

# A NEW SPECIES OF *SIGMATOSTALIX* (ORCHIDACEAE: ONCIDIINAE) FROM COSTA RICA, AND ITS CONCOLOROUS FORM<sup>1</sup>

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**ABSTRACT:** A new species of the genus *Sigmatostalix* (Orchidaceae: Oncidiinae) from Costa Rica, and its concolorous form, are described and illustrated. *Sigmatostalix dulcineae* is a close relative of the Colombian *Sigmatostalix hermansiana*, from which it differs mainly in the ovate pseudobulbs and the distinctly ovate lamina of the lip, only slightly notched at the subacute apex. The affinities of the Mesoamerican taxa in the genus are discussed, and a key to the species of the *Sigmatostalix picta* group is provided.

A FEW YEARS ago, in the introduction to his useful pictorial guide to the genus *Lycaste*, Henry F. Oakeley wrote, “if it is not in here it has not been described” (Oakeley, 1993). The sentence may sound a bit ambitious, but it summarizes the wish and the effectiveness of any monographic treatment.

The systematic revision of a group of plants when it is carried out in the context of a regional flora (i.e., to a reduced geographic scale) usually serves to assess species diversity in the group and to permit the correct identification of the species involved. The keys, descriptions and illustrations of the taxonomic treatment allow botanists and other people working with plants, such as geneticists, chemical prospectors, horticulturists and conservationists, among others, to clearly identify plants of the group in question and to