I. AN INLAND *ARMERIA* OVERLOOKED IN BRITAIN

Part 1

By E. J. Gibbons and J. E. Lousley

The aggregate species *Armeria maritima* (Mill.) Willd. has been the subject of considerable taxonomic research in Britain, and several workers have attempted to recognise segregates. For example, as early as 1849, Babington described four species in an elaborate account, but later work has made it clear that these, and other segregates brought to notice later, cannot be accepted, and that the group exhibits a range of variation which deserves study on modern lines. The variants so far described fall into two broad groups :— the first of maritime plants scattered round the coast; the second of inland montane plants. Both groups include several variants which may be ecads, or of higher grade, but it is not proposed to discuss these here – the purpose of this paper is to draw attention to an inland lowland segregate of which the significance in the British flora has been overlooked since the first discovery of the plants more than two centuries ago.

Since 1953, one of us (E.J.G.) has been much interested in an *Armeria* growing in the vicinity of Ancaster, South Lincolnshire, v.c. 53. In 1954, she sent a rooted plant to Dr. H. G. Baker, then of the University of Leeds, who is working on the group over a wider field. He provisionally determined to it be " *A. maritima* Willd. var. *elongata* Marsson " (nomenclature based on the treatment of the genus by Lawrence (1940).

In September, 1955, E.J.G., with Mr. and Mrs. R. C. L. Howitt, took J.E.L. to see a colony growing above an old sand-pit. These plants showed quite clearly that this identification is correct. The plant differs conspicuously from all other British material of *Armeria maritima* seen by us from coastal or mountain districts. With its long leaves and tall glabrous scapes bearing heads of flowers, the outer bracts of which are distinctly narrow, it is morphologically well separated from all of the segregates previously described from this country. It is well known, however, from sandy heaths in north central Europe. Specimens were exhibited at the B.S.B.I. Exhibition Meeting on November 26th, 1955, and the identification was confirmed by Dr. A. Melderis and others who have known it in central Europe.

The following description is based on material collected at Ancaster :—

Leaves 6—12 cm. long and 1—1·5 mm. broad, flat, not fleshy, with a single prominent nerve, usually fringed with scattered hairs on the margins. Scape glabrous, 20—55 cm. tall. Capitula 1½—2 cm. broad; outer bracts pointed, pale brown; corolla bright rose.

Nomenclature

The name applied to the thrifts by Linnaeus was *Statice armeria*, and his description (1753) covers the plant with which we are particularly concerned here, as well as the coastal and other segregates. Lawrence (1940, 1947) has already pointed out that there is little doubt that the specimen of " *Statice armeria* " in the Linnean herbarium should be referred to the taxon now under discussion, and this is also true of the specimen in Hortus Siccus Cliffortianus which should be regarded as the type of his species.

A deliberate restriction of the name *Statice armeria* to the particular taxon now under

consideration was made by Pollich (1776), before Hoffmann (1800) described it as *Statice elongata* as follows :—

> " *S. elongata*, scapo simplici elongato capitato glabro.
> *Fl. dan. t.* 1092. In arenosis; fl. Jun.-Aug. (Folia in utraque linearia plana obtusa, in priori angustiora glabra, in hac latiora pubescentia.) "

The Ancaster specimens match the illustration in *Flora Danica* cited by Hoffmann.

The Linnean genus *Statice* included the sea-lavenders as well as the thrifts, and in 1809 Willdenow established the genus *Armeria* to describe the thrifts alone. This generic name was conserved by the International Botanical Congress in 1935, and is included in the list of *Nomina Generica Conservanda* issued as an appendix to the current Code of Botanical Nomenclature. The correct name, as a species, for the taxon which is the subject of this paper appears to be *A. elongata* (Hoffm.) Koch (1823).

As a variety the correct name is *A. maritima* var. *elongata* (Hoffm.) Crépin (1884). This greatly antedates the same combination made by Lawrence (1940), and Mansfeld (1941). Lawrence cited " *A. maritima* var. *elongata* Massart, *Fl. Neu Pom.*" which, by combining the name of one author with the title of the work of another, has caused confusion. Massart (1913) published " *Armeria maritima elongata* " but did not indicate the rank of the taxon and did not cite the basinym. If, on the other hand, Lawrence intended Marsson's *Flora von Neu-Vorpommern* (1869), as some have supposed, the combination used in that work was *A. vulgaris* var. *elongata* (Hoffm.) and this combination had been published in 1826 by Mertens & Koch.

