

## The genus *Takulumena* (Orchidaceae, Epidendreae) in Colombia

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*Summary:* A discussion on the generic separateness of the orchid genus *Takulumena* is presented together with a revision of this taxon in Colombia. Six new species are described and illustrated. The information about the habitat and ecology of the novelties is provided. All new entities are placed within a key for identification of *Takulumena* species.

*Keywords:* biodiversity, Colombia, Neotropics, orchids, taxonomy, sp. nov.

The Neotropical genus *Epidendrum* is one of the largest among Orchidaceae. In the concept widely accepted it embraces over 1500 species distributed from Argentina to North Carolina, USA. *Epidendrum* species grow as epiphytes, lithophytes or terrestrials in a variable broad array of habitats including different types of lowland to montane forests, sand dunes, scrubs and páramo formations. Moreover, some species became adapted to ruderal habitats. It is obvious that such a wide spectrum of habitats resulted in enormous diversity of the species classified in *Epidendrum*.

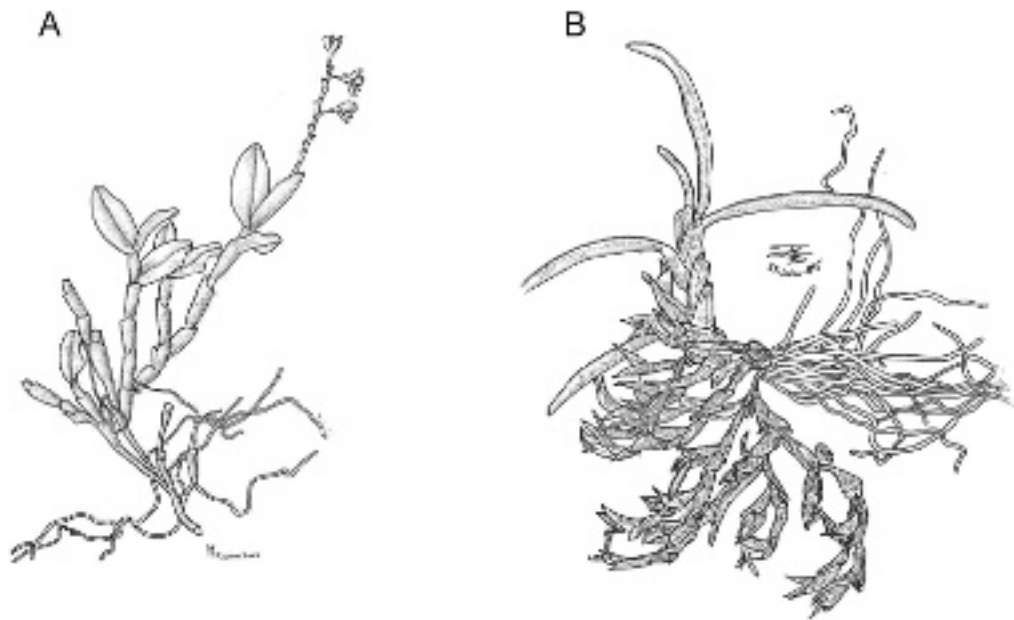
The stem of *Epidendrum* representatives is usually sympodial, cane-like, simple or branching, sometimes thickened and then often fusiform. In many species, however, single-leaved or many-leaved pseudobulbs can be found. There is a group of species which can produce so-called 'pseudomonopodial' stem, i.e. the primary stem is usually much longer and somewhat thicker, while the secondary stems are shorter, usually emerging from the upper half of the primary stem and often produce very short tertiary, flowering stems, which may be produced in succession, with new stems arising sub-apically (HÁGSATER et al. 2014). It is necessary to emphasize that this type of growth is not a monopodial in its strict sense. Leaves, one to numerous per stem, are distichous, blade is usually articulate, linear, ligulate, lanceolate, elliptic to ovate, membranous to fleshy. Inflorescence is apical, lateral or rarely appearing from an abortive stem and thus basal, 1-flowered, sub-corymbose, racemose to paniculate or pluri-racemose (racemose at first flowering, the producing new successive racemes from the same peduncle). The striking feature of *Epidendrum* species is high variability of vegetative parts with simultaneously relative uniformity of morphology of the flower and reproductive parts. Even though flowers are pollinated by moths, butterflies and birds. Species pollinated by hawkmoths have white to green, star-shaped flowers with deep nectaries, those pollinated by butterflies have a faint scent and are usually white to greenish or sometimes brightly coloured, hummingbird-pollinated species are often scentless and red-orange or purple coloured (ACKERMAN 1986). Some species are autogamous or cleistogamous. Generally, *Epidendrum* flowers are resupinate or not, often with lip facing the rachis, simultaneous or successive. Sepals are sub-equal, usually free, sometimes partially connate, spreading or reflexed, usually smooth. Lip is variously united to the gynostemium margins, usually with 2 basal globose calli, a pair of laminar calli ending in a narrow keel or a complex, tuberculate callus, occasionally without a callus, entire to deeply 3-lobed. Gynostemium is slender to thick, elongate or short, erect or slightly arched, dilated at the apex. Clinandrium-hood can be very short, as long to much

longer than the anther, variously fringed to entire on margins. Anther is erect, sub-incumbent or incumbent, motile to easily falling off, dorsiventrally flattened, ellipsoid to ovoid in outline, 4-chambered, rarely 2- or 8-chambered. Connective is usually elongate towards the apex forming a beak. Pollinia mostly 4, rarely 2 or 8, are gathered in two pairs, equal or unequal in size and form, obliquely ellipsoid, ovoid to clavate, laterally compressed, rather hard. Stigma is bilobed, both lobes are connate, sticky. Rostellum is erect, shelf-like, truncate or sinuous. Viscidium is single, usually longer than caudiculae, oblong to ovoid, dorsiventrally compressed, detachable, generally semi-liquid, transparent to whitish.

To unify the morphological definition of *Epidendrum*, several species groups were proposed as separate genera, i.e. *Amblostoma* Scheidw., *Epidanthus* L. O. Williams, *Lanium* (Lindl.) Lindl. ex Benth., *Nanodes* Lindl., *Neolehmannia* Kraenzl. and *Stenoglossum* Kunth. This fragmentation of *Epidendrum* was usually motivated by the leaves' form and arrangement on the stem, the number of pollinia and degree of fusion between lip and gynostemium. Their status was variously accepted by taxonomists (GARAY 1969; DUNSTERVILLE & GARAY 1979; DODSON 1982; MCLEISH et al. 1995; SZLACHETKO & MARGOŃSKA 2002), however, still most of them are recognized as synonym under *Epidendrum* (DRESSLER 1967; HÁGSATER 2008).

Unfortunately, sequencing of selected molecular markers and chromosome variability are not very helpful in this case as less than 3% of species of the genus have been examined so far in this respect (HÁGSATER & SOTO ARENAS 2005; PINHEIRO & COZZOLINO 2013) according to GenBank database. The only comprehensive study concerned subgenus *Amphyglottium* (PINHEIRO et al. 2009). The phylogenetic tree presented by HÁGSATER & SOTO ARENAS (2005) based on ribosomal ITS and plastid *matK* gene sequences is premature for any speculation concerning relations between species or group of species. The obvious conflict of the morphological studies results with the vestigial molecular data is observed in case of the genus *Takulumena*. It was proposed by SZLACHETKO et al. (2006) to accommodate plants with *Epidendrum*-like flowers but characterized by the monopodial type of growth. The species remind of small *Vanda*-like plants. They produce linear-lanceolate, conduplicate, canaliculate leaves and the basal inflorescence which is covered by scarious bracts. Their flowers opening in succession are non-resupinate with lip connate with the gynostemium in the basal half. The lip lamina is usually ornamented with a thick ridge in the apical third. The genus is not accepted by most orchidologists as it is nested in the *Epidendrum* clade. The only representative of *Takulumena* presented on Hągsater's phylogenetic tree is *Epidendrum sophronitoides* F. Lehm. & Kraenzl. The species form a sub-clade with *Epidendrum mancum* Lindl., but it is very difficult to explain it in the view of morphology as both species differ one from another essentially. *E. mancum* is sympodial plant with cylindrical or fusiform pseudobulbs with few leaves and apical, dense, multi-flowered inflorescence. Petals are prominently smaller than sepals and lip is inconspicuous, obscure. All of these features are in contrast with *Takulumena* representatives.

