Anales del Jardín Botánico de Madrid 77 (1): e097
https://doi.org/10.3989/ajbm.2559
ISSN-L: 0211-1322

Sertulum Ternstroemiacearum I. Synopsis of the genus *Freziera* (Ternstroemiaceae) in Venezuela, including a new species from Cordillera de Mérida

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Abstract. The genus *Freziera* Willd. is distributed in Venezuela along major mountain systems, including Los Andes, Coastal Cordillera, and Guayana Shield. Two out of 11 *Freziera* species known from Venezuela are endemic to this country and could be endangered, but their actual conservation status is unknown, being Data Deficient according to the criteria of the IUCN. In this work, a key for the Venezuelan species is provided for the first time, and *Freziera polita* A.L.Weitzman ex J.R. Grande, sp. nov., from Cordillera de Mérida, is described and illustrated. Diagnostic characters of the new species, which is most closely similar to *F. guaramacalana* D.Santam. & Cuello, include elongated petioles, subglabrous mature leaves, and corollas (at anthesis) that are exerted less than half the length of sepals.

Keywords. Cloud forests, Freziereae, Pentaphylacaceae s.l., Ternstroemieae, Venezuelan Andes.

Resumen. El género *Freziera* Willd. se encuentra distribuido en Venezuela a lo largo de los sistemas montañosos de Los Andes, la Cordillera de la Costa y el Escudo Guayanés. Dos de las 11 especies conocidas del país son endémicas y podrían encontrarse amenazadas, pero su estado real de conservación se desconoce, correspondiendo a la categoría Datos Deficientes de acuerdo con los criterios de la UICN. En el presente trabajo se ofrece por primera vez una clave para todas las especies presentes en el país y se describe e ilustra *Freziera polita* A.L.Weitzman ex J.R.Grande, sp. nov., una especie restringida a la Cordillera de Mérida. Los caracteres diagnósticos de la nueva especie, la cual es muy similar a *F. guaramacalana* D.Santam. & Cuello, incluyen pecíolos alargados, hojas maduras subglabras y corolas (en antesis) exertas menos de la mitad del largo de los sépalos.

Palabras clave. Andes de Venezuela, bosques nublados, Freziereae, Pentaphylacaceae s.l., Ternstroemieae.

How to cite this article: Grande Allende J.R. 2020. Sertulum Ternstroemiacearum I. Synopsis of the genus *Freziera* (Ternstroemiaceae) in Venezuela, including a new species from Cordillera de Mérida. *Anales del Jardín Botánico de Madrid* 77: e097. https://doi.org/10.3989/ajbm.2559

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Associate Editor: Ricarda Riina. Received: 22 April 2020; accepted: 17 June 2020; published online: 2 september 2020

INTRODUCTION

Tribe Freziereae differs from Ternstroemieae, the other major group in the family, by the presence of several to many-flowered inflorescences, rarely one-flowered (vs. always solitary), and small seeds that are hard and ornamented (vs. relatively large seeds that are smooth with a distinct red to purple sarcotesta; Barker 1980; Corner 1976; Luna & Ochoterena 2004; Weitzman & al. 2004). *Freziera*, its type genus, is closely related to *Cleyera* Thunb. and *Eurya* Thunb. (cf. Kobuski 1941b), and their generic circumscription remains problematic; characters presently employed to delimit these genera, once considered under *Eurya* s.l. (Szyszyłowicz 1893; Melchior 1925) are, in fact, subtle and, at least in some instances, ambiguous (cf. Kobuski 1937, 1941a, 1941b; Prince & Parks 2001; Luna & Ochoterena 2004; Weitzman 1987; Weitzman et al. 2004). They include phyllotaxis, petiole, fruiting pedicel, style morphology, flower size, degree of fusion of petals, stamen arrangement, anther pubescence, seed number, and sexuality of plants. As it is currently circumscribed, *Freziera* includes functionally dioecious plants with a well-developed pistillode in male flowers, distichous leaves, serrate leaf margins, urceolate corollas, free and glabrous stamens, styles that are entire and reduced with short lobes, baccate fruit, rarely a drupe (and thence with as many pyrenes as seeds), and a sub-hippocrepiform, rarely straight, embryo (Weitzman & al. 2004). Despite a rich recent literature on new species and nomenclature (summarized in Santamaría-Aguilar & Monro 2019), the taxonomy of this genus, with c. 63 species in the Neotropics, is still poorly understood.

