

ILLUSTRATIONS AND STUDIES IN NEOTROPICAL ORCHIDACEAE— THE *LEPANTHES JIMENEZII* GROUP (PLEUROTHALLIDINAE)

FRANCO PUPULIN^{1,2} AND DIEGO BOGARÍN¹

Abstract. Recent advances in orchid DNA barcoding and molecular phylogeny have increased over the past few years. The need for rigorously delimited specific concepts and the development of an integrative taxonomic system intended to place molecular information within the context of morphological, ecological, and physiological knowledge are the main reasons for which traditional taxonomy should constitute the basis of future molecular works. This is the first in a series of manuscripts to focus on discrete groups of Neotropical orchid taxa, providing full and comparable species descriptions and illustrations for taxonomic discussion. Here, we revise the *Lepanthes jimenezii* group, in which *Lepanthes caroli-lueri* and *Lepanthes pulcherrima* are described. *Lepanthes jimenezii* is lectotypified and a key to the species is provided based on morphological characters.

Keywords: DNA barcoding, *Lepanthes caroli-lueri*, *Lepanthes pulcherrima*, new species, Pleurothallidinae

The need for rigorously delimited specific concepts has been emphasized in the past for the accuracy of biodiversity inventories. Precise circumscriptions of species limits and a sound application of botanical names, however, are also important to establish the basic scientific framework on which a vast array of other biological disciplines (including phylogeny, ecology, phytogeography, and conservation) depends. It is interesting that, while the number of newly described organisms increases at an unprecedented rate, our knowledge of many of the old and new taxa is still based on inadequate samples, with at best a reduced understanding of their natural variation.

In recent years, sequencing of the plant genome has been regarded as a powerful tool to evaluate the phylogeny of the major groups of Orchidaceae and to assess the consistency of specific concepts, mainly through species barcoding. DNA barcoding is also a potent instrument to review previously recognized taxa circumscriptions and clarify problems of synonymy, to disclose cryptic taxa difficult to

tell apart with traditional taxonomic methods and, in general, to test the scientific hypotheses represented by the description of new species (Lahaye et al., 2008).

Dayrat (2005) and Ebach and Holdrege (2005) addressed the need to include other disciplines into a model of “integrative taxonomy” and to place DNA barcoding within the context of rich morphological and physiological knowledge. Hebert and Gregory (2005) stressed that barcodes by themselves are hitherto insufficient to describe new species, but at some stage clearly divergent barcodes may be used as the basis for taxonomic decisions (e.g., to distinguish one particular species from another). An understanding of individual variation and the identification of taxa that can be confidently recognized on the basis of a consistent set of diagnostic features, are preliminary steps to be addressed in order to propose a feasible barcode of morpho-species. If diagnostic DNA sequences are to be used for species identification, then barcoding should ideally be carried out on type specimens. The “minimalist” barcode for degraded DNA of

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museum specimens (Hajibabaei et al., 2006) proved to be a realistic approach, but also the analysis of short sequences is of no use when no specimens are preserved. In these cases, traditional approaches cannot be replaced.

With the start of a vast project aimed at reconstructing the phylogenetic and evolutionary histories of the orchid subtribe Pleurothallidinae in Mesoamerica utilizing DNA techniques, the need to critically revise the taxonomy of many species groups becomes evident. The subtribe Pleurothallidinae is one of the most diverse groups in Neotropical floras, and recent estimates (Ossenbach et al., 2007) recorded some 1130 species in 30 genera in the Central American isthmus. Species diversity in the Pleurothallidinae is probably better sampled in Costa Rica, with 450 recorded taxa (Ossenbach et al., 2007), or in Mexico, than in other Central American countries, but taxonomic novelties in the group are still frequent in Mesoamerica (Pupulin, 2001; Pupulin and Bogarín, 2004;

Dressler and Bogarín, 2007; Pupulin and Bogarín, 2007; Pupulin et al., 2007, 2009), showing that traditional floristic treatments failed to reveal the real richness of species in this taxonomically difficult subtribe.

A sound application of names to the “species clusters” revealed by molecular analyses is of paramount importance if DNA barcoding is to be used as the standard technique to inventory biological diversity in hotspot areas (Blaxter et al., 2004; Janzen et al., 2005; Hajibabaei et al., 2006). This paper begins a series of contributions by the staff of Lankester Botanical Garden and associate scientists involved in the project, mainly focused on the taxonomic discussion of discrete groups of taxa, providing full and comparable species descriptions and illustrations, in many cases still unavailable to the students of the Neotropical orchid flora. The aim of the series is to constitute the taxonomic bases for future works in Neotropical orchid phylogeny and DNA barcoding.

THE *LEPANTHES JIMENEZII* GROUP

The *Lepanthes jimenezii* group is easily distinguished within the genus by the plants with hispid ramicauls and suborbicular leaves, the inflorescences larger than the leaves and provided with ciliate bracts, the muriculate ovary, the suborbicular to orbicular, ciliate blades of the lip, and the column with distinct apical arms (Fig. 1). The three known species of this group so far have been found only in Costa Rica and Panama.

The first species referable to this group was described by Rudolf Schlechter in 1923 as *Lepanthes jimenezii* Schltr., on the basis of a Costa Rican specimen sent by Adolphe Tonduz and labeled by Ottón Jiménez without closer locality data (*O. Jiménez s.n.*, B, destroyed). Schlechter (1923) compared the new taxon with *L. blepharistes* Rehb.f., a species that shares few characters with and is not closely related to *L. jimenezii*.

