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The *Limonium auriculae-ursifolium* (Pourret) Druce group (Plumbaginaceae) in the Channel Isles

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ABSTRACT

The history of the investigation of the *Limonium auriculae-ursifolium* group (Plumbaginaceae) in the Channel Isles is related. Evidence is presented, from a cultivation experiment, that shows the presence in the islands of two variants in this group, *L. auriculae-ursifolium* sensu stricto and **L. normannicum** Ingrouille **sp. nov.**

INTRODUCTION

Limonium auriculae-ursifolium (Pourret) Druce was first discovered in the Channel Isles in August 1900 (Salmon 1901), growing at St Esquère Bay on the eastern tip of Alderney (GR WA 607.088, M.O.D. 1:10560 Alderney map (1966)). Later it was found in three places on the northern coast of Jersey (Fig. 1): at Rouge Nez, near Crabbe (Attenborough 1916), at Plémont Point (Attenborough 1918) and at Ronez Point in 1919 (Attenborough 1920) (G.R. 588.558, 562.567, 518.572 respectively, Official States of Jersey 1:25000 map (1981)).

The Alderney Sea-Lavender has long been known from the Atlantic coast of France in Dépts Morbihan, Loire-Atlantique and Gironde (Lloyd 1844). It was first described from the Mediterranean coast of France, from Guissan near Narbonne, as *Statice auriculae-ursifolia* Pourret (Pourret 1788). It was later found in Spain and Portugal (Boissier 1848), in the Balearic Islands (Pignatti 1960) and on the northern coast of France opposite the Channel Isles (Salmon 1902).

The same species was described from L'Isle Saint Lucie, adjacent to the original type locality, as *Statice lychnidifolia* Girard (Girard 1842), and for a long time it was this synonym which was used in Floras. The earlier name of *L. auriculae-ursifolium* was not properly adopted until 1928 (Druce 1928).

It was Boissier (1848) who first formally recognized the variation present within *L. auriculae-ursifolium* by describing a var. *corymbosa* from southern Spain (Cádiz and Málaga) and from the western coast of France. Recently Erben (1978) described part of Boissier's variety, i.e. those plants from southern Spain and Portugal, as a new species, *L. algarvense* Erben. He also recorded a variant from the northern Atlantic coast of France, which required further investigation.

C. E. Salmon (1901) was quick to identify the Alderney Sea Lavender as Boissier's var. *corymbosa* (*L. lychnidifolium* var. *corymbosum* (Boissier) C. E. Salmon), by its subcorymbose habit, and extended Boissier's rather sketchy description from Alderney material.

It was Frère Louis Arsène who first noted the differences between plants from different places on Jersey (Arsène 1930). He described the different branching pattern and smaller spikelets of the plants from Plémont Point and the congested panicle of plants from Ronez Point. In a note on one herbarium specimen (**JSY**), he suggested that the plants from Plémont Point might be hybrids between the Ronez Point plants and Rock Sea Lavender, *L. binervosum* (G.E.Sm.) C. E. Salmon (*L. occidentale* (Lloyd) O. Kuntze), which is also found at Plémont Point. At this time C. E. Salmon was rather diffident about determining the Plémont Point plants as var. *corymbosum* but had no reluctance in labelling Ronez Point plants as such.

In recent years the populations at Ronez Point and that from Rouge Nez (which resembles the Plémont Point variant) have been searched for without success. The Ronez Point population was adjacent to, or in, a quarry used by the German army during the Second World War, from which stone was transported by rail to build the fortifications of St Ouen's Bay. It was during the war that a colony of *L. lychnidifolium* var. *corymbosum* appeared along St Ouen's Bay, probably founded by

