

The National Archives of Scotland (NAS) is pleased to announce an exciting and innovative partnership agreement with the recently established Conservation Research Section of The National Archives (TNA) at Kew. This is the first formal collaboration between the two archives, and an important first step in taking forward the conservation science research agenda for library and archive collections.

The three-year project, beginning October 2005, will support a graduate student based at the Optometry and Vision Science Department, University of Cardiff, working under the supervision of internationally renowned Prof. Tim Wess. The study will address fundamental questions surrounding the treatment of parchment artefacts and provide evidence to revise current conservation and preservation practice. The main project aims are to:

To better understand the changing interactions with water that may cause damage to collagen, this study will examine the rate of behaviour of parchment using x-ray diffraction/scattering technology. This will allow intensive study of the changing interactions with water that may cause damage to collagen at various levels of hierarchy from the microscopic length scale to atomic-nanoscale level. Tests will be carried out on parchments, both historic and modern, at various stages of degradation.

This collaboration is the continuation of a successful relationship between the NAS and Cardiff University, which supports and promotes the understanding of the life cycle of parchment artefacts. Significantly this continued research initiative has provided valuable data to ensure the continued preservation of the Declaration of Arbroath which will be displayed in the Scottish Parliament's Holyrood building from 15th August - 9th September in an exhibition entitled *For Freedom Alone*. The exhibition will also commemorate the 700th anniversary of the death of William Wallace.

Project Objectives

- To determine a detailed understanding of how water and collagen interacts within the preservation and conservation context of parchment records.
- To determine damage caused by relative humidity misuse particularly during conservation treatments.
- To train a student at basic science and conservation interface.
- To disseminate the results of this work to broader professional audiences and the public.

Brief Overview of Project including how it relates to previous work in the field

Parchment retains many of the hierarchical structural features that ensure skin is an effective biocomposite. The collagen molecular and fibrillar interactions provide a connectivity that transcends the features a biological rope to higher levels of ultra-structural architecture. At each level the interaction with water is critical to the structural integrity and survival of parchment. In parchment storage and conservation, the changes in humidity can be regarded as an effective tool to remodel the collagen-based architecture, but also as a challenge to structural integrity. Since the interaction with water covers a large number of length scales covering the atomic-nanoscale to macroscopic length scale it is pertinent to study the structural effects and alteration in physical properties at different levels of hierarchy. We wish to make an innovative study of rate behaviour of parchment using state of art X-ray diffraction/scattering technology. This will allow the changing interactions with water that may cause damage to the collagen. This will be tested on a series of parchments both historic and modern at various stages of degradation. Detailed understanding of water collagen interactions within the preservation and conservation context of parchment records.

Schedule of Activities

1st year – Progress report every four months to coincide with academic reviews.

2nd year – Progress reports every six months

3rd year – Progress reports every six months

Project partners:

The National Archives of Scotland www.nas.gov.uk

Cardiff University www.cf.ac.uk/optom/staff/wess.html,

The National Archives www.nationalarchives.gov.uk