A REPRESENTATIVE ARTIST OF THE ROMANIAN MODERN PAINTING RESEARCH ON PICTORIAL MATERIALS AND TECHNIQUE

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***Abstract**: Constantin D. Stahi (1844-1920) is one of the representative authors of Romanian Modern Art. The paintings selected for the analytical study* Tabiet *(1901),* Books, journals *(1906) and* Proskomidi *(1909) had been examined in VIS, U, VIR radiations and the pigments have been determined by optical microscopy and X-rays Fluorescence spectrophotometry.*
Degradations of the vernis layer, retouching and other interventions on the painting surface were observed. IR reflectography of the three paintings showed the author's paint brushing. The paintings showed no preparatory drawings or changes in compositions. Pigments used in all three paintings are ochres (yellow, brown, red), umber, Prussian blue, Lead white and Cinnabar. In paintings Tabiet *and* Proskomidi *was identified, in addition, Cobalt blue, while in* Tabiet *and* Books, journals *appears Naples yellow. The research purposes it is to create a database including the painting materials used by the most famous representatives of the Romanian Modern Art.*

***Keywords**: VIS & UV examination, IR reflectography, optical microscopy, XRF, pigments*

1. INTRODUCTION

Constantin D. Stahi (1844-1920) studied at the School of Fine Arts in Iasi, under the guidance of artists Gh. Panaiteanu Bardasare and Gh. Schiller. He continued his artistic education as a scholar of the Academy of Fine Arts in Munich starting with 1871.
Contemporary of Grigorescu, Constantin D. Stahi is the most important Moldavian engraver and drawer, together with Em. Panaiteanu Bardasare, and an "honorable painter". Art critics singled out the quality of Stahl's paintings, outperformed only by Grigorescu's drawings, but the latter ones were bound to different coordinates [1-7].
In his paintings, he paid great attention to still life, as the subject requested patience in rendering the details under controlled lighting conditions and boundless analysis time. Moreover, the large amount of items, faithfully, almost in an illusionist manner reproduced, gave him the occasion to practice his mastership in rendering different textures in a vintage and gentle manner.
Highly suggestive and expressive in terms of ideatic content, his paintings are accessible to a large public by the realistic manner of rendering objects' materiality.
His works have never been investigated in terms of painting materials and technique [8-11].
Three works, realized in oil on canvas technique, have been selected for the technical study: *Tabiet* (1901), *Books, journals* (1906) and *Proskomidi* (1909). They are important works from the collection of Art Museum in Iasi, included in its permanent exhibition.
The aim of this research is to describe the materials used in these three paintings and to identify their state of conservation and possible former interventions.
This paper is part of the research project "*Innovative interactive artistic mediation system designed for the capitalization of the art patrimony of Romanian museums" (SIMAP)*, which intends to create a database including the painting materials used by the most famous representatives of the Romanian Modern Art.

2. EXPERIMENTAL

2.1. Visible (VIS) and Ultraviolet (UV) examination

The paintings were examined by means of optical microscopy using a SMZ 800 NIKON microscope. UV fluorescence of the paintings, determined with a Black Light lamp, was used to gather information concerning the degradation of the varnish, retouching and other interventions on the painting surfaces. The ART LUX 4 lamp was also used in order to make photos in grazing light and to evaluate the general state of paintings.

2.2. Infrared (IR) examination technique

IR reflectography is a non-destructive method for examining the paintings, which can highlight the preparatory drawing, changes of the painting composition and retouches [12]. The paintings were analyzed using the IR reflectography system MOD M-IR 10.2, CTS.

2.3. Optical microscopy

The paintings were examined by means of optical microscopy using a SMZ 800 NIKON microscope.
Optical microscopy is widely used scientific method in the examination of artworks. This type of investigation allowed a detailed study of each canvas, regarding colour layers, working technique, possible fissures, cracks and other types of degradations.

2.4. X-ray fluorescence spectrometry (XRF)

The elemental analysis of inorganic pigments, preparation layer of the canvas and *imprimatura* was performed by a non-invasive method [13-14] using the

portable spectrometer Innov-X Systems Alpha Series, with SiPIN detector, and the following maximum working parameters: tension 40 KV, intensity 100 μA and an analysis soft designed for heavy and light matrixes.

