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Evaluation of archaeometallurgical residues from the N8 Fermoy-Mitchelstown, Ballynacarriga 2, Co. Cork, (E2413)

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Abstract

Ballynacarriga 2 yielded a small (8.4kg), but diverse assemblage of archaeometallurgical residues including slags from both iron smelting and smithing. Detailed evidence for both processes is sparse. The smelting appears on textural evidence to have been in a non slag tapping (slagpit) furnace, but the slags have a maroon surficial colour; a feature more common in tapped slags. The few examples of smithing hearth cakes are generally moderately large, suggesting they are the waste from the refining of the blooms produced by the smelting.

Contents

Methods

All investigated materials were examined visually, using a low-powered binocular microscope where necessary. For microscopic residues a general statement of the nature of each assemblage was recorded (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

Nature of the assemblage

The total material examined amounted to a weight of 8.8kg, of which approximately 8.4kg were archaeometallurgical residues. Most of the other material was iron artefacts. The residues comprised about 1kg of material that can be identified with confidence as deriving from iron smelting, 5.8 kg was part or whole smithing hearth cakes (SHCs), with the remainder (1.6kg) being slags that were not identifiable to a specific process

Description of the iron smelting slags

The iron smelting slags comprised fragments of dense flow slags, typically in amalgamated flows, and often with a slightly maroon oxidised surface. A maroon surface is often an indicator of smelting slags that have been tapped from the furnace. Such slags are extremely rare in Ireland, and the morphological evidence of the pieces from [c137], [c186] and possibly [c062) suggests that these are flow slags from the basal pit of a non slag-tapping furnace.

Description of the smithing slags

Seven fragments from small SHCs were recorded from [c055], but other finds of SHCs were of moderately large examples. A fragment from the topsoil [c094] weighed 412g but was only an unknown fraction of a complete cake. The ditch [c267] yielded a piece weighing 878g that was probably about 50% of the original SHC. A feature in the southern entrance [c277] yielded an almost complete, but weathered, SHC weighing 1980g. A complete SHC from the souterrain passage [c304] weighed 1875g. In addition there were several very small pieces of SHCs which gave no information as to the size of their original cakes.

Other materials

Most of the non-slag component of the archived assemblage comprised pieces of iron. In particular a large iron ring (corroded onto a stone) was recovered from the souterrain passage [c291]. Smaller scraps of iron come from [c067] and [c087].

Context [c209] (the fill of posthole [c119]) contained (amongst other residues) a small, 34g, fragment of possibly roasted iron ore.

Distribution of the residues

The archaeometallurgical residues derive from contexts right across the site, with no particular focus. 5kg of the 8.8kg total assemblage was recovered from deposits associated with the souterrain, which probably reflects the limited opportunity for sediment accumulation in other areas within the enclosure.

There were no recorded features of certain metallurgical origin, although the northern group of pits

has been suggested to be associated with metalworking. Only one of these pits yielded residues of pyrotechnological origin; pit [c206] contained a small quantity (4 pieces, 16g) of blebby flows of green glazed fuel-ash slag. Such fuel-ash slags are not necessarily of metallurgical origin. However, it is worth noting that two adjacent postholes ([c118] and [c119]) did contain metalworking residues, including small fragments of both smelting and smithing slags.

Interpretation

The site yielded a very small quantity of a diverse range of archaeometallurgical residues, suggesting that both iron smelting and smithing were undertaken here. There is no clear focus to the activities, although during excavation the northern cluster of pits (approximately at the centre of the enclosure) were suggested to be associated with the metalworking. The residues offer little to confirm this suggestion.

The iron smelting furnaces were probably of the usual slagpit furnace type, but the maroon surficial colour of the flow slags resembles that at Woodstown, where a slag tapping furnace type seems to been employed (Young 2009).

The majority of the SHCs that were recovered were moderately large, with the three examples for which the original weight could be estimated lying in the range of 1700-2000g. SHCs of this weight are likely to be from the refining of blooms, rather than from end-use of the iron (blacksmithing), reinforcing the evidence for iron production at Ballinacarriga 2.

