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TWO NEW SPECIES OF *LEPANTHES* FROM COSTA RICA CLOSE TO *L. SCHIZOCARDIA* (ORCHIDACEAE: PLEUROTHALLIDINAE)

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ABSTRACT. We revise the group of species close to *Lepanthes schizocardia*, and we describe and illustrate two new species from Costa Rica. *Lepanthes montis-narae* is compared with the Panamanian *L. schizocardia*, from which it mainly differs by the pendent plants, the dark gray green leaves, the ovate to orbicular, subacuminate leaves, the inflorescences borne above the leaf, the petals with inequal lobes, the apical lobe ovate, acute, the lower lobe smaller than the upper lobe, narrowly ovate, the scarlet lip and the conic, apically ciliate appendix. *Lepanthes sotoana* is similar to *L. maxillaris* from Ecuador. It can be distinguished by the pendent plants, the dark gray green leaves, the inflorescences borne above the leaf, the acute lateral sepals, the lip with subfalcate lateral lobes touching each other and hiding the base of the appendix. We also illustrate for the first time *L. schizocardia* to facilitate species comparison.

RESUMEN. Revisamos el grupo de especies cercanas a *Lepanthes schizocardia* y describimos e ilustramos dos nuevas especies de Costa Rica. *Lepanthes montis-narae* es comparada con la panameña *L. schizocardia*, de la cual se diferencia principalmente por las plantas pendulosas, las hojas verde oscuro grisáceas, las hojas ovadas a orbiculares, subacuminadas, las inflorescencias que se desarrollan encima de la hoja, los pétalos con lóbulos desiguales, el lóbulo apical ovado, agudo, el lóbulo inferior más pequeño que el lóbulo superior, ligeramente ovado, el labelo escarlata y el apéndice cónico, apicalmente ciliado. *Lepanthes sotoana* es similar a *L. maxillaris* de Ecuador. Puede ser distinguida por las plantas pendulosas, las hojas verde oscuro grisáceas, las inflorescencias que se desarrollan encima de la hoja, los sépalos laterales agudos, el labelo con lóbulos laterales subfalcados que se tocan el uno al otro y esconden la base del apéndice. También ilustramos por primera vez a *L. schizocardia* para facilitar la comparación de las especies.

KEY WORDS: Orchidaceae, Pleurothallidinae, *Lepanthes montis-narae*, *L. sotoana*, *L. schizocardia*, *L. maxillaris*, new species, Costa Rica

The genus *Lepanthes* Sw. is probably the most diverse in the floras of the Neotropics and one of the largest plant genera in the world, with more than 700 species distributed in the West Indies and from Mexico to Bolivia and Brazil. According to the geographic records, most of the species are very restricted in distribution, often with narrow regional and local endemisms. Besides the inherent difficulty of comparing an unusually large number of taxa, species of *Lepanthes* are mostly easy to identify on the basis of their vegetative and floral features. The generalized morphological scheme of *Lepanthes* flowers (with mostly transversely bilobed petals and

a lip provided with thickened, erect lateral lobes and a minute apical appendix) has impeded until recently to formally recognize fine subgeneric ranks. Even within the grouping proposed by Luer, who divided the genus into subgenera, sections, subsections and series (Luer 1986, 1987a, 1987b, 1993, 1996), most of the taxa are assigned to subgen. *Lepanthes* sect. *Lepanthes* subsect. *Lepanthes* ser. *Lepanthes*. This large group, mostly characterized by a congested raceme with short rachis internodes, is quite homogeneous in floral morphology, but several informal groups of species can be recognized by some peculiar combinations of characters.

