



<https://doi.org/10.11646/phytotaxa.349.2.10>

Pleurothallis hawkingii and *Pleurothallis vide-vallis* (Orchidaceae; Epidendroideae), two new species from Cordillera de Guanacaste in Costa Rica

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Abstract

Two new species of *Pleurothallis* are described from the Cordillera de Guanacaste in northern Costa Rica. Both novelties belong to *Pleurothallis* sect. *Macrophyllae-Fasciculatae*, among which they can be recognised by their fasciculate inflorescence with numerous simultaneously produced flowers, a rare feature in the species-rich group. This feature is shared with *Pleurothallis bothros*, putatively their closest relative. Both novelties may be distinguished from that species by their non-spreading (vs. spreading), pale yellow to pinkish flowers (vs. green) and broad, oblique petals (vs. narrow, straight). *Pleurothallis hawkingii* can be easily distinguished from *Pleurothallis vide-vallis* by its broader panduriform lip with raised margins and depressed basal glenion (vs. narrow lanceolate lip, lacking raised margins, with the glenion raised on a high basal callus).

Key words: Central American orchids, Cordillera de Guanacaste, Epidendreae, Miravalles, Pleurothallidinae, Stephen Hawking

Introduction

Pleurothallis Brown (1813: 211), with just under 500 species, is the fourth most species-rich genus of Pleurothallidinae (Karremans 2016), despite the narrower, current circumscription (Pridgeon 2005). The great diversity of species within the genus and an overall morphological similarity of their flowers have made circumscription of some traditionally difficult. The publication of a series of monographic works on the species belonging to *Pleurothallis* (i.e. Luer 1989, 1998, 1999, 2005) resulted in a steady increase in the species recognised in the genus in the last few decades (Karremans & Davin 2017). Monographic study has prompted clarification of particular species complexes within the genus (e.g., Wilson *et al.* 2017a, 2017b), among which Costa Rican species of *Pleurothallis* are no exception. Papers dealing with the *Pleurothallis cardiothallis* Reichenbach (1857: 158–159) and *P. phyllocardia* Reichenbach (1866: 97) species groups were published by Pupulin *et al.* (2017a, 2017b).

While revising material resulting from a broad floristic inventory of the Miravalles Volcano (Jiménez 2017), an undescribed species of *Pleurothallis* was encountered. During the revision of material belonging to close relatives of this novelty, a second undescribed *Pleurothallis* was found. Both are described here.

Taxonomic Treatment

Pleurothallis hawkingii Karremans & J.E.Jiménez, *sp. nov.* (Fig. 1)

Type:—COSTA RICA. Guanacaste: Tilarán, Tierras Morenas, desviación a la izquierda después del Río Cabuyo, camino al Proyecto Geotérmico Tenorio y Cerro Jilguero, ca. 4.5 km norte de Tierras Morenas, ladera sureste del Volcán Tenorio, 10°36'11.6"N 85°00'05.3"W, 900–1000 m, bosque pluvial premontano, epífitas a orillas del camino y en bordes de potreros, 2 febrero 2006, Bogarín 2386 (holotype: USJ!; isotype: JBL-spirit!).