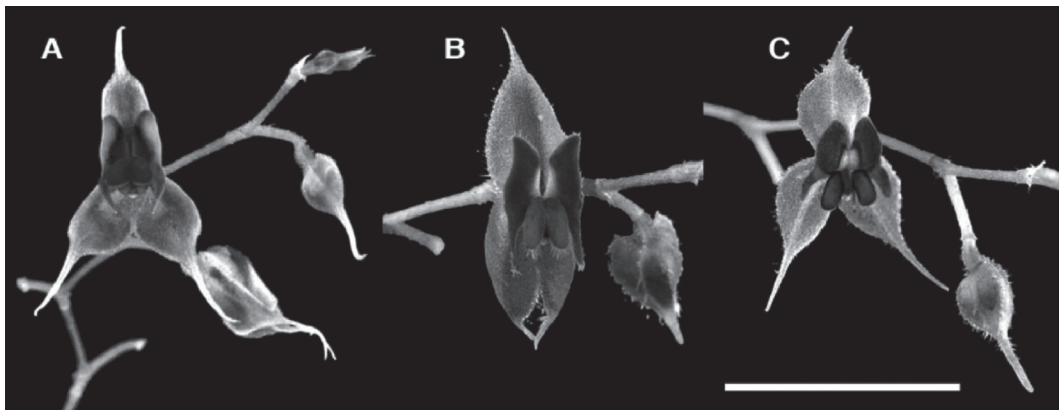


FIGURE 1. Inflorescences of species of the *Lepanthes jimenezii* group. **A**, *L. caroli-lueri* (F. Pupulin et al. 5162, JBL-Spirit); **B**, *L. jimenezii* (F. Pupulin 1372, JBL-Spirit); **C**, *L. pulcherrima* (D. Bogarín 2942, JBL-spirit). Scale bar = 5 mm.

Specimens pertaining to this group were collected long ago by A. Endrés, who sent his collections to H. Gustav Reichenbach, in 1887. Remarkably, Endrés collected and drew detailed sketches of *Lepanthes jimenezii* and of both the two new species we describe here. Unfortunately, they remained undescribed in the Reichenbach Herbarium under the intended names of *Lepanthes hispida* and *L. pulcherrima*, first given by Endrés.

A collection of *L. jimenezii* was gathered by A. M. Brenes in 1922 at Alto de la Calera de San Mateo (A. M. Brenes 306, AMES, CR); however, the material sent by him to Ames remained undescribed in the herbarium of the great American orchidologist. In 1924, Brenes collected the same species near El Socorro de San Ramón (AMES) and in 1927 at La Palma de San Ramón (CR). After the loss of the *L. jimenezii* type specimen in Berlin-Dahlem Herbarium, the only material available to reconstruct its identity are the protologue and the drawings preserved at AMES in Harvard. These drawings were mounted with Brenes 306, however Schlechter did not mention any of these specimens in the protologue.

In 1987, Carlyle Luer published *Lepanthes crossota*, based on a plant collected in 1986 by A. Maduro at Cerro Punta in Chiriquí, Panamá (Luer, 1987). A paratype, C. A. Luer & J. Luer 6406 (SEL) comes from Monteverde Forest Preserve in Costa Rica. Luer distinguished his new species from *L. jimenezii* by the

sepals provided with ciliate margins and the short connectives of the lip bearing the blades no higher than the column (vs. sepals with denticulate margins and the connectives long, lifting the blades of the lip far above the column, in *L. jimenezii sensu* Luer). The specific epithet, from the Greek *krossotos*, “fringed,” refers to the ciliate margins of the sepals. Luer was right, not only in recognizing the existence of two closely related species, but also in pointing out the diagnostic characters to tell them apart. Unfortunately, the sets of features that he considered critical to distinguish the two entities are inverted, and the characters used to delimit *L. crossota* are actually diagnostic of *L. jimenezii*, according to Schlechter’s protologue (1923) and to the analytical drawings of the type conserved at AMES. In his key to the species of *Lepanthes* from Costa Rica, Luer (2003: 217), correctly assigned to *L. jimenezii* the short connectives of the lip, characterizing *L. crossota* by the connectives that bear the blades of the lip far above the column. This interpretation, however, is not in agreement with the protologue of *L. crossota*, and an examination of both the holotype and the paratype reveals that this taxon is conspecific with *L. jimenezii*.

As part of the preliminary studies aimed to reevaluate the generic limits and species circumscriptions in Mesoamerican Pleurothallidinae, the following taxonomy is proposed for the *L. jimenezii* group.

TAXONOMIC TREATMENT

1. *Lepanthes jimenezii* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 19: 281. 1923. TYPE: COSTA RICA. Ohne nähere Standortsangabe, O. Jiménez s.n. (Holotype: B, destroyed; Lectotype, selected by C. Luer on the herbarium sheet and designated herein: tracings of Schlechter’s drawing of the Holotype, AMES-31565, based on O. Jiménez s.n., excluding the specimen A. Brenes 306 mounted on the same sheet). Figs. 2–3.

Synonym: *Lepanthes crossota* Luer, Lindleyana 2(4): 188. 1987. TYPE: PANAMÁ. Prov. of Chiriquí: Cerro Punta, collected and cultivated by A. Maduro, 1986, C. Luer 11630 (Holotype: MO, Photo), *syn. nov.*

Plant epiphytic, caespitose, small, up to 8 cm tall. *Roots* slender, flexuous, to 1.5 mm in diam. *Ramicauls* slender, erect, to 7 cm long, enclosed by 4–9 hirsute, lepanthiform sheaths, the ostia ciliate and obliquely dilated. *Leaves* erect or suberect, coriaceous, elliptic to orbicular, somewhat lenticulate, conduplicate, obtuse, retuse, 0.8–2.5 × 0.6–1.3 cm, the rounded base narrowing into a petiole 1 mm long. *Inflorescence* racemose, distichous, successively flowered, borne above the leaf, to 11 cm including the peduncle 1.4–2.7 cm long. *Floral bracts* 1 mm, ciliate, spiculate. *Pedicels* 1 mm long, persistent. *Ovary* 1 mm long, spiculate-muriculate. *Flowers* red-scarlet, the sepals reddish tinged with brown, the petals

