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A new species of *Varronia* P. Browne (Cordiaceae) from central Colombia

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Abstract

A new species, *Varronia teguorum* Fern. Alonso & J.I.M. Melo (Cordiaceae), from central Colombia is described. This new taxon is compared morphologically with *V. subtruncata* and *V. bullata*, the species with which it is most easily confused. An identification key for the *Varronia* species with globose inflorescences from Colombia/northern South America is presented.

Keywords: Boraginaceae s.l., Boraginales, *Cordia* s.l., diversity, Neotropical flora, taxonomy

Resumen

Se describe *Varronia teguorum* Fern. Alonso & J.I.M. Melo (Cordiaceae), una nueva especie del centro de Colombia. Este nuevo taxon es comparado morfológicamente con las especies con las cuales es más fácilmente confundida, *V. subtruncata* y *V. bullata*. Se presenta una clave para separar las especies de *Varronia* con inflorescencias globosas de Colombia/norte de Sudamérica.

Palabrasclave: Boraginaceae s.l., Boraginales, *Cordia* s.l., diversidad, flora neotropical, taxonomía

Introduction

In the last few decades, researchers from the Instituto de Ciencias Naturales of the Universidad Nacional de Colombia made important new collections in the eastern part of the departments of Boyacá and Cundinamarca, in the region of the El Guavio, Chivor and La Esmeralda water dams, and lower sectors of the eastern slope of the Cordillera Oriental de Colombia. These samplings were part of projects like: "*Diversidad biótica de la cuenca del río Guavio*" between 1997–1999; and the "*Caracterización taxonómica de grupos focales de la Cordillera Oriental de Colombia*", focusing on the regions of Santa María and San Luis de Gaceno, Boyacá, between 2003–2004 (Linares *et al*. 1998; Fernández-Alonso & Jaramillo 1999). Subsequently, numerous Plant Systematics classes and some degree theses were carried out in these regions. These recent studies served as the basis for the publication of field guides on the overall flora and useful plants of the region (Betancur *et al*. 2007; Fernández-Alonso 2009; Linares 2018; Rodríguez *et al*. 2020). As part of the identification and taxonomic study of the Boraginaceae s.l. (Boraginales *sensu* APG IV 2016) specimens collected during the above-mentioned expeditions, we describe a new species of *Varronia* P. Browne (1756: 172), which is used in traditional medicine in the region (departments of Boyacá and Cundinamarca).

Varronia was described by P. Browne to include two species of Boraginaceae from Jamaica and Central America. Later, the genus was considered a synonym of *Cordia* Linnaeus (1753: 190) and this was generally accepted by many recent authors (Taroda & Gibbs 1986; Miller & Nowicke 1989; Estrada 1995), treating *Varronia* as a subgenus or section of *Cordia*. Nonetheless, based on the great morphological diversity of the clades of *Cordia* s.l. and its placement as sister to *Cordia* s.str. as supported by molecular studies, *Varronia* has been reestablished as a distinct genus and included in Cordiaceae, Boraginales (Gottschling *et al*. 2005; Gottschling & Miller 2006; Miller & Gottschling

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2007; BWG 2016). After the reestablishment of *Varronia*, several studies transferred species from *Cordia* to *Varronia* and proposed additional taxonomic novelties in *Varronia* (Miller 2007, 2012a, 2013; Miller & Wood 2008; Stapf 2010; Feuillet 2012, 2016; Silva & Melo 2019a). *Cordia* s.str. usually includes trees and treelets with entire-margined leaves and many-flowered inflorescences with a conspicuous axis. Alternatively, species of *Varronia* are generally subshrubs, shrubs, or scandent shrubs with dentate or serrate-margined leaves and few-flowered inflorescences with an inconspicuous axis, which produces spike-like or globose inflorescences (Estrada 1995; Melo & Stapf 2014). *Varronia* currently comprises 125 to 130 species, mostly restricted to warm regions of the Neotropics, from southern USA to Argentina, but with centers of diversity in Brazil, northern South America, and Mexico (Miller & Gottschling 2007; Miller 2013).

