Archaeological Conservation in the United Kingdom: Development, History, and Diffusion of Knowledge

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Abstract

This thesis seeks to reflect critically on the historical development of archaeological conservation as a distinct profession in the UK. The study is underpinned by two major strands of research. The first is an examination of the development of archaeological conservation at five institutions across the UK (the National Museum Wales, the Ashmolean, the British Museum, the Museum of London and the York Archaeological Trust) and a programme of semi-structured interviews with leading conservators within the profession, who were invited to reflect on their own training and professional development from the 1950s onwards. The second is an attempt to apply the framework of diffusion of innovations and knowledge transference studies in order to better understand the way conservators share information through an examination of the movement of two specific treatment materials (Soluble Nylon and Paraloid B-72) across the sector.

The project was inspired by two contemporary issues within the sector; a concern that jobs in archaeological conservation are decreasing at a rapid rate, creating future gaps in specialism and provision in object conservation; and an understanding that knowledge is disappearing with the loss of particular individuals from the profession. The examination of the development of archaeological conservation and the identification of knowledge transference pathways is followed by recommendations for the future of the profession.

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Acknowledgments

This work would not have been possible without the good will and kindness of the conservation community, of which I have been proud to have been a part for the last decade. I hope that this thesis will go some small way towards supporting its future.

Thanks are due to the many archaeological conservators who gave their time to be interviewed about their careers, to the five case study institutions, and to the Archaeology Department at the University of York. The support for this endeavour provided by my family, friends, and cats was also invaluable. You are all loved.

Author's Declaration

I certify that this thesis is a presentation of my own work and I am the sole author. All material that is not my own work has been identified and sources have been acknowledged as references. This work has not previously been presented for an award at this or at any other university.

Chapter 1: Introduction

1.1 Thesis Focus

In the preface of *The Nature of Conservation: A Race Against Time*, conservator Philip Ward states, '…That museums are one of the vital spiritual cornerstones of civilised society; that preservation is the most important thing that they do; and that conservators are at once the most valuable, the most fortunate, and the most frustrating people who work in them.' (Ward 1989, viii).

When I discovered the above quote during the first year of research for this thesis, I pinned it above my desk, regularly returning to it for inspiration during the following two years. As a professional archaeological and museum conservator who, after ten years of work, returned to an academic setting in part due to the growing concerns amongst my colleagues about loss of jobs within the sector, loss of knowledge due to retirement, and the ever-increasing backlog of unresolved documentation digitisation issues that meant that it was often a matter of sleuthing to discover what had happened to an object during early restoration efforts, I found it hit rather uncomfortably close to home. In the above quote, Ward was writing specifically about the issue of conservators being so immersed in and obsessed with their work that they neglect to perform the outreach necessary to explain themselves to their colleagues (Ward 1989, ix). Whilst elements of this quote resonated with my own experience of the profession, my time with colleagues in the sector convinced me that it was a profession more 'frustrated' than 'frustrating'.

Modern archaeological conservators face a tension within the profession. They are most often employed to perform a specific task- to investigate and to stabilise archaeological and museum objects in order to derive information about their manufacture, their use, their age, their burial, their potential significance, and finally to use this information to preserve the object in a way that is intelligible and understandable to both the researcher and the casual museum visitor. What conservators may not be often paid or encouraged to do is to *write* about this work. This has resulted in a lack of critical and theoretical perspective on the field when compared to other branches of archaeological practice, such as field archaeology. The publication venues that do exist are not necessarily accessed by other branches of the archaeological profession, and as a result, the world of the conservator

remains closed off and the vital work of the conservator is often overlooked. The barriers of time and resource experienced by conservators is something that, if removed or addressed, could enhance both professional and public understanding and help to support and protect the profession in the future. This thesis, which is an attempt in part to give a voice to the community of archaeological conservators who have devoted their careers to investigating and preserving objects for display and for future study, therefore seeks both to understand how the field has developed and thereby to inform recommendations for the future.

1.2 Aims and Objectives

The aim of this thesis is to provide insight into the historical development of archaeological artefact conservation and the profession within the UK. It will also place the development of the field into context within the wider UK and international conservation community whilst determining the scientific and political factors that shaped this development. It is not intended to be a comprehensive history of the field but rather a first step towards understanding its professional development and characteristics. This is achieved through the following primary objectives:

- To clarify the history of the development of archaeological conservation within England and Wales, identifying the impact of select internal and external political and social events on the field, and to attempt to fill a portion of the existing gap in the literature related to the history of archaeological conservation. The career trajectory of several key individuals will also be highlighted, and their roles within the sector in regard to knowledge transfer theory will be examined. This will form a 'nested' approach- firstly, identifying the role of conservation within the wider archaeological narrative, and secondly, identifying that role within specific institutional frameworks.
- To identify how knowledge transfer and the diffusion of innovations have functioned within the profession and furthermore; how they have affected its development.
- To investigate concerns arising from within the profession about the future sustainability of archaeological conservation within the heritage sector.
- To identify areas for further research and make recommendations for the future.

1.3 Archaeological Conservation in the Context of Conservation Philosophy and Practice

1.3.1 What is Conservation?

The field of conservation is complex. In the UK alone, the Institute of Conservation (ICON) supports 18 specialist groups, with subjects ranging from archaeology, paper, and photographs to stone, wall paintings, ethnography, heritage science, glass and ceramics, and metals (Institute of Conservation 2016). The developmental history of the field of conservation is equally complex, and the challenge of arriving at a unifying definition of such a diverse field has resulted in numerous changes over time. In 1984 the International Council of Museums Committee for Conservation (ICOM-CC) attempted to clarify the role of the cultural history conservator and published the below definition:

(Someone whose activities consist of) 'Technical examination, preservation and conservation-restoration of cultural property.' Examination is defined as 'the preliminary procedure taken to determine the documentary significance of an artefact; original structure and materials; the extent of its deterioration, alteration and loss; and the documentation of these findings.' Preservation is the action which is 'taken to retard or prevent deterioration of or damage to cultural properties by control of their environment and/or treatment of their structure in order to maintain them as nearly as possible in an unchanging state.' Restoration is 'action taken to make a deteriorated or damaged artefact understandable, with minimal sacrifice of aesthetic and historic integrity.' (ICOM-CC 2013).

Conservation and the ethical codes surrounding it have been defined by numerous heritage organisations over the past 50 years. In addition to the ICOM definition above, similar definitions have been put forward by the International Institute for Conservation of Historic and Artistic Works (IIC), the former United Kingdom Institute for Conservation (UKIC) (now ICON), the American Institute for Conservation of Historic and Artistic Works (AIC), the Canadian Conservation Institute (CCI), and others. These definitions were increasingly intended not only to define the activities of the professionals engaged in conservation but in some ways to outline the ethical parameters followed by conservators. These changes in

both terminology and ethics previously have been documented by archaeological conservators, most notably by Chris Caple in his book *Conservation Skills: Judgement, Method, and Decision Making*, a text which is (as of 2016) recommended reading for students at each of the three main archaeological conservation training institutions in the UK (Caple 2012). This work, which is focused on institutional and individual history, will not attempt to replicate the excellent history of the development of the ethical codes governing conservators, as this has been covered in depth by authors such as Clavir and Caple (Clavir 1998; Caple 2012). Instead, it will utilise the ICOM-CC definition as a historical starting point, with critique to follow later in this chapter.

1.3.2 Conservation or Restoration?

One of the key aspects of the ICOM-CC definition above is the close link between the words conservation and restoration. They share close historical links and are used interchangeably in some parts of Europe and Asia, but within the conservation profession in the United Kingdom they now hold very different meanings. The second definition of conservation used for this work is based on the definition put forth by Thomson (1994) from the Butterworth-Heinemann Series in Conservation and Museology book *Museum Environment.* The definition encompasses two of the main tenets of the modern archaeological conservator's role: firstly, to control the environment surrounding an object to minimise the decay of materials and artefacts, and secondly, to treat the objects to arrest decay and to ensure stabilisation against further deterioration. Restoration is now considered to be a continuation of the conservation process, mainly used when an object is to be exhibited and is thought to be insufficient in conveying the idea of the physical appearance of the object. This is conducted without falsification (Thomson 1994, ii). This definition is particularly valuable as it highlights the differences between the practices of conservation and restoration as currently understood in the UK.

However, as this definition is meant to cover all the various branches of conservation, it focuses nearly exclusively on the actions of conservators to preserve objects. This emphasis on conservation for museum display fails to highlight one of the most valuable and unique contributions of archaeological conservators, that of investigation and understanding of the

object from a scientific viewpoint. The central importance of investigation which sets archaeological conservation apart from other branches will be further explored later in this chapter.

Thomson (1994, vii) also outlines an international professional code of ethics for conservators, which has undergone revision over the years but is considered to include the following:

1) Treatments should ideally be reversible, so that objects may be returned to their original state (both chemically and physically) if desired. It is understood that at times this may not be possible if the survival of the object is dependent on irreversible treatment.
2) Treatments should attempt to conserve decayed material and not to replace original material.
3) Consequences of the aging process should not be concealed or removed- patinas should be left intact and later accretions should be removed unless they are determined to be a part of the social history of the object.
4) All treatments should be extensively documented so that it is possible for later researchers to determine what is original and what has been subjected to conservation or restoration processes (Thomson 1994).

The first of Thomson's ethical code points is extremely important as it indirectly impacts one of the greatest issues facing archaeological conservators- the knowledge that any interventive treatment poses some risk to the chemical and physical makeup and appearance of the object. This awareness has led to the rise of preventive conservation, passive actions taken to stabilise an object that will hopefully ensure the future and continued viability of the archaeological material for study via investigative conservation. This rise in emphasis on preventive conservation is believed by some members of the profession to have caused some unintended effects on the employment of the bench-based or interventive archaeological conservator, which will be addressed more fully in section 3.5.3 of this work.

Thomson's second tenet, addressing the adherence to the conservation of original material and the ethical questionability of its replacement, is one which firmly sets apart the ethical framework of archaeological conservation from that of other fields of conservation, which sometimes rely on the continued *function* of an object as 'working' or 'as intended by the artist' and necessitates the removal or replacement of original material which is actively causing problems to surrounding material (for example, an iron dowel in stonework which is causing the adjacent stonework to break down due to corrosion product expansion) or is no longer structurally sound (e.g. timber which has suffered severe dry rot or pest infestation or overly eroded stonework). Archaeological museum objects as a whole no longer have to perform their original function and as such it is not often strictly necessary to carry out physical replacement of their component parts. This will be more fully addressed in section 1.3.3.

Thomson's third point is important from a historical perspective- over cleaning and over restoration of archaeological artefacts was once standard practice but with the advent of investigative conservation and the increase in understanding that patinas and accretions often contain important clues to help understand the usage and manufacture of the object, this type of conservation work has become uncommon. A modern example of over restoration is sometimes considered to be the reshaping of archaeological metal artefacts, concerning which a seminal article exploring the ethical debate appeared in 1988 (Corfield 1988; see section 3.5.4).

The rationale for Thomson's fourth point is self-evident and modern professional archaeological conservators are universally trained to thoroughly document their treatment work. It is also important to note that previous conservation efforts may sometimes limit the options left to future conservators in deciding treatments as well as affect the future potential scientific investigation of the object itself.

There are numerous examples of restoration or repair of objects perceived to have a sentimental, spiritual, historical or practical importance- examples of which cover thousands of years and many cultures, but archaeological conservation as it is known today is a relatively young profession. The key difference between what comprises archaeological

conservation today and its progenitor, restoration, has been a result of the advancement of scientific technique and the resulting understanding of the potential for study that is provided within the material composition of each artefact, the outcome of which has been the growth of investigative conservation. Whereas early restorers working on archaeological objects were primarily concerned with making the appearance of the object acceptable, modern archaeological conservators are focused on understanding the object itself and its contribution to the archaeological record as well as ensuring that the physical and chemical integrity of the object is preserved for future research. Although some objects are still brought to a level at which they are understandable and appropriate for display, the majority of archaeological objects now are stabilised through environmental controls, negating the need for extensive cleaning and repair.

1.3.3 The Unique Challenges of Archaeological Conservation

Thomson's second point above, meant to describe the activities of all conservators working within the museum context, has been further enhanced by archaeological conservators writing about conservation ethics. In her paper, 'Objects as systems: a new challenge for conservation', Suzanne Keene highlights the unique challenge at the heart of archaeological conservation in her statement 'thou shalt not change the nature of the object' (Keene 1994, 19). The ethics governing archaeological conservation may require more direct adherence to this statement than do other areas of conservation, a phenomenon that is recognised in the literature (Oddy 1996; Caple 2012).

These ethics set archaeological conservation apart from other conservation specialisms. For example, although the conservation of industrial collections falls under the above ICOM definition, there are different balancing points within the three tenets. For industrial collections, it is often the act of what would be considered restoration rather than preservation that takes precedence- or rather, preservation is expanded to include the removal and replacement of original material which is no longer functional. The multi-year project to return the Flying Scotsman steam engine to working condition at the National Railway Museum is a good example of the end goal of conservation being focused on the function of an item rather than on the retention of original material (National Railway

Museum 2014). Similar ethical differences may be found in the conservation of musical instruments and in the conservation of timepieces, both of which are sometimes restored to workable status (Wharton 2005). In paintings conservation it is sometimes considered appropriate to remove and replace a discoloured original varnish coating to reveal the colours as intended by the artist (Modestini 2005). In archaeological conservation, any removal of original material may be considered highly unethical (Oddy 1996). However, some archaeological conservation theorists have criticised this generalisation, instead emphasising the delicate ethical balance sought by archaeological conservators between revelation, investigation, and preservation for each individual object (Caple 2012, 62). While a number of excellent histories of architectural conservation and paintings conservation have been undertaken, such as those by Jokilehto (2007) and by the Moras and Philippot (1984), respectively, no such work has been done on archaeological conservation.

A further issue facing archaeological conservation that differentiates it from other conservation fields is that of the obvious immediate preservation 'value' of an object. In this context, the 'value' of an archaeological object is not just in the object itself but in what can be learned from the evidence surrounding it, its context, and its future potential for yielding information about manufacture and use. Objects which have been freshly excavated are often not fully understood and focusing expensive interventive conservation efforts on one object may mean that other objects are essentially condemned to decay (Caple 2012, 66). In the 18th and 19th centuries, large numbers of artefacts which were not immediately recognisable as being of interest to preserve for study or display were either destroyed during the excavation process or not collected (Lucy 2000, 6).

Many objects undergo changes in physical appearance due to the environment in which they are buried. One example of this type of change would be the voluminous corrosion layers which often form on archaeological ironwork. These layers may contain the original surface of the material, which may be 'cleaned' off during excavation by inexperienced or untrained excavators. Other examples include the removal of weathering crusts on archaeological glass, the removal of mineral preserved organics, and the emptying of ceramic vessels of soil and the loss of potential evidence for their contents.

1.3.4 Interventive and Preventive Conservation

ICOM's 1984 definition of conservation as given in section 1.3.1 is still in use today, and although it goes some way towards outlining the role of the general archaeological conservator, like Thomson's definition it neglects to overtly state the importance of archaeological conservators in helping to better understand the objects themselves. This understanding may be gained through an investigation into the composition of the object, the surrounding context clues from the excavation or burial site, and the usage of the object itself (often via an analysis of wear patterns). One of the main roles of the modern archaeological conservator is 'investigative conservation' and it has grown in tandem with the advancement of the other archaeological sciences.

Investigative conservation forms a part of the process of interventive conservation. For the purposes of this work, the definitions of interventive and preventive conservation will be based on those outlined by ICOM-CC and ICON. It should be noted that although the author has chosen to use the term 'interventive' for the below definition, ICOM-CC and some other organisations use the term 'remedial'. It was decided to use the term 'interventive' as it is the term most commonly used within the sector by practicing archaeological conservators.

Interventive conservation includes any actions that are applied directly to objects with the intention of halting damage or degradation or reinforcing structure (ICOM-CC 2016a). ICON's definition further clarifies that it is to include minimal conservation and avoid making changes to the object that prevent it being returned to its previous state (ICON 2016).

Although these definitions address two of the most important 'whys' behind interventive conservation, those of supporting and preserving objects, neither focuses on a third very important function, which is to better understand, investigate, and record the makeup and history of an archaeological object. For this work, it should be understood that interventive conservation also includes work undertaken with the purpose of exploration and understanding of objects. Interventive conservation within archaeological conservation is most likely to occur at several distinct points in the conservation life of an object.

Firstly, it is likely to occur soon after excavation, when items must be initially cleaned and investigated to determine their physical makeup, materials identification, manufacture, and potential for further study (the presence of mineral preserved organics within corrosion layers, or pigments or residues on ceramics, for example). This type of interventive conservation is often carried out by conservators embedded within or contracted by archaeological units. The issues inherent in excavated archaeological materials are often more extreme than objects from other conservation disciplines. Survival of an archaeological object is due to the burial environment in which it is encapsulated, and deterioration accelerates as soon as that environment is disturbed by excavation.

Secondly, interventive conservation is also often a part of the accessions process, when museums acquire objects for display or research. Interventive conservation is also often performed when objects are involved in further programmes of research, or, unfortunately, when events occur within the preventive conservation programme that affect an object's stability, such as natural disasters or pest infestations. Interventive conservation may be performed when previous conservation or restoration efforts fail and put the integrity of the object at risk.

Early conservators were limited by both a lack of understanding of the mechanisms of deterioration and an inability to control the environment in which the objects were displayed, resulting in a need for more severe and invasive treatments to stabilise the object and to slow deterioration. The work that is commonly termed restoration falls into the category of interventive in that it is nearly always the act of visually, practically or physically returning the object to an approximation of its original appearance or function with sometimes scant regard for the maintaining of the original fabric and often the addition of non-original materials. Unfortunately, the methods used often changed the chemical makeup of the object or rendered it unsuitable for future study.

Ethical debates about the appropriateness of both interventive restoration and conservation methods have been increasingly prevalent since the 1970s. Though conservation does take appearance and function into consideration, for the modern archaeological conservator these goals are very much secondary to the preservation of the original chemical and physical properties of an object (although these may have been changed by the burial environment) and its investigative potential. Although modern archaeological conservators

must occasionally use highly interventive treatment methods, over the last 30 years, conservators in the UK have argued increasingly for preventive conservation and environmental control as a means of maintaining the physical integrity of objects and ensuring their future for study.

Preventive Conservation as defined by ICOM-CC is 'all measures and actions aimed at avoiding and minimising future deterioration or loss. These measures and actions are indirect- they do not interfere with the materials and structures of the items… (or) modify their appearance' (ICOM 2016a). Preventive conservation within the context of archaeological conservation takes the form of controlling the environment surrounding an object. This is primarily accomplished by regulating relative humidity, temperature, light exposure, and preventing the access of pests. An important thing to understand is that within archaeology, preventive conservation measures may only be applied effectively after the investigation stage has occurred and materials have been correctly identified. This proper identification of the full range of materials is argued by Caple to be difficult to learn through textual sources as students must have a chance to handle the materials and to 'gain a 'feel' for them' (Caple 2012, 5). This materials identification is made all the more difficult for archaeological conservators as objects that have been exposed to varying burial conditions often undergo significant changes in appearance and even in material properties (Kibblewhite, M., et al. 2015).

1.4 The Field of Archaeological Conservation

Archaeological conservation within the UK began within the museum environment and was originally linked to the desire by historians to ensure that archaeological items on display retained (or in some cases, were given) the appearance expected by scholars and the visiting public (Seeley 1987, 165). The act of conservation therefore emerged in an effort to prevent object deterioration or disintegration and the work undertaken primarily focused on aesthetics, a focus that has changed significantly. The earliest conservation work was what today would be termed restoration and was firmly rooted in craftsmanship tradition (Seeley 1987, 162).

Although archaeological conservators today have the same primary goal of preventing the deterioration of an object, the methods employed are often quite different and the level of acceptable intervention has significantly altered, as discussed above. Archaeological conservators work on a wide variety of material types, including bone, leather, ceramic, glass, metals, stone, textile, wood and plaster. In the UK, they may be found working for archaeological units or organisations, museums or in private practice, and are often involved with artefacts from the excavation of an object through to the stewardship of an object in long term storage or on display. ICON Archaeology Group defines archaeological conservators as those who are involved in the investigation and preservation of the evidence of the excavated physical remains of the past (ICON 2016). This definition emphasises both of the two central tenets that uniquely define the role of the archaeological conservator as opposed to conservators working with other material types. Crucially, the definition goes on to explain that 'conservation…is the process of both managing change and realising the potential of any object or material to inform, instruct and inspire' (ICON 2016).

The importance of post excavation investigation (often performed by the archaeological conservator) within the landscape of the broader heritage profession has also been recognised through its inclusion in planning guidance and research frameworks from the 1990s to the present day. This recognition has been included in documents such as Policy Planning Guidance 15 (PPG15) and Policy Planning Guidance 16 (PPG16), Planning Policy Statement 5, all produced by the UK government, and Management of Archaeological Publications (MAP2), and Management of Research Projects in the Historic Environment (MoRPHE), produced by English Heritage (now Historic England). These policies and their effect on the development of archaeological conservation will be explored in Chapter 3 of this work.

Although archaeological conservation is sometimes practiced by interns and supervised volunteers (an issue within the profession which will, again, be further examined in Chapter 3), this work will primarily examine professional archaeological conservators, increasingly a graduate and postgraduate profession. These may be found employed within universities, either in teaching and research roles or working within associated museum collections. At University College London, Durham University, and Cardiff University, archaeological

conservators are currently engaged in instructing conservation and archaeology students, whilst at universities that do not offer conservation degrees, archaeological conservators may focus more on materials or technological research. Archaeological conservators also may be found working in museums at both national and regional level, caring for freshly excavated as well as historic archaeological materials. Conservators may be embedded within archaeological units, such as the York Archaeological Trust and AOC archaeology, where they work on archaeological materials for in house excavations as well as for external clients. National bodies such as English Heritage, the National Trust, Cadw in Wales, and Historic Environment Scotland also employ archaeological conservators to work on their collections and sites. Archaeological conservators may be found working in regional conservation centres, such as the Wiltshire and Swindon centre and through associations such as the University of Cambridge Museums Consortium (UMC). In addition to these employers and others, some archaeological conservators work within private practice or as independent consultants.

Although numbers specifically relating to archaeological conservators are difficult to obtain, insight into the profession is available from a few sources. Firstly, three years of the regular email jobs bulletin circulated to members of ICON, Iconnect Jobs, were studied (May 2013-May 2016). It was clear that most advertisements are for posts within the museum sector, with very few for jobs at universities, research institutions, or within archaeological units. This information was utilised when selecting the case study institutions in Chapter 2 of this thesis and will be addressed in more depth in Chapter 3. Secondly, the 2015 membership survey conducted by ICON provided some insight into the employment of conservators generally. Of the 544 respondents, 13.97% identified themselves as archaeological conservators (ICON 2015, 22). Icon also provided a number of categories for job roles, which included manager, preventive conservator, bench-based conservator, scientist/researcher, teacher, and 'other'. Of the survey respondents, the highest numbers (44.25%, n=538) reported working as practical or 'bench' conservators, with the lowest number reporting that they were employed in science and research (2.79%) or teaching (2.42%) (ICON 2015, 20-21). Interestingly, a number of conservators did not feel that their role could be adequately described by any of the categories chosen by ICON, feeling that the definitions were out of date and that their job did not fit well within any of the described

categories (ICON 2015, 20). These conservators highlighted the difficulty in defining what the role of 'archaeological conservator' means today. The changing role of the conservator will be examined in more depth in Chapter 3 of this work.

Differences in terminology and in the way conservation is provisioned between institutions meant that in practice, very few who consider themselves 'archaeological conservators' may be named as such on their work contracts. Instead, conservators who trained to undertake work on archaeological objects and treat archaeological objects may be working in roles with such divergent titles as conservation scientist, metals conservator, organics conservator, ceramics conservator, senior conservator, or, in a few cases, in the named post of 'archaeological conservator'

Due to the varied nature of this terminology, it was therefore necessary to attempt to establish a method for this research which would follow the development of a role when the role itself frequently came under disparate titles. For the purpose of this thesis, any conservator performing interventive treatments on archaeological objects was considered to be an archaeological conservator. No distinction was made in this definition between freshly excavated objects and those which are part of existing collections.

Despite relatively small numbers as indicated above, conservators are integral to the archaeological excavation process within the UK. Conservators are often invited onto excavation to work with finds specialists in triaging, assessing, and providing first aid for delicate or easily damaged artefacts as well as providing training to students and archaeologists in freshly excavated materials identification and handling. Freelance conservators or those attached to archaeological units or museums are sometimes called out to site when unusual assemblages or particularly fragile artefacts are discovered, to perform block lifts and removal of the artefacts to the laboratory, or to provide stabilisation before continued excavation (AIC 2016).

Conservators are key to ensuring that objects requiring specific treatment upon excavation are given the best chance at survival for future research, study, and preservation. In addition to the conservation of moveable artefacts, archaeological conservators may also be found working with larger features such as buildings and landscapes in conjunction with other archaeological and buildings specialists in an effort to better understand how objects

were created and used (AIC 2016). However, for the purposes of this thesis, the term 'archaeological conservation' will refer strictly to the preventive and interventive conservation of portable archaeological objects, those commonly found on display in museums and excavated by archaeological units.

1.5 Timeliness of Thesis

Although object restoration has existed in some form since the establishment of museums, the subset of archaeological conservation is relatively new and the profession has undergone much change over the past 100 years. In examining the development of the field, it quickly became apparent that publications investigating the history of archaeological conservation were quite rare. One of the primary aims of this work is to better understand the professional history of conservation. As an archaeological conservator myself, it is difficult to fully divest myself of the personal perspective being a member of this profession brings to bear on this research. However, I believe that this unique position as a member of a relatively small professional group allows in some ways for a better ability to identify current issues within the field.

This research is particularly timely for two reasons: firstly, there is a general perception amongst archaeological conservators that interventive or 'bench' conservation jobs within the museum sector are being lost at a rapid rate. Although this is something *felt* by conservators, evidence of decline has not been formally documented by any survey. Regardless of this, the sentiment has appeared in a variety of places, including via Prospects, a graduate careers specialist organisation, who state, 'Conservation departments in museums have been severely cut back over the last ten years. Therefore, with the exception of national museums, full-time, permanent posts (and even part-time posts) for conservators in museums are comparatively few and there is fierce competition for all posts.' (Prospects 2013).

Prospects' reference to conservation within national museums as an exception from budget cuts is not supported by the data gathered by the surveys undertaken by the Museums Association, which recorded overall operational budget cuts resulting in decreases in full time staff members in national museums for each of the three years during which this work was undertaken. In the Cuts Surveys undertaken each year, 37% of respondents in 2013

reported a decrease (n=131), 53% reported a decrease in 2014 (n=95), and 24% reported a decrease in 2015 (n=115) (Museums Association 2013; Museums Association 2014; Museums Association 2015). Unfortunately, conservation and more specifically, archaeological conservation were not singled out within these reports, but it may be assumed that budgetary cuts and staffing decreases are likely to have equally affected these roles. Evidence of this concern was borne out by the semi-structured interviews conducted for this research and also by previous survey work undertaken in the Yorkshire and Humber region by the author (Schmisseur 2015).

Secondly, given the relatively recent establishment of archaeological conservation as a profession, it is still possible to interview some of those who may be considered to be the first to become professional conservators (trained between the 1950s and 1970s) to elucidate first-hand information about their experience of their early days of the profession which will otherwise be lost. It is therefore an optimum time to collect oral histories and gather together previously unpublished documents and treatment information.

These research questions are supported by two types of case study, both of which use the framework of diffusion of ideas and sociology of knowledge studies to better understand the development of the field of archaeological conservation. The first type of case study (presented in Chapter 3) is historiographical in nature and examines the early development of archaeological conservation at five diverse institutions across the UK, all of which are still in operation. The second type of case study (Chapter 4) examines knowledge transfer within the profession through the movement and diffusion of two specific treatment materials, Soluble Nylon and Paraloid B-72. Both types of case study are supported by data from scholarly publications, grey literature, and interviews with conservators. This methodology is outlined in Chapter 2. Both case studies are intended to further the understanding of the formation and composition of the archaeological conservation community.

An examination of knowledge transfer and diffusion of innovations has not yet been carried out within the realm of archaeological conservation, although some work has been undertaken within the field of buildings conservation. Sian Jones and Tom Yarrow (2014) have studied the interactions of craftsmen and buildings conservation professionals within the context of the restoration of Glasgow Cathedral, though that work has been focused

more on the relationship between buildings conservation professionals, their sites, and their ethical frameworks and concepts of significance with only slight emphasis on how these relationships are formed and the pathways of innovation within communities within the field. This thesis will instead look to why and how knowledge networks are formed and treatments are spread. This will help to identify potential pathways for change within the profession.

1.6 Structure of the Thesis

The remainder of this thesis adopts the following structure:

Chapter 2 considers the thesis methodology, including the reasoning behind selection of institutions for study and a discussion of the ethical issues involved in the study. It also includes a brief discussion of the indicators used to identify development and change within the field of archaeological conservation.

Chapter 3 consists of a literature review of the history of the development of archaeological conservation, an evaluation of historical approaches to archaeological conservation, and the identification of external and internal political and social factors affecting the growth of the field as a whole. Broad changes in the archaeological and museum sectors between the 19th century and the present day are identified and addressed, as well as the rise of the training programmes for archaeological conservators; the development of governing bodies; the influence of professional groups and the increasing application of scientific methods to conservation.

Chapter 3 includes an analysis of the history of archaeological conservation at the five case study institutions: the National Museum Wales, the York Archaeological Trust, the British Museum, the Ashmolean Museum, and the Museum of London. The development of the role of professional archaeological conservators at each institution will be examined and knowledge exchanges between institutions highlighted. Finally, concerns about the current state of employment will be assessed through an examination of job postings.

Chapter 4 begins with a consideration of aspects of the sociology of knowledge and the transference of ideas. This provides a theoretical foundation for the analysis of the diffusion of knowledge and innovations across the sector which follows in two case studies of specific

conservation treatment materials. The first material selected for case study is Paraloid B-72, an extremely popular adhesive and consolidant used on a wide variety of materials and with a nearly 100% diffusion rate over the past 30 years. The second material is Soluble Nylon, which was very popular in the mid-20th century and was later found to possess poor aging properties and to be nearly irreversible. The selection of a contemporary treatment material and a historic one was intentionally done to better show changes in knowledge transference and diffusion pathways over time. The study of the diffusion of these two innovations will be supported by data from the conservation literature, the interviews, and the case study institutions.

Chapter 5 further discusses the case studies and includes recommendations for the future of archaeological conservation supported by evidence from the institutional and treatment case studies. It reflects critically on the findings of the analysis in Chapters 3 and 4 and relates these to current concerns and debates about the development of archaeological conservation, and the profession within the heritage sector.

Chapter 2: Methodology and Research Design

2.1 Introduction

This chapter will detail the methods employed in exploring the development and the history of archaeological conservation in the UK. An explanation for the selection of the case study institutions will be given and information gathering techniques will be fully outlined. The methods reflect a multi-stranded approach to better understanding the field. Firstly, a literature review was undertaken, focusing on a survey of the existing literature concerning the history and development of both the profession as a whole, and the specific case study institutions. The second data gathering technique is the investigation and recording of the history and development of archaeology conservation within living memory. This takes the form of 87 semi-structured interviews, comprised of 18 questions and for which the participants were anonymised. The third data gathering technique consists of institutional case studies, which were supported by further interviews in which the interviewees were named and citations provided. An additional and supplementary data gathering technique, further detailed in Chapter 4 of this thesis, consists of an investigation applying knowledge transference theory to better understand the diffusion of knowledge within the field. This took the form of a publication frequency analysis and was additionally supported by data obtained via two of the interview questions.

This multi-stranded approach to uncovering the history of the profession has a number of potential strengths as well as weaknesses. The existing literature concerning the history of the profession is largely written by conservators and may therefore be considered to be more 'immediate' and may also evidence a true understanding of the field as it is produced by those who are actors within it. A limitation, however, is that the existing literature covering the history of archaeological conservation is sparse, primarily limited to brief mention in volumes concerned with other topics and the rare journal article. The bulk of this material is quite old and as a result does not cover the most recent developments within the field.

The use of conservator interviews is one of the ways in which this thesis makes an original contribution to knowledge and understanding at the forefront of the discipline. As an archaeological conservator myself, I needed to use well-established sociological and

ethnographical methods to reflect carefully on both my choice of interviewee, the way in which my semi-structured interview questions were framed, and the analysis and conclusions I drew as a result. It was very helpful in this context, to draw on the guidance of both the Oral History Society and wider sociological literature on semi-structured interview practice (Grele 1994; Mcmahan and Rogers 1996; Perks and Thomson 2015). This will be further covered below.

The interviews themselves are data, but data which is dependent on the memory and the opinion of those interviewed. At times, these memories and opinions (particularly with regard to dates) may be in conflict with the established 'published' record, or with the memories of other interview subjects. These conflicts, where apparent, will be noted in the thesis.

The interview questions were focused to extract information about knowledge networks within the field and about the diffusion of ideas, the methodology of which will be further covered later in this section. Although the conservators interviewed nearly all had links with the case study institutions featured in the work, they perhaps inevitably prioritised their answers to focus on their personal experiences rather than on events and change within their institutions.

The institutional case studies component of the research also presents a number of strengths and weaknesses. Firstly, the institutions chosen for the case studies were selected based on having both a long history of archaeological conservation and on still employing multiple archaeological conservators as of 2015. This was thought to provide a larger data cache and therefore a better chance of observing changes within the profession. The primary strength of this was that it allowed for a more rounded view of the history of conservation within the institutions. Internal and personal correspondence as well as grey literature, meeting proceedings, and treatment records could be examined in relation to the information gleaned from oral history interviews with past and current conservators, hopefully minimising gaps in the record. This was particularly effective in the case of the National Museum Wales and the Museum of London.

However, the requirement of a lengthy and continuing history of archaeological conservation as one of the selection criteria for the case study institutions precluded the

selection of other institutions which are either no longer employing conservators or which have not enjoyed a long history. It also excluded smaller and regional museums, which may employ archaeological conservators but seldom employ more than one at a time, limiting the number of individuals available for interview (ICON 2015, 26). Future research might seek to target these individuals specifically and is further discussed in the conclusions.

It was also originally hoped that the study would include archaeological conservation in Ireland and Scotland, but neither the National Museum Scotland or the National Museum of Ireland was able, in the end, to furnish individuals for interview. One of the interesting findings of the research was that it was much harder to analyse the most recent institutional histories of museums, due to the reliance on ephemeral electronic correspondence, particularly email, rather than the letters and notes preserved in older museum archives. This is an issue to which I will return in my conclusion, but it re-emphasised the importance of triangulating any published and grey literature accounts with the oral history interviews.

These research methods were selected in an attempt to produce an overview of the history of the development of the field of archaeological conservation in the UK and the current state of the sector. With some caveats, the geographic distribution and the number of institutions surveyed helps to provide a reasonably comprehensive picture of the development of the field, irrespective of more localised practices. The proposed research design also provided a foundation for the third strand of research in this thesis, namely the understanding of the mechanisms of the transference of knowledge and diffusion of innovations within the archaeological conservation community. This will be further detailed in section 2.3.1.

The decision to examine the development of archaeological conservation in the context of museum history did impose some limitations on this study, both anticipated and unanticipated. It was anticipated that museums would provide the most lengthy and complete data set concerning archaeological conservation activities. It was found that in reality, there are large gaps in the recording of conservation and restoration. A further discovery was that the most recent history of archaeological conservation was actually more difficult to access than much of the historical data due to data protection, a lack of personal correspondence availability, changes to the format of departmental reports (many becoming less formalised and no longer including staffing lists), and a lack of digitisation of

treatment records. Additionally, current programmes of digitisation rendered some of the paper based archival records inaccessible to the researcher.

The selection of museums as case study institutions also biased the type of evidence collected. Some developments in the general history of archaeological conservation that were clearly worthy of additional study, such as the foundation of the Area Museums Services, the work of the Museums and Galleries Commission, and the publication of a series of EU directives and standards did not appear within the institutional records at all, and featured only tangentially in one of the interviews. Although a closer examination of the potential impacts of these factors on the history of archaeological conservation would undoubtedly be worthwhile and complimentary to this study, ultimately, they fell outside the scope due to the design of the research methodology.

Information relating to the history of conservation at the selected case study institutions was sourced primarily through archival research. The history of some of the larger museums had been previously covered in institutional biographies and wherever possible this information was utilised. Primary source archival materials relating to the establishment and development of conservation departments were also consulted. These sources took the form of internal documentation, minutes of meetings, departmental reports, personal correspondence, employment and object registers, and treatment records. Some examples of typical treatment record cards and relevant personal correspondence relating to early conservation at case study institutions is reproduced in Chapter 3.

Another potential way in which to approach the topic would have been to examine the personal biographies of a number of archaeological conservators. This might have circumvented the issues outlined in section 1.2.3 above, particularly those surrounding the definition of the role of an archaeological conservator. As evidenced through the interviews with archaeological conservators that were undertaken for this work, 'bench' conservation is often only one stage of a long career. More experienced conservators may move on to managing conservation laboratories or museum departments, teaching archaeological conservation within educational institutions, or working on research problems within universities or laboratories—yet still consider themselves to be archaeological conservators. An examination of the biographies of individual conservators would have provided a

personal approach to the topic of the development of the archaeological conservation profession but it would not have facilitated the institutional case studies. The institutions employing conservators have a key role to play in supporting the field of archaeological conservation.

2.2 Literature Survey

Archaeological conservation as it is known and understood today is a relatively young profession, which may be one of the reasons why very little research has been published concerning its development. As the field of archaeological conservation is guided by a very different ethical framework than of buildings and paintings, it is essential to examine its development separately, as a unique subset of the larger subject area.

Although a handful of authors have previously addressed the topic, none of the resulting publications have included a thorough investigation into the history of archaeological conservation within the museum and private sectors, which is quite understandable given the challenges uncovered in the research undertaken for this thesis. No specific monographs have been written, and the sources that do exist consist of a short account given as a conference paper (Sease 1996), another which focused almost exclusively on the effect of publications on the field (Caldararo 1987), and a third, which outlined the differences between the professionalisation of archaeological conservation in the UK and the USA (Johnson 1993). Other previously published sources for the history of archaeological conservation include basic conservation textbooks, where extremely limited historical descriptions of a paragraph in length sometimes may be found within the introductory sections (Plenderleith and Werner 1956; Buys and Oakley 2011, vi).

Short references to the conservation history at specific institutions may occasionally be found on museum department websites, for example on those of the Ashmolean and the Museum of London, but this information is rarely referenced and generally takes the form of anecdotal reminiscence. As yet, a thorough and in-depth examination of the history of archaeological conservation and an analysis of the influences of external events has not been undertaken. For this thesis, research into the history of archaeological conservation began with a review of articles that had been published in the journals of the field and the

established conservation literature and developed into institution-specific publications and grey literature produced by organisations which employed conservators.

What quickly became apparent is that the field of archaeological conservation does not appear to ignite the imagination of general historical researchers and is additionally often subsumed into the wider conservation profession. All of those who have written about the history of archaeological conservation have been professional conservators, and the peak for this type of writing appears to have been some time ago, with no major publications coming out in the last 15 years. This lack of published history is in contrast with that of archaeology generally, which has had significant recent works by Schofield and Carver which detail the history of the field through the lens of specific excavations (Schofield 2011; Carver 2017). A further issue is that the work of the conservator is seldom highlighted in the histories written about museum institutions, where most work features a narrative structure focused around the acquisition of collections and the notable curators who have shaped them. The conservator, though a vital part of the story, is mentioned only in passing and specific conservators appear only as background characters within the narrative.

This study uses as its foundation the work previously undertaken by Seeley (1987), Gilberg (1987), Caldararo (1987), Sease (1996), Clavir (2002), and Johnson (1993); all are archaeological or objects conservators who have investigated aspects of the foundation and development of the field in journal articles and through conference presentations.

Upon examining these publications, it is clear that conservators have for some time been concerned with establishing when the profession came into existence. Two of the aforementioned authors who have written about the history of the field of archaeological conservation date the beginnings of the modern profession to the time where conservation became as much of an attempt to discern the causes for object deterioration as it was about the effort to restore those objects (Clavir 1998, 43; Gilberg 1987, 106). Generally, the literature surrounding the history of the profession is concerned with changing approaches and ethics rather than with individuals.

Arguably the most thorough of the histories of conservation is Caldararo's article which appeared in the autumn 1987 issue of the Journal of the American Institute of Conservation. Titled, 'An Outline History of Conservation in Archaeology and Anthropology as Presented

through its Publications', the author, Niccolo Caldararo, surveys the historical development of the field though an examination of publications. This approach is highly effective in establishing the scientific pedigree of the profession, but the author does not focus on which external factors may have been influencing the publications within the field, or the position of the conservators themselves within the wider history of the heritage profession. Although Caldararo does briefly and positively link the initial establishment of the profession with the ever-increasing need to preserve artefacts, his main focus is to call for further publication within the field of archaeological conservation (Caldararo 1987, 87). Caldararo believes that publication of scientific papers within the field is haphazard and that the most necessary texts are those which cover broad and general areas of conservation, something which is necessary as he believes the retirement of practitioners from the field in combination with the lack of impetus for publication inherent to most conservators will result in the retirees taking with them their skills and knowledge without transferring it to their replacements (Caldararo 1987, 95-96).

Caldararo's concern has been answered in part- since 1987 and the publication of his article, several general texts have appeared. Most notable is the work by Chris Caple (2012), and Janey Cronyn's Elements of Archaeological Conservation (Cronyn 1990), which has appeared in several editions. Caldararo's point regarding '…the spectre of so many experienced and older practitioners leaving the field by retirement without publishing summaries of their experience or outlines of their work…' is still an active issue (Caldararo 1987, 96). It is hoped that the oral histories of conservators taken as part of this thesis will go some way towards mitigating the loss of historical information due to the retirement of some of the leading UK conservators or the reorganisation within leading institutions and organisations due to restructuring and cost-cutting measures.

The targeting for the literature survey supporting the second type of case study (knowledge transference and diffusion of innovations) was slightly more complex. No work has been undertaken in these areas in either archaeology or in conservation to date, so reading began very broadly- first in an attempt to understand the theoretical underpinnings of the field of knowledge transfer theory and then more specifically to critically assess the various models to the field of archaeological conservation. This was done through an analysis of approaches from the fields of modern social psychology and sociology, and their potential

application to the understanding of how the diffusion of innovations spreads within the field of archaeological conservation. This in turn was supported by a quantitative literature survey, focusing on the recorded references in publication of the two case study materials, which was then brought together with the information gleaned from the interviews undertaken with archaeological conservators.

The methodological approach to the selection of the institutions, material case studies, and subjects for interview will be covered further in section 2.3 below, as well as in Chapter 4.

2.3 Case Studies

2.3.1 Institutions

The decision to include specific institutional case studies was influenced by the lack of published information available about the history of the profession discovered during the introductory research phase of this work. Once it became apparent that a good deal of unpublished primary source data was available in institutional archives, selection criteria were created to identify institutions for study. First, it was determined that public museums should be studied rather than private individuals and firms as they generally provided the most stable environment for archaeological conservation records (i.e. they were most likely to have complete records). This is in part as their funding and therefore their ability to support the role of conservator has tended to be more consistent and less immediately affected by economic downswings than private practices. The individual museums were chosen based on the following criteria:

1) That the institution has a substantial history of employing archaeological conservators and therefore was in possession of a related archive of archaeological conservation records, departmental notes, and personal correspondence.
2) That the institution still actively employs archaeological conservators. This was thought to be important in order to accurately reflect the recent and current states of the profession and to provide an unbroken chain for research.
3) That the institutions selected represent the widest possible geographic range. Effort was made to select institutions in geographically disparate regions in the hope that the study would therefore encompass conservators with the most potentially diverse training backgrounds and employment histories.