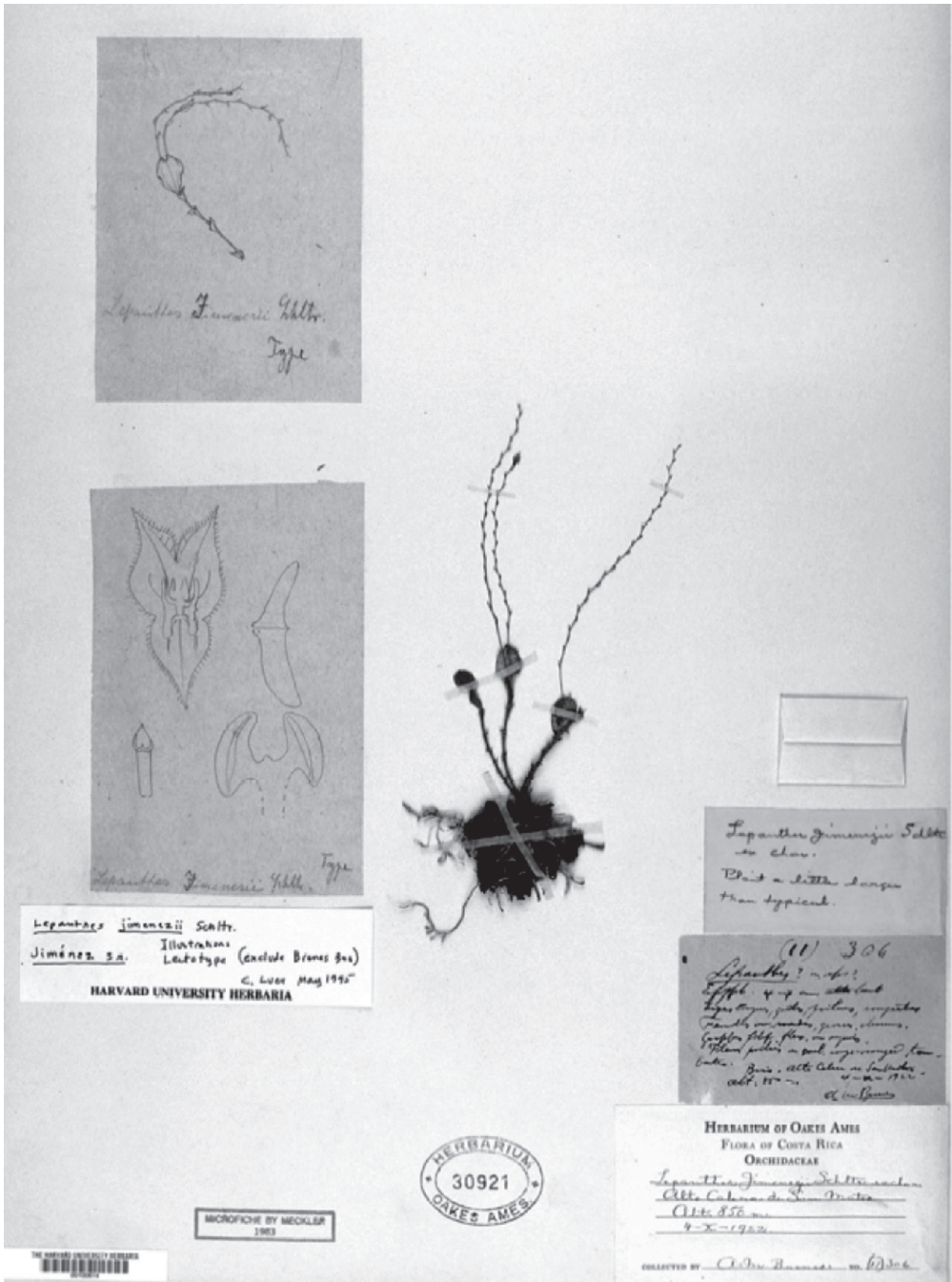


FIGURE 2. Copy of Schlechter's sketch of *Lepanthes jimenezii* Schltr. (AMES), selected as the lectotype. Reproduced with the kind permission of the Director, Harvard University Herbaria.

