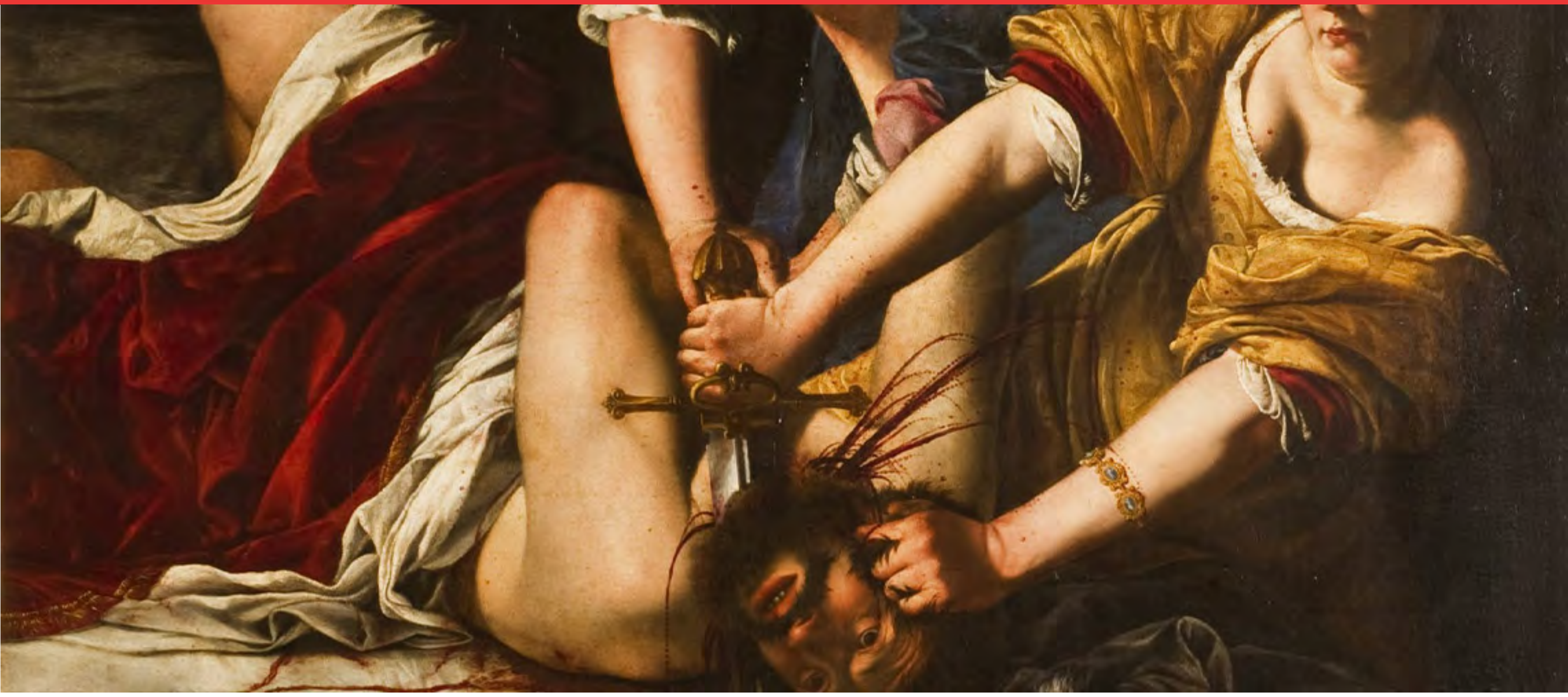

Judith slaying Holofernes, Artemisia Gentileschi, 1614–18, Galleria degli Uffizi, Florence.

ON THE CRIME SCENE....OF AN ARTWORK!

