# Petrological Analysis of Anglo-Saxon Pottery from Cambridge (Site SSL02)

*Alan Vince*

Following a visual analysis of the Anglo-Saxon pottery from the Institute of Criminology, Sidgwick, Cambridge it was decided to examine four sherds in thin-section.

Visually, the fabrics fell into three groups (Table 1): sherds tempered with fragments of oolitic limestone (two samples, V1681 and V1684) coded LIM, sherds tempered with fragments of sandstone of Millstone Grit type (V1682, Code SSTMG) and fabric characterised by inclusions of sandstone, fine shell and microfossils (V1683, Code SST).

**Table 1**

| TSNO | **Context** | **REFNO** | cname | subfabric |
|---|---|---|---|---|
| V1681 | 126/133 | 67 | LIM | |
| V1682 | Unstrat | 92 | SSTMG | |
| V1683 | 073 | 39 | SST | FINE SHELL AND MICROFOSSILS IN GROUNDMASS |
| V1684 | 009 | 4 | LIM | |

## Petrological Description

### LIM

Thin-section V1681 contained the following inclusions:

- Abundant angular quartz up to 0.3mm across.
- Moderate angular fragments of oolitic limestone up to 2.0mm across consisting of micrite pellets (non-ferroan calcite) in a sparry ferroan calcite cement. Some fragments have a dolomitic cement.
- Sparse individual ooliths up to 1.0mm across, mostly composed of non-ferroan calcite but including some composed, in whole or part, of ferroan calcite.
- Sparse angular fragments of igneous rock up to 2.0mm across. This rock contains altered feldspar and quartz. The grain size suggests that it is a micro-granite, possible from the South Leicestershire Diorite outcrop, at Croft Hill, c.5 miles to the south of Leicester.
- Sparse fragments of sandstone up to 1.0mm across. The grains are well-sorted and range up to 0.3mm across. They are overgrown with some brown material at the original grain boundaries and between grains.

- Sparse rounded phosphate pellets up to 0.3mm across.

The groundmass consists of anisotropic baked clay minerals, with some darkening caused by the presence of carbon, with sparse angular quartz and muscovite laths.

Thin-section V1684 contains the following inclusions:

- Sparse rounded fragments of sandstone up to 1.5mm across. The quartz grains are rounded and range up to 1.0mm across and the cement is opaque.
- Moderate fragments of oolitic limestone up to 1.0mm across. The ooliths are composed of micrite of non-ferroan calcite and the cement consists of sparry ferroan calcite.
- Moderate fragments of fossiliferous limestone, composed of dolomite and ferroan calcite. The fragments are too small to identify the fossils but they include bivalve shell and gastropods.
- Moderate rounded opaque grains up to 0.3mm across. Some of these may be altered glauconite.
- Sparse ooliths up to 0.5mm across composed of brown phosphate.
- Sparse angular acid igneous rock fragments up to 1.5mm across. The rock is composed of biotite, quartz and feldspar.
- Sparse organic inclusions up to 1.0mm long.
- Sparse limestone fragments up to 1.0mm across composed of micrite (non-ferroan calcite)
- Sparse rounded quartz with brown veins, up to 1.5mm across.

The groundmass consists of anisotropic baked clay minerals, sparse muscovite laths up to 0.2mm long and ferroan calcite microfossils up to 0.1mm across.

Both of these sections indicate a temper containing oolitic limestone with sparse igneous rock inclusions. However, the range of inclusions present differs and suggests that the two fabrics may not be composed of the same raw materials. In V1681 the majority of the inclusions are likely to be of Jurassic origin and the igneous rock appears to have a south Leicestershire origin. In V1684 the inclusions appear to be a mixture of Jurassic and lower Cretaceous rocks whilst the igneous rock is a coarser-grained biotite-rich rock. The presence of microfossils in V1684 also distinguishes the two samples. Calcareous gravels containing a mixture of Jurassic and Cretaceous rocks occur at Ely, where they were used as temper in the medieval pottery industry but no igneous rock fragments have ever been noted in samples from Ely.