The main synonomy of the taxon under consideration is as follows :—

> *Statice armeria* L. (1753) *Sp. pl.*, **1**, 274, *pro parte.*
> *Statice armeria* L. sensu Pollich (1776) *Hist. Pl. Palat. Elect.*, **1**, 318.
> *Statice elongata* Hoffm. (1800) *Deutsch. Fl.*, 1800, **1**, 150.
> *Statice armeria* var. *elongata* (Hoffm.) DC. (1805) *Fl. Franc.*, ed. 3, **3**, 419.
> *Armeria vulgaris* Willd. (1809) *Enum. Pl. Berol.*, 333.
> *Armeria elongata* (Hoffm.) Koch (1823) *Flora*, **6**, 698.
> *Armeria vulgaris* var. *elongata* (Hoffm.) Koch (1826) in Mert. & Koch, *Deutsch. Fl.*, **2**, 487.
> *Armeria campestris* var. *hoffmannii* Wallr. (1842) *Beiträge*, **1**, 204.
> *Armeria maritima* subsp. *elongata* (Hoffm.) Bonnier (1927) *Fl. Complète*, **9**, 54.

This plant has been the subject of considerable confusion in European floras of the 19th century but recent works (e.g. Hegi, 1927) have given clear accounts. The distribution is centred on the sandy heaths of the north German plain, where it is common, and it extends east to White Russia (Smolensk), south to the Danube, and west to the Saar and Palatinate on the eastern boundary of France (fig. 1). The distribution is thus of a continental type, in contrast to that of restricted *A. maritima*, which is an Atlantic type extending eastwards along the northern coast of Europe. *A. elongata* sometimes grows in the vicinity of the coast although, apart from its apparent edaphic requirement of an easily draining soil (well provided by " sand fields " near the coast), its ecological requirements do not restrict it to the coast, and most of its stations are inland. This will be discussed further later in this paper. Individuals intermediate in their morphological characters sometimes occur and may be found in populations which are in general uniform. It therefore seems unlikely that the rank of species, which has been accorded to the taxon under discussion, is justified, but since it exhibits clear morphological, ecological and geographical differentiation, the appropriate grade is that of subspecies, and we propose to treat it accordingly. This view is supported by the experimental work carried out by Professor Baker (see Part 2).

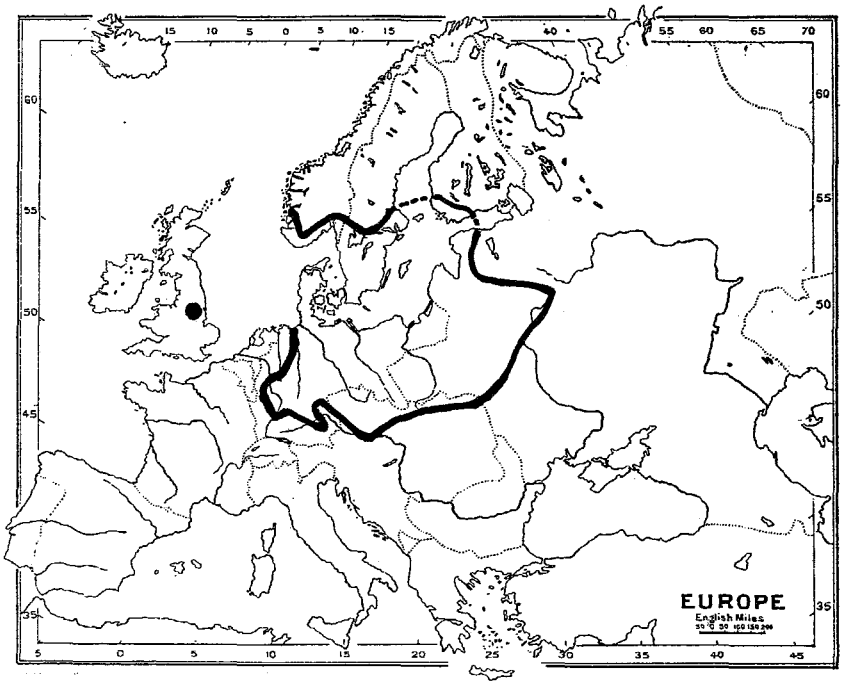

Fig. 1. Distribution of *Armeria maritima* subsp. *elongata*. Based on Hegi, *Fl. Mitt.-Eur.*, **5/3**, 1890 fig. 2885.