This new series, Sertulum Ternstroemiacearum, aims to update the taxonomy of family Ternstroemiaceae worldwide. As here circumscribed, the family excludes *Pentaphylax* Gardner & Champ., which is the sister group of the monophyletic Ternstroemieae plus Freziereae (Weitzman & al. 2004 [as "Ternstroemiaceae"]; APG IV 2016; Tsou & al. 2016; Stevens 2001 onwards; Rose & al. 2018). The genus *Pentaphylax*, from Southeast Asia, is in fact both

different and ancient enough to represent a distinct family (i.e., Pentaphylacaceae s.s.) (Grande Allende, ined.), and in the case they are considered together as a sole taxon (as in APG IV 2016), the name Pentaphylacaceae s.l. should be used.

The new species here described (*Freziera polita*) was included in the current catalogue of the Venezuelan flora (Berry & Weitzman 2008) as an unpublished name along with the name *F. serrata* A.L.Weitzman, ined., which was later published as *F. guaramacalana* (Cuello & Santamaría-Aguilar 2015). Besides the new species description, this work summarizes the current knowledge on the genus *Freziera* in Venezuela, including the first key to all the species occurring in the country. Additional information on the genus is available in Kobuski (1941b), Weitzman (1987), and Santamaría-Aguilar & Monro (2019).

MATERIALS AND METHODS

Specimens of *Freziera* housed at INPA, MER, MERC, MERF, MY, MYF, and VEN were carefully studied with the aid of a stereoscopic microscope Leika MZ6. The relevant literature was reviewed and type material of similar species was consulted in the cited herbaria and through the Jstor Plant Sciences (https://plants.jstor.org/). Conservation status was assessed following the IUCN Red List criteria (IUCN 2012). Specialized terminology follows the foundational reviews of Kobuski (1941b) and Weitzman (1987). Since in the genus there are only either functionally male or functionally female flowers, "staminate" and "pistillate" (Kobuski, 1941b) or "carpellate" (Weitzman 1987) flowers are here treated just as "male" and "female". No hermaphroditic flowers were seen.

RESULTS AND DISCUSSION

Freziera polita A.L.Weitzman ex J.R.Grande, sp. nov. Type: Venezuela, Táchira, Dtto. Uribante, 13 km S of El Portachuelo, on small road to Pregonero off Bailadores-La Grita road; heavily disturbed cloud forest along road; 08°07'N, 71°53'W, 2650 m, 27 Nov. 1983, fl., ♀, *A.L. Weitzman & C. Sobrevila 33* (holo-: VEN 203691!; iso-: MERF s.n.!). Fig. 1.

Species haec *Frezierae guaramacalanae* affinis, sed lenticellis minoribus remotisque, pedicellis longioribus, foliis margine inconspicue serrulato-crenulatis (non conspicue serratis) et corolla minus quam dimidio longitudinis sepalorum sub anthesi exerta, vero differt.

