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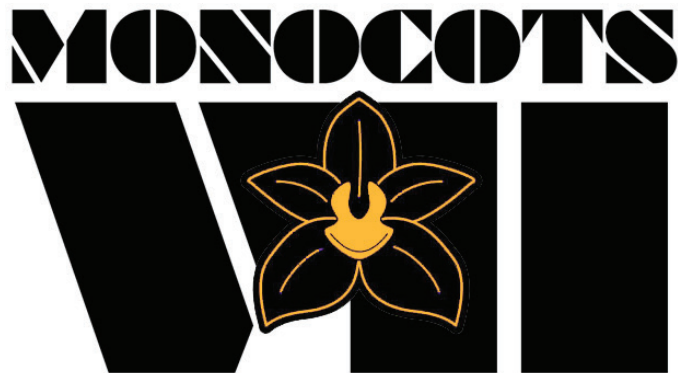
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LANKESTERIANA

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April 2022

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A NEW SPECIES OF *LEPANTHES* (PLEUROTHALLIDINAE) LACKING AN APPENDIX WITH RABBIT EAR-LIKE PETALS ENDEMIC TO COLOMBIA

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ABSTRACT. A new species of *Lepanthes* from the department of Antioquia apparently restricted to the north-central Andes of Colombia is described and illustrated. The new species is similar to *L. alcicornis*; however, it can be easily distinguished by the transversally lobulate petals that resemble the ears of a rabbit, the reniform lip with sub-oblong basal lobes surrounding the column, and the absence of an appendix on the lip.

RESUMEN. Se describe e ilustra una nueva especie de *Lepanthes* del departamento de Antioquia aparentemente restringida al centro-norte de los Andes centrales de Colombia. La nueva especie es similar a *L. alcicornis*, sin embargo, puede diferenciarse fácilmente por los pétalos transversalmente lobulados que recuerdan las orejas de un conejo, el labelo reniforme con lóbulos basales sub-oblongos que rodean la columna y la ausencia de apéndice en el labelo.

KEYWORDS/PALABRAS CLAVE: Endemism, endemismo, *Lepanthes alcicornis*, nueva especie de orquídea, orchid new species, San José de la Montaña

Introduction. With around 1160 species (Gutiérrez *et al.* 2021, Karremans & Vieira-Uribe 2020, Moreno *et al.* 2020a, 2020b, 2021, Moreno & Vieira-Uribe 2020), *Lepanthes* Sw. is one of the most species-rich genera in Pleurothallidinae (Karremans 2016, Luer 1996, Luer & Thorerle 2012). Its distribution is strictly neotropical, from the trans-Mexican volcanic belt to the south to Bolivia and northern Brazil, including the Antilles (Jiménez-López *et al.* 2017). More than 300 species of *Lepanthes* have been recorded in Colombia, most of

them distributed along the biogeographical regions of the Andes, up to 3800 m in elevation. Many species are endemic, but some are relatively frequent and widely distributed (Luer & Thorerle 2012, Pridgeon 2005). New species in the genus and records for the country are regularly published, so as more field exploration continues, the number of *Lepanthes* species attributed to Colombia is expected to increase (Gutiérrez *et al.* 2021, Moreno *et al.* 2017, 2018, 2020a, 2020b, 2021, Moreno & Vieira-Uribe 2020, Vieira-Uribe & Moreno 2019).

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Lepanthes species are recognized by the infundibuliform sheaths that are frequently pubescent, ciliated, with a slight to wide, apical dilatation; petals that are usually transversely bilobed to trilobed, and a compound lip having two thickened blades usually covering the column, with a minute basal appendix. Most species of *Lepanthes* show a structure at the base of the lip called the appendix (Luer 1996). Small fungus gnats likely pollinate the species that bear an appendix via pseudo-copulation (Blanco & Barboza 2005, Vieira-Uribe & Moreno 2019). However, some species in the genus, which is the case of *Lepanthes calodictyon* Hook. and others apparently related: *L. arachnion*, *L. barbellifera*, *L. kayii* Baquero, *L. microcalodictyon* J.S.Moreno & L.Baquero, *L. pantomima* Luer & Dressler, *L. pretiosa* Luer & Hirtz, *L. saltatrix* Luer & Hirtz, *L. tentaculata* Luer & Hirtz, *L. tortuosa* Luer & Hirtz, and *L. volador* Luer & Hirtz, lack a visible appendix (Baquero 2018, Bogarín *et al.* 2019, Moreno *et al.* 2020b). Another group of species, apparently endemic to the department of Antioquia, Colombia, include *Lepanthes alcicornis* Luer & R.Escobar, *L. culex* Luer & R.Escobar, *L. georgii* Luer & R.Escobar, and *L. insolita* Luer & R.Escobar. These species are characterized by the flowers with simple, cordate lips without an appendix (Luer & Thoele 2012). In addition, a new species lacking an appendix recently discovered near San José de la Montaña (also Antioquia department), most similar to *Lepanthes alcicornis* is described and illustrated here.

Materials and methods. The type specimen was collected in Colombia while conducting research on the orchids of Antioquia, under permit Resolución No. 01711. Vouchers were preserved as dried or spirit specimens for future reference at JAUM. Living and preserved specimens were examined for morphological and taxonomic comparisons. The monograph of *Lepanthes* from Colombia (Luer & Thoele 2012) and other original descriptions from related species were reviewed and compared, specimens from the following herbaria: AMES, COL (online), CUVV, HUA, JAUM, JBB, and MO (online) were consulted, and no additional material of the new species was found. The description and drawings were prepared from living specimens dissected under a Barska AY11234 trinocular zoom stereo microscope. Digital images were taken

with a Canon 7d Mark II with a Canon 100 mm f/2.8L macro lens. Sketches from living and preserved specimens were digitized, and the images were used for diagramming a draft composite plate in Adobe Photoshop® 2020. A digital composite line drawing was made in the Procreate illustration application with an iPad 8th generation tablet.

TAXONOMIC TREATMENT

Lepanthes sylvilagus E.Restrepo & S.Vieira-Uribe, *sp. nov.* (Fig. 1–2).

TYPE: Colombia. Antioquia: Municipio de San José de la Montaña, vereda La Mariela, bosque secundario a borde de quebrada cerca de la vía a El Congo, 2810 m, diciembre de 2019, *S. Vieira-Uribe 53* (holotype: JAUM-Spirit!).

DIAGNOSIS: *Lepanthes sylvilagus* is most similar to *L. alcicornis* in the plant habit and general flower morphology, but easily distinguished by the transversely bilobed petals, with the upper lobe oblong to narrowly triangular and twice the length of the ovate, narrowly triangular lower lobe (*vs.* transversely bilobed petals with both lobes similar in length the lower lobe variably bifurcate, with narrowly linear-triangular lobes).

Plant epiphytic, medium in size, caespitose, suberect to horizontal, to 10 cm tall. *Roots* slender, flexuous, filiform, up to 0.2 mm in diameter. *Ramicauls* enclosed by 5–9 lepanthiform sheaths minutely ciliate along the ribs, with a ciliate, acuminate, and dilated ostia, 4–7 cm long. *Leaves* suffused with purple abaxially, coriaceous, lanceolate, 4.0 × 1.8 cm, the apex attenuate, emarginate; the cuneate base narrowing into a petiole 2–3 mm long. *Inflorescence* a congested, distichous, successively flowered raceme, up to 8 mm long, born at the abaxial side of the leaf by a filiform peduncle 3–6 mm long; floral bracts ovate, ciliate, acuminate, 2.2 mm long; pedicels 1.8 mm long. *Ovary* sub-clavate, terete, finely verrucose, three-keeled, 3 mm long. *Flowers* with sepals greenish-cream, petals orange suffused with red in the upper lobes and yellow at the lower lobe, lip yellow, marginally suffused with orange, suffused with red towards the base, column magenta. *Sepals* elliptical, acute, carinate abaxially, irregularly

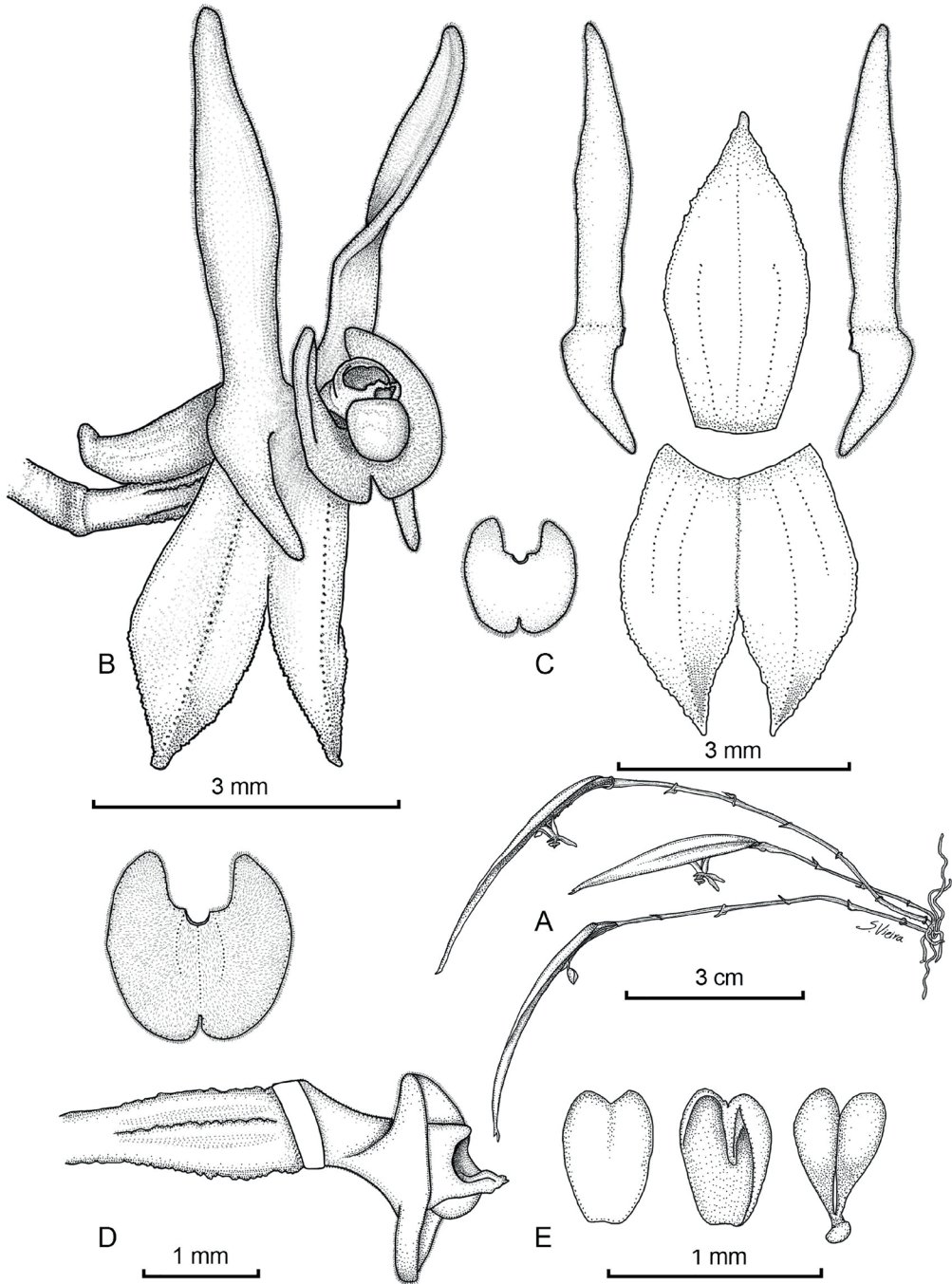


FIGURE 1. Drawing of *Lepanthes sylvilagus* E.Restrepo & S.Vieira-Uribe. **A.** Habit. **B.** Flower. **C.** Dissected perianth. **D.** Expanded lip; Ovary, column and lip, side view (pollinia and anther cap absent). **E.** Anther cap and pollinia. Drawn by S. Vieira-Uribe from the plant that served as the holotype.

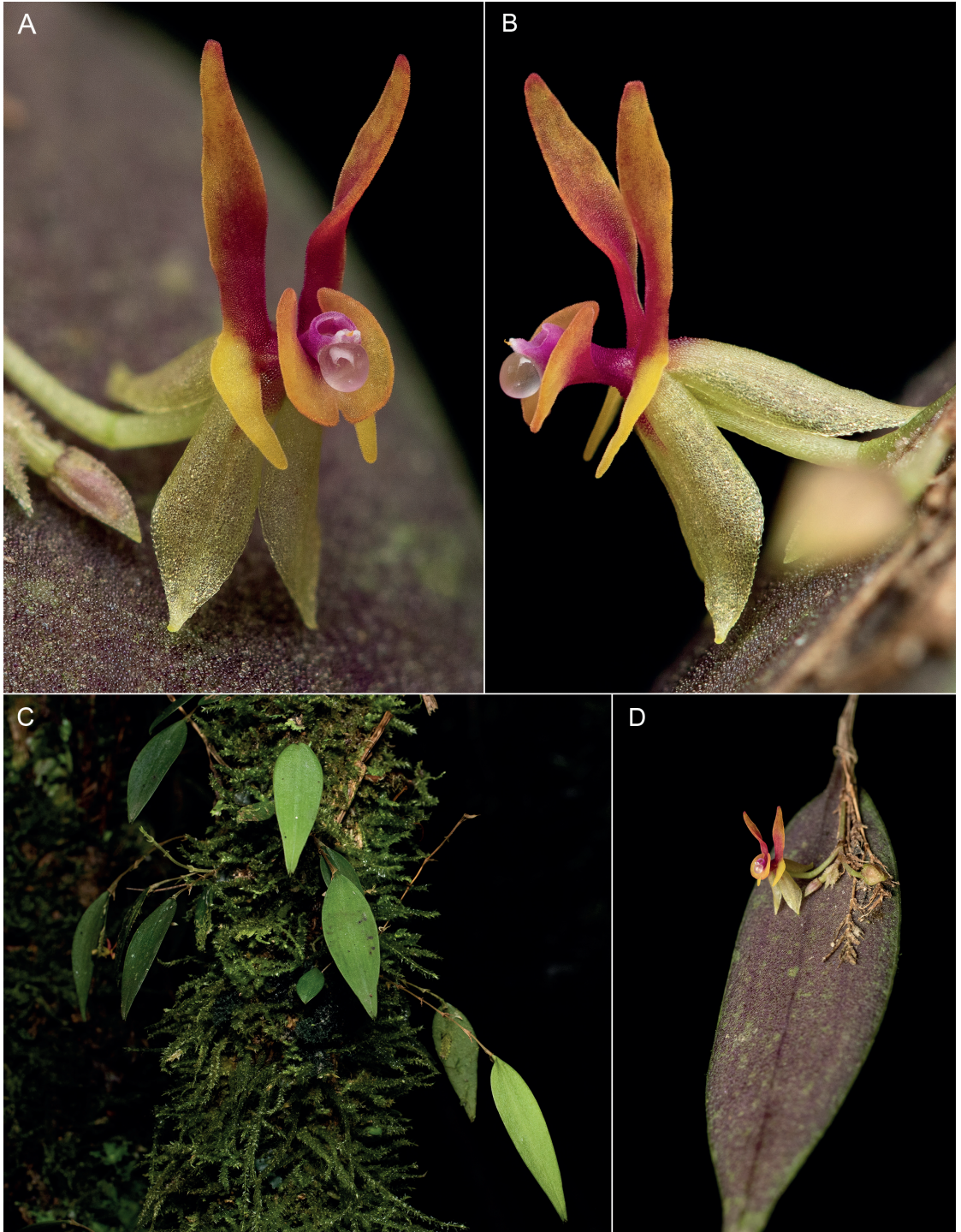


FIGURE 2. Photographs of *Lepanthes sylvilagus* E.Restrepo & S.Vieira-Uribe. **A.** Flower. **B.** Flower, side view. **C.** Plants *in-situ*. **D.** View of the leaf and flower. Photographs by S. Vieira-Uribe from the plant that served as the holotype.

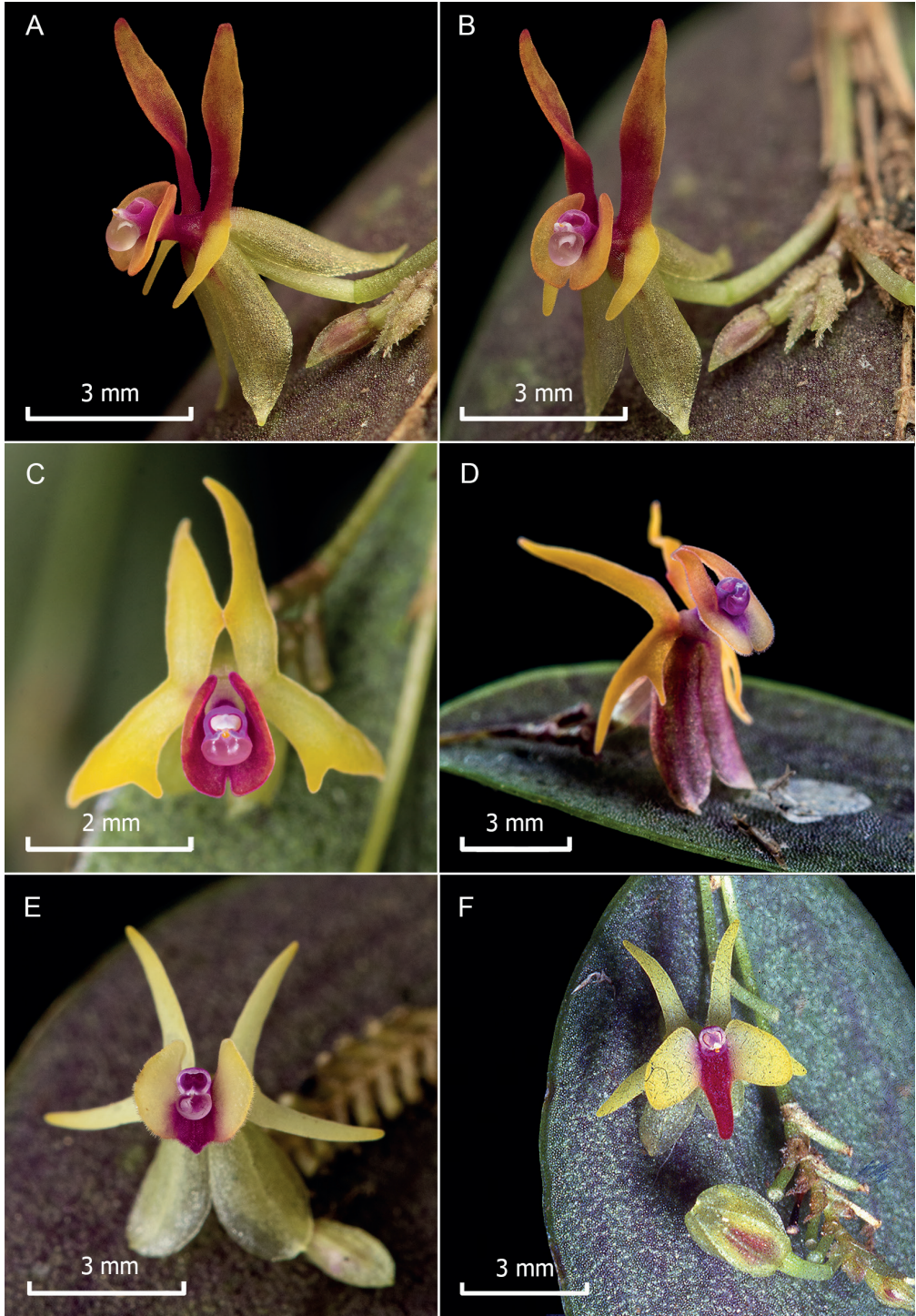


FIGURE 3. Species comparison. A–B. *Lepanthes sylvilagus*. C. *Lepanthes alcicornis* Luer & R.Escobar. D. *Lepanthes culex* Luer & R.Escobar. E. *Lepanthes georgii* Luer & R.Escobar. F. *Lepanthes insolita* Luer & R.Escobar. Photographs by S. Vieira-Uribe (A–E) and Sociedad Colombiana de Orquideología (F). Figure preparation by E. Restrepo.

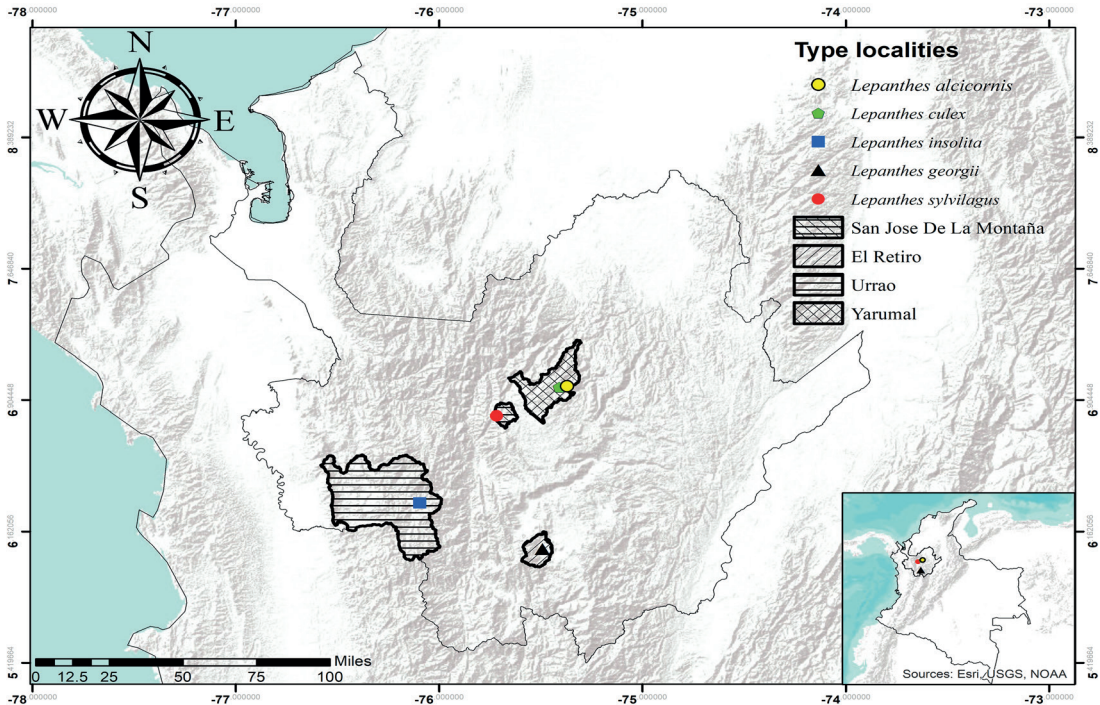


FIGURE 4. Map showing the type localities and municipalities for *Lepanthes sylvilagus* E. Restrepo & S. Vieira-Uribe and morphologically similar species: *L. alcicornis* Luer & R. Escobar, *L. culex* Luer & R. Escobar, *L. georgii* Luer & R. Escobar and *L. insolita* Luer & R. Escobar. Map preparation by E. Restrepo.

serrated, revolute, reflexed. *Dorsal sepal* 3-veined, 4.3 × 2.0 mm. *Lateral sepals* 2-veined, connate 1 mm at the base, 3.6 × 1.4 mm. *Petals* transversely bilobed, microscopically pubescent, 0.9 × 5.7 mm, the upper lobe oblong to narrowly triangular, oblique, longitudinally twisting outward above the middle, sub-acute, 3.9 mm long, the lower lobe falcate, narrowly triangular, oblique, about 1/2 the length of the upper lobe, 1.8 mm long. *Lip* reniform, microscopically pubescent, the rounded apex emarginate, the sub-oblong basal blades erect and surrounding the column, the base adnate to the base of the column, 1.5 × 1.5 mm expanded. *Column* slender, terete, microscopically pubescent, 2 mm long, *stigma* apical, *anther* apical; *anther cap* oblong, cucullate, ca. 0.6 mm long; *pollinia* two, yellow, pyriform, 0.7 mm long.

ETYMOLOGY: In allusion to the shape of the petals that resemble the ears of cottontail rabbits, *Sylvilagus* spp.

DISTRIBUTION AND ECOLOGY: *Lepanthes sylvilagus* was found in the central Cordillera of the Colombian An-

des in the department of Antioquia in two nearby localities at about 2700–2800 m (Fig. 4). In both places, several plants were growing as epiphytes up to 3 m above the ground, on branches and trunks heavily covered by moss, and inside a well-preserved cloud forest, along the edge of a river.

Discussion. *Lepanthes sylvilagus* is most similar to *L. alcicornis* (Fig. 3C). Both species are vegetatively small and share a congested raceme, recurved sepals, and an expanded disc-shaped labellum. The new species is distinguished from *L. alcicornis* by its flowers bearing a reniform labellum (vs. elliptical-cordate); narrowly triangular lower lobe (vs. variably bifurcate lower lobe), with the upper lobe twice longer than the lower lobe (vs. similar in length). Other similar species with small flowers, reflexed sepals, and entire labellum without an apparent appendix are *L. culex* (Fig. 3D), *L. georgii* (Fig. 3E), and *L. insolita* (Fig. 3F), all from Antioquia, Colombia. *Lepanthes sylvilagus* is easily differentiated from *L. culex* by its flowers born on the abaxial surface of the leaf (vs. adaxial in

TABLE 1. Morphological differences among *Lepanthes sylvilagus* and four of the most morphologically similar species in the genus.

Character	<i>L. alcornis</i>	<i>L. culex</i>	<i>L. georgii</i>	<i>L. insolita</i>	<i>L. sylvilagus</i>
Leaves	Sub-erect, ovate-elliptic.	Erect, lanceolate-ovate.	Erect, ovate, acute.	Erect, ovate, acute.	Sub-erect, lanceolate
Inflorescence	Slender, very congested distichous raceme up to 6 mm raceme borne behind the leaf.	Slender, very congested, distichous many-flowered raceme up to 4 mm long borne in both sides of the leaf.	Slender, distichous, many-flowered raceme up to 9 mm long borne behind the leaf.	Slender, distichous many-flowered raceme up to 6 mm long borne behind the leaf.	Slender, distichous, many-flowered raceme up to 8 mm borne behind the leaf.
Sepals	Ovate triangular, dorsal obovate-obtuse, laterals elliptical, subacute.	Ovate, acute.	Elliptical, obtuse.	Dorsal elliptical, laterals obovate-oblong.	Obovate, acute, carinate abaxially, irregularly serrated, revolute, reflexed.
Petals	0.50 x 1–2.66 mm, 4-lobed wide at the middle, the two halves bifurcate, the lobes narrowly linear-triangular.	0.5 x 7.5 mm, transversely bilobed, the lobes subequal, spreading, narrowly linear, acute, gently curved, the lower lobe with a minute lobule on the inner margin.	0.5 x 8.0 mm deeply bilobed, the lobes similar, oblique, diverging, linear, acute, with a minute lobule between the lobes.	7.0 x 1.0 mm bilobed, 1 mm long, 7 mm wide, the lobes equal, oblique, narrowly triangular, narrowly obtuse.	0.9 x 5.7 mm, bilobed, upper lobe oblong to narrowly triangular, sub-acute and twisted, the lower lobe ovate, narrowly triangular, about half the length of the upper lobe.
Lip	Elliptical-cordate, with narrowly obtuse, oblique, basal lobes erect, embracing the column, the obtuse apex shallowly cleft, the base adnate to the middle of the column.	Cordate or V-shaped, the rounded apex shortly incised, the margins thickened, the rounded basal lobes erect and surrounding the column, the base adnate to the middle of the column.	Broadly oblong with apex apiculate, with erect, obtuse, basal angles, the base adnate to the base of the column.	3-lobed, the lateral lobes expanded, broadly oblong with the apex rounded, the middle lobe descending, narrowly triangular, acute, the base adnate to the base of the column.	Reniform, the rounded apex emarginate, the sub-oblong basal lobes erect and surrounding the column, the base adnate to the base of the column.

L. culex) and its petals with the upper lobe much longer than the lower ones (*vs.* similar in size). It differs from *L. georgii* basically in ramicaul length (up to 10 cm tall *vs.* up to 6 cm tall), petal lobes (unequal length *vs.* same length), and lip shape (2-lobed, reniform *vs.* 3-lobed, transversely oblong, with a broadly transverse, apiculate apex). Finally, the new species differs from *L. insolita* by its upper lobes of the petals oblong to narrowly triangular and twice longer than the lower lobes (*vs.* hornlike upper lobes and similarly narrowly triangular lower lobes) and the reniform 2-lobed lip (*vs.* 3-lobed lip with widely oblong lateral lobes and acute, narrowly triangular mid lobe). The differences among *L. alcornis*, *L. culex*, *L. georgii*, *L. insolita*, and *L. sylvilagus* are shown in Table 1.

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LITERATURE CITED

- Baquero, L. (2018). A new species of *Lepanthes* (Orchidaceae: Pleurothallidinae) from northwestern Ecuador. *Phytotaxa* 343(1), 75–81. doi: <https://doi.org/10.11646/phytotaxa.343.1.7>.
- Blanco, M. A. & Barboza, G. (2005). Pseudocopulatory pollination in *Lepanthes* (Orchidaceae: Pleurothallidinae) by fungus gnats. *Annals of Botany*, 95, 763–772. doi: <https://doi.org/10.1093/aob/mci090>
- Bogarín, D., Pérez-Escobar, O. A., Karremans, A. P., Fernández, M., Kruizinga, J., Pupulin, F., Smets, E. & Gravendeel, B. (2019). Phylogenetic comparative meth-

- ods improve the selection of characters for generic delimitations in a hyperdiverse Neotropical orchid clade. *Scientific reports*, 9(1), 117. <https://doi.org/10.1038/s41598-019-51360-0>
- Gutiérrez, N., Vieira-Uribe, S. & Moreno, J. S. (2021). *Lepanthes marielana* (Orchidaceae, Pleurothallidinae), a new species from the eastern Andes in Colombia. *Phytotaxa*, 484, 113–120. doi: <https://doi.org/10.11646/phytotaxa.484.1.5>
- Jiménez-López, D. A., Solano, R., Martínez-Camilo, R. & Martínez-Meléndez, N. (2017). Un nuevo registro para *Lepanthes* (Orchidaceae) de México y clarificación del estatus taxonómico de *Lepanthes quetzalensis*. *Revista mexicana de biodiversidad*, 88(4), 784–791. doi: <https://doi.org/10.1016/j.rmb.2017.10.026>
- Karremans, A.P. (2016). *Genera Pleurothallidarum*: an updated phylogenetic overview of Pleurothallidinae. *Lankesteriana*, 16(2), 219–241. doi: <http://dx.doi.org/10.15517/lank.v16i2.26008>
- Karremans, A. P. & Vieira-Uribe, Sebastián. (2020). *Pleurothallids Neotropical Jewels* (Vol. 1). Ecuador: Imprenta Mariscal.
- Luer, C. A. (1996). *Icones Pleurothallidarum XIV*. Systematics of *Draconanthes*, *Lepanthes* subgenus *Marsipanthes*, and subgenus *Lepanthes* of Ecuador. *Monographs in Systematic Botany from the Missouri Botanical Garden*, 61, 1–255.
- Luer, C.A. & Thoerle, L. (2012). *Icones Pleurothallidarum XXXII. Lepanthes* of Colombia (Orchidaceae). *Monographs in Systematic Botany from the Missouri Botanical Garden*, 123, 1–296.
- Moreno, J. S. & Vieira-Uribe, S. (2020). Una nueva especie minúscula de *Lepanthes* (Orchidaceae, Pleurothallidinae) de los Andes Orientales de Colombia. *Orquideología*, 37, 17–26.
- Moreno, J. S., Baquero, L.E. & Vieira-Uribe, S. (2020b) Two new species of *Lepanthes* (Orchidaceae: Pleurothallidinae) from the Anchicayá river valley in Colombia. *Harvard Papers in Botany*, 25(1), 99–110.
- Moreno, J. S., Galindo-Tarazona, R., Alegría-Valencia, M., Mora-A, D. L. & Tróchez, A. Z. (2021). Three New Species of *Lepanthes* (Orchidaceae: Pleurothallidinae) from San José Del Salado, Valle Del Cauca, in Southwestern Colombia. *Harvard Papers in Botany*, 26(1), 177–188.
- Moreno, J. S., Gutiérrez, N. & Vieira-Uribe, S. (2018). *Lepanthes agatarum* (Orchidaceae: Pleurothallidinae), a new species honoring an ancient tribe from the eastern Andes in Colombia. *Phytotaxa*, 376(2), 89–96.
- Moreno, J. S., Pisso, G. & Vieira-Uribe, S. (2020a). Discoveries in indigenous territories: Two new species of *Lepanthes* (Orchidaceae: Pleurothallidinae) in southwestern Colombia. *Lankesteriana*, 229–239. doi: <https://doi.org/10.15517/lank.v20i2.43358>.
- Moreno, J. S., Vieira-Uribe, S., & Karremans, A. P. (2017). A new species of *Lepanthes* (Orchidaceae: Pleurothallidinae) from Colombia with a large and protruding column. *Lankesteriana*, 17(2), 227–234.
- Pridgeon, A. (2005). *Lepanthes* Sw. In: A. M. Pridgeon, P. J. Cribb, M. C. Chase & F. N. Rasmussen (eds.), *Genera Orchidacearum* vol. 4. (pp. 362–365) Oxford: Oxford University Press.
- Vieira-Uribe, S. & Moreno, J. S. (2019). Three new *Lepanthes* (Orchidaceae: Pleurothallidinae) from the Alto de Ventanas ecoregion in Antioquia, Colombia. *Lankesteriana*, 19(2), 63–75.

***THRIXSPERMUM PATKAIENSIS SP. NOV.* (VANDEAE: AERIDINAE) FROM ASSAM, NORTHEAST INDIA**

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ABSTRACT. A new species of orchid, *Thrixspermum patkaiensis* from the tropical evergreen forest in Dehing Patkai National Park, Assam, India, is described. It is morphologically similar to *T. musciflorum*, *T. formosanum*, and *T. pygmaeum* but distinct from these species by the inflorescence 12–18 cm long; the lip with purplish bands and glandular-hairy on both sides of the lateral lobes and the epichile forming a rim of glandular hairs.

KEYWORDS/PALABRAS CLAVE: Dehing Patkai, Flora de India, Flora of India, plant taxonomy, taxonomía de plantas, *Thrixspermum formosanum*, *Thrixspermum musciflorum*, *Thrixspermum pygmaeum*, *Thrixspermum* sección *Dendrocolla*, *Thrixspermum* section *Dendrocolla*.

