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THE COLOURS OF "BARBABLÙ"

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INTRODUCTION

The topic of this work deals with the scientific results obtained thanks to a diagnostic campaign, which was carried out, through non-invasive and non-destructive methodologies, on the famous "head of Hades" popular also as Barbablù (Figure 1).
The sculpture, with dimensions H: 27 cm and W: 20 cm, is conserved at the Museo Archeologico di Morgantina in Aidone, a town in Southern Sicily and its name derives from the colour of the beard. It belongs to a statue of human dimension and is dated, on stylistic basis, to hellenistic age (400-300 B.C.). The sanctuary of Demeter, site in San Francesco Bisconti in Morgantina [1], seems to be its original collocation.
The study falls in a wider research project regarding the polychromy studies of a lot of archaeological finds coming from Morgantina site. Among these, Barbablù represents an unicum with respect to the technical production [1] and for the exceptional conservation status of the original polychromy. In the Haden's head, the blue traces of the original colours of the beard, together with the red ones of both hair and lips, are in fact visible to naked eye. Multi-method archaeometrical approach was used to examine the coloured surfaces in order to the pigments identification.
The study of polychromy in very important because the colour and the materials used to reproduce it, clearly have symbolic meaning. In particular, the blue of beard was emblematic of eternity, due to its resemblance to the color of the sky, as well as being indicative of power and worth [2-4].

Figure 1 – Front (a) and back (b) of the Hades's head.

EXPERIMENTAL METHODS

The scientific analyses are focused on the characterization of the painting materials after a first step carried out using UV radiation in order to identify the original painted areas. Fluorescence response in visible region is observed with Wood's lamp (366nm). It represents a useful preliminary analysis of the conservation state and the mapping of different materials present on the investigated surfaces.
The Raman signals were acquired by Madatec portable and compact system. The spectrometer operates in a region approximately between 750 and 1000 nm, which is given by the silicon CCD detector. The exciting wavelength was the 735 nm. For the focusing on the sample a probe is used. For the presented spectra, the acquisition time was 10 seconds with 30 mW laser excitation. As the fluorescence affects the spectra, the background subtraction was necessary.
The spectroradiometric measurements, using Minolta CS-1000 spectroradiometer and Minolta CS-S1W software, have carried out for the optical behaviour study and the specification of the colour.
Through Spectral Reflectance Factor (SRF%) trend in function of the visible region (400-700 nm) it is possible to identify the pigments comparing the experimental ones with those of specific database.
The measurements were made under diffuse natural light with distance between spectroradiometer and sculpture of about 30 cm.

CONCLUSIONS

The diagnostic campaign, besides analysing the colours of this masterpiece of Greek coroplastic collection, represents an example of an archaeometric approach in situ. In museum, the conditions for performing analysis are not comfy. Often the artwork cannot be moved and the researchers have to work under time pressure. Among the archaeometric techniques, thus, it is necessary to select those that may allow to obtain the wished results in few time at disposition. The UV observation provided the preliminary information about the head of Haden and it was useful to choose the area for Raman acquisitions. Starting from the obtained data, some considerations can be made about production technique. The presence of a slip and the gypsum as background layer of pigments was found. About the polychromy, the blue pigment of the beard is not surely identified. By spectroradiometric measurements and according to literature data it should be Egyptian Blue. For the red curly hair, instead, hematite was identified.
The perspectives of the work regard the extension of the measurements also to pieces of beard conserved in museum warehouse and the crossing of the information with XRF analysis planned for the summer.

RESULTS AND DISCUSSION

The head is broken off on a line with the neck; several curls from the beard and hair are missing. There are traces of black, maybe from combustion, on the left cheek and on the curls. Especially in the face, the surface is heavily encrusted with clay/dirt and clay/carbonate mixtures. In some points, painted area are powdery and fragile, adhering only loosely to the surface.
The UV observation is conducted in the preliminary step of the investigation and it is useful to define area to be submitted to Raman analysis and to make first consideration on the type of materials. During the UV irradiation, a yellow tone fluorescence from the face was observed (Figure 2). It is probably due to calcite. Specific area of the cheek presents blue-violet fluorescence. This is due to material different from calcite and probably recognizable with gypsum. It represents the background on which the pigments were applied. The coloured beard and hair don't shown any luminescence during UV irradiation. Furthermore, no fluorescence deriving from any medium is observed. The Raman acquisitions allowed to confirm the presence of calcite and gypsum in the area observed with UV irradiation. In fact, studies conducted on other archaeological finds, conserved at Aidone Museum and belonging to the same period of the head of Hades, put in evidence a whitish slip characterized by carbonatic composition [5-6]. Also the presence of gypsum is interesting and falls within the type of materials used in Ellenistic period in the coroplastic artifacts [6]. The Raman spectrum acquired on the left cheek (Figure 3) shows the peak of gypsum and a lot of fluorescence. This is imputable to the fact that the surface is heavily encrusted, as before said. The blue pigment used for the beard is not surely recognized. In general, the blue areas did not yield Raman spectra of sufficient quality to allow identification. The reasons for this are multiple. In general, Raman methodology difficultly detects blue and green pigments with red laser [7]. In addition, there was a large amount of background radiation, both from the museum lights and from fluorescence. Many acquisitions were made on different point of the curls of the hair. As example, in Figure 4 a spectrum was reported in which the peaks related to hematite are visible. The spectroradiometric measurements allow us to confirm the presence of hematite and to hypnotize the presence of Egyptian Blue as pigment used for the beard [1]. The Figures 5 and 6 show the SRF% trends in function of visible region (400-700 nm) respectively for the red and blue area investigated.

Figure 2 – UV observation of the face that shows yellowish and blue-violet fluorescence.

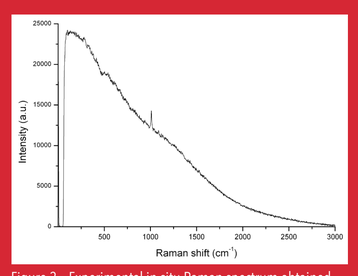

Figure 3 – Experimental in situ Raman spectrum obtained from the area on the cheek shown in Figure 2. The only peak at 1010 cm^{-1} is related to gypsum that represents the background of the painted upper layers.

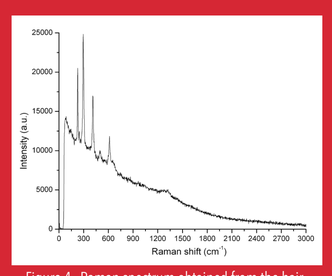

Figure 4 –Raman spectrum obtained from the hair. The peaks at 225, 293, 417 and 621 cm^{-1} are related to hematite.

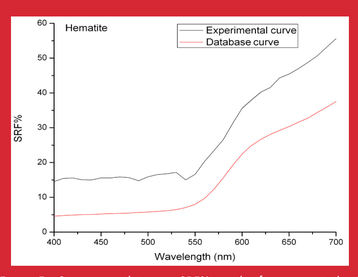

Figure 5 – Comparison between SRF% trends of experimental and database curves for hematite pigment.

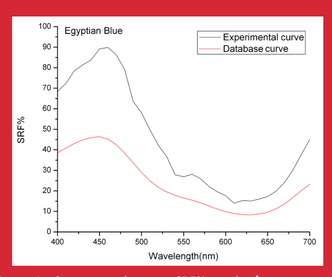

Figure 6 – Comparison between SRF% trends of experimental and database curves for Egyptian Blue pigment.

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