



A new species of *Tournefortiopsis* (Guettardeae, Rubiaceae) from northern Colombia

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Abstract

A new species of *Tournefortiopsis* from high Andean forests of the Central Colombian Cordillera is described and illustrated. *Tournefortiopsis triflora* is characterized mainly by its dichasium inflorescence, a feature not previously reported in the genus. It can be distinguished from its related species by its smaller leaves, peduncles, and corolla tube, and by the leaves abaxially glabrous on the areoles. The new species is from an area of biogeographic interest due to the large number of endemic species known to this area. A distribution map, conservation status and taxonomic affinities are provided in this paper.

Key words: Antioquia, *Chomelia*, Flora of Colombia, *Guettarda*

Introduction

Tournefortiopsis Rusby (1907: 369) belongs to the tribe Guettardeae and is comprised by 12 species found in wet forest vegetation in the neotropics (Taylor & Berger 2021). The genus was described by Rusby (1907) as different from *Guettarda* Linnaeus (1753: 991), but was later synonymized by Standley (1931) and since then many of its species were described under *Guettarda*. However, according to the phylogenetic analyzes carried out by Achille *et al.* (2006), *Guettarda* resulted not monophyletic, with some species, including the type species of the genus, *G. speciosa* Linnaeus (1753: 991), grouping in the clade *Guettarda sensu stricto*. Two other *Guettarda* species formed a separate clade and were later transferred to *Tournefortiopsis* by Borhidi (2008).

Delprete *et al.* (2010), based on the phylogeny of Achille *et al.* (2006), suggested that the *Guettarda crispiflora* Vahl (1796: 36) group, which appears as a monophyletic, deserve a generic recognition. Furthermore, in the phylogeny performed by Pessoa (2016), *Tournefortiopsis* was recovered as a monophyletic group and considered as a distinct genus from *Guettarda*. However, despite the fact that several authors pointed that *Tournefortiopsis* was different from *Guettarda*, a monographic work was lacking for the genus until Taylor & Berger's treatment (2021).

Tournefortiopsis species are recognized by the combination of some characters related to its leaf venation pattern; axillary inflorescences with usually two or four scorpioid axes, 4–5-lobed corollas valvate-induplicate in bud and with a well-developed tube, and generally 2–6 locular pyrenes with three to six apical horns (Taylor & Berger 2021). The presence of apical horns in the pyrene is the principal diagnostic character of the genus and allows to differentiate it from *Chomelia* Jacquin (1760: 12) which is the most related genus. Both genera develop valvate corollas.

During recent studies with herbarium collections, we found a specimen, from the north of the Central Cordillera of Colombia, belonging to *Tournefortiopsis* which does not correspond to any of the species previously described. According with that, this paper describes and illustrates a new species including notes on its distribution, conservation status and taxonomic affinities.

Material and methods

A comprehensive review of the type specimens available for all the published names in *Tournefortiopsis* was done

through Global Plants project (<http://plants.jstor.org>) and the websites of BM, F, K, MO, NY, S and US herbaria (acronyms follow Thiers 2023). In addition, we did a review of preserved specimens of the genus at HUA, JAUM and MEDEL. The description of vegetative characters was based on dried material; flowers and fruits were described from rehydrated structures. Comparative characters of related species were obtained from protologues, digital images and Taylor & Berger (2021) publication. Descriptive terminology follows Beentje (2016), and Harris & Harris (2001). The distribution map was made using QGIS version 3.22.10 (QGIS Development Team 2022), and the conservation status was assessed according to the IUCN red list criteria (IUCN 2012, 2022), using the R package “ConR” (Dauby *et al.* 2017).

Taxonomy

Tournefortiopsis triflora D.Pérez & Alzate, *sp. nov.* (Figure 1)

TYPE:—COLOMBIA. Antioquia: municipio de Sonsón, vereda Chaverras, vertiente de la quebrada “El padre Sánchez”, ascenso al cerro La Paloma, cerros al NE, 2900–3000 m a.s.l., 5°37'N, 75°16'W, 10 April 1994 (fl, fr), *R. Callejas et al. 11139* (holotype: HUA-100854!).

