Characterisation Studies of Anglo-Saxon and Medieval Pottery from Galegate, North Newbald, East Yorkshire

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Archaeological evaluation by On-Site Archaeology of a site in North Newbald produced a sherd of early to mid Anglo-Saxon date and a small collection of medieval handmade unglazed wares which, assessment suggested, might be locally produced (Vince 2003). Accordingly, samples of the early to mid Anglo-Saxon vessel (Fig 1, top) and the medieval handmade wares (Fig 1 middle and bottom) were analysed using thin sections and chemical analysis in order to test the suggestion of a local origin.

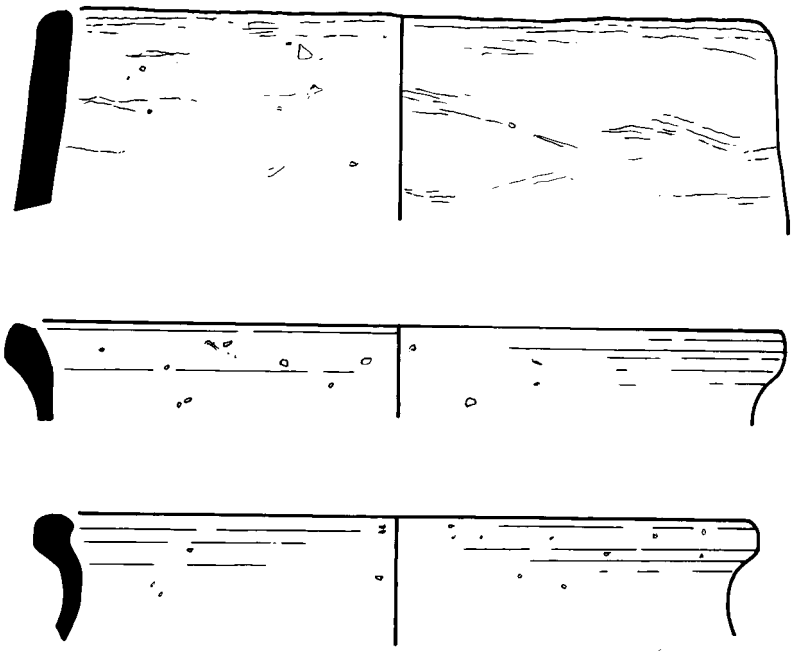

Figure 1. Top: Early to Middle Anglo-Saxon bowl; Middle and Bottom: Medieval Jars (Fabric QC)

Methodology

The thin sections were prepared by Steve Caldwell, University of Manchester, and were stained using Dickson's method ({Dickson 1965 #44803}). This staining distinguishes ferroan calcite (stained blue) from non-ferroan calcite (stained red or pink) and dolomite (unstained).

The chemical analyses were carried out at Royal Holloway College, London, under the supervision of Dr J N Walsh. This analysis determined the amount of several major elements

by percent oxide (Appendix 1) and that of a range of minor and trace elements as parts per million (Appendix 2).

Early to Mid Anglo-Saxon Pottery

Thin Section Analysis

The following inclusion types were noted in the thin section (V3030):

- Mudstone. Abundant rounded fragments of mudstone, of similar colour but generally finer texture to the groundmass. Some have abundant rounded opaque grains up to 0.05mm across whilst others are free from visible inclusions.

- Bioclastic limestone. Sparse rounded fragments of limestone consisting of shell and echinoid shell fragments in a groundmass of sparry ferroan calcite.

- Opaques. Sparse angular fragments up to 1.0mm across, some incorporating angular quartz grains up to 0.3mm across.

- Angular quartz. Moderate grains up to 1.5mm across, mostly unstrained monocrystalline but including some strained grains. Some of the grains show signs of overgrowth.

- Dolomitic limestone. A single rounded fragment of fine-grained dolomitic limestone, c.0.8mm long.

The groundmass consists of optically anisotropic baked clay with abundant dark brown clay/iron and opaque inclusions up to 0.1mm across.

