



Novelties in *Meriania* (Melastomataceae: Merianieae) from Andean rainforests of Colombia

HUMBERTO MENDOZA-CIFUENTES¹, FRANK ALMEDA² & MARCELA ALVEAR²

¹ Investigador independiente, Claustro de San Agustín, Villa de Leyva, Colombia. E-mail: hummendoza@gmail.com

² Institute for Biodiversity Science and Sustainability, Department of Botany, California Academy of Sciences, 55 Music Concourse Drive, Golden Gate Park, San Francisco, CA 94118, USA. E-mail: falmeda@calacademy.org; malvear@calacademy.org

Abstract

Two new species of *Meriania* (Melastomataceae: Merianieae) are described from the Andean region of Colombia (Northern Andes) in the departments of Caldas, Cauca and Putumayo. *Meriania barbosa*, known only from one locality in Selva de Florencia National Park, is characterized by its calyptrate flowers, calyptras with obtuse apex, dimorphic stamens and presence of a glandular pubescence on the vegetative organs. *Meriania fantastica*, from the departments of Cauca and Putumayo, is characterized by its few flowered inflorescences (up to 12 flowers), large flowers (ca. 15 cm in diameter) with bright orange petals and the presence of a scutum at the petiole apex. Both species are Colombian endemics and are only known from a few specimens. Each species is illustrated, compared with presumed relatives, and provided with a conservation assessment using IUCN guidelines.

Resumen

Se describen e ilustran dos nuevas especies de *Meriania* de Colombia procedentes de la región andina (Andes del Norte) en los departamentos de Caldas, Cauca y Putumayo. *Meriania barbosa*, conocida solo de una localidad del Parque Nacional Natural Selva de Florencia, se caracteriza principalmente por sus flores caliptradas, caliptras de ápice obtuso, estambres dimórficos y presencia de tricomas glandulares en las partes vegetativas. *Meriania fantastica*, de los departamentos de Putumayo y Cauca, se caracteriza principalmente por sus inflorescencias con pocas flores (hasta 12 flores), grandes flores (ca. 15 cm de diámetro) de pétalos color naranja y ápice del pecíolo con escutelo. Ambas especies son endémicas de Colombia y solo se conocen de unos pocos registros. Para cada especie se incluye una ilustración, comparación con las presuntas especies cercanas, y una evaluación del estado de conservación con base en los criterios de la UICN.

Introduction

Meriania Swartz (1798: 823), a neotropical genus of shrubs and trees (rarely liana-like shrubs) with about 93 species, is distributed from southern Mexico, Central America, the Greater Antilles, Andean South America, the Guayana Highlands, and south to southeastern Brazil, from sea level to lower páramos at about 3500 m (Wurdack 1973; Mendoza & Ramírez 2006; Chiavegatto & Baumgratz 2009; Mendoza-Cifuentes & Fernández-Alonso 2010, 2012, Mendoza-Cifuentes in prep.). Colombia is the country with the highest diversity for this genus with 37 species, followed by Ecuador (26), Brazil and Peru (14 each), and Venezuela (10) (Almeda *et al.* in press; Baumgratz *et al.* 2013; Chiavegatto & Baumgratz 2009; Calderón & Mendoza 2000; Mendoza-Cifuentes in prep.; Michelangeli & Cotton 2008; Neill & Ulloa-Ulloa 2011; Renner 1999).

The genus is characterized by the following suite of characters: woody plants, large 5–6(–8)-merous, diplostemonous flowers (petals >1 cm long), non-geniculate stamens, anther pores prevailingly dorsally inclined in antepetalous stamens (rarely apical), superior (3–)5–6-locular ovary, capsular fruits, and seeds with a straight embryo (Almeda 1993; Mendoza-Cifuentes & Fernández-Alonso 2010, 2011, 2012).

Recent collecting trips to Colombia for the Miconieae Planetary Biodiversity Inventory project (<http://sweetgum.nybg.org/melastomataceae/>) and a review of Colombian *Meriania* that is currently in progress made possible the discovery and collection of flowering/fruitlet material of two undescribed species of *Meriania*, as well as material of close relatives for comparison. We describe here two new species of *Meriania* that are endemic to Colombia.

Meriania barbosa Humberto Mend., Alvear & Almeda, *sp. nov.* (Figs. 1, 2)

Meriania barbosa is distinguished by its rufous pubescence on the branches, petioles, inflorescence, hypanthium and calyx; sessile glandular hyaline trichomes on the abaxial foliar surface; foliar lamina base subpeltate; calyptrate calyx, calyptra obtuse apically with dorsal or external teeth like rough calluses; corolla spreading; stamens slightly dimorphic, with subulate dorsal connective appendages.

Type:—COLOMBIA. Caldas: Florencia, de Ranchoquemado por la vía a Pensilvania, Parque Nacional Natural Selva de Florencia, 5°23'13"N, 75°9'48" W, 1800–2000 m, 27 September 1993 (fl), *C. Barbosa 14932-95* (holotype: FMB! 34472; isotypes: COL!, HUA).

