The Characterisation of Anglo-Saxon Pottery from Catterick Bridge 1983, North Yorkshire

Alan Vince

[summary of Wilson's site analysis and Evans' pottery study]

Fourteen sherds of Anglo-Saxon pottery from Catterick Bridge 1983, North Yorkshire, were examined at x20 magnification and principal visible inclusions noted. Samples were then selected of nine of these vessels and these samples were thin-sectioned and their composition determined using ICPS (Table 1).

Table 1

TSNO	Context	Cluster	Petrogroup	cname	Form	Action	Description
V1423	665	2	1	SST	BOWL	TS;ICPS	SAGGING BASE;BEADED RIM;INT AND EXT BURNISHING WITH WEAR ON BASE
V1424	1093	1	1	SST	JAR	TS;ICPS	EVERTED RIM;BURNISHED INT AND EXT;SOOTED EXT
V1425	124	1	3	SST	BOWL	TS;ICPS	FLATTENED RIM
V1426	2115	1	3	SST	JAR	TS;ICPS	THICK-WALLED BASE SHERDS
V1427	2115	1	4	CHARN	JAR	TS;ICPS	WIDE BURNISHED LINES, POSSIBLY OUTLINING BOSS? OR HANGING TRIANGLE
V1428	2115	1	2	SST	JAR	TS;ICPS	BURNISHED INT;OXID EXT
V1429	2125	3	4	CHARN	JAR	TS;ICPS	BURNISHED INT AND EXT;EVERTED ROUNDED RIM
V1430	2169	2	1	SST	JAR	TS;ICPS	BURNISHED INT AND EXT;EVERTED ROUNDED RIM
V1431	2208	2	1	SST	JAR	TS;ICPS	FLAT BASE;EXT OXID;POSSIBLY RB 'NATIVE'

Petrological Analysis

The thin sections were examined and individual descriptions of the principal inclusions and the character of the groundmass were made. However, several of the samples were so similar that only four fabric descriptions need be given here, Subfabrics 1 to 4. If necessary minor differences in composition are noted under the relevant subfabric heading.

Subfabric 1 (SST)

The following inclusions were noted:

- Moderate subangular fragments of a coarse-grained feldspathic sandstone. The quartz grains show overgrowth and euhedral outlines. Kaolinite is sometimes present in the pores. Sandstones with these characteristics are common in the Lower Carboniferous strata of northern England and are termed here Millstone Grit-type.

- Sparse to moderate rounded pellets of brown clay. These pellets contain few inclusions and may be detrital grains of mudstone.

- Sparse subangular fragments of a fine grained sandstone, with well-sorted quartz grains between 0.2 and 0.3mm across. There is no visible cement.

- Sparse rounded quartz grains up to 1.0mm across.

The groundmass consists of anisotropic baked clay minerals, abundant angular quartz grains up to 0.3mm across, sparse muscovite laths up to 0.1mm long and sparse unidentified accessory minerals up to 0.1mm across.

Subfabric 2 (SST)

This subfabric has an identical range of inclusions to Subfabric 1 but the larger inclusions are much less common. Furthermore, the sample contains sparse organic inclusions up to 1.0mm long. These may have been deliberately added in the form of chaff or dung and do not appear to be naturally-occurring rootlets.

Subfabric 3

This fabric contains the following inclusion types:

- Moderate sandstone fragments of Millstone Grit-type up to2.0mm across. The kaolinite cement is perhaps more prevalent in this subfabric than in Subfabrics 1 and 2.

- Sparse rounded inclusionless clay pellets up to 1.0mm across

- Moderate organic inclusions up to 2.0mm long

- Sparse rounded quartz up to 0.5mm across (only seen in V1246)

The groundmass consists of anisotropic baked clay minerals with sparse angular quartz inclusions up to 0.1mm across.

Subfabric 4

The following inclusions were noted in the two examples of this subfabric:

- Moderate angular fragments of biotite granite up to 2.0mm across and individual minerals derived from this rock. These are of biotite, perthite, muscovite sheaves (up to 0.5mm long. These were not seen in a composite rock fragment but are probably from the same rock)

- The groundmass consists of anisotropic baked clay minerals and moderate angular quartz up to 0.2mm across. This groundmass is finer-textured than that of subfabrics 1 and 2.

Chemical Analysis

Samples were prepared by P Hill, who removed all potentially contaminated surfaces from an offcut c.1-2gm in weight. The remaining sample was ground to a fine powder and submitted to Royal Holloway College, London, for chemical analysis under the supervision of Dr J N Walsh.

