

The re-circumscription and lectotypification of *Lavandula antineae* Maire and description of a new species *L. saharica* Upson & Jury (*Lamiaceae*)

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Summary. Examination of herbarium specimens of *Lavandula* species from Saharan massifs has revealed two distinct groups, here described as species. *Lavandula antineae* Maire occurs in Algeria, Niger, Chad and Sudan. *Lavandula saharica* occurs in Algeria and Libya and is described here. Within *L. antineae*, we recognise subsp. *antineae* from the Hoggar (Algeria) and Aïr (Niger), subsp. *tibestica* from the Tibesti (Chad) and subsp. *marrana* from Jebel Marra (Sudan).

INTRODUCTION

Lavandula antineae was described as an endemic to the Central Sahara, specifically the Ahagger (Hoggar), Tefedest and Tassili-n-Ajjer, all in Algeria (Maire 1929). Maire characterised his species by the stem indumentum of short uncinately hooked hairs, the ovate-acuminate bracts and corolla tube which broadens into a cup about one third of the way along its length. He also described three forms differing in the shape of the upper middle calyx tooth: forma *typica* Maire with a triangular tooth as broad as wide; forma *platynota* Maire with a more broadly triangular calyx tooth; and forma *stenonota* Maire with a narrowly-elliptic tooth only slightly broader than the other teeth.

Lavandula antineae belongs to sect. *Pterostoechas* Ging. which is the largest in the genus and contains 15 species distributed from Macaronesia across north Africa, parts of the Mediterranean basin, SW Asia, the southern Arabian Peninsula to Iran. It is readily distinguished by its single-flowered cymes that have a decussate arrangement, giving a bi-seriate to 4-seriate spike, and the ovate-elliptic bracts with parallel veining.

The only other *Lavandula* species recorded from the central Saharan region is *L. coronopifolia* (Ozenda 1983), known from the Aïr (Bruneau de Miré & Gillet 1956), Hoggar (Maire 1933) and Tibesti massifs (Maire & Monod 1950) where it occurs at lower altitudes than *L. antineae*. *Lavandula coronopifolia* also occurs in the Cape Verde Islands, across North Africa, the southern Arabian Peninsula and eastern Iran. It is characterised by the highly branched peduncle and the spike which is

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typically interrupted tending to be biseriate rather than \pm 4-seriate as in other species. The calyx teeth are all similar in shape and size, a character only shared with the species we describe here, *L. saharica* (syn. *L. antineae* forma *stenonota*).

Within section *Pterostoechas*, *L. multifida* L. is also recorded from Algeria and Libya, where it occurs in the northern regions of these countries in a Mediterranean climate. It is mainly found in the western Mediterranean region and is easily differentiated by its stem indumentum of short dendritic hairs and long white hairs, the bipinnatisect leaves, the broadly deltoid upper middle calyx lobe and the spike, which has a characteristic twist (Upson & Jury 2002).

Lavandula pubescens Decne. is listed by Quézel & Santa (1963) from Algeria as subspecies *antineae* (Maire) Miré & Quézel. We do not agree with their circumscription but concur with other authors (e.g. Chaytor 1937 and Miller 1985) that *L. pubescens* is a species of arid and desert areas in South West Asia and the Arabian Peninsula. Wickens (1977) also lists *L. pubescens* from Jebel Marra but having examined his and other collections from Jebel Marra we determined them as *L. antineae*. *Lavandula pubescens* is readily identified by its 2- to 3- pinnatisect leaves and dense glandular indumentum of short- and long-stalked capitate hairs on the stems, and leaves with long simple non-glandular hairs. *Lavandula antineae* does not share any of these diagnostic characters with *L. pubescens*, although the form of the spike and bracts are superficially similar in both species.

MATERIALS AND METHODS

Specimens of *L. antineae* were examined from the following institutions: BM, E, G, K, M, MPU & P. Syntypes of Maire's names were examined from his herbarium at MPU and P, as were duplicates from other herbaria. Some syntype sheets bear type stickers, attached by one of Maire's helpers (P. Schäfer, *pers. comm.*). These were not used as a guide in selecting lectotypes (although we have cited them to help distinguish between duplicates in the same institution). Several syntypes were also "schizotypes", the results of the original sheets having been cut in half, remounted and the two halves distributed to MPU and P. The most complete specimen of these "schizotypes" was selected as the lectotype. The conservation status of each taxon follows the IUCN red list categories (IUCN 2001).

RE-CIRCUMSCRIPTION OF *LAVANDULA ANTINEAE* MAIRE

We found that the material from Algeria could clearly and consistently be differentiated into two distinct groups based on eight morphological characters, summarised in Table 1. The two groups also have distinct distributions and occur in different habitats. These two groups are here recognised as distinct species. The diagnostic characters are those that have been found useful in identifying other species in this section (see Upson & Jury 2002). The distribution and ecology of the two morphological groups support recognition of them as species. Maire (1933) noted that his forma *stenonota* (our *L. saharica*) is found on the Tassili-n-Ajjer and Tefedest and specimens of his forma *typica* and *platynota* are entirely from the Hoggar.

