PAINTING TECHNIQUE AND STATE OF CONSERVATION OF WALL PAINTINGS IN SAINT NICHOLAS CHURCH AT ZAGORI-GREECE

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Abstract classification data: SEM-EDX, FTIR microscopy, UV-Vis absorption and fluorescence, Chromatography (GC, HPLC)

Introduction*:* The scientific investigation of materials and techniques used in Byzantine and Post-Byzantine wall paintings is rapidly gaining interest among researchers, as the synergistic use of various physicochemical techniques allows a more detailed inspection in the chemical composition and the degree of degradation of the various paint layers. The present study aims at identifying the pigments in the various layers, establishing the possible existence of an organic binder and scientifically evaluating the state of preservation of the paint layers in the wall paintings of Saint Nicholas church, (village of Vitsa, North Western Greece). To this end, microscopic (optical and SEM), spectroscopic (FTIR) and chromatographic (HPLC) techniques were employed.

Experimental*:* Visible Light Microscopy (VLM), Scanning Electronic Microscopy coupled with Energy Dispersive X–ray analysis (SEM-EDX), Infra-red spectroscopy (FTIR) and micro-FTIR were used for the identification of pigments. Fluorescence Light Microscopy-staining (FLM-staining), FTIR and micro-FTIR, and Reversed Phase High Performance Liquid Chromatography (RP-HPLC) were used for the identification and assessment of degradation of binding medium.

Results*:* The examination of cross-section samples by VLM and SEM-EDX, combined with FTIR analysis of powder samples enabled (i) the identification of inorganic pigments of the wall paintings (red ochre, yellow ochre, terre verte, malachite, cinnabar and lime), (b) the characterisation of the inorganic constituents in plaster. In addition, decay products (nitrates, oxalates and gypsum) have been identified by FTIR and microbial flora was detected by SEM. The detection of proteins in cross-section samples was achieved by staining with fluorescent dyes (FITC) followed by microscopic observation, as well as FTIR (analysis of water soluble fraction of sampled powders). Finally, HPLC analysis showed egg yolk as the major component in binder of paint layers (see *Figure* 1) and animal glue in plaster.

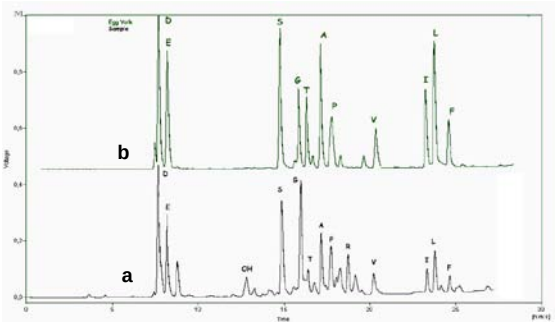

Figure 1: (a) HPLC chromatogram of hydrolysate from sample (western wall of the monument) and (b) chromatogram of an egg yolk std. sample. Both derivatised with FMOC-Cl. Column 200x4.6mm ODS Hypersil 3μm.

Conclusions: The information gained from the physicochemical characterisation of materials and the scientific assessment of preservation condition of wall paintings, underlines the necessity for immediate restoration action in Saint Nicholas church, a notable post-Byzantine monument. This also offers an valuable asset to the conservator in the proper decision-making towards efficient treatments.

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