GeoArch

Report 2017/29

Assessment of archaeometallurgical residues from Llangefni (AB1604)

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14th December 2017

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Abstract

The material submitted for assessment comprised 46 samples from 33 contexts, with a total weight of approximately 250g, representing approximately 25% of the samples from the site as a whole.

The samples were dominated by natural, albeit probably heat affected, materials. Almost all samples contained microresidues from ironworking (smithing). These included examples of hammerscale (both flake and spheroidal), slag blisters, slag flats and grains of comminuted macroscopic slag. Some samples contained small, but macroscopic slag blebs and fragments of fired clay. The samples from grave fills were in general very sparse, rarely exceeding 20 microresidue grains per sample. These probably represent only residual material.

Three contexts that were fills of pits contained more extensive assemblages and are probably closer to being primary occurrences.

The residues were not capable of providing further information at this stage about a more detailed technology of blacksmithing or the age of the residues; more macroscopic slags would be required to provide that information.

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Methods

All materials were examined visually, using a low-powered binocular microscope where required. As an assessment, the materials were not subjected to any high-magnification optical inspection, not to any form of instrumental analysis.

The identifications of materials in this report are therefore necessarily limited and must be regarded as provisional.

The submitted material comprised 46 samples from 33 contexts, with a total weight of approximately 250g. The full catalogue of examined material is presented in Table 1. These materials comprised an approximately 25% sample of the samples from the site as a whole.

This assessment was conducted in December 2017, and was commissioned by Laura Parry, of Brython Archaeology.

Results

General description of the assemblage

Almost all samples contained microresidues from ironworking (smithing). These included examples of hammerscale (both flake and spheroidal; for terminology see Young 2011), slag blisters, slag flats and grains of comminuted macroscopic slag. Some samples contained small, but macroscopic slag blebs and fragments of fired clay.

The natural materials contained in the samples contained various magnetic rocks, presumably heat-affected. A wide variety of rock types were present, mainly of siltstone and sandstone, but with lesser amounts of chert, basalt and dolerite. Some samples contained significant quantities of small iron oxide particles, probably mostly small fragments of mineral vein and weathering crusts. Two grave fills (contexts (2019) and (2134)) produced materials that were probably iron mottles. These soft, brownish, particles resembled fired clay, but showed slightly darker surfaces and pale coatings, suggesting that they are small natural concretions.

Ironworking residues

Microresidues

The magnetic separates contained small fragments of flake hammerscale (FHS). There were very few large fragments of FHS in any of the samples. Several samples bore examples of closely-related slag blisters. These are broadly similar to FHS but are arched away from the metal surface and may be slightly more siliceous. Slag flats, tabular particles of slag that had adhered to the metal surface, are rare, and only small fragments were observed.

Hearth/furnace lining

A few fragments of fired clay were recovered, particularly from (2187). None of the fragments was certainly hearth lining, and other types of technical ceramic may also be represented (or indeed possibly non-metallurgical fired clay).

Other slags

Small fragments of iron slag were present in many samples and showed a wide variety of textures from dense vesicular slag, through to glassy lining-influenced materials. Many of these small fragments appeared rather weathered.

A few larger (although still less than 10g each) particles of slag were also recovered (from contexts (2090), (2144) and (2160)). Each of these was blebby or prilly, with textures typical of iron smithing slags.

Distribution of the assemblage

The assessed material was recovered from 33 different contexts. The assemblages from grave fills were typically very sparse. Three contexts had somewhat richer assemblages, and these were all fills of pits (contexts (2144), (2160) and (2162)). Even these assemblages were small, but were markedly different from those from the grave-fills.

Contexts (2186) and (2187) produced only fired clay.

A few of the submitted samples produced no residues at all (contexts (1006), (2141) and (2253).

Interpretation

The recovered residues were typical microresidues from blacksmithing (Young 2011). They occurred in small quantities in most contexts and so their archaeological significance will require careful consideration.

The richest assemblages, and therefore those most likely to be related to, or contemporary with, the ironworking, are those from pit fills (2144), (2160) and (2162).

All the grave fills bear sparse assemblages (although those from contexts (2009) and (2019) are moderately abundant). The significance of this is unclear. The most likely interpretation is that the microresidues are residual in these contexts, but it is possible for very small microresidue assemblages to be intrusive (they are of a suitable size range to be carried by worms as burrow-linings).

The residues do not provide much indication of age or detailed technology, but would appear to be residues from charcoal-fuelled smelting, rather than coal (as may be encountered locally on Roman and medieval sites, and more generally in the later post-medieval).

