

# GeoArch

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Evaluation of archaeometallurgical  
residues from Aghaloo, Co. Tyrone  
(AE/05/116)

Dr Tim Young  
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# Evaluation of metallurgical residues from Aghaloo, Co. Tyrone (AE/05/116)

Dr T.P. Young

## Abstract

*The assemblage from Aghaloo was extremely small. Contexts associated with hearth c127 (its fill c109, slumped material c147 and the fills of two postholes c139 and c143) yielded nine fragments of slag material, with a total weight of just 41g, as well as a tiny fragment of archaeometallurgical ceramic, just possibly from a crucible. All the identifiable slag materials were the products of iron-working (smithing). The fuel employed was almost certainly charcoal and the technology provides no great constraint on age (probably pre-20<sup>th</sup> century). The presence of a nail within the hearth suggests that a historic date is more likely than prehistoric. A single slag fragment (0.3g) was recovered from a separate pit (c116).*

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## Methods

All pieces from the assemblage were examined under a low-powered binocular microscope and weighed (although some particles were below the limit of sensitivity on the electronic balance and are recorded as < in the catalogue).

## Results

The assemblage contained two pieces that were identifiable as fragments from smithing hearth cakes (SHCs), including the piece tentatively identified as tapslag. This piece (from c134, which is assumed to be equivalent to c147) was part of an extremely fluid small slag cake with a cake thickness of about 25mm, of which the lower crust comprises approximately 10mm. Overall cake size is not determinable. A second, much smaller, SHC fragment was recovered from the fill of a posthole sealed by the hearth.

Tiny fragments of unidentifiable iron slag were found in the hearth fill (4 pieces), possibly from the slumped material (c134/147), and from one of the postholes sealed by the hearth (c143)

Material normally classed as microresidues were recovered from the hearth fill (c109: 1 slag sphere) and from a posthole sealed by the hearth fill (c143: 1 slag sphere, 1 piece of slag "flat"). The slag spheres are likely to be spheroidal hammerscale, although they are towards the upper size limit for true spheroidal hammerscale and may be slag droplets formed by dripping within the hearth.

A small piece of slag (0.3g) from c108 is extremely unusual. It appears to have cooled in an approximately rounded hole, 8x11mm (although only half of this is preserved). The piece has a thickness of approximately 3mm.

The hearth fill, c109, yielded a single tiny fragment of what may be a crucible. The material is clearly an archaeometallurgical ceramic, for its grey, reduced fabric is deeply vitrified and it has a brown slag layer adhering to its concave surface (the opposite surface is not preserved). The preservation of only a single

surface, and the lack of any colouration in the slag or vitrification associated with a non-ferrous metal means that identification as a crucible is far from certain. The attached slag is dark in colour and might be an iron slag.

Pieces within the assemblage that are not archaeometallurgical residues include stone fragments (c109), iron pan fragments (c109, c134) and a nail (c109).

## Interpretation

The assemblage includes two pieces of smithing hearth cakes, two possible pieces of spheroidal hammerscale (or within-hearth droplets) and a piece of slag "flat". Slag "flats" include material that is either a slag layer on the workpiece surface (like extremely thick flake hammerscale) or a layer on the smith's tools (tongs or poker). This assemblage is derived from iron-working (smithing).

The presence of a small nail within the hearth fill is not necessarily indicative of the product of the smithing, with such material often entering hearths as debris on abandonment.

The possible crucible fragment is not sufficiently well-preserved to be confident of that identification. Small concave areas are common, for instance, on the tips of ceramic tuyères; a location where quartz grains also accumulate both from partial melting of the tuyère and from accumulation of the sand flux employed by the smith.

The iron pan mottles are typical of those formed in low degrees of iron mobility during diagenesis, but are particularly common in iron-rich ash.

The limited evidence from the nature of the slags and from the single example of charcoal adhering to slag (as well as the recorded abundance of charcoal in the hearth fill), suggests that charcoal was employed as the fuel in the smithing.

Dating such a limited assemblage is difficult, and charcoal fuelled smithing persisted in some circumstances into the 20<sup>th</sup> century, but a pre-19<sup>th</sup> century age is likely. The occurrence of a nail would slightly favour a historic rather than prehistoric date.

The nature of the deposit and containing feature is difficult to determine on the basis of the present evidence. If the feature is a hearth rather than a dump of rubbish from elsewhere, then a lack of other forms of artefact/residue might be expected. If the charcoal-rich material is mainly or entirely from a smithing hearth then rather more microresidues might be expected. The smallest recorded sieve fraction is 2mm, which is fairly large for retaining hammerscale; it would be interesting to know whether magnetic separation was attempted from the 0.1 to 2mm fraction. If this was attempted, and no hammerscale found, this negative evidence might argue against the material being directly from a smithing hearth (whether in-situ or redeposited), but if the lack of hammerscale is related to that size fraction not being examined, then the possibility remains open.

## Evaluation of potential

The assemblage is indicative of charcoal-fuelled smithing and has limited potential to reveal further information. The sole item possibly worthy of further investigation would be the possible crucible fragment. Analysis of the slag layer (for instance by ED-XRF) might reveal whether this is indeed a crucible used for non-ferrous metals (and if so what sort of metal) or whether the slag is simply an iron slag adhering to a fragment of hearth structure.

context	sample	label	weight (g)	description
<b>Fill of hearth c127</b>				
109	ss7	misc	1.08	pale soft material with two almost planar converging faces - this is probably a natural stone fragment
			0.5	heavily vitrified quartz-rich grey reduced material with thin vesicular slagged surface, probably a crucible fragment, but could be quartz-rich furnace lining
109	s16 sieve 2mm	slag	<	slag sphere plus 4 tiny slag fragments
109	s23 sieve 4mm	slag?	<	c8 fragments of soft brownish material - probably, but not certainly, a natural iron pan mottle
109	s23 sieve 2mm	slag	0.27	c10 fragments of weathered iron-rich rock or iron pan mottle
			<	dark slag(?) fragment
109	s23	metal/slag	2.29	small corroded nail tip
<b>Slumped hearth material (134=147?)</b>				
134	ss12	misc	33.3	dense slag piece probably from very fluid smithing hearth cake. The fragment suggests shallow bowl of about 25mm depth with 10mm crust. Crust has spheroidal vesicles and has some included ?quartz grains.
134	s19 sieve 4mm	slag	0.16	fragment of slag or "rust" (probably latter)
			0.09	ferruginous almost tubular piece - probably a natural concretion around a wormhole/root
<b>Fill of posthole c139 sealed by hearth</b>				
140	s17 4.00mm	slag	6.41	small fragment almost certainly from a smithing hearth cake; has large vesicles and has charcoal on one end
<b>Fill of posthole c143 sealed by hearth</b>				
144	s18	slag	0.01	slag sphere
			0.44	slag flat
			0.78	5 irregular slag blebs, some rusty (at least one is just possible a slag fragment worn smooth)
<b>Fill of pit c116 in group to N of hearth</b>				
108	ss1	metal	0.33	curious semicircular slag fragment. Slag is fine, vesicular and looks clinkery. Apparently half a slag disc, edge clearly constrained and one face seems to have been in contact with something - perhaps this is slag that has formed inside a small cavity in a tool. If symmetrical would have been c 8 x 11mm.

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*geoarchaeological, archaeometallurgical & geophysical investigations*

54 Heol y Cadno,  
Thornhill,  
Cardiff,  
CF14 9DY.

*Mobile:*  
*Fax:*  
*E-Mail:*  
*Web:*

07802 413704  
08700 547366  
Tim.Young@GeoArch.co.uk  
www.GeoArch.co.uk