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A new species of *Stelis* subgen. *Unciferia* (Orchidaceae: Pleurothallidinae) from Costa Rica

GUSTAVO ROJAS-ALVARADO^{1,2}

¹ Jardín Botánico Lankester, Universidad de Costa Rica, Cartago, Apartado 302-7050

² ✉ gustavo.rojasalvarado@ucr.ac.cr; <https://orcid.org/0000-0002-8918-0823>

Abstract

A new species of *Stelis* recorded in the middle lands of the Tilarán mountain range and the Volcanic Central mountain range of Costa Rica is described based on living material. Distribution map, line drawing and a Lankester Digital Composite Plate of the new species is provided. The new species *Stelis luz-marinae* belongs to the *Stelis* subgen. *Unciferia* and is related to the *Stelis segoviensis* group, a group of a dozen species distributed from Mexico to Ecuador, but with its highest diversity in Costa Rica and Panama. The new species is compared to its similar species, as *Stelis psilantha*, *S. segoviensis* and *S. werckleana*, but it can be distinguished by its short cincinnoses generally as long as the leaf length, its rachis with short internodes, and its yellow-brownish flowers with the adaxial edges of the sepals covered by white or brownish trichomes.

Key words: Orchids, Pleurothallids, *Stelis segoviensis*, *Stelis werckleana*, *Unciferia*

Resumen

Una nueva especie de *Stelis* presente en las tierras medias de la Cordillera de Tilarán y Cordillera Volcánica Central de Costa Rica es descrita basada en el estudio de material vivo. Se incluye un mapa de distribución, un dibujo a línea y una Lámina Digital Compuesta Lankester de la nueva especie. La nueva especie *Stelis luz-marinae* pertenece a *Stelis* subgen. *Unciferia* y es afín al grupo *Stelis segoviensis*, un grupo de una docena de especies distribuidas desde México a Ecuador, pero con mayor diversidad en Costa Rica y Panamá. La nueva especie es comparada con especies similares como *Stelis psilantha*, *S. segoviensis* y *S. werckleana*, pero se distingue por sus cincinnoses cortas generalmente tan largas como las hojas, sus raquis con entrenudos cortos y sus flores amarillo marrones con los bordes adaxiales de los sépalos cubiertos por tricomas.

Introduction

The neotropical subtribe Pleurothallidinae Lindley ex Don (1839: 636) is well known by its incredible diversity (Perez-Escobar *et al.* 2017). It is the largest orchid's subtribe with around 5480 species (Karremans & Vieira-Urbe 2020), including two of the few genera in orchids that exceeds a thousand species, as *Stelis* Swartz (1799a: 239) (1246 spp.) and *Lepanthes* Swartz (1799b: 85) (1158 spp.). Species of *Stelis* are distributed from Florida and Mexico, throughout Central America, and South America and the Antilles.

In Costa Rica the genus *Stelis* comprise around 107 species, 15 of them belongs to the *Stelis* subgen. *Unciferia* Karremans (2019: 327), a subgenus with a total of 42 species. Most of the species of the *Stelis* subgen. *Unciferia* found in Costa Rica corresponds to the *Stelis segoviensis* (Reichenbach 1855: 223) Pridgeon & M.W.Chase (2001: 266) group (Karremans & Rojas-Alvarado 2022). This is a small group that includes a dozen of species distributed from Mexico to Ecuador, but more diverse in Costa Rica with 10 recorded species. Species of the *S. segoviensis* group are characterized by having epiphytic plants with a caespitose habit, short ramicauls of two internodes covered by tubular papery sheaths and narrowly obovate, obtuse leaves. The inflorescence produces generally successive cincinnoses with successive flowers. Contrary to other groups within *Stelis* or in the subtribe, in which each ramicaul produces multiple cincinnoses, species of this group generally produces only two cincinnoses. Flowers of the *Stelis segoviensis* group are specially characterized by the lip, in which the lateral lobes are elevated and antrorse-uncinate, with an oblong middle lobe with a pair of longitudinal lamellae emerging at the base of the lateral lobes, a unique lip

morphology within the genus *Stelis*, but similar are present in *Acianthera* (Scheidweiler 1842: 292), *Echinosepala* Pridgeon & Chase (2002: 100), *Madisonia* Luer (2004: 258), *Pabstiella* Brieger & Senghas (1976: 195) and *Restrepia* Kunth (1816: 366).

