



## ***Salvia guaneorum* (Labiatae), a new species from the Chicamocha Canyon, Colombia**

JOSÉ LUIS FERNÁNDEZ-ALONSO

Real Jardín Botánico-CSIC, Consejo Superior de Investigaciones Científicas, Plaza de Murillo 2, 28014 Madrid, Spain.  
Email: [jlfernandeza@rjb.csic.es](mailto:jlfernandeza@rjb.csic.es)

### **Abstract**

A new species of *Salvia* subgen. *Calosphace* from the Chicamocha Canyon, in the Eastern Cordillera of Colombia is described and illustrated. The morphological affinities and putative relatives with other Colombian species of the sections *Angulatae* and *Longipes* are discussed.

**Key words:** Chicamocha, Neotropic, *Salvia* sect. *Angulatae*, *Salvia* sect. *Longipes*, *Salvia* subgen. *Calosphace*

### **Resumen**

Se describe e ilustra una especie nueva de *Salvia* subgen. *Calosphace*, procedente del Cañón del Chicamocha, en la Cordillera Oriental de Colombia. Se discuten sus afinidades morfológicas y posible relación con otras especies colombianas de las secciones *Angulatae* y *Longipes*.

**Palabras clave:** Chicamocha, Neotrópico, *Salvia* sect. *Angulatae*, *Salvia* sect. *Longipes*, *Salvia* subgen. *Calosphace*

### **Introduction**

The cosmopolitan genus *Salvia* L., with about 1000 species, is the largest of the family Labiatae. Of the four traditionally recognized subgenera in *Salvia* (Benth 1876), the largest, with about 540 species, is the subgenus *Calosphace* Benth. It is a predominantly tropical group, restricted to the New World, which according to some phylogenetic analyses this group seem to be monophyletic (Epling 1936, 1939, Harley *et al.* 2004, Walker *et al.* 2004, Walker & Systma 2007). In Colombia the genus *Salvia* is represented by at least 88 recognized taxa of herbs and shrubs, and is also the most diverse genus of Colombian Labiatae (Fernández-Alonso *et al.* 2003, 2009, Fernández-Alonso 2012b).

In the last decade some work was carried out on the Colombian species of *Salvia*, dealing with various taxonomic and chorological novelties and some cases of natural hybridization, mainly in the sections *Flexuosae* (Epling) Epling, *Longipes* Epling, *Rubescentes* (Epling) Epling, *Angulatae* (Epling) Epling, *Purpureae* (Epling) Epling, *Siphonantha* (Epling) Epling and *Tomentellae* (Epling) Epling of the subgenus *Calosphace* (Fernández-Alonso 1995, 2002, 2003a, b; 2006, 2008a, b). Recent specimen collections in some unexplored areas of the basin of the river Chicamocha (Chicamocha Canyon), included some undescribed taxa of Labiatae are currently being studied (Fernández-Alonso 2010, 2012a). In this work, I propose a new species of *Salvia* that is related to some Colombian taxa of the section *Longipes* and *Angulatae*.

### **Material examined**

The material for this new species was collected in an unexplored region of Santander Department, Colombia during the course of bioprospecting for essential oils carried out with the National University of Colombia (Fernández-Alonso & Chacón 2012). This appears to be the first known collection of this plant and there is not similar

collections in the revised herbaria that could be assigned to this new species. All collected samples have been deposited in the Colombian National Herbarium (COL) and in many cases a duplicate in FMB, HUA, MA and UIS. This present study used samples deposited in MA and COL herbaria and in various different Colombian herbaria visited. Visits were also made or material was obtained on loan or gift for identification from AAU, MEXU and MO.