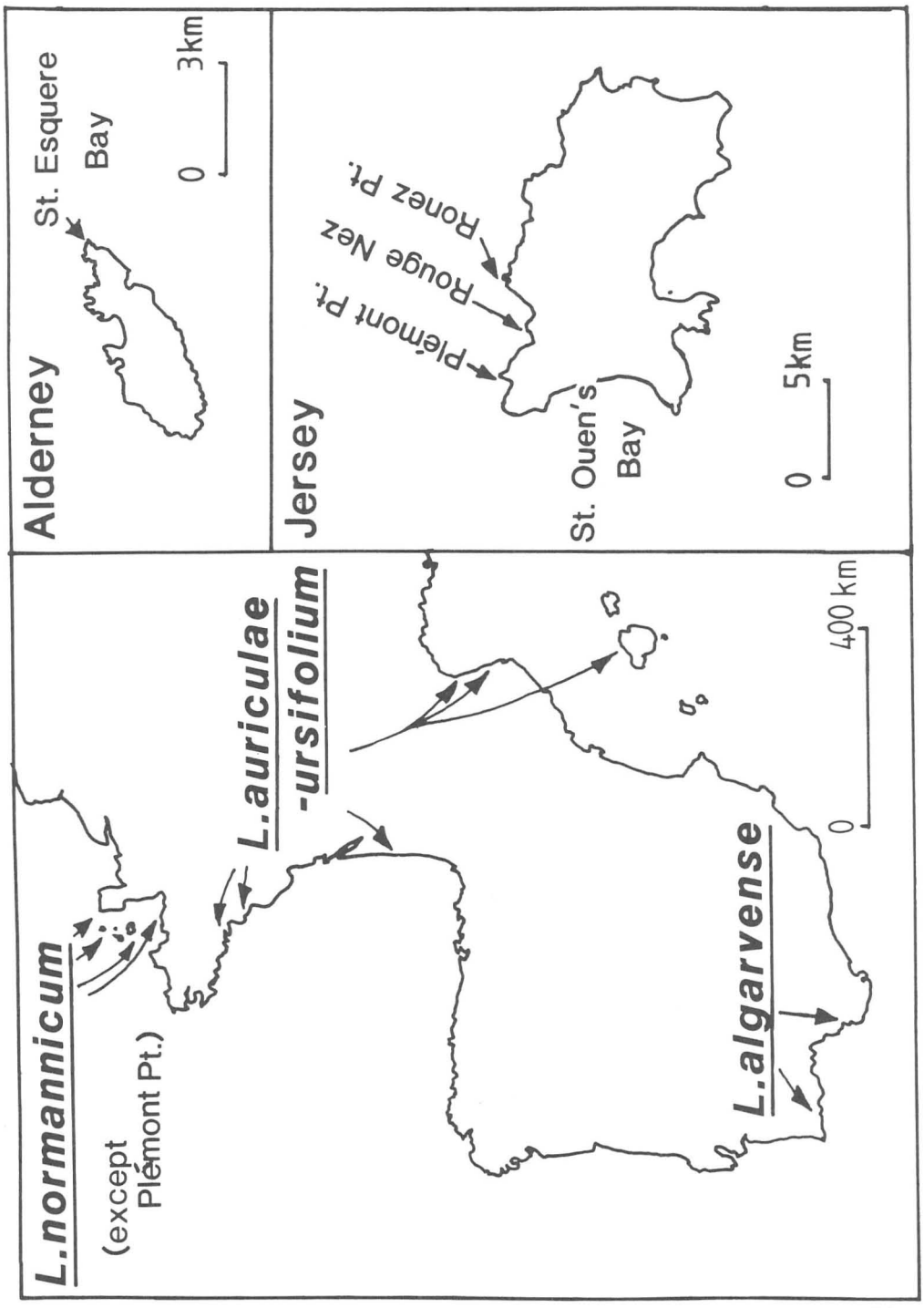

FIGURE 1. Distribution of *Limonium auriculae-ursifolium* agg. in western Europe and in the Channel Isles.

seed from Ronez Point plants. At present, this colony is by far the largest in the Channel Isles, numbering many hundreds of plants, and is especially abundant at the White Guard House (La Caumine de Mary Best) and at El Tico café (GR 564.521 and 564.518, Official States of Jersey 1:25000 map (1981)).

Here it grows on stabilized dunes, with *Catapodium marinum* (L.) C. E. Hubbard, *Cynodon dactylon* (L.) Pers., *Ammophila arenaria* (L.) Link, *Plantago coronopus* L., *Armeria maritima* (Mill.) Willd., *Honkenya peploides* (L.) Ehrh. and *Salicornia* sp. The colony at St Esquère Bay, Alderney, is smaller, numbering tens of plants. Here it grows with *L. binervosum* (G. E. Sm.) C. E.Salmon on low rocks beside the sea.

