Characterisation studies of Anglo-Saxon pottery from Longacre, City of Westminster

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Samples of six Anglo-Saxon pottery vessels were submitted for analysis (Table 1). Thin-sections were made of each sample. In addition, samples of five of the samples were submitted for chemical analysis using Inductively Coupled Plasma Atomic Adsorption Spectroscopy (ICPAES, or ICPS for short).

The thin-sections were stained using Dickson's method in order to distinguish dolomite from ferroan and non-ferroan calcite. They were given registration numbers within the AVAC sample collection and are at present stored at AVAC's offices.

Table 1

TSNO	Site code	Context	Ware code	Action
V1485	lgc00	13	SSTSUGARY	TS
V1486	lgc00	48	NFGW	TS;ICPS
V1487	lgc00	US	NFGW	TS;ICPS
V1488	lgc00	13	SSTMG	TS;ICPS
V1489	lgc00	45	NFGW	TS;ICPS
V1490	lgc00	13	ECHAF	TS;ICPS

Description and Analysis

Chaff-tempered ware

A single sample of chaff-tempered ware was analysed (V1490). In thin-section the sample contains moderate fragments of burnt organic matter, up to 2.0mm long; moderate to abundant subangular quartz grains up to 0.2mm across and sparse muscovite laths up to 0.3mm long. These are the typical characteristics of the main chaff-tempered ware fabric in mid Saxon London (and other sites in the Thames basin). In addition, however, a few grains of coarse-grained sandstone and quartz derived from this sandstone were present. The character of these grains suggests that they are of lower Carboniferous date (Millstone Grit) but whether they are detrital grains or derived from a millstone is not known. Such sandstone fragments are widespread in early and middle Anglo-Saxon ceramics and unless present as a pure detrital sand (whose natural outcrop appears to be limited to parts of Yorkshire) they do not seem to be indicative of source.

The chemical analysis of this sample was compared with those of chaff-tempered wares from numerous sites in the Thames valley and elsewhere using principal components analysis (PCA). A plot of the 3rd and 4th components indicates that the Longacre sample has a similar composition to those from other Thames valley sites, especially V1247 and AG349, from Staines and Barking Abbey respectively.