Estrada (1995) recognized 26 species of *Varronia* in his taxonomic revision for Colombia. However, Miller (2020) only recognizes 14 of the taxa accepted by Estrada (1995) in the checklist of plants and lichens from Colombia, plus *Varronia globosa* Jacquin (1760: 14). Of the 12 remaining species, ten of them are treated either as synonyms or as not occurring in Colombia (e.g., *C. eggersii* K. Krause (1906: 628)). The last two species are currently recognized in *Cordia* (Miller 2020). Three species that were erroneously retained in *Cordia* were transferred to *Varronia* only recently: *V. fuertesii* (Estrada) T.S. Silva & J.I.M. Melo (2019: 25), *V. ramirezii* (Estrada) T.S. Silva & J.I.M. Melo (2019: 25), and *V. serratifolia* (Kunth) T.S. Silva (2019: 297).

Material and methods

Most of the studied samples were collected during the last few decades, part of projects led by the Instituto de Ciencias of the Universidad Nacional de Colombia. The taxonomic and morphological analyses of the specimens was carried out at the "Herbario Nacional Colombiano" (COL) and herbarium of the Real Jardín Botánico de Madrid - CSIC (MA), where most of the new species samples are housed. Duplicates are currently found or are in the process of distribution to the following herbaria COAH, HECASA, HUA, K, MEDEL, MO, NY, P, PSO, UPTC and US (acronyms follow Thiers 2021). For the identification of these samples, we consulted the available specialized literature: Johnston 1930, 1949; Taroda & Gibbs 1986; Gavíria 1987; Borhidi *et al*. 1988; Estrada 1995; Feuillet 2003, 2008; Stapf 2010; Miller 2012b; Campos-Ríos & Chiang-Cabrera 2012). We also consulted the protologue and type specimens of related species using JSTOR-Global Plants (https://plants.jstor.org) and Tropicos.org (http://www.tropicos.org). The descriptive terminology followed Font Quer (1985) and Harris & Harris (2001).

Results

Description

Varronia teguorum Fern. Alonso & J.I.M. Melo, ***sp. nov.***
(Figs 1–3)

TYPE: **COLOMBIA. Dpto. Boyacá**. Vertiente Oriental de la Cordillera oriental. Mpio. de Santa María. Cañón Negro, vía Quebrada Honda, 1000–1050 m, 3 December 2006, fl., fr., *J.L. Fernández-Alonso & al. 24079* [holotype: COL 537711!; isotypes (to be distributed): COL 557483!, G!, K!, MA (3 sheets: 888443!, 888444!, 888445!), MEDEL!, MO!, NY!, P!, PSO!, US!].

This new species is similar to *Varronia subtruncata* and *V. bullata*, but it differs from these two by the presence of a rusty (*vs*. white to yellow) indumentum covering the stems, leaves and inflorescences, longer (1.5–2 mm *vs*. < 1.5 mm long) and patent (*vs*. patent or adpressed) hairs; oblong to ovate-oblong (vs. lanceolate to ovate), larger (7.5–13 × 4.5–7.5 cm *vs*. < 8.0 × 4.5 cm) leaf blades.

Shrubs 1.5–6 m high, densely branched; branches sub-cylindric in cross-section, self-supporting, sometimes scrambling or vining, indumentum with eglandular hairs, densely hirsute, becoming denser towards the apex, hairs 1.5–2 mm long, simple, coarse, patent, rusty. ***Leaves*** sparsely distributed along the branches, 2–5 cm apart from each other; petioles 8–13 mm long, slightly adnate at base, 2–4 mm long, hispid, hairs 1.5–2 mm long, rusty, enlarged at base; blades 7.5–13.0 × 4.5–7.5 cm, oblong to ovate-oblong (most rarely narrowly ovate), membranous to sub-chartaceous, asperous, drying blackish-brown, base cuneate to truncate, margins thick, irregularly dentate in upper 2/3, rarely dentate from base to apex, teeth short, 0.5–1 mm long, 2–4 mm apart from each other, apex acute to slightly acuminate,

