

Ancient Monuments Laboratory  
Report 33/86

ANALYSIS OF MEDIEVAL METAL OBJECTS  
FROM EASTGATE, BEVERLEY, HUMBS.

Paul Wilthew

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Summary

Over 50 copper alloy and 18 lead and/or tin objects were analysed qualitatively using energy dispersive X-ray fluorescence. The results showed that a wide range of copper alloys had been used, including bronze, brass gunmetal and copper, although the majority of the objects were bronze. There was no apparent correlation between particular types of object and composition, but too few objects were analysed to enable firm conclusions to be drawn.

The lead /tin objects were all (with the exception of one tin handle) either lead or tin-lead alloy, probably with between one half and two thirds tin in the alloy. The decorative objects such as brooches and pendants were generally pewter, whereas simple weights, whorls and rings were lead.

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## Analysis of Medieval Metal Objects from Eastgate, Beverley, Humberside

Over 70 metal objects (AM 858376-391, 858395-448 and 858450) found in Medieval contexts at Eastgate were analysed qualitatively using energy dispersive X-ray fluorescence. They included 18 'white metal' objects which were either lead, tin or an alloy of tin and lead and over 50 copper alloy objects. The analytical results are given in the appendices and are discussed below. The analyses were required to be non-destructive and so no preparation of the areas analysed was carried out. The results would therefore have been affected by factors such as the depletion of elements from the surface during burial, the presence of contamination and corrosion products and the possible remains of surface coatings which were no longer visible. For this reason the compositions are given in terms of fairly general alloy types which could be assigned with confidence in most cases.

### Lead/tin objects

The analytical results for these objects are given in appendix 1. Apart from one tin handle(?) (AM858382), all the objects analysed were either fairly pure lead (one circular brooch, AM858379, did contain a trace of tin) or pewter (an alloy of tin and lead). The analyses were not quantitative but comparison with similar results for objects of known composition suggested that the pewter objects generally contained between about one-half and two-thirds tin, although one brooch (AM858384) may have contained slightly less and a decorated strip (AM858383) slightly more tin than this.

As has been found elsewhere (Wilthew 1984) the more decorative objects such as pendants and brooches were pewter, whereas plain functional objects such as weights and whorls were lead. One openwork pendant(?) (AM858375) contained the remains of a white material in one half. It was rich in calcium and a sample placed in dilute hydrochloric acid effervesced strongly, indicating that it was almost certainly calcium carbonate.

Copper was detected on most of the pewter and tin objects but not on any of the lead objects. Although copper compounds can be deposited on lead/tin alloys during burial, the consistent absence of copper from the lead objects suggests that it was present originally in those objects in which it was detected. Low levels of copper are sometimes found in pewter (Tylecote 1986) and it does have a significant hardening effect on the metal.

### Copper alloy objects

A wide range of copper alloys had been used in the objects analysed, including bronze, gunmetal, brass and fairly pure copper. Almost all the objects contained traces at least of lead, but probably only the key (AM858313) was a deliberately leaded

alloy. This is not surprising as the vast majority of the objects would have been wrought rather than cast and leaded alloys are not suitable for use in wrought objects.

Too few objects were analysed to enable any conclusions about the relationship, if any, between composition and object type to be drawn, particularly in view of the large number of different sorts of object involved. There was no apparent correlation but it is possible that more detailed conclusions could be reached when more archaeological information is available.

### References

R.F.Tylecote (1986), The Prehistory of Metallurgy in the British Isles. The Institute of Metals, London

P.T.Wilthew (1984), Analysis of 'Lead' Objects from Coppergate, York. Ancient Monuments Laboratory Report No.4352

### Glossary of terms as used in this report

Bronze - An alloy of copper and tin containing at most relatively low levels of zinc.

Brass - An alloy of copper and zinc containing at most relatively low levels of tin.

Gunmetal - A copper alloy containing both tin and zinc at significant levels.

Pewter - An alloy of tin and lead containing only low levels of other elements.

Appendix 1 - analytical results for the lead/tin objects

AM No.	Object No.	Description	Elements Detected	Composition
858375	272/	Openwork pendant Metal White material	Pb Sn Pb Sn Ca	Pewter Calcium** carbonate
858376	586	Triangular brooch	Pb Sn (Cu)	Pewter
858377	611	Penannular object	Pb Sn (Cu)	Pewter
858378	755	Cross brooch	Pb Sn (Cu)	Pewter
858379	774	Circular brooch	Pb (Sn)	Lead
858380	916	Fragment	Pb Sn (Cu)	Pewter
858381	941	Object	Pb	Lead
858382	1028	?Handle	Sn (Cu)	Tin
858383	1029	Decorated strip	Pb Sn	Pewter
858384	1102	Brooch	Pb Sn	Pewter
858385	1149	?Pendant	Pb Sn	Pewter
858386	1667	Object	Pb Sn (Cu)	Pewter
858387	1668	Object	Pb Sn (Cu)	Pewter
858388	366	Whorl or weight	Pb	Lead
858389	1368	Whorl or weight	Pb	Lead
858390	1429	Whorl or weight	Pb	Lead
858391	1592	Ring	Pb	Lead
858450	1465	Seal die	Pb Sn (Cu)	Pewter