Here, a new species of the *S. segoviensis* group is described and illustrated based on living material collected in the Caribbean slopes of the Central Volcanic range of Costa Rica, increasing to eleven the species of the group recorded to Costa Rica.

Materials and methods

This study was mainly conducted at Lankester Botanical Garden (JBL), University of Costa Rica, in Cartago, Costa Rica. Plants were collected under the corresponding scientific passports issued by the Costa Rican Ministry of Environment and Energy (MINAE) and its National System of Conservation Areas (SINAC).

Vegetative and floral structures of specimens of the new species were photographed with a Nikon® 810 camera using an AF-S VR Micro-NIKKOR 105 mm f/2.8G IF-ED, and a Carl Zeiss Luminar 63 mm 1:4.5 Macro lens. Those photographs were used to prepare Lankester composite digital plates (LCDP) with Adobe Photoshop®. All photographs are by the author. For each documented plant, a spirit specimen, was prepared and deposited at the JBL spirit collection. Each voucher of the specimens is indicated in the caption of the figures. Distribution maps were made using the geographic information system software ArcGIS 10.1 (ESRI, Inc., California, USA).

The inflorescence terminology follows Rojas-Alvarado *et al.* (2022), Sneekermburger (1994) and Weberling (1989).

Taxonomy

Stelis luz-marinae Rojas-Alv., *sp. nov.* (Figure 1)

Type:—COSTA RICA. Alajuela: Río Cuarto, Bosque pluvial premontano, cerca de la plaza de deportes de Pata de Gallo, epifitas sobre palmeras, 10°17'0.69"N 84°12'53.83"W, 1020 m, 1 Jan 2022, *G. Rojas-Alvarado 596* (holotype: JBL-spirit!).

Stelis luz-marinae is similar to *S. wercklenana* Bogarín & Pupulin in Pupulin *et al.* (2019: 373) and *S. psilantha* (Luer 1998: 95) Pridgeon & M.W.Chase (2001: 266), but distinguished by its cofilorescence as long as the leaves and the lateral lobes of the labellum papillate adaxially *vs.* cofilorescences longer than the leaves and the labellum without papillate lateral lobes.

Description:—Epiphytic, caespitose, small, up to 7–14 cm tall. Rhizome abbreviated among adjacent ramicauls, 1–2 internodes producing roots. Roots 0.5–1.0 mm in diameter, Flexuous. Ramicauls 10.0–20.0 × 1.0 mm, with 2 internodes, the basal one shorter, covered by sheaths. Sheaths papery, brown, acute, the basal one imbricate, the apical one reaching the annulus. Leaves coriaceous, 3.5–10.0 × 0.7–1.0 cm, oblanceolate, cuneate and channeled at the base; apex obtuse, minutely tridentate. Inflorescence with successive erected, secund multi-flowered cofilorescences of 5.0–10.0 cm long, generally shorter or as long as the leaf, with a short rachis with simultaneous and successive flowers, 1–5 opened simultaneously, internodes of the rachis 3.0–8.0 mm long. Pseudopeduncle 2.8–6.5 cm long, with 3–4 internodes. The pseudopeduncle and floral bracts acuminate, papery greenish to brownish, 3.0–4.0 × 2.0 mm. Pedicels 3.0–6.0 × 0.5 mm. Ovary glabrous, 2.0–3.0 × 1.0 mm, linear to subclavate, slightly 6-sulcate. Flowers with the sepals yellowish to brownish at the apex and yellowish translucent petals with purple on mid-nerve. Dorsal sepal 8.0–11.0 × 3.5–5.0 mm, ovate-lanceolate, acute, with trichomes along the margins of the adaxial surface, 3-veined, the mid-nerve keeled abaxially; lateral sepals fused to near the apex forming an oblong-ovate, synsepal, 8.0–11.0 × 3.5–5.0 mm, 3-veined, sepal's apex acute, mid-nerve keeled abaxially, covered by white trichomes along the margins of the adaxial surface. Petals small, elliptic to sub-circular, obtuse to rounded, 2.0–2.5 mm × 1.5 mm, 1-nerved. Lip narrowly unguiculate, trilobate, 3.5–4.0 mm × 1.0–2.0 (3 mm extended), the base with a pair of parallel rounded small calli forming a glenion like structure; lateral lobes erected below the middle then antrorse, uncinata, acute, parallel with mid lobe, adaxially papillose below the middle; the disc papillose near the base of the lateral lobes, with a pair of submarginal lamellae emerging at the base of the lateral lobes where they are more separate or expanded, then converging to above the middle of the mid lobe gradually fading into the blade with a truncate ending; mid lobe oblong with a rounded to obtuse apex. Column 3.0–4.0 mm × 1.0 mm, whitish to yellowish, purplish basally, curved, winged

