Characterisation Studies of an Anglo-Saxon Pottery Vessel from Preston, East Yorkshire

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Excavations by Humber Archaeology Partnership at Preston, East Yorkshire, produced a sherd of hand-made, gritty pottery which was identified by Peter Didsbury as being of early to mid Anglo-Saxon date. It was recommended that scientific analysis of the sherd was carried out, firstly, to compare the sherd with others of early-to-mid Anglo-Saxon date, to confirm the identification and, secondly, to use petrological analysis to determine, if possible, the source of the raw materials used in its manufacture.

Visual examination at x20 magnification confirms that the sherd is tempered with a rounded, mixed gravel, similar to that used on several sites in East Yorkshire in the early to mid Anglo-Saxon period, and is quite different from the coarse, angular rock-tempered ware found in the pre-Roman Iron Age in the same area. A thin section and chemical analysis of the sherd was obtained and given the code V2837 in the AVAC reference collection.

Petrological Analysis

A thin section was produced by Steve Caldwell, University of Manchester, and stained using Dickson's method (Dickson 1965).

In thin section, the fabric was seen to contain moderate quantities of rounded gravel, with grains between c.1.0mm and 3.0mm across, in a groundmass of finer inclusions and baked clay.

The rounded gravel consists of the following inclusion types:

- Acid igneous rock. Composed of altered feldspar, altered microcline, quartz (accessory) and epidote.
- Basic igneous rock.
- Non-Ferroan Micrite.
- Bioclastic ferruginous limestone. Clasts of echinoid shell, bivalve shell, and ostracods in a dark brown clay/iron groundmass, some sparry ferroan calcite filling of pores.
- Dark brown stained flint.

- Fine-grained sandstone with dark brown cement and quartz, and some ferroan calcite grains c.0.1mm across. Fragments vary in grain size, amount of cement and the presence of ferroan calcite.

- Rhaxella chert.

- Quartz.

- Mudstone/ironstone. opaque grains, some with sparse angular quartz inclusions.

The groundmass consists of optically anisotropic baked clay minerals (opaque and black in reflected light in the core) and moderate angular to subangular quartz grains c.0.1mm to 0.3mm across.

The majority of the inclusions present in this section probably originated either in the Middle Jurassic of the North Yorkshire Moors or in the Chalk with some more exotic erratic grains. The rounded nature of the grains is typical of exposures of till along the east Yorkshire coast, indicating a complex depositional history. The non-ferroan calcite micrite is probably chalk and the presence of chalk and flint, together with the Middle Jurassic and erratic material, limits the source to a boulder clay deposited to the south and east of the Wolds, and probably north of the Humber (boulder clays to the south of the Humber often contain a much higher proportion of rounded quartz of Permo-Triassic character, probably as a result of material being transported along the line of the Humber). Similar vessels have been examined from Easington and Sancton whilst the gravel is similar in composition to the coarse sand-tempered medieval wares of the Beverley area.

The fine-textured clay groundmass and the fine angular quartz sand in the groundmass are both likely to be derived from Middle Jurassic rocks whilst the medieval Beverley wares have a groundmass containing abundant quartz and muscovite silt, probably indicating the use of an estuarine silt or post-glacial lacustrine deposit.

Chemical Analysis

A subsample of the sherd was cut off and the surfaces mechanically removed. The remainder was crushed to a fine powder and submitted to the Department of Geology, Royal Holloway College, London, where is was analysed using Inductively-Coupled Plasma Spectroscopy under the supervision of Dr J N Walsh. A range of elements was measured, the major elements being measured as percent oxides (App 1) and the remainder in parts per million (App 2).

An estimate of the total silica content (not measured by ICPS) was made by subtracting the total measured oxides from 100%. The result, c.71%, is in the same range as samples from

various other sites in North and East Yorkshire, which have silica contents ranging from 64% to 78%.

The data were then normalised to Aluminium and analysed using Factor Analysis. The data set excluded Calcium, Phosphorus and Strontium, because of the post-burial leaching of the calcareous inclusions in some samples. Five factors were found. A plot of the first two factor scores reveals that the Sanction, Easington and Sewerby samples all have different and discrete compositions but that the West Heslerton samples have a much wider range, overlapping all the other groups. In this plot, the Preston sample is seen to be similar in composition to the Sewerby samples and, of course, to those from West Heslerton, but is different from the Sancton and Easington samples (Fig 1).

