

Weed associates of recently grown *Avena strigosa* Schreber from Shetland, Scotland

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Summary

Weed seeds and other plant remnants were extracted from recent samples from Shetland of the now rarely grown *Avena strigosa* (bristle oats) and were found to include, in addition to seeds of typical arable weeds, those of plants not usually associated with cereal crops. An account of the location and conditions of the fields is given, with some information about the crop processing practices, to explain the range of seeds which could appear in archaeological deposits. The reclamation of a new field in a wet area is also described.

Introduction

Avena strigosa (bristle oats) is increasingly rarely grown as a crop, and then only in the marginal lands of north-west Europe, where it can tolerate poor, damp soil and withstand wind and rain. In Shetland, in recent years, it has been grown only in one or two of the outer islands, and few opportunities now remain to observe the results of unsophisticated harvesting methods.

For several years, during visits to the Shetland islands, small quantities of crops had been acquired which were subsequently sorted and weed seeds removed and identified. The results illustrated how seeds of plants of surrounding areas and atypical parts of a field can become incorporated in a harvested crop, and thus be of relevance to the interpretation of archaeological seed samples. Therefore the opportunity was taken in 1989 of visiting for a second time a farm at Breakon on the island of Yell, to obtain further samples. It was also possible to visit the fields in which the oats were grown and to note their surroundings. (It must be pointed out that the material was gathered as convenient, rather than by scientific sampling principles.) The oats from Fields 1 and 2 (see below) were acquired in 1979 and 1983 for reference and for growing; the weed seeds were extracted simply to see what might possibly be found in a sample of oats. All the results are tabulated for convenience, but numerical comparison is not intended as the samples differ in size and means of acquisition, in their post-harvest treatment, and in the soils, conditions, and surroundings of the fields in which the oats were grown.

The fields

The first sample came from a field near Underhoull on the west coast of Unst, the most northerly of the Shetland Isles (Field 1; see Fig. 14). This is in a region of grassland on peaty soil, mainly damp pasture for ponies and sheep where, in spring, some of the small meadows are almost entirely covered by flowers of *Caltha palustris* (marsh-marigold). There are a few fields for potatoes, turnips, cabbages, etc., but in recent years bristle oats have not been grown on Unst. The area has a long history of occupation and cultivation, and there are sites of Early Iron Age and Norse farmsteads, a souterrain and a broch nearby (Small, 1964-6).

Field 2 is on light sandy loam, not far from dunes at Breakon, on the north coast of Yell (Fig. 14), in one of the few fertile regions of this island, which is otherwise covered by thick deposits of peat. Situated on the slopes of a shallow valley, the fields and meadows are fairly well-drained and alongside them are streams and drainage channels which in June outline the fields in gold with their dense growths of *Caltha palustris*. Lower down, they are bordered by wetter areas with patches of *C. palustris* and extensive stands of *Iris pseudacorus* L. (flag iris) and *Equisetum* spp. (horsetails), etc.

Field 3 is about one kilometre to the west of Field 2, and is one of several created by ploughing and re-seeding an area of heath to improve grazing. The heath merges into damper woodland and, a few hundred metres further west, peat banks have been worked. The field has a micaceous, peaty soil, which

