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Evaluation of Archaeometallurgical residues from the M7/M8 Contract 1: Cuffsborough 3 (E2198)

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Abstract

This assemblage has a total weight of 9.6kg, of which approximately 1.2kg is probably smithing slags, but most of the remainder is probably residue from iron smelting. The slags are generally extremely dense, have a colour suggestive of high manganese content and occur in rather rounded pieces suggestive of a degree of reworking.

Most of the material (8.8kg) derived from the fills of linear ditch 3 (F075, fills F076/F077), with lesser quantities from the primary fill of linear feature 1(F026, fill F070) and the primary fill of circular pit 6 (F015; the origin of the piece from sample 30, pit 6, may require checking, since there is no record of samples taken from this context in the draft report). All the slag was from Area 1.

The slags have some unusual features and further analysis would be desirable to clarify the slag composition, but they are certainly interpretable in terms of iron production and as such cast considerable doubt on the wider application of the 14C dates from Area 2 to the whole complex, which must be at least in part of Iron Age date.

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Methods

All investigated materials were examined visually, using a low-powered binocular microscope where necessary. All significant materials were summarily described and recorded to a database (Table 1). As an evaluation, the materials were not subjected to any high-magnification optical inspection, nor to any other form of instrumental analysis. The identifications of materials in this report are therefore necessarily limited and must be regarded as provisional.

Results

The residues from the site are slightly unusual in appearance having a slightly grey-brown surface colour with slightly resinous lustre on many pieces. Surficial alteration also obscures surface details in some specimens. Many of the pieces appear to have been rather rounded and the material is likely to have suffered some reworking. Despite the rather unusual features of the slag it is interpretable in terms of iron working and iron production.

Iron smelting

The probable iron smelting slags are dominantly extremely dense materials, with frequent signs of some flowage. Very few pieces form good prills, indicative of a very fluid flow in the furnace, but several of the larger dense blocks appear to be formed of coalesced flow lobes. These pieces also frequently show adhering indurated sandy material suggestive of reaction between the hot descending slags and the pit wall in a slag pit furnace.

The assemblage is unusual because of dominance of these dense slags and a complete absence of the more fragile and finer slags that make up most of the residues in a slag pit furnace. The material shows some degree of rounding, and it is likely that the assemblage is derived, with the reworking inducing both the rounding and the loss of the fines/fragile material.

Iron working

The collection includes several pieces of slag that are probably from smithing hearth cakes (SHCs). None is entirely unequivocal, but the balance of probabilities is that there are several SHCs represented, with original weights in the 300-600g range. Although small by later standards, these are fairly substantial for prehistoric examples, so if the site is indeed early, then the SHCs are probably associated with boom-refining (bloomsmithing) rather than end-use blacksmithing.

Interpretation

The materials indicate that iron production was undertaken somewhere in the area of the site, although there is no in-situ evidence for the activity.

The presence of iron smelting and smithing residues on the site indicates that the chronology of the site must be more complex than currently presented. The site is currently dated by two 14C dates from features in Area 2 indicating dates of 10th-12th centuries BC for F51 (primary fill of pit 4, Area 2) and F67 (primary fill of trough Area 2).

Not only do the features in Area 1 contain iron slag (and therefore must be significantly younger than 10th century BC), but the well in Area 2 is also described as containing fragments of an iron knife, which is also unlikely to be of such an early age. The draft report text indicates in the detailed description that the trough dated to the Bronze Age truncated the well with the iron knife, whereas the discussion describes the reverse relationship.

It seems likely that the complex in Area 1 and at least part of that in Area 2 must belong to the Iron Age.

Evaluation of potential

Although the assemblage is small and shows indications of being derived, features which normal reduce the potential of an assemblage to provide useful additional information on analysis, in this instance further analysis might be justified because of the age-implications of the residues for a site with few dateable finds.

In particular, although there are no particular reasons to doubt the identification, clarification of the nature of the slag to ensure exclusion of the possibility these are copper smelting residues (which can have a similar bulk chemical composition t o iron slags, but different trace elements).

context	sample	c weight	weight	no.	notes
15	30	463	463	1	dense fragment of bowl-shaped slag encasing large charcoal/wood fragment up to 70mm long, very dense - foot of blowing wall in a curved pit
70	29	363	363	3	296g piece is most of small SHC, deep at proximal end then very thin and plate-like- however had strong grey overgrowth so detail of morphology hard to see, particularly on lower face. , 35g piece is flat thin edge of SHC – possibly the same one, 29g piece is partially flown bleb of vesicular slag - could be a flow slag but could be from an SHC margin
76	27	7321	396	1	dense block of coalesced flow lobes
			434	1	biconvex block - small dense SHC ? 80x90x65
			442	1	dense slag lump with fused hearth lining
			298	1	irregular block with large fuel mould and fused wall
			476	1	dense block – probably a small SHC but might be part of larger example or possibly a burr, 100x70x50mm
			180	1	crust fragment
			144	1	crust fragment
			458	1	curious broken slag lump cut by fractures
			290	1	crust fragment
			266	1	irregular slag lump
			508	26	Small rounded slag lumps
			50	1	stone
			260	3	crust fragments
			110	3	rounded slag lumps with incorporated wall / lining / gravel
			200	2	irregular lumps with large wood impressions
			494	11	pieces poor dense flow lag - just two of them are good prills
			382	3	irregular dense fragments of locally dimpled crust
			578	3	pieces of thick dense crust/burr
			1355	71	fragments of slag - mostly in sub-rounded pieces
77	28	1464	168	16	small slag fragments
			16	2	pieces of fired lining
			404	5	rounded slag lumps
			192	1	irregular fragment from basal crust apparently formed of coalesced flow lobes
			684	8	pieces of flow slag with large flow lobes - rather unusual - high viscosity slag?

Table 1. Summary catalogue by context and sample

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