Treelet to 5 m tall, rarely trees to 15 m tall and 20 cm DBH. Fertile (terminal) twigs with internodes to 0.5 cm in diameter, subterete, more or less fractiflex, slightly angulate, slightly pruinose, blackish toward apex and greyish-glaucous toward base, conspicuously lenticellate, the lenticels generally < 1 mm diam. and clear brown when mature. Leaves distichous, with petioles slender, (1.2–) 1.3–4.3 cm long, subentire (more or less sinuate), flattened toward margins, conspicuously involute, the base slightly widened and undulate, adaxially glabrous, abaxially sparsely pubescent; leaf blades coriaceous, 5.1–16.8 × (1.5–) 2.5–6.3 cm, ovate-elliptic, rarely oblong, the base rounded, truncate or subcordate, sometimes obtuse, margin serrulate-crenulate, flat, the apex slightly acuminate, adaxially glabrous, more or less shiny, seldom glaucous, brown-olivaceous to brown-purpureous, abaxially yellowish-brown to ochraceous, with fine and appressed pubescence relatively inconspicuous and dense, more or less sericeous, of fragile aspect under magnification, hyaline; main vein adaxially slightly impressed, very prominent abaxially, the secondary venation prominent on both sides, the tertiary veins prominule all along abaxially and only in the distal half adaxially. Inflorescences axillary, 1–4-flowered, glomerular, supported by a reduced axis (scarcely defined, c. 1 mm long), bracts disposed toward base of the inflorescence, chaffy, with margins serrulate-crenulate and with conspicuous colleters, oblong, to 3.3 mm long, the pubescence similar to that of the leaf blade; peduncles to 0.8 cm in fructification, with pubescence similar to that of the abaxial side of the leaf blade, but somewhat sparser; bracteoles ovate-orbicular or orbicular, 3.3–3.8 × 3.3–3.5 mm. Sepals more or less orbicular, persistent, externally more or less pubescent, 3.5–4 × 3.2–4 mm (reaching 5 mm long in fructification), the margins ciliolate, otherwise pubescent toward base and center, sometimes the pubescence extending beyond, along the central nerve, to the apex; sepal apex obtuse with the margins thinner, ciliate, sometimes bifid in fructification. Corolla whitish, 4.8–5.5 × 5 mm, connate at the very base, slightly exceeding the sepals during anthesis; petals glabrous, conspicuously imbricate, the pistil scarcely exceeding to just reaching their length, glabrous. Staminodes subequal, c. 20, free, linear, dorsi-ventrally flattened, c. 3 mm long, apically acute or rounded; ovary narrowly pyriform, c. 5.5 × 2.5 mm, 4-locular, with c. 100–140 ovules; stigmatic lobes erect, c. 0,5 mm long. Fruit subspherical, conspicuously rostrate, c. 0.6 cm in diameter and 0.85 cm long, glabrous, subtended by the sepals and the bracteoles, only slightly concrescent. Only female flowers examined; seeds not seen.

Etymology.—The epithet *polita* means polished (Stearn 2013), but also accomplished, refined, cultivated and polite (Numen-The Latin Lexicon 2017). It is retained for the sake of nomenclatural stability and because of its mnemotechnic value. At least among Venezuelan species, this is one of the most polished in aspect, with leaves inconspicuously nerved and (to the naked eye) with an indistinguishable pubescence, which gives the plant a very elegant appearance. This name is included in many databases and several herbaria, including the last catalogue of the vascular flora of Venezuela (Berry & Weitzman 2008).

Distribution and Ecology.—According to the data available in the herbarium labels, the new species is known only from the Venezuelan Andes, growing both in cloud forest and cloud forest-páramo vegetation ecotone, even within regrowths, at 2500–2850 m elevation.

Conservation.—The ecology of the Venezuelan species of *Freziera* is very poorly known. The only species for which we