Introduction. *Thrixspermum* Lour. comprises epiphytic, or rarely terrestrial plants characterized by a callus in front of the sac of the lip, the short column with a broad foot, and the four pollinia united in unequal pairs on a short broad stipe (Seidenfaden 1988). The genus includes around 160 species (Chase *et al.* 2015) distributed widely from the Himalayas to the Philippines, Malesia, Northern Australia, and the Pacific islands (Govaerts *et al.* 2016). It is represented by 16 species in India of which nine species are recorded from Northeast India (Misra 2019). Seven species have been recorded from Assam: *Thrixspermum acuminatissimum* (Blume) Rchb.f., *T. centipeda* Lour., *T. formosanum* (Hayata) Schltr., *T. merguense* (Hook.f.) Kuntze, *T. musciflorum* A.S.Rao & Joseph, *T. pygmaeum* (King & Pantl.) Holttum, and *T. trichoglottis* (Hook.f.) Kuntze (Gogoi 2018a).

Thrixspermum has been little studied by botanists (O’Byrne & Vermeulen 2008). During a field trip under the “Biodiversity Documentation Programme, Jeyepore Reserve Forest” to Dehing Patkai National Park, Dibrugarh district of Assam on 5 December 2010, the author collected an unidentified epiphytic orchid with an immature inflorescence. The orchid was brought under cultivation at the Regional Orchids Germplasm Conservation and Propagation Centre (Assam Circle),

where it has flowered every year since. However, this species was erroneously recorded by Gogoi (2012a, 2012b, 2018a, 2018b, 2019a, 2019b), Gogoi & Yonzon (2015), and Gogoi *et al.* (2012a, 2012b, 2012c, 2015) as *T. pygmaeum* without studying the type specimen and protologue (King & Pantling 1898). A critical study based on the available literature (Chen *et al.* 2009, Chowdhery 1998, Gogoi 2018a, 2019a, 2019b, Gogoi *et al.* 2015, Hegde 2017, King & Pantling 1898, Kumar *et al.* 2017, Lucksom 2007, Maina *et al.* 1998, Mao *et al.* 2011, Pearce & Cribb 2002, Pradhan 1979, Rao 2010, Seidenfaden 1975, Singh *et al.* 2019) and the comparison with the herbarium specimens of *Thrixspermum* collections deposited in the local herbaria proved that the present specimen is an undescribed species. Hence, it is here described and illustrated as a new species.

Materials and methods. All the photos were taken with a Canon 6D Mark-II fitted with an EF 100 mm f/2.8L Macro USM lens. The measurements and species description were made from living plants following the terminology for morphological descriptions by Beentje (2012). Specimens were deposited at the Herbarium of the TOSEHIM, the Orchid Society of Eastern Himalaya, Assam and OHT, Orchid Herbarium Tipi, Arunachal Pradesh.

TAXONOMIC TREATMENT

Thrixspermum patkaiensis K.Gogoi, *sp. nov.* (Fig. 1–3).

TYPE: India. Assam: Tinsukia district, Dehing Patkai National Park, 200 m, 5 December 2010, *K. Gogoi 00956* (holotype: TOSEHIM, Herbarium of the Orchid Society of Eastern Himalaya; isotype: OHT, Orchid Herbarium Tipi).

DIAGNOSIS: The present new species is morphologically similar to *Thrixspermum musciflorum* A.S.Rao & Joseph, *T. formosanum* (Hayata) Schltr., and *T. pygmaeum* (King & Pantl.) Holttum, but differs from these species by the 12–18 cm long inflorescence with 2.5–5.0 cm long rachis; yellow or pale-yellow flowers; lip yellow with white or pale yellow in-front, streaked with purplish stripes and glandular-hairy on both sides of the lateral lobes; epichile forming a glandular hairy rim and the disk with long hairs.

Plant epiphyte, erect, 5–10 cm tall, monopodial; *roots* slender, extra-axillary. *Stems* 2–6 cm long, with 4–12 leaves, branched towards the base, lower portion enclosed with remnant of scarious sheaths. *Leaf* 5–7 × 0.8–1.0 cm, linear or linear-lanceolate or narrowly oblong, acute, green, glabrous, channeled, fleshy, weakly bilobed at apex, curved downward, distichous. *Inflorescence* 1–4, terete, glabrous, suberect, stout, arising from the axils of lower stems, 12–18 cm long, *ca.* 1 mm diam., peduncle 9–12 cm long, terete, glabrous with 2–3, 0.1–0.2 cm long sterile bracts; rachis 2.5–5.0 cm long, glabrous, with 1–2 pedicellate flowers; floral bracts triangular or leaf-like, 0.3–1.0 × 0.12–0.40 cm, ovate, acute, glabrous. *Flowers* 1.3–1.5 cm across, fragrant, yellow, spreading. *Sepals* sub-equal, spreading, yellow or pale yellow. *Dorsal sepal* 0.6–0.8 × 0.3–0.4 cm, oblong or elliptic, acute or sub-acute, concave, glabrous. *Lateral sepals* 0.6–0.7 × 0.4–0.5 cm, obliquely obovate or ovate-elliptic, acute or obtuse, glabrous. *Petals* 0.6–0.7 × 0.10–0.15 cm, obovate-oblong, obtuse, spreading, curved backward, glabrous. *Lip* 0.7–0.8 cm long, adnate to the base of column foot, 3-lobed, yellow with white or pale yellow in-front, streaked with purplish stripes both side; hypochile projected

into a scrotiform spur, spur shallowly bilobed, lobules of spur obtuse; lateral lobes 0.2–0.3 cm, erect, subovate, obtuse, with glandular hairs both sides; epichile reduced, emarginate in front, narrow, inflexed, with glandular hairs on the rim; yellow with white or pale yellow in the middle; disk pale yellow, orange yellow at base, with a median longitudinal lamella covered with dense glandular hairs, starting from the base up to apical lobe, disc with long hairs and with a fleshy scale like appendage. *Column* 0.25 × 0.20 cm, white. *Anther* 0.15 cm long ovate, glabrous. *Pollinia* 4, 0.6 mm long, white, unequal. *Capsule* 5–8 × 0.3–0.4 cm, linear-cylindric, ribbed, glabrous.

FLOWERING: from May to October.

HABITAT: Epiphytic on tree trunks in tropical mixed evergreen forest at 200 m in Dehing Patkai National Park of Tinsukia district, Assam.

DISTRIBUTION: Only known from India (Dehing Patkai National Park, Tinsukia District of Assam) (Fig. 1A).

ETYMOLOGY: The specific epithet refers to the Dehing Patkai National Park, Assam in Northeast India where from the plant was collected.

Discussion. This species belongs to the *Thrixspermum* section *Dendrocolla* (Blume) J.J.Smith characterized by the plants with small, narrow floral bracts; inflorescence with few flowers (< 3 flowers), flowers crowning the tip, facing all ways and densely arrange in a very short rachis; sepals and petals similar; lip immovable, trilobed, midlobe usually fleshy. *Thrixspermum patkaiensis* is morphologically similar to *T. musciflorum*, *T. formosanum*, and *T. pygmaeum*, but distinct from these species in having inflorescences of 12–18 cm long and rachis of 2.5–5.0 cm long; yellow or pale-yellow flowers; lip yellow with white or pale yellow in front, streaked with purplish stripes and glandular hairy both side of the side lobes; epichile forming a glandular hairy rim and the disk with long hairs.

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FIGURE 1. *Thrixspermum patkaiensis*. A. Natural habit. B. Close-up of the flower. Photos by Khyanjeet Gogoi.

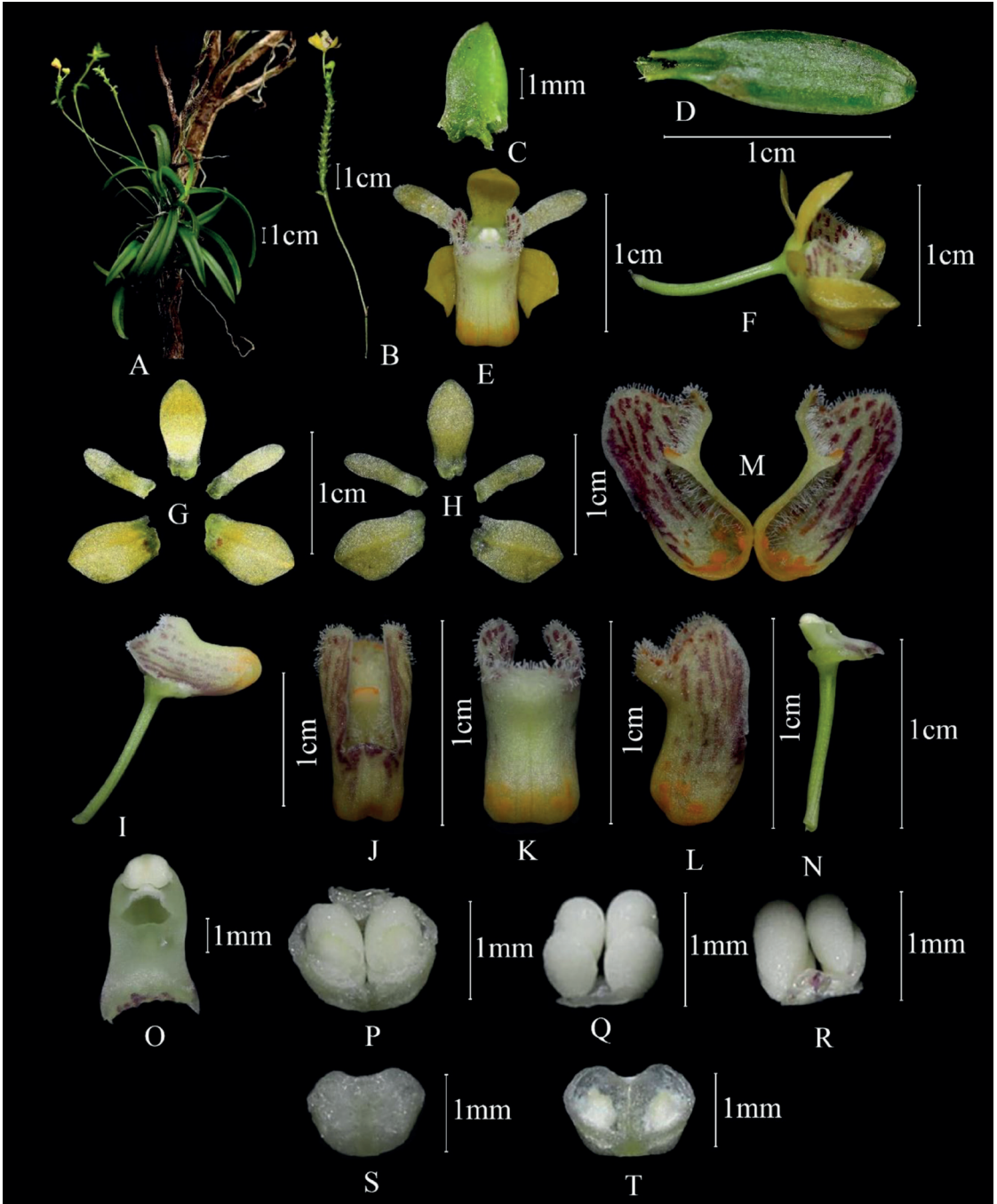


FIGURE 2. *Thrixspermum patkaiensis*. A. Habit. B. Inflorescence. C–D. Floral bracts. E. Flower, ventral view. F. Flower, lateral view. G. Dissection of the perianth, ventral view. H. Dissection of the perianth, dorsal view. I. Lip, column, and ovary, lateral view. J. Lip, ventral view. K. Lip, dorsal view. L. Lip, lateral view. M. Lip, longitudinal section. N. Ovary with pedicel and column. O. Column, ventral view. P. Anther cap with pollinia, ventral view. Q. Pollinarium, ventral view. R. Pollinarium, dorsal view. S. Anther cap, dorsal view. T. Anther cap, ventral view. Photos by Khyanjeet Gogoi.

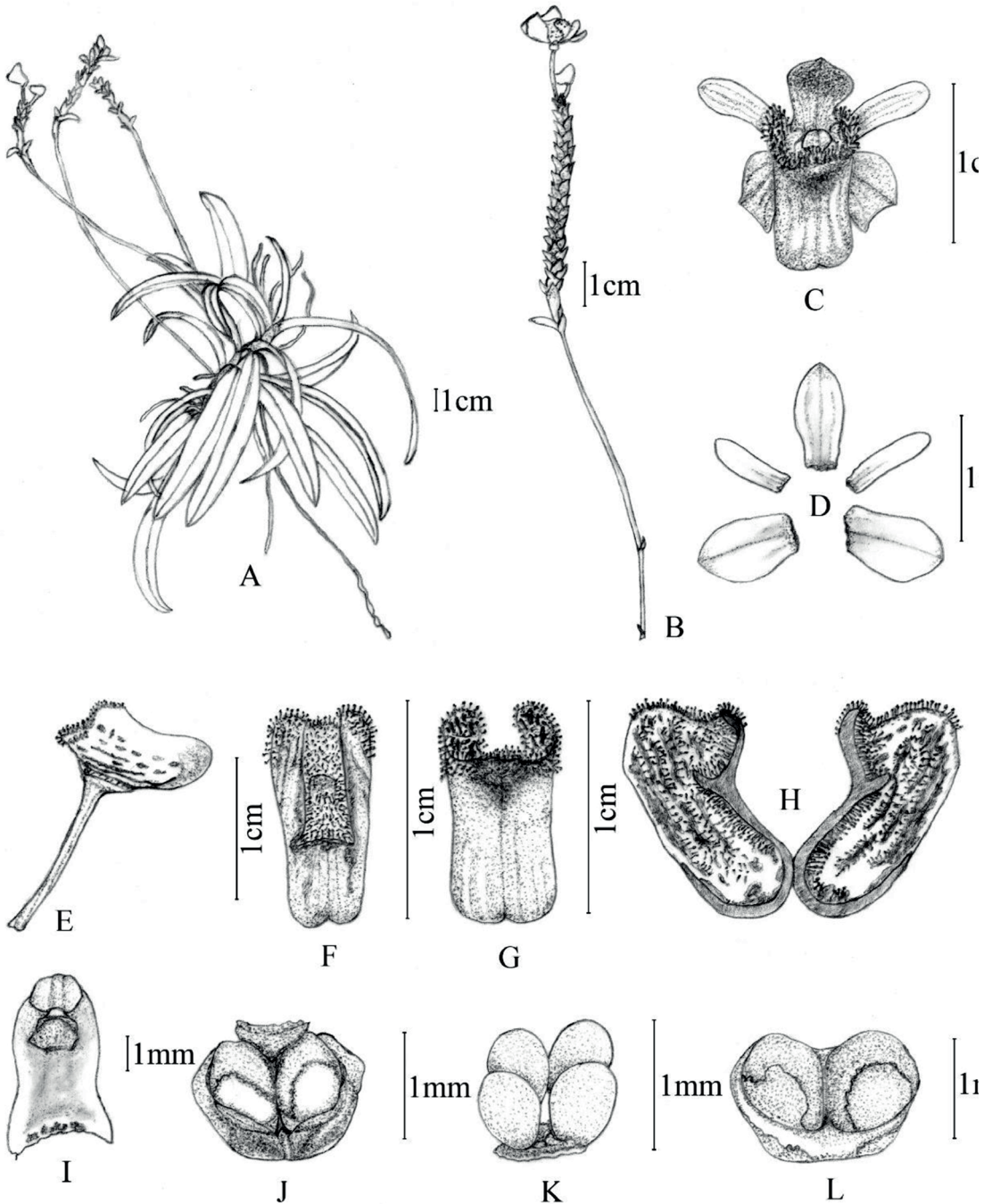


FIGURE 3. *Thrixspermum patkaiensis*. A. Habit. B. Inflorescence. C. Flower, ventral view. D. Perianth, ventral view. E. Lip with ovary and column, lateral view. F. Lip, ventral view. G. Lip, dorsal view. H. Lip, Longitudinal section. I. Column, ventral view. J. Anther cap with pollinia, ventral view. K. Pollinarium, ventral view. L. Anther cap, ventral view. Drawing by Khyanjeet Gogoi.

TABLE 1. Differences between *Thrixspermum formosanum*, *T. musciflorum*, *T. patkaiensis*, and *T. pygmaeum*.

	<i>T. formosanum</i>	<i>T. musciflorum</i>	<i>T. patkaiensis</i>	<i>T. pygmaeum</i>
Stem	1–2 cm long, with 4–5 leaves.	up to 1.5–2.0 cm long, with 4–6 leaves.	2–6 cm long, with 4–12 leaves.	0.8–1.0 cm long, with 2–5 leaves.
Leaves	4–6 × 0.4–0.9 cm, linear-lanceolate or narrowly oblong, abaxially often spotted with purple.	2–6 × 0.3–0.5 cm, narrowly oblong, V-shaped in section, trigonal, acute, keeled at apex.	5–7 × 0.8–1.0 cm, linear or linear-lanceolate or narrowly oblong, curved downward, distichous, weakly bilobed at apex.	2–7 × 0.5–1.0 cm, linear oblong, acuminate.
Inflorescence	4–6 cm long; rachis short, slender; peduncle 3–5 cm long, suberect, slender, straight, with 2 sterile bracts; rachis short, 0.3–0.5 cm long, green, thickened, with 1–2 pedicellate flower.	1.0–2.5 cm long, slender, cylindrical, slightly swollen towards the top with condensed bracts and flower, 1–2 flowers opening at a time; peduncles with two minute, adpressed scales.	12–18 cm long, 0.8 mm diam.; peduncle 9–12 cm long, terete, glabrous with 2–3, 0.1–0.2 cm long sterile bracts; rachis 2.5–5.0 cm long, broader, glabrous, with 1–2 pedicellate flower.	3–5 cm long; peduncle 1.5–1.9 cm long, with 3–4, 0.1–0.2 cm long sterile bracts, rachis 1.5–1.9 cm, nodding, green with densely dark purple spots, laxly 3–5 flowers.
Floral bracts	0.1 cm long, broadly ovate-triangular, acute.	0.2 cm long, triangular, ovate, acute.	1.0–0.3 × 0.12–0.4 cm long, ovate, acute, glabrous, triangular or leaf-like.	0.2–0.5 cm long, ovate to somewhat triangular, acute.
Flowers	1.1–1.4 cm across, fragrant, white with brownish stripes on lip on adaxial.	1.2–1.3 cm across, white, sepals and petals widespread, lip with pinkish streaked on the sides.	1.3–1.5 cm across, fragrant, yellow, spreading; sepals sub-equal, spreading, yellow or pale yellow; lip yellow with white or pale yellow in-front, streaked with purplish stripes both sides.	0.7–0.8 cm across widely opening; sepals and petals yellow, lip yellow with white margins, adaxially with a reddish brown stripe.
Dorsal sepal	0.5–0.7 × 0.2–0.3 cm, oblong or elliptic, obtuse.	0.35–0.60 × 0.25–0.30 cm, oblong-ovate, concave, acute.	0.6–0.8 × 0.3–0.4 cm, oblong or elliptic, acute or sub-acute, concave.	0.5–0.7 × 0.2–0.3 cm, subacute to obtuse, broadly ovate, concave.
Lateral sepals	0.5–0.7 × 0.3–0.4 cm, obliquely obovate or ovate-elliptic, acute or obtuse.	0.4–0.5 × 0.2–0.3 cm, broadly ovate, acute.	0.6–0.7 × 0.4–0.5 cm, obliquely obovate or ovate-elliptic, acute or obtuse.	0.5–0.7 × 0.3–0.4 cm, obtuse oblique.
Petals	0.5–0.7 × 0.15–0.25 cm, falcate-oblong, obtuse or obtusate.	0.4–0.5 × 0.12–0.20 cm, oblong-lanceolate, obtuse 1.5 × 4.5 mm, blunt.	0.6–0.7 × 0.10–0.15 cm, obovate-oblong, obtuse, spreading, curved backward.	0.5–0.6 × 0.2 cm, obtuse, oblanceolate.
Lip	0.4–0.5 cm long, 3-lobed, saccate at base; lateral lobes erect, subovate, obtuse; mid-lobe inconspicuous; disk with long hairs and with a fleshy scale like appendage; sac cylindrical, shallowly bilobed at apex.	0.7–0.8 cm long, 3 lobed with 3 grooved sacs at base, acute, pointed; lateral side-lobes rounded, auriculate, crenate edged; mid lobe semicircular, crenate hairy; disc with centrally placed, tongue like, hairy callus, a yellow spot-on tip of tongue.	0.7–0.8 cm long, 3-lobed; yellow with white or pale yellow in-front, lateral lobes erect, subovate, obtuse, with glandular hairs both sides streaked with purplish bands and glandular hairy on both sides; epichile with glandular hairs on the rim; disk with a median longitudinal lamella covered with dense glandular hairs and with a fleshy scale like appendage; epichile forming a glandular-hairy rim; with a median longitudinal glandular hairy lamella, disk with long hairs.	0.2–0.4 cm long, 3 lobed, subtriangular, base with shallow saccate spur; lateral lobes erect, curved forward, apex rounded, mid lobe fleshy, apex obtuse; callus with glandular orange hairs at base of spur.
Column	0.20 cm long.	0.10 cm long.	0.25 cm long.	0.25 – 0.30 cm long.
Capsule	4.5–7.3 cm.	2.5–4 cm long.	5–8 cm long.	4–5 cm long.
Flowering time	February–May.	October–November.	May–October.	April–May.

LITERATURE CITED

- Beentje, H. (2012). *The Kew Plant Glossary, an illustrated dictionary of plant terms* (revised edition). Kew: Royal Botanic Gardens, Kew Publishing.
- Chase, M. W., Cameron, K. M., Freudenstein, J. V., Pridgeon, A. M., Salazar, G., Van Den Berg, C. & Schuiteman, A. (2015). An updated classification of Orchidaceae. *Botanical Journal of the Linnean Society*, 177, 151–174.
- Chen, X. Q., Liu, Z. J., Zhu, G. H., Lang, K. Y., Ji, Z. H., Luo, Y. B., Jin, X. B., Cribb, P. J., Wood, J. J., Gale, S. W., Ormerod, P., Vermeulen, J. J., Wood, H. P., Clayton, D. & Bell, A. (2009). *Orchidaceae*. In Z. Y. Wu, P. H. Raven & D. Y. Hong (Eds.), *Flora of China*, volume 25 (pp. 1–506). St. Louis: Missouri Botanical Garden Press.
- Chowdhery, H. J. (1998). *Orchid Flora of Arunachal Pradesh*. Dehra Dun, India: Bishen Singh Mahendra Pal Singh.
- Gogoi, K. (2011). *Thrixspermum acuminatissimum* (Blume) Reichenbach f. (Orchidaceae) - a recollection for India. *Pleione*, 5 (2), 334–336.
- Gogoi, K. (2012a). A checklist of orchids in Tinsukia District of Assam, India. *Pleione*, 6 (1), 5–26.
- Gogoi, K. (2012b). *Wild Orchids of Tinsukia District of Assam, North East India*. Tinsukia, Assam, India: Heuj-Kunhi Publication.
- Gogoi, K. (2018a). *Thrixspermum merguense* (Hook.f.) Kuntze [Orchidaceae: Epidendroideae: Vandaeae: Aeridinae] - an addition to the Orchid flora of Mainland India. *Pleione*, 12(2), 333–336.
- Gogoi, K. (2018b). *Wild Orchids of Assam - A Pictorial Guide*. Guwahati, Assam: Assam State Biodiversity Board.
- Gogoi, K. (2019a). *Orchids of Assam - A Pictorial Guide*. Dibrugarh, Assam: Dibrugarh University.
- Gogoi, K. (2019b). *Thrixspermum changlangensis* sp. nov. [Orchidaceae: Epidendroideae: Vandaeae: Aeridinae] from Arunachal Pradesh in Northeast India. *Pleione*, 13(1), 167–170.
- Gogoi, K., Borah, R. L., Sharma, G. & June, C. (2012a). A Checklist of Orchids of Dibrugarh District of Assam, India. *Journal of Non-Timber Forest Products*, 19(2), 117–132.
- Gogoi, K., Borah, R. L., Das, R. & Yonzon, R. (2012b). Present Status of Orchid Species Diversity Resources of Joypur Reserve Forest of Dibrugarh District (Assam) of North East India. *International Journal of Modern Botany*, 2(3), 47–67.
- Gogoi, K., Das, R., & Yonzon, R. (2012c). Present ecological status, diversity resources, and distribution of the genus *Thrixspermum* Loureiro, a little known epiphytic orchid species in Assam of North East, India. *The McAllen International Orchid Society Journal*, 13(5), 7–14.
- Gogoi, K., Das, R. & Yonzon, R. (2015). Orchids of Assam, North East India – An annotated checklist. *International Journal of Pharmacy and Life Sciences*, 6(1), 4123–4156.
- Gogoi, K. & Yonzon, R. (2015). *Thrixspermum formosanum* (Hayata) Schltr. (Orchidaceae) from Karbi Anglong (Assam): A new record for India. *The McAllen International Orchid Society Journal*, 16(1), 11–16.
- Govaerts, R., Campacci, M. A., Baptista, D. H., Cribb, P. J., George, A., Kreutz, K. & Wood, J. J. (2016). World checklist of Orchidaceae. The Board of Trustees of the Royal Botanic Gardens, Kew. Published on the Internet. Available from: <http://apps.kew.org/wcps/> [Accessed 1 September 2021].
- Hegde, S. N. (2017). *Orchids of Arunachal Pradesh*. Revised Edition, Department of Environment and forest, Government of Arunachal Pradesh. 168 p.
- King, G. & Pantling, R. (1898). The orchids of the Sikkim Himalayas. *Annals of the Royal Botanical Garden Calcutta*, 8, 1–342.
- Kumar, V., Verma, D. & Rao, A. N. (2017). *Thrixspermum indicum* (Orchidaceae), a new species from Northeast India. *Phytotaxa*, 292 (1), 79–84.
- Lucksom, S. Z. (2007). The Orchids of Sikkim and North East Himalaya: Development Area, Jiwan Thing Marg, Gangtok, East Sikkim, India. 984 p.
- Maina, V., Rao, P.S.N. & Sinha, B.K. (1998) A new record of *Thrixspermum merguense* (Hook.f.) Kuntze (Orchidaceae) from Nicobar Islands. *Journal of The Bombay Natural History Society*, 95(2), 375–376.
- Mao, A. A., Rao, A. N., Bhaumik, M. & Apang, O. (2011) *Thrixspermum saruwatarii* (Hayata) Schltr. (Orchidaceae) – a new record to India from Arunachal Pradesh. *Bulletin of Arunachal Forest Research*, 26 (1&2), 68–70.
- Misra, S. (2019). *Orchids of India- a hand book*. Dehra Dun, India: Bishen Singh Mahendra Pal Singh.
- O'Byrne, P. & Vermeulen, J. J. (2008). Six new species of *Thrixspermum*. *Malesian Orchid Journal*, 2, 55–72.
- Pearce, N. R. & Cribb, P. J. (2002). *Orchids of Bhutan: Flora of Bhutan*. Vol. 3, No. 3. Edinburg: Royal Botanical Garden.
- Pradhan, U. C. (1979). *Indian Orchids Guide to Identification and Culture*, Vol II. (pp. 190–747). Faridabad, India: Thomson Prass.

- Rao, A. N. (2010). Orchid flora of Arunachal Pradesh - an update. *Bulletin of Arunachal Forest Research*, 26 (1–2), 82–110.
- Seidenfaden, G. (1975). Orchid Genera in Thailand III. *Dansk Botanisk Arkiv*, 29 (4), 4–49.
- Seidenfaden, G. (1988). Orchid genera in Thailand XIV. Fifty-nine vandoid genera. *Opera botanica*, 95, 148–167.
- Singh, S. K., Agrawala, D. K., Das, S. S., Mao, A. A. & Singh, P. (2019). *Orchids of India- A pictorial guide*. Kolkata, India: Botanical Survey of India, Ministry of Environment, Forest & Climate change.

***ACIANTHERA HAGSATERI* (PLEUROTHALLIDINAE), A NEW SPECIES FROM THE SUB-ANDEAN FOREST OF COLOMBIA**

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ABSTRACT. A new species of *Acianthera* from the relict cloud forests of Valle del Cauca, Colombia is described and illustrated. This new species, *Acianthera hagsateri*, morphologically resembles *A. geminicaulina*, *A. decurrens*, and *A. erythrogramma*, but differs from them by its shorter plants and stems, the elliptic and obtuse smaller leaves, the racemose, 1–3 flowered raceme, and the obovate, entire lip, with a pair of smooth calli reaching the apical half. Illustration, distribution map, eponymy, notes on ecology, pictures for this new species are included, and a comparison table with morphologically similar species.

RESUMEN. Se describe e ilustra una nueva especie de *Acianthera* de los bosques nubosos relictos del Valle del Cauca, Colombia. Esta nueva especie, *Acianthera hagsateri*, se parece morfológicamente a *A. geminicaulina*, *A. decurrens* y *A. erythrogramma*, pero se diferencia de ellas por las plantas y tallos más cortos, las hojas elípticas y obtusas más pequeñas, el racimo racemoso de 1–3 flores, y el labelo obovado, entero, con un par de callos lisos que llegan hasta la mitad apical. Se incluye una ilustración, mapa de distribución, eponimia, notas sobre ecología, fotografías de esta nueva especie y una tabla comparativa con especies morfológicamente similares.

KEYWORDS/PALABRAS CLAVE: American tropics, Chocó, Colombian Flora, Flora de Colombia, florística, floristics, orchids, orquídeas, Northern Andes, Norte de los Andes, taxonomía, taxonomy, Trópicos americanos.

Introduction. *Acianthera* Scheidw. (Scheidweiler 1842) comprises ca. 300 species nested in the species-rich subtribe Pleurothallidinae (Brito *et al.* 2019, Chiron *et al.* 2012, Karremans *et al.* 2016, Pridgeon & Chase 2001, Rodrigues *et al.* 2017, Serna-Sánchez *et al.* 2021). Plants of *Acianthera* grow as epiphytes, lithophytes, or rarely as terrestrials in the cloud, wet or dry forests, ranging from Mexico and Antilles to Uruguay and Northern Argentina. The group exhibits its highest species richness in Brazil, where almost 120 species have been recorded (BFG 2015, 2018).

For decades, *Acianthera* was considered under a broad circumscription of *Pleurothallis* R.Br. (Brown

1813, Luer 1986). However, phylogenetic studies revealed *Acianthera* as a distinct and well supported monophyletic group (Karremans *et al.* 2016, Pérez-Escobar *et al.* 2017, Pridgeon *et al.* 2001, Serna-Sánchez *et al.* 2021) and, therefore, a broad consensus to recognize the genus (Damián *et al.* 2018, Karremans *et al.* 2016, Zambrano-Romero & Solano 2019).

Like many other genera in the Pleurothallidinae, *Acianthera* remains a poorly studied group in Colombia. About 30 species are recorded for the country (Bernal *et al.* 2019, Ortiz 2003, Ortiz *et al.* 2010). However, other neighboring Andean countries harbor more species than Colombia. For example, about 65

species are recorded in Ecuador (more than twice of Colombia), and new species are continuously revealed (Zambrano-Romero & Solano 2019). Therefore, the species diversity of *Acianthera* might be greater than presently recorded in Colombia (Bernal *et al.* 2019).

During orchid surveys conducted in the relict cloud forests of Valle del Cauca, Colombia in the western range of the Northern Andes cordillera, specimens of *Acianthera* were collected. They revealed morphological similarities with species recorded in Costa Rica, Panama, Colombia, and neighboring Andean countries such as *A. geminicaulina* (Ames) Pridgeon & M.W.Chase, *A. decurrens* (Poepp. & Endl.) Pridgeon & M.W.Chase, and *A. erythrogramma* (Luer & Carnevali) Luer (Luer 2004, Pridgeon & Chase 2001). However, comparisons of our field collected specimens with the available material for such taxa showed consistent breakdowns in the morphological continuum. Here, we propose it as a new species to science with the name of *Acianthera hagsateri*.

Materials and methods. Some flowers were preserved in liquid (70% ethanol, 20% water, 10% glycerol) before drying the plant. Dried material and digital specimens of *A. decurrens*, *A. erythrogramma*, and *A. geminicaulina*, available at CUVC, JBL, and VALLE and the herbarium databases of AMES, COL, MO, and W were consulted. Specialized literature and floristic catalogues were also consulted (Chiron & van den Berg 2012, Damián *et al.* 2018, Luer 2004). Morphological observations, dissections, and photographs of dried and spirit material of *A. hagsateri* and *A. geminicaulina* were carried out under a stereomicroscope provided by each herbarium. *Acianthera hagsateri* was described and illustrated by a composite line drawing from material collected in the field. The morphological description of *A. hagsateri* was based on five individuals gathered at the type locality. Distribution maps were generated using QGIS v.2.13. Distribution data of closely related species was obtained from the GBIF repository with the R-package SPOCC (Chamberlain 2017). Political division layers were downloaded from <http://www.diva-gis.org/Data>.

TAXONOMIC TREATMENT

Acianthera hagsateri O.Pérez, L.Oses & Bogarín, *sp. nov.* (Fig. 1–2)

TYPE: Colombia. Valle del Cauca: Municipio de Dagua, Corregimiento de Queremal, junto al río San Juan, cerca del balneario, *ca.* 1400 m, 14 January 2012, Pérez O. & Parra E. 1488 (holotype: CUVC!).

DIAGNOSIS: *Acianthera hagsateri* is similar to *A. geminicaulina* (Ames) Pridgeon & M.W.Chase, but differs in the small-sized plants, shorter ramicauls, smaller, succulent leaves, much shorter inflorescence born at the base of the leaves, dorsal sepal erect, linear-oblong, petals mucronate with margins strongly serrate-lacerate, and by the entire, obovate lip.

