Characterisation Studies of Medieval Glazed Wares from York

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As part of the post-excavation analysis and publication of the medieval pottery from sites excavated by York Archaeological Trust in the city of York, samples of various medieval (12th to 14th-century) glazed wares found in the city were submitted for characterisation.

The primary aim of this study was to establish whether there was any petrological or chemical evidence to support the visual classification of medieval pottery fabrics and, if so, to provide a description of these groups, emphasising any characteristics which might be visible in the hand specimen.

A second aim was to investigate the source of the raw materials used in the manufacture of these wares as a contribution towards a reconstruction of the local economy of 12th- to 14th-century York. To further this aim, samples of pottery from a kiln site at Brandsby were included in the study.

Methodology

~~[to add]~~

Results

A major division of the medieval pottery fabrics in York can be made on the basis of the colour of the groundmass when fired in an oxidizing atmosphere at earthenware temperatures (i.e. between c.700 and 1100 degrees centigrade). In almost every case, the fabric can be either classed as a whiteware or a redware. The results are therefore presented under these two headings (whilst remembering that in no case are the fabric colours actually “white” or “red” but lie on a continuum.

Whitewares

Thirty-three samples of whiteware were submitted for analysis. They were divided by Mainman and Jenner into fifteen groups, including two samples from the Brandsby kiln excavated by Le Patourel.

Five samples, all from the 1971 York Minster excavations, have been heavily altered after burial through contamination with calcite. This has not simply filled the pores of the fabric but appears to have had an effect on the groundmass as well. These samples cannot, therefore, be adequately analysed using either chemical or petrological evidence and are treated as a separate group. Other samples from the York Minster group show no sign of contamination in thin section but have distinctly difference chemical compositions. This may indicate that

they come from other sources and they have accordingly been given separate fabric codes, even though they do not form petrologically distinct fabrics.

A major difference exists between the three gritty ware samples and the remainder but otherwise there are no clear-cut fabric groups present. The reason for this can be seen in some samples in thin section where lenses of clay of different colour and texture occur together. The raw materials used for some of these whitewares, therefore, include silty clays, micaceous silty clays, and inclusionless clays as well as varying in the colour/iron content of the groundmass. To add to the difficulty in classification, some of the whitewares have been made from organic clays in which the carbon has been incompletely burnt out, giving a black body, usually with one or both margins oxidized. However, we cannot easily say from the thin section evidence whether samples without this black core had a lower organic content or were simply fired for a longer period of time.

Not only are there complex variations in the character of the whiteware groundmass, the parent clays employed by the potters, but there is also clearly added sand temper present in many of the samples. Several distinct sands can be recognised. In geological order these include a lower Cretaceous sandstone-derived sand; Coal Measure sandstone and mudstones; Permo-Triassic windblown sands; Jurassic sandstones, siltstones and mudstones. These sands, which are clearly visible by eye and can be identified at low magnification, are likely to provide the key to identification of the York whitewares. However, at present little is known about the natural distribution of these sands, since they are mostly derived from fluvioglacial deposits which could have travelled long distances from the outcrop.

The scheme put forward here is based on the assumption that the parent whiteware clays are likely to vary considerably in texture within a single industry, and even in a single vessel, and that in any case they cannot be easily classified without recourse to thin section analysis. Furthermore, there is every likelihood that good-quality white-firing clays would have been marketable commodities and could have been used at more than one centre. This is, itself, a subject worthy of study, but is best tackled by studying the groundmass characteristics and chemical composition of whiteware clays from known sources. Groupings are therefore made primarily on the basis of the coarser fraction; inclusions greater than c.0.2mm across. Whilst some of these may have been present in the parent clay, it is likely that most were deliberately added.

