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INTERNATIONAL JOURNAL ON ORCHIDOLOGY

LANKESTERIANA

INTERNATIONAL JOURNAL ON ORCHIDOLOGY

This issue of Lankesteriana is dedicated
to the memory of our colleague
Jaime A. Aguilar Velásquez
(1961-2018),
prematurely taken away
from his friends and loved ones on
May 29th, 2018

LANKESTERIANA

INTERNATIONAL JOURNAL ON ORCHIDOLOGY

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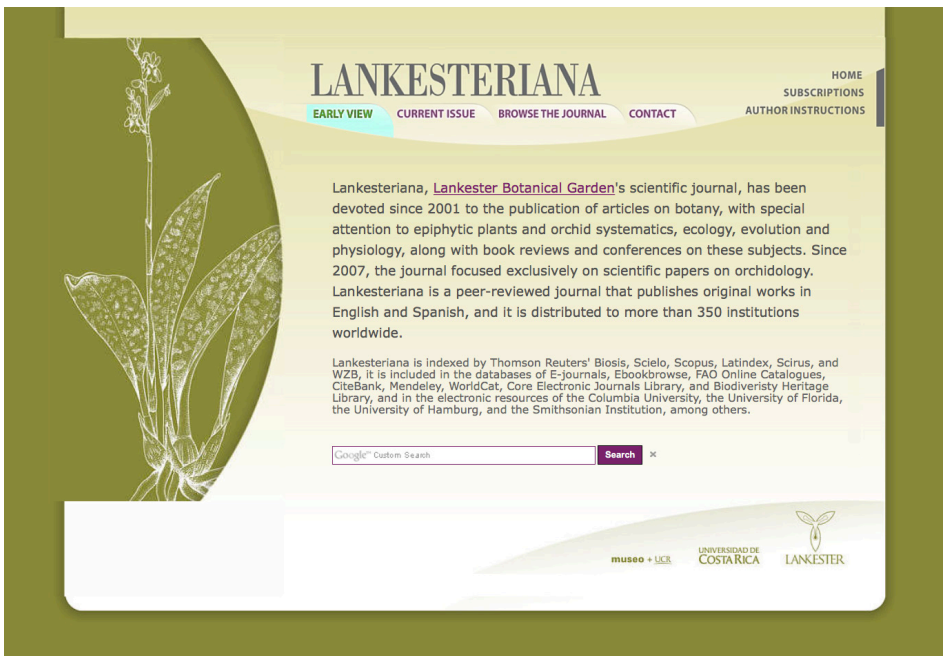

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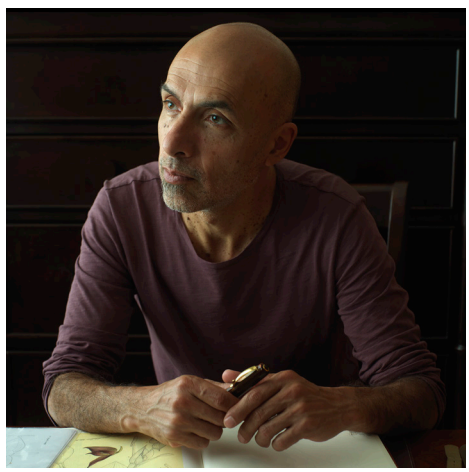
OBITUARY
JAIME A. AGUILAR VELÁSQUEZ (1961–2018)

FRANCO PUPULIN

Lankester Botanical Garden, University of Costa Rica



Jaime died almost secretly, after a short and calm fight against the father of all ills, a pancreatic cancer that defeated him at the end of last May. He had been absent from the Lankester Botanical Garden for a few months, and the privacy of his character pushed him not to bother his colleagues with the news of an evil that had no remedy. Some of us are still incredulous of his passing.

Jaime Alberto Aguilar Velásquez was the senior official at our botanical garden, where he had started working in 1985, then 24 years old, when Lankester was little more than a fascinating land with trees festooned with orchids and a small greenhouse in the most remote corner of the property. Here were grown the rarest of the plants that have been owned by the already mythical Charles H. Lankester.

During the time of the directorship of Dora Emilia Mora de Retana, Jaime took charge of the organization of Lankester's field courses, mostly devoted to the study of orchids, decorative and edible plants, and the rich ornithological fauna of Costa Rica. They were very busy courses, and to the lecture time spent in the (then) small classroom, followed splendid trips, sometimes of several days, with a bus that ran along the streets and woods of Costa Rica. Jaime often accompanied the participants along with the professors of the courses, and he became an excellent guide, particularly in the virtues and use of medicinal plants. The great botanist and dendrologist, Luis Poveda Álvarez, now Professor Emeritus with the National University, was his mentor and one of his friends. I remember Jaime, in the early Nineties, getting on the bus with a "satellite phone", the height of modernity at the time, which was much more voluminous than a good iron! When, at the beginning of the new millennium, the Botanical Garden abandoned the program of field courses, Jaime's proverbial organization was very regretted.

With the inauguration of the Lankester *in vitro* micropropagation laboratory during the late 1990s, the meticulousness and precision of Jaime's work were placed at the service of orchid conservation. Thousands of beautiful plants were taken out of the laboratory for years, making their way into the collection of the botanical garden for the joy of the visitors. Most were threatened species of the Costa Rican flora, such as *Guarianthe skinneri*, as well as species of *Brassia* and *Trichopilia*, but also uncommon miniatures such as *Pleurothallis tonduzii*, of which the living collections of our center still host dozens of splendid specimens.

Meanwhile, with a Pentax K1000 camera, a normal SMC 50 mm lens and a set of extension tubes, he used his passion and innate talent in photography to document the garden's collections on film.

In 2006, Aguilar temporarily left the Lankester Botanical Garden to move to the United Kingdom, where he soon began his research association with the Royal Botanic Garden Edinburgh (RBGE). He was an externally funded staff member of the RBGE Herbarium until 2012[1], where he mainly worked on databasing and digitization, collaborating to the goal of 250 thousand specimens imaged and online by the end of 2012[2].

His previous experience in the micropropagation laboratory allowed him to assume leadership of a research carried out at the RBGE, aimed at the *ex situ* conservation of two rare Scottish orchid species, *Dactylorhiza ebudensis* and *D. traunsteinerioides*. For this project, turfs were lifted from wild populations to ensure the best possible association between orchids and their growing environment, and wild harvested seeds were sowed in a combined *in vitro* experiment, leading to two different successful *ex situ* conservation methods[3].

In 2012 Jaime returned to the Lankester Botanical Garden, where he reincorporated as a staff member at the Research Department of the center. He took charge of the databasing of the living and auxiliary collections, including the spirit collection, the collection of pollinaria and that of dehydrated tissues in silica gel. As a fine photographer, he devoted himself to the digital documentation of selected orchid groups, within the frame of the research projects at Lankester intended to complete the treatment of Orchidaceae for *Flora costaricensis*. He was an active researcher in the difficult group of Pleurothallidinae[4,5], as well as in the study of the historical background of the discovery of orchid diversity[6,7,8].

He mastered microphotography, and his work at the Microscopy Laboratory was instrumental to the creation and launch of *e-pollinaria*, a recent project of the Lankester Garden in which Jaime took an active role. In 2014 he participated in an international symposium on the biology of the Euglossine bees, carried out at La Gamba, in the Osa peninsula of Costa Rica, where he presented a poster on the advances of the digital pollinaria collection at our research center[9]. The following year, Jaime founded the Lankester Orchid Scent Collection, as a result of a cooperative project with Dr. Santiago Ramírez of the University of California Davis, mostly focusing in species of the subtribe Stanhopeinae, well known for their pollination relationship with perfume collecting Euglossine male bees. He personally extracted the floral perfumes of tenths of *Gongora* and *Stanhopea* species, learning the technique to do it properly and teaching it to other assistants at the Lankester Garden, who hopefully will take over his work.

As a colleague, and a friend, he will be sorely missed.

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TRICHOGLOTTIS CORAZONIAE (ORCHIDACEAE: VANDEAE: AERIDINAE), A NEW SPECIES FROM THE PHILIPPINES

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Abstract. A new species of *Trichoglottis*, *T. corazoniae*, apparently endemic to Negros island, is here described and illustrated. It is closely similar to *T. tamesisii* but distinct by having forward-pointing stelidia with the upper surface being pubescent, larger flowers and a longer inflorescence. Information on the distribution, ecology and phenology are provided.

Key words: Aeridinae, endemic, Negros Occidental, new species, Orchidaceae, Philippines

Introduction. The genus *Trichoglottis* Blume (1825: 3590) was estabilised by Dr. Carl Blume in *Bijdragen tot de Flora van Nederlandsch Indie* in 1825. The designated type species of this genus is *Trichoglottis retusa* Blume. There are approximately 70 species in the genus which are distributed in the Himalayas, Union of Myanmar (Burma), Thailand, Peninsular Malaysia, Laos, Kampuchea (Cambodia), Vietnam, Indonesia, Borneo, Sulawesi (Celebes), New Guinea, the North of Australia, the islands of the Pacific and the Philippines, with about 22 species (Cootes 2011, Pelser *et al*. 2017).

Several unknown *Trichoglottis* plants were first seen in the collection of Mr. Josef Sagemuller in Tabucol, Murcia, Negros Occidental in 2014. In April 2016, three blooming plants were found in a garden by the main highway in Don Salvador Benedicto by the second author. A search for additional plants revealed that the plants can be found in the remaining forested areas of the Northern Negros Natural Park which is bounded by several cities and municipalities of the northern portion of Negros Island. Pictures of the flowers were sent then to the first and third author and they suspected that it could be an undescribed species. After a careful examination of its morphology and comparative study of relevant literature from the Philippines and neighboring countries, it turned out that the collected specimen does not match any other known *Trichoglottis* species. We hereby take this opportunity to describe this orchid as *Trichoglottis corazoniae*, a species new to science.

Materials and Methods. The measurements and descriptions were based on fresh, dried, and spirit materials. The terminology in general follows Beentje (2016). Flowers were preserved in formalin-acetic-acid-alcohol (FAA) for further study. All original materials under *Trichoglottis* from the Philippines were examined in different herbaria through high resolution images accessed at https://plants.jstor.org/. Detailed descriptions and coloured photographs of this new species as well as notes on its distribution, phenology, and ecology are provided.

Taxonomic treatment

Trichoglottis corazoniae Naive & Martyr, ***sp. nov.***

TYPE: Philippines. Visayas, Negros Occidental, Municipality of Don Salvador Benedicto, Northern Negros Natural Park, elevation 700 m asl, 12 April 2016, *M. A. Naive 024/2017* (holotype, CMUH; isotype, HNUL). Fig. 1–3b.

Diagnosis: *Trichoglottis corazoniae* is closely allied to *T. tamesisii* Quisumb. & C.Schweinf., however,

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it differs significantly in having a forward-pointing stelidia with the upper surface being pubescent (*vs*. stelidia which are upward-pointing with glabrous upper surface), an upright convex dorsal sepal with truncate apex (*vs*. nodding or arching, concave, apex rounded dorsal sepal), larger flower and a longer inflorescence (50 cm long *vs*. 25 cm long). It also differs in the coloration of the flowers and in having a downwards-pointing, puberulous labellum (*vs*. porrect, pubescent labellum). This new species is also comparable to *T. ionosma* (Lindl.) J.J.Sm. ex Hayata, however, it differs significantly in the shape of the midlobe of labellum (lanceolate *vs*. heart-shape), colour of the flowers (greenish yellow to yellow with or without reddish brown patches flowers *vs*. brown, edges of segments yellow flowers), an erect dorsal sepal and petals (*vs*. nodding or arching petals and dorsal sepal) and in having a glabrous column (*vs*. pubescent column).

Monopodial, upright, epiphytic, clumping *herb. Roots* thick, terete, glabrous, up to 0.4 cm in diameter. *Stems* cylindrical, up to 55 cm long, covered with leaf sheaths. *Leaves* elliptic to oblong, sessile, green, leathery, two ranked, glabrous, 18–23 × 4.0–4.5 cm, margin entire, apex unequally bilobed. *Inflorescence* paniculate, lax, 1–3 branches, upright, dichotomously branching, longer than the leaves, up to 50 cm long, bearing up to 20 fragrant blooms. *Pedicel with ovary* sulcate, twisted, 1.5–1.7 × 0.15 cm. *Flower* 3.5–4.0 cm, greenish yellow to yellow with or without reddish brown patches. *Dorsal sepal* narrowly obovate, truncate to slightly emarginate, slightly convex, glabrous, fleshy, 1.5–1.8 × 0.7–0.9 cm. *Lateral sepals* narrowly obovate, rounded slightly convex, glabrous, slightly fleshy, 1.3–1.6 × 0.5–0.7 cm. *Petals* oblanceolate to narrowly obovate, rounded, slightly falcate, glabrous, fleshy, sometimes slightly recurved, 1.5–1.7 × 0.5–0.7 cm. *Labellum* trilobed, lanceolate when viewed from above, fleshy, puberulous on the upper surface, 1.5–1.8 × 0.4–0.5 cm, with a thickened ridge centrally and a short spur basally, pointing downwards at a slight angle from the vertical; lateral lobes erect, squarish, apex subtruncate; midlobe relatively large, lanceolate, with a stout, fleshy, densely pilose callus in the upper surface, rostrate, upper surface of the rostrum pubescent; spur saccate, short, 0.4–0.5 cm long. *Column* stout, short, rostellate, porrect, bearing two short narrowly triangular falcate porrect arms located below the stelidia, with two stelidia; stelidia porrect, narrowly triangular, pointing forward, 0.3–0.4 × 0.1 cm, outer surface pubescent. *Anther cap* 2 × 3 mm, apex bilobulate. *Pollinia* oblate, 1 × 1 mm. *Fruits and seed* not seen.

Eponymy: Named after Mrs. Corazon Montilla Sagemuller, mother of Mr. Josef Sagemuller, who first brought the plants to the attention of the authors.

Distribution: This Philippine endemic species has only been observed and documented in the Northern

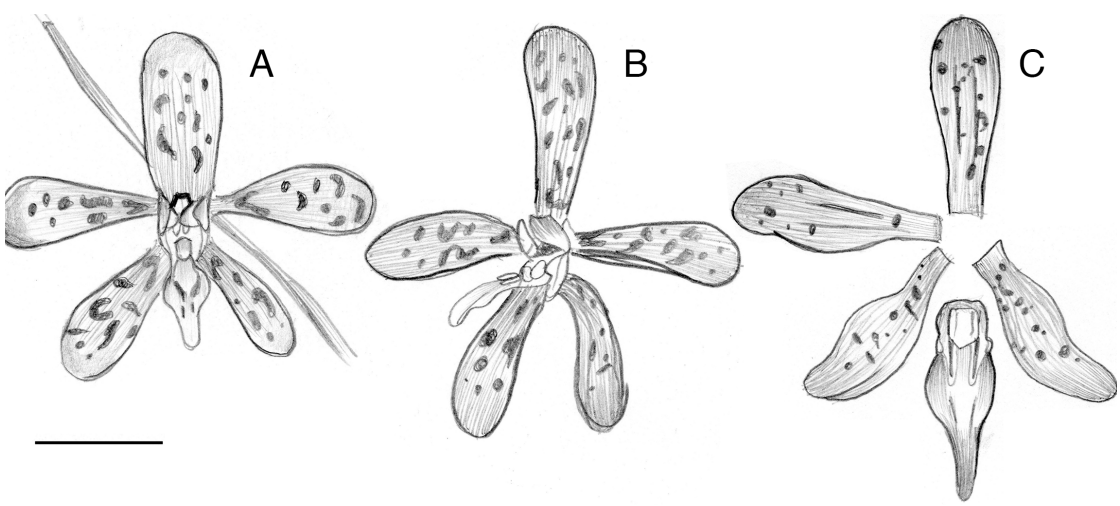

Figure 1. *Trichoglottis corazoniae.* Flower in frontal (A) and three quarters views (B). C. Perianth, flattened. Drawn by Belson Esponilla Amsicua from *M.A. Naive 024/2017*. Scale bar = 1 cm.

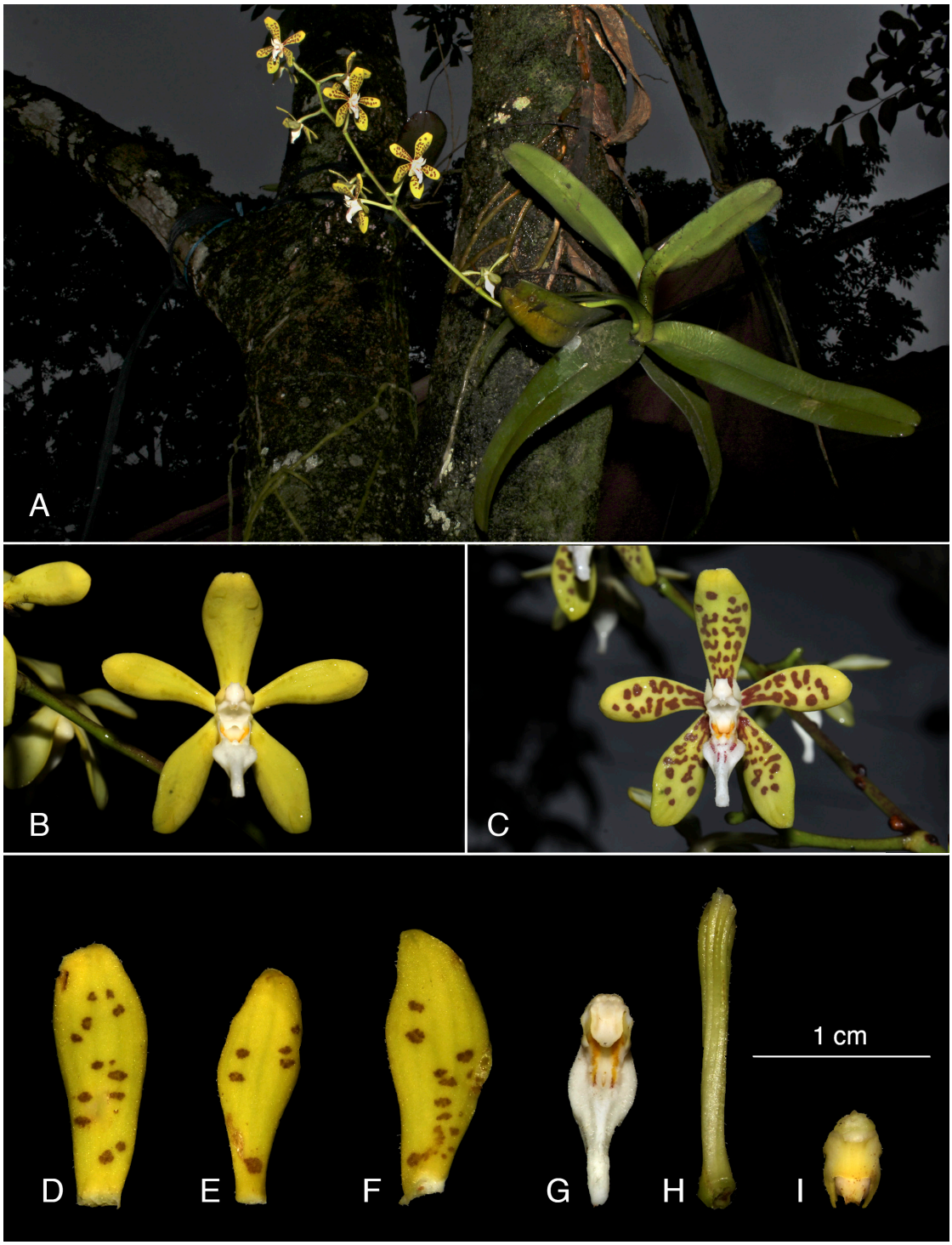

Figure 2. *Trichoglottis corazoniae.* A. Habit. B–C. Flower color variations. D–I. Dissected flower. D. Dorsal sepal. E. Petal. F. Lateral sepal. G. Labellum. H. Pedicel and ovary. I. Column and stelidia. Photographs by Mark Arcebal K. Naive from *M.A. Naive 024/2017*.

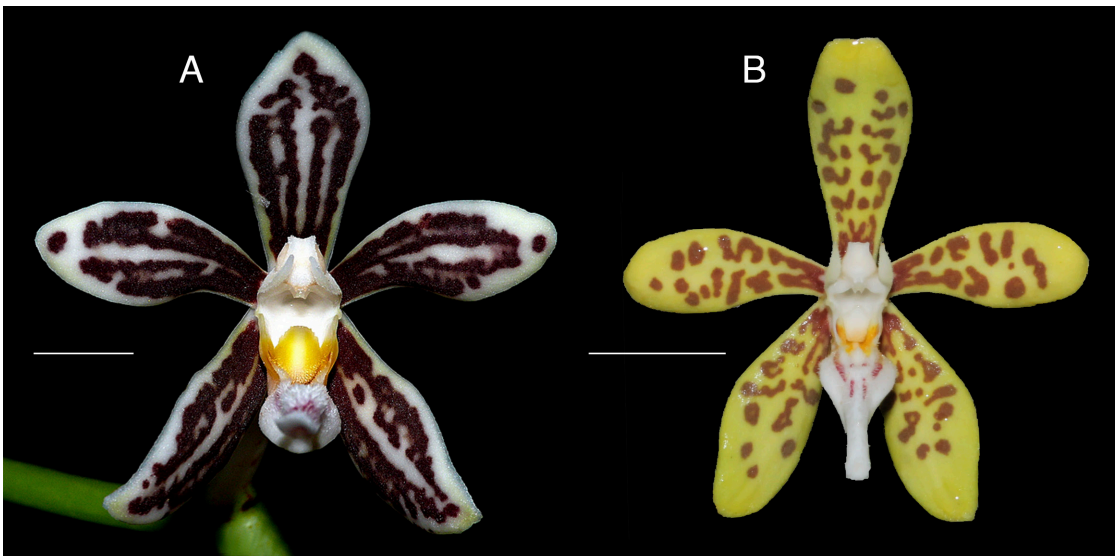

Figure 3. Flower comparison. A. *T. tamesisii.* B. *T. corazoniae*. Scale bars: A = 2 cm; B = 4 cm. Photographs by Ravan Schneider (A) and Mark Arcebal K. Naive (B).

Negros Natural Park, Municipality of Don Salvador Benedicto, Negros Occidental.

Ecology: Epiphytic in primary or secondary montane forest in half shady to brightly lit positions at 700–1000 m.

Phenology: Observed flowering under cultivation from April to June.

Conservation status: There is no adequate information to make a direct or indirect assessment of its risk of extinction based on its distribution and/or population status. Following the Red List Criteria of the IUCN (2012), we herein consider *Trichoglottis corazoniae* as Data Deficient.

Based on overall morphology, *Trichoglottis tamesisii* appears to be the closest ally of *T. corazoniae*. However, it differs significantly in having a pointing upwards stelidia with the upper surface being pubescent (*vs*. stelidia which are pointing toward each other with glabrous upper surface), an upright convex dorsal sepal with truncate apex (*vs*. nodding or arching, concave, apex rounded dorsal sepal), larger flowers and a longer inflorescence (50 cm long *vs*. 25 cm long). It also differs in the coloration of the flowers and in having a pointing downwards, puberulous labellum (*vs*. porrect, pubescent labellum). This new species is superficially resembles *T. ionosma*, however, it differs significantly in the shape of the midlobe of labellum (lanceolate *vs*. heart-shape), colour of the flowers (greenish yellow to yellow with or without reddish brown patches flowers *vs*. brown, edges of segments yellow flowers), an erect dorsal sepal and petals (*vs*. nodding or arching petals and dorsal sepal) and in having a glabrous column (*vs*. pubescent column).

Acknowledgements. This study was conducted in partnership with Philippines Biodiversity Conservation Foundation, Inc. (PBCFI) through Mr. Godfrey Jakosalem and League of Orchid Conservationists Philippines, Inc. (LOCPhil). We also thank Jim Cootes, Daniel Geiger, Mark Clements, Josef Sagemuller, Ravan Schneider, Belson Esponillo Amsicua and Ricarido Marquez for their valuable help in completing this manuscript.

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A NEW SPECIES OF *PLEUROTHALLIS* (ORCHIDACEAE: PLEUROTHALLIDINAE) FROM QUITO, ECUADOR

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Abstract. A new species of *Pleurothallis* from Ecuador, *Pleurothallis quitu-cara*, is described, illustrated and compared with the similar species *P.corysta*. The new finding is a surprise for the orchid flora of Quito and its valleys.

Resumen. Una nueva especie de *Pleurothallis* de Ecuador, *Pleurothallis quitu-cara* se describe, ilustra y compara con la especie similar *P. corysta*. El hallazgo es una sorpresa para la flora orquidácea de Quito y sus valles.

Key words: *Acronia*, callus, glenion, Hoya de Quito, *Pleurothallis quitu-cara*

Ecuador holds about 15% of the world's described species in the family Orchidaceae, with 4,032 species of orchids, a third of which are endemic to the country (León-Yánez *et al* 2011, Neil 2012, Christenhusz & Byng 2016). The diversity of orchids from Ecuador is still understudied, and new species continue to be discovered and described every year (Doucette, Portilla & Cameron 2016, Wilson *et al.* 2016, Baquero 2017, Baquero & Iturralde 2017, Baquero & Zuchan 2017, Jost & Iturralde 2017, Wilson *et al.* 2017a, b).

Within the large subtribe Pleurothallidinae, several taxonomic problems have been identified at generic and infrageneric levels (Chase & Pridgeon 2001, Karremans 2016). Traditionally, hundreds of species have been included in the genus *Pleurothallis sensu lato* (Luer 1986), but morphological and molecular analyses evidenced its polyphyly (Pridgeon & Chase 2001). Several proposals to split it have been presented, with different generic and infrageneric definitions and circumscriptions (Szlachetko & Margonska 2001, Chase *et al.* 2003, Luer 2005). *Pleurothallis jupiter* was described by Luer (1975) and placed in the section *Macrophyllae-Fasciculatae* Lindl. Szlachetko & Margonska (2001) proposed the genus *Zosterophyllanthos* for species of section *Macrophyllae-Fasciculatae*, but Luer (2005) resurrected the genus *Acronia* for previously included species in sections *Acronia*, *Amphigya* and *Macrophyllae-Fasciculatae*. Molecular analyses have evidenced that species of the section *Macrophyllae-Fasciculatae* are closely related with the type species of *Pleurothallis*, *P. ruscifolia* R.Br., thus supporting its inclusion in *Pleurothallis sensu stricto* (Pridgeon*et al.* 2001, Wilson *et al*. 2011, 2013). Based on morphological similarity to other member of the section *Macrophyllae-Fasciculatae* (Table 1), we describe here a new species as a member of the genus *Pleurothallis*.

