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Revision of *Salvia* subg. *Calosphace* sect. *Membranaceae* (Lamiaceae)

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Abstract

A taxonomic revision of *Salvia* subg. *Calosphace* sect. *Membranaceae* (Lamiaceae) is presented based on the examination of recent herbarium collections and field observations. The section consists of 12 species and it occurs from northern Mexico to northern South America. A morphological conspectus, identification key, botanical descriptions, photographs, distribution maps, a comprehensive list of synonyms and a discussion about the delimitation of problematic taxa are given.

Introduction

Traditionally, *Salvia* L. was regarded as one of the largest vascular plant genera (Frodin 2004), with 900–1100 species worldwide (Standley and Williams 1973, Hsi-wen and Hedge 1994, Harley et al. 2004, Walker et al. 2004). It has a subcosmopolitan distribution, but native species are only absent from the highest latitudes and from Australasia, with the major centres of diversity in Mexico-Central America and the Mediterranean Basin-Middle East (Walker et al. 2004). It occupies a broad range of habitats, temperate and tropical forests, arid and semi-arid scrubs, alpine and secondary vegetation; and it grows from sea level to elevations of 4800 m (Hsi-wen and Hedge 1994, Ramamoorthy and Elliott 1998). Various species of this genus have been part of popular medicine in different regions and cultures (Rivera et al. 1994, Ceroni-S. 2002, Cahill 2003, Dweck 2000, Jäger and Van Staden 2000, Martínez-Moreno et al. 2006, Ramírez et al. 2006, Cheng 2007, Jenks 2008, Jenks and Kim 2013), and recent studies are uncovering the underlying chemicals responsible for the healing properties (Perry et al. 2000, Yokozawa 2000, Veličovič et al. 2003, Ramírez et al. 2006, Cheng 2007, Ramírez et al. 2007, Li et al. 2012). Some individual species have had great relevance and have been employed for several purposes, such as *Salvia hispanica* L., which was employed by Mesoamerican people as food, medicine and oil (Cahill 2003), and that is now reappraised as a valuable nutritional resource (Ayerza and Coates 2005, Peiretti and Gai 2009). Furthermore, *S. divinorum* Epling & Játiva, possesses medicinal and stimulating properties that are utilized by Mazatec people (indigenous people who inhabit the Sierra Mazateca, in Oaxaca, southern Mexico) in divination rites (Wasson 1962, Valdés-III et al. 1987, Reisfield 1993), and is presently gaining popularity as a hallucinogenic in different countries (González et al. 2006, Lange et al. 2008). In addition, *Salvia* has been a popular ornamental and continues to be prized as a decorative garden plant (Clebsh 1997, Froissart 2008).

Phylogenetic evidence based on molecular data revealed *Salvia* as a non-monophyletic genus consisting of three clades. In these, *Dorystaechas* Boiss. & Heldr. ex Benth., *Meriandra* Benth., *Perovskia* Kar., *Rosmarinus* L., and *Zhumeria* Rech.f. & Wendelbo are intermixed (Walker et al. 2004, Walker and Sytsma 2007). However, no attempt has been made to recircumscribed *Salvia* in a broader sense, or to segregate it into smaller genera, since a more exhaustive sampling in phylogenetic analysis is still required (Walker et al. 2004). One of the recovered clades includes *Salvia* subg. *Calosphace* (Benth.) Epling and *Salvia* sect. *Audibertia* (Benth.) Epling, which would not belong to *Salvia* s. str. if a narrower generic concept was applied. This clade embraces about 520 species, being the richest clade. *Salvia* sect. *Audibertia* is restricted to the Californian floristic province with 18–20 species (Epling 1938, Strachan 1982), whereas *Salvia* subg. *Calosphace* occurs from the United States of America to northern Argentina and Chile, including the Caribbean Islands, but not in the Amazonian forest. It includes about 500 species (Walker 2004). The most comprehensive revision of subg. *Calosphace* (Epling, 1939) has been followed with successive publications that describe new sections and species, provide additional and/or emended data about sectional and species delimitations, and amplify geographical distributions (Epling 1940, 1941, 1944, 1947, 1951, 1960; Epling and Mathias 1957; Epling and Játiva 1963, 1966, 1968). In the last 10 years at least 34 new species have been published within subg. *Calosphace* (Missouri Botanical Garden 2013). Hence, in view of these recent advances, a current revision of the subgenus is much needed.

Salvia subg. *Calosphace* is an interesting example of species diversification and represents a difficult challenge for any plant taxonomist, simply because there are many species and they occur across a wide geographical area. Before this, the efforts have been centred on unravelling the taxonomy of small manageable sections (Espejo and Ramamoorthy 1993, Santos 1991, 1996, Torke 2000, Santos and Harley 2004, Fernández-Alonso 2006, Zona et al. 2011). Occasionally the species analyses were circumbscribed by political bounderies (Turner 2008, 2009a, 2009b, 2010, 2011) or by regional floristic bounderies (Wood and Harley 1989, Pool 2001, Wood 2007, Klitgaard 2012).

Table 1. Chronological summary of the infra-sectional classification of *Salvia* subg. *Calosphace* sect. *Membranaceae*.

Bentham (1833, 1848)	**Briquet (1897)**	**Fernald (1900)**	**Epling (1939, 1940a)**	**Present study**
	subg. *Jungia*		subg. *Calosphace*	subg. *Calosphace*
sect. *Calosphace*	sect. *Calosphace*	sect. *Calosphace*	sect. *Membranaceae*	sect. *Membranaceae*
§ *Membranaceae*	**§ *Membranaceae***	**§ *Membranaceae***	**§ *Elscholtzioideae***	
S. bupleuroides	*S. bupleuroides*	*S. bupleuroides*	*S. galinsogifolia*	*S. bupleuroides*
S. hyptoides	*S. hyptoides*	*S. cladodes*	*S. hyptoides*	*S. compsostachys*
S. lasiocephala	*S. lasiocephala*	*S. galinsogifolia*	*S. lasiocephala*	*S. confertispicata*
S. lophantha	*S. lophantha*	*S. hyptoides*	*S. verecunda*	*S. glabra*
S. mocinoi	*S. mocinoi*	*S. lophantha*	***§ Lophanthoideae***	*S. langlassei*
S. nitida	*S. nitida*	*S. lophanthoides*	*S. glabra*	*S. lasiocephala*
S. rubiginosa	*S. rubiginosa*	*S. mocinoi*	*S. langlassei*	*S. lophanthoides*
		S. rubiginosa	*S. lophantha*	*S. mexiae*
		S. saltuensis	*S. lophanthoides*	*S. mocinoi*
		§ Brachyanthea	*S. mexiae*	*S. nitida*
		S. sanctae-luciae	*S. mocinoi*	*S. sanctae-luciae*
			S. nitida	*S. verecunda*
			S. rubiginosa	
			S. sanctae-Luciae	
			S. zacuapanensis	
			Incertae sedis	
			S. compsostachys	

[a] Epling (1940) did not assigned *Salvia compsostachys* to any of the subsections within *Membranaceae* that he recognized (Epling 1939).

§ = subsection

This study focuses on a revision *Salvia* subg. *Calosphace* sect. *Membranaceae* (Benth.) Epling. According to Epling (1939, 1940), the section is composed of 15 species; most of them are restricted to Mexico, with only one species extending to northern Peru, Ecuador, Colombia and Venezuela in South America. None of the members of this group have been included in the four *Salvia* phylogenetic analyses with representative samples of New World sages, and that were carried out using DNA sequences (Jenks *et al.* 2011, Jenks *et al.* 2012, Walker and Sytsma 2007, Walker *et al.* 2004). In two of these analyses (Jenks *et al.* 2012, Walker and Sytsma 2007) the specimen *Crone 15/9/00* (MJG) was included as *Salvia mocinoi*; however, this was erroneously identified, as it belongs to *S. setulosa* Fernald. Section *Membranaceae* has undergone many taxonomic changes since its description by Bentham (1833), including the addition of new species and proposals for infra-sectional classification (Table 1).

Materials and Methods

Specimen examination

A total of 1041 herbarium specimens of *Salvia* sect. *Membranaceae* (Appendix 1) were examined for this study. The specimens were held at the following herbaria: CHAPA, CREG, CIIDIR, CIMI, ENCB, GUADA, HEM, HUAA, HUMO, IBUG, IEB, MEXU, MICH, NY, OAX, SERO, UAGC, UC, USON, WIS, XAL, XALU, and ZEA; Herbario de Bioquímica de la Universidad Autónoma de Guerrero (here abbreviated as HBQ) and Herbario de la Universidad Autónoma de Nayarit (here abbreviated as UAP), not registered in *Index Herbariorum*, were also consulted. The complete *Salvia* collections of these herbaria were inspected in order to find all specimens of *Salvia* sect *Membranaceae*, except for NY herbarium, where only *Salvia mocinoi* Benth. was checked. Images of specimens, chiefly of type material, provided on the web pages of the following herbaria :ARIZ, CAS, G, K, LA, MO, NY, RSA-POM, UC, US, were also examine.

Field exploration was carried out to observe aspects of growth, development and morphology, and to collect botanical samples.

Most of the characters surveyed for the descriptions were those employed in the literature to define sections and delimit species within *Salvia* subg. *Calosphace* (Epling 1939, 1940, 1941, 1944, 1947, 1951, 1960; Epling and Mathias 1957; Epling and Játiva 1963, 1966, 1968; Appendix 2). Quantitative variables were counted or measure with a rule and caliper, and these data were used to enhance descriptions of the species. Plant height and flower colour were taken from specimen labels when available and from field observations.

Geographic coordinates were used to prepare the distribution maps. Those specimens without, or with incorrect, geographic coordinates were georeferenced according to recommendations of Wieczorek and Hijmans (2004), but without a calculation of uncertainty.

Taxonomic treatment

The taxonomic treatment was prepared based on morphological data surveyed on specimens examined and field observations. It is preceded by a morphological conspectus of the species. Genus, subgenus, section and species descriptions are included in alphabetical order. A key for the identification of the species in *Salvia* sect. *Membranaceae* is provided. A complete list of synonyms is given for each taxon.

Results

Morphological conspectus of *Salvia* sect. *Membranaceae*

Most of the species of *Salvia* sect. *Membranaceae* are subshrubs to shrubs, only three of them are herbs: *Salvia bupleuroides*, *S. lasiocephala* and *S. verecunda*. They grow erect except for the always trailing or subscandent *S. confertispicata* and *S. langlassei*; moreover, *S. mocinoi* and *S. sanctae-luciae* are sprawling and supported by surrounding plants when growing in dense vegetation. Height of the plants, length of branches, as well as degree and robustness of branching are variable, but plants from 0.6–1.5 m tall, profusely branched and robust are the most common. In *S. confertispicata* and *S. langlassei* Fernald, several stems arise from the ground and are poorly branched, or the internodes are long and the lateral branches are short. *Salvia lasiocephala* and *S. mexiae* are sometimes could be monopodic or with branching just before inflorescences. The three herbs of the section generally are the less tall and the most delicate, though, *S. verecunda* consists of both delicate and robust plants.

The stems are quadrangular and caniculate between the angles and often reddish or dark magenta tinged; old stems tend to be terete in *S. mexiae*, *S. mocinoi* and *S. sanctae-luciae*, glabrescent and brown to green. Nodes are slightly thickened and more densely pubescent. Pubescence is more or less uniform between species, pilose to moderately hirsute, puberulent, or rarely hispidulous, sometimes difficult to be unambigously assigned to a particular kind. Pubescence is not useful for distinguishing taxa within this section. The hairs are simple (and sometimes glandular-capitate in *S. bupleuroides*), uniseriate, pellucid or sometimes yellowish to ferruginous in *S. mocinoi*, usually retrorse or variably curled. Stems in *S. confertispicata*, *S. langlassei* and *S. nitida* are often glabrous.

The leaves on the stem of *S. mexiae* and *S. nitida* are sessile or subsessile, whereas in the remaining species, the leaves are always petiolate, becoming progressively shorter or even sessile toward and close to the inflorescences. Blades are usually ovate to narrowly ovate, with base rounded to cordate; margin always serrate; apex acute to acuminate. *Salvia mexiae* is unique in that it posses narrowly lanceolate leaf blades; in *S. sanctae-luciae* the blades are elliptic to ovate-elliptic, with base attenuate; and in *S. bupleuroides*, the blades are ovate to rhombic-ovate; *Salvia mocinoi* has the most variable blades: ovate, narrowly ovate, ovate-elliptic to rhombic-ovate and rounded, with base subcordate, cuneate, obliquous, or long-attenuated. The upper surface of the blade is

Fig. 1. *Salvia bupleuroides.* **A**) lateral view of monocephalous inflorescence; **B**) frontal view of the flower showing white nectar guides; **C**) pubescence of the stem (taken by J.G. González-G.).

commonly bullate or rugose, except in *S. confertispicata* and *S. nitida*, and some populations of *S. mocinoi* from Veracruz, Mexico, that correspond to what was described as *S. zacuapanensis* Brandegee. Pubescence is sparse and composed of appressed simple (sometimes also glandular-capitate hairs in *S. bupleuroides* and *S. mocinoi*), uniseriate hairs, and puberulent on both surfaces, but more abundant and glandular dotted below, and frequently with the hairs concentrated on the veins and along the margin. Blades of *S. confertispicata* and *S. nitida* are almost glabrous and lustrous above, especially in the latter.

The inflorescences are terminal or axillary racemes, composed by verticillasters, which consist of two demiwhorls that are subtended at the base by a floral bract. Verticillasters are multi-flowered, crowded together to long separate from each other, lax and crowded inflorescences can be found in the same species and even within the same population; the inflorescences tend to have the flowers progressively more crowded distally. Most of the inflorescences of *S. bupleuroides* have only one verticillaster (monocephalous). It should be noted that the term verticillaster has sometimes been regarded as equivalent to demiwhorl (Epling 1939, 1940, 1941, 1944, 1951), so this must be consider when making a comparison. Floral bracts in *Salvia* sect. *Membranaceae* are very showy and usually brightly coloured, reddish to magenta, bluish to violet, or green, often straw-coloured when dried; they are reniform to ovate, with margin finely serrate and usually ciliated, with apex acuminate to long caudate as in *S. glabra*, *S. lophanthoides* and sometimes truncate to subcordate in *S. mocinoi*, outer surface puberulent, covered with some appressed and sometimes also with glandular-capitate hairs and sessile glandular dots as in *S. bupleuroides*, or almost glabrous as in *S. nitida*, inner surface is always glabrous except for the joint to floral axis which is covered by appressed hairs. The bracts persist even in fruit. Floral axis manifests a similar pubescence on the stems, but additionally it often has glandular-capitate hairs.

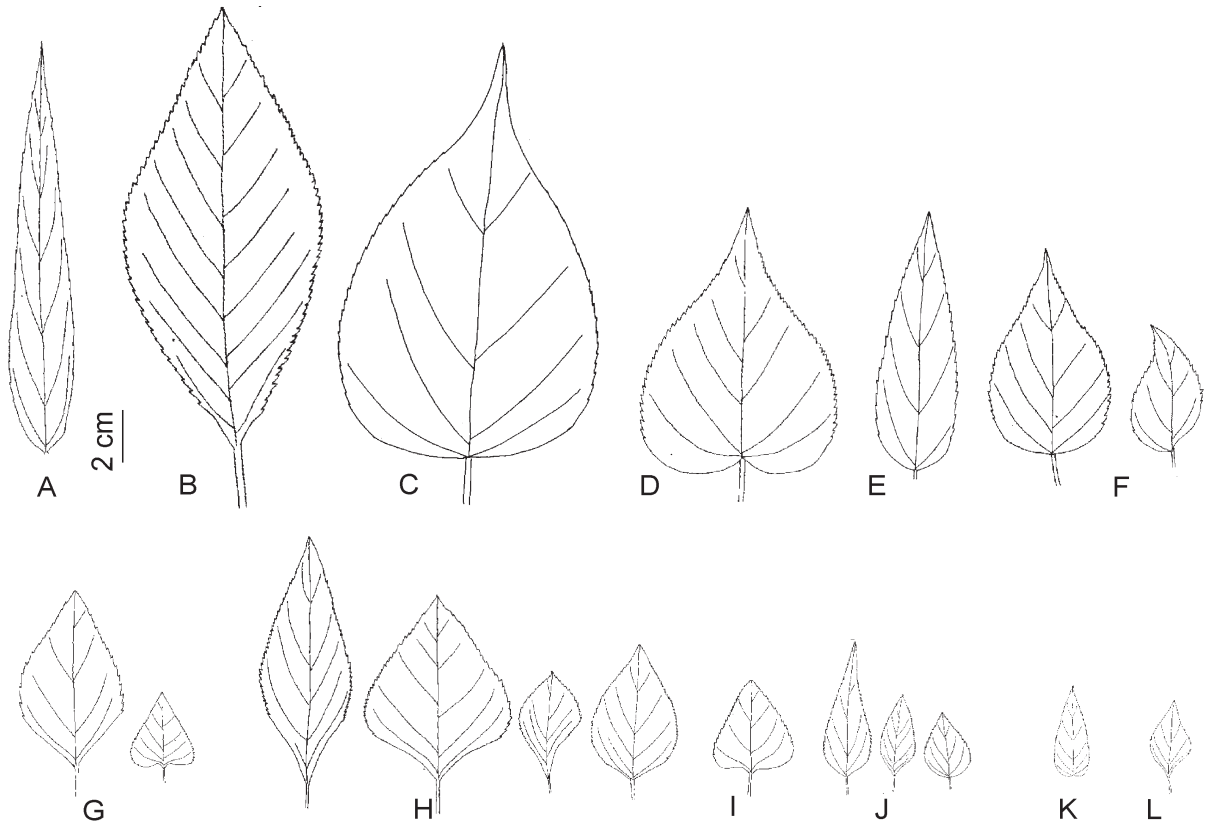

Fig. 2. Leaf shape comparison between *Membranaceae* species. **A**) *Salvia mexiae*; **B**) *S. sanctae-luciae*; **C**) *S. lophanthoides*; **D**) *S. glabra*; **E**) *S. langlassei*; **F**) *S. compsostachys*; **G**) *S. lasiocephala*; **H**) *S. mocinoi*; **I**) *S. verecunda*; **J**) *S. confertispicata*; **K**) *S. nitida*, and **L**) *S. bupleuroides* [A–J drawn by J.G. González-G.; illustrations based on A *J.G. González-G. et al. 882* (IBUG), B *J.G. González-G. et al. 923* (IBUG), C *J.G. González-G.1508* (IBUG), D *L.M. Villarreal de Puga 779* (IBUG), E *J.G. González-G. 1517* (IBUG), F *J.G. González-G. 654* (IBUG) and *656* (IBUG), G *E. Martínez-S. 5260* (IBUG) and *J.G. González-G. 510* (IBUG), H *J.G. González-G. 1449* (IBUG), *R. Acosta-P 805 and F. Vázquez-B.* (XAL), *M.E. Medina-A. 174 and R. Acosta-P.* (XAL), and *J.G. González-G. 1368* (IBUG), I *S. González 3615 and S. Acevedo* (IBUG), J *J.G. González-G. 1438 and J.H. Zárate-J.* (IBUG), *J.G. González-G. 1184* (IBUG), and *P. Tenorio-L. et al. 2658* (IBUG), K *J.G. González-G.571* (IBUG), and L based on *E. Martínez-S. 5744* (IBUG].

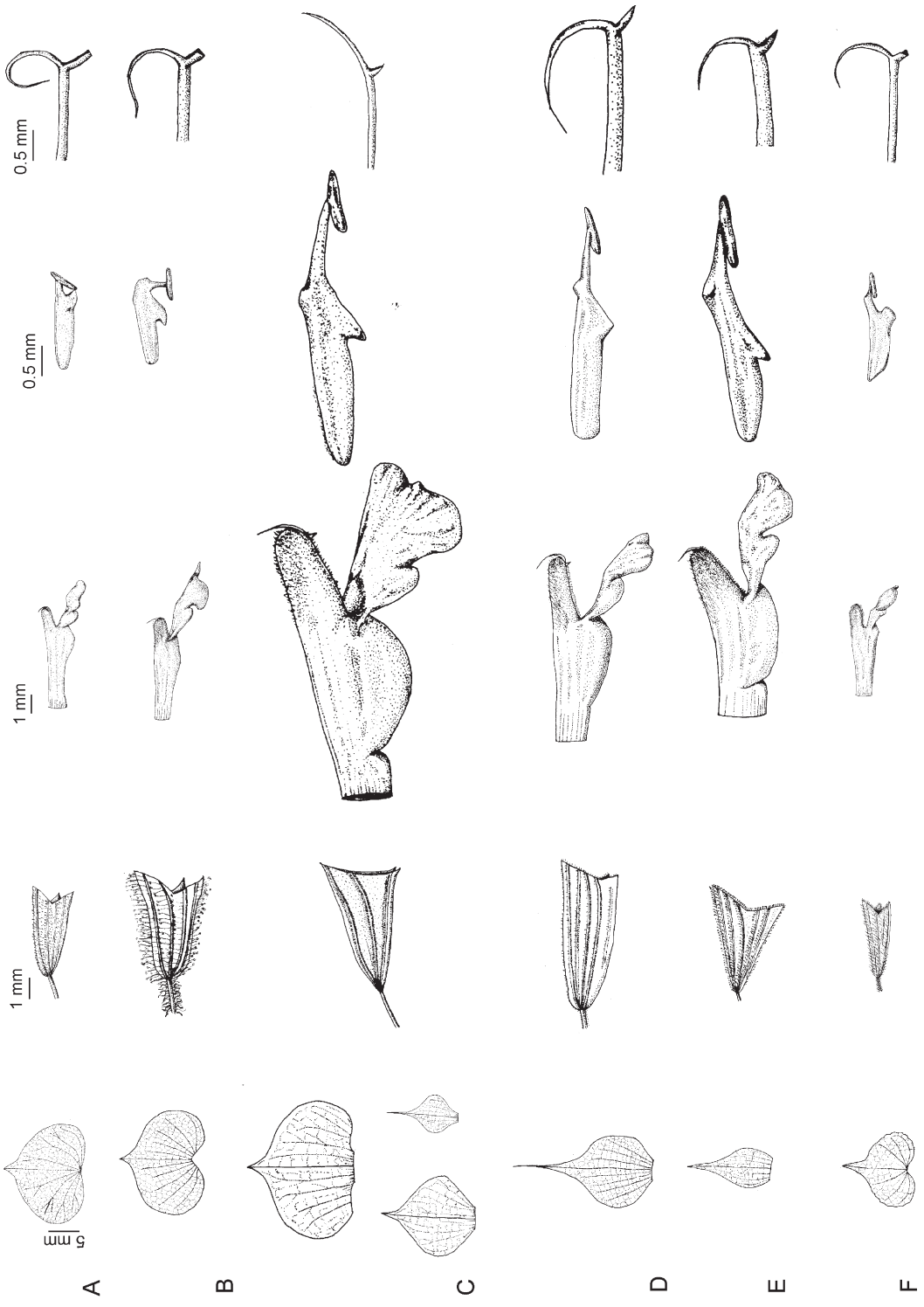

Fig. 3. Comparison of floral bracts, calyces, corollas, connectives, and apical portion of the styles of the species of *Salvia* sect. *Membranaceae*. **A**) *Salvia bupleuroides*; **B**) *S. compsostachys*; **C**) *S. confertispicata*; **D**) *S. glabra*; **E**) *S. langlassei*; **F**) *S. lasiocephala*; **G**) *S. lophanthoides*; **H**) *S. mexiae*; **I**) *S. mocinoi*; **J**) *S. nitida*; **K**) *S. sanctae-luciae*; and **L**) *S. verecunda*. In C) and H) three floral bracts of the same species are shown to properly represent shape variation [A–J drawn by J.G. González-G.; illustrations based on A *E. Martínez-S. 5744* (IBUG) and *J.G. González-G. 594* (IBUG), B *J.G. González-G. 656* (IBUG), C *J.G. González-G. 589, 1184* (IBUG), and *J.G. González-G. 1438 and J.H. Zárate-J.* (IBUG), D *H. Rubio 1283* (IBUG), E *J.G. González-G. 1517* (IBUG), F *J.G. González-G. 1164 and D. Juárez* (IBUG), G *J.G. González-G.1508* (IBUG), H *J.G. González-G. 882* (IBUG), I *M. Martínez-M. 84* (HEM), and *J.G. González-G. 602 and J.A. Vázquez-García* (IBUG), J *E. Martínez-S. 5768* (IBUG), K *J.G. González-G. et al. 923*, L *S. González 3615 and S. Acevedo* (IBUG)].

