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Miconia lucenae (Melastomataceae), a new species from montane Atlantic Forest in Espírito Santo, Brazil

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We describe *Miconia lucenae*, a new species from montane Atlantic Forest in Santa Teresa, state of Espírito Santo. Our analysis based on three plastid spacers (*atpF-atpH*, *psbK-psbI* and *trnS-trnG*), one plastid gene (*ndhF*), and two nuclear ribosomal loci (nrITS and nrETS) showed that it belongs to a small clade with *Miconia paradoxa* (Mart. ex DC.) Triana (Minas Gerais) and *M. michelangeliana* R.Goldenb. & L.Kollmann (Espírito Santo). The three species in "Paradoxa clade" can be recognized by the plants with glabrous or glabrescent branches and leaves, white petals and yellow stamens, these with the connectives not prolonged below the thecae, ventrally unnapendaged, dorsally unnapendagged or with a minute tooth, bilobed or not, glabrous ovary, and the fruits with a persistent calyx. *Miconia lucenae* can be recognized, among the species in this clade, by the shrubby plants with terete young branches, short inflorescences, usually with red axes, and the 2-bracteolate, sessile, 4-merous flowers, with a ciliolate inner portion of the sepals, lanceolate petals, yellow stamens and 4-celled ovaries.

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Abstract

We describe *Miconia lucenae*, a new species from montane Atlantic Forest in Santa Teresa, state of Espírito Santo. Our analysis based on three plastid spacers (*atpF-atpH*, ~~*psbK-psbI*~~ and *trnS-trnG*), one plastid gene (*ndhF*), and two nuclear ribosomal loci (nrITS and nrETS) showed that it belongs to a small clade with *Miconia paradoxa* (Mart. ex DC.) Triana (Minas Gerais) and *M. michelangeliana* R.Goldenb. & L.Kollmann (Espírito Santo). The three species in "Paradoxa clade" can be recognized by the plants with glabrous or glabrescent branches and leaves, white petals and yellow stamens, these with the connectives not prolonged bellow the thecae, ventrally ~~unnapendaged~~, dorsally ~~unnapendagged~~ or with a minute tooth, bilobed or not, glabrous ovary, and the fruits with a persistent calyx. *Miconia lucenae* can be recognized, among the species in this clade, by the shrubby plants with terete young branches, short inflorescences, usually with red axes, and the 2-bracteolate, sessile, 4-merous flowers, with a ciliolate inner portion of the sepals, lanceolate petals, yellow stamens and 4-celled ovaries.

Introduction

Miconia Ruiz & Pav. has nowadays about ca. 1900 species native to the Neotropics (Michelangeli et al. 2016). Its circumscription has been recently modified (see Michelangeli et al. 2016, 2019), and now it is equivalent to the whole tribe Miconieae, in its modern definition (Michelangeli et al. 2004, 2008, Goldenberg 2008; see also Penneys et al. 2010, Michelangeli et al. 2011). This new circumscription includes former *Miconia* sensu stricto and several other genera, such as *Leandra* Raddi, *Clidemia* D.Don, *Ossaea* DC. and *Tococa* Aubl. Some of these genera or parts of these genera may be monophyletic (Reginato & Michelangeli 2016), but their recognition renders *Miconia* s.s. paraphyletic. For an alternative opinion on this broad circumscription of *Miconia* see Kriebel (2016) and Reginato (2016).

In the course of floristic work in the state of Espírito Santo, Brazil, we collected a previously undescribed species with lanceolate petals and terminal inflorescences. In Cogniaux's (1891) classification, this species would have been placed in *Leandra*. However, the general floral and vegetative morphology of this species makes any comparison to other species previously placed in *Leandra* in the Atlantic Forest very difficult. Moreover, preliminary data placed this species (Michelangeli et al., in prep.) among ~~species~~ traditionall~~y placed in~~ *Miconia* s.s.

Even though nowadays this species would be unequivocally placed in *Miconia* s.l., following its modern circumscription, we have opted to present here the description of the new species along with a simplified phylogeny based on molecular markers, in order to explain its phylogenetic placement and better understand its unique combination of morphological characters.

Materials & Methods

Taxonomy. The authors have been collecting and working on plant collections from montane Espírito Santo sice 1994. Specimens from the new species and related ones have been studied in loco in ~~the~~ herbaria MBML, NY, RB, UPCB. The specimens from VIES have been checked through images available in virtual herbaria (http://reflora.jbrj.gov.br). All morphological analyses were based ~~in~~ herbarium specimens; floral parts were rehydrated from dried specimens.

Phylogeny. Taxon sampling was based on previous phylogenies that ~~have~~ sampled the tribe Miconieae (Goldenberg & al., 2008; Martin & al., 2008; Michelangeli & al., in prep.). For each previously recognized major clade up to six species were selected and their sequences

downloaded from ~~Genbank~~. We kept the traditional generic classification for Miconieae, based on Cogniaux (1891; see also Michelangeli et al. 2004, 2008; Goldenberg et al. 2008; Reginato & Michelangeli 2016); i.e., we did not show all the names transferred to a single genus, *Miconia* s.l., as proposed in Michelangeli et al. (2016, 2019), since ~~we understood that~~ the tree with the old names is more easily understandable.

