

Franco Palla · Giovanna Barresi *Editors*

# Biotechnology and Conservation of Cultural Heritage

 Springer

---

Franco Palla • Giovanna Barresi  
Editors

# Biotechnology and Conservation of Cultural Heritage

 Springer

---

## Preface

Over the past few decades, biotechnology has provided innovative techniques useful for diagnosing cultural heritage deterioration induced by microbiological systems and for defining efficient conservation/restoration strategies. Seen from this perspective, the *International Congress on Molecular Biology and Cultural Heritage* held in Seville (Spain) in 2003 represents a milestone.

This book comes from the experience gained in the last decade of basic and applied research, developed in the Laboratory of Biology and Biotechnology for Cultural Heritage (LaBBCH), within the framework of national and international research projects and in collaboration with other Italian and foreign research institutions. In particular, biotechnology has found successful application in at least three areas in the conservative restoration of works of art, such as the characterization of *biodeterioration*, the analysis of *bioaerosols*, and the development of innovative protocols for *biocleaning* and *bioremoval*.

A biotechnological approach to biodeterioration minimizes sample amount, contributing to understanding the contamination and complexity of microbial communities colonizing the cultural assets, as well as revealing unculturable species in both organic and inorganic substrates. This approach, based on genomic DNA analysis, has also proven useful in recognizing microbial systems in the aerosol of indoor cultural heritage environments, particularly for those representing a potential health risk for visitors and professionals.

It is well known that the removal of undesired layers can be performed by viable bacterial cells or purified enzymes (hydrolases), thus contributing to the development and definition of specific biocleaning/bioremoving protocols. The application of novel bioactive molecules isolated from marine organisms has recently been employed, opening up new perspectives for the enzymatic removal of undesired layers.

This book also presents the use of plant extracts, already utilized as a biocide in the food, medicine, and pharmaceutical industries, as a strategy for controlling the microbial colonization of cultural heritage, representing a potential alternative to traditional biocides.

There is no doubt that biotechnology provides a plethora of information useful for setting up appropriate strategies that are totally safe for works of art, restorers, and environment, and require only a short time of application, straight to green conservation strategies in a sustainable restoration prospective.

Case studies are reported in the final chapter in order to demonstrate that a biotechnological approach may represent a valid alternative to traditional procedures generally used in the conservation/restoration of cultural assets.

In this book, I have tried to present current knowledge in the field, highlighting the extraordinary power of DNA and of the novel bioactive molecules when applied to the conservative restoration of cultural assets. I apologize to the authors of those papers who have escaped my attention, and also to those whose papers I have not quoted accurately.

This book is dedicated to Roberta, Emanuele, and Federica, in exchange for the time I spent away from them.

Palermo, Italy

Franco Palla