Regarding morphology the most similar to *Takulumena* appear to be species attributed to the genus *Kalopternix*. It was described by Garay & Dunsterville (in DUNSTERVILLE & GARAY 1976) with *Epidendrum deltoglossum* Garay & Dunst. as the generitype. The authors originally ascribed here two other species, *E. mantinianus* Rolfe and *E. sophronitis* Linden & Rchb.f., but probably much more taxa shared the same morphological characters. *Kalopternix* comprises species with sympodial type of growth, small, homoblastic pseudobulbs, apical non-articulated leaves and apical 1–3-flowered inflorescence. Flowers are essentially very similar to those of *Takulumena*,

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**Figure 1.** Habit of (A) *E. mancum* (HÁGSATER & SÁNCHEZ SALDAÑA 2009) and (B) *E. sophronitoides* (HÁGSATER & SÁNCHEZ SALDAÑA 2008).

but floral segments are glabrous, placed perpendicularly to the ovary and obconical gynostemium fused only basally to the lip. Molecular results (HÁGSATER & SOTO ARENAS 2005) indicate, however, that *Kalopternix*, represented by *Epidendrum serpens* Lindl., is not related to *Takulumena*. We can speculate that similarity in the flower morphology in two groups in question might be a result of convergence.

The question arises how to explain similarity in sequences of ITS and *matK* genes in species morphologically very different, as *E. mancum* and *E. sophronitoides* (Fig. 1). The simplest and easiest answer in such situation often used by molecular taxonomists is diversification caused by adaptation to different pollinators. We do not have information concerning pollination biology of both species. The flower morphology, however, can suggest transfer of pollinia by various agents.

First, it should be stressed that all systems based on the limited datasets do not reflect the evolution of the whole organisms, but just evolutionary modifications of the data in question. Using phylogenetic data to study speciation requires that potential limitations have to be kept in mind.

There are some phenomena which can usher in information noise that disturbs the topology of the phylogenetic tree. Portions of genomes can be transferred between closely and even very distantly related lineages via viral vectors (WON & RENNER 2003; BERGTHORSSON et al. 2004), fungi or plant parasites or insects. The problem of the incongruent trees produced by population genetic processes from true hybrid speciation are discussed in detail by LINDER & RIESEBERG (2004). At the species level, lineage sorting and recombination should create both gains and losses of gene lineages in extant taxa that have no specific correlation with the species network. Horizontal gene transfer as well as hybridization might be responsible for the topology of phylogenetic trees and puzzling position of some species. It is important that *Epidendrum mancum* and *E. sophronitoides* inhabit similar geographical regions and plant communities, i.e. Andean humid montane and



**Figure 2.** Distribution of *T. psilosepalum* (circle), *T. rhodovandoides* (square), *T. sophronitoides* (star) and *T. vazquezii* (triangle).

premontane forests, often growing together, which facilitates genes/genomes transfer. Until more detailed work on much more representative species of *Epidendrum* will be conducted, we suggest to treat molecular outcomes as preliminary.

The representatives of the genus were accommodated by Hágsater in the informal *Takulumena* group of *Epidendrum*. The same author described two new species, *E. rhodovandoides* Hágsater and *E. psilosepalum* Hágsater & E. Santiago A., within the group (HÁGSATER & SÁNCHEZ SALDAÑA 2008) – both were transferred to *Takulumena* three years later (SZLACHETKO et al. 2011). The number of species was elevated to seven by SZLACHETKO et al. (2011) who described three new species from Peru and Ecuador.

Species of *Takulumena* are distributed along the Andes from Peru to Colombia and Venezuela. They grow epiphytically in montane and high-montane cloud and elfin forests between 1800 and 3420 m a.s.l. Some populations were found growing on *Cavendishia* Lindl. and *Weinmannia* L. The occurrence of four *Takulumena* species has been reported from Colombia so far (HÁGSATER 2008): *T. psilosepalum*, *T. rhodovandoides*, *T. sophronitoides* and *T. vazquezii* (Fig. 2). The recent revision of the orchid material deposited in the National Colombian Herbarium [COL] revealed the existence of six distinctive *Takulumena* species which are described here as new.

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## Materials and methods

Dried herbarium specimens were examined according to standard procedures. Each studied sheet was photographed and data were taken from the labels. The morphology of the perianth segments and gynostemium was examined after having softened flowers in boiling water. Finally the measurements on the surface of each floral element were studied under a stereomicroscope.

## Description and taxonomy

### *Takulumena psilosepalum* (Hágsater & E. Santiago A.) Szlach. & Mytnik

Willdenowia 41 (2011): 298. – *Epidendrum psilosepalum* Hágsater & E. Santiago A., Icon. Orchid. 11 (2008): t. 1167.

**Type.** Colombia, Cauca, Caldera Chiriquí, Tierradentro, 2000 m, 27 Feb. 1883, Lehmann 2721 [G, holotype!].

Stem 2.5–4 cm long. Leaves 6–8, 2.1–4.5 cm long, 0.4–0.6 cm wide, coriaceous, linear, obtuse, minutely apiculate, margin entire, papillose. Inflorescence 1.5 cm long, 1-flowered, completely covered by bracts. Flowers reddish yellow-green. Floral bracts 7 mm long. Pedicel and ovary 5 mm long. Dorsal sepal 7–8 mm long, 3–3.5 mm wide, glabrous, ovate, acute, minutely apiculate, margins entire, spreading, 5-nerved. Petals 6.8 mm long, 1.8 mm wide, narrowly lanceolate, apex short acuminate, 3-nerved, ventral surface densely pubescent, margins spreading, ciliate. Lateral sepals 7–8 mm long, 3–3.5 mm wide, glabrous, obliquely ovate, acute, minutely apiculate, margins entire, spreading, 4-nerved. Lip 5.5 mm long, 7 mm wide, fleshy, broadly triangular, base truncate, the sides erect, embracing the apex of the column without covering it; disc ecallose, with a low, rounded keel along the apical half of the lip, the surface of the lip near the margin densely pubescent, margin spreading, ciliate. Gynostemium 3 mm long, thick, arching upwards.

### *Takulumena rhodovandoides* (Hágsater) Szlach. & Mytnik

Willdenowia 41 (2011): 299. – *Epidendrum rhodovandoides* Hágsater, Icon. Orchid. 11 (2008): t. 1172.

**Type.** Colombia, Antioquia, 1 km antes del puerto del Boquerón del Cerro del Padre Amaya, 2380 m, 21 Apr. 1983, Hágsater et al. 7246 [AMO, holotype].

