



Five new species of *Miconia* (Melastomataceae) from the Central Peruvian Andes

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Abstract

We describe five new species of *Miconia* (Melastomataceae) from Yanachaga Chemillén National Park and vicinity in Pasco, Peru: *Miconia cardenasiae*, *Miconia chemillensis*, *Miconia humifusa*, *Miconia odoratissima*, and *Miconia pozuzoana*. These species occur across a range of ecological habitats in the central Andes of Peru. Two of these species exhibit modifications for plant-arthropod interactions as leaf domatia and one of them has hollow stems. The number of previously undescribed species presented here from a relatively small area underscores the continued need for alpha taxonomy in the tropical Andes. Based on restricted distribution and habitat degradation pressure, we recommend that all species be categorized as either Endangered or Critically Endangered under IUCN guidelines.

Resumen

Se describen cinco especies nuevas de *Miconia* (Melastomataceae) del Parque Nacional Yanachaga Chemillén y sus alrededores en Pasco, Perú: *Miconia cardenasiae*, *Miconia chemillensis*, *Miconia humifusa*, *Miconia odoratissima*, *Miconia pozuzoana*. Estas especies ocurren a lo largo de un gran rango de hábitats en los Andes centrales de Perú. Dos de estas especies exhiben modificaciones para interacciones planta-artrópodo en forma de acarodomacios y una de ellas tiene tallos huecos. La cantidad de especies nuevas presentadas en este estudio proveniente de un área tan pequeña enfatiza la necesidad de trabajos de alfa taxonomía en los Andes tropicales. Basado en la distribución restringida y la presión de degradación del hábitat de todas estas especies, recomendamos que sean categorizadas como En Peligro o En Peligro Crítico bajo las categorías de la IUCN.

Introduction

The Melastomataceae are comprised of about 5000 species in 150–166 genera of mostly trees and shrubs, but also lianas and herbs (Renner 1993). Of these over 3500 species are present in the Neotropics, often as important elements both in number of species and individuals in most humid forest environments (Renner 1990, Tuomisto & Ruokolainen 1994). Within Latin America the family has been the object of several floras and/or checklists (e.g. Wurdack 1973, 1980, Wurdack *et al.* 1993, Almeda *et al.* 2007, Almeda 2009), but remains poorly studied in Peru. The last comprehensive treatment of the family for Peru was that of Macbride (1941), in which he cited 504 species for the country. More recently these numbers have increased to 43 genera and 660 species (Brako & Zarucchi 1993, Ulloa-Ulloa *et al.* 2004), of which 169 species are endemic (Leon 2006). However, ongoing work for the PBI-Miconieae project (Michelangeli *et al.* 2009 onwards) has shown that these numbers are a gross underestimate.

During an inventory of *Miconia* Ruiz & Pavon (1794: 60) for the Yanachaga Chemillén National Park the first author registered 113 species (Cárdenas 2007). Of these, two were immediately identified as new to science and three others were later found to also be undescribed when the first author consulted the herbarium at The New York Botanical Garden in February 2013. The facts that two of these five new species are only known from the type, and that the number of Melastomataceae collections for the area is relatively low, underscore the need for more taxonomic work in central Peru.

The Yanachaga Chemillén National Park has an extension of 122,000 hectares and is located in the central forest of Peru in the department of Pasco, province of Oxapampa, spanning part of the districts of Oxapampa, Huancabamba, Pozuzo and Villa Rica. Elevation within the park ranges from 800 to 3800 m with several different vegetation types present: Amazonian forests, montane transitional forests, cloud forests, dwarf high montane shrublands and exposed grasslands.

Miconia is one of the largest strictly Neotropical genera with over 1000 species (Goldenberg *et al.* 2013), and recent molecular phylogenetic analyses have shown that it is highly paraphyletic, with the other 17 genera of the tribe Miconieae embedded within it (Michelangeli *et al.* 2004, Goldenberg *et al.* 2008, Martin *et al.* 2008, Michelangeli *et al.* 2008). The species described here all correspond to the traditional circumscription of *Miconia* with terminal inflorescences that bear flowers with rounded petals and partially to totally inferior ovaries that develop into fleshy berries (Cogniaux 1891, Judd 1986, Judd & Skean 1991).

Taxonomic Treatment

Here we present five new species found of *Miconia* from Yanachaga Chemillén National Park. A complete list and key to the remaining 113 species can be found in Cardenas (2007). A note on stamen morphology: The filaments of many species of Miconieae have an inflection (often accompanied with narrowing of the filament). This inflection is distinguished from the geniculation present in all Melastomataceae in that the filament bends at a point below the attachment to the anther.

Miconia odoratissima L. A. Cárdenas *sp. nov.* (Fig. 1)

Tree or treelet, young stems acutely quadrangular. Leaves sessile, the base auriculate. Inflorescences a terminal panicle. Flowers 5-merous, stamens isomorphic, filaments glabrous with an inflection and narrowing from the anther base, connective with four lobes, style bending away from the anthers, glabrous; stigma capitate.

Type:—PERU. Pasco: Oxapampa, Huancabamba, sector San Daniel, 10°26'37"S, 75°26'57"W, 2171 m, 9 September 2006 (fl, fr), L. Cárdenas, G. Castillo & J. Mateo 820 (holotype CUZ!, isotypes AMAZ, HOXA!, HUT!, MO!, MOL, NY!, USM!).

Tree or treelet, up to 4 m. Young stems acutely quadrangular, later becoming terete, the indumentum farinose ferruginous with dendritic trichomes, later glabrescent, internodes longitudinal ridges absent, nodal line raised and slightly darker than the stem in the shape of an inverted "V". Leaves isophyllous to slightly anisophyllous, then the smaller leaves up to 20% reduced with the smaller leaf alternating sides on the branch; petiole absent, blade 20–27 × 6.5–7 cm, narrowly ovate to lanceolate, coriaceous, base auriculate, apex narrowly acute, sinus 2.5–4.0 mm, margin entire to obscurely serrulate; 1 pair of secondary veins plus 1 pair of faint marginals, plinerved, the first pair of secondaries diverging 1.8–2.0(–2.7) cm above the base, symmetrical or slightly asymmetrical (even in the same branch), the marginals basally nerved, tertiary veins percurrent, evenly spaced every 3–5 mm, the quaternaries reticulate, areoles 1.5–4 mm wide, veins impressed on the adaxial surface and raised on the abaxial surface; adaxial surface with very sparse stellate trichomes < 0.15 mm wide, mostly towards the base and midvein, and on the primary and secondary veins; abaxial surface yellow to orange, with the primary and secondary veins occasionally red to crimson, with dendritic trichomes up to 0.1 mm and sparse glandular trichomes, the primary and secondary veins with dendritic trichomes 0.2 mm long. Inflorescences terminal panicle, 10–17 cm long; peduncles quadrangular, green to bright yellow, the indumentum farinose ferruginous with dendritic trichomes; bracts not seen; bracteoles not seen. Flowers with the pedicel 0.7–1 mm long. Hypanthia 1.9–2.1 mm long, shortly tubular to urceolate, 2–2.4 mm wide at the torus, external indumentum with stellate sessile trichomes < 0.15 mm long, internal surface with 10 faint ridges and sparsely < 0.1 mm long sessile stellate trichomes. Calyx open in bud, tube ca. 0.2 mm long at anthesis, the lobes ca. 0.4 × 0.5–0.7 mm, deltoid and round at the apex, as in the hypanthium, pale white; calyx teeth subulate, ca. 0.7 × 0.3–0.35 mm, with stellate trichomes along the entire length, slightly pink. Petals 5, 1.5–1.7 × 2.1–2.2 mm, broadly obovate to orbicular, spreading, white at anthesis (drying bright brown), glabrous, the apex retuse to deeply emarginate, the base obtuse to slightly cuneate, the margin entire, slightly incurved towards the apex. Stamens diplostemonous, isomorphic or nearly so, around the style at anthesis; filaments 1.5–2 mm long, with an inflection and narrowing 0.4 mm from the anther base, glabrous, white; anthers with 2 locules, thecae 1.5–1.8 × 0.8 mm, straight, opening by one apical to slightly ventrally