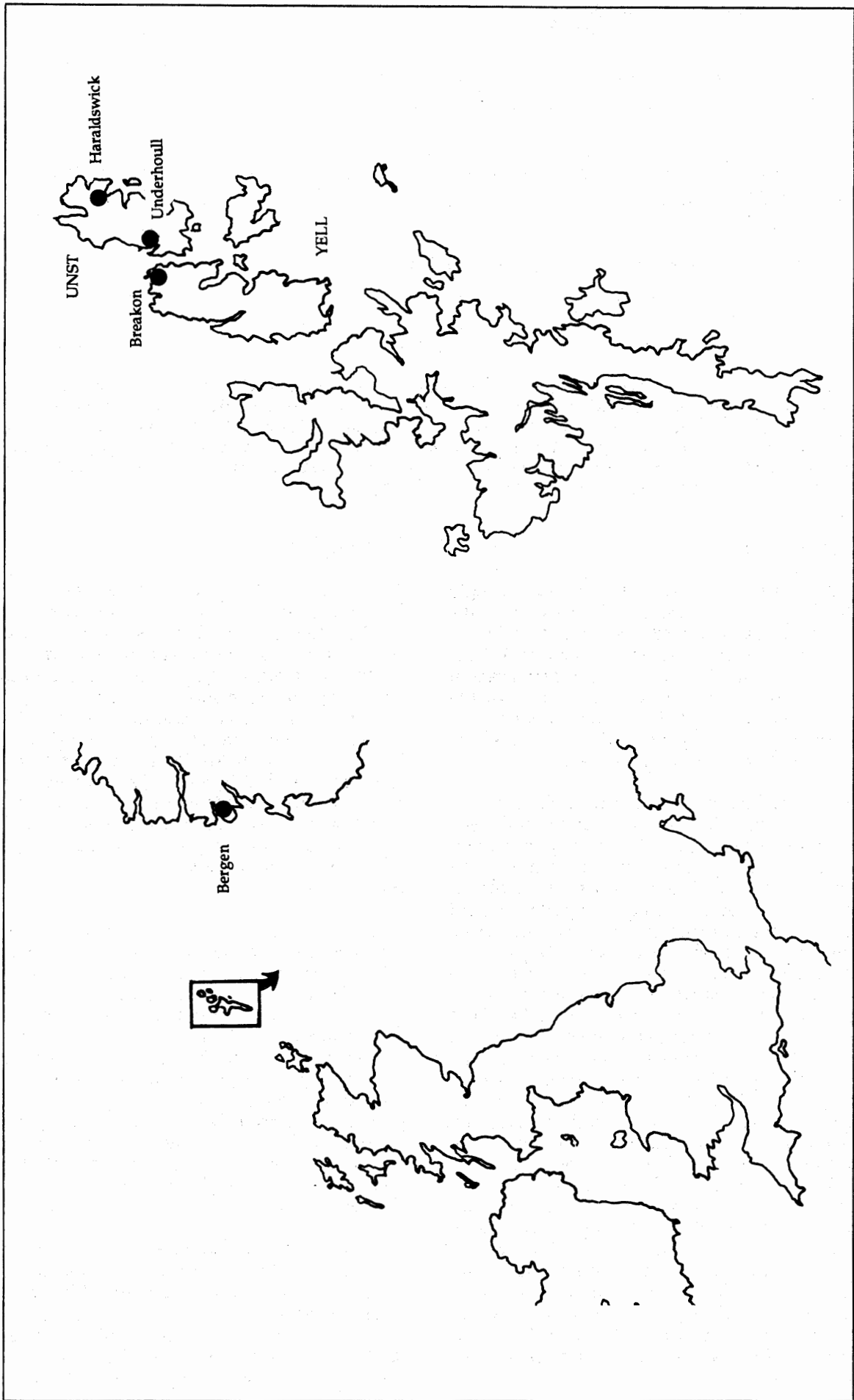


Fig. 14. Location of the Shetland Islands and sites mentioned in the text.

has been treated with 'muck and fertiliser' and in 1988 had been sown with oats and a commercial grass and clover mixture. The oats were harvested later that year and the 'under-sown' grasses were just beginning to put on new growth when the field was visited in June 1989. (Spring in Shetland usually begins about six weeks later than in southern England.) The field was sufficiently dry in one higher corner for the standing of three *scroos* (small, round, partly-thatched stacks) of oats from the 1988 sowing and a rectangular *dess* (small stack) of hay from the adjoining fields, but nearby were wetter areas with patches of *Eriophorum angustifolium* Honckeney (cotton sedge), *Carex* spp. (sedges), *Juncus* spp. (rushes) and mosses, including *Sphagnum* spp. *Scroos* of oats and *desses* of hay are illustrated by Fenton (1978, 351).

The samples

The oats from Field 1 were acquired through an intermediary, and the method of harvesting and subsequent treatment are uncertain. Threshing was most likely to have been done by beating the sheaves against a solid object; one crofter used to beat them against a grid from a discarded refrigerator. The oats must have been winnowed as there was no very light chaff in the sample, but the quantity of larger panicle parts suggests that they had not been sieved. More careful cleaning would have been unnecessary, since the oats were generally used as winter feed for the house cow.