In this grade the correct name, to which Mr. J. E. Dandy has kindly drawn our attention, appears to be *A. maritima* subsp. *elongata* (Hoffm.) Bonnier (1927). It is of interest that Bonnier knew it only, in the area covered by his *Flora*, from calamine soils in Belgium, the same habitat as given by Crépin and Massart.

Records of an Inland Armeria in Eastern England to 1955

An inland *Armeria* from Lincolnshire was first recorded by Vincent Bacon in 1726 and, as will be seen from the list of records given below, it has been observed at intervals up to the present time. It is remarkable that most recent botanists have either ignored the records, or else dismissed them as errors, in spite of the respectability of the recorders and the availability of supporting evidence which could have been found with little difficulty. Horwood's views, published in 1933, are worth citing as an example of the attitude which led to this plant's being ignored for so long. He wrote " This can only be a mistake. Inland stations for Thrift are all montane. These localities (Saltby, Grantham, Sleaford, Belvoir Castle) are at low elevations c.400 ft. It is . . . . . an error without doubt."

The detailed records which follow are set out under the approximate dates to which they refer. The localities are marked on the map in figure 2.

1726. Near Grantham. Bacon (1726, and see also Woodruffe-Peacock, 1898).

1749 " abundantly about Sleaford and Grantham, Lincolnshire." Pulteney (1749).

c.1752. " This I never saw spontaneously growing in Leicestershire but observed it abundantly upon the heaths about Sleaford and Grantham in Lincolnshire." Pulteney (1752).

1757. " This is not only found in the marshes near the sea, but farther in the inland parts of the country, as I observed in Lincolnshire, where it is very plentiful about Grantham and Sleaford. I have not seen it nearer Leicester than upon a heath not far from Belvoir Castle." Pulteney (1757, 826).

c.1763. Grantham. Martyn (1763, 63).

1780. " circa Easton prope Grantham." Sibthorp ex Druce (1910). The records and herbarium in the University Department of Botany, Oxford, have been searched by Mrs. H. N. Clokie but she has been unable to trace a specimen or the list cited by Druce.

1789. " In meadows; about Grantham and Sleaford, and upon a heath not far from Belvoir Castle." Pulteney ex Gough (1789 & 1806).

c.1795. Lincoln Heath—specimen in Herb. Banks (Herb. Mus. Brit.).

1795. " On a heath near Saltby but more plentifully on the chalk plains near Grantham and Sleaford, Lincolnshire." Pulteney ex Nichols (1795).

1855. Wilsford and Ancaster. Lowe (1856).

1884. Grantham. E. E. Browne ex Peacock MS (1922).

1895. Manthorpe, Grantham. S. C. Stow in Herb. Lincoln.

1896. " Leaving Grantham .... the party proceeded .... along the Manthorpe Road. In an adjacent field, Thrift (*Armeria maritima*) was observed growing in plenty .... Mr. Cordeaux, who noticed the plant in several other localities, was of the opinion that it is a relic of the time when the tide had access to the valley, being perhaps the only surviving representative of the old fitty-flora." Goulding (1896).

The unlikelihood of this historical interpretation is shown not only by the taxonomic nature of the thrift material, but also by the complete absence of other maritime species.

1930. Near Oarcliff (sic) spring, Wilsford. H. Fisher in Herb. Fisher, Nottingham.

From 1932 to 1935 Mr. Edward E. Orchard of Ancaster was familiar with an *Armeria* growing in several fields near his home, and in 1953 showed it to E.J.G. and Mr. Roger Hull. In 1954 E.J.G. showed the plant to Mr. and Mrs. R. C. L. Howitt, who found a new locality by the railway east of Ancaster.