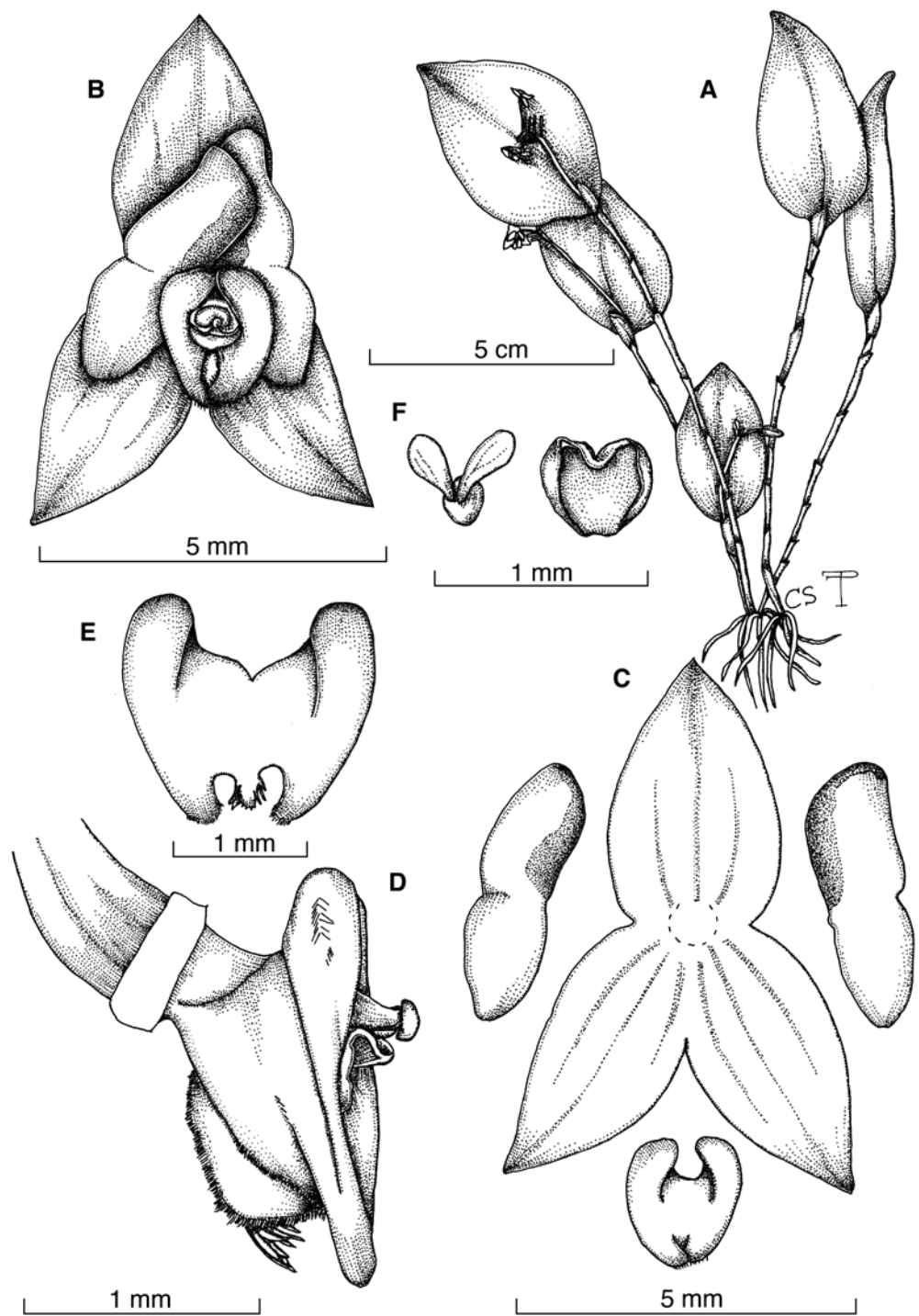


FIGURE 1. *Lepanthes schizocardia* Luer. A — Habit. B — Flower. C — Dissected perianth. D — Ovary, column and lip. lateral view. E — Lip, adaxial view. F — Pollinarium and anther cap. Drawing by F. Pupulin and C. M. Smith based on D. Bogarín 5940 (JBL).

TABLE 1: Comparison of characteristics of the different taxa.

