



## A new species of *Camaridium* (Orchidaceae: Maxillariinae) from the cloud forests of Colombia

LIZETH RODRÍGUEZ-MARTÍNEZ<sup>1</sup> & MARIO A. BLANCO<sup>2,3</sup>

<sup>1</sup>Facultad de Ciencias Agropecuarias, Universidad Nacional de Colombia-Sede Palmira, Cra. 32 #12-00 Chapinero, Palmira, Colombia.

<sup>2</sup>Escuela de Biología, Universidad de Costa Rica, Ciudad Universitaria Rodrigo Facio, Apdo. 11501-2060, San José, Costa Rica.

<sup>3</sup>Jardín Botánico Lankester, Universidad de Costa Rica, Apdo. 1031-7050, Cartago, Costa Rica; e-mail: mario.blancocoto@ucr.ac.cr

### Abstract

*Camaridium perezianum* is described from the remnant cloud forests of Valle del Cauca Department (western range of the Andes, southwestern Colombia). This new species is most similar to *C. nutantiflorum*, from which it differs by its sub-rhombic, apically rounded labellum and by its ligulate, minutely trifid, basally papillose callus. The seemingly bifid callus reported for *C. nutantiflorum* is shown to be an artifact caused by longitudinal splitting when flattening the labellum; the callus in living and liquid-preserved flowers is thick and widely obtuse. A key to the six species of the *C. carinulatum* alliance is provided.

### Resumen

Se describe *Camaridium perezianum* de remanentes de bosques de niebla del Departamento Valle del Cauca (cordillera occidental de Los Andes, suroccidente colombiano). Esta nueva especie es similar a *C. nutantiflorum*, del cual difiere por su labelo subrómico y apicalmente redondeado, y por su callo ligulado, diminutamente trifido, basalmente papiloso. Se muestra que el callo aparentemente bifido de *C. nutantiflorum* es un artefacto causado por una rajadura longitudinal que se forma al aplastar el labelo; el callo en flores vivas y preservadas en líquido es grueso y anchamente obtuso. Se ofrece una clave para las seis especies de la alianza de *C. carinulatum*.

**Key words:** El Queremal, taxonomy

### Introduction

*Camaridium* Lindley (1824: sub. t. 844) is one of the largest genera of the orchid subtribe Maxillariinae Benth (1881: 288) (sensu Whitten *et al.* 2007, 2009, Blanco *et al.* 2007). Species of this genus (ca. 80) are distributed from southern Mexico and southern Florida (USA) to Peru and southeastern Brazil (Blanco *et al.* 2007, Whitten *et al.* 2009). Most species occur in Central America (including the group that is sister to the rest of the genus), with more than 80% of them present in Costa Rica and Panama (and with ca. 70% of the species being endemic to either or both of those two countries). It is therefore a reasonable inference that this genus originated in the Central American isthmus (Kirby 2011). At least 17 species of *Camaridium* occur in Colombia (Bernal *et al.* 2015); however, the genera in subtribe Maxillariinae have been poorly studied in this country. This is evidenced by the paucity of taxonomic and floristic treatments in this group for Colombia and of reliable specimen identifications in Colombian herbaria (Valencia 2014: 162).

*Camaridium* is vegetatively variable, with most species having plants with pseudobulbs (either caespitose or distanced along suberect foliaceous stems), while other species have monopodial stems without pseudobulbs. A few species have dimorphic growth, with caespitose juvenile plants that produce monopodial stems when they reach maturity; in these species, only the monopodial shoots produce flowers. As a rule, the floral bract is somewhat inflated and completely covers the pedicel and ovary, and overlaps with the base of the dorsal sepal. The sepals and petals lack conspicuous fibers; in some other genera of subtribe Maxillariinae, i.e., *Maxillaria* Ruiz & Pavón (1794: 116, pl. 25) sensu stricto, fibers are visible as threads that stick out of from the broken surface of the perianth segments when

these structures are pulled apart (Whitten *et al.* 2007). The capsular fruits are pendulous and the three valves separate completely at the apex upon maturity. Most species of *Camaridium* grow exclusively in premontane to montane tropical wet-to-moist forest life zones above 1000 m elevation (Kirby *et al.* 2012).