adaxially with long hairs, more or less adpressed, evenly distributed, with numerous cystolithic pustules; abaxially with hairs congested on primary veins, hispid, with numerous strigose hairs, sometimes presenting sessile papillae; midvein thick, 1–1.5 mm wide at base, secondary veins 5–6 pairs, adaxially impressed-excavate, abaxially prominent; tertiary veins reticulate, generally conspicuous. ***Inflorescences*** axillary, pedunculated glomerules, peduncles cylindric, adnate at the base of the leaf 2–4 mm; 2.5–8.5 cm long, ca. 1.5 mm wide, gradually thickened towards the apex; rarely inflorescences not associated with leaves; yellowish-green, with the same indumentum as the young branches, hairs long, drying dark brown; glomerules globose to narrowly ellipsoid, 11–15 mm diam., presenting ca. 60 flowers sessile, arranged in radiated series from base to apex; the residual inflorescence rachis (flowerless), cylindric, ca. 8 mm long. ***Flowers*** bisexual, intensely fragrant, sessile; calyx slightly accrescent, 5–7 mm long (at the end of anthesis), urceolate, yellow, tube 3.5–4.5 mm long, turbinate-saccate, narrowing at apex, inconspicuously costate, externally densely pilose in the upper half, 5-toothed, teeth 1.5–2.5 mm long, incurved, covering the calyx throat, with a short appendage, up to 1.5 mm long, linear, with long, stiff, erect or patent hairs, internally glabrous; corolla 3.5–5 × 3.5–4.5 mm, slightly conspicuous, subcylindric, slightly campanulate, white to cream, externally pruinose, nitid, internally glabrous towards the apex, with short hairs at the throat, lobes scarcely distended, scarcely apart from each other; stamens included, shorter than the corolla tube, filaments short, densely pubescent at their insertion, anthers broadly cylindric; style bifurcated, branches bifurcated, stigmatic lobes filiform to clavate. ***Drupes*** red, included in the persistent calyx when immature, 5–6 × 3–5 mm, ventricose, teeth 2–3.5 mm long, appendages 1–1.5 mm long; immature pyrenes ca. 2 × 1.5 mm, ovoid, bilobed.

Phenology:—This new species was observed in flower during almost the whole year, except during January and February. This is most likely associated with the elevated rainfall levels on this side of the Eastern Cordillera throughout the year, which can surpass 5000 mm of annual rainfall, on the edge of tropical rainforests and their transition to submontane rainforests.

Etymology:—The epithet refers to the indigenous Tegua people, who inhabited the base of the Boyacá-Casanare Mountain, bordering the Muiscas people territory (Fernández de Piedrahita 1973). The chroniclers Fray Pedro Simón and B. Fernández de Oviedo highlighted the Tegua's longevity and their knowledge and use of medicinal plants, which was also acknowledged by the Muiscas neighbors.

Distribution and Habitat:—Currently this species is known exclusively from a small sector in the border area of Boyacá and Cundinamarca Departments, at the base of Colombia's Cordillera Oriental (Figure 4). It grows in very wet tropical forest and in its transition to pluvial submontane forest (5000 and 6000 mm of annual rainfall). It has been exclusively collected at the edge of forests, in exposed areas such as creek margins and road slopes on forest edges, between 500 and 1150 m elevation. Among the species restricted to this region of the mountain base are *Brownea enricii* Quiñones (1995: 17) (Fabaceae) and *Phragmotheca mambitana* Fern. Alonso & Jaramillo-Mejía (1999: 125) (Malvaceae).