The frequency of a range of major elements was determined as percent oxides (Appendix 1a) and minor and trace elements were measured as parts per million (Appendix 1b).

The data were first examined to establish if any outliers were present in the dataset (ie samples where an element's frequency was more than 4sd from the mean value in the dataset). No outliers were found.

The data were next examined using Cluster Analysis (Ward's method). This approach gives a quick overview of the similarities in composition of the samples and in this case shows a major division into two clusters, containing 3 and 6 samples respectively. The larger cluster split into two subgroups, one containing a single sample (Cluster 3) and the other containing the remaining 5 samples (Cluster 2).

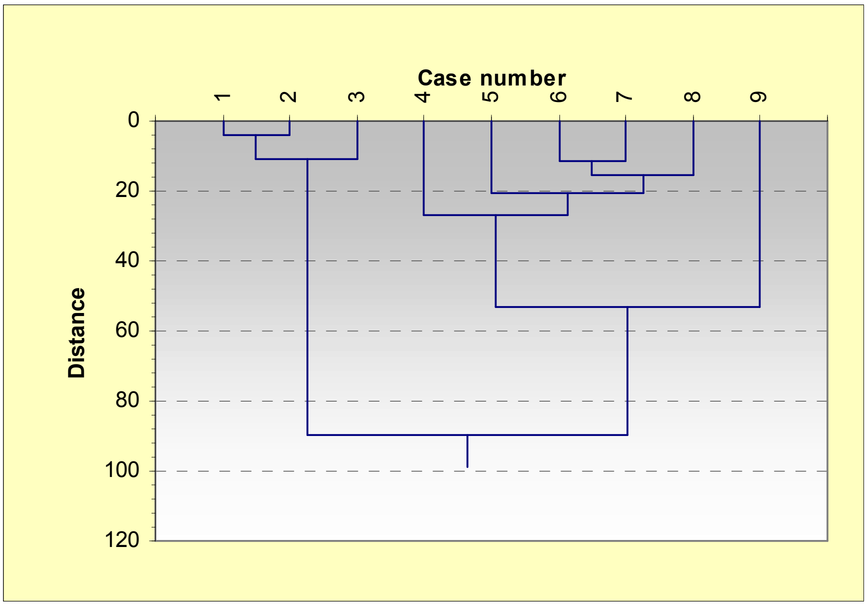

Figure 1

The dataset was then examined using Factor Analysis (Principal Components method). This method attempts to explain the variance seen in a dataset by calculating a series of factors each of which consists of loadings or weightings applied to the observed frequency. In this way, the complexity of the relationships between the samples can be reduced. Four factors with an Eigenvalue greater than 1.0 were found, explaining in total 91% of the variance in the dataset (Table 00). The factor loadings produced for these four factors are showing in Appendix 2.

Table 2

Factor	Eigenvalue	Variance (percent)	Percent cumulative
1	15.1821978	52.35240619	52.35240619

2	6.111425511	21.07388107	73.42628727
3	3.498121897	12.0624893	85.48877657
4	1.705297596	5.880336538	91.36911311

Scatterplots of Factor 1 versus Factor 2, Factor 3 versus Factor 4 and so on were produced and the relationships of the 9 samples noted.

