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Cover: *Eriopsis wercklei* Schltr.
(see page 135, Figure 26). Drawing by B. Angell.

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TAXONOMICAL NOTES ON *TELIPOGON FALCATUS* WITH COMMENTS ON *HOFMEISTERELLA* (ORCHIDACEAE: ONCIDIINAE)

CARLOS MARTEL^{1,2} AND DELSY TRUJILLO³

Abstract. The transfer of *Telipogon falcatus* to *Hofmeisterella* is here challenged and *Hofmeisterella falcata* is relegated to the synonymy of *Telipogon falcatus*. Additional features to distinguish the species and comments about the type material are also provided. The recently described *Hofmeisterella biglobulosa* is discussed and referred to *Hofmeisterella eumicroscopica*.

Resumen. Aquí se cuestiona la transferencia de *Telipogon falcatus* a *Hofmeisterella* y se relega formalmente *Hofmeisterella falcata* a la sinonimia de *Telipogon falcatus*. Además se señalan características adicionales para distinguir a la especie y se dan comentarios acerca del material tipo. La recientemente descrita *Hofmeisterella biglobulosa* es discutida y propuesta como sinónimo de *Hofmeisterella eumicroscopica*.

Keywords: *Telipogon*, *Hofmeisterella*, Colombia, types, synonym

There are currently three recognized genera in the *Telipogon* Kunth alliance: *Hofmeisterella* Rchb.f., *Telipogon*, and *Trichoceros* Kunth.

Hofmeisterella was first described as *Hofmeistera* Rchb.f. (Reichenbach f., 1852a), although the author soon after proposed a new name, *Hofmeisterella*, because a variant of the name (*Hofmeisteria* Walp.) had already been used for a genus in Asteraceae (Toscano de Brito, 2001; Repasky and Christenson, 2010). The genus was described using *Hofmeisterella eumicroscopica* Rchb.f. as the type species (Reichenbach f., 1852b) and it was thought to include a single species for 157 years. Nevertheless, Nauray and Galán (2009) proposed a second species to this genus, *Hofmeisterella falcata* (Linden & Rchb.f.) Nauray & A.Galán, formerly described as *Telipogon falcatus* Linden & Rchb.f. (Reichenbach f., 1854). Nauray and Galán study was based on the revision of the type specimen (*L. Schlim 1192*, W [Reichenbach 30508]) consisting of an incomplete

pressed plant (part of an inflorescence and a leaf) with two drawings, plus a sheet with drawings (W [Reichenbach 30500]) and two photographs (*K. Senghas s.n.*, RENZ [photos 601819 and 601820]). This proposal was accepted by several plant name compilers and orchid checklists (e.g., KEW Orchid World checklist and W³TROPICOS).

A careful revision of the herbarium specimens of *T. falcatus* housed at W, as part of a current study in the *Telipogon* alliance, indicates that the combination proposed by Nauray and Galán (2009) is the result of misinterpreting the limits of both *Hofmeisterella* and *Telipogon*: these two genera share some common features but clearly differ in their floral morphology and vegetative structure. Kolanowska et al. (2014) already enumerated differences between *Telipogon* and *Hofmeisterella* and indicated why *T. falcatus* should be kept in *Telipogon*. Here we point out additional features of *T. falcatus* and propose formally *H. falcata* as its nomenclatural synonym. Comments on *Hofmeisterella* are also provided.

ON THE IDENTITY OF *TELIPOGON FALCATUS*

Vegetative features

Species of *Telipogon* can be divided into two groups according to habit: (a) those with an elongated stem, leafy throughout, and the sheath not articulated with the leaf blade, such as *Telipogon boissierianus* Rchb.f., *Telipogon bowmanii* Rchb.f., *Telipogon machupicchuensis* Nauray & Christenson, etc; and (b) those with a short compressed stem, leafy at the base, and the sheath articulated with the leaf blade, such as *Telipogon antisuyuensis* Nauray & A.Galán, *Telipogon ariasii* Dodson & D.E.Benn, *Telipogon peruvianus* T.Hashim. and the species formerly placed in *Stellilabium* Schltr.

Plants of *Telipogon falcatus* show the second kind of habit; plants of *Hofmeisterella* do develop a short compressed

stem, but the leaves are disposed in the fashion of a fan and have no articulation between the sheath and the blade.

Plants of *Telipogon* species bear bifacial (conduplicate) leaves, but those of *Hofmeisterella* unifacial (laterally flattened) leaves. Although unifacial leaves have evolved independently in the diverse orchid group, those found in *Hofmeisterella* are unique in the *Telipogon* alliance (Toscano de Brito, 2001). Nauray and Galán (2009) based their hypothesis that *T. falcatus* was a species of *Hofmeisterella* by comparing leaf morphology. They claimed that the leaves of *T. falcatus* and *H. eumicroscopica* are ensiform, equitant and organized fan-like. Notwithstanding, an examination of a single leaf blade of *T. falcatus* from *Schlim 1192* (Reichenbach 30508, W) shows that it is indeed ensiform-

We thank Günter Gerlach (M) for kindly providing a flower of *Telipogon falcatus*, Ministerio de Agricultura y Riego of Peru and its Servicio Nacional Forestal y de Fauna Silvestre (SERFOR) for issuing the collection permit under which orchid specimens for this study were collected (N° 0282-2014-MINAGRI-DGFFS-DGEFFS), and the staff of Wayqecha Biological Station for helping and providing facilities for our research. The German Academic Exchange Service (DAAD) supports the senior author's doctorate studies at Ulm University.

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lanceolate and bifacial as in *Telipogon* species. Further, leaves of *T. falcatus* are not organized fan-like. The plant (and leaves) illustration shown in the sheet *Reichenbach 30500* (W), also cited as *T. falcatus* by Nauray and Galán (2009), represents a different *Telipogon* species (as it is discussed below).

Floral features

Nauray and Galán (2009) placed *T. falcatus* in *Hofmeisterella* because of its triangular-lanceolate, heart-shaped labellum. Nonetheless, this labellum shape also occurs in other *Telipogon* species, e.g., *Telipogon portillae* Christenson, *Telipogon tungurahuae* Dodson & R. Escobar, and in several miniature *Telipogon* species such as *Telipogon selbyanus* N.H. Williams & Dressler and *Telipogon pseudobulbosus* (D.E. Benn. & Christenson) N.H. Williams & Dressler. An ancipital peduncle was indicated to occur in *T. falcatus* and *H. eumicroscopica* (Nauray and Galán, 2009); however, *T. falcatus* presents a triquetrous peduncle as many species of *Telipogon* s.str. Therefore, referring *T. falcatus* to *Hofmeisterella* is not supported by the evidence presented by Nauray and Galán (2009), i.e., the shape of the labellum and the form of the peduncle.

The main characters that distinguish species in *Telipogon* are those associated with the column and callus (Dodson and Escobar, 1987); these characters were overlooked by Nauray and Galán (2009). For instance, flowers of *Telipogon* bear an abbreviated subquadrate column (with projections in some species), a rounded to subquadrate stigmatic area, an erect rostellum, a dorsal anther, and a hook-like viscidium, whereas flowers of *Hofmeisterella* present a bialate excavated column, a triangular stigmatic area, a deflexed rostellum, a terminal anther, and a spatulate flat viscidium (Reichenbach f., 1858; Schweinfurth, 1961; Dunsterville and Garay, 1965; Foldats, 1970; Vásquez and Dodson, 1982; Dodson and Dodson, 1984; Dodson and Bennett, 1989; Toscano de Brito, 2001). *Telipogon falcatus* presents, indeed, all the characters that define *Telipogon* species (Fig. 1).

Molecular evidence

Hofmeisterella was shown to form a monophyletic group in two molecular studies (Williams et al., 2005; Neubig et al., 2012), although its relative position in the *Telipogon* alliance was not determined only recently.

Telipogon is sister to *Trichoceros* and *Hofmeisterella* is sister of these two (Neubig et al., 2012). One specimen of *T. falcatus* (Escobar 3353, FLAS) was used for a molecular systematic study by Williams et al. (2005); results of this study show that *T. falcatus* is imbedded in a *Telipogon* subclade with strong support, and *H. eumicroscopica* forming another cohesive subclade.

Hofmeisterella eumicroscopica has been recorded from Venezuela to Bolivia at elevations between 1,840 to 3,000 m (Dunsterville and Garay, 1965; Foldats, 1970; Ortiz, 1975; Dodson and Dodson, 1984; Dodson and Bennett, 1989; C. Martel, pers. obs.). The records show that the flowers display some variation in color, size and lip shape (Fig. 3, 4). The

Unfortunately, we could not examine that specimen: it is no longer at FLAS (W. M. Whitten, pers. comm.).

Nomenclatural notes

Calaway H. Dodson annotated *L. Schlim 1192* (Reichenbach 30508, W) as the lectotype of *Telipogon falcatus* Linden & Rchb.f. in 1991, but he never formally designated it. Reichenbach f. (1854) in the original publication of *T. falcatus*—as part of his *Orchideae Schlimianae*—cited [Schlim] “1192” after the species description. Additionally, later publications of Reichenbach f. (1861) and Kränzlin (1919) indicated “*Schlim Nr 1192*” as the holotype of *T. falcatus*. We here assume that the holotype resides in the author’s herbarium, and that any attempt to propose a lectotype is superfluous.

Telipogon falcatus Linden & Rchb.f., Bonplandia 2: 280. 1854. TYPE: N^{LE} GRENADE [COLOMBIA]. Pamplona: La Baja, 9000 ft. [2728 m], [fl.] Januar 1846 à 1852, *L. Schlim 1192*, [Reichenbach 30508] (Holotype: W [Reichenbach 0024998]).

Synonym: *Hofmeisterella falcata* (Linden & Rchb.f.) Nauray & A. Galán, Novon 19: 389–390. 2009.

Additional specimens examined: COLOMBIA. Sep. 1974, K. Senghas s.n. (RENZ [photos 601819, 601820]); G. Gerlach s.n. (M-spirit); J.J. Triana t. 512 (MAD, illustration [DIV. III A-512]).

Identity of drawings in the Reichenbach Herbarium

There is a herbarium sheet in the Reichenbach Herbarium with two drawings labeled “*T. falcatus*”: *Reichenbach 30500* (Fig. 2). It shows two species: the first one is a drawing (signed as “N°17”) showing two views of a flower (front and side view) that agrees with *T. falcatus*. The other drawing (signed as “N°18”) shows a whole flowering plant that does not seem to represent *T. falcatus* because the leaves are arranged fan-like, it bears up to four flowers open at the same time, the petals of which are long spatulate with a broad triangular acute apex, the labellum with no apparent ornamentation, and the sepals, petals and lip with red veins. Many flowered inflorescences are common in *Hofmeisterella*, but also in miniature *Telipogon* (the former *Stellilabium* species).

The plant illustrated probably is referable to a miniature *Telipogon*. It seems Friedrich Kränzlin agreed; he wrote on the herbarium label: “*Telipogon falcatus?*”, and he also pointed out on the same label that this habit might not be a *Telipogon* (see Fig. 2). Nonetheless, Kränzlin (1919) seemed to accept that this drawing represented a *T. falcatus*.

A more detailed drawing of habit of *T. falcatus* was elaborated by J. J. Triana (see Mutis, 2011).

COMMENTS ON *HOFMEISTERELLA*

color of the flowers varies from greenish yellow to lemon yellow with purple red to brownish red at the base of the segments (Fig. 4; Schweinfurth, 1961; Ortiz, 1975; Repasky and Christenson, 2010). The sepals and petals are 6.5–13.5 mm long and 0.5–0.8 mm wide; the lip is 8–14.4 mm long and 2.8–5.8 mm wide near the base (Schweinfurth, 1961;

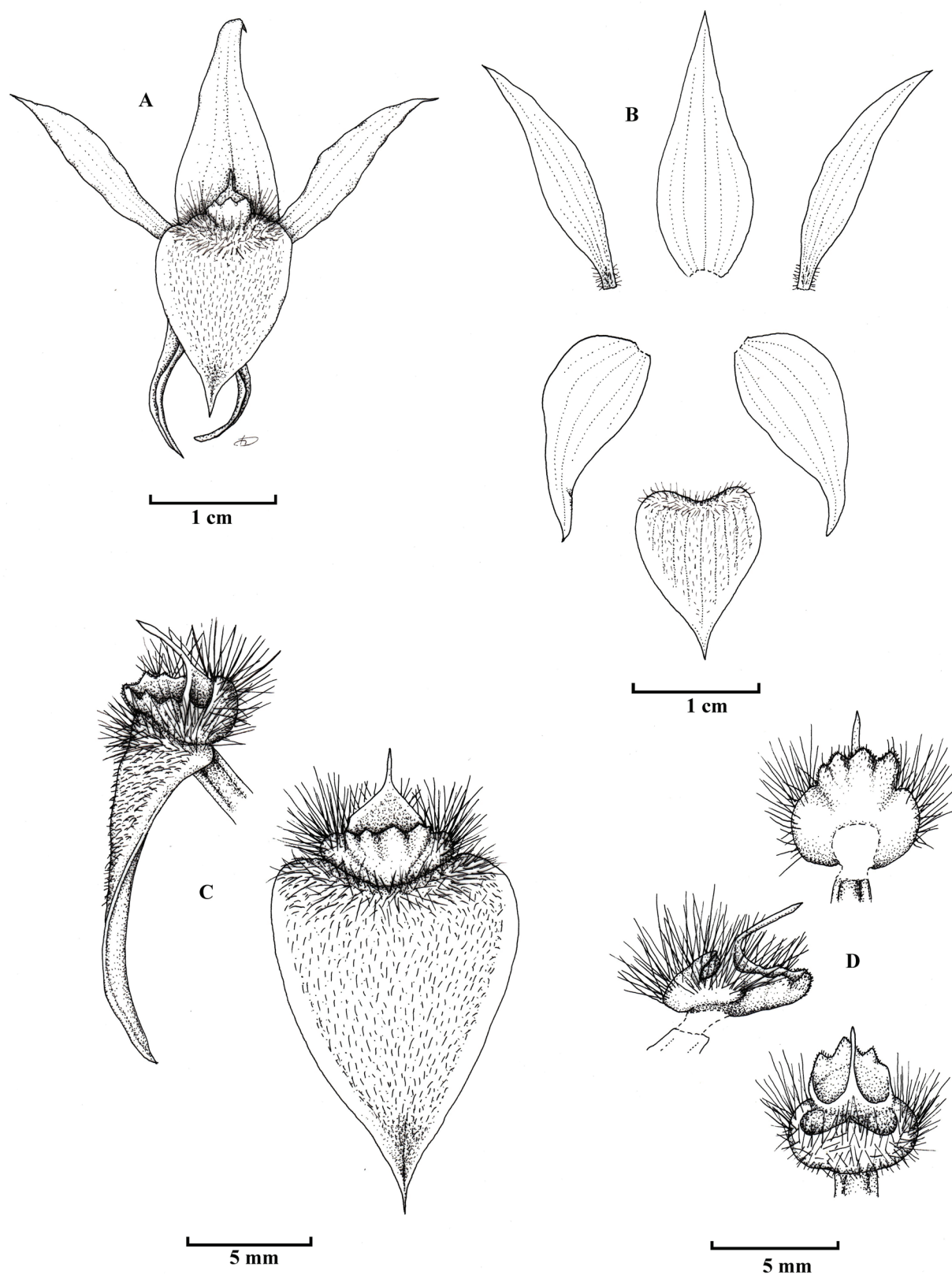


FIGURE 1. *Telipogon falcatus* Linden & Rehb.f. **A**, flower; **B**, dissected perianth; **C**, column and lip, frontal and lateral view; **D**, column, three views. Drawing by D. Trujillo from G. Gerlach s.n. (M-spirit).

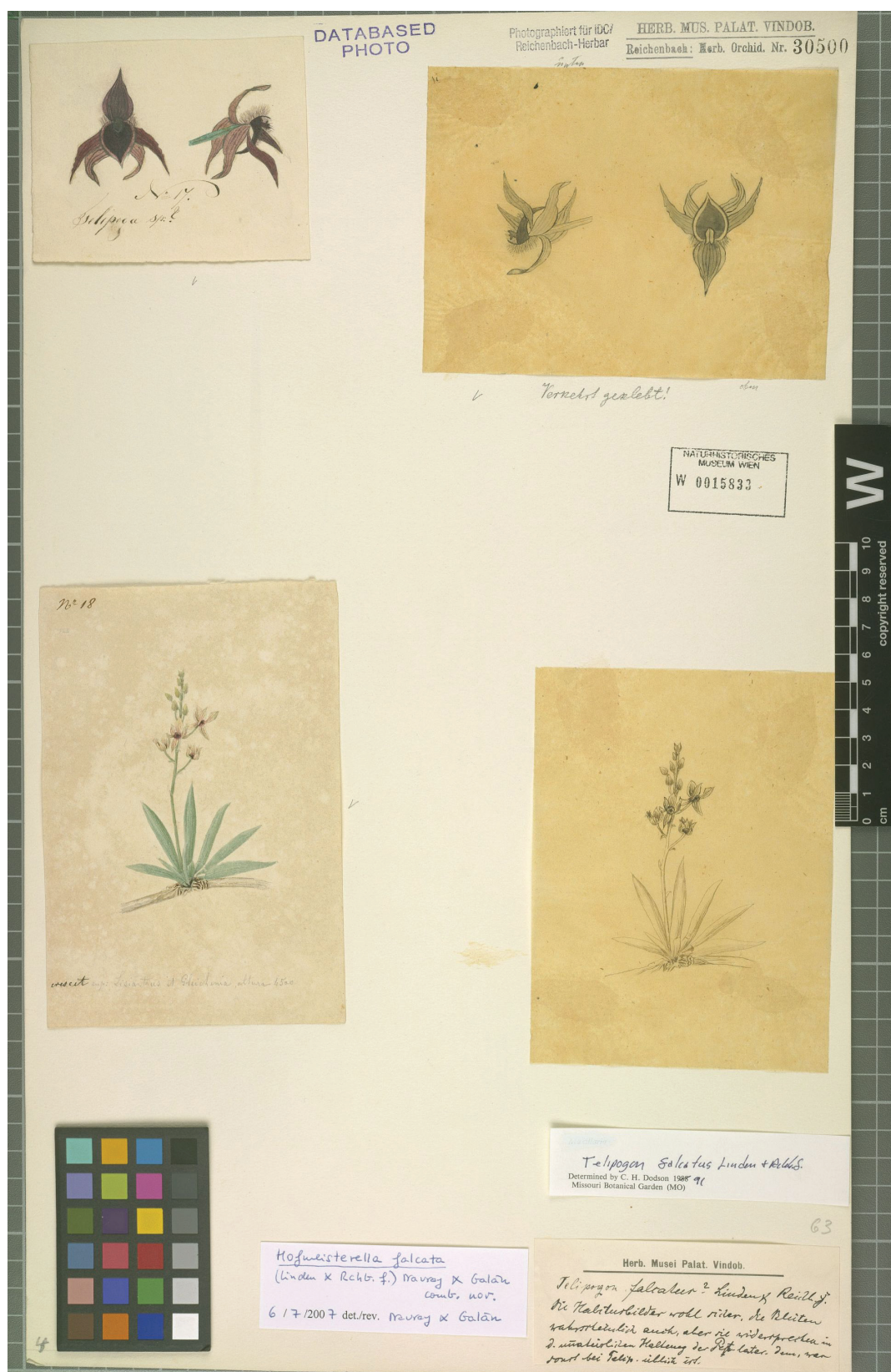


FIGURE 2. Single herbarium sheet at W-R (Reichenbach 30500) bearing illustrations of *Telipogon* species. *Telipogon falcatus* Lindl. & Rehb.f. (top drawings) and *Telipogon* sp. (bottom drawings). © Naturhistorisches Museum Wien, reproduced with permission.

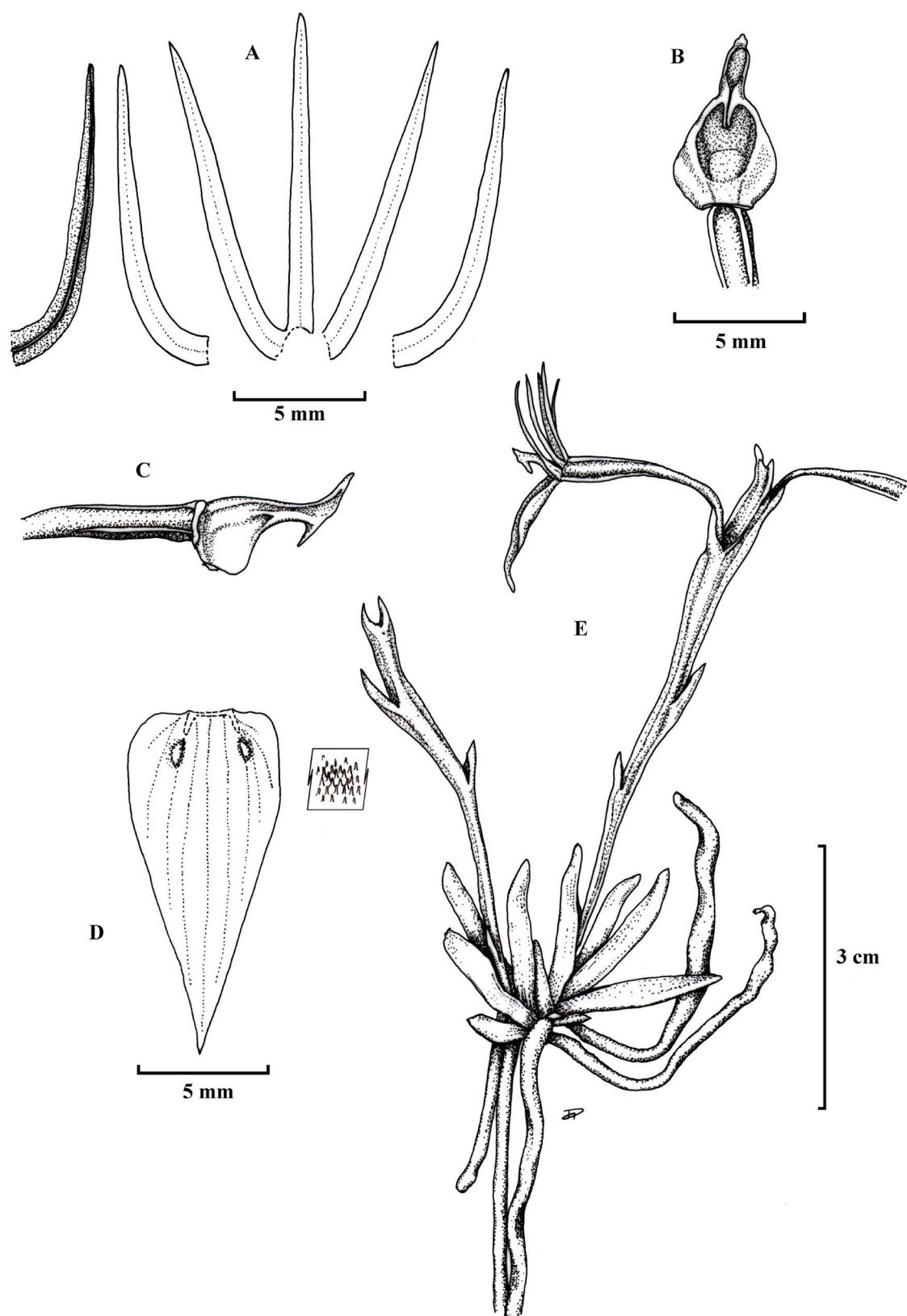


FIGURE 3. *Hofmeisterella eumicroscopica* Rchb.f. **A**, dissected perianth; **B**, column, frontal view; **C**, column, lateral view; **D**, lip; **E**, habit. Drawing by D. Trujillo from *Bennett 3583* (MOL-spirit).

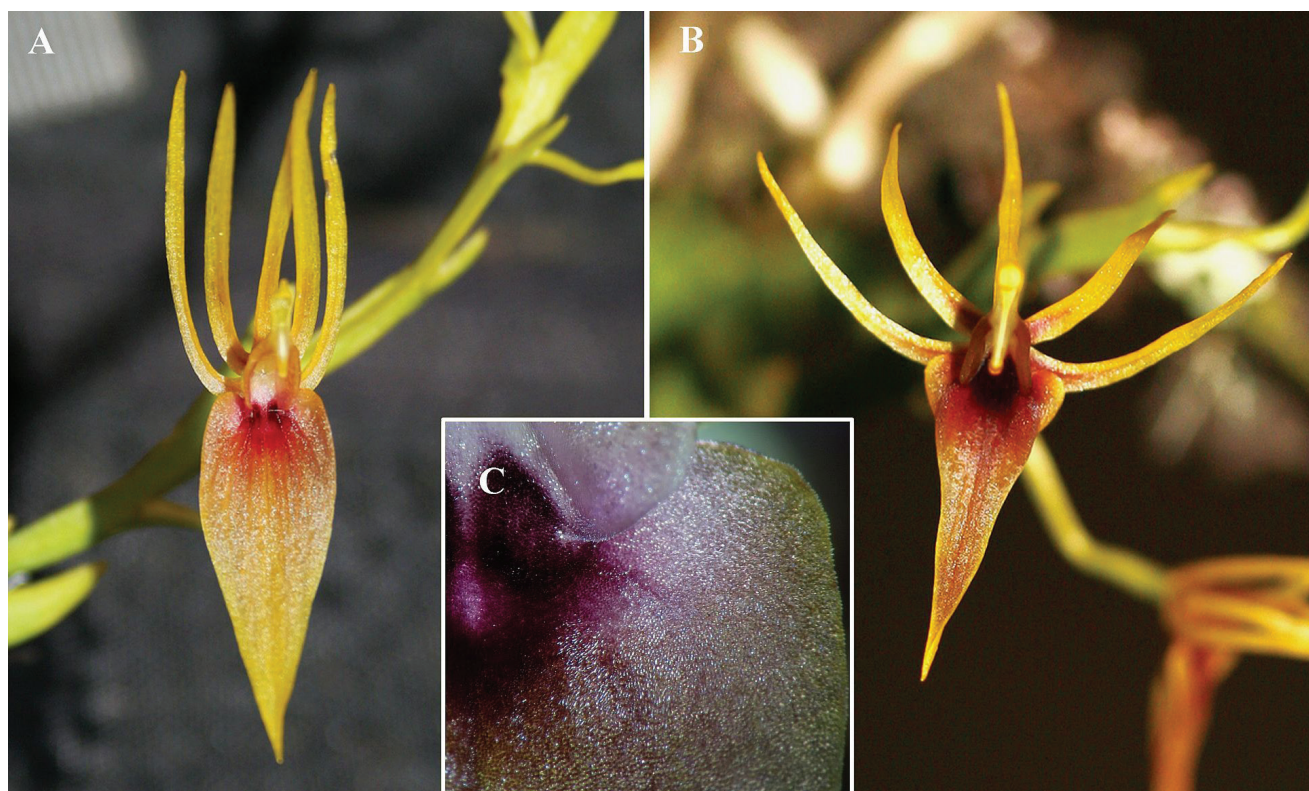


FIGURE 4. Flower variation in *Hofmeisterella eumicroscopica* Rchb.f. **A**, *C. Martel 56* (USM); **B**, *C. Martel 57* (USM); **C**, lip close-up of *C. Martel 57* (USM). Photographs by C. Martel.

Foldats, 1970). The lip is triangular to triangular lanceolate, sessile, cordate or subcordate at the base (Schweinfurth, 1961); the inner surface is densely and shortly pilose (Fig. 4C). At the point where the labellum is attached to the column, the lamina is slightly concave and has a pair of small projections (Fig. 3, 4; see also pictures in Ortiz, 1975; Dodson, 2001; Zelenko and Bermúdez, 2009; Repasky and Christenson, 2010); these projections are inconspicuous in some individuals.

Kolanowska et al. (2014) recently described *Hofmeisterella biglobulosa* Kolan., Szlach. & Medina Tr., from Colombia. They proposed this tentative new species based on two features: two globular projections and a puberulent pad on the base lip. However, these two features are not unique in the proposed new taxon because they are present in other individuals of *H. eumicroscopica*. The whole inner surface of the lip has short and dense hairs; not only on the base as was described by Kolanowska et al. (as a puberulent pad) (Fig. 4C). Furthermore, the presence of these two distinctive features while having the same whole floral morphology may not be enough to consider it as a new species: small changes in floral morphology may not be related to floral isolation in a taxon that could be auto-pollinated (Toscano de Brito,

2001; C. Martel, pers. obs.). We therefore refer this recently described taxon to the synonymy of *H. eumicroscopica*.

We hypothesize that molecular studies will greatly increase our understanding of *H. eumicroscopica*.

Hofmeisterella eumicroscopica Rchb.f., Ann. Bot. Syst. (Walpers) 3: 563. 1852. TYPE: [ECUADOR.] Loxa [Loja]: 9000 ft. [2728 m], *Warszewicz s.n.* [H. Reichenbach-31005] (holotype: W-R [0025004]).

Synonym: *Hofmeisterella biglobulosa* Kolan., Szlach. & Medina Tr., Ann. Bot. Fennici 51: 209-210. 2014.
Syn. nov. TYPE: COLOMBIA. Dept. Putumayo, Sibundoy Valley, parte baja de la Vereda de la Cumbre, 2,200 m, 24 April 2013, *R. Medina 914* (Holotype: HPUJ [not seen]).

Additional specimens examined: PERU. Cusco, La Convención, collected by L. Moore and Darbe McSorley, without specific locality along road from Cuzco to Quillabamba, March 1986, *Bennett 3583* (MOL-spirit). Cusco, Paucartambo, Wayqecha Biological Station, 2,836 m a.s.l., 27 Mar 2015. *C. Martel 56* (USM); Wayqecha Biological Station, 3,005 m a.s.l., 29 March 2015. *C. Martel 57* (USM).

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NOVELTIES IN THE ORCHID FLORA OF VENEZUELA VIII. SUBTRIBE ERIOPSIDINAE. *ERIOPSIS*.¹

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GÜNTER GERLACH,⁵ AND WILLIAM CETZAL-LX⁶

Abstract. We present a revision of all the species and available names of *Eriopsis*, a long misinterpreted genus of Orchidaceae described by John Lindley in 1847. A new species from the Venezuelan Guayana, *E. escalerensis*, is described and illustrated. An additional species from the Andes is circumscribed morphologically and geographically, but it remains undescribed until further data are available. A key to identify all the seven recognized species, conservation assessments in accordance with the B set of criteria of the IUCN, and miscellaneous notes are also provided.

Resumen. Se presenta una revisión de todas las especies y de todos los nombres disponibles en *Eriopsis*, un género de Orchidaceae descrito en 1847 por John Lindley y por mucho tiempo incorrectamente interpretado. Describimos e ilustramos una nueva especie de Venezuela, *E. escalerensis*. Se circunscribe tanto geográfica como morfológicamente otra especie de los Andes, que resta por describir hasta que hayan más datos disponibles. También se presentan una clave para las siete especies reconocidas, evaluaciones del estado de conservación con el uso de los criterios B de la metodología de la IUCN y notas misceláneas.

Keywords: Amazonas, *Eriopsis*, Eriopsidinae, Orchidaceae, Orinoco, Rio Negro

John Lindley described *Eriopsis* based on *E. biloba*, the origin of which was not known (“The history of its introduction is unknown”; Lindley, 1847a). However, specimens of *Eriopsis* had been collected long before, possibly in the late 1770s, by Alexandre Rodrigues Ferreira, but they remained unidentified until recently (see cited specimens of *Eriopsis sprucei* Rchb.f.).

Eriopsis has been long misunderstood. In the past, the number of, and the accepted species have differed greatly from treatment to treatment (Cogniaux, 1902; Schlechter, 1927: 379–380; McLeish et al., 1995: 61; Bennett Jr. and Christenson, 1998; Dressler, 2003; Dodson, 2005: 311; Gerlach et al. in Pridgeon et al., 2009: 88; Kolanowska and Szlachetko, 2014). Furthermore, the name *Eriopsis biloba* has been broadly applied and often treated as “... variable in both vegetative and floral morphology” (Gerlach et al. in Pridgeon et al., 2009: 90). Some authors even refer all available names to *E. biloba* or to a few other species (e.g., Dunsterville and Garay, 1965: 126; Cremers and Hoff, 1992: 102; Senghas, 1993; Chiron and Bellone 2005: 277). Other authors even attributed differences between proposed species to growing conditions (e.g., “The *Eriopsis rutidobulbon* of the ‘Botanical Magazine’ is nothing

whatever except *E. biloba* well grown”; Lindley, 1849, a phrase that Reichenbach f., 1863, labeled *falsissime*; see also Lemaire, 1852). This confusion is easily explained: one species is locally common and well documented (i.e., *Eriopsis biloba*), others less so (*E. rutidobulbon* Hook. and *E. sprucei* Rchb.f.), while the others enumerated below are rare and poorly known.

Two groups of species can be easily teased apart, both in the field and the herbarium, based on the structure of the compound callus placed at the base of the labellum (see first couplet in the key below). Notwithstanding, sometimes it is difficult to sort out the species in each of these two groups, particularly in the herbarium. Nonetheless, subtle but easily discernable morphological differences as well as ecological and geographical variables can be employed to decipher the diversity within the genus, and there appear to be more species than we had anticipated.

Although here we place more emphasis on species of *Eriopsis* occurring in Venezuela, from where we describe a new species (*Eriopsis escalerensis* G.A.Romero & Carnevali), we do account for all available names, and circumscribe another species that we hesitate to describe until more information is available (as *Eriopsis* sp. A).

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¹ Previous articles in this series were Romero-González and Batista (2009), Romero-González et al. (2010a), Romero-González et al. (2010b), Romero-González and Meneguzzo (2012), Romero-González et al. (2013a–b), and Romero-González and Gómez (2014).

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TAXONOMY

Eriopsis Lindl., Edwards's Bot. Reg. sub t. 9. [February] 1847.

Type species: *Eriopsis biloba* Lindl. (see *Index Nominum Genericorum*, 2014).

Etymology: From *Eria* Lindl., a Paleotropical genus of Orchidaceae, and the Greek *-opsis*, having the appearance of, presumably because of the similarity of *Eriopsis* to *Eria*.

Synonym: *Pseuderriopsis* Rchb.f., Linnaea 22: 852. 1849.

Type species: *Pseuderriopsis schomburgkii* Rchb.f., Linnaea 22: 853. Mai 1850 ("1849"; see *Index Nominum Genericorum*, 2014).

Etymology: From the Greek *pseudo-*, resembling but not equaling, and *Eriopsis* Lindl., a genus of Orchidaceae, in reference to its similarity to the latter.

Distribution: Found in continental tropical America from Southern Mexico (Hágsater et al., 2005: 107), Guatemala (Dix and Dix, 2000: 20), Belize (McLeish et al., 1995: 61), Honduras (Nelson and Ortiz, 2007), Costa Rica (Charpentier,

1973; Horich, 1982), Panama (Dressler, 1980; Bogarin et al., 2014), Colombia (Ortiz, 1991), Venezuela (Foldats, 1970), the Guianas (Boggan, 1997: 156; Carnevali et al., 2007), Brazil (Cogniaux, 1902; Hoehne, 1953), Ecuador (Dodson, 2001: 302), to Peru (Schweinfurth, 1960) and Bolivia⁷ (Vásquez et al., 2003: electronic supplement) (Fig. 1).

Seed morphology: seeds of *Eriopsis sceptrum* Rchb.f. & Warsz. (Fig. 2) are pale brown, elongate scobiform, and, within Orchidaceae, medium-size (520–630 μm $\times$ 110–115 μm). There are few testa cells along the longitudinal axis of the seed; the medial cells are highly elongate and the ones at the poles rounded. The anticlinal cell walls are straight and the transverse anticlinal walls are elevated, arch-like. The surface of the periclinal walls is rather smooth but some low longitudinal ridges can be observed (description follows the nomenclature of Barthlott et al., 2014).

Phylogeny: The relationship of *Eriopsis* with other orchids always has been controversial. When describing his new genus, Lindley (1847a–b) stated:

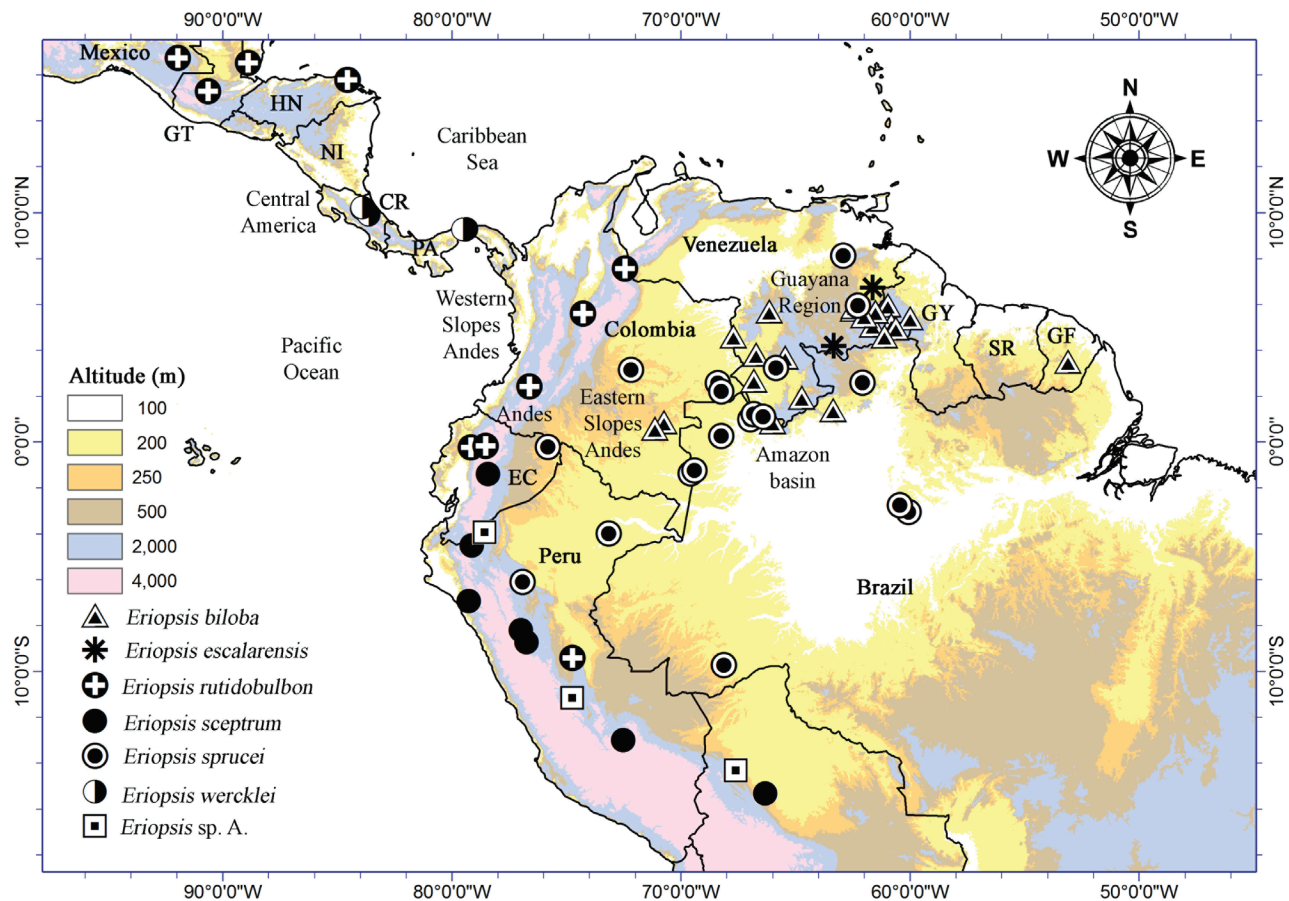


FIGURE 1. Distribution of *Eriopsis* species. Notice the gap in the distribution of *E. rutidobulbon* Hook. (reported from Mexico, Guatemala, Belize, Honduras, and then in Colombia, Venezuela, Ecuador, and Peru, obviously absent from Nicaragua, Costa Rica, and apparently Panamá). CR = Costa Rica, EC = Ecuador, GT = Guatemala, HN = Honduras, NI = Nicaragua, PA = Panamá, SR = Suriname, GY = Guyana, and GF = French Guiana. Based on specimens examined by the authors and cited herein. Map produced by plotting locality data cited in additional specimens examined on a DIVA-GIS base map (Hijmans et al., 2004) using ArcView 3.2 (Environmental Systems Research Institute, Inc., New York).

⁷The latest checklist of plants from Bolivia (Vásquez, 2014) lists two species of *Eriopsis*, *E. biloba* Lindl. and *E. sceptrum* Rchb.f. & Warsz. Based on drawings one of us (G.G.) received from the author of the checklist, the first one is hereby referred to *E. species A*; the second one is, following the species concepts presented here, correctly identified.

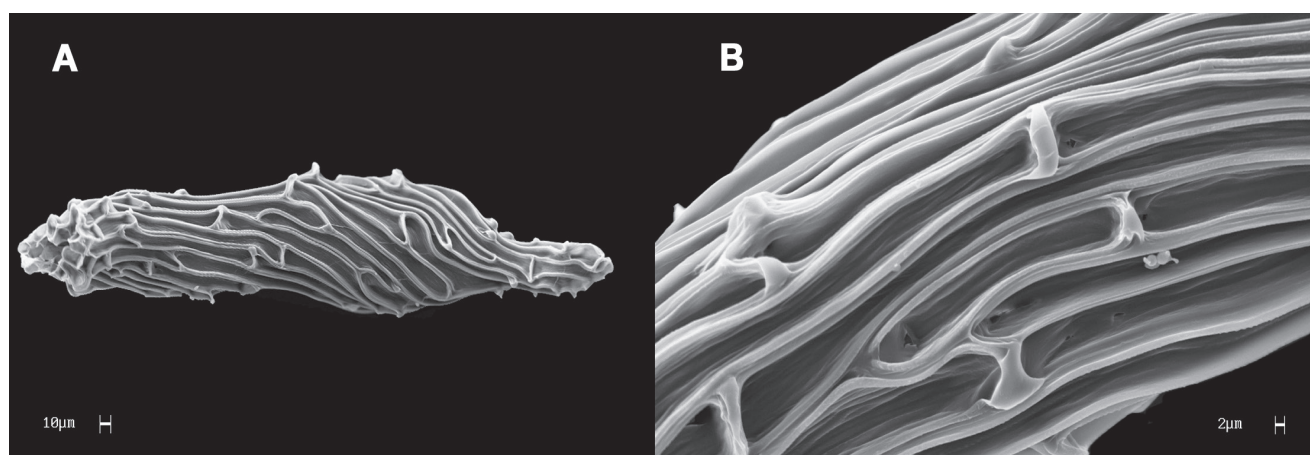


FIGURE 2. Seed morphology of *Eriopsis* under S.E.M. **A**, whole seed; **B**, detail. Scanning electron micrograph by E. Facher based on seeds of *E. sceptrum* Rchb.f. & Warsz. (ex Hort. Botanischer Garten München-Nymphenburg 07/2043).

“This new genus belongs to the Maxillariids, among Vandaceous orchids, but it has so much the habit of an *Eria* when not in flower, that it may be mistaken for it... Its nearest affinity is with the racemose Maxillarias, readily distinguished however by their crescent-shaped gland and tubercular (not lamellate) lip with a long chin.”

Thus, from the beginning, the morphology of the genus, which seems to combine features of several groups, was a source of confusion. The pollinarium, with a well-developed viscidium on a short tegular stipe and two pollinia, has always suggested a position in the vandoid orchids, probably close to the Maxillariinae. The pseudobulbs with 2–3 internodes, the basal one being the thickest, each bearing one fleshy, leathery leaf with convolute veneration, the lateral, racemose inflorescences with many simultaneously open flowers with patent perianth, the 3-lobed labellum articulated to a short but well-developed column-foot, and the lamellar calli recall no other known orchid; the fancied similarity to *Eria* Lindl. is only superficial, based on leaf morphology. Professor Reichenbach f. (1863), implicitly, placed it in Zygopetalinae, close to *Zygopetalum* Hook.

In the twentieth century, Dressler (1981: 254), based on general flower and pollinarium structure, placed the genus in Cyrtopodiinae. Later, the same author revised his position and regarded it as *incertae sedis*, suggesting it may merit its own subtribe (Dressler, 1993: 213), which later was proposed by Szlachetko (i.e., Eriopsidinae, 1995).

A phylogenetic analysis of the Orchidaceae based on slow-evolving *rbcl* sequences (Cameron et al., 1999) recovered *Eriopsis* in an isolated position within the higher vandoid orchids. The first broad scale phylogenetic analyses of orchids using both plastid and nuclear DNA sequences (Whitten et al., 2000, Maxillarioid subtribes; van den Berg et al., 2005, Epidendroideae) included *Eriopsis* species (identified as *E. biloba* but most likely best referred to *E. sp. A*) but taxon sampling was too limited to unambiguously assess the relationships of the genus. However, it always appeared in unresolved or weakly supported topologies associated with and relative to the major Cymbidioid subtribes. Whitten and Pridgeon (2009) and Chase et al.

(2015) placed Eriopsidinae in Cymbidiaceae.

Most recently, a phylogenomic-supertree analysis of the Orchidaceae, placed Eriopsidinae again within the Cymbidiaceae, sister to the Zygopetalinae, a clade that is in turn sister to a (Stanhopeinae (Coeliopsidinae, Maxillariinae)) clade (Givnish et al., 2015); the molecular clock in this analysis hypothesized a Zygopetalinae-Eriopsidinae divergence 15–18 my in the late Pliocene, well after the fourth and last acceleration of net diversification rate (inferred from BAMM analysis) of the family that happened about 40 my ago. A hypothesis of a relationship with the Zygopetalinae is further supported by the vegetative similarity of the genus with some of the pseudobulbous zygopetaloid genera such as *Zygopetalum* and *Weidmannia* G. A. Romero & Carnevali.

Summarizing, *Eriopsis* is apparently a relatively recent lineage with a low net diversification rate, which most likely has been associated with shifts between terrestrial and epiphytic habits, low-elevation versus high elevation ecosystems, and allopatric speciation events in isolated cordilleras (Andes, Guiana Highlands).

The placement of the species within the genus is uncertain, although one would expect the species with simple calli and long pedicels (*E. sprucei* and *E. sceptrum*) to be in a clade separate from the rest of the genus. A phylogenetic study of this genus based on DNA sequences is badly needed. Such a study could be easily done, given the small number of species. However, international laws, both the Convention on International Trade in Endangered Species, CITES, and especially other multinational treaties that regulate the extraction and use of DNA from plant and animal tissues that do not distinguish commercial from scientific applications have long, and incomprehensibly, blocked this purely scientific endeavor.

Pollination Biology: There are few data available for pollination of *Eriopsis*. The flowers of some species have a subtle fragrance (see below under *E. biloba*, *E. sceptrum* Rchb.f. & Warsz., and *E. sprucei*), but they do not appear to produce any nectar. One character clearly discernable in flowers of most species of *Eriopsis*, never presented or discussed before, is the ornamentation at the base of the labellum and column, consisting of short, unicellular

trichomes the function of which, if any, is unknown.

At the Botanical Garden Munich-Nymphenburg, in the spring of 2015, we collected floral fragrances from flowers of *E. sceptrum* (*sub ex Hort* Botanischer Garten München-Nymphenburg 07/2043, see below), later analyzed by R. Clery at the Givaudan laboratory in Switzerland. The analysis showed some long chained hydrocarbons, probably hexadecanal with its derivatives hexadecenal, hexadecadienal and hexadecatrienal (together representing more than 35% of the captured fragrance). Chemical components of this type often function as semiochemicals such as insect pheromones (Lepidoptera, information “pherobase.com”). Checking for Syrphidae and C16 aldehydes in “Pherobase” (El-Sayed, 2014) was negative and, therefore, no predictions could be made following this lead (i.e., fragrances of *Eriopsis* possibly attracting insects acting as pheromones).

Robert L. Dressler caught, in August 1967, a female of *Euglossa villosiventris* Moure with a pollinarium allegedly of *E. rutidobulbon*; the orchid grew at Cerro Jefe, Panama (personal communication to G.G., 2015; rather, most likely, based on reports herein, a pollinarium of *E. wercklei* Schltr.). Female euglossine bees visit flowers seeking food (i.e., pollen and/or nectar), or resins for nest construction (Roubik and Hanson, 2004). What attracted the female *Euglossa* to the *Eriopsis* flower in Panama is unclear: it could have been simple curiosity but, if looking for food,

then *Eriopsis* would be another example of orchids that rely on deception to attract pollinators (see other examples in Ackerman, 1986). Meanwhile, thousands of euglossine bees were caught in Panama during the same sampling period (Dressler, personal communication to G.G., 2015), but more than 99% were males attracted to different chemical baits, none carrying pollinaria of *Eriopsis*. The three senior authors have also seen in the field many plants of *Eriopsis* in flower (especially of *E. biloba* and *E. sprucei*) never observing an euglossine bee or, for that matter, any other pollinators. These data rule out the male-euglossine syndrome in *Eriopsis*.

In December 2014, near Zamora (Ecuador, Provincia Zamora-Chinchi), in the private reserve Copalinga Ecological, frequented by bird watchers and orchid enthusiasts, situated close to *Podocarpus* National Park, Charles W. Melton observed and photographed a bee (Hymenoptera) and two syrphid flies (Diptera, Syrphidae) visiting flowers of *Eriopsis* sp. A (see key and text below). The bee was too small to reach the viscidium and stigma of the flower. The flies were females: one was too small (referable to *Toxomerus* Macquart) to be an effective pollinator; the other one was of the right size, a species of *Ocyptamus* Macquart. Photographs kindly made available to the authors clearly show the attachment of the pollinarium to the scutellum of the fly (Fig. 3).

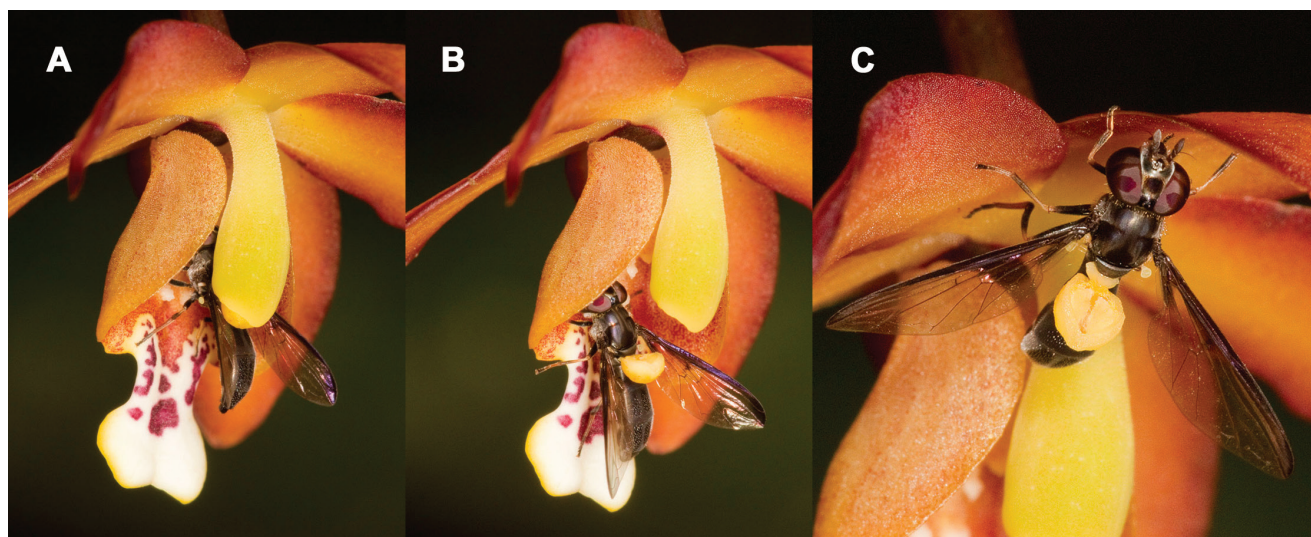


FIGURE 3. Pollination of *Eriopsis* species A by a female of *Ocyptamus* species (Macquart 1843, Syrphidae). **A**, insect at the base of the lip; **B**, leaving the lip with the pollinarium already attached to the scutellum; **C**, leaving the flower; the point of attachment of the pollinarium is clearly visible and the anther cap was still on the pollinarium. Photographed at Copalinga Ecological by Charles W. Melton based on a plant from Zamora, Provincia Zamora-Chinchi, Ecuador (see Fig. 30). The orchid and insect specimen were preserved, but reference as to where was not available to the authors at the time this article was published. For scale, the column of the flower is ca. 1.0 cm long.

What attracted the female of this fly to flowers of *Eriopsis* sp. A is entirely unclear. Syrphid fly larvae are known to feed on aphids but several adaptations to other prey evolved in the Americas (personal communication to G.G., 2015 by Dieter Doczkal who also identified the syrphid flies). The female syrphid flies could have been seeking potential prey for its progeny. *Ocyptamus* sp., however, has more than 300 known species, including several undescribed

taxa (a common case in flies that pollinate plants: they can hardly ever be identified at the rank of species!), and there is nothing to be learned in the literature regarding their possible role as pollinators. We point out, again, that deception could explain the attraction of bees and flies to the flowers of *Eriopsis* sp. A. at Copalinga Ecological.

Hand pollinated flowers of *E. sceptrum* (see reference above) produced viable seeds within 75 days in the

temperate orchid greenhouse at the Botanischer Garten München-Nymphenburg. This is a relative short time for tropical orchids, the capsules of which normally need between 150 and 350 days to produce viable seeds (see <http://www.orchidsrepbiol.de/> for references).

Conservation assessment: The conservation status of all the species of *Eriopsis* was assessed using the IUCN Red List Criteria (IUCN, 2010). Because population data of these species are not available, we relied mostly on the B criteria, geographical distribution assessed both as B1 (extent of occurrence) or B2 (area of occupancy), both as implemented in GeoCAT (Bachman et al., 2011). We complemented these assessments with our own field experience, information and opinions furnished by experts, published data and iconography, whenever available. With the exception of two species that occupy extremely specialized habitats, *Eriopsis* species are found in tropical rain and cloud forests, where they primarily are epiphytes found on thick branches or tree-trunks high on the canopy, usually far beyond the reach of the average collector. In common with many epiphytic orchids from these ecosystems, on occasion they can be found as subterrestrial plants, mainly on talus slopes, cliffs, or road cuts. Thus, forest *Eriopsis* species are seldom seen and collected only when they are found on tree falls; only then these canopy species become available to collectors and photographers alike. Moreover, flowering periods are relatively short with the flowers on the racemes open in quick succession, making the encounter of these plants in bloom a rather serendipitous event. Furthermore, all

species of the genus are difficult to maintain and practically impossible to flower in cultivation. Hence, distributions and population parameters are usually much underestimated in herbaria and floras. It is safe to assume that most of the forest species are both more widespread (assuming the availability of suitable habitats) and probably more common than the current evidence suggests.

The preferred habitats of these forests *Eriopsis* species, tropical rain to cloud forests, throughout their range in the Neotropics, have been disturbed to a great extent and in many places are severely fragmented. However, the often discontinuous area covered by this kind of vegetation in tropical America is rather extensive, which, added to the fact that these forest epiphytes normally appear to grow and survive as isolated individuals (versus in small to large populations), habitat fragmentation may not be a threat.

As mentioned above, there are two species that grow in specialized habitats: *Eriopsis biloba* is a terrestrial on sandy soils or sandstone or granite outcrops and is locally common and widespread in the Guayana region, while *E. sprucei* is a riparian epiphyte occurring on thick branches of trees found along black-water rivers in the northern Amazonia; their conservation assessment will be further discussed below.

In vivo and *in situ*, all the species of *Eriopsis* recognized here can be easily identified using the following key. To identify cultivated material, knowledge of the geographical origin of the plant is necessary. Herbarium material requires the geographical origin of the plant and flowers that conserve the structure of the labellum.

KEY TO THE KNOWN SPECIES OF *ERIOPSIS*

- 1a. Labellum unguiculate; callus with two parallel, ligulate, subtriangular, divaricate, narrow to wide lamellae. 2
- 1b. Labellum sessile, callus with at least four rows of longitudinal lamellae, apically often erose and with wart-like processes. 3
- 2a. Plants terrestrial, from the upper Amazon river basin of Ecuador and Peru, petals with seven nerves; the two lamellae that constitute the callus wide *in vivo*, starting close to the base of the labellum, increasing in width and bending toward the apex of the labellum; in herbarium material much reduced, and placed just beyond the claw of the labellum; lateral lobes of the labellum separated from the midlobe by a long, conspicuous isthmus. *E. sceptrum* Rchb.f. & Warsz.
- 2b. Plants epiphytic, found primarily along black-water rivers, including seasonally flooded forests, in the upper Orinoco, Rio Negro, and lower Amazon river basins, but also reported from the Caquetá-Japurá, Purus, Napo, and Huallaga river basins, petals with five nerves; the two lamellae that constitute the callus narrow *in vivo*, increasing in width both toward the base and the apex of the labellum, bending toward the base of the labellum, in herbarium material much reduced, ligulate, placed away from the claw of the labellum; lateral lobes of the labellum separated from the midlobe by a constriction. *E. sprucei* Rchb.f.
- 3a. Plants from the Guayana region, terrestrial or epiphytic. 4
- 3b. Plants from the Andes and Central America, primarily epiphytic, in tropical rain forests. 5
- 4a. Plants terrestrial or lithophytic (rarely epiphytic), from Brazil, Colombia, Venezuela, and the Guianas, in tepui summits, shrublands, medium to high altitude savannas, and lowland shrublands; flowers *in vivo* less than 2.5 cm in diameter; labellum equal or less than 1.5 cm across the lateral lobes. *E. biloba* Lindl.
- 4b. Plants epiphytic, known only from La Escalera region, Bolívar state, Venezuela, and most likely found elsewhere in the Guayana region including neighboring Guyana, in tropical cloud forest; flowers *in vivo* at least 3 cm in diameter; labellum more than 1.5 cm across the lateral lobes. *E. escalerensis* G.A.Romero & Carnevali
- 5a. Callus composed of four basal, parallel lamellae, the two outer ones taller than the inner ones, the inner ones projecting apically beyond the outer ones, and, further toward the apex, with two parallel, irregular, fleshy calli that almost reach the base of the central lobe; the creamy white coloration of the central lobe extending deeply along the edges of basal lobe in the form of a broad “Y”, flanking the apical fleshy calli. *E. rutidobulbon* Hook.
- 5b. Callus composed of four basal, parallel lamellae, the two outer ones taller than the inner ones, apically converging and ending on two pointy teeth, and, further toward the apex, with two additional, pointy processes between the main callus and the isthmus of the labellum, not reaching the base of the central lobe; the dull white or pale yellowish coloration of the central lobe only shallowly extending or not at all into the basal lobe and never flanking the apical calli. 6
- 6a. Plants from Costa Rica and Panama, possibly also from Colombia; pseudobulbs semi-spherical to pyriform. *E. wercklei* Schltr.
- 6b. Plants from the slopes of the Andes of Colombia, Ecuador, Peru, and Bolivia; pseudobulbs conspicuously elongate. *Eriopsis* sp. A

Eriopsis biloba Lindl. Edwards's Bot. Reg. 33: sub t. 9. [February] 1847. Fig. 4–10.

TYPE: Without precise locality, *ex Hort. J. J. Blandy s.n.* (Holotype: K-Lindl.; holotype fragment: AMES [one flower]).

Synonyms: *Pseuderioopsis schomburgkii* Rchb.f., Linnaea 22: 853. 1849. TYPE: GUYANA [GUIANA ANGLICA]. Without any other locality, "In Oasen auf Baumstämmen", *M. R. Schomburgk 1679a* (Holotype: B, destroyed; lectotype, designated by Romero-González [2005], W [Reichenbach Herbarium 38103, flowers in envelope in the middle of the right margin]). Etymology: Named after the collector, Moritz Richard Schomburgk (1811–1891), famous botanist, and Director of the Adelaide Botanic Garden 1865–1891). *Eriopsis schomburgkii* (Rchb.f.) Rchb.f., Bonplandia 3: 67. 1855.

