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551

NORTHAMPTON DEVELOPMENT CORPORATION SITE N80-N82 M115
REPORT ON ORGANIC RESIDUE ANALYSIS

Nine samples of sherd (AML 840454-62, 840464-5) were submitted for analysis. All had a charred residue on their inner surface. After removal of the residue and the outer surfaces of the sherd mechanically, a 5g portion of sherd was crushed and subjected to the same analytical procedure as the residue.
The samples were examined initially by both optical and scanning electron microscopy. No biological debris was observed. Several of the residues showed a vesicular, multi-layered structure suggesting a series of contents burnings.

The samples were extracted with a series of solvents of varying polarities (namely hexane, chloroform, 2-propanol and water) using a Soxhlet's apparatus. The resulting extracts were examined by various spectrographic and chromatographic techniques. Only the hexane extracts yields positive information. The experimental data showed that the residues and their associated pot contained the same organic substances. This suggests that the original vessels may have had a specific purpose and not have been used for general cooking activities. The data further suggested that the samples could be considered in two groups. Group I contained AM 840457 and AM 840459, and, Group II the other seven samples.

Group I samples were peculiar in that they were "rich" in stearates; stearic acid accounting for approximately 45% of the total fatty acid content. The remaining fatty acids were composed of about equal portions of palmitic and oleic acids. Such a pattern is not representative of any natural fat or oil, even when degenerate. The abnormally high stearic acid level (it is usually less than 10%) cannot be explained by accumulation through use either of of a specific fat/oil system or group of such systems. Such levels suggest a deliberate processing of a fat system, most probably by careful melting and then decanting of the lower melting triglycerides thus leaving the stearate enriched material. What the purpose of this procedure was must be speculative but could have been associated with candle making. The increased levels of stearic acid rich triglycerides would produce a harder and cleaner burning material for the wax phase.

The data obtained for the Group II samples indicated the presence of a degenerate animal fat. The material was closely similar to adipocere. The negative results from the solvents other than hexane argues against cooking or similar general purpose use as one would normally expect to detect traces of protein, sugars dibasic acids, etc. It could be that pots were used primarily for fat storage ie. dripping pots. The degenerate nature of the residues makes it impossible to identify the original fats present.

After the completion of the extraction procedure each sample was refluxed for 24 hours with hydrochloric acid. (This process would hydrolyse any non-soluble proteinaceous material to its corresponding amino-acids). No amino-acids were detected in any sample thus confirming the absence of proteins.

Each pot sample was refluxed with a mixture of concentrated acids (nitric and perchloric). The acid extracts were than examined by flame photometry to ascertain the sodium ion levels. AM 840457 and AM 840459 showed relatively high levels, namely 12 and 15 ppm, whilst the other samples gave values between 2 and 4 ppm. (The aqueous extracts all gave 1-2 ppm). Corresponding levels of chloride ion were observed. The relatively high levels of both sodium and chloride ions in AM 840457 and AM 840459 suggest the use of salt at some stage. Possibly the salt may have 'arrived accidentally' from the use of salt preserved meat or fat. However as these two samples were the stearate rich systems, then assuming them to be involved with candle making, the salt may have been especially added to improve the luminescent properties of the wax.

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Note on ADIPOCERE

Adipocere is a soft waxy material consisting almost entirely of free fatty acids, particularly rich in palmitic acid and containing very little triglycerides.

A variety of micro organism will decompose fats and oils in anaerobic conditions

provided that there is a nitrogen source available. Such conditions are available when animal materials, oils, etc are buried in wet, anaerobic conditions. Unfortunately the composition of adipocere tends to be similar no matter what the origin of the parent material.

Useful reference:- M D Thornton, E D Morgan and F Celoria
Science and Archaeology April-Sept 1970 pages 20-24.