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# *Salvia robertoana* (Lamiaceae), a new species from Oaxaca, Mexico

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## Abstract

A new species of *Salvia* belonging to *Salvia* sect. *Penellia* from the state of Oaxaca is here described and illustrated. Only two species are included within this section: *S. pennelli* and the new species, *S. robertoana*. Both species are perennial herbs, with a 3-veined upper calyx lip, included stamens in the galea, late deciduous bracts, corolla tube epapillate inside, pubescent style and violet flowers. However, *S. robertoana* is distinguished from *S. pennellii* by its larger, elliptic to elliptic-oblong leaf blades (vs. blades lanceolate, oblong-lanceolate to oblong ovate) with tomentulose upper surface and pale, tomentose lower surface, and shortly decurrent base; usually longer inflorescence and shorter corolla tube and lower lip. A comparative table and an identification key of *Salvia* sect. *Pennellia* are provided.

## Resumen

Una nueva especie de *Salvia* perteneciente a *Salvia* sect. *Penellia*, del estado de Oaxaca, se describe e ilustra. Sólo dos especies se incluyen dentro de esta sección, *S. pennelli* y la nueva especie *S. robertoana*. Ambas especies son hierbas perennes, con el lóbulo superior del cáliz 3-nervado, estambres inclusos en la gálea, brácteas caducas tardíamente, el interior del tubo de la corola sin papilas, estilo pubescente y flores violeta. No obstante, *S. robertoana* se distingue de *S. pennellii* por sus láminas foliares más grandes, elípticas a oblongo-elípticas (vs. láminas lanceoladas, oblongo-lanceoladas a oblongo ovadas) con el haz tomentuloso y envés pálido, tomentoso, y base cortamente decurrente; inflorescencia usualmente más larga y tubo de la corola y labio inferior más cortos. Se presenta un cuadro comparativo y una clave de identificación para las especies de *Salvia* sect. *Pennellia*.

## Introduction

*Salvia* Linnaeus (1753: 23) is the most diverse genus of the Lamiaceae, with nearly 1,000 species distributed worldwide (Harley *et al*. 2004); as such, it has been traditionally subdivided into four subgenera: *Salvia* Bentham (1876: 1195), *Sclarea* Bentham (1876: 1195), *Leonia* Bentham (1876: 1196) and *Calosphace* (Bentham 1833: 198, 245; Epling 1939: 3). Among these subgenera, *Calosphace* has the highest species-richness, is endemic to the American Continent, and has its main center of diversification in Mexico (Jenks *et al*. 2013). Martínez-Gordillo *et al.* (2013) listed 307 species of *Salvia* for Mexico, with an endemism of 75.5%. Recently, several new species have been described (Bedolla-García & Zamudio 2015, Fragoso-Martínez & Martínez-Gordillo 2013, Fragoso-Martínez *et al*. 2015, González-Gallegos 2013, 2015, González-Gallegos & Aguilar-Santelises 2014, González-Gallegos & Castro-Castro 2013, González-Gallegos *et al.* 2013, Lara-Cabrera *et al.* 2013, González-Gallegos & López-Enríquez 2016, Martínez-Gordillo *et al.* 2016, Turner 2013), and currently the number of described species is 331, most of them belonging to *Salvia* subg. *Calosphace*. The most recent revision of *Salvia* subg. *Calosphace* was made by Epling (1939), who divided the subgenus into 91 sections. Later, several sections were described (Epling 1940, 1941, 1944, 1947, 1951, Epling & Játiva 1966, Epling & Mathias 1957), and currently 105 sections, most of them monotypic, are included in this subgenus.

In Mexico, Oaxaca is the state with the highest number of angiosperms (Villaseñor 2014), as well as the one which

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embraces more *Salvia* species. The physiography of this state, due to its geological evolution, explains the diversity of soil types and, consequently, types of vegetation (Centeno-García 2004). The combination of these features underlies the magnitude of plant richness in this state. *Salvia* is the second-most diverse genus in Oaxaca, with 84 species (García-Mendoza 2011), and an endemism of 16.6%. As part of an ongoing project of our research group on the inventory of Lamiaceae species in Mexico (Fragoso-Martínez & Martínez-Gordillo 2013, Fragoso-Martínez *et al*. 2015, Martínez-Gordillo *et al*. 2016), herbarium specimens of *Salvia* from Oaxaca, kept in the National Herbarium of Mexico (MEXU, Thiers 2016), were examined. Some specimens could not be assigned to any of the known species, and are here proposed as a new species of *Salvia* sect. *Pennellia* Epling (1939: 211). This section is distributed in the Sierra Madre Oriental in Mexico. It previously comprised only *Salvia pennellii* (1939: 2011), a perennial herb, with 3-veined upper calyx lips, stamens included in the galea, epapillate inner corolla tube, pubescent style and violet-colored flowers.