Tree up to 6 m tall. Young branches quadrangular. Branches, petioles, inflorescence branches, hypanthium and calyx densely covered with a rufous indumentum of asperous-headed to irregularly branched trichomes 0.3–1.2 mm long, also with hyaline sessile glandular trichomes ca. 0.1 mm in diameter. Petioles 2–5.2 cm long, terete. *Leaves* opposite and isophyllous, 16.5–20.5 × 9–11 cm, ovate to elliptic, apex blunt-acuminate, base subpeltate, or rounded to slightly cordate when young, margin entire; adaxial surface glabrous, abaxial surface with hyaline sessile glandular trichomes and branched trichomes similar to those on the branches, mostly restricted to the veins; venation acrodromous, the primary nerve flat on the adaxial surface, prominent on the abaxial surface, with 2–3 pairs of secondary nerves, but only the innermost pair extending to the blade apex and converging with the primary nerve, the secondaries basal, impressed on the adaxial surface and prominent on the abaxial surface, tertiaries percurrent (transversals), impressed on the adaxial surface, slightly prominent on the abaxial surface. *Inflorescence* terminal, compound thyrsoid, 10–12 cm long, sessile or pedunculate, peduncle 3–3.5 cm long, with 6–15 pedicellate flowers, rachis with 2–3 nodes, quadrangular; paracladia 6–8 cm long, not branched, branchlets triflorous with scars of aborted flowers at the base of the adjacent persistent flowers. Bracts and bractoles not seen. *Flowers* 5-merous, on pedicels 7–11 mm long. Hypanthium 9–10 mm long, cup-like, cylindrical, externally smooth, torus thickened 4–4.5 mm. Calyx calyptrate, calyptra apically obtuse in bud, opening by irregular fissures with basal parts of the calyx remaining attached to the hypanthium in post-dehiscence, in fruit lengthening up to 5 mm long; external or dorsal teeth roughened-callous. *Petals* 2.9–3.2 × 2.2–2.4 cm, magenta, spreading, obovate, glabrous. *Stamens* 10, slightly dimorphic, the antepetalous whorl with longer anthers. Antepetalous stamens: filaments 1.6–1.8 cm long, ascendant elbow or filament apex/base of the connective junction triangular, ca. 5.5 × 2 mm; the dorsal connective appendage ca. 5 mm long, subulate, parallel to the anther and pointing to the apical pore; anther thecae ca. 12 mm long, subulate and sigmoid, pore 0.3–0.4 mm in diameter, dorsally inclined; pedoconnective ca. 1–2.6 mm long. Antesepalous stamens: filaments 1.7–1.8 mm long, ascendant elbow or filament apex/base of the connective junction widely triangular, ca. 3–3.2 × 2.5–2.6 mm; dorsal connective appendage ca. 3.5 mm long, subulate, parallel to the anther and pointing to the apical pore; anther thecae ca. 10 mm long, subulate and strongly arched dorsally, pore 0.3–0.4 mm in diameter, dorsally inclined; pedoconnective absent. *Style* 1.8 cm long, cylindrical, apically curved in open flowers; stigma slightly expanded. *Ovary* 6–7 × 6 mm, ovoid, superior, 5-locular, fused to hypanthium basally up to 1 mm, apex with a few tooth-like lobes that do not enclose the style base; axile placentae 2.3 × 1.2 mm, obovate, with ovules concealing the surface. *Immature capsule* 1.3–1.7 × 1.3–1.4 cm, completely enclosed by the hypanthium and remnants of the receptacle. *Immature seeds* 2.5–2.8 mm long, narrowly cuneiform, brown, lateral symmetrical plane narrowly oblong, the chalazal end expanded into an elongate wing-like apically ± horizontally flattened appendage, the antiraphal plane rounded-angulate, the raphal zone narrowly oblong-carinate, extending the entire length of the seed and expanded at the hilar end into an acicular appendage, testa ± smooth.

Phenology:—Collected in late September with flowers, and with fruits in March.

Habitat and distribution:—Endemic to Colombia where it is known only from the type locality in the Selva de Florencia National Park, located in the department of Caldas on the eastern flank of the cordillera Central. This species grows between 1573 and 2000 m.

Conservation status:—This species is presently known only in the Selva de Florencia National Park. This protected area was established in 2005 with an area of ca. 100 km² of subandean forest at 850–2400 m, with high levels of precipitation (over 8000 mm annually). It is surrounded by highly disturbed areas and more than 50 peasant families still reside within the park boundaries (Parques Nacionales Naturales de Colombia 2014). Based on georeferenced data from the known collections, GeoCAT (Bachman *et al.* 2011) was used to calculate extent of occurrence (EOO) and area of occupancy (AOO) based on a user defined cell of 2 km. The area of occupancy for *Meriania barbosa* is 8.000 km². Using IUCN guidelines and criteria (IUCN 2001, 2011, 2014), we assign this species a conservation status of Critically Endangered CR B2ab(iii). It will be important to encourage *ex situ* propagation in botanical gardens in Colombia and elsewhere.

Etymology:—We dedicate this new species to César Barbosa, a notable Colombian botanist, and collector of the type specimen. His botanical collections from Selva de Florencia National Park represent the first ever made in this protected area.

Additional specimens examined (paratypes):—COLOMBIA. **Caldas:** Samaná, corregimiento de Florencia, Parque Nacional Natural Selva de Florencia, sector de manejo Florencia, sendero Bocatomas, cerca de Río Claro, 05°31.34' N, 75°3.678' W, 1573 m, 2 March 2011 (fr), *M. Alvear et al. 1459* (CAS!, COL!, FMB!, HUA!, NY!).

