152
doi:10.1017/S1431927614014469
Microsc. Microanal. 21 (Suppl 6), 2015

Mural paintings deterioration – a multianalytical approach

Rosado, T.[*,**], Mirão, J.[*,***], Candeias, A.[*,**] and Caldeira, A.T.[*,**]

[*]HERCULES Laboratory, Évora University, Largo Marquês de Marialva 8, 7000-809 Évora, PORTUGAL
[**]Évora Chemistry Centre and Chemistry Department, Évora University, Rua Romão Ramalho 59, 7000-671 Évora, PORTUGAL
[***]Évora Geophysics Centre and Geosciences Department, Évora University, Rua Romão Ramalho 59, 7000-671 Évora, PORTUGAL

Email: atc@uevora.pt

Historical built heritage, like mural paintings, are important landmarks that play an important role on the sustainable development of a region or country and therefore its degradation is a problem with social and economic impact. Its degradation depends on the physical properties and chemical nature of the substrate as well as extrinsic factors including biological attack and several environmental parameters like humidity, temperature, pH and light [1].

This work presents a novel microanalytical approach in the mural paintings microbial diversity characterisation and identification of the damages promoted by their biological activity.

Mortar microfragments, removed from visually biodegraded mural paintings, were analysed by several microscopic/spectroscopy techniques: variable pressure scanning electron microscopy coupled with energy dispersive X-ray spectrometry (VP-SEM-EDS), raman microspectrometry and infrared spectrometry in order to evaluate the presence of microbial contamination and to detect the alteration products resulting from the metabolic activity of the microorganisms [2]. These analyses were complemented with culture-dependent methods and DNA based approaches, like DGGE and pyrosequencing [3,4], aiming the identification of the biota involved in the biodeterioration phenomena.

Samples collected with sterile cotton swabs were used for microbiological assays and then inoculated in selective culture media, in order to identify the microorganisms that are able to grow in laboratorial conditions. The identification of the microbial isolates was performed based on the macroscopic and microscopic features. Metagenomic DNA extracted from microfragments of mortar were also analysed by DGGE and by pyrosequencing, an innovative molecular assessment, which allows the identification of a