The only other surviving colony of *L. auriculae-ursifolium* agg. in the Channel Isles is that at Plémont Point which numbers only about 10 individuals, though each of these numbers from few to tens of rosettes. The colony grows in rock crevices on the side of a bare granite gully, with *Crithmum maritimum* L.

This paper raises to specific rank the northern French and Channel Isles plants referred to var. *corymbosum* by Salmon, and reports the results of cultivation of plants from the three present-day Channel Isles populations.

MATERIALS AND METHODS

Cultivated material was grown in a mixture of equal parts of John Innes No. 1 compost, coarse sand and grit, in 7.5 cm pots. Plants were kept in an unheated glasshouse at Leicester University until November 1981 and thereafter in a cold frame at Birkbeck College in London. Details of the cultivated material are given in Table 1.

TABLE 1. CULTIVATED MATERIAL OF *LIMONIUM AURICULAE-URSIFOLIUM* AGG. FROM THE CHANNEL ISLES

Site	Collector and date	Origin	Date sampled for measurements
Plémont Point, Jersey	F. Le Sueur, September 1979	Collected as seed	June 1983
St Ouen's Bay, Jersey	M. Ingrouille, May 1980	Collected as cuttings	June 1981
St Esquère Bay, Alderney	Unknown, cultivated at Leicester since 1978	Collected as seed	June 1981

Mitotic preparations were made from root tip squashes. Root tips were collected at midday, pretreated for 3 hours with hexachlorocyclohexane, fixed in 3:1 ethanol:glacial acetic acid, squashed, and stained with aceto-carmine.

TAXONOMIC DESCRIPTION

Limonium normannicum Ingrouille, **sp. nov.** (Fig. 4; A1, A2)
HOLOTYPUS: Rocks, Alderney, Channel Isles, 1900, *C. R. P. Andrews* (**BM, herb. J. Groves**).
PARATYPI: On seashore rocks, Alderney, Channel Isles, 27.7.1901, *E. W. Marquand* (**BM, herb. J. Groves**); Ronez Point, Jersey, 8.8.1919, *Père Morin* (**JSY**); 2.9.1925, *Frère Ariste* (**JSY**); St Ouen's Bay, Jersey, 12.9.1950, *Frère L. Arsène* (**JSY**).
Synonyms: *Statice lychnidifolia* Girard var. *corymbosa* Boiss. (1848) in DC. *Prodr.* **12**. pro parte. *Limonium lychnidifolium* (Girard) O. Kuntze var. *corymbosum* (Boissier) C. E. Salmon (1901) *J. Bot., Lond.* **39**: 192–195.

Planta perennis glabra oligocaulis. Folia basalia per anthesis persistentia usque ad 120 mm longa et 24 mm lata, late obovata-spathulata, obtusa; lamina auriculae-ursi similis in petiolum usque ad 6 mm latum sensim attenuata, herbacea, subtus 5-nervata vel plus, supra laevis. Folia caulina inferiora anguste triangulari-acuminata, squamata usque ad 10 mm vel infirma usque ad 25 mm longa. Caules

usque ad 25 cm alti, nonnunquam in parte inferiore ramosi, erecti, recti vel in parte ramosa flexuosi. Inflorescentia subcorymbosa. Spicae usque ad 20 mm longae, densissime (spiculae 7–8 per cm dispositae) secundae vel biseriales. Bractea inferior 2.6–4.2 mm longa et 2.6–4.0 mm lata, late ovata, crassiuscula, margine membranacea. Bractea media 2.1–3.4 mm longa et 1.4–2.8 mm lata, biloba, membranacea. Bractea superior 4.5–6.9 mm longa et 3.5–5.8 mm lata, elliptica vel obovata, rotunda, margine late hyalina, parte centrali crassa, apice acuminata, acumine marginem hyalinum non contingente. Calyx 4.1–6.3 mm longus, rectus, infundibuliformis, tubo quam limbo 1.5–1.6-plo longiore, in parte inferiore piloso, calycis lobis transverse late semi-ellipticis, plicatis. Corolla infundibuliformis, petalis 6.2–7.4 mm longis × 2.1–2.8 mm latis, cuneatis, emarginatis, pallide violaceis.

