

Characterisation studies of the Humber wares from Wawne, East Yorkshire

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The Humber wares from Wawne all have similar fabrics, forms and decoration to those found elsewhere in the Humber basin but it was uncertain from visual examination whether this was a family resemblance between wares made at a number of centres utilising Humber estuarine clay, with its high silt content, or whether the ware was produced at a single source. Production sites making Humber ware are known at West Cowick (McCarthy and Brookes 1988), which was ideally situated close to the rivers Don, Ouse, Trent and the Humber itself and could have been the source of much of the Humber ware in the region, and at Holme upon Spalding Moor (McCarthy and Brookes 1988), which by contrast does not have good communications for long-distance trade, either by road or water. In addition, it is clear from petrological analysis of samples of Humber ware from Lincoln (forthcoming) and Barton-upon-Humber (Vince forthcoming) that there are other sources for this ware, probably in northern Lincolnshire.

To examine the source of the Wawne Humber ware six samples were chosen for analysis (Table 1). Thin sections were produced of each sample, to confirm that they were all petrologically similar and chemical analysis was carried out to provide a means of comparison between the Wawne samples and those from West Cowick and Holme-upon-Spalding Moor. Samples of the former were obtained from Doncaster Museum and include material from more than one kiln site. By contrast, the Holme-upon-Spalding Moor samples come from material assumed to come from a single kiln recovered during excavations by Humber Field Archaeology. One might expect, therefore, to find most variation in composition in the Wawne samples, since they come from a consumer site and may include material spanning a long period of time, from the mid 14th to the 16th centuries with the West Cowick material being less variable and the Holme-upon-Spalding Moor material the least variable. This prediction, however, assumes that there would have been chemical differences between the clays used at different production sites and within each site that there would be a greater similarity in composition between pottery made at the same time and fired in the same kiln than between pottery made at different times and places in the same centre.

TSNO	Context	Group	Form	Description
V2100	1037	gp1	PIPKIN	GLAZED EXT
V2099	1036	gp1	JUG	PULLED SPOUT; EXTERNAL GLAZE
V2103	1086	gp1	JUG	THUMBED FOOT; SPOTS OF EXT GLAZE
V2104	1111	gp3	JUG	SPOTS AND DRIBBLES OF EXT GLAZE
V2102	1081	gp1	JAR	FULL OLIVE GLAZE EXT; STACKING SCARS. BLACK CORE AND INTERIOR
V2101	1057	gp2	JUG	GREEN GLAZE EXT

Petrological description

Thin sections of the Wawne Humber ware samples reveal a fabric with abundant silt and fine-sand grade quartz inclusions. The largest grains, which are sparse, are up to 0.5mm across and rounded. The remainder are subangular or angular. In addition to quartz, some plagioclase feldspar, chert and a silica-cemented siltstone was noted. Sparse large subangular opaque ironstone grains up to 1.0mm across are present in some of the sections. Muscovite laths up to 0.3mm long are moderately common. Sparse unidentified accessory minerals of silt grade are present.

There are two slightly variant fabrics. Sample V2101 contains sparse large fragments of subangular flint and rounded quartz with an outline similar to those from the lower Cretaceous whilst sample V2104 has a finer-textured matrix than the remainder although the fine sand grade inclusions are similar to those seen in the remaining samples. The analysis therefore suggests that there may be three petrological groups present, Group A is the main fabric group, Group B is sample V2101 and Group C is sample V2104.

The character of the silt – predominantly quartz with moderate muscovite and sparse accessory minerals, is similar to that of recent (i.e. post-glacial) silts found in wares produced at Beverley, the Lincolnshire fens, the Trent mouth near Flixborough and the Witham Valley in the vicinity of Lincoln. It is likely that it reflects the silt component of estuarine clays in this part of the North Sea rather than local detritus from the Humber catchment. Its absence in sample V2104 may suggest that in this case another clay source was being exploited. Inclusionless clays occur in the Jurassic strata which outcrop in north Lincolnshire but whose outcrop north of the Humber consists of a very narrow band at the foot of the scarp of the Yorkshire Wolds, where it is probably obscured by drift deposits. The fine sand found in all the samples is similar in composition to that found in the Trent valley which is derived in the main from Triassic strata. The Humber catchment includes a large area of such strata although in the Vale of York most of the deposits are masked by drift. The larger, rounded inclusions are also, in the main, of types which could occur in the Trent Valley but those found in sample V2101 are unlikely to occur in detrital sands much to the west of the lower Cretaceous outcrop. West Cowick is undoubtedly too far east whereas Holme-upon-Spalding moor is just possible, but perhaps unlikely.