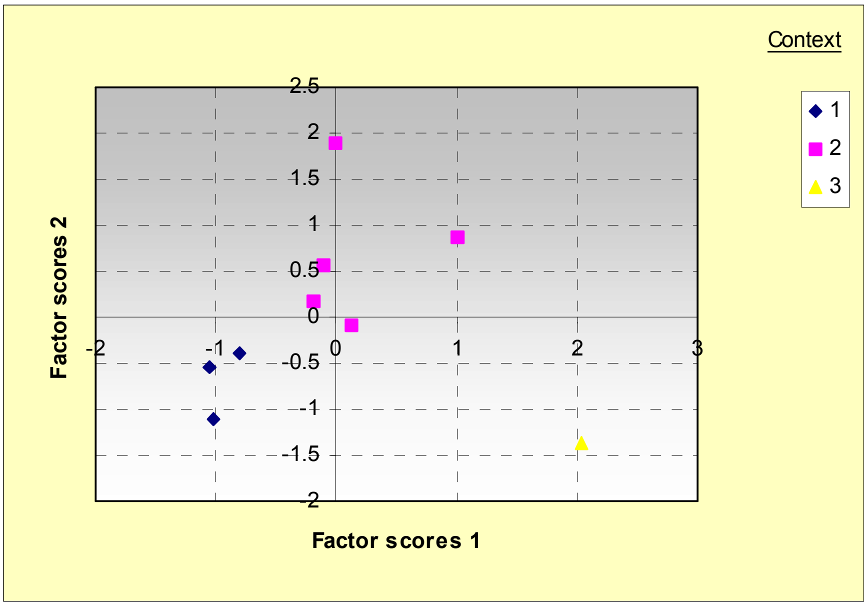

Figure 2

The F1/F2 plot (Fig 2) shows that cluster 3 has high F1 values and negative F2 values. The three Cluster 1 samples have negative values for F1 and F2 and Cluster 2 samples do not have strong F1 values but all have positive F2 values.

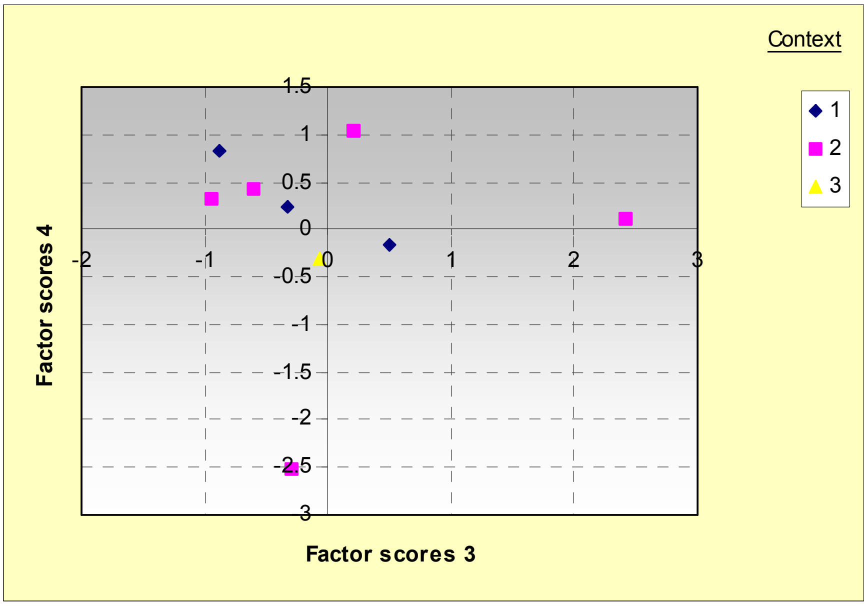

Figure 3

The plot of F3 against F4 (Fig 3) shows that for these two factors most of the samples are similar with just two strays, both in Cluster 2. V1424 has a high positive F3 score and V1425 has a strong negative score for F4. These scores seem to be due mainly to a high MnO value in the first instance and a low Pb value and a high Cu value in the second instance.

Discussion

A Factor Analysis plot of F1/F2 grouped by the subfabrics identified in thin section (Fig 4) shows some correspondence between these factors and the petrological characteristics. The two samples of subfabric 4, tempered with angular acid igneous rock fragments, both have positive F1 scores. The two Subfabric 3 (Millstone Grit-type sandstone in fine groundmass) samples have high F2 scores and the samples of subfabrics 1 and 2 have lower scores for both factors. The sample of subfabric 2 has a higher F1 score than those of subfabric 1.

