THE VULNERABILITY OF ARCHAEOLOGICAL ARTEFACTS: THE IMPORTANCE OF INNOVATIVE CONSERVATION

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Introduction: It is clear that all archeological heritage is subject to risk and vulnerability, as the finds (stone, pottery and metal) are subject to biotic and abiotic deterioration processes that sometimes profoundly alter their original structure/composition. To avoid the inevitable loss of archeological artifacts, or at least to prolong their life cycle under optimal conservation conditions, constant monitoring and prevention, protection and "care" interventions are required, carried out conscientiously and over a prolonged period of time, but respecting the environment, the health of the operators and the object itself to be protected

Aim: Our multidisciplinary research group, composed of archeologists, chemists and geologists, has been carrying out in-depth and specialized studies on monumental stone and metal finds from archeological excavations in the southern Italian regions of Apulia and Basilicata for some time. Bioremediation and biorestoration using secondary metabolites derived from spontaneous plants and bacterial and fungal microorganisms are the innovative methods being tested to replace the traditional restoration methods based on chemical and mechanical treatments (Sharma et al., 2012; Young et al., 2008)

Experimental phases:

1- Analytical characterization of the studied materials (Fig.1) and the metabolites extracted from Solanum Nigrum L. (on stone) and Beauveria Bassiana W. (on copper findings).electron microscopy (SEM), X-ray fluorescence (XRF), diffraction (XRD), X-ray photoelectron spectroscopy (XPS), Fourier transform infrared spectroscopy (FTIR), HPLC mass spectrometry 2-in vitro and in vivo treatments of the investigated materials 3-toxicity tests with Dafnia Magna and Vibrio Fischeri

Results.Fig. 1 shows the effect of cleaning with an extract of Solanum nigrum L. on stone material from Hontoria (Spain) contaminated by numerous biodeteriogenic species. Fig. 2 shows the effects of treatment with Beauveria Bassiana Will. on corroded copper samples. Analysis by infrared transformation spectroscopy (FTIR) shows the formation of copper oxalate, a process that stabilizes the degraded metal

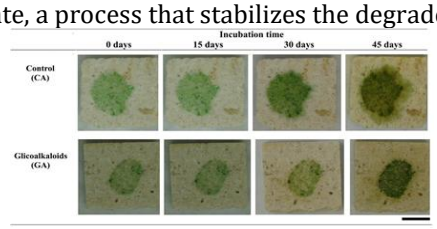
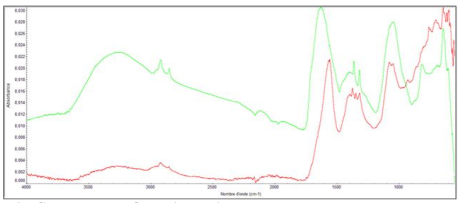


Figure 1. Results of bio-treatment on rock samples



Legend : (red) Copper oxalate, (green) copper specimen

Figure 2. FTIR analysis on sample after treatment with culture broth of Beauveria Bassiana Will.

Both metabolites did not showed environmental toxicity

Conclusion. The reported results show the efficiency of secondary metabolites derived from spontaneous plants and microorganisms and open possibilities to further researches in this area.

References:

Young M. E.,et al. (2008) Development of a biocidal treatment regime to inhibit biological growths on cultural heritage: BIODAM. *Environ Geol.*, 56(3–4):631–641.

Sharma S. K., Sharma A.(2012),Green corrosion inhibitors: status in developing countries. In: Sharma SK (ed) Green corrosion chemistry and engineering: opportunities and challenges, 1st edn. Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, Germany, pp 157–180.

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