

## PLASTERS AND PIGMENTS IN THE ROMAN VILLA AT AGIOS DONATOS (GREECE)

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The results obtained on the characterization of plasters and pigments of the Roman Villa at Agios Donatos (Greece) are presented in this contribution.

On a rock facing the Kokytos River is the little chapel of Agios Donatos, built on the ruins of a Roman villa, which in its turn had been constructed on a Hellenistic fortress. During the Thesprotia Expedition, an archaeological research project of the Finnish Institute in Athens, several trenches were opened. One of these, Trench D, covered a small room of the former villa [1, 2]. No standing walls remained. These had fallen at different times. More than 2000 pieces of decorated plaster fragments were found in the room (Fig.1). The questions posed were if these fragments belonged to one period, to this room only or to different rooms, and if it was possible to reconstruct any datable decoration. Visual observations of fragments suggested that most of plaster and stucco or *marmorino* (about 98%) were of the same kind. Two fragments, AD13 and AD14 with different plasters were found in trenches West clearance and C. The colours used and the remains of decoration identified were similar to which is typical for the earlier phase of the second style at Pompeii.



Fig.1. Two analysed plaster fragments

14 samples were collected and analyzed with different analytical methods, as described in Table 1.

All the cross sections of samples were observed with a Nikon Eclipse E 600 optical microscopy, at different magnification under both visible and ultraviolet light (filter system UV 2A). Images were captured at different magnifications with a high resolution camera (DSFi 1c).

The thin sections of plaster were observed with an Axioscope A.1 Zeiss optical polarized microscopy coupled with a high resolution camera and a software AxioVision for image analyses was used. A small amount of powder of both pigments and plasters obtained from samples was analyzed using an X'Pert Pro PanAnalytical diffractometer in the following

operative conditions: radiation Cu K $\alpha$ 1 ( $\lambda=1,545 \text{ \AA}$ ), tube X ray 40 KV, 30 mA, angular range  $3^\circ < 2\theta < 70^\circ$ . A zero background sample stage was used. The cross sections were observed with an electronic microscope ESEM Quanta 200 Fei in low vacuum conditions, without necessity of section metallization; semiquantitative analyses were performed.

Tab. 1. Description of samples and analytical methods used  
 (OM= optical microscopy, XRD= X ray diffraction; SEM EDS= Scanning electron microscopy with microanalyses)

Sample	Description	Analytical methods
AD1 pigment	pale blue paint layer, same as AD10	OM
AD 2 pigment	red paint layer, same as AD9	OM
AD 3 pigment	yellow paint layer	OM
AD 4 pigment	red paint layer, same as AD9	OM
AD5 pigment and preparation	dark purple paint layer	OM, XRD, SEM EDS
AD6 pigment and preparation	green paint layer, same as AD11	OM, XRD, SEM EDS
AD7 pigment and preparation	purple paint layer, same as AD5	OM, XRD, SEM EDS
AD8 pigment and preparation	red paint layer	OM, XRD, SEM EDS
AD9 pigment and preparation	bright red paint layer	OM, XRD, SEM EDS
AD10 pigment and preparation	pale green paint layer	OM, XRD, SEM EDS
AD11 pigment and preparation	dark green paint layer	OM, XRD, SEM EDS
AD12 pigment and preparation	purple paint layer	OM, XRD, SEM EDS
AD13 plaster	plaster	OM, XRD
AD14 plaster	plaster	OM, XRD

The preparation layer of all samples is *marmorino* made by a mixture of lime and calcite grains. The binder/aggregate ratio is 1/3; the aggregate has a bimodal grain size distribution (maximum grain size 1 mm, minimum grain size 100  $\mu\text{m}$ ) and it is constituted by calcite. These grains have a very angular shape (Fig. 2a). Some microcrackings in the *marmorino* due to shrinkage phenomena are evident.

The plaster of sample AD13 is made of lime containing numerous lime lumps and only two rock fragments which are evident in thin section. The sample AD14 is made of a mixture of lime and *cocciopesto* with a binder/aggregate ratio of 1/3; the aggregate is made of mono crystals of quartz and feldspar which are clearly visible in thin section (Fig.2b).