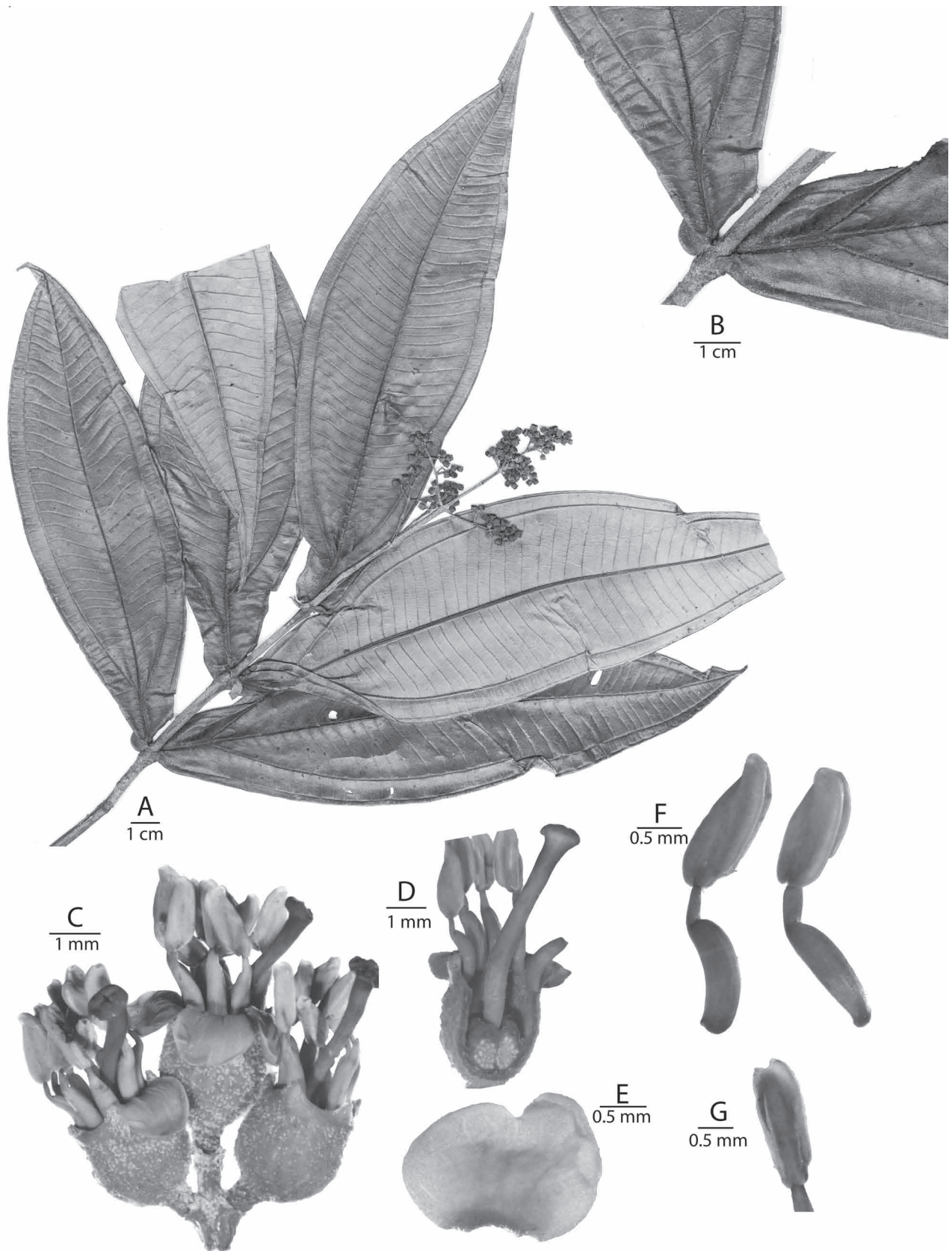


FIGURE 1. *Miconia odoratissima*. **A.** Fruiting branch. **B.** Detail of leaf bases. **C.** Flowers at anthesis in dichasium. **D.** Longitudinal section of a flower. **E.** Petal, adaxial surface. **F.** Antesepalous (L) and antepetalous (R) stamens on side view. **G.** Antepetalous stamen, dorsal view (Cárdenas 820, A–B: NY; C–G: CUZ).

oriented broad pore, yellow, connective extended <0.3 mm below the thecae, with four lobes up to 0.2 mm long, dark yellow, glabrous. Ovary 4-locular, 50–60% inferior, the free portion projecting 0.4–0.6 × ca 1.3 mm, truncate conical, with sparse stellate trichomes, 10-ribbed at the apex, with a corona of 5 setae ca, 0.2 mm long; style 5–5.7 mm long, bending away from the anthers, pale white, glabrous; stigma capitate, ca. 1 mm wide. Mature fruits or seeds not seen.

Habitat and Distribution:—*Miconia odoratissima* is endemic to the central forests of Peru in Huancabamba, Oxapampa where it has been collected from two neighboring localities at the border of the Yanachaga Chemillén National Park in secondary forests dominated by *Clusia* sp. and near streams.

Phenology:—*Miconia odoratissima* has only been collected in September, and was in flower at the time.

Etymology:—This new species is named for the sweet smell of its flowers, which attracted several bees at the time of collection.

Conservation Status:—*Miconia odoratissima* is only known from two specimens from the same locality at the edge of the Yanachaga Chemillén National Park, in an area that is highly degraded and under logging pressure. Based on the paucity of collections it should be considered Data Deficient (DD), following the IUCN criteria (2001) as implemented by the IUCN guidelines (2011). However, based on its limited distribution and endangered habitat, we recommend that this species is considered Critically Endangered.

