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## NOVELTIES IN THE ORCHID FLORA OF VENEZUELA VIII. SUBTRIBE ERIOPSISIDINAE. *ERIOPSIS*.<sup>1</sup>

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**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).

We thank the staff and curators of BR, G, HBG, HEID, HOXA, K, LOJA, M, MOL, NY, P, SEL, TFAV, UNAH, UNL, USM, VEN, and W for allowing access to their collections, B. Angell and S. Strigari for the illustrations, E. Facher for the S.E.M. microphotographs, C. W. Melton for documenting pollination, R. Clery for fragrance analysis, D. Doczkal for the identification of the pollinator, and D. Aguilar-Santamaría, D. Bogarin, G. Dill, C.H. and P. Dodson, R. L. Dressler, L. Endara A., L. Ferrufino, F. Guánchez, E. Hágsater, O. Hokche, B. Holst, M. M. Jiménez León, A. Karremans, S. McPherson, B. Manara, T. E. C. Meneguzzo, E. M6, P. Moraes, F. A. Obermüller, F. Pupulin, A. Reynolds, L. Rodríguez, K. J. Romero Soler, A. Schuiteman, M. Speckmaier, D. Szlachetko, M. Schultz, D. Trujillo, L. Venegas Perdomo, C. Vits, W. M. Whitten, and G. and K. Yatskievych for providing critical information, P. Ormerod for his comments and suggestions, and to K. Gandhi for his help with nomenclatural matters. The Orchid Society of Arizona provided generous financial support (to GAR-G).

<sup>1</sup> 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 Paletropical genus of Orchidaceae, and the Greek *-opsis*, having the appearance of, presumably because of the similarity of *Eriopsis* to *Eria*.

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

Type species: *Pseuderiopsis 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 Bolivia<sup>7</sup> (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  $\mu\text{m} \times 110$ –115  $\mu\text{m}$ ). 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:

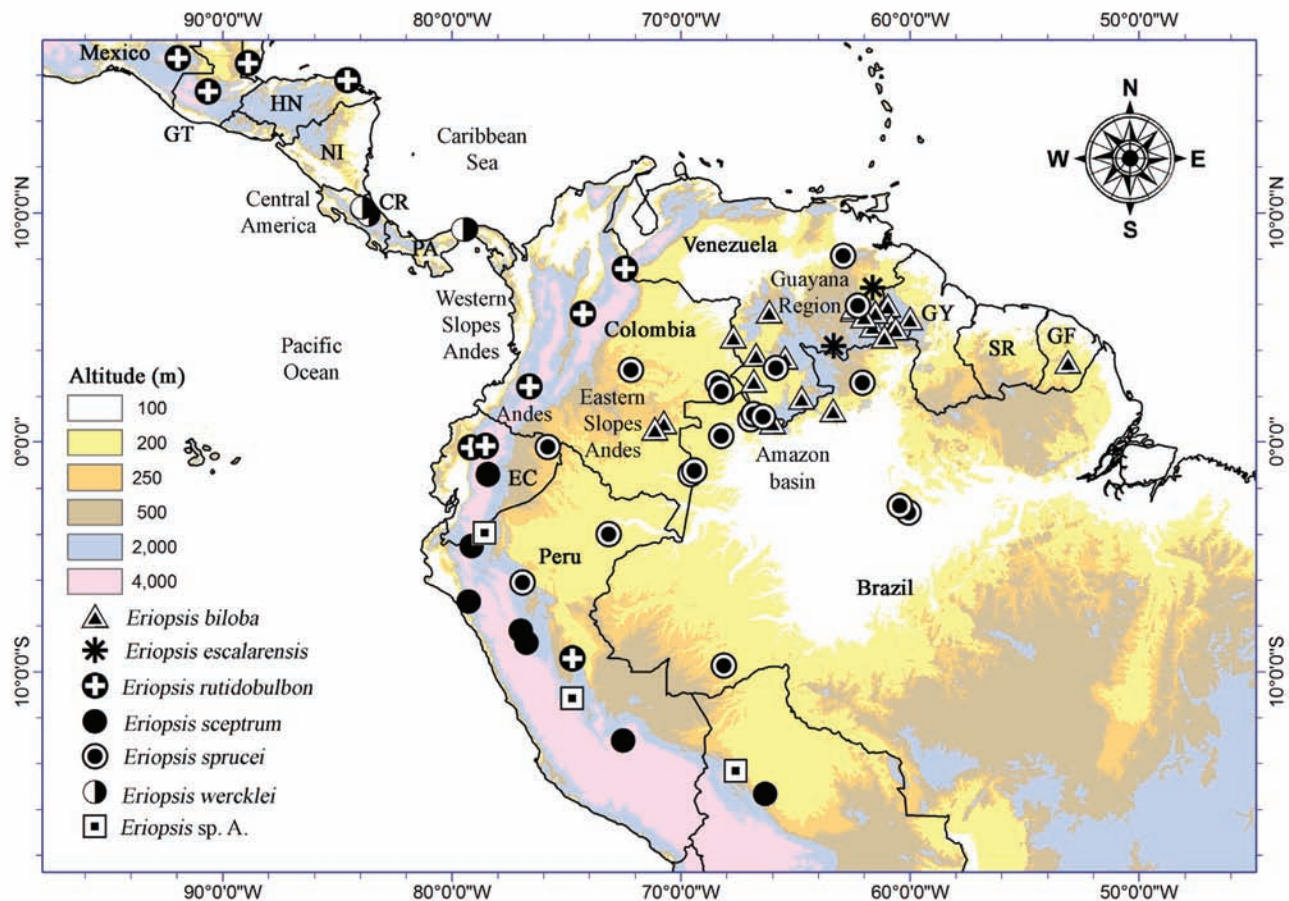


FIGURE 1. Distribution of *Eriopsis* species. Notice the gap in the distribution of *E. rutidobulbon* Hook. (reported from Mexico, Guatemala, Belize, Honduras, and then in Colombia, Venezuela, Ecuador, and Peru, obviously absent from Nicaragua, Costa Rica, and apparently Panamá). CR = Costa Rica, EC = 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).

<sup>7</sup>The 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.

