



# A just overtime discovery: another new species of *Echinosepala* (Orchidaceae) from Costa Rica

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## Key words

flower of Costa Rica  
new species  
Península de Osa  
phylogeny  
*Pleurothallidinae*

**Abstract** *Echinosepala truncata* is described as new to science and illustrated from the holotype. It is compared with *E. tomentosa*, from which it differs by the sparsely lanate ovary, the narrowly obovate, apically rounded synsepals, the spatulate, apically and basally rounded petals, and the rectangular, apically truncate lip. The phylogenetic relationships of the new species could be hypothesized based on a shared set of morphological characters and geographic distribution.

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## INTRODUCTION

Systematic monographs, even on a local scale, have the undoubted advantage of aiding with species identification of a given taxonomic group thanks to the identification keys, descriptions and comparative illustrations of the taxa in question (Grace et al. 2021). One of the side effects of these monographs is stimulating new attention for the treated group and a new check of previous identifications. Thus, frequently after immediately publishing a systematic review of a genus, new species are suddenly discovered (Pupulin 2019, 2021, Pupulin & Karremans 2020). For the authors of a monograph of this kind, it is inevitable to feel the appearance of these novelties as something that happens just out of time. Still, it is consoling to believe that the discovery of greater diversity is partly the result of the work already done. In this specific case, two of the authors have very recently published a review of the genus *Echinosepala* for the Costa Rican flora (Pupulin et al. 2020). The results of a systematic study begun over fifteen years earlier, in which they recognized 11 species in the genus, grouped into three phylogenetically related groups. It is now necessary to add to this study (Pupulin et al. 2020) a new species that cannot be assigned to any of those already known. The new species is based on a plant recently discovered in the Península de Osa, in the southern Pacific coast of Costa Rica, one of the richest but least studied floristic regions of the Central American country (Chinchilla et al. 2020).

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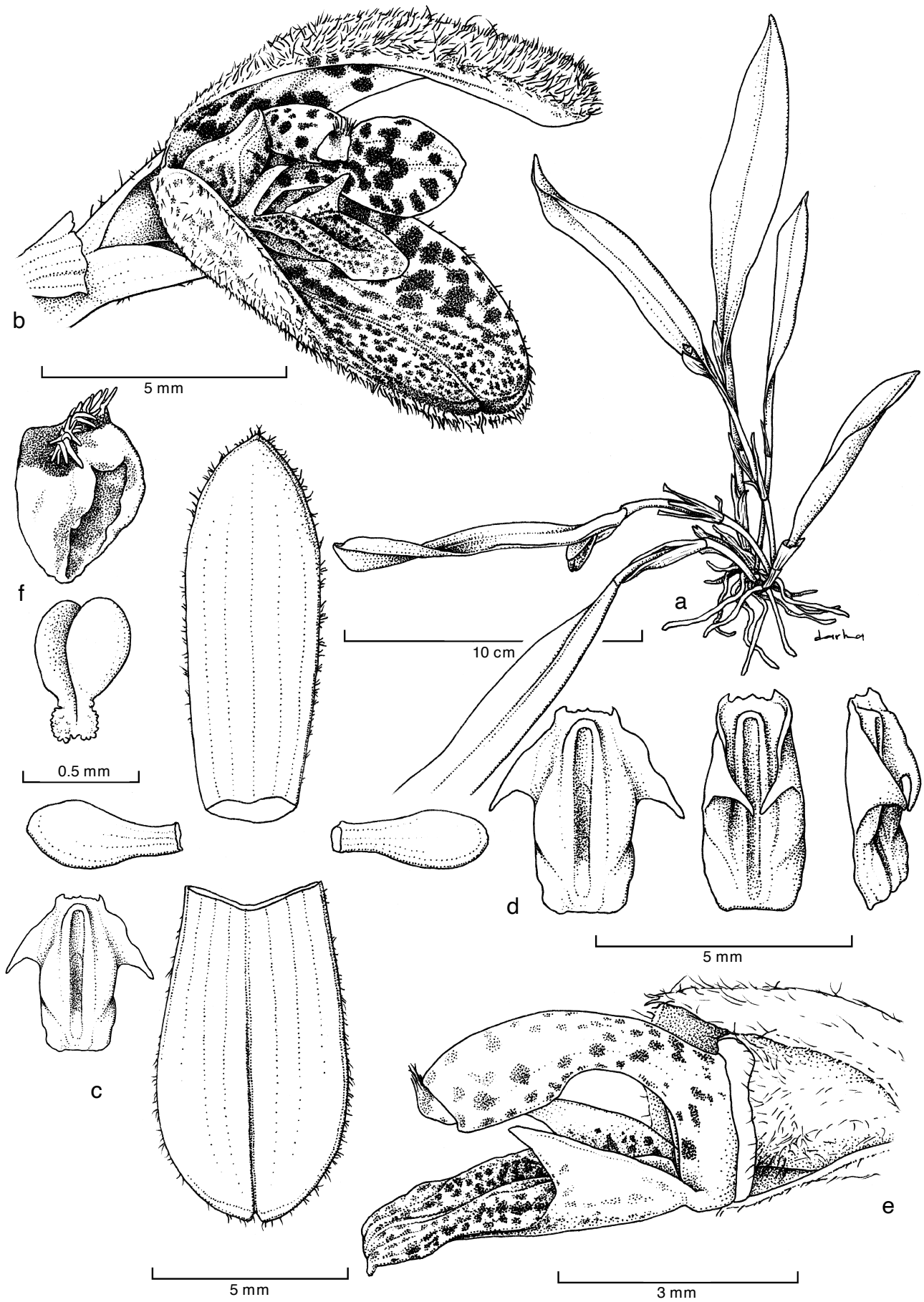
## TAXONOMIC TREATMENT

