Petrological Analysis of Medieval and Post-medieval Pottery from Harlow, Essex

Alan Vince

Twenty five samples of medieval and post-medieval pottery produced in the Harlow area were submitted for petrological analysis.

The samples include a group of Medieval Harlow ware from a variety of sites in the Harlow area but include no production waste. A question posed for this group was whether or not it formed a coherent fabric group and, if so, whether the source of the raw materials could be pinpointed.

The remaining samples are of three groups: Transitional Harlow wares, of late medieval/early post-medieval date; Metropolitan slipware, of early to mid 17th-century date and the contemporary blackwares. All of these samples are wasters, or at least come from production sites or were associated with pottery waste. These sites occur on a variety of geological strata and a question posed for these samples was whether or not the various sites showed variations in fabric, which might indicate the use of local raw materials at each site.

Methodology

Samples were selected by Helen Walker in order to cover the visual range of Medieval Harlow ware and as wide a chronological and geographic range of waster groups as possible (Table 1). Thin sections were produced by Steve Caldwell, University of Manchester, and stained using Dickson's method (Dickson 1965). This staining distinguishes between dolomite (unstained), non-ferroan calcite (stained red) and ferroan calcite (stained blue).

Each thin section was examined by the author, noting the principal inclusion types present, their frequency and the overall texture of the inclusions and the groundmass (defined as the clay matrix and all inclusions less than 0.1mm across). On the basis of these characteristics, the sections were grouped into five fabric groups, 1 to 5. A description of each fabric group was then prepared, based on a detailed examination of each section.

Table 1

TSNO	Sitecode	Walker Sample No	Hughes ICPS No	Context	cname	subfabric	Form
V2456	cm86	TS01	N2		MED HARLOW	1	JAR
V2457	MT65	TS02	N8		MED HARLOW	1	JUG

V2458	canes lane	TS03	N10		MED HARLOW	1	?
V2459	ms73	TS04	N11		MED HARLOW	1	JAR
V2460	cmg01	TS05	N12	26258	MED HARLOW	1	JUG
V2461	ms73	TS06	N18		HARLOW TRANS	3	JUG?
V2462	ms73	TS07	N19		HARLOW TRANS	3	JUG?
V2463	ms73	TS08	N20		HARLOW TRANS	2	JUG?
V2464	ms73	TS09	N21		HARLOW TRANS	3	JUG?
V2465	ms73	TS10	N23		HARLOW TRANS	3	JUG?
V2466	ms73	TS11	N24		HARLOW TRANS	3	JUG?
V2467	ms73	TS12	N26		HARLOW TRANS	3	JUG?
V2468	ms73	TS13	N27		HARLOW TRANS	2	JUG?
V2469	cm86	TS14			HARLOW TRANS	2	JUG?
V2470	cm86	TS15			HARLOW TRANS	2	JUG?
V2471	brays grove	TS16	NO ICPS		METS	4	CLSD
V2472	cm86	TS17			METS	4	DISH
V2473	ls70	TS18			METS	4	DISH
V2474	ls70	TS19			METS	4	DISH
V2475	s190	TS20			METS	4	DISH
V2476	ms73	TS21			PMBL	5	MUG
V2477	brays grove	TS22			PMBL	5	BAL
V2478	bush fair	TS23			PMBL	5	MUG
V2479	ls70	TS24			PMBL	4	MUG
V2480	S188	TS25			PMBL	4	MUG

Petrological Descriptions

Fabric 1

Description

The following inclusion types were noted in thin section:

- Rounded quartz. Sparse fragments up to 1.0mm across with well-rounded outlines, embayments and iron-stained veins. Such grains were probably derived from an iron-panned lower Cretaceous sand such as the Woburn sands formation (Sumbler 1996, 68). Similar sands occur, however, within the Thames basin, for example in the Bagshot beds.

- Rounded perthite. A single fragment, 1.0mm across, with a similar shape to the rounded quartz.

- Rounded chert. Sparse fragments up to 1.0mm across. The fragments have a more spherical outline than the rounded quartz. Some have slight brown staining and are mainly composed of microcrystalline silica with no chalcedony and no sign of fossils. A single small circular fragment of chalcedony, 0.3mm, was noted.