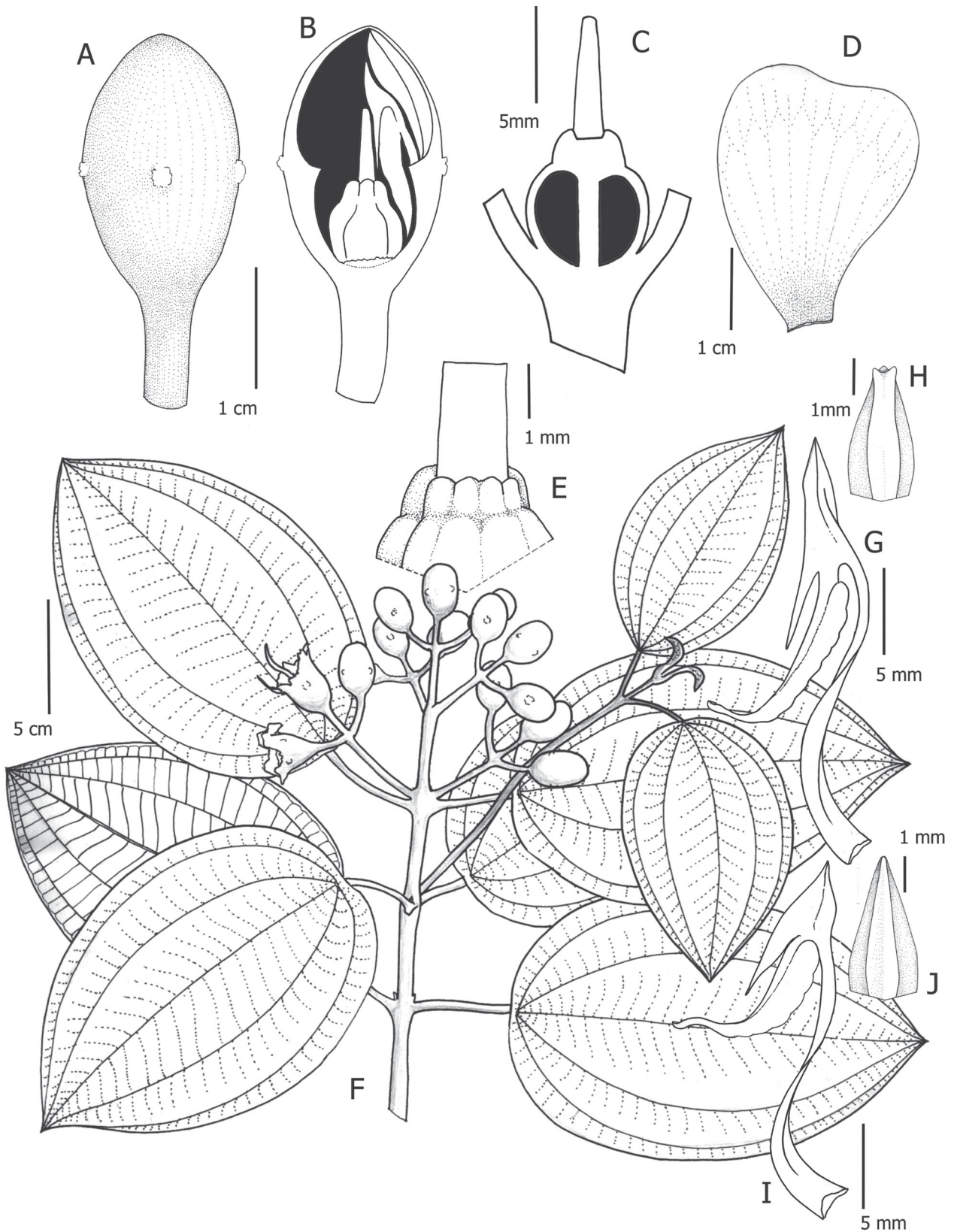


FIGURE 1. *Meriania barbosa*. A. Flower bud. B. Flower bud in longitudinal section. C. Detail of ovary (longitudinal section) and style. D. Petal. E. Detail of ovary apex. F. Flowering branch. G. Antepetalous stamen in lateral view. H. Elbow of the antepetalous stamen in dorsal view. I. Antesepalous stamen in lateral view. J. Elbow of the antesepalous stamen in dorsal view. (A–J from *Barbosa 14932–95*, FMB). Line drawing by H. Mendoza-Cifuentes.

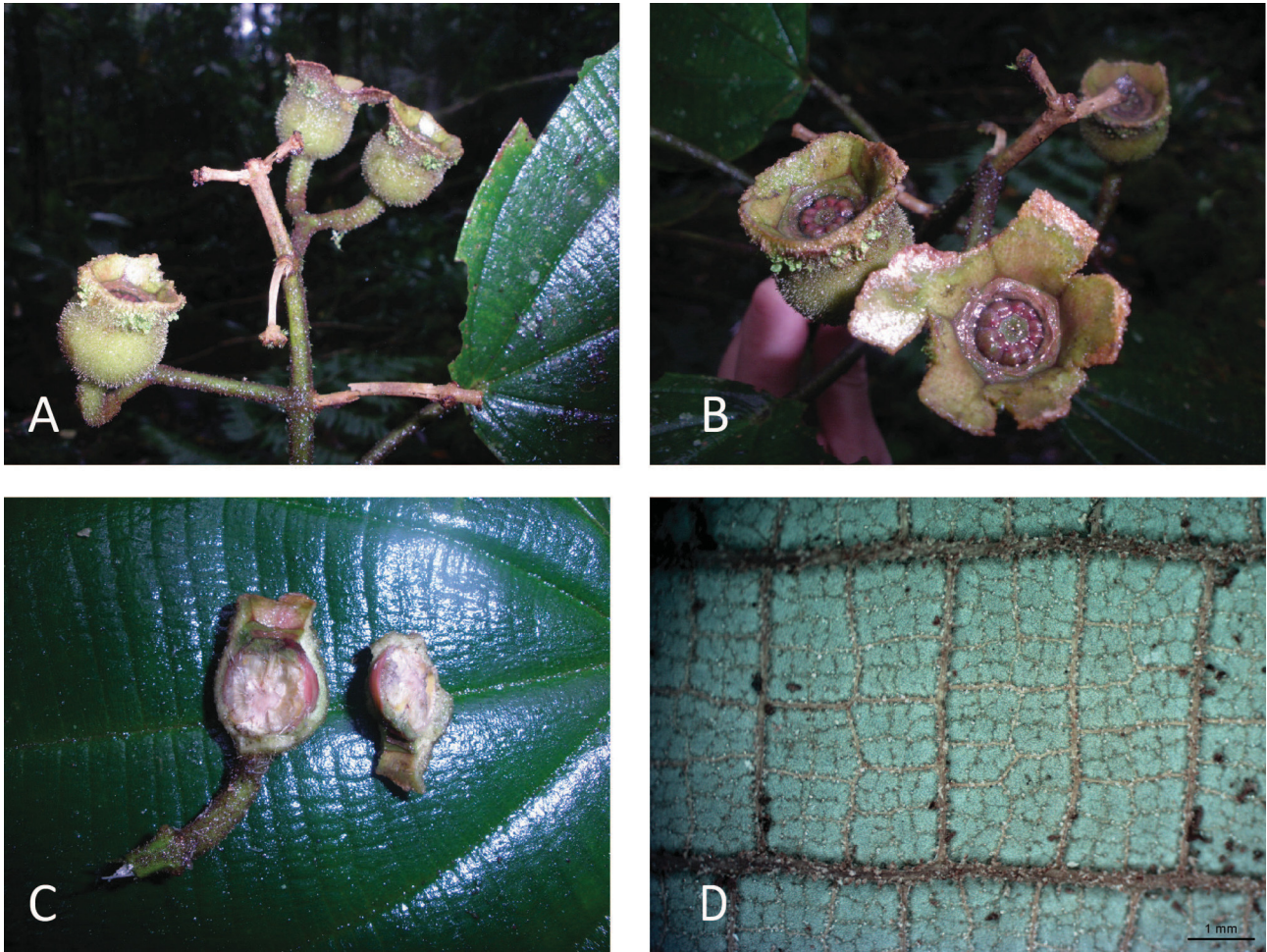


FIGURE 2. *Meriania barbosa*. A. Branch with infructescence. B. Immature fruits. C. Immature fruit in longitudinal section. D. Leaf (abaxial surface) showing venation and indument (all photos from *Alvear 1459* by M. Alvear).

