Characterisation of Medieval Pottery from RAF Quedgeley, Quedgeley, Gloucestershire

Alan Vince

Archaeological excavations on the site of RAF Quedgeley by Thames Valley Archaeological Services revealed evidence for a medieval settlement occupied between the mid 11th and the 17th centuries. Most of the pottery used on the settlement was of types which are well-known from excavations in Gloucester but a small quantity could not be matched with the Gloucester Type Fabric Series by eye and samples of some of these types were selected for further study using thin section and chemical analyses.

The samples are of a possibly local-produced coarseware (Table 1, MEDLOC) and for comparison a sample of daub which was presumably of local production. In addition, three samples of unidentified wares were examined.

Table 1

TSNO	Context	cname	subfabric	Action
V3987	457	MEDLOC		DR;TS;ICPS
V3988	457	MEDLOC		DR;TS;ICPS
V3989	260	MEDX		DR;TS;ICPS
V3990	496	MEDX		DR;TS;ICPS
V3991	476	MEDLOC		DR;TS;ICPS
V3992	284	MEDLOC		DR;TS;ICPS
V3993	669	MEDX	MICACEOUS SILT;F SOMERSET LEVELS	TS;ICPS
V3994	381	FCLAY	FABRIC1	TS;ICPS

Thin Section Analysis

Possible locally-produced ware (MEDLOC)

- Rounded quartz. Moderate grains up to 0.5mm across, some well-rounded with a high sphericity.
- Ferroan calcite. Sparse fragments of sparry ferroan calcite. Some are probably the matrix from an oolitic limestone.
- Dark brown clay/iron. Moderate subangular and rounded grains up to 1.0mm across. Some contain sparse to moderate angular quartz grains up to 0.1mm across but most are fine-textured.
- Organics. Sparse carbonised organics surrounded by a darkened halo. The fragments range up to 2.0mm long and 0.2mm wide.

The Alan Vince Archaeology Consultancy, 25 West Parade, Lincoln, LN1 1NW
http://www.postex.demon.co.uk/index.html
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- Oolitic limestone. Sparse fragments of oolitic limestone. The ooliths are mostly replaced by micrite and the groundmass is sparry ferroan calcite.
- Fossiliferous limestone. Moderate fragments of limestone containing a high proportion of clay mixed with ferroan calcite. Fossils are present, including probable ostracods, areas of sparry non-ferroan calcite, nacreous bivalve shells.
- Microfossils. Sparse non-ferroan calcite multi-chambered microfossils with their tests filled with non-ferroan calcite or clay.
- Bivalve shell. Sparse fragments of nacreous shell, up to 1.0mm across.
- Calcareous siltstone. Sparse rounded fragments of siltstone up to 1.0mm across containing well-sorted angular quartz, c.0.05-0.1mm across in a ferroan calcite matrix.
- Echinoid shell. Sparse fragments of ferroan calcite echinoid shell and spines, up to 0.5mm across.

The groundmass consists of optically anisotropic baked clay minerals, abundant specks of ferroan calcite and dark brown grains, up to 0.1mm across.

The groundmass is typical of Jurassic clays. Locally, the most likely clays are Lias and within this the Middle and Upper Lias clays contain muscovite and quartz silt both of which are absent from this fabric, which is therefore likely to have come from the Lower Lias.

The sand temper contains material from a variety of sources, probably including Triassic-derived material; Rhaetic or Lower Lias limestones, Middle Jurassic oolitic limestones and Middle Lias clay/ironstone. The calcareous content of the terrace sands in the Vale of Gloucester seems to fall off rapidly as one moves away from the Jurassic limestone hills and this sand therefore probably originated in one of the terraces at the foot of the Jurassic scarp or its outliers, such as Churchdown Hill.

Fired Clay

The following inclusion types were noted in thin section:

- Rounded quartz. Abundant grains, mostly less than 0.5mm across but ranging up to 1.0mm across. The larger grains are mostly well-rounded with a high sphericity.
- Feldspar. Sparse angular fragments up to 0.4mm across.
- Acid igneous rock. A single rounded fragment 1.0mm long composed of quartz, biotite and feldspar.