The mudstone fragments probably indicate the origin of the clay, as weathered mudstone. In this area they could have two sources: Millstone Grit or Coal Measure mudstones or a Jurassic clay, which could have been obtained very locally. The bioclastic limestone is probably of Jurassic origin and, again, suitable candidates occur locally, immediately to the west and south of North Newbald. There are several potential sources for the opaque inclusions, but they could certainly outcrop within the Jurassic strata of this part of Yorkshire. The angular quartz, however, is almost certainly of Millstone grit origin and the dolomitic limestone is probably of Permian origin. The thin section evidence therefore points to the use of a weathered mudstone tempered with a detrital sand which includes material from a wide variety of sources, but including Jurassic material. The latter precludes a source further west than a line running from Market Weighton to South Cave. The lack of either chalk fragments or fresh flint, however, argues against a source on or close to the chalk outcrop itself.

Chemical Analysis

The chemical data were compared with that obtained from similar gritty, handmade early to mid Anglo-Saxon vessels from sites in Yorkshire. Factor analysis was carried out on this dataset and five significant factors were found, accounting for 60% of the variability in the dataset. A plot of F1 against F2 (Fig 2) shows the North Newbald sample as being similar to samples from Garton Slack, Scorton and West Lilling and as being distinguishable from samples from the nearby site of Sancton.

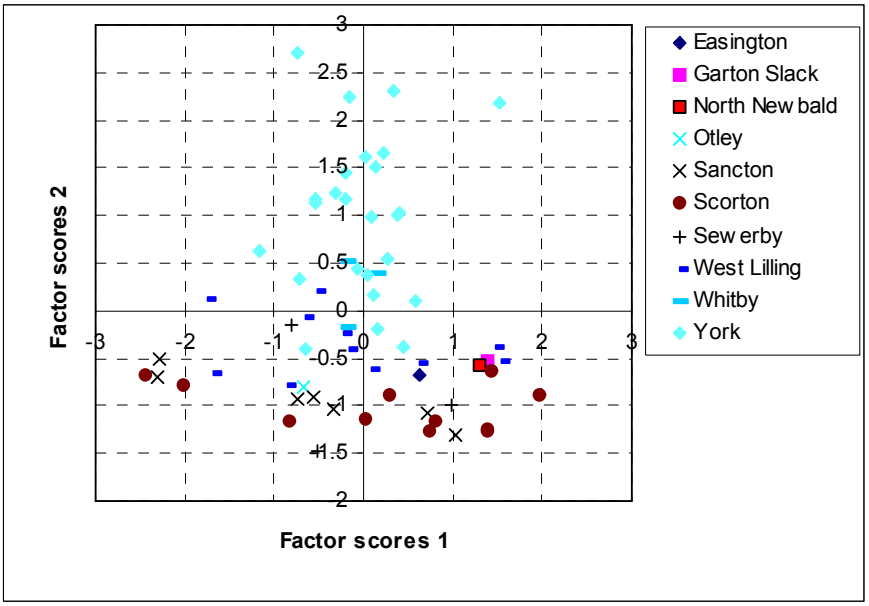

Figure 2

By contrast, a plot of the F3 against F4 scores (Fig 3) shows the North Newbald sample as being an outlier, not similar to any of the comparanda. This separation appears to be due mainly to the Iron, Cobalt and Manganese values.