Stem 1–2 cm long. Leaves 6–11, 1.2–5 cm long, 0.3–0.6 cm wide, succulent-coriaceous, linear-subulate, canaliculated, subacute, margin minutely papillose. Inflorescences up to 2 cm long, 1-flowered, made of successive segments with various internodes, each internode provided with an ovate bract. Flowers cardinal-red to reddish magenta. Floral bracts 6–7 mm long. Pedicel and ovary 4.5 mm long. Dorsal sepal 4–5.5 mm long, 2.5–3 mm wide, generally glabrous (rarely with a few short trichomes on the ventral surface), narrowly ovate, subacute, 3-nerved, margin entire, spreading. Petals 3.7 mm long, 1.3 mm wide, narrowly lanceolate, subacute, 1-nerved, with a few, short trichomes on the ventral surface, margin short ciliate, spreading. Lateral sepals 4–5.5 mm long, 2.5–3 mm wide, fleshy, generally glabrous (rarely with a few short trichomes on the ventral surface), obliquely united to the basal  $\frac{2}{3}$  of the column, triangular-ovate, acute, short aristate, oblique 3-nerved, margin entire, spreading. Lip 3 mm long, 4 mm wide, subcordiform, fleshy, apex truncate, rounded, margin short and scarcely ciliate, the sides erect forming a spoon;

disc ecallose, with a prominent, subapical, rounded keel. Gynostemium about 2 mm long, thick, slightly arching upwards.

***Takulumena sophronitoides* (F. Lehm. & Kraenzl.) Szlach.**

Orchidee (Hamburg) 57/3 (2006): 326. – *Epidendrum sophronitoides* F. Lehm. & Kraenzl., Bot. Jahrb. Syst. 26 (1899): 464.

**Type** (SANTIAGO & HÁGSATER 2008). Colombia, Cauca, Forest above Inzá, 3000–3200 m, F. C. Lehmann 6245 [lectotype: K! (mixed sheet); isolectotype: K (mounted singly)].

Stem 2–4 cm long. Leaves 7–12, 5.7–7.5 cm long, 0.6–0.9 cm wide, coriaceous, linear to linear-lanceolate, obtuse, minutely apiculate, rugose, margin entire, papillose. Inflorescence 5–9 cm long, 1-flowered, flowering during several years, completely covered by bracts. Flowers greenish yellow to greenish-brown. Floral bracts 9–14 mm long. Pedicel and ovary 3–5 mm long. Dorsal sepal 10–14 mm long, 3–5 mm wide, glabrous, triangular-ovate, acuminate, 5-nerved, margins entire, spreading. Petals 10–11.5 mm long, 2.8–3.3 mm wide, narrowly lanceolate, apex short acuminate, 3-nerved, glabrous, margins ciliate, spreading. Lateral sepals 12–16 mm long, 4.5–6 mm wide, glabrous, obliquely oblong to triangular, falcate, acuminate, 5-nerved, margins entire, spreading. Lip 8.5–10 mm long, 10–10.5 mm wide, ovate-cordiform, base slightly cordate, obtuse at the apex, margin spreading, ciliate, sides erect, embracing the apex of the column without covering it; disc ecallose, with a low, rounded keel that disappears at the apex of the lip. Gynostemium 5–6 mm long, thick, straight.

***Takulumena vazquezii* Szlach., Mytnik, Romowicz & Marg.**

Orchidee (Hamburg) 57/3 (2006): 327. – *Epidendrum dasyanthum* Hágsater, Icon. Orchid. 11 (2008): t. 1116.

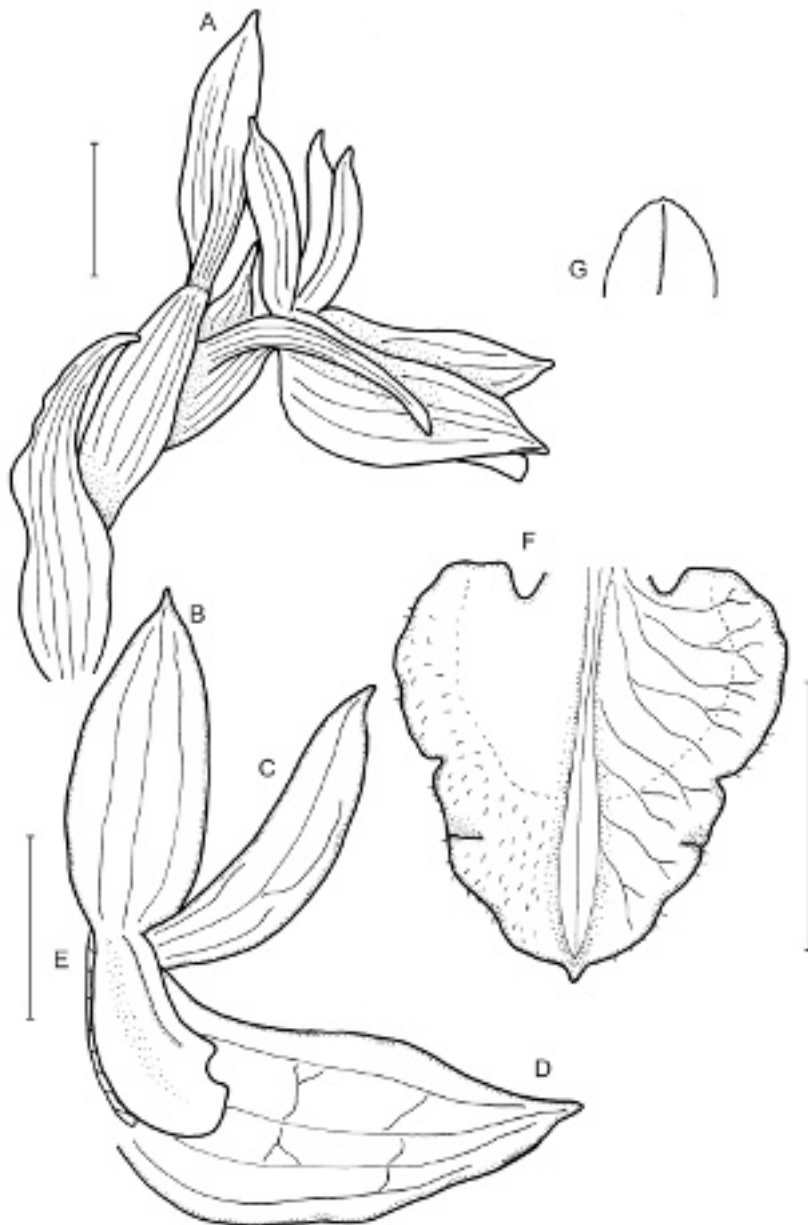
**Type.** Ecuador, Circum Lojam, in silva montana humile, epiphytus in ramis muscosis, Nov. 2005, Szlachetko et al. s.n. [UGDA, holotype!].

Stem 1.5–6 cm long. Leaves 6–16, coriaceous, 1–7.5 cm long, 0.4–0.6 cm wide, linear, obtuse, minutely apiculate, rugose, margin entire, papillose. Inflorescence up to 5 cm long, 1-flowered, flowering during several years, completely covered by bracts, made of successive segments, branching. Floral bracts 9–10 mm long. Flowers pink-salmon to reddish, the lip disc darker. Pedicel and ovary 6 mm long. Dorsal sepal 9–13 mm long, 4–6 mm wide, narrowly ovate, acute to acuminate, 5-nerved, ventral surface densely pubescent, margins entire, spreading. Petals 9–11 mm long, 2.5–3.5 mm wide, narrowly lanceolate, apex acute to acuminate, 3-nerved, ventral surface densely pubescent, margins spreading, ciliate. Lateral sepals 9–13 mm long, 4–6 mm wide, obliquely triangular-ovate, acute to acuminate, ventral surface densely pubescent, 4-nerved, margins entire, spreading. Lip 7–10 mm long, 6–9 mm wide, cordiform to subtriangular, fleshy, apex triangular-rounded, the sides erect, embracing the apex of the column without covering it; disc ecallose, with a low-rounded keel running down the middle, ventral surface densely ciliate towards the margins. Gynostemium 4–5 mm long, thick, straight.