TABLE 1. Comparative morphological characters, distribution and ecological patterns distinguishing *L. antineae* and *L. saharica*, sp. nov.

<i>L. antineae</i>	<i>L. saharica</i>
Lateral branching of stem and peduncle at an angle > 45°	Lateral branching of stem and peduncle at 45°
Plants generally leafy throughout	Plants with few leaves
Leaves comparatively large, 10 – 25(– 35) × 5 – 15 (20) mm	Leaves small, 7 – 10 × 5 – 10 mm
Leaves ovate-elliptic in outline	Leaves ovate in outline
Leaves pinnatisect, with frequent secondary lobing	Leaves pinnatisect, without secondary lobing
Bract apices acuminate to ± long-acuminate	Bract apices long-acuminate tending to spinescent
Bracts 0.5 – 0.75 × length of calices	Bracts 0.3 – 0.5 × length of calices
Upper middle calyx lobe triangular, differing in shape from the other lobes	Upper middle calyx lobe narrowly-elliptic, similar in shape to the other lobes
Indumentum of short uncinat hispid hairs, long simple to bifid hairs and sparse capitate glandular hairs	Indumentum of short uncinat hispid hairs and frequent capitate glandular hairs
Algeria: Hoggar	Algeria: Tassili-n-Ajjer and Tefedest
Generally found above 1800 m	Found 600 – 1500 m

TAXONOMIC TREATMENT

Lavandula antineae Maire, Bull. Soc. Hist. Nat. Afrique N. 20: 32-33 (1929). Type: In montibus Atakor-n-Ahagger, in rupibus graniticus secus amnem Tihaliouin, 2150 m, 22 March 1928, *Maire Iter Saharicum 1928* 939 (Lectotype MPU!, **designated here**). Original syntypes: In montibus Atakor-n-Ahagger, in lapidosis vulcanicus oropedii Tighaglar secus torrentes, 1900 – 2000 m, 11 March 1928, *Maire Iter Saharicum 1928* 933 (MPU! 2 sheets).

A suffruticose shrub, often with large woody base and erect branching annual stems (150 –)300 – 500 mm, usually leafy throughout, stems from the previous year often persisting. Stem indumentum of short uncinat hispid white hairs, long, simple to once-branched white coarse hairs and capitate glandular hairs, variable in both type and density, often glabrescent near apex. Leaves ovate, ovate-elliptic to triangular in outline, pinnatisect. Leaf indumentum of short uncinat or branched hairs with few glandular capitate hairs and occasional long coarse hairs. Spike simple and compact, rarely interrupted, 20 – 60(– 100) mm long. Bracts ovate-elliptic with scarious wings, with three main nerves, the outer two branched near the base giving five nerves over much of the bract, dark brown in colour. Apex

mucronate to \pm long-acuminate, variable in length. Calyx bilabiate, 15-nerved, 5 – 6 mm, the upper lateral calyx lobes triangular, the middle posterior lobe broadly triangular, the anterior pair narrowly-elliptic, all acute and erect in fruit. Corolla c. 10 – 12 mm, the tube dark violet-blue, becoming bright blue with darker guidelines on all lobes. Lower three lobes \pm equal in size, the upper two slightly larger erect and distinctly bilobed. Flowering September – April (– June).

LECTOTYPIFICATION. Maire, in his protologue of *L. antineae*, cited no specific specimens or localities for the three taxa he described, but made a broad reference to the mountainous areas of the Hoggar, Tefedest and Tassili-n-Ajjer. Our examination of specimens from Maire's herbarium in MPU and P revealed specimens collected during his *Iter Saharicum* in 1928. All these had been annotated with one of the 'forma' epithets by Maire and are therefore here treated as original material. We lectotypify the name *L. antineae* Maire on his collection 939 at MPU as it is the best available specimen, and corresponds to his forma *typica*. A photograph of this specimen is in Maire (1933).

INFRASPECIFIC VARIATION IN *L. ANTINEAE*

The majority of specimens of *L. antineae* examined were collected from the Hoggar. There are also collections and records from the Air (Niger) Bruneau de Miré & Gillet (1956), Tibesti (Chad) Maire (1935) and Jebel Marra (Sudan) Wickens (1977). Wickens (1977) cites *Lynes* 403a (K) from Jebel Meidob, NW of Jebel Marra, as *L. antineae* Maire. We agree with Chaytor (1937) that this is *L. coronopifolia* Poir. (syn. *L. stricta* in Chaytor, 1937 — see Upson & Jury 2002 for synonymy).

Within *L. antineae* there are groups of specimens that vary consistently in stem indumentum, bract length and leaf form (discussed later). These groups correlate with geographical distribution. We here recognise the populations from the Hoggar and Air as *L. antineae* subsp. *antineae* and those populations from the Tibesti and Jebel Marra as subsp. *tibestica* and subsp. *marrana*. We recognise these populations as subspecies rather than varieties because of their discrete geographic distributions.