Plant epiphytic, rhizomatous, small, to 5 cm tall. *Rhizomes* short, straight, the internodes up to 4.5 mm long. *Roots* filiform, greenish-white, sometimes stained with purple, up to 0.7–0.8 mm in diameter. *Ramicauls* short, stout, 4–10 mm long, erect, terete, slightly thickened toward the apex, covered by two scarious, tubular sheaths when young. *Leaf* 32 × 12–13 mm, sessile, ascendant, succulent, green stained with reddish-purple or sometimes completely reddish-purple, elliptical to ovate, acute, apex minutely 2-lobed, with a mucron between the lobes, margin entire, slightly convex on the adaxial surface, base cuneate. *Inflorescence* born from the apex of the stem, shorter than the leaf, racemose, 1- to 3-flowered, *ca.* 5 mm long without flowers, including the pinkish-purple peduncle 1.5 mm long. *Ovary* 1.5 mm long, purple, minutely echinate, the trichomes conic, articulated to a stout pedicel, 2 mm long, microscopically echinate. *Floral bracts* 3.5 mm long, obliquely funnel-shaped, long acute. *Flowers* relatively large in comparison with the plant size, to 2.4 cm in diameter, simultaneously-opening, bilabiate. *Sepals* pale purple, the nerves markedly pinkish-purple, membranous, minutely and sparsely verrucose on the abaxial surface, shortly hirsute, entire; the dorsal one 13.5 × 1.6 mm, linear-oblong, acute, shortly apiculate, slightly channeled, three-veined; the lateral ones connate into an ovate-lanceolate, obtuse, shortly apiculate synsepal, 11.2 × 4.5 mm long, convex near the apex, concave toward the base, chordate at the base, 6-veined. *Petals* 4.7 × 1.6 mm, translucent, membranaceous, slightly falcate, oblong-elliptical, acute, aristate, 3-veined, strongly serrate-lacerate along the margins, the margins, base, and nerves pinkish-

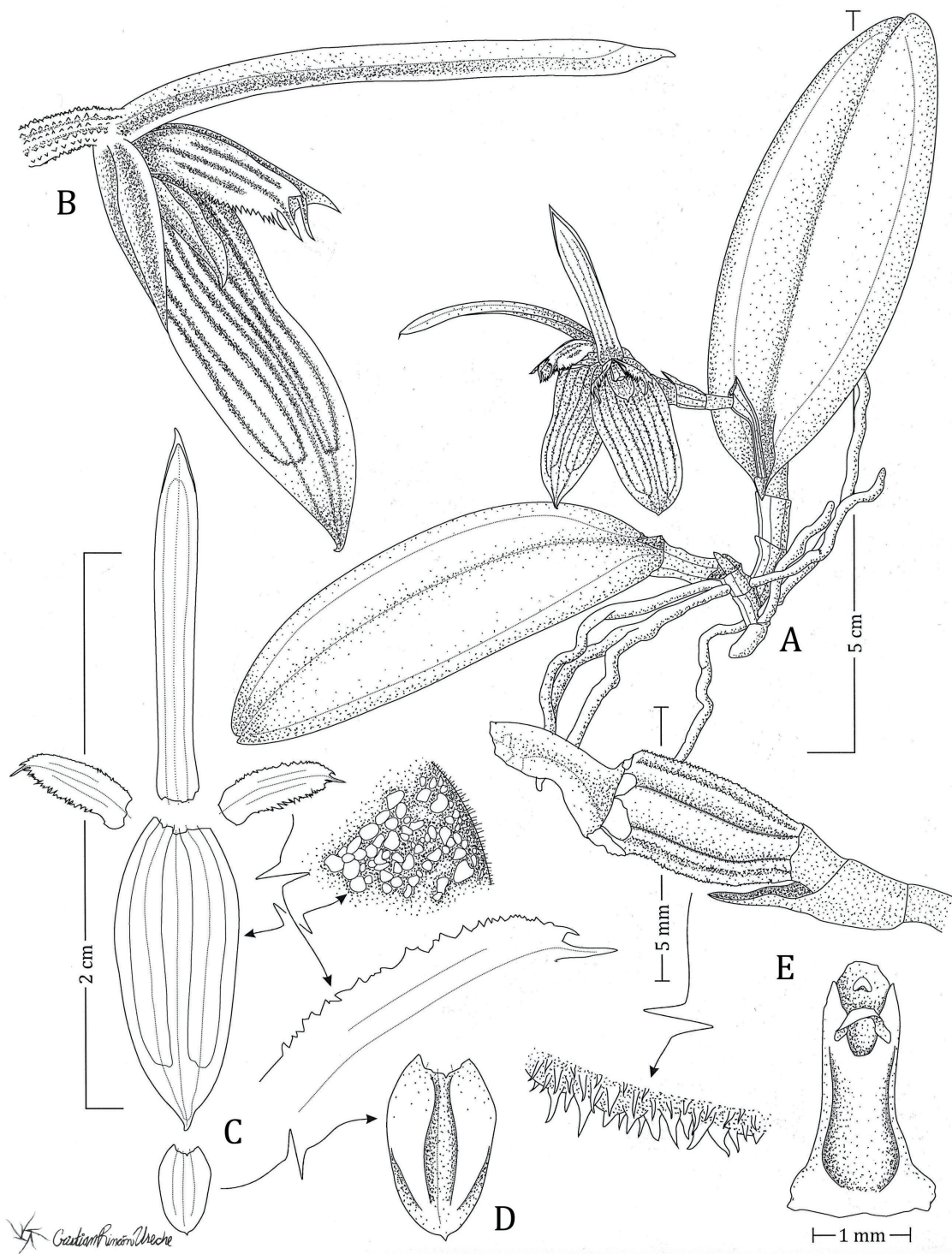


FIGURE 1. Illustration of *Acianthera hagsateri*. A. Plant habit. B. Flower (3/4 view). C. Floral dissection. D. Lip E. Column (side and ventral view); drawn by O. Pérez and C. Rincón-Useche from the holotype.

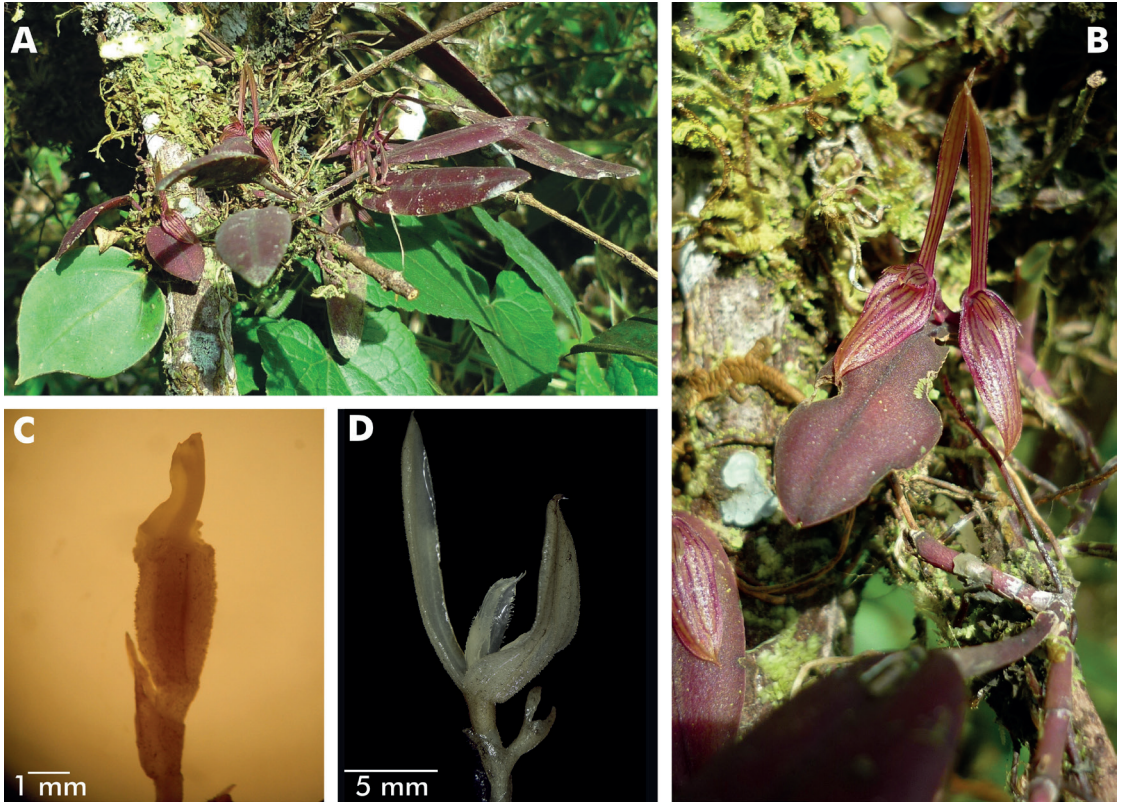


FIGURE 2. *Acianthera hagsateri*. **A.** Plant habit. **B.** Flowers *in situ*. **C.** Flower (side view). **D.** Column, ovary, and pedicel. Photographs by O. Pérez, from the holotype.

purple. *Lip* 3.3 × 1.9 mm, similar in color to the sepals, fleshy, entire, verrucose, thickened towards the base, oblong, subacute, shortly apiculate, truncate at the base, three-veined; the disc with a small pair of marginal, thickened, slightly erect calli, extended from the base up to near the apex, channeled among them. *Column* 2.6 mm long, pinkish-purple at the base, green pale at the apex, stout, slightly curved at the middle part, ventrally channeled, thickened at the base, clinandrium denticulate, with a basal extension to form a very short foot. *Stigmatic cavity* ventral, suborbicular; rostellum ventral, helmet-like. *Anther* ventral, yellow. *Pollinarium* not seen. *Capsule* ellipsoid, 1 cm long, with persistent perianth.

ADDITIONAL SPECIMENS EXAMINED: Colombia. Valle del Cauca: Dagua, Corregimiento de Queremal, junto al camino que conduce al Cerro “Tokio”, ca. 1600 m, 29 May 2011, Pérez O. & Parra E. 1487 (VALLE!). Valle del Cauca: Dagua, Corregimiento de Queremal, car-

retera destapada que conduce al Cerro “Tokio”, ca. 10 minutos en carro del casco urbano de El Queremal, ca. 1600 m, 18 March 2018, Pérez O., Galindo-T. & Zuluaga 1936 (CUVC!).

DISTRIBUTION AND ECOLOGY: So far, *Acianthera hagsateri* is known from the western slope of the Western Cordillera of the Andes, vicinity of Queremal, department of Valle del Cauca, Colombia (Fig. 3). The area is nested in the Northern Andes and Chocó biogeographic regions (Pérez-Escobar *et al.* 2019). It is known to be a center of orchid endemism (e.g. Pérez-Escobar *et al.* 2021a, Pérez-Escobar *et al.* 2022, Rodríguez & Blanco 2015), in particular of Pleurothallidinae (e.g. Farfán *et al.* 2003, Kolanowska & Pérez-Escobar 2012, Peláez *et al.* 2009, Pérez-Escobar *et al.* 2013). It grows as an epiphyte on isolated trees and remnant cloud forests at 1600 m elevation, where it appears to be abundant. It flowers throughout the year, and developing fruits were observed in June.

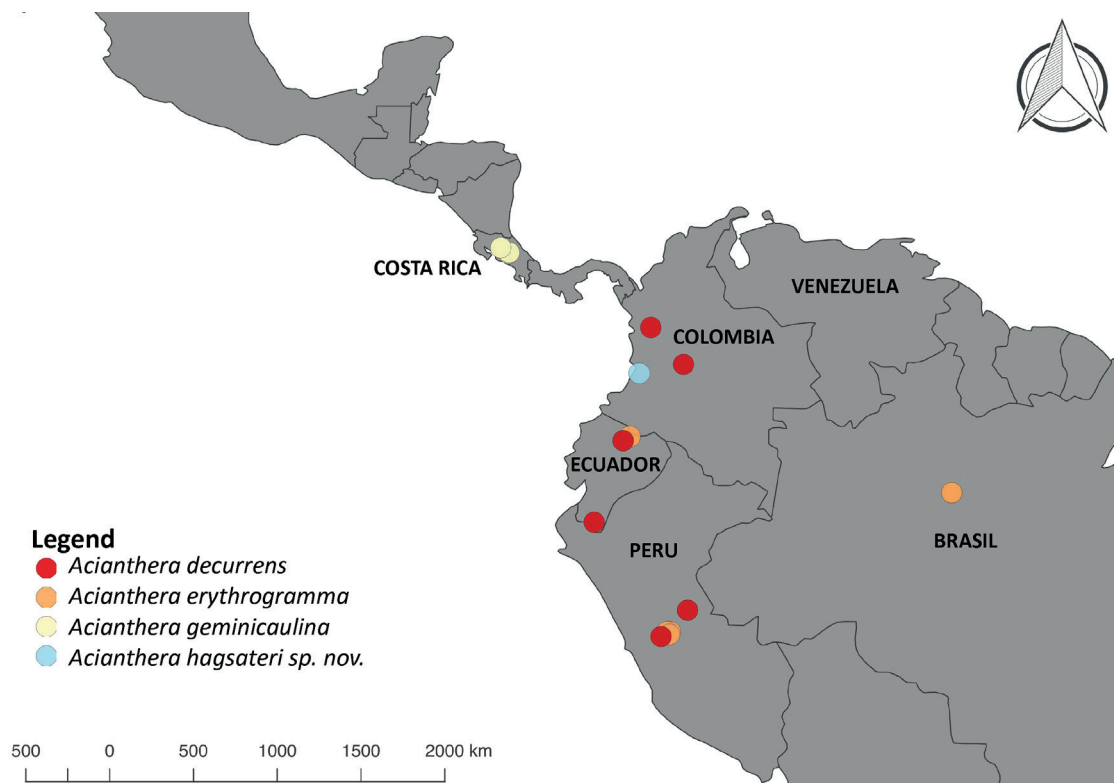


FIGURE 3. Distribution map of *Acianthera hagsateri*, *A. decurrens* (based on Poeppig 1604 W!, Luer *et al.* 19691 MO, Betancur *et al.* 7018 COL!, Croat 69890 MO), *A. geminicaulina* (based on Karremans 2990 JBL!, Karremans 5209 JBL!, Karremans 3205 JBL!, Karremans 5210 JBL!) and *A. erythrogramma* (based on Luer *et al.* 11766 MO!, Berlin 1605 MO). Map by O.A. Pérez-Escobar.

One population was reported growing prolifically on *Myrsine* sp. (Myrsinaceae), beside a river.

EPONYMY: Named after Eric Hágsater Gartenberg, chief Director of the AMO Herbarium in Mexico. Eric has enormously contributed over the past 50 years to the taxonomy and systematics of the genus *Epidendrum* and the Mexican orchid flora. His monographic work on the genus has led to the thorough documentation of the morphological variation, distribution and ecology of thousands of orchid species in the American tropics, while promoting the training of dozens of young Latin American botanists.

Discussion. *Acianthera hagsateri* resembles *A. geminicaulina*, a species described as *Pleurothallis geminicaulina* Ames based on a plant collected by Charles H. Lankester at La Unión, Turrialba, Costa Rica; then it was recorded in, Panama, Colombia, and

Ecuador (Luer 2004). While studying the morphological variation of *A. geminicaulina* in Costa Rica from four localities, including the type locality, we observed that Colombian specimens differ from those of Costa Rica. *Acianthera hagsateri* differs from *A. geminicaulina* mainly in the shorter ramicauls < 1 cm long (*vs.* 3–8 cm), shorter inflorescences < 5 mm (*vs.* of 10–15 mm), the pale purple sepals with markedly pinkish-purple veins up to the apex (*vs.* purple or reddish without prominent purple veins), the erect dorsal sepal (*vs.* suberect or patent), the petals with three markedly pinkish-purple veins (*vs.* only the midvein purple-reddish) and the oblong, verrucose lip (instead of elliptical-oblong, smooth). The morphological variation of the lip in *A. geminicaulina* and *A. hagsateri* is shown in Fig. 4. All morphological differences among the new taxon and its closest relatives are summarized in Table 1.

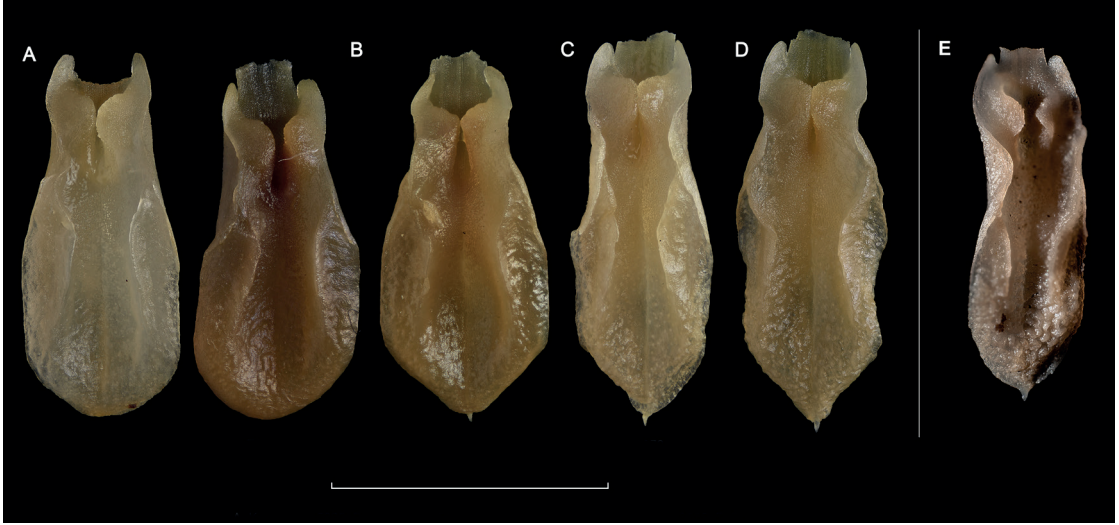


FIGURE 4. Morphological diversity of the lip in individuals of *A. geminicaulina* (A–D) and *A. hagsateri* (E): **A.** *Karremans* 2990, Costa Rica. Cartago: Santa Cruz, 9°57'8"N 83°43'3"W, elevation: 1350 m JBL!. **B.** *Karremans* 5209, Costa Rica. Alajuela, 10°16'N 84°09'W, elevation: 900 m JBL!. **C.** *Karremans* 3205, Costa Rica. Cartago: Turrialba, 10°00'06''3"N 83°41'47''5"W, elevation: 1470 m JBL!. **D.** *Karremans* 5210, Costa Rica. Alajuela, 10°16'N 84°09'W, elevation: 900 m JBL!. **E.** Pérez O. & Zuluaga 1936 (CUVC!). Scale bar= 3 mm. Photos by L. Osés.

Acianthera hagsateri is further similar to *A. decurrens*, a species from Ecuador and Peru, but differs in its smaller habit, up to 4 cm (vs. 20–45), shorter leaves up to 32 mm long not decurrent along the apex stem (vs. 10–15 cm long, decurrent along the apex), shorter ramicauls 4–10 mm long (vs. 10–30 cm long), shorter inflorescence < 5 mm (vs. 40–50 mm), petals elliptical, aristate at the apex, not callose (vs. obovate, long acuminate, bicallose at the mid-part) and the obovate lip, with margins entire, bicallose near the base (instead of elliptical with margins minutely serrate below the middle, bicallose above the middle). *Acianthera hagsateri* also resembles *A. erythrogramma*, which is restricted to the Amazonian lowland forests of Brazil, Ecuador and Peru and has larger (6–8 cm vs. 0.4–1.0 cm), triquetrous ramicauls (vs. rounded, cylindric), larger, broadly elliptical to suborbicular leaves and chordate at the base (vs. elliptical to ovate, rounded at the base), fasciculate-like inflorescences (vs. racemose), yellow, glabrous sepals (vs. pale purple and minutely verrucose), and a larger elliptical lip (5.5 mm long) with denticulate margins (vs. 3.3 mm and entire margins).

The *Acianthera* clade comprises the genera *Acianthera*, *Antilla* Luer, *Brenesia* Schltr., and *Kraenzlinella* Kuntze. These groups have also been treated at subge-

neric level under a broad concept of *Acianthera* (Karremans *et al.* 2016, Pérez-Escobar *et al.* 2017, Pridgeon *et al.* 2001, Serna-Sánchez *et al.* 2021). Among them, the most diverse group is *Acianthera* subgenus *Acianthera* concentrating almost 90% of the species of the clade. Several generic concepts have been proposed within this group, but none is supported yet by molecular data. The taxon sampling and DNA sequencing of *Acianthera s.l.* is still deficient (e.g., Pérez-Escobar *et al.* 2021b). Thus, systematic interpretations in *Acianthera* and the Pleurothallidinae have been based on studies that included a limited number of molecular markers leading to poorly supported and unresolved phylogenies (Bogarín *et al.* 2018, 2019, Karremans *et al.* 2016, Rodrigues *et al.* 2017). Morphologically, *A. hagsateri* belongs to *Acianthera* subg. *Acianthera*.

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TABLE 1. Main morphological differences among *Acianthera hagsateri*, *A. decurrens*, *A. erythrogramma*, and *A. geminicaulina*.

Character	<i>A. hagsateri</i>	<i>A. decurrens</i>	<i>A. erythrogramma</i>	<i>A. geminicaulina</i>
Plant size	up to 4 cm	up to 32 cm	up to 12 cm	up to 16 cm
Ramicaul	Terete, 0.44–1.00 cm long	Terete, 10–30 cm long	Triquetrous, 6–8 cm long	Terete, 3–8 cm long
Leaves	Elliptical to ovate, 3.2 × 1.2–1.3 cm	Elliptical, decurrent, 10–15 × 4–6 cm	Broadly elliptical to suborbiculate, 3.5–4.5 × 3.5–4.5 cm	Oblong-elliptic, 3–8 × 1.5–2.5 cm
Inflorescence	5 mm long	40–50 mm long	ca. 10 mm long	ca. 10–15 mm long
Petals	elliptical, margin strongly serrate-lacerate, translucent with the base, margins, and nerves purple	obovate, entire, green	Obovate, serrate, translucent	Elliptical-obovate, serrate, translucent with a purple midvein
Lip	Oblong, obtuse, entire, verrucose. Shortly apiculate with a pair of calli near the base and two parallel keels above the middle	Elliptical, slightly serrate, smooth. Disc depressed, surrounded by parallel calli above the middle, and with a callus below the middle reaching the base (Luer 2004)	Elliptical, obtuse, denticulate, with a pair of verrucose calli within the margins in the mid-part (Luer & Carnevali 1993).	Elliptical-oblong, obtuse, entire, smooth. Shortly apiculate with a pair of calli near the base and two parallel keels above the middle (Luer 2004).

granting access to their collections. OAPE is supported by the Sainsbury Orchid Fellowship at the Royal Botanic Gardens Kew and the Swiss Orchid Foundation. We would like to dedicate this study to the loving memory of Pedro Ortiz Valdivieso (†2012), who contributed enormously to the knowledge of the Colombian flora and provided valuable feedback to this study.

LITERATURE CITED

- BFG—The Brazil Flora Group. (2015). Growing knowledge: an overview of Seed plants diversity in Brazil. *Rodriguésia*, 66, 1085–1113. Doi: 10.1590/2175-7860201566411
- BFG—The Brazil Flora Group. (2018). Brazilian Flora 2020: Innovation and collaboration to meet Target 1 of the Global Strategy for Plant Conservation (GSPC). *Rodriguésia*, 69, 1513–1527. Doi: 10.1590/2175-7860201869402
- Bernal, R., Gradstein, S.R. & Celis, M. (2019). Catálogo de plantas y líquenes de Colombia. Bogotá, Colombia: Instituto de Ciencias Naturales, Universidad Nacional de Colombia.
- Bogarín, D., Pérez-Escobar, O.A., Karremans, A., Fernández, M., Kruizinga, J., Pupulin, F., Smets, E. & Gravendeel, B. (2019) Phylogenetic comparative methods improve the selection of characters for generic delimitations in a hyperdiverse Neotropical orchid clade. *Scientific Reports*, 9, 15098.
- Bogarín, D., Pérez-Escobar, O. A. Groenberger, D., Holland, S. D., Karremans, A., Lemmon, E. M., Lemmon, A. R., Pupulin, F., Smets, E. & Gravendeel, B. (2018). Anchored hybrid enrichment generated nuclear, plastid and mitochondrial markers resolve the *Lepanthes horrida* (Orchidaceae: Pleurothallidinae) species complex. *Molecular Phylogenetics and Evolution*, 129, 27–47. Doi: <https://doi.org/10.1016/j.ympev.2018.07.014>
- Brito De Almeida, A. R., De Camargo Smidt, E. & Amano, E. (2019). Evolution of anatomical characters in *Acianthera* section *Pleurobotryae* (Orchidaceae: Pleurothallidinae). *PLoS ONE*, 14(3), 1–21. Doi: <https://doi.org/10.1371/journal.pone.0212677>
- Brown, R. (1813) *Pleurothallis*. *Hortus Kewensis*, 5, 211.
- Chamberlain, S. (2017). SPOCC: interface of species occurrence data sources. R package v. 0.7.0. <https://cran.r-project.org/web/packages/spocc/index.html>
- Chiron, G. R. & van den Berg, C. (2012). Révision taxonomique du genre *Acianthera* (Orchidaceae: Pleurothallidinae). *Richardiana*, 12, 59–77.
- Chiron, G., Guiard, J. & van den Berg, C. (2012). Phylogenetic relationships in Brazilian *Pleurothallis* sensu lato (Pleurothallidinae, Orchidaceae): evidence from nuclear ITS rDNA sequences. *Phytotaxa*, 46, 34–58. Doi: <https://doi.org/10.11646/phytotaxa.46.1.5>
- Damián, A., Mitidieri, N. & Chiron, G. (2018). A taxonomic synopsis of *Acianthera* (Orchidaceae: Pleurothallidinae) in Peru, including two new species. *Anales del Jardín Botánico de Madrid*, 75(1), 1–21.

- Farfán, J., Otero, J. T. & Luer, C. A. (2003). Especies de *Lepanthes* (Orchidaceae) de Colombia. *Biota Colombiana*, 4, 33–47.
- Karremans, A. P., Bogarín, D., Díaz-Morales, M., Fernández, M., Osés, L. & Pupulin, F. (2016). Phylogenetic reassessment of *Acianthera* (Orchidaceae: Pleurothallidinae). *Harvard Papers in Botany*, 21(2), 171–187.
- Kolanowska, M. & Pérez-Escobar, O. A. (2012). A new species of *Lockhartia* (Orchidaceae) from Colombia. *Systematic Botany*, 37, 347–351.
- Luer, C. A. (1986). *Icones Pleurothallidarum* III. Systematics of *Pleurothallis* (Orchidaceae). *Monographs in Systematic Botany from the Missouri Botanical Garden*, 20, 1–107.
- Luer, C. (2004). *Icones Pleurothallidarum* XXVI: *Pleurothallis* subgenus *Acianthera* and three allied subgenera, a second century of new species of *Stelis* of Ecuador, *Epibator*, *Ophidioid*, *Zootrophion*. *Monographs in Systematic Botany from the Missouri Botanical Gardens*, 95, 1–265.
- Luer, C. & Carnevali, G. (1993). Two new species of *Pleurothallis* (Orchidaceae) from the Amazonian lowlands. *Novon*, 3, 158–162.
- Ortiz, P. (2003). Gallery of Colombian Orchids. Bogotá, Colombia, CD-ROM. Da Vinci Editiones, Bogotá.
- Ortiz, P., Pérez, O. & Parra, E. (2010) A new species of *Acianthera* (Orchidaceae) from Colombia. *Orquideología*, 27(1), 60–62.
- Peláez, N., Buitrago, E. & Meyer, G. (2009). New Colombian species of *Dracula* and *Masdevallia*: Pleurothallidinae (Orchidaceae). *Orquideología*, 26, 53.
- Pérez-Escobar, O. A., Dodsworth, S., Bogarín, D., Bellot, S., Balbuena, J. A., Schley, R., Kikuchi, I. A., Morris, S. K., Epitawalage, N., Cowan, R., Maurin, O., Zuntini, A., Arias, T., Serna-Sánchez, S., Graveendel, B., Torres-Jimenez, M. F., Nargar, K., Chomicki, G., Chase, M. W., Leitch, I. J., Forest, F. & Baker, W. J. (2021b). Hundreds of nuclear and plastid loci yield novel insights into orchid relationships. *American Journal of Botany*, 108, 1166–180.
- Pérez-Escobar, O. A., Chomicki, G., Condamine, F. L., Karremans, A. P., Bogarín, D., Matzke, N. J., Silvestro, D. & Antonelli, A. (2017). Recent origin and rapid speciation of Neotropical orchids in the world's richest plant biodiversity hotspot. *New Phytologist*, 215, 891–905.
- Pérez-Escobar, O. A., Jaramillo, C., Zuluaga, A., García-Revolo, S., Dodsworth, S., Bogarín, D. (2021a). Two new orchid species (*Camardium*: Maxillariinae; *Lepanthes*: Pleurothallidinae) from the pacific slope of the northern Andes, Colombia. *Lankesteriana*, 21, 351–362.
- Pérez-Escobar, O. A., Kolanowska, M. & Rincón-Useche, C. (2013). A new species of *Lepanthes* (Pleurothallidinae, Orchidaceae) from Colombia. *Systematic Botany*, 38, 316–319.
- Pérez-Escobar, O. A., Lucas, E., Jaramillo, C., Monro, A., Morris, S. K., Bogarín, D., Greer, D., Dodsworth, S., Aguilar-Cano, J., Sanchez, A. & Antonelli, A. (2019). The origin and diversification of the hyperdiverse flora in the Chocó biogeographic region. *Frontiers in Plant Science*, 10, 1328.
- Pérez-Escobar, O. A., Zizka, A., Bermúdez, M. A., Meseguer, A. S., Condamine, F. L., Hoorn, C., Hooghiemstra, H., Pu, Y., Bogarín, D., Boschman, L. M., Pennington, R. T., Antonelli, A. & Chomicki, G. (2022). The Andes through time: evolution and distribution of Andean floras. *Trends in Plant Science*, 4, P364-378. Doi: doi.org/10.1016/j.tplants.2021.09.010.
- Pridgeon, A. M. & Chase, M. W. (2001). A phylogenetic reclassification of Pleurothallidinae (Orchidaceae). *Lindleyana*, 16, 235–271.
- Pridgeon, A. M., Solano-Gómez R. & Chase M. W. (2001). Phylogenetics relationships in Pleurothallidinae (Orchidaceae): combined evidence from nuclear and plastid DNA sequences. *American Journal of Botany*, 88, 2286–2308.
- Scheidweiler, M. (1842). *Acianthera*. *Allegemeine Gartenzeitung*, 10, 292.
- Serna-Sánchez, M., Pérez-Escobar, O. A., Bogarín, D., Torres-Jimenez, M. F., Alvarez-Yela, A. C., Arcila-Galvis, J. E., Hall, C., de Barros, F., Pinheiro, F., Dodsworth, S., Chase, M. W., Antonelli, A., Arias, T. (2021). Plastid phylogenomics resolves ambiguous relationships within the orchid family and provides a solid timeframe for biogeography and macroevolution. *Scientific Reports*, 11, 6858.
- Rodríguez, L. K. & Blanco, M. B. (2015). A new species of *Camardium* (Orchidaceae: Maxillariinae) from the cloud forests of Colombia. *Phytotaxa*, 222, 61–66.
- Rodrigues, V. T., de Camargo Smidt, E., Bolson, M. & de Barros, F. (2017). Phylogeny of *Acianthera* sect. *Pleurobotryae* (Orchidaceae: Pleurothallidinae), an endemic group of the Atlantic Forest. *Revista Brasileira de Botânica*, 40(3), 811–817. Doi: https://doi.org/10.1007/s40415-017-0384-1
- Zambrano-Romero, B. J. & Solano, R. (2019). Two new Pleurothallidinae (Orchidaceae) from Southwestern Ecuador: *Acianthera pustulata* and *Lepanthes marioi*. *Phytotaxa*, 422(3), 255–272.

UNA NUEVA ESPECIE DE *PLEUROTHALLIS* (PLEUROTHALLIDINAE) SUBSECCIÓN *MACROPHYLLAE-FASCICULATAE* PARA LA REGIÓN ANDINA COLOMBIANA

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RESUMEN. Se describe e ilustra una nueva especie del género *Pleurothallis* para la región Andina colombiana llamada *P. villahermosae*, perteneciente a la subsección *Macrophyllae-Fasciculatae*. La nueva especie es morfológicamente similar a *Pleurothallis callosa*, de la cual se diferencia por tener el sépalo dorsal y el sinsépalo ovado-elíptico; pétalos falcado-lanceolados, acuminados y el labelo cuadrangular-ovado con presencia de dos callos basales que ocupan un tercio de la longitud del labelo (*vs.* sépalo dorsal elíptico y sinsépalo ampliamente ovado y labelo unguiculado con dos callos basales que se extienden hasta la mitad de la longitud del labelo en *P. callosa*). Se proporciona información geográfica, características ecológicas y estado de conservación de la nueva especie.

ABSTRACT. A new species of *Pleurothallis* that belongs to the *Macrophyllae-Fasciculatae* from the Colombian Andes region is described and illustrated. The new species is morphologically similar to *Pleurothallis callosa* from which it can be differentiated by having its ovate-elliptic dorsal sepal and synsepal; falcate-lanceolate, acuminate petals and the quadrangular-ovate lip with two basal calli that extend up to a third the length of the lip (*vs.* dorsal sepal elliptic and synsepal widely ovate and unguiculate lip with two basal calli that extend up to half the length of the lip in *P. callosa*). Geographic information, ecological characteristics, and conservation status of the new species are provided.

PALABRAS CLAVE / KEYWORDS: Andes, Colombia, *Macrophyllae-Fasciculatae*, *Pleurothallis villahermosae*, taxonomía, taxonomy, Tolima.

Introducción. El género *Pleurothallis* R.Br. se distribuye ampliamente desde el oeste de México hasta Sudamérica, con representación en las islas del Caribe (Doucette *et al.* 2016), contando con 499 especies conocidas a la fecha (Karremans & Vieira-Urbe 2020). Colombia es uno de los países con mayor número de especies de este género, con 236 especies registradas (Ministerio de Ambiente y Desarrollo Sostenible y Universidad Nacional de Colombia 2015).

Robert Brown (1813) describió *Pleurothallis* para incluir una especie de las Antillas originalmente descrita como *Epidendrum ruscifolium* Jacq. *Pleurothallis* se reconoce por tener plantas con ramicales delga-

dos terminados en una hoja, ovadas a ovado-elípticas con la base cordada, flores en racimos o en fascículos, sépalos laterales fusionados, pétalos frontales y transversales, labelo articulado a la base de la columna, dos polinios, columna corta y estigma bilobulado (Brown 1813). *Macrophyllae-Fasciculatae* Lindl. inicialmente fue propuesta como una sección de *Pleurothallis* por Lindley (1859). Luer (1986) reconoció el estatus seccional del grupo dentro de *Pleurothallis*, pero más tarde la ubicó como subsección (Luer 1988). Posteriormente, Luer (2005) revivió *Acronia* C.Presl, donde incluyó a *Macrophyllae-Fasciculatae* nuevamente como una sección. Estudios filogenéticos de Pridgeon *et al.*



FIGURE 1. Localidad de *Pleurothallis villahermosae* Sierra-Ariza, Rincón-González & Villanueva. A. Iglesia Nuestra Señora De Las Mercedes (estructura insignia del municipio de Villahermosa-Tolima). B. Fragmento de bosque muy húmedo montano, donde se descubrió *P. villahermosae*. C. *Pleurothallis villahermosae* in situ. Fotografías y lámina elaboradas por M. A. Sierra-Ariza.

(2001) y Wilson *et al.* (2011, 2018) muestran que *Acronia* y la subsección *Macrophyllae-Fasciculatae* quedan incluidos dentro de un clado de *Pleurothallis* bien soportado, tal y como se conserva en la actualidad.

Esta subsección se distingue morfológicamente por tener hojas sésiles con la base generalmente cordada, flores solitarias agrupadas en un fascículo, sépalos laterales connados en un sinsépalo más o menos similar al sépalo dorsal, estigma bilobulado, un labelo recostado sobre el sinsépalo o ligeramente elevado por encima de él (Lindley 1859, Luer 2005, Wilson *et al.* 2018). En cuanto a diversidad, la subsección *Macrophyllae-Fasciculatae* ha crecido en número de especies durante los últimos años. Luer (2005) reconoció 213 especies, Wilson *et al.* (2018) mencionan que la subsección es la más diversa del género, con entre 239

y 309 especies dependiendo del tratamiento que se le dé al subgrupo y a las sinonimias que se establezcan (Wilson, unpubl. data).