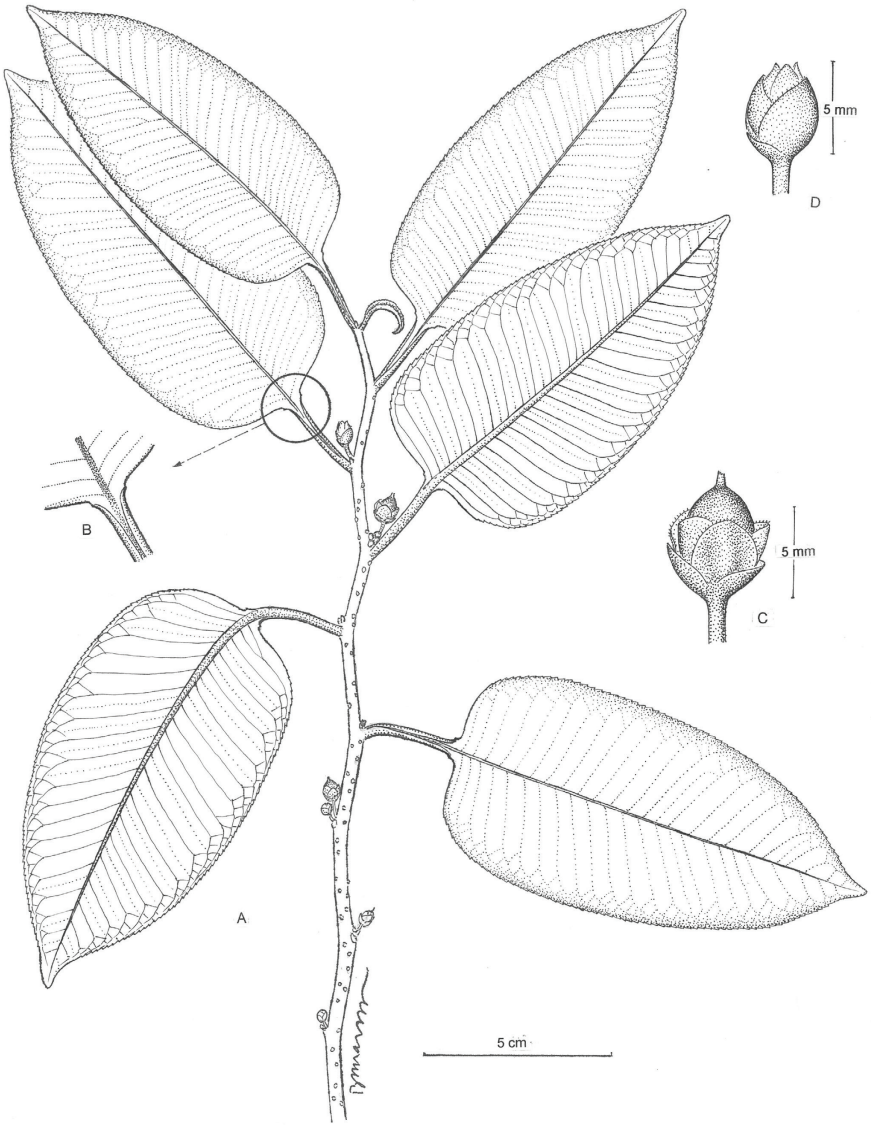

Fig. 1. Line drawing of *Freziera polita* A.L.Weitzman ex J.R.Grande, sp. nov. **a,** habit; **b,** base of leaf blade and apex of petiole; **c,** fruit; **d,** flower. [a–c based on Weitzman & Sobrevila 38 (VEN 203687), d after the holotype, Weitzman & Sobrevila 33 (VEN 203691)].

have more or less accurate information is *F. guaramacalana*, and even in this case just for a limited area within the Guaramacal National Park. There, however, *F. guaramacalana* is one of the most important species in the *Geissantho andini-Miconietum jahnii* Cuello & Cleef association (Cuello & Cleef 2011), where it is restricted to a thin belt between cloud forest and páramo vegetation. Since human pressure is increasing even within such legally protected localities, with agriculture, ranching, tourism, urbanization, power lines establishment, and path openings (Cuello & Cleef 2015), we think it is better to recommend that both species be assigned to the Data Deficient category instead of the Least Concern category suggested by Cuello & Cleef (2015).

Notes.—The new species is somewhat similar to *Freziera guaramacalana*, from which it can be differentiated by the lenticels that are less densely disposed along the stems and less conspicuous, usually not exceeding 1 mm in diameter (vs. lenticels tightly disposed along stems, very conspicuous, generally > 1 mm in diameter), relatively long petioles, petiole length/total leaf length ratio > 1/6 (vs. generally < 1/6), leaf blades that are basally rounded, truncate or subcordate, sometimes obtuse (vs. rounded, sometimes obtuse or subcordate), inconspicuously serrulate-crenulate margins (vs. conspicuously serrate), and corollas that are exerted, at anthesis, less than half the length of sepals (vs. exerted more than half the length of sepals). The Little 15593 collection is somewhat different from the rest of the available specimens, having an arborescent habit, 15 m tall and 20 cm DBH, and leaf blades that are glaucous adaxially, smaller and oblong. Weitzman (1987) reported male flowers in bud, but we were unable to find them.

