Characterisation of Medieval Shell-Filled Pottery from Upminster, Essex (R-126)

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Six samples of shell-filled pottery from Upminster were selected for thin section and chemical analysis in order to establish their source and relationship to other medieval shelly wares from the Thames estuary (Table 1).

Table 1

TSNO	Context	class	cname	Action
V3559	388	POTTERY	MED SHELLY 1	TS;ICPS
V3560	243	POTTERY	MED SHELLY 2	TS;ICPS
V3561	467	POTTERY	MED SHELLY 1	ICPS
V3562	365	POTTERY	MED SHELLY 3	TS;ICPS
V3563	354	POTTERY	MED SHELLY 1	ICPS
V3564	377	POTTERY	MED SHELLY 1	ICPS

Thin Section Analysis

Thin sections were prepared of three samples, V3559, V3560 and V3562, by Steve Caldwell, University of Manchester. Each thin section was stained using Dickson's method (Dickson 1965) in order to distinguish ferroan and non-ferroan calcite and dolomite. Unfortunately, in two of the three sections the calcareous inclusions were leached. The samples for thin section were chosen to represent the standard fabric (here called Med Shelly 1); and two atypical pieces (Med Shelly 2 and Med Shelly 3).

Med Shelly 1 (V3559)

The following inclusions were noted in thin section:

- Shell. Sparse subrectangular voids, up to 1.0mm long and 0.5mm wide. No ornamented shell was noted and the rounded corners indicate that the shell fragments were detrital.
- Subangular quartz. Sparse grains up to 0.3mm across.
- Organics. Sparse rounded voids, some with carbonised contents.
- Angular quartz. Abundant grains up to 0.2mm long. Most are unstrained and monocrystalline.
- Muscovite. Moderate laths up to 0.2mm long.

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- Feldspar? No twinned or altered feldspar was present but some grains have a rectangular outline and are up to 5 times as long as wide.
- Opaques. Moderate rounded grains up to 0.1mm across.
- Altered glauconite. Sparse subangular grains up to 0.1mm across.

The groundmass consists of optically anisotropic baked clay and moderate quartz, muscovite, and opaques.

Interpretation

The parent clay appears to have been micaceous, silty clay and only the shell, and subangular quartz may have been added. However, even these might have been in the clay. The size range and sorting of the silt inclusions can be paralleled in the upper parts of the London Clay, such as were used at Ingatestone to produce Mill Green ware.

Med Shelly 2 (V3560)

The following inclusions were noted in thin section:

- Rounded quartz. Moderate rounded grains up to 1.5mm across. Some have the characteristic outline of quartz derived from the Lower Cretaceous and some of these have red/brown stained veins.
- Organics. Sparse elongate voids, up to 1.0mm long but mostly much smaller, some with carbonised contents, surrounded by a darkened halo. These give the impression of being lenses of organic matter rather than added inclusions or rootlets.
- Clay concretions. Sparse rounded dark brown nodules with concentric dark brown and black layers, up to 1.0mm across.
- Clay pellets. Sparse dark brown and light brown rounded pellets up to 2.0mm across.
- Bivalve shell. Sparse voids up to 1.5mm long.

The groundmass consists of optically anisotropic baked clay with sparse angular quartz inclusions.

Interpretation

The parent clay was probably a fine-textured clay with organic lenses and clay concretions. The clay pellets were probably also present in the parent clay whilst the rounded quartz sand and possibly the shell were probably added.

Fine-textured, silt-free clays may occur as part of the Woolwich Formation, which outcrops both north and south of the Thames (Sumbler 1996, 100-102 and Fig 27).

The rounded quartz sand is composed mostly of grains derived from the Lower Greensand, contrasting with the more mixed quartz sands found in the Thames gravels of central

London. The nearest source for this sand to Upminster is the Quaternary Medway gravels which outcrop in north Kent and eastern Essex, from the Rayleigh Hills to Bradwell on Sea (1996, 117).

Both the characteristics of the clay and the quartzose sand temper suggest an origin in north Kent or east Essex.

Med Shelly 3 (V3562)

The following inclusions were noted in thin section:

- Bivalve shell. Moderate angular voids up to 1.5mm long. Also, a few actual shell inclusions, consisting of non-ferroan calcite. Most of the fragments are 0.3mm to 0.5mm thick but thin-walled shell also occurs (c.0.1mm thick).
- Clay pellets. Moderate subangular clay pellets of varying character, all of which are up to 1.0mm across; some are rounded and inclusionless, firing brown (similar in colour to the groundmass); some are darker brown and some are lighter in colour than the groundmass.
- Subangular quartz. Moderate grains up to 0.4mm across, mostly monocrystalline.
- Opaques. Sparse rounded and angular opaque grains up to 0.3mm across. A single example has a euhedral lozenge-shaped outline and is presumably iron pyrites.

The groundmass consists of optically anisotropic baked clay minerals, sparse angular quartz and muscovite, and moderate rounded opaque grains.

Interpretation

Although this fabric is clearly distinguished from the other two, it has no characteristics which allow its source to be determined.

Chemical analysis

Six samples were submitted to Royal Holloway College, London, for analysis using Inductively-Coupled Plasma Spectroscopy (ICP-AES). A range of major elements were measured, as percent oxides (App 1) and a range of minor elements were measured in parts per million (App 2).

Silica is not measured as part of this analysis and has to be estimated by subtracting the total measured oxides from 100%. The four Med Shelly 1 samples have a mean silica content of 70.44% (SD 1.35) and the Med Shelly 2 sample has a similar silica content (70.32%). The Med Shelly 3 sample, however, has a lower silica content, 67.78%. These estimates are consistent with the thin section analysis.