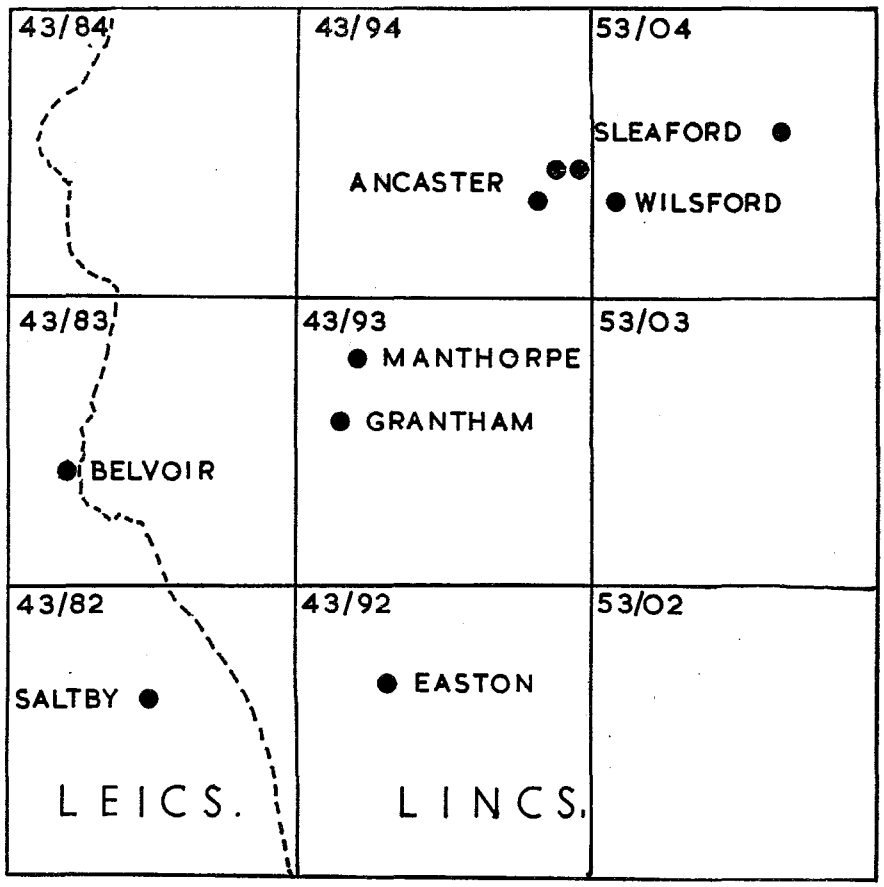

Fig. 2. Distribution of an inland *Armeria* in Leicestershire and Lincolnshire as recorded 1726 – 1955 plotted on the 10-kilometre squares of the National Grid.

The localities recorded up to 1955 thus extend from Saltby and Easton in the south to Belvoir, Grantham and Manthorpe, and north-east to Ancaster, Wilsford and Sleaford (Fig. 2). They occurred in the following 10-kilometre squares of the National Grid :— 43/82, 43/83, 43/92, 43/93, 43/94, and 53/04. The distance between the extreme recorded localities is about 18 miles, and distances of the various stations from the nearest coast vary from 18 to about 33 miles. The heath near Saltby is in Leicestershire (v.c. 55), as was probably the heath near Belvoir Castle which is near the county boundary; all the remaining localities are in South Lincolnshire. The habitats were described as heaths, fields and meadows.

The area over which the records extend was part of the old Lincoln Heath, which in the 18th century was open "heath," without hedges and with few landmarks. Most of it was calcareous grassland which was destroyed by enclosure and the plough, and now survives only in a few small patches of old turf by roadsides or quarries. The term "heath" was applied in its general sense to connote open uncultivated land and there is no reason to suppose that it implied the presence of species of Ericaceae or acid soils. Pulteney's records show that an *Armeria* was abundant about Grantham and Sleaford "on the chalk plains" and that he knew it in other widely scattered places on this part of Lincoln Heath. Since his time enclosure has destroyed most of the stations. It is now known to persist only near Ancaster and Wilsford in the habitats discussed later in this paper.

Present Distribution

During the summer of 1956 an attempt was made to examine the old localities and ascertain the present distribution. The results are as follows :—

V.c. 55, Leicestershire. Belvoir Castle and Saltby Heath were visited by J.E.L. and Mr. and Mrs. R. C. L. Howitt on July 7th. Near the former no suitable ground was found, and remnants of Saltby Heath were searched without success. Here there are remnants of rough limestone grassland with abundant calcicoles which are likely to be representative of the Heath before it was broken up by agriculture. The last Leicestershire record for *Armeria* dates from 1795, and it seems unlikely that it still persists.

V.c. 53, South Lincolnshire.

A. Easton. A very brief examination of this district on July 7th showed that it is intensively cultivated and no suitable ground was seen from public roads. The parkland of Easton Hall should be investigated.

B. Grantham and Manthorpe. Mr. L. Bond of Grantham has made enquiries and states (*in litt.*) that friends remember it about Manthorpe, that most of the land is now built over and he has searched in vain.

C. Ancaster—Wilsford. *Armeria maritima* subsp. *elongata* is still plentiful over a considerable area. The habitats are discussed below :—

Present Stations in the Ancaster-Wilsford District

Armeria maritima subsp. *elongata* was seen by us in the following 11 stations (Fig. 3) on July 9th, 1957 :—

(1) Ancaster. Pasture, west of the school and north of the stream. Here the *Armeria* is restricted to calcareous grassland on sandy soil (pH 7.1) on the drier upper slopes, and is absent from the lower damper, rushy parts of the field. The pasture is heavily grazed by cows. For associated species see Table 1.

