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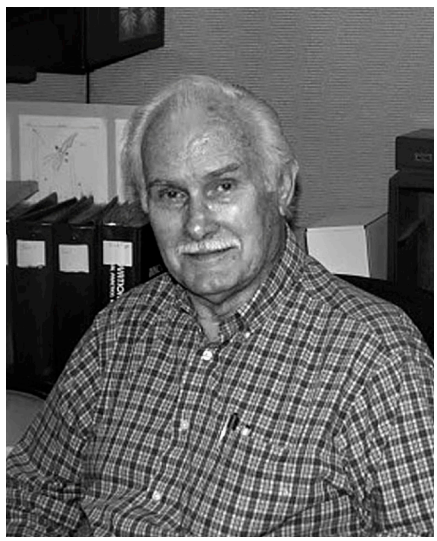

Kerry Dressler, 2010

This issue of Lankesteriana is dedicated
to the memory of

CALAWAY H. DODSON
(1928–2020)

a true pioneer in many fields of orchid science.

He recommended buying Charles Lankester's farm El Silvestre
which, after being donated to the University of Costa Rica,
became the Lankester Botanical Garden.

SAVE THE DATE

MONOCOTS VII

7th International Conference on

Comparative Biology of Monocotyledons

COSTA RICA

San José, Costa Rica
March 6–10, 2023

LANKESTERIANA

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IN MEMORIAM

CALAWAY HOMER DODSON (1928–2020) EXPLORER, SCHOLAR, ORCHIDOLOGIST

Cal Dodson in the field in Ecuador. Photo by Stig Dalström.

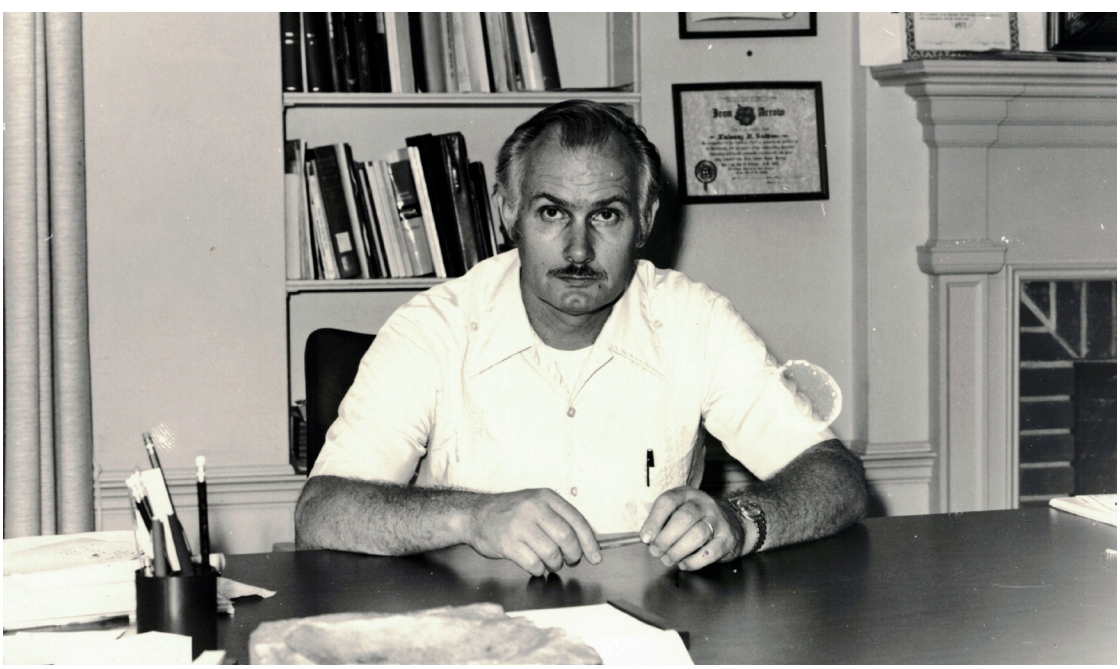
Neotropical plant biology was saddened by the passing of Dr. Calaway (Cal) H. Dodson on August 9th, 2020. He was born in the San Joaquin Valley, Selma, California the 17th of December 1928, to Homer and Leona Dodson. At eighteen, he enlisted in the US Army in 1947 and served as a paratrooper in the Korean war. Upon his return, he started his undergraduate education in Fresno State College (now university), where he received his bachelor's degree in Botany in 1954. He continued with his graduate education in Claremont College where he worked under the direction of Lee W. Lenz and obtained his masters and doctoral degrees in 1956 and 1959, respectively.

As part of his dissertation research "Natural hybridization in some tropical orchids in the Andes", he conducted fieldwork in Cuenca, Ecuador. After the completion of his Ph.D., he returned to Ecuador as a professor at the University of Guayaquil. Dodson taught Ecology, Botany, and Evolution, all in Spanish. In Ecuador, Dodson raised awareness of the importance of botanical knowledge, and he was instrumental in the foundation of the Institute of Botany and the Herbarium of Guayaquil (GUAY), which became part of the University of Guayaquil's Faculty of Natural Sciences.

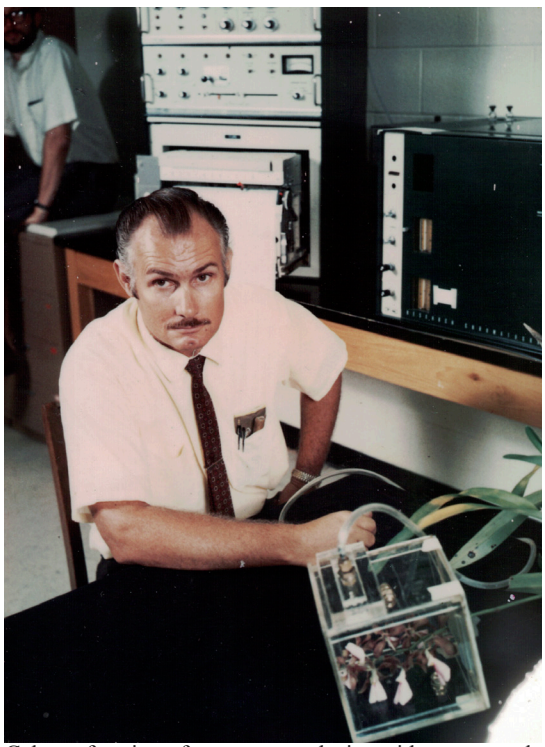
In 1960, Dodson married Piedad Mármol Dodson and relocated with his family to Saint Louis, Missouri, where he was Taxonomist and Curator of Living Plants of the Missouri Botanical Garden and a contributor to the *Flora of Panama* project. During this period, he started his long-time collaboration with Robert L. Dressler, to whom he dedicated the orchid genus *Dressleria* in 1975.

Cal became Assistant Professor and Curator of the University of Miami in Coral Gables in 1964. Funded

Calaway H. Dodson (right), with Edgar Anderson and Lee W. Lenz i n Rancho Santa Ana Botanical Garden., 1959. Unknown photographer.



Dodson on his desk as Director of Marie Selby Botanical Gardens. Payne's house, 1974. Unknown photographer.



Cal performing fragrance analysis with a recently purchased gas chromatography system in his lab at the University of Miami, 1981. Unknown photographer.

In Río Palenque, Los Ríos Ecuador, 1994. Photo by Piedad Dodson.

by a Fulbright grant, he moved with his growing family to Peru, where he conducted botanical surveys in Iquitos. After returning to the United States, Dodson continued to develop a dynamic research program focused on orchid evolution and fragrances, and he received tenure and was promoted to Full Professor in 1970. Through his program he mentored numerous students, including Ralph M. Adams, Sister John Karen Frei, Katharine B. Gregg, Harold G. Hills, Kiat W. Tan, Hans J. Whieler, and Norris H. Williams, who have since devoted their careers to the study of orchids and other tropical plant groups.

A visionary of the importance of research, education, and conservation in the Neotropics, Dodson purchased, together with Earl R. Rich, Leonard J. Greenfield and John R. Harrison, colleagues at University of Miami, ca. 200 hectares of remnant forests of coastal Ecuador, in an area that was being rapidly deforested due to the establishment of banana plantations. This land became the Río Palenque Science Center, a flagship for the conservation of forests in the coast of Ecuador, and a unique natural laboratory where many generations of students were trained.

While on his sabbatical in Río Palenque in 1973, Dodson was visited by Dr. Carlyle A. Luer, who would become one of his most valued collaborators. Luer invited Cal to take part in the establishment of a botanical garden located in Sarasota, Florida, that would specialize on epiphytic plants. Dodson left the University of Miami and joined the Marie Selby Botanical Gardens from 1973 to 1983. He was appointed founding director of the gardens and had an active role planning the physical infrastructure of the gardens and building a strong research program through the recruitment of investigators specializing in epiphytic plants. He was the founder of the Orchid Identification Center, and also started and frequently contributed to *Selbyana,* a journal devoted to epiphytic plants published by Selby Gardens.

Always an avid botanical explorer, Cal visited forests in all the Andean and Central American countries, accompanied by colleagues, orchid

Cal and Piedad Dodson in the summer 1973 in Sarasota, Florida. Photo by George M. Luer.

enthusiasts, members of orchid societies, students, and family. During his lifetime, he collected over 14,000 herbarium specimens that are deposited in the herbaria in which he worked (primarily MO, GUAY, QCA, QCNE, SEL, RPSC). His collections are among his most important scientific legacies, providing evidence of forests that no longer exist and the foundation of his monographic treatments and *florulae*.

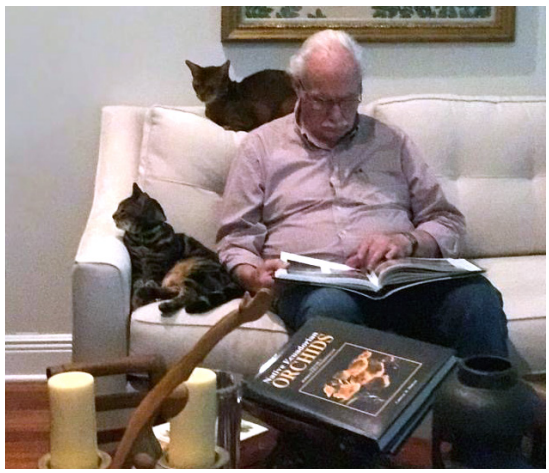
In 1983, the Missouri Botanical Garden re-hired Cal as Senior Curator through the New World Tropical Research program, which sought to strengthen the Missouri Botanical Gardens' research initiatives in North-Western South America. He had an important role in the creation and organization of the National Herbarium of Ecuador (QCNE). During this period of his prolific career, Cal and his colleagues Alwyn H. Gentry and Flor M. Valverde published floristic inventories, monographic treatments, and manuscripts that have become classics in Neotropical plant ecology.

Dodson also led the compilation of the orchid checklist for the *Catalogue of Vascular Plants of Ecuador*, published in 1999. This monumental work collected nomenclatural, habitat and distribution information of 4100 species and raised the awareness that one out of every five species of vascular plants in Ecuador is an orchid. This stunning statistic, revealed through Cal's lifetime work, changed the way in which Ecuadorians perceived and valued their plant diversity and paved the way for conservation and research projects as well as national campaigns to value, protect, and promote orchids and their habitats.

For his contributions to the scientific advancement of Ecuador, in 2001 Cal became the first non-

Dodson and David Benzing collecting plants on the road to Apuela, Imbabura, Ecuador, in 1994. The genus *Ecuadoria* was discovered in this field trip, as well as *Lepanthes benzingii* and *Benzingia hirtzii*. Photo by Alex Hirtz.

Cal Dodson accepting the Medal of Scientific Merit of the National Congress of Ecuador, Guayaquil, Ecuador, 2005. Unknown photographer.



Cal Dodson, reviewing his volumes of *Native Ecuadorian Orchids* surrounded by his cats in 2018. Photo by Piedad Dodson.

Ecuadorean honored with the Presidential Medal of National Merit. In 2005, he received the Medal of Scientific Merit of the National Congress of Ecuador and was recognized as Honorary Member of the Ecuadorian Orchid Society.

During his later life, Cal continued to publish orchid monographic treatments for the *Flora of Ecuador*. Parallel to this effort, in collaboration with Alexander Hirtz he also produced the series *Native Ecuadorian Orchids*, a pictorial guide with introductory compendia

Cal with (from the left) Norris Williams, Bob Dressler and Mark Whitten in the First International Conference of Neotropical Orchidology, Lankester Botanical Garden, Costa Rica 2003. Photo by Joseph Arditti.

Carl Luer, Peter Raven and Calaway Dodson at Selby Botanical Gardens, 2017. Photo by Piedad Dodson.

to each genus that was directed for a wider audience.

Throughout his life, Cal remained an active supporter of numerous conservation initiatives in Ecuador. He was part of the conservation status assessment of ca. 1000 species of orchids for the Red List of Endemic Plants of Ecuador, for which he provided detailed accounts of their populations and threats. In 2006, he supported the formation of EcoMinga, an Ecuadorian foundation devoted to the conservation of the unique ecosystems of the Andes. Cal was a member of EcoMinga's directory until 2016, and he remained an honorary director of this organization thereafter.

Cal received the award for 'Extraordinary Achievement' from his *Alma Mater* in 2005 and remained Curator Emeritus of the Missouri Botanical Garden, Senior Research Associate of Marie Selby Gardens, and honorary life member of the American Orchid Society and the Ecuadorian Orchid Association.

Scientific legacy. Dr. Dodson's career interests focused on the evolution of Neotropical orchids and their pollination mechanisms. As pioneer in the research of Neotropical euglossine bees and orchid fragrances, his work transcended plant systematics and Orchidology, and influenced the fields of bee taxonomy and behavior, biochemistry, biodiversity, and conservation.

Due to his inspiring career his colleagues dedicated one genus (i.e. *Dodsonia* Ackermann) and 74 plant species to honor him in the families Acanthaceae (2 species), Amaryllidaceae (1), Apocynaceae (1), Araceae (4), Aristolochiaceae (1), Asteraceae (4), Begoniaceae (1), Bromeliaceae (7), Cactaceae (4) , Chrysobalanaceae (2), Ericaceae (2), Gesnericeae (6), Lecythidaceae (1), Maranthaceae (2), Melastomataceae (1), Moraceae (1), Myrsinaceae (2), Orchidaceae (26), Piperaceae (1), Rubiaceae (1), Sapindaceae (1), Thelypteridaceae (2), and Viscaceae (1).

Principal Scientific Publications

A prolific scholar, Dodson published over 400 papers and described 1039 species new to science in the following families: Amaranthaceae (1), Cactaceae (2), Crassulaceae (1), Heliconiaceae (4), Meliaceae (1), Mimosaceae (1), Orchidaceae (1025), Sapindaceae (1), Urticaceae (2), and Zamiaceae (1).

These selected publications of Dr. Dodson's career portray his contributions to different disciplines of biology, the knowledge of the flora in geographical areas and the diversity of collaborators throughout the decades of his career.

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A NEW SPECIES OF PLEUROTHALLIDINAE (ORCHIDACEAE) FROM THE SOUTH-EAST OF ECUADOR

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Abstract. *Porroglossum marcojimeneziorum*, a new species of subtribe Pleurothallidinae, was discovered in Zamora Chinchipe province (south-east Ecuador) and is described here, including information about its phenology and ecology. *Porroglossum marcojimeneziorum* is compared with its most similar species, *P. hirtzii*, from which it differs by producing smaller flowers; the shortly-pubescent, triangular-ovate, obtuse lateral sepals and the blade of the lip obovate transversely expanded.

Resumen. *Porroglosum marcojimeneziorum*, una nueva especie de la subtribu Pleurothallidinae, fue descubierta en la provincia de Zamora Chinchipe (sur-este de Ecuador) y se describe aquí incluyendo información sobre la fenología y ecología de la especie. *Porroglossum marcojimeneziorum* es comparada con la especie *P. hirtzii*, de la que se diferencia por la flor más pequeña con sépalos laterales de pubescencia corta, de forma ovada-triangular y ápice obtuso, ampliamente abiertos y la lámina transversalmente obovada del labelo.

Key Words / Palabras clave: *Porroglossum hirtzii, Porroglossum marcojimeneziorum,* Zamora Chinchipe

Introduction. The genus *Porroglossum* Schlr. was created in 1920 by Rudolf Schlechter, who designated two species to the genus, *P. mordax* (Rchb.f.) H.R.Sweet (type) and *P. muscosum* (Rchb. f.) Schltr, both previously assigned to *Masdevallia* Ruiz & Pav., however, Kraenzlin held the position that those species should stay in *Masdevallia* (Luer 1987). Nevertheless, Carlyle Luer not only recognized the genus described by Schlechter, but he additionally published a monograph of the genus in 1987, describing a total of 25 species of *Porroglossum* (Luer 1987).

The flowers of this genus are easily recognized for the apical anther and the mobile labellum that snaps shut when stimulated; combination of characteristics not found in any other Pleurothallidinae. A mobile lip can be found in *Stelis rodrigoi* (Luer) Pridgeon & M.W.Chase and some species of the *Specklinia* subgen. *Acostaea* (Schltr.) Karremans. Plants of *Porroglossum* commonly have coriaceous leaves slightly to densely warty at the adaxial surface. The petals are projected forward, parallel to the column, with the upper and lower margins frequently expanded into acute teeth-like lobes. The number (absent, at one or both margins of the petals) and position (basal third, mid third or apical third) of these lobes are diagnostic for the species in the genus. A typical feature of the genus is that the lip is attached to the back side of the column foot. The blade of the mobile lip can be rhombic, terete, ovate, obovate, elliptic or rounded and always with a sulcus at the apex. The callus at the base of the blade can be longitudinal, transversal, simple or double (Luer 1987).

The 54 described *Porroglossum* species are distributed throughout the Andes of Venezuela, Colombia, Ecuador, Peru, with a single species in Bolivia, with a peak of diversity in Ecuador with (40 spp., 74% of the genus) (Luer 1987, 1988, 1989, 1991, 1994, 1995, 1998, 2006, 2010, 2011, Luer & Thoerle 2012, 2013, Kolanowska & Szlachetko 2013, Merino *et al.* 2010, McDaniel *et al.* 2015, Baquero & Iturralde 2017). Species of *Porroglossum* are found epiphytic in cloud-forests, from moderate to high elevation (between 1000 and 3200 m a.s.l.). In Ecuador, many species come from the Andean South-East slopes, and the Cutucú and Condor mountain ranges in Zamora Chinchipe and Morona Santiago provinces. Here, we describe and illustrate a recently discovered species, also from south-east Ecuador, which is compared with *P. hirtzii* Luer, likely the most closely related species.

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Taxonomic treatment

Porroglossum marcojimeneziorum Baquero & A.Fierro-Minda, ***sp. nov***. (Fig. 1, 2, 3A, 3C, 4, 5A).

TYPE: Ecuador. Zamora Chinchipe: Palanda, Cerca de Palanda 4°38'58" S, 79°08'46" W, 1470 m, 24 Jan 2017, *M. Jimenez 323* (holotype, QCNE) (Fig. 1–5).

Diagnosis: *Porroglossum marcojimeneziorum* is similar to *P. hirtzii* from which it differs by possessing smaller flowers (16–18 mm *vs.* 20 mm of the corolla), with widely opened lateral sepals (*vs.* a larger flower with the lateral sepals inflexed forward), triangular ovate, obtuse, and white with cream colored nerves in the adaxial side (*vs.* triangular ovate, subacute, and white suffused with pale rose in the adaxial side), the callus of the lip transversely triangular and longitudinally notched in the middle (*vs.* the low, erect, transverse, entire callus), the blade of the lip transversely obovate stained with purple (*vs.* rhomboid and white) (Fig. 1–5).

Epiphytic caespitose *herb*, up 65 mm tall. *Roots* slender, *ca*. 1.5 mm in diameter. *Ramicauls* nigrescent, erect, slender, *ca*. 10.0–30.0 × 1.8 mm, enclosed by 2–3 tubular sheaths. *Leaf* erect-arcuate, coriaceous, 4–7 cm long including the petiole, the blade narrowly obovate, 3.0–4.5 × 0.7–1.0 cm, acute, the base attenuate. *Inflorescence* a congested, successively single-flowered raceme, emerging from low on the ramicaul, the flowers resupinate, peduncle glabrous, erect to sub-erect, 7.5–8.5 cm long, with 2 tubular distant bracts; floral bracts tubular, imbricating, 4–7 mm long, pedicel 7–10 mm long. *Ovary* curved, rugose, 3.2 mm. *Dorsal sepal* narrowly ovate, acute, three-veined, convex at the apical third, concave below and long pubescent towards the apical third, 8.0–9.0 × 3.2–3.5 mm, 3-veined, connate at the base (1.4 mm) to the lateral sepals, shortly-pubescent at the margins below the apical third; white, with yellowish green in both surfaces, adaxial and abaxial side suffused with rose and veins elevated at the abaxial side. *Lateral sepals* ovate, obtuse to subacute apex, snow-white, slightly translucent, slightly pubescent (including margins) toward the apex, 8.0–9.0 × 4.5–4.8 mm, connate to each other (1 mm) at the base; with three cream veins, yellowish green in the basal half and elevated abaxially. *Petals* cream, translucent, with a yellowish green mid vein, waxy, oblong, curved, 3.0 × 0.8 mm, narrowed in the middle third, the apex thickened, slightly dilated, rounded, the lower margin with an obtusely angled lobe in the lower third. *Lip* white, suffused with purple towards the apex; the blade shortly pubescent, obovate, the lateral angles rounded, the apex obtuse to sub-truncate, sulcate medially, 4.2 × 4.4 mm; the base with a low, transversely triangular callus longitudinally notched in the middle, deflexed below into a strap-like claw bent with tension around the free apex of the column-foot, hinged to the back surface of the column-foot. *Column* stout, semi-terete, 2.5 mm long, swollen ventrally with a 0.8 m in diameter and round stigma. *Pollinia* two, yellow, 1 mm long. *Fruit* a dehiscent capsule, 18 mm × 9 mm.

Paratype: Ecuador. Zamora Chinchipe: Palanda, Cerca de Palanda 4°39'1" S, 79°8'39" W, 1405 m, 3 May 2017, *LB 3133* (paratype, QCNE) (Fig. 2A–B).

Eponymy: Named after Marco M. Jimenez (father) and Marco M. Jimenez (son) from Zamora, Ecuador; both passionate orchid lovers. Marco M. Jimenez V., the father, has made notable discoveries along the past 40 years and his son represents a member of the new generation orchid researchers from Ecuador. Both of them initially observed the first plants of the new species presented here.

Habitat and ecology: *Porroglossum marcojimeneziorum* has been found growing epiphytic in low elevation cloud forest of the south of Ecuador. Two populations of this species have been found growing nearby at a similar elevation (between 1400–1500 m in elevation), where, around 15 plants have been witnessed growing between the two sites.

Phenology: Plants of *Porroglossum marcojimeneziorum* grown in Zamora were recoded flowering from July through November. A plant cultivated at Quito Botanical Gardens has not flowered in the past two years, but undeveloped inflorescences. This is perhaps attributable to the colder weather in Quito. However, plants *in situ* have been observed flowering during the same time periods across the past two years.

Of all the species of *Porroglossum* within the

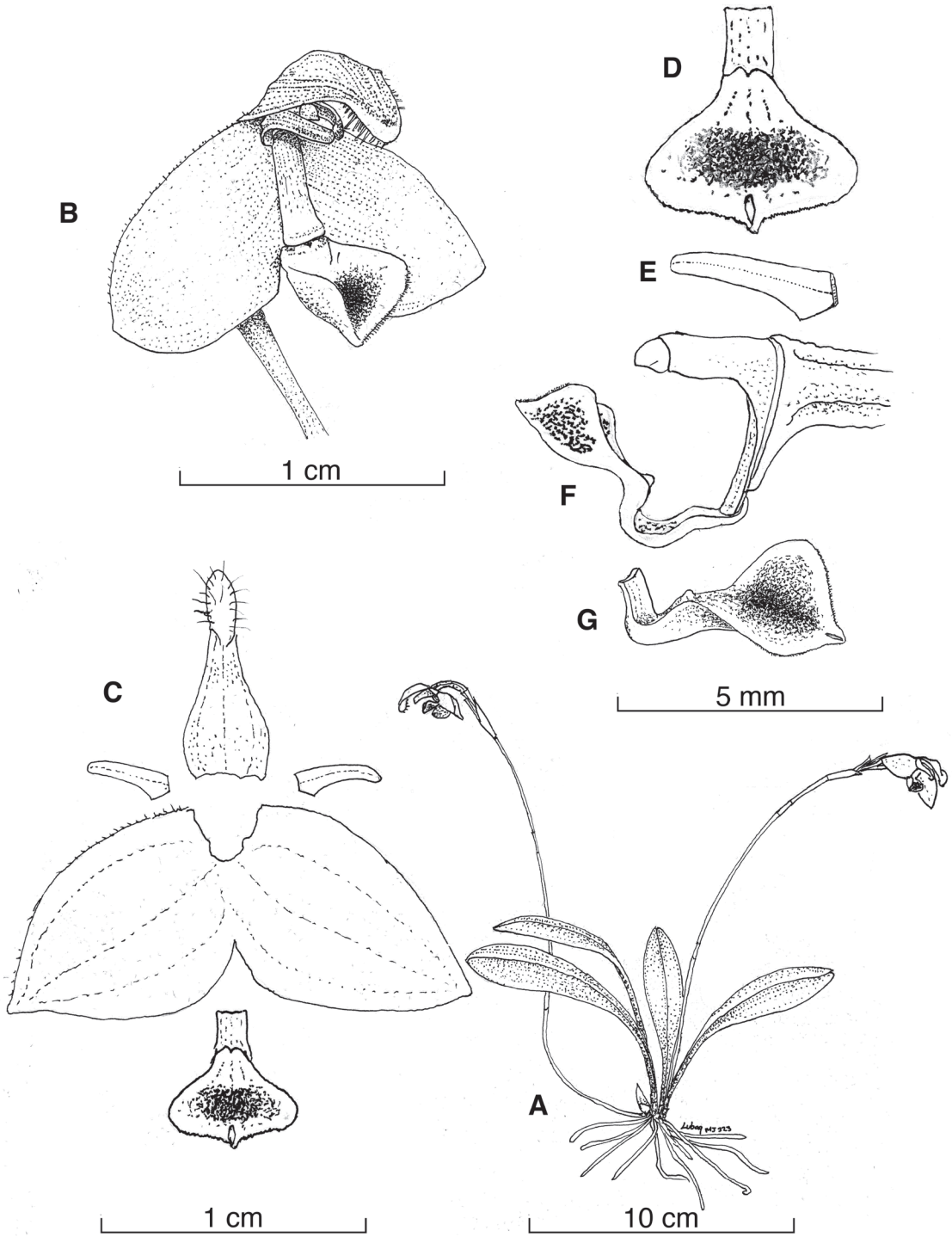

Figure 1. *Porroglossum marcojimeneziorum* Baquero & A.Fierro-Minda. **A**. Habit. **B**. Flower, ¾ view. **C**. Dissected perianth. **D**. Adaxial view of the lip and callus. **E**. Petal. **F**. Lateral view of the column and lip. **G**. Lateral view of the lip. Illustration by L. E. Baquero, based on the holotype, *Marco Jimenez 322* (QCNE).

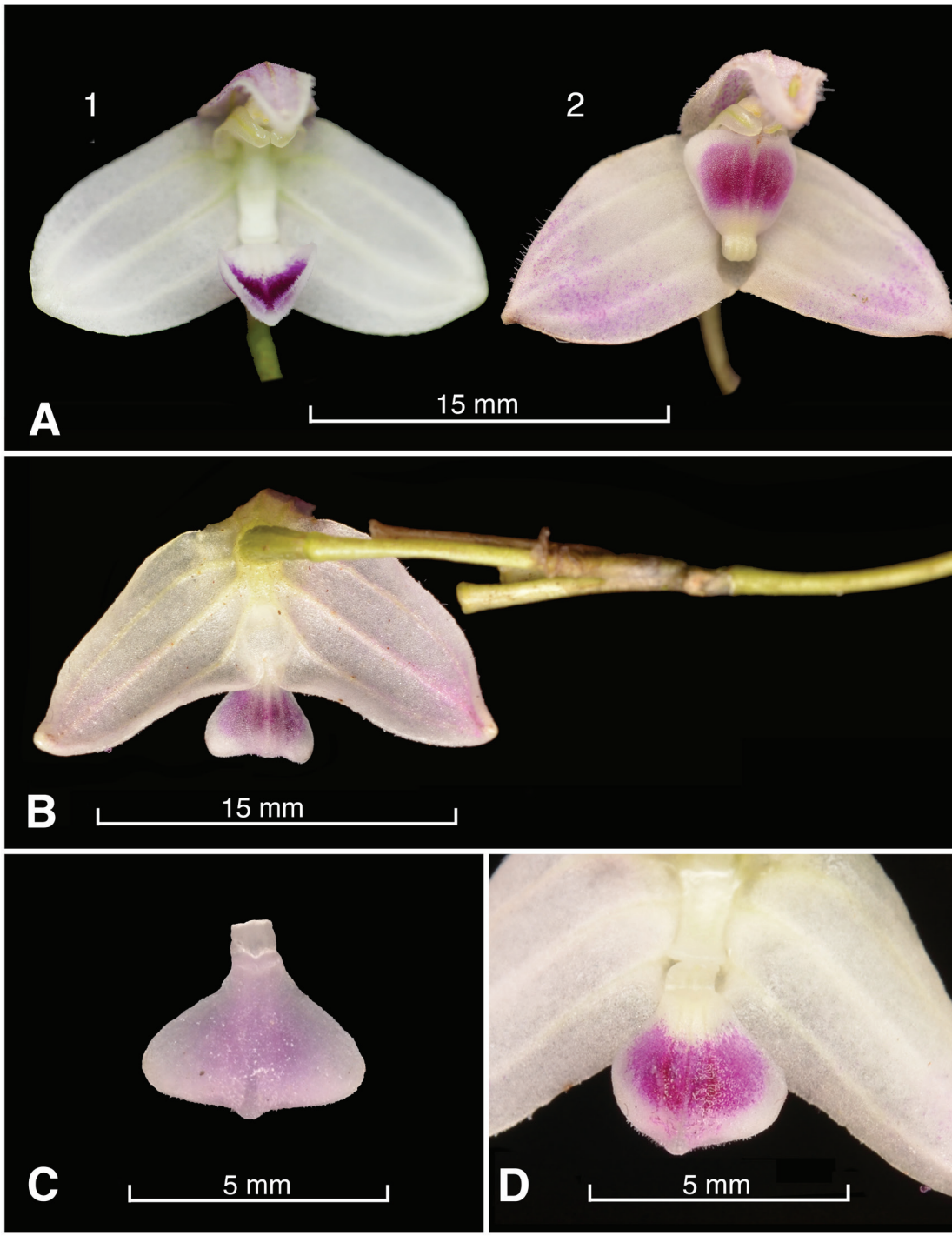

FIGURE 2. *Porroglossum marcojimeneziorum* Baquero & A.Fierro-Minda. **A1**. Flower with the lip opened (based on *MJ 332,* holotype, QCNE). **A2**. Flower with the lip closed (based on *LB 3133*, paratype, QCNE). **B**. View from behind with lip opened and peduncles. **C**. Lip in expanded position from a preserved flower in alcohol. **D**. Lip in opened position. Photos by L. E. Baquero (A1–D, except B) and M. M. Jimenez L. (B), based on *MJ 332* (A1) and on *LB 3133* (A2–D).

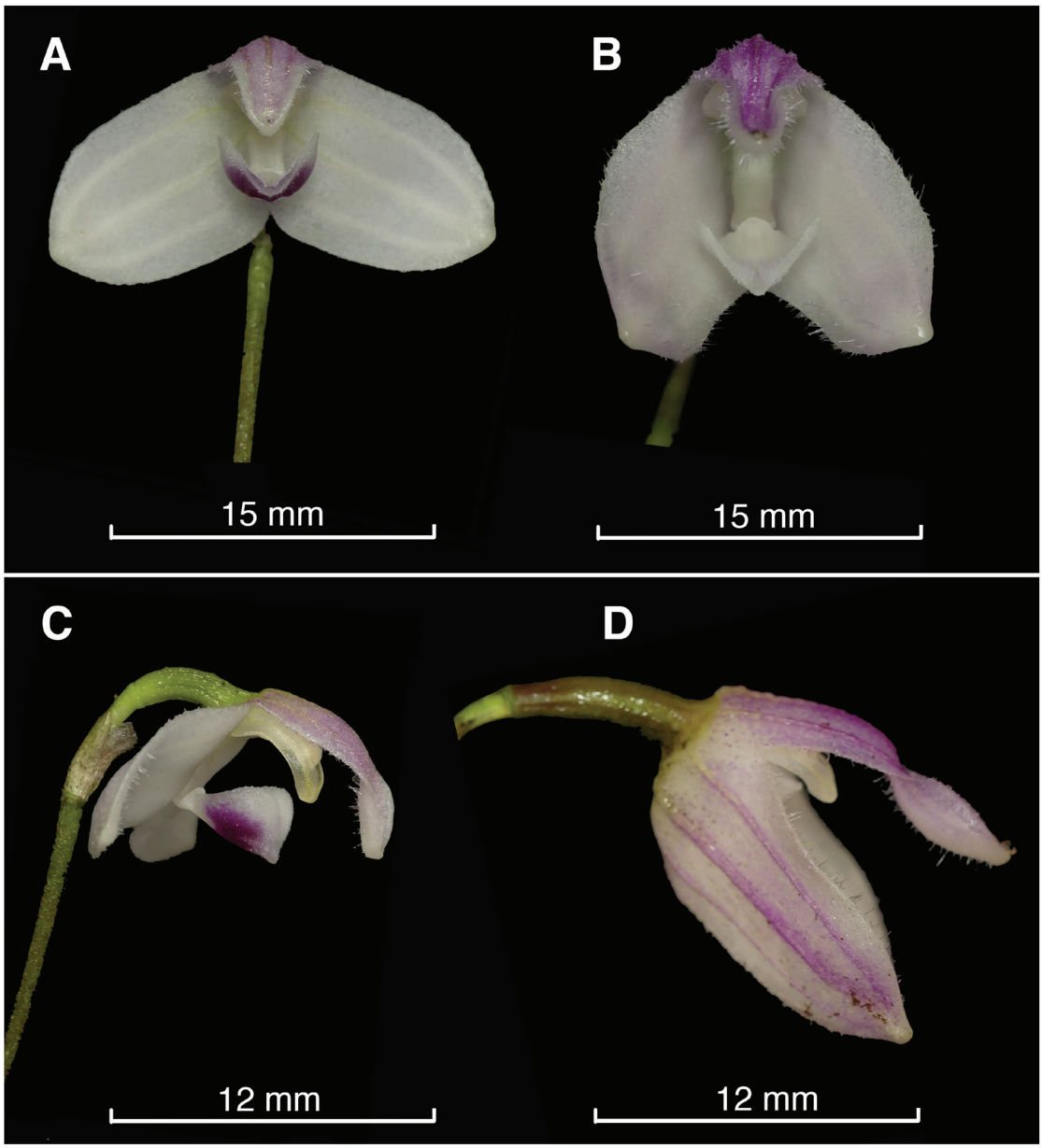

Figure 3. Comparison of *Porroglossum marcojimeneziorum* Baquero & A.Fierro-Minda and *P. hirtzii* Luer. **A**. Frontal view of *P. marcojimeneziorum*. **B**. Frontal view of *P. hirtzii*. **C**. Lateral view of *P. marcojimeneziorum*. **D**. Lateral view of *P. hirtzii*. Photos by M. M. Jimenez L. (A–B) and L. E. Baquero (C–D).

subgenus *Porroglossum*, *P. hirtzii* was the only known species with tail-less sepals. Also, the white, pubescent flowers immediately help to distinguish *P. hirtzii* from the other species in the genus. Nevertheless, *P. marcojimeneziorum* is the second known species in the genus which shares this feature (Fig. 3, 5). Although, both species are similar and both come from the eastern slopes of the Ecuadorian Andes, *P. marcojimeneziorum* was discovered further south, and all known individuals from natural populations share unique morphological characteristics which separate them from *P. hirtzii*. The inflorescences of *P. marcojimeneziorum* are erect

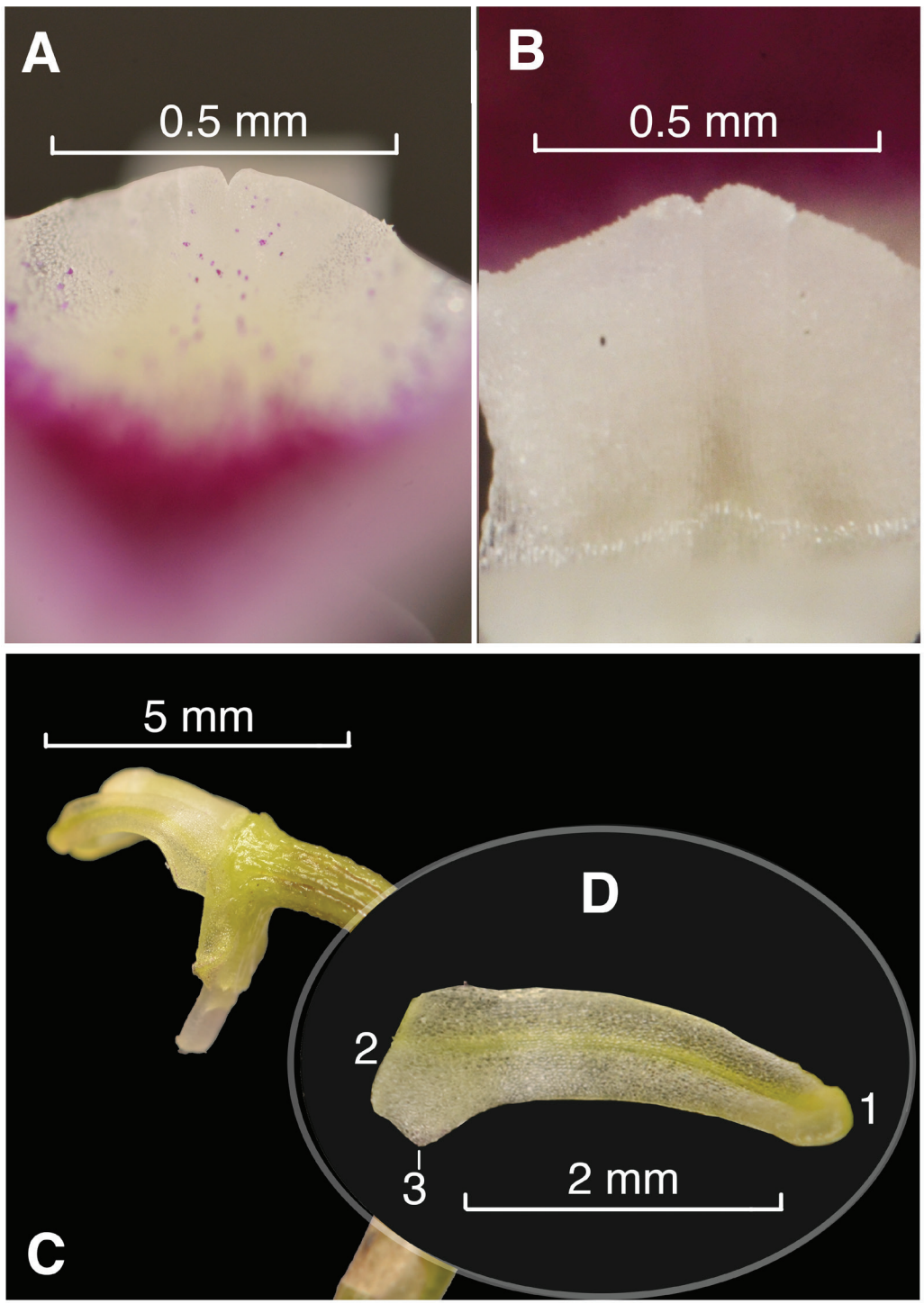

FIGURE 4. *Porroglossum marcojimeneziorum* Baquero & A.Fierro-Minda **A**. Frontal view of the lip callus. **B**. Back view of the lip callus. **C**. Lateral view of the petal and column. **D**. Close-up of the petal. **D1**. Apex. **D2**. Base. **D3**. Wing-like lobe of the base of the petal. Photos by L. E. Baquero.

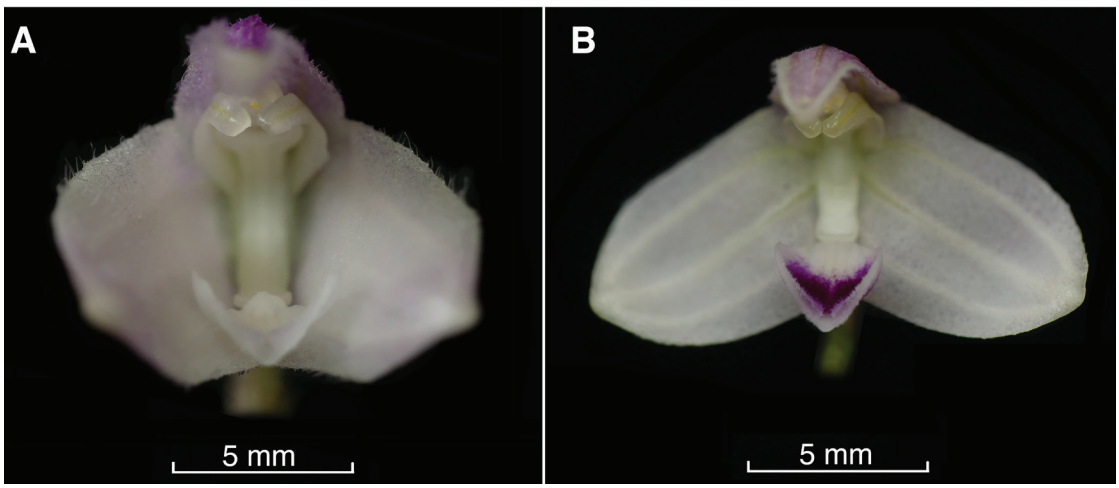

Figure 5. Flowers of *Porroglossum hirtzii* Luer (**A**) and *Porroglossum marcojimeneziorum* Baquero & A.Fierro-Minda (**B**). Photos by M. M. Jimenez L.

or sub-erect and bare smaller flowers (from 16 mm long) compared to the bigger flowers in *P. hirtzii* (from 20 mm long) which has horizontal or even descending inflorescences. The flowers of *P. hirtzii* never open widely, and the sepals project more or less to forward, whereas the flowers of *P. marcojimeneziorum* have widely opened lateral sepals, even a little reflexed in some plants. The lips of both species are also different in shape and pigmentation; the consistently white rhomboid blade of the lip in *P. hitzii* is different from the widely obovate and stained with purple blade of the lip in *P. marcojimeneziorum* (Fig. 1–5).

Conservation status: At the moment, the plants known of this new species grow in an unprotected area where mining activity is abundant. Although the species seems to have healthy populations, in the event forest cutting or invasive mining activities take place and destroy habitats, the species might be placed at risk. As we have previously suggested, more research is needed to get a better understanding of populations of *P. marcojimeneziorum*. Being such an attractive species of a commonly cultivated genus, illegal collecting and exporting are additional threats for the species.

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DRACULA IRMELINAE, A NEW SPECIES IN THE SUBTRIBE PLEUROTHALLIDINAE (ORCHIDACEAE) FROM THE WESTERN ANDES OF COLOMBIA

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Abstract. A new species of *Dracula* (Pleurothallidinae: Orchidaceae) from Colombia is described, honoring Irmelin Indenbirken, mother of the actor and philanthropist Leonardo DiCaprio. *Dracula irmelinae* is phenotypically most similar to *D. verticulosa,* but differs in having larger and wider sepals that form a smoothly curved semicircular mentum behind the lip, an indumentum with dark red internal and external maculae and dense long pubescence on the internal sepal surfaces and bases of the tails. The geographic distributions of the two species also differ, with the new species being restricted to a small area in the western Cordillera of Colombia. The conservation status of the new taxon is assessed as Endangered (EN) according to the International Union for Conservation of Nature (IUCN) criteria.

Resumen. Una nueva especie de *Dracula* (Pleurothallidinae: Orchidaceae) en honor a Irmelin Indenbirken, madre del actor y filántropo Leonardo DiCaprio, es descrita a continuación. *Dracula irmelinae* es fenotípicamente más similar a *D. verticulosa,* pero se diferencia por tener sépalos más largos y anchos que forman un mentum semicurcular, suavemente curvado detrás del labelo, un indumento con máculas rojas oscuras en las caras internas y externas de los sépalos, y una pubescencia densa y larga en la cara interna de los sépalos y la base de las caudas. La distribución geográfica de las dos especies también difiere dado que la nueva especie está restringida a un área pequeña de la cordillera occidental de Colombia. El estado de conservación del nuevo taxón es evaluado y se reporta como En Peligro (EN, por sus siglas en inglés) usando los criterios de la Unión Internacional para la Conservación de la Naturaleza (UICN).

Key words / Palabras clave: Colombia, Cordillera Occidental, *Dracula,* endangered species, especies amenazadas, Pleurothallidinae, Western Andes

Introduction. The genus *Dracula* Luer contains approximately 134 species (Karremans 2016). Since their original discovery in the western Andes of Colombia in the nineteenth century and their initial circumscription in a section of genus *Masdevallia* Ruiz & Pav., species of *Dracula* have been sought after due to their horticultural value. The genus has been the subject of several monographs (Luer, Escobar &

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Dalström 1988, 1989, 1990, 1991, 1992, 1993, 1994, Luer 1993). New species and a few natural hybrids are still being described even from localities that have undergone significant botanical exploration (Peláez *et al.* 2009, Doucette 2011, Zambrano & Solano-Gómez 2011, Doucette 2012, Luer & Thoerle 2012, Meyer, Baquero & Cameron 2012, Baquero 2013, Baquero & Meyer 2014, Cavestro & Fernandez 2016). Extensive destruction and fragmentation of native cloud forest habitats for agriculture and mining in the Andes, as well as poaching for ex-situ cultivation, have contributed to the decline of populations of multiple species of *Dracula,* especially in cases in which the taxa have reduced geographic distribution (GEM and NP, pers. observ., Calderón *et al.* 2007). For example, Colombia harbors about half (55.2%) of the *Dracula* species known to date (74 sp), out of which 13 species (17.5 %) have been listed as Endangered (EN) and 33 species (24.6%) as Vulnerable (VU) using International Union for Conservation of Nature (IUCN) criteria (Calderón *et al.* 2007). Formal description of new taxa precedes detailed biological studies on their structure, physiology, ecology, evolution, and *in situ* conservation. Here we describe *Dracula irmelinae*, a new species found at the Mesenia – Paramillo nature reserve (MPNR), a private preserve located in the western Cordillera of Colombia. *Dracula irmelinae* is vegetatively and florally most similar to *D. verticulosa* Luer & R.Escobar, a species known only from the Central Cordillera of Colombia, further south in the Valle del Cauca province. We characterize the conservation status of this new taxon using IUCN criteria and present notes on its taxonomy, biology and natural history.

Dracula irmelinae N.Peláez, Gary Mey. & L.Mazariegos , *sp. nov.* (Fig. 1–3)

TYPE: Colombia. Department of Antioquia: municipality of Jardín, La Mesenia village, found in cloud forests of the Mesenia–Paramillo nature reserve. The holotype was collected by the authors on May 14th, 2019, *JDF-078* and is composed of three cross-referenced parts derived from the same individual, labeled as Parts 1-3 in the corresponding specimens [Part 1: JAUM #083541 (dried plant), Part 2: JAUM # 083542 (dried flower), and Part 3: JAUM # 083541, (flower in spirit!)]. Figures 3A-B correspond to the dried holotype specimen (Parts 1-2); the flower in spirit (Part 3) is not shown. Precise elevation above sea level and other geographic information is provided in the herbarium specimens and will not be reported here (see below).

Diagnosis: *Dracula irmelinae* is vegetatively and florally most similar to *Dracula verticulosa* Luer & Escobar due to sharing with the latter most of the floral and vegetative traits, including the plant habit, leaf blade shape, flower morphology and structure of specific flower parts such as the shape of the lateral petals and lip, the epichile aspect ratios and concavity, and the branching pattern and morphology of the lip lamellae. However, *D. irmelinae* can be morphologically distinguished from *D. verticulosa* by having larger and wider sepals that form a deep, semicircular, smoothly curved mentum (vs. a deep, acutely angled mentum) behind the lip, sepal indumentum containing dark red maculae internally and externally (vs externally purple-brown and internally light greenish-brown to light yellow indumentum), and long and dense pubescence on the distal internal sepal surfaces and bases of the tails (vs short and dense pubescent indumentum), and usually descending (vs usually erect) inflorescence axes.

Plant epiphytic, large, caespitose, up to 40 cm long. *Roots* coarse. *Ramicauls* erect, enclosed by 2–3 loose, consecutive tubular sheaths, 4–6 cm long. *Leaf* erect, carinate, thinly coriaceous, narrowly elliptical, apex acute, narrowing gradually into a conduplicate subpetiolate base, 27–38 cm long including the petiole, 2–3 cm at the widest. *Inflorescence* successively several flowered, from the base of the ramicaul, breaking through the basal bract, then usually descending to occasionally lateral; peduncles dark green speckled in brown, subverrucose, with several green-brown tubular bracts up to 19 mm long; pedicel green to brown, verrucose, up to 4 cm long. *Ovary* green to brown, smooth on the outside surface, without costae, with 6 red-brown furrows running the length of the ovary, 8–10 × 3–5 mm. *Sepals* off-white and covered externally and internally with red-brown maculae that increase in density towards the center, densely long pubescent within, suborbicular, basally connate to form a deep, prolonged and smooth semicircular mentum covering the entire extension behind the lip,

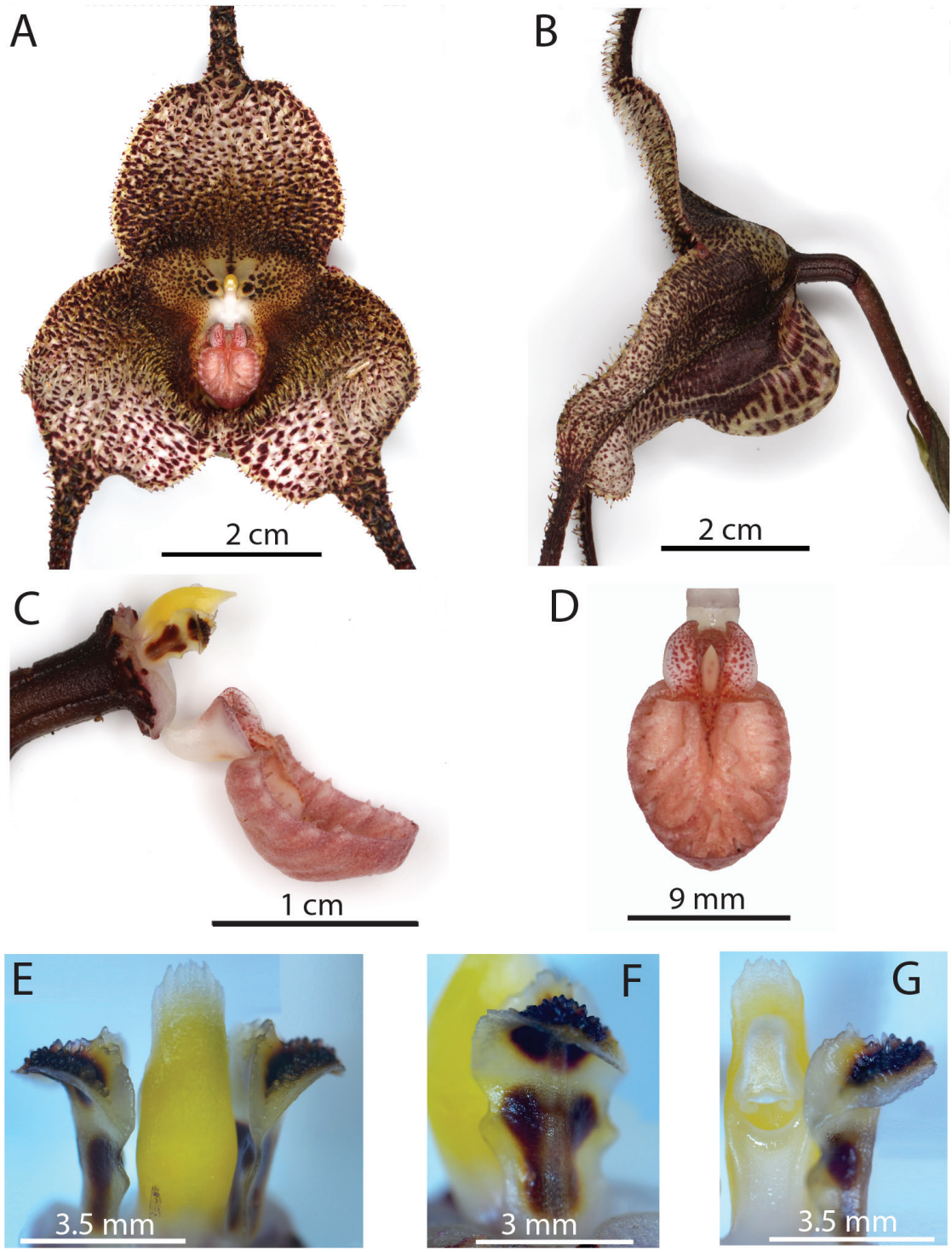

Figure 1. Flower of *Dracula irmelinae* N.Peláez & Gary Mey. & L.Mazariegos. **A–B**. Flower (frontal and lateral views). **C**. Ovary, column, petals and lip (side view). **D**. Lip (frontal view). **E–G**. Petals and column (dorsal, lateral and ventral views respectively). All specimens were collected in the wild by the authors. Photographs by L. Mazariegos.