Results

Plant material.— Specimens collected in 1994 are deposited in the collections of the Herbario de Botánica Económica del Ecuador QUSF. Flowers are preserved

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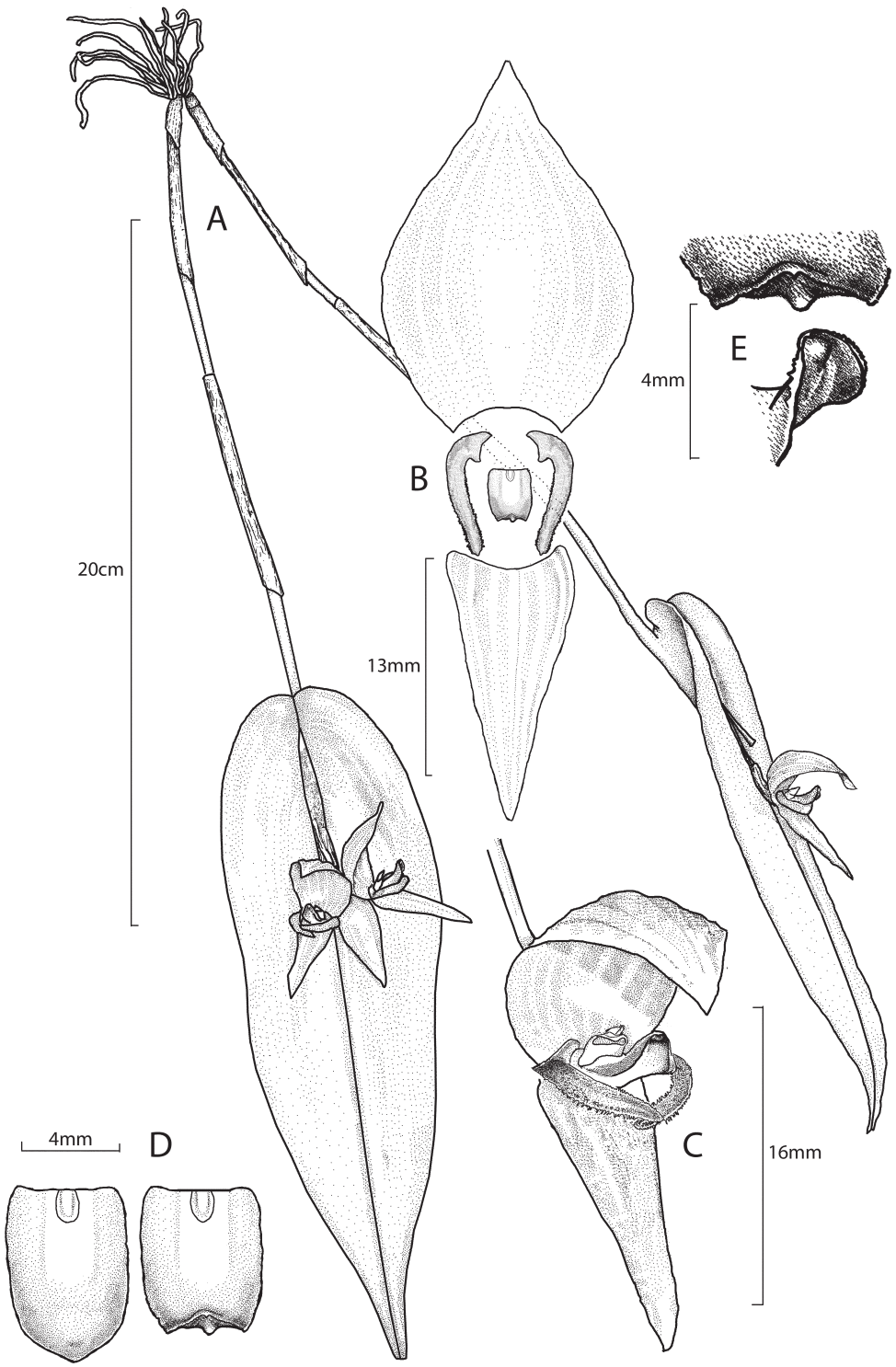

FIGURE 1. *Pleurothallis quitu-cara.* A, habit. B, disected flower. C, flower close-up. D, dorsal view of the lip, flattened (left), with normal bent apex (right). E, lip close up showing with portruding abaxial callus (Illustration: Luis Baquero).

in 75% ethanol with glicerine. Living individuals were found and examined at the type locality in 2015 and 2016, but no specimens were collected, and photographs were taken *in-situ*. Research on the material lead to the knowledge that it belonged to a new species.

Study area.— The only known population of the new species was discovered close to Quito, in the sourthern valley of Los Chillos near Pita river.

Pleurothallis quitu-cara Carrera & Baquero, ***sp. nov.*** (Fig. 1–3).

TYPE: Ecuador. Provincia de Pichincha: Valle de los Chillos, Río, -0.436431°S, -78.4118900°W, 2980 m, April 10th, 1994, *V. Zak 6543* (holotype: 2380 QUSF).

Diagnosis: *Pleurothallis quitu-cara* is similar to *P. corysta* Luer, from which it differs in the rectangular lip with an elliptical small glenion with an elevated center at the base, a minutely pubescent, protruding callus and the apex of the lip bent upwards *versus* the erect, subovate, without an obvious glenion and an elevated line on the disc and the apex of the lip not bent in *P. corysta* (Fig. 3).

Plant medium in size, epiphytic or terrestrial, caespitose, with slender roots. *Ramicauls* stout and glandular, pendent to horizontal, 25–35 cm long, with three, 8–10 cm long, tubular sheaths. *Leaf* horizontal to pendent, coriaceous, oblong, slightly undulated, leaf-margins slightly deflexed, 13–20 × 6–8 cm, base sub sessile, cordate to deeply cordate, apex rostrate and acute. *Inflorescence* a fascicle of 1–4 medium sized simultaneous flowers subtended by a spathe 1 cm long, peduncles 10–12 mm long withing the spathe; floral bracts 4.5–6.0 mm long; pedicel 7.0–8.5 mm long; ovary smooth, six-ridged, 5.0–5.5 mm long. *Dorsal sepal* deeply concave, ovate, acute, 19 × 12 mm, 7 veined, sulphur-coloured (xanthic above and below) or sulphur coloured with 7 sanguine color veins (non xanthic above, below without colored veins). *Lateral sepals* connate into a side-decurved, lanceolate, acute synsepal, 16 × 8 mm, 6 veined, yellow-sulphur coloured, powdered with sanguine color glands (non-xanthic form with more obvious). *Petals* pubescent, deeply decurved below the lip, crescent shaped, subacute, 10.0 × 1.8 mm, colored as the dorsal sepal. *Lip* oblong, 6.8 × 4.1 mm, sides bent downwards, papillose, apex obtuse, apiculate, bent upwards, with a small swollen callus underneath, pubescent at the margins, the base truncate with a small elliptical glenion with an elevated center, the quadrangular disc convex, minutely pubescent, lemon-coloured above, milk-white color at the base suffused with leather-yellow in xanthic form, lemon-coloured suffused with a sanguine color above, milk-white color at the base, suffused with leather-yellow in the middle and suffused with sanguine color below in non xanthic form. *Column* stout, 2.5 mm long, 2.3 mm wide, foot thick, rostellum and bilobed stigma apical. *Pollinia* 2, yellow.

Eponymy: Honoring Quitu-Cara, the indigenous group which originally inhabited Quito and the valley near Quito, where the known population of the new species persists.

Distribution and habitat: *Pleurothallis quitu-cara* has been found only at one locality in the Hoya de Guayllabamba, valley of Los Chillos, on the canyon of the River Pita (Fig. 4). A population of approximately 50 plants of *Pleurothallis quitu-cara* grows at the type locality. Two color forms, a xanthic and a non-xanthic form, coexist (Fig. 2B). It is not clear if the species is always represented by this two colour forms, or other phenotypes could be found somewhere else. Nevertheless, no other populations of the species are known by the authors at the moment, which does not necessarily mean *P. quitu-cara* is restricted to this single population. More exploration is needed to confirm if this original population is the only one known for the species. This finding confirms that, even so close to Quito, the capital of a well explored country, when it comes to orchids, a new species of orchid can still be found anywhere.

Conservation status and extinction risk: The type locality of *Pleurothallis quitu-cara* is located in one of the most populated valleys of the northern Andes, Los Chillos. Habitat destruction in Los Chillos is extensive, mostly produced by expansion of the agricultural frontier focused on monocultures, especially for the floral industry, and expansion of the urban frontier. The few remnants of natural ecosystems in Los Chillos are found in ravines,

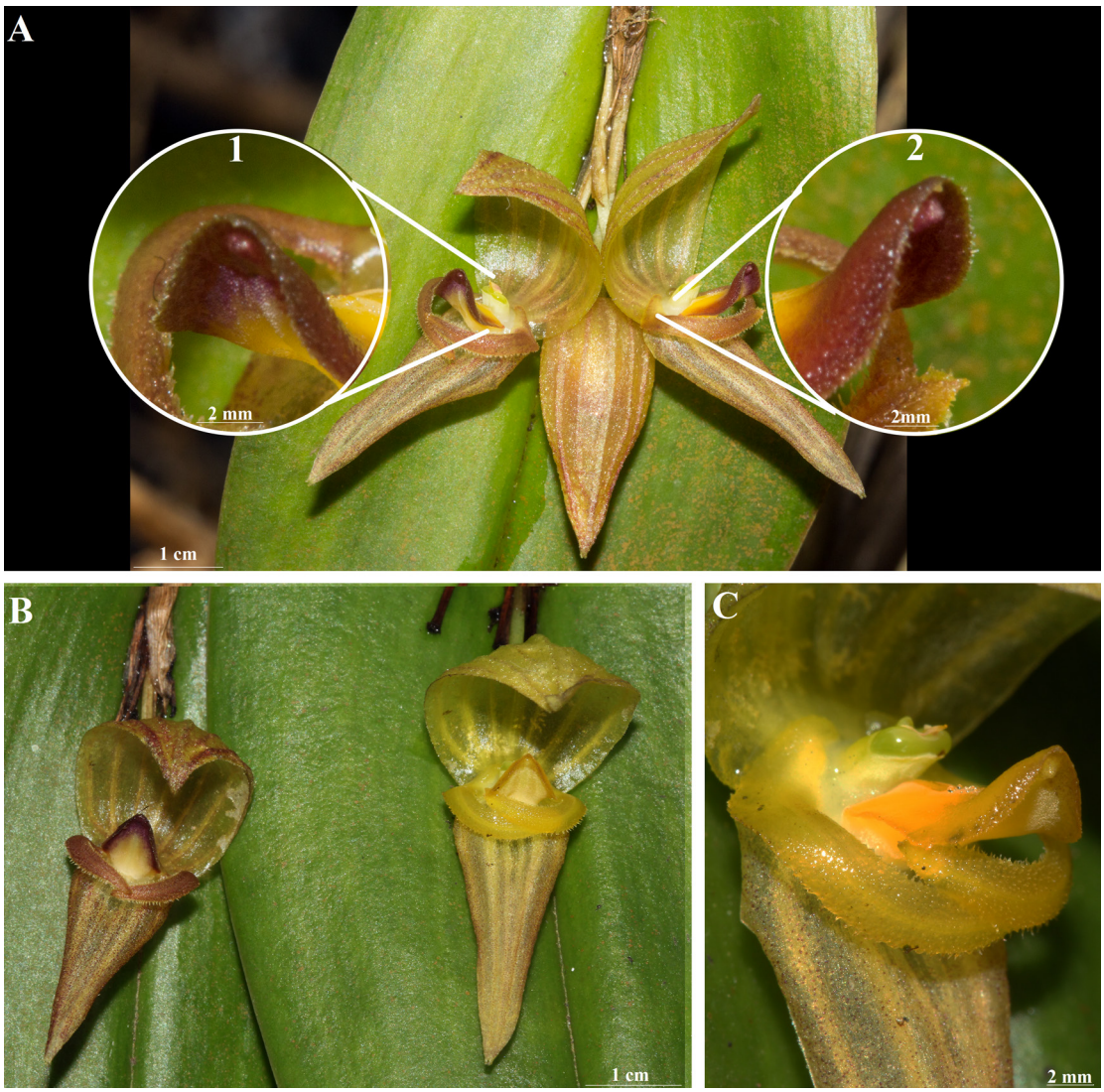

FIGURE 2. Photos of *Pleurothallis quitu-cara*. A, leaf with a inflorescence with succesive flowers; 1 = callus at the abaxial surface of the lip; 2 = apex of the lip bented upwards. B, two color forms, non xanthic form at the left and xanthic form at the right. C, petals notably crossed below the lip (Photos: Kilian Zuchan, Luis Baquero).

gorges and protective forests, although most of them are in precarious state of conservation. Unfortunately, the area is not under any type of formal protection. Exploration of additional surrounding canyons and surrounding areas is needed to confirm how restricted is the distribution of this new species. Urgent conservation actions are needed in order to preserve the known population of *P. quitu-cara* and other species that are restricted to the particular ecosystem. We are unaware of the presence of this new species in *ex situ* situations. However, it is important to remember that *in situ* conservation actions should lead the way to preserve biodiversity, while *ex situ* management by itself is only complementary and alone has little conservation impacts (Wilson *et al.* 2016).

Discussion. In its general shape of the flower, *P. quitu-cara* reminds some other species and species-complex of *Pleurothallis*; *P. corysta, P. adonis* Luer,

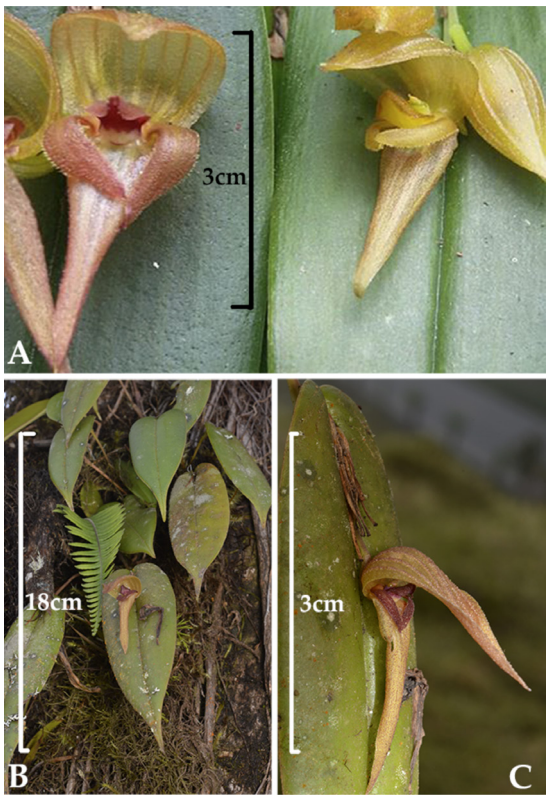

Figure 3. Comparison between *Pleurothallis corysta* Luer and *Pleurothallis quitu-cara*. A, *P. corysta* (left) and *P. quitu-cara* (right). B–C, *P. corysta in situ* (habit and flower). Photo by Martín Carrera (A) and Luis E. Baquero (B–C).

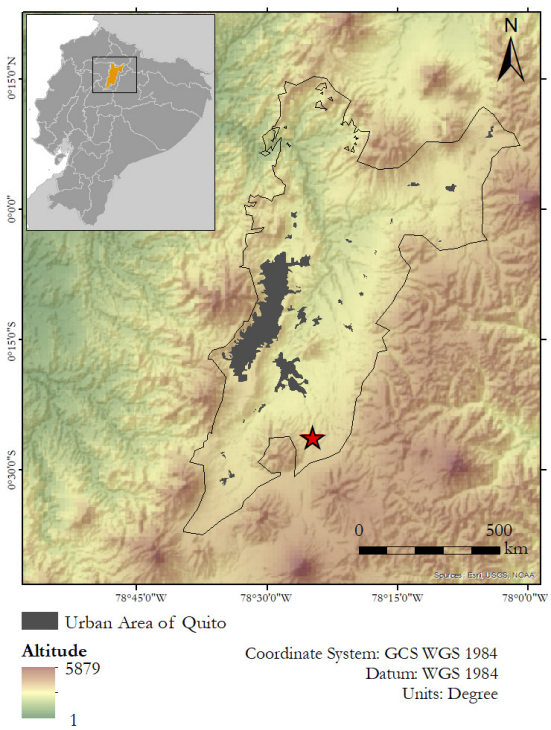

Figure 4. Collection location of *Pleurothallis quitu-cara* (red star) in the gorge of "Río Pita" in "Valle de los Chillos" near Quito (Map: Emilia Peñaherrera).

P. linguifera Lindl., *P. grandiflora* Lindl., *P. jupiter* Luer and *P. sarcochila* Garay (Table 1). It is most similar to *P. corysta* but, the size of the flowers, the pubescent, slim petals and the shape of the lip are totally different among the two species (Fig. 3). Two distinctive traits are present in *P. quitu-cara* lip; an elevated, microscopically pubescent, and quadrangular disc, and a small, protruding callus at the upward bent apex of the lip. Considering that the final portion of the lip bents upwards, the protrusion in the apex of the lip is most conspicuous and might have something to do with pollinator attraction. *Pleurothallis corysta*, on the other hand, has a similar growing habit to the new species and a swollen apex of the central vein at the apex of the lip, also similar to *P. quitu-cara* although the shape of the petals, the glabrous flowers and the absence of an obvious glenion separates it from *P. quitu-cara* (Fig. 1, 2A, 3).

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Table 1. Comparison between *Pleurothallis quitu-cara* and other related species.

Species	Ramicaul orientation	Petals position	Lip apex	Glenion	Disc
P. quitu-cara	Horizontal to pendant	Crossed forward in front of the lip	Bent upwards and with a protruding callus in the abaxial side	Elliptical, slightly elevated	Quadrangular, convex, elevated and microscopically pubescent
P. corysta	Suberect to horizontal	Downwards, decurved	Sides revolute above the middle, the apex narrowly obtuse with the end of the mid vein beneath markedly swollen	Not obvious	Subrhombic to broadly elliptical. Glabrous
P. jupiter	Suberect	Forward (petal tips touching)	Sides bent downwards and tip remains unfolded	Broad, above the base	Subquadrate, verrucose and ciliate above the middle
P. adonis	Erect	Forward (without crossing)	Sides bent downwards, tip unfolded	Small, at the base	Not given
P. linguifera	Erect	Forward (petals tips may touch)	Slightly bent downwards with a small crest like	Small at the base	Not given
P. grandiflora	Erect	Downwards	Bent upwards with a canal in the middle	Above the base	More or less convex
P. sarcochila	Erect	Down and forward	Bent downwards	Not given	More or less convex

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USO DEL MICROHÁBITAT POR *ENCYCLIA PYRIFORMIS* (ORCHIDACEAE) EN LA RESERVA ECOLÓGICA LOS PRETILES, CUBA

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Resumen. La distribución de las plantas epífitas está influenciada por las características de su forófito, que provee el sustrato necesario para el establecimiento. *Encyclia pyriformis* (Lindl.) Schltr. es una especie característica de las arenas blancas del Occidente de Cuba, con una distribución restringida, lo cual es un elemento clave para el manejo y mantenimiento de la población en el tiempo. El objetivo del trabajo es caracterizar el uso del microhábitat de *E. pyriformis* y analizar la relación entre las variables ambientales y morfológicas. El estudio se realizó en 39 parcelas (25 m^2), en la Reserva Ecológica Los Pretiles. Se identificaron a los individuos de *E. pyriformis,* en los cuales se midieron seis variables ambientales y cuatro morfológicas. Los valores promedios de las variables ambientales fueron de 9.42 cm de diámetro del tronco, 66.58% de cobertura vegetal, 373 m de distancia a la costa, 0.84 m de altura sobre el suelo y 2.37 m de altura del forófito. Para las variables morfológicas los valores promedios fueron de 24.9 cm para altura del individuo, 1.87 cm de diámetro del pseudobulbo, 13.62 cm y 2.06 cm de largo y ancho de la hoja, respectivamente. No se encontró correlación entre las variables ambientales y morfológicas. La ausencia de correlación entre los dos grupos de variables parece indicar que la combinación de variables ambientales analizadas no tienen un efecto evidente sobre la morfología de los individuos de *E. pyriformis*. Entender los factores ambientales que limitan y afectan la distribución de las especies es crítico para el mantenimiento de la diversidad. Identificar los factores que limitan el potencial de colonización de las orquídeas permitiría predicciones certeras ante cambios futuros en la comunidad y el ecosistema, lo cual puede influir en las estrategias de manejo de la especie.

Abstract. The distribution of epiphyte plants is strongly influenced by the characteristics of the host plant, which provides the area needed for the establishing process. *Encyclia pyriformis* (Lindl.) Schltr. is typical from the white sands region of eastern Cuba, with a restricted distribution which is a key element when managing the population over time. The goal of this research is to characterize the use of the microhabitat of *E. pyriformis* and to analyze the relation between the environmental and morphological variables. The study was carried out in 39 plots (25 m^2) in the Ecological Reserve Los Pretiles. Individuals of *E. pyriformis* were identified and six environmental variables were measured. The average values of the environmental variables were 9.42 cm for the diameter of the trunk, 66.58% for the vegetal cover, 373 m for the distance from the coast, 0.84 m for the height above ground and 2.37 m for the height of the host plant. For the morphological variables the average values were 24.9 cm for the height of the individual, 1.87cm for the diameter of the pseudobulb, 13.62 cm and 2.06 cm respectively for the length and width of the leaf. No correlation was found between the environmental and morphological variables. This seems to indicate that the combination of environmental variables analyzed apparently do not have an effect on the morphology of *E. pyriformis*. To understand the environmental factors limiting and affecting the distribution of species is critical to keep of biodiversity. To identify the factors limiting the colonization's potential of orchids would enable accurate predictions faced with future changes in the community and the ecosystem, which could influence the management strategies for this species.

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Palabras clave: *Acoelorrhaphe wrightii*, epífitas, forófito, microhábitat, micrositios de establecimiento

Key words: *Acoelorrhaphe wrightii*, epiphytes, host plant, microhábitat, microsites of establishment

Introducción. Uno de los principales objetivos en los estudios ecológicos es determinar los factores que limitan la distribución y abundancia de las especies de plantas (Godínez-Alvarez & Valiente-Banuet 2004). Los factores limitantes son una combinación de condiciones bióticas y abióticas que operan a diferentes escalas tanto espaciales como temporales, y que definen en gran medida la distribución de las especies (Maldonado & Mondragón-Chapano 2007). La comprensión de estos factores limitantes permite identificar las condiciones necesarias para la supervivencia de las especies a escala de paisaje (Münzbergová & Herben 2005), y en consecuencia determinar los hábitats donde son más efectivas las medidas de manejo. Todo esto puede ser crítico para el mantenimiento de la diversidad (Gowland *et al*. 2007). La disponibilidad de agua, luz, el rango de temperatura y el tipo de suelo son algunos de los factores que probablemente limiten la distribución de muchas especies (Guo *et al*. 2011, Song *et al*. 2013). En general, la preferencia del hábitat es asumida como adaptativa, y si las condiciones son buenas en estos sitios, se produce una selección natural que mantiene tales preferencias (Martin 1998).

La distribución de las plantas epífitas está fuertemente influenciada por las características de su forófito, que provee el sustrato necesario para el establecimiento (Hirata *et al*. 2009). Entre las características del forófito de mayor influencia está la arquitectura arbórea (Flores-Palacios & Ortíz-Pulido 2005, Otero *et al*. 2007, Winkler & Hietz 2001), las características físicas y químicas de la corteza, su estabilidad, la disponibilidad de área colonizable y la cobertura vegetal (Callaway *et al*. 2002, Maldonado & Mondragón-Chapano 2007). Estas características junto a las condiciones microclimáticas y los requerimientos ecofisiológicos de las epífitas puede limitar la distribución y abundancia de las mismas (Maldonado & Mondragón-Chapano 2007, McCormick *et al*. 2012).

Los factores limitantes no actúan de manera independiente, según Hirata *et al*. (2009) estos pueden interactuar entre sí, por lo que para entenderlos es necesario un análisis simultáneo de los mismos. Estudios en la última década han examinado la influencia del tamaño del hospedero sobre la diversidad de epífitas, encontrando una fuerte relación entre ambas variables (ver Hirata *et al*. 2009). En el caso de las orquídeas sus microhábitats preferenciales están más limitados aún, debido a que sus semillas dependen de la disponibilidad de hongos micorrízicos para germinar y establecerse (Flores-Palacios & Ortíz-Pulido 2005).

Las orquídeas constituyen una de las familias más numerosas de la flora de Cuba, con un alto grado de especies endémicas y un 71% de epifitismo (García-González *et al.* 2016). Una de estas especies endémicas es *Encyclia pyriformis* (Lindl.) Schltr., característica de las arenas blancas del Occidente de Cuba (Ackerman 2014, Vale *et al*. 2014). Esta orquídea tiene hojas cortas e inflorescencias con pocas flores (con respecto al resto de las especie del género), labelo obcordado y crestas del labelo que terminan en cuernos. Hasta el momento se considera una epífita específica del tronco de la palma *Acoelorrhaphe wrightii* (Griseb. & H.Wendl.) H.Wendl. ex Becc. (Vale *et al*. 2014). Su escasa y restringida distribución dificultan los estudios de autoecología, lo cual provoca que se desconozca el efecto que puedan tener ciertas variables ambientales sobre el desarrollo de los individuos de *E. pyriformis*. Esta información podría ser clave en el desarrollo de planes para su manejo exitoso, dado que es una especie que vive cerca de costas, la cual puede verse seriamente afectada por los efectos del cambio climático. Teniendo en cuenta estos aspectos el presente estudio tiene como objetivos caracterizar el uso del microhábitat de *E. pyriformis* y analizar la relación entre las variables morfológicas y el microhábitat usado en la Reserva Ecológica Los Pretiles, Cuba.

Materiales y métodos

Área de estudio.— El estudio se realizó en junio de 2015 en la Reserva Ecológica Los Pretiles, ubicada en la región noroeste del municipio Mantua, Pinar del Río (Fig. 1). El área protegida tiene una extensión de 37,100 ha, de las cuales 451.8 ha son de zona terrestre (Márquez *et al*. 2015). La temperatura media anual se mantiene alrededor de los 25.7°C y las precipitaciones no superan los 1,100 mm anuales. El bosque de pino es

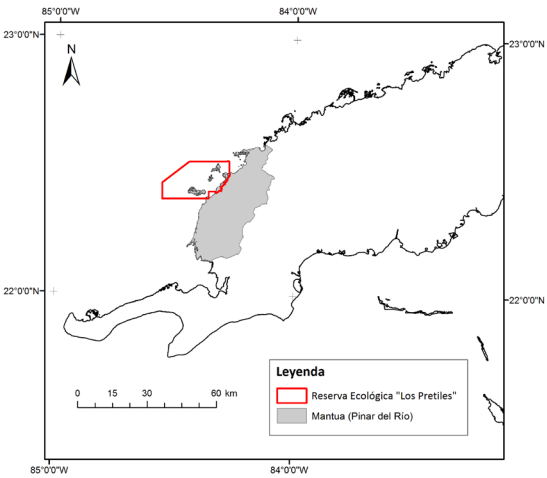

Figura 1. Mapa de la Reserva Ecológica Los Pretiles localizada en Mantua, Pinar del Río, Cuba.

una de las principales formaciones vegetales del área y está constituido por un bosque abierto cuyos árboles (*Pinus tropicalis* Morelet) ocupan entre el 20–40% de la cobertura. El estrato superior está compuesto, principalmente por *Acoelorrhaphe wrightii*, *Tabebuia lepidophylla* (A.Rich.) Greenm., *Byrsonima pinetorum* C.Wright ex Griseb., *Lyonia ekmanii* Urb., *Lyonia lucida* (Lam.) K.Koch y *Morella cerifera* (L.) Small.

Muestreo y análisis de datos.— El muestreo se realizó en el pinar Los Pretiles, perteneciente al sector 1 "La Isla", donde se marcaron 39 parcelas de 25 m^2, posicionadas en 4 recorridos lineales perpendiculares a la línea de costa. Para ubicar las parcelas se siguió un muestreo sistemático, con una distancia de 15 m entre cada parcela, con inicio en la línea de costa y con una separación de 50 m entre cada recorrido lineal. Debido al crecimiento cespitoso de esta y otras especies de *Encyclia* (Vale *et al*. 2014) delimitar un individuo genéticamente diferente de otro puede ser un tarea inviable en el campo. Por esta razón se siguió el criterio de Sanford (1968), quien define a un individuo como un grupo de rizomas y hojas pertenecientes a una misma especie, que forman una unidad claramente delimitada (Fig. 2). Este mismo criterio fue utilizado por Zotz (2007) para varias especies de orquídeas y otras epífitas.

Dentro de las parcelas se identificaron a todos los individuos de *E. pyriformis* y para cada uno se midieron seis variables externas (o ambientales): diámetro del tronco ocupado, cobertura vegetal, distancia a la costa,

Figura 2. *Encyclia pyriformis* sobre *Acoelorrhaphe wrightii* en la Reserva Ecológica Los Pretiles.

altura sobre el suelo, altura del forófito y orientación. El diámetro del tronco fue medido con un pie de rey en la misma zona donde estaba la orquídea. La altura del forófito se midió con una cinta métrica, y la cobertura vegetal mediante una fotografía tomada encima de cada individuo de *E. pyriformis*. Las fotos fueron procesadas en el programa *GapLight Analysis*, que permite calcular el porcentaje de cobertura de cada imagen. Para calcular la distancia a la costa se tomaron las coordenadas geográficas de cada parcela, las cuales se montaron sobre el mapa de línea de costa de Cuba, en el sistema de información geográfica *ArcGis* 10.1. La orientación de cada individuo en el forófito fue determinada con una brújula. Además, sobre cada individuo se midió: la altura de la orquídea, el diámetro del pseudobulbo (correspondiente a la hoja mayor), y el largo y ancho de la hoja mayor. Algunas mediciones fueron realizadas con una cinta métrica (error 0.1 cm) y otras con un pie de rey (error 0.01 cm). En las 39 parcelas fueron identificados y muestreados 138 individuos de *E. pyriformis*.