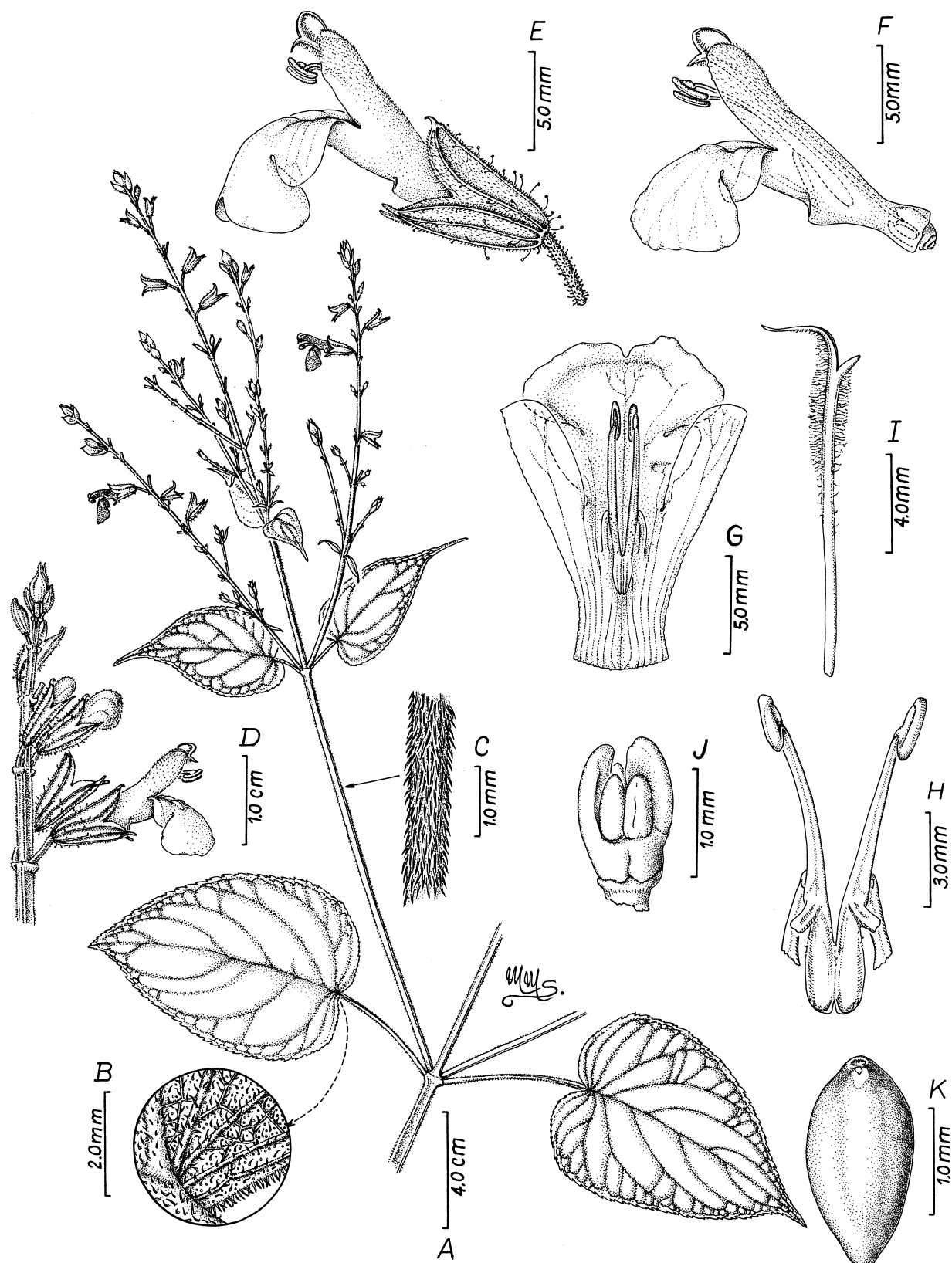
## Taxonomy

*Salvia guaneorum* Fern. Alonso, *sp. nov.* (Figs. 1–2)