The samples of oats from Fields 2 and 3 were obtained from two brothers who farm a large part of the Breakon area. They are two of the very few who still grow 'Shetland oats' in the Northern Isles, and they supply them to several crofters. They were kind enough to describe and demonstrate the treatment of their crops.

Harvesting of both fields had been by mowing machine, cutting about 0.1 m above the ground, the sheaves being bound by hand, stacked in *scroos* in the field, and brought into the barn for threshing.

Threshing was done by a small wooden-cased machine, one of many made in the nineteenth century by Messrs Shearer's of Aberdeenshire, in which the oats are passed between a concave surface and a revolving drum with rows of projecting spikes. The machine, now

fitted with an electric motor, was originally hand- or treadle-operated, and the farmers described turning the handle while their mother fed in the sheaves. One of these machines is illustrated by Fenton (1978, 368).

Winnowing, to remove the chaff, was demonstrated in the wind outside the barn, the oats being dropped in handfuls onto sacking (previously, a *flaakie* or mat of oat straw would have been used). This might be followed by further winnowing and/or sieving, if the oats were intended for sowing, and I was shown a sieve made of sheep skin stretched on a wooden hoop, with pieced holes of approximately 3-4 mm diameter.

The sample from Field 2 was obtained in the summer of 1983, when there were very few oats left from the previous year, and the sample was tipped from the bottom of a sack. These oats would not have been used for sowing, since weed seeds tend to sink to the bottom.

The 'threshed and winnowed' sample from Field 3 was taken from the top of a sack of 'seed corn' to be supplied to a crofter, and I was told I would find no weed seeds in it! The second sample from Field 3 ('threshed only') was gathered in handfuls from beneath the threshing machine, avoiding the very bottom of the heap. While it is possible that the results of more than one threshing operation could become mixed here, only oats from Field 3 had recently been through the machine. Although the weight of this sample is less than that of the other from Field 3, the mass of light chaff and other fragments gives it greater volume. The main constituent of the other samples is, of course, the oat spikelets and grains.

Results and discussion

Table 4 shows the results from analysis of these samples.

The majority of seeds extracted from the samples from Fields 1 and 2 are of typical crop weeds, but those of *Caltha palustris*, *Angelica sylvestris* (wild angelica) and *Stachys palustris* L. (marsh woundwort) originated in the damp areas (particularly by the streams) which border the fields in this part of Breakon. The long-established grassland around both of these fields is reflected by the seeds of the hemi-parasites *Euphrasia officinalis*