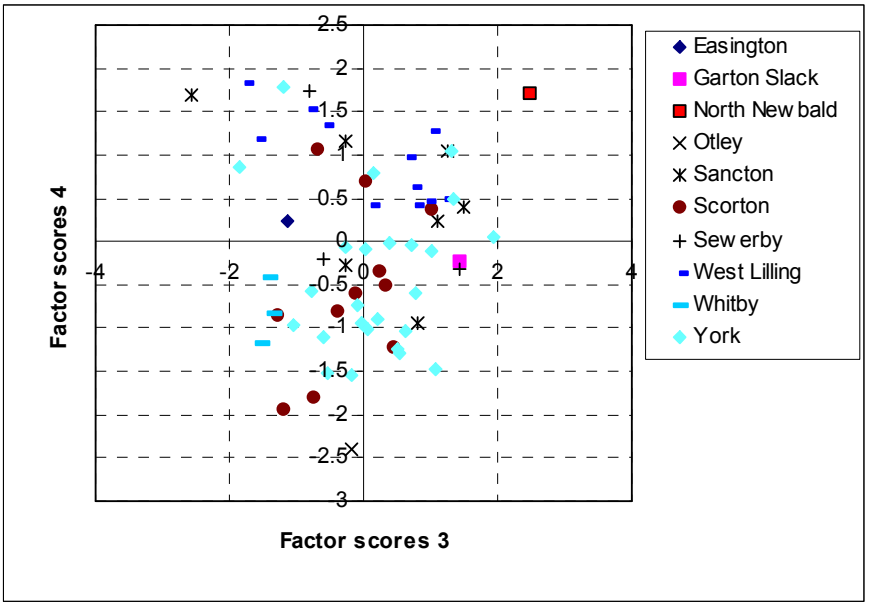

Figure 3

The thin section evidence therefore suggests a local origin for this vessel and the chemical analysis seems to confirm this. Of particular significance is the dissimilarity between the chemical composition of the North Newbald and Sancton samples.

Medieval Pottery

The medieval sherds are of a type termed Staxton-type ware. This ware was produced at a number of centres in North and East Yorkshire from the later 12th century to an unknown date, claimed by some to be in the 14th or 15th century but probably much earlier, in the 13th century.

Thin Section Analysis

The following inclusions were noted in the six thin sections:

- Angular Quartz. Abundant grains up to 0.4mm across. Some have quartz overgrowth in which the original grain boundary is visible.
- Oolitic Limestone. Moderate rounded fragments up to 1.5mm across in which the ooliths usually have a dark brown coating and a core of micrite or, in a few instances, bivalve or echinoid shell. The groundmass consists of sparry ferroan calcite.
- Micrite. Sparse rounded fragments up to 1.0mm across composed of non-ferroan calcite with spherical microfossils, typical of chalk.

- Calcareous Sandstone. Sparse fragments up to 1.0mm across composed of well-sorted angular quartz grains up to 0.2mm across in a matrix of sparry ferroan calcite.

- Ferruginous Sandstone. Sparse fragments up to 1.0mm across composed of angular and subangular quartz grains up to 0.3mm across in a matrix of sparry ferroan calcite.

- Clay/Iron Compounds. Sparse rounded and subangular opaque and dark brown grains up to 0.3mm across.

- Flint. A single angular fragment of flint, 3.0mm across, was present. The fragment contains a high degree of calcite and is therefore cortex.

The groundmass consists of optically anisotropic baked clay minerals, sparse clay/iron compounds and few other visible inclusions.

The quartz grains originate in a sandstone, but the lack of fragments of the parent sandstone suggests that they probably have travelled some distance from the outcrop of that rock. The oolitic limestone is undoubtedly of Jurassic origin and should be compared with the local Cave Oolite. The ferruginous sandstone is probably of Jurassic origin, but is too fine-grained to be the source of the quartz sand. The micrite is probably chalk, although micrites also occur in the Rhaetic and lower Jurassic, both of which outcrop in the general area. The inclusions probably all come from a detrital sand and their distinctive nature means that it would be possible to narrow down the source of the vessels through a programme of clay sampling. The source area must be limited to the north of the Humber, since to the south the Chalk and Jurassic limestones are separated by a wide expanse of Jurassic clay, mainly masked by Quaternary deposits, and the water body responsible for its deposition must be drain both the Chalk and the Cave Oolite.

Chemical Analysis

The chemical data were compared with samples of a similar fabric from a consumer site at Wawne, to the east of the Wolds, north of Beverley, and with samples of Staxton-type ware from a production site at Staxton, and from consumer sites at Hartlepool, Scarborough, and Wawne. Sandstone-sand tempered vessels of early Anglo-Saxon date from Sancton, and the early to mid Anglo-Saxon vessel from North Newbald were also included.