Discussion

Meriania barbosa is distinguished by its subpeltate leaves, an indumentum of sessile hyaline glandular trichomes on the abaxial foliar surface, the calyprate calyx, spreading petals, and slightly dimorphic stamens with subulate dorsal connective appendages.

The closest relative appears to be *M. selvaflorensis* Mendoza-Cifuentes (2011: 249). These two taxa form a species pair characterized by a calyprate calyx and indument of sessile hyaline glandular trichomes. *Meriania selvaflorensis* differs from *M. barbosa* by its scandent liana-like habit (vs. arborescent habit), its much longer and slender inflorescences (35–44 cm long) with 35–80 flowers, the absence of the overall dense rufous indumentum, and the apiculate calypratas (vs. obtuse calypratas).

Meriania barbosa and *M. selvaflorensis* may be related to the “brachycera” group described by Mendoza-Cifuentes & Fernández-Alonso (2012), but differ from the other species in this group by their indumentum of glandular trichomes and the slightly dimorphic stamens in each flower.

Meriania fantastica Alvear, Humberto Mend. & Almeda, *sp. nov.* (Figs. 3, 4, 5)

Meriania fantastica is distinguished by a knobby scutum at the adaxial petiole apex, the strongly revolute auriculate lobes at the abaxial foliar base, the comparatively large flowers about 15 cm in diameter, the orange petals that are blunt-lacinate or irregularly lobed, the dimorphic stamens, and the calyx teeth that are modified into thickened callosities positioned just below the truncate calyx.

Type:—COLOMBIA. Putumayo: Carretera desde San Francisco a Mocoa, alrededores del Km 88, 1° 6.802' N, 76° 50.060' W, 2314 m, 16 February 2013 (fl, fr), *M. Alvear, J.D. García & D. Alvear. 1851* (holotype: COL!; isotypes: CAS!, CAUP!, CUVCI!, FMB!, HUA!, MO!, NY!, PSO!, US!).

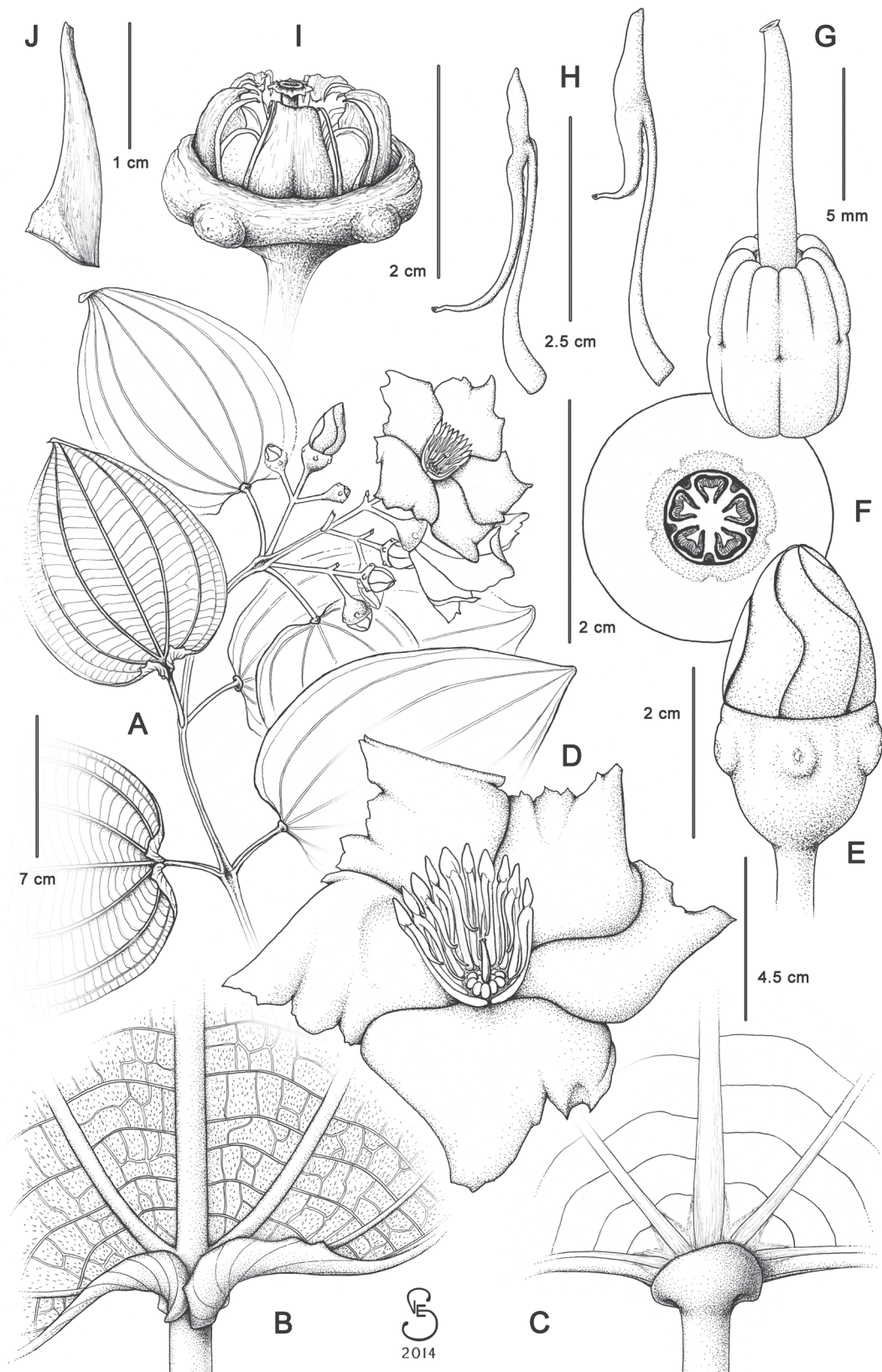


FIGURE 3. *Meriania fantastica*. A. Flowering branch. B. Leaf base detail (abaxial surface), indument detail at 60X. C. Leaf base detail (adaxial surface). D. Flower. E. Flower bud. F. Ovary cross section in bud, showing placentation. G. Ovary and style. H. Stamens in lateral view, antesepalous (right) and antepetalous (left). I. Post-mature capsule. J. Seed in lateral view. (A–J from *Alvear 1851*, CAS, COL).