Conservation status:—Based on fieldwork carried out in the regions of de Mámbita, Santa María, and Guateque conducted by one of us (JLFA), it seems to represent a locally common species associated with unstable environments, presenting some degree of human influence. Thus, it seems likely that this species is not under any current threat. However, the species has never been formally assessed in Colombia, based on the IUCN criteria (2019). Therefore, since it represents a locally used medicinal plant, it would be essential for this species to be properly assessed.

Notes:—*Varronia teguorum* is closely related morphologically to other species of the genus with globose inflorescences from northern South America, but it can be easily differentiated from *V. subtruncata* Friesen (1933: 151) and *V. bullata* Linnaeus (1759: 916) due to its long and rusty indumentum with straight hairs 1.5–2 mm long *vs*. white to yellow indumentum, with patent to adpressed hairs < 1.5 mm long, and oblong to ovate-oblong, 7.5–13 cm leaf blades *vs*. lanceolate-ovate, 2.5–8.0 cm leaf blades. Moreover, it differs from *V. bullulata* (Killip ex J. Estrada & García-Barr.) J.S. Mill. (2007: 373) because this one presents finely bullate (*vs*. flat) leaf blades, recurved (*vs*. straight) inflorescence peduncles, and appendages of the calyx lobes 1.7–5 mm long (*vs*. ≤ 1.5 mm long). Other species from this group, namely *V. macrocephala* Desvaux (1808: 173) and *V. andreana* (J. Estrada) J.S. Mill. (2007: 372), also significantly differ from *V. teguorum*. The first due to its unique indumentum with stellate hairs, and the latter due to its indumentum with short glandular hairs and flowers with larger (18–23 mm long) corollas. Finally, *V. serratifolia* (Kunth) T.S. Silva (2019: 297), which shares with *V. teguorum* the short calyx appendages, can be differentiated from the new species by its smaller leaf blades (usually 2.1–7.5 cm long) and inflorescences less than 8 mm diam.

Vernacular names:—It is locally known as "*salvia*" in the localities in which it is regarded as a medicinal plant. Other species of *Varronia*, such as *Varronia cylindristachya* Ruiz & Pav. (1799: 23) and *V. spinescens* (Linnaeus 1771: 206) Borhidi (1988: 393) are also known by the same name, or small variations thereof ("*salvia negra*" or "*salvio*") (García-Barriga 1975; Estrada 1995).

FIGURE 1. Image of the isotype of *Varronia teguorum* Fern. Alonso & J.I.M. Melo, *Fernández-Alonso 24079* (MA 888445).

