Characterisation Studies of Two Neolithic Pottery Vessels from King's Stanley, Gloucestershire

Alan Vince

Samples of two Neolithic pottery vessels found in Pit 1 at King's Stanley, Gloucestershire, were submitted for analysis with the aim of establishing, firstly, whether they were made from the same raw materials and, secondly, whether the source of the raw materials could be provenanced. The study employed thin section and chemical analysis. The two vessels were stylistically identified as Grooved Ware (sample V3228, Pot 4) and Mortlake Ware (Sample V3227, Pot 1).

Thin Section analysis

The thin sections were stained using Dickson's method (Dickson 1965). This staining differentiates dolomite (unstained) from ferroan (stained blue) and non-ferroan (stained pink) calcite. The thin sections are retained in the AVAC reference collection where they can be consulted by appointment.

Grooved Ware

The following inclusion types were noted in the thin section:

- Shelly marl. Angular fragments of marl containing fragments of non-ferroan bivalve shell, up to 1.5mm long, in a matrix of clay minerals, scattered ferroan calcite and sparse dark brown/opaque grains up to 0.1mm across. Some of the bivalve shell has layers of prismatic ferroan calcite on either side of the non-ferroan core. This may be part of the original shell, which would therefore probably be an inoceramid, or may be a subsequent coating (the fragments are too small to show whether the coating covers broken shell edges). Echinoid spines composed of ferroan calcite are also present. The clay component of the marl fragments is similar in texture to that of the groundmass, but is sometimes darker in colour, due to either iron or an organic content.
- Dark brown/opaque grains. Sparse angular fragments up to 0.7mm across

The groundmass contains optically anisotropic baked clay minerals, sparse muscovite laths up to 0.1mm long, moderate ferroan calcite and dark brown/opaque grains up to 0.1mm across.

Mortlake Ware

The following inclusion types were noted in thin section:

The Alan Vince Archaeology Consultancy, 25 West Parade, Lincoln, LN1 1NW

http://www.postex.demon.co.uk/index.html

A copy of this report is archived online at
http://www.avac.uklinux.net/potcat/pdfs/avac2006013.pdf

- Rounded quartz. Moderate rounded and subangular grains up to 0.3mm across. Most are monocrystalline with little straining. A few are polycrystalline and appear to be of sedimentary origin (i.e. could be classed as sandstone fragments) and rare chert fragments occur.
- Clay/ironstone. Moderate sub-angular fragments of dark brown to opaque clay/ironstone, in one case consisting of two bands of opaque material with a band of fine sandstone between. The sandstone band has a high proportion of feldspar laths present. Moderate voids, both rounded and rectangular, are present, probably indicating the former presence of shell and other calcareous inclusions.
- Organics. Moderate linear voids, c.0.1mm wide and up to 1.0mm long, usually with a darkened halo indicating the presence of organic matter in the inclusion.
- Clay pellets. Moderate angular fragments with a lighter colour than the groundmass but similar texture. Some have signs of lamination and coherent birefringence. These are probably relict clay

The groundmass consists of optically anisotropic baked clay minerals, sparse angular quartz, and dark brown/opaque grains up to 0.1mm across.

Discussion

The grooved ware sample was probably produced from a shelly marl clay. Similar clays occur in the lower Jurassic which outcrops throughout the Vale of Gloucester, although extensively masked by later deposits. Similar fabrics have been observed as far afield as North Lincolnshire and it is unlikely that ceramic petrology alone can provenance this fabric.

The Mortlake ware sample, on the other hand, contains inclusions derived from terrace sands. The high proportion of clay/ironstone is matched with samples of gravel from the site itself and the clay groundmass is likely to have originated as a lower Jurassic mudstone which has been weathered, and perhaps redeposited, in Quaternary or recent times.

The thin sections therefore indicate that the two vessels were made from different raw materials, and that the Mortlake ware sample was potentially produced very close to the site.

Chemical Analysis

Samples from both vessels were ground to a fine powder, having removed any potentially contaminated surfaces, and analysed using Inductively-Coupled Plasma Spectroscopy. The frequencies of a range of major and minor elements were determined, as percent oxides for the major elements (App 1) and parts per million for the minor elements (App 2).