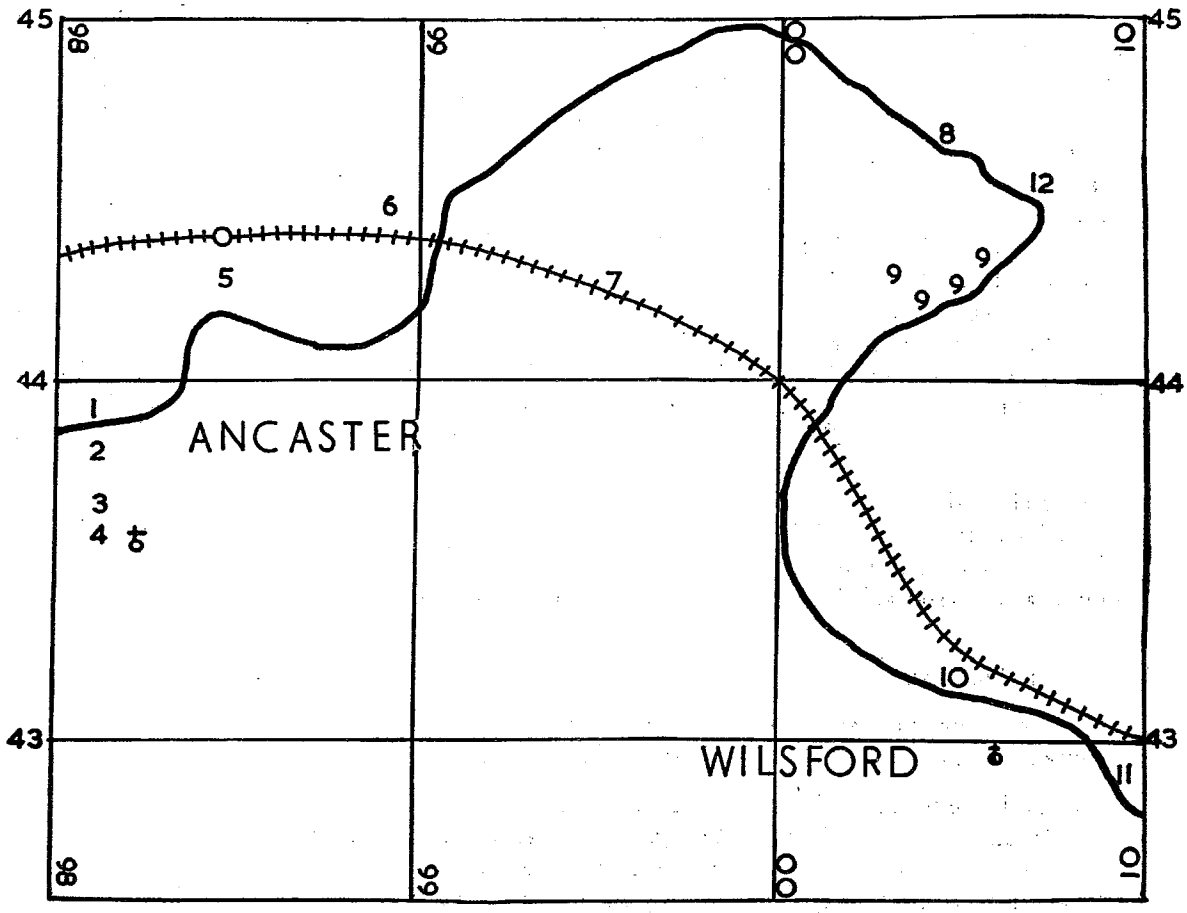

Fig. 3. Habitats of *Armeria maritima* subsp. *elongata* about Ancaster and Wilsford, S. Lincolnshire, examined in 1956, showing their relationship to the stream and the railway. The numbers refer to the habitats discussed in the text, and are plotted on the 1-kilometre squares of the National Grid.

(2) Ancaster. Pasture south of (1) and separated from it by a stream. Vegetation very similar to (1).