Diagnosis:—*Tournefortiopsis triflora* differs from the remaining species of the genus by the simple dichasium inflorescence (*vs.* usually double scorpioid cyme). It is similar to *T. sopkinii* C.M. Taylor (2021: 260) but can be distinguished by its leaf blades with abaxially glabrous areoles (*vs.* whitened lanulose), calyx limb 4 or 5-lobed (*vs.* truncate to shallowly 4-lobed) and shorter peduncles 0.4–1 cm long (*vs.* 1.3–2.5 cm long).

Description:—Shrubs 2–3 m tall; stems terete, young branchlets densely strigulose to hirsutulous. Stipules interpetiolar, caducous, triangular, 5–9.1 × 2.1–3.6 mm, densely strigulose in both surfaces, acuminate at apex. Leaves opposite, decussate; petioles terete, 0.3–1 cm long, strigose to hirsute; blade 2.8–6.8 × 1.4–3 cm, elliptic to slightly ovate, acuminate with tip 5–7 mm long at apex, obtuse to cuneate at base, drying subcoriaceous, adaxially bullate, strigose on costa and secondary veins, indument caducous except on costa, abaxially strigose to hirsute on costa, secondary, tertiary veins and margins, on both surfaces glabrous on areoles; venation eucamptodromous, secondary veins 7–9 pairs, tertiary veins subparallel, quaternary venation irregularly reticulated on abaxial surface, not visible in adaxial surface; adaxially costa, secondary, and tertiary venation impressed, abaxially costa, secondary, and tertiary venation prominent and quaternary venation plane. Inflorescences axillary, simple dichasium, 3-flowered; peduncles 0.4–1.1 cm long, puberulent to sparsely strigulose toward apex, bracts ovate, acute at apex, 1.2–1.7 mm long, adaxially sparsely strigulose, abaxially mostly glabrous. Flowers subsessile or pedicellate, calyx and hypanthium 2.5–4 mm long, hypanthium turbinate, 1.5–2.5 mm long, sparsely strigulose; calyx limb 0.6–1.1 mm long, 4 or 5-lobed, lobes ovate, rounded, externally strigulose, internally sparsely strigulose toward the base; corolla tubular in bud, purple, externally tomentose to velutinous, internally glabrous, tube 11.9–13 mm long, lobes at anthesis not seen; anthers 5, shortly pedicellate, dorsifixed, oblong, inserted in corolla tube, ca. 4 mm long, sagittate; ovary 3-locular; style ca. 14 mm long, antrorse-pilulous, dilated toward the base; stigma capitate, lobulate, ca. 1 mm long, ca. 0.7 mm diam. Fruit ellipsoid, ca. 5.1 × 3.1 mm, immature green; pyrene immature 3-locular, with 3 apical horns.

Etymology:—The specific epithet refers to its simple dichasium composed by three flowers.

Distribution and habitat:—*Tournefortiopsis triflora* is found on the western slopes of Colombian Central Cordillera, in the municipality of Sonsón (Figure 2). Although in the herbarium label states that it grows at 2900 m, the location and elevation is not correct and could be georeferenced with the information provided by one of the original collectors. The species grows at 2500 m in humid forest and is found in the lower part of the village Chaverras, near the urban center.

Morphological affinities:—The new species is similar to *Tournefortiopsis sopkinii* (see diagnosis) and *T. crassifolia* (Standley ex Steyermark 1964: 51) C.M. Taylor & A.C. Berger (2021: 242). It can be differentiated from the latter by their glabrous areoles on the abaxial surface of the leaf (*versus* variably pubescent in *T. crassifolia*), and leaves and peduncles smaller. Table 1 summarizes the main differences between these three species.

