

ALISMA GRAMINEUM IN BRITAIN

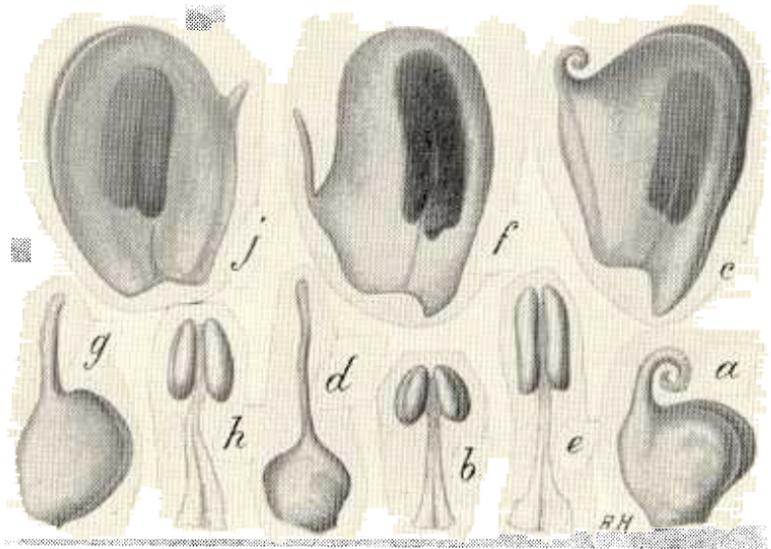
By J. E. LOUSLEY

The discovery by Miss E. J. Gibbons of *Alisma gramineum* Lejeune in Lincolnshire in 1955 has implications of greater importance than the mere addition of a second station for a species already known from England. The plant in the new locality is the deep water submerged form growing in streams and the antithesis of the form previously known from shallow water on the margin of an artificial lake in Worcestershire. Its discovery greatly widens our knowledge of the ecological conditions under which the species can thrive in Britain and establishes its status as a native beyond reasonable doubt.

The species of *Alisma*, like many other aquatics, are extremely plastic, and the characters derived from the flowers and fruits offer the most reliable means of identification. *A. gramineum* is readily distinguished from other species occurring in western Europe by the spirally coiled style and the shape of the achene, which is broadest near the apex (Plate 6). The vegetative characters vary extremely widely with differences in water-level, and while the typical species as it occurs in Lincolnshire, with flowers, fruit and narrow (3-5 mm.), elongated (60-70 cm.) leaves all submerged, can hardly be taken for any other species, the plants growing in shallow water or on mud may be confused with *A. lanceolatum* With., or even *A. plantago-aquatica* L. It was not until Samuelsson published his full revision of the genus in 1932 that this plastic species was properly understood: prior to this descriptions and citation of synonyms were generally unreliable. The distribution of the species as worked out by Samuelsson, with subsequent additions, is known to extend from central Asia through Europe to Holland, Belgium, eastern France and England, with outliers in Tangier (?) and Egypt. In addition there are two areas in North America where plants accepted as conspecific occur, and the subsp. *wahlenbergii* Holmberg ex Samuelsson (1922) ranges over limited areas in Sweden and Finland (fig. 1).

Alisma gramineum Lejeune falls into two subspecies:—(a) subsp. *gramineum* with thick-walled achenes 2 mm. or more in length and (b) subsp. *wahlenbergii* with thin-walled achenes 1.5-2 mm. in length, and with other differences. The known range of the latter round the Gulf of Bothnia and northern side of the Gulf of Finland suggests that it is very unlikely to be found in Britain, and only subsp. *gramineum* (subsp. *arcuatum* (Michalet) Hvland. (1941, 1945, 1953)) will be further considered here. This

PLATE 6



Alisma gramineum—*a*, ovary; *b*, stamen; *c*, achene. *Alisma plantago-aquatica*—*d*, ovary; *e*, stamen; *f*, achene. *Alisma lanceolatum*—*g*, ovary; *h*, stamen; *j*, achene.

From Schotsman, *Ned Kruid. Archief.*, 56, 202, 1949.

occurs in two extreme forms which, following Tournay and Lawalrée (1949) may be distinguished as follows:—

- (a) forma *gramineum* Tournay & Lawalrée (1949) (*A. gramineum* Lejeune (1811); *A. graminifolium* Ehrhardt (app. Steudel, 1821); *A. graminea* C. C. Gmelin (1826); *A. loeselii* Gorski (1830)). Plant submerged with all parts elongated; flowering stem 20-60 cm. long; leaves ribbon-like, 40-60 cm. long and 0.4-1.4 cm. wide but dilated at the base, nerves all parallel.
- (b) forma *arcuatum* (Michalet *sensu stricto*) Tournay & Lawalrée (1949) (*A. arcuatum* Michalet (1854)). Plant not submerged; flowering stem 10-25 cm. tall; leaves with slender petiole 1-6.5 cm. long, with clearly distinct oblong-lanceolate limb 2.5-5.5 cm. long by 0.4-1 cm. broad, with 5-7 subparallel nerves joined by distinct transverse nerves to form a grid.