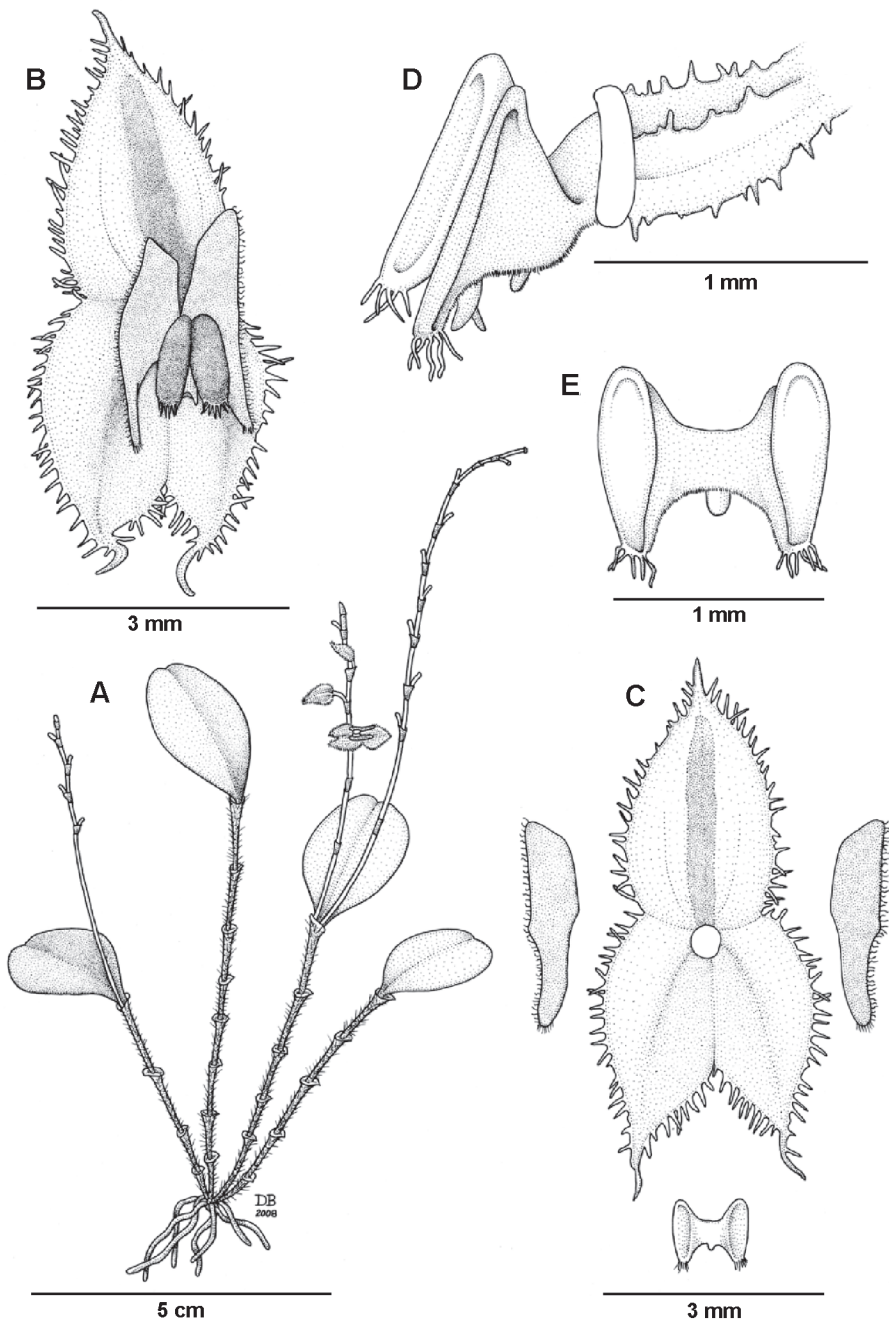


FIGURE 3. *Lepanthes jimenezii* Schltr. **A**, habit; **B**, flower; **C**, dissected perianth; **D**, ovary, column, and lip, lateral view; **E**, lip, spread. Drawn by Diego Bogarín from *F. Pupulin 2016* (JBL–Spirit).

red-scarlet. *Dorsal sepal* ovate, apiculate, ciliate, dorsally carinate-muriculate, connate to the lateral sepals for about 0.75 mm, 3.7×1.8 mm. *Lateral sepals* ovate, apiculate, ciliate, dorsally carinate-muriculate, connate to 1.5 mm, the apices made by up slender falcate short tails (to 1 mm long). *Petals* transversely bilobed, ciliate and slightly pubescent, 0.75×4.00 mm, the upper lobe oblong, obtuse, the lower lobe smaller than the upper lobe, narrowly oblong, subfalcate. *Lip* bilobate, adnate to the column, the blades elliptic to oblong with rounded ends and ciliate at apex, 1.2×1.0 mm, the connectives cuneate, to 0.5 mm long, embracing and hiding the column, the body oblong, connate to the base of the column, the appendix small, rounded, ligulate, incurved. *Column* cylindrical, 1 mm long, with two apical arms, the anther dorsal, the stigma ventral. *Pollinia* two, ovoid.

Distribution: Costa Rica and Panama.

Habitat: found in lower montane rain forest to cloud premontane forest at 850 to 1500 m.

Eponymy: named in honor of Ottón Jiménez, who prepared the specimen that R. Schlechter designated as the type.

Additional specimens examined: COSTA RICA. Alajuela: Bajos del Toro, Río Segundo, a minor tributary of Río Toro, 1420 m, in primary forest remnants along the banks of the river, lower montane rain forest, 12 Feb. 2000, *F. Pupulin 2016* & *L. Spadari* (JBL-spirit). San Ramón, El Socorro, 1075–1000 m, 25 Junio 1924, *A. Brenes 83* (AMES). San Ramón. Alto de la Calera de San Mateo, 850 m, 4 Oct. 1922, *A. Brenes 306* (CR, AMES, photo). San Ramón. La Palma, 850 m, 17 July 1927, *A. Brenes s.n.* (CR). San Ramón, 3000', Aug-Dec, *A. R. Endrés 59* (W *Rchb-Orch 33632*; W *Rchb-Orch 44247*, with drawing; W *Rchb-Orch 38646*, drawings and description; W *Rchb-Orch 7594*, drawing; W *Rchb-Orch 38645*, drawings and description; W *Rchb-Orch 36235*, drawing; W *Rchb-Orch 33204*, drawing and description). Monteverde, epiphytic in felled trees along the road before the entrance to forest preserve of Monteverde, 1400 m, 24 June 1981, *C. Luer 6406* & *A. Luer* (paratype of *L. crossota*, SEL). Without collecting data, *A. R. Endrés 9* [?](W *Rchb-Orch 30677*); *A. R. Endrés s.n.* (W *Rchb-Orch 41392*; W *Rchb-Orch 30665*). PANAMA. Chiriquí: Cerro Punta, collected and cultivated by A. Maduro, 1986, *C. Luer 11630* (holotype of *L. crossota*, MO, Photo).

Schlechter (1923) described the sepals of *L. jimenezii* as having ciliate margins. The drawings designated here as the lectotype, based on *O. Jimenez s.n.* (the only known material associate with the protologue referable to this species after the destruction of Schlechter's material kept at Dahlem-Berlin Herbarium), clearly show the sepals provided with ciliate margins and short apical tails, the connectives of the lip bearing the blades no higher than the column, and the narrowly-oblong upper lobe of the petals. Other diagnostic features of this species are the glabrous inflorescence, the red sepals tinged with brown, the petals ciliate, basally tinged with pink on a scarlet-red background, and the lip connectives that embrace the column, which is hidden by the blades. Luer (1987) described this species a second time as *L. crossota*.

The closest morphologically-related species to *L. jimenezii*, which is described hereafter as *L. caroli-lueri* Bogarín & Pupulin, has a pubescent rachis, denticulate and long-tailed sepals, glabrous petals provided with a broadly-oblong upper lobe, red petals with orange-yellow margin, and connectives of the lip bear the blades higher than the column. In the other species described here as a member of the *Lepanthes jimenezii* group, *L. pulcherrima*, the rachis is also pubescent, the sepals shortly connate (< 1 mm) and yellow with a small reddish spot only at the base of the dorsal sepal, and the petals are glabrous, with the upper lobe ovate and the lower lobe linear, orange, with a large pink blotch at the base ending into a scarlet-red stripe.

2. *Lepanthes caroli-lueri* Bogarín & Pupulin, sp. nov. TYPE: COSTA RICA. Boundary between Alajuela and Heredia provinces: Grecia, Sarapiquí, Colonia Virgen del Socorro, road to Cariblanco, bridge on San Fernando river, $10^{\circ}16'32''N$ $84^{\circ}10'16''W$, 750 m, shores of San Fernando river, 13 February 2004, *D. Bogarín 741*, *H. León-Páez*, *F. Pupulin* & *E. Salas* (Holotype: JBL-spirit; Isotypes: CR, JBL-spirit). Fig. 4.

A Lepanthe jimenezii Schltr. *rhachidi pubescenti*, *sepalis orbicularibus caudatis marginibus denticulatis*, *petalis aurantiacis base rubra marginibus glabris loboque superno late oblongo*, *connectivis labelli distincte longioribus recedit*.

Plant epiphytic, caespitose, small, up to 5 cm tall. *Roots* slender, flexuous, to 1.5 mm in diam.