*Echinosepala truncata* Pupulin, L. Álvarez & Bogarín, *sp. nov.*  
— Fig. 1, 2a

Species resembling *Echinosepala tomentosa* (Luer) Pridgeon & M.W.Chase in the habit and the shape and size of the flower, but easily distinguished by the sparsely lanate ovary, obovate synsepals, spatulate and apically rounded petals, and rectangular, apically truncate lip (see also Discussion). — Type: *L. Álvarez 288, T. M. Jeffery, M. López Morales & J. Ortiz García* (holo JBL), Costa Rica, Puntarenas, Osa, Piedras Blancas, Santa Cecilia, trails West of the property Lomas del Sierpe, Reserva Forestal Golfo Dulce, N8.7625 W83.2857, 100 m, wet tropical forest, mature secondary vegetation, 10 Apr. 2020.

*Etymology.* From the Latin *truncatus*, 'truncate, having the end cut off', in reference to the apex of the lip.

Epiphytic, caespitose, erect *herb* up to 22 cm tall. *Roots* slender, quite stiff, 1–2 mm diam. *Ramicauls* slender, erect, terete, thicker in the distal portion, 2.5–9.5 cm long, homoblastic, composed of c. 3 internodes different in length, the lower one much shorter (to 1–1.3 cm long), completely enclosed by 4, loosely tubular-inflated, ancipitous, apically obliquely truncate, greenish sheaths, the youngest with purple spots, increasing in size toward the upper one, 0.8–6.5 by 0.7–1.5 cm, glumaceous when young, becoming dry-papyraceous with age and breaking longitudinally into long fibres, eventually disintegrating when old. *Leaf* erect, thinly coriaceous, narrowly elliptic to subglulate, 8.4–12.4 by 1.4–2.4 cm, apex acute, tip minutely emarginate, the margins slightly revolute, the base cuneate, conduplicate, sessile, the midvein strongly protruding abaxially and several lateral veins faintly visible on both sides. *Inflorescence* a fascicle of single, successive flowers at the apex of the ramicaul; the peduncle terete, suberect, microscopically sparsely pubescent, 4–6 mm long, subtended by a papyraceous, whitish, obliquely truncate spathe, c. 15 mm long. *Floral bract* papyraceous, broadly obovate, apex obliquely subobtuse, c. 8 by 5 mm, sparsely covered with short and soft spines. *Pedicel* terete-subclavate, c. 2.5 mm long, sparsely warty; *ovary* completely



**Fig. 1** *Echinosepala truncata* Pupulin, L.Álvarez & Bogarín. a. Habit; b. flower; c. dissected perianth; d. lip, front with lateral lobes spread, front with lateral lobes in natural position and side view; e. column and lip, lateral view; f. anther cap and pollinarium. — Drawn by D. Solano Ulate from the holotype.



