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Assessment of archaeometallurgical residues from Balbriggan. Fingal (15E586)

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Abstract

The material from the site formed a small collection of residues ironworking (blacksmithing) in a coal-fuelled hearth. All the material derived from various contexts within a single ditch. Just two smithing hearth cakes (SHCs) were present, both with weights a little over 400g, typical of SHCs from blacksmithing of the medieval period.

The amount of waste was small, suggesting that the smithy was either short-lived, or more likely that it was at some distance from the excavated locality.

The use of coal as fuel is interesting, but its significance on this site depends on the age of the contexts. Coal appears to have been used on the east coast of Ireland from around the 13th century, from which period onwards it was imported to areas under Anglo-Norman influence. Away from the coast, there seems to have been little use of local coal until the 17th century even close to the coalfields, but outside the coalfields charcoal remained the principal fuel into the 19th century (and the advent of mass transport by canal and railway).

Blocks of indurated sediment from the ditch contained much fine coal. They may have been cemented either by the reprecipitation of iron leached from the coal, or perhaps more likely from associated iron artefacts. It is also possible that the iron was derived from iron-rich metallurgical residues, but the indurated bocks appeared to only contain a small quantity of hammerscale.

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Methods

The material described here derives from excavations at Clogheder/Clonard or Folkstowne Great, Balbriggan (licence 15E586) conducted by Archaeology Plan. This project was commissioned by Steve McGlade.

All materials were examined visually with a low-powered binocular microscope where required. As an evaluation, the materials were not subjected to any high-magnification optical inspection, nor to any form of instrumental analysis. The identifications of materials in this report are therefore necessarily limited and must be regarded as provisional.

Results

Description of residues

A total of approximately 1.8kg of materials were examined (weight after washing). Of this approximately 0.75kg was indurated sediment, the remainder was mostly archaeometallurgical materials.

The residues were indicative of ironworking (blacksmithing) using coal as fuel.

Ironworking slags

The assemblage included two examples of smithing hearth cakes (SHCs), of rather similar form and weight (401g and 443g). Both were dense, but were, however, covered in rusty accretion, meaning that surface details could not be observed.

There was one other substantial fragment of slag, a rounded, dense nub rich in coal, but also covered with rusty accretion. There was also a single small fragment of just 1g.

Hearth ceramic

The assemblage include seven fragments of vitrified lining with a total weight of 25g. One of the fragments showed coal embedded in the glassy surface. None of the pieces showed any evidence for morphology, so it was not possible to determine whether the material was from the vitrified front face of large tuyères (as it normal in Irish medieval material), or whether it was the vitrified face of the hearth itself (as might potentially occur in a hearth of Anglo-Norman type).

Other materials

The collection included two isolated pieces of coal, as well as indurated blocks of sediment rich in coal, two fragments of iron and two small concretions.

There were two fragments of iron (total 32g), besides the iron that was embedded within the samples of indurated coal-bearing sediment. The isolated pieces were small fragments, apparently small pieces of bar, but would require X-radiography to confirm their morphology.

The indurated sediment was rich in fine coal fragments, was poorly laminated and also contained a few particles of hammerscale. It contained several small iron fragments, mostly apparently of sheet form.

Coal was also present in a small (14g) concretion, along with slag, charcoal and gravel.

Two small fragments of coal (12g) were present as hand-picked items.

A second concretion was a tubular concretion of hydrated iron oxides (‘limonite’). Such concretions may grow, under appropriate groundwater and chemical conditions, around small burrows or, more likely, decaying vegetation.

Interpretation

The materials at the core of the collection are indicative of being the residues from blacksmithing (i.e.

the end use of iron), rather than from any part of the process of iron-production.

Coal was a significant component of the assemblage and was observed within one of the slag and one of the lining specimens, as well as occurring in isolation within the deposits.

The history of the use of coal in smithing is poorly understood at present. It I likely that coal was first employed in smithing within the areas of strongest maritime connections to Great Britain. Coal was widely moved along the coast of N Wales during the major period of castle construction in the late 13th century from the coalfields of NE Wales, and the same sources appear as major documented exporters to Ireland by the 16th century (Nef 2013, 364-5). It would appear probable that the earliest coal-fuelled smithing in Ireland would have been within the areas of Anglo-Norman influence, but the date of introduction to different areas is not known.