As there are relatively few museums that employ multiple archaeological conservators, a large percentage of museums in the UK with the above attributes are included in this study. Those institutions are the National Museum Wales, the Ashmolean, the British Museum and the Museum of London. Where decisions had to be made regarding similar museums and their inclusion in the study (an example would be the decision to include the Ashmolean rather than the Fitzwilliam Museum at Cambridge), the museum with the longer history of archaeological conservation was selected. It was thought that the selection criteria outlined above would allow for the most balanced and complete view of the development of archaeological conservation up to the present day.

While private practices were not examined as case study institutions, it would have been remiss to ignore the phenomenon of the large urban unit and its effect on the employment of archaeological conservators. These began to come into being in the 1960s in the wake of development after the Second World War and they have proven to be a major employer of conservators over the past fifty years and as a result, have greatly affected the development of the profession (as will be further discussed in Chapter 3 of this work). Similar criteria were applied to the selection process as has been outlined above, and organisations considered for study included Wessex Archaeology (established 1979), AOC Archaeology (established 1994) as well as The York Archaeological Trust. Ultimately the York Archaeological Trust was selected as it had a long and continuous history of employing archaeological conservators, is located out with the South and London, and has a rich record and archive for study.

Although the urban archaeological units have contributed significantly to the development of the field of conservation, they came into existence at a later point than the majority of museological institutions which employ conservators. As a result, more substantial data is available from the museum sector. Conservators working within commercial archaeological units are also limited by their nature as archaeological specialist service providers and treatments more often are dictated by time and the budgetary constraints of the client requesting conservation services. Due to these reasons, the use of the commercial unit as a case study has been limited to one purely commercial organisation (the York Archaeological Trust) and a second hybrid museum and commercial organisation (Museum of London).

These two types of institutions were selected in an effort to encompass as much of the mission of archaeological conservation as possible, from conservators working on site during the excavation period, conservation efforts surrounding freshly excavated materials, investigative conservation work into the production and composition of objects, conservation done in anticipation of museum or collecting institution display, and preventive conservation of materials. Although it was not possible to include a Scottish and Irish case study in this thesis, it was thought that the interviews might go some way towards supplying a more complete geographic overview as the presence of many short-term contracts often results in conservators passing through multiple institutions in the course of their careers.

Institutions for Case Study

Ashmolean Museum

The Ashmolean Museum is located in Oxford, England and was first opened in 1683. The collections are primarily composed of archaeological objects and fine art. The Ashmolean also takes in freshly excavated materials when they fit the existing collections strategy, though does not actively excavate. Preventive conservation has been a part of the museum since its foundation in the 17th century but interventive work has only been recorded since the 19th century, although there is limited evidence of some earlier restoration work. Historically, conservation was attached to individual departments, but in 1999 a conservation department was created, and today archaeological conservators share a laboratory space with conservators of other specialisms. The head of conservation at the time of the writing of this thesis is an archaeological conservator and archaeological conservation has a prominent position within the laboratory. Research for this work was primarily undertaken within the conservation department archives within the museum, which include early training manuals, record treatment cards, day books, and departmental reports as well as at the Sackler Library over two one-week periods in the spring and summer of 2015. Interviews with current and former staff members were conducted in 2015.

British Museum

The British Museum is in central London and opened to the public in 1759. It maintains a collection of art, archaeology, and social history items from around the world as well as holding artefacts from some of the most famous archaeological sites discovered within the United Kingdom. Archaeological restoration at the British Museum first appears in the records in 1845. The BM is also notable for the first appointment of a conservation scientist (Dr. Alexander Scott) in 1920. The early structure of conservation within the museum closely resembled that of the Ashmolean, with conservators attached to individual departments until the mid-1970s, when the Department of Conservation was created and combined with the Department of Scientific Research to create a centralised conservation department. Archaeological conservators are a part of this department, but are divided into object material specialisms (ceramics, stone, etc.). The British Museum regularly receives freshly excavated materials from both UK and worldwide excavations. The case study materials for the British Museum, focusing on personal correspondence, pamphlets, departmental reports, and early treatment reports, were gathered from the British Museum Central Archive as well as the British Library during four two and three-day visits over the course of 2014 and 2015. Interviews with current and former staff were conducted during 2014, 2015, and 2016.

National Museum Wales

The National Museum Wales was established in Cardiff in 1909 and holds collections pertaining to the history of Wales, including natural history specimens, social history objects, and archaeology and fine art collections. Archaeology has historically held a high profile within the museum with several early directors being prominent archaeologists. The earliest archival evidence for archaeological restoration shows that this work was often supplied by the Ashmolean and by the British Museum, and in-house restoration was not reported until the 1920s. Archaeological conservators and other specialisms were merged into a central department in the 1970s, but in contrast to the Ashmolean and British Museum, remained embedded in the Archaeology and Numismatics Department until 2016. The Department has maintained an excavation programme and archaeological conservators work on both freshly excavated materials, perform site visits, and work on antiquarian archaeological collection objects but do not take in external contract work. Research for

this work was conducted over multiple one-week periods in the National Museum Wales and Archaeology and Numismatic Department archives in 2013 and 2014, with several additional visits in 2015 and 2016 to conduct interviews.

Museum of London

The Museum of London in present incarnation was created in 1965 from the merging of the collections of the former Guildhall Museum, which was heavily archaeologically focused, with the London Museum. The current institution holds a large archaeological collection as well as extensive social history, fine art, and costume collections. Archaeological restoration and conservation was already in place at both the Guildhall Museum and the London Museum when they combined. Numbers of archaeological conservators remained high until the Museum of London Archaeological Service (MoLAS) separated from the Museum itself and the department was split into separate entities. Most freshly excavated archaeological material is now conserved by the MoLAS conservators, and the museum-based conservators focus their work on existing collections and new acquisitions. The research for the Museum of London case study occurred during two visits to the Museum of London Archaeology Department and the Museum of London Archaeological Archive as a researcher in 2014 and 2015, when personal correspondence and departmental reports were examined. Interviews were also conducted in conjunction with these visits, primarily in the early summer of 2015.

York Archaeological Trust

The York Archaeological Trust (YAT) is located in York, England. Founded in the early 1970s, it actively excavates and publishes archaeology sites across the UK. Conservation has been a part of the York Archaeological Trust from its foundation, and in addition to providing field conservation, investigative conservation, and interventive conservation for internal and external projects the archaeological conservators are also responsible for providing preventive conservation for objects on display at Jorvik, Barley Hall, and the city of York Bar Wall museums. The majority of the work of the archaeological conservators employed by the York Archaeological Trust is undertaken on freshly excavated materials for research and publication. The YAT has also established an international reputation for the conservation of waterlogged organics and takes in contract work on a regular basis. Whilst conducting

research at the York Archaeological Trust I interviewed current and former employees (of which I am one) and conducted archival research, which included examining early treatment records log books and personal correspondence, over a two-week period in 2013 and a further week in 2015.

The case study institutions provided a chronological framework within which to examine the history of archaeological conservation. These were supported by the materials case studies, which provided an opportunity to more closely examine the history within and between the institutions via the networks of professionals and the way knowledge is transferred between institutions and the individuals working within them.

2.3.2 Materials

The second type of case study was designed to show the diffusion of knowledge and the transference of ideas within the archaeological conservation community, particularly highlighting the ways in which archaeological conservators acquire new information, interact as a profession, and their likeliness to take up new ideas based on the source of introduction. It was determined that an effective way to illustrate this movement would be to look at two treatment materials used in archaeological conservation.

The first, Soluble Nylon, was chosen as it was once frequently used in archaeological conservation and fell out of use at a definable point within living memory of conservators who are now reaching retirement age. Both the usage and eventual disavowal of soluble nylon may be traced through the published conservation literature and through oral histories with conservators who were actively practicing in the 1970s and early 1980s. The second treatment material selected for case study was Paraloid B-72. It is a methyl methacrylate copolymer adhesive and consolidant which became popular in archaeological conservation treatment in the 1980s and is still in use today.

The diffusion of innovations through professional and educational networks in archaeological conservation was examined via looking at the emergence of both treatment materials within the subject field and the end of use of soluble nylon. The spread of both treatments was followed through a study of the publications, treatment records within the case study institutions, and oral histories conducted with conservators, which included questions regarding individual use of soluble nylon and Paraloid B-72.

2.4 Conservator Interviews

2.4.1 Sampling Strategy

Archival information was also supplemented through interviews focusing on the personal recollections and experiences of employees of the case study institutions, past and present. Persons of interest for interviews were identified through departmental and institutional records and via recommendations from retired and practicing conservators and other staff members. Oral histories took the form of a series of interview questions intended to encourage the subjects to speak about their personal career histories, the methodology of which was drawn from Gubrium and Holstein's Handbook of Interview Research (Gubrium and Holstein 2005). Questions were designed to minimise influence of the interviewer on interviewee responses but to also generate a casual and comfortable interview environment. Questions were standardised for all interviewees (Appendix A). Interviewees were all conservators and associated professionals who had been/are currently practicing in the UK and were/are employed by the five institutions selected for the case studies. Many of these conservators had worked at numerous institutions over the course of their career, including within the commercial sector. In total, 87 conservators were interviewed, with an average of 15 with direct links (either past or present) to case study institution. Seven associated non-conservators were additionally interviewed for historical information purposes in the case of the York Archaeological Trust and the National Museum Wales.

Interview Sample Size in Relation to the Archaeological Conservation Community

Determining the exact number of archaeological conservators in the UK is a complex task. In the United Kingdom, the conservation profession is currently self-governed via a charity organisation known as ICON (The Institute for Conservation in the UK). ICON has a total of over 2400 members (though not all are located in the UK and many are supporters rather than professional conservators). It is composed of 18 special interest/specialism groups, one of which is Archaeology. It is possible for members of ICON to be affiliated with one primary and multiple secondary groups (ICON 2015). According to correspondence with ICON in April 2015, there are 147 current members who have selected Archaeology as their primary subgroup. A further 96 members have selected Archaeology as one of their secondary interest groups. These numbers include all categories of membership, including

student and supporter, and may not indicate a currently active career in archaeological conservation (Nelles 2015). However, it should be noted that due to the restriction of having only one primary group, these numbers may not accurately reflect the number of conservators who consider themselves to be professional archaeological conservators.

A recent survey of all specialisms of conservators who have practiced in the Yorkshire and Humber regions over the past three years (many of whom live outside the region) revealed that 92% of respondents were members of ICON (Schmisseur 2015). If the trends seen within the conservators working within the Yorkshire and Humber regions within the past three years are any indication, it may be extrapolated that nearly all of those employed as archaeological conservators in the UK are members of ICON and have selected Archaeology as either their primary or as one of their secondary classification subgroups. The sample size of 87 conservators interviewed for this thesis, all of whom report being members of ICON, is therefore relatively large based on the overall size of the field, constituting approximately 36% of the total ICON numbers of primary and secondary group archaeological conservators. It is therefore implicit that the data gathered from the case study institutions included in this work is fairly comprehensive and indicative of trends in the profession as a whole. Although it was determined that non-anonymous publication of the interview transcripts was undesirable, a general overview of the interview subjects appears below.

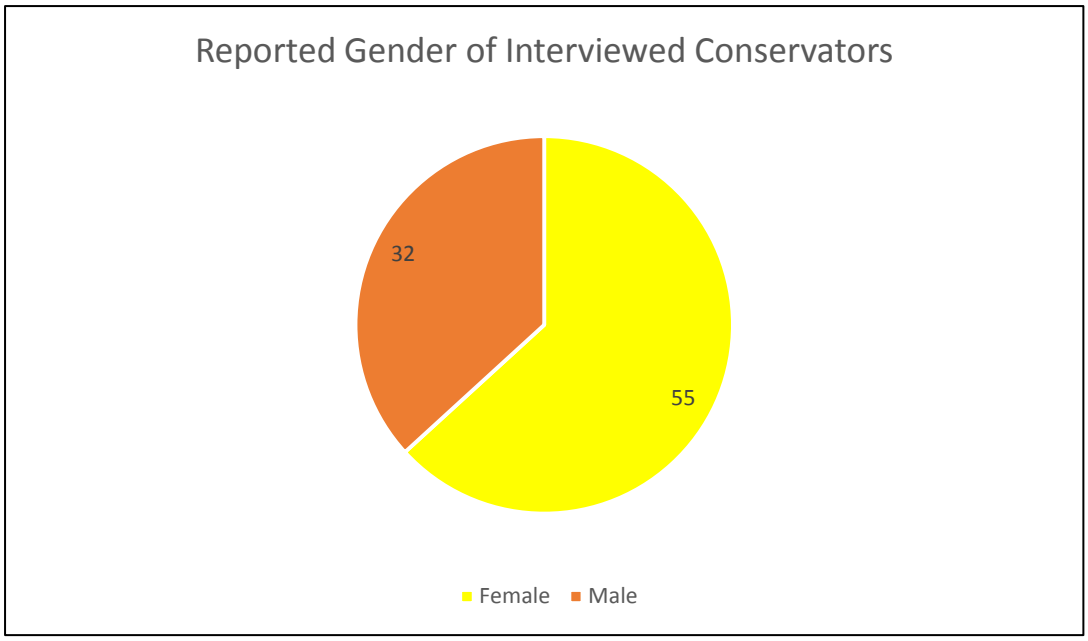


Figure 1: Gender of interviewed conservators (n=87)

37% of the conservators who consented to interviews for this thesis identified their gender as male (figure 1). Speculation could be made that this seems to be quite a high percentage, given that anecdotally, the profession seems to be disproportionately female and has been heavily populated by women since the days of Tessa Wheeler (the wife of Mortimer Wheeler and known to do a great deal of conservation work, which will be further detailed later in this thesis) and Ione Gedye (the first instructor of conservation at the Institute of Archaeology). It has been reported by interviewees that the three University training courses of Cardiff, UCL and Durham are all currently (2016) over 70% female, with an average between one and three male conservation students per intake year. Although future analysis of gender distribution in archaeological conservation could prove interesting, it was not undertaken as part of the study as it was not believed impact knowledge transference within the sector.

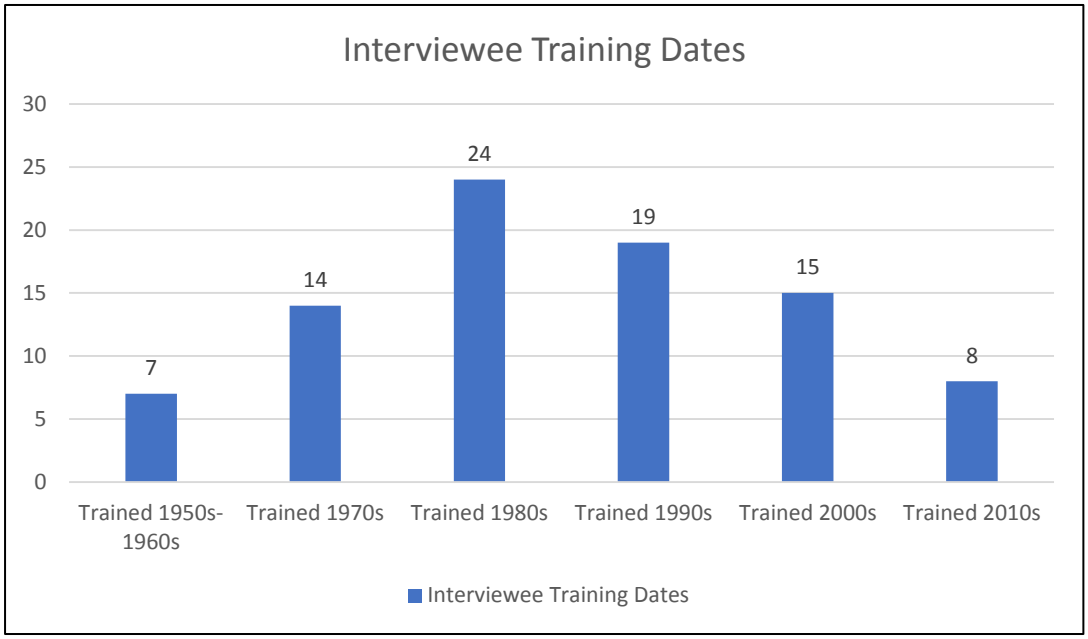


Figure 2: Date interviewee began initial conservation training (n=87)

Conservators who agreed to be interviewed for this work covered a broad range of training dates (figure 2). The training date ascribed to each interviewee was determined to be the date that initial conservation training began. It was decided to record dates in this way to avoid confusion about subsequent degrees such as PhDs as well as to better standardise the training responses. Conservators who trained in the 1950s and 1960s were awarded Diplomas or Certificates. Conservators trained in the 1970s and 1980s most often obtained BSc or BA degrees or Diplomas, and conservators trained between the 1990s and 2010s were most likely to hold a BSc, an MSc or an MA in conservation. This change in the degree awarded over time will be more fully addressed in Chapter 4 of this work.

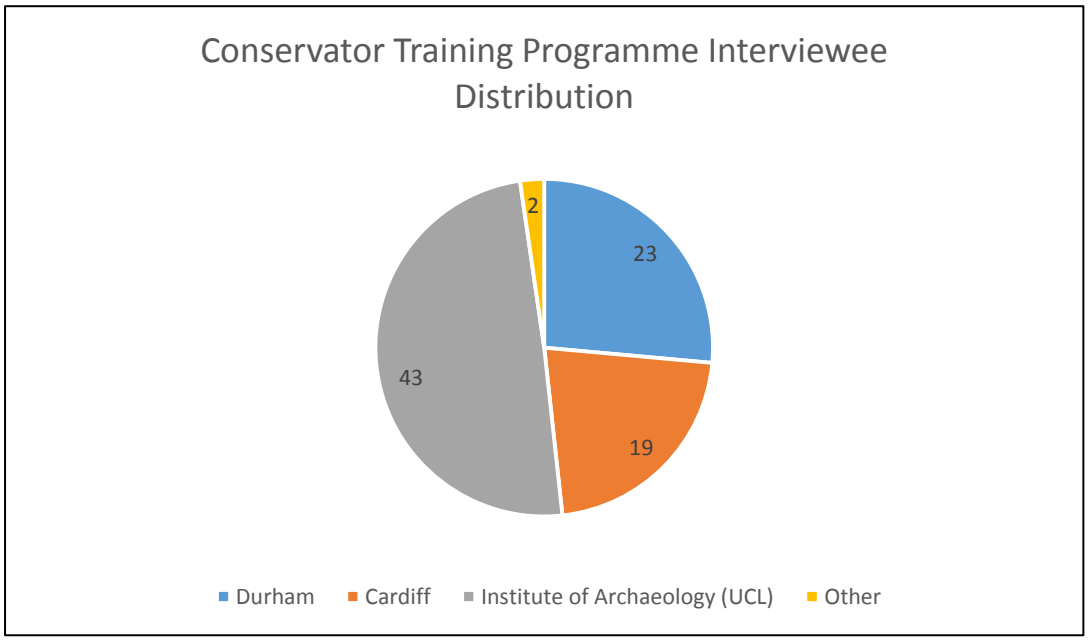


Figure 3: Interviewed Conservator Distribution by Training Programme (n=87)

Conservators interviewed for this thesis were almost exclusively trained at the Institute of Archaeology (UCL), the University of Durham, or the University of Cardiff (figure 3). There were two subjects who had received training elsewhere, but for the purpose of anonymity and the ease in therefore identifying the conservators interviewed by these outliers, these institutions are not listed. The higher proportion of conservators trained at UCL's Institute of Archaeology may be attributed to the earlier establishment of this course as opposed to the 1970s establishment of the courses at Cardiff and Durham Universities.

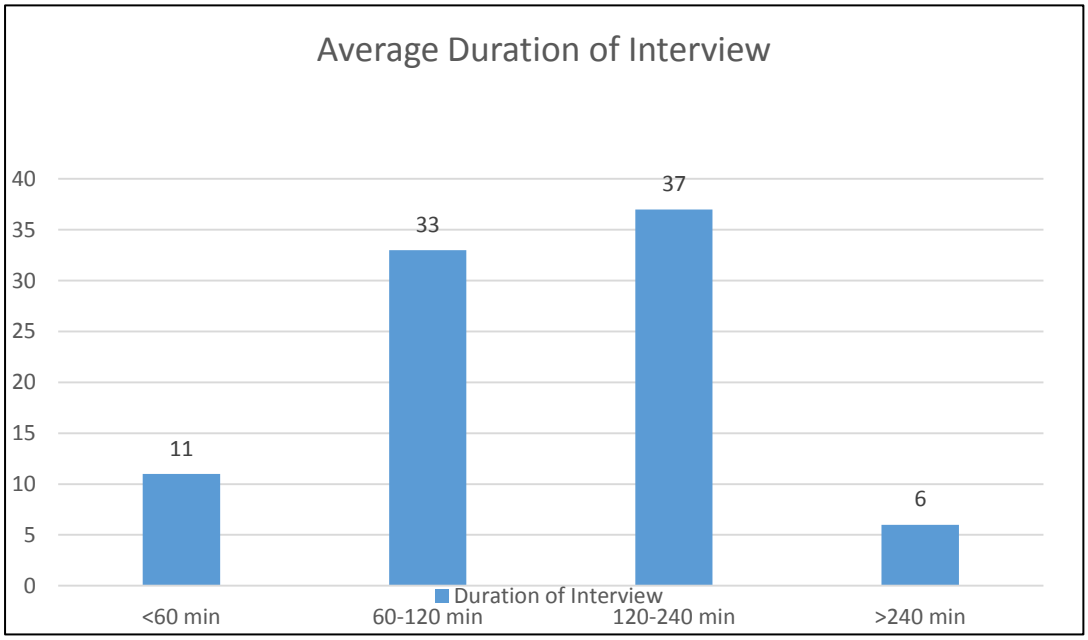


Figure 4: Conservator Interview Duration (n=87)

Conservators tended to appear to enjoy having the opportunity to speak about their career development and their experiences within the sector (figure 4). The average duration for interview was just over 2 hours. Most of the 11 interviews that were under 1 hour were conducted with conservators who were relatively new to the sector, with the exception of one retired conservator and one who had been trained in the 1980s. A few conservator interviews lasted for more than 4 hours, but in most cases, this was due to the interviewee being a key source for one of the five case study institutions or due to tangential discussions on other aspects of conservation with the interviewer.

The informal tone of the interviews was intentionally set to ensure that conservators felt comfortable speaking about their personal histories and it was quite successful, though success also might be in part due to the pre-existing relationship the interviewer had with many of the interviewees as a known professional colleague.

2.4.2 Ethical Considerations

The subjects for interview were all professionals, not part of a vulnerable group, and were given full information about the nature of the research. All interviewed subjects were over 21 years of age. Invitations to interview were issued via telephone, email, or personal contact. The interview informational sheets and disclosure forms given to subjects may be found in Appendix A of this thesis.

They were approached approximately 3 weeks to 1 year prior to being interviewed and had time to consider whether they wished to be involved and/or to decline involvement. Written consent for interview was obtained from all interviewees and permission to electronically record the interview was also obtained in some cases. Interviewees were free to withdraw from the study at any point and were offered anonymity for all or some of their resulting material. Although most of the interviewees waived their anonymity, after reviewing the transcripts it was decided that all individually identifying interview data would remain unpublished as it is sensitive in nature and frequently concerns living persons who were not interviewed as part of the research and could therefore not give consent. It is thought that the researcher's professional familiarity with many of the subjects may have influenced the level of personal revelations about other members of the profession which were shared by interview subjects.

Interviews will be kept securely for 10 years. Publication of the full transcripts may be revisited in the future after the conservators interviewed are no longer practicing, and full permission will be sought again at that time.

Data about the establishment of archaeological conservation at various institutions will be taken from the interviews, but this is not expected to be controversial or to pose any risk to the professional standing of those interviewed.

Chapter 3: A History of Archaeological Conservation in the UK

3.1 Identifying distinct eras

Understanding the development of the field of archaeological conservation may come down in large part to identifying shifts in the makeup of the profession itself. This chapter and the next provide an examination of the development that links together the chronological history of the conservation of archaeological objects within a museological context, variations in the training of archaeological conservators, and changes in the way archaeological treatments are passed between practitioners. Over the course of the institutional case studies and the interviews undertaken for this thesis, a number of distinct turning points emerged, leading to the identification of distinct 'eras' or 'epochs', periods of time in which the role of the archaeological conservator took on new and concrete dimensions.

The first era in archaeological conservation began with the establishment of museums, with evidence of the repair of objects and concern for their appearance appearing as early as the beginning of the 18th century at the Ashmolean and the later 18th century at the British Museum. One of the first conservators to write about the history of the field was Nigel Seeley, who highlights the distinction between restorers/craftsmen and conservators. Seeley argues that the absence of references to conservation in most of the early writings on antiquities and artworks indicates that early conservation was the province of craftsmen and was therefore not considered a field of study in itself (Seeley 1987).

This distinction between the early days of object work by craftsman (for the purposes of this thesis, termed 'restoration' and 'restorers') as opposed to the later, more scientific and investigative work done by conservators, is an important one which is supported by both the interviews and the institutional case studies undertaken for this work. The literature concerning the history of archaeological conservation surveyed in Chapter 2 revealed that the authors are unanimous in agreeing that the role of the conservator transitioned from

the role of restorer, a transition that was encouraged both by external political events such as the World Wars and driven by archaeological discovery.

Clavir (1998, 1) states that there is a clear distinction between conservation and restoration, which is demonstrated through two points which are found in conservation ethics but not in restoration: firstly, that a systematic scientific approach is the best way to preserve objects, and secondly, that the preservation of the physical integrity of an object should take precedence over aesthetics.

This definition, though simple, is a useful one- particularly as it identifies the watershed moment in which scientists began to examine the causes behind deterioration rather than focusing solely on the appearance of the objects themselves. Although there were a few sporadic examples of scientific study being utilised to interrogate the reasons behind the deterioration of objects, the focus in terms of archaeological objects during the time of the restorer or craftsman has an emphasis on the correction of the appearance of the object over all other values. This is a distinct difference in priority to the work of the modern professional archaeological conservator, identified by Keene as having a core ethic of, 'thou shalt not change the nature of the object', by which she means both that it is inappropriate to obfuscate the true nature of an object and furthermore, that changes may destroy crucial evidence (Keene 1996, 19).

Previous authors such as Caldararo have argued that the development of the role of the archaeological conservator can be closely linked to the need to address the influx of objects due to increased excavation on a worldwide scale in the 19th century, and the growing realisation that objects not only needed cataloguing but also preserving, analyzing, and interpreting (Caldararo 1987). Of the institutions with an unbroken history of archaeological conservation examined for this work, the Ashmolean and the British Museum were in existence before the advent of this 19th century excavation increase highlighted by Caldararo. The Guildhall Museum (which would later merge with the London Museum to become the Museum of London) was founded in the 19th century and the National Museum of Wales was founded at the turn of the 20th century. As will be shown, Caldararo's assertion that increased excavation was responsible for the formalisation of the role of the professional archaeological conservator is strongly supported by the evidence uncovered during the data gathering for the institutional case studies outline later in this chapter.

Prior to this recognition of the integrity of the object being of importance, most work was carried out in an effort to stabilise or to create a certain appearance for the piece, with scant regard for the physical nature or composition of the artefact and, for the most part, without scientific investigation into the reasons for decay or an understanding of what evidence could be preserved. However, even during this period there are examples of scientists working on archaeological remains, though they are notable for their rarity and the most prolific were working in Denmark and Germany rather than in the UK, though their work was known here (two of these scientists were Christian Jurgensen Thomsen and his assistant Herbst at the National Museum in Copenhagen in the early part of the 19th century, whose experiments into the preservation of waterlogged wood evolved into a treatment methodology which was used for over 100 years and influenced the practices of the National Museum of Wales and the British Museum (Mumford, 2013a)). Clavir and Gilberg suggest that this change is best seen in the publications that emerged from the laboratory of Dr. Friedrich Rathgen in Berlin, the most prolific (in terms of publication and international renown) early conservation scientist and to whom Caldararo ascribes the title of 'father of modern conservation' (Caldararo 1987).

Rathgen published his most famous work *Die Konservierung von Altertumsfunden* (The Conservation of Antiquities) in 1895. This book is composed of two halves, the first of which examines the causes of deterioration and the second part which addresses what should be done to combat deterioration (Rathgen, 2013 [1895]). Rathgen's work is the first known example of a scientific approach to object conservation and Rathgen himself is the first scientist to have been employed within a laboratory associated with a museum (the Chemical Laboratory of the Royal Museums of Berlin) (Gilberg 1987, 106). Rathgen was appointed Chemist in Charge in 1888 and held the position for nearly 40 years until his retirement in 1927 (Gilberg 1987, 117). Rathgen was therefore in place and actively publishing by the time of the 1919 appointment of the first conservation scientist at the British Museum, Dr. Alexander Scott.

Although Gilberg's work does not focus on the distinction between conservation and its predecessor, restoration, it states that prior to Rathgen's work, 'archaeological conservation was associated with the individual crafts…when help was needed for the preservation of

archaeological materials.' (Gilberg 1987, 106). Gilbert is writing of the general practice of early restorers to have come to museum work from the world of craftsmanship, which is something that appeared with regularity in the case study institutions.

This reliance on craftsmen to provide work on objects prior to the First World War is seen throughout the case study institutions in this thesis. When work was not undertaken by craftsmen, it was often undertaken by the archaeologists themselves, notable examples being Mortimer Wheeler, his wife Tessa Wheeler, Nash Williams, WF Grimes, and Flinders Petrie. The archaeological conservation work of the first four will be addressed within the case studies of the National Museum Wales and the Museum of London. Flinders Petrie's work, identified by Johnson as a prime example of early archaeological conservation and not covered elsewhere in this thesis, was also of high importance (Johnson 1993, 253). Petrie, an archaeologist specialising in the Middle East and Egypt, was an extremely prolific excavator in the latter part of the 19th century. He was known for his interest in techniques for the stabilisation of fragile materials and by 1888 had already referenced the preservation of objects in his work (Petrie 2013 [1888]). Additionally, two chapters of his 1904 book *Methods and Aims in Archaeology* are entitled 'Preservation of Objects' and 'Packing' and contain techniques which would not be unfamiliar to conservators working today (Petrie 1904). Johnson cites these chapters as the forerunners to more recent handbooks for field archaeologists such as those three written by Leigh, Watkinson and Neal, and Sease (Johnson 1993, 254).

Interestingly, Petrie also felt strongly about the quality and amount of restoration work common at the time, writing in his diary on October 3, 1881, 'One is irritated by the great quantity of restoration; so frequent are they that nearly every label has a long list of them, which one needs to read through before one can begin to consider the statue. Everything- chronology, subject, and style- is made subservient to effect and appearance. It is all very fine to stare at, but for study it is spoilt.' (Petrie 1931, 25-27). Petrie also condemned archaeologists who did not care for delicate objects in the field, stating, 'To undertake excavating and so take the responsibilities for preserving multitude of delicate and valuable things, unless one is prepared to deal with them efficiently, both mechanically and chemically, is like undertaking a surgical operation in ignorance of anatomy.' (Petrie 1904, 178). Petrie called for those excavating and undertaking work on archaeological objects to

have ‘some familiarity with chemistry and physics and properties of materials’ (Petrie 1888 [2013], 85).

Based on the existing literature as outlined above, this thesis will seek to explore how the profession of archaeological conservation developed through the further identification of these turning points, or ‘epochs’ which are defined both by the institutional framework in which conservators worked as well as their own biography, including education and training opportunities and the projects on which they were employed. Evidence for these stages in the emergence of the profession emerges strongly from the institutional data, case studies and semi-structured interviews reviewed in this thesis. Whilst acknowledging that these must always be a slight over simplification of the narrative, as suggested by Kristiansen and Rowlands (1998) and Bogucki (2008), and that such epochs often overlap, three distinct phases or epochs can be identified.

The first of these is the age of the **craftsman/restorer**, which spans the period pre-20th century to approximately the 1950s. Although craftsmen and restorers still exist in the present day within the broader field of conservation (an example of which would be those employed at folk and living history museums such as St. Fagans, part of the National Museum Wales group), the standard for employment within archaeological conservation has changed in tandem with the increased application of scientific principles and the vast majority of archaeological conservators within the UK are no longer hired from craftsmanship backgrounds. Since the 1970s, the current standard entry route into the profession increasingly has been a university degree or a postgraduate qualification in conservation. This is implicitly understood by those working within the profession, a point evidenced by the recent campaigns to increase ‘alternative’ entry routes into the profession, such as the internships and apprenticeships supported by ICON’s five year Heritage Lottery Fund supported scheme (ICON 2015).

Although itself not an age of archaeological conservation, linking this first epoch with the current era is the emergence of the **conservation scientist**, which began in earnest in the UK in 1919 with the establishment of the scientific laboratory at the British Museum. The conservation scientist, however, stands apart from the archaeological conservator. There is no specific training route which leads to the role of conservation scientist, and as a result those within the role may or may not have an archaeological conservation background.

Some conservation scientists may be concerned primarily with understanding the processes of deterioration and the development of treatment materials and may never perform interventive treatments. The development of the age of the conservation scientist also led to the adoption of much of the technology that has revolutionised the way modern conservators work today, moving the conservator from a workshop to a laboratory setting. These include the application of non-invasive imaging procedures as well as the understanding of the potential application of analytical techniques such as C14 dating, residue analysis, and others, which will be addressed more fully later in this chapter.

The roles of the conservation scientist and the craftsman/restorer co-existed until the establishment of Ione Gedye's training programme at the Institute of Archaeology (latterly absorbed into University College London) and the development of the International Institute for Conservation of Historic and Artistic Works UK group in 1957. At around this time the craftsman/restorer role was phased out of existence in the four museum case study institutions examined and was replaced by the **formally trained/professional archaeological conservator**, a role generally filled by individuals who had been through a formal university training programme. The rise of the professional conservator constitutes what, for the purposes of this work, will be known as the third age of archaeological conservation. Although it overlaps with the second age of the scientist it is distinctly separate in its influences and outcomes and persons filling the role of professional archaeological conservator tend to come from a different academic background to those that undertake the role of conservation scientist. However, the conservation scientist and the professional conservator roles both have continued onward until the present day.

In the following section, the history of each institutional case study will be examined chronologically and the path of archaeological conservation within the institution will be considered in relation to the above epochs.

3.2 Age of the Craftsman/Restorer: 18th Century-1950s

3.2.1 The Age of the Craftsman/Restorer at the Ashmolean

Background History of the Ashmolean Museum of Art and Archaeology

The Ashmolean Museum of Art and Archaeology is the oldest institution included in this thesis. It was founded in 1677 when Elias Ashmole gifted the University of Oxford with his collection of curiosities, consisting of archaeological, social history and natural history objects. Ashmole's collection was a continuation of part of an earlier collection made by the Tradescant family, whom Ashmole had befriended circa. 1650. The Tradescants were gardeners and botanists who had originally collected specimens of the natural world but eventually began to collect rarities, an occupation which was fashionable in the early 17th century (MacGregor 1983, 17). Due to connections with the nobility and the East India Company, father and son John Tradescant the Elder and Younger were able to acquire a significant number of objects over a period of some 40 years. This collection grew in size and renown until the house at Lambeth where the Tradescants lived and which held the curiosities was renamed 'The Ark'. The collection was open to anyone with an interest in visiting, and a catalogue of the collections was produced, which identifies many of the antiquities still in the possession of the Ashmolean Museum to this day (MacGregor 1983, 23).

Ashmole, by this point a close friend of the Tradescant family, was instrumental in helping to create the first catalogue of the collection and on December 16, 1659, recorded in his diary, 'Mr Tredescant and his wife sealed and delivered to me the deed of Guift of all his Rarities' (Josten 1966; MacGregor 1983, 39). This gift was not as straightforward as it appeared, as Tradescant had made multiple wills, at least one of which indicated that the collection should pass directly to Oxford or Cambridge University upon the death of his wife and himself and post-dated the gift of deed made to Ashmole in 1659 (MacGregor 1983, 41). Ashmole fought this after the death of John Tradescant the Younger and was awarded the collections by the court in 1664, but by the terms of the deed the collections remained with the widow of John the Younger, Hester Tradescant, until her death in 1678.

Ashmole was also a keen collector, specialising in medals, coins and manuscripts. Thus, the eventual amalgamation of his holdings with those of the Tradescants resulted in an

extremely well-rounded basis for a new museum. In October of 1677 he began the process of donating his collections to Oxford University, following the wishes of the Tradescants but taking sole credit for the donation (Macgregor 1983, 40-43).

Figure 5: John Tradescant the Elder, John Tradescant the Younger, Elias Ashmole (Hollar 1827)

One of the stipulations made by Ashmole in the transference of the collections to Oxford University was that a purpose-built museum be erected to house them. The museum was intended to serve as a teaching facility, and to that purpose Ashmole required that the museum be open to the public on a regular basis and for the rarities owned by the University to be included with his collection. At the time of Ashmole's donation, the University also championed the installation of a chemistry laboratory in the new building (Hunter and Hayes 1983, 25). Ashmole's detailed plans for the new museum building revealed a keen appreciation for the need of environmental management in the keeping of objects. During the design stage, he proposed 'the building of some large Roome, which may have Chimnies, to keep those things aired that will stand in need of it' (Norman 2001, 159). This appears to be the first instance of preventive conservation at the Ashmolean.

Construction was begun on the first museum building in the spring of 1679 on a plot of land on Broad Street near the Sheldonian Theatre and Exeter College and was finished by February 1683; Ashmole's collections arrived shortly thereafter by barge and cart (MacGregor 1983, 49). The museum formally opened on May 21, 1683 and was open to the public by June (figure 6).

Figure 6: Original Ashmolean building, now the Museum of the History of Science (Museum of the History of Science 2015)

Ashmole appointed Robert Plot, a Professor of Chemistry, as the first Keeper, but Plot was not compensated for his work. Later roles at the museum were equally unendowed, and the only source of museum-based income for the early Keepers and other employees came from admissions fees charged to the visitors (MacGregor 1983, 51). This may go some way toward explaining the infamously poor condition and organisation of the collections in the early days of the museum, which will be addressed later in the case study.

The Tradescant and Ashmole collections may have been best known for their natural history content in the early days but a significant number of archaeological items had also been collected. The resulting need for interpretation of the collection was reflected in Plot's appointment, as he was also known for his publications on the histories of Staffordshire and Oxfordshire, which focused primarily on the natural history of the areas but made some forays into archaeology (Ashmolean Museum 2015). .

Plot's successor, Edward Lhuyd, was also keenly interested in archaeology (Lhuyd went on to publish Archaeologica Britannica in 1707), but there is little evidence that the subsequent Keeper David Parry shared his predecessor's drive. Parry was known as a drunkard and little else is reported of his time as Keeper (Macgregor and Turner 1986, 648). John Whiteside succeeded Parry and was said to have done good work in reordering the museum and establishing it as a repository for local coin finds (Milne 1949, 62).

According to H.M Vernon in his history of the Oxford Museum (an early account of what is now the Oxford University Museum of Natural History), the early Keepership of the Ashmolean was not an endowed post until 1755, when these funds came with such restrictions as to 'confine the post to men of no distinction'. These restrictions stipulated that Keepers could not be Doctors in any Faculty, Fellows of the Society of Antiquaries or the Royal Society, of Irish, Scottish or Colonial extraction, or married or widowers (Vernon 1909, 18). Further issues with the Keeper post were identified in 1732, when the President of Trinity College, George Huddesford, was appointed Keeper and authorised a salary of £50 per annum 'whether he do anything there or not'. Although paid, Huddesford was seen as being extremely negligent with the collections, prompting the topographer Gough to remark in 1780, 'Nothing can equal the negligence with which the Ashmolean Museum was kept. The librarian being one of the Heads put in a scholar…who made a perquisite of shewing the curiosities, which lay in the utmost confusion. Lhwyd's fossils were tumbled out of their papers and nobody regarded or understood them till his catalogue of them was republished by Mr. Huddesford the late librarian, son of Dr. Huddesford.' This reputation for lack of care of objects within the Ashmolean resulted in Sir Hans Sloane withholding his previously promised financial support and instead ultimately donating his collections to form what became the British Museum (MacGregor 1983, 52).

This second Huddesford was known to have imposed some semblance of order on the collections, seemingly uniquely amongst his contemporaries (MacGregor 1983, 65). The majority of the Keepers in the 18th century allowed the collection to slide into decay and decline and it was not until the 19th century and the reordering of the museum collections that the Ashmolean again became an effective institution (MacGregor and Turner 1986, 658).

This new era of professionalism may be traced to the appointment of John Shute Duncan as Keeper in 1823. Duncan, showing an early awareness of what one day would be called preventive conservation, built new chimneys and replaced the open coal fires with closed stoves. He also purchased new showcases for the collections (Norman 2001, 161). Unfortunately, the environmental issues within the Ashmolean continued to pose an issue to the collections. In 1884 the Keeper Arthur Evans argued for the replacement of the fires and stoves with central heating and for the extension of the building to house the collections. Evans was successful in his campaign for more space and a new building was constructed in Beaumont Street and the collections were moved in 1894 (figure 7)(Ashmolean 2014).

Figure 7: New Ashmolean Museum on Beaumont Street

The move to new premises did not entirely solve the environmental issues, however, and it was not until 1909 that a sophisticated new heating and ventilation system was installed. New lighting and blinds were also put in place at the same time (Norman 2001, 162).

An interest in environmental control was present from the founding of the museum and was considered important by Elias Ashmole himself. However, interventive conservation techniques were not in practice until slightly later, though awareness of object conservation issues was apparent from the days of the first Keeper. Plot was known to have an interest in corrosion products and provided advice to King Charles II regarding treatment of dockyard rust in Chatham, but no evidence exists that he conducted work on the objects within the museum collections (Ovenell 1986, 55; Norman 2001, 164).

The Age of the Craftsman/Restorer at the Ashmolean

The first reference to what might be considered interventive conservation comes in 1721 when John Whiteside paid 17s 6d for the polishing of exhibits, which may have included archaeological collections although there is no record of what exactly was done (Norman 2001, 164).

In 1823, an oblique reference is made to the conservation of archaeological objects when Shute Duncan is recorded as having paid out three shillings for the cleaning of Alfred's Gem (now more commonly known as the Alfred Jewel, figure 8) and a new hinge for the piece.

Figure 8: Alfred Jewel (Ashmolean Museum 2015c)

In the same year, there is reference to the mending of newly acquired Anglo Saxon pottery (Norman 2001, 164). The first major addition to the conservation landscape came in the form of Under-Keeper G.A. Rowell, who started off at the museum by doing small bits of work on the collection. He was the son of a watchmaker and had received little formal education (Parker 1881). He first came to the museum in the role of cabinet maker, describing in his own words,

'…I was apprenticed to a cabinet-maker at an early age, became a journeyman at a little over seventeen, and after about two years in two different shops, with an intervening year of compulsory idleness from a wound in my leg caused by the bite of a dog, to avoid the drinking habits then so prevalent in large shops I began work on my own account, before I was 21 years of age – but I did not commence business as a cabinet-maker and upholsterer till about four years later.