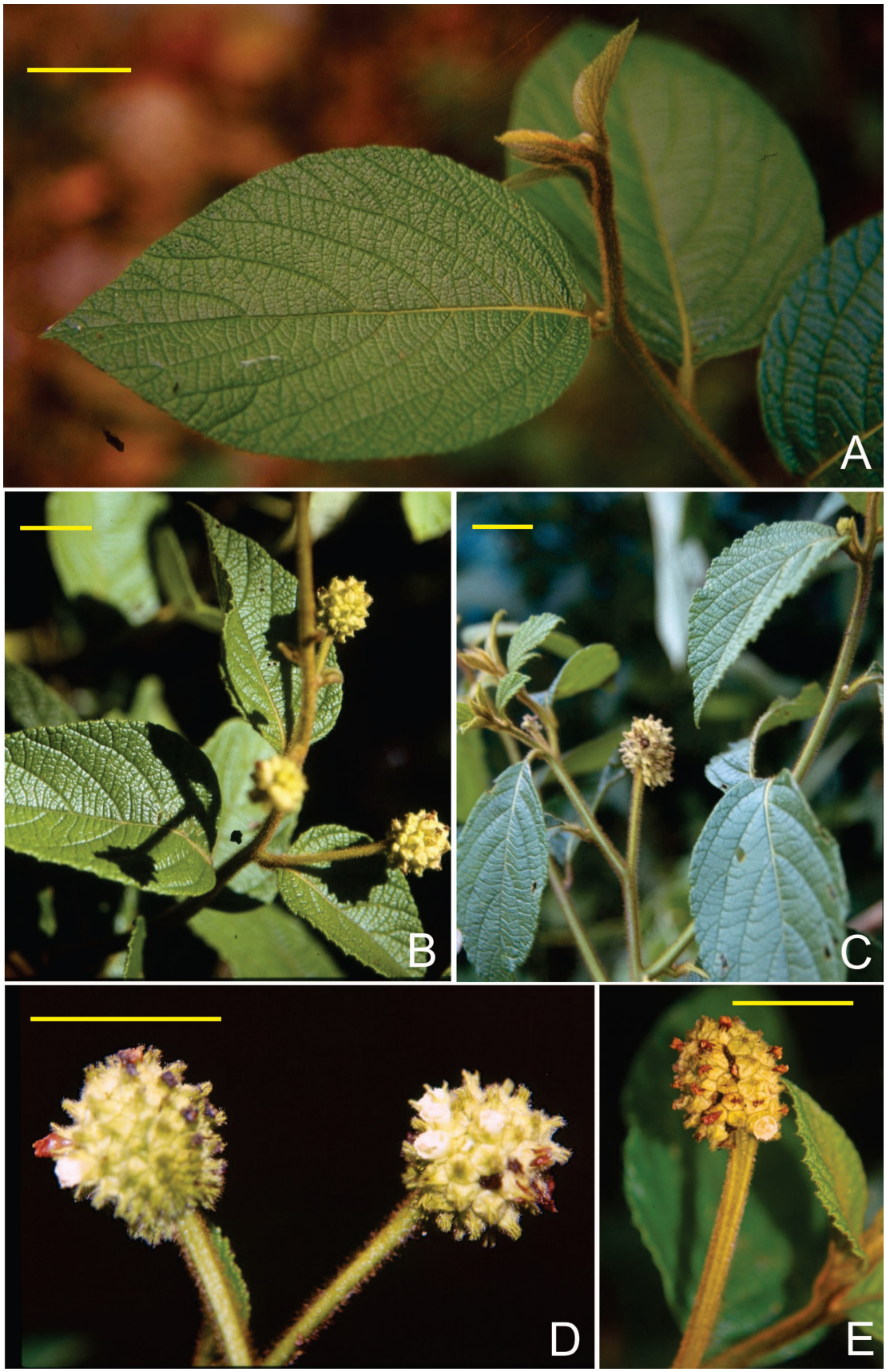

FIGURE 2. Field images of *Varronia teguorum*. A. Apex of a young branch, showing the rusty indumentum and the tertiary and quaternary veins on the leaf adaxial surface. B. Branch with developed axillary inflorescences, showing floral buds. C. Branch with an inflorescence. D. Inflorescences with some flowers at anthesis (white corolla) and others at post-anthesis (senescent corolla), and immature fruits (red). E. Inflorescences with an open flower at a basal position, showing the senescent flowers with accrescent calyx and incurved lobes obscuring the calyx throat. Scale bar in all cases = 15 mm long. Photos by J.L. Fernández-Alonso taken in the type locality, Santa María, Boyacá.

