Edited by Eric May, Mark Jones and Julian Mitchell

Heritage Microbiology and Science

Microbes, Monuments and Maritime Materials

RSC Publishing

Heritage Microbiology And Science Microbes Monuments

Brian A. Whitton

Heritage Microbiology And Science Microbes Monuments:

Heritage Microbiology and Science Eric May,Mark Jones,Julian Mitchell,2008-09-17 Heritage Science is emerging as a discipline that brings together chemists physicists microbiologists conservation scientists archaeologists and conservators Its scope precise boundaries and the interfaces between its component disciplines may be in a state of flux but above all its interdisciplinary nature offers understanding of the causes control and protection of heritage from ever present environmental challenges In particular the activities of microbes play a central part in shaping the natural world of our planet but this awesome power constitutes a serious threat to the integrity of our most precious art heritage artefacts monuments and cultural treasures Heritage artefacts that have been recovered from water or that exist near the sea in maritime conditions pose special conservation problems due in main to the combined effect of microbial activities and physical chemical assaults that the environment can offer This book is a result of the invited and updated papers from HMS2005 Microbes Monuments and Maritime Materials and forms a comprehensive volume that addresses key topical areas of heritage science and discusses the threats to a wide range of heritage materials and monuments by biological and chemical agents of decay Key features of the book include Up to date summaries on the conservation of internationally important artefacts and monuments Clear outline of molecular techniques to identify microbes in environmental heritage samples Wide range of case studies covering wood stone cave and cave paintings Contributions presented as fully referenced research publications giving useful technical details and identification of areas for future study Informs conservators about the threats from microbes to a range of materials Extensive range of case studies of important world heritage artefacts and monuments as well as an overview of in situ preservation of historic ships Provides background knowledge on the use and application of modern analytical techniques in conservation Contains detailed information on molecular and synchrotron techniques to assist with identifying biological and chemical threats to heritage artefacts and monuments The book also provides up to date information on subjects covering the component field of heritage microbiology molecular and chemical analytical techniques and the mechanisms of degradation and deterioration of historic ships and buildings The book details state of the art techniques for the study of large and small heritage objects and their conservation Techniques cover the use of GIS image processing molecular biological analysis of environmental samples including FISH electrophoresis to remove corrosive ions and synchrotron radiation to detect chemicals present in artefacts Several authors have developed their methods through involvement in international collaborative projects such as BIOBRUSH BACPOLES and Save the Vasa Extensive emphasis is placed on case studies and there is a valuable section on historic ships covering the preservation of HMS Victory ss Great Britain Vasa and the Mary Rose This book provides an indispensable guide and reference source for those working in all areas of historical conservation biodeterioration microbiology and materials science Microbial Biotechnology Approaches to Monuments of Cultural Heritage Ajar Nath Yadav,Ali Asghar Rastegari,Vijai Kumar