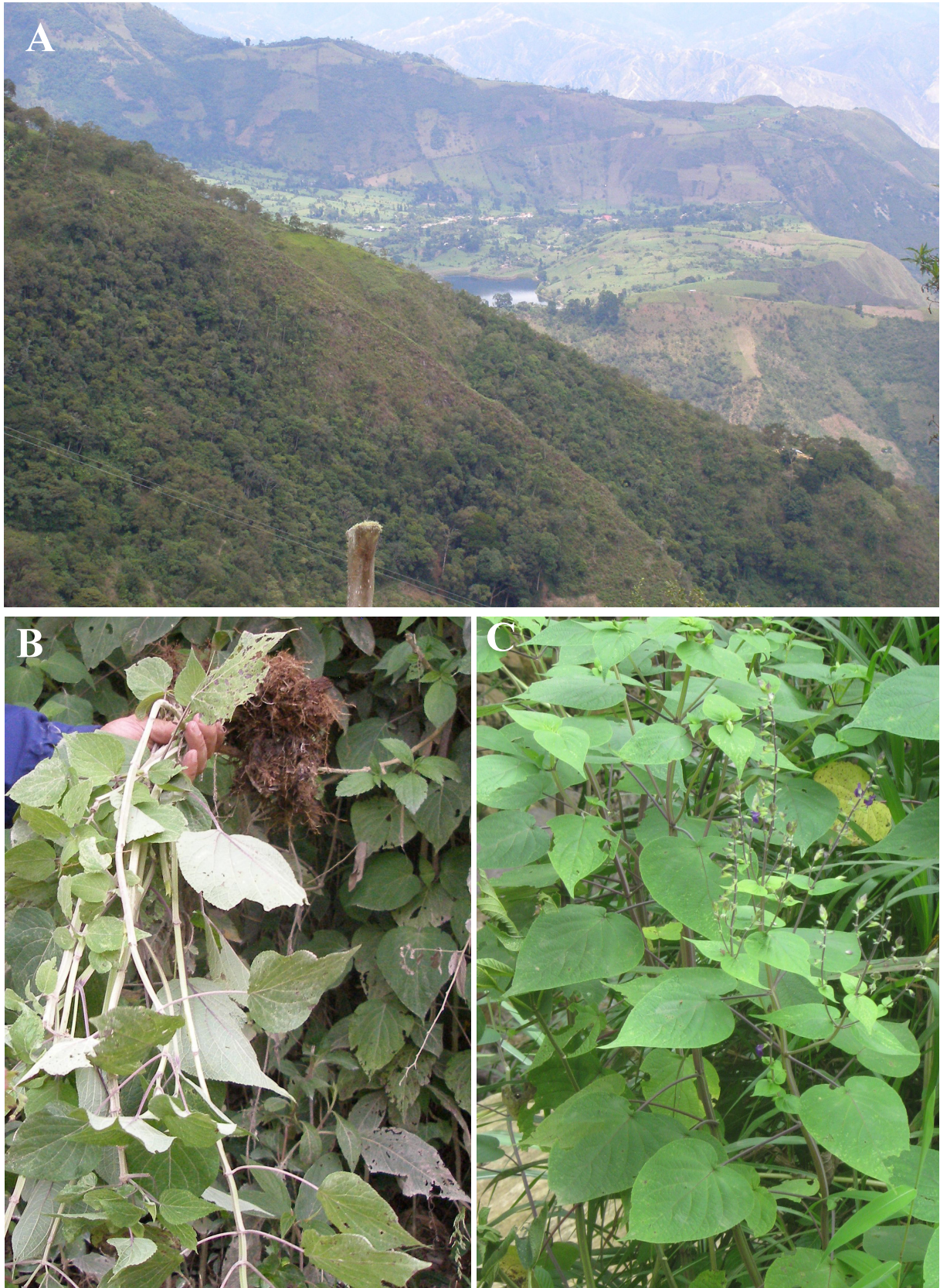
*Affinis Salvia erythrostomae* Epling (*Sectio Longipedi*) a qua imprimis differt inflorescentia ramosa, diffusa, racemis breviores, bracteis maiores, oval-lanceolatis, 6–8 mm longis; verticillastris 2–3 floris; pedicellis breviores (2–5(7) mm longis; calyce brevior, 7–8.5(9.5) mm et labio infero corollae manifeste longior (8–9 mm longis) quam galea (3–4 mm longis).

**Type:**—COLOMBIA. Santander: Vía Curos – Málaga, desvío San Andrés – Molagavita, taludes húmedos junto al camino, 06°46'N, 72°50'W, 1680 m, 28 June 2009. Hierba erecta, fl. *J. L. Fernández-Alonso & C.N. Díaz-Perez 28169A* (holotype COL!; isotypes BM!, COL!, G!, HUA!, MA858787, 858788!, MO!, MEXU!, NY!, UIS!, US!).