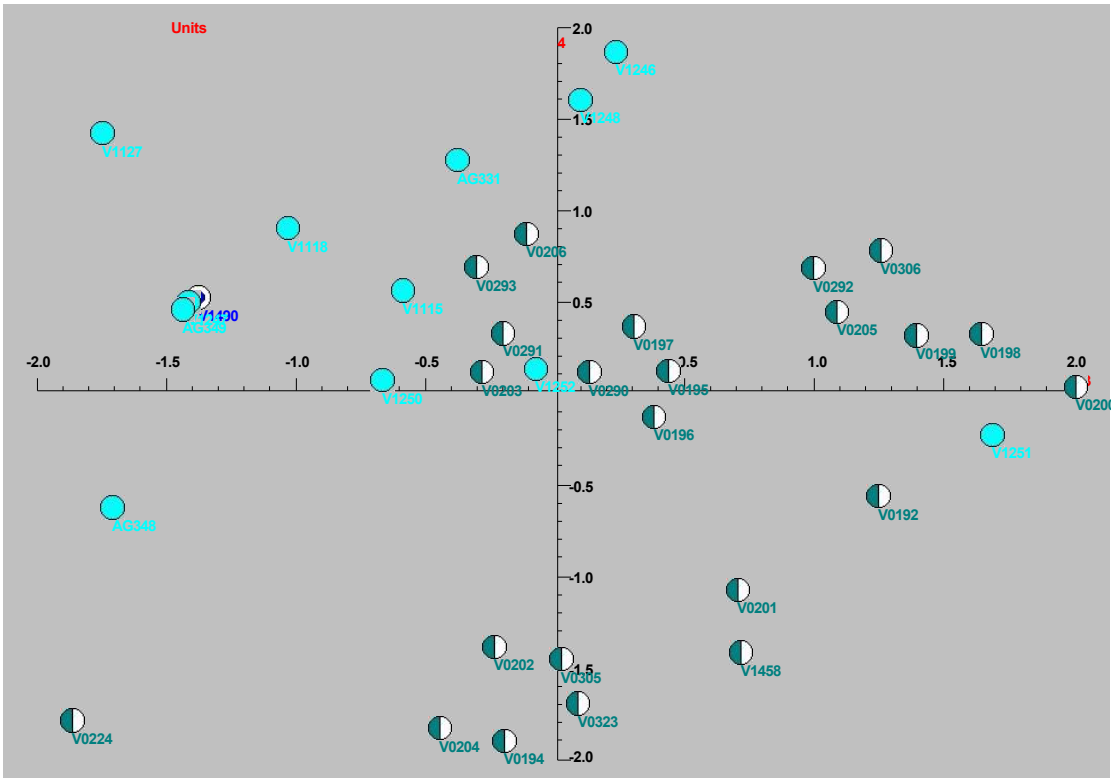

Figure 1 PCA Plot of ICPS analyses of chaff-tempered pottery. Dotted circle = Longacre, Filled circles = Thames valley finds, Half-filled circles = Northern English finds

Sandstone-tempered ware

A sample of a handmade vessel with visible sand/gravel temper was thin-sectioned (V1485). The thin-section contained abundant quartzose sand, most of which was composed of a fine-grained sandstone with overgrown quartz grains, producing an interlocking mosaic texture in thin-section, or from quartz grains which probably originated in this sandstone. The sandstone did not contain muscovite or noticeable feldspar but a few grains of cryptocrystalline silica might have been detrital chert or, more likely, subsequent silica filling of pores. Sparse rounded quartz grains up to 1.0mm across were present. Their appearance suggests an origin in a lower Cretaceous sandstone. Sparse rounded oxidized clay pellets up to 1.0mm across, some of which have a similar colour and texture to the groundmass (ie relict clay) were also present. The groundmass consists of moderate angular quartz grains up to 0.1mm across and sparse laths of muscovite up to 0.1mm long.

Vessels tempered with this distinctive sandstone, which has the appearance of white sugar lumps under x20 magnification, are found in the early Anglo-Saxon period in the Thames valley and elsewhere (eg the Sleaford area in central Lincolnshire). The identity of the sandstone, however, proves elusive. However, for the sand to contain almost exclusively fragments of this sandstone we can infer that the sand was obtained from a river whose catchment area was dominated by this sandstone outcrop (and possibly strata which would not contribute to the sand, such as clays and silts).

Coarse-grained sandstone tempered ware

A sample of a handmade vessel containing a gravel temper was thin-sectioned and chemically analysed (V1488). Under x20 magnification the most distinctive feature is the presence of moderate fragments of overgrown quartz and quartz sandstone of similar type. As in the chaff-tempered sample from Longacre, these are probably Lower Carboniferous sandstone fragments. In the thin-section these sandstones are seen to consist mainly of quartz but with minor feldspar and chert grains. In addition, however, there are rounded polycrystalline quartz grains up to 1.5mm across, sparse rounded grains with iron-stained veins (probably lower Cretaceous in origin) up to 1.0mm across and moderate rounded fragments of an Oolitic limestone and individual ooliths. The ooliths are replaced by non-ferroan micrite, but with traces of their original concentric structure remaining, whilst the rock has a sparry ferroan calcite matrix. These characteristics are typical of Jurassic Oolitic limestones. The groundmass consists of moderate fragments of angular quartz up to 0.1mm across and sparse laths of muscovite up to 0.3mm across.

These inclusions probably indicate that the vessel was tempered with a detrital sand of mixed origins. The Oolitic limestone is the most distinctive of these inclusions, since detrital limestone grains tend not to travel great distances from their source before succumbing to chemical and mechanical erosion. It is unlikely, therefore, that the vessel could have been produced in the south-east of England, to the east and south of the Cretaceous outcrop. The closest source of a suitable limestone is probably the Great Oolite in the Cotswolds. Mixed sandstone-derived sands of similar character to those in this sherd occur in Warwickshire, northeast Gloucestershire and north Oxfordshire and it may be that this vessel was produced in that area.