Character	<i>L. montis-narae</i>	<i>L. schizocardia</i>	<i>L. sotoana</i>
Habit	pendent	erect	pendent
Leaves	not reticulated ovate to orbicular, subacuminate	reticulated elliptic, acute	not reticulated ovate to orbicular, subacuminate
Inflorescences	borne above the leaf	borne beneath the leaf	borne above the leaf
Apical petal lobe	ovate	oblong	oblong
Lower petal lobe	smaller than upper lobe	equal to upper lobe	equal to upper lobe
Lip lobes	hiding the column	hiding the column	not hiding the column
Apex of lip lobes	touching each other	touching each other	not touching each other
Lip color	scarlet	orange	scarlet
Lip appendix	cylindric, ciliate	oblong, bristly	oblong, ciliate

We refer here to one of these morphological alliances with the name of *Lepanthes schizocardia* group, characterized by a cleft lip with the blades scarcely distinct from the connectives, sometimes mandible-like in shape, and particularly long appendices. Carlyle Luer described the first species of the group, *L. schizocardia*, from Panama (Luer 1984), the specific epithet (“split heart”) alluding to its characteristic, cleft, heart-shaped lip. The species was not illustrated with the protologue (Luer 1984), and we take this opportunity to present here a composite plate based on Panamanian material originally collected at the type locality (Fig. 1, 4). Two closely allied species (*L. maxillaris* Luer & Hirtz and *L. didyma* Luer & Hirtz) were subsequently described from Ecuador (Luer 1996). The group ranges to the North to Costa Rica, where a few collections were previously identified at the herbarium of the University of Costa Rica and in the living collection of Lankester Botanical Garden (LBG) as *L. schizocardia*.

In 2007, researchers at LBG began working to a complete survey of the species of Pleurothallidinae in Costa Rica, eventually intended as a contribution to the *Flora Costaricensis*. In the framework of this project, we are critically revising the identity of the species previous recorded from Costa Rica, comparing specimens from local populations with the original materials and, whenever possible, with living plants of the concerned taxa, preferably from type localities. The importance of transnational floristic projects combined with extensive examination of natural populations in the field cannot be overemphasized. As

orchid populations are many times either found only in a narrow geographical range or in reduced numbers it is essential that studies be carried out over a broad geographical areas in a thorough manner.

In revising Costa Rican materials previously assigned to *L. schizocardia*, we discovered two species that we described here as new to science. The main differences between the three taxa are summarized in Table 1.

Lepanthes montis-narae Pupulin, Bogarín & C. Smith, *sp. nov.*

TYPE: COSTA RICA. San José: Dota, crest of Cerro Nara, 910-1000 m, epiphytic in premontane rain forest, disturbed primary forest, 20 Feb. 2000, *F. Pupulin* 2103, *D. Castelfranco*, *L. Spadari* & *K. McFarland* (holotype: JBL; isotype: USJ). FIG. 2, 4.

A *Lepanthes schizocardia* Luer similis, sed planta pendula, foliis fuscatis viridi-griseus ovatis-orbicularis subacuminatis, inflorescentiis folii portatis abaxialibus, lobulis petalorum inaequalibus, lobo superno ovato acuto, lobo infero minore, anguste ovato, labello scarlatino appendice conica ciliata recedit.

Epiphytic, caespitose, pendent *herb*, up to 14.5 cm tall. *Roots* slender, flexuous, to 1 mm in diameter. *Ramicauls* pendent, up to 10.5 cm long, enclosed by 9 – 11 glabrous, lepanthiform sheaths, the ostia glabrous. *Leaves* coriaceous, dark green, ovate to orbicular, conduplicate, subacuminate, emarginate, with a short apiculus, 3.0–4.0 x 1.4–3.0 cm, the