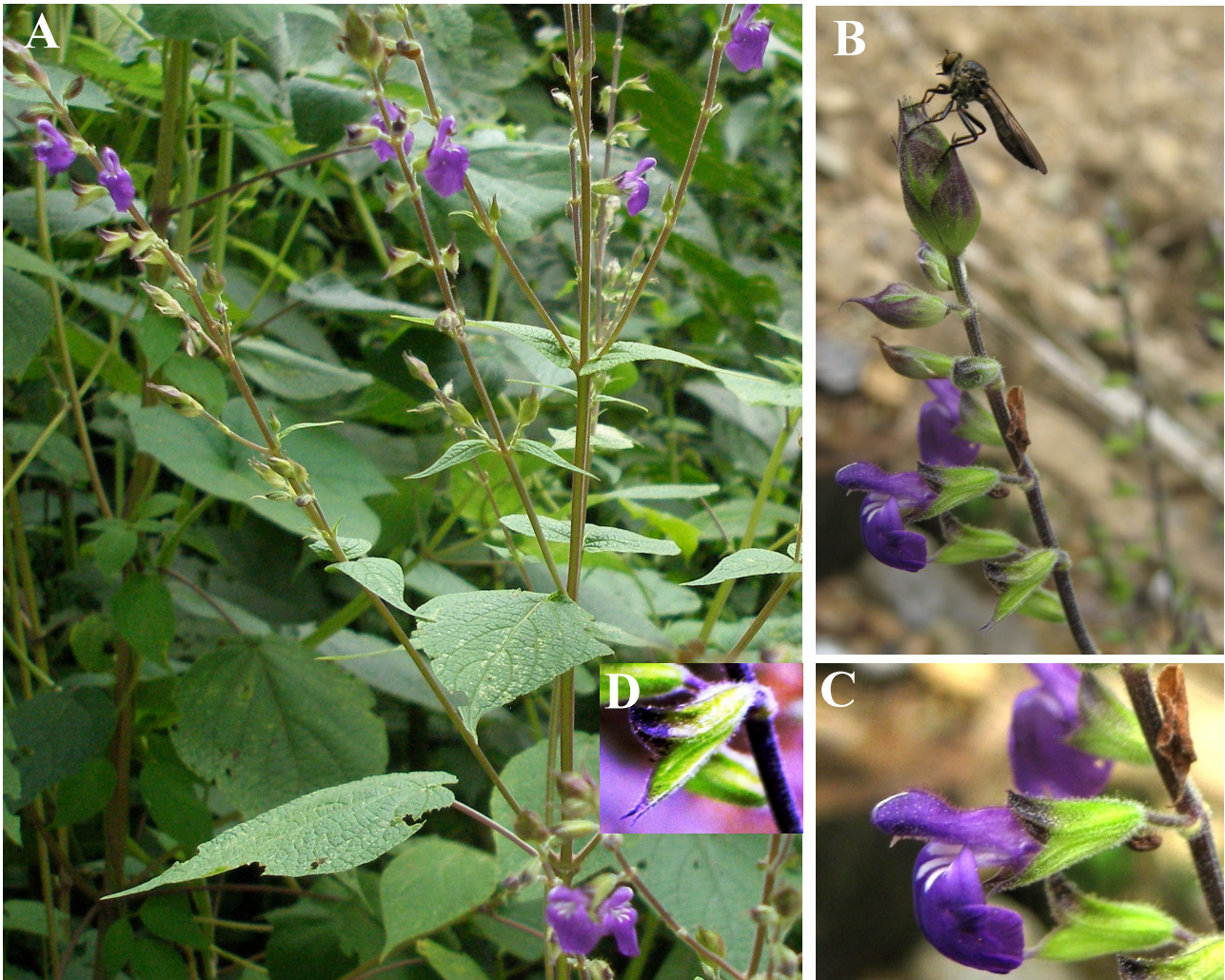
**Biannual** or annual herbs up to 2.4 m tall, scarcely aromatic, very bitter. Stem erect, delicate and very branched at the top, green or purple tinged, quadrangular with thickened angles and long internodes, pilose with very short retrorse hairs. **Leaves** with petioles greenish or more often bluish or purple, thin, (20)25–60(80) mm long, thin and densely pubescent, olive-green leaves and bright upperside beam, pale gray-green or whitish on the underside, membranaceous, thin, cordate or broadly triangular-cordate, 7–11(15) x 5–8(10) cm, cordate at the base, with basal sinus of 20–30 mm from the petiole, acuminate or caudate-acuminate at the apex; appendix 2.5–4.0 cm long, finely serrate margin; surface thick and slightly reticulate, venation brochidodromous, noticeable on both sides, excavated on upperside and prominent on the underside, secondary veins ascending or erect-patent with respect to the midrib, tertiary venation polygonal on the margins of the blade, fourth-order venation reticulate, manifested only on the underside; this with short trichomes, with strigose aspect on nerves and with hairs and sessile glands on the lamina. Leaves of young plants (without inflorescences) with petioles 7–12 cm long and blades 15–22 x 11–15 cm. **Inflorescences** large terminal or lateral panicles, erect, 15–40 cm long, formed by many terminal or axillar racemes, each with 6–10(12) verticillaster; each verticillaster with 2–3 flowers (Fig. 1a); axis with dense pubescence of short hairs, retrorse, acute; bracts green or purple, promptly deciduous, oval to broadly ovate to lanceolate, 6–8 mm long, apex acuminate or caudate with short trichomes, gland-tipped and ciliate margin. Floral pedicels 2–5 mm long (up to 7 mm in fruit), erect-patent, with short pubescence and with scattered longer gland-tipped hairs. **Flower** 13–16 mm long. **Calyx** usually pale green, with purple tinge in the teeth, 7–8.5(9.5) mm long, externally with fine pubescence lying and some longer gland-tipped hairs, similar to the