During fieldwork for a floristic survey to the remnant cloud forests of the El Queremal corregimiento (Dagua municipality, Valle del Cauca department, Colombia), a particular individual of *Camaridium* was found, which we describe here as a new species.

***Camaridium perezianum*** Rodr.-Martínez & M.A. Blanco, *sp. nov.* (Figs. 1, 2)

Similar to *Camaridium nutantiflorum* Schlechter (1918: 417–418), but differs from that species by its subrhombic, apically rounded labellum and by its slightly trifid, basally papillose callus.

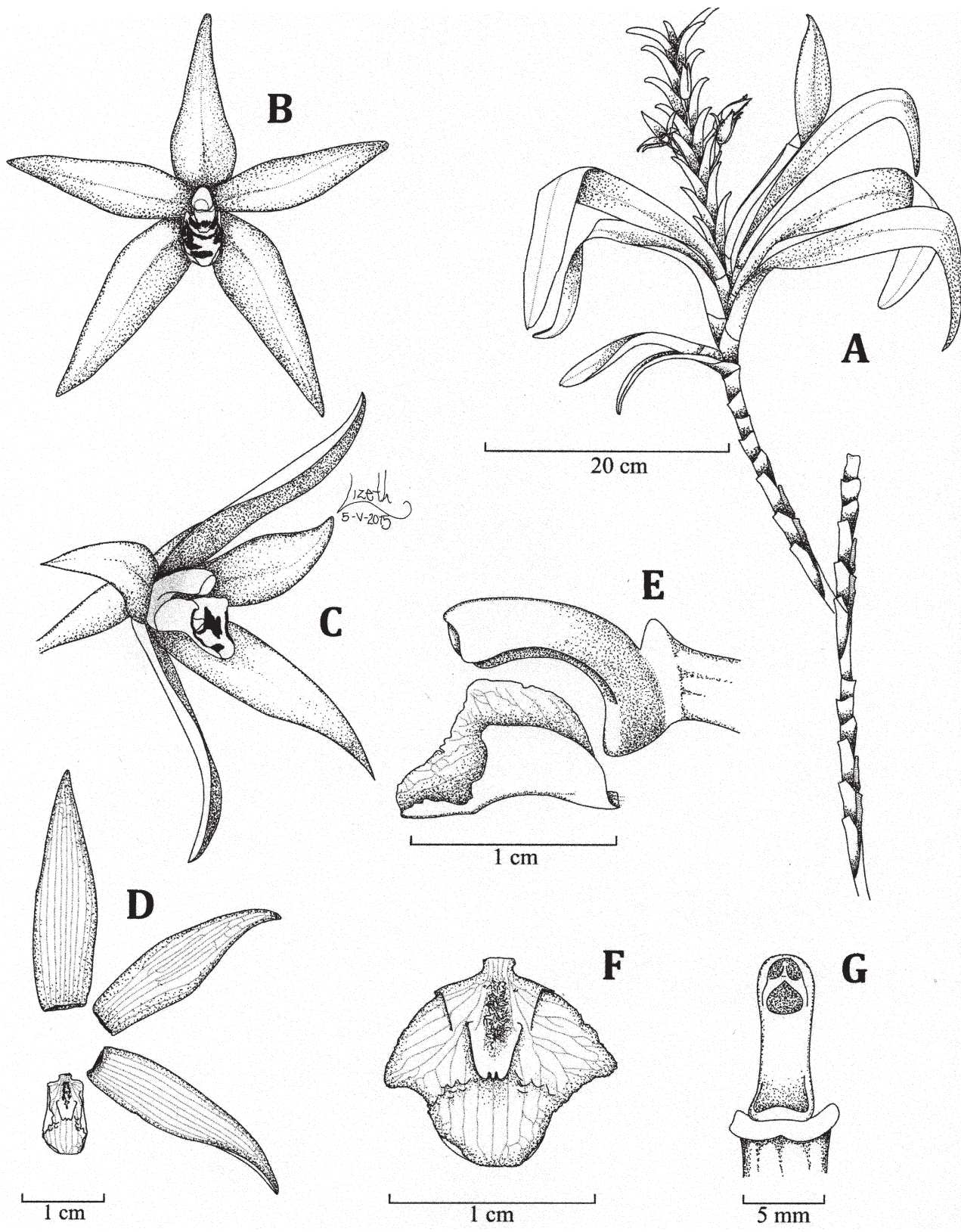
**Type:**—COLOMBIA. Valle del Cauca: Municipio de Dagua, El Queremal, remnant cloud forest, 1850 m, 21 September 2012, *Rodríguez & Rincón 019* (holotype: VALLE!).