use correct scientific names. A second effect of a systematic treatment is the opportunity to easily discover individuals that, for some divergent characters, do not fit any of the previously recognized species. It is rather frequent that, after the publication of a taxonomic treatment, several new species within the group will appear soon as a result of a better understanding of the critical characters useful for species circumscription, patterns of geographic distribution,

and the availability of more material for study and comparison.

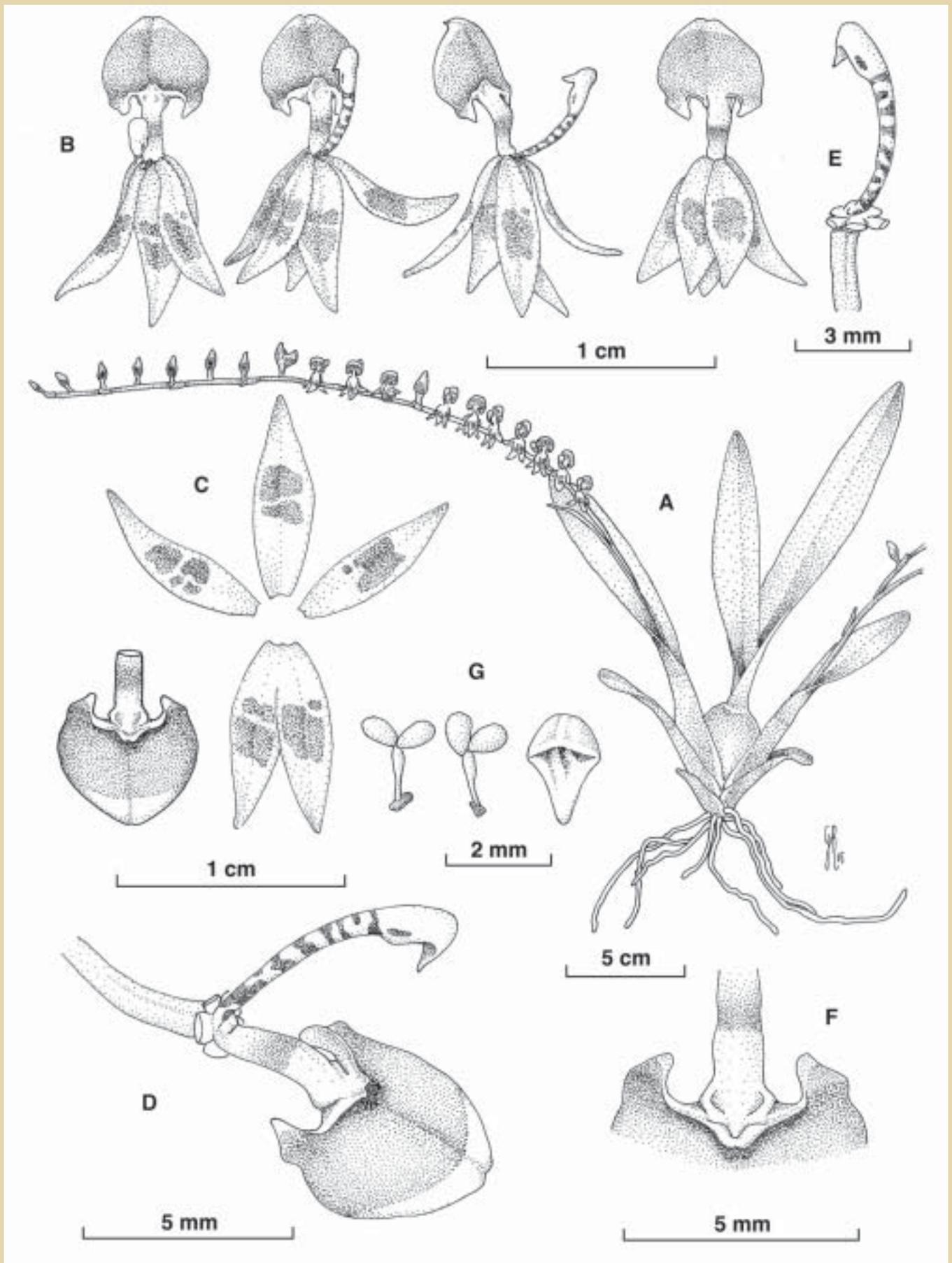
The genus *Sigmatostalix* Rchb.f. includes 57 species of small pseudobulbous epiphytes, ranging from Mexico to Argentina, Paraguay, Bolivia and southeastern Brazil in South America. The genus is most diverse in the Andes, and its center of distribution seems to be in the main mountain chains of Ecuador and Colombia, where 20 and 19 species have been recorded, respectively (Dodson, 2004; Govaerts, 2002). Species diversity greatly decreases toward the Amazon basin, with a single species known from the Guyanas, and two species from the otherwise orchid-rich Brazil and toward northern Central America. Plants of the genus *Sigmatostalix* are obviously best suited for the intermediate to cool environment of the Andean chain and the high mountains of the American isthmus, and apparently no species occurs in the Caribbean islands. In Central America, *Sigmatostalix* distribution is likely correlated with the presence of high topographic reliefs, and the