Tabla 1. Estadísticos descriptivos de las variables ambientales de los individuos de *Encyclia pyriformis* (n=138) en la Reserva Ecológica Los Pretiles, Cuba.

Variable	Media	Dev. Std.	LC inf (95%)	LC sup (95%)	Min	Max
Diámetro del tronco (cm)	9.42	1.84	9.11	9.73	6.2	13.9
Cobertura vegetal (%)	66.58	20.80	63.07	70.08	0	94.43
Distancia a la costa (m)	173.1	114.8	153.78	192.43	0	373
Altura sobre el suelo (m)	0.84	0.52	0.75	0.93	0	2.30
Altura del forófito (m)	2.37	0.84	2.22	2.51	0.69	5

Se calcularon los estadísticos descriptivos para las variables ambientales (media, desviación estándar de la media, límites de confianza, mínimo y máximo). Se realizó una prueba de Mantel (10,000 iteraciones), para determinar si existía relación entre las variables morfológicas y las variables ambientales (sin considerar la orientación por ser una variable nominal). Además, se relizaron pruebas de Mantel (10,000 iteraciones) entre las variables morfológicas y las variables ambientales por separado.

Resultados. Los individuos de *E. pyriformis* en la Reserva Ecológica Los Pretiles siempre fueron encontrados sobre *A. wrightii* y se encontraban como promedio en troncos de 9.42±1.84 cm de diámetro, y con un valor máximo de 13.9 cm (Tabla 1). La mayor concentración de individuos de la orquídea estuvo entre los 7.3 y 9.3 cm de diámetro, con un total de 62. La segunda mayor concentración de individuos de *E. pyriformis* se encontró entre los 10.5 y los 12.5 cm de diámetro del tronco ocupado (Fig. 3A). Seis individuos de *E. pyriformis* presentaron valores de cobertura de 0%, por lo que representan orquídeas que estaban complemente expuestas a la luz solar. El valor promedio de esta variable fue de 66.58±20.8%, siendo 94.43% el valor máximo de cobertura registrado para la especie (Tabla 1). El 91% de los individuos se encontraron en valores de cobertura entre el 40 y el 95% (Fig. 3B). Por debajo de este rango solo exitían unos pocos individuos.

Encyclia pyriformis puede crecer desde la línea de costa hasta 373 m costa adentro (Tabla 1). La mayoría de los individuos fueron reportados en los intervalos de 0–60 m y 241–300 m (Fig. 3C). Como promedio los individuos de *E. pyriformis* se encontraron a 0.84±0.52 m sobre el suelo, reportándose un individuo que estaba a nivel de suelo y otro a 2.3 m sobre el suelo (Tabla 1), lo que representan los valores extremos de la variable. Cerca del 8% de los individuos de *E. pyriformis* se encontraron en alturas inferiores a 1 m (Fig. 3D), y solo 2 individuos fueron registrados en alturas superiores a los 2 m sobre el suelo.

El valor promedio de la altura del forófito (*A. wrightii*) fue 2.37±0.84 m (Tabla 1). El 96% de los individuos de *E. pyriformis* se encontraron en forófitos que presentaron alturas entre 1 y 4 m (Fig. 3E). Al analizar las variables altura del forófito y altura sobre el suelo de la orquídea, se observa que el valor promedio de la primera fue 2.37 m y el de la segunda de 0.84 m. Esto demuestra que *E. pyriformis* solo aprovecha un 35 % del área disponible y siempre hacia el primer tercio del forófito. El valor máximo de altura sobre el suelo donde se encontraron individuos de *E. pyriformis* fue de 2.30 m mientras que la altura máxima de su forófito fue de 5 m.

La orientación cardinal encontrada con mayor frecuencia en la población de *E. pyriformis* fue la norte con un total de 32 individuos (Fig. 4). La segunda orientación que más se presentó en la población fue la helicoidal, en la cual los individuos le dan la vuelta a todo el tronco en el cual se desarrollaban. Las exposiciones menos frecuentes fueron las sureste con solo seis individuos, la oeste con ocho y noroeste con nueve individuos (Fig. 4). Los estadísticos descriptivos de las variables morfológicas de *E. pyriformis* se muestran en la Tabla 2.

No se encontró correlación estadísticamente significativa entre las variables ambientales y las variables morfológicas de *E. pyriformis* (Fig. 5). El valor de la prueba de Mantel para esta correlación múltiple fue de 0.047, con un valor de probabilidad del 8%. Al correlacionar las variables ambientales con las morfológicas de manera independiente (Tabla 3), se puede observar que solo existió correlación estadísticamente significactiva para las variables

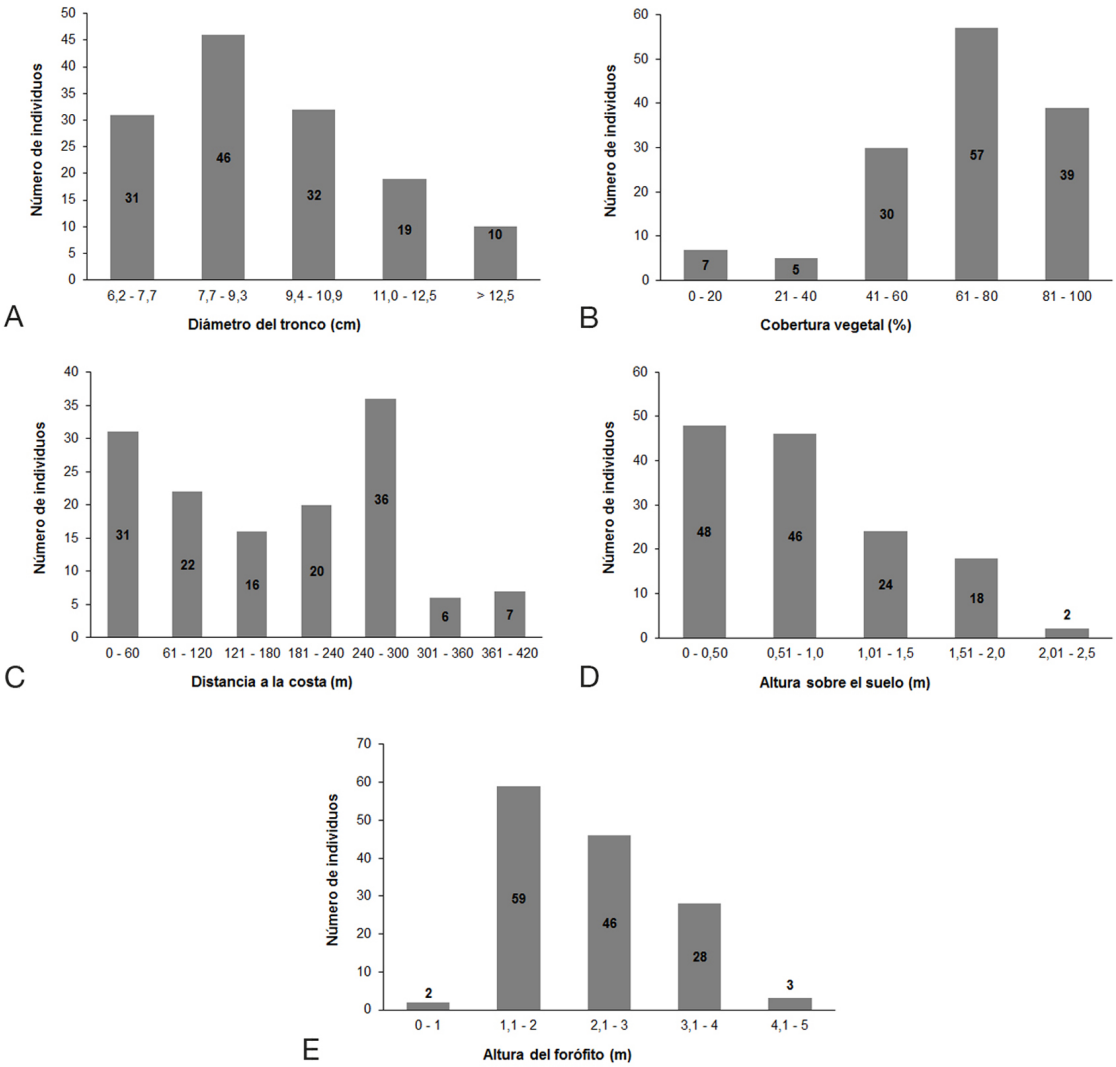

Figura 3. Proporción de individuos de *Encyclia pyriformis* por intervalos de condiciones ambientales. (A) Diámetro del tronco, (B) Cobertura vegetal, (C) Distancia a la costa, (D) Altura sobre el suelo, (E) Altura del forófito. Medidas en la Reserva Ecológica "Los Pretiles", Cuba.

diámetro del tronco y distancia a la costa. Al parecer estas son las dos variables que presentaron algún tipo de influencia sobre la morfología vegetal de *E. pyriformis*.

Discusión. A una escala local como la del presente estudio, la distribución de las especies es, en teoría, limitada por la disponibilidad de micrositios apropiados y por la capacidad de dispersión de cada especie (Frei

Tabla 2. Estadísticos descriptivos de las variables morfológicas de los individuos de *Encyclia pyriformis* (n=138) en la Reserva Ecológica Los Pretiles, Cuba.

Variable (cm)	Mean	Std. Dev.	LC inf (95%)	LC sup (95%)	Min	Max
Altura del individuo (cm)	24.90	11.51	22.96	26.84	4	61
Diámetro del pseudobulbo (cm)	1.87	0.54	1.77	1.96	0.4	3.4
Largo de la hoja mayor (cm)	13.62	5.56	12.68	14.56	2	30
Ancho de la hoja mayor (cm)	2.06	0.58	1.96	2.15	0.3	3.8

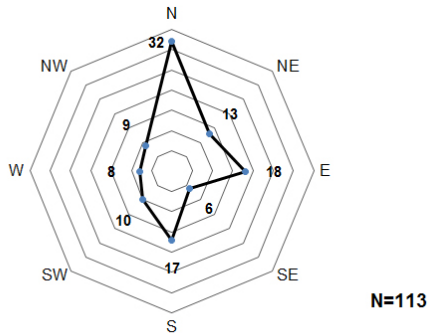

FIGURA 4. Diagrama de las orientaciones cardinales de *Encyclia pyriformis* en la Reserva Ecológica Los Pretiles, Cuba.

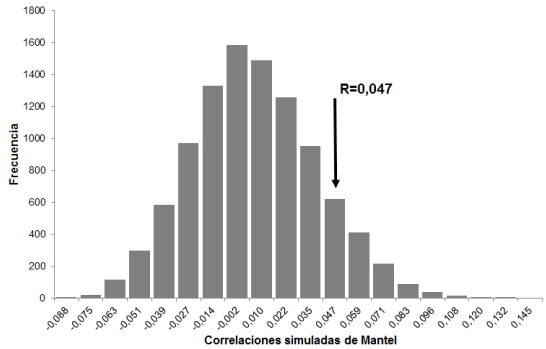

FIGURA 5. Histograma de frecuencia donde se muestran las correlaciones simuladas de Mantel (10,000 iteraciones) entre las variables ambientales (diámetro del tronco, altura sobre el suelo, cobertura vegetal, altura del forófito, distancia a la costa) y las variables morfológicas (altura de la orquídea, diámetro del pseudobulbo, largo y ancho de la hoja mayor) de *Encyclia pyriformis*. R de Mantel=0,047.

et al. 2012). En la mayoría de orquídeas la dispersión es mediada por el viento (González *et al*. 2007), lo que hace más azaroso el movimiento de las diásporas. La disponibilidad de micrositios como principal factor limitante ha sido reportado para otras especies de orquídeas como *Oncidium poikilostalix* (Kraenzl.) M.W.Chase & N.H.Williams (García-González *et al*. 2011), *Ionopsis utricularioides* (Sw.) Lindl. (García-González & Riverón-Giró 2014) y *Telipogon helleri* (L.O.Williams) N.H.Williams & Dressler (García-González & Damon 2013). Según Frei *et al*. (2012) las principales causas de disponibilidad de micrositios idóneos son factores ambientales como el clima, el suelo y la sucesión vegetal. Además de factores bióticos como la competencia y otras interacciones como es la presencia de hongos micorrízicos apropiados, sin los cuales la germinación de las semillas de orquídeas es imposible (Winkler *et al*. 2009).

Otros factores no identificados relacionados con las condiciones del microhábitat pueden limitar la ditribución y la abundancia de las orquídeas (McCormick *et al*. 2012, Otero *et al*. 2013). Los valores mínimos y máximos de las variables analizadas representan las condiciones extremas en que se desarrollan los individuos de *E. pyriformis* muestreados en la Reserva Ecológica Los Pretiles. Los resultados obtenidos permiten asegurar que los individuos de *E. pyriformis* no usan de manera homogénea el área del forófito, de hecho usan menos del 40% del área disponible y siempre hacia la porción inferior del forófito. Esto podría estar influenciado por la alta intensidad lumínica que inside sobre las zonas más altas del forófito y por el hecho de que la humedad relativa en las zonas inferiores del forófito es mayor. Esta última causa cobra gran importancia si se tiene en cuenta que las orquídeas epífitas son organismos que requieren de altos valores de humedad relativa (Maldonado & Mondragón-Chapano 2007). Benavides *et al*. (2005) encontraron que la mayor concentración de epífitas de la amazonía estaba en la base de los troncos.

TABLA 3. Valores de las correlaciones simuladas de Mantel entre cada una de las variables ambientales y las variables morfológicas (**correlación estadísticamente significativa).

Variable	R Mantel	Percentil inferior (2.50 %)	Percentil superior (97.50 %)
Diámetro del tronco (cm)	0.140**	-0.066	0.076
Cobertura vegetal (%)	0.011	-0.077	0.109
Distancia a la costa (m)	0.0559**	-0.047	0.0553
Altura sobre el suelo (m)	0.004	-0.068	0.083
Altura del forófito (m)	-0.028	-0.070	0.087
Todas las variables	0.047	-0.057	0.064

La mayoría de los individuos de *E. pyriformis* presentaron valores de cobertura superiores al 50%, esto apoya lo planteado por Arévalo & Betancour (2006) y por Guo *et al*. (2011) de que la intensidad lumínica es uno de los factores que más influye en la distribución de las orquídeas epífitas. También puede ser explicado por el hecho de que las especies epífitas pueden experimentar daños en el fotosistema ante altos valores de intensidad lumínica (Callaway *et al*. 2002). Según Flores-Palacios y Ortiz-Pulido (2005) uno de los principales factores de mortalidad de las orquídeas es la desecación; esta puede ser la causa del hecho de que casi todos los individuos de *E. pyriformis* se encontraran en las porciones inferiores de los troncos de *A. wrightii* y en valores de cobertura vegetal superiores al 50%. La baja variabilidad que presentó el diámetro del tronco del forófito sugiere que esta variable podría ser de gran importancia en la selección de micrositios para *E. pyriformis*. Esto concuerda con Arévalo & Betancour (2006), quienes plantean que el diámetro del tronco, su inclinación y posición, presencia de ramificaciones y su rugosidad son factores que influyen en la distribución de las plantas epífitas.

El diámetro del tronco, la cobertura vegetal y la altura del forófito son variables que caracterizan a la especie hospedera. Según Hirata *et al*. (2009) una combinación de rasgos del hospedero determina la presencia de epífitas. La especie que actúa como forófito provee el sustrato para las espífitas, por lo que el establecimiento de estas se ve afectado por rasgos del hospedero que incluye el área del tronco disponible para el establecimiento de la epífita, las características físicas y químicas de la corteza, la arquitectura del forófito y la cobertura vegetal (Hirata *et al*. 2009). En el caso de las orquídeas con una elevada afinidad por uno o pocos forófitos, la preferencia de microhábitat depende en gran medida de la preferencia de microhábitat de su(s) forófito(s) (Otero *et al*. 2007). En el caso de *E. pyriformis*, que es altamente específica para *A. wrightii* (Ackerman 2014, Vale *et al*. 2014), cabría esperar que su distribución se vea altamente influenciada por los requerimientos de hábitat de su forófito.

La ausencia de correlación entre las variables ambientales y morfológicas parece indicar que la combinación de variables ambientales analizadas no tienen un claro efecto sobre la morfología de *E. pyriformis*. Sin embargo, la prueba de Mantel analiza solamente correlación lineal entre las variables, puede ser el caso de que la correlación que exista entre estas variables no siga esta premisa. A pesar de no existir una correlación evidente, el valor de la R de Mantel (valor de correlación obtenido) cae cerca de los extremos de la distribución de frecuencias. Lo cual puede ser tomado como una evidencia de que puede existir algún tipo de influencia no detectada por la prueba estadística. El análisis de cada variable por separado mostró un resultado similar, pues tres de las variables analizadas no presentaron correlación significativa con las características morfológicas. Una limitación del presente estudio es el "conflicto de estados de vida" o de "cambio ontogenético del nicho", que plantea que la calidad del micrositio puede cambiar entre la semilla, la plántula y el adulto. Un micrositio puede ser favorable para que el estado de semilla se establezca, pero se vuelve menos favorable para otros estados (Scott & Morgan 2012). Aún así, entender los factores ambientales que limitan y afectan la distribución de las especies es crítico para el mantenimiento de la diversidad (Gowland *et al*. 2007). Esto cobra gran relevancia cuando se trabaja con orquídeas epífitas, que son especialmente sensibles al cambio climático (Seaton *et al*. 2013). Desde el punto de vista conservacionista, investigar los factores que limitan el potencial de colonización de esta orquídea permitiría predicciones certeras ante cambios futuros en la comunidad y el ecosistema lo cual puede influir en las estrategias de manejo de la especie.

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PLEUROTHALLIS CHICALENSIS, A NEW SPECIES IN SUBSECTION *MACROPHYLLAE-FASCICULATAE* (ORCHIDACEAE: PLEUROTHALLIDINAE) FROM NORTHWESTERN ECUADOR

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Abstract. A new species of *Pleurothallis* in subsection *Macrophyllae-Fasciculatae* from Ecuador is described, illustrated and its relationship with other species is discussed. *Pleurothallis chicalensis* is compared with *P. dewildei*, from which is distinguished by the ovate leaves, the yellow flowers with broadly obovate synsepal and the transversely cordate lip with apiculate apex.

Resumen. Una especie nueva de *Pleurothallis* de la subsección *Macrophyllae-Fasciculatae* de Ecuador es descrita, ilustrada y su afinidad con otras especies es discutida. *Pleurothallis chicalensis* se compara con *P. dewildei*, de la cual difiere por las hojas ovadas, las flores amarillas con el sinsépalo ampliamente obovado y el labelo transversalmente cordado con el ápice apiculado.

Key words: Andes, Carchi, *Pleurothallis bovilingua*, *Pleurothallis dewildei*, taxonomy

Introduction. In the genus *Pleurothallis* R.Br. *sensu* Pridgeon *et al.* (2005) there are between 478 and 625 species (Wilson unpubl. data), depending on synonymy, making it the third largest genus in Pleurothallidinae, after *Lepanthes* Sw. and *Stelis* Sw. The genus is distributed from Central America and the Caribbean Islands to South America, where most of the species are epiphytes in cloud forests of the Andes (Doucette *et al*. 2016).

Section *Macrophyllae-Fasciculatae* Lindl. was created as part of *Pleurothallis* infrageneric classification by Lindley (1859), which was later considered by Luer (1986) in his initial systematics of genus *Pleurothallis* and subsequently demoted to a subsection of the same name (Luer 1988). However, in 2005 he resurrected the genus *Acronia* C.Presl, grouping the subsections *Acroniae* (C.Presl) Luer and *Macrophyllae-Fasciculatae* (Lindl.) Luer (Luer 2005).

Recently, phylogenetic relationships of *Pleurothallis* have been evaluated from DNA sequence analysis (Pridgeon *et al.* 2001, Wilson *et al.* 2011, 2013, unpubl. data). The studies revealed the close relationship of subsection *Macrophyllae-Fasciculatae* with the type species *Pleurothallis ruscifolia* (Jacq.) R.Br. that supports the inclusion of this group within *Pleurothallis versus Acronia* (Wilson *et al.* 2016).

Luer (2005) in revision of subsection *Macrophyllae-Fasciculatae* indicated that members of the group are distinguished by their sessile leaves with a cordate base, single flowers with lateral sepals connate into a synsepal, and a bilobed stigma. Since

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Luer's revision, about a dozen new species have been described in this group, bringing the number to between 236 and 305 species, depending on synonymy (Wilson unpubl. data).

Northwestern Ecuador has been the source of several new orchid discoveries in the recent years. Exhaustive exploration carried out in the forests of El Carchi Province, near the Colombian border has resulted in the discovery of species like *Porroglossum raoi* Baquero & Iturralde and *Platystele baqueroi* Jost & Iturralde. In 2016, Luis Baquero found an unknown species of *Pleurothallis* from subsection *Macrophyllae-Fasciculatae* in this area. This species with intense, yellow flowers and cordate lip is described here.

Taxonomy treatment

Pleurothallis chicalensis M. Jiménez & Baquero, ***sp. nov.*** (Fig. 1, 2A–B).

TYPE*:* Ecuador: El Carchi Province, near Cerro Colorado, Chical-El Carmen road, 00°54.74'N, 78°12.34'W, 1590 m, 4 June 2016, *LB 3033* (holotype, QCNE!).

Diagnosis: Similar to *Pleurothallis dewildei* Luer & R. Escobar, from which it differs in the ovate leaves, the yellow flowers with broadly obovate synsepal and the widely cordate, apiculate lip with involute margins *versus* the narrowly ovate leaves, purple flowers with ovate synsepal and the broadly cordate-ovate lip with obtuse, saccate apex of *P. dewildei*.

Plant medium in size, *ca.* 20 cm tall, epiphytic, caespitose. *Roots* numerous, slender *ca.* 1 mm wide. *Ramicauls* green, erect, slender, 10–30 cm long, enclosed by a tubular, brown sheath running through the second third from the base, and 1–2 other tubular sheaths near the base. *Leaf* green above, microscopically papillate, dull, light green underneath, perpendicular to the ramicaul, coriaceous, ovate, acuminate, 7–18 × 4–8 cm, edge entire, the base sessile, deeply cordate, with lobes connate for 1 cm. *Inflorescence* a solitary flower, resupinate, produced successively from a reclining spathaceous bract *ca.* 1 cm long; peduncle *ca.* 3–5 mm long concealed within the spathe, floral bract 3 × 2 mm, pedicel *ca.* 6 mm long. *Ovary* 5 mm long, clavate, almost straight. *Flower* 20–23 × 13–18 mm, bright-yellow. *Sepals* glabrous to microscopically papillose; *dorsal sepal* ovate, 12–13 × 8 mm, 9-veined, obtuse, margin microscopically glandulous; *synsepal* broadly obovate, 10–11 × 8–9 mm, 10-veined, subacute, margin microscopically papillous. *Petals* obliquely triangular-ovate, acute, 7–8 × 2.0–2.5 mm, 3-veined. *Lip* broadly cordiform, obtuse with a minute rounded apiculus, 4 × 4–5 mm, 5-veined, with involute margins starting near the middle towards the apex, microscopically pubescent; the base subtruncate with a short, deflexed claw, hinged to the column-foot; *glenion* a small depression between the basal lobes of the lip, surrounded by a slightly convex disc, thickened to the sides. *Column* stout, yellow-green, 2.0 × 1.6 mm, stigma bilobed. *Anther cap* apical, yellow, narrowly deltoid. *Pollinia* 2, narrowly ovoid.

Paratype*:* Cerro Oscuro, near Chical, 00°54.445'N, 78°11.63'W, 1499 m, 29 October 2016, *Baquero 3065* (paratype: QCNE!, flowers preserved in alcohol).

Eponymy: Named after Chical, a small town in El Carchi Province of Ecuador close to the type locality.

Distribution and habitat: *Pleurothallis chicalensis* has been found in two localities, close to Cerro Colorado on the Chical-El Carmen road and in Cerro Oscuro near the small town of Chical (Fig. 3). Two individuals were found growing at the type locality and a population of fifteen plants was found at the second locality. It was also found around La Planada Natural Reserve, Department of Nariño in southwestern Colombia (Fig. 3), based on a color photograph in the book *Orquídeas en la Niebla* (Orejuela 2011). The color and morphology of flowers is consistent between populations.

Pleurothallis chicalensis is sympatric with *P. imperialis* Luer and *P. crucifera* Luer & Hirtz, two species confined to northwestern Ecuador. In Cerro Oscuro it is also found with *Scaphosepalum swertiifolium* (Rchb.f.) Rolfe, *S. cimex* Luer & Hirtz and other pleurothallids. Near Cerro Colorado, it is found growing next to *P. imperialis, P. crucifera*, *Sobralia lancea* Garay, *S. crocea* (Poepp. & Endl.) Garay, *S. macrophylla* Rchb.f. and *S. ecuadorana* Dodson.

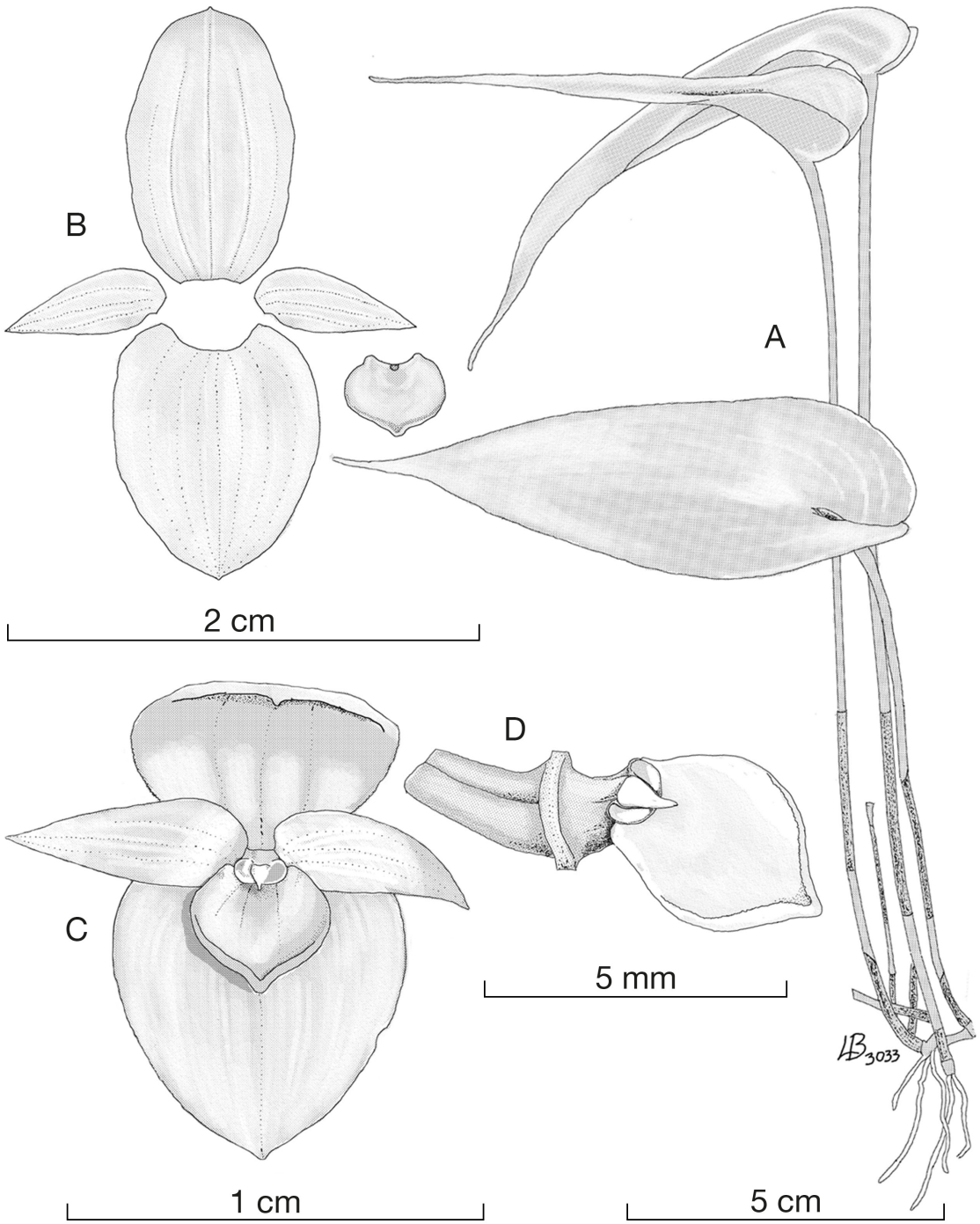

Figure 1. *Pleurothallis chicalensis* Jiménez & Baquero A. Habit. B. Dissected flower. C. Flower close-up. D. Column and lip, lateral view. Illustration by Luis Baquero based on the holotype.

