

THE GENUS *LAVANDULA* IN ARABIA AND TROPICAL NE AFRICA

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ABSTRACT. A synopsis, including a key, maps and illustrations is given of the genus *Lavandula* L. (Labiatae) in the Arabian peninsula, Socotra and Somalia. Fourteen species are recognized in the area including five which are new: *L. aristibracteata* A. G. Miller (Somalia), *L. citriodora* A. G. Miller (N Yemen and Saudi Arabia), *L. dhofarensis* A. G. Miller (Oman), *L. galgalloensis* A. G. Miller (Somalia) and *L. hasikensis* A. G. Miller (Oman).

INTRODUCTION

The genus *Lavandula* L. contains c.30 species distributed from Macaronesia and the Mediterranean basin to India. The discovery of several new taxa in Arabia and Somalia since the most recent treatment of the genus by Chaytor (1937) has made it necessary to revise the species occurring in the Arabian peninsula, Socotra and Somalia.

Chaytor divided the genus into five sections: sect. *Stoechas* Ging., sect. *Spica* Ging., sect. *Pterostoechas* Ging., sect. *Chaetostachys* Benth. and sect. *Subnuda* Chaytor. These sections generally seem to reflect natural groupings of species, although the position of two Arabian species, *L. atriplicifolia* Benth. and *L. hasikensis* A. G. Miller, is uncertain (see below). Two sections do not occur in the area under consideration: sect. *Spica* with three species from southern Europe, and sect. *Chaetostachys* with two species from India. The other three sections are discussed below.

Sect. *Subnuda* Chaytor in J. Linn. Soc., Bot. 51:200 (1937).

Woody-based herbs or subshrubs, sometimes leafless. Bracts alternately or spirally arranged with a single flower in the axil of each. Bracteoles absent. Calyx 15-nerved, slightly 2-lipped, without appendage. Nutlet mucilaginous on wetting, areole 0.25-0.33 × as long as nutlet. [Species nos 1-8].

Eight species.

Type species: *L. subnuda* Benth.

Distribution of section: S Arabia, Socotra and Somalia.

Chaytor originally included four species in this section: *L. subnuda* Benth., *L. macra* Baker, *L. setifera* T. Anderson and *L. nimmoi* Benth. To these I have added the three new species, *L. dhofarensis* A. G. Miller, *L. aristibracteata* A. G. Miller and *L. galgalloensis* A. G. Miller, as well as *L. somaliensis* Chaytor. Chaytor (1937: 192) placed *L. somaliensis* in sect. *Pterostoechas* commenting 'the slender ascending stems and the general shape of the leaves suggest a relationship with certain S Arabian and Socotran species of section *Subnuda*, but the opposite paired arrangement of the bracts of *L. somaliensis* excludes it from that section'. However, in all the material of *L. somaliensis* that I have examined the bracts are spirally arranged, and I therefore transfer it to sect. *Subnuda* where, as Chaytor suggests, its closest relatives seem to be.

Sect. *Subnuda* is confined to Oman, S Yemen, Socotra and Somalia, a pattern of distribution commented on previously (Miller, 1984) and which represents an important centre of diversification of the genus outside the Mediterranean basin and Macaronesia where the bulk of the other species occur. The species are all closely related, being separated mainly on characters of indumentum, and size and shape of bracts.

The only other species found in the area occupied by sect. *Subnuda* is *L. hasikensis* A. G. Miller [Species no. 14] from southern Oman (see comments under *L. hasikensis*).

Sect. *Pterostoechas* Gingins, Hist. nat. Lavand. 120, 158 (1826).

Perennial herbs, sometimes shrubby. *Bracts* opposite with a single flower in the axil of each. *Bracteoles* absent. *Calyx* 15-nerved, \pm 2-lipped, without appendage. *Nutlet* mucilaginous on wetting, areole 0.25–0.33 \times as long as nutlet. [Species nos 9–12].

Fifteen species

Distribution of section: Macaronesia, N Africa, Mediterranean basin, W Arabia, Iran.

Represented in Arabia by four species restricted to the mountains of the western escarpment: *L. coronopifolia* Poiret, *L. pubescens* Decaisne, *L. citriodora* A. G. Miller and *L. atriplicifolia* Benthham. The first three are closely related and distinguished by characters of indumentum, bract size, inflorescence form and leaf dissection. Their affinities are with the NW African species and particularly with *L. antineae* Maire which occurs on the high mountains of the Sahara. The fourth species, *L. atriplicifolia*, is very distinct, and was placed in the genus *Sabbaudia* Buscalioni & Muschler by Chiovenda (1917). It is clearly unrelated to the other species in the section and its affinities within the genus remain uncertain (see also discussion under *L. atriplicifolia*).

Sect. *Stoechas* Gingins, Hist. nat. Lavand. 119, 128 (1826).

Shrubs. *Bracts* opposite, with several flowers in the axil of each, dimorphic, the upper sterile forming a coma. *Bracteoles* absent. *Calyx* 13-nerved, 4 anterior teeth \pm equal, posterior tooth with a large appendage. *Nutlets* mucilaginous on wetting or not, areole minute. [Species no. 13]

Three species.

Distribution of section: Mediterranean basin, Macaronesia to western Arabia and Ethiopia.

The sole species in Arabia is *L. dentata* which is restricted to the mountains of the western escarpment.

KEY TO THE SPECIES

(Covering species from Arabia, Socotra and Somalia)

1. Spikes with a coma of elliptic, coloured, sterile bracts;
several flowers in the axils of each bract; calyx with an orbicular
appendage 13. *L. dentata*

- + Spikes without a coma of sterile bracts, if bracts overtop flowers at apex then spinescent and colourless; single flower in the axil of each bract; calyx without an orbicular appendage 2
- 2. Spikes nodding; corolla \pm regular, lobes \pm equal, pale yellow or yellowish brown; leaves entire, rarely lobed below 12. *L. atriplicifolia*
- + Spikes erect; corolla bilabiate, lobes markedly unequal, blue to mauve; leaves various or absent, rarely \pm entire 3
- 3. Subshrub; whole plant densely white tomentose; spike short, \pm capitate in flower, c. 0.75cm long, lengthening in fruit; bracts enveloping calyx, broader than long 14. *L. hasikensis*
- + Woody based perennial; densely white tomentose or not; spike more than 1cm long; bracts not enveloping calyx, longer than broad 4
- 4. Bracts opposite; calyx teeth distinctly unequal; plants from western mountains of N Yemen and Saudi Arabia 5
- + Bracts alternate or spinally arranged; calyx teeth subequal; plants from Oman, S Yemen and Somalia 7
- 5. Spike lax; bracts less than half as long as calyx; leaves with \pm linear lobes 9. *L. coronopifolia*
- + Spike dense; bracts more than half as long as calyx; leaves with narrowly lanceolate to narrowly oblong lobes 6
- 6. Leaves pinnatifid, scabrescent to tomentose with simple and branched hairs; bracts puberulous to tomentose; corolla 13–15mm long; leaves lemon-scented when crushed 11. *L. citriodora*
- + Leaves 2–3-pinnatisect, hirsute with long simple hairs and densely glandular; bracts densely glandular; corolla 10–12mm long; leaves variously aromatic but never lemon-scented when crushed 10. *L. pubescens*
- 7. Bracts ovate to obovate, \pm abruptly acuminate, venation \pm reticulate; leaves \pm regularly pinnatifid with simple segments (see Fig. 4A) 8. *L. somaliensis*
- + Bracts ovate or narrowly triangular, attenuate above into spinescent or setaceous tip, parallel-veined; leaves various (sometimes absent), normally pinnatifid with toothed segments (see Fig. 3A, 4B) 8
- 8. Indumentum of spike and lower stem villous with long simple hairs 5. *L. nimmoi*
- + Indumentum of spike puberulous, tomentose or lanate with branched hairs; indumentum of lower stem glabrous to lanate; if hairs simple then spike puberulous 9
- 9. All least some stems 6–8-angled; bracts narrowed above to a fine \pm soft setaceous tip 4. *L. setifera*
- + All stems 4-angled; bracts with stiff, spinescent tip 10
- 10. Bracts 6.5–12mm long exceeding calyx; calyx purple at anthesis; indumentum of stem and leaves scabrescent to \pm hirsute with simple hairs only 7. *L. aristibracteata*

- + Bracts 2–7mm long; calyx green to grey-green, if purplish then exceeding subtending bract; indumentum of stem and leaves puberulous, tomentose to lanate with branched hairs, rarely with simple hairs only and then bracts shorter than calyces. 11
- 11. Plants \pm leafless, rarely with one or two leaves below. 12
- + Plants leafy 13
- 12. Spike lax in fruit; plant branched above, often \pm tufted at upper nodes; sessile glands common and regularly spaced in sulci between nerves on calyx 2. *L. macra*
- + Spike condensed in fruit; plant branched mainly from base; sessile glands rare in sulci between nerves on calyx. 1. *L. subnuda*
- 13. Bracts longer than calyx; calyx teeth \pm reflexed in fruit; bracts and calyx sparsely lanate 6. *L. galgalloensis*
- + Bracts shorter than calyx, rarely longer; calyx teeth erect in fruit; bracts and calyx puberulous to lanate-tomentose. 14
- 14. Stems and leaves densely hairy; seeds 0.9–1.1mm long; upper leaves pinnatifid 3. *L. dhofarensis*
- + Stems and leaves glabrescent or sparsely hairy; seeds 1.3–1.5mm long; uppermost leaves typically entire or with one or two teeth only. [Rarely *L. macra* may key out here] 1. *L. subnuda*

1. *L. subnuda* Bentham in A. DC., Prodr. 12:148 (1848). Fig. 1A

Syn.: *L. bipinnata* Kuntze δ *subnuda* (Bentham) Kuntze, Revis. gen. pl. 2:521 (1891).

