Characterisation Studies of Ceramic Building Material from Cambridge

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A series of samples of medieval and post-medieval ceramic building material from sites in Cambridge was submitted for characterisation using thin section and chemical analyses.

Methodology

Thin sections were produced by Steve Caldwell, University of Manchester, and stained using Dickson's method ({Dickson 1965 #44803}). The sections were examined using a petrological microscope and the principal inclusions were identified and listed, noting frequency, size, roundness and other potentially distinguishing features. The characteristics of the groundmass were also described, noting the colour, isotropy and inclusions. A boundary of 0.1mm was used to divide inclusions into two groups: the groundmass and inclusions but the interpretation of the sections is more complex, with the probability in some cases that inclusions over 0.1mm were present in the parent clay rather than added as deliberate temper.

Samples were also take for chemical analysis using Inductively-Coupled Plasma Spectroscopy. The samples were taken from offcuts from which all surfaces had been mechanically removed. The resulting block was crushed to a fine powder and analysed at Royal Holloway College, London, under the supervision of Dr J N Walsh. The data consist of a series of values for major elements, expressed as percent oxides (App 1) and a series of values for minor and trace elements, expressed as parts per million (App 2). The silica context was estimated by subtraction of the total measured oxides from 100% and the data were normalised to aluminium before investigation using the factor analysis option in WinSTAT for Excel ({Fitch 2002 #44933}).

Thin Section Analysis

Chemical Analysis

The normalised ICPS data for the Cambridge ceramic building material was compared with a range of data from Cambridgeshire ceramics whose source or source area is known.

This comparison indicated that the Cambridge samples could be distinguished from samples of shell-tempered wares of Iron Age, Roman, Anglo-Saxon and medieval date most of which appear to have been produced from Middle and Upper Jurassic shell marls including material from kiln sites at Haddon and Earith. The samples could also be distinguished from Hunts Fen Sandy ware, samples from the Colne kiln and Bourne ware (including production waste

from Bourne itself). Furthermore, samples of post-medieval redware and clays from which they may have been made from Broad Street, Ely, were also differentiated from the Cambridge samples.

The samples could not be distinguished from samples of medieval pottery waste from Ely and samples of probable Ely wares from various consumer sites in the county ({Vince 2008 #48533}; {Spoerry 2008 #48533}). The samples from the Forehill and Potters Lane sites in Ely were then compared in detail with the Cambridge samples together with three samples of Kimmeridge clay from an exposure in Ely and a sample of a Cambridge yellow brick. Factor analysis revealed five factors and a plot of the first two factor scores (Fig 1) shows that the Potters Lane samples can all be distinguished by a combination of lower F1 scores and higher F2 scores.

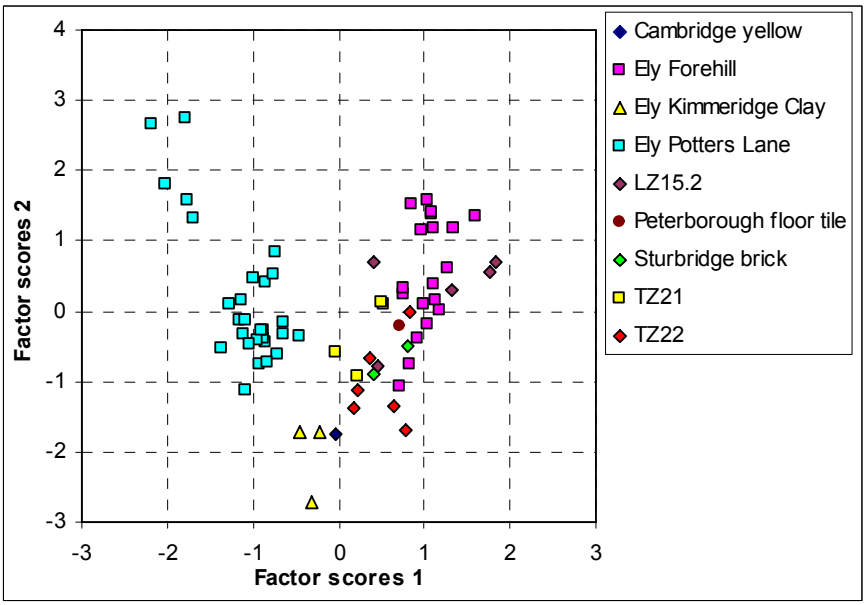

Figure 1

The Cambridge yellow brick and the three Ely Kimmeridge clay samples form a distinct group and the remaining samples all form one group, but with evidence for patterning within it. A plot of the F3 against F4 scores (Fig 2) shows that the LZ15.2 samples can be distinguished by their lower F4 scores whilst the TZ21 samples can be distinguished by their higher F3 scores. The F5 scores do not distinguish any of the groups.

