



Scientific studies for the restoration of a wood painting of the Galleria Interdisciplinare Regionale della Sicilia—Palazzo Mirto di Palermo☆



Claudia Pellerito^{a,*}, Agata Evelina Di Marco^b, Maria Concetta Di Natale^c, Bruno Pignataro^a, Michelangelo Scopelliti^a, Mauro Sebastianelli^d

^a Dipartimento di Fisica e Chimica (DiFC), Università degli Studi di Palermo, Viale delle Scienze, Ed. 17-90128, Palermo, Italy

^b Restauratore di Beni Culturali, Italy

^c Dipartimento di Culture e Società, Università degli Studi di Palermo, Viale delle Scienze, Ed. 12-90128, Palermo, Italy

^d Laboratorio di restauro Museo Diocesano di Palermo, Università degli Studi di Palermo, Via Matteo Bonello n. 2-90134, Palermo, Italy

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ABSTRACT

The *Ritratto muliebre*, referring to Venus, is a panel painting, oil on wood, attributed to unknown artist and probably dated to the second half of 16th century, today conserved in the Galleria Interdisciplinare Regionale della Sicilia—Palazzo Mirto of Palermo.

The aim of this research was to assess the techniques used to decorate the wooden painting and to verify the state of conservation of the artwork's materials but also to identify the previous treatments. This study was the essential condition to plane and perform the correct restoration.

For this reason, an integrated analytical approach based on the use of non-invasive and micro-invasive techniques was used, with the aim to obtain a characterization of the wooden panel, to elucidate the painting technique, including the stratigraphic sequence of the pigments and the organic binders, the state of preservation, the possible decay processes, and the possible additions made during previous restorations.

In addition to the imaging diagnostics techniques and the microchemical spot tests, micro-fragments of the painted material, original or not, were analyzed by several analytical techniques: optical microscopy, scanning electron microscopy (SEM-EDAX), FT-IR spectroscopy, and X-ray photoelectron spectroscopy (XPS).

The results of all analyses revealed that the portrait is a small panel painting made by an unknown painter in the second half of 16th century, with a traditional painting technique: a single wooden panel, two preparatory layers ("ammannitura"), a sort of priming ("imprimitura"), an underdrawing, a paint layer composed of oil as binding medium and pigments common in 16th century.

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1. Introduction

The scientific investigations aimed to the study, characterization, and conservation of archaeological and artistic finds are in general based on a strong interdisciplinary approach allowing, beside historical and artistic evaluations, to answer to questions about the dating, painting materials and technique, authors, artistic production area, or movements or schools and also about authenticity of antique paintings.

They are also an important support for the visual observations and the technical evaluations, which are in any case the prior condition of a scientific and correct restoration, according to the modern theory and the current laws.

The *Ritratto muliebre*, attributed to unknown artist and probably dated to the second half of 16th century, is conserved in the Galleria Interdisciplinare Regionale della Sicilia—Palazzo Mirto of Palermo (Figs. 1 and 2).

The portrait is a painting of small format (47.5 × 37.5 cm) that consists in a single wooden panel 3.5 cm of thickness, inserted in a gilded not original frame. The frame is composed of four molded wooden elements, fixed by glue and a butt-joint, gilded with the technique of "meccatura": this technique is quite common in the gilding of the frames and consists in a process of applying a silver leaf and coating with a specific varnish, such as shellac or varnish named "mecca"; this varnish is transparent and brilliant and has a yellowish color, useful to simulate the more precious, expensive, and ancient gilding with gold leaf.

Before the restoration, the panel showed many decay processes related to the constitutive materials, specifically the wooden support and the painting layers. Some previous treatments were also present, and they appeared similar to the common practices in 19th century: for example, a large use of wax, only beeswax or mixed with pigments, was identified for the treatment of the lacunae of the support and of the

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* Corresponding author at: Dipartimento di Fisica e Chimica (DiFC), Viale delle Scienze, Ed.17-90128, Palermo, Italy. Tel.: +39 091 238 97984; fax: +39 091 590015.

