Technological Aspects of Niko Pirosmani' Works

P1-12

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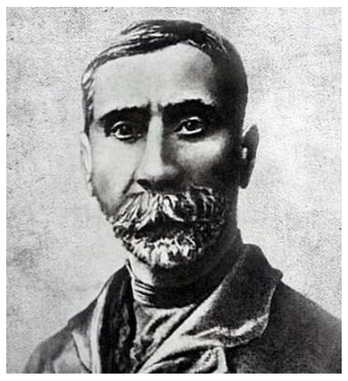

Figure 1. *Niko Pirosmani, 1916.*

Introduction

Niko Pirosmani (1862 - 1918), the 20th century Georgian artist, is one of the most original self-taught masters in the world (*Fig. 1*). His paintings were discovered by the artists Kirill Zdanevich and Mikhail Le Dante, who spotted them in the train station pub, *The Varyag,* in 1912. Impressed by his art, they began searching for other Pirosmani's pictures. However, only after the encounter between Pirosmani and Ilya Zdanevich (art historian and publisher) four of his paintings were exhibited for the first time at the *The Target* exhibition in Moscow in 1913. It became a turning point in Pirosmani's artistic work, specialists called for the collection of all his paintings in the museum, the Georgian Art Society acknowledged him as a significant artist [1]. Despite his very complicated and short life in poverty he left behind him a huge artistic legacy. Yet, it is only after his death that Pirosmani's paintings earned fame and commenced attracting more and more attention not only of art historians and art lovers, but also of numerous forgers.

Materials and Methods

Pigments and oilcloth from seven paintings from Russian and Georgian museums and private collections were examined using a complex of analytical methods. Authenticity of the paintings was verified by documented provenance provided by the museums, and results of artwork expertise.

Samples of paint layers and oilcloth were taken under a microscope. Paint samples were studied by an optical microscope (MSP-1, LOMO) and examined with polarizing microscopy (POLAM L-213M microscope, LOMO) (*Fig. 2c, d*). Scanning electron microscope (JSM 5610LV, JEOL) with energy-dispersive X-ray spectrometer (SEM-EDX) was used to determine the elemental composition and to characterize the morphology of some pigments (*Fig. 2e*). Analysis of pigments and fillers was performed with the help of micro-Fourier transform infrared (μ-FTIR) spectroscopy (LUMOS, Bruker). Cross-sections were prepared to study the paint layer structure, as well as to determine the elemental and molecular composition layer-by-layer using SEM-EDX and μ-FTIR spectroscopy.

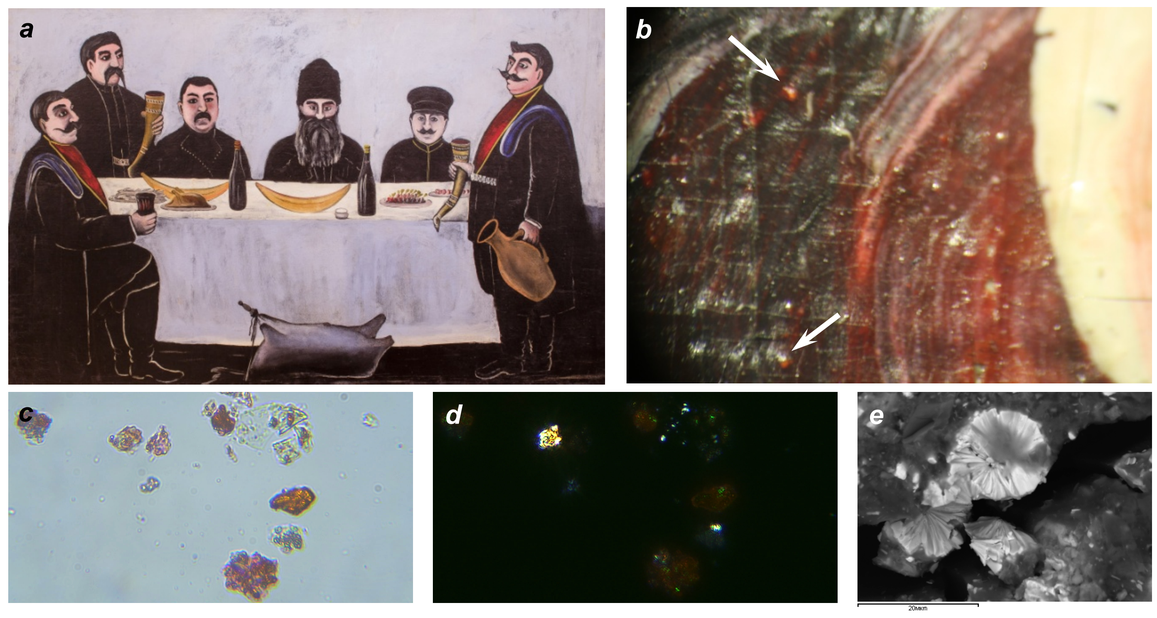

Figure 2. A study of the red paint layer in the painting (a) *Carousal,* oil on oilcloth, 113x137, The State Museum of Oriental Art; (b**)** the surface of the paint layer, the white arrows point the large orange particles; a study of the orange particles (c) in the transmitted polarized light and (d) between crossed polars: the orange particle gives very bright green interference which is characteristic of ***red lead***; (e**)** SEM-image of the large crystals of red lead.