	Field number:	1	2	3	3
	Treatment:	TW	TW	TW	T
	Approximate sample weight (g):	120	1500	1600	1000
Taxon	Parts recorded				
<i>Sphagnum</i> sp.	stem fragments	-	-	-	2
Musci indet.	"	-	-	-	2
<i>Equisetum palustre</i> L.	stem fragment	-	-	1	-
<i>E. cf. arvense</i> L.	"	-	1	-	-
<i>Polygonum aviculare</i> agg.	nuts and perianths	127	486	335	62
<i>Rumex acetosa</i> L.	"	7	82	1	2
<i>R. longifolius</i> DC.	"	-	-	2	43
<i>R. crispus</i> L.	"	-	54	-	5
<i>R. obtusifolius</i> L.	"	-	13	48	1
<i>Rumex</i> sp.	"	1	5	-	14
<i>Montia fontana</i> L.	seeds	-	-	-	2
<i>Stellaria media</i> (L.) Vill.	seeds	27	49	67	c.1300
	capsules, mostly with seeds	-	6	45	184
<i>S. alsine</i> Grimm.	seeds	-	-	-	60
<i>Cerastium fontanum</i> Baumg.	"	-	20	4	560
	capsules with seeds	-	2	-	48
<i>C. glomeratum</i> Thuill.	seeds	-	-	-	115
	stem with leaves and 2 capsules	-	-	-	1
<i>Spergula arvensis</i> L.	seeds	3	11	1	1
<i>Lychnis flos-cuculi</i> L.	"	-	-	1	2
<i>Caltha palustris</i> L.	"	-	1	1	-
<i>Ranunculus repens</i> L.	achenes	-	3	1	5
<i>R. acris</i> L.	"	-	9	-	-
<i>R. repens/acris</i>	"	-	15	-	-
<i>Capsella bursa-pastoris</i> (L.) Medic.	seeds	12	-	68	33
	siliculae	9	-	2	1
<i>Brassica cf. rapa</i> L.	seeds	-	-	9	-
<i>Raphanus raphanistrum</i> L.	"	-	-	1	-
	siliqua segments (single, and groups if 2-4)	5	61	9	1
<i>Potentilla palustris</i> (L.) Scop.	achenes	-	-	3	-
<i>P. erecta</i> (L.) Rausch.	flower	-	-	-	1
<i>Trifolium repens</i> L.	seeds	1	2	-	1
	flowers	-	-	-	94
	leaf fragments	-	-	-	43
<i>Vicia cracca</i> L.	legume, with 3 seeds	-	1	-	-
<i>Angelica sylvestris</i> L.	mericarp	-	1	-	-
<i>Calluna vulgaris</i> (L.) Hull	stem and leaf fragments	-	-	-	2
<i>Myosotis arvensis</i> (L.) Hill	nutlets	6	10	1	-
	calyces	5	5	2	-
<i>Galeopsis tetrahit</i> L.	nutlets	16	50	-	1
	calyx	-	-	-	1
<i>Lamium purpureum</i> L.	nutlets	2	5	-	-
<i>L. cf. molucellifolium</i> Fries	"	-	-	4	-
<i>Stachys palustris</i> L.	"	-	1	-	-
<i>Veronica agrestis</i> L.	seeds	-	-	1	1
	capsules	-	-	-	2
<i>Euphrasia officinalis</i> s.l.	seeds	2	1	-	-
	capsules	3	5	-	-
<i>Rhinanthus minor</i> L.	seeds	5	62	-	-
	capsules	3	5	-	-
<i>Plantago lanceolata</i> L.	seeds	1	-	-	1
	half-capsules	-	-	1	1
<i>Succisa pratensis</i> Moench	involucel and calyx	-	-	1	-
<i>Bellis perennis</i> L.	achenes	2	3	-	2

<i>Achillea millefolium</i> L.	"	-	-	-	10
<i>Matricaria perforata</i> Mérat	"	24	138	340	182
	capitula	-	-	1	2
	involucral bracts	-	-	10	1
	stem fragments	-	-	4	-
<i>Chamomilla suaveolens</i> (Pursh) Rydb.	achenes	-	-	-	11
<i>Senecio vulgaris</i> L.	achene	-	-	-	1
<i>Cirsium arvense</i> (L.) Scop.	capitulum	-	-	-	1
<i>Sonchus asper</i> (L.) Hill	achenes	-	-	-	6
<i>Juncus conglomeratus</i> L.	capsules (dehiscing)	-	4	-	-
	seeds	-	-	-	35
<i>J. squarrosus</i> L.	"	-	-	9	7
	capsules with seeds	-	-	1	1
<i>J. cf. bufonius</i> L.	seeds	-	-	-	34
<i>Juncus</i> sp.	"	1	-	2	-
<i>Luzula cf. multiflora</i> (Retz.) Lej.	"	-	-	3	-
	capsules with seeds	-	-	2	-
<i>Lolium perenne</i> L.	spikelets*	2	5	92	c.900
	stem and spike fragments	-	-	-	c.140
<i>Poa annua</i> L.	spikelets	1	10	-	-
<i>Poa</i> sp.	caryopses	-	-	7	4
<i>Dactylis glomerata</i> L.	spikelets	-	-	-	64
<i>Cynosurus cristatus</i> L.	"	-	2	-	-
<i>Bromus cf. hordeaceus</i> L.	"	-	4	-	-
<i>Anthoxanthum odoratum</i> L.	**	1	28	5	2
<i>Holcus lanatus</i> L.	**	5	61	11	5
<i>H. mollis</i> L.	"	-	4	15	19
<i>Agrostis</i> sp.	"	-	-	-	7
<i>Phleum pratense</i> L.	"	-	12	3	c.300
	caryopses	-	-	-	10
	rachis fragments	-	-	-	10
Gramineae indet.	leaf and stem fragments	-	-	-	c.50
<i>Carex echinata</i> Murray	utricles with nut	-	-	3	1
<i>C. cf. binervis</i> Sm.	"	-	-	-	1
<i>C. nigra</i> (L.) Reichard	"	-	-	3	2
	male spike fragments	-	-	-	1