Gupta,Neelam Yadav,2020-06-24 Our country s cultural legacy is one of the world s most diverse drawing millions of visitors every year to our convents and monuments and to our museums libraries concert halls and festivals In addition it is a dynamic trigger of economic activity and jobs Among the various scientific branches microbial biotechnology offers an innovative and precise approach to the complexity of problems that restorers face in their daily work This book discusses a range of topics including the biodiversity of microbial communities from various cultural heritage monuments microbial biotechnological cleaning techniques the role of bacterial fungal communities for the conservation of cultural heritage and microbial enzymes and their potential applications as biorestoration agents Written by internationally recognized experts and providing up to date and detailed insights into microbial biotechnology approaches to cultural heritage monuments the book is a valuable resource for biological scientists especially microbiologists microbial biotechnologists biochemists and microbial biotechnologists *Ecology of Cyanobacteria II* Brian A. Whitton,2012-07-05 Cyanobacteria have existed for 3 5 billion years yet they are still the most important photosynthetic organisms on the planet for cycling carbon and nitrogen The ecosystems where they have key roles range from the warmer oceans to many Antarctic sites They also include dense nuisance growths in nutrient rich lakes and nitrogen fixers which aid the fertility of rice fields and many soils especially the biological soil crusts of arid regions Molecular biology has in recent years provided major advances in our understanding of cyanobacterial ecology Perhaps for more than any other group of organisms it is possible to see how the ecology physiology biochemistry ultrastructure and molecular biology interact This all helps to deal with practical problems such as the control of nuisance blooms and the use of cyanobacterial inocula to manage semi desert soils Large scale culture of several organisms especially Spirulina Arthrospira for health food and specialist products is increasingly being expanded for a much wider range of uses In view of their probable contribution to past oil deposits much attention is currently focused on their potential as a source of biofuel Please visit http extras springer com to view Extra Materials belonging to this volume This book complements the highly successful Ecology of Cyanobacteria and integrates the discoveries of the past twelve years with the older literature Corrosion and Conservation of Cultural Heritage Metallic Artefacts P Dillmann,D Watkinson,E Angelini,A Adriaens,2013-07-31 The conservation of metallic archaeological and historic artefacts is a major challenge whether they are ancient bronzes or relics of our more recent industrial past Based on the work of Working Party 21 Corrosion of Archaeological and Historical Artefacts within the European Federation of Corrosion EFC this important book summarises key recent research on analytical techniques understanding corrosion processes and preventing the corrosion of cultural heritage metallic artefacts After an introductory part on some of the key issues in this area part two reviews the range of analytical techniques for measuring and analysing corrosion processes including time resolved spectroelectrochemistry voltammetry and laser induced breakdown spectroscopy Part three reviews different types of corrosion processes for a range of artefacts whilst part four discusses on site monitoring techniques The final part of the

book summaries a range of conservation techniques and strategies to conserve cultural heritage metallic artefacts Corrosion and conservation of cultural heritage metallic artefacts is an important reference for all those involved in archaeology and conservation including governments museums as well as those undertaking research in archaeology and corrosion science Summarises key research on analytical techniques for measuring and analysing corrosion processes Provides detailed understanding of corrosion processes and corrosion prevention Discusses on site monitoring techniques **The UNESCO Training Manual for the Protection of the Underwater Cultural Heritage in Latin America and the Caribbean** Netherlands. Ministry of Education, Culture and Science. Cultural Heritage Agency,UNESCO,2021-03-10 De Engelstalige UNESCO Training Manual for the Protection and Management of Underwater Cultural Heritage in Latin America and the Caribbean is samen met UNESCO ontwikkeld en vormt de basis voor trainingen in onderwater cultureel erfgoedbeheer in Latijns Amerika en de Cara ben Het is een vervolg op een eerder verschenen trainingsmanual 2012 waarin gefocused werd op Azi en de Pacifische regio uitgever *Heritage Wood* Austin Nevin,Malgorzata Sawicki,2019-10-12 This volume highlights recent research efforts in the conservation and investigation of works of art on wood Through eleven case studies it showcases different experimental methods ranging from X ray analysis of objects to the study of cross sections made from micro samples New research focusing on the technical study treatment and assessment of works of art on wood in its many forms is featured in this edited volume Technical studies include the attribution and investigations of a triptych by Hans Memling and a sculpture from workshop of Michel and Gregor Erhart decorated Syrian rooms and investigations of finely carved Gothic wooden objects Synchrotron based methods are presented for studying the alteration of 19th c verdigris in Norway and multi analytical methods are employed for the investigations of 16th to 19th c East Asian lacquer from the Kunsthistorisches Museum in Vienna Novel methods for the cleaning of gilded surfaces using gels and emulsions are shown as are innovative strategies for the consolidation for waterlogged wood providing key data for the assessment of risks and benefits of new methods and the short and long term effects on gilding layers and archaeological wood The book clearly shows how collaboration between engineers physicists biologists and chemists and conservators of different types of materials can lead to new research in conservation science This book is crucial reading for conservators and conservation scientists as well as for technical art historians providing key methodological case studies of polychromy from different temporal and geographical contexts Coping with Biological Growth on Stone Heritage Objects Daniela Pinna,2017-05-18 Coping with Biological Growth on Stone Heritage Objects Methods Products Applications and Perspectives offers hands on guidance for addressing the specific challenges involved in conserving historical monuments sculptures archaeological sites and caves that have been attacked and colonized by micro and macroorganisms The volume provides many case studies of removal of biological growth with practical advice for making the right choices It presents detailed and updated information related to biocides and to alternative substances features that will be valuable to dealing with these challenges The author s