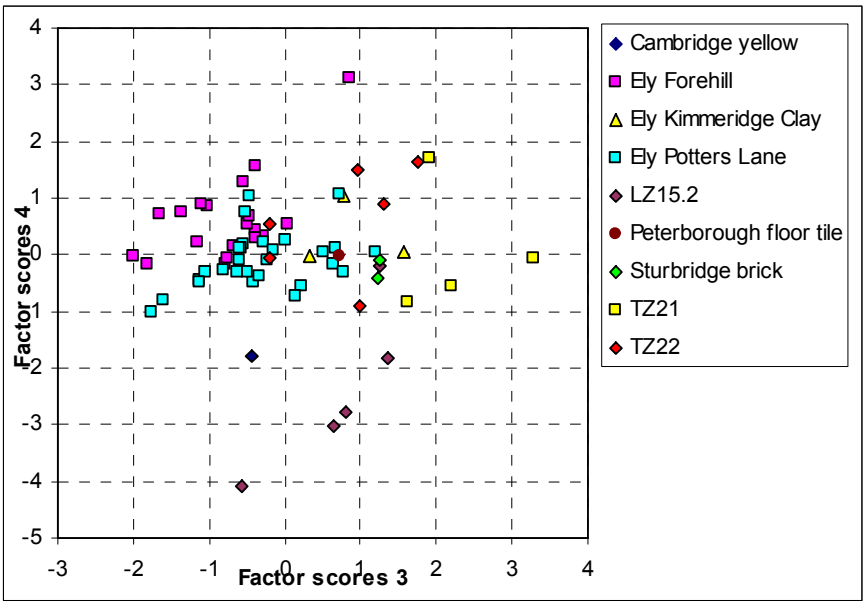

Figure 2

This analysis indicates therefore that there are two distinct chemical groupings within the Ely production waste and that none of the Cambridge samples match those from Potters Lane. However, the F3 and F4 scores also separate the Cambridge samples from the Forehill samples. Therefore, none of the samples give a precise match to either of the sampled waste groups from Ely but all show a broad similarity and are more similar to Ely products than to any other sampled ceramics from the county. In addition, neither the highly calcareous Kimmeridge clay from Ely nor the sample of a yellow brick from Cambridge matched the Cambridge samples. It is particularly interesting that the two Sturbridge bricks, definitely produced in Cambridge, do not match the Cambridge yellow brick or the Ely Kimmeridge clay but are instead similar to the other Cambridge samples.

Factor analysis of the data, excluding the Potters Lane samples, shows that the TZ21 samples can be distinguished from the remainder by high F2 scores and the Forehill samples by a combination of higher F1 and lower F2 scores. There is no clear separation of the remaining samples (LZ15.2, TZ22 and the Sturbridge bricks) although their mean F1 and F2 scores clearly differ.

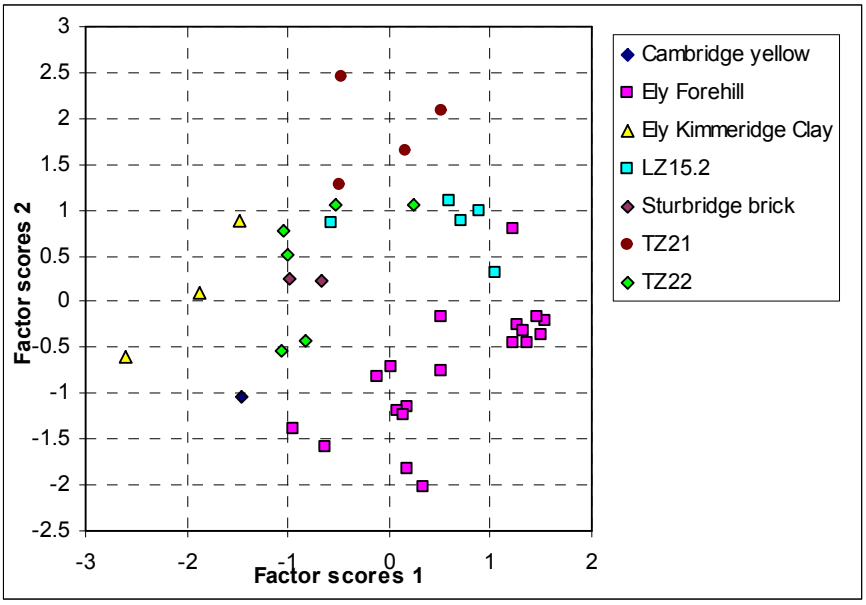
Factor scores 2
Factor scores 1
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
-2
-1
0
1
2
Cambridge yellow
Ely Forehill
Ely Kimmeridge Clay
LZ15.2
Sturbridge brick
TZ21
TZ22

Figure 3

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