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EXAMINATION OF CRUCIBLES FROM COPTHALL STREET, LONDON

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The material examined (AM 830514) comprised Roman, Medieval and Post-Medieval sherds listed as fragments of crucibles. The samples were analysed qualitatively using energy dispersive X-ray fluorescence and the analytical results and identification of each sample are given in the appendix. The samples are referred to by their museum accession numbers, unless otherwise stated, in the discussion below.

The Medieval and Post-Medieval samples could be split into several groups, the largest of which was a group of nine samples (1320, 1322, 1323, 1325, 1328, 1332, 1334, 1335 and 1373). Each of these fragments formed part of large, thick walled crucibles with internal diameters in the range 15-20 cm and wall thicknesses of up to 4 cm, but generally about 2cm. Their fabrics were all reduced fired and heavily vitrified, and appeared to be refractory and quite coarse. As copper, tin, zinc and lead were detected on the inside of each of the fragments it is almost certain that these crucibles were used in melting copper alloys containing tin and zinc, and that at least some of the alloys were leaded. It is not possible to say whether gunmetal (a copper alloy also containing tin and zinc) was being melted or if brass (a copper-zinc alloy) and bronze (a copper-tin alloy) were both melted in the same crucible, one after the other. This group included all the Post-Medieval crucibles (contexts 17, 25 and 31) and some of the Medieval crucibles (contexts 42, 45, 47, 54 and 58). There were no significant differences between the Post-Medieval and Medieval samples and it is possible that the Post-Medieval samples were residual material from the Medieval period. Similar size crucibles have been found at Angel Court, Walbrook which were dated to C. late 14th to early 15th century (Transactions of the London and Middlesex Archaeological Society, Volume 28 1977 p 86) and at the Tower of London which were dated to C1600 (J Bayley, forthcoming publication). Three further samples (1317, 1318 and 1331), from contexts 43, 52 and 54 were also parts of large crucibles, but they were thinner walled and their fabrics were less heavily vitrified although they were reduced fired and quite coarse. Copper, zinc, lead and, in two cases (1318 and 1331), possibly tin were detected on the inside surface of the crucibles showing that they had been used to melt similar alloys to the thicker walled crucibles.

Four of the Medieval samples (1319, 1324, 1463, and 1487) were fragments from smaller crucibles (wall thicknesses 0.5 - 1 cm, internal diameters up to about 10 cm) with fairly coarse, reduced fired and refractory fabrics. Very high levels of zinc, with some copper, were detected on the inside surfaces of these crucibles as well as lead which was found on 1463 and 1489. The crucibles were almost certainly used for melting brass, some of which contained lead.

Two small Medieval crucibles (1329 and 1330) may have been used to melt lead, and one (1481) was possibly used in working gold as drops of gold were visible on the surface of the sample, and both gold and silver were detected analytically together with lead, which was the major element present, copper and, possibly zinc.

The remaining medieval samples had not been used as crucibles. Several samples (1326, 1483, 1484, 1485 and 1486) were oxidised fired sherds from large vessels which may have been heated in metalworking hearths, as traces of copper, zinc and lead were detected on some of them. One oxidised fired sherd with a thick deposit of lead glaze on the inside surface (1487) was probably from a vessel on which the glaze had run. A rim sherd (1482) with a pale fabric from a large vessel had also not been used as a crucible and only lead was detected, on both its inner and outer surfaces.

The four Roman samples were all from small vessels (internal diameter about 4cm), two of which had pedestal bases (1312 and 1315). Copper, zinc and lead were detected on one sample (1313) which may have been used as a brass melting crucible. Lead was the major element detected on 1312 with some copper and traces of gold. Small globules, apparently of gold, were visible suggesting that it may have been used as a cupel for gold refining. Lead was also the major element detected on 1314, with small amounts of copper and silver. The fabric was oxidised fired and it is possible that the item was used in the cupellation of silver. No sifnificant evidence was found to indicate that 1314 had been used in metalworking. Overall, the material suggests that metalworking took place on or near the site in the Roman, Medieval and Post-Medieval periods. The Roman remains are few, but they indicate that brass melting and gold working probably took place, and possibly cupellation of silver. The Medieval crucibles are much more numerous and show that copper alloys containing zinc, tin and lead were melted on the site. The smaller (? earlier) crucibles were probably used to melt brass, some of which contained lead. Large, thick walled crucibles were (?later) used to melt either brass and bronze or gunmetal, or all three alloys, at least some of which contained lead. Similar crucibles were probably used for the same purpose in the Post-Medieval period, but the samples of these may have been residual material from the Medieval period. Gold working probably also took place in the Medieval period.

APPENDIX - IDENTIFICATIONS OF SAMPLES

Context	Museum Accession No	Elements Detected by XRF (Minor elements)	Period	Identification
17	1325	Cu, Pb, Zn, Sn	Post-Medieval	Crucible
25	1320	Cu, Pb, Zn (?Sn)	Post-Medieval	Crucible
31	1322	Cu, Pb, Zn, Sn	Post-Medieval	Crucible
42	1323	Cu, Pb, Zn, Sn	Medieval	Crucible
43	1318	Cu, Pb, Zn (?Sn)	Medieval	Crucible
45	1373	Cu, Pb, Zn, Sn	Medieval	Crucible
47	1335	Cu, Pb, Zn	Medieval	Crucible
52	1317	Cu, Pb, Zn	Medieval	Crucible
54	1328	Cu, Pb, Zn, Sn	Medieval	Crucible
54	1329	Pb, (Zn, Cu)	Medieval	?Crucible
54	1330	Pb	Medieval	?Crucible
54	1331	Cu, Pb, Zn, (Sn)	Medieval	Crucible
54	1332	Cu, Pb Zn, Sn	Medieval	Crucible
58	1334	Cu, Pb, Zn, Sn	Medieval	Crucible
64	1461	-	Medieval	Sherd
68	1324	Cu, Zn	?	Crucible
69	1319	Cu, Zn	?	Crucible
74	1462	(Pb, ?Cu, ?Zn)	Medieval	Sherd
74	1463	Cu, Pb, Zn	Medieval	Crucible
193	1314	Cu, Pb, Ag	Roman	?Cupel
129	1315	(Pb, ?Cu, ?Zn)	Roman	Sherd
440	1312	Pb, Au (Cu, Zn)	Roman	?Cupel
443	1313	Cu, Pb Zn	Roman	?Crucible
42	1482	(Pb)	Medieval	Sherd
42	1481	Cu, Pb, Au (Ag, Zn)	Medieval	?Cupel
54	1487	Pb, Sn	Medieval	Sherd
58	1489	Cu, Pb, Zn	Medieval	Crucible
58	1483	-	Medieval	Sherd
58	1484	(traces Cu, Pb, Zn)	Medieval	Sherd
58	1485	(traces Cu, Pb, Zn)	Medieval	Sherd
58	1486	-	Medieval	Sherd
54	1326	(traces Cu, Pb, Zn)	Medieval	Sherd
64	1460	(Cu, Pb, Zn)	Medieval	Sherd