pedicel; bilabiate, subequal lips, the lobes ovate-deltate and acuminate at the apex, lower lip slightly longer and acute, the upper widened, of 3–4 mm long (somewhat larger, more laterally compressed in fruiting), with teeth of 0.5–1 mm, slightly incurved; the upper lip 3-veined. **Corolla** purple-violet, with two white bands (nectar lines), at the junction of the lower lip with the mouth of the tube, 13–15 mm long (slightly shorter dry), glabrescent externally, with fine pubescence on the galea; tube 7–8 mm long, straight or slightly upward, widened sharply and ventricose-invaginated toward the middle, tapering in the distal third, epapillate inside; upper lip galeate, straight with respect to the tube, 3–4 mm long and shorter than the lower lip, with very fine, inconspicuous pubescence; lower lip, semi-patent or patent-reflexed, 8–9 mm long, 3-lobed, with the lateral lobes of 2–3 mm long, shorter and narrower than the very wide, rounded and bilobed middle lobe (Figs. 1e–g). **Stamens** included in the galea or very slightly exerted (more noticeable in the dried flower); filaments inserted into the middle of the corolla tube (Fig. 1f), invaginated area, about 3 mm from the mouth of the tube, 3–4 mm long, glabrous; connective of 9–10 mm long, arched convex, glabrous; the posterior connective arm 4 mm in length, connate with the connective of adjacent stamen only in the distal area (Fig. 1h), with cylindrical tooth, obtuse arched located 3 mm from the end, near the binding site to the filament; anthers slightly arched, convex, narrow, 1.5 mm long and ca. 0.3 mm thick. **Ginobase** with nectariferous projection bilobed, erect, much longer than the nutlets primordia at anthesis (Fig. 1j). **Style** whitish 12–13 mm long, hairy in the distal third, with septate hairs, in comb-like anteroposterior arrangement with longer upper branch, of ca. 3 mm, acute, arched-ascending and attached on the surface of the galea; lower branch, straight, down, of ca. 1 mm (Figs. 1e–i). **Nutlets** smooth or minutely granular, ellipsoid-fusiform, trigonous in