Plant an epiphyte, up to 1 m tall. Roots not seen. Stems erect, sympodial, scarcely branched; each sympodial unit up to 55 cm long, with a terminal pseudobulb, with 1–2 branches arising from the nodes just before the pseudobulb. Pseudobulb elliptic to ovate, flattened, 5.0–6.0 × 4.0–5.0 cm, partly covered by the bases of leaves, with one apical leaf. Leaves distichous, completely covering the stem (including most of the pseudobulb), dimorphic; the 11–14 proximal leaves of each sympodial unit oblong, retuse, conduplicate, falcate in profile, 3.4–5.7 × 1.2–2.0 cm, green, with a transverse abscission line at the middle, the blade caducous upon maturity of the sympodial unit; the 8–10 distal leaves of each sympodial unit pseudopetiolate (pseudopetiole comprised by the extended, conduplicate leaf sheath); 19.2–34.2 cm long; the sheath strongly conduplicate, 4.3–5.4 cm long; the blade lorate, suboblong, slightly wider above the middle, acute to retuse, basally attenuate, 15.2–29.5 × 1.9–3.5 cm; the leaf apical on the pseudobulb similar to the distal leaves, but without a sheath. Inflorescences single-flowered, produced from the axils of the short, proximal leaves during the early stages of elongation of the sympodial unit, when the distal large leaves and pseudobulb have not yet expanded; 5–9 inflorescences produced per shoot, with flowers opening in a rapid succession. Peduncle 5.2 cm long, with 3 distichous bracts (including the floral bract); only the last two emerging from the subtending short-leaf sheath. Floral bract ovate, acute, cucullate, sheathing the pedicel and ovary, 2.5–2.7 × 1.5 cm, its tip overlapping with the base of the dorsal sepal. Pedicel plus ovary cylindrical, smooth, 1.38 cm long, 5 mm in diameter. Flowers resupinate; sepals and petals yellow adaxially, pale yellow abaxially; the sepals lightly spotted with reddish purple at the base; labellum cream with transverse purple spots, the papillae yellow with purple apices; column cream, basally flushed with purple. Sepals long-lanceolate, suboblong, acute; the dorsal sepal 30–35 × 8–9 mm, 9-veined; the lateral sepals 30–35 × 9 mm, 8-veined. Petals long-lanceolate, suboblong, acute, 25–30 × 8–9 mm, 6-veined. Labellum subrhombic, 3-lobed, short-unguiculate, minutely erose on the distal half, 11 × 12 mm; lateral lobes triangular, subacute, apically rounded, erect; midlobe subquadrate to widely rounded, apically subtruncate to widely rounded, straight, slightly larger than lateral lobes; disc 6–7 × 3 mm, papillate at base, apically projected as a ligulate, minutely trifid callus, whose apex ends at the base of the midlobe. Column hemicylindrical, arcuate, apically truncate, 1.3 × 0.4 cm, basally provided with a shortly projecting (0.6 cm) foot. Anther operculum not seen. Pollinia ovoid, flattened. Fruit not seen.

**Distribution and ecology:**—*Camaridium perezianum* is known so far from the remnant cloud forest on the western side of the western range of the Andes, municipality of Dagua, corregimiento of El Queremal, department of Valle del Cauca, Colombia. It was observed growing as an epiphyte, in fragmented cloud forest at 1800–1900 m elevation. Five individual plants were seen, and flowering was observed in July and September.