Factor analysis of this dataset revealed six factors which in total accounted for 74% of the variability in the data. A plot of F1 against F2 (Fig 4) shows that the North Newbald samples can be distinguished from the Staxton-type wares from Staxton, Hartlepool, Scarborough and, less strongly, Wawne. They are similar, however, to the Sancton samples, the early to mid Anglo-Saxon sample from North Newbald and the Wawne examples with a similar fabric (marked Wawne QC). This result is consistent with the North Newbald vessels being made

from similar raw materials to those used in the Anglo-Saxon period at Sancton and Wawne, and having the same or similar composition to the Wawne QC examples.

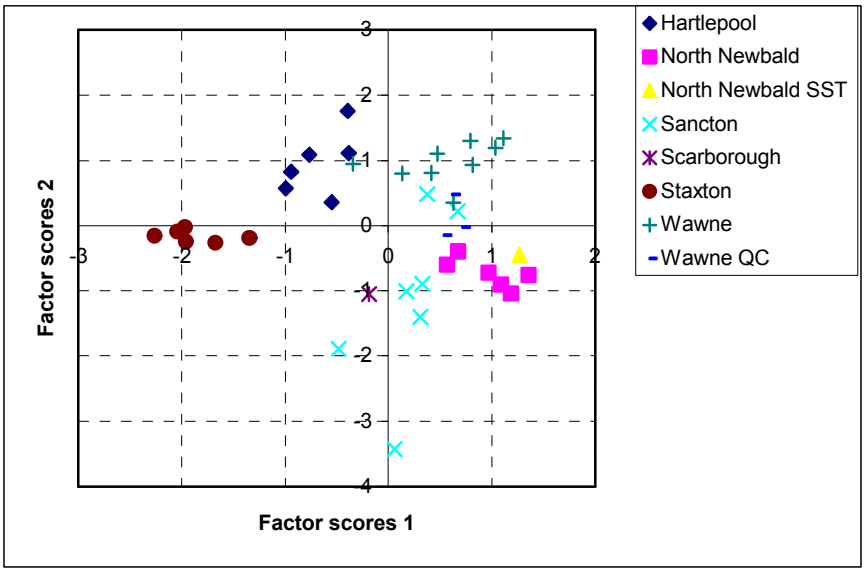

Figure 4

A plot of the F3 against the F4 scores (Fig 5) distinguishes the North Newbald Anglo-Saxon sample (high F3 score) whilst confirming the difference in composition between the North Newbald samples and those from Wawne, Staxton and Scarborough. The elements which separate the North Newbald Anglo-Saxon sample from the remainder are Iron and, to a lesser extent, Magnesium and Potassium.

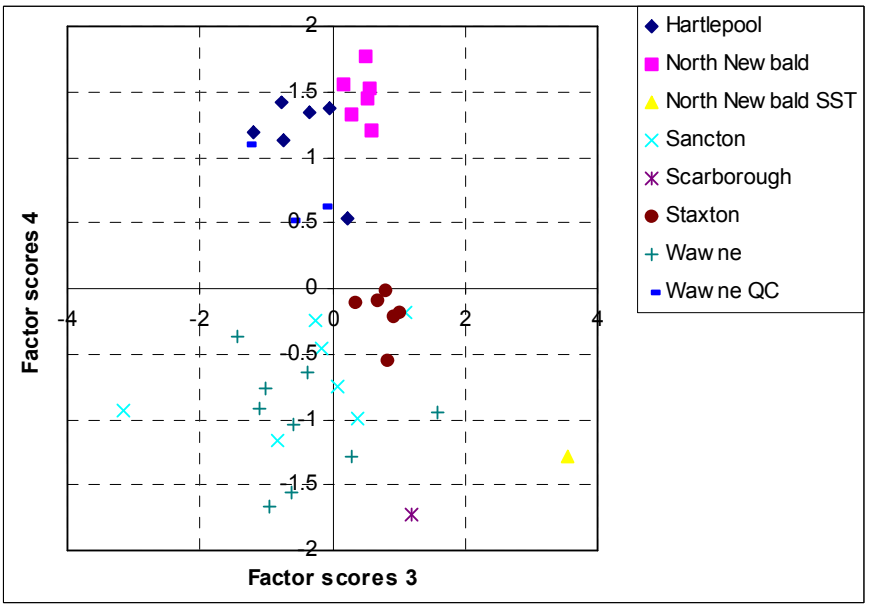

Figure 5

Finally, a plot of the F5 against F6 scores (Fig 6) distinguishes the Anglo-Saxon samples from the remainder, but fails to distinguish the North Newbald medieval samples from the others.

