ASSESSMENT OF THE IRON SLAG AND RELATED HIGH-TEMPERATURE DEBRIS FROM AYLESBURY BERRYFIELDS (site codes: various)

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Introduction and methodology

A small quantity of material (2.6kg.), initially identified as slag, was recovered by hand on site and from soil samples processed after excavation. Most of the material from the samples was heat-magnetised natural grit, stones, or sand; very occasionally some fired clay and charcoal was present.

For this report it was examined by eye and tested with a magnet. The material was categorised on the basis of morphology; a magnet was used to test for iron-rich material and detect smithing micro-slags in the soil adhering to slags. Each slag or other material type in each context was weighed except for smithing hearth bottoms, which were individually weighed and measured for statistical purposes. Quantification data and details are given in the table below in which weight (wt.) is shown in grams, and length (len.), breadth (br.) and depth (dp.) in millimetres.

Number of boxes and types stored

The slag is stored in one medium flat box and consists of fayalitic slag plus heat-magnetised material retrieved from samples.

Quantification table for the Aylesbury Berryfields slag (sorted by context number)

			(site codes: various)					Aylesbury Berryfields
site	cxt	<s>	slag type	wt	len	br	dp	comment
AYLBER 07	1001		undiagnostic	64				
AYLBER 07	1098	100	heat-magnetised residue	20				grit and flint
AYLBER 07	1098	100	heat-magnetised residue	15				grit & stones
AYLBER 07	1100	101	heat-magnetised residue	7				grit
AYLBER 07	1100	101	heat-magnetised residue	9				fine grit
AYLBER 07	1111	102	heat-magnetised residue	21				fine grit
AYLBER 07	1111	102	heat-magnetised residue	21				fired clay, grit & stones
AYLBER 07	1150	103	heat-magnetised residue	5				stones
AYLBER 07	1150	103	heat-magnetised residue	2				grit
AYLBER 07	1150	103	heat-magnetised residue	7				fine grit
AYLBER 07	1152	104	heat-magnetised residue	0.5				stones
AYLBER 07	1152	104	heat-magnetised residue	2				grit
AYLBER 07	1152	106	heat-magnetised residue	1				grit
AYLBER 07	1225	105	heat-magnetised residue	0.5				

AYLBER 07	1225	105	heat-magnetised residue	0.5	
AYLBER 07	1225	105	heat-magnetised residue	1	fine grit
AYLBER 07	1229	106	heat-magnetised residue	1	stones
AYLBER 07	1229	106	heat-magnetised residue	1	grit
AYLBER 07	1229	106	heat-magnetised residue	1	grit
AYLBER 07	1231	107	heat-magnetised residue	2	grit & stones
AYLBER 07	1231	107	heat-magnetised residue	2	grit
AYLBER 07	1241	108	heat-magnetised residue	15	fired clay, grit, stones
AYLBER 07	1284	110	heat-magnetised residue	16	fine grit
AYLBER 07	1284	110	heat-magnetised residue	15	fired clay, grit & stones
AYLBER 07	1284	110	heat-magnetised residue	14	stones
AYLBER 07	1293	109	heat-magnetised residue	0.5	grit & stones
AYLBER 07	1293	109	heat-magnetised residue	0.5	grit & stones
AYLBER 07	1313	111	heat-magnetised residue	6	fine grit
AYLBER 07	1375	112	heat-magnetised residue	7	charcoal & some stones (date?)
AYLBER 07	1375	112	heat-magnetised residue	8	grit & stones
AYLBER 07	1375	112	heat-magnetised residue	5	fine grit
AYLBER 07	1377	113	heat-magnetised residue	4	grit
AYLBER 07	1389	114	heat-magnetised residue	16	fine grit
AYLBER 07	1389	114	heat-magnetised residue	20	grit
AYLBER 07	1401	115	heat-magnetised residue	8	finely crushed
AYLBER 07	1401	115	heat-magnetised residue	2.5	grit & stones
AYLBER 07	1401	115	heat-magnetised residue	7	grit
AYLBER 07	1407	116	heat-magnetised residue	1	grit
AYLBER 07	1407	116	heat-magnetised residue	4	grit
AYLBER 07	1409	117	heat-magnetised residue	4	stones
AYLBER 07	1409	117	heat-magnetised residue	6	grit