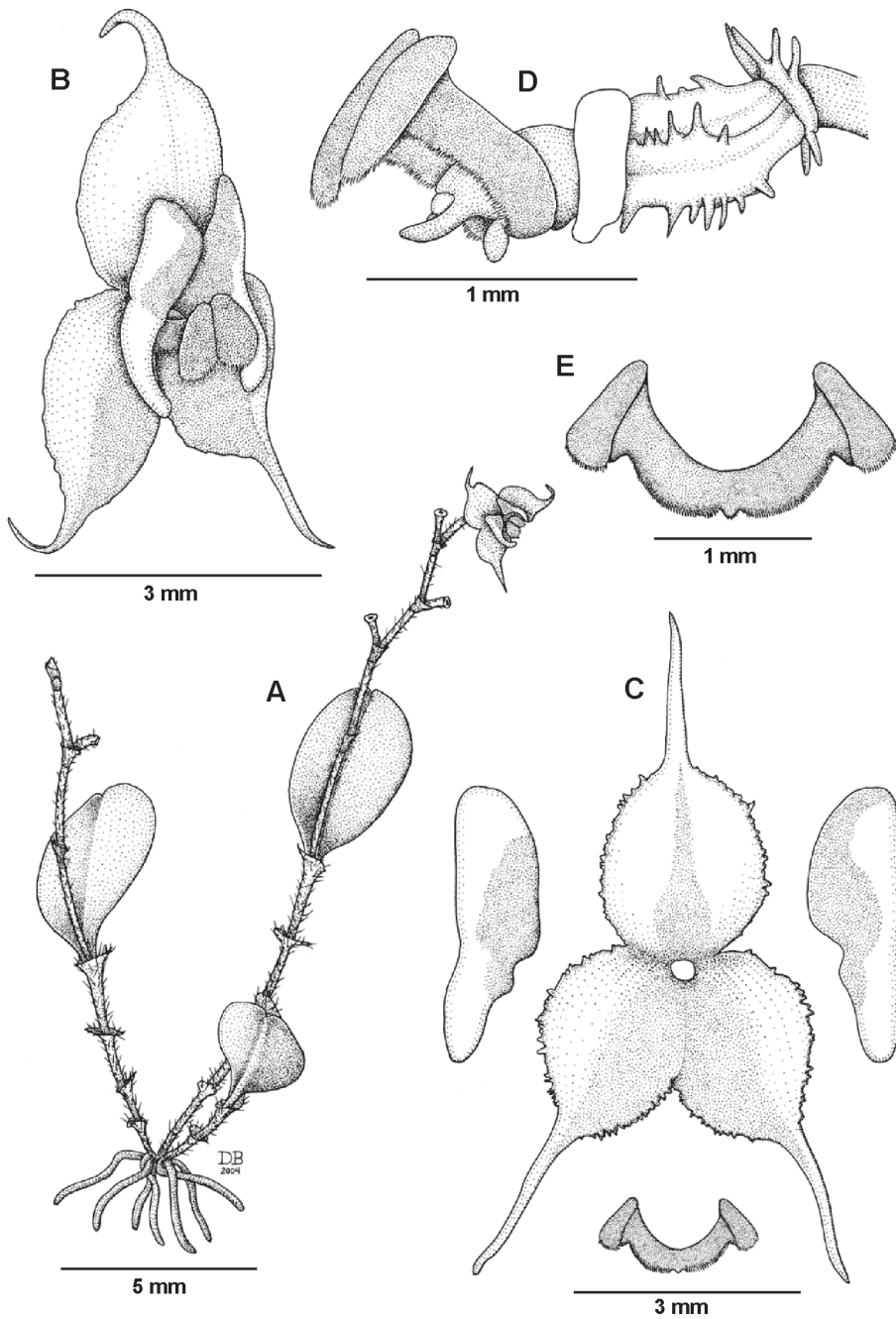


FIGURE 4. *Lepanthes caroli-lueri* Bogarín & Pupulin. **A**, habit; **B**, flower; **C**, dissected perianth; **D**, ovary, column, and lip, lateral view; **E**, lip, spread. Drawn from the holotype by Diego Bogarín.

Ramicauls slender, erect, to 4 cm long, enclosed by 2–5 hirsute, lepanthiform sheaths, the ostia ciliate and obliquely dilated. *Leaves* erect or suberect, coriaceous, elliptic to orbicular, somewhat lenticulate, conduplicate, obtuse, retuse, 0.9–1.1 × 0.9–1.0 cm, the rounded base narrowing into a petiole less than 1 mm long. *Inflorescence* racemose, distichous, pubescent, successively flowered, borne above the leaf, to 3 cm including the peduncle 1.5–2.0 cm. *Floral bracts* 1 mm, ciliate, spiculate. *Pedicels* 1 mm long, persistent. *Ovary* to 1 mm long, spiculate-muriculate. *Flowers* yellowish brown with red-scarlet, the sepals yellowish tinged with brown, the petals red-scarlet tinged with yellow. *Dorsal sepal* ovate to orbicular, caudate, denticulate, dorsally carinate-muriculate, connate to the lateral sepals for about 0.75 mm, 4 × 2 mm including the tail. *Lateral sepals* ovate to suborbicular, caudate, denticulate, dorsally carinate-muriculate, connate to 1.5 mm, the apices made up slender tails (up to 3 mm long). *Petals* transversely bilobed, entire, 0.9 × 3.0 mm, the upper lobe wide oblong to ovate, the apex rounded, the lower lobe smaller than the upper lobe, narrowly oblong, the apex rounded. *Lip* bilobate, adnate to the column, the blades ovate to orbicular with rounded ends and ciliate at apex, 0.5 × 2.0 mm, the connectives terete, to 1 mm long, lifting the blades far above the column, the body oblong, connate to the base of the column, the appendix small, rounded. *Column* cylindrical, 1 mm long, with two apical arms, the anther dorsal, the stigma ventral. *Pollinia* two, ovoid.

Distribution: known only from Costa Rica.

Habitat: plants grow epiphytic in secondary and primary vegetation in tropical wet forest, premontane belt transition along the Caribbean slopes of Tilarán and Central Volcanic ranges, between 700 and 1200 m. Populations are apparently restricted to the Caribbean slopes.

Eponymy: the specific epithet honors Carlyle (Carl) A. Luer. His superb work makes possible a better understanding of the Pleurothallidinae.