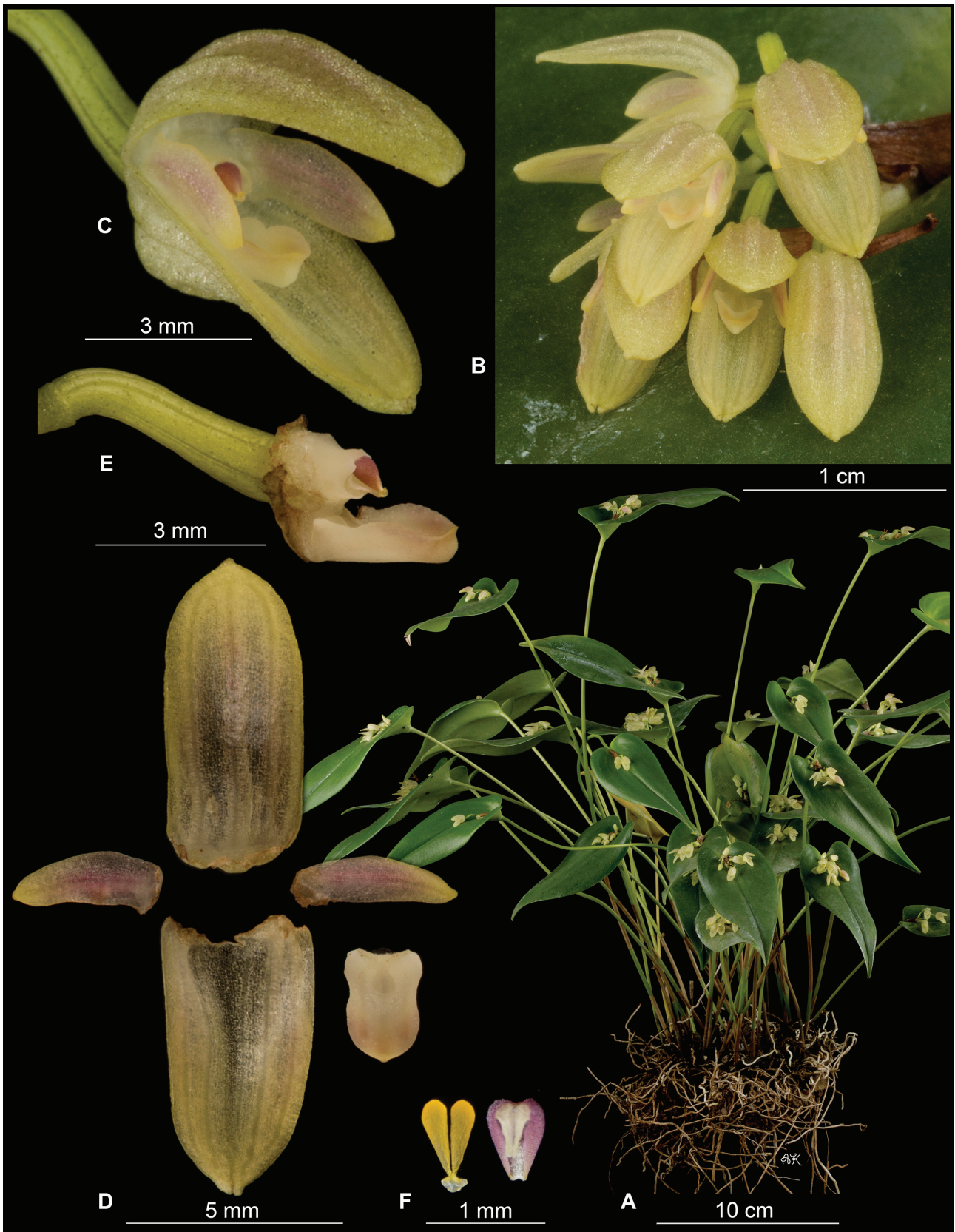


FIGURE 1. *Pleurothallis hawkingii*. A. Habit. B. Inflorescence. C. Flower. D. Dissected perianth. E. Ovary, column and lip, lateral view. F. Anther cap and pollinarium. Based on type specimen, *Bogarin* 2386 (USJ, JBL-spirit). Lankester Composite Digital Plate (LCDP) by APK.

The fasciculate inflorescence with numerous simultaneously open flowers in *Pleurothallis hawkingii* is reminiscent of *P. bothros* Luer (1996: 70–72). It differs, however, in the non-spreading, pale yellow to whitish flowers with pinkish markings (vs. greenish), oblong synsepal (vs. ovate), obtuse petals (vs. acute) and lip horizontally disposed, panduriform, smaller, ca. 2.7×1.7 mm (vs. recurved, ovate, 3.5×2.5 mm).