Eriopsis grandibulbosa Ames & C. Schweinf., Bulletin of the Torrey Club 58: 350. 1931. TYPE: VENEZUELA. Amazonas: Municipio Autónomo Alto Orinoco, Summit of Mount Duida, valley between peaks 7 and 15, 6,500 ft. [1980 m], flowers dull brown with yellow lip, August 28 to April 1929, *G. H. H. Tate 681* (Holotype: NY [two sheets, NY-GPI 8838–8839]; Isotypes: AMES, NY).

Etymology: From the Latin *grandis*, great, and *bulbus*, a swelling, in reference to the large, elongated pseudobulbs that supposedly distinguish this species.

Etymology: From the Latin *bi*, two or twice, and *lobus*, lobe, perhaps referring to the deeply emarginate apical lobe of the type flowers.

Iconography: Lindley (1847b); Dunterville and Garay (1965: 127; 1979: 309, *pro parte*, excluding flowers type A); Dunsterville, 1973: 395; Speckmaier (1993); Baumbach (2002); Silva and Silva (2011: 234).

Distribution: Brazil, Colombia, Guianas (including Surinam; Werkhoven, 1986: 137), Venezuela.

Field characters: Terrestrial plants from the Guayana Shield on sandstone or loose sand, seldom epiphytic, pseudobulbs of 1–3 internodes, inflorescences taller than the plant, flowers fragrant ("cinnamon-like" according to Maas *et al.* 5729, or "odor of licorice" according to Schultes 5560, both collected in Colombia; see also Schultes, 1957) sepals and petals yellow edged with bronze, labellum yellow suffused with reddish brown, the central lobe white with reddish-brown speckling.

Other relevant references: Schweinfurth (1944: 190–191; 1967: 169–170), Foldats (1970), Dunsterville and Garay (1965: 126), Dunsterville and Dunsterville (1979), Speckmaier (1993), Baumbach (2002).

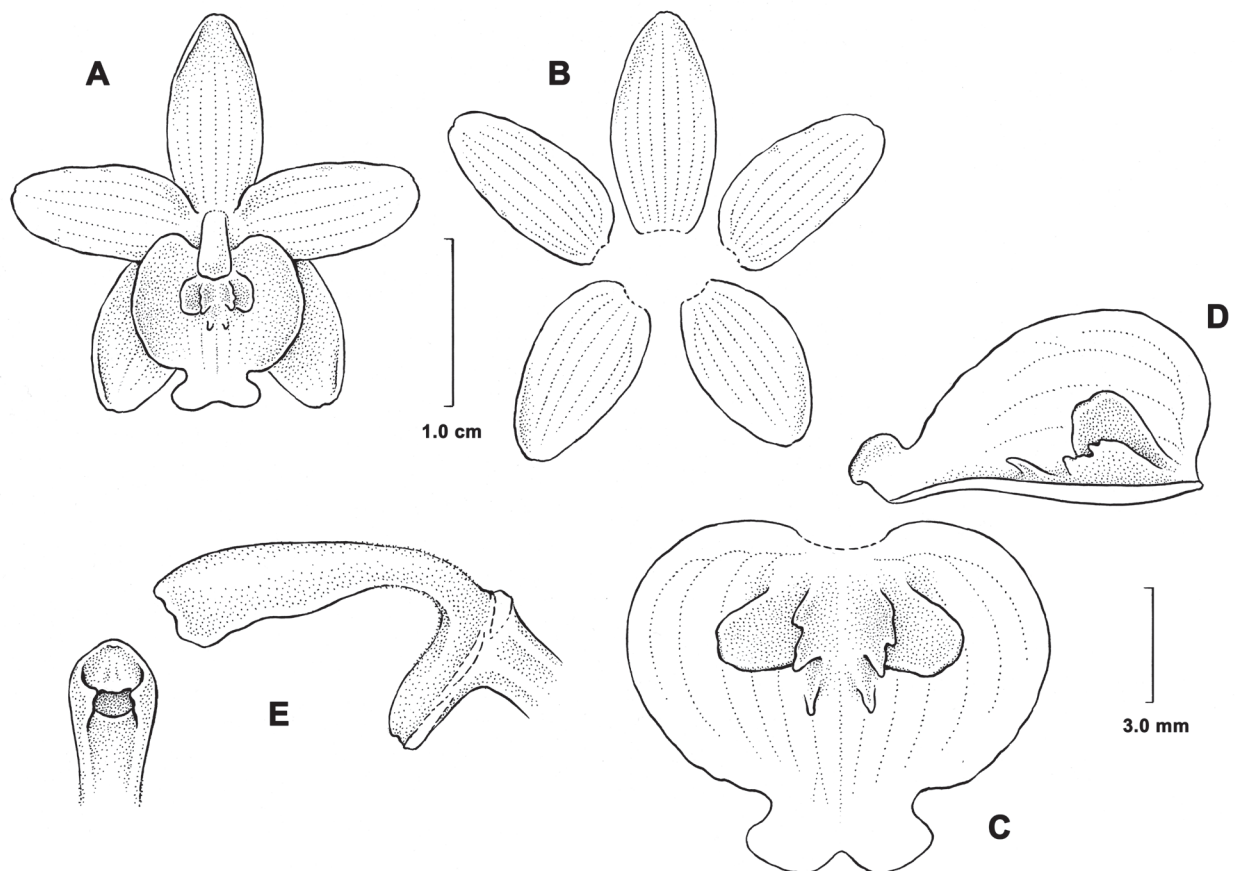


FIGURE 4. *Eriopsis biloba* Lindl. A, flower; B, sepals and petals; C, labellum viewed from above; D, sagittal section of the labellum; E, two views of the column. Drawing by B. Angell based on a flower sent to Prof. Oakes Ames from K allegedly from the holotype.



FIGURE 5. *Eriopsis biloba* Lindl. Illustration from Lindley (1847b). Based on a published plate at AMES.

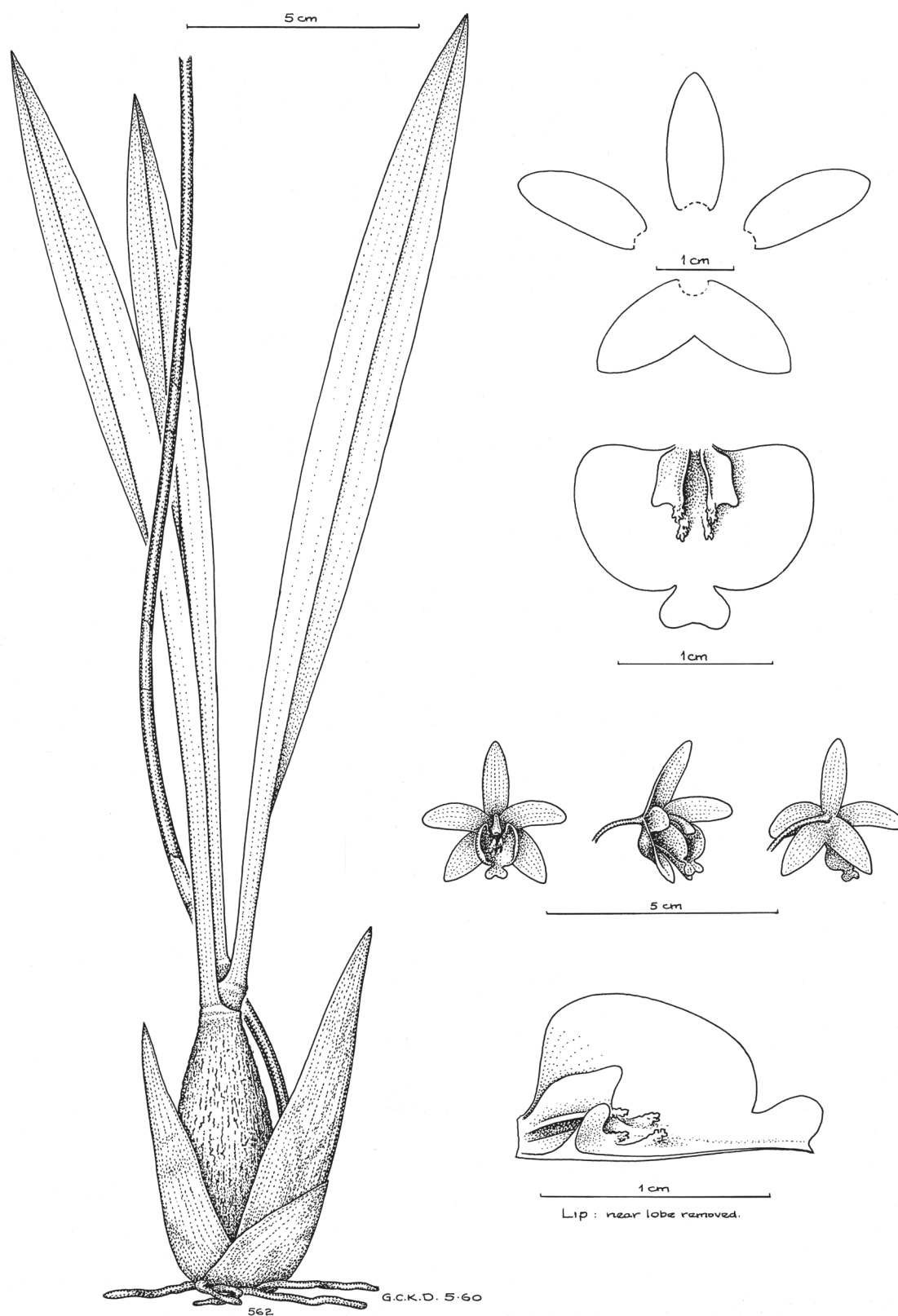


FIGURE 6. *Eriopsis biloba* Lindl. Typical plant from the Gran Sabana Region of Venezuela, near Kavanayen. Drawing by G. C. K. Dunsterville based on his collection number 562 (reproduced from a photostatic copy of his drawing at AMES).



FIGURE 7. *Eriopsis biloba* Lindl. Typical plant from the Gran Sabana Region of Venezuela: A, plant *in situ*; B, close-up of flower. Photograph by G. A. Romero-González.

Selected specimens examined: BRAZIL. Amazonas: arredores do R. da Serra Araçá, epífita sobre pedras, flores cremes, 29 January 1978, N. A. Rosa & S. B. Lisa 2284 (MO, NY). COLOMBIA. Amazonas: Vaupés, río Apaporis, cachivera de Jirijirimo y alrededores, 250 m, 11 June 1951, in clumps in sand, spikes of brownish yellow flowers; tip of lip canary yellow with brown dots, no odour, R. E. Schultes & I. Cabrera 12369 (A, AMES); Ajaju river, Cerro la Campana, quartzite base, summit above 800–1,200 feet above forest floor, 1,700–2,100 feet above sea level, epiphytic on crags on top, open, sunny exposures, flowers all brown but tip of lip yellow and red-brown spotted, odour of licorice, 1–6 June 1943, R. E. Schultes 5560 (AMES; cited by Schultes, 1957). FRENCH GUIANA. Monts Bakra, 21.5 km à l'Ouest du Pic Coudreau, 580 m, forêt basse sur inselberg, 22 June 2002, J.-J. de Granville, F. Crozier, C. Sarthou 14943 (CAY, photograph seen). GUYANA. Pakaraima mountains, mount Ayanganna, between Ayanganna and Chinowieng, 1,000–1,200 m, 7–8 February 1955, terrestrial, flowers bronze with yellow-tipped lip, B. Maguire, W. M. C. Bagshaw & C. K. Maguire 40636 (AMES, NY); Pakaraima Mountains, Mt. Aymatoi (sandstone), 1,150 m, herb, about 60 cm tall, cinnamon-scented; flowers orange-brown, labellum with brown blotch at the base, yellow coloured, having a brown-blotched appendage, callus white-margined, 15 October 1981, P. J. Maas, E. A. Mennega, B. J. H. ter Welle & H. J. Groen 5729 (P, VEN). Upper Mazaruni river basin, Ayanganna Plateau,

Chinowieng Savannah, 747 m, frequent, clumped with many pseudobulbs, in wet sandy soil, pseudobulb olive-green, leaves coriaceous, green above, olive beneath, flowers bronish-yellow shading to brown on margins, lip same, crest lighter, terminal lobe of lip yellow with purple spots turing to white with purple spots in age, lip light yellow on back, with fine brown spots, 20, 22 July 1960, S. S. Tillett, C. L. Tillett & R. Boyan 44882 (MO, NY). VENEZUELA. Amazonas: Municipio Autónomo Alto Orinoco, cerro Marahuaca, cumbre, parte central de la meseta S-E, al lado de una grieta, a lo largo de la quebrada Yekuana, afluente del río Negro, 3°40'30"N, 65°26'20"W, 2,560 m, 10–12 October 1983, J. A. Steyermark 129473 (MO, VEN). Municipio Autónomo Atabapo, Cerro Yapacana, alrededores del campamento a lo largo del río en las faldas en la parte SO, 825 m, terrestrial, pseudobulbs fusiform, 24 cm long, 2.5 cm at its widest point, lip tawny brown with white or yellow crest at tip, sepals and lateral petals tawny brown, column green, scape maroon, J. A. Steyermark & G. Bunting 103072 (AMES, VEN). Municipio Autónomo Autana, Cerro Sipapo, frequent in Camp Savanna on rocks, 1,500 m, terrestrial, pseudobulbs with 2–3 leaves, perianth yellowish-green, margined bronze red, terminal lobe of lip white with four red dots, column green, yellow tinged, 21 January 1949, B. Maguire & L. Politi 28532 (AMES, NY). Municipio Autónomo Río Negro, Cerro Aracamuni, summit, Popa Camp, savanna with small to large patches of forest and stream, 01 26 N 65 47 W, 1,550



FIGURE 8. *Eriopsis biloba* Lindl. A plant from Auyan-tepui growing in a clump of *Brocchinia reducta* Baker (Bromeliaceae), the leaves barely visible, the pseudobulbs hidden. © Photograph courtesy of L. Venegas Perdomo.



FIGURE 9. *Eriopsis biloba* Lindl. Another plant from Auyan-tepui bearing flowers with a long midlobe of the labellum (see insert).
© Photographs courtesy of S. McPherson.



FIGURE 10. *Eriopsis biloba* Lindl. **A**, plant in situ; **B**, close-up of flower. Plants from shrublands on white sand in southern Venezuela. Photograph by G. A. Romero-González based on Romero & Gómez 3777 (see specimens cited).

m, in savanna near edge of tepui, fruit green, 17 October 1987, R. Liesner & F. Delascio 22049 (MO, VEN). Río Yatua, Cerro de la Neblina, summit, terrestrial, occasional in scrub forest 15–18 km SE of Cumbre Camp, 2,000 m, tepals brown-yellow with dull maroon margins; lip brown-yellow with dull maroon margins, the apical lobe white with purple splotching, 1–2 December 1957, B. Maguire, J. J. Wurdack & C. K. Maguire 42294 (AMES, NY); same locality, altiplanicie en la cumbre del brazo noroccidental, al N del campamento base a lo largo del río Mawarinuma, afluente del río Baria, 0°52'–53'N, 66°05'W, 1,880 m, 7–8 February 1984, J. A. Steyermark & J. L. Luteyn 129837 (MO, VEN); same locality and date, terrestrial, scattered in dry, rocky area, perianth yellowish, heavily tinged with maroon, J. L. Luteyn & J. A. Steyermark 9435 (MO, NY, VEN); same locality, camp III, Neblina and massif NW plateau, 13.5 km ENE of Cerro de La Neblina Base Camp, 0°54'N, 66°04'W, 1750–1,850 m, terrestrial, flower reddish, brownish, yellow, lower petal with upraised, lighter patch at base, apex appendage yellow with reddish, brownish spots, 16–18 February 1984, R. Liesner 16007 (MO). Municipio Autónomo Manapiare, Cerro Coro-Coro, top of plateau, west side of valley, 8 km NNW of settlement of Yutaje, sandstone lajas and adjacent forest, W of serranía of Yutaje, 05°41'N, 66°08'W, 900–1,000 m, terrestrial in transitional

forest between dwarf forest and taller forest, 1 March 1987, R. Liesner & B. Holst 21530 (MO, VEN). Municipio Autónomo Maroa, 1 km east of Maroa, 130 m, terrestrial in sabanita, tepals old gold, maroon-edged; lip basally old gold with fine maroon speckling, the apical lobe white with maroon speckling, 1 July 1959, J. J. Wurdack & L. S. Adderley 43273 (NY); bana al NE del aeropuerto de Maroa, 100–120 m, hierba terrestre, bulbos con dos entrenudos, una hoja por entrenudo, el basal 12–18 × 2 cm, el apical 2–3 × 1 cm, hojas lanceoladas, 40 cm × 5 cm, bulbos verdes, rugosos, amarillos en la articulación de la hoja, pedúnculo y raquis morado-verdosos, de hasta 62 cm de altura y con hasta 25 flores, ovario pedicelado del color del raquis en la base, verde en el ápice, sépalos y pétalos amarillos con los bordes rojizos, labelo amarillo cubierto con pequeñas manchas rojizas, con cuatro líneas casi imperceptibles rojizas siguiendo el contorno del labelo y a cada lado del callo central amarillo, el apice blanco, ligeramente emarginado, con manchas moradas, pie columnar morado oscuro, columna verde-amarillenta en la base, verde claro en el ápice, antera amarilla, 20 June 2005, G. A. Romero & C. Gómez 3777 (AMES [flowers in EtOH], TFAV, VEN). Bolívar: Municipio Cedeño, cabeceras del río Túriba y caño La Miel, 45 km al E de Pijiguaos, bosque y arbustales sobre lateritas bauxíticas, 6°34'N 66°23'W, 800 m, terrestre en

orillas de quebrada, flores amarillo mostaza-verdoso, con márgenes de sépalos y pétalos morados, estigma y columna amarillo-verdoso, tecas blancas, ápice del labelo blanco con manchas moradas, base de la columna morado muy oscuro, August 1989, *A. Fernández & E. Sanoja* 5873 (MO, PORT). Municipio Gran Sabana, summit of Auyan-tepui, 1 January 1949, *F. Cardona* 2742 (AMES [flower], VEN); same locality, 01–30 April 1956, *E. Foldats* 2596 (VEN); same locality, abundante en la parte central de la región superior, 1,800–2,200 m, April 1956, *E. Foldats* 2597 (AMES, VEN); same locality, 01–30 April 1956, *E. Foldats* 2596 (VEN); same locality, cumbre de la parte SE (división occidental del cerro), entre “Oso Woods Camp” y el río Churún, atravesando un macizo plano rocoso de arenisca, common on rocky dry savanna expanses of flat part of plateau, 1,690–2,100 m, scape maroon, lip black basally, otherwise chocolate brown suffused fulvous with yellow apex spotted brown and crest in center pale yellow with minute brown spots along whitish 2-edged center; column arching, olive green with yellow apex, sepals and two lateral petals chocolate brown suffused fulvous golden within, more golden tawny basally without, pedicels dull olive green with dark green and maroon, 1 May 1964, *J. A. Steyermark* 93206 (AMES, VEN); same locality, E. edge of massif, 5°53'N, 62°26'W, 1,740 m, open area with large flat rocks and low vegetation, some patches of *Bonnetia roraimae* scrub, terrestrial, leaves basal, sepals and lateral petals magenta with pale yellow midrib, column pale green, lip yellow-white with dark purple spots, 27 May 1986, *B. Holst* 3015 (MO, VEN). Roraima, *C. F. Appun s.n.* (Reichenbach Orchid. Herb. Nr. 37986, inflorescence in the lower right corner, W); same locality, *F. V. McConnell & J. J. Quelch* 34 (K). Soropán-tepuí, crest of cerro between east and west end, 2,255 m, terrestrial, leaves erect, coriaceous, deep green, peduncle purple, sepals and petals wine-lavender, dull green at the base; lip brown-lavender with central small lobe yellow with 3 purple spots, column pale green, November 14 1944, *J. A. Steyermark* 60138 (AMES, F). Sarven-tepuí, 1,900–2,050 m, *J. J. Wurdack* 34140 (NY). Churi-tepuí (Muru-tepuí), 2,250–2,300 m, *J. J. Wurdack* 34241 (NY). La Gran Sabana, ca. km 167 S of El Dorado along hwy. to Santa Elena, 24 km S of La Ciudadella, treeless wet savanna dominated by *Axonopus*, *Paspalum*, *Panicum* and in spots by Rapateaceae, 1,300 m, terrestrial in sand, perianth brown, lip yellow at tip with brown spots, lip with a dark purplish-brown spot at base, flowers fragrant, 4 December 1973, *G. Davidse, M. Ramia & R. Montes* 4765 (MO). Extremo N de la Gran Sabana, aprox. 100 km at S de El Dorado en línea directa, carretera El Dorado-Sta. Elena, sabana, 5°40'N, 61°30'W, 1,300 m, terrestre, pétalos y sépalos color amarillo claro, punto del labio blanco cremoso, 3 April 1985, *B. Holst, J. A. Steyermark & B. Manara* 2154 (MO, VEN). Gran Sabana, Parque Nacional Canaima, carretera Fuerte Luepa-Santa Elena km 168, herbazal, planta herbácea, aprox. 70 cm de alto, eje de la inflorescencia marrón violeta, flores de color anaranjado, parte final del labelo color blanco con puntos color morado, 9 April 1994, *N. Ramírez, O. Hokche, E. Raimúndez, H. Briceño & L. Rodríguez* 4850 (MO, VEN).

Conservation assessment: *Eriopsis biloba* is found over a large area and it is locally frequent; we predict that herbarium collections largely underestimate its current distribution. It is less common in the Rio Negro basin (and ultimately the Amazon river basin) because exposed outcrops are less common in this area dominated by forests and savannas. The habitats that *Eriopsis biloba* prefers have been disturbed to some extent, but there are still rather large areas of suitable habitat in the Guayana area, particularly in southeastern Venezuela, Guyana, and northwestern Brazil (e.g., extensive populations of *Eriopsis biloba* are protected within Canaima National Park in Venezuela, in the state of Bolívar, as well as in the also legally protected tepui summits in the state of Amazonas). We assume that there is little concern regarding the conservation status of *Eriopsis biloba*.

As mentioned above, the geographical origin of the type material of *Eriopsis biloba* is unknown (Lindley, 1847a). Quoting Kent (1893: 71–72):

“When Dr. Lindley founded the genus on this species [i.e., *E. biloba*] nothing was known of its origin; the specimen was sent to him by Mr. Blandy, of Reading, who had had acquired the orchid collection of Mr. George Barker, of Birmingham, shortly after the gentleman’s decease in 1845, and among which were many rare species, some of them undetermined at the time. From that time to the present *Eriopsis biloba* has received but little attention from cultivators, and scarcely anything is recorded respecting it. Its geographical range is still unknown to science...”

George Barker (1776–1845) amassed a large collection of Orchidaceae in Birmingham, England (Desmond, 1994: 44). As circumscribed here, however, the type species is so particularly distributed that the original collector can be narrowed down considerably: it is entirely possible that Barker obtained his plant of *E. biloba* from Robert H. Schomburgk, from whom he had gotten other live plants, e.g., *Bollea violacea* (Lindl.) Rchb.f., as proposed by Romero-González (2005). Barker also could have obtained it from other collectors in the Guianas (listed in Romero-González, 2005), the most likely provenience of the type material.

Eriopsis biloba, as circumscribed here, is a highly variable species, both morphologically and ecologically. It is found in the Guayana Shield growing terrestrially both on tepui summits and high altitude savannas and shrublands (e.g., as in the Gran Sabana region of Venezuela) at [600–] 1,000–2,200 m in Brazil, Colombia, Guyana and Venezuela, and in white-sand savannas and shrublands at 90–140 m in the upper Rio Negro in Brazil, Colombia, and Venezuela. It is the most common orchid species on some tepui summits in Venezuela, in both Amazonas and Bolívar states (e.g., Dunsterville, 1964, 1973), growing on open white-sand savannas or sandstone outcrops of the Roraima formation, exposed to full sun or partially shaded in shrublands; some grow in even darker spots, often along creeks. In Venezuela it also occurs on granite outcrops or “lajas” in the proximity of Cerro Autana (a tepui in Amazonas state at

approximately 04°51'33"N, 67°27'05"W, 120 m), although plants in this particular population have never been found in flower, nor have old inflorescences been detected (personal observation, GAR-G). It has also been reported from Sierra Parima on granite outcrops at 1,450 m ("Scattered among the depressions of the 'laja' are herbaceous species characteristic of the tepuis, such as ... *Eriopsis biloba*..."; Huber et al., 1984).

Plants of this species also grow on open white-sand savannas and shrublands at 100–250 m in the Orinoco and upper Río Negro basins in Colombia (Vaupés river), Venezuela (Atabapo and Guainía rivers), and most likely in similar habitats in Brazil. Wurdack & Adderley 43273 (NY), cited by Foldats (1970: 260) as *E. grandibulbosa*, was collected from a population located east of Maroa (Venezuela, Amazonas state), the plants of which have long, fusiform pseudobulbs, which was re-sampled and documented by the senior author (see Romero & Gómez 3777). The flowers of the plants in this population, nonetheless, are exactly like the ones of *E. biloba* from Gran Sabana (and also exactly like the type of *E. biloba*). Here we report a collection apparently found growing as an epiphyte in French Guiana (de Granville et al. 14943). Although here referred to *E. biloba*, its status is uncertain at this time. We also report a sample collected growing on bauxite (see Fernández & Sanoja 5873 cited above).

In *Eriopsis biloba* the pseudobulbs can be pyriform, slenderly ovoid-ellipsoid to long, fusiform, resembling those of some members of the *Prosthechea vespa* (Vell.) W.E. Higgins complex. Overall, flowers are fairly homogeneous but there is some variation in size and color with petals and sepals varying from pale yellow or greenish-yellow with a broad brown margin or concolor brown or yellow. The apical lobe varies in color from white to dull yellow, variously spotted.

The most striking variation pattern in the flowers, however, is found in the shape of the labellum. The basal lobe varies from ovate to transversely elliptic or transversely oblong. The apical lobe varies in the absolute and relative length of the claw. In some flowers, the claw is so short that the apical lobe is practically sessile (Fig. 6); in others, the apical lobe is held by a long claw, the claw being much longer than the apical lobe itself (Fig. 9).

We accommodate all this observed variation in a single, widely ranging taxon but refer *Eriopsis grandibulbosa* to the synonymy of *E. biloba* with some hesitation. Plants of *Eriopsis biloba* that closely match the protologue of *E. grandibulbosa* are found on the summits of Mount ("Cerro") Duida (type locality of *E. grandibulbosa*), and Mount ("cerro") Yapacana (both in Amazonas state, Venezuela) and in Auyan-tepui (in Bolívar state), where *Eriopsis* is the dominant orchid (Dunsterville, 1964). We simply find no morphological, ecological, or geographical patterns that at this point could justify recognizing *Eriopsis grandibulbosa*. Nonetheless, the authors encourage further studies of the ecological and geographical distribution of both the vegetative and floral variation of *E. biloba*.

We do exclude from *Eriopsis biloba* a set of plants found growing epiphytically and occasionally terrestrially

in Colombia, Ecuador, Peru, and Bolivia, including plants growing along "Cordillera del Cóndor", a place well known to have plants and animals also found in the Guayana Highlands (Schulenberg et al., 1997; see *Eriopsis* sp. A in the key and below).

Reichenbach f. described *Pseuderriopsis schomburgkii* perhaps because, as he admitted, at that point he knew the genus only from published iconography and from Robert Schomburgk's drawings at the British Museum (Reichenbach f., 1849).

Eriopsis escalerensis G.A.Romero & Carnevali, *sp. nov.*
 TYPE: VENEZUELA. Bolívar [Municipio Gran Sabana]: a lo largo del camino al Sur de El Dorado, vecindades del km 125 [La Escalera], 1,155 m, "[t]errestrial; lip creamy white spotted purple in apical half, magenta red in lower half; column orange-yellow apically, brown-red basally; lateral petals magenta most of the length, orange-yellow apically, dull magenta in middle suffused yellow, greenish yellow basally; flowering rachis purple-brown; leaves stiff-coriaceous", 21 December 1963–13 January 1964, J. A. Steyermark, G.C.K. and E. Dunsterville 92923 (Holotype: VEN [64257]). Fig. 11–12.

Species perhaps most closely related to *Eriopsis rutidobulbon*, but easily distinguished by the absence of two long, parallel, irregular thickenings extending between the basal callus and the isthmus. It can be distinguished from *E. biloba* by the much larger flowers and the epiphytic habit.

Very robust epiphytic herb. Pseudobulbs dark, rugose, bifoliate; to 6 × 4 cm, somewhat compressed. Leaves fairly thick and very rigid, shiny green on top, dull underneath; midnerve sulcate-carinate, 6.5 × 32.0 cm (including the petiole). Peduncle thick, puce, 28 cm long; rachis 30 cm long. Flowers relatively large, ca. 3.5 cm in diameter. Sepals yellow with orangey-maroon flush; 25 × 10 mm. Petals yellow, with maroon flush, 23 × 7 mm. Labellum 23 mm long, 21 mm across spread lateral lobes; disc and lateral lobes dark puce on face, paler puce on back and white with some fine puce spotting underneath; isthmus white with puce spots which continue partly onto the mid-lobe which is mainly white. Column orangey yellow [based on G.C.K. Dunsterville original notes, themselves based on a live plant].

Etymology: Named after the type locality, "La Escalera", part of "Sierra de Lema" (Brewer-Carías, 2012), a mountainous upland lying north of Gran Sabana and crossed roughly north to south, at the time the type was collected, by what was a dirt path, difficult to traverse, and currently by a two-lane, paved but still curvy and steep road. "La Escalera" is the type locality of many plants and animals, as the road cut across the otherwise inaccessible rain and cloud forest habitats found on the slopes of the northern tepuis.

Other relevant references: Dunsterville and Garay (1965, only when referring to flowers type A).

Iconography: Dunsterville and Garay (Dunsterville and Garay (1965: 127; 1979: 309, *pro parte*, excluding all flowers except type A).

Field characters: Plant epiphytic, on trees in tropical cloud forest, leaves proportionally wider and flowers

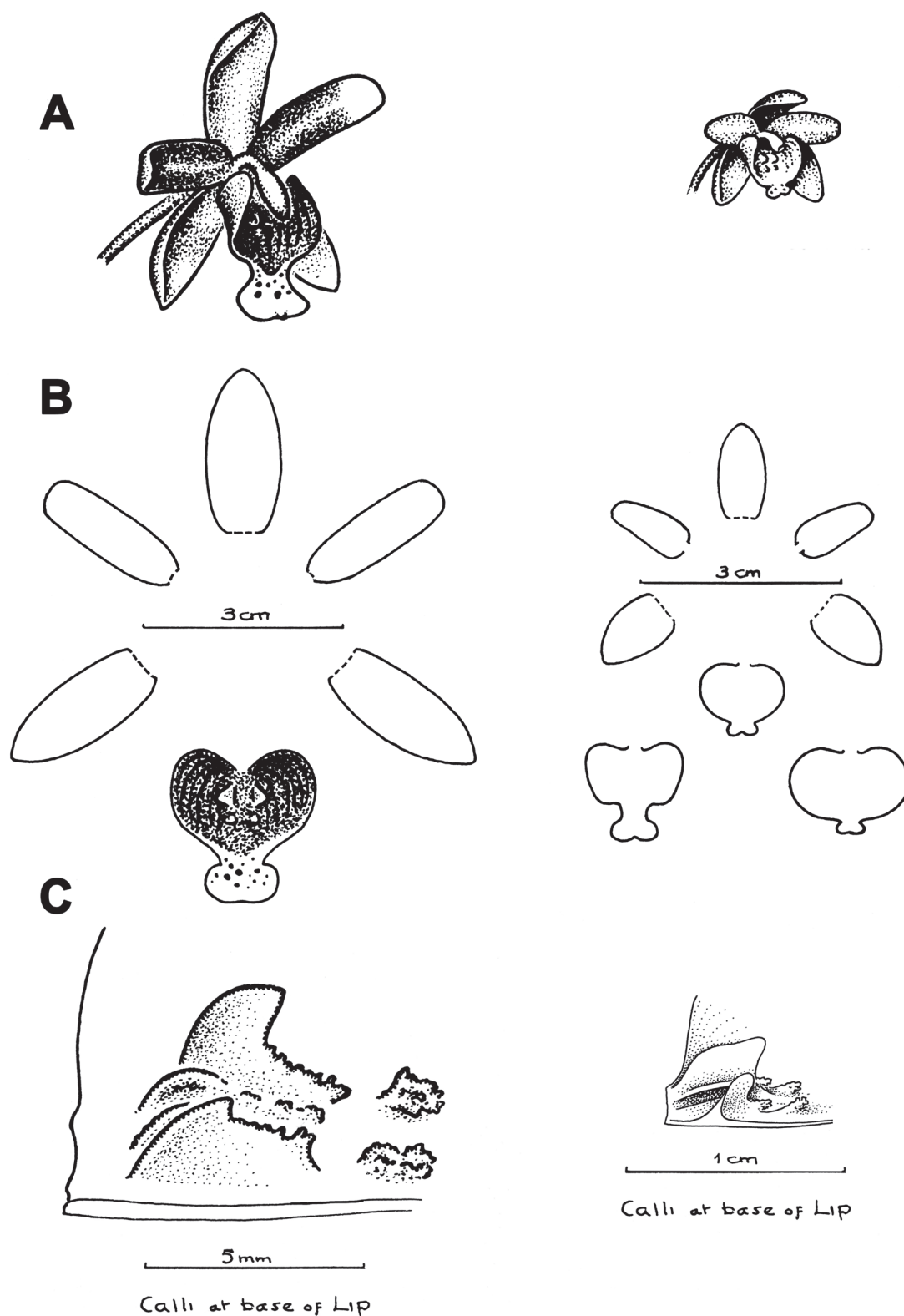


FIGURE 11. Comparison of the flowers of *Eriopsis escalerensis* G. A. Romero & Carnevali (left column) and *E. biloba* Lindl. (right column). A, flower; B, floral segments; C, callus of the labellum. Drawings by G. C. K. Dunsterville based on his collections 857 and 562, respectively, presented at the same scale except for C (reproduced from photostatic copies of his drawings at AMES).



FIGURE 12. *Eriopsis escalerensis* G. A. Romero & Carnevali. Holotype. VEN). © Herbario Nacional de Venezuela (VEN), courtesy of O. Hokche and L. Rodríguez.

relatively larger and with much more darker pigmentation than in *E. biloba*, similar to that observed in *E. rutidobulbon* (see key above and text below).

Distribution: Known only from the type locality, but most likely found on trees growing in tepui slopes in Venezuela and most likely neighboring Guyana.

Additional specimen examined: same locality of the type collection, most likely from the same plant from which the type was prepared, *G.C.K. and E. Dunsterville 857* (AMES, drawing of flowers, Fig. 11, *pro parte*). Cerro Marutani, cumbre, selva siempre verde tupida en la altiplanicie cerca de la frontera venezolana-brasileña, 3 45 N 62 30 W, 1,420 m, low epiphyte, scape dull purple, 13 January 1981, *J. A. Steyermark, B. Maguire, C. Brewer-Carías, C. K. Maguire & V. Carreño Espinosa 124039* (MO).

Conservation assessment: According to IUCN (2010), *Eriopsis escalerensis* would be considered a Data Deficient (DD) species because it is known from a single “official” collection. However, the species has been seen in the field at least two additional times (see text below). In these two cases, the plants had no flowers and, under cultivation, they never flowered, as it is commonly the case with all *Eriopsis* species. All sightings occurred within a small area of a few square kilometers around km 125 south of El Dorado (probably accounting for an “Extent of Occurrence” not exceeding 100 km² and an “Area of Occupancy” of ca. 8 km²) along the road to Santa Elena de Uairén, in the general Cerro Venamo-La Escalera region. This area, covered by dense, fairly well preserved tropical rain and cloud forests, lies in SE Bolívar State in Venezuela and extends into neighboring Guyana. Plants occurring in this general zone are often also known to occur on the forested slopes of the tepuis of NE Bolívar State. *Eriopsis escalerensis* most likely has a broader, yet still fairly restricted, extent of occurrence within this mostly well-preserved area, part of which resides within the Canaima National Park, a protected area that has been fairly well-collected and traveled by numerous botanists and orchid aficionados alike. As *Eriopsis escalerensis* occurs high on thick branches of large trees and is difficult to observe and collect unless one of these forest giants falls, both the type collection and at least one of the sightings have occurred on large fallen trees. Thus, the species is likely to have gone mostly undetected and may be more common than the evidence suggests. On account of its limited extent of occurrence yet inhabiting an area that is still largely pristine, we would rate the species as Endangered (EN).

Dunsterville and Garay (1965: 126) placed this novelty within the supposedly wide range of vegetative and floral variation of *Eriopsis biloba*, whereas Foldats (1970) inexplicably referred the holotype selected here to *E. grandibulbosa*. One of us (GAR-G), misinterpreted Dunsterville’s drawing (Dunsterville 857; see additional specimen examined), particularly the callus shown, and reported it as *E. rutidobulbon* Hook. in the orchid treatment for Flora of the Venezuelan Guayana (Romero-González, 2003).

Notwithstanding, a reassessment of the available evidence clearly indicates that *Eriopsis escalerensis* can be easily distinguished from both *E. biloba* and *E. rutidobulbon* based on the characters detailed in the key above.

Julian A. Steyermark wrote in his field book and corresponding label that the type plant was terrestrial. Dunsterville, however, accompanied Steyermark when the type was collected and, in unpublished notes that accompany his drawing 857 at AMES, he wrote:

“Very close to the old road camp at km 125 south of El Dorado we found a magnificent plant of this species, growing on the trunk of a tree that had obviously fallen quite a long time ago. The clump of pseudobulbs carried three large inflorescences, erect, at the base and arching over the top, each about 60 cm long and each carrying about 30 flowers. The flowers themselves were considerably larger than those shown in No 562 (another specimens [of *Eriopsis biloba*] we have seen since) and the colour pattern slightly different.”

There is little doubt that the plant that Steyermark pressed was the same plant described by Dunsterville, and the former most likely made a mistake when he wrote “terrestrial” in his field notes. It is also likely that Steyermark pressed three specimens (based on what Dunsterville wrote, “... [t]he clump of pseudobulbs carried three large inflorescences...”), but the authors have located only the specimen at VEN cited above.

One of us (GC) found this species in the type locality growing on a tree in the late 1970s. Efforts to flower a plant in Maracay (Aragua state, Venezuela) failed, and the plant eventually died. Manfred Speckmaier (personal communication to GC, 2015), also found plants of *Eriopsis* growing epiphytically at the type locality but, again, efforts to flower plants in Caracas, in the greenhouse of G. Bergold, failed.

Steyermark et al. 124039 (see specimens cited above), which extends the range of this species considerably, is placed here based on its habit and the size of the plant.

Eriopsis rutidobulbon Hook., Botanical Magazine 75: t. 4437. 1849. TYPE: COLOMBIA. Antioquia: without any other locality, “growing on the smooth stem of a Palm tree”, Collected by W. Purdie, cultivated at the Royal Botanical Garden, Kew (Holotype: apparently never preserved or perhaps lost, Lectotype, here proposed, plate 4437 published in *Botanical Magazine* [1849]). (Fig. 13–15).

Synonyms: *Eriopsis biloba* Lindl. var. *grandiflora* Lem., Jard. Fleur. 2: 78. 1852.

Etymology: Based on the presumption of the author that the species was simply a cultivar of *E. biloba* with larger flowers.

Eriopsis colombiana Schltr., Rep. Spec. Nov. Regni Veg. Beih. 27: 172. 1924. TYPE: COLOMBIA. Antioquia, “Ohne nähere Standortsangabe” [without any other locality], 1,200 m, *M. Madero s.n.* (Holotype: B, destroyed).

Etymology: Named after the country of origin of the type collection.

Eriopsis fuerstenbergii Kraenzl., Orchis 2: 62. 1908. TYPE: Origin unknown, cultivated by “Baron M. v. Fuerstenberg-Hugenpoet” (Holotype: HBG; see Schultz, 2013).



FIGURE 13. Illustration of *Eriopsis rutidobulbon* Hook. in Linden (1854, as *E. biloba*). The artist did not fully draw all details of the flowers. Based on a published plate at AMES.



FIGURE 14. Illustration of *Eriopsis rutidobulbon* in Hooker (1849), designated here as Lectotype. Based on a published plate at AMES.

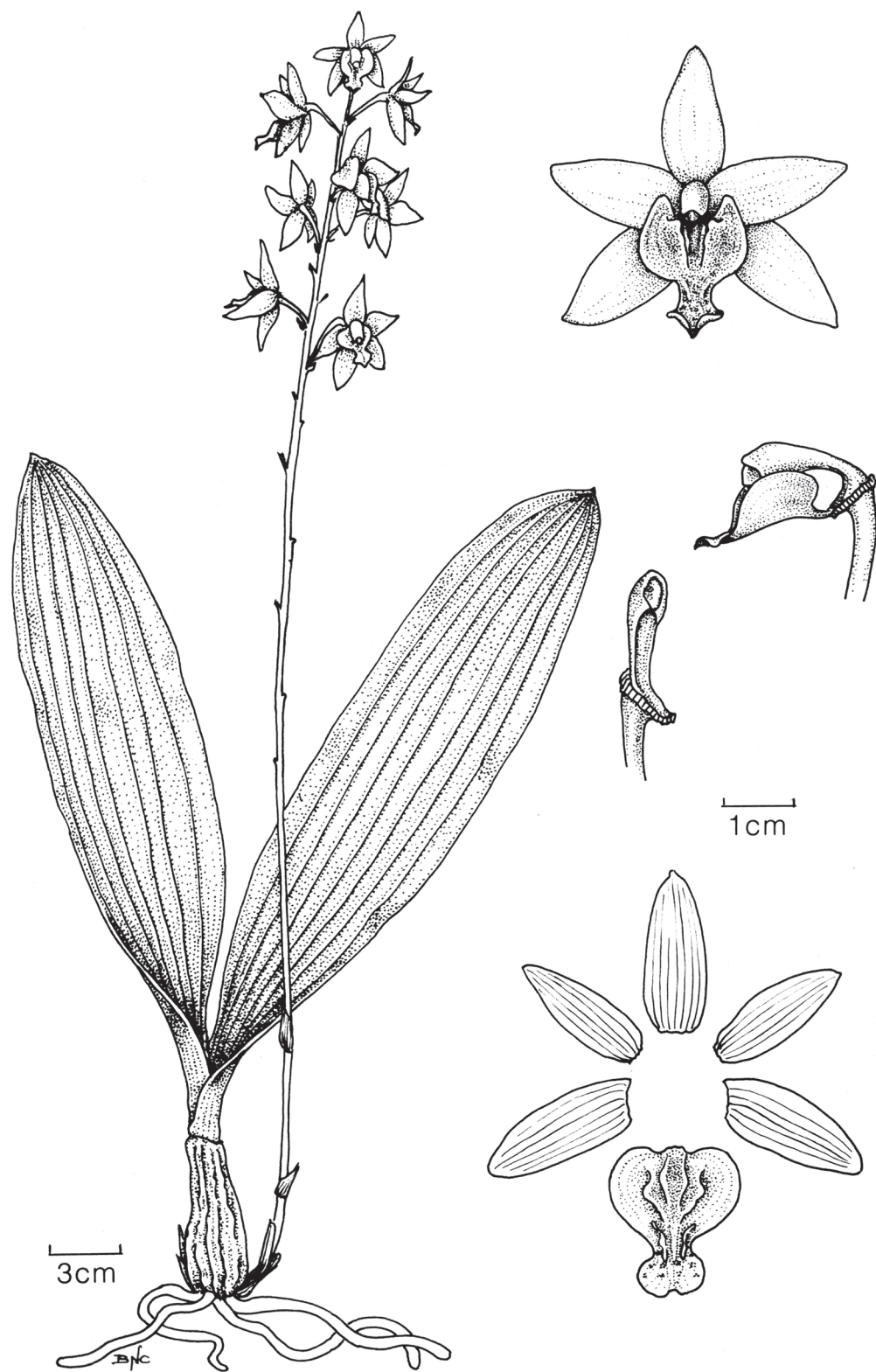


FIGURE 15. Illustration of *E. rutidobulbon* Hook. in Dodson and Dodson (1980). With Permission from C. H. Dodson and the Missouri Botanical Garden.

Etymology: Named after Baron M. von Fürstenberg-Hugenpoet, who cultivated the plant from which the description was prepared.

Usage synonym: *Eriopsis rhytidobulbon* Lem., Jard. Fleur. 2: 77. 1852.

Etymology: From the Greek *rhytidodes*, wrinkled, and *bolbos*, bulb, in reference to the wrinkled surface of the pseudobulbs.

Iconography: Morren (1849); Linden (1854, as *Eriopsis biloba*); Warner and Williams (1889); Linden (1901); Schlechter (1930, as *E. colombiana*); Dodson and Dodson (1980, as *E. colombiana*); McLeish et al. (1995: 62, Fig. 25 and photograph 45, as *E. biloba*); Behar and Tinschert (1998: 144, as *E. biloba*); Dodson (2001: 303, No. 621); Zelenko and Bermúdez (2009: 138); Szlachetko et al. (2012: 285, fig. 423, as *E. sceptrum*); Wolf and Baumbach (2015, including cover).

Field characters: Plants apparently epiphytic, found occasionally growing terrestrially, mature pseudobulbs pyriform to elongate, dark brown to dark purple, rugose, labellum with four basal, longitudinal lamellae and, toward the apex, a fleshy callus with two ridges that often approach the isthmus or narrowing of the labellum. Within the genus, this species bears the largest flowers.

Distribution: Southern Mexico (Hágsater et al., 2005: 107; Beutelspacher Baigts, 2008; see also Soto Arenas et al., 2007), Guatemala (Dix and Dix, 2000, as *E. biloba*), Belize (McLeish et al., 1995: 61, as *E. biloba*), Honduras (Nelson and Ortiz, 2007, as *E. biloba*), Panama (Williams and Allen, 1949: 378). Colombia (type), Venezuela (Linden, 1854), Ecuador (Dodson, 2001), and Peru (Zelenko and Bermúdez, 2009: 398, a doubtful report, based on a photograph by A. Hirtz from Ecuador).

Additional specimens examined: BELIZE. Toledo, southern Maya Mountains, Bladen Nature Reserve, mountains 1.7 airline N of the Ek Xux archeological site, low forest on steep slope with thick humus layer and a herbaceous understory dominated by *Rhynchospora exaltata*, on soils derived from volcanic rocks, 16°31'05"N, 88°54'11"W, 500–600 m, terrestrial, perianth brownish-maroon, the lip whitish in the center, column yellowish green, lighter toward the tip, 24 May 1996, *G. Davidse* 36234 (MO). HONDURAS: Departamento Gracias a Dios: Klauban, O de Brus Laguna, bosque tropical lluvioso, nivel del mar, 24–31 enero 1976, *E. Vargas, J. Espinoza & G. Cruz* 361A (UNAH). COLOMBIA. Boyacá: El Humbo, 4–5000 ft [1200–1500 m], high cold forest, flowers with an “unusual, sweet” odor, sepals and petals deep plum colour fading to a yellow, back of the labellum spotted dark plum, base of lip pure white & spots are deep plum, “A very beautiful flower... [s]uitable for [o]rchid bloom trade”, 19 February 1934, *A. E. Lawrence* 621 (AMES [two specimens]). Cauca: highlands of Popayán, blooms March & April, 1,600–1,800 m, *F. C. Lehmann* 8125 (AMES [three specimens], G, GH, W). Ocaña, *L. Schlim* 46 (G [two specimens]). ECUADOR. Santo Domingo, Ceja de la Montaña, 2,000 m, petals pale yellow with red edges, labellum pale yellow with red edges and with points, 9 September 1954, *W. Rauh & G. Hirsch* E191

(collection number not clearly readable) (AMES). Pichincha, el Volante on road to Chiriboga to Santo Domingo de los Colorados, cliff, 1,900 m, 22 August 1955, Sepals and lateral petals ochre-yellow with narrow reddish brown margins, middle lobe and central part of lip pale yellow, crests with dark violets dots, lateral lobes reddish brown, *E. Asplund* 17413 (AAU, AMES). GUATEMALA. Alto Verapaz: Cobán, Comunidad Seconon, 15°16'28"N, 90°38'52"W, 832 m, July 2013, *E. Mó* 62 (BIGU). On trees and rocks below Cobán and Senahú, in wet forest, 500 m, 2 May 1882, “Pflanzen groß; Bulben lang birnförmig. Blätter robust lederartig. Blütenhüllen ockerbraun. Lippe gelb mit weißer Spitze, rotgefärbt... Vereinzelt!”, *F. C. Lehmann* 1410 (G). PERU. Departamento Huánuco, Provincia Puerto Inca: Distrito Yuyapichis, CC.NN. Tahuantinsuyo, Reserva Comunal el Sira, bosque pre-montano, suelo archilloso negro con abundante hojarasca, 9°26'14"S 74°44'8"W, 1,308 m, epífita 70 cm, incluyendo las hojas con 4–5 pseudobulbos verdes oscuros, curvadas, sépalos naranjas, pétalos naranjas, labelo anaranjado con dos lóbulos apicales amarillo-crema, con moteado rojizo, aparecen 5–6 venas negruzcas sobre el labelo parte posterior[r], *L. Valenzuela & J. Flores* 27875 (HOXA, photograph seen). VENEZUELA. Táchira: Las Delicias “niedriger Busch, an offenen Stellen am Boden” [low shrub, in open vegetation, on the ground], 1,800 m, 5 May 1951, *O. Renz* 6892 (RENTZ, photograph seen).

Conservation assessment: According to IUCN (2010), *Eriopsis rutidobulbon* would be considered a Least Concern (LC) species because it occurs over a large surface area (“Extent of Occurrence”) of ca. 2,800,000 km². However, based on an Area of Occupancy of 52 km² (cell width of 2 km) it would rate as Endangered (EN).

Eriopsis rutidobulbon does have a large area of distribution, growing usually as an epiphyte on thick branches of high trees in rain to cloud forests at elevations from sea level (reported from Belize) to, most commonly, of 1,000–2,400 m along both sides of the Andes from Venezuela southward to Peru. It is also known from Guatemala, Honduras, Belize, and México (Chiapas), so we assume it must also occur in Panama, Costa Rica and Nicaragua. We consider that there is little reason for concern regarding the conservation status of *Eriopsis rutidobulbon*.

Eriopsis rutidobulbon apparently was first collected in 1841 by Jean Jules Linden (1817–1898) in the western slopes of the Venezuelan Andes (Linden, 1854 see figure 13 herein; see also L. Linden, 1901), although no specimen is known: it was never described based on his gathering. It later was collected by W. Purdie, this time in Colombia, who introduced it to the Royal Botanic Gardens, Kew, where it flowered in August 1848 (Hooker, 1849).

Eriopsis rutidobulbon can be easily distinguished from all other species of the genus by the presence of two sets of calli: a basal set of four longitudinal lamellae and then two thickened, fleshy ridges near the constriction of the labellum. These two ridges are readily discernable *in vivo*, in re-hydrated, herbarium material, and even in dry, well preserved herbarium material. They also can be seen in the drawing of the type of *E. colombiana* (Schlechter, 1930)

and the type flowers of *E. fuerstenbergii* (a drawing of the type of which D. Szlachetko kindly made available to the authors).

This species was reported from Panama by Williams and Allen (1949) from both “Chiriqui Province at about 6000 ft. elevation” and from “... the wet forested region north of El Valle de Antón, in Coclé”, although based on plants that could have easily been *E. wercklei* (see below). Dressler (1980) implicitly referred these reports to *E. biloba*. Dix and Dix (2000: 20) reported *E. biloba* for Guatemala. However, if the species found in Guatemala is the same one found in Belize, what Dix and Dix (2000: 20) reported is most likely misidentified material of *E. rutidobulbon*, to which the Belize material is also referred here (based on McLeish et al., 1995: 62, Fig. 25, and photograph 45, reportedly from native material, also as *E. biloba*). In fact, we have recently received photographs of *Eriopsis* plants from Guatemala in flower (from E. M6 via W. Cetzal-Ix) and there is no doubt they are referable to *E. rutidobulbon*.

As stated above, two authors (Lindley, 1849; Lemaire, 1852), argued that *Eriopsis rutidobulbon* was identical to *E. biloba*, and that the larger flowers could be attributed to better growing conditions. Notwithstanding, *E. rutidobulbon* can be easily distinguished differs from *E. biloba* not simply by the larger flowers, but also based on the easily discernable characters presented in the key and the text above.

The presence of this species in Colombia and then in Central America and México, “skipping” Costa Rica and Nicaragua (the genus is not reported for Nicaragua at all; Hamer, 2011), is puzzling, and we predict that eventually it will appear in this geographical gap.

Eriopsis sceptrum Rchb.f. & Warsz., Bonplandia 2: 98. April 1854. TYPE: PERU. “Sources of the Marañon”, May 1853, J. von Rawicz Warszewicz s.n. (Lectotype, selected here, W [Reichenbach Herb. 37988], Warszewicz watercolor in the upper left, a Reichenbach f. drawing of the labellum, and three flowers [copy at AMES 38306]; Isotypes: K [ex herbarium Lindley]; possible Isotype: G [ex herbarium Barbey-Boissier]). (Fig. 16–19).

Synonyms: *Eriopsis helenae* Kraenzlin, Gard. Chron. ser. 3, 22: 98. 1897. TYPE: PERU. “Imported by F. Sander, St. Albans” (Holotype: specimen apparently not preserved; Neotype, here proposed, Bot. Mag. 138: t. 8462, 1912).

Etymology: From the Latin *sceptrum*, staff, walking-stick, baton, or wand (Brown, 1954: 664), perhaps in reference to the shape of the calli or, more likely, in reference to the dense, tall inflorescence (as in *Lepidogyne sceptrum* Schltr. from New Guinea).

Distribution: Bolivia, Ecuador, and Peru.

Other relevant references: Reichenbach f. (1863, 1884).

Iconography: Prain (1912, as *E. helenae* [plate based on a plant from the type collection Sander donated to Kew that flowered in June 1909]), Gerlach et al. in Pridgeon et al. (2009: color plates 32–33, photographs by M. Whitten, as *E. biloba*, based on Whitten et al. 3153 cited below from Ecuador).

Field characters: Plant terrestrial, pseudobulbs elongate, inflorescence tall (up to 1.5 m tall), flowers yellow, fragrant, undefined (*fide* Weberbauer 7050), or with a bad smell (*fide* Vargas 4200).

Additional specimens examined: BOLIVIA. Cochabamba: Provincia Chapare: km 95 entre Cochabamba y Villa Tunari, 1,830 m, planta rupestre, creciendo en laderas rocosas, 22 febrero 1979, R. Vásquez 121 (VASQ, drawing seen). ECUADOR. Provincia Loja: road from Vilcabamba to Valladolid, at Tapichalaca Biological Reserve, km 6.1 south of Casa Simpson, 04°31'24.5"S, 079°07'49.6"W, 2,485 m, “terrestrial on steep roadbanks, pseudobulbs to 15 cm tall, surface relatively smooth, not wrinkled, 3–4 foliate; inflorescence to 1.3 m tall; flowers yellow-brown, edged with darker brown, midlobe of lip white, spotted with brown; base of lip and lateral lobes brown, callus consisting of a pair of erect, diverging, Y-shaped lamina; column yellow-green, 1 November 2005, M. Whitten, N. Williams, L. Endara, M. Blanco, K. Neubig & P. Viveros 3153 (QCA, to be distributed, *fide* Whitten, not seen; photographs seen, reproduced in Gerlach et al., 2009, color plates 32–33; Fig. 18 herein). Provincia Zamora-Chinchipe, near Valladolid, 1,700 m, ex Botanischer Garten München-Nymphenburg 07/2043 (AMES, M). PERU. Departamento Libertad, Provincia Pataz: valle del río Mixiollo encima de Ongón, 1,800–2,000 m, crece en el suelo entre arbustos, flores amarillo-parduzco, fragantes, 5 August 1914, A. Weberbauer 7050 (AMES [flowers], F, MOL). Departamento Cajamarca, Provincia San Ignacio, Distrito San José de Lourdes, San Juan de Pacay en la Quebrada El Palto, 1,450 m, 2 February 2007, D. Trujillo 301 (URP, not seen; photographs and drawing seen). Same department and province, La Coipa, Vergel, bosque secundario, 5°16'11"S, 78°56'0"W, 1,750 m, hierba terrestre con pseudobulbos verdes, escapeo 1 m, flores amarillas, labelo amarillo con máculas rojas, 25 October 1997, J. Campos, Z. García & H. García 4537 (USM, photograph seen). Departamento Cuzco, Provincia Convención, Valle Lucumayo, Amaibamba, laderas abiertas hasta 1.40 m, raíz bulbosa, perianto amarillo-dark brown, huele mal, 1,700 m, 28 April 1944, C. Vargas C. 4200 (AMES). ECUADOR. Pastaza: Tungurahua, region of Puyo, 13 October 1961, sepals and petals yellow brown, lip purple with yellow tip and spotted with purple, C. H. Dodson & L. B. Thien 1004 (AAU, MO).

Conservation assessment: According to the IUCN (2010), *Eriopsis sceptrum* would be considered a Least Concern (LC) species because it occurs over a large surface area (“Extent of Occurrence”) of ca. 830,000 km². However, based on the Area of Occupancy of 36 km² (cell width of 2 km) it would rate as Endangered (EN). *Eriopsis sceptrum* does have a large area of distribution, growing usually as a terrestrial, subterrestrial, or lithophyte on road banks, steep rocky slopes, or open, grassy savannas at elevations of 1,400–2,200 m in rain to cloud forests. This species, being strictly terrestrial, is probably rare, and it seems to rarely have been collected. However, on account of its large extent of occurrence, we assume there is little reason for concern regarding the conservation status of *Eriopsis sceptrum*.



FIGURE 16. *Eriopsis sceptrum* Rchb.f. & Warsz. at W (Reichenbach 37988), designated it here as Lectotype. Notice Warszewicz's original drawing in the upper left corner. © Naturhistorisches Museum Wien, with permission.



FIGURE 17. *Eriopsis sceptrum* Rchb.f. & Warsz. (as *E. helenae* Kraenzlin) from Prain (1912). Based on a published plate at AMES.



FIGURE 18. *Eriopsis sceptrum* Rchb.f. & Warsz. **A**, flowering plant in situ; **B**, close-up of the base of the plants, showing new shoots and pseudobulbs; **C**, Lorena Endara holding an inflorescence; **D**, close-up of the inflorescence. © Photographs courtesy of M. W. Whitten based on Whitten *et al.* 3153 (see specimens cited).

