THE THRONE ICONS OF THE ICONOSTASIS IN THE BIGORSKI MONASTERY: THE SHADES FROM THE PAST

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Abstract: Two throne icons, Virgin Mary and little Christ and Jesus Christ the Emperor, from the iconostasis of the church St. John the Baptist belong to the Bigorski monastery (near the town of Debar) in Macedonia. They are among the most tremendous 19th century religious art achievements performed by the father and the son – Michael and Daniil, the monk of Samarian (Northern Greece). Their first stay at the Bigorski monastery in 1831–32 overlaps with the famous carving of the iconostasis construction. These most exceptional artistic 19th century achievements of the Samaritan painters and Miyak carvers, along with other monastery authentic contents, have been confirmed by the Protection act in 1953 and in 2007 as a declared cultural heritage of particular importance in the subcategory – the cultural heritage of great importance. According to the legislation, the icons are included in the list of real estate by its purpose in our country. Two throne icons were the subject of the investigation and conservation in 2015 in the National Conservation Center – Skopje. X-Ray Fluorescence spectroscopy, microchemical qualitative analysis and optical microscopy were carried out to determine the composition of the painting material. Photo diagnostic analyses were used to specify the origin of the damages and the condition of the icons, which complemented the conservation examinations of the technology of the painting system, especially the varnish layer which eventually degraded and darkened, causing some new discovered facts to influence the further decisions regarding the conservation treatment.
Keywords: throne icons, varnish, cross-section, XRF spectroscopy, conservation treatment

PHOTO AND VISUAL DIAGNOSTIC ANALYSES OF THE TECHNIQUE OF THE PAINTING SYSTEM AND ITS DAMAGES

The conservation team has created new records for each of the icons, including information related to construction and condition, evidence of past restoration work, visible evidence of damages and other details that will help future research. The excellent gilding and virtuosic paintings reveal the mastery of craftsman-

Fig. 1

ship, especially because of the size of the icons and numerous details, skillfully accomplished. The visual analyses identify silver and gold leaves, covered with a thick layer of varnish. The highlighting or decorating the parts of the clothes was performed with gold pigment. Gilded area was adorned with a metal tool molded in different shapes on one side, with which they repeatedly engraved the gold surface to create the decoration. Pigmented varnishes are recognized above the golden leaves (fig. 1). Through visual analyses we identified post interventions in a type of colored lacunae's placed on the damaged places, which are very similar to the style of the old reparations. Oftentimes un-original areas can be easily identified in raking light, which can be achieved simply by looking at the painting from one side, parallel to the plane of the iconography. On both icons there were large damaged lacunas, probably destroyed by the constant action of dripping water or dripping from the candle lamps. Because the icons were once treated with the wax protection, the origin of the damage was not fully understood, but with the presumption that during the past these kinds of reparations were made by filling the damaged places with hard preparation layer[1], perhaps those can be connected to the old conservation processes or reparations during the past decades[2].

The construction of the wooden support consists of two wooden parts joint with metal boards, which were nailed on the wooden surface (fig. 2). The metal joints were intentionally placed to strengthen the wooden boards due to the bending, compression or relaxation of the wood tissue under the influence of temperature or moisture. But the anomalies of this kind of performance are the large-head metal nails that have raised and separated from the metal panel, thereby elevating the painting system from the ground up. Other damages point to the worm work that reflects from the backside to front, displaying the

1 Ангелина Поповска, *Конзерваторско реставраторски методи и третмани на Охридската збирка икони*, Каламус, Скопје, 2018, 181 (During the seventies the conservators who performed these conservation processes used the animal glue with high degree of hardness from the leather factory Kožara „Godel"–Skopje in the preparations of the primer layer)

2 The throne icons were investigated and conserved by the conservator Jovan Petrov, „Технологијата на иконописот во делата на Зографите Михаил и Даниил Монах од с. Самарино", *Биторски научно-културни собири (1974–1975)*, Мисла-Скопје, 1976, 146–150

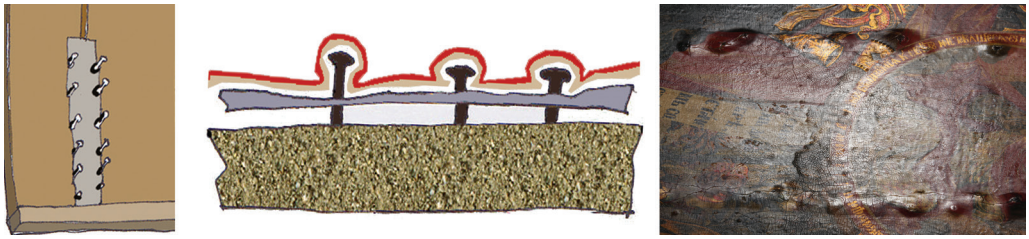


Fig. 2

image of the iconography layer with numerous little holes. Also the damages of the varnishes, recognizable by the numerous cracks, some of them rather deep to the bottom of the varnish layer, undoubtedly desaturated the iconographic image (fig. 3)

ANALYTICAL METHODS USED TO DETERMINE THE CHEMICAL COMPOSITION

Scientific approach to the study of artifacts enables us to understand both the nature of artworks and the way they were produced. In this work scientific investigations were conducted to obtain information about the composition of the paintings materials, stratigraphy and painting technique. The obtained information deeply affects the conservation and restoration processes. Brilliant colors used by the masters, which had been hidden beneath several layers of discolored and degraded varnish, were revealed during in-situ testing probes with different organic solvents in the context of removing the varnish from the paintings layer. A material characterization of two artworks was performed using X-Ray Fluorescence spectroscopy, microchemical qualitative analysis and optical microscopy. Eighteen samples of different colors and tonality were taken from the parts where the paint was flaking and one sample of textile (fig. 4, 5). The eighteen samples were used for cross-section and pigment composition analyses.