There are few documentary references to the medieval coal trade, for instance coal is listed amongst taxable items at Fethard in 1292 (Cosgrove 1987, 238; although this is unclear whether the coal was being imported, or exported during a very early phase of exploitation of the Kilkenny Coalfield) and in 1322-3 a ship carrying **coal** was detained in Dublin (O'Neill, 1987).

Coal has been noted from archaeometallurgical assemblages from Carrickmines Castle, Co. Dublin (Young 2006; Young & Kearns 2010; Young 2011) and Greencastle, Co. Down (Young 2010), but in neither case was the date of introduction of coal certainly within the medieval period. Slightly later, probably in the 17th century, comes evidence from Gorteens, Co. Kilkenny (Dabal & Young 2011) and possibly in the 18th century from Cuffsborough, Co. Laois (Young 2009), both of which lie close to the Kilkenny Coalfield. This latter evidence correlates with documentary evidence for expanded activity in the Kilkenny Coalfield from the 17th century. Similarly, it is known that the sources at Coalisland, Co. Tyrone, were being exploited by the mid-17th century (Bardon, 1991, p. 203). Balbriggan would have been ideally located for supply of coal both from external sources and by coastal trade from the Irish sources.

In most other areas where suitable assemblages have been recovered, there is evidence for the survival of charcoal-fuelled blacksmithing into the 19th, if not 20th, centuries.

Further work

The slags from the site are interesting from the point of view of the use of coal as fuel. Future clarification of the age of the residues may affect their significance.

As residues isolated from an actual context of production (being in a ditch fill), and as a small assemblage, it is unlikely that further additional analysis would generate additional archaeologically-useful information. Consequently, no further analysis is advised at this stage.

As the slags do provide potential documentation of the early use of coal, they ae worthy of retention with the site archive.

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Table 1: summary catalogue of macroscopic materials. All weights in g.

context	feature	find	sample note	sample wt.	item wt.	item no.	notes
126	f125	21,22	area 5 bs 2	7	6	2	slagged and vitrified oxidised lining; one fragment has brick-red glass, the other dark with coal fragments embedded
126	f125	23	area 5 bs 4	401	401	1	small dense SHC heavily accreted, 75x105x75mm, flat-topped bowl 50mm deep, overlain by tall mass at one end. No details visible
126	f125	24 to 26	area 5 bs 2	457	443	1	dense SHC, 80x100x45mm, very dense, slightly biconvex, some deep impressions in top, but otherwise surface obscured by rust; small detached chip also present
					14	1	rusty charcoal bearing concretion with slag debris and gravel, some possible coal
126	f125	27 to 33	area 5 bs 2	114	18	2	broken tubular concretion formed of merged pisolith-like iron oxide structures - probably a form of bog iron ore that has grown around a burrow or plant/root
					10	1	triangular iron fragment
					2	1	burnt? stone
					1	1	fragment of vitrified oxidised lining
					1	1	fragment of iron slag
					79	1	rounded nub of slag, very dense, but also very rich in coal
129	f125		area 5	77	77	8	fragments of 'smithing floor' concretion including several iron fragments; rich in coal
129	f125	30	area 5	738	674	2	blocks of 'smithing floor', very rich in coal, some probable hammerscale
130	f125	8 and 9		12	12	2	coal
130	f125	10 to 11	area 5 bs 1	7	7	2	tiny fragments of slagged and vitrified oxidised hearth lining
130	f125	12 to 15	area 5 bs 1	46	11	2	slagged and vitrified oxidised hearth lining; ceramic with angular gravel inclusions
					22	1	iron fragment

context	feature	find	sample note	sample wt.	item wt.	item no.	notes
					13	1	small worn fragment of iron slag
131	f125	4	basal, bs 1	58	58	1	oxidised lining with adhering thick layer of maroon-surfaced slag, probably sub-blowhole mass; carries lots of unburnt coal fragments and a few piece of ?chert

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