Plant perennial, glabrous, (except for calyx) with one scape (occasionally more) to each rosette, smooth. Rosette leaves 35–120 × 11–24 mm, broadly obovate-spathulate with an obtuse (acute) apex, mucronate, with mucro to 1 mm long; lamina 0.3–0.5 × length and 3.0–6.0 × width of petiole, convex laterally, concave longitudinally; petiole broadly winged, with at least two obvious parallel veins on either side of the midrib. Leaves grey-green, glaucous, rigid, held erect, persisting at time of flowering. Scape up to 25 cm but usually 5–20 cm, erect, robust, branching from the lowest node or several nodes above; stem straight becoming zig-zag in the branched portion, subcorymbose; scape diameter up to 2.5 mm. Scape scale leaves narrowly triangular (3–10 mm) with an acute apex, the lowest often much larger (up to 25 mm long). Branches strong (diameter up to 2.2 mm), arranged regularly alternately or more often spirally, often with secondary branches arising at each node; branches below longer than those above, up to 3/4 total length of scape, or rarely the lowest branch short (up to 3 cm) and weak (diameter less than 1 mm); branching at 30–45°. Spikes concentrated in upper quarter to third of scape, congested, spreading or recurved, up to 20 mm, usually 6–15 mm long, with 2–13 spikelets; long spikes often with a much shorter spike arising at the same node; pedicels very short, up to 4 mm. Spikelets very crowded, 1–3 flowered, 7–8 per cm. Outer bract widely ovate, slightly acuminate, (2.6)3.0–4.0(4.2) × (2.6) 2.8–3.2(4.0) mm, herbaceous with a broad hyaline margin, but together sometimes forming a short cusp. Middle bract asymmetrical, 2-lobed, (2.1)2.2–2.9(3.4) × (1.4)1.6–2.5(2.8) mm, each lobe ovate, hyaline, the larger lobe with a herbaceous vein. Inner bract widely elliptic-obovate, (4.5)4.9–5.6(6.9) × (3.5)3.8–5.0(5.8) mm, with a broad hyaline margin, 0.7–1.0 mm wide; inner herbaceous region obovate, with the midrib slightly excurrent and forming a point up to 0.5 mm. Bracteoles usually 1, of variable size, with 1 green vein. Calyx (4.1)4.8–5.5(6.3) mm infundibuliform; basal portion (tube) herbaceous, pubescent-pilose, with 5 strong ribs excurrent into chartaceous upper region (limb); ribs terminating well below the base of the calyx teeth; tube 0.6–0.7 × length of calyx; teeth 0.5–1.0 mm long triangular–semi-elliptic, acute; pedicels 0.3–0.5(0.7) mm. Petals (6.2)6.5–7.2(7.4) × 2.1–2.5(2.8) mm, pale violet, cuneate, emarginate. Seed smooth, reddish, 1.5–2.0 mm long, narrowly ovate. Incompatibility morph 'Papillate', 'B' pollen. Chromosome number: 2n=25 (material from Saint Ouen's Bay, Jersey and St Esquère Bay, Alderney).

Distribution: CHANNEL ISLES: Alderney (St Esquère Bay); Jersey (St Ouen's Bay, Ronez Point); FRANCE: Dépt. Île et Vilaine (near St Malo) (Erben 1978); Dépt. Manche (Cherbourg, Surville (Erben 1978), Cartaret, Portbail (Salmon 1902)).

This taxon differs from *L. auriculae-ursifolium* sensu stricto in the following characters: leaves more usually with an obtuse rather than a rounded-obtuse apex; scape shorter, usually less than 20 cm tall, crowded, subcorymbose, with branches often arising from low down and arranged spirally; spikes larger, more swollen-looking and crowded together, recurved; bracts and calyx larger; incompatibility morph 'Papillate' stigma/'B' pollen rather than 'Cob' stigma/'A' pollen.

RESULTS AND DISCUSSION

Measurements of cultivated plants are shown in Table 2. Measurements of herbarium material from the 'extinct' colonies of Rouge Nez and Ronez Point are included for comparison.

