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## Biodeterioration of Stone in Tropical Environments

An Overview

Rakesh Kumar Anuradha V. Kumar

# **Biodeterioration Of Stone In Tropical Environments An Overview**

Franco Palla, Giovanna Barresi

### **Biodeterioration Of Stone In Tropical Environments An Overview:**

Biodeterioration of Stone in Tropical Environments Rakesh Kumar, Anuradha V. Kumar, 1999 This series includes monographs research results and state of the art reviews of conservation literature by Institute staff and others Discusses the types and causes of stone biodeterioration in hot and humid climates preventive and remedial methods selection of chemical treatments status of current research and areas for further investigation **Biodeterioration of Stone Surfaces** Larry St.Clair, Mark Seaward, 2012-11-02 This is a timely volume in view of the considerable interest currently shown in the preservation of our cultural heritage and the extensive and growing literature on the subject Unfortunately the latter is to be found in a wide variety of published sources some aimed at a very specific readership and therefore not all that accessible to those who need this resource The present volume draws together a spectrum of biodeterioration work from across the world to provide an overview of the materials examined and the methodologies employed to elucidate the nature of the problems as well as an extensive and current bibliographical resource on lichen biodeterioration Biodeterioration of historical and culturally important stone substrata is a complex problem to be addressed Easy risk free solutions are simply not available to be dealt with by other than a wide range of expertise Successful resolution of this issue will inevitably require a multidisciplinary effort where biologists work in close cooperation with ecologists geologists geochemists crystallographers cultural property conservators archaeologists anthropologists and historians in order to recommend the most effective management scheme The advantage of this approach is obvious multidisciplinary management teams with good leadership can ask more appropriate questions while developing much more thoughtful and informed decisions for the Conservation of Stone Majid Hosseini, Ioannis Karapanagiotis, 2018-01-22 This book identifies novel advanced materials that can be utilized as protective agents for the preservation of stone The innovative solutions to stone conservation presented here result in increased sustainability reduced environmental impact and increased social and economic benefits It provides an overview of recent trends and progress in advanced materials applied to stone protection It also explores the scientific principles behind these advanced materials and discusses their applications to diff erent types of stone preservation efforts Essential information as well as knowledge on the availability and applicability of advanced nanostructured materials is also provided with focus placed on the practical aspects of stone protection. The book highlights an interdisciplinary eff ort regarding novel applications of nanostructured materials in the advancement of stone protection It provides insight towards forthcoming developments in the fi eld Advanced nanostructured materials are designed and developed with the aim of being chemically physically and mechanically compatible with stone Advanced materials for stone conservation that are characterized by several functional properties are considered in this book These include the physico chemical protective and morphological properties eco toxicity and mechanisms of degradation The authors present a thorough overview of cutting edge discoveries detailed information on recent technological developments breakthroughs in

novel nanomaterials utilization strategies for applications in cultural heritage and the current status and future outlook of the topic to address a wide range of scientific communities Analysis, Conservation, and Restoration of Tangible and Intangible Cultural Heritage Inglese, Carlo, Ippolito, Alfonso, 2018-10-12 Communities have witnessed a fundamental shift in the ways they interact with heritage sites Much of this change has been driven by the rapid democratization and widespread adoption of enabling technologies As expediency is embraced in the collection and analysis of data there may also be a certain amount of intimacy lost with both the tangible and intangible vestiges of the past Analysis Conservation and Restoration of Tangible and Intangible Cultural Heritage is a collection of innovative research on the quantitative methods and digital workflows transforming cultural heritage There is no contesting the value of advanced non destructive diagnostic imaging techniques for the analysis of heritage structures and objects Highlighting topics including 3D modeling conservation and digital surveying this book is ideally designed for conservation and preservation specialists archaeologists anthropologists historians academicians and students seeking current research on data driven evidence based decision Food Preservation and Biodeterioration Gary S. Tucker, 2016-01-26 Food making to improve intervention outcomes Preservation and Biodeterioration Food Preservation and Biodeterioration Biodeterioration is the breakdown of food by agents of microbiological origin either directly or indirectly from products of their metabolism Preservation on the other hand is the process by which food materials are maintained in their original condition or as close to this as possible This second edition of Food Preservation and Biodeterioration is fully updated and reorganised throughout It discusses how the agents of food biodeterioration operate and how the commercial methods available to counteract these agents are applied to produce safe and wholesome foods With this book readers will discover traditional methods and major advances in preservation technology Both microbiological and chemical pathways are analysed This topic being important to all producers of food the readership spans food scientists across the industry and academia particularly those involved with safety and quality Food Biodeterioration and Preservation Gary S. Tucker, 2008-04-30 Biodeterioration can be defined as the breakdown of food by agents of microbiological origin either directly or from products of their metabolism Microbiological sources can be present in foods prior to packaging or on the surfaces of packaging materials. The shelf life and safety of the food will depend on the type and quantity of microorganism as well as the hurdles to their growth offered by various preservation techniques This book discusses how the agents of food biodeterioration operate and examines the commercially used industrial methods available to control them allowing the production of safe and wholesome foods There is an emphasis on the equipment employed to carry out the various methods of preservation The introductory chapter describes in detail the microorganisms and mechanisms of food breakdown intrinsic to various key food types dairy meat and fish fruit and vegetables Direct microorganism action will be covered in addition to enzymatic breakdown The second chapter addresses HACCP including food safety legislation Subsequent chapters outline the principal commercially used methods of