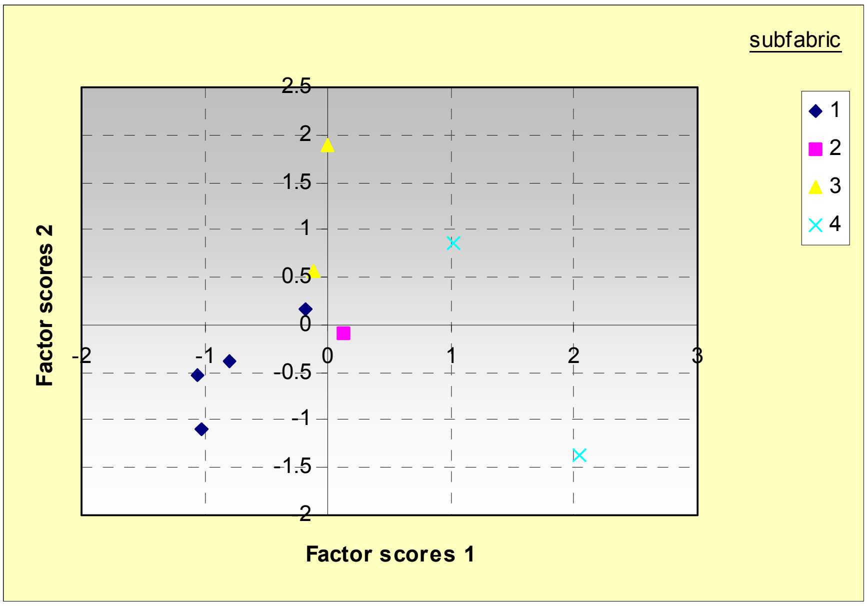

Figure 4

There is no obvious correlation with subfabric group for either F3 or F4. V1424 was assigned to Subfabric 1 and the thin-section shows no significant difference from those of other samples in the group. Similarly, V1425 is extremely similar to V1426 in thin section. It is likely in both cases that the differences revealed by Factor Analysis are very minor and do not reflect differences in the source of raw materials.

The groundmass and inclusions found in Subfabrics 1 and 2 are similar to those of handmade pottery of Romano-British date from Piercebridge. Although no precise match has been found between this fabric and geological outcrops the general similarity in texture between this material and boulder clays suggests that the source of the pottery lies somewhere in the Vale of York in the general area of these two sites. The source of the finer sandstone inclusions is not known. Sandstones of similar texture occur in the Jurassic in the North Yorkshire Moors and in the Coal Measures. However, the lack of siltstone, shale or chert makes the latter source unlikely.

The similarity in petrological composition between subfabrics 3 and 4 and examples of CHARN and SSTMG found elsewhere in northern England suggests that they may have been traded or exchanged. Glacial erratics which made match those in Subfabric 4 have been recorded along the eastern side of the Vale of York, at the junction with the Jurassic rocks of the North Yorkshire Moors but the frequency of these erratics in local boulder clays or fluvio-glacial sands is unknown. Similarly, the gravels of the area around York contain a high percentage of Millstone Grit-type sandstone and vessels with a very similar appearance to Subfabric 3 have been noted in the York area, both in the pre-Viking Anglo-Saxon period and in the earlier part of the Anglo-Scandinavian period (eg HM 1, York A and York D wares). However, a relatively local source cannot be completely ruled out in either case and the results of this study will need to be reviewed alongside those from York and elsewhere.

Conclusions

The nine samples were grouped visually into those with angular 'granitic' inclusions (CHARN) and those with inclusions of Millstone Grit-type sandstone (SST). Thin section analysis confirmed the broad visual identifications and allowed the sandstone-tempered wares to be subdivided into three subfabrics. Chemical analysis using Factor Analysis confirms that these four subfabrics have different chemical compositions but cluster analysis using Ward's method fails to group the samples in the same way as the petrology. This is probably a failing of the methodology.

It is likely that Subfabrics 1 and 2 were made from the same parent clay, but whereas Subfabric 1 was tempered (or naturally contained) a mixed sandstone gravel, Subfabric 2 contained less gravel and was tempered with organic material, such as chaff or dung. Subfabrics 3 and 4 are very different and were made from different raw materials. The variation in groundmass suggests that both the clay and temper, if any, were obtained from different sources. Subfabric 3 is the main fabric found in the York area in the early Anglo-Saxon, mid Anglo-Saxon and early Anglo-Scandinavian periods. The source of Subfabric 4 is at present uncertain.

Acknowledgements

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The samples were prepared by Peter Hill. Thin sections were made by Steve Caldwell, Department of Earth Sciences, University of Manchester. ICPS analyses were carried out in the Department of Geology, Royal Holloway College, London, under the supervision of Dr J N Walsh.

Bibliography

Appendices

Appendix 1a. ICPS Major Elements, measured as percent oxides

TSNO	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5	MnO
V1423	10.47	2.62	0.7	1.03	0.42	1.46	0.37	0.97	0.02
V1424	12.03	3.94	0.72	1.38	0.39	1.15	0.42	2.54	0.13
V1425	15.45	4.79	1.8	1.35	0.22	2.79	0.59	1.03	0.03
V1426	15.44	5.33	1.32	1.55	0.2	2.17	0.55	2.02	0.04
V1427	17.07	4.28	1.21	1.41	0.81	2.03	0.66	1.96	0.03
V1428	15.03	3.53	1.06	1.17	0.47	1.65	0.63	0.68	0.01
V1429	20.72	3.5	1.02	1.19	1.14	2.7	0.76	0.3	0.01
V1430	12.36	3.34	0.77	1.06	0.38	1.62	0.47	1.35	0.01
V1431	11.75	3.3	0.71	1.09	0.54	1.29	0.43	1.49	0.05