**Etymology:**—Named after Oscar Alejandro Pérez Escobar, currently a graduate student at the Ludwig-Maximilians University (Munich, Germany), who has contributed to the knowledge of the Colombian orchid flora and who has constantly motivated the orchid taxonomy studies of the first author for several years.

**Discussion:**—*Camaridium perezianum* belongs in a small group of species that include *C. darienense* (Atwood 1998: 254–257) Szlach. & Sitko in Szlachetko *et al.* (2012: 25, as “*darienensis*”), *C. ampliflorum* (Schweinfurth 1940: 188) Blanco (2007: 519), *C. campanulatum* (Schweinfurth 1938: 94–96) Blanco (2007: 520), *C. carinulatum* (Reichenbach 1877: 6) Blanco (2008: 15), and *C. nutantiflorum* Schltr. The last five species form a clade with weak (70%) bootstrap support in Whitten *et al.*'s (2007) phylogenetic analysis of subtribe Maxillariinae (*C. darienense* was not sampled, but is morphologically most similar to *C. carinulatum*).

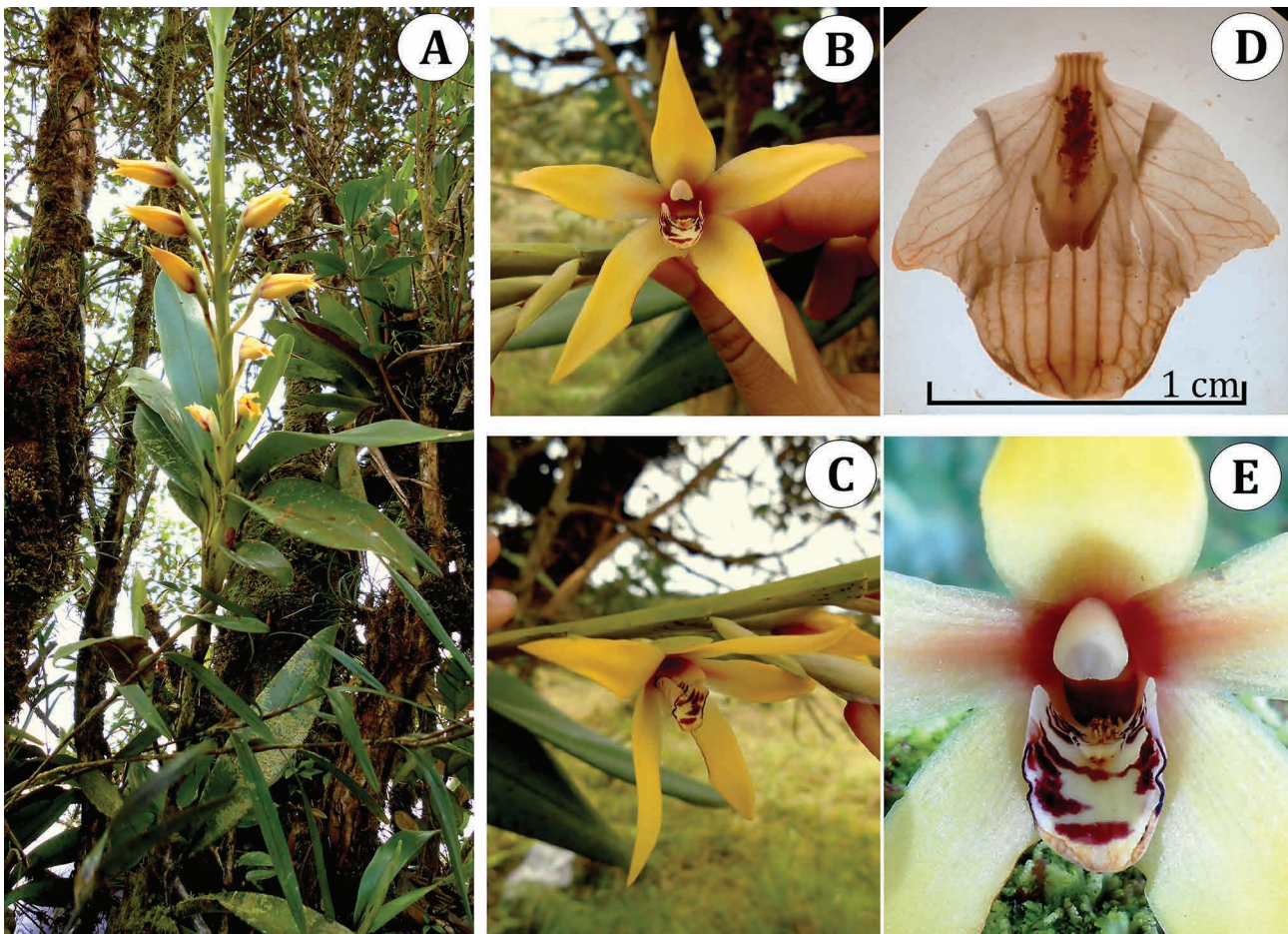


**FIGURE 1.** *Camaridium perezianum*. **A.** Plant habit. **B.** Flower, front view. **C.** Flower, oblique view. **D.** Dissected perianth. **E.** Column and detached labellum, side view. **F.** Extended labellum. **G.** Column, ventral view. Drawn by L. Rodríguez-Martínez from the holotype.

The six species in this group (here defined as the “*Camaridium carinulatum* alliance”, which ranges from Costa Rica to Peru) share the same growth habit; juvenile plants have caespitose pseudobulbs, but when mature they produce elongate, erect sympodial units. Each sympodial unit has many short, falcate (curved outward) leaves at the base, followed by several larger, ligulate leaves and a terminal pseudobulb with one or two terminal leaves. The single-

flowered inflorescences are always borne from the axils of the short, falcate leaves during the early development of the sympodial unit. Atwood (1989; also in Atwood & Mora de Retana 1999) described these plants as having “half-lyre shaped foliaceous bracts subtending the inflorescences”, in reference to the falcate short