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Technological Characterization of Wall Paintings from the A Mithraic Tomb Dated to 4th-5th Century AD, Gargaresc, Libya

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The excavations of Gargaresc started in 1965 and were one of the most important archaeological sites in Tripoli because it includes a period of about 500 years starting from the 1stc. AD was and continuing until the 5th century AD. The Mithraic tomb is one of the most important outlying monuments of Oea, 200 yards south of the western end of Gargaresc oasis, on the left of the Tripoli-Zuara road between kilometers 5 & 6. The tomb is cut in an outcrop of soft sandstone. The wall paintings found were symbolic to the religion of that period; which contained a mixture of older religions and Christian, and presented the interaction between the artistic and religious elements of that time.

Several optical, chemical and mineralogical methods were applied to identify the materials, composition and technology of the plasters and mortars, as well as, the pigments used in the tomb. These are:
-OP: Optical microscopy was used as the initial examination of polished cross-sections to identify the structure and microstratigraphy of the plasters and mortars as well as the painted layers.
-MCT: Micro-chemical tests were used to identify the type of the plasters and mortars- calcium aluminium silicate and water-soluble salt to identify sulphates, chlorides, carbonates, nitrites and nitrates.
-SM: Standard methods for chemical analysis to identify the quantitative and qualitative nature of the plasters and mortars and their mixture.
-SEM & EDS: Analytical Scanning electron microscope with energy dispersive x-ray analysis system to examine the micrmorphology and determine the chemical composition of the plasters, pigments and the inclusions.
-XRD: X-ray powder diffraction to identify the mineralogical composition of the plasters, mortars and pigments.

On the bases of all the data obtained, it was possible to establish the nature of the plasters, mortars and their binder. The examination and analysis gave a full picture about the materials and the approximate ratio of amount of additives to lime used for making the mortars and plasters. In addition the results showed the stratigraphy of the various layers applied. The lime plasters and mortars contained apart from lime as binder quartz grains, charcoal, ironstone, brick and some other inclusions. Furthermore the mineralogical analysis provided information on the main mineralogical phases present in the plasters and pigments.
The use of gypsum was detected in some cases but it was identified as a result of conservation.
The analytical results provided also information on the deterioration factors and alterations that have affected the materials of the wall paintings and present quite interesting challenges for conservation science.