Additional specimens examined (paratypes):—PERU. Pasco: Oxapampa, Huancabamba, La Colmena, Trocha Erica, Parque Nacional Yanachaga Chemillén, 10°26'37"S, 75°26'15"W, 2300 m, 22 Aug 2008 (fl), *L. Valenzuela*, *J. L. Mateo*, & *R. Rivera 11637* (HOXA, HUT, MO!, MOL!, USM!).

Discussion:—Vegetatively *M. odoratissima* resembles *Miconia impetiolearis* (Swartz 1788: 70) D. Don ex de Candolle (1828: 183) *var. pandurifolia* Naudin (1850: 137) given their sessile and pandurate, coriaceous leaves with auriculate bases and a glabrous adaxial surface. However, *M. impetiolearis var. pandurifolia* (and all other described varieties) has an undulate leaf margin and abaxial leaf surface with dense stellate indument. Additionally, the inflorescence of *M. impetiolearis* is usually larger (over 20 cm long) and the flowers are not as densely arranged. Based on flower morphology, particularly that of the anthers, it is unlikely that these two species are closely related: *Miconia odoratissima* has large flowers with short yellow anthers that open by a minute pore which would place it in *Miconia* section *Amblyarrhena* (Naudin 1850: 204) Triana ex Hook.f. in Bentham & Hook (1867: 763), while *M. impetiolearis* has subulate and relatively thinner white anthers with a ventrally bilobed connective, and it belongs in *Miconia* section *Miconia* (Goldenberg *et al.* 2008). Other Andean species of *Miconia* with sessile leaves (but unrelated flower morphology) are *Miconia asclepiadea* Triana (1871: 121), *M. ferreyrae* Wurdack (1960: 235), and *M. retusa* Pilger (1905: 174). *Miconia asclepiadea* and *M. retusa* have glabrous, ovate and cordate leaves that are either basally or only slightly plinerved. *Miconia ferreyrae* has lanceolate and basally nerved leaves with cordate to hastate bases.

Miconia odoratissima shares with *M. monzoniensis* Cogniaux (1908: 140), *M. barbeyana* Cogniaux (1891: 872), *M. pedicellata* Cogniaux (1891: 875), *M. pulgari* Macbride (1929: 182) and *M. terera* Naudin (1850: 196), also from *Miconia* section *Amblyarrhena*, the glabrous filaments, thecae and styles, but all of the latter species all have petiolate leaves.

The anthers of *M. odoratissima* have the connective with four lobes around the base of the thecae (Fig.1), a character also present in *M. pedicellata*. However, this last species has smaller and narrower petiolate leaves, 4-locular anthers and thinner calyx teeth.

Miconia chemillensis L. A. Cárdenas *sp. nov.* (Fig. 2)

Shrub or treelet, young stems terete, glabrous, on the blade surface mostly glabrous but with minute glandular trichomes, glomerulate panicle, flowers sessile, 5-merous, stamens dimorphic, antesealous stamen filaments with an inflection towards the apex and connective with two minute ventral appendages, antepetalous lacking basal connective appendages.

Type:—PERU. Pasco: Oxapampa, Huancabamba, sector San Daniel, 10°26'37" S, 75° 26'57" W, 2171 m, 9 September 2006 (fl), *L. Cárdenas*, *G. Castillo* & *J. Mateo 823* (holotype HOXA!, isotypes AMAZ, CUZ!, HUT, MOL!, MO!, NY!, USM!).

Shrub or treelet, 4–7(–10) m tall. Stems terete to slightly flattened when young, glabrous, internodes longitudinal ridges absent, nodal line raised and slightly brighter than the stem. Leaves isophyllous; petiole 1.5–2.5 cm long, glabrous; blade 15–25 × 3.5–8 cm, elliptic membranaceous, base acute to broadly acute, apex narrowly acute, often narrowing below the attachment of the first pair of secondary veins, margin entire to loosely sinuate; secondary veins 1 pair plus 1 pair of faint marginals, shortly plinerved [diverging ca. 0.7 cm above the base, symmetrical or slightly asymmetrical (even on the same branch)] to basally nerved, tertiary veins percurrent, evenly spaced every 4.5–5.5 mm, the quaternaries reticulate, areoles 1.5–2 mm wide, veins flat on the adaxial surface, the primary and secondaries