Conservation status: Both Ecuadorian localities are near the Colombian border, however, the plants at the type locality are threatened by road works, while the population of Cerro Oscuro is protected in Ecominga's

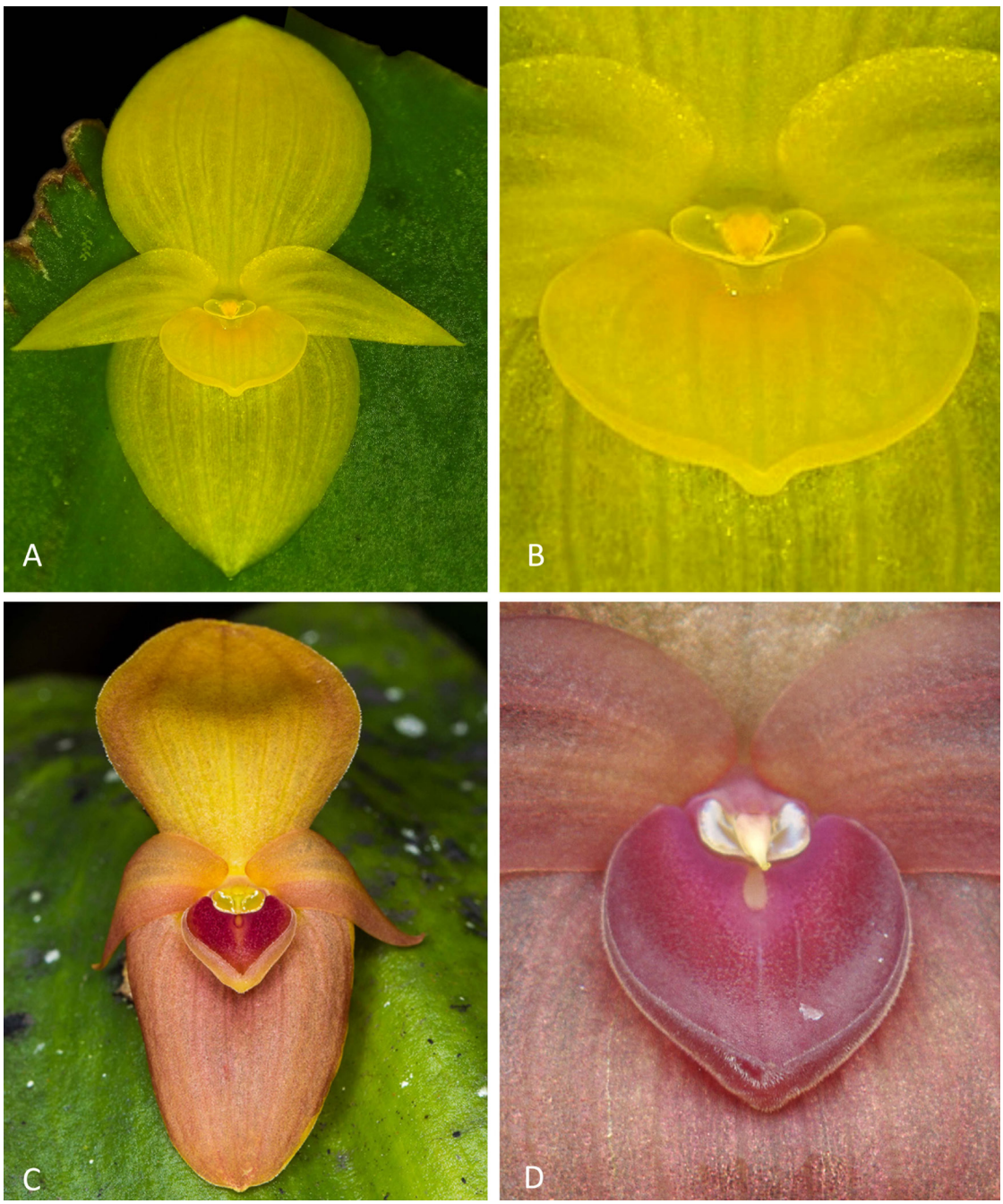

FIGURE 2. *Pleurothallis chicalensis* flower (A) and lip (B), and *Pleurothallis dewildei* flower (C) and lip (D). Photos by Andreas Kay (A–B), Sebastian Vieira-Uribe (C) and Mark Wilson (D).

Dracula Reserve. The status of the population near La Planada in Nariño, Colombia is unknown. Until further assessment can be performed, the species should be considered "data deficient" (DD) under IUCN criteria.

Discussion. Due to morphology and geographic proximity, *P. chicalensis* is probably most closely related to *P. dewildei* (Fig. 2C–D, 4–5), *P. bovilingua* Luer & R. Escobar (Fig. 4–5), and *P. calolalax* Luer &

Figure 3. Distribution of *Pleurothallis chicalensis* (white stars) in Ecuador and Colombia and *P. dewildei* (black star) in Colombia.

R. Escobar (Fig. 5). The vegetative and floral features shared are the unusually wide, obliquely triangular petals and the wide lip, which is remarkable in species of *Macrophyllae-Fasciculatae* subsection. However, *P. chicalensis* is easily recognized in this group of species inside the subsection, by the uniformly bright yellow flowers and the broadly cordate shape of the lip. Other significant differences between these species are detailed in the Table 1.

Both *P. chicalensis* and *P. dewildei* occur in the Pacific slopes of the Andes (Fig. 3). The type locality for *P. dewildei* is south of Pueblo Rico, Risaralda, Colombia, on the Pacific slope of the Western Cordillera (Luer 1998) (Fig. 3). Unfortunately, *P. bovilingua* was described without collection data.

Acknowledgments. We acknowledge to Universidad de Las Américas (UDLA) for funding research on orchids of Ecuador. The Ministerio del Ambiente is acknowledged for issuing Environmental Research Permit 008-2016-IC-FLO-DNB/MA. We also want to thank Andreas Kay and Sebastian Vieira for giving us permission to use their photos.

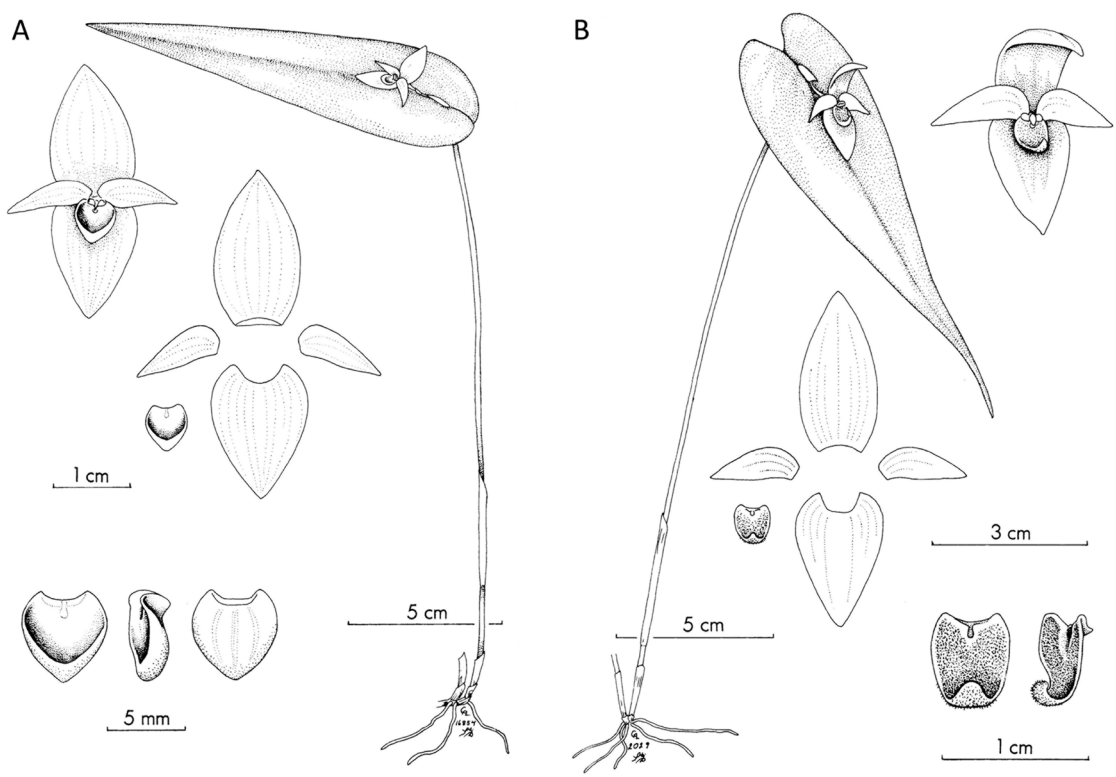

Figure 4. Drawings of A. *Pleurothallis dewildei* and B. *Pleurothallis bovilingua* (Reproduced from Luer (2005) courtesy of Missouri Botanical Garden Press).

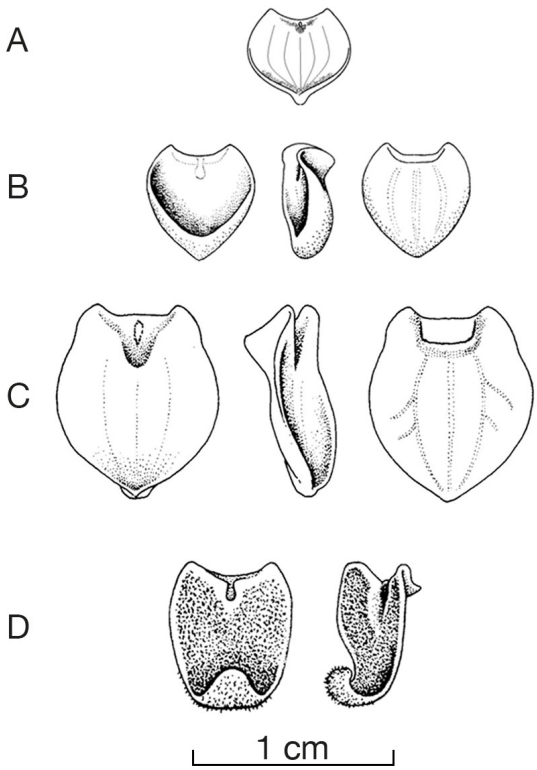

Figure 5. Lip drawings. A. *Pleurothallis chicalensis*, frontal view. B. *Pleurothallis dewildei*, frontal, lateral and ventral view. C. *Pleurothallis calolalax,* frontal, lateral and ventral view. D. *Pleurothallis bovilingua*, frontal and lateral view. (Modified from Luer (2005) courtesy of Missouri Botanical Garden).

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Table 1. Comparison of *Pleurothallis chicalensis* to *P. dewildei* and *P. bovilingua*.

Plant part	*P. chicalensis*	*P. dewildei* [a]	*P. bovilingua* [a]
Leaves	Ovate, 7–18 × 4–8 cm	Narrowly ovate, 10–15 × 3.0–4.5 cm	Narrowly cordate-ovate, 9–20 × 2.5–5.0 cm
Flowers	Bright yellow	Purple, dorsal sepal purple to yellow	Light rose-brown, lip darker
Synsepal	Broadly ovate, obtuse, 10–11 mm × 8–9 mm	Ovate, subacute synsepal, 17 × 12 mm	Ovate, acute, 24–25 mm × 17.0 mm, 8-veined
Lip	Broadly cordiform, 4 × 4–5 mm, 5-veined, with involute margins, apiculate	Broadly cordate-ovate, 6.0 × 5.5 mm, apparently 3-veined, concave with involute margins above the middle, obtuse	Ovate, 7 × 6 mm, apparently not veined, acute, incurved

[a] Obtained from Luer (1998).

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ORCHIDS IN THE ERA OF GRIGORY VON LANGSDORFF: TWO GOLDEN DECADES IN THE HISTORY OF THE BOTANICAL EXPLORATION OF BRAZIL (1813-1830)

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Abstract. The figure of Grigory Ivanovich von Langsdorff was largely neglected by the scientific literature of the 19th and 20th centuries. German-born von Langsdorff was consul of the Russian Empire in Rio de Janeiro. His activities in Brazil from 1813 to 1830 are here described, a time during which his house in Rio and his famous *fazenda Mandiocca* became the center of scientific activity and the point of attraction for European travellers and naturalists who flocked to Brazil after its frontiers were opened to foreigners in 1808 by King João VI of Portugal. Wilhelm Freyreiss, Friedrich Sellow, Maximilian zu Wied-Neuwied, Augustin de Saint-Hilaire, Carl Friedrich Philipp von Martius, Johann Baptist von Spix, Giuseppe Raddi, Johann Baptist Emanuel Pohl, and Ludwig Riedel are among those who explored Brazil impulsed by von Langsdorff and often under his patronage. Their journeys in Brazil culminated in von Langsdorff's ill-fated expedition to the interior of Brazil between 1822 and 1829, while the epilogue is marked by Langsdorff's return to Germany, in a state of insanity and no longer able to publish the results of his life-long scientific efforts.

Key words: botanical history, Brazil, exploración, exploration, historia de la botánica, orchids, orquídeas

After the Portuguese court moved to Rio de Janeiro in 1808, and Brazil opened its ports after centuries of isolation, the country became an El Dorado for European travellers and naturalists, especially since it would take until 1825 for the Spanish colonies to gain their independence and open their borders to foreigners.

Brazil's immense territory — 8.5 million square kilometers — was, with exception of part of its coast, at that time mostly unexplored. This offered outstanding opportunities for the many scientists and adventurers who soon arrived. That an important number of them were Germans was largely a consequence of the impulse given to the scientific exploration of Brazil by a German-born naturalist, the Baron von Langsdorff, who had first set foot in Brazil in 1803, and afterwards made his home there from 1813 to 1830.

At the same time, the marriage of Dom Pedro, the eldest son of King João VI of Portugal, to Princess Maria Leopoldina of Austria in 1817, brought further notable scientists who travelled to Brazil under her patronage, namely the Italian Giuseppe Raddi, the Austrian Johann Pohl, and the Germans von Martius and von Spix.

Georg Heinrich von Langsdorff. Better known by his Russian names, Grigory Ivanovich, Baron von Langsdorff (1774 –1852) (Fig. 1) was a German-Russian naturalist and explorer as well as a Russian diplomat. A member and correspondent of the Russian Imperial Academy of Sciences and a respected physician, Langsdorff graduated in medicine and natural history from the German University of Göttingen.

In the first decade of the 19th century, Langsdorff had already gained considerable experience as an explorer. He had become a Russian citizen and participated as naturalist and physician in the Russian scientific circumnavigation expedition of 1803 to 1805, under the command of Ivan Fedorovich Kruzenstern. The expedition sailed across the Atlantic spending several months (1803-1804) in the southern Brazilian state of Santa Catarina, before continuing around Cape Horn and into the Pacific. This was Langsdorff's first contact with tropical America. He left the expedition when it arrived at the peninsula of Kamchatka and set off to explore the Aleutian, Kodiak and Sitka islands. He then sailed from San

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FIGURE 1. Grigory Ivanovich Langsdorff, Baron von Langsdorff (1774.1852) in 1809. Engraved by F. Lehmann from a drawing by L. Bojanus.

FIGURE 2. Location of Langdorff's *Fazenda Mandiocca.* In Baldini & Guglielmone, 2012: 6.

Francisco to Siberia and travelled overland to Saint Petersburg, arriving in 1808.

After being nominated consul general of the Russian Empire in Brazil, Langsdorff arrived in Rio de Janeiro in 1813. He would live in Brazil until 1830. His house soon became the center of scientific activity in and around Rio de Janeiro. Langsdorff hosted and entertained, and quite often sponsored, foreign naturalists and scientists. Among them were such prestigious names as Georg Wilhelm Freyreiss (who had travelled to Rio employed as his "aide-naturaliste"), Friedrich Sellow, Prince Maximilian Alexander Philipp zu Wied-Neuwied, William Swainson, Augustin Saint-Hilaire, Frei Leandro de Sacramento (who named the new genus *Langsdorfia* in the Rutaceae in the baron's honor), Ludwig Riedel, and Maria Graham Callcott.

In 1816 Langsdorff acquired his famous country retreat, *Fazenda Mandiocca*, in the vicinity of Porto Estrela (today part of the municipality of Magé, Rio de Janeiro) (Fig. 2). Here he developed a farm and turned his house and property into a cultural and scientific nucleus by creating a museum of natural history, a botanical garden and a vast library. According to Kommisarov, one of Langsdorff's biographers, Mandiocca *"had a large main house, other houses which were let to travellers, many other dependencies, a coffee plantation with some 30-40,000 plants, and hundreds of slaves, giving the impression of a typical Brasilian fazenda of its days. The marvellous botanical garden, a library containing selected works in all fields of science and its multiple scientific collections made of Mandiocca the scientific center of Rio de Janeiro, a place frequently visited by foreign travellers. There one could find representatives of the intellectuality of the capital, intermingled with local artists and Russian seamen. It was, undoubtedly, the center of culture of Brazil in the old days"* (Kommisarov 1994).

On more than one occasion, the *fazenda* received a Royal visit from Dom Pedro and Dona Maria Leopoldina. It is said that it was Langsdorff's enthusiastic collaboration with the scientific interests of the Austrian Archduchess that laid the foundations for many of the natural history expeditions of their time, including those of Carl Friedrich Philipp von Martius, Johann Baptist von Spix, Giuseppe Raddi,

and Johann Baptist Emanuel Pohl. These expeditions produced some brilliant results, such as von Martius' *Flora Brasiliensis,* published between 1840 and 1906. Langsdorff himself undertook numerous excursions around Rio de Janeiro and, more importantly, in the Province of Minas Gerais during the years between 1813 and 1821, sending many of his botanical and zoological collections to Saint Petersburg. He was untiring, absolutely indifferent to all difficulties and expected the same from all others. Saint-Hilaire, who collected with him during this period, although a much younger man, complained about not being able to keep up with Langsdorff's pace.

A much larger portion of Brazil's immense territory was explored during Langsdorff's time than during the previous three centuries. The scientific results were exceptional, and Langsdorff's role has been, even up to the present, largely underestimated.

Georg Wilhelm Freyreiss. Born in Frankfurt, the son of a shoemaker, Georg Wilhelm Freyreiss (1789-1825) showed an early interest in natural history. This brought him into contact with the respected ornithologist Meyer in Offenbach, who recommended him to Langsdorff in Saint Petersburg. Freyreiss travelled to Russia, and in 1812 left with von Langsdorff for Rio de Janeiro. However, due to stormy weather the journey was interrupted, and they were obliged to winter in Sweden. Freyreiss took advantage of the opportunity to visit Stockholm and Uppsala, where he made the acquaintance of the eminent botanists Olof Peter Swartz and Carl Peter Thunberg, who furnished Freyreiss with letters of recommendation to Lorentz Westin, the Swedish Consul in Rio. Once in Rio, Freyreiss soon had personal differences with Langsdorff. This led him to take a position with Westin, representing the interests of the Royal Academy of Sciences in Stockholm in collecting material for the herbaria of Stockholm and Uppsala. In July 1814 Freyreiss went to Minas Gerais, taking part in a trip organized by Baron Wilhelm von Eschwege, then director of the mining companies of Brazil and one of the most learned students of Brazilian natural resources (Rodrigues de Moraes, 2014: 123). Freyreiss made large collections of birds, insects and plants, sending many of them to the Swedish Academy, which published most of his travel reports and named him a foreign correspondent in 1816.

Recommended by State Minister Araujo Conde de Barca, Freyreiss was named King's Naturalist with a lifelong salary of 1,000 *Crusados* and appointed Professor of Zoology at the University of Rio de Janeiro.

Following this, Freyreiss became attached to the explorations of Prince Maximilian Wied-Neuwied and the German botanist Friedrich Sellow (1815-1817). He separated from the Prince's expedition on several occasions, rejoining it again further ahead. Freyreiss collected thousands of specimens of plants and bird skins for the Botanical and Zoological Museums in Berlin. Finally, in 1818, Freyreiss was given permission to settle in Bahia and to establish a German colony, which he named Leopoldina in honor of the Brazilian Princess. In 1824 Freyreiss published an account of life in Brazil, *Beitrage zur näheren Kenntniss des Kaiserthums Brasilien* (= *Contributions to a closer knowledge of the Empire of Brazil*). An account of his travels, *Reisen in Brasilien* (= *Travels in Brazil*), was published nearly 150 years afterwards in 1968. Both works are largely of anthropological interest. He died in 1825 in the colony he had founded.

Only a few specimens of Orchidaceae are known among Freyreiss' collections, all collected during his expedition to Minas Gerais, and described as new to science by Swedish botanist Carl Peter Thunberg in his *Plantarum Brasiliensum* (1817-1821). These are *Cattleya crispata* (Thunb.) Van den Berg (Fig. 3), *Epidendrum dendrobioides* Thunb. (Fig. 4) and *Zygopetalum pedicellatum* (Thunb.) Garay.

Friedrich Sellow. Born in Potsdam to Carl Julius Samuel Sello, the Royal Gardener at Sanssouci, Friedrich Sellow (he changed later his family name adding a "w") (1789-1831) was apprenticed to Carl Ludwig Willdenow before studying botany in Paris and London. With recommendations and financial support from Alexander von Humboldt, he travelled to the Netherlands and England in 1811, where he made the acquaintance of the most prominent botanists of his time.

While in London, he was invited by Baron von Langsdorff to visit Brazil and travelled to Rio de Janeiro, where he arrived in March 1814. As we

FIGURE 3. *Cattleya crispata* (Thunb.) C.Berg, as *Sophronitis crispata* (Thunb.) C.Berg. & M.W.Chase, in *Edward's Botanical Register* n.s. 6, 28: t. 62.

FIGURE 4. *Epidendrum dendrobioides* Thunb. as synonym *Epidendrum carnosum* Lindl., *in* v. Martius, Eichler, & Urban, 1898-1902, *Flora Brasiliensis*, vol. 3, part 6: tab. 45.

have read, in Langsdorff's house he met Georg W. Freyreiss and some months later, in 1815, Prince Maximilian Alexander Philipp zu Wied-Neuwied. When Prince Maximilian arrived, Freyreiss and Selllow were ready for a journey to the north-eastern regions of Brazil, which was to be sponsored by Langsdorff. In return for his investment, Langsdorff would receive the zoological collections for himself. Both Freyreiss and Sellow had letters of recommendation to the authorities of the Brazilian provinces, and they had been appointed as 'financed naturalists', with annual pensions of 400,000 *reis* (Rodrigues de Moraes, 2009). The two naturalists and the Prince travelled partly together, partly on their own, until finally, early in 1817, near the Rio Mucuri, they all met again. Arriving in Salvador de Bahia, Prince Maximilian considered that his collections were sufficient and departed for Europe in May of that year.

During the following eleven years, financed by the government of Prussia, Sellow explored southern Brazil and Uruguay, travelling through unexplored regions. He collected over 12,000 plants, 5,000 birds, 110,000 insects and 2,000 samples of stones and minerals, which he sent to scientific institutions in Brazil, Portugal, England and Germany.

Sellow drowned in the Rio Doce in October 1831, aged 42. It is assumed that his canoe crashed into the rocks of the *Cachoeira Escura* (the 'Dark Waterfall'). Many specimens of Orchidaceae from Sellow's collections can be found in European and American herbaria. The Oakes Ames Herbarium of Harvard

Figure 5. Sketch by Sellow and type specimen of *Maxillaria plebeja* Rchb. f. at the herbarium of the Vienna Natural History Museum, N° w_15431.

University holds specimens of *Cranichis candida* Lindl., *Epidendrum carnosum* Lindl., *Epidendrum dipus* Lindl., *Epidendrum faustum* Rchb.f., *Isochilus brasiliensis* Schltr., *Pleurothallis sonderana* Rchb.f., *Ponera australis* Cogn., and *Ponera striata* Lindl. At the Vienna Natural History Museum we find *Eulophia arundinae* Rchb.f., *Galeandra beyrichii* Rchb.f., *Koellensteinia eburnea* (Barb. Rodr.) Schltr., *Maxillaria cepula* Rchb.f., and *Maxillaria plebeja* Rchb.f. (Fig. 5). The Herbarium of the Botanical Garden at Meise in Belgium has amongst its collections specimens by Sellow of *Campylocentrum densiflorum* Cogn., *Campylocentrum sellowii* (Rchb.f.) Rolfe, *Notylia stenantha* var. *angustifolia* Cogn., and *Oncidium sellowii* Cogn. The Royal Botanic Gardens at Kew holds *Brassavola tuberculata* Hook., *Campylocentrum sellowii* (Rchb.f.) Rolfe, *Cattleya amethystoglossa* Linden & Rchb.f. ex Warner, *Cattleya cinnabarina* Beer, *Cyanaeorchis arundinae* (Rchb.f.) Barb.Rodr., *Elleanthus crinipes* Rchb.f., *Oncidium flexuosum* (Kunth) Lindl., *Oncidium longipes* Lindl., and *Prosthechea aemula* (Lindl.) W.E. Higgins. Finally, the National History Museum in Paris preserves Sellow's specimens of *Epidendrum faustum* Cogn., *Zygopetalum intermedium* Lodd., *Epistephium sclerophyllum* Lindl., *Brassavola martiana* Lindl., *Cattleya intermedia* Hook., *Cattleya loddigesii* Lindl., and *Cattleya coccinea* Lindl. All known orchid specimens by Sellow were collected in Brazil. No orchid collections by him are known from Uruguay.

A number of orchid species were named in honor of Friedrich Sellow, among them: *Angraecum sellowii* Rchb.f., *Campylocentrum sellowii* Rolfe, *Epidendrum sellowii* Rchb.f., *Oncidium sellowii* Cogn., and *Zygopetalum sellowii* Rchb.f.

FIGURE 6. Prince Maximilian Alexander Philipp zu Wied-Neuwied (1782-1867). Engraving by H. Meyer.

Prince and Naturalist: Maximilian Alexander Philipp zu Wied-Neuwied. Although perhaps more a zoologist than a botanist, German Prince Maximilian Alexander Philipp zu Wied-Neuwied (1782-1867) (Fig. 6) contributed many interesting Brazilian orchid specimens, today held at the herbaria of Vienna and the *Herbarium Martii* in Meise (Belgium).

His name is remembered in the orchid genus *Neuwiedia* Blume, from New Guinea, typified by *N. veratrifolia* Blume. Also, the orchid *Maxillaria neowidii* Rchb.f. was dedicated to him by Reichenbach from amongst his Brazilian collections. In his *Beitrag zur Flora Brasiliens* (= Contribution to the flora of Brazil) he complains about not having collected a larger number of orchids: "… *from the abundant and beautiful Cactus, Epidendrum, Caladium, Dracontium and Loranthus, etc. did we obtain only a small number, since they normally grow on trunks and branches which are too high away from the ground"* (Wied-Neuwied 1823-1825:5).