Petrological analysis therefore suggests that there may be up to three sources of Humber Ware represented in the six samples.

Chemical analysis

Sub-samples of all six Wawne Humber ware samples were prepared and submitted to Dr J N Walsh at Royal Holloway College, London, for analysis using Inductively-Coupled Plasma Spectroscopy. The resulting data provide the frequencies of a range of major, minor and trace elements. The major elements are measured as percent oxides and the remainder as parts per million. The percentage of silica is estimated by subtracting the total major element counts from 100%. This does, however, include both organic matter (unlikely to be a major problem with these wares) and chemically-

combined water. There was no difference in overall silica content between the three groups recognised petrologically (Group A = 68-77% silica, Group B = 73% and Group C = 72%).

The chemical data were then transformed by dividing each count by that of Al₂O₃, to try and remove the dilution effect caused by variations in silica content. Factor analysis of the transformed dataset suggests that there are differences in chemical composition between the three groups. The Group 2 sample has a higher Factor 2 score than the remainder and the Group 3 sample has a higher Factor 3 score. These factors are calculated by positive and negative weightings being given to the various measured elements. A high F2 score indicates high values for P₂O₅, Ba, Sr, Zr and CaO and/or low values for Zn, K₂O, and Li whilst a high F3 score indicates high Mn. All of these elements, except for Zr, are potentially affected by post-burial alterations but the combination of elements affecting F2 is suggestive of a Cretaceous component in the sample, which is consistent with the petrological analysis. Furthermore, the analysis was repeated omitting P₂O₅, Ba, Sr, CaO and MnO and the same separation was found. This indicates that there are also more subtle differences in the frequency of the remaining elements.

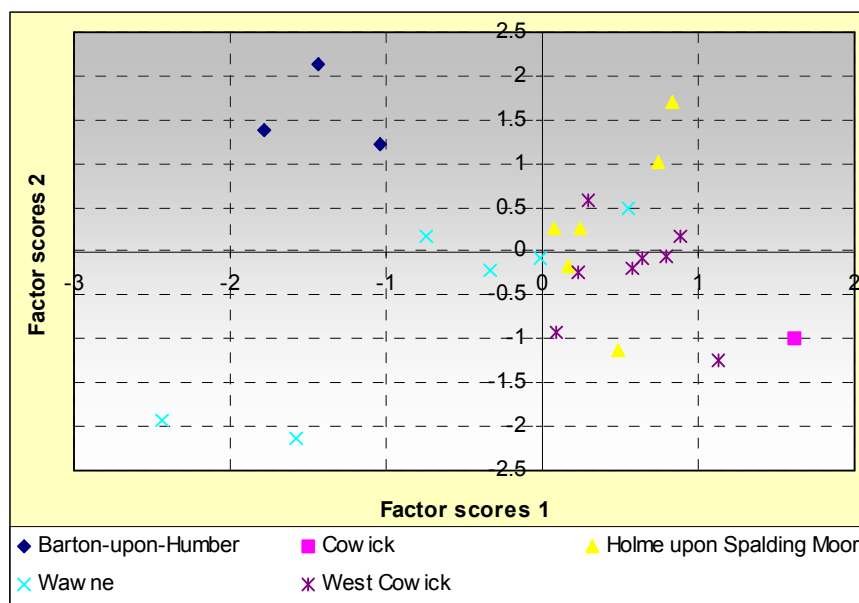


Figure 1

The Wawne chemical data were then analysed alongside samples of Humber ware from other production and consumer sites. These comprise three samples from St Peter’s Church, Barton upon Humber, a sherd from Cowick Moat (marked “cowick” in Figures) which is a consumer site with some wasters present, and samples from the West Cowick and Holme upon Spalding moor production sites.

