



A new species of *Pleurothallis* (Orchidaceae, Pleurothallidinae) from northwestern Ecuador with affinities to both subgenera *Ancipitia* and *Scopula*

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Abstract

A new species, *Pleurothallis ecomingae*, from near Chical, Carchi Province, Ecuador, is described and illustrated. This species is unique in that it has characteristics typical of both subgenera *Scopula* and *Ancipitia*. The plant has narrowly lanceolate leaves with a near-apical fascicle of single-flowered peduncles, previously only seen in *Scopula*. And, it has flowers with a minute, pubescent, tri-lobed lip in which the basal lobes are modified into ‘horns’, and an apical orifice in the central lobe, a feature previously only seen in *Ancipitia*. This intermediate morphology supports the previous suggestion that, at least based on morphology, the two subgenera should be combined.

Keywords: taxonomy, systematics

Introduction

Luer (1986) created *Pleurothallis* Brown in Aiton (1813: 211) subgenus *Scopula* Luer (1986: 76) to include those species that produce a fascicle of single-flowered flower-bearing stems (“peduncles” per Luer 1989) at or near the apex of the leaf, a characteristic unique in the genus. The subgenus currently contains ten species: *Pleurothallis aspergillum* Luer & Hirtz (Luer 1989: 56), *Pleurothallis cosmetron* Luer (1992: 120), *Pleurothallis garayana* (Ospina 1973: 232) Luer (1975: 90), *Pleurothallis juvenilis* Rodr.-Mart. & Karremans in Karremans *et al.* (2017: 253), *Pleurothallis ottocarii* Rodríguez-Martínez, Rincón-Useche & Karremans (2015: 75), *Pleurothallis penicillata* Luer (1980: 78), *Pleurothallis ruscaria* Luer (1980: 79), *Pleurothallis scoparum* Reichenbach (1888: 153), *Pleurothallis silverstonei* Luer (1992: 122) and *Pleurothallis tetroxys* Luer (1989: 66). Of these ten species, six are characterized by narrowly lanceolate leaves with a near-apical fascicle of single-flowered flower-bearing stems (Fig. 1), while the remaining four species have broadly ovate leaves with a fascicle of single-flowered flower-bearing stems closer to the center of the leaf.

Species of subgenus *Scopula* are currently known only from Colombia and Ecuador, none having been described yet from the adjacent Andean countries of Venezuela or Peru, and appear to be distributed almost exclusively on the western or Pacific slopes of the Andes (Fig. 2). In particular, there appears to be a center of diversity in southwestern Colombia in the Department of Nariño, with three of the seven species, *P. penicillata*, *P. ruscaria* and *P. tetroxys*, occurring within the La Planada Nature Reserve near the municipality of Ricaurte (Luer 1989).

At the same time subgenus *Scopula* was created, Luer created *Pleurothallis* subgenus *Ancipitia* Luer (1986: 29) to include species characterized by having two- or four-angled “ramicauls” (secondary stems). Subgenus *Ancipitia* currently contains 38–41 species, depending on synonymy. Luer (1989) alluded to the close resemblance between the two subgenera writing about *Scopula*: “The inflorescence suggests some relationship with *Pleurothallis* subgenus