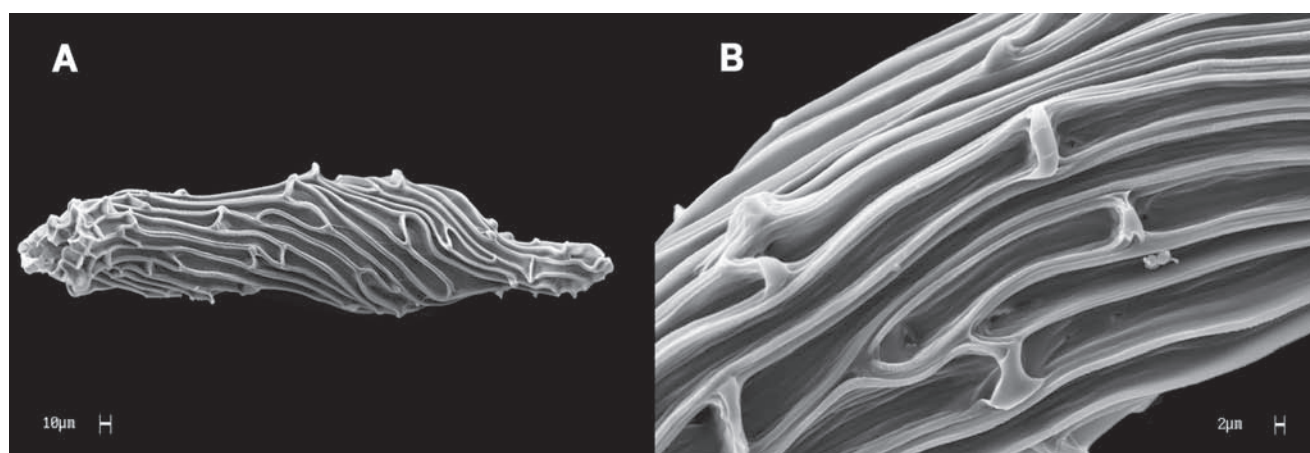


FIGURE 2. Seed morphology of *Eriopsis* under S.E.M. **A**, whole seed; **B**, detail. Scanning electron micrograph by E. Facher based on seeds of *E. sceptrum* Rchb.f. & Warsz. (ex Hort. Botanischer Garten München-Nymphenburg 07/2043).

“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 vandooid 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 vandooid 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-Chinchipe), 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).

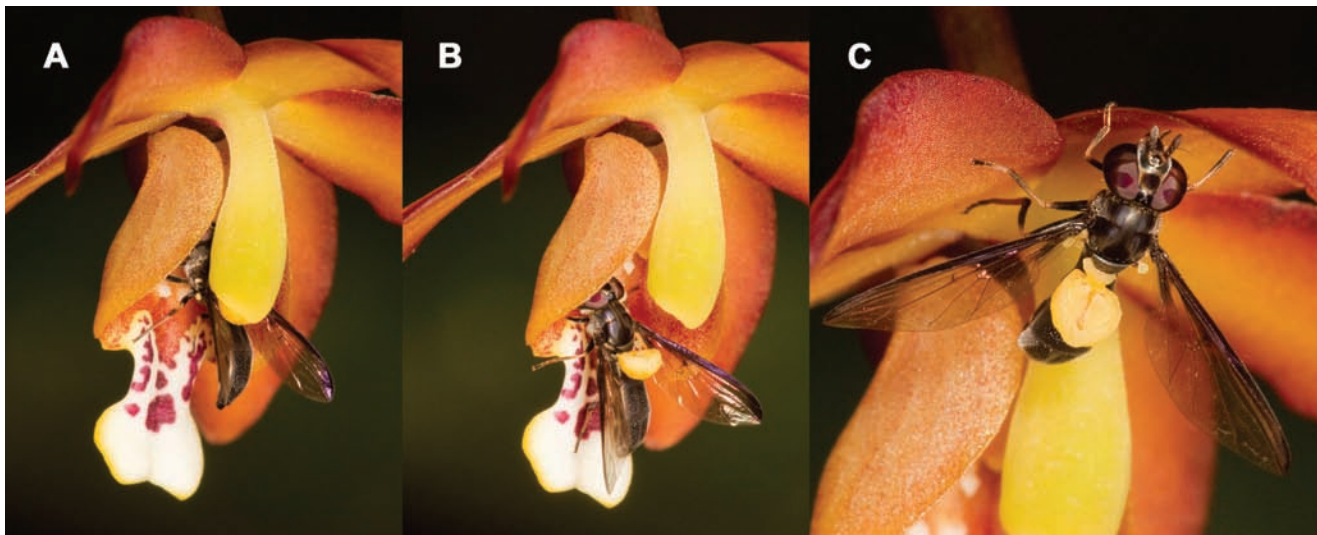


FIGURE 3. Pollination of *Eriopsis* species A by a female of *Ocyptamus* species (Macquart 1843, Syrphidae). **A**, insect at the base of the lip; **B**, leaving the lip with the pollinarium already attached to the scutellum; **C**, leaving the flower; the point of attachment of the pollinarium is clearly 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-Chinchipe, 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* Rehb.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* Rehb.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); Dunterville, 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), Dunterville and Garay (1965: 126), Dunterville and Dunterville (1979), Speckmaier (1993), Baumbach (2002).