**FIGURE 1.** *Salvia guaneorum* A- Habit, natural position of a branch with terminal inflorescence. B- Indument detail on the basis of the underside of the blade, showing short hairs and sessile glands. C- Detail of the retrorse indument of the stem, in a lateral branch. D- Top of an inflorescence with flowers, buds and inflorescence bracts. E- Complete flower in side view, showing the indument of floral pedicel and calyx. F- Side view of corolla showing the position of stamens, gynoecium and stigmatic branches. G- Corolla open at its upper back, extended, showing the position of filaments, connective and anther and shape of the lobes of the lower lip of the corolla. H- Filaments and connectives showing the retrorse tooth and the anthers. I- Style with the two stigmatic branches. J- Ginobase and immature nutlets. K- Mature nutlets in ventral view showing the hilar scar (top). Drawn from the type collection and photographs, Fernández-Alonso & C. N. Díaz 28169A (COL).



**FIGURE 2.** *Salvia guaneorum*. **A**—Region of sub-andean forest of oak (*Quercus humboldtii*), in the type locality, San Andrés-Molagavita, Department of Santander, Colombia. **B**—Appearance of some young plants (first year), before the onset of anthesis. **C**—Appearance to the plant to the top of this bloom.



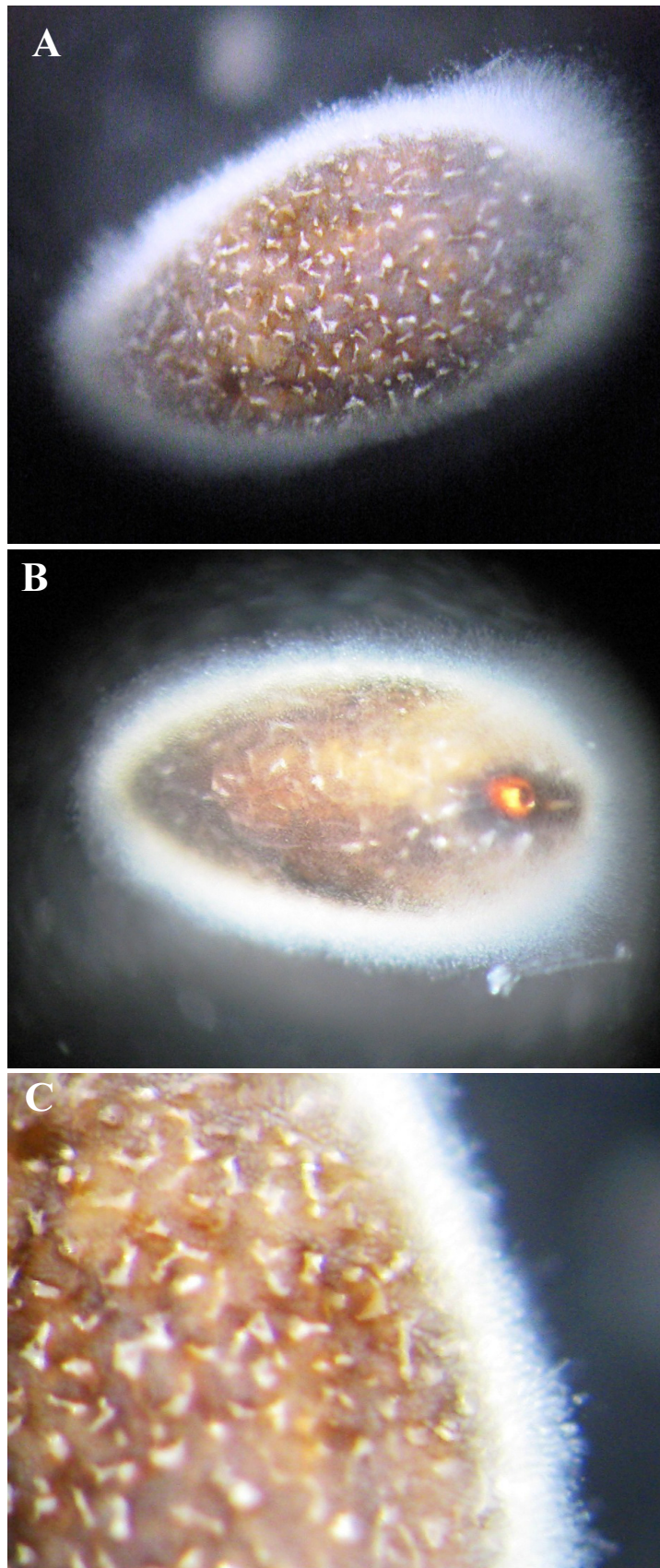
**FIGURE 3.** *Salvia guaneorum*. **A**—Inflorescence terminal, photographed in their natural environment, in San Andrés-Molagavita, Department of Santander-Colombia. **B**—Details of the terminal portion of an inflorescence, showing the deciduous floral bracts, and an Diptera Asilidae family, which is not related with the floral biology of the plant and probably used it as a hunting lookout. **C**—Flower in lateral view showing the long stigmatic branch (white) and closely attached to the outside of the upper lip of the corolla (helmet or galea). **D**—Detail of the calyx. (Photographs made to the plant type Fernández-Alonso & C. N. Díaz 28169A).

section, acute-apiculate at both ends, with circular hilum scar at the lower end, from 2–2.2 x 1.3–1.5 mm. In contact with water present mucilaginous whitish halo, cottony-looking, 0.5–1 mm in thickness (Fig. 4).

**Distribution and habitat:**—The only known records suggest it is a species endemic to a small sector of the Chicamocha Basin (department of Santander), an Andean valley located on the western flank of the Eastern Cordillera of Colombia. It is located in the sub-Andean oak forest belt (*Quercus humboldtii* Bonpl.) at between 1600–2100 m, where it grows on grassy slopes and the edges of streams and creeks, along with some Asteraceae such as: *Austroeupatorium inulifolium* (Kunth) R.M. King & H. Rob., *Baccharis trinervis* (Lam.) Pers., *Chromolaena tacotana* (Klatt.) R.M. King & H. Rob., *Conocliniopsis prasiifolia* (DC.) R.M. King & H. Rob., Bignoniaceae as: *Saritea magnifica* (W. Bull) Dugand, and the Labiatae: *Hyptis mutabilis* (L. Rich.) Briq., *Minthostachys mollis* (Kunth) Griseb., *Salvia aratocensis* (J.R.I. Wood & Harley) Fern. Alonso, *Salvia chicamochae* Wood & Harley, *Salvia occidentalis* Sw. and *Salvia tilifolia* Vahl.

**Conservation status:**—Given the limited range of known distribution of this plant and the current categorization criteria (IUCN 2003, Fernández-Alonso & Rivera-Díaz 2006), now this species could be tentatively classified as vulnerable (VU). This categorization is justified due to the limited extent of similar habitats throughout the Chicamocha region, where the species may be present.

**Etymology:**—The species name refers to Guane people, who lived in some sectors of the middle and lower Chicamocha Canyon, in the Eastern Cordillera of Colombia.



**FIGURE 4.** Nutlets of *Salvia guaneorum* after wetting, showing mucilage cover. **A-** Dorsal view with the nutlet surface rough-fragmented and the radial lace cover mucilage. **B-** Ventral view nutlet with hilar scar (right), little ornamentation and the halo of very conspicuous mucilage. **C-** Folding detail ornamentation-fragmented nutlet surface and the outer halo of mucilage. (Photographs taken in the nutlets of the collection type: *Fernández-Alonso & C. N. Díaz 28169A*).