Fig. 1 (opposite). *Sigmatostalix dulcineae*. A. Although they look like simple racemes, the inflorescences of *Sigmatostalix dulcineae* are actually paniculate. The bracts of the rachis hide short lateral branches, on which the flowers are produced. B. The flowers of *Sigmatostalix dulcineae* are small, less than 2 cm long, but vividly colored. They are unscented and, like many other species in the genus, they attract the pollinators by producing oil at the base of the column. C. *Sigmatostalix dulcineae* is apparently restricted to the areas still covered with primary vegetation in the southern Pacific watershed of the Cordillera de Talamanca in Costa Rica. D. The perianth segments of *Sigmatostalix dulcineae* are yellow and blotched reddish-brown in different intensities. In some clones, the brown blotches are very pale. Photographs: F. Pupulin.

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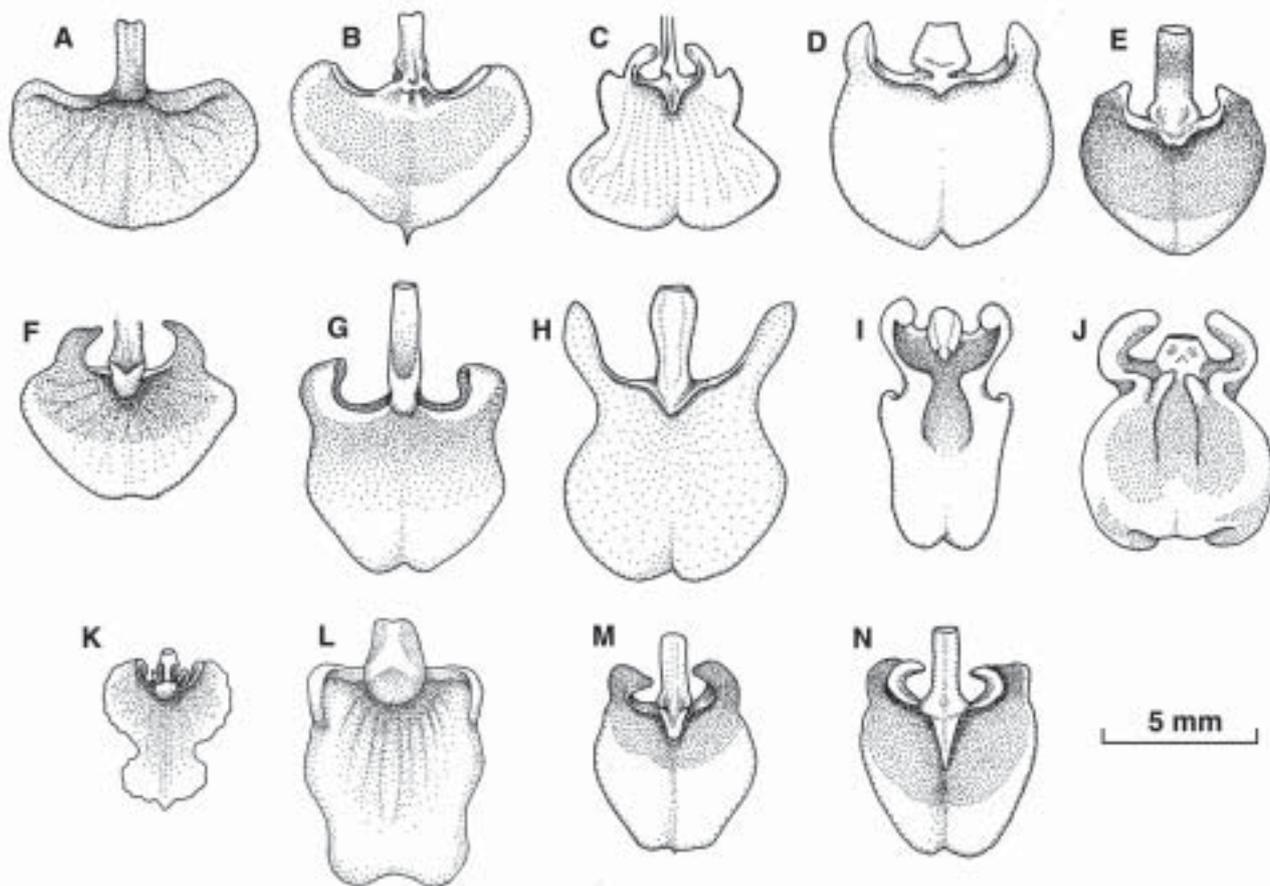


Fig. 2 (opposite). *Sigmatostalix dulcineae* Pupulin & G. Rojas. A. Habit. B. Flower, four views. C. Dissected perianth. D. Column and lip, three-quarters view. E. Column, three-quarters view. F. Callus. G. Pollinarium and anther cap. Drawn by Gustavo Rojas from the holotype.

comparatively high mountains of Costa Rica host the highest diversity in the region.

Among the species of *Sigmatostalix* of Central America, four or five groups can be recognized on the basis of gross flower morphology, most of them South American in origin. They include the *Sigmatostalix graminea* group (with two species in Mesoamerica), the *Sigmatostalix hymenantha* group (three species ranging from Ecuador to Nicaragua), the *Sigmatostalix picta* group (five previously known species in Central America) and the somewhat aberrant *Sigmatostalix brownii*, likely allied to the *Sigmatostalix amazonica* group. Particularly noteworthy is the *Sigmatostalix unguiculata* group, with three species strictly Mesoamerican in distribution, one of which (*Sigmatostalix mexicana*) is the northernmost species of the genus (Williams, 1942).

The group of species related to the South American *S. picta* had proven to be somewhat difficult due to the gross similarity in flower morphology and color among the involved taxa, which led some authors (i.e., Mora-Retana, 1999) to adopt a broad concept of *S. picta*, ranging from Mexico to Peru. Nevertheless, the Mesoamerican species of the group can be distinguished from typical *S. picta* on the basis of a consistent set of morphological characters, and a detailed