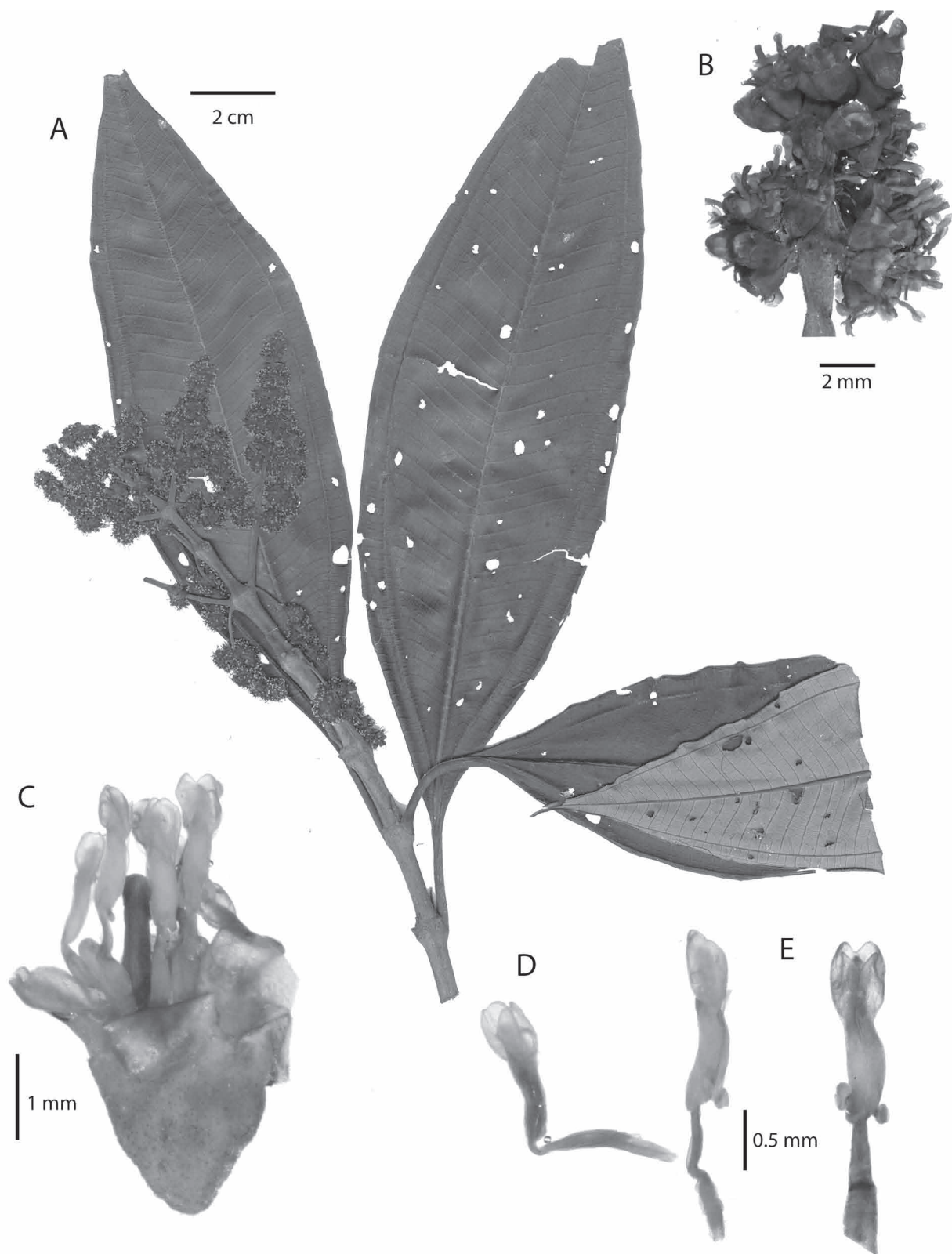


FIGURE 2. *Miconia chemillensis*. **A.** Flowering branch. **B.** Inflorescence detail. **C.** Flower at anthesis. **D.** Antepetalous stamen, side view. **E.** Antesepalous stamen in side (L) and ventral view (R) (Cardenas 823, NY).

raised, tertiaries and quaternaries flat on the abaxial surface; adaxial surface and primary and secondary veins glabrous; abaxial surface pale green, the surface mostly glabrous but with minute very sparse glandular trichomes, the primary and secondary veins with sparse glandular sessile trichomes, < 0.05 mm. Inflorescences terminal, glomerulate panicle, 12–15 cm long; peduncles slightly quadrangular and widening at the nodes, pale yellow, towards the base with a dense covering of stellate trichomes; bracts and bracteoles early caducous. Flowers sessile. Hypanthia 2 mm long,

shortly broadly tubular to funnellform, 1.8–2 mm wide at the torus, with an external indumentum of dense stellate trichomes ca. 0.05 mm, internal surface smooth, glabrous. Calyx open in bud, tube ca. 0.4 mm long at anthesis, lobes ca. 0.5×0.8 mm, broadly deltoid, with sparse stellate trichomes, pale green yellowish; calyx teeth reduced and blunt, pale green. Petals 5, $1.5\text{--}2 \times 1.4\text{--}1.6$ mm, broadly obovate, spreading, bright white at anthesis (drying pale brown), glabrous, the apex emarginate, the base cuneate, the margin minutely ciliate. Stamens diplostemonous, dimorphic, around the style at anthesis; antesealous stamen filaments ca. 1.5 mm long with an inflection 0.3–0.4 mm from the apex, glabrous, white; anthers with 2 locules, $1.6\text{--}1.9 \times ca. 0.5$ mm, oblong, the thecae occupying only the upper half, opening by 1 broad apical pore, the connective extending ca. 0.7–0.85 mm below the thecae, linear, with two spheroid ventral appendages, pale yellow, glabrous; antepetalous stamen filaments 0.9–1.2 mm long with an inflection very near the apex (< 0.15 mm), anthers ca. 1.25–1.45 mm long, lacking basal connective appendages, the thecae occupying the upper half, opening by 1 broad apical pore. Ovary 3-locular, 1/2 to 2/3 inferior, the free portion projecting up to 0.5 mm, cylindrical, glabrous, the apex with a 5-lobed collar ca. 0.2 mm long; style 2.7–3 mm long, straight, white, glabrous; stigma truncate, ca. 0.4 mm wide. Mature berries not seen.

Habitat and Distribution:—Endemic to the central forests of Peru in Huancabamba, Oxapampa. *Miconia chemillensis* is known only from the type and has been collected in the border the Yanachaga Chemillén National Park, in the San Daniel area (2171 m).

Etymology:—This new species is named after the Yanachaga Chemillén National Park where is found. Chemillén is a Yanesha word that means “burnt” and it refers to the aspect of the mountains of the region.

Conservation Status:—*Miconia chemillensis* is only known only from one population a at the border of the Yanachaga Chemillén National Park, in an area that is highly degraded and under logging pressure. Based on the paucity of collections it should be considered Data Deficient (DD), following the IUCN criteria (2001) as implemented by the IUCN guidelines (2011). However, based on its limited distribution and endangered habitat, we recommend that this species is considered Critically Endangered.

Discussion:—The anthers of *Miconia chemillensis* have a slender but prolonged connective with apically widening thecae that open by broad pores. These characteristics place this new species in the traditional definition of *Miconia* section *Hypoxanthus* (Richard ex de Candolle 1828: 180) Triana ex Hook.f., in Bentham & Hooker (1867: 764), also known as *M.* section *Glossocentrum* (Crueger 1847: 111) Triana ex Hook.f. in Bentham & Hooker (1867: 763); see Goldenberg (2000). The great majority of the species in this group are from Eastern Brazil but eleven species are known from Peru. The members of *Miconia* section *Hypoxanthus* in Peru are mostly found below 800 m elevation in Amazonian forests, while *M. chemillensis* was collected in cloud forests ca. 2500 m elevation. Molecular phylogenetic work is necessary to ascertain whether this species is indeed closely related to the Brazilian species of *Miconia* section *Hypoxanthus*.

The flowers of *M. chemillensis* closely resemble those of *M. semisterilis* Gleason (1936: 535), especially in calyx, style and anther shape. However, *M. chemillensis* has dimorphic anthers (as opposed to isomorphic in *M. semisterilis*), and 5-merous flowers (vs. 4-merous). Additionally, the inflorescence of *M. chemillensis* is glomerulate (flowers not clustered in *M. semisterilis*) and the leaves are glabrous abaxially (vs. densely stellate-pubescent). Vegetatively *M. chemillensis* resembles *M. klugii* Gleason (1931: 240), also from Peru, but differs in leaf pubescence (glabrous vs. densely stellate) and the anthers of *M. klugii* lack the connective below the fertile portion of the thecae.

Miconia pozuzoana L. Cárdenas & Michelang. sp. nov. (Fig. 3)

Treelet with stems acutely angled and sulcate; peduncles quadrangular, fleshy and clearly winged, bracts foliaceous; flowers pedicellate, petals 5–6, pleiostemonous; filaments with a few pedicellate glands; ovary 6-locular, style bending away from the anthers, glabrous; stigma capitate.