Sanger based DNA sequences of *M. lucenae* (voucher Goldenberg 889) were generated for five molecular markers included in those studies. Total genomic DNA was isolated from silica-dried or herbarium material using the DNeasy Plant Mini Kit (Qiagen, Valencia, CA, USA) following the protocol suggested by Alexander & al. (2007). The molecular data set included three plastid spacers (atpF-atpH, ~~psbK-psbI~~ and trnS-trnG), and two nuclear ribosomal loci (the internal and external transcribed spacers nrITS and nrETS). The amplification protocols and primers used are described in Reginato & Michelangeli (2016). Cycle sequencing was performed with the same forward and reverse primers used for amplification at the high-throughput sequencing service at the University of Washington (USA). Contigs were assembled with Sequencher 4.9 (GeneCodes Corp., Ann Arbor, MI, USA). An additional plastid gene (*ndhF*) available for most of the sampled taxa was also included in the phylogenetic analysis. Genbank accessions of all taxa analyzed are available in the supplementary Table S1.

Sequence alignment was performed with MAFFT v.7 using the strategy G-INS-i (Katoh, 2013). DNA substitution models for each of the six makers were selected using jModeltest v.2.1 (Dariba et al., 2012), using the 3 model scheme with or without four discrete rate categories approximating a gamma distribution (+G) and including models with equal/unequal base frequencies (+F). The likelihoods were calculated using a Maximum Likelihood optimized base tree with NNI topology search using phyml (Guindon and Gascuel, 2003) and the models were evaluated using the BIC criterion. Tree inference was performed ~~in a~~ Bayesian framework implemented in the program BEAST v.2.5.0 (Bouckaert et al. 2014). The analysis was performed using the DNA models recovered in the previous step: GTR (atpF-atpH, ~~psbK-psbI~~); GTR+G (nrETS, nrITS, trnS-trnG); and HKY+G (*ndhF*). Clock and tree models were linked across markers, the molecular clock prior was set to the lognormal uncorrelated, and the tree prior was set to the Birth and Death model. Two independent runs of 50 million generations each, sampling every 1,000 generations with a 10% burn in were performed. Convergence was assessed using Tracer v.1.5 (Rambaut & Drummond, 2007), and runs ~~presented~~ ESS values

greater than 200 for all parameters. The stable posterior distributions of the independent runs were combined using LogCombiner v.2.5.0 and a maximum clade credibility tree summarized with TreeAnnotator v.2.5.0 (Bouckaert et al. 2014).

Niche modeling. The potential distribution of *M. lucenae* under current climatic conditions was modeled and evaluated in Maxent 3.4.0 (Phillips & Dudik, 2008) ~~through~~ the R package dismo (Hijmans et al., 2017). The climatic model was based on its known localities and the 19 climatic variables from the WorldClim data set v.2 with 30" spatial resolution (Fick & Hijmans, 2017). The area under the curve (AUC) of the receiver operating characteristic (ROC) was used as evaluation criterion, and all parameters were left as the default.

SEM. Seeds and leaves for the SEM images were obtained from herbarium specimens and manually cleaned. The structures were mounted on aluminum stubs, coated with gold-palladium for 2 ~~min~~ in a Hummer 6.2 (Aratech LTD), and examined using a JEOL – JSM 5410LV SEM, with the software JEOL ORION 5410, version 1.72.01 (1999–2004).

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Results and Discussion

Phylogenetic relationships. Our phylogenetic analysis recovered the same major clades indentified in previous studies (Goldenberg et al., 2008, Michelangeli et al., in prep.); these clades are indicated in Fig. 1. *Miconia lucenae* was recovered in an early divergent subclade of a clade containing Miconia IV and Miconia V (sensu Goldenberg et al. 2008), all of them sister to the Clidemia/Leandra clade. *Miconia lucenae* is resolved in a clade with *M. michelangeliana* ~~R.Goldenb. & L. Kollmann~~ and *M. paradoxa* (Mart. ex DC.) Triana, called "Paradoxa clade"

from now on. Among the other two species in Paradoxa clade, *M. lucenae* seems closer to *M. paradoxa* (Fig. 1), which was then chosen as the species to be compared in the formal taxonomic diagnosis.

While there is little overall morphological resemblance between *M. lucenae* and the two other species in the Paradoxa clade, all three share the glabrous or glabrescent branches and leaves, white petals and yellow stamens, these with the connectives not prolonged bellow the thecae, ventrally ~~unnapendaged~~, dorsally ~~unnapendagged~~ or with a minute tooth, bilobed or not, glabrous ovary, and the fruits with a persistent calyx (Table 1). Other distinctive characters in the clade are the strongly decussate flattened young branches (in *M. michelangeliana* and *M. paradoxa*; lacking in *M. lucenae*), and 4-merous flowers with 4-celled gynoecia (in *M. lucenae* and *M. paradoxa*; 6-merous flowers with 6-celled gynoecia in *M. michelangeliana*). All three species occur in roughly similar latitudes, two of them endemic to rain forests in ~~Espírito Santo~~ (*M. lucenae*, *M. michelangeliana*, the former also in Santa Teresa, to which *M. lucenae* is endemic), and one endemic to the neighboring state of Minas Gerais, but in "campos rupestres" (i.e., not in rain forests).

Taxonomy

Miconia lucenae R.Goldenb. & Michelang., spec. nov.