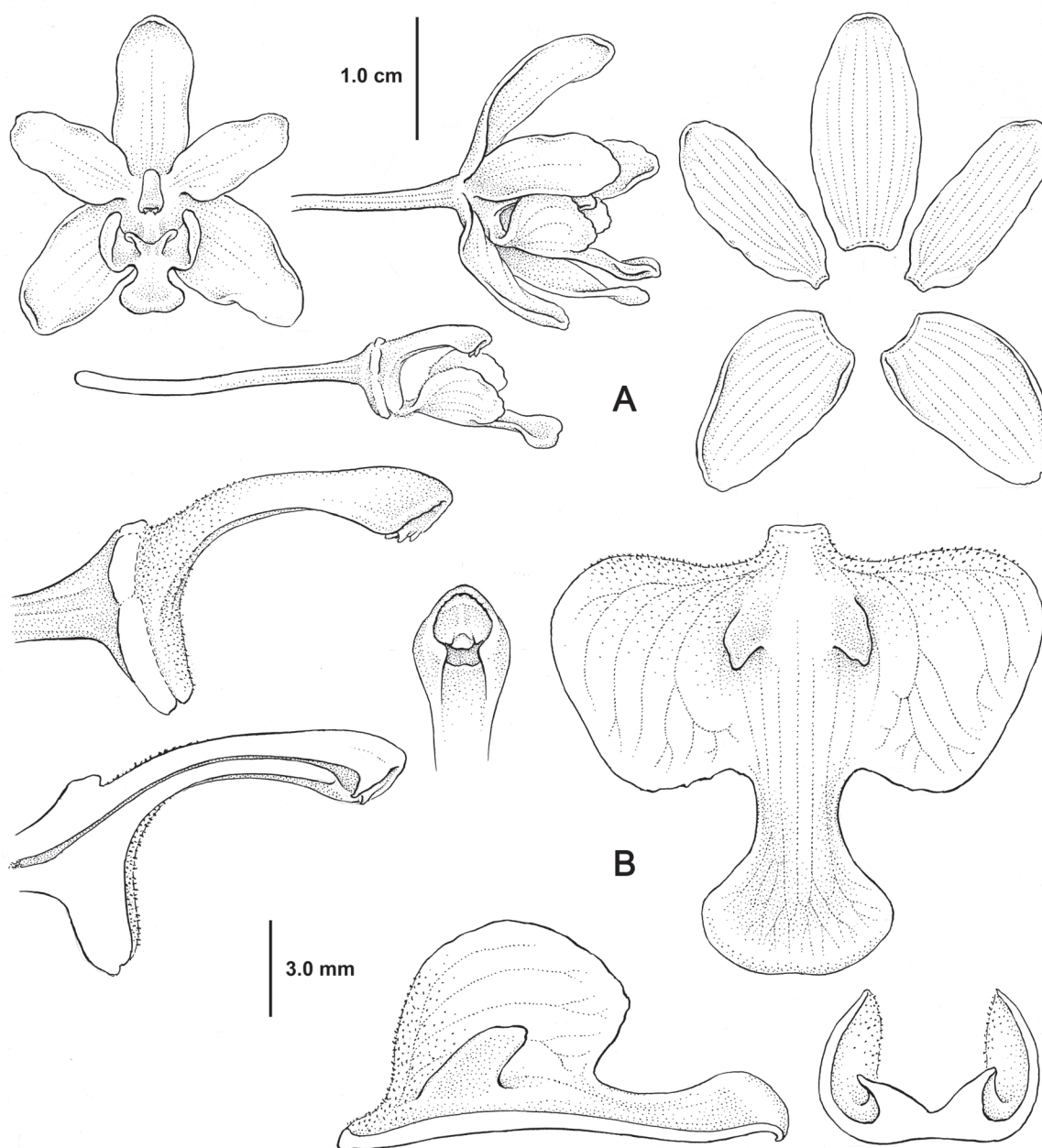


FIGURE 19. *Eriopsis sceptrum* Rchb.f. & Warsz. **A**, details of the flower; **B**, floral segments and column. Drawing by B. Angell based on ex Hort. Botanischer Garten München-Nymphenburg 07/2043 (see specimens cited).

Lindley published *Eriopsis altissima* Lindl. on the pages of an auction catalogue in 1853, apparently the first valid name for specimens previously referred to *E. sceptrum*. Although Lindley preserved bits of the text of the catalogue on different sheets in his herbarium, we have not been able to locate a complete copy and, for now, we keep the name *E. sceptrum*, preserving the *status quo*.

This orchid was one of the many species that Warszewicz collected at the “Sources of the Marañón” (see Reichenbach f., 1854). The name was erroneously applied to specimens

of *E. sprucei* starting with Dunsterville and Garay (1965: 128), closely followed by Schweinfurth (1967) and the most recent treatment of the genus for Venezuela (Romero-González, 2003).

A re-assessment of the evidence strongly indicates that *E. sceptrum* is a terrestrial plant that bears quite tall inflorescences (deserving Lindley’s epithet “*altissima*”), whereas *E. sprucei* is an epiphyte with relatively shorter inflorescences. The flowers also differ significantly (see key and Fig. 17–20 versus 21–22).

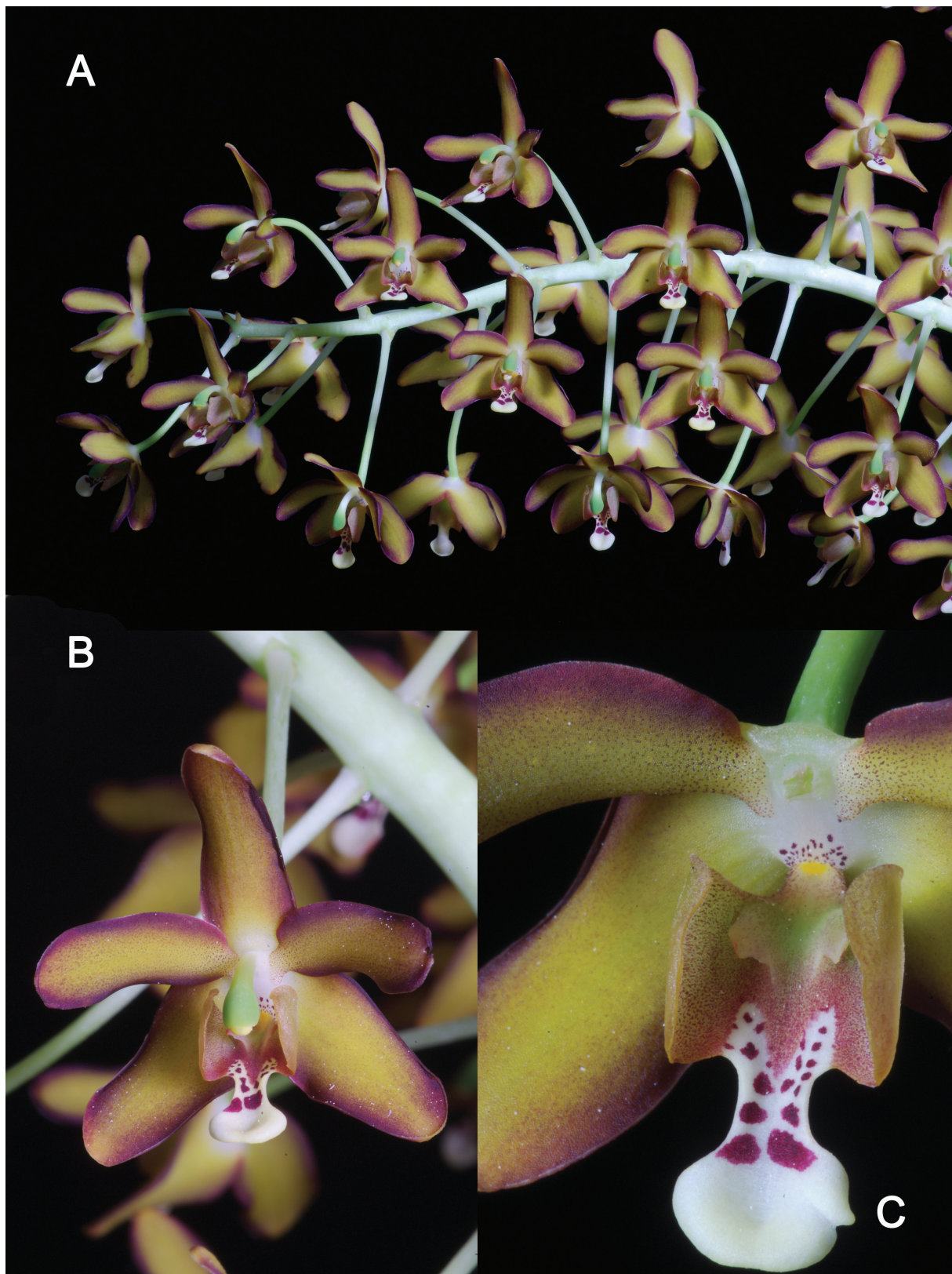


FIGURE 20. *Eriopsis sceptrum* Rchb.f. & Warsz. **A**, inflorescence; **B**, close-up of flower; **C**, close-up of the labellum after removing the column. Photographs by G. Gerlach based on ex *Hort*. Botanischer Garten München-Nymphenburg 07/2043 (see specimens cited). For scale, see Fig. 19.



FIGURE 21. *Eriopsis sprucei* Rehb.f. Drawing by G. C. K. Dunsterville based on his collection 661 (reproduced from a photostatic copy of his drawing at AMES).

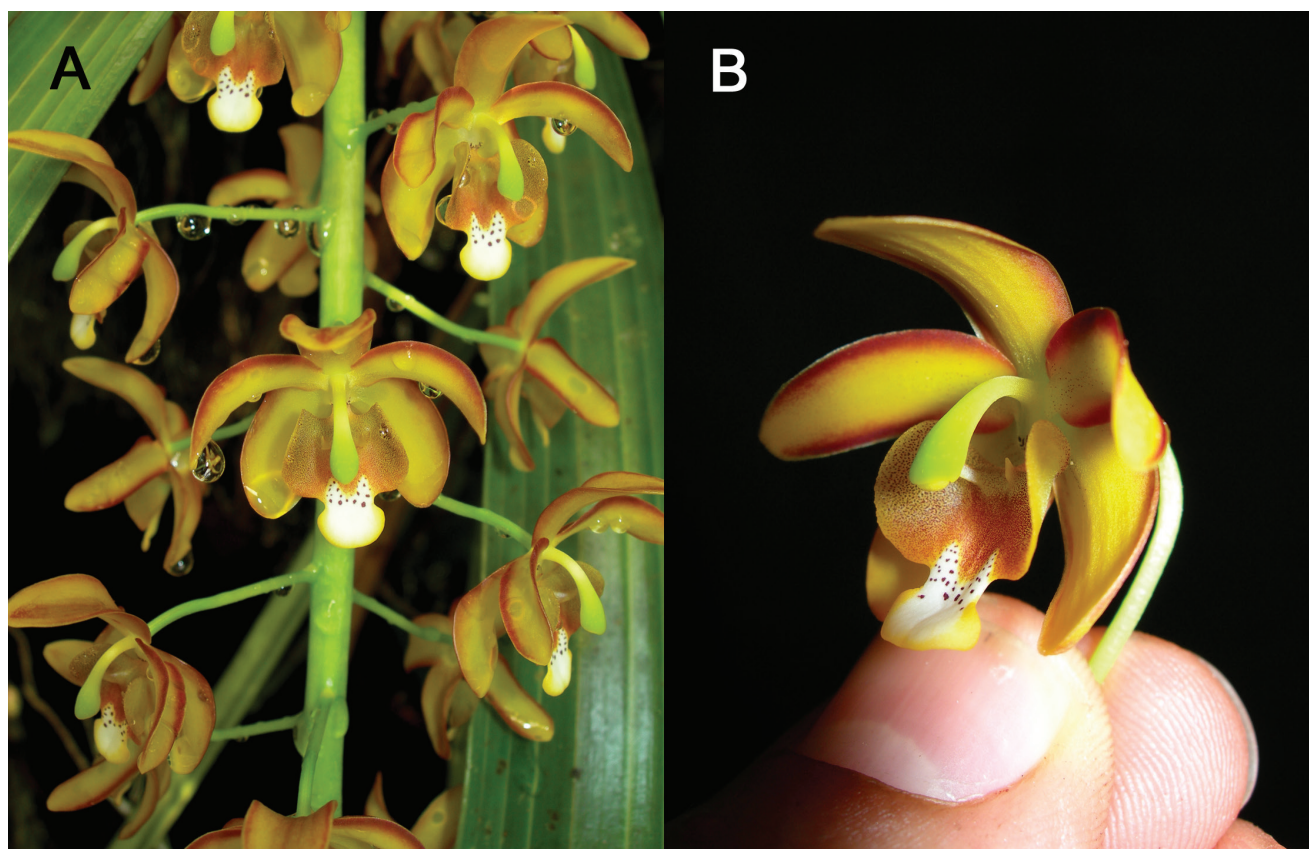


FIGURE 22. *Eriopsis sprucei* Rchb.f. GAR-G plate. **A**, detail of inflorescence; **B**, close-up of flower. Photographs by G. A. Romero-González based on Romero *et al.* 3566 (see specimens cited).

There are two sheets in the Reichenbach herbarium with material referable to *E. sceptrum* (W [Reichenbach 37988 and 37989]). Here we designate as lectotype Reichenbach 37988, which includes Warszewicz's original drawing (cited by Lindley in his description of *E. altissima*), three flowers in a packet, and a drawing of the labellum by Reichenbach f. (Fig. 16). The second sheet (i.e., Reichenbach 37989) has no annotations; it is impossible to determine whether this plant material (two inflorescences) and a drawing, were unambiguously part of the original material that Warszewicz brought to Hamburg from London and ultimately from Peru.

The isotype at K (ex Herbarium Lindley) is no doubt part of the original material that Warszewicz brought from Peru. In addition, There is a sheet at G bearing an inflorescence with four flowers and a label, written unquestionably by Reichenbach f., with the following note: "*Eriopsis sceptrum* Rb.f. [&] Wrsz., Peru, Warszewicz". This fragment, as indicated above, most likely part of the original collection that Warszewicz brought from Peru, in all probability was sent by Reichenbach f. to Edmond Boissier, with whom the former had an active exchange of correspondence (e.g., Simpson, 1897, regarding *Selenipedium boissierianum* Rchb.f.).

Reichenbach f., when describing *Eriopsis sceptrum*, failed to capture the most obvious difference between his new species and the two previously published (i.e., *E. biloba* in 1847 and *E. rutidobulbon* in 1849), i.e., the shape of the calli and instead, emphasizing primarily the colors of the flowers.

Eriopsis helenae was described based on cultivated material, perhaps accounting for the large pseudobulbs (50–60 cm long) and flowers. Otherwise, the flowers are identical to *E. sceptrum*, as circumscribed here.

Eriopsis sprucei Rchb.f. Ann. Bot. Syst. 6: 663. 1863. TYPE: COLOMBIA OR VENEZUELA. "ad flum. Guiana v. Rio Negro supero ostium fluminis Casiquiare," 1854, R. Spruce 2390 pro parte (Holotype: Reichenbach Orchid. Herb. Nr. 37992, W; Isotypes: BM, BR ex Cogn. [with an annotation by Cogniaux, "Exemplaire figuré in Fl. Bras. Orch. III tab. 109"], K [three specimens, ex Benthham, Hooker, and Lindley herbarium], TCD). (Fig. 21–24).

Synonyms: *Cyrtopodium jauaperiense* [as "yauaperyense"] Barb. Rodr., Vellozia Ed. 2, 128. 1891. TYPE: BRAZIL. Roraima: "as arvores das mattas humidas do rio Yauapary, formando grandes soqueiras", J. Barbosa Rodrigues s.n. (Holotype: presumably lost; Lectotype, designated here, original illustration of *Iconographie des Orchidées du Brésil* at RB [vol. 6: t 252, Fig. F], reproduced in Cogniaux [1901: t. 75, II] and Sprunger [1996, I: 380]).

Eriopsis amazonica Kolan. & Szlach., Ann. Bot. Fennici 51: 26. 2014. TYPE: COLOMBIA. Amazonas: [Rio Caquetá basin], Corregimiento La Pedrera, Resguardo Indígena Comeyafü, Comunidad Angostura, 30 m, 20 July 2010, R. Cámara-Laret, G. Makuna Barasana & A. Carijona 1672 (Holotype: COL, not seen), *syn. nov.*



FIGURE 23. *Eriopsis sprucei* Rchb.f. A particularly large flowering clump. Photograph by R. E. Schultes based on *Schultes & Cabrera 12620* (see specimens cited).

Eponymy: Named after Richard Spruce (1817–1893), the collector of the type specimen.

Distribution: Brazil, Colombia, Ecuador, Peru, and Venezuela. Plants of this species are one of the most common epiphytes found along rivers and flooded forests in black-water tributaries of the upper Orinoco river, the Rio Negro, and the Amazon river basins, after the confluence of the Río Negro, the origin of most herbarium collections examined by the authors. However, it is also known from a few specimens collected in tributaries of the Amazon above its confluence with the Rio Negro, such as in the Caquetá-Japurá, Purus, Napo, and Huallaga river basins.

Other relevant references: Cogniaux (1902), Foldats (1970: 261–264), Dunsterville and Garay (1965: 128, as *E. sceptrum*).

Iconography: Cogniaux, 1902 (t. 75, as *Cyrtopodium yauaperyense*; t. 109, based on the holotype), Foldats (1970: 263), Dunsterville and Garay (1965: 128, 1979: 310, as *E. sceptrum*); Senghas (1993: 1725, Fig. 1638, as *E. sceptrum*); Luz and Franco (2012: 117, as *E. sceptrum*).

Ethnobotany: Mucilage applied to sore gums and mouth—"Makuna = *wa-noó-maka*" (see *Schultes & Cabrera 12620*, a specimen collected in Colombia and cited below, and Schultes, 1977, 1990).

Field characters: Plant epiphytic, robust, often in large clumps, the root mass usually inhabited by ants, flowers yellow suffused with reddish brown, central lobe of the labellum white, cream to yellowish, with reddish brown speckles, with a pleasant, sweet fragrance.

Additional specimens examined: BRAZIL, COLOMBIA OR VENEZUELA. Without locality, *R. Spruce 1790* (P ex Herb. Drake); most likely from the Rio Negro basin, without precise locality, *R. H. Schomburgk s.n.* (K ex Herbarium Lindley). BRAZIL OR COLOMBIA. Without locality, Rio Negro, *Spruce 2390* (K ex Herbarium Hooker). BRAZIL. Amazonas, Rio Negro, Arquipelago Anavilhasnas, Ihas Tres Bocas, 2°37'45"S, 60°48'57"W, epiphyte, sepals and petals yellow fringed with brown, apex of lip white with brown spots, *S. A. Mori, C. Gracie, W. Capraro, J. Mitchell, D. Russell 20397* (NY); flooded riverine forest, epiphyte, large, coarse-keeled leaves, basal floral spike, in bud; buds with purple streaks, 12 June 1990, *S. A. Mori, C. Gracie, H. Betros, S. Hecht, M. van Etten, and F. Wright 21295* (NY). Pará: without any other locality, "Cebolla, q' nasce em cima dos troncos das Arvores, principalm^{te}. das q tem a casca grossa, e sumarenta. Fl. em Maio e Junho", without date, but before 1789, *A. Rodrigues Ferreira s.n.* (P [00392144], as "*E. sceptrum* R.f."). BRAZIL [*Brasiliae borealis*]. Prope San Gabriel da Cachoeira, ad Rio Negro, January–August 1852, *R. Spruce 2390* (K ex Herbarium Hooker). BRAZIL. Acre: Bujarí, Riozinho do Andirá, 9°43'17"S, 68°07'44"W, epífita, cálice laranja com bordas das sépalas avermelhadas, corola iden calice, labelo laranja avermelhado con pontos marrom, 20 December 2008, *F. Obermüller, E. C. Oliveira, D. Martins, D.B. Miranda, J. P. Asfury 436* (RB). Amazonas: Rio Negro, Manauáca supra & San Gabriel, *R. Spruce 2390* (P); Rio Negro, Igapó, from Manauáca upward, *R. Spruce 2390* (K ex Benth.; Reichenbach Orchid. Herb. Nr. 25907, W); Rio Negro below S. Gabriel, *Spruce 2390* (K Lindley

with drawing of labellum and column); Rio Negro basin, Rio Dimití, showy yellow flowers, 12–19 May 1948, *R. E. Schultes & F. López 9947* (AMES [four specimens]); upper Rio Negro, Cocuí, epiphyte, flowers showy, yellow, 9 May 1948, *R. E. Schultes & F. López 9997* (AMES); [Rio Negro basin], Rio Cuieiras, 50 km upstream, near farm of Sr. Nemerio, Igapó, epiphyte, peduncle green, petals yellow with brown periphery, androphore with white bee guides distally, speckled yellow proximally, lovely aroma, 9 April 1974, *D. G. Campbell, J. C. Ongley & J. F. Ramos P21975* (AMES, K, MO, NY). COLOMBIA. Vaupés: Río Guainía basin, Río Naquieni, vicinity of Cerro Monachí, 17 June 1948, *R. E. Schultes & F. López 10035A* (AMES [two specimens]); Río Apaporis, entre el río Pacoa y el río Kananarí, 250 m, 17 June 1951, *R. E. Schultes & I. Cabrera 12620* (AMES [six specimens, one [AMES 68216] including the photograph shown in Fig. 23, also reproduced in Schultes, 1977]); ECUADOR. Napo: Laguna Cuyabeno, epífita sobre árbol de leguminosa, flore[s] amarillas con bordes café, columna verde amarillenta y puntos morados en el labelum, 7 July 1980, *J. Jaramillo & F. Coello 2873* (AAU); same locality, inundated tropical rain forest near Palma Roja in Laguna Grande, 0°01'N, 76°11'W, 265 m, epiphyte on *Macrolobium acaciifolium*, flowers yellow, 6 April 1989, *H. Balslev, R. Valencia & G. Paz y Miño 84855* (MO, NY); same locality, Laguna Grande, tropical rainforest, 0°0'S, 76°1'W, 265 m, epiphyte, collected on *Macrolobium*, 15 May–25 July 1988, *I. Nielsen 76166* (MO). PERU. Loreto: Mishuyacu, near Iquitos, 100 m, in forest, flowers brown-yellow, May–June 1930, *G. Klug 1351* (AMES); San Martín: Zepelacio, near Moyobamba, mountain forest, 1,100 m, epiphyte, flowers brown yellow, green, and white, June 1934, *G. Klug 3678* (AMES, with a watercolor of a flower, Fig. 24). COLOMBIA OR VENEZUELA. *Secus fl. Guainiam, ad arbores, frequens* [the same species is common on Uaupés], Maio [18]54,



FIGURE 24. *Eriopsis sprucei* Rehb.f. Watercolor accompanying Klug 3678 (from the original at AMES; see specimens cited).

R. Spruce 2390 (K ex Herbarium Benthani; K ex Herbarium Lindley, with drawing of labellum). VENEZUELA. Amazonas: Municipio Autónomo Alto Orinoco, caño Tama-Tama (a black-water caño on right bank of río Orinoco just above Tama-Tama), epiphyte, abundant, in large clumps, tepals old gold margined maroon, lip flesh colored, the apical lobe with with maroon speckling, 23 June 1959, *J. J. Wurdack & L. S. Adderley* 43143 (AMES); Municipio Autónomo Maroa, bosque rivereno del caño Mesaque [Atacavi river and ultimately Atabapo river basin], 21 July 2006, hierba epífita, en grandes macollas, flores amarillas, labelo con puntos rojos tenués en el ápice del lobulo central, *G. A. Romero, C. Gómez, G. Gerlach & O. Gómez* 3566 (TFAV). Municipio Autónomo Río Negro, middle part of río Baria, forest around small laja, 1°05'N, 66°25'W, 80 m, margin of flooded forest, epiphyte, in large clumps, common, perianth dull yellow with redish-brown margin, lower lip pale yellow with maroon dots, upper part of lip dull yellowish-brown; column yellow in the lower half, green in the upper half, the pollinia yellow, 29 June 1984, *G. Davidse & J. S. Miller* 26845 (MO, NY, VEN). Bolívar: Municipio Autónomo Gran Sabana, río Icabarú [Caroní river basin], fairly low on relatively open tree by side of rapids, 1961, *G. C. K. Dunsterville* 661 (copy of drawing at AMES). Río Acanán, Guarumo, 5 km W of Amarua-tepuil, 0 to 1 km N of base camp at Guadequen, forest (15 to 20 m trees), forest edge and savanna, 5°56'N, 62°17'W, 470 m, epiphyte, spine-like projecting on roots erect, 15 May 1986, *R. Liesner & B. Holst* 20890 (MO, VEN).

Spruce assigned his number 2390 to many of the collections of this species he gathered during his travels along the Río Negro in Brazil, Colombia, and Venezuela, and then along the Guainía river (that is, the same watercourse above the confluence of the Río Negro with the Casiquiare). Nonetheless, the holotype cited above, designated by Reichenbach f., clearly states that it was collected along the Guainía river (“*ad flum. Guiania v. Rio Negro supero ostium fluminis Casiquiare*”, that is, “at the Guainía river or the Río Negro above the mouth of the Casiquiare river”). Spruce’s collections from other locations bearing this number, no doubt referable to *E. sprucei*, nonetheless should be excluded from the protologue (Romero-González, 2005).

Conservation assessment: According to IUCN (2010), *Eriopsis sprucei* would be considered a Least Concern (LC) species because it occurs over a large surface (“Extent of Occurrence”), ca. 2,300,000 km². However, based on the Area of Occupancy of 68 km² (cell width of 2 km) it would rate as Endangered (EN). *Eriopsis sprucei* does have a large area of distribution, growing usually as an epiphyte on thick branches of high trees along the many rivers of the lowlands in the NW Amazonian Basin in Venezuela, Colombia, Ecuador, Peru, and Brazil. As with many other epiphytes with similar growing requirements, it occurs as isolated, yet frequently massive, individuals.

Although the Amazon Basin has been disturbed to a great extent, it still has large tracts of pristine forests. Moreover, often when forests are cut, tall trees are left standing along the rivers, affording suitable habitat for this species.

We estimate that *E. sprucei* is still quite common in its distribution range.

For a taxon with such an extensive distribution, *Eriopsis sprucei* is known from relatively few specimens, most likely a collection artifact: the species is difficult to find in flower and even harder to collect because it often grows on high branches and it is usually associated with nasty ants (see text below). We assume there is little reason for concern regarding the conservation status of *Eriopsis sprucei*.

The Guainía river, in its lower course (below 2°47'19"N, 67°51' and down to its confluence with the Casiquiare), marks the border between Colombia and Venezuela (the eastern side of the river is Venezuela; the western side Colombia:” see República de Colombia, 1934: 21). Spruce (based on Huber and Wurdack, 1984, and on copies of his notes at AMES, originally at K), after leaving San Carlos de Río Negro (currently in Venezuela) on May 26, 1854, most likely reached the Guainía river the same day or the next one at the latest; he reached Tiriquin (currently in Venezuela) on May 29, San Miguel [de Davipe] (currently in Venezuela) on June 2, Tomo (currently in Colombia) on June 5, Maroa (currently in Venezuela) on May 9, and entered Caño Pimichín (currently in Venezuela) on June 10; there is absolutely no way to determine where he collected the holotype.

The three senior authors of this essay have traveled most if not all of this section of the Guainía river where the type probably was collected and *Eriopsis sprucei* is by far the most common orchid on both sides of the stream.

Eriopsis sprucei had lately been treated as a synonym of *E. sceptrum* (Schweinfurth, 1967; Dunsterville and Garay, 1965: 128; Romero-González, 2003), but careful examination of the material at hand clearly indicates that they are two separate species (see discussion under *E. sceptrum*). This erroneous circumscription could have been avoided had we read the following text that the authors located only recently:

“This interesting species [*E. sprucei*] was discovered in 1854, in the neighborhood of the Río Negro of Amazona[s], or Solimoes, by the eminent collector, Dr. Spruce, whose No. 2390 it is. I named and described it in *Walper’s Annales*, vi., 663, and now, after a lapse of nearly thirty years since the discovery, I have it alive. Mr. E. Harvey, 12, Riversdale Road, Aigburth, Liverpool, has kindly sent me bulbs, leaves, and inflorescence, telling me that it came from the Amazon territory. The cylindrical, strong, green bulbs are nearly even, having few linear superficial furrows, and the scars of the leaves are aculeate from the remains of the vascular bundles, as in *Lycaste*, &c. The long cuneate oblong-ligulate acute leaves are of a thicker substance than those of a common *Lycaste* and *Zygopetalum*. The raceme is long, cylindrical; the flowers equal in size to those of *Eriopsis biloba*, Lindl.; the sepals and petals are lemon coloured, and the petals have red borders.

The side laciniae of the lip are nearly circular, the mid-lacinia has broad stalk, and a transverse elliptic blade. Two fleshy retrorse acute horns stand in the middle of the disc, quite an unusual ornament for an *Eriopsis*, when the nearest ally, *Eriopsis sceptrum*, has two membranous, triangular, no doubt resupinate blades, standing more towards the base. It is exceedingly distinct in this, not to speak of the different bulbs. The side laciniae are whitish, covered over by innumerable red minute spots. The central part between the side laciniae, the disc, is white, like the two horns, which have an apiculus below their point in front, and mauve spots at the base. The central laciniae is lemon-coloured, with mauve spots on the base of the stalk. The trigonous curved column is lemon-coloured, and has a few purple spots on the anterior part of the base. It was an extraordinary satisfaction for me to see this fine plant alive—a pleasure for a botanist to name such [a] distinct species” (Reichenbach f., 1884).

A specimen in the Lindley Herbarium collected by Robert H. Schomburgk (microfiche 247/14; IDC, 1987), as *Eriopsis schomburgkii* is no doubt referable to *Eriopsis sprucei*. We presume it was collected while the collector was descending the Río Negro, in current Brazil, Colombia, or Venezuela, during his trip from La Esmeralda to Fort San Joaquim (Schomburgk, 1940).

Luz and Franco (2012: 117) showed typical plants of *Eriopsis sprucei* (as *E. sceptrum*) that reportedly grew, unlike any other plants of this species observed by the authors, on rocks in the forest (“Cresce sobre rochas em áreas de mata”).

Dunsterville, in unpublished notes accompanying his drawing 661 at AMES, indicated that “... the vertical secondary (aerial) roots... not shown on the drawing... make such a deep dense mat that they practically conceal the pseudobulbs”.

It is precisely in this dense root mats where ants make their home, with which the authors are “painfully” familiar: collecting herbarium samples of this species can be as bad as collecting, for the same reason (the numerous ant bites or stings one can get), samples of species of *Coryanthes* Hook., *Gongora* Ruiz & Pavón, or other genera the plants of which house ants in their roots.

Eriopsis wercklei Schltr., Repert. Spec. Nov. Regni Veg. 16: 447. 1920. TYPE: COSTA RICA. [San José:] Corillo [Carillo], 300 m, *Karl [Carl] Wercklé s.n.* (Holotype: B, destroyed; Lectotype, designated by Pupulin, 2010, tracing of Schlechter’s drawing of the holotype, AMES 24701). (Fig. 25–29).

Usage synonym: *E. werckleyi* Schltr., Native Orchids of Belize 1995: 61.

Etymology: Named after the collector, *Karl [Carl] Wercklé* (1860–1924).

Distribution: Atlantic slopes of Costa Rica and Panama, and possibly the Colombian Chocó.

Other relevant references: Standley (1937: 230), Lankester (1924, 1943), Charpentier (1973), Horich (1982), Rodríguez Caballero et al. (1986: 170), Bogarin et al. (2014, as *E. biloba*).

Iconography: Charpentier (1973); Rodríguez Caballero et al. (1986: 171, as *E. biloba*); Dressler (1993: 170, as *E. rutidobulbon*), Dodson (2005: 310, 312–313, photography by F. Pupulin, as *E. biloba*), Pupulin (2010: Fig. 11C therein; Fig. 25 herein).

Field characters: Plants epiphytic, pseudobulbs semi-spherical to pyriform, flowers similar in size and color to those of *E. biloba*, apparently fragrant, “clove scented”, according to *McPherson 8484*.

Additional specimens examined: COLOMBIA. Without any other locality, plant provided by P. Taggesell, flowering at the Botanischer Garten Heidelberg, *sub H.G. Seeger O-21507*, flowers in alcohol sub 254460 (HEID; fragments at AMES). COSTA RICA. Without collecting data, flowered in cultivation at Jardín Botánico Lankester, 1 April 2003, *F. Pupulin 4578* (UC). [Cártago]: in deep jungle near Pavones, not far (to the north) from Turrialba [vía de Turrialba a Siquirres, a unos 4–5 km de Turrialba], rainforests of Costa Rica, sporadic on tall jungle tree tops, 700 m, endemic and very rare, “U.C. Bot. Gdn. Acc. No. 58.421”, *C. K. Horich s.n.* (AMES, P). Heredia o Limón: río Sucio, 300 m, on trees, 19 March 1882, *F. C. Lehmann 1253* (G [two specimens]). See additional localities in Costa Rica in Lankester (1943), Charpentier (1973), Rodríguez Caballero et al. (1986: 170), and Dodson (2005: 312–313). PANAMA. Provincia de Panama: Cerro Jefe region, Cerro Jefe, epiphytic at 6 m, petals red, ovary maroon-brown with green stripes; inflorescence from below wrinkled pseudobulb, 15 April 1971, *T. B. Croat 14424* (MO); same locality, flat before first Y in the road, 800–1,000 m, 23 February 1977, *J. P. Folsom, R. Lantz & J. Atwood 1842* (MO); same locality, 4 mi [ca. 14 km] past Cerro Azul on road to Altos Pacora, cloud forest, 2800 ft [ca. 940 m], epiphyte, flowers deep maroon outside, yellower inside, column maroon outside, green inside, 19 February 1981, *K. Sytsma & W. G. D’Arcy 3716* (MO); same locality, along road toward río San Cristobal, in Chagras drainage, forested slopes, 9°15'N, 79°30'W, epiphytic, perianth yellow with brown apex yellow and white with purple spots, column green with deep red at base, flowers clove-scented, 24 February 1986, *G. McPherson 8484* (MO); same general locality, Chilibre, Altos de Cerro Azul, Calle Andora, sendero El Cantar, 9°13'51.6"N, 79°24'11.0"W, 839 m, bosque muy húmedo tropical, epífita en bosque secundario, 13 Marzo 2015, *D. Bogarín J & L. Harrison 11576* (flowers in alcohol, UCH).

Conservation assessment: According to the IUCN (2010), *Eriopsis wercklei* would be considered a Near Threatened (NT) species because it occurs over a relatively large surface area (“Extent of Occurrence”) of 30,800 km². Based upon an Area of Occupancy of 44 km² (cell width of 2 km) it is rated as Endangered (EN). However, about half of the minimum-area polygon lies over the Atlantic Ocean, thus rendering the actual extent of occurrence to be of less of 16,000 km². Such an “Extent of Occurrence” would render the species “Vulnerable” (VU) which would be a much more realistic assessment.



FIGURE 25. *Eriopsis wercklei* Schltr. Drawing of the type, at AMES, proposed as lectotype by Pupulin (2010).

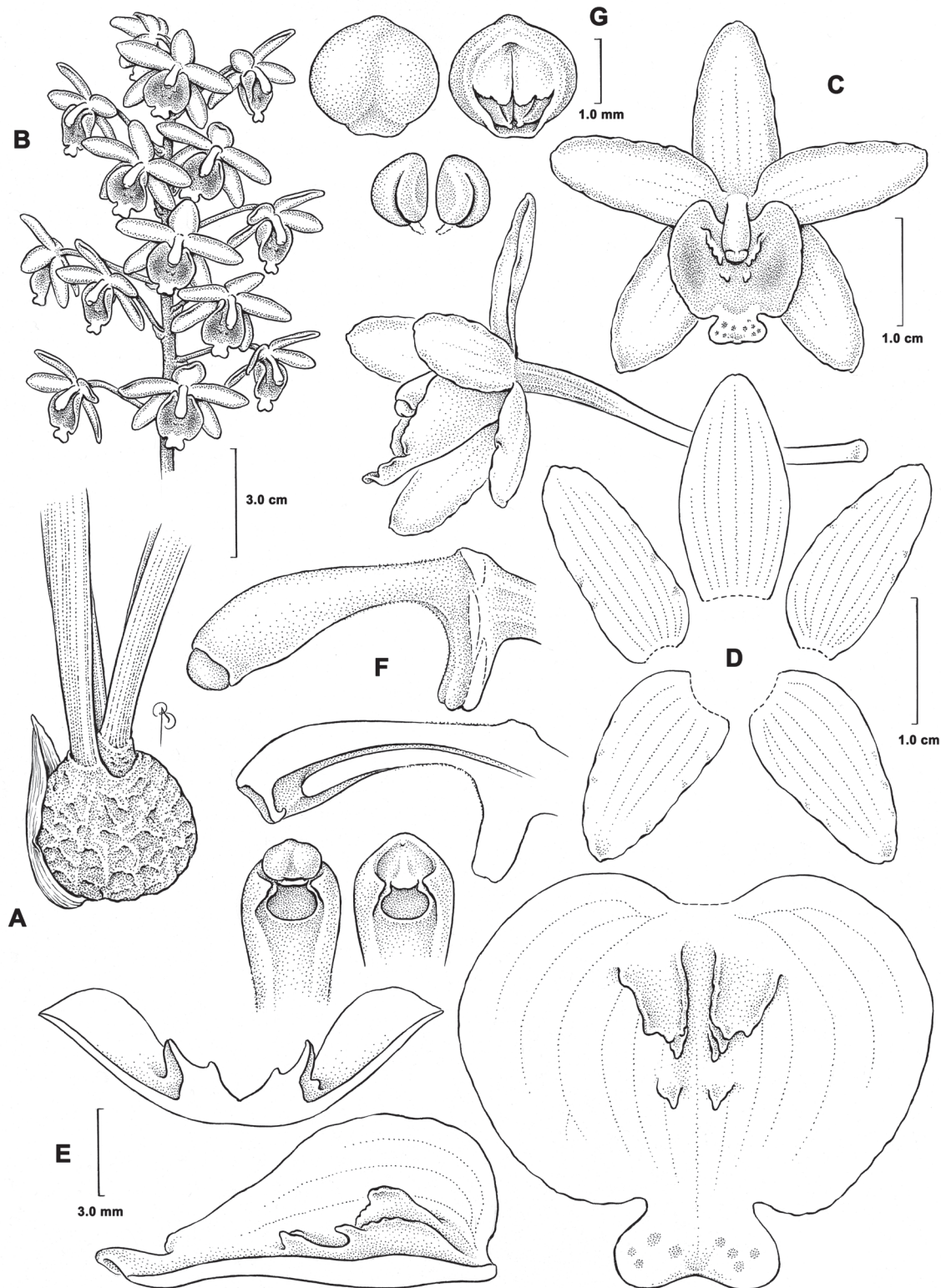


FIGURE 26. *Eriopsis wercklei* Schltr. **A**, close-up of young pseudobulb; **B**, detail of Inflorescence; **C**, flower, front and side view; **D**, sepals and petals; **E**, details of the labellum; **F**, details of the column; **G**, anther and pollinia (the viscidium absent and most likely dissolved by the alcohol solution). Drawing by B. Angell based on hydrated flowers of *Horich s.n.* (AMES; see specimens cited), except for A, which is based on a photograph by G. A. Romero-González taken at Jardín Botánico Lankester in 2005.



FIGURE 27. *Eriopsis wercklei* Schltr. A, inflorescence; B, close-up of flowers. © Photographs courtesy of F. Pupulin.

Eriopsis wercklei occurs as an epiphyte on thick trunks and branches of high trees. It is currently known from two main areas. It has been collected at 6–7 localities at elevations of 700–1,500 m, in extremely humid tropical rain and cloud forests in and around the Central Valley of Costa Rica, where it is apparently rare and poorly collected, although some of the localities lie within or near the boundaries of several of the national parks.

The second set of localities are centered around Cerro Jefe and Cerro Azul in central Panama. These localities are located approximately 450 km east of the ones in Costa Rica. In this area, the species is known from about the same kind of ecosystems and elevations as in Costa Rica but has been reported at even lower elevations down to almost sea level. Here the species is at least locally common and has been documented from several collections and photographs. The Cerro Jefe-Cerro Azul general area is mostly included within the Chagrés National Park (INRENARE, 1987), thus providing protection for these populations. Whether the species occurs in the intervening areas in eastern Costa Rica and western Panama, mainly along the Talamanca range, is currently unknown at this time, but it is likely to occur in this region. It seems to be locally rare in the Central Valley of

Costa Rica, with populations consisting of widely dispersed individuals growing high on the phorophytes. Considering that *Eriopsis wercklei* occurs in two widely separated distributional cores and that at least several populations occur within protected areas, we assume that at this time there is little reason for concern regarding the conservation status of *Eriopsis wercklei*.

This species traditionally has been placed in the synonymy of *E. biloba* (e.g., Schweinfurth, 1944, 1960; Dunsterville and Garay, 1965: 126; Foldats, 1970) or *E. rutidobulbon* (Dressler, 2003), but it is easily distinguished, from the former, by the epiphytic habit and the shape of the pseudobulbs, and from the latter, by the pattern of the calli on the labellum.

Lankester (1924, 1943), described the roots of this species as “sometimes densely set with sharp-pointed tips which need care on the part of the collector”.

In a color plate by José Manuel Martínez (DIV. III A-572), part of the “Dibujos de la Real Expedición Botánica del Nuevo Reino de Granada (1783–1816), dirigida por José Celestino Mutis” (Real Jardín Botánico-CSIC, 2015), identified as a peloric form of *Eriopsis* sp. (according to annotations by C. Schweinfurth), the pseudobulb



FIGURE 28. *Eriopsis wercklei* Schltr. from a plant flowering at at *Jardín Botánico Lankester* in 2013. © Watercolor courtesy of S. Strigari.

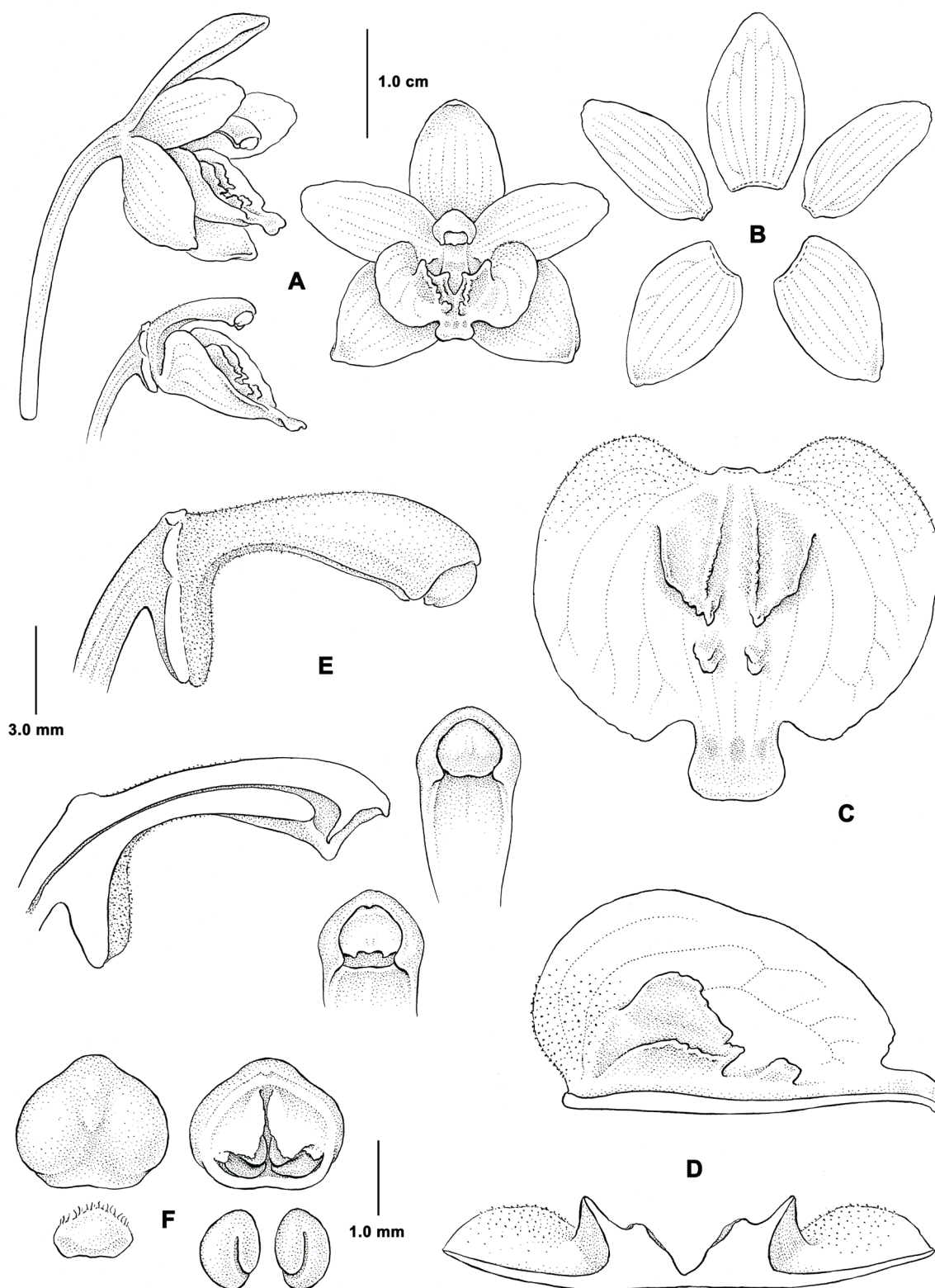


FIGURE 29. *Eriopsis wercklei* Schltr. **A**, views of a flower; **B**, sepals and petals; **C**, labellum from above; **D**, sagittal and transversal views of the labellum; **E**, views of the column; **F**, views of the pollinia and anther. Drawing by B. Angell based on material from Colombia (254460, HEID).

strongly resembles the spherical ones of *E. wercklei*, but one of us (G.G.) is sure this drawing is referable to *Lueddemannia striata* G. Gerlach & M.H. Weber. We also have a collection that flowered at the Botanischer Garten Heidelberg, apparently from Colombia, Chocó, but with no other provenance (Fig. 29). The presence of *E. wercklei* in Colombia should not be discarded.

***Eriopsis* sp. A.** (Fig. 30–31).

Distribution: Found in Colombia (based on the published iconography), Ecuador, Peru, and Bolivia.

Iconography: Ortiz (1991: 181, No. 200, as *E. rutidobulbon*); Dodson (2001: 303, No. 619, as *E. biloba*); Zelenko and Bermúdez (2009: 139, as *E. biloba*).

Field characters: Plants apparently epiphytic, occasionally terrestrial, pseudobulbs conspicuously elongate, flowers similar in color but apparently larger than those of *E. biloba*.

Specimens examined: BOLIVIA. La Paz, Provincia Nor Yungas: entre Chuspipata y Yolosa, rupícola en bosque montano húmedo de Yungas, 28 enero 1983, 1,800 m, R. Vásquez, C. Luer & J. Luer 734 (VASQ, drawing seen). ECUADOR. Provincia Zamora-Chinchi: Nangaritza, Cordillera del Cóndor, parroquia Surmi, comunidad Yawi, cima de la cordillera, bosque primario denso achaparrado

sobre roca de arenisca, suelo bamboso, 4°29'59"S, 78°38'18"W, 1,600 m, epífita, botones florales cafés, 15 june 2005, W. Quizhpe, V. Granda, D. Veintimilla, H. Salas & P. Wampash 1453 (UNL, photograph seen); Cordillera del Cóndor near Tundayme, 03°37'09,7"S 78°27'37,7"W, 1,200 m, 17 January 2004, G. Gerlach s.n. (photographs taken, Fig. 30). PERU. Departamento Junín, Provincia Satipo: 1,700 m, terrestrial, steep rock slopes, 30 July 1987, G. Bennett 3952 (MOL, photograph seen). Tarapoto, Rioja, Jaquire, 2,000 m, collected by W. Rauh (Rauh 53686), 9 September 1980, flowered in cultivation in Botanical Garden Heidelberg (HEID 251563; in spirit).

Conservation assessment: According to the IUCN (2010), *Eriopsis* sp. A. would be considered a Least Concern (LC) species because it occurs over a large surface area ("Extent of Occurrence") of ca. 830,000 km². However, based on the Area of Occupancy of 24 km² (cell width of 2 km) it would rate as Endangered (EN).

Eriopsis sp. A does have a large area of distribution, growing usually as an epiphyte, terrestrial, subterrestrial, or lithophyte on road banks, steep rocky slopes at elevations of 1,200–2,000 m in rain to cloud forests. It is known from northern Bolivia in the Yungas northward into southern Colombia along the eastern slopes of the Andes. Its distributional range overlaps that of *E. sceptrum* and



FIGURE 30. *Eriopsis* species A. Photograph by Charles W. Melton based on the plant flowers of which were shown in Fig. 3, collected in Ecuador, near Zamora, Provincia Zamora-Chinchi, 1,150 m. The flowers were preserved, but no reference as to where was available to the authors at the time this article was published. For scale, the column is ca. 1.0 cm long.



FIGURE 31. *Eriopsis* species A. **A**, inflorescence; **B**, close-up of flowers. Photographs by G. Gerlach based on *Gerlach s.n.* from Ecuador, Provincia Zamora-Chinchipe, Cordillera del Cóndor near Tundayme, 1,200 m.

at this time we cannot establish whether they are sympatric or parapatric along their extensive ranges. Differences in labellum morphology, particularly the callus and apical lobe among other features, may play a role in species isolation because no intermediates are known. This species is seldom seen or collected. However, on account of its large extent of occurrence we assume there is little reason for concern regarding the conservation status of *Eriopsis* sp. A.

This apparently undescribed species has been confused with *Eriopsis rutidobulbon* and *E. biloba* (see iconography above). It can be easily distinguished from the former based on the calli (e.g., Fig. 14 versus 30 herein; also compare the photographs on the following pages of Zelenko and Bermúdez, 2009: 138, lower right corner of page [*E. rutidobulbon*] versus 139 [*E. sp. A*, as *E. biloba*]). It is perhaps more difficult to

distinguish from *E. biloba*. *In vivo*, however, in *Eriopsis* sp. A the lateral lobes of the labellum appear to be obtriangular, due to their folding toward the column, more pronounced toward their base, whereas they appear rather orbicular in *E. biloba* (e.g., Fig. 10 versus 30–31 herein), due to their overall uniform folding toward the column.

An illustration of *Bennett 3952* at MOL (images of which were kindly provided by D. Trujillo, see specimens cited above), appeared in Bennett and Christenson (1998). Vásquez sent details of his collection, including a copy of his drawing, to one of us (G.G.). Both collections are hereby referred to this undescribed species. Otherwise, the authors have not been able to examine herbarium specimens of this puzzling entity and, at this point, we prefer to refer it to an unidentified, undescribed species.

OBSCURE SPECIES

Eriopsis mesae Kraenzl., Notizbl. Bot. Gart. Mus. Berlin-Dahlem 7, No. 69: 427. 1920. TYPE: COLOMBIA. Antioquia: bei la Mesa in schattigen Wäldern [near La Mesa in shaded forests], 1,800 m, G. Kalbreyer 1677 (Holotype: B: destroyed).

Etymology: Named after the type locality.

Kränzlin described this species from material that Reichenbach f. had borrowed from Berlin-Dahlem (B), retained at W while his herbarium was in storage until it was opened in 1914, subsequently returned to B (Kränzlin,

1920), and destroyed by fire in a bombing raid on the night of 1–2 March 1943 (Merrill, 1943; see also Ames, 1944). The protologue describes a plant that, given the size of the flowers (one of the largest within the genus), their color description (“*Kontrastfarben dunkel violettbraun gegen grün*”; “contrasting colors dark-violet-brown against green”) and particularly the origin of the plant, is most likely *E. rutidobulbon*. Kränzlin (1920), however, described a callus unlike any other the authors never have observed in the herbarium or the available iconography: after describing the typical basal callus, with two sets of

lamellae (“*lamellae medio in disco utrinque 2, laterales cum labello ipso contiguae, centrales liberae, erectae, antice sensim decrescentes*”), Kränzlin described a “... *lamellula mediana interposita multo brevior et humilior*” that, as mentioned, above, never has been observed by the authors. Given the loss of the type of the species, the absence of any matching live or herbarium material or iconography, and, most important of all, because of the history of Kränzlin’s “misfirings” (e.g., Garay and Romero-González, 1998), the authors prefer to treat this entity as an obscure species.

ACCOUNT OF ALL DESCRIBED SPECIES

In alphabetical order, accepted species in **bold**, *italics*.

Cyrtopodium jauaperiense Barb. Rodr.

[as “*yauaperyense*”] = *E. sprucei* Rchb.f.

Eriopsis altissima Lindl. = *E. sceptrum* Rchb.f. & Warsz.

E. amazonica Kolan. & Szlach. = *E. sprucei*

***Eriopsis biloba* Lindl.**

E. colombiana Schltr. = *E. rutidobulbon* Hook.

E. helenae Kraenzl. = *E. sceptrum* Rchb.f. & Warsz.

Eriopsis longibulbosa Ames & C. Schweinf. = *E. biloba*

E. mesae Kraenzl. = obscure species, possibly referable to *E. rutidobulbon*

E. rutidobulbon Hook.

E. sceptrum Rchb.f. & Warsz.

E. schomburgkii (Rchb.f.) Rchb.f. = *E. biloba*

E. sprucei Rchb.f.

Pseuderisopsis schomburgkii Rchb.f. = *Eriopsis biloba*

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CARDAMINE XINFENII (BRASSICACEAE), A NEW SPECIES FROM SICHUAN (CHINA)

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Abstract. *Cardamine xinfenii*, a new species from southern Sichuan Province, is described and illustrated. It does not seem to be closely related to any of the known Asian species of the genus. It is easily distinguished by the scapose habit and by having slender stolons, 7–9-foliolate, strongly toothed basal leaves, spreading floral parts, and filiform, non-auriculate cauline leaves (bracts) subtending the base of lowermost 1 or 2 pedicels of the raceme.

Keywords: Brassicaceae, *Cardamine*, China, Cruciferae, Sichuan.

During my 2014 visit to the main herbaria in Sichuan Province (China), CDBI and SZ, to work on the treatment of Brassicaceae (Cruciferae) for the Flora of Pan-Himalayas, the following new species of *Cardamine* L. was discovered. Unfortunately, no other collections of the species were found among the holdings of these and other Chinese herbaria. Although the type locality of this novelty falls outside the boundaries of that flora, two other species, *C. hongdeyuana* Al-Shehbaz and *C. pseudotrifoliolata* Al-Shehbaz, have recently been described from Xizang (Al-Shehbaz, 2015a, b).

Cardamine xinfenii Al-Shehbaz, *sp. nov.* TYPE: China, [South] Sichuan, Leibo Xian, Xining, 214 farm (forestry farm), moist rocky areas, 1,250 m, 16 May 1983, *S. H. Zhao & J. B. Shi 117125* (Holotype: CDBI-10034702; Isotypes: SZ 00172780, SZ 00172784). Fig. 1.

Plants perennial, scapose, with long, slender stolon and no bulbils. *Stems* 15–30 cm, few branched above middle, sparsely pilose proximally, glabrous distally. *Basal leaves* 7–9-foliolate; petiole 3–7 cm, pilose, slender, not expanded at base; terminal leaflet suborbicular to broadly ovate, 6–17 x 7–20 mm, slightly wider than long, pilose, apex acute, margin 9–11-toothed, with the proximal teeth smallest, most teeth terminated in a mucro 0.1–0.3 mm, base truncate to shallowly cordate; lateral leaflets ovate, 5–8 x 3–5 mm, 1–3-toothed on each side, cuneate to subobtusate at base, apical tooth acute; cauline leaves few, filiform, entire, glabrous, 5–10 x 0.2–0.3 mm, reduced to bracts subtending lowermost pedicels, not auriculate at base. *Raceme* 6–18-flowered, lowermost 1 or 2 flowers bracteate; rachis straight, glabrous; lowermost flowering pedicels divaricate, slender 1–2 cm, glabrous. *Sepals* green, oblong, 2.5–3 mm, spreading, glabrous; petals pink, narrowly obovate, not

clawed, 4–4.5 mm x 2.5–3 mm, spreading, apex obtuse; stamens subequal, spreading; filament 2.5–3 mm; anthers yellowish brown, oblong, ca. 1 mm; median nectaries absent; lateral nectaries oblong, to 0.5 mm; style in developing fruits 1–2 mm. *Mature fruits* and seeds unknown.

Eponymy: This novelty is named after Dr. Gao Xinfen, director of the herbarium CDBI, Chengdu Institute of Biology.

Distribution: China (south Sichuan). Known only from the type collection.

IUCN Red List Category: *Cardamine xinfenii* is only known from the type collection and is therefore given the assessment of Data Deficient (DD) according to the IUCN (2001) criteria.

Cardamine xinfenii does not seem to be closely related to any known Asian species of the genus. It is readily distinguished by the scapose habit and by having slender stolons, 7–9-foliolate, strongly toothed basal leaves, spreading floral parts, and filiform, non-auriculate cauline leaves (bracts) subtending the base of lowermost 1 or 2 pedicels. Two Himalayan species, *C. lihengeana* Al-Shehbaz and *C. pseudotrifoliolata* Al-Shehbaz, have bracteate racemes, but these have the inflorescence bracteate throughout, are rhizomatous (vs. stoloniferous), and the former has simple (vs. 7–9-foliolate) leaves, and the latter has trifoliolate cauline leaves and auriculate simple bracts. From the stoloniferous and scapose *C. scaposa* Franch. and *C. fargesiana* Al-Shehbaz, *C. xinfenii* is easily distinguished by having compound (vs. simple) basal leaves. Furthermore, the presence in *C. xinfenii* of flowers with spreading sepals, petals, and stamens is a rather rare feature and should readily distinguish it from the vast majority of the 55 species of *Cardamine* that grow in China and the Himalayan Mountains.

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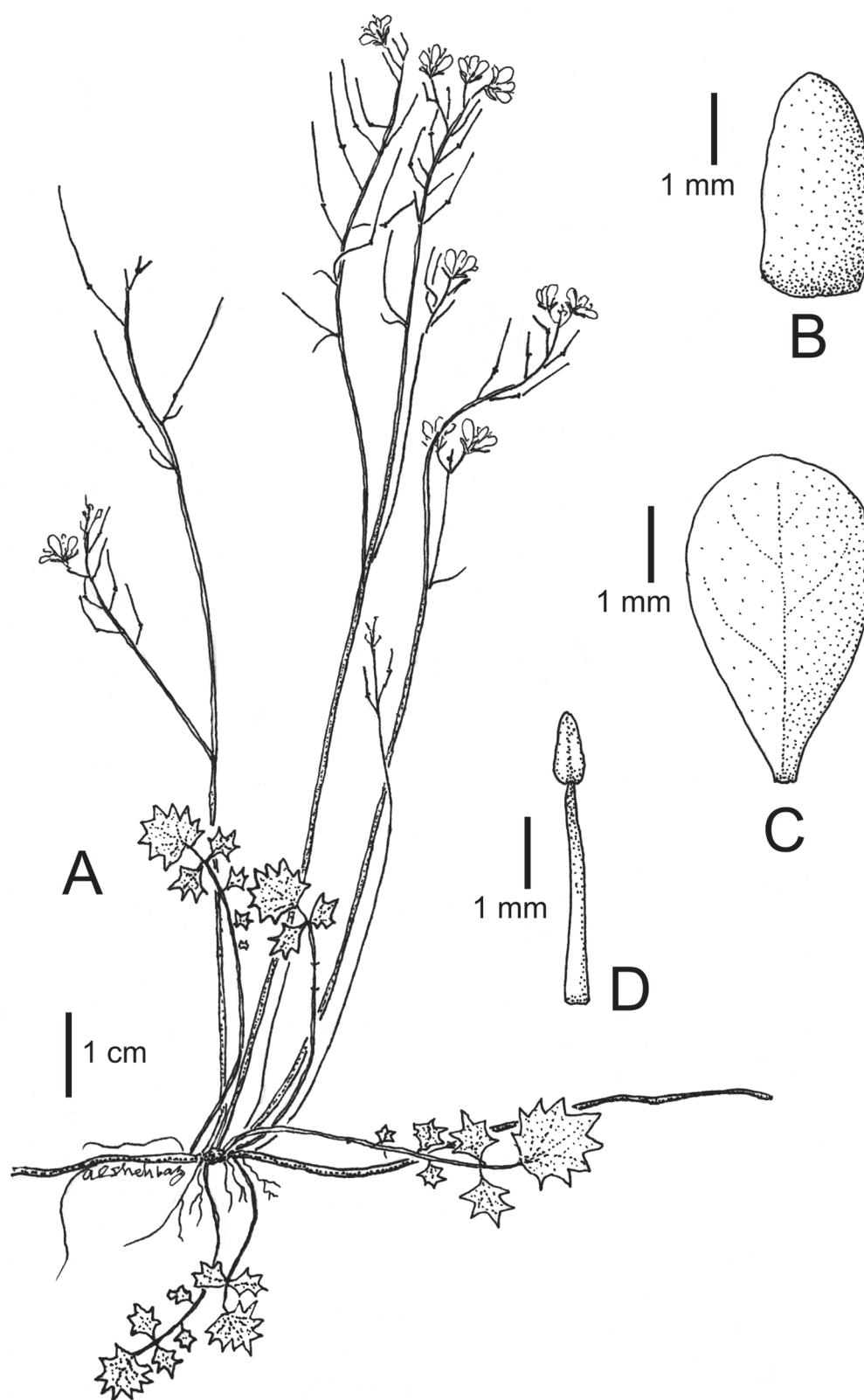


FIGURE 1. *Cardamine xinfenii* Al-Shehbaz. A, plant; B, sepal; C, petal; D, stamen. Drawn by Al-Shehbaz from the holotype, S. H. Zhao & J. B. Shi 117125 (CDBI-10034702).