Paratypes: COSTA RICA. Alajuela, San Ramón: road from San Ramón to Santa Clara, 1080–1200 m, 27 July 1983, *R. Escobar 3086* & *M.A. Pérez* (SEL); *R. Escobar 3096* & *M.A. Pérez* (CR, SEL); Border between Heredia and Alajuela provinces: Grecia, Sarapiquí, Colonia Virgen del Socorro, road to Cariblanco, bridge on Río San Fernando, 10°16'32"N 84°10'16"W, 750 m, shores of Río San Fernando, tropical wet,

belt transition to premontane wet forest, 13 Feb. 2004, *F. Pupulin 5162*, *D. Bogarín*, *H. León-Páez* & *E. Salas*, (CR, USJ); Puntarenas: Monteverde in lower montane rainforest on Forsythe property at 1600 m, 16 June 1989, *J. T. Atwood 89-104* (SEL); Monteverde, on the road to National Park, 1580 m, 15 July 1983, *R. Escobar* & *K. Anderson 3014* (SEL); Monteverde Reserve, 2 km SW Station, in lleward cloud forest, 10°18'N 84°48"W, 1500–1550 m, 10 July 1992, *S. Ingram 1467*, *K. Ferrell-Ingram* & *N. Edmondson* (SEL); San José: Vásquez de Coronado, Parque Nac. Braulio Carrillo, Zurquí Station, about 0.5 km SE of Estación de Peaje, at Parlk Border, 10°03'10"N 84°00'20"W, 1660 m, 26 Oct. 1990, *S. Ingram 636* & *K. Ferrell* (SEL); [Without collecting data]: *A. R. Endrés s.n.* (W *Rchb-Orch 29901*); *A. R. Endrés 62* (W *Rchb-Orch 36220*, drawing); *A. R. Endrés 604* (W *Rchb-Orch 36205*, drawing, W *Rchb-Orch 38503*, drawings, W *Rchb-Orch 07635*, drawing).

First collected and illustrated by A. R. Endrés, *Lepanthes caroli-lueri* is distinguished by the pubescent rachis, the orbicular, denticulate, long-tailed sepals, the glabrous petals provided with a broadly oblong upper lobe, red with orange-yellow margin. The connectives of the lip bear the blades distinctly higher than the column. This is the species identified and illustrated by Luer (1986) as *L. jimenezii*.

3. *Lepanthes pulcherrima* Endrés ex Bogarín & Pupulin, *sp. nov.* TYPE: COSTA RICA. Alajuela: San Ramón, Santiago, finca of Jesús Salas Jiménez, mountains toward the towers of Berlín, 10°02'21"N 84°12'02"W, 1300 m, epiphytic in old tress along coffee plantations, *F. Pupulin 7159*, *E. Salas-Pupulin* & *Jesús Salas*, 14 September 2008 (Holotype: JBL-spirit) Figs. 5–7.

A *Lepanthe jimenezii* Schltr. *rhachidi pubescenti*, *apicibus sepalorum caudatis*, *sepalis luteis*, *dorsali macula rubra in base notato*, *sepalis lateralibus ellipticis connatis minus quam 1 mm*, *petalis aurantiacis rubrofasciatis basaliter erubescens marginibus glabris lobo superno late ovato infernoque lineari differt.*

Plant epiphytic, caespitose, small, up to 6 cm tall. *Roots* slender, flexuous, to 1.5 mm in diam. *Ramicauls* slender, erect, to 4 cm long, enclosed by 3–5 hirsute, lepanthiform sheaths, the ostia ciliate and obliquely dilated. *Leaves* erect or suberect, coriaceous, elliptic to orbicular, somewhat lenticulate, conduplicate, obtuse, retuse,