Maximilian was born in Neuwied, on the Rhine, the grandson of the ruling count (after 1784 prince), Johann Friedrich Alexander of Wied-Neuwied. His education coincided with the end of the European Enlightenment, and he came under the influence of two of its most important figures: the anthropologist Johann Friedrich Blumenbach, under whom he studied biological sciences, and Alexander von Humboldt, who, years later, became Maximilian's mentor. In 1800 he joined the Prussian army, rising to the rank of major. The years of Maximilian's life which are of interest to our story begin in 1815, when leave from the army allowed him to lead an expedition to southeastern Brazil which lasted until 1817. According to K. V. Wied, "*there is not the slightest doubt that his paramount interest in the American continent derived from the influence of the older and famous scholar* [Humboldt]*, who henceforth was to remain his model, friend and mentor. From this time on the prince's most ardent and firmest purpose was an overseas expedition"* (Wied 1954:17).

Maximilian sailed from London in May 1815 and arrived in Rio de Janeiro in July of the same year. In his company travelled two servants, an experienced taxidermist by the name of David Dreidoppel, and the Wied's family gardener Christian Simonis. In Rio de Janeiro, Wied was the guest of Baron von Langsdorff, the Russian Tsar's Consul General. We have already read about two other German naturalists, Georg Wilhelm Freyreiss and Friedrich Sellow, who were at the time ready to undertake a trip to the north-eastern regions of Brazil, sponsored by Langsdorff. Wied decided to accompany them, traveling under the pseudonym of Baron Von Braunsberg.

According to Rodrigues de Moraes (2009), the three naturalists left Rio de Janeiro on August 4th 1815, taking 16 pack animals and 10 servants. From the district of Sao Cristovao they crossed the Bay of Guanabara by boat and went along the coast to the province of Espirito Santo, reaching Vitoria in November. While Wied and Freyreiss proceeded north, Sellow stayed behind for some time, collecting more botanical and zoological specimens. Wied and Freyreiss separated in Morro d'Arara, the latter returning to Espirito Santo. Finally, as has already been told, the three met again and after arriving in Salvador; the Prince departed for Europe on May 10th 1817.

Figure 7. Botocudo heads. Engraving by Maximilian of Wied-Neuwied.

Maximilian amassed a wealth of information about native tribes, particularly the Puris and Botocudos, which is considered his most important contribution to human knowledge (Moraes, 2009: 19) (Fig. 7–8).

The rich botanical material collected by the Prince and by Sellow and Freyreiss is the best testimonial to the many hours they devoted to gathering plants, but of equal importance are Wied's citations and descriptions of many species in his works *Reise nach Brasilien in 1815 bis 1817* (= Journey to Brazil in 1815 to 1817) (1820–21) and the already mentioned *Beitrag zur Flora Brasiliens* (1823–25), published after his return to Europe. His writings contain beautiful descriptions and illustrations of the Brazilian forests, their flora and fauna (Fig. 9).

Until his death, in 1867, Maximilian was an active member of the Leopoldina Academy. His merit has been fully acknowledged. Many learned societies elected him a member, and besides the already named orchids, a beautiful creeper from the primeval forests of Brazil was named *Neowedia* after him by Heinrich Schrader.

Among the orchid collections, Lindley, in his *Folia Orchidaceae,* mentions *Zygostastes cornuta* Lindl. (Fig. 10) and *Oncidium varicosum* Lindl. The Herbarium of the Vienna Natural History Museum holds specimens of *Cyrtopodium punctatum* (L.) Lindl., *Eltroplectris calcarata* (Sw.) Garay & H.R.Sweet, and *Ionoposis utricularioides* (Sw.) Lindl. But the largest number of orchid specimens collected by Wied in Brazil can be found in the *Herbarium Martii* at Meise, Belgium, among which we find *Eltroplectris calcarata*, *Aspidogyne argentea* (Vell.) Garay, *Brassavola flagellaris* Barb.Rodr., *Campylocentrum micranthum* (Lindl.) Rolfe, *Cattleya amethystoglossa* Lindl. & Rchb.f. ex Warner, *C. cernua* (Lindl.) Van den Berg, *Cyrtopodium paniculatum* (Ruiz & Pav.) Garay, *Habenaria pratensis* (Lindl.) Rchb.f., *Ionopsis*

FIGURE 8. Maximilian with Botocudo Indian. Painting by Johann Heinrich Richter, 1828.

FIGURE 9. Tucutucuara River, Espirito Santo. By Maximilian of Wied-Neuwied.

FIGURE 11. *Zygostates cornuta* Lindl. Reichenbach's sketch from Lindley Herbarium sheet at Vienna (W0024035).

paniculata Lindl., *Maxillaria neowiedii*, *Mesadenella cuspidata* (Lindl.) Garay, *Oncidium cimiciferum* (Rchb.f.) Beer, *Oncidium pumilum* Lindl., *Oncidium pusillum* (L.) Schltr., *Oncidium varicosum* Lindl., *Pleurothallis articulata* Lindl., and *Rodriguezia rigida* Rchb.f.

Augustin François Cesar Prouvençal de Saint-Hilaire. Son of an artillery officer and belonging to the French landowning nobility, Augustin François Cesar Prouvençal de Saint-Hilaire (1779-1853) (Fig. 11) was born in the city of Orléans. From his early youth, he showed his vocation for natural history, and when forced by the French Revolution to emigrate to Germany, he made the acquaintance of the eminent botanist Carl Segismund Kunth.

He advanced in his career as a botanist and was appointed professor at the Natural History Museum in Paris. Through contacts, he was called to form part of a mission to Brazil in 1816, promoted by the Duc de Piney-Luxembourg, Charles Emmanuel Sigismond de Montmorency-Luxembourg — French ambassador to the court of Portugal — and financed by King Louis XVIII. The expedition also had a political

Figure 11. Augustin François Cesar Prouvençal de Saint-Hilaire (1799-1853). Portrait by Henrique Manzo. Museu Paulista.

character, as one of its objectives was to solve border conflicts between French Guyana and the Portuguese government of King João VI.

Saint-Hilaire arrived in Rio aboard the frigate *Hermione* in June 1816. In December of that year he started on his first excursion, in the company of Baron von Langsdorff, to explore the province of Minas Gerais. In the village of Vila Rica (Fig. 12) they were guests in the house of Wilhelm von Eschwege, who had been the host of Georg Freyreiss a few years earlier. The two explorers returned to Rio in March

Figure 12. View of Vila Rica. by Arnaud Julien Pallière (fragment).

of 1818. Other excursions, all financed by the French government, took Saint-Hilaire through the provinces of Rio de Janeiro and Espirito Santo (August through November, 1818); Minas Gerais again, Goiás and São Paolo from January to October of 1819; Santa Catarina, Rio Grande do Sul and Cisplatina (today the Republic of Uruguay) (December 1819 to June 1821); and finally, once more to Minas Gerais and São Paolo, from January to May of 1822. In the first days of August of that year, he returned to France, never to return again to South America.

In France, Saint-Hilaire concentrated on publishing the results of his six years of travel through Brazil. The results of his study of its rich flora of were published in several books and numerous articles in scientific journals. The works for which he is best known are: *Histoire des plantes les plus remarquables du Brésil et de Paraguay* (= History of the most noteworthy plants of Brazil and Paraguay), published in 1824; *Flora Brasiliae Meridionalis* (= Flora of southern Brazil), published in three volumes between 1825 and 1832 in conjunction with A. de Jussieu and J. Cambessèdes; *Plantes usuelles des Brésiliens* (= Usual plants of the Brazilians), also in conjunction with De Jussieu and Cambessèdes, printed in 1827–1828; and *Voyage dans le district des diamants et sur le littoral du Brésil* (= Voyage through the diamond district and along the coast of Brazil), in two volumes, published in 1833. Unfortunately, and perhaps surprisingly, the family Orchidaceae is not mentioned in these works.

For his work, he was appointed to the Prussian Academy of Sciences, the French Academy, the Linnean Society, the Academy of Sciences in Lisbon, The Historic and Geographic Institute in Rio de Janeiro, and the Medical Society of Rio de Janeiro.

Saint-Hilaire died in Orléans on September 30th 1853.

Dozens of specimens of Orchidaceae can be found amongst Saint-Hilaire's botanical collections, most of them at the Martius Herbarium in Meise (Belgium) and at the National History Museum in Paris. It must be said at this point that although the author does not intend to enumerate each and all orchid specimens collected by every one of the collectors and botanists mentioned in this work, an exception is made here with Saint-Hilaire only to give proof of his enormous contribution to the orchidology of Brazil, Paraguay and Uruguay in a period of barely six years. The total

number of botanical specimens collected by Saint-Hilaire in South America — considering only those held in Paris — amounts to 18,248, of which 10,263 were collected in Brazil.

Meise holds the following specimens: *Habenaria inconspicua* Cogn., *H. poissoniana* Cogn., *H. trífida* Kunth, *Oncidium gomesii* Cogn., *Pelexia bonariensis* (Lindl.) Schltr., *P. laminata* Schltr., *P. loefgrenii* (Porsch) Schltr., *Pelexia P.* (Rchb.f. & Warm.) Schltr., *P. stenantha* (Cogn.) Schltr., *Pteroglossa hilariana* (Cogn.) Garay, and *Skeptrostachys latipetala* (Cogn.) Garay. But Paris has by far the richest collection of specimens collected by Saint-Hilaire, a collection that shows him as the most prolific orchid collector of his time: *Acianthera bicarinata* (Lindl.) Pridgeon & M.W. Chase, *A. sonderana* (Rchb.f.) Pridgeon & M.W.Chase *Aspidogyne commelinoides* (Barb. Rodr.) Garay, *Bipinnula gibertii* Rchb.f., *B. montana* Arechav., *B. penicillata* (Rchb.f.) Cisternas & SalaTsar, *B. polysyka* Kraenzl., *Bletia catenulata* Ruiz & Pav., *Brachystele bracteosa* (Lindl.) Schltr., *B. camporum* (Lindl.) Schltr., *Brassavola flagellaris*, *B. tuberculata* Hook., *Bulbophyllum weddellii* (Lindl.) Rchb.f., *Campylocentrum densiflorum* Cogn., *Catasetum discolor* (Lindl.) Lindl., *C. gardneri* Schltr., *Cattleya amethystoglossa*, *C. bicolor* Lindl., *C. caulescens* (Lindl.) Van den Berg, *C. cernua*, *Cattleya cinnabarina* (Bateman ex Lindl.) Van den Berg, *C. coccinea (*Lindl.) Van den Berg, *C. crispa* Lindl., *C. crispata* (Thunb.) Van den Berg, *C. forbesii* Lindl., *C. fournieri* (Cogn.) Van den Berg, *C. longipes* (Rchb.f.) Van den Berg, *Cleistes castaneoides* Hoehne, *C. exilis* Hoehne, *C. brasiliensis* (Barb.Rodr.) Schltr., *C. metallina* (Barb. Rodr.) Schltr., *C. paranaensis* (Barb.Rodr.) Schltr., *C. pluriflora* (Barb. Rodr.) Schltr., *C. rodriguesii* (Cogn.) Campacci, *Comparettia coccinea* Lindl., *Cranichis candida* (Barb. Rodr.) Cogn., *Cyclopogon elatus* (Sw.) Schltr., *Cyrtopodium aliciae* L. Linden & Rolfe, *C. blanchetii* Rchb.f., *C. brandonianum* Barb.Rodr., *C. flavum* (Nees) Link & Otto ex Rchb., *C. gigas* (Vell.) Hoehne, *C. glutiniferum* Raddi, *C. hatschbachii* Pabst, *C. pallidum* Rchb.f. & Warm., *C. parviflorum* Lindl., *C.* cf. *poecilum* Rchb.f. & Warm., *Elleanthus brasiliensis* Rchb.f., *E. crinipes* Rchb.f., *Eltroplectris cogniauxiana* (Cogn.) Pabst, *E. triloba* (Lindl.) Pabst, *Epidendrum avicula* Lindl., *E. dendrobioides* Thunb., *E. dichromum* Lindl., *E. martianum* Lindl., *E. paniculatum* Ruiz & Pav., *E. paranaense* Barb. Rodr., *E. saxatile* Lindl., *E. secundum* Jacq., *Epistephium lucidum* Cogn., *E. sclerophyllum* Lindl., *Eulophia alta* (L.) Fawc. & Rendle, *Galeandra beyrichii* Rchb.f., *G. junceoides* Barb. Rodr., *G. xerophila* Hoehne, *Gomesa imperatoris-maximiliani* (Rchb.f.) M.W.Chase & N.H. Williams, *G. laxiflora* Klotzsch ex Rchb.f., *Habenaria armata* Rchb.f., *H. brevidens* Lindl., *H. cryptophila* Barb. Rodr., *H. edwalli* Cogn., *H. glaucophylla* Barb. Rodr., *H. guilleminii* Rchb.f., *H. gustavo-edwallii* Hoehne, *H. jaguariahyvae* Kraenzl., *H. johannensis* Barb. Rodr., *H. macronectar* (Vell.) Hoehne, *H.* cf. *melvillei* Ridl., *Habenaria* cf. *nuda* Lindl., *H. paranaensis* Barb. Rodr., *H. petromedusa* Webb, *H. petalodes* Lindl., *H. pleiophylla* Hoehne & Schltr., *H. pungens* Cogn. ex Kuntze, *H. regnelli* Cogn., *H. repens* Nutt., *H.*cf. *rupicola* Barb. Rodr., *H. schwackei* Barb. Rodr., *H. subviridis* Hoehne & Schltr., *H. tamanduensis* Schltr., *H. taubertiana* Cogn., *H. trifida* Kunth, *H. warmingii* Rchb.f., *Ionopsis utricularioides* (Sw.) Lindl., *Isabelia violacea* (Lindl.) Van den Berg & M.W.Chase, *Leptotes bicolor* Lindl., *Liparis nervosa* (Thunb.) Lindl., *Hexalectris spicata* (Walter) Barnhart, *Koellensteinia eburnea* (Barb. Rodr.) Schltr., *Malaxis parthoni* C. Morren, *Mesadenella cuspidata* (Lindl.) Garay, *Maxillaria pumila* Hook. *Mesadenus glaziovii* (Cogn.) Schltr., *Miltonia regnellii* Rchb.f., *Neottia aestivalis* Lam., *Octomeria wawrae* Rchb.f. ex Wawra, *Oncidium barbatum* Lindl., *O. batemanianum* Parm. ex Knowles & Westc., *O. baueri* Lindl., *O. divaricatum* Lindl., *O. flexuosum* Sims, *O. fuscans* Rchb.f., *O. hydrophilum* Barb. Rodr., *O. praetextum* Rchb.f., *O. uliginosum* Barb. Rodr., *Ornithidium pendens* (Pabst) Senghas, *Pelexia bonariensis* (Lindl.) Schltr., *P. laminata* Schltr., *P. loefgrenii* (Porsch) Schltr., *P. orthosepala* (Rchb.f. & Warm.) Schltr. *P. stenantha* (Cogn.) Schltr., *Phymatidium delicatulum* Lindl., *Physurus pictus* Lindl., *Prescottia micrantha* Lindl., *P. montana* Barb. Rodr., *P. plantaginea* Lindl., *P. rodeiensis* Barb. Rodr., *P. stachyodes* (Sw.) Lindl., *Prosthechea fragrans* (Sw.) W.E.Higgins, *P. vespa* (Vell.) W.E.Higgins, *Pteroglossa hilariana* (Cogn.) Garay, *P. macrantha* (Rchb.f.) Schltr., *Rodriguezia microphylla* Barb.Rodr., *Rodriguezia secunda* Kunth, *Sacoila duseniana* (Kraenzl.) Garay, *S. lanceolata* (Aubl.) Garay, *Sauroglossum elatum* Lindl., *Skeptrostachys balanophorostachya* (Rchb.f. & Warm.) Garay, *S. congestiflora* (Cogn.) Garay, *S. gigantea*

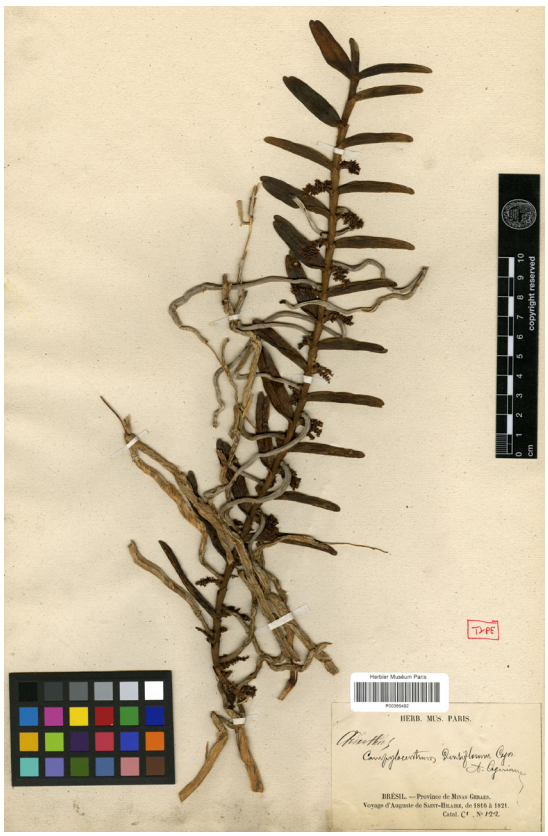


Figure 13. Type specimen of *Campylocentrum densiflorum* Cogn., collected by Saint-Hilaire. National History Museum in Paris (P00366492)..

(Cogn.) Garay, *S. hebesepala* (Barb. Rodr.) Cogn., *S. latipetala* (Cogn.) Garay, *S. paraguayensis* (Rchb.f.) Garay, *Specklinia grobyi* (Bateman ex Lindl.) F. Barros, *Stelis catharinensis* Lindl., *S. omalosantha* BarbRodr., *S. rodriguezii* Cogn., *Stenorhynchus arrabidae* Rchb.f., *Stenorrhynchos hassleri* Cogn., *Theodorea gomezoides* Barb. Rodr., *Trichocentrum cebolleta* (Jacq.) M.W.Chase & N.H.Williams. *T. pumilum* (Lindl.) M.W.Chase & N.H.Williams, *Veyretia rupicola* (Garay) F. Barros, *Zygopetalum crinitum* Lodd., *Z. intermedium* Lodd. ex Lindl., *Z. mackaii* Hook., and *Z. sellowii* Rchb.f.

Other orchid collections by Saint-Hilaire which were unknown to botany at that time were *Campylocentrum densiflorum* (Fig. 13) and *Stelis rodriguesii*, both described by Cogniaux.

Stenorrhynchos hilarianum Cogn. (Fig. 14), an orchid species which was new to science, was dedicated to Saint-Hilaire.

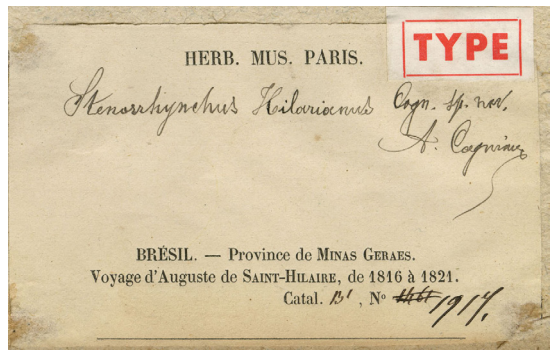


Figure 14. Herbarium label of the holotype of *Stenorrhynchus hilarianum* Cogn., collected by Saint-Hilaire. National History Museum in Paris (P00345645).

William John Swainson. An English naturalist specializing in zoology, William John Swainson (1789-1855) (Fig. 15) was born in Newington, London, the son of John Timothy Swainson, one of the first fellows of the Linnean Society. He joined the Army and toured Malta and Sicily but was forced to return to England due to ill health. Following in his father's footsteps, in 1815 he became a fellow in the Linnean Society.

In 1816 he was invited by the explorer Henry Koster to accompany him to Brazil. Koster was born in Portugal and lived in Brazil for several years, becoming famous for his book *Travels in Brazil*, published in 1816.

Swainson wrote: "*About this time, the jealousy of the Portuguese government relaxed, and they opened Brazil to European researches. Mr. Koster had just published his travels: he gave me such a picture of the zoological riches of the country he had just quitted, that I resolved to accompany him on his second journey; and we left England together on the 22d of November, 1816"* (Swainson 1840: 344). They landed in Pernambuco in the first months of 1817. However, the outbreak of the 1817 'Revolution of Pernambuco' (which demanded the independence of Brazil from Portugal) forced Swainson to stay in the village of Olinda, where he spent his time collecting plants and animals.

Let us learn about the rest of Swanson's relatively short but fruitful journey in his own words: "*The insurrection being put down, I immediately engaged a guide and three Indians, with whom I set off, overland, for the Rio St. Francisco. We found the draught, however, so great, that we were obliged to reach Bahia by water* [In Bahia Swainson met naturalists Sellow and

FIGURE 15. Portrait of William John Swainson (1789-1855). Unknown artist.

Freyreiss, who were part of the expedition of Maximilian von Wied-Neuwied]. *After investigating several parts of that province, we proceeded by sea to Rio de Janeiro. Here I met with Dr. Langsdorff, the late Dr. Raddi of Florence, and some of the German naturalists sent by the court of Austria* [Dr. von Martius and Dr. von Spix]. *With Langsdorff I made several excursions, and in four months so enriched my collections, that I became almost satiated. I felt I had now more than enough to study and arrange for years to come. I therefore broke up my party, embarked for England, and once more, -like a bee loaded with honey- returned to my father's house"* (Swainson 1840: 344).

Swainson returned to England in 1818. His harvest comprised over 20,000 insects, 1,200 species of plants, drawings of 120 species of fish, and about 760 bird skins.

In 1841 Swainson emigrated to New Zealand. He spent the rest of his life involved in property management, history-related publications and forestry research in New Zealand, Tasmania and Australia. He died in New Zealand in 1855. Koster, who never left Brazil again, died in Pernambuco in 1820, at the age of 27.

FIGURE 16. *Cattleya labiata* Lindl. Herbarium specimen by Swainson at the Royal Botanic Gardens, Kew.

Swainson's orchids: the genus *Cattleya*. Swainson was not a prolific collector, but he was a very selective one. Only a few orchids can be found among Swanson's specimens: *Oncidium barbatum* Lindl., *Catasetum hookeri* Lindl., and *Cattleya labiata* Lindl. But it would be the latter that brought Swainson fame, as he had collected the plant that would be the type for one of the most popular orchid genera of all times (Fig. 16–17). A first plant of this genus had been published in Loddiges' *Botanical Cabinet* (plate 337), where it was illustrated and described as *Epidendrum violaceum* in 1819 (Fig. 18) (Dr. William Hooker had already bloomed an allied species in his greenhouse in 1818.) The plant had been collected by Swainson in the Organ Mountains, some 100 kilometers north of Rio de Janeiro (other sources say in Pernambuco, about 1,600 kilometers north-east from Rio). Either Hooker or Cattley forwarded the flowering plant to John Lindley, who described it as *Cattleya labiata* in

Figure 17. *Cattleya labiata* Lindl. *Collectanea Botanica*, 1814, plate 33.

Figure 18. *Epidendrum violaceum* Lodd. Botanical Cabinet, 1819, vol. 4: plate 337.

his *Collectanea Botanica*, plate 33 (1824), establishing a new genus which he named in honor of Mr. Cattley. A second specimen of this plant – as rumor has it – had been used as packing material in a consignment of orchids sent by Swainson to a reputed amateur orchid grower, Mr. William Cattley, of Barnet near London.

As with so many other visitors to Brazil in those years, Swanson was helped and guided in his exploration of Brazil's exuberant nature by Grigory von Langsdorff.

Charles Gaudichaud-Beaupré. French botanist Charles Gaudichaud-Beaupré (1789-1854) would make important botanical collections in Brazil, Chile and Peru, between 1830 and 1832 (this will be addressed in a future work). However, in 1817–1818, and again in 1820, he passed briefly through Rio de Janeiro during Louis Claude de Saulces de Freycinet's world's circumnavigation aboard the *Uranie*. The *Uranie* arrived in Rio de Janeiro on December 6th 1817 and departed for Cape Town on January 30th 1818. On her return voyage the *Uranie* sank in a storm near the Falkland Islands. Freycinet and his crew managed to save themselves and purchased an American vessel which they renamed *Physicienne,* They arrived again in Rio on June 19th 1820, leaving for France on September 13th of that year.

No records of botanical collections made by Gaudichaud-Beaupré during these visits to Rio have been found, mainly because most of the collections were lost in the wreck of the *Uranie.* A number of herbarium specimens at the National History Museum in Paris are listed as having been collected by Gaudichaud-Beaupré in Brazil during the *Uranie* expedition. However, the specimens all bear dates of 1833 and 1834. They must, therefore, belong to Gaudichaud-Beaupré´s later expeditions to South America.

However, in the narrative of the earlier expedition, *Voyage autour du monde... exécuté sur les corvettes de S. M., "l'Uranie" et "la Physicienne", pendant les années 1817, 1818, 1819 et 1820,* Gaudichaud-Beaupré gave a beautiful description of the vegetation surrounding the capital of Brazil, marvelling at the

FIGURE 19. Caroline Josepha Leopoldina Franziska Ferdinanda of Austria (1797-1826). Portrait by Joseph Kreutzinger.

FIGURE 20. Pedro I of Brazil (1798-1834). Portrait by Simplicio Rodrigues de Sá.

orchids, among which he names the genera *Stelis*, *Epidendrum*, *Limodorum*, *Ionopsis*, *Cymbidium*, and *Anguloa.* He also names some of the scientists who had explored the botany of Brazil; he mentions Prince Maximilian von Wied-Neuwied, Auguste de Saint-Hilaire, von Spix and von Martius, Giuseppe Raddi and Baron von Langsdorff. Baldini & Guglielmone (2012) assume that he made botanical excursions with Raddi in December 1817 and January 1818.

Further reference to Langsdorff is made in the journal of Rose de Freycinet, Louis de Freycinet's wife. She praises the musical abilities of Madame von Langsdorff, who played piano at a party given at Langsdorff's house to entertain the officers of the expedition during their first visit to Rio de Janeiro in December 1817.

Coincidentally, the draftsman accompanying Freycinet on the *Uranie* was Adrien-Aimé Taunay, who seven years later would be chosen by Langsdorff to be part of his own expedition to the interior of Brazil, from which the young French artist would never return.

The Austrian-German Expedition to Brazil. On May 13th 1817, in the Imperial Chapel of the Palace of Vienna, a marriage took place. Archduchess Caroline Josepha Leopoldina Franziska Ferdinanda of Austria (better known as Maria Leopoldina of Austria) (1797-1826) (Fig. 19), daughter of Francis I, Emperor of Austria, married Dom Pedro of Braganza (1798-1834), Crown Prince of the United Kingdom of Portugal, Algarve and Brazil, later Pedro I of Brazil and for a short period of time King Pedro IV of Portugal (Fig. 20).

The wedding had, however, one peculiarity: it was celebrated *per procuram* (by proxy). The bridegroom was 10,000 kilometers away in tropical Rio de Janeiro and was represented at the ceremony by Maria Leopoldina's uncle, Archduke Charles.

Among the 2,000 guests was Maximilian I Joseph, King of Bavaria, whose sympathy with France and the ideas of enlightenment were made manifest when he succeeded to the throne. He was deeply under the influence of Count Max Josef von Montgelas, one of the most ardent promoters of French ideas in Germany,

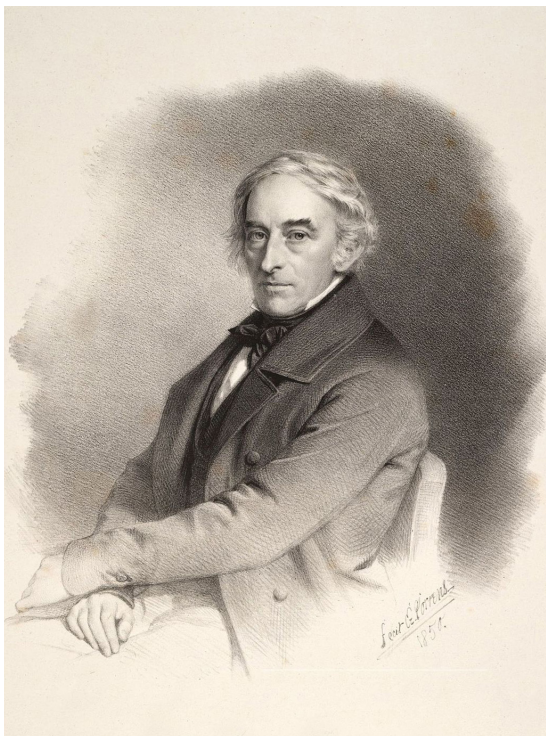


Figure 21. Carl Friedrich Philipp von Martius (1794-1868). Unknown artist.