Tree up to 20 m tall. Internodes subquadrangular or quadrangular, with rounded edges, canaliculate. All vegetative and reproductive organs prevalingly glabrous except for the inconspicuous glandular punctate abaxial foliar surface. Petioles 2.7–7.9 cm long, abaxially flattened; apex with a scutum. *Leaves* opposite and somewhat anisophyllous, 15.5–31 × 10.4–20 cm, membranaceous, elliptic, elliptic-lanceolate to suborbicular, apex shortly blunt-acuminate and commonly twisted or folded, base truncate to rounded with prominent auricles (0.8–2 × 1.5–3 cm) forming domatial pockets, margin entire to somewhat crenulate; adaxial surface glabrous, abaxial surface minutely glandular-punctate with sessile to short-stalked and sometimes clavate glandular trichomes less than 0.2 mm long; venation acrodromous, the primary nerve flat on the adaxial surface, prominent on the abaxial surface, with 3 pairs of secondary nerves, but only the innermost two pairs extending to the blade apex and converging with the primary nerve, the secondaries basal, impressed on the adaxial surface and prominent on the abaxial surface, tertiaries percurrent (transversals), impressed on the adaxial surface, slightly prominent on the abaxial surface. *Inflorescence* terminal, compound thyrsoid, 10–12 cm long, sessile with three main branches from the base, with 5–12 pedicellate flowers, rachis with 1–2 nodes, quadrangular; paracladia 7.5 cm long, not branched, branchlets or floriferous shoots triflorous. Bracts and bractoles not seen. *Flowers* 5-merous, ca. 15 cm in diameter, on pedicels 1.5–2.5 cm long. Hypanthium 1.4–1.8 cm long, campanulate, glabrous, torus thickened 3.8–5 mm. Calyx truncate, receptacle 0.7–0.9 cm long; external calyx teeth modified into thick roughened callosities. *Corolla* spreading, petals 6.5–8.5 × 4.0–5.8 cm, obovate, bright orange, apex strongly asymmetrical, the margin commonly irregularly blunt-lacerate or irregularly ruptured on mature open flowers, glabrous. *Stamens* 10, slightly dimorphic, the antepetalous whorl with comparatively longer anthers and the antesepalous whorl with comparatively longer filaments; both whorls with magenta filaments, elbow or filament apex/base of the connective junction yellow, anthers purple-magenta; dorsal connective appendages absent. Antepetalous stamens: filaments 3.3–3.5 cm long, ascendant elbow or filament apex/base of the connective junction triangular and expanded on the sides, ca. 1.0 cm long; anther thecae 2.2–2.5 cm long, subulate and slightly sigmoid, pore 0.73–0.85 mm in diameter, dorsally inclined; pedoconnective absent. Antesepalous stamens: filaments 3.5–4 cm long, ascendant elbow or filament apex/base of the connective junction triangular, 0.79–0.97 cm long; anther thecae 1.4–1.8 cm long, subulate and sigmoid, pore 0.78–0.85 mm in diameter, dorsally inclined; pedoconnective absent. *Style* 1–2.3 cm long, conic, apically curved in open flowers, magenta; stigma slightly expanded. *Ovary* 1.0–1.3 × 0.89–9.3 cm, ovoid, apically lobed, superior, 5-locular, apex with rounded lobes 0.2–1.3 mm long enclosing the style base; axile placentae obovate with cordate apex 2.2–2.5 × 2.2–2.4 mm, with ovules concealing the entire surface. *Capsule* 1.8–2 × 2–2.3 cm, only partially to medially enclosed by the hypanthium and remains of the receptacle. *Seeds* 1.5–2.2 mm long, cuneiform, pale brown, lateral symmetrical plane oblong-cuneate, the chalazal end expanded into an inconspicuous apically truncate appendage, the antiraphal plane bluntly angled, the raphal zone oblong, dark brown and extending about ¼ the length of the seed, testa ± smooth.

Phenology:—The species has been collected with flowers in February, March and September, and with fruits in March.

Habitat and distribution:—Endemic to Colombia where it is only known from six collections, five from Putumayo (road from Valle del Sibundoy to Mocoa) and one from Cauca (Santa Rosa, Bota Caucana). All the collections come from a small region on the eastern flank of the “Nudo de los Pastos” and “Macizo Colombiano”, an area where the three Colombian cordilleras of the Andes are united in southernmost Colombia. This eastern flank drains to the Amazon basin. This species grows in Andean forests at 1500 and 2000–2800 m.

Etymology:—The name of this new species refers to the unusually large and strikingly showy flowers.

Conservation status:—This species is known only from two populations. Most of the collections come from the population in Putumayo from the forests along a main road in an region lacking protected status. The other collection comes from the buffer zone of the Serranía de los Churumbelos National Park. Based on georeferenced data from the known collections, GeoCAT (Bachman *et al.* 2011) was used to calculate extent of occurrence (EOO) and area of occupancy (AOO) based on a user defined cell of 2 km. The extent of occurrence for *Meriania fantastica* is 144.536 km² and the area of occupancy is 12.000 km². Using IUCN guidelines and criteria (IUCN 2001, 2011, 2014) and its restricted extent of occurrence, we assign this species a conservation status of Endangered EN B2ab(iii). It is important that urgent measures be taken to protect the few known sites where this species grows. We also strongly advise propagation in botanical gardens since this species has extraordinary ornamental potential.

Additional specimens examined (paratypes):—COLOMBIA. Cauca: Santa Rosa, corregimiento de San Juan de Villalobos, vereda Palmeras, zona amortiguadora del Parque Nacional Serranía de Los Churumbelos, camino a la quebrada La Puerca y al Filo del Tigre, 1° 30.179' N, 76° 20.228' W, 1523 m, 21 February 2013 (fl) *M. Alvear et al.* 1911 (CAS!, COL!); Putumayo: Mocoa, Río Blanco, 2400 m, 28 February 1981 (fl), *G. Mahecha* 8869 (COL!); carretera San Francisco–Mocoa, 2100–2300 m, 30 January 1973 (fl), *L.E. Mora-O.* 6242 (COL!); San Francisco–Mocoa, 2000 m, March 1978 (fl), *F. Sánchez s.n.* (COL!); Río Blanco, 2400 m, March 1981 (fl), *G. Mahecha s.n.* (COL!); Mocoa,

carretera entre Sibundoy y Mocoa, El Mirador, 2000 m, 7 September 1998 (fl), *H. Mendoza 6056, 7019* (FMB!); Sibundoy, entre Río Blanco y La Cabaña, 2300–2800 m, 6 March 1987 (fl), *B. Ramírez 937* (PSO!); Mocoa, carretera entre San Francisco y Mocoa, 2700 m, 29 January 1973 (fl), *E. Hernández 351* (PSO!).