Figure 9: Arthur Evans, Keeper of the Ashmolean Museum (Ashmolean Museum 2016a)

One of my first employments was by Mr. John Shute Duncan in the Museum in 1825, and with him I soon became (I believe) a special favourite, and this, probably, from a fellow feeling…My first employment was in accordance with my trade, but I soon outran that; as, finding I was willing to do anything, I was soon expected to do everything, including the preparation of sculls, [sic] &c, from the collections, down to mending broken pottery of Anglo-Saxon or earlier times; and this went on until I became as fond and as proud of the Museum as if it had been my own, so that while, afterwards, carrying on business as a Cabinet-maker, I kept to the Museum work generally as an amusement for myself. And these matters went on till the resignation of the keepership in 1854, by Mr. Philip Burz [sic] Duncan, who had succeeded his brother, and from him I received a very pleasing proof of his satisfaction with my doings in the Museum, although I really held no office under him.' (Parker 1881, 188).

Rowell later records that one of his restoration projects came about in 1862 when he was contracted to clean the Arundel Marbles at a cost of £9 6s 1d. More work came his way when the Hyde Clarke collection was acquired, containing cement concretions that required

removal. Rowell reported in 1881 that, '…as (Keeper) Professor Phillips hesitated who should be employed to clear it off I undertook to do it. It was nothing fresh for me and needed some patience, and for several months I was chip, chip, chipping away in the front area of the Museum from early until late, except in the hours when the Museum was open' (Parker 1881, 188). This positive turn in the tide of conservation development was further helped by the appointment of Arthur Evans in 1884 (figure 9). Evans addressed the sometimes poor condition of archaeological objects in his care by ensuring that work was done on the collections (Evans 1884; Pitt Rivers Museum 2016).

The man who could be considered the first full time conservation professional (though it would be some years before that title came into use) at the Ashmolean was appointed in 1900 during the Keepership of Arthur Evans. His name was W.H. Young, and he had been trained by W.H. Ready in the British Museum (Ready also appears in the conservation records of the National Museum Wales and of the Museum of London).

Young's skills were much appreciated, the Annual Report for 1900 stating,

> 'Great advantages have been derived during the past year owning to the Museum having secured the skilful services of Mr. W.H. Young, in the cleaning and mending of various objects such as vases and bronzes, and in forming plaster casts of the seals and gems. Much delicate work that it was formerly necessary to place outside can now be executed within the walls of the Ashmolean' (Evans 1900).

Young was known to work on all areas of the collection but in 1903 he spent a particular amount of time working on items from the Egyptian Section as eight cases of material arrived from excavations. The receipt of this material seems to have hastened the establishment of the first official conservation laboratory in the basement of the museum, which came into use in 1905 (Ashmolean Museum 2016c). Evans wrote, 'The specimens (from Egypt) are mainly in a fragmentary condition but with the skilled assistance of Mr. Young and with the facilities now offered by the new workroom, it is hoped that a considerable number of interesting objects may be reconstituted and restored' (Evans 1904, 1). The new laboratory included equipment for the conservation work being undertaken, such as a large drying oven, various appliances, a Bunsen burner and a muffle furnace for

desalination of objects with salt efflorescence. Young took on a number of apprentices, the first in 1905. By 1911, this (unnamed) apprentice was given an established post. In 1913 Young began training J.H. Axtell, who later moved to the British Museum as restorer in the Greek and Roman Department. It is evident that skills transference was shifting not only between institutions in the UK but in Europe, as the early library of the Ashmolean contains the previously mentioned 1895 publication by Friedrich Rathgen '*Die Konservierung von Altertumsfunden'* and the 1904 English translation of the same. What could be considered conservation was not, however, limited to Young and the other persons performing the newly established role at the Ashmolean. Due to his 1909 correspondence with what would become the National Museum Wales, it is known that Professor Haverfield (made Camden Professor of Ancient History in 1907) was performing ceramics restoration work via the Ashmolean Museum (Haverfield 1909). The case studies of the other museums within this chapter reveal similar trends for archaeologists to perform some of their own conservation work on freshly excavated materials.

By 1928 Young was still in post as conservator and his son W.R. Young had also joined him after completing a traineeship. Soon after, Young junior left Oxford to take up a post at the Museum of Fine Art in Boston, where he set up the laboratories and established a well-known conservation centre. W.H. Young remained at the Ashmolean until 1937, when he retired and was replaced by V.R. Rickard, who had trained under him some years previously (Norman 2001, 165).

In 1939 new laboratories were constructed for the Department of Antiquities (which ran its own conservation programme) as an extension of the basement conservation laboratories. They included provision for electrotyping and reduction of metalwork (Norman 2001, 165). Rickard stayed on in post at the museum until 1956. He would later work at the Ancient Monuments Laboratory with Leo Biek. Upon his departure from the Ashmolean, new posts were created in the Departments of Eastern and Western Art and the Cast Gallery (Norman 2013). This creation of new posts could be considered to be the beginning of the era of the professional conservator at the Ashmolean.

3.2.2 The Age of the Craftsman/Restorer at the British Museum

Background History of the British Museum

The second institution for study is the British Museum. Founded nearly 80 years after the Ashmolean and home to the first purpose-built, dedicated scientific conservation department, it is considered by many to be the birthplace of modern archaeological conservation in the UK (Caygill 1992).

In 1753 a parliamentary lottery was held in order to secure a very famous collection of curiosities and works of art for the British people. Although the public lottery was beset by scandal, the end result was a profit of £95,194, 8s., 2d., which was used to purchase the founding collections of what was to become the British Museum and a building in which to keep them (Miller 1973, 48).

The original collection which became the nucleus of the new museum had belonged to Sir Hans Sloane (figure 10). A physician by training, he was also a keen collector of natural specimens, antiquities, coins, drawings, books and manuscripts (Caygill 1992, 6).

Figure 10: Sir Hans Sloane (British Museum 2014b)

When Sloane died in early 1753, it was therefore not surprising that the terms of his will specified that his collection of 79,575 objects be offered first to King George II for benefit of the nation. After a period of two months, it was to be offered in turn to the Royal Academies of Science in Paris, St. Petersburg, Madrid and Berlin. The collection was offered at the price of 20,000 pounds, despite an estimated value of over 100,000. Despite this public appreciation of the contents of Sloane's collection, at the time of the bequest the King stated that he doubted the Exchequer would contain enough to afford the purchase. At this point, Parliament stepped in with the idea of funding the acquisition of the collection by a public lottery. The collection was 'to be kept for the use and benefit of the publick, who may have free access to view and peruse the same' (Caygill 1992, 6; Miller 1973, 44-45). Parliament accordingly passed the British Museum Act of 1753, which governed the acquisition of and set up the regulatory processes for the new collection. This included the creation of a new governing body of Trustees. In keeping with the belief that the collection was to be owned by the nation, the newly formed board of Trustees included three Principal Trustees, all of them incredibly influential public figures: the Archbishop of Canterbury, the Lord Chancellor and the Speaker of the House of Commons. An additional twenty appointed official Trustees included other powerful and famous individuals, and a further fifteen Trustees were elected by the previously appointed members of the board (Caygill 1992, 7).

The first meeting of Trustees occurred in Whitehall in December of 1753, the main objective being to examine the contents and conditions of the newly acquired collection (Miller 1973, 48). Their next task was to locate premises for the establishment of a new repository for the collections. The original Sloane bequest had been combined with the Cottonian Library (which included the Lindisfarne Gospels, Beowulf and two copies of the Magna Carta), owned by the nation since 1700, and the Harley manuscript collection, which had been purchased with £10,000 of the remaining money raised by the public lottery. Montague House in Bloomsbury was selected as the most suitable and affordable location for the new collection (figure 11).

Between 1755 and 1759 the Trustees appointed staff, who worked to organise the collections and move them into the new premises. The collections were divided into three categories: Printed Books, Manuscripts, and Natural and Artificial Productions. These were

overseen by a Principal Librarian, Dr. Gowin Knight, who was assisted by three Under-Librarians, one of whom was the original curator of Sloane's collection, James Empson (Caygill 1992, 9-11).

Figure 11: Montague House, original home of the British Museum, with 1804 addition shown in inset below. (British Museum 2015a)

The new British Museum officially opened to the public on 15 January 1759. In order to enter the museum as a visitor, it was necessary to apply for a ticket from the Porter, granted by personal approval of the Principal Librarian. Ticket holders were escorted around the collections in groups of five between the hours of 9 am and 3 pm. Between 1759 and 1761 Museum tours were tightly regimented, with Trustees restricting visitors to one hour per department. After 1761 groups were allowed to vote on how their time would be spent between departments but were required to stay within the allotted entrance time of a total of three hours.

Early visitors often complained about the brevity of the tours as well as the lack of information available concerning the objects, but the Museum proved extremely popular regardless of these defects. Due to the popularity of the collections, ticket touts were able

to sell timed admission cards to the public and the Trustees considered attempting to charge for admission, but quickly scrapped the idea due to the majority of the ticket applicants consisting of '…Mechanics and persons of the lower Classes, few of whom would probably have been at any expense to satisfy mere curiosity.' (Caygill 1992, 13).

Coincidentally, one of the first descriptions of the condition of the collections is found in tandem with an early visitor's distaste for the Museum admission system. In Simonds's Journal of a Tour and Residence in Great Britain, Simonds mentions the state of decay of the natural history collections and also references the collection of 'antiquities from Herculaneum and Pompeia and monstrous Egypt' whilst complaining simultaneously of the lack of time to examine any of the objects on display (Simond 1815, 84). This indication of the poor state of the collections echoes the accounts of the Ashmolean at the same period, described earlier in this chapter.

During the 18th century the collection continued to grow, especially the quantity of archaeological objects (Miller 1973, 96). In February 1756 the first Egyptian mummy arrived as part of the Lethieullier bequest. Other antiquities were acquired via the Hollis collection of Classical artefacts in 1757 and the Hamilton collection of Greek vases in 1772, purchased by an Act of Parliament. In 1802 the Rosetta Stone was acquired (Caygill 1992, 16). This period of intense collecting coincided with the further dilapidation of the Museum building. By 1776 dry rot had been reported and in 1780 sizable decorative elements were falling from the Colonnade. As a large number of antiquities from Alexandria had been incorporated into the collection in 1802, the Trustees began to consider the merits of constructing a new building to house the extended collection and to partially replace the now failing Montague House. In 1804, Parliament funded the erection of a new building on the site, which was opened to the public on 3 July 1808, shortly after the establishment of the Department of Antiquities and the appointment of Taylor Combe, a numismatist (Caygill 1992, 17-18).

The founding of the Department of Antiquities heralded a new era of collecting for the Museum. A great number of famous classical objects were incorporated into the collections during the early decades of the 19th century, including the Elgin Marbles, the Temple of Apollo from Bassae and a number of Egyptian colossal sculptures. In 1826 Combe was succeeded by another numismatist, Edward Hawkins, who remained in post until 1860

(Caygill 1996, 22, 68). The larger collections and the public interest generated by the acquisitions resulted in an increase of visitors to the museum, resulting in pressure on Parliament (which was still providing funding to the institution) to regulate the workings more efficiently. One of these effects was the creation of additional departments in 1837 (Miller 1973, 146-150).

The Age of the Craftsman/Restorer at the British Museum

Little mention is made of what we now term conservation or restoration in the published accounts of early museum history, though occasional references may be found in Trustee reports and in curator correspondence (British Museum 2015b). Sadly, unlike the Ashmolean, there is no record of the 1804 building design taking into account the preventive conservation theories of the day, though a general awareness of the need to control the environment to better preserve collections was in evidence by 1831, when a debate occurred between the Trustees and Smirke, the architect responsible for rebuilding sections of the museum at the time, regarding the need to heat various sections of the building and the deleterious effect this might have on the sculpture collection. Smirke assured the Trustees that thermometers would be placed in every new gallery (Miller 1973, 195). The rebuild occurred between 1823 and 1852 (British Museum 2016).

Figure 12: British Museum present day main entrance, 2016

Around this time, the increased visits from the public combined with a decrease in security (by 1810 visitors were allowed to wander unescorted, the timed entry tickets system having been replaced by a visitor signing-in book in 1805) combined to produce one of the most infamous conservation stories from the early days of the Museum (Caygill 1992, 30). In February of 1845 a young man from Ireland, allegedly suffering from the after-effects of a night of drinking, destroyed the Portland vase using a conveniently located inscribed stone artefact. The perpetrator was sentenced to two months of hard time in Clerkenwell and the Portland vase was given to a Mr. John Doubleday, an employee of the museum, for restoration (figure 13).

Figure 13: John Doubleday, first named restorer at the British Museum (Corbould 1856)

Doubleday was apparently very efficient in his work and the restored vase was back on display by March 1846. The opinion at the time, as evidenced in the Madden Journal on 24 March 1846, 'He has certainly restored it very wonderfully and really deserves the 25 pounds the Trustees presented to him.' (Miller 1973, 208). The Portand vase itself has served as an ambassador for objects conservation in the past (figure 14). It has been twice conserved since Doubleday's work, once in 1948 and the most recent time in 1989 by Nigel Williams and Sandra Day. This was filmed and televised by the British Museum, bringing a greater awareness of conservation to the general public (British Museum 2016a).

Figure 14: Portland Vase after most recent reconstruction by Williams (British Museum 2016)

The Portland Vase also serves as an excellent case study in itself in terms of the ways in which conservation recording has changed over the years, as it was deemed significant enough to write about on three occasions. Investigation carried out during the final re-conservation by Williams revealed much about the earlier conservation attempts, including that the edges of some sherds had been sanded down in order to facilitate an earlier restoration (Brooks 2004, 175). This historic treatment method of removing original fabric to ensure a 'proper' aesthetic appearance for display highlights the absolute change in value system between the ages of the craftsman/restorer and the professional archaeological conservator.

Upon the retirement of Edward Hawkins as Keeper of Antiquities in 1860, the department was revised and separated into three new departments: Oriental Antiquities, Coins and Medals, and Greek and Roman Antiquities. These departments avidly acquired new artefacts for curation via purchase from existing antiquarian collections and, increasingly, excavation. Excavations at Ephesus, Sardis, Rhodes, Halicarnassus, Cyrenaica, and Nineveh were amongst the most publicised, and public attention from the press resulted in an increased demand from visitors to view the artefacts (Caygill 1992, 39).

The later part of the 19th century also saw an increased focus on archaeological and anthropological collections due to the departure of other collection types to dedicated museums of their own. In 1879 many of the portraits were transferred to the National Portrait Gallery. In 1880 the Natural History collections were moved to the newly developed site at South Kensington. This allowed room for the archaeological collections to be expanded and the amount of material on display increased accordingly to fill the recently vacated gallery space (Caygill 1992, 40-41).

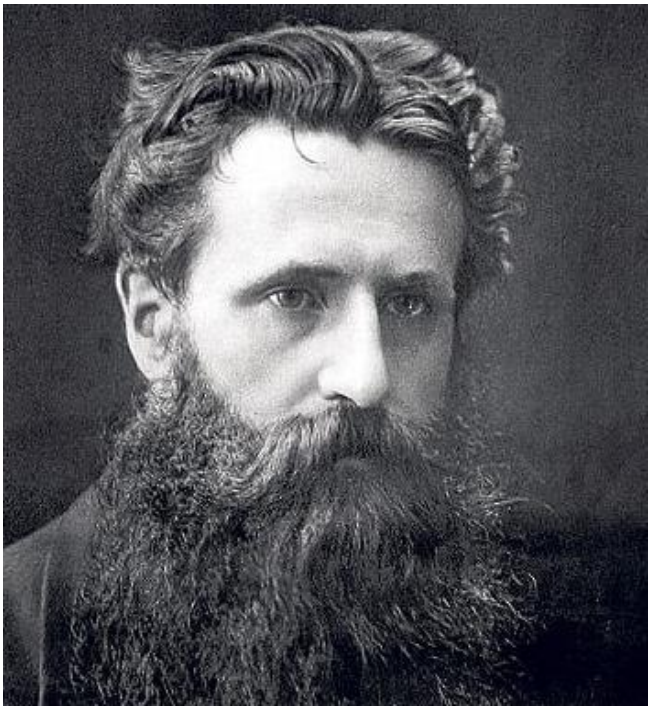


Figure 15: George Smith of the British Museum (Cregan-Reid 2013)

Although it is known that Doubleday served as a restorer within the British Museum, the archives do not record any specific information as to the dates of his employment or retirement. Most mention of restoration work comes only through tangential references via happenings in other museum arenas. For example, another early work of a British Museum restorer is found as part of the career history of George Smith, a former banknote engraver who, through the development of an obsession with the study of the Bible and the history of the Old Testament, eventually became an Assistant in the Department of Oriental Antiquities (figure 15).

Smith originally came to the notice of the museum curators as he was continuously present in the exhibition halls, conducting a study of the materials related to Nineveh and Babylon. Smith was hired as a 'repairer', with the intention that he was to restore the fragments of Babylonian clay tablets to their original form (Miller 1973, 308). He was quite successful at the job, so much so that he was promoted to Assistant in the Department of Oriental Antiquities in 1870. After this promotion, Smith became even more eccentric, the happy benefit of one of his outbursts being the highlight of the existence of another restorer at the museum, a Mr. Robert Ready.

Upon being handed the 'Deluge' tablet (more modernly known as the Flood Tablet, see figure 16), which had been under the care of Mr. Ready in order to clean and preserve it, Smith read a few lines of the text, shouted, 'I am the first man to read that after more than two thousand years of oblivion', then jumped up and raced around the room in excitement, astonishing everyone present by starting to undress himself. Conservators will be pleased to know that Smith did take the time to carefully place the freshly conserved tablet upon a table before giving in to his flight of abandon (Miller 1973, 309). The Deluge Tablet, which is the 11th tablet in the Epic of Gilgamesh, was one of the most celebrated finds of the Victoria era (British Museum 2016a).

Figure 16: The Flood Tablet (British Museum 2016)

The restorer Ready also undertook work for other museums, including the previously mentioned work for the Ashmolean Museum and also work for the National Museum Wales, for which he conserved the Caergwerle Bowl. Information about the career of Ready is, like most of the other early craftsmen/restorers, to be found only in passing reference in personal correspondence or where the objects to be restored were of sufficient renown to merit a mention. A small amount of information is also sometimes available from other sources, however. In the case of Ready, information is provided by Shorer, a later employee of the British Museum who gave a conference paper on his fifty years of employment there in 1995 (Shorer 1997).

Shorer gives a brief history of conservation at the British Museum, including references to Ready, whom he states came to the Museum in the 1850s as a restorer of ceramics and to produce electrotypes of coins and medals. He furthermore goes on to state that Ready's son followed him in the role and stayed from the 1890s to the early 1930s, certainly within the memory of Shorer's early coworkers at the BM. Shorer furthermore mentions that after the First World War a Mr. Axtel came to the British Museum from the Ashmolean Museum and proceeded to join the metals restoration work there (Shorer 1997, 6). This rather frustratingly ephemeral mention of employees within the departments is typical of the history of early restoration/conservation at the case study museums.

Excavation and collection of archaeological artefacts continued at a rapid pace between the 1880s and the outbreak of the First World War. During the years 1914 through 1917, active acquisition stopped and fear of bombing resulted in the removal and deposition of a great number of objects in the newly excavated London Underground Rail lines below Holborn or were placed into storage in the museum basement (Caygill 1992, 48). This storage method would be repeated during the Second World War. The posts of craftsman/restorer were attached to individual departments within the museum and the only indication of the amount of work being done by these individuals is found within individual departmental reports and the occasional mention of 'restoration' conducted by persons within the British Museum for other institutions.

A small amount of additional information regarding the training background of those filling the role of craftsman/restorer during this time period also is provided by the aforementioned conference paper by Shorer. Shorer came to the BM in 1939 at the age of

15 as a boy-learner. He had been studying silversmithing and jewellery making at the Central School of Arts and Crafts, Holborn, when he was identified as a potential trainee to 'learn to work with antiquities' in the British Medieval and Antiquities Department. Shorer stated that at the time there was a precedent for taking on 'boy learners', and that they were taught equally by their respective departments and by Dr. H.J. Plenderleith (a conservation scientist, whose work at the British Museum will be discussed later in this chapter) and his staff in the research laboratory (Shorer 1997, 6). Shorer is also particularly helpful in identifying that the activities of what would now be considered a conservator were, in the early days (pre 1967, when the Conservation Grade post was created at the British Museum), carried out by persons with the title of museum attendants or museum technicians. He further states that the training background tended to be 'informal and of a specialised nature' until the development of the diploma courses (Shorer 1997, 6).

Figure 17: Dr. H.J. Plenderleith, right, with Batten, an early conservator at the British Museum (Oddy 1997, 3)

3.2.3 The Age of Craftsman/Restorer at the National Museum Wales

Background History of the National Museum Wales

The third institution for study is the National Museum Wales, where archaeology has been a high profile department since the establishment of the institution in 1909. The museum itself was founded by royal charter and the nucleus of the original collection was drawn from the Cardiff Municipal Museum, which was founded in 1868 (Walker 2007, 74). National Museum Reports of the new organisation were published annually beginning in 1909. By 1910, plans were made to build a large and central collection repository and exhibition building on the current site in Cathays Park, between Cardiff University's central building and City Hall (Adshead 1910, 149)(figure 18). Although work began on the museum in 1911, it was not fully completed until after the First World War (National Museum Wales 2013).

Figure 18: National Museum Wales, Cardiff (Visit Wales 2016)

The most complete and comprehensive records for the early history of the museum are the National Museum Annual Reports (NMARs), a series of internally published departmental notes and meeting minutes which were produced yearly from 1914 until the present day, with a minor hiatus between 1977 and 1988 when it was decided not to publish them (Mumford 2013b). The institutional library of the National Museum Wales provided full chronological copies of the National Museum Annual Records for the purpose of this research.

The first archaeologist on staff at the museum was John Ward in 1914. Ward was originally a curator at the Cardiff Municipal Museum and moved with the collection to the newly formed National Museum (National Museum Wales 2013). Between 1914 and 1920, Ward was the official Keeper of Archaeology, a post which existed until 2013 when the department was merged with Social History.

The Age of the Craftsman/Restorer at the National Museum Wales

No mention is made of conservation or restoration issues or practices within the Keeper Reports concerning the archaeological collections in the earliest NMAR documents, but personal papers held within the museum's Archaeology and Numismatic Department archives indicate that curatorial staff performed a limited amount of their own conservation work and also that external specialists were sought and used for conservation and restoration tasks. The first recorded mention of external expertise sought for object conservation or restoration appears in personal correspondence between a Mr. Rodger of the Cardiff Naturalist Society, holdings of which became part of the National Museum Wales, and Francis J. Haverfield, Professor of Roman history at Brasenose College, Oxford. In a fascinating series of letters commencing on September 15, 1909, Haverfield offers to re-assemble a Roman bowl, should Mr. Rodgers like to send it to him at the Ashmolean. Further letters give a brief glimpse into the work as Haverfield requests to be given any additional sherds of the bowl that may have been located in the interim (Haverfield 1909).

Figure 19: Caergwrle Bowl in current reconstructed condition (National Museum Wales 2015)

In 1912, the Caergwrle Bowl (figure 19) was sent to the British Museum for restoration work which was conducted by the aforementioned Mr. Ready (Davis 2013). Records and subsequent analysis show that the restoration was mainly done using wax and a variety of adhesives to reattach small gold decorative pieces. This conservation treatment eventually failed, and the bowl was reconserved in house for display in a new gallery in 2005. The early conservation history of the piece was researched and documented prior to commencement of treatment (Davis 2013).

Undoubtedly these are only two examples of objects being outsourced for what we would now term conservation work, but unfortunately receipts and bills of lading were not generally saved within the department, thus leaving the record of outsourced object conservation traceable only through offhand mention in personal correspondence or on treatment record cards. Although this is frustrating, the only formal and regular sources of departmental activities are snippets mentioned within the departmental notes section of the NMARs.

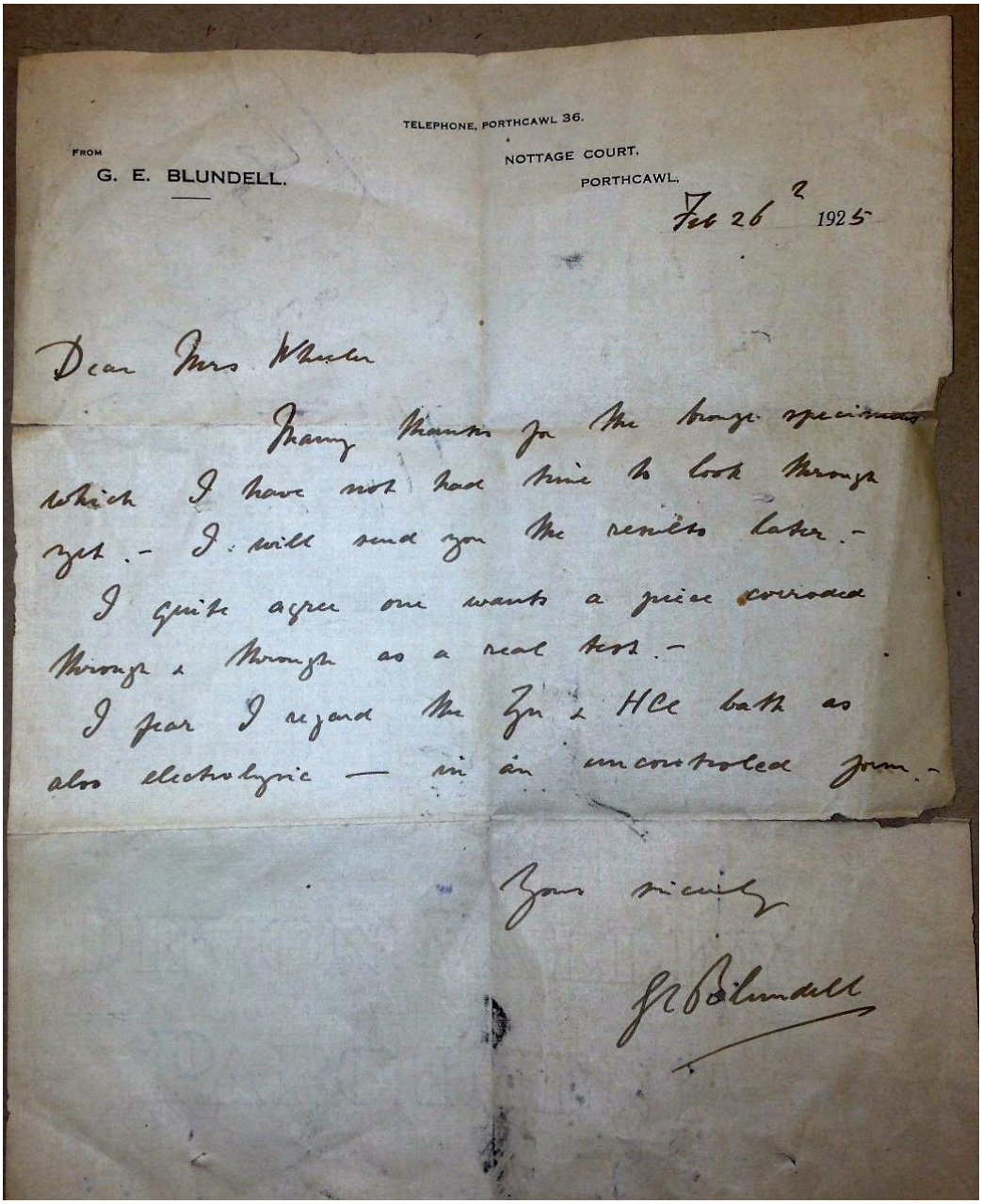
Further personal correspondence records reveal that there was an interest in following international conservation developments. A handmade copy of something entitled '1915 Oseberg Fundet Report' exists in the Archaeology and Numismatics Department archives, recording the treatment of iron and wooden artefacts in Denmark undertaken some ten years earlier (Oseberg Fundet Report 1915). The survival of these notes on new potential waterlogged wood treatments establishes that not only were members of the Archaeology Department aware of developments in archaeological artefact conservation but that they were actively collecting treatment information, perhaps with the intention to inform their own practices. Although no mention of the research trip is made in the NMARs of the decade, a later conservation department report from the 1990 NMAR records that a restoration study trip was made to Denmark in the 1920s to observe practices in the conservation of waterlogged wood. 'Skilled restoration has always been important to the museum. Until the 1960s each department employed a craftsman, part of whose job it was to undertake any work necessary to enable an object to be used, and curatorial staff maintained an interest in the developing discipline of conservation. In the 1920s a visit was paid to Scandinavia to see how the famous Viking longboats were being preserved and in the 1930s, following a visit to the British Museum, a request was made for 80 pounds to set

up a conservation laboratory- the cost was considered too high!' (National Museum Wales 1990).

By focusing on the evidence preserved in the NMARs (which are not paginated) it is possible to follow the development of archaeology and also the role of conservator within the newly formed museum. In 1920, Ward was replaced by R.E. Mortimer Wheeler as Keeper of Archaeology. Ward became a consulting archaeologist with the department (National Museum Wales 1920). One of the limitations to be considered in the usage of the NMARs as a record source is the apparent inconsistency in listing staff titles and the incomplete nature of the departmental staff lists in general. For example, in the early days of the NMAR reports only some members of the department were listed with job titles, among them Keeper, Assistant Keeper, Archaeology Attendant and Archaeology Typist. 1920 staff listings show Fred Gay in the post of Archaeological Attendant. Although it is not entirely clear what this job may have entailed, it was possible to discuss this information in a meeting of current departmental staff (some of whom have been employed since the 1970s and had worked with Harry Gear, Gay's successor) and the general consensus was that the Archaeological Attendant was the person responsible for curatorial duties such as the storage, movement and labelling of objects and eventually displays.

Figure 20: Tessa Wheeler (Unknown 1930s)

Uncredited in the NMAR department notes is another important early figure in conservation, Mortimer Wheeler's wife, Tessa Wheeler (figure 20). Although she does not appear in formal documentation and there is no reference to her receiving a salary, the archives of the Archaeology and Numismatics Department show that she was actively involved in conservation at the National Museum Wales. Personal correspondence exists between Mrs. Wheeler and G.E. Blundell (experimental chemist and geologist) in 1925 concerning the dangers of uncontrolled electrolytic baths for metals cleaning, as well as a sample artefact (see Figures 21, 22, and 23).



TELEPHONE, PORTHCAWL 36.

FROM
G. E. BLUNDELL.

NOTTAGE COURT,
PORTHCAWL,

Feb 26 1925

Dear Mrs Wheeler

Many thanks for the bronze specimens which I have not had time to look through yet. - I will send you the results later. -

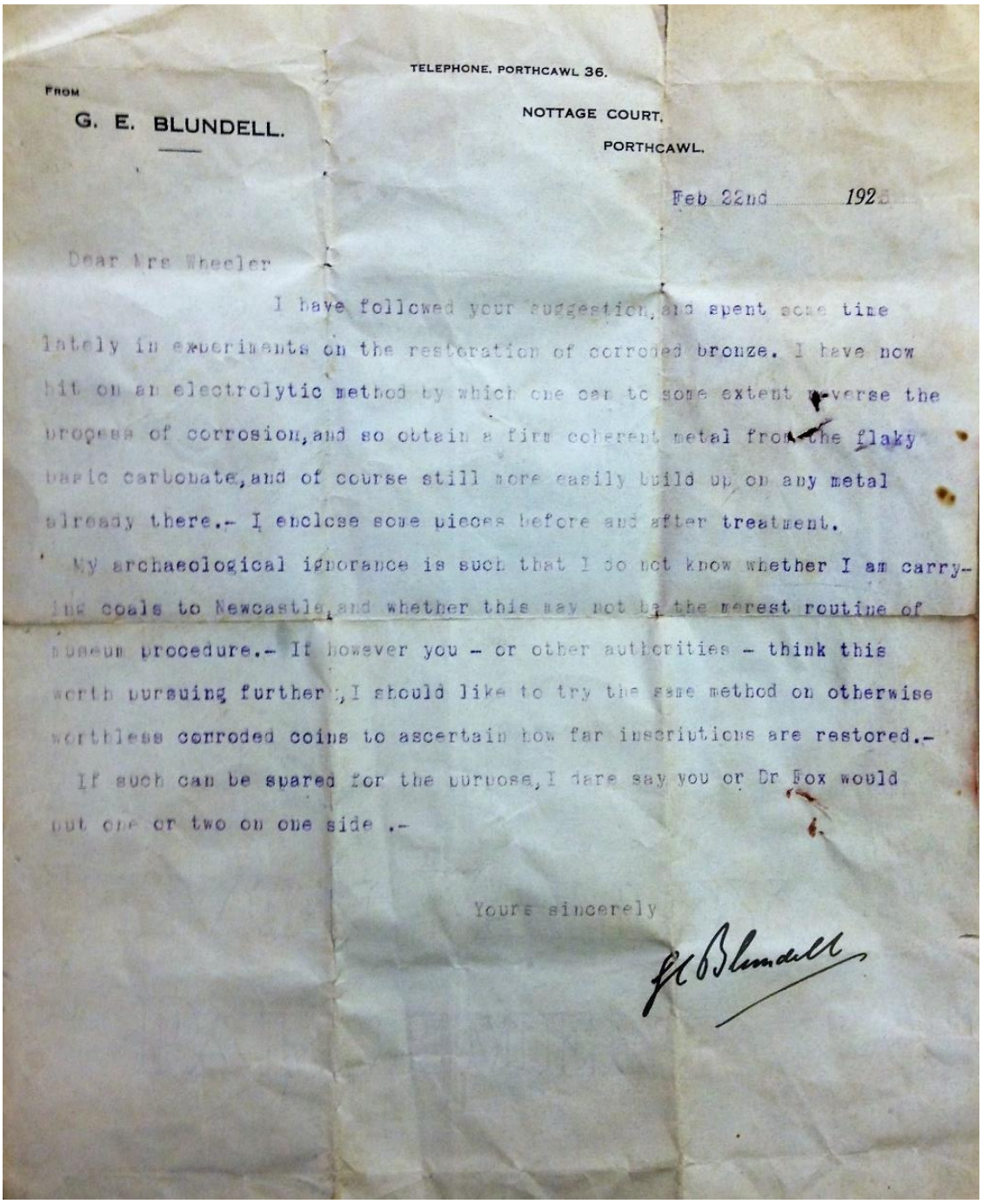
I quite agree one wants a piece corroded through & through as a real test. -

I fear I regard the Zn & HCl bath as also electrolytic — in an uncontrolled form. -

Yours sincerely

G E Blundell

Figure 21: Letter from G.E. Blundell to Tessa Wheeler, February 1925 (Blundell 1925a)



TELEPHONE. PORTHCAWL 36.

FROM

G. E. BLUNDELL.

NOTTAGE COURT,

PORTHCAWL.

Feb 22nd 1925

Dear Mrs Wheeler

I have followed your suggestion, and spent some time lately in experiments on the restoration of corroded bronze. I have now hit on an electrolytic method by which one can to some extent reverse the process of corrosion, and so obtain a firm coherent metal from the flaky basic carbonate, and of course still more easily build up on any metal already there.- I enclose some pieces before and after treatment.

My archaeological ignorance is such that I do not know whether I am carrying coals to Newcastle, and whether this may not be the merest routine of museum procedure.- If however you - or other authorities - think this worth pursuing further, I should like to try the same method on otherwise worthless corroded coins to ascertain how far inscriptions are restored.-

If such can be spared for the purpose, I dare say you or Dr Fox would put one or two on one side .-

Yours sincerely

G E Blundell

Figure 22: Letter from Blundell to Tessa Wheeler, accompanied by sample of electrolytic method (Blundell 1925b)

Figure 23: Blundell's sample of electrolytic cleaning on bronze, 1925 (Blundell 1925c)

Although Tessa Wheeler was clearly interested and active in early conservation, few other pieces of evidence exist for her work in the field in Wales (though she continued her interests in London, as will be described later in this thesis).

By 1926 Wheeler had left to take up the post of Director at the Museum of London and Cyril Fox became the Director of the National Museum of Wales. Nash Williams was promoted to Keeper of Archaeology with W.F. Grimes (later to become the director of the Museum of London) as Assistant Keeper (National Museum Wales 1926). It is known that Nash Williams undertook restoration on some of his own finds (as did many of his contemporaries) and it is likely that restoration was primarily carried out in house by curators and archaeologists

(with the exclusion of restoration of high visibility objects such as the Caergwrle bowl) followed by an increasing reliance on craftsmen such as Gay for certain types of in-house work, particularly ceramics restoration and casting (Mumford 2015).

In 1927 a second Assistant Keeper was added, Iowerth C. Peate (National Museum Wales 1927). This ended the rather tumultuous departmental growth and staff change overs of the 1920s and ushered in a stable period until 1933, when Archaeology was given a sub department of Folk History headed by Peate (National Museum Wales 1933).

In 1933 a significant event in the history of conservation at the NMW occurred when W.F. Grimes (figure 24) was sent to London to learn conservation methodology and treatments for bronzes and iron artefacts from Harold Plenderleith and his assistant Ernest Padgham at the British Museum. A detailed report of Grimes's experience still exists in the departmental archives (Grimes 1933). This is the first recorded instance of training being sought out for conservation of artefacts and it appears to have been prompted by the need for treatment of three bronzes from the Culver Hole Cave in Llangennydd, Gower and iron objects found at Pen Dinas, Aberystwyth. In the notes recording the visit it is acknowledged that the treatment of metals 'has always' proved difficult and problematic and that the training sought is intended to address this issue. This is of interest as it specifically references the awareness of the need for conservation treatment and that the knowledge is being developed elsewhere. The notes finish by stating that a conservation room or laboratory is necessary for successful treatment:

'It must be pointed out, however, that it will be impossible to put these methods into practice until a certain amount of equipment necessary for the work has been obtained, while it seems also to be desirable that a small room fitted with gas and water should be set aside as a small laboratory for the purpose. The treatment of specimens in some cases may involve (at intervals) a period of weeks. It would be extremely difficult to provide accommodation for this in the present workrooms, if only because of the varied nature of the work which already has to be done in them. Dr. Plenderleith (to whom, as to Mr. Padgham, thanks are due for every kindness and help) was good enough to draw up a list of the equipment needed for a laboratory which would meet our needs, the cost of which he thought might approach £80.' (Grimes 1933).

Unfortunately a purpose-built conservation laboratory was not funded in this year, despite the best efforts of Mr. Grimes, and was in fact not built until after the War (Brewer 2013).

Figure 24: W.F. Grimes with artefacts from the Mithras Temple in London (British Pathé Films 1954)

It is not surprising that in the aftermath of this visit the NMAR of 1934 brings with it the first mention of objects restoration within the departmental notes. Although neither the objects nor the names of the restorers are mentioned, it can be inferred that the work was done in-house and was deemed significant enough to be recorded as part of the departmental activities for the year and it seems likely that the work was carried out by the staff members listed previously: Grimes, Fox, Gay, Gear, and Williams (National Museum Wales 1934). In 1935 a similar mention of restoration is made in the NMAR, but this time it is more specific and shows that the work undertaken was the cleaning of bronzes. In 1936 restoration is again mentioned non-specifically and in 1937 pottery restoration is named as an activity of departmental staff. This trend continues in 1938 and 1939 (again non-specific, just a mention of objects restoration). In 1939 W.F. Grimes left the department and H. N. Savory replaced him as Assistant Keeper (National Museum Wales 1935-1939).

In 1940, the museum staff list was altered significantly due to war. The Keeper and Assistant Keeper as well as the Department Attendant were all listed as in military service (National Museum Wales 1940). During the war years, objects were put into storage due to

bomb risk, as was happening around the country (as previously noted in the British Museum case study, and which will be discussed in more detail later in this chapter). Perhaps unsurprisingly, with all departmental members at war and all objects in storage, no further mention of restoration is made until 1947, when the archaeology collection objects are reported as taken out of storage and the staff returned from the war (National Museum Wales 1947). Intriguingly, the objects were stored within something termed 'basement workrooms', which could imply early conservation laboratory space. It is thought that these may have been the current artefact studies room and conservation laboratory (Walker 2013). What is interesting about the return of the objects from storage is that no notation is made of the condition of the objects after being subjected to store over a period of approximately 7 years. Given that the artefact studies room is partially underground, and the sub-basement is below the studies room, it would not be surprising to find that objects stored in this way fared similarly to those stored in the Underground by the British Museum. However, in dissimilarity to the British Museum case study, no mention is made of the objects requiring additional conservation after removal for storage and there was no reported increase or change in the employment of craftsmen and restorers at the time.

Figure 25: Cyril Fox (Bird 1958)

Significant staff changes occurred again in 1948 with the retirement of Cyril Fox (figure 25). The museum directorship was taken on by a non-archaeologist for the first time since 1924 with the appointment of D. Dilwyn John. The structure of the Archaeology department remained largely unchanged, however (National Museum Wales 1948). Until 1949, the conservation-style work mentioned in the NMARs primarily consists of descriptions of casting, ceramics restoration and bronze cleaning. In 1949 iron treatment is mentioned for the first time, as is taking on external contracts for restoration work. In 1950 and 1951, staff activities again list 'reparations' to objects and casting work. 1952 shows no mention of active restoration activities but the NMARs for 1953, 1954 and 1955 report ceramics restoration and general finds restoration (National Museum Wales 1949-1955).

1956 was a significant year in National Museum Wales archaeological conservation history as it was then that the NMAR language changed from the usage of the words 'restoration' and 'repair' to 'conservation'. This is of particular significance as it coincides with the establishment of the teaching of conservation, first as a technical subject at the Institute of Archaeology in London and a department in its own right by 1960 (University of London 1960). The change in terminology also very nearly coincides with the establishment of the IIC UK Group at the Institute of Archaeology in 1957, which also may have helped in establishing the role of professional conservator (ICON 2015). 1956 also saw the death of Nash Williams. H.N. Savory became Keeper of Archaeology with no supporting Assistant Keeper until 1957, when George C. Boon arrived. Boon was in place as Keeper of Archaeology when the current Keeper (2013) came to the department in the 1970s (Brewer 2013).

In 1959 the Assistant Keeper George Boon visited the laboratories of the London Institute of Archaeology and the Ministry of Works to study new techniques of conservation. This is the first mention of a specific trip for conservation knowledge acquisition since before WWII and it is of great interest that Boon chose to visit the IoA and Ministry of Works rather than another museum (National Museum Wales 1959). In 1960, the department records the acquisition of a new electrolytic tank, which 'greatly facilitates' the cleaning of metalwork artefacts (National Museum Wales 1960). In 1962 the first photographic evidence of conservation treatment is included in the NMAR, further increasing the visibility of the activity (National Museum Wales 1962). It is of interest that throughout the 1950s and

1960s conservation activity is described within the section for 'curatorial work', which further aligns with the tradition that the curators conducted some of their own conservation work in addition to the work provided by craftsmen such as Gay and Gear.

Although the history of the department itself is fairly simple to trace through the NMAR staff listings, the history of conservation within the department is much less clear in the early reports until the late 1950s, when artefact conservation is first mentioned with some regularity. The first person to hold what could be considered the full time, specific post of restorer within the museum was Harry Gear, who started in the Department in the 1920s and retired in 1979, by which time he is referred to as a conservator. In early records his role is referred to as 'Departmental Technician' and it appears that he was largely responsible for technical restoration treatments, as supported by the following entry in the NMAR for 1969, 'The modernisation of exhibits has continued, though the serious illness of Mr. H. Gear, the departmental technician, meant that some plans had to be deferred. He has now been welcomed back. Curatorial work was also reduced owing to Mr. Gear's absence. It has comprised restorations of a Bronze Age urn from Welsh St. Donat's and a Roman jar (for Abergavenny Museum); the remains of a Limoges enamel plaque have been conserved for the Vicar of Penmon (Ang.).' (National Museum Wales 1969).