The data were normalised to Aluminium, to take account of differences in quartz content, and then compared with four groups of samples of pottery made from lower Jurassic clays:

a) Silty Dales ware, produced in North Lincolnshire using Rhaetic or Lower Jurassic clay

b) Dales ware with sparse Cretaceous inclusions, produced in north Lincolnshire or East Yorkshire using Rhaetic or Lower Jurassic clay.

c) Gloucester TF41B, produced at Haresfield using Middle Lias clay.

d) Dursley Fabric B, produced closer to Dursley, to the south of Haresfield but from a similar Middle Lias clay.

The data were analysed using factor analysis (using Winstat for Excel,). A plot of the two principal factors generated by this analysis (Fig 1) indicates that the Mortlake sample is similar to both the Gloucester TF41B and the Dursley B samples but is more similar to the Gloucester TF41B samples, which have a stronger negative Factor 1 score. The Grooved ware sample, however, is distinct from all four comparative groups.

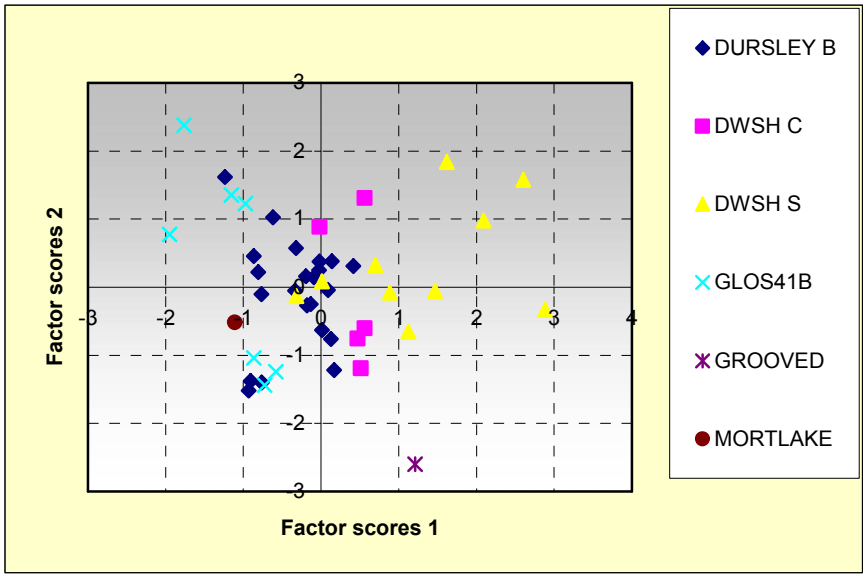

Figure 1

This analysis is further confirmation of the local origin of the Mortlake ware sample but indicates that the Grooved ware is chemically distinguishable from wares made from similar raw materials in Lincolnshire.

Acknowledgements

The thin sections were prepared by Steve Caldwell, Department of Earth Sciences, University of Manchester, and the chemical analysis was carried out at Royal Holloway College, London, under the supervision of Dr J N Walsh. Sample preparation at Lincoln was carried out by Dr P Hill.

Bibliography

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

Winstat for Microsoft (r) Excel. Fitch, Robert K. 2001.

Appendix 1

TSNO	**Al2O3**	**Fe2O3**	**MgO**	**CaO**	**Na2O**	**K2O**	**TiO2**	**P2O5**	**MnO**
V3227	19.3212	8.6076	1.3608	2.2464	0.3456	2.6784	0.8316	2.5704	0.0864
V3228	14.8176	6.5988	1.3932	17.1288	0.216	2.1492	0.6264	1.6524	0.06156

Appendix 2

TSNO	Ba	Cr	Cu	Li	Ni	Sc	Sr	V	Y	Zr*	La	Ce	Nd	Sm	Eu	Dy	Yb	Pb	Zn	Co
V3227	475	136	36	110	69	19	140	141	33	92	46	80	49	11	2	5	3	32	125	18
V3228	315	140	51	126	80	15	265	174	30	81	33	48	36	6	1	4	3	15	137	15