(3) Ancaster. Burial ground, immediately south of (1), and west of the church. This burial ground is calcareous grassland which has been fenced off from the adjoining pastures for at least 30 years. Only part is occupied by graves but the whole is scythed periodically. At the time of our July visit, the area within the fence was a glorious sheet of pink from the thrift which was in full flower, in marked contrast to the pastures outside, where flowers were scarce. This abundant flowering was repeated six weeks later after the grass had been cut. From the distribution of thrift on neglected graves it seems likely to have arisen on these from self-sown seed rather than to have been planted. For associated species see Table 1.

(4) Ancaster. Pasture adjoining the burial ground to the south. A heavily grazed pasture, drier than (1) and (2), and thrift less plentiful. Calcareous grassland, with similar associated species including *Carduus nutans* and *Plantago media*.

(5) Ancaster. Pasture sloping south from railway station to the stream. As in (1), no *Armeria* was found in the lower, damper part of the field, but it was abundant on the drier upper slopes towards the railway station, where the vegetation was that of calcareous grassland (see Table 1). The soil is sandy with pH 8—8·3.

TABLE 1.

Species associated with Armeria maritima subsp. elongata at four localities at Ancaster, July 9th, 1956.*

Locality	1 *Pasture*	3 *Burial ground*	5 *Pasture*	6 *Sandpit*
pH	7·1	—	8 — 8·3	8 — 8·3
Achillea millefolium		o		
Agrostis tenuis	f			a
Armeria maritima subsp. elongata	f	d	a	r
Arrhenatherum elatius		f	o	
Bellis perennis	f			
*Brachypodium pinnatum				1
Briza media	o	o		
Carex flacca	1			
Centaurea scabiosa		o		
*Cerastium arvense	o			
Chrysanthemum leucanthemum		o		
*Cirsium palustre	l			
Cynosurus cristatus	f			
Dactylis glomerata	o			o
Festuca ovina	o	c		
F. rubra		o		
Filipendula vulgaris	r			
Galium verum	o	a		
Helictotrichon pubescens				f
Hieracium pilosella		r		
Holcus lanatus	o	f	c	o
Hypochoeris radicata				r
Knautia arvensis		r		
Koeleria gracilis		a		o
Leontodon hispidus	a			
Lotus corniculatus	o		f	
Poa pratensis				a
Phleum nodosum	o		o	o
Plantago lanceolata	f	o		f
P. media	a	a	c	f
Poterium sanguisorba	o		o	
Primula veris	1			
Prunella vulgaris	o			
Ranunculus acris	o	f		
R. repens	f	o		
*Rhinanthus minor	o			
Rumex acetosa	1	f		f
*Senecio jacobaea	f			
*Taraxacum officinale (agg.)	o			
Trifolium dubium	o	f		
T. repens	o		f	
Trisetum flavescens	f	f	a	o
*Urtica dioica				1
Vicia angustifolia				o
V. hirsuta		c		f
V. sativa		r		o

* The species marked with an asterisk were added from the lists made by Dr. Baker when he visited the same colonies with E.J.G. on August 10, 1956.

(6) Ancaster. Rough grassland above an old sand-pit, north of the railway. Here the *Armeria* is rare, and hidden in tall grass (Plate 10). The soil is sandy, pH 8—8·3, with associated species (see Table 1) mainly characteristic of calcareous grassland. The differences between this habitat and those described above appear to be attributable to the absence of grazing. This was the locality from which material was collected in 1955. Mr. Orchard tells us that it formerly grew in quantity in two fields east of the sandpit which are now ploughed.

(7) Limestone grassland above railway cutting between Ancaster and Wilsford. One plant was seen about ½ mile east of (6) in a narrow strip of grassland by the top of the cutting through Lincolnshire Limestone (oolite) rock, growing in a very shallow soil over the limestone.

(8) By stream 1 mile north of Wilsford village. Thrift was seen in quantity, associated with *Carduus nutans*, on the top of a sandy bank on the north side of the stream.

(9) On west bank of stream ½ mile N.E. of Waterloo Farm, Wilsford. This is Fisher's 1930 Norcliff (= Oarcliff) Spring locality, or very near it. On the bank of the stream the *Armeria* is plentiful in sandy but wet ground, and exceptionally fine. The associated species included :— *Arrhenatherum elatius, Cerastium arvense, Cirsium arvense, Equisetum fluviatile, Galium verum, Glechoma hederacea, Linum cathatricum, Dactylorchis fuchsii, Potentilla anserina,* and *Reseda lutea.*

Above the stream, and sloping up towards the west, is a seeded meadow in which sheep were grazing. In this, thrift was scarce in a mixture of sown grasses in which *Lolium perenne* was dominant, and *Anthoxanthum odoratum, Bromus mollis, Dactylis glomerata,* and *Rumex acetosella* common. From information obtained later by E.J.G. it seems likely that this field was ploughed in 1955, which accords with the crop. The *Armeria* here is a relic of a former pasture, which it is said to have coloured " pink all over."