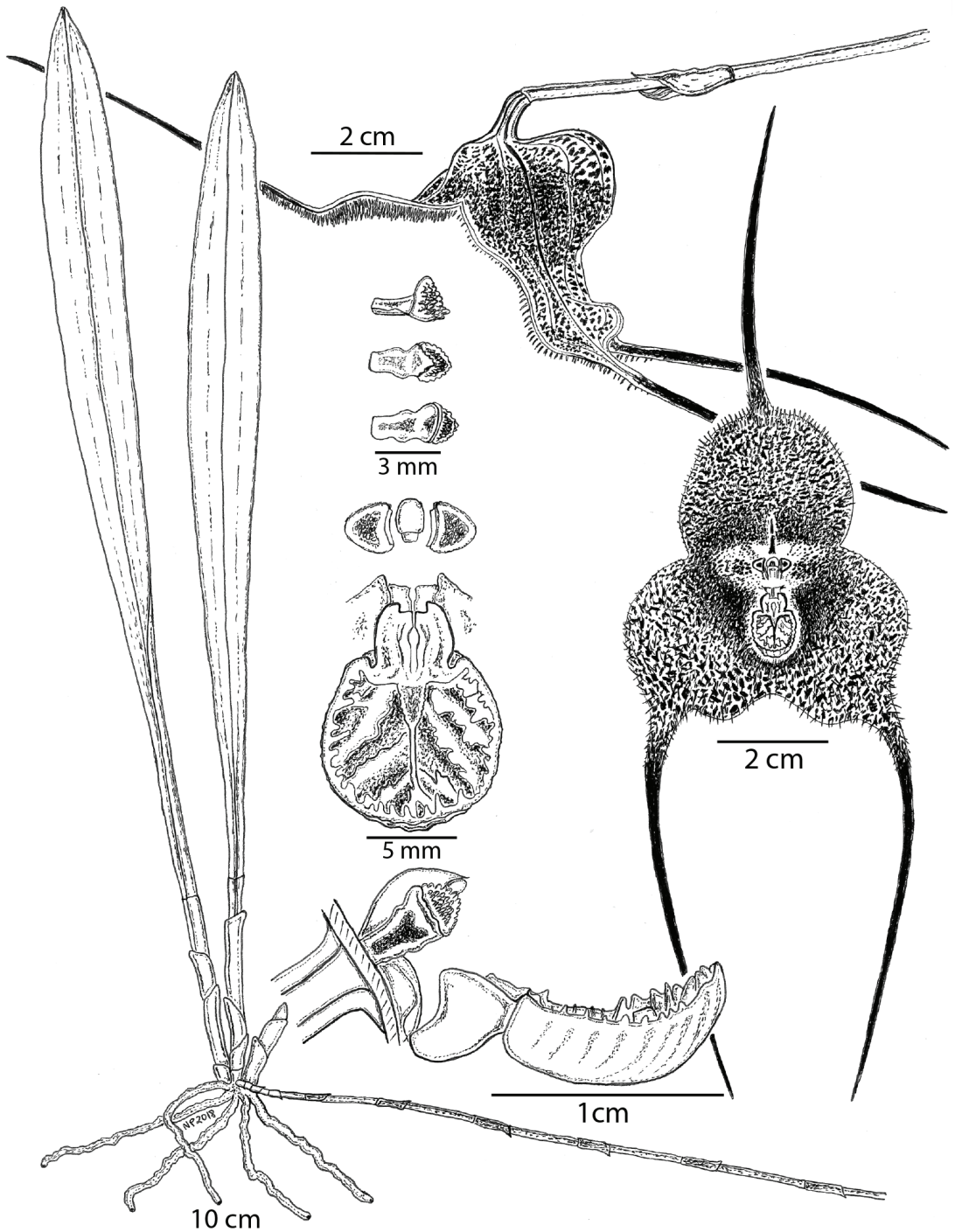

FIGURE 2. Botanical illustration of *Dracula irmelinae* N.Peláez & Gary Mey. & L.Mazariegos. Illustration was drawn from material photographed by the authors in the natural habitat of the species at Mesenia – Paramillo Nature Reserve. Illustration was prepared by Nicolás Peláez using specimens shown in figures 1–4 and 5 (panels A–C) and JAUM vouchers and #083541, #83542 and #83541.

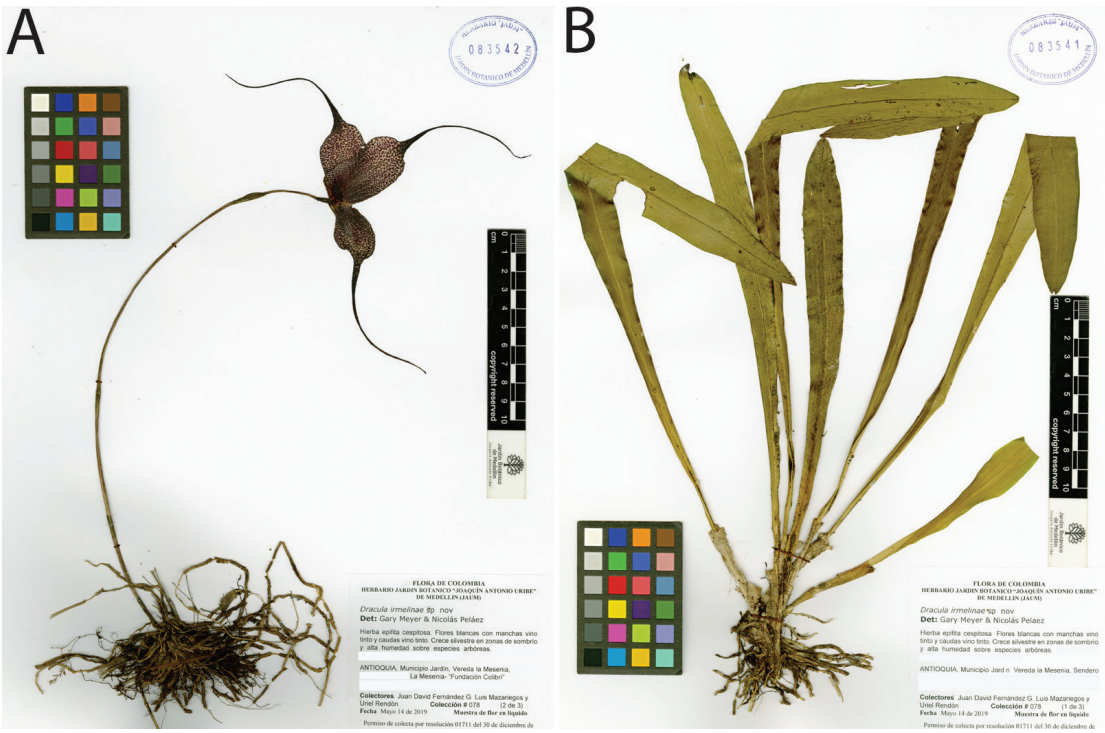

FIGURE 3. Holotype (Parts 1–2: dry specimen) of *Dracula irmelinae* N.Peláez & Gary Mey. & L.Mazariegos. Parts 1 and 2 of the Type specimen deposited at the JAUM herbarium: A. Flower and rhizome (Part 1), B. Plant (Part 2). Part 3 (Flower in spirit) is not shown. Photographs by N. López-Álvarez.

connate forming a prolonged synsepal that gradually flattens creating a wide open flower. *Dorsal sepal* 30–40 × 25–30 mm excluding the tail, connate to the lateral sepals for 12–18 mm, with the dark reddish-purple dorsal tail 5–10 cm in length. *Lateral sepals* 30–50 × 23–33 mm excluding the tails, connate at the base for 40 mm and forming a deep, angled, whitish mentum with sparse, coarse red-brown spotting, and a 5–9 cm long reddish-purple tail continuing from the midline of each lateral sepal. *Petals* cartilaginous, oblong, bivalvate, stalks dark red to brown centrally and white at the margins, apex with dark brown verrucosities between the two valves, white and smooth at the margins, in close approximation to the column, 4 mm long × 3 mm wide at the apex. *Lip* spatulate, 12 mm long × 9 mm wide, 3 mm deep, articulated with the column, clearly demarcated into a hypochile and epichile; hypochile 5 × 3 mm, white, suffused with pink blotches, ovate, each lateral margin elaborated into a smooth rounded upwardly projecting ala, central cleft bordered by a second pair of minor alae tapering into forward-pointing projections, with a hypochile channel running medially along the adaxial surface and ending in an elongated, tapered callus that continues into $^1/_3$ to $^1/_2$ of the midline ridge of the epichile; epichile white heavily suffused with pink and orange spots, concave, semiorbicular, joined to the hypochile at a 30º angle along a base 3–4 mm wide, with a central prominent ridge continuing from the termination of the hypochile channel that branches usually twice bilaterally and flattens into the floor of the hypochile before reaching the margin, flanked by two main broken carinae that flatten and rise multiple times and branch 3–4 times, margin non-involute, smooth externally but internally denticulate with approximately 20–24 sharp ridges arising abruptly from the epichile floor. *Column* white at base, yellow on the adaxial surface, semiterete, 5 × 2 mm; column foot 2 mm long. *Anther cap* white. *Pollinia* yellow, 0.7 mm long. Figure 1 (flower), 2 (botanical drawing) and 3 (holotype Parts 1–2 out of 3 – dried flower and plant) illustrate the vegetative and floral morphology and details of the parts of *D. irmelinae*.

Paratype: Dried plant and flower of *D. irmelinae* collected by the authors at the same location at similar elevation from a different individual than the holotype, May 14th 2019, *JDF-079* (JAUM # 083543) (not shown).

The description of new orchid species endemic to small geographic areas has in some cases triggered illegal over-collection and reduction in population sizes that have brought the new taxa close to extinction in the wild (Averyanov *et al.* 2014). To prevent poaching of *Dracula irmelinae*, we will not provide elevation or precise geographic data in this publication. Altitude and coordinate data are available in the corresponding specimens deposited at JAUM.

Dracula verticulosa: Cultivated living specimens from Colomborquideas Ltda of *D. verticulosa* (Fig. 5) were used for comparison with *D. irmelinae*. A corresponding specimen was deposited at JAUM. *Dracula verticulosa*: Valle del Cauca, Between Costa Rica and Ginebra, 1800–1900, Collected by J.L. Aguirre in 1989, bloomed at Colomborquídeas, August 2016. Specimen prepared by N. Peláez and L. Mazariegos (*NPR0292*, JAUM #081990).

Eponymy: The name *Dracula irmelinae* is in honor of Irmelin Indenbirken, the mother of the actor and philanthropist Leonardo DiCaprio, and constitutes an acknowledgement of DiCaprio's dedication to the long-term health and well-being of all of Earth's inhabitants. Leonardo DiCaprio supports conservation efforts at the Mesenia-Paramillo nature reserve through donations to SavingNature, a conservation organization working to increase the survival of threatened species through reforestation and reconnection of fragmented forests.

Ecology: Little is still known about the ecology of *Dracula irmelinae*. Individuals of the species have been usually found growing as isolated adult plants, separated by hundreds of meters, or aggregated, forming small to medium sized clusters (usually n<20) composed of siblings and a few adult plants (Fig. 4A and inset). Individuals usually grow as epiphytes in moderately to relatively well illuminated areas of the forest, sometimes 8–10 m above the ground, on the trunks and branches of large trees in forests in which *Quercus* L. are a dominant element of the flora. Initial field observations suggest plants usually synchronize their blooming, flowering more frequently in the wet season, which usually corresponds to February to April and October to December. Sporadic flowering is also observed in between these two blooming peaks. Flowers are visited by flies of the Drosophilidae family (Fig. 4C). It is therefore expected that the species uses a pollination mechanism based on chemical, morphological and visual deception described for other species of *Dracula* (Endara *et al.* 2010, Policha *et al.* 2016, Policha *et al.* 2019).

History, taxonomic notes and cultivation. *Dracula irmelinae* was first photographed *in situ* by nature guides in the Farallones de Citará before 2015. At the time of the first two observations, the security situation and accessibility of the sites precluded *in situ* observation by the authors. Additional individuals photographed by orchidologists near Jardín had been misidentified as *D. verticulosa*. Robust populations at the MPNR were originally observed by GEM and UR-J in February 2015. GEM, UR-J, and LAMH returned in November 2015 to further document these populations. Additional field observations related to the geographic distribution, habitat, and comparative morphology have been made by all authors since 2015.

Among the known species of *Dracula, D. irmelinae* is phenotypically more similar to *D. verticulosa*, since it shares with the latter taxon a similar plant habit and leaf blade morphology, as well as an overall similar flower shape, lip and petal morphology. However, the new taxon differs from *D. verticulosa* in multiple traits. First, in *D. irmelinae* the indumentum features long pubescence and maculate red pigmentation on the sepals (Fig. 5A–F). Second, in *D. irmelinae* the bases of the lateral sepals form a deeper semicircular and smoothly curved mentum, whereas in *D. verticulosa* the mentum is deep, short and abrupt, forming an acute angle in side view (arrows in Fig. 5C,F, Table 1). Excluding the tails, the new taxon also has larger sepals than what is recorded for *D. verticulosa*. Measurements for *D. irmelinae* were conducted on flowers that developed undisturbed *in situ*. *D. verticulosa* is known from abundant material available in cultivation, and while these cultivated plants are characteristically smaller flowered than *D. irmelinae,* there is no data on *D. verticulosa* flower

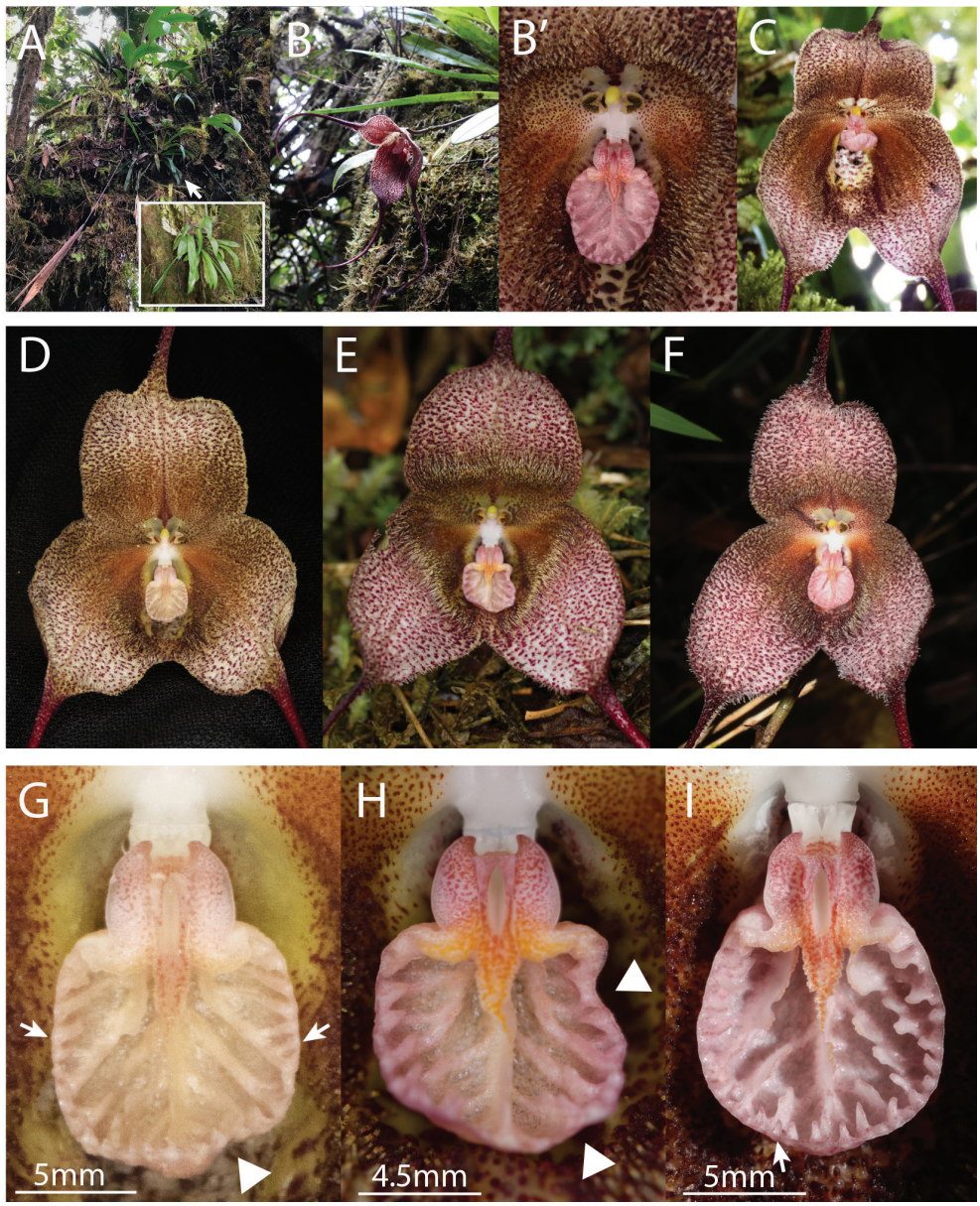

Figure 4. Flower visitors and variation of *Dracula irmelinae* in its native habitat. **A**. Adult plants of *D. irmelinae* (arrow) grow on branches covered with moss and drained decaying organic matter. Inset shows a mature plant and seedings. **B**. Plant and flower used to prepare herbarium specimen (Holotype) *in situ*. **C**. Flowers are visited by diurnal flies (Diptera: Drosophilidae*)*. **D–F**. Natural variation of flower morphology, indumentum pigmentation, sepal width and lip size of *D. irmelinae* in its native habitat (flowers of three mature individuals). **G–I**. Variation in lip morphology and symmetry. Lip close-ups from flowers (panels D–F) show different lip aspect ratios and fluctuating asymmetry: left and right sides are not symmetric (triangles) and have bilateral differences in secondary carinae branching or in lamellae continuity (arrows). Side illumination of a lip reveals carinas are discontinuous but differ between each side (panel I). Carinae have laminae of variable height that prolong until the edge, creating an internally marginally denticulated lip. The number of teeth can vary between the two sides in some flowers (arrow in panel I). Photographs by N. Peláez (A), L. Mazariegos (B, B', F, I) and G. E. Meyer (C, D,E,G,H, A' inset).

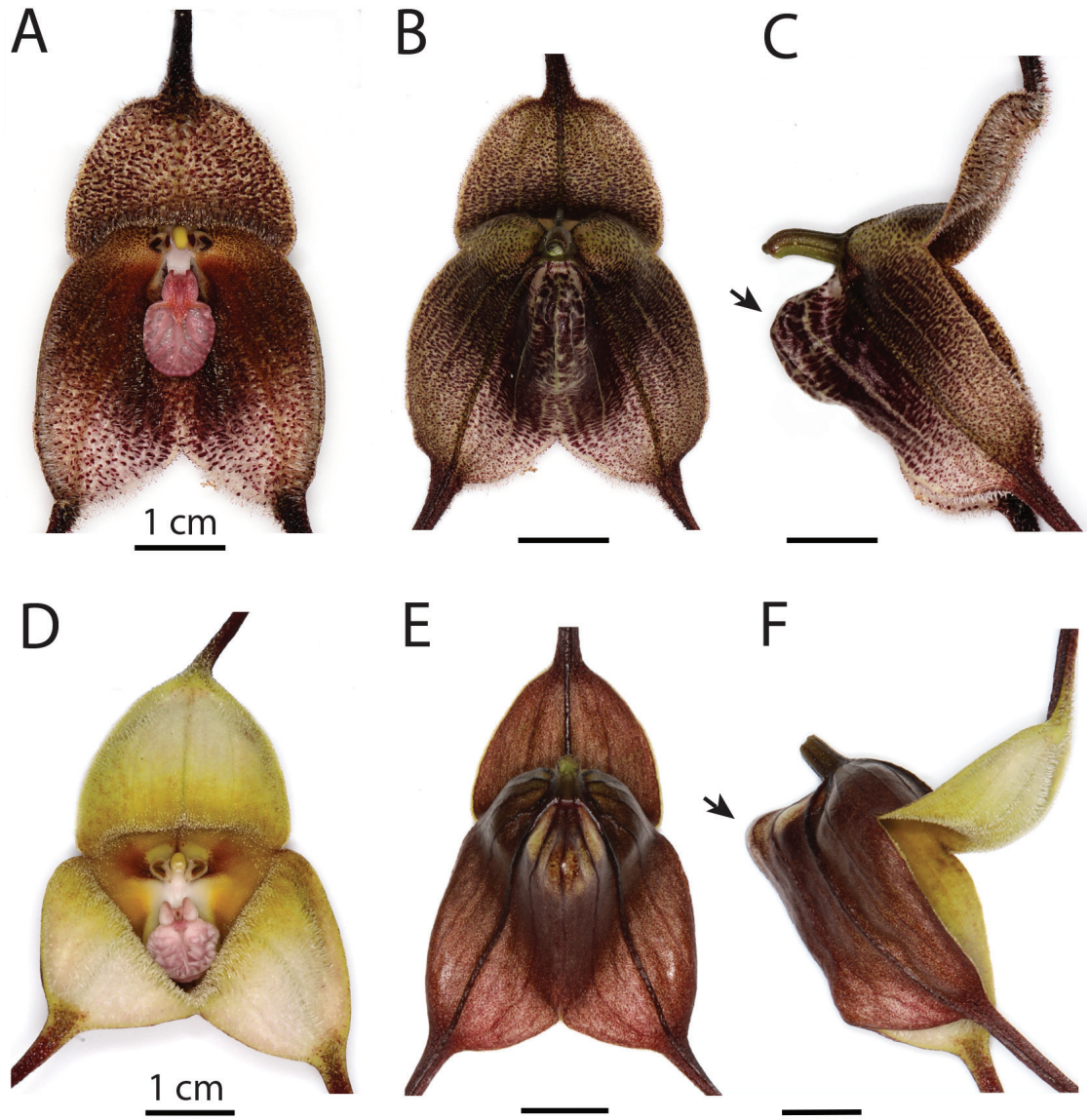

FIGURE 5. Comparison of the flowers of *Dracula irmelinae* and *D. verticulosa*. **A–C**. Frontal, dorsal and lateral views of the flower of *D. irmelinae*. **D–F**. Frontal, dorsal and lateral views of the flower of *D. verticulosa.* Note the indumentum of *D. irmelimae* has longer trichomes and dark red to brown maculae internally. A lateral view of the flowers shows the synsepal, created by lateral sepal bases, forms a deep and prolonged semicircular mentum in *D. irmelinae* and a deeply curved short and abrupt mentum in *D. verticulosa*. In the former the prolonged mentum is shaped as a long arch whereas in the latter the mentum is acute and short (arrows in panels C and F, respectively). Photographs by L. Mazariegos.

size *in situ*. *D. verticulosa* is reported to grow only at 1800–1900 m a.s.l. (Luer 1993, Luer *et al*. 1991). In the greenhouses located in the US and Colombia where the species is being maintained, abiotic factors such as temperature, which could affect flower size, usually reach similar temperatures to those predicted to exist in the natural habitat of *D. verticulosa*. As result, it is unlikely that the observed flower size difference between *D. verticulosa* and *D. irmelinae* is an artifact of factors like temperature

present in *ex situ* cultivation. Finally, the two species have unambiguously distinct geographic distributions. *D. irmelinae* occurs ~200 km further north from *D. verticulosa*, in a different cordillera (see below). The populations of the two species are separated by the Cauca river valley (~600–900 m), which acts as a geographic barrier that creates reproductive isolation between the two taxa.

To date *D. verticulosa* has not been reported in the Western Cordillera of Colombia. Although overall *D. irmelinae* is phenotypically most similar to *D. verticulosa* from the Central Cordillera, when only species of the Western Cordillera are compared, the phenotypically most similar species from the Western cordillera is *D. gigas* Luer (Luer). The later taxon differs from *D. irmelinae* in that it lacks any significant pubescence or maculate pigmentation in the sepals (*vs*. densely pubescent sepals), has narrower leaves (*vs*. broader leaf blades), and thinner, typically erect inflorescences (*vs*. lateral to usually descending) that do not produce as many flowers per inflorescence. Table 1 compares floral traits and geographic distributions of *D. gigas, D. x aphrodes* Luer & Escobar*, D. dalströemii* Luer, *D. x hawleyi* Luer, and *D. trinympharum* Luer with *D. irmelinae*. Within the genus *Dracula,* these species share some phenotypic similarity with the new taxon described here.

In order to determine if *D. irmelinae* had previously been collected, cultivated and confused with other species such as *D. verticulosa*, the authors studied *Dracula* in all the commercial Colombian orchid nurseries that amassed large collections prior to the advent of CITES and local prohibitions on wild harvesting of orchids, as well as smaller private collections. No plants matching *Dracula irmelinae* have ever been observed in these collections by us. However, *D. verticulosa* is frequently and widely represented in these and other nurseries and collections in the USA, Colombia and Ecuador, including specimens that were wild-harvested pre-CITES. No individuals have been observed showing the combination of distinctive pattern of dense long pubescence and maculate red pigmentation on the sepals together with a long and smoothly concave mentum.

Geographic distribution. Prior to the discovery of populations of *Dracula irmelinae* at the MPNR, the new species had been observed and photographed at least twice as individual plants in the Farallones de Citará, along the mountain ridge of the Western Cordillera in Antioquia. Local nature guides who have explored the Farallones de Citará have provided photographic evidence of two additional distinct populations further north from the MPNR reserve. Additional individuals of the species have been photographed south of the town of Jardín, near a region that had been explored by others since the 1980s (see Luer & Escobar 1984). The populations studied in the field by us are located at the MPNR, which lies at the southern edge of the Farallones de Citará. Overall, the current data suggests this new taxon is restricted to a small geographic area in the Western Cordillera of Colombia.

The Western and Central Cordilleras of Colombia have long been known to share "pairs" of species that have floral morphological similarity (ie. in sepal, petal and lip shapes). These pairs include *Dracula chimaera* (Rchb.f) Luer (west) and *D. wallisii* (Rchb.f.) Luer (central), *D. chestertonii* (Rchb.f.) Luer (west) and *D. cutis-bufonis* Luer & R.Escobar (central), and *D. bella* (Rchb.f.) Luer (west) and *D. nycterina* (Rchb.f.) Luer (central). The dark-purple (west) and brown-red (central) forms of *D. roezlii* can also be considered in this list, even though they are not currently recognized as separate species. There are, of course, species that exist in both cordilleras that do not show significant morphological variation between the two ranges, including *D. spectrum* and *D. trichroma* (Schltr.) Hermans (known as *D. iricolor* (Rchb.f. ex Kraenzl. B) Luer & R.Escobar by some authors). We propose that *D. irmelinae* and *D. verticulosa* are additional examples of morphologically similar species that have developed stable distinctions in geographically disjunct populations in the Western and Central Cordilleras of Colombia.

Natural variation. In past decades multiple new *Dracula* species have been described from one or a few cultivated plants collected in the wild. As a result, natural variation in *Dracula* populations has remained largely undocumented. Despite *D. irmelinae* being a rare element of the flora at the MPNR, we documented the natural variation observed *in situ*. The most apparent variation is in flower size and morphology of specific floral structures. Different individuals have flowers

TABLE 1. Comparison of floral traits and geographic distributions of *Dracula* species phenotypically similar to *D. irmelinae*.

Trait / Species	Inflorescence axis orientation	Mentum: depth, length angle (defined by edges on a side view)	Internal sepal indumentum type and Sepal color* (above the middle halve)	Lip shape Lip dimensions	Epichile shape and concavity Hypochile-epichile demarcation	Geographic Distribution** in the Andes
D. irmelinae	Usually descending, occasionally lateral	Deep, smoothly curved and semicircular, right to obtuse angle	Dense abundant long pubescence, off-white with dark brown spots	Spatulate, 12 × 9 mm	Suborbicular, concave clear demarcation	Colombia, Western Cordillera (Antioquia, Jardín).
D. verticulosa	Usually erect, occasionally lateral	Deep, short and abrupt, acute angle.	Dense short pubescence, light yellow suffused with light purple	Spatulate, 11 ×6 mm	Suborbicular, concave clear demarcation	Colombia, Central Cordillera (Valle del Cauca, near Costa Rica and Ginebra)
D. x aphrodes *(*probably hybrid between *D. verticulosa* and *D. insolita)*	Erect	Shallow, semicircular and prolonged, obtuse angle	Glabrous, lightly suffused with pale purple	Pandurate, 13 × 6 mm	Oblong, shallowly concave clear demarcation	Colombia, Central Cordillera (Valle del Cauca, near Costa Rica and Ginebra)
D. gigas	Usually erect, occasionally lateral	Deep, short and abrupt, acute angle.	Glabrous, light pinkish brown (dull yellow with numerous minute purple brown dots)	Spatulate, 10 × 6 mm	Suborbicular, concave clear demarcation	Colombia, Western and Central Cordilleras (Valle del Cauca) Northern Ecuador (Carchi, Maldonado)
D. dalströemii	Erect	Deep, short and abrupt, acute angle	Diffusely pubescent with very short trichomes, creamy white suffused with light brown small spots	Spatulate, 8.5 × 6 mm	Suborbicular, concave, clear demarcation	Northern Ecuador (Carchi, Maldonado)
D. x hawleyi (probably hybrid between *D. gigas* and *D. levii*)	Erect	Shallow to almost absent, short, obtuse angle	Glabrous, yellowish-white suffused with light orange-brown spots	Spatulate, 8.5 × 5 mm	Suborbicular, Shallowly concave indistinct demarcation	Northern Ecuador (Carchi, Maldonado)
D. trinympharum	Erect	Shallow, short, right angle	Glabrous, yellowish-white, composed of small red papillae	Obscurely pandurate, 7 × 4 mm	Suborbicular, deeply concave, indistinct demarcation	Northern Ecuador (Carchi, Maldonado)

* Pale xanthic flower coloration triggered by recessive alleles has been documented for *D. verticulosa* and *D. gigas* and several other *Draculas a*nd might exist for all the *Dracula* species in these table. Our color description here refers only to the wild type (non-xanthic) color forms.

** Geographic distributions and traits in this table have been derived from botanical illustrations, pictures and/or herbarium specimens from Luer (1993), as well as from additional observations made by the authors.

with significantly wider or longer sepaline cups and broader sepals (compare Fig. 4, panels D *vs*. E–F). The lip shows morphological variation in its length-to-width aspect ratios, as well as in its overall size relative to the sepals (Fig. 4B', G–I). Also, within some individual flowers the right and left sides are not mirror images of each other and have fluctuating asymmetry (FA). FA has been documented in many plants and animals (Graham *et al.* 1993, Donguen 2006). In the flowers of *D. irmelinae* FA exists in the position and size of spots in the indumentum of the sepals and between the right and left sides of the lip. Specifically, the overall epichile

shape (triangles in Fig. 4G–I), the carinae branching pattern, the continuity of the lamellae and the number of marginal teeth present at the end of carinae (arrows in Fig. 4G–I) are asymmetric across the two halves of the labellum in some flowers. Given that so far only a small number of flowers have been found *in situ* (n=17 from different adult individuals), no quantitative analysis of asymmetry or phenotypic variation across individuals is currently feasible. It is unknown if there is lip directional asymmetry (*sensu* Graham *et al.* 2010) at the population level. The developmental or environmental causes of flower asymmetries, their possible role in pollination and the evolutionary origin of the phenotypic variation observed across individuals in natural populations of *D. irmelinae* remain unknown. However, the overall flower pigmentation pattern created by an indumentum in the sepals containing dark red maculae internally and externally, the dense long pubescence on the internal distal sepal surfaces and bases of tails, and the deep, prolonged and smoothly curved mentum have been observed in all individuals examined so far. Therefore, these traits constitute a set of diagnostic characters that distinguish *D. irmelinae* from *D. verticulosa* and *D. gigas*.

Hybrid origin or past introgression with other species of *Dracula* has been proposed to explain morphological or genetic similarity at the DNA sequence level between different species of the genus (Cameron & Meyer 2009). Although *D. irmelinae* has been found growing in the same phorophytes with other *Dracula* species (data not shown), no intermediate forms between the different species other than *D. irmelinae* have been found so far at the MPNR. Also, no intermediate forms between *D. irmelinae* and the other taxa present at the preserve have been discovered in the forest. These findings make unlikely past or recent hybridization or introgression between *D. irmelinae* and other species. However, molecular studies are required to determine if hybridization could be responsible for the observed variation present in the populations located at the MPNR.

Phylogenetic relationships. As the holotype and paratypes represent the first material collected for this species, phylogenetic analysis including the taxon have not been conducted yet. Further, the work of Cameron and Meyer (2009) using a panel of common plastid and nuclear markers on over 95% of the known *Dracula* species found low phylogenetic signals among the majority of species in the DNA sequences investigated. The candidate sister species, which would share the most immediate common ancestor with *D. irmelinae,* is hypothesized to be *D. verticulosa*. However, in the current phylogenies, the latter taxon lies in part of the polytomy with other poorly resolved taxa. Doucette and Cameron have had success resolving a sub-portion of the genus corresponding to the Central American Draculas using SNP technology (Doucette, *pers. com.* 2018). Future studies using cultivated material of the new species, and more advanced molecular approaches using genomics will be required to establish a new phylogeny of *Dracula* and the position of this new taxon within it.

Conservation status. *Dracula irmelinae* has apparently escaped discovery in a region of Colombia that has been scoured for *Dracula* orchids since the time of the Victorian orchid craze. This is possibly due to it being endemic to a small area in the Western Cordillera of Colombia. Also, this region had been dangerous to visit for several decades during the height of the Colombian armed conflict, and is only recently opening to re-exploration, and potential poaching. Promising habitat for this species exists throughout the heights of the Farallones de Citará. However, agriculture encroaching from the heavily deforested Cauca River Valley, rampant illegal mining and poaching, as well as more recent attempts to develop legal mining projects in the Western Cordillera, all threaten precious cloud forest habitats that the armed conflict indirectly kept safe.

Although *Dracula irmelinae* has been documented in other localities outside the MPNR, the total known estimated Area of Occupancy (AO), including the remaining forests near Jardin, Farallones del Citará and MPNR, does not exceed 500 km^2. In addition to the small AO, two other criteria are met. First, although individuals of this species have been found at other sites in the Farallones de Citará, current data suggest the number of locations is still less than 5 and/or might be fragmented in part of the species distribution range (criterion a). Second, the forest suitable for the species is located at a narrow altitudinal range, and due to expansion of the agricultural frontier and forest

fragmentation, possible future mining, and continued illegal orchid collecting in the area, we infer a possible continuing decline in the (i) extent of occurrence, (ii) area of occupancy, (iii) area, extent and/or quality of habitat, (iv) number of locations or subpopulations, and (v) number of mature individuals of this taxon. We therefore propose the new species should be considered Endangered (EN) according to the International Union for Conservation of Nature Red List criterion B2 (IUCN 2017) and we characterize the status of this new species as EN, B2ab (i,ii,iii,iv,v).

Biodiversity conservation at the Mesenia–Paramillo Nature Reserve (MPNR). The MPNR has contributed to the description of several new species of plants and animals. Although *Dracula irmelinae* had been photographed outside the MPNR, the presence of the reserve allowed a detail study of the populations, which ultimately resulted in the description of this new taxon. The MPNR will allow conserving populations of this new species. The authors want to highlight the importance of preserving the forests contained within the MPNR and surrounding areas, since they constitute a highly biodiverse region hosting other orchid species currently categorized as critically endangered (CR), endangered (EN) and vulnerable (VU) according to IUCN criteria. These taxa include other species of *Dracula* and *Masdevallia*.

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A NEW *STELIS* (ORCHIDACEAE: PLEUROTHALLIDINAE) FROM THE WESTERN ANDES OF COLOMBIA

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Abstract. *Stelis excentrica,* a new species endemic to the Cauca slope of the western Andes, municipality of Cali, Valle del Cauca, Colombia, is described and illustrated. It was found in the northern part of the Farallones de Cali National Park, in the vicinity of the protected area "El Danubio" administered by the Cali mayoralty. *Stelis excentrica* is similar to *Stelis gigantissima* from Ecuador but differs in the ocher-green flowers (*vs.* dark purple), the reniform petals (*vs.* flabellate petals), subquadrate lip with a minute apicule (*vs.* subcuneate without apicule). Reaching up to 30.6 mm from the apex of the dorsal sepal to the apex of the lateral sepal, *Stelis excentrica* probably has the largest flowers reported in any member of *Stelis* subgen. *Stelis*. Its 60 cm long inflorescence is only rivaled by that of *Stelis gigantissima.* Ecological notes, *in situ* photographs, typus illustration, maps, and a composite plate are provided.

Resumen. Se describe e ilustra *Stelis excentrica*, una nueva especie de orquídea, endémica de la vertiente occidental de los Andes Occidentales, municipio de Cali, Valle del Cauca, Colombia. *Stelis excentrica* fue encontrada en la parte norte del Parque Nacional Farallones de Cali, en el área protegida "El Danubio" administrada por la alcaldía de Cali. *Stelis excentrica* es similar a *Stelis gigantissima* de Ecuador, pero difiere en sus flores verde-ocre (*vs.* purpura oscuro), pétalos reniformes (*vs.* pétalos flabelados), labelo subcuadrado, cortamente apiculado (*vs.* subcuneado y no apiculado). Alcanzando 30. 6 mm desde el ápice del sépalo dorsal al ápice del sépalo lateral, *Stelis excentrica* probablemente tiene las flores más grandes actualmente reportadas de cualquier otro miembro de *Stelis* subgen. *Stelis*. Su inflorescencia de 60 cm long solo rivaliza con las de *Stelis gigantissima*. Se proporcionan notas ecológicas, fotografías *in situ*, ilustración del typus, mapas y una lámina compuesta.

Key Words: biggest flower, Farallones de Cali, *Stelis gigantissima,* taxonomy

Introduction. With +1240 species in its broadest circumscription, the Neotropical genus *Stelis* Swartz (Orchidaceae) is the largest in subtribe Pleurothallidinae, and one of the largest genera of the Orchidaceae family (Karremans 2019). Many of the taxa occur in large sympatric populations restricted to the humid environment from Florida (USA), through Central America and the Antilles, to Brazil and Paraguay (Karremans 2013, GBIF 2020). *Stelis* is one of the most important epiphytic components of the Andean forest, especially the members of *Stelis* subgen *Stelis* which include over 1030 species with the typical *Stelis* flower morphology (Karremans 2019).

For Colombia, Luer (2016) reported 240 species of *Stelis* subgen. *Stelis*, of which Betancur *et al.* (2015) regarded 114 as endemic. Additional revisions of the Colombian members of subgen. *Stelis* (Luer 2016a, 2016b, 2017a, 2017b, 2018a, 2018b) revealed 235 new species. An exhaustive species-by-species count showed the new number of 496 species for the country. In this way, Colombia accounts for about 48% of the global diversity of that subgenus and the 40% of the genus *Stelis* in its broadest circumscription. Because of the complexity and variety of ecosystems, high rainfall, microclimate diversity and orographic factors, in Colombia, there are still gaps in our knowledge

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of orchid biodiversity, in particular, the forest canopy remains to be throughly explored (Reina-Rodríguez 2016, 2019).

Stelis is a taxonomically challenging genus. Many species are only known from historical illustrations and very brief descriptions, and herbaria are plagued with unidentified specimens and misidentifications. Moreover, currently there are few systematists specializing on it (Solano–Gómez 2014). In general terms members of subgen. *Stelis* can be recognized by the terminal, racemose, fascicled, few or multi–flowered inflorescences, the triangular flowers with almost identical sepals, tending to radial symmetry, diversely connate sepals much larger than the petals and lip, the very reduced petals usually with a thick margin, the thickened lip that is similar to the petals, and a very short, unwinged column with an apical stigma and anther (Luer 2003).

Recent studies in "El Danubio", in the north area of Farallones de Cali National Park, recorded 218 angiosperms species, 165 genera in 73 families. The most species-rich plant families in the areas are: Rubiaceae (16 species), Orchidaceae (15), Araceae (10) and Gesneriaceae (10). (Giraldo-Rodríguez *et al.* 2016). From the 2017, to the present, the number of orchids reported in "El Danubio" increased five times, reaching 88 species as a result of a joint effort between the DAGMA ranger from the Cali mayoralty, Calidris Association and our team. Some of them are the first report for the country, making this place attractive for orchid studies and ecotourism.

During an expedition in 2019 to El Danubio-Peñas Blancas, an undescribed species belonging to *Stelis* subgen. *Stelis* was discovered and it is described herein.

Material and methods. The plant material was collected in "El Danubio" Farallones de Cali National Park, Western Andes of Colombia and preserved as spirits and dried specimens at the CUVC herbarium, Universidad del Valle in Cali. The spirit material was used to prepare the line drawing. The photographs were taken *in situ*, dissections of the plant and flower according to Lankester Composite Dissection Plate (LCDP) format using a Cannon EOS 60D®, with 60 mm, 65 mm 1-5X and 100 mm macro lenses. The photographs were edited using Adobe Photoshop® CS4. Location maps were prepared using ArcGIS 10, module ArcMap ESRI ®, the official shapefile of La Elvira was downloaded from (http://runap.parquesnacionales.gov.co). The conservation assessment complies with the criteria of the IUCN (2001). We used the website (http://es.climate-data.org) to determine the weather conditions in Colombia, and Ecuador. Authors and names of plants follow The International Plant Name Index, IPNI (2019) (http://www.ipni.org). The new species was also compared with all *Stelis* species described from Colombia (Duque 2010a, Duque 2010b, Luer 2016a, 2016b, 2017a, 2017b, 2018a, 2018b) to confirm uniqueness.

Taxonomic treatment

Stelis excentrica Reina-Rodr. & López-Mach., ***sp. nov***. (Fig. 1-3)**.**

TYPE: Colombia. Valle del Cauca: Municipio de Cali, Corregimiento Los Andes, sector Los Cárpatos. Microcuenca del río Pichindé, afluente del río Cali. Cabaña "El Danubio" Planta terrestre en epifitario, traída de los alrededores. Bosque subandino, 2252 m, 20 de marzo 2019, *G. Reina-Rodríguez 2957, F. López-Machado, B. Bermúdez, J. Cruz*. (holotype: CUVC-spirit; isotype COL) . Fig. 1–2.

Diagnosis: *Stelis excentrica* Reina-Rodr. & López-Mach. is distinguished from *Stelis gigantissima* Luer by its elliptic, subpeciolate, obtuse leaf (vs. orbicular-elliptic, sessile, rounded), inflorescence two times longer than the leaf blade (vs. three times longer), the ocher green flowers (vs. dark purple) with glossy reflexed sepals (vs. flat sepals), a subquadrate, shortly apiculate lip, (vs. subcuneate not apiculate), glenion in T-shape and rounded apically (vs. subtrilobed). The new species is also similar to *Stelis superbiens* Lindl. but is distinguished by the significantly longer inflorescence (60 cm vs. 15-30 cm long), the ocher green color flowers (vs. pale yellow suffused with purple), the much larger flowers, e.g. dorsal sepal 13–15 × 7.0–9.0 mm (vs. 5-10 × 6-10).

Plant terrestrial, 70–90 cm tall excluding the inflorescence, erect to sub-erect, monophyllus. *Roots* velamentous, flexuous, cylindrical. *Ramicauls* up to 60 cm long, erect to sub-erect, terete, enclosed by 1–2 appressed, sheaths around the middle and

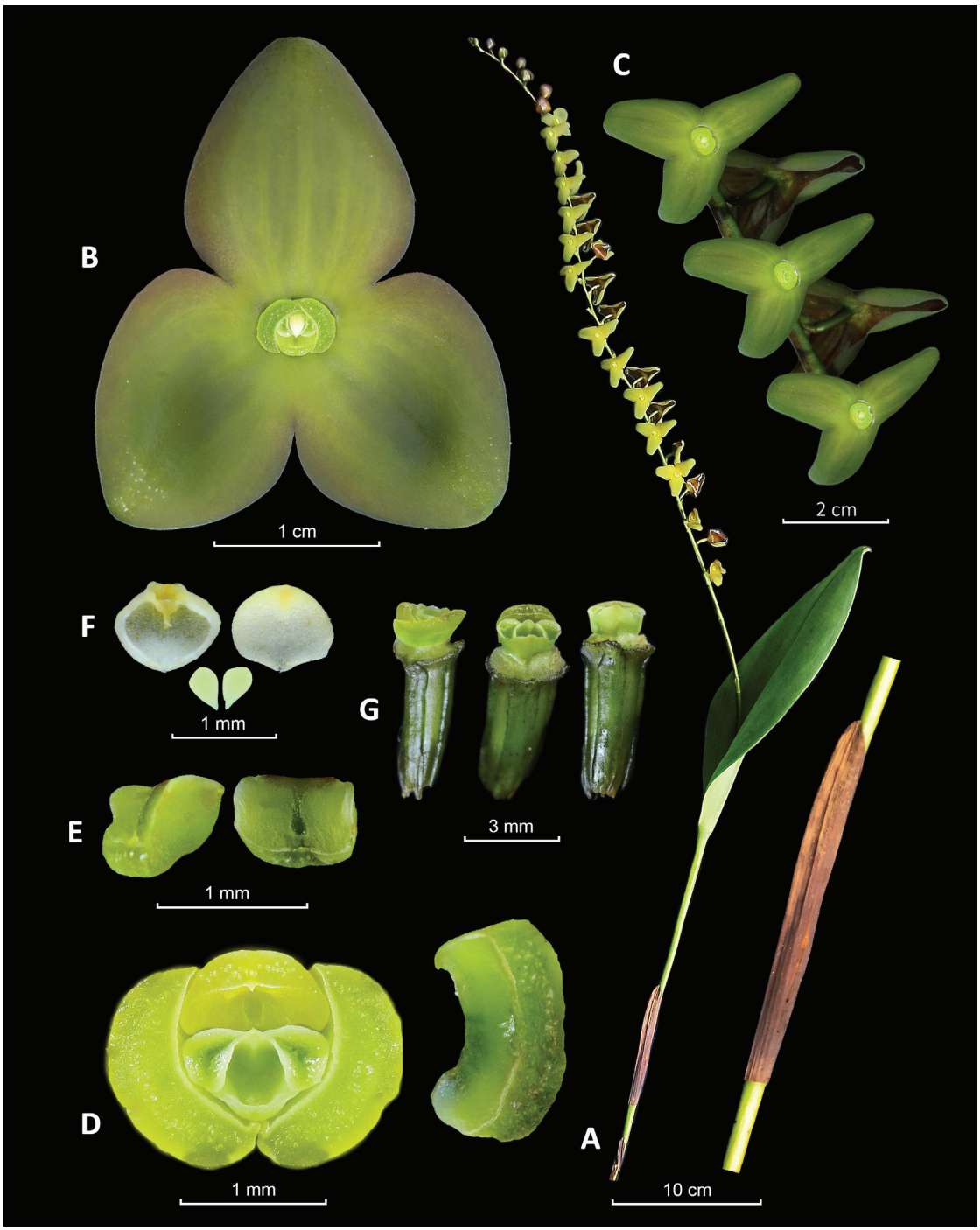

Figure 1. Lankester Composite Dissection Plate (LCDP) of *Stelis excentrica* Reina-Rodr. & López-Mach. **A**. Habit and sheaths **B**. Frontal view of the flower **C**. Flowers in the inflorescence **D**. Dissected perianth. **E**. Lip in lateral and frontal view **F**. Pollinia and anther cap dissected **G**. Column and ovary, dorsal, frontal and overhead view. Photographs by Francisco López-Machado and Guillermo Reina-Rodríguez of the plant that served as type No. 2957 G. Reina-Rodríguez *et al*. (CUVC-Spirit).

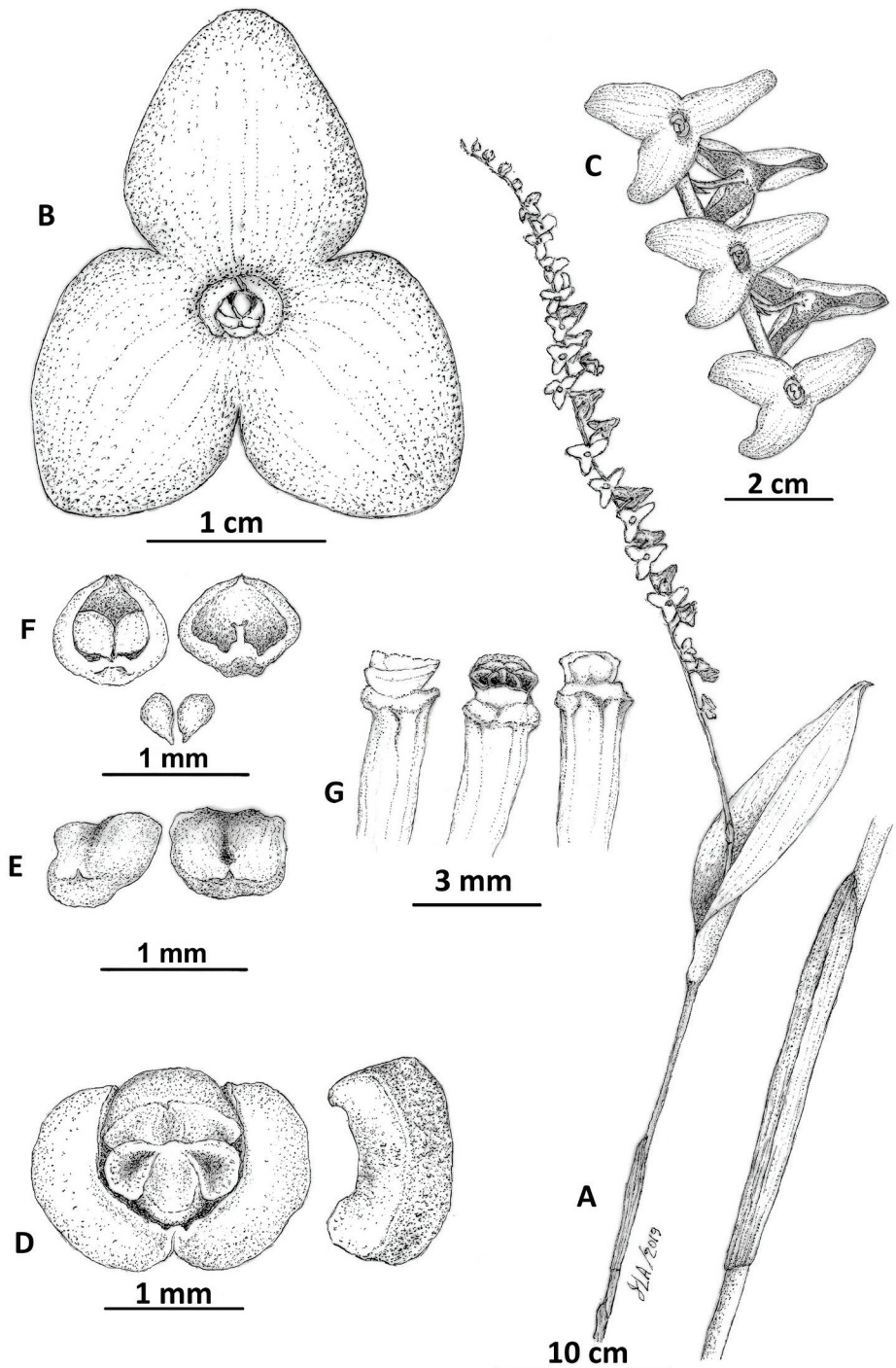

Figure 2. Ink illustration of *Stelis excentrica* Reina-Rodr. & López-Mach. **A**. Habit and Sheaths **B**. Frontal view of the flower **C**. Segment of the inflorescence **D**. Petals, lip, and column in frontal view. **E**. Lip in lateral and frontal view **F**. Pollinia and anther cap dissected **G**. Column and ovary, dorsal, frontal and overhead view. Drawing by Jairo Larrahondo Aguilar from the type.