Fig. 3. Comparison of the lip shape in species of *Sigmatostalix picta* group. A—*S. savegrensis* Pupulin. B—*S. cardioglossa* Pupulin. C—*S. auriculata* Garay. D—*S. hermansiana* Kgr. E—*S. dulcineae* Pupulin & G. Rojas. F—*S. picta* Rchb.f. G—*S. marinii* Kgr. H—*S. eliae* Rolfe. I—*S. buchtienii* Kraenzl. J—*S. lutzii* Kgr. K—*S. pandurata* Schltr. L—*S. caqueteana* Schltr. M—*S. guatemalensis* Schltr. N—*S. poikilostalix* Kraenzl. Based on: A, Herrera et al. 7282 (USJ); B, Pupulin 3499 (USJ); C, Escobar 60 (AMES); D, Königer 85 (M); E, Pupulin & Rodríguez 4480 (USJ); F, Ibañez s.n. (USJ-Spirit); G, Königer 57 (M); H, Bennett 3620 (MO); I, Vasquez 97 (Herbarium Vazquezianum); J, Koniger 43 (M); K, Lehmann CLXVI (US); L, Bennett 4069 (USM); M, Mora-Retana s.n. (USJ); N, Pupulin 3845 (USJ).

revision of the group in Costa Rica revealed several taxonomic novelties (Pupulin, 2003). Among the plants collected in Costa Rica by the staff of Jardín Botánico Lankester during an expedition to the high mountains of southern Talamanca range, close to the border with Panama and La Amistad International Park, we found some specimens that proved to be consistently distinct from previously described taxa, and we describe them as a species new to science:

***Sigmatostalix dulcineae* Pupulin & G. Rojas, sp. nov.**

TYPE: Costa Rica. Puntarenas: Coto Brus, Zona Protectora La Tablas, Las Alturas de Cotón, trail from Las Alturas Biological Station to Cerro Echandi, 08°56'59"N 82°50'02"W–08°50'30"N 82°59'50"W, 1,620–1,850 m, lower montane moist forest, 21 March 2003, flowered in cultivation at Jardín Botánico Lankester, 1 June 2005, F. Pupulin 4480 and A.C. Rodríguez (holotype: CR; isotype, Jardín Botánico



Lankester, Spirit Collection). (Figs. 1A–D, page 679; Fig. 2, page 680).

*Species Sigmatostalici hermansiana* Kgr. *similis*, *pseudobulbis ovatis*, *foliis anguste ellipticis superficie abaxiali solide purpurea*, *labello distincte ovato*, *subacuto*, *apice parum inciso*, *auriculis introrsis recedit*.

*Plant* epiphytic, caespitose, to 17 cm tall, with short rhizome. *Roots* slender, flexuous, to 1 mm in diameter. *Pseudobulbs* ovate, laterally compressed, 2.0–3.3 cm long, 1.3–2.2 cm wide, heavily suffused with purple-brown, uni- or bifoliate at apex, the base subtended by three to seven foliaceous and nonfoliaceous sheaths. *Leaves* narrowly elliptic, obtuse to acute, sometimes asymmetrically minutely bilobed, the adaxial surface olive green, sometimes lightly tinged with purple, the abaxial surface solid purple, 4–12 cm long, 0.9–2.0 cm wide, constricted at the base into a conduplicate petiole to 2 cm long. *Inflorescences* 1–3 per pseudobulb, paniculate, to 36 cm long, many-flowered (13–24), the lateral branches strongly reduced, to 3 mm long; bracts of the inflorescence triangular-lanceolate, acute, papyraceous, to 6 mm long, 2.5 mm wide; the flowers secund; peduncle terete, to 8 cm long, concealed by one to two imbricating papyraceous bracts, 5 mm long. *Floral bracts* triangular, acute, 2.5–3.0 mm long, 1 mm wide. *Ovary* pedicellate, linear, to 6 mm long including the pedicel. *Flowers* not resupinate, spreading, the sepals and petals strongly reflexed, yellow, blotched red brown, fading pale yellowish white toward the base; lip yellow, with a large chestnut brown blotch at the base of lamina, the claw yellow, barred brown, the callus yellow; the column yellow, barred with dark reddish brown. *Dorsal sepal* lanceolate, acute, slightly concave toward the apex, 8.5 mm long, 2.5 mm wide. *Lateral sepals* connate at the base for about 2 mm, lanceolate, subacuminate, 8 mm long, 2.5 mm wide. *Petals* obliquely narrowly elliptic-lanceolate, slightly asymmetrical, subacuminate, 8 mm long, 2 mm wide. *Lip* clawed, 3-lobed, 7.5 mm long, 6 mm wide; claw linear, slightly dilated toward