(Figs. 2, 3, 4)

Type: Brazil, Espírito Santo: Santa Teresa, Nova Lombardia, Terreno do Furlani, 19º47' 59''S, 40º32' 13'' W. 900 m. 7 Feb 2011 (fl, fr), *R. Goldenberg. Michelangeli, M.K. Caddah, M. Regindo & L. Kollmann 1525* (holotype: UPCB -71800; isotypes: MBML, NY- 02104713, 02104708, RB - 014190053).

Diagnosis: *Miconia lucenae* differs from *Miconia paradoxa* ~~(Mart. ex DC.) Triana~~ due to the terete young branches (vs. strongly decussate-flattened in *M. paradoxa*), ciliate inner portion of the sepals (vs. eciliate), and lanceolate petals (vs. obovate).

Description: Shrubs 0.5–1.5 m tall. All vegetative parts (including both surfaces of the leaf blades), inflorescences and hypanthia very sparsely and caducously covered with (1) stellate trichomes 0.1-0.3 mm diam, and (2) minute sessile glands, ca. 50 µm long.Young stems terete, slightly swollen at the nodes, these usually with a faint interpetiolar line, covered with some stellate trichomes when young , then glabrescent. Leaves isophyllous to slightly anisophyllous;

petiole 1.5–4.5 cm long, glabrous, reddish; blade 4.5–12 x 2.5–6 cm, oval, elliptic, oval-lanceolate to lanceolate, apex acuminate (seldom acute), base cordate, truncate or obtuse, sometimes strongly oblique, margins undulate or repand, entire, slightly hyaline (seen from below), and eciliate, membranaceous, flat in fresh material but slightly revolute in dried specimens, green in both surfaces (a bit darker on the adaxial surface) in fresh material, markedly discolor in dried specimens, with the adaxial much darker than the abaxial surface; lateral veins strongly to seldom weakly suprabasal (all specimens have leaves with distinct suprabasal nerves, but only Goldenberg 1525 also has a few leaves with shortly suprabasal nerves), the inner pair up to 7 mm distant from the base, with 2 pairs or seldom 4 pairs, plus and additional, faint, marginal pair, sometimes not symmetrically paired (in leaves with oblique bases), main, lateral and transversal veins plane/impressed, reticulation barely perceptible on the adaxial surface, main, lateral and transversal plane or seldom prominent, reticulation plane but perfectly distinct on the abaxial surface. Panicles 3–6.5 x 2.5–4 cm, terminal, erect, with accessory branches, 2–3 pairs of paraclades, glabrous, the axes reddish; bracts 1–1.5 mm long, linear-subulate, eciliate, caducous; bracteoles 0.8–1.2 x 0.2–0.3 mm, linear-lanceolate, curved upwards, persistent. Flowers sessile, 4-merous. Hypanthium 1.4–2 x 1.8–2 mm, greenish-white at anthesis, greener in older flowers and young fruits, narrowly campanulate to shortly terete, outside glabrous, inner surface glabrous; torus glabrous. Calyx persistent, the tube 0.1–0.2 mm long, greenish-white; sepals with the inner, laminar portion 0.4–0.6 mm long, greenish-white, erect, hemi-circular, apex rounded, margins sparsely ciliate (the cilia thick, less than 0.1 mm long), otherwise glabrous; outer teeth projecting ca. 0.2 mm above the laminae, light-green, thick-subulate, the apex acute and very shortly mucronulate, glabrous. Petals, 4, 2–2.2 x 0.7–0.8 mm, white, reflexed at anthesis, and apparently erect in old flowers, lanceolate, apex broadly acute to narrowly rounded, margins undulate, glabrous. Stamens isomorphic, erect, arranged in an actinomorphic bundle; filaments 1.3–1.5 mm long, light yellow, glabrous; anthers ca. 1.5–1.7 mm long, light yellow, oblong in ventral view, with the apex slightly arched backwards, attenuate, with a minute apical to slightly dorsally inclined pore; connective 0.1–0.2 mm prolonged below the thecae, yellow (brighter than filaments and anthers), unappendaged or with two dorsal-basal, minute, less than 0.1 mm long, acute teeth. Ovary ca. 3 x 3 mm, 4-locular, ca. 2/3 inferior, the free portion projecting ca. 1 mm, broadly rounded, glabrous; style 2.2–2.7 mm long, filiform, slighly curved, glabrous, stigma punctiform. Berries 3–3.5 x 3–3.5 mm, blackish

when ripe, topped with the persistent calyx, glabrous. Seeds 1.1-1.4–2.7 x 0.6-0.8 mm, narrowly pyramidate or narrowly oblong, the raphal region narrow and long, (almost 100 % of the total seed length), testa rough, minutely tuberculate.

Distribution and niche modelling. *Miconia lucenae* has been collected 6 times in 4 different places, all of them in the Municipality of Santa Teresa, state of Espírito Santo (Fig. 5). Only one of the samples has an indication on elevation (900 m), but all of them seem to be collected in places with similar elevation. All specimens were collected in shaded areas, in rainforest understory.

The climatic-based distribution model of *M. lucenae* presented a high value of AUC (0.99). Suitable areas were identified throughout the mountains of Santa Teresa region, especially southern to where the species is known to occur. Additional areas with high suitability includes the "Caparaó" region (41º 47' 10" W, 20º 26' 06" W) and the region of the Municipality of Domingos Martins (41º 00' 04" W, 20º 25' 12" S; Fig. 5). Despite the limitations of this model due to the low number of known points for this species, the results can still be informative in the case of collections of this species in new areas.