(10) Wilsford. Pasture between village and main-road. *Armeria* is confined to a band on the drier upper slopes in calcareous grassland with *Plantago media* abundant. This field was more thoroughly examined by E.J.G. and Dr. Baker on August 10th and it was found that the thrift was restricted to the higher parts of the pasture (thereby avoiding the coarsest grass), and associated with *Cirsium acaulon, Thymus drucei,* and *Torilis nodosa.* The field was very closely grazed by sheep. Some thrift plants here were up to 65 cms. in diameter and revealed their considerable age by decayed centres.

(11) Wilsford. Pasture above stream on east side of the village.

The following station was also examined by E.J.G. and differs considerably from the others :—

(12) Rough pasture, on the east side of the stream, about 1 mile north of Wilsford village. This is on the opposite bank of the stream from (9), and slightly north of it. Only two plants of *Armeria* were seen in what appears to be original grassland. The associated species included :—*Agrostis tenuis, Calluna vulgaris, Campanula rotundifolia, Leontodon leysseri, Ononis repens, Rumex acetosella, R. tenuifolius, Scleranthus annuus, Ulex europaeus.*

Discussion of the Stations

The stations in which the plant was seen in 1956 show a fairly close relationship to the stream which flows through Ancaster and Wilsford. With the exception of (7) which is on Lincolnshire limestone, they are probably all in places marked as Post-glacial River Gravels or Alluvium on the latest (c.1885) one inch geological drift map. These River Gravels extend west of Ancaster and then swing south through Manthorpe

to Grantham. It is therefore likely that the statement by Woodruffe-Peacock (1922) that the Grantham and Manthorpe localities were on " Modern River Gravels " was correct.

From a comparison of the twelve stations in which *Armeria maritima* subsp. *elongata* was seen in England in 1956, it seems that its ecological requirements are as follows :—

(A) Good drainage. In fields sloping up from wet to dry areas (1, 2, 5) it was evident that the thrift avoided the wetter parts. This preference for well drained stations was confirmed by its abundance in the dry soil of the burial ground (3), and occurrences elsewhere. The apparent contradiction of one habitat on the bank of the stream (9), with a mixture of plants characteristic of wet and dry places, is not difficult to explain. The root systems of *Equisetum fluviatile* and other species with higher water requirements were at a much lower level than those of the thrift.

(B) Absence of competition from taller vegetation. In the places where the *Armeria* was most plentiful, competing vegetation was kept down by grazing (stations 1, 2, 4, 5, 9, 10, 11) or scything (3). Where the grass was rank (stations 6, 7) the plant was scarce. The tall habit develops in places where there is no higher vegatation (e.g. 26 cm. in habitat 5 ; 47 cm. in station 9), as well as where the plant is competing witn tall grasses (47 cm. in September in station 6).

(C) Soil reaction. In the three meadows where the soil was tested the pH ranged from about 7·1 to 8·3, and the associated species were more or less characteristic of limestone grassland. The other stations all appear to have basic soils, with the probable exception of 12, where the associated species indicate acid conditions.

Abroad, the habitats of *A. maritima* subsp. *elongata* vary considerably ecologically. According to Hegi (1927), the plant is most characteristic of " *Calluna-* and *Sarothamnus*-heath and poor meadows with *Festuca rubra, Agropyron repens, Koeleria cristata, Brachypodium pinnatum, Pimpinella saxifraga, Achillea millefolium,* etc.". It also grows on grass-heath of several types, and on serpentine. The associated species listed by Hegi include several which are calcicoles in this country. According to Massart (1913) it is one of four species restricted to calamine soils in Belgium. The known English habitats are well within the range of those described from abroad. They have much in common with the sandy fields and gravelly hillslopes on which the plant grows in southern Sweden, and offer a marked contrast to the habitats of the atlantic subsp. *maritima*. The populations examined show general uniformity in the characteristics of smooth and tall scapes, rather flat heads with long sheaths and elongate outer bracts, and the long flat leaves. This also applies to the few old specimens seen from the Lincoln Heath area, and it is reasonable to assume that all the records cited refer to the same subspecies.