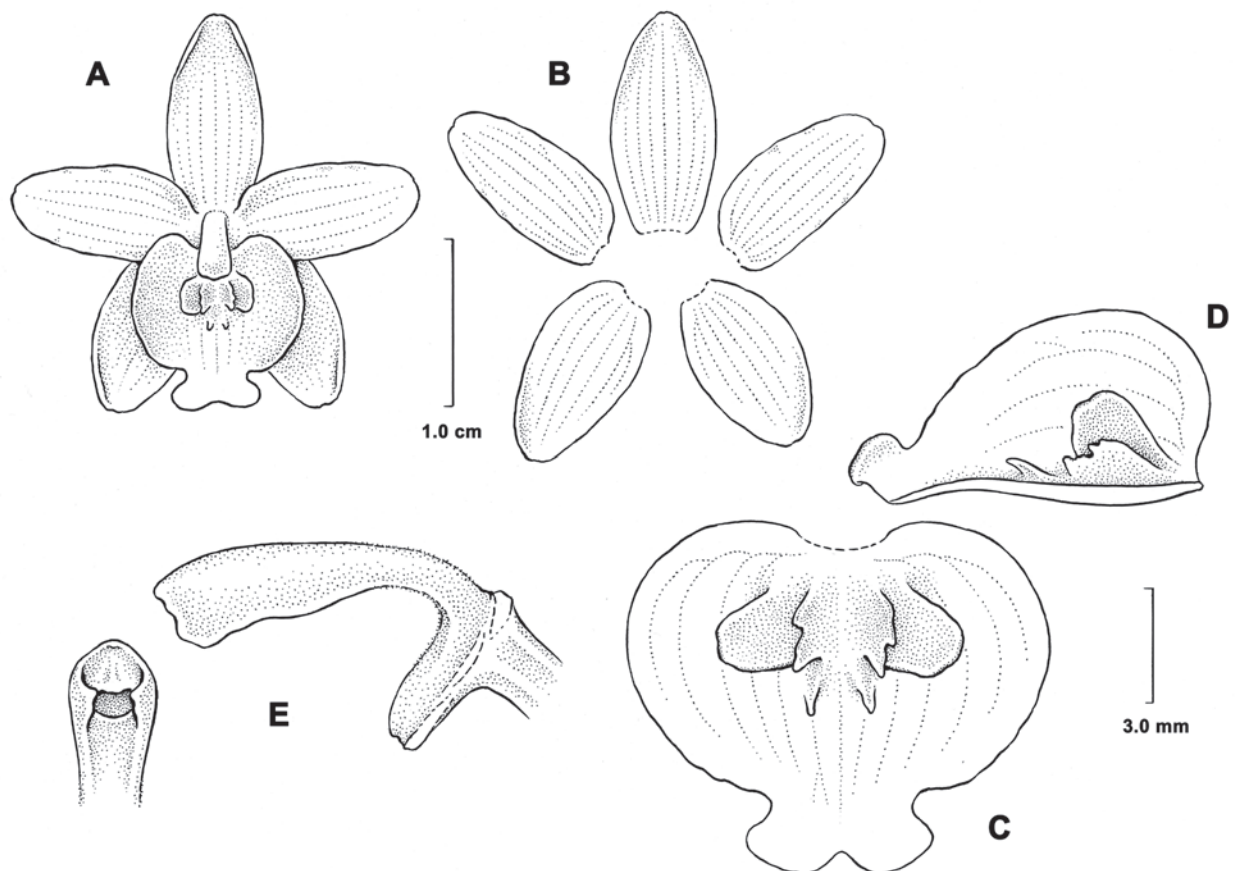


FIGURE 4. *Eriopsis biloba* Lindl. A, flower; B, sepals and petals; C, labellum viewed from above; D, sagittal section of the labellum; E, two views of the column. Drawing by B. Angell based on a flower sent to Prof. Oakes Ames from K allegedly from the holotype.



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



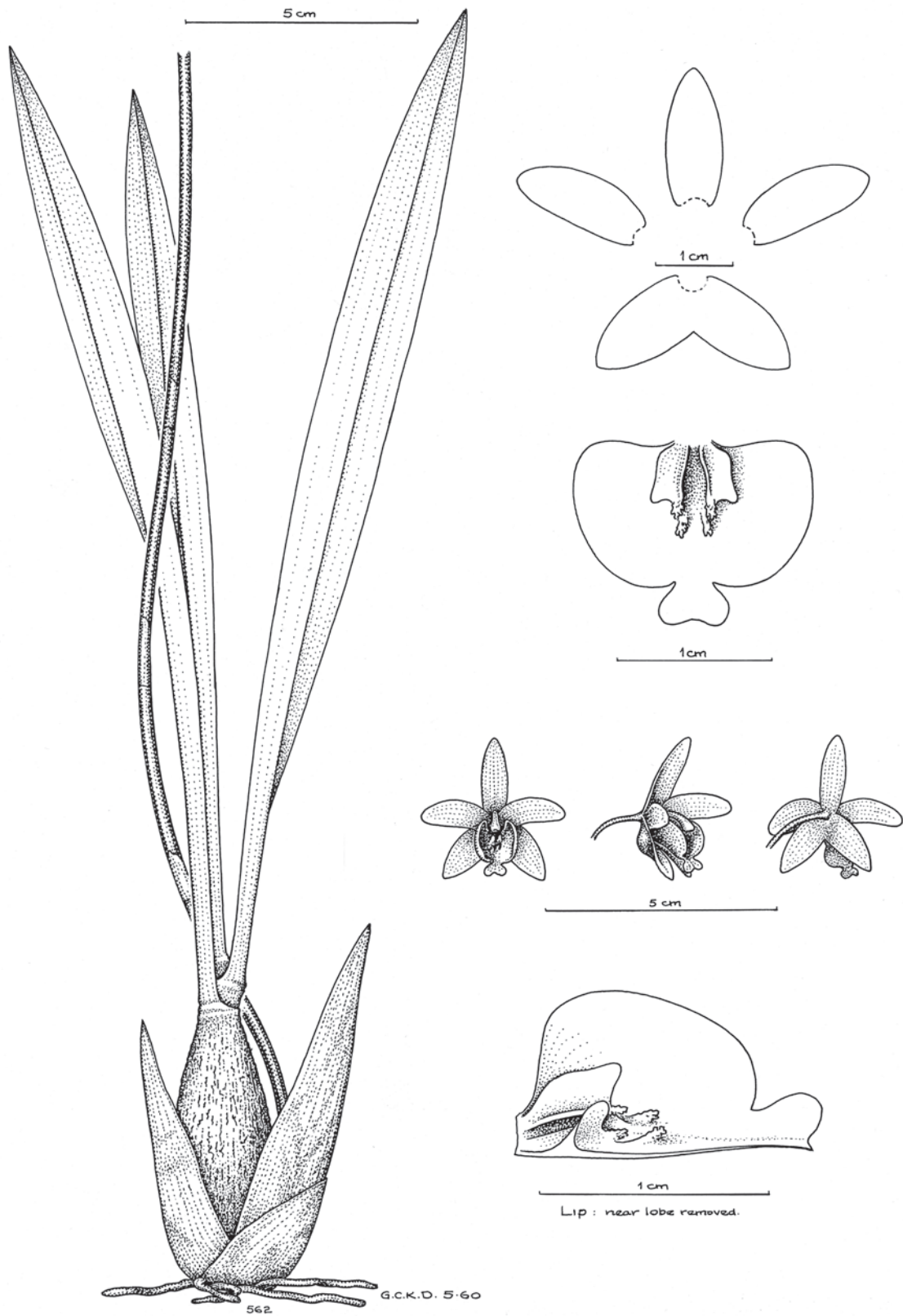


FIGURE 6. *Eriopsis biloba* Lindl. Typical plant from the Gran Sabana Region of Venezuela, near Kavanayen. Drawing by G. C. K. Dunsterville based on his collection number 562 (reproduced from a photostatic copy of his drawing at AMES).