A continuación, se describe e ilustra una nueva especie del género *Pleurothallis* subsección *Macrophyllae-Fasciculatae* recolectada en el norte del departamento del Tolima, Colombia (Fig. 1). Esta especie pertenece a un pequeño complejo de especies aliadas a *Pleurothallis cardiothallis* Rchb.f., que históricamente han sido tratadas como una sola especie morfológicamente variable y con una distribución desde México y Centroamérica al norte de los Andes. Sin embargo, estudios recientes demuestran que bajo este nombre se agrupan varias especies (Pupulin *et al.* 2021), como es el caso de *Pleurothallis scotinantha* Pupulin, M.Díaz & J.Aguilar, *Pleurothallis navise-*

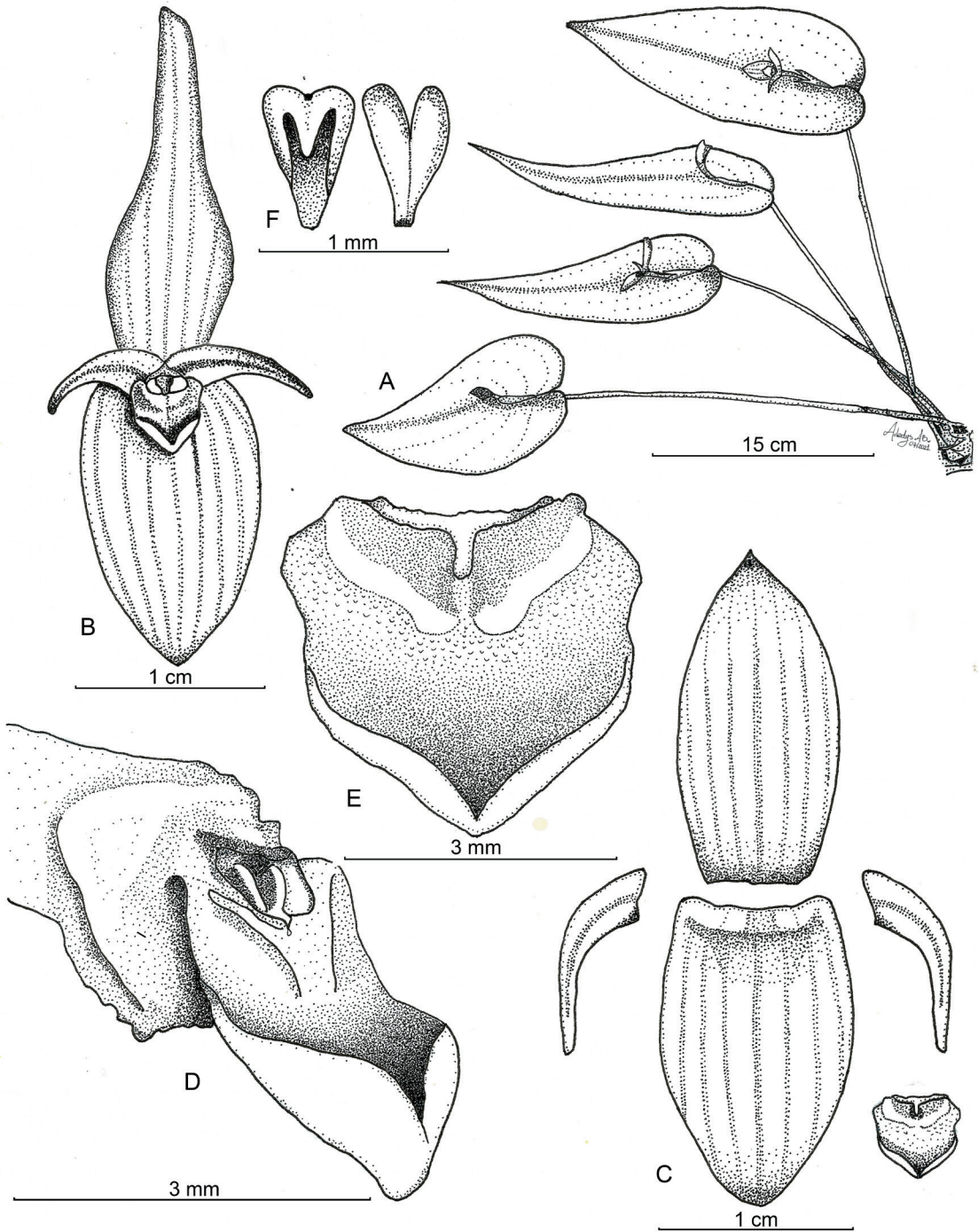


FIGURE 2. Ilustración *Pleurothallis villahermosae* Sierra-Ariza, Rincón-González & Villanueva. **A.** Hábito. **B.** Vista frontal de la flor. **C.** Disección del perianto. **D.** Vista de $\frac{3}{4}$ de la columna y el labelo. **E.** Vista adaxial del labelo. **F.** Antera y polinios. Ilustración por Arledys Albino-Bohórquez con base en el espécimen tipo.

pala Pupulin, J. Aguilar & M. Díaz y *Pleurothallis gonzaleziorum* Pupulin, M. Díaz & Pridgeon (Pupulin *et al.* 2017, Pupulin 2020).

Materiales y métodos. Se realizaron varias salidas de campo a los bosques localizados en la cuenca del río Azufrado en el municipio de Villahermosa, Tolima, entre los años 2018 y 2019, donde se encontró una única población de esta especie en su estado natural. Los especímenes de estudio fueron fotografiados, retratando a detalle cada una de sus características morfológicas, utilizando una cámara Lumix fz70, acompañada por un lente macro close-up +10. Adicionalmente, se registraron los datos ecológicos (tipo de bosque, hábito de crecimiento y fenología) y geográficos (coordenadas y elevación). Los especímenes de respaldo se prepararon almacenando las estructuras vegetativas en papel periódico embebido con etanol al 75%, las estructuras florales se preservaron en un recipiente plástico con glicerol en concentración 1:1 (partes iguales de glicerina y alcohol al 70%).

El material colectado fue secado en un horno eléctrico a 75°C durante 14 horas y posteriormente ingresado a la colección del Herbario TOLI, sección de Dendrología de la Universidad del Tolima. Las estructuras florales en glicerol fueron estudiadas en un estereoscopio Motic Serie: SMZ 168 Led, con brazo extensible Mod. 1107 / 2107, O 1109 / 2109. Para confirmar la identidad de la nueva especie, se revisó la literatura especializada sobre el complejo de *Pleurothallis cardiothallis* (Pupulin 2020, Pupulin *et al.* 2017, 2021), monografías sobre la sistemática de los géneros *Pleurothallis* y *Acronia*, sección *Macrophyllae-Fasciculatae* (Luer 1988, 2005), la revisión en línea de herbarios internacionales como AMES (www.huh.harvard.edu) y KEW (apps.kew.org/herbcat/gotoHomePage.do) y nacionales como TOLI, HPUJ, JBB y COL (www.biovirtual.unal.edu.co/es/colecciones/search/plants/colecciones/search/plants/). Para ilustrar la nueva especie se realizó un dibujo a línea y una lámina de disección compuesta Lankester (LCDP) usando Adobe Photoshop® CS6.

TRATAMIENTO TAXONÓMICO

Pleurothallis villahermosae Sierra-Ariza, Rincón-González & Villanueva, *sp. nov.* (Fig. 2–3).

TIPO: COLOMBIA. Tolima: municipio de Villahermosa, vereda Siberia, 2190 m. enero 17 del 2018. *M. A. Sierra-Ariza 54* (holotipo: TOLI! Isotipo JBB!).

DIAGNOSIS: *Pleurothallis villahermosae* es similar a *Pleurothallis callosa* M. Díaz & Pupulin (Fig. 4), pero se diferencia por su sépalo dorsal y sinsépalo ovado-elíptico (*vs.* sépalo dorsal elíptico y sinsépalo ampliamente ovado), labelo cuadrangular-ovado, redondeado (*vs.* unguiculado, obtuso), con 2 callos basales que ocupan un tercio de la longitud del labelo (*vs.* 2 callos basales que se extienden hasta la mitad de la longitud del labelo) y el glenion oblongo-elíptico (*vs.* glenion triangular).

Hierba epífita, simpodial, cespitosa, subrecta, 20–35 cm de altura. *Raíz* ramificada, 1 mm de diámetro. *Ramicales* generalmente arqueados, teretes, delgados, 18–33 cm de largo y 0.2–0.4 cm de ancho, cubiertos por 3 a 4 vainas, 2–5 cm de largo, tubulares, estrechas hacia la base con un pliegue longitudinal hacia el ápice, de color marrón oscuro con puntos densamente agrupados, cubriendo de 2 a 3 entrenudos por ramicaule, agrupadas en la base en la intersección entre el rizoma y la base del tallo. *Hojas* perpendiculares al tallo, en el ápice del ramicaule, diminutamente papilosas, brillantes, ovadas, ápice acuminado, base lobulada, lóbulos redondeados, imbricados, 14–19 × 5–8 cm. *Inflorescencia* fascículo de flores solitarias, sucesivas, en ocasiones con dos flores simultáneas, pedúnculo 1.8–1.2 cm de largo; bráctea espatácea ovada, papirácea a fibrosa, aguda, hasta 2 cm de larga. *Brácteas florales* tubulares, 10–16 mm de largo. *Pedicelo* terete, hasta 15 mm de largo. *Ovario* rojo-verdoso, cónico, levemente arqueado, estriado, pustulado, 10 mm de largo. *Flores* resupinadas, escarlatas, labelo morado brillante en la superficie adaxial, morado opaco en la abaxial, columna morada con pie amarillo, sin fragancia aparente. *Sépalos* membranáceos, glandular-papilosos, márgenes microscópicamente ciliados, nervaduras papilosas en la zona abaxial; *sépalo dorsal* ovado-elíptico, agudo, 7-nervado, revoluto desde la mitad hacia el ápice, 20 × 8 mm; *sépalos laterales* connados totalmente, formando un sinsépalo ovado-elíptico, agudo, 10-nervado, levemente cóncavo, 20 × 10 mm.

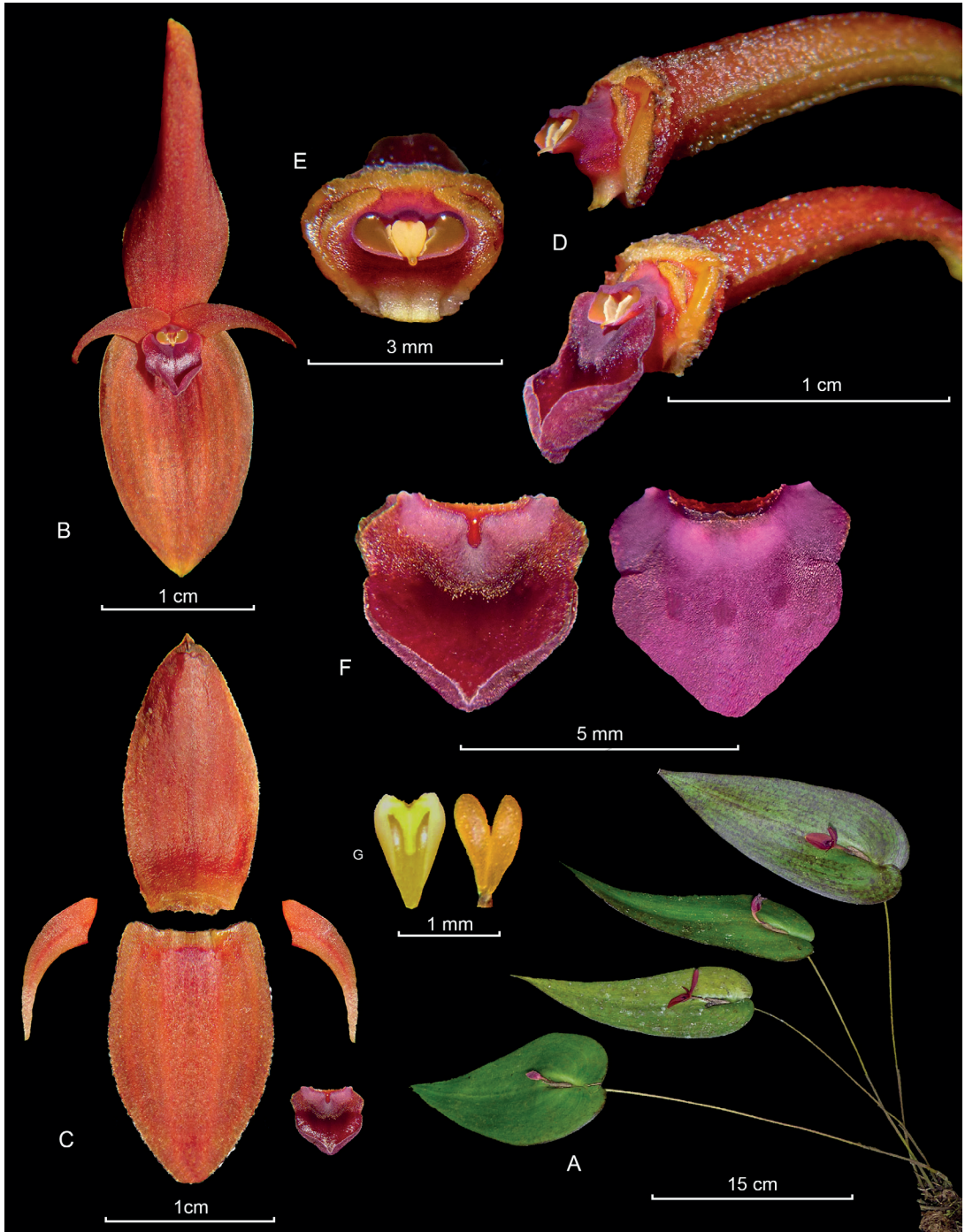


FIGURE 3. *Pleurothallis villahermosae* Sierra-Ariza, Rincón-González & Villanueva. **A.** Hábito. **B.** Vista frontal de la flor. **C.** Disección del perianto. **D.** Vista de $\frac{3}{4}$ de la columna y ovario sin labelo, y de la columna y ovario con labelo. **E.** Columna en vista frontal. **F.** Labelo, vistas adaxial y abaxial. **G.** Antera y polinario. LCDP elaborado por M. A. Sierra-Ariza con base en el espécimen tipo.



FIGURE 4. *Pleurothallis callosa* M.Díaz & Pupulin. **A.** Hábito. **B.** Vista $\frac{3}{4}$ de la flor. **C.** Diseción del perianto. **D.** Labelo vista lateral, tres cuartos, adaxial y abaxial. **E.** Ovario, columna y labelo en vista lateral. **F.** Ovario y columna, vistas ventral, dorsal y lateral. **G.** Antera y polinios, vistas adaxial y abaxial. Fotografías de M. Díaz basadas en *Rojas-Alvarado 258* (JBL-spirit), publicadas originalmente por Pupulin *et al.* (2021). Reproducida con el permiso de los autores y editores de *Harvard Papers in Botany*.

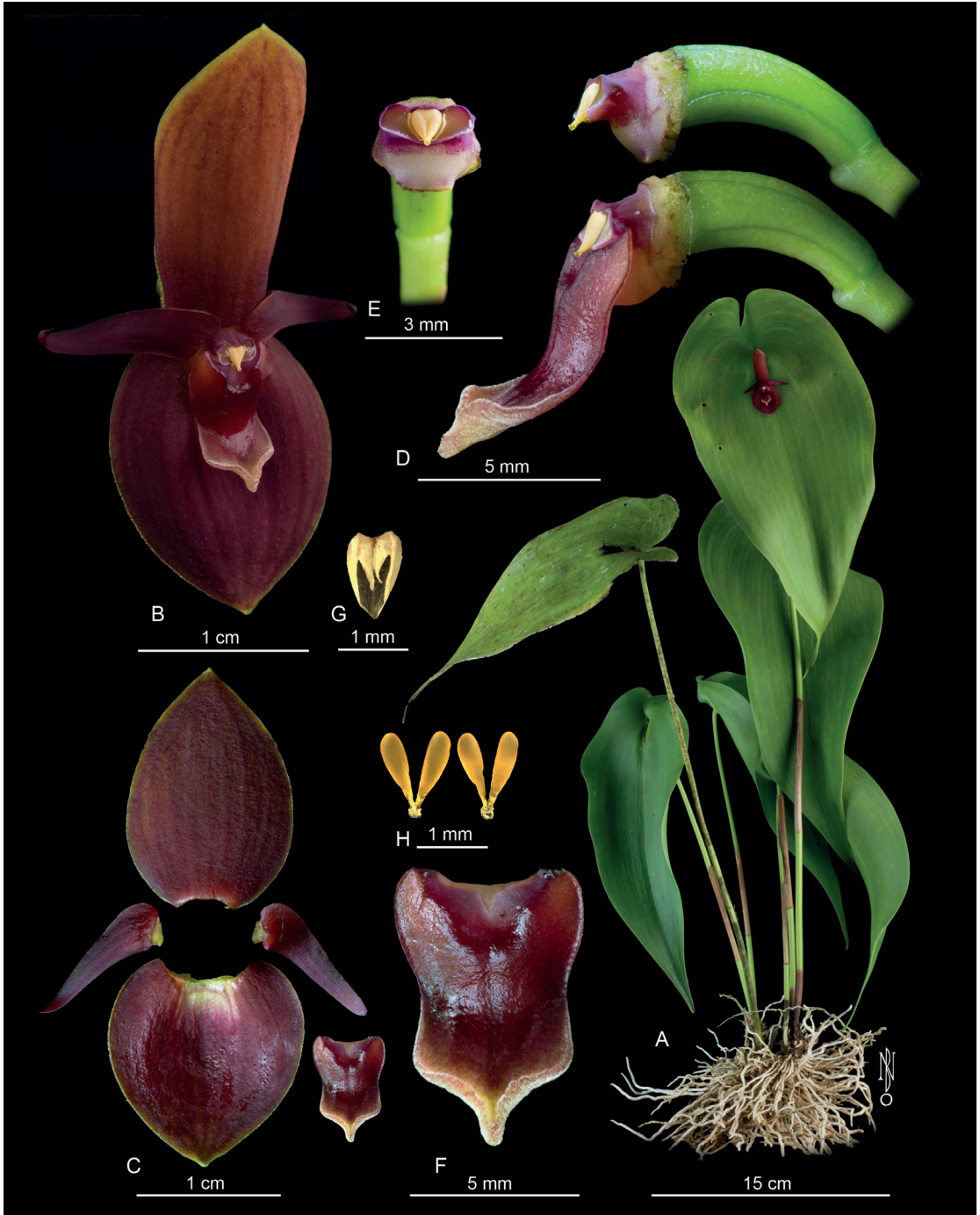


FIGURE 5. *Pleurothallis cardiothallis* Rehb.f. **A.** Hábito. **B.** Vista $\frac{3}{4}$ de la flor. **C.** Disección del perianto. **D.** Vistas laterales de la columna y ovario sin labelo, y de la columna y ovario con labelo. **E.** Columna, vista ventral. **F.** Vista adaxial del labelo. **G.** Antera. **H.** Polinario. Fotografías y LCPD de N. Belfort-Oconitrillo y A. P. Karremans basadas en *Karremans 6580* (JBL-spirit), publicadas originalmente por Karremans (2016). Reproducidas con el permiso de los editores de *Lankesteriana*.

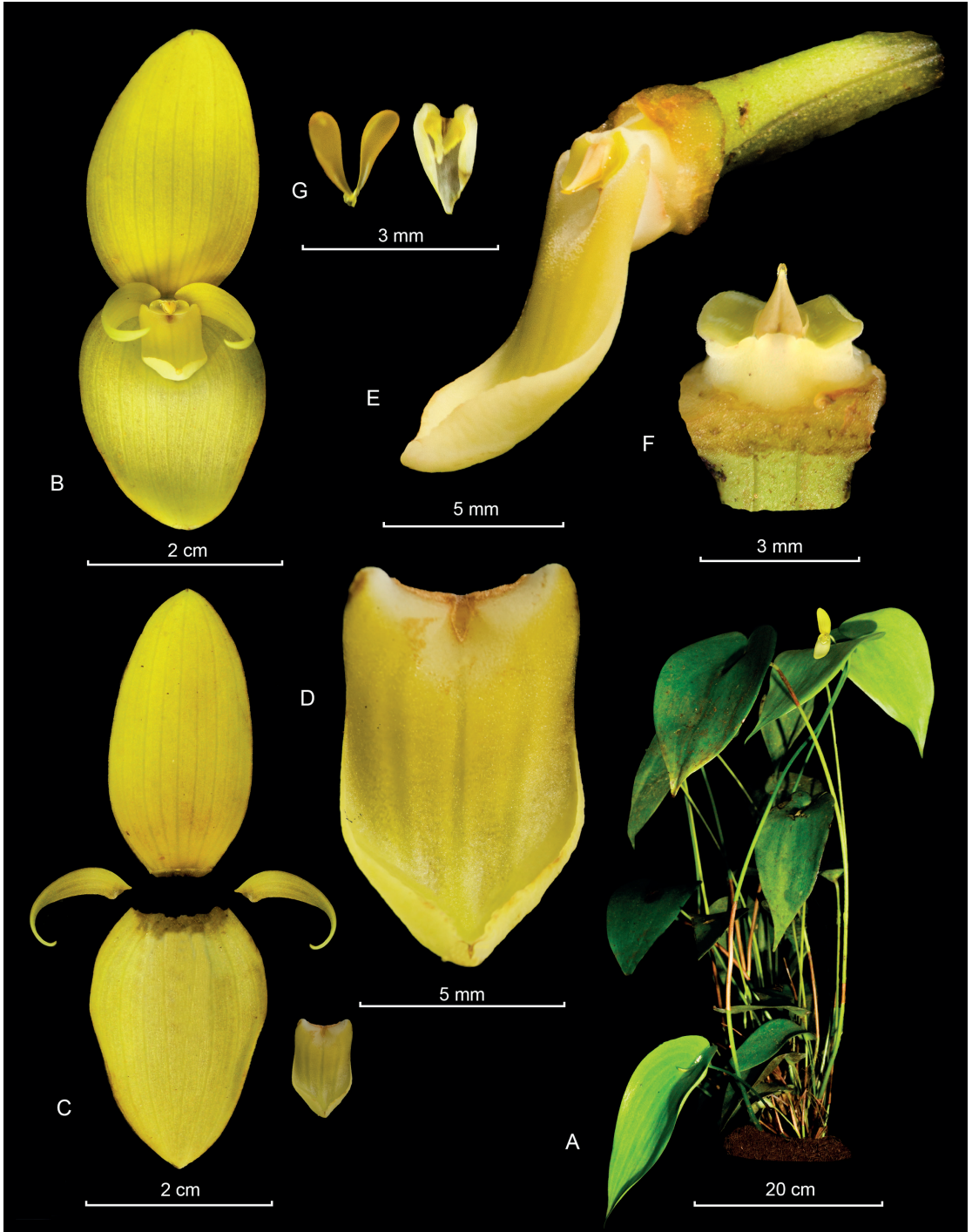


FIGURE 6. *Pleurothallis titan* Luer. A. Hábito. B. Vista frontal de la flor. C. Disección del perianto. D. Vista adaxial del labelo. E. Columna, labelo y ovario en vista $\frac{3}{4}$. F. Columna en vista ventral. G. Polinario y antera. Fotografías por M. Rincón y LCDP elaborado por M. A. Sierra-Ariza.

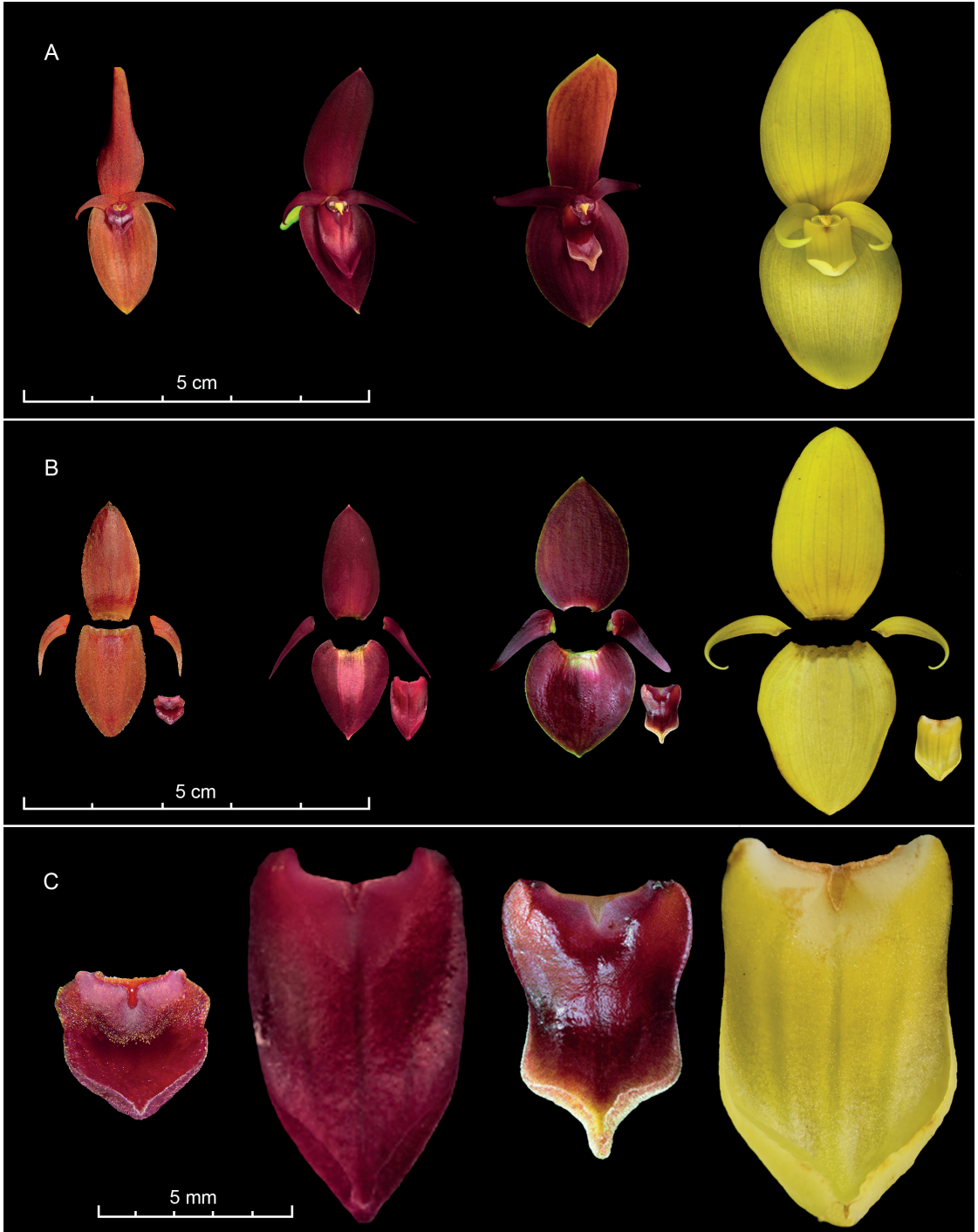


FIGURE 7. Lámina comparativa entre *P. villahermosae*, *P. callosa*, *P. cardiothallis*, y *P. titan* (de izquierda a derecha). A. Flor. B. Disección de la flor. C. Vista adaxial del labelo. Fotografías por M. A. Sierra-Ariza (*P. villahermosae*), M. Díaz (*P. callosa*), N. Belfort-Oconitrillo y A.P. Karremans (*P. cardiothallis*), y M. Rincón (*P. titan*). Elaborada por M.A. Sierra-Ariza.

CUADRO 1. Diferencias morfológicas entre *Pleurothallis villahermosae*, *P. callosa*, *P. cardiothallis* y *P. titan*.

	<i>P. callosa</i>	<i>P. cardiothallis</i>	<i>P. titan</i>	<i>P. villahermosae</i>
Hoja	Estrechamente ovada, acuminada, 10.5–13.5 × 3.0–5.5 cm.	Ovada, acuminada, 9–20 × 3.5–8.0 cm.	Ovada, acuminada, 15–25 × 7–14 cm.	Ovada, acuminada, 14–19 × 5–8 cm.
Sépalo dorsal	Elíptico, agudo, 17 × 8–9 mm.	Ovado a suborbicular, obtuso, 11–18 × 8–14 mm.	Elíptico-ovado, sub-acuminado a obtuso. 25–35 × 15–21 mm.	Ovado-elíptico, acuminado, 20 × 8 mm.
Sinsépalo	Ovado, agudo. 13–15 × 10–11 mm.	Orbicular-ovado, 10–15 × 10–15 mm.	Ovado. 25–35 × 14–35 mm.	Ovado-elíptico, 20 × 10 mm.
Pétalos	Oblicuamente-lanceolados, 11.5 × 1.0–1.5 mm.	Oblicuamente lanceolados. 7–10 × 2–3 mm.	Estrechamente triangulares. 15–20 × 3–4 mm.	Lanceolado-falcados, 8.0 × 2.5 mm.
Labelo	Unguiculado, 10.0–10.5 × 6.5–7.0 mm; con 2 callos basales que se extienden hasta la mitad de la longitud del labelo.	Unguiculado, 5–9 × 4–6 mm; (sin callos).	Oblongo-obovado a subpandurado, 11–14 × 6.0–8.5 mm; (sin callos).	Cuadrangular-ovado, 4 × 4 mm; con 2 callos basales que ocupan un tercio de la longitud del labelo.
Glenion	Triangular.	Triangular.	Elíptico-lanceolado.	Oblongo-elíptico.

Pétalos membranáceos, falcado-lanceolados, acuminados, 1-nervados, papilosos, 8 × 2.5 mm. *Labelo* cuadrangular-ovado, redondeado, 3-nervado, cóncavo, márgenes laterales lobulados y erosos, margen apical involuto, vesiculoso en la superficie adaxial, papiloso en la abaxial, 4 × 4 mm; dos callos basales, oblongos, proyectados hacia el frente del labelo, alargados, ondulados, carnosos, notoriamente vesiculosos, poco elevados, convergentes, rodeando el glenion, formando una depresión visiblemente similar a la letra griega Omega (Ω) invertido, el glenion oblongo-elíptico, profundo; con engrosamiento sobre las nervaduras en la superficie abaxial formando tres quillas ovoides, centrales. *Columna* corta, recta, ancha. *Antera* amarilla, ovada, con dos celdas elípticas. *Polinios* 2, anaranjados, elípticos.

ETIMOLOGÍA: El epíteto *villahermosae* se da en honor al municipio de Villahermosa, en el departamento del Tolima, zona altamente diversa en flora orquideológica (Sierra-Ariza *et al.* 2020) donde se encontró esta especie.

DISTRIBUCIÓN, ECOLOGÍA Y CONSERVACIÓN: *Pleurothallis villahermosae* hasta el momento solo se conoce de un fragmento de bosque muy húmedo montano bajo (bmh-MB), en el municipio de Villahermosa, en elevaciones entre 2000 a 2250 metros, creciendo como epífita. Ha

sido observada en floración en los meses de junio y septiembre. Esta especie ha sido observada creciendo junto a *Pleurothallis perijaensis* Dunst. y *Pleurothallis cordata* (Ruiz & Pav.) Lindl., también pertenecientes a la subsección *Macrophyllae-Fasciculatae*.

ESTADO DE CONSERVACIÓN: Datos deficientes (DD). Hasta ahora esta especie solo se conoce de una población. Debido al nivel de disturbio actual que presenta su hábitat y el bajo número de individuos observados durante las expediciones realizadas, se recomienda evaluar el estado de conservación de la especie, pues presenta características de amenaza. Los bosques donde crece la especie y sus áreas circundantes no tienen ninguna figura de protección, encontrándose seriamente amenazados por tala y quema para la ampliación de la frontera agrícola y ganadera.

Discusión. esta especie es similar a *Pleurothallis callosa*, *Pleurothallis cardiothallis* (Fig. 5) y *Pleurothallis titan* Luer (Fig. 6), compartiendo similitudes morfológicas y geográficas, excepto con *P. callosa* que es conocida únicamente en Costa Rica. Estas especies comparten características vegetativas como hábito de crecimiento, forma de las hojas, pétalos notoriamente ensanchados hacia la base y labelo ancho y cóncavo. Sin embargo, *P. villahermosae* se reconoce por tener pétalos falcado-lanceolados y un labelo más corto,

cuadrangular-ovado, con 2 callos basales, oblongos, proyectados hacia el frente del labelo, alargados, ondulados, carnosos, poco elevados, convergentes, rodeando el glenion, formando una concavidad similar a la letra griega Omega invertido, el glenion elíptico, profundo; tres quillas centrales en la parte abaxial, ovoides (Fig. 6, Cuadro 1). También puede compararse con *Pleurothallis dewildei* Luer & R. Escobar, pero esta última se diferencia por tener pétalos triangular-ovados y labelo ampliamente cordado-ovado.

