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Assessment of archaeometallurgical residues from Clonee, Co. Meath (15E0583)

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Abstract

The assemblage comprised approximately 0.5kg of material, from a burnt pit ([204], sample #71, Fulacht 'G'). The assemblage consisted of seven dark rounded lumps, with some adhering charcoal-rich clayey matrix. The lumps were given a further, more aggressive, cleaning to clarify their surface features, with the washings sieved at 100μm and separated magnetically.

The lumps had a coarse (with peds of up to 4mm) mottled internal texture. The individual peds were varying shades of brown, with the whole lump having a darker brown denser external crust. From the outside, the crusts showed small (<5μm) outgrowths of a dark mineral with a slightly metallic lustre. The external parts of the nodules showed attached clay matrix, with small charcoal fragments present. The charcoal appeared to be mainly fine weed/leaf charcoal rather than woody material. Charcoal was also present in the 'rusty' veins penetrating between the peds in the interior of the lumps, but no certain examples were observed within the peds.

The washings comprised small fragments of dark material, some of which were attracted to a magnet, similar to the larger lumps. The finer material appeared to be comminuted debris of the same general form, together with some more 'rusty' material.

The assemblage may be interpreted as a low-grade bog iron ore. The evidence at macroscopic scale as to whether the mineralisation occurred prior to incorporation of the lumps into the archaeological context of afterwards is slightly ambiguous, but an origin of the concretionary lumps after formation of the archaeological deposit seems most likely. The magnetic properties of the fines suggested that some of the small iron-rich particles had been subjected to the burning event in the pit.

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Methods

All materials were examined visually, using a low-powered binocular microscope where required. As an assessment, the materials were not subjected to any high-magnification optical inspection, not to any form of instrumental analysis. The macroscopic lumps were given a further aggressive cleaning with a toothbrush to clarify their surface features. The washings derived from this process were sieved at 100μm and separated magnetically.

The identifications of materials in this report are therefore necessarily limited and must be regarded as provisional.

This assessment was conducted in August 2017, and was commissioned by Paul Duffy of IAC.

Results

The assemblage comprised approximately 0.5kg of material, which consisted of seven dark rounded lumps, with some adhering charcoal-rich clayey matrix. The assemblage derived from sample #71, from the fill of burnt pit (204).

The lumps had a coarse (with peds of up to 4mm) mottled internal texture. The individual peds were varying shades of brown, separated from each other by simple joins, zones of paler 'rusty' material and locally by open fissures (sometimes with a grey clay infill). The lumps had a darker brown, denser, external crust. From the outside, the crusts showed small (<5μm) outgrowths of a dark mineral with a slightly metallic lustre. The external parts of the nodules showed attached clay matrix, with small charcoal fragments present. The charcoal appeared to be mainly fine weed/leaf charcoal rather than woody material. Charcoal was also present in the 'rusty' and clay veins penetrating between the peds in the interior

of the lumps, but no certain examples were observed within the peds themselves.

The washings comprised small fragments (<8mm) of dark material, some of which were attracted to a magnet, similar to the larger lumps. The finer material (<1mm) appeared to be comminuted debris of the same general form, together with some more 'rusty' material.

Magnetic separation of the washings separated examples of both the larger fragments and the fine-grained debris. In the lack of any detailed petrographic evidence, it seems most likely that magnetic separates are indicative of heat-altered material (in which other iron minerals have been converted to magnetite, or more likely, to maghaemite).

Interpretation

The colour of the material indicated iron/manganese mineralisation. The texture of coarse peds was that of a mottled bog iron ore (in which the 'mottles' are peds).

The presence of the abundant fine charcoal in the matrix and of the magnetically enhanced particles indicates that burning has played a role in the formation of the deposit. It is less clear whether the heating has altered pre-existing lumps of low-grade bog iron ore, or whether the iron ore has formed within the burnt sediments of the archaeological deposit after they were buried.

The textural relationship of the peds to the charcoal is not quite conclusive, but strongly suggests that the iron minerals have grown within the host sediment, perhaps pushing the charcoal aside into the gaps between the peds, but leaving the charcoal retained within the bounds of the larger-scale lumps. In this interpretation, the material may be regarded simply as a natural bog iron ore – just an example that has formed with a particular archaeological context. Indeed, it may be that the chemical properties of the ashy deposit have produced a suitable chemical environment for its precipitation. The magnetic properties of some of the fines indicated that they have been subjected to heating. This suggests that the material in the pit contained small iron-rich particles prior to the heating event.

The alternative hypothesis is that the major iron ore lumps also predate the archaeological feature and became reworked into its fill. The degree of heat-alteration of the ore is insufficient to indicate a deliberate heating (roasting) of ore for smelting, so an unintentional burning is more likely.

In neither interpretation would there appear to be any deliberate human agency involved in the generation of the ferruginous lumps.

Further work

As the results of a natural process, there would appear to be little archaeological value in the further investigation of these materials. They are unlikely to show any direct relationship with use of purpose of the containing feature.

No further investigation is therefore recommended. Although the retention of the material is not of high priority, the solid lumps do provide a medium for preservation of some rather delicate organic structures and their retention for their provision of environmental evidence might be considered.

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