Microanalytical study of the pigments in the ground layers of "The equestrian portrait of the Duke of Lerma" (P.P. Rubens)

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Rubens painted the magnificent equestrian portrait of the Duke of Lerma in 1603 during his stay at the Spanish court while temporarily resident in the city of Valladolid; the painting is now part of the collection of the Prado National Museum (Madrid). The artist chose a large canvas (283 x 200 cm) consisting of a main piece and a narrow upper strip (Fig. 1a), which was added during the course of painting following Rubens' normal way of working. In addition, the preparation of the canvas was different; while the main piece presents a fairly dark umber background (Fig. 1b), the added piece exhibits a very heterogeneous pale ochre layer (Fig. 1c). In both cases the preparation is executed in the traditional manner, with natural fillers and pigments.

This communication adds to the data furnished by the authors at an earlier date [1], presenting the results of a first analysis by SEM/EDS to characterize the pigments and fillers used by Rubens to prepare the two parts of the painting and identify the most significant differences between the two. The aim is to assemble comprehensive information about the materials that Rubens used in Spain, so as to be able to compare these with the materials that he used when he painted in Antwerp, where he lived. This study is part of a wider project to characterize the artist's materials using high-resolution transmission electron microscopy (HRTEM), the ultimate aim being to determine the origin of other paintings by the same artist which are currently part of the Prado Museum's collection [2].

The examination was conducted following a similar method to the one used for other paintings targeted by the project. Microsamples of stratigraphic sections were taken, included in epoxy resin and prepared in thin layers for examination. For proper analysis the sections should contain all the particles in the original layer. Both preparations are composed of a single, irregular layer, of a yellowish ochre colour in the main panel and a ruddier colour in the smaller part (Fig. 1d, 1e). Numerous semi-quantitative EDS microanalyses were performed to gain a general idea of the average chemical elements contained in the preparation layers (Table I). Several detailed EDS microanalyses of single particles show the nature of the components and the differences between the two parts.

The main part was prepared with calcium carbonate and a considerable amount of a natural earth rich in iron/manganese oxides (umber earth pigment), composed mainly of aluminosilicates and alkali feldspar. Considerable amounts of silica have also been located, and a regular amount of lead, possibly the drying agent used by the artist. The majority pigment in the upper strip is white lead, in the form of large, very heterogeneous crystals. This layer is practically free of calcite or of the earth identified in the main panel; the artist appears to have used only a fairly pure iron oxide and an umber earth. There is also considerably less quartz; other elements such as copper, some of the lead and even yellow lead and tin, suggest that the colour left over on the palette was reused, a common practice of many artists.

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There is no biological calcium carbonate (chalk), a product typically used in ground work by Central European artists and used by Rubens in some paintings done in Antwerp. This is significant given that chalk was not commonly used in Spain, and the analysis of this painting confirms the Spanish origin of the materials. The study has enabled us to identify all the materials used by artists in the pictorial procedure. Also, the MEB/EDS data are essential for subsequent analysis using more localised microscopic techniques.

1. M.I. Báez et al., European Conference on X-Ray Spectrometry (Cavtat) (2008) p117J.
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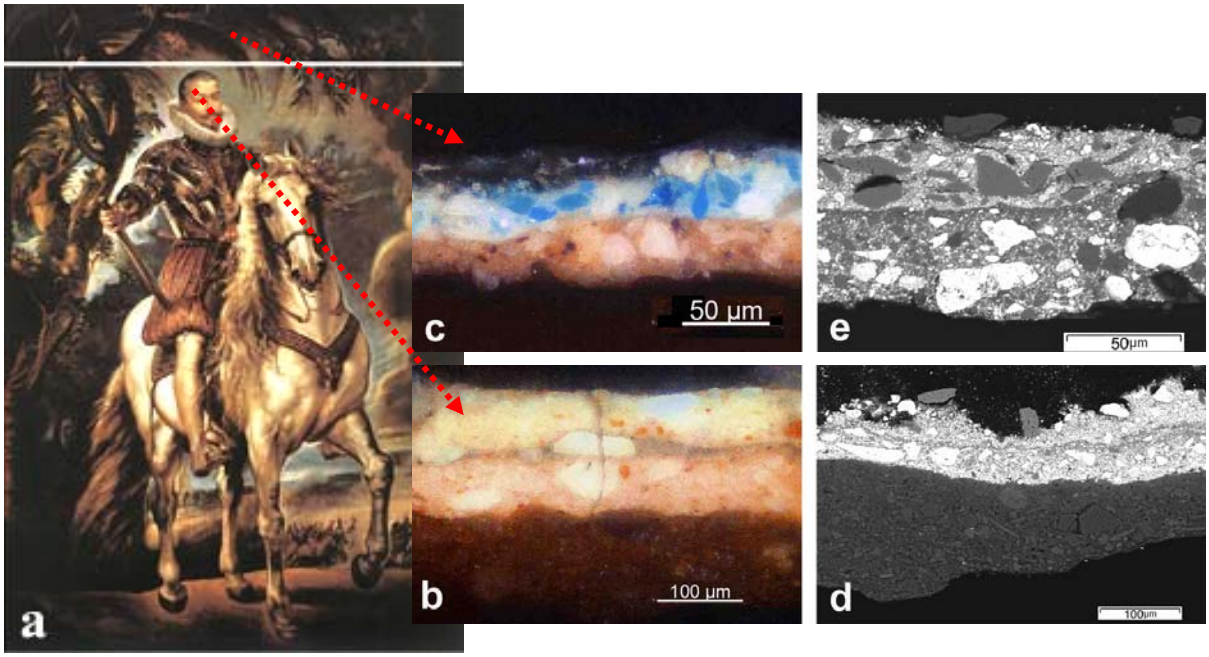

Figure 1. a) "The equestrian portrait of the Duke of Lerma" (1603). Oil on canvas. The line indicates the size of the two pieces of canvas making up the painting. b) and c) Stratigraphic view (LM): main piece (b) and added strip (c). d) and e) Stratigraphic view (SEM): main piece (d) and added strip (e).

	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	MnO	FeO	CuO	PbO
Main panel	2.75	14.27	45.80	3.14	18.42	0.53	0.72	11.59	--	5.21
Upper strip	0.19	0.63	6.11	0.15	0.71	--	1.49	10.48	12.56	67.38

Table I. Microanalysis data and average amounts (%wt) of the chemical elements present in the ground layers.

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