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Ancient Monuments Laboratory
Report 63/87

IDENTIFICATION OF ORGANIC RESIDUES ON POT SHERDS FROM TIDDINGTON, WARWICKSHIRE.

J Evans

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Summary

Analysis of an organic residue on the external surface of a pot sherd shows it to be a mixture of tallow, powdered charcoal and clay. As the fabric of the sherd contained no organic material it was concluded that the pot was most probably used for storage.

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INVESTIGATION OF ORGANIC RESIDUES ON POT SHERS FROM TIDDINGTON, WARWICKSHIRE TO ASCERTAIN POT USAGE.

It has been shown that analysis of organic residues found either on or trapped within the ceramic matrices of pot sherds can give useful information concerning vessel usage. In the present study no accidental organic residues (ie charred deposits) were present. However the sherds (AM No. 840971-3) submitted for analysis had a decorative band composed of a possible organic material on their external surfaces. Samples of this material and of the pottery fabric were subjected to analysis.

A sample of the decorative band was initially investigated by scanning electron microscopy. No biological debris was observed: the sample appeared to be an ad hoc mix of clay particles and binder. Subsequent infrared spectrophotometric analysis confirmed the presence of a silicate system mixed with an organic binder. The infrared spectrum suggested the presence of a triglyceride system and not the anticipated wood resin or beeswax as binder. Solvent extraction of the decorative material, followed by appropriate analysis by chromatographic techniques showed it to be composed of a fat system similar to that of tallow. No other organic compounds were detected.

Investigation of the residue left after the solvent extraction procedure showed it to be composed of clay particles and powdered charcoal. This latter material explains the black colouration of the fat employed. Similar analysis of the pottery fabric gave no detectable organic compounds or charcoal.
As fat systems have relatively low melting points and burn easily it is obvious that the pottery could not have been exposed to heat and is consequently not a cooking or similar pot. The absence of organic substances in the fabric strongly suggest that the pot was used for dry storage or less likely water storage. Additionally the absence of organic substances in the fabric shows that ground contamination does not occur on sites of this type.

EXPERIMENTAL

Sample size.
Decorative band 150mg. Pottery fabric 15.00g.

Procedure.

Each of the samples to be analysed was freed from surface debris, crushed (as appropriate) and passed through a 100 mesh sieve. The fine material was then extracted with a soxhlet apparatus using the following solvents: heptane, chloroform, 2-propanol and water. Each solvent was applied for 3 hours. The various extracts were partially evaporated and examined by infrared spectroscopy. Only the heptane extracts of the decorative material gave worthwhile data suggesting a triglyceride system. Subsequent analysis by thin layer chromatography showed a triglyceride similar to that for tallow. Further data was obtained by hydrolysing the triglycerides with alcoholic potassium hydroxide and converting the fatty acids obtained into methyl esters with methanolic boron trifluoride. Consequent gas chromatographic analysis of the esters at 185°C using a 10% DEGS column gave a pattern similar to that of a beef tallow.

Residue left after Soxhlet extraction was examined microscopically. The presence of charcoal was supported by the fact that the material could reduce copper oxide to copper.
Additionally the residue (from both decorative and fabric extraction) was subjected to two additional chemical procedures. One portion was subjected to hydrolysis by alcoholic potassium hydroxide in order to investigate the presence of any "dried" oils or fats. No detectable data was obtained. The second portion was refluxed for 24 hours with 6M hydrochloric acid to hydrolyse any protein present to constituent amino acids. No amino acids were detected.

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