3.2.4 The Age of Craftsman/Restorer at the Museum of London

Background History of the Museum of London

The Museum of London as it now exists was created in 1965, when the collections of the Guildhall Museum and the London Museum were brought together to create a single museum. The resulting new museum combined the previous archaeological focus of the Guildhall Museum with the social history, archaeology, fine art and costume interests of the London Museum (Museum of London 2015a). The present day Museum of London has a strong archaeological conservation department and as this was already extant in the plans for the new museum at the time of the amalgamation of the physical collections in 1976, it is necessary to briefly examine the history of the two preceding institutions to determine how archaeological conservation came to exist within the new establishment.

The Age of the Craftsman/Restorer at the Guildhall Museum

The Guildhall Museum was established in 1826 by the Corporation of London in order to display archaeological collections from the City of London (primarily Londinium). By 1872, the museum moved to premises in the Guildhall (figure 26).

Figure 26: Old Guildhall Museum (Unknown 2016)

Over the following 80 years the Guildhall Museum was moved to a variety of locations and was frequently the recipient of criticism for lack of archaeological acumen, including by Mortimer Wheeler, then of the London Museum (Hawkes 1982, 111). Unfortunately, the museum also appears to have had a distaste for keeping records and it is difficult to find any references to early archaeological conservation or restoration until conservation officially came to the museum in 1955 in the person of Bill Rector, an American who had married an Englishwoman during the Second World War and had developed an interest in archaeology.

Rector, a former postman, had partially completed a degree at the Institute of Archaeology but had abandoned it in favour of working as a conservation volunteer at the Sussex Archaeological Society, helping Norman Norris to prepare a large collection of Wealden iron for display in Anne of Cleve's House. Ralph Merrifield, then assistant keeper at the Guildhall, 'heard of an American with an aptitude for conservation' and hired Rector to be the first conservation officer of the museum in January of 1955 (Johnson 2001, 140). After

joining the museum Rector continued his conservation training by attending lectures at the Institute of Archaeology and through a prolific correspondence with colleagues to keep abreast of the latest developments in the field (Johnson 2001, 141). In 1965, the Guildhall Museum and the London Museum officially merged, although they were not to share space until 1975.

In 1967, the Guildhall Museum (still with a separate collection) moved to Bassishaw High Walk and the conservation laboratory to Gillet House. As at other museums around the country, the explosion of urban archaeology post-war led to a large increase of small finds requiring conservation. By the mid-1960s and the advent of the merger with the London Museum, Rector spent most of his time working with freshly excavated materials rather than with the existing collection and displays. Much of the materials were from waterlogged sites and Rector experimented heavily with treatments to preserve the organic remains with varying success (Johnson 2001, 140-141).

The Age of the Craftsman/Restorer at the London Museum

The London Museum has a shorter history than that of the Guildhall Museum but it is much more heavily recorded. In his book *Still Digging,* Mortimer Wheeler recounts that the idea for the London Museum was first proposed by Lord Esher as a memorial to King Edward VII after his death in 1910 and in an effort to preserve the history of London (Wheeler 1955, 83). As a result of this suggestion, the Royal Family supported the endeavour with the donation of Coronation robes and other assorted paraphernalia and continued their personal interest, although the museum was not ultimately opened as a memorial (Hawkes 1982, 103). Sir Guy Laking was selected to establish the museum and to serve as first Keeper and it was officially opened at Kensington Palace on 21 March 1912 by King George V and Queen Mary. Due to contemporaneous action by the Suffragettes, the museum was not opened to the public until 8 April 1912. On the opening day it was estimated that over 13,000 people visited the collection (Wheeler 1955, 84).

By 1914 the London Museum moved to new premises in Lancaster House (figure 27), where it was to stay until after the Second World War (Museum of London 2015).

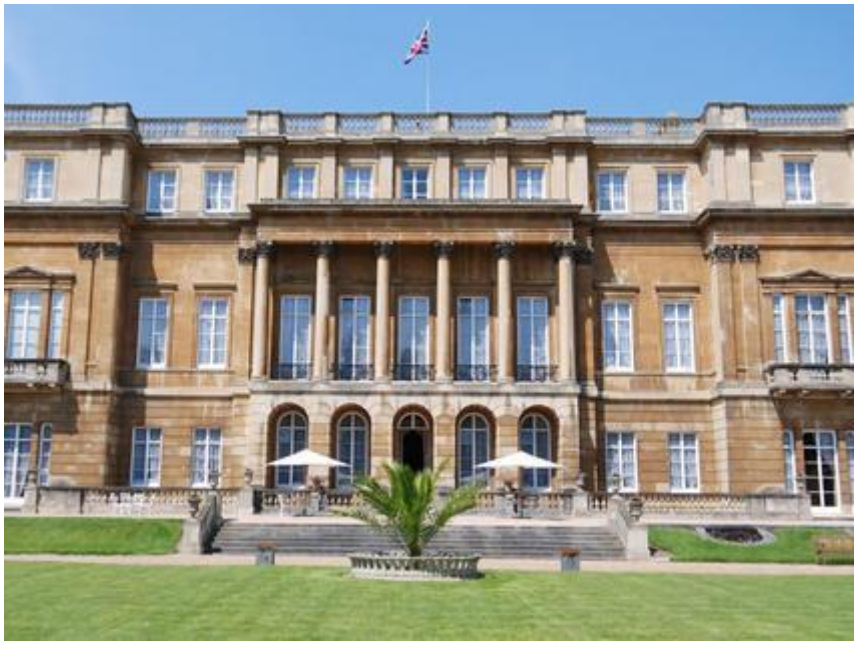


Figure 27: Lancaster House, former home of the London Museum. (Foreign and Commonwealth Office 2016)

Early records detailing the archaeological collections of the London Museum are relatively few, but Wheeler describes a colourful event concerning the first Keeper of the London Museum, Sir Guy Laking. A Roman ship was discovered during construction of the new County Hall at Westminster. Laking had the remnants placed upon a dray and proceeded to lead the procession back to the museum on horseback, taking in Parliament Square and St. James's Park en route. Although there is no mention of conservation of the timbers at the time, they were then displayed and theatrically 'adorned with stuffed gulls' (Wheeler 1955, 85).

When Laking retired, the post of Director went to Mr. Harmon Oates, about whom little has been written but who is described rather disinterestedly by Wheeler as 'a dull and pompous commercial traveller whom he (Laking) had picked up in a railway carriage' (Wheeler 1955, 85). In 1925, it became known that Oates planned to retire, upon which point the post of Keeper would become vacant. Lord Esher's son Maurice Brett was at the time working as an Assistant Keeper and a movement was established to see him succeed Oates (Hawkes 1982, 105). Wheeler was considered for the post on their strong recommendation and on the basis of his skill and reputation as an expert archaeologist. By 14 March 1926, the decision to appoint Wheeler as Keeper had been taken and he moved to London in July of 1926.

Wheeler therefore left the Directorship of the National Museum of Wales after only two years in post to take up the role of Keeper of the London Museum (figure 28). Interestingly, Wheeler may have been in ignorance of the debate in his selection for the post and related only that he was persuaded to do so by a letter from Sir Charles Peers, then Inspector of Ancient Monuments, who had previously recommended him for the Cardiff post (Hawkes 1982, 100).

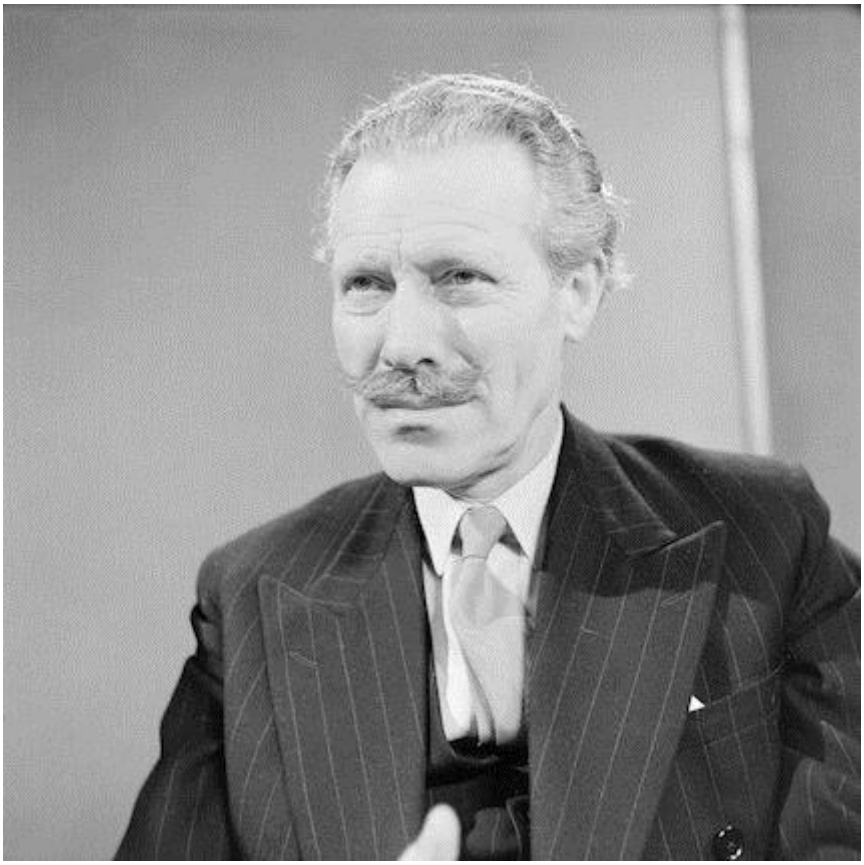


Figure 28: Mortimer Wheeler (Grant 1956)

It is important at this juncture to note that Wheeler was the first Keeper at the London Museum with an archaeology and excavation specialty. Of the previous Keepers, Laking was an art historian who had previously been employed as the Keeper of the King's Armoury (London Gazette 1902, 645). Oates appears to have had no experience in either archaeology or museumship. Hawkes identifies Wheeler's intentions on arrival at the London Museum as being the 'reform and vitalisizing of the museum, together with its responsibilities for the rescue of London's antiquities, towards the recognition of archaeology as an academic subject by the University of London, towards the training of

students and the formation of a team of experts, and finally, towards excavations that would increase knowledge, advance techniques and bring glory to British archaeology' (Hawkes 1982, 108). It is clear that Wheeler himself felt the London Museum was in great need of rescue and reform, as he stated in his memoirs that it had to 'be turned from a junkshop into a tolerably rational institution' (Wheeler 1955, 84). Carr goes further with this statement and claims that Tessa Wheeler started the conservation work and did a great deal of the cataloguing (Carr 2012, 145), though no specific further information for this conservation work is given, and Tessa does not appear on staff rosters and was presumably unpaid.

At the time of Wheeler's appointment the Guildhall Museum was nominally responsible for safeguarding the archaeology discovered during excavation in London but did not employ an archaeologist or an inspector of excavations. Wheeler agitated for financial backing from the City of London Corporation to fund such a post but was unsuccessful. Eventually the Society of Antiquaries provided funding for a Director of Excavation who was then based at the London Museum (Hawkes 1982, 112).

During the early days of Wheeler's time at the London Museum financial support from the Treasury was extremely limited. The museum itself received less than £5000 pounds per annum and the salary total was £1300 pounds, allowing only for the employment of Wheeler, two part-time assistants, a small clerical and technical staff, museum porters and an odd-job boy (Hawkes 1982, 112). Following the publication of a Royal Commission report in 1930, a case was prepared in an attempt to gain more funding from the Treasury. As cited by Hawkes, this was successful and grants were made for an improved establishment and acquisitions (Hawkes 1982, 113).

Although Carr mentions Tessa Wheeler's involvement in conservation of artefacts, no specific mention is made of what may be considered conservation work in either Wheeler's memoirs or in Hawkes's biography. However, Hawkes identifies 1930 as the year in which the Wheelers became more heavily committed to excavations and states, 'As in all excavations, the greater part of the work had to be done not in the field but indoors…Material from the digs was inevitably brought there (to Lancaster House), followed by members of the excavation teams to sort, study and prepare it for publication. Back rooms and top rooms were kept busy' (Hawkes 1982, 114).

Further investigation reveals continued references to conservation, linked to the increased excavations undertaken and specifically to the work at Maiden Castle. The first mention of conservation in conjunction with the London Museum comes in 1933, when Harry Plowman (a member of the Society of Antiquaries) requested help in restoring an accidentally broken glass jar. The request was answered by Wheeler's secretary and it was promised that 'The broken glass jar will be seen to by Mrs. Wheeler herself as soon as she returns at the end of this week.' Carr further notes that conservation at that time was a 'catch-as-catch-can' department, with most repairs on objects being conducted by Tessa Wheeler and David Sagar, who had the title of 'handyman porter' (Carr 2012, 141-142).

It must be noted that the work at Maiden Castle also increased the necessity for conservation with the London Museum. The excavations at the site provided an extensive number of objects and the London Museum acted as a clearing house for cleaning, conservation and cataloguing before the finds found their way back to Dorset and Tessa Wheeler is credited with organising the work (Carr 2012, 228). It is therefore perhaps unsurprising that after her death in 1936, Mortimer Wheeler found it necessary to make the hiring decision that would ultimately bring archaeological conservation within the London Museum through to the present day.

This took the form of the appointment of Arthur Trotman in April 1936, the same month that Tessa Wheeler died. Arthur Trotman was 14 years of age and was hired in as a 'boy learner' to assist Sagar in his general objects restoration work. Trotman would stay at the institution until his retirement in 1986, by which time he had transitioned to a professional conservator known as the 'chief conservation officer of the amalgamated Museum of London' (Sheppard 1991, 111). Trotman recalled that Wheeler selected him from 19 other candidates because 'most of his brains were in his hands', effectively highlighting the importance of craftsmanship ability to restoration that existed prior to the advent of professional conservation training. Trotman began to work alongside Sagar and also with Jack Arnold in the craftsmen's workshop (Farquharson 1986, in Johnson 2001, 136). Trotman's career spanned both the eras of craftsman/restorer and professional conservator as he began undertaking training with Ione Gedye in conservation at the Institute of Archaeology prior to the outbreak of the Second World War (Johnson 2001, 137).

From 1937 onward Wheeler made provisions for the most significant artefacts at the London Museum to be sent to storage in anticipation of war (Hawkes 1982, 194). This was undertaken by Trotman, who carefully packed the collections for storage in tube tunnels and Buckinghamshire prior to going to war himself in 1939 (Hebditch 1995).

In 1940 Wheeler also went away to fight and for the remaining duration of the war the London Museum closed to the public. Wheeler resigned from Directorship of London Museum in 1943 upon returning from service in Italy and promptly began to focus on the newly formed Institute of Archaeology. His resignation was accepted by the Board of Trustees in January 1944 (Hawkes 1982, 227). One interesting aspect of Wheeler's time at war is that his most regular correspondent was Cyril Fox, then director of the National Museum of Wales. All of this, in combination with the fact that Tessa Wheeler had a keen appreciation of conservation dating back to the early 1920s at the National Museum of Wales, indicates that Mortimer Wheeler also understood the need for archaeological conservation. This almost certainly had an impact on the hiring of Ione Gedye to teach conservation within the newly formed Institute of Archaeology.

When Wheeler resigned from the London Museum, W.F. Grimes succeeded him in the post of Director in 1944. Although Wheeler's tenure at the London Museum ended, Trotman's did not, and under Grimes and the following five Directors his work continued to rise in visibility. When Trotman returned from war in 1946, the Lancaster House premises had been appropriated by the Foreign Office and he worked to move the collections to their new and former home at Kensington Palace for opening to the public in 1951 (Hebditch 1995).

3.3 The Influence of the Conservation Scientist: 1919-Present Day

The supporting evidence for the role of the Conservation Scientist comes mainly from the British Museum institutional case study. Although all the case study institutions examined for this thesis conduct scientific investigation into archaeological objects, this is generally performed both by archaeological conservators employed within the institution (when equipment usage permits) or external scientists/contractors and not by in-house conservation scientists. The identification of the Conservation Scientist as a separate entity to the archaeological conservator is in no way meant to imply that the archaeological

conservator is not a scientist. However, there are observable differences between the background and work of the former and the latter. The individuals employed as professional conservation scientists at the British Museum have only very rarely been archaeological conservators specifically trained to perform interventive treatments on objects.

Due to the importance of the work and discoveries of the conservation scientist in shaping both the modern education system for archaeologists and informing the understanding of the mechanisms of decay as well as the application of scientific principles to the field, a short history of the development of the profession will be undertaken. It may be argued that the establishment of the conservation scientist was directly responsible for the change in archaeological conservation from a profession rooted in craftsmanship to one based on investigation and science, and that the relatively early establishment of the role of conservation scientist at the British Museum created a resource for other institutions. This known resource may have contributed to the lack of the development of the role of the conservation scientist at the other case study institutions. As the professional conservation scientist is a distinct and separate entity from the archaeological conservator, a full examination of the development of the role lies outside the scope of this thesis. However, key developments which had an impact on the archaeological conservator will be examined.

While the age of the Craftsman/Restorer would continue in the museum sector until the middle of the 20th century, external events were occurring that significantly impacted how archaeological objects were treated within institutions, most notably two world wars. As described earlier in this thesis, by the turn of the 20th century scientists were already working on the problems of object conservation in Germany and in Denmark, and it is known that correspondence between countries and even laboratory visits were carried out by curatorial staff at the Museum of Wales and the British Museum. However, there is no evidence for the full application of scientific principles to archaeological conservation in the UK until the time of the First World War, when it was discovered that objects stored in the London Underground during the war had deteriorated rapidly. Many of the objects had seriously corroded and others were covered in damp and mildew (Caygill 1992, 29). The Trustees of the British Museum quickly realised that the existing craftsmen/restorers embedded within each department would be unable to deal with the quantity and extent of

the degradation, and Dr. Alexander Scott was brought in in 1919 to carry out an inspection of the deterioration and to produce a report with recommendations for remedial treatments (Plenderleith 1998, 129-130).

Scott (figure 29) came from neither an archaeological nor a craftsmanship background. He had originally taken a degree in Experimental Philosophy from Edinburgh University 1875. In 1879 he completed a second degree (BA) in Science at Cambridge and then followed it with an MA in 1882 and a doctorate in 1884. After completion of his doctorate, Scott took a job at the Davy-Faraday Research laboratory at the Royal Institution, where he served as Superintendent from 1896 to 1911 (University of Dundee 2015).

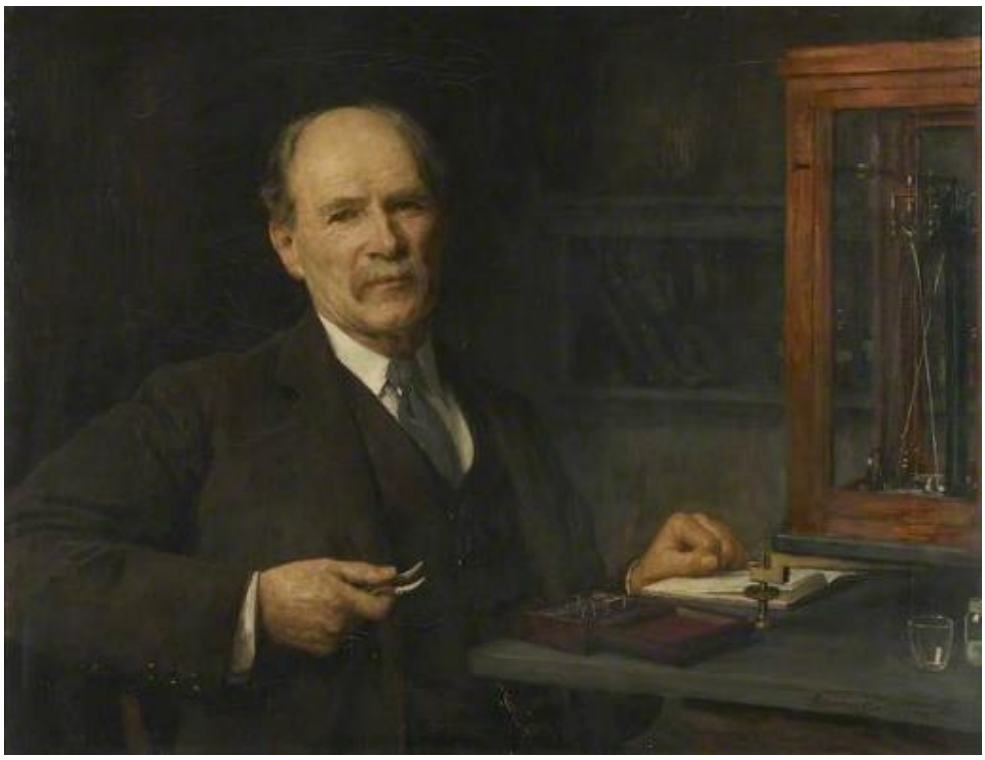


Figure 29: Dr. Alexander Scott (Olivier 1930s)

Scott's first act after being hired on a consultancy basis at the British Museum was to propose to establish a laboratory within the museum. This was agreed and in 1920 a laboratory was opened in Russell Square - originally for a duration of three years. Scott and his assistants Padgham and Mallett were successful enough in rehabilitating the damaged objects that the laboratory was made permanent in 1931 as the Department of Scientific Research. By 1933, Scott had been joined in his post by Dr. Harold Plenderleith, also trained

as a scientist rather than a craftsman or archaeologist Gilberg 1987, 105). Scott retired in 1938 at the age of 85 (Robertson 1948, 258). Plenderleith stayed in post until 1959 (Caygill 1992, 50).

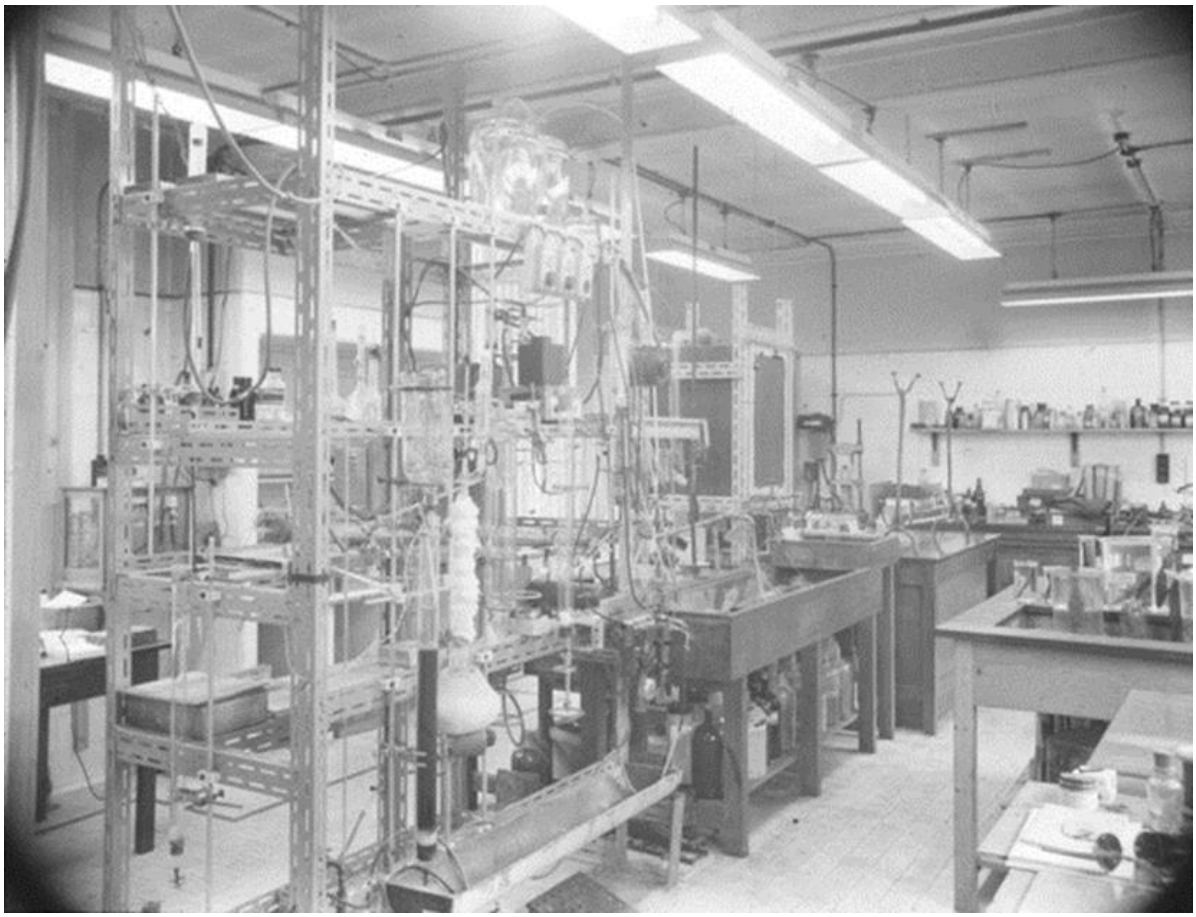


Figure 30: Early conservation laboratory at the British Museum by H. Plenderleith (ICCROM 2016)

The permanent establishment of Scott's laboratory may have been further supported through the rising realisation that science was an important part of heritage protection. In 1930, a conference was held in Rome by the International Museums Office of the League of Nations, which had been created in 1926 (Daifuku 1998, 9). This conference was the first international symposium at which scientific preventive conservation (specifically environmental control) took centre stage. This indicated an international acknowledgement that science could be 'a preferred methodology for solving problems in the preservation of historic cultural materials' (Clavir 1998, 2-3). The role of the conservation scientist continued to strengthen after the First World War. As Plenderleith notes in his article A

History of Conservation, the newly established scientific laboratory at the British Museum attracted a number of professionals and interested volunteers from around the country, including a great number of well-known archaeologists and amateur archaeologists such as the previously mentioned Nash Williams and W.F. Grimes, Kathleen Kenyon, Margaret Binyon, and Agatha Christie. By 1931 there were also many appeals to the laboratory for conservation consultation and advice, from other museums, churches, and a number of universities (Plenderleith 1998, 132). This renown and dominance within the sector may be another reason that the role of conservation scientist did not develop strongly in the other case study museums.

The positive need for the role of the conservation scientist was further supported by the Second World War, when objects from London museums were again stored within the Underground, though this time suffering far less due to the advances in understanding of environmental control made by the conservation scientists (Plenderleith 1998, 133). The war and the economic recovery afterward also resulted in the building and rebuilding booms in the late 1950s and early 1960s and would have a further knock on effect on archaeology and thus the development of the field of archaeological conservation and play a role in the rise of the urban archaeological unit. When Plenderleith left the museum in 1959 to become the first director of the International Center of the Study of the Preservation and Restoration of Cultural Property in Rome (ICCROM), he was succeeded by another chemist, A.E.A. Werner (Lambert 2014). Werner was joined by Andrew Oddy in 1966. Oddy, like Plenderleith and Werner before him, became an internationally known figure in the world of archaeological conservation by the 1970s, when his research with the Wallace Collection into the effect of materials for display on objects led to the publication of the 'Oddy Test' (Oddy 1975), which is still in use in museums around the world (Thickett and Lee 2004).

The British Museum tradition of employing chemists and other scientists to work on conservation issues continued after Oddy's retirement in 2002, at which time the museum merged the (separate) Departments of Conservation and Scientific Research into the Department of Conservation and Scientific Research (British Museum 2016a). Of the ten conservation scientists employed by the Department in 2016, six were trained as chemists, one as a physicist, and three as archaeologists with specialisations in metallurgy or imaging.

None of the scientists have formal training in archaeological conservation, which further supports the assertion that the professional conservation scientist and the professional archaeological conservator are two distinct identities.

The Role of the Ancient Monuments Laboratory

Another factor in the development of the role of conservation scientist was also a product of the Second World War- the establishment of conservation of artefacts within the Ministry of Works. This department of the Government was formed in 1943 and originally served to requisition property for wartime purposes but also took on the responsibilities of the former Office of Works, which included responsibility for historic monuments and archaeological sites (Thurley 2013, 189). Conservation activities within the Office of Works service had begun in the 1920s when the laboratories of the British Museum were no longer able to handle preservation of the Office's finds (David 2006, 1). This focus on preservation/restoration is shown to have continued, with early reports detailing the activities of the laboratory as entailing treatment and restoration rather than scientific analysis, which, if required, was carried out by the British Museum laboratory (David 2006, 1). This era of the craftsman/restorer as conservator continued until after the Second World War, when Leo Biek was appointed 'Officer in Charge' of the Laboratory in 1950.

Biek was a chemist who joined the Ministry of Works in 1950 and was instrumental in developing the scientific work of the Ancient Monuments Laboratory (AML), which at the time dealt with both archaeological objects conservation and archaeological science (Bayley 2002, 464). Although Biek was originally hired on as a chemist, in 1954 his work was reported as '75% …purely technical and concerned with the actual preservation of finds' (David 2006, 2). Due to Biek's direction, the work became increasingly more research oriented, with reports including references to chemical and X-ray analysis as well as spectrography and photography (David 2006). This gradual shift from practical restoration to investigative work in combination with increased excavation resulted in a backlog of archaeological artefacts, something that was noted unfavorably by the Inspectors (those responsible for inspecting condition and advising on the care of monuments). Biek was instructed to concentrate his efforts on cleaning and preservation and to curtail his

investigative work (David 2006, 2). Biek's work was increasingly well known to both archaeologists and conservators, which meant that he was increasingly sought out for advice.

Luckily for the application of scientific methods to conservation, Biek ignored these instructions, instead splitting the organisation of the laboratory into 'research' and 'conservation', though without a resulting increase in staff members. This had the effect of further decreasing output for the laboratory and eventually a question was raised in Parliament (in 1964) with the result being an eventual Treasury Review. In 1966, more funding was allocated and John Musty was hired as the first Head of the Ancient Monuments Laboratory. Biek continued to work on his scientific investigations (David 2006, 3).

Biek was highly instrumental in the positioning of the Ancient Monuments Laboratory as a place for both conservation and conservation science. Bayley, who worked within the Ancient Monuments Laboratory as an archaeological scientist specialising in metallurgy (later English Heritage) between 1973 and 2010, states that Biek was not an inventor of new techniques but instead was skillful at seeing applications for techniques from other fields, and networked with government laboratories and research institutes in order to try out emerging technologies on archaeological materials (Bayley 2002, 464; University College London 2016).

Biek is also well-remembered by Mike Corfield, an archaeological conservator who worked with him under John Musty at the Ancient Monuments Laboratory during the late 1960s and early 1970s. Corfield complimented the work of Biek, stating that he was 'an extraordinary man, a refugee from Eastern Europe who had his first job in England as a piano tuner and then somehow got involved in Ancient Technology and was hired on at the Ancient Monuments Laboratory' (Corfield 2016). Biek's early history as a craftsman-piano-tuner-turned-scientist is of interest to this research as it may have given him a better understanding of the world of the craftsman/restorers, with which he was increasingly interacting. Biek's involvement in the transition of the field of archaeological conservation from the province of craftsmen to one of professionals and scientists was not necessarily a smooth one. Corfield recalls that there was some tension between Biek and Rickard, the head of the conservation laboratory. Rickard had come to the AML from the Ashmolean in

1956, where he had been trained originally as an apprentice. Corfield believes Rickard resented students coming in to receive the benefit of free training from the AML when his father had had to pay for him to be apprenticed. Rickard and Biek had a contentious relationship, in which the former attempted to keep Biek from getting his hands on objects and the latter grabbed anything that looked of interest (Corfield 2016).

In addition to steering the early work of the AML from a focus on restoration to science, Biek was also instrumental in publicising the potential for scientific analysis of archaeological objects. In 1963 he published Archaeology and the Microscope: The scientific examination of archaeological evidence. With an introduction by Mortimer Wheeler declaiming the work as, 'an expert contribution to public relations between science and archaeology,' the theme of mutual benefit was explored extensively (Biek 1963, 6). Biek recognised the importance of understanding materials and stressed that conservation was essential to reduce the inevitable loss of valuable information. The book was written in an effort to help both conservators and archaeologists understand the investigative potential of the past, and effectively demonstrates what scientists can provide to the understanding of both archaeological sites and artefacts (Biek 1963). This work may have influenced others of a similar nature, such as Dowman's (1970) *Conservation in Field Archaeology* and Goodyear's (1971) *Archaeological Site Science*, both of which served to educate both the professional conservator and archaeologist about how materials decay within an archaeological context and about the importance of conservation and scientific investigation.

John Musty, the Head of the Ancient Monuments Laboratory between 1966 and 1981, was also incredibly influential in promoting the spread of scientific principles to the field of archaeological conservation. Musty had trained in both chemistry and archaeology and began his career as a research chemist in Wiltshire (Musty 1999, 330). With his appointment, the Ancient Monuments Laboratory underwent a significant change. First, a large number of additional staff were recruited, with specialisms in archaeological conservation, environmental archaeology, geophysics, zooarchaeology, and osteology. The laboratories were updated, and analytical equipment in the form of an X-ray unit, a SEM, an XRF and an XRD were added along with an air abrasive machine and an atomic absorption

spectrometer, allowing for a much larger variety of investigative work to be performed and new scientific questions to be answered through the analysis of archaeological materials.

This acquisition of equipment further highlighted the move away from the more invasive techniques practiced by the craftsman/restorer, such as chemical stripping for metals and vibro-tools for the removal of corrosion products, two treatments which were exceedingly popular amongst restorers at institutions such as the National Museum Wales (Mumford 2016). Finally, the two existing sites in Lambeth Bridge and Westminster were combined into one – Fortress House at Savile Row in 1972 (Musty 1999, 331). The combination of new staff members and new laboratory equipment allowed the AML to keep pace with the surge in archaeological artefacts resulting from the increased excavation. In 1975 Musty was appointed to the Science and Engineering Research Council (SERC), with the eventual outcome being the setup of the Science Based Archaeology Committee (SBAC), which was then funded to provide research grants to further archaeological science projects (Musty 1999, 331).

Additionally, from the mid-1970s the Ministry set up Museum and University-based contracts to assist in more regional processing and investigation of materials from their excavations. By 1983, there were 19 such contracts, a number of which supported archaeological conservators, and the AML was also taking in a number of placement students from a variety of universities (David 2006). In addition to this outreach to students, beginning in the 1950s the Ancient Monuments Laboratory was also producing hundreds of publications and reports, many of which dealt with archaeological conservation and archaeological materials investigation (English Heritage 2014). Covering topics as diverse as mosaic conservation (Cselik 1992) to slag analysis (McDonnell 1988) to clay moulds (Bowstead Stallybrass 2000) and many others, the reports after 1986 are freely available to access online, which is in direct contrast to articles published in journals produced for archaeological conservators such as Studies in Conservation and The Conservator. The issue of publication access and potential ramifications will be further addressed in Chapter 4 of this thesis.

The Ancient Monuments Laboratory employed both archaeological scientists and archaeological conservators until the early 1980s, when it was subsumed into English Heritage. The Ancient Monuments Lab then continued on (still supporting both roles) in the

guise of the English Heritage Centre for Archaeology (English Heritage 2014). The significant and accessible publication record and its effect on the application of science to archaeological conservation is of great importance. In addition to being at the forefront of scientific research on archaeological materials, the Ancient Monuments Laboratory was also responsible for promoting awareness of conservation principles to the wider archaeological community, thus supporting the integration of conservation into archaeological projects. Their publications helped early professional archaeological conservators to better understand the possibilities for research inherent in their objects and also may have served to inspire the application of scientific method to conservation ethics.

3.4 The Age of the Formally Trained Conservator

The professional archaeological conservator described in this section refers to formally trained conservators- those who entered the field with the intention to become professional conservators and who increasingly moved the profession towards the science-based field it is today. This era is hallmarked by the establishment of the first professional training programmes, their development into degree courses, and eventually the move to what is today a largely postgraduate profession. A number of significant factors in the era of the professionally trained archaeological conservator were not readily apparent through the analysis of either the history of the case study institutions or the interview data. These will be addressed below.

3.4.1 The Establishment of Formal Training Courses

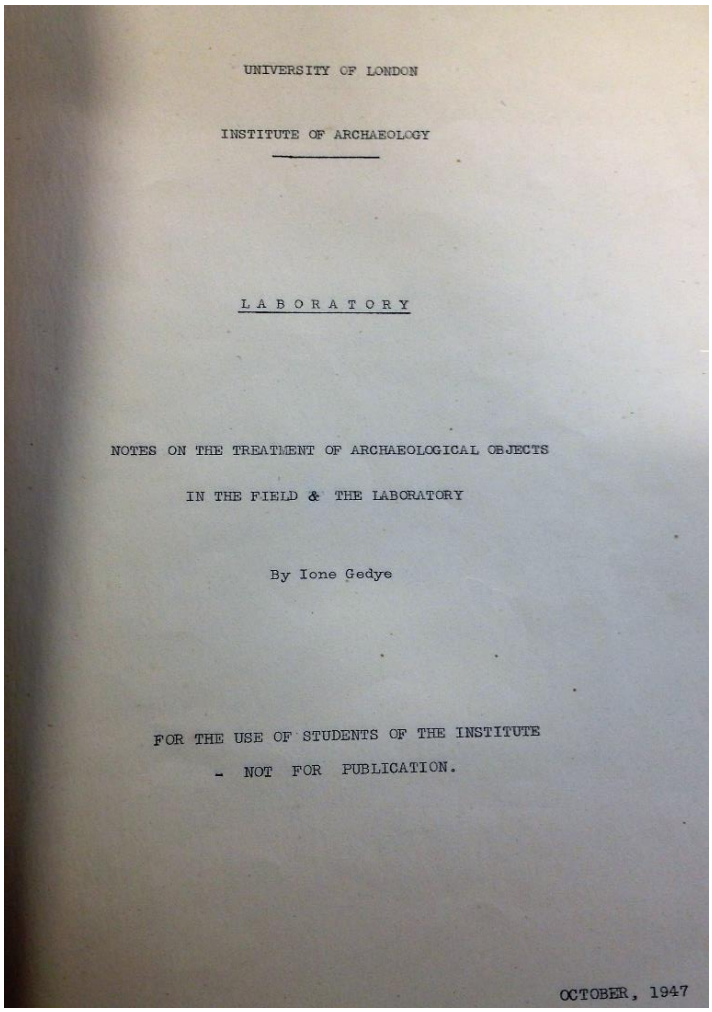
In 1926 Mortimer Wheeler had come to London to take up Directorship of the London Museum (what would later become the Museum of London), bringing with him his wife, Tessa Wheeler, who, along with restorer David Sagar, was responsible for much of the early conservation at the institution (Carr 2012, 141). From his time at the National Museum Wales, Wheeler was well aware of the need for archaeological conservation and by October 1936 (perhaps not coincidentally, shortly after the death of Tessa Wheeler), employed Ione Gedye (figure 31) to provide tuition in a repair workshop which could also provide instruction in the 'preservation of antiquities' to students at the newly established Institute of Archaeology at St. John's Lodge in London (Evans 1987, 11). A student of Petrie, Gedye

had by this time already been working for some time at the London Museum and by the end of the 1930s the Institute was taking in contract work in conservation to bring in additional funds (Evans 1987, 13-14; Johnson 1993, 255). This is reported in the Institute of Archaeology's first annual report, where the activity of the Institute Repair Lab is described as 'the repair of pottery, the treatment of archaeological objects of all sorts, and the construction of archaeological models' (Institute of Archaeology 1938).

Figure 31: Delia Parker (early conservator at the IoA) and Ione Gedye at work (in what appears to be an amusing, staged photograph) in the technical department at St. John's Lodge, taken between 1937 and 1951 (Hole 2012)

The appointment of Gedye marked a sea change in the development of the field of archaeological conservation in the UK. Until the start of education in conservation at the Institute of Archaeology, those performing the work of archaeological conservation came

primarily via the craftsmanship/apprenticeship route of restorer. This role was to be gradually replaced by the professional archaeological conservator. The advent of the training programme at the Institute of Archaeology created a profound change within the profession and ushered in a new age within the development of the field.


UNIVERSITY OF LONDON

INSTITUTE OF ARCHAEOLOGY

LABORATORY

NOTES ON THE TREATMENT OF ARCHAEOLOGICAL OBJECTS

IN THE FIELD & THE LABORATORY

By Ione Gedye

FOR THE USE OF STUDENTS OF THE INSTITUTE

- NOT FOR PUBLICATION.

OCTOBER, 1947

Figure 32: An early laboratory manual (dated 1947) used in the teaching of conservation at the Institute of Archaeology found in the Ashmolean Museum Conservation Department Library (Gedye 1947)

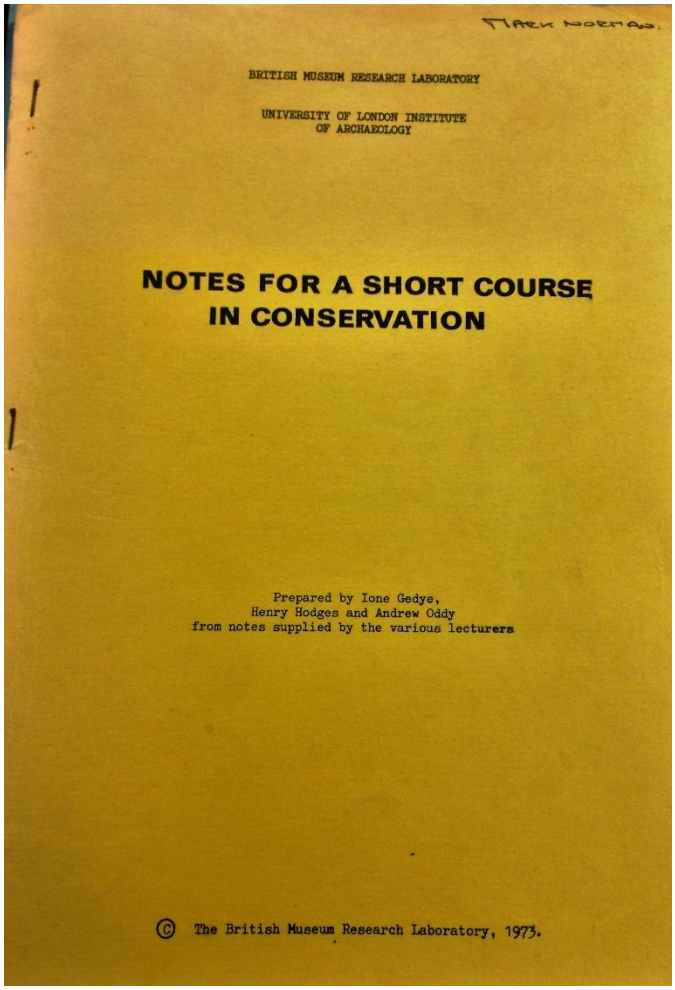


Figure 33: Notes for a short course in conservation used in teaching at the Institute of Archaeology (Gedye, Hodges, and Oddy 1973)

Relatively little has been published about Ione Gedye's early years at the Institute of Archaeology, but by 1958 the *Bulletins of the Institute of Archaeology* begin to appear, in which Gedye's work is detailed within the Director's Report. Conservation tuition is listed under the auspices of the 'Technical Department' and there are a total of 24 students, 6 of whom are full time, 15 of whom are diploma students and 3 of whom are occasional students. Gedye was at this time also undertaking work for various museums and excavations around the country, indicating a general awareness of the resources and the expertise available within the Institute (University of London 1958, 83). By 1960 the Technical Department had been renamed Conservation and Ione Gedye appears as Lecturer in Charge, a significant elevation in public status and also indicative of a shift towards a scientific and analytically based curriculum (Hodges 1987).