Chemical analysis of the sherd was carried out, on the assumption that it contained solely lower Carboniferous sandstone-derived inclusions (for which group a large body of comparative data now exists). However, since no petrologically similar vessels have been sampled there is as yet no comparative data. A PCA plot of the Longacre sherd and 134 other early to middle Anglo-Saxon sandstone-sand tempered wares shows that the sample is most similar chemically to those from Barton-upon-Humber. However, this is probably due simply to the presence of calcium in both groups – in the Longacre sherd this comes from the Oolitic limestone whilst in the Barton-upon-Humber samples it was present at the calcareous cement of a Cretaceous sandstone.

North French Greyware

Three samples of wheelthrown, sand-tempered greyware were thin-sectioned and chemically analysed. Although all three have a similar visual appearance they have differences in thin-section.

V1486 contains moderate quantities of angular, subangular and rounded quartz grains up to 0.4mm across, sparse subangular chert fragments up to 0.4mm across and sparse rounded pellets of organic shale up to 1.0mm long. The groundmass contains sparse rounded opaque grains up to 0.2mm in diameter.

These characteristics are very similar to those of sandy wares produced in Lincoln in the late Anglo-Saxon period (code LSLS). In these wares the sand is either fluvial sand from the Trent valley and the River Witham or wind-blown sand derived from these deposits, the laminated shale fragments are Jurassic clays of Middle or Upper Lias and the opaque grains are probably faecal pellets or of bacterial origin and are naturally present in some of the Jurassic clays (and limestones) in the area.

V1487 is similar but has some differences which might be significant: Quartz sand is present as are the rounded opaque grains, but no chert or shale. In their place, sparse angular flint up to 0.4mm long is present together with sparse rounded altered glauconite up to 0.2mm across and angular fragments of sparry ferroan calcite also up to 0.4mm across. The latter may have been present as an inclusion in the vessel when fired or may have been the post-burial filling of a void or pore. The groundmass consists of anisotropic baked clay minerals.

Flint and glauconite indicate a source in a region of Cretaceous or later rocks.

V1489 also contains a similar quartz sand to the other two samples and small rounded opaque inclusions up to 0.2mm across. However, it lacks any of the other inclusions present in these two other samples and includes sparse rounded red clay pellets up to 1.5mm across and a single fragment of fossil wood, 1.0mm long. The groundmass consists of anisotropic baked clay minerals.

None of the inclusions in this third sample are indicative of any particular source area although the texture of the clay is similar to vessels made from Oxford clay and other Jurassic clays, whereas the London clay (which also contains fragments of fossil wood) contains a higher quantity of quartz and muscovite silt.

Given the differences between the three samples, and the lack of a body of comparative data for wheelthrown sandy greywares of 7th to 9th-century date, it is not possible to draw many conclusions from these analyses. Nevertheless, a range of samples of sand-tempered or untempered wares of northern French or Belgium origin were available. These include grey and black burnished wares of two fabric groups from Flixborough (AG192, AG192, AG198 = untempered, AG190 = sandy off-white body), Early Rouen glazed wares of 10th-century date, Rouen glazed ware of late 12th to 13th century date, a whiteware of unknown origin from Flixborough (AG196). A PCA plot of this data shows that the Longacre samples have a similar composition to the untempered grey and black burnished wares from Flixborough. These two groups are separable, however, using PC4 although even then the samples are similar (Fig 2).

