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# Enzymatic Monitorization of Mural Paintings Biodeterioration

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**Abstract:** Mural painting is not only a form of art but also a way to learn more about our ancestral traditions - that's why it's so important to protect it from biodegradation. There are several factors that can affect this artworks, such as environmental conditions, chemical nature of the substrate and biological agents. The presence of microorganisms and their metabolic activity promote deterioration in the paintings, fungi can induce fissuring and crumbling of the paint layers when their hyphae penetrate in the substrate [1]; and bacteria can produce biofilms, which may stimulate the growth of other microorganisms, increasing the damage [2]. Enzymatic systems were chosen to evaluate the physiological features of the microorganisms and their potential for biodeterioration. The enzymes β-glucosidase, phosphatase and arylsulphatase carry out specific hydrolyses and catalyses reactions involved in the biogeochemical transformations of carbon, nitrogen, phosphorus and sulfur. Dehydrogenase, present in most of the microorganisms, have a direct relationship to total viable organisms and can be considered an accurate measure of the microbial oxidative activity [3]. This work aims to understand how microorganisms and their metabolic activity can affect mural paintings in order to evaluate the effect of their development and to establish remediation strategies. Samples collected from mural paintings with sterile cotton swabs were inoculated in several culture media, in order to identify the microorganisms with ability to grow in laboratorial conditions. The characterization of microbial isolates was performed based on the macroscopic and microscopic features. Cultures of predominant microorganisms and microfragments of mortar were used in enzymatic assays. Dehydrogenase, β-glucosidase, phosphatase and arylsulphatase enzymatic activity are correlated with the biodeterioration potential. This research allows access the presence of several microorganisms and the presence of extra and intracellular enzymes, as biomarkers of biodeterioration process.

**Keywords:** mural painting; biodeterioration; enzymatic activities;