- Limestone. Sparse rounded fragments, including one c.2.0 across composed of sparry non-ferroan calcite, brown non-ferroan micrite and a small area of ferroan calcite.
- Siltstone. Sparse rounded grains up to 0.4mm across composed of angular quartz grains c.0.05mm across in an amorphous brown matrix.
- Clay/Iron grains. Sparse rounded grains up to 0.4mm across.
- Chert. Sparse rounded grains up to 0.4mm across.

The groundmass consists of optically anisotropic baked clay and moderate angular quartz grains up to 0.1mm across.

The inclusions are typical of Triassic-derived sands throughout England apart from the limestone, which is probably of Jurassic origin.

Unidentified ware (V3989)

The following inclusions were noted in thin section:

- Quartz. Sparse subangular grains up to 0.5mm across. Most are strained and polycrystalline. Sparse well-rounded monocrystalline grains are also present together with rounded grains of sedimentary origin with brown inclusions marking the original grain boundaries.
- Feldspar. Sparse subangular grains of altered feldspar up to 0.5mm across.
- Rock fragment. A single fragment of a rock composed of a light green, splightly pleiochroic mineral and plagioclase feldspar. Also another fragment of similar but more strongly coloured and more strongly pleiochroic mineral, 0.3mm across.
- Clay. Sparse rounded clay pellets of similar colour to the groundmass but with no visible inclusions.

The groundmass consists of optically anisotropic baked clay minerals, abundant angular quartz up to 0.15mm across and sparse rounded dark brown grains, muscovite and biotite up to 0.1mm long.

The sparse inclusions over 0.1mm across include some grains typical of Severn Valley sands. However, the feldspar, and unidentified rock fragments are unusual. At this frequency. Such fragments only occur in deposits derived from the Malvern Hills and made within a few miles of the outcrop (such as Malvern Chase ware). The silty groundmass is typical of some Silurian and Devonian clays which outcrop to the west of the Severn. Together these features suggest a source close to the Malvern Hills but to the south or west of the Hills rather than the east.

Unidentified ware (V3990)

The following inclusions were noted in thin section:

- Quartz. Sparse subangular grains up to 0.3mm across.
- Siltstone. Sparse rounded fragments composed of quartz and muscovite, up to 0.5mm across.
- Clay pellets. Sparse rounded inclusionless pellets, either of similar colour to the groundmass or slightly darker.

The groundmass consists of optically anisotropic baked clay minerals, moderate angular quartz and muscovite up to 0.1mm across. Several black dendritic stains occur but it is unclear whether these were present in the parent clay or are post-burial.

No close parallels for the siltstone occur in this part of the Severn Valley, the nearest being Silurian siltstones from the Forest of Dean, in the May Hill area.

Unidentified ware (V3993)

The following inclusions were noted in thin section:

- Mudstone or Clay. Moderate subangular and rounded fragments of dark brown laminated clay up to 1.0mm across containing abundant angular quartz, muscovite and biotite up to 0.1mm across. These fragments are similar in texture to the groundmass but have a higher iron content.
- Quartz. Sparse rounded grains up to 0.3mm across.

The groundmass consists of optically anisotropic baked clay minerals, abundant angular quartz, muscovite, biotite and dark brown rounded grains all up to 0.1mm across.

Similar highly micaceous silty clays occur in the Silurian and Devonian strata west of the Severn and one of the main late medieval fabrics used at Chepstow has similar characteristics (Chepstow HK). Visually similar material has been noted from north Somerset (e.g. Cheddar J) but its source is not known. No comparative samples of these wares are available for study.

Chemical Analysis

Offcuts were taken from each sampled sherd and the outer surfaces removed mechanically. The core. c.1-2gm, was then crushed to a fine powder and submitted to Royal Holloway College, London, where it was analysed using Inductively-coupled Plasma Spectroscopy.

A range of major elements was measured and expressed as percent oxides (App 1) and a range of minor and trace elements was measured as parts per million (App 2). A estimate of silica content was obtained by subtracting the total measured oxides from 100% and the data

were all normalised to aluminium. Analysis of the data was carried out using WinStat for Excel (Fitch 2001).

Possible locally-produced ware (MEDLOC) and Fired Clay

The fired clay sample has an estimated silica content of 78% compared with a range of 59% to 69% for the MEDLOC sherds.