3. RESULTS AND DISCUSSIONS

3.1. Grazing light, UV and IR examinations

3.1.1. Observations regarding the grazing light

The study of the painting *Proskomidi* in grazing light showed that the surface is uneven and there are areas with flat painting with no obvious paint brushing (mainly in the shady parts) and areas where the paint brushing is of medium height, yet clearly shaped (especially in the areas with light and pale colours). The deformation of the original canvas was also identified as a result of the low/poor/light bending on the painting's frame (figure 1).

Cracks were identified in the upper left corner of the painting *Books, journals*.

Figure 1. Grazing light image in *Proskomidi*

3.1.2. Observations regarding the UV fluorescence

The image of the painting *Tabiet* shows the green-bluish fluorescence of the varnish, specific to natural resins. Visible erosions of varnish as well as retouching interventions, dark-coloured, belonging to former restorations, were identified (figure 2).

Former restoration works as well as retouching from different periods were visible in the painting *Books, journals* .

3.1.3. Observations regarding the IR reflectography

IR reflectography of the three paintings showed the author's paint brushing. The paintings showed no preparatory drawings or changes in compositions (figure 3).

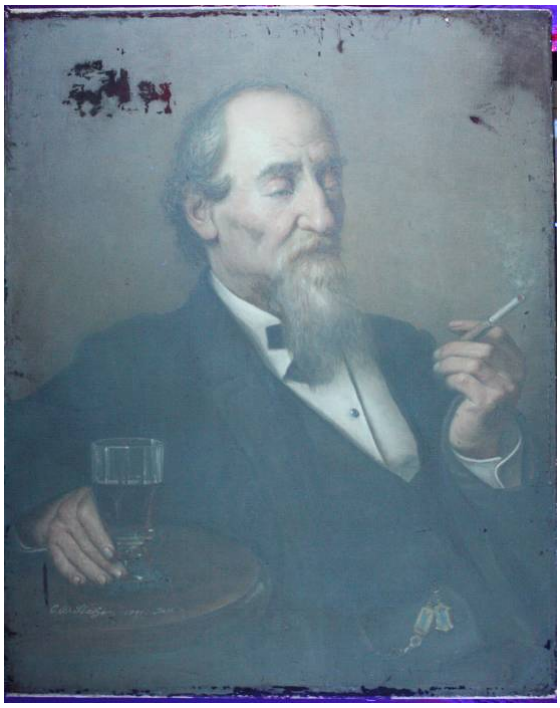

Figure 2. UV fluorescence image in *Tabiet*

Figure 3. IR reflectography image in *Books, journals*

3.2. Microscopy and XRF analyses

The images of optical microscopy (figure 4) revealed that the colours present in each analysed point represent a combination of pigments.

The aim of the XRF study was to identify inorganic pigments, the collected X-ray fluorescence data showing the main elements in the composition of pigments in the three oil paintings. The results of XRF analysis and the pigments identified are presented in Table 1, along with the analysis points on artworks, as shown in figure 5.