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LITERATURE CITED

- Brown, R. (1813). *Hortus Kewensis; or, a Catalogue of the Plants Cultivated in the Royal Botanic Garden at Kew*. London: William Aiton. 211 pp. Doi: <https://doi.org/10.5962/bhl.title.105339>
- Doucette, A., Wilson, M., Portilla, J., Kay, A., Moreno, J. S. & Cameron, K. M. (2016). Dos especies nuevas de *Pleurothallis* y un nuevo nombre para *Acronia rinkei*. *Orquideología*, 33(2), 123–139.
- Karremans, A. P. (2016). *Genera Pleurothallidarum*: An updated phylogenetic overview of Pleurothallidinae. *Lankesteriana*, 16(2), 219–241.
- Karremans, A. P. & Vieira-Uribe, S. (2020). *Pleurothallids Neotropical Jewels - Volume I*. Quito, Ecuador: Imprenta Mariscal. 320 pp.
- Lindley, J. (1859). *Folia Orchidaceae. An enumeration of the known species of orchids*. London: J. Matthews. 9–12 pp. Doi: <https://doi.org/10.5962/bhl.title.51709>
- Luer, C. A. (1986). *Icones Pleurothallidarum III: Systematics of Pleurothallis. Monographs in Systematic Botany from the Missouri Botanical Garden*, 20, 1–109.
- Luer, C. A. (1988). A revision of some sections of subgenus *Pleurothallis*. *Lindleyana*, 3(3), 133–149.
- Luer, C. A. (2005). *Icones Pleurothallidarum XXVII: Dryadella and Acronia section Macrophyllae-Fasciculatae: addenda to Acianthera, Andinia, Dracula, Dresslerella, Lepanthes, and Masdevallia; new taxa, validation of taxa, errata. Monographs in Systematic Botany from the Missouri Botanical Garden*, 103, 1–311.
- Ministerio de Ambiente y Desarrollo Sostenible y Universidad Nacional de Colombia (2015). *Plan para el estudio y la conservación de las orquídeas en Colombia*. Textos: Betancur, J., H. Sarmiento-L., L. Toro-González & J. Valencia. Ministerio de Ambiente y Desarrollo Sostenible, Colombia; Universidad Nacional de Colombia, Bogotá D.C. Pp. 336.
- Pridgeon, A. M., Solano, R. & Chase, M. W. (2001). Phylogenetic relationships in Pleurothallidinae (Orchidaceae): Combined evidence from nuclear and plastid DNA sequences. *American Journal of Botany*, 88(12), 2286–2308.
- Pupulin, F. (2020). *Vanishing Beauty. Native Costa Rican Orchids Vol. 2. Lacaena-Pteroglossa*. Oberreifenberg, Germany: Koeltz Botanical Books. 1003 pp.
- Pupulin, F., Aguilar, J., Belfort-Oconitrillo, N., Díaz-Morales, M. & Bogarín, D. (2021). *Florae Costaricensis subtribui Pleurothallidinis (Orchidaceae) Prodromus II*. Systematics of the *Pleurothallis cardiothallis* and *P. phyllocardia* groups, and other related groups of *Pleurothallis* with large vegetative habit. *Harvard Papers in Botany*, 26(1), 203–295. Doi: 10.3100/hpib.v26iss1.2021.n14
- Pupulin, F., Díaz-Morales, M., Aguilar, J. & Fernández, M. (2017). Two new species of *Pleurothallis* (Orchidaceae: Pleurothallidinae) allied to *P. cardiothallis*, with a note on flower activity. *Lankesteriana*, 17(2), 329–356. Doi: 10.15517/lank.v17i2.30272
- Sierra-Ariza, M., Rincón-González, M. & Villanueva, B. (2020). *Síntesis de las orquídeas de la cuenca del río Azufrado-Tolima, CO*. (tesis pregrado inédita). Universidad del Tolima, Ibagué.
- Wilson, M., Belle, C., Dang, A., Hannan, P., Kenyon, C., Low, H., Stayton, T. & Woolley, M. (2011). A phylogenetic analysis of the genus *Pleurothallis*, with emphasis on *Pleurothallis* subsection *Macrophyllae-Fasciculatae*, using nuclear ITS and chloroplast DNA sequencing. *Lankesteriana*, 11(3), 369. Doi: 10.15517/lank.v11i3.18304
- Wilson, M., Zhao, K., Hampson, H., Frank, G., Romoleroux, K., Jiménez, M. & Pérez, Á. J. (2018). A new species of *Pleurothallis* (Orchidaceae: Pleurothallidinae) in subsection *Macrophyllae-Fasciculatae* with a unique, highly reduced, morphologically distinct labellum. *Lankesteriana*, 18(3), 217–230. Doi: 10.15517/LANK.V18I3.35495

A NEW SPECIES AND A NEW RECORD OF *MALAXIS* (MALAXIDINAE) FROM COSTA RICA

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ABSTRACT. We describe and illustrate a new species and a new record of *Malaxis* from the lower montane and montane forests of Costa Rica. Taxonomic descriptions, illustrations, distribution maps, and conservation assessments are provided for each species. *Malaxis excentrica* sp. nov. is morphologically similar to *Malaxis simillima*, from which it can be distinguished by having a single leaf per sympodial unit, shorter, obovate, erect petals parallel to the column, the lip with triquetrous, acute, convex apical margin and the disc cavity divided by a costa. *Malaxis pittieri* is formally recorded for the flora of Costa Rica; Costa Rican specimens of this species were previously confused with *Malaxis majanthemifolia*. A lectotype for *Microstylis pittieri* is formally designated.

RESUMEN. Describimos e ilustramos una nueva especie y un nuevo registro de *Malaxis* de los bosques montano bajo y montano de Costa Rica. Se proporcionan descripciones taxonómicas, ilustraciones, mapas de distribución y evaluaciones de conservación para cada especie. *Malaxis excentrica* sp. nov. se asemeja morfológicamente a *Malaxis simillima*, de la cual se puede distinguir por tener una hoja por unidad simpodial, los pétalos más cortos, obovados, erectos, paralelos a la columna, el labelo con el margen apical triquetro, agudo, convexo y la cavidad del disco dividida por una costa. *Malaxis pittieri* se documenta formalmente para la flora de Costa Rica; anteriormente, los ejemplares costarricenses de esta especie se confundían con *Malaxis majanthemifolia*. Se designa formalmente un lectotipo para *Microstylis pittieri*.

KEYWORDS/PALABRAS CLAVE: *Malaxis acianthoides*, *Malaxis excentrica*, *Malaxis fastigiata*, *Malaxis majanthemifolia*, *Malaxis pittieri*, *Malaxis simillima*

Introduction. *Malaxis* Sol. ex Sw. (Epidendroideae: Malaxideae: Malaxidinae) in its traditional circumscription is a cosmopolitan genus comprising ca. 300 species. It has a broad pantropical distribution and few species in the temperate regions of the Americas, Asia, and Europe (Cribb 2005). However, preliminary molecular phylogenetic analyses of Malaxidinae suggest that *Malaxis* in a broad sense is polyphyletic and that the genus in the strict sense may rather be restricted to America (Cameron 2005, Radins *et al.* 2014). In the Americas, there are 143 species of *Malaxis sensu lato* currently recognized; Mexico harbors the highest species diversity with 71 published species, 45 of them endemic, followed by

Costa Rica with 22 species, six of them endemic, and then Panama with 17 species, two of them endemic (Bernet *et al.* 2021, Chinchilla 2019, Chinchilla *et al.* 2020a, Dodson 2002, Dressler 2003, 2009, Espejo Serna *et al.* 2002, Flora do Brasil 2021, González Tamayo *et al.* 2008, Ulloa Ulloa *et al.* 2018 onwards, Villaseñor 2016). Nonetheless, as detailed taxonomic studies on *Malaxis* are carried out in local and regional floras, the species richness increases in countries where the genus has previously been underestimated, such as Colombia, Ecuador, and Peru (Chinchilla 2019).

In Costa Rica, species of *Malaxis* grow at elevations from 200 to 3650 m, in tropical wet to subalpine

pluvial forests. However, the highest species diversity is found between 1000 and 2800 m in the country (Chinchilla 2019, Chinchilla *et al.* 2020a). The montane forests of the main mountain ranges of Costa Rica, especially the Talamanca mountain range, harbor the greatest diversity and endemism of *Malaxis* (Chinchilla 2019, Chinchilla *et al.* 2020a, Dressler 2003).

Despite that numerous botanical expeditions have been carried out in different locations of Costa Rica, there are still little explored areas where new or unrecorded species of orchids may be harbored (Bogarín 2011, Bogarín *et al.* 2020, Chinchilla *et al.* 2020b, Fernández *et al.* 2014, Karremans & Díaz-Morales 2016, Karremans *et al.* 2012). To update floristic inventories and contribute to the knowledge of *Malaxis*, we have carried out botanical explorations in these less explored areas to collect, document, and identify their species (Chinchilla 2019). In the Talamanca mountain range, specimens of *Malaxis* were collected that did not match any of the previously reported species in the country. The examination of herbarium specimens revealed they coincide with the Panamanian *Malaxis pittieri* (Schltr.) Ames, which is here recorded for the first time in Costa Rica. Additionally, a Costa Rican specimen of *Malaxis* kept at the United States National Herbarium (US), does not match any of the species described for the genus and is described here.

Materials and methods. This study was carried out between 2015 and 2019. It is based on collections from Costa Rica and Panama. Living plants of *M. pittieri* collected in Costa Rica were photographed using a Nikon® 7100 camera, and the herbarium specimens were deposited at JBL and USJ. Sketches of *M. pittieri* were prepared from fresh material, while sketches of *M. excentrica* were prepared using rehydrated flowers from the holotype specimen. Both were digitized and diagrammed in a composite plate using Adobe Photoshop CS6® and digitally delineated and shaded with an Apple Pencil® in Procreate application for iPad Pro® tablet (Apple Inc.). Specimens of *Malaxis* were examined in the following herbaria: AMES, CR, F, HLDG, JBL, MO, SEL, US and USJ (physically), and B, BM, BRIT, COLO, DAO, G, GH, GM, GOET, IBUG, K, L, M, NY, P, PMA, UCH and W (through digital images).

A distribution map was prepared using the QGIS 3.8 Zanzibar program (QGIS Development Team

2019), based on satellite imagery updated to 2021 from Microsoft Bing Maps, Microsoft Corporation®, Earthstar Geographics SIO, 2021© TomTom. The locations of the examined specimens were classified according to the Holdridge life zone system (Holdridge 1967). The phenology was determined from examination of herbarium specimens and their labels. The conservation status of each species was assessed according to the methodology of the International Union for Conservation of Nature (IUCN 2019). For *M. pittieri*, the Extent of Occurrence (EOO) and Area of Occupancy (AOO) were estimated based on the studied specimens using geographical data with the Geospatial Conservation Assessment Tool (GeoCAT; Royal Botanic Gardens, Kew: <http://geocat.kew.org>).

TAXONOMIC TREATMENT

Malaxis excentrica Chinchilla, Karremans & M.A. Blanco, *sp. nov.* (Fig. 1).

TYPE: Costa Rica. Puntarenas: cantón Coto Brus, distrito Sabalito, Reserva de la Biosfera de La Amistad, cerca Estación Biológica Las Alturas de Cotón, 08°57'00,3" N, 082°49'56,8" W, 2000 m, 08 julio 1994, W. J. Kress & J. L. Tuxill 94-4775 (holotype: US!-3314101, barcode 00509021).

DIAGNOSIS: Vegetatively similar to *Malaxis simillima* (Rchb.f.) Kuntze, but differs in having one leaf (*vs.* two leaves) per sympodial unit, shorter (1.0–1.2 mm *vs.* 2.3–3.8 mm) petals that are obovate, erect, parallel to the column (*vs.* linear, recurved, surrounding the ovary), the lip with triquetrous, acute, convex (*vs.* trifid, concave) apical margin, and the disc cavity divided (*vs.* non-divided) by a costa.

A terrestrial, erect, rhizomatous *herb* 25.3 cm tall, including the inflorescence. *Roots* flexuous, short, up to 4.5 cm long × 2 mm in diameter, pubescent. *Pseudobulbs* 32 × 13 mm, epigeous, heteroblastic, conical, separated by an ascending rhizome with two internodes each subtended by one cataphyll, 6 cm long, when immature covered with leaf sheaths becoming scarious and papyraceous with age, and two ovate, obtuse, cataphylls 30–55 × 10–20 mm, the margins free or connate

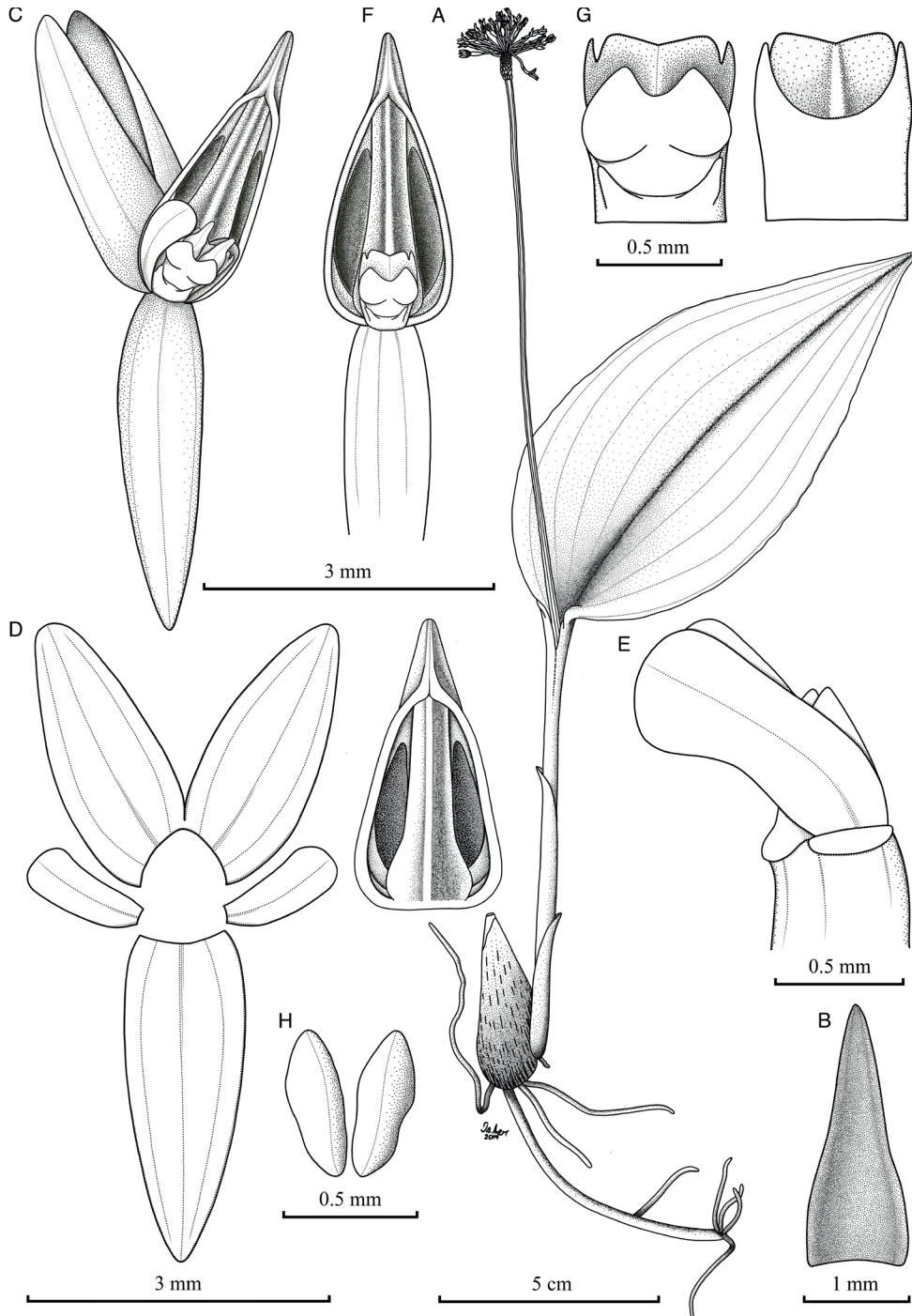


FIGURE 1. *Malaxis excentrica*. A. Habit. B. Floral bract, adaxial view. C. Flower, oblique view. D. Dissected perianth (the lip on the right), flattened. E. Apex of ovary, petals and column, lateral view. F. Ovary, lip and column. G. Column, dorsal (left) and ventral (right) views. H. Pollinia. Drawn from the holotype by Isler F. Chinchilla.

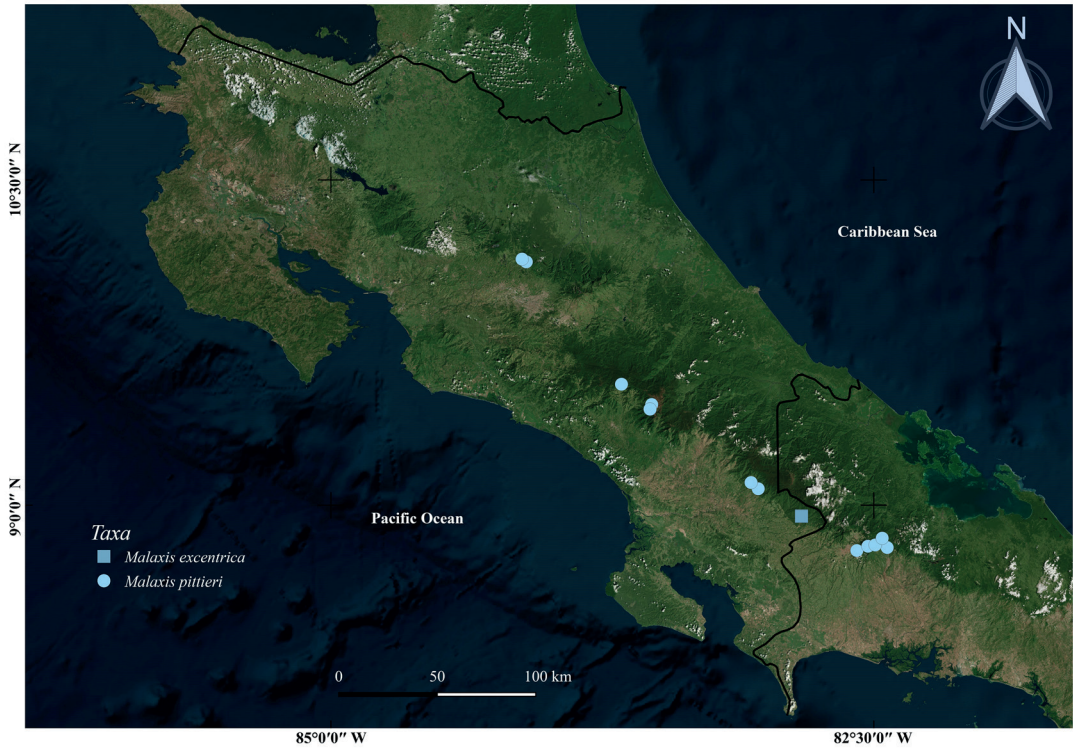


FIGURE 2. Distribution of *Malaxis excentrica* and *Malaxis pittieri*, based on the specimens examined. Satellite image source: Microsoft Bing Maps (2021). Prepared by Isler F. Chinchilla.



FIGURE 3. Flowers of *Malaxis simillima*. From left to right: front, oblique, lateral and back views (Chinchilla et al. 3183, JBL-spirit). Scale bar = 3 mm. Photographs by Isler F. Chinchilla.

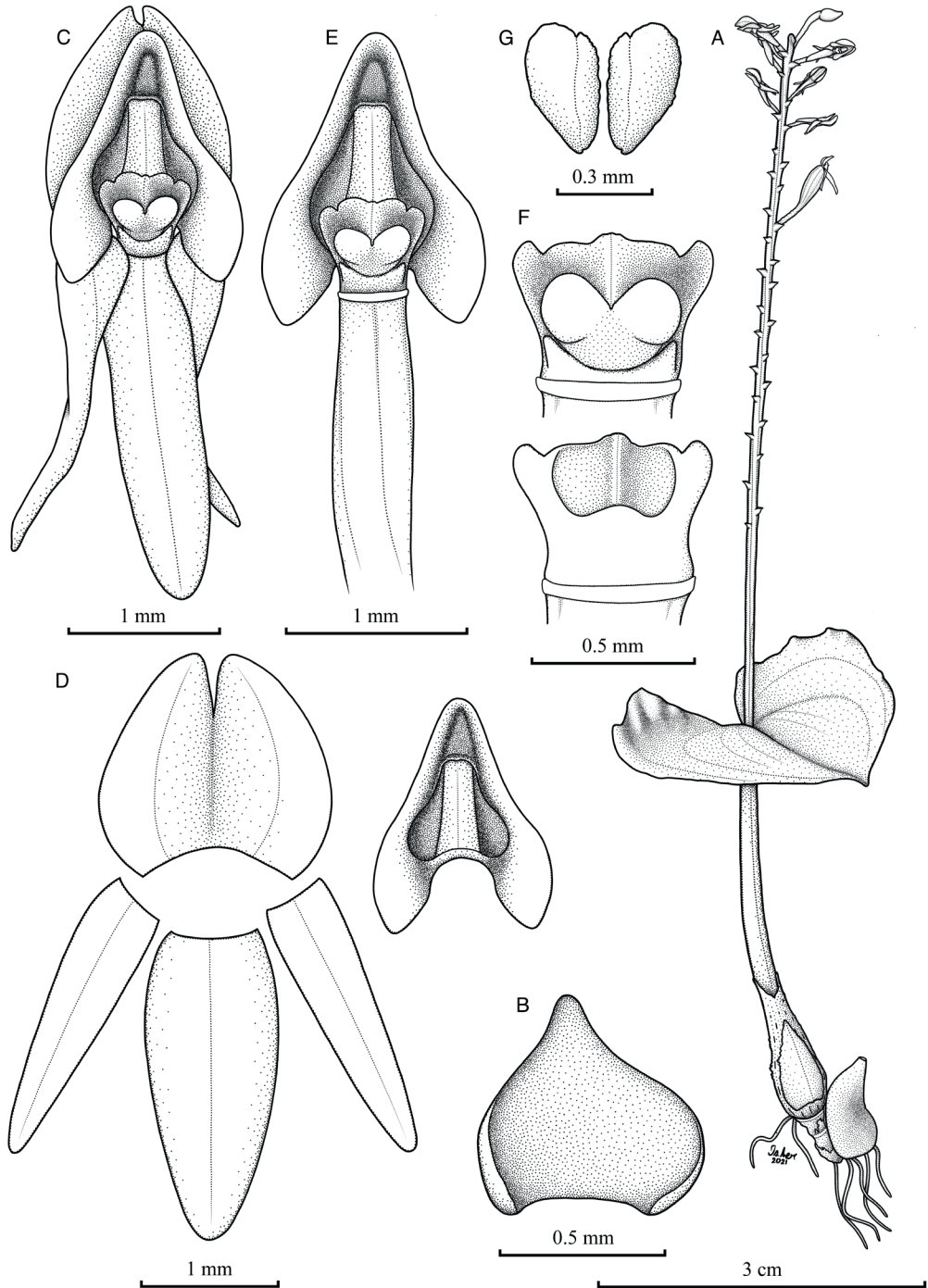


FIGURE 4. *Malaxis pittieri*. A. Habit. B. Floral bract, adaxial view. C. Flower, front view. D. Dissected perianth (the lip on the right), flattened. E. Ovary, lip and column. F. Column, dorsal (top) and ventral (bottom) views. G. Pollinia. Based on *Chinchilla* 3340 (JBL-spirit). Illustration by Isler F. Chinchilla.

up to $\frac{3}{4}$ of their length, shedding as the pseudobulb matures. *Leaves* one per sympodial unit, produced from the base of the pseudobulb, long-petiolate, conduplicate, soft-textured; sheaths with the margins connate for $\frac{3}{4}$ of their length, forming a pseudostem, 8.20 × 0.45 cm; the blade ovate, rounded, acute, the margins undulate, nine-veined, 12.2 × 6.2 cm, ascending, green. *Inflorescence* produced from the apex of the pseudobulb, erect, corymbose, 22.5 cm long; peduncle 21.0 × 0.25 cm, covered near the proximal half with leaf sheaths, seven-keeled; rachis 9.5 mm long. *Floral bracts* ovate, acute to obtuse, concave, green, 1.2–2.5 × 0.6–1.2 mm. *Pedicellate ovary* terete, inconspicuously keeled, with a 180-degree twist, 6–10 mm long. *Flowers* non-resupinate, spreading, green. *Dorsal sepal* elliptic, obtuse, convex, adpressed to the ovary, 2.7–3.5 × 1.0–1.7 mm, three-veined. *Lateral sepals* elliptic, obtuse, convex, divergent, margins recurved, 2.5–3.6 × 1.0–1.6 mm, connate at the base 0.5–0.8 mm, three-veined. *Petals* obovate, rounded, erect, lightly arcuate, parallel to the column, one-veined, 1.0–1.2 × 0.4–0.5 mm. *Lip* simple, concave, triangular, truncate, acute, papillose, fleshy, margins entire, thick, rounded, that apically converge into a triangular rim, 2.0–3.2 × 1.0–1.8 mm; the disc cavity ovate in outline, rounded, obtuse, 1.4–2.0 × 0.7–1.3 mm × 0.5–0.6 mm deep, divided by an obtuse, compressed costa, adaxially provided with a carina, subcavities narrowly elliptic, apically delimited by a semilunate emergent thickening; apical margin triquetrous, convex, porrect, acute, 0.7–0.9 mm long. *Column* 0.75–1.0 × 0.6–0.7 mm, rectangular, dorsiventrally compressed, the apex ventrally four-lobed; rostellum erect, adaxially slightly convex, emarginate; stigma obcordate, concave, longitudinally bilobed, ca. 0.4 × 0.5 mm. *Pollinia* four in two obovoid, ventrally concave hemipollinaria, 0.50–0.55 × 0.2–0.25 mm. *Fruits* unknown.

ETYMOLOGY: The specific epithet comes from the Latin *excentricus*, meaning eccentric or out from the center, in reference to the shape and position of petals, which are atypical in *Malaxis*.

DISTRIBUTION AND HABITAT: Currently known only from the type specimen collected at Las Alturas de Cotón Biological Station in Las Tablas Protective Zone, on the Pacific slope south of the Talamanca mountain

range in Costa Rica (Fig. 2). It grows in the lower montane very wet forest at 2000 m in elevation.

PHENOLOGY: The only known specimen was collected in flower in July.

Malaxis excentrica has obovate, erect petals, that are parallel to the column and barely exceed the length of the column. This unique feature distinguishes the species from all other members of the genus. Furthermore, the position of the petals is reminiscent of those of species belonging to the genus *Hippeophyllum* Schltr., another genus of the Malaxidinae endemic to Melanesia (Cribb 2005).

Due to the ascending rhizome, conical pseudobulb, ovate leaf blade, and corymbose, compact inflorescence, *M. excentrica* is similar to *M. simillima*, but the latter has up to three sympodial units with leaves that are foveate, deeply lustrous, with undulate margins, the yellowish-green to yellow flowers, the petals incurved, arcuate, the lip deeply concave, with margins thin (*vs.* thick), incurved, apically with erect, thin, diverging lateral teeth, the mid-tooth porrect, thin, flat, exceeding more than twice the length of the teeth lateral, the column robust, fleshy, the rostellum deeply emarginate and the hemipollinaria narrowly (*vs.* obovoid) claviform (Fig. 3).

The dried flowers of *Malaxis excentrica* may be confused with those of *Malaxis fastigiata* (Rchb.f.) Kuntze, a species ranging from Mexico and Guatemala. The latter can be distinguished from *M. excentrica* by the longer (*ca.* 2.5 mm), linear, recurved petals, the lip subcordate (*vs.* rounded) at the base, with disc cavity occupying up to $\frac{1}{2}$ (*vs.* more than $\frac{3}{4}$) of its length, divided by a pandurate (*vs.* obtuse) costa, and the triangular, complanate (*vs.* triquetrous, convex) apical margin.

CONSERVATION STATUS: *Malaxis excentrica* is endemic to Costa Rica, known from a single location in Las Tablas Protective Zone, Talamanca mountain range. Fortunately, the forest where it was found is conserved. Further studies on the ecology and population size of this species are required to guarantee its long-term conservation. Therefore, the species is listed as Least Concern (LC), following the IUCN (2019: section 10.4) recommendations.

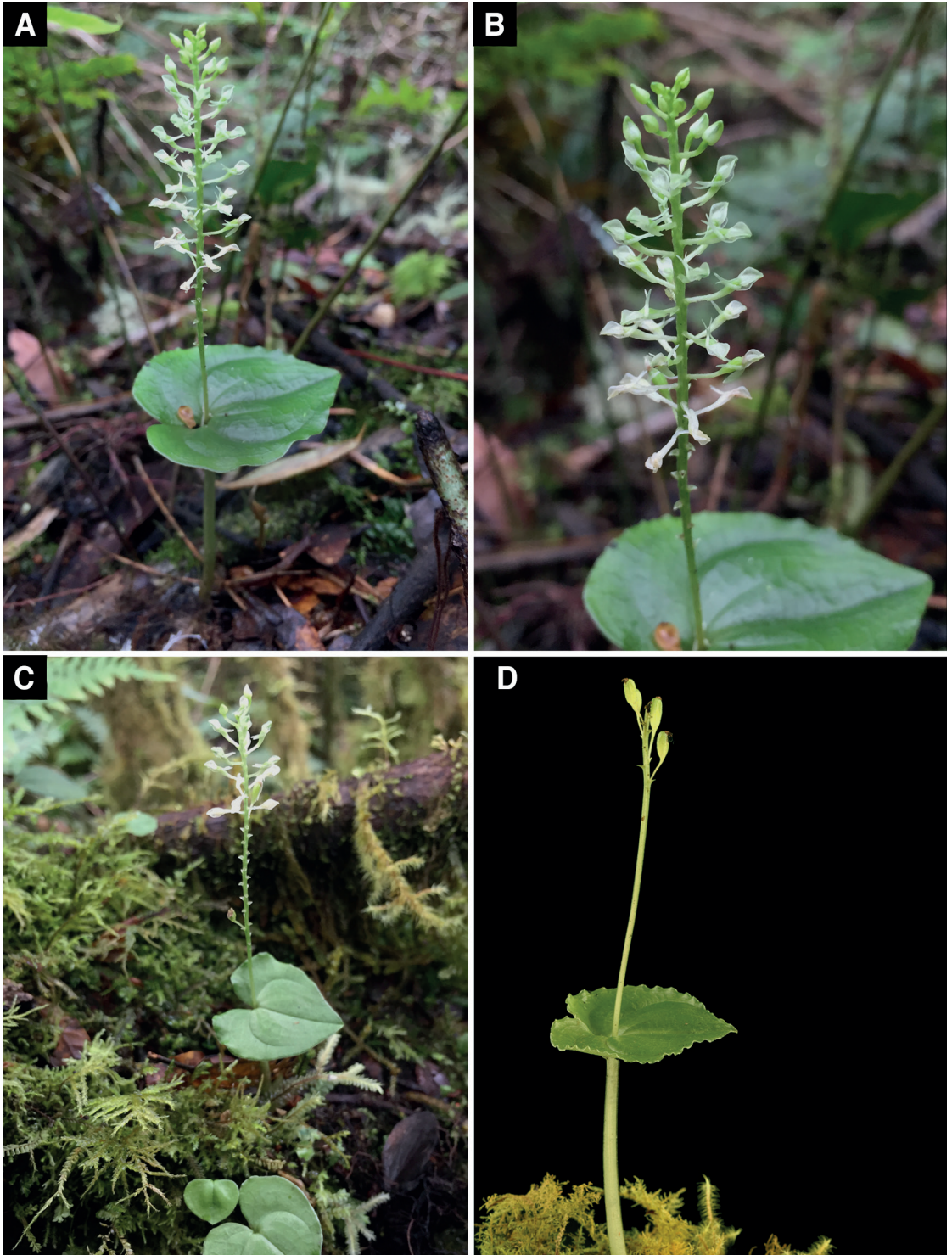


FIGURE 5. Plants of *Malaxis pittieri* in situ. **A–B.** Chinchilla 3338. **C.** Chinchilla 3340. **D.** Chinchilla 3341. All the vouchers at JBL-spirit. Photographs by Isler F. Chinchilla.

Malaxis pittieri (Schltr.) Ames, *Proc. Biol. Soc. Washington* 35: 84. 1922. (Fig. 4, 5, 6, 7). Basionym: *Microstylis pittieri* Schltr., *Repert. Spec. Nov. Regni Veg.* 12: 203. 1913.

TYPE: Panama. Chiriqui: Feuchte Wälder zwischen Alto de las Palmas und dem Gipfel des Cerro de Horqueta, 2100–2268 m ü. d. M., blühend im [11] März 1911, *H. Pittier 3277* (holotype: B, destroyed [tracing of Schlechter's floral analysis of the holotype: AMES-24153/00101736 (Fig. 8A)]; isotypes: AMES-00082841, a flower conserved in glycerine; US-677667/00093447, **designated here as lectotype** (Fig. 8B) [drawings of the lectotype: AMES-24152/00101737 (Fig. 8C)]; Schlechter's floral analysis from the holotype, reproduced in Mansfeld (1931: t. 17, no. 61; Fig. 8D).

A terrestrial or epiphytic, erect, subcaespitose to rhizomatous *herb* 4.5–20.0 cm tall, including the inflorescence. *Roots* flexuous, short, up to 3.5 cm long \times 2.0 mm in diameter, pubescent. *Pseudobulbs* 7–20 \times 3–10 mm, epigeous, heteroblastic, conical, separated by an ascending rhizome with two internodes, subtended by one cataphyll, 0.3–6.0 cm long, pale greenish, when immature, covered with leaf sheaths becoming scarious and papyraceous with age, and one greenish, ovate, obtuse cataphyll with inconspicuous tufts of hairs at the base, 12–40 \times 5–10 mm, the margins connate, shedding as the pseudobulb matures. *Leaves* one per sympodial unit, produced from the base of the pseudobulb, long-petiolate, conduplicate, soft-textured; sheaths whitish-green, four-angled, the margins connate forming a pseudostem, 3.5–9.5 \times 0.15–0.30 cm; the blade ovate, cordate-amplexicaul, acute, the margins undulate, five-seven-veined, 1.7–4.6 \times 1.8–3.8 cm, horizontal, adaxially dark green, lustrous, abaxially light green to whitish-green, dull. Inflorescence produced from the apex of the pseudobulb, erect, racemose, lax, 4–18 cm long; peduncle 3.5–13.5 \times 0.1–0.2 cm, covered up to on lower 3/4 with leaf sheaths, sometimes with a 180 degree twist, five-seven-keeled; rachis 5–65 mm long. *Floral bracts* ovate, acuminate, papillose, concave, greenish, pellucid, 0.5–1.5 \times 0.7–1.0 mm. *Pedicellate ovary* terete, inconspicuously keeled, with a 360-degree twist, 3–7 mm long, white, pellu-

cid. *Flowers* non-resupinate, spreading, lustrous, pellucid; sepals and petals white, lip white with a light to dark green stripe along the costa that extends to the apex of the lip, the column greenish with the operculum and rostellum white; becoming orangish with age. *Dorsal sepal* elliptic, obtuse, convex, adpressed to the ovary, one-veined, 2.2–2.5 \times 0.8–1.0 mm. *Lateral sepals* asymmetrically elliptic, acute to obtuse, convex, convergent, the outer margins becoming recurved as anthesis progresses, 1.8–2.3 \times 0.7–1.0 mm, the inner margins connate along 1.3–1.7 mm, one-veined. *Petals* narrowly lanceolate, obtuse to acute, margins revolute, recurved, arcuate, surrounding the ovary, one-veined, 2.0–2.3 \times 0.3–0.5 mm. *Lip* trilobed, concave, sagittate, papillose, membranaceous, margins entire, thin, 1.7–2.4 \times 1.2–1.6 mm; lateral lobes triangular, obtuse to acute, recurved, spreading, 0.5–0.8 \times 0.4–0.5 mm; midlobe triangular, 1.4–1.7 \times 0.9–1.1 mm, with the disc cavity ovate in outline, subcordate, obtuse, 0.7–1.0 \times 0.4–0.8 mm \times 0.3–0.5 mm deep, divided by a faint, compressed costa, basally wider, subcavities narrowly lanceolate, pellucid, apically delimited by a semilunate emergent thickening, shortly raised into a rounded margin; apical margin triangular, obtuse, concave, porrect, 0.4–0.6 mm long. *Column* 0.5–0.7 \times 0.5–0.7 mm, rectangular, dorsiventrally compressed, the apex ventrally four-lobed; rostellum erect, truncate, bearing two viscaria at the apex; stigma transversally oblong, subcordate, concave, longitudinally bilobed, 0.15–0.25 \times 0.35–0.40 mm. *Pollinia* four in two obovoid, ventrally concave hemipollinaria, 0.30–0.50 \times 0.15–0.30 mm. *Fruits* ellipsoid capsules, 3.0–8.0 \times 1.5–3.0 mm.

