

Characterization of biodeteriorating microorganisms in buildings in Bucaramanga, Colombia

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Abstract. The action of the microorganisms upon the integrity of the constructing material is termed Biodeterioration, concrete resistance to the action of the microorganisms is considered an indirect measurement of its durability and could be used as a marker of the integrity of the structure. In Colombia, the studies considering this parameter are rare. The objective of this study was to isolate and characterize the microbial communities present in areas with evident deterioration in the selected buildings. To accomplish this, isolation, culturing and molecular identification of the isolates was performed. Results showed that *Cladosporium* spp., *Aspergillus* spp., *Macor* spp., *Penicillium* spp., *Penicillium* spp., *Rhizopus* spp., *Fusarium* spp., *Geotrichum* spp., and bacterial genera such as *Bacillus* spp and *Amphibacillus* spp, coexist within the biofilms sampled. This study is a description and a starting point to deepen the characterization of these communities and to understand the role they perform in the integrity of the building materials considering the climatic and environmental conditions.

1. Introduction

Concrete is a material widely used in the construction of structures in the urban landscape, it is a mixture of coarse, and fine sand or crushed stone generally, it is aggregated with portland cement most cases and water. This matrix is subjected to biogenic deterioration because of the microorganisms present; this phenomenon is usually referred as biodeterioration [1].

It describes the progressive process caused by different chemical, physical, mechanical and biological agents, in the properties of a given material, as a consequence of the irreversible adherence of different macroscopic and microscopic communities [2]. The nature of this phenomena may be of biogeochemical nature, such as the bio solubilization that leads to the bioleaching of the substrate or bio geophysical nature, with the consequent formation of crusts or patinas on the surface of the material [3].

Deterioration depends on the release of nutrients, available to the microorganisms and plants; it can be initiated by airborne nutrients captured on the surface of the structure, metabolisms products and decay of the populations present in/on the building material or by the degradation of building materials themselves [4], the growing of biofilms on the surface, production of acids by diverse type of microorganisms are also determinants in the deterioration of the construction [5]. Deterioration of