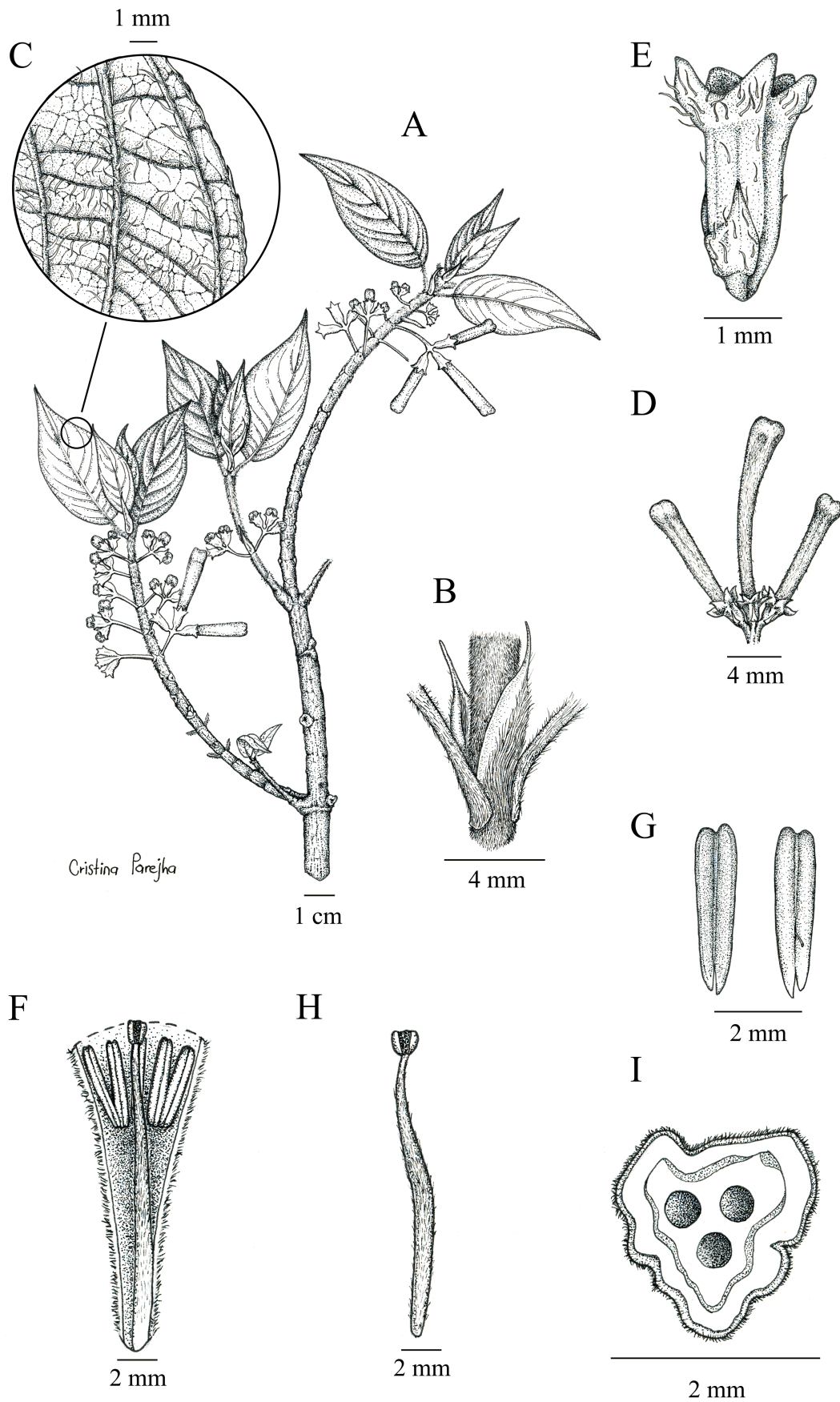


FIGURE 1. *Tournefortiopsis triflora* D. Perez & Alzate: **A.** Fertile branch. **B.** Stipule. **C.** Detail of the abaxial leaf surface. **D.** Dichasium. **E.** Calyx and hypanthium. **F.** Corolla bud in longitudinal section. **G.** Anthers. **H.** Style and stigma. **I.** Trilocular ovary in transversal section. Illustration by Cristina Parejha based on *Callejas 11139 (HUA)*.