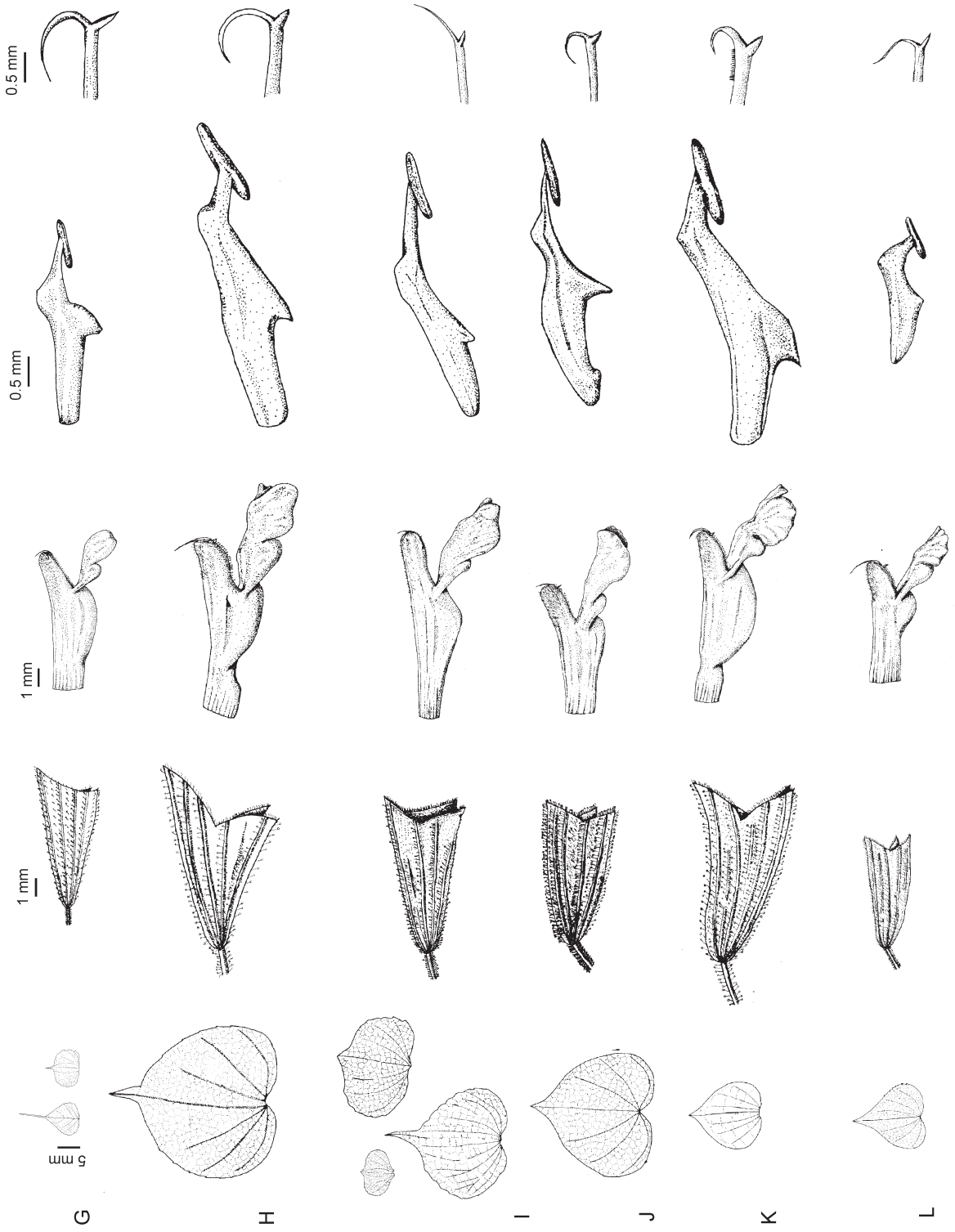

Fig. 3. cont.

Flowers are subsessile to distinctly pedicellate. Pedicels are pilose and frequently covered also with glandular-capitate hairs. Calyces are tubular, green, magenta to dark magenta, violet or purplish; outer surface shares a similar pubescence to the pedicels , but the hairs are usually concentrated on the veins and additionally glandular dotted; inner surface is somewhat verrucose or covered with short pyramidal hairs toward apex; calyx lips are acute to shortly acute and ciliated, the upper lobe is furrowed by 5–7 veins extending to the margin; the two lower lobes are distinct or connate ⅔ to ¾ of their length as in *S. sanctae-luciae* and sometimes in *S. langlassei*. Corollas are sky blue or violet as in *S. confertispicata*; indumentum consists of shortly pilose hairs that are almost restricted to dorsal surface of upper and ventral surface of lower lip, the upper is also bordered by short glandular-capitate hairs along the ventral margin; corolla tube is paler to white toward the base, longer than lips, straight or ventricose, invaginated or not at base, internally ornate with two papillae or naked as in *S. bupleudoides, S. compsostachys*, and *S. lasiocephala*; upper lip is white (only in *S. mexiae*), lower lip is longer than upper one, ornate with white nectar guides near corolla entrance. There are two stamens transversely disposed within corolla tube, hence blocking access to the nectary of the ovary. Stamens are often accompanied by two staminodes above and behind filament insertion to corolla tube. Filaments are shorter than connectives, these bear one fertile theca, posterior portion of connectives are connate between stamens. Connectives are ornate at ventral midportion with an acute tooth, sometimes truncate as in *S. mexiae* and *S. nitida*. Thecae are ellipsoid, dorsifixed, longitudinally dehiscent and extrorse. Ovary is supported by a gynobase with a prominence known as gynobasic horn that acts as a nectary; locules are usually longer than gynobasic horn; style is inserted between the locules, is glabrous except in *S. sanctae-luciae* in which it presents some simple hairs just before stylar branches, these are unequal, the upper is longer and arquate, the lower is straight, acute or truncate at the apex; in *S. bupleuroides* the lower branch has an abrupt and short twist at the apex.

There are two kinds of mericarps in *Salvia* sect. *Membranaceae*, both are smooth and glabrous, and release mucilage when moistened, they differ in shape and colour. The first is the most common and consists of ovoid structures, light brown and dark brown, presenting a marbled appearance. In contrast, in *S. bupleuroides* and *S. lasiocephala*, are lenticular and uniformly bright black.

Those characters used by Epling (1939) to defined subsections within *Membranaceae* are not clear. Sometimes the species could be intermediate between both subsections. *Elscholtzioideae* was defined by its annual lifespan, generally interrupted inflorescences, corolla tube 2.5–4 mm long and internally naked, and rounded mericarps (equivalent to what here is named as lenticular); contrasting with the perennial lifespan, generally crowded inflorescences, corolla tube 5–7.5 mm long and internally ornate with 2 or 4 pairs of papillae, and ovoid mericarps of subsect. *Lophanthoideae*. From the species of *Elzcholtzioideae* here considered as distinct, *S. bupleuroides* and *S. lasiocephala* exhibit clearly those characters of the subsection, they also share entirely black mericarps; but, *S. verecunda* exhibit corolla tube up to 4.3 mm long, and ovoid mericarps, these are light brown and irregularly dark brown marbled as in subsect. *Lophanthoideae*. Epling (1939) also stated the intermediate condition of this species. The taxonomic position of *Salvia compsostachys*, according to Epling's subsectional classification is also unclear since its corolla tube is naked, but the other characters concide with those that defined *Lophanthoideae*. Epling described this species after his revision of *Salvia* subg. *Calosphace*, and he did not assigned it to any subsection (Epling 1939, 1940). In summary Epling's subsectional classification is not followed here because its ambiguity and impracticality of recognizing subsections with few species.

Taxonomic Treatment

Salvia L., *Species Plantarum* 1: 23 (1753).

Lectotype (designated Britton and Brown 1913: 128): *Salvia officinalis* L.

Schraderia Medik., *Philosophische Botanik . . . Mannheim* 2: 40 (1791).

Audibertia Benth. in Lindley, *Edward's Bot. Reg.* 15: sub t. 1282 (1829).

Kiosmina Raf., *Fl. Tellur.* 3: 92 (1836).

Salviastrum Heist. ex Fabr., *Enum.* 231 (1759).

Polakia Stapf, *Denkschr. Kaiserl. Akad. Wiss., Wien Math.-Naturwiss. Kl.* 50(2): 43 (1885).

Ramona Greene, *Pittonia* 2(12): 301 (1892).

Pycnosphace (Benth.) Rydb., *Fl. Rocky Mts.* 1066 (1918).

Arischrada Pobed., *Novosti Sist. Vyssh. Rast.* 9: 247 (1972).

Herbs or shrubs, annual or perennial, often aromatic, with glandular hairs, glabrous to variously pubescent,

sometimes with branched hairs. Leaves simple, sessile or pedicellate, pinnatifid to pinnatisect, usually dentate, serrate to lobate, sometimes entire. Inflorescence spiciform racemes with 2–many-flowered verticillasters at each node or less frequently a thyrse, flowers distinctly to shortly pedicellate. Floral bracts deciduous or persistent, tiny and inconspicuous to large and showy, entire, dentate to serrate, or rarely spinulose. Bracteoles present or absent. Flowers small or large. Calyx ovoid, tubular or campanulate, glabrous at the throat, 15-veined, often accrescent, bilabiate, 3- or 5-lobed, upper lip entire to sometimes 3-dentate or 3-lobed, lower lip alway 2-lobed. Corolla tube included or exserted from calyx, bilabiate, with uniform diameter throughout or ventricose to expanded toward lips, straight or invaginated near base, internally naked or ornate with 2–4 papillae or folds; upper lip usually erect and concave as a hood, entire or emarginate, lower lip 3-lobed, incurved to deflexed, with middle lobe wider and emarginate or rarely entire. Stamens 2, inserted or exserted from corolla, with 1 or 2 fertile thecae; filaments short; connective extended, usually larger than filament, entire, geniculate or dentate, anterior arm always bearing a fertile theca, posterior generally without fertile theca and connate between both stamens; staminodes usually present. Gynobasic disc 4-lobed (lobes between ovary locules) with one usually larger (gynobasic horn); style bifid at apex, pubescent to glabrous, branches subulate, equal or unequal in length, lower stylar branch acute, truncate or sigmoid. Mericarps ovoid, triquetrous to lenticular, concolorous to variously marbled, usually glabrous or pilose and sometimes covered with branched hairs, smooth to verrucose, with a small abscission scar, mucilaginous or not. 2n = 12, 14, 16, 18, 14, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 42, 44, 46, 48, 60, 66, 84, 86, 240.

Salvia* subg. *Calosphace (Benth.) Epling, *Repert. Spec. Nov. Regni Veg. Beih.* 110: 4 (1939).

Basionym: *Salvia* sect. *Calosphace* Benth., *Labiat. Gen. Spec.* 198 (1833).

Calosphace (Benth.) Raf., *Fl. Tellur.* 3: 91. (1836).

Lectotype (designated by Epling 1939: 4): *Salvia coccinea* Buc'hoz ex Etl.

Salvia sect. *Microphace* Benth., *Labiat. Gen. Spec.* 198 (1832).

Salvia subg. *Jungia* Briq. in Engl., *Nat. Pflanzenfam.* 4(3a): 277 (1897).

Herbs perennial, rarely annual, shrubs or arborescent plants. Leaves petiolate or sessile; blades mostly ovate, also elliptic, narrowly ovate to linear, reniform to deltoid, thin to subcoriaceous, usually bullate above, glabrous or variously pubescent, sometimes with branched and/or glandular-capitate hairs. Flowers arranged in spiciform racemes with verticillasters or thyrses at each node, terminal or axillary, rarely the flowers solitary or in small fascicles at the axils, surrounded by inconspicuous or conspicuous, deciduous or persistent bracts; bracteoles usually absent. Upper calyx lip usually entire, less frequently trimucronate, 3–9-veined. Corolla concolorous or nuance, blue, red, magenta to pink, violet or rarely white or yellow; tube straight to ventricose, internally naked or ornate with 2 or 4 papillae or folds, often invaginate at the base; upper lip erect, hooded, lower lip 3-lobed, the middle lobe emarginate. Stamens inserted or exserted; fertile theca 1(or 2); connective geniculate, dentate or entire, posterior arms of both stamens distally connate; staminodes 2, usually present. Style pilose to glabrous, lower branch acute, truncate or sigmoid.

Salvia* sect. *Membranaceae (Benth.) Epling, *Repert. Spec. Nov. Regni Veg. Beih.* 110: 143 (1939).

Basionym: *Salvia* subsect. *Membranaceae* Benth., *Labiat. Gen. Spec.* 202 (1833).

Type: *Salvia bupleuroides* J.Presl ex Benth.

Herbs annual or perennial and delicate, or shrubs erect, or trailing to subscandent. Leaves generally ovate, narrowly ovate, rhombic, elliptic or narrowly lanceolate. Inflorescences in compact or lax racemes, verticillasters many-flowered (usually with more than 10 flowers), floral bracts persistent, reniform, membranaceous with manifest reticulate veins, abruptly acuminate at the apex, cordate to truncate at the base, often showy coloured, somehow translucent, with venation reticulate (visible to the naked eye). Flowers subsessile to shortly pedicellate. Calyx with upper lip 5–9-veined, deltoid, obtuse to acute, lobes of the lower lip more or less enclosing the throat at maturity. Corolla sky blue to violet, part of tube and sometimes upper lip white, lower lip generally with white nectar guides; tube straight or ventricose, straight or invaginate at base, internally naked to ornate with 2 or 4 papillae; upper lip shorter than lower one, bordered with glandular-capitate hairs at ventral portion. Stamens included in corolla; connective ornate with a retrorse or antrorse acute or truncate tooth at midportion. Gynobasic horn longer than ovules; style glabrous or rarely pubescent, upper branch attenuated, lower branch rounded or obutse and caniculate. Mericarps ovoid or lenticular, concolorous or irregularly marbled, smooth and glabrous.

Key to the species of *Salvia* subg. *Calosphace* sect. Membranaceae

1a. Leaves sessile or subsessile; petioles up to 8 mm long 2

1b. Leaves petiolate; petioles of midstem leaves > 15 mm long 3

2a. Blades narrow lanceolate, 6–15 cm long; inflorescence 5–12 cm long, verticillasters usually crowded (Jalisco, Mexico) ..... *S. mexiae*

2b. Blades ovate to narrowly ovate, 2–3(–5.5) cm long; inflorescence (9–)14–24 cm long, lax (Oaxaca and Guerrero, Mexico) ..... *S. nitida*

3a. Annual herbs, usually < 80 cm tall; corolla tube internally epapillate; lower stylar branch truncate; mericarps lenticular and uniformely black 4

3b. Perennial herbs, subshrubs to shrubs, usually > 100 cm tall; corolla tube internally papillate or epapillate, lower stylar branch acute or truncate; mericarps ovoid, brown and irregularly dark brown marbled 5

4a. Inflorescence in racemes with only one verticillaster or rarely two, and floral axis arranged in pseudo-umbels; lower stylar branch oblong and slightly curved upward at the apex (Guerrero, Mexico) ..... *S. bupleuroides*

4b. Inflorescence in racemes generally with 3–25 verticillasters, floral axis not arranged in pseudo-umbels; lower stylar branch truncate (widely distributed through the Mexican eastern and western mountain ranges to north of South America) ..... *S. lasiocephala*

5a. Corolla tube epapillate 6

5b. Corolla tube papillate 7

6a. Subshrub; violet to bluish floral bracts and calyces, sometimes with green tinge; upper calyx lip 5–7-veined; connective 1.2–1.4 mm long; lower stylar branch truncate (eastern Mexico: Nuevo León, Tamaulipas, Querétero, Hidalgo, northern Veracruz and northern Puebla) ..... *S. compsostachys*

6b. Perennial herb; magenta to reddish floral bracts and calyces, sometimes with green tinge or green; upper calyx lip alway 5-veined; connective 2–2.3 mm long; lower stylar branch acute (NW Mexico: Sonora, Chihuahua and Durango) ..... *S. verecunda*

7a. Blades broadly to narrowly ovate, with base rounded to subcordate; floral bracts long caudate at apex (cauda up to 8.2 mm long, longer or as long as a half bract length); mericarps 1.1–1.3 mm long, 0.6–0.9 mm diam. (Mexico: northeastern Querétaro and northwestern Hidalgo, eastern Guerrero and western Oaxaca) 8

7b. Blades ovate, narrowly ovate, elliptic to rhombic-ovate, cuneate, rounded, rounded and shortly cuneate, truncate, to long-attenuated; floral bracts generally acuminate at apex, or if caudate, then cauda less than half bract length; mericarps 1.2–2.3 mm long, 1–1.6 mm diam. (Mexico: variously distributed but not present in Querétaro nor Hidalgo) 9

8a. Floral axis covered with glandular-capitate hairs; cauda of floral bract 5–8.2 mm long; pedicel in flower (1.3–)1.5–2(–2.8) mm long; calyx 7–8 mm long, 3–3.7 mm diam., alyx lips (1–)1.6–2.2 mm long, upper one 5- or 7-veined; corolla tube 6–6.9(–7.7) mm long, 1.8–2.9(–3.4) mm diam.; style (6–)8.7–9.8 mm long ..... *S. glabra*

8b. Floral axis without glandular-capitate hairs; cauda of floral bract 2.3–4.8 mm long; edicel in flower 0.2–0.5 mm long; calyx 5–5.9 mm long, 2.3–3.1 mm diam., calyx lips 1.1–1.2 mm long, upper one 5-veined; corolla tube 5–5.6 mm long, 2.3–3.1 mm diam.; style 6.7–7.4 mm long ..... *S. lophanthoides*

9a. Trailing to subscandent shrubs; corolla violet, tube (6.3–)7.5–9.6(–10) mm long, (3–)4.3–5.5 mm diam.; connective 4.5–5.6 mm long ..... *S. confertispicata*

9b. Erect or subscandent shrubs; corolla sky to pale blue and sometimes with corolla tube and upper lip white, tube (4.4–)5–7 mm long, 2.2–3.8 mm diam.; connective 2.4–5.2 mm long 10

10a. Floral bracts usually exceeding pedicel and calyx length; Calyx 5–7.5 mm long, 2–3.2(–4) mm diam., lips short, acute or subtruncate, up to 1.6 mm long, lobes of lower lip distinct; corolla tube not invaginated at base (widely distributed from the Trans-Mexican Volcanic Belt to northern Nicaragua) ..... *S. mocinoi*

10b. Floral bracts usually not exceeding pedicel and calyx length; calyx (7.2–)7.6–9.1 long, 4–5.7 mm diam., lips acute, 2.5–4.3 mm long, lobes of lower lip usually connate ⅔ to ¾ of their length; corolla tube invaginated at base (Mexico: southern Sinaloa and Nayarit, or Guerrero) 11

11a. Subscandent shrubs; blades lanceolate to narrowly ovate; upper calyx lip 7-veined; style glabrous; mericarp (1.1–)1.6–1.8 mm long (plants from Guerrero, Mexico) .....*S. langlassei*

11b. Erect shrubs; blades elliptic to rhombic-ovate; upper calyx lip 5-veined; style dorsally hispidulous at apex; mericarp (1.7–)2.2–2.3 mm long (Mexico: southern Sinaloa and Nayarit) ..... *S. sanctae-luciae*

1. *Salvia bupleuroides* J.Presl ex Benth., *Labiat. Gen. Spec.* 271 (1833).

Type: MEXICO. Guerrero: road from Acapulco to Mexico City, 1832 (fl), *Haenke* s.n. (lectotype PR, isolectotype K!; designated in Epling 1939: 145). (Figs 1, 2L, 3A).

Annual herb, erect, 20–70 cm tall; stems pilose and moderately hirsute. Leaves with petioles (0.5–)1–1.8 cm long, covered with retrorse hairs, glandular-capitate hairs sometimes present; blades broadly ovate to rhombic-ovate, 1.6–2.7(–5) cm long, (0.8–)1–1.9 cm wide, base rounded to subcordate or truncate to subcuneate, margin crenate to serrate, apex acute, both surfaces glabrous or tiny puberulent. Inflorescences composed by several monocephalous (one verticillaster) or rarely bicephalous (two verticillasters) racemes in a secondary umbelliform arrangement (3–8 racemes per pseudoumbel), floral axis (3.6–)6–19(–28) cm long, covered with glandular-capitate hairs and/or eglandular retrorse ones, with verticillasters 10–32-flowered. Floral bracts broadly ovate to reniform, 5.4–13 mm long, (7–)10–14.6 mm wide, persistent, green and irregularly magenta tinged, sparsely covered with eglandular hairs in outer surface, inner surface glabrous, base subcordate, margin serrate and bordered with short glandular-capitate hairs and/or eglandular ones, apex acuminate. Pedicel 1–2 mm long, covered with short glandular-capitate hairs. Calyx 3.5–4.6(–5.5) mm long, (1.5–)2.6–3.8(–4.4) mm diam., usually green, densely covered with glandular-capitate hairs and sparsely glandular dotted, covered with short conical hairs on inner surface, lips short acute, 1–1.4 mm long, upper lip 5-veined. Corollas sky blue with white nectar guides on lower lip, upper lip sparsely pilose and bordered with glandular-capitae hairs, the rest glabrous; tube 3.7–4.5 mm long, 1–1.2 mm wide, ventricose and not invaginated at base, internally naked (epapillate); upper lip 1–2 mm long, lower lip 3.4–4.1 mm long, 4.5–5 mm wide. Stamens included; filament 0.5–1 mm long;

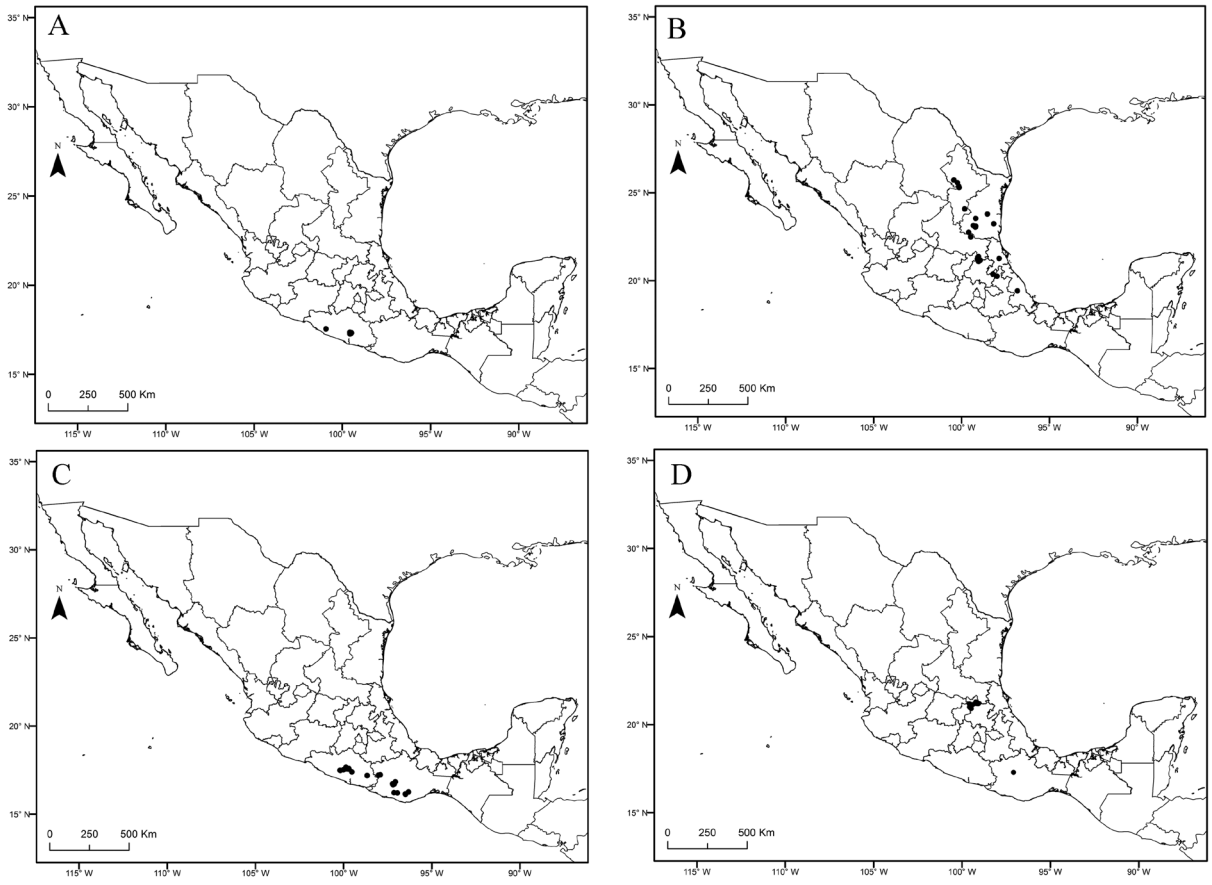

Fig 4. Distribution maps of **A**) *Salvia bupleuroides*, **B**) *S. compsostachys*, **C**) *S. confertispicata*, and **D**) *S. glabra*.

connective 1.2–1.5 mm long, with a rounded antrorse tooth near insertion of theca; theca 0.5–0.7 mm long; staminodes absent. Gynobasic horn 0.5–1 mm long; style 2.5–4 mm long, glabrous (very rarely and scarcely pilose) at apex, lower branch oblong (1 mm long) and slightly curved upward at apex, and truncate. Mericarp lenticular, 0.5–1 mm in diam., uniformly black, smooth, glabrous.