leaves of the young shoots. The young sympodial units that bear flowers are sometimes mistakenly described in herbarium labels as racemose inflorescences. The blades of the short leaves are shed soon after anthesis. After maturation of the pseudobulb, a new elongate sympodial unit is produced from the axil of one of the large leaves, eventually producing a branch composed of several sympodial units, that is apically ascending but becomes hanging because of its own weight. The pseudobulb at the base of the branch can produce other pseudobulbs at its base that repeat these growth pattern, and thus older plants often display groups of branches. Roots are produced only by the pseudobulbs at the base of each branch (the only ones in close contact with the substrate). A similar growth and flowering habit is displayed by other species of *Camaridium* (e.g., *C. ctenostachys* (Reichenbach 1870: 39) Schlechter (1923: 238)), but plants of these other taxa are often less robust, and the short leaves at the proximal part of each sympodial unit are never falcate (“half-lyre shaped”).

As is common in the genus *Camaridium*, the flowers of species in the *C. carinulatum* alliance rarely open widely. The labellum is 3-lobate, approximately as wide as long when flattened, and the lateral lobes are relatively large, triangular, and obliquely to perpendicularly oriented relative to the midlobe (however, the labellum of *C. campanulatum* is relatively narrow and has short lateral lobes that are parallel to the midlobe; see Figs. 14 D–E and 15 A–B of Atwood & Mora de Retana 1999). The labellum in these species is also spotted, and has papillae at the base in some species (e.g., *C. ampliflorum*, *C. bradeorum* and *C. perezianum*). The flowers do not produce nectar nor any other obvious reward for pollinators.



**FIGURE 2.** *Camaridium perezianum* in life, type collection. **A.** Habit. **B.** Flower, front view. **C.** Flower, oblique view. **D.** Labellum, extended. **E.** Detail of labellum and column, front view. Photos by C. Rincón-Useche and L. Rodríguez-Martínez.

