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## Abstracts Book



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ENZYMATIC SYSTEMS AS BIOMARKERS OF CULTURAL HERITAGE DECAY: A NEW APPROACH TO ASSESS ARTWORKS BIODETERIORATION STATUS

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Cultural Heritage decay is a serious problem with social and economic impact. Mural painting is one of the artistic expressions widely represented in Portugal, which over the time has suffered numerous forms of deterioration. Heritage decay depends on the physical properties and chemical nature of the materials, several environmental parameters and biological agents. The most harmful organisms involved in biodeterioration are fungi and bacteria, which are responsible by loss of cohesion, cracks, detachment of the paint layer and biofilms formation, fact which may induce microorganisms development, increasing the damage and promoting pigment alterations and discolorations of the paintings due to their metabolic activity [1, 2].

The main goal of this work was to identify the biodeteriogenic agents, evaluate and understand their effect in the mural paintings by metabolic activity monitoring, in order to obtain useful information for establish effective remediation strategies.

Four enzymatic systems were chosen to assess the physiological features of the predominant mural paintings colonizers and their biodeteriorative potential.  $\beta$ -glucosidase, phosphatase and arylsulphatase hydrolyse and catalyse specific reactions involved in the biogeochemical transformations of carbon, phosphorus and sulphur. On the other hand, dehydrogenase, detect viable organisms and can be considered an accurate measure of the microbial oxidative activity [3]. Real mortar microfragments were also enzymatically monitored and analysed by SEM to detect microbial contamination.

The predominant fungal isolates from mural paintings were *Rhodotorula* sp., *Penicillium* sp., *Cladosporium* sp. and *Aspergillus* sp., which seem to be the main responsible for artworks structural deterioration.

The metabolic activity of the microbial population can be correlated with the contamination levels detected and with biodeterioration status of the paintings. Therefore the enzymatic systems used constitute good biomarkers to be applied in this research field and are useful to detect biodeteriogenic agents.

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[2] Sterflinger K, Fungal Biology Reviews, 24 (2010) 47–55.

[3] Taylor JP, Wilson B, Mills MS, Burns RG, Soil Biology & Biochemistry, 34 (2002) 387–401.