

# Compositional Analysis of some Roman Unguentaria from the City of London

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Excavations in the City of London in 2001 (site BGG01) produced a fragment of unguent jar apparently made in a local fine oxidized ware (LOXIF). Such vessels are uncommon in locally-produced fabrics but three other examples were recovered from a site at St Paul's Cathedral (SPS74). These three vessels were also made in the same fabric (LOXIF). Both the BGG01 and one of the St Paul's vessels are decorated with what appears to be the same roller stamp, suggesting that these two vessels, and probably all four, were made at the same site and from the same materials.

Chemical compositional analysis was carried out all four samples using Inductively-Coupled Plasma Spectroscopy. The analysis was carried out at Royal Holloway College, London, under the supervision of Dr J N Walsh. The resulting data consist of the frequencies of a range of major elements (App 1), expressed as percent oxides, and a range of minor and trace elements, expressed as parts per million. The frequency of silica is not measured but was estimated by subtracting the total measured oxides from 100%. The data were normalised to aluminium before analysis using the WinStat excel add-in ().

## Analysis

### **Internal Comparison**

Examination of the ICPS data indicates that the BGG01 sample has a lower estimated silica content (69% compared with 73-4%) and higher aluminium (15% compared with 12-14%). The normalised data for the remaining elements show that in a few cases the BGG01 sample values fall within the range for the other three but that in many instances they do not:

MgO – lower  
CaO – lower  
Na<sub>2</sub>O – lower  
K<sub>2</sub>O – higher  
TiO<sub>2</sub> – higher  
P<sub>2</sub>O<sub>5</sub> – lower  
MnO – higher  
Ba – lower  
Cr – lower  
Cu – higher  
Ni – Higher  
Sr – lower  
Zr – higher

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La – lower

Ce – lower

Nd – lower

Sm – lower

Eu – lower

Dy – lower

Yb – higher

Zn – lower

Pb – higher

These results may be affected by post-burial alteration of the samples, especially for mobile elements such as calcium, phosphorus and strontium, all of which are lower in the BBG01 sample. The rare earth elements, which are also lower, can be adsorbed by phosphates. However, some of the affected elements are stable in normal burial conditions and probably indicate that the three St Paul's samples are indeed more similar to each other than to the BBG01 sample.

### **Comparison with other local oxidized wares (LOXI and LOXIF)**

The unguent jar data was then compared with a series of samples of fine and sandy local oxidized ware from a production site in the Upper Walbrook valley (Northgate House). Factor analysis of the normalised data, excluding the potentially mobile elements, found four factors. A plot of the first against the second factor scores (Fig 1), indicates that the four unguent jars have higher F1 scores than the others but comparable F2 scores. A plot of F3 against F4 scores also shows that the majority of the Northgate House samples form a cluster, defined by both scores whilst the unguent jars form outliers, together with one LOXIF sample. Examination of the factor weightings indicates that unguent jars have lower magnesium but higher sodium, chromium, zinc, copper, potassium and zirconium than the remainder. Of these, by far the most significant are the magnesium and sodium differences (Fig 3). The zinc and chromium levels are much higher in the St Paul's unguent jars than the rest but the BBG01 sample also has a slightly higher chromium value (Fig 4).

The differences in composition seem to be limited to those elements listed, since a factor analysis excluding those elements (i.e. including just Fe<sub>2</sub>O<sub>3</sub>, TiO<sub>2</sub>, MnO, Ba, Li, Ni, Sc, V, Zn and Co) found no separation of the unguent jars from the remainder. It is possible that these differences are due either to further post-burial alteration or to contamination during use, a model which could be tested by taking samples from the inner and outer surfaces of the jars and comparing them.