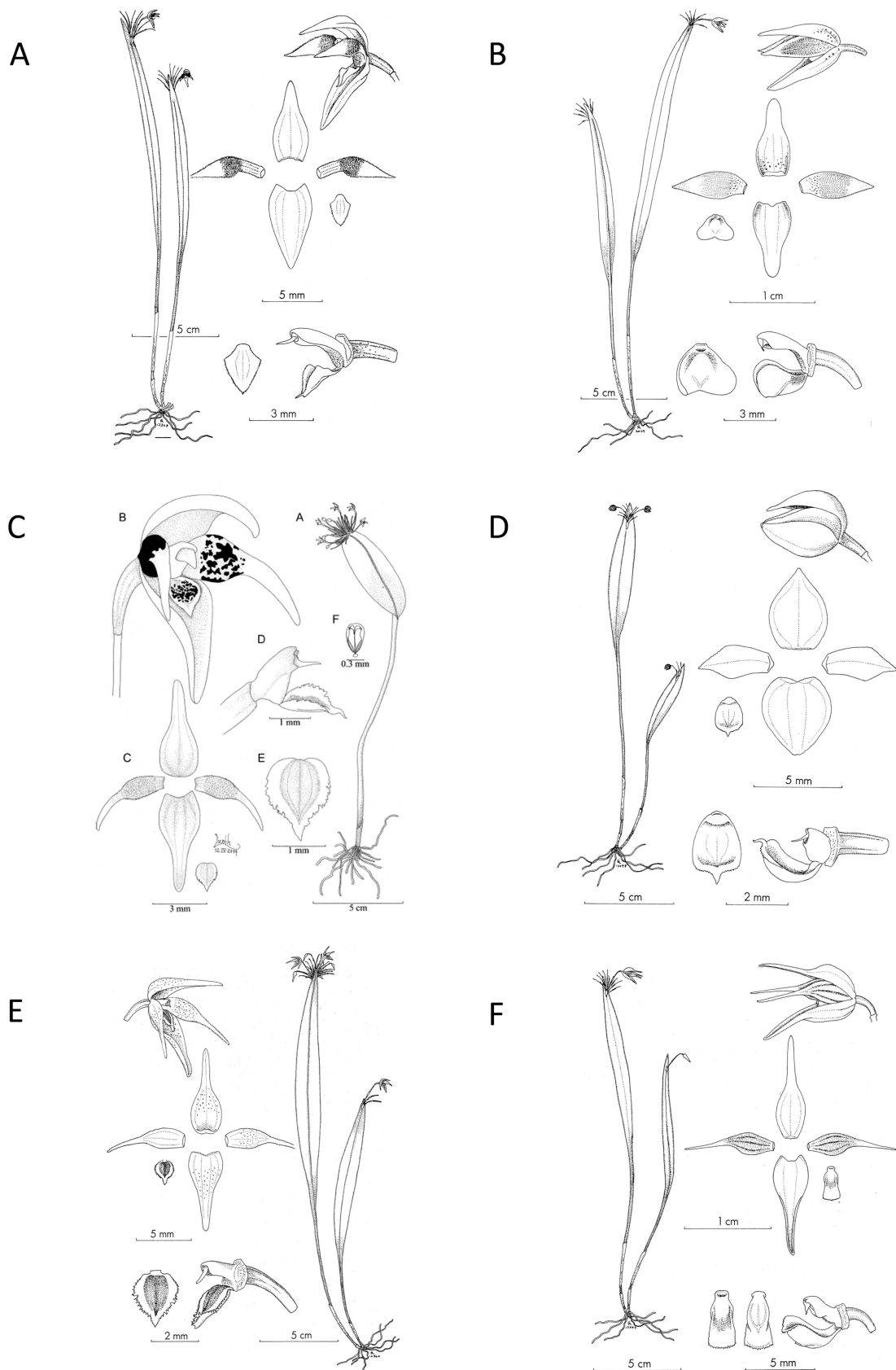


FIGURE 1. *Pleurothallis* species from subgenus *Scopula* with narrowly lanceolate leaves and a near-apical fascicle of single-flowered peduncles: **A.** *P. aspergillum*; **B.** *P. garayana*; **C.** *P. ottocarii*; **D.** *P. ruscaria*; **E.** *P. scoparum*; and **F.** *P. tetroxys*. (A, B, D, E, F and G courtesy of Missouri Botanical Garden; C. Courtesy of Systematic Botany).

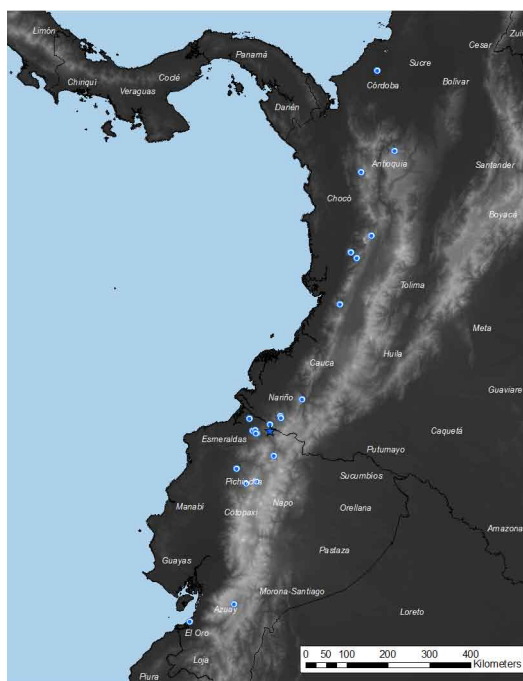


FIGURE 2. Distribution map of *Pleurothallis* species in subgenus *Scopula* prepared with collection locality data from Tropicos and Luer (1989) using ArcGIS. Type locality of *P. ecomingae* indicated by a star. (Prepared by Graham Frank and Mark Wilson.)

