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SALVIA IN MADAGASCAR

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ABSTRACT. A short revision is given of the Madagascar species of *Salvia*. Six species are recognised including one described as new, *S. perrieri* Hedge. The species fall into three distinct species-groups, each of which is illustrated; two of them are monotypic and none can satisfactorily be included in any of the existing sections; one species is allied to an endemic Somali *Salvia*, the remaining species have no obvious relatives outside Madagascar, either in Africa, Asia or the New World.

INTRODUCTION

This paper, the first stage in a wider consideration of the genus in the African subcontinent, considers *Salvia* in Madagascar.

The first species of *Salvia* to be described from Madagascar, *S. leucodermis*, *S. porphyrocalyx*, *S. cryptoclada* and *S. sessilifolia*, were published by Baker in 1881. Two years later in 1883, the same author described *S. parvifolia*. In 1894 Briquet, without having seen any of the Baker species, described an additional four species, *S. goudotii*, *S. hildebrandtii*, *S. stenodonta* and *S. tananarivensis*. Since that time the species total has remained at nine and nothing of note on the genus has been published.

The present note stems from a consideration of all the species cited above in conjunction with the substantial quantity of unnamed gatherings in the Natural History Museum, Paris; all the specimens cited have been seen. Fuller descriptions and citations of gatherings of the species recognised here will eventually be published in the Flore de Madagascar et des Comores.

KEY TO THE NATIVE SPECIES

1. Herbaceous perennial; leaves up to 1·7 cm long; corolla exannulate, up to 15 mm long 1. *S. parvifolia*
- + Shrubs or suffruticose perennials; leaves more than 3 cm long; corolla annulate, 25–40 mm long 2.
2. Leaves 8–15 cm long, linear-lanceolate with a prominent midrib; corolla blue or violet-blue 2. *S. perrieri*
- + Leaves 6 cm long or less, linear-oblong to broad obovate-lanceolate, with an inconspicuous midrib; corolla reddish-violet, white or rose 3-



FIG. 1. *Salvia parvifolia* Baker: a, habit $\times \frac{3}{8}$; b, corolla $\times 2\frac{3}{8}$; c, corolla dissected $\times 2\frac{3}{8}$; d, stamen $\times 10$; e, upper stem indumentum $\times c. 10$; f, fruiting calyx $\times 2\frac{3}{8}$; g, nutlet $\times 10$.

3. Leaves $\pm$ herbaceous, evenly distributed over stems, not or scarcely overlapping each other; corolla throat c. 8 mm broad 4. *S. porphyrocalyx*
- + Leaves thick-textured or coriaceous, concentrated beneath inflorescences, clearly overlapping each other; corolla throat less than 6 mm broad 4.
4. Upper surface of leaf with stiff lucid hairs; leaves not coriaceous; lower lip of corolla shorter than upper 3. *S. sessilifolia*
- + Upper leaf surface velutinous; leaves coriaceous, rigid; lower lip of corolla longer than upper 5.
5. Calyces with glandular hairs; leaf lamina broadest in upper third 5. *S. leucodermis*
- + Calyces without glandular hairs; leaf lamina broadest about its middle 6. *S. cryptoclada*

In addition to the indigenous species, *S. coccinea* Juss. ex Murr. is naturalised in some parts of the country, particularly around Tananarive. This red or scarlet flowered annual, widely cultivated and naturalised in many tropical and subtropical regions of the world, is native to the New World. *S. farinacea* Benth., with characteristic farinose-tomentose calyces and blue flowers, is also cultivated and occasionally escapes.

1. *S. parvifolia* Baker in Journ. Linn. Soc. Bot. 20: 232 (1883). Fig. 1.

Aromatic perennial, 15–40 cm. Leaves linear-elliptic to oblong, up to 17 $\times$ 8 mm, glabrous above, $\pm$ pannose below. Verticils distinct, c. 6-flowered. Calyx 4.5–6 mm with a thin indumentum of simple, short eglandular hairs. Corolla pale blue to lilac, up to 15 mm; upper lip $\pm$ straight; lower lip much longer than upper; tube exannulate, 8–9 mm. Staminal connectives c. 3 mm; lower thecae fertile.