Epiphytic, erect herbs, up to 35 cm tall. Roots flexuous, thin, 0.5–1.0 mm diameter, densely spaced, appearing fasciculate. Ramicauls erect, thin, up to 25 cm long, covered by tubular sheaths close to the base, tightly adpressed, up to 5 cm long. Leaves horizontal or nearly so, sessile, ovate, shortly acuminate, $8.0\text{--}9.5 \times 3.0\text{--}3.5$ cm, deeply cordate. Inflorescence a fascicle of 3–9 simultaneously open flowers, subtended by a spatheaceous bract 1.0–1.5 cm long; pedicels terete, 5–6 mm long, pale green. Ovary clavate, 3.2–3.5 mm long, green. Flowers non-spreading, pale yellow with pinkish markings to solid pink; dorsal sepal oblong, slightly concave, obtuse, 3(5)-veined, $7.0\text{--}7.3 \times 2.9\text{--}3.1$ mm, apiculate; lateral sepals connate in an oblong, slightly concave synsepal, obtuse, 6-veined, $6.5\text{--}7.0 \times 3.3\text{--}3.5$ mm; petals oblong, oblique, acute, $3.5\text{--}3.7 \times 1.1\text{--}1.3$ mm; lip panduriform, horizontally disposed, $2.6\text{--}2.8 \times 1.6\text{--}1.8$ mm, margins raised, apex obtuse; glenion a depression between elevated lateral margins, the disk ca. 0.6 mm long; column straight, transversely subrectangular, with a column foot, $1.5\text{--}1.7 \times 1.5\text{--}1.6$ mm, the anther and stigma apical; anther cap ovate, cucullate, acute at the base, bilobed apically, 2-celled, ca. 0.7×0.5 mm; pollinia 2, narrowly ovate-pyriform, 0.7 mm long, connected to an elliptic viscidium. Fruits and seeds unknown.

Additional specimens examined:—COSTA RICA. Guanacaste: La Cruz, Parque Nacional Guanacaste, Estación Biológica Maritza, Volcán Orosí, cima del volcán entre el hito y la piedra, 1300 m, $10^{\circ}58'48''$ N, $85^{\circ}28'30''$ W, 21 Agosto 2017 (fl), *Morales, Grayum & Rojas 15521* (INB-CR); La Cruz, Parque Nacional Guanacaste, Estación Biológica Maritza, Volcán Orosí, cima del volcán entre el hito y la piedra, 1300 m, $10^{\circ}58'48''$ N, $85^{\circ}28'30''$ W, 21 Agosto 2017 (fl), *Morales, Grayum & Rojas 15523* (INB-CR); La Cruz, Parque Nacional Guanacaste, Estación Biológica Maritza, Volcán Orosí, cima del volcán entre la base del campamento y sendero a Maritza, 1300 m, $10^{\circ}58'33''$ N, $85^{\circ}28'54''$ W, 23 Agosto 2017 (fl), *Morales 15527* (INB-CR; Fig. 2).



FIGURE 2. *Pleurothallis hawkingii*, *Morales 15527* (INB-CR). A. *In situ* on the Orosí Volcano. B. Plants of the same population showing colour variation. Photographs by J.F. Morales.

Eponymy:—Honouring the English theoretical physicist, cosmologist and author Stephen William Hawking, who passed away the day this manuscript was submitted, 14 March 2018.

Phenology:—Flowering August in the field but January and February in cultivation.

Distribution:—Endemic to northern Costa Rica.