Fig. 2 Flower morphology of a. *Echinosepala truncata*; b. *E. tomentosa* (from a. Álvarez 288, b. Bogarín 12945; all JBL). — Photos by F. Pupulin.

covered by the bract, linear-subclavate, c. 1 mm long, sparsely lanate-hirsute. Flowers bilabiate, ringent, externally densely tomentose, the sepals light greenish yellow, semi-transparent-fenestrate at the base, boldly blotched with a dark purple in the basal two thirds, the apex of the dorsal sepal yellow, the apex of the synsepal finely dotted with blackish purple to become almost solid purple; the petals light greenish yellow, blotched with dark purple; the lip densely spotted and blotched with blackish purple on a pale yellow background, the lateral lobes yellow, finely spotted with purple, the rear apex of the callus yellow; the column pale greenish yellow, blotched with purple. *Dorsal sepal* narrowly oblong, apex obtuse, 7.5–8 by c. 3.5 mm, 5-veined, adaxially tomentose. *Lateral sepals* connate into a narrowly obovate-oblong, apically rounded, shortly excise synsepal, c. 9 by 5 mm, each half 4-veined, the free apices broadly obtuse, adaxially tomentose. *Petals* fleshy, spatulate, c. 4 by 1.7 mm, apex rounded, thickened, 3-veined. *Lip* 3-lobed, rectangular from a small, transversely rectangular, thin, rose-hyaline claw, c. 4 by 2 mm (c. 3.7 mm across the lateral lobes), the base subtruncate with 2 retrorse auricles; the apical lobe truncate, with a pair of intramarginal, thick, introrse keels running toward the apex; lateral lobes narrowly triangular-uncinate, erect, the apex introrse, c. 2 mm long; disc with a horseshoe-shaped, channelled pseudoglenion at the base, running into a groove which extends close to the lip apex. *Column* straight to arcuate, semiterete, clavate, c. 3.8 mm long, with narrow, rectangular stigmatic wings above the middle, the foot less than 1 mm long. *Anther cap* hemispherical, cucullate, with a fimbriate crest, 2-celled. *Pollinia* 2, ovoid, flattened, on a short, broad, elliptic-obreniform, minutely bilobed caudicle.

**Distribution** — Known only from the Península de Osa in the southern Pacific region of Costa Rica.

**Habitat & Ecology** — An epiphyte in mature secondary and disturbed primary vegetation in tropical wet forest of south-eastern Costa Rica, at c. 100 m elevation. Individuals of the new species were found on fallen branches (possibly developing high in the tree or crown), along with several other orchid species. Flowering: July to September.

**Note** — *Echinosepala truncata* is characterized by the small plant habit and small flower size, the sparsely lanate ovary, the narrowly obovate, rounded synsepal, the spatulate petals,

rounded at apex, and the rectangular, truncate lip provided with a pseudoglenion extending in front into a groove running to the tip of the lip.

## DISCUSSION

The phylogenetic studies based on analysis of the nuclear internal transcribed spacer (nrITS) region by Pridgeon & Chase (2001), Pridgeon et al. (2001) and Pupulin et al. (2017), discussed by Pupulin et al. (2017, 2020) and Pupulin (2020), showed that species of *Echinosepala* form a highly supported clade. The early-diverging clade in the analysis comprises two species, *E. tomentosa* and *E. vittata* (Pupulin & M.A. Blanco) C.O. Morales & N. Villalobos, characterized by the small habit and flowers, and the lip with a pseudoglenion, a horseshoe-shaped, concave projection at the base of the lip callus, which produces a shiny and gelatinous exudate. In addition, both species are restricted to the Pacific watershed of Costa Rica. Sisters to *E. tomentosa*/*E. vittata* are two well-supported clades, the first grouping the remaining species of *Echinosepala* with a pseudoglenion (but with tall habit), and the second comprises those species with a plate-like, bare callus, which in turn are sister to the unresolved *E. stonei* (Luer) Pridgeon & M.W. Chase (also without a pseudoglenion).