I. Support

The majority of Pirosmani's works, especially those created before 1914, were painted on the oilcloth. Also, the artist used other types of support, such as cardboard, tin (for signs), and much more rarely – canvas.

The oilcloth used by Pirosmani has two main parameters. Firstly, it creates a very characteristic surface relief of paintings. E. Kuznetsov noted that the surface of the Pirosmani's oilcloths "... is black, matted and characteristically grained or speckled by wriggling grooves" (*Fig. 3*) [2].

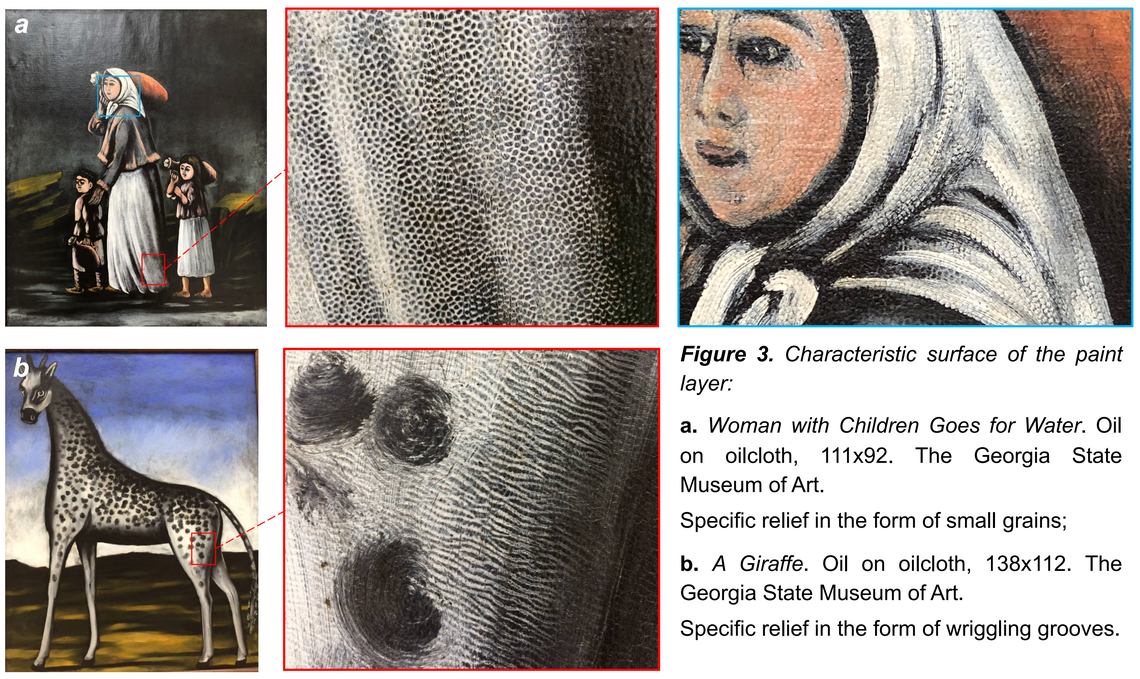

Figure 3. *Characteristic surface of the paint layer:*

a. *Woman with Children Goes for Water*. Oil on oilcloth, 111x92. The Georgia State Museum of Art.

Specific relief in the form of small grains;

b. *A Giraffe*. Oil on oilcloth, 138x112. The Georgia State Museum of Art.

Specific relief in the form of wriggling grooves.

The second essential parameter of genuine oilcloth is its multi-layer structure. As the analysis of the original paintings revealed, the Pirosmani's oilcloth was made according to the technology described in the profesional literature [3] and represents a certain structure of primer layers - an alternation of several light layers and the final black layer (*Fig. 4*). The contents of the oilcloth' grounds of the examined paintings are presented in the *Table 1*.

Painting	Content of the bottom layer(s)	Content of the upper black layer(s)
Karacokheli with a Drinking Horn. Oil on oilcloth, 82x48. Private collection	Kaolinite, zinc white, gypsum, barium sulphate; *Medium: oil, natural resin, protein*	Soot
The Deer. Oil on oilcloth, 107x91. The Georgia State Museum of Art	Kaolinite, zinc white, gypsum, barium sulphate, chalk; *Medium: protein, oil, natural resin*	Soot, Prussian Blue
The Black Lion. Oil on oilcloth, 112x140. Private collection	Kaolinite; *Medium: oil, natural resin, protein*	(**1**) Soot; (**2**) Soot, Prussian Blue
Carousal. Oil on oilcloth. 113x137. The State Museum of Oriental Art	Kaolinite, gypsum; *Medium: oil, natural resin, protein*	Soot, Prussian Blue, kaolinite
The Hunt in India. Oil on oilcloth, 111x243. The Georgia State Museum of Art	Kaolinite, zinc white, gypsum, barium sulphate, chalk; *Medium: oil, natural resin, protein*	Soot, Prussian Blue
Shamil and Khadzhi-Murat. Oil on oilcloth, 104x182. Private collection	(1) Kaolinite; *Medium: oil, natural resin, protein;* (2) Dark-green layer – soot, Prussian blue, gypsum, kaolinite	Soot, Prussian Blue, chalk, a little amount of yellow and red ochre, and ultramarine

Table 1. The content of the oilcloth' grounds of the examined paintings.

