

NOT ALL BY MANTEGNA! If non invasive analyses can help art historians in studying painted drawings

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INTRODUCTION

The painted and drawn parchment (late 15th/beginning 16th century) of *The Virgin Mary with Child in a painted landscape with ruins* now kept in the Musei Civici of Padua is attributed by some art historians to Andrea Mantegna, being the central drawing identical to the Mantegna's famous engraving of the *Madonna of Humility* (fig. 1). In order to map the conservation condition, to characterise materials and to study technical features, a large set of non-invasive examinations were carried out, both through imaging analyses in the UV, visible and IR range, and spectroscopic ones (EDXRF, visible reflectance spectrometry, FTIR, Raman).

INSTRUMENTS & METHODS

Reflected and transmitted photograph: professional scanner. **Macro and micro photograph:** Nikon D2X digital camera. **Infrared reflectography and False colour IR:** CCD camera (IR range 0.85-1 micron, res. >10 pixel/mm) and InGaAs video camera (IR range 0.9-1.7 micron) mounted on a microscope to obtain a scanning system. **Reflected UV and UV fluorescence:** 355 nm UV emission source and proper band-pass filters. **EDXRF:** Assing LITHOS 3000 portable spectrometer, with monochromatic emission at Mo K-alfa energy (17.4 keV, Zr filter). **Vis-RS:** Minolta 2600d spectrophotometer (spectral range 360-740 nm, spectral resolution 10 nm) with internal integrating sphere (56 mm diameter), d/8° geometry, UV included, specular component included and excluded. **FTIR:** Jasco IRT-3000 (spectral range 4000-600 cm⁻¹, resolution 4 cm⁻¹) in specular reflection mode, and processed with Kramers-Kronig transform. **Micro-Raman:** Jasco RMP-100 probe with an Olympus 50× objective, interfaced with optical fibres to a Lot-Oriel MS125 spectrometer (grid 1200 lines/mm, Andor CCD detector), the laser source was a SDL diode emitting at 785 nm.

STUDYING DRAWING AND UNDERDRAWING

The figure of the Virgin with the Child is made before the painted landscape with a metal-gallic ink containing iron and zinc (graph 4). The iron-gall ink is coherent with the high transparency of the brown drawing in IR reflectography. The presence of a carbonaceous medium in the ink, like carbon black, is excluded by Raman analyses (points C and D, fig. 1). Reflected UV image (fig. 3) improves the readability of the brown ink trace, returning the fineness of thin line and the variety of inclinations from shade to shade that we find in many Mantegna's incisions and drawings.

In comparison to the delicate sign to ink of the main subject, the infrared reflectography of architectural shows (fig. 5) a dark underdrawing, probably made with carbon black medium using a thin object.



1. *The Virgin Mary with Child in a painted landscape with ruins, brown ink drawing and glue distemper on parchment. Points of measure.*

2. *Image in visible transmitted light.*

3 - 4 *Reflected UV and visible image of the Virgin's cloak iron-gall drawing. Details.*

THE SUPPORT

The material of the support is parchment, as FTIR analysis confirm. Potassium, read by XRF in many points of measure, non in constant relationship with any other observed element, shows a greater intensity of counts where the parchment is not painted, can be interpreted as impurity of the calcium used in the processes of depilation of the skin of the sheep, or as trace of use of the pumice stone for smoothing the parchment.

PIGMENTS AND MEDIUM

The joined use of the four spectroscopic methods allowed a proper characterisation of nearly all the pigments used to create the complex chromatic palette.

Blue areas: azurite and lead white (**graph 3**).

Green areas: malachite identified by micro-FTIR spectroscopy. Mixture of malachite and azurite (vis-RS) is used in the greenish medallions (**graph 3**, line 11), mixed with lead-tin yellow (XRF). The yellow of lead-tin results to be of the type I (Pb_2SnO_4), as the weak band at 196 cm^{-1} shows in Raman analysis (**graph 2**, * in line B).

Brown areas: mixture of ochres and cinnabar detected by micro-Raman (**graph 2**) and XRF not only in brown-reddish shades (point 8) or rosy (points 17 and 18), but also in brown dark colour (point 24).

Pink-purple areas: red ochre/earth (silicate peak in FTIR), lead white (points 6 and 7, **graph 1**), copper pigment and smalt blue (Cu and Co in XRF), prob. red lake (madder? according to vis-RS bands).

Binder: animal glue, especially observed in purplish analysed points (**graph 1**) by micro-FTIR: characteristic bands at 2920 , 2848 , 1650 and 1540 cm^{-1} . The third typical signal of the protein binders, around 1450 cm^{-1} , cannot be found in these measures due the overlap with lead white bands.

CONCLUSIVE REMARKS

Imaging analyses, from microscopy to trans-illumination, from UV to IR, allowed to establish the quite good state of conservation of the pictorial film apart for some losses and a central damage.

While the brown drawing appears to be of the same kind of Mantegna's one, and the dimensions of the main figures are the same of the famous engraving, the underdrawing is not the typical one we find (or not find) under his paintings: Mantegna prefers incisions instead of black lines, and certain errors in perspective are far from his skill. Moreover: the absence of lapis lazuli, the presence of smalt blue and of certain mixtures of pigments are not typical of Mantegna's painting technique, nor the style of small details.

5 - 6 Detail of the IR reflectography (InGaAs micro-scanner) and the graphical reconstruction of naked lines superimposed to the visible image.