Woody-based perennial, sometimes \pm shrubby. *Stems* erect or ascending, sometimes \pm straggling, 0.3–2m, branched mainly from base, quadrangular, indumentum variable from \pm glabrescent to sparsely pubescent with short retrorse simple hairs and branched hairs, or \pm tomentose with simple and branched hairs, or \pm lanate with short branched hairs and long simple and branched hairs particularly at the nodes. *Leaves* sparse, often \pm absent, 1.4(–6) \times 0.5–1.5(–3.5)cm; below ovate, pinnatifid with 3–5 pairs of segments, segments obovate to triangular sometimes lobed, acute; middle pinnatifid often with larger terminal lobe; above \pm entire or with 1 or 2 teeth, elliptic or rhombic, acute; indumentum variable, thinly tomentose with simple and branched hairs, sometimes villous with longer hairs on petioles. *Spike* (1.5–)2–4 (–8)cm, dense, flowers spirally arranged, axis sparsely tomentose with branched hairs. *Bracts* ovate, attenuate into a spinescent tip or narrowly triangular, 2.5–4(–6)mm, 0.33–0.66(–1.25) \times as long as calyx, parallel-veined, puberulous or slightly tomentose. *Calyx* (4–)4.5–5.5mm, puberulous to shortly tomentose, few sessile glandular hairs between the nerves, teeth subequal, ovate-triangular, 2 adaxial 1.5 \times 0.5mm, 3 abaxial 1–1.25 \times 0.5mm. *Corolla* pale blue or dark blue, lilac or mauve, 12.5–14mm; tube c.10mm, widening below middle, curved and funnel-shaped in upper third; upper lip c.3mm, erect, lobed to c.1.25mm; lower lip divided into 3 spreading oblong lobes, median 2 \times 1.25mm, laterals 1.5 \times 0.75mm. *Nutlet* reddish brown, \pm smooth, \pm oblong, 1.3–1.5 \times c.0.8mm, producing mucilage on wetting, areole 0.25 \times as long as nutlet.

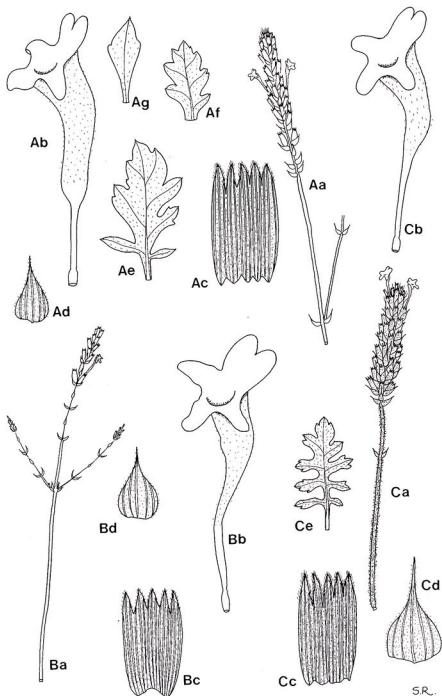


FIG. 1. *Lavandula subnuda*: Aa, inflorescence $\times 1$; Ab, corolla $\times 5$; Ac, calyx $\times 5$; Ad, bract $\times 5$; Ae, lower leaf $\times 1\frac{1}{2}$; Af, middle leaf $\times 1\frac{1}{2}$; Ag, upper leaf $\times 1\frac{1}{2}$. *L. macra*: Ba, inflorescence $\times \frac{2}{3}$; Bb, corolla $\times 6$; Bc, calyx $\times 5$; Bd, bract $\times 6$. *L. dhofarensis*: Ca, inflorescence $\times 1$; Cb, corolla $\times 5$; Cc, calyx $\times 6$; Cd, bract $\times 6$; Ce, leaf $\times 1$.

S.R.

Endemic to Oman. Rocky slopes and stony places and in crevices on cliffs, 30–760m, October–May. Fig. 2.

Type: [Sultanate of Oman] In regno Mascate, *Aucher* 5220 (K).

Selected specimens examined:

UNITED ARAB EMIRATES. Hatta, 110km ESE of Dubai, 24°48'N 56°10'E, heavily eroded hills with deeply scored wadis, common, 150–360m, 28 v 1982, *Western* 203 (E); Fujayrah, Wadi al Fay near Mukhtaraqah, 15km SW of Dibbah, stony volcanic slopes, 400m 21 ii 1980, *Edmondson* 3085 (E).

SULTANATE OF OMAN. Musandam peninsula, near Khasab, 26°12'N 56°15'E, rock crevices, 19 iii 1980, *Lawton* 2284 (BM, K); Wadi Dil, 15km N of Najd Dil, rocky slopes, 500m, 15 iii 1980, *Edmondson* 3412 (E); NE end of Wadi Hawasina, in date garden, 450m, 9 x 1979, *Whitcombe* 561 (E); Wadi Sahtan, c.20km from Al Rustaq, crevices in steep limestone cliffs, 9 iv 1982, *Maconochie* 3379 (E); J. Akhdar, Rustaq, deep wadi c.20km SE of Rustaq, dry rocky slopes, 600m, 24 x 1979, *Miller & Whitcombe* 2807 (E); Ruwi, on gravelly and rocky banks of wadi NW of town, 30m, 26 ii 1976, *Radcliffe-Smith* 3675 (K).

L. subnuda is the only species of *Lavandula* occurring in SE Arabia and is restricted to northern Oman and the UAE. It commonly forms large sprawling, almost leafless bushes with branches up to two metres long. It is certainly related to *L. macra* from which it is often difficult to distinguish if leaves are not present: the upper leaves in *L. subnuda* are typically entire and elliptic to rhombic whilst in *L. macra*, when present, they are pinnatifid. *L. macra* also differs in the spike which elongates and becomes lax in fruit and the more glandular sulci between the nerves of the calyx. There are also apparent differences in branching pattern and corolla shape: *L. subnuda* branches mainly from the base whilst *L. macra* often branches above with several branches from a single node giving a tufted appearance; in *L. subnuda* (see Fig. 1Ab) the corolla tube is broadened from below the middle whilst in *L. macra* (see Fig. 1Bb) the corolla tube broadens in the upper third. At one time I considered giving these two taxa subspecific status, but I decided on balance that the leaf character, although not always apparent, was significant and so have kept them as separate species.

L. subnuda is very variable in the indumentum of the stems which varies from glabrescent (*Radcliffe-Smith* 3675) to almost lanate (*Miller & Whitcombe* 2807). The bracts are usually shorter than the calyces but rarely exceed them (*Miller & Whitcombe* 2807).

2. *L. macra* Baker in Kew Bull. 93:339 (1984). Fig. 1B.

Woody-based perennial, sometimes \pm shrubby, usually \pm aphyllous. Stems erect or ascending, 30–60cm, branched throughout, often \pm tufted at nodes, quadrangular sometimes with 4 subsidiary ribs, glabrous or with scattered patent or retrorse simple hairs or puberulous to shortly tomentose with branched hairs. Leaves usually absent, if present very sparse up to 15 \times 5mm, ovate, pinnatifid, segments \pm oblong with obtuse or acute tips and margins 0–2-toothed, thinly tomentose with branched hairs and many sessile glandular hairs. Spike (1)–2–7(–8)cm,

lengthening in fruit, dense becoming lax in fruit, spirally arranged, axis glabrescent to puberulous with branched hairs and sessile and stalked glandular hairs. *Bracts* 2–3.5mm, ovate, attenuate into acute \pm spinescent tip, 0.25–0.33(–0.66) \times as long as calyx, parallel-veined, puberulous. *Calyx* 4.25–5.5mm, puberulous and with conspicuous sessile glandular hairs between the nerves; teeth subequal, ovate-triangular, 2 adaxial 1.5–2 \times 0.5mm, 3 abaxial 1.5 \times 0.5mm. *Corolla* pale blue, lilac or pale violet, (10–)11–13mm; tube 8–9mm, widening and curved in top third; upper lip 2–2.5mm, erect, shallowly lobed; lower lip divided into 3 spreading \pm oblong lobes, median 1.5–1.75 \times 1mm, laterals 1–2 \times 1mm. *Nutlet* pale reddish brown, \pm smooth, \pm oblong, 1.2–1.4 \times 0.5–0.6mm, producing mucilage on wetting, areole c.0.25–0.33 \times as long as nutlet.

Oman, S Yemen and Somalia. Amongst rocks on limestone hills, rocky and gravelly wadi beds, 3–1680m. September–May. Fig. 2.

Type: [PDRY, S Yemen] Hillsides at Khailah [Hadramaut], 3000ft, 3 i 1894, *Lunt* 135 (BM, K).

SULTANATE OF OMAN. Masirah Island, J. Hamra, in stony wadi bed W of the plateau, 75m, 16 iv 1976, *Radcliffe-Smith* 4230 (K). Kuria Muria Islands, Al Hallaniyah, 17°30'N 55°59'E, dry rocky slopes, 50m, 24 ix 1984, *Miller* 6354 (E); J. Hasik, 8km S of Hasik, 17°22'N 55°15'E, exposed summit area with *Lavandula hasikensis* & *Salvia hillcoatiae*, 950m, 18 ix 1984, *Miller* 6142 (E); Wadi Andur, near pools of Andur, 17°40'N 54°39'E, dry wadi bed, 600m, 26 ix 1984, *Miller* 6385 (E); Wadi Halit near Andur, 17°30'N 54°33'E, dry, wadi sides, 600m, 26 ix 1984, *Miller* 6367 (E); Dhofar, Wadi Adownib, 4km W of Raysut, gravelly wadi bed with *Boswellia*, 50m, 3 x 1979, *Miller* 2475 (E); Dhofar, Wadi Adonab [Adownib], near sea at Risut [Raysut] camp, rocky places, 3m, 12 i 1966, *Lavranos* 4320 (K).