Figure 22. Johann Baptist Ritter von Spix (1781-1826). Unknown artist.

who had acted for a time as his private secretary. Since the end of 1815, Maximilian had planned a scientific expedition to South America and chosen as its leaders Karl Friedrich Philipp von Martius (1794-1868) (Fig. 21), a Ph. D. in Botany from the University of Erlangen, and Johann Baptist Ritter von Spix (1781-1826) (Fig. 22), a prominent zoologist.

It was originally intended that the expedition would visit Buenos Aires and continue from there to Chile and Quito, returning to Europe via Caracas or Mexico. But financial difficulties obliged Maximilian to defer the execution of this project. It must have come, therefore, as quite a surprise to Maximillian, when he received an invitation to the wedding at the end of 1816, to learn that the Austrian Imperial Court had resolved to send some scientists to Brazil in the suite of the august bride. The surprise was compounded by the fact that, as Maximillian knew, the Austrian Emperor was opposed to ¨Enlightenment¨ and very well known for his ultra-conservative ideas. Notwithstanding, the golden opportunity was taken and arrangements were made for von Martius and von Spix to accompany the Austrian Expedition to Brazil.

In February 1817 the two German scientists set out for Vienna, where they met the scientists chosen by the Austrian Government to direct the expedition and who would be their fellow travellers. Among them were Professor Johann Christian Mikan from Prague (Botany and Entomology), Johann Baptist Emanuel Pohl (Mineralogy and Botany), Johann Natterer (Zoology) and the gardener Heinrich Wilhelm Schott. An important chronicler of the expedition would be the well-known landscape painter Thomas Ender, from whom we have a spectacular record of the journey, particularly the surroundings of Rio de Janeiro.

Giuseppe Raddi, Italian botanist, was sent by the Grand Duke of Tuscany to accompany the expedition. Together with Johann Buchberger (botanical illustrator) and several assistants, the group comprised a total of 14 travellers.

From Vienna, part of the expedition set out for Trieste (von Spix, von Martius, Mikan and Ender), sailing on April 10th 1817 aboard two frigates, the *Austria* and the *Augusta*. They sailed by way of Gibraltar, where

they had orders to wait for the Archduchess' convoy and accompany her to Rio de Janeiro. However, once in Gibraltar the orders were countermanded and they sailed on alone to Rio, where they arrived on July 14th. As could not have been expected otherwise, Baron von Langsdorff was immediately on the scene: "*To our great satisfaction we soon met with the very obliging M. Von Langsdorff, the Prussian* [sic] *consul-general, who is well known in the literary world by his account of the voyage round the world, in which he accompanied Commodore Krusenstern. He welcomed us with the greatest cordiality; and several of our German fellow-countrymen, who had settled at Rio de Janeiro with mercantile views, endeavoured to serve us to the utmost of their power"* (Spix & Martius1824: 132). Several months later, on November 5th, Her Imperial Highness Maria Leopoldina and her entourage made their solemn entrance into the harbour of Rio de Janeiro. With her came the rest of the expedition.

The wedding of Maria Leopoldina had become the pretext for one of the major scientific adventures of the 19th century, during which the expedition would travel over more than ten thousand kilometers through the interior of Brazil, discovering indigenous tribes, classifying unknown species of animals and plants, tracing maps and describing minerals. King João could be happy: his daughter-in-law not only brought prestige to his dynasty, but also the culture of Europe to the very heart of South America (Moro 2012: 53).

For the first weeks in Rio de Janeiro, the members of the expedition spent their time becoming acquainted with the city and the local population, and making contacts with Brazilian and resident European scientists. Again, Langsdorff was at the center of all the action. There is nobody better than von Spix and von Martius themselves to give a description of the social, literary and scientific life of that time: "*The hospitable residence of Mr. Von Langsdorff was a very agreeable place of resort in the evening for many Europeans residing at Rio de Janeiro*. […] *So great a number of naturalists, or friends of natural history, had never yet been assembled here, as just at the time of our stay. The mutual communication of the observations and feelings which the luxuriance and the peculiarity of the vegetation inspired, became doubly attractive, through the charms of the environs. Mr. Von Langsdorff inhabited a small country-house, on the declivity of the chain of hills which stretches from the city towards the south-west, and enjoyed from hence, amidst the fragrant shrubs of Brazil, an enchanting prospect over the city and part of the bay…"* (Spix & Martius 1824: 159-160). Von Langsdorff's role at that time can perhaps best be compared to that of George Ure Skinner in Guatemala some decades later, who in a similar way was the host to a large number of naturalists visiting the newly independent republics of Central America. At the Russian Consul's invitation, after having explored the neighbourhood of Rio de Janeiro, the expedition travelled to von Langsdorff's hacienda, to the north of the capital. They sailed along the coast to Porto Estrela and went from there overland to *Fazenda Mandiocca*, where von Langsdorff had built his house (Fig. 23).

The Germans: Carl Friedrich Phillip von Martius and Johann Baptist Ritter von Spix. After a few days at *Mandiocca*, Carl Friedrich Philipp von Martius and Johann Baptist Ritter von Spix returned to Rio, hoping to meet Maria Leopoldina's squadron and with it the rest of the naturalists. When eventually the rest of the expedition arrived, the Germans learned that the Austrian Government had decided to divide the exploration efforts into several smaller parties, which delayed things even further. Also, von Martius received a direct order from Munich not to prolong his journey over the term of two years. The whole party being present and taking into account the new directives, permission was asked for and received from the Brazilian Government. On December 8th a small group comprising von Spix, von Martius, the already mentioned director of mines Baron Wilhelm von Eschwege, Thomas Ender, and a Mr. Dürming (German Consul at Antwerp, who had arrived in Rio a few weeks earlier) left Rio on the road to São Paulo. On 1st May 1818, after Dürming was forced to return to Rio in the company of Ender due to a broken leg, the remaining trio of travellers left for Diamantina, Minas Novas and then Montes Claros. Early in January 1819 they were in Minas Gerais, and continued across the Rio San Francisco (Fig. 24). Martius and von Spix would then explore a large part of Brazil over the next two and a half years, until they arrivedin Belém in

Figure 23 (left, top). House of Von Langsdorff at his *fazenda Mandiocca*. In Spix & Martius1824 (Vol. 3), *Reiseatlas*: 12.
Figure 24 (left, bottom). The expeditionaries at the San Francisco River. In Spix & Martius1824 (Vol. 3), *Reiseatlas*: 37.

April 1819. They sailed for Europe on June 13th of that year. They would not see von Langsdorff again.

But let us follow the journey in detail. From May 1818 the two Germans headed north-northeast to Carinhanha and as far as the Serra Geral, before returning to Carinhanha and travelling on to Salvador, where they arrived at the end of the year.

In February 1819 the party travelled to Piaui, Oeiras, where they arrived on May 3rd, and then moved on to São Gonçalo do Amarante (15th May), where Martius became seriously ill. By this time Spix had contracted the schistosomiasis from which he eventually died seven years later. In June 1819 they were in Maranhão to replenish funds and supplies. They sailed down the Rio Itapicuru to São Luis, leaving on July 20th and collecting specimens at several places *en route* to Belém. They left Belém on August 21st for a voyage up the Tocantins to Breves, passing through Gurupá, Porto de Moz on the Rio Xingu, and Santarém, arriving at the mouth of the Rio Negro on October 22nd and finally at Tefé on November 26th.

In Tefé the two friends split up, Spix left for Solimões and visited Tabatinga before returning to Manaus in February 1820. Martius sailed from Tefé up the Rio Japorá, returning to Manaus in March, where they reunited. Soon they were again in Belém, and at the end of 1820 they were back in their hometown of Munich, where von Martius was received with honor. He was made a member of the Royal Bavarian Academy and second conservator of the Botanic Garden of Munich.

Among von Martius' many orchid collections we find: at the herbarium in Paris, *Sobralia liliastrum* Lindl.; in Belgium (Meise), *Campylocentrum tenue* (Lindl.) Rolfe, *Acianthera ochreata* (Lindl.) Pridgeon & M.W. Chase, *Acianthera rupestris* (Lindl.) F. Barros, *Anathallis articulata* (Lindl.) Luer & Toscano, and *Pabstiella hymenantha* (Lindl.) Luer; and in Kew *Aspidogyne foliosa* (Poepp. & Endl.) Garay, *Brassavola martiana* Lindl. (Fig. 25), *Bulbophyllum napellii* Lindl., *Campylocentrum micranthum* (Lindl.) Rolfe, *Campylocentrum tenue* (Lindl.) Rolfe, *Dichaea muricata* (Sw.) Lindl., *Gomesa flexuosa* (Lodd.) M.W. Chase & N.H. Williams, *Gomesa martiana* (Lindl.) M.W.Chase & N.H.Willias (Fig. 26), *Gomesa ramosa* (Lindl.) M.W.Chase & N.H.Williams, *Habenaria brevidens* Lindl., *Habenaria hexaptera* Lindl., *Habenaria imbricata* Lindl., *Habenaria mystacina* Lindl., *Habenaria obtusa* Lindl., *Habenaria quadrata* Lindl., *Laelia caulescens* Lindl., and *Specklinia grobyi* (Bateman ex Lindl.) F. Barros.

FIGURE 25. *Brassavola martiana* Lindl. Type specimen at Herbarium Kew, specimen #000061901.

Mimosa spixiana Barneby in the Fabaceae, *Banisteria spixiana* Mart. ex A.Juss. in the Malpighiaceae, *Calyptromyrcia spixiana* O.Berg in the Myrtaceae, and many others were named in honor of Johann Baptist Ritter von Spix. Carl Friedrich Phillip von Martius is remembered in the names of the following orchid species: *Bletia martiana* (Lindl.) Rchb.f., *Brassavola martiana* Lindl., *Epidendrum martianum* Lindl., *Oncidium martianum* Lindl., and *Stanhopea martiana* Bateman ex Lindl. as well as its variety *bicolor* Lindl. (Fig. 27).

In 1824 Von Spix and von Martius published a highly interesting account of their travels in Brazil, under the title *Travels in Brazil in the years 1817-1820, undertaken by command of His Majesty, the King of Bavaria*. This comprises three volumes of text and one

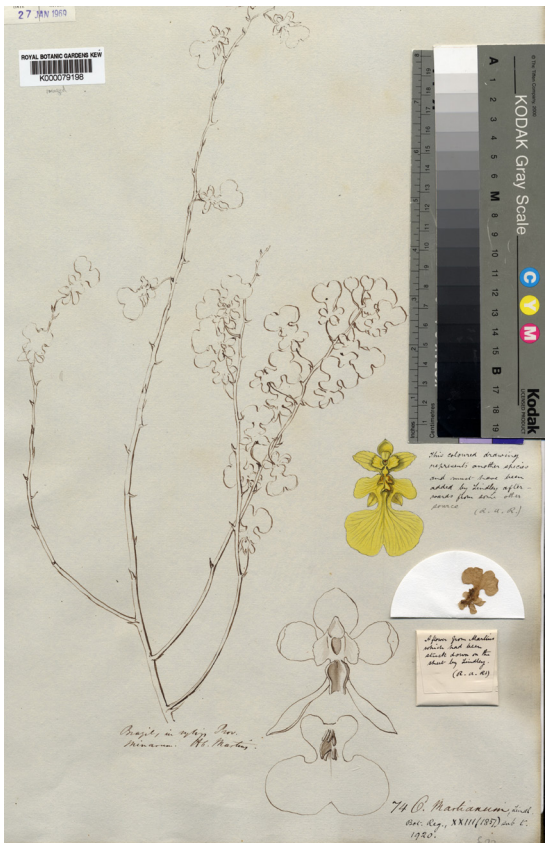


Figure 26. Drawing of the type specimen of *Oncidium martianum* Lindl. at Herbarium Kew, specimen #000079198.

so-called *Reiseatlas* of illustrations, depicting objects of natural history, landscapes and scenes of daily life in Brazil (Fig. 28, A–B). This work gives a detailed account, not only of the expedition itself, but of the political, social and economic status of Brazil during those years. It is particularly useful in understanding the transition between the colonial period and the independence that would follow the proclamation of the Empire of Brazil under Dom Pedro I in 1822. The *Reiseatlas* is a treasure-chest of vivid images of the Brazilian landscape, its exuberant nature and its melting pot of races and cultures, which has imposed its mark on Brazilian society up to the present. Sadly, von Spix died during the preparation of the second volume, but von Martius finished its publication using in part von Spix's notes.

But undoubtedly, von Martius' publication of his *Flora Brasiliensis* was the most important achievement

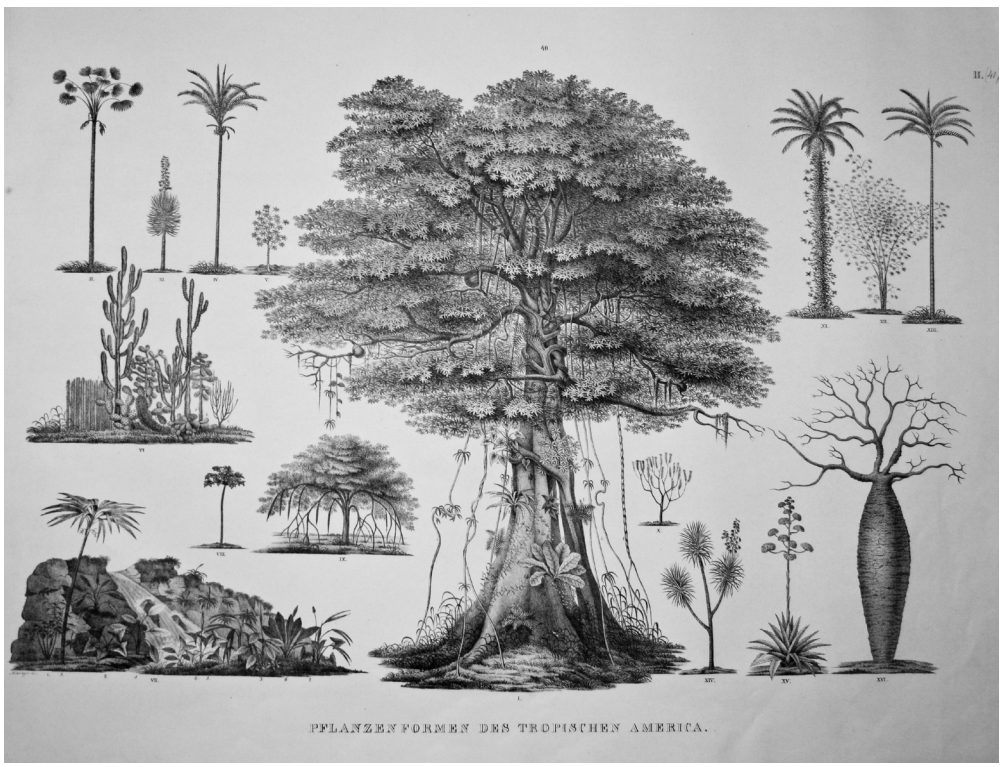
Figure 27. *Stanhopea martiana* var. *bicolor* Lindl. Edwards's Botanical Register 29: t. 44. 1843.

of the Bavarian expedition to Brazil. Publication began in 1840 as a joint effort by von Martius and Stefan Endlicher. It was completed in 1906, comprising a total of 10,376 pages in 130 fascicles, distributed in 40 parts and 15 volumes, describing and illustrating 22,767 species of Brazilian plants. Von Martius completed 46 of the 130 fascicles before his death in 1868, the work being continued by August Wilhelm Eichler and Ignatz Urban as main author-editors. The last volume to be published (numbered volume III, parts IV, V and VI) was the treatment of the Orchidaceae (1893-1906), prepared by Alfred Cogniaux. We will read about this work in a later part of this study.

Johann Baptist Emanuel Pohl and Giuseppe Raddi

Johann Christian Mikan (1769-1844), a professor for Zoology and Botany at the University of Prague, had been chosen as the main botanist for the expedition. Unfortunately, after less than a year, in June 1818, and having made important collections (no orchids however!) in the province of Rio de Janeiro, Mikan was ordered to return to Vienna and to accompany those collections to a special museum that had been established to house the products of the Brazilian expedition. In Mikan's company the botanical illustrator Johann Buchberger,

A



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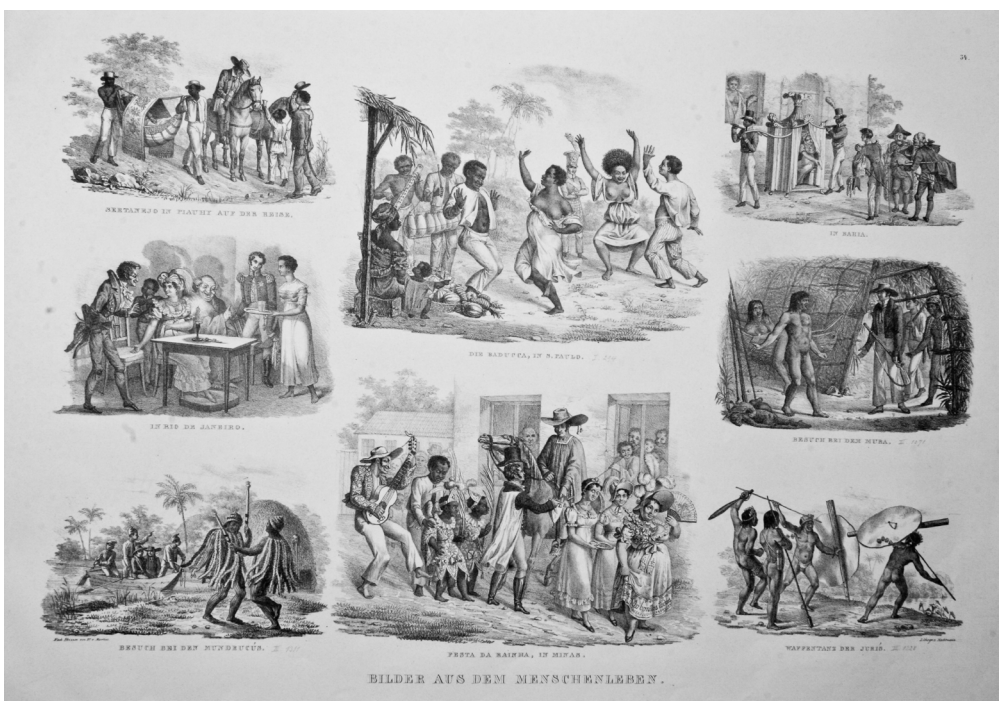

FIGURE 28. A. *Forms of plants in tropical America*. In v. Spix & v. Martius, 1824, Vol. 3, *Reiseatlas*, p. 75. B. *Scenes of Brazilian life*. In v. Spix & v. Martius, 1824, Vol. 3, *Reiseatlas*, p. 65.

who had suffered a serious accident, also returned to Europe. The Italian botanist Giuseppe Raddi and the landscape painter Thomas Ender travelled with them. From then on, Johann Baptist Emanuel Pohl (1782-1834) (Fig. 29), previously in charge of mineralogy, was put in charge of all botanical aspects of the expedition. In this post he would explore the interior of Brazil, especially the Provinces of Minas Gerais, Goias, Bahia and the province of Rio de Janeiro as far as the District of Ilha Grande.

Pohl was born in Politz, in north-western Bohemia in the present day Czech Republic. He studied in Prague and graduated as Doctor of Medicine in 1808. He soon gained a reputation in several branches of natural history and was thus selected as one of the scientists to accompany Archduchess Maria Leopoldina to Brazil, on the occasion of her marriage to Dom Pedro I in 1817.

During the last months of 1817 and early 1818, Pohl explored the province of Rio de Janeiro as far as Villa de Ilha Grande. But once he took over Mikan's position, he started on his long journey, beginning in September 1818 from -as one could have guessed- Langsdorff's *Fazenda Mandiocca*. From Mandiocca he travelled for fifteen months in a westerly direction to the village of Villa Bõa, the capital of the province of Goias, where he took canoes down the River Maranhão (Fig. 30). He travelled along the border of the provinces of Goias and present-day Tocantins, returned to Villa Bõa and then went northeast through Minas Gerais towards Bahia until September 1820, navigating the River Jequitinhonha. The impassable falls of Salto Grande made him turn back before reaching the mouth of the river. In December 1820 he reached Villa Rica in Minas Gerais, where he visited his friend Baron von Eschwege. He then passed again through Mandiocca in February 1821 (Langsdorff was at that time in Europe) and arrived finally in Rio on 28th February 1821. At the end of that year he was back in Vienna, his health weakened by the severe conditions of his journeys. Pohl's botanical collections -over 4,000 specimens of Brazilian plants- were housed with the rest of the expedition's collections in the Brazil Museum of Vienna. These collections included two live 'human specimens' of Botocudo tribespeople. The woman died soon after arriving; the man was eventually returned to his homeland. After his return to Europe, Pohl was appointed as a curator at the Vienna Natural History Museum and the Brazil Museum of Vienna, positions he would hold until his death.

Figure 29. Johann Baptist Emanuel Pohl (1782-1834). Lithograph by unknown artist, ca. 1830.

In 1832 Johann Baptist Pohl published the first volume of his travel journal, *Reise im Innern von Brasilien (= Journey through the interior of Brazil*). A small *Atlas* with three illustrations of Brazilian landscapes was part of this first volume (Fig. 31). The second volume was published posthumously in 1837, by order of the Emperor Francis I.

Pohl makes frequent mention of the exuberant vegetation of the regions through which he travels and the masses of epiphytic and parasitic plants he observes on the jungle trees. He mentions, however, only one orchid, *Epidendrum vanilla* L. (= *Vanilla mexicana* Mill.): *The trees showed themselves often tightly embraced by Vanilla (Epidendron Vanilla), in Portuguese: Baonilha. The pods of these plants are a favorite dish for bats. At the present season the plants were however without flowers or fruits* (Pohl, 1832: 416-417).

Amongst Pohl's botanical collections we find the following orchid specimens: *Cranichis scripta*

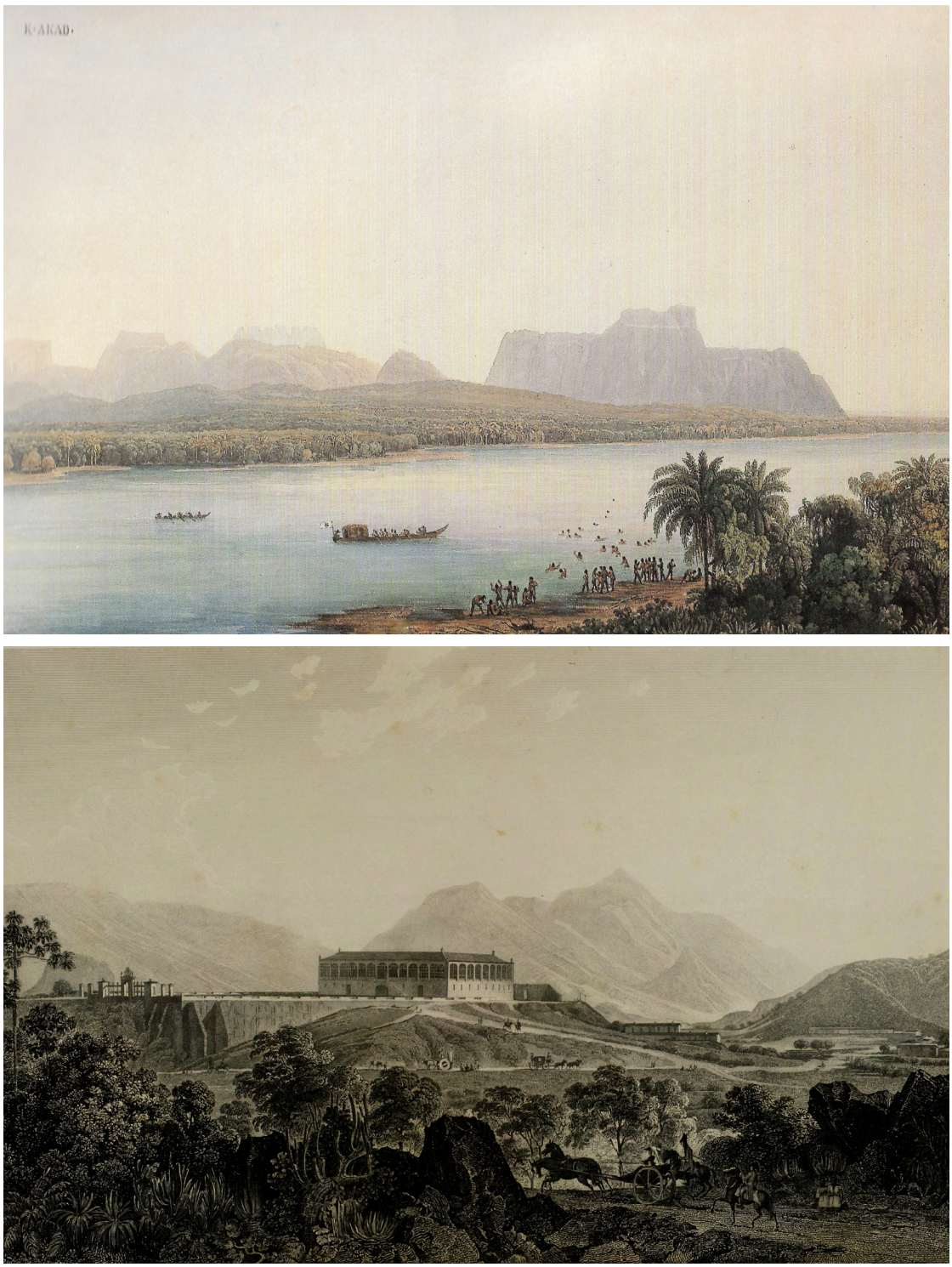

FIGURE 30 (top). River Maranhâo. Watercolor by Thomas Ender from an original drawing by J.B. Pohl.
FIGURE 31 (bottom). Royal Palace at Sâo Cristovâo. Illustration in Pohl's *Atlas,* 1832, p. 4.

Figure 32. *Dipteranthus corniger* Cogn. Plate 93 (fragment) in *Flora Brasiliensis*, volume 3, part 6, 1904-1906.

Figure 33. *Oncidium pohlianum* Cogn. Plate 82 in *Flora Brasiliensis*, volume 3, part 6, 1904-1906.

Kraenzl., *Pelexia trachyglossa* (Kraenzl.) Pabst, and *Skeptrostachys paranahybae* (Kraenzl.) Garay (Oakes Ames Orchid Herbarium); *Diptheranthus corniger* Cogn. (Fig. 32) (Herbarium Meise); and *Habenaria goyazensis* Cogn. (Herbarium Vienna).

Cogniaux dedicated *Oncidium pohlianum* (Fig. 33) to him.

Giuseppe Raddi (1770-1829) (Fig. 34) was born in Florence, Italy, into a modest family. An early interest in botany led him to move from an apprenticeship as a druggist in his hometown to a position as an assistant to Professor Ottavio Targione Tozzetti, at the Spedale Santa Maria Nuova, and later at the Botanical Garden in Pisa. Subsequently, he received a proposal to become an assistant to the renowned physician and botanist Attilio Zuccagni, director of the Museum of Natural History in Florence. He worked for over ten years at the Museum, with an interlude during the French invasion, and in 1817 was invited to take part in the Austrian Expedition to Brazil.