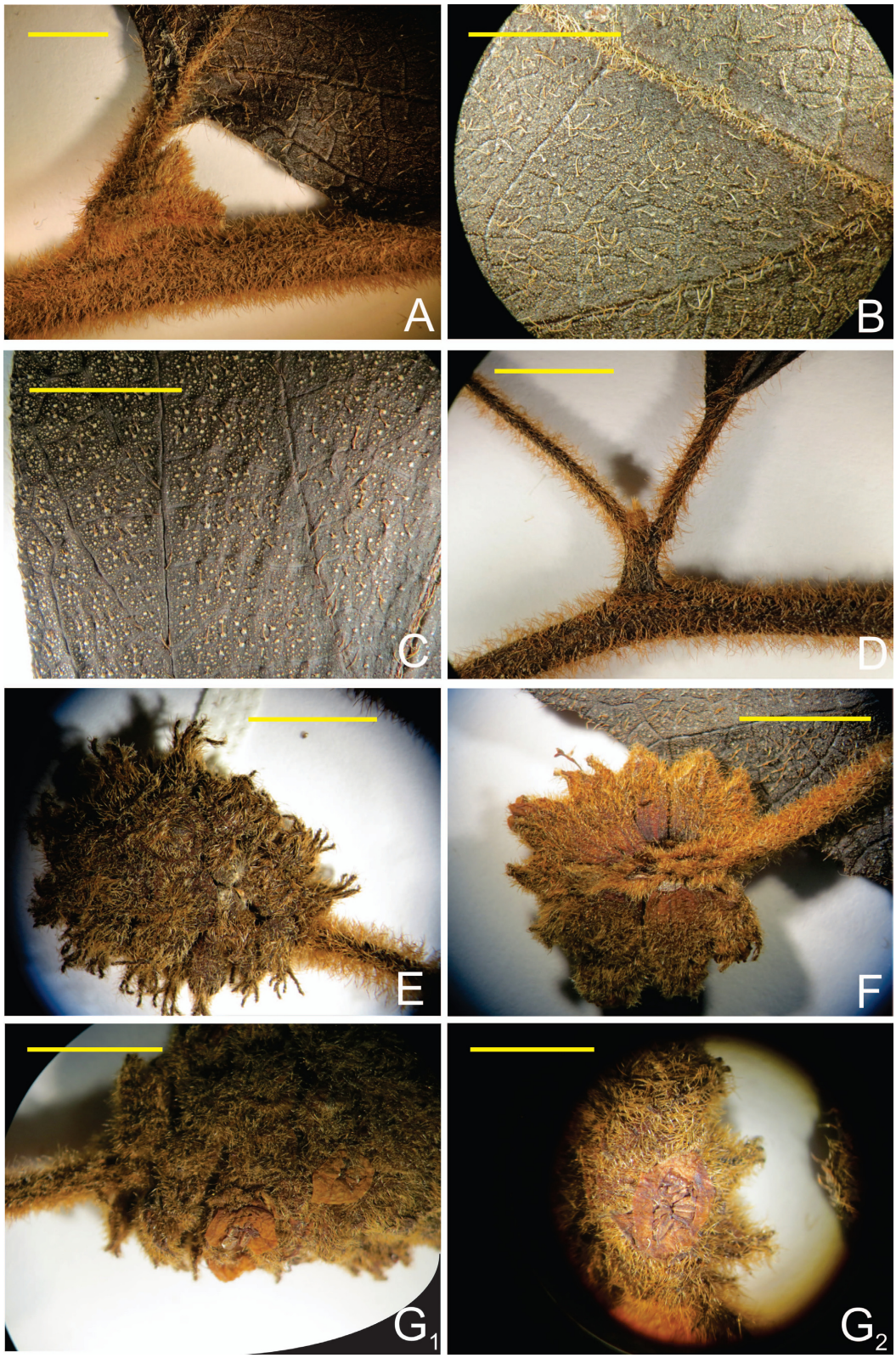

FIGURE 3. Light micrographs of a dried specimen of *Varronia teguorum*. A. Insertion of the petiole in the branch, the base of the leaf blade, and the axillary bud. B. Adaxial surface of leaf blade: impressed venation and indumentum with conspicuous long hairs along the veins and cystolithic pustules. C. Abaxial surface of leaf blade showing prominent reticulate venation (2º, 3º, and 4º orders) and hairs with cystolithic pustules. D. Slightly adnate region of the petiole (right) with the inflorescence axis (left). E. Young inflorescence, showing the indumentum of the peduncle and the incurved appendages of the calyx lobes. F. Inflorescence rachis, showing its dense indumentum and the flower arrangement. G. Inflorescence with flowers at anthesis: G1. Two open flowers showing the corolla lobes and some dehisced anthers; G2. Open flower, showing the glabrous anthers covering the corolla throat. Scale bar in all cases = 5 mm long. (Voucher: *Fernández-Alonso 24079*, COL). Photos by J.L. Fernández-Alonso.