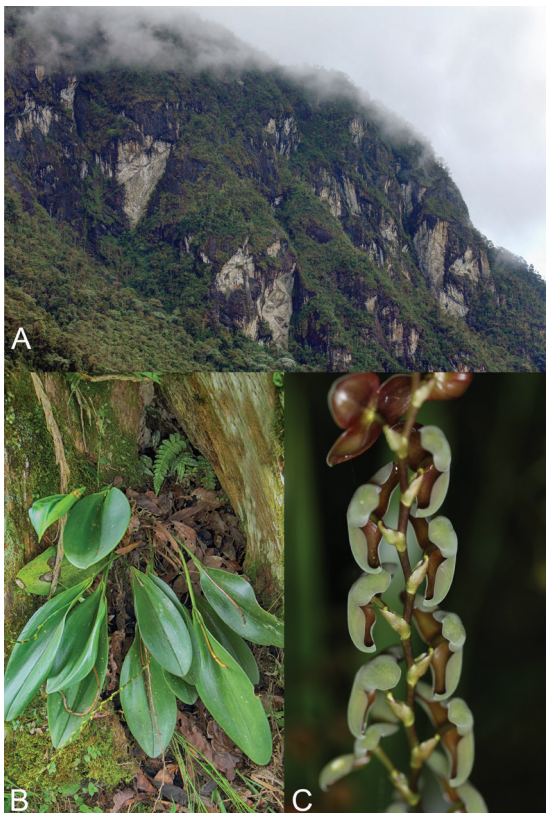

Figure 3. **A**. Peñas Blancas, cliff of Cretaceous period with vegetation where the type specimen of *S. excentrica* was found. **B**. Plant habit *in situ*. **C**. Floral bracts top view. Photographs by F. López-Machado (A–B) and G. Reina-Rodríguez (C).

base of the ramicaul. *Sheaths* 6-7-veined, tubular, oblique, papyraceous, broad and flattened towards the apex, 8.7–10.1 cm long. *Leaf* blade 26.8–28.2 × 10.3–10.5 cm, coriaceous, lustrous, elliptical, apex acuminate, emarginate. *Inflorescence* 60 cm long, single, racemose, erect, decumbent in natural position, arising from apex of the stem, peduncle 15–17 cm long, with two tubulars, acuminate sheaths, the longest 8.7 cm long. *Floral bracts* 0.8–1.0 cm long, light green, obliquely funnel-shape. *Pedicels* green, arching, 0.9–1.0 cm. *Flowers* 2.6–3.1 cm in diameter, ochraceum green color, 25–34, simultaneously opening 3/4 parts from the base and the last 1/3 in flower buds. *Ovary* straight, glossy with ribs, 6.0–7.0 × 1.0–2.0 mm. *Dorsal sepal*, 13–15 × 7.0–9.0 mm, connate with lateral sepals in 0.2 cm, ovate, rounded, markedly reflexed along the margins, green-ochraceum with soft texture adaxially and shiny brown abaxially, subapically papillose, 5-veined. *Lateral sepals* 12-14 × 7.0–11 mm, connate basally with dorsal sepal in 3 mm, obliquely ovate, apex rounded, subapically papillose, 5-veined. *Petals* 1.7–2.3 × 0.8–1.0 mm, concave, embracing totally the column and partially the labellum, kidney shaped, apex broadly rounded, slightly overlapped each to other in the columnar side, thick margin with microscopic crystals dots (calcium oxalate). *Lip* 1.0-1.2 × 0.7-0.9 × 0.8-0.9 mm, subquadrate, slightly concave, rounded, shortly apiculate, base truncate, hinged to the base of the column; *Callus* triangular with glenion in T-shape, raised, extended from the base to the middle of the lip, hirsute in its middle part and rounded apically. *Column* 1.0 mm long × 0.8 mm wide, erect, triangular in cross-section, widely bilobed stigmatic lobes with sharp margins and microscopic crystals dots. *Anther* 0.6 mm long x 0.4 wide, apical, orbicular-ovoid, cucullated. *Pollinarium* formed by two yellow pollinia, obovate, attenuated toward the base, 0.5 mm long × 0.3 mm wide, attached to elastic *caudicles* and drop of hyaline, disc-shaped, orange *viscidium*. *Column* not seen.

Etymology: The name derived from the Latin *excentricus*, eccentric, referring to the unusual size of the flower and inflorescence.

Phenology: In their habitat the plant was in blooming in March, April, November and December; coinciding with the two rainy peaks that dominate the bimodal rainfall regime in the area

Conservation status: We assume that it is endemic to the Farallones de Cali since no records are known from the north or south of the western Andes. Its presence extension area is confined to less than 483 km2. It complies with Criterion B1a for the EN (Endangered) category according to IUCN (2012).

Ecology and distribution: *Stelis excentrica* is known only from the type specimen found in the middle and upper part of the Cali river basin, in the Valle del Cauca department of Colombia, at 2200-2800 m of elevation. The average annual temperature is 17°C. Precipitation is reported as between 1900 to 2100 mm. This area has slopes of 20-50%,

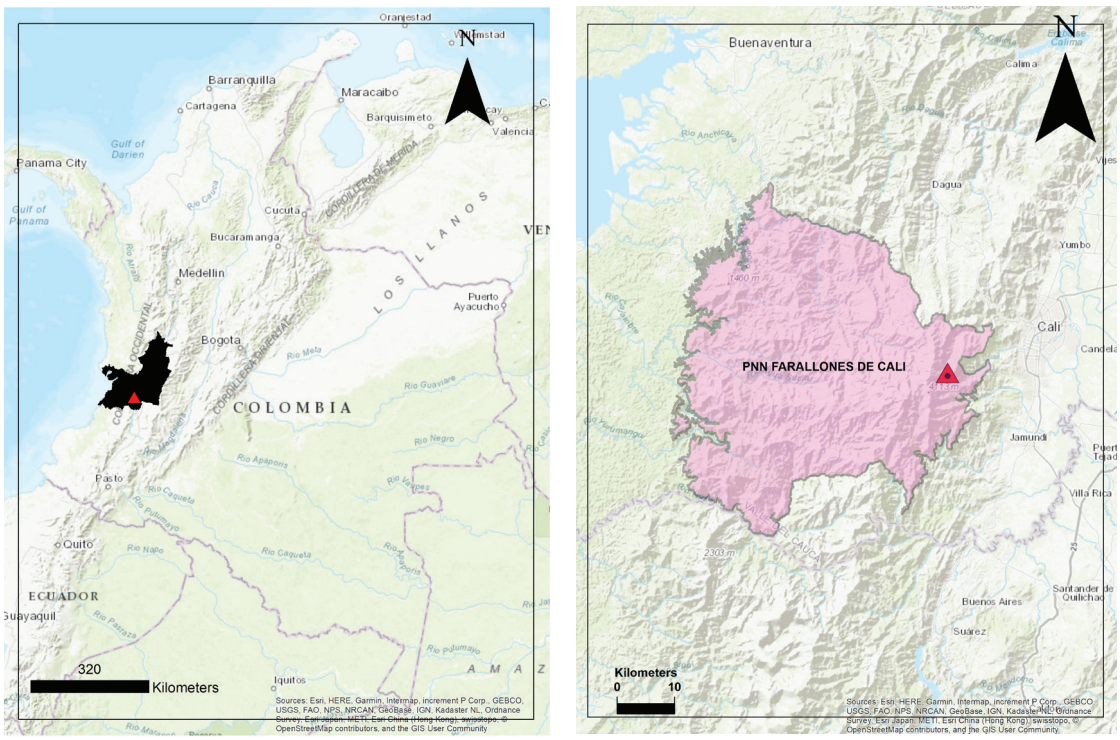

FIGURE 4: Map of location where the type specimen of *S. excentrica* Reina-Rodr. & López-Mach. was collected.

on deep and well-drained soils from volcanic of Cretaceous (CVC 2010) (Fig. 3 A). The area was classified as Montane rain forest (Holdridge 1987); the humid winds coming from the Pacific Ocean, which, when hitting the mountain top, is condensed, producing haze and strong precipitations known as orographic rains. (DAGMA 2014).

The main plant elements associated with the new species are: canopy above 10 m: *Quercus humboldtii* Bonpl. (Fagaceae), *Spirotheca rosea* (Seem.) P.E. Gibbs & W.S.Alverson (Malvaceae), *Otoba lehmannii* (A.C.Sm.) A.H. Gentry., (Myristicaceae). Subdosel species <6 m: *Brunellia comocladifolia* Bonpl. (Brunelliaceae), *Alchornea latifolia* Sw. (Euphorbiaceae), *Hedyosmum bonplandianum* Kunth. (Chloranthaceae) and *Miconia caudata* DC. (Melastomataceae) (CVC 2015). In addition, there is a community of epiphytes dominated by the genus: *Cyrtochilum* Kunth., *Epidendrum* L., *Lepanthes* Sw., *Masdevallia* Ruiz & Pav., *Maxillaria* Ruiz & Pav., *Oncidium* Sw, and *Pleurothallis* R.Br.

At the present, this species is probably the largest flower of the subgenus *Stelis* registered. It differs from its rival *Stelis gigantissima* in the flower color (ocher green flowers (*vs.* dark purple); sepals with folded margins (*vs.* unfolded), sepals abaxially bright (*vs.* dull) and the triangular "T" shaped glenion of the lip (*vs.* subtrilobed). See (Table 1)

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Table 1: Differences between *Stelis excentrica vs. Stelis gigantissima,* in terms of abiotic conditions and morphology.

Traits	*Stelis excentrica*	*Stelis gigantissima*
Abiotic conditions		
Countries	Colombia Southwest	Ecuador East
Biogeographic range	Western Andes middle lands	Amazon basin middle lands
Life zone	Montane rain forest (Holdridge 1987)	Tropical moist forest (Holdridge 1987)
Elevation	2200-2800	1000-1900
Mean annual rainfall (mm)	2000-2500	2200-4000
Mean temperture (°C)	17°C	22.3°C
Morphology/Phenology		
Biotype	Terrestrial	Epiphyte to terrestrial
Flowering	March, April, November, December	November
Ramicauls (cm)	59	35
Leaf blade size (cm)	28.2 × 10.5	25 × 20
Floral bracts	Oblique, acuminate, acute.	Oblique-Obtuse.
Floral bracts (mm)	8.0–10.0	3.0
Inflorescence long (cm)	60	75
Ovary (mm)	6.0-7.0	3.0
Sepals (mm)	15.0 × 11.0	14 × 7.5
Flower length (from apex of dorsal sepal to apex of lateral sepal) (mm)	30.6	27
Flowers color	Ocher green	Dark Purple

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A NEW SMALL-FLOWERED *CYRTOCHILUM* SPECIES (ORCHIDACEAE: ONCIDIINAE) FROM THE CONDOR MOUNTAINS IN ECUADOR

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Abstract. A new small-flowered species of *Cyrtochilum* from the isolated range of the Condor mountains in Ecuador is described and illustrated with a line drawing and a photograph of the holotype. It shares morphological features with several different-looking groups of *Cyrtochilum*, such as the two generitypes of the genus: *C. undulatum* and *C. flexuosum*, as well as with plants in the *C. myanthum* complex. These groups are treated as three separate genera by some (*Cyrtochilum*, *Trigonochilum* and *Dasyglossum,* respectively), but the combination of morphological features seen in our new species brings the groups together into one polymorphic but genetically monophyletic genus.

Key Words: Condor, *Cyrtochilum*, new species, Oncidiinae

Introduction. The genus *Cyrtochilum* Kunth was originally placed between *Oncidium* Sw., and *Epidendrum* L., from which it was distinguished by features such as unguiculate sepals and petals, and a shortened spur-less convex lip, hence the name of the genus (Kunth 1816). These generic delineations were based on two species; *Cyrtochilum undulatum* Kunth (Fig. 1) and *C. flexuosum* Kunth (Fig. 2) and may have appeared sufficient in 1815. With time, however, many new species were discovered and described, and it became more and more difficult to delineate *Cyrtochilum* from particularly *Oncidium* and *Odontoglossum* Kunth (Lindley 1833). As a result, a considerable confusion and disagreement developed among taxonomists how to treat this large group of plants (Lindley 1838, 1841, 1852, 1855, Reichenbach 1849, 1854, Beer 1854, Rolfe 1896,Kränzlin 1917,1922, Schlechter 1924, Garay 1970, Bockemühl 1989, Königer 1991, 1996, Königer & Schildhauer 1994, Senghas 1994, 1997, Dalström 2001, Szlachetko *et al.* 2017), which continue to this day. Part of the reason for this controversy is the natural variation of species within this large complex of plants, and partially depending on the taxonomists' preference for large or small genera and specifically what features to base them on. The relatively recent arrival of molecular research, particularly DNA sequencing, has helped the plant systematists to better understand how taxa are related to each other, but it has not solved the challenge of how to organize them in practical, user-friendly and visually distinguishable systems. This task is still up to the taxonomists.

Basically there are two main alternatives available how to handle this situation. Do we classify taxa according to how closely they are genetically related to each other? Or do we classify taxa based on how closely the flowers (generally) look like each other? The former method is a modern version which is strictly preferred by some, while the latter method is the older and traditional method preferred by others. The authors of this paper prefer using a combination of both methods in addition to any other informative data that can be accumulated. Combining the two methods must be done in a certain order though. The foundation of modern classification should primarily be based on molecular evidence from correctly identified voucher specimens (which are not always the case) that show natural and biological relationships between taxa. This is important in order to better understand the evolutionary processes that drive the creation of new taxa. Once we have a better understanding of how the various members of the *Cyrtochilum-Oncidium-Odontoglossum* (C-O-O) complex, for example, are related to each other, we can begin using morphological features in order to find a way to visually distinguish them from each other and to place them in natural

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FIGURE 1. *Cyrtochilum undulatum* (syn. *C. ventilabrum* (Rchb.f.) Kraenzl.), one of two generitypes for the genus. Photo by G. Escobar # 433.

groups. This method will create visually identifiable monophyletic genera, meaning that all species in each group/clade/branch have evolved from the same ancestor. At the same time this presents natural groups of plants that share certain features that visually distinguish them from other groups. But this method has some challenges as well. Nature follows its own rules, which sometimes can appear whimsical and frequently allows not closely related plants to develop flowers that look similar because they target the same pollinators. Similarly, plants that *are* closely related and grow together may display very different-looking flowers because they are targeting different pollinators. When we place species together based on floral similarities alone without respecting the genetic background, we risk creating polyphyletic groups with ancestors that come from unrelated backgrounds. This has happened a lot within the C-O-O complex and is a major reason why there are still considerable disagreements among taxonomists about how to treat this group. To include some complexes of plants that molecular evidence show belong together in a monophyletic *Cyrtochilum* (Williams *et al.* 2001, Pridgeon *et al*. 2009, Szlachetko

FIGURE 2. *Cyrtochilum flexuosum*, from Cali in Colombia, the second of the two generitypes for the genus. Photo by Stig Dalström.

et al. 2017) for example, but exclude the closely related *C. pardinum* Lindl., and *C. ramosissimum* (Lindl.) Dalström complexes, which also belong in the same monophyletic *Cyrtochilum*, and move them into the distantly related *Odontoglossum* based on floral similarities alone (Szlachetko *et al.* 2017) is inconsistent with the principles of monophyletic genera and is not accepted by us. We, therefore, prefer to maintain *Cyrtochilum* as circumscribed by Dalström (2001), by Williams *et al.* (2001), and by Pridgeon *et al*. (2009), and keep the various branches of this florally polymorphic but vegetative rather similar and monophyletic complex of species together under one admittedly wide umbrella. This directs us to describe the following taxon as a new species of *Cyrtochilum*.

Taxonomic treatment

Cyrtochilum gentryi Dalström & W.E.Higgins, ***sp. nov.*** (Figs. 3–4).

TYPE: Ecuador. Morona-Santiago: Gualaquiza; Campamento Achupalla, Cordillera del Cóndor, 15 km east of Gualaquiza, tepui-like bromeliad sward with scattered small trees, S03°27'; W78°22', altitude 2090 m, 21 July, 1993, *A. Gentry 80304* (holotype: SEL, isotype MO).

Diagnosis: *Cyrtochilum gentryi* is distinguished from all other small-flowered *Cyrtochilum* species by the combination of features such as a creeping habit similar to species in the *C. undulatum*, *C. flexuosum* and *C. auropurpureum* (Rchb.f.) Dalström complexes, a straight column that is parallel with the base of the lip as for species in the *C. myanthum* complex (Fig. 5), and a pollinarium where the stipe has a well developed extension between the pollinia, as in the *C. cimiciferum* (Rchb.f.) Dalström complex, and from all other small-flowered *Cyrtochilum* species by the structure of the interior pair of extended brachiate, or arm-like, lobes below the stigmatic surface.

Terrestrial *herb*. *Roots* few and scattered on a climbing *ca*. 5 mm thick, bracteate rhizome. *Pseudobulbs* distinctly distant, ovoid elongate, *ca*. 2.5 × 1.0 cm, unifoliate, surrounded basally and mostly hidden by 5–6 distichous foliaceous sheaths. *Leaves* subpetiolate with an abscission layer *ca*. 1 cm from the apex of the pseudobulb, conduplicate, lanceolate, narrowly acute and sub-apiculate, 5.5–5.8 × 1.8 cm. *Inflorescence* axillary from the base of the pseudobulb, 1 or 2, erect from a developing growth, to *ca.* 37 cm or taller, straight peduncle, with a fractiflex 3.5–6.0 cm long raceme or panicle with widely spaced, indistinctly flexuous side-branches (the multiple inflorescences on the type specimen are cut up, which makes it difficult to see which part is the extension of which other part). *Peduncular bracts* scale-like, appressed, acute, *ca*. 5 mm long; *floral bracts* similar, 1.5–3.0 mm long. *Pedicel* with *ovary* 10–17 mm long. *Flowers* dark brown with a yellow lip. *Dorsal sepal* sub-unguiculate, obovate, indistinctly canaliculated near the base, then cupulate, obtuse, sub-apiculate with 3 main veins, *ca*. 7.0 × 3.5 mm when flattened. *Lateral sepals* fused basally to each other and to the short column foot for *ca.* 2.5 mm, then spreading, unguiculate, elliptic to indistinctly obovate and indistinctly oblique, indistinctly canaliculated apically, bluntly apiculate, with 3 main veins, *ca*. 8.5–9.0 × 3 mm. *Petals* sub-sessile, distinctly obliquely basally, then narrowly elliptic to almost linear, obtuse and apiculate, *ca.* 7.0–7.1 × 3 mm, with 3 main veins. *Lip* rigidly attached to the base and along the margin of the *ca*. 1.5–2.0 mm long column foot, hastate to indistinctly cordate, trilobate with broadly orbiculate, entire and probably spreading lateral lobes, and a cupulate, rounded, entire front lobe, *ca*. 6.0–6.5 × 5 mm when flattened; *callus* is a fleshy, elevated central hump emerging at the base of the lip and extending for *ca*. 1.2 mm, then developing into a raised longitudinal pair of *ca.* 3.3 mm long, parallel, fleshy ridges that diverge apically into rounded angles. *Column* stout, slightly up-curved ("sway-backed") ventrally deeply concave between the lateral, slightly rounded flanks, ending with a blunt, sub-rectangular lobe, with an additional interior pair of brachiate lobes below the stigmatic surface, *ca*. 4 mm long. *Anther cap* campanulate and verruculose, shortly rostrate with a dorsal ridge. *Pollinarium* of two obovoid, cleft/folded, micro-verruculose pollinia on a minute, folded (on the rehydrated specimen) sub-triangular stipe, with a digitate extension between the pollinia (viscidium not seen).

Paratype: No additional material seen.

Distribution: *Cyrtochilum gentryi* is only known from the type location, at *ca.* 2000–2100 m elevation

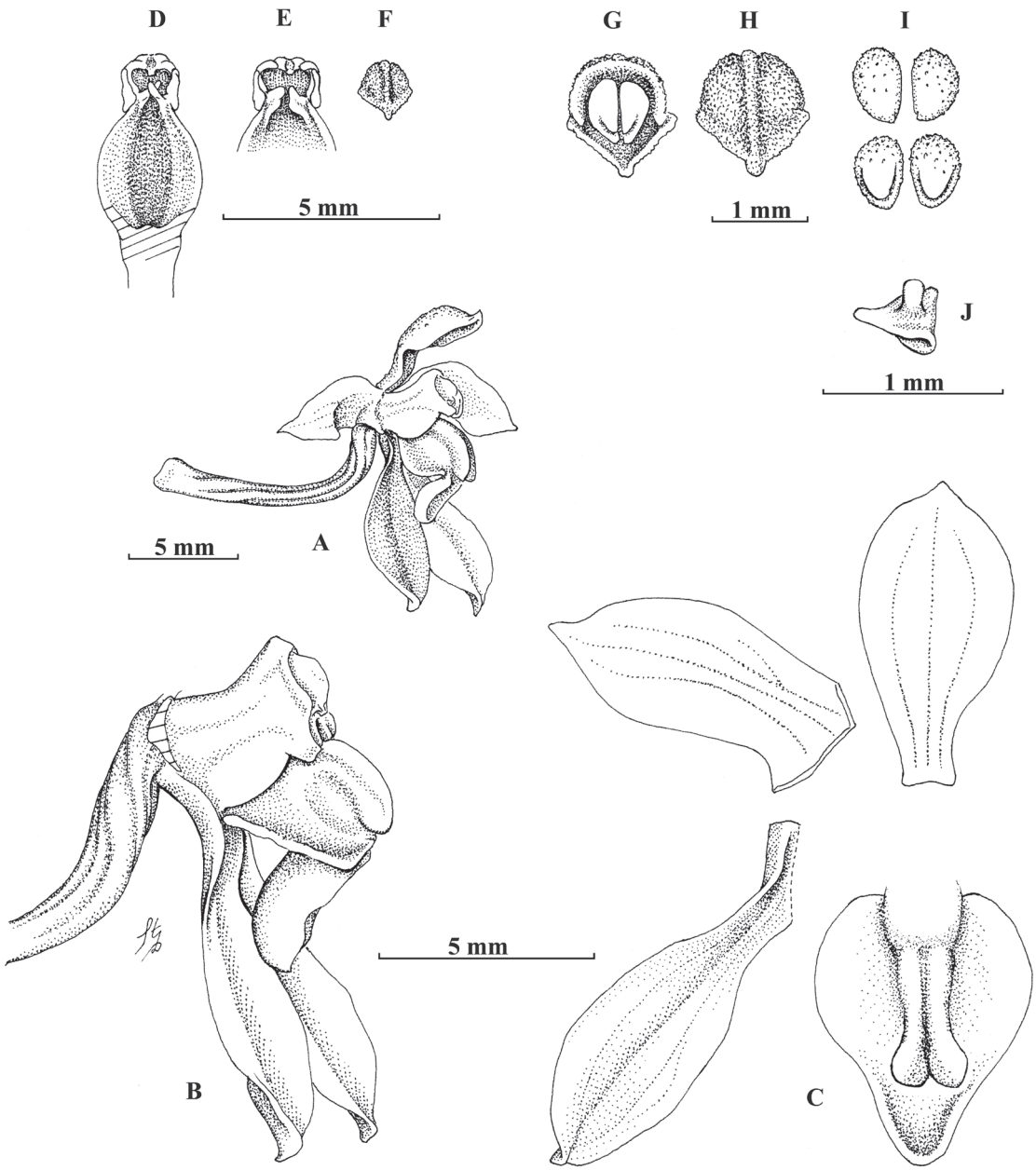

FIGURE 3. *Cyrtochilum gentryi* Dalström & W.E.Higgins. *A. Gentry 80304* (holotype: SEL, isotype: MO). **A**. Flower lateral view. **B**. Column, lip and lateral sepals lateral view. **C**. Dissected flower. **D**. Column ventral view. **E**. Column slightly widened, ventral view. **F**. Anther cap front view. **G**. Anther cap with pollinia, ventral view. **H**. Anther cap front view. **I**. Pollinia front and back views. **J**. Stipe without viscidium, tilted left, lateral view. Drawn from the holotype by Stig Dalström.

→ Right, FIGURE 4. *Cyrtochilum gentryi*. Holotype specimen *A. Gentry 80304* at SEL. Photo by Stig Dalström.


SEL
103154
HERBARIUM
SELBY BOTANICAL GARDENS
Determined by Stig Dalström 9/7-12
Cyrtochilum (Cyft. aureum) No! S. Dalström 2016
ECUADOR
ORCHIDACEAE
Oncidiinae
Morona-Santiago: Gualaquiza
Campamento Achupalla, Cordillera del Cóndor, 15 km east of Gualaquiza, tepui-like bromeliad sward with scattered, small trees.
03°27'S 078°22'W 2090 m
Terrestrial, lip yellow, tepals dark brown.
21 Jul 1993
Al Gentry 80304
MISSOURI BOTANICAL GARDEN HERBARIUM (MO)

FIGURE 5. *Cyrtochilum myanthum*, from Ecuador. Photo by Stig Dalström.

on the upper plateau of the Cordillera del Cóndor in Ecuador (Fig. 6), growing terrestrially in a "tepui-like bromeliad sward with scattered small trees".

EPONYMY: Named in honor of Alwyn Howard Gentry (1945–1993), a most prolific and dedicated botanist who died in an airplane crash near Guayaquil in Ecuador while working on a Rapid Assessment Program (Miller *et al*. 1996).

Discussion. *Cyrtochilum gentryi* is a very interesting species that share morphological features from several different species complexes in the genus, which have been treated as separate genera by some (Königer & Schildhauer 1994, Königer 1996, Senghas 1997, Szlachetko *et al*. 2017). The growth habit with a creeping and bracteate rhizome is similar to that of species in the *C. undulatum* and *C. flexuosum* (the latter as genus *Trigonochilum* Königer & Schildh.) complexes, thus displaying typical *Cyrtochilum sensu stricto* features (Kunth 1816), but also to the *C. auropurpureum* complex (genus *Odontoglossum fide* Bockemühl 1989, Szlachetko *et al*. 2017). The flower of *C. gentryi*, on the other hand, is morphologically close to those in the *C. myanthum* complex (genus *Dasyglossum* Königer & Schildh.) with a column that

FIGURE 6. The isolated Condor mountain range in Ecuador, as seen from a position near the town of Gualaquiza. Photo by Stig Dalström.

is more or less parallel with the base of the lip, and a lip callus consisting of a central pair of fleshy ridges that diverge apically. But the most intriguing feature can be seen in the pollinarium where the stipe has a distinct extension developed between the pollinia, similar to those in the *C. cimiciferum* complex (genus *Trigonochilum* Königer & Schildh.): *C. cimiciferum* (Rchb.f.) Dalström, *C. meirax* (Rchb.f.) Dalström, *C. midas* Dalström, *C. ovatilabium* C.Schweinf., *C. tricornis* Dalström & Ruíz-Pérez, *C. tricostatum* Kränzlin and *C. williamsianum* (Dodson) Dalström, and to a lesser extent to *C. flexuosum*. The distinct arm-like lobes, or extensions, below the stigmatic surface is very unusual, however, if not unique in the genus and readily distinguish this species. It seems risky to draw too many conclusions from this mixture of "generic possibilities" other than that it suggests a closer relationship with the *C. flexuosum* complex based on the vegetative and the micro-morphological features rather than to the *C. myanthum* complex despite the confusingly similar flowers. The "mixed" morphological features of *C. gentryi* also demonstrate the fragility of basing generic distinctions solely on morphological features. This further strengthens the preference for a broad generic concept in the case of *Cyrtochilum*.

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RUDOLF SCHLECHTER'S SOUTH-AMERICAN ORCHIDS III. SCHLECHTER'S "NETWORK": NORTH AND NORTHEAST BRAZIL, THE GUIANAS

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Abstract. The third chapter of the series about Rudolf Schlechter's South-American orchids presents concise biographical information about those botanists and orchid collectors who were related to Schlechter and worked in north and northeastern Brazil, as well as in the three Guianas. As an introduction, a brief geographical outline is presented, dividing the northern territories in four zones: the Amazon basin, the Araguaia-Tocantins river basin, the Northeast region and the Guianas. It is followed by a short mention of the historical milestones in the history of orchids in these regions during the preceding centuries.

Key words: Amazon River, biography, Brazil Nordeste, history of botany, Orchidaceae, Roraima, Tocantins River

The Amazonas and Tocantins River basins, and the Northeast region. As we have read in the previous chapter, southern Brazil (taking the capital city of Brasilia as its northernmost point) is part of the La Plata River basin, which drains into the southern Atlantic Ocean (Ossenbach & Jenny 2019: 207, fig. 11).

Northern and northwestern Brazil are part of the Amazon River basin, comprising the federal states of Roraima, Amapá, Amazonas, Pará, Acre, Rondônia and northern Matto Grosso (Fig. 1). Parts of Bolivia, Peru, Colombia, Ecuador, Venezuela and the southern part of the Guianas also drain into the Amazon River. The Amazon basin's immense territory covers over 50% of the total area of Brazil, over one third of the South American continent. Many new orchid species were collected along the Amazon, and many were named after the legendary river, among them by Schlechter, *Camaridium amazonicum* (Fig. 2–3).

To the Southeast of the Amazon we find the much smaller basin of the Araguaia-Tocantins river system, with an area of approximately 10% of the Brazilian territory. The Tocantins flows into the Atlantic Ocean alongside the Amazonas. The mouth of the combined rivers forms a large estuary at the port city of Belém (Fig. 4). Part of the basin are the northern regions of the state of Goiás, and the states of Tocantins, western Maranhão and eastern Pará.

Finally we have the Brazilian states that form the coastline from Pará in the north to Espirito Santo in the south, namely eastern Maranhão, Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe, and Bahia, which occupy the rest of northern Brazil, some 15% of the country's territory (Fig. 5).

The Northeast region, better known as *Nordeste* in Brazil, was the first to be discovered and colonized by the Portuguese and other Europeans, playing a crucial role in the country's history. To our day, the *Nordeste* is recognized for its history and culture, as well as for its beautiful natural sights. It is also the point of entry into the Amazon, which exerted, since the early years of Portuguese colonization, an irresistible attraction on botanical explorers and adventurers. Botanical and zoological treasures lay hidden in the midst of immense tropical forests and along mighty rivers. From the early 17th century to our day, a number of private or state-sponsored scientific expeditions into the Brazilian North must be regarded as milestones in the country's botanical history.

In 1637, the Dutchman Wilhem Piso (1611–1668) and the German Georg Marcgrave (1610–1644) set foot in Pernambuco, to take part in the exploration of the Northeast, under the patronage of Prince Johan Maurits van Nassau-Siegen from 1637 to 1644, Dutch administrator of the recently conquered "Dutch

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FIGURE 1. Map of the Amazon River basin. By Karl Musser.

FIGURE 2. *Camaridium amazonicum* Schltr. (as *Camaridium ochroleucum* Lindl.) Photograph by Dalton Holland Baptista

Brazil". Together, they made extensive botanical and zoological collections in the province of Pernambuco. Piso was responsible for giving the genus *Vanilla* its present name and in Marcgrave's herbarium we find the first dried specimen of a tropical American orchid, *Trigonidium acuminatum*. Part of Nassau Siegen's entourage was the Dutch painter Frans Post, from whom a large number of paintings are kept, mainly with rural motives and landscapes of the province of Pernambuco (Fig. 6).

Charles de la Condamine who navigated the river in 1743, wrote the first biological report (de La Condamine 1745); his expedition is considered "the beginning of the great era of Amazonian travel by

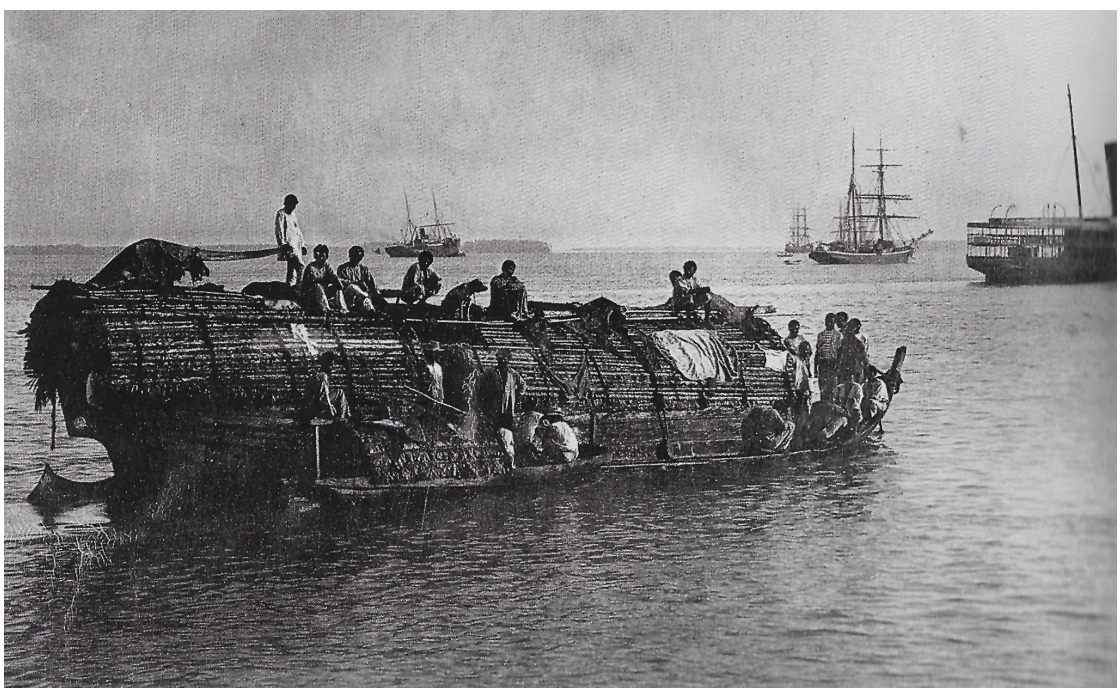

FIGURE 3. Canoe, steamship and sailships on the Amazon. Photograph by G.Huebner, *ca*. 1896–1910. In Schoepff 2005: plate 34.

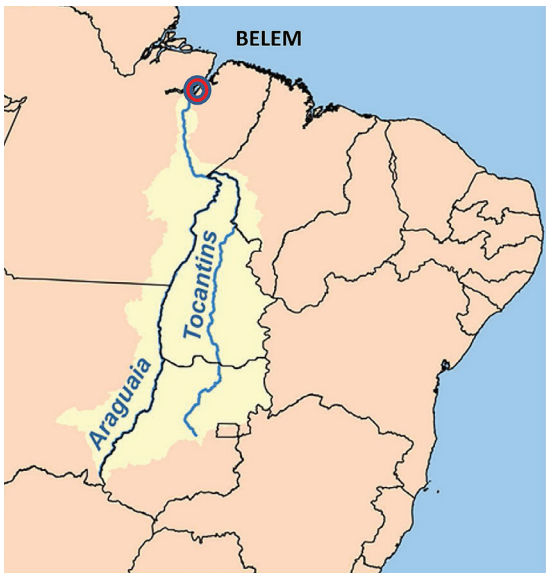

FIGURE 4. Map of the Araguaia-Tocantins river basin. By Karl Musser.

FIGURE 5. Map of Northeast Brazil. By Claus Hansen.

FIGURE 6. Pernambuco landscape. Oil on canvas by Frans Post.

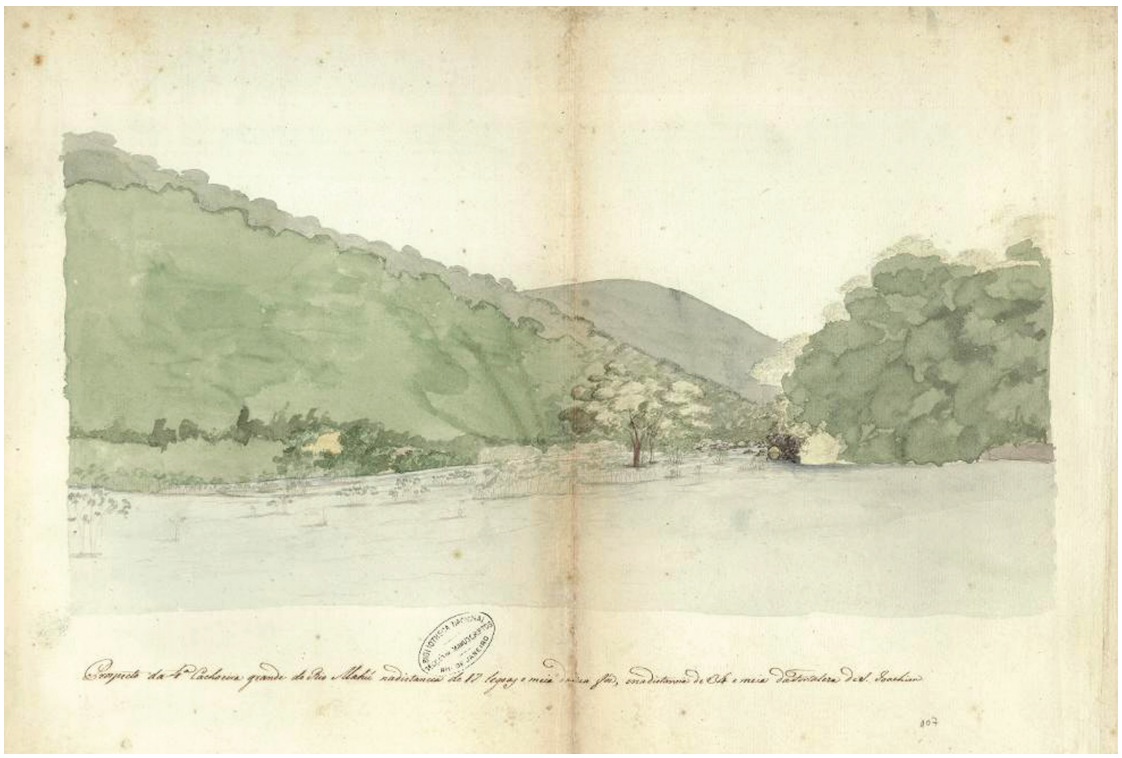

FIGURE 7. Waterfall on the Mahú River, near the border with Guiana. Watercolor by J. Codina. National Library, Rio de Janeiro.

European scientists" (ter Steege *et al*. 2016).

Twenty-five years later, Alexandre Rodrigues Ferreira (1756–1816) undertook his "philosophical journey" from 1783 to 1792, exploring the length of the Amazon, navigating the Río Negro, and continuing to the village of Cuiabá, in the province of Matto Grosso. It was the first officially sponsored expedition, and had been organized by Domenico Vandelli, Director of the Ajuda Botanical Garden in Lisbon. Joaquim José Codina and José Joaquim Freire, the draftsmen of the expedition, left an important legacy of watercolors depicting ethnological objects, landscapes, as well as specimens of the flora and fauna of the region (Fig. 7–8). Large natural history collections were made during the expedition. Herbarium material, skillfully prepared stuffed animals and rich ethnographical collections were described in numerous memoirs and travel accounts. Much of this material is still extant. However, none of the results of the expedition were ever published, and a part of the collections disappeared during the looting that followed the French occupation of Portugal in 1808 (Ossenbach 2020: 269).

FIGURE 8. *Scuticaria hadwenii* (Lindl.) Planch. By José Joaquim Freire. National Library, Rio de Janeiro.

The upper Río Negro River was explored by the famous naturalists F. H. A. von Humboldt and A. J. A. Bonpland in 1800. Again, a rich botanical harvest resulted from their expedition.

The arrival of Grigory Ivanovich, Baron of Langsdorff (1774–1852) in Rio de Janeiro in 1813 would mark the beginning of decades of an extensive exploration of Brazil by European naturalists. Langsdorff took advantage of the fact that in 1808 the Portuguese Court, at the time residing in Brazil, had opened the country's borders to foreign travelers and naturalists. In 1821, Langdorff proposed to the Alexander I and the Academy of Sciences of Saint Petersburg to lead an ambitious exploratory and scientific expedition from São Paulo to Pará, in the Amazon, via a fluvial route. It would result in the first extensive exploration of the Amazon basin and Brazil's *Nordeste* in modern times. After years of extensive preparations, the Langsdorff expedition departed with 40 people and 7 boats from Porto Feliz, by the Tietê river in June 1826 (Fig. 9) and reached Cuiabá, in Mato Grosso six months later, in January 1827. After almost unbearable hardships, among them the death by drowing of the expedition's young artist Aimé-Adrien Taunay, the expedition finally arrived at Belém in December 1828, having navigated a large part of the course of the Amazon.

From Belém, the expedition took ship to Rio de Janeiro, where they arrived in March 1829, almost three years and 6,000 kilometers after its departure. The expedition members were in pitiful conditions, and von Langsdorff showed signs of insanity during the last part of the journey.

A young Scot named George Gardner (1810–1849), a trained surgeon whose interest in botany had been stimulated by William Hooker's botany lectures at the University of Glasgow, sailed to Brazil looking for a better climate to improve his ill health and arrived in Río de Janeiro in 1836. Gardner then travelled to the North and Northeast of Brazil and spent the next five years making one of the most extensive collections of plants from the country then seen. It comprised about 6,000 numbers, representing approximately 3,000 species. Gardner's travels, after an initial excursion from Río de Janeiro to the Organ Mountains, took him to the provinces of Bahía, Pernambuco, Alagoas, Ceará, Piauí, Maranhão, and parts of Goias and Minas Gerais.

Carl Friedrich Philipp von Martius (1794–1868) and Johann Baptist von Spix (1781–1826) arrived in Brazil as part of the Austrian Scientific Expedition accompanying Archduchess Leopoldina. They explored northeastern Brazil and the course of the Amazon between 1817 and 1820. The botanical material collected during their journey served as the base for Martius' monumental *Flora Brasiliensis*, which he began publishing in 1840. His work was continued by August Wilhelm Eichler and Ignatz Urban, and the last volume appeared in 1906.

From 1849 to 1864, 1848–1952 and 1848–1859, respectively, Richard Spruce (1817–1892), Alfred Russell Wallace (1825–1892) and Henry Walter Bates (1825–1892) travelled to Brazil and navigated the major part of the Amazon and many of its tributaries. Spruce, an English botanist specializing in bryology, came to the attention of William Jackson Hooker, the director of the Royal Botanic Gardens at Kew. After a collecting expedition to the Pyrenees between 1845 and 1846, he was recommended for a much more challenging expedition to Brazil. Spruce landed in Pará in July 1849, and during the next 15 years travelled the Amazon from its mouth to the Andes of Peru.

While travelling the Amazon up to Santarém, he first met the two other naturalists who were, like himself, exploring the Amazon. Although they did not travel together, their paths crossed occasionally, always an opportunity to exchange information and specimens of natural history. Richard Spruce's *Notes of a Botanist on the Amazon & Andes* (2014, edited by Wallace) and Henry Bates' *The Naturalist on the River Amazon* (1863) became classics in the travel literature of the Victorian Era (Fig. 10).

João Barbosa Rodrigues (1842–1909) was considered one of Brazil's greatest botanists, known especially for his work on orchids and palms. He dedicated a large part of his life to the direction of the Botanical Garden in Río, from 1890 to his death in 1909. He began his botanical expeditions in 1868 and was commissioned by the Brazilian government in 1871 to explore the Amazon basin and study palms. The expedition lasted until 1874, and during this time Rodrigues drew nearly 900 color plates of Brazilian orchids (Fig. 11–12). Because of difficulty financing a publication with illustrations, Rodrigues published

FIGURE 9. Departure of Langsdorff's expedition on the Tietê River, June of 1826. Watercolor by Aimé-Adrien Taunay.

FIGURE 10. Interior of primeval forest of the Amazon. In Bates, *The Naturalist on the River Amazon* (1863), plate 2.

Figure 11. *Encyclia megalantha* Barb.Rodr. Barbosa Rodriguez, *Iconographie des Orchidées du Brésil*, vol. 4: plate 15.

Figure 12. *Laelia harpophorum* Rchb.f. Barbosa Rodriguez, *Iconographie des Orchidées du Brésil*, vol. 4: plate 54.

descriptions of more than 540 new orchids and 28 new genera without any images in his important two-volume work *Genera et species orchidearum novarum* (1877/1881).

The scientific exploration of northern Brazil in the 19th century would end with the two expeditions organized by the German Herrmann Meyer (1871–1932) to the headwaters of the Xingú River in the plains of Matto Grosso. Meyer explored the region in 1896 and again in 1899. Although the scientific results were relatively meager, Meyer's expeditions are of utmost relevance to our story: they opened to Schlechter - as we will see - the door to the splendorous world of tropical American orchids.

Herrmann Meyer's expeditions to the Xingú River

Born in Leipzig, Herrmann Meyer (1872–1932) (Fig. 13–14) studied anthropology and ethnology in Berlin and Jena. He travelled after his studies through the United States and slowly developed his plan to continue with the explorations of Central Brazil by German ethnologist Karl von den Steinen (1855–1929). Von den Steinen had organized two expeditions, in 1884 and 1887–1888 to the region of the Xingú River, one of the tributaries of the lower Amazon, in the province of Matto Grosso. Meyer was undoubtedly motivated by the successes of his brother Hans as explorer of Africa. Hans Meyer is credited with being the first European to reach the summit of Mount Kilimanjaro (5895 m), Africa's highest mountain (Brogiato 2019).

Hermann Meyer sailed in 1895 to Brazil in the company of the anthropologist Karl Ranke and the physician Heinrich Dahlen, the latter dying shortly after arrival in Rio on yellow fever. Before starting on the journey to the Mattogrosso, Meyer visited first the German colonies around Petropolis and Florianopolis, as well as Blumenau in Rio Grande do Sul. He convinced another German, an experienced explorer by the name of Carlos Dhein to take part in the expedition. Dhein had been one of the guides during von Steinen's expedition in 1884.

FIGURE 13. Herrmann Meyer in Cuiabá (Matto Grosso), 1896. Grassi Museum für Völkerkunde, Leipzig.

The expedition embarked to Buenos Aires in the first months of 1886, and from there sailed on the Paraná and Paraguay Rivers to Cuiabá, the capital city of Matto Grosso (Fig. 13–14). With Cuiabá as headquarters, the group explored the region of the Upper Xingú during the next 6 months, returning then to Río de Janeiro from where Meyer sailed back to Germany.

After his return, Meyer worked for a short time as assistant at the Leipziger Ethnological Museum, but was again in Brazil in the summer of 1898, this time in the company of the botanist Robert Pilger (1876–1923) and ethnologist Theodor Koch-Grünberg (1872–1924). In the spring of 1899, they navigated the rapids of the Río Ronuro, the largest tributary of the Xingú. After losing most of their provisions during an accident at a large waterfall, they continued on the Xingú until reaching the Amazon. The expedition was in a deplorable state, most of the equipment had been lost in accidents on the rivers, the group was weakened through hunger and fevers. Thus, it was decided to return, landing again in

FIGURE 14. Herrmann Meyer (1871–1932) (center of back row, standing) in the Brazilian jungle during the first Xingú expedition, 1896. Grassi Museum für Völkerkunde, Leipzig.

Buenos Aires in December 1899, and continuing across the Atlantic, before arriving in Germany in January of 1900. After his failure, Meyer abandoned his ambitious plans, turned his back to science and gave up his position at the Leipzig Museum, spending the rest of his life as director of the family business. The expected publication about the expedition never came to light (Koch-Grünberg 2004: 410). As already mentioned, the scientific results of the expedition were hardly worth the hardships. However, botanical collections were made, with over 3000 different species.

Herrmann Meyer, without success as an explorer, earned nevertheless a reputation as a founder of colonies of German immigrants in southern Brazil. During his visit to Rio Grande do Sul in 1898, before departing on his expedition, he went by train and then on horseback from Porto Alegre to the region of Cruz Alta, where Carlos Dhein had bought in his name, two years earlier, four large parcels of land. Meyer formed a company named Empresa de Colonização Dr. Herrmann Meyer and founded the German colony of Neu-Württemberg and two smaller colonies by the names of Xingú and Guaryta. Meyer's company was registered in 1898 in Porto Alegre, but its formal seat was the German city of Leipzig. Neu-Württemberg had in 1902 a population of nearly 3,000. The colony carries today the name of Panambí, and is a prosperous city with some 38,000 inhabitants.

Alfred Bornmüller (1868–1947) (Fig. 15), a cousin of Meyer, held the position of Director of the colony of Neu-Württemberg fom 1903 to 1907. He made ocasional botanical collections, among them a new orchid species, *Capanemia australis* (Kraenzl.) Schltr. (Fig. 16).

Robert Knud Friedrich Pilger (1876–1953; collected 1899)

Robert Knud Friedrich Pilger (1876–1953) (Fig. 17), botanist from the Berlin Botanical Garden, was part of Meyer's second Xingú expedition. At the young age of 22, Pilger was engaged in 1898 by Meyer to take part in his proposed adventure. He had been recommended by A. Engler, who had recognized Pilger's talent and knowledge (Melchior 1955: 294).

While Meyer travelled in the summer of 1898 to Río Grande do Sul, Pilger and Koch-Grünberg sailed early in 1899 to Buenos Aires, where they waited until Meyer's

Figure 15. Alfred Bornmüller (1868–1947). Archives of Rudolf Jenny.

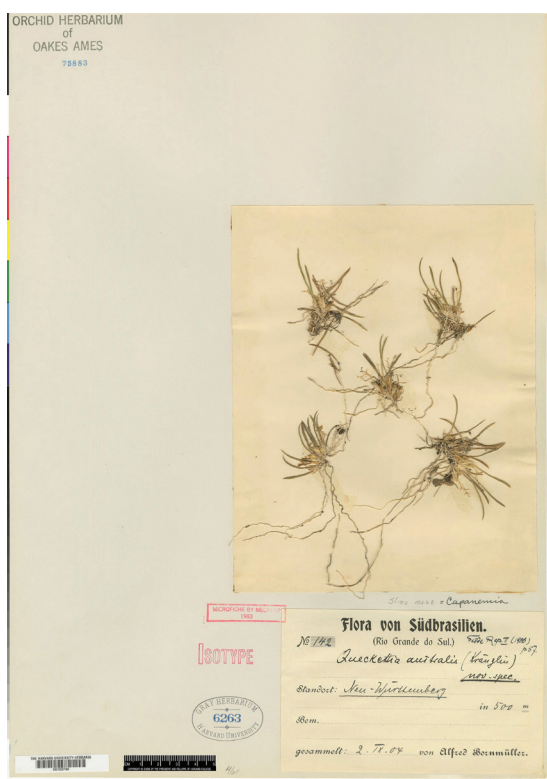

Figure 16. *Capanemia australis* (Kranzl.) Schltr. Isotype, Oakes Ames Orchid Herbarium.

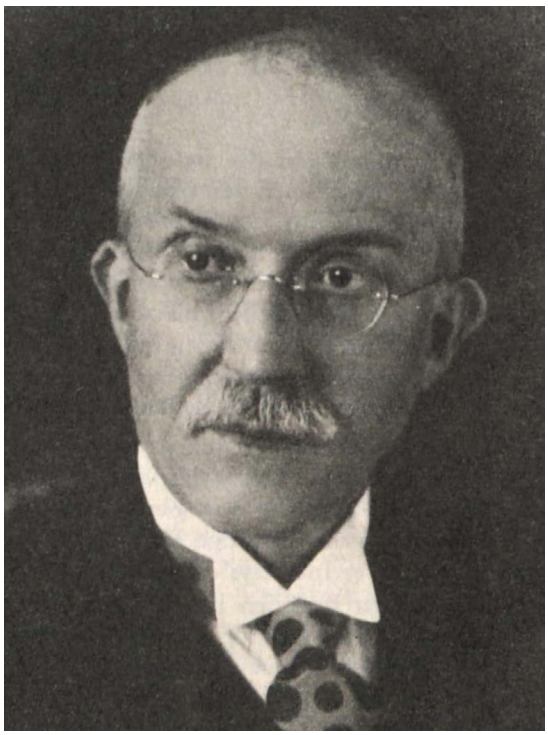

FIGURE 17. Robert Knud Friedrich Pilger (1876-1953). Archives of Rudolf Jenny.

arrival. The expedition took then again the same course as Meyer's first expedition in 1886, sailing upwards on the Paraná and Paraguay Rivers until reaching Cuiabá, in the province of Mattogrosso (Fig. 18).