Ancipitia: flowers produced in a fascicle of single-flowered peduncles, lateral sepals connate into a synsepal, petals large and often acute, a variously shaped lip, and a semiterete column with an apical or subapical anther and stigma and obsolescent foot.” Despite this similarity, Luer believed that the sharply ancipitous ramicaul was sufficient to distinguish subgenus *Ancipitia* from subgenus *Scopula*. Further, Luer (2004) considered the two groups sufficiently distinct from *Pleurothallis* to be considered separate genera and transferred all species of subgenus *Scopula* to genus *Colombiana* Ospina (1973: 232) and elevated subgenus *Ancipitia* to the generic level, *Ancipitia* (Luer) Luer (2004: 254).

In contradiction to the taxonomy proposed by Luer (2004), preliminary molecular phylogenetic studies by Pridgeon *et al.* (2001) found that *Pleurothallis niveoglobula* Luer (1975: 258) and *Pleurothallis viduata* Luer (1981: 221), from subgenus *Ancipitia*, and *P. penicillata*, from subgenus *Scopula*, were both closely related to *Pleurothallis ruscifolia* (Jacquin 1760) Brown in Aiton (1813: 211), the type species of the genus. Hence, in their circumscription of *Pleurothallis*, Pridgeon & Chase (2001) and Pridgeon *et al.* (2005) retained subgenera *Ancipitia* and *Scopula* within the genus, rather than recognizing these groups at the generic level. Retention of both groups within *Pleurothallis* is supported by subsequent more comprehensive analyses (Wilson *et al.* 2013; Wilson *et al.* unpubl. data). Therefore, in this paper we continue to refer to *Pleurothallis* subgenera *Ancipitia* and *Scopula*, rather than genera *Ancipitia* and *Colombiana*.

Among the species of *Pleurothallis* subgenus *Ancipitia* is *Pleurothallis crocodiliceps* Rchb.f. (1855: 72). Wilson *et al.* (2017a) proposed that rather than being a single variable, widely-distributed species, what was considered *P. crocodiliceps* is in fact a species-complex distributed from southern Mexico to Peru. The common morphological attribute among members of the complex being a minute, pubescent, tri-lobed labellum or “lip” in which the lateral lobes are elaborated into “horn-like” projections, with an orifice in the apical region of the central lobe. Due to a mistaken interpretation of the lip attached to the putative holotype of *P. crocodiliceps*, Wilson *et al.* (2017a) suggested calling the complex the “*P. arietina*-*P. nelsonii*” complex, referring to the first two species described which unequivocally possess the characteristic lip. Following closer study of the material on the holotype it appears that *P. crocodiliceps* may possess such a lip, hence we propose temporarily referring to the group as the “*P. crocodiliceps* (*P. arietina*-*P. nelsonii*)” complex, pending further study. In this context, however, the most important fact is that the lip characteristic of the complex has never been observed in any species of *Pleurothallis* subgenus *Scopula*.

During exploration of the recently developed EcoMinga Dracula Reserve and adjoining terrain in northwestern Ecuador, Luis Baquero observed a species of *Pleurothallis* unmistakably attributable to subgenus *Scopula* based upon vegetative morphology, but with a lip like that of the species in the “*P. crocodiliceps* (*P. arietina*-*P. nelsonii*)” complex

from subgenus *Ancipitia*. The species is described herein and the significance of this morphology, characteristic of the two subgenera, is discussed.

Materials and Methods

The putative new species was compared to all 51 described species of *Pleurothallis* in subgenera *Ancipitia* and *Scopula* to ensure novelty. In particular, the species was carefully compared to vegetatively similar species from subgenus *Scopula* possessing narrowly lanceolate leaves and a near-apical fascicle of single-flowered flower-bearing stems (“peduncles” per Luer 1989) (Fig. 1). And also to the yellow-flowered species from subgenus *Ancipitia*, including *Pleurothallis onagriceps* Luer & Hirtz (Luer 1989: 40) and the recently described *Pleurothallis andreae* Mark Wilson, B.T.Larsen & J.Portilla in Wilson *et al.* (2017a: 177) and *Pleurothallis wielii* Mark Wilson, B.T.Larsen & J.Portilla in Wilson *et al.* (2017a: 174) (Fig. 3).

