Regraxar or Glazing:

Aspects of this technique in a group of Portuguese panel paintings from the second half of the 16th century attributed to Francisco João

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INTRODUCTION

In oil painting, a glaze could be defined as a semi-transparent or translucent, medium-rich, coloured layer of paint almost always applied on top of an opaque underlayer. Glazing was referred to as '*bañar*' or '*trasflorar*' in Spanish historical documents and as '*regraxar*' in the Portuguese texts. The Portuguese word derives from '*graxa*' – a greasy material frequently used for polishing plain or polychromed wood (such as sculptures), leather, and other materials.

This technique was developped by the Early Netherlandish painters, and although much simplified, remained a common practice for 16th century painters throughout all of Europe. This study compares the glazing technique of twenty panel paintings attributed to Francisco João, the most important painter working in the region of Évora, South of Portugal, between 1562 and 1595, with the references to this practice found in Portuguese and Spanish painting treatises of the period. The comparison was made in terms of the materials present (pigments and driers), the build-up of the paint layers and the methods used for spreading the glazes.

IBERIC PAINTING TREATISES

The following five treatises were considered:

- *Reglas para pintar* (end of the 16th century), Anonymous, Santiago de Compostela - Spain (BRUQUETAS 1998)
- *Arte da Pintura, Simetria e Perspectiva* (1615), Filipe Nunes, Lisbon – Portugal (VELIZ 1986)
- *Arte de la Pintura* (1649) Francisco Pacheco, Seville – Spain (VELIZ 1986)
- *Breve Tratado de Iluminação* (before 1640-50), Monk of the Order of Christ, Portugal (MONTEIRO & CRUZ in press)
- *Tractado del arte de la pintura (ca. 1656)*, Anonymous, Andalusia – Spain (VELIZ 1986)

Although most of these documents date from the first half of the 17th century, they relate, in part, to practices from the previous century.

Table 1. Glazing materials and paint structure according to the Iberic historical documents

Visible colour	Undermodelling 1	Undermodelling 2	Glaze	Author
RED / PINK	vermilion	carmine + white	Red Lake	Pacheco
		minium + white (lights) carmine + verdigris (shadows)		*Reglas...*
	vermilion + carmine	vermillion + carmine + white (lights) pure carmine or black (shadows)		Pacheco *Tractado...*
	red ochre (*albín*) or haematite + white	carmine + black (shadows)		Pacheco *Tractado...*
	black + white			Nunes
PURPLE	blue (preferably smalt)+ carmine + white		Red Lake	Pacheco
	blue + white			Pacheco *Tractado...*
	carmine		Ultramarine	*Tractado...*
GREEN	verdigris or green + white		Verdigris	Pacheco *Tractado...*
	verdigris + white + lead tin yellow			Pacheco
	blue + lead-tin yellow	indigo + lead-tin yellow (shadows)		Monk
	malachite + white or black			Pacheco
	ochre			*Tractado...*
	yellow	green (2nd); ochre (3rd); green + umber (4th)		*Reglas...*
	black + white			Nunes Pacheco *Tractado...*
BLUE	blue + white	smalt (shadows)	Ultramarine	Pacheco
	indigo or woad + white	pure indigo (2nd); indigo + umber (3rd); indigo + black (4th)	Smalt	*Reglas...*
OTHER	red		Asphalt	Nunes
	over the painting surface to create the effect of nighttime			*Reglas...*
	orpiment	burned orpiment (shadows) massicot (lights)	Red ochre	*Tractado...*
	over the figures in the landscape or angels inside a halo		White + 1colour	Monk

ANALYTICAL METHODS

The investigation was based on the detailed observation of the painting surface under normal light and ultraviolet radiation. Paint samples were collected and made into cross-sections in order to study the paint structure with optical microscopy under incident light and ultraviolet radiation (OM: *Axioplan polarization microscope – C. Zeiss*). The materials were identified using Fourier transform infrared microspectroscopy (μ-FTIR: *Hyperion 3000*) and scanning electron microscopy coupled with energy dispersive X-ray spectrometry (VP-SEM-EDS: *Hitachi 3700N,* 20kV; SEM-EDS: *Jeol JSM 6300*, 15 kV). Micro-Raman spectroscopy was used to identify small particles of minium (MRS: *Renishaw in Via Raman Microscope*).

RESULTS

Glazes were only detected in red and green draperies.

Green areas

- Verdigris is the major component of the green glazes. Sometimes a little lead-tin yellow or lead white was added to the glaze (***Fig. 1a***).
- Green glazes were generally applied in a single layer over an undermodelling made of a lead-tin yellow based colour for the lights and an ochre or black-greenish colour for the shadows (***Fig. 2***).
- The pigment mixture of carbon black + lead-tin yellow + a little lead white used to make this black greenish underlayer had no correspondance with the painting treatises' indications, since the combination of a black and yellow pigment is never suggested (***Table 1***).
- To this basic mixture, ochre could be added and, in one instance, a green copper pigment with the optical appearance of verdigris was also used (***Fig. 1b***).

Fig. 1. 'St. Luzia and St. Bartholomew', Predela painting (44 cm × 72 cm), Church of S. Miguel de Machede, Évora.