Paratypes. Brazil, Espírito Santo: Santa Teresa, São Lourenço, Country Club, 22 Feb 1999, *L. Kollmann, E. Bausen & W. Pizziolo 1973* (MBML); Santa Teresa, Nova Lombardia, Reserva Biológica, Estrada de Goipaba-Açu, 5 Feb 2002 (fr*), L. Kollmann et al. 5484* (MBML, RB, UPCB); Santa Teresa, Nova Lombardia, Reserva Biológica, Estrada para N. Lombardia, 20 Feb 2002 (fr), *L. Kollmann 5594* (MBML, RB, UPCB, VIES); Santa Teresa, Santo Henrique, 22 Jul 2005 (fr), *L. Kollmann & A.P. Fontana 8160* (MBML, UPCB); Santa Teresa, Nova Lombardia, Terreno do Furlani, 13 Jul 2007 (sterile), *R. Goldenberg et al. 889* (MBML, NY, UPCB).

Etymology. *Miconia lucenae* honors Dr. Sérgio Lucena Mendes, a primatologist at the Universidade Federal do Espírito Santo, and more than once director of the Museu de Biologia Mello Leitão / Instituto Nacional da Mata Atlântica, in Santa Teresa. This tribute is deserved by his efforts on biological research, conservation policies in the state of Espírito Santo, and, more importantly, on his belief that the general public, and mostly the "capixabas" (i.e., people and things from Espírito Santo) must understand and value one of the most unknown and undervalued treasures that they have in their own backyards: the wondrously diverse Mata Atlântica.

Notes. The similarities of the three species in the Paradoxa clade have been discussed in the phylogeny section. The differences between them are summarized in Table 1.

In addition to the other members of the Paradoxa clade, there is another species endemic to rainforests in Espírito Santo that is morphologically similar to *M. lucenae*. *Miconia magnipetala* ~~(R.Goldenb. & Camargo) R. Goldenb.~~ (formerly *Leandra magnipetala*; see Michelangeli et al. 2019), which has not been sampled in our phylogeny, shares with the former the somewhat succulent appearance, 4-merous flowers, ~~the sepals persistent~~ in the fruits, each with a distinct internal lamina and an acute external teeth, the broadly lanceolate petals, yellow stamens, and 4-locular ovaries. Despite the unknown phylogenetic position of *M. magnipetala*, and given some shared morphological traits and geographical distribution, ~~it was also included in~~ Table 1. The inclusion of *M. magnipetala* in the Paradoxa clade ~~should be further evaluated~~.

As for its placement in the traditional generic and infra-generic classification in Miconieae (i.e. Cogniaux 1891), *M. lucenae* would fit in *Leandra* sect. *Oxymeris* (DC.) Cogn., due to the apical inflorescences, lanceolate petals and glabrous vegetative parts. No species in this genus and section has a combination of 4-merous flowers, yellow stamens and 4-celled ovaries. In terms of overall appearance, a species described in *Leandra* sect. *Oxymeris* that seems to be morphologically close to *M. lucenae* is *Leandra mourae* Cogn. (=*Miconia leamourae* R.Goldenb.), from montane forests in Rio de Janeiro. This species was chosen by Camargo & Goldenberg (2011) to compare and diagnose *M. magnipetala* (see above), but it belongs to the Clidemia/Leandra clade (Reginato & Michelangeli, 2016). It also has vegetative features similar to *M. lucenae*, but it has 5-merous, pedicellate flowers with white stamens, longer hypanthia (2.5–3.5. mm long vs. 1.4–2 mm in *M. lucenae*) and external teeth on the sepals (1–2 mm long vs. ca. 0.2 mm).

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Figure 1 – Maximum clade credibility tree from the stable posterior distribution (BEAST). Sampling included the newly described *M. lucenae* and representatives of major clades in the tribe Miconieae. Posterior probabilities values for nodes follow the legend.

Figure 2 – *Miconia lucenae*. **A**. Fertile branch. **B**. Leaf base, abaxial view. **C**. Petal, adaxial view. **D**. Stamens, lateral (left) and dorsal (right) views. **E**. Old flower (petals and stamens removed) with bracteoles, and detail of the sepal, abaxial view. **F**. Old flower (petals and stamens removed), longitudinal section. **G**. Fruit. **H**. Seeds. A-H from *Goldenberg 1525* (UPCB). Illustration by Diana Carneiro.

Figure 3 – *Miconia lucenae*, living plants. **A**. Leaf, abaxial view. **B**. Inflorescence. **C**. Flower, lateral view, and young fruit, top view. **D**. Old flower (with persistent petals and stamens), lateral view. **E**. Inflorescence branch with flowers and young fruits. **F**. Leaf, abaxial view. A-H from *Goldenberg 1525* (UPCB). Photos by F. Michelangeli.

Figure 4 – SEM of the leaf surface and seeds of *Miconia lucenae*. A. Leaf, adaxial surface, with trichomes and sessile glands. B. Sessile gland. C-D. Stellate trichomes. E Seed, lateral view. F. Seed, testa surface. All from *L. Kollmann 5594* (NY).