E-mail addresses: claudia.pellerito@unipa.it (C. Pellerito), maurosebastianelli@hotmail.com (M. Sebastianelli).



Fig. 1. Unknown author, *Ritratto muliebre*, second half of 16th century, oil on wood, Galleria Interdisciplinare Regionale della Sicilia—Palazzo Mirto of Palermo (Italy). Front (“recto”).

painting layers, according to the typical techniques of restoration of this period.

The aim of the research was to carry out the preliminary study, essential for the restoration, by the characterization of the constitutive materials and the executive techniques, the state of conservation and the previous treatments.



Fig. 2. Unknown author, *Ritratto muliebre*, second half of 16th century, oil on wood, Galleria Interdisciplinare Regionale della Sicilia—Palazzo Mirto of Palermo (Italy). Reverse (“verso”).

In fact, at first sight, some technical inconsistencies emerged, especially regarding the quality of the support and the stylistic features of the portrait.

The complex chemical composition of paint layers in artwork may be related to many factors: the technique followed by the artist, the effect of aging, and the environment and the effect of past conservations practices. The chemical characterization of materials used in the creation and restoration of a painting is extremely useful for surveying historical events and for gaining a better knowledge of the artistic heritage.

In this case, multispectral and non-invasive investigation techniques were performed as preliminary recognition and study. Then after sampling, micro-fragments of the painting material, original or not, and frass samples were analyzed by several analytical techniques: optical microscopy, scanning electron microscopy with energy dispersive spectroscopy (SEM-EDS), FT-IR spectroscopy, and X-ray photoelectron spectroscopy (XPS).

Moreover, as regards the micro-invasive techniques, at first microchemical spot tests were performed on two samples in order to find preliminary information about the constitutive material of the panel painting, specifically about the pigments and the binder used.

2. Material and methods

2.1. Sampling

A very small amount of painted materials (7 samples, each the size of a few mm) was taken from damaged areas of the painting, representing all the layers and without damaging the picture further. The samples are named RF 3, RF 5, RF 8, RF 9, RF 10, RF 11, and RF 12; the description of their color, typology, and location is given in Table 1.

Specifically, the sample RF 3 was obtained from the reverse (“verso”) of the panel and consists of frass taken from tunnels bored by wood-boring insects; the others, taken from the front (“recto”), were representative of all the different colors found on the panel painting: the samples named RF 5, RF 10, and RF 12 refer to original pigments, and the fragments RF 8, RF 9, and RF 12 are related to not original layers.

2.2. Imaging diagnostic techniques

Multispectral and non-invasive investigation techniques like photography, close-up photography, and microphotography under IR, UV, and visible radiation (raking light) were chosen as informative first-step analyses. Specifically, photography and close-up photography under IR, UV, and visible radiation were performed, using a digital reflex (DRLR) photo camera (Nikon D60) with a CCD image sensor (Nikon DX format—23.6 × 15.8 mm) and a resolution of 10.2 megapixel; to take pictures, the lens AF-S DX NIKKOR 18–55 mm f/3.5–5.6G VR was used, coupled with HOYA HMC Close-Up set (+1, +2, and +4 diopters) for the close-up photography.

2.2.1. Visible radiation

As visible radiation source two (one lamp) or four (two lamps) daylight fluorescent tubes (5000°K), 45 cm long, 25 W, 220 V single-phase were used; for raking light photography and close-up photography the illumination of the painting was made from a single side with one lamp and an oblique angle (above 80° or almost parallel to the surface).

2.2.2. UV radiation

As ultraviolet radiation source, four (two lamps) UV-A long wave tubes (emission peak 368 nm) with UV-A light (also known as Wood’s light or black light), 45 cm long, 25 W, and 220 V single-phase, were used.

2.2.3. IR radiation

As infrared radiation source two (two lamps) light bulb with NIR light (emission from 760 nm to 2.5 μm), 250 W, with E 27 cap were

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