KEY TO SUBSPECIES

1. Stem indumentum of short hispid uncinata and long white coarse hairs; bracts 0.5 – 0.75 \times the length of calyx. Hoggar (Algeria), Air (Niger) and Tibesti (Chad) 2
 Stem indumentum of short hispid uncinata hairs only; bracts 0.75 – 1 \times the length of the calyx. Jebel Marra (Sudan) subsp. **marrana**
2. Short hispid hooked uncinata hairs on stem; bracts 0.5 – 0.75 \times length of calyx; leaves pinnatisect usually with secondary lobing. Hoggar (Algeria) and Air (Niger) subsp. **antineae**
 Short hispid straight uncinata hairs on stem; bracts to 0.5 \times length of calyx; leaves very regularly pinnatisect, tending to pectinate, with no secondary lobing. Tibesti (Chad) subsp. **tibestica**

TAXONOMIC TREATMENT

1a. *Lavandula antineae* Maire subsp. *antineae*

- L. antineae* Maire forma *platynota* Maire, Bull. Soc. Hist. Nat. Afrique N. 20: 33 (1929) — Lectotype (**designated here**) — [Algeria] In ditone Ahagger, Tamanrasset, Locus canales 1500 m, 7 March 1928, *Maire Iter Saharicum 1928*, 934 (MPU! — a schizotype identified by red type sticker on sheet; isolectotype: G!, MPU!, P! — 2 sheets including matching half of “schizotype” at MPU). Original syntypes: *Maire* 931 (MPU!); *Maire* 932 (G! MPU!); *Maire* 937 (MPU!, P!); *Maire* 940 (MPU!); *Maire* 941 (MPU!); *Maire* 942 (MPU!); *Maire* s.n. (*Société Cénomane D'Exsiccata* no. 2231 — BM! 2 sheets, G!, MPU!).
- L. antineae* Maire forma *typica* Maire, Bull. Soc. Hist. Nat. Afrique N. 20: 32 – 33. (1929) *nomen nudum*.
- L. pubescens* subsp. *antineae* (Maire) Miré & Quézel in Quézel & Santa, Nouvelle Flore Algérie: 799 (1963).

Stem indumentum of short hispid uncinately hooked hairs and long simple to once-branched hirsute hairs, over sparse glandular capitate hairs, variable in density. Leaves narrowly-elliptic in outline, pinnatisect, often with secondary lobing on the lower pinnae, 10 – 25(– 35) (including petiole) × 5 – 15(– 20) mm; lobes linear to ± obovate, 1 – 1.5 mm wide, indumentum of short uncinately hooked hairs with few glandular capitate hairs and occasional long hirsute hairs. Bracts ovate-elliptic with small scarious wings, apex typically acuminate, (occasionally mucronate to ± long-acuminate in some specimens), 3 – 4 mm long, 0.5 – 0.75 × length of calyx. Middle posterior calyx lobe triangular, more or less as broad as wide. Fig. 1H.

DISTRIBUTION. Hoggar, Algeria and Aïr, Niger. Map 1.

HABITAT. Open rocky habitats in mountains, principally over 1500 m.

SELECTED SPECIMENS EXAMINED. 4 miles W of Assekrem, c. 6500 ft, 24°0'N 5°5'E, 5 Feb. 1978, *Croston* s.n. (BM); 6 km SE of Djanet turnoff, c. 2200 m, 30 July 1982, *Miller et al.* 4144 (E); Wilaya Tamanrasset, Umgeburg des Guelta Afilale, 2050 m, 23°08'N 5°45'E, 24 March 1980, *Podlech* 33328 (M 7225 × 2); Wilaya Tamanrasset, Djebel Teleghteba, 1450 – 1600 m, 24°05'N 6°53'E, 16 March 1981, *Podlech* 34789 (G!, M × 2); Wilaya Tamanrasset, Guelta Tassakint im Oued Tarôda, 28 km S Ideles, 1900 m, 23°36'N 5°58'E, 17 March 1981, *Podlech* 34825 (M 7222); Wilaya Tamanrasset, Tefedest-Gebirge, SW des Garet el Djenoun, 920 – 980 m, 20 March 1982, *Podlech* 36675 (M 7218); Coudia du Hoggar, Tamachek, 8 Sept. 1928, *Draper* 52 (P); Polignac à Djanet, Oued Lamellen, 620 m, 4 March 1934, *Lhote* 34 (P).

CONSERVATION STATUS. Near Threatened. The area above 1500 m altitude in the Hoggar can be estimated at c. 20,000 km² and over 2000 m at no more than 5,000 km² so that the taxon could qualify as vulnerable under criteria B1 or B2 (IUCN 2001). Annotations from several collections in the 1980s indicate this species is locally abundant. Maire (1933) cited his *L. antineae* (including our *L. saharica*) as occurring frequently and Quézel & Santa (1963) cited it as being quite common. Herbarium collections from the Aïr, although limited, suggest its occurrence in three areas. There is a lack of accurate information on population size, demography

and threats from both areas. We list this taxon as near threatened as available data, although poor, does not suggest it qualifies for a higher category although its area of occurrence means it could be susceptible to demographic fluctuations, stochastic events or habitat destruction leading to decline and qualification for listing at a higher category.

