

# Historical Reproduction of Grisailles: A preliminary study

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Grisaille is a glass-based paint applied on stained-glass panels, used, in general, for the creation of contours and shadows with dark colors (grey and brown hues). They are made by mixing metal oxides (iron and/or copper) with a ground lead-based glass, and applied on a glass panel with a binding agent, such as Arabic gum. After the annealing at temperatures between 650-700°C, the grisaille form a thin layer of glass with dispersed the metal oxides, wich is adhered to the base glass.

This study is focused on a preliminary research of treatises and recipe books which describe the production of grisailles with the aim to investigate its historical evolution. This includes a general overview of the historical treatises that described this type of production, the interpretation, and identification of raw materials and the reproduction of selected recipes. The produced paints were characterized before and after their annealing by optical and scanning electron microscopy, ion beam analyses and X-ray diffraction.

Four recipes were selected to be reproduced, belonging to four different treatises, dated from the 10<sup>th</sup> to the 19<sup>th</sup> century. The treatises were written by Eraclius (10<sup>th</sup> century), Antoine de Pisa (14<sup>th</sup>-15<sup>th</sup> century), Pierre Le Vieil (17<sup>th</sup> century) and George Bontemps (19<sup>th</sup> century) allowing a representative analysis of the evolution of the grisaille production through history.

As principal conclusion, it was possible to understand that the production of grisailles did not change significantly through history, except for the source of some colorants, such as the replacement of burned metals for ochres and earths, and an evolution of the morphology of the grisailles towards a greater homogeneity. It was also observed that the differences in the hues of the paint after the annealing were due to a change in the metallic phases.