Distribution, habitat and phenology: *Salvia bupleuroides* is endemic to the lowlands of the state of Guerrero, Mexico (Fig. 4A). It grows in open areas in the confluence between pine-oak or pine, with tropical deciduous forests, from 700–1050 m elevation. It shares habitat with *Acacia farnesiana* (L.) Willd., *A. cochliacantha* Humb. & Bonpl. ex Willd, *Asterohyptis stelullata* (Benth.) Epling, *Clethra lanata* M.Martens & Galeotti, *Cochlospermum vitifolium* (Willd.) Spreng., *Elytraria imbricata* (Vahl) Pers., *Lobelia laxiflora* Kunth, *Pinus oocarpa* Shiede ex Schltdl., *Quercus glaucescens* Bonpl. It flowers and fruits from October to February.

Etymology: The name of this species derives from the greek word βου (bou, ox) and πλευρον (pleuron, rib), such epithet is used to designate several plants that belong to the current genus *Bupleurum* L. (Apiaceae); hence, it makes reference to the likelihood between the umbels of those species and the pseudoumbels of this *Salvia*.

Specimens examined: MEXICO. Guerrero: km 339–40 between Acahuizotla and Agua de Obispo on highway to Acapulco, 914 m, 30 September 1949, (fl, fr), *H.E. Moore 5124* (UC); Mexico Acapulco highway N of Acapulco, 807 m, 23 January 1955 (fl), *M.C. Carlson 3100* (MICH); carretera cerca de Acapulco, 24 December 1958 (fl), *L. Paray 2849* (ENCB, MEXU); entre Chilpancingo y Tierra Colorada, 27 December 1954 (fl), *L. Paray 1485* (ENCB); Rincón Viejo, 17°1740'N, 99°30'00"W 750 m, 1 November 1960 (fl), *G.B. Hinton et al. 580* (ENCB, MEXU); 1.5 miles W of logging road off Mexico Hwy 95 (Acapulto to Iguala), 0.2 miles S of km 34 marker, 18.7 miles S of Chilpancingo, 25 October 1975 (fl), *K.M. Peterson et al. 333* (MEXU); 5.2 km al O del Ocotito, camino a Jaleaca, 735 m, 10 November 1982 (fl), *R. Torres-C. et al. 1757* (ENCB, MEXU, XAL); 3.5 km al N de Soyatepec, brecha maderera, 920 m, 12 November 1982 (fl, fr), *M. Martínez-M. and R. Torres-C. 2574* (MEXU); 3.5 km al SE de Soyatepec por el camino al cerro El Toro, 17°18'40"N, 99°32'00"W, 1000 m, 14 November 1982 (fl), *L.C. Rodríguez-M. 2492* (MEXU); 5 km al O de El Ocotito, camino a Jaleaca, 700 m, 24 November 1983 (fr), *E. Martínez-S. 5744* (IBUG, MEXU); Agua de Obispo, 25 km al NE de Tierra Colorada, 1040 m, 29 October 1984 (fl), *J.C. Soto-N. 6863* (MEXU); Tecpan, El Campamento, 2 km al NE de El Porvenir, 780 m, 7 February 1986 (fl), *J.C. Soto-N. et al 12316* (MEXU); Chilpancingo, 5 km al NO de El Ocotito, por la brecha hacia Tlahuizopa (Jaleaca), a la orilla de la brecha, 17°16'12.4"N, 99°33'34.6"W, 716 m, 1 February 2010 (fl, fr), *J.G. González-G.594* (CIIDIR, ENCB, GUADA, IBUG, IEB, MEXU, XAL, ZEA).

Epling (1939) regarded *Salvia bupleuroides* as a synonym of *S. galinosogifolia* Fernald, though he recognize the species as valid in an unpublished manuscript held at the Royal Botanic Gardens, Kew, and at the University of Maryland. *S. bupleuroides* is here regarded as a valid species, distinct from *S. galinsogifolia*, and the latter as a synonym of *S. lasiocephala*. *Salvia bupleuroides* has monocephalous inflorescences, secondarily arranged in pseudoumbels, and the lower stylar branch is oblong and upwardly curved, whereas *S. lasiocephala* has terminal or axillary racemes with at least 3 verticillasters per floral axis, and lower stylar branches that are truncate and straight (not curved). Some specimens of *S. lasiocephala*, for example, *Rzedowski 17898* (MEXU), *González-O. 234* (MEXU) and *Saunders-S. 1589 and Dieringer* (MEXU), all exhibit axillary inflorescences with only one verticillaster, but not arranged in pseudoumbels, and accompanied with a terminal inflorescence with more than three verticillasters; so they cannot be confused with *S. bupleuroides*.

The nearest populations of *Salvia bupleuroides* to the coastline in Guerrero (municipality of Tecpan de Galeana) present glandular-capitate hairs in stems, petioles and leaves; the populations of the municipality of Chilpancingo either do not have glandular-capitate hairs or if present, these hairs are sparser than usual on stems, petioles and leaves.

2. *Salvia compsostachys* Epling, *Bull. Torrey Bot. Club* 67: 519 (1940).

Type: MEXICO. Nuevo León: Villa de Santiago, trail between Potrero Redondo and Las Ajuntas, 24 August 1939 (fl), *C.H. Muller 2982* (holotype UC, isotype LL). (Figs 2F, 3B, 5).

Shrub to subshrub, erect, 30–80(–100) cm tall; stems moderately pilose between ribs. Leaves with petioles (1.5–)3–6 cm long, moderately pilose; blades ovate or narrowly ovate, (3.1–)5–8 cm long, (1.5–)3–3.7(–5) cm wide, base rounded or shortly cuneate, margin crenate to serrate, apex long-acuminate, upper surface sparsely pilose, lower one pilose, mainly on veins. Inflorescences in racemes, floral axis 14–21 cm long, pilose, with 5–9 verticillasters, each one 8–12-flowered, verticillasters 1–4 cm apart, gradually increasing toward base. Floral bracts reniform to ovate, (7–)10–12.2 mm long, 8–12 mm wide, persistent, violet to bluish and green tinged, outer surface sparsely pilose, inner one glabrescent, base truncate to subcordate, margin entire and profusely bordered by a line of simple and glandular-capitate hairs, apex abruptly acuminate (acumen up to 2.5 mm long). Pedicel (1.6–)2.1–3 mm long, densely pilose. Calyx (4.6–)5–6 mm long, (1.9–)3–3.3 mm diam. in flower (up to 6.5 mm long, 4 mm diam. in fruit), violet to bluish and green tinged, externally pilose

with eglandular and glandular-capitate hairs, internally sparsely covered with tiny conical hairs, lips acute and widely deltoid, 2–2.5 mm long, the upper one 5- or 7-veined. Corolla sky blue and with white nectar guides on lower lip, only upper lip shortly pilose and covered with short glandular-capitate hairs; tube 4–4.6 mm long, 1.7–2 mm wide, not ventricose, base not invaginated, internally naked (epapillate); upper lip (1.6–)2–2.7 mm long, lower lip (4.1–)5.3–7.8(–8.5) mm long, (5.8–)6.8–7.4 mm wide. Stamens included; filament 0.7–1.1 mm long; connective 1.2–1.4 mm long, ventrally ornate with an acute tooth at midpoint; theca 0.8–0.9 mm long; staminodes absent or present above and behind filament insertion. Gynobasic horn 0.5–1 mm long; style 5–5.7 mm long, glabrous, lower branch short and truncate at apex. Mericarp ovoid, 0.9–1.1 mm long, 0.5–0.7 mm wide, light brown and irregularly dark brown marbled, smooth, glabrous.

Distribution, habitat and phenology: *Salvia compsostachys* is endemic to the Mexican states of Nuevo León, Tamaulipas, San Luis Potosí, Querétaro, Hidalgo, northern Veracruz and northern Puebla (Fig. 4B). It inhabits oak and montane cloud forests, and subtropical scrubs from (550–)1000–1500(–1900) m elevation. It grows together with *Bocconia frutescens* L., *Bunchosia lanceolata* Turcz., *Carya ovata* (Mill.) K.Koch, *Cyathea mexicana* Schltdl. & Cham., *Dendropanax arboreus* (L.) Decne. & Planch., *Dodonaea viscosa* Jacq., *Euphorbia dioscoreoides* Boiss, *Heimia salicifolia* Link, *Heliocarpus terebinthinaceus* (DC.) Hochr., *Juglans mollis* Englem., *Licaria peckii* (I.M. Johnst.) Kosterm., *Liquidambar styraciflua* L., *Ostrya virginiana* (Mill.) K. Koch, *Platanus mexicana* Moric., *Prunus samydoides* Schltdl., *Quercus coccolobifolia* Trel., *Q. laeta* Liebm., *Q. polymorpha* Schltdl. & Cham., *Q. rysophylla* Weath., *Pinus greggii* Engelm. ex Parl., *Rollinia membranaceae* Triana & Planch., *Sideroxylon palmeri* (Rose) T.D.Penn. and *Turpinia insignis* (Kunth) Tul. It flowers and fruits from May to December.

Etymology: The name of this species derives from greek words κομψος (compsos, graceful), and σταχυσ (stachys, spikelet); making reference to its delightful inflorescences.

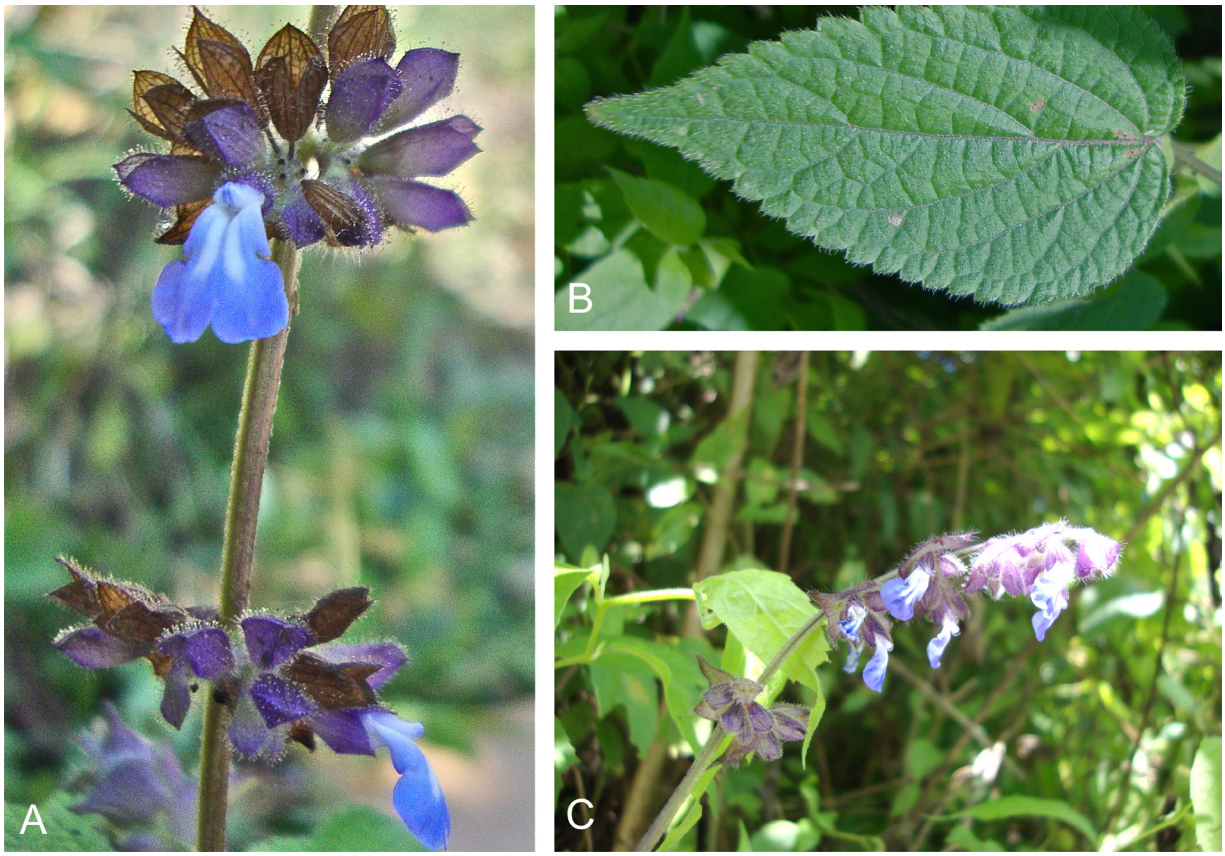

Fig. 5. *Salvia compsostachys.* **A**) detail of the verticillaster; **B**) leaf blade; and **C**) inflorescence (taken by J.G. González-G.).

Specimens examined: MEXICO. Hidalgo: Puerto del Zopilote, near km 329 on highway between Santa Ana and Chapulhuacán, 1158 m, 25 September 1949, (fl), *H.E. Moore 5078* (UC); Mex. Highway 85 at town of Palomas, 41.4 mi S of Tamazunchale and 22.9 mi N of Jacala, 1480 m, 4 July 1979 (fl, fr), *C.R. Broome and R.K. Solomon 2490* (MEXU); 10 km al NE de Tenango de Doria, hacia San Bartolo Tutotepec, 1240 m, 20 June 1983 (fl), *R. Torres-C. 3002 and H. Hernández* (MEXU). Nuevo León: Villa de Santiago, trail between Potrero Redondo and Las Ajuntas, 14 August 1920, (fl), *C.H. Muller 2982* (UC); Horsetail falls near Villa de Santiago, 10 miles of Monterrey, August 1934, (fl), *L.A. Kenoyer 134* (UC); Horstail Falls, 10 October 1937 (fl), *L.A. Kenoyer 342* (F); near Las Mitras, 4 mi from Monterrey, August 1946 (fr), *J.J. Roybal 640* (MEXU); Cola de Caballo, Monterrey, 17 September 1959 (fl, fr), *C.L. Díaz-L. s.n.* (ENCB); Hacienda Cola de Caballo, formerly Hacienda Vista Hermosa, ca. 30 km S of Monterrey, 25.37°N, 100.17°W, 900 m, 1 December 1985 (fl, fr), *S.A. Reisfield 1308* (MEXU, XAL); Cañón El Diente, Sierra Madre Oriental, 20 km al S de Monterrey, 25.57°N, 100.23°W, 700 m, 21 September 1989 (fl), *J. Valdés-R. et al. 1964* (CHAPA), *4964* (MEXU); Aramberri, cerro El Viejo, 1270 m, 2 October 1993 (fl, fr), *G.B. Hinton et al. 23825* (MEXU, MO). Puebla: Ixtepec, Hotel Mi Ranchito, Villa Juárez, 1600 m, 1 November 1966 (fl), *L.M. Villarreal de Puga 12673* (IBUG). Querétaro: alrededores de Agua Zarca, 1300 m, 12 October 1987 (fl), *J. Rzedowski 45224* (IEB); 2 km al NE de El Humo, 1100 m, 13 December 1989 (fl, fr), *H. Rubio 1413* (IEB); 6.5 km al NE de El Humo por el camino a Neblinas, 21.26°N, 99.97°W, 1120 m, 25 September 2002 (fl), *S. Zamudio-R. 12116 and V. Steinmann* (IEB). San Luis Potosí: km 253 de la carretera San Luis Potosí-Antiguo Morelos, 1200 m, 28 October 1956 (fl, fr), *J. Rzedowski 8370* (ENCB); 5 km al NE de ejido de Xilitlilla, 1400 m, 5 May 1959 (fl), *J. Rzedowski 10543* (ENCB); 5 km al W de Ahuacatlán, 1450 m, 16 September 1970 (fl), *J. Rzedowski 27705* (MEXU); entrada a Xilitla a partir de la carretera Querétaro-Xilitla, 21.32°N, 9.96°W, 1170 m, 22 August 2010 (fl), *J.G. González-G. 654* (ENCB, IBUG, IEB, MEXU, ZEA); 4 km al O de Ahuacatlán, a la orilla de la carretera Xilitla-Landa de Matamoros, cerca de La Gloria, 21.31°N, 99.06°W, 1245 m, 25 August 2010 (fl), *J.G. González-G. 656* (ENCB, IBUG, IEB, MEXU, ZEA). Tamaulipas: near Frank Harrison's rancho El Cielo, in Sierra de Guatemala, above Gómez Farías, 28 August 1952, (fl), *A.J. Sharp* et al. *52098* (UC); near rancho El Cielo, 1000 m, 27 August 1955 (fl), *A.J. Sharp 50289* (UC); Aldama, región of Rancho Las Yucas, ca. 40 km NNW of Aldama, 14 October 1957, (fl, fr), *R.L. Dressler 2418* (UC); Puerto de Arrazola, Sierra de Guadalupe, 18 August 1985 (fl, fr), *F. González-M.* et al. *14722* (MEXU); Victoria, Puerto El Encinal, 6 km al Sur de la Escondida, 1900 m, 18 August 1985 (fl, fr), *F. González-M. et al. 14722* (MEXU521372); rancho el Cielo, 11 km al NO de Gómez Farías, 1200 m, 19 September 1971 (fl, fr), *F. González-M. et al. 3592* (MEXU); rancho El Cielo (Harrison Rancho of Martin and Harrell), 6.4 km NW of Gómez Farías, 108 km SSW of Ciudad Victoria, 1100–1300m, 11 August 1991 (fl), *H.H. Iltis 30628 and B. Simon* (WIS); Hidalgo, Divisadero, 1025 m, 21 September 1994 (fl, fr), *G.B. Hinton et al. 24799* (IEB, MEXU, MO); km 86 de la carretera Ciudad Victoria-Soto La Marina, 550 m, 12 December 2003 (fl), *S. Zamudio-R. 12679 and A. Ibarra* (IEB). Veracruz: Dos Ríos, El Roble, 600 m, 8 June 1979 (fl), *F. Ventura-A. 16188* (XAL); Tepetzintla, Sierra de la Peña Blanca, Sierra de Tantima, 21°19'24"N, 97°51'42"W, 21 September 1989 (fl), *P. Zamora-C. et al. 1232* (XAL).

Salvia compsostachys is similar to *Salvia verecunda*. However, it is distinctive by its violet to bluish and green tinged floral bracts and calyces (*S. verecunda*: magenta to reddish and green tinged, or green), 5–7-veined upper calyx lip (*S. verecunda*: always 7-veined), shorter connective (1.2–1.4 mm long; *S. verecunda*: 2–2.3 mm long), and truncate lower stylar branch (*S. verecunda*: acute). Furthermore, the arid lands of the Central Mexican Plateau separates both species, the first growing in Sierra Madre Oriental (Nuevo León, Tamaulipas, San Luis Potosí, Querétaro, Hidalgo, Veracruz and Puebla), and the second in Sierra Madre Occidental (Chihuahua, Sonora and Durango; compare Figs 4B *vs* 13D).

It is also morphologically similar to *Salvia glabra*, but can be differentiated from this by its abruptly acuminate floral bracts (*S. glabra*: long caudate at the apex), shorter calyces in flower (4.6–6 mm long, compared to *S. glabra*: 7–8 mm long), shorter corolla tube (4–4.6 mm long; *S. glabra*: 6–6.9(–7.7) mm long), shorter upper corolla lip (1.6–2.7 mm long; *S. glabra*: (2.6–)3–3.9 mm long), shorter connective (1.2–1.4 mm; *S. glabra*: (2.3–)3.2–5 mm long), shorter style (5–5.7 mm long; *S. glabra*: (6–)8.7–9.8 mm long), and lower stylar branch truncate (*S. glabra*: acute). They have not been collected in the same locality, though their general distributions overlap in Querétaro and Hidalgo region (Figs 4B, D).

3. *Salvia confertispicata* Fragoso & Mart.Gord., *Acta Bot. Mex.* 103: 2 (2013).

Type: MEXICO. Guerrero: Chilpancingo, 4.5 km al SW de Omiltemi por el camino a La Soledad, 2360 m, 18 January 1984, *J. Contreras 1456* (holotype FCME, isotypes IEB, MEXU, NY). (Figs 2J, 3C, 6).

Shrub, trailing to subscandent, (0.8–)1.5–2.5(–4) m long; stems pilose and soon glabrescent. Leaves with petioles (0.7–)1.4–3(–3.7) cm long, caniculate, the ribs bordered by a line of simple hairs; blades ovate to narrowly ovate, (2.6–)3–5(–8.9) cm long, (1.2–)2–3(–5) cm wide, base rounded and shortly cuneate to truncate, margin serrate, apex acute to acuminate, upper surface glabrous or pilose on the main vein, lower surface sparsely pilose, mainly on the veins. Inflorescence in racemes, floral axis (2.5–)3.5–6(–7.8) cm long, sparsely pilose, with 3–4(–8) verticillasters, each one 6–20-flowered, up to 1.5 cm gradually apart toward the base in mature inflorescences. Floral bracts ovate, (5.1–)11–14.5(–16.8) mm long, (5.2–)10–15(–24) mm wide, persistent, dark violet, both surfaces almost glabrous, base truncate to subcordate, margin entire and sparsely ciliated, apex acuminate to caudate (cauda up to 4.5 mm long). Pedicel (1.2–)1.5–2 mm long in flower (up to

4.8 mm long in fruit), pilose. Calyx 6–7(–8.4) mm long, (2.8–)3.5–5.1 mm diam. (up to 8.6 mm diam. in fruit), dark violet, sparsely pilose and covered with glandular-capitate hairs, internally covered with short conical hairs, lips acute, (1.7–)2.4–2.8 mm long, upper lip 7–veined. Corolla violet with whitish nectar guides on the lower lip, pilose and covered with glandular-capitate hairs in the upper lip and along the throat; tube 7.5–9.6 (–10) mm long, 4.3–5.5 wide, slightly ventricose, invaginated at base, internally ornate with a pair of papillae (1 mm long); upper lip 2.9–4.4 mm long, lower lip 4.7–8 mm long, 6.6–8 mm wide. Stamens included; filament 1.4–2.1 mm long; connective 4.5–5.6(–7.6) mm long, ventrally ornate with an acute tooth at midportion; theca (1.4–)1.8–2 mm long; a pair of staminodes present above and behind filament insertion. Gynobasic horn 0.6–0.8 mm long; style 8.8–11.5(–13) mm long, glabrous, lower branch acute. Mericarps ovoid, 2–2.2 mm long, 1.5–1.6 mm wide, light brown and irregularly dark brown marbled, smooth, glabrous.

Distribution, habitat and phenology: *Salvia confertispicata* is endemic to the Mexican states of Guerrero and Oaxaca (Fig. 4C). It grows exclusively in Sierra Madre del Sur, in montane cloud, pine-oak, pine, and oak forests, from (1779–)2200–2800 m elevation. It shares habitat with *Abies guatemalensis* Rehder, *Chiranthodendron pentadactylon* Larreat., *Clethra galeottiana* Briq., *Cleyera integrifolia* (Benth.) Choisy,

Fig. 6. *Salvia confertispicata*. **A**) hanging down branches along the walls of a ravine; **B**) leaf blade; **C**) inflorescence; **D**) frontal view of the flowers; and **E**) lateral view of the uppermost flower (taken by J.G. González-G.).

Clinopodium macrostemum (Moc. & Sessé ex Benth.) Kuntze, *Oreopanax echinops* (Cham. & Schltdl.) Decne. & Planch., *Pinus ayacahuite* C.Ehrenb. ex Schltdl., *P. oocarpa* Schiede ex Schltdl., *P. strobus* L., *Quercus acutifolia* Née, *Q. castanea* Née, *Q. magnoliifolia* Née, *Q. liebmannii* Oerst. ex Trel., *Q. nixoniana* S.Valencia & Lozada-Pérez, *Q. obtusata* Bonpl, *Roldana langlassei* (Greenm.) H.Rob. & Brettell, *Salvia carnea* Kunth, *S. cinnabarina* M.Martens & Galeotti, *S. karwinskii* Benth., *S. mexicana* L., *S. mocinoi* Benth., *S. polystachya* Cav., *S. protracta* Benth., *S. roscida* Fernald, *S. tricuspidata* M.Martens & Galeotti, *S. tubifera* Cav., *S. vitifolia* Benth. and *Villadia nelsoni* Rose. It flowers and fruits from the end of October to beginnings of May.

Etymology: The name of this species makes reference to its typical compact inflorescences, from the latin confertus (crowded, dense, thick) and spicatus (spike).