In addition to educating more than double the number of students, the Department was still taking in work from around the country as well as from the Ministry of Works and also delivering special courses to museum assistants from places such as the Ashmolean, Cirencester Museum and Corinium Museum. Gedye was also responsible for the Institute of Archaeology hosting the monthly meeting of the International Institute for Conservation of Historic and Artistic Works (IIC-UK) group and encouraged her students to take membership, which enabled the students to further develop connections with international conservation issues (University of London 1960, 81; Corfield 2016). UKIC was founded in the 1970s by students within the Institute, including Mike Corfield, who remembers that this upset Gedye at the time as she did not believe the group should be split from the main IIC body (Corfield 2016). This group continued the publication of the UKG newsletter, the new version of which was circulated under the title of Conservation News beginning in 1975. The early issues of Conservation News are very much accounts of treatment, sources for material, and technical advice, but by March of 1979 this had changed, prompting an editorial plea noting that the predecessor of Conservation News, the UKG Newsletter was full of 'useful advice, workshop notes, hints on supplies and many other helpful items of conservation information. With the inception of Conservation News its editors noticed a marked falling off in contributions of this nature...the main bulk of our pages is taken up by grander matters, further removed from the day to day activities of conservators.' (Watkinson 1979, 5). UKIC would become ICON in 2003, the formation of which will be more fully addressed below.

By the late 1960s the first three year diploma course in Conservation was offered at the Institute of Archaeology, and in 1974, the first intake of students began studying for the BSc in Conservation, graduating in 1977 (Payton 2015). The popularity and success of the London course was also influenced by the explosion in urban archaeology in the 1960s and the rise of RESCUE- the British Archaeological Trust, an independent charitable trust. As a result, two more courses were established by former students of Gedye, first the University of Wales Cardiff course in 1974 by David Leigh and then the Durham University course in 1976 by Janey Cronyn (Johnson 1993, 256; Leigh 2016). All three courses are still in operation, with the Institute of Archaeology and Durham courses now offering only postgraduate qualifications and the University of Cardiff course being the only one to offer

undergraduate conservation degrees as well as postgraduate qualifications (University College London, 2016b; Cardiff University, 2016; Durham University, 2016). The result of these changes in education has meant that archaeological conservation is now a largely postgraduate profession.

The establishment of two more conservation training courses in the 1970s was a direct response to the influx of freshly excavated material produced by the rapid post war development boom in the UK and the change to the urban cores of many cities (Hunter and Ralston 1999, 9; Leigh 2016). The Council for British Archaeology was founded in 1944 in part in response to the great devastation due to bombing (Addyman 2013). By the 1950s, redevelopment was beginning in earnest and archaeologists had to be found at short notice in an attempt to salvage the archaeological record prior to destruction (Everill and Irving 2015, xiii). Between 1953 and 1963, Philip Rahtz was part of an itinerant group of archaeologists who travelled around the country in response to sites threatened by development. In his edited volume *Rescue Archaeology*, he identifies rescue archaeology as a product of the Second World War. Rahtz contends that most excavations prior to WWII were undertaken as research excavations, either for objects or for knowledge. After the beginning of the war, rescue archaeology enlarged in scope- firstly because a large amount of archaeology was lost in wartime preparations, during the construction of training grounds and airfields. Secondly, funding for 'rescue' archaeology was made available by the Government in an effort to ensure that they cared for Ancient Monuments as charged. This led to the Ministry of Works sponsoring rescue excavations and providing significant funding (Rahtz 1974, 55-57). The RESCUE pressure group, founded in 1971, went further in supporting the foundation of county archaeological units (Hunter and Ralston 2009, 34). Other publications, such as Heighway's survey *The Erosion of History* further drew attention to the loss of the urban archaeological record to development (Heighway 1972). The increased public awareness of archaeology generated by these publications and groups resulted in the establishment of a number of charitable and educational trusts, many of which employed their own archaeological conservators to work with freshly excavated materials. One of these newly established units was the York Archaeological Trust (founded 1972), the development of which will be addressed later in this chapter.

3.4.2 The Impact of Policy Guidance on Archaeological Conservation

Another external impact on the development of the field of archaeological conservation came about through the establishment of guidelines for the management of archaeological projects. The first of these was English Heritage's Management of Archaeological Projects in 1989 (MAP 1), the conservation impact of which was addressed by archaeological conservator Sonia O'Connor in her paper 'Developing a Conservation Strategy in a Rescue Archaeology Environment' (O'Connor 1996). MAP 1 required that archaeological projects receiving funding from English Heritage should be planned in advance for both duration and cost. This management guidance was later supplemented in 1992 by MAP 2, which required that conservation needs be considered as part of the archaeological project and thus formalised the role of the conservator within excavation and post excavation processes (O'Connor 1996, 135). O'Connor believes that the introduction of MAP 2 further ensured that conservators were involved earlier in the project planning process and that time could then be built in for research and investigation (O'Connor 1996, 136). This support of archaeological conservation at all stages of a project effectively supported both the visibility of conservators to the wider archaeological profession and ensured their continued importance to archaeological excavation. MAP 2 was replaced by Management of Research Projects in the Historic Environment (MoRPHE) in 2006, and with Project Planning Note 3 covering archaeological excavation (Historic England 2017).

In November of 1990 Planning Policy Guideline 16 (PPG 16) was issued to planning authorities by the Government. This guidance imposed a formal framework on archaeological investigation and also shifted the burden of funding rescue archaeology away from English Heritage and towards those who were undertaking the development (the polluter pays principle). It required that provision be made for the care of archaeological sites and objects found in the course of development, but that excavation was a last resort and that ideally archaeology should be avoided or recorded and left in situ (Planning Policy Guidance 16 1990).

However, this guidance had the perhaps unintended result of opening up competitive commercial archaeology through increasing competition for contracts by archaeological units, which raised a number of concerns about both the quality of the work being

undertaken and also the long term survival and analysis of artefacts (Champion et al. 1995). It also contributed to the rise of the commercial archaeological units such as Wessex, PCA, and AOC Archaeology, three commercial archaeological units with national presence. The potential impact of the resulting competitive tendering on archaeological conservation was also recognised by O'Connor, who expressed concern that it might 'again be relegated to the margins as an expensive optional extra' (O'Connor 1996, 136). PPG 16 was replaced in March 2010 by Planning Policy Statement 5: Planning for the Historic Environment, which was then swiftly replaced by the National Planning Policy Framework (NPPF) in 2012 (Historic England 2017).

It is likely that this guidance had the largest effect on the archaeological conservators at the York Archaeological Trust, the only case study institution which primarily deals with freshly excavated materials (and where O'Connor was employed from 1981 to 1995), but there may have been smaller impacts on the archaeological conservators at the Museum of London. Unfortunately, none of the former and present Museum of London conservators interviewed for this research spoke of planning policy guidance, nor did current employees of the York Archaeological Trust. It must be assumed that there would have been some impact, but no evidence was found during data collection to support this theory.

A further example of the impact of policy on conservation comes in the form of the 2006 House of Lords Science and Technology Committee Report on Science and Heritage. The report committee called for the government policy on sustainability to be applied to cultural heritage, focusing on ensuring that future generations be given access to it, requiring an increased focus on conservation being given a high priority (University College London 2018). This report brought both national and international attention to the need to properly fund and safeguard conservation activities for the survival of history, arts and culture.

3.4.3 Additional Developments in the Professionalisation of Archaeological Conservation

A number of additional factors marked the transition of the role of the archaeological conservator from a skilled job, as seen during the craftsman/restorer period, into a profession. The first of these was the development of the formal professional bodies for

archaeological conservators, primarily IIC, then UKIC and SSCR, then, finally, ICON. There were other professional bodies in existence for archaeological conservators during the professionalisation period as well, such as the Scottish Society for Conservation and Restoration (SSCR), which published a journal focusing on all fields of conservation and was established in 1975 from the IIC-UK Scottish Group (Plenderleith 1998, 136).

In 2005, ICON was formed, enfolding the UKIC, the SSCR, and a number of other separate professional bodies that represented a variety of fields of conservation and restoration into one organisation (ICON 2015). This was intended to create a stronger base from which to support and promote the interests of the professional conservator as well as regulate and govern the activities of the conservator through the establishment of the professional accreditation programme for conservators and restorers (PACR) (Nelles 2017). ICON groups also facilitate training for conservators who have left formal education through supporting day courses, conferences, and workshops (ICON 2016d). Attendance at these is further supported by grants available from organisations such as the Anna Plowden Trust and the Clothworkers' Foundation.

Although the landscape for funding for conservators to attend conferences and development courses appears to have changed (seven conservators interviewed for this thesis identified lack of funding as an issue within their institutions), there have been important advances for conservation funding on a national level. Professor May Cassar, currently Director of the UCL Institute for Sustainable Heritage (who originally trained as an archaeological conservator in Malta) has been instrumental in influencing policy, serving as a special advisor to the House of Lords Science and Technology Committee Inquiry on Science and Heritage between 2005-2006. She may be credited with helping to obtain funding for the AHRC/EPSCR Science and Heritage Programme, which she then directed between 2007 and 2014 (University College London 2017). Cassar's position and successful obtainment of funding both served to raise the profile of conservation on a national level. Cassar continues to influence policy, currently serving as a member of the Department for Culture, Media and Sport's Science Advisory Council. She also has worked internationally on projects with the European Parliament and European Commission (University College London 2017).

An additional factor in the development of the professional archaeological conservator was the increase in books by conservators for conservators themselves and for those who were working with them, such as archaeologists. A few of these have already been noted, such as Plenderleith's (1934) and later Plenderleith and Werner's volume (1956), Biek's book (1963), Dowman's volume (1970), and Goodyear's contribution (1971), in addition to the other influential publications noted by Caldararo (1987) and described earlier in this thesis. After Dowman's volume a number of other texts were published, perhaps most significantly First Aid For Finds (Leigh 1972), a manual about conservation for the field archaeologist and now in its third edition (1998), with a fourth expected in 2019. Another extremely influential text was The Elements of Archaeological Conservation (Cronyn and Robinson 1990), which was meant to assist both conservators and archaeologists in understanding field conservation principles.

The professionalisation of archaeological conservation also led to an explosion in the number of papers published in journals and via conference proceedings. The identification of 'seminal' publications of this nature is difficult, given the extreme range of topics that fall under the heading of archaeological conservation. Some might include (but are not limited to) Corfield's article on reshaping archaeological metal (Corfield 1988), Johnson's on consolidation of bone (Johnson 1994), and Selwyn et al. on archaeological iron deterioration (Selwyn 1999). However, some of the most seminal regarding the treatment materials Paraloid B-72 and Soluble Nylon will be addressed in Chapter 4 of this thesis.

Conservators have also been involved in outreach to non-archaeologist and amateur archaeology groups, including metal detectorists. For example, archaeological conservators at the York Archaeological Trust were responsible for drafting the published conservation guidance notes distributed by the Portable Antiquities Scheme (PAS) to aid finders in caring for their objects (Spriggs 2003) and many conservators regularly speak to community groups about artefacts. The involvement of the archaeological conservator with the PAS has been of great importance, as raising the awareness of non-archaeologists of the importance of context, burial surroundings, and the damage that may be done through cleaning is key in increasing the possibility of conducting future investigative conservation on an object. Although the limitations of PAS materials are many in comparison to those recovered from

properly planned and recorded excavations, the work of archaeological conservators with the metal detecting community is still of great value.

Although it is interesting to reflect on how these factors affected the development of the profession of conservation and archaeological conservation, they were not focused on by the archaeological conservators interviewed for this thesis. This may perhaps be attributed to the more personal nature of their reflections about career which were encouraged by the wording of the interview questions.

3.4.4 The Age of the Formally Trained Conservator at the Case Study Institutions

The age of the formally trained conservator within the case study institutions appears in the 1950s and continues to the present day. However, the institutional histories become much less clear after the 1970s. This is in part due to an increase in data protection (institutions would not release lists of names of employees with dates of employment), a move towards computerised and telephone communication which greatly decreased the amount of information available in institutional archives, and the advent of the internet in the 1990s which meant that information posted on line could be removed, altered, or replaced regularly. Treatments began to be computerised in the 1980s, and none of the institutions allowed access to their computerised databases for this research. Therefore, the most recent history of archaeological conservation presented in this thesis relied more heavily upon conservator oral histories. These in themselves were not free of issue. Although some conservators freely elaborated on their professional trajectory and that of their former and current institutions, others chose to focus on parts of their career (interpersonal relationships with curators, specific archaeological sites, training programme experiences) that did not aide in fleshing out institutional histories. As referenced in Chapter 2 of this thesis, the interview questions primarily were designed to extract information about how conservators communicated with one another and how the archaeological conservation community shared innovations. Thus, the primary focus on the modern age of conservation is seen within the context of knowledge network theory, which will be covered in Chapter 4.

The institutional case studies do provide some information about this era, however. The beginning of the age of the Formally Trained Conservator at the Ashmolean can be dated to

1956, when new posts were created in the Departments of Eastern and Western Art and the Cast Gallery. These posts were filled by some of the first academically trained conservators, in part from the newly established Institute of Archaeology, and this brought the Ashmolean into the modern world of conservation (Norman 2001, 166). The attachment of conservators to specific departments within the museum continued until 1999, when a new Conservation Department was created and the seven conservators working within individual departments were brought together into one unit (Ashmolean 2015a). Mark Norman was made head of the new conservation department and is still in post today (Norman 2015).

Norman believes that the new combined conservation department has gone a long way towards bridging previous gaps in conservation coverage within the Ashmolean. The existence of the Conservation Department allows conservators to have a holistic approach to conservation of the entire collection rather than an object type specific focus. This has ensured that conservators are brought into discussion during the planning process for new exhibitions and that conservation concerns were addressed during the redesign of the museum which was completed in 2009. New conservation laboratories were also designed at this time, along with 400 individually controlled, high specification cases for objects. The Head of Conservation (Norman) is now directly line managed by the Director of the museum, which means the potential for high level backing along with the ability to influence decisions that might impact the health of the collection (Norman 2015). As yet, the department has been unaffected by cuts and employs three objects conservators, five paintings conservators, two paper conservators, a textile conservator and a projects conservator as well as hosting interns from training programmes and independent contractors. Freshly excavated archaeological materials are handled only when they relate to sites already in the collections of the museum and the museum does not currently conduct its own excavations (Norman 2015). The management of the team by a professional archaeological conservator since 1985 may be one of the reasons for the sustainability of interventive conservation roles within the museum has been preserved.

Conservation at the British Museum became increasingly professionalised after the Second World War. By the late 1950s, craftsmen who had originally undertaken work as restorers were gradually replaced by specialists who had undertaken the newly established

conservation training course at UCL's Institute of Archaeology (British Museum 2016). Shorer himself stayed in post for over 50 years, which he recognises in large part as due to his continued adaptation to changing technology and ethical approaches to conservation (Shorer 1997, 8).

One of the new breed of conservation professionals was Robert Organ, who was to stay at the museum through the mid-1960s when he was succeeded by Andrew Oddy (British Museum tenure 1966-2002). By 1975, the Department of Conservation had been created and combined with the Department of Scientific Research and the conservators who had previously been attached to individual curatorial departments within the museum were brought into a centralised department subdivided into object material types. These five subsections are metals, stone, ceramics, paper and organics, a classification division that has continued to the present day (British Museum 2016). The Department of Conservation and Scientific Research continues to employ both conservation scientists and material-specific conservators to preserve and research the objects within the British Museum collection.

Throughout the case study it may be seen that the trajectory of the development of archaeological conservation at the British Museum was extremely similar to that of the Ashmolean Museum in terms of the role of craftsmen/restorers until the advent of the First (and Second) World War(s) and the recognition of the need to investigate and ameliorate the degradation of the objects stored in sub-optimal environmental conditions in London Underground stations. The founding of Scott's scientific laboratory marked the national beginning of the role of conservation scientist and the legacy of that early laboratory has continued through to the present day.

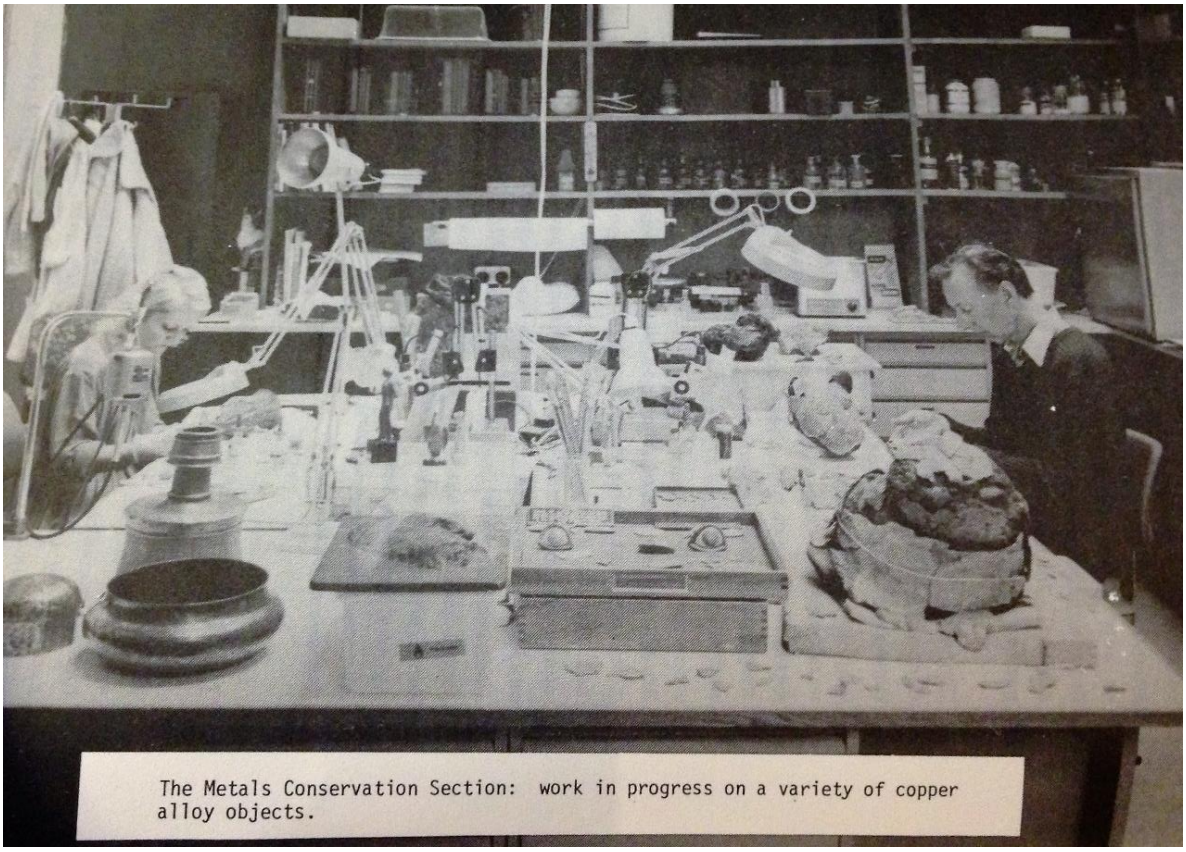


Figure 34: British Museum metals conservation section, circa 1985 (British Museum 1985)

At the National Museum Wales, although the word 'conservation' began to appear in the National Museum Annual Reports in the mid-1950s, the beginning of the era of the formally trained conservator occurred in 1971 with the appointment of a formally trained Conservation Officer. The NMAR reports it with great fanfare: 'The principal event in the curatorial sphere, however, has been the re-organisation made necessary by the appointment of a conservation officer by the Council of Museums in Wales. This officer will use and develop the departmental facilities for conservation work available alike to the National Museum and other museums in Wales; much work has already been done to modernise the laboratory and its equipment. '(National Museum Wales 1971).

This is of particular interest as the appointment of the Conservation Officer resulted in a modernisation of the laboratory and the addition of new treatment equipment. The Conservation Officer receives considerable mention in the departmental notes of the NMAR for the following few years and in 1975 more changes to the laboratory occur, including the very first employee hired to fill a specific Archaeological Conservator post. 'During the year

the conditions under which conservation work can be carried out in the department have greatly changed. The former Area Council Conservator, Mr. Graham Morgan, gave up his post and at the same time approval was given for a new Museum post of Archaeological Conservator. Ms. Wendy Turner, formerly conservation assistant to the Area Council, was appointed to the new post and has obtained the Museums Association Conservation Certificate (with distinction) at the University of London Institute of Archaeology (National Museum Wales 1975).

The report goes on to highlight an 'extensive purchasing programme' which resulted in equipping the laboratory with an X-ray unit. Work is described as including the cleaning of silver and silver-plated coins from museum excavations and for external clients such as the Gwynedd Archaeological Trust. The terms conservation and restoration are used seemingly interchangeably, with the report stating, 'In the field of restoration, a Neolithic pottery bowl from Mount Pleasant Farm, Nottage, a Bronze Age urn from Llanddyfnan (Ang., Gwynedd) and an Early Iron Age bowl from Twyn-y-gaer hill-fort, Cwmyoy (Gwent) have been reconstructed, and a copy has been made of a decorated stone spindle-whorl for a school at Conwy. Medieval floor tiles and a pottery mortar have also been restored, and a number of casts of Early Christian stones have been renovated for the new display being prepared for the proposed Early Christian Gallery. For the same purpose, a fresh latex mould and fibre-glass cast of the Catamanus stone, in Llangadwaladr Church (Ang., Gwynedd) has been made.' (National Museum Wales 1975).

Louise Mumford, one of the first to complete the Cardiff conservation degree programme begun in 1976, was hired by the Archaeology and Numismatics department in 1979 (commencing work on January 2, 1980, becoming head of laboratory in 1982 with the departure of Wendy Turner) and is still in employment at the museum today (2016) (Mumford 2016). Two more conservator posts were added in the 1980s and were filled by a variety of professionally trained archaeological conservators, including Mike Corfield, Diane Gwilt, Penny Hill, Kate Hunter, and Mary Davis.

Although the NMARs provide the most complete and regular information on the development of conservation within the department, it is essential to understand their limitations, some of which have already been addressed earlier in this case study. The National Museum Annual Reports are an annual snapshot of the departmental activities and

staff members deemed worthy of reporting at the time of the report, which changes over the years. The patchiness of the personal correspondence and reports found within the departmental archives results in the NMAR being the most complete chronology of conservation events, but it must be taken as a limited rather than a comprehensive record. The NMARs show a strong indication that conservation within the Archaeology Department at the National Museum Wales developed slowly and organically over time, with certain catalyst events creating a push for additional resources and training, particularly numerous large-scale excavations and the linked accessioning of new objects. Development surges clearly evidence a strong correlation to Plenderleith's pioneering conservation work at the British Museum and from the establishment of conservation education in the 1950s at the Institute of Archaeology. Additional entrenching of the role of professional conservator in the 1970s and early 1980s parallels development at other institutions.

Conservation provision within the National Museum Wales has been both centrally overseen by a head of conservation and attached to individual departments since the 1970s. However, since undertaking the original research for the Museum of Wales case study, the museum has undergone significant changes. The three archaeological conservator posts (overseen jointly by the Head of Conservation and by the Archaeology and Numismatics Department) have been reduced to one, which is held by Louise Mumford, who has been in place for nearly 37 years. One of the former archaeological conservators had become a scientific/analytical conservator as of 2014 but has now accepted a voluntary redundancy package (Davis 2016). A former geology department curator with no formal training or qualifications in conservation has been hired to perform the role of preventive conservator for the entirety of the museum (National Museum Wales 2016). The Archaeology and Numismatics Department has been merged with Social History and the collections have been relocated to the St. Fagan's site outside the city centre and a number of staff members have been offered both voluntary and involuntary redundancy (Davis 2016). Excavation and the associated accession of freshly excavated materials have stopped, and the museum is no longer currently involved in excavation. A further round of funding cuts has been announced and restructuring is expected in 2017 (Deacon 2016).

The beginning of the Age of the Formally Trained Conservator at the Museum of London really had its beginning in the London Museum when, in the years between 1946 and 1951,

Trotman continued his conservation training by attending evening classes and day release at the Institute of Archaeology (Johnson 2001, 138).

Specific examples of Trotman's work are mentioned in his obituary, which include a recreation of Laking's Roman boat in 1944 (which had been damaged by War Reserve Police) and the silver vessels from the Temple of Mithras in 1954 (Hebditch 1995). Somewhat of an all-rounder, Trotman also taught himself paintings conservation, clock conservation, scientific and mechanical objects conservation and exhibition mounting. In 1963, Trotman received support in his conservation work in the form of two school leaver trainees, Robert Salanson and Peter Sweeney, and in 1974 Fred Dungey joined the department as a conservator (Johnson 2001, 138). Trotman recognised the importance of scientific training in addition to apprenticeship-style training and encouraged Sweeney and Salanson to take the City and Guilds Laboratory Technician Qualification and to undertake day-release study for the Institute of Archaeology Conservation Diploma. Trotman also sent the two to other institutions to gain additional experience, and accepted students from other institutions for training in the London Museum laboratories (Johnson 2001, 139).

In 1972 Trotman engendered controversy over what some considered to be his over-treatment of a medieval wooden figure for the 'Chaucer's England' exhibition. It is posited by Johnson that this debate may have sparked the transition to conservation-based rather than restoration-based conservation within the London Museum (Johnson 2001, 138).

Although some of the early history of archaeological conservation at the Museum of London has already been touched upon in the description of Trotman's career, a more thorough examination of the role of archaeological conservation within the new organisation will now be undertaken. In 1964 the Guildhall and the London Museum merged to form the Museum of London and in 1965 the Museum of London Act formalising the amalgamation was passed (Museum of London 2015b). Although the two entities were now one, they did not share premises until 1975 when a new building was created (figure 35).

Figure 35: Museum of London building (Powell and Moya 1977).

During the time between the merging of the two collections and the move to the new facility, the pace of rescue excavation had increased so much that a professional unit was argued for and developed. Rector (the conservation officer from the former Guildhall Museum) took on a number of archaeological conservation assistants, including E. Sandford, M. Parrot, A. Edmonson, B. Scamell, A. Argyrakis and J. Andrews. This team was the first to move into the newly designed laboratories at the Museum of London site in 1975. Rector was extremely innovative - in addition to pioneering treatments for waterlogged wood and leather he also began using polyethylene fibre Tyvec labels for finds, a procedure that has become standard across Britain to this day (Johnson 2001, 141).

The new purpose-built conservation laboratories enjoyed by Rector and his team had been shaped tirelessly by Trotman of the London Museum (figure 36). Trotman personally designed both the laboratories and storage facilities to best suit the conservation needs of

the objects (Hebditch 1995). Trotman stressed the importance of proper environmental control within stores and galleries based on his own experience in unpacking the stored collections after the Second World War. Trotman also foresaw the need to raise the visibility of conservation within the museum setting and ensured that the new conservation laboratories were designed to reflect the change from craftsmanship to professional status. No longer were the conservators to be relegated to a basement workshop. The new laboratories shared a floor with the curatorial and administrative offices and had natural daylight, something extremely important for accuracy in assessing objects and colour matching. The laboratories also occupied a central space to further ensure dialogue with curators and management. Interestingly, Johnson also credits Trotman (who had started his career firmly within the apprenticeship tradition of craftsman/restorer) with insisting that conservators wear white lab coats rather than brown trade coats in the workplace, thus continuing to raise the profile of the profession (Johnson 2001, 139).

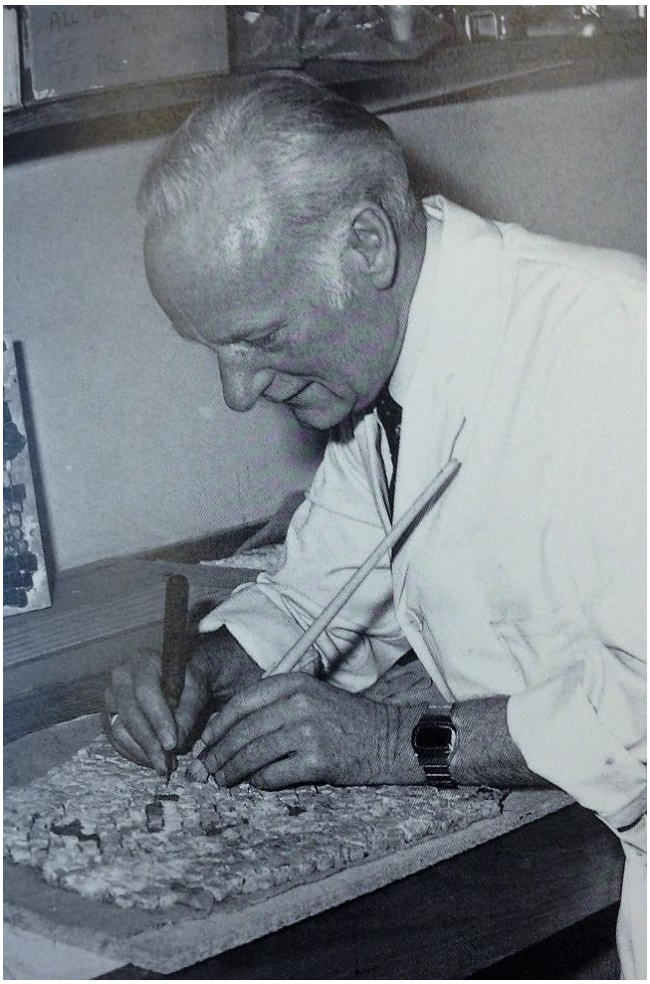


Figure 36: Arthur Trotman at work in the Museum of London conservation laboratory (Museum of London 2014).

Rector also played a role in the formation of the new laboratories. He argued for an increasing connection between archaeological field excavation and conservation and lobbied to include supervision of all preliminary treatment of archaeological objects and their storage to the conservation curriculum at the newly amalgamated institution. Although this did not occur in the 'upstairs' labs, Rector was partially successful in implementing conservation supervision of freshly excavated materials in the new Department of Urban Archaeology, housed in the ground floor of the museum in an attempt to incorporate the former Guildhall's archaeology unit into the new Museum of London services (Johnson 2001, 141).

Trotman continued to lead the development of conservation at the newly formed Museum of London after designing the laboratories. As the growth of rescue archaeology persisted in causing an increase in the number of artefacts requiring conservation treatment, the Museum of London took on additional archaeological conservators. By 1980 Suzanne Keene, Kate Starling, Rose Johnson, and Helen Ganiaris were working within the department (Ganiaris is still in place as of 2016, though in a different role). The early 1980s also saw a diversification of conservation skill hiring away from archaeology, with the addition of a paper conservator and the contracting out of paintings conservation. Rector retired in 1977 in failing health, and when Trotman retired from post in 1986 he was succeeded by Suzanne Keene. Keene was at the Museum of London between 1980 and 1992, becoming Head of Conservation upon Trotman's retirement (Ganiaris 2015).

Rector's and Trotman's careers both spanned the transition from conservation as a craftsmanship discipline to a science. University educated, Rector falls into the category of professional archaeological conservator whilst Trotman emerged from the tradition of craftsman/restorer and transitioned into professional conservator, doing much to increase the professionalisation of the discipline along the way. Both came together in the formation of the new Museum of London to create the first purpose-designed conservation laboratory facility with a focus on archaeological conservation.

In 1987 under Keene's direction the conservation department was reorganised into four specialist sections, consisting of paper, applied arts, archaeology and textiles (Johnson 2001,

139). Keene was followed by Kate Starling (Head of Conservation between 1992 and 1998). After Starling, Heads included Andrew Calver (1998-2008) and Rob Payton (2008-present) (Payton 2015). All of the Heads of Conservation since Trotman have been professionally trained archaeological conservators. The conservation department has remained faithful to the tenets established by Rector and Trotman and regularly hosts student placements to continue on-site training and to give trainee conservators a chance to gain experience and to enhance their skills (Payton 2015). There have been some changes to the way freshly excavated archaeological materials are processed, however. In 1991 the Department of Urban Archaeology merged with another department within the Museum of London, the Department of Greater London Archaeology, to become the Museum of London Archaeological Service (MoLAS). In November of 2011, the Museum of London Archaeological Service separated from the Museum of London and became an independent charity called Museum of London Archaeology, taking with it three of the archaeological conservators. Although the Museum of London itself still maintains two archaeological conservation staff, the majority of freshly excavated materials are now handled by the archaeological conservators at MOLA. The two organisations still work closely together (Ganiaris 2015).

3.4.5 The York Archaeological Trust

York Archaeological Trust as an example of the urban archaeological unit

The rise of the urban archaeological unit in the 1960s and 1970s has been largely attributed to the formation of the archaeological pressure group known as RESCUE (Council for British Archaeology 2013). RESCUE was formed when archaeologists and academics became concerned about the destruction of archaeology in rapidly re-developing areas due to the erection of large new buildings and roads in the construction boom following the Second World War. RESCUE undertook a series of large and well-publicised urban excavations in response to direct threats to specific areas. This was in an effort to combat the irrevocable loss of archaeological data exposed in a 1972 CBA report that showed that out of 457 at-risk sites, only 17 were recorded to an appropriate archaeological standard (Heighway 1972).

The institution selected for study for the purposes of this thesis is the York Archaeological Trust, which was established in 1972 in response to threats to archaeology due to increased

urban regeneration. The main instigator in the founding of the York Archaeological Trust was the Yorkshire Philosophical Society (afterward known as the YPS), a group formed in 1822 with the dual purposes to promote the study of the natural sciences and to combine the scientific collections of the members. By 1829 the Society had received what is now the Museum Gardens by Royal Grant, and by 1829 the Yorkshire Museum was built in the gardens to house the collections of the group. In 1961 the YPS gave the museum and associated land to the City of York in trust, an arrangement which was last revised in 2009. The administration of the Yorkshire Museum and Gardens is now overseen by the City of York Council, the York Museum and Art Gallery Trust and the Yorkshire Philosophical Society under the umbrella of the Yorkshire Museum and Gardens Charity. The York Archaeological Trust was created after the Yorkshire Philosophical Society joined the Council for British Archaeology in 1971 (Yorkshire Philosophical Society 2014).

Investigation into the establishment and formation of the York Archaeological Trust for this case study was undertaken through personal interview of several members of the YPS committee serving at the time of its foundation and through interviews with original staff members of the York Archaeological Trust, some of whom are now retired. Additional information was taken from grey literature surrounding the establishment, specifically the reports of the YPS and early unpublished bulletins concerning the work of the newly developed Trust found within the conservation archives. Additional information about the early days of the YAT conservation department was gathered through examining personal correspondence, lab reports and laboratory log books.

The influence and media presence of RESCUE was credited in the decision to found the York Archaeological Trust, as were plans underway to create an inner ring road in York which would disturb numerous known archaeological sites and result in the destruction of a number of historic buildings (Hampshire 2013). According to Hampshire, a former president of the YPS and an instigator in the creation of the York Archaeological Trust, the YPS was extremely concerned with the plans for development and believed that the best way to preserve the archaeological heritage of York would be to support the establishment of a dedicated team of archaeological researchers who could professionally record the sites threatened with destruction (Yorkshire Philosophical Society 1971, 8). Amongst such proposed developments at the time were an inner and outer ring road, five multi-storey car

parks, Lord Esher's proposals for central York, and extensive urban renewal in general, all with archaeological implications. The city seemed about to face archaeological devastation (Addyman 1992, 37). A committee was proposed to the society by Herman Ramm and it eventually joined forces with the Council for British Archaeology under Alan Butterworth, then Curator of the Yorkshire Museum. It was chaired by Professor Maurice Barley, chairman of the Urban Research Committee at the CBA (Addyman 1992, 38).

The first task of the newly formed committee was to commission a report on the archaeological threats hanging over the city and to evaluate the particular research needs of York, discovering ways to promote the necessary research within development constraints (Addyman and Rumsby 1971). The YPS committee was influenced by the recently established archaeological committees in Winchester and Oxford and '…recommended a permanently constituted excavation unit with staff, premises, laboratory, labour and funds to carry out round-the-year excavations.' (Addyman 1992, 37). These recommendations were supported by grants of £50 from RESCUE and £15,000 from the Department of the Environment. The York Archaeological Trust for Excavation and Research was formally constituted from the working committee on 28 April 1972. Premises were secured at 47 Aldwark and the first two formal staff members, Peter V. Addyman and Jim Spriggs, a conservator, took up their posts in October 1972 (Addyman 1992; Spriggs 2013).

Further interviews with Peter Addyman and Jim Spriggs provided greater detail about the early operations of the newly formed Trust and about Addyman's insistence on the importance of building conservation into the organisation from the beginning. Much of this may be traced to Addyman's early archaeological career.

In the year between leaving school and entering university at Cambridge, Addyman took part in four or five Ministry of Works rescue operations. One of these was a Bronze Age farm in Dorset at Chalk Down, under the direction of Philip Rahtz. At this excavation Addyman met Leo Biek of the Ancient Monuments Laboratory, previously mentioned in section 3.3 of this thesis. Biek had set up a site laboratory for remedial conservation but identified as an analytical scientist rather than as a conservator, though he performed both tasks (Addyman 2013). During Addyman's first vacation at Cambridge he worked with Martin Biddle at Nonsuch. The artefacts excavated were very sensitive, and, remembering his earlier introduction to Leo Biek, he took a number of them to Bridge House in London for

conservation. At this time Biek was assisted in his work by Ken Barton, who eventually became the director of Hampshire Museum Services (Addyman 2013).

Addyman's association with conservation continued through his early career. His first job was at Queen's University Belfast, where he was research assistant to Martin Jope, who had a laboratory and worked with Stephen Rhys, who had been educated at the Institute of Archaeology (IoA) in the 1950s. Rhys was an associate of Ione Gedye and was also the son of S.R. Jones, a picture conservator at the Courtauld. These early career associations further impressed upon Addyman the need for conservation to accompany archaeology.

Addyman's next post was at Southampton with Barry Cunliffe. Cunliffe persuaded the university to set up a post in conservation and a conservation laboratory. David Leigh, a recent graduate of Gedye's programme at the IOA, was taken on to fill the post (Leigh 2016). Between 1967 and 1972, Cunliffe, Addyman and Leigh established an archaeology course at Southampton and as a result all of their archaeology students were exposed to the importance of archaeological conservation (Addyman 2013). According to Addyman, Leigh was fervent in his espousal of conservation as an essential component of excavation and thoroughly stressed the need for an archaeological conservation laboratory to be in place to receive artefacts prior to the commencement of site excavation (Addyman 2013).

A major event in Addyman's time at Southampton was the Chalton Anglo-Saxon settlement excavation, which was co-directed with Leigh. Addyman states that it became the norm to integrate conservation into the archaeological work. During this time Addyman and his friend Martin Biddle also became very interested in urban archaeology.

'In the 1960s development was tearing up the post-Roman archaeology. The nation was ruining towns. The M5 was being constructed. Peter Fowler found hundreds of archaeological sites along it. Gravel pits were destroying the archaeology. A number of groups met at Barford near Warwick as all were steamed up. It was a Friday, Saturday, Sunday meeting as we felt something had to be done to combat the destruction. We set up RESCUE, got a publicist involved, gained 700 members within the year and a tenfold increase in government spending on rescue archaeology. There was suddenly a lot more archaeology to do! This was the scene for York. Locals had heard RESCUE's roar about destruction and 6 car parks and ring roads were already planned. I was cornered at a

conference and spent the summer doing a feasibility study. I took students and sent in a report wanting to set up a five year ad-hoc team. I was persuaded to come and set up the Trust with my wife, Shelly. I didn't want it to be part of the University or part of the Council, so we came up with an Independent Charitable Trust with the purpose to educate. I took the post in October of 1972. We had to dig first. We set up at normal academic rates and I had learned from David Leigh that you had to have conservation in place before you go digging things up. Jim Spriggs actually arrived six weeks before I did and was technically the first employee of the YAT' (Addyman 2013).

Figure 37: Jim Spriggs, first conservator at the York Archaeological Trust (Unknown 1974).

Jim Spriggs also has clear memories of the early days of the York Archaeological Trust. As the first employee, he arrived in York to find 'tremendous amounts of goodwill but a bit of a primitive laboratory situation' (Spriggs 2013). Spriggs had trained at the Institute of Archaeology under Ione Gedye, who was infamous for throwing Christmas party hiring fairs to which she invited her students and anyone she knew who might be interested in

employing conservators. At the Christmas party in 1971 Spriggs was introduced to David Leigh, who was at that time still working with Peter Addyman in Southampton. Leigh had been asked to attend Gedye's Christmas party by Addyman in order to find a good conservator for the newly developing York Archaeological Trust and Gedye selected Spriggs as the appropriate candidate for the role (Leigh 2016). Spriggs was taken on after receiving his Diploma in Conservation in 1972 (a three year course at the time). Spriggs had 'no idea' what to expect upon his arrival in York but worked well with Addyman, who trusted and expected him to 'just get on with things' and was extremely busy overseeing the rest of the work of the YAT (Spriggs 2013). The first two goals set for Spriggs were to establish a laboratory and then to keep an eye on all the excavation work, which consisted of checking on packaging and ensuring proper storage for finds. Spriggs was allowed to select whichever artefacts he preferred to clean up and conserve for display or publication purposes, but remembers the early days of conservation at the YAT as being mostly about safe storage as there was much more material than could be dealt with in the laboratory space available (Spriggs 2014).

Establishing a Conservation Laboratory for YAT

The space set aside for conservation was based at the Yorkshire Museum in Museum Gardens and in return for the room Spriggs was expected to complete a certain number of conservation hours for the museum. Spriggs remembers that the most difficult part of settling into his new role as YAT conservator was learning to navigate the politics between the Yorkshire Museum and the new YAT (Spriggs 2014). Addyman also reflected on this, believing that the Yorkshire Museum archaeologist at the time felt threatened by the establishment of the YAT and tried to avoid working with them whenever possible, even to the point of sending things to the British Museum for conservation rather than allowing the YAT conservator access (Spriggs 2013; Addyman 2013).

The first conservation laboratory was a tiny room in the Yorkshire Museum basement, which was quickly vacated for a slightly larger space composed of two rooms within the basement of St. Mary's Lodge in the Museum Gardens (figure 38).

Figure 38: St. Mary's Lodge, Museum Gardens, York (Watts 2015)

Addyman remembers setting up the lab by asking Spriggs what he would need to successfully perform the role of conservator. Spriggs, being formally trained and with a good understanding of the importance of investigative work, indicated that an x-ray machine was a top priority- so Addyman posted an advertisement asking for a redundant one in a dental magazine (Addyman 2013). Everything was set up on a very low budget and Addyman recalls that Spriggs was running a very professional laboratory operation within months of his arrival. Subsequent research in the archives of the York Archaeological Trust revealed extensive photographic, x-radiographic and treatment records beginning in November of 1972.

Spriggs remembers the early days of conservation at the Trust as presenting unique problems. He stated that 'People in museum work had a clear idea of what they would do but conservators for archaeological units had no idea, other than that their conservation work would involve a very high volume of materials. The Yorkshire Museum couldn't deal with the amount of excavated material and we had to create our own systems for storage and conservation. Finance was a major issue and in equipping the first laboratory we had a budget of only £200 for setup. I had one microscope, some ancient glassware and had to beg, borrow and steal everything else. I succeeded in getting a lot of old stuff from the

science laboratories at the University of York. Funding for the conservation laboratory remained tricky and the Galmanhoe Lane laboratory development (the conservation laboratory moved to Galmanhoe Lane in 1981, to a building provided by the North Yorkshire County Council) was a result of major fundraising for the Coppergate excavations (and a grant from the Danish Tjaereborg Foundation of £30,000). We didn't have any developer money or any real money from the City Council, so we had to resort to our own devices and thus we cranked up the publicity with Blue Peter and other TV appearances, which were very successful after the hiring of a PR fundraising team. All the stuff for the laboratory was donated, including the flooring and the blinds, or purchased cheaply as ex-demo. It was the early 1980s, prior to Thatcher…People were excited by archaeology' (Spriggs 2013).