The normalised chemical data from the four MEDLOC sherds and the daub sample were compared (Table 2). Some of these differences could be explained as being due to the higher sand content found in the fired clay and the presence of iron-rich grains, sodium-rich feldspars and lead-rich ore fragments in that sand. However, the fired clay also contains higher frequencies of all the measured rare earth elements, which are usually found in the clay fraction. The higher magnesium, calcium and strontium values in the MEDLOC samples are clearly due to the higher frequency of limestone fragments in that fragment and the calcareous inclusions in the groundmass. The chemical analyses therefore confirm the thin section analysis and indicate that the sand used to temper the fired clay and the sand used in MEDLOC are different and that the two groups were made from different parent clays.

Table 2

Elements with similar frequencies	Potassium, Titanium, Manganese, Barium, Chromium, Copper, Lithium, Nickel, Scandium, Vanadium, Zinc, Cobalt
Elements higher in MEDLOC	Magnesium, Calcium, Phosphorous, Strontium
Elements higher in the fired clay	Iron, Sodium, Ytterbium, Zirconium, Lanthanum, Cerium, Neodymium, Samarium, Europium, Dysprosium, Yttrium, Lead

The data were then compared with a series of analyses of wares produced in the Severn Valley in Gloucestershire ranging from the Tewkesbury area in the north to the Dursley area in the south (Table 2).

Table 3

Code	N	Description
DURSLEY A	7	Limestone sand in a calcareous silty groundmass
DURSLEY B	22	Mixed limestone/quartz/ironstone sand, cf MEDLOC, in fine non-calcareous groundmass
DURSLEY C	15	Palaeozoic sandstone sand in fine groundmass
DURSLEY D	15	As Dursley A but with shell and less calcareous inclusions
DURSLEY E	1	Sandstone sand (as in Dursley C), calcareous inclusions and fine groundmass
FCLAY DURSLEY	1	Abundant coarse silt
FCLAY RQG	1	Quedgeley V3994
GLOS41B	8	Gloucester TF41B, probably made at Haresfield
TAM 1/2/4/6	14	Rounded quartz sand in ?Lower Lias clay
TAM FLOOR 1	2	Rounded quartz sand in ?Lower Lias clay

Factor analysis of this data, excluding calcium, strontium and phosphorus, found no clear groupings (Fig 1) but did indicate that the Quedgeley MEDLOC sherds were similar in composition to each other, to the fired clay sample and to Dursley Fabric A and Gloucester TF41B.

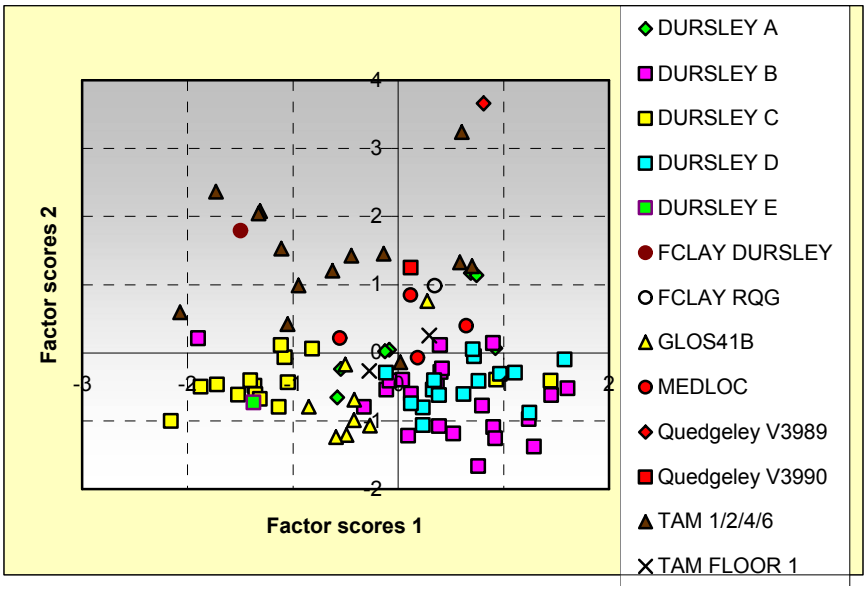

Figure 1

Unidentified Wares

At present, the only samples with which to compare the three unidentified ware samples are from Herefordshire and the Malvern Chase.