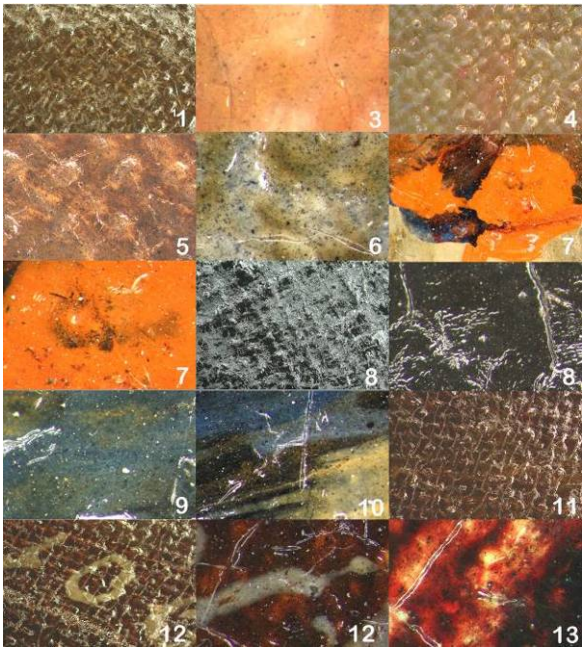

Figure 4. Optical microscopy images in Stahi's *Tabiet*

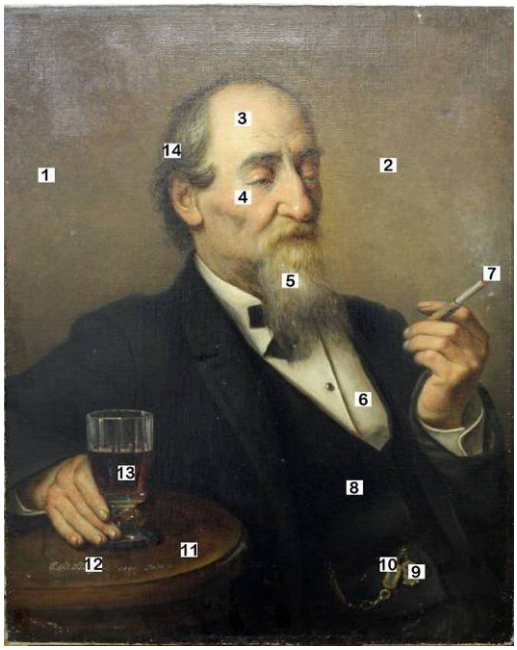

Figure 5. Analysed points (optical microscopy and XRF) in Stahi's *Tabiet*

Table 1. Optical microscopy and XRF analysis results

Analysis point	Microscopy study	Specific elements (XRF)	Results
1. Left fund (figure 6)	This colour represents a combination of pigments. Particles of brown pigment on ochre-brown background are visible	Fe, Mn, Cu, Pb, Zn, Ca	Umber +Prussian blue + Copper blue + Lead white + Zinc white
2. Right fund		Fe, Mn, Cu, Pb, Zn,Ca	Umber +Prussian blue + Copper blue + Lead white + Zinc white
3. Carnation forehead	This colour represents a combination of pigments. Particles of red, black, blue pigment on ochre-yellow background are visible	Fe, Pb, Cu, Zn, Ca	Yellow ochre + Lead white / Prussian blue + Copper blue + Lead white + Zinc white
4. Carnation cheek	This colour represents a combination of pigments. Splashes of red colour on skin colour background are visible	Fe, Hg, Cu, Pb, Zn, Ca	Yellow ochre + Cinnabar / Prussian blue + Copper blue + Lead white + Zinc white
5. Beard	This colour represents a combination of pigments. Particles of red and brown pigment on white- ochre background are visible	Fe, Pb, Cu, Zn, Ca	Brown ochre + Lead white / Prussian blue + Copper blue + Lead white + Zinc white
6. Shirt	This colour represents a combination of pigments. Particles of red and black pigment on white background are visible	Pb, Fe, Cu, Zn, Ca	Lead white / Prussian blue + Copper blue + Lead white + Zinc white
7. Cigarette (figure 7)	A red pigment is visible	Hg, Fe, Cu, Pb, Zn, Ca	Cinnabar / Prussian blue + Copper blue + Lead white + Zinc white
8. Vest	A black pigment is visible	Fe, Mn, Cu, Pb, Zn, Ca	Prussian blue + + Umber / Prussian blue + Copper blue + Lead white + Zinc white
9. Breloc – blue (figure 8)	This colour represents a combination of pigments. Particles of blue pigment are visible	Co, Fe, Mn, Cu, Pb, Zn, Ca	Cobalt blue / Prussian blue + Copper blue + Lead white + Zinc white
10. Breloc – yellow	A yellow pigment is visible	Sb, Fe, Mn, Cu, Pb, Zn, Ca	Naples yellow / Prussian blue + Copper blue + Lead white + Zinc white
11. Table (figure 9)	This colour represents a combination of pigments. Particles of dark-coloured pigment on reddish-brown background are visible	Fe, Mn, Cu, Pb, Zn, Ca	Red ochre / Prussian blue + Copper blue + Lead white + Zinc white
12. Signature	A white pigment is visible	Pb, Fe, Mn, Cu, Zn, Ca	Lead white / Prussian blue + Copper blue + Lead white + Zinc white

13. Glass	A red pigment is visible	Fe, Mn, Cu, Pb, Zn, Ca	Red ochre / Prussian blue + Copper blue + Lead white + Zinc white
14. Hair	A dark brown pigment is visible	Fe, Mn, Cu, Pb, Zn, Ca	Umber / Prussian blue + Copper blue + Lead white + Zinc white