Figure 39: Coppergate excavation, York (York Archaeological Trust 1978)

One of the greatest challenges for the fledgling laboratory at the YAT was establishing a system of treatment records. In the beginning there were no computers, but it was essential to keep a record of everything as well as two extra copies. Spriggs bought a copybook and used a sheet of carbon paper. The top copy contained a little sketch and sometimes a contact print and stayed with the object. The book stayed in the laboratory. This system was in use from 1972 until around 1990, when the first computer was acquired

for the laboratory. The old book records were put onto microfilm and some collections were added to the Integrated Archaeological Database (IADB), the current database system used by the YAT (Spriggs 2013).

The York Archaeological Trust has changed substantially since 1972. As mentioned above, publicity campaigns in the 1980s and the establishment of Jorvik brought in additional funding and changes in direction for the YAT. The conservation laboratory also kept pace, taking in numerous student placements and interns beginning in late 1972 and with the hiring of a conservation assistant for Spriggs in 1974. By the 1980s the laboratory had grown and employed four conservators, including Julie Jones and Sonia O'Connor (O'Connor 2016). A large number of student placements were also taken on over the years, from all the past and current conservation programmes in the UK (Cardiff, Durham, Lincoln, Bradford and UCL) as well as a number of international programmes in the United States, Europe and Asia.

After the Coppergate excavation began in the late 1970s (figure 39) the laboratory became well known for treatment of large scale waterlogged objects and appropriate freeze-drying treatment equipment was acquired. The Coppergate excavation and the subsequent establishment of Jorvik Viking Centre as a promotion for the work of the YAT were credited by Addyman in securing the stability of both the Trust and the conservation department (Addyman 2013). This excavation also provided an example of the way in which conservators are to some degree at the mercy of the end client- in this case, the treatment of the York Helmet, Anglo-Saxon in date and discovered during the course of the Coppergate excavation. The helmet was immediately claimed as the property of the York City Council, who owned the site, and they viewed it as an object of art rather than as a source for archaeological knowledge (Corfield 1988, 263). Despite the protests of the conservators of the York Archaeological Trust, the helmet was fully restored by the British Museum and under such time constraints that the programme of detailed conservation recording and analysis requested by the conservation team at YAT could not be undertaken. The resulting over-restoration and dent removal of the metal components removed what were almost certainly indicators of the way in which the helmet had been made (Corfield 1988, 264). This type of reshaping, common in the craftsman/restorer period, was already unusual in the early 1980s due to the advancement of scientific understanding in

archaeological conservation, and it is now only undertaken if strictly necessary and after careful consideration of all other options, including the creation of a replica for display (Corfield 1988). This event does provide an example, if extreme, of the constant importance for conservators to provide education for other heritage professionals as well as outreach to the public.

The move to Galmanhoe Lane allowed space for additional work to be taken on from other parts of the country and York became known as a centre for waterlogged wood and leather conservation. As this was and is a fairly unique specialism, YAT began to take in external contract work for other units around the country and abroad. Addyman credits the success of conservation at the YAT with having been extremely fortunate in the person of Jim Spriggs, who has played an active part in national conservation politics and international waterlogged wood treatment development for the past 40 years (Addyman 2013).

In 2006 Spriggs retired from the York Archaeological Trust and the laboratory relocated to new premises on Aldwark. The current head of the laboratory, Ian Panter, is in demand as a consultant on waterlogged archaeological sites and to museums around the country. Although voluntary and involuntary redundancies have been made at various financial crunch points in the past, there is relatively little danger of the conservation lab being eradicated as in addition to supplying conservation to the materials excavated by the unit, it also provides a positive cash flow for the YAT.

3.5 The Current Landscape of Archaeological Conservation

3.5.1 Current Issues within the Profession

As noted above, the historical evidence for the case study institutions became increasingly difficult to uncover after the advent of the age of computing and data protection. The autobiographical nature of the interview questions also may have influenced conservator respondents to reflect on their personal experience rather than consider issues within an institutional context. Further information about the current state of the profession was therefore derived from topics brought forward in the conservator interviews. Two issues were consistently brought up by interviewees across all experience levels. These were the role of volunteers in conservation and the decrease in practical conservation time/increase in ratio of preventive conservation.

3.5.2 Volunteers in Conservation

The appropriate use of volunteers in the sector is something that was brought up by 26 of the 87 interviewees. This has become an increasingly contentious issue in recent years as financial constraints have resulted in the use and reliance upon volunteers to perform a number of roles within the museum sector normally undertaken by paid professionals, including aspects of conservation, something which also was highlighted in a previous project undertaken by the author (Schmisseur 2015). Although the data within the report covered only the Yorkshire and Humber regions and was not exclusive to archaeological conservation, it presents an interesting picture of the current state of conservation.

The data revealed that 75% of the museums surveyed reported that they relied on volunteers to undertake general conservation and collections care work. In only 32% of these cases was a conservator used to provide training to the volunteers undertaking the work (Schmisseur 2015, 6-7). Professional conservators who attended the follow-up meeting after publication of the report expressed concern for two reasons. The first is that volunteers are being used as a cost saving measure by museums, highlighting the lack of understanding of the benefits of employing a professionally trained conservator. The second was that when volunteers are being used, conservators are not being consulted to

provide training, the end result of which may be well-intentioned work being carried out that actively contributes to the decay or damage of objects (Conservator Meeting 2016).

An example within the field of archaeological conservation which brings together both of these concerns is 'Anglo-Saxon CSI: Sittingbourne', a community volunteering project which was led by a well-respected and highly experienced archaeological conservator formerly of the Museum of London, Dana Goodburn-Brown. The project allowed members of the public to conduct investigative conservation in a laboratory setting under supervision of a professional conservator. The project was unique as '…it is one of the first times that public volunteers have been used to conserve archaeological objects. It is also the first time the public has been allowed to see the conservation process in a public domain, making this truly interesting.' (Anglosaxoncsi 2016). Due to what was perceived by some members of the professional community to be an inappropriate de-professionalisation of the role of archaeological conservator, the project and the project instigator received significant backlash in the early years. However, over time the community has come to appreciate the public education angle of the project and the level of supervision under which the volunteers are working. Additionally, the level of interventive work carried out by non-professionals has been accepted as appropriate. This approval has been evidenced by the awarding of the Keck Award in 2012 by the IIC, a cash prize given to the individual or group which has contributed most to the public understanding of conservation (IIC 2016b). The use of volunteers in conservation may be a contentious or fear-inspiring issue for many conservators, but the Anglo-Saxon CSI project shows that with careful direction, appropriate application of volunteer input may be achieved. Further potential use of volunteers will be addressed in the conclusion of this thesis.

3.5.3 Preventive Conservation

As seen in the above case studies, the most recent period in the development of the professionally trained archaeological conservation includes the distancing of the profession from interventive treatments and the marked increase in ethical debates within the sector. Although preventive conservation has been around in some form since the days of Elias Ashmole's request for chimneys in the Ashmolean to provide ventilation and reduce mould growth, the act of preventive conservation as an alternate and complete approach to

conservation in which conservators could specialise was not defined by the profession until relatively recently. This increase in focus on preventive conservation has been reflected by a rise in appearance in conference topics and an increase in related journal articles.

Simon Lambert (currently working at the Canadian Conservation Institute who gained an MSc from Cardiff in 'Care of Collections', a degree related to conservation) identifies the term 'Preventive Conservation' as first being used in the early 1970s (Lambert 2014, 2). It was defined by the International Council of Museums Committee for Conservation at the 2008 meeting in New Delhi as 'All measures and actions aimed at avoiding and minimising future deterioration or loss…These measures and actions are indirect- they do not interfere with the materials and structures of the items. They do not modify their appearance. Examples of preventive conservation are appropriate measures and actions for registration, storage, handling, packing and transportation, security, environmental management (light, humidity, pollution and pest control), emergency planning, education of staff, public awareness, legal compliance '(ICOM-CC 2016b). It is more broadly defined by the Getty Conservation Institute as, 'Any measure that reduces the potential for, or prevents, damage…focusing on non-treatment rather than treatment' (Getty Conservation Institute 1992, 4; Caple 2011, 1).

The importance of preventive conservation truly came to the fore during the interwar period, when work done by Scott and later Plenderleith at the British Museum led to the discovery that controlling the temperature and relative humidity of materials would lead to less degradation (Caple 2011, 8). Technological developments such as improvements in monitoring instrumentation also meant that it became much easier to monitor conditions within storage and display cases, which further progressed the cause of preventive conservation (Caple 2011, 9). By the 1960s, the International Institute of Conservation for Historic and Artistic Works (IIC) dedicated an entire conference to Museum Climatology, and by 1978 the volume *The Museum Environment* was published, bringing awareness of environmental controls for conservation to a broad international audience (Caple 2011, 9).

During the course of interviews for this work, four of the more experienced archaeological conservators (trained in the 1960s-1970s) identified the 1970s and 1980s as a time of 'luxury' in archaeological conservation or as 'the good old days'. Reasons given for this included increased excavation, the experience of working in a field that was experiencing

exponential growth and publicity, and the sense of exploration and of being able to attempt new treatments. Although the demarcation line as to the end of the 'good old days' is less clear, four conservators who had reached retirement age determined that it coincided with the beginning of the 1990s and a sense of a loss of freedom in experimentation. Although all of these conservators were also quick to state that control of the environment surrounding an object was vastly preferable to interventive treatments that impact the composition or inherent qualities of an object, it would be remiss to ignore the changes that the rise of preventive conservation have brought to the profession, although mostly positive in terms of the objects, but perhaps with negative drawbacks to the future of the role of archaeological conservator. This was further borne out in the interviews in answers to Question 15, selected excerpts from which have been anonymised:

'The rise of preventative conservation (has been the biggest change during my career). The whole thing of intervention has gone to minimal intervention. Collections care has been brought about by lack of funds as no one is willing to pay for it (archaeological conservation). There isn't money, so that is why we can't conserve objects in the way we used to.' (Subject 12, trained in 1970s)

'People have moved much more away from the interventive approach. We are much more aware of the consequences than 40 or 50 years ago. We are lucky we can do this as we work in a museum- in private practice at the mercy of clients it's a harder line to hold.' (Subject 30, trained in 1960s)

'Collections care/preventative (has been the biggest change) between the 1980s and now. Things were not as rigorous in terms of science. We now don't feel so confident because there are conservation scientists who do it and are more trained and professional- something has been lost for us. Minimum intervention is a big change. We were doing things in the 1980s that we would never do now.' (Subject 56, trained 1980s)

'For archaeology, when we were trained it was highly interventive- now we are more concerned with making sure that we do as little as possible.' (Subject 17, trained in 1970s)

'We have conservators doing a lot of other museum things that other staff should be doing and that means that we are deskilling our conservators. Conservators are not touching complex objects anymore. A lot of work is done for exhibitions and the objects chosen are

in good condition. People are not getting to do as much conservation as they would like to, it's more collections care.' (Subject 41, trained 1980s)

'Now there are collections care people coming straight into preventive conservation jobs with a masters, but they don't understand objects and object care in the same way as a conservator would. Any trained conservator can do collections care and not every collections care can do conservation- preventive conservation is only one small aspect.' (Subject 13, trained in 1980s)

'Loss of practical work time has been made up by more collections care time. Pest, environments, stores, galleries checks, huge increase in amount of projects/management work/collections care at the same time practical is going down severely. That reflects a change from the early days when people spent a lot of time doing highly interventive practical work where it wasn't needed (every object in the 1970s involved a lot of restoration work, which is probably unnecessary in hindsight). Now we look at the picture in a more holistic way, instead of 30 hours looking at one object we spend 30 hours looking at collections care side of 3000 objects or more. It does impact on aspirations of fresh conservators coming out who are not getting so much practical work.' (Subject 22, trained 1970s)

The concerns voiced by Subject 22 were evident in the literature. Several authors have recently addressed the 'downskilling' of conservators, most recently Jonathan Ashley Smith (former head of Conservation at the Victoria & Albert Museum). Ashley Smith cites the priority given by museums and other heritage employees to collections surveys and storage rather than to practical hands-on conservation (referred to in this thesis as interventive conservation) as being in part responsible for the decline of skills amongst conservators (Ashley Smith 2016, 119). Returning to the ICOM-CC definition of the Conservator-Restorer given in the introductory chapter of this thesis, we see that the practical is inextricably linked with the profession: '…manual skill must be linked to theoretical knowledge…' (ICOM-CC 2016a).

Ashley Smith's paper came about as a result of an increase in concern amongst the profession that these practical skills, an integral component of the profession, are being lost at many levels (Ashley Smith 2016, 128). Previous work has been done within this area.

Robert Payton, who was interviewed for the case study on the Museum of London, highlighted his concerns on the decrease in practical conservation time spent within the institution in the interview for this thesis and in an unpublished paper given at the British Library Collection Care Conference in 2013. Through keeping records during his time as Head of Conservation at the Museum of London, Payton found that, 'If we compare the amount of time that the department worked on practical conservation related work in the 1990s it averaged around 50-60%. By 2012-13 this was down to 21%. In the same time period the amount of time spent on collections care was the reverse- on average <5% in the 1990s and up to 24% in 2012-2013' (Payton, 2013; Ashley Smith 2016, 129). Payton's findings were echoed in sentiment by the majority of the more experienced conservators interviewed for this thesis, many of whom related that their daily tasks had changed significantly since the early days of their careers with a marked decrease in practical or 'bench' time (although it must also be acknowledged that this may have resulted in part due to an increase in management duties related to seniority). However, two conservators trained in the 1960s and six conservators trained in the 1970s stated that they believed that there now are fewer interventive treatments performed on archaeological objects overall in comparison to earlier decades when answering Question 15 (Appendix A).

Although the general perception amongst the archaeological conservators interviewed for this thesis and the conservators interviewed by Ashley Smith is that there is a general trend towards a decline in the 'amount and complexity of (conservation) interventions in museums', it is difficult to pinpoint the reasons for this. Ashley Smith believes that the reasons might be related to an increase in the emphasis on ethical principles within conservation, specifically minimal intervention and reversibility (Ashley Smith 2016, 129).

This recent work by Ashley Smith also cites a downskilling in practical work at conservator education level (Ashley Smith 2016, 124-125). This finding, however, was not supported by the research into archaeological conservation training undertaken for this thesis. The professional archaeological conservator trained at London, Durham, or Cardiff has undertaken at least one year of intensely supervised laboratory work as well as a full time work placement in a 'live' environment, either a museum or an archaeological unit. Admission to the programmes requires a background knowledge of chemistry, in the case of London a good mark at A-level (Cardiff and Durham have similar requirements but are not

explicit about the need for an A level in Chemistry). This serves to ensure that the emerging archaeological conservators are capable of conducting the investigative and interventive work required of the role as well as being able to understand and monitor the environment in which to stabilise an object without physical intervention (preventive conservation).

Ashley Smith has previously speculated on the reasons which may be driving the loss, stating in 2008 that 'It is my belief that 'minimum intervention is an institutional ploy to save money and to cover up a lack of skills' but he is not alone, and the phenomenon is not limited to the UK (Hassard 2008, 98). David Hallam, an American conservator, believes that, 'Preventive conservation is a great 'cop out' for those who do not have the science basis or practical skill to carry out successful treatment of difficult, unstable, or 'unreadable' objects' (Hallam 2011, 14; Ashley Smith 2016, 129). Feeling amongst Ashley Smith's anonymous conservator respondents was that the need for interventive conservation would always be there, regardless of the new emphasis on preventive conservation. 'To put it bluntly, objects fall apart and get broken and they need to be fixed.' 'Boxing things and storing them in good conditions is great; but a box does not magically repair material that is falling apart.' (Ashley Smith 2016, 130). Similar responses were given by conservators interviewed for this thesis. Although there is a perceived need amongst conservators for the continuation of interventive work, the concern is that there may be an issue in making this understood by museum and other heritage professionals. This is an issue for the future of the profession that will be discussed further in the conclusion.

There is one issue which may be affecting the employment of archaeological conservators which is not addressed within Ashley Smith's article. Since the 1990s a new type of qualification has been increasingly popular for those who wish to work within the heritage sector. This is the museum studies postgraduate degree or diploma. A programme delivered at many universities around the country, the content varies. 'Conservation and Collections Care' is often offered as a module within the degree (University of Leicester 2016; Newcastle University 2016). However, this 'conservation' education bears scant resemblance to that taught on the three archaeological conservation programmes, which spend a great deal of time focusing on interventive and investigative methods.

Focusing primarily on basic environmental controls such as relative humidity, temperature and light, students leave the courses with the ability to claim that they have received

training in museum conservation yet without the laboratory skills or deeper understanding of how to deal with complex composite archaeological objects. This rise in non-conservators practicing preventive conservation combined with the decrease in practical bench work within institutions highlighted by Payton and Ashley Smith will be further investigated below.

3.5.4 Jobs in Archaeological Conservation

A total of fourteen conservators interviewed for this thesis who graduated in the 2000s and 2010s specifically referenced a lack of jobs for archaeological conservators as a part of their response to Question 14 (Appendix A). Conservators from the earlier time periods were far less likely to refer to lack of jobs as a current issue facing the field, which may be attributable to their job security as senior professionals. Anonymised excerpts included the following:

'We are always fighting a rear guard action- conservators are always the first out the door when cuts come.' (Subject 81, trained 1970s)

'Fewer jobs, even in the seven years I've been involved in conservation. Even fewer jobs now.' (Subject 38, trained 2010s)

'I think there is higher public awareness of what we do, but it has not been matched by the amount of actual jobs in conservation.' (Subject 70, trained 2000s)

'There are not enough jobs out there for archaeological conservators. I only have two friends who have been successful in finding a job working with archaeological objects.' (Subject 8, trained 2010s).

'Staff cuts, both conservators and museum staff. Across the sector we don't have enough levels of staff to do the basic work.' (Subject 32, trained 1990s)

Finding data to examine to investigate these perceptions was challenging, as job postings since 2000 increasingly have been in online fora, subject to regular purge and deletion. Ultimately, an examination of the jobs advertised on the ICON Iconnect jobs bulletin (an email posting sent regularly to members of ICON, containing jobs of interest to the conservation profession) was undertaken. It is acknowledged that this approach has a number of potential limitations. First, ICON jobs listings may not provide a full picture of the

jobs available to archaeological conservators as there are other venues in which they are advertised, such as the Museum Jobs website and the Conservation DistList (an online service which will be more fully examined in Chapter 4 of this thesis). However, Museum Jobs does not provide an archive of postings and charges a high fee to display posts (potentially putting conservation departments off of advertising with them), and the Conservation DistList is based in the United States and tends to advertise fewer UK-based jobs. Therefore, the ICON jobs mailing is considered to give the best overview of available jobs for conservators seeking work in the UK.

Covering the three year period between May 2013 and May 2016 (which is when the researcher began saving job email bulletins), original job adverts specifically requiring formal training in archaeological conservation were tabulated, as were those which could be undertaken by archaeological conservators (e.g. Organics Conservator at the British Museum, Regional Conservator for English Heritage). These were divided into full time permanent posts and fixed term or part time posts. Jobs that did not specifically require a conservation degree and referenced preventive conservation duties (often advertised as requiring 'relevant conservation experience') were also tabulated and divided into the two categories above. The intent of this analysis was to determine the reality of the trend perceived within the profession of a decrease in jobs for archaeological conservators as well as to show whether there had been a corresponding increase in posts that could be filled by those without a specific conservation qualification. This data is charted below in figure 40.

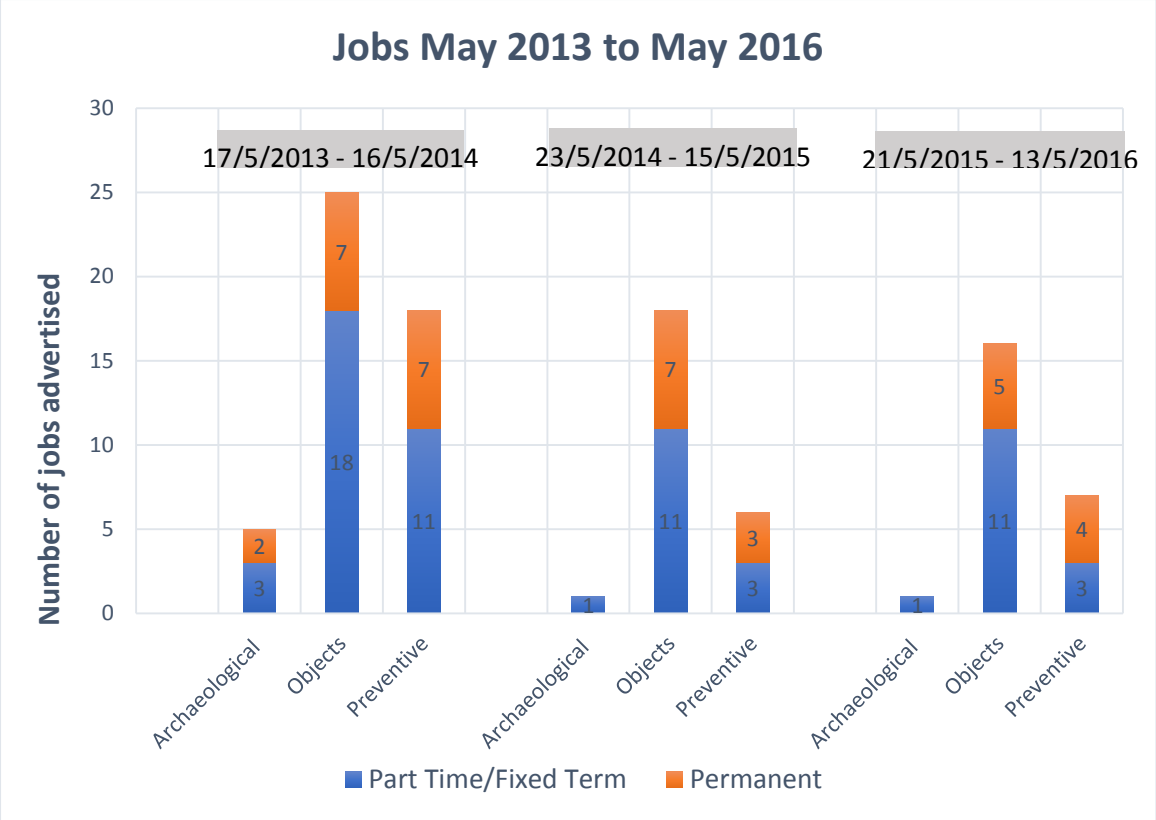


Figure 40: Jobs for Archaeological Conservators

A number of trends are apparent in the data, though the sample size is very small. Over the three years examined, the number of permanent jobs advertised specifically for archaeological conservators is very low. Two jobs were advertised between May 2013 and May 2014, with zero jobs advertised between May 2014 and May 2016 (known as 2013, 2014, and 2015 going forward). The other two categories of objects and preventive conservation jobs, both of which a person holding an archaeologically-based conservation qualification would be qualified to perform, were slightly higher. Sixteen permanent jobs for which archaeological conservators were qualified were advertised in 2013, ten in 2014, and nine in 2016. Permanent jobs under the banner of preventive conservation that did not require a specific degree in conservation actually showed a significant decrease across the period, with seven jobs being advertised in 2013, three in 2014, and four in 2015.

Part time and temporary jobs were generally more common. In 2013, a total of three jobs were advertised for archaeological conservators, followed by one job in both 2014 and 2015. For objects conservation jobs, a total of eighteen were advertised in 2013 with eleven

in both 2014 and 2015. Preventive jobs went from a total of eleven in 2013 to three in 2014 and four in 2015.

The results of the permanent job analysis show that specific archaeological conservation jobs are very rare. Objects conservation jobs are far more common, though a significant drop was seen between 2013 and 2014, from 18 to 9 jobs, the same number advertised in 2015. Preventive conservation jobs showed a large drop between 2013 and 2014 as well, but again remained steady between 2014 and 2015. There were 32 total jobs advertised for those with an archaeological conservation qualification in 2013 and fifteen for both 2014 and 2015.

The data for both part time/temporary jobs and full time/permanent jobs reveals a significant decrease between 2013 and 2014. There are no known external causes for why the drop would occur across all three categories, though a longer term analysis of jobs data might reveal a more definite pattern and it would be of great benefit to be able to follow job adverts across the period before and after the recession of 2007, which was not possible. However, what is not borne out in this small sample of data is the perception within the profession that a lack of jobs for archaeological conservators correlates to an increase in preventive conservation jobs that do not require a formal conservation qualification and do not have an interventive conservation component. What is concerning, however, is the drop in total jobs for archaeological conservators in relation to the number of new professionals graduating each year from the three main training programmes. If this trend continues, the conservation community and the reach of knowledge networks may be severely impacted. Using data from the interviews, the conservation community as it stands (2016) will be examined in the next chapter.

Chapter 4: The Diffusion of Treatment Ideology in Archaeological Conservation

4.1 Introduction

This thesis has raised a number of questions about the ways in which ideas and treatment methodologies spread through the archaeological conservation profession in the UK in the 20th century. Chapter 3 has suggested that the biographies, training and networks of individual conservators played a crucial role in this process, set against the context of major institutions and key archaeological projects, and notwithstanding the emergence of national and international professional bodies and standards in the field. In this chapter, the close link between individual conservators and the spread of technologies via networks of knowledge will be explored in several ways. First, careful thought will be given to ways of approaching mechanisms of knowledge and technology transfer, drawing on relevant historiography and theory (4.2) from which a series of questions about knowledge transfer within the conservation profession are developed. The chapter will then consider the role of communities within archaeological conservation (4.3), followed by a detailed case study of two treatment materials: Soluble Nylon and Paraloid B-72 (4.4). These treatment materials have undergone significant change in popularity and use over the past 50 years, which can be tracked through interviews with conservators considered earlier in this thesis, and by the appearance of these materials in the contemporary published literature.

The decision to focus on Soluble Nylon and Paraloid B-72 as a means of understanding methods of knowledge transfer in the conservation profession was taken for a number of reasons. To maximise the likelihood of respondents being able to comment on particular conservation materials, an online and verbal poll of conservation contacts inviting reflection on the most 'memorable' treatment materials was undertaken. Two materials emerged consistently from these professional responses: Paraloid B-72, due to the fact that it is incredibly widely used, and Soluble Nylon, because it had a very public fall from grace and is still cited by the profession as an example of a problematic material.

The memorability and recent usage of these two treatment materials therefore provided an important opportunity to examine the ways in which archaeological conservators share

knowledge and diffuse new technologies within the profession, making a new and distinctive contribution to knowledge and opening up this methodology for further research.

4.2 The Study of Knowledge Transference Theory and Diffusion of innovations

Before discussing the application of knowledge transfer theory to the field of archaeological conservation, it is worth reflecting on relevant approaches to the diffusion of ideas. Such studies have their origin in the work of the French lawyer and forefather of modern social psychology and sociology Gabriel Tarde (1903). Tarde's (1903, 178) 'laws of imitation' theory suggested that the more similar an innovation was to already-accepted ideas, the more likely it was to be accepted or adopted. This is echoed by modern diffusion theorists such as Rogers (2003, 41) who emphasise that an innovation's perceived compatibility with existing approaches or ideas results in a more rapid rate of technological and social adoption.

The importance of perceived compatibility and selective perception also appears in the work of Edward Hassinger, a rural sociologist. Hassinger argued that individuals in a community that engages in selective perception do not expose themselves to new innovations unless they are actively seeking a solution to an existing concern or problem (Hassinger 1959). This needs-based solution-seeking process can be argued to be evident in the institutional case studies of Chapter 3 of this thesis. Examples include the waterlogged organics conservation research trip undertaken by National Museum Wales staff to Denmark in the 1920s and the establishment of Scott's laboratory at the British Museum after the First World War. The interviews undertaken for the case study institutions also revealed that today's conservators tend to seek out additional training only when urgent need can be argued to outweigh a museum's financial constraints (Davis 2013; Spriggs 2013; Leigh 2016; Corfield 2016).

A second strand of relevant literature on the diffusion of innovations can be found in the work of Georg Simmel, a lecturer at the University of Berlin and contemporary of Tarde. Writing about the importance of communication networks, he argued that 'The groups with which the individual is affiliated constitute a system of coordinates, as it were, such that

each new group with which he becomes affiliated circumscribes him more effectively and less ambiguously (Simmel 1955, 140). This recognition of the 'local' community, or sense of belonging to a coherent group, becomes increasingly important in the development of archaeological conservation communication networks. Building on Simmel's work, Valente and Rogers suggest that personal communication networks are of high importance in the spread of innovation (Valente and Rogers 1995, 240).

Simmel further suggested that 'innovators' were often 'strangers', part of, but not strongly attached to, the network and thus more able to deviate from the system (Rogers 2003, 42). The importance of this separateness is key. Homophily, or the existence of similarity between two individuals in beliefs, background and education, is considered to generally increase the effectiveness of communication (Lazarsfeld and Merton 1964). The *stranger* is therefore 'an esteemed and objective acquaintance' and retains this position as he or she is not in competition with, or does not seek to be included within, the local community (Ossewaarde 2007, 369). Researchers have found that the effect of change brought about by the *stranger* works most strongly when the *stranger* is acting upon this kind of homogenised society (Tabboni, 1995).

The network of archaeological conservators, coming from a very small pool of training programmes within the UK and moving between a relatively small number of laboratory-bearing institutions, has been revealed by this thesis as extremely homophilious. This small community and its associated implications for knowledge transfer within the field will be further explored in section 4.3. Based on the data from the epochs of conservation identified in Chapter 3, it is suggested that within the field of archaeological conservation, the role of the *stranger* is sometimes fulfilled by the 'conservation scientist', an individual who historically and currently comes from outside the discipline of archaeology from another field, such as chemistry or the material sciences (see section 3.3.1 of this thesis). Examples of this phenomenon seen in the institutional case studies include the influence on archaeological conservation of Scott, Werner, Biek, and Plenderleith. The conservation scientist occupies a subtly different role to the formally-trained archaeological conservator and as such is perceived as neither a 'local', nor a threat.

A further influence on the rate and likelihood of the acceptance of new innovations comes from the presence of the 'opinion leader'. Although occasionally the roles of opinion leader and innovator may be found in one individual, the opinion leader is distinct from the innovator as they may, or may not, be responsible for the discovery of the innovation. However, their role is extremely important in determining how quickly new innovations are implemented in a given network (Valente and Davis 1999, 56). The place of the opinion leader in the diffusion of innovations within archaeological conservation will be further examined in section 4.4.

Understanding how the diffusion of innovations might work within the field of archaeological conservation requires first to identify the type of knowledge transfer network in operation. The most recognised approach to this requires the identification of whether diffusion of innovations within the field follow a 'centralised' or 'decentralised' pathway. In Roger's model of a Centralised Diffusion system, an innovation descends linearly from a single expert who has developed a particular product to future adopters (Rogers 2003). This was critiqued by Donald Schon in his 1971 work, *Beyond the Stable State.* Schon argued that innovations are often created by numerous individuals and then spread horizontally amongst networks, as a 'decentralised' pathway (Schon 1971, 154). Section 4.5 will seek to use the analysis of the diffusion trajectories of Soluble Nylon and Paraloid B-72 to explore which of these diffusion systems appear to be most prevalent in the field of archaeological conservation. Rogers (2003, 396) provides a useful checklist of six points that may be applied to a community to determine whether it is more likely to have a centralised or decentralised innovation diffusion system. These are:

- Whether or not the decision-making and power to innovate is centralised
- The direction of diffusion
- The source of innovations within the field
- The person or body who decides which innovations are spread
- How heavily weighted the needs of the clients are in driving the process of diffusion
- The amount of re-invention amongst adopters, with low re-invention for Centralised and high levels of re-invention for Decentralised diffusion systems (Rogers 2003, 396).

Rogers' checklist will be used in the case studies of Soluble Nylon and Paraloid B-72 which follow. Examining the development of the role of the archaeological conservator and the diffusion of innovations within the context of established sociological theory presents a number of interesting research questions. First, how are the roles of the innovator and opinion leader significant in the diffusion of innovations within archaeological conservation? Secondly, is it possible to trace the diffusion of innovations through knowledge networks in archaeological conservation? And thirdly, if these knowledge transference pathways are identified, how might they be leveraged to support the diffusion of innovations among archaeological conservators in the future?

4.3 Understanding the Local Community or Network within Professional Archaeological Conservation

To begin to answer these questions, it was first necessary to identify the sources through which archaeological conservators learn about new innovations, and secondly, to determine what drivers inspire new innovations to be taken up by the profession. Evidence for the diffusion of the innovations Soluble Nylon and Paraloid B-72 diffusion was gathered from three sources: the first, peer-to-peer interaction data supported by publications; the second, oral history interviews with archaeological conservators; and the third, the evidence for the usage of both Soluble Nylon and Paraloid B-72 within object treatment records within the five previous case study institutions.

4.3.1 Networks of Knowledge: Training Programmes

Section 2.4.1 above reflects on the size and scale of the self-identifying archaeological conservation profession. Within the 2,500 members of ICON, only 147 members selected archaeological conservation as their primary group affiliation. Of this, 29 are currently student or supporter members. A further 96 members selected archaeology as their secondary interest group, which importantly, may indicate former archaeological conservators now working in other areas (Nelles 2015). Unfortunately, no data has been collected by ICON as to the link between primary interest group and career. However, ICON conducted a full membership survey in December 2015. 604 members responded (roughly 25% of the total membership), of which 76 identified as archaeological conservators (Institute of Conservation 2016, 21). This study also revealed a relative lack of diversity

within the membership, with 90% of respondents identifying as white, and only 3.8% identifying as having a disability (Institute of Conservation 2016, 15). Both the relatively small size of the professional archaeological conservator community and the demographic homogeneity of the profession suggested by professional membership of ICON provide an important context for understanding how knowledge transfers between practitioners. A small field may preferentially benefit interpersonal communication, leading to a swifter adoption of treatments recommended by peers. It may also serve to reinforce the impact of the *stranger* as innovator.

The conservators interviewed for this thesis had nearly all undertaken their professional training via British training programmes at Durham, Cardiff, and UCL. As detailed In Chapter 3, UCL's Institute of Archaeology began providing archaeological conservation education in the 1930s, with a diploma offered by the 1950s and a degree course in the 1970s. Cardiff and Durham followed, establishing degree courses in the mid-1970s. By the 1990s, the focus for UCL and Durham had shifted to postgraduate archaeological conservation training, with Cardiff remaining the sole provider of an undergraduate qualification, reflecting both market forces but also the standardisation of undergraduate teaching according to QAA subject benchmarking. Although there are other conservation training courses in the UK (at the University of Lincoln, West Dean College etc.), they are more heavily focused on non-archaeological objects conservation. The number of students graduating with qualifications in *archaeological* conservation is believed to have been between 30 and 50 per year for the last two decades (ICON 2015).

As of 2016, the course at UCL is supervised by a team of five instructors; at Durham, two; at Cardiff, five. Additional guest lecturers for specific topics are brought in by all three institutions (Cardiff University 2016; Durham University 2016; University College London 2016). It is from this relatively small pool of instructor knowledge that emerging archaeological conservators are produced, which further increases the educational homogeneity of the profession. The potential issues introduced by this small teaching cohort is acknowledged by the training programmes, and each programme therefore requires students to undertake full-time placements in other institutions to further broaden their knowledge base (Caple 2015). The placement period also serves to strengthen the emerging conservator's professional network, ensuring that connections are formed with

the wider community in addition to those formed at the educational institution. This sense of belonging to a distinct and coherent group (in this case, that of the 'archaeological conservator') may continue long after the individual practitioner has left an interventive conservation role for one of management, research, or another specialism. The strong sense of identity may also impact the ways in which communication channels operate within the field.

Teaching within a conservation training programme confers a de facto 'opinion leader' status on instructors who are responsible for determining which methods and treatments are taught to students. Students therefore leave their programme with a specific toolkit of approved treatments which they have attempted or observed during the course of the programme. These treatments may vary slightly between training programmes. An example of this is the preference for applying a microcrystalline wax coating to an iron object after air abrasion treatment, which was reported by interviewees in 2014 to be in favour at Durham but not at UCL.

4.3.2 Networks of Knowledge: Professional Bodies, Publications, and Conferences

Upon leaving a formal training environment, many archaeological conservators choose to join professional membership groups. The primary membership organisation in the UK is ICON, and its sub-membership category ICON Archaeology Group, which evolved from the original UKIC Archaeology Section formed at the Institute of Archaeology. Conservators wishing to apply to become a Professionally Accredited Conservator-Restorer (PACR) must hold membership at the Associate level and must maintain membership of ICON to retain their accreditation, which encourages membership retention throughout a conservator's career. Some professional archaeological conservators are also members of the IIC. Both organisations hold conferences at which papers relating to developments within the profession may be presented (two previous conferences of the IIC have been devoted to archaeological conservation, in Stockholm in 1975 and Copenhagen in 1996) (IIC 2019). Membership of a professional organisation also entitles the archaeological conservator to receive the regular publications of the organisation, which provides the conservator with an opportunity to keep abreast of the most recent developments in the field. The primary

publications of IIC and ICON are below, though there are also occasional published conference proceedings:

IIC:

Reviews in Conservation existed between 2000 and 2009 as a separate occasional publication, primarily existing as a vehicle in which conservators could review the literature relating to various new treatments or discuss topics important to the field. A percentage of the articles pertained to archaeological conservation. In 2010 it was amalgamated with *Studies in Conservation.*

Studies in Conservation is the flagship publication of the IIC and the primary international peer-reviewed journal for the field of conservation (IIC 2016a). It has been in publication since 1952.

News in Conservation is another publication of the IIC, established in 2007 and now produced as six electronic newsletters per year. It aims to keep the conservation community updated on the latest international developments but is not peer reviewed. The lack of peer review process allows for more timely dissemination of information but also removes critical oversight, increasing the risk that methods which may be innovative but have not have yet been thoroughly tested, reach the community rapidly.

ICON:

The Conservator/Journal of the Institute of Conservation is the flagship publication of ICON and serves as the other peer-reviewed journal for those working in conservation, with regular submissions on archaeological conservation.

Icon News is published six times per year and covers conservation and restoration of cultural heritage in the UK. It is non-peer-reviewed and contains updates from the Groups (including Archaeology) and a gazetteer of events, scholarships and awards.

In addition to the publications of the IIC and ICON, a number of other special interest group publications exist, such as conference proceedings and papers published by the International Council of Museums (ICOM) Conservation Committee (founded 1967), covering specialist areas such as wet organic and archaeological materials, metals, glass and

ceramics, and textiles (ICOM CC 2016). Other English-language conservation publication venues in which UK archaeological conservators are occasionally published also exist, including the Journal of the American Institute of Conservation (JAIC), which has been in production since 1977, and the *Museums Journal.* The number of peer-reviewed publication opportunities for archaeological conservators may seem relatively limited in relation to the broader fields of archaeology and the sciences. However, the relatively small size of the profession as well as the lack of institutional imperative or funding for publication mean that the opportunity and significance of peer-reviewed publishing has perhaps been under-valued by the profession. This may have been further compounded by the efficiency of the personal communications network within the field.

Some researchers such as Peter Brimblecome, a chemist heavily involved in the Dust Project (a conservation-based research initiative funded by the Leverhulme Trust that examined the science and management of dust in historic properties) have questioned the level of engagement of the profession with conservation publications. In a rather hyperbolic (and for which no references were provided, save his personal observations) statement in the House of Lords Science and Technology Committee report on Science and Heritage, Brimblecombe noted that, 'I found that conservators and managers of heritage do not read scientific journals; in fact they hardly seem to read anything at all. The only way that I can really translate what I do into a (institutional) policy change is by visiting them and almost shaking them…' (House of Lords 2006). Clearly, the lack of personal membership or institutional subscription to IIC or ICON may be one explanation for Brimblecombe's experience, rendering publications inaccessible to some conservators. However, this does not mean that diffusion of knowledge is not occurring. This chapter will suggest that such knowledge and technology exchange is much more likely to occur within the context of primary conservation education and collegial networks rather than through publication.

It is also possible that Brimblecombe, a *stranger*, is experiencing another phenomenon relating to the uptake of new ideas discussed in Section 4.2 above. The apparent lack of interest of conservators in published scientific journals may relate more to Rogers' fifth point in determining the type of diffusion in a field. If the field of archaeological conservation is operating as a decentralised diffusion system, the adoption of innovations will be directly related to the perceived need for the innovation. Brimblecombe's status as

stranger may distance him from understanding the current needs of the conservator, and his research may therefore not be found and implemented by the community until that need forces conservators to actively seek new information.

In addition to the more formal printed publications for archaeological conservators, there are a few online resources that provide communication fora. The most popular and long-lasting of these is undoubtedly the CoOL Conservation DistList, part of the Conservation Online resource hosted by AIC. The ConsDistList has been in existence since 1987 and serves as a place where curators, bench conservators, scientists and administrators can meet on 'the internet to share technical information, news, rumour-control etc. relating to the conservation of museum, library and archive information' (Conservation Online 2016). With more than 10,000 members, it is a moderated digest into which participants send information for distribution. The ConsDistList comes out once or twice per week and is open to professionals working within the field of conservation or preservation and is intended to serve as an informal newsletter within which information may be quickly exchanged and queries answered.

With the exception of the ConsDistList there are not many online communication networks for archaeological conservators. The advent of Facebook has fostered the creation of several groups for emerging conservators (based in America, however), and the training courses have set up online blogs for their students to report on their experiences of laboratory matters (Caple 2015). ICON Archaeology Group has a webpage under the ICON site as well as a Facebook presence, but neither are regularly updated. Online community communication in archaeological conservation therefore may be underutilised at this point in time (2016), a point to which this thesis returns in its conclusion.

4.3.3 Networks of Knowledge: Interaction with Peers and Personal Communication

The research carried out for this thesis, and my own professional experience provides clear evidence that archaeological conservators communicate regularly, but often privately rather than publicly about conservation treatments. This may reflect the desire to protect professional reputation. For example, one of the conservators interviewed for this thesis directly referenced the DistList, stating, 'I would never post a conservation decision related

question on the DistList, unless I had a very good idea of what the answer might be already, and was sure I wasn't going to make a complete idiot of myself.' (Subject 74, trained 2000s) This feeling of holding oneself up to potential criticism in a relatively public space may be hindering a number of conservators from seeking information from online fora and may indicate a more significant reluctance to engage publicly. All 87 conservators interviewed cited communication with other conservators as crucial to their work. Responses to Interview Question 17, 'How did you keep in touch with other conservators and with developments in the field at the beginning of your career? And now?', were uniform. Conservators responded that they kept in touch with one another by telephone and email, and by telephone and letter, prior to the advent of email. Twelve conservators mentioned that seeing colleagues at conferences and events was important, with seven wistfully mentioning UKIC (later ICON) Christmas meetings at the Institute of Archaeology as being particularly useful (these appear to have stopped in approximately 2010). A further seven mentioned that the lack of institutional funding to attend conferences as an issue impacted on their ability to keep in touch professionally. Additional information about importance of personal and peer communication also emerged from the research, such as 'I know if I am faced with a conservation problem that is new to me, I can ring up XXXX (a more experienced conservator) and ask for her advice', and 'I have often relied on the advice of XXXX (a known expert in a particular material type) over the years, he has come to visit the laboratory on a consultancy basis as well'.

4.3.4 Networks of Knowledge: Interview Evidence

Interview Question 18, 'From what sources did you learn about the treatments you currently use? Could you estimate percentages?' was designed to provide an overall indication of how conservators view and rank their treatment sources. Of the 87 respondents, only 45 were willing to estimate the percentages (further discussed below). However, only three sources were identified, the first being training programmes, the second being interaction with peers (both within and without their respective institutions) and the third being conference proceedings and publications (Figures 40 and 41).