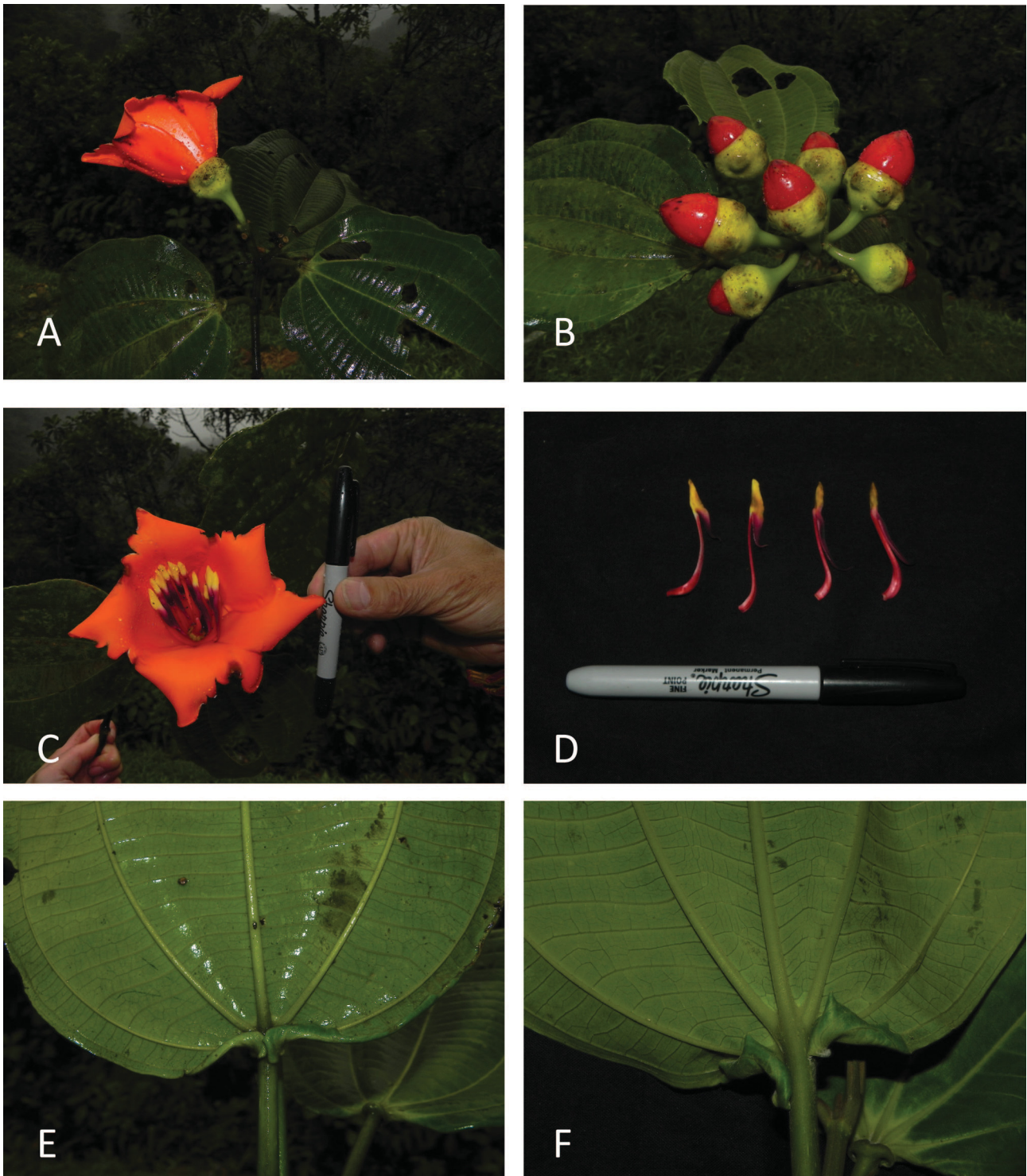


FIGURE 4. *Meriania fantastica*. A. Flowering branch (flower in lateral view). B. Flowering branch with flower buds. C. Flower. D. Two antesealous stamens (left) and two antepetalous stamens (right). E–F. Leaf base details (abaxial surfaces). (All photos from *Alvear 1851* by M. Alvear).