Type:—PERU. Pasco: Oxapampa, Pozuzo, Sector Huampal, Pan de Azúcar, cerca al área de observación de gallitos de las rocas. $10^{\circ}11'05''S$, $75^{\circ}34'51''W$, 1000–1100 m, 22 July 2006 (fl), L. Cárdenas & V. Flores 622 (holotype HOXA!, isotypes AMAZ!, CUZ!, HUT!, MOL!, MO!, NY!, USM!).

Treelet, up to 2–3.5 m. Young stems acutely angled and sulcate, glabrous, internodes longitudinal ridges absent, nodal line raised and slightly darker than the stem, some internodes hollow and with orifices (presumably for ants). Leaves slightly anisophyllous; petiole 3–4.2 cm long, glabrous; blade $16\text{--}24 \times 7.5\text{--}10$ cm, elliptic, coriaceous, base acute to obtuse, apex narrowly acute, occasionally cuneate, margin entire to obscurely undulate; secondary veins 1 pair plus 1 pair of faint marginals, shortly plinerved [diverging < 0.8 cm above the base, symmetrical or slightly asymmetrical (even on the same branch)], tertiary veins percurrent, the quaternaries reticulate, areoles 1.8–5 mm wide, all veins flat

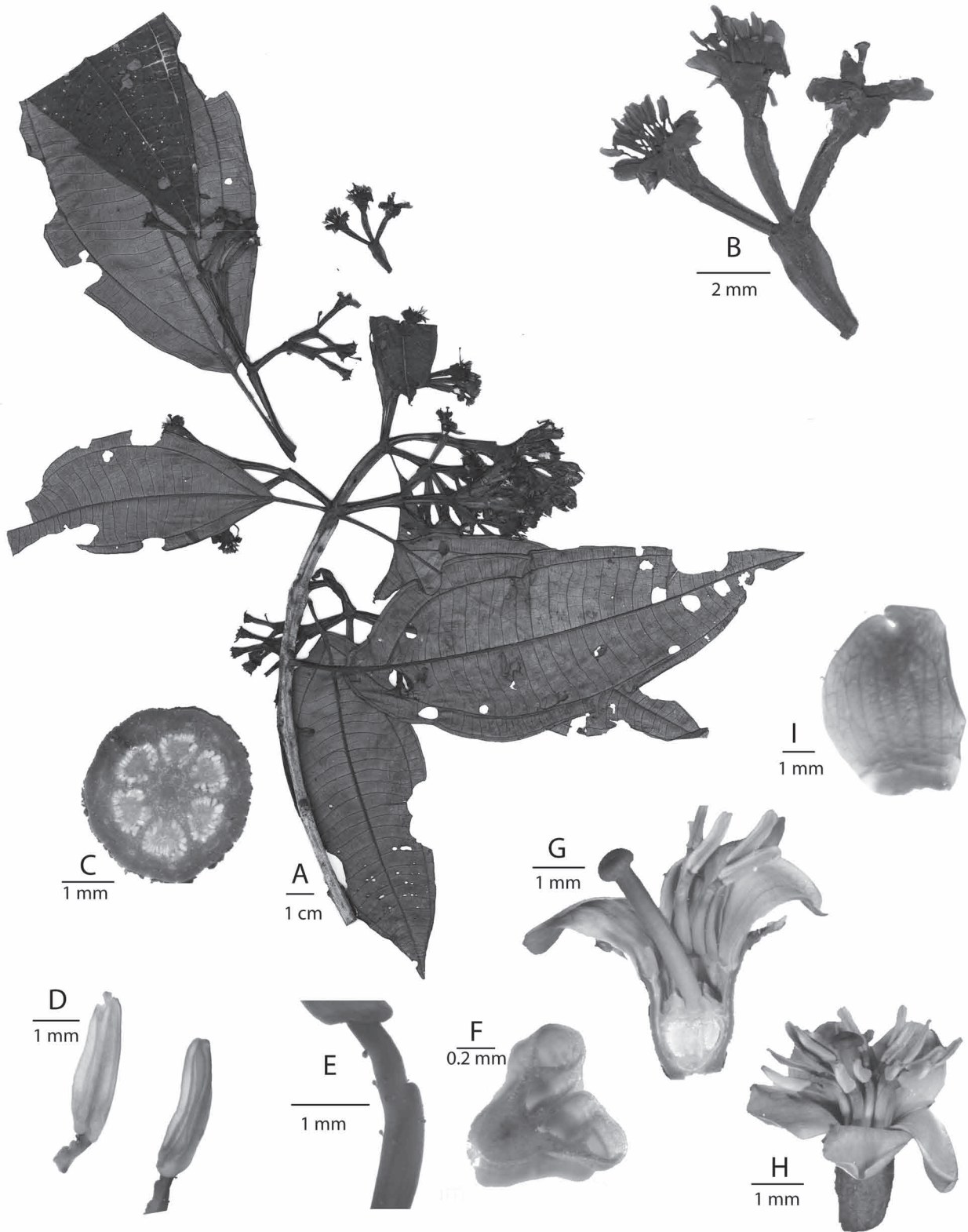


FIGURE 3. *Miconia pozuzoana*. **A.** Flowering branch. **B.** Inflorescence detail. **C.** Cross section of mature fruit. **D.** Anthers on side view. **E.** Detail of the apex of the filament. **F.** Anther in cross section. **G.** Flower in longitudinal section. **H.** Flower. **I.** Petal, adaxial surface (Cardenas 622, NY).

on the adaxial surface, of the abaxial surface the primary and secondaries raised, tertiaries and quaternaries flat; adaxial surface glabrous; abaxial surface glabrous, the primary veins with a mix of sparse small simple and stellate trichomes <0.1 mm long; smaller leaves up to 35% reduced with the smaller leaf alternating sides on the branch.

Inflorescences terminal panicle, 14–20 cm long; peduncles quadrangular, fleshy and clearly winged, pale green and reddish (in vivo), with a mix of very sparse dendritic trichomes and amorphous scales < 0.1 mm wide; bracts 4.5–7 × 2–3.5 cm, foliaceous, obovate, caducous; bracteoles 6–7 × 1.5–1.7 cm, gladiate, persistent at least until anthesis, most caducous afterwards. Flowers with the pedicel 4.5–7 mm long, tetragonal and clearly winged. Hypanthia 2.8–3.1 mm long, cylindrical to narrowly tubular, 2 mm wide at the torus, glabrous to very sparsely sessile-glandular, internal surface with 5–6 faint ridges, glabrous. Calyx open in bud, tube 1–1.3 mm long at anthesis, lobes 1.2–1.4 × ca. 2.4 mm, deltoid, pubescence as in the hypanthium, pale green yellowish; calyx teeth subulate, ca. 3.4 × ca. 1 mm, pale green. Petals 5–6, 6.5–7 × 4.2–5 mm, broadly obovate to suborbicular, spreading, bright white at anthesis (drying brown), glabrous, the apex emarginate, the base truncate, the margin entire. Stamens pleiostemonous, with up to 18 stamens, isomorphic or nearly so, around the style at anthesis; filaments 5–5.5 mm long, bright yellow becoming reddish in older flowers, with a few pedicellate glands; anthers with 4 locules, thecae 2.4–2.8 × ca. 0.7 mm, narrowly oblong, opening by 1 apical to dorsally-oriented broad pore, yellow at anthesis, later turning orange or reddish, connective extending up to 0.3 mm below the thecae, with two obscure basal and ventral appendages < 0.1 mm long, pale yellow. Ovary 6-locular, 1/4 to fully inferior, the free portion projecting ca. 0.5 × ca. 1 mm, truncate-conical, glabrous, ribbed at the apex, with a corona of small setae; style 7.5–8 mm long, bending away from the anthers, pale white to pale pink, glabrous; stigma capitate, ca. 1.7 mm wide. Berries not seen.