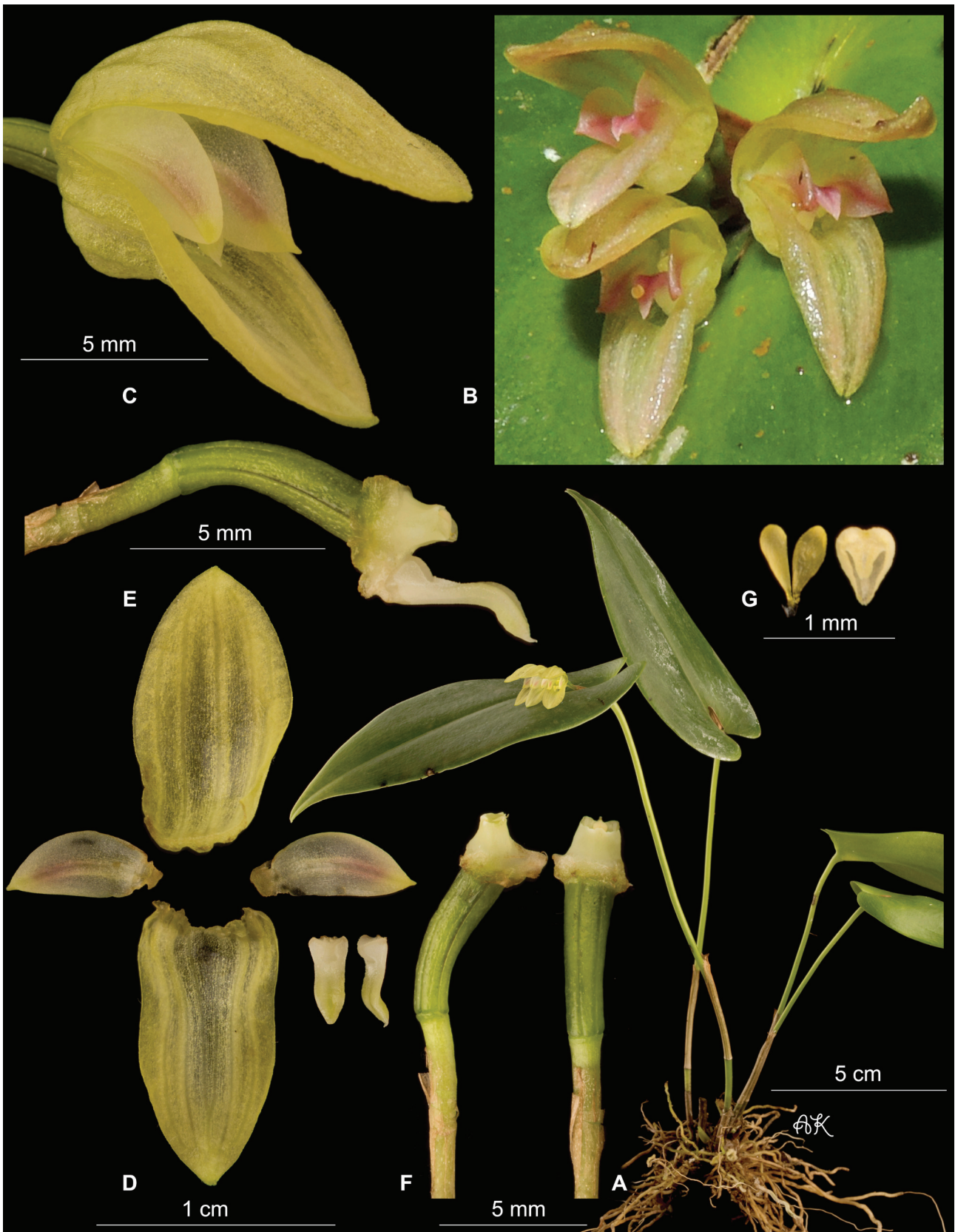


FIGURE 3. *Pleurothallis vide-vallis*. A. Habit. B. Inflorescence. C. Flower. D. Dissected perianth. E. Ovary, column and lip, lateral view. F. Column lateral and dorsal view. G. Anther cap and pollinarium. Based on type specimen *Calderón & Jiménez 96* (JBL-spirit). Lankester Composite Digital Plate (LCDP) by APK.

Habitat and ecology:—The species is only known from the Orosí Volcano and the Tilarán area in Cordillera de Guanacaste between 900–1300 m.

