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Ancient Monuments Laboratory
Report 123/87

THE EXAMINATION OF SOME CRUCIBLE FRAGMENTS FROM BARNARD CASTLE, CO. DURHAM.

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Summary

Eight fired clay sherds thought to be associated with metalworking were examined under a low power microscope and analysed qualitatively by X-ray fluorescence for non-ferrous metal traces. It is concluded that six of the sherds probably originated from crucibles used for lead melting while the remaining two probably came from larger vessels which were used to melt brass. They were of late- or post-medieval date.

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THE EXAMINATION OF SOME CRUCIBLE FRAGMENTS FROM BARNARD CASTLE, CO.DURHAM.

Eight fired clay sherds (AM Nos.830463-7), excavated from Barnard Castle between 1977 and 1981 and thought to be associated with metal working, were examined. The sherds were examined under a low power microscope and their surfaces were analysed qualitatively by energy dipersive X-ray fluorescence (XRF) for non-ferrous metal traces.

The largest of the sherds (consisting of the two joining fragments AXA 2127 and AWX 2125) displayed a complete vessel profile from base to rim (See Fig.1). The sherd was from a straight walled vessel with a fairly large rim diameter and reletively small, flat base (a typical late medieval/post medieval crucible form) 87mm high, with a base diameter of approximately 40mm and a wall thickness varying from 3 to 8mm at the base. Concentric ribbing indicated that the vessel had been wheel thrown, after which the rim had been distorted to give a triangular shape with three pouring lips. The fabric is highly refractory with a coarse angular quartz temper and has been reduced fired to a light grey. Slight vitrification of the sherd surface indicates that the crucible had been subjected to fairly strong heating.

The similar form and fabric of five of the remaining sherds suggests that they originated from the same or similar crucibles. They included a base (AXA 2127), Rim (ETD 2127), and three body sherds (AWX 2125, ANP 2125, and AXG 2127).

All of these sherds had vitrified deposits attached to their inner surfaces concentrated towards the base of the crucible and often clearly demarked by "tide marks" running around the inside of the vessel. The deposits varied in colour from off-white to yellow, orange and green. In one example (AXG 2127) distinct bands of orange and green, each about 8mm wide, can be distinguished.

The inner surfaces of all of the sherds were analysed by XRF. On all of the thin-walled fragments significant levels of lead, but no trace of any other non-ferrous metals were detected. These analytical results strongly suggest that the crucibles from which these sherds originated were used for the melting of lead. It maybe significant that some fragments of lead were noted amongst the metallurgical debris already reported from this site as well as one piece of partially smelted galena which lead the authors to speculate on the possiblity of lead smelting at Barnard Castle (Linton and Bayley 1982).

The two remaining crucible sherds (CDE 6009 and EZN 2001) are clearly from much thicker walled, and presumably larger, vessels. CDE 6009 is 10-12mm thick and is made from a fairly refractory, mineral tempered, fabric which has been reduced fired to a pale grey. However the fabric has been altered by the high temperatures to which the sherd has been exposed and has become highly vitrified and vesicular throughout. Droplets of corroded copper alloy present on the surface of the sherd were analysed by

XRF and found to be brass with traces of lead.

Smaller deposits of the same alloy were detected on EZN 2001, a thick (14-17mm), black, reduced fired sherd with a thin, yellow fired, and partly vitrified layer on both surfaces. The fabric was quite unlike CDE 6009 and contained a number of large organic inclusions.

The earlier report mentions metal melting crucibles of similar wall thickness to the two thick-walled sherds examined. These were cylindrical in form and had been used to melt a range of copper alloys including brass.

Reference

Linton R., & J.Bayley (1982) Technological Samples from Barnard Castle, Co.Durham. Ancient Monuments Laboratory Report No.3810

Fig 1. Sketch of the crucible fragment AXA 2127/AWX 2125.