Ancient Monuments Laboratory
Report 125/88

ANALYSIS OF AMBER SAMPLES FROM SITES IN LONDON.

Michael Heyworth

Ancient Monuments Laboratory Report 125/88

ANALYSIS OF AMBER SAMPLES FROM SITES IN LONDON.

Michael Heyworth

Summary

Four samples of amber from medieval excavations in London were analysed using infrared spectroscopy in an attempt to identify the geological source. Comparison with published data showed that the results agreed with a Baltic origin for the latter.

Author's address :-

Ancient Monuments Laboratory
English Heritage
23 Savile Row
London
W1X 2HE

01 734 6010 x533

ANALYSIS OF AMBER SAMPLES FROM SITES IN LONDON

Four samples of amber fragments from medieval excavations in the city of London were analysed in an attempt to confirm their source.

Amber is commonly used as a term to describe all fossilised resins which derive from botanical sources. Amber is found in many areas of the world and variations in the physical and chemical characteristics of amber from different regions seem to relate to variations in the period of amber formation and resin source. The elemental composition of amber is usually of the order of 78% carbon, 10% hydrogen and 11% oxygen. Some amber, particularly that from the Baltic region of Europe, contains up to 8% succinic acid and is known mineralogically as succinite (as opposed to retinite which contains no succinic acid).

Infra-red spectroscopy is an analytical technique which characterises structural units in unknown compounds. It has been widely used in the analysis of amber to attempt to characterise amber from different regions (eg Beck et al 1964). Baltic succinite is known to have a distinctive ester absorption pattern in the region between 8 microns and 9 microns. This band is due to the carbon-oxygen single bond stretching of saturated aliphatic esters (Beck et al 1965). It consists of a broad and typically perfect horizontal shoulder between 8 and 8.5 microns which is followed by a sharp absorption peak which reaches its maximum intensity just below 8.7 microns after which absorption diminishes rapidly.

The amber samples from London were analysed using a Perkins Elmer 197 Infra Red Spectrophotometer in an attempt to show that they were composed of Baltic succinite. The amber samples were ground to a fine powder in an agate pestle & mortar and mixed with 200 mg of potassium bromide. This powder was then pressed into a thin translucent circular pellet. An infrared beam was then passed through the pellet to obtain the absorption spectra of the amber sample. The absorption spectrum was measured from 2.5 to 16 microns.

The absorption spectra of the amber samples from London (see figure) all showed the characteristic absorption band between 8 and 9 microns which proves that the amber must have originated from the Baltic deposits. However it cannot be proven whether the amber was imported from the Baltic or whether it was found on the east coast beaches of England, as both areas contain amber from the same geological deposit. This is due to land movements during the Ice Ages and subsequent fluvial erosion which has spread succinite over much of northern and eastern Europe (Beck et al 1971).

The samples, which were all dated to the fourteenth century on the basis of associated ceramics, have very similar absorption spectra and are likely to be an identical succinite resin.

References

Beck,C.W., Adams,A.B., Southard,G.C. & Fellows,C., 1971 "Determination of the Origin of Greek Amber Artifacts by Computer-Classification of Infrared Spectra", in Science and Archaeology, R.H.Brill (ed), 235 - 240.

Beck,C.W., Wilbur,E., & Meret,S., 1964 "Infra-red spectra and the origin of amber" Nature, Vol. 201, 256-7.

Beck,C.W., Wilbur,E., Meret,S., Kossova,D., & Kermani,K., 1965 "The infrared spectra of amber and the identification of Baltic amber" Archaeometry, Vol.8, 96-109.

INFRARED ABSORPTION SPECTRA OF AMBER SAMPLES FROM LONDON