Syntypes. C Madagascar, (without exact locality), Baron 2011, 2073, 2074 (K). Endemic. Selected specimens. Vakinankaratra, dist. d'Ambatolampy, Tsinjoarivo, 1600 m, 29 xi 1912, *Viguiér & Humbert* 1785. Dist. Antsirabe, Antsirabe, *Perrier de la Bâthie* 10485.

A very distinct and constant species characterised by the small leaves, the small blue to lilac corollas and the long labellum. The unrelated S African genus *Hemizygia* contains some species, e.g. *H. albiflora* (N.E. Br.) Ashby from the Transvaal, which in habit and foliage are curiously similar to this *Salvia*.

2. *S. perrieri* Hedge, sp. nov.

Affinis *S. somaliensis* Vatke sed foliis discoloribus, pedicellis longioribus, calycibus triangulari-campanulatis recedit.

Suffrutex ad 150 cm altus, ramis erectis vel ascendentibus lignosis $\pm$ simplicibus quadrangularibus, basi pilis adpressis eglandulosis multicellularibus et glandulis punctatis praeditis, internodiis mediis c. 3 cm longis. *Folia* sessilia vel breviter (ad 8 mm) petiolata, discoloria; lamina anguste lineari-lanceolata vel lanceolata, 8–12 $\times$ 1.5–1.8 (–3) cm, areolato-reticulata, margine minute crenulata, apice acuta vel rotundata, basi sensim attenuata, vel raro auriculata, subtus pilis brevibus eglandulosis et glandulis punctatis



FIG. 2. *Salvia perrieri* Hedge subsp. *perrieri*: a, habit $\times \frac{1}{3}$; b, corolla dissected $\times 2$; c, upper stem indumentum $\times c. 4$; d, stamen $\times 4$; e, nutlet $\times 8$.

dense vestita, supra glabra. *Axis inflorescentiae* c. 14 cm longus, $\pm$ simplex vel parce ramosus, pilis eglandulosis, glandulis punctatis et raro pilis glandulosis brevibus praeditus. *Verticillastra* c. 14-nata, c. 10-flora, inferiora c. 3.8 cm distantia superiora approximata. *Folia floralia* late lanceolata, acuminata, ad 14×5 mm. *Pedicelli* erecto-patentes ad 1 cm longi. *Calyx* triangulari-campanulatus, c. 10 mm, 12-14- nervosus, ad medium bilabiatus labiis divergentibus, indumento e glandulis punctatis et pilis eglandulosis glandulosisque composito; labium inferius in dentes duos ovatos lanceolatos mucronatos fissum; labium superius tridentatum recurvatum dentibus acuminatis, 2-3.5 mm longis. *Calyx in fructu* parum expansus, deflexus. *Corolla* pallide coerulea vel albo-coerulea, ad 27 mm longa, pilosa, labiis valde, vel raro vix, divergentibus; tubus parum, raro manifeste, exsertus, c. 10 mm, annulatus; galea falcata, bifida; labellum galea longius raro brevius 4-10 mm. *Stamina* inferne non cohaerentia; connectivum antherarum 11-14 mm longum; staminodia evoluta. *Stylus* exsertus, ramo postico longiore. *Nuculae* nigrae, $\pm$ rotundatae, 2.5×2 mm. *Fl.* Nov.-Dec.

The new species is quite closely related to the Somali endemic *S. somalensis* Vatke: they share a shrubby habit, linear-lanceolate leaves, a similar indumentum and blue corollas. They also grow in comparable mesophytic habitats: the Somalia species is in open glades or at the edge of juniper forest at about 2000 m and the Madagascar species is apparently restricted to shady places near streams at the edge of forest vegetation between 1000 and 2000 m. Morphologically, *S. perrieri* differs in the clearly bi-coloured leaf lamina, the longer pedicels and the triangular-campanulate calyces.

