



Minimally invasive analysis: Fact or fantasy? The challenge of ^{14}C dating Early Modern material

Dr Jane Malcolm-Davies – Associate professor of textile analysis, The Globe Institute, University of Copenhagen, Denmark

Dr Laurie S Waters – retired, Los Alamos National Laboratory, New Mexico, USA & Curator, Northern New Mexico Museum of Lace

Interdisciplinary work in cultural heritage is usually characterised by commercial transactions in which arts and humanities researchers contract natural scientists to analyse their archaeological or historical material. The ‘men with the machines’ are in a position to direct what is and is not possible in terms of investigation since the parameters of the technology are usually well tried and tested.

This leads to an imbalance of power in the direction and scope of the research and a disconnect between the cultural expertise required to interpret the object in context and the scientific endeavour which goes into investigating it.

There is also often a gender dimension to this relationship because analytical technologies are still largely researched and operated by men while the majority of cultural artefacts are cared for and studied by women. This is especially so in work on textiles and dress.

Archaeology breaks this stereotype in successfully bridging the arts and sciences more often than other cultural heritage disciplines. However, non-woven textiles are rarely the focus of innovative analysis as they lack well-defined taxonomies. This paper explores the experiences of systematically recording two understudied but important non-woven fabrics - knitting and lace - and using accelerator mass spectrometry (AMS) to date them for the first time. Practical issues in AMS dating are sample size, pretreatments, and geographical provenance.

The size of a viable sample (5 mg to 20 μg) has decreased with advances in AMS technology. Nevertheless, what seems a small sample to the lab represents a violation of the integrity of a culturally precious object to the conservator. A new protocol for sampling knitted objects was drafted by a collaborative team at the Museum of London and pilot tested as part of the Knitting in Early Modern Europe project. The concept of sampling tolerance was explored in a pilot project for AMS dating lace. A sample representing 6% of a length of lace with a repeated pattern was adequate for two samples without destroying any information about the artefact’s composition, structure and design.

Pretreatments for silk are better researched than those for linen and wool. Ensuring these are appropriately discussed and implemented is a challenge when labs are set up for routinely testing other materials. Likewise, the geographical provenance of the textile sample is essential for the selection of the appropriate calibration curve for refining the raw dates provided by AMS.

A further critical issue is incorporating the AMS results into textile and dress research while acknowledging that they do not provide absolute truths. Results using natural science yield



perspectives on cultural phenomena which require interpretation within the context of other observations made via a variety of other methodologies. Craft knowledge and skill are also essential to this process but they are difficult to incorporate into the study of textiles since such expertise is located outside the traditional academic disciplines.

The pioneering investigations into Early Modern non-woven textiles reported here illustrate the friendly yet frustrating interdisciplinary collaboration.