The program ArcMap in ArcGIS (ESRI) was used to generate the distribution map of described species in subgenus *Scopula* and the new species (Fig. 2). Species collection localities were downloaded from Tropicos.



FIGURE 3. *Pleurothallis* species from subgenus *Ancipitia* with similar yellow flowers: **A.** *P. onagriceps*; **B.** *P. andreae* PL0962; **C.** *P. wielii* PL0713. (Photographs by Mark Wilson.)

Taxonomy

Pleurothallis ecomingae M. Jiménez, Baquero & Mark Wilson, *sp. nov.* (Figs. 5–7).

This species has flowers similar to those of the yellow-flowered *P. wielii* of the “*P. crocodiliceps* (*P. arietina*-*P. nelsonii*)” complex. *P. ecomingae* can be easily distinguished from *P. wielii* by the fascicle of single-flowered flower-bearing stems near the apex of the narrowly lanceolate leaf versus few single-flowered flower-bearing stems emerging from the base of an ovate leaf in *P. wielii*.

Type:—ECUADOR. Carchi: Chical-El Carmen road, Km. 18-Km. 19, 2228 m elevation, 2nd April 2016, Baquero 3106 (holotype: QCNE!).

Plant medium in size, epiphytic, caespitose; roots flexuous, thin, densely fasciculate. *Ramicauls* slender, erect to suberect, terete, 16.6 cm long, with a tubular papyraceous sheath below the middle, 3.7 cm long and two others at the base. *Leaves* suberect, sessile, thinly coriaceous, oblanceolate to narrowly elliptical, acute, 16.6 × 1.7 cm, the base narrowly cuneate, decurrent on the ramicaul. *Inflorescence* a fascicle of solitary, successive flowers borne from a reclining scarious spathaceous bract near the apex of the leaf, 8 mm long; peduncle filiform, ascending, 9 mm long; floral bract tubular, 6 mm long; pedicel ascending, 14 mm long; ovary arcuate, 9 mm long. *Sepals* dark yellow spotted with chocolate brown near the base, glabrous, cellular-glandular; dorsal sepal ovate-triangular, 12 × 3 mm, semi-erect, tubular, concave at the base, narrowing over the middle, obtuse at the apex; lateral sepals completely connate into a

synsepal, similar to the dorsal sepal, 10×4 mm. *Petals* dark yellow, paler than sepals, with a few chocolate brown spots at the base, cellular-glandular, oblong, obliquely triangular above the middle, apically acute, 10×2 mm. *Lip* 2×1 mm, chocolate brown, white at base and margins, delicately hinged to the base of the column by a flexible strap, three lobed, obpentagonal; middle lobe ovate-cordiform, thick, convex, densely pubescent, pilose at margin, with a pair of longitudinal swollen calli beginning from the basal lobes to the apex, small orifice above the cleft, obtuse apex; basal lobes narrowly falcate-triangular, densely pubescent, pilose on the outer margin; the base elevated, truncate, hinged behind a conical callus at the base of the column. *Column* arcuate, semiterete, pedestal like, without foot, 3 mm long; anther and stigma apical. Pollinia two, 0.7 mm long.

