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Summary

A soil sample from the foundations of a buttress of the north granary was analysed for charred plant macrofossils. The sample was found to contain a large quantity of fully-processed spelt wheat. No chaff fragments and very few weed seeds were present as contaminants of the crop. About half of the grain had been damaged and this was thought to be due to insect infestation, probably *Sitophilus granarius*.

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Excavations were carried out at the Ambleside Roman Fort Granary from 1988 to 1991 because of the need by HBMC to re-consolidate the exposed structure. The main concern was to remove backfill from earlier excavations carried out by R.G.Collingwood between 1913-20 and to record the walls and Roman stratigraphy. However, it became clear that Collingwood had failed to observe aspects crucial to the phasing of the structure, so in a few areas limited exploratory excavations were undertaken.

During the course of the excavations a soil sample was taken from an ashy area found within the lowest layer of the foundations of buttress 5 of the north wall of the north granary. This context, 241, has been placed in phase 2 which covers the period of construction of the north granary and central area rooms linking north and south granaries. The south granary was also in use at this time.

Methods

The soil sample from context 241 weighing 0.44kg, was ashy in appearance and contained visible quantities of grain and some small pebbles. The entire sample (volume 400ml) was floated in cold water with the flot being poured off through a 250 micron meshed sieve and the residue being sieved to 1mm. The flot and residue were slowly air-dried and both were sorted under a dissecting microscope.

Because a large number of small fragments of grain was present, the dry flot was sieved through a 2mm mesh prior to sorting and identification. The <2mm flot was then sorted for small weed seeds and chaff fragments, but no attempt was made to quantify the small fragments of grain present in this fraction. Cereals were quantified in the larger fraction by counting only whole grains, embryo ends and longitudinally split grains in pairs. The quantity given in table 1, therefore, is a minimum count of cereal grains present. The total number is likely to have been much larger, judging from the large number of small fragments present.

Results

Charred cereal remains were abundant in the flot and occasional in the residue. In all, 16% of the total remains (total = 752 seeds) was recovered from the residue. Cereal grains, in particular cf. spelt wheat, were the main component of the assemblage. Very few fragments of charcoal were present and remarkably few weed seeds. No chaff fragments were recovered. Table 1 lists the remains found in the flot and residue.

Identifications

There are no clear morphological characters with which to differentiate between grains of emmer (*Triticum dicoccum* Schübl.) and spelt (*T. spelta* L.). In plan view, emmer grains tend to be slim and have more pointed ends, whilst spelt often has fairly parallel sides and blunter ends. In side view, the humped dorsal side of emmer is usually deeper and highest near the embryo, whilst in spelt the dorsal ridge is more evenly humped (Jacomet, 1987). Because there is a morphological continuum between these two species it is important that chaff fragments (glume bases) are present to provide more reliable identification criteria. No chaff fragments were found in this assemblage, but sufficient

numbers of well-preserved grains had characters typical of spelt wheat to suggest that spelt was the principal species present. Where grains were particularly pointed-ended and deeply humped, an identification of cf. emmer was given. Four rounded, flat backed grains typical of bread-type wheat (*T. aestivocompactum* s.l. ; includes bread and club wheat) were also recovered.

A few grains of barley were observed, some of which were twisted in the manner found in the lateral grains of six-row barley. Most of the grains were slightly hexagonal in profile indicating that they were hulled barley (*Hordeum vulgare* L. emend.), but one had the rounded cross-section, dented upper end and distinctly wrinkled outer surface of naked barley (*H. vulgare* var. *nudum*) (see figure 1b).

Several grains had the very blunted upper ends and pointed embryo ends of rye (*Secale cereale* L.). There can be some confusion of this cereal with wheat grains, but in this case there were a sufficient number of well-preserved grains to be fairly certain that rye was present.

State of preservation

Although there was some fragmentation of the grains, many were well-preserved. There were no obvious signs of sprouting, i.e. elongated or detached embryos, or furrows along the dorsal side of the grain. However, several grains were wrinkled or completely collapsed and some collapsed grains had fused together. This could either be because they had begun to germinate or perhaps because they were unripe or shrivelled when harvested and charred.

The most notable point of interest was the presence of holes in roughly 50% of the whole grains examined. The holes varied in size, depth and position but were usually present on the dorsal side of the grain (see figure 1a). The significance of these observations is discussed below.

Discussion

This deposit appears to consist of a quantity of clean, fully-processed spelt wheat, since very few weed seeds and no chaff fragments were present. The few contaminants recovered may have come from an independent source, such as from flooring or bedding in the case of the bracken and spike-rush. They may also have grown with the spelt crop, either as weeds, along field margins or as relicts of previous crops.