An artist can hide countless amounts of visual symbols and references in a painting. Similarly, the very materiality of these artworks can also contain a huge amount of information and traces that inform about how these artworks were executed, as well as their current condition. Today, heritage scientists benefit from a wide variety of scientific techniques available to identify the deeply hidden facts about visual artworks. In particular, my project at Tech4Culture PhD Program aims to the development of non-invasive imaging techniques for understanding the characteristics and degradation of pigments.

A RESEARCH TALE BY

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“How did the artist prepare the painting surface before he set to work? How much expensive and easily available was that bright red pigment at the time of its execution? Was the artist aware that this pigment contains arsenic and therefore it was toxic? Did the artist know that this pigment would degrade and therefore turn to black within three hundred years?”

As an early career heritage scientist, one of the “occupational deformations” that I feel I have been going through is how I began to perceive artworks more through their materiality and less through their visual and aesthetic properties. That is to say, as a young student of English literature and Classics in my first years of university, I was drawn to the visual aspects of artworks, that complimented my comprehension of literary characters, mythological heroes or historic personalities. Now, on the other hand, every time I come across a painting in a cultural heritage context, museum, church or a daily life setting, what I mostly see would be the following a cloud of decision making processes that were negotiated, dictated and shaped by the very physical aspects of the materials used in the making of those artworks.

Looking deep into the material characteristics of artworks requires methodologies or equipment actually similar to those used in forensic science. In the modern context of scientific analysis of artworks, be it in a conservation laboratory or in an archaeometry lab, cultural heritage scientists utilise a wide variety of techniques and tools such as ultra violet (UV) and infrared (IR) light, electron microscopes (SEM) and separation techniques (such as chromatography) that provide deep insights into the characteristics of the constituent materials and their behaviour both in time and in reaction to their physical environment (such as degradation). In other words, similar to forensic science, pointing the scientific inquiry towards the depths of an artwork could be regarded as backtracking the series of human actions or natural processes that an artefact would go through in time. This information in turn can widely be used by other specialists such as art historians and conservators for authentication, diagnostics and answering wider questions regarding the diachronic survey of painting techniques and pigment types used.

Nevertheless, these promising research possibilities do not come without any caveats and limitations. One of the most pressing limitations we face today is the fact that cultural heritage entities are non-renewable resources that cannot be retrieved once lost. In other words, as scientists we carry the responsibility of leaving the minimal physical effect and footprint on the analysed artworks. In this view, while we know that taking a sample (although microscopic and in many cases not noticeable to the naked eye) from an artwork can provide the most in depth view into an object, the current conservation and scientific ethics codes are more in favour of the non-invasive techniques that cause no physical damage or change to the analysed artefacts.

Today, there are many non-invasive analytical tools such as portable X-Ray fluorescence (pXRF) or imaging tools such as technical photography, that yield information based on the interactions that can take place between electromagnetic waves and the matter of the object. In the case of the pXRF, the data belongs to a single measurement point (in the form of a characteristic spectrum) and imaging techniques offer spatial information regarding the material characteristics of the artworks` chromatic layers. In addition to these, spectral imaging methods, (multi and hyper spectral imaging; MSI & HSI) have the possibility of combining spectral data with their respective spatial distribution and have been a useful tool for cultural heritage specialists.

In this context, the BHSICS (Bridging Hyper Spectral Imaging and Conservation Science) project, which I follow as a PhD student, aims to the development of cultural heritage oriented protocols for the data acquisition and database construction of multi and hyper spectral imaging (MSI / HSI) data. We hope this database can serve as a reference tool for other cultural heritage specialists around the world while interpreting data from other projects. The project involves a group of professors and researchers from the Department of Earth Sciences of the UniTo and Centro Conservation e Restauro La Venaria Reale work on the development of experimental mock-ups to test and document the characteristics and behaviour of pigments in their original state and mixture forms. Through this endeavour, we hope that the tools and know-how produced will contribute to improve the non-invasive techniques of analysis and methodologies for the better and more sustainable practices for cultural heritage safekeeping.