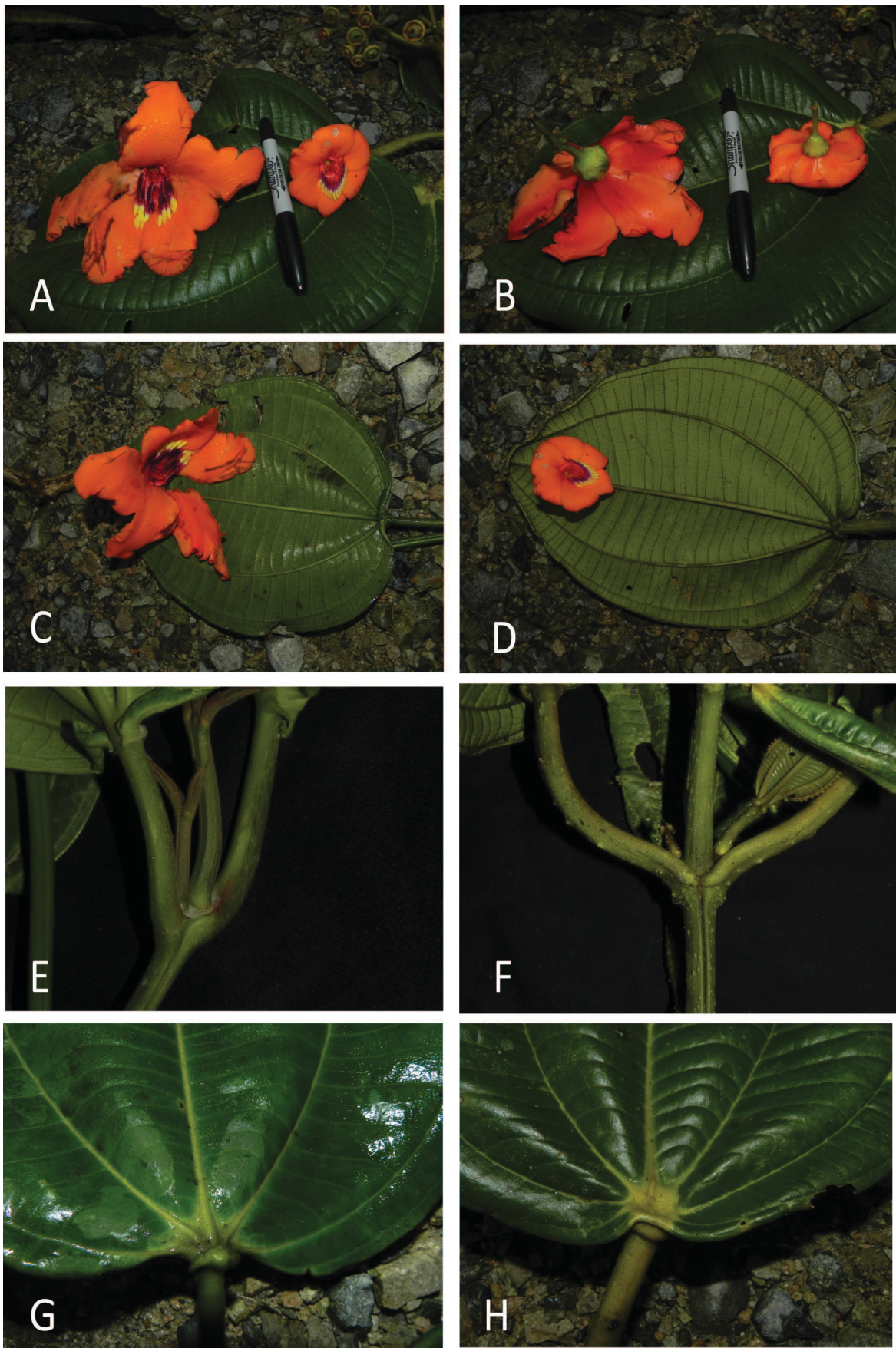


FIGURE 5. *Meriania fantastica* and *M. hernandoi* comparison. A. Flower comparison, *M. fantastica* (left), *M. hernandoi* (right). B. Flower comparison, showing abaxial petal surfaces and hypanthia, *M. fantastica* (left), *M. hernandoi* (right). C. Leaf (abaxial side) of *M. fantastica*. D. Leaf (abaxial side) of *M. hernandoi*. E. Branch with node and leaf bases of *M. fantastica*. F. Branch with node and leaf bases of *M. hernandoi*. G. Leaf base (adaxial side) of *M. fantastica*. H. Leaf base (adaxial side) of *M. hernandoi* (*Meriania fantastica* photos from Alvear 1851; *Meriania hernandoi* photos from Alvear 1856; all photos by M. Alvear).

Discussion

The distinguishing features of *Meriania fantastica* are the scutum at the adaxial petiole apex (Fig. 3C; 5G), the revolute auricles at the blade base abaxially (Fig. 3B; 4E,F), the large flowers (ca. 15 cm in diameter), bright orange petals that are blunt-lacerate or irregularly lobed (Fig. 3D; 4C), and the dimorphic stamens (3H; 4D). This species most closely resembles *M. hernandoi* (Uribe 1969: 292), a species known from Colombian and Ecuador that also has orange flowers with widely spreading petals at anthesis. However, the latter has a subpeltate blade (Fig. 5H) that lacks the conspicuous auricles on the abaxial foliar base (Fig. 5D), and has a longer multiflowered inflorescence (to 30 cm long with 19–50 flowers). *Meriania hernandoi* also has calyx teeth modified into conspicuous callosities below the truncate calyx but they are much less prominent and often difficult to see on dry material. The much smaller petals (2–2.5 × 1.5–2 cm) of *M. hernandoi* are essentially entire and unlobed (Fig. 5A, B, D), and the stamens are uniformly isomorphic (Fig. 5D). In *M. hernandoi* the texture of the leaf blade and abaxial leaf base also differ; the leaves are coriaceous (vs. membranaceous) and the primary nerve is modified at the base into a thickened bilobed appendage or callosity that superficially resembles a domatium (Fig. 5D).

Meriania pastazana (Wurdack 1974: 142–143) of Colombia and Ecuador is another orange-flowered species with spreading petals. It is readily separated from *M. fantastica* by its smaller coriaceous leaves (11–18 × 5.3–9.3 cm) that are basally acute to obtuse, absence of a petiolar scutum at the adaxial petiole apex and revolute auricles at the blade base abaxially, smaller hypanthia (5–6 mm long) with well developed calyx (4–4.5 mm long) that is conspicuously expanded above the hypanthium, lack of external calyx teeth, smaller petals (2.5–3.4 × 2.0–2.4 cm) that are entire, and isomorphic stamens.

Acknowledgments

We thank Mario Camilo Barrera, his family, and friends at Fundación Buenoy Yumartán Aldea Ecológica (Valle del Sibundoy, Putumayo) for their hospitality, support and guidance; José David García and Diego Alvear for their help on the expeditions where these specimens were collected; Sean Vidal Edgerton for the line drawings of *M. fantastica* and C. Pfeiffer for technical assistance with color plates; curators and staff at CAS, CAUP, COL, FMB and PSO for access to collections under their care; the staff at Parque Nacional Natural Selva de Florencia and Parque Nacional Natural Serranía de los Churumbelos, especially to Hugo Ballesteros, Mónica Arroyave, Weimar Hincapié, Mauricio Zambrano, Sandra Pizo and Yadira Vargas for their support; Darin Penneys and one anonymous reviewer for helpful reviews of the manuscript. This research was supported in part by the California Academy of Sciences, the M. Stanley Rundel Charitable Trust, and a grant from the U.S. National Science Foundation (DEB-0818399-Planetary Biodiversity Inventory Miconieae project). We are grateful to Parques Nacionales de Colombia, Ministerio de Ambiente y Desarrollo Sostenible, and Autoridad Nacional de Licencias Ambientales (ANLA) in Colombia for granting the research permits to collect members of the Melastomataceae for the project entitled “Sistemática y filogenia de la tribu Miconieae (Melastomataceae)”.