- Subangular quartz. Moderate fragments up to 0.5mm across. Some appear to be broken rounded grains. Most are monocrystalline and unstrained but strained, polycrystalline grains were also present. The grains do not have iron-stained veins but sometimes have a dark brown cement adhering to their surfaces and therefore probably have a different origin from the rounded quartz.

- Calcareous inclusions. Sparse non-ferroan calcite grains up to 0.5mm across. Some are heat-altered but some retain their original structure, which is a micrite, perhaps chalk (although some chalk adsorbs a high amount of red dye and contains spherical microfossils, neither of which were noted in these grains.

- Concretionary clay pellets. Sparse fragments up to 1.5mm across containing concentrations of dark brown iron-rich clay, either being darker in the centre or forming a sphere with a lighter-coloured clay core.

- Subangular opaques. Moderate fragments up to 0.3mm across.

- Brown-stained flint. Sparse angular fragments up to 1.0mm across with heavy brown staining.

- Altered glauconite. Sparse rounded fragments up to 0.3mm across. There are no clearly authigenic grains (which tend to have an outline line a squashed pea in thin section) and some do appear to be fragments of larger rounded grains.

The groundmass consisted of optically isotropic baked clay minerals, sparse angular quartz silt, sparse altered glauconite and sparse muscovite laths up to 0.1mm long.

Interpretation

Most of the larger inclusions were probably added to the parent clay as a sand tempering. The character of this sand is typical of Quaternary and recent detrital sands in the Thames basin and probably includes material of Triassic, lower Cretaceous, Upper Cretaceous and Tertiary origin. Inclusions less than 0.3mm across, however, are of a different character and it is likely that the subangular opaque grains and the altered glauconite were present in the parent clay. Glauconitic clays do outcrop within the Thames basin, but well to the southeast of Harlow. This suggests that all of the inclusions including the detrital sand might be present in the Hanningfield Till, a chalky boulder clay. Samples of this clay would have to be collected and briquettes prepared and thin sectioned to test this suggestion.

Fabric 2

The four samples of Fabric 2 come from high-firing vessels, two of which have reduced cores with a sharp boundary between the core and the wide, oxidized margins. The outer surfaces of all four samples were reduced.

Description

The following inclusion types were noted in the four thin sections of Fabric 2:

- Subangular quartz. Sparse subangular to rounded grains up to 0.5mm across.
- Rounded limestone. Sparse fragments of non-ferroan calcite. In some sections these have been altered by the firing.
- Bivalve shell. Sparse non-ferroan calcite shell fragments, c.0.05mm thick and up to 0.5mm long. Some come from ornamented shells but the internal detail of the shell structure is not present. They may either be casts of the original fossil or post-burial recrystallisation of the shell fragments.
- Concretionary clay pellets. Sparse dark brown grains up to 1.0mm across. Some have cracks radiating from the centre, as found in septarian nodules.
- Relict clay pellets. Sparse rounded grains of similar colour and texture to the groundmass.

The groundmass consisted of optically isotropic baked clay minerals, angular quartz of silt to fine sand grade, round calcareous inclusions up to 0.2mm across, angular altered glauconite up to 0.2mm, rounded and subangular opaque grains up to 0.2mm across and sparse muscovite laths up to 0.1mm long. The samples come from two separate sites (Mill Street and Carters Mead). No difference in the fabric could be seen between the two groups.

Interpretation

With the exception of the lack of rounded quartzose sand, this fabric is similar to Fabric 1, although the texture of the groundmass is somewhat finer, and the same arguments concerning its source hold true.

Fabric 3

Six samples of Fabric 3 were thin sectioned. In comparison with Fabric 2, the fabric is finer-textured, with far fewer quartzose inclusions greater than 0.2mm across. The samples include two completely oxidized sherds, three with a ‘sandwich’ firing similar to those of Fabric 2, and one completely reduced sample.

Description

The following inclusion types were noted in thin section:

- Rounded quartz. Rare rounded grains up to 1.0mm across with iron-stained veins.
- Relict clay pellets. Rounded clay pellets with a similar texture to the groundmass, up to 1.5mm across. Some show signs of bedding and might therefore be classed as mudstone or shale, but even these appear to merge at the edges with the groundmass.
- Rounded limestone. Sparse fragments up to 1.0mm across.
- Concretionary clay pellets. Rounded dark brown pellets up to 1.0mm across.
- Bivalve shell fragments. as in Fabric 2
- Microfossils. Sparse foramenifera up to 0.5mm long.
- Subangular opaques. Sparse fragments up to 0.3mm across.