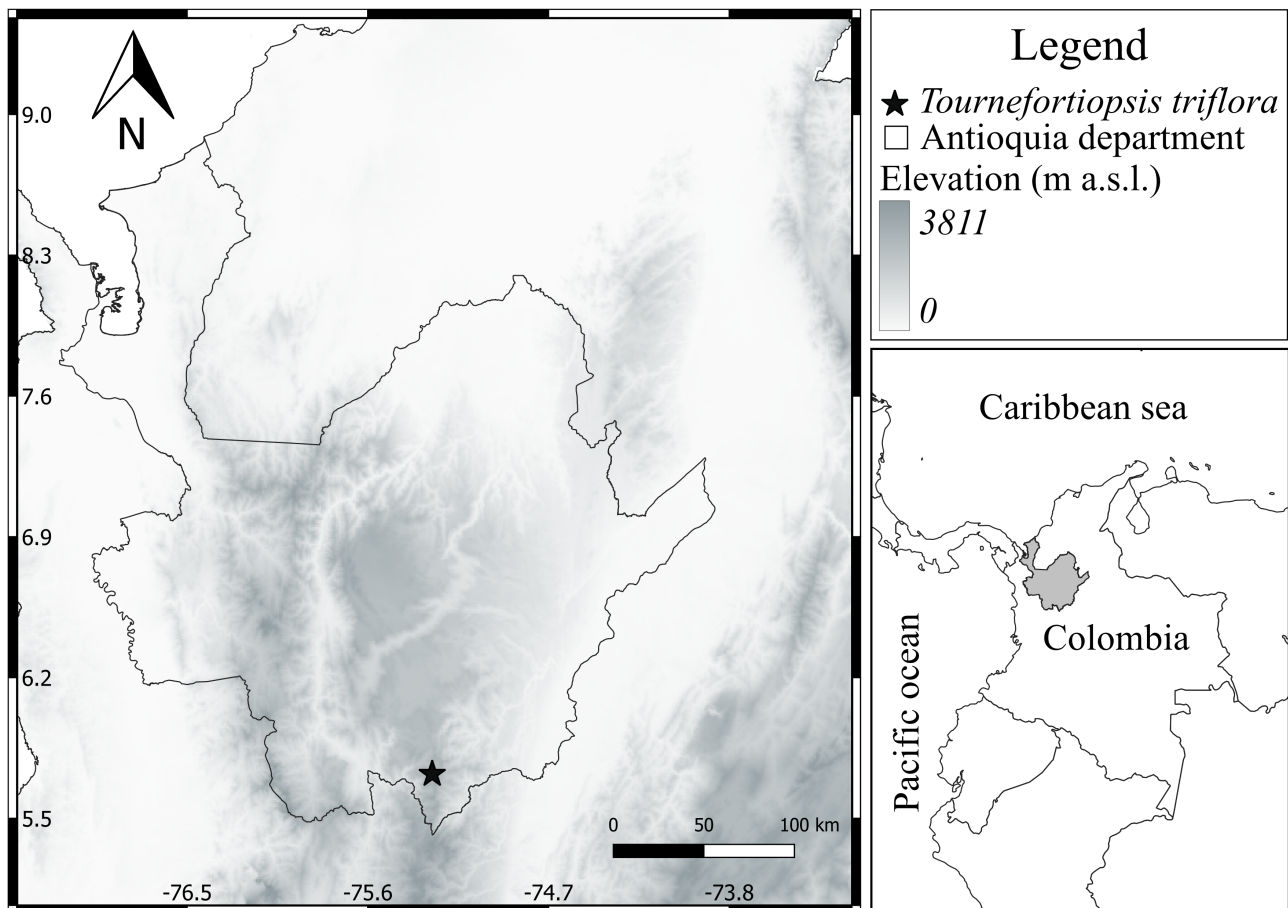


FIGURE 2. Distribution of *Tournefortiopsis triflora*.

TABLE 1. Comparison of morphological characters of *Tournefortiopsis triflora* with the most related species.

Character	<i>T. triflora</i>	<i>T. crassifolia</i> Based on Taylor & Berger (2022)	<i>T. sopkinii</i> Based on Taylor & Berger (2022)
Leaf size	2.8–6.8 × 1.4–3 cm	8.5–14 × 3.5–5	4–9 × 1.4–3.2 cm
Peduncle length	0.4–1.1 cm	1–3 cm	1.3–2.5 cm
Areole indument	Glabrous	Tomentose	Whitened-lanulose
Inflorescence type	Dichasium	Double scorpioid cyme	Double scorpioid cyme
Corolla tube length	11.9–13 mm	14–23 mm	ca. 15 mm

Tournefortiopsis triflora is also similar to a species group characterized by their small leaves, such as *T. deviana* C.M. Taylor (2021: 255) and *T. torrana* (C.M. Taylor 2010: 356) C.M. Taylor (2021: 262). From the former it can be distinguished by its adaxially bullate leaves (*versus* adaxially plane leaves in *T. deviana*) and smaller peduncles, and from the latter by its strigose indumentum on vegetative structures (*vs.* mostly glabrous in *T. torrana*) and by its lobed calyx (*vs.* truncate).