goal is to provide access to information and offer the conceptual framework needed to understand complex issues so that the reader can comprehend the nature of conservation problems and formulate her his own views From bacteria to plants biological agents pose serious risks to the preservation of cultural heritage In an effort to save heritage objects buildings and sites conservators activities aim to arrest mitigate and prevent the damages caused by bacteria algae fungi lichens plants and birds Although much has been learned about these problems information is scattered across meeting proceedings and assorted journals that often are not available to restorers and conservators This book fills the gap by providing a comprehensive selection and examination of international papers published in the last fifteen years focusing on the appropriate methods techniques and products that are useful for the prevention and removal of micro and macroorganisms that grow on artificial and natural stone works of art including wall paintings Results on new substances with antimicrobic properties and alternative methods for the control of biological growth are presented as well The book also emphasize issues on bioreceptivity of stones and the factors influencing biological growth and includes an outline of the various organisms able to develop on stones a discussion on the bioprotection of stones by biofilms and lichens a review of the main analytical techniques and a section on bioremediation This volume will be a valuable reference for cultural heritage conservators and restorers scientists and heritage site staff involved in conservation and maintenance of buildings archaeological sites parks and caves **Corrosion and conservation of cultural heritage metallic artefacts** D. Watkinson,M.B. Rimmer,F. Kergourlay,2013-07-31 Current research into the removal of soluble chloride corrosion drivers from archaeological iron by deoxygenated aqueous alkaline treatments is described and assessed along with suggestions for future work The problems of how to determine treatment success are discussed along with the impact of treatment unknowns such as chloride form and location within iron objects on the assessment techniques Post treatment residual chloride is shown to be the best measure of treatment effectiveness and methods for assessing this are described A real time study of oxygenated and deoxygenated treatment mechanisms and corrosion product transformations using micro X ray diffraction is reported *Biotechnology and Conservation of Cultural Heritage* Franco Palla,Giovanna Barresi,2022-06-28 This second fully updated and extended edition of Biotechnology and Conservation of Cultural Heritage provides in depth insights into the role of different microorganisms and microbial compounds in biodeterioration conservation and restoration of artworks and artifacts Latest methods to detect remove and prevent microbial colonization on artwork surfaces and in air environments of libraries and museums are discussed and illustrated by engaging case studies Furthermore this edition covers new case studies on Archaeobiology exploring ways to perform the molecular biology characterization restoring and protecting museum taxidermal specimens preserving and guaranteeing the future integrity Finally the use of halloysite nanotubes is investigated to set up innovative protocols in consolidation and long term protection of waterlogged and archaeological wood This book addresses to Biologists Microbiologists Conservation Scientists and Conservators who are interested in understanding the