The link between these Madagascar and Somalia *Salvias* is particularly interesting because both species are isolated taxonomically in the genus with no other obvious allies in Africa or elsewhere. The question of their correct sectional affinity cannot be resolved without a revision of all the currently recognized sections in the Old World; one can however say that almost certainly, when it was originally described by Vatke, *S. somalensis* was wrongly placed in sect. *Plethiosphace*.

Two subspecies are recognised: subsp. *perrieri*, known from several gatherings in the south of the island, and subsp. *brevilabiata* known from a solitary collection in the north. They are readily separated:

1. Lower lip of corolla c. 10 mm, clearly divergent from hood;
upper lip prominent, falcate, $\pm$ entire subsp. *perrieri*
- + Lower lip of corolla c. 4 mm, scarcely divergent from hood; upper
lip very short, straight or slightly curved, bifid subsp. *brevilabiata*

subsp. *perrieri*. Fig. 2.

Madagascar, central-south: Horombe, 1300 m, flower blue or pale blue, *Perrier de la Bâthie* 12685 (holo. P); massif of Andringitra, 2000 m, *Perrier de la Bâthie* 14347; massif of Kalambatittra, Mt. Kalambatittra, corolla blue, c. 1500 m, xi 1933, *Humbert* 11886; massif of Kalambatittra, Mt. Analatsitendrika, 1600 m, xi 1933, *Humbert* 12014; massif of Ivakoany, 1000-1200 m, 17-18 xii 1928, *Humbert* 7035. Ampandrandava ($24^{\circ}05'S$, $45^{\circ}42'E$), *Herb. Jard. bot. Tananarive* no. 6385.

The cited specimens are all very similar to each other and show little range of variation.

subsp. *brevilabiata* Hedge, **subsp. nov.**

A typo labiis corollarum brevibus vix divergentibus, corollis exsertis differt. Madagascar, central-north: mountains to the north of Mangindrano (high Maevarano) near the summit of Ambohimirahavavy, clearing in shady forest, 1.5 m, flowers blue (pale violet blue), 1800 m, 19 i - 12 ii 1951, *Humbert & Capuron* 25684 (holo P.)

This interesting subspecies is known only from the cited gathering. In all characters except that of the corolla, it is virtually indistinguishable from the type subspecies. In habit, inflorescence, indumentum, floral leaves, calyces, pedicels and flower colour, the two are, allowing for minor variations, identical; they also grow in similar habitats. But in corolla shape, they differ clearly. The corollas of *S. perrieri* subsp. *perrieri* have widely separated lips and are scarcely exserted (Fig. 2) whereas in *Humbert* 25684 the corolla lips are short, scarcely divergent and the tubes are clearly exserted from the calyces; but they do share a similar type of annulus near the base of the tube. Although the difference in corolla shape, combined with the very wide geographical separation of the southern *S. perrieri* (south of c. 23°S) and the northern *Humbert* 25684 (at c. 14°S), might apparently warrant a higher category, I prefer, at least in the meantime, to consider the northern plant as a subspecies. I have been influenced in this by the helpful comments of Monsieur J. Bosser, Paris, who informs me that he has encountered several similar instances in other plant groups and that probably these apparent distinct vicariads would, if a full range of material was at hand, show a continuous range of variation.

3. *S. sessilifolia* Baker in Journ. Linn. Soc. Bot. 18: 276 (1881). Fig. 3.

Shrub up to 100 cm; stems densely leafy below inflorescence, lowermost parts of stem leafless. Leaves ascending-erect, linear-oblong to oblanceolate, sessile, up to 3.5 × 0.6 cm (rarely to 6.5 × 1.5 cm), densely pubescent on upper surface; below with a very dense white indumentum. Verticils ± distinct or crowded, to 6-8-flowered. Calyx 8-13 mm, with an indumentum of short eglandular hairs. Corolla reddish-violet, rose or white, up to 33 mm; upper lip short, straight; lower lip deflexed, shorter than upper; tube annulate up to 22 mm. Staminal connectives 9-12 mm; lower thecae fertile.

