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Evaluation of archaeometallurgical residues from the N8 Fermoy-Mitchelstown, Ballynacarriga 3, Co. Cork, (E2412)

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Abstract

Ballynacarriga 3 produced a sparse scatter of slag from an area straddling the interior of the earlier enclosure and the area to its NE. Residues, where determinable, are from iron smelting (in a non slag-tapping slagpit furnace) and smithing. There are no residues which can be attributed to pre-Iron Age metallurgy.

Two pits, [c397] and [c448], contained multiple pieces of slag suggesting a possible contemporaneity with the metalworking. Neither pit showed signs of burning. All other occurrences of residues were single pieces, so their interpretation must address questions of both potential residuality and intrusion.

The date of the metalworking (if indeed it does belong to a single period) is hard to determine. The smelting technology is not indicative of anything more than early Iron Age to early post-medieval. The smithing slags are not particularly indicative of age, although the lack of tuyère material and the lack of fragments from large smithing hearth cakes might suggest either an Iron Age or post-medieval age. Although residuality and intrusion are likely problems with this site, the co-occurrence of slag and evidence for flint use suggests that a prehistoric, Iron Age, date is more likely.

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

General nature of the assemblage

The total examined collection weighed 2.67kg, of which the archaeometallurgical residues amounted to 95 pieces, weighing 2.54kg. Pit [c397] contained a rich assemblage of 70 pieces weighing 682g. Pit [c448] contained 13 pieces of iron smelting slag (404g) divided between four fill contexts. Three pieces of smelting residue were recovered from the topsoil (466g).

Thus the remainder of the collection comprised just 8 pieces weighing 990g, spread over 8 contexts.

Two pieces of slag derive from the Group 15b hearths, with one piece from each of hearths [c521] and [571]. Neither of the slag pieces is certainly of metallurgical origin.

Description of iron smelting residues

Iron smelting resides are represented by small fragments of flow slag from several contexts. Some of these are individual prills, but several show amalgamation of prills into more substantial stalactitic masses. Such flow slags are usually formed in the lower parts of the basal pits of non slag-tapping, slagpit, furnaces, where the slag trickles through the pit packing (usually of wood) and solidifies in rather variable prilly and flow-like forms.

The only large block of flow slag is the 738g broken block from [c020], the fill of pit [c017]. This dense block shows amalgamated flows which have solidified around large pieces of wood (now represented by voids) in the pit-packing, and is the product of the flow

of larger slag volume down the blowing side of the furnace pit.

Rather poorly developed flow slags occur in the assemblage from [c396], the fill of pit [c397]. These are possibly from smelting, although the mixed assemblage from this feature could also be from a smithing hearth.

The substantial piece of reduced-fired furnace material from the topsoil is likely to be from a smelting furnace (vitrified wall material from smithing hearths is likely to be dominantly oxidised-fired).

Description of the smithing residues

Certain smithing residues are represented by a small smithing hearth cake (SHC) from [c396], the fill of pit [c397] and a fragment of a second small SHC from [c367], the fill of pit [c403]. Both of the these SHCs are very small (the intact example weighs just 116g). The intact example shows a strong contribution from hearth ceramic, with glassy, dimpled surfaces.

As mentioned above, the slag assemblage from [c396] is of uncertain origin, but the gravelly lining slags and the thin dimpled slag sheets might suggest that this is an assemblage from within a smithing hearth.

Description of other residues

Hearths [c521] and [c571] each contained a single slag piece. In neither case is the slag readily identifiable. The piece from [c521] appears to partially melted hearth material. Material with some signs of flowage, often classed as “fuel-ash slag”, and formed largely of material from the walls of the hearth is quite commonly formed in non-metallurgical hearths, particularly those in which the fire is kept burning for extended periods. The slag from [c571] is rather more dense, and a metallurgical origin is perhaps more likely, although by no means certain.

The collections included small iron concretions from [c012], a goethite particle from [c512] and a hollowstone from [c602]. Although all of these particles are iron-rich, it is likely that in the present context they can be regarded as natural.