ETYMOLOGY: The specific epithet honors the Swiss botanist Dr. Henri François Pittier (1857–1950), who collected the type specimen. Pittier was one of the most influential scientists for Costa Rican botany; his work, leadership, and academic knowledge contributed to the formation of what is now the National Herbarium of Costa Rica and the development of scientific research on the flora of the country.

DISTRIBUTION AND HABITAT: From Costa Rica and Panama, where it grows at 1500–3036 m of elevation. *Malaxis pittieri* is recorded here for the first time for the flora of Costa Rica on the Pacific slope of the Cen-



FIGURE 6. Inflorescences of *Malaxis pittieri* bearing recently opened flowers, showing the lip with the entire apex. **A.** From Costa Rica (*Chinchilla et al.* 2341, JBL-spirit). **B.** From Panama (*Bogarín et al.* 11179, UCH). Photographs by Isler F. Chinchilla (A) and Diego Bogarín (B).

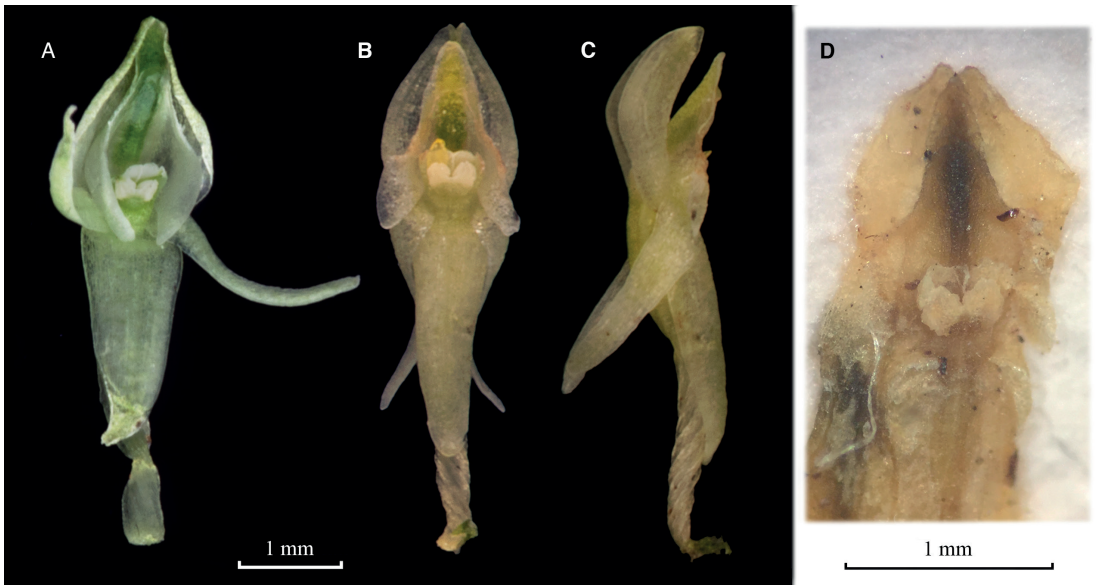
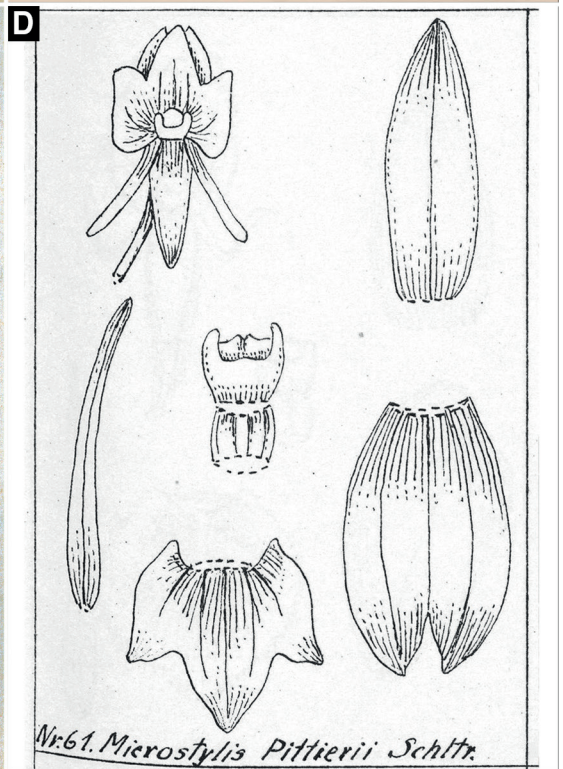
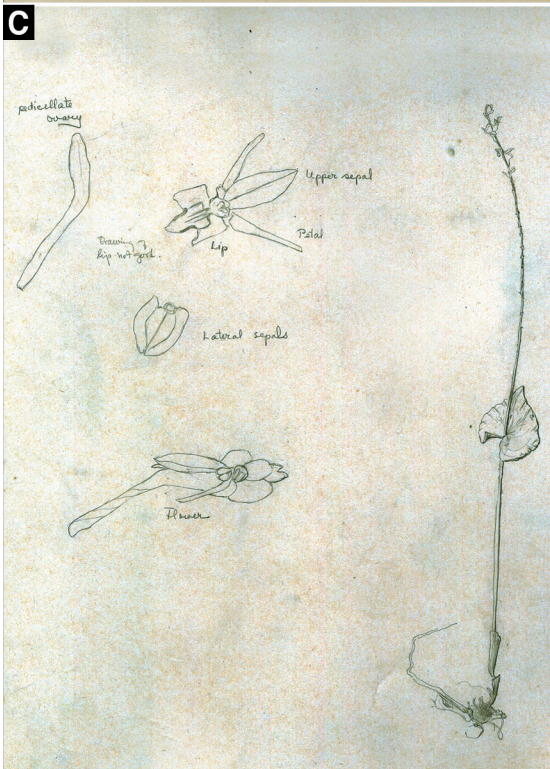
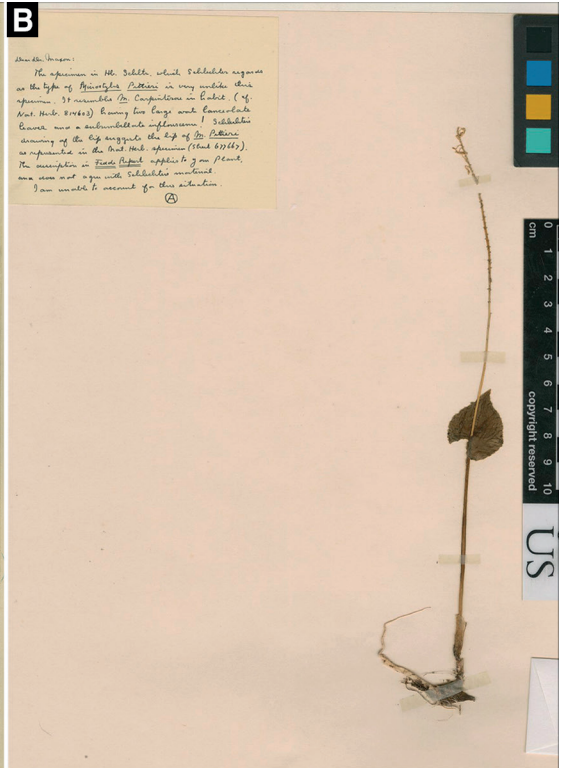


FIGURE 7. Flowers of *Malaxis pittieri*. **A–C.** From Costa Rica: **A.** A recently opened flower (*Chinchilla et al.* 2341, JBL-spirit). **B–C.** A flower in an early stage of dehydration showing the partially contracted lip (*Chinchilla* 3340, JBL-spirit). **D.** From Panama: A dehydrated flower with a contracted lip that simulates being apically trilobed (*Woodson & Schery* 474, MO). Photographs by Isler. F. Chinchilla.



tral Volcanic and Talamanca mountain ranges (García Castro *et al.* 1993 included it in an unvouchered list of orchid species common to Costa Rica and Panama, but their report must be considered speculative). In Panama, *M. pittieri* it is known from Chiriqui province (Fig. 2). It inhabits in lower montane and montane pluvial forests, in understory clearings, on very moist, mossy, and well-drained soils. It usually grows as a terrestrial, but sometimes as an epiphyte up to 1.5 m in height on moss-covered tree trunks (Fig. 5).

PHENOLOGY: Plants flower from March, June to September and bear fruits from June to August and December in the field.

OTHER SPECIMENS STUDIED: COSTA RICA. **Heredia:** Parque Nacional Braulio Carrillo, Volcán Barva Station, path and forest between park office and crater, 10°07'20" N, 84°06'00" W, 2700–2900 m, 13 Jul 1991, *H. Gay et al.* 1507 (CR); Barva, San José de la Montaña, Área de Conservación Central, Parque Nacional Braulio Carrillo, sector Volcán Barva, cerca del sendero que conduce a la laguna del Volcán Barva, aprox. 230 m de la Estación del MINAE, 10°08'05" N, 84°07'10" W, 2711 m, 15 Dic 2018, *I. Chinchilla et al.* 4031 (JBL-spirit); Braulio Carrillo Nat. Park, canton of Barva, Barva Station, in pastures around station, near stream, 10°07'20" N, 84°06'00" W, 2580 m, 10 Sep 1990, *S. Ingram et al.* 507 (CR). **Puntarenas:** Buenos Aires, Cuenca Térraba-Sierpe. Buenos Aires, Potrero Grande, Tres Colinas, ca. 800 m, bajando hacia Helechales, 09°06'16,80" N, 83°03'53,60" W, 1600 m, 14 Jun 2006, *D. Santamaría et al.* 4504 (CR); Buenos Aires, P. N. La Amistad. Cuenca Térraba-Sierpe, Sabanas Esperanza, entre 1° y 3° Sabana, 09°04'33" N, 83°01'55" W, 1600 a 1800 m, 01 Jun 2006, *J. F. Morales* 13929 (CR). **San José:** Pérez Zeledón, Albergue Cuericí, mirador trail above the Albergue Cuericí, 09°33'30" N, 83°39'42" W, 2600 m, 23 Jun 2002, *B. Boyle et al.* 6331 (USJ); [Valle del El General, San Isidro] Vale Gen. S. Isidro, Jun, *A. R. Endrés*

s.n. (W-1889–0030705); Pérez Zeledón, Rivas, Parque Nacional Chirripó, aprox. 200 m después del km 10, a la orilla del sendero, 09°26'35,30" N, 83°31'48,20" W, 3021 m, 23 Jul 2015, *I. Chinchilla et al.* 2305 (USJ); same data, *I. Chinchilla et al.* 2341 (JBL-spirit); same data, *I. Chinchilla et al.* 2342 (JBL-spirit); same locality, aprox. 300 m después del kilómetro 10, a la orilla del sendero, 09°26'33,67" N, 83°31'47,15" W, 3036 m, 13 Ago 2017, *I. Chinchilla* 3338 (JBL-spirit); same data, *I. Chinchilla* 3340 (JBL-spirit); same data, *I. Chinchilla* 3341 (JBL-spirit); [Pérez Zeledón] Fila Ventisqueros, Chirripó Gde., en el humus de la montaña alta [09°27'52" N, 83°31'21" W], 2000–3000 m, Ago 1971, *L. D. Gómez-Pignataro & W. C. Burger* 3418 (CR). PANAMA. **Chiriquí:** Boquerón, Cordillera, Paso Ancho, Aguacate, Finca Aguacatal, camino a la naciente del Río Breque, 08°47'28,6" N, 82°34'39,7" W, 2126 m, 04 Ago 2014, *D. Bogarín et al.* 11179 (UCH); Boquete, [08°48'18" N, 82°26'16" W], 5000 ft [1524 m], Jun. 27, 1938, *M. Davidson* 801 (AMES, F, US); Potrero Muleto to summit, Volcán de Chiriquí, [08°48'40" N, 82°31'35" W], 13–15 Jul 1940, *R. E. Woodson & R. Schery* 474 (MO); Vicinity of Casita Alta, Volcán de Chiriqué [08°49'01" N, 82°29'35" W], ca. 1500–2000 m, 28 Jun-02 Jul 1938, *R. E. Woodson et al.* 830 (AMES, BM, US).

Malaxis pittieri is distinguished by having a single leaf per sympodial unit with the margins of the sheaths connate, forming a pseudostem and the blade cordate-amplexicaul at the base, the inflorescence racemose, lax, bearing small, white flowers, the lateral sepals connate for more than half their length forming a galea behind the lip, and the lip trilobed, sagittate, with a green stripe along the costa that extends to the apex of the lip. Historically, it has been confused with *Malaxis majanthemifolia* Schltdl. & Cham., a species native from Mexico to Costa Rica (Fig. 9). However, *M. pittieri* differs in having white pedicels with a 360-degree twist (*vs.* greenish, not twisted), the sepals, petals, and lip white (*vs.* green to yellowish-green), the lip with a

Left: FIGURE 8. Type material of the *Microstylis pittieri*. **A.** Tracing of the original drawings of the floral analysis of the holotype of *M. pittieri* (AMES-24153 / 00101736), excluding the habit of a plant of a different species. Courtesy of the Orchid Herbarium of Oakes Ames, Harvard University Herbaria. **B.** Lectotype of *M. pittieri* (US-677667 / 00093447). Courtesy of the United States National Herbarium (US). **C.** Drawings of the lectotype of *M. pittieri* (AMES-24152 / 00101737). Courtesy of the Orchid Herbarium of Oakes Ames, Harvard University Herbaria. **D.** Schechter's drawings of the floral analysis from the holotype of *M. pittieri*, reproduced in Mansfeld (1931: t. 17, no. 61).

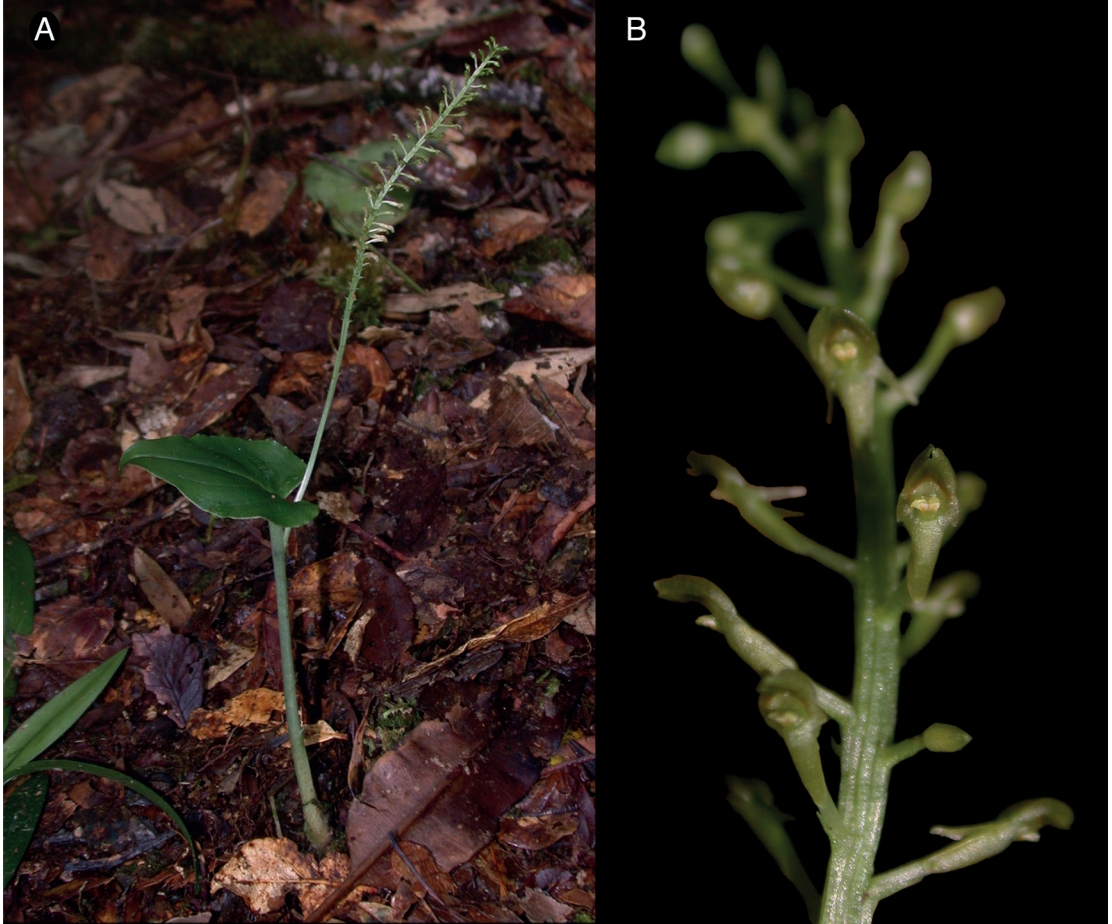


FIGURE 9. Plant habit (A) and inflorescence (B) of *Malaxis majanthemifolia* in situ (J. F. Morales 21193, CR). Photographs by Juan. F. Morales.

vertical green stripe (*vs.* dark brownish-green on the distal half), the disc cavity divided (*vs.* non-divided) by a costa into two subcavities, ending in a raised (*vs.* non-raised), rounded, concave (*vs.* flat) apical margin. *Malaxis pittieri* is vegetatively similar to *M. acianthoides* (Schltr.) Ames from Mexico and Guatemala, but the latter has green to yellowish-green flowers, the petals unguiculate, obliquely and transversely rhombic (*vs.* simple, narrowly lanceolate), the lip with lateral lobes of similar length to the mid lobe (*vs.* up to half the length of the midlobe), with ciliate-papillose (*vs.* entire) margins, and the disc cavity non-divided (*vs.* divided by a costa). *Malaxis cobanensis* Archila, Szlach. & Chiron, a Guatemalan endemic, is also vegetatively similar. But the latter has green sepals, petals and lip, the lip with disc cavity occupying up to $\frac{1}{3}$ (*vs.* more

than $\frac{3}{4}$) of its length, non-divided (*vs.* divided by a costa), and basally delimited by a transverse thickening (*vs.* not with a transverse thickening).

The first collection of *M. pittieri* in Costa Rica was made by the French botanist and orchidologist Auguste R. Endrés between 1866 and 1874 (*Endrés s.n.*, W-1889-0030705!; see Ossenbach *et al.* 2010). Subsequently, it has been collected multiple times in the country, but specimens have been misidentified as *M. majanthemifolia* and its presence has gone unnoticed for over 147 years. For example, the specimen cited as a Costa Rican voucher of *M. majanthemifolia* by both Pupulin (2002) and Dressler (2003) (*Ingram et al.* 507, CR) is a plant of *M. pittieri*.

Similarly, the specimens cited as a Panamanian vouchers of *M. majanthemifolia* (see Bogarín *et al.*

2014, Dressler 2009, Williams 1946) are indeed *M. pittieri*. *Malaxis majanthemifolia* to date has not been recorded in Panama.

NOMENCLATURE NOTES: Schlechter (1913) described *Malaxis pittieri* (as *Microstylis pittieri* Schltr.) with the lip trilobed at the apex as shown in the drawings of the type (Fig. 8C, D). The tracing of Schlechter's drawings of the holotype of *M. pittieri* at AMES (24153/00101736; Fig. 8A) show a floral analysis that coincides with the protologue of *M. pittieri* (and also with the original drawings of Schlechter, published posthumously by Mansfeld, 1931: t. 17, no. 61; Fig. 8D), but includes a plant habit drawing from a different species of *Malaxis*, because it has two leaves in the same sympodial unit, with opposite blades rounded at the base, and a corymbose inflorescence; inflorescence; Fig. 8A, center). This indicates a confusion with part of the type material when tracing the flower analysis and the plant habit of the holotype of *M. pittieri* in the Berlin herbarium (many of the flower analyses and plant habit of the types of orchid species that Schlechter described were traced after their publication upon Ames's request, for his own herbarium; Ames 1944). Oakes Ames, in a herbarium annotation on the specimen here designated as lectotype (US-677667/00093447, visible in the upper left corner in Fig. 8B) suggested that this drawing by the morphology of the leaves and inflorescence resembles *Microstylis carpintera* Schltr. [*Malaxis carpintera* (Schltr) Ames]. But it is impossible to determine with certainty from this drawing alone. However, *M. pittieri* consistently has one leaf cordate-amplexicaul at the base, and the lip with the entire apex (Fig. 6A–B); what happens is that when dehydrated, the lip apex undergoes a strong contraction that cleaves the apical margin, simulating a trilobed apex (Fig. 7A–D). The artifact described above was also verified with fresh material collected near the type locality of *M. pittieri* (D. Bogarín *et al.* 11179, UCH; Fig. 6B).

The isotype of the *Microstylis pittieri* designated here as the lectotype was previously indicated by Dressler (2009) as the holotype, and he also wrote it in an annotation on the specimen sheet. However, the holotype specimen that Schlechter used to describe *M. pittieri* was destroyed in 1943 in the bombing of the Berlin-Dahlem Botanical Museum (Ames 1944). In his annotation on the lectotype specimen, Ames also

indicated that there was a duplicate in Berlin, which was undoubtedly the holotype.

CONSERVATION STATUS: *Malaxis pittieri* is a native of Costa Rica and western Panama. It is known from 11 locations (six in Costa Rica, five in Panama), in the Central Volcanic (Costa Rica) and Talamanca mountain ranges (Costa Rica and Panama). Its extent of occurrence (EOO) was estimated at 3562.297 km² with an area of occupancy (AOO) of 48 km². This species is known from five protected areas: Braulio Carrillo National Park and Chirripó National Park in Costa Rica; Volcán Barú National Park in Panama; and Talamanca Range-La Amistad Reserves / La Amistad National Park in both Costa Rica and Panama. In Costa Rica, five locations are found in protected areas, and one location is also in a forest near a protected area; similarly, in Panama, four locations are in protected areas, and one location near a protected area. Therefore, the species is listed on a global level and national level as Least Concern (LC).

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LITERATURE CITED

- Ames, O. (1944). Destruction of the Schlechter Herbarium by bombing. *American Orchid Society Bulletin*, 13(4), 105–106.
- Bernet, P., Kratochvil, K., Gerlach, G., Carr, G., Alrich, P., Pridgeon, A. M., Pfahl, J., Campacci, M. A., Holland Baptista, D., Tigges, H., Shaw, J., Cribb, P., George, A., Kreuz, K., & Wood, J. (2021). World Checklist of *Malaxis*. The Board of Trustees of the Royal Botanic Gardens, Kew. Retrieved from <http://www.kew.org/wcsp/> (accessed 3 March 2021).
- Bogarín, D. (2011). How many orchid species in Costa Rica? A review of the latest discoveries. *Lankesteriana*, 11(3), 185–205.
- Bogarín, D., Chinchilla, I. F. & Cedeño-Fonseca, M. (2020). Two new species of *Lepanthes* (Orchidaceae: Pleurothallidinae) from Costa Rica and their phylogenetic affinity. *Plant Systematics and Evolution*, 306, 20. Doi: <https://doi.org/10.1007/s00606-020-01653-z>
- Bogarín, D., Serracín Hernández, Z., Samudio, Z., Rincón, R. & Pupulin, F. (2014). An updated checklist of the Orchidaceae of Panama. *Lankesteriana*, 14(3), 135–364.
- Cameron, K. M. (2005). Leave it to the leaves: a molecular phylogenetic study of Malaxideae (Epidendroideae, Orchidaceae). *American Journal of Botany*, 92(6), 1025–1032. Doi: <https://doi.org/10.3732/ajb.92.6.1025>
- Chinchilla, I. F. (2019). Revisión taxonómica del género *Malaxis* (Orchidaceae: Malaxidinae) en Costa Rica. MSc thesis, Programa de Posgrado en Biología, Universidad de Costa Rica, San José, Costa Rica.
- Chinchilla, I. F., Dressler, R. L. & Pupulin, F. (2020a). *Malaxis* Sw. In: F. Pupulin & collaborators (Eds.), *Vanishing Beauty: native Costa Rica orchids*. Vol. 2. *Lacaena–Pteroglossa* (pp. 562–571). Oberreifenberg, Germany: Koeltz Botanical Books.
- Chinchilla, I. F., Aguilar, R. & Bogarín, D. (2020b). A new *Lepanthes* (Orchidaceae: Pleurothallidinae) from Península de Osa, Puntarenas, Costa Rica. *Harvard Papers in Botany*, 25(2), 215–219. Doi: <http://dx.doi.org/10.3100/hpib.v25iss2.2020.n9>
- Cribb, P. J. (2005). *Malaxis*. In: A. M. Pridgeon, P. J. Cribb, M. W. Chase & F. N. Rasmussen (Eds.), *Genera Orchidacearum*. Volume 4. *Epidendroideae (Part One)* (pp. 471–475). Oxford, New York: Oxford University Press.
- Dodson, C. H. (2002). *Native Ecuadorian orchids*. Vol. III: *Lepanopsis - Oliveriana*. Sarasota: Dodson Trust.
- Dressler, R. L. (2003). Orchidaceae. In: B. E. Hammel, M. H. Grayum, C. Herrera & N. Zamora (Eds.), *Manual de Plantas de Costa Rica*. Volumen III. *Monocotiledóneas Orchidaceae–Zingiberaceae*. *Monographs in Systematic Botany from the Missouri Botanical Garden*, 93, 1–595.
- Dressler, R. L. (2009). Orchidaceae (In part). In: G. Davidse, C. Ulloa Ulloa, H. M. Hernández Macías & S. Knapp (Eds.), *Flora Mesoamericana*, Volume 7 (2). Manuscript in preparation: First published on the Flora Mesoamericana Website, 13 July 2009; updated 11 September 2009 (pp. 1–446). Retrieved from <https://www.tropicos.org/docs/meso/orchidaceae.pdf> (Accessed on 9 November 2021).
- Espejo Serna, A., García Cruz, J., López Ferrari, A. R., Jiménez Machorro, R. & Sánchez Saldaña, L. (2002). Orquídeas del Estado de Morelos. *Orquídea (Mexico City)*, 16, 1–332.
- Fernández, M., Bogarín, D., Karremans, A. P. & Jiménez, D. (2014). New species and records of Orchidaceae from Costa Rica. III. *Lankesteriana*, 13(3), 259–282.
- Flora do Brasil 2020 (2021). *Malaxis*. Jardim Botânico do Rio de Janeiro. Retrieved from: <http://floradobrasil.jbrj.gov.br/reflora/floradobrasil/FB11814> (accessed 7 March 2021).
- García Castro, J. B., Mora de Retana, D. E. & Rivas Rossi, M. E. (1993). Lista de orquídeas comunes a Costa Rica y Panamá. *Brenesia*, 39–40, 93–107.
- González Tamayo, R., Hernández Hernández, L. & Ramírez Medina, M. E. C. (2008). Algunas novedades del género *Malaxis* (Orchidaceae) en el occidente de México. *Ibugana*, 15(1–2), 35–64.
- Holdridge L. R. (1967). *Life zone ecology*. San José: Tropical Science Center.
- IUCN. (2019). Guidelines for Using the IUCN Red List Categories and Criteria, version 14. Prepared by the Standards and Petitions Committee. Retrieved from: <http://www.iucnredlist.org/documents/RedListGuidelines.pdf> (accessed on 15 October 2021).
- Karremans, A. P., Bogarín, D., Fernández, M., Smith, C. M. & Blanco, M. A. (2012). New species and records of Orchidaceae from Costa Rica. II. *Lankesteriana*, 12(1), 19–51.
- Karremans, A. P. & Díaz-Morales, M. (2016). *Epidendra Nova Talamancana*. *Phytotaxa*, 272 (4), 248–256. Doi: <http://dx.doi.org/10.11646/phytotaxa.272.4.2>
- Mansfeld, R. (1931). Blütenanalysen neuer Orchideen von R. Schlechter. II. Mittelamerikanische Orchideen. *Repertorium Specierum Novarum Regni Vegetabilis, Beihefte*, 59, Tafs. 1–81.

- Ossenbach, C., Pupulin, F. & Jenny, R. (2010). Orchid itineraries of Augustus R. Endrés in Central America: a biographic and geographic sketch. *Lankesteriana*, 10(1), 19–47.
- Pupulin, F. (2002). Catálogo revisado y anotado de las Orchidaceae de Costa Rica. *Lankesteriana*, 2(2) [as 4], 1–88.
- QGIS development Team. (2019). QGIS Geographic Information System. Open Source Geospatial Foundation Project. Retrieved from: <http://qgis.osgeo.org> (accessed 6 August 2021).
- Radins, J. A., Salazar, G., Cabrera, L. I., Jiménez-Machorro, R. & Batista, J. A. N. (2014). A new paludicolous species of *Malaxis* (Orchidaceae) from Argentina and Uruguay. *Phytotaxa*, 175(3), 121–132. Doi: <http://dx.doi.org/10.11646/phytotaxa.175.3.1>
- Schlechter, R. (1913). *Orchidaceae novae et criticae, Decas XXXVIII. Repertorium Specierum Novarum Regni Vegetabilis Beihefte*, 12, 202–206.
- Ulloa Ulloa, C., Acevedo-Rodríguez, P., Beck, S., Belgrano, M. J., Bernal, R., Berry, P. E., Brako L., Celis, M., Davidse, G., Forzza, R. C., Gradstein, S. R., Hokche, O., León, B., León-Yáñez, S., Magill, R. E., Neill, D. A., Nee, M., Raven, P. H., Stimmel, Strong, M. T., Villaseñor Ríos, J. L., Zarucchi, J. L., Zuloaga, F. O. & Jørgensen, P. M. (2018 onwards). Vascular Plants of the Americas (VPA) website. Tropicos, Botanical Information System at the Missouri Botanical Garden, Saint Louis, Missouri. Retrieved from: <http://www.tropicos.org/Project/VPA> (accessed on 17 January 2021).
- Villaseñor, J. L. (2016). Checklist of the native vascular plants of Mexico. *Revista Mexicana de Biodiversidad*, 87(3), 559–902. Doi: <http://dx.doi.org/10.1016/j.rmb.2016.06.017>
- Williams, L. O. (1946). Orchidaceae. In: R. E. Woodson & R. W. Schery (Eds.), *Flora of Panama*. Part III. Fasc. 2. *Annals of the Missouri Botanical Garden*, 33, 1–140.

A NEW SPECIES OF *LEPANTHES* (PLEUROTHALLIDINAE) FROM THE NORTH OF THE CENTRAL ANDES OF COLOMBIA

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ABSTRACT. A new *Lepanthes* species from the northern end of the Central Andes of Colombia is described, illustrated, and compared with morphologically similar species. *Lepanthes wakemaniae* is most similar to *L. caesariata* but is easily distinguished by its petals with oblong to ovate upper lobes and triangular lower lobes; semi-ovate lip blades, with their inner margins touching above the column; the appendix ligulate and pubescent, and a column with an expanded, orbicular stigma.

RESUMEN. Una nueva especie de *Lepanthes* del extremo norte de los Andes Centrales de Colombia se describe, ilustra y compara con especies morfológicamente similares. *Lepanthes wakemaniae* es más similar a *L. caesariata* pero se distingue fácilmente por sus pétalos con los lóbulos superiores oblongos a ovados y los lóbulos inferiores triangulares; las láminas del labelo semi-ovadas, con las márgenes internas tocándose por encima de la columna; el apéndice ligulado y pubescente, y una columna con un estigma orbicular y expandido.

KEYWORDS / PALABRAS CLAVE: Alto de Ventanas, Antioquia, conservation, conservación, *Lepanthes caesariata*, *Lepanthes wakemaniae*, Yarumal

Introduction. The genus *Lepanthes* Sw. is a neotropical genus in the Pleurothallidinae with approximately 1160 accepted species (Restrepo *et al.* 2022), it comprises more than 300 species described in Colombia (Luer & Thorerle 2012), and during the last decade, several new species have been described from different areas and ecoregions in this country (Gutiérrez *et al.* 2021, Moreno *et al.* 2017, 2018, 2020a, 2020b, Restrepo *et al.* 2022, Vieira & Larsen 2014a, 2014b, Vieira & Moreno 2018, 2019, 2020, Vieira-Urbe *et al.* 2021). One of these ecoregions is the Alto de Ventanas, located at the northern end of the central Andes of Colombia, where several *Lepanthes* species have been discovered and described (Vieira & Moreno 2019).

In recent studies of biogeographic regions and diversification of flora and fauna in the Andes (Hazzi *et al.* 2018, Pérez-Escobar *et al.* 2022), the northern Andes in the Central Cordillera are found to have more relation in terms of biodiversity with the Western Cordillera rather than the Central Cordillera which means that probably bioregions like the Pacific, The Chocó and the Western Andes could have a strong influence

in this area. These findings could be supported with some events of isolation caused by rivers and others biogeographic boundaries that could drive events of vicariance and dispersal. Also, some of the species that have been found in the Alto de Ventanas have a strong correlation with the Eastern Cordillera, suggesting that environmental factors from several areas may converge into a big biodiverse hotspot.

The idea of a hotspot in the northern Andes could be supported with the high endemism and the description of new plant species like *Columnnea antennifera* J.L.Clark & Clavijo (Gesneriaceae) (Clark & Clavijo 2012), *Cyathea toroi* Lehnert, F.Giraldo & A.Tejedor (Cyatheaceae) (Lehnert *et al.* 2019), *Dicksonia lehnertiana* Noben, F.Giraldo, W.D.Rodr. & A.Tejedor (Dicksoniaceae) (Noben *et al.* 2018), *Schefflera breviramia* Jiménez-Mont. & Idarraga (Araliaceae) (Jiménez-Montoya & Idarraga-Piedrahíta 2018), and *Lepanthes gloriæ* S.Vieira-Urbe & J.S.Moreno (Orchidaceae) (Vieira & Moreno 2021), and frogs like *Pristimantis carylae* Rivera-Correa, González-Durán, Saldarriaga-Gómez, and Duarte-Marín, and *P. choco-*

latebari Rivera-Correa, González-Durán, Saldarriaga-Gómez, and Duarte-Marín (Rivera-Corre *et al.* 2021). The area probably could be considered in the future as a new bioregion, compared with the three cordilleras and even, with the Sierra Nevada de Santa Marta.

Corporación Salvamontes is a Colombian NGO dedicated to conserving threatened species and their habitat in the Alto de Ventanas, currently owning three nature preserves where 1300 acres of land are protected. Some of their land acquisitions were funded by auctioning the names of new species, like the three *Lepanthes* species described in 2019: *Lepanthes cis-syana* S.Vieira-Uribe & J.S.Moreno, *L. dougdarlingii* S.Vieira-Uribe & J.S.Moreno and *L. sabinadaleyana* J.S.Moreno & S.Vieira-Uribe (Vieira & Moreno 2019), an excellent example of what is possible with the cohesion of conservation and taxonomy and the benefits that this can bring for the biodiversity in Colombia. Here, we describe another new species of *Lepanthes* discovered recently in the Los Magnolios Natural Reserve during explorations and documentation of its orchid flora. We name it to the memory of the mother of a generous donor who partially funded the expansion of the protected area where the new species can be found.