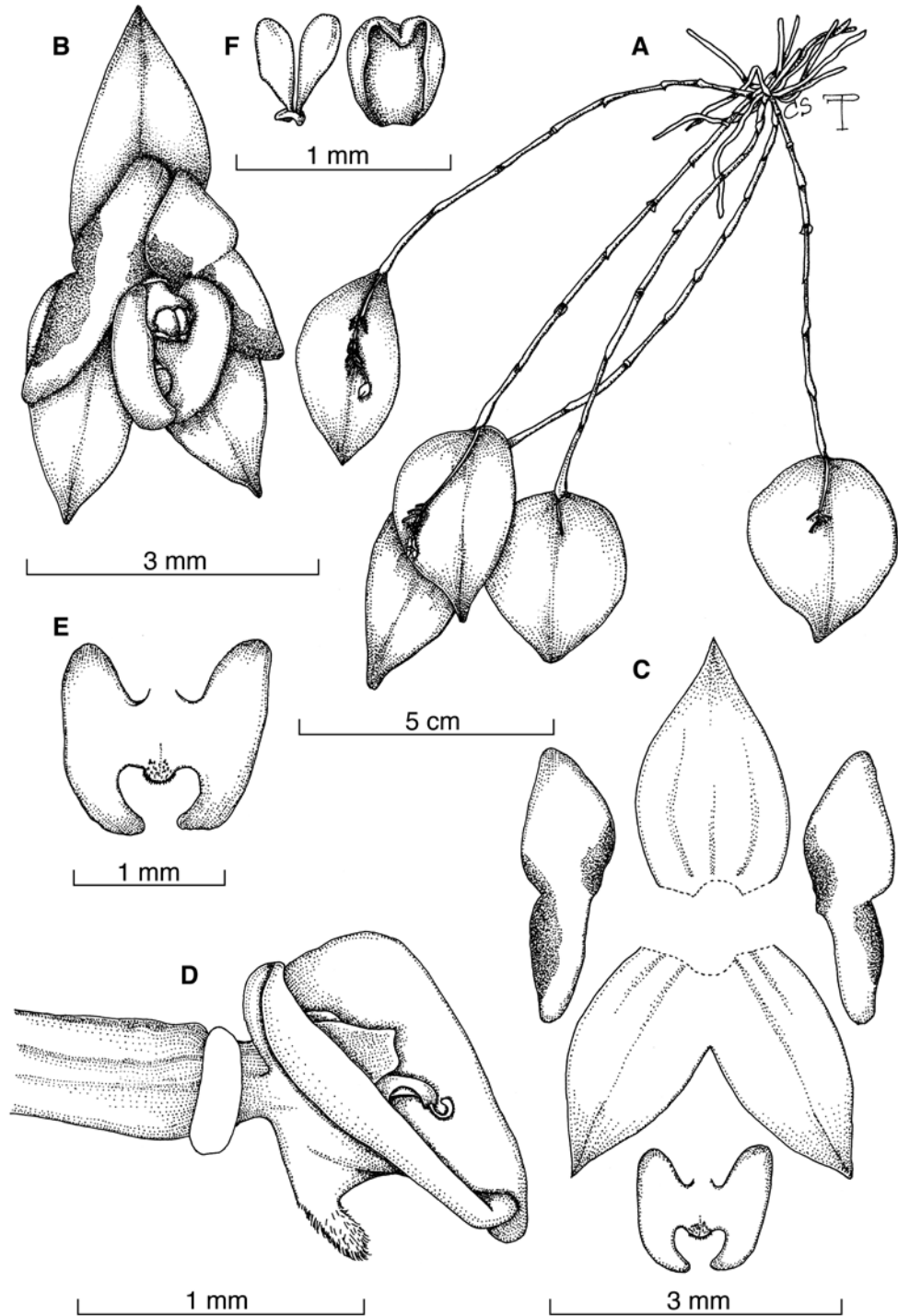


FIGURE 2. *Lepanthes montis-narae* Pupulin, Bogarín & C. Smith. A — Habit. B — Apex of inflorescence. C — Flower, side view. D — Dissected perianth. E — Lip, frontal view. F — Lip, lateral views. G — Petals, lateral views. H — Pollinarium and anther cap. Drawing by F. Pupulin and C. M. Smith from the holotype.

