Microanalytical characterization of the inorganic materials in a mural painting from Ampurias Archaeological Site

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Encaustic is practically the only pictorial technique cited in the various known Greek and Latin writings of classical Antiquity. There are two current hypotheses as to the nature of this kind of painting. The more widely-accepted of the two posits that encaustic was a technique based on the application of molten coloured waxes. The second hypothesis posits that in addition, Greek and Roman artists used a paint based on wax emulsified with an alkali. However, chemical, experimental and historical studies would appear to indicate that neither hypothesis fully accounts for the true nature of the encaustic used in Antiquity [1].

There is a multi-disciplinary study currently in progress whose main aim is to characterize the organic and inorganic materials in numerous pictorial remains from various Spanish deposits, with a view to determining more precisely what kind of pictorial procedure the artists followed in their mural paintings. Some of these studies have already been published, reporting the partial results achieved up until now [2, 3].

Carrying on the same line of research, this communication reports the results of morphological and microanalytical examinations of mural remains belonging to a civil structure (2nd century a.C.), part of the Ampurias Archaeological Site (Gerona), using LM and SEM/EDS. Following the usual methodology for studies of this kind, we have examined stratigraphic microsamples included in epoxy resin.

Numerous semi-quantitative EDS microanalyses have been performed to gain a general idea of the average chemical elements contained in the layers. Spectra were accompanied by semi-quantitative evaluations in all cases. Samples were then examined in detail by series of EDS microanalyses of single particles, and we were thus able to establish the nature of the components.

The samples present a morphologically very heterogeneous priming mortar composed of large calcium carbonate crystals and small particles of a silica aggregate with a considerable amount of impurities (feldspaths, micas, etc.) (Fig. 1). The configuration of the pictorial layers on top of the ground mortar is typical of a painting executed using a dry technique, which would confirm the starting hypothesis and rule out a fresco technique. A majority of the pigments are iron oxide-rich earths of varying tones (brown, umber, ruddy, etc.) along with small amounts of an umber earth (double Fe/Mn oxides); it is confirmed that the white pigment is calcium carbonate, typically used in mural painting (Fig. 2). Especially in some samples, the procedure followed in applying the paint layers is unusual in that we find underlying pictorial layers where the artist has used a lot of dolomite as filler.

These analyses have made it possible to characterize the inorganic materials (pigments and fillers) with a high degree of precision and to establish the possibility that a dry procedure was used. The information that studies of this kind can yield constitutes a valuable supplement to the analyses being conducted simultaneously on the organic materials [4].

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1. J. Cuní et al., Archivo español de arqueología **66** (1993) pp. 107-124.
2. M.I. Báez et al., SCANDEM 2009, in press.
3. N. Rosales et. al., Real Sociedad Española de Química–Sigma Aldrich (2008).
4. This work is part of Research Project Ref.: PR34/07-15858 (Complutense-Santander).

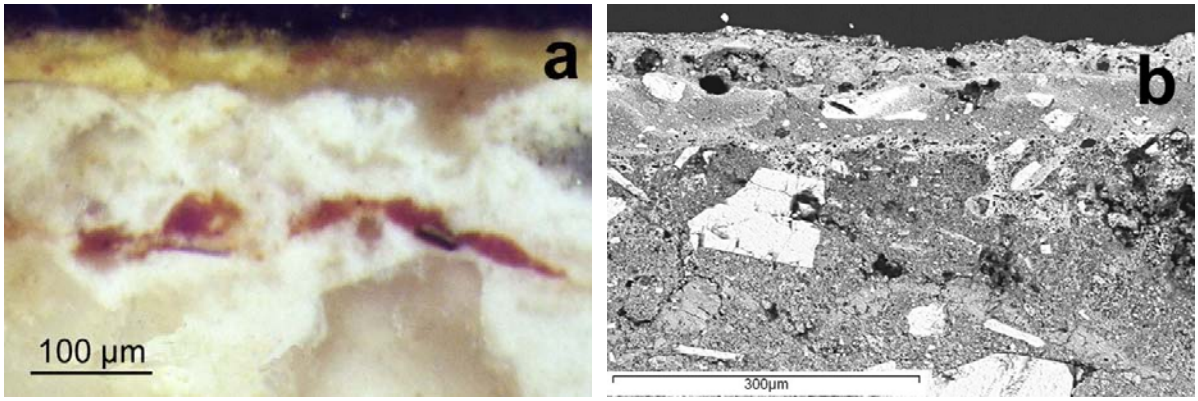

Figure 1. General stratigraphic view of a paint sample. Yellowish ochre zone. a) LM. b) SEM backscattering.

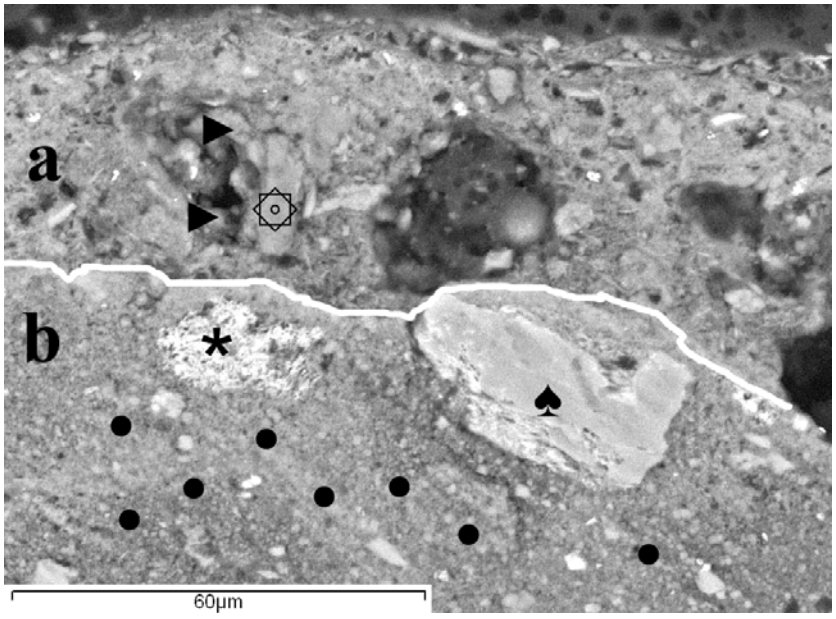

Figure 2. View of pictorial layers: (a) Ground layer, (b) Top layer. Detail of some of the particles analysed: (*) Iron oxide; (۞) Umber earth; (►) Mica; (♠) Calcium carbonate; (•) Dolomite. SEM backscattering.

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