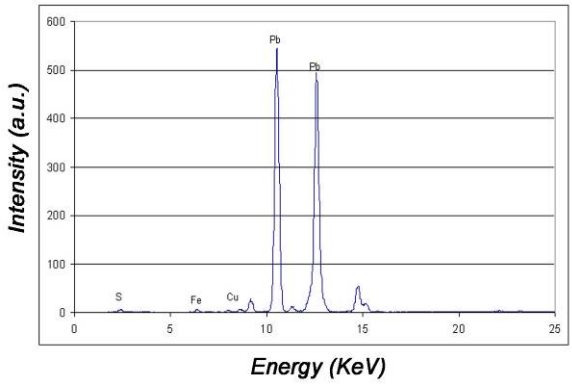

Figure 6. XRF spectrum left fund

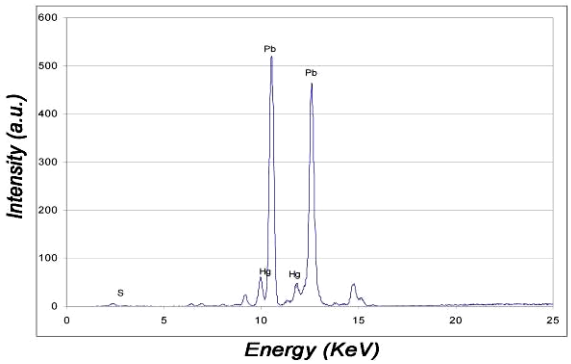

Figure 7. XRF spectrum cigarette

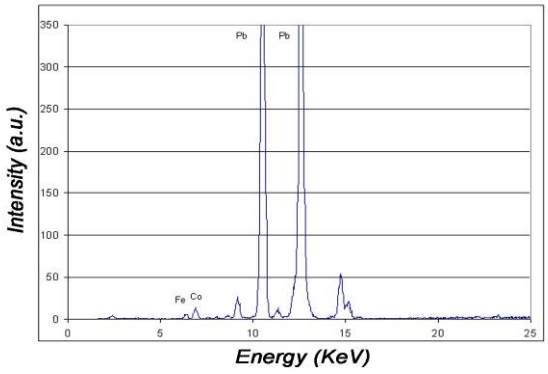

Figure 8. XRF spectrum breloc (blue)

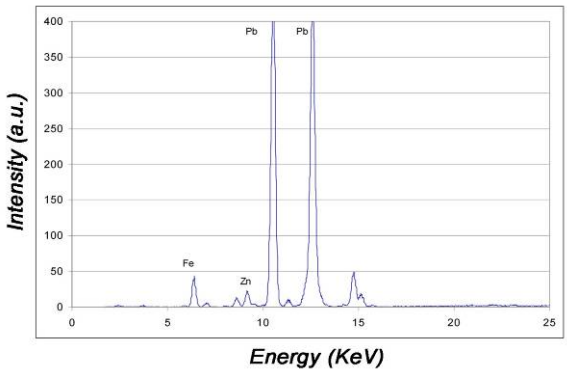

Figure 9. XRF spectrum table

For all the artworks analyzed the preparation layer of the canvas is chalk; the *imprimatura* of *Tabiet* and *Proskomidi* paintings is the same – a mixture of lead white and zinc white, with Prussian blue and copper blue, while for the third picture the imprimatura consists in a mixture of lead white and lithopone with some Prussian blue.

The pigments used in all three paintings are ochres (yellow, brown, red), umber, Prussian blue, lead white and cinnabar. Additionally, in the paintings *Tabiet* and *Proskomidi* cobalt blue was identified, while in *Tabiet* and *Books, journals* Naples yellow was found.

It could be noticed the author's preference for a dark background, based on ochres and umber, with addition of blue pigments. It had to be mentioned that is unusual the use of three different blue pigments (cobalt blue, Prussian blue, copper blue), in the case of *Tabiet* and *Proskomidi*, made in early twentieth century.

4. CONCLUSION

The study of three paintings from the same period of creation of the painter C.D.Stahi led to the determination of the color palette and pictorial materials he used.

Similarities concerning the preparation layer and *imprimatura*, but also differences in canvas preparation and the pigments used were found.

The pigments used in all three paintings have been: ochres (yellow, brown, red), umber, Prussian blue, lead white and cinnabar.

The paintings *Tabiet* and *Proskomidi* proved similar preparations layer, *imprimatura* and used pigments, while the third painting *Books, journals* show differences as *imprimatura*, and for the blue pigment only Prussian blue was identified.

The study is part of a research project *"Innovative interactive artistic mediation system designed for the capitalization of the art patrimony of Romanian*

museums" (SIMAP), trying to construct a database concerning the painting materials used by the most representative artists of Romanian Modern Art.

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