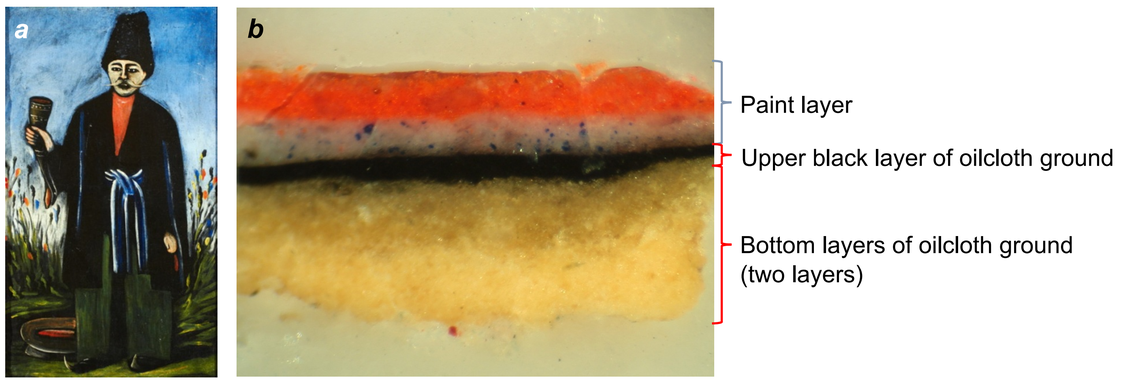

Figure 4. A study of the oilcloth' structure: (*a*) *Karacokheli with a Drinking Horn.* Oil on oilcloth, 82x48. Private collection; (*b*) cross-section of a sample from the image of red flower showing a complex structure of the oilcloth ground.

II. The "Oilcloth" in Forgeries

The "oilcloth" structure in forgeries, as a rule, is as follows: on the fabric there is only a layer of black oil paint, and there are no light layers of primary, which must necessarily be present on industrially manufactured oilcloth (*Fig. 5*).

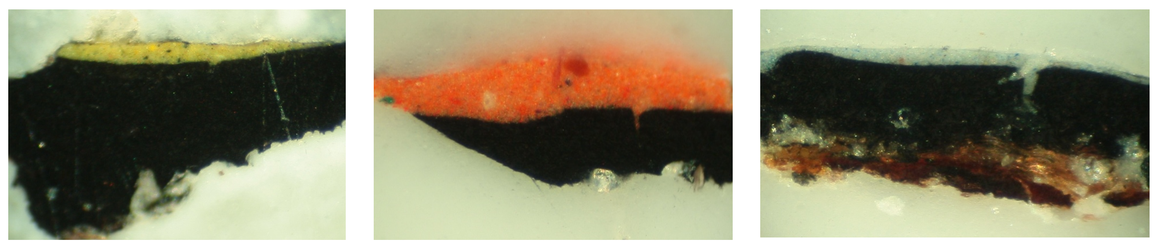

Figure 5. Cross-sections of the forgeries' paint layer. Lacks the bottom light layer of oilcloth ground.

III. Paint Materials

A limited set of pigments was identified in the group of studied authentic paintings: **white pigments** are either pure zinc white, or zinc white with the addition of gypsum; **yellow pigment** is chrome yellow, which contains either barium sulphate or gypsum as an impurity; **blue pigment** is artificial ultramarine; r**ed pigments** are red organic pigment, red ocher, red lead, which was used by the artist in a mixture with red organic pigment (*Fig. 3*). There are no **green pigments** in the studied paintings. In some cases, Prussian blue was used in a combination with chrome yellow to convey the green color.

Conclusion

Application of analytical methods provides competent knowledge about the technological aspects of the artist's work. An increase in the number of genuine works studied can open up even greater opportunities not only for establishing the time of a painting, but also for determining the authorship of such a unique artist like Niko Pirosmani. Numerous fakes of the paintings of the Georgian primitivist seem beyond the authority of exposure. However, it may be struggled with as soon as the paintings become an object of a laboratory research.

References

1. *Dzutsova I.* Pirosmani. Pirosmani… Tbilisi, 2013. P. 150.

2. *Kuznetsov E.* Pirosmani. Moscow, 2002. P. 117.

3. *Gross P.* Artisanal production of linoleum and oilcloth: a practical guide for the manufacture of linoleum and oilcloth by artisanal way. St. Petersburg, 1912. P. 13.