

## Coping with Biological Growth on Stone Heritage Objects Methods, Products, Applications, and Perspectives

Daniela Pinna

Former Director, Scientific Laboratory,  
Polo Museale dell'Emilia-Romagna, Italy

*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 for 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 antimicrobial properties and alternative methods for the control of biological growth are presented as well.

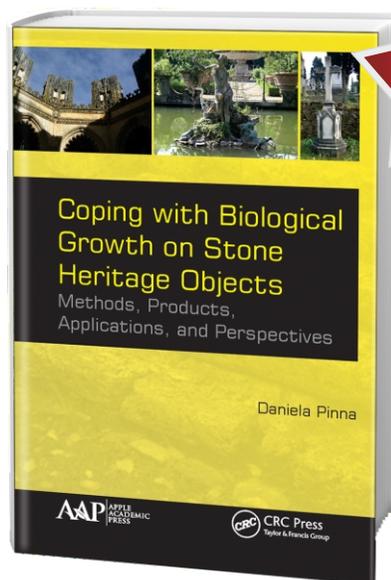
The book also emphasizes issues on bioreceptivity of stones and the factors influencing biological growth and includes an outline of the various organisms able to develop on stones, a discussion on the bioprotection of stones by biofilms and lichens, a review of the main analytical techniques, and a 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.

Features:

- 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
- provides many case studies of removal of biological growth with practical advice for making the right choices
- presents detailed and updated information related to biocides and to alternative substances, features that will be valuable to dealing with these challenges
- provides access to information and offers the conceptual framework needed to understand complex issues
- provides a comprehensive selection and examination from a published material from a wide variety of sources that focus on the methods, techniques, and products useful for the prevention and removal of micro and macroorganisms that grow on artificial and natural stone works of art

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### REVIEWS

*"Daniela Pinna is a reputable biologist with an extensive practice in the field of conservation of cultural heritage. . . . The book is a very detailed state of the art, but it contains also a personal perspective about the addressed topics, helping the reader to better move among these often complex subjects. . . . It analyzes this topic under the scientific point of view . . . but also tackles the practical issues connected with biodeterioration, its occurrences, consequences, and possible remediation. . . . The book is easy to read, [and] can be used as a consulting manual for conservation scientists searching for identifying problems, their causes, and solutions, as well as for practitioners searching for feasible solutions to the problem at hand. . . . Should be a reference on the shelf of any conservation scientist and conservator-restorer working in the field of cultural heritage."*

—From the Foreword by José Delgado Rodrigues, Geologist, Former Principal Research Officer LNEC; Consultant in Stone Conservation, Lisbon, Portugal

*"An outstanding addition to the existing publications that address this complex subject. . . . There are several points that make this book unique: first, the care taken in properly defining terms such as biodeterioration and biodegradation that are often misapplied; second, the logical organization within each chapter that makes it easy to read and follow, even for those unfamiliar with these challenges; and third, the excellent Appendix that brings together so much information about products, brands, chemicals, etc. in an organized fashion. While this information is readily available on the internet, concentrating it in this appendix makes a big difference in having it used and applied. Finally, the drawings, photographs and examples . . . are really remarkable. [The book discusses] issues that conservators have to face and address in their work, and communicate clearly to those responsible for the preservation of the monument or building in question who may not understand the complexity of nature."*

—A. Elena Charola, PhD, Research Scientist, Museum Conservation Institute, Smithsonian Institution

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## ABOUT THE AUTHOR

Daniela Pinna has been working as a biologist at the Italian Cultural Heritage Ministry since 1987. Since 2011, she has been lecturing on biodeterioration and degradation of bioarchaeological materials at Bologna University (International Degree Course Science for the Conservation-Restoration of Cultural Heritage). She was involved in the European Projects EU-ARTECH (Access Research and Technology for the Conservation of the European Cultural Heritage—2004–2009) and CHARISMA (Cultural Heritage Advanced Research Infrastructures: Synergy for a Multidisciplinary Approach to Conservation/Restoration—2009–2014).

She has published two books and several articles on those subjects. She is editor of the book *Scientific Examination for the Investigation of Paintings: A Handbook for Conservators-Restorers* (Centro Di, Firenze, 2009). Moreover, she is involved in the activity of CEN/TC 346. CEN is the European Committee for Standardization and TC346 is in charge for standards related to conservation of cultural heritage. Her areas of specialization include biodeterioration of heritage objects, prevention and treatment of biodeteriogens, testing and evaluation of conservation products, and the control of treatment efficacy and durability in the field of stone, mortar, mural paintings, and polychrome sculpture conservation. She graduated in Biology from Padua University, Italy.

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