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Evaluation of archaeometallurgical residues from Kiltrough, Co. Meath (08E0297 extension)

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Abstract

This small assemblage comprised just five pieces of slag, three of which were certainly from smithing hearth cakes (SHCs and one probably so, but one piece is of fuel ash slag and may derive from a non-metallurgical process. The two measurable SHCs were moderately large (474 and 630g), compatible with the sizes of SHCs produced during iron-working (blacksmithing) in the early medieval period. The extremely small size of the assemblage suggests that although smithing was undertaken on the site, it may not have been undertaken within the excavated area. Fuel ash slags may be produced by a variety of processes, including iron-working, but the proximity of this material to the corn drying kilns suggests that the origin of this slag may lie there.

Contents

Methods

All materials were examined visually with a low powered binocular microscope. Macroscopic slag pieces were individually weighed, described and recorded to a database. The summary catalogue is given in Table 1.

The conclusions reached in this report are therefore limited by the nature of the evaluation inspection. No chemical analysis or high-powered microscope work is attempted during an evaluation.

Results

Description of the residues

The assemblage comprised five pieces of slag. Of these three were substantial pieces of slag from smithing hearth cakes (SHCs). A fourth piece may also have been from an SHC. The final piece is a low density fuel ash slag, but has a morphology rather similar to that of an SHC.

Two of the SHCs are reasonably complete – one example weighs 474g, the other (502g) is approximately 80% of the original cake, which would therefore have weighed around 630g.

These two SHCs are both compact examples, with diameters of a little over 100mm. Their internal textures are not well exposed, but their bowls appear filled with dense, slightly vesicular slag. One example (that from C66) is strongly overgrown by iron-rich concretion, so its surface details are obscured. The example from C300 shows a dense, slightly dimpled base and an upper surface which is slightly dished, with some concentric structure and with a green-grey surficial glass bearing some gravel clasts. This surficial layer is indicative of the nature of the input to the SHC from the melting of the tuyère tip.

The fuel ash slag is a pale (cream to grey) glass, with rare sandstone clasts and a very high degree of vesicularity. This small cake, unlike many fuel ash slags, does show indications of “way-up”, with a dimpled base and a slightly lobate top.

Distribution of the residues

Two of the three contexts yielding smithing slag were towards the north of the site: the fills of small ditches (C289 and C299) just to the north of the ringfort. These are close to the burnt pit C287, which did not itself yield any slag. Whilst a short-lived period of smithing in this area cannot be excluded, it would be unusual and most smithing sites yield very much more evidence for waste material.

The example of fuel ash slag came from C95, a fill of early medieval ditch C107, close to several corn drying kilns.

Interpretation

The assemblage provides rather slight evidence for iron-working. The two reasonably complete SHCs are within the size range proposed for SHCs from blacksmithing in the early medieval period (Young forthcoming). Although three of the five pieces derived from contexts close to burnt pit C287, there is no direct evidence linking that pit to smithing and the very small amount of slag may suggest that focus of the activity lay elsewhere on the site, outside the excavated area, or that the activity was a very unusual one at this site (each SHC represents one work period, so the

recovered evidence is equivalent to the waste from just two to four days smithing).

The fuel ash slag cannot be linked to any particular activity with certainty. Fuel ash slags are the products of the melting, or more commonly partial-melting, of siliceous materials, often soil, present as impurities within the fuel in a hearth, kiln or furnace. The high content of alkali and alkali-earth elements (such as potassium, calcium and magnesium) in many biofuels acts as a flux to reduce the solidus (the temperature at which a material starts to melt) of the silicate from temperatures normally only reached in furnaces, down to levels that may be achievable in quite modest fires. Fuel ash slags produced in corn drying kilns have been described by Young (2005, 2006). The present material is not interpretable with certainty as having an origin in a cereal kiln, but the proximity of the kilns to the ditch (C107) from which the slag was recovered hint that this may have been the case.

Evaluation of potential

The slags from the site appear to be well-preserved and therefore suitable for being taking forward to further analysis. However, given the very small size of the assemblage, the lack of certain metallurgical features and that the residues are dominantly from blacksmithing, there would be little to be gained in this instance from further analysis. Accordingly there is no recommendation for further work. The residue samples are not considered to be of high priority for retention in their own right, although their value as part of the site archive may be higher.

References

Young, T. 2005. Site Activities: slag and related materials. pp. 174-176. *In:* Sharples, N (ed.), *A Norse Farmstead in the Outer Hebrides. Excavations at Mound 3, Bornais, South Uist*. Cardiff Studies in Archaeology, Oxbow Books, Oxford.

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sample	*context*	*weight*	*number*	*notes*
17	66	502	1	c80% of compact conventional plano-convex SHC, (100)x(80)x60mm, upper and lower surfaces have rusty accretion suggesting a high original content of metallic iron
316	95	90	1 (4)	small cake of highly vesicular clinker-like fuel-ash slag, c60mm diameter and 30mm thick, glassy, dimpled base lobate top, contains a few sandstone clasts
317	290	214	1 (2)	part of centre of two-layered SHC, both upper planar crust and lower bowl are c 10mm thick and have dimpled bases, which raises the possibility this is a broken and welded object, 50mm max thickness
318	300	474	1	neat SHC , complete, 105x100x40mm, plano-convex, smooth very slightly lobate top with central slight dish, slightly concentrically ringed. coated in greenish glass with some gravelly debris, particularly proximally, some slightly reddened raised lobes on proximal side, neatly conical shape, dense smoothish base micro-dimpled.
		58	1	indeterminate dense slag fragment - probably part of an SHC but not certain

Table 1. Summary Catalogue

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