A NEW SPECIES OF *FREZIERA* (PENTAPHYLLACACEAE) FROM THE VENEZUELAN ANDES

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Abstract. *Freziera guaramacalana*, a new species from the Venezuelan Andes, is described and illustrated, and its morphological relationships with allied species are discussed.

Resumen. Se describe e ilustra *Freziera guaramacalana*, una especie nueva de los Andes Venezolanos, y se discute su relación morfológica con las especies afines.

Keywords: Andes, Guaramacal, Theaceae, Venezuela

Freziera Willd. is a Neotropical genus of functionally dioecious trees or shrubs with alternate leaves and lenticellate, often pubescent twigs sometimes organized in a zig-zag fashion. The genus is distributed from Mexico to Bolivia, including the Guayana Highlands, and the West Indies (Weitzman, 1987). Species of *Freziera* mainly occur in cloud forest (1000–3200 m) and sometimes in páramos, although some species may have a wider altitudinal range, from near sea level to middle elevation forests at about 1,800 m (Weitzman, 1987). Nine species are known to date from Venezuela. Four species are present in montane forests in the Andes of Mérida to the Cordillera de la Costa (*F. candicans* Tul., *F. chrysophylla* Bonpl., *F. grisebachii* Krug & Urb., and *F. tomentosa* (Ruiz & Pav.) Tul.); three species are found in montane forests of the Venezuelan Guayana (*F. calophylla* Triana & Planch., in Amazonas and *F. carinata* A. L. Weitzman and *F. roraimensis* Tul., in Bolívar and Amazonas); and two species are known only from the Andes (*F. bonplandiana* Tul. in Táchira and *F. karsteniana* (Szyszyl.) Kobuski in Mérida) (Berry and Weitzman, 2005, 2008).

Berry and Weitzman (2008) suggest there may be a third species of *Freziera* in forest areas on slopes of Roraima-Tepui in the Venezuelan Guayana (*F. roraimensis* Tul.) which has been also cited by Berry & Weitzman (2007); however its presence there has still not been confirmed and the species is known only from the type collection, which does not mention a specific locality.

There is an additional Venezuelan species of *Freziera*, which is apparently very common in forests and páramos of the Andes in Mérida, Lara and Trujillo. Weitzman (1987) originally identified it as a new species, *F. serrata* A. L. Weitzman *ined.* It has since been cited by that name in different floristic and vegetation studies in Venezuela (Dorr

et al., 2000; Hokche et al., 2008; Cuello and Cleef, 2009), although it has not been validly published. Here, we validly describe this species as *F. guaramacalana* and expand on Weitzman's observations.

Freziera guaramacalana D. Santam. & Cuello, *sp. nov.* TYPE: VENEZUELA. Trujillo: Boconó, Páramo Guaramacal, 17 km beyond jct. with hwy, NE of Boconó, 09°13'N, 70°13'W, 2,720 m, 13 March 1984 (♂ fl), J. L. Luteyn & E. Cotton 9636 (Holotype: PORT [31093]; Isotypes: GH, NY [00353865], PORT [34933]). Fig. 1.

Freziera guaramacalana is distinguished by its densely lenticellate twigs; long, pubescent winged petioles; leaves with a conspicuously serrate margin and a pubescent abaxial surface. It differs from its closest related species (*F. bonplandiana* Tul.), by having the leaf basis rounded to sub-truncate and not revolute, instead of cuneate and revolute; the leaf margins are serrate instead of sinuate and by having indument only on the central portion of the abaxial surface, instead of on both leaf surfaces. Also, the new species has pubescent and longer ([1.0–] 1.5–2.6 cm) petioles against the glabrous and shorter 0.3–0.6 [–1.1] petioles in *F. bonplandiana*.

Trees or shrubs 2.5–12 m × 15–20 cm; trunk with the external bark blackish-brown; mature branches cylindrical, the outer bark grayish, internal bark reddish or whitish, glabrous; twigs cylindrical or flattened, the bark reddish-brown to dark brown, densely villous, trichomes reddish-brown or pale brown, ca. 0.08–0.1 mm long, sparsely or densely lenticellate, the lenticels whitish to grayish, elliptical or rounded. *Terminal bud* conduplicate-involute (2.8–) 4.1–6.4 cm long, densely pubescent, trichomes 0.5–1.0 mm long, reddish-brown or pale brown. *Leaves* petiolate; petiole (1.0–) 1.5–2.6 cm long, conspicuously caniculate adaxially,

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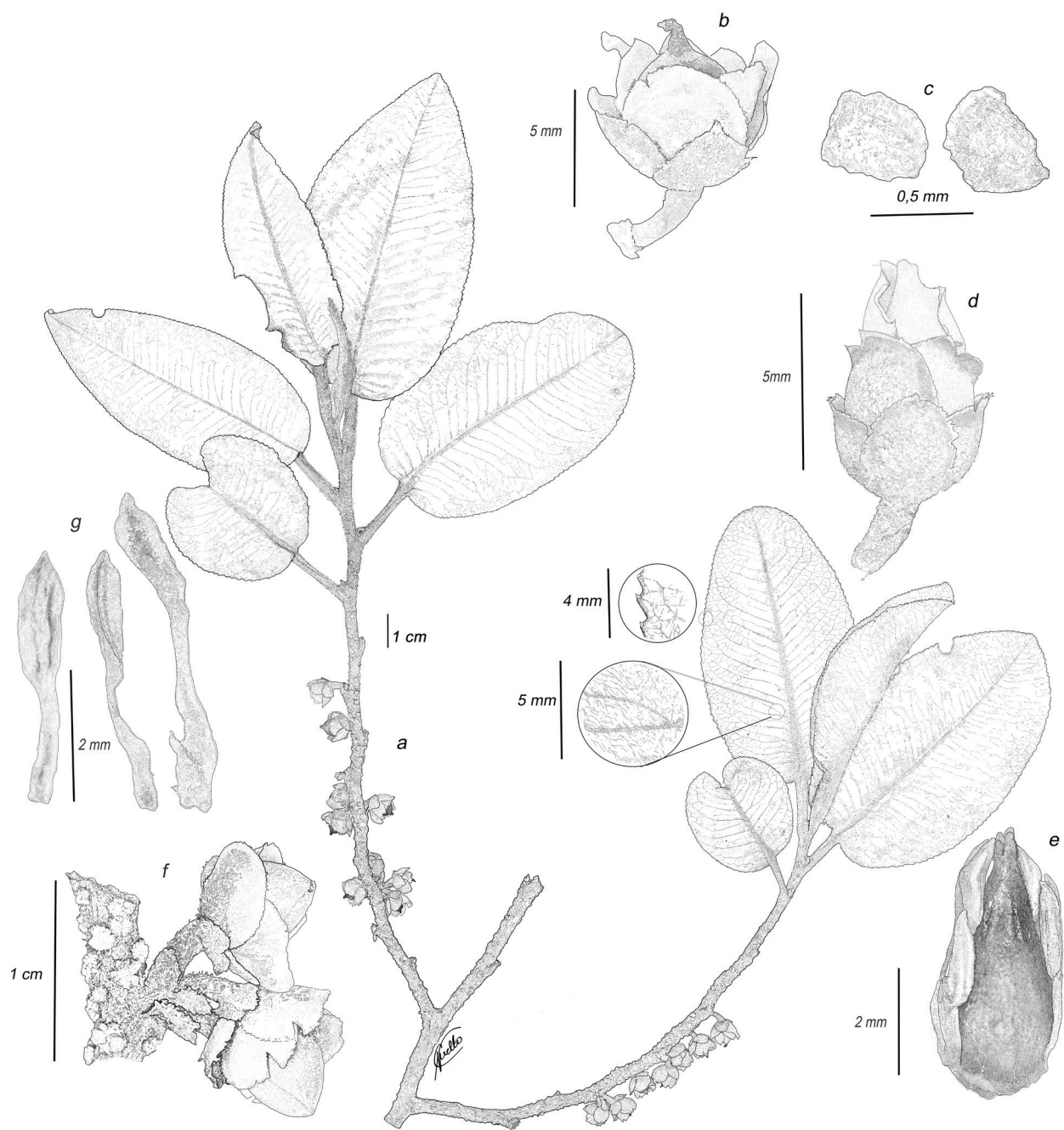


FIGURE 1. *Freziera guaramacalana* D. Santam. & Cuello. **A**, habit; **B**, pistillate flower with immature fruit; **C**, seeds; **D**, hermaphrodite flower; **E**, inner view of a hermaphrodite flower bud; **F**, staminate flower bud; **G**, stamens; **H**, detail of pubescence on lower surface of a leaf; **I**, detail of serrate margin. Drawing by Nidia L. Cuello A–B, C and H–I based on Dorr 9019 (PORT); D–E based on Duno & Riina 1475 (PORT); F–G based on Luteyn & Cotton 9636 (PORT).

rounded or more or less triangular abaxially, generally densely villous, sometimes sparsely pubescent, trichomes dark brown, reddish-brown or pale brown, 0.1–0.12 mm long, winged, the wings erect or revolute, without setae on their margins; colleters 1–9 in petiole base, black or reddish-brown. *Laminae* (4.9–) 7.1–11.3 (–13) × 3.4–5.6 cm, ovate to elliptic; base rounded to sub-truncate, not revolute, both sides equal or one weakly unequal; apex acute; margin serrate, with 54–86 teeth per side, each tooth with a black or reddish, conical or curvate seta, caducous, the seta not ringed by trichomes; adaxial surface glabrous, densely pustulate; abaxial surface villous, tomentose or strigose, trichomes reddish-brown or pale brown, 0.1–0.18 mm long, papillate; midrib on adaxial surface flat, sometimes with some trichomes near to the base (strigose in young leaves), densely pustulate, on abaxial surface raised and rounded, densely pubescent, densely pubescent and pustulate; lateral veins 23–30 for side (including some intermediate), weakly impressed on the adaxial surface and weakly raised on the abaxial surface. *Inflorescences* 1-solitary flower or 2–5 fasciculate flowers, axillary or axillary at nodes where leaves have already fallen. *Flowers* pedicellate, pedicel 4.5–9.5 mm long, curved or erect, cylindrical, strigose, trichomes reddish-brown, sometimes each pedicel with a colleter at the base; *bracts* 2.5 × 2.0 mm, at the base of pedicel, ovate to triangular, external surface densely or sparsely strigose, internal surface glabrous, margin entire, sometimes with small setae, apex acute or rounded; *bracteoles* 2, 2.2–4.0 × 2.3–5.0 mm, persistent, opposite or sub-opposite, at apex of pedicel, unequal, widely ovate or “D” shape, external surface minutely and sparsely appressed pubescent, trichomes reddish-brown or whitish, internal surface glabrous, margin entire, ciliate, sometimes with black and conical setae, apex rounded; *sepals* 5, imbricate, pale green with the margin reddish-brown; outer sepals 3.8–5.5 (–6.0) × (3.5–) 4.0–5.5 (–6.3) mm, widely ovate, apex rounded, margin entire and chartaceous or membranaceous, ciliate, external surface appressed pubescent or glabrous, sometimes the indument restricted to the center and base, trichomes whitish or reddish-brown, internal surface glabrous; inner sepals 4.0–4.5 (–6.0) × 3.5–5.0 (–6.0), similar to the external sepals; *petals* 5, (3.0–) 3.5–6.3 × (2.0–) 3.0–4.5 mm, yellow, white or cream, free or weakly united at the base, ovate, apex acute or obtuse, glabrous. *Flower bud* 4.0–7.0 mm wide. *Staminate flowers*: 26–31 stamens, free or weakly united at the base, unequal; filaments 1.0–4.5 mm long, more or less flat; anthers 1.5–2.0 mm long, not moniliform, oblong, apex apiculate; gynoecium 4.0–6.0 mm long, glabrous, globose or conical, 5-locular; style not separated apically; stigma 5-lobulate, papillate. *Pistillate flowers*: ca. 25–30 staminodes, 1.0–2.5 mm long, free or weakly united, linear, flat, apex apiculate or acute; gynoecium 3.0–4.3 long mm, conical or pyriform, glabrous, 4 or 5-locular; style not separated apically; stigma 4 or 5-lobulate, weakly papillate. *Hermaphrodite flower bud*: 36 stamens, unequal, filaments 1.5–2.5 mm long, free or weakly united, flat toward margins and main nerve raised; anthers 1.5–2 mm long, oblong, apex apiculate; gynoecium 4–4.3 mm long, pyriform,

glabrous; style not separated apically, ca. 0.25–0.3 mm long, 0.3–0.5 mm wide; stigma 4 or 5-lobulate, lobules ca. 0.25–0.4 mm long, unequal, lanceolate, apiculate, weakly papillate; ovary 5-locular, 1.2 mm wide. *Fruits* 7.0–8.0 × 6.0–7.0 mm, immature, 5-locular; *seeds* 0.5–0.8 × 0.25–0.3 mm, immature, 15–20 per locule, oblong to triangular or irregular, surface reticulate and papillose.

Etymology: The specific epithet *guaramacalana* refers to the Ramal de Guaramacal or Parque Nacional Guaramacal, the locality of most collections of this species. Guaramacal National Park protects a vascular flora of 1,227 species (Dorr et al., 2000).

Distribution and Habitat: *Freziera guaramacalana* is endemic to Venezuela, where it has been collected in the states of Lara, Mérida and Trujillo. At Ramal de Guaramacal in the state of Trujillo, the species can be found on steep slopes and rocky outcrops in wet forest and areas with shrubby páramo between 2,200–2,900 m. There, *Freziera guaramacalana* is relatively abundant, with ca. 30 individuals in 0.1 hectare (or 1,000 m²), and it is considered characteristic of a community of dense upper montane forests, belonging to the Geissantho andini–Miconietum jahnii Cuello & Cleef association (Cuello and Cleef, 2009). *Freziera guaramacalana* has also been observed by the senior author in others montane forest communities, at the border of Trujillo and Lara state, in Dinira National Park. Because it has been broadly observed and is found in multiple protected areas, we presume that this species does not need a protected conservation status and it is at a low risk of extinction.

Phenology: *Freziera guaramacalana* has been collected with staminate flowers in January, with pistillate flowers in January, April, June and October and hermaphroditic flowers in January and April. Immature fruits were collected in June.

Freziera guaramacalana can be recognized by the generally densely lenticellate twigs; long, pubescent winged petioles; leaves with a conspicuously serrate margin and a pubescent abaxial surface, numerous colleters in the petiole base and sometimes in the pedicels. It can also be distinguished by its sepals, which have a rounded apex and are minutely and sparsely pubescent with appressed whitish or reddish-brown hairs. Of the nine species of *Freziera* known from Venezuela (Berry and Weitzman, 2008), *F. guaramacalana* is more similar to *F. bonplandiana* Tul. Adopting the concept of Weitzman (1987), the new species differs from *F. bonplandiana*, which have cuneate, revolute leaf bases (vs. rounded to sub-truncate and not revolute in *F. guaramacalana*), sinuate margin (vs. serrate), the indument on both leaf surfaces (vs. only to the central portion on abaxial surface), and shorter 0.3–0.6 [–1.1] and glabrous petioles (vs. [1.0–] 1.5–2.6 cm and, pubescent petioles). For its densely lenticellate twigs, serrate leaf margin, and relatively long petioles, *F. guaramacalana* is also similar to *F. reticulata* Bonpl. from Colombia and Ecuador; however this species is distinguished by its mostly angulate twigs (vs. cylindrical or flattened in *F. guaramacalana*), wide leaves (7.3–9.3 vs. 3.4–5.6 cm) with lateral veins markedly

impressed above and raised below (vs. weakly impressed above and raised below), sepals that are densely tomentose on the entire abaxial surface (vs. sparsely appressed pubescent or the indument restricted to center and base), and large fruits (7–11 vs. 6–7 mm wide). Because of its long petioles and abaxially pubescent leaves, the new species can be compared to *F. longipes* Tul., and *F. smithiana* Kobuski, both from Colombia. However, the two latter species have longer petioles (3.0–4.0 vs. [1.0–] 1.5–2.6 cm in *F. guaramacalana*), sinuate leaf margins (vs. serrate), and larger leaves (15–24 × 6.0–8.5 cm). Additionally, *F. longipes* has shorter pedicels (1.0–3.0 vs. 4.5–9.5 mm long) and *F. smithiana* has two trichome types (vs. one type in *F. guaramacalana*) and densely pubescent sepals (vs. minutely and sparsely appressed pubescent).

The collections *Ruíz-Terán* 6474 and 13205, from the state of Mérida, differ somewhat from other collections by their wider, longer leaves with less pronounced teeth along their margin, but otherwise conform to the species concept adopted here.

Additional specimens examined: VENEZUELA. Lara: Parque Nacional Dinira, Quebrada Las Lajitas (sistema de tres quebradas sobre lajas) en la vertiente lareense del Pico Cendé, vegetación paramera, arbustales y bosques a lo largo de las quebradas, 09°33'06"N, 70°05'42"O, 2,600 m, 11 January 2001 (♀♂ fl), *R. Duno & R. Riina* 1475 (PORT,

VEN). Mérida: Departamento Rangel, entre Cañada de Padre y El Baho, unos 10 km al E de la Sierra Nevada de Santo Domingo, 2300–3340, 11 October 1971 (♀ fl), *L. Ruíz-Terán* 6474 (GH); Departamento Campo Elías, bosque nublado andino, muy húmedo, de la margen izquierda de la chorrera de La González, 28 January 1976 (♀ fl), *L. Ruíz-Terán & R. M. Schuster* 13205 (GH). Trujillo: Boconó, páramo Guaramacal, 13.7–14.6 km beyond jct NE of Boconó, summit of road, 09°13'N, 70°13'W, 2,750–2,800 m, 19 January 1984 (♀ fl), *J. L. Luteyn & J. J. Pipoly* 9310 (GH, MO, NY, PORT); Páramo de Guaramacal, W of road summit, 09°14'N, 70°11'W, 2800–2900, 28 April 1988 (♀ fl), *L. J. Dorr et al.* 5005 (MO, NY, PORT, US); Parque Nacional Guaramacal, Boconó-caserío de Guaramacal road S (Qda. Jirajara) from turnoff to antennas to just above El Campamento, 2200–2900, 15 June 2001 (♀ fl), *L. J. Dorr et al.* 9019 (MO, NY, PORT, US); Parque Nacional Guaramacal, bosques bajos de la vertiente sur por la vía de las antenas a Guaramacal, parcela #24, UTM 371718 E, 1022127 N, 2,554 m, July 2002 (sterile) *N. Cuello et al.* 2459 (PORT); Páramo de Guaramacal, W of road summit, 09°14'N, 70°11'W, 2800–2900, 28 April 1988 (♀♂ fl), *L. J. Dorr et al.* 5005 (MO, NY, PORT, US); Parque Nacional Guaramacal, bosques remanentes cerca de la carretera hacia las antenas, Vertiente Norte, parcela #39, Pos. UTM 369545 E, 1021382 N, 2,770 m, 15 April 2005 (sterile), *N. Cuello et al.* 2857 (PORT).

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THREE NEW SPECIES OF *SLOANEA* (ELAEOCARPACEAE) FROM COSTA RICA, WITH EMPHASIS ON THE SPECIES FROM THE OSA PENINSULA.

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Abstract. Three new species of *Sloanea* (Elaeocarpaceae) from Costa Rica, are described illustrated, and discussed morphologically with reference to allied species. *Sloanea damonsmithii* is found in the Osa Peninsula, and apparently also occurs in Panama; *S. eugenifloresii* is from the Golfo Dulce Forest Reserve, Golfito region, and La Cangreja National Park; and *S. herrerae* occurs on the Caribbean slope of Costa Rica, in the Cordillera de Talamanca and Llanuras de San Carlos.

Resumen. Tres nuevas especies de *Sloanea* (Elaeocarpaceae) de Costa Rica son descritas e ilustradas y la relación morfológica con especies afines se discute. *Sloanea damonsmithii* se distribuye en la Península de Osa y aparentemente ocurre en Panamá; *S. eugenifloresii* ocurre en la Reserva Forestal Golfo Dulce, región de Golfito, y el Parque Nacional La Cangreja; y *S. herrerae* se encuentra en la vertiente Caribe de la Cordillera de Talamanca y Llanuras de San Carlos.

Keywords: Cordillera de Talamanca, Costa Rica, Península de Osa, *Sloanea*

Sloanea L., distributed in tropical and subtropical regions of the world except in continental Africa, is the largest genus of Elaeocarpaceae. In Costa Rica, *Sloanea* is represented by 22 species (Smith, 2010), not including the three species described herein. Overall, 12 species occur on the Osa Peninsula, Puntarenas (principal area of focus of the second author; e.g., see <http://sweetgum.nybg.org/osa/index.php>). The most recent revision of the genus in the New World was published by Smith (1954), who recognized 62 species in two subgenera and four sections. Characters associated with the sepals distinguish two American subgenera: subgenus *Quadrisepala* Earle Sm. (sections *Corymbo-racemi* Earle Sm. and *Paniculi* Earle Sm.) comprises species with four sepals—equal in shape and size—that cover the reproductive organs before anthesis; and subgenus *Sloanea* (sections *Brevispicae* Earle Sm. and *Sloanea*) comprises species with 4–11 sepals—unequal in size and shape—that do not fully cover the reproductive organs before anthesis. Since the publication of this revision, approximately 47 new species have been described (Lundell, 1975; as Tiliaceae; Steyermark, 1988; Smith, 1996; Palacios-Duque, 2004a,b, 2005, 2007a,b; Palacios-Duque and Fernández-Alonso,

2005, 2011; Lozada-Pérez, 2008; Vasquéz-Martínez, 2009; Sampaio and Souza, 2010, 2011; Boeira et al., 2012; Palacios-Duque and Baeza, 2014).

In the Osa Peninsula, species of *Sloanea* generally are known by the vernacular name “abrojo” and/or “guellaperro.” In this region the genus is represented by large trees, often with very high buttresses [e.g. *S. laurifolia* (Benth.) Benth.] with cylindrical trunks that are twisted or deeply grooved; stipules that are small or large and leaf-like (*S. damonsmithii* and *S. medusula* K. Schum. & Pittier); petioles that are thickened at one or both ends and frequently unequal; leaves that are usually alternate, opposite or subopposite [in *S. guianensis* (Aubl.) Benth. and *S. rugosa* Dam. A. Sm.]; flowers lacking petals (as in all spp. from Costa Rica, with numerous stamens; and fruits unarmed or with rigid or flexible spines, sometimes few in number [*S. brachytepala* Ducke, *S. garcia-cossioi* Pal.-Duque, *S. laurifolia* (Benth.) Benth. and *S. longipes* Ducke]).

Sloanea medusula and *S. zuliaensis* Pittier are among the most common species in the Osa Peninsula, while *S. petenensis* Standl. & Steyerm. and the two other species described here are known from few individuals.

TAXONOMY

Sloanea damonsmithii D. Santam. & Aguilar, *sp. nov.*
TYPE. COSTA RICA. Puntarenas: Cantón de Golfito, Península de Osa, 7 Km. SW. of Rincon, La Cuenca de Aguabuena, sector sur, disturbed primary forest along edge of pasture, 08°42'20"N, 83°31'30"W, 70–100 m, 24 February 1994 (old fl and young fr), D. Smith, R. Aguilar, S. G. Smith

1301 (Holotype: CR; Isotypes: F, GH, K, MO, NY, US to be distributed). Fig. 1.

Tree 15–25 m tall × 0.12–0.40 m DBH; external bark described as reddish, with lenticels. *Twigs* 3–4 mm wide, below the terminal bud, cylindrical, densely puberulent, the trichomes ferruginous. *Leaves* alternate, spaced along twigs;

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FIGURE 1. *Sloanea damonsmithii* D. Santam. & Aguilar. **A**, branch with young fruits, showing leaves on adaxial and abaxial surface; **B**, stipules; **C**, branch with young fruits; **D**, stamen; **E**, fruit. **A** to **D** from the type; **E** from *Quesada & J. Marín* 562 (CR).

stipules 0.9–1.5 × 0.5–0.8 cm, foliaceous, persistent, the pedicel 0.15–0.2 cm long, pubescent on both surfaces, with midrib and lateral veins distinctive, margin entire; petiole 1.5–4.7 cm long, cylindrical, puberulent, the trichomes ferrugineous, both pulvini prominent; lamina 6.3–12.8 (–19) × (3–) 5.4–8 cm, elliptic, glabrous on the adaxial surface, minutely pubescent to glabrescent on the abaxial surface; midrib flat and pubescent on the adaxial surface, raised and densely or sparsely puberulent on the abaxial surface; lateral veins 9–13 per side, densely or sparsely puberulent on both surfaces, abaxially raised; tertiary veins distinct, flat on the adaxial surface, raised on the abaxial surface; base acute-cuneate to obtuse; apex acute to short acuminate; margin entire, or rarely crenate distally. *Inflorescences* racemes, axillary, often at nodes lacking leaves; peduncle 6–15 mm long, terete, pubescent; pedicels 5–7 mm long in flower, 3–15 mm long in fruit, terete or weakly compressed, pubescent; bracts and bracteoles 2–3.1 × 0.3–1 mm, lanceolate or narrowly triangular, densely pubescent on both surfaces, margin entire, apex acute or acuminate, sometimes tridentate, sometimes three or four bracts at node. *Flowers* with the sepals apparently not covering the reproductive organs in the floral bud, brown, generally 5–9, 1.5–3 × 0.8–1.5 (at the base) mm, erect, narrow or broadly triangular, pubescent on both surfaces, the margin entire, the apex acute; stamens inserted separately in pores in the receptacular disc, ca. 2–3 mm, pubescent, the filament 1.5–3 mm long, color unknown, pubescent, the anther 0.5–1 mm long, color unknown, pubescent, elliptic, the base rounded to cuneate, the thecae opening by lateral pore, the awn 0.1–0.2 mm long, more or less conical, glabrescent; ovary ca. 2 × 1.5– mm, sub-globose or more or less conical, densely pubescent, 3 or 4-locular, color unknown; style ca. 3.1 mm long in flowers (past anthesis, *Quesada* 429) and 5–7 mm long in immature fruits (*Smith* 1301), densely pubescent, glabrescent at the apex, 3 or 4-lobed at apex. *Fruits* 1.4–3.5 × 1.2–2.5 cm, green, yellowish green, or brown; valves 0.2–0.4 cm thick, external surface pubescent, covered with dimorphic, rigid and semi-flexible spines, the longer ones 0.45–1 cm long, strigose, the shorter ones 0.23–0.32 cm long, strigose; seeds 1.1–1.5 × 0.6–0.7 cm, the aril reported as red.

Etymology: This species is named in honor of Damon A. Smith for his important contributions to Neotropical *Sloanea*, including the excellent preparation of the type specimen for this species.

Distribution and Habitat: In Costa Rica, *Sloanea damonsmithii* is known only from the Osa Peninsula of the country's south Pacific coast, where it has been found growing in very wet forests from approximately 70 to 350 m in elevation. Although this species was reported from Panama by Smith (2010) and Zamora et al. (2004), we found no specimens from that country during the present study.

Phenology: *Sloanea damonsmithii* has been collected in old and past anthesis flowers in February and with fruits in February, March, August and September.

Additional specimens examined: COSTA RICA. Puntarenas: Cantón de Osa, Rancho Quemado, Fila Estero Guerra, 08°43'50"N, 83°34'40"W, 250–350 m, 01 August 1991 (fr), *J. Marín* 73 (CR, MO); Rancho Quemado, sector

norte, camino a Cerro Chocuaco, 08°43'30"N, 83°34'20"W, 350 m, 17 March 1992 (fr), *J. Marín* 434 (CR-2 sheets, MO); Rancho Quemado, alrededores de la toma de agua, bosque primario, Rincón, 08°42'N, 83°34'W, 200 m, 15 February 1991 (fl past anthesis), *J. F. Quesada* 429 (CR); Rancho Quemado, Fila Guerra, Rincón, bosque primario, 08°46'N, 83°38'W, 200 m, 01 August 1991 (fr), *J. F. Quesada* & *J. Marín* 562 (CR-2 sheets); Rincón de Osa, Reserva Forestal Golfo Dulce, Aguabuena, La Cuenca, 08°42'20"N, 83°31'30"W, 50–150 m, 01 September 1991 (fr), *R. Aguilar* 297 (CR); Aguabuena, 3 km W of Rincón, one hectare permanent sample plot 800 m N of the house of Henry Monge in well-drained, moderately sloping terrain, 08°42'N, 83°30'W, 130 m, 19 April 1993 (ster), *K. Thomsen* 904 (CR); Rincón de Osa, 100 m, October 1965 (ster), *S. Hern* 28 (CR-2 sheets).

Sloanea damonsmithii is readily recognized by the foliaceous and pediculate stipules with conspicuous venation which are pubescent on both leaf surfaces. It is further distinguished by its densely puberulent twigs; alternate, relatively small leaves that are spaced along twigs with entire margins (rarely crenate distally); flowers with pubescent filaments and anthers; short staminal awn; and fruits with dimorphic spines.

Because it shares similar leaves, short staminal awns, and fruits with dimorphic spines, this new species is similar to *S. faginea* Standl. from Costa Rica and Panama (Smith 2010), which grows between 400–1,400 m in elevation in the north of Costa Rica in the Alajuela, Guanacaste, and Puntarenas provinces. However, *S. damonsmithii* differs from *S. faginea* by its foliaceous and pediculate stipules (vs. lanceolate and not pediculate stipules). The new species is also likely to be confused with the similarly low-elevation (100–300 m) *S. geniculata* Dam. A. Sm., endemic to the Caribbean slope in Heredia and Limón provinces, Costa Rica. The latter differs, however, by its leaves with crenate to serrate margins (vs. entire or rarely distally crenate in *S. damonsmithii*), numerous lateral veins (17–25 vs. 9–13 per side), and flowers with long staminal awns ([0.9–] 1.1–2.1 vs. 0.1–0.2 mm long). In the Osa Peninsula, the new species resembles *S. medusula* for its conspicuous stipules and fruits with dimorphic spines, but the latter is easy to differentiate by its larger leaves ([40.5–] 48–65 [–99.5] vs. 6.3–12.8 [–19] cm long) with cordate bases and with the abaxial surface covered with whitish trichomes.

In the treatment of Elaeocarpaceae for the *Manual de Plantas de Costa Rica* (Smith, 2010), *S. damonsmithii* was treated as *Sloanea* “sp. C.” Zamora et al. (2004) used the name *S. latistipula*, though it was not validly published.

Sloanea eugenifloresii Aguilar & D. Santam. *sp. nov.* TYPE. COSTA RICA. Puntarenas: Refugio de Vida Silvestre Golfito, 3 km al norte del aeropuerto, sendero natural, 08°40'25"N, 83°11'25"W, 200 m, 26 January 1992 (fl), *R. Aguilar*, *R. Martín*, *C. Formoso* & *M. H. Grayum* 878 (Holotype: CR [202324]; Isotype: BM, COL, CR, F, GH, K, LPB, MO, MEXU, NY, P, PMA, RB, US to be distributed). Fig. 2–3.

Tree 7–30 m tall × 0.10–1 m DBH; external bark described as reddish. *Twigs* 5–7 mm wide, below the terminal

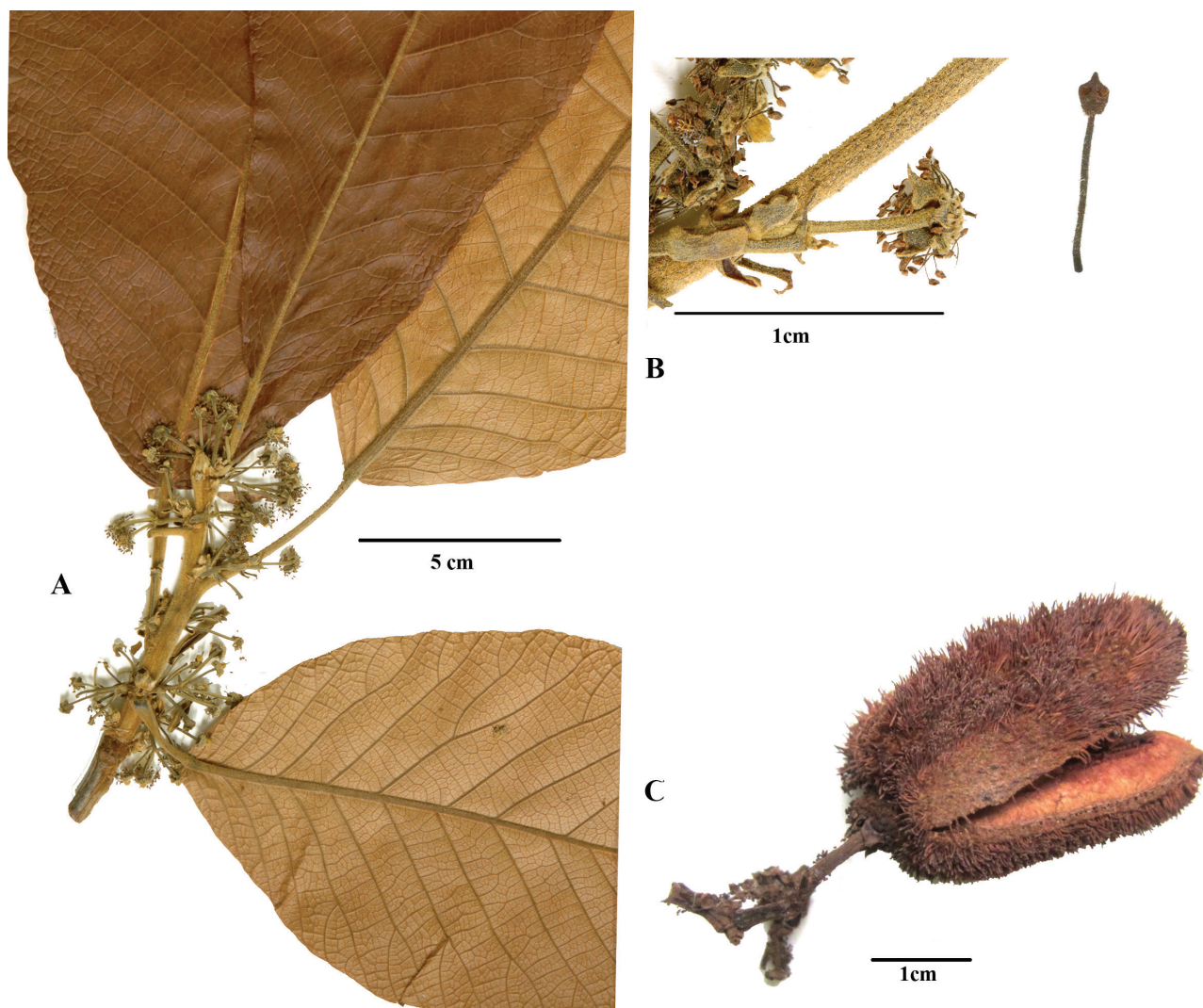


FIGURE 2. *Sloanea eugenifloresii* Aguilar & D. Santam. **A**, branch with inflorescences; **B**, flower and stamen; **C**, fruit. A and B based on Aguilar 3160 (CR); C based on Aguilar 4431 (CR).

bud, cylindrical or weakly ribbed, densely pubescent, the trichomes brown or pale-brown. *Leaves* alternate, spaced along twigs; stipules 0.6–1 (–1.4) $\times$ 0.3–0.5 cm, ovate or deltate, quickly caducous, leaving a conspicuous scar on the twig, sessile, densely pubescent on the external surface, glabrous on the internal surface, the venation indistinct, the margin entire; petiole 1.8–6.5 cm long, cylindrical to weakly compressed, densely pubescent, the trichomes brown or pale brown, upper pulvinus prominent; lamina 13–30.1 $\times$ 8–18.5 cm, obovate, pubescent on both surfaces, denser on the abaxial surface; midrib flat on the adaxial surface, raised, rounded or more or less square on the abaxial surface; lateral veins 14–19 per side, generally densely pubescent on both surfaces, raised below; tertiary veins very distinct, flat and weakly sulcate on the adaxial surface, raised on the abaxial surface; base rounded or subcordate; apex rounded or emarginate; margin entire, either crenulate or undulate. *Inflorescences* axillary racemes; peduncle 3–10 mm long, terete or compressed, pubescent; pedicels 5–13

mm long in flower, 10–20 mm long in fruit, compressed, densely pubescent; bracts and bracteoles 3–6 $\times$ 1–1.5 mm, wide to narrowly triangular, densely pubescent on both surfaces or glabrous inside, the margin entire, the apex acute or acuminate. *Flowers* with the sepals not covering the reproductive organs in the floral bud, green or red, generally 4, sometimes 5 to 7, 2–3 $\times$ 1.2–2 mm (at the base), reflexed, triangular, pubescent on both surfaces, the margin entire, the apex acute to acuminate; stamens inserted separately in pores in the receptacular disc, ca. 3–4 mm, pubescent, the filament 1.5–4 mm long, red, densely pubescent, the anther 0.5–1 mm long, possibly red, densely pubescent, ovate or elliptical, the base truncate or subcordate, the thecae opening by widely lateral pore, the awn 0.1–0.3 mm long, more or less conical, glabrescent; ovary 1.3–1.5 $\times$ 1–1.5 mm, orange, subglobose, densely pubescent, weakly lobulate, 4-locular; style 1.1–1.4 mm long, pubescent at the base and glabrous distally, sometimes with scattered trichomes along the style, 4-lobed at apex. *Fruits* 3.5–4 $\times$ 1.8–3 cm, green;

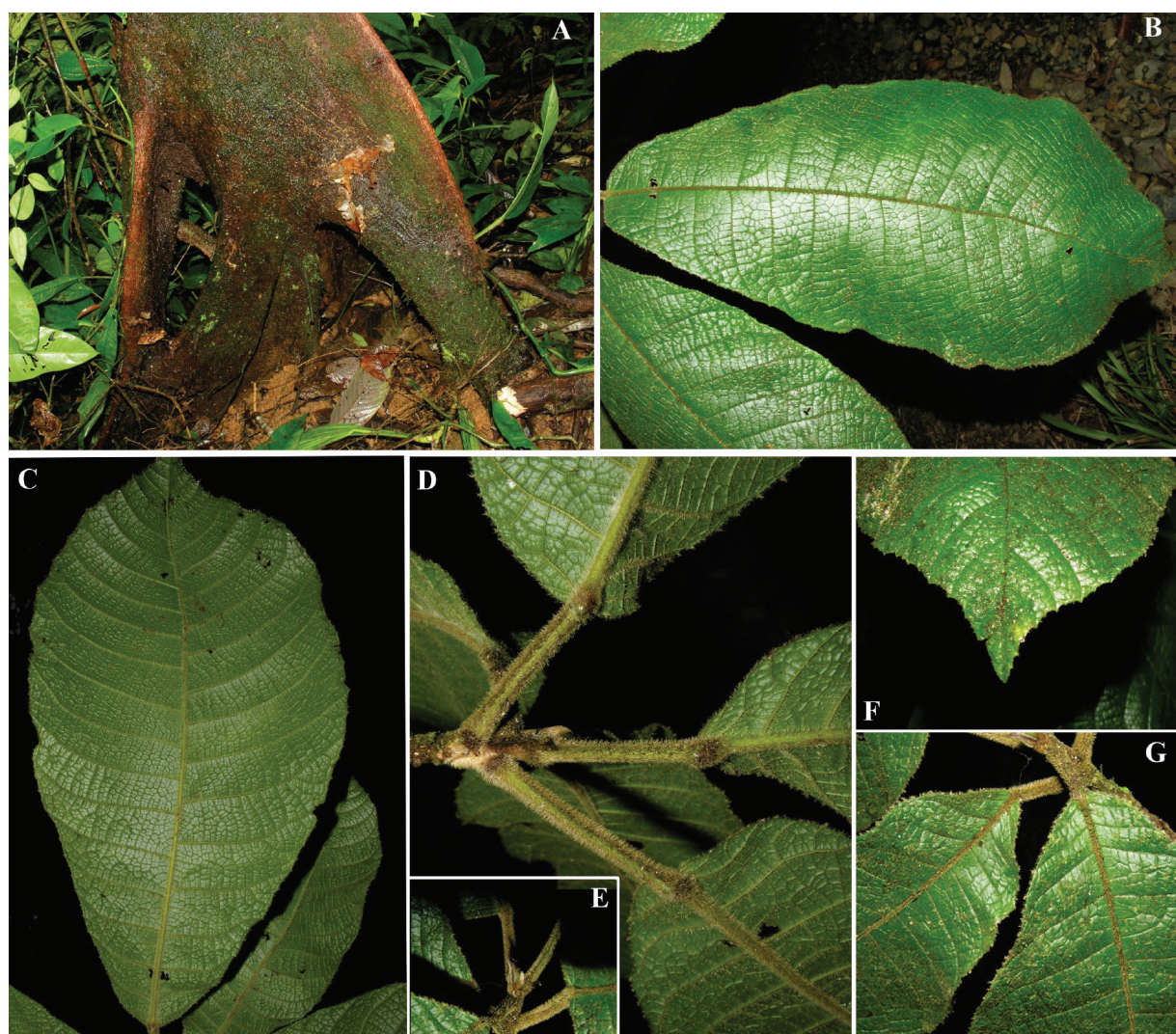


FIGURE 3. *Sloanea eugenifloresii* Aguilar & D. Santam. A, buttresses; B, leaf adaxial surface; C, leaf abaxial surface; D, petioles; E, stipules; F, leaf apex; G, leaf base. A to G based on *Santamaría & R. Aguilar 9817* (CR). Photos by R. Aguilar.

valves 0.3–0.5 cm thick, external surface pubescent, densely covered with semi-flexible and monomorphic spines 0.2–0.4 cm long, flattened, pubescent; seeds $1.7\text{--}1.8 \times 0.8\text{--}1$ cm, the aril reported as red.

Etymology: This species is named in honor of Eugenia Flores Vindas for her important contributions to botanical sciences and for supporting the work of the first author of this species.

Distribution and Habitat: *Sloanea eugenifloresii* is endemic to Costa Rica. It is found in very wet forest, on the Pacific slope in Puntarenas and San José provinces, 20 to 650 m in elevation. This species was reported from Llanura de San Carlos (Alajuela Province) on the Caribbean slope by Smith (2010), though we found no specimens from that area during the present study.

Phenology: *Sloanea eugenifloresii* has been collected in flower in January and March and in fruit in April and September.

Additional specimens examined: COSTA RICA. Puntarenas: Osa, distrito Sierpe, Reserva Forestal Golfo Dulce, Mogos Bahía Chal (entrada de Chocuaco a 35 km. de Chacarita) Finca de Carlos Rojas (entre los repastos, charrales y parches de bosque intervenido), $08^{\circ}44'10''\text{N}$, $83^{\circ}28'00''\text{W}$, 20 m, 13 March 1994 (fl), *R. Aguilar 3160* (BM, CR, GH, LPB, MEXU, MO, P, PMA, RB, US); Reserva Forestal Golfo Dulce, entrada a Chocuaco, Bahía Chal, $08^{\circ}43'00''\text{N}$, $83^{\circ}34'50''\text{W}$, 200–350, 10 April 1994 (fr), *R. Aguilar 4431* (CR, MO); Reserva Forestal Golfo Dulce, Rancho Quemado, camino a Drake, lugar donde se encuentran las antenas del ICE, $08^{\circ}41'33''\text{N}$, $83^{\circ}35'35''\text{W}$, 350–400 m, 28 May 2015 (ster), *D. Santamaría & R. Aguilar 9817* (CR, other duplicates to be distributed). San José: cantón de Puriscal, Zona Protectora La Cangreja, cuenca del Tulín, faldas de la fila Cangreja, costado sur, $09^{\circ}42'10''\text{N}$, $84^{\circ}22'25''\text{W}$, 650 m, 15 September 1998 (fr, collected from the ground), *L. Acosta 7* (CR-2 sheets, MO).

Sloanea eugenifloresii is characterized by the dense pubescence on twigs, leaves and inflorescences; leaves with rounded or emarginate apex, and reticulate venation that is conspicuous on both surfaces; flowers that are generally with 4 (5–7) sepals, anthers that are densely pubescent, thecae opening by widely lateral pore, and with a short, conical awn; and fruits that are densely covered with monomorphic spines.

For its vestiture of the vegetative and reproductive parts and distinct reticulate leaf venation, *S. eugenifloresii* is similar to *S. rufa* Planch. ex Benth. According to Smith (1954), the latter species has stipules with the margin deeply lacinate (vs. margin entire in *S. eugenifloresii*) and long-awned stamens (0.75–1.5 vs. 0.1–0.3 mm long). *Sloanea kuhlmannii* Ducke also has the leaves and trichomes similar in color to the new species, but the inflorescences are umbellate (vs. racemes in *S. eugenifloresii*) and the flowers have larger sepals (7 vs. 2–3 mm long in *S. eugenifloresii*). In the Osa Peninsula, species of *Sloanea* with fruits with monomorphic spines are: *S. guianensis*, *S. obtusifolia* K. Schum., *S. petenensis*, *S. picapica* Standl., *S. rugosa* Dam. A. Sm., *S. terniflora* (Sessé & Moc. ex DC.) Standl., and *S. zuliaensis* (Fig. 4). But in all these species the spines generally are less dense, thick, rigid and pungent. Among these *Sloanea* species, the new species most resembles *S. terniflora*. However, the latter species differs in its shortly tomentose twigs that are soon glabrescent (vs. densely pubescent in *S. eugenifloresii*), shorter petioles (0.1–0.4 vs. 1.8–6.5 cm), and smaller fruits (1.5–1.9 × 1–1.5 vs. 3.5–4 × 1.8–3 cm). In the Osa Peninsula, young plants of *S. garcia-cossioi* (see D. Santamaría & R. Aguilar 9814, CR; D. Smith et al. 1303, CR; and N. Zamora et al. 6447, CR) resemble adult plants of *S. eugenifloresii* by their densely pubescent branches and leaves, long petioles, and marked venation. However, the stipules in the first species are linear (vs. ovate or deltate in *S. eugenifloresii*). Adult plants of *S. garcia-cossioi* are clearly different from *S. eugenifloresii*, by their glabrous petioles (vs. densely pubescent in *S. eugenifloresii*) and larger fruits (4.7–5.5 × 3.5–4.3 vs. 3.5–4 × 1.8–3 cm).

In the Elaeocarpaceae treatment for the *Manual de Plantas de Costa Rica* (Smith, 2010), *S. eugenifloresii* was treated as *Sloanea* “sp. A.” Zamora et al. (2004) used the name *S. pilosa*, though it was not validly published.

Sloanea herrerae Aguilar & D. Santam., *sp. nov.* TYPE. COSTA RICA. Limón: Cantón de Talamanca, Alto Urén, inmediaciones cerro Laúbeta, 09°24'15"N, 83°00'30"W, 1,190 m, 28 July 1989 (fl), G. Herrera 3390 (Holotype: CR [66518]; Isotype: CR [181540]). Fig. 5–6.

Tree (15–) 25–30 tall × 0.15–0.20 m DBH; external bark unknown. *Twigs* 2–5 mm wide, below the terminal bud, weakly angulate and flattened, densely pubescent or glabrescent, the trichomes yellow or pale brown. *Leaves* alternate, spaced along twigs; stipules ca. 0.15–0.35 × ca. 0.12 cm, deltate, quickly caducous, not a conspicuous scar on the twig, sessile, pubescent on the external surface, glabrous on the internal surface, venation indistinct, margin entire; petiole 2.2–7 cm long, cylindrical, glabrous, both pulvini prominent; lamina 6.8–17.3 × 4.1–8.9 cm, elliptical to obovate, glabrous on both surfaces; midrib flat on the adaxial surface, rounded on the abaxial surface; lateral

veins 4–7 per side, glabrous on both surfaces, raised below; tertiary veins distinct, flat on the adaxial surface, raised on the abaxial surface; base rounded to sub-cuneate; apex rounded, weakly retuse or short-acuminate; margin entire. *Inflorescences* racemes, axillary; peduncle 7–22 mm long, terete, weakly alate and ribbed, diminutely pubescent; pedicels 7–29 mm long in flower, 30–44 mm long in fruit, weakly flattened or cylindrical, diminutely pubescent; bracts and bracteoles unknown. *Flowers* with the sepals covering the reproductive organs in the floral bud, pale green, 4 (5), ca. 7–8 × 5–6 mm (at the base), erect, broadly triangular, pubescent on both surfaces, the margin entire, the apex acute; stamens inserted separately in pores in the receptacular disc, ca. 4–6 mm, pubescent, the filament 0.3–0.7 mm long, color unknown, densely pubescent, the anther 1.4–1.8 mm long, yellow, pubescent, narrowly oblong to lanceolate, the base subtruncate, the thecae opening longitudinally, the awn 0.5–1 mm long, glabrous, linear to lanceolate; ovary ca. 2–2.5 × 1.2–1.5 mm, conical, densely pubescent, 4? locular, pale green; style 0.5–0.6 mm long, glabrous, 4-lobed at apex. *Fruits* 3–4.5 × 2.5–3.2 cm, green; valves 0.4–0.7 cm thick, external surface pubescent, covered with very rigid monomorphic spines 0.5–1.8 cm long, pubescent; seeds ca. 2.5–3.3 × 2.5–2.7 cm, the aril reported as white.

Etymology: The epithet of this species honors Gerardo Herrera Chacón, the first to collect the new species, and who has collected many other important first records for the flora of Costa Rica.

Distribution and Habitat: *Sloanea herrerae* appears to be endemic to Costa Rica, on the Caribbean slope in Alajuela and Limón provinces. It is found in very wet forest in Boca Tapada de San Carlos, Alajuela, from 50 m elevation; and pluvial forest in the Cordillera de Talamanca (Alto Urén and fila Tsiurábeta), Limón, from 700–1,190 m elevation.

Phenology: *Sloanea herrerae* has been collected in flowers and fruits in July.

Additional specimens examined: COSTA RICA. Limón: Reserva Indígena Talamanca, camino entre Sukut y Amubri por la fila Tsiurábeta, 09°27'00"N, 082°59'24"W, 700–900 m, 09 July 1989 (fr), B. Hammel et al. 17612 (CR). Alajuela: Cantón de San Carlos, cuenca del San Carlos, Pital, Boca Tapada, finca Aserradero San Jorge, 10°42'57"N, 084°10'27"W, 50 m, 15 January 1997 (ster), N. Zamora & M. Ocampo 2576 (CR).

Sloanea herrerae is characterized by its leaves glabrous on both surfaces and with entire margins; flowers borne on long pedicels; sepals that cover the reproductive organs in bud; floral buds rounded; stamens with short filament, elongate anther, and thecae opening longitudinally; fruits with long and very rigid spines; and large seeds.

As mentioned in Smith (2010), the leaves in this new species resemble those of *S. laevigata* Dam. A. Sm. (also from the Caribbean slope) and *S. laurifolia* (Benth.) Benth., (from the Pacific slope), in both of which the sepals also cover the reproductive organs in bud. But of these the first has the fruits unarmed and in the second they have scattered spines up to only ca. 0.2 cm long (vs. always with scattered spines 0.5–1.8 cm in *S. herrerae*). In Costa Rica, the other species with sepals covering the reproductive organs in bud are *S. petenensis* and *S. terniflora*. The former species

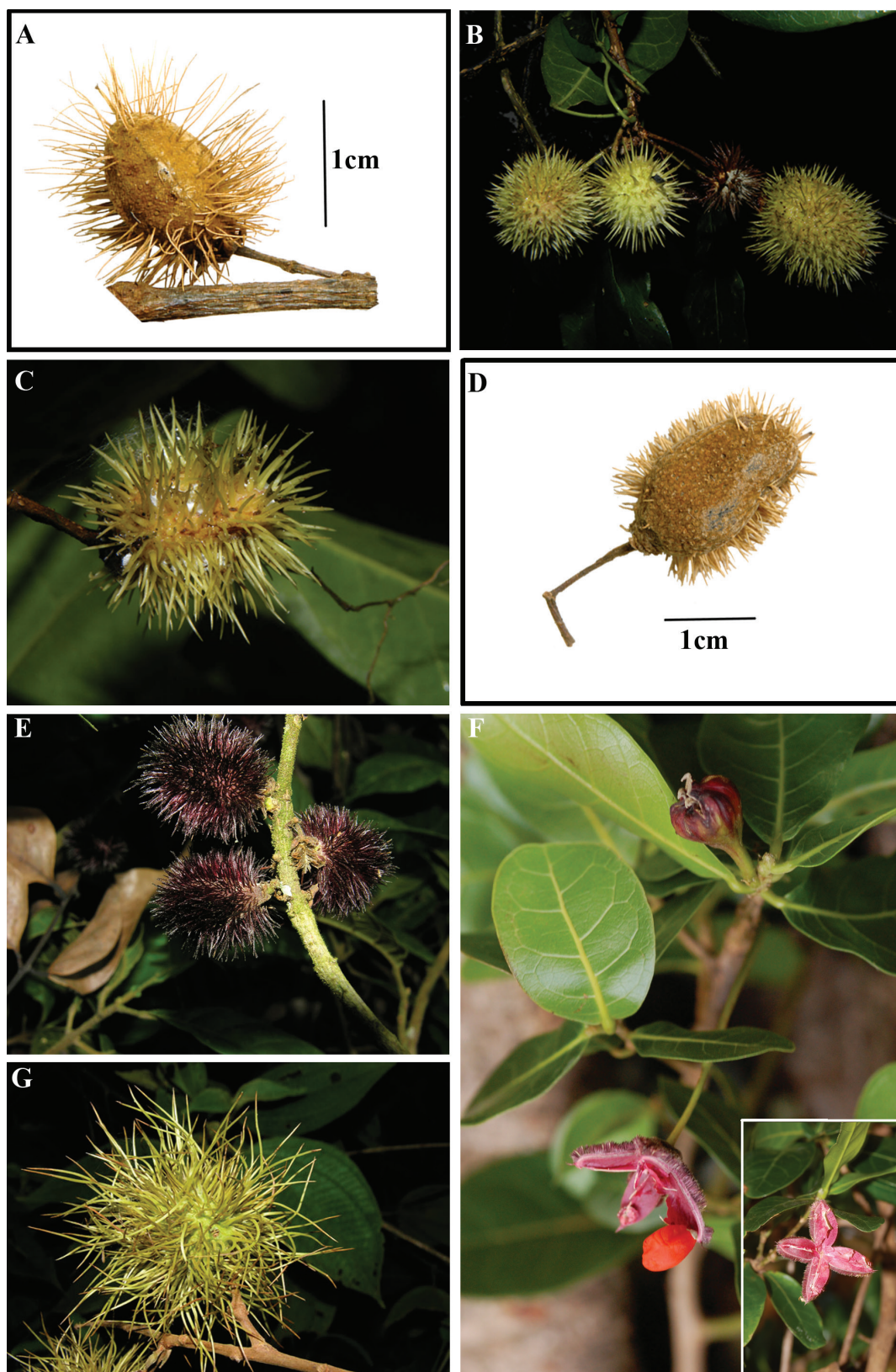


FIGURE 4. Species of *Sloanea* with monomorphic spines presents in the Osa Peninsula. **A**, *S. guianensis* (Aubl.) Benth.; **B**, *S. petenensis* Standl. & Steyer.; **C**, *S. picapica* Standl.; **D**, *S. obtusifolia* K. Schum.; **E**, *S. rugosa* Dam. A. Sm.; **F**, *S. terniflora* (Sessé & Moc. ex DC.) Standl.; **G**, *S. zulianensis* Pittier. A based on Aguilar 1253 (CR); B based on Aguilar 6766 (CR); C based on Aguilar 13963; D based on Aguilar 281 (CR); E based on Aguilar 10222; F based on Hammel & Pérez 24752 (CR); G based on Quesada & Segura 809 (CR). Photos by R. Aguilar (B, C, E and G), J. Mata-Lorenzen (A and B), and B. Hammel (F).

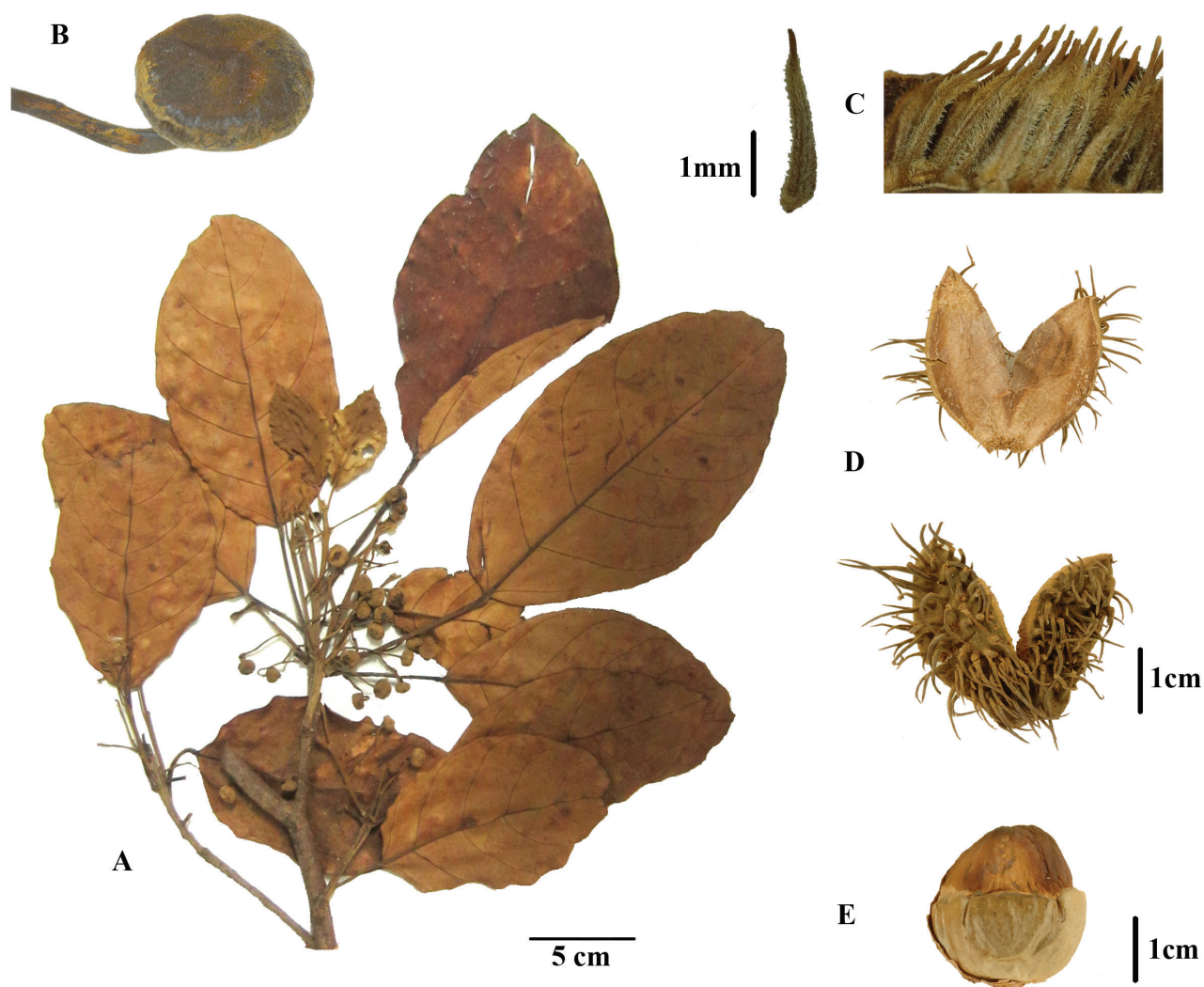


FIGURE 5. *Sloanea herrerae* Aguilar & D. Santam. **A**, branch with inflorescences; **B**, floral bud; **C**, stamens; **D**, fruit showing both surfaces; **E**, seed. A to C based on the holotype; D and E based on *Hammel et al. 17612* (CR).

differs by its linear stipules (vs. deltate in *S. herrerae*), leaf apex long acuminate (vs. rounded, weakly retuse or short-acuminate), and flowers with glabrous or sparsely pubescent filaments (vs. densely pubescent). *Sloanea terniflora* differs by its leaves with shorter petioles (0.1–0.4 vs. 2.2–7 cm in *S. herrerae*), purple sepals and fruit (vs. pale green and

green, respectively), and fruits densely covered with easily detached spines (vs. not scattered and persistent spines).