He sailed in the company of the Archduchess Maria Leopoldina, arriving in Rio de Janeiro in November 1817, and immediately began botanical collections, mainly in the Rio de Janeiro area, including Serra d'Estrela and Serra dos Orgaos. He collected together with Langsdorff, and it is said that he made excursions with Charles Gaudichaud-Beaupré during the latter's short stay in Rio in December 1817-January 1818 (Baldini & Guglielmone, 2012), although no specimens by Gaudichaud have been recorded from that period.

Unlike other members of the expedition, such as the Germans Martius, von Spix and others, Raddi's financial means were very limited. Furthermore, he was alone and did not have any assistants to help him

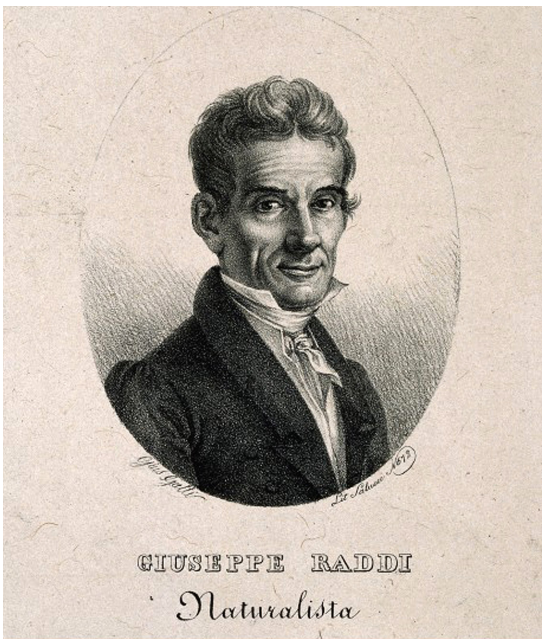

Figure 34. Giuseppe Raddi (1770-1829). Litograph by G. Galli. Courtesy of Rudolf Jenny.

in the field. Life in Rio de Janeiro was too expensive to allow him to employ impromptu local assistants. Raddi tried in vain to get more funding from Tuscany for a prolonged stay in Brazil and was forced to return to Italy, leaving Rio de Janeiro on June 1 1818, together with Professor Mikan and Thomas Ender (Baldini & Pignotti, 2018: 7-8).

It is not clear how many plants Raddi collected in Brazil. In a letter to the Grand Duke of Tuscany, Raddi wrote that in Brazil he collected 3000-4000 plants, the seeds of 340 species, 3300 insects and several fishes, reptiles and birds (Baldini & Guglielmone, 2012). He described several new species based on this material, among them a new orchid, *Cyrtopodium glutiniferum* Raddi, published in Modena in 1823 (Fig. 35). The original botanical collection was transferred to Pisa from Florence after Raddi's death.

In 1824 Grand Duke Leopold II of Tuscany organized a scientific expedition to Egypt, led by the famous Ippolito Rosselini, professor of oriental languages of the University of Pisa. Raddi was selected to accompany the expedition as naturalist, and once in Egypt, he collected plants along the Nile, getting as far as the first cataract. On his way back, he fell ill with dysentery and died on September 8th 1828 on the island of Rhodes, *en route* to Florence.

Grand Duke Leopold II bought Raddi's private herbarium and donated it to the University of Pisa

Figure 35. Illustration by Raddi of *Cyrtopodum glutiniferum,* in Memorie di Matematica e di Fisica della Società Italiana delle Scienze Residente in Modena, Parte contenente le Memorie di Fisica, 1823.

The Brazilian landscapes of Thomas Ender

The contribution of Thomas Ender (1793-1875) (Fig. 36) is of great importance to the understanding of the social and cultural circumstances encountered by the expedition upon its arrival in Rio de Janeiro. Ender painted a portrait not only of the city and its surrounding landscape, but of Brazilian society in the era of slavery, which he approached from a very critical point of view, interesting himself especially in the diverse nationalities of the Brazilian slaves (Fig. 37).

Ender was born on the outskirts of Vienna into a humble household. Together with his twin brother, Johann, he entered the Vienna Academy of Arts in 1806, to study historical painting. He soon changed to landscape painting, which he learned under Professor Laurenz Janscha and, after Janscha's death, Professor Joseph Mössner. In 1816 he was distinguished with the Grand Prize of the Academy. He travelled through Austria and Italy, learning and improving his techniques, and in 1817 he was chosen by Austrian Prime Minister Prince Clemens Metternich as a member of the Austrian Expedition to Brazil.

Ender sailed to Brazil from the port of Trieste with the first group of scientists on the frigates *Austria* and *Augusta*, in the company of von Martius, von Spix and Professor Mikan in April 1817, arriving in Rio de Janeiro on July 14th.

He soon set out to explore the region around the Brazilian capital, and Langsdorff's *fazenda Maniocca* was for him, as for so many others, an obligatory visit. One of his longest excursions took him to São Paolo with von Martius and von Spix. From this journey we have from him a beautiful painting of the *Vale das laranjeiras* (the valley of the orange growers) (Fig. 38). He extensively documented Rio de Janeiro and the Vale do Paraíba, where coffee growing was starting. After his return to Rio, he dedicated himself to capturing beautiful scenes of the capital, its squares and churches, its people and daily life (Fig. 39, A–B) and the park and waterfall of Tijuca (Fig. 40).

Thomas Ender was a more accomplished painter of landscapes than any other traveller of this period. In his works one can appreciate his detailed observation of vegetation, his careful treatment of scenes and perspectives and his magnificent treatment of urban

Figure 36. Thomas Ender (1793-1875). Portrait by Friedrich von Amerling. Österreichische Galerie Belvedere.

space from different points of view. According to Texeita Leite (1988) "Thomas Ender practised the techniques of oil painting and watercolor, being an outstanding master of the latter. As a landscape painter, he worked not only in his native country and Brazil, but also in Turkey, Greece and other regions. Of obvious interest for us is that part of his work produced in Brazil, in Rio de Janeiro, Sâo Paolo and the surroundings of both cities. His designs and watercolors are of extreme sensibility, traced, drawn and blotted with outmost elegance and hability. They retain all the emotion felt by the artist at his first impression. Thus, Ender reveals himself as one of the major painters that visited Brazil in the first decades of the 19th century, and of the most noteworthy Austrian artists of his time".

On June 1st 1818 the *Austria* returned to Europe with Professor Mikan accompanying the natural history collections of the Austrian expedition. Ender, who was suffering from tropical diseases, decided to return to Vienna, too. He spent the next months on board sorting, indexing and listing his drawings. Upon his return, Ender delivered a total of 782 works

FIGURE 37 (top). *Domestic slaves*. Watercolor by Thomas Ender.
FIGURE 38 (bottom). *Vale das laranjeiras*, São Paolo. By Thomas Ender.

Figure 39. Paintings by Thomas Ender. A. *Park of Santa Ana*, Rio de Janeiro. B. *Vale das laranjeiras*, São Paolo.

FIGURE 40. *Small waterfall of Tijuca*. Sketch by Thomas Ender.

to the Imperial government. These watercolors and sketches, which constitute the majority of his work in Brazil, remain one of the most beautiful and evocative sources of information on Brazilian colonial life and society. Along with Jean-Baptiste Debret and Johann Moritz Rugendas, Ender stands out as one of the greatest documentarians of Brazil's past.

After his return to Vienna, Ender travelled with Metternich to Rome, where he stayed on an Imperial grant until 1823. The year 1824 saw his appointment to the Vienna Academy. From 1837 to 1851 Thomas Ender was Professor at the Vienna Academy of Arts and created a series of sets of landscapes, which where often engraved in steel by English artists.

Thomas Ender combined his artistic talent with a great interest in geographic and topographic details, a feature that is particularly noteworthy in his Brazilian landscapes. He was thus a perfect illustrator in an era in which many painters endeavoured to document the world and nature fully and realistically, much in line with the philosophy of Alexander von Humboldt.

Heinrich Carl Beyrich

The son of the gardener Heinrich Beyrich, Heinrich Carl Beyrich (1796-1834) was born in the German city of Wernigerode, where he finished his secondary studies before going on to study Botany at the University of Göttingen and serve an apprenticeship at the Botanical Garden of the University. After finishing his studies he continued working as a gardener and landscaper at the Royal Garden in Tübingen and the Imperial Garden of Schönbrunn in Vienna. The year of 1819 saw him in Paris in the company of Alexander von Humboldt. He then went on to England on Humboldt's recommendation. At von Langsdorff's invitation, he was commissioned by the Prussian Government for a botanical journey to Brazil to collect plants for the Botanical Garden of Berlin.

Beyrich landed in the first days of June 1822 in Rio de Janeiro, where he stayed for several weeks. He then travelled to the Serra da Estrela, Langsdorf's *Fazenda Mandiocca*, Serra dos Orgaos, Serra da Tingua, Tocaia, Pilar, Morambaia and Lagoa da Saquarema, all in the Province of Rio de Janeiro. In July 1823 he returned to Germany, having collected over 400 species of living plants for Berlin's Botanical Garden and hundreds of herbarium specimens, many of which were new to science. In the final years of his life he was described as *of middle stature, usually walking somewhat bent forward, with a dreamy inquisitive attitude, thin in feature, eyes easily lighted up, and made to glow with pleasure, a hooked nose, betraying his great courage and perseverance* (Anonymous, 1846-47:101).

Among his Brazilian collections we find a number of specimens of Orchidaceae, such as *Habenaria secunda* Lindl., *Stelis miersii* Lindl., *Stelis papaquerensis* Rchb.f., *Ascolepis brasiliensis* (Kunth) Benth. ex C.B.Clarke, *Habenaria helodes* Rchb.f., *Habenaria achnantha* Rchb. f., and *Habenaria modestissima* Rchb.f.; *Cymbidium stapelioides* [= *Promenaea stapelioides (Link & Otto)* Lindl.] (Fig. 41), a new species brought by Beyrich from Rio de Janeiro, was published by Heinrich Friedrich Link and Friedrich Otto in their beautiful work about selected plants at the Berlin Botanical Garden, *Icones plantarum selectarum Horti Regii Botanici Berolinensis cum descriptionibus et colendi ratione* (1820-1828). *Pleurothallis beyrichii* Rchb.f. and *Galeandra beyrichii* Rchb.f., also new species collected by Beyrich, were dedicated to him.

In 1833, after having been defeated by a rival

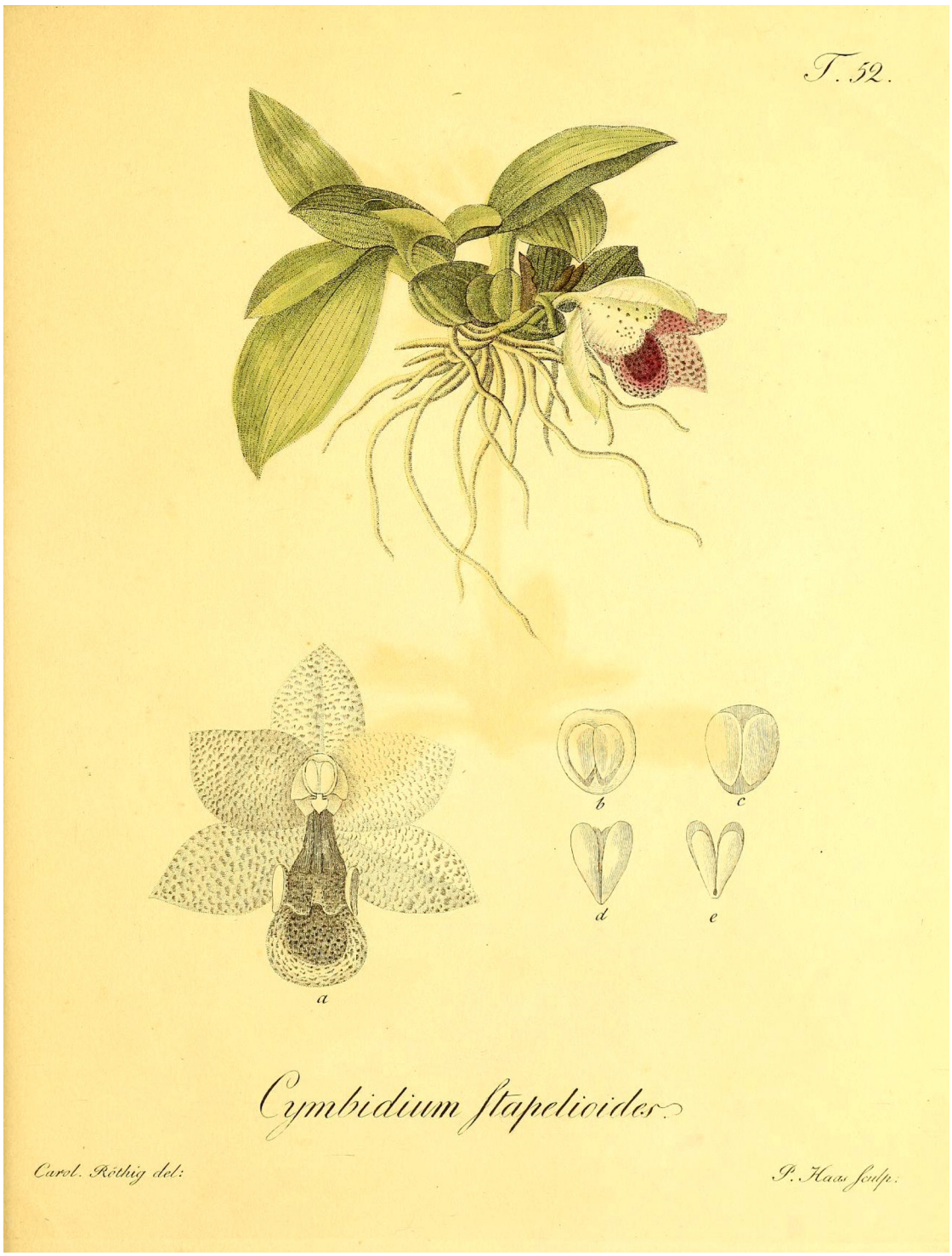

Figure 41. *Cymbidium stapelioides* Link & Otto. Plate 52 in Link's Otto's *Icones plantarum selectarum Horti Regii Botanici Berolinensis cum descriptionibus et colendi ratione*.

candidate for the position of curator of the Imperial Garden at Berlin, he embarked for the United States, again on a botanic journey commissioned by the Prussian government. While accompanying a military expedition to Fort Gibson, Oklahoma, he died there from cholera in 1834.

The Langsdorff Expedition to the interior of Brazil

Of all scientific expeditions to the New World, seldom had one been as carefully prepared as that undertaken by Baron von Langsdorff in the early 1820s. After having purchased his *Fazenda Mandiocca* near Rio de Janeiro in 1816, where he grew coffee and root crops using slave labor, the next step in Langdorff's plans was to replace slaves with European colonists. To this end, he travelled to Europe in 1820, promoting the idea of European immigration vigorously. He published two pamphlets advocating settlement in Brazil, one in Paris in 1820 and the second at Heidelberg in 1821. These were the first works on the subject to appear in Europe (Barman, 1971: 74).

While in Saint Petersburg in June 1821, he presented the plan for a great scientific expedition to the interior of Brazil to Karl Nesselrode, the Vice-Chancellor of the Empire. His stated objective was to make *scientific explorations, geographic discoveries, and studies of the little known produces of commerce and materials of all kingsdoms of Nature that could be gained to enrich the collections of the Empire*. Two days later he was received by Tsar Alexander I (1777-1825)], who guaranteed his personal patronage of the initiative.

The expedition would last for fifteen years, including intervals and the different composition of its members, from 1821 to 1836, and cost the Russian Treasury almost three hundred and thirty thousand roubles (Banco do Brasil, 2010: 8). With the liberty to choose his route, almost unlimited time, and ample financial means, Langsdorff took his time in Europe assembling a group of specialists in various fields of science and buying the necessary equipment.

Ludwig Riedel (1791-1861) (Fig. 42) was to be the expedition's botanist. Riedel arrived in Brazil in advance of his future companions. Between 1821 and 1829, as we will see shortly, he amassed an important herbarium of over 100,000 samples of 8,000 different species of plants. Néster Gavrílovitch Rubtsov (1799-1874), a graduate of the School of Navigation of the Baltic Fleet, served as the expedition's navigator and became Langsdorff's right-hand man during the years of the expedition. He also arrived in Rio before Langsdorff, as the second member of the team, in February 1822. Twenty-eight excellent maps are preserved in Saint Petersburg, proof of Rubtsov's excellent cartographical work during the journey.

FIGURE 42. Ludwig Riedel (1790-1861). Portrait by Johann Moritz Rugendas.

At the end of 1821 Langsdorff sailed from Bremen in a chartered ship carrying a group of eighty-five Germans he had contracted to settle on his *fazenda*. They arrived in Rio de Janeiro on March 6th 1822. In Langsdorff's company sailed Edouard Ménétries (1802-1861), who was the official zoologist. A disciple of the famous French naturalists G. Cuvier and P. Latreille, he was responsible for the zoological records until the summer of 1825, when he returned to Saint Petersburg with letters of recommendation written by Langsdorff. He became a collaborator of the Saint Petersburg Academy of Sciences and one of its corresponding members. Johann Moritz Rugendas (1802-1858), from a family of famous Bavarian painters, was to be the artist of the expedition between 1822 and 1824. He arrived with Langsdorff and Ménétries.

Ludwig Riedel

Born in Prussia in late 1790, Ludwig Riedel, who possessed a talent for languages, had acquired considerable experience working as a horticulturist and botanist in several European countries. He was sent to Brazil as Langsdorff's deputy ahead of the main part of the expedition and occupied his time there collecting materials for remittance to Russia (Barman, 1971: 75-76). Prior to this Riedel had served in the Prussian army (1813-1815) and collected plants in the south of France (1816-1817).

Riedel landed in Ilhéus, Bahia, in February 1821, and started botanizing and touring. He established relations with groups of foreign settlers, which helped him to get to know the country. Riedel stayed in southern Bahia until early November 1822, and then sailed to Rio de Janeiro, where he arrived on November 15th. He immediately went to the Russian Consulate, where he was received by the vice-consul since Langsdorff was at his country house in Mandiocca. Riedel came into contact with Georg Wilhelm Freyreiss and with the German botanist Heinrich Carl Beyrich.

While Riedel was still in Bahia, Langsdorff set off on his first excursion, which explored as far as the town of Novo Friburgo. While little or none of this exploration was original in a geographic sense, the area investigated was scientifically mostly unknown. Returning to Rio de Janeiro in December 1822, the expedition found that, during its absence, Prince Regent Pedro had declared Brazil independent of Portugal and had himself crowned Emperor of the new Empire of Brazil, taking the name of Pedro I. Although Langsdorff quickly assured the new regime *of the good will with which he* [the Tsar] *will receive this most important event*, Alexander I did not recognize the Empire of Brazil for another five years (Barman, 1971: 76).

After visiting the main sights of the capital of the very recently declared Empire of Brazil, Riedel departed for *Fazenda Mandiocca*, where he finally met not only Langsdorff, but also Rugendas, Rubtsov and Ménétries, who were preparing to depart for the tropical jungle (Rodrigues de Moraes, 2012b: 187).

Although Langsdorff kept his position as Russian Consul General, the political and diplomatic uncertainties of the period probably made any prolonged absence from the capital unwise and may explain the quiescence of the expedition during 1823.

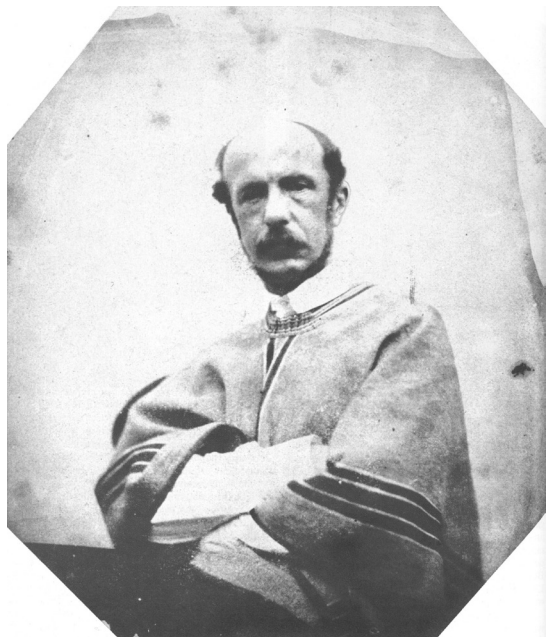

Figure 43. Johann Moritz Rugendas (1802-1858). Photograph by Franz Hanfstaengls.

Riedel used this time for further botanical collecting, using both Langsdorff's house in Rio and his property in Mandiocca as headquarters.

Johann Moritz Rugendas

Considered *by far the most varied and important of the European artists to visit Latin America* (Miles, 1996), Johann Moritz Rugendas (1802-1858) (Fig. 43) had just graduated from the Munich Academy of Arts and had little professional experience when he landed in Rio de Janeiro on the *Doris von Bremen* in 1821. The turning point in his career was his appointment by Langsdorff as the draftsman of the expedition. During this mission, and later on his own, Rugendas dedicated himself to documenting Brazilian nature and culture (Fig. 44, A–B). Back in Europe in 1825, and with the enthusiastic support of his compatriot Alexander Von Humboldt, he published his monumental book *Viagem pitoresca ao Brasil* (= *Picturesque journey to Brazil*) in Paris. Rugendas later travelled to Haiti and Mexico, 1831, to Chile, Argentina, Uruguay, Peru and Bolivia in 1834-1844, and finally went back to Rio de Janeiro in 1845.

During the first months of 1824, Langsdorff finally began to organize the prolonged expedition which he

FIGURE 44. Engravings by Moritz Rugendas. A. Virgin forest at Manqueritipa (Rio de Janeiro). B. View of Sabará, Minas Gerais.

had started planning four years before. On February 25th he applied for *permission to undertake a scientific journey in the provinces of St. Paul, Minas Geraes, Goyaz, Matto Grosso and others*, *being always anxious to know more about the products of this wonderful country, the sole reason which leads him to undertake the difficult journey* (Barman, 1971: 77). After further delays, the expedition, now including Riedel, started in early May.

Langsdorff's intention was to travel north across the Paraiba River into the mineral rich province of Minas Gerais, and then to turn west towards the provinces of Goais and Matto Grosso. However, after having explored the south and center of the province, it was decided to return to Rio. It seems that the direct route from Minas Gerais to Goais was unfrequented and undeveloped, difficult for a party so loaded with baggage. In addition, Moritz Rugendas and Edouard Ménétries refused to continue, due to personal difficulties with Langsdorff. Rugendas left Brazil on May 21st 1825, for Paris. Ménétries returned to Russia, where the Academy of Sciences, honoring a promise made to Langsdorff in 1821, took him into its service in 1826 as curator of the entomological section of the Academy's museum (Barman, 1971: 78). Thus, needing to find replacements, the expedition rested in Rio de Janeiro during the first half of 1825.

Aimé-Adrien Taunay

To fill the vacant positions, Langsdorff had now to draw upon such talent as was available in Rio de Janeiro. Christian Friedrich Hasse, a young Prussian about whom little is known, was chosen as the new zoologist. Rugendas was replaced by young Aimé-Adrien Taunay (1803-1828), son of the painter Nicolás-Antoine Taunay, who had arrived in Rio with the famous French Artistic Mission in 1816. Sadly, Taunay drowned on January 1st 1828, through his own imprudence, while trying to cross the Guaporé River on his horse.

Antoine Hercules Florence

After Taunay had been appointed as successor to Rugendas, Langsdorff thought of inviting a second artist to be paid from his own resources. Langsdorff was approached by another French artist, Antoine Hercules Florence (1802-1879) (Fig. 45), who replied

Figure 45. Antoine Hercules Florence (1804-1879). Portrait by Oscar Pereira da Silva.

to a newspaper advertisement. He was hired since he displayed a definite artistic talent. Florence would stay in Brazil for the rest of his life. He was the inventor of photography, six to eight years before Daguerre, Talbot and Niepce.

Langsdorff changed his original plans and instead of travelling directly overland from Rio de Janeiro to Goais, decided to adopt the suggestion of *trustworthy persons that I would do better, in desiring to travel to Goyaz, to go by sea to the port of Santos where I will more easily find the means of transportation for my baggage* (Barman, 1971: 79). Riedel and Hasse travelled to São Paolo overland, while Langsdorff embarked in Rio for the port of Santos on August 29th 1825, and thence to São Paolo.

Here began the main part of Langsdorff's Brazilian expedition. First came a period of research and preparation in the province of São Paolo. Then, in June 1826, began the journey from Porto Feliz, by the Tietê River, to the city of Cuiabá, the capital of the province of Matto Grosso, where the party arrived in January 1827. The expedition stayed in Cuiabá for a total of ten months until November 1827, exploring and researching the environs of the city (Fig. 46).

The travellers then split into two groups: the first

FIGURE 46. Indian village by Santarém. Hercules Florence. Page 410 of his manuscript.

Figure 47. The Amazon as seen from Monte Alegre. Watercolor by Hercules Florence.

one, with Langsdorff, Rubtsov and Florence, set off northwards in December 1827 and managed to reach Santarém on the Amazon River (Fig. 47), despite enormous difficulties, on July 1st 1828. Most of the members of the expedition became ill with tropical fevers (most probably malaria), including the Baron de Langsdorff. As a consequence of the febrile attacks, Langsdorff began to show signs of insanity and loss of memory at the Juruena River in May 1828. His condition deteriorated continuously. *At the time*, he wrote in his diary on May 13th, *I was without memory and did not know and do not know anything about what took place* (Barman, 1971: 89).

The second group, with Riedel and Taunay, took a north-westerly course along the Guaporé River, where Taunay drowned in January 1828. It then continued along the Mamoré and Madeira Rivers to Manaus. There Riedel received orders from the main party to continue to the port of Belem on the Atlantic, where the two groups finally rejoined in December 1828. *At last he arrived*, wrote Florence after seeing Riedel again, *being in his turn thin and wasted by the illnesses he suffered at the river Madeira where he underwent as much as we* (Barman, 1971:89).

From Belem the expedition took ship to Rio de Janeiro, where they arrived in March 1829, almost four years and 6,000 kilometers after its departure.

The orchids of the expedition

The hardships of the expedition made it difficult for its members to collect many botanical and zoological specimens, or to make detailed descriptions of them. Most of the scientific results of Langsdorff's efforts were of geographic or ethnographic nature, being particularly interesting as they related to the many indigenous people of Brazil that they met. Today, a large part of the material has been recovered and is in the Ethnographic Museum, the Zoological Museum and in the Repositories of the Academy of Sciences of St. Petersburg. Therefore, it must be said that Langsdorff's contribution to Brazilian orchidology lies much more in his efforts to attract foreign travellers and botanists to Brazil than in his ill-fated expedition itself. However, we must mention here the few orchid specimens that were collected during the journey.

As collected by Langsdorff himself we find: *Campylocentrum longicollis* (Cogn.) Hoehne, *C. latifolium* Cogn., *Gomesa barbaceniae* (Lindl.) M.W.Chase & N.H.Williams, *Phymatidium lancifolium* Lindl. (Fig. 48), and *Habenaria santensis* Kraenzl.