In the introduction to his *Beitrag zur Flora von Mattogrosso* ('Contribution to the flora of Matto Grosso'), Pilger gave a short account on his part of the journey: "We landed early February in the capital of Mattogrosso, Cuiabá, where we stayed until the second half of March. The expedition rode from Cuiabá to Rosario and from there to the valley of the Cuiabá River until we reached its headwaters. Continuing then over the water divide [to the Amazon River basin in the north], we crossed the Paranatinga River and arrived finally at the headwaters of the Ronuro River. At this point the expedition, under the leadership of Dr. Meyer, boarded canoes and followed the course of the river while I stayed behind with a few men and went by land, after crossing the Jatobä and Batovy Rivers, back to our main camp. Here we stayed until September, when Meyer's Ronuro's expedition returned. We then went together back to Cuiabá, arriving there at the end of October" (Pilger 1901). It was during the months of April through September that

FIGURE 18. São Rosario street, Cuiabá, 1899. Photograph by Theodor Koch-Grünberg during the expedition. In Koch-Grünberg 2004: plate 37.

Pilger made his most important botanical collections which he published in 1901 in the above mentioned *Flora von Mattogrosso*. In this work, a total of seven species of Orchidaceae was mentioned, all determined by Rudolf Schlechter. It was in fact Schechter's first publication on South American orchids. Among these orchids we find *Habenaria pratensis* Rchb.f., *Pelexia setacea* Lindl., *Ponthieva mandonii* Rchb.f., *Galeandra juncea* Lindl., *Cattleya superba* Schombgk. ex Lindl., *Oncidium sprucei* Lindl., and *Habenaria pilgeri*, determined by Schlechter as a new species and named by him after Robert Knud Friedrich Pilger (Fig. 19). 700 phanerogams collected by Pilger in Brazil were deposited at the herbarium of the Berlin Museum, all destroyed in March 1943 during the Allied bombings of the German capital (Fig. 20). However, and according to Batista and collagues, the type of *H. pilgeri* is the only type material left at the Berlin-Dahlem Herbarium of Schlechter's New World *Habenaria* (Batista *et al.* 2011: 251).

After his return from Brazil, Pilger was named assistant at the Botanical Museum in Berlin, an institution he would serve for the next 50 years. In 1908 he was named curator of the Museum, and in 1913 he became professor. After Engler's retirement in 1921 and having Ludwig Diels been named as his successor, Pilger took over as second Director and played an important role in the upswing of the Museum under Diel's direction, an in the prestigious institution it became in the years prior to World War II.

In December 1934, Pilger made a short trip to Rio de Janeiro, invited by the Brazilian Government to the inauguration of the monument erected in honor of Martius, Eichler and Urban in the city's Botanical Garden, on the occasion of the centenary of the appearance of the general plan to the famous *Flora Brasiliensis*. During his stay, Pilger made short botanical excursions to São Paulo and the Serra of Itatiaia. Before leaving again for Germany in January of 1935, he was conferred the order of the Southern Cross by the Brazilian Government (Anonymous 1953).

After Diel's death in 1945, Pilger took over as Director of the Botanical Museum in Berlin, a position he held until 1950, the year of his retirement (Eckhardt 1966). He was responsible during this time for the reconstruction of the herbarium after its destruction some years before.

Figure 19. *Habenaria pilgeri* Schltr. (II, as *H. pungens*). From Martius *et al., Flora Brasiliensis*. vol. 3(6), t.107, 1906.

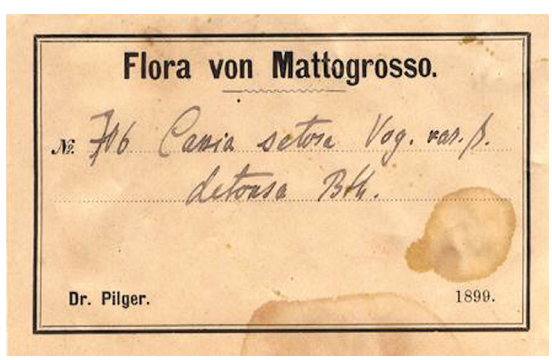

Figure 20. Herbarium label of Pilger's Flora von Mattogrosso, 1899. Natural History Museum, Vienna, #B 10 0525598.

In the words of Melchior (1955a: 386): "He was a man who embodied the Engler-Diels tradition and who served the Botanical Institute in an exemplary and selfless way".

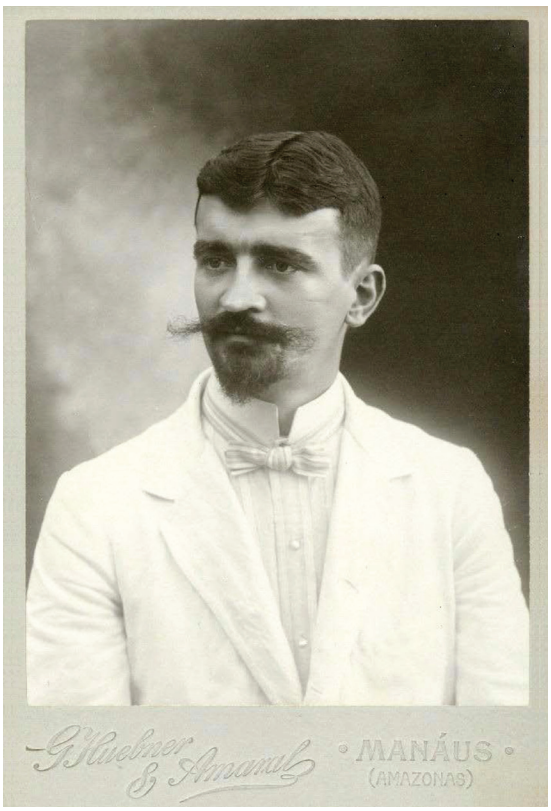

FIGURE 21. Theodor Koch-Grünberg (1872-1924). Photograph by Huebner & Amaral, Manaus

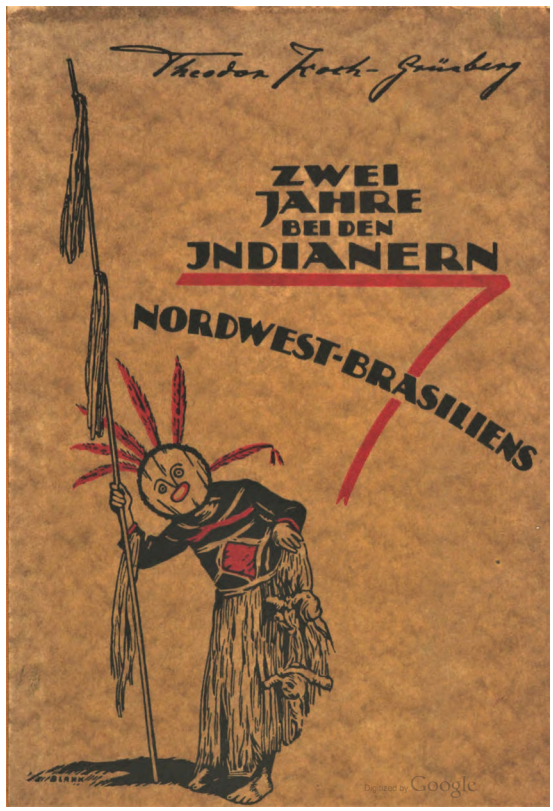

FIGURE 22. Title page of Koch-Grünberg's work: Two years with the Indians in northwestern Brazil (1921)

CHRISTIAN THEODOR KOCH-GRÜNBERG (1872–1924; collected 1899–1913)

Probably the most detailed account of Meyer's second exploration of the Xingú headwaters is the journal kept by Theodor Koch-Grünberg (Fig. 21) during the expedition (see Koch-Grünberg 2004). As scientist and photographer he was part of the group that travelled down the Ronuro River. In June of 1899, when everything was lost and the expedition was at its lowest point, he wrote in frustration: "It is a land condemned by God, this Central Brazil, and I pity the poor European who has to live here. The ground is partly a bottomless swamp, partly stone-hard backland where nothing will grow. Trees and bushes are mostly withered cripples; no eatable fruits can be found, and seldom an animal to avoid starvation […] Wherever you go, death, waste and ruin. Truly, if not absolutely necessary, one should stay at home instead of venturing in this wilderness!".

It seems that Pilger´s botanical collections were the only made during the expedition. Koch-Grünberg, in his extensive journal of the voyage (see Kraus 2018) does not make any mention whatsoever on botanical discoveries. Aside from a few general remarks about the vegetation of the regions they passed through, specific plants or flowers are not mentioned anywhere. As we will see, this would change in the travel journals of his future expeditions.

Koch-Grünberg undertook several other expeditions to Brazil after he received his PhD. in 1902 at the University of Würzburg. Sponsored by the Royal Ethnology Museum in Berlin, he started in 1903 on his second exploration journey through northern South America, which would last until 1905. Koch-Grünberg explored for two years the course of the upper Río Negro and its tributaries, including the region of the upper Vaupés River, in Colombia. His two-volume work *Two years with the Indians in northwestern Brazil* (here cited in its first edition, Koch-Grünberg 1910) (Fig. 22) gave him international fame as scholar

in the ethnology of the Indian tribes of the Amazon River basin. Koch-Grünberg travelled on this occasion in the company of a young Brazilian of German origin by the name of Otto Schmidt, not to be confused with Heinrich Schmidt, who would travel with him on his third expedition, a few years later.

Koch-Grünberg presented in 1905 a lecture at the Geographic Society in Berlin about this expedition, *Report of my travels to the upper Río Negro and the Caquetá in the years 1903 to 1905* (see here its Spanish version, Koch-Grünberg 1994) in which he wrote: "The most varied classes of orchids have found place in any crevice if the trees, on each dry branch, in any place where they can find nourishment. How many botanical treasures does this unknown and untamed Tropic hide!" And further: "The river became soon very small […] and disappeared finally into a typical tropical flooded forest, whose exuberant vegetation and extraordinary richness in orchids would captivate the heart of any botanist." "I gave to the Royal Botanical Museum in Berlin a small botanical collection, with some new orchids" (Koch-Grünberg 1906).

A list of the orchids that Koch-Grünberg had sent to Berlin was published later by R. Pilger, in an appendix to Koch-Grünberg's book of 1910 (Pilger 1910: 363–367). Pilger praised Koch-Grünberg's work and affirmed that even small collections made in so far little known regions had great value, especially if -as in this case- they were accompanied by detailed information about the localities were they were found and about their habitat. "They are like blocks which will come together in the future as a large building" (Pilger 1910: 360). Among these, Schlechter described in Martius' *Flora Brasiliensis* a new genus, *Kochiophyton*, typyfied by *Kochiophyton negrense* (a synonym of *Acacallis cyanea* Lindl.). Schlechter described the origin of his plant as follows "Habitat in truncis arborum ad Cabeceira secus flum. Rio Tiquie affl. Rio Negro prov. Alto Amazonas: Br. Th. Koch n. 114. — Floret Maio" ('Habit on tree trunks at the headwaters of the Tiquie River, a tributary of the Río Negro, province Alto Amazonas: Br[azil]. Th. Koch. Nr. 114 – Flowers in May.") (Fig. 23).

Pilger enumerated 15 other orchid specimens collected by Koch-Grünberg. The following genera were represented: *Batemannia, Dichaea, Epidendrum,* an undetermined species of *Galeandra, Galeottia,*

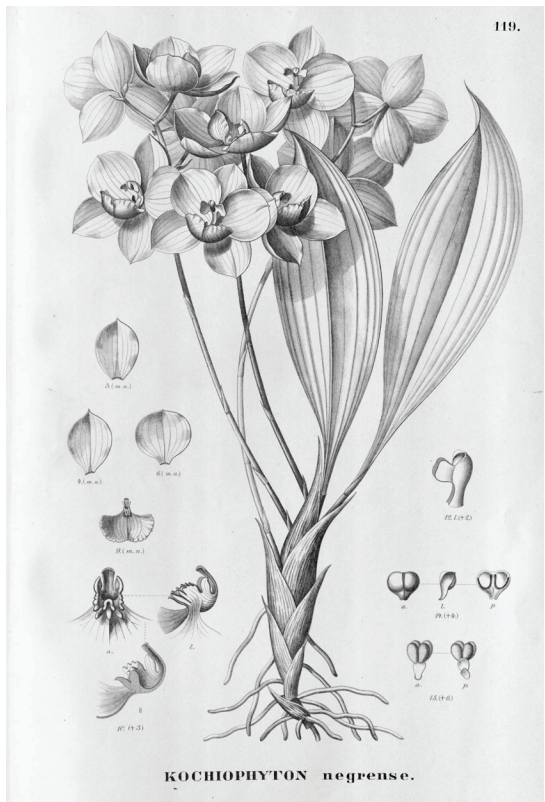

Figure 23. *Kochiophyton negrense* Schltr. In Pilger, 1910: 366. From Martius *et al., Flora Brasiliensis*, vol. III(6): plate 119.

Koellensteinia, Maxillaria, Oncidium, Rodriguezia, and *Sobralia*.

Koch-Grünberg wrote in 1921 once more about the orchids along the Río Negro: "The richness in orchids is extraordinary, and I collected, just in passing by, over half a dozen new species, which stood in flower. On this river, so rich in vegetation, I started to form a small herbarium. However, in this continuously wet weather - we are in the midst of the rainy season - I have little hope of being able to dry the plants properly" (Koch-Grünberg 1921).

In 1911, Theodor Koch-Grünberg started on his third South American journey, now to the border region between Brazil, Venezuela, and British Guiana, and the Venezuelan lowlands of the Orinoco River basin. In Manaus, he had made the acquaintance of Hermann Schmidt, and Georg Huebner (of whom we will talk later), a German who had emigrated to Brazil around 1901 and had gained considerable experience as a

FIGURE 24. Heinrich Schmidt, Theodor Koch-Grünberg, and Romeo Wapixana, Manaus 1913. Photograph by Georg Huebner.

collector of ethnographic objects in the region of the Río Negro (Kraus 2018). Koch-Grünberg started from Manaus in the company of Schmidt, and an Indian asssistant by the name of Romeo Wapixana (Fig. 24).

Travelling the Río Branco upwards, he reached Mount Roraima in Venezuela. Here he documented the myths and legends of the Pemón and Yek'wana tribes and made important photographic records. He proceeded through the Sierra Parima and the regions of Caura and Venturarí, until reaching the Orinoco on the first of January of 1913. After staying for a short period in San Fernando de Atapabo, then the capital of the Federal Territory of Amazonas, he followed the Casiquiari channel, which connects the Orinoco with the Amazon through the Río Negro. He returned to Manaus and in 1917, back in Germany, published his travel journal, *Vom Roroima zum Orinoco*, probably his most famous work. In this work, Koch-Grünberg again described the vegetation of the regions he passed through: "The twisted branches of the smaller trees are covered with moss and long, light-green and white lichens, and many other parasites, also flowering orchids." "In the afternoon we went on the other side, and enjoyed a few hours on the canoes between forest-covered islands, from whose tall trees diverse orchids hung" (Koch-Grünberg 1917).

In 1915, Theodor Koch-Grünberg took over the position as scientific director at the Linden Museum in Stuttgart and in 1924 joined the British explorer Alexander Hamilton Rice (1875–1956) on an expedition to the Orinoco River basin. At the beginning of this trip, Koch-Grünberg fell ill, and on October 8, 1924 died of malaria in the Brazilian town of Vista Alegre where he was buried. His gravestone was donated by Georg Huebner.

Figure 25. Georg Huebner (1862-1935). Self-portrait, 1910.

Georg August Eduard Huebner (1862–1935; collected 1895-1929)

From Manaus, and with date of December 7, 1923, Georg Huebner (Fig. 25) wrote his last letter to Theodor Koch-Grünberg, his friend of many years who would pass away a few months later, on October 8, 1924: "During the last years I resumed my former occupation, namely the study of orchids. I did this through the encouragement of professor doctor Rudolf Schlechter, an authority in this field. He asked me to collect herbaceous plants, including the smaller and less important species, many of which are still unknown. I undertook this work with the intention of improving the knowledge about Brazilian orchids and it will be published in Portuguese in the *Anexos das Memórias do Instituto de Butantan* by doctor Schlechter and by doctor F.C. Hoehne, in São Paulo, with whom I correspond frequently (see Schlechter & Hoehne 1926, a translation of Schlechter 1925). To my regret, work was interrupted recently by Dr. Schlechter's illness who suffered a nervous breakdown due to excessive work. Now, since I know he has recovered, he will be able to occupy himself with the material I have sent him. It is true that I dedicate my time to activities of little profit, but I am very happy to know that among

FIGURE 26. Promotional leaflet of Hubner & Amaral's photographic studioos.

the samples I collected a century of species were new, which allows me to make a small contribution to science. At this moment I intend to turn this into a lucrative activity, approaching the importers of live orchids and offering my services, since I acquired a certain experience in this matter when I worked as a plant collector for Linden-Brussels in the 1890's" (Schoepf 2005: 194).

Georg Huebner, born in the German city of Dresden, came for the first time to South America in 1885, and was active during almost two years in the rubber business in the Peruvian Amazon. In 1888 Huebner travelled to Lima, where he met the Alsatian photograph Charles Kroehle (?–1902) with whom he travelled during three years through eastern Peru. They opened a photo studio in Iquitos under the name of "Fotografía del Amazonas" and took photographs which Huebner sold in Germany, after his return in 1891, and the failure of his business in Iquitos (La Serna 1918, Wolff 2014). Before sailing back to Germany, he worked for a time as plant collector for the Linden nurseries in Brussels.

Huebner travelled in 1894 a second time to the Amazon region, where he undertook an exploration along the Río Branco, a tributary of the Río Negro. This journey took him to the headwaters of the Orinoco River and, besides a botanical collection, he made a large number of photographs which - again - he sold mainly in scientific circles. In 1897, Huebner moved finally to Manaus, a city marked by the rubber boom, on the confluence of the Amazon and the Río Negro. Here, he offered his services as landscape and portrait

FIGURE 27. Breakfast at the "Photographia Allemã". Center: G. Huebner. Right: T. Koch-Grünberg

photographer and opened in 1899 an atelier under the name "Photographia Allemã" (German photography), which developed into the most important for photographic services in the region. The art teacher Libanio do Amaral became in 1901 Huebner's partner in his expanding business. The two partners adquired later in Belém the atelier of the recently deceased Italian photographer Felipe Augusto Fidanza and opened in 1911 a branch in Rio de Janeiro (Fig. 26).

Huebner maintained intensive contact to European scientific circles and to individual researchers, besides the already named Theodor Koch-Grünberg also to the botanist Ernst Ule, of whom we will talk next. He had in Koch-Grünberg a lifelong friend (Fig. 27).

In 1920, after the death of his partner Amaral, and in view of the crisis in the rubber business, Huebner retired from his profession and sold his studios in Manaus, Belém and Rio de Janeiro. He dedicated himself for the rest of his life to his botanical passion, the cultivation and commerce with orchids.

Huebner's photographs and postcards became with the years collector's ítems (Fig. 28–29).

His orchids achieved world fame through Rudolf Schlechter's publication of 1925, *Contributions to the orchidology of the Amazon Region, Orchidaceae*

Figure 28. Public market in Manaus. Photograph by Georg Huebner.

Figure 29. Theatro Amazonas, Manaus. Postcard by Huebner & Amaral.

FIGURE 30. *Huebneria yauaperyensis* (Rodr.) Schltr. Illustration by Barbosa Rodrigues in *Flora brasiliensis*, vol. 4: plate 2B.

FIGURE 31. *Encyclia huebneri* Schltr. Unknown photographer.

Hueberianae. In the introduction to this work Schlechter wrote: "Never has a collection of dried orchids of the Amazon region been put together as extensive as that which Mr. Georg Hübner collected for me. His collection encompasses some 200 numbers and is constantly growing […] All other collections cannot be compared with that of Hübner and his collection is therefore the most important which we have received so far from the Amazon region" (Schlechter 1926).

Among Schlechter's descriptions of Huebner's orchids, we find a total of 51 new species, of which he dedicated 14 to Georg Huebner, including one new genus: *Huebneria* [with the type species *Huebneria yauaperyensis* (Rodr.) Schltr.] (Fig. 30). The others were *Brassia huebneri*, *Encyclia huebneri* (Fig. 31), *Epidendrum huebneri*, *Galeandra huebneri, Habenaria georgii, Masdevallia huebneri*, *Maxillaria huebneri, Pleurothallis huebneri*, *Polystachya huebneri, Rodriguezia huebneri*, *Scaphyglottis huebneri,* and *Stelis huebneri.*

Schlechter had published, in 1926, the first 193 numbers collected by Huebner (Schlechter 1926: 83–150). In 1928, after Schlechter's death, his successor Rudolf Mansfeld continued with this work, and published *Orchidaceae Amazonicae Huebnerianae* which included 102 additional specimens, Huebner's numbers 194 to 296. Among these, Mansfeld (1934) dedicated another two new species to Huebner: *Campylocentrum huebneri* and *Catasetum huebneri*. In 1934 Mansfeld described again two additional new orchids among Huebner's collections: *Hybochilus huebneri* (collected in Colombia) and *Sigmatodtalix huebneri*.

Georg Huebner, aside from being an outstanding orchid collector, with a privileged eye for new species, must be regarded also as a magnificent photographic recorder of people, landscapes, villages and cities in the Amazon region. His photographs, not only from the point of view of technical perfection, but also as magnificent artistic compositions, constitute a monument to his almost 50 years in South America, and especially to his more than 30 years in Brazil. He spent the last years of his life in the village of Cacau

Pirêra, in the outskirts of Manaus. Huebner only went into the city to look after mail in the post office, and to bring occasionally new orchid species to the "Orchidario Amazonense", a private garden property of J. Gunzbürger, another German immigrant (Schoepf 2005: 209). Huebener died of a stomach illness on April 20, 1935, and was buried in Manaus.

Huebner's photographs were often used by other botanists in their publications. During the earlier stages of his travels on the Juruá and Madeira rivers, Ernst Ule (1854-1915) did not feel that he had sufficient practice as a photographer (Ule 1904). "This explains why Ules's first detailed publications on rubber tapping – aside from one exception – featured pictures by Brazil-based photographer Georg Huebner" (Kraus 1915). Of Ernst Ule we will read next.

Ernst Heinrich Georg Ule (1854-1915; collected 1893–1912)

Ernst Heinrich Georg Ule (Fig. 32) was born on in 1854 in Halle an der Saale, Germany. His father, Otto Eduard Vincenz Ule, was a science writer, who inspired Ernst and his brother, Wilhelm in their love for science. Ernst Ule very early showed a marked interest in the natural world, his main interests aimed at the botanical sciences. Wilhelm became a Professor of Geography at the University of Rostock. After completing his first education in his hometown, Ule attended horticulture clases in Proskau, where he received his training from the well-known plant pathologist Paul Sorauer. Ule worked then for a short period as gardener at the botanical garden in Halle and moved in 1877 to Berlin. He decided to continue his education in Coburg, but began to show the sequels of the scarlet fever he had contracted when young. He started showing signs of mental disorder and a serious spell forced him in 1880 to abandon school and to go into psychiatric care. Whether by luck, healing, or divine intervention, Ernst was able to re-enter society and by 1883 he had made a complete recovery (Harms 1916).

Since he had fallen behind in school because of his illness, Ernst Ule decided that a change in climate and environment would help and so he sailed in 1883 to Brazil. He worked as a tutor in the state of Santa Catharina and started plant collecting after he was named "naturalista viajante" by the National Museum in Rio de Janeiro (Fig. 33).

Figure 32. Ernst Heinrich Georg Ule. Photograph by Koch-Grünberg. In Harms (1916).

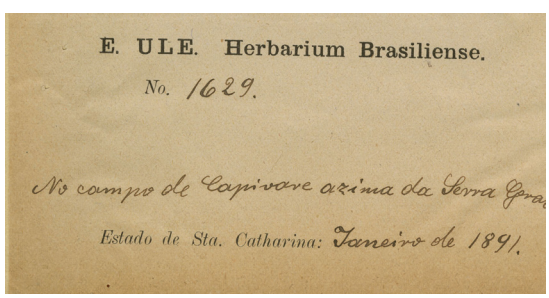

Figure 33. Herbarium label of Ule's "Herbarium Brasiliense".

He made a rapid career at the museum and was named subdirector of the Department of Botany, a position he held from 1885 to 1890 (Harms,1916: 5), with an interruption between 1888 and 1889, when he returned to Germany and worked at the Royal Botanical Garden to use the herbarium to verify his Brazilian plant

FIGURE 34. Research station Foz de Copéa on the Solimões, Upper Amazon (29 April 1903). Photograph by E. Ule. In Kraus (2015).

collections. He was then dismissed from the position at Brazil's National Museum, a political move borne of accusations that his botanical labors were intended to benefit foreign and not Brazilian entities (Harms 1916). This marked the beginning of a career as an independent plant collector and researcher, which would continue for the rest of his short life. The most productive period in his life began in 1900, when he undertook expeditions into the Amazon region, regularly interrupted by short visits to the Berlin herbarium, to determine his botanical collections.

His first large expedition took him to Manaus, from where he explored the upper Amazon in Brazil and well into Peruvian territory. It all began in 1899, when an excursion to tropical South America was organized with the support of the leaders in the import of raw materials and the manufacture of rubber products in Germany. The purpose was to study the distribution and ecology of rubber plants. It was an unfortunate coincidence that Dr. Kuhla, a young botanist from the Botanical Institute of Marburg, who had been chosen to accompany the expedition, fell ill after only a month on the job, and died of fellow fever. Thus, Ule was called to fill his place (Ule 1901: 111).

This trip involved extensive studies on "rubber tapping and rubber trading" and saw Ule travel to the regions of the Río Juruá, the Río Madeira, the Río Negro and finally the Río Huallaga and the eastern slopes of the Andes in Peru (Fig. 34).

In 1903, Ule traveled back to Germany to study and classify the botanical collections he had compiled on his travels. He stayed in Berlin until 1906, made a short trip to Bahia in 1907 and started in 1908 on his largest and last expedition to South America. He arrived in Manaus on 1 September 1908 and his first excursion took him upwards the Río Negro, and then into its tributary, the Río Branco. He intended to continue much further north, but attacks of malaria and severe leg wounds forced him to consider returning to Manaus, where he arrived in April 1909. After recovering from his illness and wounds, he started again on 1 June 1909 in the same direction and finally, early December, the region of sandstone mountains on the frontier with Venezuela was reached and they came nearer to Roraima, now visible in

Figure 35. Mount Roraima, Venezuela. Unknown photographer.

the distance (Fig. 35). The mountain was reached soon, and, "in order to be able to collect most conveniently on Roraima, Ule installed himself in a forest hut situated at about 1900 m on the slope of the mountain where the real ascent begins. He stayed there for seven weeks and climbed to the high plateau four times, making rich botanical collections (see Ule 1914a). In February, 1910, he set out on the return journey to Manaus, where he arrived in April." Ule now stayed for a while in the city, to organize his collections and prepare for a new journey (Harms 1916).

The last leg of Ule's expedition began when the Commercial Association of the Amazon proposed to Ule a new expedition, this time to the region of then Río Acre, near the borders of Bolivia and Peru. Then, the journey had to be postponed several times due to new attacks of malaria, but Ule finally departed in December 1910, sailing westwards on a tributary of the Amazon until reaching the mouth of the Río Acre in February 1912 (Fig.36).

Ule remained in the region until October and made numerous excursions into the forests. On 6 November he returned to Manaus but reached the city only in February 1912, long delays being unavoidable due to either insufficient water levels or mechanical problems of the ships involved.

On 17 March, 1912, Ernst Ule departed from Manaus, never to return to South America again; on 10 April he arrived in Berlin. The rest of his life, only 3 years, was dedicated to determining his botanical collections, which proved to be of great scientific value. Hermann Harms, perhaps the best of his biographers, who knew him personally and called himself his friend, described Ule's botanical work with these words: "When we survey the life work of our researcher, we must first of all remember the extensive collections, which are among the most valuable which we possess from Brazil. The number of plants collected by him runs to about 17,000 numbers or somewhat more. Of these, somewhat more than 10,000 are allotted to the separately numbered Phanerogams (including the Pteridophytes); the remainder consist of Cryptogams,

FIGURE 36. Rubber balls ready for export in Cobija, upper Acre River, 1912. Photograph by E. Ule.

which are again numbered by group (2500 mosses, 666 liverworts, 3527 fungi, 366 lichens, 46 algae). The large number of Cryptogams is remarkable, especially of Bryophytes and fungi, both groups in which he had shown a special interest at the beginning of his career. He had distributed collections of *exsiccatae* of Bryophytes and fungi more than once. Just because of his preference for Cryptogams, he accomplished very much increasing our knowledge of the richness of these plants in South America." (Harms 1916).

In Ule's report on his second expedition (Ule 1914), he makes frequent mention of orchids. It does therefore not surprise us, that many new species were later discovered amonst his collections. Robert Pilger published in 1914 a list of the new or little known species of plants collected by Ule during his last expedition, under the title *Plantae uleanae nova vel minus cognitae* (Pilger 1914). In this work, the orchids were again described by Rudolf Schlechter. Thirteen new species were described, among them three which were dedicated to Ernst Ule: *Habenaria ernestii*, *Masdevallia ulei* and *Epidendrum ulei*.

In addition, Hoehne established the new genus *Uleiorchis* (Fig. 37) and dedicated to Ule the new

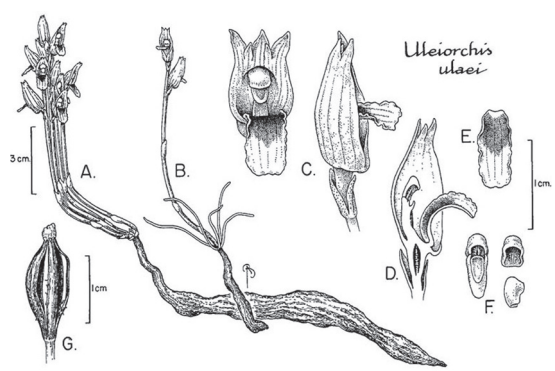

FIGURE 37. *Uleiorchis ulaei* (Cogn.) Handro. Drawing by Bobbi Angell, New York Botanical Garden.

Figure 38. *Itaculumia ulaei* Hoehne. In F.C. Hoehne, *Flora Brasilica*: plate 123.

Figure 39. *Xerorchis amazonica* Schltr. Drawing from the type at the Oakes Ames Herbarium, # 00084541.

species *Itaculumia ulaei* (Fig. 38) and *Habenaria ernesti-ulei*. Cogniaux dedicated to Ule his *Spiranthes ulei, Campylocentrum ulaei, Habenaria ulaei,* and *Physurus ulaei*.

Finally, Hágsater named in Ule's honor *Epidendrum uleinanodes*. The Oakes Ames Herbarium holds several drawings of orchid types collected by Ule (Fig. 39).

Jacques Huber (1867–1914; collected 1895–1914) and **Walter Adolpho Ducke** (1876–1959; collected 1899–1959)

In 1866, the Brazilian naturalist Domingo Soares Ferreira Penna (1818–1888), under the influence of the Swiss scientist Jean-Louis-Rodolphe Agassiz (1807–1873), founded the Sociedade Filomática do Pará, a Brazilian scientific association dedicated to the study of the natural history of the Amazon region. Ferreira Penna, during his time one of the most important researchers of the Amazon, directed the Sociedade Filomática towards its first important objective, the foundation in the city of Belém of the Pará Museum of Natural History and Ethnography (Fig.40).

In the meantime, the Swiss zoologist Émil August Goeldi (1859–1917) (Fig. 41) was invited in 1884 by Ladislau de Souza Mello Netto, director of the Brazilian Museu Imperial to work at that institution. Goeldi arrived in Rio de Janeiro in 1885 but was fired from the Museum five years later, due to political circumstances related to the military coup which overthrew the government of the Brazilian Empire and the proclamation of the republic. It was then that the governor of the state of Pará invited Goeldi to reorganize the Museum, which had fallen into a state of abandon, especially after Ferreira Penna's death in 1888 (Florez *et al*. 2018).

Goeldi began looking for qualified collaborators. Jacques Huber (1867–1914) (Fig. 42) applied for the position of botanist and after being admitted arrived in Belém and took charge of his new post in July of 1895 (Aerni 1992: 88). Soon the Museum and the gardens experienced a profound transformation (Fig.43A–B).

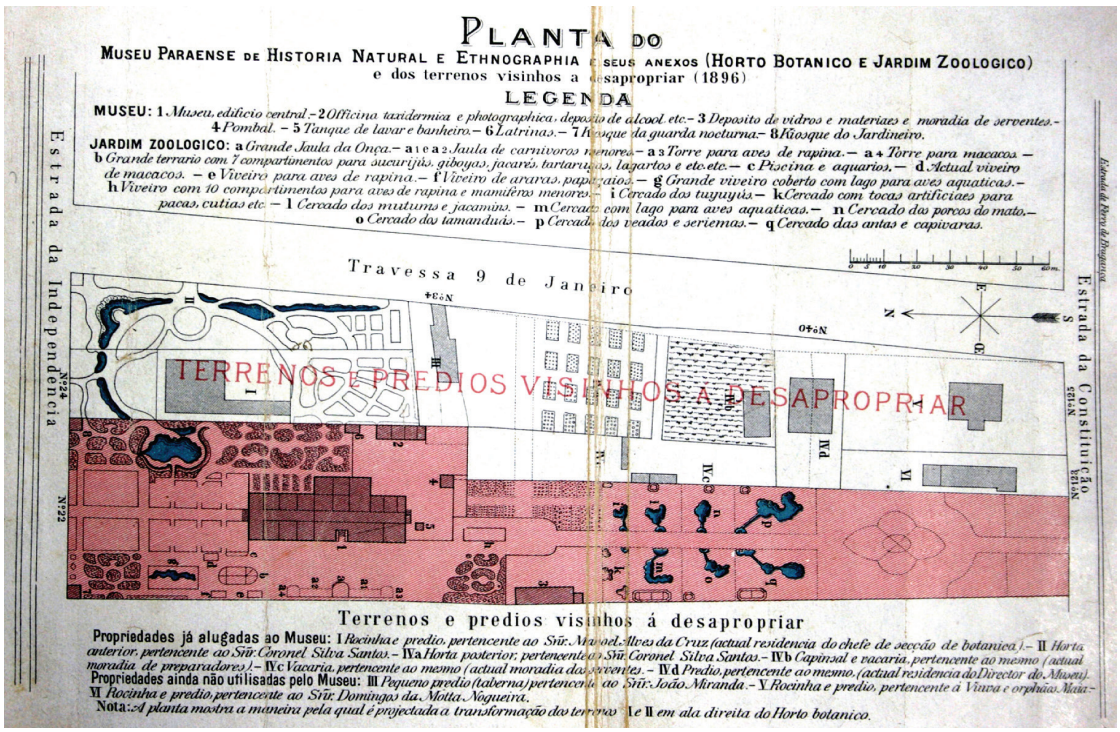

FIGURE 40. Museu Paraense de História Natural e Etnografia. Site plan in 1896. In Florez *et al*. 2018.

FIGURE 41. Émil August Goeldi. Unknwon photographer.

FIGURE 42. Jacques Huber (1867–1914). Unknown photographer. Archives of Rudolf Jenny.

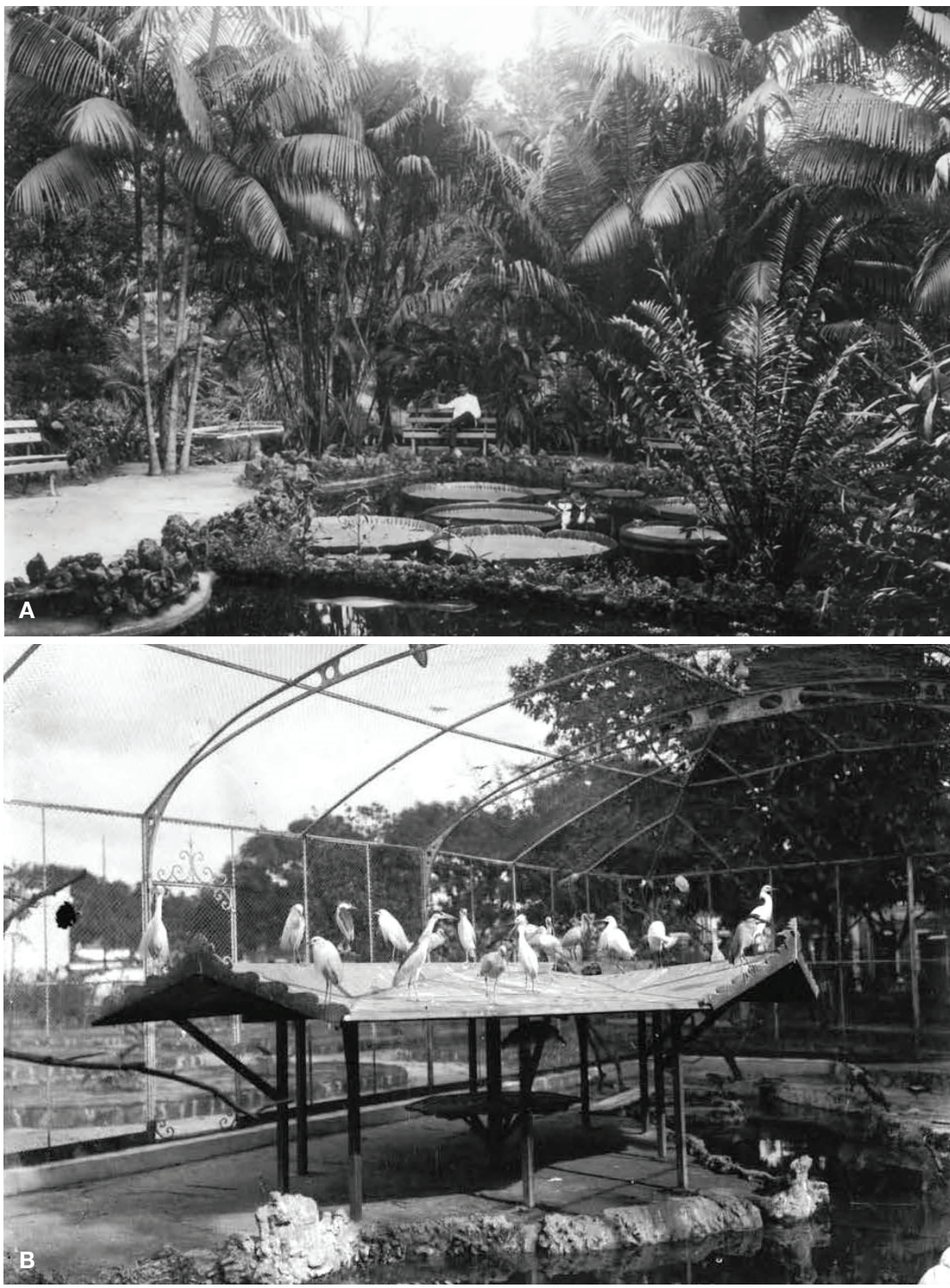

Figure 43. Museu Paraense Emilio Goeldi, 1901. **A**. Pond with *Victoria regia*. **B**. Cage with water birds. Unknown photographer: Arquivo Guilherme de La Penha.

FIGURE 44. *Epistephium duckei* Huber. In: Mutis (1954–2010), *Flora de la Real Expedición del Nuevo Reino de Granada*, Vol. VII, Plate 9.

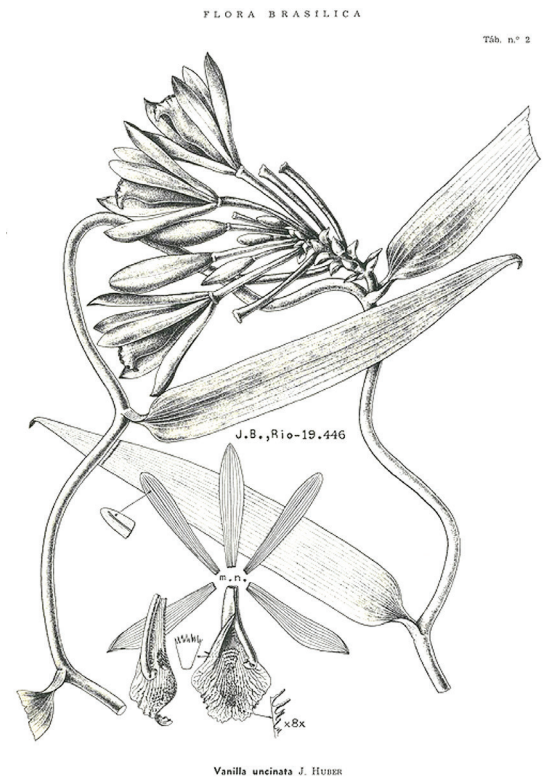

FIGURE 45. *Vanilla uncinata* Huber. In F.C. Hoehne, *Flora Brasilica*: plate 2.

During his life, Huber was an active collaborator of activities intended to protect the tropical rain forests. He was the inspirer of a yearly «tree folks festival», and with the years became popularly known as «o amigo dos avores» ("friend of the trees"). Among his many botanical descriptions of new plants, Huber described five new orchid species: *Epidendrum mapuerae* Huber, *Epistephium duckei* Huber (Fig. 44), *Epistephium petiolatum* Huber, *Vanilla duckei* Huber, and *Vanilla uncinata* Huber ex Hoehne (Fig. 45).

Walter Adolpho Ducke (1876–1959) (Fig. 46) was born in Trieste, at the time part of the Austro-Hungarian Empire. The son of an engineer, he lost his father at young age, which led him to emigrate to Brazil, settling for a time in São Paulo. After returning to Europe, he began studies in entomology working under the direction of Heinrich Friese (1860–1948), recognized as the leading authority in Hymenoptera. In 1899, Ducke was engaged by Emilio Goeldi to take a position as entomologist and assistant in the Zoological Department at the Museu Paraense, where he would stay for almost 20 years. He began taking an interest in botany under Jacques Huber's influence, who had succeeded Goeldi at the direction of the Museum. Among the collections during his first excursion to Magazao, in the Federal Territory of Amapá (1900), we find already - besides numerous entomological specimens - some herbarium sheets collected as a result of Huber's encouragement.

Well trained, after the death of his adviser he dedicated himself entirely to botany, working almost exclusively on Amazonian species, especially on the difficult tree flora and particularly the Leguminosae. He once remarked that it was appropriate for a man of his height (about 2 meters) to be dedicated to the study of tall trees (Archer 1962).

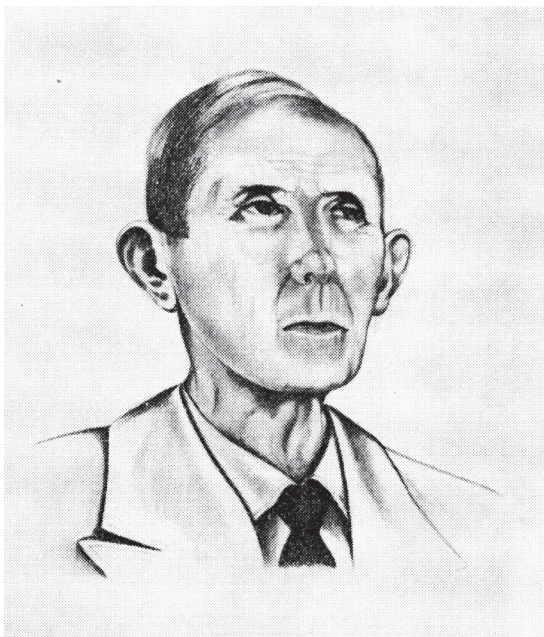

Figure 46. Walter Adolpho Ducke (1876–1959). Portrait sketch, unknown author. Archives of Rudolf Jenny.

"The difficulties of collection, irregular flowering, fertile samples difficult to spot due to the height of the trees, problems of access and establishment at remote regions, were some of the obstacles to overcome. Ducke managed all these problems, creating the current techniques for plant collection and monitoring tree phenology. He located the trees in bloom by observing the forest floor in search of fallen flowers or listening to the sounds of animals that gather nectar or fruits. He also instructed and trained local people in techniques for climbing trees and collecting botanical samples. When additional botanical material was necessary, he used to mark and make repeated trips to visit particular trees. Through repeated visits to those remote locations, he became an expert on the region and on the local and regional flora. His persistence, patience, and meticulousness established him as one of the most respected investigators of the Amazon flora until the present day" (dos Santos 2016).

Several of Huber's descriptions of new orchid species were based on collections by Ducke and published in 1909 as *Plantae Duckeanae austro-guyanenses*, a work that included all those botanical specimens collected by Ducke between 1902 and 1907 and determined by Jacques Huber. An important number of orchids is included in this publication, including (according to the original nomenclature) *Habenaria pauciflora* Rchb.f., *Vanilla duckei* Huber, *Spiranthes acaulis* Cogn., *Galeandra devoniana* Schomb., *G. juncea* Lindl., *Epidendrum caespitosum* Barb.Rodr., *E. mapurae* Huber, *Sobralia liliastrum* Lindl., and *Cyrtipodium cristatum* Lindl. (Ducke & Huber 1909).

As mentioned above, during his first years, Ducke's dedicated his main efforts to entomological collections, and only in second place to botany. However, this tendency to botany would, over the years and influenced by the growing relationship with Huber, lead to a complete transformation in Ducke's interests and collecting activities. In the years after Huber's death, Ducke's bibliography contains only botanical works. In 1915, he began the publication of his *Plantes nouvelles ou peu connues de la region Amazonienne*, which he continued until 1939.

"[Ducke] published 180 papers and monographs. Of this total, two thirds on botanical subjects. 1050 new entities were added to scientific knowledge: 900 new species, 50 genus, 80 varieties and almost 20 forms. His field trips covered practically all of the Amazonian region, with repeated excursions to the same place. [...] he colaborated with others institutions such as Jardim Botãnico (Rio de Janeiro) and Instituto Agronômico do Norte (Belém)" (Egler 1963).

In 1914, the Museu Paraense's golden era had come to its end and the institution went into a period of progressive decadence. The scientific staff, thrown into disarray by the death or retirement of the best part of its members, could not be renewed, in part by the conditions imposed by the world war, which led to Brazil breaking up relations with Germany and Austria, the museum's main source of scientists. In addition, the lack of financial resources made the daily work increasingly difficult. The museum had been reorganized in the midst of the rubber boom, during which it counted with generous official support. The war, and the collapse of the market for natural rubber left the state of Pará without resources to properly maintain the museum. Ducke left Belém in 1918 and moved to Rio de Janeiro, where he accepted a position in the Department of Botany and Plant Physiology of the city´s Botanical Garden.

From Rio de Janeiro, Ducke organized over the next 25 years numerous excursions to the Amazon, spending long periods in Manaus, which became his

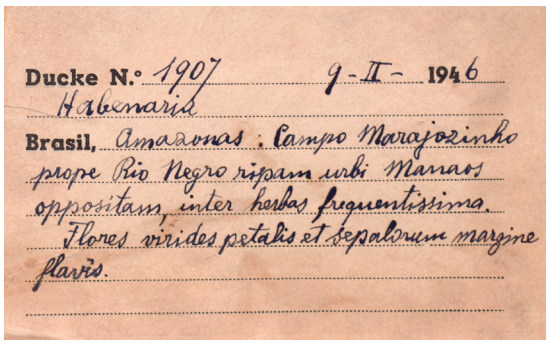
Ducke N.° 1907 9-II-1946
Habenaria
Brasil, Amazonas: Campo Marajozinho prope Rio Negro ripam urbi Manaos oppositam, inter herbas frequentissima. Flores virides petalis et sepalorum margine flavis.

FIGURE 47. Ducke herbarium label of a specimen of *Habenaria* sp. Oakes Ames Herbarium # 01946195.

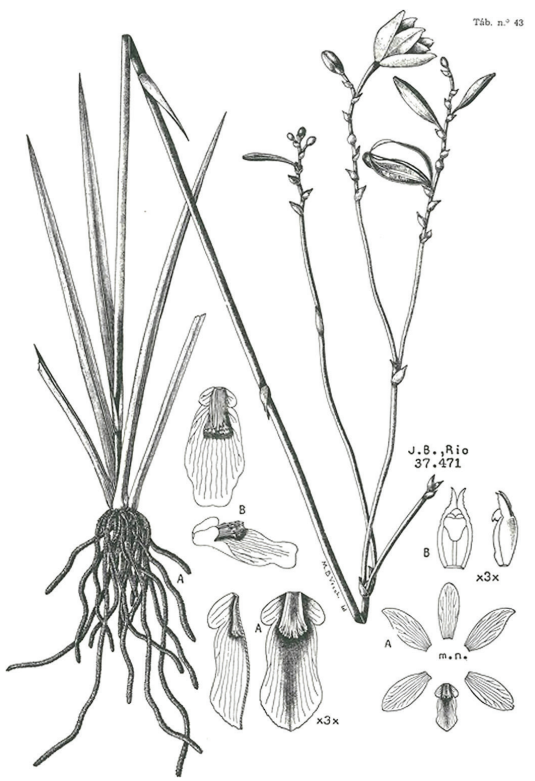

FIGURE 48. *Duckeella adolphii* Porto & Brade. In Hoehne, *Flora Brasilica*, plate 43.

support and encouragement from the Council.

Adolpho Ducke died in Fortaleza, State of Ceará in 5 January, 1959. He was honored by Porto and Brade by naming a new orchid genus after him: *Duckeella* Porto & Brade and two new orchid species, *Duckeella adolphi* Porto & Brade (Fig. 48) and *Epidendrum duckei* Porto & Brade. Huber named in his honor *Epistephium duckei* Huber (Fig. 53, 54) and *Vanilla duckei* Huber, and Horta did the same with *Brassavola duckeana* Horta. Rudolf Schlechter added *Habenaria duckeana* Schltr. (from a collection by Kuhlmann) and *Triphora duckei* Schltr. (from a collection by Ducke) (Schlechter 1926a), Sampaio contributed *Octomeria duckei* A.Samp. and Hoehne *Palmorchis duckei* Hoehne. Pessoa and Alves honored him in *Stelis duckei* E.M.Pessoa & M.Alves.

Arellano and coauthors (2019) consider Walter Adolpho Ducke "the most legendary individual in the Amazon basin."

PHILIPP VON LUETZELBURG (1880–1948; collected 1910–1936)

A controversial figure, Philipp von Luetzelburg (1880–1948) (Fig. 49) was a German botanist and traveller, who made his name as collector of plants in the Amazon River basin and northern Brazil. Of aristocratic origin, Luetzelburg went to school in Augsburg and Memmingen and then began an apprenticeship in pharmacy which brought him to Ottobeuren, Reichshofen, Basel, Cologne and Murnau. After receving his title in Pharmacy from the University of Munich in 1906, he was named Assistant at the University's Institute of Plant Physiology and received in 1909 his Ph.D.

The turning point in Luetzelburg's career came in 1910, when he was commissioned by the Bavarian Academy of Sciences to travel to Brazil and collect plants in the region of Rio de Janeiro. It was love at first sight: in 1912 Luetzelburg decided to stay in Brazil, and would live in this country for the next 25 years, with an interval in Germany from 1922 to 1926. He was named Professor of Botany at the Agricultural Institute in São Bento, Bahia, and held a series of positions as adviser to the Brazilian Government during the next years. During World War I he lost all of his Brazilian posts, was however still allowed to travel throughout the country. He returned to his office immediately after the end of the war. Shortly thereafter, in 1921, Rudolf Schlechter described two new species of orchids, which he named after him: *Habenaria luetzelburgii* (Fig. 50) and *Pelexia luetzelburgii* (Schlechter 1921: 268–270). Two years later, in 1923, Sandt described *Epidendrum luetzelburgii* Sandt ex Luetzelburg. When Luetzelburg returned to Germany he carried with him an important botanical collection of over 28,000 specimens, many of which were described as new to science in Robert

Figure 49. Philipp von Luetzelburg (1880-1948). Archives of Rudolf Jenny.

Figure 50. *Habenaria luetzelburgii* Schltr., holotype. State Herbarium Munich, # 16080.

Pilger's (1921–1927) series of *Plantae Luetzelburgianae brasilienses*. However, no orchids were mentioned in this work.