## Taxonomy

***Salvia robertoana*** Mart.Gord. & Fragoso, *sp. nov.* (Figs. 1, 2).

*Salvia pennellii affinis sed foliis ellipticis vel elliptico-oblongis, laminis 8.1–12 cm longis, 3–3.75 cm latis, tomentulosis supra, albido-tomentosis subtus, breviter decurrentibus base, inflorescentiis longioribus, plerumque corollae tubo et labio infero brevioribus differt.*

Type:—MEXICO. Oaxaca: Putla, Santa Cruz Itundujia: El Mirador, 9.54 km en línea recta de Santa Cruz Itundujia, 2849 m, 16º48'10"N, 97º36'33"W, 1 August 2008, *K. Velasco 3061* (holotype MEXU!).

Herbs unbranched, 0.3–0.9 m tall, stems tan brown colored, densely pubescent with short, multicellular trichomes. Leaf blades elliptic to oblong-elliptic, 8.1–12 × 3–3.75 cm, base decurrent, margin serrulate, involute, apex acute to short-acuminate, upper surface green, bullate, tomentulose, with short sparse trichomes, lower surface pale, tomentose, densely covered with multicellular trichomes, lower side involute; petioles 0.6–3.6 cm long, pubescent. Inflorescences terminal, (8–)18–30 cm long; peduncle 2–5.6 cm long, internodes up to 2.3 cm long, 6 or more flowers per node; bracts persistent at anthesis, 0.8–1.7 cm long, ovate-caudate, margin cuneate, apex caudate to shortly-acuminate, upper surface glabrescent, lower surface densely tomentose, whitish, with parallel venation. Calyx 9–11 mm long, upper lip 3-veined, densely pubescent, with simple trichomes and spherical glands on the outer surface, mainly along the veins, pubescent inner surface, with antrorse trichomes. Corolla purple, 16–18 mm long, tube 10–12 mm long, ventricose, sometimes slightly curved, papillae absent; upper lip 6–7 mm long, lower lip (4–)6–8 mm long. Stamens inserted near the mouth of the corolla, filaments 2.7–3.5 mm, connective straight, 4.5–5.2 mm, abaxially with a retrorse tooth. Style pubescent, 1.4–1.6 cm long; gland of the gynobase larger than the mericarps. Mericarps oblong, 1.5–2.1 mm, brown, smooth.

**Distribution, habitat and phenology**:—The new species is thus far known from the state of Oaxaca, in the region of the Mixteca Alta (Fig. 3), in Pine-Oak forest and xeric shrublands. It has been collected at 2540–2849 m elevation. Flowering and fruiting in August.

**Etymology**:—The specific epithet *robertoana* honors Roberto Carreño-Colorado, an enthusiast in botany who has spent time and resources supporting research on the Mexican Lamiaceae.

**Discussion**:—*Salvia robertoana* is a small herb, unbranched, with showy inflorescences, due to size and bluish tones of the calyx and bracts. These features, in addition to the size of the corolla, the lower lip slightly longer than the upper lip, and the presence of a functional lever mechanism, suggest that the new species fits into a melittophilous pollination syndrome (Wester & Claben-Bockhoff 2011). In Table 1, *Salvia robertoana* is compared with *S. pennellii*, which due to its morphological similarity is considered its most closely related species. Although they share traits such as the habit and duration (perennial herbs), as well as the presence of lately deciduous bracts, violet corollas with stamens inserted in the galea and an epapillate corolla tube, *S. robertoana* can be distinguished by its larger, elliptic to elliptic-oblong leaves, which are tomentose and whitish on the lower side and tomentulose on the upper side, with a shortly decurrent base, longer inflorescences, and usually shorter corolla tube. *Salvia pennellii* is distributed in northern Mexico (Fig. 3), where it has been collected in the mountainous zones of San Luis Potosí and Tamaulipas, at 1600 to 2870 m elevation, in oak forests, conifer forests and xeric shrublands, growing on dry and cold limestone slopes (José García, comm. pers.). This species is cultivated as ornamental for the beauty of its flowers and its resistance to low humidity levels (José García, comm. pers.). On the other hand, *S. robertoana* is endemic to the Mixteca Alta region of the state of Oaxaca, at elevations of 2540 m or higher, where pine and mixed forests predominate.