Being particularly hardy, the oats and rye would have been suitable crops for north-west England and there is evidence of them having been cultivated in the Roman period, e.g. rye from Thornborough Scar, Northumberland (Van der Veen, 1992) and cultivated oats from several sites in Scotland (Jessen & Helbaek, 1944). Six-rowed hulled barley was a common crop from early prehistoric times onwards but naked barley was of reduced importance from the Late Bronze Age. Occasional finds of naked barley from later sites could simply represent sporadic mutations amongst hulled crops since the character is controlled by a single recessive gene (Harlan, 1976). Emmer wheat had largely been replaced by spelt by the Roman period, although small quantities are often present in Roman samples. The first major deposits of charred bread-type wheat are found in the Roman period, for example at the granary in South Shields (Van der Veen, 1988), although small quantities have been recovered as early as the Neolithic. However, over most of the British Isles, spelt seems to have been the principal crop in Roman times.

Amongst the few weed seeds present, chess (*Bromus* sp.) and vetch/tare (*Vicia/Lathyrus* sp.) are commonly found as arable weeds and provide little information about the type of soils cultivated except that legumes (vetch/tare) can become frequent on nutrient-poor soils because of their ability to fix atmospheric nitrogen. Spike rushes (*Eleocharis* subg. *Palustres*) are damp ground plants and their frequent occurrence in charred grain assemblages, particularly on Iron Age and Roman sites, indicates the cultivation of low-lying ground (Jones, 1981). The charred pinule of probable bracken (cf.*Pteridium aquilinum*) may have come from a separate source, or bracken could have been encroaching on the margins of arable fields on fairly acidic soils.

About 50% of the grains seemed to have been damaged prior to charring (see figure 1a) and some were shrivelled. The significance of the shrivelled grains has been discussed earlier. The damaged grains appear to have been nibbled, mostly on the dorsal side with the endosperm rather than the embryos being the target of attack. Mark Robinson (Oxford University Museum) was sent a sample of the grain and gave the following information;

'In general, the damage looks undiagnostic, but it is noticeable that the endosperm rather than the embryos have been attacked. Most grain beetles feed primarily on the embryos and can only attack damaged grain. *Sitophilus granarius* (grain weevil), however, attacks whole grains. The larvae eat out grains from the inside and one of the grains shows damage typical of *S. granarius* larvae, with the epidermis in place over part of the cavity. On balance, I would suggest that the damage resulted from a developing infestation of *Sitophilus granarius*. This beetle seems to have been a Roman introduction.'

Although no fragments of charred insect were observed amongst the grain, in view of the high proportion of damaged grains it is likely that this deposit represents stored grain that had been deliberately burned in order to eradicate an infestation.

Mark Robinson also suggested that the beetle probably cannot attack hulled grain. This fits in with the sample consisting of fully-processed grain and provides evidence that the grain had been stored in this condition rather than in spikelets. Large quantities of processed grain have been found at a number of other granaries, for example South Shields, Tyne & Wear (Van der Veen, 1988), and it appears to have been the normal method of storage for military purposes. On domestic sites it has been suggested that hulled wheats would have been stored in spikelet form because of the protection that this provides against the damp and insect attack (Hillman, 1981). For military purposes storage in well-built granaries was obviously considered to be sufficient protection. However, several other Roman grain stores have produced relatively large numbers of germinated grains (e.g. Colchester, Essex; Murphy, 1984) demonstrating an additional problem caused by storing processed grain under damp conditions.

Two large deposits of processed cereals from sites in London also contained fairly high percentages of sprouted grain, and this was thought to have been due to poor storage conditions (Straker, 1983). The presence of non-native weed taxa amongst the cereals indicated that the grain had been imported. No other clear examples of imported shipments of grain have been identified, since the weed taxa usually found in these large deposits are common to most countries in northern Europe. For the South Shields granary spelt and bread wheat, the question of possible importation was discussed (Van der Veen, 1988), but no

definite conclusion was reached because all of the weed taxa were native to the British Isles. Similarly, it is not possible to determine whether the Ambleside grain had been imported, but as spelt grows well in most parts of Britain there is no reason why it could not have been grown locally.

ACKNOWLEDGEMENTS

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REFERENCES

Harlan, J.R. (1976) Barley. *In* N.W.Simmonds (ed.) *Evolution of Crop Plants.* Longman, London, pp.93-98.

Hillman, Gordon (1981) Reconstructing Crop Husbandry Practices from Charred Remains of Crops. *In* R.Mercer (ed.) *Farming Practice in British Prehistory.* Edinburgh University Press, pp.123-162.

Jacomet, Stefanie (1987) *Prähistorische Getreidefunde.* Botanisches Institut der Universität Abteilung Pflanzensystematik und Geobotanik, Basel.