Notes:—*Pleurothallis hawkingii* belongs to *P.* sect. *Macrophyllae-Fasciculatae* (Luer 2005), and can be recognised by the fasciculate inflorescence of numerous simultaneously open flowers, a rare feature in this species-rich group. It shares the fasciculate inflorescence of several simultaneously open flowers with *P. bothros* and *P. vide-vallis*, also described in this paper. *Pleurothallis hawkingii* can be distinguished from *P. vide-vallis* by the oblong synsepal (vs. elliptic), narrower oblong (vs. elliptic) petals, horizontal lip (vs. apically recurved) that is shorter and broader ($2.6\text{--}2.8 \times 1.6\text{--}1.8$ mm vs. $3.4\text{--}3.6 \times 1.3\text{--}1.5$ mm) and has raised margins, lacking a callus higher at the base. It is also found at lower elevations than *P. vide-vallis*.

***Pleurothallis vide-vallis* Karremans & J.E.Jiménez, sp. nov. (Fig. 3)**

Type:—COSTARICA. Guanacaste: Bagaces, Fortuna, Zona Protectora Volcán Miravalles, cumbre del volcán sobre sendero, $10^{\circ}44'47.07''\text{N}$ $85^{\circ}09'07.97''\text{W}$, 1929 m, 17 de diciembre 2014, Calderón & Jiménez 96 (holotype: JBL-spirit!).

Pleurothallis vide-vallis is closely related to *P. hawkingii*, but it can be easily distinguished by its elliptic synsepal (vs. oblong), broader elliptic (vs. oblong) petals, apically recurved lip (vs. horizontal) that is longer, narrower and thinner ($3.4\text{--}3.6 \times 1.3\text{--}1.5$ mm vs. $2.6\text{--}2.8 \times 1.6\text{--}1.8$ mm) and a lip lacking raised margins with a callus higher at the base bearing a raised glenion (vs. raised margins, lacking a raised basal callus).

Epiphytic, erect herbs, up to 20 cm tall. Roots flexuous, thin, 0.5–1.0 mm diameter, densely almost fasciculate. Ramicauls erect, up to 8–14 cm long, covered by tubular sheaths tightly adpressed and close to the base, up to 5 cm long. Leaves horizontal or nearly so, sessile, acuminate, $7.0\text{--}11.0 \times 2.5\text{--}3.0$ cm, deeply cordate. Inflorescence a fascicle of simultaneously open flowers, 3–6 at a time, subtended by a spathaceous bract 1–2 cm long; pedicels terete, 5–6 mm long, pale green. Ovary sub-clavate, 4–5 mm long, green. Flowers pale yellow, diversely suffused with pink, to solid pink; dorsal sepal slightly concave, elliptic, obtuse, 5-veined, $12.0\text{--}12.5 \times 5.0\text{--}6.0$ mm; lateral sepals connate in a weakly concave synsepal, oblong, sub-acute, 6-veined, with the 2-central veins fused near the apex, $12.0\text{--}13.0 \times 5.5\text{--}6.0$ mm; petals elliptic, oblique, acute, $6.5\text{--}7.0 \times 2.3\text{--}2.5$ mm; lip pale yellow, whitish basally, lanceolate to narrowly panduriform, sigmoid, acute, shortly apiculate, $3.4\text{--}3.6 \times 1.3\text{--}1.5$ mm, minutely papillose, with a callus raised at the base, bearing a raised glenion, basally hinged to the column foot; column straight, transversely subrectangular, with a column foot, $2.0\text{--}2.3 \times 1.9\text{--}2.1$ mm; anther and stigma apical; anther cap ovate, cucullate, acute at the base, bilobed at the apex, 2-celled, ca. 0.6×0.4 mm; pollinia 2, narrowly ovate-pyriform, 0.6 mm long, connected to a round viscidium. Fruits and seeds not seen.

Etymology:—From the Latin, *videre*, to see, and *vallis*, valley, referring to the Miravalles Volcano, which in Spanish means overlooking the valleys.

Phenology:—Flowering in August and December, probably also in between.