preserving foods These chapters follow a common structure theoretical background flow sheets of operations food preparation processing equipment special features of hygiene packaging shelf life and product safety Food Biodeterioration and Preservation is directed at food scientists and technologists in industry and academia Since it covers all the commonly used methods of food preservation it will be relevant across the entire food manufacturing industry 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 Handbook of Polymers in Stone Conservation Elisabetta Princi, 2014-11-20 This handbook is dedicated to the conservation of stone materials by the application of polymers A short introduction on polymer chemistry is given to highlight their characteristics and properties After the physical and chemical attributes of stone are summarised the problems related to its degradation are discussed Finally the properties of the various polymers of potential value for stone restoration are reviewed and classified by schemes and tables and pointers for the future are suggested This handbook will be of great interest to those who share the author's enthusiasm for stone artworks and her dedication to their restoration and conservation Plant Biology for Cultural Heritage Getty Conservation Institute, 2008 Brings together wide ranging scientific contributions from those who have studied the biological degradation of cultural heritages It tackles both general topics mechanisms of biodeterioration correlation between biodeterioration and environment and destructive organisms and specific ones the problems presented by different materials environments climatic conditions and geographic settings The contributors also discuss ways to diagnose prevent and control deterioration

**Fungi in Biogeochemical Cycles** Geoffrey Michael Gadd,2006-05-04 This book promotes further understanding of the contribution that fungi make to the biogeochemical cycling of elements the chemical and biological mechanisms involved and their environmental and biotechnological significance **Alkoxysilanes and the Consolidation of Stone** George Wheeler,2005 Stone is one of the oldest building materials and its conservation ranks as one of the most challenging in the field The use of alkoxysilanes in the conservation of stone can be traced as far back as 1861 when A W von Hoffman suggested their use for the deteriorating limestone on the Houses of Parliament in London Alkoxysilane based formulations

have since become the material of choice for the consolidation of stone outdoors l This volume the first to cover comprehensively alkoxysilanes in stone consolidation synthesizes the subject s vast and extensive literature which ranges from production of alkoxysilanes in the nineteenth century to the extensive contributions from sol gel science in the 1980s and 90s Included are a historical overview an annotated bibliography and discussions of the following topics the chemistry and physics of alkoxysilanes and their gels the influence of stone type commercial and noncommercial formulations practice lab and field evaluation of service life and recent developments This book is designed for conservators scientists and preservation architects in the field of stone conservation and will also serve as an indispensable introduction to the subject for students of art conservation and historic preservation 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 *Fungi in the* Environment Geoffrey Gadd, Sarah C. Watkinson, Paul S. Dyer, 2007-04-12 Fungi are of fundamental importance in the terrestrial environment They have roles as decomposers plant pathogens symbionts and in elemental cycles Fungi are often dominant and in soil can comprise the largest pool of biomass including other microorganisms and invertebrates They also play a role in maintenance of soil structure due to their filamentous growth habit and exopolymer production Despite their important roles in the biosphere fungi are frequently neglected within broader environmental and microbiological spheres Additionally mycological interests can be somewhat fragmented between traditional subject boundaries This multi disciplinary volume explores the roles and importance of fungi in the environment Particular emphasis is given to major research advances made in recent years as a result of molecular and genomic approaches and in cell imaging and biology Drawing together microbiologists mycologists and environmental scientists this work is a unique account of modern environmental mycology and a pivotal contribution to the field **Of Microbes and Art** Orio Ciferri, Piero Tiano, Giorgio Mastromei, 2000-06-30 Microbial defacement and degradation of artistic or historic artifacts is a worldwide problem affecting all countries regardless of their history geographical location or economic conditions. This is the first comprehensive study of