Specimens examined: MEXICO. Guerrero: Sierra Madre prope Chilpancingo, 2743–3048 m, 24 December 1894 (fl, fr), *E.W. Nelson 2206* (UC); San Antonio Buenos Aires, district Montes de Oca, 22 December 1937 (fl), *G.B. Hinton et al. 11703* (UC); second ridge W of Petlacala, 1915 m, 1 January 1938 (fl, fr), *Y.E.J.Mexia 9058* (UC); Laguna Soyate, 2100 m, 23 March 1939 (fl), *G.B. Hinton et al. 14106* (UC); Puerto Rico, distr. Mina, 1750 m, 15 April 1939 (fl, fr), *G.B. Hinton 14162* (ENCB); Puerto Rico, 1700 m, 15 April 1939 (fl, fr), *G.B. Hinton et al. 14168* (UC); cerro de Teotepec, December 1946 (sterile), *L. Paray 82* (ENCB); cerro Teotepec y cercanías, March 1947 (sterile), *L. Paray 4034* (MEXU); 5 km al W de Camotla, 2600 m, 8 April 1963 (fl), *J. Rzedowski 16404* (ENCB, MEXU); about 10 km W of Camotla, about 40 km W of Chilpancingo, 2500 m, 30 November 1963 (fl), *J.V.A. Dieterle 3184* (MICH); Puerto Chico, 10 km al W de Camotla, 2500 m, 30 November 1963 (fl), *J. Rzedowski 18005* (ENCB); at and just below summit of cerro Alquitrán, 17–18 km by road west of Mex. highway 95 and Mazatlán, 2600 m, 6 December 1966 (fl), *W.R. Anderson 4427 and G.W. Laskowski* (ENCB); cerro Alquitrán, cerca de Mazatlán, 2600 m, 6 December 1966 (fl), *J. Rzedowski 23671* (ENCB); cerro Alquitrán (cima), 17°23'30"N, 99°31'31"W, 2400 m, 2 May 1969 (fl), *H. Kruse 2485* (MEXU, IEB); eastern slopes of cerro Alquitrán, 5–7 km (straight line distance) west-southwest of Mazatlán, 2450 m, 11 February 1970 (fl), *W.R. Anderson 5712 and C. Anderson* (ENCB); WNW of Filo del Caballo on road to Puerto El Gallo, 2500 m, 11 November 1973 (fl), *D.E. Breedlove 36012* (MEXU); 16 km al SW de Filo de Caballo, along road to Atoyac, 2590 m, 5 October 1988 (fl), *D.E. Breedlove 64928* (MEXU); 6 km al W de Omiltemi, camino a la Soledad Las Joyas, 27 March 1982 (fl), *E. Martínez-S. 270 and O. Téllez* (ENCB, XAL); 6 km al NW de Omiltemi, brecha Chilpancingo-Omiltemi-Las Joyas, 2530 m, 11 November 1982 (sterile), *P. Tenorio-L. et al. 2658* (IBUG, MEXU); 10 km adelante de la vuelta rumbo a Atoyac, 2530 m, 8 January 1983 (fl), *A.R. López-F. 220* (MEXU); Nueva Delhi, 23 km al NE de Paraiso, carretera Atoyac-Filo de Caballo, 1510 m, 1 February 1983 (fl, fr), *P. Tenorio-L. et al. 3227* (MEXU); 12 km al SO de Filo de Caballo camino a Puerto del Gallo, 2580 m, 25 February 1984 (fl), *E. Martínez-S et al. 6144* (XAL); 26 km al SW de la Hierbabuena, camino a Filo de Caballo-Pto. Del Gallo, 26 February 1984 (fl), *E. Martínez-S. 6155* (IBUG); 5–10 km above and SW of Filo del Caballo, along road to Puerto El Gallo, 2440 m, 19 October 1984 (fl), *D.E. Breedlove 61900* (MEXU); 14 km al SO de Filo de Caballo, camino a Puerto del Gallo, 2610 m, 21 April 1985 (fl), *J.C. Soto-N. 8356 and S. Aureoles-C.* (CIIDIR, IBUG, IEB); Carrizal de Bravo, 4 km al S, 17°35'7"N, 99°50'50"W, 2800 m, 4 March 1986 (fl), *J. Calónico-S. 8298* (MEXU); 21 km al NE de Filo de Caballo, carretera a Puerto del Gallo, 2200 m, 4 May 1986 (fl, fr), *O.R. Dorado-R. et al. 1559* (HUMO); El Chayotal, parque estatal Omiltemi, 2400 m, 20 February 1994 (fl), *N. Diego 6977* (UAGC); Balsamar, 6 km al NE de Filo de Caballo, 17°35'46"N, 99°49'49"W, 2400 m, 9 November 1997 (fl), *J. Calónico-S. 6765* (MEXU); El Jilguero, 2 km al N, 17°30’45˝N, 100°0’0˝W, 2610 m, 16 January 1999 (fl), *R. Cruz-D. 3547* (MEXU); ejido de Yextla, 4 km al SW de Filo de Caballo, aprox. 2 km al W de Carrizal de Bravo, 17°37'15.1"N, 99°51'51"W, 2673 m, 31 January 2010 (fl), *J.G. González-G. 589* (IBUG); 3.8–4 km al SW de Filos de Caballo y 2 km al W de Carrizal de Bravo, 17°37'12.94"N, 99°51'51"W, 2706 m, 11 February 2012 (fl, fr), *J.G. González-G. 1184* (IBUG); 1 km al S de Carrizal de Bravo, 17°35.845'N, 99°5096'W, 2597 m, 30 October 2012 (fl, fr), *J.G. González-G .et al. 1377* (IBUG); Malinaltepec, Ojo de Agua de Cuauhtémoc, 17°11'8.9"N 98°39'32.5"W, 2231 m, 27 December 2012 (fl), *B. Nepomuceno-C. 132 and E. Cándido-B.* (IBUG, UAGC). Oaxaca: 4 km al S de Lachao, km 183 carretera Oaxaca-Puerto Escondido, 1850 m, 14 April 1965 (fl, fr), *J. Rzedowski s.n.* (ENCB); S-slopes of Sierra Madre del Sur, between Suchixepec and La Soledad, on Oaxaca-Puerto Angel road (Mexican highway 175), 2340 m, 8 November 1966 (fl), *W.R. Anderson and C.W. Laskowski 4165* (MICH); 15 km al W de San Jerónimo Coatlán, brecha a Juquila, 1940 m, 14 December 1985 (fl), *P. Tenorio-L. 10729* (MEXU); 13 km al SO de San Jerónimo Coatlán, brecha a San Gabriel Mixtepec, 16°12'N, 96°57'57''W, 1100 m, 20 February 1988 (fl), *A. Campos-V. et al. 1288* (CHAPA, MEXU); 3 km al N de San Pedro el Alto, 1980 m, 15 January 1988 (fl), *A.R. López-F. et al. 593* (UAP); 0.5 km al S de S. M. Yucunicoco, distrito de Juxtlahuaca, 2600 m, 3 March 1988 (fl, fr), *S. Salas-M. 126* (OAX); paraje El Campanario, comunidad de San Pedro El Alto, 2400 m, 29 November 1998 (fl), *A.G. Miranda-M. 782* (MEXU, OAX); paraje el Manzanal, San Pedro el Alto, 2700 m, 6 February 1995 (fl), *F. García-B. 33* (MEXU); 3 km de San Pedro Chayuco, carretera por el aserradero, 17.12°N, 98°W, 1855 m, 19 February 1995 (fl), *J.I. Calzada 19782* (MEXU); 2 km al S de San Juan Mixtepec, 16°15.3'N, 96°18.3'18.3"W, 2400 m, 14 November 1996 (sterile), *E. Hunn 439* (OAX); reserva ecológica, 5 km al NW de San Miguel Suchixtepec, 2600 m, 26 March 2011 (fl), *B. Hernández et al. 82* (MEXU); inmediaciones de el paraje El Campanario, 5.2 km al E en línea recta de Santiago Textitlán, 16°41'54.88"N, 97°12'12"W, 2650 m, 17 November 2012 (fl), *J.G. González-G. and J.H. Zárate-J. 1438* (IBUG); Cerca de el paraje El Manzanal, 11.3 km en línea recta al O de San Vicente Lachixio y 14.5 E km de Santiago Textitlán, 16°42'14.2"N, 97°7'7"W, 2343 m, 17 November 2012 (fl), *J.G. González-G. and J.H. Zárate-J. 1422* (IBUG).

Salvia confertispicata was differentiated from *S. langlassei* and *S. mocinoi* by means of an identification key (Fragoso-Martínez and Martínez-Gordillo 2013). The distinctive characters indicated were ascendant floral bracts (reflexed or divaricate in *S. langlassei* and *S. mocinoi*) with caudate apex (acuminate in *S. langlassei* and *S. mocinoi*), and compact inflorescences with internodes less than 1 cm long (lax with internodes more than 1 cm long in *S. langlassei* and *S. mocinoi*). However, Floral bract orientation relative to inflorescence axis relies on the number of flowers and their state of development; the more flowers and more developed, floral bracts will tend to be divaricate, otherwise, they will be ascendant. This can be appreciated in several specimens of *S. confertispicata*, where floral bracts changed from divaricate to ascendant from base to top of the inflorescence (*J.G. González-G.589* (IBUG), *1184* (IBUG), *J.G. González-G. 1422 and J.H. Zárate-J.* (IBUG) and *1438* (IBUG), *E. Martínez-S. et al. 6155* (IBUG), *J.C. Soto-Núñez 8356 and S. Aureoles-C.* (IBUG), and *P. Tenorio-L. et al. 2658* (IBUG)); thereby, this feature is not adequate to delimit the species. Besides, in *S. langlassei* Fernald and *S. mocinoi* Benth. (species against which *S. confertispicata* was contrasted) floral bracts are not always acuminate but also caudate; so apex shape of floral bracts does not help either to differentiate clearly between these species. The features that allows the distinction between *S. confertispicata* and *S. mocinoi* are its violet corollas with whitish (poor developed) nectar guides on lower lip (*S. mocinoi*: sky blue with clear white nectar guides), longer corolla tubes (*S. confertispicata*: (7.5–9.6(–10) mm long, *S. mocinoi*: (4.4–)5–6.6(–7.5) mm long) and invaginated at base (*S. mocinoi*: straight at base), longer connective (*S. confertispicata*: 4.5–5.6 (–7.6) mm long, *S. mocinoi*: 2.4–3.6(–4.5) mm long), longer style (*S. confertispicata*: 8.8–11.5(–13) mm long, *S. mocinoi*: 5.4–9.3 mm long) and slightly wider mericarps (*S. confertispicata*: 1.5–1.6 mm wide, *S. mocinoi*: 1–1.2 mm wide). These species grows together only in Filo de Caballos, Guerrero; *S. mocinoi* has a much more extensive distribution (compare Figs 4C *vs* 13A). *Salvia confertispicata* can be distinguished from *S. langlassei* by its smooth blades above (*S. langlassei*: bullate), shorter floral axis (*S. confertispicata*: (2.5–)3.5–6(–7.8) cm long, *S. langlassei*: 11–30.2 cm long), more crowded verticillasters (*S. confertispicata*: up to 1.5 cm from each other, *S. langlassei*: 4–6 cm of separation), usually bigger floral bracts (*S. confertispicata*: (5.9–)11–14.5(–16.8) mm long, (5.2–)10–15(–24) mm wide, *S. langlassei*: (5.5–)7.9–9 mm long, 4–4.6(–6.2) mm wide), shorter pedicel in flower (*S. confertispicata*: (1.2–)1.5–2 mm long, *S. langlassei*: 2.4–3.4(–6.3) mm long), shorter calyx lips (*S. confertispicata*: (1.7–)2.4–2.8 mm long, *S. langlassei*: 3–3.7(–4.8) mm long), corolla violet with witish nectar guides on lower lip (*S. langlassei*: blue with clear white nectar guides on the lower lip), bigger corolla (*S. confertispicata*: 7.5–9.6(–10) mm long, 4.3–5.5 mm wide, *S. langlassei*: 5.8–6.5 mm long, (2.5–)3.3–4.3 mm wide), and slightly bigger mericarps (*S. confertispicata*: 2–2.2 mm long, 1.5–1.6 mm wide, *S. mocinoi*: (1.1–)1.6–1.8 mm long, 1–1.4 mm wide). Furthermore, *S. confertispicata* usually grows in higher elevations than *S. langlassei* (*S. confertispicata*: (1779–)2200–2800, *S. langlassei*: 1400–2100 m). *Salvia confertispicata* can be also morphogically similar to *S. sanctae-luciae* Seem., mainly in terms of inflorescence architecture, but it is distinguished from this by ovate to narrowly ovate blades (*S. sanctae-luciae*: elliptic to rhombic-elliptic) and rounded and shortly cuneate to truncate base (*S. sanctae-luciae*: cuneate to long attenuated), 7-veined upper calyx lip (*S. sanctae-luciae*: 5-veined), violet corolla with whitish nectar guides on lower lip (*S. sanctae-luciae*: white upper lip and corolla tube with blue lower lip without clear defined nectar guides), bigger corolla tube (*S. confertispicta*: 7.5–9.6(–10) mm long, 4.3–5.5 mm wide, *S. sanctae-luciae*: 5.5–6.5 mm long, 3.4–3.7 mm wide), and longer (*S. confertispicta*: 8.8–11.5(–13) mm long, *S. sanctae-luciae*: 8.3–9.1 mm long) and glabrous style (*S. sanctae-luciae*: hispidulous toward apex). Moreover, *S. sanctae-luciae* is known from Sierra Madre Occidental and northwestern Trans-Mexican Volcanic Belt in Nayarit and Sinaloa, whereas *S. confertispicata* is exclusive of Sierra Madre del Sur in Guerrero and Oaxaca (compare Figs 4C *vs* 13C).

A very peculiar feature in *S. confertispicata*, that also helps to differentiate it from *S. mocinoi* and *S. sanctae-luciae*, but not from *S. langlassei*, is its trailing to subscandent habit, long branches (up to 4 m long) that can climber into medium size trees or hang down along ravines or dirt road walls. However, the inflorescences are not pendulous but erect by means of a distal twist of the branches, which secures the usual nototribic pollination way described by Wester and Claßen-Bockhoff (2007). Some populations of *S. mocinoi* can emulate a similar pattern but never with branches as long and delicate as those of *S. confertispicata.*

4. *Salvia glabra* M.Martens & Galeotti, *Bull. Acad. Roy. Sci. Bruxelles* 11(2): 68 (1844).

Type: MEXICO. Oaxaca: Cordillera, in Sierra de Llano Verde, April–November 1840 (fl), 5700 ft (1737 m), *H.G. Galeotti 714* (holotype BR511071, isotypes BR511080, BR511104, BR511137, G). (Figs 2C, 3D).

Subshrub, erect, around 40–80(–100) cm tall; stems glabrous to sparsely pilose and puberulent. Leaves with petioles (1.4–)2–8 cm long (the uppermost leaves with petioles 0.3–5 mm long), sparsely pilose, with axillary fascicles of several immature leaves; blades broad ovate, (4–)6–10.9 cm long, (2–)3–5(–7.4) cm wide, base rounded to subcordate, margin serrate, apex acute to acuminate, both surfaces glabrous or sometimes sparsely covered with appressed hairs in the veins, puberulent. Inflorescences in racemes, floral axis 3–18 cm long, pilose and with some glandular-capitate hairs, with 5–11 verticillasters, each one (6–)12–16-flowered, 0.8–1.9(–3.5)

cm gradually apart toward base, uppermost crowded. Floral bracts ovate, 7–16.2 mm long, (6.4–)7.4–12 mm wide, persistent, green to purplish, glabrescent to sparsely covered with appressed hairs, base truncate, margin entire to shortly and irregularly crenate and bordered by a line of long simple hairs, apex long caudate (cauda 5–8.2 mm long, longer than or as long as half bract length). Pedicel (1.3–)1.5–2(–2.8) mm long, pilose and occasionally with some glandular-capitate hairs intermixed. Calyx 7–8 mm long, 3–3.7 mm diam., green, dark magenta to dark purple, externally glabrous or scarcely pilose and with short glandular-capitate hairs, puberulent, internally covered with short conical hairs, scarcely accrescent, lips acute, (1–)1.6–2.2 mm long, upper lip 5 or 7-veined. Corolla sky blue with white nectar guides on lower lip, glabrous except for upper lip which is scarcely pilose and ventrally bordered with glandular-capitate hairs; tube 6–6.9(–7.7) mm long, 1.8–2.9(–3.4) mm wide, slightly ventricose and not invaginated at base, internally papillate; upper lip (2.6–)3–3.9 mm long, lower lip (4–)6–7(–8.8) mm long, 3.4–4.6(–8.4) mm wide. Stamens included; filament (0.8–)1–1.7 mm long; connective (2.3–)3.2–5 mm long, ventrally ornate with an acute tooth at midportion; thecae (0.8–)1.2–1.8 mm long; a pair of staminodes present above and behind filament insertion. Gynobasic horn 0.4–0.8 mm long; style (6–)8.7–9.8 mm long, glabrous, lower branch acute. Mericarp ovoid, 1.1–1.2 mm long, 0.6–0.9 mm wide, light brown and irregularly dark brown marbled, smooth and glabrous.

Distribution, habitat and phenology: *Salvia glabra* is endemic to Mexico, growing in Sierra Madre Oriental (Querétaro and Hidalgo) and Sierra Madre del Sur (Oaxaca), Mexico (Fig. 4D). It inhabits oak and montane cloud forests, from (900–)1200–1800(–2120) m elevation. It shares habitat with the trees *Juglans mollis*, *Liquidambar styraciflua*, *Platanus mexicana*, *Quercus polymorpha*, *Tilia mexicana* Schltdl. and the herbs *Arthrostemma ciliatum* Pav. ex D. Don. and *Hybanthus attenuatus*. It flowers and fruits from September to March.

Etymology: The specific epithet makes reference to the supposedly hairlessness throughout the plant, from the latin glaber (hairless); however, although the plant is not too pubescent, the stems, leaves, floral bracts, petioles and calyces are sparsely pilose or covered with appressed hairs.

Specimens examined: Hidalgo: carretera México-Zimapan, km 129, 2100 m, 21 October 1966 (fl), *L.M. Villarreal de Puga 779* (IBUG); 1 km al E de San Onofre, 900 m, 12 November 1990 (fl), *H. Rubio 2095* (IBUG, IEB). Querétaro: La Cuesta, 3 km al S de Escanelilla, 2113 m, 14 December 1983 (fl), *Fernández 2113 and Acosta* (CIIDIR, IEB); La Cuesta, 3 km al S de Escanelilla, 1100 m, 14 December 1983 (fl), *Fernández 2144 and Acosta* (IEB); cerca de el Llano, 12 km al NE de Pinal de Amoles, sobre la carretera a Jalpan, 1800 m, 13 October 1987 (fl), *J. Rzedowski 45257* (IBUG, IEB); Jalpan de Serna, 3 km al S del Carrizal por el camino a San Pedro el Viejo, 930 m, 8 December 1988 (fl), *S. Zamudio-R. 6135* (IEB, IBUG); aprox. 2 km al O de San Pedro Escanela, 1840 m, 10 December 1988 (fl), *E. Carranza-G. 1245* (IBUG, IEB); 7 km al W de San Pedro Escanela, sobre el camino a El Llano, 1850 m, 11 December 1988 (fl), *J. Rzedowski 47993* (IBUG, IEB); 24 km al NE de Landa de Matamoros, sobre la carretera a Xilitla, 1450 m, 12 December 1988 (fl), *J. Rzedowski 48069* (IEB); 2 km al NW del cerro de La Palma, 1500 m, 1 November 1989 (fl), *H. Rubio 1283* (IBUG, IEB); aproximadamente 4 km al SW de Acatitlán de Zaragoza, 1400 m, 6 November 1989 (fl, fr), *E. González-P. 1218* (IBUG); 2–3 km al NNW de San Pedro El Viejo, 1680 m, 6 November 1989 (fl), *E. Carranza-G. 2191* (IBUG); aprox. 3 km al SE de la Vuelta, 1370 m, 11 December 1989 (fl), *E. González-P. 1333* (IBUG, IEB); cerca de Huazmazontla, 13 km al NE de Pinal de Amoles, sobre la carretera a Jalpan, 1300 m, 12 March 1989 (fl), *J. Rzedowski 48407* (IEB); aprox. 2 km al S de El Carrizal de Los Sánchez, 1000 m, 26 January 1989 (fl), *E. Lugo-L. 44* (IBUG, IEB); 1 km al SW de El Sabinito, 1450 m, 30 September 1989 (fl), *H. Rubio 1156* (IBUG, IEB); aproximadamente 1 km al E de El Llano de Huazquilico, 1740 m, 12 November 1990 (fl), *E. Carranza-G. 2902* (IBUG, IEB); Milpa Vieja, cerca del Aguacate, por la carretera San Joaquín, Casa de Máquinas, 1950

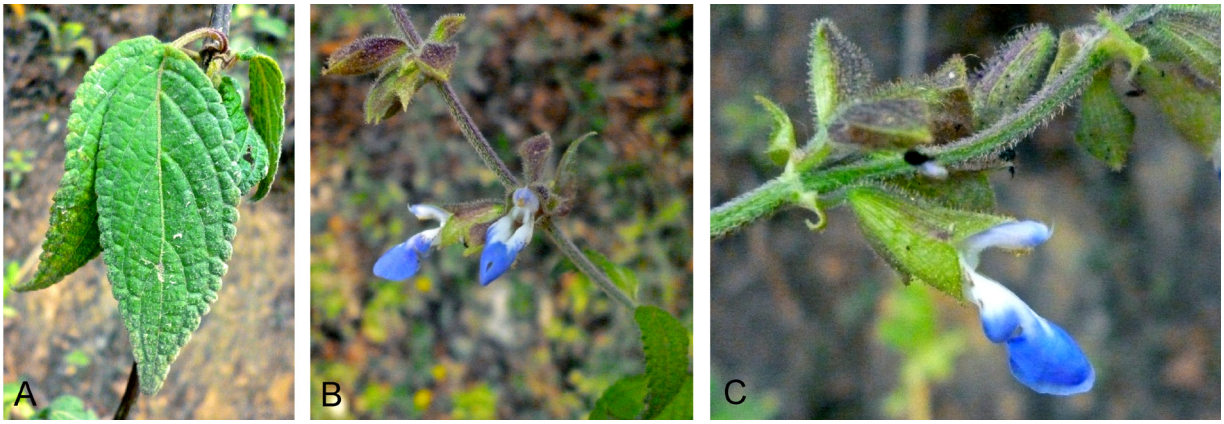

Fig. 7. *Salvia langlassei.* **A**) leaves; **B**) verticillasters; and **C**) detail of the flower (taken by J.G. González-G.).

m, 17 November 1993 (fl*), H. Díaz 7447 and E. Carranza-G.* (IEB); 16 km de La Florida, por el camino a Coniá, 1200 m, 21 *November 1995 (fl), E. Pérez-C. 3283 and S. Zamudio-R.* (IEB); Cerro Grande, 3 km al SE de Carrera de Tancama, 1180 m, 9 December 1997 (fl), *M. Chávez L. 183* (IBUG, IEB); sobre el camino de San Joaquín-Bucareli, 99.579159°W, 99.579159°W, 1773 m, 27 November 2002 (fl), *P. Balderas 248* (IEB); en el camino de San Joaquín a Bucareli, 21.000112°N, 99.579159°W, 1773 m, 27 November 2002 (fl), *Y. Pantoja 390* (IEB).

Salvia glabra resembles *S. compsostachys*, *S. lophanthoides* and *S. verecunda*. Nonetheless, *S. glabra* differs in several ways from *S. compsostachys* that are explained in the discussion of the latter. *Salvia glabra* is similar to *S. lophanthoides*, in fact, Epling (1939) was hesitant about if they were actually conespecific; however, they can be easily differentiated by the visible floral axis between the verticillasters and covered with glandular-capitate hairs of the first (*S. lophanthoides*: floral axis hidden between verticillasters by flowers and floral bracts and without glandular-capitate hairs), longer cauda of floral bracts (*S. glabra*: 5–8.2 mm long, *S. lophanthoides*: 2.3–4.8 mm long), longer pedicels in flower (*S. glabra*: (1.3–)1.5–2(–2.8) mm long, *S. lophanthoides*: 0.2–0.5 mm long), longer calyces (*S. glabra*: 7–8 mm, *S. lophanthoides*: 5–5.9 mm long), longer calyx lips (*S. glabra*: (1–)1.6–2.2 mm long, *S. lophanthoides*: 1–1.2 mm long] and 5–7-veined upper lip (*S. lophanthoides*: always 5-veined), longer corolla tubes (*S. glabra*: 6–6.9(–7.7) mm, *S. lophanthoides*: 5–5.6 mm long), and usually longer style (*S. glabra*: (6–)8.7–9.8 mm long, *S. lophanthoides*: 6.7–7.4 mm long]. Regarding *S. verecunda*, it differs by its long caudate apex (*S. verecunda*: acuminate) and truncate base (*S. verecunda*: cordate) of floral bracts, longer calyces in flower (*S. glabra*: 7–8 mm long, *S. verecunda*: 4.5–5.5(–6) mm long] and with 5 or 7-veined upper lip (*S. verecunda*: 7-veined), longer corolla tube (*S. glabra*: 6–6.9(–7.7) mm long, *S. verecunda*: 4–4.3 mm long], longer upper corolla lip (*S. glabra*: (2.6–)3–3.9 mm long, *S. verecunda*: (1.5–)2.5–2.8 mm long], and longer style (*S. glabra*: (6–)8.7–9.8 mm long, *S. verecunda*: 5.5–5.8 mm long]. Additionaly, they are isolated from each other; *S. glabra* grows in Sierra Madre del Sur and Sierra Madre Oriental, whereas *S. verecunda* is restricted to Sierra Madre Occidental (compare Figs 4D *vs* 13D).

