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Evaluation of archaeometallurgical residues from Ffynnonwen, Ceredigion

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Abstract

The small assemblage of material from Ffynnonwen that was submitted for evaluation contains a variety of materials, only one piece of which is certainly residue from ancient pyrotechnological activity, and that is not certainly metallurgical. This piece is a vitrified and slagged slab of ceramic of uncertain origin, but possibly from an iron-working hearth.

Other materials included a fragment of probable post-medieval bottle glass, together with several pieces of coal (which does not occur naturally in this area and is likely to have been brought to the site in Roman or later periods). Three samples are of purely local natural material and one is heavily corroded but may be an iron artefact and is worth X-ray imaging.

Contents

Abstract	1
Methods	1
Results	2
Interpretation	2
Evaluation of potential	2

Methods

All materials were examined visually, using a low-powered binocular microscope where necessary. All significant materials were weighed and recorded to a database (Table 1).

As an evaluation, the materials were not subjected to any high-magnification optical inspection, nor to any other form of instrumental analysis. The identifications of materials in this report are therefore necessarily limited and must be regarded as provisional.

Results

find	context	notes
905	4	block of vitrified hearth lining
901	2	possible artefact or natural
904	6	natural concretion
906	6	coal
907	27	1 piece bottle glass, 7 pieces of coal
912	107	coarse sandstone
	u/s	natural mineralisation

Table 1: list of materials

The submitted collection contains one significant piece of possible archaeometallurgical residue. Find #905 (context 4) is a block of vitrified and slagged ceramic weighing 175g. The ceramic has a reduced-fired grey silty fabric and is deeply vitrified, both from the original surface and from internal cracking. It has one flat, deeply vitrified face with a dark, almost black, glassy slag adhering. The slag surface shows small dimples, probably from contact with the fuel. The ceramic below this face shows intense vesicularity to a depth of 8-10mm below the surface.

Only a small section of the probable opposing flat face survives, but enough to suggest the ceramic had a slab-like form, with a thickness of 40mm thick. This opposing face shows very little vitrification. The piece shows fractured surfaces both into the slab and laterally, but preserves the slab margin. The slab margin is angled back from the slagged surface to the relatively unaltered face at approximately 45° to the slab orientation. Irregular globose slag masses extended from the smoothly vitrified face onto this face, suggesting slag flowage off the vitrified face. This terminal face appears to have received little direct heating and is therefore presumably original. The irregular slag is, in places, covered in secondary iron corrosion products.

The function of this piece is not identifiable. Its morphology suggests that it formed a plate jutting into a hearth or furnace – and as such might be lower margin of some sort of ceramic tuyère, but the details are hard to equate with any particular known tuyère style. The intensity of the vitrification and slagging certainly suggest an origin in a metallurgical process and the rusty accretion may suggest an elevated iron content for inclusions with the slag. On balance, an origin of this piece within the technical ceramic of a smith's hearth is probably most likely. Elevated temperatures sufficient to melt ceramic materials may, however, be achieved in a wide variety of settings (both deliberately and accidentally).

Material from context 27 (find #907) includes a small fragment of greenish-brown glass, which would appear most likely to be a fragment of post-medieval bottle glass.

Also in the same sample were numerous small fragments of coal and a single piece of coal was also recovered from context 6 (find #906). Coal is not found naturally in this area, nor is the area likely to be receiving significant amounts of coal from the glacial drift, so these pieces will have arrived at the site by human agency. The occurrence of the coal alongside the post-medieval glass in context 27 may provide a hint that the coal is a relatively recent arrival. Small coal fragments are common in agricultural areas either as a contaminant in lime or as residues from traction engine boilers. However, in both cases burnt coal (coke), burnt coal shale and clinker usually accompany any fresh coal. Coal has been used in South Wales as a fuel from the Roman period, so an earlier origin is also possible, particularly in view of the relatively close proximity of the Pembrokeshire coalfield.

Find #91 (context 2) is (superficially) iron corrosion products with included natural shale fragments. Such a material might arise from decomposition of natural ferruginous concretions, but in this instance a rather dense section of iron oxides at one end of the piece provide a hint that this may be an iron artefact. X-ray imaging of the piece to ascertain this might be worthwhile.

Other materials from the site include a fossiliferous ferruginous concretion from the bedrock (context 6), a piece of coarse ferruginous sandstone (context 107) and a piece of weathered mineralised rock either from a concretion or vein (unstratified).

unknown. The occurrence of coal fragments on the site may indicate an early (but unlikely to be pre-Roman) use of coal as fuel. However, the occurrence of much of the coal in the same context as a piece of probable post-medieval bottle glass means that later contamination is hard to exclude.

The overall lack of significant archaeometallurgical residues from the excavations implies that metalworking is unlikely to have been a significant activity on the site, at least within the excavated portion.

Evaluation of potential

The material has little potential for useful further investigation.

Interpretation

The single piece of vitrified ceramic fragment provides evidence for a high temperature pyrotechnological process, but the precise nature of that process remains

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