NOTES. This subspecies varies notably in the number and size of leaves, stems and flower spikes. The suffruticose habit means that the annual stems will be heavily influenced by the prevailing climate. Maire described this species as flowering after the rains and it is likely that the observed variation is phenotypic and affected by environmental factors such as rainfall. Two specimens (*Podlech* 34738 & 34789) that differ in their facies from the rest, notably in the more regular division of the leaves, denser pubescence and smaller size were collected in the same year from an outlying mountain of the main Hoggar massif, Djebel Teleghtebea. They have the triangular median calyx tooth, bracts and indumentum typical of *L. antineae* subsp. *antineae*. We treat these specimens as aberrant phenotypic variants of *L. antineae* subsp. *antineae*.

SYNONYMY. Examination of type material of *L. antineae* showed little difference between Maire's forma *typica* and forma *platynota*. Both have a broad triangular calyx tooth, a character that varied slightly. It is clear that the type of forma *platynota* falls within the variation found within *L. antineae sensu stricto*.

We lectotypify the name *L. antineae* forma *platynota* Maire on *Maire* 934 (MPU) which is a "schizotype" and bears a red type sticker. This sheet consists of a good portion of a branched stem with plenty of leaves and flowers and is superior to the "schizotype" of this collection at P which consists of two smaller stems and fewer flower spikes. A further sheet of *Maire* 934 in P is also a good specimen but we select the sheet at MPU because Maire's own herbarium is deposited there.

1b. *L. antineae* subsp. *tibestica* Upson & Jury subsp. nov. a subspecie *L. antineae* pilis hispidis, foliis pinnatisectis regulariter dissectis; bracteis anguste-ellipticus trinervatis, ad apicem acuminatis vel mucronatis, calycis dente postico medio late triangulari differt. Typus: Chad, Tibesti, Tarso Toussiclé, 5 – 6000 ft on rhyolite, 25 Aug. 1957, *Grove & Johnson* s.n. (holotypus: K!).

Plant grey-green with an indumentum of dense short hispid hairs typically uncinuate sometimes branched, long white hairs and scattered capitate glandular hairs. Leaves \pm ovate in outline, pinnatisect with narrow very regular dissections tending to pectinate, 8 – 15 (including petiole) \times 5 – 10 mm, petiole 2 – 3 mm. Spike 30 – 50 mm. Bract narrowly-elliptic, apex acuminate to mucronate, c. 0.5 \times length of calyx, the outer two of the three main nerves branching 0.3 – 0.5 \times along length of bract. Median posterior calyx tooth broadly triangular, slightly broader than long, lobes ciliate. Fig. 1J – K.

DISTRIBUTION. Chad — endemic to the central Saharan Massifs of the Tibesti. Map 1.

HABITAT. A montane species occurring from 1350 – 3200 m (Maire & Monod 1950) on volcanic substrates. This is a species of the Saharomontane vegetation (White 1983).

REPRESENTATIVE SPECIMENS EXAMINED. CHAD, Tibesti: Tousside volcano from 2700 m upwards, 17 Sept. 1958, *Rossetti* 69 (BM); Plaine comprise entre le Pic Tousside et le Trou du Natron, 1500 m, Oct. 1962, *Grosclaude* 5, 42 & 52 (G); Pic Botum, 2300 – 2350 m, *Wyss-Dunant* 1948 (G); Volcan de Emi-Koussi, 1900 – 3000 m, 20 March 1926, *Mission Tilho* (P); Dans les Oueds, terrains montagneux, Nov. 1930, *Tarrieux* s.n. (P); Ouadi-Bini Alali, Ouadi-bas fond, Sept. 1932, *Tarrieux* s.n. (P).

CONSERVATION STATUS. Near Threatened. The Tibesti covers an area of 250,000 km² (Maire & Monod 1950) but a generous estimate of land over 2000 m in which suitable habitat may occur is between 15 – 20,000 km². From herbarium collections and literature (Maire & Monod 1950) about 12 localities are known. It could come close to qualifying as vulnerable based on an estimate of its possible area of occurrence, under criteria B1 and 2 (IUCN 2001). However, available information although poor with regards to population size, fragmentation, demography or threats does not suggest it qualifies as vulnerable.

NOTES. The indumentum of dense short uncinata hispid hairs, long white hairs giving it a grey-green appearance and the scattered capitate glandular hairs immediately differentiates it. The regular pinnatisect leaves, which tend to pectinate, and the bract length 0.5 × length of calyx, are also diagnostic.