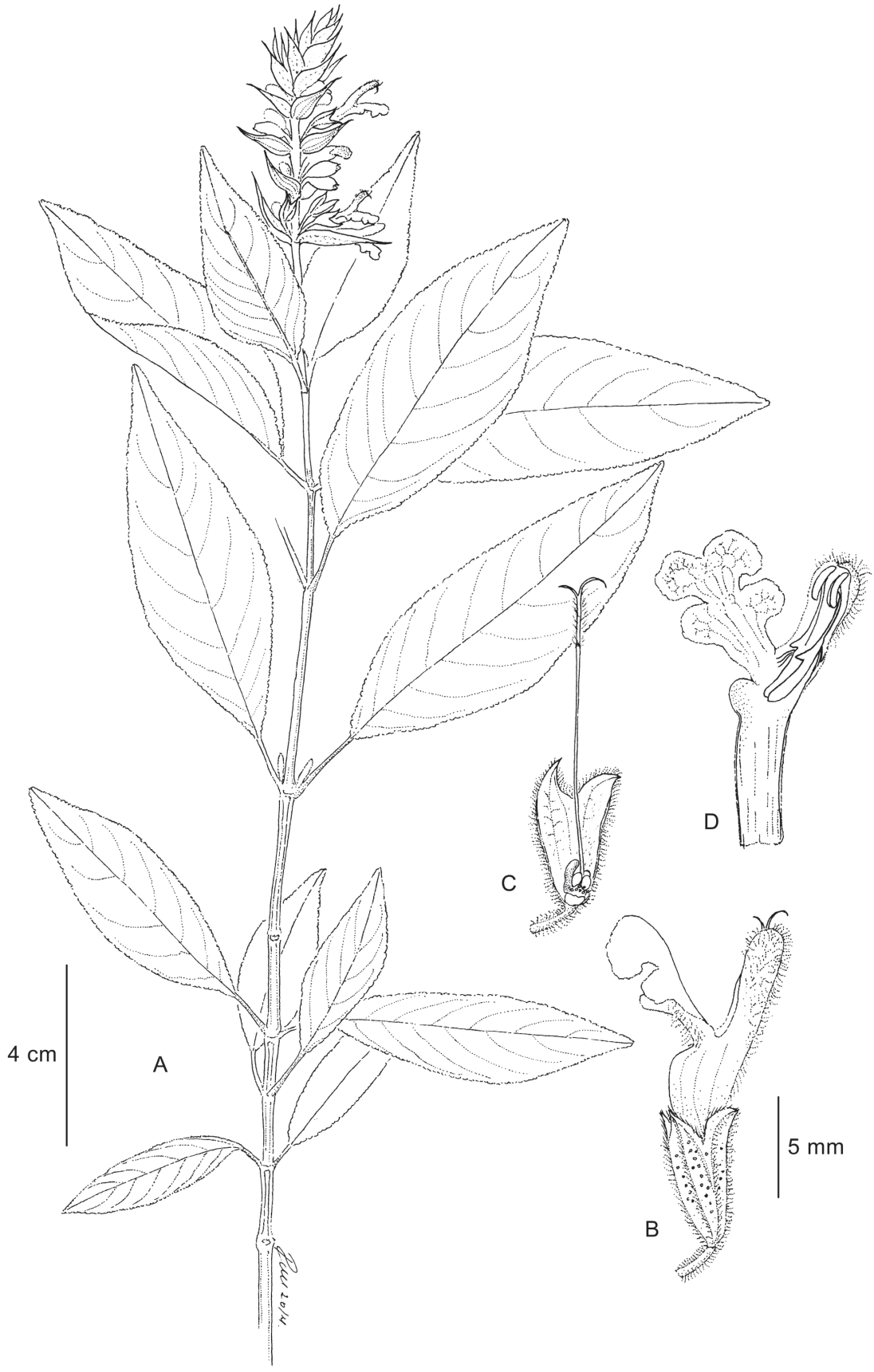


**FIGURE 1.** *Salvia robertoana*. A) Branch with leaves and inflorescence. B) Lateral view of the flower. C) Dissected calyx with style, mericarps and gland of the gynobase. Dissected corolla with androecium. Illustration drawn from the type by Ramiro Cruz Durán.