Brandsby-type ware

Table 1

TSNO	Sitecode	Context	REFNO	Fabric Group	Form	YAT Working Code
V2374	york ajenner			BRAN	BOWL	HAMB

V2378	BRANDSBY	u/s		BRAN	JUG	BRAN
V2379	BRANDSBY	u/s		BRAN	JUG	BRAN
V2384	Coppergate	17699	1979.7	BRAN	UNKNOWN	SPLSOX
V2397	1979.14	1544	BEDBRAN 2	BRAN	JUG SHLDR	BEDBRAN
V2400	1979.14	1588	BEDBRAN 9	BRAN	JUG SMR	BEDBRAN
V2401	Coppergate	5786		BRAN		SPLWHFIN
V2409	1979.14	1588		BRAN	JUG	BEV
V2410	1979.14	1588		BRAN	JUG	BEV
V2411	1979.14	1588		BRAN	JUG	BEV

Description

This fabric is defined on the basis of four samples from the late 13th to 14th-century Brandsby kiln excavated by Jean Le Patourel. None of these samples has any inclusions larger than c.0.3mm across except for relict clay/mudstone fragments. The groundmass of these four vessels is variable in texture and colour, even in the same sherd, and it is evident that the parent clay was extremely variable in its quartz and iron contents.

Within this group are samples from York given the following working codes: BEDBRAN (2), BEV (3), HAMB, SPLSOX, and SPLWHFIN.

The following inclusion types are present in the thin sections of these vessels:

Sandstone. Two sections produced sparse grains of a sandstone, up to 0.5mm across. The sandstone is composed of quartz grains whose original boundaries have been overgrown, but where the original boundary is sometimes discernable as a faint line of micro-inclusions (unlike the overgrown grains seen in Millstone Grit, where no sign of the original shape of the grain survives). These overgrown grains are loosely-cemented with a dark brown cement. A possible source for this sandstone is the Ball Beds which form part of the Lower Calcareous grit in the Corallian outcrop.

Subangular quartz. Moderate to Abundant, well-sorted grains, some with signs of overgrowth and/or a coating of dark brown cement. Four samples contained abundant grains and the remainder, including the Brandsby samples, contained moderate grains.

Rounded mudstone. Fragments of mudstone were present in all but two of the samples. In six, the mudstone had a black core, or laminae, indicating that it had had a high organic content. In one, they contained quartz silt, absent from the remainder. Where oxidized, all fired to a light colour, sometimes lighter than the groundmass.

Microperthite. Two sections contained single grains of microperthite, of similar size to the subangular quartz.

Plagioclase. One section contained a lath of plagioclase feldspar, of similar size to the subangular quartz.

Siltstone. A single fragment of siltstone, consisting of loosely-cemented quartz grains c.0.1mm across, was present.

Muscovite and Biotite. Laths of muscovite were present in three samples. They ranged up to 0.5mm long and in one sample were abundant. In all cases, they were accompanied by less frequent biotite laths of similar size.

The groundmass was the most variable trait in the fabric group and in three cases poorly mixed lenses of slightly different colour and texture were present. These include the two Brandsby samples and one sample from the Bedern (V2411). In all cases, however, the groundmass had a light colour and consisted of highly birefringent baked clay minerals. Two sections contained only sparse quartz and muscovite silt. Two contained moderate quartz and muscovite silt. One contained abundant quartz silt, but of a finer grade than usual (less than 0.05mm across) and two contained abundant quartz and muscovite silt together with some biotite.

Interpretation

These characteristics are all consistent with an origin in the Jurassic outcrop of north Yorkshire, north of Market Weighton. The Ball Beds are absent in the Howardian Hills area and thus potentially could help distinguish vessels made in that area from those made further north.

The mudstone fragments, and by inference the parent clay, appears to be one of the the Middle Jurassic deltaic formations, of which there are three: the Saltwick Formation (Kent 1980, 54); the Gristhorpe Member (Kent 1980, 56) and the Scalby Formation (Kent 1980, 58). All three were deposited in deltaic conditions in which coals were formed. The seat-earths outcropping below these coal beds would have been more or less heavily leached, leading to the formation of kaolinitic clays, merging downwards into more iron-rich clays and cut by stream beds filled with more silty sediments. The mixed nature of the clays used in this fabric group is consistent with this origin.

Gritty Brandsby-type ware

Table 2

TSNO	Sitecode	Context	REFNO	Fabric Group	Form	YAT Working Code
V2391	Coppergate	6257	1978.7	GRBRAN		SPLWHMOD
V2398	1979.14	1588	BEDBRAN 4	GRBRAN	JUG SHLDR	BEDBRAN

V2399	1979.14	1588	BEDBRAN 6	GRBRAN	JUG SHLDR	BEDBRAN
V2404	1987.24	7154		GRBRAN	SEAL JUG	YGW
V2406	1979.14	1560		GRBRAN	JUG	GRBRAN
V2407	Coppergate	12276	1978.7	GRBRAN	JUG	EYGW
V2425	YM71NN	1921	BRAN 6	GRBRAN	JUG SHLDR	MINBRAN

Description

This fabric is defined by the presence of a similar groundmass as Brandsby-type ware but with an added, subangular and rounded quartz sand temper, with grains ranging up to 1.5mm across.