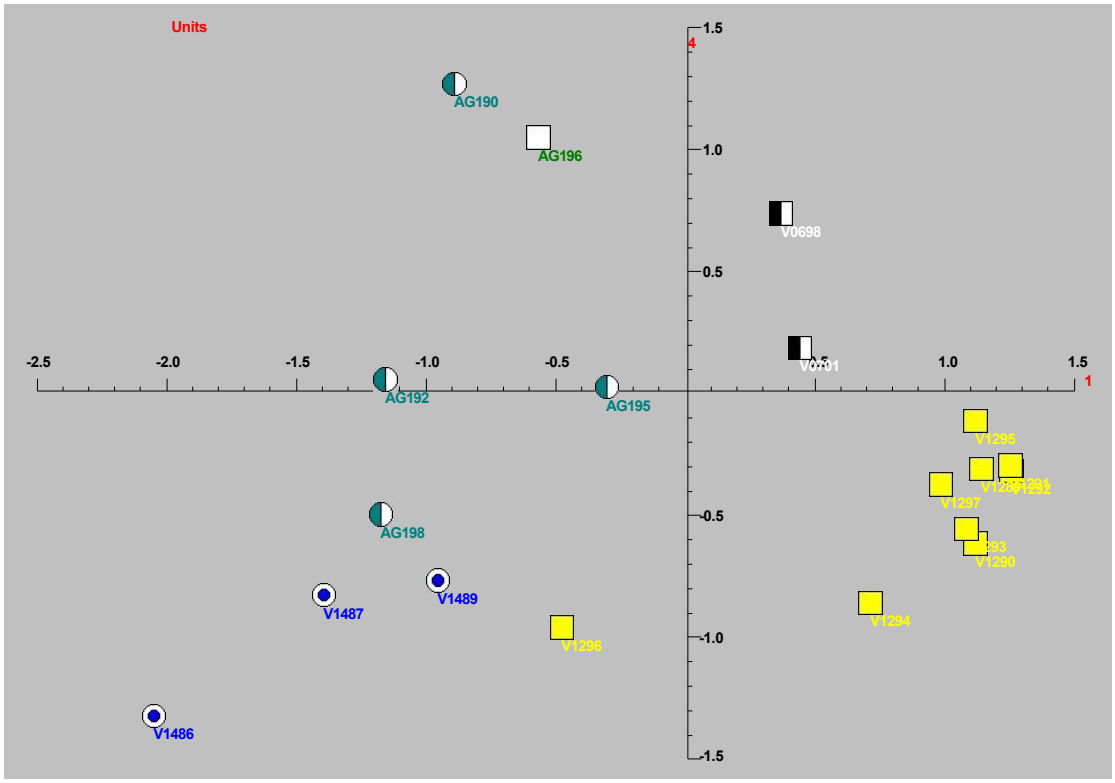

Figure 2 PCA analysis of North French Greyware (Dotted circles) and other 'North French' wares (half-filled circles = grey and black burnished wares, squares = 10th-century Rouen glazed wares, half-filled squares= late 12th and 13th-century Rouen glazed wares.)

Acknowledgments

Steve Caldwell produced the thin-sections and Dr N Walsh, Royal Holloway College, London, undertook the ICPS analyses.

Appendix 1a. ICPS analyses of major elements measured as percentage oxides

TSNO	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5	MnO
V1490	14.57	8.34	1.75	2.38	0.24	3.29	0.74	1.92	0.08
V1489	16	7.43	1.5	1.04	0.28	2.87	0.93	1.08	0.05
V1488	15.62	7.82	1.92	2.42	0.35	4.21	0.79	1.5	0.08
V1487	17.41	6.17	1.51	1.22	0.29	3.13	0.94	0.83	0.02
V1486	17.95	6.07	2.06	0.9	0.33	2.83	0.95	0.36	0.04

Appendix 1b. ICPS analyses of minor and trace elements measured as parts per million

TSNO	Ba	Co	Cr	Cu	Li	Ni	Sc	Sr	V	Y	Zn	Zr*	La	Ce	Nd	Sm	Eu	Dy	Yb	Pb
V1490	686	21	106	41	49	61	16	216	151	34	207	74	42	84	44.84	-0.09	1.58	5.7	2.9	65.93
V1489	625	21	123	22	28	43	18	164	157	16	114	73	29	62	30.17	-0.46	1.03	3.1	1.9	33.3
V1488	804	19	118	29	62	56	17	232	146	28	142	68	41	80	43.52	0.04	1.61	5.3	2.7	118.88
V1487	619	29	127	28	56	54	19	151	154	21	165	77	34	71	35.44	-0.04	1.19	3.7	2.1	46.09
V1486	440	25	132	43	45	53	20	129	184	38	142	87	50	91	53.39	0.78	2	6.8	3.5	50.75