Distribution of the residues

The greatest concentration of residues was found in a relatively small area (pits [c448], [c397] and [c017]). None of these pits shows clear indications of being a metallurgical feature. All of the pits were too large to be smelting furnaces (pits [c448] and [c017] contained smelting residues only); pit [c397] contained an assemblage with probable smithing residues, as well as possible smelting residues, and was of a size that might be compatible with a small smithing hearth- but there were no features of the pit itself to support such an identification.

The remainder of the assemblage represents a general background scatter of material.

Interpretation

The residues clearly indicate that both iron smelting and smithing have been undertaken within, or close to, this site. A concentration of residues in an area corresponding to a point just east of the centre of the earlier enclosure provides a suggestion that the activity might have been in this area. No metallurgical features have been identified in this area. Smithing hearths, however, may be very shallow and easily removed by truncation. The basal pit of a slagpit iron smelting furnace, being deeper, is more likely to have been preserved. The only pits with multiple finds of slag do not appear to have the appropriate morphology.

With the exception of the possibly non-metallurgical slag from hearths [c521] and [c571] the residues from the site are not compatible with a pre-Iron Age date. Their actual age is however not determinable. The smelting technology is not indicative of anything more than early Iron Age to early post-medieval. The smithing slags are not particularly indicative of age, although the lack of tuyère material and the lack of fragments from large smithing hearth cakes might suggest either an Iron Age or post-medieval age. Although residuality and intrusion are likely problems with this site, the co-occurrence of slag and evidence for flint use suggests that a prehistoric, Iron Age, date is perhaps more likely.

Where the occurrence of iron slag conflicts with the suspected earlier prehistoric date of a feature (for instance in pit [c038]) the possibility of the small slag fragments (that from [c038] is only 12g) being intrusive should be borne in mind.

Evaluation of potential

As a sparse and undated assemblage, this material presents little opportunity for the revelation of additional useful information from further analysis. There is, accordingly, no further analysis recommended.

The material is not a high priority for retention.

NMI find	*context*	*feature*	*weight*	*no*	*notes*
31	1	topsoil	364	1	dense indurated reduced fired wall block
32	1	topsoil	64	1	flow slag in medium width prill
33	1	topsoil	38	1	flow slag - amalgamation of narrow flows
1	12	pit c11	6	4	dark iron concretions or mottles - do not appear to be formed on slag
1	20	pit c17	738	2	dense flow slag block, broken, with massive accumulation of flow lobes around large wood moulds (plus small fragment)
1	37	pit c38	12	1	irregular bleb - probably a flow slag
1	61	pit c62	24	1	flow slag stalactite
3	96	ditch c97	32	1	flow slag
1	98	cut c99	18	1	flow slag
1	105	pit c113	62	1	natural rock
2	367	pit c403	62	1	fragment probably from the margin of a small SHC, 50x40x20mm
210	396	pit c397	116	1	65x70x35mm small SHC-like cake, fairly dense but superficially glassy/gravelly lining slag, all surfaces slightly dimpled
			158	6	fragments of dense slag , mainly in thin dimpled sheets, possibly under-developed SHC material?
			58	2	dense iron slag with charcoal - could be rusted poor flow slag?
			162	38	small slag debris
			80	16	poorly-developed flow slag pieces
			108	7	rounded lumps of lining slag, gravelly in places, some (most?) quite dense - suggesting lining material may be a veneer.
2	449	hollow c448	68	3	flow slag
1	450	hollow c448	78	3	flow slag
1	451	hollow c448	134	6	flow slag fragments
3	471	hollow c448	124	1	flow slag block
1	475	pit c474	28	1	natural rock

NMI find	*context*	*feature*	*weight*	*no*	*notes*
2	512	linear c512	4	1	goethite iron ore globule – probably to be considered as natural rather than ore
1	519	hearth c521	32	1	very strange vitrified material - in part poorly flown lobes, probably altered hearth wall material
1	568	hearth c571	72	1	rounded slag bleb - flattish, probably a small "puddle" embedded in ash - could be furnace floor material
1	602	pit c606	32	1	natural hollowstone

Table 1: summary catalogue by context

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