PDRY, S Yemen. Hadramaut: Wadi Himem, v 1931, *Wissman* 1293 (HBG); 1541 (HBG); Bakrain near Mukalla, 60m, 22 vii 1893, *Lunt* 60 (K); Kôr Sêbân, 2100m, 12 v 1931, *Wissman* 1285 (HBG); Jol, Kathiri, iv 1961, *Kerfoot* 3046 B (K); Jol, West Road between Sai'un and Mukalla, 1676m, 1 v 1952, *Popov* 570 (K); Jol, East Road between Mukalla and Sai'un, 1219m, 30 ii 1952, *Popov* 529 (K); Wadi Do'an, Masna'a, v 1931, *Wissman* 1284 (HBG); El Lasb, 10 v 1931, *Wissman* 1283 (HBG).

SOMALIA. Togga Baadaanle, 10°44'N 51°30'E, sandy Togga in sub-coastal zone, 70m, 16 ix 1980, *Beckett* 570 (K); 20 miles W of Las Koreh, coast, between rocks, 26 x 1956, *Bally* 11224 (K).

L. macra occurs in Oman, S Yemen and Somalia. In S Yemen it is found in the Hadramaut region mainly on the Jol, a high (c.1000m) limestone plateau, and the wadis draining south from it. In Oman it is found in the drier areas to the north of the Dhofar mountains and in scattered localities along the coast to Masirah. These areas receive little or no benefit from the summer monsoon rains and mists but are affected, particularly in the coastal areas by heavy dews and fogs which occur frequently in Spring and Autumn. The two specimens from Somalia agree fairly well with the Arabian material; *Beckett* 570 particularly is branched above and tufted at the nodes, a type of branching often seen in *L. macra*. Like *L. subnuda*, *L. macra* is very variable in stem indumentum:

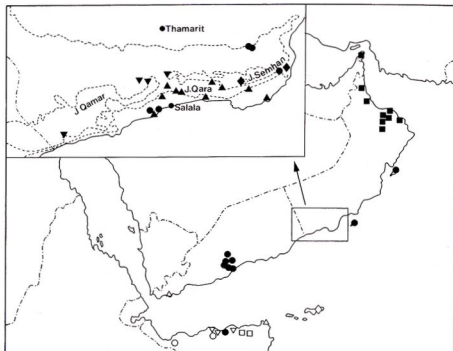


FIG. 2. Distribution of *Lavandula hasikensis* ◆; *L. dhofarensis* subsp. *dhofarensis* ▲; *L. dhofarensis* subsp. *ayunensis* ▼; *L. macra* ●; *L. somaliensis* ○; *L. aristibracteata* ▽; *L. galgalloensis* □; *L. subnuda* ■; *L. nimmoi* ◇; *L. setifera* △.

simple hairs only (*Lavranos* 4320), branched hairs (*Popov* 529), or sometimes glabrous (*Wissman* 1283). It is normally leafless but on two specimens (*Kerfoot* 3046B & *Wissman* 1285) leaves have developed. These leaves are reminiscent of *L. dhofarensis* in shape but are very glandular unlike those of that species. *L. macra* is most closely related to *L. subnuda* and *L. dhofarensis* (see remarks under those species).

3. *L. dhofarensis* A. G. Miller, sp. nov. Fig. 1C.

A *L. galgalloensis* A. G. Miller bracteis brevioribus quam calyces, lobis calycis fructiferi erectis differt; a *L. subnuda* Bentham indumento lanato, habitu densiore et foliis superioribus pinnatis refert; a *L. macra* Baker indumento lanato et praesentia foliorum recedit ab omnibus specibus sectionis *Subnudae* Chaytor nuculis brevioribus diagnosticat.

Perennial, sometimes woody-based, forming dense or open and ± straggly clumps, ± odourless or faintly lemon-scented, branched hairy throughout. *Stems* twiggy or ± stout, leafy, erect or ascending to 40cm, much branched, quadrangular, tomentose or densely lanate. *Leaves* ovate to lanceolate in outline, pinnatifid with up to 4(–5) pairs of segments, apex sometimes cuspidate, 0.75–5 × 0.3–2cm; segments triangular, oblong or obovate with acute or obtuse tips and sometimes with 1–4 teeth, margins revolute or not, densely to thinly lanate or ± scabrescent. *Spike* (1–)1.5–6(–7)cm, flowers spirally arranged, dense axis lanate or with

scattered branched hairs and stalked glandular hairs. *Bracts* ovate, gradually attenuate into a spinescent tip, (2-)4-7 × 1.5-2mm, c.(0.5-)0.75-1 × as long as calyx, parallel-veined, shortly ± sparsely lanate or tomentose. *Calyx* 4.5-5(-6)mm, shortly lanate-tomentose to puberulous with sessile glandular hairs between the nerves, teeth, subequal; 2 adaxial lanceolate, 1.5-2 × 0.3-0.5mm; 3 abaxial ovate-triangular, 1-1.4 × 0.3-0.5mm. *Corolla* lilac, mauve or pale purple, (11-)12-13mm; tube (8.5-)9-10mm, widening about the middle and curved above; upper lip 2-2.5mm, erect, shallowly lobed; lower lip divided into 3 spreading ± oblong lobes, median 2 × 1-1.25, laterals 1.25-1.5 × 1-1.5mm. *Nutlet* reddish brown, minutely pustulate, ± oblong, 0.8-1.1 × 0.4-0.6mm, producing mucilage on wetting, aerole 0.25-0.33 × as long as nutlet

Type: Oman, Dhofar. Jebel Qara, Thamrait to Salalah road, wooded escarpment slopes, c.15km N of Salalah, ascending densely branched perennial to 30cm, fls lilac, 300m, 1 x 1979, A. G. Miller 2394 (holo. E, iso. K).

L. dhofarensis is restricted to the Dhofar region of southern Oman. It is immediately distinguished from *L. subnuda* and *L. macra* by its much leafier facies and the lanate indumentum. It probably most closely resembles *L. galgalloensis* in facies but differs in the bracts which are shorter than the calyx and the erect, not reflexed, teeth of the fruiting calyx. Within sect. *Subnuda* it has the smallest nutlets, ranging from 0.9 to 1.1mm long while in other species of the section they are from 1.2 to 1.4mm long. I have recognized two subspecies within *L. dhofarensis*: subsp. *dhofarensis* occurs on the escarpment mountains, an area receiving full benefit from the summer monsoon rains, whereas subsp. *ayunensis* occurs in the much drier northern dip slopes of the mountains. In floral characters the two subspecies are identical but in vegetative facies they look rather different: subsp. *ayunensis* forms dense clumps, with stout, ± erect stems with shorter internodes and a thick lanate indumentum; subsp. *dhofarensis* forms more open clumps with straggling, weak, rather twiggy stems with longer internodes and a much sparser indumentum.

- | | |
|---|---------------------------|
| 1. Plant forming dense clumps, stems erect; upper internodes 2-4cm;
dense lanate indumentum hiding stem surface | subsp. <i>ayunensis</i> |
| + Plant forming loose, straggling clumps, stems ascending; upper
internodes (2-)4-9cm; sparse lanate indumentum not hiding stem
surface | subsp. <i>dhofarensis</i> |

subsp. *dhofarensis*

Perennial, sometimes woody based. *Stems* ± twiggy, slender, ascending often ± straggling, sparsely to ± densely tomentose not hiding stem surface. *Leaves* ± scabrescent. *Spike* axis tomentose, internodes of peduncles (2-)4-9cm. *Bracts* (3.5-)4-4.5(-5) × 1.5-1.75mm, c.0.75 × as long as calyx, shortly tomentose. *Calyx* 4.5-5mm, tomentose to puberulous, adaxial teeth 1 × 0.3mm, abaxial teeth 1 × 0.3mm.

Rocky slopes and amongst rocks on J. Qara in escarpment woodland and to the north in the degraded *Euphorbia balsamifera* zone, particularly common at the foot of the mountains by springs on the Salalah coastal

plain. Apparently restricted to areas receiving the full benefit of the summer monsoon rains, 30–900m. October–November, February. Fig. 2.

SULTANATE OF OMAN. Dhofar: cliffs by Ras Hamar, 16°45'N 53°56'E, 200m, 17 ix 1984, *Miller* 6109 (E); foot of J. Qara, Ayn Jarsis, 12km N of Salalah, by spring with permanent pool, 150m, 7 x 1979, *Miller* 2575 (E, K); at the debouchment of Wadi Arzat onto the Salalah coastal plain, 17°07'N 54°14'E, amongst boulders, 90m, 20 ix 1977, *Radcliffe-Smith* 5088 (K); Ayn Arzaat, in rock crevices, 20 ii 1982, *Maconochie* 3182 (E); Ayn Salhalnawt, 25 ix 1978, *Berkeley* 158 (E); Wadi Darbat, 5km E of Taqah, wadi sides and bottom, 30m, 2 x 1979, *Miller* 2434 (E, K); J. Qara, 10km E of Jibjat, rocky slopes, *Euphorbia balsamifera* zone, 100m, 30 ix 1979, *Miller* 2384 (E, K); J. Qara, c.15km SE of Jibjat, dry rocky wadi with *Anogeissus-Commiphora* scrub, 900m, 30 ix 1979, *Miller* 2365 (E); Dhofar mountains, 610m, 1895, *Lunt* (under *Bent*) 164 (K). J. Qinqari near Sath, 17°02'N 55°01'E, 4 xi 1983, *Lawton* 2526 (E); Leje water hole, at the foot of J. Semhan, 17°11'N 54°56'E, 500m, 20 ix 1984, *Miller* 6192 (E).

subsp. *ayunensis* A. G. Miller, *subsp. nov.*

A subsp. *dhofarensi* habitu erectiore densioreque indumento lanato densiore et caulibus crassioribus internodis superioribus 2–4cm longis (non(2–)4–9cm) differt.