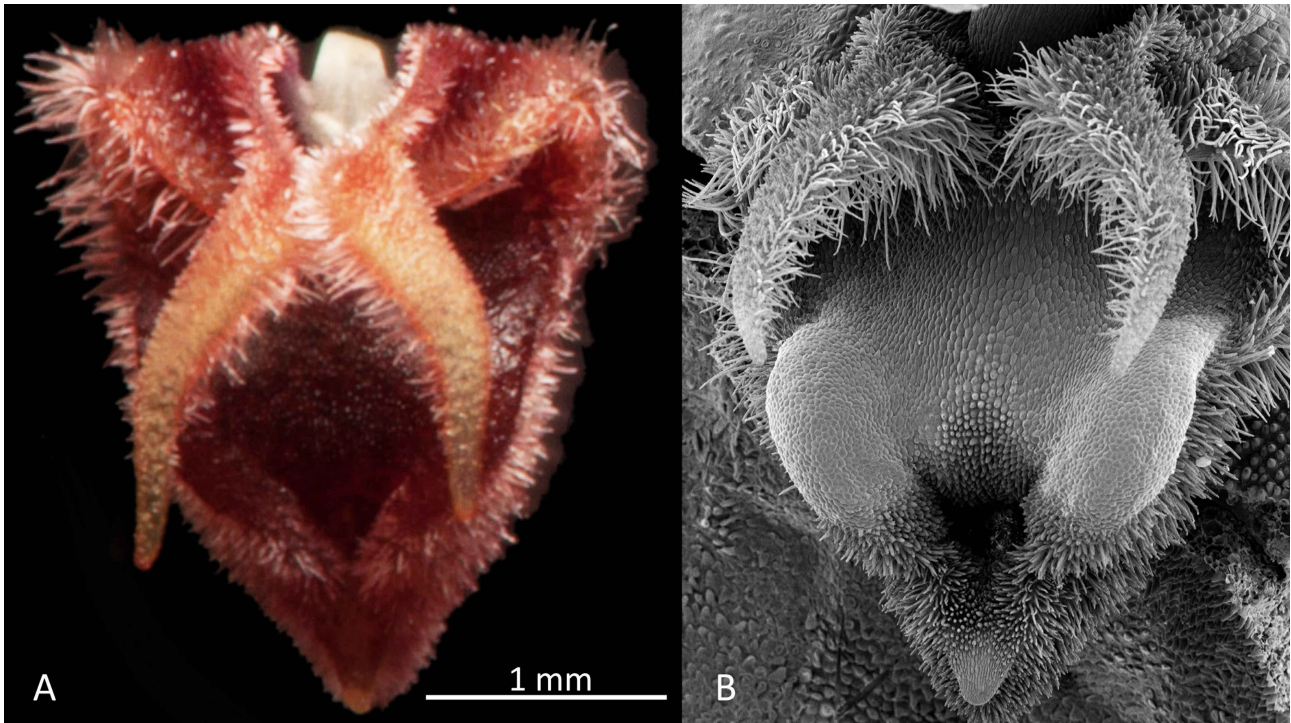


FIGURE 4. Lip characteristic of the “*P. crocodiliceps* (*P. arietina*-*P. nelsonii*)” complex. **A.** Macro-photograph of lip of *Pleurothallis wielii* PL0929. **B.** Scanning electron micrograph of lip of *Pleurothallis wielii* PL0713. (From Wilson *et al.* 2017a. Courtesy of Lankesteriana.)

Etymology:—Named after Fundacion EcoMinga, a science-based Ecuadorian conservation organization, which has established the Dracula Reserve in the Chical region of northwest Ecuador.

Comments:—This species is vegetatively similar to the narrowly lanceolate-leaved species from subgenus *Scopula*, including *P. aspergillum*, *P. garayana*, *P. ottocarii*, *P. ruscaria*, *P. scoparum* and *P. tetroxys* (Fig. 1). *P. ecomingae* can be easily distinguished from all of these species by the yellow and chestnut flowers with a minute, pubescent, tri-lobed lip in which the lateral lobes are elaborated into ‘horn-like’ projections, with a minute orifice in the apical region of the central lobe, as in species of the “*P. crocodiliceps* (*P. arietina*-*P. nelsonii*)” complex.

Distribution and habitat:—The type locality for *P. ecomingae* is in very humid cloud forest at an elevation of 2,228 m, between Km. 18 and Km. 19 of the Chical-El Carmen road, in Carchi Province, near the Ecuador-Colombia border (Fig. 2). *P. ecomingae* has also been observed growing further south near Rio Gualpi at an elevation of ~1,900 m. To our knowledge *P. ecomingae* has not been observed in adjoining areas of Ecuador or Colombia and may be endemic to this area of Carchi Province near Chical.

Conservation status:—Neither of the known localities for *P. ecomingae* occur in protected areas and it is not yet known whether *P. ecomingae* occurs within the borders of any of the parcels of the Dracula Reserve or in the Bosque Protector Golondrinas. Further, the whole area is under mining concession (Roy *et al.* 2018), and since the opening of the Chical-El Carmen road there has been substantial deforestation of adjacent areas for cattle ranching, suggesting that the species is at high risk from deforestation. However, until additional surveys can be completed the species should probably be listed as “data deficient” (DD) according to IUCN criteria.

