel’s monograph under the name *Conostegia peltata* (Almeda 1989: 217) Kriebel (2016: 281).

See Table 1 for distinguishing characters and distribution among these four species.

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References

- Almeda, F. (1989) New species and taxonomic notes on mexican and central american Melastomataceae. *Proceedings of the California Academy of Sciences, Series 4* 46: 209–220.
- Almeda, F., Mendoza, H., Penneys D.S., Michelangeli, F.A. & Alvear, M. (2020) Melastomataceae. In: Bernal, R., Gradstein, S.R. & Celis, M. (Eds.) *Catálogo de plantas y líquenes de Colombia*. Instituto de Ciencias Naturales, Universidad Nacional de Colombia. Available from: <http://catalogoplantasdecolombia.unal.edu.co/es/resultados/familia/melastomataceae/> (accessed 5 November 2020)
- Beentje, H. (2016) *The Kew Plant Glossary, an illustrated dictionary of plant terms (Second edition)*. Royal Botanic Garden, Kew, Richmond, 183 pp.
- Bentham, G. & Hooker, J.D. (1867) *Genera plantarum*, vol. 1. Reeve, Williams & Norgate, London, 1040 pp. <https://doi.org/10.5962/bhl.title.747>
- Burke, J.M. & Michelangeli, F.A. (2018) Six new species of *Miconia* (Miconiaceae, Melastomataceae) from the Andes. *Phytotaxa* 361 (2): 131–150. <https://doi.org/10.11646/phytotaxa.361.2.1>

- Caddah, M.K. & Meirelles, J. (2018) *Miconia goldenbergiana* (Melastomataceae, Miconieae): a new species from the Atlantic Forest, Brazil. *Phytotaxa* 356 (2): 167–173.
<https://doi.org/10.11646/phytotaxa.356.2.6>
- Candolle, A.P. (1828) Melastomataceae. In: De Candolle, A.P. (Ed.) *Prodromus Systematis Naturalis Regni Vegetabilis* 3. Sumptibus Sociorum Treuttel et Würtz, Paris, pp. 99–202.
- Cogniaux, C.A. (1891) Melastomataceae. In: Candolle, A.L.P.P. de & Candolle, A.C.P. de (Eds.) *Monographiae Phanerogamarum* 7. G. Masson, Paris, pp. 1–1256.
- Dauby, G., Stévant, T., Droissart, V., Cosiaux, A., Deblauwe, V., Simo-Droissart, M., Sosef, M.S., Lowry, P.P., Schatz, G.E., Gereau, R.E. & Couvreur, T.L. (2017) ConR: An R package to assist large-scale multispecies preliminary conservation assessments using distribution data. *Ecology and evolution* 7: 11292–11303.
<https://doi.org/10.1002/ece3.3704>
- ESRI (Environmental Systems Research Institute) (2018) ArcGIS Desktop. Environmental Systems Research Institute, Redlands, California.
- Gamba, D. & Almeda, F. (2014) Systematics of the Octopleura Clade of *Miconia* (Melastomataceae: Miconieae) in Tropical America. *Phytotaxa* 179 (1): 1–174.
<https://doi.org/10.11646/phytotaxa.179.1.1>
- Goldenberg, R., Penneys, D.S., Almeda, F., Judd, W.S. & Michelangeli, F.A. (2008) Phylogeny of *Miconia* (Melastomataceae): patterns of stamen diversification in a megadiverse neotropical genus. *International Journal of Plant Sciences* 169: 963–979.
<https://doi.org/10.1086/589697>
- Goldenberg, R., Almeda, F., Caddah, M.K., Martins, A.B., Meirelles, J., Michelangeli, F.A. & Weiss, M. (2013) Nomenclator botanicus for the neotropical genus *Miconia* (Melastomataceae, Miconieae). *Phytotaxa* 106 (1): 1–171.
<https://doi.org/10.11646/phytotaxa.106.1.1>
- IUCN (2012) IUCN red list categories and criteria: Version 3.1. Second edition. IUCN, Gland, Switzerland and Cambridge, UK. Available from: <https://portals.iucn.org/library/node/10315> (accessed 6 November 2020)
- IUCN Standards and Petitions Subcommittee (2019) Guidelines for using the IUCN red list categories and criteria. Version 14. Prepared by the standards and petitions committee. Available from: <http://cmsdocs.s3.amazonaws.com/RedListGuidelines.pdf> (accessed 6 November 2020)
- Kriebel, R., Michelangeli, F.A. & Kelly, L.M. (2015) Discovery of unusual anatomical and continuous characters in the evolutionary history of *Conostegia* (Miconieae: Melastomataceae). *Molecular Phylogenetics and Evolution* 82: 289–313.
<http://dx.doi.org/10.1016/j.ympev.2014.09.021>
- Kriebel, R. (2016) A monograph of *Conostegia* (Melastomataceae, Miconieae). *PhytoKeys* 67: 1–326.
<https://doi.org/10.3897/phytokeys.67.6703>
- Meirelles, J. & Bacci, L.F. (2017) *Miconia renatogoldenbergii* (Miconieae, Melastomataceae), a new species from savanna enclaves in southern Amazonia, Brazil. *Phytotaxa* 298 (2): 187–193.
<https://doi.org/10.11646/phytotaxa.298.2.9>
- Mendoza, H. & Posada, J.M. (2018) Una nueva especie de *Miconia* (Melastomataceae) de hojas rojizas de los andes de Colombia. *Revista de la Academia Colombiana de Ciencias Exactas, Físicas y Naturales* 42: 74–79.
<https://doi.org/10.18257/raccefyn.602>
- Mendoza, H., Posada, M. & David, H. (2019) Una nueva especie de *Miconia* (Melastomataceae) con anteras connadas de Colombia. *Revista de la Academia Colombiana de Ciencias Exactas, Físicas y Naturales* 43: 250–254.
<https://doi.org/10.18257/raccefyn.848>
- Michelangeli, F.A., Penneys, D.S., Giza, J., Soltis, D., Hils, M.H. & Skee, J.D. (2004) A preliminary phylogeny of the tribe Miconieae (Melastomataceae) based on nrITS sequence data and its implications on inflorescence position. *Taxon* 53: 279–290.
<https://doi.org/10.2307/4135608>
- Michelangeli, F.A., Judd, W.S., Penneys, D.S., Skee Jr., J.D., Bécquer-Granados, E.R., Goldenberg, R. & Martin, C.V. (2008) Multiple Events of Dispersal and Radiation of the Tribe Miconieae (Melastomataceae) in the Caribbean. *The Botanical Review* 74: 53–77.
<https://doi.org/10.1007/s12229-008-9004-x>
- Michelangeli, F.A., Almeda, F., Alvear, M., Bécquer, E.R., Burke, J., Caddah, M.K., Goldenberg, R., Ionta, G.M., Judd, W.S., Majure, L.C., Meirelles, J., Nicolas, A.N., Ocampo, G., Penneys, D.S., Skee Jr., J.D. & Ulloa, C. (2016) Proposal to conserve *Miconia* nom. cons. against the additional names *Maieta* and *Tococa* (Melastomataceae: Miconieae). *Taxon* 65: 892–893.
<https://doi.org/10.12705/654.27>
- Michelangeli, F.A., Goldenberg, R., Almeda, F., Judd, W.S., Bécquer, E.R., Ocampo, G., Ionta, G.M., Skee Jr., J.D., Majure, L.C. & Penneys, D.S. (2019) Nomenclatural novelties in *Miconia* (Melastomataceae: Miconieae). *Brittonia* 71: 82–121.
<https://doi.org/10.1007/s12228-018-9546-0>