Luetzelburg returned in 1926 to Brazil and in 1928 took part in a new expedition organized by Colonel Cândido Mariano da Silva Rondon, this time to the regions on the border with Colombia, Guyana and Venezuela, including the table mountains of Roraima. During the expedition, which had as main objective the cartographic survey of the Brazilian borders, Luetzelburg collected over 9,000 botanical specimens. Further expeditions, under contract with the Brazilian government, were organized by Luetzelburg in 1930 to British Guiana and from 1933 to 1937 to the savannas of Ceará, during which further botanical collections were made. Most of his botanical collections were sent to the State Herbarium in Munich (formerly Royal Herbarium of Munich), were several orchid specimens collected by him are kept (Fig. 50).

After marrying Maria Naessl in Río de Janeiro in 1936, his wife´s health problems forced him to return to Germany in 1938. Once there, he soon made contact with Heinrich Himmler, the infamous leader of the Schutzstaffel (SS), who was a cousin of his wife. Through Himmler's mediation he was appointed as Director of the Botany Departement of the "Ahnenerbe", a think tank that operated in Nazi Germany between 1935 and 1945 that had been established by Himmler as an appendage of the SS devoted to promoting the racial doctrines embraced by Adolf Hitler and his governing Nazi Party. His position in the "Ahnenerbe" was a severe blow for his international reputation. Adolpho Ducke published in 1945 a paper with the title: *Um pseudo-botânico Nazi no Brazil. Ph. von Luetzelburg e sua conferencia sobre a fitogeografia de Amazonia*, a critical review of a paper on the phytogeography of the Amazon region published by Luetzelburg in 1939

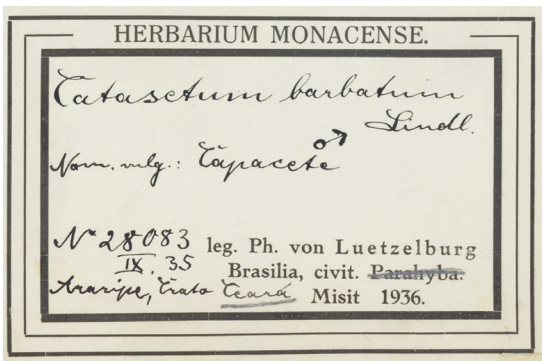

FIGURE 51. Luetzelburg herbarium label of *Catasetum barbatum*. New York Botanical Garden, # 00547417.

(Ducke 1945). Ducke reproached him for a deficient preparation of his botanical specimens and for incorrect determinations (Fig. 51). He was however especially angry at Luetzelburg for having brought all of his collections to Germany, without leaving duplicates in Brazilian herbaria.

Luetzelburg was promoted to «SS-Sturmbann-fuhrer» and in 1943 to «SS-Obersturmbannführer» (equivalent, respectively, to the ranks of major and lieutenant colonel in the German Army), and was awarded in 1944 one of the SS's highest honors: the «Totenkopfring» (Death's head ring). During his time of service with the «Ahnenerbe» he worked mainly with vegetal poisons and medicinal plants of the South American natives. He had occasional contact with the infamous SS-Physician Sigmund Rascher, known for his experiments with human beings.

A long manuscript about the history of the botanical exploration of Brazil, prepared by Luetzelburg, was lost during the turmoils at the end of the war. He retired with his wife to his native Bavaria, where he died in 1948. The genus *Luetzelburgia* Harms from the Fabaceae was named in his honor.

The State Herbarium in Munich, besides the already mentioned holotype of *Habenaria luetzelburgii*, holds a number of other orchid specimens which he collected in Brazil, among them a syntype of *Pelexia luetzelburgii* Schltr., a new orchid species described by Schlechter as *Laelia bahiensis*, and specimens of *Cranichis candida* (Barb.Rodr.) Cogn., *Habenaria hamata* Barb.Rodr., *Isochilus linearis* (Jacq.) R.Br., *Prescottia stachyodes* (Sw.) Lindl., *Sacoila lanceolata* (Aubl.) Garay, *Stelis grandiflora* Lindl., and several undetermined specimens of *Epidendrum* and *Sobralia*.

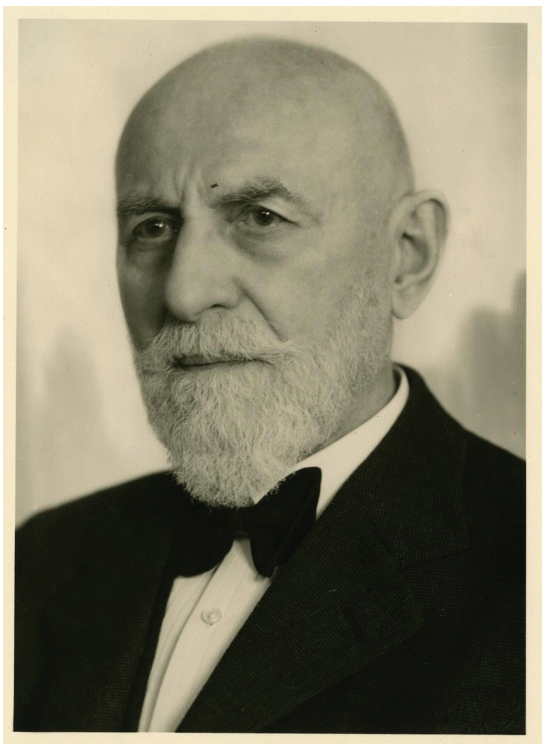

FIGURE 52. Leo Zehntner (1864–1961). Archives of Rudolf Jenny.

LEO ZEHNTNER (1864–1961; collected 1906–1918)

In Luetzelburg's botanical collection at the Herbarium in Munich we find a specimen with the imprint "Mis[cellaneous]. Ph. V. Luetzelburg", which is the holotype for a new orchid species described by Schlechter in 1925 and named in honor of Leo Zehntner (1864–1961) (Fig. 52), a Swiss naturalist who collected plants in Bahia around 1912, coinciding with Luetzelburg at the Agricultural Institute, where Zehntner was Director and Luetzelburg Professor in Botany.

Campylocentrum zehntneri (Fig. 53) was part of a botanical collection made by Zehntner in the years from 1906 to 1918, when he resided in Bahia after being invited by the Brazilian government to direct the Agricultural Institute at São Bento, a suburb of the city of Salvador de Bahía.

Zehntner was born in Reigodswil, a small village in the Swiss canton of Basel. He studied natural sciences in Basel and Bern and after graduating, worked since 1898 in Geneva as assistant to the renowned entomologist Henri Louis de Saussure. In

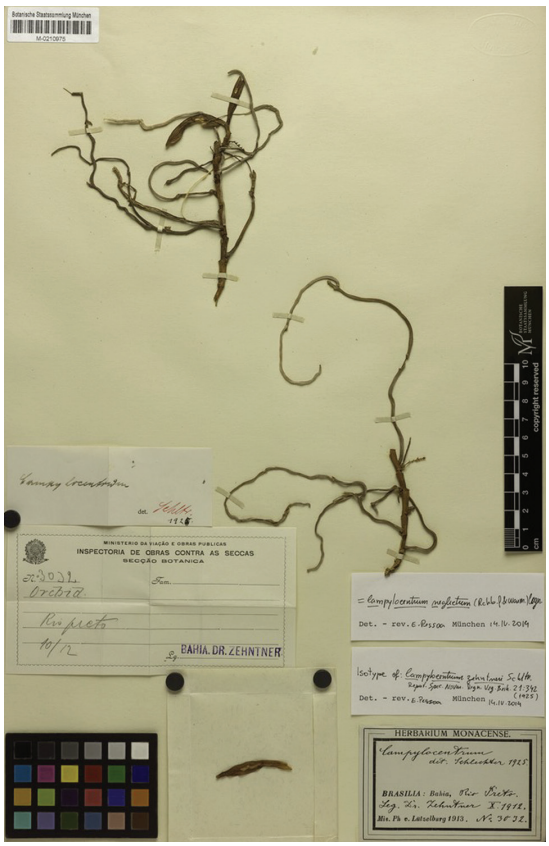

Figure 53. *Campylocentrum zehntneri* Schltr. Holotype in Luetzelburg's collection, #3032.

1894, Zehntner was invited to work as zoologist at the Pasuruan inspection station in Java, to deal with pests that plagued sugar cane plantations in the region. In 1901, again in Java, he opened in Salatiga an inspection station for the cultivation of cacao.

Not long after having settled in Salatiga, Zehntner received the visit of Dr. Miguel Calmon, Secretary of Agriculture of the State of Bahía, in northeastern Brazil. Calmon offered Zehntner the direction of the Agricultural Institute in Bahía, which Zehntner accepted after a year-long struggle with himself, since he had established already strong social and professional relations In Java. However, Brazil was tempting and finally, in May of 1906, Zehntner assumed his post in Bahía.

Zehntner served at the Institute in Bahía until 1918, a time during which, aside from his new orchid specimen, he discovered eight new species of rubber-trees and five new species of cacti.

After returning to Europe in 1920, Zehntner continued his scientific activities, but took part in local politics and was active in the improvement of living conditions in his hometown. From 1926 to 1941, he served as mayor of the town of Reigoldswil (after Schmassmann 1939, 1961).

The Guianas. The Guianas are on the Guiana shield, a geographic formation along the northern South American coast. Most of the region consists of flatlands, drained by important rivers flowing into the Atlantic, or in a few cases into the Amazon. The Guiana shield (Fig. 54) extends roughly from the Atlantic Ocean to the east, the mighty Orinoco River to the north and west, the Rio Negro to the southwest and to the south the Amazon. From a historical point of view, the territory consists of the former British, Dutch and French Guyana, colonies that in the 20th century gave way to the independent republics of Guyana and Suriname, and to French Guiana (or Guyane), today an overseas region and department of the French Republic. From a geographical viewpoint, two other territories should be added to the Guianas in a broad sense: Spanish Guiana, the present southeastern Venezuela; and Portuguese Guiana, later the Brazilian Guiana and today the Brazilian state of Amatá.

The Guianas consist of wetlands along the Atlantic coast, with the ground slowly rising to the South and East, until reaching its highest peaks, in Suriname the Julianatop, with 1230 m and in French Guiana the Bellevue d'Inini, at 861 m. British Guiana is limited at the south for the mythical table mountains of Roraima, with Mount Roraima as its highest peak with 2727 m. The total area of the Guianas is of some 460,000 sq. km, approximately the same area as the whole of Central America.

The botanical exploration of the Guianas is of especial interest due to the special position of these territories during the 16th, 17th and 18th centuries. While Spanish and Portuguese South America were jealously protected by their motherlands, and no foreigners were allowed into these colonies, the Guianas were the only territories were European naturalists, travellers and other adventurers could roam at their will. Thus, as we have seen (Ossenbach 2020), the number of explorers of the Guianas during these three centuries was enormous in relation to the small size of their territories.

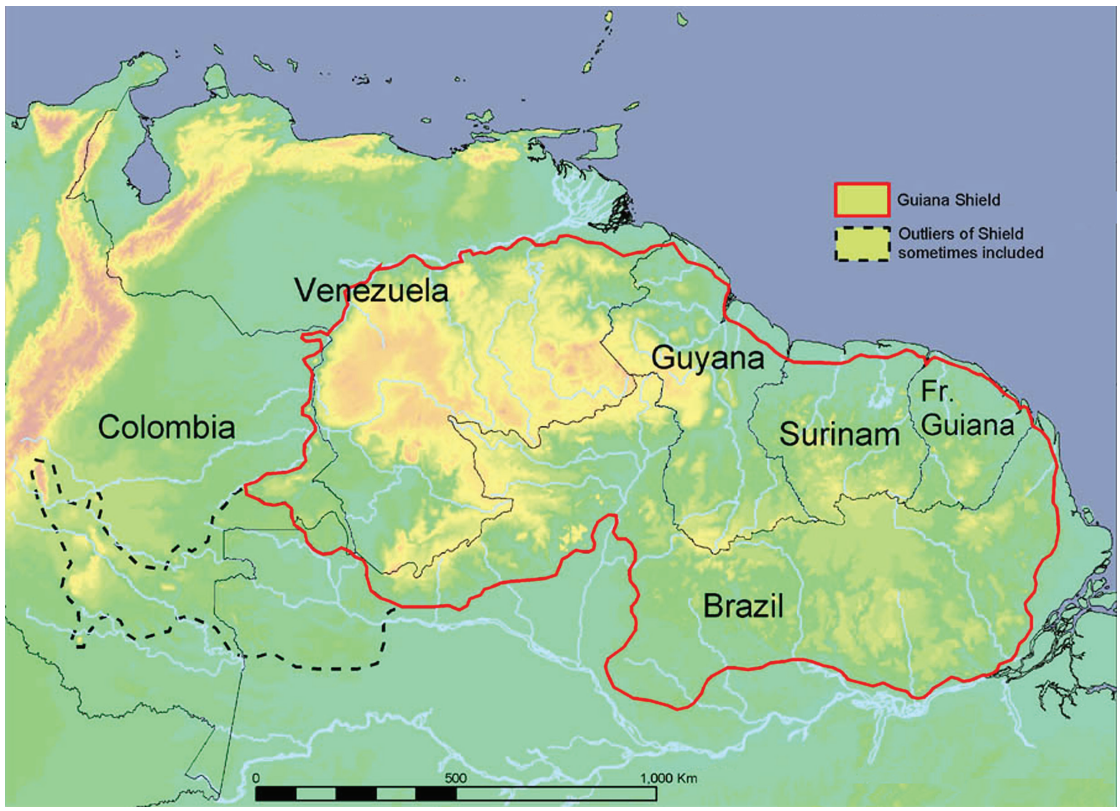

FIGURE 54. Map of the Guiana shield. By Tom Hollowell, NMNH Informatics.

This situation took a reverse turn when Portugal, in 1808, opened the doors of Brazil to all foreigners, and the new South American republics followed suit after gaining independence during the period of 1810 to 1825. Although botanical collecting continued, the number of collections in the Guianas decreased significantly, especially during the second half of the 19th century. Other, barely explored lands, held now the attention of voyagers and botanists.

In 1939, a volume of bound herbarium sheets was found at the University of Leiden, prepared by well-known botanist Paul Hermann (1646–1695). The plants had been collected in Suriname in 1687 by a certain Hendrik Meyer and where integrated into Hermann's herbarium, where they lay during centuries, confused with Hermann's collections of plants from Ceylon. Among the plants from Hermann and Meyer's Suriname herbarium we find a sheet containing a specimen of *Erycina pusilla* (L.) N.H.Williams & W.W.Chase, in all probability the first herbarium specimen prepared from an orchid from the Guianas (Ossenbach, 2020). "It must be understood that, true to the spirit the Netherlands' Golden Age of seaborne mercantilism, Suriname itself was administered as a business enterprise. In 1684 the society of shareholders, each owning one third of the Suriname trade, consisted of the Dutch West India Company, the City of Amsterdam, and the powerful family Van Aerssen van Sommelsdijk. A number of the directors of the Society of Suriname were also commissioners of the Amsterdam Hortus Medicus, the city's botanical garden. Consequently, plant exchanges between Suriname, the Dutch East Indies and Amsterdam were frequent, plantation owners (Fig. 55) acting often as patrons and sponsors for learned institutions and scientists. They provided not only specimens of tropical plants, but their plantation houses served often as headquarters for botanical and other scientific expeditions (DeFilipps 1992).

A few years later the German botanical and zoological illustrator Maria Sibylla Merian (1647–1717), the first female explorer of the American Tropics, illustrated the first orchid from the region, a beautiful

Figure 55. Plantation in Suriname, 1707. Oil on canvas by Dirk Valkenburg.

watercolor showing an arrangement of butterflies and caterpillars on a plant of *Vanilla planifolia*.

Pierre Barrère (1690–1755), who spent three years, from 1722 to 1725, in Cayenne, was the first explorer of French Guiana. He published two important works on the natural history of the colony, *Essai sur Histoire Naturelle de la France Equinoxiale* (1741) and *Nouvelle Relation de la France Equinoxiale* (1743). In his works, Barrère described 12 species of orchids, some of them yet undetermined.

The Swede Daniel Rolander (1725–1793), one of Linnaeus' "apostles", arrived in Suriname in 1754, and spent two years in the Dutch colony, sponsored by his countryman Carl Gustav Dahlberg (1721–1781), who also had botanical interests. Rolander left two manuscripts, *Diarium Surinamicum* (1754–1765) and *Diarium Surinamense, quod sub itinere exotico conscripsit Daniel Rolander* (published posthumously in 1811). In these works, Rolander named four different species of orchids collected by him in Suriname.

Known as the "founding father of ethnobotany in the Neotropics", Jean Baptiste Christophore Fusée Aublet (1720–1778), a skilled pharmacist with a great interest in botany, was accepted at the Jardin du Roi in Paris to complete his training as an "apothecaire-botaniste". He eventually accepted a position as Botanist in French Guiana at the invitation of the King of France in 1762, and stayed in the colony for the next two years, a time during which he dedicated every free moment he had to observing and collecting plants. With the results of his two years of collecting in French Guiana, Aublet published his monumental *Histoire des plantes de la Guiane Françoise* in 1775, in which over 30 species of Orchidaceae were described. Of these a remarkable amount, 12 in total were new to science.

Someone said of Louis-Claude Marie Richard (1754–1821), that "he had sucked botany with the milk". In 1780 the French Government sent to the French possessions in America a man capable of collecting plant species that could be useful. King Louis XVI gave personal instructions in this matter. Louis-Claude was chosen and travelled to Cayenne in July 1781, remaining there for eight years. Richard returned to France in 1789 with a large botanical collection, from which Kunth described the orchid genus *Catasetum* in 1822.

In 1790 Joseph Martin (?–*ca*. 1826) was appointed Director of the cultivation of spice plants and other exotics in the acclimatization garden at Cayenne (plantation La Gabrielle) in French Guiana. He held this post until 1802 (with a two-year interlude in France from 1796 to 1798) and during the last years at his post, he collected new orchid species that were new to science. Martin was one of Joséphine Bonaparte's most assiduous plant suppliers for her Château de Malmaison, near Paris.

Georg Friedrich Wilhelm Meyer (1782–1856), a professor at the University of Goettingen, became interested in tropical botany, especially after he had the opportunity to purchase the herbarium of Ernst Carl Rodschied (?–1796). Rodschied, a German physician and botanist, emigrated to Essequibo (a part of Dutch Guiana) in 1790 in the service of the Dutch West-India Company and lived there until his death in 1796. Rodschied wrote several small works about climate, social circumstances, and health problems of the population of the colony, and made frequent botanical excursions along the rivers Demerara and Essequibo. Based on Rodschied's collections, in 1818 Meyer published an important work: *Primitiae Florae Essequeboensis adjectis descriptionibus centum circiter stirpium novarum, observationibusque criticis*,

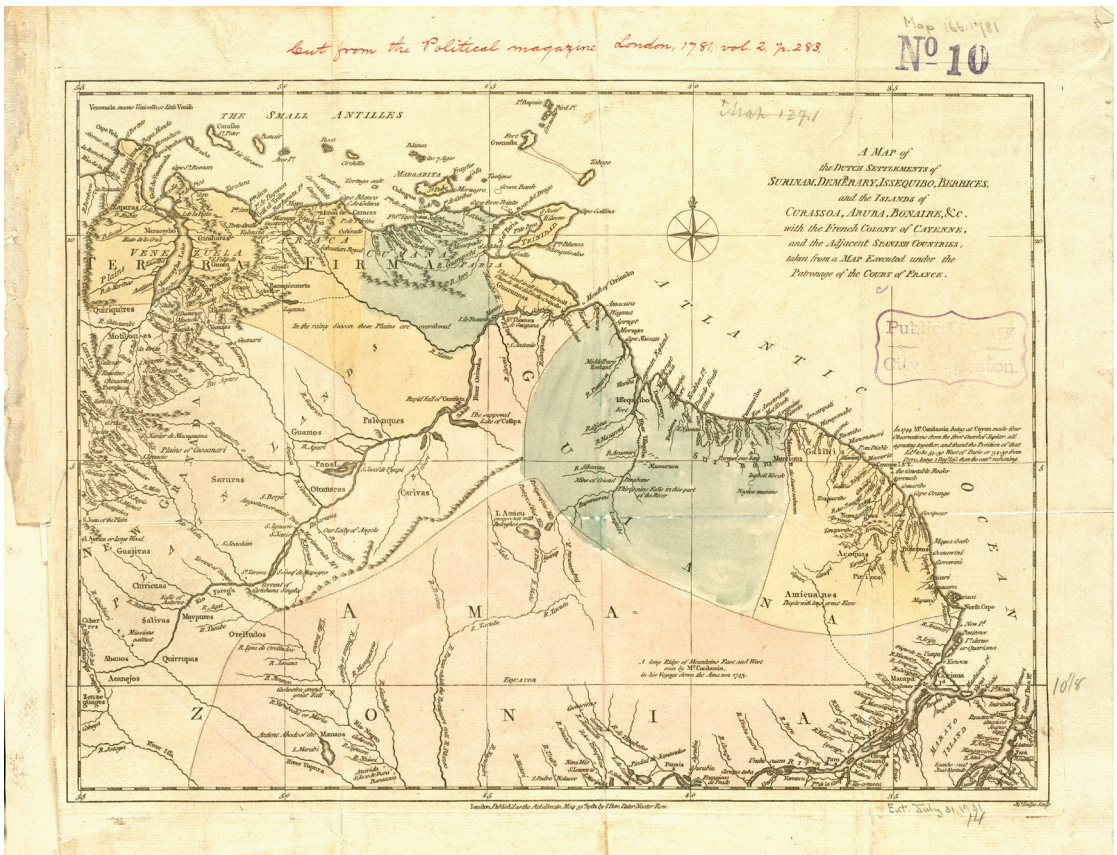

FIGURE 56. A map of the Dutch settlements of Surinam, Demerary, Issequibo, Berbices, and the islands of Curassoa, Aruba, Bonaire, &c., with the French colony of Cayenne, 1781. By John Lodge.

a precursor to a flora of the colony. In this work, Meyer determined two new orchid species: E*pidendrum flexuosum* and *Dimerandra emarginata*.

At the end of the 18th century, France and the Netherlands shared a hegemonic position in the territory of the Guianas. Great Britain only came into the region at the turn of the century, after occupying in 1796 the Dutch colonies of Essequibo, Berbice and Demerara, which were officially ceded to the British in 1812 and consolidated into the colony of British Guiana, in 1831 (Fig. 56). It is only in the period of 1820–1840 that we find the first British botanists and collectors in the region, with outstanding figures as John Henry Lance and Robert Schomburgk.

British and Dutch Guiana are today independent republics under the names of Guyana and Suriname respectively, while French Guiana is today known as Guyane Française or simply Guyane, an Overseas Department of the French Republic.

In 1818, three important plant collectors arrived in French Guiana and Suriname, respectively: the French Pierre Antoine Poiteau (1766–1854) together with the Swiss Georges Guerrard Samuel Perrottet (1793–1870) in Cayenne, and the German Friedrich Wilhelm Rudolf Hostmann (1794–1864), in Paramaribo. Poiteau and Perrottet made important collections of orchids in the colony, among them several new species. Hostmann, who was born in Hildesheim and studied medicine at the University of Göttigen, came in 1818 to Paramaribo, where he established a very lucrative private clinic, and where he would live for the rest of his life. In 1824, Hostmann sent a herbarium to his teacher Ernst Heinrich Friedrich Meyer (not to be confused with the Georg Friedrich Wilhelm Meyer named above) at Gottingen. Meyer published his *Plantarum Surinamensium* in 1825, based on Hostmann's collections. Several new orchid species were described in this work. Years later, Rolfe would dedicate *Vanilla hostmanni* to its collector.

Figure 57. Illustrations from *Surinam orchids, Etc. from Nature.* **A**, *Oncidium lanceanum* Lindl.: plate 125, by J.H. Lance. **B**, *Stanhopea grandiflora* (Loddiges) Lindl.: plate 055, by Gerrit Schouten. With permission of the Lindley Library, R.H.S.

During the rest of his life, Hostmann continued botanizing, and sent large collections of plants to Sir William Hooker.

John Henry Lance (1793–1878), a British barrister, spent a ten year term in Surinam, as Judge appointed to the 'Mixed Court' in Paramaribo, created to supervise the compliance of the Dutch authorities of a treaty signed between the Netherlands and England in 1818, which prohibited the slave trade in the Dutch colonies. During his term in Paramaribo, Lance, a friend of Bateman and Lindley, collected a number of new orchid species, a few of which such as *Oncidium lanceanum* and *Brassia lanceana*, were described by Lindley in his honor. However, more important seems to be his collection of watercolors depicting plants from Surinam, many of them orchids. Some of these were painted by himself, and others by the Surinamese artist Gerrit Schouten and are contained in two bound manuscript volumes with the title *Surinam orchids, Etc. from Nature*, today fortunately available at the Lindley Library of the Royal Horticultural Society (Figs. 57A–B). These illustrations have remained hitherto unpublished (Ossenbach 2020b).

Henrik Charles Focke (1802–1856) was a Dutch lawyer and botanist, born of a black mother and a white father. He received his education in the Netherlands at Utrecht, where he received his Ph.D. in 1827. He collected plants in Suriname (to where he had moved in 1834), British Guiana and during a short excursion also in Peru, among them a new species of orchid, *Pleurothallis fockei* named in his honor by Lindley. In 1850 he published an important work, *Enumeratio diagnostica Orchidearum quarundam Surinamensium*, one of the first to be published specifically about orchids in the Guianas. Here, Focke described a number of new orchid species, two of which, *Brassavola surinamensis* and *Masdevallia surinamensis* were named by him in honor of his adopted country.

Robert Hermann Schomburgk (1804–1865) was born in Prussian Saxony, son of a Protestant Minister. He began with diverse commercial enterprises in 1828 which eventually led to his financial ruin. In 1839, he surveyed the island of Anegada, in the Virgin Islands, at his own expense and, after reporting the results of this adventure to the Royal Geographical Society was entrusted with conducting an expedition of exploration

FIGURE 58. *Victoria regia* Lindl. Photograph by P. Casasa and C. Ossenbach.

FIGURE 59. Table mountains of Roraima. By Charles Bentley in Schomburgk & Bentley 1841: 42.

to British Guiana. He fulfilled this mission with success, incidentally discovering the giant *Victoria regia* (Fig 58) described and named by Lindley in honor of the British monarch.

Many orchids were collected by Schomburgk, among them the type specimen of the new genus *Schomburgkia* and over half a dozen species which bear the epithet *schomburgkii* or *schomburgkianum*.

Schomburgk returned to Guiana in 1841, now as British official to survey the colony and to establish the boundaries between British Guiana, Suriname, Brazil and Venezuela. He devoted the next three and a half years to this mission, in the company of his brother Moritz Richard. In 1842, the two brothers went as far as the famous Roraima table-mountains, on the border between the British colony, Brazil and Venezuela. An interesting work with texts and illustrations was published by Schomburgk in 1841, including beautiful prints by the artist Charles Bentley based on sketches made during Schomburgk's expedition to the table mountains of Roraima (Fig 59). On his return to London in 1844, Schomburgk presented a detailed report of his journey to the Geographical Society and was knighted by Queen Victoria in 1845.

August Kappler (1815–1887) was a German naturalist and explorer born in Mannheim. In 1836, Kappler enrolled in the Dutch Army and was destined to Suriname where he served a six-year term until 1842. His journal of his time in the colony was published in 1854 in a book entitled *Sechs Jahre in Surinam oder Bilder aus dem militärischen Leben dieser Kolonie und Skizzen zur Kenntnis seiner sozialen und naturwissenschaftlichen Verhältnisse*, (Six years in Suriname or images from the military life of this colony and sketches to its social and scientific circumstances) (Fig 60).

Kappler established himself in Paramaribo and ammassed a large collection of insects and plants which he sold mainly to European collectors. By 1846 he had earned enough money to purchase a plot of land on the Marowijne River, which he called "Albina", after his fiancée Albina Josefine Liezenmeier. He spent in Albina the next 33 years of his life. With the time, Albina would become a small settlement with a handful of European farmers. Kappler returned to Germany in 1879. When he died in Stuttgart, at the age of 71, his coffin was covered with the flag of the Netherlands.

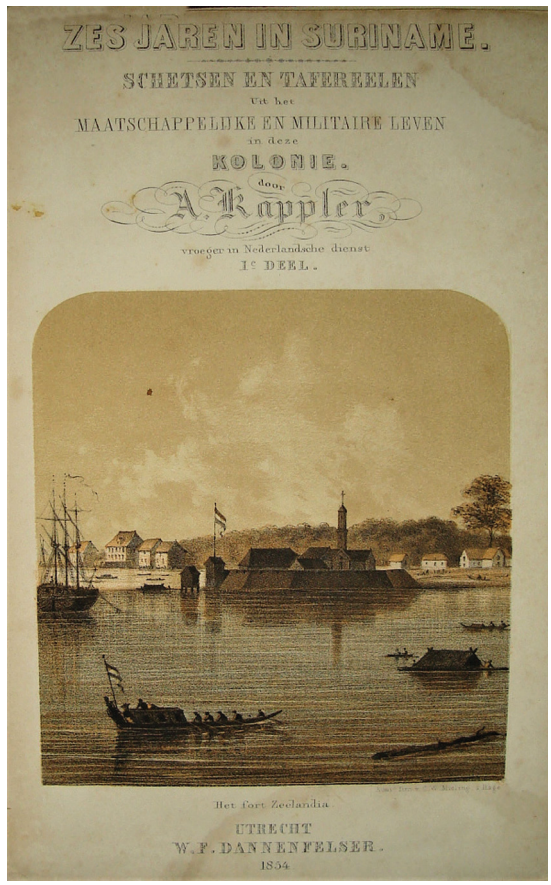

Figure 60. Frontispiece of Kappler's *Sechs Jahre in Surinam oder Bilder aus dem militärischen Leben dieser Kolonie und Skizzen zur Kenntnis seiner sozialen und naturwissenschaftlichen Verhältnisse.* Dutch edition, Utrecht 1854.

August Kappler also made important botanical collections, often in the company of W.R. Hostmann. Among these, two new orchid species were named in his honor, *Oncidium kappleri* Rchb.f. ex Lindl. and *Sturmia kappleri* Rchb.f.

Hermann Aribert Heinrich Kegel (1819–1856) made botanical collections in Suriname between 1844 and 1846 under contract with the nurseries of Luis van Houtte in Gent, Belgium. A number of new orchids collected around Paramaribo were named after him by Reichenbach, among them *Maxillaria kegelii*, *Cryptarrhena kegelii, Restrepia kegelii*, and the genus *Kegeliella*. After returning to Germany he was offered the position of head gardener at the Botanical Garden of the University of Halle.

The Moravian Evangelical Church of Herrenhut in Saxony, Germany (known as the "*Bruedergemeinde*," or "Community of the Brothers") began to send missionaries to the Caribbean in the early years of the eighteenth century, founding an establishment in Suriname in 1735. Heinrich Rudolf Wullschlaegel (1805–1864) came to the mission of the "*Bruedergemeinde*" in Suriname in 1849. An amateur botanist, he made some interesting collections, among them *Notylia wullschlaegeliana* H.Focke.

No important plant collections were made in the Guianas in the second half of the 19th century, and it was only in the early 1900s that we see further botanical expeditions, again mostly to Suriname.

August Adriaan Pulle (1878–1955), a botany professor at the Dutch University of Utrecht, took part in the expedition to the region of Saramacca (Suriname) from 1902 to 1903. His studies of the flora of the colony led him to publish, in 1906, *An Enumeration of the Vascular Plants known from Surinam, together with their Distribution and Synonymy*. In this work, he mentions a large number of Orchidaceae, although he complains that his knowledge of this plant family is very incomplete, mainly because many of the historical collections of orchids were locked at that time as part of the Reichenbach herbarium at the Natural History Museum in Vienna. He travelled again to Suriname in 1920, and in 1930 published the first part of his *Flora of Suriname*. Pulle was named Rector of the University of Utrech, a position he held from 1929 to 1930, and in 1938 presided over the South American Congress of Botany, which took place in Rio de Janeiro.

Although the harvest of orchids from the Guianas had been rich during the 19th century, with Lindley and Reichenbach as its main beneficiaries, Rudolf Schlechter received only relatively few numbers of orchid specimens from this region. Only three plant collectors which worked in the three colonies can be named as part of Schlechter's network.

Sir Everard Ferdinand im Thurn (1852–1932; collected 1877–1897)

> "*Will no one explore Roraima and bring us back the tidings which it has been waiting these thousands of years to give us?*" *The Spectator*, April 1877

"Nearly twenty-one years ago the Fates led me to Guiana and, nearly ever since, have detained me in the wilder and more remote parts of that region. Throughout, I have taken an interest in plants, and especially in the Orchids; and of late years whatever time I have been able to afford to botanical hobbies has been devoted almost exclusively to the ardous task of collecting, drying, dissecting and drawing orchids…" (Im Thurn 1888–1889: 40). With these words, Everard Ferdinand im Thurn (Fig. 61) described his first years in British Guiana and his predilection for the orchids of the colony. The above citation forms part of an article published by him in the journal of the Royal Horticultural Society, entitled *Sketches of Wild Orchids in Guiana*, in which Im Thurn gave a beautiful description of Guianas orchid world.

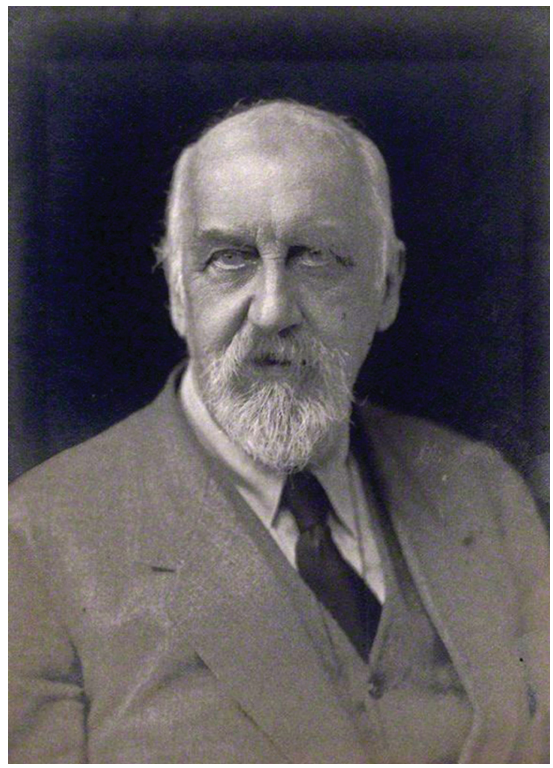

Figure 61. Everard Ferdinand im Thurn (1852-1932). Archives of Rudolf Jenny.

Im Thurn had begun studies at Exeter College in Oxford, but was forced to abandon after obtaining his undergraduate degree in 1875 when his father, a Swiss-born businessman, went bankrupt. Recommended by Sir Joseph Hooker, a friend of his family considered at that time the "un-crowned King of British Guiana",

Im Thurn was appointed curator of the museum in Georgetown, the colony's capital, a position in which he served from 1877 to 1882 (Aerni,1981). It was probably also Hooker, a lover of Orchidaceae, who pointed him in the direction of tropical orchids.

In 1882, im Thurn was appointed special magistrate of the Pomeroon River District where his work lay almost entirely among the Indian tribes of Guiana with whom he had close bonds of sympathy. He spent over 20 years in the colony, the last decade of the century as Government agent in the north-western districts.

Im Thurn's first description of Guyanese orchids was in his report on an ascend to Mount Russell, in the district of Pomeroon: "…an Epidendron was very common on the boulders; and another, this time a terrestrial orchid, either a Spiranthes or very closely allied to that genus, was not only more striking in appearance than most of this comparatively insignificant genus but surpassed every other orchid known to me, without exception, in the excellence of the scent." (im Thurn 1882: 226).

In 1883, a second expedition took him to the Orinoco River. He wrote in his report (im Thurn 1883): "Orchids, as might be expected from the damp character of the district, are unusually abundant; but these are not very different from those of other parts of Guiana. Probably because the district has been less visited and less despoiled than many others, several orchids, however, which were once abundant throughout the colony but are now rare elsewhere, are here abundant." (im Thurn 1883).

In 1884, im Thurn organized an expedition in the company of surveyor Harry L. Perkins to the famous table-mountains Roraima. They cut through dense forest which previous explorers had been unable to pass. "Surrounding the formidable barrier of Roraima's steep cliff face, the team circumnavigated a waterfall, and succeeded where none had before, ascending to the summit of the highest table-mountain, or tepui, in the region. The triumph was described in *Nature* as the "cherished object of botanical exploration in South America for the last quarter of a century", and held the public imagination for years to come" (JSTOR 2020).

Important botanical collections were made on the mountain (Fig. 62), a report of which was published by Im Thurn in 1887: *The Botany of the Roraima Expedition of 1884, being notes on the plants observed* (im Thurn 1887). A large number of orchids are mentioned in this work, among them several new orchid species, collected by Im Thurn and described by Henry Ridley: *Epidendrum alsum, Epidendrum imthurnii* (Fig. 63A–B), *Epidendrum montigena, Epidendrum violascens* (Fig. 63A)*, Pelexia aphylla* (Fig. 64A–B), *Spiranthes bifida, Stenoptera alata* (Fig. 64A), *and Zygopetalum venustum* (Fig. 65).

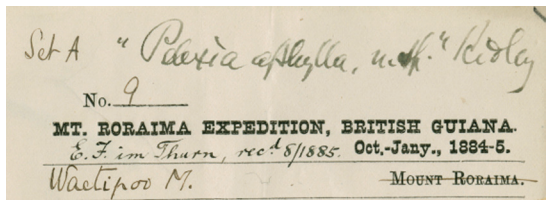

Figure 62. Im Thurn herbarium label from the Roraima expedition 1884 [*Pelexia aphylla* Ridl.].

The expedition was successful, however Im Thurn was not completely satisfied: "The number of species collected would probably have been greater but for the extreme difficulty of drying plants in so excessively damp a climate as that of Roraima, and also for the fact that the other very serious labours inseparable from the direction of such an expedition greatly curtailed the time I was able to devote to the preparation of botanical specimens. As regards the number of new generic and specific forms collected, great as it is, it would undoubtedly have been much greater but for the fact (unfortunate in this respect) that my collection was made at exactly the same period of the year [November and December] at which such collecting as had been done before about Roraima had been accomplished by Sir Robert and Dr. Schomburgk and by Karl Appun." (Im Thurn, 1887: 24).

Many orchid collections followed, the herbarium specimens often accompanied by detailed pencil drawings. Orchids were by far his preferred plant family, to an extent that from a total of 275 plant specimens collected by Im Thurn in Guiana and the Western Pacific which form part of Kew's digital herbarium catalogue, almost one third correspond to Orchidaceae (Fig. 66).

Alfred Coignaux described another new orchid species collected by Im Thurn: *Cheiradenia imthurnii* collected in the district Pomeroon (Fig. 67). Cogniaux mentions that the plant can also be found in northern Brazil, which is the reason for the description being published in the *Flora Brasiliensis*.

FIGURE 63. **A**. *Epidendrum imthurnii* Ridl. (left) and *E. violacens* Ridl. Illustration in *The Botany of the Roraima Expedition of 1884*, im Thurn 1887, plate 46. **B**. *Epidendrum imthurnii* Ridl. Herbarium specimen by J. Renz, #1547. Collected in Caldas, Colombia.

FIGURE 64. **A**. *Stenoptera alata* Ridl. (left) and *Pelexia aphylla* Ridl. Illustration in *The Botany of the Roraima Expedition of 1884*, im Thurn 1887, plate 47. **B**. *Pelexia aphylla* (K000573814/573815.), with pencil drawings by E.F. im Thurm.

Figure 65. *Zygopetalum venustum* Ridl. *Illustration in The Botany of the Roraima Expedition of 1884*, im Thurn 1887, plate 46.

FIGURE 66. *Aganisia alba* Ridl. Holotype at Kew (K000589020), with a pencil drawings by E.F. im Thurm.

FIGURE 67. *Cheiradenia imthurmii* Cogn. (as *C. cuspidata* Lindl.) Phograph by T. Paine.

Charles Schweinfurth published in 1935 an article entitled "Additions to the Orchid Flora of British Guiana" in which - once more - he described new orchid species collected by E.F. im Thurn and sent by him to the herbarium in Kew: *Stelis perparva* (Fig. 68), *Pleurothallis breviscapa*, *P. difussiflora*, *P. minima*, *P. pertenuis*, *Octomeria exigua*, *O. integrilabia*, and *O. parvula*. A number of orchids from the Western Pacific region were also dedicated to Im Thurn: *Calanthe imthurnii* Kores, *Dendrobium imthurnii* Rolfe, and *Microstylis imthurnii* Rolfe.

"A numbered series of 16 watercolours representing orchids native in British Guiana (now Guyana) in the collections of the Royal Botanic Gardens, Kew, have (with one exception) printed labels attached reading "ORCHIDS OF GUIANA. - E. F. im THURN." (Albuquerque 2012). It was originally believed that they were painted by E.F. im Thurn, but further research has showed that they came from the hand of his wife. Everard im Thurn returned to Great Britain in 1895, to marry Hannah Cassels Lorimer (1854–1947) in a ceremony at her family home, Kellie Castle in Scotland. In a letter to Thiselton-Dyer dated 13 September 1896, im Thurn excused himself for not writing due to the time he had to devote in the previous year to "managing a wife".

Shortly afterwards the couple travelled to Guiana, where Hanna lived with her husband between 1895 and 1897, at the remote village of Morawhanna, near the border of Venezuela. There ,the couple spent the evenings together, Im Thurn sorting, drawing and preparing his orchids specimens, while Hanna painted her series of beautiful watercolors based on her husband's sketches. Hannah's drawings are evidence of a fruitful exchange between husband and wife, resulting in at least sixteen illustrations of orchids which are now housed at Kew. Although not signed by Hannah, it is clear that these botanical illustrations should be attributed primarily to her. They reveal a keen eye for detail and a command of the media (watercolour and bodycolour) unlikely to have been achieved by someone with poor eyesight and without formal artistic training. Hannah's delight

Figure 68. *Stelis perparva* C.Schweinf. Type at Kew, (K000573983), with a pencil drawings by E.F. im Thurm.

Figure 69. *Rodriguezia secunda* Kunth. Watercolor by Hanna Cassels im Thurn. Kew Botanic Gardens.

in documenting her observations is evident from her letters to her mother. As she noted in a letter from March 1897, "I have been painting the splendidest orchid I have ever seen, *Coryanthes macrantha*, very rare out here" (Albuquerque & Martins 2018).

The list of orchids illustrated by Hanna is composed mainly of the showier species, with following genera represented: *Aganisia, Bifrenaria, Catasetum, Cryptarrhena, Ionopsis, Leucohyle, Maxillaria, Notylia, Rodriguezia* (Fig. 69), and *Trigonidium*.

However, there seem to have existed additional illustrations which have not been found yet. "Everard im Thurn showed 'some beautiful water-colour sketches of Guiana orchids' at the Royal Society's conversazione in Burlington House, Piccadilly, on Wednesday 3 May 1899. The reports do not state whether he was the artist. At least 20 genera were represented in the Royal Society exhibit." (Albuquerque 2012).

Charles Schweinfurth seems to confirm this in 1935, when describing a number of species of Pleurothallidinae collected in British Guiana by E.G. im Thurn, J. Jenman, and N.Y. Sandwith: "In general the descriptions are based on herbarium specimens, but in a few cases these were suplemented by water-color drawings. For the opportunity to describe this species, we are indebted to the Royal Botanic Gardens at Kew and to the New York Botanical Garden and extend our thanks to them for the loan of the material uppon which the descriptions were based." (Schweinfurth 1935). Taking into account that of the ten species described eight had been collected by E.F. im Thurn, we could easily asume that -again- we stand before some lost water-colors of Everard im Thurn and his wife Hanna.

Im Thurn returned to England in 1897 and in 1901 was appointed Lieutenant-Governor of Ceylon, in 1904 Governor of Fiji, High Commissioner of the Western

Pacific and Consul-General for the Western Pacific Islands, until his retirement in 1910 (W.L.S. 1932). "It is chiefly as a scientific explorer and a Colonial Governor that his memory will be revered. British Guiana, Ceylon, Fiji and the Isles of the Western Pacific were eminently suitable fields for a man of his tastes and abilities and we are much the richer for the valuable work he did in these three Colonies" (Anonymous 1932).

Im Thurn was president of the Royal Anthropological Institute from 1919 to 1920 and the first president of the Edinburgh and Lothians Branch of the Royal Anthropological Institute from 1924 until 1932.

On his return from the summit of Roraima, Im Thurn authored several works related to his travels. Unexpected by him, this narratives inspired Sir Arthur Conan Doyle to write his novel of imperial adventure, *The Lost World* (1912), based on an expedition to a plateau in Venezuela where prehistoric animals had survived. The singular Maple White's Land described in this work of fiction has a great similarity with the "tepuy" Roraima (Dalziell 2002). Dalziell concludes: "Conan Doyles novel has become the shaping metaphor for later scientific and travel writing in British Guiana for the rest of the colonial period. *The Lost World* has come to symbolize European anxieties about vanishing species, cultural continuity and the role of science."

Over 300 specimens of orchids collected by E. F. im Thurn are distributed among the world's most important herbaria. Altogether it is a good representation of the orchid flora of British Guiana as known at his time. Among these we find samples of the following orchid genera: *Aganisia, Cheiradenia, Epidendrum, Gomphichis, Habenaria, Macradenia, Maxillaria, Nohawilliamsia, Octomeria, Otostylis, Panmorphia, Platystele, Pleurothallis, Scaphyglottis, Sobralia, Specklinia, Stelis, Stenoptera, Vanilla, Veyretia*, and *Zygostates*.

Rudolf Schlechter apparently did never meet Im Thurm in person. However, the latter's botanical collections, and those of other botanists who had worked in Guiana in the past were of great importance to him. As he wrote in 1919: "The collections made on the Roraima by Schomburgk, Burke, im Thurn, Quelch, Connell and Ule have shown how many interesting and characteristic species can be found here. These collections are all what we know from this undoubtedy very rich region." (Schlechter 1919).

FIGURE 70. Frederick Vasavour MacConnell. In Charles Chubb, *The birds of British Guiana* (1916).

FREDERICK VAVASOUR MCCONNELL (?–1914) and **JOHN JOSEPH QUELCH** (1854–?; collected 1894–1898)

John McConnell, trader and plantation owner in British Guiana, passed away in 1890. His three companies, Booker Brothers & Co., George Booker & Co., and John McConnell & Co., passed to his sons Arthur John and Frederick Vavasour McConnell (Fig. 70) (Hollett 1999). Frederick established himself in Georgetown (Fig. 71), and besides his business interests, passed much of his time studying the natural history of the colony. Based on his ornithological collections, Charles Chubb would publish in 1916 his *The birds of British Guiana*, in which a new species of piculet was illustrated, *Picumnus macconnelli*, which had been described by Sharpe in 1901. Another species, McConnell's flycatcher (*Mionectes macconnelli*) was described by Chubb a few years later.

Figure 71. Georgetown, ca. 1890. James Roadway, *Handbook of British Guiana* (1893).

John Quelch (1854–?) (Fig. 72) held a position as zoologist at the British Museum until 1886, when he was appointed curator at the Museum of British Guiana. In the same year he contributed to the report of HMS Challenger, the scientific expedition commissioned by the British Government in 1872–1876 that sailed over 80,000 miles around the world, with his *Report on the Reef-Corals Collected by H.M.S. Challenger During the Years 1873-76*. Quelch was editor of the Guianan journal Timehri from 1887 to 1893 and wrote on topics as diverse as fish and coral, botany and entomology.

J.J. Quelch made the acquaintance of Frederick Mc Donnell while working at the museum in Georgetown, and together they made frequent excursions to the surroundings of the capital city and different other points of the colony. Although their interests were mainly zoological, they made important botanical discoveries during the last decade of the 19th century.

McConnell's and Quelch's main contribution to the knowledge of British Guiana's natural history were their two expeditions (1894 and 1898) to Mount Roraima, on the border between Guiana, Venezuela

Figure 72. John Joseph Quelch. Unknown photographer.

FIGURE 73. *Brachionidium brevicaudatum* Rolfe. Holotype at the Royal Botanic Gardens, Kew (K0000583670).

FIGURE 74. *Maxillaria quelchii* Rolfe. Specimen at the Royal Botanic Gardens, Kew (K000079370).

and Brazil, during which they followed in the footsteps of their mutual friend E. F. im Thurn. Both times they reached the plateau on the summit of the mountain. The botanical results of both expeditions were published by N. E. Brown in 1901. In this work, the treatment on Orchidaceae was by Robert A. Rolfe (Brown 1901). Rolfe described from McConnell and Quelch's collections an important number of new orchid species: *Brachionidium brevicaudatum* (Fig. 73), *Bulbophyllum roraimense, Houlettia roraimensis, Maxillaria connellii, M. quelchii* (Fig. 74), *Octomeria connellii, O. parvifolia, Pleurothallis roraimensis, Stelis guianensis*, and *Habenaria roraimensis*.

Albert William Bartlett (1875–1943; collected 1903–1929)

Biographical information about Albert William Bartlett (1875–1943) is scarce. He received a Bachelor's degree in Botany in London in 1898 and was elected member of the Linnean Society in 1903. In this year he was named Superintendent of the Botanic Garden and Government Botanist in Georgetown, British Guiana, a position he held until 1908.

After he returned to England he worked as Assistant lecturer in Botany at the University of Sheffield (1909–1920) and Lecturer in Botany at Armstrong College in Newcastle-on-Tyne from 1920 to 1939.

Only one new orchid species is known among the collections of A.W. Bartlett, *Neobartlettia guianensis* Schltr. (Fig. 75A), which served as the type species for the new genus *Neobartlettia*. In the same publication Schlechter made a new combination, transferring *Palmorchis sobralioides* Barb. Rodr. (Fig. 75B) to the new genus. As Schlechter wrote: "The new genus is dedicated to the discoverer of one of the species, A.W. Bartlett, Superintendent of the Botanical Garden in Georgetown, who has dedicated himself to the exploration of the flora of British Guiana" (Schlechter 1920).

Thus we come to the end of this enumeration of botanists and collectors, who –in one way or the other– were essential for Rudolf Schlechter in his work on the orchids of South America. The geographical scope of the work has so far been limited to the non-Spanish-speaking countries: Brazil and the three Guianas.

The following chapters will deal with the former Spanish colonies: Venezuela, Ecuador, Colombia, Peru, Bolivia, Chile, Argentina, Uruguay, and Paraguay.

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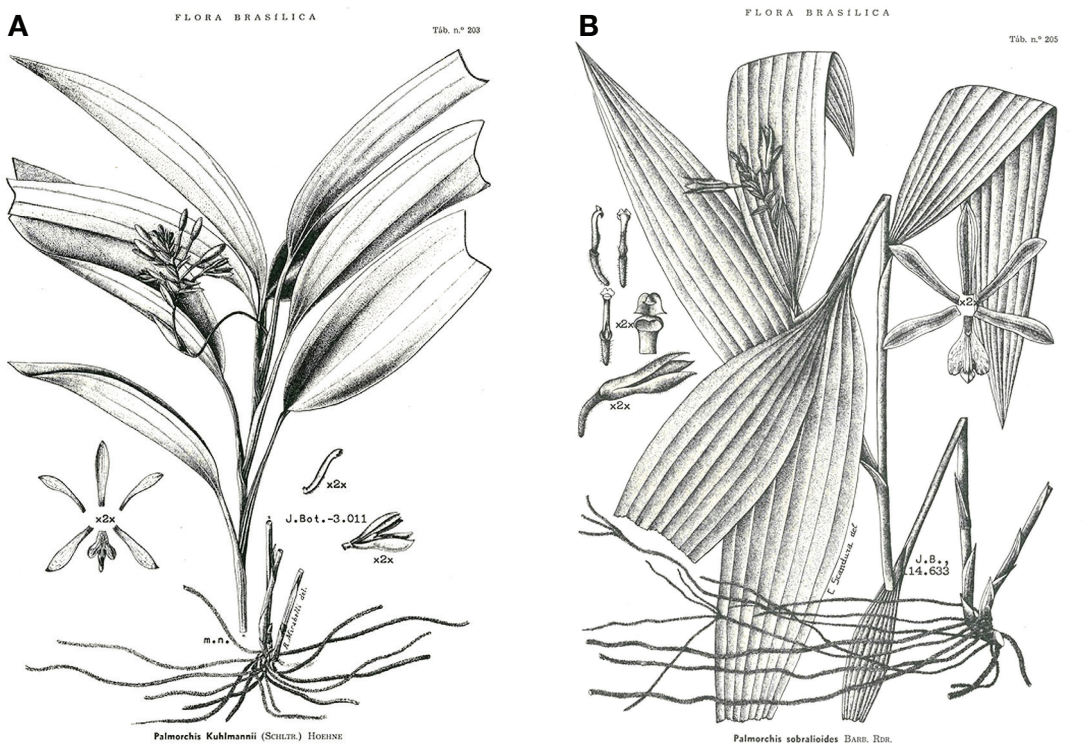

Figure 75. **A**. *Neobartlettia guianensis* Schltr. [as *Palmorchis kuhlmannii* (Schltr.) Hoehne]. B. *Neobartlettia sobralioides* (Barb.Rodr.) Schltr. [as *Palmorchis sobralioides* Barb.Rodr.]. Plates 203 and 205from F.C. Hoehne, *Flora Brasilica*, 1945.