In the Elaeocarpaceae treatment for the *Manual de Plantas de Costa Rica* (Smith, 2010), *S. herrerae* was treated as *Sloanea* “sp. D”. Zamora et al. (2004) used the name *S. marcescens*, though it was not validly.

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FIGURE 6. *Sloanea herrerae* Aguilar & D. Santam. **A**, trunk; **B**, leaves abaxial surface; **C**, inflorescences; **D**, fruit. Photos by Daniel Solano-Peralta; INBio-Atta.

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A SECOND TREE SPECIES OF *AMPELOZIZYPHUS* (RHAMNACEAE), FROM THE UPPER CUYARÍ RIVER BASIN, GUIANÍA (COLOMBIA)

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Abstract. *Ampelozizyphus kuripacorum* from the upper río Cuyarí, Guianía department, Colombia, is described, illustrated, and its relationship with related species discussed. This new species differs from *A. guaquirensis* (the only other tree species in the genus) by its larger petioles, elliptic leaves, the domatia located only in the base the midrib on the lower surface, the glands (nectaries) on the leaf blades different in form, place and size, and the shorter, few- to single-flowered inflorescence. Updated keys to identify the genera of Rhamnaceae of Colombia and the species of *Ampelozizyphus* are provided.

Keywords: Amazonia, *Ampelozizyphus*, Upper Río Negro basin, Río Cuyarí, Rhamnaceae, Colombia

Resumen. Se describe e ilustra *Ampelozizyphus kuripacorum*, una especie del alto río Cuyarí, departamento del Guianía, Colombia. Este nuevo taxon se diferencia de la otra especie arborescente del género (*A. guaquirensis*) por sus pecíolos más largos, las hojas elípticas, domacios solamente en la base del nervio medio en el envés, glándulas (nectarios) en las hojas situados arriba de la base, diferentes en forma y tamaño, y las inflorescencias más pequeñas, con pocas flores hasta una flor solitaria. Se presenta claves para los géneros de Rhamnaceae de Colombia y de las tres especies de *Ampelozizyphus*.

Yaakuti iipenaa (Kuripaco). Pakaite linakuapanaa jnite likapakanaa jliaji *Ampelozizyphus kuripacorum*, aapana jaiko Kuwiali jii-widaapulikudali pauketa, Guainía, Colombia liko. Jliaji waline jaiko tekojledalitsa liuyani jliaji aapana jaikuna jlipepe (*A. guaquirensis*) lima jliaji yapipjaka lipje ikawanaa irukaruna, yapikujniadali lipje, ipirati yufakarudape (Domacios) litajmete linitakawa lipamuyuka lipje, litupa (glándulas) irukape yenunsre liuya linitakawa jliaji lipje, tekojleperi nauyawaka nakapakana jnite namakadalika, jnite tsudalipepja jnaji liiwi, padapenaaperi papiape apadatsa liiwi. Wajñata naapuwanaa (claves) nasrowalewa jnaji jaikolima nauyawaka papuko Rhamnaceae Colombia liko jnite madalida nauyawaka jnaji jaiko irukape *Ampelozizyphus* liko. Wajñata jliaji yaakuti iipenaa Kuripako liko, naaku jnaji yufakape oopitsa nini, jnite liyutsakja wajñata kanakaidalika lisro jliaji botánica neotropical jliaji idejnik-jeti awakadaliko aji kurikaawa padiajni nisre jliwidaapuliko jliaji Río Negro nayu jnaji idejnikjeti Compensation International Progress S.A.–Ciprogress Greenlife-jnite inaikitsa yufakape nini yapiyaperi.

Ampelozizyphus Ducke (Rhamnaceae) was long thought to include a single species, *A. amazonicus* Ducke, the plants of which are vining shrubs or high-climbing lianas found mainly in the Amazon basin of Brazil, Colombia (also in Chocó), Ecuador, Perú, the Orinoco river basin in Venezuela (Bolívar, and southern Apure states), and the Guianas (Vásquez, 1997; Steyermark and Berry, 2004; Tortosa, 2015). This species grows in either riparian habitats or in *terra firme* lowland forests at an altitude range of 50–300 m.

Ampelozizyphus amazonicus is called “Saracura-Mirá” or “Mado” in Brazil, and “Saracura” or “Palo de culebra” in Venezuela; it is well known as an Amazonian medicinal plant used to treat infections, diseases (i.e., malaria, stomach pain, liver disorders, gastritis, inflammation of the prostate, and rheumatism), snake bites, and also as a fortifying tonic and even as an aphrodisiac (Krettli et al., 2001; Revilla, 2002; Krettli & Andrade-Neto, 2004; Santos et al., 2005; Rodrigues, 2006; Andrade-Neto et al., 2008; Silva et al., 2009; Oliveira et al., 2011; 2012). A drink of “Saracura”

is prepared scraping the bark from a section of the stem, close to the ground, and/or roots, mixed with water, and stirred; this concoction has a rather bitter taste, and due the high saponin content of the bark, it yields copious foam when shaken. This foam, in Brazil, is the origin of other names associated with beer, such as “cervejinha,” “cerveja,” “cerveja domato,” “cerveja de índio,” “cerveja de mico,” and “cerveja de preto” (Torres Peçanha et al., 2013). Additionally, because of the foam produced in water, the bark is used to replace soap (Smith, 1939). Besides all these properties, “Saracura” also has been used in the last three decades as treatment of high blood pressure, diabetes, and to reduce high levels of cholesterol and triglycerides (information provided to G.A.A. by natives of Amazonas state, Venezuela). As a result, this species is in high demand and has been overharvested: currently its populations have been considerably reduced, especially in the Upper Rio Negro region (Pedro Maquirino, pers. comm. to G.A.A., 2013).

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Up to the early 21st century, the genus was characterized by a lianoid habit (without tendrils) and an elongate, paniculate inflorescence. Based on immature fruits, Ducke (1935) described them as berry-like; notwithstanding, when mature fruits were found later, they were identified correctly as elastically dehiscent capsules (MacBride, 1956; Medan and Schirarend, 2004). Nonetheless, several authors continued to describe the fruits of *Ampelozizyphus* as drupes (for a discussion see Meier and Berry, 2008).

A second species, *A. guaquirensis* Meier & P. E. Berry, was later discovered in the cloud forests of Venezuela's Coastal Cordillera (Meier and Berry, 2008). This new taxon has characters not previously reported in the genus, such as a tree habit, a subsessile inflorescence (versus pedunculate), deciduous calyx lobes in the fruit (versus persistent), and the presence of nectaries at the base of the leaf blades (versus absent); the lobed fruits of this new taxon clearly show their capsular nature.

During field work in the upper Cuyarí and Isana river basins, the Guianía Department, we collected a second arborescent species of *Ampelozizyphus* that shares several morphological features found in the species from the Venezuelan Coastal Cordillera.

Ampelozizyphus kuripacorum Aymard & Castro-Lima *sp. nov.* TYPE: COLOMBIA. Guianía: Corregimiento Campo Alegre (Panapana): Caño Guaviarito, afluente del río Cuyarí, ca. 3 km aguas arriba de Campo Alegre, aprox. 01°52'N, 69°00'W, 200 m, 04 Mayo 2014 (fl and fr), Francisco Castro-Lima, Gerardo Aymard C., Vladimir Minorta-C., Marcela González, Adela Lozano & Carolina Villegas-V. 18256 (Holotype: COL; Isotype: COAH). Figs. 1–2.

This new species is morphologically similar to *A. guaquirensis* Meier & P. E. Berry, from which it differs by having petioles 1.5–3.3 cm long, elliptic leaves, the tufted hair clusters (domatia) only located in both side at the base of the midrib lower surface, the glands (nectaries) orbicular, 3–3.4 × 1–1.6 mm, located ca. 5 mm from the base of the leaf blades, the inflorescence a cyme, 0.5–2.2 cm long, few to single-flowered, and the flowers with a bifid stigma.

Small tree 6–12 m tall, young branches and twigs covered with appressed yellow-brown hairs, glabrescent when mature, stipules ca. 20 × ca. 5 mm, lanceolate, covered with yellow-brown hairs externally, glabrous internally and at the tip, early caducous. Leaves alternate, distichous, petioles 1.5–3.3 cm long, densely covered by hairs similar to the young twigs, canaliculate along the length of upper side; lamina elliptic, 8–19 × 5–14 cm, subcoriaceous, base obtuse, apex shortly acuminate, glabrescent on the upper surface, with scattered appressed hairs on the lower surface, 3-veined from the base, midvein sunken, the other primary veins impressed on the upper surface of the lamina, elevated on the lower surface, and covered with appressed hairs like the petiole on both surfaces, secondary veins external

to the two lateral veins weakly plane on both surfaces of the lamina; two conspicuous lateral glands (extrafloral nectaries) located ca. 5 mm from the base of the leaf blade (sometimes two glands in each side), each gland orbicular, 2–3.4 × 0.5–1.6 mm, glabrous, the domatia 1–2 mm long, oblong, only located at the both sides at the base of the midrib on the lower surface. Inflorescence axillary, shortly pedunculate (ca. 0.5 mm long in flower, to 1–2.2 cm long in fruit), few-flowered cymes to single flowered, these 1–2 times dichotomous, rachis, pedicels and sepals externally densely covered with appressed hairs similar to the leaves and young twigs; pedicels ca. 5 mm long at anthesis, to 8–10 mm long in fruit. Flowers cream-colored to greenish-yellow; calyx tube shortly turbinate, 5-lobed, lobes thick, triangular, 3–3.5 × ca. 2 mm (in the middle), glabrous internally; petals 5, inserted on the margin of the disk, cucullate at apex, unguiculate at the base, 2–2.5 × 1–1.5 mm, glabrous on both sides; stamens 5, opposite the petals, filaments 1.5–2 mm long, glabrous, anthers basifixed, ca. 0.5 mm long; ovary semi-inferior, 3-carpellate, with a thick nectariferous annular disk on the upper surface, ovules one per locule; style ca. 0.5 mm long and wide, glabrous with an apical bifid stigma. Fruit a trilobed capsule ca. 2.5 cm × ca. 1.4 cm diam when mature, the calyx lobes deciduous; endocarp hard when mature, 1.5–2 cm long, glabrous on both sides, covered the seed completely, explosively dehiscent when dried. Seeds one per locule, ca. 11 × ca. 10 mm, oblong, brown, shiny and glabrous.

Additional specimens examined: COLOMBIA. Guianía: Corregimiento Campo Alegre (Panapana): same locality as the type. Marcela González, Francisco Castro-Lima, Gerardo Aymard C., Vladimir Minorta-C., Adela Lozano & Carolina Villegas V. 675 (COL).

Eponymy: *Ampelozizyphus kuripacorum* is named after the Kuripaco Indigenous people, a nation that has lived for centuries in the upper Rio Negro area (González Náñez, 1987, 2005, 2013), largely a pristine region with a diverse and unique flora and fauna.

The biological exploration of the upper Cuyarí river had been limited. Nevertheless, the Isana, Guianía, and Inirída rivers were explored by the famous ethnologist T. Koch-Grünberg between 1903–1905 (Kraus, 2004), by Hamilton A. Rice and P. P. Bauer in 1912–1913 (Rice, 1914), F. von Luetzelburg in 1928–1929 (Lopes de Sousa, 1959), and by R. E. Schultes with J. Murça Pires and F. López in 1947 and later in 1952, and R. Lemos Fróes and G. A. Black also in 1947 and later in 1952 (Kirkbride Jr., 1980; Fantz, 1982).

Relationships: Because of its arborescent habit, petioles and inflorescences covered with appressed yellow-brown hairs, the presence of glands on the leaf blades, short inflorescences, and deciduous calyx lobes in the fruit, this new species is most similar to *A. guaquirensis*, however *A. kuripacorum* differs from the latter and from *A. amazonicus* Ducke based on the characters indicated in the following key.

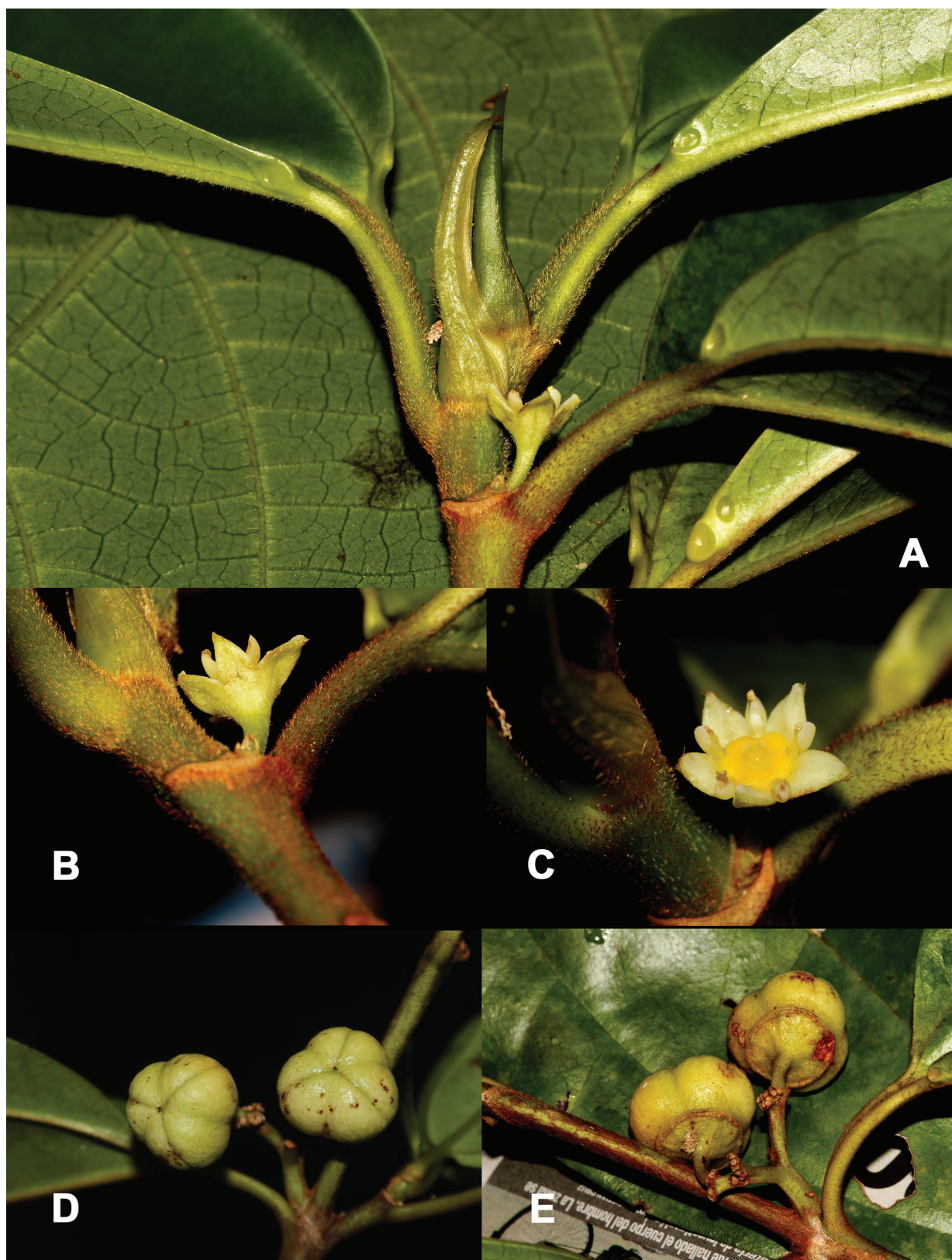


FIGURE 1. *Ampelozizyphus kuripacorum* Aymard & Castro-Lima. **A**, apex of a vegetative shoot, showing domatia on the lower surface of several leaves and a flower; notice the indument on leaf sheaths and petioles; **B**, side view of flower; **C**, flower viewed from above; **D–E**, two views of the fruits. Photographs by F. Castro-Lima based on the Holotype.

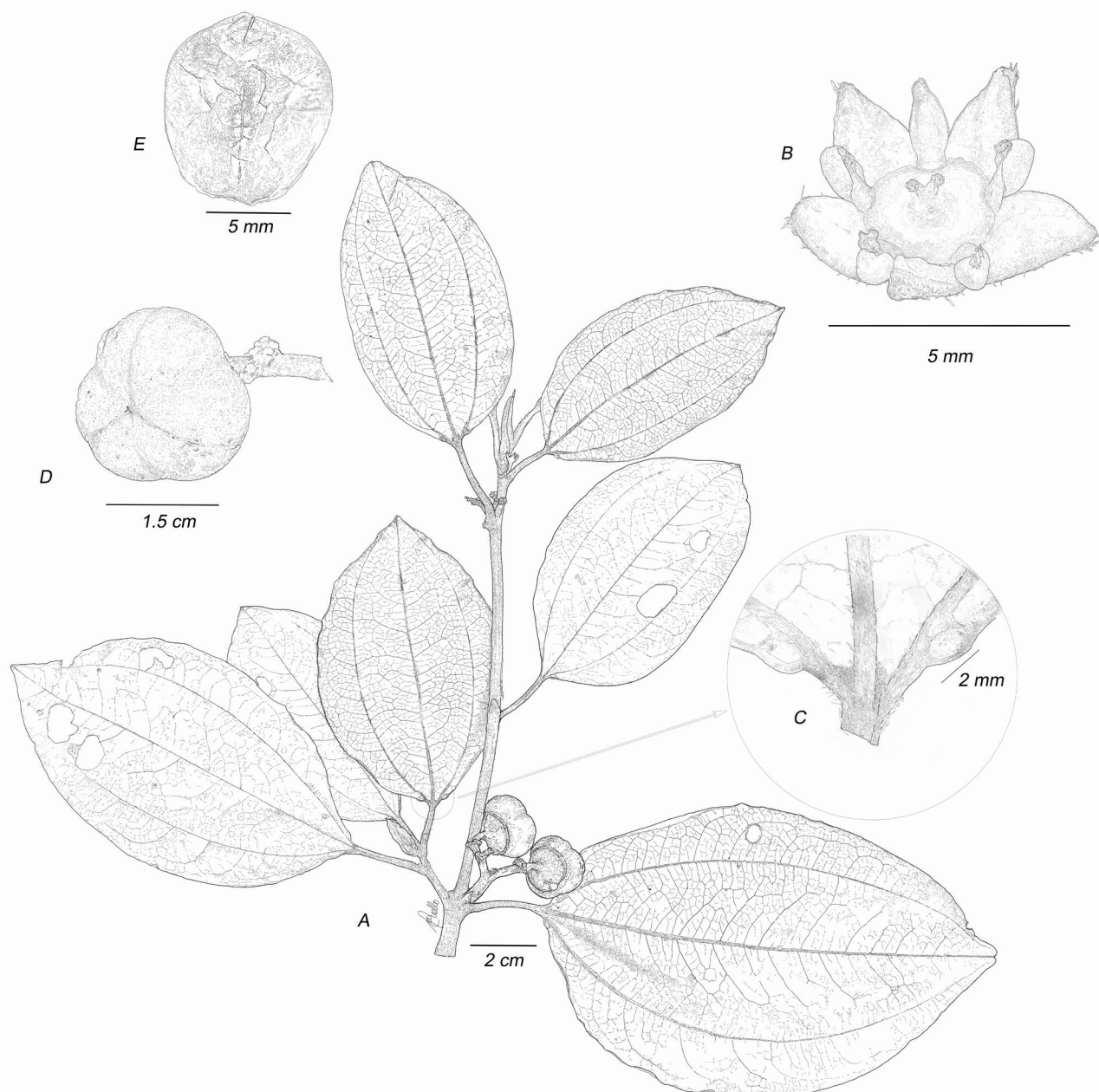


FIGURE 2. *Ampelozizyphus kuripacorum* Aymard & Castro-Lima. **A**, habit showing the branch with the young fruits; **B**, flower from above; **C**, nectary glands and domatia at the base of the leaf; **D**, young fruit; **E**, seed. Drawn by N. Cuello based on the Holotype.

KEY TO THE SPECIES OF *AMPELOZIZYPHUS*

- 1a. Habit lianoid; nectaries at the base of the leaf blades absent; inflorescence pedunculate, many-flowered; calyx lobes absent in fruit *A. amazonicus*
- 1b. Habit arborescent, nectaries at the base of the leaf blades present; inflorescence subsessile, many- to single-flowered; calyx lobes present in fruit 2
- 2a. Petioles 1.5–2.2 cm long; leaves oblong-elliptic, base acute, the lower surface with clusters of tufted hairs (acarodomatia) present at the junction of the secondary and central vein and at the junction of the two lateral veins with the external secondary veins on the lower leaf surface, lateral glands (nectaries) located at the base of the leaf blades, elliptical, swollen, $0.4\text{--}0.7 \times \text{ca. } 0.5$ mm; inflorescence a many-flowered, 3.7–10 cm long cyme; stigma trifid. *A. guaquirensis*
- 2b. Petioles 1.5–3.3 cm long, leaves elliptic, base obtuse, the acarodomatia only located at the both sides at the base of the central vein on the lower surface, lateral glands (nectaries) located ca. 5 mm away from the base of the leaf blades, orbicular in shape, $3\text{--}3.4 \times 1\text{--}1.6$ mm; inflorescence a few- to single flowered, 0.5–2.2 cm long cyme, stigma bifid *A. kuripacorum*

Phenology: Specimens of *Ampelozizyphus kuripacorum* bearing flowers and immature fruits were collected during the start of the rainy season (April–May).

Habitat and distribution: This new species is known from the margins of flooded forests drained by black water river of Caño Guaviarito, an affluent of the upper Cuyarí river, near the village of Campo Alegre, Guianía department, Colombia, at altitudes between 100–300 m. This new species probably has a wider distribution in moist Amazon forests of the upper Río Negro basin, an area scantily explored botanically.

The discovery of this new species and the recent description of *A. guaquirensis* clearly indicate that the description of tribe Ampelozizipheae (Richardson et al., 2000a,b) and additional taxonomic work on Rhamnaceae (Steyermarck and Berry, 2004; Medan and Schirarend, 2004; Fernández-Alonso and Arbeláez, 2008) should be amended.

The following key, where the newly found morphological features of *Ampelozizyphus* have been incorporated, and can be used to identify the genera of Rhamnaceae found in Colombia.

KEY TO THE GENERA OF RHAMNACEAE OF COLOMBIA (BASED ON FERNÁNDEZ-ALONSO AND ARVELÁEZ, 2008)

- 1a. Lianas or scandent plants with or without tendrils 2
- 1b. Trees, erect shrubs, rarely scandent plants, always without tendrils 4
- 2a. Plants with circinnate tendrils; ovary inferior; fruit a longitudinally 3-winged dry mericarp *Gouania*
- 2b. Plants without tendrils; ovary superior or semi-inferior; fruit a drupe or an explosive capsule without wings 3
- 3a. Plant armed; leaves opposite or subopposite, pinnately veined; fruit a drupe *Sageretia*
- 3b. Plant unarmed, leaves alternate with 1 to 3 main pairs of lateral veins at the base, fruit a trilocular capsule *Ampelozizyphus*
- 4a. (1b) Fruit an explosive capsule 5
- 4b. Fruit a drupe 8
- 5a. Shrubs, leaves up to 1 cm long; petals absent *Colletia*
- 5b. Shrubs or trees, leaves longer than 2.5 cm long; petals present 6
- 6a. Leaves densely clustered at the tip of the branches; petioles with bilobed glands located at or close to the base; inflorescences terminal, longer than the leaves *Araracuara*
- 6b. Leaves not clustered at the tip of the branches, with or without glands located in the lower blade or at the base of the leaves; inflorescences axillary, shorter than or equal to the leaves 7
- 7a. Plant armed or unarmed; leaves alternate or opposite; pinnately veined or 3-veined from the base, margins entire, serrate or crenate, with or without glands located in the lower blade or at the base of the leaves; flowers sessile to shortly pedunculate, hypanthium cup dish-shaped, ovary 3(4)-locular; capsules 4–15 mm long, opening loculicidally; seeds with abundant endosperm *Colubrina*
- 7b. Plant unarmed; leaves distichous, always entire, alternate, 3-veined from the base and with glands located in the lower blade or at the base of the leaves; flowers pedunculate, hypanthium shortly turbinate, ovary 3-locular; capsules 20–25 mm long, opening septicidally; seeds with little endosperm *Ampelozizyphus*
- 8a. (4b) Fruit with only one pyrene 9
- 8b. Fruit with 2–4 pyrenes 13
- 9a. Plants armed; leaves alternate or in fascicles 10
- 9b. Plants unarmed; leaves opposite, rarely subopposite 11
- 10a. Leaves clustered in small fascicles, pinnately veined; flowers solitary or in axillary fascicles; petals absent *Condalia*
- 10b. Leaves alternate; 3–5-veined; inflorescences cymes or short thyrses; petals present *Zizyphus*
- 11a. (9b) Flowers without petals *Krugiodendron*
- 11b. Flowers with petals 12
- 12a. Inflorescences umbelliform cymes with more than 5 flowers, flower long-pedunculate *Rhamnidium*
- 12b. Inflorescences cymes with 2–4 flowers, flower short-pedunculate *Karwinskia*
- 13a. (8b) Plants unarmed (if spines present, these never recurved and located at the end of the branches); leaves and branchlets alternate (rarely opposite); ovary superior *Rhamnus*
- 13b. Plants armed; leaves and branchlets opposite (sometimes subopposite); ovary semi-inferior *Scutia*

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THE LAURACEOUS COLLECTIONS OF CARL FRIEDRICH PHILIPP VON MARTIUS IN THE *FLORA BRASILIENSIS*

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Abstract. This study refers to specimens of Lauraceae collected in Brazil by Carl Friedrich Philipp von Martius between 1817 and 1820. He collected 57 currently accepted species of Lauraceae, which belong to nine genera: *Aniba*, *Cassytha*, *Cinnamomum*, *Cryptocarya*, *Dicypellium*, *Licaria*, *Nectandra*, *Ocotea*, and *Persea*, for which Martius is known to have made about 99 different collections. The vast majority of them are nomenclatural types and, taking into account the synonyms involved, encompassing 26 holotypes, 23 lectotypes, and 30 syntypes. Besides Martius himself, early descriptions and citations of these materials were made by Nees von Esenbeck, Meissner, and Mez, the first monographers of the family. Martius's collections were the basis for the *Flora Brasiliensis*, where the taxonomic treatment of Lauraceae was made by the Swiss botanist Carl Daniel Friedrich Meissner in 1866, being of particular interest for indicating all the collections examined and available at that time. Here, we provide an annotated and updated list of 60 entries with information on the status of the names and their types, currently accepted names, collections found in different herbaria, accompanied by an Index to Scientific names and an Index to Collections. Although there are no cases of specimens of Lauraceae collected by Martius from his "*Martii Herbarium Florae Brasiliensis*," they are also listed here since they have been attributed to him in literature. Lectotypes for two names, *Cryptocarya speciosa*, and *Nectandra nitidula* var. *maior*, are designated, and a new synonymy is proposed.

Resumo. O presente estudo refere-se aos espécimes de Lauraceae que Carl Friedrich Philipp von Martius coletou no Brasil entre 1817 e 1820. Ele coletou 57 espécies atualmente aceitas de Lauraceae, pertencentes a nove gêneros: *Aniba*, *Cassytha*, *Cinnamomum*, *Cryptocarya*, *Dicypellium*, *Licaria*, *Nectandra*, *Ocotea*, e *Persea*, para os quais Martius é sabido de ter feito cerca de 99 coletas diferentes. A grande maioria das mesmas são tipos nomenclaturais e, levando-se em consideração os sinônimos envolvidos, englobando 26 holótipos, 23 lectótipos e 30 síntipos. Além do próprio Martius, as primeiras descrições e citações desses materiais foram feitas por Nees von Esenbeck, Meissner, e Mez, que foram os primeiros monografistas da família. As coleções de Martius serviram de base para a *Flora Brasiliensis*, onde o tratamento taxonômico das Lauraceae ficou a cargo do botânico Suíço Carl Daniel Friedrich Meissner em 1866, sendo de particular interesse por indicar todas as coleções examinadas e disponíveis à época. Aqui, apresentamos uma lista anotada e atualizada de 60 entradas com informações sobre o estado dos nomes e de seus tipos, nomes atualmente aceitos, coleções dos diferentes herbários, acompanhadas de um Índice de Nomes Científicos e de um Índice de Coleções. Embora não existam casos de espécimes de Lauraceae oriundos do "*Martii Herbarium Florae Brasiliensis*," que tenham sido coletados por Martius, esses também são aqui listados por terem sido atribuídos a ele na literatura. Lectótipos de dois nomes, *Cryptocarya speciosa*, e *Nectandra nitidula* var. *maior*, são designados, assim como uma sinonímia nova é proposta.

Keywords: Brazil, *Herbarium Florae Brasiliensis*, historical collections, nomenclature, taxonomy

Carl Friedrich Philipp von Martius was born on the 17th of April 1794 in Erlangen, Germany, and died in Munich on the 13th of December 1868. He is one of the most famous naturalists of the 19th century, having his name in close association with Brazil and its flora. In 1817, King Maximilian Joseph I of Bavaria, took the occasion of the marriage of the Archduchess Caroline Josepha Leopoldine von Habsburg-Lothringen with the Crown Prince, Dom Pedro de Alcântara, the future Emperor of Brazil, to send the zoologist Johann Baptist Spix and the botanist Carl Martius to join the Austrian scientific commission that was organized to accompany the entourage of the Archduchess on her departure to Brazil. These [and many other] scientists came to explore the Brazilian Kingdom, making collections of animals, plants, and minerals, investigating the productions of the countries visited, the culture, the inhabitants, etc. (Papavero, 1971). Martius arrived in Rio de Janeiro on the frigate "Austria" on the 15th of July 1817, accompanied by

the Austrian entomologist and botanist Johann Christian Mikán, and his wife, along with the Austrian painter Thomas Ender, and Spix (Martius and Rodrigues, 1956: 433; Papavero, 1971: 61). After some weeks in Rio, Spix and Martius decided to initiate their voyage through Brazil.

Spix and Martius collected in Brazil between 1817 and 1820. Detailed information about their itineraries and the places visited can be found in Spix and Martius (1823, 1828, 1831a, 1831b, 1968), Urban (1906), Papavero (1971), and in Tiefenbacher (1983). The journey itself began on the 8th of December 1817, with São Paulo as the first destination, reaching it by the end of the year (31st of December). In 1818, they left São Paulo for southern Bahia, gathering large collections especially in Minas Gerais and Bahia, where they arrived in November 1818. For a few months they collected in the northeastern states of Bahia, Pernambuco, Piauí and Maranhão, after which embarking for Belém in July 1819. The collecting followed by the Ilha de Marajó and other

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localities in the vicinity of Belém, Pará, then beginning the final stage of the expedition up the Rio Amazonas to Manaus, where Spix and Martius followed separate paths: the first followed by the Rio Negro and its tributaries and Martius followed the Rio Solimões and Rio Jupará. Both returned to Belém in April 1820 and in June of that year, embarked for Europe, arriving in Lisbon on the 23rd of August, and finally in Munich in December 1820 (Spix and Martius, 1823, 1828, 1831a; Urban, 1906; Shepherd, 2002).

The literature about the life and writings of Carl Martius is quite extensive, given the amount and importance of his work. Among the primary sources, we can highlight the texts by Lasègue (1845), de Candolle (1856a, b, 1857), Carus (1869), Eichler (1869a, c, d), Meissner (1869, 1870), Seemann (1869), Schramm (1869a, b), Spring (1870, 1871), Rau (1871), Wunschmann (1884), and Ross (1917). More recent literature and contextualized approaches about Martius's works can be found in Dutra (1942), Hoehne (1942), Rambo (1952), Sommer (1953), Biblioteca Nacional (1968), Stafleu and Cowan (1981), Wuschek (1989), Mägdefrau (1990), Förther (1994), and Lisboa (1995, 1997).

The collections of Martius during the travel to Brazil may be estimated at nearly 8,000 species, of which 800 were collected in port sites of Europe in Istria, Malta, Gibraltar, Madeira, and Portugal, at the beginning and the end of the travel (Martius, 1850; Wallich, 1851; Förther, 1994) (c. 20,000 to 25,000 specimens), thus becoming the foundation for the production of the *Flora Brasiliensis*. Martius originally edited this monumental work from 1840 to 1868, with the printing of 46 fascicles, where more than about 9,000 species were treated, illustrated in about 1,400 figures and 1,071 lithographs. The edition of the *Flora* was continued posthumously by August Wilhelm Eichler (1839–1887) and Ignatz Urban (1848–1931), with completion of the work in 1906. The *Flora Brasiliensis* in its final form consists of 15 volumes (in 40 parts) *in folio*, originally published in 130 individual fascicles (in 130 dated parts), the text consisting of 20,733 “pages” (the page numbers actually refer to columns, two on each page), and 3,811 lithographs and nature-prints, illustrating 6,246 species in full size. Given the magnitude of the undertaking, the work had the collaboration of 65 researchers including the most illustrious European botanists of the time, who have described a total of 22,767 species (Urban, 1908; Martius and Rodrigues, 1956: 434; Baldus in Spix and Martius, 1968: 8; Shepherd, 2002). The majority of those species are angiosperms, of which 19,629 are native to Brazil and 3,138 are from adjacent regions or introduced in the country. The treatment of Lauraceae in the *Flora Brasiliensis* was made by the Swiss botanist Carl Daniel Friedrich Meissner (1800–1874), which was published in Volume 5, Part 2, in 1866, with the description of 327 species. Among them, there are 64 taxa with the indication of collections made by or attributed to Martius.

During the expedition to Brazil, Martius made quick notes *in situ* for 3,320 species of plants, in his “*Adversaria Botanica*” (Martius, 1850: 723; Wallich, 1851: 68; Förther, 1994). Later, in his writings, he refers to this unpublished manuscript again. A handwritten copy made by A. Progel,

entitled “*Observationes botanicae, Plantae in itinere Brasiliensi annis 1817–1820 a Car. Frid. Phil. Martio descriptae, vol. 1–6*,” bound in six volumes *in quarto*, is housed at the Library of the Botanische Staatssammlung München (Martius, 1817–1820). A xerographic copy of these volumes is also deposited in the Library of the Royal Botanic Gardens, Kew. Of key importance is the fact that many of the specimens collected by Martius have labels that refer to those comments, providing an additional source of information on the species (see Förther, 1994). For Lauraceae, all these cases have been registered here and referred to as “*Martius Obs.*,” followed by their numbers.

Additionally, as pointed out by Förther (1994: 12), Martius received many collections sent from Brazil, in between the end of 1830 and the end of 1840, made by Ackermann (gathered in 1830–1836), P. Claussen (gathered in 1834–1843), B. Luschnath (gathered in 1831–1837), A. L. P. da Silva Manso (gathered ca. 1830–1832), and L. Riedel (gathered ca. 1821–1836), which were distributed by him to major European herbaria (e.g., B, BM, G, L, LE, M, W, etc.). Among them, there were a series of new species that Martius entitled as “*Herbarium Florae Brasiliensis*,” being published in the journal *Flora* between 1837 and 1841 (Martius, 1837–1841). These exsiccatae distributed to herbaria bear printed labels with “*Martii Herbar. Florae Brasil. N°*,” followed by a handwritten number, corresponding to what has been published in *Flora*. Although for Lauraceae there are no cases where the species were collected by Martius, often in the literature these collections were assigned to him. For this reason, they have been also listed in this work and, when known, their collectors are indicated. As pointed out by Hind (2011), the specimens at herbarium BR usually provide evidence identifying the collectors, since they bear both the labels of the original collector and of the “*Herb. Fl. Bras.*”

Martius's own collections from Brazil are held in the Botanische Staatssammlung München (M), with duplicates at B, BM, BR, G-DC, K, L, LE, P, and W (Urban, 1906; Förther, 1994). Martius's private herbarium (*Herbarium Martii*), estimated to comprise about 300,000 specimens, containing 60,000 species, nearly half of which are Brazilian, was purchased by the Belgian Government for a sum of £1,200, in 1870, to form the basis of a national collection, and is now at the Botanic Garden Meise (BR) (see Eichler, 1869b; Bommer, 1870; Seemann, 1870; Stafleu and Cowan, 1981; Förther, 1994). In Förther (1994), a detailed account on the development and content of Martius's private herbarium and his numerous, fruitless attempts to sell his collections to the Bavarian Government is presented. According to Bommer (1870), these efforts of selling the private herbarium to the Bavarian Kings, Maximilian II and his successor Ludwig I, were unsuccessful because Bavaria already had the Brazilian herbarium formed by Martius and Spix. However, Martius's strained relationship with King Maximilian II might help to partially explain the king's refusal to buy the collections. The king had refused to increase Martius's starting salary since his initial appointment in 1836 to succeed Schrank as the first curator of the Munich Botanical Garden (see Förther, 1994).

The aim of the present study was to review all Lauraceae collections made by Martius in Brazil, updating and commenting their taxonomic status, detailing and clarifying the localities and dates of the collections, as well as indicating all herbaria known to possess their duplicates. Meissner's treatment of the family in Martius's *Flora Brasiliensis* (Meissner, 1866) was taken as a key reference for citing the material collected by Martius along with the specimens examined and available from other collectors.

This study is based on herbarium material from the herbaria A, AWH, B, BC, BM, BR, C, CGE, COL, E, F, FI, G, G-DC, GH, GOET, GZU, HAL, HBG, HRCB, JE, K, KIEL, KR, L, LE, LINN, LISU, LZ, M, MA, MEL, MO, NY, OUPR, OXF, P, S, SBT, STR, TO, TUB, U, US, VT, W, and WRS� (herbarium acronyms according to Thiers, [continuously updated]). "Original material," indicated within the text, relies on Art. 9.2 & 9.3 ICN (McNeill et al., 2012). All species names and their taxonomic treatment were checked in the classical taxonomic works on Lauraceae, such as those by Nees von Esenbeck (1833, 1836, 1848), Meissner (1864), and Mez (1889), as well as in the more recent published or available revisions: *Aiouea* Aubl. and *Aniba* Aubl. (Kubitzki and Renner, 1982), *Cassytha* L. (Weber, 1981), *Cinnamomum* Schaeff. (Lorea-Hernández, 1996), *Cryptocarya* R. Br. (Kostermans, 1937, 1938a; Moraes, 2005, 2007), *Dicypellium* Nees & Mart., *Phyllostemonodaphne* Kosterm., *Systemonodaphne* Mez and *Urbanodendron* Mez (Rohwer, 1988), *Endlicheria* Nees (Chanderbali, 2004), *Licaria* Aubl. (Kostermans, 1936; Kurz, 2000), *Nectandra* Rol. ex Rottb. (Rohwer, 1993), *Ocotea* Aubl. (Rohwer, 1986), and *Persea* Mill. (Kopp, 1966).

AN ANNOTATED LIST OF LAURACEAE COLLECTED BY MARTIUS OR ATTRIBUTED TO HIM

1. *Aiouea laevis* (Mart.) Kosterm., *Recueil Trav. Bot. Néerl.* 35: 84. 1938 = *Aiouea brasiliensis* Meisn. in DC., *Prodr.* 15(1): 83. 1864, *nom. illegit.*; *ibid.* in Martius, *Fl. Bras.* 5(2): 170. 1866; Mez, *Jahrb. Königl. Bot. Gart. Berlin* 5: 43. 1889; Moraes, *Harvard Pap. Bot.* 17(1): 189. 2012; *ibid.* in *Pl. Ecol. Evol.* 146(3): 361. 2013.

Basionym: *Cryptocarya laevis* Nees ex Mart., *Flora* 21(2, Beibl.): 64. 1838; Meissner in DC., *Prodr.* 15(1): 83. 1864; *ibid.* in Martius, *Fl. Bras.* 5(2): 170. 1866; Renner, *Fl. Neotrop. Monogr.* 31: 109. 1982. TYPE: BRAZIL. Rio de Janeiro, "Crescit in sylvis Caa-poera dictis ad Sebastianop.," 12 June 1817, *Martii Herbar. Florae Brasil. N° 237* (Holotype: BR 0000008686169 [annotated by Nees as "*Cryptocarya pyriformis levis* N. ab. E."]; Isotypes, AWH 28362, AWH 28363, B⁺ [F neg. 3782], BM 000894059, BR 0000008685834, E 00259412, FI 005252, G, G 00021045, G 00021046, G 00021047, G-DC 00200460, GH 00041126, HAL 0101918, JE 00004805 [and probably JE 00000523, ex Herbar. Bernhardt, *Anonymous s.n.*], K 000512712, K 000512713, K 000512714, KR, L 0035524, L 0035525, LE 00000096, LE 00000135, LZ⁺, M 0111049, M 0111050, M 0111051, M 0111052, MO 247250, NY 00354800, P00128383, P00128384, W⁺, WRS�).

As results, we show below that Martius collected 57 currently accepted species of Lauraceae, 55 of which are native to Brazil (not introduced or subsontaneous). Taking into account the synonyms involved, among the 99 different collections gathered by Martius, 26 are holotypes, 23 are lectotypes, and 30 are syntypes of names of the corresponding taxa, i.e., the vast majority are nomenclatural types. These numbers alone would be enough to demonstrate the importance of the Lauraceae collections that Martius gathered in Brazil over the three years of his expedition with Spix. However, when comparing the expedition of Spix and Martius with what is known about those of other naturalists who visited Brazil in the early 19th century (see Mez, 1892, for a list of collectors and their numbered collections of Lauraceae), it is evident that just Friedrich Sellow (1789–1831) and Ludwig Riedel (1791–1861), who remained in Brazil for much longer, would have surpassed Martius in number of species collected for the family. Sellow collected in Brazil, from 1814 to 1831, a total of 61 currently accepted species of Lauraceae (Moraes, 2008). Riedel, in turn, came to Brazil in 1821 and remained in the country until his death in 1861. His collection period was from 1821 to 1836, in which he collected 92 species of Lauraceae (Moraes, 2012a, b).

For convenience, the current accepted names of species are listed in alphabetic order. Accepted names appear in **boldface italics**, synonyms in *italics*. Homotypic synonyms are indicated by "=", while the heterotypic are under the entries "Synonym" or "Synonyms." Whenever available, barcode numbers are quoted with the herbarium acronyms. An Index to Scientific Names and an Index to Collections are provided at the end.

Synonyms: *Aiouea brasiliensis* Meisn. var. *attenuata* Meisn. in DC., *Prodr.* 15(1): 83. 1864; *ibid.* in Martius, *Fl. Bras.* 5(2): 170. 1866 = *Aiouea riedelii* Mez, *Jahrb. Königl. Bot. Gart. Berlin* 5: 37. 1889, *nom. illegit. superfl.* TYPE: BRAZIL. Loco haud indicato, s.d., L. Riedel s.n. (Holotype: LE; Isotypes, B⁺ [F neg. 3788], G 00020674, GOET [2 sheets], K 000601965, L 0035527, LE [2 sheets], NY 00354799). Specimen: BRAZIL. Bahia, Ilhéus, "ad ripas fluvi Itahype" [Rio Itaípe], March 1822, L. Riedel 688 (LE n.v.).

For a complete list of synonyms, see Kubitzki and Renner (1982).

None of the located specimens of *Martii Herbar. Florae Brasil. N° 237* bears information on who the collector is, even in BR. Nonetheless, it has been wrongly attributed to Martius by Kubitzki and Renner (1982). In fact, once Martius (1838) had indicated the gathering as from June, in Rio de Janeiro, this excluded him as the collector, since he has arrived in Rio de Janeiro in July 1817. From information on the sites and dates of the collections reported by Martius in *Herbarium Florae Brasiliensis*, and based on the respective specimens located in BR, the most likely collector of the present species would be Bernhard Luschnath. As pointed out by Moraes (2012: 189), in Martius's *Flora Brasiliensis*, Meissner (1866: 170) mistakenly attributed to Martius the collection of *Riedel 688* from Rio Itaípe.

2. *Aniba canelilla* (Kunth) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 53. 1889; Kostermans, Recueil Trav. Bot. Néerl. 35: 898. 1938; Kubitzki, Fl. Neotrop. Monogr. 31: 79. 1982; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 13, 111. 1986; Moraes, Harvard Pap. Bot. 17(1): 190. 2012.

Basionym: *Cryptocarya canelilla* Kunth in Humboldt, Bonpland and Kunth, Nov. Gen. Sp. (quarto ed.) 7: 192, t. 645. 1825. Lectotype (designated by Kostermans, 1938b: 899): VENEZUELA. “crescit ad orientem Esmeraldæ, in monte de la Canelilla, juxta ripam Cauræ et erevati; item prope catarractam Maypurensium,” s.d., immat. fr., *F. W. H. A. von Humboldt & A. J. A. Bonpland 1018* (B-W 07784 00 0 & B-W 07784 01 0 [“*Laurus canelilla* Willd.,” herbarium name, “Orinoco”]; Isolectotypes, P 00307242 [F neg. 35005], P 00506929).

Synonyms: *Cryptocarya pretiosa* Mart. in Buchner, Repert. Pharm. 31: 356. 1829, **syn. nov.** = *Mespilodaphne pretiosa* Nees & Mart., Linnaea 8: 45. 1833, *nom. illegit. superfl.*; Martius, Syst. Mat. Med. Bras.: 111. 1843; *ibid.* in Fl. Bras. 5(2): 317. 1868 = *Mespilodaphne pretiosa* Nees & Mart. var. *angustifolia* Nees, Syst. Laur.: 237. 1836, *nom. invalid.*; Meissner in DC., Prodr. 15(1): 103. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 198–199. 1866; Moraes, Komarovia 6(1): 16. 2008. LECTOTYPE (designated here): BRAZIL. Pará, “in sylvis ad oppidum Pará rarius, frequentius in Provinciae Paraensis interioribus,” 1819, immat. fr., fr., *C. F. P. von Martius s.n.* (M 0121069 [“*Cryptocarya pretiosa* Mart.,” “Páo v. Casca preciosa Lusitan.”]). Original material: BRAZIL. Pará, s.d., immat. fr., *C. F. P. von Martius s.n.* (M 01121070 [fragment], M 0121071, M 0121072, MEL 2318499); *idem*, “ad fluvium Rio Negro,” s.d., immat. fr., *C. F. P. von Martius s.n.* (G, MEL 2318499); *idem*, Amazonas, “inveni prope praedium Capitany in prov. Alto Amaz.,” 1819, immat. fr., *C. F. P. von Martius s.n.* (BR 0000008685865 [“*Laurus pretiosa*,” herbarium name]).

For a complete list of synonyms, see Kubitzki and Renner (1982).

Vernacular names: “Casca preciosa” (Martius, 1829), “Pereiorá Tupin.,” “Páo v. Casca pretiosa” (Martius, 1843, 1868).

Hitherto, the name *Cryptocarya pretiosa* Mart. has been interpreted as a herbarium name mentioned in the synonymy of *Mespilodaphne pretiosa* Nees & Mart. var. *angustifolia* Nees as “*Cryptocarya pretiosa* Mart. in Herb. Brasil. Monac.” (Nees von Esenbeck, 1836), therefore being overlooked by Nees as already published by Martius (1829).

Moraes (2008) pointed out that, as indicated by Rohwer (1986: 13, 111, 229), the name *Mespilodaphne pretiosa* Nees & Mart. is superfluous, thus illegitimate, since *Laurus quixos* Lam., Encycl. 3: 455. 1792 was cited as a synonym {= *Ocotea quixos* (Lam.) Kosterm., Recueil Trav. Bot. Néerl. 35: 900. 1938. TYPE: [ECUADOR] “ex Provincia de los Canelos in Peru,” “Provincia Riobaruba,” 12 April 1748, sterile, *Joseph de Jussieu s.n.* (Holotype: P-JU 00307277 [Cat. No. 4245]); Isotype, P-LA 00381527, sterile.; see Rohwer, 1986: 229, 249; 1993: 297–298}}.

The earlier name *Laurus quixos* was not included in a subordinated taxon under *Mespilodaphne pretiosa*, so the latter name should be automatically typified by the type of the first one (Art. 7.5). The name *Ocotea pretiosa* Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 250. 1889, based on *Mespilodaphne pretiosa* Nees & Mart. with exclusion of its variety *angustifolia* Nees (with *Laurus quixos* in synonymy) is therefore legitimate. The former name in sense of Mez is *Ocotea odorifera* (Vell.) Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 111. 1986. Another name, *Aydendron suaveolens* Nees, Linnaea 8: 37. 1833, which was included by Mez into the concept of *Ocotea pretiosa* does not make the new name illegitimate because the combination *Ocotea suaveolens* (Meisn.) Benth. ex Hieron., Bol. Acad. Nac. Ci. 4: 437. 1881 (= *Oreodaphne suaveolens* Meisn. in DC., Prodr. 15(1): 136. 1864) was already published to that date. The combination “*Ocotea pretiosa* Benth. et Hook. f.” recorded in *Index Kewensis* has not been validly published by Bentham in Bentham and Hooker (1880: 158), being substituted by the phrase “species typica generis” without any nomenclatural status under the ICN (Art. 35.2).

Martius (1843a), in his *Systema materiae medicae vegetabilis brasiliensis*, cited the existence of several lithograph plates that were already finished from his book that was never published, “*Plantae Medicae et Oeconomicae Brasiliae*” (Mart. Pl. med. et oec. Br. ined.), with the plate 33 being indicated for *Mespilodaphne pretiosa* Nees & Mart. Meissner (1866: 301–302) also mentioned this unpublished book as “Tabulas LXVI. LXX. XCV. XCVI. CI. CII. receptae sunt e Martii opere inedito: Plantae medicinales et oeconomicae Brasilienses” and used those Martius’s plates in his monograph, which were acknowledged as “Tabula nostra [...] ex Martii Pl. med. et oec. Bras. ined. recepta” (for *Aydendron cujumarum* [Tabula LXVI], *Mespilodaphne opifera* [LXX], *Nectandra puchury-major* [XCV], *Nectandra cymbarum* [XCVI], *Nectandra puchury-minor* [CI], and *Dicypellium caryophyllaceum* [CII]). However, for “*Mespilodaphne pretiosa* Meissn.,” Meissner only quoted “Tabula nostra LXXIV,” therefore evidencing that another plate was prepared for the species in question. Actually, plate 74 in *Flora Brasiliensis* refers to *Ocotea odorifera* (Vell.) Rohwer, which most likely was based on Riedel’s collection from “Mandiocca,” since it is the only flowering material among the collections cited by Meissner (see Moraes, 2012b).

3. *Aniba citrifolia* (Nees) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 74. 1889; Kostermans, Recueil Trav. Bot. Néerl. 35: 890. 1938; Kubitzki, Fl. Neotrop. Monogr. 31: 23. 1982; Moraes, Harvard Pap. Bot. 17(1): 191. 2012.

Basionym: *Aydendron citrifolium* Nees, Syst. Laur.: 257. 1836; Meissner in DC., Prodr. 15(1): 93. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 183. 1866. TYPE: BRAZIL. Amazonas, “Rio Negro” (Alto Amazonas), “In sylvis Japurensibus, ad amnem Juì,” February 1820, *C. F. P. von Martius s.n.* (Holotype: M 0147109 [F neg. 6583]).

Additional synonyms in Kubitzki and Renner (1982) and Moraes (2012).

4. *Aniba desertorum* (Nees) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 76. 1889; Kostermans, Recueil Trav. Bot. Néerl. 35: 892. 1938; Kubitzki, Fl. Neotrop. Monogr. 31: 38. 1982; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 247. 1986.

Basionym: *Aydendron desertorum* Nees, Syst. Laur.: 260. 1836; Meissner in DC., Prodr. 15(1): 92. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 182, t. 65. 1866 = '*Ocotea desertorum* Mart.,' *nom. nud.* = '*Ocotea obtusifolia* Mart.,' *nom. nud.* Lectotype (designated by Kubitzki and Renner 1982: 38): BRAZIL. Minas Gerais, "in sylvis Capões ad fluv. Rio Verde pequeno et in Chapada do Paranan," July 1818, fl., fr., *C. F. P. von Martius s.n.* (M 0147106; Isolectotypes, M 0147104 [ex Herb. Zuccarini], M 0147105, M 0147108). Syntype: BRAZIL. Minas Gerais, Rio São Francisco, "in sylvis capões versus f. S. Francisci," August 1818, fr., *C. F. P. von Martius s.n.* (M 0147107).

For a complete list of synonyms, see Kubitzki and Renner (1982).

5. *Aniba permollis* (Nees) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 55. 1889; Kostermans, Recueil Trav. Bot. Néerl. 35: 896. 1938; Kubitzki, Fl. Neotrop. Monogr. 31: 73. 1982.

Basionym: *Aydendron permolle* Nees, Syst. Laur.: 246. 1836; Meissner in DC., Prodr. 15(1): 88. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 176. 1866 = '*Cryptocarya aiü-üva* Mart. ex Nees,' Syst. Laur.: 246. 1836, *nom. invalid.* Lectotype (designated by Kostermans, 1938b: 896): BRAZIL. Amazonas, Tefé, "in sylvis ad Ega," December 1819, *C. F. P. von Martius Obs.* [Observationes botanicae] 2908: "Laurus Aiüüva / Arbor magna frondosa. Rami teretes tomento ferruginei. ..." (M 0147098; Isolectotypes, B[†] [F neg. 3806], M 0147099, M 0147100, NY 00354890 [fragment], NY 00354891 [fragment]). Syntype: BRAZIL. Amazonas, Tefé, "Ega," November 1831, fl., *E. F. Poeppig* 2769 (B[†], BM, F 0061359F ex W, G [2 sheets], G-DC, HAL 0103802, KIEL, LE 00006806, LE, LZ[†], M, OXF 00000388, P 00745599, P 00745600, W, WRS�).

6. *Aniba puchury-minor* (Mart.) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 70. 1889; Kostermans, Recueil Trav. Bot. Néerl. 35: 903. 1938; Kubitzki, Fl. Neotrop. Monogr. 31: 57. 1982; Moraes, Pl. Ecol. Evol. 146(3): 362. 2013 = *Nectandra puchury-minor* (Mart.) Nees, Syst. Laur.: 336. 1836; Martius, Syst. Mat. Med. Bras.: 109–110. 1843; *ibid.* in Fl. Bras. 5(2): 317. 1868; Meissner in DC., Prodr. 15(1): 166. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 277, t. 101. 1866. Basionym: *Ocotea puchury-minor* Mart. in Buchner, Repert. Pharm. 35: 172. 1830. Lectotype (designated by Mez, 1889: 70): BRAZIL. Amazonas, "in sylvis Japurensibus," December 1819, fr., *C. F. P. von Martius s.n.* (M 0113213; Isolectotype, B[†]). Syntypes: BRAZIL. Amazonas, "in sylvis secus fl. Solimões," November 1819, fr., *C. F. P. Martius s.n.* (GZU 000254329 [fragment], M 0112564); BRAZIL. Amazonas, loco haud indicato, 1819, fr., *C. F. P. von Martius s.n.* (M 0112563).

Synonymy in Kubitzki and Renner (1982) and Moraes (2013).

Vernacular names: "Fabas Pechurim v. Puchury" (Martius, 1868).

7. *Cassytha filiformis* L., Sp. Pl. 1: 35. 1753. Lectotype (designated by Imkhanitskaya, 1974: 208): INDIA. *P. Osbeck s.n.* (Herb. Linn No. 519.1, LINN). Original material: *P. Osbeck s.n.* (S [05-4065]).

Synonyms: *Cassytha brasiliensis* Mart. ex Nees, Syst. Laur.: 648. 1836; Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 490. 1889 = *Cassytha americana* Nees var. *brasiliensis* (Nees) Meisn. in DC., Prodr. 15(1): 256. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 296. 1866. TYPE: BRAZIL. Minas Gerais, "in Campis editis Minarum novarum," July–August 1818, *C. F. P. von Martius s.n.* (Holotype: M).

Cassytha americana Nees var. *puberula* (Nees) Meisn. in DC., Prodr. 15(1): 256. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 296. 1866. TYPE: BRAZIL. Bahia, *C. F. P. von Martius s.n.* (Syntype: M); BRAZIL. Bahia, "in collibus siccis pr. Ilheos. J. Domingo" [Fazenda João Domingo], June 1821, *L. Riedel* 374 (Syntypes: LE, NY 00354928).

Synonyms and further information in Stapf (1912), Kostermans (1950), and Weber (1981).

8. *Cinnamomum erythropus* (Nees & Mart.) Kosterm., Reinwardtia 6: 21. 1961; Lorea-Hernández (1996: 81); Moraes, Harvard Pap. Bot. 17(1): 193. 2012 = *Phoebe erythropus* (Nees & Mart.) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 189. 1889.

Basionym: *Persea erythropus* Nees & Mart. in Nees, Linnaea 8: 49. 1833. Lectotype (designated by Moraes, 2008: 48): BRAZIL. Minas Gerais, Ouro Preto, "in ferruginosis ad Antonio Pereira," April 1818, fl., *C. F. P. von Martius Obs.* 883 (GZU 000249338 [fragment on the top, annotated by Nees]; Isolectotypes, M 0147194, M 0147196 ["*Persea erythropus* M. Reise I. p. 401. (nomen)"]). Syntypes: BRAZIL. Minas Gerais, loco haud indicato, s.d., fr., *C. F. P. von Martius s.n.* (M 0147195); BRAZIL. Loco haud indicato, fl., *F. Sellow* 1360 (B[†], F [619716; fragment ex B[†], F neg. 58035, *Sellow s.n.*], GZU 000265498 [fragment on the bottom, annotated by Nees, *Anonymous s.n.*]).

Synonyms: *Persea erythropus* Nees & Mart. var. *angustata* Meisn. in DC., Prodr. 15(1): 55. 1864 = *Persea erythropus* Nees & Mart. var. *mixtinervia* Meisn. in Martius, Fl. Bras. 5(2): 162. 1866, *nom. illegit. superfl.* TYPE: BRAZIL. Minas Gerais, "Serra da Piedade et S. Itacolomi," October–November 1834, fl., *L. Riedel* 2777 (Syntypes: C, G [2 sheets], K 000602109, K 000602110, LE 00000480, LE 00000481, LE 00000482, NY 00355827, OXF 00000375 [*Anonymous s.n.*], P 01978620, US 00099112); BRAZIL. Minas Gerais, Ouro Preto, "in ferruginosis ad Ouro Preto," "Serra de Ouro Preto," June 1839, fl., fr., [*Ackermann s.n.*] *P. Clausen* 108 in *Martii Herbar. Florae Brasil. N° 1238* (Syntypes:

BR 0000008762092, BR 0000008764317, G-DC 00200453, LE, NY 00355828, P 00128549).

