

THE GREENS OF MEDIEVAL PORTUGUESE ILLUMINATIONS

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Colour production in medieval illuminations was a complex process and good green colours were not available to the medieval artist; saturated deep colours were difficult to be obtained and many were not durable. Therefore to obtain a green it was necessary to mix other pigments and eventually to develop new, and unique, formulations. Mixtures, especially greens, can be very localised and idiosyncratic, and this is the reason why several authors have pointed out that greens are a useful indicator for specific artists, workshops, periods or countries. Green is an important colour in medieval Portuguese manuscripts, namely a certain deep green known in Portuguese as “verde garrafa” (*bottle-green*), which could be obtained from copper pigments, such as carbonate and acetate complexes or from a mixture of yellow and blue paints.

The analysis of the *bottle-green* colour was carried out for the manuscript collections of three important Portuguese monasteries: Alcobça, Lrvão and Santa Cruz. The techniques used were *m*-FTIR (Fourier Transform Infrared Spectroscopy) and *m*-EDXRF (Energy Dispersive Spectroscopy of X-ray Fluorescence) as well as by microscope observation. It was not possible to obtain relevant information with microRaman. For Lrvão and Alcobça infrared spectra were acquired in micro-samples and *in situ* for Santa Cruz, as infrared reflectance spectra. The colours of Santa Cruz were analyzed in the framework of a Molab mission [Medman Eu-Artech Project, 12th-15th January 2009, Biblioteca Pública Municipal do Porto], and in this presentation the data obtained in the infrared reflectance spectra will be compared to what inferred from a transmission spectra from a micro-sample. Historical accurate reconstructions based both in the analytical data as well as in a critical assessment of medieval recipes proved to be a crucial tool to the characterization of this bottle green colour.

The glassy deep homogenous and brilliant green, evident under the microscope, is only obtained in certain conditions (1), and indicate that a consistent synthetic method has been used for the production of the Portuguese *bottle-green*. Moreover, the historic reproductions enabled us to confirm the nature of these greens as Copper proteinates.

Finally, we will discuss how based on the infrared molecular fingerprint as well as on chemometrics it was possible to conclude that the greens used in Lrvão and Alcobça monasteries are similar, and were obtained using a similar recipe.

(1) C. Miguel, A. Claro, M.J. Melo, “Green, blue, greenish blue or bluish green? Copper pigments in medieval Portuguese Illuminations”, Proceedings of the third International Symposium of the working group Art Technological Source Research (ICOM-CC)- Study, Serendipity and Testimonies of Artists’ Practice, 12-13 June 2008, University of Glasgow, Scotland, in press.

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(1) “An interdisciplinary approach to the study of colour in Portuguese manuscript illuminations”, POCTI/EAT/33782/2000

(2) “The identity of Portuguese medieval manuscript illumination in the European context”, PTDC/EAT/65445/2006