Materials and methods. The type specimen was collected in Colombia while conducting research in Los Magnolios Natural Reserve to improve knowledge of its orchid flora, and as part of the ongoing research on the orchids of Antioquia, under permit Resolución No. 01711. Vouchers were preserved as dried or spirit specimens for future reference at JAUM.

Living and preserved specimens were examined for morphological and taxonomic comparisons. In addition, the monograph of *Lepanthes* from Colombia (Luer & Thoerle 2012), other original descriptions from related species were reviewed, and compared, specimens from the following herbaria: AMES, COL, CUVC, FMB, HUA, ICESI, JAUM, JBB, TOLI, and MO (online) were consulted, and no additional material of the new species was found.

The description and drawings were prepared from living specimens dissected under a Barska AY11234 trinocular stereo microscope. Digital images were taken with a Canon 7d Mark II with a Canon 100 mm f/2.8L macro lens. Sketches from living and preserved specimens were digitized, and the images were used

for diagramming a draft composite plate in Adobe Photoshop® 2020. In addition, a digital composite line drawing was made in the Procreate illustration application with an iPad 8th generation tablet. The Botanical terminology used in the manuscript was consulted in Beentje (2012) and Stearn (1992).

TAXONOMIC TREATMENT

Lepanthes wakemaniae S.Vieira-Uribe & J.S.Moreno, *sp. nov.* (Fig. 1–2).

TYPE: Colombia. Antioquia: Municipio de Yarumal, vereda Corcovado, Reserva Natural Los Magnolios, 1540 m, 8 Nov 2021, *S.Vieira 027 & L.F. Pérez* (holotype: JAUM-Spirit; isotype: HUA-Spirit).

DIAGNOSIS: *Lepanthes wakemaniae* is most similar to *L. caesariata* Luer & R.Escobar but is easily distinguished from the latter by having petals with oblong to ovate upper lobes and triangular lower lobes (*vs.* oblong and oblique lobes) that are microscopically pubescent (*vs.* densely long pubescent, ciliate); semi-ovate lip blades (*vs.* oblong sub-truncate) longer than the lower lobes of the petals (*vs.* of similar length), with their inner margins touching above the column (*vs.* adherent above the column), the appendix ligulate and pubescent with the pubescence longer at the apex toward the sides (*vs.* oblong, short and pubescent appendix) and an expanded, orbicular stigma (*vs.* bilobed stigma).

Plant medium in size for the genus, epiphytic, caespitose, 10–14 cm tall. *Roots* slender, flexuous, filiform, 0.5–0.7 mm in diameter. *Ramicauls* slender, suberect to horizontal, 2.4–7.6 cm long, enclosed by 5–9 acuminate, ribbed, ciliate along the ribs lepanthiform sheaths, with ciliate dilated margins. *Leaves* occasionally suffused with purple along the veins on the adaxial surface, abaxially speckled with purple and suffused with purple along the veins, more or less horizontal, coriaceous, acrodromous and reticulate-veined, ovate to lanceolate, the apex attenuate, 4.6–6.2 × 1.9–2.0, the rounded base contracted into a *ca.* 1.5 mm long petiole. *Inflorescence* a congested, distichous raceme successively many-flowered, up to $\frac{3}{4}$ the length of the leaf, 4.1 cm long including the peduncle, held ap-

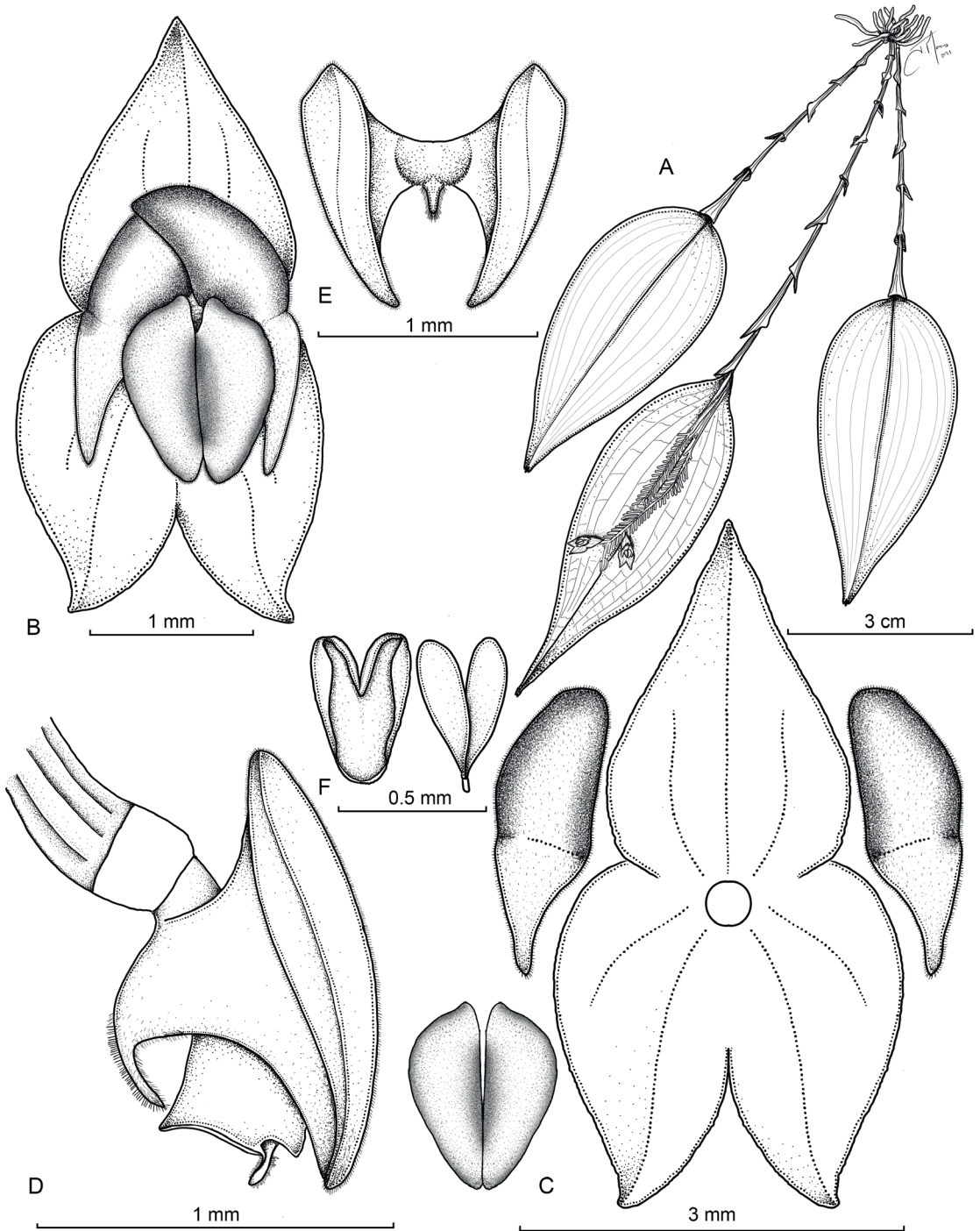


FIGURE 1. Illustration of *Lepanthes wakemaniae* S.Vieira-Uribe & J.S.Moreno. **A.** Habit, as seen from below. **B.** Flower. **C.** Dissected perianth. **D.** Ovary, column and lip, side view. **E.** Lip expanded. **F.** Anther cap and pollinia. Drawn by J. S. Moreno from S.Vieira 027 & L.F. Pérez.



FIGURE 2. *In-situ* photos of *Lepanthes wakemaniae* S.Vieira-Uribe & J.S.Moreno. **A.** Flower, $\frac{3}{4}$ view. **B.** Abaxial view of a leaf with three open flowers. **C.** Habit. Photographed by S. Vieira-Uribe from S.Vieira 027 & L.F. Pérez.

pressed to the abaxial surface of the leaf by a filiform, terete peduncle up to 2.0 cm long borne near the apex of the ramicaul; *floral bracts* conical, acuminate, ciliate, up to 1.5 mm long; *pedicels* terete, up to 1.9 mm long. *Ovary* terete, costate, ca. 1.9 mm long. *Flowers* sepals translucent cream; petals dull yellow-brown, the upper lobe with deep purple-red external margins and magenta inner margins; the lip with the body magenta, the connectives and blades tawny tinted with magenta in the apex, the appendix cream; the column cream suffused with magenta. *Dorsal sepal* ovate, with repand margins, acute, 3-veined, 2.8×1.9 mm, connate at the base to the lateral sepals for ca. 0.7 mm. *Lateral sepals* ovate, oblique, with repand margins, the apex attenuate and oblique, pointing away from the flower axis, 2-veined, 2.5×1.4 mm, connate at the base for

ca. 0.9 mm. *Petals* transversally bilobed, microscopically pubescent, slightly convex, $0.8 \times 2.2\text{--}2.3$ mm, 1 veined; the upper lobes imbricate, oblong to ovate, the inner margin straight, rounded to sub-truncate, $1.2\text{--}1.3 \times 0.8$ mm; the lower lobes triangular, oblique, obtuse, $0.9\text{--}1.0 \times 0.7$ mm. *Lip* bilaminate, microscopically pubescent, the blades semi-ovate, the base subacute, the apex obtuse, the inner margins touching above the column, 1.4×0.5 mm, supported by cuneate connectives from near the middle, the body elliptic, adnate to the base of the column, the sinus rounded, with a ligulate, pubescent appendix, the pubescence longer at the apex toward the sides. *Column* conical, terete, microscopically pubescent, arcuate, ca. 1.3 mm long, the anther dorsal, the stigma expanded, orbicular, ventral, the rostellum minutely fimbriate. *Anther cap* white suffused

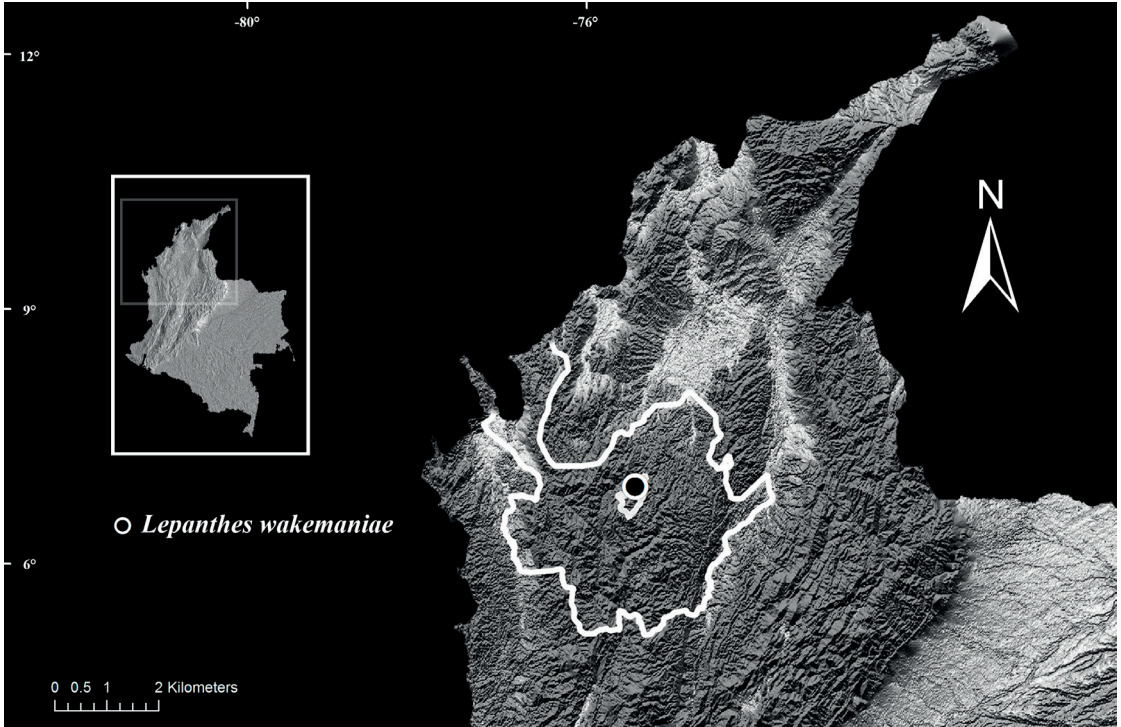


FIGURE 3. Map showing the locality where *Lepanthes wakemaniae* S.Vieira-Uribe & J.S.Moreno was found. Prepared by J. S. Moreno.

with magenta and tawny, narrowly cordate, cucullate, smaller than the clinandrium cavity, 0.5 mm long. *Polinia* 2, yellow, narrowly obovoid, 0.45 mm long, attached to a drop like viscidium.

EPONYMY: The name of the new species memorializes Elizabeth “Betty” Wakeman (Eshbaugh) Henderson from the USA, who lived from 1916 to 1997, an ardent lover of the natural world and everything botanical.

HABITAT AND ECOLOGY: The new species has been found only at a single locality inside Los Magnolios Natural Reserve, a privately owned nature preserve in Alto de Ventanas, Yarumal. A highly biodiverse spot located at the northern end of the Central Andes of Colombia (Fig. 3). There, *Lepanthes wakemaniae* grows as an epiphyte in moss-covered twigs and trunks near the border of a well preserved and orchid-rich mature forest along a river (Fig. 4). It grows together with several other orchid species, such as *Dracula chimaera* (Rchb.f.) Luer, *Houlletia lowiana* Rchb.f., *Lepanthes agglutinata* Luer, the recently described *L.*

gloriae, *L. golondrina* Luer & R.Escobar, and *Phragmipedium schlimii* (Rchb.f.) Rolfe.

CONSERVATION STATUS: *Lepanthes wakemaniae* is known only from its type locality, located inside a privately owned nature preserve. The proposed IUCN categorization is data deficient (DD) because adequate population and distribution information to assess the species is unavailable.

Discussion. *Lepanthes wakemaniae* (Fig. 1, 2, 5A) can be uniquely recognized from all other species of the genus by the following combination of characters: medium sized plants with leaves ovate to lanceolate, acrodromous and reticulate-veined, the veins tinted with purple abaxially, sometimes also adaxially; the flowers resting on the abaxial surface of the leaf with microscopically pubescent petals and lip; the petals transversally bilobed with the upper lobes imbricate, oblong to ovate, slightly longer than the oblique, triangular lower lobes and a bilaminar lip with semi-ovate blades longer than the lower lobes of the petals, with



FIGURE 4. Habitat of *Lepanthes wakemaniae* S.Vieira-Uribe & J.S.Moreno. Photographed by L. F. Pérez at the type locality.

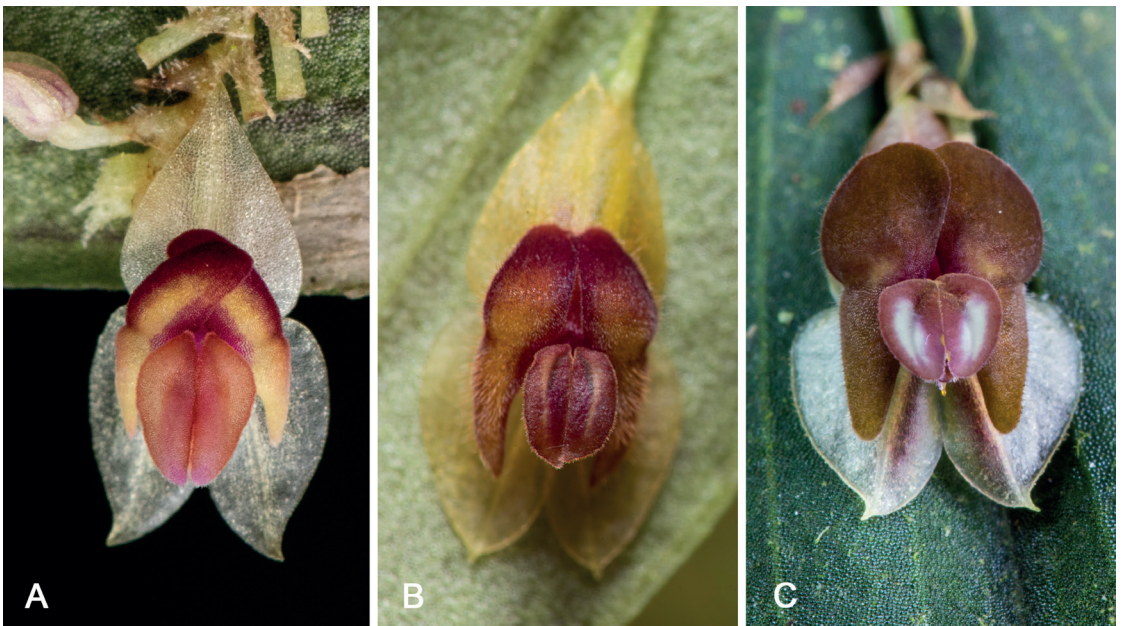


FIGURE 5. Comparative plate showing photos of the species most similar to *Lepanthes wakemaniae* S.Vieira-Uribe & J.S.Moreno. **A.** *Lepanthes wakemaniae*. **B.** *Lepanthes caesariata*. **C.** *Lepanthes hymenoptera*. Photographed by S. Vieira-Uribe.

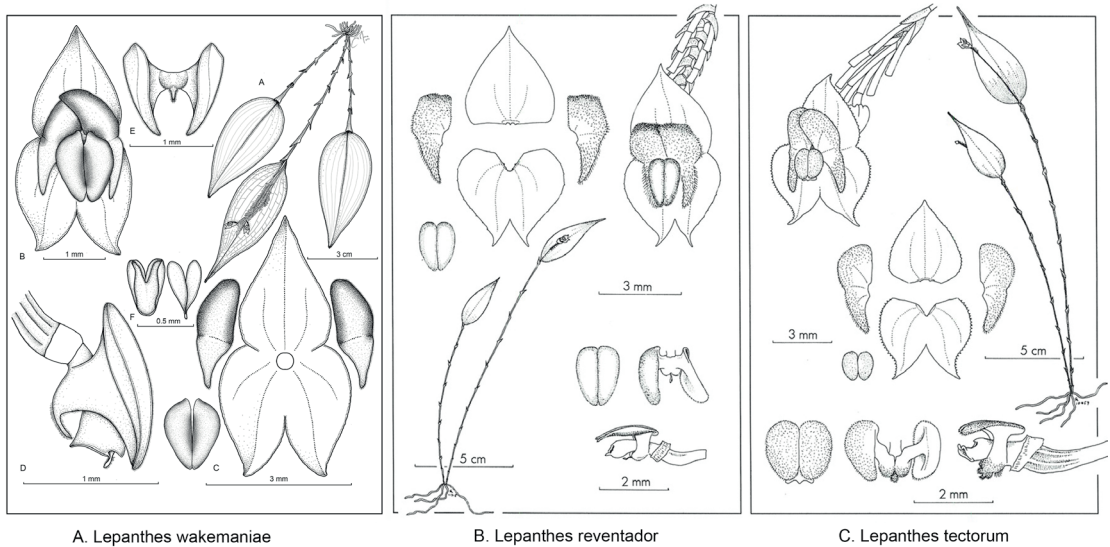


FIGURE 6. Comparative plate showing drawings of other species similar to *Lepanthes wakemaniae* S.Vieira-Uribe & J.S.Moreno. **A.** *Lepanthes wakemaniae*. **B.** *Lepanthes reventador*. **C.** *Lepanthes tectorum*. Prepared by S. Vieira-Uribe. Drawing A by J. S. Moreno from S.Vieira 027 & L.F.Pérez., drawings B and C, Courtesy of Missouri Botanical Garden.

the inner margins touching above the column but not adherent, and the lip appendix ligulate, pubescent, with the pubescence longer at the apex toward the sides.

It is most similar in plant and flower to the Colombian species *Lepanthes caesariata* (Fig. 5B), both with medium sized plants, a congested, distichous inflorescence borne resting on the abaxial surface of the leaf, light colored and fully spread sepals, transversely bilobed and pubescent petals with purple-red margins and upper lobes overlapping and slightly larger than the lower lobes, and a bilaminate lip with thin, microscopically pubescent blades with their inner margins touching above the column, but *L. wakemaniae* is easily distinguished by having petals with the upper lobes oblong to ovate and the lower lobes triangular (vs. oblong and oblique) that are microscopically pubescent (vs. densely long pubescent, ciliate); a lip with semi-ovate blades (vs. oblong subtruncate) with their inner margins touching above the column (vs. adherent above the column) and the appendix ligulate and pubescent with the pubescence longer at the apex toward the sides (vs. oblong, short and pubescent).

The new species is also florally similar to the three Ecuadorean species *L. hymenoptera* Luer (Fig. 5C), *L. reventador* Luer & Hirtz (Fig. 6B), and *L.*

tectorum Luer & Hirtz. (Fig. 6C), sharing with them fully spread ovate sepals, pubescent petals with the upper lobes oblong and overlapping and the lower lobes triangular, and a bilaminate lip with the inner margins of the flat blades touching above the column.

Lepanthes wakemaniae can be distinguished from *L. hymenoptera* and *L. reventador* by producing the inflorescence on the abaxial surface of the leaves (vs. on the adaxial surface), the petals microscopically pubescent (vs. short pubescent, *L. reventador* with long pubescent lower lobes), with the upper lobe oblong to ovate with the apex rounded to sub-truncate (vs. oblong, truncate), the lip blades barely touching above the column (vs. adherent medially) and the appendix ligulate (vs. ovoid in *L. hymenoptera* and filiform in *L. reventador*).

Lepanthes tectorum also produces its inflorescence on the abaxial surface of the leaf, but it can be easily separated from *L. wakemaniae* by the lip blades broadly ovate (vs. semi-ovate) that are adherent medially above the column (vs. barely touching above the column) and a pubescent, longitudinally tripartite appendix (vs. ligulate appendix).

A summary of differences between *Lepanthes wakemaniae* and already mentioned similar species is found in Table 1.

TABLE 1. Summary of the main differences between *Lepanthes wakemaniae* and morphologically similar species.

Trait	<i>L. caesariata</i>	<i>L. hymenoptera</i>	<i>L. reventador</i>	<i>L. tectorum</i>	<i>L. wakemaniae</i>
Lip blades	Oblong with subtruncate ends, adherent medially.	Minutely erose, oblong with the ends obtuse, adherent medially.	Ovate with rounded ends, adherent medially.	Broadly ovate with rounded ends, adherent medially.	Semi-ovate, barely touching above the column.
Lip connectives	Oblong, supporting the blades from the basal third.	Oblong, supporting the blades from the middle.	Narrowly oblong, supporting the blades from the basal third.	Narrowly oblong, supporting the blades from near the middle.	Cuneate, supporting the blades from the near the middle.
Lip appendix	Short, oblong, pubescent.	Ovoid, bilobulate, pubescent.	Filiform, ciliate on the underside.	Pubescent, longitudinally tripartite.	Ligulate, pubescent, the pubescence longer at the apex toward the sides.
Petals (pubescence)	Densely long pubescent-ciliate.	Shortly pubescent.	Upper lobe short pubescent, lower lobe long pubescent.	Microscopically pubescent.	Microscopically pubescent.
Petals (upper lobe)	Oblong, oblique, imbricate, apex obtuse.	Oblong, truncate, imbricate.	Oblong, truncate.	Oblong, oblique, obtuse.	Oblong to ovate, imbricate, the inner margin straight, apex rounded to sub-truncate.
Petals (lower lobe)	Oblong, oblique, apex obtuse.	Triangular, obtuse.	Triangular.	Oblong-triangular, obtuse.	Triangular, oblique, apex obtuse.

ACKNOWLEDGEMENTS. The authors want to thank Corporación Salvamontes and the Orchid Conservation Alliance for the protection of the habitat of the new species, the staff at the herbarium Jardín Botánico Joaquín Antonio Uribe (JAUM) for their support, and finally, Ian Van Coller, W. Hardy Eshbaugh and the Elizabeth Wakeman Henderson Charitable Foundation for their support to the expansion and management of the Los Magnolios Natural Reserve, where the new species was found.

LITERATURE CITED

- Beentje, H. (2012). *The Kew Plant Glossary* (Rev. ed.). Richmond, UK: Kew Publishing.
- Clark, J. L. & Clavijo, L. (2012). *Columnnea antennifera*, a new species of Gesneriaceae from the Cordillera Central of the Colombian Andes. *Journal of the Botanical Research Institute of Texas*, 6(2), 385–390.
- Gutiérrez, N., Vieira-Urbe, S. & Moreno, J. S. (2021). *Lepanthes marielana* (Orchidaceae, Pleurothallidinae), a new species from the eastern Andes in Colombia. *Phytotaxa*, 484(1), 113–120. Doi: <https://doi.org/10.11646/phytotaxa.484.1.5>
- Hazzi, N. A., Moreno, J. S., Ortiz-Movliav, C. & Palacio, R. D. (2018). Biogeographic regions and events of isolation and diversification of the endemic biota of the tropical Andes. *Proceedings of the National Academy of Sciences of the United States of America*, 115(31) 7985–7990. Doi: <https://doi.org/10.1073/pnas.1803908115>
- Jiménez-Montoya, J. & Idárraga-Piedrahíta, Á. (2018). Novedades taxonómicas del género *Schefflera* (Araliaceae) para Colombia. *Brittonia*, 70(3), 316–323. <https://doi.org/10.1007/s12228-018-9523-7>
- Lehnert, M., Duque, W. D. R., Giraldo Gallego, L. F. & Tejedor, A. (2019). New Additions of Scaly Tree Ferns (Cyatheaaceae) to the Flora of Colombia. *American Fern Journal*, 109(2), 77–120. Doi: <https://doi.org/10.1640/0002-8444-109.2.77>
- Luer, C.A. & Thorer, L. (2012). *Icones Pleurothallidinarum XXXII. Lepanthes of Colombia* (Orchidaceae). *Monographs in Systematic Botany from the Missouri Botanical Garden*, 123, 1–296.
- Moreno, J. S., Vieira-Urbe, S., & Karremans, A. P. (2017). A new species of *Lepanthes* (Orchidaceae: Pleurothallidinae) from Colombia with a large and protruding column. *LANKESTERIANA*, 17(2), 227–234. Doi: <https://doi.org/10.15517/lank.v17i2.30076>
- Moreno, J. S., Gutiérrez, N. & Vieira-Urbe, S. (2018). *Lepanthes agatarum* (Orchidaceae: Pleurothallidinae), a new species honoring an ancient tribe from the Eastern Andes in Colombia. *Phytotaxa*, 376(2), 89–96. Doi: <https://doi.org/10.11646/phytotaxa.376.2.2>
- Moreno, J. S., Pisso-Florez, G. A. & Vieira-Urbe, S. (2020a). Discoveries in indigenous territories: Two new

- species of *Lepanthes* (Orchidaceae: Pleurothallidinae) in southwestern Colombia. *Lankesteriana*, 20(2), 229–239. Doi: <https://doi.org/10.15517/lank.v20i2.43358>
- Moreno, J. S., Baquero R., L. E., & Vieira-Uribe, S. (2020b). Two New Species of *Lepanthes* (Orchidaceae: Pleurothallidinae) from the Anchicayá River Valley in Colombia. *Harvard Papers in Botany*, 25(1), 99–110. Doi: <https://doi.org/10.3100/hpib.v25iss1.2020.n13>
- Noben, S., Kessler, M., Weigand, A., Tejedor, A., Duque, W. D. R., Gallego, L. F. G. & Lehnert, M. (2018). A Taxonomic and Biogeographic Reappraisal of the Genus *Dicksonia* (Dicksoniaceae) in the Neotropics. *Systematic Botany*, 43(4), 839–857. Doi: <https://doi.org/10.1600/036364418X697634>
- Pérez-Escobar, O., Zizka, A., Bermúdez, M., Meseguer, A. S., Condamine, F. L., Hoorn, C., Hooghiemstra, H., Pu, Y., Bogarín, D., Boschman, L. M., Pennington, R. T., Antonelli, A. & Chomicki, G. (2022). The Andes through time: evolution and distribution of Andean floras. *Trends in Plant Science*, 20(20), 1–15. Doi: <https://doi.org/10.1016/j.tplants.2021.09.010>
- Restrepo, E., Vieira-Uribe, S., Moreno, J. S. & Baquero L. E. (2022). A new species of *Lepanthes* (Pleurothallidinae) lacking and appendix with rabbit ear-like petals endemic to Colombia. *Lankesteriana*, 22(1), 1–8. Doi: <http://dx.doi.org/10.15517/lank.v22i1.50373>
- Rivera-Correa, M., González-Durán, G. A., Saldarriaga-Gómez, A. M. & Duarte-Marín, S. (2021). Biodiversity in the Andean Mountains: Two new rain frogs of the genus *Pristimantis* (Anura: Craugastoridae) from the Northern Cordillera Central in Colombia. *Zootaxa*, 5040(3), 334–364. Doi: <https://doi.org/10.11646/zootaxa.5040.3.2>
- Stearn, W.T. (1992). *Botanical Latin* (4th ed.). Portland, USA: Timber Press.
- Vieira-Uribe, S. & Larsen, B. (2014a). Una nueva especie de *Lepanthes* (Orchidaceae) de Colombia. *Orquideología*, 31(1), 5–14.
- Vieira-Uribe, S. & Larsen, B. (2014b). *Lepanthes paramosolensis* (Orchidaceae: Pleurothallidinae), una nueva especie endémica de Colombia. *Orquideología*, 31(2), 94–103.
- Vieira-Uribe, S. & Moreno, J. S. (2018). Dos nuevas especies de *Lepanthes* (Orchidaceae: Pleurothallidinae) del Parque Nacional Tatamá en Colombia. *Orquideología*, 35(2), 174–188.
- Vieira-Uribe, S. & Moreno, J. S. (2019). Three new *Lepanthes* (Orchidaceae: Pleurothallidinae) from the Alto de Ventanas ecoregion in Antioquia, Colombia. *Lankesteriana*, 19(2), 63–75. Doi: <https://doi.org/10.15517/lank.v19i2.37802>
- Vieira-Uribe, S. & Moreno, J. S. (2020). Una nueva especie minúscula de *Lepanthes* (Orchidaceae, Pleurothallidinae) de los Andes orientales de Colombia. *Orquideología*, 37(1), 17–26.
- Vieira-Uribe, S., Moreno, J. S. & Perez-Arcila, L. F. (2021). Una nueva especie de *Lepanthes* (Orchidaceae: Pleurothallidinae) del norte de los Andes centrales de Colombia. *Orquideología*, 38(1), 4–16.

***PLATYSTELE FINLEYAE* (PLEUROTHALLIDINAE), A NEW SPECIES FROM NORTHWESTERN ECUADOR**

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ABSTRACT. A new species of *Platystele* from northwestern Ecuador is described and illustrated. The new species, *Platystele finleyae*, belongs to the “pubescens” morphological informal group of species, and it is similar to *P. ximena* in the broad flowers with pubescent sepals and petals but is easily distinguished by the vermilion to vinaceous flowers (*vs.* yellow, suffused with purple at the basal middle) and long ciliate petals (*vs.* shortly pubescent in *P. ximena*). *Platystele finleyae* was found near Dracula Reserve, and it is named in honor of Elizabeth Finley Broaddus, who inspires many people, especially the youth, in environmental conservation. In addition, information is provided on its distribution, habitat, and conservation status.

RESUMEN. Se describe e ilustra una nueva especie del género *Platystele* del noroeste de Ecuador. La nueva especie, *Platystele finleyae*, pertenece al grupo morfológico informal “pubescens”, y es similar a *P. ximena* ya que posee flores amplias con sépalos y pétalos pubescentes, pero se distingue fácilmente por las flores de color bermellón a vináceo (*vs.* amarillo, teñido de púrpura en la mitad basal) y pétalos largamente ciliados (*vs.* microscópicamente pubescentes en *P. ximena*). *Platystele finleyae* se encuentra cerca de la Reserva Dracula, y lleva su nombre en honor a Elizabeth Finley Broaddus, quien inspiró a mucha gente, especialmente a los jóvenes, a trabajar en la conservación del medio ambiente. Además, se proporciona información sobre su distribución, hábitat y estado de conservación.

KEYWORDS/PALABRAS CLAVE: Carchi, EcoMinga Foundation, Fundación Ecominga, minería, mining, new orchid species, nueva especie de orquídea, Reserva Youth Land Trust.

Introduction. *Platystele* was first proposed by Schlechter (1910), and published in *Repertorium Specierum Novarum Regni Vegetabilis*. The name comes from the Greek “*platys*” and “*stele*” meaning “a broad column,” referring to the column of the type species, *Platystele compacta* Ames (Luer 1990). The genus comprises more than 120 species, with new species being discovered each year (Baquero & Galarza Verkovich 2019, Baquero & Zuchan 2017, Jost & Iturralde 2017, Karremans 2016, Karremans & Bogarín 2017, Luer 1990, 1994, Reina-Rodríguez & Karremans 2018, Romero

et al. 2018, Thoerle 2018, Vieira-Uribe & Karremans 2017). Karremans *et al.* (2016) found that, based on DNA analyses, *Platystele* is related to *Andinia* (Luer) Luer, *Dryadella* Luer, *Muscarella* Luer, *Scaphosepalum* Pfitzer, *Specklinia* Lindl., and *Teagueia* (Luer) Luer. *Teagueia*, with species previously belonging to *Platystele*, was segregated by Luer (1991) due to its much larger flowers, sepals with well-developed sepaline tails, and multiple veined, among other differences.

Platystele is distributed in the Neotropics, from the Trans-Mexican Volcanic Belt and the Antilles to South

America as far south as Bolivia and ranging in elevation from 300 to 3600 m with the greatest number of species known from Ecuador and Colombia (Baquero & Galarza Verkovich 2019, Baquero & Zuchan 2017, Jost & Iturralde 2017, Karremans & Bogarín 2017, Luer 1990, Reina-Rodríguez & Karremans 2018, Romero *et al.* 2018, Thoerle 2018). Ecuador is considered the center of diversity for the genus with almost 60 species, of which 35 are considered endemic (Baquero & Galarza Verkovich 2019, Baquero & Zuchan 2017, Jost & Iturralde 2017, Romero *et al.* 2018, Thoerle 2018).

Species of *Platystele* can be easily recognized by their repent to caespitose plants, usually no more than 5 cm long, with petiolate, spatulate to obovate leaves, a filiform flower raceme which can be successively or simultaneously flowered, and varying from umbellate, congested, flexuous to distichous racemes borne at the base of the leaves and bearing miniature flowers, which are frequently flat, with free and spreading sepals and petals, a simple lip more or less cellular-glandular, with a basal glenion (Luer 1990). The column is short and wide, with an apical anther and a bilobed stigma (Karremans & Bogarín 2017, Luer 1990, Thoerle 2018).