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CYMBIDIUM SIGMOIDEUM (ORCHIDACEAE), A NEW ADDITION TO THE FLORA OF THE PHILIPPINES

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Abstract. *Cymbidium sigmoideum* (Orchidaceae: Epidendroideae) is reported here as a new record for the Philippines based on the collection from Antique Province on the island of Panay. A detailed description and photographs are provided for easy identification of the species. With this discovery, the Philippines now holds a total of 13 species and three subspecies of *Cymbidium*.

Key Words / Palabras clave: Antique, biodiversity, Cymbidieae, Malesian flora, Panay Island, new record, taxonomy

Introduction. Described by Olof Swartz in 1799, *Cymbidium* belongs to the tribe Cymbidieae and is one of the most attractive and desirable orchid genera in the world because of its showy and fragrant flowers (Mandal *et al*. 2018). According to the current taxonomy (Du Puy & Cribb 2007, Govaerts *et al*. 2020), it includes 74 species, four subspecies, 10 varieties and 15 natural hybrids widely distributed in South and East Asia, north to Japan and south through the Malay Archipelago and New Guinea to northern and eastern Australia. In the Philippines, the genus is represented by 12 species and three subspecies (Cootes 2011, Pelser *et al.* 2011).

An unidentified flowering *Cymbidium* specimen was collected during the second and third author's botanical exploration in one of the tropical mountains of Antique Province of Panay island in the Philippines last May 2019. After examination of its morphology and comparison with protologues and the relevant literature as well as digitized type specimens of the genus *Cymbidium* from the Philippines and neighbouring countries, a match was made with *Cymbidium sigmoideum* J.J.Sm.

Cymbidium sigmoideum was first discovered in central Sumatra in 1905 by Wilhelm Micholitz who sent his specimens to the nursery of Sander, who sent one to Kew for identification. However, Rolfe (the first curator of orchid herbarium at the Royal Botanic Gardens, Kew) failed to recognize it as a new species (Du Puy & Cribb 2007). J.J. Smith (1907) later described it based on a collection of Connell from Java. The species was previously known to occur only in Java, Sumatra and Borneo (Du Puy & Cribb 2007). Thus, this paper reports its first record in the Philippines. The species is presented here with a description and photographs to aid accurate identification.

Materials and methods. The measurement and description of the species were based on examinations of photographic images of plants *in situ*, living specimens, and voucher herbarium specimens held at the University of Santo Tomas Herbarium (USTH). The description follows the recent work of Zhang *et al.* (2018) with general plant descriptive terminologies following Beentje (2016). Flowers have been preserved in 70% ethyl alcohol for microscopic study. Available type specimens of *Cymbidium* spp. from the Philippines and neighbouring countries were examined in different herbaria (*viz.* B, BM, E, GH, K, KATH, L, LINN, M, P, SBT, SING) through high resolution images accessed at https://plants.jstor.org/.

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Taxonomic treatment

Cymbidium sigmoideum J.J.Sm., Bull. Dép. Agric. Indes Néerl. 13: 52, 1907. ≡ *Cyperorchis sigmoidea* (J.J.Sm.) J.J.Sm., Bull. Jard. Bot. Buitenzorg, sér. 3, 9: 57, 1927. TYPE: Java Loemadjang, *Connell s.n.* (holotype BO!). Fig. 1.

Cymbidium kinabaluense K.M.Wong & C.L.Chan, Sandakania, 2: 86. 1993. TYPE: Sabah, Mt. Kinabalu, *C.L. Chan & Jamili Nais s.n*. (holotype SAN; isotype: SRN).

Perennial, epiphytic *herb*. *Pseudobulbs* inconspicuous, 4.2–4.8 cm long by 2.0–2.3 cm in diameter, with 5–7 leaves. *Leaves* 38.0–43.5 cm long by 0.8–1.2 cm wide, linear-obovate, glabrous both sides, margin entire, apex acute. *Inflorescence* up to 47 cm long, arising from the base of the pseudobulb; *peduncle* horizontal to pendulous, green, covered by overlapping sheaths; *sheaths* 5–6, boat-shaped, 8.5–9.0 cm long, cucullate, yellowish brown to brown, apex acute to subacuminate; *rachis* 10–20 cm long, bearing 4–6 flowers, green, glabrous; *floral bracts* 2–3 mm long, ovate, hyaline green, glabrous, apex acute. *Flower* 3.0–3.5 cm across, waxy; *Pedicel and ovary* 2.0–2.5 cm long, green, terete, glabrous. *Dorsal sepal* 2.5–2.8 cm long by 0.8–1.0 cm wide, narrowly obovate, glabrous, concave, closely covering the column, green with dark or purple-brown spots and stain, margin entire, apex acute, porrect. *Lateral sepals* 2.5–2.8 cm long by 0.8–1.0 cm wide, falcate, glabrous, spreading or reflexed, green with dark or purple-brown spots and stain, margin entire, apex acute. *Petals* 2.1–2.4 cm long by 0.5 cm wide, falcate, glabrous, spreading in the apical half, green with dark or purple-brown spots and stain, margin entire, apex acute. *Lip* 3-lobed, green with dark or purple-brown spots and stain, fused with base of the column for 5 mm, with a glabrous disc (callus) with two slightly raised ridges and a swollen rounded apex; *side-lobes* 5–6 mm broad, broadly triangular, fleshy, erect and clasping the column, minutely papillose, apex subacute; *mid-lobe* small, 7–9 mm long by 2.0–2.3 mm wide, ligulate, glabrous, strongly recurved or coiled, apex acute. *Column* broad, about 2 cm long, S-shaped, glabrous, yellowish green with purplish red spots, basal quarter fused to the base of the labellum; *anther cap and viscidium* elongated into a projecting rostellum; *pollinia* about 2 mm long, quadrangular-pyriform, cleft. *Fruit* not seen.

Distribution: Java, Sumatra, Borneo (Sabah) and the Philippines (Antique). This species warrants further observation and collection to determine whether there are other known populations present in other areas within the Philippine archipelago.

Habitat: Found growing on trunks and large branches of trees which are covered by moss cushions in deeply shaded mossy forest at elevations between 1500 to 1600 m above sea level.

Phenology: Observed flowering in the wild in May (this study). According to Du Puy & Cribb (2007), this species flowers all throughout the year.

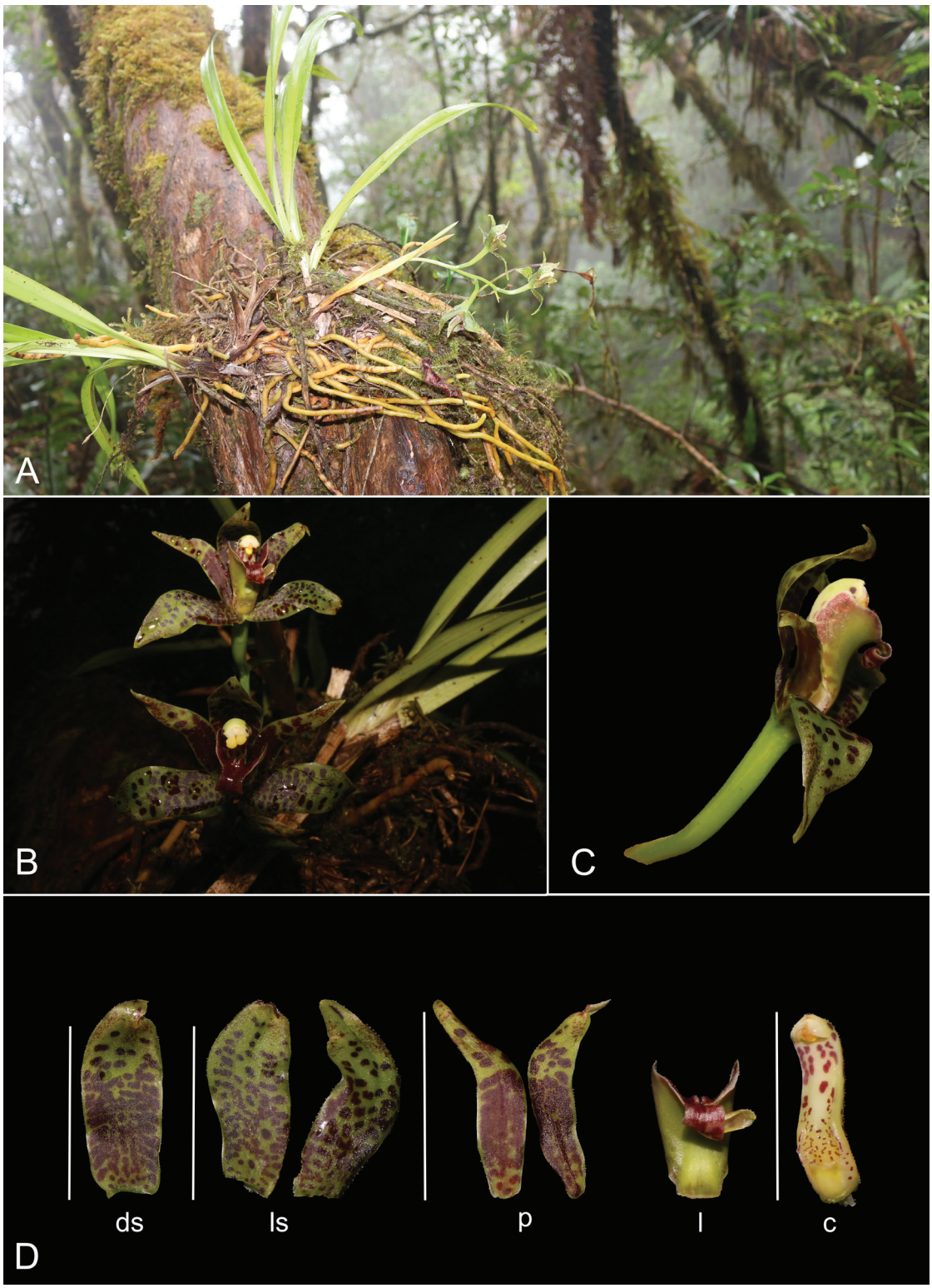
Conservation status: VU A1cd; B1ab (Du Puy & Cribb 2007).

Specimen examined: PHILIPPINES, Visayas, Antique, elev. 1520 m, 10 May 2019, JAGP *Dalisay & PS Bangcaya 102* (USTH). – Full locality data are withheld to prevent potential exploitation of wild populations for commercial purposes.

Cymbidium sigmoideum is a species belonging to the section *Cyperorchis* (Blume) P.F.Hunt, characterized by the fusion at the base of the lip and column, two cleft pollinia, narrow petals, porrect dorsal sepal covering the column and quadrangular-pyriform pollinia. According to Du Puy & Cribb (2007), it closely resembles *C. roseum* J.J.Sm. from Java and *C. whiteae* King & Pantl. from Sikkim. However, *C. sigmoideum* differs in having shiny brown spotted, green flowers, narrow falcate petals, narrow, ligulate, recurved midlobe and S-shaped column.

A number of characters shows greater variation based on our recent material than the original given by J.J. Smith. For example, the leaves are smaller (38–43.5 cm long *vs*. up to 102 cm long), colour of the pedicel and ovary (green *vs*. purple) and dimensions

Right, Figure 1. *Cymbidium sigmoideum* J.J.Sm. **A**. Habit. **B**. Flowers (front view). **C**. Flower (profile view). **D**. Dissected flower (ds: dorsal sepal, scale bar: 2 cm; ls: lateral sepals, scale bar: 2 cm; p: petals, scale bar: 2 cm; l: labellum; c: column, scale bar: 2 cm). Photos by: JAGP Dalisay.


A
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of other parts which can be explained by the stage of development of the inflorescence, growth conditions and processing techniques. Despite these differences, we are in no doubt that our recent collection is *C. sigmoideum*.

Acknowledgements. We thank Mecan Rod Celesio, Helvzen Junvy Vego, Samuel O. Tamolin and Michael O. Tamolin for the assistance during fieldwork; Paul Ormerod and André Schuiteman for verifying the identity of the species; and Department of Environment and Natural Resources-City Environment & Natural Resources office (DENR-CENRO) Culasi for allowing us to conduct this study.

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NOTES ON AUSTRALASIAN ORCHIDS 6: A NEW SPECIES OF *RHIZANTHELLA* (DIURIDEAE, SUBTRIBE PRASOPHYLLINAE) FROM EASTERN AUSTRALIA

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Abstract. *Rhizanthella speciosa*, a new species of the remarkable Australian underground orchids, is described as new from New South Wales. The new species, which is morphologically distinct and apparently also genetically distinct from its congeners and strikingly beautiful with its sea-anemone-like flowerheads and prominent attenuate sepals, grows in a different habitat than its geographically closest relative.

Key Words: Australian orchid flora, New underground orchid, Orchidoideae, *Rhizanthella speciosa*

Introduction. *Rhizanthella* R.S.Rogers is an enigmatic genus of orchids that created astonishment in the botanical world when it was described in 1928 by the Adelaide-based botanist Dr. R. S. Rogers using specimens discovered by a Western Australian farmer while clearing native vegetation that was dominated by a shubby myrtaceous species known as Broombush (*Melaleuca uncinata*) (Rogers 1928). This was followed in 1932 when a second species of underground orchid was discovered in eastern Australia, this time by Ernest Slater while digging up plants of another orchid, a species of *Dipodium*, on the lower western slopes of Alum Mountain at Bulahdelah in central New South Wales. This species was described by the Rev. H. M. R. Rupp in 1932. Rupp named the species after its discoverer but distinguished it from *Rhizanthella*, placing it in the newly erected genus *Cryptanthemis* Rupp. The differences between the two genera were relatively minor and a later study showed that both species belonged in the same genus, with *Rhizanthella* being the earlier name (Clements & Cribb 1984).

Commonly known as the Underground Orchids because of their completely subterranean habit, this endemic Australian genus currently comprises four species, namely *R. gardneri* R.S.Rogers and the recently segregated *R. johnstonii* K.W.Dixon & Christenh. (Dixon & Christenhusz 2018) from the south-west of Western Australia, and two from eastern Australia – *R. slateri* (Rupp) M.A.Clem. & P.J.Cribb from the central coast of New South Wales and *R. omissa* D.L.Jones & M.A.Clem. which is known from a single collection in the Lamington National Park in the Border Ranges of south-eastern Queensland (Jones & Clements 2006). Here we report on a fifth species that was recently discovered in the Barrington Tops National Park of north-eastern New South Wales.

The new species was discovered by Maree Elliot in 2016 while studying the biological diversity in the forests of the Barrington Tops National Park. An inflorescence of the *Rhizanthella* was uncovered whilst she was looking for native truffles as subjects to illustrate for her PhD on Mycological art–scientific drawing. This *Rhizanthella* was growing under deep leaf litter in wet-sclerophyll forest dominated by *Eucalyptus saligna*, a habitat which differs fairly significantly from the drier open forest habitat on Alum Mountain where an extensive study of *R. slateri* had been undertaken as part of the Pacific Highway Bulahdelah Bypass project. Comparisons between the two habitats were made and on a subsequent visit to the site in the Barrington Tops a second inflorescence of the new species was located and material collected for DNA analysis and morphological comparison with other species. Because of the significance of this discovery, the New South Wales National Parks and Wildlife Service undertook to protect the site, survey

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for more plants and study its biology, all essential data for the protection and long-term conservation of the species.

Results from this survey coupled with our own morphological studies plus preliminary results from a comparative molecular analysis confirms the distinctiveness of the Barrington Tops taxon and it is here described as new.

Taxonomic treatment

Rhizanthella speciosa M.A.Clem. & D.L.Jones, ***sp. nov***. (Fig. 1–6).

TYPE: Australia. New South Wales: North Coast; Barrington Tops National Park (exact locality withheld for conservation reasons), 23 Oct. 2019, *M.A.Clements 12445, P. Hillier, W.M.Dowling & A.M.Mackenzie* (holotype CANB; isotype NSW).

Diagnosis: With affinity to *Rhizanthella slateri* (Rupp) M.A.Clem. & P.J.Cribb but differing by its larger carinate floral bracts (*ca*. 16 mm long, *ca*. 7 mm wide), bright mauve to pinkish-purple flowerheads each containing 15–35 flowers, larger flowers (9–11 mm long, *ca*. 5 mm across), larger tepals (7–9 mm long) with long drawn-out filamentous tips, widely divergent lateral sepals, a larger dark purple-black, densely papillate labellum strongly folded along the midline and narrower pink to light maroon drupes.

Rhizomes and flower *stems* probably similar to those of *R. slateri*. *Flowerheads* 15–30mm wide, flattish, fleshy. *Sterile sheathing bracts* surrounding flowerhead imbricate, 16–18, ovate-triangular, carinate, 10–12 mm long, 3–4 mm wide, fleshy, 1-veined, tapered to long-attenuate acuminate apex, drab white, becoming purplish on exposure. *Floral bracts* subtending flowers triangular, *ca*. 16 mm long, *ca*. 7 mm wide, fleshy, translucent, 1-veined, tapered to subacute apex. *Flowers* 15–30 per head, tubular but opening widely, 9–11 mm long, *ca*. 5 mm wide, the dorsal sepal and petals similar in shape, lateral sepals dissimilar to them, all tepals with drawn-out filamentous tips, translucent creamy white, maturing bright mauve to pinkish-purple, the flowers remaining in close proximity during anthesis, the labellum protruding between the divergent lateral sepals. *Floral bracts* closely sheathing ovary, triangular, carinate, *ca*. 16 mm long, *ca*. 7 mm across. *Ovary* narrowly cylindric, slightly wider near apex, at anthesis 7–10 mm long, 2.0–2.5 mm wide. *Sepals* free. *Petal bases* fused with column margins. *Dorsal sepal* narrowly elliptical, *ca*. 9 mm long, 2.0–2.2 mm wide, translucent with purple flecks, surface strongly wrinkled/papillate, apex attenuate. *Lateral sepals* widely divergent, *ca*. 9 mm long, 1.8–2.2 mm wide, asymmetric, broadly triangular in proximal half, shallowly curved, inner surface rugose, suddenly tapered near middle to long, thin, attenuate or filamentous apex, translucent with purple marks. *Petals ca*. 7 mm long, 2 mm wide, asymmetric, oblong to elliptical with short, linear, attenuate apex, translucent with purple streaks. *Labellum* hinged to apex of column foot by narrow claw *ca*. 0.6 mm long; *lamina* strongly folded along the midline to form a deep channel, shallowly curved in profile, V-shaped in cross-section, broadly heart-shaped when flattened, *ca*. 4 mm long, *ca*. 3 mm wide, thick, fleshy, dark purple-black with paler narrow central channel, surface and margins densely papillate, apex paler and less papillate, shortly tapered, subobtuse. *Column* erect, much longer than wide, *ca*. 4 mm long, *ca*. 1 mm wide, translucent white with purple markings, anterior surface dark purple, apex of column narrowed, extending just above the anther; column wings narrow, *ca*. 0.5 mm long, flanking the anther. *Anther cap ca*. 1 mm long, erostrate. *Stigma* cordate, *ca*. 0.7 mm long, *ca*. 0.5 mm wide, separated from anther by a large rostellum. *Pollinarium ca*. 0.4 mm across; pollinia bright yellow, incoherent. *Drupes* fleshy, narrowly cylindrical, slightly angular from compression, pinkish to light maroon when ripe. (Fig. 1–5).

Flowering: October to early November.

Distribution: Known only from a relatively small area within the Barrington Tops National Park of northern New South Wales, aprox. 470 m in elevation.

Habitat: Grows under deep surface litter in tall wet sclerophyll forest dominated by Sydney Blue Gum (*Eucalyptus saligna* Sm.), Tallowood (*E. microcorys* F.Muell.) and Turpentine (*Syncarpia glomulifera* (Sm.) Nied.) with a well-developed rainforest midstorey including Tree Heath (*Trochocarpa laurina* (Rudge) R.Br.) and Scentless Rosewood (*Synoum glandulosum*

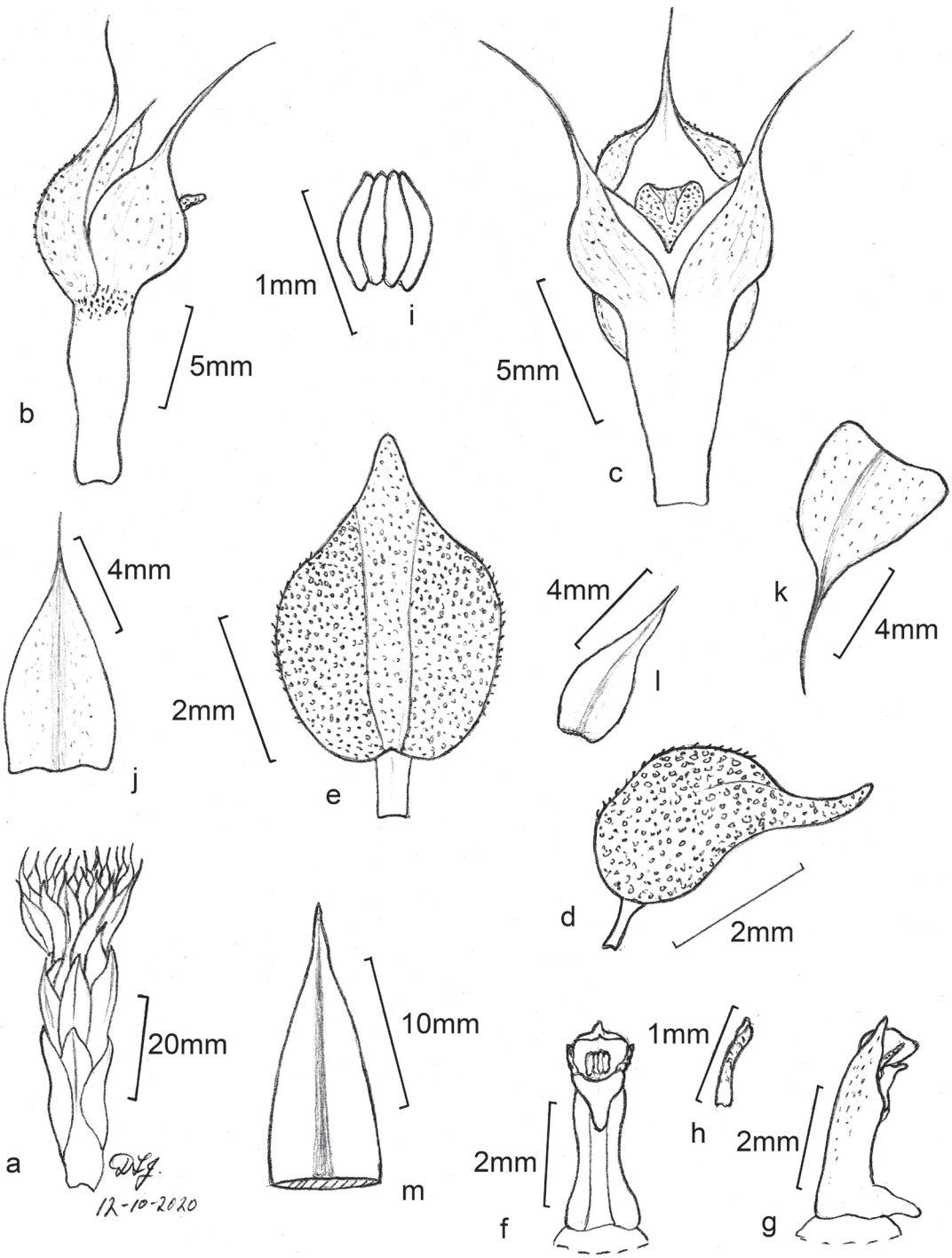

Figure 1. ***Rhizanthella speciosa***, Barrington Tops, NSW, *W. Dowling (DC1705)*. **A.** Stem and flowerhead. **B.** Flower from side. **C.** Flower from front. **D.** Labellum from side. **E.** Flattened labellum from above. **F.** Column from front. **G.** Column from side. **H.** Column wing. **I.** Pollinarium. **J.** Dorsal sepal. **K.** Lateral sepal. **L.** Petal. **M.** Floral bract. (Drawn from the holotype). Illustration by D.L.Jones©, 12-10-2020.

FIGURE 2. Habitat and original place of discovery of *Rhizanthella speciosa* with its discoverer Maree Elliot pointing to the location of one flowering head, accompanied by Sky Moore and Bill Dowling.

FIGURE 3. Flowering plant *in situ* with scale.

FIGURE 4. A cluster of 4 flowering heads.

(Sm.) A.Juss.) and a sparse ground layer in dark clay-loam over metasediments.

RECOGNITION: This new species has large carinate floral bracts (*ca*. 16 mm long, *ca*. 7 mm wide) that subtend the flowers and bright mauve to pinkish-purple flowerheads, each head 9–11 mm long and *ca*. 5 mm across and bearing 15–35 flowers. The widely-opening flowers have purple-marked tepals 7–9 mm long with long drawn-out filamentous tips and a dark purple-black, densely papillate labellum *ca*. 4 mm long and *ca*. 3 mm across that is strongly folded along the midline to form a deep channel and broadly heart-shaped when flattened. At anthesis the lateral sepals diverge widely and the flowers emit an unusual animal- or fungal-like smell. The ripe drupes of this new species are pinkish to light maroon.

SIMILAR SPECIES: The new species is geographically closest to *R. slateri* and although both species have

Figure 5. Close up of twin inflorescence one of which was collected and was used as type for the new species.

similar growth and floral features they are readily distinguished by a number of characters. By contrast to the new species, *R. slateri* has smaller floral bracts (*ca*. 7 mm long, 3 mm wide) and pink to dark reddish flowerheads, each head with 15–30 flowers which are 6–8 mm long and *ca*. 3 mm across. The flowers have densely papillate tepals 2–4 mm long with short extended tips and a flat, dark red, broadly heart-shaped papillate labellum *ca*. 2 mm long and 2 mm wide, with a smooth base. At anthesis the lateral sepals remain in close proximity and no scent is obvious. Ripe drupes are yellow.

When viewed uncovered in the wild, *Rhizanthella speciosa* is the most striking species found so far in the genus. The flowering head, which ranges from bright mauve to pinkish-purple in bud and in flower, is clearly visible against the dark ground and leaf litter on the forest floor. The prominent elongate sepals, which are a notable feature of this new species, give flowering plants a similar appearance to that of a sea anemone. At anthesis the flowers open widely with the lateral sepals widely divergent. In this state many inflorescences emit a pungent odor not unlike native animal faeces or a fruiting fungus. Not all flowers of the new species set fruit which contrasts with the pollination biology of *R. slateri* where a very high proportion of flowers set fruit.

Aside from the stated morphological differences between *R. speciosa* and *R. slateri*, preliminary results from a comparative molecular analysis of the two species suggest they have been separated for a long period. More study is required to determine these relationships (Katharina Nargar *pers. com.*). Thirty-nine inflorescences were uncovered in 2019 and their position recorded. Several flowering heads, two with fruits attached were also uncovered.

Etymology: The Latin *speciosus* (showy, splendid) in reference to the striking and colourful inflorescences of this species when compared to all other species of *Rhizanthella*.

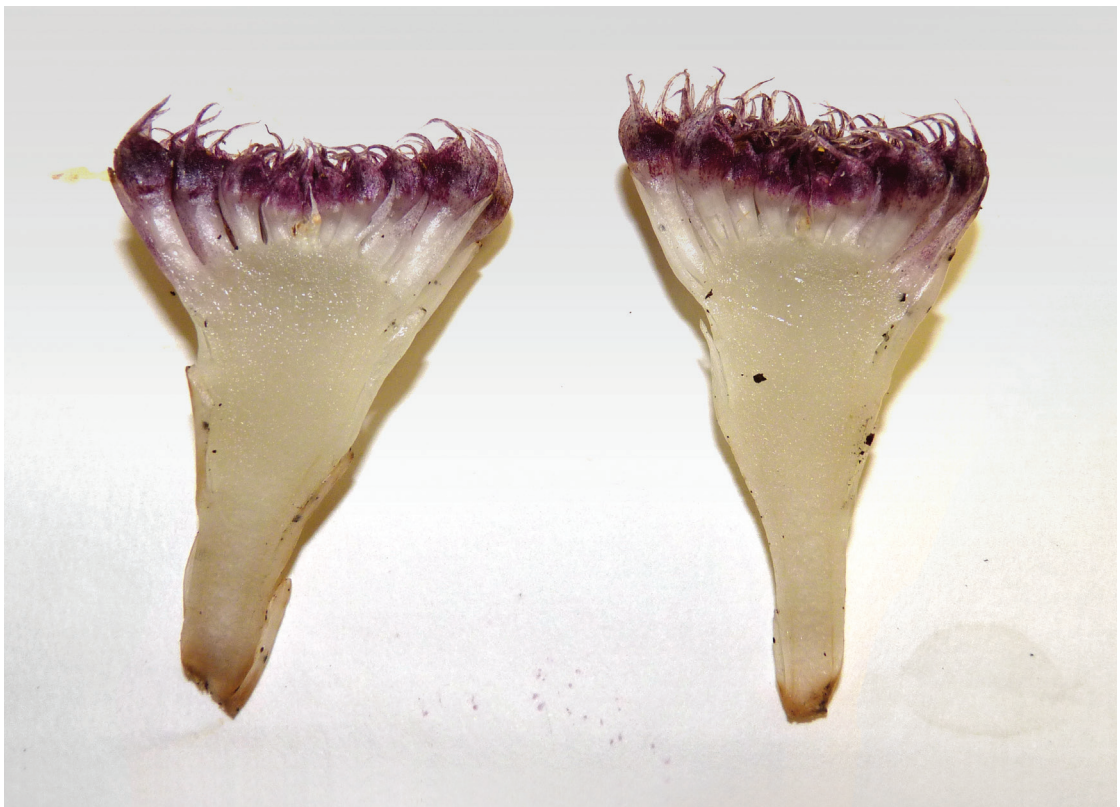

FIGURE 6. Dissected inflorescence and type of *Rhizanthella speciosa.*

CONSERVATION STATUS: Known from a single restricted site but conserved in the Barrington Tops National Park. The habitat where it grows is a very widespread and common community in north-eastern New South Wales but limited searching to date has failed to locate further populations. More field searching is required but with less than 50 plants known from a single locality it meets the IUCN criteria for critically endangered.

KEY TO SPECIES OF *RHIZANTHELLA*

1. Capitulum shaped like a tulip flower, sheathing bracts 3–7-veined, extending well above the flowers, tepals fused in the proximal half of the flower (western spp.) 2
1a. Capitulum shaped like a sea anemone, sheathing bracts 1-veined, not extending above the flowers, tepals free (eastern spp.) 3
2. Sheathing bracts 3-veined, up to 100 flowers or more per capitulum, flowers pinkish red to deep red and cream ..... ***R. gardneri***
2a. Sheathing bracts 3–7-veined, up to 60 flowers per capitulum, flowers white with pinkish red markings ..... ***R. johnstonii***
3. Sheathing bracts 7–8 mm long, sepals 3–4 mm long with an apical point 0.5–1.5 mm long ..... ***R. slateri***
3a. Sheathing bracts 16–18 mm long, sepals 6.5–10.0 mm long with an apical point 3–5 mm long 4
4. Apex of lateral sepals caudate, densely papillate, labellum narrowly elliptical, dark red without pale central band, margins with numerous short siliceous trichomes ..... ***R. omissa***
4a. Apex of lateral sepals filiform, smooth, labellum cordate, dark purple-black with pale central channel, margins with few short siliceous trichomes ..... ***R. speciosa***

Acknowledgements. We thank Maree Elliot who discovered the new species and brought it to our attention; also Sky Moore and Allison Webb who assisted in this process. Paul Hillier, Senior Project Officer (Saving our Species), Biodiversity Conservation Division, Department of Planning, Industry and Environment. Liam Banyer and Aaron Mulcahy are thanked for their ongoing support, protection and study of the species. Bill Dowling provided hospitality and regular field assistance. Catherine Busby and Anne Mackenzie are thanked for their ongoing support and assistance in the field. Lachlan Copeland provided habitat details, photographs and critically checked this manuscript, and Barbara Jones read the manuscript.

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DISCOVERIES IN INDIGENOUS TERRITORIES: TWO NEW SPECIES OF *LEPANTHES* (ORCHIDACEAE: PLEUROTHALLIDINAE) IN SOUTHWESTERN COLOMBIA

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Abstract. Two new species of *Lepanthes* from the Central Cordillera of the Colombian Andes are described and illustrated. Both were found during a botanical expedition to Puracé National Natural Park, within the high Andean forests ecosystem of the municipality of Puracé, in the department of Cauca.

Resumen. Dos nuevas especies de *Lepanthes* de la Cordillera Central de los Andes Colombianos se describen e ilustran. Ambas fueron encontradas en una expedición botánica al Parque Nacional Natural Puracé, en Bosques Altoandinos en el municipio de Puracé en el departamento del Cauca.

Key Words: Cauca, Colombian Massif, Kokonukos, Paletará, Puracé National Natural Park

Introduction. The National Natural Park (PNN) Puracé and its buffer zone cover areas of Andean, high–Andean forest, and paramo ecosystems in the Colombian Massif of southwestern Colombia. This PNN is located in the southern sector of the Central Cordillera between the departments of Cauca and Huila, it has an extension of 91,483 ha with an elevation range between 2350 and 5000 m a.s.l. (Bonilla-Valencia *et al*. 2019). In the northwestern of PNN Puracé, the buffer zone si inhabited by the *Kokonukos* indigenous community, distributed in the Resguardo of *Kokonuko*, Puracé, and Paletará, occupying approximately 15,630 ha in the western slope of Cordillera Central, municipality of Puracé, central-eastern area of the Cauca department (Fig. 1) (Bravo 2012). This indigenous community recognizes the vital importance of biodiversity conservation since the geographical sites are intimately linked to its worldview and especially the ancestral medical system, describing their natural territory like the land of "Jucas" that corresponds to an ancestral power of the underground world where water dominates (Faust 1991, 2004).

Given its location, this area occupies a unique position to study the high Andean flora diversity, but this information is scarce and scattered with limited scientific publications (Rangel-Ch & Lozano-D 1986, Duque & Rangel-Ch 1989, Duque & Restrepo 1992, Alzate 2007, Hágsater & Santiago 2015, Abud & Torres 2016, Hágsater, Santiago & Uribe Vélez 2018, Bonilla-Valencia *et al*. 2019). Here, contributing to the knowledge of the flora in this important area, we describe and illustrate two new *Lepanthes* Sw. species found within the *Kokonukos* indigenous territories in the Cauca department of Colombia. The new species were found during a botanical expedition between December 2019 and February 2020, within and in surrounding areas of the Puracé PNN.

Materials and methods

Descriptions and drawings.— The descriptions and drawings were prepared from living specimens. Specimens were dissected under an AmScope SM-1TNZ-144A-3M stereo microscope and preserved in alcohol. Digital images were taken with a Nikon D750 with a Nikkor 105 mm f/1.8 macro lens. Sketches from living and preserved specimens were digitized, and the images were used for diagramming a draft composite template in Adobe Photoshop® CS6. Then, a digital composite line drawing was made (lines and stippling) in Procreate illustration application for iPad 6th generation tablet computer (Bogarín *et al*. 2019).

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FIGURE 1. Panoramic view of "Jucas" territories in the "Resguardo Indígena de Puracé" from the Kokonukos volcanic chain, PNN Puracé, southwestern Colombia. Photograph by Diego Miguel Garcés.

Plant material.— *Lepanthes* specimens in the following herbaria AMES, CAUP, ICESI, JAUM, HPUJ, HUA, FMB, VALLE, JBB, CUVC, SEL, MO (online), TOLI and COL (online) were consulted, but no additional material was found there for us to include in the description of the new species.

TAXONOMIC TREATMENT

Lepanthes kokonuko J.S.Moreno & Pisso-Florez***, sp. nov.*** (Fig. 2–3, 6A).

TYPE: COLOMBIA. Cauca: Municipality of Puracé, Cabildo indígena de Paletará, Río Negro village, 3235 m. February 2020. *J .S. Moreno, A. L. Erazo, G. Pisso 523* (holotype: CAUP!).

DIAGNOSIS: *Lepanthes kokonuko* is most similar to *Lepanthes guanacasensis* Luer & R.Escobar, but it can be distinguished by its strongly ovate revolute lateral sepals (*vs*. ovate, non-revolute), its transversely bilobed petals with the upper lobe lanceolate (*vs*. oblong) and a bilaminate lip with the blades microscopically pubescent (*vs*. essentially glabrous) and a bipartite appendix with two linear clavate processes (*vs*. ovoid appendix minutely bilobulate at the apex).

Plant epiphytic, medium in size, caespitose, erect to suberect, up to 11.5 cm tall. *Roots* slender, flexuous, filiform, *ca*. 1 mm in diameter. *Ramicauls* slender, erect to suberect, stout, up to 8 cm long, enclosed by 2–6 lepanthiform sheaths, furrowed, microscopically ciliate along the margins, with a dilated ostia, acuminate. *Leaves* erect, coriaceous, elliptical, acute, the apex emarginate with an abaxial apiculum in the middle, 1.5–3.5 × 1.0–1.5 cm, the base cuneate contracted into a petiole 4–6 mm long. *Inflorescence* 2–3 congested, successively few-flowered racemes up to 7 cm long including the peduncle, loose, distichous, flexuous positioned below the leaf by a filiform peduncle up to 2.5 cm long; floral bract deltoid, acute, 1.5–3.6 mm long; pedicel terete, persistent, 3–4 mm long. *Ovary* with 3 fringed wings, costate, 1.0–1.3 mm long. *Flowers* with sepals light yellow, the lateral medially suffused

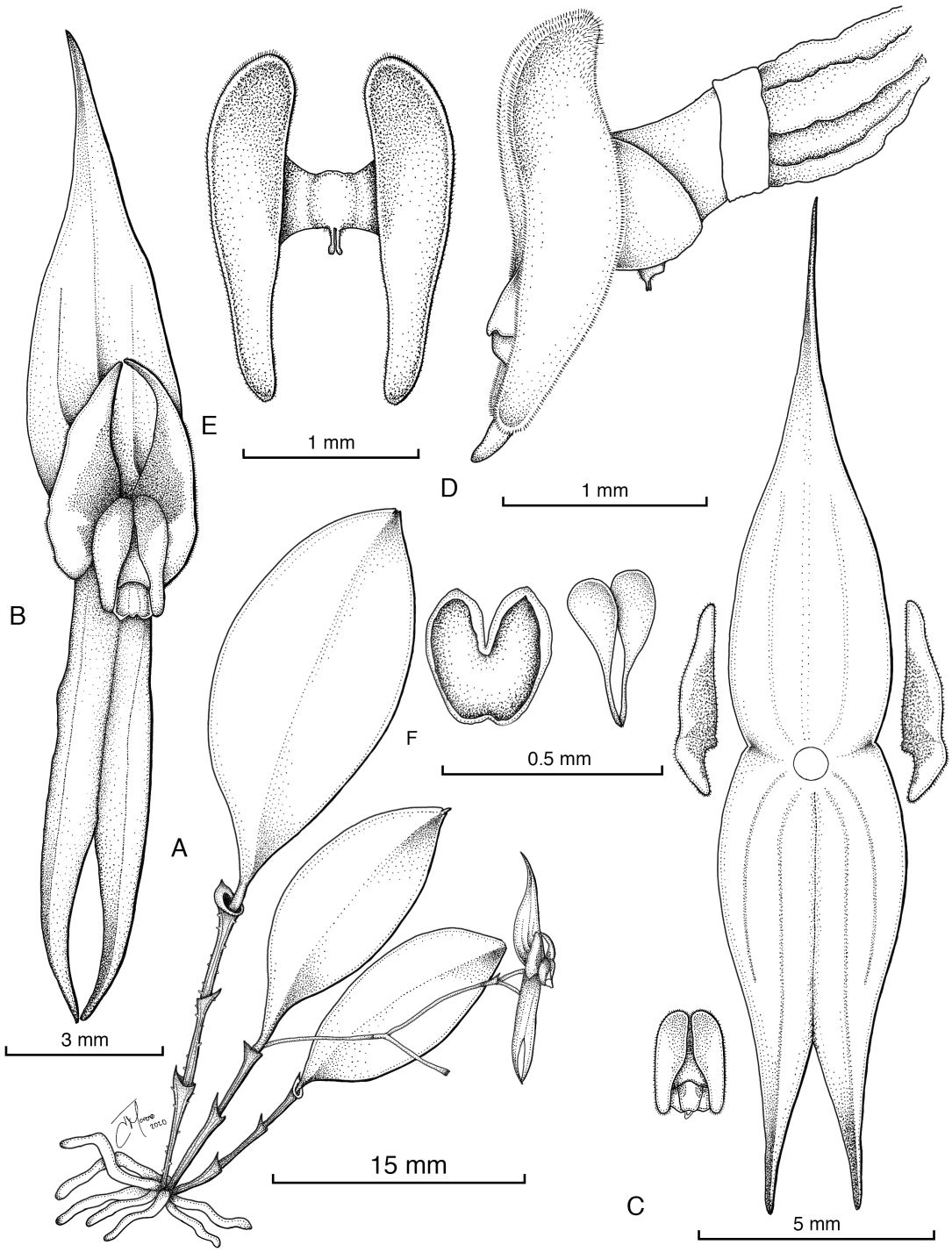

Figure 2. *Lepanthes kokonuko* J.S.Moreno & Pisso-Florez. **A**. Habit. **B**. Flower. **C**. Dissected perianth. **D**. Lip, column and ovary, lateral view. **E**. Lip, adaxial view. **F**. Pollinia and anther cap. Drawn by J. S. Moreno from *J. S. Moreno & A. L. Erazo 523* (CAUP).

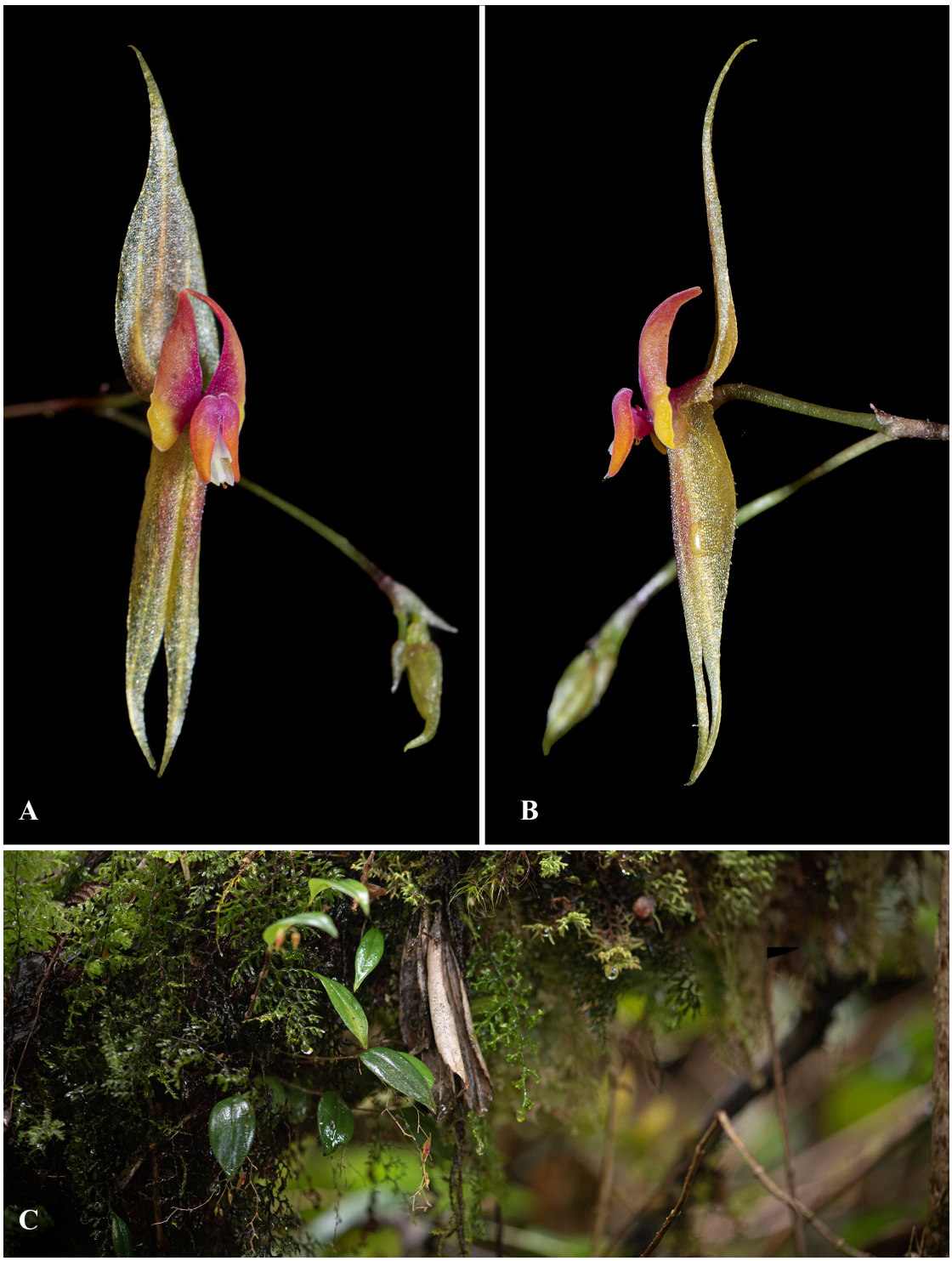

FIGURE 3. *Lepanthes kokonuko* J.S.Moreno & Pisso-Florez. **A**. 3/4 view. **B**. Lateral view. **C**. Habit and plant, *in-situ*. Photographs by J. S. Moreno of the plant that served as type.

with burgundy, petals yellow with the upper lobes suffused with burgundy towards the base and orange along the margins, lip saffron marginally suffused with orange, the base of the blades crimson, column white, anther cap pink. *Sepals* similar in shape and size, ovate, attenuate, carinate abaxially along the veins. *Dorsal sepal* 3-veined, slightly concave, 1.0–1.3 × 0.3 cm, connate to the lateral sepals for 2 mm. *Lateral sepals* 2-veined, strongly revolute in natural position, 1.0 × 0.4 cm, connate for 6 mm. *Petals* microscopically pubescent, transversely bilobed, with a small, marginal angle between the lobes, 1.0 × 4.5–5.0 mm, the upper lobe narrowly triangular, acute, recurved, 3.0–3.5 mm long, the lower lobe ovate to triangular, slightly falcate, acute, with a retuse inner margin, 1.0–1.5 mm long. *Lip* bilaminate, the blades ovate-lanceolate with rounded ends, microscopically pubescent, 2 × 1 mm long, the connectives cuneate, the body, connate to the base of the column, the sinus broad with a bipartite appendix composed of two linear, clavate processes. *Column* terete, 1.5 mm long, the anther dorsal and the stigma apical. *Anther cap* orbicular to cordate, cucullate, 0.25 mm wide. *Pollinia* yellow, two, pyriform, 0.3 mm long.

Paratype: COLOMBIA. Cauca: Municipality of Sotará, Piedra León village, 3172 m. March 2020. *J. S. Moreno, A. L. Erazo, G. Pisso 524* (Paratype: CAUP!).

Etymology: The name *Kokonuko*, which means "Mountain people", refers to the *Kokonukos* indigenous community that inhabit the area where the species was found. Also, in reference to the *Kokonukos* volcanic chain, a sacred place protected by the Puracé National Natural Park and its local communities.

Distribution and ecology: *Lepanthes kokonuko* is found in the Colombian Massif of the western slope in Central Andes at Piedra León village in the municipality of Sotará and Rio Negro village in the municipality of Puracé, both in the Cauca department, between 3172–3235 m in elevation (Fig. 4). It has been found growing as an epiphyte next to *Lepanthes cyrtostele* Luer & Hirtz, *Lepanthes mucronata* Lindl., and *Lepanthes arbuscula* Luer & R.Escobar, in a high Andean forest (Fig. 5) with arboreal species like *Clusia multiflora* Kunth and *Weinmannia pubescens* Kunth. We observed this species flowering during our visits (December to February), typically dry seasons in that region.

Lepanthes kokonuko can be easily recognized by its caespitose medium size plants, elliptical coriaceous leaves, long loosely, flexuous and distichous inflorescences; strongly revolute lateral sepals, transversely bilobed petals with the upper lobe lanceolate (hornlike), and a bilaminate lip with the blades ovoid–lanceolate with a bipartite appendix. It is probably related to the other racemose species *Lepanthes biloba* Luer & R.Escobar, *Lepanthes guanacasensis* Luer & R.Escobar, *Lepanthes muscula* Luer & R.Escobar and *Lepanthes osiris* Luer & R.Escobar (Luer & Thoerle 2012). The most similar species is undoubtedly *Lepanthes guanacasensis* (Fig. 6B), characterized also by its long loosely and flexuous inflorescences like *L. kokonuko*, ovate dorsal and lateral sepals (*vs*. strongly revolute lateral sepals) transversely bilobed petals with the upper lobe oblong [*vs*. lanceolate (hornlike)] longer than the lower lobe and an ovoid appendix, minutely bilobulate at the apex (*vs*. bipartite with two linear clavate processes). *Lepanthes osiris* is also similar but it has ovate lateral sepals (*vs*. strongly revolute lateral sepals), narrowly ovate, subequal petals (*vs*. upper lobe longer than the lower, the upper lobe lanceolate and the lower lobe triangular) and a lip with a small, oblong, bifid appendix (*vs*. bipartite with two linear clavate processes). Finally, *Lepanthes biloba* and *Lepanthes muscula* have a bilaminate lip with the blades elliptical or ovate, convex in *L. biloba* and blades oblong in *L. muscula* (*vs*. ovate-lanceolate), and both having an orbicular appendix with a pair of rounded terminal lobules (*vs*. bipartite with two linear clavate processes).

Lepanthes jucas J.S.Moreno & S.Vieira-Uribe, ***sp. nov.*** (Fig. 7–8, 9D).

TYPE: COLOMBIA. Cauca: Municipality of Puracé, Corregimiento de Paletará, road to San José de Isnos, Huila. 3172 m. December 2019. *J. S. Moreno, A. L. Erazo, G. Pisso 526* (holotype: CAUP!).