Woody-based clump forming perennial. *Stems* ± stout, erect or ascending, densely lanate, surface hidden by indumentum. *Leaves* densely or sparsely lanate. *Spike* axis lanate, internodes of peduncles 2–4cm. *Bracts* (2–)4–7 × 15–2mm, c.(0.5–)0.75–1 × as long as calyx, shortly ± sparsely lanate-tomentose. *Calyx* (4.5–)5(–6)mm, shortly lanate-tomentose, adaxial teeth 2 × 0.5mm, abaxial teeth 1.4 × 0.5mm.

Rocky slopes, wadi beds and sides, within and just south of the *Boswellia sacra* zone, associated with *Acacia* spp. and *Commiphora* sp. (Taxon B), 600–800m. September–October. Fig. 2.

Type: Sultanate of Oman, Dhofar, Salalah to Thamrait road, 4km N of 'Raven's Roost' at Aqabat al Hatab, ascending clump forming perennial, flowers lilac, no particular smell, 700m, 4 x 1979, *Miller* 2534 (holo. E, iso. K).

SULTANATE OF OMAN. Dhofar: Jebel Qara, Ayun road, rocky slopes, 800m, 25 ix 1979, *Miller* 2222 (E, K); Al Ayun, 17°17'N 53°52'E, gravelly wadi bed, 650m, 8 x 1977, *Radcliffe-Smith* 5421 (K); J. Qara, 5km N of 'Ravens Roost' on Salalah to Thamrait road, rocky slopes, 800m, 4 x 1979, *Miller* 2509 (E, K); J. Qara, 4km N of 'Ravens Roost', rocky slopes, 600m, 13 x 1979, *Miller* 2718b (E); Ayun crossroads, 600m, 6 v 1978, *Berkeley* 10 (E); 11km N of Rhakyut, 16°51'N 53°26'E, open, dry habitat with *Dracaena* sp., 1060m, 22 ix 1984, *Miller* 6261 (E).

4. *L. setifera* T. Anderson in J. Linn. Soc., suppl. 5:29 (1860). Fig. 3C.

Syn.: *L. bipinnata* Kuntze ζ *setifera* (T. Anderson) Kuntze, Revis. gen. pl. 2:522 (1891).

Bushy, often ± leafless perennial. *Stems* slender, wiry, ascending, to 50cm, laxly branched throughout, 4–8-angled some at least octagonal, glabrous or sparsely hairy with simple retrorse hairs and occasional

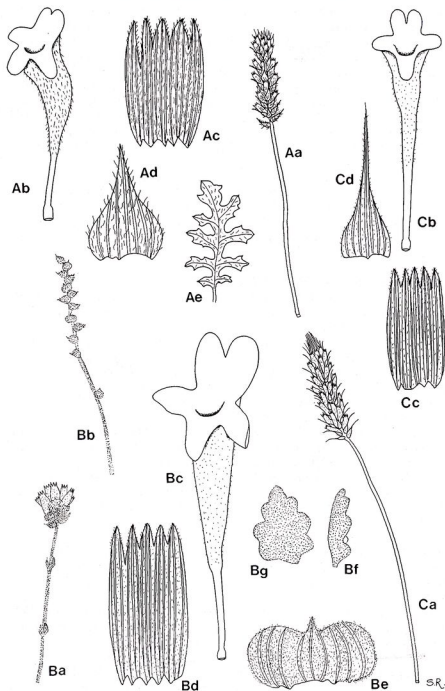


FIG. 3. *Lavandula nimmoi*: Aa, inflorescence $\times 1$; Ab, corolla $\times 5$; Ac, calyx $\times 6$; Ad, bract $\times 6$; Ae, leaf $\times 1$. *L. hasikensis*: Ba, flowering inflorescence $\times 1$; Bb, fruiting inflorescence $\times 1$; Bc, corolla $\times 5$; Bd, calyx $\times 6$; Be, bract $\times 5$; Bf, leaf $\times 4$; Bg, leaf flattened out $\times 4$. *L. setifera*: Ca, inflorescence $\times 1$; Cb, corolla $\times 5$; Cc, calyx $\times 6$; Cd, bract $\times 5$.

branched hairs below. *Leaves* oblong-lanceolate in outline, pinnatifid or lobed with up to 4 pairs of segments, 1.3×0.3 – 1 cm, segments oblong with obtuse tips, linear setaceous above, often becoming \pm leafless, sparsely hairy with short simple and branched hairs and scattered stalked and sessile glandular hairs. *Spike* 1.5 – 3 cm, flowers spirally arranged, dense, axis sparsely tomentose, at tip with coma of setaceous bracts. *Bracts* ovate or narrowly triangular, narrowing gradually above into a long setaceous tip, 5 – 6 – $(7) \times 1.5$ – 2.25 mm, 1.25 – $1.5 \times$ as long as calyx, stiff, spinescent, parallel-veined, puberulous. *Calyx* $c.5$ mm, puberulous; teeth subequal; 2 adaxial lanceolate 1×0.2 – 0.3 mm; 3 abaxial triangular-ovate 0.5×0.2 – 0.3 mm. *Corolla* white or pale lilac, 11 – 12 mm; tube $c.9$ mm, widening gradually above; upper lip 1 mm, divided into two shallow lobes; lower lip divided into 3, \pm oblong lobes, 1.25×0.75 – 1 mm. *Nutlet* reddish brown, minutely pustulate, oblong-ovate, $c.1.2 \times 0.6$ mm, areole $0.25 \times$ as long as nutlet.

Restricted in S Yemen to volcanic rocks by the coast near Aden; outside S Yemen known only from Somalia. From sea level to 30 m.

December–March. Fig. 2.

Type: Aden [PDRY], ii 1837, *Thompson* s.n. (K).

PDRY, S Yemen: Tehemsan, 10 xii 1888, *Schweinfurth* 135 (BM, K); environs de Aden, 5 xii 1889, *Deflers* 21 (K); *Balfour* s.n. (K); *Beever* 83 (K); Aden, ii–iii 1884, *Yerbury* 16 (BM).

SOMALIA. Mijertein, Bereda, near sea on cliff debris, 15 – 30 m, 5 xi 1959, *Hemming* 1802 (K).

L. setifera is immediately recognizable by the very long, thin, setaceous bracts which clearly exceed the calyces and by the stems, of which some at least are 6–8-angled, a character seen in no other species. The only specimen from outside the Aden area is *Hemming* 1802 from Somalia which is sterile but vegetatively closely resembles material from S Yemen with its octagonal stems and indumentum. It comes from cliffs by the sea, an apparently similar habitat to the S Yemen plants.

5. *L. nimmoi* Benth in A.DC., Prodr. 12:148 (1848). Fig. 3A.

Syn.: *L. bipinnata* Kuntze ε *nimmoi* (Benth) Kuntze, Revis. gen. pl. 2:521 (1891).

Perennial, sometimes woody-based. *Stems* slender, wiry, leafy below, ascending, 30 – 60 cm, little or much-branched, quadrangular, sparsely to densely pilose with long, simple hairs \pm glabrous above. *Leaves* ovate to oblong-ovate, pinnatifid to bi-pinnatisect with 3–7 pairs of segments, 1 – 5×0.5 – 2.5 cm, segments oblong with obtuse or acute tips and often coarsely serrate, bract-like above, often becoming \pm leafless, villous with long simple hairs and stalked and sessile glandular hairs. *Spike* 2 – 5 cm, flowers spirally arranged, \pm dense, axis villous and with stalked glandular hairs. *Bracts* ovate, tip acuminate, (2) – 3.5 – 4.5×2 – 2.5 mm, 0.33 – $0.75 \times$ as long as calyx, parallel-veined, villous with long simple hairs and sessile glands. *Calyx* 4.75 – 5.5 mm, with long simple hairs and sessile glandular hairs between the nerves; teeth subequal; 2 adaxial lanceolate 2.5×0.5 mm; 3 abaxial triangular-ovate, 1.25×0.6 – 7 mm. *Corolla* clear blue, $c.10$ mm, lanate outside, tube $c.8$ mm. *Nutlet* reddish brown, \pm oblong, $c.1.3 \times 0.8$ mm, areole $c.0.25 \times$ as long as nutlet.

Endemic to Socotra. Balfour (1888) comments that *L. nimmoi* is 'abundant both on plains and on the hills'. February–April. Fig. 2.

Type: [PDRY, Socotra] Ad mare Rubrum, *Nimmo* s.n. (K).

PDRY, Socotra: J. Ma'ali, above Qaysuh, amongst limestone boulders, 370m, 27 iii 1967, *A. R. Smith & Lavranos* 148 (K); W of Tamarida, 5 iv 1881, *Schweinfurth* 657 (K); *Balfour* 486 (BM, K); 507 (K); ?*Hunter* 806 (E).

L. nimmoi can be readily distinguished from other related species by the villous indumentum of long, simple hairs on the floral parts and the base of the stem and leaves. The type is described as coming from 'Ad mare Rubrum' however Balfour (1888, p. 239) notes that it almost certainly comes from Socotra, and Wickens (1982, p. 322) comments that *Nimmo* in fact never left India, where he was a clerk, and that plants attributed to him were collected by his friends in the Indian Navy. There is a little variation in the gatherings cited, Balfour (1888, p. 239–240) observes that plants from the dry plains are much branched, diffuse herbs with small leaves, whereas those on the hills are little and rather loosely branched, always densely hairy and have large, conspicuous leaves.

6. *L. galgalloensis* A. G. Miller, *sp. nov.* Fig. 4C.

A *L. dhofarensi* A. G. Miller bracteis longioribus, lobis calycis fructiferi reflexis et nuculis majoribus differt; a *L. nimmoi* Bentham bracteis longioribus, indumento lanato non villosa refert et inflorescentia plus condensata; a *L. setifera* T. Anderson caule semper quadrangulato et indumento lanato recedit.