Distribution:—Endemic to Costa Rica, where it is known from the Miravalles Volcano in the Cordillera de Guanacaste of northern Costa Rica.

Habitat and ecology:—Growing in primary forest at about 2000 m.

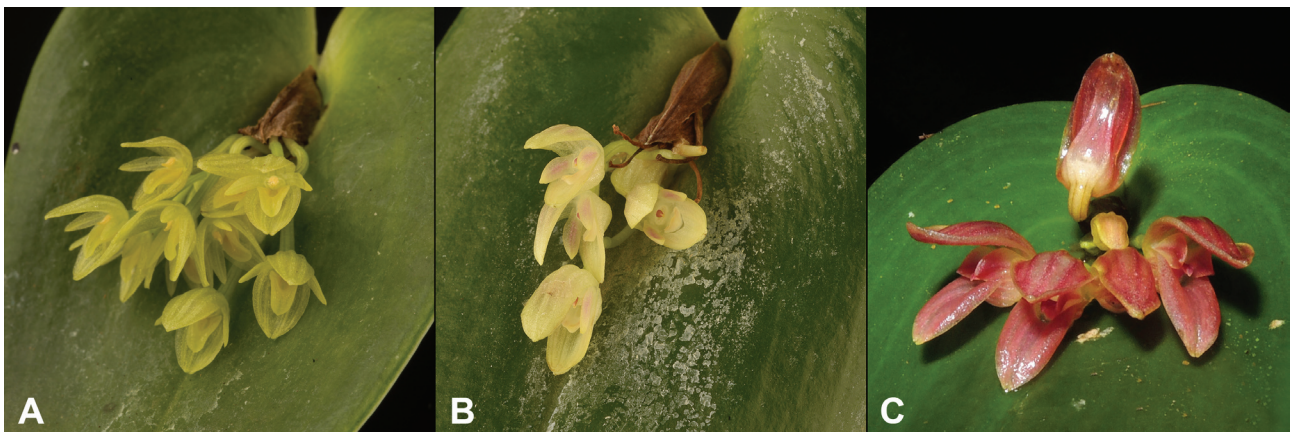


FIGURE 4. Flower comparison. A. *Pleurothallis bothros*. B. *Pleurothallis hawkingii*. C. *Pleurothallis vide-vallis*. Photographs by APK and JEJ.

Notes:—*Pleurothallis vide-vallis* belongs to *P. sect. Macrophyllae-Fasciculatae* (Luer 2005) and can be recognised by the fascicled inflorescence of numerous simultaneous flowers and the broad petals, rare features in this species-rich group. It is similar to *Pleurothallis bothros* (Fig. 4) but distinguished by its non-spreading, the flowers pale yellow, diversely suffused with pink, to solid pink (vs. greenish), the elliptic and oblique petals (vs. oblong and straight), the lanceolate to narrowly panduriform, sigmoid, acute, ca. 3.8×1.4 mm (vs. ovate, recurved and obtuse, 3.5×2.5 mm). *Pleurothallis hawkingii*, described in this paper, is highly similar, but the two species conspicuously differ in the labellum. *Pleurothallis vide-vallis* has a generally similar distribution, but *P. hawkingii* grows at higher elevations (Fig. 5).