\* Trace elements in parentheses

\*\* A sample effervesced in dilute hydrochloric acid

Appendix 2 - analytical results for the copper alloy objects

Key: ++ = detected at high levels  
 + = detected at low levels  
 tr = just detectable  
 nd = not detected

AM No.	Object No.	Description	Elements detected				Composition
			Cu	Zn	Pb	Sn	
858395	128	?Brush holder	++	+	tr	+	Gunmetal
858396	131	?Brush holder	++	nd	tr	nd	Copper
858397	393	?Brush holder	++	+	tr	+	Gunmetal
858398	111	Soldered strips	++	++	+	++	Brass strips, tin-lead solder
858399	132	Object	++	tr	++	++	Probably bronze, coated with tin or tin+lead
958400	162	Buckle loop	++	tr	+	++	Bronze
850401	199	Sheet	++	tr	tr	+	Bronze
850402	205	?Mount	++	nd	+	+	Bronze
850403	220	Thin sheet	++	tr	+	++	Bronze
850404	230	Strips -metal -metal+solder	++	+	tr	+	Gunmetal sheets, tin-lead solder
850405	232	Hook	++	+	+	++	Bronze
850406	245	Buckle- loop -bar	++	+	tr	++	Bronze
850407	263	Ring (?from brooch)	++	tr	tr	+	Bronze
850408	276	?Buckle loop	++	nd	tr	+	Bronze
850409	283	Wire	++	tr	tr	+	Bronze
850410	298	Bars	++	++	tr	+	Copper alloy with brass coating
850411	310	Object	++	nd	tr	nd	Copper
850412	327	Fragment	++	nd	tr	nd	Copper
850413	345	Key	++	tr	++	++	Leaded bronze
850414	367	Needle	++	+	tr	++	Bronze
850415	370	Ring	++	+	+	++	Probably tin or tin+lead coated gunmetal
850416	371	Needle	++	+	tr	++	Bronze
850417	375	?Needle	++	nd	+	++	Bronze
850418	394	Needle	++	tr	+	++	Bronze
850419	412	Buckle -loop -plate	++	tr	tr	+	Bronze
850420	438	Sheet	++	tr	tr	+	Bronze
850421	459	Tube	++	tr	tr	+	Bronze
850422	520	Ring	++	nd	tr	nd	Copper
850423	534	Needle	++	nd	tr	+	Bronze
850424	569	Needle	++	tr	tr	+	Bronze
850425	570	Sheet	++	tr	tr	++	Bronze
850426	591	Buckle -loop -bar/plate	++	nd	tr	++	Bronze, possibly tin coated Bronze

AM No.	Object No.	Description	Elements detected				Composition
			Cu	Zn	Pb	Sn	
850427	710	Needle	++	++	tr	+	Brass
850428	762	Needle	++	++	tr	+	Brass
850429	763	Sheet	++	++	tr	+	Brass
850430	793	Sheet	++	nd	tr	nd	Copper
850431	923	Needle	++	++	tr	+	Brass
850432	995	Rod with hook	++	tr	tr	++	Bronze
850433	991	Strip	++	+	tr	+	Gunmetal
850434	993	Strip	++	++	tr	+	Brass
850435	996	?Needle	++	+	tr	+	Gunmetal
850436	1003	Sheet	++	tr	tr	+	Bronze
850437	1005	Sheet	++	nd	tr	nd	Copper
850438	1023	Needle	++	+	tr	+	Gunmetal
850439	1043	Sheet	++	tr	tr	+	Bronze
850440	1046	Sheet	++	+	tr	+	Gunmetal
850441	1054	Needle or pin	++	++	tr	+	Brass
850442	1146	Pin -shaft	++	++	tr	+	Brass
		-head	++	++	tr	+	Brass
850443	1217	Object	++	++	+	+	Brass
850444	1218	Strips	++	+	tr	+	Gunmetal
850445	1220	Wire, pointed	++	++	tr	tr	Brass
850446	1224	Strip	++	+	+	++	Bronze
850447	162	?Brooch loop	++	nd	tr	nd	Copper
850448	1490	Penannular object	++	nd	tr	++	Bronze
	1744	Rod	++	nd	nd	nd	Copper
	1745	?Buckle loop	++	+	tr	nd	Brass