- | | | |
|----|---|--------------------------|
| 1. | Leaves not auriculate at base, up to 3.5 × 0.6 cm; verticils up to 6-flowered | var. <i>sessilifolia</i> |
| + | Leaves auriculate at base, up to 6.5 × 1.5 cm; verticils 8-flowered | var. <i>auriculata</i> |

var. *sessilifolia*

Syn.: *S. hildebrandtii* Briq. in Bull. Herb. Boiss. 2: 135 (1894); *S. stenodonta* Briq., l.c.; *S. tananarivensis* Briq., l.c. 136.

Holotype. Madagascar, N and E of Ankaratra mountains, *Kitching* (K).

Endemic. Selected specimens. Dist. Antsirabe, Antsirabe, high valley of Sahatany (or Sahatano), 1300-1500 m, 20 vii 1928, *Humbert & Swingle* 4623. Dist. Ambatofinandrahana, Ambatofinandrahana, 1600-1800 m, *Decary* 13124. Prov. Vakinankaratra, dist. Betafo, 1450 m, 19 xi 1912,

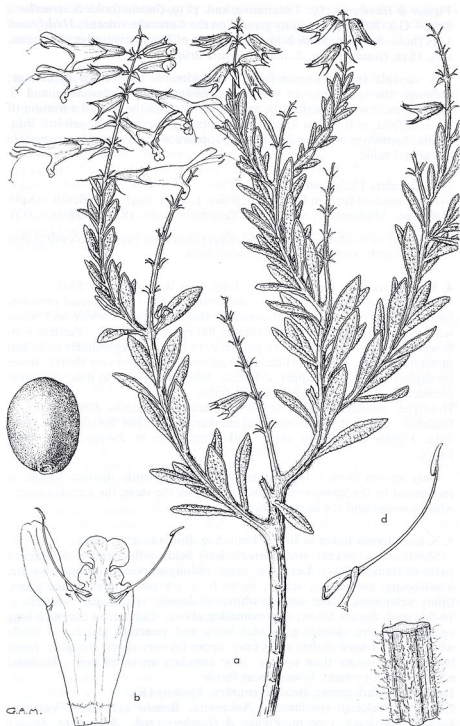


FIG. 3. *Salvia sessilifolia* Baker: a, habit $\times \frac{2}{3}$; b, corolla dissected $\times 1\frac{1}{2}$; c, upper stem indumentum $\times 4\frac{2}{3}$; d, stamen $\times 3\frac{1}{3}$; e, nutlet $\times 10$.

Viguiér & Humbert 1385. Tananarive, ann. 1839, *Goudot* (holo. *S. stenodonta* Briq.—G.). Betsileo, dry stony ground on the Antsirabe volcano, *Hildebrandt* 3535 (holo. *S. hildebrandtii* Briq.—G.). West of Tananarive, edge of streams, ann. 1840, *Goudot* (holo. *S. tananarivensis* Briq.—G.).

A variable species known from a considerable number of gatherings; although the specimens on which *S. hildebrandtii*, *S. stenodonta* and *S. tananarivensis* were described in no way differ from the overall variation of *S. sessilifolia*, as it is now known, the solitary gathering of *S. goudotii* Briq. (a later homonym of *S. goudotii* Benth.) appears to merit separate recognition at varietal rank.

var. *auriculata* Hedge, nom. nov.

Syn.: *S. goudotii* Briq. in Bull. Herb. Boiss. 2: 137 (1894)—non Benth. (1848). Holotype. Madagascar, environs de Tananarivo, ann. 1840, *Goudot* s.n. (G).

A variety of doubtful worth; field observations are needed to confirm that it is not merely another form of *S. sessilifolia*.

4. *S. porphyrocalyx* Baker in Journ. Linn. Soc. Bot. 18: 277 (1881).

Shrub up to 100 cm; stems $\pm$ uniformly leafy. Leaves broad obovate-lanceolate, up to 4.5×1.8 cm, sessile or shortly petiolate, above and below with a $\pm$ dense indumentum of simple, flat eglandular hairs. Verticils 6–7-flowered, not condensed. Calyx purple, c. 17 mm, with eglandular hairs and punctate glands. Corolla white, up to 40 mm; upper lip very short; lower lip slightly longer than upper, deflexed, tube annulate c. 30 mm. Staminal connectives c. 7.5 mm; lower thecae fertile.