TABLE 2. MEAN DIMENSIONS (±95% CONFIDENCE LIMITS) OF SPIKELET PARTS, IN MM, OF COLONIES OF *LIMONIUM AURICULAE-URSIFOLIUM* AGG. FROM THE CHANNEL ISLES

		St Esquère Bay (Alderney)		St Ouen'sBay (Jersey)		Ronez Pt (Jersey)	Plémont Point (Jersey)		Rouge Nez (Jersey)
		wild	cultivated	wild	cultivated	wild	wild	cultivated	wild
Outer bract	Length	2.6±0.4	2.7±0.8	3.7±0.6	3.2±0.9	3.3±0.7	2.2±0.3	2.2±0.1	2.3±0.4
	Width	2.7±0.2	2.9±0.5	3.3±0.3	3.1±0.9	3.2±0.7	1.9±0.3	2.0±0.3	2.1±0.4
		n=12	n=12	n=11	n=10	n=12	n=8	n=8	n=10
Middle bract	Length	2.3±0.2	2.2±0.3	3.0±0.5	2.7±0.2	2.5±0.4	2.0±0.2	2.1±0.3	2.1±0.2
	Width	1.9±0.3	1.9±0.4	2.3±0.6	2.3±0.2	2.1±0.6	1.5±0.2	1.4±0.1	1.6±0.2
		n=5	n=7	n=10	n=10	n=8	n=6	n=6	n=8
Inner bract	Length	5.2±0.5	4.8±0.5	5.7±0.4	5.3±1.2	5.4±0.9	4.2±0.5	3.9±0.6	4.5±0.5
	Width	4.2±0.6	4.4±0.4	4.7±0.4	4.9±1.3	5.2±0.6	3.6±0.4	4.0±0.7	4.2±0.3
		n=10	n=10	n=12	n=10	n=10	n=9	n=7	n=10
Calyx	Length	5.5±0.3	5.2±0.4	6.0±0.7	5.1±0.4	5.8±0.3	4.3±0.7	4.1±0.4	4.8±0.5
		n=9	n=9	n=10	n=10	n=10	n=4	n=6	n=6
Petals	Length	6.7±0.6	7.1±0.4					6.8±0.6	
								n=4	
	Width	2.3±0.2	2.5±0.4					1.9±0.2	
		n=10	n=10					n=12	

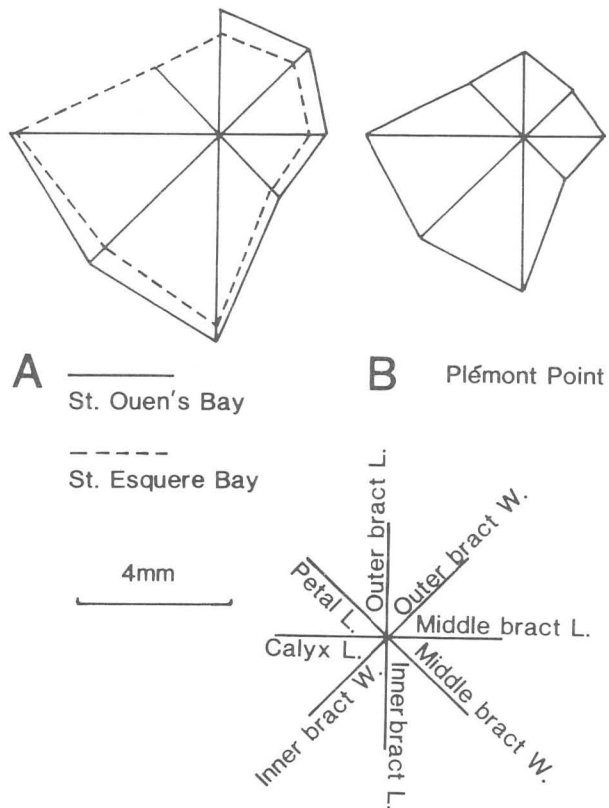

FIGURE 2. Polygonal graphs of eight spikelet characters of: A. *Limonium normannicum*, B. *L. auriculae-ursifolium*. L=length W=width.

A number of differences are apparent between the St Esquère Bay and St Ouen's Bay colonies (*L. normannicum*) and the colony from Plémont Point. The latter has much the smaller bracts (Fig. 2) of *L. auriculae-ursifolium* sensu stricto. It is, however, the presence in these plants of the 'A'/Cob morph characteristic of *L. auriculae-ursifolium* from further south which identifies this population as this species. The presence of different incompatibility morphs within the *L. auriculae-ursifolium* group was first noted by Baker (1953). Sexual species of *Limonium* such as the related *L. ovalifolium* (Pourret) O. Kuntze from Portugal and western France are dimorphic (Fig. 3). The presence of a single self-incompatible morph in each *L. auriculae-ursifolium* group colony preventing sexual reproduction indicates its agamospermous nature which is confirmed by the presence of a maintained aneuploid, triploid chromosome number of 2n=25. Baker (1953) demonstrated agamospermy in plants from Jersey by a continual emasculation experiment on isolated plants.