1c. *L. antineae* subsp. *marrana* Upson & Jury subsp. nov. a subspecies *L. antineae* ramis hispidis, bracteis anguste-ellipticis longitudine 0.75 – 1 × calycis, calycis dente postico medio deltoideo differt. Typus: Sudan, Jebel Marra: Tora Tongo, upland heath, pumice soils, 7,800 ft, *Wickens* 1224 (holotypus: K!).

Plant grey-green with indumentum of short uncinata hispid hairs, occasionally once or twice branched, usually dense on the lower part of the stem. Leaves ovate to triangular in outline, pinnatisect usually with secondary lobing on the lower pinnae, lobes with simple often retrose margins, 30 – 40 (including petiole) × 20 – 30 mm. Leaf indumentum sparse to dense consisting of simple uncinata hairs with scattered short capitate glandular hairs. Peduncle 120 – 160 mm, spike (50 –)90 – 170 mm, with the lower pair of cymes slightly distant from main spike. Bracts narrowly-elliptic with distinct scarious wings, apex long-acuminate, sometimes slightly reflexed, 0.75 – 1 × length of the calyx. Calyx indumentum of hispid uncinata hairs and scattered glandular hairs; median posterior calyx tooth broadly triangular and slightly shorter than adjacent lobes, the tips sometimes tinged pink, distinctly ciliate. Fig. 1L – M.

DISTRIBUTION. Sudan, Province of Darfur and Chad, Ennedi. Endemic to Jebel Marra and its northern outlier Jebel Gurgeil in Sudan. Map 1.

HABITAT. 1900 – 2750 m in upland grassland on volcanic soils where it is one of the commonest shrubby herbs along with *Blaeria spicata* subsp. *spicata* (*Ericaceae*) (*Wickens* 1977); 1900 – 2750 m.

REPRESENTATIVE SPECIMENS EXAMINED. SUDAN: Darfur, Jebel Marra. High zone, c. 8500 ft, *Lynes* 151 (BM, K); Marra Mts, 8 Dec. 1932, *Sandison* 21 & Jebel Marra, 8000 ft, 6 April 1920, *Lynes* (BM); Dariba crater, on pumice and tufa, 7500 ft, 19 Dec. 1957, *Robertson* 138 (BM, K); Upper zone of Jebel Marra, 8000 ft, 6 April 1920, *Lynes* s.n. (K); Jebel Marra, 1929, *Rugman* 9 (K); Between Bobbery and salt lake,

March 1930, *Mackintosh* 40 (K); Between Kerinko and Deriba, 2000 m, 14 Jan. 1953, *Jackson* 2586 (K); N of Crater, upland meadow, 9000 ft, 8 Sept. 1964, *Wickens* 2394 (K); Topolin Plateau, about 120 km E of Zalingei, 1700 – 1800 m, 23 Jan. 1965, *de Wilde* 5529 (K, WAG); Deriba, 22 Oct. 1966, *Sahni* 431 (K).

CONSERVATION STATUS. Near Threatened. Jebel Marra covers approximately 30,750 km² and this taxon is confined to upland grassland areas. A vegetation map of Jebel Marra (*Wickens* 1977) suggests that possible habitat is less than 100 km². *Wickens* (1977) does describe it as one of the commonest shrubby herbs of the upland grassland, albeit scattered. This taxon could qualify as endangered based on its limited occurrence under criteria B1 or B2 (IUCN 2001) although available data, whilst poor, does not suggest it qualifies.

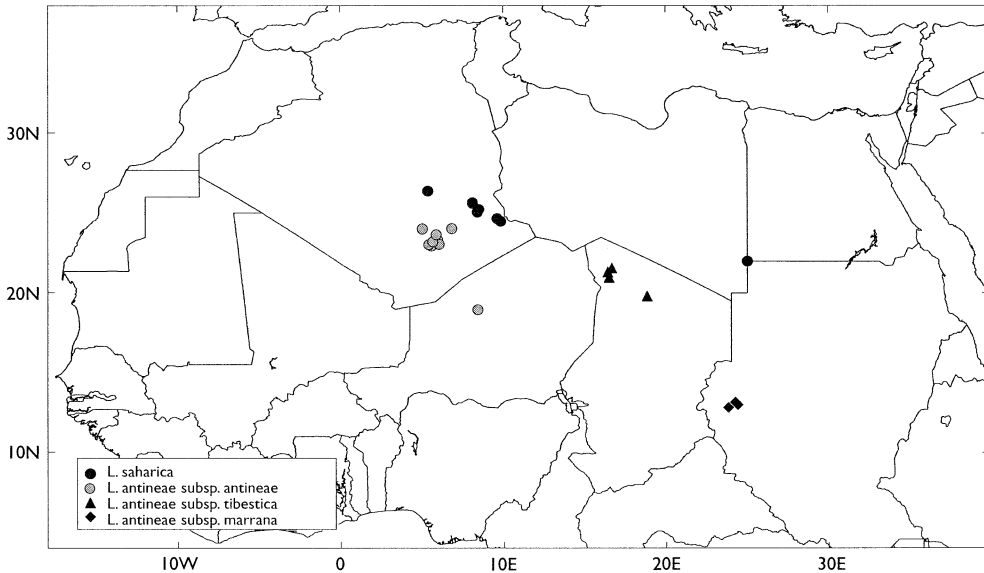
NOTES. This subspecies can be recognised by: the stem indumentum lacking the long white hairs of subsp. *antineae* and subsp. *tibestica*; the bracts which are narrowly-elliptic with distinct scarios wings, and $0.75 - 1 \times$ length of the calyx, and the median calyx tooth which is broadly triangular and slightly shorter than the outer pair of lobes.

