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EXAMINATION OF A SHELL CONTAINING PIGMENT FROM ACTON COURT, AVON.

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Summary

An oyster shell containing red pigment, excavated from a 16th century deposit, was examined to identify the nature of the pigment present. Dry process vermilion was identified using polarising microscopy in conjunction with qualitative X-ray fluorescence analysis. An inconclusive attempt was made to determine the presence of any media using infrared spectroscopy.

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An oyster shell (AML No 877469) containing a red pigment, excavated from Acton Court, Avon, between 1986 and 1987, was examined to identify the pigment present. The shell was excavated from the fill of the south arm of the moat, west of the south porch (context 2149), and was deposited in the mid/late 16th century (Period 4:4-5).

Qualitative X-ray fluorescence was performed on a small sample of the pigment and showed the presence of mercury, iron and sulphur, with some silica and calcium. Therefore, the pigment was initially identified as either natural cinnabar (HgS) or vermilion (HgS), possibly with a small amount of an iron pigment present, although the presence of the iron could be due to contamination from the soil.

A small sample of the pigment was mounted on a microscope slide using Cargille Melt Mount (which has a refractive index of 1.662 at 25 ^{o}C), to enable examination under the polarising light microscope.

In plane polarised light the pigment was observed to be finely ground but there was a variety of particle size, and larger particles appeared to be fibrous with stub shaped ends. The particles were orange/red in colour and under cross polars looked a fiery red. The pigment was anisotropic and had a high refractive index.

These characteristics suggest that the pigment is **dry process vermilion** which is produced by forming black amorphous mercuric sulphide and then, by a process of sublimation and condensation, converting it to the red crystalline form. Wet process vermilion, which was first produced at the end of the eighteenth century, is made by grinding the mercury and sulphur together in the presence of water, before a warm solution of caustic potash is added (Gettens and Stout, 1966, 170-173). It is usually very fine and even in size and does not contain fibrous particles.

It is often difficult to distinguish between dry process vermilion and natural cinnabar. Cinnabar is a naturally occurring ore which has been ground. Samples of pure cinnabar which have been finely ground display the same characteristics as dry process vermilion but generally cinnabar tends to be coarser and contains fragments of mineral impurities. The sample from the shell found at Acton Court had few impurities.

Although it may be possible that the shell contains a very pure, fine cinnabar it is more likely that the pigment is an artificially produced dry process vermilion. Comparisons with known samples of cinnabar and vermilion seem to support this view. The pigment has been produced using this method since the eighth/ninth century.

A small sample of the pigment was mixed with potassium bromide, formed into a pellet and analysed using a Perkin-Elmer 197 infrared spectrophotometer in order to determine whether any medium was present. This proved inconclusive as there was nothing distinguishable in the sample analysed.

The shell was identified as the left (lower) valve of the Common European, Flat or Native oyster, *Ostrea edulis* Linnaeus.

It is probable that the shell was used as a container for the pigment while it was being applied, perhaps as a fine decoration to a wall or something similar.

REFERENCES

Gettens R J and Stout G L, 1966, **Painting Materials A Short Encyclopaedia**, Dover Publications, New York.

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