role of microorganisms and bioactive molecules in conservation projects *Stone Conservation* Clifford A. Price,Eric Doehne,2011-02-15 First published in 1996 this volume has been substantially updated to reflect new research in the conservation of stone monuments sculpture and archaeological sites **Cultural Heritage Microbiology** Ralph Mitchell,Christopher J. McNamara,2010 Ideal for anyone concerned with recognizing and dealing with microbial deterioration of heritage materials Provides a unique single overview of the seminal literature in conservation microbiology Presents the current state of the art along with a synthesis of the major developments over the years Represents the findings of leading international experts and pioneers in the field Offers conservation scientists and conservators an inclusive view of the heritage conservation field plus extensive resources for further investigation **Bridging the Gap** Delphine Neff,Sabrina Grassini,David Watkinson,Nicola Emmerson,2025-06-27 Conservation practitioners seek predictable and successful procedures and treatments for controlling corrosion of heritage metals that conform to aesthetic and ethical boundaries set by prevailing cultural historical and archaeological contexts Understanding metallic corrosion and its prevention is informed by scientific research provided by heritage scientists conservators themselves and to a lesser extent corrosion scientists who may be in academia or industry Bridging the Gap Corrosion Science For Heritage Contexts explores the decision making processes for preserving heritage metals and examines the collaborative interdisciplinary relationships that underpin them Through themed chapters the book is designed to develop and strengthen collaboration between these three groups of professionals creating a synergy that benefits research and practice for the preservation of heritage metals It builds an overview of metals conservation across a broad range of heritage contexts from indoor museum displays to fixed outdoor structures and moving objects Researchers and practitioners provide critical insights into corrosion problems within heritage current corrosion mitigation procedures and the evidence supporting best practice guidance The book will be a valuable reference resource for corrosion and corrosion protection scientists heritage preservation scientists conservation practitioners and students studying preservation of cultural objects Provides a detailed understanding of recent advancements and the benefits of a multidisciplinary approach to addressing future challenges Presents a contextual understanding of the corrosion of a range of heritage metals in different environments Discusses novel characterization techniques as applied to heritage science Overviews innovative protection treatments in use and under development Includes extensive case studies from highly qualified experts who deal with numerous issues on the conservation of metal artifacts

Nanoscience for the Conservation of Works of Art Piero Baglioni,David Chelazzi,2015-11-09 Understanding the chemistry behind works of art and heritage materials presents an opportunity to apply scientific techniques to their conservation and restoration Manipulation of materials at the nanoscale affords greater accuracy and minimal disturbance to the original work while efficiently combating the affects of time and environment This book meets the growing demand for an all encompassing handbook to instruct on the use of today s science on mankind s cultural heritage The editors have

pioneered modern techniques in art conservation over the last four decades and have brought together expertise from across the globe Each chapter presents the theoretical background to the topic in question followed by practical information on its application and relevant case studies Introductory chapters present the science behind the physical composition of art materials Four chapters explore various cleaning techniques now followed by four chapters describing the application of inorganic nanomaterials Each chapter is fully referenced to the primary literature and offers suggestions for further reading Professional conservators and scientists alike will find this essential reading as will postgraduate students in the fields of materials and colloid science art restoration and nanoscience Preserving Archaeological Remains in Situ David Gregory,2017-07-05 The PARIS 4 conference which took place at the National Museum of Denmark in 2011 attracted over 100 participants from 18 countries Delegates presented and discussed the latest developments in the field of Preserving Archaeological Remains In Situ These proceedings explore four major themes rates of degradation in archaeological remains and the limits of acceptable change the techniques and duration of monitoring on archaeological sites the role of multinational standards when the sites and national legislations are so variable reviewing the effectiveness of in situ preservation after nearly two decades of research A special issue of Conservation and Management of Archaeological Sites Vol 14 Nos 1 4 **Microorganisms in the Deterioration and Preservation of Cultural Heritage** Edith Joseph,2021-05-05 This open access book offers a comprehensive overview of the role and potential of microorganisms in the degradation and preservation of cultural materials e g stone metals graphic documents textiles paintings glass etc Microorganisms are a major cause of deterioration in cultural artefacts both in the case of outdoor monuments and archaeological finds This book covers the microorganisms involved in biodeterioration and control methods used to reduce their impact on cultural artefacts Additionally the reader will learn more about how microorganisms can be used for the preservation and protection of cultural artefacts through bio based and eco friendly materials New avenues for developing methods and materials for the conservation of cultural artefacts are discussed together with concrete advances in terms of sustainability effectiveness and toxicity making the book essential reading for anyone interested in microbiology and the preservation of cultural heritage **PROCEEDINGS 4th International Congress on “Science and Technology for the Safeguard of Cultural Heritage in the Mediterranean Basin” VOL. II** , **Science, Technology and Cultural Heritage** M.A. Rogerio-Candelera,2014-12-01 The Second International Congress on Science and Technology for the Conservation of Cultural Heritage was held in Seville Spain June 24 27 2014 under the umbrella of the TechnoHeritage network TechnoHeritage is an initiative funded by the Spanish Ministry of Economy and Competitivity dedicated to the creation of a network which integrates CSIC and University groups private companies and end users such as foundations museums or institutions The network s purpose is to foster the creation of transdisciplinary and not only multidisciplinary initiatives focused on the study of all assets movable or immovable that make up Cultural Heritage The congress was

