Ancient Monuments Laboratory
Report 70/90

THE ANALYSIS OF THREE PEWTER SPOONS FROM THE WALBROOK, CITY OF LONDON.

J G McDonnell BTech PhD MIFA

Ancient Monuments Laboratory Report 70/90

THE ANALYSIS OF THREE PEWTER SPOONS FROM THE WALBROOK, CITY OF LONDON.

J G McDonnell BTech PhD MIFA

Summary

Three Roman pewter spoons from the Walbrook, City of London were analysed using an SEM. Two had tin contents of 65-70% but the third had 85% tin.

Author's address :-

J G McDonnell BTech PhD MIFA

Ancient Monuments Laboratory
English Heritage
23 Savile Row
London
W1X 2HE

The Analysis of Three Pewter Spoons from the Walbrook, City of London.

Dr Gerry McDonnell

1 Introduction

Three pewter(?) spoons recovered from early(?) Roman levels at the Walbrook, City of London, were sent for analysis by the Museum of London. The dating of the spoons is uncertain, since typologically they can be dated to the second- to third-century AD, but they were found by workmen and are therefore without a secure archaeological context. However, the other pewter objects from the Walbrook are well dated to pre 155 A.D.. Three other Walbrook spoons had already been analysed (Jones 1983) but as early Roman pewter is rare in Britain, it is important to obtain compositional data to compare these finds with the more abundant later material (Beagrie 1989).

2 Methods of Analysis

The spoons were qualitatively analysed by X-ray fluorescence (XRF) to determine whether antimony (Sb) was present. The XRF unit was used with an accelerating voltage of 30KV to detect the Sb K X-ray lines, the quantitative analysis system operates at 20kV and therefore only excites the L lines which interfere with tin (Sn) L lines. No antimony was detected by XRF.

A small scratch was made on the surface of the spoons through the corrosion to expose bright metal. Quantitative analyses were obtained using a Scanning Electron Microscope with an attached energy dispersive X-ray analysis system. A small area of the scratch was analysed with a reduced raster scan using an acceleration voltage of 20kV. Small areas of analysis can give variable results due to sample heterogeneity, and in the case of tin/lead alloys strong segregation of the metals can occur, resulting in large inclusions of one or other of the metals. Further errors in the results may be introduced by the rough nature of the surfaces, and the possibility that the surface being analysed was not flat with respect to the incident electron beam, eg the curved surface of a spoon.

3 Results

All samples showed segregation, and therefore raster scans were carried out at the lowest possible magnification (normally about x500). Two areas of each scratch were analysed.

Table 1 (N.D. = Not Detected)

Spoon 85/147

	Sn	Pb	Cu	Ag	Other	Total
Area1	88.1	10.0	N.D	N.D		98.1
Area2	82.2	19.1	0.4	N.D	0.1(Fe)	101.8
mean	85.1	14.5	0.2	-	-	99.8
normalised	85.3	14.5	0.2	-	-	100.0

Spoon 84.453/2

	Sn	Pb	Cu	Ag	Other	Total
Area1	61.8	30.6	0.1	N.D	0.2 (Fe)	92.7
Area2	59.4	31.0	0.2	N.D	-	90.6
mean	60.6	30.8	0.1	-	0.1	91.6
normalised	66.2	33.6	0.1	-	0.1	100.0

Spoon 84.193/1

	Sn	Pb	Cu	Ag	Other	Total
Area1	67.4	30.6	1.4	N.D	(0.1 Fe)	99.5
Area2	64.7	26.6	0.7	N.D	-	92.0
mean	66.1	28.6	1.1	-	-	95.8
normalised	69.0	29.9	1.2	-	-	100.1

4 Discussion

The results indicate that spoons 84.193/1 and 84.453/2 were of similar composition, ie 65-70/30 Sn/Pb, although 84.193/1 had a trace of copper. Spoon 85/147 was much higher in tin approximating to 85/15 Sn/Pb.

Three other spoons from the Walbrook had been analysed previously by XRF (Jones 1983) and the results are given in Table 2. They show consistent tin values (72-75%), but have a wide variation in copper content. The high iron percentages in r20373 and rA94 are probably due to the presence of this element in the corrosion products. The high copper value of rA94 may also be due to the presence of copper in the corrosion products, rather than in the alloy.

Table 2 XRF Analyses of Three Walbrook Spoons

	Sn	Pb	Cu	Ag	Other	Total
r19490	75.0	23.5	1.26	N.D	0.2 (Fe)	99.96
r20373	72.2	25.4	0.74	N.D	1.5 (Fe)	99.84
rA94	75.4	19.7	3.08	N.D	1.77(Fe)	99.95

Results from other analyses (Pollard 1983, Tylecote 1986, McDonnell 1988, and Beagrie 1989) indicate that Roman pewter can be assigned to one of three broad groups with tin values of 35-60% , 70-85% or >95%. The three spoons analysed by XRF fall within the second group, but those analysed by SEM fall either side of it. Assuming that this variation is not due to analytical technique, this would indicate either that the groups are not as tight as previously thought, or that the grouping only becomes apparent in later material. An analysis similar to that of the 65-70% Sn spoons was obtained for a Roman circular dish from Appleshaw (Hants) which contained 64.75% Sn (Tylecote 1986 p50). The other Appleshaw material fell within the 70-85% Sn group (4 items) or the >95% group (2 items) with one dish containing 90.55% Sn. Two Roman ingots recovered from the Thames at Battersea were also of similar composition to the lower tin spoons analysed here (c. 67% Sn, Tylecote 1986, p50).

5 Conclusion

The analysis of the spoons showed that two had similar tin contents, but one of these also had copper present at a low level comparable to that found in the previously analysed Walbrook spoons. The third spoon contained a higher percentage of tin. All three analyses fell just outside the second of three compositional ranges suggested by Pollard (1983).

References

Beagrie N 1989 The Romano-British Pewter Industry
Britannia Vol XX 170-191

Jones CEE 1983 A review of Roman lead alloy material recovered from the Walbrook Valley in the City of London.
Trans. London Middlesex Arch Soc 34 49-59

McDonnell G & White D 1988 The analysis of five Late Roman pewter vessels from Shepperton, Surrey
AM Lab Report 90/88

Pollard M 1983 X.R.F. analysis of the Appleford hoard of Romano-British pewter.
Hist. Met. 17/2 83-90

Tylecote RF 1986 The Prehistory of Metallurgy in the British Isles
Institute of Metals