Fig. 2. 'Descent from the Cross' (166 cm × 106 cm), Church of S. Francisco, Évora.

Red areas

- The reds exhibit a traditional build-up with a local opaque undermodelling of the forms covered by the red glaze applied in one or two layers.
- Different red lake pigments could be distinguished:
  - Large particles (c. 10–20 μm), irregular in shape, exhibiting a pale pink colour and a highly discoloured appearance. SEM-EDS analysis revealed the presence of sulfur (the main peak) and aluminium with small amounts of calcium, potassium, chlorine and, occasionally, silica, magnesium, copper and sodium (***Fig. 3a***). These characteristics appear to be typical of red lakes rich in protein made from shearings of dyed wool (KIRBY et al. 2005). This type of red lake was especially found in undermodelling layers, in mixtures with vermilion, ochres or lead white.
  - Particles with a close or high aluminium content relative to sulphur, suggesting the use of a lake with a conventional alumina substrate probably not prepared by indirect extraction of textile shearings. This type of red lake was preferably found on the red medium-rich glazes, with little or no other opaque pigment. On certain occasions, the two types of red lakes were present in the same layer (***Fig. 3b***).
- Glass particles (c. 5-12 μm) were identified by EDS in the red glazes of three paintings belonging to three different altarpieces. The red glazes with glass were severely degraded, showing loss of cohesion and a matte appearance. All the Iberic treatises considered mention the use of ground glass as a drier, although they also suggest other materials.

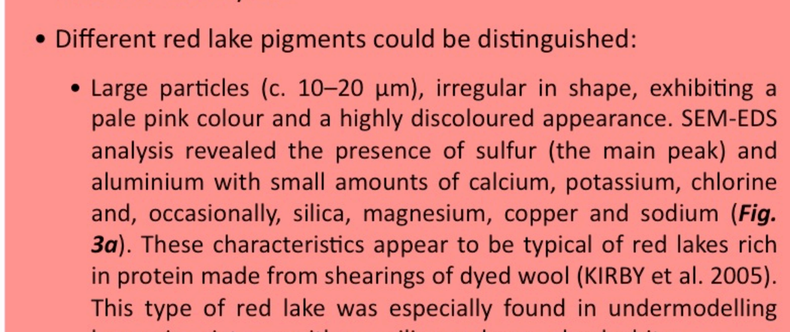

Fig. 3. 'Descent from the Cross' (166 × 106 cm) from the Church of S. Francisco, Évora.

- Three main structures following the main indications of the painting treatises **(Table 1)** were found:
  - A vermilion-based paint to which red lake or red ochre, and sometimes a little carbon black were added, was modelled in one or two layers of similar tonal range **(Fig. 3a)**.
  - The modelling was achieved with an ochre based colour for the shadows, overlapped only in the middle and highlighted areas of the folds, with an opaque pink to white layer made of lead white and a red lake **(Fig. 3b)**. Small amounts of lead white, carbon black, minium or red lake were sometimes added to the ochre underlayer.
  - A grey-pink single layer made with a basic mixture of carbon black + lead white + red lake was modelled in a single layer.
- The imprint of the weave of a cloth was found on the red glazes of three paintings belonging to two altarpieces **(Fig. 4)**, following the advice given by Filipe Nunes (1615):

> *How to glaze*
>
> *Take a soft linen cloth and put a little bit of cotton on it, and then make a sort of brush in a way that the cotton stays inside the cloth and doesn't touches the painting, and like this you will spread the verdigris, and you will see the lights in light green, and the darks in dark green.*
>
> *The same is also done with the red lake.*

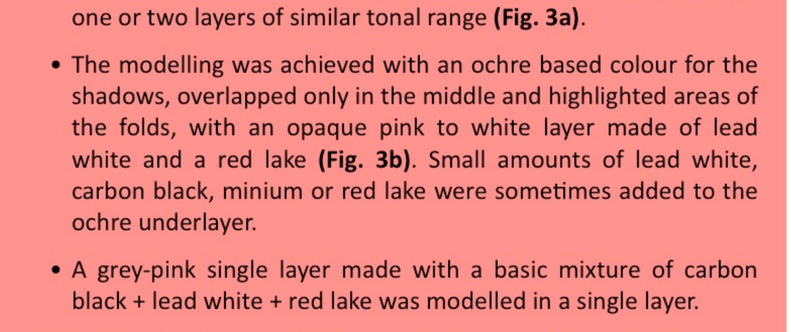

Fig. 4. Detail of the 'Assumption of the Virgin' (269 × 214 cm) from the Church of S. Estêvão de Beringel, Beja, with the imprint of the weave of a cloth on the glazed surface.

CONCLUSION

- The glazing technique found in a group of paintings produced in the region of Évora, South of Portugal, during the second half of the 16th century and attributed to the local painter Francisco João (act. 1562 – 1595), showed the permanence of conventional techniques that, with small variations, are in close relation with the theoretical references found in the Iberic painting treatises of the period.
- The research will proceed with the identification of the dyestuff used in the red lakes and with the practical reconstruction of the particular technique of applying the red glaze with a linen cloth.

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