## Discussion and affinities

On account of its herbaceous graceful habit, with long-stalked leaves, with cordate blades, membranous, sessile glands dotted on the underside and its flowers with 3-nerved upper lip, corolla with basal invagination into the tube and lower lip patent, clearly longer than the bottom, *S. guaneorum* has obvious affinities with the South American species of Section *Longipes*. The only exception would be *S. madreensis* Epling, Mexican species which has chartaceous leaves and yellow flowers with long tube without basal invagination, which probably warrants relocation to a different section. Moreover, the presence in *S. guaneorum* of pauciflorous verticillasters (2–3 flowers) and shortly pedicellate flowers, clearly distinguishes the plant described here, from the rest of the species of the section *Longipes*, and questions its allocation to it. Within this section, *S. erythrostoma*, would be the most similar species in terms of stem morphology and the presence of subtruncate upper calyx lip. *S. gracilipes* Epling, of Merida, Venezuela and *S. codazziana* Fern. Alonso from N Colombia differ by having long-lipped calyx subequal (Fernández-Alonso 1995). Moreover, the cordate leaves of *S. guaneorum* and morphology of the calyx and corolla (color and lips) resemble two species of *Angulatae* section: *S. tiliifolia* Vahl widely distributed and *S. chicamochae* Wood & Harley, also endemic to this same Chicamocha Canyon (Fernández-Alonso 2003a). However, the differences in habit, indumentum, some leaf traits and in the inflorescence are well marked and allow to clearly separate *S. guaneorum* of the species of *Angulatae* section.

The mucilage of the nutlet of *S. guaneorum*, cottony type (Fig. 4), consists of radial cords flexuous and corresponds to the type IIA, those set in Fernández-Alonso *et al.* (2009). This type of mucilage is also present in some species of the subgenus *Calosphace* previously studied as *S. coccinea* Etling. (Sect. *Subrotundae*) and *S. splendens* (sect. *Secundae*). The moistened nutlet of *S. guaneorum*, also shows a series of irregular folds on the dorsal surface of the nutlet, which is not present in the dry nutlet (Fig. 4a–c). This ornamentation had not been observed in other species of *Salvia*, may be similar to the conical structures embedded in mucilage, described in the nutlet of *Ocimum gratissimum* L. (subfam. Nepetoideae).

**Additional specimens examined (Paratypes):**—COLOMBIA. Santander: Vía Curos – Málaga, antes de la Hacienda La Tahona, flancos herbosos de la carretera, 06°56'N, 72°56'W, 2050 m, 26 June 2009. Hierba erecta, aspecto bianual, sin flores, *J. L. Fernández-Alonso & C.N. Díaz-Pérez 28102* (COL!, G!, MEDEL!, MA 858793, 858794, 858795!, MO!, P!); *Ibidem*, vía Curos–Málaga, desvío San Andrés–Molagavita, taludes húmedos junto al camino, 06°46'N, 72°50'W, 1680 m, 28 June 2009. fl, *J. L. Fernández-Alonso & C.N. Díaz-Pérez 28170* (B!, COL!, HUA!, MA 858791, 858792!, MO!, W!).

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## References

- Bentham, G. (1876) Labiatae. *In*: G. Bentham & J. D. Hooker. *Genera Plantarum* 2. Reeve & Co., London, pp. 1160–1223.  
Epling, C. (1936) Synopsis of the South American Labiatae (part. 7–12). *Repertorium Specierum Novarum Regni Vegetabilis. Beihefte* 85: 193–341.  
Epling, C. (1939) A Revision of *Salvia* subgenus *Calosphace*. *Feddes Repertorium Specierum Novarum Regni Vegetabilis, Beihefte* 110: 1–383.