Seven samples fall into this group and these were given the following working codes: BEDBRAN (2), EYGW, GRBRAN, MINBRAN, SPWHMOD and YGW.

The attribution of these sherds to the Hambleton Hills area is based on the chemical similarity of these samples to the Brandsby-type ware ground. The presence of a sample of Seal Jug, a York Glazed ware product, in this group suggests that York Glazed ware was produced in the same area as Brandsby-type ware but at an earlier date and the presence of a splash-glazed vessel (EYGW) may even take this production back to the early to mid 12th century. However, two of the samples are from roller-stamped jugs, apparently a late 13th- or 14th-century decorative tradition in the York area, and therefore the use of a quartz sand temper overlapped with the use of the untempered Brandsby-type ware.

The following inclusion types were noted in these samples:

Rounded quartz. One section revealed abundant rounded quartz sand, three had moderate grains and three had sparse grains. The grains range up to 1.5mm across and include some with evidence of overgrowth and an iron-rich cement. By contrast with Permo-Triassic rounded quartz sands, there are no grains of chert present.

Sandstone. Two sections contained sparse rounded fragments, up to 1.5mm across of a similar sandstone, containing quartz and muscovite grains up to 0.2mm across with a brown cement. These are probably larger examples of the sandstone seen in the Brandsby-type ware sections.

Mudstones. Rounded mudstone fragments were noted in five sections. In three, they were organic and fine-textured (coded SPLWHMOD, MINBRAN and EYGW) and in three they were of two textures: white-firing and inclusionless, and white-firing and slightly silty (coded GRBRAN and BEDBRAN). The York glazed ware seal jug sample contained no mudstone fragments.

Subangular quartz. In addition to the rounded grains which define this group, five samples contained a finer subangular quartz sand, with maximum grain sizes ranging from c.0.2mm to c.0.5mm across. In one case, these were coated with a brown cement.

Biotite and Muscovite. Biotite was present in three sections and muscovite in two.

Voids. One sample, V2398, contained sparse voids which probably held calcareous inclusions.

The groundmass of these samples varies in a similar fashion to that of the Brandsby-type ware. Two sections revealed abundant fine quartz silt, one had moderate organic mudstone fragments and moderate quartz silt and three had sparse quartz and muscovite silt. In two of these the groundmass was a browner colour than normal (both coded BEDBRAN). The only exceptional sample was V2407 (EYGW), which has a groundmass devoid of quartz silt and with sparse dark brown to opaque rounded inclusions up to0.05mm across and probably of biological origin. The latter are typically found in marine clays but have been noted in Coal Measures mudstones of deltaic origin.

Interpretation

In the absence of comparative material from kiln sites, it is difficult to be certain how much emphasis to place on minor differences in the range or character of the inclusions noted in these sections. However, all of the inclusions noted are consistent with an origin in the North Yorkshire Moors area and it is assumed that the Ball Beds clay (or a similar Jurassic sandstone) is the source of the rounded quartz grains. Permo-Triassic rounded quartz sand has a higher sphericity than these grains and tends to include rounded chert, specifically sought for but not found in these samples. Perhaps the least secure member of the group is the York Glazed Ware seal jug, since it contains neither the subangular, brown cemented quartz nor the mudstones which are found in all the other samples. It is, however, placed in this group by its chemical composition.

Chemical composition of Brandsby-type and Gritty Brandsby-type wares

Tables 1 and 2 show the mean and standard deviations for the major and minor elements measured by ICPS for the Brandsby-type and Gritty Brandsby-type fabric groups, normalised to Al2O3 (with the exception of the estimated silica and the aluminium contents). They show remarkably little difference between the two groups, and the similarity in estimated silica content suggests that the rounded quartz sand was used as a substitute for the finer, subangular sand rather than in addition to it. Thus, the two wares do not constitute fine and coarse versions of the same fabric.

