Getty Conservation Institute

Scientific Report

<arches:value path="projectDetails/0/displayname">

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Artist/Date/Medium

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GCI Scientists

<Fill curators here>
Conservators

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Curators

<arches:value path="projectDetails/0/displayname">
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Executive Summary

<arches:value path="projectDetails/0/displaydescription">

Introduction

Add more detailed contextual information about the project here.

Project studied the following object(s):

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Object	Description	Type	Artist
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Previous Work

Summary of previous work if any existed for the object(s) of study but not part of this specific project

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Experimental

Details about the scientific process(s) used during the project

<arches:context path="observationDetails">

Ramen

Raman micro-spectroscopy was used to identify pigments in several areas of the physical thing. The vibrational signatures in the resulting spectra allow pigment identification through comparison to known or reported spectra,[1-3] and can be acquired from individual pigment grains because the Raman spectrometer is coupled to a microscope.

Ramen Instrument Configuration

Raman spectra were collected using a <Raman Instrument> using the instrument calibration settings summarized below.

<instrument parameters>

Ramen Analysis Details

For analysis, the <object> was secured in a cradle, which was set directly on the microscope sample stage (Figure 1); a 50X-L microscope objective (N.A. 0.50, 8 mm working distance) was used to direct laser light onto the open folio and collect the resulting Raman signal. In all cases, laser power and collection times for each area were chosen to optimize the signal while avoiding sample degradation.

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Ramen Sample and Analysis Areas

Areas examined by Raman spectroscopy are indicated in Figures x-y.

<arches:context path="/annotationScreenshots">
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Figure x <Canvas Name>
Caption

Summary of results for objects examined, grouped by <type of object>

Area	<object>	Materials Found	Possible Materials
<sample description>	<results for object>		

Ramen Results

Interpretation of results

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XRF (X-ray Fluorescence)

<technique used from xrf instrument in project>

-or-

X-ray fluorescence spectroscopy (XRF) is a non-destructive technique useful for identifying the elemental composition of discrete areas in the work, and which can detect the majority of elements commonly found in mineral-based pigments.

Importantly, however, air-path XRF instruments such as the one used in this analysis are generally incapable of detecting the low energy x-rays emitted by elements with atomic number less than ~20, so elements such as carbon, nitrogen, oxygen, sodium, aluminum, silicon, and sulfur cannot be detected.

The presence, or absence, of particular elements provides an indication of the pigments that are present in the examined area(s). The technique relies on the use of x-rays, which are sufficiently energetic to excite fluorescence from the materials not only of the uppermost pigmented layers, but also of elements present in buried layers of the work. Elements detected, therefore, may be from a ground layer or pigments from underlying paint layers, as well as from the painted surface.

Determination of the specific stratigraphy of the various paint layers requires removal of a sample for cross-sectional analysis (not done as part of this study). It should be noted that XRF provides an *elemental* rather than *molecular* analysis and therefore cannot conclusively identify the presence of particular pigments. Conclusive pigment identification requires complimentary analysis via a molecularly specific technique such as x-ray diffraction (XRD) or Raman spectroscopy.

XRF Instrument Configuration

In this work, the elemental composition of the major color regions in the painting were studied using a <Instrument> x-ray fluorescence spectrometer with the following instrument configuration:

<instrument parameters>

A spectrum was collected for each major color area. The spot size of incident x-rays is approximately 0.065 mm in diameter. For areas examined that are near this size, the resulting XRF spectra may not be fully spatially resolved, that is, that elements in a neighboring color field may contribute to the final spectrum.

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XRF Sample and Analysis Areas

Areas examined are shown in Figures x-y, below in individual results sections.

Figure x <Canvas Name>

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Caption

Analysis Area Table

Area	Description	XRF analysis	Raman analysis	Confirmed materials	Possible (additional) materials
1	<sample description>	<yes/no>	<yes/no>		

XRF Results

Interpretation of results

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Discussion

Interpretation and final results

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References

(1)   Burgio, L.; Clark, R. J. H. Spectroc. Acta Pt. A-Molec. Biomolec. Spectr. 2001, 57, 1491-1521.

(2)   Bell, I. M.; Clark, R. J. H.; Gibbs, P. J. Spectroc. Acta Pt. A-Molec. Biomolec. Spectr. 1997, 53, 2159-2179.

(3)   Lee, A. S.; Otieno-Alego, V.; Creagh, D. C. J. Raman Spectrosc. 2008, 39, 1079-1084.

(x)   Author(s). *Title* **Year**, *Volume*, Start Page-End Page.

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