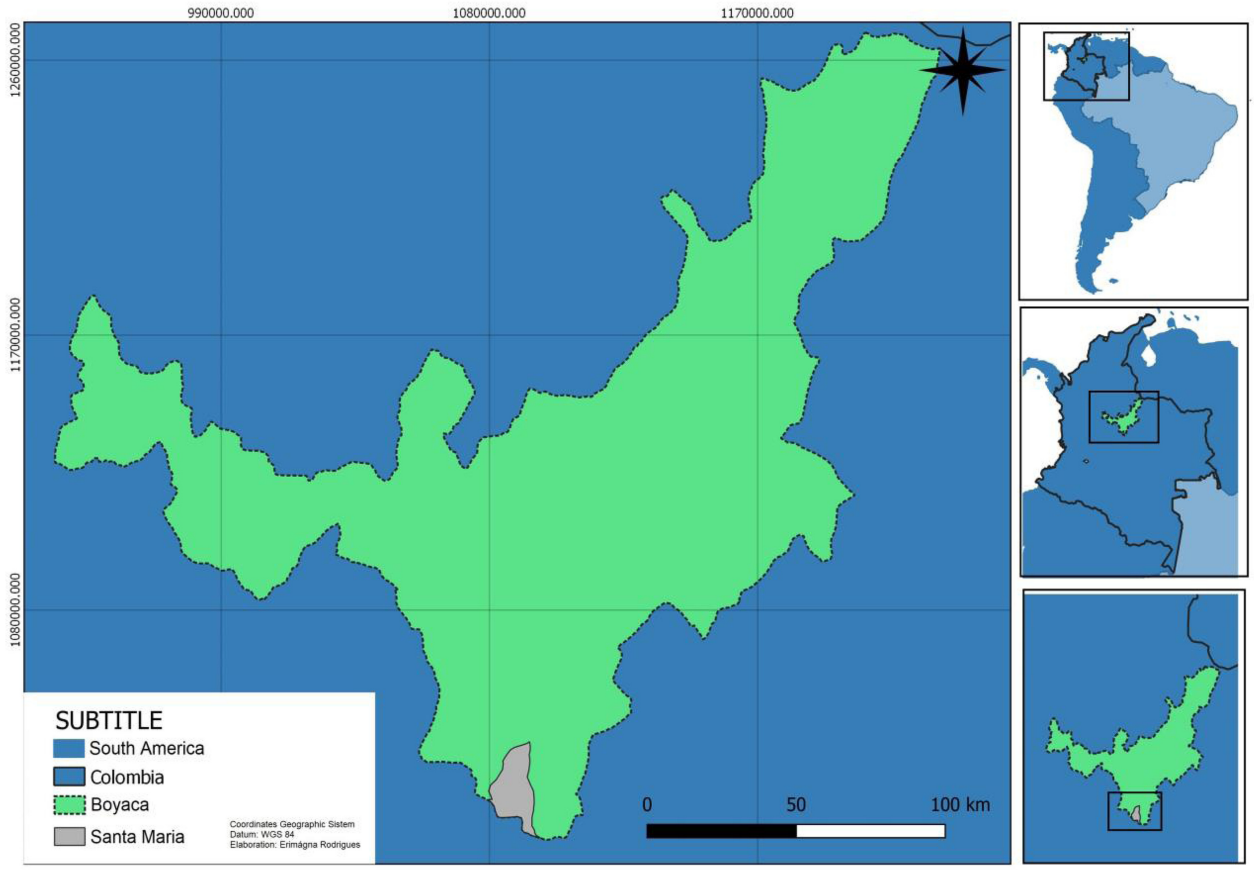

FIGURE 4. Map showing the type locality of *Varronia teguorum*.

Known uses:—In the region of Santa María, it has been recently cited as medicinal under the tentative identification of *V. andreana* (Estrada) J.S. Mill. (Rodríguez-Mora *et al*. 2020).