to the apex; clinandrium elongate, doubly serrate, generally with a pair of teeth; rostellum subcuadrate, truncate; column foot 1.0 mm long. Anther cap 0.75 wide, sub-cuadrate, papillose. Pollinia 2, laterally complanate, 0.3–5.0 mm wide, obovate, caudices 2, flat.

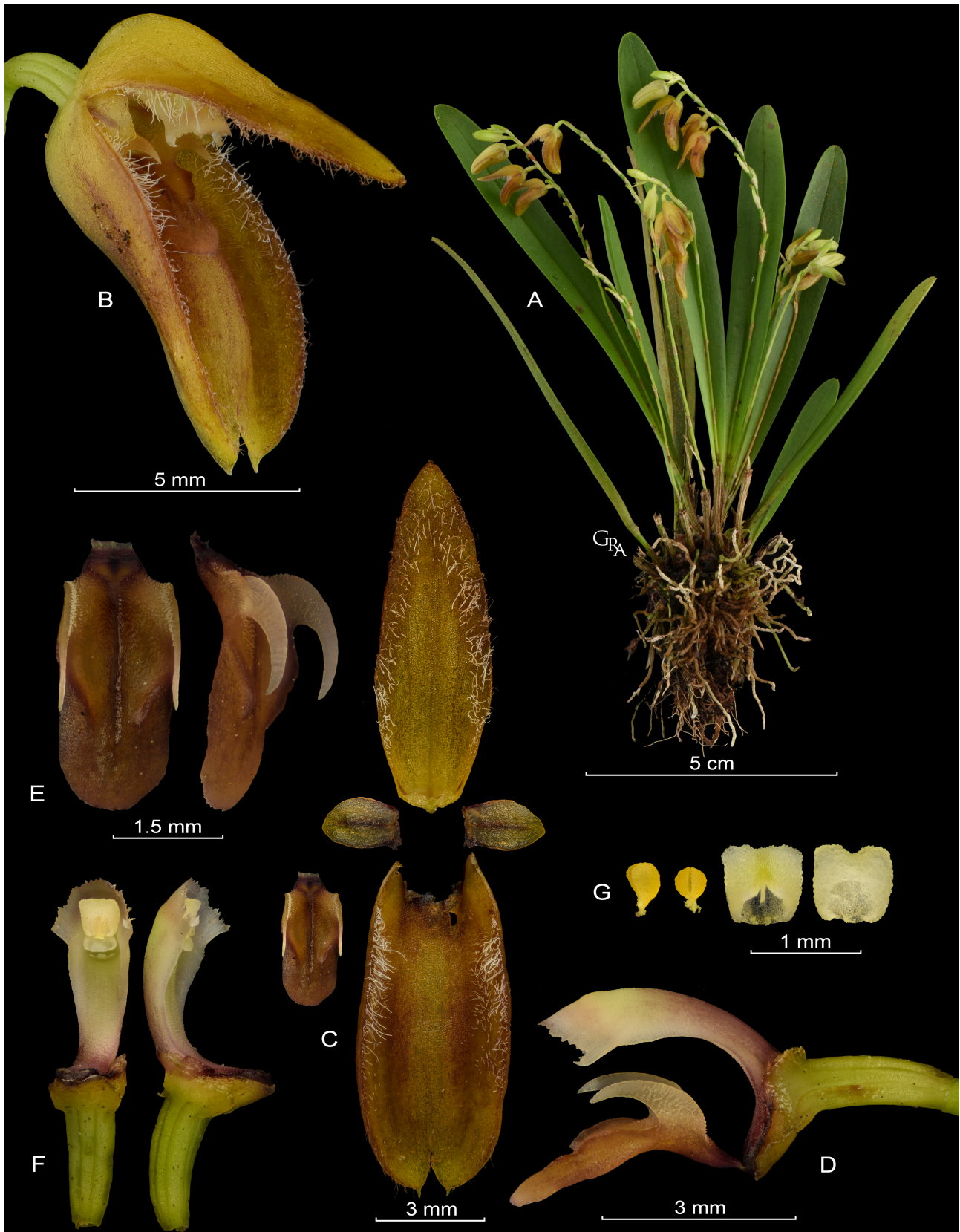


FIGURE 1. LCDP of *Stelis luz-marinae*. **A.** Habit. **B.** Flower in $\frac{3}{4}$ view. **C.** Dissected perianth. **D.** Column with lip in lateral view. **E.** Lip in adaxial and $\frac{3}{4}$ view. **F.** Column in ventral view. **G.** Pollinia and anther cap in different views. Based on type specimen *G. Rojas-Alvarado* 596.