***Takulumena boyacaensis* Szlach. & Kolan., sp. nov. (Fig. 3)**

**Diagnosis.** Species similar to *T. kuelpense*, from which it differs by the cordate lip base, ciliate lip lamina and minutely dentate leaf apex.

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**Figure 3.** *Takulumena boyacaensis*. A – arrangement of the inflorescence; B – dorsal sepal; C – petal; D – lateral sepal; E – gynostemium; F – lip; G – leaf apex. Scale bars = 5 mm.

**Type.** Colombia, Boyacá, Aquitania-Toquilla. Páramo. Rio Cusiana. En bosque primario entresacado, 2800 m, 8 Mar. 1980, H. Bernal M. & G. Chavarro 304 [COL, holotype!, COL, isotypes! UGDA - drawing of holotype!].

**Description.** Stem 7–9 cm long. Leaves numerous, up to 9 cm long, 0.7 cm wide, linear-lanceolate, canaliculate, apex minutely dentate. Inflorescence about 5 cm long, with 2–3 branches. Floral bracts about 12 mm long. Pedicel and ovary 8 mm long. Tepals hispid on the inner side. Dorsal sepal 9.5 mm long, 3.3 mm wide, oblong-ovate, apiculate, obtuse, 3-nerved. Petals 7.5 mm long, 2.3 mm wide, ligulate, shortly acuminate, obtuse, 1-nerved. Lateral sepals 10.5 mm long,



**Figure 4.** Distribution of new *Takulumena* species in Colombia: *T. boyacaensis* (circle), *T. camargoi* (square), *T. uribei* (triangle), *T. glabrilabia* (star), *T. hernandoii* (diamond), *T. kapulerii* (cross).

5 mm wide, oblong-ovate, apiculate, obtuse, 4-nerved. Lip 8 mm long, 7.5 mm wide, cordate at the base, obovate in outline, somewhat 3-lobed, apiculate and obtuse at the apex; margins and lamina ciliate, disc ornamented with a thick ridge running along the middle nerve, widened in the apical part. Gynostemium 5 mm long.

**Etymology.** In reference to the Colombian Department of Boyacá where type specimens have been collected.

**Distribution and ecology.** So far this species is only known from Eastern Andean Cordillera, Colombian department of Boyacá (Fig. 4). It was found growing in the low high-Andean forest at the altitude of about 2800 m. Flowering in March.

**Notes.** The species resembles *T. kuelapense* (Fig. 5), from which it is distinguished by the cordate lip base (vs base truncate), the ciliate lip lamina (vs lip ciliate only along the margins), the oblong-ovate lateral sepals (vs lateral sepals triangular-ovate) and minutely dentate leaf apex (vs lip apex shortly apiculate).

***Takulumena camargoi* Szlach. & Kolan., sp. nov. (Fig. 6)**

**Diagnosis.** Species similar to *T. psilosepalum*, but with much smaller flowers, glabrous lip lamina and truncate lip apex.



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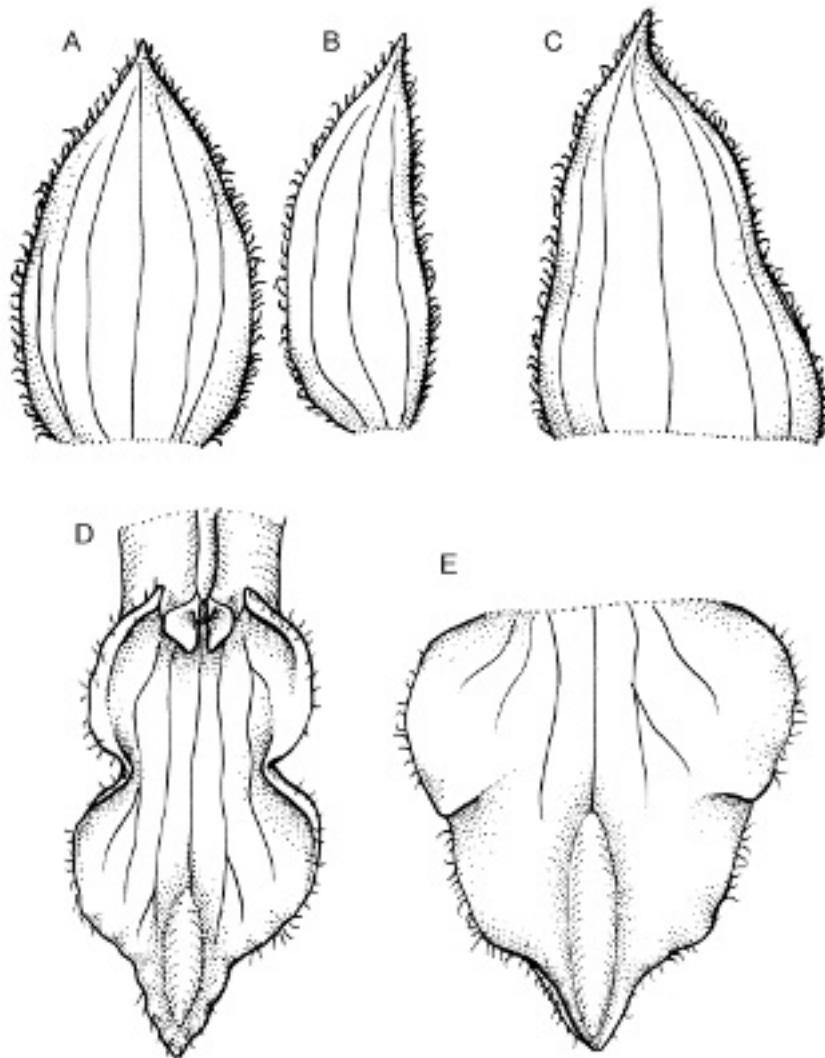
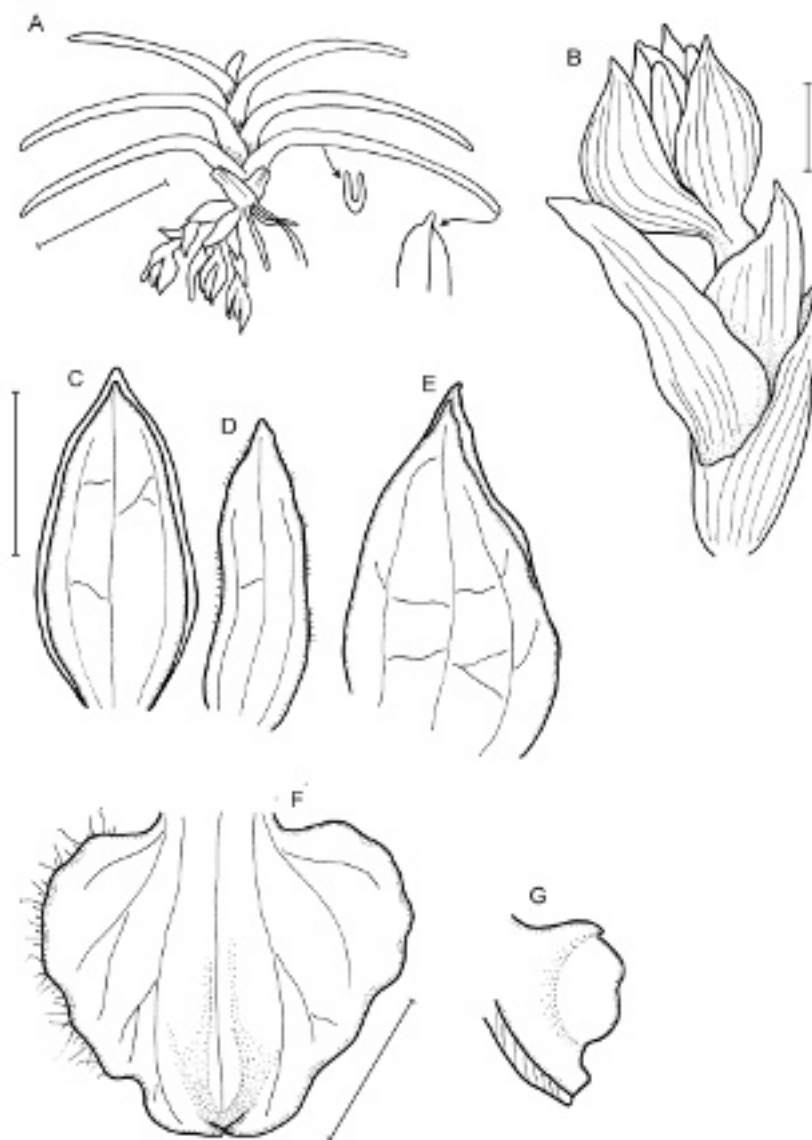