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, 1,750–1,850 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 Churuf, 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-lavander, dull green at the base; lip brown-lavander with central small lobe yellow with 3 purple spots, column pale green, November 14 1944, *J. A. Steyermark 60138* (AMES, F). Sarven-tepui, 1,900–2,050 m, *J. J. Wurdack 34140* (NY). Churi-tepui (Muru-tepui), 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 al 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

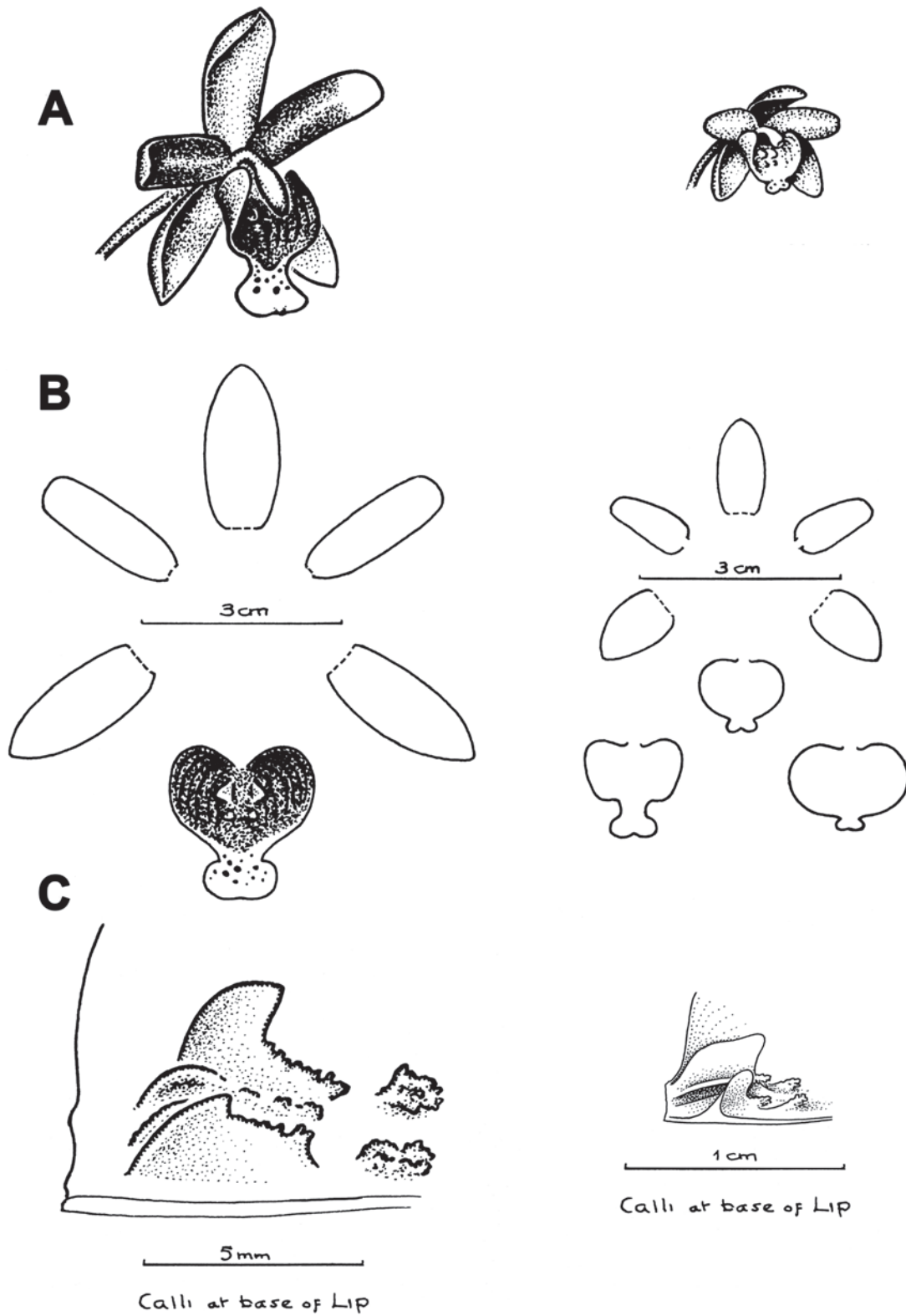


FIGURE 11. Comparison of the flowers of *Eriopsis escalerensis* G. A. Romero & Carnevali (left column) and *E. biloba* Lindl. (right column). A, flower; B, floral segments; C, callus of the labellum. Drawings by G. C. K. Dunsterville based on his collections 857 and 562, respectively, presented at the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





FIGURE 12. *Eriopsis escaalerensis* 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 km<sup>2</sup> and an “Area of Occupancy” of ca. 8 km<sup>2</sup>) 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.