Factor analysis of this dataset was carried out and four factors calculated. A plot of F1 against F2 (Fig 1) shows that the Barton-upon-Humber samples are clearly different in composition to the remainder whereas the Cowick and Holme-upon-Spalding Moor samples are very similar. The Group B and C samples in fact are those shown in Fig 1 as having F1 scores of 0 or higher whereas the Group A samples have negative F1 scores, which distinguish them from both the Cowick and Holme-upon-Spalding Moor samples. Negative F1 scores indicate high values for Na₂O, Ce, Li, P₂O₅ and Eu. Since phosphate is highly mobile and is often seen in thin-section filling the voids and cracks in pottery fabrics, the analysis was then carried out again omitting P₂O₅, CaO, Sr and Ba, all of which might be affected by post-burial alteration. The resulting F1/F2 plot is almost identical. The distinction between

the Wawne Gp A and Barton samples is based on their F2 scores. These indicate higher values for Li, MnO and Fe₂O₃ and lower values for Na₂O and TiO₂ in the Barton samples. These are less likely to be affected by post-burial alteration. The sodium is possibly present in the form of detrital feldspar or possibly a Na-rich calcium-aluminium silicate formed where calcareous clays are fired in the presence of brine. The titanium is certainly present in detrital minerals, such as rutile.

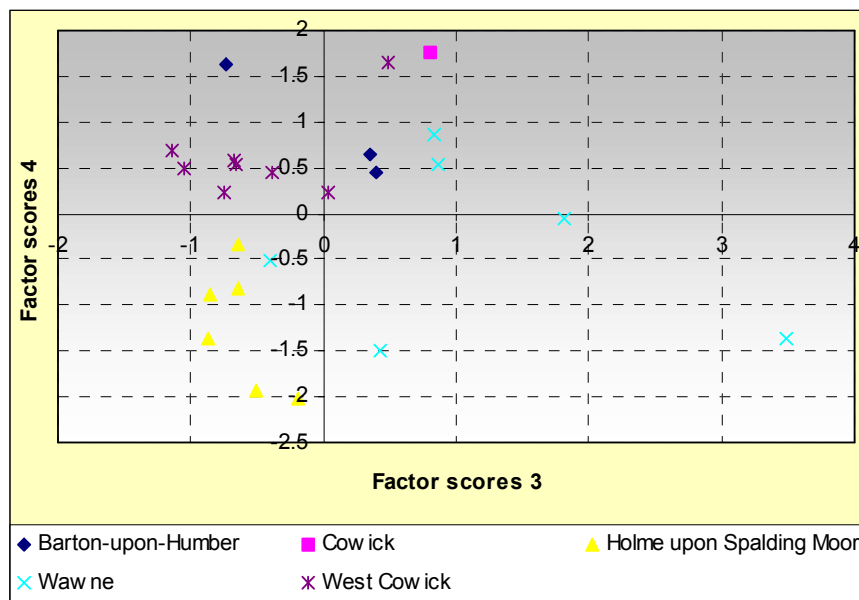


Figure 2

Fig 2 shows the F3/F4 plot for this second dataset (omitting P2O₅ etc). In this plot the Holme-upon-Spalding Moor samples can be distinguished from the remaining samples by their negative F3 and F4 scores. Negative F3 scores imply a high Zr content and low La and Ce whilst negative F4 scores imply low Zn, K₂O and Eu.

Thus, this comparison of the chemical composition of the Wawne Humber ware samples shows that there are chemical differences between them and the samples from the production sites of West Cowick and Holme-upon-Spalding Moor and that the Humber ware used at Barton-upon-Humber is also chemically distinct from that used at Wawne. Hayfield notes that there are Humber ware wasters from Thornton Curtis, just to the southeast of Barton, and this is a potential source for the Barton samples (Hayfield 1992).

The Wawne Humber ware samples were finally compared with a variety of medieval ceramics made at Beverley, whose silty products are petrologically similar to the Wawne wares. Fig 3 shows a scatterplot of the first two factors calculated by factor analysis. The Group B and C samples (indicated as osa02ex02 B and C) are similar in composition to samples of Beverley 1 and 2 wares from Grovehill Road (BGR85) and Eastgate (BE84). The Group A samples have lower F1 and F2 scores but still overlap in composition with these samples. A group of flat roof tiles however (1827-1986-bly on Fig 3) are chemically distinct from both the Wawne samples and the Beverley pottery.