Figure 5. *Takulumena kuelapense* - dissected perianth. A – dorsal sepal; B – petal; C – lateral sepal; D – lip, natural position; E – lip, flattened (SZLACHETKO et al. 2011).

**Type.** Colombia, Antioquia, Cecednia de Santa Rosa de Osos, vegetación perturbada a orillas de la carretera, 2170 m, 22 Mar. 1979, L. A. Camargo G. 7107 [COL, holotype!; COL, isotype!; UGDA! - drawing of holotype!].

**Description.** Stem about 1.7 cm long. Leaves 6–10, up to 3.5 cm long, 0.5 cm wide, rather thick, linear-lanceolate, canaliculate, apex apiculate. Inflorescence 1 cm long, 1–2-flowered, probably producing successively opening flowers over years. Flowers purple. Floral bracts about 6 mm long. Pedicel and ovary 6 mm long. Dorsal sepal 4.3 mm long, 1.8 mm wide, oblong-ovate, apiculate, obtuse, 3-nerved. Petals 3.8 mm long, 1 mm wide, ligulate, shortly apiculate, obtuse, sparsely and shortly ciliate on margins, 3-nerved. Lateral sepals 4 mm long, 2.3 mm wide, triangular-ovate, apiculate, obtuse, 3-nerved. Lip 4 mm long, 4.6 mm wide, truncate at the base, broadly obovate in outline, apex truncate; margins unevenly ciliate, disc ornamented with a thick ridge in the lip apical third. Gynostemium 1.5 mm long.



**Figure 6.** *Takulumena camargoi*. A – habit and leaf details. Scale bar = 2 cm. B – fragment of the inflorescence; C – dorsal sepal; D – petal; E – lateral sepal; F – lip; G – gynostemium. Scale bars = 2 mm.

**Etymology.** Dedicated to L. A. Camargo G., collector of the type specimens.

**Distribution and ecology.** Known exclusively from the Central Andean Cordillera in Colombian department of Antioquia (Fig. 4). It was found growing epiphytically on *Cavendishia* (Ericaceae) in the disturbed area on the road edge at about 2170 m. Flowering in March.

**Notes.** The species resembles *T. psilosepalum* (Fig. 7), from which it differs by the much smaller flowers (sepals 4–4.3 mm long in *T. camargoi* vs sepals 7–8 mm long in *T. psilosepalum*), the glabrous lip lamina (vs densely pubescent near the margins) and truncate lip apex (vs apiculate). From *T. rhodovandoides* (Hágsater) Szlach. & Mytnik the new species is distinguishable by the floral bract subequal in length to the ovary (vs floral bracts much longer than ovary), the lip being longer than wide (4 × 4.6 mm vs 3 × 4 mm) and truncate lip base (vs base cordate).

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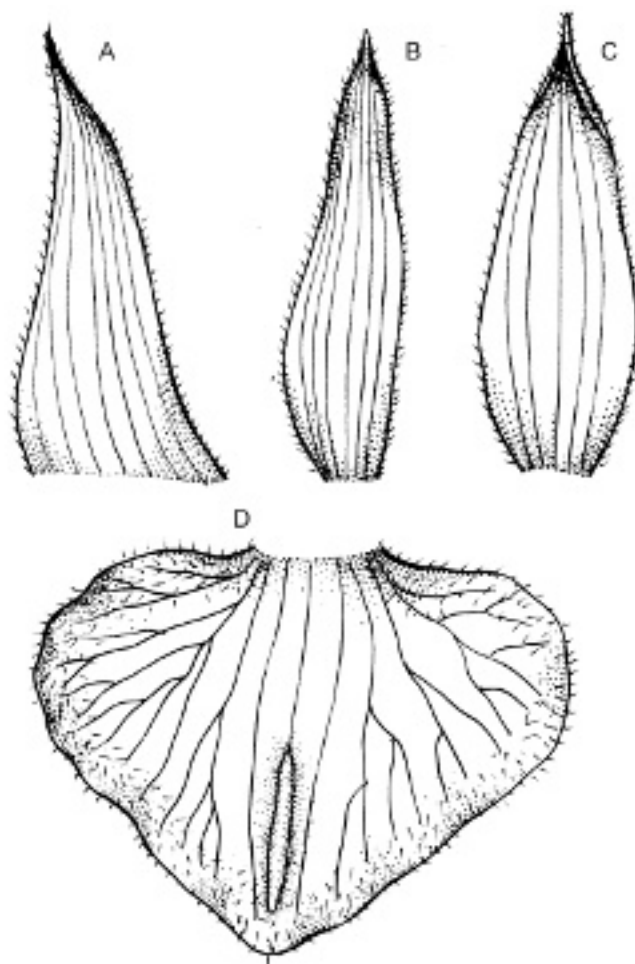


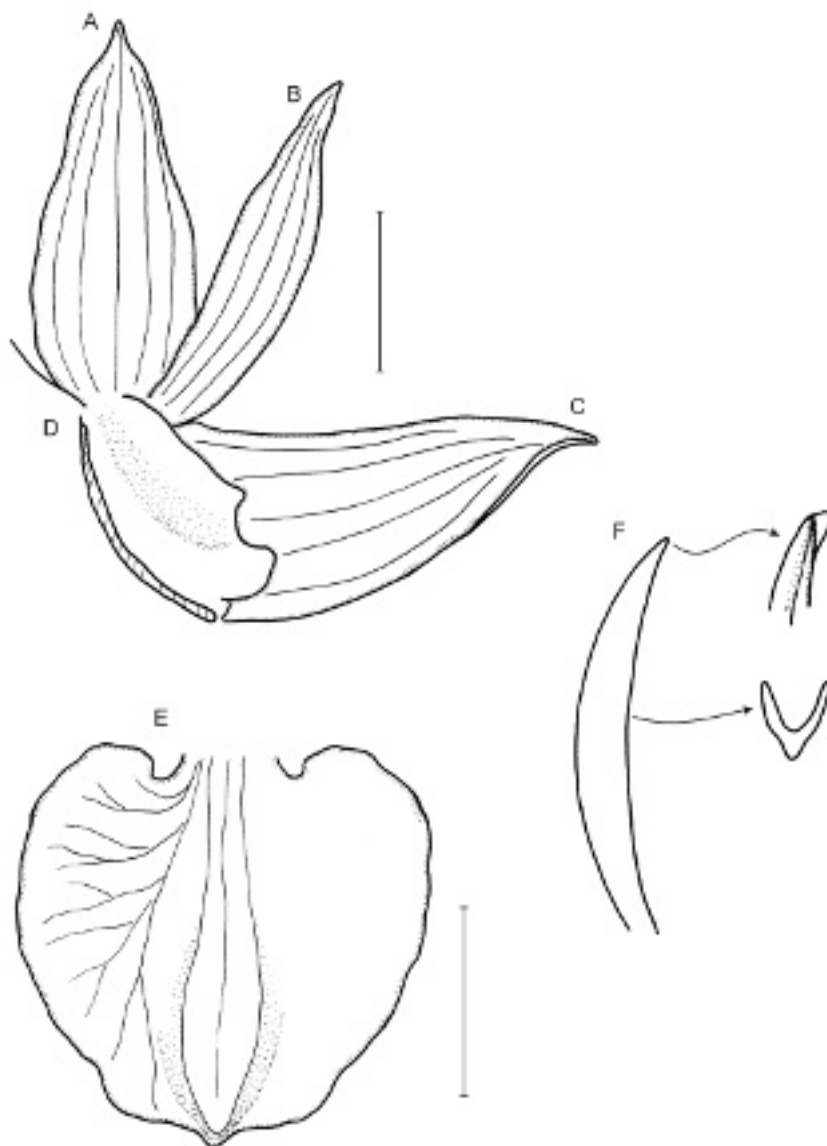
Figure 7. *Takulumena psilosepalum* - dissected perianth. A – lateral sepal; B – petal; C – dorsal sepal; D – lip (SZLACHETKO et al. 2011).