The responses showed distinct differences with respect to the age of the conservator interviewed. Firstly, the most experienced conservators were less likely to attempt to

estimate the source of the knowledge which underpinned their treatment methods, with only 12 conservators trained between the 1950s and the 1980s providing an estimate. This is in direct contrast to the least experienced conservators, particularly those trained in the 2000s and 2010s, who nearly all attempted to provide an estimate. Although the sample size is low, it is possible to observe some general patterns from the data.

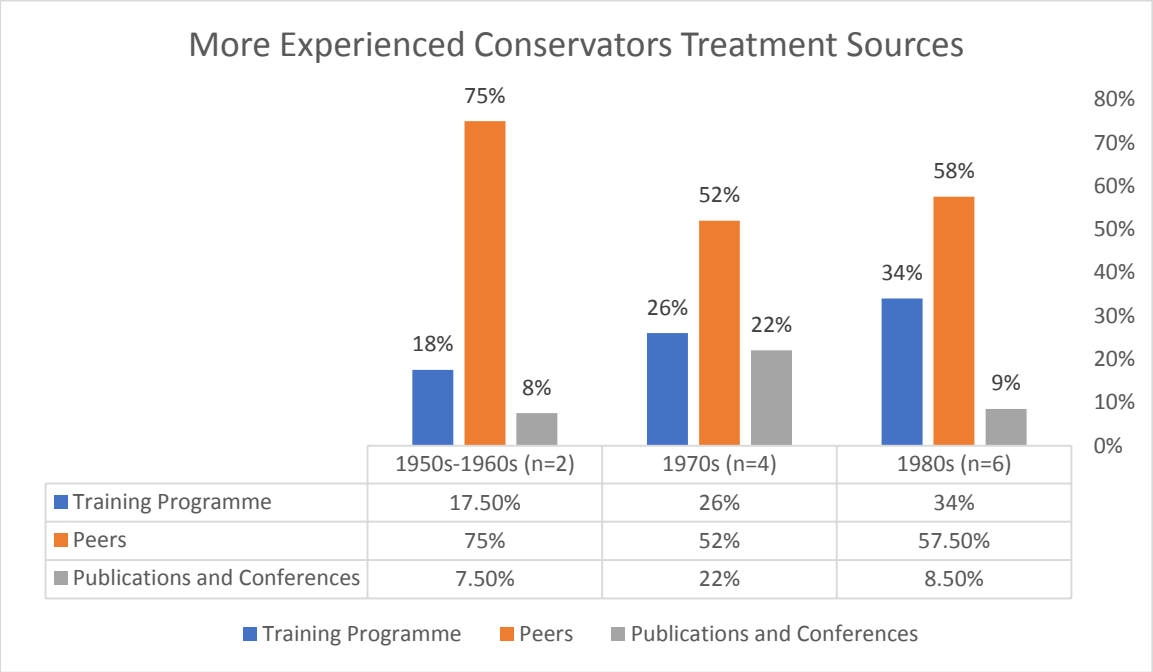


Figure 41: Treatment sources of more experienced conservators

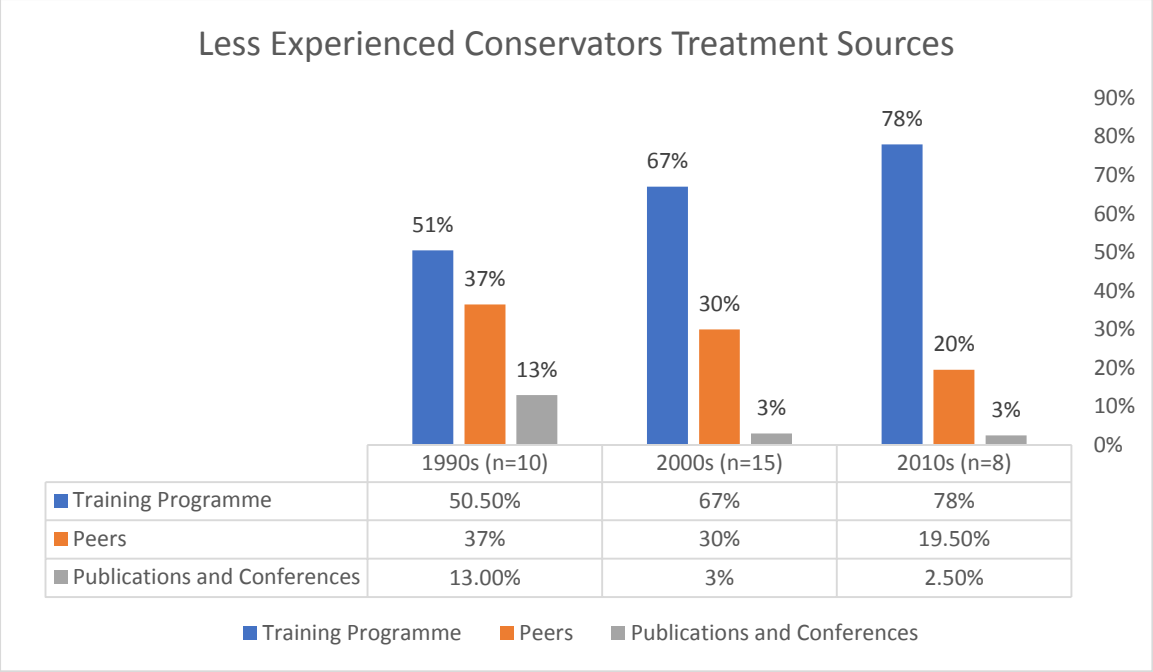


Figure 42: Treatment sources of less experienced conservators

For the most experienced conservators, training programmes were the least likely source of treatments. The majority of treatments were credited as being learned from peers, followed distantly by publications. Amongst the most experienced conservators, treatments gleaned from conferences and publications were at a higher level in comparison to peers and training programmes than those of any training era group, with the exception of those trained in the 1970s. This may reflect the fact that changes in the level of intervention found acceptable by the archaeological conservation community (as traced in Chapter 3 of this thesis) may have rendered some treatments learned in early training programmes obsolete or unfavourable. It also suggests that the emergence of the professional groups such as IIC and ICOM and the sudden availability and increase of conservation literature may have directly influenced these early conservators in taking up new treatments. Furthermore, the smaller size of the training programmes at the time may have impacted on communication between peers, as professional archaeological conservators had a much more intimate network within which to operate and communicate.

General trends could be observed across all levels of experience. The more recently an archaeological conservator had undertaken their formal conservation training the greater the likelihood that they perceived the source of knowledge for their treatment methods was

their formal training programme, rather than from a colleague or a publication. This reflects positively on the professionalism of current archaeological conservation training programmes but also perhaps the more limited working environments and professional networks experienced and established by an emerging conservator. The argument that peer network influence grows with length of time in practice is also supported by the general trend across all experience groups. Peers as a source of treatment information is highest amongst the most experienced conservators, and except for a slightly lower level reported by conservators trained in the 1970s, continues in a downward trajectory from a high of 75% amongst the most senior conservators to a low of 19.5% amongst the most recently trained.

Publications and conferences as a source for treatments showed perhaps the most interesting trajectory. Conservators trained in 1950s-1970s were far more likely to cite these as a source of treatment. A small increase appeared for conservators trained in the 1990s, with a sharp decline in publications and conferences as a source of treatments reported by conservators trained from the 2000s onward. This trajectory could be a result of a number of factors, such as decreased funding for attendance at conferences due to institutional budget cuts in recent years. This may have disproportionally affected conservators entering the workforce in junior roles after the recession of 2007, as they would be less likely to be in permanent posts and therefore less likely to be the recipients of institutional support for conference attendance than their more established colleagues. The possibility of a change in the content of conservation publications, with an overall movement away from technical treatment articles towards ones based on conservation ethics may also have influenced this downward trajectory and may be an interesting area of analysis for future research. Although the reasons behind the decreased likelihood of conservation treatments being sourced from publication and conference proceedings is unclear, the interview data reveals that it is uniformly the least likely source for new treatments across all experience levels.

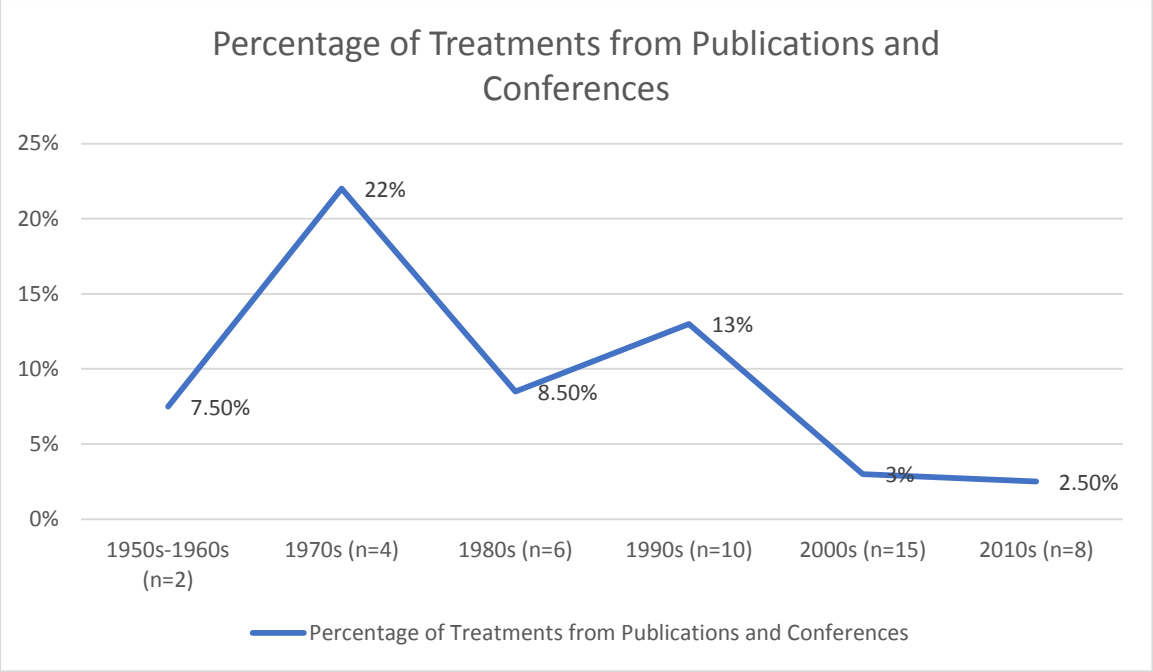


Figure 43: Percentage of treatments from publications and conferences

The above analysis indicates that the treatments used by archaeological conservators are heavily influenced by both their training programmes and their peers. Curiously, continuing professional development in the form of short or day courses as a source of new treatments did not arise, though 7 individuals interviewed mentioned a growing lack of available institutional funding to attend conferences as being an issue in the profession. This may be attributable to budget cuts across the heritage sector.

One interviewee's answer gave an eerily prescient sense of the above findings:

'Personal recommendation is probably the best indicator of whether I will try something new- the students bring new things into the lab. There is so much to read now, and I feel like I'm not reading as much as I should. People do get set in their ways and it does take someone showing you something to make a change.' (Subject 23, trained 1980s)

4.4 Treatment Material Diffusion in Archaeological Conservation

4.4.1 Introduction to case studies

Soluble Nylon and Paraloid B-72 as treatment materials through which to trace knowledge transfer were selected in part due to the oral history element of data collection for this

thesis. A number of archaeological conservators nearing retirement age (and some who had already retired, but kindly agreed to be interviewed for this work) were actively employed in archaeological conservation during the time during which Soluble Nylon was used and then critiqued as a conservation treatment, as well as at the time of the introduction of Paraloid B-72 as a new material. The aim of this section of the thesis is to identify both the principal agents of diffusion in the spread of the usage of Paraloid B-72, and the point of transference of knowledge, whether via publication, peer contact, or industry contact.

The following sections introduce the reader to the two materials and trace their introduction and trajectory through the conservation literature, focusing particularly on key papers and significant authors. Tracking knowledge transfer through the publication record was undertaken using the databases SCOPUS, Google Scholar and JSTOR, and divided into five-year publication periods, beginning with the first appearance of the materials in the literature and ending in 2015. The search terms used were 'Soluble Nylon' +conservation or 'Paraloid B-72' +conservation. This inclusion of grey literature sources necessitated a careful review of the results to remove duplicates, but the overall numbers of publications which include a reference to either Soluble Nylon or Paraloid B-72 are still significant, as will be evidenced in the graphs below. (Note: AATA Online was considered but ultimately was not used as the database is created by volunteers and is therefore less-standardised or systematised in terms of meta-data). Soluble Nylon and Paraloid B-72 were tracked across all conservation literature, to reflect archaeological conservation practitioner engagement with literature and knowledge across related fields.

After this, the diffusion of both materials will be traced through the oral history interviews conducted for this thesis. Interview Questions 19 and 20 focused on practitioner memories of Soluble Nylon and Paraloid B-72, respectively, asking interviewees 'Do you remember how you first heard of Soluble Nylon? Did you ever use it?' and 'Do you remember how you first heard of Paraloid B-72? Did you ever use it? (Appendix A). The answers given by respondents will be discussed and analysed later in this chapter.

Finally, the results of the attempt to track the diffusion of these materials via conservation treatment records at the case study institutions will be discussed and the future potential of this method will be assessed.

4.4.2 Soluble Nylon

In conservation literature, Soluble Nylon is the common name for N-methoxymethyl nylon. It was created by chemically modifying nylon through the addition of formaldehyde (Sease 1981, 102). This modification produces a polymer that is both soluble in ethanol and methanol and more flexible than nylon (Horie 2010, 123). It was first developed by ICI (Imperial Chemical Industries) and Du Pont de Nemours between 1939-1945 (De Witte 1975, 30). The introduction of Soluble Nylon was of particular interest to the archaeological conservation community as it seemed to present a new material that could be used to support flaking and delicate porous surfaces during potentially damaging conservation treatments such as desalination and consolidation of bone and ivory (Plenderleith and Werner 1971). The parent material, polyamide, has a very regular structure with high crystallinity and a large number of hydrogen bonds. This makes traditional nylon a very hard and high-melting polymer that is nearly insoluble. Breaking the hydrogen bonds decreases the level of crystallinity and results in the nylon becoming soluble with a lower melting point. The hydrogen bond breakage is accomplished by substituting an N-alkoxy bond for the N-H bond, which is achieved by reacting the nylon with formaldehyde and alcohol with the addition of an acid (De Witte 1975, 30). The new creation, Soluble Nylon, is unstable and forms a gel-like substance that may be painted or sprayed onto objects as a coating.

Soluble Nylon originally was believed to be a good material for conservation as it had a number of desirable properties: firstly, it was flexible and had a non-shiny appearance as a coating; secondly, it did not exert contractile forces (shrinking as it set); and thirdly, it was an effective adhesive yet also water permeable, allowing breathability when used as a coating (Sease 1981, 106). At first, Soluble Nylon is reversible. However, after prolonged periods and upon exposure to environmental acids, the polymers have been proven to cross link and thus become insoluble and render the treatment irreversible (Sease 1981, 104-105).

4.4.3 Paraloid B-72

Paraloid B-72 is an unpigmented, translucent thermoplastic acrylic resin which was first developed by Rohm and Haas and came into use in conservation as a varnish for paintings by 1961, when it was recommended as suitable for conservation use due to the low

likelihood of cross-linking of the polymers upon aging (Feller 1961, 172). The development of Paraloid B-72 coincided with the search for reversible treatments that had been increased after the discovery that Poly(butyl methacrylate) (PBMA) was an inappropriate material for conservation because it cross-links, becoming completely insoluble and thus irreversible (Horie 2010, 37). From the 1930s PBMA had been considered an excellent material for conservation, its insolubility only discovered after long term exposure to light (Feller 1971, 196). Until this point it had been used extensively in conservation. Because of the unexpected unsuitability, a more stable class of polymers was brought into use, the Poly(ethyl methacrylate) (PEMA/MA), although PBMA continues to be used in rare situations where low glass transition and solubility in petroleum solvents is a requirement (Horie 2010, 108). The PEMA Paraloid B-72 shared many of the positive characteristics of the PBMA in that it was non-yellowing, soluble in hydrocarbon solvents, and flexible, but also retained non-cross linking properties even in advanced aging tests (Horie 2010, 106).

Although Horie claims Paraloid B-72 came into use in paintings conservation in the 1950s, evidence of this was not found in the publication record before the early 1960s. The spread of usage into archaeological conservation occurred at roughly the same time, reflecting the close relationship between the different specialism strands of conservation. This was also the time in which many of the senior and retired conservators interviewed for this thesis were beginning their careers.

4.5 Knowledge Transference in Archeological Conservation

4.5.1 Tracking Knowledge Transference across Publications

In examining peer-to-peer transmission via publication, it was apparent that an effort had been made to spread information regarding first the discovery of Soluble Nylon as a material for conservation and later its unsuitability, with numerous articles appearing between the 1950s and the 1980s. A similar effect was seen for the popularisation of Paraloid B-72.

The first mention of Soluble Nylon in the archaeological conservation literature comes in 1958 by Werner as a useful material for the conservation of friable surfaces during the removal of soluble salts from Egyptian stonework (Werner 1958, 273). As detailed in

Chapter 3 of this thesis, Werner was at the time employed at the British Museum, one of the most well-known conservation scientists in the UK, and published with Plenderleith one of the most seminal and enduring volumes in the field, *The Conservation of Antiquities and Works of Art*, where Soluble Nylon was mentioned as a material for conservation in 1956 (Plenderleith and Werner 1956). Werner continued to be prolific in his advocacy for Soluble Nylon, publishing articles suggesting its applications in conservation of archaeological materials eight more times before 1974. Plenderleith and Werner's status and renown as leading conservation scientists at the British Museum and their 'otherness' as *stranger* mark them as both innovator and, perhaps, opinion leaders, increasing the likelihood that innovations they publicly supported would be taken up by the profession.

Other well-known conservation scientists followed in their footsteps. Andrew Oddy, also at the British Museum, published an article referring to the use of Soluble Nylon in conservation of friable surfaces in 1975 (Oddy 1975). Although the article's primary focus was on materials testing, Soluble Nylon was cited in the opening paragraph as a beneficial discovery for conservators, a position which Oddy appeared to continue to take in 1976 when he referenced using Soluble Nylon to protect paint fragments on limestone sculpture from Egypt during washing (Oddy et al. 1976, 7). However, it is likely that this publication was an outlier and may have been submitted much earlier- therefore, the date cannot be taken as proof of continued endorsement.

In 1975 three articles appeared questioning the use of Soluble Nylon in conservation. The most cited and the most damning was by E. De Witte, a material scientist who published on the properties of three materials used to consolidate stone, of which one was Soluble Nylon. The article appeared in *Studies in Conservation* and focused on Egyptian materials treated in the early 1960s with Soluble Nylon, which was found to have aged poorly and become irreversible. De Witte rounds up the article by stating,

> 'These observations allow us to conclude that one has to be very careful when using Soluble Nylon as a consolidation product, especially for the consolidation of stone surfaces during desalting in water. There is a risk that, during the soaking in water, the Soluble Nylon will be transformed into a very brittle, non-elastic film, which gives the object very little protection during the operation. Long treatments (more than one year) can cause the insolubilisation of Soluble Nylon. Thus we should advise the use of

Soluble Nylon only when there is no other possibility and then for short immersions in water.' (De Witte 1975, 33-34).

Although there were a total of three negative articles relating to Soluble Nylon, there were nine articles published in 1975 which promoted the use or were neutral in tone. The idea that Soluble Nylon was a dangerous material gradually developed, however. In 1976 Robert Feller, a conservation scientist who published prolifically on the properties of various materials for conservation, published on the solubility of picture varnishes and specifically highlighted Soluble Nylon as being problematic (Feller 1976, 122).

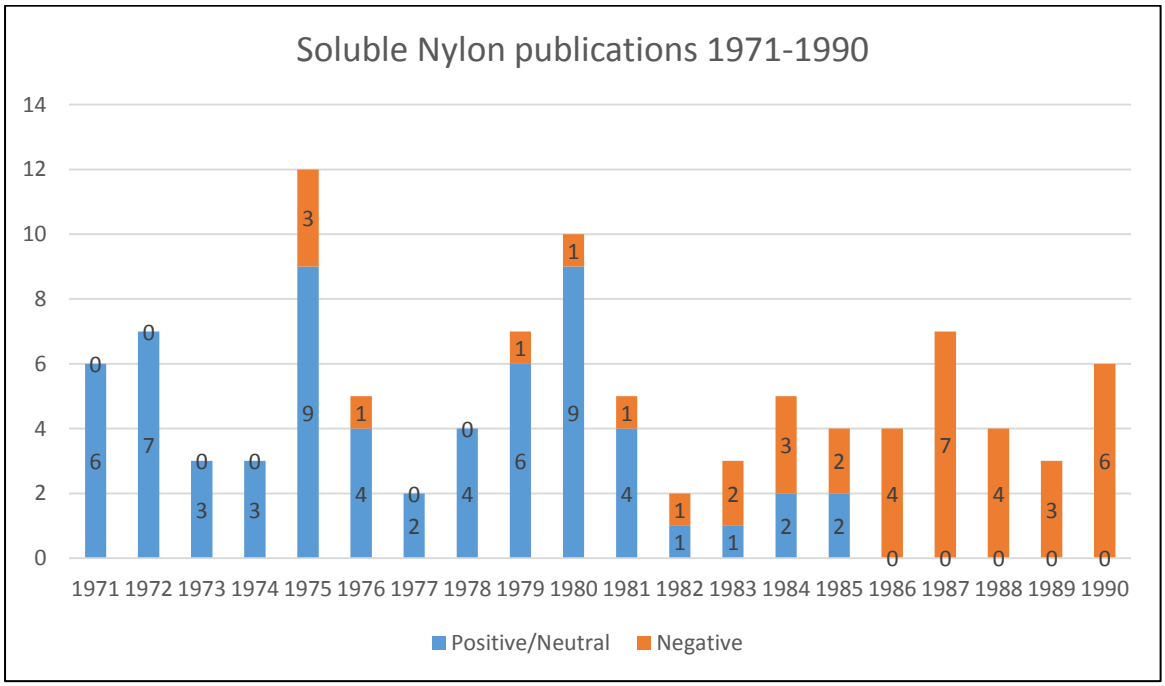


Figure 44: Articles Promoting or Decrying the use of Soluble Nylon in Conservation Treatments

By 1981, more negative mentions of Soluble Nylon began to occur. Archaeological conservator Catherine Sease's 1981 article, entitled 'The Case Against Using Soluble Nylon in Conservation Work', was published in the most well-established peer reviewed journal in the field, *Studies in Conservation*, and was the first to roundly condemn the usage of Soluble Nylon as a material for conservation.

One of the factors in the rapid dissemination of Sease's work may have been its title. Sease used her article to examine the effect of the material on objects within the Petrie Museum

collection that had been treated with Soluble Nylon in the 1950s and 1960s. She argued that the only beneficial property of Soluble Nylon to be retained over time was the permeability to water (Sease 1981, 106). Major problems were that Soluble Nylon films had attracted dust and dirt, obscuring the surface, that the films had completely lost flexibility and were insoluble and thus irremovable, and that contractile forces had resulted in some cases in the loss of object surfaces. Sease (1981, 109) suggested that the primary function of Soluble Nylon in archaeological conservation, to consolidate friable surfaces of stone or ceramic objects prior to soaking to remove soluble salts, could be successfully replicated using Paraloid B-72 thus avoiding the use of Soluble Nylon altogether. Sease's article is particularly of interest as it not only represents the first major work to be published condemning the use of Soluble Nylon for archaeological conservation but also because she challenged the ongoing use of Soluble Nylon when a superior material was available.

Despite Sease's publication, Soluble Nylon continued to be considered as a viable material for conservation treatment by the profession. Examples include the use of Soluble Nylon in the conservation of murals from Thracian painted tombs, delivered as a paper at an international conference (Barov 1984, 203), and an article from the 1984 issue of *Studies in Conservation,* in which a conservator details the selection of materials to conserve painted mummy cloths. In this second article, Soluble Nylon is ultimately discounted in favour of Paraloid B-72, but the reasons for this are given as the amount of material needed to be effective having more of a sheen, which was undesirable, and secondly, the negative aging effects having been noticed in anthropological collections (Hillyer 1984, 5). It is also clear that Soluble Nylon continued to be used in other fields such as paper conservation as a temporary fixative for inks (Daniels 1985, 13) and in wallpaper conservation (Shelley 1981, 133).

A closer look at the publication data reveals that a watershed moment did not occur until the mid-1980s. 1986 is the first year in which no articles promoting the use of Soluble Nylon appear. Instead there are four articles which cited its negative attributes. In 1987 there were seven references to Soluble Nylon, including Pearson's manual on, 'The Conservation of Marine Archaeological Artefacts', which states that Soluble Nylon is

'…no longer recommended for conservation work. Objects treated with Soluble Nylon have exhibited the following problems: 1) the film attracted dirt and dust, badly discolouring the

objects and obscuring painted decoration; 2) the film was not matt; 3) the film exerted strong contractile forces, peeling off the surface of the object with it; 4) the film was no longer flexible; 5) the film was insoluble. Of the desirable properties claimed of it, only permeability to water seems to be maintained over time.' (Pearson 1987, 255). A total of 17 articles cite De Witte's 1975 work between 1976-2013, including Sease's 1981 paper, and a total of 31 articles from 1982-2014 cited Sease's article within their referencing (see Figures 44 and 45, below). De Witte and Sease may both be considered to fill the role of 'Opinion Leader', as they radically affected the diffusion of innovations (in this case, the innovation was the cessation of usage of Soluble Nylon) within the peer-to-peer publications realm.

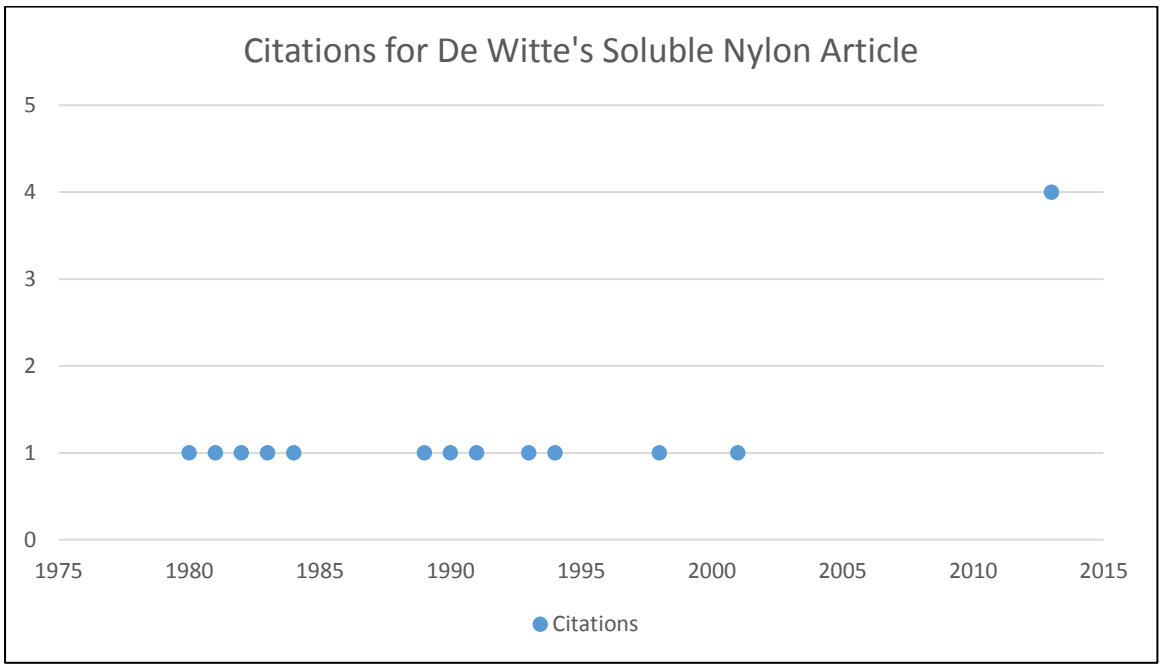


Figure 45: Citations for De Witte's Soluble Nylon Article

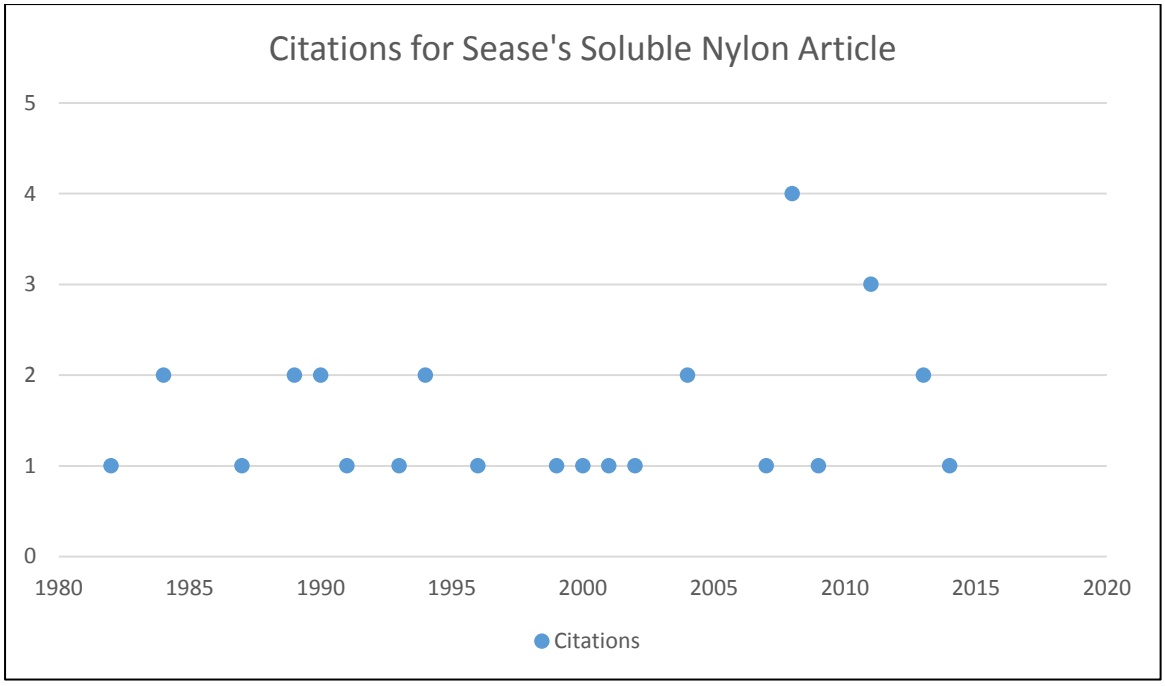


Figure 46: Citations for Sease's Soluble Nylon Article

Paraloid B-72 has a very different publication record. As it has not been found to share similar negative properties with Soluble Nylon, it has not gone through the same arc of promotion followed by critique. Instead, the dissemination of Paraloid B-72 emerged in the literature through the work of 'opinion leaders' charted below. The first article promoting the use of Paraloid B-72 in archaeological conservation focused on textiles conservation (Geiger and Franzen 1956). By 1961, Feller had published an article in *Studies in Conservation* citing Paraloid B-72 as an appropriate solvent-type varnish for use in conservation (Feller 1961). Feller's support of the material can be seen as an example of the positive transference effect of the *stranger* on the profession.

A veritable explosion of articles next appeared, promoting the use of Paraloid B-72 to conserve alabaster objects (Hedvall and Karamustfaoglu 1961), waterlogged wooden objects (Müller-Beck and Haas 1961), and in the conservation of murals and frescoes (Tintori 1961), among other materials such as metals and ceramics. By the late 1960s the treatment material was firmly established within the archaeological conservation literature, with numerous positive articles appearing with regularity since that time to promote the usage of Paraloid B-72 as a potential consolidant, or, after 1986, as an adhesive for every type of archaeological artefact from textile to metals.

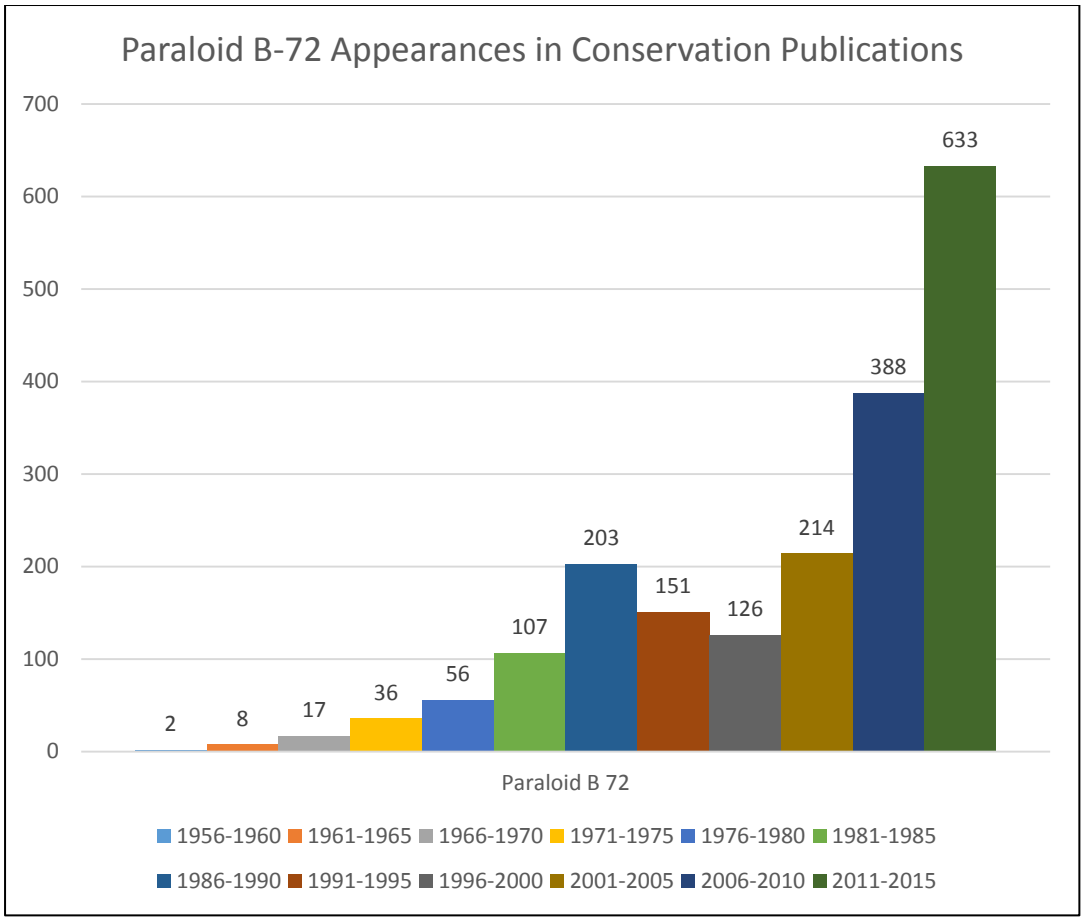


Figure 47: References to Paraloid B-72 in the Conservation Literature

The strong link between the downfall of Soluble Nylon and the rise of Paraloid B-72 is also visible in the publication data. Between 1981 and 1985, the same point at which Soluble Nylon began to be publicly refuted as a material for conservation in the literature, articles in which Paraloid B-72 is mentioned in conjunction with conservation exploded, with a total of 107 appearances of it as a material suitable for conservation. Several of the articles in question contain references to the replacement of Soluble Nylon with Paraloid B-72 as a consolidant (Sease 1981; Barov 1984; Hillyer 1984), and this similarity between the innovations may have further helped to establish Paraloid as a treatment material (Tarde 1903; Rogers 2003). Another factor which may have an effect on increase in references to the use of Paraloid B-72 was the publication of another article by De Witte, questioning the (unexpected and unheralded) change in formulation of Paraloid B-72 by the manufacturer that was noticed by conservators around the world (De Witte et al. 1978, 1).

The number of references to Paraloid B-72 nearly doubled between 1986 and 1990, with 203 citations appearing in the literature. This increase may have been related to publications by Stephen Koob, an archaeological conservator opinion leader, which will be further addressed in the interview data in 4.4.2. Citation analysis reveals that Koob's 1986 *Studies in Conservation* article, 'The use of Paraloid B-72 as an adhesive: its application for archaeological ceramics and other materials' has been cited 104 times within the conservation literature. Koob himself has published numerous other articles promoting the use of Paraloid B-72 in conservation treatments on materials ranging from ceramics and glass to bone and stone and is also active on the international conference circuit (Corning Museum of Glass 2016). By 1990, Paraloid B-72 was firmly entrenched as a material suitable for treatment in archaeological conservation, and despite a slight decrease in new articles in the 1990s (perhaps reflecting the point at which it became so widespread that use was no longer notable), the routine use of the material continued to grow. Between 2011 and 2015 there were 633 articles published in which Paraloid B-72 was mentioned or utilised as a material for conservation. It is expected that the instances of Paraloid B-72 being mentioned in the conservation literature will continue to carry on at a steady or increasing pace if the material continues to be popular and is not replaced by another.

The importance of the innovator and the opinion leader to the diffusion of Soluble Nylon and Paraloid B-72 within the field of archaeological conservation are clear. The use of Soluble Nylon as a treatment material for general conservation was included in Plenderleith's publication 'The Conservation of Antiquities and Works of Art', which was one of the first English language guides to conservation, and the resulting widespread usage as a textbook for archaeological conservation training programmes further strengthened the use of Soluble Nylon within the profession. Werner's responsibility for the initial introduction of Soluble Nylon via publication to the archaeological conservation field is also important to recognise. Similarly to Plenderleith, Werner's 'otherness', with primary identity as a conservation scientist rather than as an archaeological conservator, will have both influenced the taking up of the new material. Additionally, it is not unreasonable to speculate that Werner's fame within the sector may have given him additional status as an opinion leader, capable of influencing the decision making of other professionals. The downfall of Soluble Nylon in the publication record, begun by De Witte and Feller in 1975, is

another example of the conservation scientist serving as innovator- in this case, reversing the previous innovation. Archaeological conservator Sease's heavily referenced 1981 article may indicate her status as an opinion leader, inspiring other conservators to share their own thoughts on the usage of Soluble Nylon.

Feller occupied a similar position with regards to international reputation and 'otherness'. His early championing of Paraloid B-72 as a replacement for Soluble Nylon may have helped to support its establishment as a new material for conservation, and the similarity in usage potential to Soluble Nylon at the time when that material had been discovered to be inappropriate for use in conservation will have significantly influenced the embracing of Paraloid by the conservation community. Innovator Feller later worked with opinion leader and archaeological conservator Koob to suggest ready-made tubes of Paraloid B-72 for use by conservators, and the combination of these two roles in targeted marketing may have been in part responsible for the great uptake of the material by the profession. This will be discussed further below.

4.5.2 Tracking Knowledge Transference across Oral Histories

Most conservators interviewed could not recall the exact point at which they learned about Soluble Nylon. Many of the archaeological conservators who were in education or practicing by the 1980s (45/87 of the conservators interviewed for this work), when Soluble Nylon finally fell out of favour in the conservation literature (see figures below) recalled an awareness of the use of Soluble Nylon. However, only two of the interviewees (both trained at UCL's Institute of Archaeology) specifically recalled learning about it during their training programme. The remaining 43 affirmed that they were aware of the material in the early stages of their career but could not state where they had learned about it. 13 could remember using it on archaeological objects. This lack of remembering being formally taught about Soluble Nylon combined with the awareness of it at the beginning of the career may imply that knowledge of this treatment material was transferred via practice, within an institutional setting, and not via formal publication or learning, although it is also possible that the memory of interviewees has faded with time. Interview data also revealed that recent graduates of training programmes at both Cardiff and UCL remember being taught the story of Soluble Nylon within their courses as an example of why treatments

must be reversible and why it is necessary to only use materials which have been thoroughly age-tested in the conservation of archaeological materials.

Few of the most experienced conservators could remember clearly what had stopped them using Soluble Nylon. Five reported that they had never liked it and had independently decided not to use it, preferring other materials. The remaining 27 responses were all variations of, 'it was bad for the objects, it aged horribly, it was irreversible'. No interviewees identified specific memories relating to how they had acquired this knowledge, though 6 used variations of phrasing indicating that there was a general awareness amongst the conservation community that Soluble Nylon was an unsafe material for conservation, which may suggest personal observation and informal sharing as the source. None of the conservators interviewed could recall an approximate date relating to this awareness, though all 87 interviewees across all time periods were fully aware of the problems with the material. Of the 45 conservators interviewed who had been in practice or training prior to 1990, only three mentioned the articles that appeared in the early 1980s, and all three had been trained in the 1970s.

There are several reasons that the archaeological conservation community might be fully aware of the negative properties of Soluble Nylon yet not recall where they had learned this information, and in particular, not recall reading articles about it. Responses to Question 18 reflect that conservators are much more likely to have acquired the treatments they use on objects from their training programmes or peers instead of from publications. Combined with the potential lack of access to publications in a pre-internet age and the potential time lag between conservation discoveries and their publication, conservators may have been significantly more likely to acquire the information about Soluble Nylon's downfall from their own personal observations, or via word of mouth from a peer or an instructor.

The interviews with conservators about their initial introduction to Paraloid B-72 yielded slightly different results. All 87 conservators interviewed for the oral history portion of this thesis stated that they regularly use Paraloid B-72 as both an adhesive and a consolidant. 79 of the 87 of archaeological conservators claimed to have learned of Paraloid B-72 in their training programmes. The remaining eight conservators could not recall where they had first learned of Paraloid B-72 or when they had begun using it, though all stated that it was at an early point in their career. All eight conservators were part of the first two

generations of conservators interviewed, trained in the 1950s-1970s, and this could indicate that either Paraloid B-72 was not being presented as an archaeological conservation material within the training programmes at this time.

During the oral history interviews, 64 of the 87 conservators immediately associated conservator Stephen Koob with the spread of Paraloid B-72 when asked when they had learned of the material. Koob, who now works in America but who studied archaeological conservation at the UCL Institute of Archaeology in the 1970s, developed an international reputation as an opinion leader for the use of Paraloid B-72 as a conservation material, promoting it at conferences beginning in the 1980s and even creating an early viral video demonstrating the tensile strength of Paraloid B-72 as an adhesive.

Koob was contacted during the writing of this thesis and was asked if he could remember how he first learned of Paraloid B-72 and he credited this initial introduction to Feller. Koob's shortened response appears below:

> 'I am proud to say that I introduced Paraloid B-72 as an adhesive to the conservation field: (Studies in Conservation, 1986, 31, pp. 7-14). The origin of this is a bit complicated. I was certainly aware, as were many others, of the usefulness of B-72, thanks to research by Robert Feller, who termed it the Class A resin (the resin, against all others, that have now been compared to it), but it was primarily used as a consolidant or a coating. You may not be aware of the fact that in 1982 I published 'The instability of cellulose nitrate adhesives' (Conservator Volume 6, pp. 31-34). The film industry had already condemned cellulose nitrate almost 20 years earlier, and it was still being used in conservation. That article prompted an editorial by the Director of the Tate Gallery in an issue of *Conservation News* (UKIC Newsletter), who asked ' what are we to do now? and who will champion a replacement?'. I certainly did not have answers, but ironically, I did start research into how a solvent resin was produced (mostly thanks to the Science Reference Library in London), and after a year or more of experimentation, I introduced B-72 adhesive. I discussed it with Robert Feller, and in fact, the making up of the adhesive and putting it into adhesive tubes became well known as 'Koob's Tubes'.

> It certainly has made a good name for itself, and it is used worldwide… through dozens and dozens of hands-on demonstrations and intern training. We now use it as one of our two adhesives for Glass conservation (Koob, Conservation and Care of Glass Objects, 1986, Archetype Books).
>
> That's the story. There are some other publications that I wrote, a bit more obscure, and we have spread its use significantly on archaeological sites.' (Koob 2016).