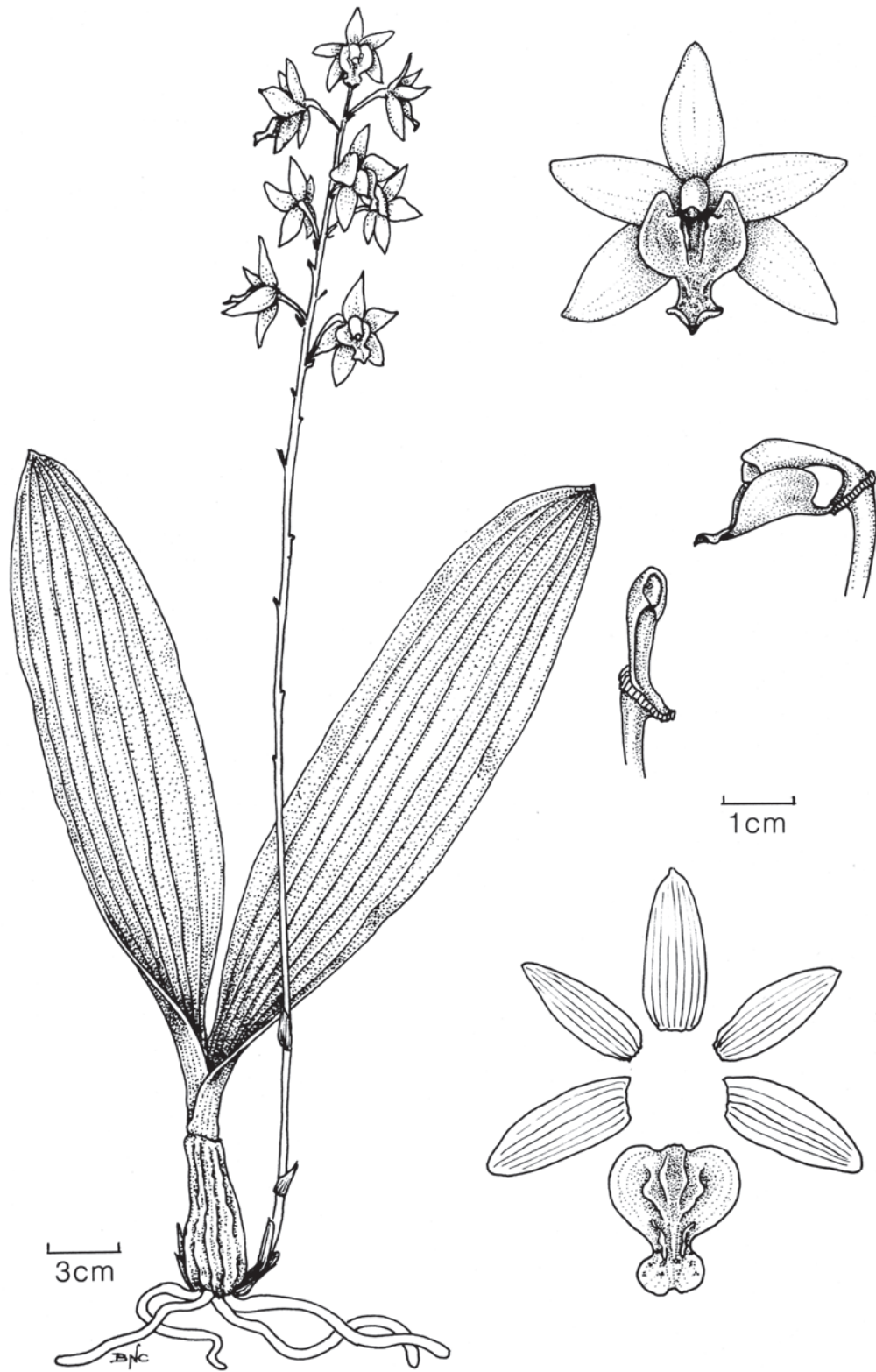


FIGURE 15. Illustration of *E. rutidobulbon* Hook. in Dodson and Dodson (1980). With Permission from C. H. Dodson and the Missouri Botanical Garden.

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. M6 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* (RENZ, 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 km<sup>2</sup>. However, based on an Area of Occupancy of 52 km<sup>2</sup> (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* Rehb.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 (*vide* Weberbauer 7050), or with a bad smell (*vide* 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, *vide* Whitten, not seen; photographs seen, reproduced in Gerlach et al., 2009, color plates 32–33; Fig. 18 herein). Provincia Zamora-Chinchipec, 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 km<sup>2</sup>. However, based on the Area of Occupancy of 36 km<sup>2</sup> (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).