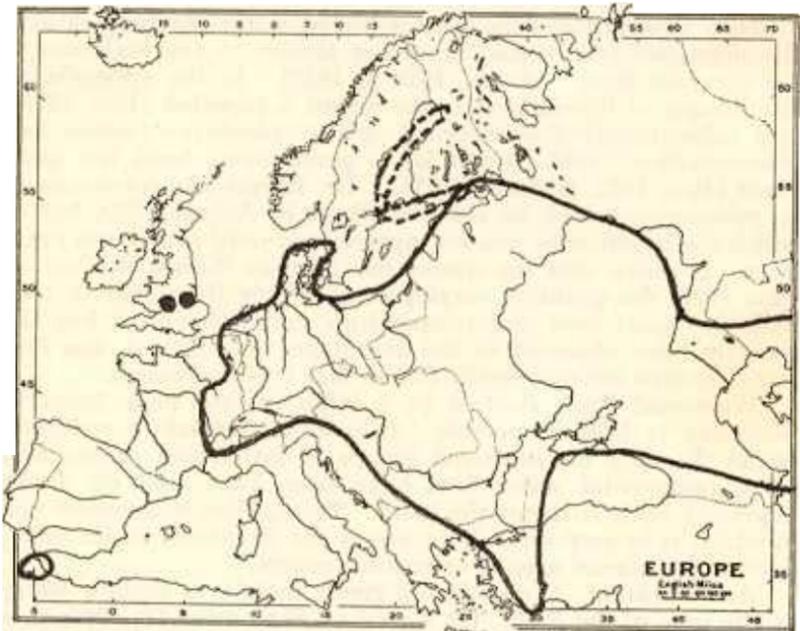


Fig. 1. *Alisma gramineum*—British localities of subsp. *gramineum* in relation to its distribution in Europe and part of North Africa (enclosed in continuous black line), and to the distribution of subsp. *wahlenbergii* (dotted line).

Further synonymy is given by Holmberg (1922), Samuelsson (1932) and Tournay and Lawalrée (1949). Glück (1905), who illustrates plants similar to those from Lincolnshire and Worcestershire, has shown beyond doubt that these forms have no taxonomic significance. The names employed by Tournay and Lawalrée are used here for convenience in drawing attention to the extreme variations. It should be pointed out that the name *Alisma* is to be treated as neuter retaining its Greek gender, and that Lejeune's name antedates C. C. Gmelin's which has been used in British literature.

BRITISH DISTRIBUTION

WORCESTERSHIRE, V.c. 37

Alisma gramineum was first brought to general notice as an English plant when Dr. R. C. L. Burges distributed specimens from Westwood Park Pool near Droitwich through our Exchange Section in 1948 (Lousley, 1950). In all probability it was the plant found by the Worcestershire Naturalists' Club on their visits to the Pool in 1920 and 1930 and reported later as follows:— "*Alisma lanceolatum* (the narrow-leaved water plantain) is here the dominant species and flourishes almost to the exclusion of the common form" (Anon., 1924 & 1932). In the appendix to the *Botany of Worcestershire* the record is repeated (Rea, 1925), and subsequently Rea recorded *Alisma plantago-aquatica* var. *graminifolium* Wahl. (which is *A. gramineum*) from the same place (Rea, 1932, & Anon., 1935). Dr. Burges has specimens of *A. gramineum* which he collected there in August 1939, but of which the significance was not appreciated until nearly ten years later. It seems that the species has been at Westwood since at least 1920, the quantity varying considerably from year to year with the water-level and temperature, and although it has not recently been observed in the abundance in which it was first found, it does not necessarily follow that it is decreasing.

Westwood Park Pool is in a large private park formerly belonging to Lord Doverdale. It is almost certainly artificial; round the edge are scattered groups of introduced shrubs and trees, ornamental water fowl have been kept, and no doubt migrating birds frequent the pond. The habitat is therefore one in which it is very difficult to assess the likelihood of its introduction by human agency or natural means.