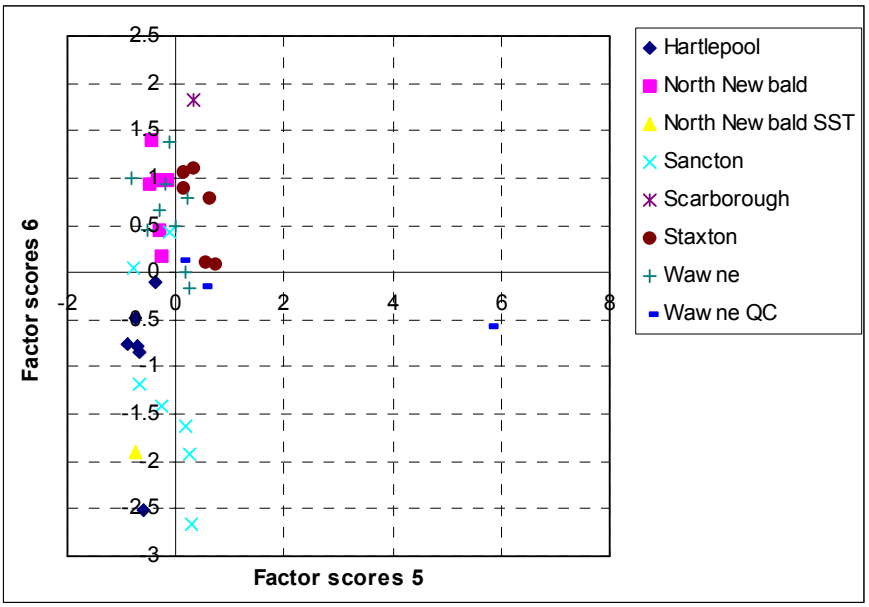

Figure 6

The thin section and chemical data together indicate that the North Newbald medieval sherds all have a similar composition and that they can be distinguished from all the comparanda, including those samples from Wawne with similar petrological characteristics. Without analyses of clays or pottery wasters of definite North Newbald origin it is not possible to say for certain that the North Newbald medieval sherds come from locally-made vessels but all of the thin section and chemical evidence is consistent with this interpretation.

Appendix 1

TSNO	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5	MnO
V3030	14.32	11	1.67	3.7	0.25	2.21	0.56	1.21	0.088
V3031	12.36	4.95	1.19	12.52	0.19	2.13	0.5	0.64	0.035
V3032	12.89	4.68	1.19	12.29	0.22	2.17	0.5	0.8	0.046
V3033	11.89	4.35	1.11	13.52	0.21	1.98	0.47	0.69	0.032
V3034	12.98	5.2	1.28	9.25	0.2	2.2	0.54	0.27	0.036
V3035	13.21	5.47	1.09	12.32	0.19	2.21	0.52	0.22	0.037
V3036	12.13	4.83	1.08	13.46	0.19	2.11	0.49	0.55	0.036

Appendix 2

TSNO	Ba	Cr	Cu	Li	Ni	Sc	Sr	V	Y	Zr*	La	Ce	Nd	Sm	Eu	Dy	Yb	Pb	Zn	Co
V3030	300	84	25	35	46	13	151	91	22	63	41	91	42	6	1	4	3	28	62	17

V3031	312	83	18	35	37	12	260	96	17	58	35	62	36	5	1	3	2	25	66	10
V3032	379	83	18	39	40	12	282	100	19	63	38	63	39	6	1	3	2	25	56	11
V3033	309	77	18	33	35	11	277	90	17	61	33	56	34	5	1	3	2	24	81	10
V3034	293	86	18	41	39	12	193	94	18	58	37	79	38	5	1	3	2	39	73	15
V3035	287	84	19	45	39	12	243	99	17	53	37	64	38	5	1	3	2	40	68	14
V3036	290	81	17	31	35	11	254	89	17	56	35	62	36	5	1	3	2	36	77	11