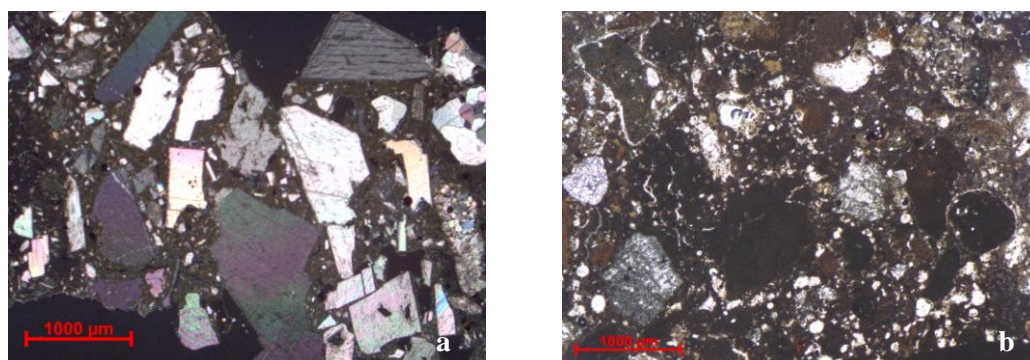


Fig. 2 Microphotographs of thin sections of:  
*marmorino* (a, sample AD5) and *cocciopesto* mortar (b, AD14) under polarized light microscope, n.l.

With respect to the pigments two different red were identified: for sample AD9 the XRD and the microchemical analyses performed with SEM EDS confirmed the presence of cinnabar, with an enrichment of goethite in the preparation, while samples AD5, AD7, AD8, AD12 are all characterized by the presence of haematite as red pigment. The different hues of red in these samples are obtained by the addition of carbon black to the red pigment.

The green and blue colors are obtained by mixing Egyptian blue (cuprorivaite) with some iron based pigment, such as in the samples AD10, AD11, in which the presence of green and yellow earths was evidenced through the microchemical analyses performed with SEM EDS (Fig. 3).

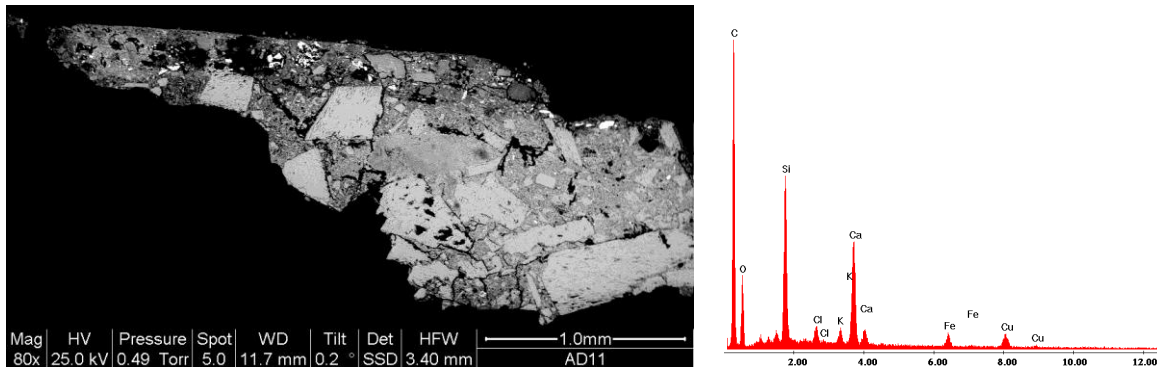


Fig. 3. Backscattering SEM image of sample AD11 and microchemical analyses of pigment obtained by mixing Egyptian blue and some earth material.

The results achieved by the combined methods of visual inspection and scientific analyses have proved to be valid in the present context. The subjective interpretations of plasters and *stucco/marmorino* based on earlier research at other sites, were confirmed by non-subjective methods in the present study as well. The nature of some pigments is always problematic. As an example, some violet paints judged as possibly purple proved to be haematite plus carbon black, The presence of cinnabar and the very high quality of the materials as well as the plastering and painting technique suggest this was the house of a prominent person.

## References

Forsén, B. 2011. The Emerging Settlement Patterns of the Kokytos Valley, in, *Thesprotia Expedition II. Environment and Settlement Patterns* (PMFIA XVI), B. Forsén and E. Tikkala (eds.), Helsinki, 1-38.

Forsén B. and Reynolds, P., 2001. An Early Closed Deposit at the Roman Villa of Agios Donatos, in, *Thesprotia Expedition II. Environment and Settlement Patterns* (PMFIA XVI), B. Forsén and E. Tikkala (eds.), Helsinki, 247-267.

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