Figure 5 – Geographic distribution of *Miconia lucenae*. Known distribution is indicated by the point localities and predicted suitable areas under current climatic conditions are in red tones following the legend.

Table 1 (on next page)

~~Comparative features among *Miconia lucenae* and relatives in clade paradoxa.~~

Comparative features among *Miconia lucenae* and relatives in clade paradoxa plus *Miconia magnipetala*, a species that is morphologically similar, but not sampled in the phylogeny. The table includes the Brazilian state to which they were recorded and vegetation type. The table does not include characters that are shared by all four species, such as the glabrous or glabrescent branches and leaves, white petals and yellow stamens, these with the connectives not prolonged below the thecae, glabrous ovary, and the fruits with a persistent calyx.

Table 1. Comparative features among *Miconia lucenae* and relatives in clade paradoxa plus *Miconia magnipetala*, a species that is morphologically similar, but not sampled in the phylogeny. The table includes the Brazilian state to which they were recorded and vegetation type. The table does not include characters that are shared by all four species, such as the glabrous or glabrescent branches and leaves, white petals and yellow stamens, these with the connectives not prolonged bellow the thecae, glabrous ovary, and the fruits with a persistent calyx.

Character/Species	*M. lucenae*	*M. magnipetala*	*M. michelangeliana*	*M. paradoxa*
Habit, plant size	small shrubs, up to 1.5 m tall	small shrubs, up to 1 m tall	trees , 8–12 m tall	small shrubs, up to 1.5 m tall
Young branches, shape	terete	terete	strongly flattened-decussate	strongly flattened-decussate
Number of bracetoles per flower	2	4	2	2
Pedicel	absent	2-4,5 mm long	absent	absent
Flower, number of parts	4-merous	4-merous	6-merous	4-merous
Calyx tube/sepals inner portion margins	ciliate	glabrous	glabrous	glabrous
Calyx outer teeth	distinct	distinct	not perceptible	distinct
Petals shape/ apex	lanceolate / broadly acute to narrowly rounded	broadly lanceolate / acute	oblong to oblanceolate / rounded	obovate / obtuse to rounded
Stamen connective, appendages	unnapendaged or with a small bilobed dorsal tooth	unappendaged	unappendaged or with two small dorsal teeth	unappendaged
Ovary, number of locules	4-celled	4-celled	6-celled	4-celled
Distribution/vegetation	Espírito Santo / rainforest	Espírito Santo / rainforest	Espírito Santo / rainforest	Minas Gerais / “campo rupestre”

Figure 1

Maximum clade credibility tree from the stable posterior distribution (BEAST); ~~sampling included~~ the newly described *M. lucenae* and representatives of major clades in the tribe Miconieae.

Maximum clade credibility tree from the stable posterior distribution (BEAST). ~~Sampling included~~ the newly described *M. lucenae* and representatives of major clades in the tribe Miconieae. Posterior probabilities values for nodes follow the legend.

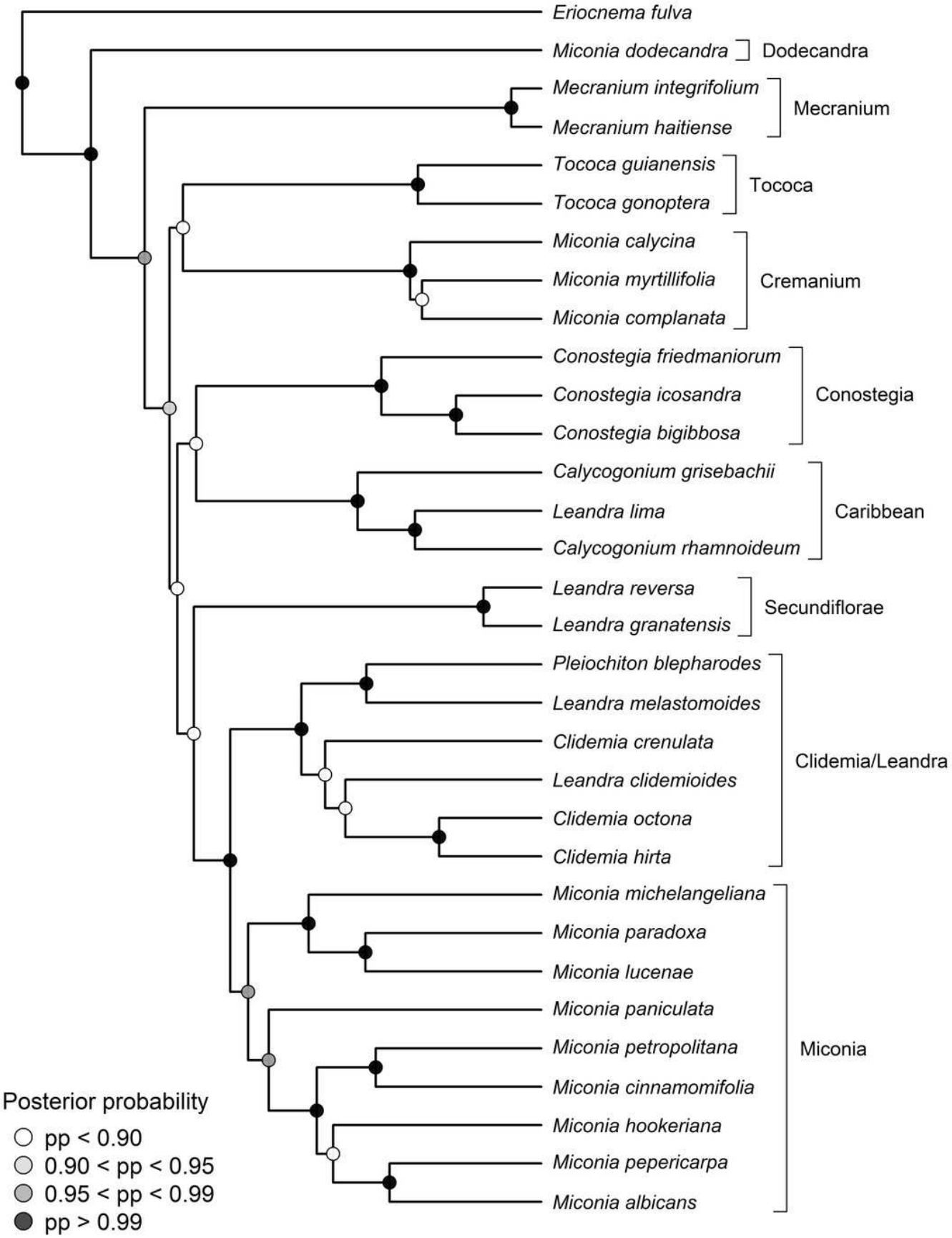
Eriocnema fulva
Miconia dodecandra
Dodecandra
Mecranium integrifolium
Mecranium haitiense
Mecranium
Tococa guianensis
Tococa gonoptera
Tococa
Miconia calycina
Miconia myrtillifolia
Miconia complanata
Cremanium
Conostegia friedmaniorum
Conostegia icosandra
Conostegia bigibbosa
Conostegia
Calycogonium grisebachii
Leandra lima
Calycogonium rhamnoideum
Caribbean
Leandra reversa
Leandra granatensis
Secundiflorae
Pleiochiton blepharodes
Leandra melastomoides
Clidemia crenulata
Leandra clidemioides
Clidemia octona
Clidemia hirta
Clidemia/Leandra
Miconia michelangeliana
Miconia paradoxa
Miconia lucenae
Miconia paniculata
Miconia petropolitana
Miconia cinnamomifolia
Miconia hookeriana
Miconia pepericarpa
Miconia albicans
Miconia
Posterior probability
pp < 0.90
0.90 < pp < 0.95
0.95 < pp < 0.99
pp > 0.99