Table 4 (opposite and above). Weed seeds and other plant remains found in samples of recently-grown *Avena strigosa* (bristle oats) from Shetland, Scotland. Nomenclature and order follow Tutin et al. (1964-80). Treatment codes: T—threshed, W—winnowed. *—sclerotia of *Claviceps purpurea* (ergot) present in a few spikelets.

(eyebright) and *Rhinanthus minor* (yellow-rattle), absent from the more recently created Field 3, in an area of drier, ericaceous heath.

With the oats from Field 3, there are again the usual crop weeds, but there are also plants characteristic of different parts of the field and its borders. Among those typical of the more poorly-drained areas are *Stellaria alsine* (bog stitchwort) and *Montia fontana* (blinks), which occur frequently in wet flushes, and *Equisetum palustre* (marsh horsetail) and *Potentilla palustris* (marsh cinquefoil), frequently seen in the marshy areas and at stream edges. *Caltha palustris* and *Lychnis flos-cuculi* (ragged robin) are typical of the damp grassland of the

adjoining fields and *Calluna vulgaris* (ling) is abundant in the heath from which the fields were reclaimed. The large numbers of spikelets and stem fragments of grasses and clover parts (estimated from a subsample) originate, of course, in the under-sowing of the oats with a grass/clover mixture for future hay or pasture.

The lists illustrate that, in addition to the 'normal' arable weeds, seeds of plants of differing habitat requirements may become included in samples from a harvested crop. They may come from atypical patches within the field (and the content of sheaves from different parts might vary considerably), or

originate in adjoining areas with different vegetation characteristics. In the latter case, the surrounding plants may invade (e.g. the rhizomes or rooting nodes of prostrate stems of *Caltha*), or other seeds may be accidentally included when cutting close to the field edges, which are not always clearly defined. Some, such as the wetland species, seem particularly out of place in a crop sample, but their occurrence is matched by, for example, Hillman's (1984) report of fruits of *Alisma lanceolatum* With. (a water-plantain) with grain in present-day East Anatolian granaries and Jones' (1978) records of *Eleocharis palustris* (spike-rush) from Iron Age grain assemblages from Oxfordshire.

Weed seeds in such numbers and variety are only likely to be found in samples of crops in the earlier stages of processing, and here the most comprehensive sample was the 'threshed only' sample from Field 3. The 'threshed and winnowed' sample from the same field had lost the light chaff, small flowers and some of the lighter seeds, but still included much that would have been removed by further winnowing and sieving if the oats had been intended for human consumption.

The making of a new field

During my latest visit to Shetland in 1989, I was fortunate enough to see something of the 'reclamation', or perhaps better the making *de novo*, of a field near Haraldswick, Unst.

In this case, the part-time crofter (who owns several hectares of this particular area, land which was wet enough for a number of his sheep to be drowned) had the opportunity of acquiring a supply of rubble and soil from the demolition of a building and the levelling of a site. After moving the topsoil of the new field to one side, he built up the area with rubble, and then replaced the topsoil, together with that from the building site, and in June he was harrowing repeatedly in preparation for the sowing of grass seed. He said that if 'Shetland oats' (*Avena strigosa*) were available, he would prefer to sow them. When this new field was visited, it was seen to be bordered on two sides by very wet areas (in which there were five sheep skeletons—evidence of his losses), swampy patches with *Potentilla palustris*, *Menyanthes trifoliata* (bog-bean), *Equisetum palustre* and slightly less wet parts with *Lychnis flos-cuculi*, *Cardamine pratensis* (cuckoo flower) and *Juncus* spp. The harrowing was

breaking up and spreading the replaced soil, but it was also distributing many fragments of *Equisetum* and *Caltha* rhizomes throughout the field. A further visit to the island has not yet been possible, to see the result of the hard work in which the farmer took such a pride. Had oats been sown, it is very likely that samples of the harvest would have included examples of plants not usually associated with a cereal crop.

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