Table 3

Group	SiO2	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5	MnO
BRAN Mean	70.46	21.38	0.13	0.04	0.03	0.01	0.11	0.06	0.01	0.001
BRAN SD	3.84	3.17	0.02	0.01	0.01	0.01	0.03	0.01	0.01	0.000
GRBRAN MEAN	69.10	22.51	0.13	0.04	0.02	0.01	0.10	0.06	0.01	0.001
GRBRAN SD	1.57	1.63	0.02	0.01	0.01	0.00	0.02	0.01	0.00	0.000

Table 4

	Ba	Cr	Cu	Li	Ni	Sc	Sr	V	Y	Zr*	La	Ce	Nd	Sm	Eu	Dy	Yb	Zn	Co
BRAN Mean	18.49	6.22	1.89	3.17	2.05	0.95	4.48	8.17	1.05	4.10	2.40	5.53	2.46	0.37	0.08	0.21	0.10	3.45	0.76
BRAN SD	4.38	0.39	0.32	1.02	0.59	0.05	1.05	0.92	0.18	0.70	0.46	1.43	0.48	0.15	0.02	0.05	0.01	0.73	0.19
GRBRAN MEAN	15.04	6.18	2.43	2.81	1.90	0.94	3.86	8.16	0.98	3.95	2.32	5.30	2.37	0.33	0.07	0.20	0.09	2.91	0.80
GRBRAN SD	3.14	0.31	1.01	0.98	0.48	0.09	0.73	0.77	0.19	0.55	0.53	1.49	0.54	0.14	0.02	0.05	0.01	0.83	0.20

Fig 1 shows the results of a factor analysis carried out on this data. It confirms that there is no sign of any difference in composition between the two groups.

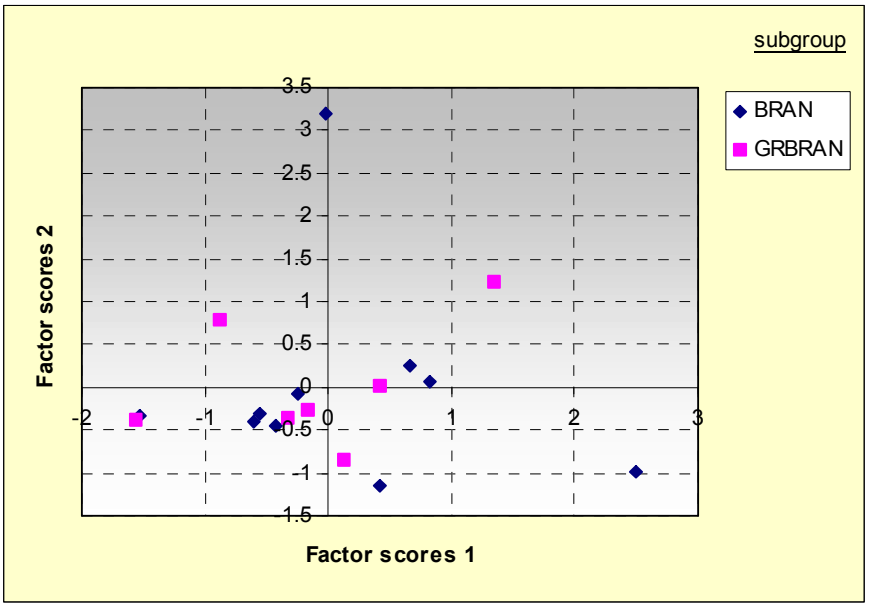

Figure 1

White Gritty glazed ware 2

Two samples have a similar rounded quartz sand to the Gritty Brandsby-type ware but have chemical compositions which suggest that they may be from another source. They were given the working codes SPLWHCO and MINBRAN. It is quite possible that the chemical dissimilarity is due to burial conditions.

The following inclusions were noted in thin section:

** TO ADD

White Gritty glazed ware 3

A single sample has a similar rounded quartz sand to the Gritty Brandsby-type ware but, again, has a different chemical composition. It was given the working code MINBRAN. It is quite possible that the chemical dissimilarity is due to burial conditions.

The following inclusions were noted in thin section:

** TO ADD

White Gritty glazed ware 4

A single sample has a coarse gravel temper consisting of fragments of Millstone Grit sandstone. It also has a different chemical composition to the remaining whitewares and probably comes from a different source. It was given the working code PALRED.

The following inclusions were noted in thin section:

** TO ADD

Redwares