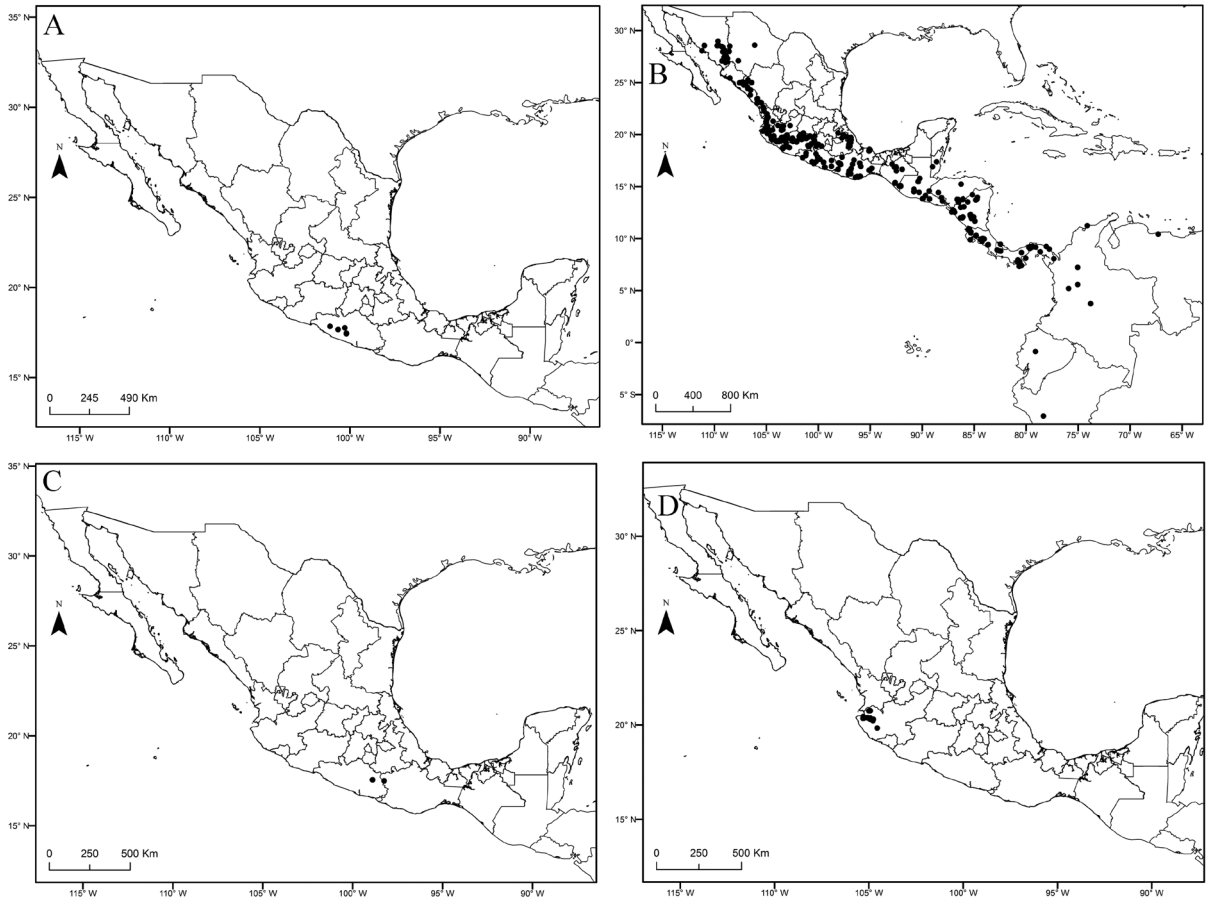

Fig. 8. Distribution maps of **A**) *Salvia langlassei*, **B**) *S. lasiocephala*, **C**) *S. lophanthoides*, and **D**) *S. mexiae.*

5. *Salvia langlassei* Fernald, *Proc. Amer. Acad. Arts* 45: 417 (1910).

Type: MEXICO. Sierra Madre (états de Michoacán et de Guerrero), 1700 m, 27 January 1899 (fl), *E. Langlassé 805* (holotype GH, isotypes K, US). (Figs 2E, 3E, 7).

Shrub, subscandent, 1–4 m long; stems sparsely pilose with the hairs concentrated on ribs to glabrous and puberulent. Leaves with petioles 4.5–18 mm long, pilose and frequently covered with glandular-capitate hairs, with axillary fascicles of several immature leaves; blades lanceolate to narrowly ovate, (1.9–)4.5–10.1 cm long, (1.4–)2–4.2 cm wide, base rounded to shortly cuneate or subequal, margin serrate, apex acuminate to acute, bullate above, both surfaces sparsely covered with appressed hairs, mainly on main vein, to glabrous. Inflorescence in racemes, floral axis 11–30.2 cm long, pilose and with glandular-capitate hairs, with 4–11 verticillasters, each one 10–16-flowered, up to 4–6 cm apart toward the base. Floral bracts ovate to ovate lanceolate, (5.5–)7.9–9 mm long, 4–4.6(–6.2) mm wide, persistent, green and sometimes magenta tinged, glabrescent to sparsely covered with appressed hairs, base truncate, margin entire and ciliated, apex acuminate to short caudate,. Pedicel 2.4–3.4(–6.3) mm long, pilose and covered with glandular-capitate hairs. Calyx 7.6–9.1 mm long, 4.6–5.7 mm diam., green and usually magenta tinged on upper lip, externally covered with glandular-capitate hairs, internally verrucose to smooth, lips acuminate, 3–3.7(–4.8) mm long, the upper lip 7-veined, the two lower lobes sometimes connate ¾ of their length. Corolla blue with white nectar guides on lower lip, glabrous except for upper lip which is pilose and ventrally bordered with short glandular-capitate hairs; tube 5.8–6.5 mm long, (2.5–)3.3–4.3 mm wide, slightly ventricose and invaginated at base, internally ornate with two papillae; upper lip (3.1–)3.7–4.5 mm long, lower lip (6.2–)7–9.2 mm long, (6.4–)6.8–10.6 mm wide. Stamens included; filament 1.9–2.4 mm long; connective 4.4–5.1 mm long, ventrally ornate with and acute tooth at midportion; thecae 1.6–1.8 mm long; a pair of staminodes present above and behind filament insertion. Gynobasic horn 0.8–1 mm long; style 7.9–9.1 mm long, glabrous, lower branch acute. Mericarp ovoid, (1.1–)1.6–1.8 mm long, 1–1.4 mm wide, brown and irregularly dark brown marbled, smooth and glabrous.

Distribution, habitat and phenology: *Salvia langlassei* is endemic from Sierra Madre del Sur in the Mexican state of Guerrero (Fig. 8A). It inhabits ecotones between oak and montane cloud with tropical sub-evergreen forests. It dwells from 1400–2100 m in elevation. It shares habitat with *Alchornea latifolia* Sw., *Alsophila firma* (Baker) D.S.Conant., *Conostegia volcanalis* Standl. & Steyerm., *Cyathae bicrenata* Liebm., *Dendropanax arboreus*, *Quercus salicifolia* Née, *Siparuna thecaphora* A.DC., *Ulmus mexicana* Planch. It flowers and fruits from December to the beginnings of May.

Etymology: The name of this species honors the botanical explorer and earliest collector of the taxon, Eugène Langlassé (1864–1900), who explored several inaccesible locations in southeastern Michoacán and southwestern Guerrero, Mexico, from 1898–1899 (McVaugh 1951; Rzedowski et al. 2009).

Specimens examined: MEXICO. Guerrero: Coahuayutla de José María Izazaga, San Antonio Buenos Aires, district Montes de Oca, 22 December 1937 (fl), *G.B. Hinton et al. 11703* (UC); San Miguel Totolapan, second ridge W of Petlacala, 1915 m, 1 January 1938 (fl, fr), *Y.E.J. Mexia 9058* (ARIZ UC); Tecpan de Galeana, Puerto Rico, distr. Mina, 1750 m, 15 April 1939 (fl, fr), *G.B. Hinton 14162* (ENCB, Herbario Hinton); Tecpan de Galeana, Puerto Rico, 1700 m, 15 April 1939 (fl, fr), *G.B. Hinton et al. 14168* (UC); Laguna-Soyate, 2100 m, 23 March 1939 (fl), *G.B. Hinton et al. 14106* (UC); Atoyac de Álvarez, Nueva Delhi, 23 km al NE de Paraiso, carretera Atoyac-Filo de Caballo, 1510 m, 1 February 1983 (fl, fr), *P. Tenorio-L. et al. 3227* (MEXU); Atoyac de Álvarez, 11 km al SW de Puerto del Gallo, carretera Atoyac-Chichihualco, 2000 m, 29 March 1983 (fl), *J.C. Soto-N. 5133 and E. M. Martínez-S.* (MEXU); Atoyac de Álvarez, 15 km al SW de Puerto de Gallo camino a Atoyac, 1900 m, 27 February 1984 (fl, fr), *E.M. Martínez-S. et al. 6203* (MEXU); Atoyac de Álvarez, Nueva Delhi, 62 km de Atoyac a Puerto de Gallo, 1415 m, 28 April 2013 (fl, fr), *J.G. González-G. et al. 1517* (IBUG).

Salvia langlassei is very similar to *S. confertispicata* about the habit. Both are subscandent or hanging down shrubs with a terminal twist in the inflorescences. The differences between these species are stated in the description of *S. confertispicata*.

6. *Salvia lasiocephala* Hook. & Arn., *Bot. Beechey Voy.* 306 (1841).

Type: MEXICO. Nayarit: San Blas to Tepic, *A. Sinclair s.n.* (lectotype K247994, isolectotype K247995; designated in Epling 1939: 145). (Figs 2G, 3F, 9).

Salvia elscholtzioides Benth., *Bot. Voy. Sulphur* 152, t. 50 (1846).

Salvia fracta L.O.Williams, *Fieldiana, Bot.* 34(8): 110 (1972).

Salvia galinsogifolia Fernald, *Proc. Amer. Acad. Arts* 35(25): 498 (1900).

Salvia hyptoides M.Martens & Galeotti, *Bull. Acad. Roy. Sci. Bruxelles* 11(2): 74 (1844).

Salvia hyptoides var. *subspicata* Fernald, *Proc. Amer. Acad. Arts* 35(25): 498 (1900).

Fig. 9. *Salvia lasiocephala.* **A**) leaves; **B–C**) variation in inflorescence appearance (taken by J.G. González-G.).

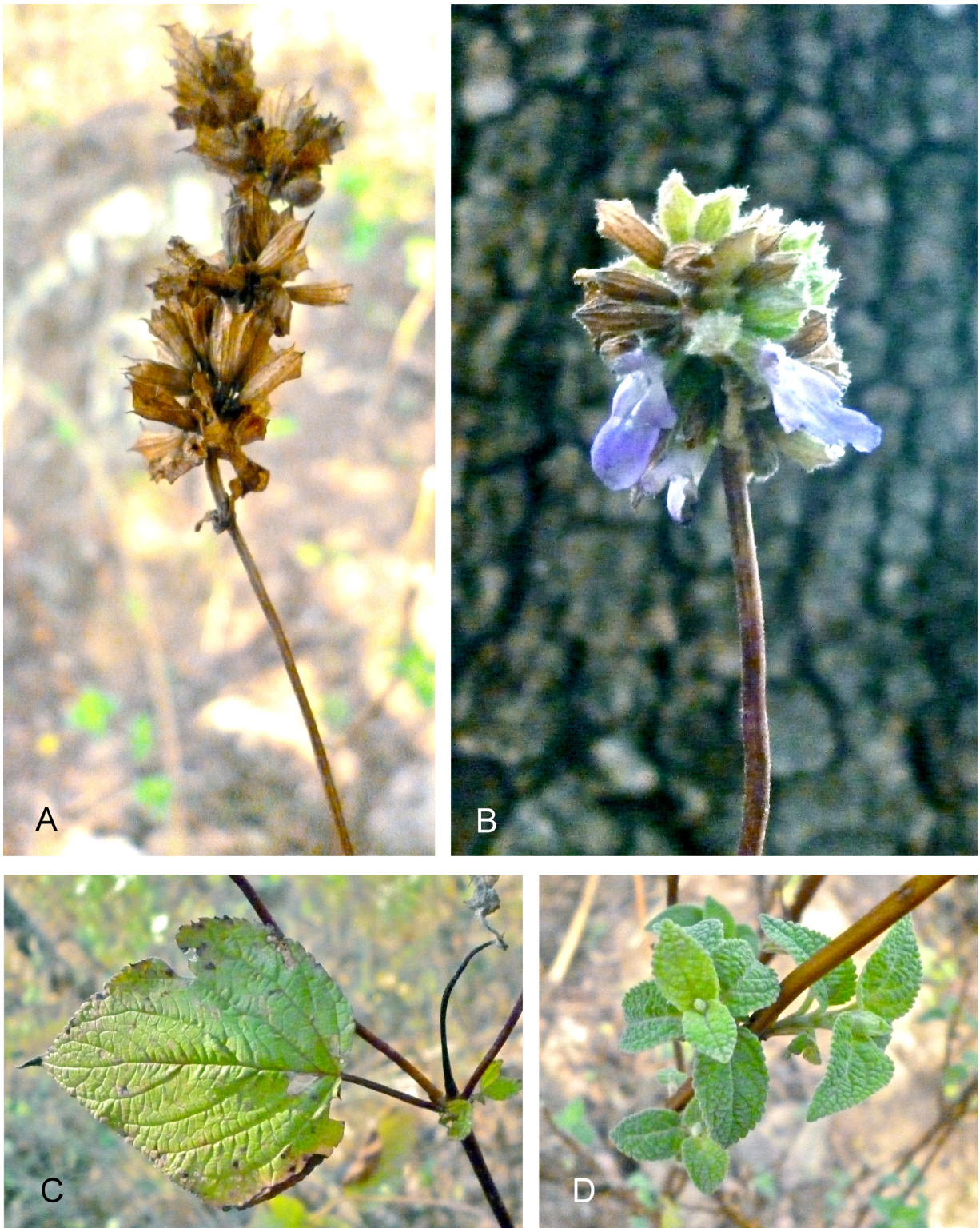

Fig. 10. *Salvia lophanthoides.* **A**) inflorescence in fruit; **B**) inflorescence in flower; **C**) mature leaf; and **D**) immature leaves (taken by J.G. González-G.).

Salvia multispicata Rusby, *Descr. S. Amer. Pl.* 111 (1920).

Annual herb, erect, 0.2–0.7(–1) m tall; stems pilose and usually hirsute. Leaves with petioles 0.5–4 cm long, pilose; blades ovate, (2–)3–7 cm long, (1.5–)2.4–5.2 cm wide, base cordate, rounded, truncate or sometimes oblique, margin widely serrate, apex acute, both surfaces sparsely pilose. Inflorescence in racemes, floral axis (10–)15–45 cm long, densely to sparsely pilose, with (3–)5–25 verticillasters, each one16–50-flowered, 5–10 cm gradually apart toward base, uppermost usually crowded together. Floral bracts reniform, (3.8–)8–11.8 mm long, (3.5–)5.8–10(–18.3) mm wide, persistent, green and turning into straw color when dried, rarely magenta tinged, pilose on outer surface, base cordate, margin finely serrate near apex and ciliated, apex acute to acuminate. Pedicel 1.4–1.9 mm long, pilose. Calyces 3.5–4(–5.1) mm long, 1.5–1.9(–2.3) mm diam., green, densely pilose and sometimes covered with short glandular-capitate hairs, internally naked, lips acute and with ciliated margin, 0.6–1.3 mm long (up to 1.6 mm long in fruit), upper lip 5-veined. Corolla sky blue with white nectar guides, glabrous except for the upper lip which is sparsely pilose and ventrally bordered by short glandular-capitate hairs; tube (2.5–)3–3.5 mm long, 1–2.4 mm wide, not ventricose nor invaginated at base, internally naked (epapillate); upper lip 1–1.5(–3) mm long, lower lip (2.6–)3–4(–4.5) mm long, 2.6–4(–5.8) mm wide. Stamens included; filament 0.7–0.9 mm long; connective 2–2.4 mm long, ventrally with an acute or rounded tooth at midportion; theca (0.7–)1–1.4 mm long; a pair of staminodes present above and behind filament insertion. Gynobasic horn 0.7–0.9 mm long; style (3.6–)5–5.5 mm long, glabrous, lower branch truncate (up to 0.8 mm long). Mericarps lenticular, 0.5–0.7(–1) mm diam., uniformely bright black, smooth, glabrous.

Distribution, habitat and phenology: *Salvia lasiocephala* is the widest distributed species within *Salvia* sect. *Membranaceae* (Fig. 8B). It grows from northern Mexico to northern South America (Colombia, Ecuador, Peru and Venezuela) throughout Central American countries (Fig. 8B). In Mexico it inhabits almost all the states except for those of California and Yucatán Peninsulas and most arid areas of Mexican Central Plateau. It dwells mainly in tropical deciduous and subdeciduous forests, or associated to disturbed vegetation; it can also be found less often in oak, pine-oak or montane cloud forests. It occupies an elevetional range from 0–1800(–2840) m. It shares habitat with *Acacia farnesiana* (L.) Willd., *A. hindsii* Benth., *Bauhinia ungulata* L., *Byrsonima crassifolia* (L.) Kunth, *Bursera palmeri* S. Watson, *B. penicillata* (DC.) Engl., *Curatella americana* L., *Lysiloma divaricatum* (Jacq.) J.F.Macbr., *Pinus oocarpa*, *P. strobus*, *Quercus glaucescens*, *Ulmus mexicana*, *Muhlenbergia dumosa* Scribn. ex Vasey, *Pinguicula crenatiloba* A.DC., *P. moranensis* Kunth, *Salvia alamosana* Rose, *S. cinnabarina*, *S. misella* Kunth, *S. mocinoi*, *S. pringlei* B.L. Rob. & Greenm., *S. protracta,* and *S. purpurea* Cav. It flowers and fruits from September to April, and occasionally also in May, June and July.

Etymology: The name of this species derives from greek words λαιος (lasios, hairy), and κεφαλη (cephale, head); it talks about inflorescence appearance, each verticillaster resembling a head, and pubescence.

Selected specimens examined: BELIZE: Gracie Rock, Sibun river, 12 April 1935 (fl), *P.H. Gentle 1595* (WIS). COLOMBIA. Antioquia: Planta Providencia, 26 km S and 23 km W (air) of Zaragoza, in valley of río Anorí, between Dos Bocas and Anorí, 400–700m, 16 November 1974 (fl), *J. Denslow 2486* (WIS); Planta Providencia, 26 kmS and 23 km W (air) of Zaragoza, in valley of río Anorí, between Dos bocas and Anorí, 400–700m, 13 February 1975 (fl), *J. Denslow 2712* (WIS). Meta: Río Ariari, 450–500m, 30 May 1988 (fl), *J.L. Fernández-A. 7920* (WIS). Santa Marta: Santa Marta, 304 m, November 1898–1901 (fl), *H.H. Smith 562* (WIS). COSTA RICA. San José: Liceo farm, Santiago de Puriscal, 1000 m, 14 November 1966 (fl), *A.S. Weston et al. 3249* (UC); premontane wet forest life zone, soccer field and environs, Motel del Prado, San Isidro de El General, 752 m, 28 nov 1966 (fl), *A.S. Weston et al. 3596A* (UC); about 4 km W of Santa Ana, highway 7 (Santa Ana Puriscal), 800 m, 22 December 1966, (fl), *A.S. Weston et al. 3732* (UC); about 4 km, W of Santa Ana, highway 7 (Santa Ana Puriscal), 800 m, 1 January 1967 (fl), *A.S. Weston et al. 3816* (UC). EL SALVADOR. Ahuacapán: P. N. El Imposible, Hda. San Benito, al O de la cabecera de el Semillerón, 13°49'N, 89°56'W, 14 February 1992 (fl, fr), *L. Sandoval 825 and M. Sandoval* (MEXU); San Francisco Menéndez, El Cerezo, Mariposario, zona baja Los Sánchez, 13°49'N, 89°59'W, 125 m, 27 June 2000 (fl, fr), *J.M. Rosales 626* (MEXU, MO); alrededores de la Finca La Montaña, casi en la cima del cerro El Yupe, aprox. 6 km al NO de Candelaria de la Frontera, 1300 m, 28 October 1993 (fr), *L.J. Linares 1024 and C.A. Martínez* (MEXU); entre cerro Peña del Cuervo y el cerro El Yupe, +/- 6 km al NO de Candelaria de la Frontera, 14°8'30"N, 89°40'9"W, 1300 m, 4 December 1994 (fr), *L.J. Linares 2159 and C.A. Martínez* (MEXU). Morazán: monte de Caracansunga, immediately NW of Divisadero, 270 m, 4 December 1941 (fl), *J.M. Tucker 465* (UC). GUATEMALA. Alta Verapaz: prope Cobán, 1340 m, January 1880 (fl), *Gûrckheim 299* (ENCB). Chimaltenango: crops of Chimaltenango Experimental Station, 2000 m, 5 November 1971 (fl), *A. Molina-R. and A.R. Molina 26921* (MICH); Guatemala: near Amatitlán, 1170 m, 28 December 1938 (fl, fr), *P.C. Standley 61445* (UC). Huehuetenango: near El Reposo, about 8 km from Mexican frontier, 900–1000 m, 14 December 1972 (fl), *L.O. Williams et al. 41350* (MICH). Jutiapa: between Jutiapa and La Calera, SE of Jutiapa, 850 m, 2 November 1940 (fl), *P.C. Standley 76105* (UC). Sacatepéquez: above Pastores, 1680 m, 23 December 1938, (fl), *P.C. Standley 57826* (UC); San Miguel Dueñas, 1450 m, 19 September 1992 (fl, fr), *M. Véliz 922497* (MEXU). MEXICO. Chiapas: on slopes along the Tana Te' river, near Sahal K'esh, paraje of Mahben Chauk, 884 m, 27 November 1964 (fl), *D.E. Breedlove 7691* (ENCB); en el camino de Talquián a Chiquihuite, 1700 m, 3 February 1987 (fl, fr), *E. Martínez-S. 19323* (HEM, IEB, MEXU); 600–700 m al SO de Pueblo Nuevo, 17°9'12.69'N, 92°53'20.8"W, 1690 m, 15 November 2009