dedicated to six topics namely 1 Environmental assessment and monitoring pollution climate change natural events etc of Cultural Heritage 2 New products and materials for conservation and maintenance of Cultural Heritage 3 Agents and mechanisms of deterioration of Cultural Heritage physical chemical biological including deterioration of modern materials used in Contemporary Art and information storage 4 Development of new instruments non invasive technologies and innovative solutions for analysis protection and conservation of Cultural Heritage 5 Security technologies remote sensing and G I S for the protection and management of Cultural Heritage and 6 Significance social value and policies for the conservation of Cultural Heritage This volume publishes a total of seventy two contributions which reflect some of the most recent responses to the challenge of cultural assets conservation and the application of different scientific approaches to the common goal of the conservation of Cultural Heritage Corrosion and conservation of cultural heritage metallic artefacts D. Neff,S. Reguer,P. Dillmann,2013-07-31 This chapter introduces the techniques used when investigating corrosion layers formed on cultural heritage artefacts Various multiscale analysis methods from macroscopic to nanoscopic scales are presented Information on the morphology the elementary composition and the crystalline structure that each method allows for determining the constituents of the corrosion layers is examined as well as their limits in terms of set up spatial and detection resolution This chapter discusses the characteristics of the scientific tools that can be used to understand corrosion phenomena by taking into account the major parameters responsible for alteration mechanisms Manual de Formación de la UNESCO para la Protección del Patrimonio Cultural Subacuático en América Latina y el Caribe Netherlands. Ministry of Education, Culture and Science. Cultural Heritage Agency,UNESCO,2024-04-08 *WreckProtect* Charlotte Gjelstrup Björdal,David Gregory,2011 This book stems from the results of an interdisciplinary European Union supported research project WreckProtect which investigated the decay and preservation of wooden shipwrecks under water in the Baltic Sea It is not limited to the decay of wrecks in the Baltic alone and is aimed at all stakeholders with a vested interest in the protection of the underwater cultural heritage including marine archaeologists conservators engineers and students in related fields at universities around the world The book includes chapters on the anatomy and structure of wood and the physical and biological decay of shipwrecks under water Well known shipwrecks in the Baltic Sea are introduced focusing upon their state of preservation and are compared to finds typically found in the North Sea and the Mediterranean Microbial decay processes and their identification in both sediments and the water column are also discussed and related to other natural decay processes as well as human impacts Finally a summary of available methods for the in situ protection of wrecks is presented and a cost benefit analysis of in situ preservation versus conventional raising and conservation is given Contents 1 Introduction 2 The Baltic Sea a unique resource of underwater cultural heritage 3 Other European waters 4 The Baltic Sea environment 5 Wood as material 6 Wood degraders in the Baltic Sea 7 The decay process of shipwreck timbers in the Baltic 8 Spread of shipworm into the Baltic 9 In situ preservation of a wreck site 10 Future research

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