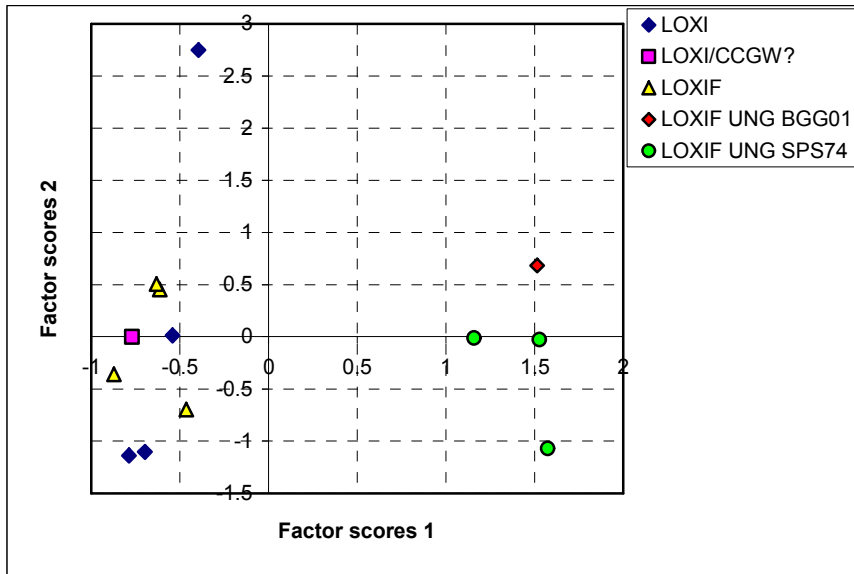


Figure 1

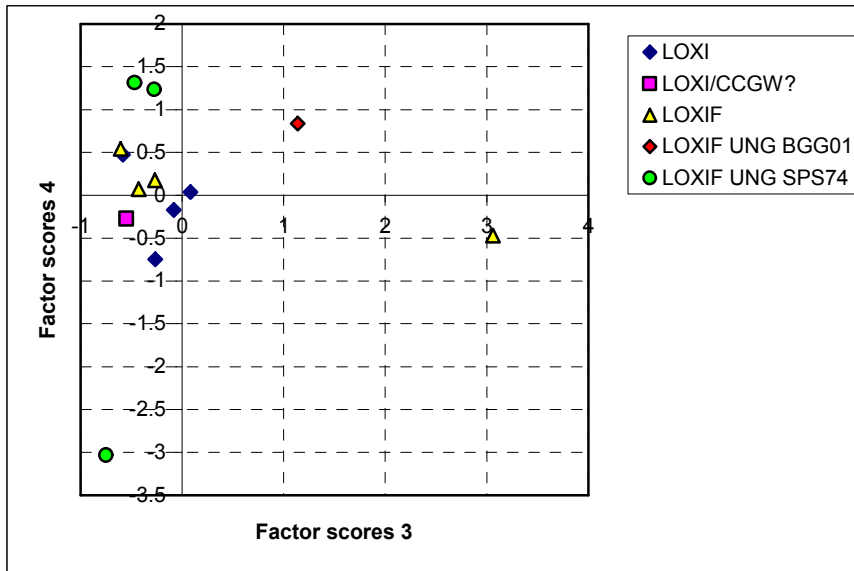


Figure 2

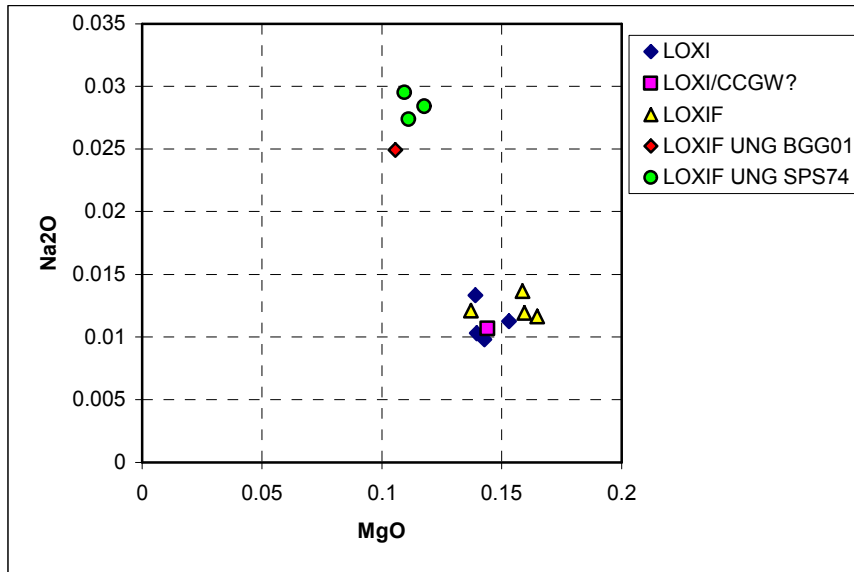


Figure 3

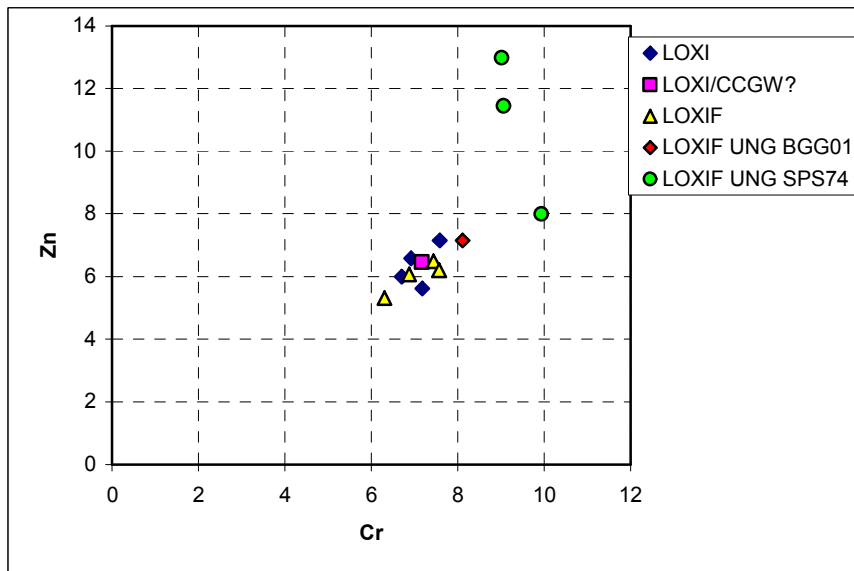


Figure 4

### Comparison with other London-made ceramics

The unguent jar data were then compared with that from a range of wares, of Roman, medieval and post-medieval date, whose source of production is known (Table 1). Most come from the Northgate House site or the neighbouring site of Cophall Close (CCGW) but they also include groups of wasters from Sugar Loaf Court (SLOW), the Fleet valley (VAL88) and Moorfields (MRL98). A final group consists of handmade greyware of Saxo-Norman date which, from its occasional freshwater mollusc inclusions, appears to be made from recent Thames alluvium, probably somewhere on the fringes of the city (Vince and Jenner 1991, LOGR).

Table 1

Site	Group	Comments	Quantity
bgg01	LOXIF UNG BGG01	Unguent Jar	1
ER1674	CCGW	Copthall Close greyware wasters	5
GDH85	LOGR	Saxo-Norman handmade greyware	1
IRO80	LOGR	Saxo-Norman handmade greyware	1
khs98	FMIC	Northgate House	1
	LOMIF		1
	LONW		1
	LONW?		2
	LOXIF		1
	VCWS		2
MLK76	LOGR	Saxo-Norman handmade greyware	1
mrg95	BB2N	Northgate House	4
	CCGW		4
	FMIC		3
	LCWS		1
	LCWS/RWS?		1
	LCWS?		3
	LOMI		6
	LOMIF		3
	LONW		1
	LONW?		2
	LOXI		4
	LOXI/CCGW?		1
	LOXIF		3
	VCWS		4
MRL98	MRL98	Post-medieval redwares from Moorgate	15
SLO82	SLOW	Sugar Loaf Court wasters	6
SPS74	LOXIF UNG SPS74	St Paul's unguent jars	3
VAL88	VAL88	Fleet valley medieval greyware wasters	6
WAT78	LOGR	Saxo-Norman handmade greyware	3
Grand Total			90