Koob's influence in promoting Paraloid B-72 may be seen in the conservation literature as the number of references to the material (and citations of his 1986 article) increase exponentially after its publication (see Figure 46 above). Koob's status as an opinion leader within the field, particularly his work in conjunction with Feller the known innovator in the endorsement of Paraloid B-72, almost certainly intensified what was already an upward trend in both popularity and publication. Koob's reference above to the need to champion a replacement for Cellulose Nitrate also finds support from the concept of need-driven innovation, which was apparent throughout the development of archaeological conservation in the case studies in Chapter 3 of this thesis. Additionally, the similarity in function of Paraloid B-72 to Cellulose Nitrate would have made the adoption of the innovation (in this case the new material) more likely by the conservation community.

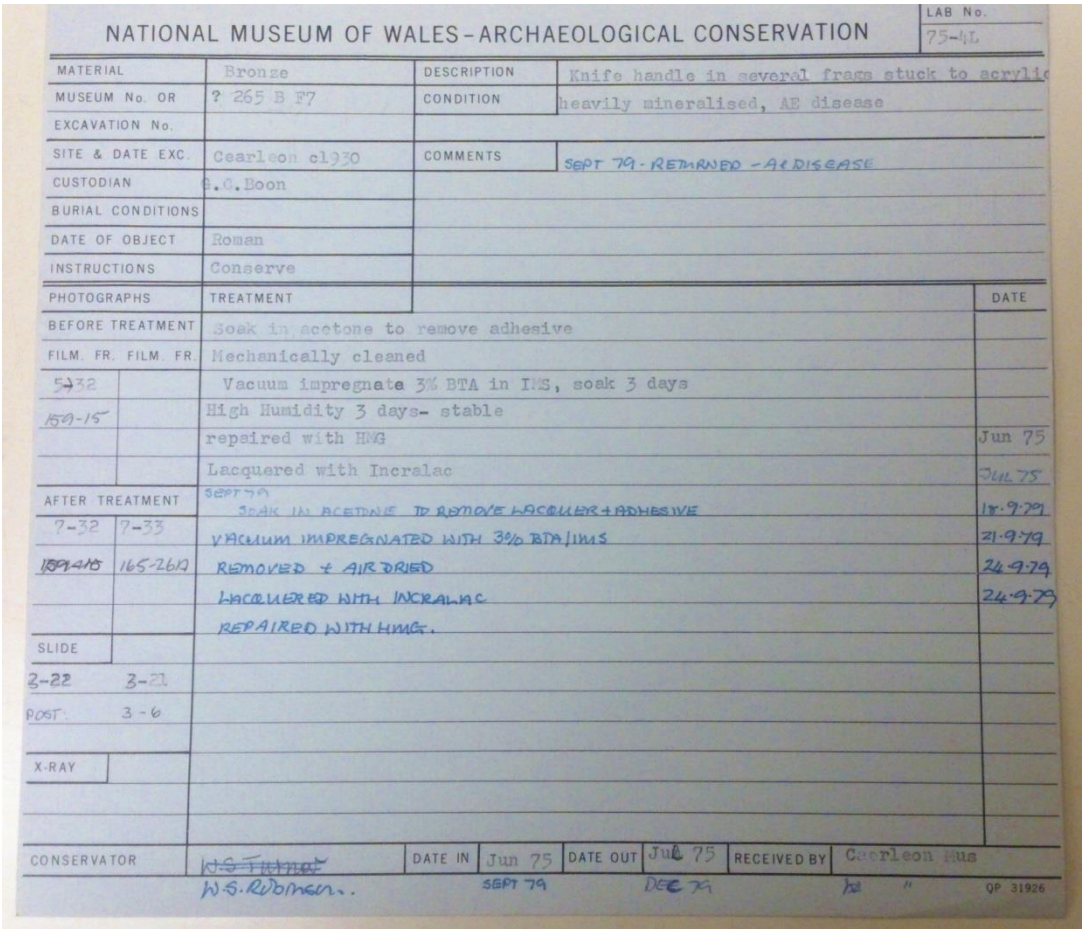
4.5.3 Tracking Knowledge Transference Across Case Study Institutions

While it was possible to track the diffusion of Soluble Nylon and Paraloid B-72 across the publication record and via the conservator interviews, tracking it across the case study institutions was not as successful. Although conservators at all five of the case study institutions verified that they had stopped using Soluble Nylon by approximately 1980 and all the institutions are currently using Paraloid B-72 in many treatments, further details were difficult to unearth. There were several reasons for this: firstly, all of the institutions studied use a similar method of recording treatments. This method is to attach conservation records to the object accession number. Although treatment records have been kept with regularity since the professionalisation of the field in the late 1960s, the early records were pre-computer and have not been digitised and are not indexed by material type or by treatment. This makes it impossible to search by materials used in conservation as the only way the records are indexed are by object accession number. This

allows for current conservators to see the history of conservation treatments performed on an object if it is retreated, but it does not enable a search by conservation treatment to conduct other research into treatment usage.

All of the case study institutions are aware of this limitation and a number of them are currently in the process of digitising record cards, which will allow for further research on knowledge transfer to be undertaken in the future. This digitisation programme also presented a hurdle to the research project, as records undergoing digitisation are currently inaccessible. Therefore, at this point in time it is not possible to trace the introduction and spread of either Soluble Nylon or Paraloid B-72 at any of the case study institutions with any reliability as the records from the 1960s-1980s have not yet been digitised unless a particular object has been re-treated, in which case the earlier records are often (though not always) added to the database. Although various sampling strategies were considered, these were frustrated by a lack of indexing and the ongoing digitisation process. A percentage-based sampling strategy by annual quarter using laboratory log books was piloted at the National Museum Wales, but the method failed to produce enough objects treated with either material to adequately show their uptake, spread, or cessation of usage.

The digitisation of the old conservation treatment records is an ongoing project for four of the five institutions studied in this thesis, but it is low on the list of priorities for conservator time. This is potentially an area where conservation department volunteer labour could be utilised effectively. Although this third research method of examining treatment uptake within the five case study institutions was unsuccessful at this point in time, it may prove to be a useful method in the future, provided the pre-computerisation records are digitised in a searchable form in due course. An example of a typical record for digitisation from the National Museum Wales appears below (figures 48 and 49).



NATIONAL MUSEUM OF WALES - ARCHAEOLOGICAL CONSERVATION

LAB No. 75-4L

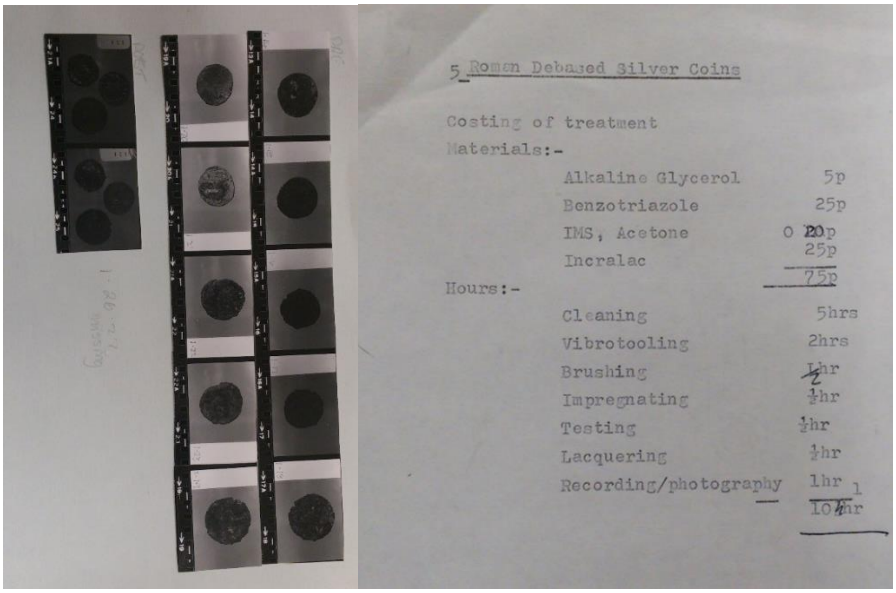
MATERIAL	Bronze	DESCRIPTION	Knife handle in several frags stuck to acrylic
MUSEUM No. OR	? 265 B F7	CONDITION	heavily mineralised, AE disease
EXCAVATION No.			
SITE & DATE EXC.	Caerleon c1930	COMMENTS	SEPT 79 - RETURNED - AE DISEASE
CUSTODIAN	G.C. Boon		
BURIAL CONDITIONS			
DATE OF OBJECT	Roman		
INSTRUCTIONS	Conserve		

PHOTOGRAPHS		TREATMENT	DATE
BEFORE TREATMENT		Soak in acetone to remove adhesive	
FILM. FR.	FILM. FR.	Mechanically cleaned	
5-32		Vacuum impregnate 3% BTA in IMS, soak 3 days	
159-15		High Humidity 3 days- stable	
		repaired with HMG	Jun 75
		Lacquered with Incralac	Jul 75
AFTER TREATMENT		SEPT 79 SOAK IN ACETONE TO REMOVE LACQUER + ADHESIVE	18·9·79
7-32	7-33	VACUUM IMPREGNATED WITH 3% BTA/IMS	21·9·79
159-15	165-261	REMOVED + AIR DRIED	24·9·79
		LACQUERED WITH INCRALAC	24·9·79
		REPAIRED WITH HMG.	
SLIDE			
3-22	3-21		
POST	3-6		
X-RAY			

CONSERVATOR	DATE IN	DATE OUT	RECEIVED BY
~~W.S. Rudman~~ W.S. Rudman.	Jun 75 SEPT 79	Jul 75 DEC 79	Caerleon Mus "

QP 31926

Figure 48: Undigitised conservation treatment record card from National Museum Wales. Shows updating from subsequent treatments (National Museum Wales 2014)



5 Roman Debased Silver Coins

Costing of treatment

Materials:-

Alkaline Glycerol	5p
Benzotriazole	25p
IMS, Acetone	0 ~~20~~p
Incralac	25p
	75p

Hours:-

Cleaning	5hrs
Vibrotooling	2hrs
Brushing	~~1~~ ½hr
Impregnating	½hr
Testing	½hr
Lacquering	½hr
Recording/photography	1hr
	10~~½~~hr

Figure 49: Associated treatment record card archival documentation (National Museum Wales 2014).

4.6 Discussion

It is now possible to examine the knowledge transference evidence provided by the two case studies in an effort to identify whether archaeological conservation takes the form of centralised or decentralised transfer system. It is important to note that although some systems are a hybrid of the two, knowledge transference patterns generally conform more strongly to one or the other (Rogers 2003, 396).

1) Whether or not the decision-making and power to innovate is centralised

There is no centralised body controlling treatment decisions. Instead, archaeological conservators operate very much as individual expert innovators. A treatment which is successful for one conservator may be spread via word of mouth, publication or conference presentations. The decision-making process for selecting which treatments to use is very much an individual one, and archaeological conservators are not forced to apply specific treatments by any centralised organisation. The power to innovate is likewise decentralised, though the evidence presented above shows that most innovations are likely to come from *strangers* with conservation scientists playing a leading role.

2) The direction of diffusion

This is much more questionable in the case of archaeological conservation. In a Centralised Diffusion system, the innovations come via experts, possibly from other fields. In the Decentralised Diffusion system, innovations are passed horizontally from peer to peer. Paraloid B-72, one of the two case study materials examined later in this chapter, was adopted by the archaeological conservation community after it was found to be an effective treatment material by conservators working in the field of paintings conservation. It seems likely that the first introduction of the material to the field of archaeological conservation was via conservation scientist Feller, which is another argument for centralised diffusion. However, the direction of diffusion as interviewed by conservators is heavily weighted towards peer-to-peer communication, as shown in figures 40 and 41, above. Additionally, the spread of Paraloid B-72 was strongly influenced by Koob, an opinion leader and archaeological conservator peer.

Based on the above, the diffusion of innovations within archaeological conservation aligns more closely with the decentralised model.

3) The source of innovations within the field

Rogers roughly defines sources as either being innovations from formal researchers (centralised) or experimentation from non-experts, often users (decentralised) (Rogers 2003). The introduction of both Soluble Nylon and Paraloid B-72 to archaeological conservation came from conservation scientists, though continued promotion of both materials was continued by archaeological conservators acting as opinion leaders. Innovations within archaeological conservation are therefore following both centralised and decentralised diffusion models to some extent.

4) The person or body who decides which innovations are spread

This tenet is not applicable as it does not comfortably align with the field of archaeological conservation. There is no overarching body with the power to decide which innovations are spread within the field. Further research incorporating the history of other organisations such as the Ancient Monuments Laboratory may provide an interesting way to explore whether some institutions were more influential than others.

5) How heavily weighted the needs of the clients are in driving the process of diffusion

Centralised systems are more innovation-centred, with technological innovations driving implementation. Decentralised system innovation spread is driven by user need for applications to solve problems (Rogers 2003). Utilising the information gained from the institutional case studies in Chapter 3, it is clear that at the Ashmolean, the National Museum Wales, the British Museum and the Museum of London and the York Archaeological Trust, the role of archaeological conservator was created entirely out of the need to solve end user problems, primarily the understanding of objects, the decay of objects, and the care of freshly excavated objects. Following on from this origin, the spread of treatment innovations may be directly related to the perceived ability of new treatments to better solve existing problems. Both treatment case studies also revealed that innovations are acquired when it is necessary for the needs of the end client, in this case, the archaeological conservator.

6) The amount of re-invention amongst adopters, with low re-invention for Centralised and high levels of re-invention for Decentralised diffusion systems

When we apply these parameters to what oral histories and publications have revealed about treatment diffusion within the field of archaeological conservation, it becomes apparent that the Decentralised Diffusion system is most applicable. As many treatment materials and methodologies are imported from other fields, it is common for their usage in archaeological conservation treatment to consist of some form of re-invention. In the course of this research a material invented with the express intent for use in archaeological conservation was not discovered. All materials and methods used in archaeological conservation were modified or taken in from other fields.

When the results of the above checklist are examined in the context of the field of archaeological conservation, it becomes apparent that the field conforms much more strongly to a decentralised diffusion method. Rogers' checklist presents an interesting exercise when applied to archaeological conservation and it is clear that adherence to both centralised and decentralised diffusion systems could be argued, but that decentralised diffusion is more strongly aligned with the field.

Both Centralised and Decentralised Diffusion systems rely on the point of interaction, or the place at which individuals come into contact with potential new treatments. The oral histories taken for this thesis have revealed that the interaction point for the introduction of methodology is overwhelmingly on a personal and peer- based level, either within an educational training programme or via other professionals in the field. It is this point of interaction and the agents of diffusion, those publication pioneers and treatment opinion leaders who actively spread new treatment materials and methodologies, which best illuminate the way in which knowledge transference networks work within archaeological conservation.

Based on the evidence presented through the publications and interview data outlined above, it has been possible to identify the individuals responsible for acting as innovators and opinion leaders for the diffusion both Soluble Nylon and Paraloid B-72 within the field of archaeological conservation. Tracking knowledge transference across the publications for both materials also made it clear that the primary role of innovator is most often filled by

the conservation scientist rather than the conservator. This drawing of conservation innovations from *strangers* who are affiliated with but not entirely of the profession may increase the opportunity for new innovations, as heterophily is shown to increase innovation and idea spread (though not necessarily adoption of new ideas). A large number of archaeological conservation innovations are brought in via connected heterophilic partners such as conservation scientists, and via related conservation disciplines.

However, the interview questions revealed that archaeological conservators are largely receiving their treatment information from peers and from their training programmes rather than from publications and conference proceedings. This is not to say that the publications are not important in the dissemination of information- they are used extensively within the teaching environment and as such, archaeological conservators are acquiring the information presented within the literature, though perhaps via the conduit of an instructor, mentor, or peer. This emphasises the importance of the role of the opinion leader.

Although the role of innovator may be filled by the conservation scientist in most instances and may be most visible through the publication record, the significance of the opinion leader may be in facilitating greater knowledge transfer. Valente and Roger's theory that personal communication networks are of great importance to the spread of innovations has been borne out in the evidence given by the interviewees. In archaeological conservation, these opinion leaders may be the acknowledged material type experts who are sought to give advice on treatments (for example, the advice of Jim Spriggs (formerly of the York Archaeological Trust) is sought internationally on matters concerning waterlogged wood, as is David Pinniger's (West Dean College) advice on pest control within the museum environment and Sonia O'Connor's (University of Bradford) expertise in non-invasive imaging of archaeological material). In addition to these widely-recognised experts, opinion leaders appeared in the publication record for both Soluble Nylon and Paraloid B-72, actively publishing to promote or condemn both materials.

When the individuals filling the roles of the innovator and the opinion leader worked together, as in the case of Feller and Koob's in the promotion of Paraloid B-72, the innovation spread incredibly quickly and extensively. Other examples of this successful

working partnership exist within the field of archaeological conservation, one being the application of laser cleaning to stone sculpture. In the 1990s, National Museums Liverpool group appointed Martin Cooper, a physicist, as conservation scientist. Cooper had previously published findings on the applications of lasers to stone conservation (Cooper et al. 1992) but did not come from a formal conservation background. Once employed by Liverpool, he worked closely with conservators within the department, eventually producing the first book dedicated to the use of laser technologies in conservation for conservators in 1998 (Cooper and Larson 1998).

Future collaboration between innovators and opinion leaders could be highly effective in speeding both the transfer of knowledge and the acceptance of new ideas into the archaeological conservation community.

Chapter 5: Conclusions

5.1 Introduction

This thesis was conceived in an effort to better understand the historical development of the profession of archaeological conservation and to place it within the broader museological and archaeological narrative. To date, the history of archaeological conservation largely has been overlooked by both the wider conservation community, which has focused on architectural conservation history, and the archaeological community, where conservation is mentioned merely in passing. This second issue was highlighted during this research when attempting to unearth the activities of early conservators within the case study institutions. They were mentioned only as tangents in the broader museological and collecting narrative, and unfortunately that trend continues today.

Despite this lack of acknowledgment in the formal record, it has been possible to identify ways in which the profession has radically contributed to both the development of archaeology and museum collecting, intrinsically changing the way in which objects are viewed, highlighting the research potential of collections, and impacting the way in which material is recorded and collected on archaeological sites. These sweeping changes, many of which have not been formally documented, are still within living memory of many of the archaeological conservators now at retirement age- making a collection of their experiences imperative.

This thesis does not claim to be a complete history of the profession, and during the course of the research a number of areas where further research might be undertaken were identified. These include the history of the Ancient Monuments Laboratory, the history and impact of the Local Museums Services, and to some degree the history of the development of ICON, all of which are currently under documented but which could be addressed by conservators who lived through these developments. Rather, this thesis has sought to pilot a methodology for the bringing together of diverse sources in order to highlight the significance of crucial shifts and key individuals within the profession, as well as areas where more research is needed. As of the writing of this conclusion, the appetite for an understanding of conservation history appears to be growing. The Sackler Research Fellowship awarded by the Ashmolean and Worcester College, Oxford in 2017 is to consist

of a three year focus on the history of conservation at the Ashmolean (Ashmolean Museum 2017).

The overview of the key developments in archaeological conservation undertaken by this thesis was accomplished via two primary exercises. The first looked at the history of the profession up to the present day through an examination of archaeological conservation at five case study institutions and a series of interviews with conservators. The second was an attempt to understand how knowledge transference operates within the profession. This was undertaken via an examination of two materials, the history and diffusion of which were traced via a survey of publications and further supported by interview data.

The historiographical design of this research was intended to help fill the existing gap in the literature relating to the history of the development of archaeological conservation, a subject which has attracted very few articles and no larger scale works to date. The oral history interviews and the archival research conducted to support the institutional case studies found within Chapter 3 represent the first attempt to gather together into a cohesive study the fragmented evidence for the development of the field and to critically examine the factors, both internal and external, which have driven change within the sector over the last century. This has resulted in the identification of a number of significant political, legislative, and scientific events which impacted the development of the field, such as the two World Wars, which resulted in the establishment of the role of the Conservation Scientist at the British Museum, the Ancient Monuments Lab, and the building boom of the post war period that greatly affected urban archaeology. A key aim of the thesis was to understand how knowledge networks operate within the archaeological conservation community. The application of existing knowledge transference theory to the examination of the profession clarified both the pathways through which innovations are shared within the community and the importance of key individuals in the dissemination of new ideas.

This chapter will first reflect on the major findings of the thesis. Successes and limitations will be identified, as well as areas where more work could be undertaken to better understand this dynamic profession.

5.2 Knowledge Gained and Recommendations for the Future

5.2.1 The Institutional Histories

The institutional case studies undertaken in Chapter 3 of this thesis revealed that there are two identifiable epochs of archaeological conservation, linked and transformed by the establishment of the role of the conservation scientist. A number of hallmarks were identified for each epoch. For the first, that of the craftsman/restorer, the theoretical underpinnings, or the 'why' of what drove the work were linked not to an understanding of the archaeological object but to the need to preserve (or in some cases, recreate) an acceptable or impressive physical appearance for museum display. Archaeological objects without obvious potential for display were not acquired by museums, and thus the focus of the restoration treatment was to correct appearance and not to investigate. The craftsman/restorer was therefore primarily concerned with activities such as ceramics restoration and the removal of corrosion products from metals, as evidenced in the early departmental and annual reports and personal correspondence of individuals at the British Museum, the National Museum Wales, and the Ashmolean, outlined in Chapter 3 (3.2). Secondly, the training background of the earliest craftsmen/restorers was generally in the mechanical crafts. 19th century restorers such as Ready at the British Museum (3.2.1) and Rowell at the Ashmolean (3.2.2) had previous experience in carpentry and watch repair, but later craftsmen/restorers were taken on as young apprentices and trained up within the institutions. This apprenticeship model is the third hallmark. During the time of the craftsman/restorer, archaeological conservation was also practiced by curators and archaeologists such as Tessa Wheeler (3.2.3, 3.2.4, 3.4.1), W.F. Grimes (3.2.3, 3.2.4, 3.3), and Flinders Petrie (3.1, 3.4.1), all of whom played a role in promoting the development of archaeological conservation. Although biographical studies exist of these three individuals, their input into archaeological conservation is referenced only briefly or in passing, further indicating the opportunity and need for archaeological conservation to be placed within the wider institutional and professional picture. This thesis identifies their importance in supporting the development of archaeological conservation.

Figure 50: Archaeological Conservation Development in the UK

Archaeological Conservation Epochs/Influences	Time Period	Educational Background	Key Identifiers
Epoch 1: Craftsman/ Restorer	18th Century-1950s	• Apprenticeship training model • Craftsmanship (watchmaker, joiner, etc.)	• Craftsmanship background • 'brown coat' denoting workman nature of role
Influence: Conservation Scientist	1919-Present day	• Material Science • Chemistry • Biochemistry • Geology/Geochemistry • Metallurgy • Archaeological Sciences	• Often from fields outside archaeology • Focus is on scientific research into materials and treatments rather than interventive conservation treatments, less object-specific • Role may encompass numerous conservation specialisms, e.g. archaeology • Distinct from archaeological conservation, may not have any conservation background.
Epoch 2: Formally Trained Conservator	1950s-Present day	• Conservation diploma or degree from formalised training course (Occasional apprenticeship training (more common in other fields of conservation such as paintings, now very unusual in archaeology)).	• Perform both preventive and interventive treatments • Have undertaken technical training in interventive or 'bench' conservation • May be lab or field based

Linking the two epochs of the archaeological conservator is the establishment of the role of the conservation scientist. This came about in large part as a result of the First World War, when Scott's laboratory was established at the British Museum to help save the objects which had suffered during their forced storage (3.3). Although the formal role was limited to just one of the case study institutions, it existed within other organisations, with the Ancient Monuments Laboratory being a key supporter of the development and application of scientific methods to archaeological conservation, particularly the integration of

conservation into archaeological projects. The important and influential literature produced by the Ancient Monuments Laboratory (3.3) in the form of reports and guidelines aimed at both archaeological conservators, conservation scientists, archaeologists, and the heritage profession cannot be overestimated and is deserving of its own dedicated future study.

The second epoch in archaeological conservation identified during the course of this research is that of the professionally trained archaeological conservator. Chapter 3 theorises that this began with the establishment of the formal training programmes between the 1950s and 1970s (3.4.1) and has been characterised primarily by the subsequent application of scientific principles to conservation, made possible by the development of the role of the conservation scientist (3.3).

A number of important external and internal events shaped the development of this era, including the establishment of professional groups such as the IIC, from which the UKIC (and later ICON) developed, and the resulting emergence of peer-reviewed conservation literature. The support for archaeological conservation inherent in policy guidance such as PPG 16, MAP2, and MoRPHE and the increased funding opportunities via the Science and Heritage Programme (3.4.2) were also of key importance in helping to establish the profession, ensuring that it is considered at all stages of the archaeological process and that post excavation research is supported.

Although a number of influential publications emerged during this period and were highlighted (3.4.3), this was by no means exhaustive. It is noted that changes in outreach for the profession, particularly the history of the development of publications by archaeological conservators for archaeological conservators, by conservators for archaeologists, and by conservators for the public could be another area in which to conduct research. An analysis of the successfulness of various archaeological conservation publications in reaching the broader archaeological community would allow future promotion to be undertaken more effectively by better identifying mechanisms of diffusion at work between the communities and to make recommendations about how information is disseminated in the future.

The role of the conservation scientist, though integral to the development of the modern profession of archaeological conservation, was found to be distinct from that of the

archaeological conservator for a number of reasons. Firstly, there is no standard training which produces the conservation scientist, and nearly all of the conservation scientists detailed in Chapters 3 and 4 were originally chemists, material scientists, or physicists (3.3, 4.2, 4.5.1). Secondly, as noted in Chapter 3, the conservation scientist likely has not undertaken any formal conservation training (3.3.). Thirdly, the focus of the work of the conservation scientist is different to that of the archaeological conservator. The research undertaken for this thesis revealed that the impact of the conservation scientist on the world of the archaeological conservator most often occurs via the discovery and subsequent publication and transmission of new materials for treatment and new treatment protocols for archaeological objects (4.4, 4.5.1, 4.6). Prior to the advent of the role of the conservation scientist, there was little awareness of the risk of chemically irreversible treatments damaging objects or rendering them unfit for further study. The development of new techniques for analysis, even simple ones such as microscopy (aiding in the identification of not only construction details but also of evidence such as mineral preserved organics, pigments, and wear patterns) has changed how objects are treated by both archaeologists and conservators from the point of excavation onward (3.3).

5.2.2 The Archaeological Conservation Community: Knowledge Transference and Diffusion of innovations

A key question for this thesis was to identify how knowledge transfer and the diffusion of ideas have functioned within the profession, and to determine how they have affected the development of the profession and to inform better and more effective communication practice within the profession for the future. This will help current conservators and conservation scientists to understand how better to utilise existing knowledge networks in the dissemination of new technology, research, and ideas. Answering this began with the challenge of identifying and understanding the makeup of the archaeological conservation community and the knowledge networks operating within it (4.3). Through the conservator interviews it was established that knowledge is gained through three primary sources. The first source is the conservation training institution during the formal education period, the second is the peer to peer network, and the third is via publications and conferences. When interviewees were questioned about where they gained their treatment methodology information, several patterns emerged. The more experienced conservators, those trained

between the 1950s and the 1980s, reported that they were most likely to obtain treatment information from their peer network, followed rather distantly by training programmes and finally publications and conferences. Less experienced conservators were far more likely to cite their training programme as a source of treatment information, followed by peers, with publications and conference proceedings again the least likely source (4.3).

The diffusion of innovations within the archaeological conservation community was traced via an examination of the treatment materials Soluble Nylon and Paraloid B-72 and their transmission through the conservation literature (4.5.1), through conservator interviews (4.5.2), and through conservation laboratory records at the case study institutions (4.5.3). It was apparent that the conservation scientist played a significant role in introducing both case study materials to the archaeological conservation field. The publication survey results implied that the conservation scientist may often function as the innovator, and may sometimes also function as an opinion leader, though the role of opinion leader is also filled by expert conservators (4.6). The interviews revealed that many archaeological conservators do not remember their formal introduction to a material, which may imply that knowledge is being transferred via practice and not in a formal setting. Many conservators also associated Koob with the spread of Paraloid B-72, further identifying him as an opinion leader.

These findings showed that the archaeological conservation network is heavily and preferentially reliant on peer to peer communication in the university and collegiate setting (4.6). This discovery provides an opportunity for researchers as well as professional bodies such as ICON and the IIC to consider ways in which to leverage this communication network in the dissemination of new information relating to treatments and materials. Chapter 4 also explored the existing online community for conservators (4.3), which was found to be perhaps underutilised. This provides an opportunity for further research. Exploration of new online fora and case studies taken from other fields may highlight new ways forward for online communication networks between archaeological conservators, an example of which is the wildly successful online presence of the British Archaeological Jobs Resource (BAJR) Facebook page, which successfully combines job postings with new items. A similar approach for conservators may not be possible due to the small size of the field, but the

pulling together of conservation jobs and popular press into one forum may be a useful tactic to increase information sharing in a quasi-published format.

Furthermore, leveraging the roles of opinion leaders and paring opinion leaders with innovators (perhaps via joint initiatives combining archaeological conservators with conservation scientists) may help to more effectively disseminate information. This could take the form of a series of video briefings hosted on the ICON website or additional funding for the remote-broadcasting of conferences to facilitate easier attendance by archaeological conservators without institutional funding. If the barriers to both producing and accessing publications (primarily temporal and financial) could be removed or addressed, both professional and public understanding could be enhanced and the future of the profession could be supported and protected.

Recommendations for the profession based on the findings of this thesis are threefold:

1) Further work should be done to investigate ways to increase access to publications to make them a more desirable venue through which to transfer knowledge within the profession.
2) Focus should be placed on investigating ways in which peer to peer communication networks may be better utilised to transfer knowledge.
3) The revelation that publication is the least utilised source of knowledge transference amongst conservators emphasises the importance of recording archaeological conservation history through other means.

5.3 Reflections on Thesis Limitations

This thesis has applied a new theoretical approach to the study of the field of archaeological conservation, resulting in a number of interesting findings as outlined above. However, as is inevitable at the end of a research project, there were also a number of limitations inherent within the study which are equally important to recognise.

5.3.1 Interviews

The semi-structured format of the interviews combined with the informality of speaking with (in most cases) a fellow conservator known to them already may have resulted in conservators choosing to reflect on personal biographical data rather than institutional

history. Although expected, this was difficult to overcome as the researcher did not wish to lead the interviewees to specific conclusions or influence their answers in any way. In light of the findings uncovered via the institutional case studies, if the study was to be done again, the career-based questions would be reworded in an effort to elucidate more information about the great changes in conservation over the past 30 years.

5.3.2 Scope

The decision to focus on institutions with long histories of archaeological conservation and multiple conservators was undertaken in hopes of accessing the most complete and historic archives on the work of archaeological conservators. However, this selection criterion resulted in the exclusion of smaller and regional museums, which may employ conservators but seldom employed more than one at a time, limiting the number of individuals available for interview (Institute of Conservation 2015, 26). Future research might seek to target these individuals specifically, in order to build a more complete picture of the way in which archaeological conservation has been developed away from the larger institution environment. A further limitation became apparent near the end of the research. The decision to focus on the development of archaeological conservation through the lens of institutions which employ conservators and through personal interviews meant that some events were not highlighted as they were not recorded in the institutional histories or spoken about by interviewees. Although these influences were mentioned and addressed where possible, a line of future research focused solely on funding streams and policy impact could be beneficial to making future recommendations for the profession.

5.3.3 Reliability of Results

The first conclusion reached in Chapter 4, that the community of archaeological conservators preferentially accept innovations from peer-to-peer networks and formal education over publications and conferences appears robust. The data from the oral history interviews presented in section 4.3 shows clear trends, despite the small sample set. However, a larger sample set might reveal more, and it might be possible to examine it by institution. Although this approach was considered, the nature of archaeological conservation employment is such that conservators often move between a relatively small

number of laboratories, with many of the conservators interviewed for this work having worked in several of the case study institutions.

One of the conclusions reached in Chapter 4 is that conservation scientists often act in the role of innovator and *stranger* to the field of archaeological conservation, thereby increasing the uptake of innovations. Although the application of knowledge transfer theory to the diffusion of Soluble Nylon and Paraloid B-72 shows that both materials were introduced to the conservation literature and championed by conservation scientists, they are only two materials. It is also important to note that the selection of these two complex organic materials may have emphasised the conservation scientist as innovator, as the job of the conservation scientist is often to research materials to be used for conservation. The selection of a different type of innovation may have revealed conservators to be acting more as innovators. Replication of the literature analysis for other types of innovations would confirm whether this is an anomaly or standard practice. Examining other types of innovations within the field of archaeological conservation might serve to identify other innovators within the field.

5.4 Areas for Further Research

Reflection upon the findings of this study also presented a number of avenues for future research. These will be addressed below.

Too Many Archaeological Conservators?

A potential area for research touched upon by this thesis (3.5) but that ultimately fell outside of the primary scope of the research questions centres around the number of archaeological conservators emerging from training programmes in relation to the number of jobs that are available in archaeological conservation. Although a significant drop in positions for which archaeological conservators were qualified was identified between 2013 and 2014, when numbers of jobs advertised halved (3.5.4), the data set was too small and the timeframe over which job adverts collected too short to make any predictions about overall trends (Figure 40). Additionally, it was not possible to identify a single event that may have resulted in the decrease. As identified in Chapter 3.4.1, there are three

universities in the UK that specifically educate professional archaeological conservators. These together produce approximately 40 newly trained conservators each year. When tallied with the data provided by ICON's 2015 membership survey in Chapter 4 of this thesis (25% response rate and of the respondents, 76 were archaeological conservators) as well as the total advertised jobs for which archaeological conservators are qualified (32 in 2013 and 15 in both 2014 and 2015) (3.5), it is apparent that a degree in archaeological conservation does not necessarily equate with a job in archaeological conservation in the UK. This is information that any archaeological conservator practicing in the UK could have provided anecdotally. Although a number of the conservators emerging from the courses may be international students who intend to return to their home countries, this data is not readily provided by the universities or by ICON. Despite a number of attempts to get hard data from the official sources, it became clear that the best way to obtain actual numbers would be to survey or interview current students on courses. This was outside the scope of this work, but could prove very interesting for future research, as could further research into the events which may have caused the decrease in advertised jobs in 2014.

This disconnect, as well as the decrease in institutional preference for interventive conservation practitioners as identified by Ashley Smith (though unevidenced in the data collected for this thesis) (3.5) should be examined further in an effort to identify whether supply exceeds demand and if the focus on increasing professional numbers through programmes such as the shared ICON HLF internships (a programme which operated between 2006 and 2015 and received Heritage Lottery Funding to support new conservators through providing alternate routes into the profession) serves the best interests of the profession. The preliminary findings of this thesis indicate that perhaps support of such efforts such as May Cassar's outreach (3.4.3) to bodies who are in the position to fund and support conservation posts may be a more effective use of funds.

Volunteers and Conservation

The appropriate use of volunteers within the sector is still a very contentious issue for conservation and for ICON (3.4.3), and further work on the impact of volunteering on the sector would be a welcome addition in the forming of future strategy for the development of the profession.

One of the areas for further research identified within this thesis (4.5.3) that could be greatly helped by the usage of volunteers is the ongoing digitisation of old conservation treatment records. This digitisation is an important part of the curation of the history of the field and could be easily undertaken by volunteer labour with minimal supervision.

Pioneers of Archaeological Conservation

A potentially exciting area in which more work could be undertaken is on the pioneers of early conservation. Information uncovered during the course of this research indicates that female figures such as Ione Gedye (3.4.1) and Tessa Wheeler (3.2.3, 3.2.4) were instrumental in influencing the development of the profession, yet articles about their impact on conservation are few (and in the case of Wheeler, non-existent). This is in contrast to those that have been written about the careers of conservation scientists such as Plenderleith (Caldararo 1987; Oddy 1998). This work would likely be beset by some of the issues encountered during the institutional case studies research, particularly the lack of documentation on conservation activity. However, there is potential for the discovery of more information via other archival resources which lay outwith the scope of this thesis, particularly via personal correspondence with institutions not included as case studies. Additionally, no biographical works have appeared on archaeological conservators, despite a number existing for archaeologists who have been tangentially involved in conservation (Wheeler (Hawkes 1982), Petrie (Drower 1985), et al.). More research on forerunners of archaeological conservation could serve to set the profession into context in the broader archaeological and museum/collecting narrative, publicising the importance of the profession in the histories of both sectors.

5.5 Final Conclusions and Recommendations for the Future

This thesis has examined how the field of archaeological conservation developed and how conservation communities share knowledge. The findings revealed several factors which have been likely to increase employment stability for archaeological conservators. These include the insertion of archaeological conservation into planning policy (3.4.2) and the prominence of archaeological conservation within the institution (historically often driven by the accession of freshly excavated material, which more obviously requires investigative or interventive conservation).

The importance of ensuring that the need for archaeological conservation is understood by persons outside the profession cannot be overestimated. The historical success of archaeological conservation at a number of the case study institutions appears to have been highly dependent on the favour of individuals with decision-making capability. Mortimer Wheeler's influence was key to the establishment of archaeological conservation at both the National Museum Wales, the Museum of London, and the foundation of the first conservation training programme at the Institute of Archaeology (3.2.3, 3.2.4, 3.4.1). Much of his understanding of the importance of the field may be down to the evidence we have of Tessa Verney Wheeler's involvement with and interest in archaeological conservation, evidence of which was apparent in the archives of two case study institutions (3.2.3, 3.2.4). Mark Norman, former head of conservation at the Ashmolean, credits the sympathetic nature of the last Director with the continued health of the department as well as the temporary conservation gallery space (Norman 2015) (3.4.4). Peter Addyman of the York Archaeological Trust experienced early career exposure to the work of Leo Biek and later, to David Leigh. He credited both of them with his understanding of the importance of conservation to archaeology and the result was his championing of conservation at YAT (3.4.5).

The preceding examples serve to emphasise that it is essential for archaeological conservators to make their work known, so that advocacy for the role might come from outside the profession as well as from within. One way to effectively promote awareness of the vital role of archaeological conservation would be for conservators to increase their publications in journals outside the profession. Another would be for archaeological conservators, perhaps supported through funding from the ICON Archaeology Group (or via the current training programmes at UCL, Durham, and Cardiff) to establish an outreach programme for universities currently offering archaeology and museum studies degrees.

The education of individuals within the museum and archaeology sectors is therefore of utmost importance, and conservators should be concerning themselves with outreach as much as is possible, illustrating what it is that they have done and can do for both archaeology and for collecting institutions.

Appendix A: Oral History Interview Information

A study of the history of the profession of archaeological conservation

THE UNIVERSITY of York

PARTICIPANT INTERVIEW INFORMATION SHEET

You are being invited to take part in a research study looking at the development of archaeological conservation as a profession. Please take time to carefully consider whether or not you would like to participate by being interviewed about your experiences as a conservator or related practitioner.

What is the purpose of the study?

The profession of archaeological conservation is relatively new but has undergone rapid development over the past 50 years. This study will aid in understanding how the profession developed by examining professional networks and their relationship to the diffusion of treatments. The end goal of the work will be to gain a clearer understanding of how knowledge networks in professional conservation are established and to use the results to make recommendations for the future sustainability of the profession.

Why is the study being done?

This work is being undertaken in an attempt to clarify the historical development of archaeological conservation, tracing the earliest beginnings and determining how it became established as a distinct profession. Identification of the intent in development will allow further examination into the relationship between intent and stability of employment of conservators. This is particularly timely for two reasons: 1) conservation jobs within the museum sector are being lost at a rapid rate, and 2) no work on the history of archaeological conservation has been published, and as the profession is relatively new it is still possible to interview those who may be considered to be the first intentional professional conservators (trained in the 1950s and 1960s) to elucidate first-hand information about the early days of the profession which will otherwise be lost. Interviewees have been selected from the six institutions for study or have been suggested by previously interviewed participants.

Why have I been asked to participate?

You have been asked to interview as you have worked at one of the case study institutions or have been suggested for interview by a previously interviewed subject. The research involves collecting first person histories of the development of the field of archaeological conservation via a standardised list of interview questions. Around 120 interviews in total will be undertaken.

Do I have to take part?

You do not have to take part unless you would like to participate in this research. If you decide to participate, you may still withdraw at any time. You may also determine whether or not you would like to remain anonymous. It is completely up to you.

What will happen if I do decide to take part?

If you decide to take part you will be interviewed about your path to archaeological conservation and your working history. The goal of the interview process is to better understand the overall development of knowledge transference within the field of archaeological conservation. The interview may be terminated at your request and you are welcome to decline to answer any of the questions. You will also be asked if you will consent to audio recording, which is not mandatory. If audio recording is declined, the interviewer will take notes, which will then be kept as secure computer files. A paper copy of the interview will also be kept for ten years in accordance with the University of York ethics requirements. You are welcome to have a copy of your interview if you so choose. Alaina Schmisseur (interviewer) will be responsible for the security and confidentiality of the files. You will be given a copy of this information sheet and the consent form.

What happens to the interview data?

When the interviews have been completed the data, transcripts and recordings will be kept in locked files and password protected computer storage for at least 10 years after the end of the study. All data will be treated in accordance with the Data Protection Act 1998.

How can I find out the results?

When the research has been completed it will be incorporated into a doctoral thesis. You will receive an electronic copy of the thesis upon request and an update on the work prior to completion of the thesis if requested. The results may also be publicised through conference proceedings and journal publications. No names or other material for personal identification will be publicised, though personal comments may be cited in the thesis.

How can I find out more about the study?

The researcher is Alaina Schmisseur, a professional conservator and a PhD student at the University of York. She will be conducting the interviews. If you have any questions about this research or the nature of the study, please contact her at ams557@york.ac.uk or at tel. 07845326728

History of Archaeological Conservation Project Consent Form

Please read and answer every question.

TO COMPLETE

	YES	NO
Do you understand what the project is about and what will be involved in taking part?	☐	☐
Do you understand that you are not obligated to take part and that if you do, you can leave the project at any time without giving a reason?	☐	☐
Do you understand that the information you share will be used to better understand the development of the field of archaeological conservation?	☐	☐
Would you like to take part in the project?	☐	☐
If yes, is it OK to audio record your interview?	☐	☐

Name of participant: .....

Signature of participant: .....

Name of researcher: .....

Signature of researcher: .....

Date of interview: .....

You will be provided with a copy of this consent form by post or electronically

Oral History Interview Questions

1) Name, address, telephone, age, gender
2) How did you first learn about conservation?
3) Did you originally plan to become a conservator?
4) Did you receive encouragement from outside sources?
5) What kind of training did you undertake?
6) What was your first job in conservation?
7) Were there any preconceived expectations of the role? Were they met?
8) Would you tell me a bit about early job duties?
9) Please tell me about a typical day on your first job.
10) Did you stay in conservation for your entire career?
11) Please tell me about a typical day on your last or current job in conservation.
12) How did your record your work at the beginning of your career? How did this change?
13) In your opinion, what were the biggest issues in the field when you began work as a conservator?
14) What are the biggest issues facing the field today?
15) What do you believe is the biggest change in the profession since you started in conservation?
16) How has the profile of conservation changed over the years?
17) How did you keep in touch with other conservators and with developments in the field at the beginning of your career? And now?
18) From what sources did you learn about the treatments you currently use? Could you estimate percentages?
19) Do you remember how you first heard about soluble nylon? Did you ever use it?
20) Do you remember how you first heard about Paraloid B-72? What convinced you to try it?

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