(fl), *J.G. González-G. et al. 453* (IBUG). Chihuahua: La Mesa Colorado, 17 October 1933 (fl), *H.S. Genry 569* (ARIZ); along arroyo Wimivo (arroyo Samachique), between Wimivo and Río Batopilas on N side of Barranca de Batopilas, 890 m, 28 February 1973 (fl), *R.A. Bye 3435* (MEXU). Colima: rancho El Jabalí, 22 km al NNO de Colima, por terracería cerca del lago Jabalí, 19°27'N, 103°42'W, 1250 m, 4 November 1982 (fl), *L. Vázquez-V. 264 and B. L. Phillip* (MEXU, HUMO); San Antonio, 15 km al N de Comala, 22 November 1987 (fl, fr), *F.J. Santana-M. 2655* (IBUG, IEB, ENCB, MEXU, XAL); El Zapote, poblado entre Comala y San Antonio, 1400 m, (fl, fr), *L.M. Villarreal de Puga 221* (ENCB, CHAPA). Durango: Tamazula, al E, alrededores de rancho El Carrizal, por el camino a Agua Caliente, 24°58'16"N, 106°56'17"W, 190 m, 9 March 2002 (fl, fr), *J.I. Calzada et al. 23126* (CIIDIR); 20 km al S de Canelas, 10 January 1986 (fl), *M. Vizcarra 205* (CHAPA, CIIDIR,IEB, ENCB, HUAA). Estado de México: Temascaltepec, Tejupilco, 1340 m, 20 November 1932 (fl), *G.B. Hinton 2654* (UC); Carboneras, 2030 m, 24 October 1932 (fr), *G.B. Hinton 2123* (ENCB, MEXU); La Junta, Santo Tomás, 750 m, 12 October 1953 (fl), *E. Matuda et al. 29414* (UC). Guerrero: Tecpan de Galeana, Moreno, 175 m, 11 April 1929, (fl), *G.B. Hinton et al. 14132* (UC); 1.5 miles W of logging road offf Mexico highway 95 (Acapulco to Iguala), 0.2 mile S of km 34 marker, 18.7 miles S of Chilpancingo, 1250, 24 October 1975 (fl), *K.M. Peterson et al. 315* (WIS); 1 km al W de Filo de Caballos, rumbo a Carrizal de Bravo, 17°36.623'N, 99°50.384'W, 2338 m, 30 October 2012 (fl), *J.G. González-G. et al. 1363* (IBUG). Jalisco: bluffs of the Río Grande de Santiago near Guadalajara, 19 October 1889 (fl), *C.G. Pringle 2297* (MEXU); S–facing mountainsides 4 miles NNE of Talpa de Allende, 1450–1500 m, 12 October 1960 (fl), *R. McVaugh 20092* (MICH); aproximadamente 2 km al E de Epenche, carretera Valle de Juárez-Epenche, 2040 m, 12 October 1989 (fr), *I. García-R. 2098* (GUADA); 7–8 km al SE de San Pedro rumbo a Barandillas, por la brecha hacia San Andrés y el cerro de El Cabro, 20°31'54.8"N, 105°4'32.6"W, 1105 m, 27 October 2011 (fl, fr), *J.G. González-G. 1151 y D. Juárez* (IBUG). Michoacán: 7 km al E de Villa Jiménez, sobre el camino a Copándaro, 5 October 1986 (fl), *J. Rzedowski 40723* (CIIDIR, IBUG, IEB, ENCB, MEXU); lado NE de los Chorros del Varal, 1000 m, 30 September 2004 (fl), *I. García-R. 6788 and A. Linares* (CIMI, IEB); carretera de Tancítaro a Apo, a aprox. 200 m del poblado de Tancítaro, 19°22'10"N, 102°23'11"W, 1986 m, 25 January 2009 (fl), *J.G. González-G. 273* (IBUG). Nayarit: Tepic, 5 February 1892 (fl, fr), *E. Palmer 1897* (UC); Río de los Talladeros, 14 November 1985 (fl), *I. Solís 602* (IEB); slopes and ravines along raod to microondas Santa Bárbara, 3–3.8 miles E of highway 15, ND m, 1 March 1987 (fl), *T.F. Daniel and B. Bartholomew 4729* (MICH); a la orilla de la carretera en el poblado de San Gabriel, sobre la carretera Tepic-Jalcocotán, 21°31'3.3"N, 104°56'24.3"W, 979 m, 2 January 2010 (fl), *J.G. González-G. 485* (IBUG). Oaxaca: Mineral Zavaleta, Zimatlán, 1900 m, 1931 (fl), *C. Conzatti 4702* (MEXU 15 km al S de Sola de Vega, dto. Sola de Vega, 1960 m, 22 October 1985 (fl), *R. López-G. 806* (OAX, MEXU); 2 km al SE de San Juan Juquila Mixes, sobre la brecha que va hacia San Pedro Ocotepec, 16°55'47"N, 95°54'21.3"W, 1505 m, 24 January 2010 (fl), *J.G. González-G. 553* (IBUG). Puebla: On moist trailside bank, Huauchinango, 1494 m, 6 October 1944 (fl), *A.J. Sharp 44119* (MEXU). Sinaloa: La Gloria, 244 m, 9 October 1925 (fl), *Y.E.J. Mexia 211* (UC); 16 mi NW of Culiacán, 92 m, 18 December 1974 (fl), *G.L. Webster 19808* (MEXU); al borde de la carretera, Capilla de Taxtán, 2 km al O de Santa Lucía, 23°25'30.3"N, 105°51'45.5"W, 1258 m, 5 January 2010 (fl, fr), *J.G. González-G. 510* (IBUG). Sonora: between Quiriego and Cajeme, 6 March 1933 (fl), *F. Shreve 6186* (ARIZ); 2.7 km WNW of Tepoca on Mex. 16, 28º27'36 N, 109°15'48"W, 750 m, 17 March 1998 (fl), *A.L. Reina-G.* et al. *98-250* (USON). Veracruz: Valle de Córdoba, 12 December 1865 (fl), *M. Bourgeau 1587* (ENCB); Estación Biológica, Los Tuxtlas, 110 m, 2 July 1970 (fl, fr), *G. Martínez-C. 2200* (XAL, MEXU); Briones, 1500 m, 29 March 1996 (fl, fr), *R. Díaz 5* (XALU); 5.5 km al N de Huatusco por la carretera rumbo a Totutla, 19°10'7"N, 96°57'43"W, 1317 m, 22 December 2008 (fl), *J.G. González-G. 270 and S. Rúa-H.* (IBUG). NICARAGUA. Atlántico Norte: rain forest near Siuna, Mt. Liveco, Madregava, 7 January 1970 (fr), *F.C. Seymour 3276* (MEXU). Nueva Segovia: bed of dried–up river in ravine, Ocotal, bed of dried–up river in ravine, Ocotal,20 December 1968 (fl), *R.B. Hamblett 799* (WIS); 20 December 1968 (fl), *R.B. Hamblett 799* (WIS); 3 km W of Ocotal, 20 December 1968 (fr), *F.C. Seymour* 862 (MEXU; UC). PANAMA. Bocas del Toro: Chanquinola, E, 3 August 1923 (fl), *H.W. Stork 56* (UC). Chepo: sabanas near Chepo, 30 m, 20 January 1935 (fl), *A.A. Hunter 23 and P.H. Allen* (UC). Chimán: Chimán,12 December 1967 (fl), *W.H. Lewis* et al. *3325* (UC). Colón: vicinity of Madden Dam, 15 m, 3 December 1966 (fr), *W.H. Lewis* et al. *6* (ENCB). Los Santos: vicinity of headwaters of río Pedregal, 25 Tonosí, 762–914 m, 7 December 1967, (fl), *W.H. Lewis* et al. *2933* (UC). Panama: canal zone, vicinity of Madden Dam, 50 m, 3 December 1966, (fl), *W.H. Lewis 6* (UC); along road near entrance to Boy Scout camp, 1.6 km from Madden Dam rd., 24 December 1974 (fl), *S. Mori* et al. *4059* (MICH).

Salvia lasiocephala resembles *S. bupleuroides* the most. Together, these species are distinct within *Salvia* sect. *Membranaceae* because they are annual herbs, usually delicate, and have lenticular, bright black mericarps; whilst, the other species are perennial shrubs with ovoid, light brown and dark brown marbled mericarps. According to Epling (1939) they were grouped into subsect. *Elscholtzioideae* Epling, however, later in his unpublished revision of subgenus *Calosphace*, it seemed he stopped recognizing subsectional classification since he did not alluded it, this agrees with our current proposal. Although *S. lasiocephala* and *S. bupleuroides* are too similar, they differ consistently in inflorescence and stylar branch traits (see discussion at the end of *S. bupleuroides* description). Furthermore, the first is widely distributed, contrasting with the restricted distribution of *S. bupleuroides* (compare Figs 8B *vs* 4A).

Salvia lasiocephala exhibits a wide range of morphological variation in features such overall and flower size, pubescence density, inflorescence length and flower number per verticillaster; this pattern might be related with the surface and diversity of the area it occupies. For instance, degree of separation between verticillasters along floral axis, and pubescence let to recognition of several taxa including what was named as *S. hyptoides*;

which consists of an extreme of variation where verticillasters are all crowded together, contrasting in that way with those plants with verticillasters up to 10 cm apart. Though, a thorough examination of specimens at the herbaria and plants in situ at field reveals a continuous of morphological variation that allows connecting both extremes, avoiding the recognition of more than one taxon within this morphological complex.

7. *Salvia lophanthoides* Fernald, *Proc. Amer. Acad. Arts* 35(25): 499 (1900). Type: MEXICO. Oaxaca: San Francisco Tlapancingo Mts. near Tlapancingo, 6000–8000 ft, 1829–2438 m, *7 December 1984* (fl), *E.W. Nelson 2086* (lectotype US, isolectotype GH; designated in Epling 1939: 151). (Figs 2C, 3G, 10).

Herb erect, 1–2 m tall; stems glabrous to puberulent. Leaves with petioles 1.1–2.2(–2.5) cm long, puberulent to shortly and sparsely pilose; blades ovate to narrowly ovate, 4.1–8 cm lon, (2.1–)5–6.2 cm wide, base rounded to slightly cordate, margin serrate, apex acuminate, both surfaces glabrous except for the veins beneath where they are covered with appressed hairs. Inflorescence in racemes, floral axis (9.6–)14.8–32.5 cm long, puberulent and covered with appressed hairs, with 7–15 verticillasters, each one (12–)22–30-flowered, crowded together (floral axis hidden by floral bracts and flowers) or rarely up to 1.8 cm apart. Floral bract ovate to narrowly ovate, 5.7–12.3 mm long, 5.3–9.6 mm wide, persistent, green, both faces glabrous or the outer puberulent, base truncate, margin entire to slightly corrugated and ciliated, apex caudate (cauda 2.3–4.8 mm long). Pedicel 0.2–0.5 mm long (up to 1 mm long in fruit), covered with glandular-capitate hairs. Calyx 5–5.9 mm long, 1.9–3.9 mm diam., up to 7 mm long in fruit, green, covered with glandular-capitate hairs, internally with some tiny conical hairs to verrucose, lips acute, 1.1–1.2 mm long, upper lip 5-veined. Corolla sky blue with white nectar guides on lower lip, upper lip pilose and bordered with tiny glandular-capitate hairs; tube 5–5.6 mm

Fig. 11. *Salvia mexiae*. **A**) leaves; **B**) inflorescence (taken by J.G. González-G.).

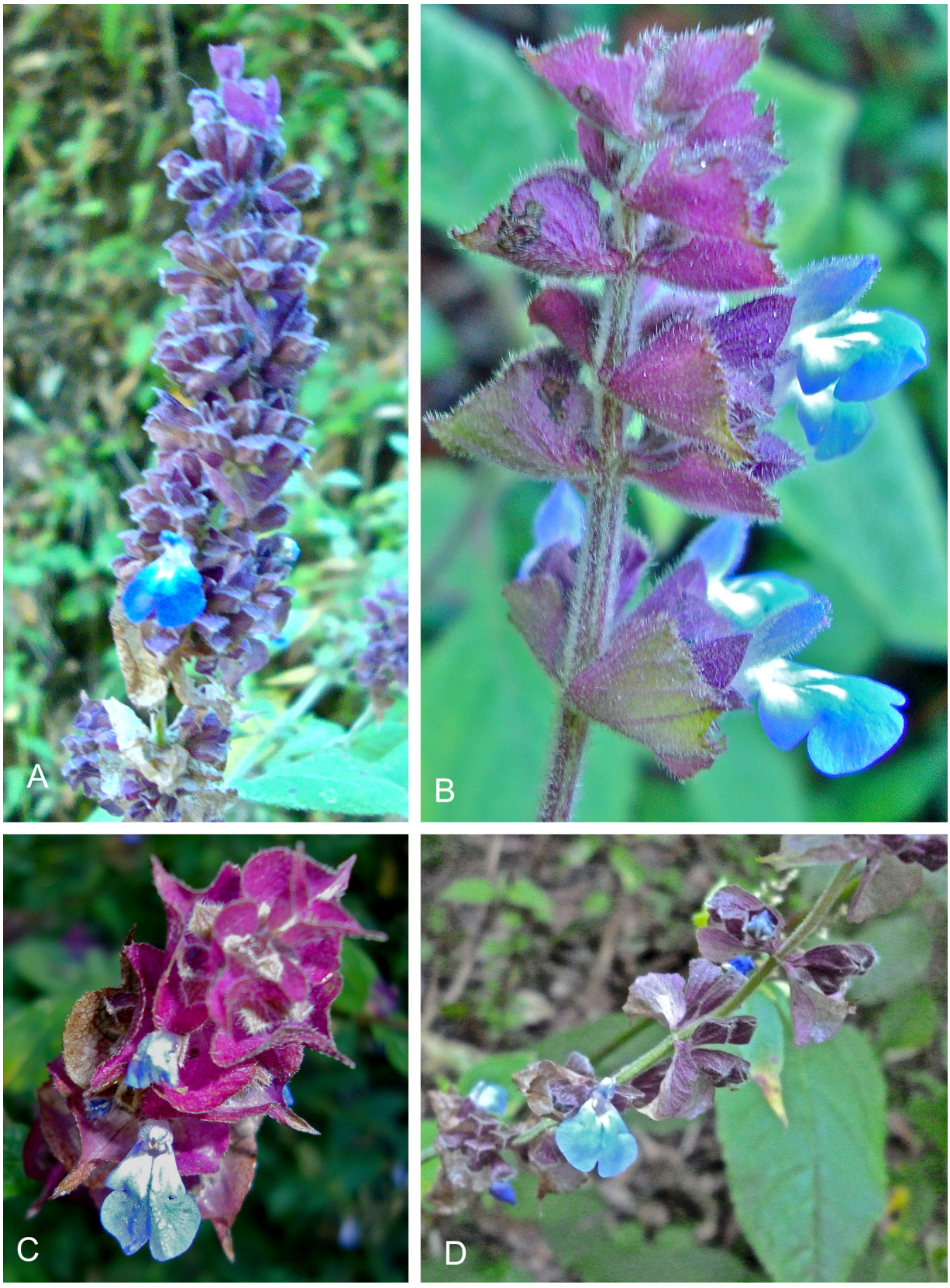

Fig. 12. *Salvia mocinoi*. **A–D** variation in inflorescence appearance (taken by J.G. González-G.).

long, 2.3–3.1 mm wide, slightly ventricose, not invaginated at base, internally ornate with a pair of papillae; upper lip (1.5–)2.6–3.7 mm long, lower lip (4.5–)5.3–6.6 mm long, 4.5–5.3 mm wide. Stamens included; filament 1.2–1.8 mm long; connective 3.2–3.9 mm long, ventrally ornate with an acute tooth at midportion; theca 1–1.9 mm long; a pair of staminodes present above and behind filament insertion tube. Gynobasic horn 0.6–0.8 mm long; style 6.7–7.4 mm long, glabrous, lower branch acute. Mericarp ovoid, 1.2–1.3 mm long, 0.8–0.9 mm wide, brown and irregularly dark brown marbled, smooth and glabrous.

Distribution, habitat and phenology: *Salvia lophanthoides* is an endemic species restricted to Sierra Madre del Sur in the eastern confluence between the Mexican states of Guerrero and Oaxaca (Fig. 8C). It inhabits oak forests, from 1700–1900(–2450) m. It shares habitat with *Dendropanax arboreus* and *Salvia mexicana*. It flowers and fruits from November to April.

Etymology: The name of this species derives from the greek words λοφος (lophos, crested), ανθος (anthos, flower), and the suffix – οειδες (oides, similar to); it is about the similarity of the compact spikelike inflorescence with small and numerous flowers of this *Salvia* with those of the genus *Lophanthus* Adans. (Lamiaceae).

Specimens examined: MEXICO. Guerrero: 20.1 km al E de Petlaltina ó 68.1 km al E de Chilapa, camino a Tlapa, 1700 m, 14 November 1982 (fl), *R. Torres-C.* et al. *1920* (MEXU, MO, XAL); Atlixtlac, 300–400 m antes de Mesones a partir de Atlixtlac, 17º32´54.37˝N 98º52´53.4˝W, 1846 m, 27 April 2013 (fr, fl), *J.G. González-G. et* al. *1508* (IBUG).

Salvia lophanthoides is similar to *S. glabra*. The differences between them are treated in the description of the previous one.

Between the species of *Salvia* sect. *Membranaceae*, this is the least collected (Fig. 8C) and known. It is possible that more thorough botanical exploration in the border region between Guerrero and Oaxaca, Mexico, reveals new insights on the morphology and distribution of this species.

8. *Salvia mexiae* Epling *Repert. Spec. Nov. Regni Veg. Beih*. 110: 153 (1938).

Type: MEXICO. Jalisco: west of San Sebastián, Hacienda del Ototal, arroyo de los Hornos, Sierra Madre Occidental, 1500 m, 4 March 1927 (fl), *Y.E.J. Mexia 1801* (holotype UC, isotypes A, BM, CAS, GH, MICH, MIN, MO, NY, UC, US). (Figs 2A, 3H, 11).

Shrub, erect, (0.8–)1.2–2.5(–4) m tall; stems pilose and covered with appressed and retrorse hairs. Leaves with petioles generally absent or sometimes 2–3.3 mm long, pilose; blades narrow lanceolate, 6–15 cm long, 1–2.3 cm wide, base attenuated, margin finely serrate, apex acuminate to acute, both surfaces covered with appressed hairs to pilose. Inflorescence in racemes, floral axis 5–12 cm long, pilose, with (3–)5–7 verticillasters, each one 10–16-flowered, crowded together or up to 1.6 cm apart but with calyces and floral bracts overlapping. Floral bracts ovate to narrowly ovate, 1.8–2.8 cm long, 1.4–2.2 cm wide, persistent, magenta and green tinged, sparsely pilose and covered with appressed hairs, base cordate, margin entire to serrate, apex acuminate. Pedicel (1–)2–4.5 mm long, pilose. Calyx (5–)6.4–8.7 mm long, 2.9–4.5(–5.1) mm diam., dark magenta and green tinged toward base, covered with glandular-capitate hairs, internally with some tiny conical hairs, lips acute, 2.5–4.3 mm long, upper lip 7-veined. Corolla with tube and upper lip white to sky blue, and lower lip dark blue and without white nectar guides, or if present, poor developed and restricted to corolla throat, upper lip pilose and bordered with tiny glandular-capitate hairs; tube (4.9–)6–7 mm long, 2.1–3.5(–5) mm wide, ventricose, invaginated at base and internally ornate with a pair of papillae; upper lip 2.7–4.4 mm long, lower lip 4.8–8(–10.5) mm long, 5–8 mm long wide. Stamens included; filament 1.8–2.9 mm long; connective 3–4 mm long, ventrally ornate with a rounded to truncate tooth at midportion; theca 1.6–1.8 mm long; a pair of staminodes present above and behind filament insertion tube. Gynobasic horn 0.6–0.8 mm long; style 4.7–10 mm long, glabrous, lower branch acute. Mericarp ovoid, 1–1.4 mm long, 0.7–0.9 mm wide, light brown and irregularly dark brown marbled, smooth and glabrous.

Distribution, habitat and phenology: *Salvia mexia* is an endemic species restricted to westernmost Trans-Mexican Volcanic Belt and Sierra Madre del Sur in Jalisco, Mexico (Fig. 8D). It grows in pine-oak, oak and montane cloud forests, from 800–1720 m elevation. It shares habitat with *Abies flinckii* Rushforth, *Bejaria mexicana* Benth., *Carpinus caroliniana* Walter, *Clethra rosei* Britton, *Clusia salvinii* Donn.Sm., *Juniperus jaliscana* Martínez, *Microspermum gonzalezii* Rze., *Myrica cerifera* L., *Oreopanax xalapensis* (Kunth) Decne. & Planch., *Pavonia pleuranthera* (DC.) Fryxell, *Pinus devoniana* Lindl., *P. oocarpa*, *Quercus cualensis* L.M.González, *Q. eduardi* Trel., *Q. magnoliifolia*, *Salvia cualensis* J.G.González, *S. helianthemifolia* Kunth, *S. manantlanensis* Ramamoorthy, *Sapium macrocarpum* Müll.Arg. and *Styrax argenteus* C.Presl. It flowers and fruits from December to middle May.

Etymology: The name of this *Salvia* honors Ynes E. J. Mexia (1870–1938), its earliest and prollific botanical collector (Rzedowski et al. 2009).

Specimens examined: MEXICO. Jalisco: steep mountains 10–12 miles S of Talpa de Allende, in the headwaters of an E branch of Río de Talpa, 3 miles above Los Sauces, 1400 m, 26 November 1960 (fl), *R. McVaugh 21468* (MICH); steep mountains 20–22 km, south of Talpa de Allende, in the headwaters of a W branch of Río Talpa, barranca above a rapid clear stream, 1200 m, 30 March 1965 (fl), *R. McVaugh 23318* (ENCB); entre la Cumbre de Tejamanil y Cuale,1610 m, 3 March 1971 (fl, fr), *R. González-T. 81* (ENCB, IBUG); steep mountainsides 3–10 km generally E on the road to Mina del Cuale, from the junction 5 km NW of El Tuito, 850–1150 m, 16 February 1975 (fl), *R. McVaugh 26360* (MICH); Sierra del Cuale, entre Talpa y Cuale, 11 May 1976 (fr), *L.M. Villarreal de Puga 8851* (GUADA); Sierra de Cuale, entre Cuale y Talpa, 11 May 1976 (fl, fr), *L.M. Villarreal de Puga 8403* (CHAPA, ENCB, IBUG); entre el Tuito y Pto. Vallarta, a 20 km al S de Pto. Vallarta, carr. a Barra de Navidad-Pto. Vallarta, 800 m, 27 January 1977 (fl), *A. Delgado-S.* et al. *487* (ENCB); km 17 brecha Zimapan-El Cuale, 1585 m, 12 December 1981 (fl), *L.M. González-V. 1091* (IBUG); km 24 carretera No. 200 al S de Puerto Vallarta,800 m, 4 February 1989 (fl), *L.M. González-V.* et al. *3514* (IBUG); km 19 camino a Cuale,1100 m, 20 February 1990 (fl), *R. Ramírez-D.* et al. *1966* (IBUG); camino de La Estancia de Landeros a La Bulera, 28 March 1996 (fl, fr), *J.J. Reynoso-D.* et al. *3094* (IBUG); La Bulera, 9.2 km al OSO de La Estancia, 20º44'30˝N, 104º59'43˝W, 910 m, 2 April 2002 (fl), *P. Carrillo-R.* et al. *3137* (IBUG, IEB, GUADA); arroyo Paso Hondo, 16 km al SE de Talpa de Allende por el camino a La Cuesta (Sierra de Cacoma), 20°14'N, 104°47'W, 1450 m, 9 February 2002 (fl), *P. Carrillo-R. 2796 and J.A. Lomelí-S.* (GUADA); Villas de Cacoma, 19°49'45"N, 104°33'30"W, 1230 m, 27 January 2010 (fl), *J.G. Morales et al 196* (ZEA); La Peña del Cuervo-La Cumbre, 1263 m, 29 January 2010 (fl), *J.A. Vázquez-G. 8954 and M. Muñiz-C.* (IBUG); 3–3.1 km al S del poblado de El Cuale por la brecha rumbo a Talpa de Allende, 20°22'44.3"N, 105°3'17.07"W, 1720 m, 30 December 2010 (fl), *J.G. González-G.* et al. *802* (IBUG); 1.6–1.7 km por la brecha de El Cuale a La Mina de Zimapan, 20°23'14"N, 105°4'44.2"W, 1580 m, 13 February 2011 (fl), *J.G. González-G.* et al. *882* (IBUG).

Salvia mexiae is immediately recognizable from the other species of the section by its sessile to subsessile and narrow-lanceolate leaves, and usually crowded inflorescences with floral bracts and calyces hiding floral axis. Epling (1939) and the specimen *McVaugh 23318* (ENCB) recorded a height of 3 m and 4 m, respectively, for *Salvia mexiae*; though, plants higher than 2.5 m tall were not observed at the field.

9. *Salvia mocinoi* Benth., *Labiat. Gen. Spec.* 271 (1833).

Type: MEXICO. Hab. in Novo Hispania, *M. Sessé y Lacasta 226 and J.M. Mociño* (lectotype OXF, isolectotypes F, G, MA; designated in Epling 1939: 151). (Figs 2H, 3I, 12)

Salvia lophantha Benth. in DC, *Prodr.* 12: 301 (1848).

Salvia rubiginosa Benth. in DC., *Prodr.* 12: 301 (1848: 301).

Salvia rubiginosa var. *hebephylla* Fernald, *Proc. Amer. Acad. Arts* 35(25): 496 (1900).

Salvia saltuensis Fernald, *Proc. Amer. Acad. Arts* 35(25): 497 (1900).

Salvia zacuapanensis Brandegee, *Zoë* 5: 255 (1908).