Factor analysis of this data, using the non-mobile element list used for Figs 1 and 2, found five factors. Factors 1 and 2 distinguish some of the LOMI samples (low F2 scores) and most of the MRL98 samples (high F1 scores) from the remainder, which consists of a large cluster in which there is some patterning, with the SLOW, VAL88, LOGR, and VCWS groups, for example, forming distinct sub-groups. The St Paul's jars have high F1 scores but within the range found at Northgate House whilst the BGG01 jar has a negative F1 score like the majority of the Northgate House samples. Factors 3 and 4 again distinguish the MRL98 samples but Factor 3 also distinguishes the unguent jars and the Saxo-Norman local greyware, LOGR. The main distinguishing elements are copper and zinc. The fifth factor does not distinguish any of the groups.

The analysis was then repeated using the restricted element list used for Figs 3 and 4. Only two factors were found and a plot of these factor scores separates four of the LOMI samples which have negative F1 and F2 scores. The unguent jars have positive F2 and negative F1 scores and compare well with two of the LOGR samples, two LOMI samples, a LOMIF sample and a sample from MRL98. Since three of these samples are from the Northgate House site and the others are Saxo-Norman or post-medieval in date and produced on the

fringes of the city it seems most likely that the unguent jars were produced in the upper Walbrook valley but from a clay whose characteristics are not typical of the oxidized and redware production there.