2. *Lavandula saharica* Upson & Jury sp. nov. Suffrutex generaliter aphyllus, internodiis longis, ramis lateralibus et pedunculis ad angulum 45° patentibus. Trichomata brevia, hispida, alba, plerumque adpressa, saepe semel ramosa. Pili glandulosi capitati. Folia ovata, pinnatisecta, lobis linearibus magis minusve obovatis. Florum bracteae typice longitudine $0.3 - 0.5(-0.75) \times$ calycum. Bractearum apices longe acuminati, quasi spinescentes. Calycis lobus medius posticus anguste triangularis, lobis lateralibus magis minusve similis; lobi antichi anguste elliptici. Typus: Algeria, Tassili N'Ajjer, 10 km SE of Djanet. In rock painting village, 1500 m, 10 Aug. 1982, *Baxter*, *Burleton*, *Kirkpatrick*, *Miller* 4194, *Rae* (holotypus: E!).

L. antineae forma *stenonota* Maire, Bull. Soc. Hist. Nat. Afrique N. 20: 33 (1929).

Typus: Algeria, in montibus Tefedest in alveis lapidoso amnis, Ahetes, 1200 – 1300 m, 14 April 1928, *Maire Iter Saharicum* 1928 936 (Lectotype MPU!, **designated here**). Original syntypes: *Maire* 944 (MPU!, P!); *Maire* 945 (MPU!).

A suffruticose shrub with erect annual stems (150 –)300 – 500 mm, much branched from the base. Stems rather leafless with long internodes, the frequent lateral branches borne at c. 45° to the main stem. Stem and leaf indumentum of short uncinuate hispid white hairs, often adpressed, frequently once-branched, and glandular capitate hairs; stems glabrescent towards the apex. Leaves ovate in outline, 7 – 10 (including petiole) \times 5 – 10 mm, pinnatisect usually without secondary lobing, linear to \pm obovate lobes. Peduncles usually simple, sometimes with secondary branches borne at c. 45° to the axis, 50 – 120 mm. Spike typically compact and unbranched, 10 – 30 mm long. Bracts narrowly-elliptic, with small scarios wings, dark brown in colour, 4 mm long, $0.3 - 0.5(-0.75) \times$ length of calyx, with three main nerves, the outer pair branched near their base to produce five nerves over much of the bract. Apex long-acuminate tending to spinescent, the tip $0.3 - 0.5 \times$ length of the whole bract. Calyx bilabiate, 15-nerved, 5 – 6 mm long; middle posterior lobe narrowly-triangular in shape and \pm similar to lateral and anterior pair, all acute and



MAP 1. Distribution of *L. antineae* and *L. saharica* across Saharan Africa.

erect in fruit. Corolla c. 10 mm long, the lower three lobes \pm equal in size, the upper two slightly larger and erect. Fig. 10D – G. Flowering October – April.

DISTRIBUTION. Central Saharan region: Algeria — Tassili-n-Ajjer and Tefedest. Libya/Sudan/Egypt - Djebel Uweinat. Map 1.

HABITAT. Found on open rocky desert plains from 600 – 1500 m in the Tassili-n-Ajjer and Tefedest. On Jebel Uweinat it forms with *Ochradenus baccatus* a distinctive shrubby community (Léonard 2001) in gorges full of sandstone blocks between 1250 – 1800 m.

REPRESENTATIVE SPECIMENS EXAMINED. ALGERIA: Tassili N'Ajjer: Wilaya Ouargla, Paßhöhe 118 km SSW Ilizi an der Straße nach Djanet, 1440 m, 25°37'N 8°7'E, 15 March 1980, *Podlech* 33002 (CAI, G, HUJ, M 7227); Wilaya Ouargla, Tassili-Hochfläche N von Djanet, Hochtal von Tamrit, 24°40'N 9°37'E, 17 Oct. 1981, *Dittrich* (G, M 7217); Wilaya Tamanrasset, Amguid, Guelta Tin Selmakene, Wasserstellen in felsigen Canyon, 620 – 650 m, 26°23'N 5°22'E, 18 March 1982, *Podlech* 36614 (G!, M 7220); Wilaya Tamanrasset, Tefedest-Gebirge, W-Hänge SW des Gare el Djenoun, 920 – 980 m, 20 March 1982, *Podlech* 36675 (M); Wilaya Ouargla, Tassili N'Ajjer: S'Hang der Paßhöhe, 30 km N Fort Gardel an der Piste nach Ilizi, 1300 m, 25°04'N 8°25'E, 1 April 1982, *Podlech* 36984 (M 7221); Region N. de Djanet, Tassili da Tafatelet, 28 Aug. 1934, *Lhote* 111 (P); Oued Tin Ekert, Tefedest, 10 Jan. 1950, *Lhote* 257 (P).