Diagnosis: *Lepanthes jucas* is similar to *Lepanthes cornualis* Luer & R.Escobar, but can be easily distinguished by its elliptical–lanceolate leaves (*vs*. narrowly elliptical); strongly papillose petals (*vs*. minutely pubescent, shortly papillose), transversely bilobed with falcate, triangular lobes (*vs*. lobes narrowly triangular) and bilaminate lip with the blades

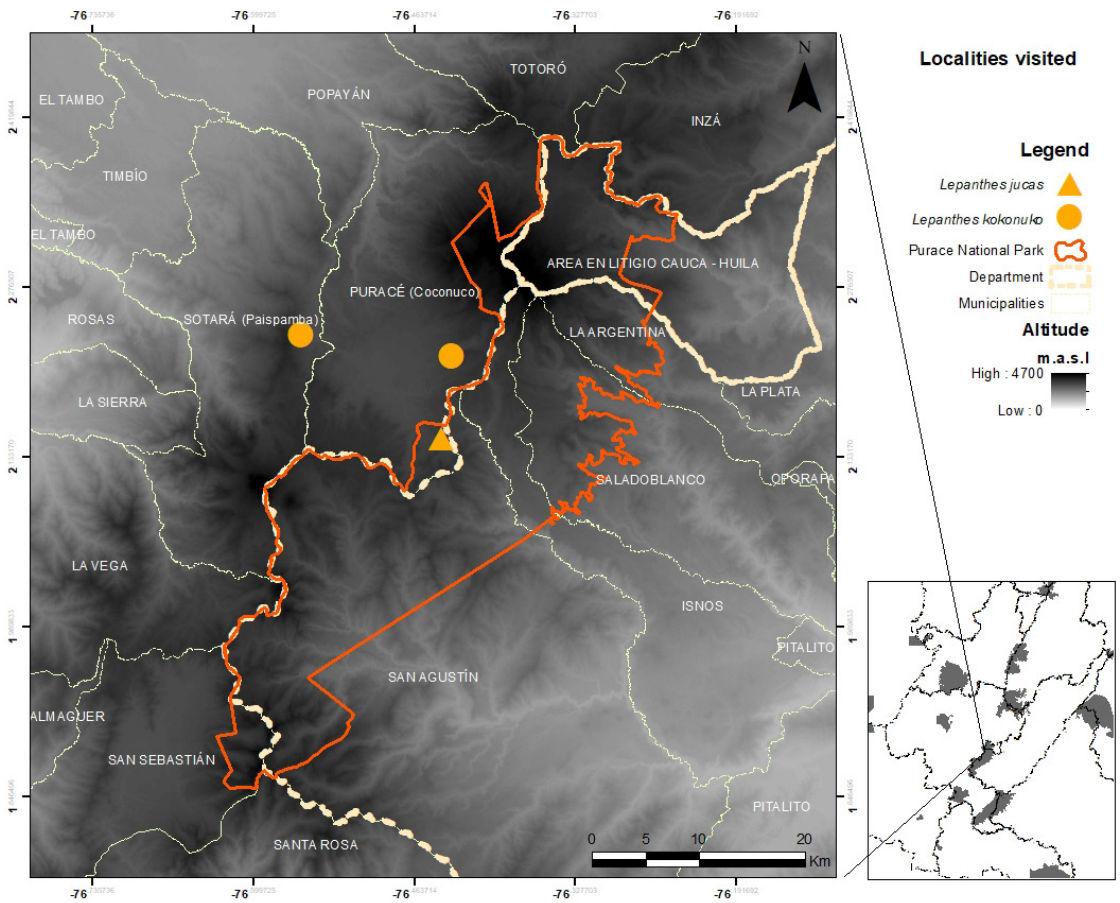

FIGURE 4. Distribution map of *Lepanthes kokonuko* J.S.Moreno & Pisso-Florez and *Lepanthes jucas* J.S.Moreno & S.Vieira-Uribe. Circles: *L. kokonuko*, triangle: *L. jucas.* Map by G.A. Pisso-Florez.

FIGURE 5. High Andean ecosystem where *Lepanthes kokonuko* J.S.Moreno & Pisso-Florez was found. Photograph by J.S. Moreno.

Figure 6. Comparison with the most similar species. **A**. *Lepanthes kokonuko*. **B**. *Lepanthes guanacasensis*. Photographs by J. S. Moreno.

hispid, obovate to oblong with an ovate appendix (*vs*. narrowly obovate blades and a minute bilobed appendix).

Plant epiphytic, caespitose, suberect, up to 7.5 cm tall. *Roots* slender, 0.5 mm in diameter. *Ramicauls* slender, erect to suberect, stout, 2.8–4.2 cm long, enclosed by 5–8 lepanthiform sheaths, furrowed, with a dilated ostia, acuminate. *Leaves* erect, coriaceous, elliptical, with slightly revolute margins of the blade, acute, the apex emarginate with an abaxial apiculum in the middle, 2.8–3.2 × 0.5–0.8 cm, the base cuneate contracted into a petiole 3–4 mm long. *Inflorescence* subcongested, 1–2 successively flowered racemes up to 2 cm long including the peduncle, loose, distichous, flexuous, positioned below the leaf by a filiform peduncle up to 1 cm long; floral bract, acute, 1.0–1.3 mm long; pedicel terete, persistent, 3 mm long. *Ovary* costate, trialate, with 3 fringed wings, 2 lateral and 1 dorsal, 2 mm long. *Flowers* with sepals vinaceous, petals scarlet, lip peach, column scarlet, anther cap pink. *Sepals* similar in shape and size, ovate, minutely denticulate, attenuate to acuminate, carinate on the abaxial surface along the veins. *Dorsal sepal* 3-veined, concave, 6.0 × 3.8–4.0 mm, connate to the lateral sepals for 1.5 mm. *Lateral sepals* 1-veined, oblique, 5.8–6.0 × 4.5 mm, connate for 3 mm. *Petals* falcate, strongly papillose, transversely bilobed, 1.0–1.3 × 3.8–4.0 mm, the lobes triangular, oblique, obtuse, the upper lobe wider than the lower lobe. *Lip* bilaminate, the blades hispid, obovate to oblong, with rounded ends, 2.5 × 1.0 mm long, the connectives short, cuneate, puberulous, the body connate to the base of the column, the sinus obtuse, with an ovate, pubescent appendix. *Column* terete, slender, 2.5 mm long, the anther dorsal and the stigma apical. *Anther cap* cordate, cucullate, 0.5 mm wide. *Pollinia* yellow, two, pyriform, 0.5 mm long.

Additional material examined: COLOMBIA. Valle del Cauca: Municipality of Cali, PNN Farallones,

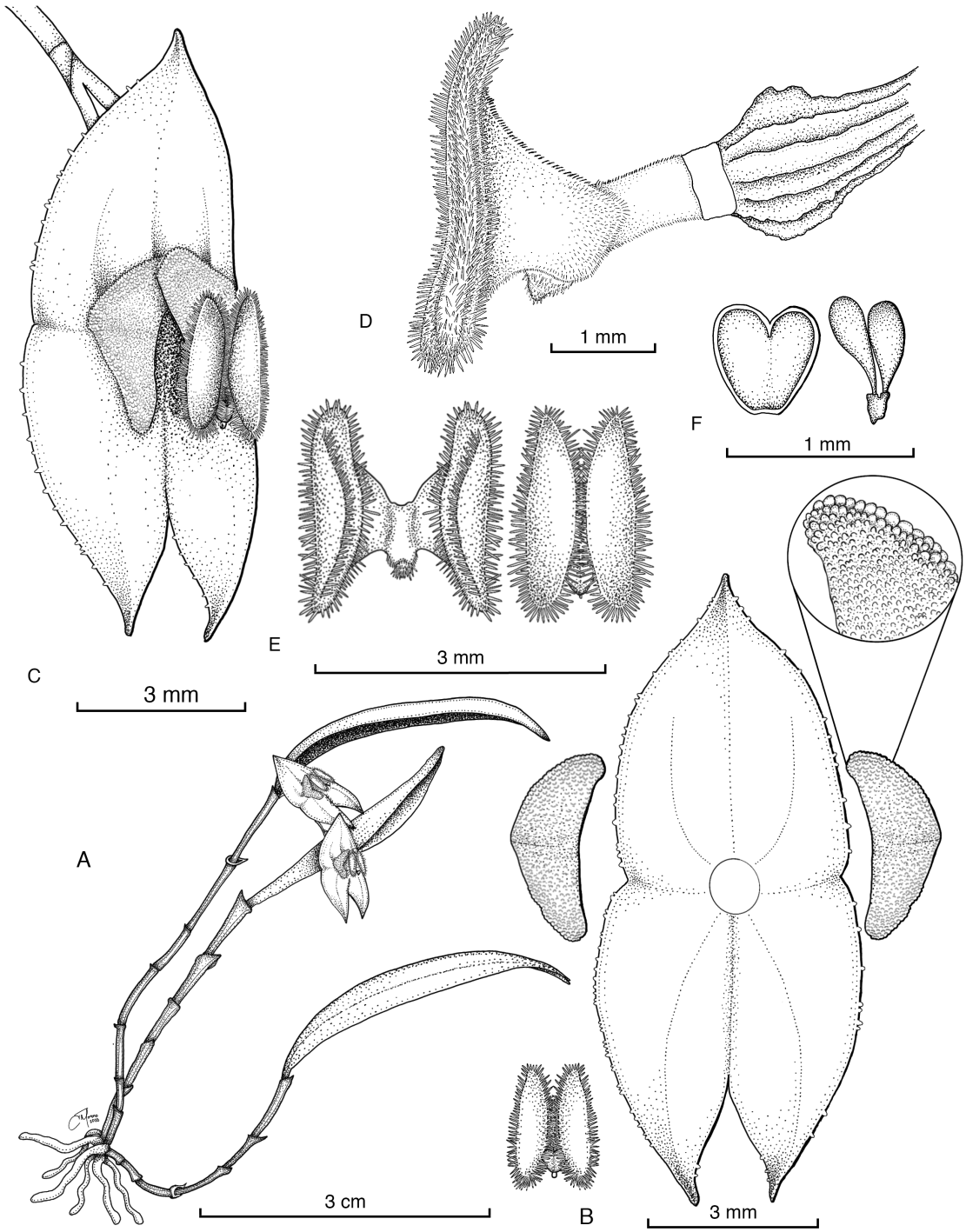

Figure 7. *Lepanthes jucas* J.S.Moreno & S.Vieira-Uribe. **A**. Habit. **B**. Flower. **C**. Dissected perianth. **D**. Lip, column and ovary, lateral view. **E**. Lip, adaxial view. **F**. Pollinia and anther cap. Drawn by J. S. Moreno from *J. S. Moreno & A. L. Erazo 526* (CAUP).

Minas del Socorro. 3231 m. July 2020. *R. Galindo-T, A. Fierro, G. Rodriguez, M. Espitia y G. Marín 1468* (CUVC).

Etymology: The specific epithet *Jucas* represents, for the *Kokonukos* indigenous communities, an ancestral energy of the underground world where the water dominates. *Jucas* also means all the native plants, animals and the spirits of nature, even the spirits that cause "mal viento" (cold wind) producing weakness in children and pregnant women. The following description was published by Faust (2004) which states: "From *Jucas* is the virgin land, the water and all places rich in water as the lagoons, rivers, swamps, primary forests, hills and mountains that "gushes" out water, and even the volcanos that according to the indigenous people of the Colombian Massif, when are snowy "gushes" ice".

Distribution and ecology: *Lepanthes jucas* was found growing next to *Lepanthes caudata* Luer & R.Escobar, in the Colombian Massif of the western slope of the Central Andes on the road between Paletará and San José de Isnos municipalities in the departments of Cauca and Huila, respectively. It has been found on the edge of an open road surrounded by a High Andean Forest Ecosystem within the Puracé National Natural Park. The new species is possibly distributed all along the open road to Huila department where the ecosystem ends (Fig. 4).

Lepanthes jucas belongs to the section *Lepanthes* subsection *Breves*, characterized by having one single vein in the lateral sepals (Luer & Thoerle 2012). It can be recognized by its caespitose plants with elliptical–lanceolate leaves, short inflorescences and dark vinaceous flowers with striking papillose transversely bilobed petals and a bilaminate lip with hispid blades. Three species from the subsection *Breves* share similar traits with *Lepanthes jucas*. *Lepanthes cornualis* Luer & R.Escobar, *Lepanthes cyrtostele* Luer & Hirtz (Fig. 9) (Luer 1996), and *Lepanthes monoptera* Lindl. All of these species might belong to an informal group of species confined to wet and mossy high Andean forests, paramo and subparamo ecosystems from the Andes. The most similar species is *Lepanthes cornualis*, but it can be distinguished by its petals narrowly triangular, minutely pubescent and shortly papillose along the margins (*vs*. falcate, triangular, entire, and strongly papillose), the lip blades narrowly obovate, ciliate with the apices recurved (hornlike) and a minute bilobed appendix (*vs*. lip blades obovate to oblong, hispid with the apices rounded and an ovate appendix).

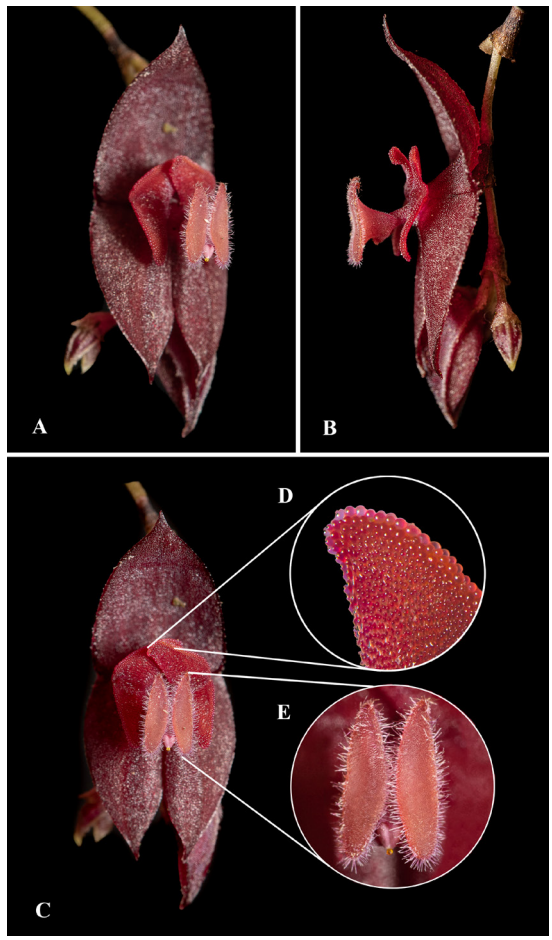

Figure 8. *Lepanthes jucas* J.S.Moreno & S.Vieira-Uribe. **A**. 3/4 view. **B**. Lateral view. **C**. Frontal view. **D**. Close up of the strongly papillose petals. **E**. Close up of the long ciliate blades of the lip. Photographs by J.S. Moreno.

These two new species that honor the ancient territories of the *Kokonokus* indigenous communities within the PNN Puracé and its surroundings are part of a contribution to recognize the native indigenous population in Colombia, its worldview, and its territories. *Lepanthes kokonuko* and *L. jucas* are distributed on territories where the forests are still pristine, with numerous lagoons, swamps, volcanos, and surrounded by different paramos that produce big

FIGURE 9. Comparison with the most similar species. **A**. *Lepanthes cornualis*. **B**. *Lepanthes cyrtostele*. **C**. *Lepanthes monoptera*. **D**. *Lepanthes jucas*. Photographs by Ron Parsons (A) and J. S. Moreno (B–D).

amounts of water for the human being in Colombia. The ancient territories must be protected all along the country, and conservation efforts must be carried out involving local people to be immersed in biodiversity and conservation actions.

Acknowledgments. We are grateful with the support of Parques Nacionales Naturales de Colombia and Parque Nacional Natural Puracé, specifically, the chief Isaac Bedoya, who motivated us to develop this research through the contract 087 - 04 February 2020, to contribute to the knowledge of the biodiversity of this protected area; and the park ranger Diomar Castro Fierro and son for joining us. To Salomón Avirama and Edgar Pizo, for protecting these high Andean forests where the species were found and for letting us explore their territories. Finally, we thank Kanchi Gandhi from the AMES herbarium at Harvard, for his kind help with the etymologies of the names; to Eugenio Restrepo, for his comments regarding the identity of these new species; to Ron Parsons, who let us use the photograph of *Lepanthes cornualis*. Finally, to Diego Miguel Garcés, who was very kind in contributing his picture of the volcanic chain of the *Kokonukos*.

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A NEW YELLOW-FLOWERED *CHILOSCHISTA* (ORCHIDACEAE: AERIDINAE) FROM THAILAND

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Abstract. A new species of *Chiloschista* Lindl. from western Thailand is described and illustrated with a line drawing and photographs. It is compared with the sympatric *C. parishii* Seidenf., from which it differs in having larger flowers, which are 11–12 mm across versus 8–10 mm across for *C. parishii*. The new species also distinctly differs in having widely spreading rostellum lobes and a viscidium that is as broad as the length of the stipe, as opposed to downward directed rostellum lobes and a viscidium that is distinctly narrower than the length of the stipe for *C. parishii*. The same distinguishing features separate the new species from the similarly colored *C. trudelii* Seidenf., which has inward-directed rostellum lobes and a viscidium that is distinctly narrower than the length of the stipe.

Key Words: Epidendroideae, new *Chiloschista*, Thailand orchid flora, Vandeae

Introduction. The orchid genus *Chiloschista* Lindl. was first described by John Lindley, who proposed to segregate *Epidendrum usneoides* D.Don from Nepal into a separate taxon (Lindley 1832). Over the years, almost 30 specific epithets were applied to *Chiloschista*, but currently about 10 (Chen & Wood 2009, Wood 2014), or 22 (Govaerts 2020) species are accepted, distributed from the Indian subcontinent through SE Asia to Australia. The most recent phylogenetic analysis conducted by Zou *et al*. (2015) using five DNA markers (ITS, *mat*K, *trn*L-F, *psb*A-*trn*H, and *atpI*-H) revealed that *Chiloschista* is a monophyletic taxon related to the group composed of the *Phalaenopsis* clade, *Thrixspermum* clade, and *Vanda* clade of Aeridinae. In previous treatments, *Chiloschista* was classified in Sarcochilinae (Schlechter 1926), Aeridinae (Dressler 1993), or Phalaenopsidinae (Szlachetko 2003). Representatives of this genus are monopodial plants growing as epiphytic or lithophytic herbs. Plants usually appear only as a cluster of roots, which hide the distinctly abbreviated stem. Narrowly elliptic and acute leaves only appear during the rainy season and soon fall off at the arrival of the dry season. The roots are gray, green, brownish or purple, photosynthetic, flat to terete, and sometimes scabrid. *Chiloschista* plants produce ephemeral flowers with a more or less clawed lip, which is attached to the apex of the column foot and is 3-lobed, deeply saccate/pouched, or spurred (Wood 2014).

In May of 2009, an unknown *Chiloschista* was discovered growing epiphytically on *Hevea brasiliensis* (rubber tree) in western Thailand (Fig. 1). Because of its vulnerable position due to ongoing destructive human activities, a plant was collected and introduced to cultivation where it flowered in April the following year. The flowers superficially resemble the sympatric *C. parishii* Seidenf., but differ in being larger and of a warm yellow color, with only faint brown spots on the basal half of the sepals and petals (Fig. 2) , while the smaller *C. parishii* generally has distinct spots throughout the sepals and petals (Fig. 3; Seidenfaden 1988). A more careful examination and comparison of the column details reveal more distinct differences where the unknown species has widely spreading rostellum lobes and a distinctly broadened viscidium (Fig. 4, 8), in comparison with *C. parishii*, which has downward projected and more or less parallel rostellum lobes and

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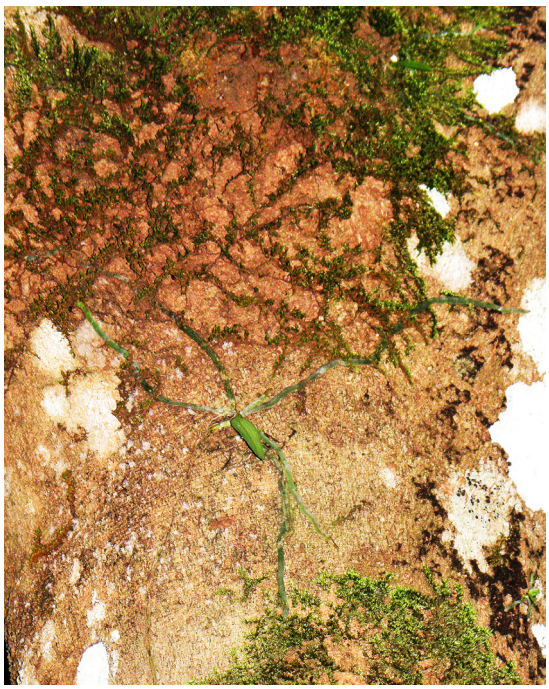

FIGURE 1. *Chiloschista lindstroemii* growing epiphytically on a rubber tree (*Hevea brasiliensis*). Photo by Stig Dalström.

FIGURE 2. *Chiloschista lindstroemii* has an attractive flower in a warm yellow color, faintly spotted with brown. Photo by Stig Dalström.

a distinctly narrower viscidium (Fig. 5, 8). The widely spreading rostellum lobes and the broadened viscidium also distinguish the unknown species from the color-wise similar *C. trudelii* Seidenf., (Fig. 6) which has inward projecting rostellum lobes and a narrower viscidium (Fig. 7–8). The rather distinct difference in size between the unknown species described here and *C. parishii* is most easily observed when the various flower parts are placed next to each other on the same scale (Fig. 8). We have found no other *Chiloschista* species that color-wise or morphologically corresponds with the unknown species and we, therefore, conclude that it is new to science and is described here.

TAXONOMIC TREATMENT

Chiloschista lindstroemii Dalström & Kolan., ***sp. nov.*** TYPE: Thailand. Kanchanaburi Province: collected in May 2009, flowered in cultivation 29 April, 2010, *A. Lindström 09-1571* (holotype: BK). (Fig. 2, 4, 8).

DIAGNOSIS: *Chiloschista lindstroemii* is superficially similar to the sympatric *C. parishii*, but differs in having larger flowers, *ca*. 11–12 mm across with widely

FIGURE 3. *Chiloschista parishii* is sympatric with *C. lindstroemii*, but differs by having smaller flowers with differently shaped lip callus and rostellum lobes. Photo by Stig Dalström.

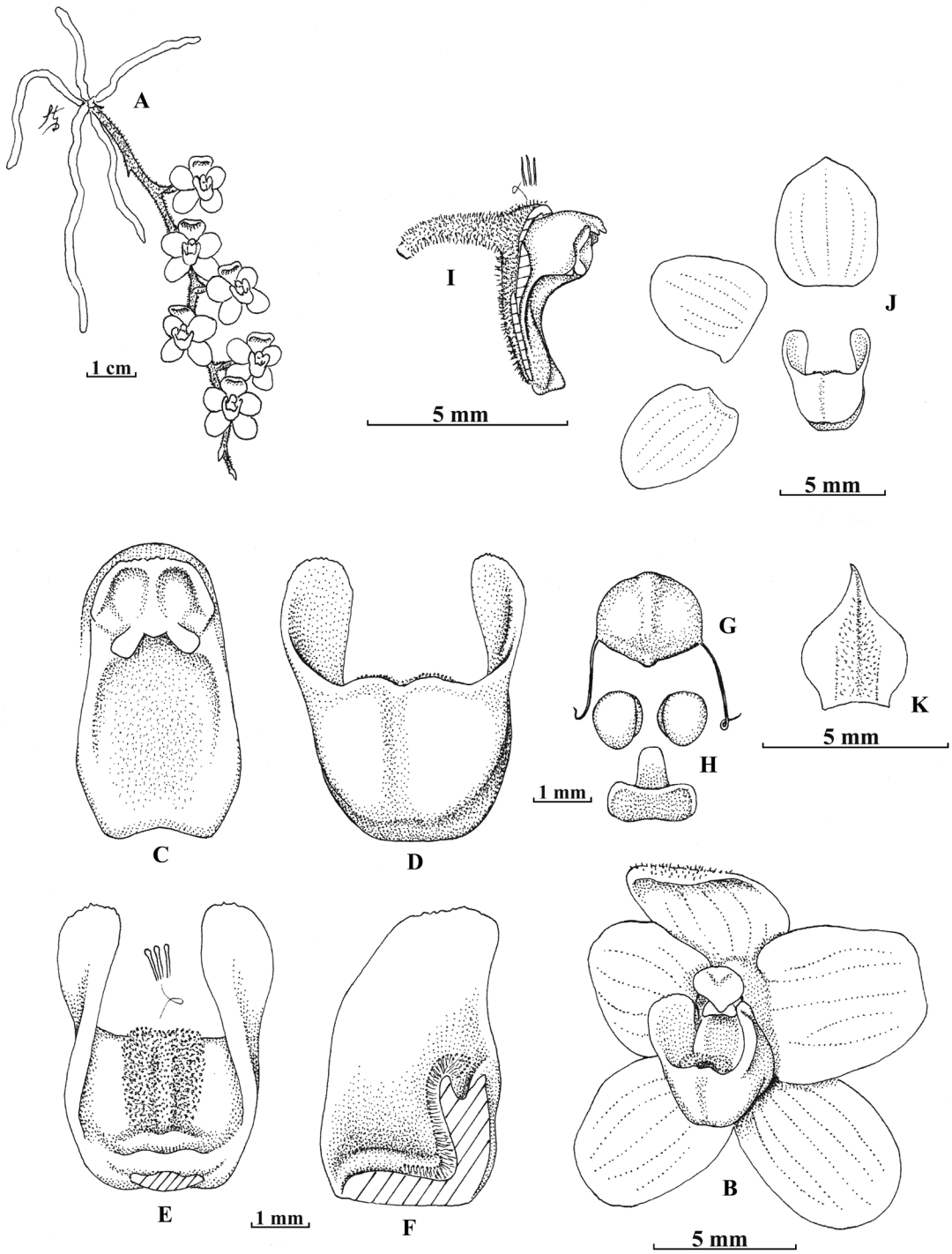

Figure 4. *Chiloschista lindstroemii* Dalström & Kolan. **A**. Plant habit. **B**. Flower angled front view. **C**. Column front view displaying the spreading rostellum lobes. **D**. Lip front view. **E**. Lip interior view. **F**. Lip split, interior lateral view. **G**. Anther cap dorsal view. **H**. Pollinarium with pollinia and stipe with viscidium. **I**. Column lateral view. **J**. Flower dissected. Drawn from the holotype by Stig Dalström.

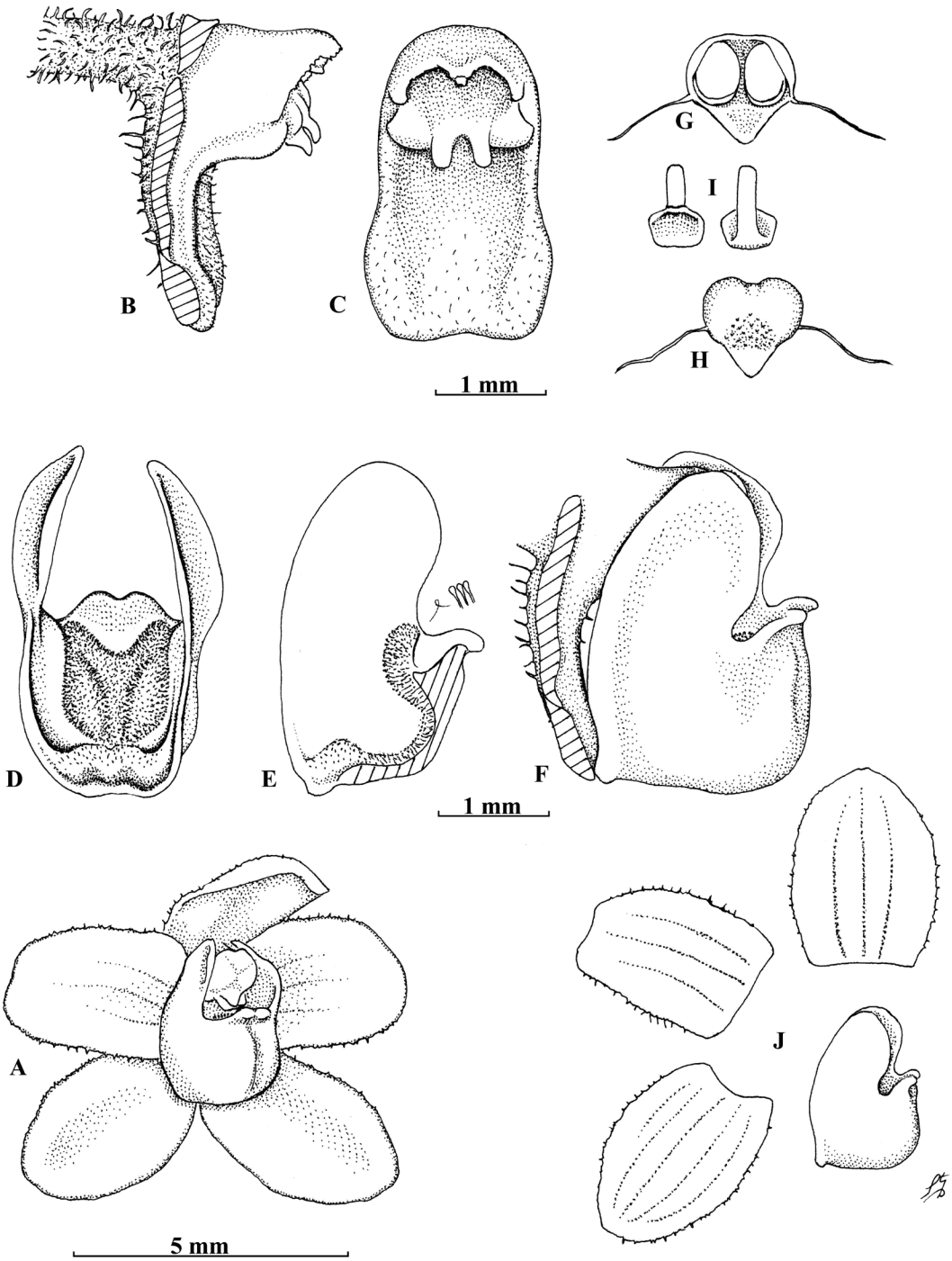

FIGURE 5. *Chiloschista parishii* Seidenf. **A**. Flower angled front view. **B**. column lateral view. **C**. Column front view displaying downward directed rostellum lobes. **D**. Lip interior back view. **E**. Lip cleft, lateral view. **F**. Column and lip lateral view. **G**. Anther cap with pollinia ventral view. **H**. Anther cap dorsal view. **I**. Stipe and viscidium back and front view. **J**. Dissected flower. Drawn from *S. Dalström 3023* (Dalström archives) by Stig Dalström.

Figure 6. *Chiloschista trudelii* is superficially similar to *C. lindstroemii*, but differs primarily in the shape of the rostellum lobes. Photo by Stig Dalström.

spreading rostellum lobes and a viscidium that is as broad as the length of the stipe, as opposed to downward directed and parallel rostellum lobes and a viscidium that is distinctly narrower than the length of the stipe for *C. parishii*. The new species also differs from the rather similar *C. trudelii* which has inward-directed rostellum lobes and a viscidium that is distinctly narrower than the length of the stipe.

Herb epiphytic. *Roots* numerous, spreading, terete to slightly flattened, 2–3 mm thick. *Stem* minute, *ca*. 0.5–1.0 mm long. *Leaves* one or two, deciduous during the rainless season, conduplicate, ovate and acute (roots, stem and leaf not preserved on the type specimen). *Inflorescence* more or less pendent, *ca*. 7 cm long with seven flowers on the type specimen (but old inflorescences observed in the wild reveal that it can be at least twice as long with many more flowers), almost straight to somewhat flexuous, finely pubescent, laxly racemose; *stem* and *floral bracts* scale-like, narrowly acute, dorsally pubescent, 3–4 mm long. *Pedicel* with *ovary* finely pubescent, 3–4 mm long. *Flower* with rather flat and spreading lateral sepals and petals, 11–12 mm across; *dorsal sepal* light yellow with pale brown spots on the basal half, externally finely pubescent, internally glabrous, broadly elliptic, entire, apically indistinctly obtuse, 6 × 5 mm; *lateral sepals* similar in color and pubescence, fused basally along the column foot, indistinctly obliquely ovate, entire, apically indistinctly obtuse to rounded, 6 × 4 mm; *petals* similar in color, glabrous, sessile and fused to the column foot, with a minute angle near the lower base, then almost linear to indistinctly obovate, entire, apically rounded, 5.0 × 4.5 mm; *lip* basally dark yellow with yellow lateral lobes streaked with red, and a white frontal part, rigidly attached to the column foot, deeply saccate and indistinctly canaliculated ventrally, 3-lobed, lateral lobes erect to slightly incurved, apically somewhat falcate and finely denticulate, median lobe short and fleshy, indistinctly 2-lobulate, *ca*. 5 mm high and 4.0–4.5 mm wide; *callus* in form of fleshy, broad, finely puberulent swelling, extending from the base and up to the median lobe where it creates a distinct pit, or cavity, leaving the apex of the lip glabrous; *column* very short and stocky, 1.5–2.0 mm long, including the anther cap and with a 2.8–3.0 mm long column foot, with spreading rostellum lobes; *anther cap* light yellow, galeate with a pair of filiform tendrils, *ca*. 2 mm long, on each side; *pollinarium* of a pair of obliquely globose and indistinctly flattened, cleft pollinia on a *ca*. 1.5 mm long, narrowly rectangular to trapezoid stipe on a broadly rectangular and indistinctly constricted viscidium, *ca.* 1.5 mm broad.

Distribution: *Chiloschista lindstroemii* is currently known only from the type location in western Thailand. The exact locality of this species is withheld from the public in order to protect it from being eradicated by commercial collectors. Specific locality information for scientific treatments can be obtained from the authors upon request.

Eponymy: Named in honor of Anders Lindström (Fig. 9), a world leading authority in Cycadaceae and many other tropical plant families. He works at Nong Nooch Tropical Garden, Thailand.

Acknowledgments. The authors would like to thank Kampon Tansacha, the owner of Nong Nooch Tropical Garden for his generous support and administrative assistance. We also thank Anders Lindström for superb field assistance, the Sarasota Orchid Society for financial support, and Wesley Higgins for improving the manuscript.

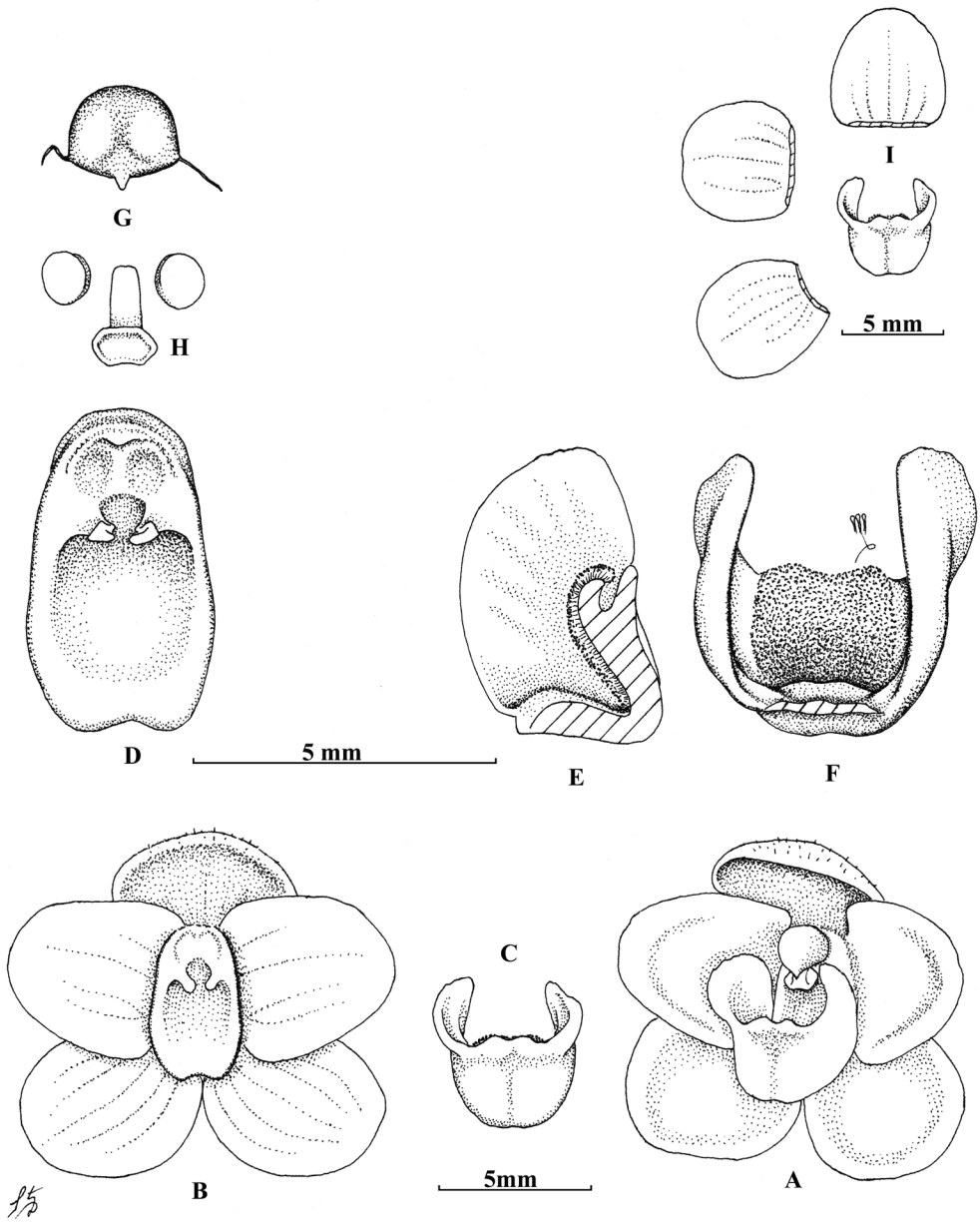

FIGURE 7. *Chiloschista trudelii* Seidenf. **A**. Flower angled front view. **B**. Flower front view with lip removed. **C**. Lip front view. **D**. Column front view. **E**. Lip split and interior lateral view. **F**. Lip interior back view. **G**. Anther cap dorsal view. **H**. Pollinarium, with pollinia and stipe with viscidium. **I**. Flower dissected. Drawn from *S. Dalström 3017* (Dalström archives) by Stig Dalström.

Right, FIGURE 8. **A**. *Chiloschista lindstroemii*. **A1**. Column frontal view. **A2**. Lip lateral view. **A3**. Lip split with interior view. **A4**. Flower dissected. Drawn from the holotype by Stig Dalström. **B**. *Chiloschista parishii*. **B1**. Column frontal view. **B2**. Lip lateral view. **B3**. Lip split with interior view. **B4**. Flower dissected (with lip lateral view). Drawn from *S. Dalström 3023* (Dalström archives) by Stig Dalström. **C**. *Chiloschista trudelii*. **C1**. Column frontal view. **C2**. Lip lateral view. **C3**. Lip split with interior view. **C4**. Flower dissected. Drawn from *S. Dalström 3017* (Dalström archives) by Stig Dalström.

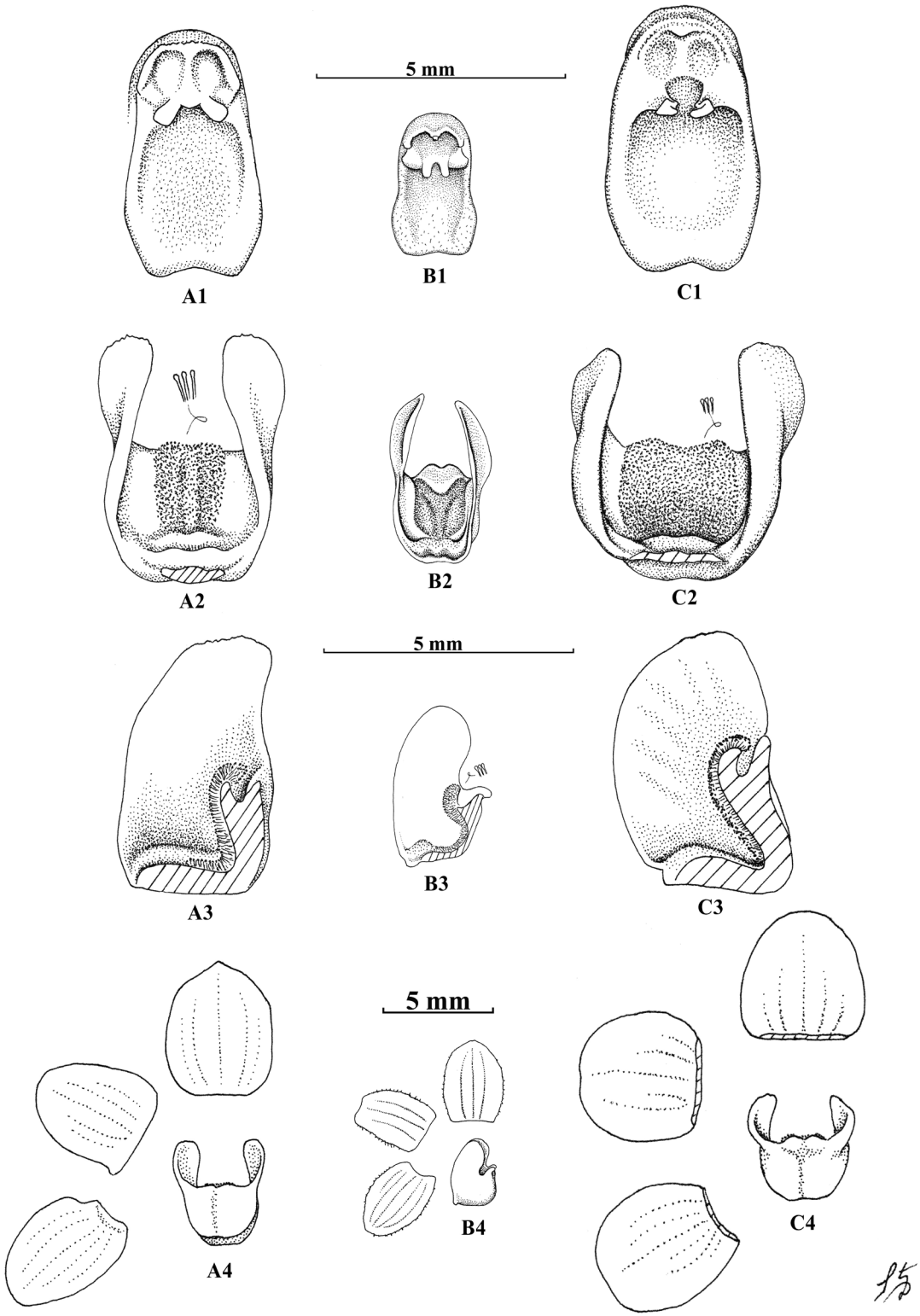
5 mm
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FIGURE 9. Anders Lindström, the Nong Nooch Tropical Garden's world leading taxonomic and horticultural expert on Cycadaceae and many other tropical plant groups. Photo by Stig Dalström.

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A NEW UNUSUAL-LOOKING *CYRTOCHILUM* (ORCHIDACEAE) FROM SIERRA NEVADA DE SANTA MARTA IN COLOMBIA

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Abstract. A new and unusual-looking *Cyrtochilum* species is described, compared with the possibly closely related *Cyrtochilum leucopterum* and illustrated by drawings and a photograph of the holotype. It is distinguished from *Cyrtochilum leucopterum* by having an elongate basal portion of the lip with erect lateral lobes, and a trilobed front lamina with a glabrous, blunt and thickened bilobed lip callus, versus what appears to be more horizontally spreading lateral lip lobes, and a densely micro-pubescent apically multifid lip callus for the latter species. The new species also has some purported silica bodies of unknown significance visible in plant and flower parts, which are not present in *C. leucopterum*.

Key Words: Colombia, *Cyrtochilum leucopterum*, Helmuth Schmidt-Mumm, new species, Oncidiinae

Introduction. The isolated mountain range of Sierra Nevada de Santa Marta (SNSM) in northern Colombia was for a long time a dangerous place to visit due to local drug and terrorist activities. Only very recently has the situation been slowly improving allowing biological expeditions to carry out more complete inventories of plant and animal life. Isolated mountains, in general, tend to develop unique and endemic biota and the SNSM is no exception. The showy orchid species *Odontoglossum naevium* Lindl., and *Odm. nevadense* Rchb.f., for example have never been found outside of this mountain range. The genus *Cyrtochilum* Kunth also contributes with some unique species such as *C. violaceum* Dalström, and the enigmatic *C. leucopterum* (Rchb.f.) Dalström (Fig. 1). The latter species was originally found growing as a terrestrial plant somewhere in the "Rio Hacha province" [Provincia del Río de La Hacha] at 9000–10,000 feet (3000–3300 m) and collected in 1852 by Luis Schlim, the half-brother of the famous orchid nursery legend Jean Linden, who later introduced this species into cultivation in Europe. It was scientifically described as *Odontoglossum leucopterum* Rchb.f., by Heinrich Gustav Reichenbach (1854) and later transferred to *Cyrtochilum* by Dalström (2001). The color of the flower is described by Schlim as white with purple-violet spots. Since the original description and introduction of "*Odontoglossum leucopterum*", no living material, photographs or illustrations of fresh flowers have been seen by the authors of this paper. Leonore Bockemühl (1989) included what she believed was this species in her treatment of the genus *Odontoglossum*, but a comparison between the morphological details of the flowers demonstrate that aside from the coloration there are no similarities between the two taxa. The taxon interpreted as "*Odm. leucopterum*" by Bockemühl is in fact an undescribed species (Dalström *et al.* in prep.), which is not known from the SNSM region. The senior author of this paper has also been fooled by superficial appearances of a couple of recently observed species, but they both represent something else other than the true *C. leucopterum* and one of them is described as a new taxon here.

Taxonomic treatment

Cyrtochilum schmidt-mummii Dalström & C.Castro, ***sp. nov.*** (Fig. 2–6).

TYPE: Colombia. Department of Magdalena: San

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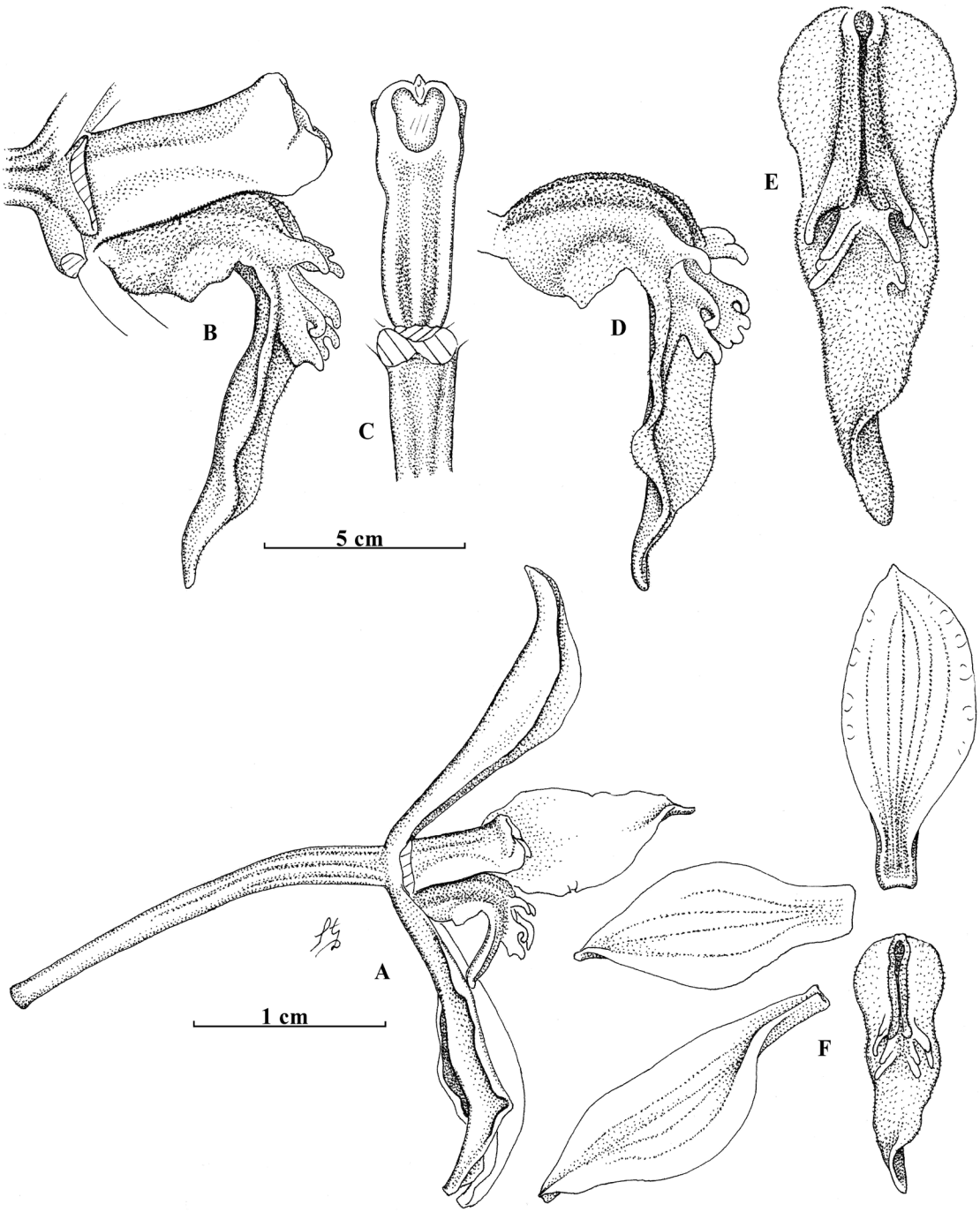

Figure 1. *Cyrtochilum leucopterum* (Rchb.f.) Dalström. **A**. Flower lateral view, with right petal removed. **B**. Column and lip lateral view. **C**. Column ventral view. **D**. Lip lateral view. **E**. Lip dorsal view. **F**. Dissected flower. Drawn from *J. Hanbury-Tracy 493* (K), by Stig Dalström.

Figure 2. *Cyrtochilum schmidt-mummii* Dalström & C.Castro, *H. Schmidt-Mumm 105* (holotype: COL). Photo by Cristian Castro.

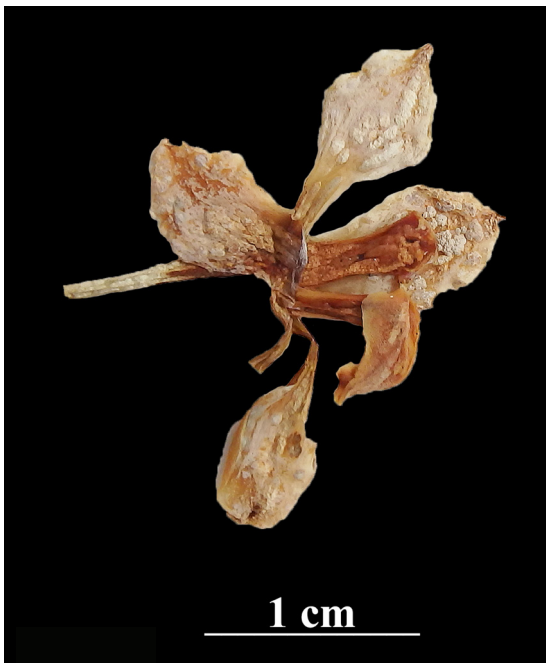

FIGURE 3. *Cyrtochilum schmidt-mummii* Dalström & C.Castro, *H. Schmidt-Mumm 105* (holotype: COL). Photo by Cristian Castro.

Lorenzo, Hacienda La Victoria, Cerro Quemado "near" Santa Marta, alt. 1900 m, 12 Feb. 1962, *H. Schmidt-Mumm 105* (holotype: COL-93207).

Diagnosis: *Cyrtochilum schmidt-mummii* is distinguished from the superficially similar *C. leucopterum* by having an elongate basal part of the lip with erect lateral lobes, and a trilobed front lamina with a glabrous, blunt and thickened bilobed lip callus, versus what appears to be more horizontally spreading lateral lip lobes and a densely micro-pubescent apically multifid lip callus for *C. leucopterum*. In a dried state, the leaves, inflorescence, sepals, petals and lip of *C. schmidt-mummii* show the presence of purported silica bodies (Prychid, Rudall & Gregory 2004) which are lacking in *C. leucopterum*.

Epiphytic *herb*. *Pseudobulbs* caespitose, ovoid, *ca*. 5.5 × 2 cm, surrounded basally by 4 or 5 distichous foliaceous sheaths, 3-leaved on the type illustration, which can be a misinterpretation and include the foliaceous bracts. *Leaves* subpetiolate, conduplicate, linear, acute to acuminate, to *ca.* 60 × 4.5 cm, in Schmidt-Mumm's type illustration, to *ca*. 40 × 3 cm on the holotype, which can be based on foliaceous bracts. *Inflorescence* axillary from the base of the pseudobulb, a loosely flexuous panicle with 4 basal slightly fractiflex 2 to 5 flowered side branches, *ca.* 4–7 cm apart, then racemose, to *ca*. 54 cm long. *Peduncular* and *floral bracts* appressed, scale-like, acute, *ca.* 5 mm long. *Pedicel* with *ovary* 12–20 mm long. *Flowers* stellate, with yellow sepals and petals marked with dark brown basally, and a "clear" yellow lip and column, which has some "caramel-colored" stripes. *Dorsal sepal* unguiculate then broadly orbiculate and acute, *ca.* 12–13 x 7 mm. *Lateral sepals* unguiculate, then obliquely and unevenly orbiculate, apically slightly canaliculate and acute, *ca*. 15 × 7 mm. *Petals* sub-sessile, obliquely obovate apically slightly canaliculated, acute, *ca*.11–12 × 5 mm. *Lip* rigidly attached to the base of the column by a central, longitudinal fleshy keel, basally parallel with the column, with basal erect lateral lobes, then reflexed with a trilobed front-lamina with rounded lateral lobes and a broadly rounded front-lobe, 12–13 × 7–8 mm; *callus* of a low central, longitudinal fleshy keel emerging from the base of the lip and extending to the base of the front-lobe, with a pair of blunt, fleshy and slightly diverging keels with a smaller fleshy angle on each side. *Column* clavate, straight, ventrally grooved, with a slightly thickened apical wingless part, 6–7 mm long. *Anther cap* campanulate, dorsally slightly lobulate, apparently whitish. *Pollinarium* of two obovoid, cleft/folded, pollinia on a minute stipe, on a pulvinate viscidium.