Subshrub to shrub, erect, rarely subscandent, (0.5–)1–2(–3) m tall; stems pilose and covered with appressed hairs concentrated on ribs but also between them, hairs whitish or ferrugineous. Leaves with petioles (0.2–)1–2.5(–6.3) cm long, softly to coarsely pilose; blades ovate, narrowly ovate, ovate-elliptic to rhombic-ovate, (1–)4–9.5 cm long, (0.5–)2–5.5(–8.8) cm wide, base rounded, cuneate to long attenuated, sometimes subcordate or oblique, margin serrate, apex acuminate to acute, both surfaces sparsely to moderately pilose and sometimes with some glandular-capitate hairs, the upper one sometimes bullate. Inflorescence in racemes, floral axis (3–)5–16(–29) cm long, pilose and usually with glandular-capitate hairs, with 4–15 verticillasters, each one 6–10(–18)-flowered, 0.5–4.8 cm gradually apart toward base. Floral bracts ovate to reniform, (5.3–)12–20 mm long, (3–)14–17 mm wide, persistent, rose, magenta, dark magenta, reddish or purple, often green toward base, and less frequently green throughout, glabrous or with outer surface pilose and ocassionally with glandular-capitate hairs, base cordate at the base or slightly attenuated and then truncate, margin entire to serrate and ciliated, apex acuminate to caudate (cauda length less than, or a third of floral bract length). Pedicel 1–3.4 mm long (up to 4 mm long in fruit), pilose and sometimes with glandular-capitate hairs. Calyx 5–7.5 mm long, (1.8–)2–3.2(–4) mm wide, green, magenta to dark-magenta or purplish, pilose to hispidulous and often with glandular-capitate-hairs, internally glabrous to covered wtih tiny conical hairs, lips acute and ciliated at margin, (1–)1.5–2.2(–2.7) mm long, up to 3 mm in fruit, upper lip 5- or rarely 7-veined. Corolla sky blue and with white nectar guides on lower lip, glabrous except for the upper lip which is pilose and ventrally bordered with short glandular-capitate hairs; tube (4.4–)5–6.6(–7.5) mm long, (1.7–)2–3(–5.4) mm wide, slightly to clearly ventricose, not invaginated at base and internally ornate with a pair of papillae; upper lip (1.5–)2.5–4 mm long, lower lip (4–)5–9.3 mm long, (3.6–)8–9 mm wide. Stamens included; filament (0.9–)1.3–2.6 mm long; connective 2.4–3.6(–4.5)mm long, ornate at ventral midportion with an acute or

truncate tooth; theca (0.7–)1–1.5(–2.6) mm long; a pair of staminodes present above and behind filament insertion to the corolla, rarely absent. Gynobasic horn (0.4–)0.8–0.9 mm long; style 5.4–9.3 mm long, lower branch acute, glabrous. Mericarp ovoid, 1.2–2 mm long, 1–1.2 mm wide, light brown and irregularly dark brown marbled, smooth and glabrous.

Distribution, habitat and phenology: *Salvia mocinoi* is the second most widely distributed species in the section. It can be found from central Mexico to central Nicaragua (Fig. 13A). It grows in oak, pine-oak, pine, montane cloud forests, and in a lesser degree in tropical deciduous, subdeciduous and evergreen forests, mainly from 1700–2850 m elevation, though in southern Mexico and Central America can flourish in lower elevations (30–1950 m elevation). *Salvia mocinoi* shares habitat with the trees *Abies guatemalensis*, *Carpinus caroliniana*, *Chiranthodendron pentadactylon, Clehtra galeottiana*, *Cleyera integrifolia*, *Cornus disciflora* DC., *Magnolia pacifica* A.Vázquez, *Pinus ayacahuite*, *P. oocarpa*, *Quercus aristata* Hook. & Arn., *Q. castanea*, *Q. magnoliifolia*, *Q. peduncularis* Née, *Symplocos citrea* Lex. ex La Llave & Lex., *Zinowiewia concinna* Lundell and the shrubs and herbs *Pinguicula moranensis*, *Salvia cinnabarina*, *S. lasiocephala*, *S. lavanduloides* Kunth, *S. longispicata* M. Martens & Galeotti, *S. longystila* Benth., *S. mexicana, S. misella*, *S. polystachya, S. protracta*, *S. roscida*, *S. rostellata* Epling, *S. tiliifolia* Vahl, *S. tubifera,* and *S. vitifolia*, among others. It flowers and fruits during whole the year, but mainly from September to April.

Etymology: The name of *Salvia mocinoi* was devoted to José M. Mociño (1757–1820), one of the first and most important Mexican botanists (Rzedowski et al. 2009).

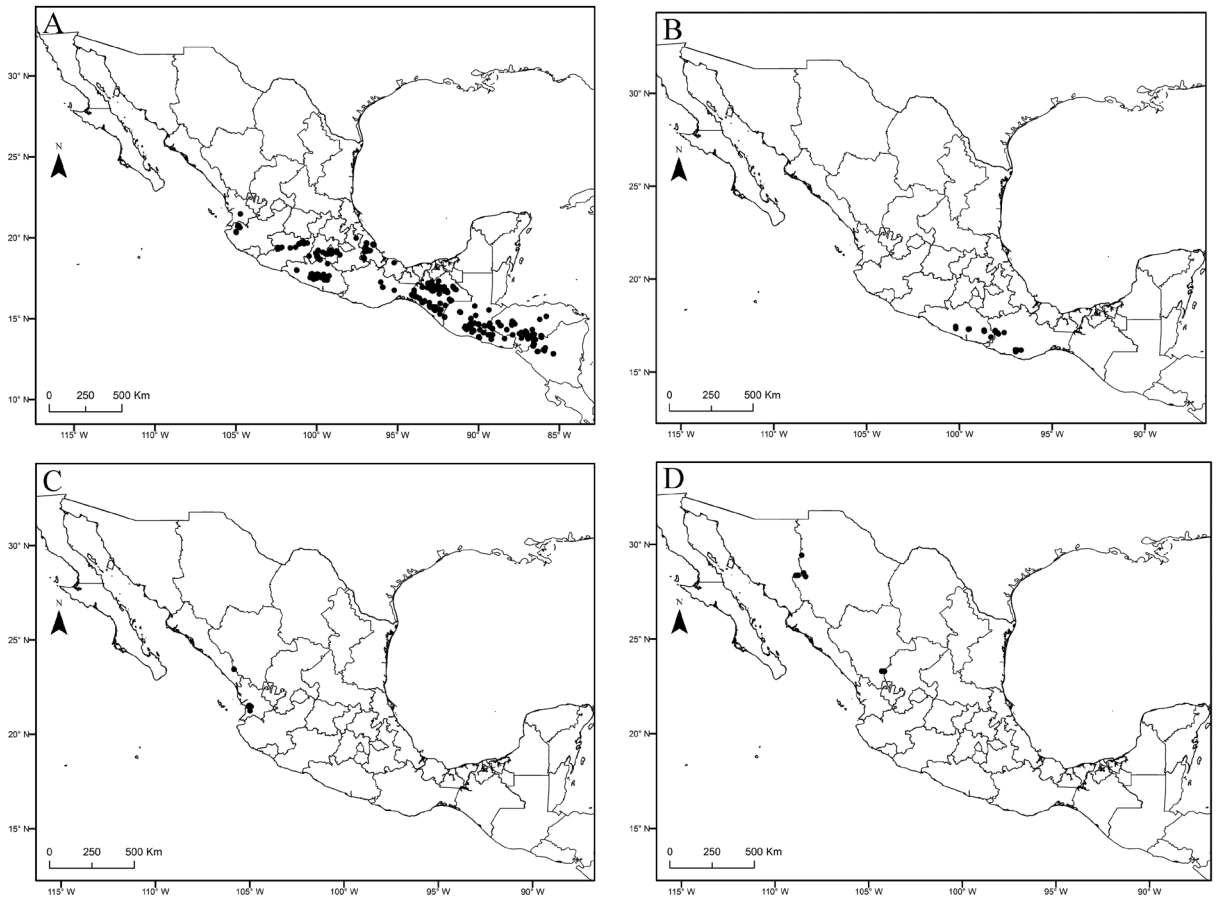

Fig. 13. Distribution maps of **A**) *Salvia mocinoi*, **B**) *S. nitida*, **C**) *S. sanctae-luciae*, and **D**) *S. verecunda*.

Selected specimens examined: EL SALVADOR. Chalatenango: E slope of Los Esesmiles, 2160 m, 12 March 1942 (fl), *J.M. Tucker 1014* (MO, UC). Morazán: S side of montes de Cacaguatique, directly S of finca of general J.T. Calderón, 1030 m, 8 January 1942 (fl), *J.M. Tucker 756* (UC). Santa Ana: El Mosco, entre el cerro Yupe y el cerro Peña del Cuervo, ca. 3 km al SSO de Tierra Blanca y 3 km al NNO de Candelaria de la Frontera, 14°8'N, 89°41'W, 1120 m, 30 January 2000 (fl), *J.L. Linares 4884* (MEXU). GUATEMALA. Amatitlán: along slopes of Lago de Amatitlán, below Morán, 1300 m, 18 October 1942 (fl), *J.A. Steyermark 52154* (UC). Guatemala: 4 miles ME of Guatemala city, road to Chinautla, 1341 m, 30 November 1943 (fl), *S.S. White 5140* (MICH Baja Verapaz: Union, 13 March 1972 (fl), *E. Contreras 11258* (MEXU). Chiquimula: upper slopes of Volcán de Ipala, 1200 m, January 1907 (fr), *H. Pitcher 1882* (NY). Jalapa: near Jalapa, 1360 m, 7 January 1908 (fl), *W.A. Kellerman 7959, 7974* (NY). El Quiché: Nebaj, 1828 m, 19 November 1934 (fl), *A.F. Skutch 1728* (UC). HONDURAS. Comayagua: vicinity caserio El Limón and Calán river, 1300 m, 2 January 1990 (fl, fr), *A. Molina-R. 34240 and A.R. Molina* (MEXU). Francisco Morazán: along the roadside 3–8 km W of Escuela Agrícola Panamericana, 853–914 m, 12 January 1944 (fl), *J. Vera-S. 2718* (MICH); Ocotepeque: aldea El Portín, Agua Caliente (Guatemalan border)-Santa Rosa de Copán, 18.1 mi E of Santa Fe, 26.8 mi SW of bridge over Rio Higuito (or Río Grande), near village of Cucuyagua Copán, 14°28'N, 89°15'W, 1800 m, 28 January 1987 (fl), *T.B. Croat 63802 and D. P. Hannon* (MEXU). MEXICO. Chiapas: Talquián, 8 km al NE, 1600 m, 25 November 1986 (fl), *E. Ventura 4175 and E. López* (IEB, OAX, XAL); en el camino de Talquián a Chiquihuite, 1700 m, 3 February 1987 (fl, fr), *E. Martínez-S.* et al. *19341* (HEM, XAL); entrada a Pueblo Nuevo, extremo E de la población sobre la carretera Jitotol-Pueblo Nuevo, 17°9'23.42"N, 92°53'25.27"W, 1700 m, 15 November 2009 (fl), *J.G. González-G. et* al. *449* (IBUG); 13 km al NE de San Pedro Chenalhó, 1457 m, 31 December 2009 (fl), *V. Ramírez-C 1234* (IBUG). Distrito Federal: cerca de Xicalco, delegación Tlalpan, 2600 m, 20 April 1974 (fl), *J. Rzedowski 31872* (ENCB); Santa Cecilia, delegación de Milpa, 2600 m, 6 January 1976 (fl), *A. Ventura-A. 790* (ENCB). Estado de México: 14.5 km NE of Temascaltepec on hwy 130, 1900 m, 10 November 1985 (fl), *S.A. Reisfield 1254* (WIS); km 18 de la carretera Ocuilán-Cuernavaca, 2200 m, 12 January 1986 (fl), *Castillo* et al. *4* (HUAA). Guerrero: cerro de la Cruz (Sierra Manuel Díaz), 19°34'0"N, 96°27'0"W, 700 m, 8 October 1985 (fl), *R. Acosta-P. 902 and J.I. Calzada* (IBUG, XAL, XALU); ejido de Yextla, 4 km al SW de Filo de Caballo, aprox. 2 km al W de Carrizal de Bravo, 17°37'15.1"N, 99°51'36.6"W, 2673 m, 31 January 2010 (fl), *J.G. González-G. 590* (IBUG); paraje de Pazclar, sobre la brecha que va de Chichihualco a Carrizal de Bravo, 17°35'39.2"N, 99°47'21.1"W, 2037 m, 31 January 2010 (fl), *J.G. González-G. 578* (IBUG). Jalisco: camino de San Sebastián del Oeste a la Bufa, segundo arroyo, 20°45'19"N, 104°50'18"W, 1455 m, 7 March 2009 (fl), *J.G. González-G.305* (IBUG). Michoacán: cerro Pico Azul, 2600 m, 3 December 1988 (fl), *C. Medina-G. 1527* (IEB, XAL); Volcano of Tancítaro, near town of Tancítaro, 19°22'9.05"N, 102°13'5.49"W, 2421 m, 23 November 1999 (fl), *J. Cahill 3002* (CIMI); al oeste de el cerro la Cantera, por la brecha de Tancítaro a el Jazmín, 19°22'32.6"N, 102°22'3"W, 2267 m, 2 May 2010 (fl, fr), *J.G. González-G. 602 and J.A. Vázquez-G.* (IBUG). Morelos: antiguo camino de la colonia del Bosque a Mexicapa, 18°59'26"N, 99°18'33"W, 2540 m, 26 February 1999 (fl), *J. Ceja* et al. *800* (ENCB, IEB). Nayarit: en la base del cerro Sanganguey, 20 km al SE de Tepic, 21°28'N, 104°43'W, 17 June 1987 (fl), *O. Téllez-V.* et al. 10388 (IEB). Oaxaca: 2 km al SE de San Juan Juquila Mixes, sobre la brecha que va hacia San Pedro Ocotepec, 16°55'47"N, 95°54'21.3"W, 1505 m, 24 January 2010 (fl, fr), *J.G. González-G. 552* (IBUG). Puebla: San Pedro B. J., 2050 m, 27 February 1987 (fl), *Dorado et al. 509* (IEB). Veracruz: 13 km N of Hwy 140 on Hwy 136 (the Misantla road), 1500 m, 5 January 1982 (fl, fr), *K. Elliot 35a* (XAL); San Andrés Tuxtla, March 1982 (fl, fr), *T.P. Ramamoorthy 3445* (IBUG); cerro Tres Picos, Sierra de Manuel Díaz, 700 m, 18 November 1984 (fr), *R. Acosta-P. 82 and N. Acosta-B.* (IBUG, IEB, XAL); Comapa , 450 m, 14 June 1985 (fl, fr), *A. Espíritu-S. 336 and J.L. Martínez-P.* (XAL); cerro de la Mesa (Sierra Manuel Díaz), 460 m, 15 August 1985 (fl), *R. Acosta-P. 805 and F. Vázquez-B.* (XAL); barranca de Panoaya, 2.5 km al NE de El Coyol, 450 m, 26 September 1985 (fl, fr), *M.E. Medina-A. 524 and F. Vázquez-B.* (IEB, XAL, XALU); 1 km al NO de El Coyol, 500 m, 28 June 1985 (fl), *M.E. Medina-A. 174 and R. Acosta-P.* (MEXU, XAL). NICARAGUA. Jinotega: Santa Lastenia, between Matagalpa and Jinotega, 13°2'N, 85°57'W, 1450 m, 31 October 1982 (fl, fr), *W. Douglas-S. 21897* (MEXU).

Salvia mocinoi is the second morphologically most variable and most widely distributed species within *Salvia* sect. *Membranaceae*. Its wide variation let to the description of 4 additional species and a variety (*Salvia lophantha* Benth., *S. rubiginosa* Benth., *S. rubiginosa* var. *hebephylla* Fernald, *S. saltuensis* Fernald, and *S. zacuapanensis*). These were recognized by Epling (1939), excepting *S. rubiginosa* var. *hebephylla* and *S. saltuensis*, in base to petiole length, leaf shape, inflorescence diameter and compactness, floral bract size, calyx length and pubescence, and calyx lip length. The amount of herbarium specimens Epling had available for examination was scarce, such that it might have been easy to identify morphological discontinuities. However, after examining the specimens here cited, it was found a continuous variation gradient between the extremes he recognized as distinct taxa, that it is consistent with the resolution of recognizing only one species.

The way these taxa have been treated in floras developed in areas that embraces part of their distribution or nomenclatural checklists has been variable. In Flora of Guatemala, Standley and Williams (1973) recognize both *S. mocinoi* and *S. rubiginosa* and submerge *S. lophantha* as synonym of the first; they allude *S. rubiginosa* differs from *S. mocinoi* in having glandular-pubescent calyces, whereas *S. mocinoi* does not. Alziar (1992) recognizes *S. lophantha* as synonym of *S. mocinoi*. Pool (2001) in Flora of Nicaragua considers *S. mocinoi* as a very variable species where she submerges *S. lophantha*, *S. rubiginosa* and *S. saltuensis* as synonyms; besides, she declares the posibility that a detailed study could reveal additional taxa. Klitgaard (2012) in Flora Mesoamericana recognizes *S. mocinoi* and *S. rubiginosa*; the first having 14-nerved calyces with 3-nerved

upper lip, membranaceous and smooth leaves, and being sparsely pilose, contrasting with the 15-nerved calyces with 7-nerved upper lip, wrinkled and bullate leaves, and densely pilose surfaces of *S. rubiginosa*; she considers *S. lophanta*, *S. lophanthoides* and *S. saltuensis* as synonyms of *S. mocinoi*. Furthermore, in an online world checklist of Lamiaceae (Govaerts et al. 2012) *S. lophantha*, *S. rubiginosa*, *S. rubiginosa* var. *hebephylla*, *S. saltuensis* and *S. zacuapanensis* are treated as synonyms of *S. mocinoi*. The lack of agreement between different authors also reveals that the recognition of these taxa is not straightforward, and conclusive.

There is more coincidence considering *Salvia lophantha* and *S. saltuensis* as synonyms of *S. mocinoi* (Standley and Williams 1973, Alziar 1992, Pool 2001, Govaerts 2012, Klitgaard 2012). Epling (1939) recognized *S. lophantha* by its 7–9 mm (*vs* 6–7 mm) long mature calyces with almost truncate upper lip no more than 1 mm long. But, examining type specimens, mature calyces more than 7 mm long were not found, and in collections of typical *S. mocinoi* upper calyx lip length varies from 1–2.7 mm long; hence, recognition of *S. lophantha* is not justified. *Salvia saltuensis* is identical to typical *S. mocinoi* in every aspect; Fernald (1900) recognized the species because of its pilose branches with spreading hairs; nonetheless, pubescence is very variable within *S. mocinoi* complex as to be used to defined taxa, and *S. saltuensis* was not longer recognized from Epling (1939) up to date.

Epling (1939) recognized *Salvia rubiginosa* exclusively in base to a perception of a coarser and sometimes branched pubescence on the stem ribs and between them (*vs* finer, never branched, and restricted to the ribs). In fact, there is a major tendency in possessing coarser pubescence in populations considered by Epling as *S. rubiginosa*, however the hairs are always simple, contrary to what he stated, and pubescence variation is

Fig. 14. *Salvia nitida*. **A**) leaves; **B**) frontal view of the flower; **C**) lateral view of the flower (taken by J.G. González-G.).

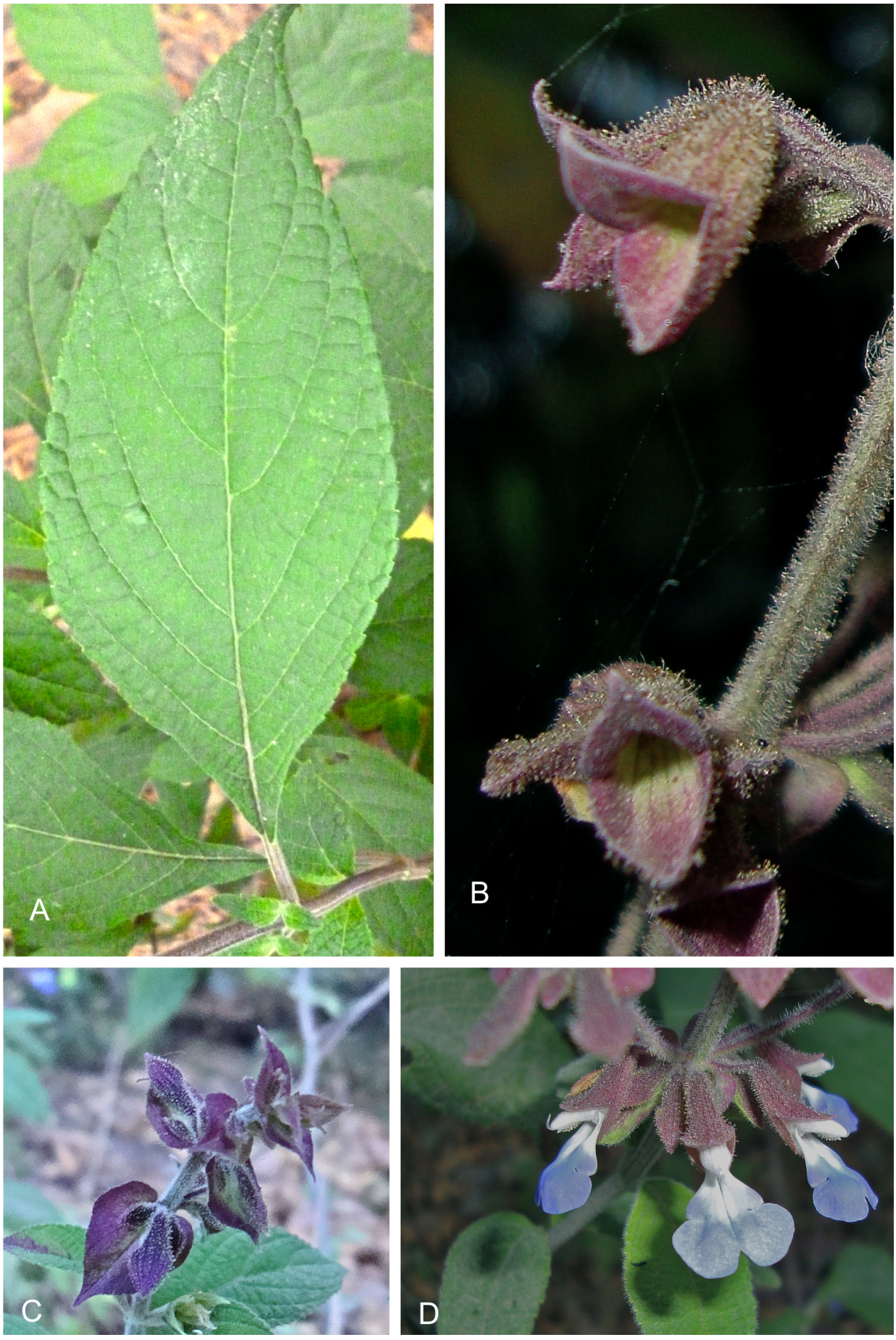

Fig. 15. *Salvia sanctae-luciae*. **A)** leaf blade; **B)** calyces; **C)** floral bracts; and **D)** flowers (taken by J.G. González-G.).

copious in both typical *S. rubiginosa* and *S. mocinoi*, stems sparsely to densely pubescent, the hairs exclusively on the ribs or also between them; hence pubescence is not enough to recognize two different species. The arguments of Standley and Williams (1973) and Klitgaard (2012), exposed above, to accept both species are inadequate. Most of typical populations of *S. mocinoi* also presents glandular-capitate hairs in their calyces, with 12–15 veins in total and 5 (or 7) in the upper lips [*González-G. 578, 590* (IBUG), *González-G. 602 and Vázquez-G.* (IBUG), and *Ramamoorthy 3445* (IBUG), for example]. It should be also noted that veins in *S. rubiginosa* calyces varies from 13–15, and in the upper lip from 5–7 (*González-G.* et al. *449*, *552*, (IBUG), *Méndez-T. 5556* (IBUG), *Ramírez-C. 1234* (IBUG), for example], contrasting with the 14-nerved calyces with 3-nerved upper lip recorded by Klitgaard (2012). Consequently, recognition of *S. rubiginosa* as a distinct taxon is not supported.

Salvia zacuapanensis is not recognized here, because no diagnostic characters were found to distinguish it from *S. mocinoi s.l.* Epling (1939) recognized this species in base to its glabrous and 10–11 mm long (*vs* 7–9 mm long) calyces with 2.5 mm long (*vs* 2 mm long) upper lip; but, some specimens examined present pilose calyces [*Medina-A. 174 and Acosta-P.* (XAL) and *Medina-A. 524 and Vázquez-B.* (XAL)], and (6.5–)7.6–9 mm long calyces with 1.8–2.9 mm long upper lip [*Acosta-P. 82 and Acosta-B.* (IBUG), *Acosta-P. 805 and Vázquez-B.* (XAL), *Acosta-P. 902 and Calzada* (IBUG, XAL), *Espíritu-S. 336 and Martínez P.* (XAL)].

Salvia lophanthoides is resurrected as a different species, after its synonymization to *S. mocinoi* by Klitgaard (2012) without any explanation. The distinction of the former against morphologically similar species is delineated above in the key to the species of *Salvia* sect. *Membranaceae* and in the discussion after the description of *Salvia glabra*.