Woody-based perennial, whole plant aromatic. *Stems* ± twiggy, leafy below, erect or ascending, 15–60cm, branched below, quadrangular, lanate sometimes sparsely so with branched hairs. *Leaves* ovate in outline, pinnatifid with 4–5 pairs of segments, 1–5 × 0.5–3cm, segments oblong to obovate with acute to obtuse tips and often coarsely serrate, bract-like above, sparsely lanate with long branched hairs and below also with sessile glands. *Inflorescence* 2–4cm, flowers spirally arranged, conferted, axis sparsely lanate. *Bracts* ovate with long attenuate spinescent tip, (5–) 6–7 × c.2mm, c.1.25 × as long as calyx, parallel-veined, sparsely lanate with long branched hairs. *Calyx* c.5.5–6mm, shortly lanate; teeth subequal reflexed in fruit; 2 adaxial triangular, c.1.5 × 0.3–0.5mm; 3 abaxial triangular, c.1.3 × 0.3–0.5mm. *Corolla* lilac, c.12mm; tube c.8mm, widening gradually and curved above; upper lip c.2.5mm, ± erect, divided into two broadly ovate lobes; lower lip divided into 3 spreading, oblong-ovate lobes, median 2.5 × 1mm, laterals 2 × 1.5mm. *Nutlet* yellow or reddish brown, minutely pustulate or ± smooth, oblong, 1.2–1.3 × 0.7mm, producing mucilage on wetting, areole c.0.25 × as long as nutlet.

Endemic to northern Somalia. Growing on the limestone escarpments, 1610–1830m. October–January. Fig. 2.

Type: Somalia, Galgallo, 64km SSW of Bosaso at eastern end of Al Mado Range, nr water, between rocks of limestone escarpment, stems 18"–2' high, flowers lavender-blue, 10 i 1973, *P. R. O. Bally & R. Melville* 15821 (holo. K).

SOMALIA. Above Galgallo, 11 i 1973, *Lavranos & Horwood* 10285 (E); E

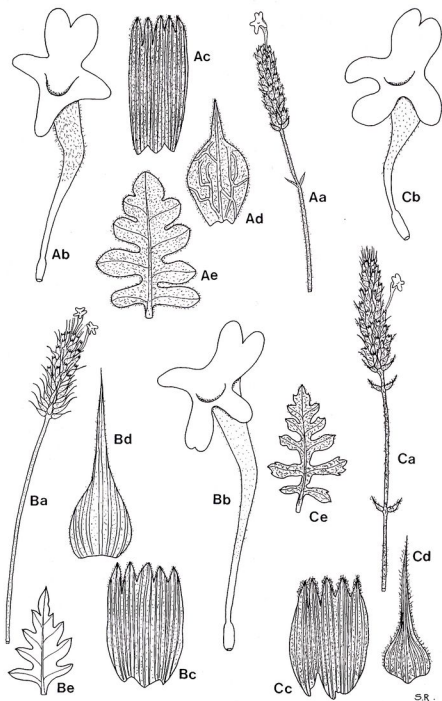


FIG. 4. *Lavandula somaliensis*: Aa, inflorescence $\times 1$; Ab, corolla $\times 5$; Ac, calyx $\times 5$; Ad, bract $\times 5$; Ae, leaf $\times 1$. *L. aristibracteata*: Ba, inflorescence $\times \frac{2}{3}$; Bb, corolla $\times 5$; Bc, calyx $\times 5$; Bd, bract $\times 5$; Be, leaf $\times 1$. *L. galgalloensis*: Ca, inflorescence $\times 1$; Cb, corolla $\times 5$; Cc, calyx $\times 6$; Cd, bract $\times 6$; Ce, leaf $\times 1$.

of Al Mado Range at Agasur, 1610m, 11 x 1956, *Bally* 11037 (K); Mas Aled, 11°00'N 48°20'E, 1500–1830m, 7 viii 1957, *Newbould* 821 (K); 38km SSE of Las Kiorei, 1km N of Haval Iswale, scrub forest on limestone bluffs and stony slopes with *Buxus hildebrandtii*, *Aloe eminens* and *Dracaena ombut*, 14 i 1973, *Bally & Melville* 15918 (K); Sugli, Al Hills, 10°58'N 48°53'E, 13 xi 1929, 1829m, *C. N. Colletette* 271 (K).

L. galgalloensis superficially resembles *L. dhofarensis* subsp. *dhofarensis* but differs in the bracts which are always longer than the calyx, in the larger nutlets and in the reflexed teeth of the fruiting calyces. It also resembles *L. nimmoi* but differs in the more condensed inflorescences, the longer bracts and in the lanate not villous indumentum. From *L. setifera* it differs in the lanate indumentum and the stems which are always quadrangular.

L. galgalloensis seems to be allopatric with the two other species of *Lavandula* endemic in Somalia: *L. somaliensis* and *L. aristibracteata*. It differs from *L. somaliensis* in the longer bracts with parallel not reticulate venation and in the leaf shape (see Fig. 4). From *L. aristibracteata* it differs in the shorter bracts, in the calyces which are not purple in flower and in the indumentum which is thicker and woollier.

7. *L. aristibracteata* A. G. Miller, sp. nov. Fig. 4B.

Ab omnibus speciebus sectionis *Subnudae* Chaytor bracteis relative longis spinescentibus, calyce florifero intense purpureo et indumento pilorum simplicium statim recognoscitur.

Woody-based perennial, aromatic. *Stems* leafy below, erect, to 35cm, branched below, quadrangular, scabrescent to hirsute with antrorse or patent simple hairs and sessile glandular hairs. *Leaves* elliptic, ovate, obovate or \pm triangular in outline, simple to pinnatifid with 2–7 pairs of segments, 1.5–5 \times 0.5–3.5cm, segments ovate-oblong or obovate with obtuse or acute tips and rarely coarsely serrate with 2–4 teeth, sparsely scabrescent to \pm hirsute with simple hairs, sometimes with many sessile glandular hairs below. *Spike* 2–5(–8)cm, flowers spirally arranged, dense, axis pilose to \pm sparsely lanate with mainly simple hairs. *Bracts* often purple-tinged, ovate, attenuate above into a long spinescent tip, 6.5–12 \times 2.5–3mm, 1.25–2 \times as long as calyx, parallel-veined, puberulous with short mainly simple hairs. *Calyx* purple-tinged, 6–7mm, puberulous; teeth subequal, reflexed in fruit; 2 adaxial lanceolate, 1.8 \times 0.5–0.7mm; 3 abaxial \pm triangular, 1–1.2 \times 0.5–0.7mm. *Corolla* blue or purplish blue, c.18mm, tube c.14mm, thin, widening and curved in top third; upper lip 4–5mm, erect, divided at apex into two rounded lobes; lower lip divided into 3 spreading \pm oblong lobes, median 2.5–3 \times c.2mm, laterals 2.5 \times 1.5mm. *Nutlet* pale reddish brown, oblong, c.1.75 \times 0.8mm, areole 0.25–0.33 \times as long as nutlet.

Known only from the Surudi Hills in northern Somalia. It occurs amongst rocks on limestone near the escarpment edge at 1500–2200m. It is recorded from *Juniperus* woodland and associated with *Dodonaea*, *Cadia*, *Buxus hildebrandtii*, *Sideroxylon buxifolium*, *Olea africana*, *Pistacia lentiscus* and *Osyris compressa*. July–January. Fig. 2.

Type: Somalia, Surud Range, N of Erigavo, 10°48'N 47°22'E, locally

frequent in clumps on open rocks on mountain edge. *Juniperus* dominant with *Cadia* and *Dodonaea* etc., 1900–2060m, 8 vii 1981, J. B. Gillett & R. M. Watson 23849 (holo. K, iso. EAH).

SOMALIA. 15km N of Erigavo, 10°47'N 47°24'E, open degraded *Juniperus* forest with *Sideroxylon buxifolium*, *Olea africana*, *Pistacia lentiscus* and *Osyris compressa*, 1950m, 21 xi 1980, Hemming & Watson 3212 (K); Daloh NE of Erigavo on limestone rocks, juniper forest, 2200m, 29 x 1956, Bally 11264 (K); Daloh 18 miles N of Erigavo, limestone rocks, 2130m, 3 xi 1954, Bally 10288 (K); Gan Libah on the Surudi Hills, on cliff edge, 25 i 1945, Glover & Gilliland 659 (BM, K); Mas Aled-Al, 11°00'N 48°20'E, clearing in *Buxus hildebrandtii* thicket on limestone hill, 1525m, 5 viii 1957, Newbould 816 (K).

A very distinctive new species immediately recognizable by its long spinescent bracts and strongly purple-tinged calyx at anthesis.

8. *L. somaliensis* Chaytor in J. Linn. Soc. 51:192 (1937). Fig. 4A. Ic.: op. cit.: 152 t.17, 17a; 159:17a–d (1937).

Woody-based perennial, whole plant lanate-tomentose. *Stems* numerous from a woody rootstock, leafy, ascending, 20–40cm, simple or branched, quadrangular, indumentum lanate with branched hairs thinning with age, stem angles \pm glabrous. *Leaves* ovate to ovate-oblong in outline \pm regularly pinnatifid with 5–7 pairs of segments, 1–3.5 \times 0.5–2cm, segments obovate to oblong with obtuse tips, sparsely lanate-tomentose with branched hairs, beneath also with many sessile glandular hairs. *Spike* 1.5–3.5cm, flowers spirally arranged, dense, axis lanate with branched hairs. *Bracts* ovate to obovate, \pm abruptly acuminate, 5.5–6.5 \times 1.5–2mm, 0.33–0.75 \times as long as calyx, papery, venation reticulate, sparsely lanate with branched hairs and scattered sessile glandular hairs. *Calyx* often purple tinged, 5–6mm sparsely lanate with branched hairs and many sessile glandular hairs between nerves; teeth subequal, slightly reflexed in fruit; 2 adaxial lanceolate c.2.5 \times 0.5mm; 3 abaxial triangular-ovate, c.1.5 \times 0.5mm. *Corolla* blue, 16–17mm, long exserted from the calyx; tube c.13mm, long, narrow, widening gradually and curved above; upper lip 3–4mm, \pm erect, divided into two ovate-oblong lobes; lower lip divided into 3 spreading ovate-triangular lobes, median c.2.5–3 \times 1.5mm, laterals c.1.5 \times 1.5mm. *Nutlet* reddish brown, oblong, 1.75–2 \times c.0.75mm, not mucilaginous on wetting, areole c.0.25 \times as long as nutlet.

