

Analysis of microbial communities involved in biodeterioration of the Roman Necropolis of Carmona (Seville, Spain)

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The problem with deterioration of stone works is widespread. It is known, that weathering, anthropogenic pollution, and biological activity play a considerable role in deterioration of stone monuments.

The Roman Necropolis of Carmona (Seville, Spain) is an important historical monument dated back to the 1st and 2nd centuries A.D. The Necropolis was excavated into soluble calcarenite of the Messinian-Lower Pliocene that is highly porous which easily leads to the formation of efflorescences as a consequence of salt dissolution and precipitation on the rock surfaces.

This study aims to the analysis of microbial communities in different tombs of the Necropolis of Carmona where efflorescences were observed. The Tombs of Serviha, Portumio, Mausoleo Circular, and Mausoleo Cuadrangular, were analyzed.

In this research we applied culture-independent techniques, such as a PCR-amplification of the 16S rRNA gene fragments and Denaturing Gradient Gel Electrophoresis. Microorganisms were identified after cloning and sequencing of the amplified products.

Dominant microbial groups belong to the Alpha-Proteobacteria (Nordella, Sphingomonas and Phyllobacterium), Gamma-Proteobacteria (Acinetobacter, Salinisphaera, Pseudomonas and Enterobacteria), Actinobacteria (Micrococcus, Propionibacterium, Pseudonocardia, Rubrobacter, Saccharomspora and Saccharothrix) and Bacteroidetes (Bacteroides). A high diversity was observed for Actinobacteria which has been previously reported in the Necropolis of Carmona.

Keywords Cultural heritage, Biodeterioration, Microbial diversity, Culture-independent techniques