For a complete list of synonyms, see Lorea-Hernández (1996) and Moraes (2008).

9. *Cinnamomum verum* J. Presl in Berchtold & J. Presl, Přir. Rostlin 2: 36–37, t. 7. 1825 [1823?]; Moraes, Harvard Pap. Bot. 17(1): 194. 2012; *ibid.* in Pl. Ecol. Evol. 146(3): 364. 2013. Specimen: BRAZIL. Rio de Janeiro, “in horto (Chacara) secundum viam ad S. Clemente, prope Sebastianopolin, cultum,” July 1833, fl., November–December 1833, fr., *B. Luschnath s.n.* in *Martii Herbar. Florae Brasil. N° 477* (BR 0000013332587, M 0147231). Basionym: *Laurus cinnamomum* L., Sp. Pl. 1: 369. 1753.

Lectotype (designated by Wu-Kuang, 2011: 261): Herb. Clifford: 154, *Laurus* 6, sheet B (BM 000558701).

Synonyms: *Cinnamomum zeylanicum* Breyn., Ephem. Nat. Cur. Dec. I, Ann. 4: 139. 1676, *nom. invalid.* (see Howard, 1981).

Cinnamomum zeylanicum Blume; Bijdr. Fl. Ned. Ind. 11: 568. 1825; Nees in Nees and Th. Nees, Cinnam. Disp.: 48. 1823; Nees in Wallich, Pl. Asiat. Rar. 2: 74. 1831; Nees, Syst. Laur.: 45. 1836; Meissner in DC., Prodr. 15(1): 13. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 147. 1866. Specimen: BRAZIL. Rio de Janeiro, “... haec est ex horto botanico prope Rio de J.º Provinciae ejusdem nominis”, 1817, fl., *C. F. P. von Martius s.n.* (BR, M 0147232).

Cinnamomum zeylanicum Blume var. *microphyllum* Nees, Syst. Laur.: 47. 1836; Meissner in DC., Prodr. 15(1): 14. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 147. 1866. Specimen: BRAZIL. Pará, “in cultis ad Pará”, fl., *C. F. P. von Martius s.n.* (L 0036030 [“*Laurus cassioides* Mart.”, herbarium name, “Pará”; ex Herbarium Reinwardtianum], M 0147236) [“*Laurus cassioides* Mart. ex Miq.’, Ann. Mus. Bot. Lugduno-Batavi 1: 256. 1864, *nom. invalid.*].

For a complete list of synonyms, see Kostermans (1964, 1986).

The specimen cultivated in Pará that Martius collected was cited by Nees von Esenbeck (1836: 48), Miquel (1864), and Meissner (1866: 147).

10. *Cryptocarya mandioccana* Meisn. in DC., Prodr. 15(1): 75. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 165. 1866; Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 10. 1889; Kostermans, Recueil Trav. Bot. Néerl. 34: 572. 1937; *ibid.* in Recueil Trav. Bot. Néerl. 35: 125–126. 1938; Moraes, Taxon 54(3): 792. 2005; *ibid.* in Abc Taxa 3: 70. 2007; *ibid.* in Komarovia 6(1): 8. 2008; *ibid.* in Harvard Pap. Bot. 17(1): 194. 2012. TYPE: BRAZIL. Rio de Janeiro, Magé, “in sylvis Mandiocensis,” October 1823, fl., *L. Riedel s.n.* (Holotype: LE; Isotypes, B⁺ [F neg. 3844], GOET 007344, GOET 007345, K 000601800, L 0036185, L 0036186, LE, NY 00355045, OXF 00057026, OXF 00057027 [right-hand specimen], U, US 00051077). Specimen: BRAZIL. Minas Gerais, Visconde do Rio Branco, “habitat in sylvis aboriginibus ad Praesid. Joannis Bapt. et alibi. Provinciae

Minar.” April 1818, fr., *C. F. P. von Martius Obs. 1095 b*: “Noz moschada do Brazil. Litsaeae sp. ? Arbor alta trunco recto, cortice 2–3 lin. crasso castáneo epidermide laevigata cinereo-subrufesc. laevia absque rimis, ligno albedo, fibra dura compacta, speculis transversal. minutis, gravi. ...” (M 0152460 [syntype of *Cryptocarya moschata* Nees & Mart. in Nees, Linnaea 8: 37. 1833; Martius in Spix and Martius, Reise Bras. 2: 543. 1828; *ibid.* in Syst. Mat. Med. Bras.: 110. 1843; *ibid.* in Fl. Bras. 5(2): 319. 1868; Meissner in DC., Prodr. 15(1): 74. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 164, t. 56. 1866]).

Further information in Moraes (2005, 2007).

Vernacular name: “Noz mocada do Brazil” (Martius, 1843, 1868).

Originally, *Cryptocarya moschata* was based on two collections, a fruiting one by Martius and a flowering one by Sellow. Unfortunately, these collections represent different taxa, which had not been acknowledged either by Meissner or by Mez. The lectotypification of *C. moschata* in the sense of the Martius collection was done by Kostermans (1937). He proposed the specimen of Martius as (lecto)type, without analyzing it, based on the description of Nees von Esenbeck and solely on the available specimen of Sellow in hand. Later (Kostermans, 1938a), after studying the specimen of Martius, he was “obliged to alter the synonymy” of *C. moschata* as “it proved to have pilose leaves,” justifying his earlier decision in favor of the Martius collection because “...as the description of Nees refers especially to this species and not to that of Sellow...” However, contrary to Kostermans’s statement, Nees’s paper deals mainly with the Sellow collections at Berlin (*Revisio Laurinarum a b. Sellowio in Brasilia collectarum et iam in Herbario Regio Berolinensi asservatarum*), from which the protologue allowed a clear decision (see below) on which material the species was primarily described [see also Rohwer, 1993b in his lectotypification of *Nectandra leucantha* Nees & Mart., Linnaea 8: 48. 1833]. In Moraes (2005), after studying both syntypes, he has concluded that the Martius collection was in conflict with the protologue, while the Sellow one was not and, therefore he selected a specimen of the Sellow collection as lectotype. According to the original diagnosis, which is not much elucidative, *C. moschata* has “*foliis ovali-oblongis brevi-cuspidatis utrinque reticulatis glabris concoloribus, pedunculis axillaribus petiolo paulo longioribus paucifloris, fructu obovato umbonato costato.*” The Sellow collection has leaves ovate-oblong, short-cuspidate, on both surfaces reticulate, glabrous, concolor, whereas the Martius collection has leaves ovate-oblong, acute to pointleted, on both surfaces reticulate, but pubescent on the lower surface, discolour (brownish and shining above, somewhat olive-green and dull below). Still, the specimen of Sellow has short peduncles, slightly longer than petioles, whereas the specimen of Martius has peduncles considerably longer than petioles, and fruits umbonico-ovate, ribbed. Other authors might reject Moraes’s supersession of the existing lectotype, with the allegation that “the specimen chosen by Kostermans as lectotype is not in ‘serious’ conflict with regards to the protologue,” since the main evidence relies on the leaf pubescence. In fact, as pointed out by Moraes, according to the protologue

C. moschata is a glabrous species, which was clearly based on the *Sellow* collection. This indument character, or its absence, plays a major part in the delimitation of *Cryptocarya moschata* in the sense of *Sellow's* syntype and *C. mandioccana*, the species represented by *Martius's* collection. If the lectotypification of *C. moschata* in the sense of the *Martius* collection would not be rejected for the reasons explained, it will be necessary to coin a new name for the distinctive entity represented by *Sellow's* collection. Unfortunately, in Moraes's lectotypification he selected the specimen preserved at LE as the lectotype, reasoning that it was the only material, from the available isosyntypes he had accessed, that still had a flower. Only later he found out that CGE houses a duplicate of *Sellow's* syntype still bearing three flowers, which would be the best choice.

In Martius (1843a: 110), the plate 105 was indicated for "*Cryptocarya moschata* Mart." (see entry 2; present work). However, in Meissner (1866: 164), he has only quoted "Tabula nostra LVI," thus evidencing that another plate was prepared for this species. Although Kostermans (1937, 1953, 1964) had also cited plate 105 under *C. moschata* Nees & Mart., this manuscript has not been found within the reliquia of Martius either at the the Bayerische Staatsbibliothek (Abteilung fuer Handschriften und Seltene Drucke) or at the library of the Botanische Staatssammlung München. Wuschek (1989), in his treatment of Martius's *Systema materiae medicae*, did not mention the unpublished manuscript, either.

The illustration of *Cryptocarya moschata* in *Flora Brasiliensis* (Meissner, 1866; plate 56) was delineated from different flowering and fruiting material, based on the specimens analyzed and cited by Meissner. In this sense, only the flowering habit and the flower pieces can be ascribed to *C. moschata* Nees & Mart., since they were drawn from either *Sellow's* or *Widgren's* collections. On the other hand, the fruiting elements of the plate could be either ascribed to *C. mandioccana* (from *Martius s.n.*), *C. riedeliana* P.L.R. Moraes (from *Riedel* 485), or to *C. guianensis* Meisn. (from *Martin s.n.*). However, judging from the outlined shape of leaves and fruits, it would be proved that they were based on *Martius's* collection.

Another manuscript of Martius (1843b), which is kept at the University of California at Los Angeles Library (Louise M. Darling Biomedical Library), is a bound volume that has a simple bookplate stating: "*E Bibliotheca C. Ph. F. Martii.*" Additionally it is stamped: "Urban Library 1933." The holographic titlepage reads: "Plantae medicinales Florae Brasiliensis secundum Ordines naturales dispositae," "1843. 10. Junii." The second leaf of the work has a handwritten note: "Conferenda haec flora medica Brasil. cum Schöpfii flora med. Amer. bor., cum Lunan Jamaic.," likely referring to a comparison among the *Flora Medica* of Brazil (probably from Martius's *Systema materiae medicae vegetabilis brasiliensis*), Johann David Schöpf's *Materia medica americana* (1787), and John Lunan's *Hortus Jamaicensis* (1814). Leaf 3–5 present a holographic list of plants arranged by family and genus and species. Leaf 6 begins as a numbered Leaf 1, after that each opening (left page and right page facing) is numbered on the right leaf. There are 80 openings and the left side of the opening is

blank or contains handwritten notes made by Martius relating to some of the printed text, which has been cut from some other book and pasted on the right hand side. Regarding the species of Lauraceae, all the 11 species treated in *Syst. mat. med. bras.* compose the printed matter, with a different order of entries of the species from the former. Additionally, there are handwritten notes about *Silvia navalium* Allemão [= *Mezilaurus navalium* (Allemão) Taub. ex Mez], and "Nectandra rodgiaei Schomb." [= *Nectandra rodioei* R.H. Schomb. = *Chlorocardium rodiei* (R.H. Schomb.) Rohwer, H.G. Richt. & van der Werff]. The clipped printed text of *Cryptocarya moschata* Mart. is pasted on the numbered leaf 16.

11. *Dicypellium caryophyllaceum* (Mart.) Nees & Mart. in Nees, Pl. Laur. Expos.: 14. 1833; *ibid.* in Syst. Laur.: 344. 1836; Martius, Syst. Mat. Med. Bras.: 111. 1843; *ibid.* in Fl. Bras. 5(2): 316. 1868; Meissner in DC., Prodr. 15(1): 170. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 281, t. 102. 1866; Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 473. 1889; Rohwer, Bot. Jahrb. Syst. 110: 169. 1988; Moraes, Harvard Pap. Bot. 17(1): 195. 2012 = *Ocotea caryophyllacea* (Mart.) Kostel., Allg. Med.-Pharm. Fl. 2: 482. 1833.

Basionym: *Persea caryophyllacea* Mart. in Buchner, Repert. Pharm. 31: 355. 1829; *ibid.* in Spix and Martius, Reise Bras. 3: 915. 1831. TYPE: BRAZIL. Amazonas, Maués, "in sylvis ad Maué hanc culta in hortis Parae.," April 1820, *C. F. P. von Martius s.n.* (Holotype: M 0147268; Isotypes, B 10 0185010, B 10 0185011, G, GZU 000254389). Other original material: BRAZIL. *C. F. P. von Martius Obs.* 2617: "Persea caryophyllat. Mart./Dicypellium caryophyllat. Nees/Laurus sanguinea Sw. ? ... Colitur in horto regio Pará, ex interioribus silvis advecta" (M 0147264, M 0147265, M 0147266 [as *Martius s.n.*]; BRAZIL. Amazonas, "ad Coari et Ega," November 1819, *C. F. P. von Martius s.n.* (M 0147267 [ex Herb. Zuccarinii]).

Vernacular names: "Cravo do Maranhão" (Martius, 1829), "Páo Cravo Bras.," "Imyra-Quiyinha v. Kiynja i. e. lignum Capsici Tupin." (Martius, 1843).

12. *Licaria brasiliensis* (Nees) Kosterm., Recueil Trav. Bot. Néerl. 34: 601. 1937 = *Aydendron brasiliense* (Nees) Meisn. in DC., Prodr. 15(1): 87. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 180, t. 64. 1866 = *Misanteca brasiliensis* (Nees) Lundell, Wrightia 4(3): 99. 1969.

Basionym: *Acrodiclidium brasiliense* Nees, Syst. Laur.: 267. 1836; Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 92. 1889; Kostermans, Recueil Trav. Bot. Néerl. 33: 746. 1936; Kurz, Mitt. Inst. Allg. Bot. Hamburg 28/29: 157. 2000. TYPE: BRAZIL. Pará, "in sylvis secus fluvium Amazonum," September–October 1819, fl., *C. F. P. von Martius s.n.* (Holotype: M 0147427; Isotypes, L 0308064 ["Laurus riparia M.," herbarium name, "Amaz. fl.," M 147428, M 0147429, MEL 2324397 ["Laurus riparia," herbarium name, "Para"], MEL 2324398 ["Laurus riparia Mart.," herbarium name, "Para"], S [R-7276]).

Further synonyms in Kurz (2000).

13. *Licaria crassifolia* (Poir.) P.L.R. Moraes, Komarovia 6(1): 55. 2008. Specimen: BRAZIL. Amazonas, “in sylvis ad Coari,” November 1819, sterile, *C. F. P. von Martius s.n.* (GZU 000256425 [annotated by Nees; leaf fragment], M 0147426) [Syntype of *Nectandra nitidula* Nees & Mart. var. *maior* Nees, Syst. Laur.: 313. 1836].

Basionym: *Laurus crassifolia* Poir. in Lam. Encycl., Suppl. 3: 323. 1813. Lectotype (designated by Moraes, 2008: 55): FRENCH GUIANA. “Caienne”, 1791, fr., *L. C. M. Richard s.n.* (P 00128465 [ex Herb. Poirer]; Isolectotypes, P 00128463 [ex Herb. Richard], P 00128464 [ex Herb. E. Drake], P-JU 00662838 [Cat. No. 1226]).

Synonyms: *Aydendron cannella* Meisn. in DC., Prodr. 15(1): 90. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 180. 1866 = *Acroclididium cannella* (Meisn.) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 90. 1889; Kostermans, Recueil Trav. Bot. Néerl. 33: 728. 1936 = *Licaria cannella* (Meisn.) Kosterm., Recueil Trav. Bot. Néerl. 34: 583. 1937; Kurz, Mitt. Inst. Allg. Bot. Hamburg 28/29: 121. 2000 = *Misanteca cannella* (Meisn.) Lundell, Wrightia 4(3): 99. 1969. TYPE: FRENCH GUIANA. Acarouany, August 1858, fl., *P. A. Sagot 1190* (Holotype: G-DC; Isotypes, B⁺ [F neg. 3837], BM 000993917, K 000602022, NY 00354870, P 00128461, P 00128462, U 0002746, W n.v.).

Aydendron cayennense Meisn. in DC., Prodr. 15(1): 95. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 186. 1866 = *Acroclididium cayennense* (Meisn.) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 91. 1889; Kostermans, Recueil Trav. Bot. Néerl. 33: 730. 1936 = *Licaria cayennensis* (Meisn.) Kosterm., Recueil Trav. Bot. Néerl. 34: 583. 1937 = *Misanteca cayennensis* (Meisn.) Lundell, Wrightia 4(3): 99. 1969. TYPE: FRENCH GUIANA. Caiena, s.d., fr., *J.-B. Patris 41* (Holotype: G-DC [F neg. 7288]; Isotypes, B⁺, G, L 0036456, NY 00354869, P).

14. *Licaria polyphylla* (Nees) Kosterm., Recueil Trav. Bot. Néerl. 34: 584. 1937; Kurz, Mitt. Inst. Allg. Bot. Hamburg 28/29: 167. 2000 = *Misanteca polyphylla* (Nees) Lundell, Wrightia 4(3): 101. 1969.

Basionym: *Nectandra polyphylla* Nees, Syst. Laur.: 332. 1836; Meissner in DC., Prodr. 15(1): 160. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 270. 1866; Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 97. 1889. TYPE: BRAZIL. Amazonas, Coari, “in sylvis ad Coari,” November 1819, sterile, *C. F. P. von Martius s.n.* (Holotype: M 0147422; Isotype, GZU 000254280).

Synonyms: *Acroclididium guianense* Nees var. *caudatum* Meisn. in DC., Prodr. 15(1): 85. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 173. 1866; Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 98. 1889; Kostermans, Recueil Trav. Bot. Néerl. 33: 734. 1936 = *Acroclididium meissneri* Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 98. 1889. Lectotype (designated by Kostermans, 1936: 738): VENEZUELA. Amazonas, “prope San Carlos, ad Rio Negro,” August 1853, *R. Spruce 3058* (K 000602019;

Isolectotypes, B⁺ [F neg. 3841], BM 000947197, BR 0000008812810, C 10013587, E 00259391, F [0061307F], G 00368869, G 00368870, G-DC, GH 00041577, GOET 004500, K 000602020, LE 00000141, NY 00354749, NY 00354750, P 00757118, P 00757119, P 00757120, S [S-R-7278], U, W n.v.).

Further synonyms in Kurz (2000).

15. *Licaria puchury-major* (Mart.) Kosterm., Recueil Trav. Bot. Néerl. 34: 583. 1937; Kurz, Mitt. Inst. Allg. Bot. Hamburg 28/29: 126. 2000; Moraes, Harvard Pap. Bot. 17(1): 198. 2012 = *Nectandra puchury-major* (Mart.) Nees & Mart. in Nees, Syst. Laur.: 328. 1836; Martius, Syst. Mat. Med. Bras.: 109–110. 1843; *ibid.* in Fl. Bras. 5(2): 317. 1868; Meissner in DC., Prodr. 15(1): 156. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 265, t. 95. 1866 = *Acroclididium puchury-major* (Mart.) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 88. 1889; Kostermans, Recueil Trav. Bot. Néerl. 33: 727. 1936 = *Misanteca puchury-major* (Mart.) Lundell, Wrightia 4: 101. 1969.

Basionym: *Ocotea puchury-major* Mart. in Buchner, Repert. Pharm. 35: 171. 1830. TYPE: BRAZIL. Amazonas, “in sylvis ad Tabatinga,” December 1819, fr., *C. F. P. von Martius s.n.* (Holotype: M 0147421 [F neg. 19259]; Isotypes, B⁺, BR 0000008812841, G 00368872, GZU 000254328, L 0036458 [“*Laurus Pichurim vera*,” herbarium name, “Rio Negro”; ex Herbarium Reinwardtianum]). Probable isotypes: M 0147419, M 0147420.

For a complete list of synonyms, see Kurz (2000).

Vernacular names: “*Fabas Pechurim v. Puchury*” (Martius, 1868).

16. *Nectandra acuminata* (Nees & Mart.) J.F. Macbr., Publ. Field Mus. Nat. Hist., Bot. Ser., 11(1): 19. 1931; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 49. 1986; *ibid.* in Fl. Neotrop. Monogr. 60: 270. 1993.

Basionym: *Persea acuminata* Nees & Mart. in Nees, Syst. Laur.: 170. 1836; Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 409. 1889 [as synonym of *Nectandra acutifolia* (Ruiz & Pav.) Mez]. TYPE: BRAZIL. Amazonas, Rio Japurá, “in sylvis ad fl. Japurá,” December 1819, monstr. fr., *C. F. P. von Martius s.n.* (Holotype: M 0147319) [also syntype of *Nectandra berchemiifolia* Meisn. in DC., Prodr. 15(1): 154. 1864, as “*berchemiaefolia*”; *ibid.* in Martius, Fl. Bras. 5(2): 262. 1866; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 50. 1986; *ibid.* in Fl. Neotrop. Monogr. 60: 267. 1993].

17. *Nectandra amazonum* Nees, Syst. Laur.: 282. 1836; Meissner in DC., Prodr. 15(1): 150. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 256, t. 92. 1866; Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 420. 1889; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 49. 1986; *ibid.* in Fl. Neotrop. Monogr. 60: 236. 1993; Moraes, Pl. Ecol. Evol. 146(3): 369. 2013. Lectotype (designated by Rohwer, 1986: 49, as “Holotyp M”): BRAZIL. Pará, “in fluminis Amazonum omni ripa a Pará,

ad Tabatinga,” September–October 1819, fr., *C. F. P. von Martius s.n.* (M 0147314; Isolectotype, GZU 000254251). Syntypes: BRAZIL. Pará, fl., *C. F. P. von Martius s.n.* (B 10 0185108, G, GZU 000254252, L 0037115 [“*Laurus amazonum* M / secus totum fl. Amazon.,” herbarium name], M 0147315, M 0147316, M 0147317, M 0147318, MEL 2324402 [“*Laurus amazonum*,” herbarium name, “Para”], U 0002889 [fragment]).

Synonymy in Rohwer (1993).

18. *Nectandra canescens* Nees & Mart. in Nees, *Linnaea* 8: 47. 1836; *ibid.* in *Syst. Laur.*: 280. 1836; *ibid.* in *Linnaea* 21: 501. 1848; Meissner in DC., *Prodr.* 15(1): 147. 1864; *ibid.* in Martius, *Fl. Bras.* 5(2): 251. 1866; Mez, *Jahrb. Königl. Bot. Gart. Berlin* 5: 408. 1889; Rohwer, *Mitt. Inst. Allg. Bot. Hamburg* 20: 51. 1986; *ibid.* in *Fl. Neotrop. Monogr.* 60: 274. 1993; Moraes, *Komarovia* 6(1): 23. 2008; *ibid.* in *Harvard Pap. Bot.* 17(1): 199. 2012; *ibid.* in *Pl. Ecol. Evol.* 146(3): 369. 2013. Lectotype (designated by Rohwer, 1993: 274): BRAZIL. Pará, “in sylvis secus fl. Amazonum, Provinciae Paraënsis et RN,” 20 October 1819, fl., immat. fr., *C. F. P. von Martius Martius Obs.* 2750: “*Pomatium canescens* ... arbor 15–20 ped. ... In silvis ad marginem fl. Amazonum” (M 0112453 [annotated by Martius as “*Persea canescens*,” and by Nees as “*Pomatium canescens*,” herbarium names]; Isolectotypes, GZU 000254254 [annotated by Nees as “*Pomatium canescens* M. / in sylvis secus flumen Amazonum Provinciae Paraënsis. Sept. et Oct.; in sylv. Ad fluv. Madeiram Prov. Flumini Nigri Aprili / a Martius], M 0112458, M 0112459). Specimen: BRAZIL. Amazonas, “in sylvis ad fluv. Madeira,” April 1820, sterile, *C. F. P. von Martius s.n.* (B 10 0185095 [F neg. 3750]).

Synonymy in Rohwer (1993) and Moraes (2012a).

The other syntype of *Nectandra canescens* Nees & Mart. is the gathering by “*Sellow B 433 c 410*”, which is the type of *Nectandra rigida* (Kunth) Nees var. *canescens* Mez, *Jahrb. Königl. Bot. Gart. Berlin* 5: 407. 1889. According to Rohwer (1993: 288), although *N. rigida* var. *canescens* is based on the Sellow syntype of *N. canescens* Nees & Mart., it has to be treated as a new variety and not as a combination based on *N. canescens*, because Mez accepted *Nectandra canescens* in the sense of its Martius syntype in the same publication.

19. *Nectandra cuspidata* Nees & Mart. in Nees, *Syst. Laur.*: 330. 1836; Meissner in DC., *Prodr.* 15(1): 159. 1864; *ibid.* in Martius, *Fl. Bras.* 5(2): 268, t. 97. 1866; Mez, *Jahrb. Königl. Bot. Gart. Berlin* 5: 449. 1889; Rohwer, *Fl. Neotrop. Monogr.* 60: 100. 1993 = *Nectandra membranacea* (Sw.) Griseb. ssp. *cuspidata* (Nees & Mart.) Rohwer, *Mitt. Inst. Allg. Bot. Hamburg* 20: 72. 1986; Moraes, *Pl. Ecol. Evol.* 146(3): 369. 2013. Lectotype (designated by Rohwer, 1993: 100): BRAZIL. Amazonas, Tefé, “in ripa fluminis Amazonum, praesertim ad villam Ega,” January 1820, fl., fr., *C. F. P. von Martius s.n.* (M 0147303; Isolectotypes, B 10 0086138, GZU 000254262, L 0037121, L 0037122 [“*Laurus cuspidata* M. / R. Amazon.,” herbarium name], L 1802480 [“*Laurus egensis* Mart.,” herbarium name, “Prov.

Rio Negro”], M 0147304). Syntypes: BRAZIL. Amazonas, Rio Japurá, “in sylvis Japurensibus,” January 1820, fl., fr., *C. F. P. von Martius s.n.* (GZU 000254262, M 0147302, M 0147306); BRAZIL. Amazonas/Pará, “in sylvis secus fluv. Maué et Amazonum,” September 1819, immat. fr., *C. F. P. von Martius s.n.* (GZU 000254261, M 0147305).

Synonymy in Rohwer (1993).

“*Martius Obs.* 2721 *Ocotea*”, which has not been annotated in any specimen in Munich, most likely refers to this species.

20. *Nectandra hihua* (Ruiz & Pav.) Rohwer, *Fl. Neotrop. Monogr.* 60: 196. 1993 = *Nectandra leucantha* Nees var. *peruviana* Meisn. in DC., *Prodr.* 15(1): 151. 1864.

Basionym: *Laurus hihua* Ruiz & Pav., *Fl. Peruv.* 4(2): t. 366. 1804[–1830] (Ruiz and Pavón, 1956: 33, t. 366). TYPE: ECUADOR. Guayas, “in Huayaquilensibus nemoribus,” 1799, *J. Tafalla s.n.* (Holotype: MA 811751; Isotypes, B 10 0185060, F [0040309F; fragment], FI-W 005165, G 00369022, MA 811752).

Synonyms: *Nectandra lucida* Nees, *Syst. Laur.*: 334. 1836, non *ibid.* p. 295, non 1833, *hom. post.* = *Nectandra schomburgkii* Meisn. in DC., *Prodr.* 15(1): 151. 1864; *ibid.* in Martius, *Fl. Bras.* 5(2): 258. 1866. Lectotype (designated by Mez, 1889: 429): BRAZIL. Amazonas, “ad flumen Japurá,” December 1819, fr., *C. F. P. von Martius s.n.* (M 0121041 [“*Ocotea lucida* Mart.,” herbarium name]; Isolectotype, GZU 000249367). Syntype: BRAZIL. Amazonas, “in sylvis Japurensibus,” February 1820, fl., *C. F. P. von Martius s.n.* (M 0147294).

Complete synonymy in Rohwer (1993).

21. *Nectandra japurensis* Nees & Mart. in Nees, *Syst. Laur.*: 335. 1836; Meissner in DC., *Prodr.* 15(1): 163. 1864; *ibid.* in Martius, *Fl. Bras.* 5(2): 274, t. 99. 1866; Mez, *Jahrb. Königl. Bot. Gart. Berlin* 5: 440. 1889; Rohwer, *Mitt. Inst. Allg. Bot. Hamburg* 20: 65. 1986; *ibid.* in *Fl. Neotrop. Monogr.* 60: 125. 1993. Lectotype (designated by Rohwer, 1993: 125): BRAZIL. Amazonas, “in sylvis Japurensibus ad Maripi, S. Joh. Princ. cet. Provinciae Fluminis nigri Brasiliae,” December–January 1819/1820, fl., *C. F. P. von Martius s.n.* (M 0147292; Isolectotypes, B 10 0185058 [Mus. Bot. Berol. Film Nr. 1232/13; NY neg. 8343], B 10 0185059, GZU 000254272, HBG [fragment], L 0037128 [“*Laurus japurensis* M. / R. Negro,” herbarium name; ex Herbarium Reinwardtianum], M 0147293).

Synonymy in Rohwer (1993).

22. *Nectandra leucantha* Nees & Mart. in Nees, *Linnaea* 8: 48. 1833; *ibid.* in *Syst. Laur.*: 310. 1836; Meissner in DC., *Prodr.* 15(1): 150. 1864; *ibid.* in Martius, *Fl. Bras.* 5(2): 257. 1866; Mez, *Jahrb. Königl. Bot. Gart. Berlin* 5: 431. 1889; Rohwer, *Mitt. Inst. Allg. Bot. Hamburg* 20: 52. 1986; *ibid.* in *Fl. Neotrop. Monogr.* 60: 201. 1993; Moraes, *Komarovia* 6(1): 19. 2008 = “*Persea leucantha* Mart., *nom. nud.* Lectotype (designated by Rohwer, 1993: 201): BRAZIL. Loco haud indicato, s.d., fl., *F. Sellow s.n.* (B 10

0185048 [B neg. 6873]). Syntypes: BRAZIL. Minas Gerais, "In campos Tabuleiro ad Salgado," August 1818, fl., *C. F. P. von Martius Obs. 1704*: "arbor 15–20 ped. ... In campis locis Tabuleiro consitis" (GZU 000254273 [annotated by Nees; *Anonymous s.n.*], M 0111058) [= *Nectandra hihua* (Ruiz & Pav.) Rohwer, Fl. Neotrop. Monogr. 60: 196. 1993]). Specimen: BRAZIL. Bahia, "m. ad. V. do Rio de Contas interionis," October–November 1818, fl., *C. F. P. von Martius Obs. 1704* (GZU 000254273 [*Anonymous s.n.*], M 0111057).

Synonymy in Rohwer (1993).

23. *Nectandra membranacea* (Sw.) Griseb., Fl. Brit. W. I. 282. 1860; Meissner in DC., Prodr. 15(1): 161. 1864; Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 450. 1889; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 70. 1986; *ibid.* in Fl. Neotrop. Monogr. 60: 94. 1993 = *Persea membranacea* (Sw.) Spreng., Syst. Veg. (ed. 16) 2: 270. 1825 = *Phoebe membranacea* (Sw.) Nees, Syst. Laur.: 118. 1836 = *Ocotea membranacea* (Sw.) R.A. Howard, J. Arnold Arbor. 62: 59. 1981.

Basionym: *Laurus membranacea* Sw., Prodr. 65. 1788. TYPE: JAMAICA. Loco haud indicato, s.d., fl., *O. P. Swartz s.n.* (Holotype: S [R-3166; NY neg. 8559]; Isotypes, BM 000758874, S [09-16300]). Specimen: "Ex India occidentalis", s.d., fl., *O. P. Swartz s.n.* (SBT 11582).

Synonym: *Nectandra cuspidata* Nees & Mart. var. *macrocarpa* Nees, Syst. Laur.: 331. 1836. TYPE: BRAZIL. Rio de Janeiro, "in sylvis caeduis," October 1817, fr., *C. F. P. von Martius s.n.* (Holotype: M 0147307).

Complete synonymy in Rohwer (1993).

24. *Nectandra nitidula* Nees & Mart. in Nees, Linnaea 8: 48. 1833; *ibid.* in Syst. Laur.: 313. 1836; Meissner in DC., Prodr. 15(1): 160. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 271, t. 98. 1866; Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 436. 1889; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 57. 1986; *ibid.* in Fl. Neotrop. Monogr. 60: 180. 1993; Moraes, Komarovia 6(1): 20. 2008; *ibid.* in Harvard Pap. Bot. 17(1): 200. 2012; *ibid.* in Pl. Ecol. Evol. 146(3): 369. 2013 = *Nectandra nitidula* Nees & Mart. var. *minor* Nees, Syst. Laur.: 313. 1836, *nom. illegit. superfl.*, = var. *nitidula*. Lectotype (designated by Rohwer, 1993: 180): BRAZIL. São Paulo, "in campis prope Taubaté," December 1817, fr., *C. F. P. von Martius Obs. 546*: "arbor 20 ped. cal. viridis" (M 0111064). Other syntypes: BRAZIL. São Paulo, 1829, fl., *F. Sellow 28* (B 10 0185228 [B neg. 1581/3, NY neg. 8319]); BRAZIL. Loco haud indicato, s.d., fl., *F. Sellow s.n.* (B 10 0185227 [B neg. 5197]). Probable syntypes: BRAZIL. Loco haud indicato, s.d., fl., *F. Sellow s.n.* (B 10 0185226 [ex Herb. Baschant]); *idem*, s.d., fl., *F. Sellow s.n.* (BR 0000008808479, E 00259309); *idem*, s.d., fl., *F. Sellow s.n.* (CGE); *idem*, s.d., fl., *Anonymous s.n.* (GZU 000259200 [annotated by Nees]).

Synonyms: *Nectandra nitidula* Nees & Mart. var. *maior* Nees, Syst. Laur.: 313. 1836; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 57. 1986; *ibid.* in Fl. Neotrop.

Monogr. 60: 181. 1993; Moraes, Komarovia 6(1): 20. 2008; *ibid.* in Harvard Pap. Bot. 17(1): 200. 2012; *ibid.* in Pl. Ecol. Evol. 146(3): 369. 2013. LECTOTYPE (designated here): BRAZIL. Minas Gerais, Serro, "in montosis Serro frio Provinciae Minarum generalium," May 1818, fl., *C. F. P. von Martius s.n.* (M 0111060 [annotated by Nees]; Isolectotype, GZU 000249360 [annotated by Nees with "*Nectandra nitidula*, nondum florens / *Petalanthera paniculigera* N. ab Es. / Minas Geraes"]). Syntypes: BRAZIL. Minas Gerais, Diamantina, "in campis, Tabuleiro, terrae Adamantin. Prope Tejuco," June 1818, fr., *C. F. P. von Martius s.n.* (GZU 000256425 [annotated by Nees; fragment; *Anonymous s.n.*], M 0111063 [annotated by Nees]); BRAZIL. Bahia, "in sylvis Catingas locis editoribus deserto Min. Nov.," October 1818, fl., *C. F. P. von Martius s.n.* (GZU 000249359 [annotated by Nees], M 0111061 [F neg. 6590; annotated by Martius as "*Persea paniculigera*," herbarium name]); BRAZIL. Paraná, fl., *F. Sellow 4495* (B 10 0088601 [B neg. 1581/5, NY neg. 8321; *mixtum compositum*, only the flower fragment]); BRAZIL. Loco haud indicato, s.d., fl., *F. Sellow 1368** (B[†], L 0037147); BRAZIL. Santa Catarina, "Insula S. Catharinae," s.d., fl., *J. Tweedie s.n.* (E 00259433, GZU 000249358 [ex Herb. Arnott., annotated by Nees as "*Nectandra nitidula* Var. α;," *Anonymous s.n.*]) [= *Nectandra megapotamica* (Spreng.) Mez, Bull. Herb. Boissier, Sér. 2, 2: 824. 1902]. Specimens: BRAZIL. Minas Gerais, August 1839, *P. Claussen* in *Martii Herbar. Florae Brasil. N° 1239* [as 1293 in Mez, 1892] (AWH 28295, BM 000947260, G, G-DC, JE 00004387 [*Anonymous 1239*], K [not located], L 0037144, L 0037145, L 0037146, LE 00006796, LE, M 0111059, M 0111062, MO 247468, NY 00355481, OXF 00083028, P 00711051) = *Claussen 106* [BR 0000008808240], *Claussen 107* [BR 0000008807946], *Claussen s.n.* [BR 0000008808271; attributed to *Riedel*]).

Nectandra sarcocalyx Nees, Syst. Laur.: 338. 1836; Meissner in DC., Prodr. 15(1): 167. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 278. 1866; Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 436. 1889. TYPE: BRAZIL. Bahia, "in alpestribus campis ad V^a. Do Rio das Contas et Sincorâ," October 1818, fr. monstr., *C. F. P. von Martius s.n.* (Holotype: M 0111065 [annotated by Martius as "[*Laurus*] *Persea sarcocalyx*," herbarium name]; Isotype, GZU 000254287 [annotated by Nees; fragment]).

Further synonymy in Rohwer (1993), and Moraes (2012a).

Rohwer (1993: 181) designated the collection *Martii Herbar. Florae Brasil. N° 1239* as the lectotype of *Nectandra nitidula* Nees & Mart. var. *maior* Nees. However, this collection refers to a gathering undertaken by Peter Claussen in Cachoeira do Campo, Minas Gerais, in August 1839, which therefore is not an original material for the lectotypification of the variety named by Nees von Esenbeck.

25. *Nectandra oppositifolia* Nees & Mart. in Nees, *Linnaea* 8: 47. 1833; *ibid.* in Syst. Laur.: 279. 1836; Meissner in DC., *Prodr.* 15(1): 146. 1864; *ibid.* in Martius, *Fl. Bras.* 5(2): 250. 1866; Mez, *Jahrb. Königl. Bot. Gart. Berlin* 5: 406. 1889; Rohwer, *Fl. Neotrop. Monogr.* 60: 286. 1993; Moraes, *Komarovia* 6(1): 22. 2008; *ibid.* in Harvard Pap. Bot. 17(1): 201. 2012; *ibid.* in Pl. Ecol. Evol. 146(3): 369. 2013 = *Nectandra oppositifolia* Nees & Mart. var. *angustifolia* Nees & Mart. in Nees, *Linnaea* 8: 47. 1833, *nom. illegit. superfl.*, = var. *oppositifolia* = *Nectandra mollis* (Kunth) Nees ssp. *oppositifolia* (Nees & Mart.) Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 61. 1986. Lectotype (designated by Rohwer, 1993: 286): BRAZIL. São Paulo, fl., *F. Sellow* 5722 (B 10 0185222 [NY neg. 8327; annotated by Mez as “*Nectandra oppositifolia* Nees fa. intermedia,” *nom. nud.*]; Isolectotypes, B 10 0185221 [ex Herb. Kunth], BM 000895363, G-DC 00130422, K 000512726, VT 001549). Other syntypes: BRAZIL. “Brasília orientalis”, fl., *F. Sellow* LVI (BR 0000008808226); BRAZIL. Santa Catarina, fl., *F. Sellow* 4428 (B 10 0185220). Probable syntypes: BRAZIL. Loco haud indicato, fl., *F. Sellow* s.n. (GZU 000249356, HAL 0010385 [both with labels by Schlechtendal annotated as “*Pomatium oppositifolium*”]); *idem*, fl., *F. Sellow* s.n. (GZU 000249357 [annotated by Nees as “*Pomatium oppositifolium*”]). Specimens: BRAZIL. Loco haud indicato, sterile., *F. Sellow* s.n. (B 10 0185172); *idem*, fl., *F. Sellow* s.n. (B 10 0185175); BRAZIL. São Paulo, Iperó, “in sylvis primaevae ad Ypanema,” January 1818, sterile, *C. F. P. von Martius* s.n. (M 0121029); BRAZIL. Minas Gerais, “in sylv. abor. ad fl. Doce,” 1818, fl., *C. F. P. von Martius* s.n. (M 0121027).

Synonym: *Nectandra schottii* Meisn. in DC., *Prodr.* 15(1): 147. 1864; *ibid.* in Martius, *Fl. Bras.* 5(2): 252. 1866; Mez, *Jahrb. Königl. Bot. Gart. Berlin* 5: 407. 1889 = ‘*Nectandra acutissima* Nees ex Meisn.’ in DC., *Prodr.* 15(1): 147. 1864, *nom. invalid.* Lectotype (designated by Rohwer, 1993: 286): BRAZIL. Rio de Janeiro, “prope Cantagallo,” s.d., *H. W. Schott* 5607 (M). Syntype: BRAZIL. Rio de Janeiro, “in sylvis caeduis ad Sebastianopolin,” December 1817, fr., *C. F. P. von Martius* s.n. (GZU 000249322, M 0121030).

Further synonyms and detailed information in Rohwer (1993) and Moraes (2008).

26. *Nectandra psammophila* Nees & Mart. in Nees, Syst. Laur.: 303. 1836; Meissner in DC., *Prodr.* 15(1): 161. 1864; *ibid.* in Martius, *Fl. Bras.* 5(2): 272. 1866; Mez, *Jahrb. Königl. Bot. Gart. Berlin* 5: 434. 1889; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 68. 1986; *ibid.* in Fl. Neotrop. Monogr. 60: 160. 1993; Moraes, Harvard Pap. Bot. 17(1): 201. 2012; *ibid.* in Scripta Bot. Belg. 49: 120. 2013. Lectotype (designated by Rohwer, 1993: 160): BRAZIL. Espírito Santo, Vila Velha, “Barra de Jucu,” March 1816 [sic; December 1815], fl., *M. A. P., Prinz zu Wied* s.n. (BR 0000008808066; Isolectotypes, B 10 0185169 [F neg. 3763], BR 0000008808363, GOET 000753, GZU 000254281, MEL 2324403 [“*Laurus amoena* Mart.” herbarium name], MEL 2324386). Probable isolectotypes: BRAZIL.

[Bahia], with label “Ad fl. Ilheos,” s.d., fl., *Anonymous* s.n. [“Communic. Martius 1827”] (K 000642237; “*Laurus amoena* Mart.” herbarium name); *idem*, [Bahia], with label “In silvis prope Rio das Contas,” s.d., fl., *Anonymous* s.n. [“Communic. Martius 1827”] (K 000642238; “*Laurus saporosa* Mart.” herbarium name). Syntype: BRAZIL. Rio de Janeiro/São Paulo, “in sylvis subalpinis alt. 1500 pedum supra Serra do Mar”, December 1817, immat. fr., *C. F. P. von Martius* Obs. 411: “Arbor 30 ped. Flores in racemis 6–8. In alpinis alt. 1500” (GZU 000260031, M 0121034). Specimen: BRAZIL. São Paulo, Iperó, “in sylv. primaevae ad Ypanema,” January 1817, sterile, *C. F. P. von Martius* s.n. (M 0121033 [annotated by Rohwer as “probabiliter *Nectandra* aff. *psammophila* Nees vel *N. megapota mica* (Spr.) Mez”]).

Further synonymy in Rohwer (1993).

Specimens at K 000642237 and K 000642238 have *Herbarium Martii* labels, typically printed with “*Communic.182...*” and handwritten with “*Martius*” and “7” (i.e. “*Communicavit Martius 1827*”). Moraes et al. (2013), and in subsequent papers, have reported part of the sets of Brazilian plants that Martius distributed in 1827 to several European herbaria and correspondents, particularly concerning the sets received by Luigi Colla and published in *Herbarium Pedemontanum*. In those papers, it has been demonstrated that most of the specimens communicated by Martius in 1827 came from collections of Prince Maximilian zu Wied, from evidence of the localities (toponyms) indicated on labels, being the same as those visited by Wied in Brazil, and from matching of the specimens distributed by Martius with those that are clearly attributed to Wied. In the present case, the specimen at K 000642237 closely matches Wied collections at BR and MEL, while the one at K 000642238 closely matches the collections at B, GOET, and GZU. Collections from Ilhéus and Rio de Contas can be attributed either to Martius or to Wied, since both visited these localities.

27. *Nectandra puberula* (Schott) Nees, Syst. Laur.: 332. 1836; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 58. 1986; *ibid.* in Fl. Neotrop. Monogr. 60: 220. 1993; Moraes, Harvard Pap. Bot. 17(1): 202. 2012.

Basionym: *Persea puberula* Schott in Sprengel, Syst. Veg. (ed. 16) 4(2): 405. 1827. TYPE: BRAZIL. Rio de Janeiro, loco haud indicato, s.d., *H. W. Schott* s.n. (Holotype: B 10 0185167 [B neg. 5200, ex Herb. Sprengel nr. 40]; Isotypes, GZU 000254414, and probably P 00711066, P 00711067).

Synonym: *Nectandra amara* Meisn. var. *chartacea* Meisn. in DC., *Prodr.* 15(1): 158. 1864; *ibid.* in Martius, *Fl. Bras.* 5(2): 267. 1866. Lectotype (designated by Rohwer, 1993: 221): BRAZIL. Rio de Janeiro, “São Cristóvão,” s.d., *H. W. Schott* 5609 (G 00369012; Isolectotypes, F [0061480F], F [0061481F; fragment], LE, US 00048566, US 00997590). Syntypes: BRAZIL. Rio de Janeiro, “in sylvaticis collibusque umbrosis circa Rio de Janeiro,” May–July 1832, *L. Riedel* 480 (B 10 0185163 & GOET [2 sheets; *Riedel* s.n.; annotated

as “*Nectandra amara* β . *subevenia* Meissn.”], C, G 00368979, K 000576215, K 000576216 [as *Riedel s.n.*], L 0037068, LE, MEL 2324391, MICH 1104567, MICH 1104568, NY 00355407, NY 00355408, NY 00355409, P 00711053, P 00711054, US 00288970, W n.v.); BRAZIL. Rio de Janeiro, “Campos ad St. João et Cabo Frio,” October 1833, fl., *B. Luschnath s.n.* in *Martii Herbar. Florae Brasil. N° 1307* (BR 0000008810496); BRAZIL. Mato Grosso, Cuiabá, 1836, fl., *A. L. P. da Silva Manso s.n.* in *Martii Herbar. Florae Brasil. N° 1307* (BR 0000008810878, G-DC, LE, M 0121045, MICH 11104567, NY 00355406, P 00711056); BRAZIL. Loco haud indicato, s.d., fl., *P. Claussen 47* (B 10 0185166, KIEL); BRAZIL. Loco haud indicato, s.d., fl., *P. Claussen 78* (B 10 0185165, KIEL); BRAZIL. Minas Gerais, loco haud indicato, s.d., fl., *P. Claussen 2078* (F [0061484F; fragment], G 00368980, G 00368981, G 00369008, MO 247433, P 00711064, P 00711065); BRAZIL. Rio de Janeiro, “Près le Jardin bot. de Rio de Janeiro,” March 1839, fl., *J. B. A. Guillemain 667* (F [0061482F], F [0061483F], G 00368978, G-DC, P 00711057, P 00711058, P 00711059).

For a complete list of synonyms, see Rohwer (1993).

Specimen at BR 0000008810526 bears a label annotated anonymously as “*Nectandra canescens* Nees / *Brasilia Martius*,” being identified by Kostermans in 1935 as “*Nectandra puberula* Nees”.

28. *Nectandra purpurea* (Ruiz & Pav.) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 443. 1889; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 77. 1986; *ibid.* in *Fl. Neotrop. Monogr.* 60: 46. 1993; Moraes, Harvard Pap. Bot. 17(1): 202. 2012.

Basionym: *Laurus purpurea* Ruiz & Pav., Fl. Peruv. 4(2): t. 351. 1804[–1830] (Ruiz and Pavón, 1956: 17, t. 351). Lectotype (designated by Bernardi, 1967: 60, as “specimine holotypico herbarii berolinensis addicto”); PERU. Huánuco, “in Andium nemoribus ad Cuchero et Chinchao,” 1778, *H. Ruiz L. & J. A. Pavón s.n.* (B 10 0185160 [B neg. 1232/25]; Isolectotypes, BM 000947299, F [0040316F; #13/25 ex MA 811806], G 00369268 [F neg. 27609], MA 811806, OXF 00000255); Icon: *Laurographia* t. 7 (G [F neg. 34254]).

Synonyms: *Ocotea latifolia* Kunth in Humboldt, Bonpland and Kunth, Nov. Gen. Sp. (quarto ed.) 2: 165. 1817 = *Nectandra latifolia* (Kunth) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 454. 1889. TYPE: COLOMBIA. Cundinamarca, “in alta planitie Bogotensi,” s.d., *F. W. H. A. von Humboldt & A. J. A. Bonpland s.n.* (Holotype: P 00128755).

Nectandra polita Nees & Mart. in Nees, Syst. Laur.: 325. 1836; Meissner in DC., Prodr. 15(1): 163. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 275. 1866. TYPE: BRAZIL. Bahia, Cachoeira, “in sylvis Capões ad Villa da Caxoeira,” November 1818, *C. F. P. von Martius s.n.* (Holotype: M 0121031 [F neg. 19268]; Isotype, GZU 000249355). Specimens: BRAZIL.

Bahia, Ilhéus, “in collib. pr. Ilheos,” May 1821, fl., *L. Riedel 307* (GOET, K 000642337, L 1802307 [as *Riedel s.n.*], LE [2 sheets], NY 00887019); *idem*, April 1837, fl., *B. Luschnath s.n.* in *Martii Herbar. Florae Brasil. N° 420* (B 10 0185159, BM 000947255, BR 0000008810489, BR 0000008810519, G, G-DC, GZU 000249354 [fragment], K 000642336, L 0037070, LE 00006797, LE, M 0121032, MO 247434, NY 00355493, P 00711025); *idem*, 1836, *B. Luschnath s.n.* (BR 0000008808042).

Further synonyms in Rohwer (1993), and further information on the priority of Ruiz and Pavón’s name over Kunth’s name in Moraes (2012, 2013).

As pointed out by Moraes (2012a), Rohwer (1993) indicated that *Martii Herbar. Florae Brasil. N° 420* would probably be the same collection of *Martius s.n.*, collected in Cachoeira. However, Martius (1837–[1841]; 1841: 7) clearly indicated “420. *Oreodaphne dispersa* Nees ab Esenb. Laur. 427 var. *grandifolia* ? ipso definiente. ... In silvis ad Ilheos. Aprili. *Dryas*,” which does therefore represent a different collection gathered by Luschnath.

29. *Nectandra reticulata* (Ruiz & Pav.) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 404. 1889; Rohwer, Fl. Neotrop. Monogr. 201: 276. 1993; Moraes, Komarovia 6(1): 24. 2008; *ibid.* in Harvard Pap. Bot. 17(1): 203. 2012; *ibid.* in Pl. Ecol. Evol. 146(3): 370. 2013.

Basionym: *Laurus reticulata* Ruiz & Pav., Fl. Peruv. 4(2): t. 348. 1804[–1830] (Ruiz and Pavón, 1956: 14, t. 348). Lectotype (designated by Rohwer, 1993: 276, as “MA”; second-step lectotype designated by Moraes, 2008: 24); PERU. Cuchero, May[–September?] 1780, fl., *H. Ruiz L. & J. A. Pavón s.n.* (MA 811776 [with handwritten labels “*Laurus reticulata* *Laurographia Pavon et Sp. Pl. Fl. Per. / de Cuchero*” by Pavón, and “*Enneandria Monogyn. Casyta ? Laurus F P. c. L. N. 160 Ex Vitoc [Tarma]. Año 94*” by Tafalla]; Isolectotypes, F [0040293F, ex MA, ex Vitoc, fragments of leaf and flower], MA 811778 [numbered “13/19”], MA 811780 [F neg. 29398; numbered “13/19”]. Syntypes: PERU. Cuchero and Chinchao, s.d., fl., *H. Ruiz L. & J. A. Pavón s.n.* (A 00041960 [Pavón 504 ex G], B 10 0185150, BC 872724, BM 000947252, BR 0000008808370 [ex Herb. Reg. Berolinense ex Herb. Lamberti], F [0040319F; F neg. 58079], F [0040320F; F neg. 58078, with flower and fruit], FI-W n.v., G 00020756 (Pavón 504, 2 sheets), G 00020755 & G 00020758 (Pavón s.n.; 7 sheets), G (4 sheets), GZU 000261284 [fragment], HAL 0010378 [ex Herb. Reg. Berolinense ex Herb. Lamberti], MA 811777 & MA 811779 [ex Herbarium Peruvianum Ruiz et Pavon, numbered “13/20”], MA 811781 [Pavón’s label annotated as “*Laurus reticulata* / *Laurographia Pavon et Sp. Pl. Fl. Per.*”], P 00571439 [ex Herb. Pavon], P 00571440 [ex Herb. Pavon N° 36, annotated by Mez], P 00571441 [ex Herb. Reg. Berolinense ex Herb. Lamberti]; PERU. Cuchero, July, fl., *J. Dombey s.n.* (B 10 0185149, G-DC, GZU

000254296 [fragment], MA 811775 [ex Herb. Ruiz & Pavón, with Dombey's label as "Laurus pubescens. F. p. 1780/in Sylvis Cochoero," and "Enneandria monogynia.../habitat in Sylvis Cochoero, floret julio;" see Alvarez Lopez, 1956: 75, and Ruiz and Pavón, 1989], P 00745320, P 00745321, P-JU 00662847; also syntypes of *Nectandra villosa* Nees & Mart. var. *venosa* Nees, Syst. Laur.: 291. 1836). Icon: Laurographia t. 3 (G [F neg. 34250]).

Synonyms: *Ocotea mollis* Kunth in Humboldt, Bonpland and Kunth, Nov. Gen. Sp. (quarto ed.) 2: 164. 1818 = *Persea mollis* (Kunth) Spreng., Syst. Veg. (ed. 16) 2: 270. 1825 = *Nectandra mollis* (Kunth) Nees, Pl. Laur. Expos. 14. 1833; *ibid.* in Syst. Laur.: 287. 1836; Martius, Syst. Mat. Med. Bras.: 112. 1843; Meissner in DC., Prodr. 15(1): 148. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 253, t. 91. 1866; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 60. 1986. Lectotype (designated by Rohwer, 1993: 276): COLOMBIA. Tolima, "prope El Azufral in Andibus Quindiuensibus, alt. 1050 hexap., s.d., fl., F. W. H. A. von Humboldt & A. J. A. Bonpland s.n. (P 00128743; Isolectotypes, B 10 0185155 [Mus. Bot. Berol. Film Nr. 5202], B-W 07796 -01 0 [Mus. Bot. Berol. Film Nr. 657/33; "Laurus villosa Willd., herbarium name] & B-W 07796 -00 0, F [0061634F; F neg. 63073], GZU 000254324 [fragment], NY 00355629, NY 00355630, P 00128746, U 0002912, US 00028321). Specimens: BRAZIL. Rio de Janeiro, April 1836, *Martii Herbar. Florae Brasil. N°169* [= Ackermann V no. 121] (AWH 28300, BR 0000008808080, BR 0000008808387, G-DC 00147172, K 000576187, L 1802317, LE, M 0147273, M 0147274, M 0147275, M 0147276, MO 257354, OXF 00000288, STR).

Complete synonymy in Rohwer (1993) and further information in Moraes (2013).

Vernacular name: "Canella preta" (Martius, 1843).

30. *Ocotea bracteolata* (Nees) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 354. 1889; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 216. 1986; Moraes, Pl. Ecol. Evol. 146(3): 372. 2013 = *Oreodaphne bracteolata* Meisn., DC., Prodr. 15(1): 124. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 220. 1866. Basionym: *Petalanthera bracteolata* Nees, Syst. Laur.: 347. 1836. Lectotype (designated by Meissner [first-step], and by Mez [second-step]): BRAZIL. Amazonas, "in sylvis aeternis Coari," November–December 1819, fl., C. F. P. von Martius s.n. (M 0147154; Isolectotypes, B 10 0185271 [F neg. 3633], GZU 000254422, HBG [fragment], M 0147155, NY 00355873 [fragment]). Syntypes: BRAZIL. Amazonas, Rio Japurá, "in sylvis Japurensibus," January–February 1820, fl., C. F. P. von Martius s.n. (GZU 000265483, M 0147153); PERU. Loreto, "in Peruvia orient. prov. Maynas pr. Yurimaguas," 1839, E. F. Poeppig 2426 (AWH 28268, B⁺ [F neg. 3702], F [0040353F], G 00369324, G 00369325, G-DC, GOET 004541, GZU 000254361, KIEL [2 sheets], NY 00355874 [fragment], OXF

00000301, P 00756760) [Lectotype of *Ocotea petalanthera* (Meisn.) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 358. 1889].

Further information in Rohwer (1986) and Moraes (2013).

31. *Ocotea camphoromoea* Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 179. 1986 = '*Persea subtripplinervia* Mart. ex Nees', Syst. Laur.: 466. 1836, *nom. invalid.* = *Ocotea subtripplinervia* (Nees) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 333. 1889, *nom. illegit.*

Basionym: *Camphoromoea subtripplinervia* Nees, Syst. Laur.: 466. 1836; Meissner in DC., Prodr. 15(1): 144. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 246, t. 87. 1866. TYPE: BRAZIL. Pará, "in sylvis secus Flumen Amazonum," September 1819, fl., C. F. P. von Martius s.n. (Holotype: M 0147134; Isotypes, B 10 0185426, M 0147135, M 0147136, M 0147137, M 0147138, M 0147139).

32. *Ocotea ceanothifolia* (Nees) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 365. 1889; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 214. 1986 = '*Persea ceanothifolia* Mart. ex Nees', Syst. Laur.: 236. 1836, *nom. invalid.*

Basionym: *Mespilodaphne ceanothifolia* Nees, Syst. Laur.: 236. 1836; Meissner in DC., Prodr. 15(1): 106. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 199. 1866. TYPE: BRAZIL. Amazonas, "in sylvis Japurensibus ad Porto dos Miranhas," February 1820, fl., C. F. P. von Martius Obs. 3174: "Laurus ceanothifolia m. ... Arbor sive frutex ramis densis ..." (Syntypes: B 10 0185262 [F neg. 3640], G 00369362, L [2 sheets; "Laurus ceanothifolia M., herbarium name, "Japura"], M 0147148, M 0147150, NY 00355332 [fragment]); BRAZIL. Pará, "in sylvis ad Flumen Amazonum," September 1819, fl., C. F. P. von Martius Obs. 3174 (Syntypes: M 0147149, NY 00355332 [fragment]).

33. *Ocotea cernua* (Nees) Mez, Mitt. Bot. Vereins Kreis Freiburg 47/48: 422. 1888, *s. lat.*; *ibid.* in Jahrb. Königl. Bot. Gart. Berlin 5: 377. 1889; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 207. 1986; Moraes, Harvard Pap. Bot. 17(2): 247. 2012; *ibid.* in Pl. Ecol. Evol. 146(3): 371. 2013. Basionym: *Oreodaphne cernua* Nees, Syst. Laur.: 424. 1836. Lectotype (designated by Mez, 1888: 422): MARTINIQUE. Loco haud indicato, s.d., F. W. Sieber *Flora mixta. N° 385* (KR; Isolectotypes, G 00369366, G-DC 00130426 [only the flowering sheet], LE 00006768, LE [2 sheets], MEL, NY 00074413, P 01959499). Syntypes: MARTINIQUE. Loco haud indicato, s.d., F. Kohaut in F. W. Sieber *Flora martin. N° 106* (AWH 28401, B 10 0185257, B 10 0185260, B 10 0185261, BR 0000008813053, G 00369384, GH 00042066, GZU 000254342 [fragment], JE 00004386, KIEL, L 0056294, L 0056295, LE [2 sheets], M 0147144, M 0147145, MO 277515); MARTINIQUE. Loco haud indicato, s.d., J. W. Hornemann s.n. (C, GZU 000260297 [fragment]).

Synonyms: ? *Laurus nitida* Ruiz & Pav., Fl. Peruv. 4(2): t. 353. 1804[–1830] (Ruiz and Pavón, 1956: 19, t. 353) = *Mespilodaphne nitida* (Ruiz & Pav.) Meisn. in DC., Prodr. 15(1): 106. 1864. Lectotype (designated by Moraes, 2012b: 247): PERU. “in Chacahuassi,” 1787, *H. Ruiz L. & J. A. Pavón s.n.* (503 in G-Del) (MA 811788; Isolectotypes, B 10 0247502 [B neg. 5266B], BM 000947285, F [0061414F; fragment], F [0061419F; fragment], G [2 sheets], G [ex Herb. Moricand, F neg. 27619], HAL 0103800, MA 811787, NY 00355164 [ex G ex Herb. Moricand], P 00756828 [Pavón 36]). Syntype: PERU. “Cuchero,” *J. Dombey s.n.* (P 00756826, P 00756827). Icon: Laurographia t. 13 (G [F neg. 34260]).