The distribution of the old records and Pulteney's statement that thrift was plentiful on the " chalk plains " (by which he intended limestone – the nearest chalk being farther east) are consistent with the association of the plant with soils with a high base content. Until the enclosure of Lincoln Heath such places would probably have been grazed by sheep and the plant thus protected from the competition of tall grasses. Peacock (1922) wrote " Horses and goats eat it, but not sheep, or it would have been exterminated long ago inland. I have seen it inland and on the shore where sheep were grazing, but it was quite untouched by them. In pasture where horses were grazing it was eaten. Here by a goat, too." Our observations do not entirely support those of Peacock, since it seems that sheep will eat it quite readily. Grazing operates to the advantage of thrift, however, by removing the competition for light. The parish of Ancaster was not enclosed until 1770 and the greater part of it was then " a wild and barren heath " (White, 1842, 666),

but no doubt flocks of sheep were grazed there, as elsewhere in Lincolnshire where vast numbers were kept. It seems likely that the present stations, and those destroyed by enclosure, were available for *Armeria maritima* subsp. *elongata* for a very long period.

SUMMARY

An inland *Armeria* has been known to grow in Lincolnshire since 1726 and in adjoining parts of Leicestershire since a little later. The old records are reviewed, and twelve stations where the plant was studied in 1956 are described and discussed. It is shown that this non-maritime *Armeria* is distinguishable from *A. maritima* (Mill.) Willd. subsp. *maritima* on morphological, geographical and ecological characteristics and it is therefore best treated as a subspecies, *A. maritima* subsp. *elongata* (Hoffm.) Bonnier based on *Statice elongata* Hoffmann.

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Part 2

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During the course of an extensive series of cultivation – and breeding – experiments on the species and races of *Armeria* which I have carried out in the experimental gardens of the University of Leeds and the Carnegie Institution of Washington (at Stanford, California), material of coastal and montane forms of *A. maritima* as well as the grassland thrift here called subsp. *elongata* has been studied. These studies, which have enabled certain biosystematic conclusions to be drawn as well as making more certain the identification of plants from nature, will be published elsewhere.

The South Lincolnshire populations described here were visited by me whilst on leave from the Gold Coast, on August 10th, 1956, under the guidance of Miss Gibbons. Leaf- and scape-samples were collected and some ecological observations were made, The latter were in close accord with those reported by Miss Gibbons and Mr. Lousley. This visit enabled me to confirm my previous provisional determination of the plants as *A. maritima* " var. *elongata,*" for they agree in key characters with those in culture from Scandinavian and Polish sources. In particular, they have long, glabrous scapes bearing rather flat heads of pale flowers. The outermost bracts of the heads are rather long and pointed while the involucral sheath is also long (up to 2·5 cm.). The pilosity of the calyces is pleurotrichous. The leaves have a single prominent nerve and are deeply channelled on the upper surface; in a majority of plants they are ciliate on their margins.

The treatment of these grassland thrifts suggested by Miss Gibbons and Mr. Lousley as a subspecies of *Armeria maritima* distinct from the coastal and montane forms is in agreement with the results obtained from the experimental production and breeding of hybrids in Leeds and follows the treatment given to other ecological races in this species by me (Baker, 1953). Such hybrids between subsp. *elongata* on the one hand and British coastal material on the other have proved fully fertile in the first and second generations (Baker, 1954*a*, and unpub.). The chromosome-number of subsp. *elongata* has been determined both from the Continental cultures and from Ancaster and shows $2n = 14$, the same as for the other subspecies of *A. maritima.*

The South Lincolnshire populations, like material of subsp. *elongata* from all sources, show the pollen- and stigma-dimorphism (Baker, 1948*a*, *b*, 1954 *a*, *b*) characteristic of the Old World, non-arctic species of the genus. Dimorphism of this type in a population is an indication that cross-pollination is the general rule and that isolated plants are unlikely to produce viable seed.

It was clear from the burial-ground population in August, 1956, that the thrift was very much more abundant on relatively new graves where there was little shading and root-competition by grasses than it was in places where the grasses had become rank. This is in agreement with observations made in the garden at Leeds where this taxon, like the other subspecies of *Armeria maritima,* has shown itself very unfavourably affected by artificial shading which, in particular, reduces flowering considerably. The length of the leaves of the Ancaster plants could be related directly to the rankness of the grass around them (cf. Table I).

A similar picture was provided in the pasture (Habitat No. 1). Here the thrift was particularly frequent on the ant-hills. Although both the grasses and the leaves and scapes

PLATE 10.

Armeria maritima subsp. *elongata* in rough grassland above an old sand-pit, Ancaster (habitat 6, p.—). September, 1955.