AAYA Report 4422

SITE 1826

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ARCHAEOMETALLURGY GROUP

Riseley Farm, Berkshire

Interim Report

Three sample areas of a large cropmark complex were excavated of which only one, Area A produced significant quantities of ironworking residue. The material is dated to the Late Iron Age and it is therefore of interest due to the overall lack of Iron Age ironworking sites.

The early ironworking manufacturing cycle, (ore to artefact) can be divided into two separate processes, the smelting process and the smithing process.

The smelting process is the preparation and reduction of the ore by carbon monoxide derived from the combination of oxygen (air) and fuel (normally charcoal). The operation was carried out in a furnace normally constructed of clay and/or stones. The smelting process took a long time (eight hours minimum), and the furnace had to be tended throughout, fuel and ore being charged at the top, and the slag removed at the base, (some furnaces may have retained the slag throughout the operation), until a bloom of metallic iron of sufficient size had been formed, which was then removed to be smithed into a refined bloom or artefacts. The nature of Iron Age furnaces is in some doubt; until recently it was believed that they were primitive non-tapping (ie the slag was not removed) furnaces. There is now definite evidence for the use of shaft furnaces by the Late Iron Age Period

(McDonnell 1984 p.56). The shaft furnace was previously thought to have been introduced by the Romans, they were clay built shafts upto two metres high, about 0.3 metres internal diameter, and were tapped, eg Ashwicken (Tylecote 1962 p.220).

The bloom was removed from the furnace to be repeatedly hammered to drive out excess slag and then either turned into artefacts on the same site or traded to other blacksmiths. This smithing process also includes heat treatment etc of the artefact and any subsequent repair or refashioning of the artefact. It is likely that nearly all settlements had a smithy of some form, though not perhaps a full-time 'blacksmith'. The smithing process was carried out in a hearth but this could vary between a simple charcoal fire on the ground surface blown with bellows and a purpose built forge.

Both processes produce iron silicate slag as a waste product, and in amny cases, especially with mixed assemblages, ie where both smelting and smithing has been carried out, it is difficult to distinguish smelting from smithing slag.

Other residues also occur though they are not only associated with iron working. The residues recovered from Riseley Farm are :

Site A	Provisional Identification
Smithing Slag	6.685 kilos
Smith or smelt	6.595 kilos
Smelting Slag	6.580 kilos
Furnace/Hearth Lining	6.435 kilos
Bog Ore	0.600
Fuel Ash Slag	0.060 kilos

Site B	
Smithing slag	1.390 kilos
Smelt/smith	0.470 kilos
Smelting Slag	0.300 kilos
Fuel Ash Slag	0.010 kilos

The list of Site A materials clearly shows the problems of distinguishing between smelting and smithing slag. There is approximately 6.5 kilos of both smelting and smithing slag with another 6.5 kilos unascribed. It is likely that in the final identification the unidentified slag will be predominantly smelting slag and some of the smithing slag being re-identified as smelting slag. The presence of a single sample provisionally identified as bog ore confirms the opinion that smelting was carried out on the site. It is expected that more furnace and hearth lining will be found amongst the recovered "burnt clay". The fuel ash slag could derive from any high temperature operation, and is not of significance.

There is no characteristic tap slag in the assemblage except for a few "runners", (dribbles of slag normally weighing less

than 50gm). The smelting slag is characterised as having a flowed appearance, often with surface dribbles. The lumps vary in size considerably, but rarely exceed 500gm in weight. The smelting slag has clearly been fully liquid and tapped from a furnace, possibly into a pit in front of the furnace.

The smithing slag lacks the flowed appearance of the smelting slag. It occurs as randomly shaped lumps, very few of which are in the characteristic plano-convex shape of the hearth bottom.

Since it is impossible to examine every slag lump microscopically to determine whether they are smelting or smithing slags a selected number will be analysed to try to determine the type of smelting slag, temperature of operation etc.

Over ninety-nine percent of the slag came from the ditches, ie no material, (except for (85) from features [94] and [112]) was associated with any possible furnace structure.

It is therefore probable that the slag recovered indicates a small amount of smelting activity (perhaps even a single smelting operation) with the associated smithing operation. It is also worth noting that Berkshire was one of the six counties listed by Tylecote as having no ore sources (Tylecote 1962 p175) yet at Riseley Farm there is definite evidence for smelting during the Iron Age with the ore source possibly being bog ore.

References

McDonnell J G 1984 Review of Lewisham Moor Archaeological Investigations 1975-78, by R Hayes'. in The Pyedale Historian No. 12.

Tylecote 1962, Metallurgy in Archaeology, London.