Additional examined specimens (paratypes). COLOMBIA. Dpto. Boyacá. Vertiente Oriental de la Cordillera Oriental. Santa María, Vereda La Carbonera y Charco Largo, 650-900 m, 7 June 2008, fl., *J. Betancur & al. 13020* (COL); Ibidem, en zonas de huertas y caminos en los márgenes del casco urbano, 800m, arbusto scandens 2–4 m, indumento ferrugíneo café, inflorescencias verdosas, corola crema, 22 April 2005, fl., *J.L. Fernández-Alonso & al. 22914* (COL, MA); Ibidem, bajada de S. María a S. Luis de Gaceno, Zona del río Lengupá, Quebrada Mollas y Vereda Aguas Calientes, 500 m, 25 April 2005, fl., *J.L. Fernández-Alonso & al. 23000* (COL 535465, 535816; HUA, MA 888438, 888439); Vía Santa María a La Cristalina, bocatoma del acueducto, rio Batá, 500-550 m, 25 April 2005, fl., *J.L. Fernández-Alonso & al. 23020* (COL 535820, 535826; HUA, MA 888440, 888441, MEDEL, MO, US); Ibidem, remanente de bmhT en el tramo al Acueducto, 800 m, 24 August 2005, fl., *J.L. Fernández-Alonso & al. 23579* (COL 533668; HUA, MA 888442, UPTC); Vía S. María a Mámbita, Trayecto desde el río Garagoa a Santa María, 700-800 m, bosque intervenido y potreros, 6 March 2007, fr., *J.L. Fernández-Alonso & al. 24775* (COL, HUA, MA 888446); Ibidem, 800 m, 4 March 2007, arbusto 2-4 m, flores blancas con cáliz amarillento, fr., *J.L. Fernández-Alonso & al. 24933* (COL, MA 888447, 888448, MEDEL); Vía de Santa María a Mámbita, 700-750 m, arbusto 1,5-2 m, capítulos muy aromáticos, 2 October 2007, fl., *J.L. Fernández-Alonso & al. 25768* (COL, MA, UPTC, US). **Dpto. Cundinamarca**. Ubalá B, Vereda San Roque, Camino a Campo Hermoso, 4º45’50’’N, 73º20’56’’W, 1150 m, arbusto 2 m, fl., 30 June 1998, fl., fr., *J.L. Fernández-Alonso & al. 16210* (COAH, COL 479190, 479208, 479209, 479210; HECASA, MA 888436).

Key to the Colombian species of *Varronia* with globose and glomerulate inflorescences

1. Indumentum with stellate hairs ..... *V. macrocephala*
– Indumentum with simple hairs 2
2. Inflorescences less than 8 mm diam.; calyx lobes with aristate appendage 0.4–1.1 mm long..... *V. serratifolia*
– Inflorescences more than 9 mm diam.; calyx lobes with aristate appendage 1.2–5.0 mm long 3

3. Indumentum with glandular hairs; corolla more than 15 mm long ..... *V. andreana*
– Indumentum with eglandular hairs; corolla less than 12 mm long 4
4. Peduncle of the inflorescences recurvate; calyx internally covered with short hairs ..... *V. bullulata*
– Peduncle of the inflorescences straight; calyx internally glabrous 5
5. Indumentum rusty, hairs 1.5–2 mm long, patent; leaf blades 75–130 × 45–75 mm, oblong to ovate-oblong, sometimes narrowly ovate ..... *V. teguorum*
– Indumentum white to yellow, hairs < 1.5 mm long, patent or adpressed; leaf blades 25–80 × 12–42 mm, lanceolate to ovate 6
6. Aristate appendage of the calyx lobes with patent hairs, corolla tube 5–15 mm long ..... *V. subtruncata*
– Aristate appendage of the calyx lobes with adpressed hairs, corolla tube 3.5–7.5 mm long ..... *V. bullata*

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