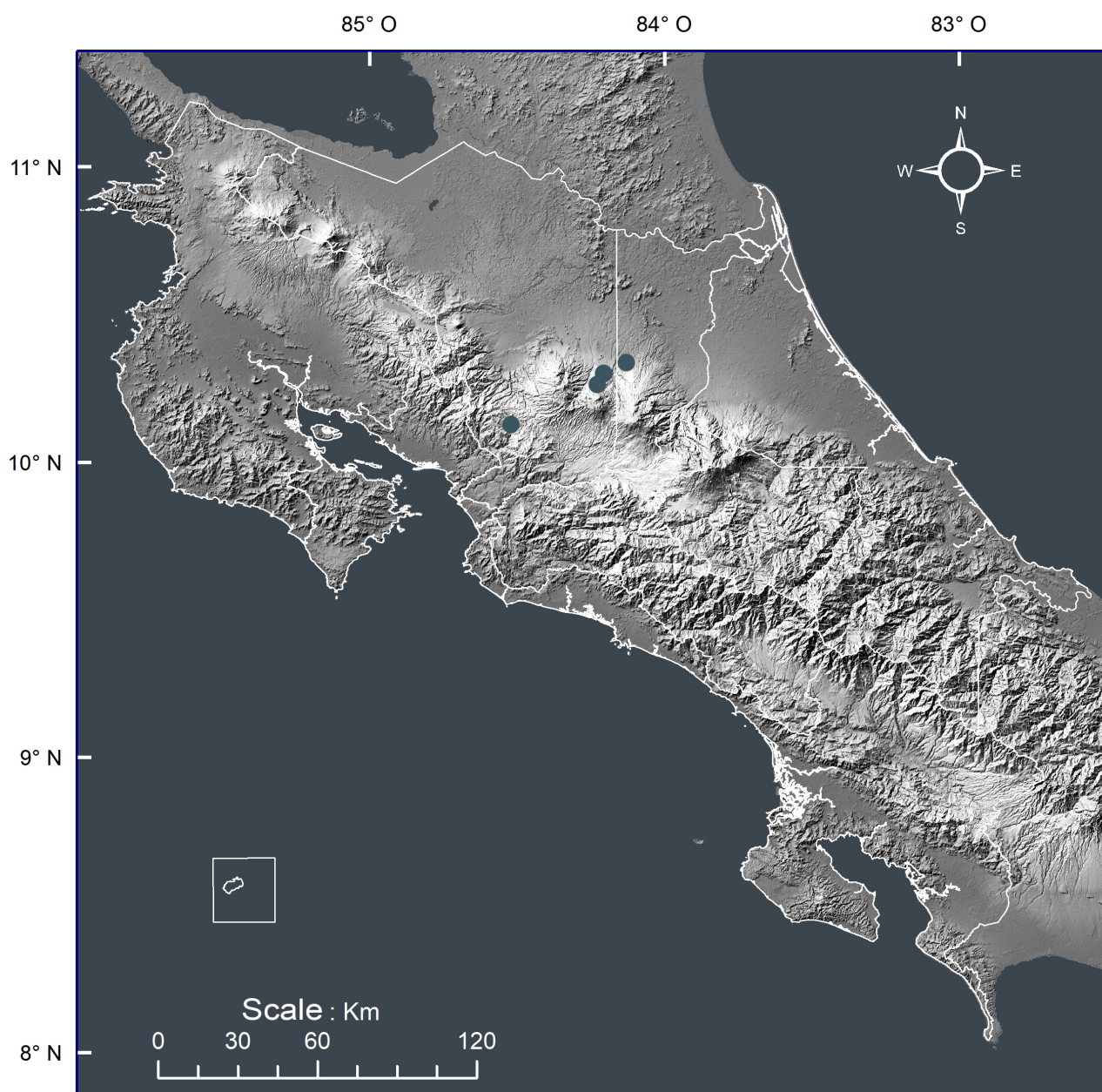


FIGURE 2. Distribution map of *Stelis luz-marinae* in Costa Rica.

Distribution and ecology: This species had been collected growing as epiphytic in premontane wet and premontane rain forest of the Tilarán mountain range and Central Volcanic range of Costa Rica, at mid elevations from 450 to 1020 m (Figure 2). Some plants were collected on trees of secondary forest and over ornamental palms. No other species of the same group have been collected in the same locality.

Etymology:—The name of the new species honors Luz Marina, mother of the author of this new species.

Additional specimens examined:—COSTA RICA. without collecting data, cultivated by Gerson Villalobos, flowered in cultivation in Jan 2020, *G. Rojas-Alvarado* 407 (JBL-spirit). Alajuela: Río Cuarto, bosque pluvial premontano, cerca de la plaza de deportes de Pata de Gallo, epífitas sobre palmeras, 10°17'0.69"N 84°12'53.83"O, 1020 m, 1 Jan 2022, *G. Rojas-Alvarado* 597 (paratype, JBL-spirit); Río Cuarto, bosque pluvial premontano, cerca de la plaza de deportes de Pata de Gallo, epífitas sobre palmeras, 10°17'0.69"N 