Comments on the Archaeometallurgical Aspects of the Excavations at Yarm, Cleveland

by

J G McDonnell

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THE UNIVERSITY OF ASTON IN BIRMINGHAM
DEPARTMENT OF METALLURGY AND MATERIALS ENGINEERING

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by J G McDonnell, D.O.E. Contract Archaeometallurgist

The limited excavation of 101 High Street, Yarm identified four phases. The third phase could be described as an 'industrial phase' as evidenced by the spread of metallurgical residues within the phase. The evidence suggests that the metallurgical process or processes were carried out at the street frontage with the waste material being dumped at the rear of the plot.

In the excavation at the street frontage four features associated with the slags and residues were found. Feature 064 has been interpreted as a furnace with 057 being the associated tapping trench. The presence of ferruginous ore would support this theory. The nature of the furnace cannot be determined, ie. whether bowl or shaft furnace, since without any evidence of superstructure any interpretation is pure conjecture.

Contemporary with the furnace were two pits 062 and 059. The fill of 062 suggests that it was some kind of hearth, and hence may be classed under the general heading of smithing hearth, though whether its function was to work the bloom extracted from the furnace, or as a secondary smithing hearth, or some other function cannot be determined. The description

'scaley, cinder like accretion' may be a description of hammer scale which would confirm it as a smithing hearth.

Pit 059 was smaller and lacked in-situ burning and may, therefore, be only a waste pit rather than a hearth.

A sample of slag from Pit 062 was analysed by D M Tomlin. The interesting point about the analysis is the high ferric content (Fe_2O_3). In early iron smelting slags the majority of the iron content is in the form of wustite (FeO, ferrous iron). During smithing, the hearth's atmosphere is not controlled and is usually oxidising. Therefore, during or after slag formation in the smithing the wustite (FeO) can be further oxidised to Magnetite (Fe_3O_4) or Hematite (Fe_2O_3). The analysis would suggest that the oxide is in the form of magnetite with some higher oxidised hematite present, the slag analysis would, therefore, confirm the interpretation of pit 062 as being associated with the smithing process.

Another slag specimen was taken for Metalographic examination. On fracturing the sample clearly showed that it had a high iron content, most of which was in the form of Magnetite or Hematite. The oxides (and some metallic ferrous iron) was fused together by slag. The specimen was extremely friable and metallographic examination confirmed the heavily oxidised nature of the 'slag'. The friable nature and high iron oxide content of the specimen is not characteristic of a 'typical smithing slag', the slag may, therefore, derive from primary smithing ie. consolidation and refining of the bloom, or from another process, eg. residues from carburisation. The proximity of a furnace would suggest a primary smithing activity.

Conclusions

The evidence from 101 High Street, Yarm would be expected from a small scale smithy and smelting site, clearly only complete excavation of such a site would allow a full interpretation to be made. There are no exact parallels for the site but the recent excavation at Stamford bears some similarity though the furnace there was better preserved.

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Reference

1. C Mahany, A Burchard and G Simpson. Excavations in Stamford, Lincolnshire, 1963-1969, p105-144. The Society for Medieval Archaeology, Monograph Series No 9.