Fig. 4. *Sigmatostalix guatemalensis*. A. At the type locality in Cobán, the concolorous form is more frequent, and the type specimen collected by Tuerckheim had completely yellow flowers. This plant was photographed in the Archila collection at Cobán, Guatemala. B. Although the typical (yellow) form also exists, populations of *S. guatemalensis* in Costa Rica have mostly blotched flowers. The species is here relatively common, and Robert A. Rolfe at Kew described it with the name of *S. costaricensis* on a collection by Charles H. Lankester. Photographs: F. Pupulin.

the apex, basally flattened in section, thickened in the mid-portion, 3 mm long, 1.5 mm wide at apex; lateral lobes retrorse, triangular, obtuse to almost rounded, 1 mm long, 0.8 mm wide, the involute inner margin thickened; midlobe transversely ovate, obtuse, minutely apiculate, 4 mm long, 6 mm wide; disc with a short, triangular, retuse, suberect callus, 1 mm long, 1.5 mm wide. *Column* slender, terete-subclavate, curved, the apex quadrate, the stigmatic cavity elliptic, the rostellum triangular, acute. *Pollinia* 2, obovate, on a obtriangular-clavate stipe; viscidium elliptic, brown.

**PARATYPE:** Costa Rica. Puntarenas: Coto Brus, Las Alturas de Cotón, Fila Cedro, unpaved road to Río Cedro, 8°58'20"N 82°52'40"W–8°59'03"N 82°54'20"W, 1,670–1,240 m, 20 March 2003, F. Pupulin 4405, H. León-Páez and A. C. Rodríguez (CR, USJ).

**ETYMOLOGY:** Named after Dulcinea del Toboso, El Quijote de la Mancha's historical character, to celebrate the fourth century of the first edition of the fundamental Castilian novel by Miguel de Cervantes.

**HABITAT AND ECOLOGY:** An uncommon epiphyte of lower montane moist forests and oak submontane forests, apparently restricted to the southern Pacific watershed of the Cordillera de Talamanca in Costa Rica. The species is mainly known from areas still covered with primary vegetation, where it grows at elevations of 1,200–1,900 m. Flowering occurs from May to September.



Fig. 5. *Sigmatostalix poikilostalix*. A. The flowers can be easily distinguished by the very narrow and pointed callus at the base of the lip lamina. As the flowers age, the tip of the callus turns up toward the column. B. The concolorous form of *S. poikilostalix* is less frequent, but it has been observed in Costa Rica and Guatemala. Photographs: F. Pupulin.

The flowers of *S. dulcineae* are similar to those of *S. hermansiana* Kgr. from Colombia, but the new species has ovate pseudobulbs (vs. elliptic), narrowly elliptic leaves (vs. oblong-lanceolate), and a differently shaped lip. The lamina of the lip is ovate, subacute and slightly notched in *S. dulcineae*, whereas *S. hermansiana* has an elliptic, rounded, deeply emarginate lamina; the basal auricles are introrse in the new species, and retrorse in *S. hermansiana* (Fig. 3, page 681).

Among the species of the *S. picta* group in Mesoamerica, *S. dulcineae* is closely related to *S. guatemalensis* Schltr. (Figs. 4A–B) and *S. poikilostalix* Kraenzl. (Figs. 5A–B), both of which also present concolorous forms. Nevertheless, *S. dulcineae* can be distinguished by the reniform lamina of its lip, which is wider than long, and the absence of the callous triangular projection that extends toward the lamina. The other two species of the *S. picta* group in Costa Rica that present a reniform lamina of the lip are *S. savegrensis* Pupulin and *S. cardioglossa* Pupulin (Fig. 6); both of them are markedly different from *S. dulcineae* in their entire lamina, with no basal auricles.

The type locality of *S. dulcineae*, in southwestern Costa Rica, is so close to the border with Panama and La Amistad International Park that we can expect to find populations of this species also in the adjacent regions of Panama.