## SSTMG

Thin-sections V1682 contained the following inclusions:

- Moderate organic inclusions up to 1.0mm long
- Moderate angular quartz up to 0.2mm across
- Moderate sandstone fragments of Millstone Grit type, up to 2.0mm across. The characteristics of this type are euhedral grains formed by overgrowth with no sign of the original grain boundaries and interstital kaolinite. Feldspar is sometimes present alongside quartz, but in this case no feldspar was noted.
- Moderate fragments of limestone up to 2.0mm across. This limestone contains rounded brown phosphate pellets up to 1.0mm across in a non-ferroan sparry calcite matrix.
- Sparse altered glauconite up to 0.3mm across. Some of these have the typical 'squashed pea' outline of glauconite pellets and are probably not detrital.
- Sparse individual ooliths up to 0.5mm across. These are micrite composed of non-ferroan calcite.
- Sparse rounded quartz grains up to 0.5mm across. Some grains have brown veins and most have the characteristic outline of quartz grains from the Lower Cretaceous
- Sparse sandstone fragments up to 2.0mm across, with angular grains up to 1.0mm across and brown cement
- Rare fish bone up to 0.5mm long and 0.2mm wide.

The groundmass consists of anisotropic clay minerals with sparse angular quartz up to 0.1mm across and sparse muscovite flakes up to 0.1mm long. There is ?dolomite deposited within some of the laminae (unless this was present as thin sheets within the original clay, which is less likely).

The characteristics of this fabric indicate a mixed detrital sand containing material of probable lower Carboniferous, upper Carboniferous, Lower Cretaceous and Jurassic ages. Glauconite is a very soft mineral and the presence of unweathered grains suggests that the parent clay may well have been glauconitic. Glauconitic clays of Lower Cretaceous age outcrop at Ely, where mixed calcareous gravels also occur. However, in detail the sand in this sample is quite different from that found in Medieval Ely ware. Nevertheless, it would seem that a relatively local (ie Cambridgeshire) origin is possible. The identify of the phosphatic limestone is unknown and if it were to be identified it might be possible to narrow down the likely source of the vessel.

### SST

Thin-section V1683 contains the following inclusions:

- Abundant rounded quartz grains
- Sparse microfossils up to 0.3mm across. These have non-ferroan calcite tests filled with ferroan calcite.
- Sparse sandstone fragments up to 1.5mm across. The quartz grains are well-rounded and the cement is opaque.
- Sparse altered glauconite up to 0.3mmacross
- Sparse calcite and micrite fragments up to 0.5mm across. These are composed of a calcite with only a faint red stain, presumably a non-ferroan calcite.

The groundmass consists of anisotropic baked clay minerals, sparse ferroan calcite spherical microfossils and sparse muscovite laths up to 0.2mm long.

All of the inclusions, and the groundmass, are consistent with a lower Cretaceous origin. The calcite fragments may be chalk, but no distinctive spherical microfossils were noted.

## Conclusions

The four samples submitted for petrological analysis all have distinctly different characteristics which suggest the employment of very different raw materials. Without extensive sampling of locally available sands, gravels and clays it is not possible to say for certain how close to Cambridge potential sources of these materials might be. However, in the case of one sample an origin in south Leicestershire is possible whereas in the three remaining samples lower Cretaceous inclusions point to more local sources. It is noteworthy that much of the diagnostic detail in these sections is only present in calcareous inclusions and would not have been present if the sherds had been leached or fired at over 850 degrees C. Low-fired, unleached Anglo-Saxon pottery from Cambridgeshire therefore has a high potential for being able to pinpoint the source of raw materials used and for allowing comparisons between the procurement of pottery in different settlements to be made.

The presence of organic material in two of the samples suggests the deliberate addition of chaff to those fabrics (V1684 and V1682). The status of the igneous rocks in the two oolitic limestone-tempered wares is debatable. They may have been detrital fragments, from the south Leicestershire Diorites and the Mountsorrel granodiorite, and this does seem to be the most likely source for the former. Potters Marston ware, which was made immediately to the north of Croft, contains both oolitic limestone and igneous rock inclusions, presumably from local detrital sands. The reason for the presence of biotite granite in V1684, however, is less clear. Mountsorrel granodiorite was transported south and west from its outcrop by glaciation but there does not seem to be any geological mechanism

to produce a sand containing rocks from the Charnwood inlier, Cretaceous strata and Jurassic strata together. An alternative interpretation is that these are actually Scottish or Scandinavian granite fragments, present as a result of the erosion of boulder clay in a Cambridgeshire sand. This is geologically feasible but can only be tested by practical fieldwork. The final alternative is that, like the organic inclusions, the biotite granite was a deliberate addition.