84°12'53.83"O, 1020 m, 1 Jan 2022, *G. Rojas-Alvarado* 598 (paratype, JBL-spirit); Río Cuarto, bosque pluvial premontano, camino a Pata de Gallo, epífitas sobre árbol caído a orilla del camio, 10°16'56.28"N 84°12'25.51"O, 970 m, 1 Jan 2022, *G. Rojas-Alvarado* 601 (paratype, JBL-spirit), Río Cuarto, camino a Laguna Hule, por el antiguo quebrador del ICE, colectada y cultivada por Gerson Villalobos, *G. Rojas-Alvarado* 594 (JBL-spirit!); San Ramón, Piedades Sur, San Miguel (La Palma), camino a San Bosco, a orillas y dentro de un pequeño bosque secundario. 10°07'18.8"N 84°31'13.1"W, 1062 m. 21 Dec 2010,



FIGURE 3. Comparison of cymes and flowers of the similar species. **A–D.** *Stelis luz-marinae* (A, D. G. Rojas-Alvarado 596; B. G. Rojas-Alvarado 601; C. G. Rojas-Alvarado 597). **E–H.** *Stelis werckleana* (E–F. I. Chinchilla 2394; G. JBL36951; H. D. Bogarín 11320). **I–L.** *Stelis psilantha* (I. A. Karremans 8468; J. A. Karremans 8325; K. A. Karremans 8314; L. G. Rojas-Alvarado 508). Scale bar of the flowers=5 mm (applies for the flowers' photos), scale bar of the cymes=2.5 cm (applies for the cymes' photos).