ADDITIONAL MATERIAL EXAMINED: Colombia. Department of Magdalena: Sierra Nevada de Santa Marta, collected during the Herbert H. Smith expedition 1898–1899. *H. Smith 2351* (CM, K!, NY!).

DISTRIBUTION: *Cyrtochilum schmidt-mummii* is only reported from Sierra Nevada de Santa Marta in northern Colombia, growing as an epiphyte at 1900–2000 m elevation.

EPONYMY: Named in honor and memory of Helmuth Schmidt-Mumm, a German optometrist who lived in Bogota and specialized in contact lenses, and was a keen orchid enthusiast (at least until 1980). During his later years, he abandoned all his nurseries, mostly for security reasons due to local guerilla activities

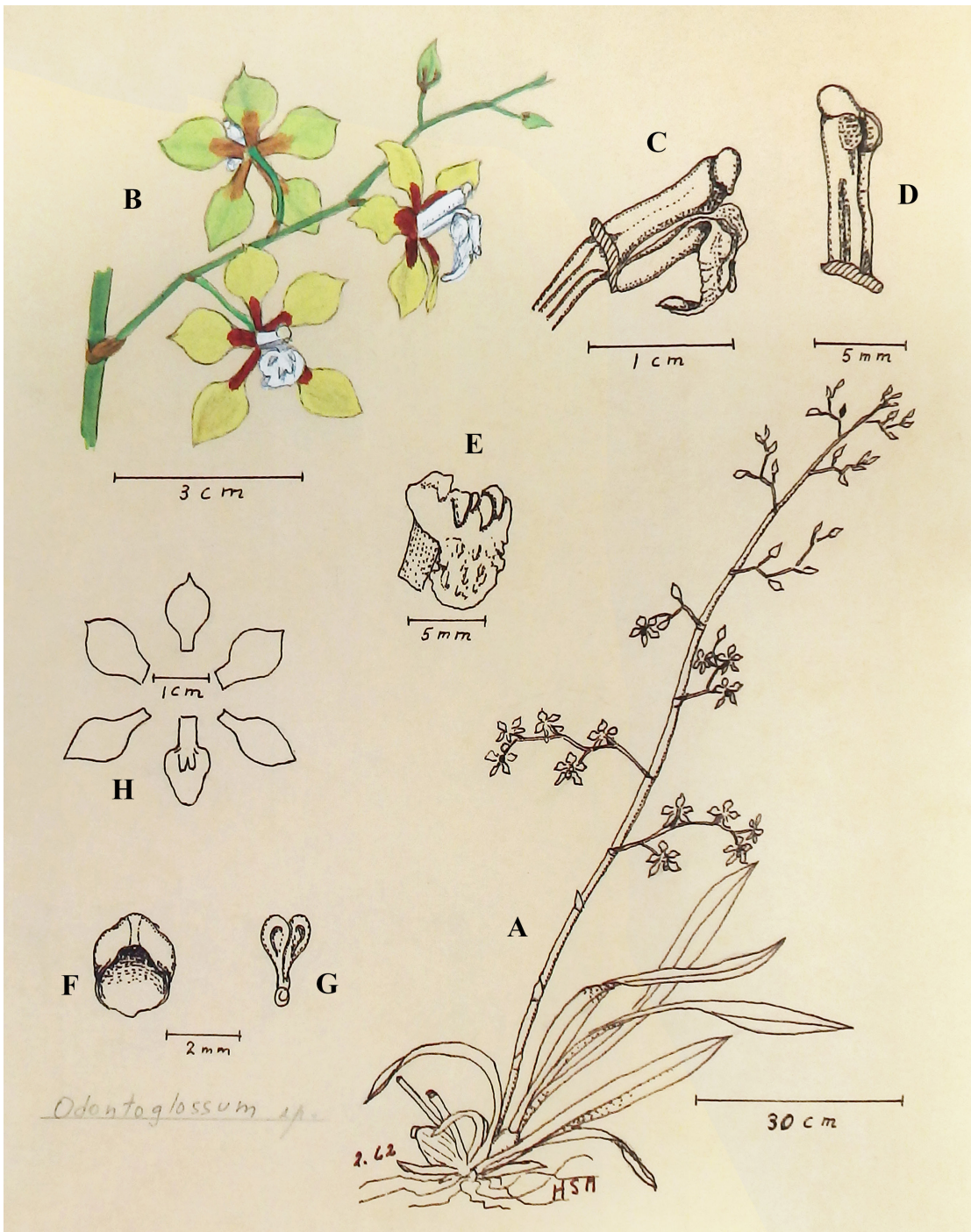

Figure 4. *Cyrtochilum schmidt-mummii* Dalström & C.Castro. **A**. Plant habit. **B**. Side branch with flowers. **C**. column and lip lateral view. **D**. Column lateral view. **E**. Lip frontal-ventral view. **F**. Anther cap. **G**. Pollinarium. **H**. Flower dissected. Drawn from *H. Schmidt-Mumm 105* by Helmuth Schmidt-Mumm, edited by Stig Dalström and published with kind permission from the President of the "*Fundación Rodrigo Escobar Restrepo*".

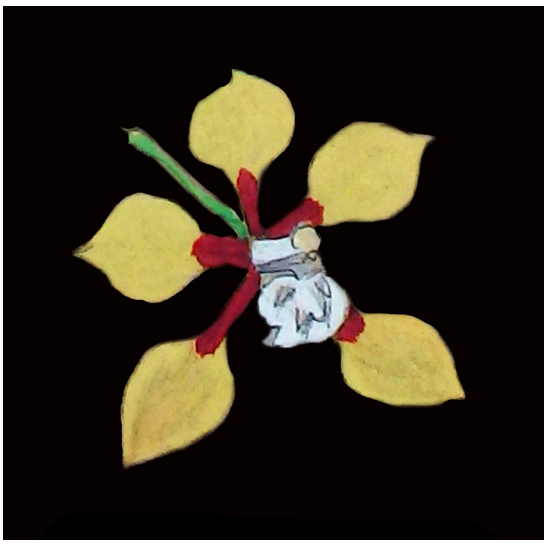

FIGURE 5. Close-up of the flower of *Cyrtochilum schmidt-mummii*, illustrated by Helmuth Schmidt-Mumm.

and his amazing collection disintegrated almost completely. During the last years of his life, Helmuth Schmidt-Mumm developed a friendship with recently passed Peter Wüllner, also a Bogota resident and an enthusiastic orchid collector and grower. Much thanks to Wüllner, his elder friend returned to the orchid world and together they managed to salvage some of the former Schmidt-Mumm collection. One of his plants represents the type of the species that now bears his name.

Miscellaneous notes. The type illustration of *Cyrtochilum schmidt-mummii* was made by Helmuth Schmidt-Mumm in 1962 (Fig. 4–5) and has appeared in a book containing a brief biography of Schmidt-Mumm's life and with numerous colored illustrations of Colombian orchid species made by Schmidt-Mumm, presumably from his private collection. It was published in 2015 on the initiative by Peter Wüllner together with Juan Felipe Posada, and funded by the *Fundación Rodrigo Escobar Restrepo*, Medellín, Colombia (Posada & Wüllner 2015). When the senior author of this paper was casually going through the illustrations while visiting Antonio Uribe in Bogota in 2018, his attention was caught by the drawing of a hitherto unfamiliar species labeled as "*Odontoglossum* sp.". It was immediately recognized as an unusual *Cyrtochilum* species, and it was first believed to represent the rare and elusive *C. leucopterum*. Later, however, and after having erroneously determined the dried specimen at the Herbario Nacional Colombiano (COL), in Bogota, which correlates with the Schmidt-Mumm illustration, it was realized that this taxon represents a new species. After some additional research going through old files and notes, it was discovered that Herbert Huntington Smith also collected this species in the Sierra Nevada de Santa Marta region during his expedition in 1898–1901 (Ayers & Boufford 1988). Herbert Huntington Smith (1851–1919) was a devoted collector of a wide variety of natural history specimens, primarily insects, mammals, fresh water molluscs, birds, and plants. He is best known for his collections from the New World tropics where he gathered specimens in Brazil, Mexico, the West Indies, and Colombia (Ayers & Boufford 1988). After having held a position as the Curator of Invertebrate Zoology at the Carnegie Museum of Natural History in Pittsburgh for two years, he resigned and moved to Colombia together with his wife and young son in 1898. The Smith family settled in Bonda, a small town seven miles east of Santa Marta in the department of Magdalena. From Bonda, Smith made collecting trips to 19 different sites (Ayers & Boufford 1988), including the Sierra San Lorenzo. It, therefore, seems plausible that Smith may have found his plants of *C. schmidt-mummii* in the same general area where Helmuth Schmidt-Mumm found his plant 60 years later. Smith returned to the US together with his family in the spring of 1902 when both he and his wife were employed as assistants by the section of Botany at the Carnegie Museum where they sorted their collections into sets (Ayers & Boufford 1988). After having accessioned one set of approximately 2500 unidentified specimens, the Carnegie Museum sent other sets to various "subscribers" after they had been named. Smith arranged for most of the plant identifications to be made at the New York Botanical Garden (NY) by Dr. H. H. Rusby, Columbia University, New York City (Ayers & Boufford 1988). A duplicate set of specimens was also sent to the herbarium at Kew in England, where a specimen of *Smith 2351* was examined in 1998 by author Dalström. Fortunately, a drawing of a rehydrated flower was made at the time (Fig. 6) with kind permission from the keeper of the

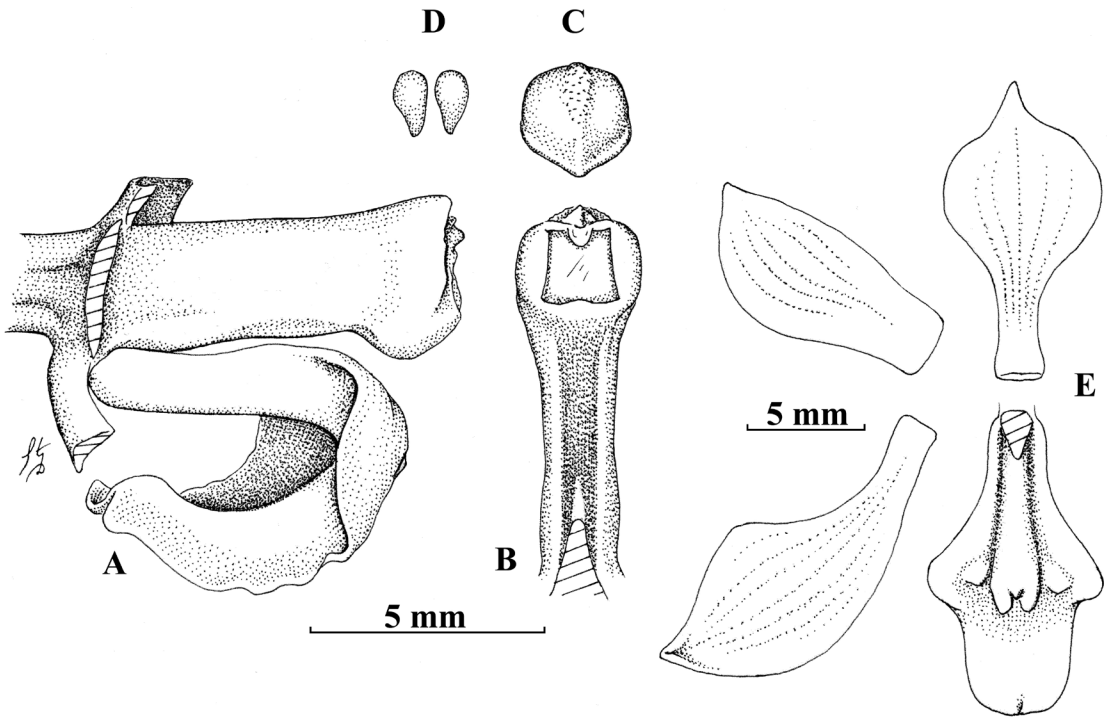

Figure 6. *Cyrtochilum schmidt-mummii*. **A**. Column and lip lateral view. **B**. Column ventral view. **C**. Anther cap dorsal view. **D**. Pollinia, without stipe and viscidium. **E**. Dissected flower. Drawn from *H. Smith 2351* (K) by Stig Dalström, with kind permission from the keeper of the herbarium at the Royal Botanic Garden, Kew.

herbarium. This represents so far the only other record of *C. schmidt-mummii* seen by the authors.

The presence of purported silica bodies in the floral segments of *C. schmidt-mummii* is an interesting observation, but a more detailed discussion about this phenomenon is beyond the scope of this present paper and is better left for a future project when more plant material has been examined.

Acknowledgments. The authors thank the staff and administration of the Herbario Nacional Colombiano COL of the Instituto de Ciencias Naturales, and particularly the curator of the herbarium, Julio Betancur, and the director of the herbarium, Jaime Uribe, for their kind support and permission to examine herbarium specimens and use photographs of the type specimen in this article. We thank Peter Wüllner and Juan Felipe Posada for publishing the book with Helmuth Schmidt-Mumm's illustrations, and we thank Phillip Cribb, the keeper of the herbarium at Kew in 1998 for allowing critical studies of preserved material. Finally, we thank Wesley Higgins for commenting on and improving the manuscript.

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A NEW GOLD-COLORED *LEPANTHES* (PLEUROTHALLIDINAE: ORCHIDACEAE) FROM SOUTHEAST ECUADOR

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Abstract. *Lepanthes vere-aurum*, a new species of the orchid subtribe Pleurothallidinae, discovered in Zamora Chinchipe province, southeast Ecuador, is described here. We compare *L. vere-aurum* to *L. brenneri*, the only similar species, from which it differs in having larger leaves and longer inflorescences. Also, *L. vere-aurum* has an obovate, concave, long-acuminate dorsal sepal and a concave appendix with a pubescent crest underneath and with a long, pubescent apex,versus a flat, triangular-ovate, acuminate dorsal sepal and a smaller appendix with a ciliate apex in *L. brenneri*. Some information about its phenology and ecology is additionally provided.

Resumen. *Lepanthes vere-aurum*, una nueva especie de orquídea de la subtribu Pleurothallidinae, fue descubierta en la provincia de Zamora Chinchipe, sureste de Ecuador, y es descrita aquí. *Lepanthes vere-aurum* es comparada con *L. brenneri*, la única especie similar, de la que se diferencia por plantas con hojas más grandes e inflorescencias más largas. Además, *L. vere-aurum* posee un sépalo dorsal obovado, cóncavo y largamente acuminado y un apéndice cóncavo con una cresta pubescente por debajo y el ápice largo y pubescente, versus el sépalo dorsal plano triangular-ovado y acuminado y, un apéndice más pequeño y ciliado en *L. brenneri*. Se presenta información sobre la fenología y ecología de la especie.

Key Words / Palabras clave: Cordillera del Cóndor, endangered orchid, Epidendroideae, *Lepanthes brenneri*, nueva especie, new orchid species, orquídea amenazada

Introduction. Ecuador is rich in orchid diversity, with around 4187 species, of which 1706 are endemic (Endara & Jost 2012). In Zamora Chinchipe province (southeast Ecuador) alone, 221 orchid species are endemic, which represents 13% of the endemic orchids of the country (Endara & Jost 2012). This might be explained, in part, by peculiar geological characteristics that produce several ecosystems with different elevations and temperatures (Jiménez V. & Jiménez L. 2014).

Lepanthes Sw. is one of the mega-diverse genera of Pleurothallidinae orchids with more than 1100 species. In Ecuador, more than 300 species of *Lepanthes* are known (Luer 1996, Thoerle & Hirtz 2015, Karremans 2016, Baquero 2018, Baquero *et al.* 2018, Tobar *et al*. 2018, Baquero *et al*. 2019, Zambrano & Solano 2019). The species of *Lepanthes* have ramicauls enclosed by lepanthiform sheaths, flowers with transversely expanded petals with two or three lobes, a complex lip (with some exceptions) with a body connecting a pair of blades which normally embrace the column, and a very small structure at the base of the lip which has been called the "appendix" (Luer 1996). The appendix is present in species which are believed to be pollinated by small gnats via pseudocopulation, where the male insects confuse the structures with the female genitalia and pollinate the orchids during the attempt to copulate (Blanco & Barboza 2005). A new species from southeast Ecuador has been recently discovered and it is described here.

Taxonomic treatment

Lepanthes vere-aurum Donoso & Baquero, ***sp. nov.*** (Fig. 1–2).

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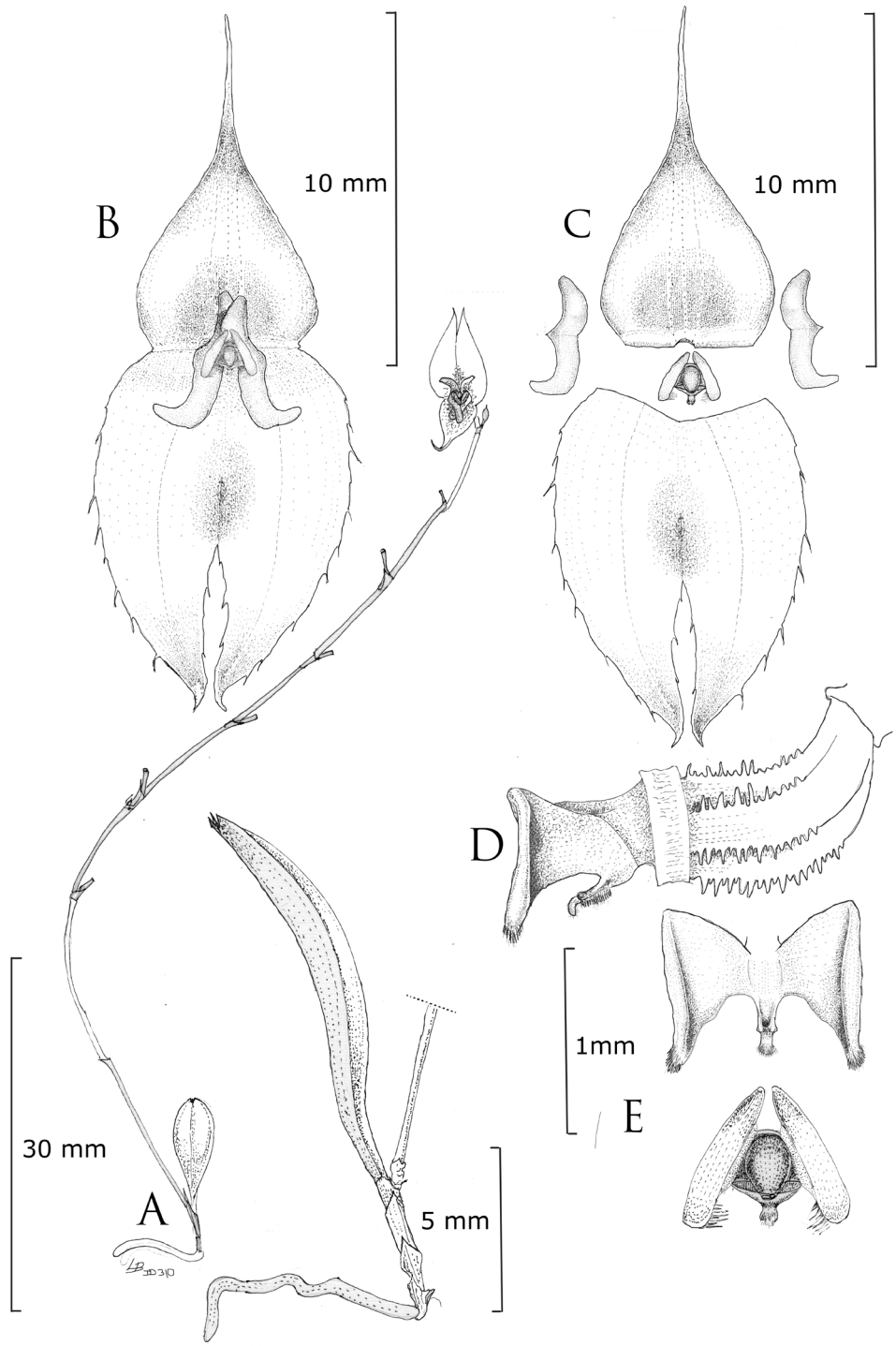

FIGURE 1. *Lepanthes vere-aurum* Donoso & Baquero. **A**. Habit and plant close-up. **B**. Flower, frontal view. **C**. Dissected perianth. **D**. Lateral view of the lip and ovary. **E**. Adaxial view of the expanded lip and frontal view of the lip, appendix and column. Illustration by Luis Baquero, based on the holotype *Javier Donoso #310* (QCNE).

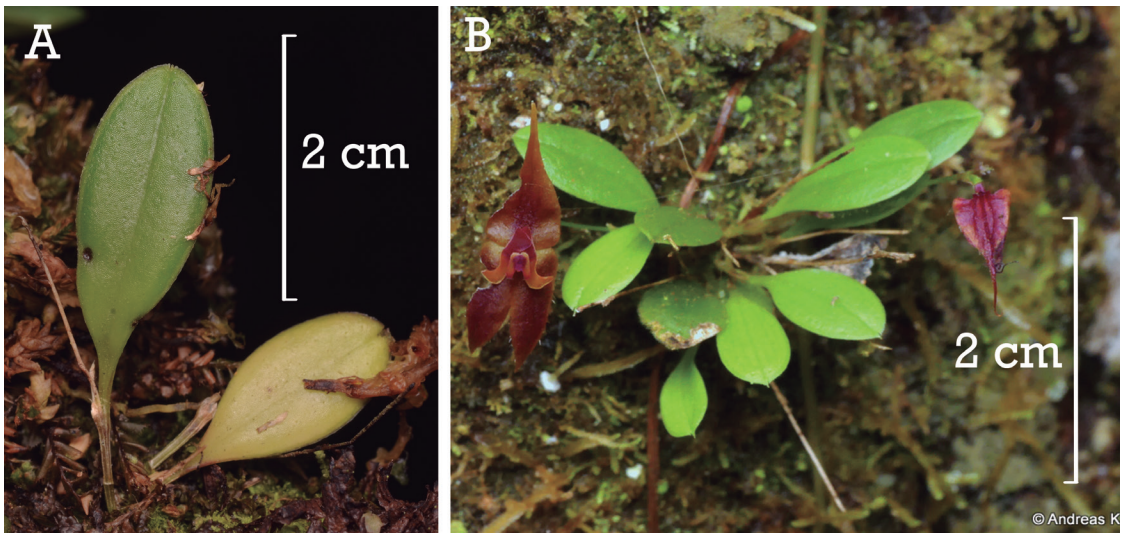

Figure 2. Plants of *L. vere-aurum* and *L. brenneri* Luer. **A**. Plant and leaves of *L. vere-aurum in situ.* **B**. Plant and leaves of *L. brenneri in situ.* Photos *in situ* by Javier Donoso (A) and Andreas Kay† (B).

TYPE: Ecuador. Zamora-Chinchipe: Tundayme vía al Quimi, 1418 m, 03°34'32.8" S, 78°25'10.7" W, 13 March 2019. *J. Donoso 310* (holotype: QCNE).

Diagnosis: Species similar to *Lepanthes brenneri* Luer from which it differs in the bigger plants (leaves of 10–17 mm long *vs.* 6–8 mm long in *L. brenneri*), the obovate leaves with obtuse apex (*vs.* elliptical with subacute apex in *L. brenneri*), the longer inflorescences in *L. vere-aurum* (up to 12cm long *vs.* 1.3 cm long in *L. brenneri*), the obovate, concave and long-acuminate dorsal sepal in *L. vere-aurum* (*vs.* the flat, triangular-ovate, acuminate dorsal sepal in *L. brenneri*), and the oblong and concave appendix in *L. vere-aurum* with a pubescent crest underneath and a long, pubescent apex (*vs.* the triangular appendix with a ciliate apex in *L. brenneri*).

Plant small, up to 22 mm long, epiphytic, caespitose. *Roots* slender, 0.8 mm in diameter. *Ramicauls* abbreviated, 2–6 mm long, enclosed by 3 ribbed, lepanthiform sheaths. *Leaf* erect, coriaceous, obovate, obtuse, apiculate, 10–17 mm long, 4.0–6.5 mm wide, the base cuneate into a petiole 1–5 mm long. *Inflorescence* a progressively lengthening, flexible, loose, lightly flexuous raceme up to 12 cm long, peduncle 10–30 mm long, successively flowered with only one flower open at a time. *Dorsal sepal* yellow suffused with red except for the apex, concave, the blade glabrous, the markings slightly erose, obovate, with an acute, long-acuminate apex, 8–10mm long, including a 3mm long tail, 4–5 mm wide, three-veined, with three spiculate carinae at the abaxial side. *Lateral sepals* yellow suffused with red towards the fusion of both sepals, the blades glabrous, margins sparsely spiculate, obovate, oblique with an acute, acuminate apex, 7–9 mm long (including the tail), 3–4 mm wide, one-veined, with one spiculate carina at the abaxial side. *Petals* yellow, suffused with pink, slightly velvety, transversely bilobed, with an acute apex 2.5 mm wide, 0.5 mm long, the upper lobe oblong, obtuse, the lower lobe uncinate to broadly uncinate, apex acute. *Lip* yellow suffused with pink at the base of the blades, minutely pubescent, bilaminate, the blades oblong with the ends rounded, the apices long ciliate, 1.5 mm wide, 0.75 mm long, the connectives broadly cuneate, 0.4 mm long, the body narrow, connate to the base of the column, the appendix oblong, concave, with a pubescent crest below and along the entire length, the apex long with two glabrous, oblong calli at each side of the pubescent terminal part, 0.3 mm long. *Column* 0.75 mm long, the anther apical, the stigma transverse, apical.

Paratype*:* Ecuador. Zamora-Chinchipe: El Quimi, 900 m, 03°33'58" S, 78°28'56" W, September 4 2019, Ecuador, Tundayme, *J. Donoso 311* (QCNE).

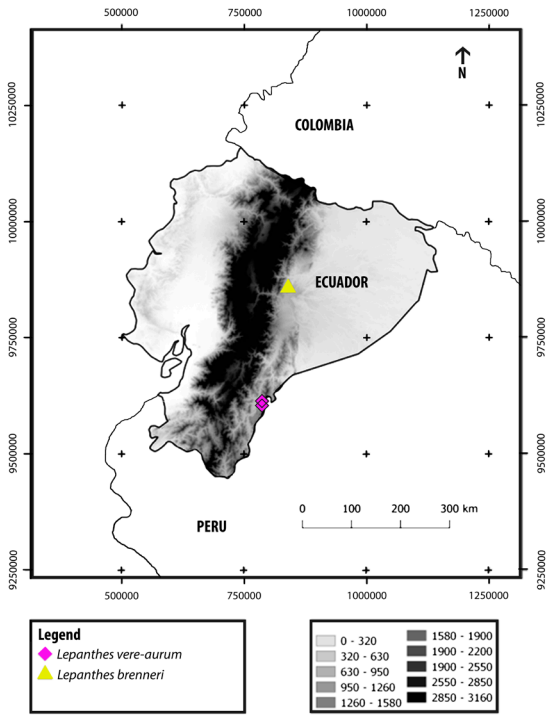

FIGURE 3. Map showing localities of *Lepanthes vere-aurum* and the type locality of *L. brenneri.* Map created by Marco Monteros.

ETYMOLOGY: From the Latin *vere*, truly, and *aurum*, gold, so named named to raise awareness of the intrinsic value of wild and endangered orchids (even scarcer than the precious metal) under threat of mining activities, and due to the golden color of the flowers.

HABITAT AND ECOLOGY: *Lepanthes vere-aurum* has been found growing as an epiphyte in the cloud forests of southern Ecuador. Two populations of this species grow nearby (between 900–1418 m in elevation), where no more than five plants were witnessed growing between the two sites. The holotype of the new species was collected at 1418 m in elevation, growing in a cloud forest of the Cordillera del Condor. This plant was found growing as an epiphyte on a fallen branch of a tree species belonging to the genus *Guatteria* (Annonaceae). Other orchid species belonging to the Pleurothallidinae, such as *Lepanthopsis* sp., *Specklinia* (ex *Acostea*) and *Trichosalpinx* sp., were growing sympatrically on the same branch. When collected, the plant of *L. vere-aurum* was in flower (Fig. 3).

PHENOLOGY: This species has been observed blooming in its habitat in different months (May, June and December). In culture, a single plant shows long and consecutively flowered inflorescences which lasts for several months.

Lepanthes vere-aurum is similar to *L. brenneri* in the small plants (less than 5 cm long) with very short ramicauls, the big flowers when compared to the leaves, and the inflorescences that exceed the length of the leaves. *Lepanthes brenneri* differs from *L. vere-aurum* in the lower lobes of the petals which are uncinate and with a shape unique for the genus (Fig. 4). Furthermore, *L. vere-aurum* has bigger plants and obovate leaves with obtuse apex, different from the smaller plants of *L. brenneri*, with the leaves elliptic, subacute. The inflorescences in *L. vere-aurum* are much longer than in *L. brenneri* and the flowers have wider sepals, with the lateral sepals conspicuously oblique. Also, the shape of the appendix is different in both species: with a concave oblong appendix in *L. vere-aurum* and a smaller, triangular appendix in *L. brenneri* (Fig. 2, 4).

Lepanthes brenneri grows far north of where *L. vere-aurum* has been found. Since the original discovery of *L. brenneri*, few new encounters with this species have happened. The latest known encounter was made by the explorer and photographer Andreas Kay (Fig. 2–3) not far from Puyo in lower elevation slopes of the eastern Andes of Ecuador and at the base of the independent range of Cordillera Abitagua (both sites in northeast Ecuador). A couple of plants were photographed by Kay not distant from where the holotype was discovered in 1976. *Lepanthes vere-aurum* grows farther south at the western slopes of the Cordillera del Condor, an independent mountain range from the eastern Andes of Ecuador.

CONSERVATION STATUS: Considering the two plants used in this study and others witnessed and photographed were growing within active mining sites, this species is considered to run a high risk of extinction due to the destructive nature of forests characteristic from mining activities in Ecuador. The forests where the holotype and paratype came from have disappeared already. There are no other known living plants or populations of the new species in the wild which does necessarily mean it is extinct. We recommend including it under the IUCN category of Critically Endangered (Fig. 3).

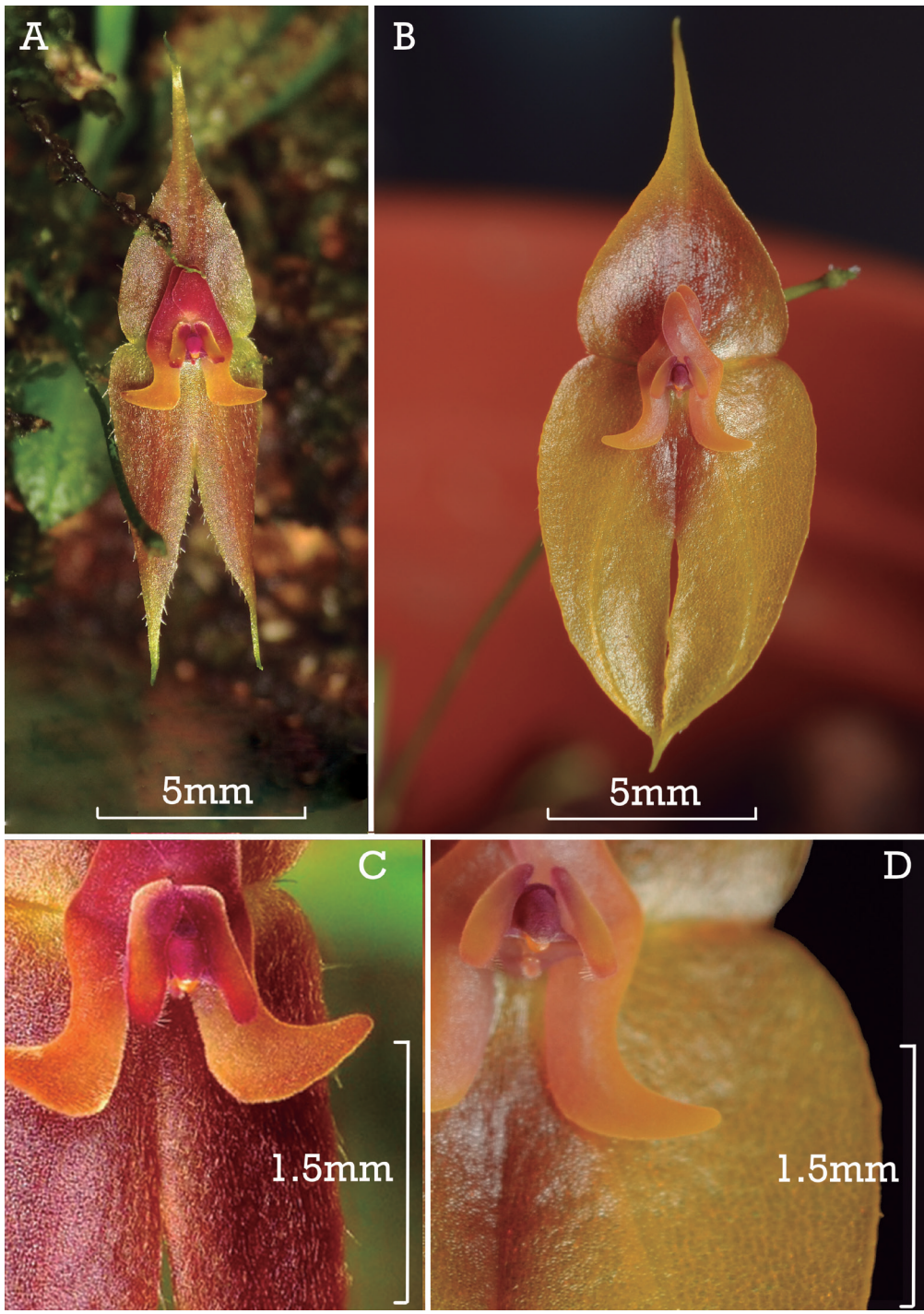

Figure 4. Comparison of *Lepanthes vere-aurum* Donoso & Baquero and *L. brenneri* Luer. **A**. Flower of *L. brenneri in situ.* **B**. Flower of *L. vere-aurum* in studio (from *JD 311 paratype, QCNE*). **C**. Lower petal lobe and lateral sepal comparison of *L. brenneri.* **D**. Lower petal lobe and lateral sepal comparison of *L. vere-aurum.* Photos by Andreas Kay† (A, C) and Luis Baquero (B, D).

Acknowledgements. The authors wish to acknowledge and dedicate this paper to Andreas Kay, who recently passed away, and is the author of the photos of *Lepanthes brenneri* used in this paper and of much other biodiversity found in Ecuador. We thank Marco Monteros for his help in this paper. We acknowledge Universidad de Las Americas (UDLA) for funding research on orchids in Ecuador. The Ministerio del Ambiente del Ecuador is acknowledged for issuing the Environmental Research Permit No. 008-2016-IC-FLO-DNB/MA. Finally, we are grateful to the Editor and the anonymous reviewers for suggestions on the manuscript.

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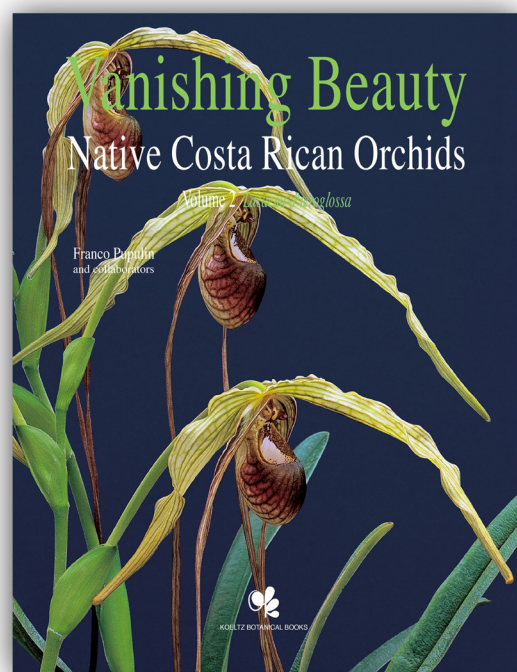
BOOKS

Vanishing Beauty. Native Costa Rican Orchids. Vol. 2: *Lacaena–Pteroglossa*, by Franco Pupulin and collaborators. Oberreifenberg, Germany, Koeltz Botanical Books, 2020. ISBN 978-3-946583-12-7. Large volume *in quarto* (25.5 × 33.0 cm), 578 pages (pp. 425–1003), 586 color photographs, one watercolor and six line drawings. Hardbound with dust jacket. 320.00 US$.



This is the second installment in a projected three-volume series dedicated to Costa Rican orchids. Those who are fortunate to have access to the first volume will continue to be pleased with this second volume; those who have not seen the first volume will be astonished by the layout and photographs of the second volume, which, incidentally, is paginated consecutively with the first (the first volume ends on page 421; the second begins with page 422, if the opposite of the cover, a photograph of *Masdevallia attenuata* (Rchb.f.) Luer, is taken into account). The second volume has different covers than the first, not only in material but in dimensions (they are slightly larger by a few millimeters), and it is slightly heavier (ca. 2.6 kg the first and 3.5 kg the second, without dust jacket).

Pupulin and 17 collaborators (listed on pages 990–991) cover 58 genera and 539 species in this volume, the latter profusely and lavishly illustrated with 586 color photographs, the vast majority captured by Franco Pupulin (images from five other photographers also appear). The genera are listed at the beginning of the book and these, like the included species, are listed at the end of the book in a detailed index of scientific names.

The authors also propose eleven novelties (listed on page 996), nine of which are new species that, in addition to being accompanied by photographs, are illustrated either with a digitization of the plant and flowers (in one case) or with drawings by various authors. One of the novelties, this time the extraordinary *Prescottia congesta* Pupulin, appears on pages 935–936 and not on 925–926, as indicated by the taxonomic novelties index.

As in the case of the first volume, the second one includes a detailed description of each genus, although

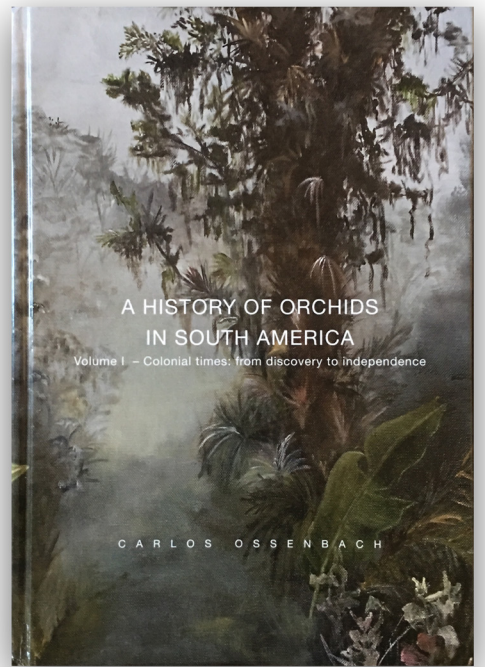
it goes a little further since they include in most cases the etymology of each genus. Two cases in particular show the dynamics of the Orchidaceae systematics in recent years: "*Maxillaria* Ruiz & Pav. and *Camaridium* Lindl.", where the first genus represents "the true Maxillarias" under the circumscription accepted by the author (F. Pupulin), and the second a segregated who has been "jumping" in and out of *Maxillaria* for many years, but that the author accepts in this treatment and that, if accepted before, obviously would have appeared in the first volume. The second case is "*Oerstedella* Rchb.f.", a genus that at the time the first volume was prepared was accepted by the author of the *Epidendrum* L. treatment (Eric Hágsater), and had been left for the second volume. However, today this circumscription does not have phylogenetic support, as the authors (E. Hágsater and E. Santiago) explain in detail, and the photographs of the species appear under *Epidendrum*.

The second volume of *Vanishing Beauty* includes a whole series of genera of ornamental importance such as *Laelia* Lindl., *Lophiaris* Raf., *Lycaste* Lindl., the already mentioned *Maxillaria*, *Mormodes* Lindl., *Oncidium* Sw. (inexplicably including *Sigmatostalix* Rchb.f.), *Otoglossum* (Schltr.) Garay & Dunst., *Paphinia* Lindl., *Peristeria* Hook., *Pescatorea* Rchb.f., *Phragmipedium* (Pfitz.) Rolfe, *Polycycnis* Rchb.f., *Prosthechea* Knowles & Westc. and *Psychopsis* Raf., among some others that, as already mentioned, are profusely illustrated. The exceptional quality of the photographs in this volume is especially evident in some genera of Pleurothallidinae, such as *Lepanthes* Sw., *Myoxanthus* Poepp. & Endl., *Octomeria* R.Br., *Platystele* Schltr., and *Pleurothallis* R.Br. *sensu stricto*, stand out for their clarity, sharpness, layout and species coverage. The photographs of this select group of Pleurothallidinae highlight not only the diversity of these genera in Costa Rica, but also the extraordinary ability of photographers (again, the vast majority of which are images of Franco Pupulin) to capture at high resolution this fascinating group of orchids; many of them imperceptible to the human eye (e.g., many of the *Platystele* species). Of course, among those interested in orchids, the Latin adage *de gustibus non est disputandum* prevails. This volume includes, as it is a comprehensive treatment of Costa Rican orchids, other genera whose images many consider less "attractive" (eg, *Microthelys* Garay), although they will undoubtedly win admirers and, in addition, appreciated by the avid orchidologist.

Although the price of this volume is relatively high, due to the print quality and the number of photographs it includes, it is recommended to all botanists and aficionados interested in the orchids of the American continent, especially those of Costa Rica and Central America, as well as those who have an interest in particular groups such as Pleurothallidinae, and all institutions that maintain libraries focused on tropical botany. Those who purchase it, will spend countless hours reading the text and admiring the photographs without a second thought to the cost.

Gustavo A. Romero-González
Orchid Herbarium of Oakes Ames
Harvard University Herbaria

A history of orchids in South America. Volume 1 - Colonial times: from discovery to independence, by Carlos Ossenbach. Oberreifenberg, Germany, Koeltz Botanical Books, 2020. ISBN 978-3-946583-24-0. Volume *in ottavo* (26.0×18.5 cm), xvi, 646 p, 548 illustrations. Hardbound. 226.00 US$.



If he's not in this book, it's because he didn't collected plants in South America...

Let me start trying to impress you with some figures, just as I was impressed by the first volume of *A history of orchids in South America*. Thirteen pages of Index of names (and this does not include the scientific names of plants, which sum another 13 pages). Seven pages of general Index. 548 illustrations (the Index of illustrations takes 11 pages), including color and black and white photographs, and color and black and white drawings. Fifteen pages of literature: you may need a few years of activity to consult them all. And, the main reason for owning and frevieweing this book, 564 pages of really enjoyable text.

Carlos Ossenbach never ceases to surprise us with his erudition and with his very personal way of telling the story of the discovery of orchids and their scientific learning in the frame of a more general history of people and the world. In many cases, this is the only possible approach to understanding the somewhat ordered *fil rouge* of history, that eventually leads to the heroes of this narrative and their work in the midst of an apparently chaotic unraveling of facts. As the other books that Ossenbach has written on the history of orchids (*Orchids and orchidology in Central America: 500 years of history*, orginally published in 2009 in this same journal and translated into Spanish in 2016, and *Orchids and Orchidology in the Antilles: An encyclopaedic history*, of 2016) also the first part of this planned South American trilogy (but will other two volumes be enough to complete the series?) offers a narrative of the story of botanical exploration in the context of the social, political and economic development of the region and the powers that concurred to its conquest.

One would not imagine that, to find the reasons for the exploration of the New World by monks of the size of Charles Plumier and Luis Éconches Feuillé, one must go back to the creation of a humble religious order of the fifteenth century and a convent built at Maire-en-Provence, around which extraordinary gardens of essences earned to its occupants the reputation of

"botanical monks" (chapter 10). Who would have imagined that, after having been the faithful shadow of Alexander von Humboldt during an extraordinary adventure of discovery in South America, Aimé Bonpland would also have contributed to making Josephine Bonaparte's gardens in Malmaison a place to cultivate and study American plants during the age of French supremacy, to finally be the witness of his protector's beheading (chapter 32)? Only by reading the pages of this book does it become clear why, in a historical perspective, the botany of the American regions under Spanish and Portuguese rule developed almost a century later than in those other regions which fell into the more liberal hands of the French, British and Dutch, and had to wait till the advent of the Enlightenment in the second half of the18th century to inaugurate the first attempts to promote the direct observation of nature.

The grand scheme of things and the small events, the great stars of botany and the minor figures, crucial facts and anecdotes, all mix and interpenetrate through a narrative that reveals Ossenbach's deep sympathy and respect for the myriad of characters who populate his book, as well as the author's intimate pleasure in researching their biographies, in examining their contributions, in sewing them together in a coherent historiography.

Together with the reports of the great scientific expeditions financed by the Spanish Crown to its American colonies, of which those of Ruiz and Pavón in Peru and Chile (1777–1815) and José Celestino Mutis in Colombia and Ecuador (1783-1808) are of utmost importance, those sent from Portugal to explore the province of Rio de Janeiro, led by José Mariano da Conceição Vellozo, and the Amazon Basin with Alexandre Rodrigues Ferreira, the development of a French botanical supremacy until 1800, the era of Linnaeus and the aforementioned Humboldt and Bonplad expedition to the New World, Ossenbach follows the routes - often unpredictable - of a large number of other botanical feats, often almost unknown, and the exploits of countless individuals who helped reveal the orchid richness of the South American continent. Six short chapters of "Geographical landmarks" interspersed with the narrative help the reader to focus on the complex physical and political geography of South America during the 16th to 18th centuries. In the Appendixes to the book, a very useful, chronologically arranged "Timeline", allows visualizing with a single glance the years, the protagonists, the places visited and the major publications of this incredible crowd of characters: in the words of the author himself, "eighty main players and dozens of supporting actors".

The first volume of the South American story comes to its end with the independence of Brazil and the Spanish colonies in the third decade of the 19th century and, according to the editor, we will have to wait until late 2021 to see the second part.

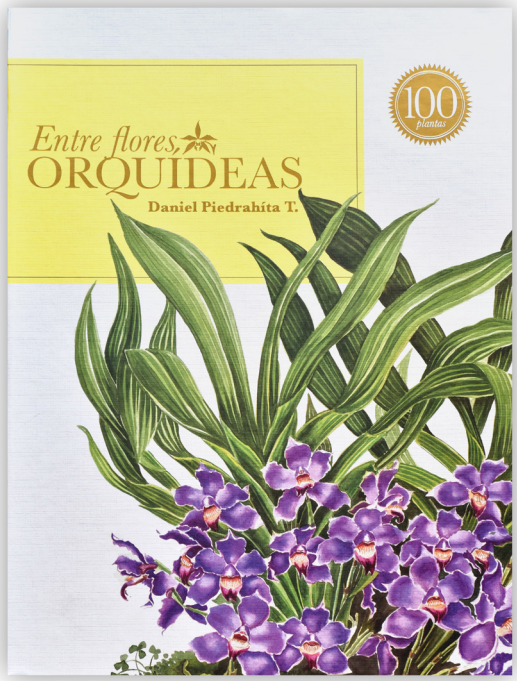
The illustrations, copious and varied, include portraits, engravings and sketches of landscapes, covers of printed works, manuscript pages, and a large number of magnificent and often unpublished drawings of orchids, which alone represent a sort of encyclopedia of botanical illustration in South America, and a very pleasant way to accompany reading.

My only criticism to this beautiful work is the mixed sue of original scientific names (basionyms) and subsequent combinations that the author adopts in the text and in the captions to the illustrations, in an attempt to keep up to date with the most recent and accepted nomenclatural changes. It is a titanic undertaking, as we well know, and which perhaps goes beyond the need for a narrative that is primarily of a historical nature.

This is a book that, in my opinion, should not be missing in any serious library of botany and history, and certainly even less in that of the orchid enthusiast.

Franco Pupulin
Lankester Botanical Garden
University of Costa Rica

Entre Flores, Orquídeas, by Daniel Piedrahita Thiriez. La Ceja, Antioquia, Colombia, Entre Flores (printed by Especial Impresores), 2019. Large volume *in quarto* (30×40 cm). Numberd edition of 300 copies, 238 pages, 100 illustrations in color, 100 photographs. Hardbound with cover box.



Offering a book is a sharing, a token of friendship, and if I ventured to measure the weight of this friendship against the weight of the book, it is truly invaluable.

After the amazement at first glance at the cover, it was with curiosity and excitement that I discovered the exceptional book of Daniel Piedrahita Thiriez brought back from Colombia by friends.

"*Entre Flores, Orquídeas*" is a large format book, illustrated by Emmanuel Laverde B. and Paula Andrea Romero, which presents itself in a marvelous pearl gray and golden box illuminated by an illustration of *Pescatoria coelestis*, then a ribbon allowing you to lift another cardboard revealing by its window a lovely painting of *Lepanthes helgae*, shuddering under the wind, which seems to welcome the reader.

And finally, the book! Rarely so much refinement has been brought to an edition. The texture of the paper, the quality of the print, the colors, the layout, the beautiful botanical illustrations, all of this contributes to real enchantment.

Then, at the bottom of the box, still another surprise... a beautiful golden yellow envelope containing around twenty remarkably reproduced illustrations, on heavyweight paper, ready to be framed.

"*Entre Flores*" is the culmination of a dream, an initiative to teach and promote the conservation of the immense biodiversity of flora and fauna in Colombia. An agronomist by academic training, and a renowned ornithologist, Daniel Piedrahita is in perpetual wonder at the luxuriant vegetation during his morning escapades in the "*selva*". It is with generosity that he shares his passion for nature and his experience as a professional grower, thus making the beauty, the luxuriance and diversity of the Orchidaceae family accessible to the reader.

On his property near Medellin, where *Hydrangea* cultures rub shoulders with the large greenhouses that accomodate his collection of orchids, more than 3000 species as well as a multitude of hybrids, have been an inexhaustible source of inspiration for

Emmanuel Laverde and Paula Andrea Romero. They are the founders of the conservation society "Arte y conservación" in Bogotá (Colombia), and authors of several illustrated publications, two remarkable naturalist and botanical artists whose illustrations, precise and lively, beautifully accompany the text.

The book contains a selection of 100 plants organized by suprageneric groups, both formal and informal. A presentation of the selection of few genera from which the 100 illustrated species are extracted, introduces the work. They are very well documented and didactic texts, indicating the parameters of the natural habitats as well as numerous detailed tips for the cultivation of the different genera.

At the core of the book, each species is presented in a double page, where the beautiful watercolor illustrations combine precision with an extremely vivid artistic representation of the plant. On the left page there is the scientific information about the species, its taxonomy, distribution and natural habitat, as well as a scale indicating the actual size of the illustrated specimens.

The treated groups are "Vandae" (including species of Angracecinae, Aerangidinae, and Aeridinae), Pleurothallidinae (7 genera), Oncidiinae and Zygopetalinae (both with 6 genera), Stanhopeinae and Lycastinae (3 genera each), *Epidendrum*, and informal groups of "Miniatures" (mostly Pleurothallidinae), "Terrestrial" (with 4 genera), and "Foreigner species" (including *Coelogyne*, *Dendrobium*, *Dendrochilum*, and *Mediocalcar*).

Two chapters are reserved for terrestrial species as well as hybrids. All the specimens represented are cultivated in the greenhouses of Daniel Piedrahita T. The book concludes with a series of 100 small photographs of the actual flowers of the species illustrated in watercolor, and a Glossary.

Being myself a compulsive collector of "beautiful books" and a botanical illustrator, I can only recommend this work which will delight any lover of beautiful books.

Sylvia Strigari
Lankester Botanical Garden
University of Costa Rica

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