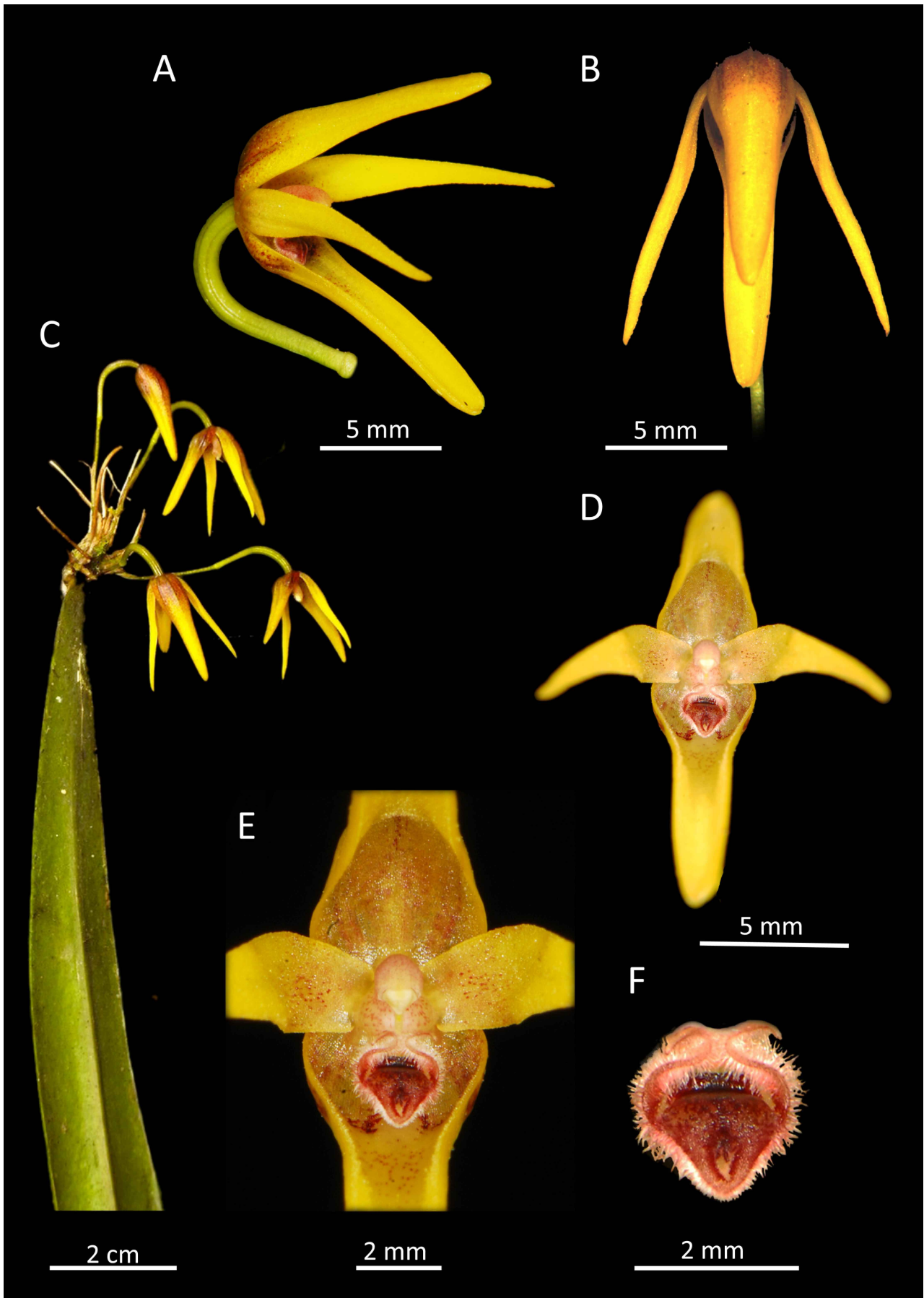


FIGURE 5. Lankester composite digital plate of *P. ecomingae*. **A.** Flower (side view); **B.** Flower (top view); **C.** Leaf and apical ‘tuft’ of single-flowered peduncles; **D.** Flower (front view); **E.** Column, anther and lip (front view); **F.** Lip. (Prepared by Mark Wilson from photos by Francisco Tobar Suárez and Andreas Kay.)

