Chapter 18
Cultural Heritage Career Paths for Materials Scientists and Corrosion Engineers

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ABSTRACT

The study and preservation of cultural heritage is a multidisciplinary field where Materials Science and Corrosion Science have a very significant role to play. This chapter discusses how materials and corrosion scientists can follow a career in cultural heritage. It highlights the particular challenges that these disciplines encounter in the study and preservation of cultural heritage materials and the exciting career paths offered in museums, monuments, and relevant academic and research institutions. The applications for science and engineering skills to cultural materials are diverse, including the reverse engineering necessary to reconstruct ancient technologies used for materials production, the examination and condition assessment of often complex finds and structures, and the development of innovative treatment methods for their protection and conservation for future generations. Within this range of challenges and materials, numerous career paths are available that lead to specialisations within the sub-fields of archaeological science and conservation science.

INTRODUCTION

Cultural heritage is a major and growing industry of great social significance with a huge economic impact. Cultural heritage encompasses the wealth of physical remains, artefacts and built heritage, as well as intangible expressions, folklore, traditions, and practices that are uncovered or passed on from one generation to the next, as witnesses of the local and universal past. It is universally relevant as it is intimately linked in a reciprocal relationship with processes of social identity formation and

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re-negotiation. In its 2001 Universal Declaration on Cultural Diversity, UNESCO identifies "cultural heritage as the wellspring of creativity" and states that "Creation draws on the roots of cultural tradition, but flourishes in contact with other cultures. For this reason, heritage in all its forms must be preserved, enhanced and handed on to future generations as a record of human experience and aspirations, so as to foster creativity in all its diversity and to inspire genuine dialogue among cultures" (UNESCO, 2001). Cultural heritage is thus considered a fundamental human right and a resource for both the past and the future within the 'cultural rights' framework. Enjoying and valuing cultural heritage are closely tied with understanding and preserving it (Thurley, 2005). In this, the role of scientists and engineers is of paramount importance, as discussed in this chapter.

Objects and monuments have been made using a wide range of materials and manufacturing techniques, the study of which require extensive research using both established and new methods, from controlled laboratory conditions to on-site applications in far-flung places around the globe. A wealth of other evidence and phenomena need to be recorded and studied in order to comprehend the ancient environment within which humans lived, the periods of occupation or exploitation, and the extent and state of preservation of ancient remains. At the same time, it is the responsibility of each generation to record and preserve the material remains of the past for future generations. Uncovering archaeological remains from the ground immediately changes their surrounding conditions, usually speeding up their degradation. Increasing pollution, rapid urban development, interest in heritage tourism and other factors place growing strain on heritage materials and structures. Furthermore, in the context of heritage the term 'past' is constantly evolving, as it encompasses modern art, ethnographic objects and other contemporary material remains, as well as historical and archaeological ones.

This chapter introduces a field that is not often considered by mainstream engineers but which does offer new and exciting career paths. It distinguishes between two separate but ultimately interrelated sub-fields of heritage science: archaeological science and conservation science, both of which work towards understanding and preserving the material culture of the past. The chapter starts with a brief consideration of the historical background of scientific involvement in dealing with heritage materials and the development of the field of conservation. Subsequently, it considers this vast and diverse field today, looking into the applications and potentials of science and engineering separately within archaeological and conservation science. The particularities of working as a scientist with heritage materials and within the cultural heritage sector are highlighted. The chapter discusses the potential for scientists and engineers to follow career paths in this field, along with possible preparatory routes involving postgraduate studies.

BACKGROUND

The preoccupation of scientists with cultural heritage materials has a long history that can be traced back at least to the late 18th century (Caley, 1951; 1967; Pollard & Heron, 2008, pp. 3-6; Winter, 2005). Eminent scientists, primarily chemists at the time, amongst them Martin Heinrich Klaproth (1743-1817), Sir Humphry Davy (1778-1829), and Michael Faraday (1791-1867) were drawn to the analysis of ancient coins, glass, glazes, and pigments. These intermittent studies, driven primarily by curiosity, offered invaluable early insights into the composition and manufacture of ancient artefacts. Several of these analytical studies were incorporated as appendices in the publication of major archaeological discoveries, such as A. H. Layard's 1853 'Discoveries in the Ruins of Niniveh and Babylon' and H. Schliemann's 1878