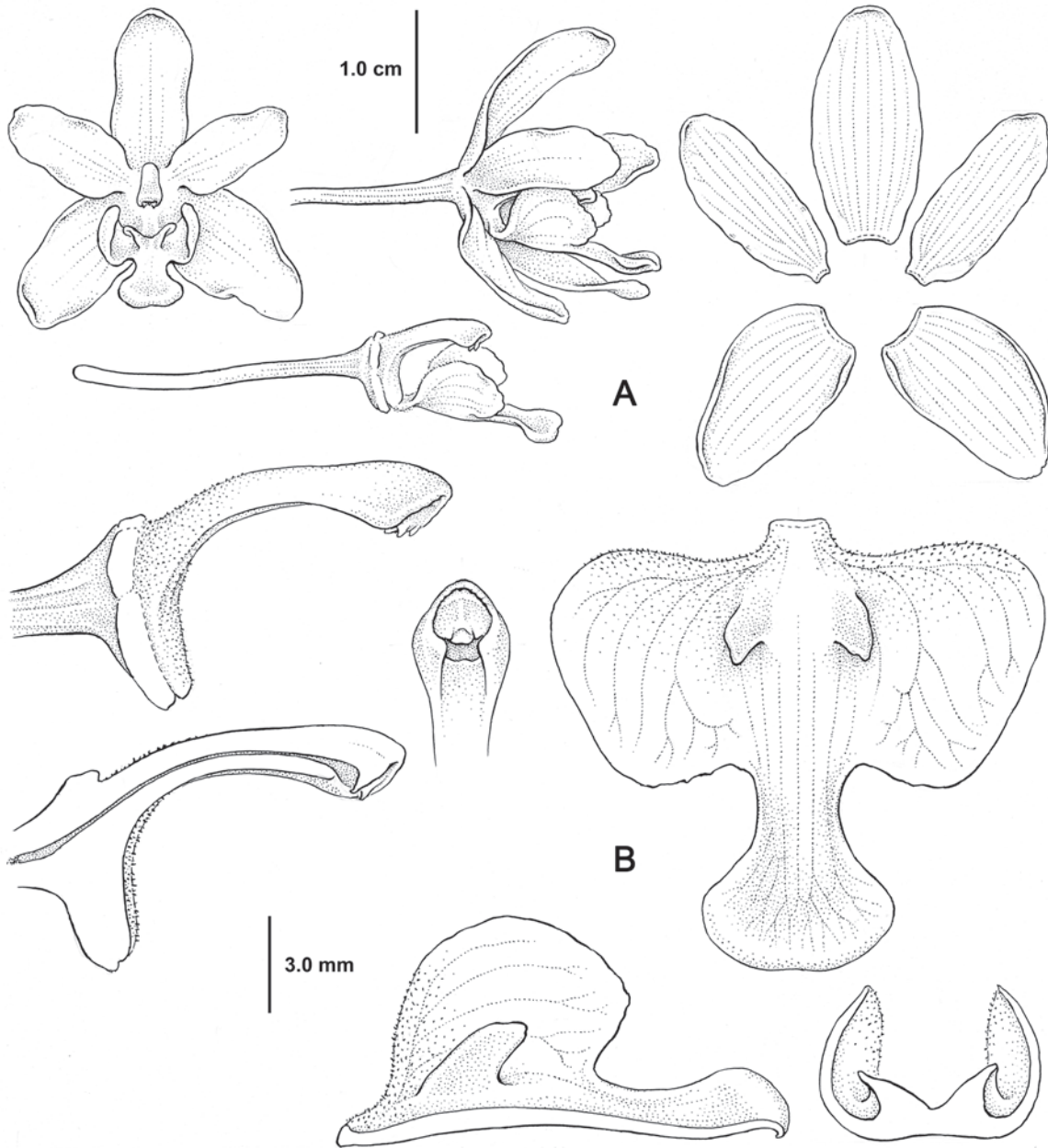


FIGURE 19. *Eriopsis sceptrum* Rehb.f. & Warsz. **A**, details of the flower; **B**, floral segments and column. Drawing by B. Angell based on ex Hort. Botanischer Garten München-Nymphenburg 07/2043 (see specimens cited).

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 Marañon" (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).

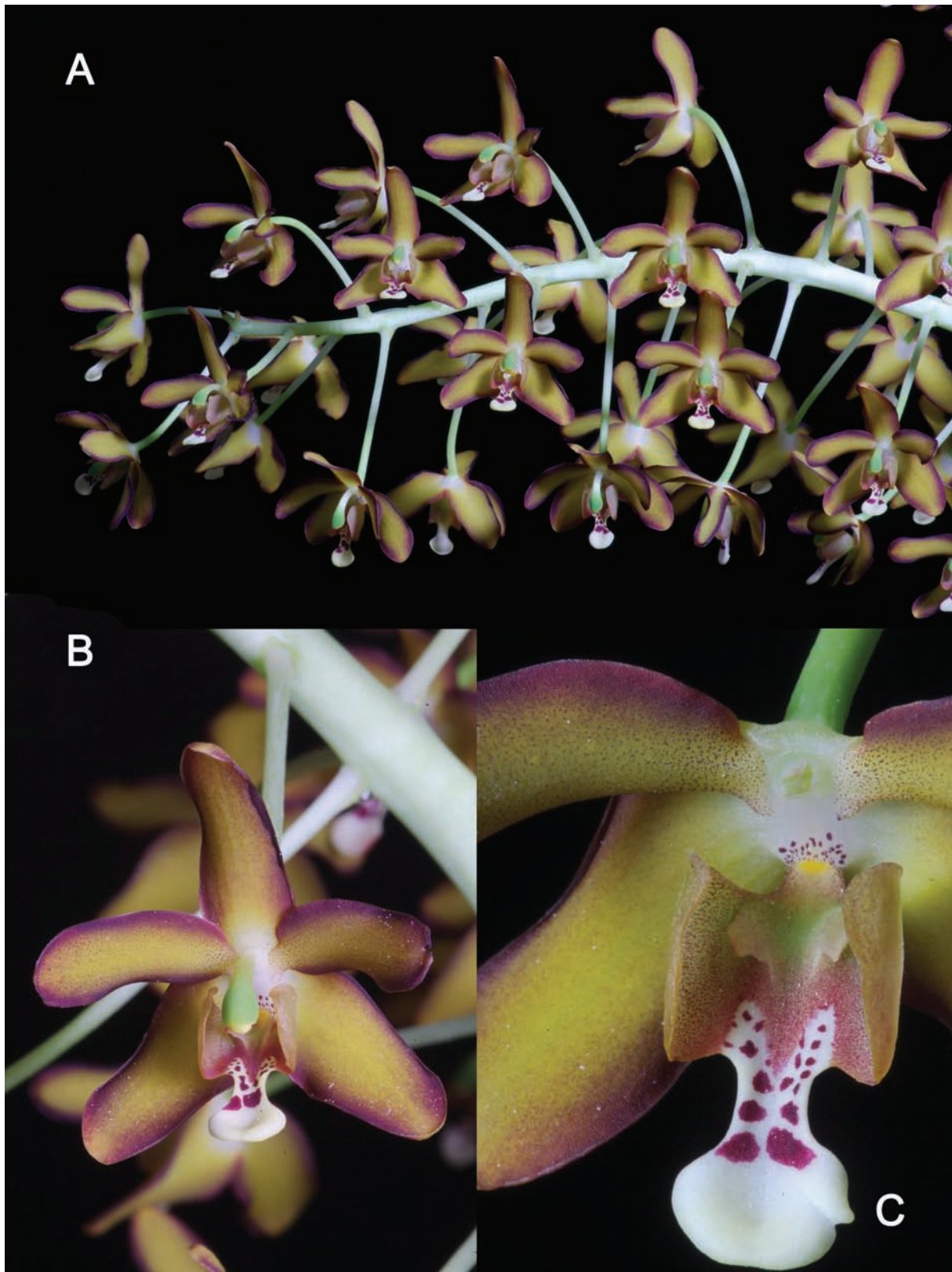


FIGURE 20. *Eriopsis sceptrum* Rchb.f. & Warsz. **A**, inflorescence; **B**, close-up of flower; **C**, close-up of the labellum after removing the column. Photographs by G. Gerlach based on ex *Hort.* Botanischer Garten München-Nymphenburg 07/2043 (see specimens cited). For scale, see Fig. 19.



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).