LIBYA: Djebel Uweinat: Sommet de Wadi Wahesh, gorge de grés, 1560 m, 30 Nov. 1968, *Léonard* 4921 (K).

CONSERVATION STATUS. Data Deficient. Benchelah *et al.* (2000: 179) describe it

as very frequent and scattered across the plateau and notes on herbarium specimens describe it as locally common. This suggests that the area of occurrence could be over 20,000 km². However, there is insufficient information on population size, fluctuations (which could be great for a species of arid lands), fragmentation or on any decline or threats. It could qualify as least concern but this could underestimate the potential threats and hence we treat it as near threatened.

NOTES. We have chosen a new specific epithet for this species as there is no existing name at the species level although it might be argued that it is desirable to use Maire's original epithet, *stenonota*. We believe this would be potentially confusing

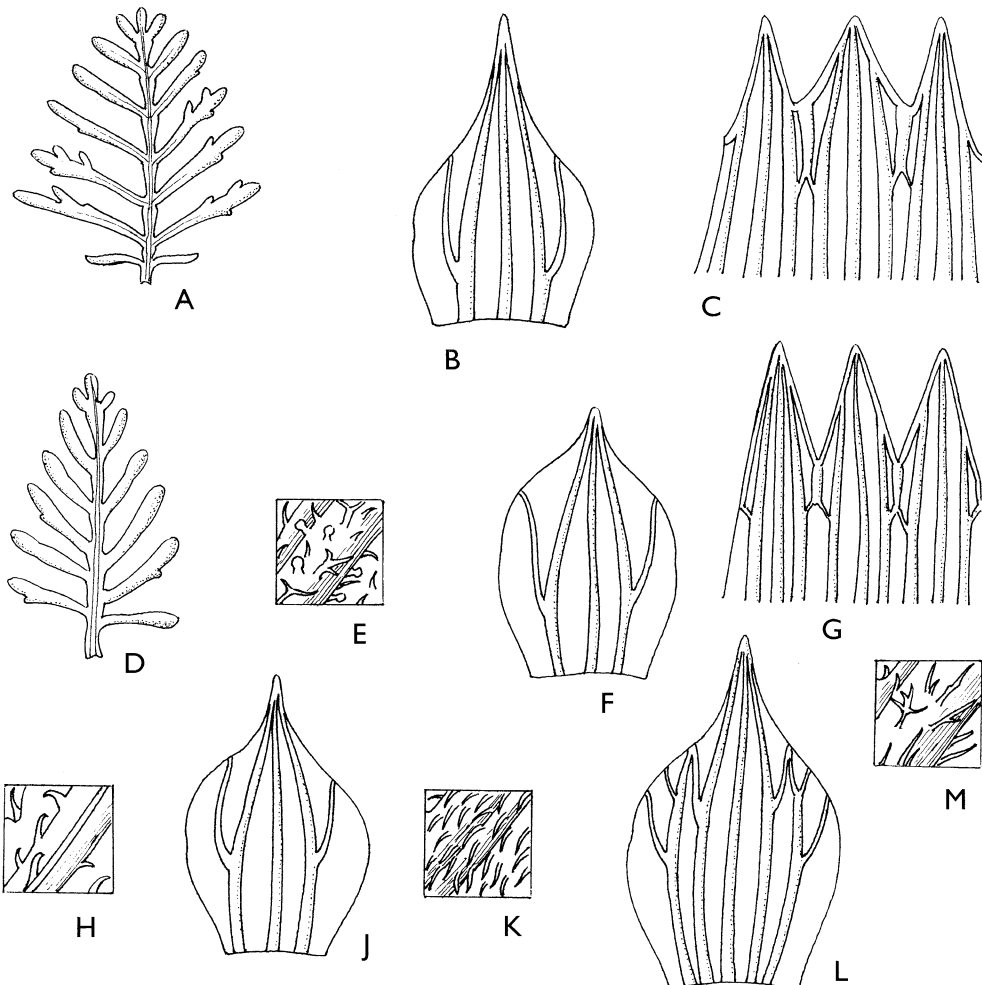


FIG. 1. **A** *L. antineae*, leaf $\times 0.5$; **B** *L. antineae*, bract $\times 12$; **C** *L. antineae*, upper calyx lobes $\times 12$; **D**–**G** *L. saharica*. **D** leaf $\times 4$; **E** leaf indumentum $\times 40$; **F** bracts $\times 12$; **G** calyx $\times 12$; **H** *L. antineae* subsp. *antineae*, leaf indumentum $\times 40$; **J**–**K** subsp. *tibestica*. **J** bract $\times 12$; **K** leaf indumentum $\times 40$; **L**–**M** subsp. *marrana*. **L** bract $\times 12$; **M** leaf indumentum $\times 40$. **A**–**C**, **H** from Miller *et al.* 4144 (E); **D**–**G** from Leonard 4921 (K); **J**–**K** from Grove & Johnson s.n. (K); **L**–**M** from Lynes 151 (K). Drawn by Georita Harriott.