Figure 2

Illustration of Miconia lucenae

Miconia lucenae. **A**. Fertile branch. **B**. Leaf base, abaxial view. **C**. Petal, adaxial view. **D**. Stamens, lateral (left) and dorsal (right) views. **E**. Old flower (petals and stamens removed) with bracteoles, and detail of the sepal, abaxial view. **F**. Old flower (petals and stamens removed), longitudinal section. **G**. Fruit. **H**. Seeds. A-H from *Goldenberg 1525* (UPCB). Illustration by Diana Carneiro.

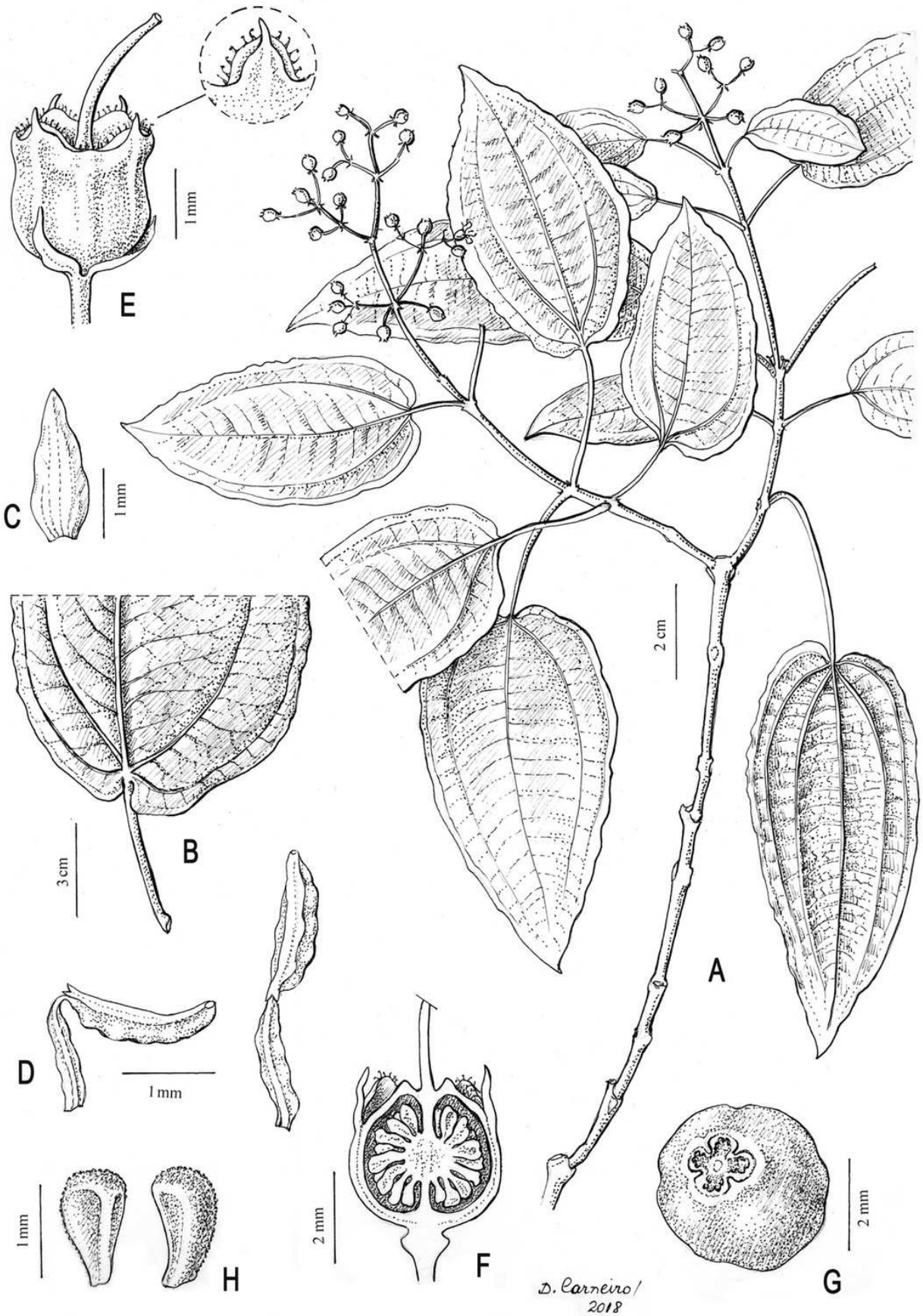
E
1 mm
C
1 mm
B
3 cm
D
1 mm
1 mm
H
2 mm
F
2 cm
A
2 mm
G
D. Carneiro / 2018

