Science in art conservation and education: the role of analysis in understanding and treating paintings

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Conservation of art requires interdisciplinary collaboration between scientists, conservators and art historians. Through the study and identification of materials, crucial data can be collected regarding physical and chemical stability. Today we have a plethora of analytical methods available to study works of art – some are portable for in situ, and others require sampling, and many of the techniques we have available are based on photonics. Collaborations between engineers, physicists, chemists have led to the development and application of instrumentation, and the nuanced interpretation of scientific data from often extremely complex systems. In this talk I will highlight how scientific methods and the interpretation of data from analytical techniques underpin conservation training at The Courtauld, how we can employ analytical methods synergistically to understand the origin and behavior of materials found in wall paintings and easel paintings, and how results from analysis can inform conservation decisions. Close-looking is an essential skill for conservators, art historians and scientists – and microscopy in various modalities plays a major role in the study of painted surfaces, allowing the visualization of stratigraphy and the heterogeneous distribution of materials on works of art. I will provide examples of how examination of surfaces can reveal clues about technology and stratigraphy, and why this is important for understanding the physical history of objects. This will be followed by a presentation of key case studies of works of art and archaeological materials that will draw on research using portable instrumentation and cutting-edge analytical methods ranging from the study of ancient polychromy to 20th C. paintings. Investigations on wall painting fragments from the ancient Canannite capital Tel Kabri allowed the identification of degraded binding media from the Aegean style wall paintings that date to the 18th C. B.C.E. Conservators suspected the presence of binding media due to the large particles of Egyptian blue on a lime plaster but very little study of binders from the period exists. The discovery of traces of organic media in the characteristic blue paint is significant for the conservation and treatment of the paintings, for understanding of the sophistication of painting practice and the use of egg-based binding media in the Eastern Mediterranean, and more broadly also questions the presence of domestic animals in the region [1]. Pigment analysis and identification are often the focus of technical studies and in situ investigations. I will highlight how analysis has demonstrated the way that deep crimson pigments from European insects were adopted by Leonardo in the Last Supper, and how, by contrast, later painters adopted newly introduced Mexican pigments from cochineal insects [2]. The molecular characterization of cross-sections using Raman spectroscopy, and Scanning Electron Microscopy demonstrate the use of pigments in paintings by Leonardo and Masolino, and carmine-based reds in paintings by other painters, while also revealing soluble uncomplexed dyes in samples that has direct implications for conservation, cleaning and lighting. Further examples of the study of pigments using laser-based time-resolved luminescence imaging, and synchrotron-based X-ray spectroscopy to study samples from paintings by Picasso, include work on cadmium yellows and their degradation [3]. Research on works of art is a major intellectual challenge that can provide key data for future conservation work, and can reveal new information about the materials, methods and techniques employed to create our common heritage.

REFERENCES

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