as the *stenonota* refers to the narrow middle calyx lobe. This character state is not unique, also being found in *L. coronopifolia*, and at the specific level the epithet loses its meaning and context. This name has not been widely used since it was published by Maire. We hence propose a more informative epithet *saharica* to reflect the distribution and a new type in preference to the poor type material of Maire.

Lavandula saharica is probably more closely allied to *L. coronopifolia* Poir. than *L. antineae*, because the upper middle calyx lobe is similar in size and shape to the rest, a character unique to these species. Both taxa are also found on desert plains, although *L. coronopifolia* has a much wider distribution (see introduction). Maire (1929) also comments on the relationship of *L. antineae* (including our *L. saharica*) with *L. coronopifolia*. They can be easily distinguished by the compact and 4-seriate spike in *L. saharica* compared to the interrupted and 2-seriate spike in *L. coronopifolia*, and by details of the stem indumentum, leaf dissection and calyx.

LECTOTYPIFICATION OF *L. ANTINEAE* FORMA *STENONOTA*. Maire in his protologue for forma *stenonota* mentions no specimens. There are three collections of *L. antineae* forma *stenonota* from Maire's *Iter Saharicum*, 1928 distributed between his herbarium specimens in MPU and P. We select *Maire* 936 in MPU as the lectotype because it is the best specimen with both leaves and flowering stems. *Maire* 945 lacks leaves and 944 lacks a mature flower.

PHYTOGEOGRAPHY OF *L. ANTINEAE* AND *L. SAHARICA*

Lavandula antineae has close affinities with a number of Moroccan species, most notably *L. tenuisecta* Coss. ex Ball and *L. maroccana* Murb., both from the High Atlas and *L. rejdalii* Upson & Jury from the Anti-Atlas (Upson & Jury 2002). It also shares some affinity with the widespread Mediterranean species, *L. multifida*. The distribution pattern of *L. antineae sensu* Upson & Jury corresponds to those central Saharan Massifs of sufficient altitude to support Saharo-montane vegetation. The taxonomic affinities of *L. antineae* shows that it is a Mediterranean element.

This suggests a vicariant origin of these taxa related to the pluvial phases during the Pleistocene which resulted in the expansion and contraction of the flora due to fluctuating periods of increased precipitation and aridity (Quézel 1978). The warm, wet climate of the early Holocene, c. 11,000 and 7,000 years B.P. would have permitted an expansion of the Mediterranean floristic elements (such as the ancestor of *L. antineae*) which reached the Hoggar, Air, Tibesti and Jebel Marra (Wickens 1984). Much of the Mediterranean floristic element had disappeared by about 2800 BP and the rapid increase in desertification by 500 BP brought about the isolation of the Saharan massifs.

Such a pattern is known to be repeated amongst other floral and faunal distributions (Goudie 1996). Long distance dispersal is a less likely explanation given that the nutlets of *Lavandula* have no adaptation for this. Finches can frequently be seen eating the nutlets and are therefore possible dispersal agents, but they are seed predators so that this would seem unlikely.

The Holocene climatic changes also probably gave rise to the distribution pattern of *L. saharica*. This species grows on some of the lower Saharan massifs below true

Saharomontane vegetation, which starts to appear from approximately 1800 m (White 1983). The two massifs from which this species is known are significantly lower than the Hoggar, Aïr, Tibesti and Jebel Marra. The Tassili-n-Ajjer and Tefedest are plateaux reaching 1850 m whilst Jebel Uweinat rises to 1893 m (Léonard 2001). A very particular plant association is described by Léonard (2001) on Jebel Uweinat consisting of *Lavandula antineae* (our *L. saharica*) and *Ochradenus baccatus*. It occurs in gorges full of big blocks of sandstone from 1250 m to 1800 m, virtually at the top of the massif. The community is not true Saharo-montane vegetation, as indicated by the presence of *Acacia tortilis* (White 1983). *Lavandula saharica* is found from 900 to 1500 m in the Tassili-n-Ajjer and Tefedest, while *L. antineae* always grows above 1800 m on the nearby Hoggar.

Lavandula coronopifolia is a species of more arid desert areas in our area and is found at much lower altitudes (150 – 800 m) (Upson & Jury 2002), and is not a montane/submontane species like *L. antineae* and *L. saharica*. Maire (1933) specifically recorded *L. coronopifolia* from the tropical elements of the vegetation of the Hoggar and Tassili-n-Ajjer, not with *L. antineae*.

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