Figure 3

Fotos of living plants of Miconia lucenae

Miconia lucenae, living plants. **A**. Leaf, abaxial view. **B**. Inflorescence. **C**. Flower, lateral view, and young fruit, top view. **D**. Old flower (with persistent petals and stamens), lateral view. **E**. Inflorescence branch with flowers and young fruits. **F**. Leaf, abaxial view. A-H from *Goldenberg 1525* (UPCB). Photos by F. Michelangeli.

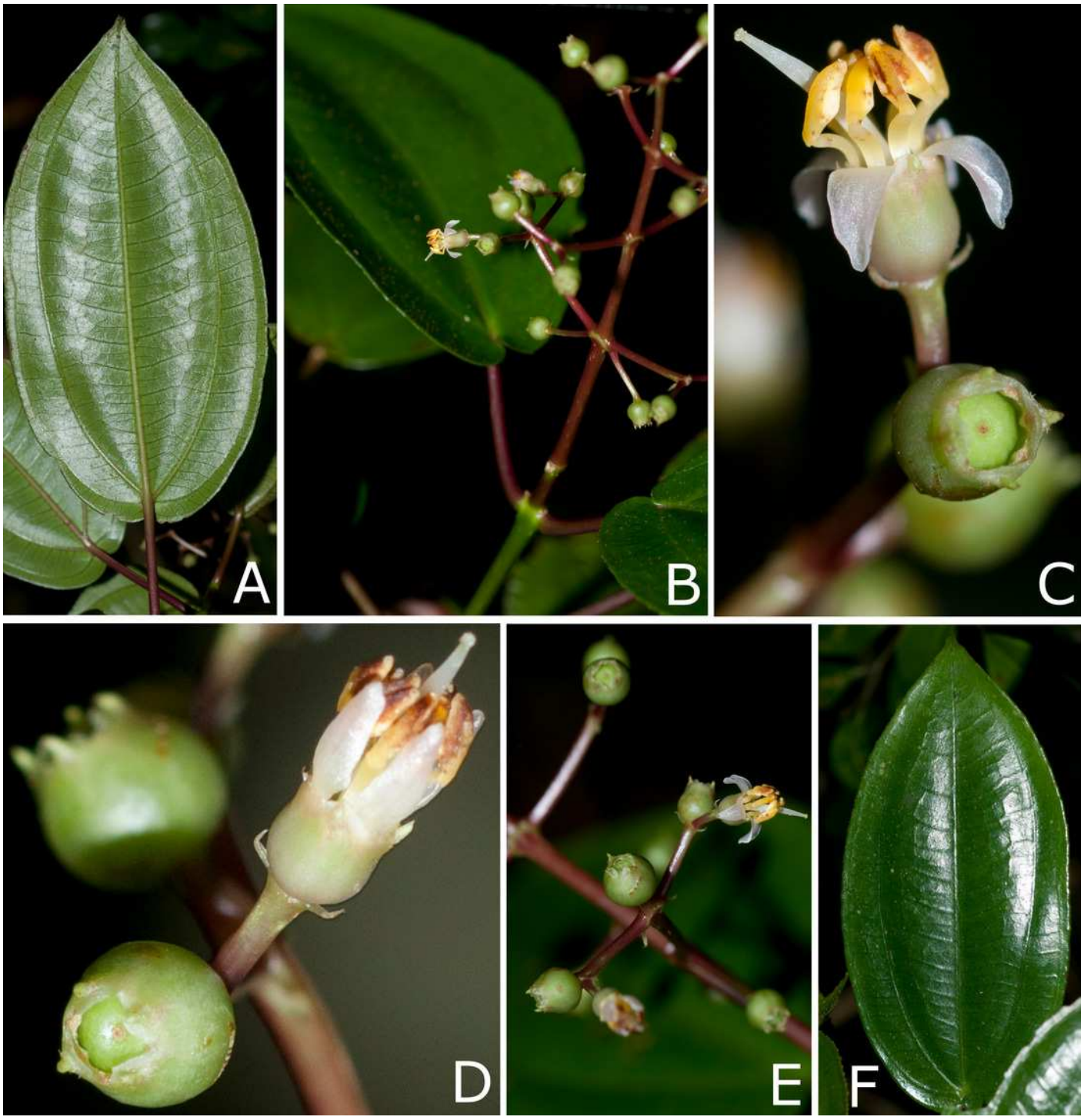
A
B
C
D
E
F

Figure 4

SEM images of trichomes and seeds of Miconia lucenae