**FIGURE 2.** Scanned image from the holotype of *Salvia robertoana*.

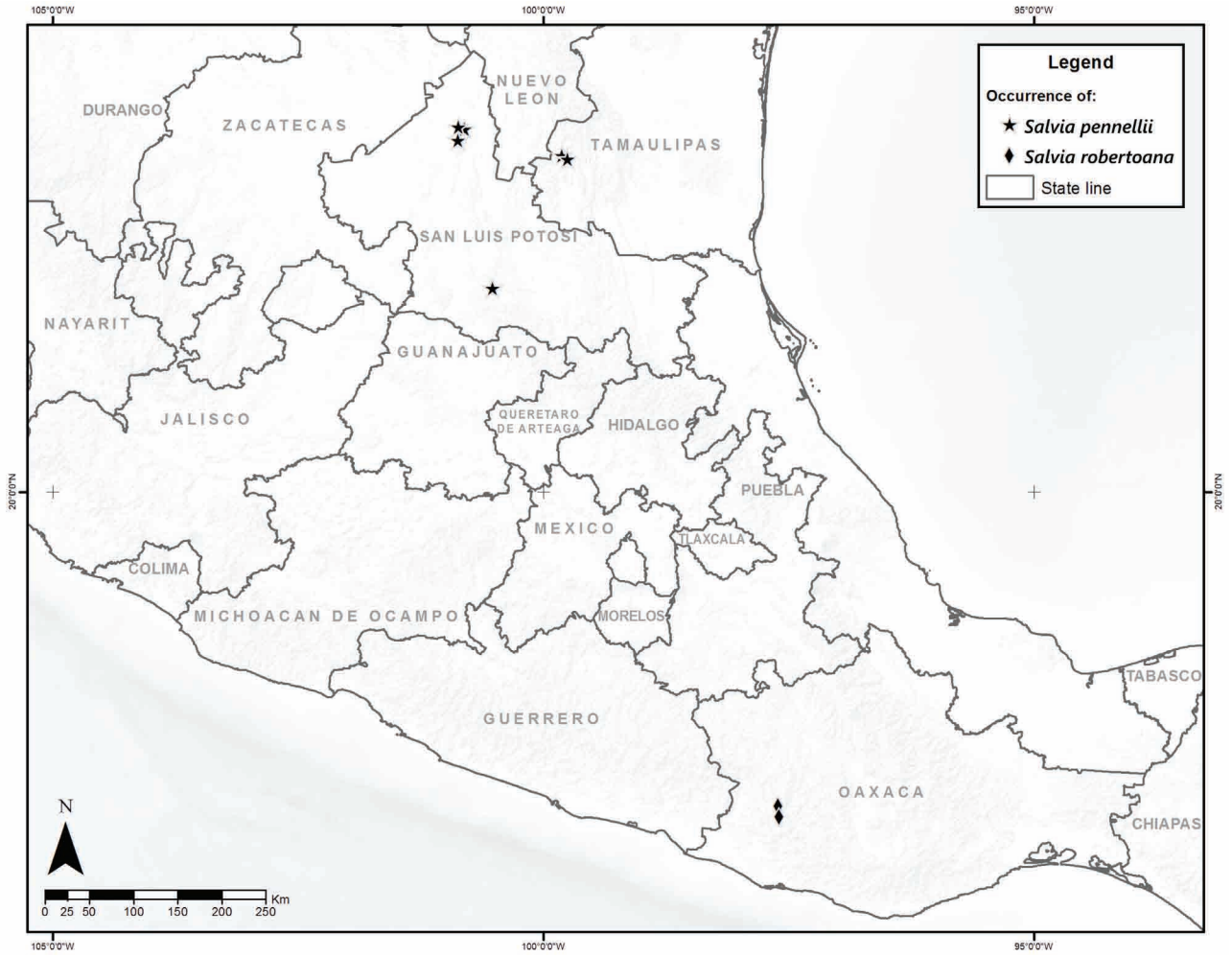


**FIGURE 3.** Distribution map of the species of *Salvia* subg. *Calosphace* sect. *Pennellia*.

## Key to the species of *Salvia* subg. *Calosphace* sect. *Pennellia*

1. Perennial herb, branched; stem color purple, leaf blades lanceolate, oblong-lanceolate to oblong-ovate, margin crenate-serrate, lower leaf surface hirtellous, green; lower corolla lip 7–10 mm long .....*S. pennellii*
- Perennial herb, unbranched; stem color tan brown, leaf blades elliptic or oblong-elliptic, margin serrulate, lower leaf surface tomentose, whitish; lower corolla lip 4–8 mm long .....*S. robertoana*