Additional specimen examined (paratypes).—VENEZUELA. **Mérida**: Mucuquí, bosques nublados de La Mosquera, 2560 m, 08 Dec. 1952, L. Bernardi 242 (MER 9782, 9795, 9796); La Carbonera, selva nublada, 2750 m, 02 Oct. 1953, L. Bernardi 1002 (MER 9797, VEN 234412); La Carbonera, 20 km NO de Ejido, selva templada alta, 2700 m, 02 Oct. 1953, E.L. Little Jr. 15593 (MER 9798, VEN 234411); camino de penetración Estánquez-Páramo de Las Coloradas, desvío camino vie [sic., "via"?, "viejo"?] Santa Cruz de Mora, 2750 m, 24 Nov. 1977, A. Quintero 2130 (INPA 97163, MER 26764); Dtto. Arzobispo Chacón, páramo El Molino, entre El Molino y San Isidro Alto, 2720 m, 07 Apr. 1966, L. Ruiz Terán 3027 (MER 33200 x 2, MERF s.n.); Dtto. Tovar, 37.4 km beyond beginning of dirt portion of road (at turn off in Guayabal) to San Isidro Alto and El Molino on SE facing slope of steep valley above Hacienda Betania, 08°18'N, 71°36'W, 2850 m, 02 Dec. 1983, A.L. Weitzman & C. Sobrevila 34 (MERF s.n., VEN 203690); Dtto. Tovar, 37.4 km beyond beginning of dirt portion of road (at turn off in Guayabal) to San Isidro Alto and El Molino from Santa Cruz de Mora, below El Molino on SE facing slope of steep valley above hacienda Betania, 02 Dec. 1983, A.L. Weitzman & C. Sobrevila 35 (MERF s.n., VEN 203692); 4 km W and below high point of road at Mesa del Trapiche (2850 m), along road to San Isidro Alto and El Molino, from Santa Cruz de Mora, 08°19'N, 71°35'W, 2500 m, 2 Dec. 1983, A.L. Weitzman & C. Sobrevila 36 (MERF s.n., VEN 203689); 700 m W and below high point of road at Mesa del Trapiche (2850 m), along road to San Isidro Alto and El Molino from Santa Cruz de Mora, disturbed cloud forest along edge of road cut cliff face, 08°19'N, 71°35'W, 2660 m, 02 Dec. 1983, A.L. Weitzman & C. Sobrevila 37 (MERF s.n., VEN 203688); idem, A.L. Weitzman & C. Sobrevila 38 (MERF s.n., VEN 203687); idem A.L. Weitzman & C. Sobrevila 39 (VEN 203686). **Táchira**: Dtto. Uribante, 13 km S of El Portachuelo, on small road to Pregonero off Bailadores-La Grita road; heavily disturbed cloud forest along road; 08°07'N, 71°53'W, 2650 m, 27 Nov. 1983, A.L. Weitzman & C. Sobrevila 29 (MERF s.n., MY 91023); idem, A.L. Weitzman & C. Sobrevila 31 (MERF s.n., VEN 203898); idem, A.L. Weitzman & C. Sobrevila 32 (MERF s.n., VEN 203890); idem, A.L. Weitzman & C. Sobrevila 33 (MERF s.n., VEN 203691).

Species excludenda

Freziera cordata Tul. Ann. S ol. Nat. Bot. Ser. 3, 8 : 334. 1847. Type: "Maracaybo", *A. Plee* s.n. (holo-: P 00136775!).
Ternstroemia amplexifolia Sieber ex Choisy, Mém. Soc. Phys. Genève, 14: 122. 1855, nom. inval. (published pro syn. by Choisy 1855).
Freziera amplexifolia Sieber, MSS in Hahn 118 (P 04572674!, P 04572676!, P 04572677!, P 04572680!), and Sieber s.n. (P 04572675!).

Like Weitzman (1987), we consider this species as restricted to the West Indies. Despite the fact that A. Plée collected in Maracaibo and its vicinities (NW Venezuela), this quite distinctive species is clearly restricted to Dominique and Martinique, where he also made collections. The locality name in the type specimen, thus, is to be regarded as a lapsus calami. This species has very characteristic leaves and flowers, and it is hard to be confused with any other in the genus. According to a herbarium note made on a duplicate of a P.A. Duss collection housed at NY, the species could have gone extinct after the 1902 eruption of Mt. Pelée (Martinique; Kobuski 1941b). Since this species has been collected again in such locality (v.gr., M. Hahn 118, P 04572673!; C. Sastre 6848, P 04572670!), and also in adjacent Dominique (Weitzman, 1987), it should be considered as extant.

The name *Freziera amplexifolia* Sieber is found in several handwritings on herbarium labels at P, including some of the available duplicates of Hahn 118, and one collection made, apparently, by Sieber himself (Sieber s.n.). *Ternstroemia amplexifolia* Sieber ex Choisy, although clearly referring to *F. cordata*, is an invalid name (Art. 36.1a). According to the code (Art. 12.1) names not validly published have no nomenclatural status; so, neither of them are to be considered formal synonyms of the species. Since herbarium labels with the name "*Freziera amplexifolia*" are attached to plants collected between 1866 and 1869 (i.e., after publication of the Choisy's name), it is not to be considered as an alternative statement. The sentence "Flora martin. Nro. 314", however, is accompanying one of the exsiccatae labeled as *F. amplexifolia* (Hahn 118, P 04572675!), which is very similar to the "Fl. Martin. 314" quotation made by Choisy (1855: 122).