*Takulumena uribei* Szlach. & Kolan., sp. nov. (Fig. 8)

**Diagnosis.** Species similar to *T. rhodovandoides* and *T. sophronitoides*, but with glabrous lip and apiculate, glabrous leaf apex.

**Type.** Colombia, Cauca, Bosque de la Ceja, entre Cocnuco y Paletará, 3200 m, 25 Aug. 1961, L. Uribe Uribe 3837 [COL!, holotype!; UGDA! - drawing of holotype].

**Description.** Stem about 3.5 cm long. Leaves 9, up to 4.5 cm long, 0.55 cm wide, rather thin, linear-lanceolate, canaliculate, apex obtuse. Inflorescence 2.5 cm long, 2-flowered. Flowers grayish yellow. Floral bract about 14 mm long, long acute, apex falcate. Pedicel and ovary 8 mm long. Dorsal sepal 12.2 mm long, 4.7 mm wide, oblong-ovate, apiculate, obtuse, 5-nerved. Petals 11.5 mm long, 2.7 mm wide, obliquely oblong-lanceolate, obtuse, papillate on margins, 3-nerved. Lateral sepals 13 mm long, 5.5 mm wide, obliquely oblong-ovate, obtuse, 5-nerved. Lip 10.5 mm long and wide, sub-cordate at the base, obovate-sub-orbicular in outline, apex truncate, with a small, obtuse apicule; margins glabrous, lamina ornamented with a thick ridge in the lip apical third, glabrous. Gynostemium 6 mm long.



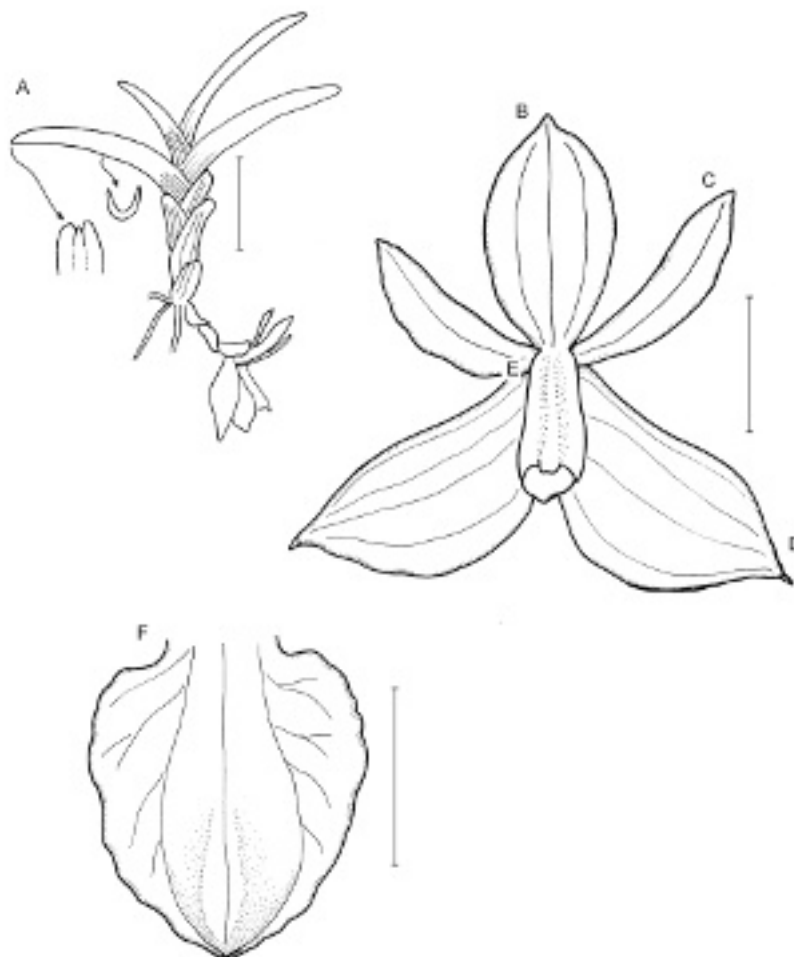
**Figure 8.** *Takulumena uribei*. A – dorsal sepal; B – petal; C – lateral sepal; D – gynostemium; E – lip (various view); F – leaf details. Scale bars = 5 mm.

**Etymology.** Dedicated to the collector of the type specimen, Antonio Lorenzo Uribe Uribe (1900–1980), Jesuit priest, botanist and zoologist, with particular interest in Lepidoptera and Coleoptera.

**Distribution and ecology.** Known exclusively from the Central Andean Cordillera in Colombian department of Cauca (Fig. 4). It was found in the high-montane forest at about 3200 m. Flowering in August.

**Notes.** Species similar to *T. rhodovandoides* and *T. sophronitoides*, but with completely glabrous lip (vs lip margins ciliate) and apiculate, glabrous leaf apex (vs apex papillose). From the former it also differs by the larger flowers (sepals over 12 mm long in *T. uribei* vs sepals up to 5 mm

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**Figure 9.** *Takulumena glabrilabia*. A – habit and leaf details. Scale bar = 2 cm. B – dorsal sepal; C – petal; D – lateral sepal; E – gynostemium; F – lip. Scale bars = 5 mm.