Among the specimens collected at the type locality, one lacks the reddish-brown blotches on the perianth segments, and it is therefore described here as a new form:

***Sigmatostalix dulcineae* Pupulin & G. Rojas f. *flava* Pupulin & G. Rojas, f. nov.**

TYPE: Costa Rica. Puntarenas: Coto Brus, Las Alturas de Cotón, Fila Cedro, unpaved road to Río Cedro, 8°58'20"N 82°52'40"W–8°59'03"N 82°54'20"W, 1,670–1,240 m, 20 March 2003, F. Pupulin 4406, H. León-Páez & A.C. Rodríguez (Holotype, CR; isotype, Jardín Botánico Lankester, Spirit Collection). (Fig. 7, page 684).

*A forma typica floribus flavis concoloribus differt.*

Concolorous, yellow-flowered forms are known in other species of the *S. picta* group in Central America, among which *S. guatemalensis* (in fact, the *forma typica*) and *S. poikilostalix*.



Fig. 6. The lamina of the lip of *S. cardioglossa*, like that of *S. savegrensis*, is entire, with no basal auricles. This is a flower of the holotype. Photograph: F. Pupulin.



Fig. 7. The concolorous form of *Sigmatostalix dulcineae* has no anthocyanine pigments and the flowers are of a bright, uniform yellow color. *Sigmatostalix guatemalensis* and *S. poikilostalix*, other two species of the *S. picta* group in Central America, also present concolorous forms. Photograph: F. Pupulin.

#### LITERATURE CITED

- Dodson, C.H. 2004. Ecuador orchid list. Pp. 1112–1156 in: C.H. Dodson, *Native Ecuadorian Orchids*, 5. Dodson Publ., Sarasota.
- Govaerts, R. 2002. Checklist of American Orchidaceae. Computer printout. Royal Botanic Gardens, Kew.
- Mora-Retana, D.E. 1999. *Sigmatostalix* Rchb.f., in: J.T. Atwood and D.E. Mora-Retana, *Flora Costaricensis*. Family #39 Orchidaceae: Tribe Maxillarieae: Subtribes Maxillariinae and Oncidiinae. *Fieldiana*, Bot. N.s. 40:161–163.
- Oakeley, H.F. 1993. *Lycaste Species, the Essential Guide*. Vigo Press, London.
- Pupulin, F. 2003. A second look at the genus *Sigmatostalix* (Orchidaceae: Oncidiinae) in Costa Rica. *Harvard Pap. Bot.* 8(1):35–60.
- Pupulin, F. In prep. *Sigmatostalix* Rchb.f. *Flora Mesoamericana*.
- Williams, L.O. 1942. A new *Sigmatostalix* from Mexico. *Amer. Orch. Soc. Bull.* 19:239–240.

### Key to the Species of the *Sigmatostalix picta* Group

1. Lamina of the lip longer than wide, -peltate — 2
2. Lamina constricted near the base, the margins up-curved — 3
3. Lamina ovate — *S. buchtienii*
- 3a. Lamina obovate — *S. lutzii*
- 2a. Lamina not constricted at the base, the margins plane — 4
4. Lamina pandurate — *S. pandurata*
- 4a. Lamina ovate — 5
5. Callus rounded in front, without triangular projection — *S. caquetteana* (syn. *S. ariasii*)
- 5a. Callus with a triangular projection extending toward the lamina — 6
6. Triangular projection short, rounded — *S. guatemalensis* (syn. *S. costaricensis*)
- 6a. Triangular projection long, acuminate — *S. poikilostalix*
- 1a. Lamina of the lip wider than long — 7
7. Lamina of the lip without retrorse auricles — 8
8. Lamina of the lip cordate, blotched — *S. cardioglossa*
- 8a. Lamina of the lip reniform, concolor — *S. savegrensis*
- 7a. Lamina of the lip with retrorse auricles — 9
9. Lamina of the lip pandurate — *S. auriculata*
- 9a. Lamina of the lip ovate or obovate — 10
10. Lamina of the lip obovate, the retrorse auricles long — *S. eliae*
- 10a. Lamina of the lip ovate, the retrorse auricles short — 11
11. Callus open in front — 12
12. Lamina distinctly ovate, subacute, slightly notched — *S. dulcineae*
- 12a. Lamina elliptic, rounded, deeply emarginated — *S. hermansiana*
- 11a. Callus cyathiform, closed toward the apex — 13
13. Lamina of the lip reniform; the lateral lobes inserted at the middle of the basal margins of the lamina — *S. picta*
- 13a. Lamina of the lip ovate; the lateral lobes inserted at the external end of the basal margins of the lamina — *S. marinii*