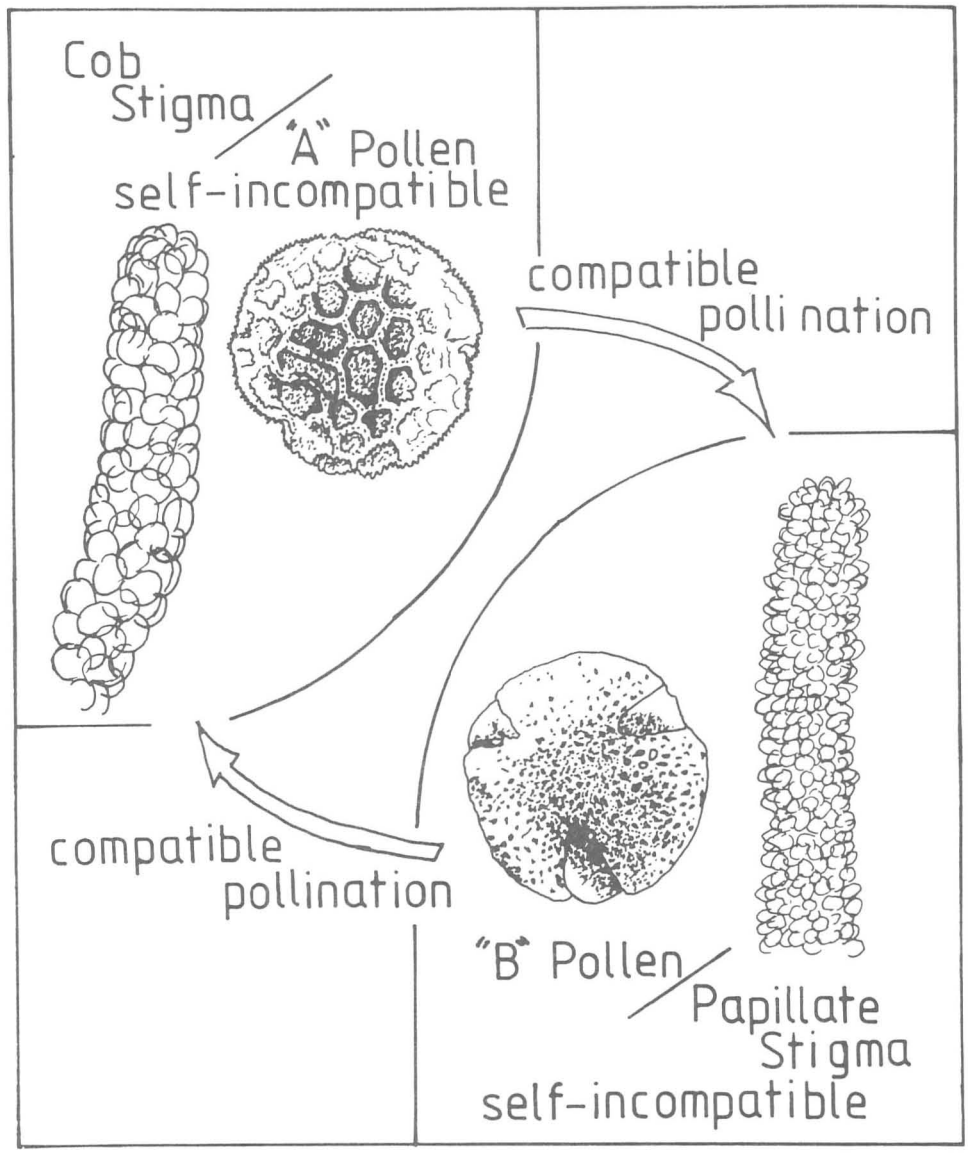

FIGURE 3. Sexual incompatibility morphs in *Limonium*.