The data for the three unidentified samples, the Quedgeley local coarseware and various Herefordshire/Malvern Chase samples was analysed using factor analysis and all three samples, to a greater or lesser extent, could be distinguished from the remainder. Therefore, the possible Silurian/Devonian origin of the silty and micaceous fabrics is not supported by their chemical composition but until further comparative data becomes available the three samples remain unidentified.

Conclusions

The petrological and chemical characteristics are consistent with the four MEDLOC samples being made from Jurassic clay, presumably a Lower Jurassic, Lias, clay given the find spot, and a detrital mixed calcareous/quartz sand. The detrital grains include probable Middle Lias ironstones, Middle Jurassic oolite as well as unidentified limestones of Jurassic character. A source on site can be discounted on the basis of the thin section and chemical comparison of the fired clay and pottery and the chemical differences suggest that the Tewkesbury area in one direction and the Dursley area in the other are too dissimilar. A source in one of the parishes in the valley between Cheltenham and Stroud is most likely.

The three unidentified types could not be provenanced on the basis of their petrological or chemical compositions. V3990 contains siltstone fragments which, locally, points to a Palaeozoic origin. V3993 contains rounded pellets of a micaceous, silty mudstone or clay, which again is best paralleled in Palaeozoic strata and V3989 was made from a less micaceous silty clay with sparse inclusions which include fragments of basic igneous rock, together with grains which are common to sands throughout the Severn Valley, at least from Worcestershire southwards to the Bristol Avon. One possible source, which would explain the basic igneous rock fragments in V3989 would be the Tortworth inlier (Kellaway and Welch 1948, 11). This small exposure of Silurian rocks in South Gloucestershire includes two layers of basic rock, the Upper Trap, which is a microporphyritic basalt, and the Lower Trap, which is an altered olivine basalt, in which the olivine has been altered to chlorite. Both occur within the Llandovery Series, which includes sandy micaceous shales.

Bibliography

Kellaway, G A and Welch, F B A (1948) *Bristol and Gloucester District*. British Regional Geology London, Inst Geol Sci

Appendix 1

TSNO	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5	MnO
V3987	13.36	5.46	1.41	16.38	0.35	2.01	0.55	0.58	0.073
V3988	12.3	6.85	1.38	12.73	0.27	2.4	0.51	1.07	0.123
V3989	15.41	5.88	3.17	0.49	0.75	3.25	0.81	0.32	0.05
V3990	18.75	12.1	5.96	0.87	0.28	4.39	0.82	0.36	0.299
V3991	13.92	5.73	1.15	8.38	0.29	2.03	0.6	0.52	0.077
V3992	12.05	4.34	0.97	9.44	0.31	1.85	0.53	1	0.089
V3993	16.57	6.1	1.12	1.01	0.36	2.57	0.88	0.85	0.026
V3994	8.55	5.1	0.66	5.09	0.31	1.58	0.36	0.18	0.065

Appendix 2

TSNO	Ba	Cr	Cu	Li	Ni	Sc	Sr	V	Y	Zr*	La	Ce	Nd	Sm	Eu	Dy	Yb	Pb	Zn	Co
V3987	283	100	23	82	45	13	322	88	21	51	32	62	34	6	1	4	2	17	85	13
V3988	434	88	31	62	47	12	255	83	22	51	31	57	33	7	1	4	2	14	78	14
V3989	521	114	27	76	36	16	93	100	18	75	37	65	38	7	1	4	2	56	94	14
V3990	447	162	24	75	100	20	86	127	27	63	46	81	48	11	1	6	3	13	167	29
V3991	390	105	26	71	46	14	192	111	19	63	35	68	36	6	1	4	2	12	69	16
V3992	382	84	20	68	36	11	279	82	16	52	31	57	32	6	1	3	2	13	63	15
V3993	547	122	22	121	42	15	134	89	27	82	44	82	46	9	1	5	3	77	77	14
V3994	292	61	20	46	31	8	100	64	18	54	25	45	27	5	1	4	2	12	53	10