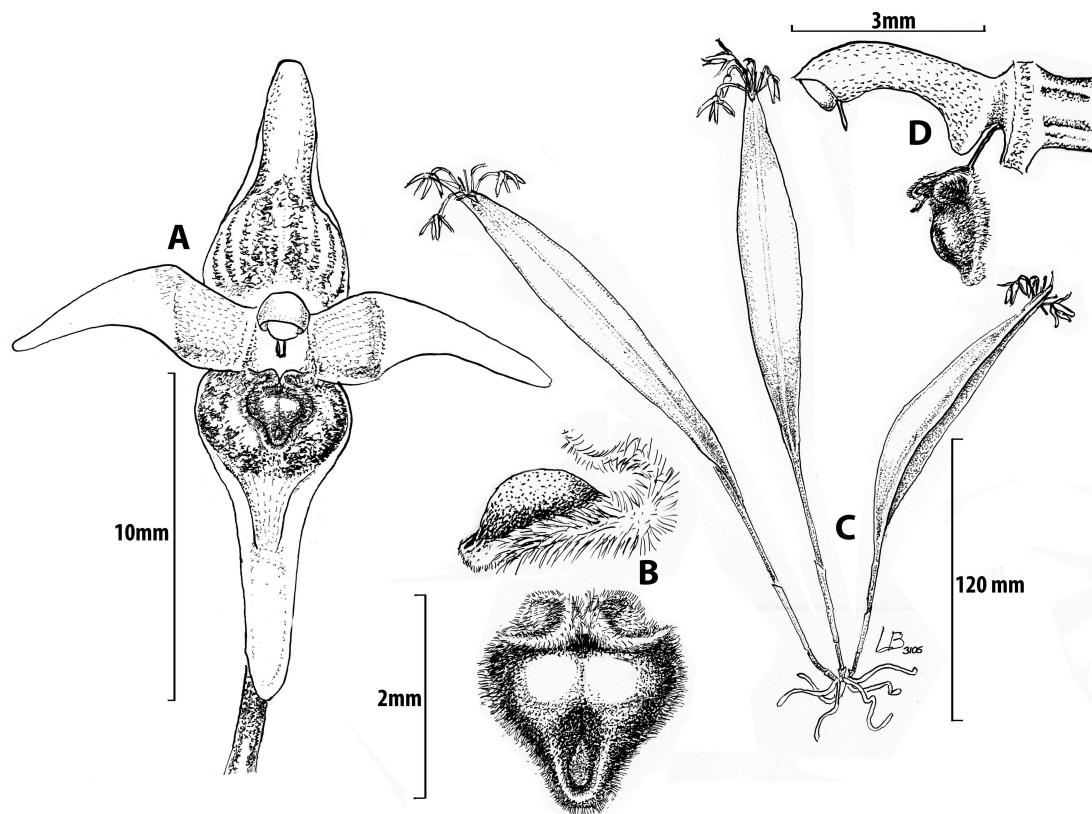


FIGURE 6. Drawing of *P. ecomingae*. **A.** Flower (front view); **B.** Lip (side and front view); **C.** Whole plant; **D.** Column and lip (side view). (Prepared from the holotype by Luis Baquero.)



FIGURE 7. *P. ecomingae* in situ near Rio Gualpi site. **A.** Plants growing epiphytically on tree trunks amongst ferns and other flora; **B.** Leaf and apical 'tuft' of single-flowered peduncles in natural orientation; **C.** Leaf and apical 'tuft' of single-flowered peduncles lifted to show inside of flowers; **D.** Two flowers (front view). (Photographed in situ by Andreas Kay.)

Discussion

P. ecomingae is a fascinating species because while the vegetative morphology suggests a member of subgenus *Scopula* (Fig. 1), the floral morphology, and in particular the lip, suggests affinity to the “*P. crocodiliceps* (*P. arietina*-*P. nelsonii*)” complex of subgenus *Ancipitia* (Fig. 3). Assuming it is not an inter-subgeneric hybrid, this morphology with characteristics of both subgenera supports the proposal by Rodríguez-Martínez *et al.* (2015) that the species of the two subgenera should probably be considered a single taxonomic group. That proposal is further supported by preliminary phylogenetic analyses of the two subgenera (Wilson unpubl. data)