Habitat and Distribution:—*Miconia pozuzoana* is endemic to cloud forests at 1000–1100 m in central Peru where it has been collected four times.

Phenology:—Flowering material of *Miconia pozuzoana* has been collected in July.

Etymology:—This new species is named after the district where it grows in the forests of central Peru.

Conservation Status:—*Miconia pozuzoana* is only known only from three populations inside the Yanachaga Chemillén National Park, with an extent of occupancy (EOO) of less than 20 km². Based on its restricted distribution and habitat, following IUCN criteria (2001) as implemented in the IUCN guidelines (2011) we recommend that this species is considered Endangered.

Additional specimens examined (paratypes):—PERU. Pasco: Oxapampa, Pozuzo, sector Yulitunqui, 10°16'44"S, 75°31'37"W, 1700 m (fl, fr) 18 Nov 2008, J. R. Ayerbe & D. Heredia 204 (MO, HOXA, USM!); Oxapampa, Pozuzo, Sector Huampal, cercano al puesto de control y la parcela controlada, 10°11'14"S, 75°34'49" W, 16 Jul 2008 (fl), L. Cárdenas & V. Flores 523 (AMAZ!, CUZ!, HOXA!, HUT!, MO!, MOL!, USM!); Parque Nacional Yanachaga Chemillén, Carretera Chontabamba al puesto de vigilancia Huampal, 10°11'S, 75°34'W, 1150 m, 19 Sep 2002 (fr), A. Monteagudo, C. Mateo, G. Ortiz 3890 (MO, USM!).

Discussion:—*Miconia pozuzoana* is morphologically similar to a group of species found at mid-elevation forests throughout the Andes with hollow stems, relatively large flowers (hypanthia of at least 3.5 mm), obovate anthers that open by a minute pore (in some species the apex of the anther is tapering), capitate stigma, and glabrous to glabrescent leaves: *M. bailloniana* Macbride (1941: 388), *M. expansa* Gleason (1936: 536), *M. huanucensis* Wurdack (1972: 201), *M. flaccida* Gleason (1931: 226), and *M. hospitalis* Wurdack (1972: 475). Based on anther morphology the first three species have been assigned to *Miconia* section *Amblyarrhena* and the latter two to *Miconia* section *Tamonea* (Aublet 1775: 441) Cogniaux (1886: 238), but because most sections of *Miconia* are not monophyletic, it is likely that all of these species are closely related based on the character combination mentioned above. *Miconia pozuzoana* can be easily distinguished by the inflorescences with at least some persistent bracteoles (vs. caducous in all the above species), and the combination of six-merous and pleiostemonous flowers. Among the species mentioned above, only *M. huanucensis* has some six-merous flowers (although they are mostly five-merous) and *M. flaccida* may be diplostemonous or pleiostemonous. The winged inflorescences of *M. pozuzoana* are similar to those of *M. flaccida* and *M. bailloniana*. However, hypanthia and fruit are also winged in *M. bailloniana* and some branches of *M. flaccida*, while they are always terete in *M. pozuzoana*.

Additionally, *M. pozuzoana* may also be related to *Conostegia inusitata* Wurdack (1968: 170) and a closely related undescribed species (see Schnell 1996). *Conostegia inusitata* has been placed in *Conostegia* due to the presence of flowers with calyptrate calyx and numerous stamens (Wurdack 1968), however calyx morphology and anther shape differs from that of *Conostegia* sensu stricto, which led to Schnell (1996) to propose a new genus to accommodate these two species, *Florbella*, which is not yet validly published. Recent detailed analyses of seed and flower morphology, as well as molecular data show that *Conostegia inusitata* is not closely related to the other members of *Conostegia*, and rather it is placed within a large group of Andean *Miconia* with large flowers (R. Kriebel pers. comm.) and these two species also have quadrangular hollow stems (Michelangeli 2010).

Miconia cardenasiae Jan.M.Burke & Michelang., *sp. nov.* (Fig. 4)

Treelet, up to 4 m; young stems bluntly quadrangular, slightly alate on young stems; leaves lanceolate to elliptical, slightly coriaceous, mite domatia present as foliar pockets formed at base of secondary vein axils, up to 2 mm deep; peduncles quadrangular, slightly alate; flowers 5(–6)-merous; stigma capitate.

Type:—PERU. Pasco: Prov. Oxapampa, Dist. Huancabamba, Sector San Daniel, cercano a la laguna, ca. 0.5 km, 10°26'08"S, 75°27'29"W, 2366 m, 5 September 2006 (fl), *L. Cárdenas, G. Castillo & J. Mateo 774* (holotype USM!, isotypes HOXA!, MO!).

Treelet, up to 4 m. Young stems bluntly quadrangular, white to beige, glabrous, internodes with 4 longitudinal ridges, slightly alate on young stems, nodal line present. Leaves isophyllous; petioles 0.45–0.75 cm long, glabrous, green; blade 8–12.5 × 2.3–4.1 cm, lanceolate to elliptical, slightly coriaceous, base rounded to attenuate, asymmetrical, apex acuminate, margin serrulate, teeth 0.5–0.75 mm long, 1–3 mm apart; two pairs of secondary veins (including faint marginals), plinerved, diverging 0.25–0.45 cm above the base, asymmetrical, tertiary veins percurrent, arched at 70–80° from midvein, quaternary veins reticulate, veins slightly impressed on the adaxial surface and raised on the abaxial surface, brown; adaxial surface nitid, especially when young, glabrous on surface and veins; abaxial surface light green (drying brown), indument on the surface glabrous, veins glabrous, mite domatia present as foliar pockets formed at base of secondary vein axils, up to 2 mm deep. Inflorescences terminal, few-branched panicle, 5.5–6.8 cm long; peduncles quadrangular, slightly alate, brown, glabrous; bracts ca. 1 × 0.25 cm, oblong, caducous; bracteoles ca. 0.75 × 0.2 cm, linear, caducous before anthesis. Flowers with pedicel 1(–2.3) mm long, glabrous. Hypanthia 1.5 mm long, urceolate, 1.4 mm wide at the torus, external indument sparse sessile glands, internal surface ridged, glabrous. Calyx open in bud; tube 0.25 mm long at anthesis; lobes ca. 0.4 × 0.4 mm, nearly vestigial, glabrous; teeth 0.5–0.6 × ca. 5 mm, long acuminate, glabrous. Petals 5–6, 1 × 0.8 mm, obovoid, erect, white at anthesis (drying yellow), granulose abaxially, base attenuate, apex slightly retuse, margin erose. Stamens diplostemonous, isomorphic, radially spreading at anthesis; filaments ca. 1 mm long, glabrous, white, with an inflection 3/4 of length; anthers incompletely 2-locular, thecae 0.5 × 0.4 mm, obovate, opening by 1 ventrally inclined pore, white at anthesis, connective prolonged 0.25 mm basally with bilobed ventral appendages and 1 short dorsal hump, glabrous. Ovary 3-locular, 2/3 inferior, the free portion projecting ca. 0.5 × ca. 1 mm, bluntly conical, glabrous; style 2.3–2.5 mm long, erect, white, glabrous; stigma capitate, 0.5–0.6 mm wide. Immature berries 2.3 mm long, globose, purple, calyx teeth persistent.