Restricted to the mountains of north Somalia from 1600–1700m.

September–December. Fig. 2.

Type: British Somaliland [Somalia], Golis Range, Fodyer [Fodiyer], Drake-Brockman 519 (holo. K).

SOMALIA. Ga-an Libah on scarp facing north, in cracks of cliff face, 1615m, 18 ix 1957, Bally 11685 (K); cliffs at Daganyado, Glover & Gilliland 623 (BM, K); above Las Korch, 14 xii 1952, Tiste 26 (K); Fodyer, Golis Range, 1753m, Drake-Brockman 506 (K); 547 (K); 549 (K).

L. somaliensis differs from the other species of sect. *Subnuda* in the reticulate venation of the bracts and in the regularly pinnatifid leaves.

9. *L. coronopifolia* Poiret in Lam., Encycl. Suppl. 3:308 (1813). Fig. 5A.

Syn.: *L. stricta* Delile, Flore aegyptiacae illustratio [in Descr. Égypte, Hist. nat.]: 238 (1813).

Ic.: Delile, Flore d'Égypte, pl.32, f.1 (1813–1814); Fl. Palaestina, plates, 3: t.177 (1977).

Woody-based herb, often forming large bushes, pleasantly aromatic, odourless or rarely acrid. *Stems* stiff, with long slender branches, leafy below, usually \pm leafless above, erect, 30–150cm, branched throughout, quadrangular, glabrescent, puberulous to scabrescent, often glabrous above, with simple or rarely branched patent or antrorse, rarely retrorse hairs and scattered stalked glandular hairs. *Leaves* ovate to broadly ovate in outline, 1–2-pinnatisect, 1.3×0.5 –3cm, segments linear, scabrous or pilose with simple hairs and stalked glandular hairs. *Spikes* 7–15(–25)cm, flowers opposite, lax, slender, axis with scattered sessile or shortly stalked glandular hairs. *Bracts* ovate, acute, 2.5 – $3 \times c.1.5$ mm, 0.33 – $0.5 \times$ as long as calyx, parallel-veined, sparsely puberulous. *Calyx* (4.5–)5–5.5mm, puberulous; teeth unequal; 2 adaxial lanceolate, 2×0.3 –0.5mm; median abaxial, broadly triangular, 1.5×0.7 –0.8mm; lateral abaxial triangular, 1.5×0.3 –0.5mm. *Corolla* blue or lilac, 12–14mm; tube c.9mm, relatively narrow, widening from bottom third and curved above; upper lip erect, c.2.5mm, bi-lobed; lower lip divided into 3 spreading ovate-oblong lobes c.1.75–2 \times 1.3–1.5mm. *Nutlet* reddish brown, oblong, 1.5×0.6 –0.8mm, oblong, producing mucilage on wetting, areole c.0.33 \times as long as nutlet.

Iran, YAR, Saudi Arabia, Jordan, Israel, Egypt, Sudan, TFAI, Ethiopia, Algeria, Mauritania, Morocco, Cape Verde Islands. Open rocky slopes and stony habitats, \pm sea level–2200m. Fig. 6A.

Type: Egypt, dans le désert de Suez, *M. Delile* (n.v.).

YAR. Rada', rocky hill, 1980m, 18 ix 1974, *Ritchie* 36 (E); Sana'a to Marib road, 10km E of Sana'a, dry scree slopes, 2200m, 3 iv 1981, *Miller & Long* 3391 (E, K); Shaharah, north slope to village, open rocky ground, 1400m, 22 ix 1978, *Miller* 172 (E); Al Kharf to Sadah road, 5km S of Sadah, 1800m, 21 iii 1981, *Miller* 3165 (E, K).

SAUDI ARABIA. Asir Province, Hijla, 14km E of Abha, 2100m, 19 ii 1980, *Nasher* IH53 (E); 10km E of Jeddah, low rocky hills, 25m, 11 i 1980, *I. S. Collenette* 1511 (E, K); Taif to Jeddah road, on escarpment, 1067m, 3 ii 1980, *I. S. Collenette* 1713 (E, K); Jebel Dibbagh, granite valley among boulders, 550m, 4 iii 1979, *I. S. Collenette* 940 (E, K).

TFAI. 3km N of Day rest house on road to Rauda, 1350m, 15 x 1976, *Lavranos & Newton* 13198 (E).

The most widespread of the species under consideration, distributed from Iran to the Cape Verde Islands. The Arabian plants tend to be very uniform, and are readily recognized by their lax inflorescences and pinnatisect leaves with linear lobes. In N Africa however *L. coronopifolia* (particularly var. *subtropica* Chaytor) approaches *L. antineae* Maire, a species occurring in the high Saharan mountains (Hoggar, Tibesti and J. Marra). *L. antineae* has relatively longer bracts, a more condensed inflorescence and a much more glandular indumentum particularly on the leaves.

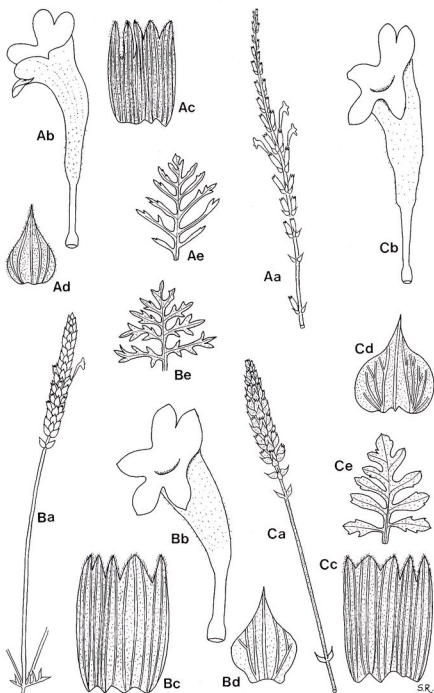


FIG. 5. *Lavandula coronopifolia*: Aa, inflorescence $\times \frac{2}{3}$; Ab, corolla $\times 5$; Ac, calyx $\times 5$; Ad, bract $\times 6$; Ae, leaf $\times 2$. *L. pubescens*: Ba, inflorescence $\times 1\frac{1}{2}$; Bb, corolla $\times 5$; Bc, calyx $\times 6$; Bd, bract $\times 5$; Be, leaf $\times 1$. *L. citriodora*: Ca, inflorescence $\times 1\frac{1}{2}$; Cb, corolla $\times 5$; Cc, calyx $\times 6$; Cd, bract $\times 5$; Ce, leaf $\times 1\frac{1}{2}$.

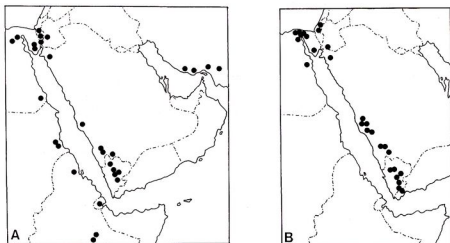


FIG. 6. Distribution of *Lavandula* species. A, *L. coronopifolia*; B, *L. pubescens*

10. *L. pubescens* Decaisne in Ann. Sci. Nat. Bot. sér. 2, 2:246–7 (1834). Fig. 5B.

Ic.: Fl. Palaestina, plates, 3: t.176 (1977).

Woody-based, clump-forming perennial, whole plant glandular, pleasantly aromatic or rarely acrid. *Stems* leafy \pm throughout, erect, 30–60 (–100)cm, branched throughout, quadrangular, hirsute with long simple hairs and dense long or short stalked glandular hairs. *Leaves* ovate to triangular in outline, 2–3-pinnatisect, 1–3(–4) \times 0.5–3cm, segments narrowly lanceolate or linear-oblong, hirsute with long simple hairs and densely glandular hairy. *Spike* (2–)3–10(–14)cm, flowers opposite, dense, axis glandular and with long simple hairs. *Bracts* ovate, acute, (4–)5–6 \times 2–3.5mm, 0.66–1 \times as long as calyx, parallel-veined, densely glandular. *Calyx* (4.5–)5.5–6mm, glandular puberulous and with short simple hairs; teeth unequal; 2 adaxial lanceolate, 1 \times 0.5mm; median abaxial, broadly triangular, 1.5 \times 1.2mm; lateral abaxial triangular, 1.5 \times 0.5mm. *Corolla* blue to lilac sometimes pale, 10–12mm; tube c.9mm, relatively broad, gradually broadening and curved above; upper lip erect, c.2.5mm, bi-lobed; lower lip divided into 3 spreading, ovate-triangular lobes, c.1.8 \times 1.5mm. *Nutlet* reddish brown, minutely pustulate, oblong, 1.5–1.8 \times 0.5–0.8mm, producing mucilage on wetting, areole c.0.33 \times as long as nutlet.

PDRY, YAR, Saudi Arabia, Israel, Jordan, Syria, Egypt. Open rocky and stony habitats, 300–2500m. Fig. 6B.

Type: Hab: le désert du Dictaè ou Sièdè Arab. Bové 55 (K, P).

Selected specimens examined:

PDRY, S. Yemen: Juheli Hills, 60 miles NW of Aden, 600–1220m, v 1904, *Wahab* s.n. (E); Dhala, flat sandy wadi bed, 1600m, 11 x 1937, *Scott & Britton* 182 (BM).