SEM of the leaf surface and seeds of *Miconia lucenae*. A. Leaf, adaxial surface, with trichomes and sessile glands. B. Sessile gland. C-D. Stellate trichomes. E Seed, lateral view. F. Seed, testa surface. All from *L. Kollmann 5594* (NY).

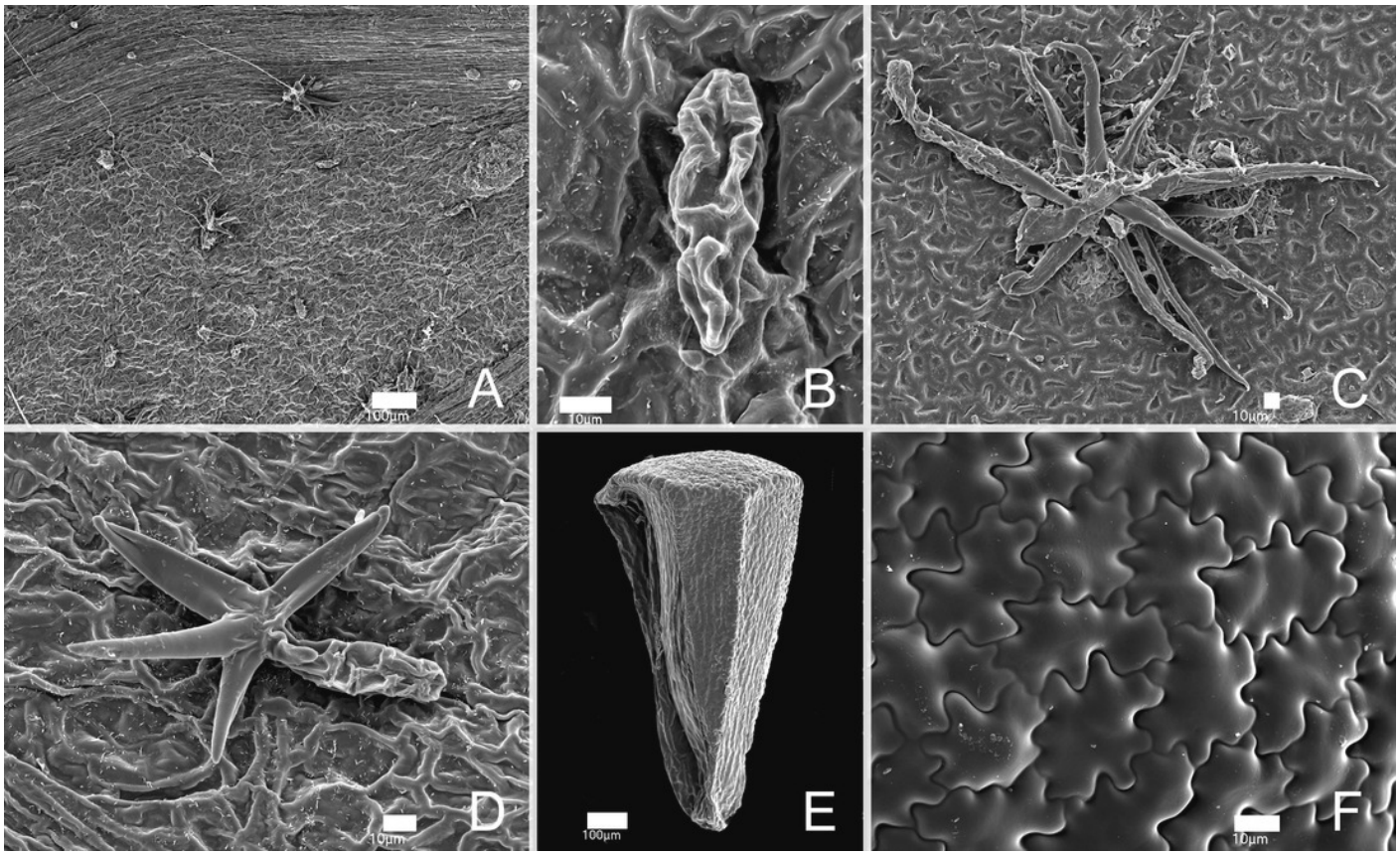

Figure 5

Geographic distribution and predicted suitable areas under current climatic conditions of *Miconia lucenae*.

Geographic distribution of *Miconia lucenae*. Known distribution is indicated by the point localities and predicted suitable areas under current climatic conditions are in red tones following the legend.