Jessen, Knud & Helbaek Hans (1944) *Cereals in Great Britain and Ireland in Prehistoric and Early Historic Times.* Biologiske Skrifter, Bind III, Nr.2.

Jones, Martin (1981) The Development of Crop Husbandry. *In* Martin Jones & Geoffrey Dimbleby (eds) *The Environment of Man: the Iron Age to the Anglo-Saxon Period.* B.A.R. 87, 95-127.

Murphy, P. (1984) The charred cereals. *In* P.Crummy, Excavations at Lion Walk, Balkerne Lane and Middleborough, Colchester, Essex. *Colchester Archaeology Report* 3, pp. 40, 105, 108, 110.

Straker, Vanessa (1983) First and second century carbonised cereal grain from Roman London. *In* W.van Zeist & W.A.Casparie, *Plants and Ancient Man.* A.A.Balkema, Rotterdam, pp.323-329.

Van der Veen, Marijke (1988) Carbonised grain from a Roman granary at South Shields, North-East England. *In* H.Küster (Hrsg.) *Der prähistorische Mensch und seine Umwelt.* (Festschrift für U.Körber-Grohne) Forschungen und Berichte zur Vor- und Frühgeschichte in Baden-Württemberg 31, 353-365.

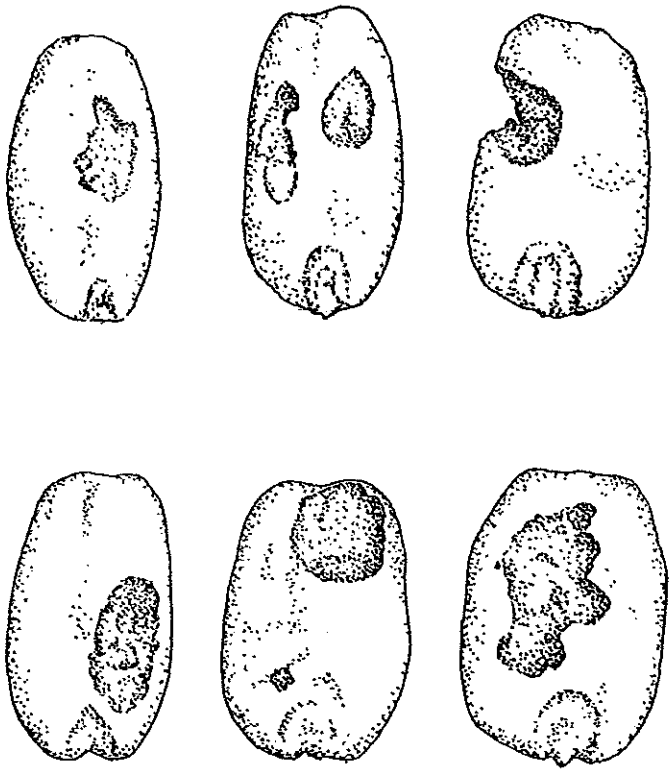
" " " " (1992) *Crop Husbandry Regimes.* Dorset Press, Dorchester.

AMBLESIDE ROMAN FORT GRANARY:

CHARRED GRAIN FROM THE NORTH GRANARY PHASE 2

Taxa	Flot	Residue
cf. *Triticum spelta* L. (cf. spelt grain)	263	63
cf. *T. dicoccum* Schübl. (cf. emmer grain)	7	8
T. spelta/dicoccum (emmer/spelt grain & fragments)	233	34
T. cf. *aestivocompactum* (bread-type wheat grain)	4	
Hordeum vulgare L. emend. (hulled six-row barley grain)	1	1
H. vulgare var. *nudum* (naked barley grain)	1	
Hordeum sp. (hulled barley grain)	2	
Secale cereale L. (rye grain)	4	4
cf. *Avena* sp. (cf. oat grain)	1	1
Indeterminate cereals	82	
Indeterminate collapsed & wrinkled grains	14	2
Bromus sp. (chess)	16	6
Eleocharis subg. *Palustres* (spike-rush)	1	
Vicia sp./*Lathyrus* sp. (vetch/tare)	1	2
cf. *Pteridium aquilinum* (L.)Kuhn (cf. bracken pinnule)	1	
TOTAL	631	121

1a



1b

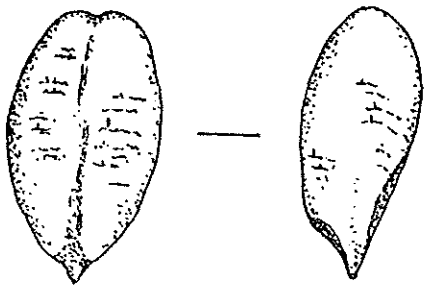


Figure 1a : Insect damaged spelt wheat grains, dorsal side.

1b : Naked barley (Hordeum vulgare var. nudum)