Further work

No further investigation of the assessed material is proposed. Should further examples of the rich assemblages be identified, or should any of the pit features yielding the residues be identified as a hearth, then that recommendation could be revisited.

References

YOUNG, T.P. 2011. Some preliminary observations on hammerscale and its implications for understanding welding. *Historical Metallurgy,* **45,** 1, 26-41.

Table 1: summary catalogue. SHS = spheroidal hammerscale, FHS = flake hammerscale, weights in grams. Grey tone indicates rich samples.

context	sample	find	wt	context notes	notes
1006	5002	390	1.4	pit	burnt iron-rich stone and less magnetic sandstone
1006	5002	391	2	pit	rotten burnt sandstone
2009	6	228	11.1	grave fill	20 FHS, 1 SHS, 3 blisters, 4 slag grains, stone
2013	107	250	16.4	grave fill	(also cards for 2013/008/297 and /376 and flot (281 and 386 also written on bag) 3 FHS, 2 SHS, 1 concretion on iron, 4 pieces of slag
2019	10	213	21.4	grave fill	(also contains card for 2019/3239/10) 16 FHS, 11 SHS, 9 slag plus large lump of Fe-Mn ore
2019	11	380	2.4	grave fill	4 pieces of iron mottle
2027	16	301	7.8	grave fill	stones, 11 slag, 10 FHS, 1 SHS
2031	19	293	7.7	grave fill	(also contains card for 2031/309/17) 11 pieces of FHS, 6 pieces of slag
2035	23	332	2.7	grave fill	2 FHS, 2 slag fragments
2040	25	251	4	grave fill	(also contains card for 2040/356/27) 13 FHS, 1 piece of slag
2051	37	284	2.8	grave fill	stone, 2 pieces FHS, 1 probable weathered slag
2075	51	313	5.4	grave fill	6 FHS, 2 SHS, 2 blisters, 1 complex slag, stone
2079	63	246	4.5	grave fill	stone, 4 pieces FHS, 1 possible SHS, 1 probable degraded slag fragment
2079	64	337	3.6	grave fill	stone and 3 pieces of flake hammerscale
2090	53	378	10	grave fill	coalesced small prills, incorporating small fragment of pale grey ceramic
2095	58	245	4.1	grave fill	2 possible FHS fragments amongst stones
2095	58	373	~ 1	grave fill	magnetite crust - probable iron replacement
2106	97	248	2.8	grave fill	stone with one small slag fragment
2109	85	348	3.5	grave fill	2 pieces FHS, 1 slag blister, stone
2134	119	289	4.3	grave fill	3 FHS, 1 slag grain, stone
2134	121	308	6.4	grave fill	mixture of stone and orange-brown soft particles - probably iron mottles rather than fired clay
2135	101	291	9	shallow pit	8 FHS, 1 SHS, 1 lining slag fragment, lots of rotted basalt, stone
2141	106	286	9.8	corn dryer	no certain residues
2144	105	339	8.9	pit	abundant FHS, moderate SHS and moderate slag, also stone. Some slag flat material
2144	105	379	3.1	pit	single bleb of slag, some adhering accretion which contains FHS
2155	110	247	3.7	grave fill	4 tiny FHS, stone
2159	113	302	4	circular pit	1 tiny FHS, stone
2160	114	273	4	pit	abundant FHS, >20 SHS, abundant small slag, stone
2160	114	375	14.6	pit	2 large stones, 2 large slag fragments, both somewhat prilly, one with a lining component
2162	115	338	11.5	pit	abundant FHS, 10 SHS, slag flat, stone
2185	128	328	2.4	grave fill	2 FHS, stone
2186	133	383	4	grave fill	single fragment of fired clay
2187	134	384	8.1	?	much fired clay, stone
2194	138	249	3.7	grave fill	3 FHS, stone
2194	139	370	4.1	grave fill	not 4.1g, less than 1g (so 0.41g?), 1 grain of sandstone, one probably fired clay
2194	140	346	2.9	grave fill	3 FHS, 2 slag grains
2199	173	335	1.5	grave fill	stones, 11 slag, 10 FHS, 1 SHS
2213	144	333	2.7	grave fill	stone, rusty concretion containing wood/charcoal
2213	183	318	1.8	grave fill	1 SHS, stone
2227	161	322	3.4	grave fill	2 FHS, 1 SHS
2227	162	221	3.4	grave fill	stone, 3 slag fragments
2229	189	319	4.3	grave fill	1 FHS, 1 possible concretion on iron, stone
2253	206	239	5.1	grave fill	stone
2253	206	360	1.5	grave fill	stone
2260	210		1.8	?	stone with one probable slag grain
2487	211	272	3.6	ditch/gully fill	stone and 3 pieces of FHS

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