A group of species endemic to the northwest of Ecuador and southwest of Colombia (Baquero & Galarza Verkovich 2019, Kolanowska 2012, Luer 1990, 1991, 1994) shares a combination of unique features, including a broad, incurved, wide column (reminiscent of a tiny and wide human nose), pubescent, broad flowers with ciliate to long ciliate margins of the petals and sepals. These species would be included in the informal “pubescens” group based on the first species described, *Platystele pubescens* Luer. The species included in this informal group are *P. adelphe* Luer & Hirtz, *P. decouxii* Baquero & G. Verkovich, *P. muscicola* Luer & Hirtz, *P. pubescens*, *P. scopulifera* Luer & Dodson, and *P. ximenae* Luer & Hirtz (Baquero & Galarza Verkovich 2019, Luer 1990, 1991, 1994). In the past few years, new species of *Platystele* have been recorded in northwestern Ecuador, like *P. pamela* Baquero & Zuchan, *P. cedriensis* Baquero & G. Verkovich, and *P. decouxii* (Baquero & Galarza Verkovich 2019, Baquero & Zuchan 2017). Here, we provide a detailed description, a line illustration, color figures, and information

about the ecology, distribution, and conservation status of another new species of *Platystele* from northwestern Ecuador.

Materials and methods. Expeditions were made in March and August 2021 with botanists and zoologists of Instituto Nacional de Biodiversidad (INABIO), Fundación EcoMinga, and Reserva: The Youth Land Trust, to characterize the flora and fauna of the Dracula reserve and the Bosque Comunal La Esperanza, Carchi, Ecuador.

Fresh material of the new species was photographed *in situ* with a Canon EOS T6 camera and a Canon EF-S 35/28 Macro lens. It was subsequently pressed, dried, and deposited at QCNE as part of a research project on orchids under Research Permit No. MAAE-ARSFC-2021-1102. Digital images taken *in situ* and fresh flowers preserved in 70% ethanol and 1% glycerol, herbarium specimens (QCNE, QCA), specialized bibliography like Luer (1990), Baquero & Galarza Verkovich (2019), Kolanowska (2012) and original descriptions of the related *Platystele* species were review and compared. The description and drawings were prepared from living specimens. Figures and a composite digital line drawing were prepared based on the type specimen images using Adobe Photoshop® 2019. The distribution map was prepared using ArcGis Desktop 10.8.

TAXONOMIC TREATMENT

Platystele finleyae M.F.Monteros, E.Restrepo & Baquero, *sp. nov.* (Fig. 1–4).

TYPE: Ecuador. Carchi: La Esperanza, 1700m, 0°56'11.14" N, 78°14'33.86" W, 24 March 2021, *M. Monteros 209* (holotype: QCNE!).

DIAGNOSIS: *Platystele finleyae* is most similar to *Platystele ximenae* from which it can be easily distinguished by its vermilion to vinaceous flowers (*vs.* yellow, suffused with purple at the basal middle), with long ciliate petals (*vs.* shortly pubescent) and the elliptical-oblong lip (*vs.* transversely cordate).

Plant small, epiphytic, caespitose herb, up to 5 cm including inflorescence; *roots* slender *ca.* 0.3 mm in di-

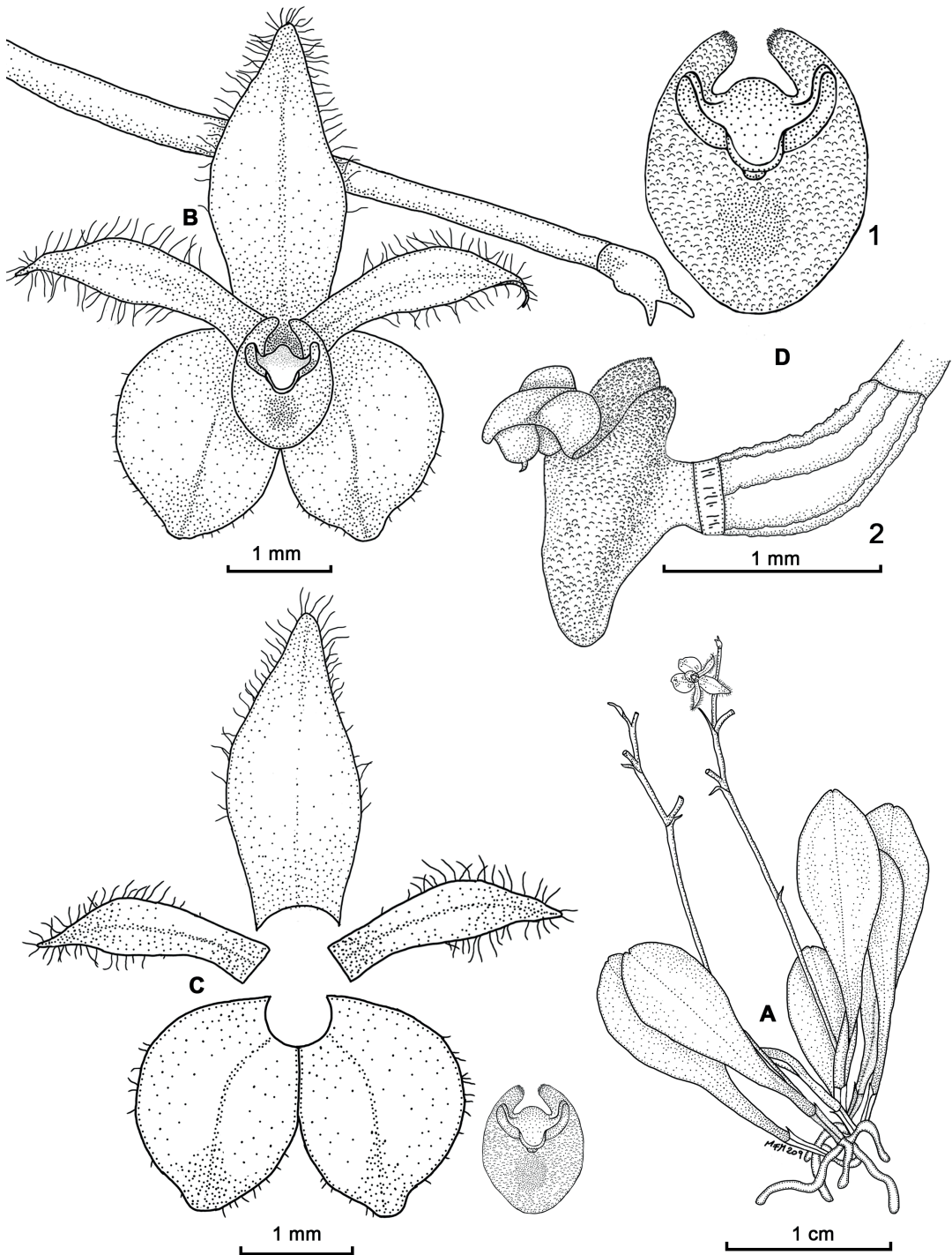


FIGURE 1. *Platystele finleyae* M.F.Monteros, E.Restrepo & Baquero. **A.** Habit. **B.** Flower. **C.** Dissected perianth. **D1.** Column and lip, frontal view. **D2.** Column, lip and ovary, lateral view. Drawn by Marco F. Monteros from the plant that served as the holotype (MFM 209, QCNE).

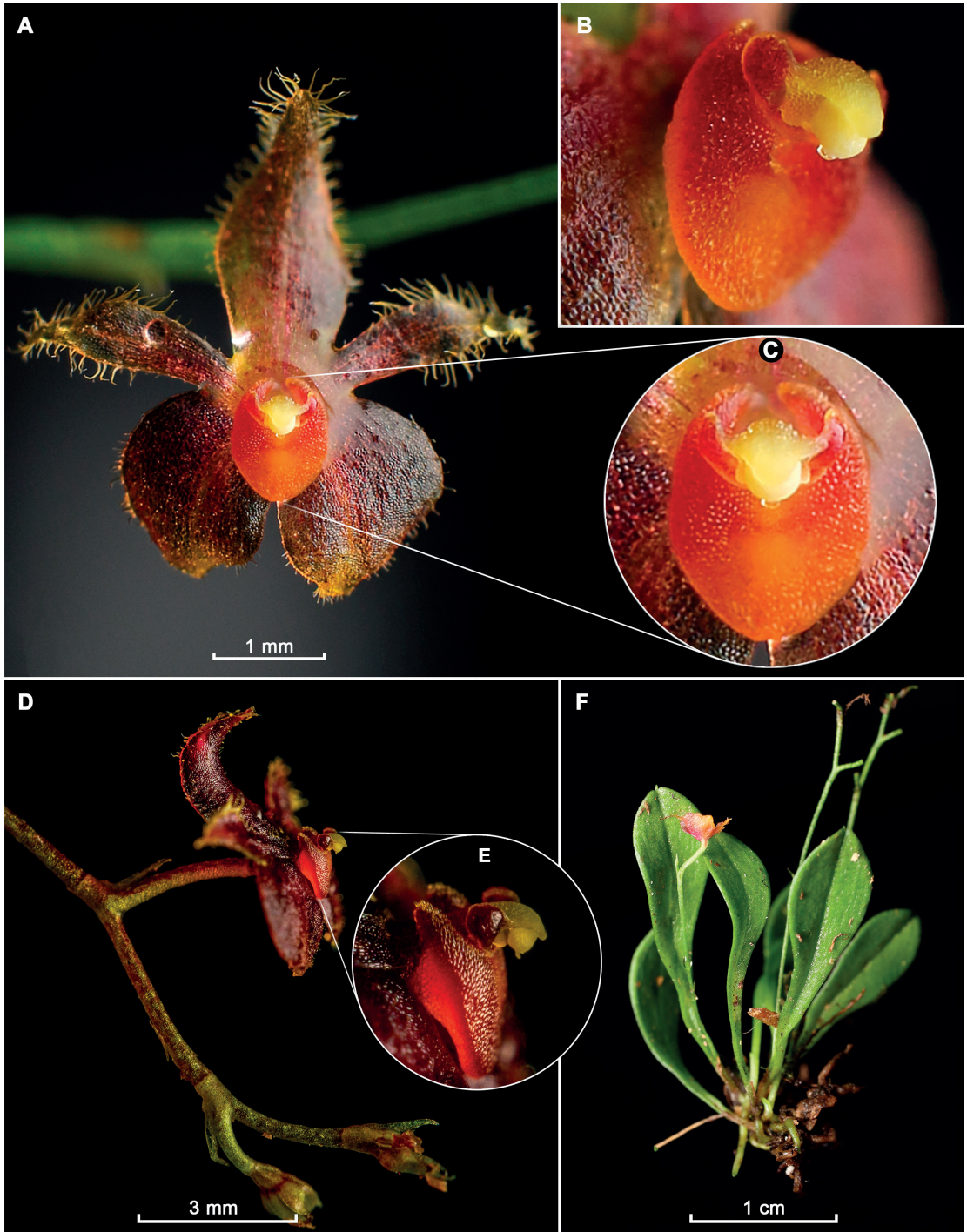


FIGURE 2. Photographs of *Platystele finleyae* M.F.Monteros, E.Restrepo & Baquero **A.** Flower, frontal view. **B.** Close-up of the lip and column, $\frac{3}{4}$ view. **C.** Close-up of the lip and column, frontal view. **D.** Inflorescence, lateral view. **E.** Close-up of the lip and column, lateral view. **F.** Habit. Photographs by Marco F. Monteros (A–C, F) & Andrés Better (D–E) from the plant that served as the holotype (MFM 209, QCNE). Prepared by Eugenio Restrepo.

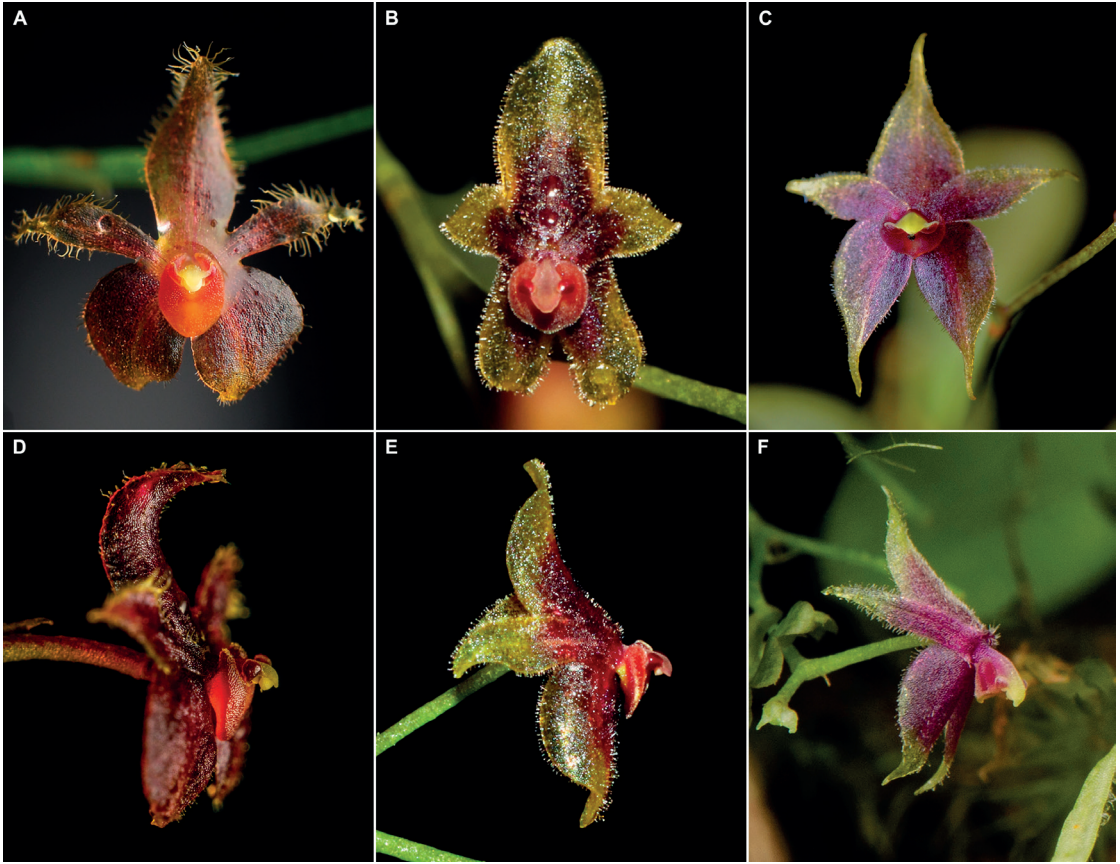


FIGURE 3. Species comparison. *Platystele finleyae* M.F.Monteros, E.Restrepo & Baquero (A, D), *Platystele ximena* Luer & Hirtz (B, E), *Platystele adelphe* Luer & Hirtz (C, F). Photographs by Marco F. Monteros (A), Andrés Better (D), Kevin Holcomb (C, F) and Luis Baquero (B, E). Prepared by Eugenio Restrepo.

anther. *Ramicauls* erect to suberect, slender, 3–4 mm long, enclosed by 1–2 thin, ribbed, imbricating sheaths. *Leaf* erect to suberect, coriaceous, obovate, with the base narrowly attenuated into a petiole, 2.0–3.0 × 0.7–1.1 cm. *Inflorescence* erect and successively-flowered raceme, 3–5 cm long, including filiform peduncle 0.5 cm long, emerging low from the ramicaul; *floral bracts* acuminate, 1 mm long; pedicels 2.5 mm long. *Ovary* 6-ribbed, 1 mm long. *Sepals* vermilion to vinaceous, glabrous towards the basal half and sparsely pubescent towards the apex, ciliate on the margins. *Dorsal sepal* broadly oblong, attenuate, long ciliate in the margins, subconvex, 1-veined, 2.0–2.5 × 1.5 mm. *Lateral sepals* broadly ovate, obtuse, slightly ciliate in the margins, connate at the base, 1-veined, 2.0 × 2.5 mm. *Petals* vermilion to vinaceous, oblanceolate, subfalcate, glabrous, acute, 2.0 × 1.0 mm, 1-veined, long-ciliate

from the middle to the apex. *Lip* flame-colored, oblong, elliptical, cellular-glandular, small deltate glenion at the base, with a rounded apex, 1.1 × 0.9–1.0 mm, with the rounded base inflexibly attached to the column. *Column* flame-colored to cream, short, incurved, stout semiterete 0.6 × 0.5 mm, anther ventral with the stigma subapical, reflexed, transversely bilobed on each side of the anther, the foot rudimentary. *Anther cap* yellowish, obovate, cucullate, 0.3 mm long. *Fruits* not seen.

PARATYPE: Ecuador. Carchi: La Esperanza, 1700m, 0°56'11.03" N, 78°14'33.91" W, 2 August 2021, M. Monteros 210 (QCNE!).

EPONYMY: The name honors Elizabeth Finley Broadus, a young nature lover who inspired thousands of people to take action to conserve nature and fight

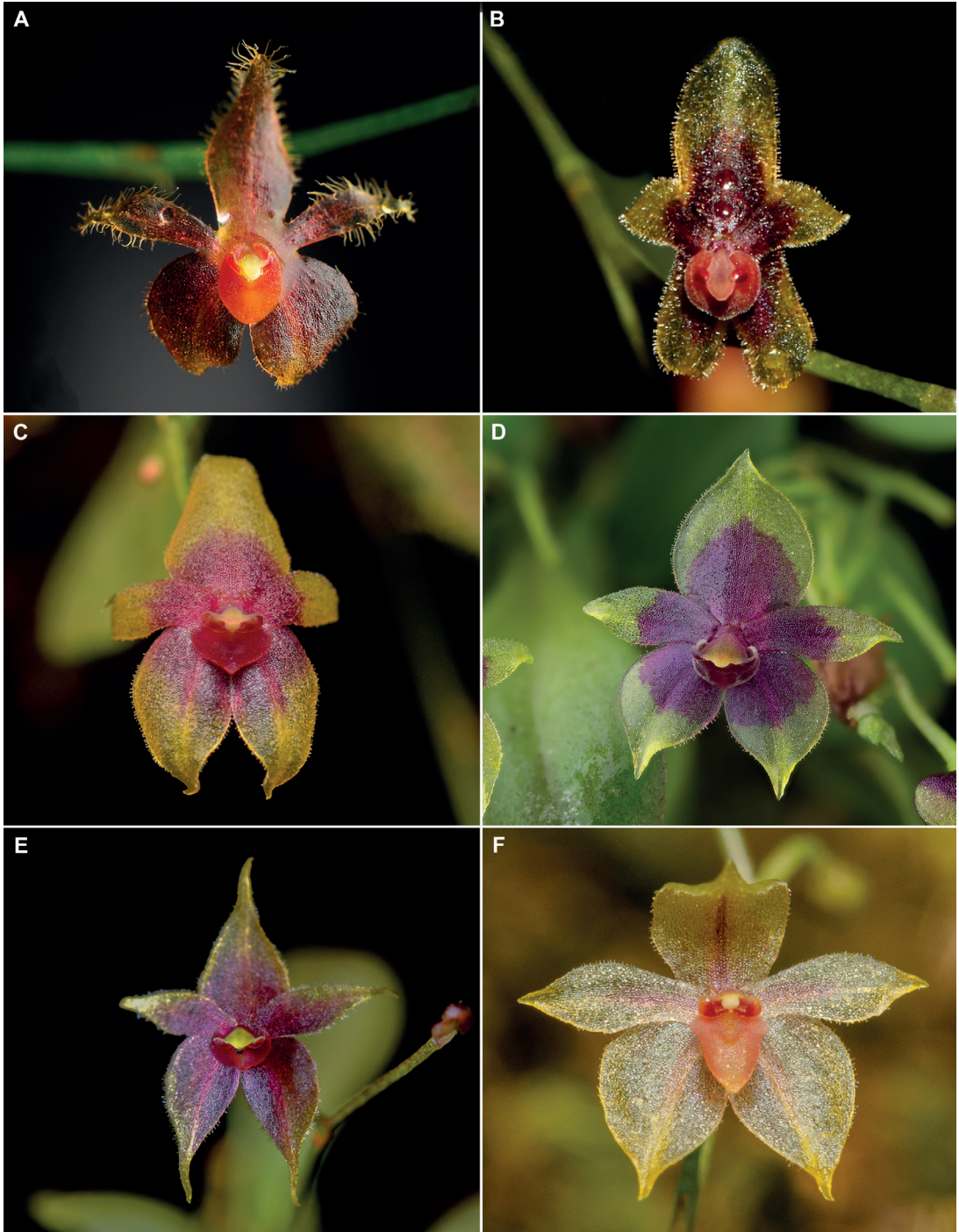


FIGURE 4. Species within the “pubescens” informal group. **A.** *Platystele finleyae* M.F.Monteros, E.Restrepo & Baquero. **B.** *Platystele ximenaе* Luer & Hirtz. **C.** *Platystele pubescens* Luer. **D.** *Platystele scopulifera* Luer & Dodson. **E.** *Platystele adelphe* Luer & Hirtz. **F.** *Platystele decouxii* Baquero & D.G.Verkovitch. Photographs by Marco F. Monteros (A), Kevin Holcomb (B), Luis Baquero (C, E–F), and Gerrit Verhellen (D). Prepared by Eugenio Restrepo.



FIGURE 5. Other species of *Platystele* that have been recorded around the locality of *Platystele finleyae* M.F.Monteros, E.Restrepo & Baquero. **A.** *Platystele baqueroi* Jost & Iturralde. **B.** *Platystele hirtzii* Luer. **C.** *Platystele caudatisepala* (C.Schweinf.) Garay. **D.** *Platystele filamentosa* Luer. **E.** *Platystele pamela* Baquero & G.Verkovitch. **F.** *Platystele cf. alucitae* Luer. Photographs by Marco Monteros (A, B) and Luis Baquero (C–F). Prepared by Eugenio Restrepo.

against climate change. She set up her foundation, Finley's Green Leap Forward, to support local and global efforts that positively impact the environment. Further to encouraging individual action, Finley's efforts served as the inspiration behind the foundation of Reserva: The Youth Land Trust. This nonprofit organization has since established the world's first youth-funded nature reserve in northwestern Ecuador.

HABITAT AND ECOLOGY: *Platystele finleyae* was found growing in a poorly explored forest of northwestern Ecuador, near the limit of Fundación EcoMinga's Dracula Reserve, around 1711 m of elevation. According to the Ministerio del Ambiente del Ecuador (2013), this ecosystem is classified as a lower montane evergreen forest of the western Andes (BSBN04). This region of Ecuador is characterized by high biodiversity

because it is influenced by two of the world's most diverse hotspots: Tumbes-Choco-Magdalena and Tropical Andes. *Platystele finleyae* grows epiphytically and shares the habitat with other Pleurothallidinae species such as *Scaphosepalum swertiifolium* Rchb.f., *Masdevallia picturata* Rchb.f., and *Lepanthes hexapus* Luer & R.Escobar.

PHENOLOGY: Plants of the species have been observed flowering in situ in March and August.

Platystele finleyae has flowers morphologically similar to *P. ximena* in the pubescent flowers with broad, connate at the base, lateral sepals, and the lip with basal lobes surrounding the column (Fig. 3B,E, 4B), but it is easily distinguished by the obovate leaves (*vs.* narrowly elliptical), the vermilion to vinal

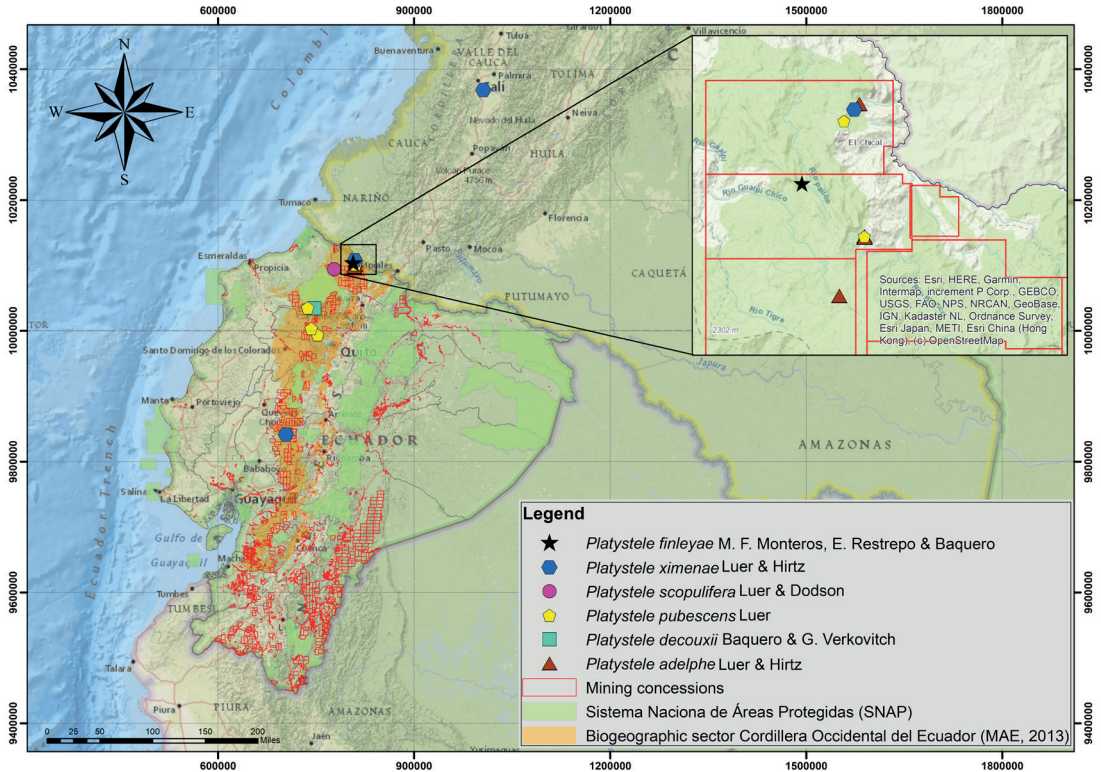


FIGURE 6. The distribution of the species within the “pubescens” informal group based on literature and field data. The map shows a hotspot in Carchi province, northwest Ecuador. It also shows the considerable number of mining concessions around these localities. Map prepared by Marco F. Monteros.

ceous color of the flowers and its pattern (*vs.* yellow, suffused with purple towards the basal middle); the dorsal sepal broadly oblong, attenuate, long ciliate in the margins, subconvex (*vs.* elliptical, obtuse, shortly acuminate), and the lateral sepals obtuse, and slightly ciliate at the margins (*vs.* broadly ovate, oblique, obtuse, shortly acuminate, shortly pubescent). It also differs from *P. ximenaе* by the integument of the petals, which is long ciliated (*vs.* short trichomes over the inner surface and margins, absent at the base), and the flame-colored lip, which is oblong, elliptical, rounded (*vs.* brown, transversely cordate, obtuse), narrower (0.9–1.0 mm *vs.* 1.4 mm), inflexibly attached to the column at the base (*vs.* with the basal lobes incurved and embracing the column).

Platystele finleyae appears to be related to other species belonging to the “pubescens” morphological informal group, like *P. adelphe*, *P. decouxii*, *P. muscicola*, *P. pubescens*, *P. scopulifera*, and *P. ximenaе* (Baquero & Galarza Verkovich 2019, Luer

1990, 1991, 1994). All these species are distributed in the biogeographic region of the western Andes of Ecuador and the southwestern Andes of Colombia in the Department of Valle del Cauca (Baquero & Verkovich 2019, Kolanowska 2012, Luer 1990, 1994, Ministerio del Ambiente del Ecuador 2013). Most of these species are endemic to the biogeographic region of the Tropical Andes. Presumably, the highest diversity of this morphological informal group is restricted to the northwestern provinces of Carchi, Esmeraldas, and Imbabura, where *Platystele adelphe*, *P. decouxii*, *P. muscicola*, *P. pubescens*, *P. scopulifera*, *P. ximenaе*, and *P. finleyae* grow (Fig. 6). Other species of *Platystele* are known to be close to the locality of *Platystele finleyae*, such as *P. alucitae* Luer, *P. caudatisepala* (C.Schweinf.) Garay, *P. filamentosa* Luer, *P. hirtzii* Luer, and *P. pamelaе* Baquero & Zuchan (Baquero & Zuchan 2017, Jost & Iturralde 2017, Luer 1990), but none of them are morphologically similar to *P. finleyae* (Fig. 5).

Even though the Cordillera Occidental de Ecuador is an important biogeographic region for Ecuadorian biodiversity, it is currently strongly threatened by mining concessions, the lack of government-owned protected areas, and the illegal extraction of species. These threats put the conservation status of these species at risk (Monteros *et al.* 2021, Yáñez-Muñoz *et al.* 2021). Therefore, it is necessary to evaluate their conservation status according to IUCN criteria, to focus on effective conservation actions (Fig. 6).

CONSERVATION STATUS: Although not yet evaluated, we suggest classifying this species as “Critically Endangered” following (IUCN 2012) criteria B2ab(iii): area of occupancy estimated to be less than 10 km²; known to exist in no more than one locality, even though constant explorations have been carried out in this region during the last five years (Baquero & Monteros 2020, Baquero & Zuchan 2017, Jiménez *et al.* 2018, Monteros *et al.* 2021) and continuing decline, observed, inferred or projected, in area, extent, or quality of

habitat. The main threats to this species are abrupt microclimate variations, habitat loss, and mining projects in the region (Fig. 6).

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LITERATURE CITED

- Baquero, L. E. & Monteros, M. F. (2020). A new tall and exceptional species of *Lepanthes* from north-west Ecuador (Orchidaceae: Pleurothallidinae). *Lankesteriana*, 20(3), 331–338. Doi: <http://dx.doi.org/10.15517/lank.v20i3.44602>
- Baquero, L. E. & Verkovitch, D. G. L. (2019). Two new species and new records of *Platystele* (Pleurothallidinae: Orchidaceae) from Los Cedros reserve in Ecuador. *Lankesteriana*, 19(1), 5–13. Doi: <https://doi.org/10.15517/lank.v19i1.36900>
- Baquero, L. E., & Zuchan, K. (2017). *Platystele pamela* (Orchidaceae: Pleurothallidinae), a new species from Ecuador. *Lankesteriana*, 17(2), 245–250. Doi: <https://doi.org/10.15517/lank.v17i2.30112>
- Jiménez, M. M., Baquero, L. E., Wilson, M. & Iturralde, G. A. (2018). *Pleurothallis chicalensis*, a new species in subsection *Macrophyllae-Fasciculatae* (Orchidaceae: Pleurothallidinae) from northwestern Ecuador. *Lankesteriana*, 18(2), 103–109. Doi: <http://dx.doi.org/10.15517/lank.v18i2.34050>.
- Jost, L. & Iturralde, G. (2017). A showy new *Platystele* (Pleurothallidinae: Orchidaceae) from northwest Ecuador. *Lankesteriana*, 17(1), 55–60. Doi: <https://doi.org/10.15517/lank.v17i1.28479>.
- Karremans, A. P. & Bogarín, D. (2017). Two novelties in genus *Platystele* (Orchidaceae: Pleurothallidinae) from Costa Rica. *Lankesteriana*, 17(2), 215–221. Doi: <https://doi.org/10.15517/lank.v17i2.30044>
- Karremans, A. P., Albertazzi, F. J., Bakker, F. T., Bogarín, D., Eurlings, M. C. M., Pridgeon, A., Pupulin, F. & Gravendeel, B. (2016). Phylogenetic reassessment of *Specklinia* and its allied genera in the Pleurothallidinae (Orchidaceae). *Phytotaxa*, 272(1), 1–36. Doi: <https://doi.org/10.11646/phytotaxa.272.1.1>.
- Kolanowska, M. (2012). The first record of *Platystele ximenae* (Pleurothallidinae, Orchidaceae) for Colombia. *Biodiversity Research and Conservation*, 25, 39–42.
- Luer, C. A. (1990). *Icones Pleurothallidarum*. VII. Systematics of *Platystele* (Orchidaceae). *Monographs in Systematic Botany from the Missouri Botanical Garden*, 38, 1–132.
- Luer, C. A. (1991). *Icones Pleurothallidarum*. VIII. Systematics of *Lepanthopsis*, *Octomeria* subgenus *Pleurothallopsis*, *Restrepiella*, *Restrepiopsis*, *Salpistele*, and *Teagueia* (Orchidaceae). *Monographs in Systematic Botany from the Missouri Botanical Garden*, 39, 139–145.
- Luer, C. A. (1994). *Icones Pleurothallidarum*. XI. Systematics of *Lepanthes*, subgenus *Brachycladium*, and *Pleurothallis*, subgenus *Aenigma*, subgenus *Elongatia*, subgenus *Kraenzlinella*; Addenda to *Dracula*, *Lepanthopsis*, *Myoxanthus*, *Platystele*, *Porroglossum*, and *Trisetella*. *Monographs in Systematic Botany from the Missouri Botanical Garden*, 52, 121.

- Ministerio del Ambiente del Ecuador. (2013). Sistema de Clasificación de los Ecosistemas del Ecuador Continental. Subsecretaría de Patrimonio Natural, 300 pp. Retrieved from https://www.ambi-ente.gob.ec/wp-content/uploads/downloads/2012/09/LEYENDA-ECOSISTEMAS_EC-UADOR_2.pdf [Accessed 15.10.2020].
- Monteros, M. F., Baquero, L. E., & Vieira-Urbe, S. (2021). A New *Pseudolepanthes* (Pleurothallidinae: Orchidaceae) from Northwest Ecuador. *Lankesteriana*, 21(1), 5–10. Doi: <https://doi.org/10.15517/lank.v21i1.45877>
- Schlechter, F. R. (1910). *Orchidaceae novae et criticae. Repertorium Specierum Novarum Regni Vegetabilis*, 8(191–195), 565.
- Reina-Rodríguez, G. A. & Karremans, A. P. (2018). A new *Platystele* (Orchidaceae, Pleurothallidinae) from the western mountains of Colombia. *Phytotaxa*, 375(3), 235–242. Doi: <https://doi.org/10.11646/phytotaxa.375.3.6>.
- Romero, B. J. Z., Solano, R. & Cornejo, X. (2018). *Platystele apoloae* (Orchidaceae: Pleurothallidinae), a new species from southwestern Ecuador. *Phytotaxa*, 372(1), 88–96. Doi: <https://doi.org/10.11646/phytotaxa.372.1.7>
- Thoerle, L. (2018). *Platystele medinae* (Orchidaceae: Pleurothallidinae), a new species from Colombia. *Novon*, 26(2), 180–183. Doi: <https://doi.org/10.3417/2018063>
- Vieira-Urbe, S. & Karremans A. P. (2017). *Platystele colombiana* sp. nov. *Species Orchidacearum, Icones Colombianae*, 1, 12.
- Yáñez-Muñoz, M. H., Reyes-Puig, J. P., Batallas-Revelo, D., Broaddus, C., Urgilés-Merchán, M., Cisneros-Heredia, D. F. & Guayasamin, J. M. (2021). A new Andean treefrog (Amphibia: *Hyloscirtus bogotensis* group) from Ecuador: an example of community involvement for conservation. *PeerJ*, 9, e11914. Doi: <https://doi.org/10.7717/peerj.11914>.
- UICN. (2012). Categorías y Criterios de la Lista Roja de la UICN: Versión 3.1. Segunda edición. Gland, Suiza y Cambridge, Reino Unido: UICN. vi + 34pp. Originalmente publicado como IUCN Red List Categories and Criteria: Version 3.1. Second edition. (Gland, Switzerland and Cambridge, UK: IUCN, 2012).

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