*Camaridium perezianum* is superficially most similar to *C. nutantiflorum* (especially because of the yellowish sepals and petals), but differs from that species by the larger flowers, subrhombic (vs. distinctly 3-lobed), apically rounded (vs. acute) labellum, the ligulate, minutely trifold (vs. subquadrate, widely obtuse or longitudinally split when flattened), basally papillose (vs. smooth) callus, and by the longer column (13 mm vs. 5 mm long). The labellum of *C.*

*perezianum* is most similar to that of both *C. ampliflorum* and *C. carinulatum*, in that it has dark, transverse bars (in life), an acute midlobe, a basal field of papillae, and a ligulate, minutely trifold callus. However, the labellum lobes of *C. perezianum* are much shorter and set almost perpendicular to the midlobe, giving the labellum a subrhombic shape.

Both Schlechter (1918; see also Mansfeld 1931: t. 68, Nr. 271) and Atwood (1989, 2003; also in Atwood & Mora de Retana 1999: Fig. 15A, as the homotypic synonym *Maxillaria umbratilis* Williams 1941: 425) described and illustrated the callus of *Camaridium nutantiflorum* as having an inverted V-shape (i.e., bifid). However, several herbarium specimens of this species show an apically subquadrate, widely obtuse callus (M.A. Blanco, personal observation), just like the one shown in Atwood's own drawing of a rehydrated flower from the isotype of *C. vinosum* Schlechter (1923: 240; a synonym of *C. nutantiflorum*) at AMES (attached to that specimen), which could be described as "non-inverted V shaped". Examination of several living flowers and one liquid-preserved flower (Bogarín *et al.* 5598, JBL) show that the callus of *C. nutantiflorum* is a triangular, obtuse, thick (ca. 2 mm tall) structure, slightly thicker at the base. These plants do not differ in any other significant trait from the ones with an apparently bifid callus. Therefore, the apical notch of the callus seen by Schlechter and Atwood is most likely an artifact caused by longitudinal splitting when the labellum of this species is rehydrated and/or flattened. Atwood & Mora de Retana (1999: 80) commented that the callus of *C. nutantiflorum* "is more V-shaped in front than shown by his [Schlechter's] drawing, but when pressed the tips of the V tend to point forward. A rehydrated flower from Brenes 234 [the type of *C. vinosum*] shows the same type of callus." The wording of Atwood & Mora de Retana (1999) is somewhat confusing in the absence of comparative illustrations, but they appeared to have noticed the inconsistency.

The following key can be used to identify the six currently known species of the *Camaridium carinulatum* alliance.

### Key to the species of the *Camaridium carinulatum* alliance

1. Labellum longer than wide when flattened, with short, rounded lateral lobes that are parallel to the midlobe; sepals and petals recurved; plants from Costa Rica ..... *C. campanulatum*
- Labellum as wide as long or wider than long when flattened, with triangular or falcate lateral lobes that are oblique or perpendicular to the midlobe; sepals and petals recurved or straight; plants from Costa Rica to Peru ..... 2
2. Labellum subrhombic, obscurely 3-lobed; plants from Colombia ..... *C. perezianum*
- Labellum trifurcate or subhastate, clearly 3-lobed; plants from Costa Rica to Peru ..... 3
3. Labellum midlobe transversally elliptic, apically rounded; plants from eastern Panama and possibly northwestern Colombia ..... *C. dariense*
- Labellum midlobe triangular, apically acute to obtuse; plants from Costa Rica to Peru ..... 4
4. Labellum midlobe approximately twice as wide and twice as long as the lateral lobes; callus wider than long, widely obtuse (often appearing bifid by splitting in pressed labella), lacking a basal field of papillae; plants from Costa Rica and Panama ..... *C. nutantiflorum*
- Labellum midlobe subequal in width and length as (or longer than) the lateral lobes; callus longer than wide, ligulate, minutely trifold, provided with a basal field of papillae; plants from Costa Rica to Peru ..... 5
5. Sepals 3.5–5.0 cm long, recurved and overlapping for less than  $\frac{1}{3}$  of their length with the petals during anthesis; plants from Costa Rica and Panama ..... *C. ampliflorum*
- Sepals 2.0–3.2 cm long, almost straight and overlapping for more than  $\frac{1}{3}$  of their length with the petals during anthesis; plants from Costa Rica to Peru ..... *C. carinulatum*

### Acknowledgments

The first author would like to express our gratitude to the Research Group on Neotropical Phytogenetic Resources (GIRFIN) from the Universidad Nacional de Colombia—Palmira campus, to the herbaria VALLE and COL for the logistic support, and to Cristian Rincón Useche and Edicson Parra Sanchez for help during field trips.