rounded base narrowing into a petiole less than 1 mm long. *Inflorescence* racemose, distichous, glabrous, successively flowered, borne above the leaf, shorter than leaves, up to 2.8 cm long, peduncle 1.1–1.9 cm long, rachis 0.3–1.2 cm long. *Floral bracts* 1 mm long, glabrous. *Pedicels* 2.5–4.0 mm long, persistent. *Ovary* to 2 mm long. *Flowers* orange with red-scarlet, the sepals orange tinged with red, the petals red-scarlet, the lip scarlet. *Dorsal sepal* ovate, acute, connate to the lateral sepals for about 0.4 mm, 3.0 x 1.5 mm. *Lateral sepals* ovate to elliptic, acute, connate for 0.9 mm, 2.6 x 1.2 mm. *Petals* transversely bilobed, entire, 1.1 x 3.1 mm, the upper lobe ovate, obtuse, the lower lobe smaller than the upper lobe, narrowly oblong, the apex rounded. *Lip* bilobate, adnate to the column, the blades oblong with rounded ends and the apex entire, falcate, 1.3 x 0.9 mm, the connectives terete, to 1 mm long, lifting the blades above the column, the body oblong, connate to the base of the column, the appendix small, oblong, pubescent, slightly curved upward. *Column* cylindric, 0.7 mm long, the anther apical, the stigma ventral. *Pollinia* two, ovoid. *Anther* cap cucullate.

PARATYPE: COSTA RICA. San José: Dota, crest of Cerro Nara, 910–1000 m, epiphytic in premontane rain forest, disturbed primary forest, 20 Feb. 2000, F. Pupulin 2102, D. Castelfranco, L. Spadari & K. McFarland (JBL-spirit, USJ!).

DISTRIBUTION: only known from Costa Rica.

HABITAT AND ECOLOGY. The only known specimens were found epiphytic in disturbed primary vegetation in premontane rain forest, between 900 and 1000 m of elevation. Apparently, it is restricted to the crest of Cerro Nara in central Pacific Costa Rica.

ETYMOLOGY: Named after Cerro Nara, the mountain where the type specimen was collected.

Lepanthes montis-narae is most similar to the Panamanian endemic *Lepanthes schizocardia* Luer. It can be distinguished by the pendent plants (vs. erect), the dark gray green leaves (vs. reticulated in purple beneath), ovate to orbicular, subacuminate leaves (vs. elliptic, acute), inflorescences borne above the leaf (vs. beneath the leaf), the petals with unequal lobes (vs. subequal), the apical lobe ovate (vs. oblong), the

lower lobe smaller than the upper lobe, narrowly ovate (vs. as long as the upper lobe, ovate), the scarlet lip (vs. orange) and the conic, apically ciliate appendix of the lip (vs. ovate, apically bristly).

Lepanthes sotoana Pupulin, Bogarín & C. Smith, *sp. nov.*

TYPE: COSTA RICA. San José: Pérez Zeledón, Miraflores, road to Santa Cruz, 1350 m, epiphytic on secondary vegetation and remnants of primary, lower montane rain forest, 2 December 2001, F. Pupulin 3484, D. Castelfranco & J. Cambronero (holotype: JBL; isotypes: CR, JBL). FIG. 3, 4.

A *Lepanthes maxillaris* Luer similis, sed planta pendula, foliis fuscatis viridi-griseis, inflorescentiis folii portatis abaxialibus, sepalis lateralibus acutis, lobis lateralibus labelli subfalcatis apicalibus contiguis, base appendicis occulta.

Epiphytic, caespitose, pendent *herb*, up to 9.3 cm tall. *Roots* slender, flexuous, to 1 mm in diameter. *Ramifera* slender, pendent, up to 5 cm long, enclosed by 4–8 glabrous, lepanthiform sheaths, the ostia glabrous and non dilated. *Leaves* coriaceous, dark grayish green, lightly suffused with purple beneath, ovate to orbicular, conduplicate, acute, emarginated with a short apiculus, 2.2–4.0 x 1.2–2.6 cm, the rounded base narrowing into a petiole less than 1 mm long. *Inflorescence* racemose, distichous, glabrous, successively flowered, borne above the leaf, up to 1.5 cm, peduncle 0.8–1.2 cm long, rachis 0.3–0.5 cm long. *Floral bracts* 1 mm long, glabrous. *Pedicels* 3–4 mm long, persistent. *Ovary* to 2 mm long. *Flowers* orange with red-scarlet, the sepals orange tinged with red, the petals red-scarlet. *Dorsal sepal* ovate, acute, connate to the lateral sepals for about 0.6 mm, 3.4 x 1.7 mm. *Lateral sepals* ovate, acute, connate for 0.7 mm, 2.8 x 1.4 mm. *Petals* transversely bilobed, entire, 0.8 x 2.7 mm, the upper lobe oblong, obtuse, the lower lobe, oblong to ovate, obtuse. *Lip* bilobate, adnate to the column, the blades oblong with rounded ends and the apex ciliate, subfalcate, 1.5 x 1.3 mm, the connectives terete, to 1 mm long, perpendicular to the column and leaving it exposed, the body oblong, connate to the base of the column, the appendix small, oblong, convex, ciliate, with