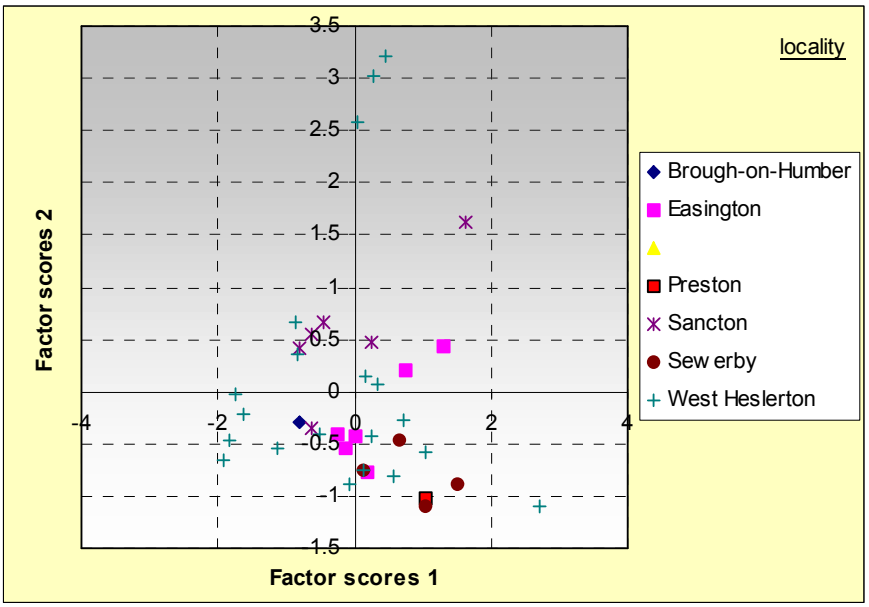

Figure 1

A plot of F3 against F4 shows that the F4 scores separate the Sewerby and Easington samples from the Preston sample whilst the Sancton samples, and one from Brough-on-Humber, also form a discrete and separate group. The Preston sample plots on the edge of the West Heslerton cluster (Fig 2).

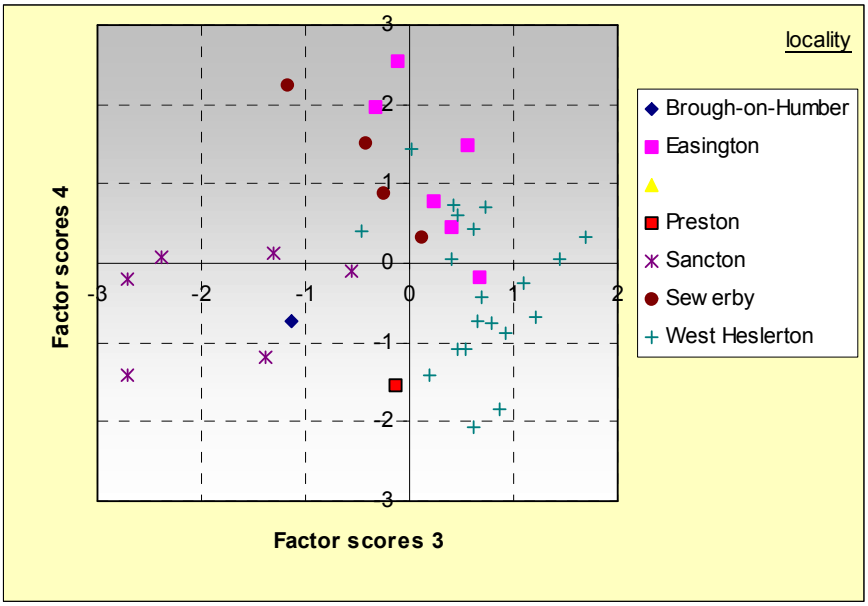

Figure 2

Finally, an examination of the F5 scores shows that this factor separates the Sewerby samples from the Preston sample.

In conclusion, therefore, there are chemical differences between the Preston sample and those from various sites in East Yorkshire but the sample falls within the range found at West Heslerton. It is not possible, from this data, to say where the Preston sample was made but it is likely to have been made from a different outcrop of clay from those used at Sewerby, Sanction or Easington.

Appendix 1

TSNO	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5	MnO
V2837	15.89	5.78	1.18	2.06	0.486	1.84	0.64	0.75	0.066

Appendix 2

TSNO	Ba	Cr	Cu	Li	Ni	Sc	Sr	V	Y	Zr*	La	Ce	Nd	Sm	Eu	Dy	Yb	Pb	Zn	Co
V2837	653	90	26	66	42	16	158	113	27	42	50	102	52	10	2	5	3	44	130	17

Bibliography

Dickson, J. A. D. (1965) "A modified staining technique for carbonates in thin section." *Nature*, 205, 587.