AYLBER 07	1411	118	heat-magnetised residue	3	fine grit
AYLBER 07	1411	118	heat-magnetised residue	2	fine grit
AYLBER 07	1411	118	heat-magnetised residue	2	stones
AYLBER 07	1415	123	heat-magnetised residue	2	stones
AYLBER 07	1415	123	heat-magnetised residue	1	grit
AYLBER 07	1419	125	hammerscale	0	one large - possibly 2 - spheres
AYLBER 07	1419	125	heat-magnetised residue	0.5	
AYLBER 07	1419	125	heat-magnetised residue	2	grit & stones
AYLBER 07	1421	126	cinder	1	
AYLBER 07	1421	126	heat-magnetised residue	1.5	natural grit etc.
AYLBER 07	1421	126	heat-magnetised residue	4	fine grit
AYLBER 07	1421	126	heat-magnetised residue	4	stones
AYLBER 07	1423	127	heat-magnetised residue	6	grit & stones
AYLBER 07	1423	127	heat-magnetised residue	10	grit & stones
AYLBER 07	1423	127	heat-magnetised residue	4	stones
AYLBER 07	1425	128	heat-magnetised residue	2	stones
AYLBER 07	1425	128	heat-magnetised residue	7	grit & stones
AYLBER 07	1425	128	heat-magnetised residue	8	stones
AYLBER 07	1425	128	roasted stone	5	possible roasted ore
AYLBER 07	1432	120	heat-magnetised residue	6	fine grit
AYLBER 07	1432	120	heat-magnetised residue	6	fired clay, stones etc.
AYLBER 07	1432	120	heat-magnetised residue	2	stones
AYLBER 07	1434	121	heat-magnetised residue	2	
AYLBER 07	1434	121	heat-magnetised residue	2	stones
AYLBER 07	1434	121	heat-magnetised residue	4	grit
AYLBER 07	1436	122	heat-magnetised residue	10	grit & stones
AYLBER 07	1473	129	heat-magnetised residue	3	

AYLBER 07	1473	129	heat-magnetised residue	6				fine grit
AYLBER 07	1473	129	heat-magnetised residue	10				grit & stones
AYLBER 07	1494	130	heat-magnetised residue	10				fine grit
AYLBER 07	1494	130	heat-magnetised residue	4				stones
AYLBER 07	1494	131	heat-magnetised residue	7				
AYLBER 07	1494	131	heat-magnetised residue	7				stones
AYLBER 07	1494	131	heat-magnetised residue	6				fine grit
AYLBER 07	1535	136	heat-magnetised residue	5				grit & stones
AYLBER 07	1535	136	heat-magnetised residue	2				fine grit
AYLBER 07	1536	137	heat-magnetised residue	8				fired clay & grit
AYLBER 07	1538	135	heat-magnetised residue	8				fired clay & grit
AYLBER 07	1546	138	heat-magnetised residue	50				grit & stones
AYLBER 07	1548	139	heat-magnetised residue	16				fired clay, grit & stones, one iron wire fragment
AYLBER 07	1548	139	heat-magnetised residue	10				grit
AYLBER 07	1554	140	heat-magnetised residue	13				grit & stones (stone possible ore)
AYLBER 07	1558	141	heat-magnetised residue	20				grit & stones
AYLBER 07	1560	142	heat-magnetised residue	3				grit
AYLBER 07	1616	143	heat-magnetised residue	7				fired clay & grit
AYLBER 07	1626		fuel ash slag	26				
AYLBER 10	2524		undiagnostic	19				
AYLBER 10	2555	175	cinder	1				
AYLBER 10	2555	175	undiagnostic	37				
AYLBER 10	2679	177	iron-rich undiagnostic	9				
AYLBER 10	2679	177	microslag fragment	0.5				
AYLBER 10	2679	177	undiagnostic	1				
AYLBER 10	2744		iron-rich undiagnostic	24				
AYLBER 10	2748		smithing hearth bottom	210	90	70	35	
AYLBER 10	3074		undiagnostic	36				with charcoal inclusions
QAVC 12	3701	5	undiagnostic	12				
AYLBER 10	5582		iron-rich undiagnostic	57				
AYLBER 10	5582		iron-rich undiagnostic	216				x1; very dense

