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Assessment of archaeometallurgical residues from Greyfrairs, Hereford, BSH16

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Abstract

The submitted material comprised 1.56kg (10 pieces) of smithing slag. Four of the pieces are complete, or substantially complete, smithing hearth cakes (SHCs), and these have weights ranging from 128-368g. All the observed evidence for fuel indicated the use of charcoal. One SHC had been broken off to include the adjacent wall with the lower part of a 22mm diameter blowhole. Several of the pieces suggested rather low-density SHCs dominated by sloughed wall material, whereas others were dense slag. Most of the pieces appeared to suggest formation in an attitude where they were formed inclined steeply down in front of a slightly overhanging hearth wall.

The variety of SHC types suggests derivation from a forge undertaking a variety of work, rather than a repetitive 'industrial' task.

Many of the pieces showed the presence of amounts of coarse sand, unlike the observed sand component of the wall ceramic, suggesting the use of a flux of crushed sand ranging up to about 2mm grain size.

Such straightforward blacksmithing slags are hard to date with confidence, but the features of the present assemblage might favour an earlier medieval age (perhaps 11th-13th centuries), although a very wide age range (Iron Age to Medieval) is possible.

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Methods

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, not to any form of instrumental analysis. The identifications of materials in this report are therefore necessarily limited and must be regarded as provisional.

This project was commissioned by Ed McSloy of Cotswold Archaeology.

Results

The assemblage comprises examples of smithing hearth cakes and fragments of similar material. The pieces are individually described in Table 1. The assemblage is very small, so the amount of interpretation possible is somewhat limited.

The pieces are indicative of SHCs with a wide range of sizes, textures and iron contents. This is probably indicative of a range of tasks and work-periods – suggestive of a general purpose forge, rather than a repetitive 'industrial' process. The denser slags are associated with evidence for a coarse quartz sand, distinct from the sand present in the observed hearth wall ceramic, which may suggest this quartz is unreacted (or only partially-reacted) welding flux.

The hearth ceramic contact is preserved in several pieces and the lower part of the blowhole in one. The blowhole was approximately 22mm in diameter – typical of examples from smithing hearths. This piece showed an angle of approximately 85° between the descending hearth wall and the axis of the blowhole bore, indicating the wall was probably slightly overhanging.

Those slag pieces with evidence for attitude, suggested formation in a fairly steeply inclined location down the wall. The top of the example including the blowhole showed an angle of approximately 50° between the top of the SHC and the bore of the blowhole. There was no evidence that the blowhole

Many of the fragments showed either the impression of charcoal fragments on the surface, or preserved charcoal pieces. None showed any evidence for the use of coal.

The four reasonably intact SHCs showed a range in weight from 128-368g.

Interpretation

These smithing slags are indicative of charcoal fuel and a hearth with a simple blowhole in the clay wall. The observed weight-range (albeit based on a very low number of specimens) would be typical of blacksmithing slags formed in such an environment – and as such they might theoretically have been produced at any period from the Iron Age. However, the use of simple blowholes in clay walls is unlikely after the later medieval period (15th century onwards; when iron tuyères, first of wrought iron and later of cast iron, progressively became the norm).

These slags include both dense iron slag and less dense wall-derived slags, but they do not the gravelly-textured material, that is so common in many residues believed to be from floor-level hearths. Such material is particularly characteristic of, but not restricted to, Roman assemblages. The 'cleaner' assemblages such as the present one, may derive from floor level hearths cut into a firm substrate, but are also characteristic of material from constructed hearths. Hearths may have been constructed rather than cut at almost any period, but become progressively more common over time, particularly with the Roman and later increasing use of waist-level hearths.

Post-medieval blacksmithing and much Roman blacksmithing commonly employed coal as fuel, although there are plenty of exceptions.

On balance, the present assemblage might be favourably compared with those from Willow Street and Mill Street, Worcester, of earlier medieval age (11th-12th centuries; Young 2007, 2009). However, that is a very tentative comparison and a wide range of dates would be possible.

Conclusion

It is likely that the present limited material would not yield further useful information on detailed analysis, so no further analysis of the assemblage from the evaluation is recommended. The material does however indicate that any subsequent work should be take consideration of the likelihood of encountering more significant residue and structural evidence for ironworking.

References

Young, T.P. 2007. *Evaluation of archaeometallurgical residues from Willow Street and Mill Street, Worcester*. GeoArch Report 2007/12. 10pp.

Young, T.P. 2009. *Evaluation of archaeometallurgical residues from 35 Mill Street, Worcester*, GeoArch Report 2009/33, 9 pp.

Context	Item wt. (g)	Notes
3005	368	80x90x55(40) mm, dense SHC; top wispy, rusty with some charcoal; base dense, with a well-formed convex surface with fine dimples; bowl well-formed, 40mm deep, slightly dished buried top, with upstanding wispy slags, wisps most raised on one side where there are two grooves in SHC face - so possibly slightly deformed during extraction.
	326	90x95x40mm, dense SHC attached to wall fragment, containing lower half of blowhole; top of SHC at 50 degrees to axis of 22mm diameter blowhole, which has longitudinal internal striations; wall face overhanging by 5 degrees with respect to borehole axis; lower face of SHC slightly prilly into fine charcoal (present in deep dimples); top flat and rusty, overlain by lining slag near blowhole and this continues up the walls laterally; wall fabric strongly foliated, possibly slightly bulbous around blowhole; strongly oxidised 25-30mm radius around from blowhole, buff/grey beyond; possible fine temper (hair?) in ceramic; sloughed wall material extends out 35mm from wall, whole SHC extends 60mm at tip; top shows angular quartz to c2-3mm, such coarse quartz not seen in wall fabric so may be flux.
	188	60x80x50mm, rather rectangular, low-density SHC, probably slab-like down-wall, small smooth-blown area at one end, very irregular in form, base lightly dimpled
	128	80x50x35mm, small down wall SHC with strongly maroon top, top largely smooth, base irregular formed of pendent sections, distal section is slightly prilly on base
	72	fragment of plate-like SHC, very dense; 50x55x15mm fragment; base well dimpled, top with broad dimples; dense slag appears to contain distinct flow lobes of lining slag and has a slightly maroon surface, except for lining slag lobes.
	90	irregular broken fragment of SHC-like mass formed of sloughed lining and some discrete angular lining slag blocks
	116	irregular fragment of contact between dense SHC and oxidised wall; wall finely sandy, but slag contains layers rich in quartz grains of a larger grain size, as well as some strongly bloated, but low-quartz zones
	100	mass of dense slag, smooth haematised top, base is prilly and at c. 45 degrees to top - so probably toe of down-wall SHC rather than small sub-blowhole mass
	98	irregular mass of coalesced nubs of lining-dominated iron slag; probably deformed into this shape; iron-rich parts have haematised surface
	74	fragment from tip of very dense SHC; haematised top, smooth centrally, but around periphery show lots of sand; slightly tubular vesicles near base; one side of V-section base shows fuel-dimpled surface, the other side is rough and sand-rich

Table 1: summary catalogue

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