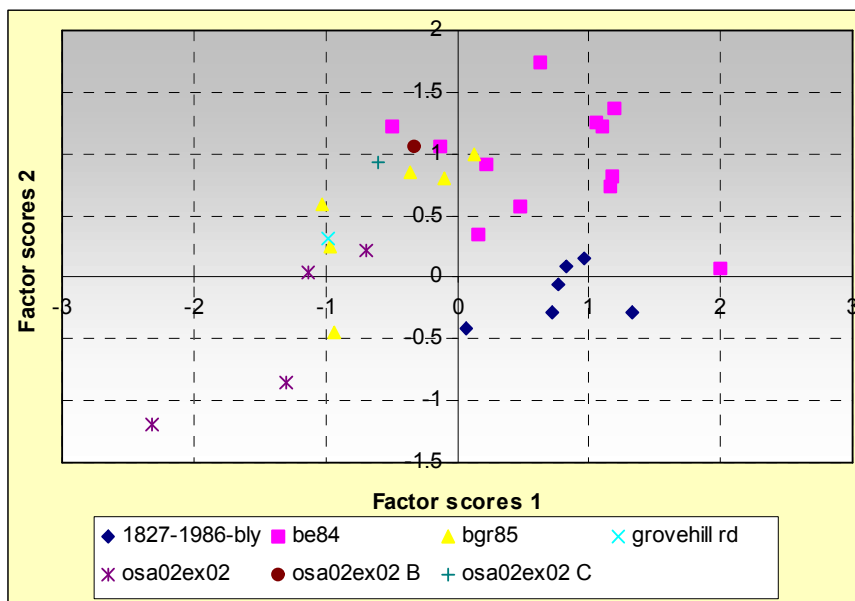


Figure 3

Conclusion

The combination of thin section and chemical analysis suggests that the Wawne Humber wares include at least three distinct fabrics and that these fabrics are chemically distinguishable. Comparison with material from known kiln sites and with pottery which may have been made at Thornton Curtis, to the south of the Humber, suggests that the Wawne samples were not made in any of those centres whilst the similarity in composition with samples from Beverley suggests that they were made from similar raw materials. Whether these later medieval production sites were also in Beverley or were exploiting the same raw materials elsewhere in east Yorkshire is not known and the Wawne wares would have to be compared with samples from other known east Yorkshire industries, such as those at Little Kelk and Hessle to see how variable these eastern Yorkshire silty clays might be in petrological and chemical composition.

Appendix 1

Major elements measured as percent oxides

TSNO	Al ₂ O ₃	Fe ₂ O ₃	MgO	CaO	Na ₂ O	K ₂ O	TiO ₂	P ₂ O ₅	MnO
V2099	12.96	3.9	0.73	1.08	0.58	1.85	0.58	0.7	0.045
V2100	15.03	5.09	0.85	0.98	0.67	2.17	0.67	0.46	0.033
V2101	14.66	5.34	1.56	1.16	0.31	2.26	0.61	0.51	0.06
V2102	17.58	6.26	2.28	1.32	0.42	2.86	0.77	0.32	0.094
V2103	17.5	6.01	2.21	1.27	0.46	2.9	0.7	0.17	0.076
V2104	15.81	5.49	1.8	0.87	0.33	2.63	0.65	0.15	0.03

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
V2099	614	73	21	61	28	9	129	80	12	41	35	72	35	4.9	1.005	2.4	1.4	478	54	12
V2100	522	80	20	74	29	11	112	71	11	36	39	81	39	5.7	1.0455	2.5	1.3	1028	71	13
V2101	522	89	43	70	53	13	137	100	17	39	40	87	40	6.9	1.433	3.6	1.7	507	67	15
V2102	520	101	28	92	49	16	121	108	19	43	45	103	45	8.5	1.587	3.9	1.9	3161	94	17
V2103	464	97	30	106	53	15	111	98	17	37	45	99	46	8.3	1.5995	3.6	1.7	917	90	19
V2104	439	94	24	95	51	14	105	103	17	38	43	94	43	7.6	1.4255	3.5	1.7	448	77	18

Acknowledgements

The Wawne samples were prepared by Peter Hill. The thin sections were made by Steve Caldwell, Department of Earth Sciences, University of Manchester, and the chemical analysis was carried out by Dr J N Walsh, Department of Geology, Royal Holloway College, London.

Comparative samples were provided by Doncaster Museums and Humber Field Archaeology and I would like to thank Peter Robinson and Ken Steedman respectively for their help in obtaining samples.

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