The ICPS data was normalised to aluminium to take account of variations in silica content (since silica “dilutes” the presence of other elements). The data were then examined using

the factor analysis module from the winstat for Excel add-in (). In this analysis, calcium, strontium, phosphorus and zirconium were all omitted because they are either affected by burial conditions or cannot be consistently measured (zirconium). This analysis confirms that the four Med Shelly 1 samples are more similar to each other than to the samples of the other two fabrics. Med Shelly 3 has a higher F1 score than the remainder, due to high weightings for the rare earth elements, samarium, copper, and manganese. Med Shelly 2 has a higher F2 score than the remainder, due to high weightings for vanadium, lithium, and nickel.

The samples were then compared with ICPS data from various Thames basin shell-tempered wares. Four factors were found, accounting in total fpr 60% of the variability in the dataset. A plot of F1 against F2 indicates that the med Shelly 1 samples have a higher F2 score and lower F1 scores than the comparanda. The closest comparative group to Med Shelly 1 consists of samples of Mill Green ware from Noak Hill. Med Shelly 2 plots with two EMS samples and is close but distinguishable from a group of north Kent Medieval Shelly ware samples (NKMS). The Med Shelly 3 sample plots with several south Essex shell-tempered wares.

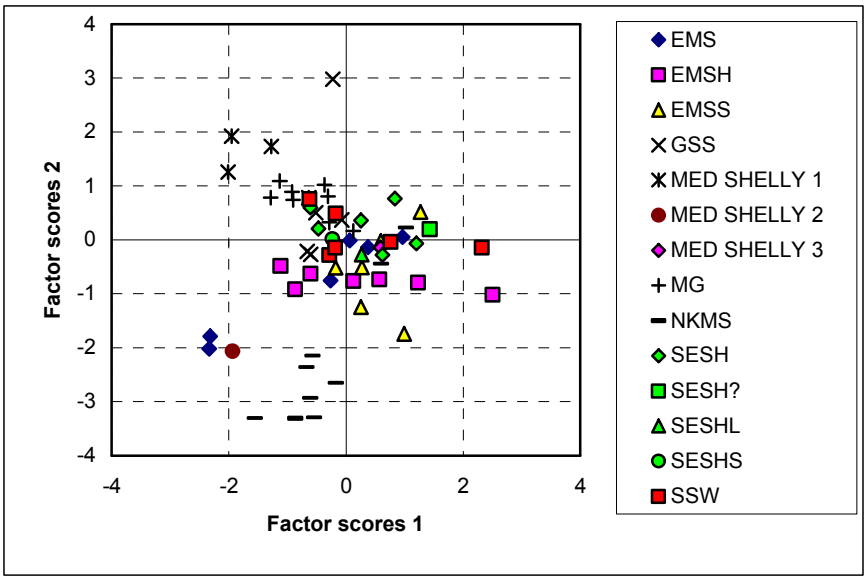

Figure 1

A plot of F3 and F4 scores shows most of the samples having similar scores but confirms that Med Shelly 2 has a similar composition to the North Kent medieval shelly ware samples.

Conclusion

The six samples of medieval shell-tempered wares from Upminster fall into three fabric groups. The most common of these (four samples) is termed Med Shelly 1 in this report. It is distinguishable in chemical composition from other shell-tempered wares from the Thames Basin and is most similar to Mill Green ware than to samples of South Essex shelly ware

from Barking Abbey. Since Upminster is only about 6 miles from Noak Hill, this suggests that Med Shelly 1 has a local origin.

Med Shelly 2 is represented by a single sample and is similar in thin section and chemical composition to shelly wares from North Kent (NKMS). However, similar clays and sands occur to the north of the Thames, the closest outcrops being in the area around Rayleigh, about 18 miles east of Upminster. However, by boat the unlocated North Kent production site for NKMS is probably as close or closer.

Med Shelly 3 is also represented by a single sample. It contains no diagnostics inclusions in thin section but the chemical composition suggests a source in south Essex or on the south bank of the Thames although the fabric is not identical to fabrics from either source, either in thin section or chemical composition.

Bibliography

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

Sumbler, M. G. (1996) *London and the Thames Valley*, HMSO, London.

Appendix 1

TSNO	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5	MnO
V3559	15.65	6.89	1.21	1.61	0.59	2.81	0.89	1.88	0.03
V3560	17.37	6.52	1.29	0.98	0.16	2.10	0.75	0.47	0.04
V3561	14.16	6.70	1.16	1.46	0.41	2.30	0.79	1.76	0.02
V3562	14.84	7.69	1.08	4.46	0.19	2.18	0.99	0.73	0.05
V3563	14.46	7.11	1.37	1.42	0.63	2.72	0.88	0.57	0.03
V3564	13.21	6.98	1.09	1.47	0.49	2.59	0.76	2.13	0.02

Appendix 2

TSNO	Ba	Cr	Cu	Li	Ni	Sc	Sr	V	Y	Zr*	La	Ce	Nd	Sm	Eu	Dy	Yb	Pb	Zn	Co
V3559	544	137	32	45	45	16	270	126	27	52	33	66	35	7	1	4	3	59	142	20
V3560	431	124	29	94	94	18	101	187	22	52	33	68	34	7	1	3	2	35	241	23
V3561	958	145	23	47	36	17	159	139	16	45	26	46	27	4	1	2	2	37	136	16
V3562	716	101	42	38	63	17	271	135	48	53	37	77	41	9	2	6	3	79	130	27
V3563	714	138	24	45	38	16	151	146	18	52	28	57	29	5	1	3	2	30	120	19
V3564	981	133	18	36	30	15	215	122	15	41	23	37	23	4	1	2	2	23	199	12