AYLBER 10	5582	smithing hearth bottom	629	120	100	50	
AYLBER 10	5582	undiagnostic	708				could be parts of smithing hearth bottoms
AYLBER 10	5602	slagged flint	54				
AYLBER 14	7166	cinder	12				
AYLBER 16	9224	heat-magnetised residue	3				

Total wt. = 2.7kg

Explanation of terms

Activities involving iron can take two forms, smelting or smithing:

Smelting is the manufacture of iron from ore and fuel in a smelting furnace. The products are a spongy mass called an unconsolidated bloom consisting of iron with a considerable amount of slag still trapped inside, and slag (waste). No diagnostic smelting slags were present in the Berryfields assemblage.

The diagnostic slags recovered were those of smithing. *Smithing* involves the hot working (using a hammer) of the bloom to remove excess slag (primary smithing) or, more commonly, the hot working of one or more pieces of iron to create or to repair an object (secondary smithing). As well as bulk slags, including the smithing hearth bottom (a plano-convex slag cake which builds up under the tuyère hole - hottest part - where the air from the bellows enters the hearth), smithing generates micro-slags; these can be hammerscale flakes from ordinary hot working of a piece of iron (making or repairing an object) and/or tiny spheres from bloom smithing or high temperature welding used to join or fuse two pieces of iron.

Hammerscale, because of its tiny size, is usually only recovered by taking soil samples from fills and deposits but it is very magnetic and its presence can be detected using a magnet; it is most prevalent (thickest) in archaeological contexts in the immediate area of smithing, i.e. in the vicinity of the anvil and between it and the smithing hearth. Virtually no hammerscale was recovered from the site.

Slag described as undiagnostic cannot be assigned to smelting or smithing either because of morphology or because it has been broken up during deposition, re-deposition or excavation. Other types of debris in an assemblage may derive from variety of high temperature activities - including domestic fires - and cannot be taken on their own to indicate iron-working was taking place. These include fired clay, vitrified hearth lining, cinder and fuel ash slag. If found in association with iron smelting and/or smithing slag they are almost certainly products of the process.

Slag types in the assemblage:

Slag type	Wt (g)	Process
cinder	2	not diagnostic
hammerscale	0	smithing
iron-rich undiagnostic	605	smelting or smithing
smithing hearth bottom	839	smithing
undiagnostic	877	smelting or smithing
Total weight =	**2323**	

Key groups

There are no serious contenders for a key group but medieval group 5597 from ditch [5581], (5582) best qualifies.

Discussion of the assemblage
The amount of slag recovered was small: just 2.3kg of which 1.7kg is represented by the two smithing hearth bottoms. The rest of the material is heat-magnetised grit, small stones, sand and occasional fired clay, all of which had been recovered from samples.

It is in Phase 3 that small quantities of slag appear: 245g from Group 8016 (ditches 2675 and 2743). No focus of activity is represented by the material and it was probably generated by one-off activity.

It is Phase 8, the medieval period, which is of most interest for slag. The group 5587 (ditch 5581, context 5582) is diagnostic evidence of smithing and all 1.6kg of the slag probably originated from the same forge.

Significance of assemblage
The assemblage is of no significance except to demonstrate a lack of iron making and iron working in past periods on this site or – as in the medieval period – possible one-off episodes after which the slag was discarded and dispersed by re-deposition.

Importance – locally, regionally, nationally
The assemblage is of no importance except to demonstrate that no local intensive ironworking took place on the site.

Recommendations for further work
No recommendations are made for further work other than that a geologist should examine the pieces of slag flagged up in the comments column of the quantification table as possibly being iron ore.

The assemblage could, if space is at a premium, be discarded.