**Additional specimens examined:**

***Salvia robertoana***:—MÉXICO. Oaxaca: Putla, Santa Cruz Itundujia: La Torre, en el cerro Yucucasa, 2.85 km en línea recta de Independencia, 2540 m, 16º41'36.3" N, 97º35'45.8" W, 5 August 2009 (fl, fr), *K. Velasco 4143* (MEXU!).

***Salvia pennellii***:—MÉXICO. San Luis Potosí: Sierra de Catorce, al N del cerro Los Chatos, al E de Santa Rita y cerro La Cuchilla ca. 15 km al E de la Estación Wadley, 2 km al E de Tierras Negras, 2870 m, 9 October 1979, *J. García et al. 1310* (MEXU!); ca. 170 km N of Cd. San Luis Potosí in Sierra de Catorce on barron overgrazed hills SE of Real de Catorce near old La Presa Mine, 2500 m, 23°43'N, 100°52'W, 18 September 1980, *J. Henrickson & P. Bekey B18584* (MEXU!); 15 km al S de Cedral, 2300 m, 30 September 1954, *J. Rzedowski 4896* (SLPM!); km 55 carretera San Luis-Río Verde, 1800 m, 11 September 1954, *J. Rzedowski 4468* (SLPM!); Sierra de Catorce, en la parte superior de Arroyo el Pastor, al N de Cerro Los Chatos y al E de Santa Rita y cerro la Cuchilla, ca. 14 km al E de Est. Wadley por vía corta, 2750–2900 m, 23°35'–23°36'N, 100°52'15"W, 9 October 1979, *T. Wendt et al. 2234* (MEXU!). Tamaulipas, Bustamante: 6 km al SW de Bustamante, 1950 m, 15 August 1972, *F. Medrano et al. 4645* (MEXU!); camino de Felipe Angeles al ojo de agua de San José, 1600 m, 5 October 1985, *L. Robles et al. 1606* (MEXU!).

**TABLE 1**. Morphological comparison between *Salvia pennellii* and *S. robertoana*

| Character | *Salvia pennellii* | *Salvia robertoana* |
|---|---|---|
| Habit | perennial herb, branched | perennial herb, unbranched |
| Size (m) | 0.4-0.8 | 0.3–0.9 |
| Stem color | purple | tan brown |
| LEAF BLADE | | |
| Petiole length (cm) | 0.5–1.2 | 0.6–3.6 |
| Shape | lanceolate, oblong-lanceolate to oblong-ovate | elliptic to elliptic-oblong |
| Size (cm) | (2–)5–7 × 1.3–2.3 | 8.1–12 × 3.3–7.5 |
| Apex | acute | acute to short-acuminate |
| Margin | crenate-serrate | minutely serrulate |
| Base | truncate to slightly attenuate | shortly decurrent |
| Pubescence in the upper surface | hirtellous | tomentulose |
| Pubescence in the lower surface | hirtellous | tomentose |
| Lower surface colour | green | whitish |
| INFLORESCENCE AND FLOWERS | | |
| Inflorescence length (cm) | 15–22 | (8–)18–30 |
| Number of flowers per node | 6 or more | 6 or more |
| Bract shape | ovate-caudate | ovate-caudate |
| Bract length (cm) | 0.7–1.2 | 0.8–1.7 |
| Calyx tube length (mm) | 7.5–11 | 9–11 |
| Calyx pubescence | hirtellous, long multicellular trichomes | densely hirtellous, long multicellular trichomes |
| Corolla tube length (mm) | (9–)–13 | 10–12 |
| Corolla colour | violet, deep violet or blue | violet |
| Length of the upper corolla lip (mm) | 5–6 | 6–7 |
| Length of the lower corolla lip (mm) | 7–10 | 4–8 |
| Width of the lower corolla lip (mm) | 4.7–6 | 4.5–5.2 |

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