

Evaluation of metalworking residues from Glebe Ringfort, County Dublin (Site 43 00E0758)

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Abstract

The slag assemblage of forty four numbered finds includes nine pieces identifiable as smithing slags, ten pieces probably so, and four probably not slags. The total weight of the slag material was 5.2kg. Thus smithing slags (certain or probable) comprise 48% of the slag assemblage by number and 78% by weight. Of the remaining less certain material, there are no specimens which are certainly not smithing slags. The likelihood is therefore that the entire assemblage was produced by smithing. The sediments bagged as possibly containing hammerscale, included a large proportion of strongly magnetic grains, but these did not have the morphology of hammerscale. The small sample examined showed magnetic grains of stone and fired clay(?) with a dominant grain size of 1-4mm. It seems likely that they were produced by the heating of clay and sand, probably in a non-metallurgical context.

The assemblage represents a low level of blacksmithing activity, with no evidence for the smithing to have been associated directly with the features yielding the magnetic sediment. It would appear that the magnetic material has been derived through intense heating of iron-rich materials, but whether these were derived from the feature itself, or the fuel employed, remains to be determined.

Follow-up investigation of this material should include production of a full catalogue and a detailed investigation of the magnetic grains from the soil samples to investigate whether more can be determined of their origin. Detailed analytical study of the macroscopic smithing slags could be undertaken, and would enhance the regional dataset, but would be unlikely to generate data of immediate impact to this project.

Contents

Abstract	1
Description of material	
Macroscopic material.....	1
Microscopic material.....	2
Discussion	2
Recommendation for future work	2
References	2

Description of material

Macroscopic material

The macroscopic slag collection comprises 40 numbered finds which are probably slags, with a total weight of 5.2kg. The collection is therefore relatively small (although the site description does not indicate the proportion of the site dug). The slag assemblage contains three morphological classes of large slag pieces (>100g):

1. Plano-convex smithing hearth cakes with relatively homogeneous fayalitic slag. Some examples may show protrusions from lower surface. There are few moderately intact cakes in the assemblage and the examples are also rather variable, so it is impossible to generalise on their morphology or size. The cakes vary from low convexity, elongate forms, to others of strong convexity.
2. Probable small smithing hearth cakes with abundant included rock granules. These are of low density, and is unclear at present whether the inclusions represent sloughing of the hearth wall or whether they indicate a deliberate flux.
3. Dense slags showing a more tabular- or sheet-like morphology.

All three classes of slag are likely to be derived from blacksmithing process. The homogeneous plano-convex cakes could be considered as "typical"

products of blacksmithing using charcoal as fuel. Several pieces show impressions or inclusions of the fuel. The only slightly unusual aspect of the group is that they are fairly large: the only fairly complete cake weighs 900g, most of the other material, including pieces of 500g, represents fragments of cakes. Blacksmithing slag cakes may vary between 100 and 2000g (Crew 1996), but are usually in the range of 200-500g. Larger slag cakes may reflect longer tasks (or at least a longer interval between clearing the hearth) or processes involving a larger loss of metal from the workpiece to the hearth (e.g. major welding tasks).

The small cake and several fragments which show abundant coarse sand/fine gravel inclusions are interesting. They probably represent sloughing of gravelly furnace lining into the hearth, but might instead be examples of deliberate flux addition. The slags from Hengistbury Head described by Salter (1987) included varieties (his classes PC1a and b) similar to ordinary smithing slags, but greener and bearing added chert. Salter suggested that the chert-bearing slags might have been from a copper purifying process fluxed through addition of silica. The analytical data he presented did little to support this idea.

The author has recently been examining an assemblage from a Roman smithy in Dorset, where many of the cakes contain a high proportion of flint and appear greener than the cakes without flint. Analysis of these suggests that they are blacksmithing slags and that the flint may have been a deliberate addition, either as a flux on the metal surface, or to increase the fluidity of the slags in the hearth (although again, wall collapse is hard to exclude as a source of these particles).

The specimens with a sheet-like morphology are difficult to interpret. They indicate accumulation of slag against the floor of a hearth (and as such might be termed *hearth bottoms*). Such slags may occur in iron smelting furnaces; thin dense slag sheets are sometimes found amongst bloomery slags, suggesting a thin layer of slag may be left in the furnace bottom after tapping. There are no other slags in this assemblage which suggest an origin in smelting rather than smithing, and it is equally possible that if a particularly fluid slag is produced in a small smithing hearth, it will drape the hearth bottom, rather than form a typical plano-convex cake attached to the wall.

The more fragmentary materials in the collection are generally either small pieces referable to the classes of slag above, or are pieces which are dominated by melted hearth wall.

Microscopic material

An examination of the already-separated material was conducted. The particles proved to be highly magnetic. The picked samples were washed, and sieved at 200µm. The sieved material was then again magnetically separated and inspected optically.

The magnetic material was found to be quite large (mainly in the 1 – 4mm range), moderately well rounded, and dominated by pale, fine-grained particles, interpreted as fragments of fired clay. Other granules were darker in colour and appeared to be lithic grains. None of the separated grains was hammerscale.

Recommendation for further work

Given the wide variety of slag morphology present in the collection and the attribution of those slags to blacksmithing, it seems unlikely that detailed analysis of the collection will yield substantial new data of direct benefit to this project. Although the presence of slag with large siliceous grains is interesting, the small amount and rather weathered nature of this material means it is not the ideal assemblage on which to pursue the issue. I would recommend that any additional work is focused on the investigation of the strongly magnetic particles present in the soil samples and on completion of a catalogue for the site archive/publication:

1. Preparation of full catalogue of macroscopic slag specimens, with hand specimen descriptions.
2. Investigation of the magnetic soil particles under the analytical SEM to attempt to determine their origin.

References

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