Holotype. Madagascar, N and E of Ankaratra mountains, *Kitching* (K).

Endemic. Selected specimens. Vakinankaratra, district Betafo, 1900 m, xi 1912, *Viguiér & Humbert* 1615. Ankaratra, 2000 m, *Perrier de la Bâthie* 13414.

Only known from a few gatherings, this apparently distinct species is recognised by the leaves evenly distributed over the stem, the purple calyces, white corollas and the loose inflorescences.

5. *S. leucodermis* Baker in Journ. Linn. Soc. Bot. 18: 276 (1881).

Shrub up to 100 cm; stems densely leafy below inflorescence; lowermost parts of stem leafless. Leaves $\pm$ erect, oblong-elliptic to oblong-obovate, overlapping, coriaceous, sessile, up to 6×1.7 cm, upper surface green, thinly velutinous, lower surface white, $\pm$ densely velutinous. Verticils c. 10-flowered, distant below, approximating above. Calyx c. 12 mm with long eglandular hairs, shorter glandular hairs and punctate glands. Corolla white, rarely tinged violet, 3–3.5 cm; upper lip very short, straight; lower lip deflexed, longer than upper; tube annulate up to 28 mm. Staminal connectives c. 10 mm; lower thecae fertile.

Holotype. Madagascar, Betsileo country, *Kitching* (K).

Endemic. Selected specimens. Ankaratra, *Benoist* 212. Prov. Vakinankaratra, Antsirabe, 1700 m, *Viguiér & Humbert* 1298. Ambositra, *Decary* 13582. N Betsileo, Antsirabe, *Hildebrandt* 3535a. Tsinjoarivo, 1600 m, *Humbert* 11184. Andringitra, *Herb. Jard. bot. Tananarive* no. 5143.

This species is characterised by the densely leafy stems, the coriaceous leaves with a velutinous indumentum and the generally white corollas. Known from several gatherings, it is a close ally of the following species.

6. *S. cryptoclada* Baker in Journ. Linn. Soc. Bot. 18: 275 (1881).

Similar in habit to the preceding species but with a denser indumentum on the lower leaf surface, leaf lamina broadest at middle and without glandular hairs on the calyx.

Holotype. Madagascar, N and E of Ankaratra mountains, *Kitching* (K).

Endemic. Selected specimens. Prov. Vakinankaratra, Betafo, 2000 m, 25 xi 1912, *Viguiér & Humbert* 1591. Faratsiho, massif of Vavavato, *Decary* 15494. Ankaratra, *Baron* 3461, 3467, 3469, 3471.

Although only known from a few gatherings, *S. cryptoclada* appears to be distinct from *S. leucodermis* on the characters mentioned above. Observations in the field are needed to confirm their specific distinctness.

DISCUSSION

The six Madagascar species, all endemic, fall into three distinct and unrelated species-groups. The first contains *S. parvifolia*, the second *S. perrieri*, and the third, *S. sessilifolia*, *S. porphyrocalyx*, *S. leucodermis* and *S. cryptoclada*. Except for *S. perrieri*, all occur in central Madagascar, particularly in the Ankaratra region where, with the possible exception of *S. parvifolia*, all the other species are found. *S. perrieri* subsp. *perrieri* grows considerably to the south although also in the phytogeographical area designated as "central"; it and subsp. *brevilabiata* appear to be restricted to more mesophytic habitats than the remaining species. *S. perrieri* subsp. *brevilabiata* is geographically very isolated from all the other Madagascar *Salvias*: c. 300 miles north of the species in the Ankaratra region and almost 600 miles from the type subspecies.

Taxonomically there are no problems with *S. parvifolia*: it is a distinct oligomorphic species. The only problem with *S. perrieri* is the relationship between its two subspecies; this has been discussed above and is not further considered here. Otherwise it too is a very distinct species.