the role of microbial colonization on the degradation of different cultural artifacts from buildings to books wall paintings textiles sculptures and glass and of the investigations into the compounds utilized to control microbial invasion The book focuses on three main areas the identification of the microorganisms which cause structural damage methods to reduce or prevent microbial colonization and damage and the use of microorganisms for the protection and bioremediation of cultural Advances in Applied Microbiology, 2009-03-11 Published since 1959 Advances in Applied Microbiology continues to be one of the most widely read and authoritative review sources in microbiology The series contains comprehensive reviews of the most current research in applied microbiology Recent areas covered include bacterial diversity in the human gut protozoan grazing of freshwater biofilms metals in yeast fermentation processes and the interpretation of host pathogen dialogue through microarrays Eclectic volumes are supplemented by thematic volumes on various topics including Archaea and sick building syndrome Impact factor for 2007 1 821 Contributions from leading authorities and industry experts Informs and updates on all the latest developments in the field Reference and guide for scientists and specialists involved in advancements in applied microbiology **DEEPENDRA KUMAR ANAND** DEEPENDRA KUMAR ANAND, 2024-01-02 Murophytes is a novel hybrid term the original term mural stands for wall and the term phytes stands for the plants or the flora Therefore the term murophytes means the plants growing over the walls or buildings The book deals with the various species of genus Ficus found growing over the buildings and playing a very dominant role in damaging the buildings The three Ficus species Ficus religiosa Ficus benghalensis and Ficus glomerata are mostly growing over the buildings These three Ficus species are mostly responsible for uprooting of plasters widening of gap or cracks and crevices and deterioration of the upper surface of buildings and causing considerable and visible damage to the buildings Seeds of Figure 5 Figure 5 Figure 6 Fig successful murophyte because of its tendency of adaptability in adverse situations Extremely high growth rate of roots of Ficus benghalensis growing murophyte was recorded Most of the murophytes appear during the rainy season and winter seasons of the year The study provides that the Asteraceae Poaceae Moraceae Scrophulariaceae and Amaranthaceae families are represented exclusively by the most dominant murophytes Similar to different serial stages in succession in water and sand different serial stages are found to exist in the case of murophytes Parallel to hydrosere and psammosere murosere has its existence Thus the term murosere stands for different serial stages in succession and establishment of murophytes The initial plants are ephemerals i e having very short life span Soon they die and decompose to add organic matter in the soil deposition in various points of collection The mineral component is contributed by the deposited dust Thus a healthy soil rich in minerals and organic matter becomes the substratum of the second generation of plants over the buildings Due to continuous addition of mineral and organic matters the amount of soil accumulation shows exponential growth year after year On some specific sites indicated in plate 2 The amount of accumulated soil forms the base and substratum to support

the growth of higher plants Thus the primary community is algae followed by a secondary community as bryophytes grasses and lower angiosperms form the tertiary community and finally the higher angiosperms form the quaternary community The point of special interest in Murosere is that one community does not replace the other instead one community invites the other Thus in the final community all the communities such as primary secondary tertiary as well as quaternary communities Analysis of Modern Paints Tom Learner, 2004 Outlines the techniques that are currently employed show co existence to analyze the synthetic resins used in modern painting materials such as pyrolysis gas chromatography mass spectrometry Fourier transform infrared spectroscopy and direct temperature resolved mass spectrometry For each technique results are given for standard samples of the principal classes of synthetic binding media various pigments and extenders tube paint formulations and microscopic paint fragments taken from actual works of art Geobiology: Objectives, Concepts, **Perspectives** N. Noffke, 2012-12-02 Geobiology is an exciting and rapidly developing research discipline that opens new perspectives in understanding Earth as a system To determine and to exploit its possibilities this promising scientific field will benefit from a discussion of its definition as a research discipline its objectives and its methodological approaches Such a spirited discussion is the goal of the book Geobiology Objectives Concepts Perspectives Geobiology touches various subdisciplines of geology and biology in many ways The book will serve biogeochemists paleontologists biomineralogists microbiologists and many others as a forum to determine future directions of geobiological research The book includes a section on the concept of geobiological studies which combines the parent disciplines biology and geology Several case studies describe geobiological investigations that serve to understand Earth in the present and past The case studies give an overview of the general understanding of geobiology and lead the reader towards the current hot topics in this rising scientific discipline New definition of the rising scientific discipline geobiology Overview into the broad spectrum of geobiological topics Insight into hot topics of current geobiological research Microorganisms in Soils: Roles in Genesis and Functions Francois Buscot, Ajit Varma, 2007-01-04 Soils would not exist without the complex and heterogeneous activities of microorganisms For the third volume of Soil Biology an international board of renowned scientists shed light on the significant role of these organisms. The following key topics are covered Microorganisms in bioerosion humification mineralization and soil aggregation Microbial energetics and microbes in biogeochemical processes such as carbon and nitrogen cycles and phosphorus bio availability Interactions in the mycorrhizosphere e g between mycorrhizal fungi and bacteria Impact of microbes on plant nutrient cycling and the possible effects of transgenic rhizospheres on soil fungi Functions of microbes in specific soil compartments such as soil surface or toxic metal polluted soils Regulation of microbial activities in functional domains that are influenced by biotic or abiotic factors. Use of marker genes and isotopes as examples for modern techniques in soil microbiology Research Anthology on Emerging Techniques in Environmental Remediation Management Association, Information Resources, 2021-11-26 As industry develops globally environmental

pollution grows to be an increasingly serious problem with each passing year While there are many things that individuals on every level of power can do to mitigate the harm done to the environment environmental remediation is a step to take to save our soil and water resources As this problem is ongoing it is essential to be knowledgeable in the emerging techniques made within the field of environmental remediation The Research Anthology on Emerging Techniques in Environmental Remediation is a comprehensive resource on the emerging techniques and developments made within the field of environmental remediation With global contributing authors this book explores environmental remediation within diverse settings and international standards Covering topics such as pollution and contamination nanotechnology and agriculture this book is an essential reference for scientists chemists environmentalists government officials professors students researchers conservationists and academicians

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