



Art and Chemistry: Discovering the Materials of “The Four Seasons” by Gaetano Paloscia (Tibaldi Palace)

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Abstract

The research regards the characterization of materials used by Gaetano Paloscia for his wallpaper artwork called “The four Season” (1931) preserved in Palazzo Tibaldi (SS. Cosma e Damiano, LT). According to the starting theory, the painting technique should have been an egg tempera but the analysis carried out on the materials showed a different result. MALDI-TOF allowed characterising the paint binder as a natural rubber, possibly Arabic gum. In this case, the technique used by Paloscia should be watercolour and not the egg tempera as believed. The nature of the adhesive used to glue the paper on the wall has been characterized too, applying Mass Spectrometry analysis. In this case a vegetal glue has been discovered as adhesive, it probably made with starch. Results from SEM-EDS analysis have helped to characterize the pigments of the wallpaper allowing also to understand the condition of conservation of the paper. Herzberg reactive revealed the nature of the paper’s paste, identifying two different kinds of papers: a more ancient one made of a paste rich in lignin, and an earlier paper with a paste poor of organic polymer.

This research complemented and helped the work of restoration carried out on the artwork considering that it is the first full characterization of the materials used by the Paloscia. Moreover, the analysis revealed a new information about the technique of realization and providing useful information about the degradation of “The Four Seasons” as demonstration that art and chemistry may merge together obtaining important results for the conservation of the artworks.

Introduction

Gaetano Paloscia studied as painter in Naples but soon he achieved an international success, decorating palaces both in Italy and abroad. In 1931 he complete “The Four Season” of Tibaldi Palace in SS. Cosma and Damiano (LT), an artwork on wallpaper realized using pigments, dyes and binders prepared by himself. The rich floral decoration of the dining room of Tibaldi Palace is an allegory of the four seasons, a veritable "explosion of flowers", taken from the truthful depiction of the nature around the Palace. Over time, it has been done some remakes of the backgrounds applying new backing papers on original media.

In the summer of 1984, it has organized an exhibition of Paloscia’s paintings, with the patronage of the city of SS. Cosma and Damiano and of the Cultural Center "Andrea Mattei"; at that time, it was thought that the artist used egg as binder for his artwork as no diagnostic analysis was perform on the artwork before, so this hypothesis could not be disproved. However, the most common technique for wallpaper was the watercolor and not the egg tempera[1]. This work is the first characterization of the artwork with a multi-analytical approach that can give useful information about the technique used by Gaetano Paloscia, filling a knowledge gap. Moreover, the research helped the conservator to understand the degradation of the artwork, especially due to fungi that can lead to an important chromatic alteration.

Materials & Methods

The sampling on the artwork of Gaetano Paloscia occurred in non-significant areas. Mass Spectrometry (MS), Scanning Electron Microscopy with Energy Dispersion System (SEM-EDS), Herzberg sage and the potentiometric measurement of pH are the analytical techniques used for the characterization of the materials of “The Four Seasons”.

Voyager DE MALDI-TOF (PE PerSpectiveBiosystems, Houston, Texas) has been used for characterizing three different samples in order to discriminate the binder and the adhesive. SEM LEO1450VP allows analyzing the pigments, the plaster and several samples of the paper. In the case of the paper it is supposed that it could be a posterior restoration with another kind of paper; therefore, the samples of paper were studied preparing the Herzberg reactive, one of the most applied technique for the recognition of fibrous mix. Then, the potentiometric analysis was carried out on the samples aiming to determine the pH and evaluating the conservation condition of the paper.

Results

MS highlighted the nature of the binder, revealing the presence of a species with MW=210 attributable to a saccharide polymer with glucaric acid at the oxidized ends. This result allow excluding the proteinaceous binder, such as egg or lipidc ones as siccative oil: in fact, the mass spectrum doesn't show any signal related to the palmitic acid, azelaic acid and glutamic acid that should be considered as diagnostic markers for this kind of binder. MS detected also the nature of the original pigments used by Paloscia as shown in Fig.1.

In fact, the processing of pigment proved to be particularly refined, a sign that the artist was expert in preparing the materials to work with. Obviously, the analysis with SEM-EDS showed this feature, highlighting also the areas of the modern restoration (Al, Si, K, Fe, Ca and S were found in different pigments).

Paloscia used several kinds of common pigments popular during the twentieth century: green earth, lampblack, white lead, Scheele's green and green Emerald. SEM detected also the presence of wood in the paper, result confirmed by the Herzberg's reactive. The presence of lignin in paper is attributable to the original wallpaper of "The Four Season" discriminating the modern restoration.

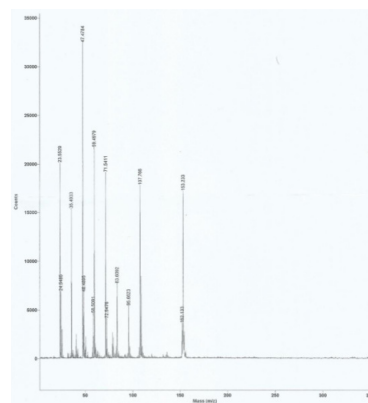


Fig.1. Sample from the original area - Mass Spectrum indicative of the presence of Carbon black

Conclusions

The investigations carried out on "The Four Seasons" by Gaetano Paloscia, located in the dining room of Palazzo Tibaldi, made possible characterizing the materials and understanding the technique used by the artist. This artwork had never been studied before. In fact, it was believed that the painting technique was an egg tempera but the MS has shown that it was a watercolor's artwork. The mass spectrum detected the presence of numerous fragments attributable to complex sugars. Watercolor is actually used since ancient times as a painting technique for media such as paper. Also the characterization of pigments reveal materials in agreements with the watercolor technique: two different types of green, a land, in modern finishing while in the original part of the painting there was detected arsenite, the white lead, gypsum, Green Earth, Blanc Fixe; Massicot and Carbon black.

The binder is undergoing to degradation due to the probable oxidation of glucose or glucuronic acid as detected by MS. The fibrous mix of the original painting consists in mechanical pulp rich in lignin while the fibrous of modern restoration are constituted by low lignin content, thus a chemical pulp. The presence of wood is visible with SEM and confirmed with the reagent of Herzberg. The wood residues appears belonging to an Angiosperma and it are biseriate and radial parenchyma cells viewed in tangential section. The alum found maybe coming from a modern restoration but, unfortunately, alum gives an acid hydrolysis and then the paper is more easily exposed to degradation. In conclusion it is possible to say that the analysis permits to characterize completely the materials of the artwork, revealing for the first time ever the executive technique used by Paloscia. Moreover, the diagnostic analysis allows investigating the condition of conservation of the painting, suggesting a complete microclimate control in order to avoid the action of bacteria and fungi on the wallpaper.

References

- 1) L. Hoskins et al. New York, "The Papered Wall", Thames & Hudson Inc., 2005, 2° ed