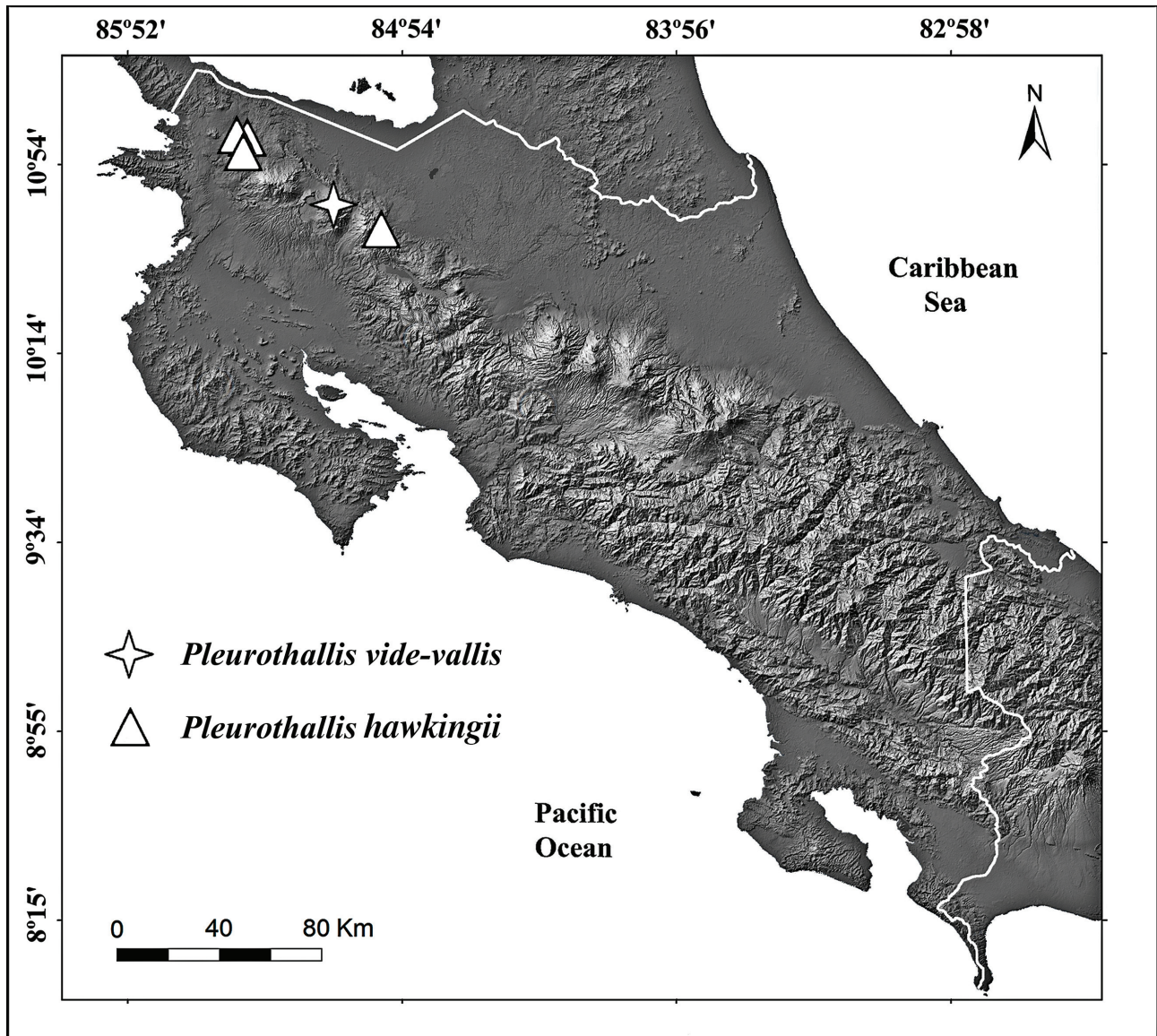


FIGURE 5. Distribution of *Pleurothallis hawkingii* and *P. vide-vallis* in the Cordillera de Guanacaste, Costa Rica.

Acknowledgments

We thank Juan Francisco Morales for sharing photographs of his specimens cited in this study. The second author wishes to thank Irene Calderón and Rodrigo Jiménez for their help during the fieldwork carried out at Miravalles Volcano. The staff and curators at CR, JBL and USJ are thanked for their help in accessing materials. A reviewer is thanked for comments on the manuscript. We are thankful to the Costa Rican Ministry of Environment and Energy (MINAE) and its National System of Conservation Areas (SINAC) for the scientific permits. This research is in part possible through to the support of the Vice-Presidency of Research, University of Costa Rica.

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