- Fernández-Alonso, J.L. (1995) Estudios en Labiatae de Colombia I. Novedades en los géneros *Salvia* e *Hyptis*. *Revista de la Academia Colombiana de Ciencias Exactas, Físicas y Naturales* 19: 469–480.
- Fernández-Alonso, J.L. (2002) Estudios en Labiatae de Colombia III. Novedades en *Lepechinia* Willd., *Salvia* L. y *Satureja* L. *Anales del Jardín Botánico de Madrid* 59 (2): 344–348.
- Fernández-Alonso, J.L. (2003a) Estudios en Labiatae de Colombia IV. Novedades en *Salvia* y sinopsis de las secciones *Angulatae* y *Purpureae*. *Caldasia* 25(2): 235–281.
- Fernández-Alonso, J.L. (2003b) Algunos patrones de distribución y endemismo en plantas vasculares de los páramos de Colombia, pp. 213–240. En C. A. Jaramillo *et al.* (eds.) *Memorias del Congreso Mundial de Páramos*, Tomo I, Mayo 2002. Ministerio de Medio Ambiente. Bogotá.
- Fernández-Alonso, J.L. (2006) Revisión taxonómica de *Salvia* sect. *Siphonantha* (Labiatae). *Anales del Jardín Botánico de Madrid* 63 (2): 145–157.  
<http://dx.doi.org/10.3989/ajbm.2006.v63.i2.4>
- Fernández-Alonso, J.L. (2008a) Estudios en Labiatae VII. Hibridación en el género *Salvia* en Colombia y su interés horticultural. *Caldasia* 30(1): 21–48.  
<http://dx.doi.org/10.3417/2006062>
- Fernández-Alonso, J.L. (2008b) Estudios en Labiatae VI. *Salvia yukoyukparum*, nueva especie y primer representante de la Sección *Tomentellae* en Colombia. *Novon* 18: 38–42.  
<http://dx.doi.org/10.3989/ajbm.2264>
- Fernández-Alonso, J.L. (2010) Una nueva especie de *Hyptis* (Labiatae) de Colombia. *Anales del Jardín Botánico de Madrid*. 67(2): 127–135.
- Fernández-Alonso, J.L. (2012a) *Salvia guacana*, una nueva Labiatae de Colombia con flores resupinadas y sinopsis de *Salvia* sect. *Tubiflorae*. *Revista de la Academia Colombiana de Ciencias Exactas, Físicas y Naturales* 36 (141): 517–533.
- Fernández-Alonso, J.L. (2012b) Labiatae. en: Bernal, R., S. R. Gradstein & M. Celis (eds.). *Catálogo de las Plantas de Colombia*. Instituto de Ciencias Naturales – Universidad de Göttingen. Bogotá y Göttingen. (ined.).
- Fernández-Alonso, J.L., Vega, N., Filgueira, J.J. & Pérez, G. (2003) Lectin prospecting in Colombian Labiatae. A systematic-ecological approach. *Biochemical Systematics and Ecology* 31: 617–633.  
[http://dx.doi.org/10.1016/s0305-1978\(02\)00223-5](http://dx.doi.org/10.1016/s0305-1978(02)00223-5)
- Fernández-Alonso, J.L., & Rivera-Díaz, O. (2006) Labiatae. pp. 385–582, en: N. García & G. Galeano (eds.) *Libro Rojo de las Plantas de Colombia - 3. Serie Libros Rojos de especies amenazadas de Colombia*. Instituto Alexander von Humboldt – Instituto de Ciencias Naturales de la Universidad Nacional de Colombia – Ministerio de Ambiente, Vivienda y Desarrollo Territorial. Bogotá.
- Fernández-Alonso, J.L., Vega, N. & Pérez, G. (2009) Lectin prospecting in Colombian Labiatae. A systematic-ecological approach.- III. Mainly exotic species (cultivated or naturalised). *Caldasia* 31(2): 227–245.
- Fernández-Alonso, J.L. & Chacón Sánchez, M.I. (2012) Especies vegetales aromáticas de la Provincia del Sumapaz y la Cuenca del río Chicamocha. Programa Aprovechamiento de aceites esenciales de especies nativas y foráneas promisorias uso agrícola en Colombia. Universidad Nacional de Colombia, Facultad de Agronomía, sede Bogotá. 189 pp.
- Harley, R.M., Atkins, S., Budantsev, A.L., Cantino, P.D., Conn, B.J., Grayer, R., Harley, M.M., de Kok, R., Krestovkaja, T., Morales, R., Paton, A.J., Ryding, O. & Upson, T. (2004) *Salvia* L. In: Kubizki, K., editor. *The Families and Genera of Vascular Plants* 7: 235–236.
- IUCN. (2003) *Directrices para emplear los criterios de la Lista Roja de la IUCN a nivel nacional y regional – Versión 3.0 – Preparados por la Comisión de supervivencia de Especies de la UICN*. IUCN – Unión Mundial para la Naturaleza.
- Walker, J.B., Sytsma, K.J., Treutlein, J. & Wink, M. (2004) *Salvia* (Lamiaceae) is not monophyletic: Implications for the systematics, radiation, and ecological specializations of *Salvia* and tribe Mentheae. *American Journal of Botany* 91: 115–1125.  
<http://dx.doi.org/10.3732/ajb.91.7.1115>
- Walker, J.B. & Sytsma, K.J. (2007) Staminal evolution in the genus *Salvia* (Lamiaceae): Molecular phylogenetic evidence for multiple origins of the staminal lever. *Annals of Botany (Oxford)* 100: 375–391.