Distribution:—This species is known only from the type collection, in humid montane forest at 2366 m, in the department of Pasco, Oxapampa province, Peru.

Phenology:—Flowering in September.

Etymology:—The epithet is in homage to Lizeth A. Cárdenas, who has collected many exquisite Melastomataceae specimens from Oxapampa, Peru.

Conservation Status:—*Miconia cardenasiae* is only known only from one population inside the Yanachaga Chemillén National Park and thus should be considered as Data Deficient (DD) under IUCN criteria (2001). Based on its restricted distribution and habitat, following IUCN criteria (2001) as implemented in the IUCN guidelines (2011) we recommend that this species is considered Critically Endangered.

Discussion:—*Miconia cardenasiae* can be recognized by the short, stout petioles, glabrous leaves, and presence of pocket domatia. *Miconia cardenasiae* is most similar to *Miconia opacifolia* MacBride (1929: 184) and *Miconia cremophylla* Naudin (1850: 228). *Miconia opacifolia* has completely sessile leaves, while *M. cardenasiae* has short (< 1 cm) petioles. *Miconia cremophylla* has similar leaf morphology, though the petioles are longer, and it lacks any pocket domatia.

Foliar mite domatia (acarodomatia) are not uncommon among tropical Melastomataceae (Goldenberg 2000, Almeda 2009, Larcher *et al.* 2012), but unlike ant domatia (Michelangeli 2010), have not been well documented, not even for other tropical plant families (Romero & Benson 2004). Foliar pocket domatia may provide shelter for beneficial mites that eat fungal spores; alternatively they may provide shelter for mite predators that help control insect or arthropod herbivory (Almeda 1989, Romero & Benson 2004). Within Miconieae, acarodomatia have been observed in a broad span of geographical and ecological zones, from Andean tropical montane forest (*e.g.*, *Miconia cookii* Gleason (1933: 43), *Miconia crocea* (Desrousseaux 1797: 55) Naudin (1850: 245), *Miconia media* (Don 1823: 313) Naudin (1850: 244)), Brazilian cerrado (*e.g.* *Miconia pusilliflora* (de Candolle 1828: 194) Naudin (1850: 171), *Miconia sellowiana* Naudin (1850: 206)), to Central American cloud forest (*e.g.*, *Clidemia hammelii* Almeda (1989: 140)). These domatia are expressed as either foliar pockets or hair tufts at vein axils. Moreover, there appears to be an ecological variation in their occurrence (Larcher *et al.* 2012). In *Miconia cardenasiae*, not all leaves on our specimen produce foliar pockets. This variation among leaves on a species bearing acarodomatia is not uncommon.



FIGURE 4. *Miconia cardenasiae*. **A.** Flowering branch. **B.** Inflorescence detail. **C.** Hypanthium and ovary in longitudinal section. **D.** Flower. **E.** Stamens in (from left to right) dorsal, ventral and side view (Cardenas 774, MO).

Miconia humifusa Jan.M.Burke & Michelang. *sp. nov.* (Fig. 5)

Prostrate shrub with adventitious roots; young stems with brown barbellate trichomes; petioles 1.3–3.3 cm long; lamina 2–3.3 × 1.3–2.3 cm, ovate; flowers 4-merous; ovary 4-locular; style with gland-tipped hairs at base; stigma broadly peltate.

Type:—PERU. Pasco: Prov. Oxapampa, Dist. Huancabamba, Sector Oso Playa?, trocha a la parcela Oso Playa, 10°17'58"S, 75°36'35"W, 2370–2475 m, 24 June 2006 (fl), L. Cárdenas & R. Francis 456 (holotype HOXA!, isotypes CUZ!, MO!, USM!).

Prostrate subshrub with adventitious roots, up to 15 cm tall. Young stems terete, indument glabrous to villous with brown barbellate trichomes, ca 0.4 mm long, nodal line faint. Phyllotaxy opposite, though leaves frequently oriented to 1 side of stem. Leaves isophyllous; petioles 1.3–3.3 cm long, indument glabrous to moderately puberulous with flexuous, barbellate, gland-tipped trichomes; lamina 2–3.3 × 1.3–2.3 cm, ovate, membranaceous, base rounded, apex bluntly acute, margin serrulate, teeth linear and ca. 0.6 mm long, 0.3 to 1 mm apart; 1 pair of secondary veins plus 1 pair of faint marginals, basally nerved, symmetrical, tertiary veins percurrent, arched ca. 80 deg angle from midvein, quaternary veins reticulate, veins slightly impressed on the adaxial surface and raised on the abaxial surface, drying brown to purple; adaxial surface green, indument on the surface glabrous, and hirtellous on the primary and secondary veins, especially along the periphery, the trichomes simple, appressed, 0.3–0.4 mm long; abaxial surface green to dark green (drying purple or yellow), indument on the surface sparse sessile glands < 0.05 mm, and glabrous to sparsely setulose on the veins, simple trichomes ca. 0.1 mm long. Inflorescence terminal, simple dichasia of 3 flowers, 1.8–2 cm long; peduncles terete, brown, indument glabrous to sparsely puberulent with barbellate hairs, flowers erect; bracts 4–4.8 × 2.3 cm, ellipsoid, persistent at anthesis, foliaceous, margin ciliate and apex with barbellate trichomes up to 0.3 mm long; bracteoles 2–3.5 × 0.5 cm, oblong to subulate, persistent at anthesis, sparsely ciliate. Flowers with pedicels 1.3–2 mm long, with sessile pigmented glands. . Hypanthia 3.2–3.8 mm long, urceolate, 3.8–4.4 mm wide at the torus, externally covered with sparse gland-tipped trichomes, setulose towards apex, internal surface with sparse sessile glands <0.05 mm. Calyx open in bud; tube 0.4 mm long at anthesis; lobes 0.6–0.8 × 0.5–0.6 mm, deltoid, glabrous, hyaline, appressed to calyx teeth; teeth 0.6–1.1 × 0.5–0.8 mm, deltoid, apex swollen, puberulent with trichomes ca. 0.4 mm long, as hypanthium. Petals 4, 3 × 2.5 mm, suborbicular, erect, white at anthesis (drying brown), sparsely puberulent with gland tipped trichomes on both surfaces, base obtuse, apex retuse, margin entire. Stamens diplostemonous, isomorphic, rigidly erect, radially spreading at anthesis; filaments 3.3–4.2 mm long, up to 1 mm wide, dilated at base, puberulent with gland tipped trichomes, white; anthers 4-locular, connective with small dorsal hump, white, puberulent with gland tipped hairs, thecae 1–1.2 × ca. 1 mm, stout, opening by 2 ventral pores, becoming rimose with age, white at anthesis, later turning brown. Ovary 4-locular, completely inferior; style ca. 4 mm long, up to 8 mm after anthesis, erect, hirsute with gland tipped hairs at base; stigma peltate, 1 mm wide. Berries immature, 4.8–5 × 4.8–5 mm, urceolate, green. Seeds 0.6–0.7 mm long, apiculate, ovoid, the hilum covering 70% of the seed.