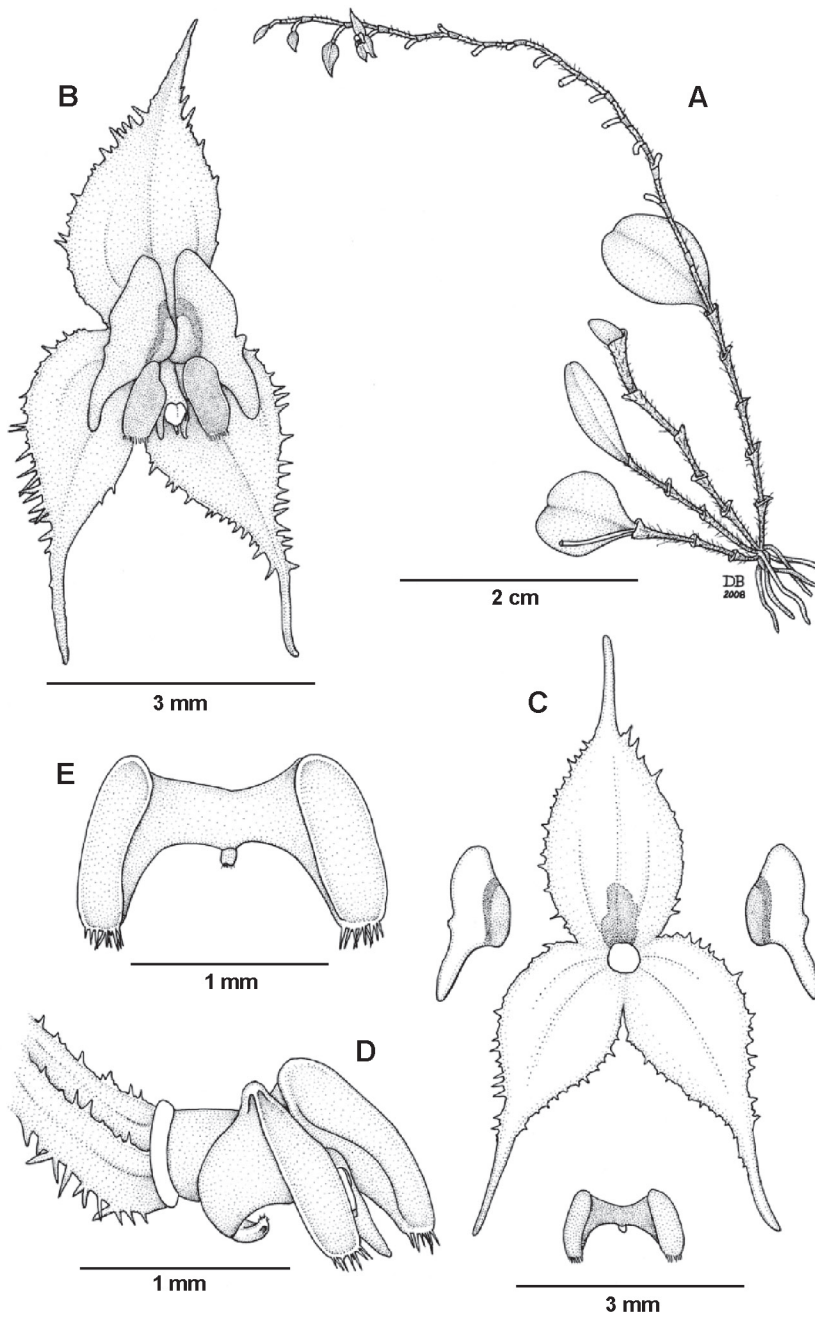


FIGURE 5. *Lepanthes pulcherrima* Endrés ex Bogarín & Pupulin. **A**, habit; **B**, flower; **C**, dissected perianth; **D**, ovary, column, and lip, lateral view; **E**, lip, spread. Drawn from the holotype by Diego Bogarín.

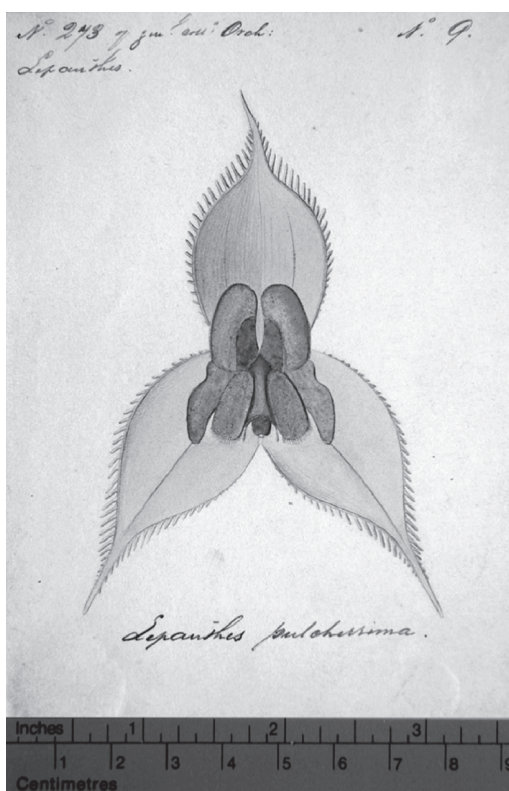


FIGURE 6. *Lepanthes pulcherrima* Endrés ex Bogarín & Pupulin. Sketch of a paratype by A. R. Endrés (Endrés 273, W Rchb-Orch 07589). Reproduced with permission of the Herbarium, Naturhistorisches Museum, Wien.

0.8–1.5 × 0.6–0.9 cm, the rounded base narrowing into a petiole 1 mm long. *Inflorescence* racemose, distichous, pubescent, successively flowered, borne above the leaf, to 4.5 cm including the peduncle to 1.5 cm. *Floral bracts* 1 mm, ciliate, spiculate. *Pedicels* 1 mm long, persistent. *Ovary* 1 mm long, spiculate-muriculate. *Flowers* with the sepals yellowish, the dorsal sepal with a reddish spot at base, the petals orange to red-scarlet basally pink spotted. *Dorsal sepal* elliptic, caudate, ciliate or denticulate to serrulate, dorsally carinate-muriculate, connate to the lateral sepals for about 0.5 mm, 4.0 × 1.7 mm. *Lateral sepals* elliptic to ovate, caudate, ciliate or denticulate to serrulate, dorsally carinate-muriculate, connate to 0.5 mm, the apices made up slender tails (to 2 mm long), 4.0 × 1.7 mm. *Petals* transversely bilobed, entire, 2 × 1 mm, the upper lobe ovate to wide oblong, rounded, the lower lobe smaller than

the upper lobe, linear. *Lip* bilobate, adnate to the column, the blades elliptic to oblong with rounded ends and ciliate at apex, 1.2 × 1.0 mm, the connectives cuneate, to 0.5 mm long, embracing but do not hide the column, the body oblong, connate to the base of the column, the appendix small, rounded, ciliate. *Column* cylindrical, 1 mm long, with two apical arms, the anther dorsal, the stigma ventral. *Pollinia* two, ovoid.

Distribution: Costa Rica and Panama.

Habitat: plants grow epiphytic in secondary vegetation in lower montane rain forest in Tilarán range in Costa Rica and Talamanca range in western Panama.

Etymology: from the Latin *pulcher*, “lovely,” in allusion to the beautiful flowers of this species. This name was proposed by Endrés, however it had not been validly published until now.

Paratypes: COSTA RICA. (Alajuela:) South

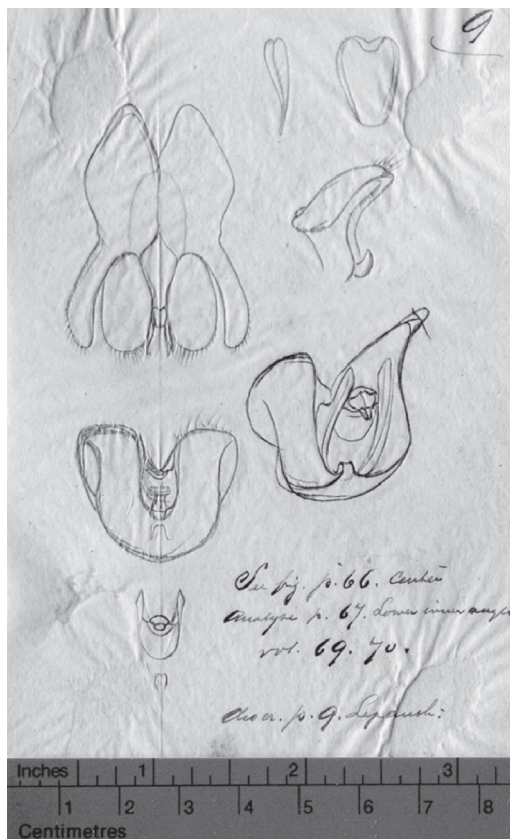


FIGURE 7. *Lepanthes pulcherrima* Endrés ex Bogarín & Pupulin. Sketch of a paratype by A. R. Endrés (Endrés 273, W Rchb-Orch 38644). Reproduced with permission of the Herbarium, Naturhistorisches Museum, Wien.