Preliminary conservation status:—The new species is only known from the type locality, and no further records have been found since its collection in 1994. Evaluating the preliminary conservation status, an area of occupancy (AOO) of 4 km² was obtained. It is more complicated if one considers that is a region where anthropogenic activities are present, including deforestation, mainly due to avocado cultivation. *Tournefortiopsis triflora* is categorized as “Critically Endangered” (CR) according to IUCN criteria B2ab(iii) (IUCN 2012, 2022).

Discussion

The new species presents valvate aestivation, trilocular ovary and pyrenes with apical horns, characteristics that justify its inclusion in the genus *Tournefortiopsis*. The inflorescence described for the genus are scorpioid cymes and the occurrence of dichasia observed in *Tournefortiopsis triflora* has not been described previously in this genus.

The type locality is the municipality of Sonsón, an area of biological interest because several new species have been described based on specimens collected there, some of which are endemic and with few known individuals (Alzate & Giraldo 2020, Rincón-González *et al.* 2022, Rivera-Correa *et al.* 2017, Venegas *et al.* 2013). That endemism may be related to the high elevations where those species inhabit because during the Andean uplift, new niches were available for colonization and speciation of various plant lineages (Luebert & Weigend 2014). It is expected that future biogeographic studies will explain the processes that led to such a unique biota in that area. The species described here adds to the list of new taxa described for that area.

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References

- Achille, F., Motley, T.J., Lowry, P.P. & Jérémie, J. (2006) Polyphyly in *Guettarda* L. (Rubiaceae, Guettardeae) based on nrDNA ITS sequence data. *Annals of the Missouri Botanical Garden* 93 (1): 103–121.
[https://doi.org/10.3417/0026-6493\(2006\)93\[103:PIGLRG\]2.0.CO;2](https://doi.org/10.3417/0026-6493(2006)93[103:PIGLRG]2.0.CO;2)
- Alzate, F. & Giraldo, S. (2020) *Espeletia restricta* (Milleriaceae, Asteraceae), a new species from the páramos of northern Colombia. *Phytotaxa* 433 (4): 288–294.
<https://doi.org/10.11646/phytotaxa.433.4.4>
- Beentje, H.J. (2016) *The Kew Plant Glossary, an illustrated dictionary of plant terms (second edition)*. Royal Botanic Gardens, Kew, Richmond, 183 pp.
- Borhidi, A. (2008) Revalidation of the genus *Tournefortiopsis* Rusby.(Guettardeae, Rubiaceae) and a new *Guettarda* from Costa Rica. *Acta Botanica Hungarica* 50 (1): 61–72.
<https://doi.org/10.1556/abot.50.2008.1-2.3>
- Dauby, G., Stévant, T., Droissart, V., Cosiaux, A., Deblauwe, V., Simo-Droissart, M., Sosef, M.S.M., Lowry, P.P., Schatz, G.E. & Gereau, R.E. (2017) ConR: An R package to assist large-scale multispecies preliminary conservation assessments using distribution data. *Ecology and evolution* 7 (24): 11292–11303.
<https://doi.org/10.1002/ece3.3704>
- Delprete, P.G., Achille, F. & Mouly, A. (2010) Four new combinations in *Chomelia* and *Stenostomum* (Rubiaceae, Guettardeae) from Central America, the Guianas and the Amazon Basin. *Blumea-Biodiversity, Evolution and Biogeography of Plants* 55 (2): 164–170.
<https://doi.org/10.3767/000651910X526906>
- Harris, J.G. & Harris, M.W. (2001) *Plant identification terminology: An illustrated glossary. 2nd ed.* Spring Lake: Spring Lake Publishing, 206 pp.
- IUCN (2012) *IUCN Red List Categories and Criteria: Version 3.1. Second edition*. Gland, Switzerland and Cambridge, IUCN, UK, iv + 32 pp.
- IUCN Standards and Petitions Committee (2022) *Guidelines for Using the IUCN Red List Categories and Criteria. Version 15.1. Prepared by the Standards and Petitions Committee*. Available from: <https://www.iucnredlist.org/documents/RedListGuidelines.pdf> (accessed September 2022)
- Jacquin, N.J. (1760) *Enumeratio Systematica Plantarum, quas in insulis Caribaeis viciniquae Americae continente detexit novas, aut iam cognitae emendavit*. Apud Theodorum Haak, Lugduni Batavorum, Leiden, 41 pp.
<https://doi.org/10.5962/bhl.title.737>
- Linnaeus, C. (1753) *Species plantarum*, Vol. 2. Impensis Laurentii Salvii, Stockholm, 1200 pp.
<https://doi.org/10.5962/bhl.title.669>