- Michelangeli, F.A. & Paredes, D. (2019) *Miconia canoi* (Melastomataceae, Miconieae), a new species from southern Ecuador and northern Peru. *Brittonia* 71: 55–63.
<https://doi.org/10.1007/s12228-018-9549-x>
- Michelangeli, F.A., Almeda, F., Goldenberg, R. & Penneys, D. (2020) A Guide to Curating New World Melastomataceae Collections with a Linear Generic Sequence to World-Wide Melastomataceae. *Preprints* 2020100203.
<https://doi.org/10.20944/preprints202010.0203.v2>
- Naudin, C.V. (1850) Melastomacearum monographicae descriptiones. *Annales des Sciences Naturelles; Botanique Series* 3 16: 83–248.
- Reginato, M. (2016) Taxonomic revision of *Leandra* sect. *Leandra* (Melastomataceae, Miconieae). *Phytotaxa* 262 (1): 1–97.
<https://doi.org/10.11646/phytotaxa.262.1.1>
- Ruiz, H. & Pavon, J. (1794) *Florae Peruvianaee et Chilensis*. Vol 1. Gabriellis de Sancha, Madrid, 78 pp.
- Thiers, B. (2020 [continuously updated]) Index Herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. Available from: <https://sweetgum.nybg.org/ih/> (accessed 5 November 2020)
- Wurdack, J.J. (1961) Botany of the Guayana Highlands IV. *Memoirs of The New York Botanical Garden* 10: 32–47.
- Wurdack, J.J. (1973) Melastomataceae (Memecyleae by Morley, T.). In: Lasser, T. (Ed.) *Flora de Venezuela*. No. 8. Instituto Botánico, Ministerio de Agricultura y Cría, Caracas, 819 pp.
- Wurdack, J.J. (1980) 138. Melastomataceae. In: Harling, G. & Sparre, B. (Eds.) *Flora of Ecuador*. No. 13. University Göteborg & Riksmuseum, Stockholm, 406 pp.
- Wurdack, J.J. (1982) Certamen Melastomataceis XXXIV. *Phytologia* 50: 297–308.
<https://doi.org/10.5962/bhl.part.16105>
- Wurdack, J.J. (1986) Atlas of hairs for Neotropical Melastomataceae. *Smithsonian Contributions to Botany* 63: 1–80.
<https://doi.org/10.5479/si.0081024X.63>