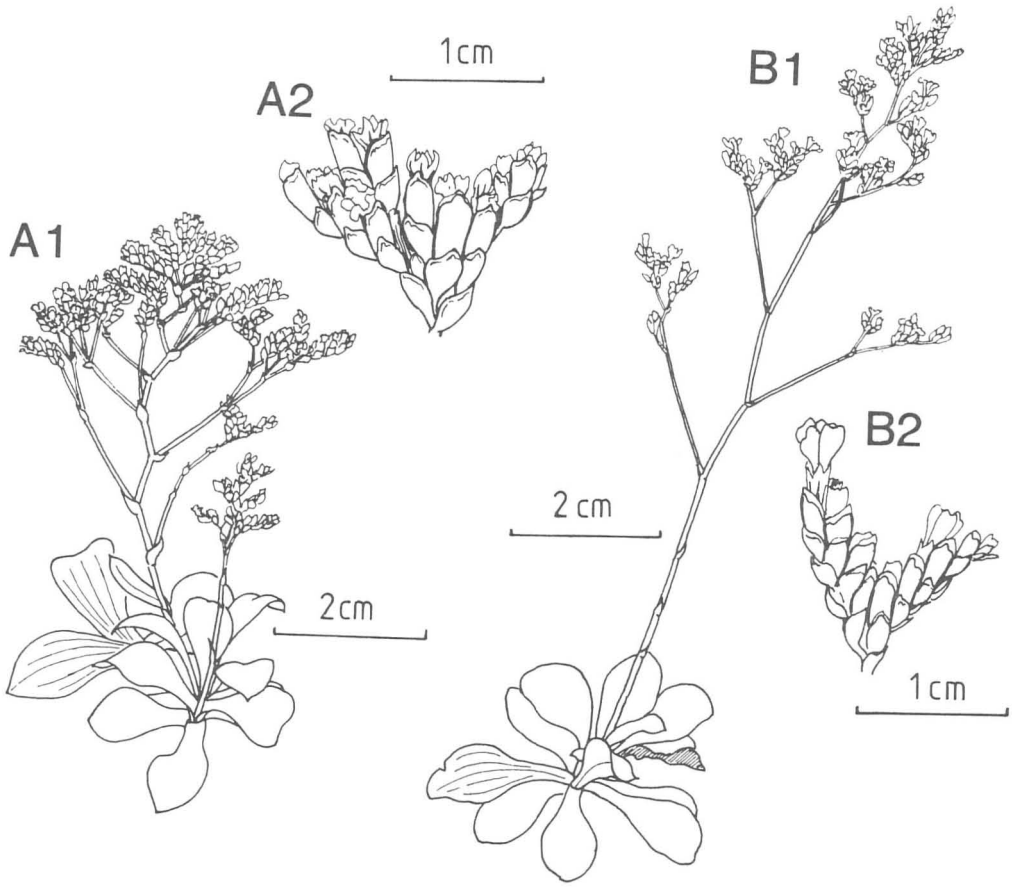

FIGURE 4. Whole plants of: A1. *Limonium normannicum* (St Esquère Bay, Alderney); B1. *Limonium auriculae-ursifolium* (Plémont Point, Jersey). Portion of scape of: A2. *L. normannicum*; B2. *L. auriculae-ursifolium*. Drawn from plants cultivated in London.

Within the group, the 'B'/Papillate incompatibility morph is otherwise present only in *L. algarvense*. It provides a single unambiguous character which argues very strongly for the recognition of *L. normannicum* as an agamospermous species distinct from *L. auriculae-ursifolium*. *L. normannicum* is readily distinguished in several other respects, not least its subcorymbose habit and fatter spikes (Fig. 4, Table 3). *L. normannicum* is much closer to *L. algarvense*, with which it shares both its incompatibility morph and subcorymbose habit but from which it differs by its much larger outer bracts.

Baker (1953) hypothesized that different variants of the *L. auriculae-ursifolium* group had arisen as hybrids between the related diploid sexual species *L. ovalifolium* with 2n=16 and the agamospermous *L. binervosum* (G. E. Smith) C. E. Salmon group with 2n=27 or 35. According to Baker the 2n=25 of *L. auriculae-ursifolium* is obtained by adding a haploid *L. ovalifolium* complement to a haploid *L. binervosum* complement (8+17=25). Different incompatibility morphs and morphological variants can then be explained by their polytopic origin.