It is interesting to hypothesize regarding how such morphology arose, since the vegetative morphology, with a fascicle of single-flowered flower-bearing stems (“peduncles” per Luer 1989) near the apex of the leaf has not been observed previously among any of the species of subgenus *Ancipitia*; and the minute, pubescent, “horned” lip, with an apical orifice, typical of the “*P. crocodiliceps* (*P. arietina*-*P. nelsonii*)” complex, has not been observed previously among any of the species of subgenus *Scopula*. In other words, no other species has this combination of morphological attributes. One might hypothesize that these attributes could have arisen by hybridization between a member of subgenus *Scopula* and a species from the “*P. crocodiliceps* (*P. arietina*-*P. nelsonii*)” complex of subgenus *Ancipitia*. However, the only member of subgenus *Scopula* in the area is *P. ruscaria*, which has a very different floral morphology which would be at least partially apparent in the morphology of the putative hybrid, which it is not. Further, assuming the hypothesis of pollination by sexual deceit proposed by Wilson *et al.* (2017a) for the “*P. crocodiliceps* (*P. arietina*-*P. nelsonii*)” complex is correct, it is highly unlikely that a pollination would occur between a “*P. crocodiliceps* (*P. arietina*-*P. nelsonii*)” complex species and a member of subgenus *Scopula* not pollinated by pseudocopulation. Even assuming such an unlikely pollination event did occur by chance, it is equally unlikely that the sophisticated lip would still retain the characteristic morphology in the hybrid progeny.

An alternate hypothesis is that either an inflorescence consisting of a fascicle of single-flowered flower-bearing stems arising from at or near the leaf apex evolved in an “*P. crocodiliceps* (*P. arietina*-*P. nelsonii*)” complex species; or the minute, pubescent, “horned” lip, with an apical orifice evolved in a species producing the fascicle of single-flowered flower-bearing stems from the leaf apex. *Pleurothallis tetragona* Luer & R. Escobar (1981: 178) and the recently described *Pleurothallis eduardoi* Mark Wilson in Wilson *et al.* (2017b: 41), from subgenus *Ancipitia*, and *P. cosmetron* and *P. silverstonei*, from subgenus *Scopula*, all produce a fascicle of flower-bearing stems not at the leaf base nor near the leaf apex, but one third of the way up the leaf, suggesting intermediate steps in the evolution of apical flowering. These morphological intermediates lead us to hypothesize that evolution of apical flowering in a “*P. crocodiliceps* (*P. arietina*-*P. nelsonii*)” complex species with a sophisticated lip that mimics a female fly is more likely than the evolution of such a lip in a species already possessing apical flowering. It will, however, require phylogenetic analysis to shed further light on the evolution of this combination of morphologies. Unfortunately, to date, material of *P. ecomingae* for DNA extraction has not been available to the first author in the U.S.

The species of the clade currently referred to as subgenus *Scopula*, including *P. ecomingae*, exhibit an interesting distribution, occurring almost exclusively on the western slopes of the Andes (Fig. 2). In Ecuador they occur on the western slope of the main Andean cordillera and in Colombia on the western slope of the Cordillera Occidental of the Andes. This area could be considered the Chocó-Andean transition zone. Precisely what this distribution indicates about the evolutionary history or ecology of the clade is unclear. It may be that these species represent a lineage that migrated southwards out of Central America (Pérez-Escobar *et al.* 2017) that has not crossed the barrier of the Cordillera Occidental. Precipitation may also be a factor, since annual rainfall in the forests of the Pacific slope of the Andes is higher than in some other areas.

The cloud forests of northwestern Ecuador and southwestern Colombia, on the western slopes of the Andes in what might be considered the Chocó-Andean transition, exhibit very high levels of biodiversity with numerous Pleurothallidinae, many of which are currently undescribed. Baquero, Jiménez and Wilson are currently in the process of describing some of these novelties. Unfortunately, these species face significant risk from deforestation, highlighting the extreme importance of the Dracula Reserve established by the EcoMinga Foundation.

Conclusions

The new species *P. ecomingae* exhibits morphological characteristics of both subgenus *Ancipitia* and *Scopula*. The near-apical fascicle of single-flowered flower-bearing stems is a characteristic of subgenus *Scopula* and the minute,

pubescent, tri-lobed lip with apical orifice is characteristic of subgenus *Ancipitia*. The existence of this species is support for the suggestion by Rodríguez-Martínez *et al.* (2015) that the species of the two subgenera should probably be considered a single taxonomic group. This species also further supports the conclusion of Wilson *et al.* (2017a) that not all species with the minute, pubescent, tri-lobed lip with apical orifice are morphotypes of a widely-distributed, morphologically variable *P. crocodiliceps*.

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