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Evaluation of archaeometallurgical
residues from the N6, Galway -
Ballinsloe

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Abstract

The material from Carnmore West comprised a single block of slag. This has a texture indicative of an origin in the basal pit of a slagpit bloomery iron-smelting furnace. This technology had a very long period of use in Ireland and is therefore not particularly indicative of age at the present level of understanding (4th century BC to 18th century AD?).

Material from Coolagh is dominated by fragments from smithing hearth cakes (SHCs). These are dense, although porous, and are generally derived from rather small SHCs (200-500g). Highly dense SHCs seem particularly typical of iron-working when a ceramic tuyère is employed (rather than a simple blowhole in the hearth wall). This technology seems to have been general in Ireland from at least the Early Christian period until modern times, when the introduction of coke as fuel and of cast-iron tuyères lead to rather different forms of smithing slag. The small size of the SHCs would suggest an origin in blacksmithing (the production and repair of iron artefacts) rather than in the processes of bloomsmithing (associated with the primary production of iron).

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Methods

All materials were examined visually, using a low-powered binocular microscope where necessary. All materials were weighed and recorded to a database (presented as 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

Carnmore West

The single block of slag from this site is a dense iron slag which has flown around large pieces of charcoal or wood fuel. This texture is characteristic of the slag which accumulates in the basal pit of a non-slag-tapping slagpit iron-smelting furnace. Such textures indicative of a particularly fluid slag are apparently found particularly adjacent to the proximal (blowing) side of the furnace.

Coolagh

The material from Coolagh comprised 14 pieces of iron slag, totalling 2252g. Almost all of these pieces are from probably from smithing hearth cakes (SHCs), and there are no pieces which are certainly not SHC fragments. The slag is dense, porous (typically from small charcoal moulds or charcoal inclusions) and appears to be dominantly from small SHCs. The pieces indicate that the SHCs were rather dense, having a well developed, but vesicular, slag bowl and frequently a smoothly dimpled top.

Those examples for which the original SHC weight can be estimated range from 200 – 500g.

Interpretation

Carnmore West

The single piece is indicative of slagpit bloomery iron smelting furnace (Young 2003, 2005). Slagpit furnaces seem to be the norm in Ireland from the Iron Age (examples from the 3rd-4th centuries BC are now known; Young 2006c, 2006f), certainly through until the Middle Ages (Young 2006e), and probably surviving well into the Post-Medieval period (Young 2006b).

Coolagh

Assemblages of small SHCs are not particularly well-known in Ireland, where large iron-working sites of Early Christian age onwards tend to produce examples of very large SHCs, which are associated with the primary production of iron (e.g. Young 2006f). However, a few assemblages are known with small SHCs being dominant. These include Coolamurray (Co. Wexford; Young 2006a), Navan (Co. Meath; Young 2007) and Carrigoran (Co. Clare; Young 2006d). In contrast, assemblages of small SHCs are much more common in areas (e.g. Britain) where the production of iron was a less widespread activity (Crew 1995, 1996). The Irish examples of such assemblages cited above are all probably from around the 10th century AD, but this is likely to be fortuitous, and a longer history of small blacksmithing sites is likely.

Evaluation of potential

The occurrence of small quantities of iron slag in contexts without direct connection with the metalworking, means that the present material has rather limited potential for further investigation.

In the case of the smelting slag from Carnmore West, chemical analysis of the slag would provide an indication of the type of iron ore being employed.

Further investigation of the Coolagh smithing slags would probably not generate significant additional useful information.

These evaluations of potential are from a purely metallurgical viewpoint, and need to be taken together with any relevant site-drive research agendas.

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context	sample	label	weight	
Carnmore West		A024/6		
1005	113	iron slag	140	Dense slag from iron smelting furnace, internally lobate, flowed around very large fuel moulds
Coolagh		A024/5		
3	2	slag	222	Two-layer sub-circular slag piece, probably a small dense SHC. Has dense well-flown magnetic slag with small charcoal moulds
3	3	iron slag	202	95x65x40mm, probably an almost complete small SHC. Top dimpled but smooth, base charcoal-rich and rusty.
			418	110x90x50mm, irregular block of dense porous iron slag. Porosity probably mainly fine charcoal moulds. Has internal structure suggestive of elliptical form 120x75mm with steep edges. This suggests the piece may be a piece from an SHC, but it is not fully diagnostic.
			188	80x60x35mm, probably about one half of a small, dense, porous conventional SHC.
			250	approximately half of a conventional smallish SHC
			146	irregular shaped slag piece, possibly an SHC margin, porous but dense (sufficiently dense that it may contain metallic iron)
			194	irregular block of porous dense slag, probably from the margin of a moderately sized SHC.
			70	Rusty cake margin fragment, size of original SHC not determinable.
			248	Irregularly pear-shaped slag mass, probably a smithing slag and possibly a deformed SHC.
			130	Irregular fragment of dense slag, flattish top and curved base, so probably a fragment from a small SHC.
			72	Small SHC fragment with rounded surfaces, rusty, probably from the edge of a small dense SHC.
			18	Small fragment of charcoal-rich slag.
			18	Small dense slag fragment, conchoidally fractured, probably from the dense crust of a small SHC.
			76	Fragment of irregular charcoal-rich slag.
			2030	

Table 1: Summary catalogue listed by context and sample.

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