The difficulty of determining the hybridity of the *L. auriculae-ursifolium* group on morphological criteria, i.e. between *L. binervosum* and *L. ovalifolium*, arises from the great variability of the *L. binervosum* group. The latter consists of eleven species and many taxa of lesser rank (Ingrouille & Stace 1985). One could probably construct by the careful choice of characters a hybrid index which might prove intermediacy or non-intermediacy. However *L. auriculae-ursifolium* is very much

TABLE 3. CHARACTERS OF SPECIES OF *LIMONIUM AURICULAE-URSIFOLIUM* AGG. AND *L. OVALIFOLIUM*. MEASUREMENTS (RANGE IN BRACKETS) IN MM

		L. auriculae-ursifolium	*L. normannicum*	*L. algarvense*	*L. ovalifolium*
Shape of inflorescence		Obtrulloid	Subcorymbose	Subcorymbose	Subcorymbose-obtrulloid
Outer bract	Length	(1.8)1.9–2.4(2.9)	(2.6)3.0–4.0(4.2)	(1.7)1.9–2.3(2.6)	0.9–1.6(1.8)
	Width	(1.6)1.8–2.3(2.6)	(2.6)2.8–3.2(4.0)	(1.9)2.1–2.6(2.8)	1.0–1.5(2.0)
Middle bract	Length	(1.5)1.9–2.3(2.4)	(2.1)2.2–2.9(3.4)	(1.7)1.9–2.3(2.4)	(1.1)1.3–1.7(2.0)
	Width	(1.4)1.6–1.7(2.1)	(1.4)1.6–2.5(2.8)	(1.4)1.6–2.0(2.2)	(0.8)1.0–1.2(1.6)
Inner bract	Length	(3.7)4.2–5.6(5.7)	(4.5)4.9–5.6(6.9)	(4.2)4.5–5.1(5.3)	(2.7)3.0–3.7(4.0)
	Width	(3.4)3.6–4.4(4.9)	(3.5)3.8–5.0(5.8)	(3.6)4.0–4.8(5.0)	(2.7)3.1–3.5(4.1)
Calyx	Length	(3.8)4.0–4.6(5.5)	(4.1)4.8–5.5(6.3)	(4.0)4.2–4.8(5.2)	(3.2)3.8–4.1(4.4)
Petal	Length	(6.0)6.5–7.0(7.4)	(6.2)6.5–7.2(7.4)	6.0–7.5	(4.7)5.5–6.8
	Width	1.9–2.6	2.1–2.5(2.8)	2.2–2.6	(1.5)1.6–1.9
Incompatibility morph		Monomorphic 'A'/Cob	Monomorphic 'B'/Papillate	Monomorphic 'B'/Papillate	Dimorphic 'A'/Cob, 'B'/Papillate
Chromosome no.		2n=25	2n=25	2n=25	2n=16
Geographical range		Western and Mediterranean France, Balearic Islands	Northern France, Jersey and Alderney	Southern Portugal, southern Spain	Western France, western Portugal, Morocco

closer morphologically to *L. ovalifolium* than to *L. binervosum*. In a numerical taxonomic study of *Limonium* species, which will be reported elsewhere, *L. ovalifolium* clustered with the *L. auriculae-ursifolium* group first and then with a larger group of other agamospermous and sexual species before the *L. binervosum* group. *L. ovalifolium* could legitimately be regarded as the sole sexual member of the *L. auriculae-ursifolium* group (Table 3).

Variation between members of the group may have arisen by asexual means, by the accumulation of somatic and chromosomal mutations, as is almost certainly the case in the *L. binervosum* group (Ingrouille & Stace, 1985). The presence of different incompatibility morphs may be the result of autosegregation. There is certainly some evidence for variation within each species in the *L. auriculae-ursifolium* group in the Channel Isles. Plants from Alderney have slightly smaller spikelets than plants of *L. normannicum* from Jersey. The petals of *L. auriculae-ursifolium* from Plémont Point are narrower than those from further south.

The presence of *L. auriculae-ursifolium* sensu stricto at Plémont Point, geographically extremely isolated from French material, is very interesting and makes the conservation of this tiny colony very important.

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