At Westwood, *A. gramineum* grows mainly in shallow water at the edge of the Pool. On a visit on September 18, 1949, at a time when the water-level was very low, the plant was most abundant in a few inches of water associated with *Eleocharis palustris* (L.) Roem. & Schult. (abundant), *Polygonum amphibium* L., *Iris pseudacorus* L., *Eleocharis acicularis* (L.) Roem. & Schult. and *Elatine hydropiper* L. It extended into a zone of

deeper water with *Polygonum amphibium* L. and *Potamogeton natans* L., and on to exposed mud with *Lycopus europaeus* L., *Juncus effusus* L., *Mentha aquatica* L., and *Carex acutiformis* Ehrh. Dr. Burges tells me that other species sometimes associated with it include *Limosella aquatica* L., *Rumex maritimus* L., and a prostrate form of *Chenopodium rubrum* L. The pH of mud round the roots was 6.4 (Johnson's test papers).

At this station the plants are 7-25 cm. tall with the flowering heads standing well above the surface of the water, and only the lower parts submerged. The leaves are linear, often only 2 cm. wide but sometimes expanded at the top into a blade about 2.5 cm. long and 5-6 mm. wide. The Westwood plant is forma *arcuatum* of Tournay and Lawalrée, though the petioles are often longer than the measurements given in their description. Dr. Burges tells me that he has found plants just coming into flower as early as July 1 but they are at their best in late July and early August. Schotsman (1950) states that in Holland the flowers of *A. gramineum* open between about 6 and 7.15 a.m., and this may well be true also of the Westwood plants since it is rarely possible to find petals during the afternoon. The fruits ripen in mid-September when stems of the fruiting heads become arcuate and often become buried in the mud.

SOUTH LINCOLNSHIRE, V.c. 53

Alisma gramineum was discovered in the river Glen at Surfleet by Miss E. J. Gibbons on September 3, 1955, in the course of a field meeting organised by the Lincolnshire Naturalists' Union, and she immediately sent me a specimen for confirmation (Gibbons & Lousley, 1956). Five days later I joined Miss Gibbons and Mr. and Mrs. R. C. L. Howitt at Surfleet and, after examination of the locality where the plant had been found first (where we were joined for a short time by Mr. D. McClintock), we traced its distribution in the river Glen downstream to the bridge where the stream becomes tidal, and upstream to above Surfleet village, — a distance of over two miles. It was also seen in the Blue Gowt Drain for a short distance above its junction with the Glen. These localities are marked "A" and "B" on figure 2. Subsequently Miss S. R. Amner, then living at Spalding, found it in two places in Vernatt's Drain ("C"), and in Clink's Drain ("D"). It will be apparent from the map that this distribution cannot be explained by water-carriage from a single recent introduction, though it could have been so spread by water-fowl. The area has been reclaimed from the sea within historic times, but, subject to this, the evidence suggests that *A. gramineum* has been here for a long period, and may safely be accepted as native. The submerged plant is extremely difficult to see except in bright sunlight and it may well have been overlooked in similar habitats elsewhere.