Evidence for early medieval iron production within enclosed settlements is not particularly strong at present (Gortnahown 2 on this road scheme is a notable exception). However, the present sample size of such sites is very small, so it is difficult to draw generalisations at present.

Evaluation of potential

The rather sparse nature of the assemblage and the lack of direct association between the residues and metallurgical features, reduces the potential for the material to provide useful information from further analysis.

The smelting slags are, however, rather interesting, both because of their oxidised surface layer and because there is a suggestion from the single piece of possibly roasted claystone ironstone discovered, that the ore smelted might not have been a bog iron ore.

A very limited set of analyses are therefore recommended in order to characterise the smelting slags, undertaking both bulk chemical analyses and textural/mineralogical characterisation using SEM/EDS on three smelting slag specimens and the iron ore piece.

Reference

YOUNG, T.P. 2009. Ferrous archaeometallurgical residues from Woodstown 6, *GeoArch Report 2009/22*, 66 pp.

sample	*context*		*weight*	*no*	*notes*
100	55	wall collapse?	772	103	indeterminate iron slag scraps - most vaguely blebby and or dimpled bits
			42	6	tuyère or other oxidised ceramic sherds
			242	11	dense flow slags
			256	7	fragments from small SHCs
			194	40	small dense flow slag fragments and blebs
			228	5	dense slags in sheets with a dimpled surface
			50	1	open coralline type slag
			184	4	dense slag lumps with no diagnostic features
85	67	ditch c68	15	1	scrap of iron
36	87	recut of possible quarry	59	1	iron artefact
35	94	topsoil	412	1	part of a medium sized SHC, proportion not determinable, 50mm thick - so comparable with examples below
			20	1	iron slag fragment
62	98	topsoil	110	1	dense worn irregular slag lump - possible a foot of blowing wall smelting slag
61	116	posthole c118	2	1	flow slag fragment
65	136	cremation pit c138	42	1	natural stone
			62	2	fused gravelly or sandy material in irregular blebby glass, lining slag or similar
81	209	posthole c119	34	1	small fragment of iron ore - possibly a weathered or roasted claystone ore?
			128	1	dense prilly/dimpled slag ball, containing a small pebble of sandstone
			20	1	small fragment of dense SHC with glassy top
			38	3	very dense flow slags in small runs with hints of maroon surfaces
107	217	pt c206	16	4	4 blebby flows of pale sandy green glazed fuel ash slag
120	267	dtich section 20/5	878	1	(110)x(100)x60mm large block from thick crust SHC. Slightly irregular shape so proportion not determinable (probably about 50%), top blown smooth blown but raised, base rough vesicular
127	269	souterrain S entrance feature c277	136	15	dense grey highly vesicular slag, presumably from a SHC but no clear identifying features, probably a single broken block
137	273	souterrain S entrance feature (with charcoal)	330	7	basal flow slags in rather low density vesicular flows in the main, although one fragment is much denser (rather comparable to Ballykilmore)

sample	*context*		*weight*	*no*	*notes*
158	277	souterrain S entrance feature (beneath c277)	1980	6	probably most of broken and decomposed large, but rather conventional SHC, largest piece (160)x(110)x70mm (of which bowl 35mm)
163	291	souterrain passage c308	320	1	large iron ring corroded onto stone
165	291	souterrain passage c308	36	1	stacked dense flow lobes with maroon surfaces, complex, small lobes
184	291	souterrain passage c308	8	1	fragment of dense slag sheet with rough charcoal moulds
185	291	souterrain passage c308	208	1	very dense curved but angular slag lump, probably from the middle of a thick crust SHC, but could be a burr
186	295	souterrain passage c308	112	1	dense fragment of stacked flow lobes attached to oxidised fired ceramic, some lobes have maroon surface - so like tapslag in appearance but lobes very small
182	304	souterrain passage c308	1875	1	large biconvex SHC, 130x180x90mm (of which bowl 65mm) transverse, proximal side flattened in centre (stone contact?), base rough, top charcoal-rich, culminating in remains of green dimpled glassy sheet on very top

Table 1: summary catalogue by context and sample

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geoarchaeological, archaeometallurgical & geophysical investigations

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