### References

- Atwood, J.T. (1989) *Maxillaria umbratilis* L.O. Wms. *Icones Plantarum Tropicarum* 14: t. 1368.
- Atwood, J.T. (1998) Seven new species of *Maxillaria* from Panama and Costa Rica. *Selbyana* 19: 254–264.
- Atwood, J.T. (2003) *Maxillaria*. In: Hammel, B.E., Grayum, M.H., Herrera, C. & Zamora, N. (Eds.) *Manual de Plantas de Costa Rica* Volumen III: Monocotiledóneas (Orchidaceae–Zingiberaceae). *Monographs in Systematic Botany from the Missouri Botanical*

- Garden* 93: 291–332. Available from: <http://www.botanicus.org/item/31753003149553> (accessed 25 May 2015)
- Atwood, J.T. & Mora de Retana, D.E. (1999) Flora Costaricensis: Family #39 Orchidaceae: Tribe Maxillarieae: Subtribes Maxillariinae and Oncidiinae. *Fieldiana, Botany New Series* 40: 1–182. Available from: <https://archive.org/details/floracostaricens40fiel> (accessed 25 May 2015)
- Bentham, G. (1881) Notes on the Orchideae. *Journal of the Linnean Society, Botany* 18: 281–360. Available from: <http://www.botanicus.org/page/230816> (accessed 25 May 2015)
- Bernal, R., Gradstein, S.R. & Celis, M. (Eds.) (2015) *Catálogo de plantas y líquenes de Colombia*. Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Bogotá, Colombia. Available from: <http://catalogoplantasdecolumbia.unal.edu.co> (accessed 25 May 2015)
- Blanco, M.A., Carnevali, G., Whitten, W.M., Singer, R.B., Koehler, S., Williams, N.H., Ojeda, I., Neubig, K.M. & Endara, L. (2007) Generic realignments in Maxillariinae (Orchidaceae). *Lankesteriana* 7: 515–537. Available from: [http://www.lankesteriana.org/lankesteriana/Lankesteriana vol. 7. 2007/Lankesteriana 7\(3\)/Numeroporsecciones/09 Blanco et al.pdf](http://www.lankesteriana.org/lankesteriana/Lankesteriana vol. 7. 2007/Lankesteriana 7(3)/Numeroporsecciones/09 Blanco et al.pdf) (accessed 25 May 2015)
- Blanco, M.A., Carnevali, G., Whitten, W.M., Singer, R.B., Koehler, S., Williams, N.H., Ojeda, I., Neubig, K.M. & Endara, L. (2008) Generic realignments in Maxillariinae (Orchidaceae): corrigenda et addenda. *Lankesteriana* 8: 15. Available from: [http://www.lankesteriana.org/lankesteriana/Lankesteriana 8\(1\)/Numero por secciones/04 Blanco et al.pdf](http://www.lankesteriana.org/lankesteriana/Lankesteriana 8(1)/Numero por secciones/04 Blanco et al.pdf) (accessed 25 May 2015)
- Kirby, S.H. (2011) Active mountain building and the distribution of “core” Maxillariinae species in tropical Mexico and Central America. *Lankesteriana* 11: 275–291. Available from: [http://www.lankesteriana.org/lankesteriana/LANKESTERIANA 11\(3\) /14\\_Lankesteriana 11\(3\) Kirby.pdf](http://www.lankesteriana.org/lankesteriana/LANKESTERIANA 11(3) /14_Lankesteriana 11(3) Kirby.pdf) (accessed 25 May 2015)
- Lindley, J. (1824) *Camaridium ochroleucum*, Pale Yellow Camaridium. *Botanical Register* 10: t. 844. Available from: <http://www.botanicus.org/page/132212> (accessed 16 June 2015)
- Mansfeld, R. (1931) Blütenanalysen neuer Orchideen von R. Schlechter (†). II. Mittelamerikanische Orchideen. *Repertorium Specierum Novarum Regni Vegetabilis, Beihefte* 59: 1–8, +81 plates. Available from: <http://pds.lib.harvard.edu/pds/view/5390144?n=4531&printThumbnails=no> (accessed 25 May 2015)