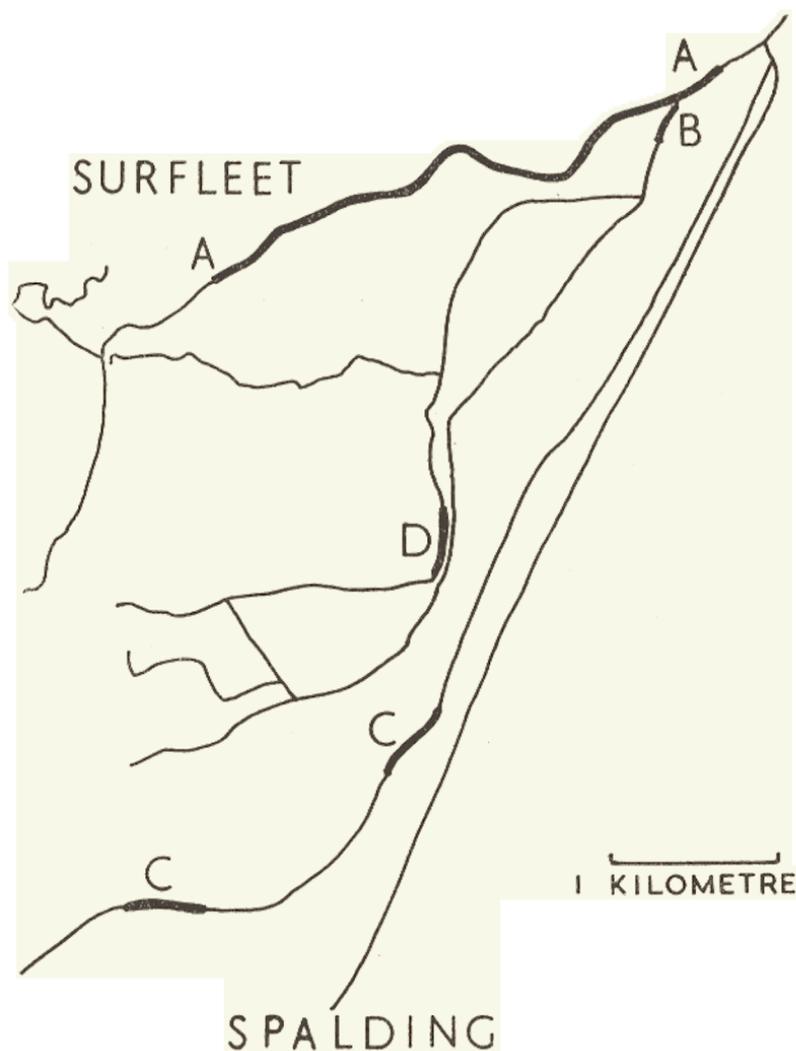


Fig. 2. *Alisma gramineum*. Distribution in S. Lincolnshire as observed in 1955. A-A, river Glen. B, Blue Gowt Drain. C-C, Vernatt's Drain. D, Clink's Drain.

In the river Glen at Surfleet it grows in about 2-4 ft. of water (the river here has a soft muddy bottom), and, with rare exceptions, the plants flower and set fruit well below the surface of the water. They are associated with the following species:—

Abundant—*Potamogeton perfoliatus* L.

Frequent—*Ranunculus circinatus* Sibth., *Callitriche stagnalis* Scop., *Potamogeton pectinatus* L., *P. pusillus* L., *P. friesii* Rupr., *Myriophyllum alterniflorum* DC.

Local—*Groenlandia densa* (L.) Fourr., *Potamogeton crispus* L.

Occasional—*Sagittaria sagittifolia* L., *Hippuris vulgaris* L., *Zannichellia palustris* L.

Rare—*Sparganium* sp., *Elodea canadensis* Michx.

A. gramineum in this locality agrees closely with Tournay and Lawalrée's description of forma *gramineum* with its tall elongated flowering stem, and ribbon-like leaves up to 60 cm. in length. It is the *Alisma graminifolium* Ehrh. forma *angustissimum* Aschers. & Graebn. (1897) which Glück (1905) has shown to be a state dependent on the water level. In some of the other Surfleet localities I understand that it grows in shallower water and the flowers sometimes rise above the surface.

We now have in this country the two extreme forms of *A. gramineum*, one completely submerged and the other subterrestrial.

OTHER RECORDS

Young (1936, p. 144) gives *Alisma plantago-aquatica* var. *graminifolium* Wahl. for Fife, v.c. 85, from "(1) Lindores Loch, and (6) Lochgelly Loch (G.W.)". West (1910) refers three times (pp. 81, 160, 161) to a submerged form of *Alisma plantago-aquatica* in Loch Gelly, and describes it as having "delicate linear-lanceolate leaves floating on the surface, and linear submerged ones". There are numerous sheets in his herbarium at the Sir John Cass College, London, with printed labels "Scottish Lake Survey (Pullar Trust)" relating to the work which was the subject of his paper, but they do not include plants from Loch Gelly or elsewhere answering to the above description. This could refer to *A. gramineum* but in the absence of specimens, or confirmation by rediscovery, the evidence is insufficient. Young's record for Lindores Loch was his own. This locality was also discussed by West (1910, p. 148) who mentions *Alisma plantago-aquatica* without comment. From its continental distribution one would not expect *A. gramineum* to occur as far north as Scotland and it seems likely that in applying the name to West's Loch Gelly plant, and to his own from Lindores Loch, Young was in error.

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Attention must also be drawn to R. S. Adamson's suggestion of *A. arcuatum* Michx. for a plant he gathered at Tring, Herts. (Adamson, 1921). I have only seen inadequate specimens (Herb. Cantab.) but it seems that these are *A. lanceolatum*.

A. gramineum is therefore reliably recorded from Britain only from Westwood Pool in Worcestershire and Surfleet in Lincolnshire. It seems virtually certain that the fruits of allied species of *Alisma* are distributed by ducks—either by passing through their intestines or by adhering to their feathers (Ridley, 1930, pp. 490, 545). There is therefore likely to be constant introduction of the fruits of *A. gramineum* into this country from abroad, and dispersal of fruits from the localities in England already known. The discovery of the Surfleet localities has drawn attention to a habitat of a type which was previously unsuspected here for this species and where it is easily overlooked. Careful search in similar habitats elsewhere, and especially on the east coast, is likely to be rewarded with additional records.

In conclusion I would like to express my thanks to Dr. R. C. L. Burges and Miss E. J. Gibbons for the great help they have given me in connection with the Worcestershire and Lincolnshire localities respectively, and to Dr. H. D. Schotsman for lending the original drawings for reproduction in Plate 6.

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