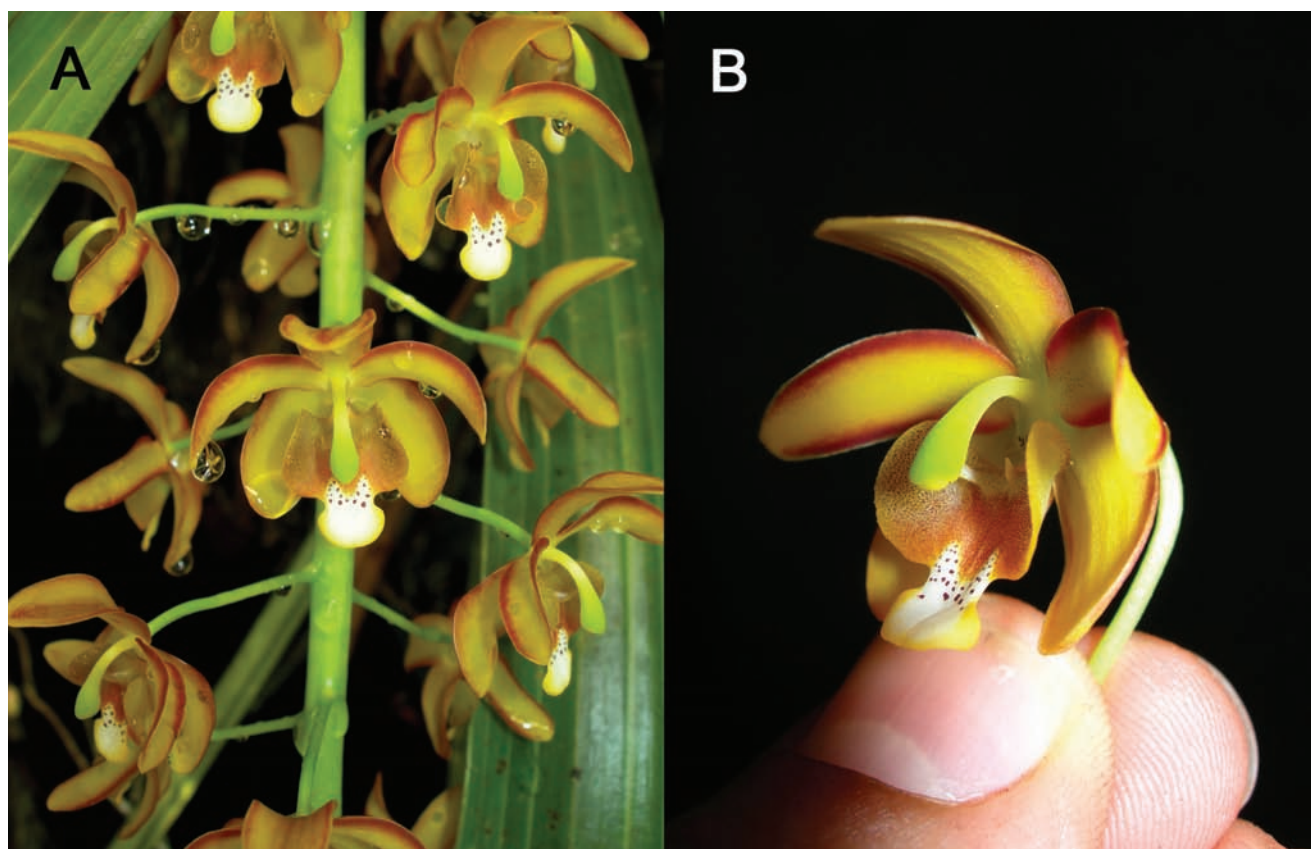


FIGURE 22. *Eriopsis sprucei* Rchb.f. GAR-G plate. **A**, detail of inflorescence; **B**, close-up of flower. Photographs by G. A. Romero-González based on Romero *et al.* 3566 (see specimens cited).

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. Guiania 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 Bentham, 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: [Río 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 Río 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 Río 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 Anavilhanas, 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<sup>e</sup>. 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 com 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 Bentham; 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 riveroño del caño Mesaque [Atacavi river and ultimately Atabapo river basin], 21 July 2006, hierba epífita, en grandes macollas, flores amarillas, labelo con puntos rojos tenues 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 Amaruay-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 km<sup>2</sup>. However, based on the Area of Occupancy of 68 km<sup>2</sup> (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 Joaquin (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, yellow 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 km<sup>2</sup>. Based upon an Area of Occupancy of 44 km<sup>2</sup> (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 km<sup>2</sup>. 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).