? *Laurus leptobotra* Ruiz & Pav., Fl. Peruv. 4(2): t. 368. 1804[–1830] (Ruiz and Pavón, 1956: 35, t. 368) = *Oreodaphne leptobotra* (Ruiz & Pav.) Nees, Linnaea 21: 520. 1848; Meissner in DC., Prodr. 15(1): 138. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 239. 1866 = *Ocotea leptobotra* (Ruiz & Pav.) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 376. 1889. Lectotype (designated by Moraes, 2012b: 247): PERU. “In Andium nemoribus ad Macora praedium,” s.d., *H. Ruiz L. & J. A. Pavón s.n.* (MA 811791; Isolectotypes, B 10 0247503 [B neg. 5266c], F [0061415F; fragment], F [0061416F; fragment], G, GZU 000254142 [ex B, fragment], MA 811790, NY 00355162 [ex G, fragment]). Icon: Laurographia t. 21 (G [F neg. 34268]).

? *Leptodaphne subalpina* Nees, Syst. Laur.: 361. 1836 = *Oreodaphne subalpina* (Nees) Meisn. in DC., Prodr. 15(1): 137. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 238. 1866 = *Ocotea subalpina* (Nees) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 375. 1889. TYPE: BRAZIL. Bahia, Rio de Contas, “Serra Grande prope Villam do Rio de Contas,” October 1818, *C. F. P. von Martius s.n.* (Holotype: M 0147140; Isotype, GZU 000254159 [fragment]).

? *Leptodaphne tenuiflora* Nees, Syst. Laur.: 359. 1836 = ‘*Persea tenuiflora* Mart. ex Nees’, Syst. Laur.: 359. 1836, *nom. invalid.* = *Camphoromoea tenuiflora* (Nees) Meisn. in DC., Prodr. 15(1): 144. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 247. 1866 = *Ocotea tenuiflora* (Nees) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 383. 1889; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 208. 1986. TYPE: BRAZIL. Rio de Janeiro, “in sylva Brasiliae densissima prope cataractas Tijuacenses ad Sebastianopolin,” November 1817, fl., *C. F. P. von Martius Obs. 261*: “*Persea tenuiflora* Calyx clavato infundibuliformis limbo 6fido ...” (Holotype: M 0111179; Isotypes, B 10 0185423, GZU 000254160 [fragment], M 0111180).

For a complete list of probable synonyms, see Rohwer (1986).

Rohwer (1986) has circumscribed *Ocotea cernua* (Nees) Mez in a very broad sense. Once confirmed that the taxa described and collected by Ruiz & Pavón in Peru are the same as the one described by Nees from collections of

Sieber “Flora Martinicensis & Mixta”, *Ocotea leptobotra* (Ruiz & Pav.) Mez must be the correct name for having priority (see Moraes, 2012b, 2013).

34. *Ocotea citrosmoides* (Nees) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 349. 1889; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 174. 1986.

Basionym: *Oreodaphne citrosmoides* Nees, Syst. Laur.: 384. 1836; Meissner in DC., Prodr. 15(1): 122. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 217. 1866. TYPE: BRAZIL. Minas Gerais, Sabará, “in sylvis caeduis prope Sabará,” May 1818, fl. ♂, *C. F. P. von Martius Obs. 1223*: “Arb. parva ramio paucis patul. Flores, qui in siccis examinandi, pall. ochroleuco-~~virid~~ialbi, anth. tandem nigrescentibus. Prope Sabará” (Holotype: M 0111194; Isotypes, GZU 000254343, M 0111193).

35. *Ocotea complicata* (Meisn.) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 247. 1889; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 109. 1986; Moraes, Harvard Pap. Bot. 17(2): 248. 2012.

Basionym: *Mespilodaphne complicata* Meisn. in DC., Prodr. 15(1): 103. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 199. 1866. Lectotype (designated by Assis and Mello Silva, 2010: 378): BRAZIL. Bahia, Ilhéus, “in sylv. arenosis maritimis pr. Ilheos,” May 1822, *L. Riedel 766* (G 00369363; Isolectotypes, B 10 0185255 [F neg. 3644], F [0061435F, fragment], G [as *Riedel 776*], GOET, K 000575058 [as *Riedel s.n.*], L 0036971 [as *Riedel s.n.*], LE 00000570, NY). Syntype: BRAZIL. Bahia, “in sylvis Catingas ad Sincorâ locis altis,” November 1818, fr., *C. F. P. von Martius s.n.* (M 0111195 [F neg. 19271; “*Ocotea firmula* Mart.”, herbarium name; “*Aydendron firmulum* Nees,” herbarium name], M 0111196).

As pointed out by Moraes (2012b), Assis and Mello-Silva (2010) reduced *Ocotea complicata* (Meisn.) Mez to synonymy under *O. fasciculata* (Nees) Mez, which is here reiteratively not accepted. The reason is based on differences between both taxa in habit, flower, fruit and vegetative characters, as well as in their habitats.

36. *Ocotea cujumarum* Mart. in Buchner, Repert. Pharm. 35: 178. 1830; *ibid.* in Spix and Martius, Reise Bras. 3: 1128. 1831; Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 286. 1889; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 161. 1986 = *Aydendron cujumarum* (Mart.) Nees, Syst. Laur.: 247. 1836; Martius, Syst. Mat. Med. Bras.: 110. 1843; *ibid.* in Fl. Bras. 5(2): 318. 1868; Meissner in DC., Prodr. 15(1): 94. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 185, t. 66. 1866. TYPE: BRAZIL. Amazonas, “in sylvis Japurensibus et ad Ega, tum etiam in carapestribus sylvisque caeduis prope Barra do Rio negro,” December 1819, fr., *C. F. P. von Martius s.n.* (Holotype: M 0121076 [F neg. 6584]; Isotypes, B 10 0185244, M 0121077, NY 00355591 [fragment]).

Complete synonymy in Rohwer (1986).

Vernacular name: “Cujumarum” (Martius, 1843, 1868).

37. *Ocotea cymbarum* Kunth in Humboldt, Bonpland and Kunth, Nov. Gen. Sp. (quarto ed.) 2: 166. 1817 = *Nectandra cymbarum* (Kunth) Nees, Syst. Laur.: 305. 1836; Martius, Syst. Mat. Med. Bras.: 111. 1843; Meissner in DC., Prodr. 15(1): 156. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 265, t. 96. 1866; Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 464. 1889; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 106. 1986; *ibid.* in Fl. Neotrop. Monogr. 60: 298. 1993; Moraes, Pl. Ecol. Evol. 146(3): 371. 2013 = *Licaria cymbarum* (Kunth) Pittier, Bol. Soc. Venez. Ci. Nat. 7: 135. 1941 = *Misanteca cymbarum* (Kunth) Lundell, Wrightia 4(3): 100. 1969. Lectotype (designated by Moraes, 2013: 371): VENEZUELA. “in sylvis Orinocensibus prope San Fernando de Atabapo,” May, fr., *F. W. H. A. von Humboldt & A. J. A. Bonpland 904* (B-W 07787 -01 0 [Mus. Bot. Berol. Film Nr. 657/28], B-W 07787 -00 0 [annotated by Willdenow as “*Laurus coruscans*” ex Bonpland, herbarium name]; Isolectotype, P 00128760).

Synonym: *Ocotea amara* Mart. in Buchner, Repert. 35: 180. 1830. TYPE: BRAZIL. Amazonas, “in sylvis aboriginibus Provinciae Fluminis nigri,” 1820, fr., *C. F. P. von Martius s.n.* (Holotype: M 0147301; Isotypes, B 10 0185242 [sterile], L 0036963 [“*Laurus longifolia* M. / Solimões”, herbarium name]).

Synonymy in Rohwer (1986: 106–107).

Vernacular name: “Páo Sassafras” (Martius, 1843).

38. *Ocotea deflexa* Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 214. 1986 = *Ocotea declinata* (Meisn.) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 352. 1889, *nom. illegit.*, *hom. post.*

Basionym: *Oreodaphne declinata* Meisn. in DC., Prodr. 15(1): 114. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 208. 1866. TYPE: BRAZIL. Bahia, Ilhéus, September 1839, fl., *B. Luschnath s.n.* in *Martii Herbar. Florae Brasil. N° 1311* (Syntypes: BR [3 sheets]); BRAZIL. Bahia, loco haud indicato, “partie merid. de la prov. de Bahia,” s.d. [1840], fl., *J. S. Blanchet 3192* (Syntypes: F [0061684F], G [4 sheets], G-DC 00201332 [F neg. 7280; *Blanchet 3192A*], NY 00355707 [fragment], OXF 00000309, P 00757003, W n.v.); *idem*, July 1839, fl., *B. Luschnath 32* (Syntypes: B 10 0185239, B 10 0185240 [F neg. 3653], B 10 0185241, LE, M 0147123, M 0147124, M 0147125, M 0147126, M 0147127, NY 00355708, NY 00355709, P 00757004, US 00047713).

39. *Ocotea guianensis* Aubl., Hist. Pl. Guiane 2: 781, t. 310. 1775 [spelled “*Guyannensis*” in the plate]; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 157. 1986; Moraes, Pl. Ecol. Evol. 146(3): 371. 2013 = *Laurus ocotea* Rich., Actes Soc. Hist. Nat. Paris 1: 108. 1792, *nom. illegit.* = *Oreodaphne guianensis* (Aubl.) Nees, Linnaea 21: 268, 516. 1848 = *Oreodaphne guianensis* (Aubl.) Nees var. *argentea* Meisn. in DC., Prodr. 15(1): 112. 1864, *nom. illegit. superfl.*, = var. *guianensis*; *ibid.* in Martius, Fl. Bras. 5(2): 204. 1866. Lectotype (designated by Rohwer, 1986: 157, as “Holotyp”): FRENCH GUIANA. Loco haud indicato, April, fl., *J. B. F.*

Aublet s.n. (BM 000947302). Syntype ? : PATRIA HAUD INDICATA. Loco haud indicato, s.d. [June ?], fr., *J. B. F. Aublet s.n.* (P 00756908). Specimen: BRAZIL. Pará, loco haud indicato, May 1820, *C. F. P. von Martius s.n.* (M 0147117).

For a complete list of synonyms, see Rohwer (1986).

40. *Ocotea hypoglauc* (Nees & Mart.) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 285. 1889; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 191. 1986; Moraes, Komarovia 6(1): 26. 2008 = *Persea scrobiculata* Meisn. in DC., Prodr. 15(1): 50. 1864, *nom. illegit.*; *ibid.* in Martius, Fl. Bras. 5(2): 161. 1866.

Basionym: *Persea hypoglauc* Nees & Mart. in Nees, Linnaea 8: 49. 1833. Lectotype (designated by Rohwer, 1986: 191): BRAZIL. Minas Gerais, “in summo Monte Itacolomi 4500’ alt.,” fr., *C. F. P. von Martius Obs. 903*: “arbor 10–15 ped. ... In summo Monte” (M 0111040 [annotated by Martius as “*Persea hypoglauc*”, by Meissner as “*Persea scrobiculata* nob. prodr.” and by Mez as “*Ocotea hypoglauc*”]; Isolectotype, GZU 000254394). Syntypes: BRAZIL. Paraná, fl., *F. Sellow 4803* (XXI) (B 10 0185196 [annotated by Nees], B 10 0185197, G 00020787 [as *Sellow s.n.*] [= *Persea venosa* Nees & Mart.]); BRAZIL. Loco haud indicato, fl., *F. Sellow s.n.* (B 10 0185313 [B neg. 1233/31; F neg. 3668]); *idem*, fl., *F. Sellow s.n.* (B 10 0185314 [B neg. 1233/32]).

41. *Ocotea indecora* (Schott) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 249. 1889; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 110. 1986; Moraes, Komarovia 6(1): 14. 2008; *ibid.* in Harvard Pap. Bot. 17(2): 251. 2012 = *Oreodaphne indecora* (Schott) Nees, Syst. Laur.: 407. 1836 = *Mespilodaphne indecora* (Schott) Meisn. in DC., Prodr. 15(1): 102. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 196, t. 72. 1866 = *Ocotea pretiosa* Mez var. *indecora* (Schott) Vattimo-Gil, Rodriguésia 37: 87. 1966.

Basionym: *Persea indecora* Schott in Spreng., Syst. Veg. (ed. 16) 4(2): 405. 1827. Lectotype (designated by Moraes, 2008: 14): BRAZIL. Loco haud indicato, s.d., fl., *H. W. Schott s.n.* (B 10 0000017 [ex Herb. Sprengel no. 43, B neg. 5254 B]). Syntype: BRAZIL. Loco haud indicato, s.d., fl., *H. W. Schott 5610* (M 0121079 [F neg. 19273], M 0121080, NY, US 00099223) [also syntype of *Mespilodaphne indecora* (Schott) Meisn. var. *stricta* Meisn. in DC., Prodr. 15(1): 102. 1864]. Probable syntype: BRAZIL. Loco haud indicato, s.d., fl., *H. W. Schott 5600* (M 0121078, NY).

Synonym: ‘*Aiouea tenuiflora* Nees ex Meisn.’ in DC., Prodr. 15(1): 510. 1864, *nom. invalid.*; Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 49. 1889. Specimen: BRAZIL. Rio de Janeiro, “in sylvis caeduis ad Sebastianopolin.,” September 1817, *C. F. P. von Martius s.n.* (M 0147112).

Other synonyms in Assis and Mello-Silva (2010), Moraes (2012b).

42. *Ocotea lancifolia* (Schott) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 289. 1889, *s. lat.*; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 188. 1986; Moraes, Komarovia 6(1): 34. 2008; *ibid.* in Harvard Pap. Bot. 17(2): 254. 2012 = *Oreodaphne lancifolia* (Schott) Nees, Syst. Laur.: 410. 1836; Meissner in DC., Prodr. 15(1): 116. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 210. 1866. Specimens: BRAZIL. Minas Gerais, Serra do Caraça, May 1818, fl., *C. F. P. von Martius Obs. 1112* (M 0121035 [*"Ocotea subacris* Mart.," herbarium name]); *idem*, loco haud indicato, s.d., fl., *Anonymous s.n.* (MEL 2324399; [*"L[aurus]. dura M[art]."*, herbarium name]).

Basionym: *Persea lancifolia* Schott in Spreng., Syst. Veg. (ed. 16) 4(2): 405. 1827. TYPE: BRAZIL. Loco haud indicato, fl. ♂, *H. W. Schott s.n.* (Holotype: B 10 0000020 [B neg. 1234/1, F neg. 3675, NY neg. 8379, ex Herb. Sprengel nr. 42, annotated as "*Persea lancifolia* Schott"])).

Synonyms: *Strychnodaphne lanceolata* Nees, Linnaea 8: 39. 1833; Meissner in DC., Prodr. 15(1): 143. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 245. 1866; Moraes, Komarovia 6(1): 53. 2008 = *Ocotea lanceolata* (Nees) Nees, Syst. Laur.: 474. 1836, non Nees in Wallich (1831); Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 334. 1889. TYPE: BRAZIL. Loco haud indicato, s.d., immat fr., *F. Sellow s.n.* (Holotype: B[†] [possibly F neg. 3675, ex Herb. Sprengel]; Isotypes, GZU 000249333 [annotated by Nees, *Anonymous s.n.*], VT 001552).

Oreodaphne martiana Nees, Linnaea 8: 41. 1833, e.p., *mixtum compositum*; Meissner in DC., Prodr. 15(1): 134. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 235. 1866. Lectotype (designated by Rohwer, 1986: 189, as "Holotyp M"): BRAZIL. Minas Gerais, "in alpinis Serra do Caraça," April 1818, fl. ♀, *C. F. P. von Martius Obs. 1112*: "Frutex 4–6 ped. ramis patentibus glab. Serra de Carass." (M 0111038 [*"Ocotea daphnoides* Mart.," herbarium name]; Isolectotypes, GZU 000259998 [fragment], M 0121036, NY 00355742 [fragment]). Syntype: BRAZIL. Minas Gerais, loco haud indicato, s.d. [April], fr., *C. F. P. von Martius s.n.* (B 10 0185347, GZU 000254355 [fragment]) [= *Ocotea odorifera* (Vell.) Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 111. 1986].

Oreodaphne nitidula Nees & Mart. in Nees, Linnaea 8: 41. 1833 = *Oreodaphne nitidula* Nees & Mart. var. *lanceolata* Meisn. in DC., Prodr. 15(1): 136. 1864, *nom. invalid.* Lectotype (designated by Moraes, 2008: 53): BRAZIL. Minas Gerais, "editis Serro Frio, ad Tapanhoacanga," May 1818, fl. ♂, *C. F. P. von Martius s.n.* (M 0111039; Isolectotype: GZU 000254358).

Oreodaphne thymelaoides Nees & Mart. in Nees, Linnaea 8: 42. 1833. Lectotype (designated by Moraes, 2008: 43): BRAZIL. Minas Gerais, Serro, "in Serro Frio," May 1818, fl., *C. F. P. von Martius s.n.* (M 0111037 [annotated by Martius as "*Ocotea daphnoides*", by Nees as "*Oreodaphne angustifolia thymelaoides* N. ab. Es. / nomen mutandum ..., ob Oreod. angustifol. Schott. in Spr. Cur. post.," and by Meissner as "*Oreodaphne Martiana* Nees &

thymelaoides Meissner ipse"]; Isolectotype, GZU 000254370 [annotated by Nees as "*Oreodaphne angustifolia thymelaoides* / Serro frio, Prov. Min. / Majo"])).

Further synonyms in Rohwer (1986).

Rohwer (1986) has circumscribed *Ocotea lancifolia* in a broad sense and in such terms that it is still needed to be established whether several of the indicated synonyms really belong to this taxon (i.e., *Ocotea lancifolia*).

In the protologue of *Oreodaphne martiana*, Nees has described a species with flowers and fruits. The specimen at B 10 0185347 (annotated and cited by Mez 1889: 250–251, under *Ocotea pretiosa* Mez) bears a handwritten label by Nees with "*Oreodaphne martiana* N. et M. Var. α / Min. Ger. Apr. / a Mart." However, it is a fruiting specimen which belongs to *Ocotea odorifera* (Vell.) Rohwer, with a duplicate in GZU. Therefore, *Oreodaphne martiana* Nees must be taken only from the flowering material of Martius. Another specimen cited by Mez (1889: 250–251, under *Ocotea pretiosa* Mez), Martius "n. 79", has not been located so far.

43. *Ocotea laxa* (Nees) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 381. 1889; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 211. 1986; Moraes, Komarovia 6(1): 8. 2008; *ibid.* in Harvard Pap. Bot. 17(2): 264. 2012 = '*Persea laxa* Mart. ex Nees', Syst. Laur.: 468. 1836, *nom. invalid.*

Basionym: *Camphoromoea laxa* Nees, Syst. Laur.: 468. 1836; Meissner in DC., Prodr. 15(1): 144. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 247, t. 88, 89. 1866. Lectotype (designated by Moraes, 2008: 8): BRAZIL. Minas Gerais, "in sylvis Capoeira prope Faz. de S. Barbara et haud procul a Villa de Campanha," February 1818, fl., *C. F. P. von Martius Obs. 678*: "arbor cortice dilute cinereo. Altitude 15–20 ped. Rami laxi dependentes. In Capoeira" (M 0111035 [*"Persea laxa* Mart.," herbarium name]; Isolectotypes, B 10 0000022, GZU 000253885). Syntypes: BRAZIL. Minas Gerais e São Paulo, "in sylvis caeduis prope fluv. Sapucahy, prope Camapuão", fl., *C. F. P. von Martius s.n.* (M 0111036 [F neg. 19275]); BRAZIL. Loco haud indicato, s.d., sterile, *F. Sellow s.n.* (B 10 0000024); *idem*, s.d., sterile, *F. Sellow s.n.* (B 10 0000025); *idem*, s.d., sterile, *F. Sellow s.n.* (HAL 0010445).

44. *Ocotea longifolia* Kunth in Humboldt, Bonpland and Kunth, Nov. Gen. Sp. (quarto ed.) 2: 164. 1817; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 158. 1986; Moraes, Harvard Pap. Bot. 17(2): 254. 2012 = *Persea longifolia* (Kunth) Spreng., Syst. Veg. 2: 270. 1825 = *Oreodaphne longifolia* (Kunth) Nees, Syst. Laur.: 391. 1836. TYPE: COLOMBIA. Tolima, "in saxosis inter Mariquitam Novogranatensium et Santa Ana," June 1801, fr., *F. W. H. A. von Humboldt & A. J. A. Bonpland 1729* (Holotype: P 00128764; Isotypes, B-W 07789-01 0 [B neg. 657/26] & B-W 07789-00 0, P 00128765, P 00128766, P 00128767).

Synonyms: ? *Laurus aurantiadora* Ruiz & Pav., Fl. Peruv. 4(2): t. 349. 1804[–1830] (Ruiz and Pavón, 1956: 15, t. 349) = *Aydendron suaveolens* Nees var. β Nees,

Linnaea 21: 499. 1848, *nom. invalid.* = *Mespilodaphne aurantiadora* (Ruiz & Pav.) Meisn. in DC., Prodr. 15(1): 101. 1864 = *Ocotea aurantiadora* (Ruiz & Pav.) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 295. 1889. Lectotype (designated by Moraes, 2012b: 255): PERU. “in Peruviae Andium nemoribus ad Chinchao et Cuchero,” 1794, *H. Ruiz L. & J. A. Pavón s.n.* (MA 811782; Isolectotypes, B 10 0247398 [B neg. 5215], F [0061413F; fragment], FI 005224, G, MA [2 sheets]). Icon: Laurographia t. 15 (G [F neg. 34262]).

Ocotea opifera Mart. in Buchner, Repert. 35: 179. 1830; Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 291. 1889; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 158. 1986; Moraes, Harvard Pap. Bot. 17(2): 255. 2012 = *Oreodaphne opifera* (Mart.) Nees, Syst. Laur.: 390. 1836; Martius, Syst. Mat. Med. Bras.: 110. 1843 = *Mespilodaphne opifera* (Mart.) Meisn. in DC., Prodr. 15(1): 510. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 194, t. 70. 1866; Martius, Fl. Bras. 5(2): 318. 1868 = ‘*Laurus opifera* Mart. ex Meisn.’ in Martius, Fl. Bras. 5(2): 195. 1866, *nom. invalid.* Lectotype (designated by Rohwer, 1986: 158, as “Holotyp M”): BRAZIL. Amazonas, “in sylvis secus fluv. Amazonum et Rio Negro,” October 1819, fr., *C. F. P. von Martius Obs.* 2796: “Arbor 10–15 pedalis floribus in paniculis magnis terminalibus pallide flavo-ochroleucis, fructibus ellipticis in cupulis hemisphaericis. Rami angulati” (M 0121057). Syntypes: BRAZIL. Amazonas, “in sylvis ad Barra do Rio Negro,” October 1819, fr., *C. F. P. von Martius Obs.* 2796 (GZU 000254327, M 0121055); *idem*, Amazonas, “in sylvis Japurensibus” [Rio Japurá], December 1819, fl., *C. F. P. von Martius Obs.* 2796 (GZU 000254326, M 0121056, M 0174126); *idem*, Amazonas, “in sylvis Japurensibus” [Rio Japurá], January 1820, fl., *C. F. P. von Martius s.n.* (M 0121058); *idem*, Pará, “in sylvis secus fl. Amazonum,” May 1820, *C. F. P. von Martius s.n.* (B 10 0185382 [fr.], M 0121059 [fl.], M 0121061 [fl.]); *idem*, loco haud indicato, s.d., fl., *Anonymous s.n.* (B 10 0185383 [annotated by Nees]).

Further synonyms in Rohwer (1986).

Vernacular name: “Canella de cheiro” (Martius, 1843, 1868).

Mez (1889), Rohwer (1986), and van der Werff (2002b) have indicated *Ocotea longifolia* Kunth and *O. aurantiadora* (Ruiz & Pav.) Mez as probable synonyms. However, since there is no recent revision of the collections of these taxa (of specimens from Brazil, Colombia, Peru, and elsewhere), we keep here the traditional use of the first name for the Brazilian specimens, indicating the second name as a doubtful synonym. Once the synonymy is confirmed, *Ocotea aurantiadora* must be the correct name to be adopted for being the oldest one (Moraes, 2012b).

45. *Ocotea minarum* (Nees & Mart.) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 305. 1889; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 148. 1986; Moraes, Komarovia 6(1): 13. 2008; *ibid.* in Harvard Pap. Bot. 17(2): 256. 2012.

Basionym: *Gymnobalanus minarum* Nees & Mart. in Nees, Linnaea 8: 38. 1833; *ibid.* in Syst. Laur.: 480. 1836; Meissner in DC., Prodr. 15(1): 140. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 242, t. 84. 1866. Lectotype (designated by Rohwer, 1986: 148 [first-step]; second-step lectotype designated by Moraes, 2008: 12): BRAZIL. São Paulo, fl. ♀, *F. Sellow 5636* (B 10 0000037 [B neg. 5276 B]; Isolectotypes, B 10 0000036, B 10 0000038, VT). Probable isolectotypes, F [0061409F; as *Sellow s.n.*], HAL 0010433 [as *Sellow s.n.*]. Other syntypes: BRAZIL. Minas Gerais, “in sylvis ad Mariana,” April 1818, fl. ♀, *C. F. P. von Martius s.n.* (GZU 000253871, M 0111045); BRAZIL. Minas Gerais, Serro, “in sylvis capões Serro Frio,” May 1818, fl. ♀, *C. F. P. von Martius s.n.* (GZU 000253871, M 0111044); BRAZIL. São Paulo, “campis ad Ypanema et Ytu” [Real Fábrica de Ferro de São João de Ypanema, currently Floresta Nacional de Ipanema, Iperó; Itu], January 1818, fr., *C. F. P. von Martius s.n.* (GZU 000253871 [fragment], M 0111041 [“*Ocotea tubigera* Mart.”, herbarium name]).

Possible synonyms in Rohwer (1986).

46. *Ocotea neesiana* (Miq.) Kosterm., Meded. Bot. Mus. Herb. Utrecht 25: 16. 1936; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 183. 1986; Moraes, Komarovia 6(1): 32. 2008; *ibid.* in Harvard Pap. Bot. 17(2): 257. 2012; *ibid.* in Pl. Ecol. Evol. 146(3): 372. 2013 = *Oreodaphne fallax* Miq., Stirp. Surinam. Select.: 203. 1851, *nom. illegit. superfl.* = *Ocotea fallax* Miq. ex Mez, Mitt. Bot. Vereins Kreis Freiburg 47/48: 422. 1888, *nom. illegit. superfl.*

Basionym: *Nectandra neesiana* Miq., Linnaea 18: 745. 1844. TYPE: SURINAME. “distr. Para,” February–April 1844, fl. ♂, *F. W. R. Hostmann & A. Kappler 1433* (Holotype: U 0008441; Isotypes, AWH 28263, B[†] [ex Herb. Döll, fide Mez 1888: 422; not located in KR], G 00021042, G 00021043, GOET 000744, JE 00004381, KIEL, LE, P 00571434, P 00571435, P 01964216).

Synonyms: *Oreodaphne japurensis* Meisn. in DC., Prodr. 15(1): 124. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 219. 1866; Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 309. 1889 = *Oreodaphne dispersa* Nees & Mart. in Nees, Linnaea 8: 43. 1833, e.p. TYPE: BRAZIL. Amazonas, “Rio Negro, in sylvis Japurensibus,” fl. ♀, *C. F. P. von Martius s.n.* (Holotype: M 0111069; Isotypes, GZU 000254347, L [“*Laurus pauciflora* M.”, herbarium name, “R. Negro,” ex Herbarium Reinwardtianum], M 0111070, MEL 2318483 [“*Laurus pauciflora*,” herbarium name, “Para”], NY 00355728 [fragment]) [also syntype of *Oreodaphne dispersa* Nees & Mart.].

Further synonyms in Rohwer (1986) and Moraes (2008, 2012b).

The specimen at L seems slightly different from the others at GZU, M, MEL, and NY. It was identified by Kostermans in February 1935 as “*Ocotea tenuiflora* (Nees) Mez”, but definitely does not belong to it (see entry number 33, this work).

47. *Ocotea nutans* (Nees) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 362. 1889; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 196. 1986; Moraes, Komarovia 6(1): 33. 2008; *ibid.* in Harvard Pap. Bot. 17(2): 259. 2012 = *Mespilodaphne nutans* (Nees) Meisn. in DC., Prodr. 15(1): 98. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 189. 1866.

Basionym: *Oreodaphne nutans* Nees, Syst. Laur.: 421. 1836. TYPE: BRAZIL. São Paulo, "In campis Provinciae S. Pauli," January 1818, fl. ♀, *C. F. P. von Martius s.n.* (Holotype: M 0111192; Fig. 1; Isotypes, L ["*Laurus paulina* M.," herbarium name, "S. Paulo;" ex Herbarium Reinwardtianum; Fig. 2], MEL ["*L. paulina* M.," herbarium name, "St. Pauli"]).

Synonyms: *Oreodaphne nutans* Nees var. *sylvestris* Nees, Syst. Laur.: 421. 1836 = *Mespilodaphne glauca* (Nees) Meisn. var. *virescens* Meisn. in DC., Prodr. 15(1): 98. 1864, *nom. illegit.*; *ibid.* in Martius, Fl. Bras. 5(2): 188. 1866. TYPE: BRAZIL. Minas Gerais, Serro, "in sylvis Capões ad Tapanhoacanga, Serro Frio," May 1818, fl. ♀, *C. F. P. von Martius s.n.* (Holotype: M 0111191).

Mespilodaphne glauca (Nees) Meisn. var. *virescens* Meisn. in DC., Prodr. 15(1): 98. 1864, *excl. syn.* *Oreodaphne nutans* Nees var. *sylvestris* Nees = *Ocotea glauca* (Nees) Mez var. *virescens* (Meisn.) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 362. 1889. TYPE: BRAZIL. Bahia, "circa Igreja Velha," s.d., fl., *J. S. Blanchet 3250* (Syntypes: B 10 0185330, BM 000993989, F [0061438F; F neg. 58155], G 00369419, G 00369420, G-DC 00200476, M 0147118 [F neg. 19272]); Bahia, Jacobina, s.d., fl., *J. S. Blanchet 3250B* (Syntypes: BR 0000008823410, BR 0000008823021, BR 0000008823366, F [0061439F], FI-W 005242, G 00369421, G [2 sheets], G-DC 00200475, K 000442015, KIEL, M 014 7118 [F neg. 19272], MO 247521, NY 00355343, P 00756893, P 00756894, P 00756895, P 00756896); *idem*, Igreja Velha, s.d., *J. S. Blanchet 301* (Syntypes: G, P).

Oreodaphne kunthiana Meisn. in DC., Prodr. 15(1): 119. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 213. 1866. TYPE: BRAZIL. Loco haud indicato, s.d., fl. ♂, *F. Sellow s.n.* (Holotype: B 10 0185388 [ex Herb. Kunth, B neg. 5286 B]; Isotypes, G 00021062, P 01958844).

Ocotea subdecumbens M.A. Lisboa & J. Badini, Rev. Esc. Minas 31(4): 32. 1974; Moraes, Harvard Pap. Bot. 17(2): 259. 2012. TYPE: BRAZIL. Minas Gerais, Mariana, entre Bento Rodrigues e Sta. Rita Durão, February 1971, fl. ♂, *M. A. Lisboa & J. Badini s.n.* (Holotype: OUPR 26600 [right-hand specimen; ex Herbário da Escola de Minas de Ouro Preto N°. 4030]; Isotype, OUPR 18212); *idem*, Minas Gerais, Mariana, entre Bento Rodrigues e Sta. Rita Durão, February 1971, fl. ♀, *M. A. Lisboa & J. Badini s.n.* (Paratype: OUPR 26600 [left-hand specimen; ex Herbário da Escola Federal de Farmácia e Bioquímica de Ouro Preto N°. 27003], HRCB).

48. *Ocotea phillyreoides* (Nees) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 315. 1889; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 168. 1986; Moraes, Abc Taxa 3: 126. 2007; *ibid.* in Komarovia 6(1): 36. 2008; *ibid.* in Harvard Pap. Bot. 17(2): 260. 2012 = '*Cryptocarya monticola* Mart. ex Nees', Syst. Laur.: 400. 1836, *nom. invalid.* = *Mespilodaphne phillyreoides* (Nees) Meisn. in DC., Prodr. 15(1): 100. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 193. 1866 = *Mespilodaphne phillyreoides* Nees (Meisn.) var. *oblonga* Meisn. in DC., Prodr. 15(1): 100. 1864 [homotypic by typification; lectotype designated by Moraes, 2008: 36]; *ibid.* in Martius, Fl. Bras. 5(2): 193. 1866.

Basionym: *Oreodaphne phillyreoides* Nees, Syst. Laur.: 400. 1836. Lectotype (designated by Moraes, 2008: 36): BRAZIL. São Paulo, "Rio das Pedras," fl. ♂, *F. Sellow B 1362 c 393* (B 10 0185369; Isolectotypes, B 10 0185367 [B neg. 5295], K 000575057). Probable isolectotypes: BRAZIL. Loco haud indicato, fl. ♂, *F. Sellow s.n.* (G-DC 00201230, HAL 0103830); *idem*, loco haud indicato, fl., *F. Sellow s.n.* (B 10 0185370, ex Herb. Baschant). Syntype: BRAZIL. Minas Gerais, "in montosis, alt. 2800–3600'," "*Cryptocarya monticola* Martius" [herbarium name], fl. ♀, immat. fr., *C. F. P. von Martius s.n.* (M 0111178 [annotated by Nees as "*Oreodaphne phillyraeoides*" and by Meissner as "*Mespilodaphne phillyreoides* β *oblonga*"]).

Further synonyms and information in Rohwer (1986) and Moraes (2008).

Ocotea phillyreoides (Nees) Mez belongs to the *Ocotea tristis* (Nees & Mart.) Mez Complex sensu Rohwer (1986), whose synonymy must be confirmed.

49. *Ocotea pulchella* (Nees & Mart.) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 317. 1889 = *Mespilodaphne pulchella* (Nees & Mart.) Meisn. in DC., Prodr. 15(1): 99. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 191, t. 68. 1866; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 166. 1986; Moraes, Komarovia 6(1): 38. 2008; *ibid.* in Harvard Pap. Bot. 17(2): 261. 2012. Basionym: *Oreodaphne pulchella* Nees & Mart. in Nees, Linnaea 8: 40. 1833; *ibid.* in Syst. Laur.: 397. 1836; Martius, Flora 20(2, Beibl.): 102. 1837. Lectotype (designated by Moraes, 2008: 39): BRAZIL. São Paulo, "inter Ypanema et Ytu, in Capões," January–February 1818, fl. ♂, *C. F. P. von Martius Obs. 595*: "...arbor 6–10 ped. ..." (M 0121047 [annotated by Nees]). Syntypes: BRAZIL. São Paulo, "in campestribus prope Caja pintada versus Civ. S. Pauli," December 1817, fl. ♀, *C. F. P. von Martius Obs. 512*: "...arbor 10–16 ped. in Campis" (M 0121046, M 0121048 [annotated by Martius as "in virgultetis prope Civ. S. Pauli"]); BRAZIL. São Paulo, fr., *F. Sellow 144* (B 10 0185456); BRAZIL. Minas Gerais, Serra da Moeda, fr., *F. Sellow B 1378 c 413* (B 10 0185472, B 10 0185471) [syntype of *Mespilodaphne pulchella* (Nees & Mart.) Meisn. var. *ferruginea* Meisn. in DC., Prodr. 15(1): 100. 1864]; BRAZIL. Rio Grande do Sul, fl. ♀, immat. fr., *F. Sellow d 2324* (B 10 0185458); BRAZIL. São Paulo, fl., *F. Sellow 459* (B 10 0185455). Probable syntype:

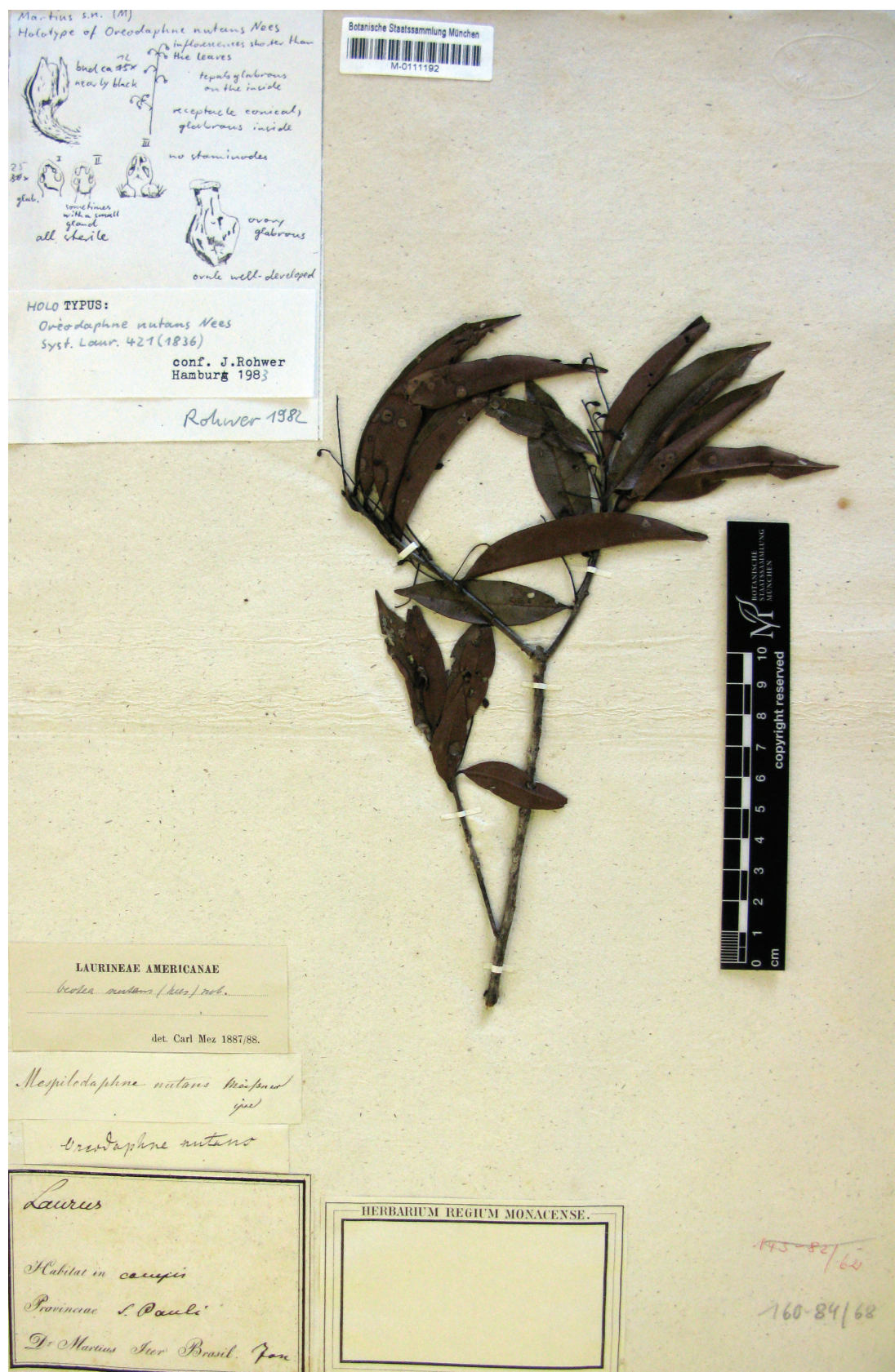
FIGURE 1. *Oreodaphne nutans* Nees: Holotype (M 0111192).



FIGURE 2. *Oreodaphne nutans* Nees: Isotype (L, ex Herbarium Reinwardtianum).

BRAZIL. Loco haud indicato, fr., *F. Sellow s.n.* (TUB 019041). Specimens: BRAZIL. Goiás, “prope Rio Claro,” June, fl. ♀, fr., *Martii Herbar. Florae Brasil. N° 117* [= *A. L. P. da Silva Manso* 278] (B 10 0185473, BR 000000880656, E 00259510, G 00021044, G-DC 00200973, K 000512688, LE 00006778, M 0121049, NY 00355381 [NY 00355365], P 00571418) [syntype of *Mespilodaphne pulchella* (Nees & Mart.) Meisn. var. *elliptica* Meisn. in DC., Prodr. 15(1): 100. 1864].

Further synonyms and additional information in Rohwer (1986) and Moraes (2008, 2012b).

50. *Ocotea spixiana* (Nees) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 260. 1889; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 193. 1986 = ‘*Ocotea rufotomentosa* Mart.’, *nomen*.

Basionym: *Oreodaphne spixiana* Nees, Syst. Laur.: 382. 1836; Meissner in DC., Prodr. 15(1): 117. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 212. 1866. TYPE: BRAZIL. Minas Gerais, Serro, “in sylvis Capões, locis montosis, Serro Frio,” May 1818, fl., *C. F. P. von Martius s.n.* (Holotype: M 0111182 [F neg. 6587]; Isotypes, GZU 000254368, M 0111181 [annotated by Nees as “*Aperiphracta martiana*,” herbarium name], M 0111183, M 0111184, NY 00355782 [fragment]).

51. *Ocotea tabacifolia* (Meisn.) Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 173. 1986; Moraes, Harvard Pap. Bot. 17(2): 263. 2012.

Basionym: *Persea tabacifolia* Meisn. in DC., Prodr. 15(1): 51. 1864. TYPE: BRAZIL. Minas Gerais, “monte Itambé,” November 1820, immat. fr., *J. B. E. Pohl 3604* (Holotype: W⁺; Lectotype, designated by Moraes, 2008: 47; NY 00355862).

Synonyms: *Oreodaphne umbrosa* Nees, Syst. Laur.: 388. 1836, non (Kunth) Nees, Syst. Laur.: 456. 1836; Meissner in DC., Prodr. 15(1): 122. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 216. 1866 = *Ocotea umbrosa* (Nees) Mart. ex Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 350. 1889, non Kunth, 1818 = *Oreodaphne minarum* Steud., Nomencl. Bot. (ed. 2) 2: 226. 1841. TYPE: BRAZIL. Minas Gerais, “inter Taparoca et Tapanhoacanga, locis altis sylvaticis,” 13 May 1818, fl. ♂, *C. F. P. von Martius Obs. 1188*: “arbor alt. 10–15 ped. ... In Capoeira” (Holotype: M 0111067; Isotypes, GZU 000254371 [fragment], M 0111068, MEL 2324416).

Further synonym in Rohwer (1986).

52. *Ocotea teleiandra* (Meisn.) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 382. 1889 = *Oreodaphne teleiandra* Meisn. in DC., Prodr. 15(1): 138. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 239. 1866; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 211. 1986; Moraes, Komarovia 6(1): 55. 2008; *ibid.* in Harvard Pap. Bot. 17(2): 263. 2012.

Basionym: *Teleiandra glauca* Nees & Mart. in Nees, Linnaea 8: 46. 1833. TYPE: BRAZIL. São Paulo, fl. ♂, *F. Sellow 399* (Holotype: B 10 0000045; Isotypes, B 10 0000044, B 10 0000046 [ex Herb. Kunth, B neg. 5322], K 000442012, VT 001553). Probable isotypes:

BRAZIL. Loco haud indicato, fl. ♂, *F. Sellow s.n.* (BR 0000008767165, F [0061819F; fragment], G, GZU 000249332); *idem*, fl., *F. Sellow s.n.* (HAL 0103829, wrongly mounted with the label of “*Oreodaphne glauca* Nees ab Es.!” written by Schlechtendal).

Synonyms: *Camphoromoea venulosa* Nees, Syst. Laur.: 469. 1836 = *Oreodaphne venulosa* (Nees) Meisn. in DC., Prodr. 15(1): 126. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 222. 1866 = *Ocotea venulosa* (Nees) Baitello, Fl. Fanerog. Estado São Paulo 3: 208. 2003. TYPE: BRAZIL. São Paulo, “in sylvis Montis formosi” [Morro Formoso, prope Bananal], December 1817, *C. F. P. von Martius s.n.* (Holotype: M 0147133 [F neg. 19278]; Isotype, GZU 000253888).

As pointed out by Moraes (2012b: 264), Rohwer (1986: 211) synonymized *Ocotea teleiandra* (Meisn.) Mez with *Ocotea laxa* (Nees) Mez. However, according to Baitello and Marcovino (2003: 195, 197, 205), although both are similar in vegetative characters, *O. teleiandra* may be distinguished by tepals thick and papillose in the inner surface, leaves glabrous abaxially, absence of bullate and barbellated domatia, and larger fruits with cupule of smooth margin, whereas *O. laxa* has leaves pubescent abaxially, with conspicuous domatia, and fruits with hexalobed cupules.

53. *Ocotea tristis* (Nees & Mart.) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 316. 1889; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 167. 1986; Moraes, Komarovia 6(1): 43. 2008; *ibid.* in Harvard Pap. Bot. 17(2): 264. 2012 = *Mespilodaphne tristis* Meisn. in DC., Prodr. 15(1): 100. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 193, t. 69. 1866 = *Oreodaphne tristis* Nees & Mart. var. *oblongifolia* Nees & Mart. in Nees, Linnaea 8: 40. 1833, *nom. illegit. superfl.*, = var. *tristis*.

Basionym: *Oreodaphne tristis* Nees & Mart. in Nees, Linnaea 8: 40. 1833. Lectotype (designated by Moraes, 2008: 45): BRAZIL. Minas Gerais, Serro, “Serro Frio,” “*Ocotea tristis* s. Aeneae (Virg. VI.) 493.) In campis tristibus, ubi animae illorum, quos amor peredit...,” May 1818, fl., *C. F. P. von Martius s.n.* (M 0111177).

Further synonyms and detailed information in Rohwer (1986) and Moraes (2008, 2012b).

54. *Ocotea variabilis* (Nees) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 288. 1889; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 189. 1986 = ‘*Ocotea variabilis* Mart. ex Nees’, Syst. Laur.: 429. 1836, *nom. invalid*.

Basionym: *Oreodaphne variabilis* Nees, Syst. Laur.: 429. 1836; Meissner in DC., Prodr. 15(1): 116. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 211. 1866. TYPE: BRAZIL. Minas Gerais, Serro, “in campestribus altis Serro Frio,” May 1818, *C. F. P. von Martius s.n.* (Holotype: M 0121081 [F neg. 6588]; Isotypes, B 10 0185417 [F neg. 3737], GZU 000254373, L [“*Laurus adamantina* M.”, herbarium name, “Diam. District,” ex Herbarium Reinwardtianum], M 0121082, MEL 2324404 [“*Laurus adamantina* Mart.”, herbarium name, “Serro Frio”).

Although Rohwer (1986) had proposed *Ocotea variabilis* as a synonym of *Ocotea lancifolia* (Schott) Mez, their fruits are different, mainly in relation to the cups, being cupola-shaped, with simple margin, without remnant tepals in the former, and dish-shaped, with double margin, and with remnant tepals in the latter, making it possible to distinguish and take them as belonging to different taxa.

55. *Ocotea velutina* (Nees) Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 172. 1986; Moraes, Komarovia 6(1): 47. 2008. Basionym: *Oreodaphne velutina* Nees, Syst. Laur.: 386. 1836; Meissner in DC., Prodr. 15(1): 132. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 231, t. 79. 1866; Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 348. 1889. Lectotype (designated by Rohwer, 1986: 172): BRAZIL. Minas Gerais, “in Sumo Brasiliae Monte Itambé, Serro Frio,” May 1818, fl. ♀–♂, *C. F. P. von Martius s.n.* (M 0121084 [annotated by Martius with “*Ocotea velutina*” and by Nees as “*Aperiphracta velutina*”]; Isolectotypes, GZU 000254374 [ex Herb. Nees, annotated by Nees as “*Aperiphracta velutina*,” “hermaphr.-fem.,” “In summo Bras. Monte Itambé Serro Frio... Maio”], GZU 000254375 [fragments]). Syntypes: BRAZIL. Minas Gerais, “in montosis sylvaticis prope Taparaoca præd. Serro Frio,” May 1818, fl. ♀–♀, *C. F. P. von Martius Obs. 1183*: “arbor 15–20 ped. ram. paucis distantibus, ...” (GZU 000260730 [fragment], M 0121085); BRAZIL. Minas Gerais, loco haud indicato, s.d., fl., *C. F. P. von Martius s.n.* (M 0121086); BRAZIL. São Paulo, Iperó, “Ypanema,” fr., *F. Sellow B 1384 c 419* (B 10 0185416 [NY neg. 8383]); BRAZIL. São Paulo, “a S. Paulo ad meridiem,” fl., *F. Sellow 5867* (B 10 0185415 [NY neg. 8384], K 000602367); BRAZIL. São Paulo, *F. Sellow 5928* (B*); BRAZIL. Loco haud indicato, fr., *F. Sellow s.n.* (B 10 0185414); *idem*, fr., *F. Sellow s.n.* (CGE); *idem*, fl., fr., *F. Sellow s.n.* (E 00259499); *idem*, fr., *F. Sellow s.n.* (HAL 0010486); *idem*, fr., *F. Sellow s.n.* (LE 00006785).

Further synonyms in Rohwer (1986).

56. *Ocotea virgultosa* (Nees) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 252. 1889; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 226. 1986; *ibid.* in Fl. Neotrop. Monogr. 60: 301. 1993; Assis and Mello-Silva, Novon 20(4): 379. 2010. Basionym: *Nectandra virgultosa* Nees, Syst. Laur.: 304. 1836; Meissner in DC., Prodr. 15(1): 167. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 278. 1866. TYPE: BRAZIL. Minas Gerais, “in sylvulis udis depressis Capões dictis,” s.d., *C. F. P. von Martius s.n.* (Holotype: M 0121088 [F neg. 19279]; Isotype, GZU 000249348 [fragment]).

57. *Ocotea xanthocalyx* (Nees & Mart.) Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 288. 1889; Rohwer, Mitt. Inst. Allg. Bot. Hamburg 20: 161. 1986. Basionym: *Nectandra xanthocalyx* Nees & Mart. in Nees, Syst. Laur.: 312. 1836; Meissner in DC., Prodr. 15(1): 167. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 277. 1866.

TYPE: BRAZIL. Minas Gerais, “inter frutices in planitie Chapada do Paranán,” September 1818, fr., *C. F. P. von Martius Obs. 1770*: “Frutex 4–6 pedalis, foliis subcomplicatis subtus glauco rore adpersis, calycibus roseo-igneis. In camp. Carrasco” (Holotype: M 0111175 [F neg. 6589]; Isotypes, GZU 000254298, M 0111176).

58. *Persea americana* Mill., Gard. Dict. (ed. 8) s.n. 1768; Kopp, Mem. New York Bot. Gard. 14: 15. 1966; Moraes, Harvard Pap. Bot. 17(1): 204. 2012; *ibid.* in Pl. Ecol. Evol. 146(3): 372. 2013.

Basionym: *Laurus persea* L., Sp. Pl. 1: 370. 1753. Lectotype (designated by van der Werff, 2002a: 580): “Prunifera arbor, fructu maximo pyriformi viridi, pericarpio esculento butyraceo nucleum unicum maximum nullo ossiculo tectum, cingente. The Avocado or Alegator pear-tree,” in Sloane (1725: 132, t. 222, fig. 2). “Typotype” (original material): JAMAICA. Herb. Sloane Vol. VII: 77 (BM-SL 000594115).

Synonym: *Persea gratissima* Gaertn., Fruct. Sem. Pl. 3: 222, t. 221. 1807, *nom. illegit. superfl.* for *Persea americana* Mill.; Nees, Syst. Laur.: 128. 1836; Martius, Syst. Mat. Med. Bras.: 26, 112. 1843; *ibid.* in Fl. Bras. 5(2): 320. 1866; Meissner in DC., Prodr. 15(1): 52. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 158, t. 105, fig. 1. 1866; Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 145. 1889. Specimen: BRAZIL. Pará, “circa Pará,” “in sylvis archipelagi Insularum Paraënsium,” August 1819, *C. F. P. von Martius s.n.* (GZU 000254384, M).

Further list of synonyms in van der Werff (2002a).

As pointed out by van der Werff (2002a), Kopp (1966: 17) designated the description in Clusius (1601: 2) as lectotype of *Laurus persea*. However, since descriptions are not accepted as lectotypes, according to Art. 8.1 of ICN (McNeill et al., 2012), the illustration in Sloane (1725) has been designated as lectotype of *Laurus persea* L. and, therefore of *Persea americana* Mill.

59. *Persea rufotomentosa* Nees & Mart. in Nees, Syst. Laur.: 153. 1836; Meissner in DC., Prodr. 15(1): 45. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 155. 1866; Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 141. 1889; Kopp, Mem. New York Bot. Gard. 14: 67. 1966; Moraes, Harvard Pap. Bot. 17(1): 205. 2012 = *Mutisiopersea rufotomentosa* (Nees & Mart.) Kosterm., Rheede 3(2): 135. 1993. TYPE: BRAZIL. Minas Gerais, Serro, “in sylvis Capões et in Tabuleiro locis editis Montanis Serro Frio,” August 1818, fl., *C. F. P. von Martius s.n.* (Holotype: M 0147211 [F neg. 6582]; Isotypes, GZU 000254417 [fragment], M 0147212, M 0147213).

60. *Persea venosa* Nees & Mart. in Nees, Linnaea 8: 50. 1833; *ibid.* in Syst. Laur.: 144. 1836; Meissner in DC., Prodr. 15(1): 48. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 153, t. 48, fig. 1. 1866; Mez, Jahrb. Königl. Bot. Gart. Berlin 5: 172. 1889; Kopp, Mem. New York Bot. Gard. 14: 30. 1966; Moraes, Komarovia 6(1): 52. 2008; *ibid.* in Harvard Pap. Bot. 17(1): 206. 2012. TYPE: BRAZIL. São Paulo, Iperó, “Ypanema,” s.d., fl., *F. Sellow B 1387 c 422* (Holotype:

B⁺; Lectotype, designated by Moraes, 2008: 52: G-DC 00135213; Isolectotypes, GZU 000254420, HAL 0103845, K 000602076, K 000512722, NY 00355864 [fragment ex G-DC]).

Synonym: *Persea venosa* Nees & Mart. var. β *tersa* Nees & Mart. in Nees, Linnaea 8: 50. 1833; Meissner in DC., Prodr. 15(1): 49. 1864; *ibid.* in Martius, Fl. Bras. 5(2): 153, t. 48, fig. 2. 1866; Kopp, Mem. New York Bot. Gard. 14: 30. 1966; Moraes, Komarovia 6(1): 52. 2008; *ibid.* in Harvard Pap. Bot. 17(1): 206. 2012. TYPE:

BRAZIL. Loco haud indicato, s.d., fl., *F. Sellow XXIV* (Holotype: B⁺; Lectotype designated by Moraes, 2008: 52: GZU 000273810 [annotated by Nees with “ β ”]). Probable isolectotype: LISU [24000] ex Herbarium Brasiliense Dr. Alexandre Rodrigues Ferreira nr. 693. Specimen: BRAZIL. “in campestribus altis ad sylv. margines / Provinciae S. Pauli et Min. Ger.,” s.d., fr., C. F. P. von Martius s.n. (M 0147206 [“*Persea hypoglaucha* Mart.,” herbarium name]).

Further information in Moraes (2008).

REMARKS

1. *Martii Herbar. Florae Brasil. N° 478*: BRAZIL. Rio de Janeiro, “in horto (Chacara) secundum viam ad S. Clemente, prope Sebastianopolin, cultum,” March–April 1833, fr., *L. Riedel s.n.* & *B. Luschnath s.n.* (BR 0000013332549, LE [4 sheets], NY 459793), belongs to *Cinnamomum camphora* (L.) J. Presl in Berchtold and J. Presl, Pfl. Rostlin 2: 36, 47–56, t. 8. 1825 [1823?].
2. Meissner (1866: 283) has reported a collection of Martius from Rio de Janeiro for *Goeppertia hirstuta* (Schott) Nees, Syst. Laur.: 366. 1836; Meissner in DC., Prodr. 15(1): 172. 1864 [= *Endlicheria paniculata* (Spreng.) J.F. Macbr., Publ. Field Mus. Nat. Hist., Bot. Ser. 13 (2/3): 850. 1938]. However, it seems to be a mistake since no other author has mentioned this material, neither it has been located in Munich, nor in any other herbarium.
3. Specimen at M 0111066 has been wrongly attributed to Martius. In fact, it is a Sellow collection belonging to *Ocotea acutifolia* (Nees) Mez (see Moraes, 2008).
4. The name *Laurus paniculigera* Mart. ex Colla, Herb. Pedem. 5: 62. 1836, according to Moraes et al. (2014), remains unresolved since no material has been located at TO. However, as indicated by the former authors, in Herbarium Sonder at MEL, there are two specimens that agree with the protologue and belong to *Metrodorea nigra* A. St.-Hil., Fl. Bras. Merid. (quarto ed.) 1: 81, t. 16. 1825.
5. Specimen at MEL 2324410 has two handwritten labels, one annotated with “*Strychnodaphne* Nees?”, the other with “*Laurus Martius*”. Although its identification is not solved yet, it resembles the pattern of specimen at M 0111065, thus of *Nectandra sarcocalyx* Nees.

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INDEX TO SCIENTIFIC NAMES

Current accepted names in **boldface italics**. Synonyms in *italics*. Unpublished (herbarium) names in regular typeset. Numbers in parentheses indicate entries of the respective species in the text.

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- Acrodictidium cannella* (Meisn.) Mez (13)
- Acrodictidium cayennense* (Meisn.) Mez (13)
- Acrodictidium guianense* Nees var. *caudatum* Meisn. (14)
- Acrodictidium meisneri* Mez (14)
- Acrodictidium puchury-major* (Mart.) Mez (15)
- Aiouea laevis*** (Mart.) Kosterm. (1)
- Aiouea brasiliensis* Meisn. (1)
- Aiouea brasiliensis* Meisn. var. *attenuata* Meisn. (1)
- Aiouea riedelii* Mez (1)
- Aiouea tenuiflora* Nees ex Meisn. (41)
- Aniba canelilla*** (Kunth) Mez (2)
- Aniba citrifolia*** (Nees) Mez (3)
- Aniba desertorum*** (Nees) Mez (4)
- Aniba permollis*** (Nees) Mez (5)
- Aniba puchury-minor*** (Mart.) Mez (6)
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- Aydendron desertorum* Nees (4)
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- Aydendron permolle* Nees (5)
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 Ruíz & Pavón s.n. [B 10 0247398, F (0061413F), G, MA [2 sheets], MA 811782] (44)
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 Schott 5600 (41)
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 Schott 5609 (27)
 Schott 5610 (41)
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 Sellow XXIV (60)
 Sellow LVI (25)
 Sellow 28 (24)
 Sellow 144 (49)
 Sellow 399 (52)
 Sellow 459 (49)
 Sellow 1360 (8)
 Sellow 1368* (24)
 Sellow 4428 (25)
 Sellow 4495 (24)
 Sellow 4803 (XXI) (40)
 Sellow 5636 (45)
 Sellow 5722 (25)
 Sellow 5867 (55)
 Sellow 5928 (55)
 Sellow B 1362 c 393 (48)
 Sellow B 1378 c 413 (49)
 Sellow B 1384 c 419 (55)
 Sellow B 1387 c 422 (60)
 Sellow d 2324 (49)
 Sellow s.n. [B 10 0185048] (22)
 Sellow s.n. [B 10 0185227] (24)
 Sellow s.n. [B 10 0185226, BR 0000008808479, CGE, E 00259309] (24)
 Sellow s.n. [GZU 000249356, HAL 0010385] (25)
 Sellow s.n. [GZU 000249357] (25)
 Sellow s.n. [B 10 0185172] (25)
 Sellow s.n. [B 10 0185175] (25)
 Sellow s.n. [B 10 0185313] (40)
 Sellow s.n. [B 10 0185314] (40)
 Sellow s.n. [B[†], GZU 000249333, VT 001552] (42)
 Sellow s.n. [B 10 0000024] (43)
 Sellow s.n. [B 10 0000025] (43)
 Sellow s.n. [HAL 0010445] (43)
 Sellow s.n. [B 10 0185388, G 00021062, P 01958844] (47)
 Sellow s.n. [G-DC 00201230, HAL 0103830] (48)
 Sellow s.n. [B 10 0185370] (48)
 Sellow s.n. [TUB 019041] (49)
 Sellow s.n. [BR 0000008767165, F (0061819F), G, GZU 000249332] (52)
 Sellow s.n. [HAL 0103829] (52)
 Sellow s.n. [B 10 0185414] (55)
 Sellow s.n. [CGE] (55)
 Sellow s.n. [E 00259499] (55)
 Sellow s.n. [HAL 0010486] (55)
 Sellow s.n. [LE 00006785] (55)
 Sellow s.n. [M 0111066] (Remarks # 3)
 Sieber Flora martin. N° 106 (33)
 Sieber Flora mixta. N° 385 (33)
 Silva Manso 278 = Martii Herbar. Florae Brasil. N° 117 (49)
 Silva Manso s.n. = Martii Herbar. Florae Brasil. N° 1307 (27)
 Spruce 3058 (14)
 Swartz s.n. [BM 000758874, S (R-3166), S (09-16300)] (23)
 Swartz s.n. [SBT 11582] (23)
 Tafalla s.n. [B 10 0185060, F [0040309F], FI-W 005165, G 00369022, MA 811751, MA 811752] (20)
 Tweedie s.n. [E 00259433] (24)
 Wied s.n. [B 10 0185169, BR 0000008808066, BR 0000008808363, GOET 000753, GZU 000254281, MEL 2324403, MEL 2324386] (26)

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× *COCHLEZELLA COSTARICENSIS*, A NAME FOR A RARE NATURAL HYBRID IN THE ZYGOPETALINAE (ORCHIDACEAE)

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Abstract. A new nothospecies in the subtribe Zygopetalinae (Orchidaceae), × *Cochlezella costaricensis*, representing a cross between *Cochleanthes aromatica* and *Warczewiczella discolor*, is described and illustrated from Costa Rica, and its relationships are discussed.