The remaining four species, however, pose several problems; they are all closely related, sharing a basically similar habit, foliage, indumentum and floral structure. As the key to the species and their brief comparative descriptions show, they are differentiated on rather unsatisfactory, often quantitative, characters. *S. cryptoclada* and *S. porphyrocalyx* are known from only a few gatherings and their range of variation is inadequately known. *S. sessilifolia*, into which most of Briquet's species have now been reduced as straight synonyms, and *S. leucodermis* are reasonably well known but only study in the field of the variation of such characters as indumentum, leaf texture and shape and corolla shape can clearly define their own limits and their relationships with *S. cryptoclada* and *S. porphyrocalyx*. Some specimens in this complex (e.g. *Waterlot* ann. 1919 from Tananarive and *Viguiér & Humbert* 1281 from Antsirabe) appear to be hybrids between *S. sessilifolia* and *S. leucodermis*, but more adequate field notes and specimens

are needed to confirm this. However, the possibility of hybridisation and introgression in this species complex can certainly not be ruled out.

The wider question of the external, that is non-Madagascar, affinities for the species and their sectional position can only be finally resolved by a consideration of all the Old World species and sections. The following remarks are therefore provisional. When Baker described *S. cryptoclada* *S. sessilifolia*, *S. porphyrocalyx* and *S. leucodermis* he placed them in section *Salvia* (*Eusphace* Benth.); he said that "they quite correspond with section *Eusphace* except that they have not the ring of hairs at the insertion of the stamens inside the corolla tube". Although it is true that they do not possess the thick annulus of sect. *Salvia* these species do in fact have a thin or an interrupted annulus and at least by the definition of the section (hood of corolla $\pm$ straight; tube pilose-annulate; staminal connective shorter than or equal to filament, arms subequal, posterior theca sterile, rarely fertile usually cohering), they technically belong here. However, even in these characters they differ slightly from most species of sect. *Salvia*—the annulus is of a different form, the connective is almost longer than the filaments, the anterior arm of the connective is clearly longer than the posterior and the posterior thecae do not cohere. Furthermore, in habit, foliage, indumentum and corolla colour the Madagascar species are quite different from any member of sect. *Salvia* whose species are all Mediterranean—southwest Asian in distribution. In fact to place the Madagascar plants in sect. *Salvia* is misleading. If then there are no morphological links with sect. *Salvia*, can these Madagascar species be considered as members of another section or allies of species from other geographical regions? At present, the answer to both questions seems to be in the negative; possibly this small group should form an independent section. Certainly there is no evidence at all of links with southern or eastern African species nor are there any clear signs of New World or southeast Asian connections, although in the latter case many of the Sino-Himalayan species do have a similar corolla with regard to basic shape—a long corolla tube with a very short upper lip. In southern India and the Malesian region where floristic links might be anticipated, *Salvia*, except for the annual weedy *S. plebeia*, is lacking.

S. perrieri is quite closely allied to the Somali *S. somaliensis* and provides the solitary example of a clear affinity between a Madagascar *Salvia* and an African mainland species. As mentioned previously the Somali species was originally placed in sect. *Plethiosphace* although neither it nor *S. perrieri* have the technical characters of the section. A few southern African species have also been regarded as members of this largely European and southwest Asiatic section but this, at least superficially, seems not to be their correct placing.

The last of the Madagascar species, *S. parvifolia*, is another isolated species without obvious either specific or sectional allies. On purely technical characters of calyx and corolla it comes closest to the entirely southern African sect. *Heterosphace* but differs so much from all the species of this fairly homogeneous section that its inclusion there would not be justified.

It is clear that there is still much to be investigated about the inter-relationships of the *Salvia* sections and species of Madagascar, Africa, Europe and Asia. Many of the currently accepted sections were defined by Benthham at a time when the world total of known species was about a quarter

of the current tally and although some of his sections are still readily defined and natural, others are not. In Madagascar, all six species are unsuitable candidates for the existing sectional hierarchy but, at least at this stage of knowledge, creation of new sections to accommodate them would be premature.