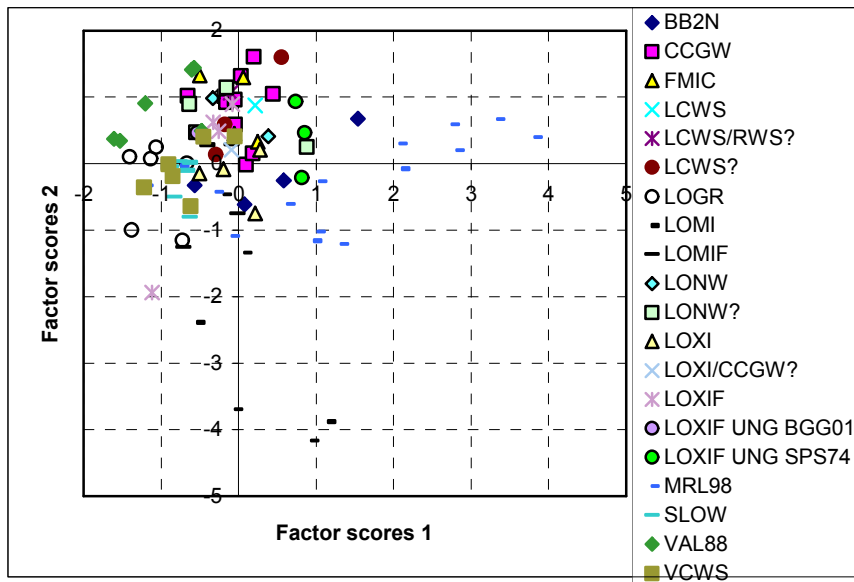


Figure 5

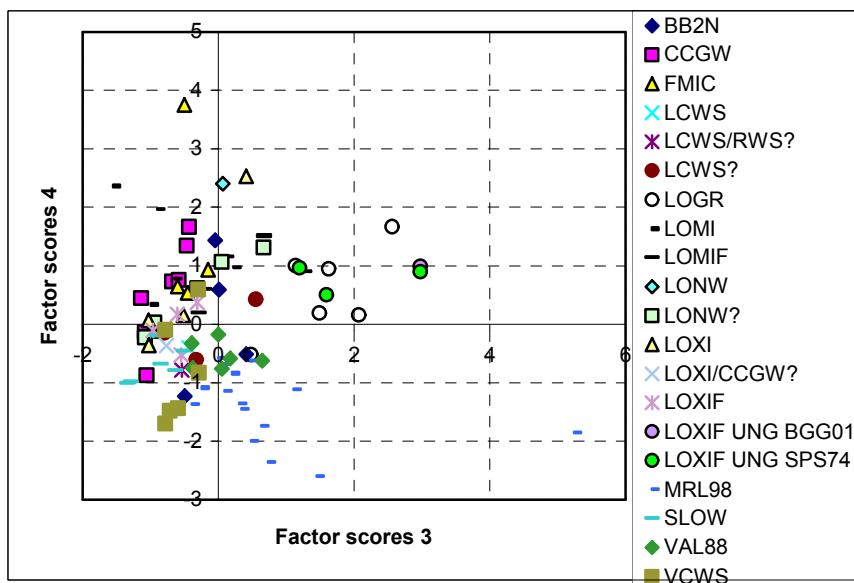


Figure 6

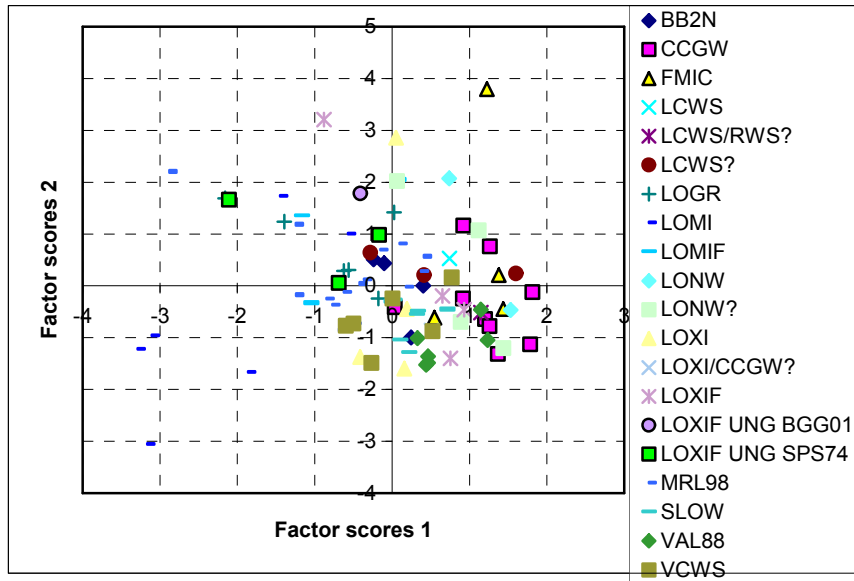


Figure 7

## Bibliography

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Vince, A. G. and Jenner, M. A. (1991) "The Saxon and Early Medieval Pottery of London." in A. G. Vince, ed., Aspects of Saxo-Norman London: 2, Finds and Environmental Evidence, London Middlesex Archaeol Soc Spec Pap 12 London Middlesex Archaeol Soc, London, 19-119

### Appendix 1

TSNO	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5	MnO
V4607	13.89	5.69	1.52	1.18	0.41	2.61	0.77	0.88	0.034
V4608	12.78	5.69	1.42	1.63	0.35	2.55	0.54	1.87	0.028
V4609	12.32	5.98	1.45	1.04	0.35	2.37	0.68	0.79	0.035
V4610	15.24	7.39	1.61	1.21	0.38	3.05	0.85	0.66	0.058

### Appendix 2

TSNO	Ba	Cr	Cu	Li	Ni	Sc	Sr	V	Y	Zr*	La	Ce	Nd	Sm	Eu	Dy	Yb	Pb	Zn	Co
V4607	436	138	26	57	47	15	166	127	28	90	41	81	43	7	2	5	3	23	111	17
V4608	469	115	45	47	47	15	224	107	28	72	40	77	42	7	2	5	2	22	166	14
V4609	440	112	32	57	45	13	136	126	25	77	38	73	40	6	2	4	2	28	141	16
V4610	434	124	69	62	75	17	111	132	32	111	40	77	42	6	2	5	3	175	109	19

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