West of San Ramón, rainy season, A. R. Endrés 273 (W *Rchb-Orch* 07859, drawing; W *Rchb-Orch* 36239, drawing; W *Rchb-Orch* 38644, drawing, W *Rchb-Orch* 38643, description); [without collecting data]: A. R. Endrés s.n. (W *Rchb-Orch* 41417). Sin datos de recolecta, una planta decomisada por el MINAE, floreció en cultivo en el Jardín Botánico Lankester, No. Acceso JBL-01304, 14 Julio 2006, D. Bogarín 2942 (JBL-spirit). PANAMA. Bocas del Toro: Culebra, collected by Beni and cultivated by Steve & Marjorie Sarnier, N. 862, Boquete, Panamá, flowered in cultivation 19 Diciembre

2008, D. Bogarín 5992 (JBL-spirit).

This species is distinguished from its closest relatives, *L. caroli-lueri* and *L. jimenezii*, by the pubescent rachis, the lateral sepals yellow, connate less than 1 mm, and the dorsal sepal yellow, with a small reddish spot at the base. The petals are glabrous, with the upper lobe ovate and the lower lobe linear; they are orange, with the base pink, surrounded with a scarlet-red stripe. The connectives embrace the column but the lip blades do not hide it, while in *L. caroli-lueri* and *L. jimenezii* they completely cover the column (see key below).

KEY TO THE SPECIES OF THE *LEPANTHES JIMENEZII* GROUP

1. Inflorescence glabrous; sepals with short tails; petals ciliate, with the upper lobe narrowly oblong . . . *L. jimenezii*
1. Inflorescence pubescent; sepals with long tails; petals glabrous, with the upper lobe broadly oblong 2
2. Margin of sepals irregularly denticulate; lateral sepals connate ca. 2 mm; lower lobe of the petals oblong *L. caroli-lueri*
2. Margin of sepals ciliate; lateral sepals connate <1 mm; lower lobe of the petals linear. *L. pulcherrima*

LITERATURE CITED

- BLAXTER, M. L., B. ELSWORTH, AND J. DAUB. 2004. DNA taxonomy of a neglected animal phylum: an unexpected diversity of tardigrades. *Proc. Roy. Soc. London, Ser. B, Biol. Sci.* 271(4): S189–192.
- DAYRAT, B. 2005. Towards integrative taxonomy. *Biol. J. Linn. Soc.* 85: 407–415.
- DRESSLER, R. L., AND D. BOGARÍN. 2007. A new and bizarre species in the genus *Condylago* (Orchidaceae: Pleurothallidinae) from Panama. *Harvard Pap. Bot.* 12(1): 1–5.
- EBACH, M. C., AND C. HOLDREGE. 2005. More taxonomy, not DNA barcoding. *BioScience* 55(10): 822–823.
- HAJIBABAEI, M., D. H. JANZEN, J. M. BURNS, W. HALLWACHS, AND P. D. N. HEBERT. 2006. DNA barcodes distinguish species of tropical Lepidoptera. *Proc. Natl. Acad. Sci. U.S.A.* 103: 968–971.
- HEBERT, P. D. N., AND T. R. GREGORY. 2005. The promise for DNA barcoding for taxonomy. *Syst. Biol.* 54(5): 852–859.
- JANZEN, D. H., M. HAJIBABAEI, J. M. BURNS, W. HALLWACHS, E. REMIGIO, AND P. D. N. HEBERT. 2005. Wedding biodiversity inventory of a large and complex Lepidoptera fauna with DNA barcoding. *Philos. Trans., Ser. B* 360(1462): 1835–1845.
- LAHAYE, R., M. VAN DER BANK, D. BOGARÍN, J. WARNER, F. PUPULIN, G. GIGOT, O. MAURIN, S. DUTHOIT, T. G. BARRACLUGH, AND V. SAVOLAINEN. 2008. DNA Barcoding the Floras of Biodiversity Hotspots. *Proc. Natl. Acad. Sci. U.S.A.* 105: 2923–2928.
- LUER, C. A. 1987. New *Lepanthes* species from Costa Rica and Panama. *Lindleyana* 2: 185–217.
- . 2003. *Lepanthes*. Pages 216–255 in B. E. HAMMEL, M. H. GRAYUM, C. HERRERA, AND N. ZAMORA, EDS., *Manual de Plantas de Costa Rica. Volumen III: Monocotiledóneas (Orchidaceae-Zingiberaceae)*. Monogr. Syst. Bot. Missouri Bot. Gard. 93.
- OSSENBACH, C., F. PUPULIN AND R. L. DRESSLER. 2007. Orquídeas del Istmo Centroamericano: Catálogo y Estado de Conservación/Orchids of the Central American isthmus: Checklist and Conservation Status. Editorial 25 de Mayo, Costa Rica.
- PUPULIN, F. 2001. New taxa in Costa Rican *Lepanthes* (Orchidaceae). *Harvard Pap. Bot.* 6(1): 289–294.
- PUPULIN, F., AND D. BOGARÍN. 2004. Two new species of *Lepanthes* (Orchidaceae: Pleurothallidinae) from Costa Rica. *Kew Bull.* 59: 559–563.
- . 2007. A second species of *Restrepiella* (Orchidaceae: Pleurothallidinae). *Willdenowia* 37: 323–329.
- PUPULIN, F., G. A. ROJAS, AND J. D. ZUÑIGA. 2007. Three new species of *Acianthera* (Orchidaceae: Pleurothallidinae) from Costa Rica. *Harvard Pap. Bot.* 12(1): 155–162.
- PUPULIN, F., D. BOGARÍN, AND D. JIMÉNEZ. 2009. New species and records in Mesoamerican *Lepanthes*. *Orchid Digest.* 73: 136–145.
- SCHLECHTER, R. 1923. Beiträge zur Orchideenkunde von Zentralamerika. II Additamenta ad Orchideologiam Costaricensem. IV Orchidaceae novae et rariorum collectorum variorum in Costa Rica collectae. *Repert. Spec. Nov. Regni Veg. Beih.* 19: 281.