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PAINTING ON CANVAS – THREE SAMPLE PREPARATION APPROACHES FOR FIBRES OPTICAL MICROSCOPE IDENTIFICATION

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Abstract

In Portuguese painting, canvas is a common structural support. However, the historical documentation, material and technique on this fabric support are scarce. From the research that is being performed on the canvas in Portuguese painting, since its implementation to its industrial production, this article focuses on the challenges existing in the fibre preparation for microscopic examination. Since paintings are layered structures, fibres are usually impregnated with dust and various materials who migrated from other layers. To clean the micro-samples, three approaches of preparation were performed. The effectiveness of the cleaning of the fibres, for microscopic observation of their morphological characteristics, it is more difficult to achieve than the texts suggest.

Keywords: *Canvas; Fibres; Sampling; Microscopic examination; Neutral detergent; Aqueous sodium hydroxide dissolution; Propanone*

Introduction

In Portugal, by the end of sixteenth century, wood panel started to be replaced by canvas support as artists' first choice for oil paintings. During seventeenth century it was already implemented [1]. Despite this fact, historical documentation on the selection of this weaved support is scarce. Even nowadays, in most projects of art history and conservation, canvas type is usually characterized by a cursory visual identification. Nevertheless, identification of canvas's fibre may aid in dating and determining provenance, understanding the artist's technique, and the selection of conservation treatments procedures and techniques. Under a research about *Canvas in Portuguese Painting, from its implementation to its industrial production*, micro-samples of canvas from sixteenth to nineteenth century have been taken, in order to identify textile fibres. This will allow knowing which canvases were used, their constituent materials, and influences in artists and to assess their state of conservation.

The typical initial and primary analytical method employed in fibre identification is microscopy identification [2, 3]. With or without polarizing transmitted light microscopy their longitudinal and cross-session morphology and optic properties are examined. Morphological

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characteristics include the homogeneity of the sample, whether it is composed of individual fibres or if this are clustered or cemented in bundles; fibre width and length; contour or bundles; shape of terminal fibre ends when present; longitudinal and transverse demarcations; the width and the lumen features; the presence of associated cellular elements, and the absence or presence of pitting in the fibre cell wall. Optical properties as the colour observed related to fibres' birefringence is also a helpful way to diagnostic examination of fibres [3].

However, paintings are layered structures and some compounds can easily migrate from one layer to another [4]. Usually these weaved supports are impregnated with dust and organic materials, such as glue, ground and other painting materials (Fig.1). These materials often cover the distinctive features of fibres. Their presence often causes equivocal results and leads to misleading interpretations, especially when examining fibres from the same family, such as the most existent fibres for artists' canvas bast fibres flax, hemp, ramie and jute [5]. Despite the importance of cleaning for the analysis of canvas's textile fibres and the inconvenient that its absence entails, are almost non-existent references to this essential practice. One of the few examples is the publication of G. Campo *et al* [5], which aims to be an easy access and effective working tool for the identification of fibres in painting to the conservator in his workshop. Based on the cleaning processes presented, three approaches were selected and their easily and effectiveness to remove dirt was compared. It is intended to make known the difficulties that the cleaning of the textile fibres of painting on canvas carry and determine whether the methods chosen are really effective and easy to perform by the conservator in his workshop.

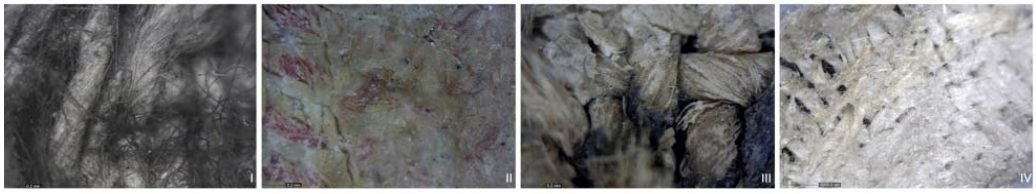

Fig.1. Canvas weaved supports impregnated with common painting materials:
I – with dust; II – with proteine glue; III – with ground; IV – with synthetic adhesive

Experimental

Despite scientific advances for the identification of textile fibres on paintings by non-destructive methods, such as E. Richardson *et al* [6] and M. Oriola *et al* [7] present, the collection of micro samples continues to be the standard practice among conservators [3].

Twelve eighteenth century easel paintings from Museu Nacional Soares dos Reis (four paintings), Museu Nacional Machado de Castro (six paintings) and Irmandade da Igreja dos Clérigos (two paintings) were selected, based on materials usually assessed on canvas: three with dust; three with glue; three with ground; three with synthetic adhesive.

The cellulosic bast fibres were clipped from an exposed yarn end in an inconspicuous area from not visible canvas edges. The micro-samples were ~ 5 mm, as small yarns may allow fibre identification [5].