YAR. SE of Rada', eroded rocky area, 2000m, 17 x 1974, *Ritchie* 67 (E); 20km SE of Dhamar, 2500m, 10 x 1978, *Miller* 473 (E, K); Naqil Al

Fardah, 60km NE of Sana'a, 2000m, 5 iv 1981, *Miller & Long* 3457 (E, K); Wadi Dhahr, N of Sana'a, sandstone hill, 2400m, 29 iii 1974, *Lavranos* 11325 (E); J. Maqash, SW of Sana'a, 2300m, 13 ix 1977, *Radcliffe-Smith* 5059 (E, K); Sana'a to Hodeida road, E of Menacha, 2200m, 18 iii 1981, *Miller* 3123 (E); Wadi Madhab, 40km N of Huth, sandy wadi bed, 2000m, 23 iii 1981, *Miller* 3179 (E); Shaharah, nr village on open rocky ground, 1400m, 22 ix 1978, *Miller* 173 (E, K).

SAUDI ARABIA. Asir Province, Hijla, 14km E of Abha, sandy and rocky habitat, 2100m, 19 ii 1980, *Nasher* IH52 (E); El Baha, c.20°30'N 41°30'E, 2000m, 24 iii 1982, *El Tawil* 202 (K); Taif to Mecca, Sail al Kebir, 920m, 7 ii 1980, *I. S. Collenette* 1762 (K); J. Dibbagh, granite massif in crevice of large boulder, 2300m, 23 iii 1978, *I. S. Collenette* 492 (K).

Distributed around the Red Sea and distinguished by its glandular indumentum and 2-3-pinnatisect leaves. It is closely related to *L. citriodora*, for differences see under that species.

11. *L. citriodora* A. G. Miller, sp. nov. Fig. 5C.

Affinis *L. pubescenti* Decne. sed foliis obtritis citriodoris, segmentis foliorum minus divisis latioribus, indumento non dense glanduloso et corolla longiore (13-15 nec 10-12mm) tubo augustiore differt. A *L. coronopifolia* Poir. foliis minus divisis segmentis latioribus, inflorescentia conferta brevior (non laxa, 7-25cm), bracteis longioribus (0.75-1.5 nec 0.33-0.5 × longitudo calycio), lobis calycis brevioribus et tubo corollae latiore differt.

Woody-based perennial, strongly aromatic, smelling of citronella. *Stems* leafy below, ascending, 30-70cm, branched throughout, quadrangular, retrorse scabrescent to shortly villous with simple and branched hairs and scattered glandular hairs. *Leaves* ovate to broadly triangular in outline, pinnatifid, 1.5-5 × 0.75-3.5cm, segments oblong-obovate to narrowly oblong, coarsely serrate, scabrescent to tomentose with simple and branched hairs below additionally with scattered sessile and stalked glandular hairs. *Spike* 3-6cm lengthening to 12cm in fruit, flowers opposite, dense with one or two remote verticils below, axis pubescent with branched hairs and sessile and stalked glandular hairs. *Bracts* ovate, acute, 4.5-9 × 3-4mm, 0.75-1.5 × as long as calyx, puberulous to tomentose with branched and simple hairs. *Calyx* 5-6mm, puberulous to tomentose with sessile glandular hairs between the nerves; teeth unequal; 2 adaxial narrowly triangular, 1.2-1.5 × 0.6mm; median abaxial broadly triangular, 0.6 × 1mm; lateral abaxial triangular 0.6 × 0.8mm. *Corolla* bright blue or violet, 13-15mm; tube 8-9mm, widening from bottom third and curved above; upper lip erect, 2.5-4mm, bilobed; lower lip divided into 3 spreading, ovate-triangular lobes c.1.5-2.5 × 1.5-2mm. *Nutlet* reddish black, minutely pustulate, oblong, 1.5-2 × 1-1.2mm, producing mucilage on wetting, areole c.0.33 × as long as nutlet.

Endemic to the southern Asir mountains of Saudi Arabia and the escarpment mountains of North (YAR) and South (PDRY) Yemen. Open rocky and stony habitats, 1980-2700m. Fig. 7A.

Type: Yemen Arab Republic, between Numayr and Tenan in the Wadi Asfal E of Sana'a, much branched perennial to 0.33m, smelling of lemon,

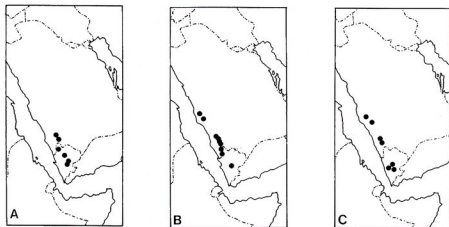


FIG. 7. Distribution of *Lavandula* species. A, *L. citriodora*; B, *L. dentata*; C, *L. atriplicifolia*.

flowers blue, leaves grey-green c.2500m, 19 v 1978, *J. R. I. Wood* 2337 (holo. E, iso. K).

Selected specimens examined:

YAR. Ysla Pass, c.45km S of Sana'a on Taiz road, dry, volcanic slopes, 2700m, 13 iii 1981, *Miller* 3009 (E, K); SW of Sana'a, rocky gully, 2200m, 12 ix 1977, *J. R. I. Wood* 1970 (E, K); J. Maqash SW of Sana'a, rock ledges and in gullies, 2300m, 13 ix 1977, *Radcliffe-Smith* 5060 (E, K); Shahara on rocky slopes near the summit, 2300m, 22 ix 1978, *J. R. I. Wood* 2500 (E); Khawlaan As Sham, above Aqaba Jifān, on rocky slopes, 2500m, 28 ix 1979, *J. R. I. Wood* 2943 (E).

SAUDI ARABIA. Asir Province, 33km SE of Abha, 29 ii 1980, *Nasher* H36 (E); near Souk al Ithnayn on Khamis Mushayt road, c.55km S of Abha, among granite blocks, 2380m, 2 iv 1979, *I. S. Collette* 1181 (K); Wadi Dalaghan, 33km SE of Abha, 2100m, 29 ii 1980, *Nasher* IH 120 (E); near Jalha on Abha to Najran road, rocky hills, 1980m, 11 v 1981, *I. S. Collette* 2665 (E).

Specimens now included in *L. citriodora* have in the past been identified as both *L. coronopifolia* and *L. pubescens*. *L. citriodora* is, however, immediately recognizable in the field by the strong smell of citronella particularly from the crushed leaves. It is most closely related to *L. pubescens* from which it is also distinguished by the indumentum which has only scattered glands as opposed to being densely glandular, the leaf shape which is less divided with broader segments, the corolla which is longer (13–15mm not 10–12mm) with a relatively narrower tube.

From *L. coronopifolia* it is distinguished by the broader, less dissected, leaf-segments, the inflorescence which is denser and shorter, the bracts which are more than half as long as the calyx, the calyx lobes which are shorter, and the broader corolla-tube.

12. *L. atriplicifolia* Benth in A. DC., *Prodr.* 12:146 (1848). Fig. 8B.
Syn.: *L. canescens* Desf., *Voyage au Yemen* 186–7 (1889).

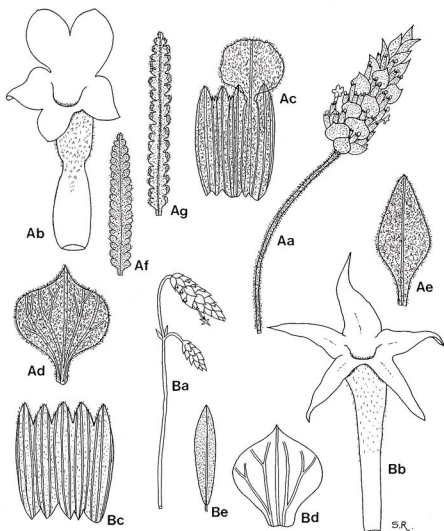


FIG. 8. *Lavandula dentata*: Aa, inflorescence $\times 1$; Ab, corolla $\times 6$; Ac, calyx $\times 5$; Ad, bract $\times 3$; Ae, sterile bract $\times 3$; Af, leaf (upper surface) $\times 2$; Ag, leaf (lower surface) $\times 2$. *L. atriplicifolia*: Ba, inflorescence $\times 1$; Bb, corolla $\times 6$; Bc, calyx $\times 6$; Bd, bract $\times 6$; Be, leaf $\times 1$.

Shrub or woody based perennial, whole plant faintly aromatic. *Stems* leafy \pm throughout, erect or ascending, 30–130cm, branched throughout, quadrangular, densely shortly tomentose with branched hairs and sessile glandular hairs. *Leaves* grey-green, narrowly elliptic, rarely ovate and lobed below, 1.5–4 \times 0.3–0.8 (–1.5)cm, acute, base attenuate, entire, densely tomentose with short branched hairs and many sessile glandular hairs. *Spike* 1–3cm, nodding, several on an erect leafless peduncle; flowers spirally arranged, dense; axis densely tomentose. *Bracts* papery textured, broadly obovate to \pm circular, acute, 3–6 \times 3–4.5mm, 0.75–1 \times as long as calyx, venation with mid-vein and \pm reticulate subsidiary veins,

glabrescent with scattered sessile glandular hairs and occasional short branched hairs on the margin and at base. *Calyx* 4.5–5.25mm, 15-nerved, sparsely tomentose with branched hairs and sessile glandular hairs; teeth \pm equal, triangular c.1 \times 0.7mm. *Corolla* pale yellow or yellowish brown, 7–10mm; tube c.5–7mm, \pm straight; lobes \pm equal, narrowly triangular to lanceolate, 2–3 \times 1mm, margins somewhat reflexed. *Nutlet* yellowish brown, smooth oblong, c.1.3 \times 0.6mm, areole c.0.25 \times as long as nutlet.

YAR, Saudi Arabia, Egypt, Ethiopia. Open rocky and stony habitats, 1500–2900m. November–March. Fig. 7C.