Distribution:—Humid montane forest, with parcels of pajonal, 2370–3479 m in the province of Oxapampa, Pasco, Peru

Phenology:—Flowering in June, fruiting in November.

Etymology:—The epithet refers to the prostrate or scrambling habit of this species.

Conservation Status:—*Miconia humifusa* is only known only from two populations, one inside the Yanachaga Chemillen National Park and a second one just outside, with a total EOO of less than 20 km² and thus should be considered as Data Deficient (DD) under IUCN criteria (2001). Based on its restricted distribution and habitat, following IUCN criteria (2001) as implemented in the IUCN guidelines (2011) we recommend that this species is considered Critically Endangered.

Additional specimens examined: PERU: Pasco: Prov. Oxapampa, Dist. Huancabamba, sector Santa Barbara, camino a Huayllar, 10°21'57"S, 75°39'47"W, 3479 m, 29 November 2006 (fr), Cárdenas *et al.* 958 (CUZ!, MO!, NY!).

Discussion:—The prostrate habit of *Miconia humifusa* at high elevation, only allies it to two other species: *Miconia chionophila* Naudin (1850: 236) / *Miconia rotundifolia* (Don 1823: 311) Naudin (1850: 235). *Miconia rotundifolia* / *M. chionophila* constitute a species complex (or complex species). Though this species complex is morphologically quite variable in leaf shape and size, the leaf size of *M. humifusa* (2–3.3 cm long) extends beyond the leaf size range of the aforementioned species. *Miconia rotundifolia* rarely exceeds 2 cm long, often with a cordate base. The leaf size, combined with the petiole length that is at least as long as the leaf lamina, long internodes and conspicuous production of adventitious roots, allows *Miconia humifusa* to be differentiated from other Andean prostrate *Miconia* species. Outside of the Andes, another specimen of prostrate *Miconia* with leaves exceeding 2 cm long has been collected from the Talamanca mountains of Central America (*Davidse 25967*, NY), and is determined as *M. rotundifolia*. Though morphologically quite similar, we hesitate to combine these disparate populations into one species. The Talamanca populations of *M. rotundifolia* need to be studied in closer detail.

One notable character of *Miconia humifusa* is the yellow or purple hue of the leaves when dry. The closely-related species, *Miconia rotundifolia* (see also *Melastoma repens* nom. herb. / *Rhexia repens* nom. herb.) has been noted as a

source of yellow dye called “ola-ola”, producing a yellow tincture, when combined with *Miconia tiri* Triana (1871: 127) (see also *Tiri tomentosa* nom. herb.) and *Bocconia frutescens* Linneaus (1753: 505) to dye wool (Ruíz annotation on MA sheet; Ruiz 1940).

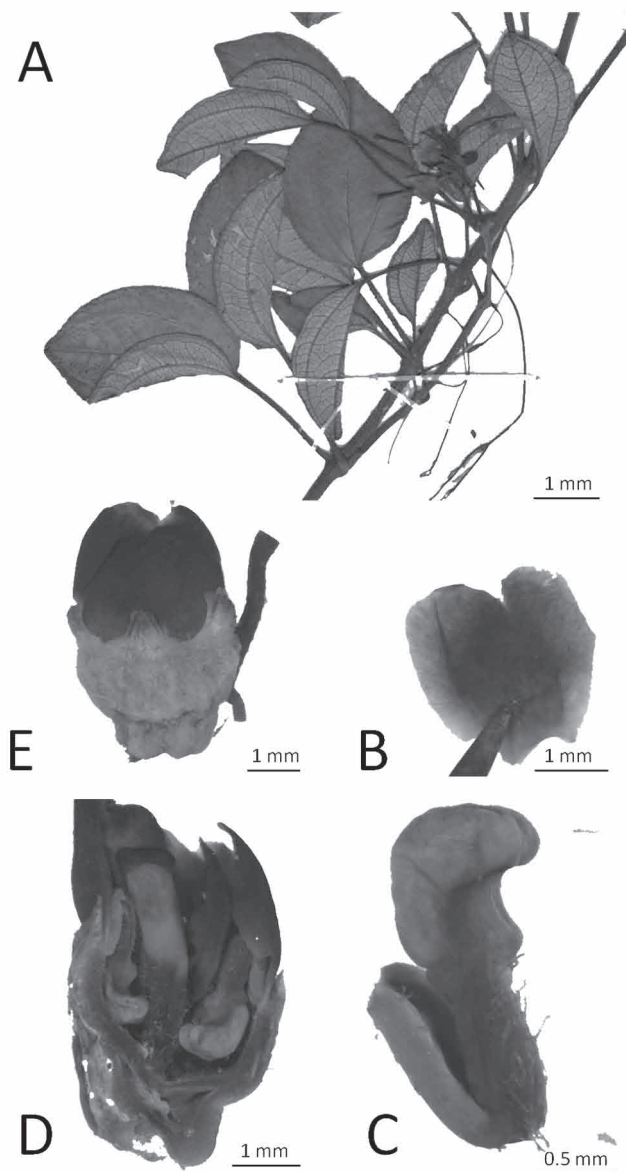


FIGURE 5. *Miconia humifusa*. **A.** Habit. **B.** Petal. **C.** Stamen. **D.** Longitudinal section of bud, note gland-tipped hairs at base of style and long pedicel. **E.** Detail of hypanthium (Cardenas 456, MO).

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