Key to the Venezuelan species of Freziera

1a. Mature leaves with a conspicuous cover of long hairs (> 2 mm long) on the abaxial surface, less than 50% of the epidermis surface visible 2
– Mature leaves glabrous or subglabrous, if the hair cover on the abaxial surface is somewhat dense, then the hairs not surpassing 2 mm, and more than 80% of the epidermis surface is easily visible 4

2a. Mature leaves abaxially creamy to whitish, sepals in fruit glabrescent ..... ***F. candicans*** Tul.
– Mature leaves abaxially golden to bronze colored, sepals in fruit pubescent to conspicuously pubescent 3

3a. Pubescence of leaf undersides as well as fruiting sepals golden to bronze colored, with a somewhat metallic sheen; mature fruits clearly pedunculate, relatively small, c. 0.5 cm diam. ..... ***F. chrysophylla*** Bonpl.
– Pubescence somewhat bronze colored, but opaque; mature fruits subsessile, relatively large, ≥ 1.3 cm diam. ..... ***F. tomentosa*** (Ruiz & Pav.) Tul.

4a. Stems hirsute ..... ***F. grisebachii*** Krug & Urb.
– Stems pubescent or villous, never hirsute 5

5a. Mature leaves glabrous or nearly glabrous 6
– Mature leaves pubescent, especially over abaxial side 9

6a. Vegetative buds tomentose-villose ..... ***F. roraimensis*** Tul.
– Vegetative buds glabrous or glabrescent 7

7a. Mature leaves relatively small, < (6–) 7 cm long and 3 cm wide, inflorescence very slender, the peduncles > 1.5 times the length of the flowers (including the corollas) ..... ***F. karsteniana*** (Szyszył.) Kobuski
– Mature leaves larger, inflorescence with the peduncle shorter than the flowers (including the corollas) 8

8a. Apical stems conspicuously flattened; leaf blades elliptic to slightly obovate, length/width ratio > 2..... ***F. carinata*** A.L.Weitzman
– Apical stems only slightly complanate; leaf blades ovate, length/width ratio considerably < 2..... ***F. bonplandiana*** Tul.

9a. Leaf blades ovate-elliptic with the base obtuse to rounded; stems with inconspicuous lenticels (rarely ≥ 1 mm diam., and then longitudinally elongated) ..... ***F. calophylla*** Triana & Planch.
– Leaf blades generally ovate or ovate-oblong, rarely ovate-elliptic or elliptic; stems with rounded lenticels, conspicuous or not 10

10a. Lenticels tightly disposed along stems, very conspicuous, generally > 1 mm diam.; petioles relatively short (petiole length/total leaf length ratio generally < 1/6); leaf blade margins conspicuously serrate; corollas at anthesis exerted more than a half the length of the sepals..... ***F. guaramacalana***
– Lenticels less densely disposed along stems and less conspicuous, usually not exceeding 1 mm diam.; petioles relatively large (petiole length/total leaf length ratio > 1/6); leaf blade margins inconspicuously serrulate-crenulate; corollas at anthesis exerted less than a half the length of the sepals .....***F. polita***

With the description of this new taxon, 11 species of *Freziera*, two of them endemic, are known from the country. Broadly defined characters, as traditionally employed for identification, tend to be difficult to use for the non-specialized botanist since they are usually ambiguous when applied to this genus. The above key includes user-friendly characters for the easy recognition of the Venezuelan species. Some of the previous species concepts remain to be further studied. This is now being undertaken, and corresponding results will be presented in future installments of this series.

ACKNOWLEDGEMENTS

To the staff of the herbaria INPA, MER, MERC, MERF, MY, MYF, and VEN for providing access to their collections; Bruno Manara (Caracas, R.I.P.) for the line-drawing; Fernanda Cabral (INPA) for providing photographic material from the INPA specimens, Stephen Tillett (MYF) for reviewing the English, and two anonymous reviewers for substantially improving the original version of this work.

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