Type: In Aegypto superiore, *Figaris* s.n.

Selected specimens examined:

YAR. 5km SW of Ma'abar, rocky hill, 2600m, 7 iii 1984, *Miller & King* 5001 (E); Sana'a district, top of crater on Jebel Kohl, c.5 miles NW of Huqqa, loose volcanic rock and ash, 2900m, 1 ii 1938, *Scott & Britton* 461 (BM); J. Nuqum near Sana'a, 2500m, *Deflers* 484 (P); Ober Sa'ad, Jebel Bura, 1500m, 20 xi 1977, *J. R. I. Wood* 2116 (E).

SAUDI ARABIA. Near Jebel Ibrahim, off the Taif to Al Bahah road, dry stony hillside, 2130m, 28 iii 1982, *I. S. Collenette* 3498 (E, K); Wadi Wajj, SSW of Taif, 2000m, 27 iii 1980, *Lavranos & Collenette* 18541 (E).

A very distinct species because of its yellowish flowers with more or less equal corolla lobes and nodding spikes. Its position in the genus is uncertain, Chaytor (1937, p. 196) placed it in sect. *Pterostoechas* where it is totally anomalous. It was transferred to the genus *Sabbaudia* Buscalioni & Muschler by Chiovenda (1917, p. 56). *Sabbaudia* then consisted of three species: the type species *S. helenae* Buscalioni & Muschler, probably from Ethiopia (Chiovenda 1916, p. 58) but not mentioned by Cufodontis (1962) in his checklist of Ethiopian plants; *S. erythraeae* Chiov. from Ethiopia transferred by Cufodontis (1962, p. 806) to *Lavandula*, and *S. atriplicifolia* (Benth.) Chiov. I have seen no material of either *S. helenae* or *S. erythraeae* and Chaytor in her revision does not mention the genus *Sabbaudia* so I can make no assessment of the position of these species. The generic position of *L. atriplicifolia* certainly needs consideration and if Cufodontis is right in saying that *S. erythraeae* should, without doubt, be placed in *Lavandula* then these three, apparently allied species would seem to deserve a section of their own. *L. atriplicifolia* is usually described as having entire leaves but *Miller & King* 5001 has deeply lobed lower leaves.

13. *L. dentata* L., Sp. Pl.:572 (1753). Fig. 8A.

Syn.: *L. santoliniaefolia* Spach in Jaub. & Spach, Ill. pl. orient. 4:t.373 (1853).

Shrub or bushy, woody perennial, whole plant glandular, aromatic. *Stems* leafy throughout, older stems flaking, erect, 60–100cm, branched throughout, quadrangular, lanate with branched hairs and stalked glandular hairs thinning on older parts. *Leaves* linear-oblong, pinnatifid, 1–3.5 \times 0.1–0.4cm; segments strongly revolute, rounded, lanate with branched hairs and stalked glandular hairs, below also with many sessile glandular hairs. *Spike* 3–5cm, with an apical coma of sterile bracts, flowers in c.5–10-flowered verticils subtended by a single bract, verticils dense, axis lanate. *Bracts* often pinkish purple-tinged, broadly obovate to

flattened-obovate, acute, 6–10 × 7–10mm, longer than calyces, with 3 main veins and reticulate venation between them, sparsely lanate with many sessile and stalked glandular hairs. *Calyx* 5–6mm, 13-nerved, shortly lanate and with stalked and sessile glandular hairs; teeth very unequal; median abaxial, transversely elliptic-oblong, 1.5–2 × 3–4mm; lateral abaxial and adaxial teeth triangular, c.0.5 × 0.5mm, sinuses between sometimes shallowly toothed. *Corolla* lilac to purple, 8–9mm, puberulous; tube 5.5–6mm, ± straight, slightly waisted at middle; upper lip ± erect, c.2mm, bilobed; lower lip divided into 3 spreading ± triangular lobes, c.1.5 × 1.5mm. *Nutlet* yellowish brown, smooth but with faint reticulate patterning, oblong, c.1.5 × 1mm, areole small, basal.

YAR, Saudi Arabia, Ethiopia, Greece, Italy, Algeria, Morocco, Spain, Macaronesia. Open rocky and stony habitats, 1800–2620m. September–April. Fig. 7B.

Type: In Hispaniae, *Calape* (n.v.)

Selected specimens examined:

YAR. Jebel Jelal, W of Naqil Isla, 8 iii 1938, *Scott & Britton* 558 (BM); W of Majz, Khawlan As Sham, stony slopes, 2300m, 26 ix 1979, *J. R. I. Wood* 2929 (E, K); Sadah to Khawlan track, 16°57'N 43°29'E, 2620m, 5 ii 1979, *D. Wood* 1020 (E).

SAUDI ARABIA. 12km N of Abha on road to As Sawdah, 2500m, 10 iii 1980, *Lavranos & Collenette* 18267 (E); 3 ii 1980, *I. S. Collenette* 1720 (E); N Asir mountains, just S of Biljurshi, 2000m, '23 iv 1982, *Podzorski* 1075A (E).

The most easterly occurring species of sect. *Stoechas*. Immediately distinguished from the other Arabian species by its apical coma of sterile bracts and the linear-oblong pinnatifid leaves with many short, revolute segments.

14. *L. hasikensis* A. G. Miller *sp. nov.* Fig. 3B.

Species sine affinitatibus distinctis, ab omnibus speciebus aliis generis habitu humili fruticoso, inflorescentia ± capitata et bracteis latis, apiculatis, flores singulos involventibus differt.

Subshrub, whole plant densely white-tomentose. *Stems* ± woody, erect, to 30cm, branched throughout, quadrangular, densely tomentose with short branched hairs, becoming glabrous with age below. *Leaves* oblong-ovate, entire or with 1–3 pairs of inconspicuous rounded or ± triangular lobes, 2–15 × 2–8mm, margins revolute, becoming smaller and entire above, densely tomentose with branched hairs. *Spike* short, c.0.75cm, ± capitate in flower lengthening to 4cm in fruit, c.10–25-flowered, flowers spirally arranged, axis tomentose with branched hairs. *Bracts* c.3.5 × 5mm, with a short acute tip arising from the sinus formed between the 2 wing-like and membranous ± orbicular lateral lobes which envelope the base of the calyx, 0.33–0.5 × as long as calyx, parallel-veined, densely tomentose with branched hairs, margins and tip ± glabrous. *Calyx* longitudinally striate with purplish veins, 6–7mm, 15-nerved, tomentose with simple and 1–2(–3)-branched hairs and scattered sessile glandular hairs between the nerves; teeth subequal; 2 adaxial narrowly triangular, 1.5–2 × 0.6–0.8mm; 3 abaxial triangular-ovate, 1–1.5 × 0.6–0.8mm. *Corolla*

lilac, c.15mm long tube c.12mm, widening and curved above the middle; upper lip c.3mm; lower lip divided into 3 oblong, rounded lobes c.2 × 1.3mm. *Nutlets* pale brown, smooth, \pm oblong, c.1.5 × 0.8mm, not producing mucilage on wetting, areole c.0.25 × as long as nutlet.

Endemic to Dhofar on dry limestone mountains in open and exposed habitats and often the dominant species in associations of low woody based herbs and subshrubs, 950–1600m. September–October. Fig. 2.

Type: Oman, Dhofar, Jebal Hasik, 8km S of Hasik, 17°22'N 55°15'E, open summit area dominated by scattered bushes of *Lavandula hasikensis* and *Campylanthus pungens*, erect woody-based herb, branched from base, whole plant white woolly, flowers lilac in capitate spikes lengthening in fruit, 950m, 18 ix 1984, A. G. Miller 6137 (holo. E).

SULTANATE OF OMAN, Dhofar: J. Hasik, SW of Hasik, 17°20'N 55°15'E, rocky slopes, 960m, 19 x 1977, J. Sale 6 (A. Radcliffe-Smith 5583) (K); J. Semhan, above Leje water hole, 17°12'N 54°55'E, dissected limestone plateau, dominated by *Salvia hillcoatiae* and *Lavandula hasikensis*, 1600m, 23 ix 1984, Miller 6318 (E).

This extremely distinct new *Lavandula* is only known from the three gatherings cited above. It was first collected by J. Sale on Jebal Hasik, an easterly outlier of J. Semhan. In October 1984 I visited J. Hasik and collected more material and also found it nearby on J. Semhan itself. Jebel Semhan is at the eastern end of the arc of limestone mountains formed by J. Qamr and J. Qara. J. Qamr and J. Qara are both well vegetated with dense woodlands to their summits. J. Semhan is much drier and only its escarpment face is thinly wooded. The summit areas of J. Semhan and J. Hasik, as Radcliffe-Smith (1980, p.70) mentions, are certainly very different from the green slopes of J. Qara and J. Qamr, the rolling limestone tops are sparsely covered with low shrubs and woody-based herbs with a few trees restricted to the deep, steep-sided wadis which dissect its surface. On J. Semhan and J. Hasik *Lavandula hasikensis* grows on exposed, virtually flat rocky areas and is in places very frequent being virtually dominant in associations with *Campylanthus pungens* (J. Hasik) and *Salvia hillcoatiae* (J. Semhan).

L. hasikensis has no clear affinities within the genus. The bracts are very distinct (Fig. 3Be); the only species with bracts which approach these are found in sections *Stoechas* and *Spica* but in these the bracts are opposite and each subtends several flowers. The spirally arranged flowers and subequal calyx teeth suggest affinities with sect. *Subnuda* but the capitate inflorescence, bracts and shrubby habit exclude it from that section. The low shrubby habit and densely tomentose indumentum gives *L. hasikensis* a characteristic facies quite unlike that of any other species in the genus and it is reminiscent of the facies of another endemic from this area, *Salvia hillcoatiae* Hedge. This probably reflects common xerophytic adaptations to the extreme climate of this region.

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