To remove the extraneous materials that can obscure or complicate the analysis, three cleaning sample preparation approaches were carried out based on G. Campo *et al* [5]: Aqueous Sodium Hydroxide dissolution (NaOH); Neutral detergent and Propanone (CH_3-CO-CH_3). The different dirt present in the samples was subjected to the three sample cleaning preparations (Fig. 2). The methods involved separating fibres from the unwanted matter, leading to a fluid medium, with a minimum of deposition of dirt and fibre degradation [8]:

- 1% Aqueous Sodium Hydroxide dissolution (NaOH): to increase solubility, samples in a test tube with the dissolution were submitted to a wash bath at 40ºC and for 10 minutes. Then,

they were submerged in deionized water and left in wash bath for more 10 minutes. At the end, pH was neutral indicating that there was no residual dissolution in the fibre.

- ***2% Neutral detergent Derquin LM 02*** (Neutral, phosphates free liquid, Panreac): samples were submerged in warm distilled water with 2% neutral detergent for one minute and submitted to occasional mechanical manipulation. Then, they were rinsed thoroughly until pH indicated no residual dissolution was present.

- ***Propanone*** (CH_3-CO-CH_3): the tubes were covered, for 10 minutes, to increase solubility, and submitted to occasional mechanical manipulation for around 10 minutes. Then residual adhesive was swabbed with blotting paper and picked off with a fine tweeze.

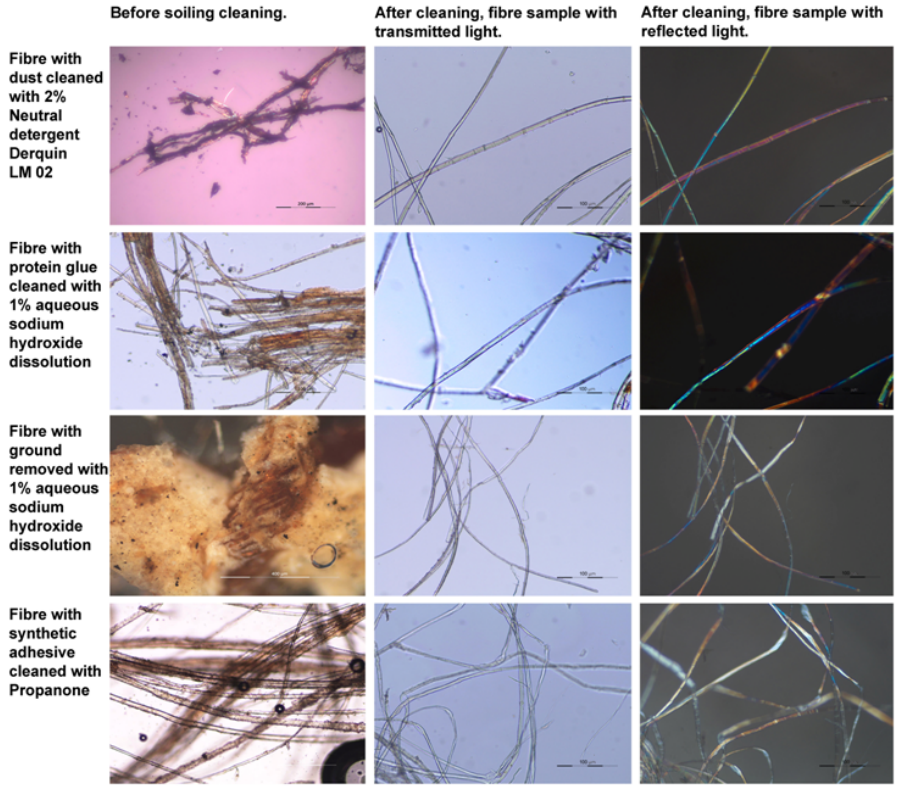

Fig. 2. Fibres samples before and after cleaning.

Results and Discussion

From the three cleaning micro-sample preparations, 1% aqueous sodium hydroxide dissolution (NaOH) is the most effective and efficient in removing dust, protein glue, ground, and synthetic adhesives. However, if fibres are very degraded, they cannot withstand the cleaning process.

To remove particulate soiling such as dust, 2% Neutral detergent Derquin LM 02 (Neutral, phosphates free liquid, Panreac), in warm distilled water and with mechanical manipulation, is the easiest and more effective way.

Although Propanone (CH_3-CO-CH_3) can cause desiccation of fibres, its effectiveness to remove synthetic adhesives, together with mechanical manipulation may be as effective as the 1% aqueous sodium hydroxide dissolution (NaOH). Nonetheless, some residues may cost more

to get out, and if the fibre is very degraded, it is not possible to remove dirt or to pick it off with a fine tweezers, without destroying the sample..

When the pH indicated no residual dissolution present sometimes the microscopic observation of the fibres revealed the presence of residues of dirt and other materials, which hindered the interpretation of samples.

Conclusions

The cleaning of fibres micro-samples in practice is a great deal more difficult than the texts lead one to believe. Experience has shown that often preparations procedures do not repay the time and effort they require and, more importantly, sometimes fail together. Fibres condition, materials present and time available may determine the selection. Although the sample should be as free as possible from extraneous material that can obscure or complicate the analysis, due to its condition and size, occasionally it may not be possible to remove all the soiling. When necessary and possible, auxiliary techniques should be carried out.

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