A much larger number of orchid specimens, collected by Riedel, can be found in the Natural History Museum in Paris. However, they correspond to collections that were made in the years after the expedition. Nevertheless, it was Langsdorff who first

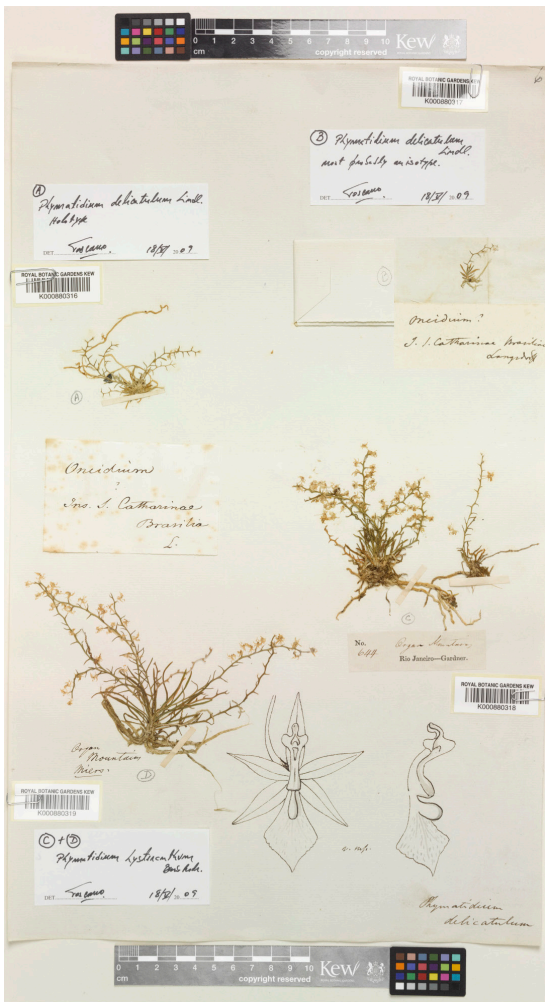

FIGURE 48. *Phymatidium delicatulum* Lindl. Specimen K000880317 in Herbarium Kew collected by Langsdorff.

brought Riedel to Brazil, so much of the credit must still go to him. These specimens are: *Aspasia lunata* Lindl., *Encyclia patens* Hook., *Epidendrum tridactylum* Lindl., *Gomesa lietzei* (Regel) M.W.Chase & N.H. Williams, *Habenaria riedelii* Cogn. (Fig. 49), *Ionopsis utricularioides* (Sw.) Lindl., *Lockhartia lunifera* Rchb.f., *Maxillaria* cf. *chlorantha* Lindl., *Maxillaria crocea* Lindl., *Miltonia flavescens* Lindl., *Mormolyca* cf. *rufescens* (Lindl.) M.A.Blanco, *Phymatidium lancifolium* Lindl., *Physurus longicornu* Cogn., *Rodriguezia pubescens* Rchb.f., *Stelis ruprechtiana* Rchb.f. (Fig. 50), and *Trichocentrum pumilum* (Lindl.) M.W.Chase & N.H.Williams,

FIGURE 49. *Habenaria riedelii* Cogn. Illustration by F. C. Hoehne. Plate N° 72 of *Flora Brasilica*, 1940.

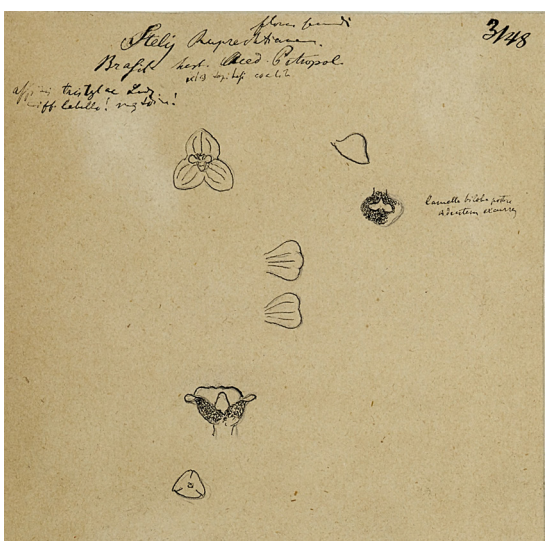

FIGURE 50. *Stelis ruprechtiana*, collected by Riedel. Flower analysis by Reichenbach in Vienna.

Finally, from Hercules Florence we have two beautiful water-colors of orchid species, a species of *Cattleya*, and one of *Rodriguezia* (Fig. 51–52).

Figure 51. *Cattleya loddigesii.* Watercolor by Hercules Florence.

Figure 52. *Rodriguezia lanceolata.* Watercolor by Hercules Florence.

Epilogue

Without Langsdorff's guidance, the expedition slowly withered away. Rubtsov was the first to depart for Russia, taking part of the expedition's records, which were then kept at the Ministry of Marine. He later produced several maps of the expedition's route.

Hercules Florence stayed in Brazil for the rest of his life. Florence left the 84-page manuscript of his diary of the expedition with Félix Taunay (1795–1881), the brother of his unfortunate companion Adrien. The manuscript was translated into Portuguese and published by Félix's son, the historian Alfredo D'Escragnolle Taunay, more than forty years later, in 1875. It was the first publication about Langsdorff's unfortunate expedition.

Riedel took a break in St. Petersburg from 1830-1831, where he was handsomely rewarded for his work. The Botanical Garden of St. Petersburg paid 25,000 roubles for his botanical collection and another 12,000 for his herbarium, and also contracted with him, on February 14th 1831, for his return to Brazil, to make further collections of living plants. Riedel returned to Rio de Janeiro in August 1831, with orders to continue in Brazil the researches on natural history that M. de Langsdorff began (Barman, 1971: 91). In 1836 he accepted a permanent position at the National Museum in Rio, founding its department of botany and botanic garden. He continued to collect plants, during 1838–1839, accompanying the French botanist J.B.A. Guillemin, who had come to study tea cultivation. In addition, Ludwig Riedel played an important role in the collection of material for the *Flora Brasiliensis*, Carl Friedrich von Martius' magisterial work on Brazilian botany, which ran to fifty volumes before it was completed in the twentieth century.

The genera *Riedelia* C.F. Meisner in the Ericaceae and *Riedeliella* Harms in the Fabaceae are both named in his honour.

Langsdorff arrived in Rio in a state of complete irrationality. Ludwig Riedel and Peter Kielchen, the Russian Vice-consul, took control of the expedition and began to settle existing commitments, while awaiting orders from the Russian government. Langsdorff finally left Rio de Janeiro on April 17th 1830, in the care of a German friend, bound for the German town of Freiburg in Breisgau, where he spent the rest of his life. Behind him were seventeen years of life in Brazil. The

FIGURE 53. Russian postal stamp of 1992, commemorating Langsdorff's expedition.

Russian government granted him an annua1 pension of 11,000 francs. Langsdorff published nothing on the expedition in the twenty years between his retirement and his death (Fig. 53).

ACKNOWLEDGEMENTS. The author wishes to thank -once more- two friends who have become essential to all his writings: Rudolf Jenny and his inexhaustible supply on valuable information and friendly advice on orchid history, and Mark Budworth, whose meticulous philological review of the text is responsible for a – hopefully – agreeable reading of this article.

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GOODYERA FUSCA (ORCHIDACEAE): A NEW RECORD FOR KASHMIR HIMALAYA, INDIA

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Abstract. *Goodyera fusca*, a rare orchid species is reported for the first time from the Kashmir Himalaya, India. A brief description and photographs of diagnostic features are provided. Comparative characters are also provided to distinguish *G. fusca* from *Goodyera repens*, already reported from Kashmir Himalaya. This newly reported terrestrial orchid species occurs in alpine habitats of this Himalayan region.

Key words: alpine habitats, flora, Himalayas, new plant record

Introduction. Orchidaceae is the second largest family of flowering plants with 870 genera and *ca.* 25,000 species, distributed worldwide (Swarts & Dixon 2009, Rao *et al.* 2012). Orchids are widely distributed in tropical, subtropical and temperate regions in all continents except Antarctica, but reach their maximum diversity in the humid tropical regions. The family constitutes 9% of the total Indian flora and is represented by 177 genera with *ca.* 1,195 species (Misra 2007, Singh *et al.* 2001). In India, the Himalayas represent one of the global biodiversity hotspots (Mittermeier *et al.* 2005), and are well-known to harbor a rich diversity of orchids (Vij & Pathak 2010, Jalal & Jayanthi 2015).

In the northwestern extreme of the Indian Himalayas, the Kashmir Himalaya constitutes a biodiversity-rich region (Dar & Khuroo 2013). From this region, 44 orchid species have been recorded (Duthie 1906, Naqshi *et al.* 1989, Akhter *et al.* 2011), including one species of the genus *Goodyera*, i.e. *G. repens* (L.) R.Br. (Kant & Chander 2004, Akhter *et al.* 2011). During recent botanical surveys in the Thajwas Wildlife Sanctuary, Sonamarg, Kashmir, the authors collected a hitherto unrecorded plant species from the region. After a detailed study of diagnostic characteristics of the fresh plant material and perusal of taxonomic literature, the species was identified as *Goodyera fusca* (Lindl.) Hook.f. which turned out to be a new record for the flora of Kashmir Himalaya. In order to validate this new record, the present paper provides a detailed taxonomic description, microphotographs of diagnostic characters (Figure 1) delimiting characters from its con-generic species occurring in this region (Table 1), which will facilitate its field identification.

Materials and Methods. Standard taxonomic methods have been used for collection, drying, and further processing of the herbarium specimens (Bridson & Forman 1998) deposited in the Kashmir University Herbarium (KASH) with a proper voucher specimen number. The fresh plant specimens have been identified using relevant taxonomic literature (Hooker 1897, Stewart 1972, Duthie 1906, King & Pantling 1979, Deva & Nathani 1986). The photographs of the diagnostic characters were taken with Handheld Portable microscope (Make: DINO Lite AM4515ZT4).

Taxonomic treatment

Goodyera fusca (Lindl). Hook. f. *Fl. Brit. India* 6: 112, 1890.

Bas.: *Hetaeria fusca* Lindl. Syn.: *Cystorchis fusca*

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Figure 1. Figure 1. *Goodyera fusca* (Lindl.) Hook.f. A. Habit. B. Rootstock. C. Leaf. D. Bract. E. Flower. F. Sepal. G. Labellum. H. Pollinia. I. Tuber. J. *G. repens* (L.) R.Br. K. Surface of leaf of *G. repens*. L. Pollinia of *G. repens*. (Photo credits: Anzar A. Khuroo, Gowhar A. Shapoo, Shugufta Rasheed, and Shah Rafiq).

Table 1. Comparison of diagnostic characters between *G. repens* and *G. fusca* occurring in the Jammu and Kashmir, India.

Diagnostic characters	*G. repens*	*G. fusca*
Leaf	Whitish green, marbled	Thick, fleshy, 5-nerved
Petiole	Sheathing in lower half	Sheathing at the base
Bracts	Linear-lanceolate	Ovate-oblong
Petals	Lanceolate, adhering on the inner margins to the dorsal sepal	Sigmoid, linear-oblong, sub-acute
Lip/Labellum	Sac of the lip papillose without any ridges inside	Sac of the lip glabrous with two ridges inside

(Lindl.) Benth. & Hook. f.; *Epipactis fusca* (Lindl.) A.A.Eaton, *Orchiodes fusca* (Lindl.) Kuntze.

Terrestrial leafy *herb*, height 16 cm. *Stem* glabrous, 8 cm long. *Leaves* clustered near the base, thick ovate, 4 cm long, 5-nerved, margins revolute, petiole 6 mm broad. *Bracts* leaf-like, oblong, 6 mm long. *Inflorescence* a many-flowered raceme, longer than the stem, 5.5 cm long. *Flowers* 5 mm long, pubescent, white flushed green. *Sepals* sub-equal, oblong, sub-acute, 4.4 mm. *Petals* linear, 5.15 mm long, oblong sigmoid, subacute. *Labellum* (lip) as long as sepals, deeply sub-globose at the base, sac of the lip with two ridges, glabrous inside, base conspicuously projecting beyond the base of the sepals. *Column* 1.5 mm long. *Pollinia* 2, broadly ovoid.

Specimen examined. India. Kashmir: District Ganderbal, Thajwas Wildlife Sanctuary, Sonamarg, 23-08-2017, *Khuroo and Shapoo 0157* (KASH).

Habitat: Grows on open mountain slopes, in rock crevices with a dense layer of decomposed humus in the alpine zone at an elevation of 3700 m.

Phenology: Flowering was recorded in August-September.

Global distribution: China, Myanmar, Bhutan, Nepal, India (Arunachal Pradesh to Himachal Pradesh); and now extended further westwards to Kashmir Himalaya.

Acknowledgments. The authors are thankful to the Head of Department of Botany, University of Kashmir, Srinagar for providing the necessary facilities. The supporting staff members at the Centre for Biodiversity and Taxonomy, University of Kashmir are also acknowledged for their kind help during the course of the present study. We acknowledge help by Dr. Pankaj Kumar, IUCN-SSC Orchid Specialist Group Asia, who confirmed the scientific identification. The useful comments made by the esteemed reviewers are also acknowledged.

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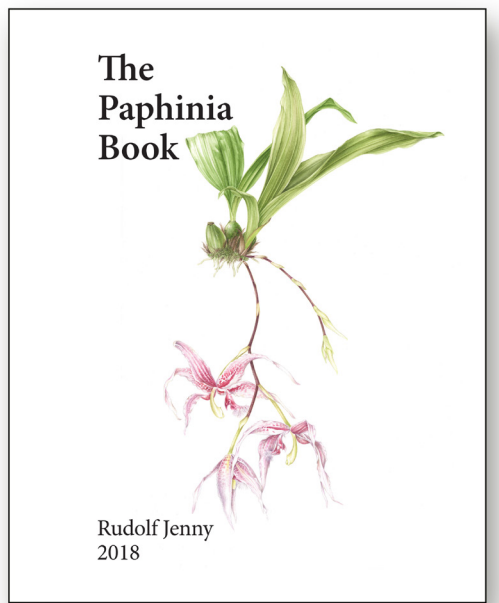
BOOKS

The Paphinia Book, by Rudolf Jenny. Printed for the author by Imprenta Mariscal, Quito, Ecuador, 2018. Volume in large octavo (22.0×27.4 cm; 8.7×29.1"), 231 pages, hundreds of color and black and white illustrations, and color photographs. Hardbound, with dust jacket. 168.00 Euro / US$ 210.00 at Koeltz Botanical Books.



I must confess I have a weakness for orchid monographs. Just plain, I like the idea of having a book to browse, among whose pages I will eventually find the correct name for an orchid flower that I hold in my hands. Paraphrasing Henry Oakeley's introduction to his first *Guide to Lycaste and Anguloa*, it is nice to know that the species you are trying to identify is either there or is a new thing… I also have a fondness for the books illustrated with prodigality, with a profusion of color pages, because to the pleasure of knowledge they add amazement and admiration for the bizarre diversity of natural beauty.

Now, one can imagine how to put together a "book" on a large orchid genus, with the over hundred species of *Cattleya* (*sensu lato*), the hundred or so species of *Paphiopedilum*, the seventy species of *Vanda*, the sixty taxa included in *Cymbidium*, the fifty species of *Phalaenopsis*, and also on the forty or so taxa accepted for *Phragmipedium*. In fact, these genera have been monographed several times. An orchidologist has however only feeble chances to see a richly illustrated monograph, shaped like a book, on small genera of ten or fifteen species.

With his *Paphinia Book*, Rudolf Jenny succeeded in bringing together both aspects of a useful and pleasant lecture, creating a real book of 230 pages on an orchid genus of just a few more than a dozen species… If only for this reason, his work deserves to be widely praised.

But, of course, this is not the only reason to review and praise Jenny's monograph on *Paphinia*. This solid book takes advantage of the author's recognized photographic skills, as well as of his passion for the historical aspects of orchidology, supported by a legendary personal library. Not only, under the "General" chapter, the history of *Paphinia* is accompanied by excellent images of old book pages, herbaria specimens, and portraits of the relevant figures in the discovery of this orchid genus, but virtually all the accepted species are illustrated with

ancient plates and botanical drawings which add a touch of historical scent to the modern photographs, and considerably broaden the reader's appreciation of the natural variation of individual species. Just to give you a few examples, *Paphinia cristata* is illustrated with eleven plates (plus 4 pics), taken from journals like the *Botanical Register, The Botanist, Curtis's Botanical Magazine, Flore des Series* and *Lindenia*, books like *Icones Plantarum Tropicarum*, Warner and Williams' *Orchid Album* and *Venezuelan Orchid Illustrated*, and unpublished illustrations from Reichenbach's and Senghas' herbaria, and John Day's Scrap Book. Six published historical illustrations, plus four sketches and a specimen reproduced from different herbaria, accompany the three color pics of *P. grandiflora* (and its synonym, *P. grandis*). Ten color photographs illustrate the variability of the Ecuadorian *P. herrerae*. *Paphinia rugosa* and its variety *kalbreyeri* have the record of illustrations, with seven unpublished and one published illustration spanning from 1877 to 1892 (mostly full age), and twelve color photographs!

For all the treated species, the original illustrations (when extant) and the protologues of the single species (together with those of the synonymized taxa) are also reproduced at the original size to be easily consulted. Photographs of the flower and the habit (in most cases), and macrophotographs of the lip, mostly taken by the author in his private plant collection, are presented for each taxon in a way that facilitates species comparison. I particularly like this style of monograph, which presents its conclusions together with most of the materials that support the taxonomic decisions. It is a transparent style which allows the reader to form his own idea about the identity and circumscription of the species, and to understand the taxonomic approach adopted by the author. Finally, when available, photographs of the habitats are also shown under the specific treatments, together with images of the original collectors and the botanists who described the species, to underline the human history behind the nomenclatural history of orchids.

The monograph recognizes 15 species of *Paphinia*, plus one variety and one form. Thirteen other *Paphinia* names, both at the specific or varietal rank, are reduced under the synonymy of the 17 accepted taxa (including the subspecific taxa).

Chapters on Morphology (including General, Sepals & Petals, Column, Pollinaria and Anther, Lip, Lip-callus, Lip appendices, in this order), a species Checklist, Distribution, and Habitat preceed the systematic treatment, arranged in alphabetical order by species. Particularly worthy of mention is an extensive chapter on the pollination biology of *Paphinia* (pp. 198–213), written by the Heiko Hentrich, a worldwide recognized expert in the reproductive biology of Stanhopeinae orchids. A profound discussion on *Paphinia* pollination mechanism and on floral scent (with a lot of personal observations by the author himself and other experts, like Günter Gerlach), make this chapter a very useful addition to the scientific literature about the pollination syndrome by male euglossine bees. Chapters on *Paphinia* hybridization (lavishly illustrated), the etymology of all the species, a selection of useful literature, and the index of names, conclude the book.

The *Paphinia Book* surely represents an authoritative monograph of the genus. From a taxonomic point of view, I just want to address a few points that could be improved. First of all, the treatment lacks a taxonomic key to the species, which would have rendered easier finding a particular taxon without the necessity of browsing through the entire book, scrutinizing the iconographic material. Secondly, some species have not been explicitly typified, as should be expected by a monographic work. So, for example, *Paphinia grandiflora* should have been formally lectotypified (and its synonyms *P. grandis* and *P. nutans* should have been typified as well), and *Paphinia posadarum* should have perhaps deserved to be neotypified, as according to the author both the holotype and the isotype are apparently missing from their respective herbaria. Finally, the author accepts and maintains in his treatment both the subspecific ranks of varietas and formae [i.e., *Paphinia neudeckeri* f. *mocoaensis* (R.Jenny) O.Gruss and *P. cristata* f. *modiglianiana* (Rchb.f.) O.Gruss, *versus P. levyae* var. *angustisegmenta* Garay], without expliciting his criteria about the meaning of the taxonomic categories utilized in the book. One would have preferred to have, also in this

particular case, a final word about the systematic ranking of the concerned taxa.

I want to warmly recommend this beautiful monograph not only to insiders, who will certainly use it for their botanical activities, but also to the many fans of this magnificent group of plants and to the simple lovers of natural beauty, since in the pages of this book they will find certainly a variety of things to feast their eyes on.

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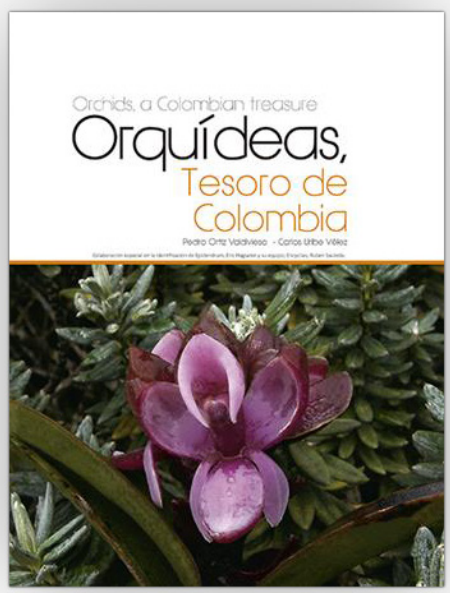
Orquídeas, tesoro de Colombia / Orchids, a Colombian treasure. Tomo 2. E–H., by Pedro Ortiz-Valdivieso† and Carlos Uribe Vélez. 2018. Da Vinci Publicidad y Medios, Bogotá. ISBN: 978-958-48-15859. Volume in 4to (29×23 cm), hardcover with dust jacket. 400 pp., 887 color photographs and 431 colored and line drawings. Bilingual, Spanish and English. 210.00 US$ / 178 €.



In reviewing the first volume of this series three years ago (Pupulin 2015), I noted that the author expected to have the present volume in press for the summer of 2015, but writing, producing, editing, printing and binding a superb book as this *Tomo 2* takes its time... As well as its predecessor, the new release is a large, solid and heavy hardcover book provided with a dust jacket, and printed on high-quality, semi-matte paper.

The derivation of this work from a previous treatment by the same authors presented in digital format, its concept and organization, as well as the choice to mix Uribe Vélez's mostly excellent photographs with the sometimes schematic floral sketches prepared by the late Father Ortiz, have been discussed in the review of the first volume (Pupulin 2015), to which I refer the interested reader.

In this second volume of the work, the generic treatment is preceeded by an extensive chapter on orchids and philately in Colombia, written by Antonio Raad Aljure and profusely illustrated with photographs taken by Uribe Vélez in the author's stamps collection, The chapter highlights over sixty years of history of stamp emission in Colombia, since 1947 – with the first six orchids species – until 2011, with a philatelic sheet devoted to Colombian biodiversity, which features flowers of *Odontoglosssum luteopurpureum*.

Volume 2 of "Orchids, a Colombian treasure" only covers 23 genera, from *Elleanthus* to *Habenaria*, but it includes the mammoth *Epidendrum*, a true *crux orchidologorum*, as well as the diverse and difficult *Encyclia* and *Gongora*.

The task of documenting, identifying and naming the 709 species of *Epidendrum* illustrated in the 220 pages devoted to this genus has been entrusted to the care of Eric Hágsater and his group of researchers, including Elizabeth Santiago and the late Luis Sánchez, ostensibly the undisputed specialists in the systematics of *Epidendrum*. The size of the effort of sorting out the over one thousand species of *Epidendrum* recorded for Colombia may be appreciated by the fact that some 20 taxa are exclusively known through the quite crude drawings of the type specimens made by Schlechter in the 1920s, and another 300 or so species simply lack any visual record of their identity. Even more indicative of the difficulty of the task is that 16 of the photographs (2%) are identified as "cf." (the way to say, in botanical jargon, that it is *probably* the given species), and almost 70 (*ca.* 10%) as "aff.", which means "similar but not the same": another way to say that, with good probability, it is a still unpublished species. In five or six cases, the photographs are identified with a name already assigned but still unpublished (*sp. nov. ined.*), and in as many cases simply as "sp.": a delicate abbreviation to say that you do not know... If it were you or me, this would be quite normal, but being the final answer of a well researched judgement by Hágsater's study group, it means that the taxonomy of Colombian *Epidendrum* must be *very* difficult! And this, in turn, is by itself a very good reason to find a place in the library for this book, as who knows for how many years to come this would be the best visual reference to identify species of *Epidendrum* in the flora of Colombia.

Rubén Sauleda and Claudia Helena Gutiérrez took charge of the chapter on *Encyclia* (pp. 48–69). Twenty-three species are illustrsted in 36 photographs and 16 sketches, while only 7 of the taxa recorded from Colombia are missing any visual records. There are a few perplexing things in the treatement. *Encyclia belizensis* is photographically recorded by three very different morphs (one of which, in my opinion, is a form of *E. diota*), and I strongly suspect that the name of Colombian populations is misapplied, as it seems difficult to explain such a broad disjunction between the populations of northern Nicaragua and those of Colombia (the species has never been recorded for the floras of Costa Rica and Panama). *Oestlundia luteorosea*, which DNA data show more closely related to *Prosthechea* than to *Encyclia* (Higgins *et al.* 2003), is here treatead as belonging to the latter genus. The variation of *Encyclia cordigera* is presented in four photographs, one of which depicting an unpublished variety "alba", together with the purple-lipped form, provided with dark brown sepals and petals, which is unknown to the north of Panama. Also included are two pics of a white-lipped form, striped with purple in front of the lip callus, identified as *E. macrochila*, a taxon originally described from Mexico and the only "species" of the *E. cordigera* group recorded in Costa Rica. As the profusion of names, both at the specific and varietal levels, applied to morphs of this group show (see, for example, Withner 1998), and the inconsistencies in distributional patterns confirm, the recognition of *E. macrochila* as a species distinct from *E. cordigera* based on flower color and the results of selfing and hybridizing (Sauleda & Esperon 2016), without a careful study of genetic and morphological variation within and among populations through the whole distribution range of the group, can not resolve the taxonomy of *Encyclia cordigera*.

The chapter on *Gongora* alone occupies 40 pages, with 84 photographs and 27 sketches. Out of the 50 names published to name the diversity of the genus in Colombia, only *G. dilaniana, G. lagunae*, *G. leucochila*, *G. passiflorolens*, and *G. unicolor* (less than 10%) are not depicted in the book, which make of it an essential visual reference for this difficult group of orchids in the northern Andes. Nevertheless, as it is unfortunately common with *Gongora*, the identification of the species seems largely tentative. So, for example, the three photographs referred to *G. arcuata* probably depicts three different taxa, and the same is true for the five entries of *G. catilligera* (*G.* aff. *catilligera* on page 350 could well be an altogether new species). The photograph of *G. charontis* and those of *G. dressleri* depict, in my opinion, the same species. Judging by the long claw of the lip of *G. claviodora* (352), this name seems likely misapplied to Colombian populations. Finally,

a small bunch of 4 photographs (p. 380) illustrated *Gongora* spp., at least two of which effectively seem different from any other known species in the genus.

I found of particular interest the chapters on *Galeandra* (8 pages, 22 illustrations) and *Gomphichis* (6 pages, 20 illustrations), as both are rarely illustrated in profusion and with such a completeness; the book includes images of all the 12 species of *Galeandra* and all but one the taxa recorded in Colombia for *Gomphichis*.

As a minor methodological fault, the genus *Guanchezia* is illustrated by a single photograph by Gustavo Romero, which undoubtedly depicts a Venezuelan specimen, so that we still lack any visual evidence of the occurrence of *Guanchezia* in Colombia.

The authors accept the genus *Expedicula*, which most workers in the Pleurothallidinae treat today as a synonym of *Lepanthopsis* (Karremans 2016), but the two photographs of *Expedicula* on page 317, *E. apoda* and *E.* sp., obviously depict true species of *Pleurothallis* (*P. caucensis* and *P.* cf. *crescentilabia* respectively). Finally, whilst *Frondiaria caulescens* is correctely illustrated in the color photographs, Father Ortíz' sketch on page 322 does not depict a flower of *Frondiaria*, but most probably one of the genus *Crossoglossa*.

There is no doubt that, dealing with probably the most diverse orchid flora over the planet, the work by Uribe Vélez has epic proportions. The effort to make the series as complete as possible as an iconographic record of this extraordinary diversity has to be praised, and make its minor faults negligible in front of its utility. The second volume of "Orchids, a Colombian treasure" is a treat for the eyes and a challenge for the mind, and it deserves a place in any serious orchid library. However, I seriously doubt that this *magnus opus* could be completed in the three volumes originally scheduled, and I guess that several more tomes will be released to cover the remaining genera, included between I and Z. I say it with a pinch of pleasure, savoring the waiting of the next volumes.

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  4. Book chapter: Nobody, A. B. (1991). The effect of light on growth. In: C. D. Somebody (Ed.), *Light and growth* (pp. 209–291). London: Light Press. – or – Nobody, A. B. (1991). The effect of light on growth. In: C. D. Somebody & E. F. Someother (Eds.), *Light and growth* (pp. 209–291). London: Light Press.
  5. Journal article: Nobody, A. B. (1991). The effect of light on growth. *Title of Journal*, 3(1), 15–20. doi: insert DOI when it is available.
  6. Manuscripts accepted for publication but not yet published: Nobody, A. B. (In press). Name of the journal or publisher. The name of the journal where the paper was accepted must be indicated, the volume number should be included if known.
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