Salvia mocinoi is similar to *S. langlassei* and *S. sanctae-luciae*. However a set of morphological differences supports and warrants its recognition. The distinction from *S. langlassei* is treated in the description of this. *Salvia mocinoi* differs from *S. sanctae-luciae* by its shorter pedicels in fruit (*S. mocinoi*: 3–4 mm long, *S. sanctae-luciae*: (4–)5–7.5(–10) mm long) that do not usually exceed floral bract length, smaller calyces in fruit (*S. mocinoi*: 5–7.5 mm × 2–3.2(–4) mm, *S. sanctae-luciae*: 9–10 mm × 6.5–7.1 mm), and lobes of the lower one distinct (*S. sanctae-luciae*: connate ⅔ to ¾ of their length), well developed nectar guides in lower corolla lip (*S. sanctae-luciae*: absent or por developed), not invaginated corolla tubes (*S. sanctae-luciae*: invaginated), and glabrous styles (*S. sanctae-luciae*: dorsally pilose at the apex).

10. *Salvia nitida* (M.Martens & Galeotti) Benth., *Prodr.* 12: 300 (1848).

Basionym: *Hyptis nitida* M.Martens & Galeotti, *Bull. Acad. Roy. Sci. Bruxelles* 11(2): 189 (1844).

Type: MEXICO. Oaxaca: near Santa Catarina Juquila y San Marcos Zacatepec, gneiss rocks near the Pacific, 3000 ft [915 m], November 1840 (fl, fr), *H.G. Galeotti 658* (holotype BR5113910, isotypes BR5114566, G, K248038, K248039). (Figs 2K, 3J, 14).

Subshrub, erect, 0.7–1.5 m tall; stems glabrous or with short dark hairs spread on the ribs. Leaves with petioles 0.1–0.3(–0.7) cm long (in uppermost leaves, petioles are absent), caniculate, pilose on ribs; blades ovate to narrowly ovate, 2–3(–5.5) cm long, (1–)1.5–2.8 cm wide, base rounded, truncate to subcordate, margin widely crenate-serrate, tipped with a reddish mucro (0.5–1 mm long), apex acute, lustrous above, coriaceous, both surfaces glabrous to sparsely covered with short appressed hairs. Inflorescence in racemes, floral axis (9–)14–24 cm long, pilose, with 4–11 verticillasters, each one 5–6-flowered, 2.8–4.8 cm gradually apart toward base. Floral bracts ovate to reniform, (12–)18–20 mm long, 13–15(–24) mm wide, persistent, magenta and turning into straw color when dried, glabrous, base cordate, margin serrate and ciliated, apex acute. Pedicel 1.5–2 mm long, pilose. Calyx 4.6–6.5 mm long, 2–4.6 mm diam., green and sometimes dark-blue or purple tinged, covered with glandular-capitate hairs, internally covered with tiny conical hairs, lips acute, 1.5–2 mm long, upper lip 5–veined. Corolla blue with tube paler or white and with white nectar guides on lower lip, glabrous except for upper lip which is dorsally pilose and ventrally bordered with glandular-capitate hairs, and ventral portion of the lower lip which is pilose; tube 3.2–5 mm long, 3–4 mm wide, not ventricose, straight at the base and internally ornate with two papillae; upper lip 2.6–3.8 mm long, ventrally with a truncate to acute tooth at midportion; lower lip 7–8.6 mm long, 6–8.2 mm wide. Stamens included; filament 0.8–1.8 mm long; connective 2.2–4.1 mm long; theca 0.7–1.2 mm long; a pair of staminodes present above and behind filament insertion to corolla tube. Gynobasic horn 0.9–1 mm long; style 6–8.5 mm long, glabrous, stylar lower branch truncate. Mericarp ovoid, 1–1.5 mm long, 0.4–0.8(–1) mm wide, uniformly brown to reddish brown, smooth and glabrous.

Distribution, habitat and phenology: *Salvia nitida* is endemic to the western mountais of Guerrero and Oaxaca in Sierra Madre del Sur (Fig. 13B). It grows in pine-oak, oak and pine forests, from 490–1900 m elevation. It shares habitat with the trees *Calliandra grandiflora* (L'Hér.) Benth., *Quercus crispifolia* Trel., *Q. glaucoides* M.Martens & Galeotti, *Q. candicans* Née, *Q. magnoliifolia*, *Q. obtusata*, *Pinus devoniana*,

P. oocarpa, and the herbs and shrubs *Euphorbia fulgens* Karw. ex Klotzsch, *Fleischmannia pycnocephala* (Less.) R.M.King & H.Rob., *Hibiscus uncinellus* DC. and *Lasiacis ruscifolia* (Kunth) Hitchc. It flowers and fruits from September to beginnings of February, though there are some collections in flower also from May and July.

Etymology: The name of this species derives from the latin word nitidus (bright), and it is most probably referred to the lustrous leaves of the species.

Specimens examined: MEXICO. Guerrero: sierrita, distr. Galeana, 950 m, 12 December 1939 (fl), *G.B. Hinton 14997* (ENCB, HUMO); Agua de Obispo, puente El Mosco, 17°18'50''N, 99°28'10''W, 790 m, 18 September 1965 (fl), *H. Kruse 1310* (IEB); 1.5 miles W of logging road off Mexico Hwy 95 (Acapulto to Iguala), 0.2 miles S of km 34 marker, 18.7 miles S of Chilpancingo, 1250 m, 25 October 1973 (fl), *K.M. Peterson 326 and C.R. Broome* (IEB); 46 km al SO de Filo de Caballo (cerca de Paraíso), 19 October 1983 (fl), *J.C. Soto-N. 5807 and E.M. Martínez* (MEXU); 8 km Al SW de Yerbabuena, camino Filo de Caballo-Atoyac, 1900 m, 23 November 1983 (fl), *E. Martínez-S. 5685 and F. Barrie* (IEB, MEXU); 33 km al N de Ometepec, camino a Tlacoachistlahuaca-San Isidro, 490 m, 26 November 1983 (fl), *E. Martínez-S. 5768* (IBUG, MEXU, XAL); barranca El Toro, 17°17'38''N, 99°30'22''W, 1987 (fl), *L.C. Rodríguez-M. 47* (IEB, MEXU); Malinaltepec, 1600 m, 2 July 1989 (fl), *I. Wagenbreth 46* (MEXU); Malinaltepec, 1600 m, 14 November 1990 (fl), *I. Wagenbreth 444* (MEXU); Malinaltepec, Ojo de Agua de Cuauhtémoc, 17°11'8.9''N 98°39'32.5''W, 2325 m, 3 August 2012 (fl, fr), *B. Nepomuceno-C.* et al. *34* (IBUG, UAGC); Malinaltepec, Ojo de Agua de Cuauhtémoc, 26 December 2012 (fl), *E. Cándido-B. 106 and B. Nepomuceno-C.* (IBUG, UAGC). Oaxaca: 5–6 km NE of Putla, road to Tlaxiaco, 850 m, 6 February 1965 (fl), *R. McVaugh 22270* (MEXU); 10 km al SO del campamento Sto. Domingo, 1790 m, 27 October 1980 (fl), *R. Hernández-M.* et al. *5243* (ENCB, MEXU); 9 km al N de Putla , 850 m, 10 December 1982 (fl), *O. Téllez-V.* et al. *6178* (MEXU); a 17 km al NE de Piedra Larga, camino a Miahuatlán, 550 m, 22 November 1982 (fl), *E. Martínez-S.* et al. *2736* (HUMO, MEXU); 9 km al SE de Piedra Larga, camino a Miahuatlán, 23 September 1982 (fl), *R. Torres-C. 1377 and R. Cedillo-T.* (IEB, MEXU, OAX); 5–6 km del poblado El Manzanal, carretera a Infiernillo, 17.12°N, 98.04°W, 1750 m, 15 December 1985 (fl), *J.I. Calzada 20631* (MEXU); 7 km al S de Cruz de Ocote, 1790 m, 23 May 1986 (fl), *J.C. Soto-N. 12744 and F. Solorzano-G.*(IBUG, MEXU); 14 km de Santiago Juxtlahuaca, entre los poblados de Agua Fría y Hierba Santa, 17.12°N, 97.58°W, 1775 m, 3 November 1995 (fl), *J.I. Calzada 20402* (IBUG, IEB, MEXU); 3 km de El Manzanal, carretera a Infiernillo, 17°13'28.6''N, 98°3'48.5''W, 1850 m, 10 March 1998 (fl), *J.I. Calzada 22385* (MEXU); a la orilla de la carretera, 2 km antes de llegar a la comunidad de El Carrizo, sobre la carretera (brecha) de Santa Catarina Juquila a Río Grande, 16°10'19.9''N, 97°19'32.7''W, 1147 m, 27 January 2010 (fl, fr), *J.G. González-G.571* (IBUG).

Salvia nitida is a distinctive species within *Salvia* sect. *Membranaceae* that can be easily recognized by its sessille to subsessile (petioles 0–0.3 mm, or rarely up to 0.7 mm long), ovate to narrowly ovate lustrous leaves, and lax inflorescences (verticillasters 2.8–4.8 cm apart from each other).

11. *Salvia sanctae-luciae* Seem., *Bot. Voy. Herald.* 327 (1856: 327).

Type: MEXICO. Sinaloa: Sierra Madre near the village of Santa Lucía, *B.C. Seemann 2071* (lectotype BM, isolectotypes GH, K247999, K248000, UC; designated in Epling 1939: 150). (Figs 2B, 3K, 15).

Salvia cladodes Fernald, *Proc. Amer. Acad. Arts* 35(25): 497 (1900).

Shrub, erect, 1–2.2(–3) m tall; stems pilose and puberulent. Leaves with petioles (0.8–)1–4.2 cm long, densely pilose and puberulent; blades elliptic to rhombic-ovate, 6–17 cm long, (2.1–)3–5.4 cm wide, base cuneate to long attenuated, margin finely serrate, apex acuminate, upper surface bullate and scarcely covered with appressed hairs on the veins, lower surface covered with appressed hairs mainly on veins. Inflorescences in racemes, floral axis 5.5–21 cm long, pilose and with some glandular-capitate hairs intermixed, with 5–9 verticillasters, each one 8–16(–20)-flowered, 1–3(–3.5) cm gradually apart at base. Floral bracts ovate, (4.9–)6–11(–15) mm long, (4.2–)5.8–9.5(–12.9) mm wide, dark magenta, outer surface covered with appressed and some glandular-capitate hairs and puberulent, base truncate at the base, margin entire, apex acuminate at the apex. Pedicel 2.9–3.6 mm long in flower (up to (4–)5–7.5(–10) mm long in fruit), densely pilose and with glandular-capitate hairs intermixed. Calyx (7.2–)8–8.6 mm long, 4–4.6 mm diam., up to 9–10 mm long and 6.5–7.1 mm wide in fruit, dark magenta and green tinged toward base, pilose on veins and covered with glandular-capitate hairs, internally covered with short conical hairs, lips long acute, (3.1–)3.7–4.3 mm long, lobes of lower lip connate ⅔ to ¾ of its length, upper lip 5–veined. Corolla sky blue with tube usually paler or white, white nectar guides on lower lip absent or poor developed and restricted to throat, glabrous except for upper lip wich is pilose and ventrally bordered with short glandular-capitate hairs; tube 5.5–6.5 mm long, 3.4–3.7 mm wide, ventricose, invaginated at base and internally ornate with two papillae; upper lip 3–4.5(–6) mm long; lower lip (6.5–)7.5–11 mm long, 7.2–11 mm wide. Stamens included; filament 1.2–1.9 mm long; connective 4.5–5.2 mm long, ventrally ornate with a retrorse acute tooth; thecae 1.9–2 mm long; a pair of staminodes present above and behind filament insertion to corolla. Gynobasic horn 0.3–0.8 mm long; style 8.3–9.1 mm long, the lower branch acute, flat and slightly curved upward, dorsally hispidulous at apex. Mericarp ovoid, (1.7–)2.2–2.3 mm long, 1.2–1.4 mm wide, light brown and irregularly dark brown marbled, smooth, glabrous.

Distribution, habitat and phenology: *Salvia sanctae-luciae* is an endemic species of northwestern Mexico, it grows in the states of Nayarit and Sinaloa (Fig. 13C). It inhabits montane cloud, oak and pine-oak forests, and less frequently in ecotones of these vegetation with tropical subdeciduous forests, from (870–)1000–1550 m elevation. It shares habitat with the trees *Carpinus caroliniana*, *Cecropia obtusifolia*, *Clethra rosei*, *Magnolia pacifica*, *Pinus devoniana*, *P. montezumae* Lamb., *P. oocarpa*, *Quercus acutifolia*, *Q. aristata*, *Q. castanea*, *Q. elliptica* Née, *Styrax argenteus*, and the herbs and shrubs *Barleria oenotheroides*, *Bomarea hirtella* (Kunth) Herb., *Hyptis oblongifolia* Benth., *Oplismenus burmannii* (Retz.) P.Beauv., *Salvia aequidistans* Fernald, *S. mexicana*, and *S. thyrsiflora* Benth. It flowers and fruits from January to April, though a specimen has been collected in flower in September.

Etymology: The name of this species brings to mind the nearby village where it was collected for the first time, Santa Lucía, Sinaloa; but curiously, this plant is better known in Sierra de San Juan, Nayarit.

Specimens examined: MEXICO. Nayarit: about 10 road-miles E of Jalcocotán, on road to Tepic, 1050 m, 22 April 1951 (fr, fl), *R. McVaugh 12128* (MEXU); El Cuarenteño, 5 km al S de Platanitos, que está en el km 8 de la carretera Tepic Santa Cruz, 5 March 1983 (fl), *P. Magaña-R. 89 and O. Téllez-V.* (MEXU); along dirt road 2.7–3 mi S from hwy 66 (between Tepic and Miramar) to Volcan San Juan, 1370 m, 1 March 1987 (fl, fr), *T.F. Daniel 4754 and B. Bartholomew* (MEXU); km 5 de la terracería que empieza en el km 6 de la carr. Compostela-Las Varas, 3 April 1987 (fl), *O. Téllez-V. 10315 and S. Aguilar* (IEB, MEXU); La Sidra, cañada al SE de El Cuarenteño, 1250 m, 6 September 1988 (fl, fr), *M. Blanco* et al. *s.n.* (MEXU); km 5 camino de terracería al Cuarenteño, que empieza 500 m al W de El Izote, carr. Tepic-Miramar, 21°28'0"N, 104°55'0"W, 2 February 1989 (fl, fr), *O. Téllez-V. 11689 and G. Flores-F.* (ENCB, MEXU); Las Tierritas, 2 km al NE del Izote, cerro de San Juan, al W de Tepic, 21°31'N, 104°59'W, 1200 m, 23 March 1989 (fl, fr), *P. Tenorio-L.* et al. *15596* (MEXU); km 11 sobre la desviación a El Cuarenteño, carretera Tepic-Miramar, 1550 m, 31 January 1989 (fl), *E. González-R. 671 and S. Aguilar* (IEB); km 3.5 de la Terracería al Cuarenteño, que empieza a 500 m al O de El Izote, camino a Jalcocotán, 21°29'10"N, 104°59'0"W, 1360 m, 29 January 1990 (fl), *O. Téllez-V. 12561* (MEXU); 11 km al E de Jalcocotán, carr. a Tepic, 21°31'N, 105°2"W, 1000 m, 13 March 1991 (fl), *G. Flores-F. 2499 and R. Ramírez-R.* (MEXU); 10 km al E de la desviación para el poblado El Cuarenteño, cerro San Juan, 21°28'15"N, 105°0'18"W, 1400 m, 6 April 1994 (fl), *J.I. Calzada* et al. *19240* (MEXU); 10 km al E de la desviación para el poblado El Cuarenteño, cerro de San Juan, 21°28'15"N, 105°0'18"W, 1400 m, 6 April 1994 (fr), *J.I. Calzada* et al. *9240* (XAL); 11 km al SW de la carr. el Izote-V. Carranza, camino al Cuarenteño, cañada La Capilla, 21°28'69"N, 105°0'8.4"W, 1325 m, 20 January 1994 (fl, fr), *J.I. Calzada* et al. *19088* (MEXU); 25 km por la brecha de El Izote a El Cuarenteño, 1 km después de El Cuarenteño, Sierra de San Juan, 21°27'7.6"N, 105°2'29.3"W, 872 m, 12 March 2011 (fl, fr), *J.G. González-G.* et al. *931* (IBUG); 11–11.2 km por la brecha del Izote a El Cuarenteño (carr Tepic-Jalcocotán), 2.8–2.9 km al SO de La Noria, Sierra de San Juan, 21°28'15"N, 105°0'10.8"W, 1404 m, 12 March 2011 (fl, fr), *J.G. González-G.* et al. *923* (IBUG); km 4.5–4.6 de la brecha del Izote (carr. Tepic a Jalcocotán) rumbo a La Noria, Sierra de San Juan, 21°30'21.2"N, 104°58'57.4"W, 1349 m, 12 March 2011 (fl, fr), *J.G. González-G.* et al. *917* (IBUG). SINALOA. Concordia: Potrerillos, a 2 km al SE rumbo a la Petaca, 23°26'31"N, 105°49'27'W, 1550 m, 16 February 1999 (fl), *A. Rito-V. 9720 and H. Aguilar-H.* (MEXU).

Salvia sanctae-luciae is morphologically similar to *S. mocinoi* and *S. langlassei*. The features that ensure their recognition are highlighted in the discussion of the two latter. The distribution of *S. sanctae-luciae* does not overlap with that of *S. langlassei* and *S. mocinoi* (compare Figs 13C *vs* 13A and 8A). *S. sanctae-luciae* grows in Sierra Madre Occidental and northwestern Trans-mexican Volcanic Belt in Nayarit and Sinaloa; whilst *S. langlassei* is endemic of Sierra Madre del Sur in Guerrero, and although, *S. mocinoi* has a wide distribution and has been collected as far north as Nayarit (*Téllez-V. 10388*, IEB), it does not grow in the same localities than *S. sanctae-luciae.*

12. *Salvia verecunda* Epling ex Jones, *Contr. W. Bot.* 18: 53 (1933). Type: MEXICO. Chihuahua: Guayanopa Canyon, 5000 ft (1524 m), 13 September 1903 (fl, fr), *M.E. Jones s.n.* (holotype RSA, isotype UC). (Figs 2I, 3L).

Perennial herb, erect, (20–)30–50(–70) cm tall; stems pilose. Leaves with petioles (0.5–)1.2–2.2(–4.6) cm long, pilose; blades ovate to ovate-deltoid, 2–3.5(–5.2) cm long, 1.5–2.5(–3) cm wide, base subtruncate, oblique to cuneate, margin crenate to serrate, apex acuminate, both surfaces covered with appressed hairs. Inflorescences in racemes, floral axis 9.5–20 cm long, pilose, with 4–8 verticillasters, each one 8–16-flowered, 1–3 cm gradually apart toward base. Floral bracts reniform, 7.7–12 mm long, 10–14 mm wide, persistent, magenta to reddish or green, sparsely pilose on outer surface, base cordate at the base, margin entire and ciliated, apex acuminate at the apex. Pedicel 1.8–2.1 mm long, pilose. Calyx 4.5–5.5(–6) mm long, 3–3.3 mm diam., magenta to dark magenta and green toward base, pilose mainly on veins and rarely covered with short glandular-capitate hairs at base, covered with short conical hairs on inner surface to glabrous, lips acute, 1.7–2 mm long, upper lip 7–veined. Corolla sky blue with white nectar guides on lower lip, glabrous except for upper lip, which is pilose and ventrally bordered with short glandular-capitate hairs; tube 4–4.3 mm long, 2.3–2.5 mm wide, not ventricose, not invaginated at base and internally naked (epapillate); upper lip (1.5–)2.5–2.8 mm long, lower lip 4.7–5.8 mm long, 4–5.6 mm long wide. Stamens included; filament 0.8–1 mm long; connective 2–2.3 mm long, ventrally ornate with a short acute tooth at midportion; theca 0.7–1 mm long; a pair of

staminodes present above and behind filament insertion to corolla. Gynobasic horn 0.6–0.8 mm long; style 5.5–5.8 mm long, glabrous, lower branch acute. Mericarp ovoid, 1–1.1 mm long, 0.7–0.8 mm wide, light brown and irregularly dark brown marbled, smooth, glabrous.

Distribution, habitat and phenology: *Salvia verecunda* is endemic to northwestern Mexico, growing in Sierra Madre Occidental in the states of Chihuahua, Durango and Sonora (Fig. 13D). It inhabits open oak forests, from 1200–1700(–2120) m elevation. It shares habitat with the trees *Prunus gentryi* Standl., *Quercus albocincta* Trel., *Q. acutifolia*, *Q. chihuahuensis*, *Q. coccolobifolia*, *Salix* sp. and the shrubs and herbs *Achimenes* sp., *Begonia* sp., *Commelina erecta* L., *Kosteletzkya thurberi* A.Gray, *Muhlenbergia dumosa, Phacelia platycarpa* (Cav.) Spreng, *Pleopeltis polylepis* var. *erythrolepis* (Weath.) T.Wendt. It flowers and fruits from September to November.

Etymology: The name of this species derives from the latin word verecundus (bashful, modest); it is not clear what Epling (1939) meant assigning such name, probably, he referred to the un-conspicuity of the plant.

Specimens examined: MEXICO. Chihuahua**:** Gambusero settlement and adjacent Rio La Haciendita of La Bataria, 1700 m, 29 August 1986 (fl, fr), *P.S. Martin* et al. *s.n.* (ARIZ); Nabogame, 28°30'N, 108°30'W, 1800 m, 7 September 1987 (fl), *J.E. Laferrièrre1035* (MEXU); Nabogame, 28°30'N, 108°30'W, 1800 m, 19 August 1988 (fl), *J.E. Laferrièrre1696* (CHAPA); Nabogame, 28°30'N, 108°30'W, 1761 m, 5 September 1988 (fl), *J.E. Leferrièrre 1932* (ARIZ). Durango: Reserva de la Biósfera La Michilía, El Sorruedo, 750 m al N, al SE de la reserva, 23°18'5''N, 104°18'5''W, 2120 m, 22 October 1985 (fl, fr), *S. González-E. 3615 and S. Acevedo* (CIIDIR, IBUG); 1 km al NW de El Sorruedo, 27 November 1985 (fl, fr), *S. González-E.* et al. *3691* (CHAPA, CIIDIR, IEB, ENCB). Sonora: Tierra de Chabacan, above Río Durazno, 28°17'N, 108°20'W, 1700 m, 3 November 1989 (fr), *G. Ferguson* et al. *254* (ARIZ); arroyo Los Pilares, about 2 km of Los Pilares, 13.4 mi E of Yécora, 1260 m, 8 September 1995 (fl), *M.E. Fishbein* et al. *2557* (MEXU, USON); Río Maycoba at Mex. 16 (20.5 km W of Maycoba, 28.6 km E of Yécora), 28°22'15''N, 108°45'30''W, 1220 m, 15 September 1998 (fl), *W. Taruba s.n.* (USON); Yécora, Cañada La Ventana (arroyo El Otro Lado), 2.5 km (by air) ESE of Yécora, 1520 m, 18 September 1998 (fl, fr), *T.R. Van Devender* et al. *s.n.* (ARIZ).

Salvia verecunda is morphological similar to *S. lasiocephala*. It can be differentiated by its perennial habit (*S. lasiocephala*: annual), wider calyx (*S. verecunda*: 3–3.3 mm diam., *S. lasiocephala*: 1.5–1.9(–2.3) mm diam.), slightly longer corolla tube (*S. verecunda*: 4–4.3 mm long, *S. lasiocephala*: (2.5–)3–3.5 mm long) and style (*S. verecunda*: 5.5–5.8 mm long, *S. lasiocephala*: (3.6–)5–5.5 mm long), acute stylar branch (*S. lasiocephala*: truncate), ovoid (*S. lasiocephala*: lenticular), slightly longer (*S. verecunda*: 1–1.1 mm long, *S. lasiocephala*: 0.5–0.7(–1) mm long), and brown and irregularly darke brown marbled mericarps (*S. lasiocephala*: entirely bright black). *Salvia verecunda* also resembles *S. mocinoi* but can be distinguished by its always 7-veined upper calyx lip (*S. mocinoi*: 5–7-veined), shorter (*S. verecunda*: 4–4.3 mm long, *S. mocinoi*: (4.4–)5–7 mm long) and not ventricose (*S. mocinoi*: ventricose) corolla tube and internally epapillate at base (*S. mocinoi*: ornate with two papillae), shorter filament (*S. verecunda*: 0.8–1 mm long, *S. mocinoi*: 1.3–2.6 mm long), shorter connective (*S. verecunda*: 2–2.3 mm long, *S. mocinoi*: 2.4–3.6(–4.5) mm long), and shorter mericarp (*S. verecunda*: 1–1.1 mm long, *S. verecunda*: 1.3–2 mm long).

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