The groundmass consisted of optically isotropic baked clay minerals, angular quartz of silt/fine sand grade, rounded limestone fragments, altered glauconite, subangular opaque grains and sparse muscovite laths up to 0.2mm long.

Interpretation

The similarity of Fabrics 2 and 3 is such that it is by no means certain that they form two distinct fabric groups, but may instead merge. The limestone fragments are perhaps the most useful for interpretation, but are all overfired (i.e. voids lined with calcite) or otherwise suspect (i.e. possibly recrystallised after alteration during firing). The only difference in the inclusion suite between fabrics 2 and 3 is the presence of the foramenifera in this fabric, but they are not sufficiently common that their absence from Fabric 2 need be significant.

Fabric 4

Fabric 4 is the most common sampled fabric and is that of the standard Metropolitan slipware and blackware. Seven thin sections of this fabric were made, coming from five different production sites or waster groups (Brays Grove, Carters Mead, Latton Street and the S1 kiln site). All the samples were completely oxidized, apart from V2480 which was taken from the base of a thick-walled vessel where the core was either blackened through incomplete oxidation or reduced.

Description

The following inclusion types were noted in thin section:

- Rounded quartz. Sparse fragments up to 1.0mm across, including well-rounded grains with iron-stained veins.

- Rounded limestone. Sparse rounded voids up to 0.5mm across, some of which are filled with light brown phosphate.

- Rounded flint. Sparse brown-stained fragments up to 1.0mm long.

The groundmass consisted of optically isotropic baked clay minerals, abundant angular quartz silt, moderate rounded opaque grains and sparse altered glauconite up to 0.2mmand muscovite laths up to 0.1mm long.

Interpretation

The lack of calcareous inclusions in the groundmass of this fabric distinguishes it from Fabrics 2 and 3. With this exception, and the scarcity of inclusions over 0.2mm, which is even more noted than in Fabric 3, there is little difference in composition.

Fabric 5

Three samples of fabric 5 were thin sectioned. all are of high-fired blackwares, one with an oxidized core and reduced or vitrified outer surface, another with a reduced core and the third being completely vitrified.

Description

The following inclusion types were noted in thin section:

- Rounded quartz. Sparse fragments up to 1.0mm across.

- Concretionary clay pellets. Sparse rounded fragments, now partially vitrified, leaving an opaque core sitting within a larger void, up to 1.0mm across.

The groundmass consisted of optically isotropic baked clay minerals, abundant angular quartz silt up to 0.1mm across and very sparse muscovite laths up to 0.1mm long.

Interpretation

It is likely that the main differences between Fabrics 4 and 5 are due to the higher firing temperature or longer firing duration of Fabric 5 which has caused the clay matrix to vitrify and shrink in volume, thus producing the illusion of a higher density of inclusions in the groundmass. The relative lack of muscovite is due to the breakdown of the mineral during firing.

Discussion

Raw Materials

Two main clay deposits outcrop in the Harlow area: the London Clay (Sumbler 1996, 103-4) and the Hanningfield Till (Sumbler 1996, 118-9). The latter is described as a chalky boulder clay and, based on samples of such clays from other parts of England, it is thought unlikely that it would be the source of the clays used at Harlow. Unfortunately, no samples of either clay were available for analysis. A priority for future work, therefore, should be the sampling and firing of these two clays, preferably on a wide enough scale to determine their variability.

In the meantime, the possibility that the fabrics might be made from boulder clay was raised for Fabric 1 but it seems more likely that the fabrics were actually produced by tempering a silty micaceous clay with quartzose sands.

Sands

The rounded quartzose sand found in Fabric 1 is also likely to be the origin of the sparse larger, rounded inclusions found in the remaining fabrics. It has a mixed composition, being mainly rounded quartz of lower Cretaceous origin together with probable rounded quartz and chert grains of Triassic origin and brown-stained flint, derived from the Tertiary rather than directly from the upper Cretaceous chalk. The rounded limestone inclusions might be chalk, or could be concretionary limestone derived from Tertiary deposits. Unfortunately, the firing conditions of the samples mean that no examples survived with their internal detail intact.