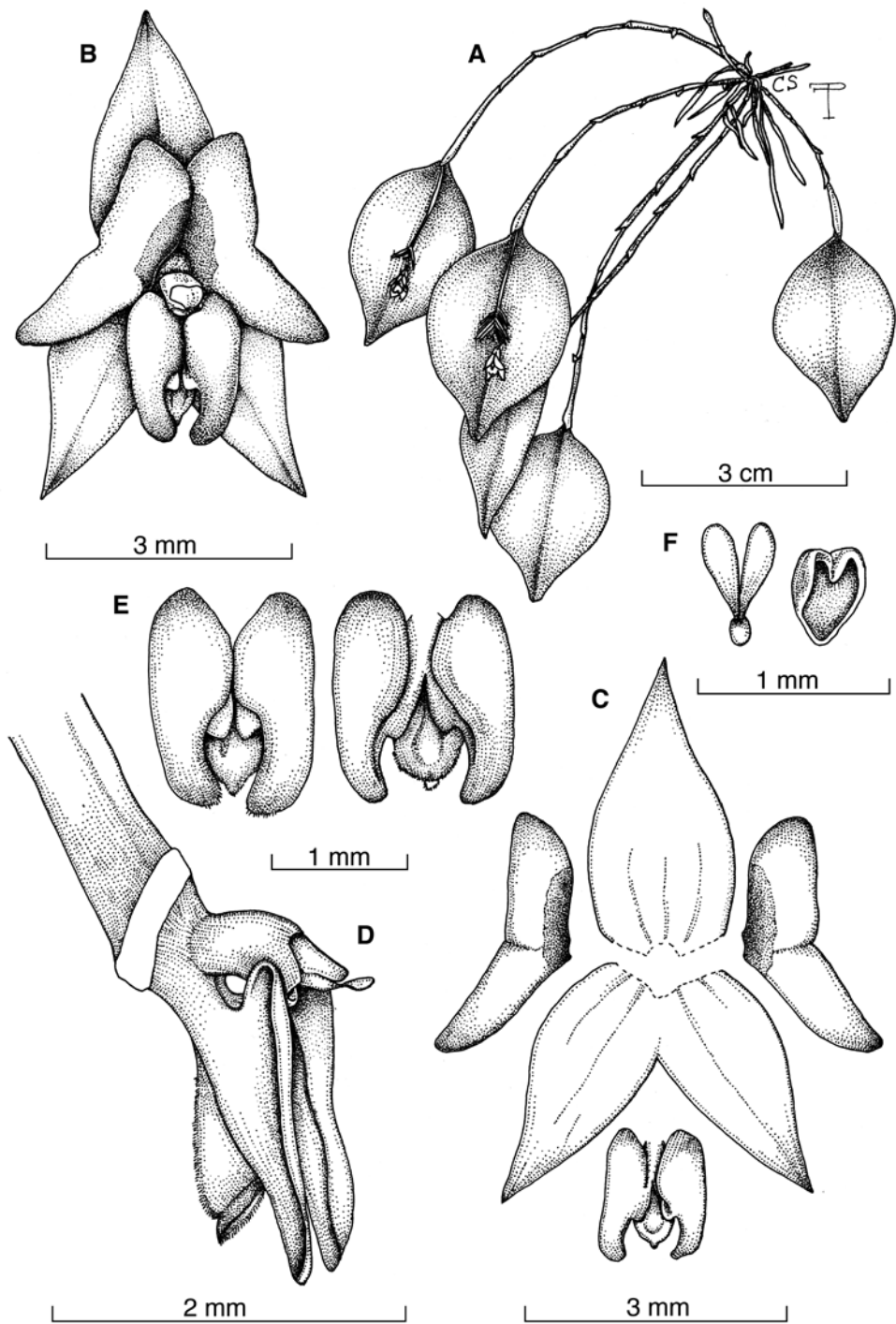


FIGURE 3. *Lepanthes sotoana* Pupulin, Bogarín & C. Smith. A — Habit. B — Apex of inflorescence. C — Flower, side view. D — Dissected perianth. E — Lip, frontal view. F — Lip, lateral views. G — Petals, lateral views. H — Pollinarium and anther cap. Drawing by F. Pupulin and C. M. Smith from the holotype.

