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Assessment of materials from Nant y Gamar Road, Llandudno (NGL/23/SME)

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Abstract

The submitted assemblage comprised a total of 43 pieces (291g) of fuel ash slag (FAS) from 9 stratified contexts and 6 pieces of natural rock.

The most likely origin of the fuel ash slags is from a substantial non-metallurgical hearths, but other sources are also possible, such as corn-drying kilns.

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Methods

All materials were examined visually, using a low-powered binocular microscope where required. The identifications of materials in this report, as an assessment during which no instrumental analysis was undertaken, are necessarily limited and must be regarded as provisional.

This assessment was conducted in August 2024 and was commissioned by Dr Rhiannon Philp of Archaeology Wales. The materials derive from the work of Archaeology Wales on land adjacent to Nant y Gamar Road, Llandudno (project NGL/23/SME).

Results

General

The submitted assemblage comprised a total of 43 pieces (291g) of fuel ash slag (FAS) from 9 stratified contexts and 6 pieces of natural rock.

The summary catalogue is presented as Table 1.

Fuel ash slag

The submitted collection includes 43 pieces (291g) of fuel ash slag (FAS). The FAS shows a range of textures, with a range in the scale of porosity from sub-millimetric to over 40mm across.

The slag is mostly pale in colour, mostly pale grey or cream in colour, but locally with slight greenish tint. Where the external surfaces of fragments could be seen, they commonly showed a maroon colour, over at least small areas.

Materials from contexts (83) and (92) was much coarser – both in terms of the size of the vesicles (up to at least 40mm) and lobes, but also the size of the fragments. These pieces probably derive from sheets of some considerable size. Both compare in texture with examples from Bornais Mound 1 (Young 2012a) and from Malmesbury (Young 2009, 2011). Other contexts mostly showed rather finer material.

One piece from context (227) showed a rather different structure. This 5.00g fragment was of vitrified and bloated hearth wall. The grey wall ceramic bore some grit, become increasingly bloated outwards and the surface was locally capped by a green wood ash external glaze. This piece was thus texturally between a typical lining slag and the other FAS pieces. It is likely to represent a fragment from the wall of a hearth, perhaps at a higher level than the FAS forming on the hearth base but might perhaps have a separate origin to the other pieces.

Other materials

Other components within the submitted assemblage were restricted to pieces of natural rock.

All items presented from context (6) were igneous rocks, probably tuffs, comprising medium-grained feldspathic phenocrysts in a fine matrix. Four pieces were very similar (perhaps from a single fractured clast) and had a very fine grained (chloritic?) groundmass. The fifth piece was of a harder lithology, with a lower frequency of phenocrysts.

A single piece (5.84g) from context (227) was a coarse-grained lithic sandstone.

Interpretation

Fuel ash slags are the product of the partial melting of a substrate under the fluxing action of particularly, calcium and potassium, contributed by both the fuel and substrate. The major fluxing elements in wood or charcoal burning hearths.

The typical texture, as seen here, is probably largely generated through the production of FAS from a rather granular substrate. Small particles of the sub-soil become incorporated into the slag. The partially melted material will co, imparting a granular nature to the slags. Those fragments are bound by the glassy slag of the more completely melted parts. They will contain relict grains (mostly of quartz) and develops a highly vesicular texture because gasses cannot escape through the extremely viscous melt. The gasses will include water vapour and carbon dioxide (the latter particularly from the decomposition of calcium carbonate minerals). In geological terms such a material is a 'buchite'. A less characteristic texture is provided by the single piece from the side of a hearth.

Fuel ash slags are not characteristic of any particular process but indicate a hearth, particularly one cut into an unconsolidated substrate, that has spent a considerable time at elevated temperature. Several archaeologically significant processes/installations may produce FAS under appropriate conditions: cereal drying kilns. (e.g. South Hook, Young 2010a, 2010b; Llandeilo, Young 2015; Bornais, Young 2012a, 2020), large hearth (e.g. Mound1 at Bornais, Young 2012a; probably all those occurrences described as 'Iron Age grey slags' in central and eastern England (Cowgill 2000, 2008; Cowgill et al. 2001; Swiss & McDonnell 2001; Young 2009, 2011, 2013; 2023 Young & Bowstead Stallybrass 2003).

The present material, with its examples of pieces from thick sheets with large voids compares most closely with examples probably from large hearths at Bornais Mound 1 (Young 2012a) and from Malmesbury (Young 2009, 2011), rather than with those from corn drying kilns. The particular association of FAS of this type with the Middle Iron Age is likely to be cultural, perhaps due to the continuous maintenance of a substantial hearth. The relative abundance of occurrences in the East Midlands is likely to be reflective of the widespread occurrence there of calcareous substrates. The present example also derives from a site on, or adjacent to, calcareous geology.

Further work

No further investigation of these materials is recommended.

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Table 1: summary catalogue, weights in g,

Context	wt	no.	notes
6	11.26	5	all natural rock fragments; 4 (9.83g) are probably from a tuff rich in feldspar phenocrysts, set in a dark fine groundmass; 1 (1.43g) I a rounded pebble of harder pale grey rock with feldspar phenocrysts.
20	9.58	4	one rounded nub (8.88g) and three small angular fragments of FAS. The 'nub' appears rounded through abrasion, rather than an original form, grey slag, very sandy; the small fragments are more highly vesicular pale FAS.
66	8.64	2	angular fragments of pale FAS; where the surface is preserved, it is dark, with small areas slightly reddened.
83	184	8	pale FAS, relatively dense slag in very coarsely vesicular and crudely lobate fragmented masses; voids to >40mm; pale green to cream, locally with grey and purple bloated clasts; locally gritty.
87	1.77	1	small angular fragment of variable FAS, convoluted surface almost purple, internally locally sandy
92	56.64	20	pale FAS with broad lobes (20mm scale), and large vesicles (>5mm), suggesting of derivation from a large sheet; the upper surface is smooth but lobed, the lower faces show adhesions of more cream-coloured slag; one piece shows a strongly violet-coloured (internally) bloated stone/ceramic fragment.; some fresh breaks show a very pale green colour to the slag internally.
227	10.84	2	5.84g, dark greywacke - very coarse lithic sandstone; 5.00g of vitrified and bloated hearth wall, - grey ceramic with some grit, becoming increasingly bloated and locally with a green wood ash external glaze (between a typical lining slag and a FAS)
144 <19>	24.38	4	rounded lumps of grey FAS, sandy, locally gritty, with brownish surfaces
215 <25>	0.16	2	small fragments of pale, cream-coloured FAS
292 <28>	0.42	1	slightly denser FAS, grey, lower degree of vesicularity, surface locally red/purple.

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