- Reichenbach, H.G. (1870) New garden plants. *Gardeners' Chronicle and Agricultural Gazette* 1870: 39. Available from: <http://www.biodiversitylibrary.org/item/84373#page/57/mode/1up> (accessed 25 May 2015)
- Reichenbach, H.G. (1877) Orchideae Roezlianae novae. *Linnaea* 41: 1–16. Available from: <http://www.botanicus.org/page/123639> (accessed 25 May 2015)
- Ruiz, H. & Pavón, J. (1794) *Florae Peruviana, et Chilensis, Prodromus, sive novorum generum plantarum peruvianarum, et chilensium descriptiones, et icones*. Imprenta de Sancha, Madrid, 154 pp. + 37 plates. Available from: <http://bibdigital.rjb.csic.es/spa/Libro.php?Libro=106> (accessed 16 June 2015)
- Schlechter, R. (1918) Kritische Aufzählung der bisher aus Zentral-Amerika bekanntgewordenen Orchidaceen. *Beihefte zum Botanische Centralblatt. Zweite Abteilung, Systematik, Pflanzengeographie, angewandte Botanik* 36: 321–520. Available from: <http://bibdigital.rjb.csic.es/ing/Libro.php?Libro=3530> (accessed 25 May 2015)
- Schlechter, R. (1923) Beiträge zur Orchideenkunde von Zentralamerika. II. Additamenta ad Orchideologiam Costaricensem. *Repertorium Specierum Novarum Regni Vegetabilis, Beihefte* 19: 1–307. Available from: <http://pds.lib.harvard.edu/pds/view/5390144?n=2259&printThumbnails=no> (accessed 25 May 2015)
- Schweinfurth, C. (1938) New orchids from Central America. *Botanical Museum Leaflets* 5 (6): 89–99. Available from: <http://www.biodiversitylibrary.org/item/32872#page/109/mode/1up> (accessed 25 May 2015)
- Schweinfurth, C. (1940) A nomenclatorial transfer. *Botanical Museum Leaflets* 8 (9): 188. Available from: <http://www.biodiversitylibrary.org/item/32874#page/214/mode/1up> (accessed 25 May 2015)
- Valencia, J. (2014) *Las orquídeas de San José de Suaita (Santander, Colombia)*. Instituto de Ciencias Naturales, Facultad de Ciencias, Universidad Nacional de Colombia, Bogotá, Colombia, 307 pp.
- Whitten, M.W., Blanco, M.A., Williams, N.H., Koehler, S., Carnevali, G., Singer, R.B., Endara, L. & Neubig, K.M. (2007) Molecular phylogenetics of *Maxillaria* and related genera (Orchidaceae: Cymbidieae) based on combined molecular data sets. *American Journal of Botany* 94: 1860–1889. Available from: <http://www.amjbot.org/content/94/11/1860.long> (accessed 25 May 2015)
- Whitten, M.W., Blanco, M.A., Oakeley, H., Pridgeon, A.M., Veitch, N.C., Grayer, R.J., Singer, R.B., Koehler, S., Carnevali, G., Ramírez, I.M. & Ojeda, I. (2009) Subtribe Maxillariinae. In: Pridgeon, A.M., Cribb, P.J., Chase, M.W. & Rasmussen, F.N. (Eds.) *Genera Orchidacearum Volume 5: Epidendroideae (Part Two)*. Oxford University Press, Oxford, pp. 119–211.
- Williams, L.O. (1941) Orchidaceae. In: Woodson, Jr., R.E. & Schery, R.W. (Eds.) Contributions toward a Flora of Panama. V. Collections chiefly by Paul H. Allen, and Robert E. Woodson, Jr. and Robert W. Schery. *Annals of the Missouri Botanical Garden* 28: 415–425. Available from: <http://www.botanicus.org/item/31753003506331> (accessed 25 May 2015)