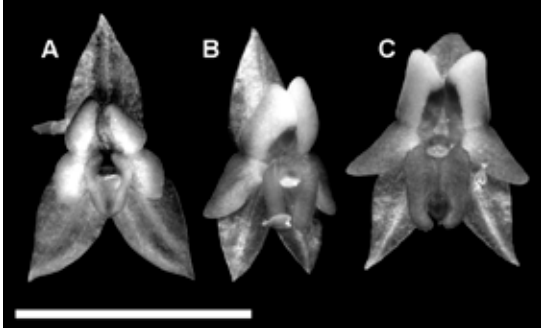


FIGURE 4. *Lepanthes sotoana* Comparison of the flowers of: A — *Lepanthes schizocardia* (Bogarín 5940). B — *L. montis-narae* (Pupulin *et al.* 2103). C — *L. sotoana* (Pupulin *et al.* 3484). Scale bar = 5 mm.

a short apicule. *Column* cylindric, 1 mm long, the anther apical, the stigma ventral. *Pollinia* two, ovoid. *Anther cap* cucullate.

PARATYPES. COSTA RICA. San José: Pérez Zeledón, Berlín, november 1998, collected by G. Chacón Valverde *s.n.*, flowered in cultivation under accession number JBL-00269, 19 september 2002, JBL-00269 (JBL-spirit); Pérez Zeledón, Miraflores, road to Santa Cruz, 1350 m, epiphytic on secondary vegetation and remnants of primary, lower montane rain forest, 2 December 2001, F. Pupulin 3483, D. Castelfranco & J. Cambronero (JBL-spirit); Pérez Zeledón, Las Nubes de Quizarrá, collected by N. Fonseca, flowered in cultivation at San Isidro del General, 2 May 2000, F. Pupulin 2319 (USJ).

DISTRIBUTION: only known from Costa Rica.

HABITAT AND ECOLOGY: Plants of this species are found in tropical wet forest, tropical moist forest, premontane belt transition and premontane rain forest, between 800 and 1400 m of elevation. The species is apparently restricted to the El General Valley in San Isidro de Pérez Zeledón, in the Pacific slope of Talamanca range in Costa Rica.

Eponymy: The specific epithet honors the memory of the late Miguel Ángel Soto Arenas, a Mexican orchidologist who made great contributions to the knowledge of the family in the Neotropics.

Lepanthes sotoana is closely related to *Lepanthes maxillaris* Luer from Ecuador. It can be distinguished

by the pendent plants (vs. erect), the dark gray green leaves (vs. reticulated in purple beneath), the inflorescences borne above the leaf (vs. beneath the leaf), the acute lateral sepals (vs. acuminate), the lip with subfalcate lateral lobes touching each other, hiding the base of the appendix (vs. falcate, separated, leaving exposed the appendix).

Lepanthes montis-narae and *L. sotoana* had been collected and cultivated at Lankester Botanical Garden since several years. The habit and flowers of both species are superficially similar, resembling those of *L. schizocardia*. After studying the type of *L. schizocardia*, we found both species consistently different. The plants are pendent, lacking the purple reticulation beneath the leaves and the inflorescences borne above the leaf. *Lepanthes sotoana* can be distinguished from *L. montis-narae* by the oblong petals (vs. ovate), the lateral lobes of the lip touching apically each other and do not hide the column, which is placed just above the lip (lateral lobes of the lip hide the column and do not touch each other apically) and the appendix of the lip is conic (vs. oblong) and conspicuous, up to 1 mm long (vs. inconspicuous, less than 1 mm long). We have not seen specimens of *Lepanthes schizocardia* in Costa Rica.

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