A finer-textured quartz sand was found in Fabrics 2 and 3. This sand, however, has a similar composition to that in Fabric 1 and is probably of similar origin. It is unlikely to have been formed by sieving the coarser sand, since some larger grains do occur. Textural analysis would be required to prove that this sand is not present in the other fabrics, and it is likely that too few grains are present to produce conclusive results anyway.

Clays

The clays employed can be divided into three groups: a non-calcareous clay with a low silt content found in fabric 1, a calcareous clay found in Fabrics 2 and 3, and a silty clay found in fabrics 4 and 5. Concretionary iron-rich clay pellets are present in all the samples and were probably in situ soon after the laying down of the clay, rather than being detrital grains.

The fabric 1 clay when dug probably contained the concretionary clay pellets, the opaque grains and the altered glauconite, although in the latter two cases the fragments are larger than those found in the remaining fabrics. Furthermore, soil matrix filling some voids and adhering to the surfaces of some of the sectioned samples indicates that altered glauconite is present in the subsoil on at least some of the production sites. Glauconite forms at the bottom of shallow seas in conditions where there is little sediment being deposited. It tends

to form as nodules about 1.0mm in diameter and is a light green colour. These fragments, even in the soil matrix, are red, have an irregular shape and are smaller than 1.0mm. It therefore seems that they are detrital grains. The London Clay underwent at least five cycles of deposition, starting with silt-free clays in which glauconite formed, followed by the deposition of more and more silt.

The clay used for Fabrics 2 and 3 is calcareous and contains microfossils and broken thin-walled bivalve shell fragments. Thin-walled bivalves tend to live outside of the tidal zone, being either freshwater or sea-bottom inhabitants but the presence of detrital silt in quantity in both fabrics suggests that in this case the shells may have been transported. The characteristics of the clay match those of the London Clay.

The clay used for Fabrics 4 and 5 is non-calcareous and has a finer-textured, but more abundant silt than that in Fabrics 2 and 3. The characteristics of the clay match those of the London Clay. However, the clay clearly comes from a different outcrop, or outcrops, than that used in fabrics 2 and 3.

Medieval Harlow Ware

Medieval Harlow ware, therefore, appears to have been produced by tempering a fine-textured London Clay with a coarse sand of Tertiary or later date. There is no evidence for more than one source of clay or temper being used and the dissimilarity between the groundmass of this ware and the other sampled wares indicates a different source of clay, probably one from towards the base of the sedimentary cycles noted above. Therefore, one should be looking for a lower bed for the source of this clay than those used for the later wares. Geographically, this might be interpreted as a source to the west or north of Harlow.

By contrast, the Mill Green potters operating at Ingatestone, who produced vessels of similar character to those of the Medieval Harlow ware potters, employed an untempered silty clay with a much higher muscovite content than that seen in any of the Harlow samples.

Transitional Harlow Ware

Transitional Harlow ware appears to be made using rather different clay and sand than those used for the earlier ware. Here too, however, it is likely that the clay is a Tertiary clay, presumably derived from the upper part of the London clay and containing a high proportion of detrital silt, composed of quartz, muscovite, opaque grains and altered glauconite. The difference between Fabrics 2 and 3 may indicate that a sand temper was added to Fabric 2 or it may indicate the natural presence of variable quantities of sand-sized inclusions. It might be significant that one of the two production sites sampled produced only Fabric 2 samples whereas the other produced a mixture of Fabrics 2 and 3.

Metropolitan Slipware and Blackware

Metropolitan slipware and blackwares were produced using an untempered silty London clay. This clay is similar to that used for the Transitional Harlow ware but without the calcareous content, and with a finer texture. The differences between Fabrics 4 and 5 are probably simply due to firing. It is unlikely that the clay used for these wares could have been produced by cleaning of the calcareous Transitional Harlow ware clay since there are some larger inclusions present which cleaning (either by sieving or levigation) would remove. There is no evidence for the use of more than one source of clay for these wares, but given the fine nature of the raw materials it is unlikely that different clay pits exploiting separate outcrops of London Clay in the Harlow area would be distinguishable using thin sections.

Bibliography

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