Keywords: Orchidaceae, Epidendroideae, Zygopetalinae, natural hybrids, *Cochleanthes*, *Warczewiczella*, *Cochlezella*, Costa Rica

The literature reports some thirty artificial intergeneric hybrids in the Zygopetalinae Schltr. (Orchidaceae), mostly involving horticulturally relevant species of *Zygopetalum* Hook., but natural hybridization in the subtribe is infrequent, and still less common is the occurrence of natural hybrids involving two different genera. Among the pseudobulbless, conduplicate-leaved, one-flowered genera of the *Huntleya* Bateman ex Lindl. clade (Whitten et al. 2005, Pupulin 2009a), only 9 intergeneric hybrids have been recorded (Dressler 1981, Shaw 2005). Of these, only the nothogenera *Pescatobollea* Rolfe (*Pescatoria* Rchb.f. × *Bollea* Rchb.f.) and *Bensteinia* Christenson (*Benzingia* Dodson ex Dodson × *Kefersteinia* Rchb.f.) have been formally described as occurring naturally. After the reduction of *Bollea* Rchb.f. under *Pescatoria* Rchb.f. (Whitten et al. 2005), the natural crosses recorded in literature between species of these two groups [e.g., × *Pescatobollea gairiana* (Rchb.f.) Fowlie, × *Psbol. pallens* (Rchb.f.) Fowlie, *Psbol. bella* Rolfe] must now be considered as infra-generic hybrids. Therefore, with two nothospecies recorded from Ecuador (Neudecker 1994) and Costa Rica (Pupulin 2007, 2010), *Bensteinia* is so far the unique natural intergeneric hybrid genus recognized among the Zygopetalinae of the *Chondrorhyncha* Lindl. complex (Pupulin 2009a).

Natural hybridization is of particular interest as it is uncommon evidence that the biological barriers designed to maintain species integrity might be circumvented. In the case of the Orchidaceae, the tens of thousands of artificial hybrids produced by humans clearly show that genetic incompatibility does not play a major role in preventing the interchange of genetic material either among species of the same genus or between genera that are phylogenetically related (Adams & Anderson 1958, Garay & Sweet 1966, Dressler 1981, Arditti 2008). Most of the effective barriers that impede the transfer of genes between different species rely therefore on pre-pollination as well as geographical factors such as temporal, mechanical, and chemical mechanisms, which effectively prevent the right pollen from reaching the wrong stigma (Paulus & Gack 1990, Ayasse et al.

2003, Schiestl & Peakall 2005, Pansarin & Amaral 2007, Salzmann et al. 2007, Pinheiro et al. 2010). When a natural hybrid occurs, and especially if it occurs more than once, it implies that most of these barriers have become weak, and in some way are promoting the “wrong” pollen transfer. In terms of evolutionary consequences, the “faux pas” leading to the unusual combination of genes could be more than a simple mistake (Ellis & Johnson 1999, Cozzolino & Widmer 2005, Peakall 2007, Scopece et al. 2008, Steiner & Cruz 2009, Bellusci et al. 2010).

It was unfortunate that the supposed hybrid between *Cochleanthes aromatica* (Rchb.f.) R.E. Schult. & Garay (Fig. 1) and *Warczewiczella discolor* (Lindl.) Rchb.f. (Fig. 2), which was originally collected in the wild in Costa Rica by Clarence Horich and studied by Jack Fowlie, was never formally described nor was any material preserved for future reference. Nonetheless, Fowlie took a color photograph showing a large flower with spreading petals and an open and wide lip, wine-red in color, that was eventually published in an article dedicated to *C. aromatica* and *W. discolor*, two “blue orchids” from Costa Rica, and their natural hybrid (Horich, 1977). Horich was quite unclear about the locality where he collected the hybrid plant, referring simply to it as “a place in the mountains where both species occurred,” but he was emphatic in noting that he never found another plant of the natural hybrid, “in spite of there being other places where the two species grow together” (Horich 1977). Robert Dressler referred to this natural hybrid in 2003 in his treatment of *Cochleanthes aromatica* for the *Manual de Plantas de Costa Rica* (Dressler 2003: 53) but, again, he did not cite any voucher for this record. According to Dressler, the infrequent natural hybrid has a spreading lip that is dark red or purple-red in color, and this may suggest that Dressler also used Horich’s photographs as the main visual guide for his concept of the nothospecies. Of course, with just a photograph at hand, he could not prepare any specimens for the typification of the natural hybrid.

Indeed, the possibility that *C. aromatica* and *W. discolor* could erratically cross in nature is quite real, as the inter-

I warmly thank Gerardo Viquez for granting me access to and use of the plant grown in his collection, which was used as the holotype of the new nothospecies. My colleagues Diego Bogarín, Robert L. Dressler and Jorge Warner commented on a preliminary draft of the paper. Two anonymous reviewers improved the manuscript with their comments and corrections. The wild specimens intended for this study were obtained through scientific collection permits No. 36891 and subsequent permits, and the Scientific Passport No. 01285, issued by the Costa Rican Ministry of Environment and Energy (MINEC) and the National System of Conservation Areas (SINAC), whose cooperation I sincerely acknowledge.

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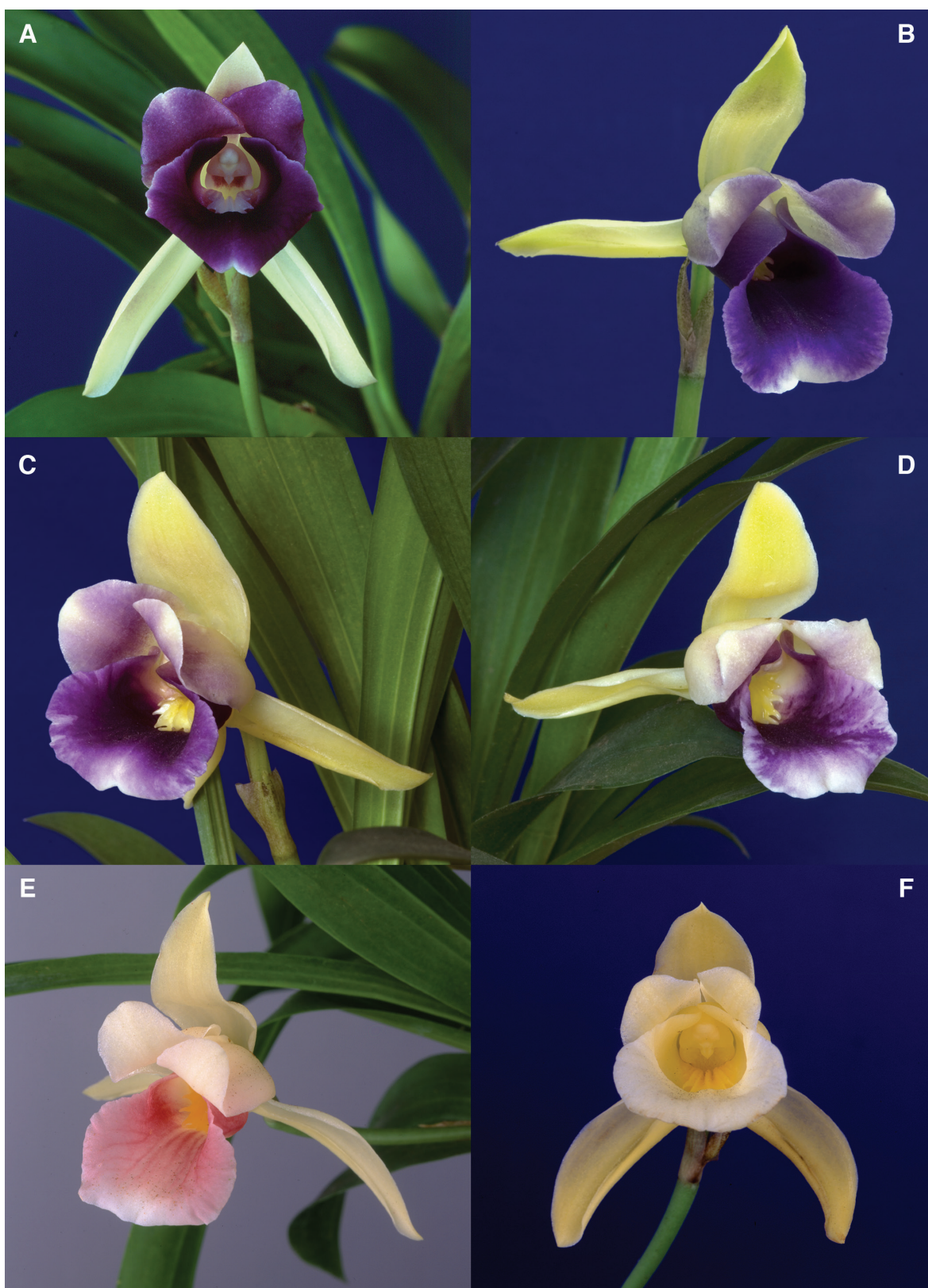


FIGURE 1. Flowers of *Warczewiczella discolor*, showing variations in lip color. A, *Pupulin 1733* (JBL); B, *Karremans 2292* (JBL); C, *JBL-s.n.* (JBL); D, *Pupulin 5994* (JBL); E, without collecting data (JBL); F, *Viquez s.n.* (JBL). All the photos by the author.

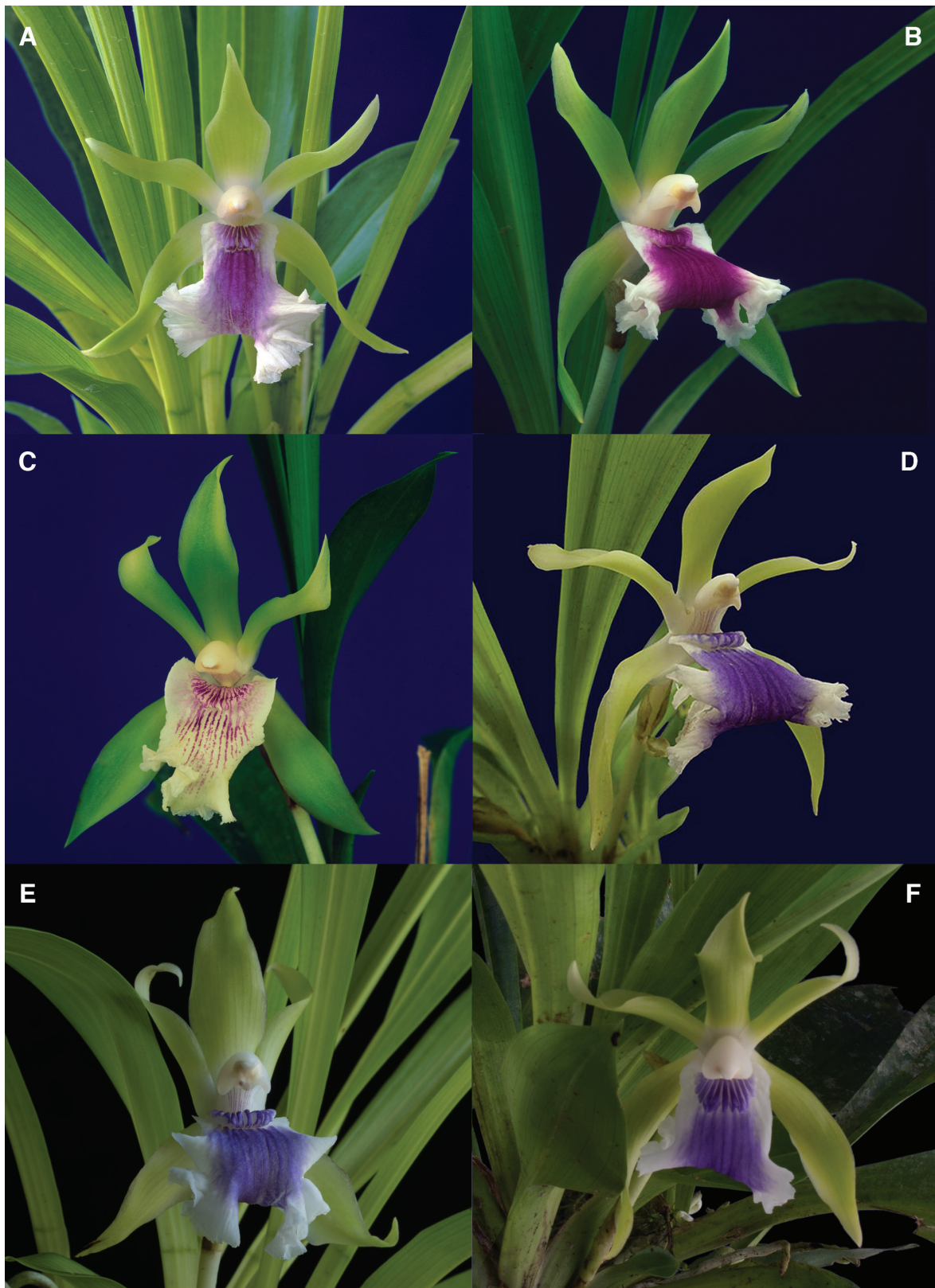


FIGURE 2. Variations in shape and color among flowers of *Cochleanthes aromatica*. A, *Pupulin* 2092 (JBL); B, *Pupulin* 6383 (JBL); C, *JBL-01987* (JBL); D, *JBL-03932* (JBL); E, *Bogarín* 1329 (JBL); F, *Karremans* 6665 (JBL). All the photos by the author.

fertility of the two genera has been proven artificially in four different hybrids, at least two of which are fertile [the aforementioned $\times$ *Cochlezella* Overbrook; $\times$ *Czl.* Amazing (*C. flabelliformis* $\times$ *W. amazonica*); $\times$ *Czl.* Perfume (*C. aromatica* $\times$ *W. marginata*); and $\times$ *Czl.* Wildmoor, resulting from the cross of two *Cochlezella* hybrids, Amazing $\times$ Overbrook] (Royal Horticultural Society 2015). According to van der Pijl and Dodson (1966), *C. aromatica* is pollinated by male bees of the genera *Euglossa* Latreille and *Eulaema* Lepeletier, which receive the pollinarium behind the head. Even though the specific pollinator of *W. discolor* has not been recorded yet, in most of the documented records in the Zygotetinae of the *Huntleya* clade, the flowers attract male euglossine bees searching for perfume compounds, and *Eulaema meriana* Olivier is known to pollinate *Warczewiczella lipscombiae* (Rolfe) Garay in Panama (Croat 1978: 281). In the same species of *Warczewiczella*, the strongly reflexed lateral sepals with the margins infolded at the base mimic nectariferous spurs like those of a sympatric legume, *Clitoria javitensis* (Kunth) Benth. (Fig. 3), and also attracts female euglossine looking for food resources extending their tongue into the backswept lateral sepals in search of nectar (Ackerman 1983). This morphology driven by deceit, characterized by swept back lateral sepals that form a tubular false spur enclosing the notch on either side of the lip, allowing the passage of a bee's tongue, is scattered in the *Chondrorhyncha* complex and it is also present, although to a lesser degree, in *Cochleanthes* (Pupulin 2006, 2009b,

2009c). As both the putative parental species produce gullet flowers that show a mixture of fragrance reward and nectar-deceit pollination for long-tongued pollinators, the chances of an “erratic pollinator visit” to the “wrong” flower are greater. The fact that *C. aromatica* and *W. discolor* are not only sympatric in several areas across their distributional range (most notably along the eastern slopes of the Irazú and Turrialba volcanoes and along the low passes between the two watersheds of the Central Cordillera) (Fig. 4), but also partially overlap in their phenology, increase the chances of hybridization. *Cochleanthes aromatica* and *W. discolor* do have two different flowering peaks, in April–June and July–September, respectively (according to phenologic records maintained at the Lankester Botanical Garden based on 68 specimens of *C. aromatica* and 106 specimens of *W. discolor*), but almost 30% of the specimens of both species flower simultaneously in June and July (Fig. 5).

The hybrid genus between *Cochleanthes* and *Warczewiczella* already has a valid botanical name. According to the International Orchid Register (Royal Horticultural Society 2015), it was artificially created by William W. Wilson (1917–2014) crossing exactly *Cochleanthes aromatica* and *Cochleanthes* (now *Warczewiczella*) *discolor*. The resulting hybrid was registered as *Cochleanthes* Overbrook in 1964, and it remained undisturbed in that genus until Julian Mark Hugh Shaw coined $\times$ *Cochlezella* in 2010 to give recognition to the separation of *Cochleanthes discolor* in his own genus



FIGURE 3. The flowers of *Warczewiczella lipscombiae* (A) are supposed to effectively mimic those of *Clitoria javitensis* (Fabaceae) (B). A: photo by the author. B: photo by S. Paton, from the Smithsonian Tropical Research Institute's Herbarium in Panama.

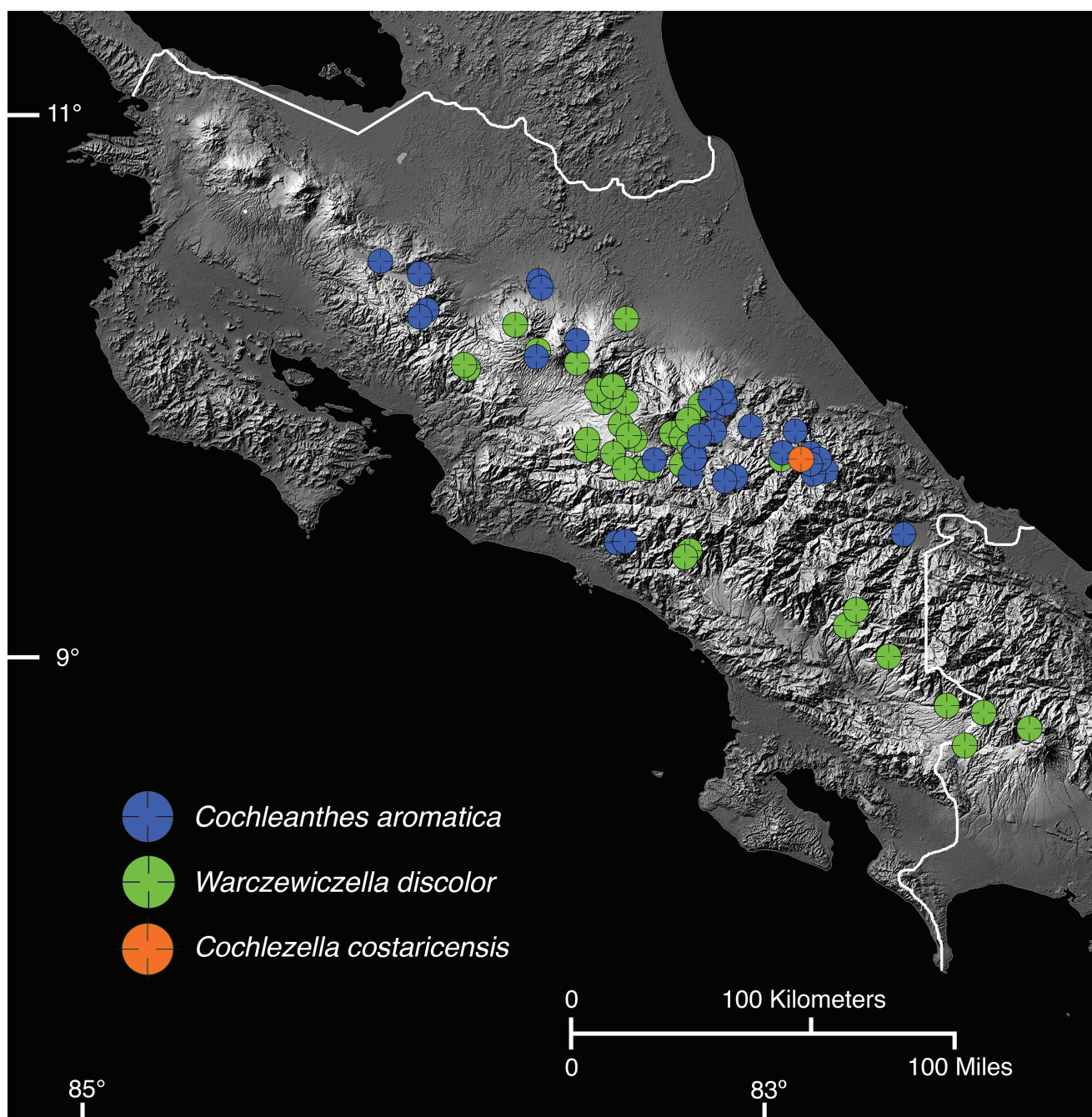


FIGURE 4. Distribution in Costa Rica of *Cochleanthes aromatica* (blue dots) and *Warczewiczella discolor* (green). The orange dot shows the putative collecting locality of the natural hybrid described here.

Warczewiczella (Shaw 2010: 79), where it originally was placed by Reichenbach (1852), a placement later confirmed by Fowlie (1969), eventually supported by contemporary molecular analyses (Whitten et al. 2005), and finally accepted in the treatment of the subtribe Zygopetalinae for *Genera Orchidacearum* (Pupulin 2009a).

Instead, what was still lacking a proper name, as well as a type and a formal description, was the natural hybrid that was found by Horich in the Costa Rican mountains, flowered with Fowlie in California, and was informally cited by Dressler in his monumental treatment of the Costa Rican Orchidaceae. For years, during the preparation of

my treatment of the subtribe Zygopetalinae for the flora of Costa Rica (Pupulin 2010), I actively looked for this elusive hybrid, visiting all the major orchid collections and the largest orchid shows in the country, but the search proved unsuccessful. Likewise, searching in the forests of Costa Rica for the hybrid between *Cochleanthes aromatica* and *Warczewiczella discolor* was and continues to be almost a nonsensical effort. The geographic distribution of the two species overlaps, both horizontally (see Fig. 4) and vertically, as *C. aromatica* has been recorded from 800 to 1,600 meters of elevation and populations of *W. discolor* are known at elevations between 700 and over 2,000 meters.

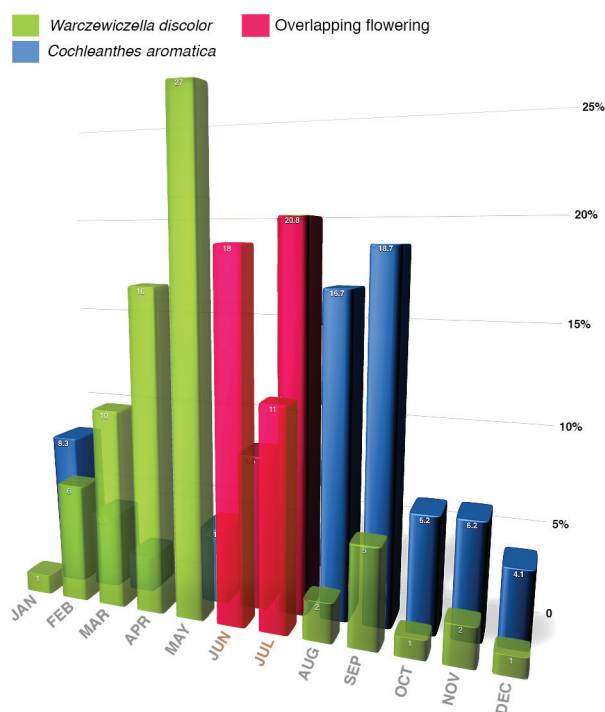


FIGURE 5. Graphic of the phenology of *Warczewiczella discolor* and *Cochleanthes aromatica*, showing distinct overlap in the months of June–July. Front row (green): *W. discolor*. Back row (blue): *C. aromatica*. Red columns: overlapping flowering period.

As the plants of *Cochleanthes* and *Warczewiczella* are almost indistinguishable in habit, and with no cues about the flowering time of the hybrid plants, the possibility of being in the right place at the right time to observe the flowering of a hybrid individual is virtually nonexistent.

I eventually had a chance to find a cultivated plant of wild origin at an orchid show recently held in Cartago, the ancient capital city of Costa Rica, which I describe herein.

× *Cochlezella costaricensis* Pupulin, *nothosp. nov.*

TYPE: Costa Rica. Cartago: Turrialba, collected by Marcos Brenes, probably in the region of Bajo Chirripó (*fide* collector), cultivated by Gerardo Viquez at Tierra Blanca, flowered 30 April 2015, *F. Pupulin* 8809 (holotype, JBL; isotype, JBL). Fig. 6–8.

*Herba epiphytica caule abbreviato foliis conduplicatis petiolatis anguste oblanceolatis acutis vel subacuminatis ad 30 cm longis, floribus intermediis inter Cochleanthem aromaticam Reichenbachii filii et Warczewiczellam discolorum Reichenbachii filii, floris amplitudine, sepalis lateralibus valde involutis, petalis anguste lineari-ellipticis acutis patentibus, labello trilobato-pandurato angustiore inter lobulos laterales quam ad lobum medium, columna alis stigmaticis prominentis instructa (atque *C. aromaticam*), labello atroviolaceo lobulis lateralibus erectis ad columna pervenientis, callo albescente multiseriato apice digitato munito, columnae facie abaxialis pubescenti-lanuginosa in basi, odore capsico vel cedrinolignaceo (atque *W. discolorum*).*

Epiphytic, caespitose herbs without pseudobulbs, the leaves arranged like a fan. Roots terete, produced from

the rhizome at the base of the new vegetative shoots, ca 2 mm in diameter. *Stem* abbreviated, enclosed by six or seven imbricating sheaths, provided with hyaline margins, the upper ones foliaceous. *Leaves* conduplicate, articulate, membranaceous, oblanceolate-oblong, acute to subacuminate, abaxially carinate, 16–27 × 2.0–3.3 cm, strongly conduplicate at the base, grass green. *Inflorescences* 1–3, lateral, single-flowered, produced from the axils of lower sheaths, 7–10 cm long; peduncle terete, stout, spreading to suberect, provided with a conduplicate, papyraceous bract near the base; floral bract double, conduplicate, glumaceous-papyraceous, shorter than to subequal to the ovary, the external widely ovate, with hyaline-chartaceous margins, 20 × 14 mm, the subopposite internal bractlet narrowly lanceolate to ligulate, 17 × 6 mm. *Flowers* resupinate, large, spreading, with pale greenish white sepals and petals, the petals apically lightly flushed with purple, and solid violet lip, provided with a cream-coloured callus, boldly scented in the morning, the scent spicy. *Dorsal sepal* free, narrowly elliptic, acute, the apical portion gently reflexed-outrolled, 4.0 × 1.3 cm. *Lateral sepals* basally adnate to column foot, narrowly elliptic-lanceolate, acute, 4.3 × 1.2 cm, inrolled-folded toward base, strongly carinate abaxially, the keel somewhat protruding at the apex. *Petals* elliptic-oblanceolate, acute, the apex slightly reflexed, the apical margins wavy, 3.9 × 1.2 cm. *Lip* with a short claw, articulate with column foot, trilobed, obovate-flabellate in natural position, pandurate when spread, the base cordiform, 3.9 × 3.4 cm, the basal lobes erect, transversely elliptic, rounded, ca. 1.2 × 0.8 cm, the midlobe transversely elliptic, notched-bilobed at apex, 2.4 × 3.4 cm, the apical margins undulate; disc with a high ovate, multiseriate callus, 1.1 × 1.1 cm, composed of many low, rounded ridges, the upper margins angular, protruding apically into linear teeth, the central ones longer. *Column* straight, stout, hemiterete, 10 × 4.5 mm, dilated at apex into rounded stigmatic wings that converge toward the rostellum, the stigma transverse, slit-like, the base of the column extending into a velutine to sparsely hirsute foot, the apex of the foot with a low, conic-rounded callus. Anther cap shallowly cucullate, trapezoidal, two-celled. *Pollinia* 4, ovate-complanate, in two subequal pairs dorso-ventrally superposed, on a triangular stipe curling after removal, scarcely distinct from the ventral, elliptic, hyaline viscidium.

Etymology: The specific epithet is chosen in reference to Costa Rica, the country where the hybrid, as well as both the putative parents, are found.

A single plant of *Cochlezella* appeared within a mixed collection of *Warczewiczella* plants from the Caribbean watershed of the Talamanca mountain range, in central Costa Rica. The plant, believed to be a specimen of *Warczewiczella discolor*, was exhibited under that name at the Orchid Show of Cartago, on 30 April 2015. Its habit is indistinguishable from a plant of the true *W. discolor*, even though tending toward the largest size samples of that species. The flowers, however, are unmistakably different from those of *W. discolor*, and show several intermediate characters tending toward those of *C. aromatica* instead. Compared with typical flowers of *W. discolor*, the putative hybrid has larger flowers, with mostly spreading parts (vs. the lateral

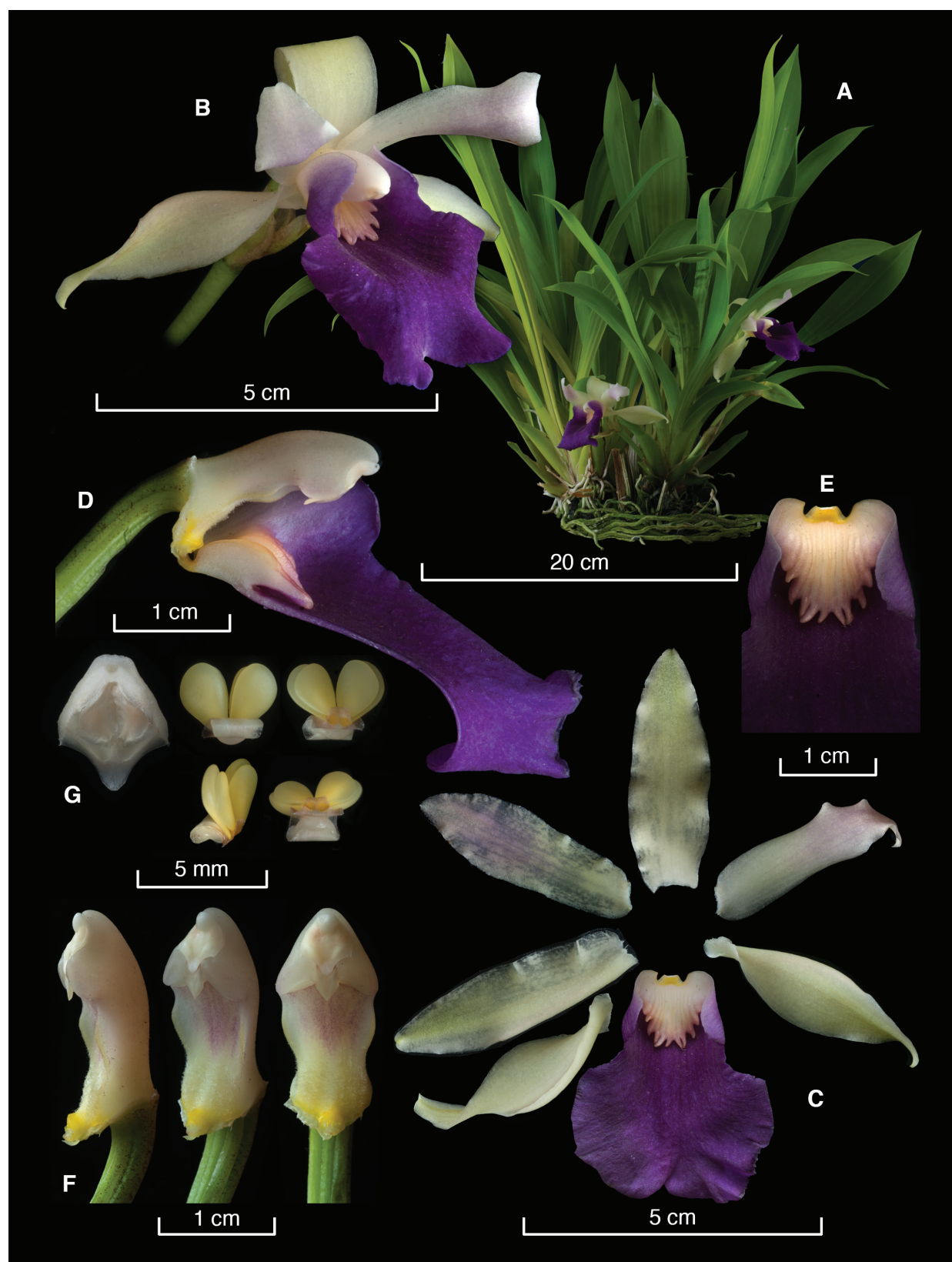


FIGURE 6. Lankester Digital Composite Plate of × *Cochlezella costaricensis*. **A**, habit; **B**, flower; **C**, dissected perianth; **D**, column and lip in lateral view (the lip longitudinally sectioned); **E**, callus; **F**, three views of the column; **G**, anther cap and pollinarium (four views). Prepared by the author.



FIGURE 7. The flower of $\times$ *Cochlezella costaricensis* that served as the holotype. Photo by the author.



FIGURE 8. The flower of $\times$ *Cochlezella costaricensis*. Three-quarter and frontal views of the flower that served as the holotype. Photos by the author.

sepals swept back and the petals almost porrect), the lateral sepals just slightly enrolled in the basal labellar portion (vs. with involute margins almost to the apex), narrowly linear-elliptic, acute petals (vs. broadly elliptic, obtuse-rounded), a lip that is wider across the midlobe than across the lateral lobes (vs. broadest at the base), and the column provided with prominent stigmatic wings, reminiscent of the column of *C. aromatica* (the column has no wings in *W. discolor*). On the other side, the flower of the hybrid also differs from those of *C. aromatica* by the completely deep violet lip (vs. white with a central lilac to violet blotch), with the lateral lobes erect to flank the column (vs. flat), the callus of the lip made up of several ridges ending in distinct teeth, and the pubescent-lanuginose ventral base of the column (vs. glabrous).

The flowers of × *C. costaricensis* emit a strong, spicy scent in the morning. The perfume also seems to show

intermediate characteristics between the powerful, sweet, lilac-hyacinth smell with notes of chocolate of *C. aromatica*, and the faint, camphoraceous, spicy, cedar-wood and black peppery fragrance of *W. discolor*.

To my knowledge, both the artificial (a few photographs of which are available through the Internet) and the natural hybrid presented here have a deep violet lip, a clear genetic legacy of the dark violet lip of *W. discolor*. Even though the form with deep violet labellum is the most frequent among populations of *W. discolor*, several individual variations occur in lip color (see Fig. 1), which may perhaps account for the unusual reddish coloration of the hybrid flower photographed by Horich. On the other side, whilst *C. aromatica* usually presents a white lip, longitudinally blotched and flecked with violet, individuals of this species with almost solid violet lip have also been documented (Fig. 9).

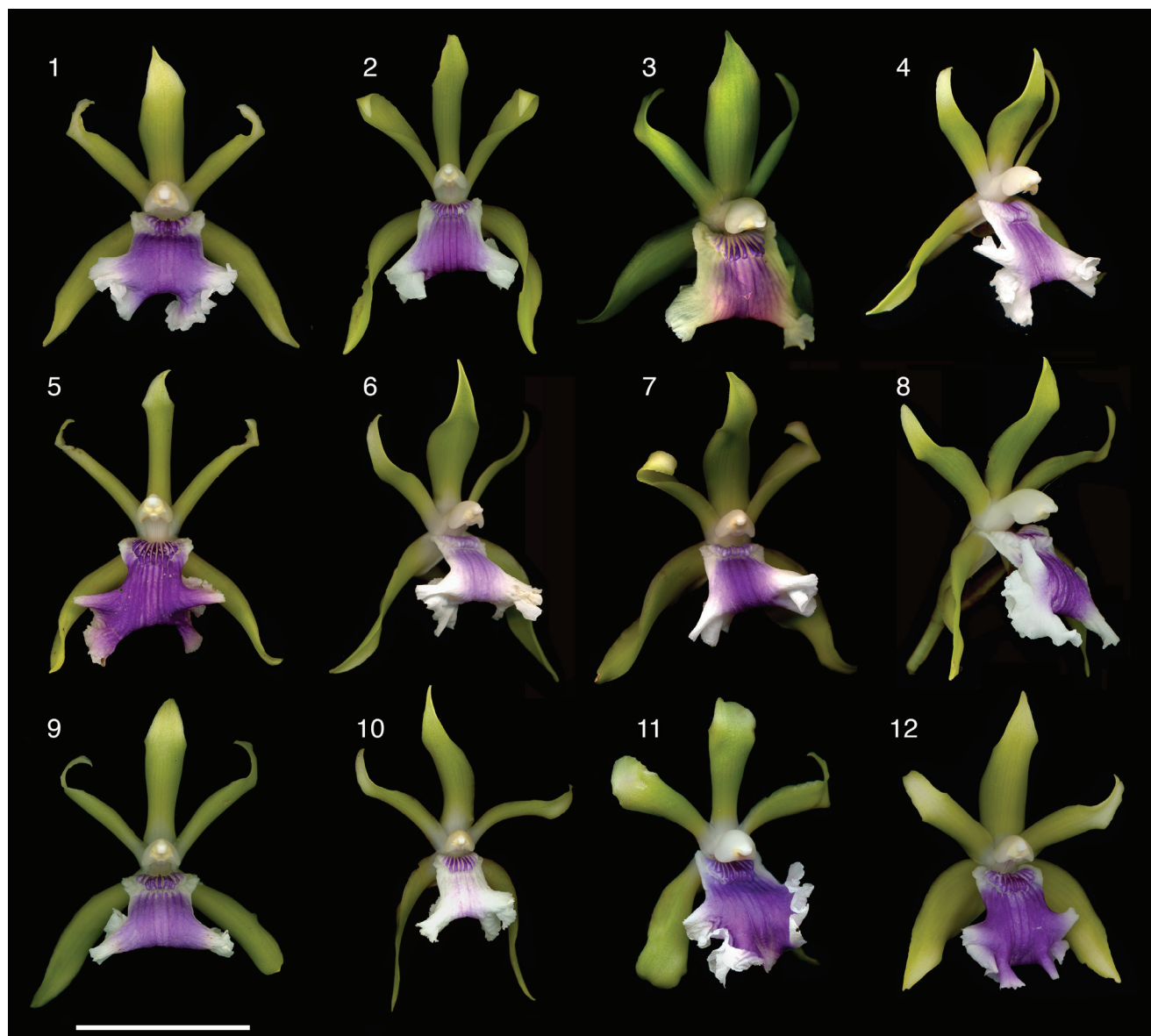


FIGURE 9. Variations in flower color among individuals of *Cochleanthes aromatica*. 1, Blanco 1904; 2, Pupulin 6363; 3, Bogarín 9258; 4, JBL-03932; 5, JBL-s.n.; 6, JBL-03932; 7, Gómez 59; 8, Pupulin 3058; 9, Blanco 1904; 10, JBL-01987; 11, Bogarín 1635; 12, Pupulin 6383. Scale bar = 5 cm. All the vouchers at JBL. Composite illustration by the author from images by F. Pupulin & D. Bogarín.

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NOVELTIES IN DILLENIACEAE FROM ECUADOR

GERARDO A. AYMARD¹

Abstract. A new species was detected during the examination of specimens of *Doliocarpus* for the Flora of Ecuador, which is described and its morphological relationships with its closest allied species are discussed. *Doliocarpus renneri*, from the wet riverine forests of the Cuyabeno (Napo) river, is most similar to *D. multiflorus*, but differs from that species in its branches, branchlets and petioles covered by black trichomes, the obovate or elliptic-obovate leaves, the shorter inflorescence, the sessile flowers, and the sepals and petals that differ in shape and number. A previously described subspecies is elevated to the rank of species (i.e., *Doliocarpus dasyanthus* subsp. *robustus* to *D. robustus*), and an updated key to the species of *Doliocarpus* of Ecuador is provided.

Keywords: Flora of Ecuador, Amazonia, Dilleniaceae, *Doliocarpus*

Resumen. Durante el estudio de los especímenes de *Doliocarpus* para la Flora de Ecuador se descubrió una nueva especie, la cual se describe y se discuten sus afinidades morfológicas con la especie más afín. Este nuevo taxon, *Doliocarpus renneri*, se conoce de los bosques húmedos ribereños del Río Cuyabeno (Napo), esta especie es similar a *D. multiflorus* Standl., pero difiere de esta por sus ramas, ramitas y pecíolos cubiertos por tricomas negros, las hojas obovadas o elíptico-obovadas, las inflorescencias más cortas, las flores sésiles, y los sépalos y pétalos diferentes en número y forma. Se eleva a una subespecie al rango de especie (i.e., *Doliocarpus dasyanthus* subsp. *robustus* a *D. robustus*) y se incluye una clave actualizada de las especies del género *Doliocarpus* para Ecuador.

Doliocarpus Rolander (Dilleniaceae) includes about 50 species distributed throughout southern Mexico, Central America, the Antilles, the Guianas, Venezuela, Colombia, Ecuador, Peru, Bolivia, Brazil, and Paraguay (Aymard, 1998). The species are lianas (rarely shrubs) and, within the family, the genus is distinguished by having ramiflorous, fasciculate or glomerate inflorescences, an unicarpellate, one-celled ovary, a berry as a fruit, sometimes opening irregularly, and seeds completely covered by a white aril (Todzia and Aymard, 2013).

The genus was monographed by Kubitzki (1971), who divided it into two sections: section *Calinea* Eichler, characterized by having leaves with tertiary nerves subparallel (rarely reticulate), erect-flexuose filaments with introrse anthers at anthesis, and a glabrous or pilose ovary, and section *Doliocarpus* having leaves with tertiary nerves reticulate, reflexed filaments with anthers extrorse at anthesis, and ovary always pilose. Although the stamen character state (filaments at anthesis) represents a reliable morphological feature when assigning specimens of *Doliocarpus* to these two sections, it is usually the case that most specimens do not have flowers at anthesis, or have flowers lacking petals, many having instead young fruits with persistent sepals and stamens. Leaf venation, therefore, is perhaps the most valuable character to distinguish the two sections of this genus.

Doliocarpus renneri Aymard *sp. nov.* TYPE: ECUADOR. Napo Province: Río Cuyabeno, from mouth and two hours upstream, wet forest, 00°10'S; 75°53'W, 300 m, 16 August 1981, J. Brandbyge, E. Asanza C., L. Werling & S. Leth-Nielsen 33583 (Holotype: QCA; Isotypes: AAU [not seen], GB, MO, NY, US). Fig. 1.

This new species is morphologically similar to *D. multiflorus* Standl., but it differs by having branches,

branchlets and petioles covered by black, 1–1.5 mm long trichomes, obovate or elliptic-obovate leaves, the margins of which are sinuate, ciliate, and the apex acuminate, inflorescence 1–1.5 cm long, pilose; sessile flowers, sepals 4, 1.5–2 mm long, orbicular, petals 3, and a glabrous and papillate ovary.

Plant a liana; *branches and branchlets* densely hispid-setose, covered by black, 1–1.5 mm long trichomes, sparsely pilose or, glabrescent when mature. *Leaves* subcoriaceous, obovate or elliptic-obovate, 11–23 × 5–13 cm, the base cuneate, the apex acuminate, margins not revolute, entire, sinuate, mostly in the upper half, ciliate, with trichomes 1–1.5 mm long, sparsely appressed pubescent on the upper surface, more evident along the midrib and the secondary nerves, where its are covered by appressed trichomes, becoming glabrous when mature, appressed short pubescent on the lower surface, except along the midrib and the secondary nerves, where its are covered by long trichomes, 1–1.5 mm long, lateral nerves 7–13, petioles 1.5–2 cm long, 2–3 mm wide, exalate, canaliculate covered with black trichomes, 1.5–2 mm long. *Inflorescence* axillary, racemose, 1–1.5 cm long, rachis pilose, trichomes white, bracteoles ovate, 1–1.5 × 1–1.5 mm, sparsely appressed pubescence externally, glabrous internally. *Flowers* sessile, *sepals* 4, 1.5–2 × 1.5–2 mm, orbicular, sparsely appressed pubescent externally, glabrous internally, *petals* 3, 1.5–2 mm long, obovate, glabrous on both surfaces, *stamens* 20–40, filaments glabrous, 0.8–1 mm long, anthers glabrous, ca. 0.5 mm long; ovary glabrous, striate, papillate, style glabrous, papillate, ca. 0.5 mm long, stigma capitate. *Fruit* not seen.

Eponymy. This species is named in honor of Susanne Renner for her noteworthy contributions to our knowledge to the Flora of Ecuador, and to tropical botany at large.

The author is grateful to Gustavo A. Romero (AMES) and two anonymous reviewers for their comments, to Nidia L. Cuello (PORT) for preparing the illustration, to Claes Persson (GB) for encouraging the author to prepare the treatment of Dilleniaceae for the Flora of Ecuador, and to the staff of the Missouri Botanical Garden and New York Botanical Garden for making their herbarium facilities available to the author.

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FIGURE 1. *Doliocarpus renneri* Aymard. Photograph by N. Cuello based on an isotype (NY).

Distribution and Ecology. Known only from the type locality, where it has been collected in riverine wet forests from the Río Cuyabeno.

Because of its subparallel tertiary venation, *Doliocarpus renneri* belongs in section *Calinea* (Kubitzki, 1971), and by its racemose inflorescence this new species is most similar to *D. multiflorus* Standl. from Central America, Venezuela, Suriname, Colombia, Ecuador, Peru, Bolivia, NE of Brazil (Maranhao, Pará, and Roraima; Aymard, unpublished data). However, *D. renneri* differs from the latter in its branches, branchlets and petioles covered by black trichomes, 1–1.5 mm long (versus white trichomes, ca. 0.5 mm long), leaves obovate or elliptic-obovate, margins sinuate, ciliate, the apex acuminate (versus obovate-lanceolate, margins mucronate-serrate, not ciliate, apex obtused or rounded), inflorescence 1–1.5 cm long, pilose (versus 1.5–4, laxe pilose to glabrescent); flowers sessile (versus pedicellate), sepals 4, 1.5–2 mm long, orbicular (versus 4–5, 2–4 mm long, obovate or obovate-oblong), petals 3 (vs. 3–5), ovary glabrous and papillate (versus villose not papillate).

The specimen *J. Brandbyge et al.* 33583 was previously referred to *D. hispidus* Standl. & L. O. Williams. However,

the latter differs from the new species in its branches, branchlets and petioles being covered by white trichomes (versus black trichomes), leaves broadly elliptic to elliptic-obovate, margins in the upper half of the leaf blade dentate (vs. obovate or elliptic-obovate, margins sinuate); inflorescences fasciculate (versus racemose), bracteoles coriaceous (versus papyraceous), and sepals broadly ovate to suborbicular, densely yellow hispid-pubescent externally (versus orbicular, sparsely appressed pubescent externally).

Doliocarpus robustus (Aymard) Aymard, *comb. et stat. nov.*
 Basionym: *Doliocarpus dasyanthus* Kubitzki subsp. *robustus* Aymard, Novon 3: 319. 1993. TYPE: PANAMA: Panama: along El Llano to Carti road, 09°15'N; 79°00'W, 150–250 m, 15 December 1987, G. McPherson 11862 (Holotype: MO).

Doliocarpus robustus was described, based on a single specimen, as a subspecies of *D. dasyanthus* (Aymard, 1993). However, the examination of additional material strongly indicates that it should be treated as a separate species, which can be distinguished from *D. dasyanthus* using the following key:

- 1a. Leaves coriaceous, oblanceolate, 9–15 cm wide, secondary veins 16–22; petioles stout, 3–5 cm long, 4–6 mm wide, peduncle 2–3 mm wide; sepals oblong-elliptic, 8–12 mm long, ovary 4–8 mm long. *D. robustus* (Aymard) Aymard
 1b. Leaves chartaceous to subcoriaceous, obovate-oblong, 3–8 cm wide, secondary veins 11–14; petioles slender, 1–2 cm long, 1–2.5 mm wide, peduncle ca. 0.5 mm wide; sepals elliptic, 4–6 mm long, ovary 2–4 mm long *D. dasyanthus* Kubitzki

Additional specimens examined: COSTA RICA. Heredia: Sarapiquí, Lomas Sardinal, 15 km N of Pto. Viejo, 10°34'N, 84°02'W, *B. Hammel* 20632, 20679 (INB, F, MO). COLOMBIA. Valle del Cauca: 18 km NW of Buenaventura, 3.4 km NW of San Isidro intersection, 03°48'N, 77°08'W, *D. Faber-Langendoen* & *J. A. Hurtado* 1561 (MO). Buenaventura, Corregimiento Córdoba, Vereda San Cipriano, Reserva Natural Escalerete, 03°49'41"N, 76°52'10"W, *Wilson Devia A. et al.* 5436 (MO). ECUADOR.

Napo: The Yasuní National Park, 00°40'S, 76°24'W, *Jacob Nabe-Nielsen* 285 (AAU, MO). Sucumbios: Estación Científica Cuyabeno, 220 m, *J. Jaramillo* & *E. Grijalva* 14764 (MO, QCA).

The new species and the new status proposed here increase to ten the number of *Doliocarpus* species known from Ecuador, all discovered during the preparation of the treatment of Dilleniaceae for the Flora of Ecuador.

KEY TO THE SPECIES OF *DOLIOCARPUS* TO ECUADOR (BASED IN AYMARD, 2007)

- 1a. Tertiary venation reticulate; leaves with verrucosities on lower surface 2
 1b. Tertiary venation subparallel; leaves without verrucosities on lower surface. 4
 2a (1a). Lateral nerves terminating at the margin; sepals glabrous externally; fruits covered by trichomes 0.3–1 mm long *D. olivaceus* Sprague & L. O. Williams (Los Ríos)
 2b. Lateral nerves linking close to the margin; sepals adpressed pilose externally; fruits covered by trichomes ca. 5 mm long 3
 3a. Branches angulate; leaves shiny on the upper surface, glabrous on the lower surface; margins entire *D. nitidus* (Triana) Triana & Planchón (Esmeraldas)
 3b. Branches terete; leaves dull on the upper surface, adpressed pubescent on the lower surface; margins sinuate to dentate *D. major* J. F. Gmel. (Manabí, Napo)
 4a (1b). Inflorescences with peduncles 0.5–7 mm long *D. brevipedicellatus* Garcke subsp. *brevipedicellatus* (Napo, Orellana)
 4b. Inflorescences with peduncles longer than 10 mm 5
 5a (4b). Inflorescences racemose (peduncle with 2 to 6 flowers). 6
 5b. Inflorescences, fasciculate, not racemose (peduncle with a single flower) 8
 6a (5a). Leaves rigid-coriaceous, oblanceolate-obovate or lanceolate, the margins entire or subsinuate; sepals elliptic *D. novogranatensis* Kubitzki (Napo, Orellana, Pastaza)
 6b. Leaves subcoriaceous, obovate-lanceolate obovate or elliptic-obovate, the margins sinuate or dentate; sepals orbicular, obovate or obovate-oblong 7
 7a (6b). Branches, branchlets and petioles covered by white trichomes; leaves obovate-lanceolate, margins mucronate-serrate, not ciliate, apex obtused or rounded inflorescence 1.5–4 cm long; flowers pedicellate, sepals 2–4 mm long, obovate or obovate-oblong, ovary villose not papillate *D. multiflorus* Standl. (Napo, Pastaza Pichincha)
 7b. Branches, branchlets and petioles covered by black trichomes; leaves obovate or elliptic-obovate, margins sinuate, ciliate, the apex acuminate, inflorescence 1–1.5 cm long, flowers sessile, sepals 1.5–2 mm long, orbicular, ovary glabrous *D. renneri* Aymard (Napo)

KEY TO THE SPECIES OF *DOLIOCARPUS* TO ECUADOR (BASED IN AYMARD, 2007) CONT.

- 8a (5b). Sepals laxe pubescent to glabrescent on the outside; ovary glabrous 9
- 8b. Sepals pubescent on the outside, ovary densely sericeous 11
- 9a (8a). Stems, petioles, and leaf blades with spreading, ferrugineous pubescence *D. dentatus* subsp. *rufescens* (Sleumer) Kub. (Napo)
- 9b. Stems, petioles, and leaf blades glabrous or with sparse, non- ferrugineous pubescence 10
- 10a. Leaves coriaceous, tuberculate along the leaves *D. dentatus* subsp. *tuberculatus* Aymard (Napo, Pastaza, Sucumbios)
- 10b. Leaves chartaceous or subcoriaceous, not tuberculate along the leaves *D. dentatus* (Aubl.) Standl. subsp. *dentatus* (Morona-Santiago, Orellana, Pastaza, Napo, Sucumbios, Zamora-Chinchi)
- 11a (8b). Leaves coriaceous, oblanceolate, margins sinuate-dentate; petioles 3–5 cm long; sepals 5 (6), sparsely pubescent inside *D. robustus* Aymard (Sucumbios)
- 11b. Leaves subcoriaceous, obovate, obovate-elliptic to elliptic, margins dentate or sinuate-crenate; petioles 1.5–3 cm long; sepals 3–4, glabrous inside *D. subandinus* Aymard (Napo)

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VALIDATION OF *PEDIOMELUM PALMERI* (FABACEAE)

KANCHI N. GANDHI¹

Abstract: *Pediomelum palmeri* Grimes is validated, and *P. ockendonii* is rejected as a superfluous and illegitimate name.

Keywords: *Pediomelum ockendonii*, *P. palmeri*, *P. pentaphyllum*, *Psoralea palmeri*, *P. pentaphylla*, Fabaceae

Rydberg (1919: 23) proposed the new combination *Pediomelum pentaphyllum*, based it on *Psoralea pentaphylla* L., and provided a description in English.

Ockendon (1965: 122, adnot.) treated “*Pediomelum pentaphyllum* sensu Rydberg” and *Psoralea pentaphylla* as two distinct species. For “*P. pentaphyllum* sensu Rydberg,” he proposed “*Psoralea palmeri* Ockendon” as the name of a new species, provided a description in English, citing a holotype (i.e., Edw. Palmer 29, NY). He did not provide a Latin description or diagnosis. Instead, he mentioned that his “reference to this previously validly published description (by Rydberg, 1919: 23) obviates the Latin diagnosis here, according to the present code of nomenclature.”

Since Rydberg did not provide a Latin description or diagnosis and since Ockendon excluded the name *Psoralea pentaphylla* (which did have a Latin diagnosis) from his “*Psoralea palmeri*,” his reference to Rydberg does not provide a Latin description or diagnosis, which is a requirement for names of new extant taxa published during 1935–2011 (McNeill & al., 2012; Art. 39.1).

Although Ockendon (1965) flagged his “*Psoralea palmeri*” as a “*sp. nov.*,” the non-provision of Latin implies that he might have considered his species name as a new name for “*Pediomelum pentaphyllum* sensu Rydberg” and assumed that his reference to Rydberg’s (1919) description alone was sufficient for a valid publication of “*Psoralea palmeri*.” Unfortunately, the preceding name was not validly published.

Perhaps with the assumption of the valid publication of “*Psoralea palmeri* Ockendon”, Grimes (1990) transferred

it to the genus *Pediomelum*, and proposed “*Pediomelum palmeri*” as a new combination.

Since Grimes (1990) did not cite a valid basionym and did not provide or refer to a Latin description, his new combination was also not validly published; furthermore, Grimes’ reference to the 1965 publication is not a correctable error (McNeill & al., 2012: Arts. 41.3, 41.4, 41.8).

For “*Pediomelum palmeri* Grimes,” Kartesz and Gandhi (1992) proposed *Pediomelum ockendonii* as the name of a new species, provided a Latin description, and cited a holotype (Edw. Palmer 295 (NY)).

However, Grimes (1990) as well as Kartesz and Gandhi (1992) overlooked the fact that subsequent to his 1965 invalid publication, Ockendon (1966) validated the name *Psoralea palmeri* with a Latin description and a holotype citation (Edw. Palmer 295 (NY)).

Since *Psoralea palmeri* and *Pediomelum ockendonii* were based on the same holotype, the latter name was superfluous and illegitimate when published. Therefore, “*Pediomelum palmeri* Grimes” is validated here.

Pediomelum palmeri (Ockendon) J.W. Grimes ex Gandhi, *comb. nov.*

Basionym and Homotypic Synonyms: *Psoralea palmeri* Ockendon, Southw. Naturalist 11: 412. 1966. *Pediomelum ockendonii* Gandhi & Kartesz, Sida 15: 138. 1992, nom. superfl. & illegit. *Psoralea palmeri* Ockendon, Southw. Naturalist 10: 122. 1965, invalid. *Pediomelum palmeri* J.W. Grimes, Mem. New York Bot. Gard. 61: 88. 1990, invalid. TYPE: MEXICO, Durango: Tepehuanes, 4–25 Jun 1906, Edw. Palmer 295 (holotype: NY).

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CORRIGENDUM

RECONSIDERING *STRYCHNOS GUBLERI* (LOGANIACEAE)

GUSTAVO A. ROMERO-GONZÁLEZ^{1,2} AND GERARDO A. AYMARD^{3,4}

Romero-González and Aymard (2015) recently designated an epitype for the name *Strychnos gubleri* G.Planchon. At that time, the holotype of this species had not been located.

It was pointed out to one of us (K. N. Gandhi, pers. comm. to GAR-G, 2015), that an epitype could not be proposed for a species the holotype of which was not known, or when a lectotype or neotype had not been previously designated (Article 9.8 of the ICBN; McNeil et al., 2012).

We have not located the holotype but, since the protologue of this species includes a figure, we make the following proposals:

Strychnos gubleri G.Planchon, Journal de Pharmacie et de Chimie, 5^e Série, 1: 295[–300], figure. [April] 1880. TYPE: VENEZUELA. Amazonas: collected by the governor of the Amazonas District (Holotype: not located; Lectotype, proposed here: image of a leaf published on page 293 of the protologue (as “Feuille du *Strychnos Gubleri*”); Epitype, proposed here, Venezuela, Amazonas, Municipio Autónomo Atures, Puerto Perico, [currently within the city limits of the state’s capital, Puerto Ayacucho], 1867, A. Gaillard 16, P).

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