Appendix 1b. ICPS Minor and Trace Elements, measured as parts per million

TSNO	Ba	Cr	Cu	Li	Ni	Sc	Sr	V	Y	Zr*	La	Ce	Nd	Sm	Eu	Dy	Yb	Pb	Zn	Co
V1423	1029	58	18	70	30	9	112	45	19	24	31	63	32	6.4	1.2	3.4	1.3	42	135	10
V1424	1163	69	29	76	52	12	213	60	25	33	31	88	34	8.2	1.5	4.9	1.9	42	246	16
V1425	986	88	68	49	51	13	138	80	23	36	39	80	41	8	1.3	4.1	1.9	27	197	12
V1426	1656	94	36	62	56	14	145	96	23	38	39	85	41	8	1.2	4.2	2	47	186	13
V1427	1996	96	28	90	55	15	214	89	26	38	49	108	51	9.7	1.7	5	2	44	169	11
V1428	1063	88	36	87	48	13	109	80	22	35	42	92	43	7.9	1.4	4	1.6	46	118	11
V1429	706	114	48	123	40	18	204	124	29	35	58	122	60	10.5	2	5.5	2.1	41	87	7
V1430	1001	66	20	67	37	10	144	58	18	28	35	79	36	6	1	3	1.2	49	125	10
V1431	1139	62	43	59	38	9	164	55	14	29	32	84	33	6.3	0.9	3.1	1	43	190	19

Appendix 2

Element	Factor 1	Factor 2	Factor 3	Factor 4	Communality
Sc	0.974669376	0.181246887	-0.042397333	-0.07878233	0.990835015
Nd	0.973742195	-0.035690249	-0.196965949	-0.005899446	0.988278045
Sm	0.967866906	0.12616548	0.17851925	-0.059718143	0.988119455
La	0.955302441	-0.067698333	-0.255749764	0.008758173	0.982670465
Al2O3	0.95395408	0.089028889	-0.208731685	-0.138667882	0.980752228
Cr	0.931618887	0.231369161	-0.221425824	-0.133507689	0.988299138
Eu	0.931257095	-0.117712659	0.203165199	0.005721101	0.922404876
Ce	0.921829734	-0.045707451	0.113324762	0.126885277	0.880801605
V	0.918410134	0.17339052	-0.202345736	-0.109679954	0.926514936
TiO2	0.910347263	0.090235462	-0.307993948	-0.123894777	0.947084765
Dy	0.89112377	0.133176027	0.387173208	-0.039252642	0.963281291
Y	0.882221917	0.16572158	0.185900558	-0.063612657	0.84438474
Li	0.826269197	-0.43022961	0.039819682	0.335516281	0.981975084

Yb	0.793771601	0.439383662	0.175163916	-0.175581464	0.884642604
Na2O	0.746552868	-0.504915943	0.075770613	0.229793455	0.870827513
Zr*	0.679405424	0.674949929	0.012702351	-0.147437245	0.939048228
K2O	0.652757071	0.178418905	-0.401752483	-0.541821136	0.9129003
Sr	0.554421	0.063165256	0.648938438	0.170953398	0.761718656
Ni	0.372530967	0.859177055	0.221835232	-0.077510412	0.932183268
CaO	0.372304537	0.876007256	0.255546007	-0.088445104	0.979125681
MgO	0.348340011	0.583054106	-0.320510292	-0.628665491	0.959240002
Cu	0.306069905	0.140056871	-0.053745892	-0.847138965	0.833827761
Fe2O3	0.270975328	0.904209838	0.005626082	-0.27965048	0.969259104
Ba	0.068835204	0.70343587	0.101717075	0.395727956	0.666507288
Pb	-0.090276248	-0.013421804	-0.124481737	0.904658286	0.842232264
MnO	-0.189920652	0.244960311	0.923689132	-0.012810274	0.949441125
P2O5	-0.273161668	0.634465738	0.621306738	0.320608574	0.965975991
Zn	-0.364228765	0.56204065	0.706369142	-0.230496411	1
Co	-0.546955778	0.273428023	0.516699923	-0.056309932	0.644073125
Sum of Squares	14.67353884	5.370855137	3.476713638	2.975935176	26.49704279
Percent of Variance	50.5984098	18.52019013	11.98866772	10.26184543	91.36911308