Petrological Analysis of Pottery from the Oakham Bypass, Rutland (OKB06)

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Sherds from five early prehistoric vessels from Oakham Bypass were submitted by Carol Allen for thin-section analysis (Table 1). The sherds could be grouped into three fabric groups, one grog-tempered, one containing clay/iron grains and the third containing abundant calcareous inclusions.

Table 1

TSNO	Action	class	Context	REFNO	Visual Characteristics (x20 magnfication)
V4160	TS	POTTERY	1036		A NACREOUS BIVALVE <1.0MM
V4161	TS	POTTERY	2123	SF2021	A NACREOUS BIVALVE SOME POSSIBLY GRYPHAEA, SOME IN GREY MICRITE CEMENT
V4162	TS	POTTERY	2152	SF2036	SPARSE ROUNDED QUARTZ
V4163	TS	POTTERY	3021		MODERATE ROUNDED QUARTZ UP TO 0.5MM ACROSS
V4164	TS	POTTERY	2129	SF2043	SPARSE ROUNDED QUARTZ

Description

Thin sections were produced by Steve Caldwell at the University of Manchester and were stained using Dickson's method (Dickson 1965).

Fabric 1 (V4162 and V4164)

The following inclusion types were noted:

- Clay Pellets. Abundant rounded and subangular fragments with a similar colour and texture range to the groundmass. Some are oxidized, even where located in part of the sample where the groundmass is carbon-rich, and some are a darker brown than the groundmass. The latter appear to be coloured as a result of a higher content rather than organic matter.
- Organic inclusions. Sparse irregular voids up to 0.3mm across containing carbonised organic matter and surrounded by a darkened halo.
- Quartz. Sparse rounded and subangular grains up to 0.4mm across.
- Sandstone. Rare fragments of a medium-grained sandstone, with quartz grains c.0.2mm across and a brown amorphous cement (?clay minerals).

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The groundmass consists of optically anisotropic baked clay minerals, abundant dark brown clay concretions, often with a diffuse boundary, rare angular quartz and rare muscovite laths, up to 0.1mm long. The clay is light brown where oxidized and dark brown to opaque where carbon-rich.

Fabric 2 (V41643)

The following inclusion types were noted:

- Clay/iron concretions. Abundant dark brown pellets up to 1.0mm across. These pellets are all similar in colour but vary in texture from being almost inclusionless to silty (similar to the groundmass) and sandy (containing moderate rounded and subangular quartz grains up to 0.4mm across).
- Opaques. Sparse subangular and angular grains up to 1.0mm across, some with a dark brown halo.
- Quartz. A single angular grain 0.8mm across and moderate rounded grains up to 0.4mm across.
- Chert. Sparse rounded grains up to 0.4mm across.
- Voids. Sparse irregular voids up to 0.5mm across. These contain no carbonised organic remains, nor do they have a surrounding halo. However, this is probably because the vessel was completely oxidized.

The groundmass consists of optically anisotropic baked clay minerals, abundant angular quartz grains up to 0.15mm across and moderate muscovite laths up to 0.2mm long.

Fabric 2 – Calcareous Inclusions

The two samples, V4160-1, have similar characteristics in thin section and a single description applied to both. The following inclusion types were noted:

- Bivalve shell. Abundant fragments of nacreous non-ferroan calcite bivalve shell up to 3.0mm across. Some of these shells are surrounded by a matrix of unstained (i.e. dolomitic) brown micrite whilst cracks in the shell are filled with a slightly coarser-grained ferroan calcite.
- Limestone. Sparse fragments of brown micrite, similar to those surrounding the shell fragments, up to 1.0mm across. Some show evidence for two generations of growth, with a fine-grained brown-stained micrite traversed by a coarser-grained white dolomite. Rare rounded fragments of a ferroan calcite marl with moderate angular quartz inclusions up to 0.1mm across.
- Punctate Brachiopod shell. Sparse fragments from thin-walled punctate brachiopod shells, up to 0.5mm long and 0.2mm thick. The punctae are filled with a dark brown

ferroan calcite marl or in some cases possibly a dark brown clay indistinguishable from the groundmass.

- Organics. Sparse irregular voids up to 0,.4mm across containing carbonised organic matter and surrounded by a dark halo.
- Quartz. Sparse subangular grains up to 0.3mm across.

The groundmass consists of optically anisotropic baked clay minerals which are almost rendered opaque through carbon content. Neither quartz nor muscovite are present.

Discussion

The three fabrics were clearly produced from different raw materials. The geological source of the clay used in Fabric 1 may be the Mercian Mudstone, which tended to be indurated and unless heavily weathered, or treated by the potter, often contains what appears to be grog inclusions (pre-fired pottery or clay, deliberately crushed or added to the clay). The rare quartzose inclusions are typical of those derived from Triassic sandstones and are found in the Trent valley terraces, as well as more widely in the East Midlands in wind blown cover sands. Thin sectioning cannot therefore pinpoint a source. However, it is noteworthy that there are no local outcrops of Mercian Mudstone in the Oakham area (BGS 1:50000 Stamford map) and it may be that the fabric was made from a Jurassic mudstone, such as the lower Jurassic clays which outcrop in the countryside around Oakham.

Fabric 2 has distinctive characteristics but cannot be matched closely with any local samples known to the author. Similar fabrics are known to the author from the Severn Valley, where they were formed from Triassic clays and considering that both Fabrics 1 and 2 have Triassic parallels it may be that both were produced outside the immediate locality. However, given its high iron content and the silty nature of the groundmass, the local Marlstone rock should be considered as a possible source.

Fabric 3, on the other hand, appears to be tempered with a shelly limestone and calcite mudstone which seems to have been chemically precipitated and subsequently altered. Oakham sits on an outcrop of Middle Jurassic Marlstone rock, with Upper Lias clay above and Middle Jurassic silt and silty clay below. The Middle Lias Marlstone rock is iron-rich and from its description does not appear to have the characteristics found in Fabric 3 (Hains & Horton 1969). However, the Blue Lias, which is earlier (Lower Lias) has many similar traits, including a grey calcite-mudstone facies. It does not outcrop in the immediate area around Oakham and the nearest source is at Ashwell, 5 miles to the north. A Lower Jurassic source is consistent with the tentative identification of *gryphaea* in one of the samples at x20 magnification. Thus, if an outcrop of solid geology was used to produce this fabric then it implies that the vessels were produced by specialist potters whose clay was obtained from at least five miles away. However, it is quite possible that the clay was obtained from an outcrop of boulder clay, since the predominant direction of ice flow in the Oakham area would have

been north to south. Outcrops of boulder clay are shown on the 1:50000 geological map immediately to the southwest of Oakham.

Further Work

This analysis raises several questions which could be answered by further analysis. This includes the obtaining of samples of Marlstone rock or, clays developed over this rock, and their analysis; sampling of the boulder clay in the Oakham area; the examination of fired clay from the Oakham Bypass site and their analysis and the use of chemical analysis (inductively coupled plasma spectroscopy) to characterise the clays themselves rather than the inclusions found within them. Triassic and Lower Jurassic clays have distinctly difference chemical signatures and such analyses would clearly either discount or confirm a Triassic source for Fabrics 1 and 2. Similarly, Shelly clays of middle Jurassic origin (such as those found in the Great Oolite and Cornbrash) contain similar fossil suites to those found in Fabric 3 and the clays are also chemically distinguishable from those found in the Lower Jurassic.

Bibliography

Hains, B. A. and Horton, A. (1969) *British Regional Geology: Central England*, HMSO, London