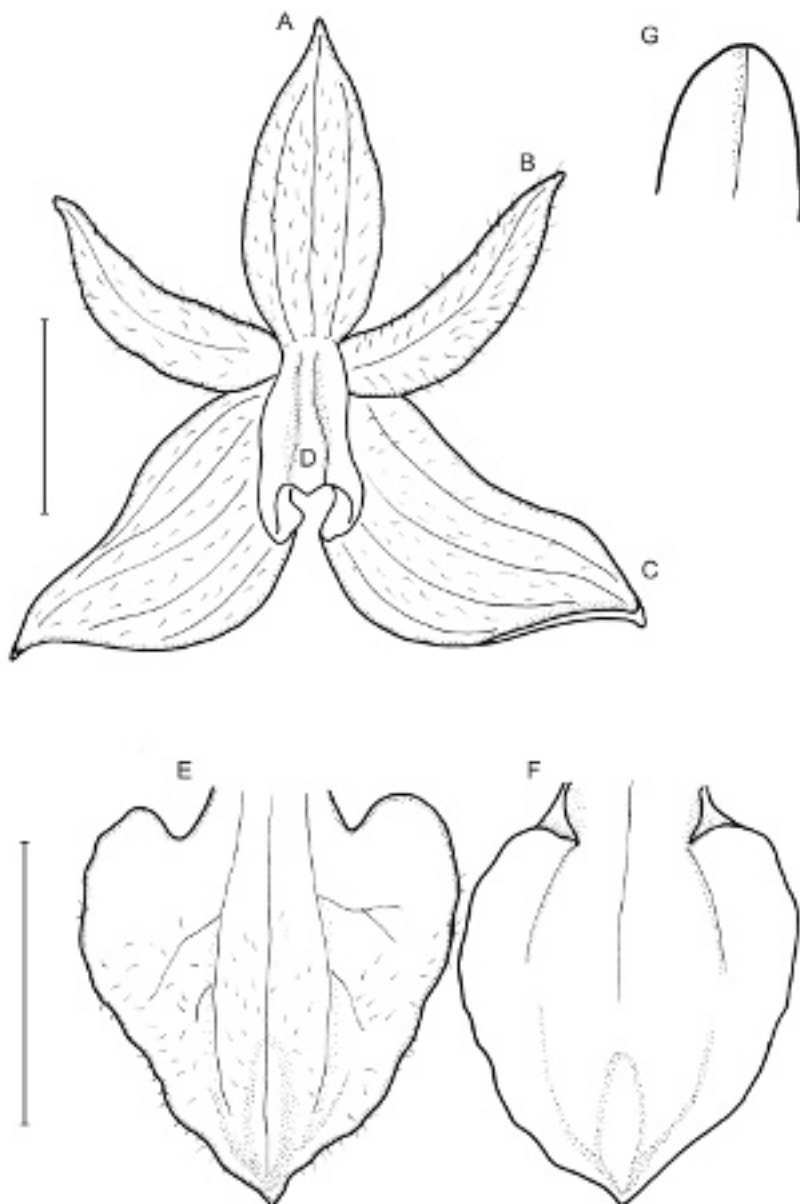
in *T. rhodovandoides*) and subcordate lip base (vs base truncate). The similar lip is observed in *T. tungurahuae* Szlach. & Mytnik, but its tepals are long-acuminate and lip is ornamented with papillate, thickened keel along the apical part of the mid-nerve. *T. uribei* Szlach. & Kolan. differs from this species by the ligulate sepals and long lip claw.

***Takulumena glabrilabia* Szlach. & Kolan., sp. nov. (Fig. 9)**

**Diagnosis.** Species similar to *T. vasquezii*, but with glabrous sepals and glabrous lip.

**Type.** Colombia, Cundinamarca, Chocontá. El Sigsa, parte alta de La Represa, 2700–2900 m, 14 Jan. 1962, H. García-Barriga 17385 [COL, holotype!, AMES, COL!, NY, isotypes; UGDA!-drawing of holotype].

Stem up to 3 cm long. Leaves 5, up to 4 cm long, 0.38 cm wide, thin, linear-lanceolate, canaliculate, apex shortly 3-dentate. Inflorescence 1.2 cm long, 1-flowered, encloded with 3–4 bracts. Flowers purple. Floral bract about 4.5 mm long. Pedicel and ovary 4.5 mm long. Dorsal sepal 8.5 mm long, 4 mm wide, oblong-elliptic, apiculate, obtuse, 3-nerved. Petals 7.5 mm long, 2.2 mm wide,



**Figure 10.** *Takulumena bernandoi*. A – dorsal sepal; B – petal. C – lateral sepal; D – gynostemium; E, F – lip (various view); G – leaf apex. Scale bars = 5 mm.

obliquely oblong-oblancheolate, obtuse, ciliate on margins, 1-nerved. Lateral sepals 9 mm long, 4.2 mm wide, obliquely oblong-ovate, acute, 5-nerved. Lip 6.2 mm long, 5.5 mm wide, truncate at the base, obovate in outline, apex obtuse; margins glabrous, lamina ornamented with a thick ridge in the lip apical third, glabrous. Gynostemium 4.6 mm long.

**Etymology.** In reference to the presence of glabrous lip.

**Distribution and ecology.** Known only from the Eastern Cordillera of the Andes, Colombian department of Cundinamarca (Fig. 4). It was found at altitudes of about 2700–2900 m growing on *Weinmannia* (Cunoniaceae). Flowering in January.

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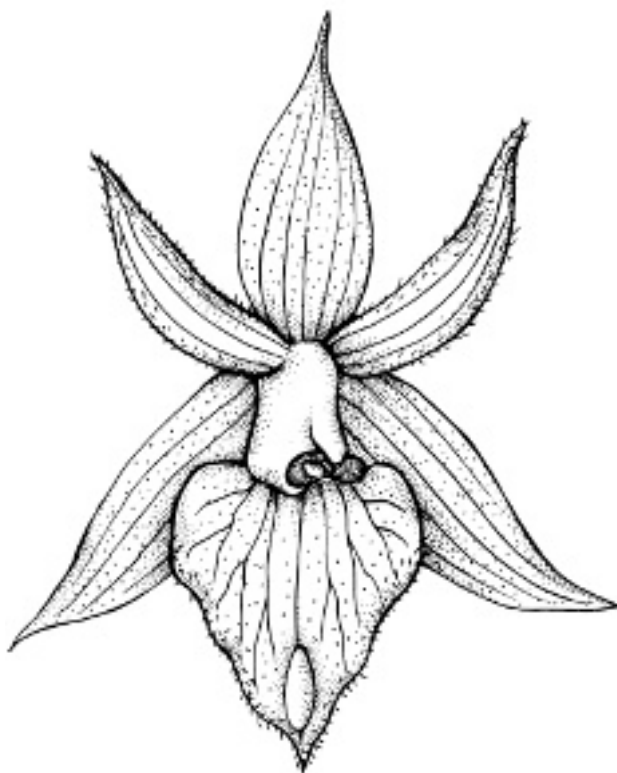


Figure 11. *Takulumena wieslawii*. Flower (SZLACHETKO et al. 2011).

**Notes.** Species similar to *T. vasquezii* in the shape of perianth segments, but sepals and lip are glabrous (vs tepals and lip ciliate). From *T. rhodovandoides* it differs by the glabrous lip (vs lip ciliate on margins) and glabrous leaf apex (vs leaf apex papillose).

*Takulumena hernandoii* Szlach. & Kolan., sp. nov. (Fig. 10).

**Diagnosis.** Species similar to *T. wieslawii*, but with rounded leaf apex and branching inflorescence.

**Type.** Colombia, Cundinamarca, El Sisga, carretera a Chocontá. A 2 K al N del Puente, 2800 m, 12 Oct. 1972, H. García-Barriga 20354 [COL, holotype!; UGDA! - drawing of holotype].

**Description.** Stem 6 cm long. Leaves 10, up to 6.5 cm long, 0.4 cm wide, linear-lanceolate, canaliculate, apex rounded. Inflorescence 8 cm long, branching, 7–8 flowers per branch. Flowers purple with shiny lip, tepals glandular externally. Floral bract about 7.5 mm long, long-acuminate, apex verrucose. Pedicel and ovary 6 mm long. Dorsal sepal 8.5 mm long, 3.6 mm wide, oblong-elliptic, apiculate, obtuse, 3-nerved, margins glabrous, inner side covered with short hairs. Petals 7 mm long, 2 mm wide, obliquely oblong-oblancheolate, obtuse, hispid, 1-nerved. Lateral sepals 8.5 mm long, 4 mm wide, obliquely ovate, obtuse, ciliate on the inner side, 5-nerved. Lip 7.5 mm long, 6 mm wide, truncate at the base, obovate-cordate in outline, rounded basal auricles upcurved in the natural position, apex obtuse; margins and lamina ciliate, disc ornamented with a thick ridge in the lip apical third, glabrous. Gynostemium 4.3 mm long.