FIGURE 4. Different view of the lips of the similar species. **A.** *Stelis luz-marinae* (G. Rojas-Alvarado 596). **B–D.** *Stelis werckleana* (B. D. Bogarin 11320; C. JBL36951; D. L. Álvarez 771). **E–G.** *Stelis psilantha* (E. A. Karremans 8326; F. G. Rojas-Alvarado 508; G. A. Karremans 8314). Scale bar=1 mm. Arrow indicate the end of the lammellae.

Karremans 3326 & Contreras (JBL-Spirit!). Heredia: Sarapiquí, La Virgen, Colonia Carvajal, Poza Azul, orillas del Río Poza Azul, 10°19'21.3"N 84°08'19.1"W, 662 m [~450 m], bosque muy húmedo tropical transición a premontano, epífitas en bosque secundario, 13 May 2010, *Bogarín 7547, Fernández, Karremans, Pupulin & Smith* (JBL-spirit!); Sarapiquí, La Virgen, Colonia Carvajal, Poza Azul, orillas del Río Poza Azul, 10°19'21.3"N 84°08'19.1"W, [~450 m], bosque muy húmedo tropical transición a premontano, epífitas en bosque secundario, 13 May 2010, *Bogarín 7551, Fernández, Karremans, Pupulin & Smith* (JBL-spirit!).

Taxonomic discussion:—*Stelis luz-marinae* is characterized by having a rachis with short internodes (<1 mm) (Figure 3A) and coflorescences generally as long as the leaf or shorter, flowers brownish with the adaxial surface of the lateral lobes of the lip papillose (Figure 4A). In comparison with the other species of the group, the rachis of *S. wagneri* (Schlechter 1921: 141) Pridgeon & M.W.Chase (2001: 267) also has short internodes, but the coflorescence is generally few centimeter (<5 cm) longer than the leaf, however it is distinguished by its dark purple flowers. Juvenile plants of the tiny species *S. psilantha* may also produces short coflorescences, but it generally continuous elongating with age, surpassing the leaf length and the rachis internodes are generally longer than 1 cm (Figure 3I). Even though the application of the name *S. segoviensis* (Reichenbach 1855: 223) Pridgeon & M.W.Chase (2001: 266) is quite difficult, the latter is distinguished from *Stelis luz-marinae* by having a coflorescence longer than the leaf, a clearly appreciated character in the type specimens at C and W herbaria.

Flowers of the new species are yellowish to brownish with the sepals adaxially covered by trichomes. Species with a similar appearance of the flowers are also found in *S. werckleana*, but with yellowish to greenish striped sepals (Figure 3F–H). Within the color variation of *S. psilantha*, yellowish and brownish flowers are also found, but with glabrous flowers (Figure 3J–L). Most of the species of the *S. segoviensis* group have lanceolate to ovate petals, generally as long as the column, however in *S. luz-marinae* are generally shorter than the column and elliptic, similar petals are found in *S. pompalis* Ames (1924: 23) Pridgeon & M.W.Chase (2001: 265) and *S. wagneri*, but the last species have purple flowers. The elevated and uncinat-antorse lateral lobes of the lip found in the *S. segoviensis* group is unique in the genus, and quite similar between the species. *Stelis luz-marinae* has the adaxial surface of the lateral lobes papillate bellow the middle and the lamellae with a truncate, shortly toothed, or gradually disappearing ending (Figure 4A). The adaxially papillose lateral lobes appears to be present in several species of the group, from slightly to density papillose. However, *S. luz-marinae* is the only having those papillose lateral lobes of the lip and a brownish to yellowish perianth. Also, the way in how the lamellae ends in the middle lobe vary, it may be clearly truncate as in *S. pilostoma* or *S. pompalis*, clearly toothed as in *S. vinacea* Ames (1923: 69) Bogarín in Pupulin *et al.* (2019: 372). The end of the lamellae is variable in *S. luz-marinae* and *S. werckleana* (Figure 4B–D), but the lip in the latter has not papillate lateral lobes.

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