Even though we do not have yet DNA sequences of *E. truncata* to include in the genus molecular phylogeny, its geographic provenance from the southern Pacific region of Costa Rica, its miniature habit and flower, and the pseudoglenion, strongly suggest a close relationship of *E. truncata* with *E. tomentosa* and *E. vittata*. A further molecular assessment of *E. truncata* might also support our hypothesis that the reduced vegetative size and the presence of a pseudoglenion are ancestral characters in the group (Pupulin 2020).

*Echinosepala truncata* is most similar to *E. tomentosa*, from which it is practically indistinguishable as to plant habit and size, as well as the size of the flower. Floral details, however, easily separate the two taxa, in particular the shape of the synsepal, the petals, and the lip. The synsepal of *E. truncata* is shorter (< 9 mm vs > 11 mm), narrowly obovate (vs elliptic), and rounded (vs subacute). The petals of *E. truncata* are distinctly spatulate from a relatively narrow obtuse base, and they

are rounded at the thickened apex. In contrast, *E. tomentosa* has narrowly oblanceolate, obliquely asymmetric, acute petals, with the central vein raised into a rounded keel (absent in *E. truncata*). The rectangular, truncate lip of *E. truncata* is very distinctive and unique in the group of species with a pseudoglenion at the base of the lip and easily distinguished from the elliptic, subacute lip of *E. tomentosa* (Fig. 2b).

## KEY TO THE SPECIES OF ECHINOSEPALA IN COSTA RICA

(updated from Pupulin et al. 2020)

1. Callus of the lip with an inverted U-shaped callus (pseudoglenion) at the base . . . . . 2
1. Callus of the lip with the basal callus smooth to rugulose 9
2. Inflorescences produced from the lower nodes of the stem . . . . . 3
2. Inflorescences produced from the apex of the stem . . . . . 4
3. Sheaths of the radical glabrous. Leaves ligulate, > 3 cm wide. Sepals shortly tomentose abaxially . . . . . *E. expolita*
3. Sheaths of the ramicauls hirsute. Leaves narrowly linear-lanceolate, < 2.5 cm wide. Sepals long-echinate abaxially . . . . . *E. pan*
4. Mature plants < 25 cm tall. Flowers small; synsepal < 12 mm long; lip up to 4 mm long . . . . . 5
4. Mature plants > 30 cm tall. Flowers large; synsepal > 15 mm long; lip > 7 mm long . . . . . 7
5. The synsepal abaxially with stiff hairs along the veins . . . . . *E. vittata*
5. The synsepal adaxially tomentose . . . . . 6
6. Synsepal elliptic, > 11 mm long, apically subacute. Petals oblanceolate; lip apex subacute . . . . . *E. tomentosa*
6. Synsepal narrowly obovate-oblong, < 9 mm long, apically rounded. Petals spatulate; lip apex truncate . . . . . *E. truncata*
7. Ovary and abaxial surface of the sepals tomentose; adaxial surface of sepals spiny . . . . . *E. expolita*
7. Ovary and abaxial surface of the flowers warty; adaxial surface of sepals verruculose . . . . . 8
8. Pedicel < 3 cm long; flowers purple-maroon; lip elliptic, purple-red, apex acute. . . . . *E. glenioides*
8. Pedicel > 6 cm long; flowers yellow-orange; lip sub rectangular, yellow, apex truncate . . . . . *E. longipedunculata*
9. Inflorescences produced from the lower nodes of the stem . . . . . 10
9. Inflorescences produced from the apex of the stem . . . . . 11
10. Dorsal sepal narrowly triangular-lanceolate . . . . . *E. lappiformis*
10. Dorsal sepal broadly oblong . . . . . *E. stonei*
11. Leaves ligulate. Flowers autogamous, mostly cleistogamous, rarely opening, adaxially warty, midlobe of lip ovate, narrower than the lip base . . . . . *E. alexandrae*
11. Leaves lanceolate. Flowers not autogamous, opening at anthesis, adaxially subglabrous, midlobe of lip transversely rectangular, as wide as the lip base . . . . . *E. isthmica*

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