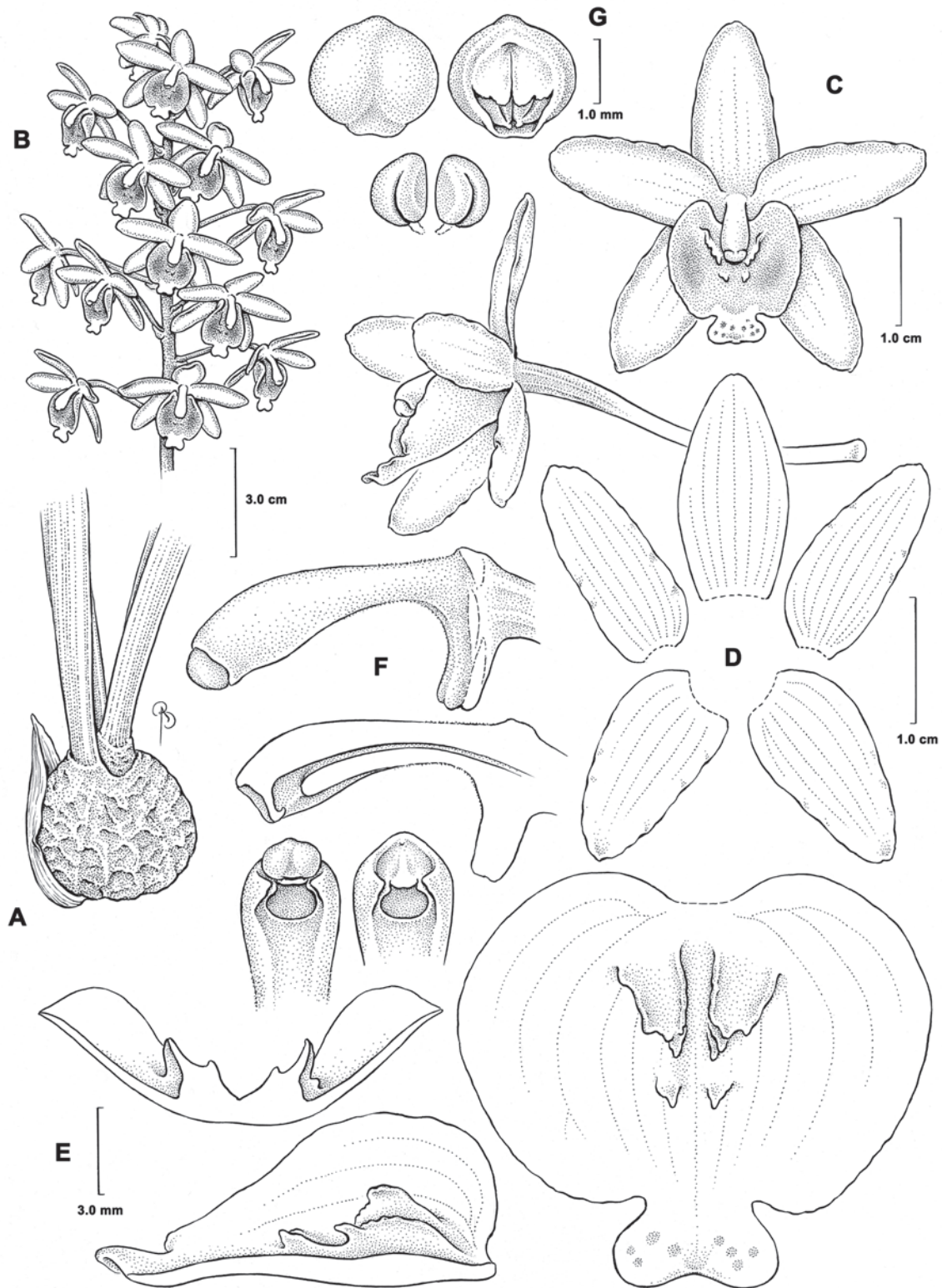


FIGURE 26. *Eriopsis wercklei* Schltr. **A**, close-up of young pseudobulb; **B**, detail of Inflorescence; **C**, flower, front and side view; **D**, sepals and petals; **E**, details of the labellum; **F**, details of the column; **G**, anther and pollinia (the viscidium absent and most likely dissolved 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; Foldvik, 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.

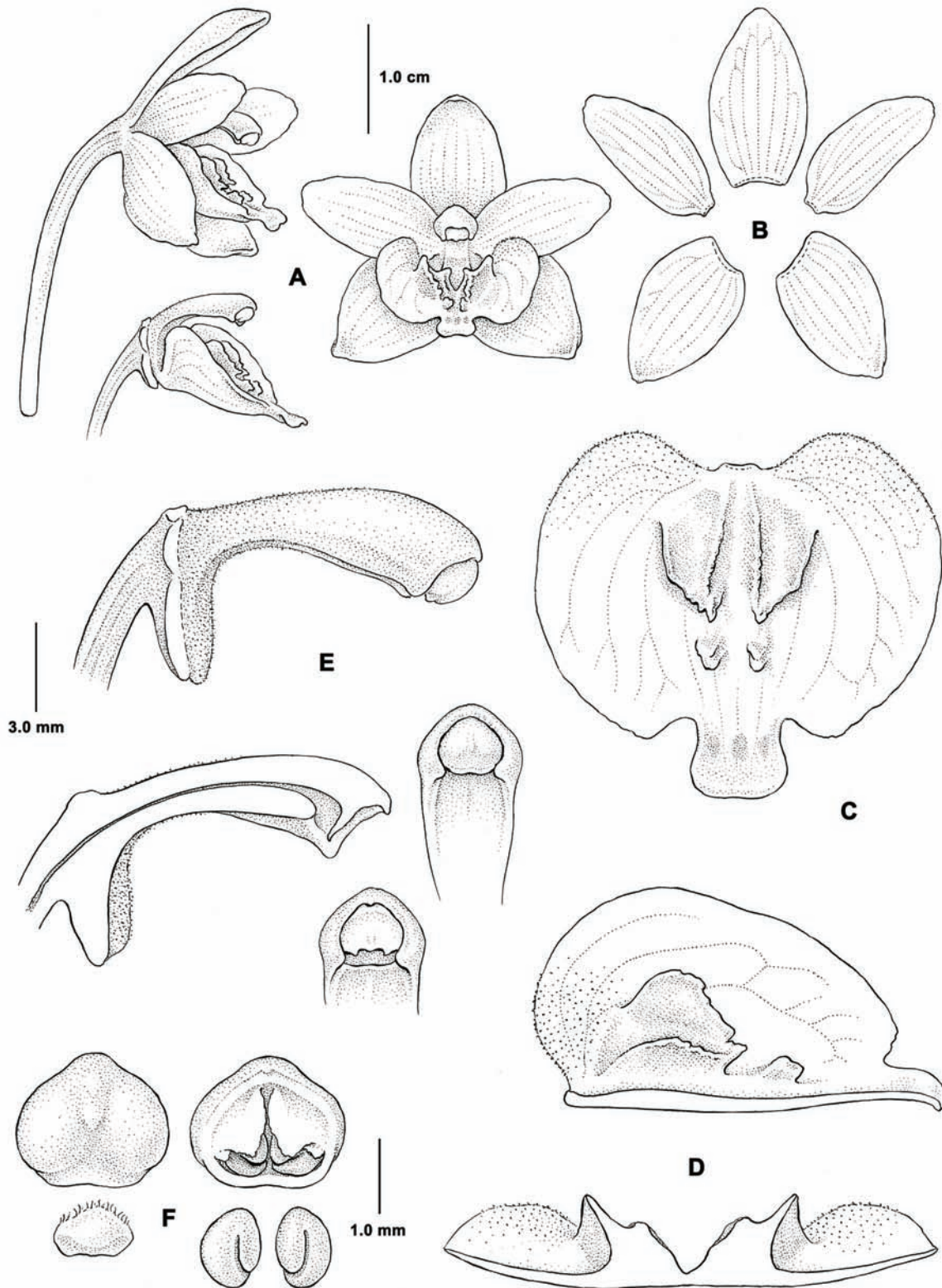


FIGURE 29. *Eriopsis wercklei* Schltr. **A**, views of a flower; **B**, sepals and petals; **C**, labellum from above; **D**, sagittal and transversal views of the labellum; **E**, views of the column; **F**, views of the pollinia and anther. Drawing by B. Angell based on material from Colombia (254460, 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 Chusipata 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-Chinchipec: Nangaritzá, 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 km<sup>2</sup>. However, based on the Area of Occupancy of 24 km<sup>2</sup> (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-Chinchipec, 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-Chinchiipe, 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.

*Pseuderriopsis schomburgkii* Rchb.f. = ***Eriopsis biloba***

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