Literature Cited

- Almeda, F. (1993) An evaluation of the Mesoamerican species of *Meriania* (Melastomataceae: Merianieae). *Proceedings of the California Academy of Sciences* 48: 141–152.
- Almeda, F., Mendoza-Cifuentes, H., Penneys, D.S., Michelangeli, F. & Alvear, M. (In press) Melastomataceae. In: Bernal, R., Gradstein, R. & Celis, M. (Eds.) *Catálogo de las Plantas de Colombia*. Instituto de Ciencias Naturales, Universidad Nacional de Colombia & University of Göttingen.
- Baumgratz, J.F.A., Bernardo, K.F.R., Chiavegatto, B., Goldenberg, R., Guimarães, P.J.F., Kriebel, R., Martins, A.B., Michelangeli, F.A., Reginato, M., Romero, R., Souza, M.L.D.R. & Woodgyer, E. (2013 onwards) Melastomataceae. In: *Lista de Espécies da Flora do Brasil*. Jardim Botânico do Rio de Janeiro. Available from: <http://floradobrasil.jbrj.gov.br/jabot/floradobrasil/FB161> (accessed: 15 April 2014).
- Bachman, S., Moat, J., Hill, A.W., de la Torre, J., & Scott, B. (2011) Supporting Red List threat assessments with GeoCAT: geospatial conservation assessment tool. In: Smith, V. & Penev, L. (Eds.) e-Infrastructures for Data Publishing in Biodiversity Science. *ZooKeys*

- 150: 117–126. (Version BETA).
<http://dx.doi.org/10.3897/zookeys.150.2109>
- Calderón, E. & Mendoza, H. (2000) Melastomatáceas de los géneros *Axinaea*, *Blakea*, *Castratella*, *Centronia*, *Killipia*, *Meriania*, *Monochaetum*, *Ossaea* y *Tibouchina* en Colombia. *Biota Colombiana* 1: 336–357.
- Chavieatto, B. & Baumgratz, J. F. A. (2009) *Revisão Taxonômica do gênero Meriania Sw. (Melastomataceae) no Brasil*. Escola Nacional de Botânica Tropical, Instituto de Pesquisas Jardim Botânico do Rio de Janeiro Escola Nacional de Botânica Tropical. Tesis de Doctorado. Rio de Janeiro, Brasil, 174 pp.
- IUCN (2001) IUCN Red List Categories and Criteria: Version 3.1. Prepared by the IUCN Species Survival Commission. IUCN, Gland, Switzerland and Cambridge.
- IUCN (2011) Guidelines for using the IUCN Red List Categories and Criteria. Version 9.0. Available from <http://www.iucnredlist.org/documents/RedListGuidelines.pdf> (accessed: 27 November 2013).
- IUCN Standards and Petitions Subcommittee (2014) *Guidelines for using the IUCN Red List Categories and Criteria. Version 11*. Prepared by the Standards and Petitions Subcommittee, 87 pp. Downloadable from: <http://www.iucnredlist.org/documents/RedListGuidelines.pdf>
- Mendoza, H. & Ramírez, B. (2006) *Guía Ilustrada de géneros de Melastomataceae y Memecylaceae de Colombia*. Instituto Alexander von Humboldt – Universidad del Cauca. Bogotá D.C., Colombia, 288 pp.
- Mendoza-Cifuentes, H. (In prep.) *Meriania. Flora de Colombia*. Instituto de Ciencias Naturales, Universidad Nacional de Colombia. Bogotá D.C., Colombia.
- Mendoza-Cifuentes, H. (2011) *Meriania selvaflourensensis* (Melastomataceae), una nueva especie lianescente de Colombia. *Anales del Jardín Botánico de Madrid* 68: 249–252.
<http://dx.doi.org/10.3989/ajbm.2279>
- Mendoza-Cifuentes, H. & Fernández-Alonso, J.L. (2010) Evaluación de caracteres del cáliz y de los estambres en la tribu Meranieae (Melastomataceae) y definición de homologías. *Revista de la Academia Colombiana de Ciencias* 34: 143–172.
- Mendoza-Cifuentes, H. & Fernández-Alonso, J.L. (2011) Análisis cladístico de *Centronia* (Meranieae/Melastomataceae) con base en caracteres morfológicos. *Revista de la Academia Colombiana de Ciencias* 35: 431–450.
- Mendoza-Cifuentes, H. & Fernández-Alonso, J.L. (2012) Novedades en *Centronia* y *Meriania* (Meranieae, Melastomataceae) y revisión taxonómica de *Meriania* grupo brachycera. *Anales del Jardín Botánico de Madrid* 69: 259–294.
<http://dx.doi.org/10.3989/ajbm.2317>
- Michelangeli, F. & Cotton, E. (2008) Melastomataceae. In: Hokche, O., Berry, P.E. & Huber, O. (Eds.) *Nuevo Catálogo de la Flora Vascular de Venezuela*. Fundación Instituto Botánico de Venezuela, Caracas, pp. 466–484.
- Neill, D.A. & Ulloa-Ulloa, C. (2011) *Adiciones a la Flora del Ecuador: Segundo suplemento, 2005–1010*. Fundación Jatun Sacha, Quito, 202 pp.
- Parques Nacionales Naturales de Colombia (2014) *Parque Nacional Natural Selva de Florencia*. Available from <http://www.parquesnacionales.gov.co/PNN/portel/libreria/php/decide.php?patron=01.0125> (accessed: 3 March 2014).
- Renner, S. (1999) Melastomataceae. In: Jørgensen, P.M. & León, S. (Eds.) *Catalogue of Vascular Plants of Ecuador. Monographs in Systematic Botany from the Missouri Botanical Garden* 75: 561–585.
- Swartz, O. (1798) *Meriania. Flora Indiae Occidentalis* 2: 823.
<http://dx.doi.org/10.5962/bhl.title.6152>
- Uribe, L. (1969) Sertula Florae Colombia XI. *Caldasia* 10(48): 287–298.
- Wurdack, J.J. (1973) Melastomataceae. In: Lasser, T. (Ed.) *Flora de Venezuela*. No. 8. Instituto Botánico, Ministerios de Agricultura y Cría, Caracas, pp. 1–819.
- Wurdack, J.J. (1974) Certamen Melastomataceis XXIII. *Phytologia* 29: 135–151.