- Luebert, F. & Weigend, M. (2014) Phylogenetic insights into Andean plant diversification. *Frontiers in Ecology and Evolution* 2: 27.
<https://doi.org/10.3389/fevo.2014.00027>
- Pessoa, M. do C.R. (2016) *Filogenia do gênero Chomelia (Rubiaceae) e revisão taxonômica das espécies brasileiras*. Ph.D. Dissertation, Universidade Federal de Pernambuco, Recife, 133 pp.
- QGIS Development Team (2022) QGIS Geographic Information System. Open Source Geospatial Foundation Project. Available from: <http://qgis.osgeo.org> (accessed 21 August 2023)
- Rincón-González, M., Santiago, E. & Hágsater, E. (2022) A new species of *Epidendrum*; (Orchidaceae) from The Central Andes of Antioquia, Colombia. *Lankesteriana: International Journal on Orchidology* 22 (2): 145–153.
<https://doi.org/10.15517/lank.v22i2.52169>
- Rivera-Correa, M., Jimenez-Rivillas, C. & Daza, J.M. (2017) Phylogenetic analysis of the Neotropical *Pristimantis leptolophus* species group (Anura: Craugastoridae): molecular approach and description of a new polymorphic species. *Zootaxa* 4242 (2): 313–343.
<https://doi.org/10.11646/zootaxa.4242.2.6>
- Rusby, H.H. (1907) An enumeration of the plants collected in Bolivia by Miguel Bang. Part 4. With descriptions of new genera and species. *Bulletin of the New York Botanical Garden* 4 (14): 309–470.
- Standley, P.C. (1931) The Rubiaceae of Bolivia. *Publications of the Field Museum of Natural History Botanical Series* 7: 255–339.
<https://doi.org/10.5962/bhl.title.2327>
- Steyermark, J.A. (1964) Novedades en las Rubiaceas Colombianas de Cuatrecasas. *Acta Biologica Venezuelica* 4: 1–117.
- Taylor, C.M. & Berger, A. (2021) Rubiacearum Americanarum Magna Hama Pars XLIX: Overview of the Neotropical Genus *Tournefortiopsis* (Guettardeae), With Some New Species and Subspecies. *Novon* 29 (1): 227–265.
<https://doi.org/10.3417/2021641>
- Taylor, C.M. & Gereau, R.E. (2010) Rubiacearum americanarum magna hama pars XXIII: Overview of the Guettardeae tribe in Central and South America, with five new species and three new combinations in *Chomelia*, *Neoblakea*, *Pittoniotis*, and *Stenostomum*. *Novon* 20 (3): 351–362.
<https://doi.org/10.3417/2009045>
- Thiers, B. (2023 onward) *Index herbariorum: a global directory of public herbaria and associated staff*. New York Botanical Garden's Virtual Herbarium. The New York Botanical Garden, Bronx, New York. Available from: <http://sweetgum.nybg.org/science/ih/> (accessed 22 June 2023)
- Vahl, M. (1796) *Eclogae americanae, seu, Descriptiones plantarum praesertim Americae meridionalis, nondum cognitarum. Vol 1*. Impensis Auctoris, Copenhagen, 52 pp.
<https://doi.org/10.5962/bhl.title.429>
- Venegas, J.G., Puerta, J.M.V. & González, F. (2013) Three new species of *Burmeistera* (Campanulaceae—Lobelioideae) from Colombia. *Brittonia* 65 (2): 119–127.
<https://doi.org/10.1007/s12228-012-9259-8>