**Etymology.** Dedicated to Hernando Garcia-Barriga (1913–2005), an eminent ethnobotanist and collector of Colombian plants.

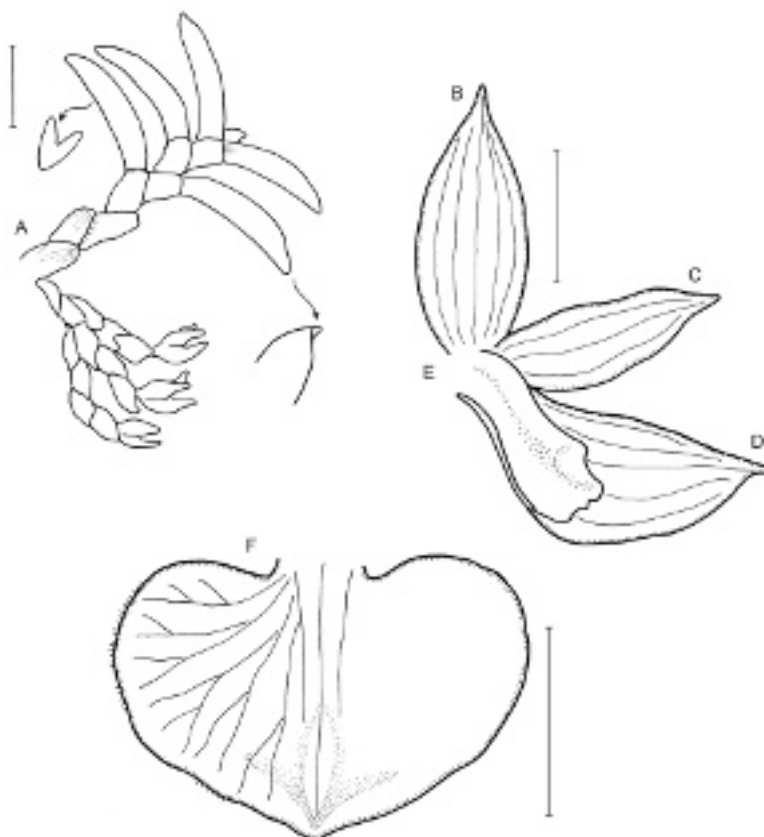


Figure 12. *Takulumena kapulerii*. A – habit and leaf details. Scale bar = 2 cm. B – dorsal sepal; C – petal; D – lateral sepal; E – gynostemium; F – lip. Scale bars = 2 mm.

**Distribution and ecology.** Known only from the Eastern Cordillera of the Andes, Colombian department of Cundinamarca (Fig. 4). It was found growing epiphytically at the altitude of about 2800 m. Flowering in October.

**Notes.** Species similar to *T. wieslawii* (Fig. 11), but the leaf apex is rounded (vs apiculate) and the inflorescence is branching.

***Takulumena kapulerii* Szlach. & Kolan., sp. nov. (Fig. 12)**

**Diagnosis.** Species similar to *T. psilosepalum*, but with glabrous leaf apex and sepals and acute floral bracts.

**Type.** Colombia, Cauca, To Paletará in direction of hacienda Valencia, Aug. 1964, A. Kapuler & V. Hascall 208 [COL, holotype!; COL, isotype!].

**Description.** Stem up to 6 cm long. Leaves 6–7, up to 3.5 cm long, 0.7 cm wide, thick, linear-lanceolate, canaliculate, apex rounded. Inflorescence up to 7.5 cm long, branching, many-flowered. Flowers rose or yellow. Floral bract about 8 mm long, acute. Pedicel and ovary 5 mm long. Dorsal sepal 10 mm long, 4.1 mm wide, oblong-elliptic, apiculate, obtuse, 5-nerved, glabrous. Petals 8 mm long, 2.3 mm wide, obliquely oblong-elliptic, obtuse, 3-nerved, ciliate on margins. Lateral sepals 10 mm long, 4.8 mm wide, obliquely ovate, apiculate, obtuse, glabrous,



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5-nerved. Lip 7.5 mm long, 10 mm wide, subtruncate at the base, broadly triangular-cordate in outline, apex obtuse; margins ciliate, disc ornamented with a thick ridge in the lip apical third, papillate. Gynostemium 5.5 mm long.

**Etymology.** Dedicated to Alan M. Kapuler, the collector of the type specimen and a seed breeder at Peace Seeds in Corvallis, Oregon, USA.

**Distribution and ecology.** Known exclusively from the Central Andean Cordillera in Colombian department of Cauca (Fig. 4). Flowering in August.

**Notes.** This species resembles *T. psilosepalum* (Fig. 7), but its leaf apex is glabrous (vs papillose), the sepals are glabrous (vs ciliate), the petals are ciliate only on margins (vs petals pubescent on inner side) and the floral bracts are acute (vs acuminate).

Key to species of *Takulumena*

- |     |  |                          |
|-----|--|--------------------------|
| 1   | Petals glabrous .....  | <i>T. tungurahuae</i>    |
| 1*  | Petals ciliate, papillate or hispid .....  | 2                        |
| 2   | Lip glabrous .....   | 3                        |
| 2*  | Lip ciliate at least along the margins .....   | 4                        |
| 3   | Lip 6.2 × 5.5 mm, truncate at the base, obovate in outline, apex obtuse .....  | <i>T. glabrilabia</i>    |
| 3*  | Lip 10.5 × 10.5 mm, sub-cordate at the base, obovate-sub-orbicular in outline, apex truncate, with a small, obtuse apicule ..... | <i>T. uribei</i>         |
| 4   | Sepals glabrous .....  | 5                        |
| 4*  | Sepals ciliate or hispid .....   | 8                        |
| 5   | Lip base cordate .....   | 6                        |
| 5*  | Lip base truncate .....  | 7                        |
| 6   | Lip obovate in outline, somewhat 3-lobed, slightly longer than wide .....  | <i>T. boyacaensis</i>    |
| 6*  | Lip obovate-cordate, wider than long .....   | <i>T. sophronitoides</i> |
| 7   | Leaf apex papillose, lip wider than long, with cordate base .....  | <i>T. rhodovandoides</i> |
| 7*  | Leaf apex glabrous, lip longer than wide, with truncate base .....   | <i>T. camargoii</i>      |
| 8   | Lip somewhat 3-lobulate, squeezed near the middle .....  | <i>T. kuelapense</i>     |
| 8*  | Lip entire, not squeezed .....   | 9                        |
| 9   | Inflorescence branching .....  | 10                       |
| 9*  | Inflorescence simple .....   | 11                       |
| 10  | Lip 7.5 × 6 mm, obovate-cordate .....  | <i>T. hernandoii</i>     |
| 10* | Lip 7.5 × 10 mm, broadly triangular-cordate in outline .....   | <i>T. kapulerii</i>      |
| 11  | Lip elliptic in outline .....  | <i>T. vasquezii</i>      |
| 11* | Lip triangular to cordate-triangular in outline .....  | 12                       |
| 12  | Lip longer than wide .....   | <i>T. wieslawii</i>      |
| 12* | Lip wider than long .....  | <i>T. psilosepalum</i>   |

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