Optical microscopy and stratigraphic analyses of the cross-sections were used to extract information about the complex layers of paint and decorative finishes, precisely identifying and documenting the painting system. For that purpose, small fragments of the painted layers were embedded in polyester resin and polished. The analysis of the paint samples was conducted using high power universal microscope Zeiss – Axioplan 2 imaging (objective magnification range from 50x to 500x; under visible and ultraviolet light). Digital images were recorded with an integrated professional camera scanner AxioCam for universal light-microscopy application.

Also, identification and characterization of textile fiber taken from the icon Virgin with the Christ was performed using optical microscopy.

Fig. 3

Fig. 4

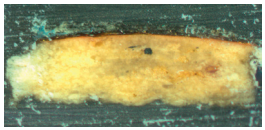
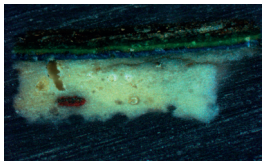
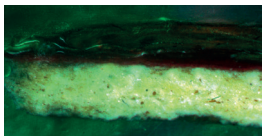
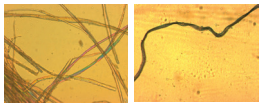
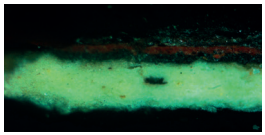
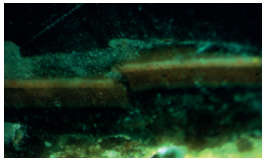
Fig. 5

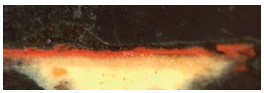
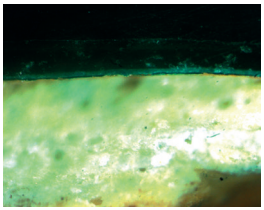
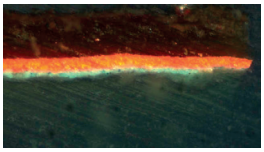
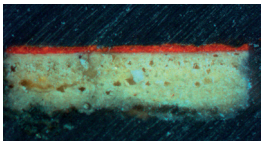
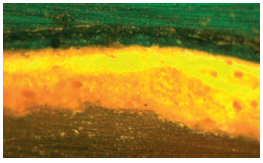
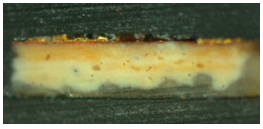
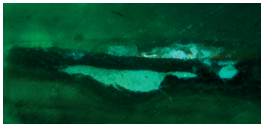
- Microchemical qualitative analysis:
- *Histochemical (staining) test* involving staining techniques for investigation of natural organic materials (mainly proteinaceous and oil-based binders/varnishes). The staining technique is mainly based on the use of dyes able to form colored compounds with organic materials, such as proteins, polysaccharides, resins, and oils. We conducted these analyses using protein stains such as Amido black, Ponceau S, Oil red that stain lipids, oils and waxes in the paint layers with an intense red, Sudan black for hystochemical staining of lipids and lipoproteins which showed as blue-black stain and bromocresol purple for natural resin.
- *Microchemical (spot) test* was applied on pigment particles and paint samples for identification of pigments and inorganic materials. Plasters (Plasters: 1956) and Masschelein-Kleiner, (Masschelein-Kleiner: 1986) describe a range of microchemical tests for confirmation of the presence of pigments in layered samples[3]. In general, a preliminary treatment of the paint samples is required for solubilizing the ionic species that were subjected to identification. For this purpose, we used concentrated acidic solutions and, less frequently, alkaline solutions. Analyses were carried out with specific reagents using acids, bases and salt solutions which showed the presence of cations, on the basis of which the pigment content in the sample was identified. Different types of reactions were performed for identification of pigments: formation of insoluble precipitates, complexion reactions with formation of colored complexes, flame tests were also used for identification of pigments containing elements, such as Ca, Ba, Sr, etc., solubility tests in water and organic solvents. Test for iron and cooper using potassium ferro cyanide, sodium azide test for sulfur containing materials, diphenylcarbazide test for mercury and chromium, ammonium thiocyanate for cobalt, zinc and cooper, Ehrlich's reagent for detection of animal glue are just some of the reagents and tests used for microchemical analysis.
- XRF analysis has allowed a quick and precise detection and identification of the inorganic elements that compose the pigments, ground layer, metal leaf and other structural elements of the icons. Eighteen different samples (fig. 4) were analyzed in order to obtain their elemental composition data. Analysis were carry out with XRF MIDEX Spectrometer with following characteristics: 1. XRF MIDEX Spectrometer, Spectro 10009264; 2. AMETEK XRF tube, Mo – anode material, 50keV energy; 3. Direct excitation with Ti and Ta filters and 4. VirtusM 2mm detector, SiLi.

3 J. Plesters (1956), "Cross-sections and Chemical Analysis of Paint Samples", *Studies in Conservation*, 2:3, 110–157, DOI

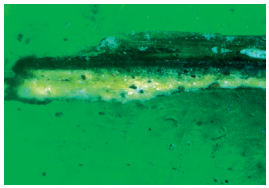
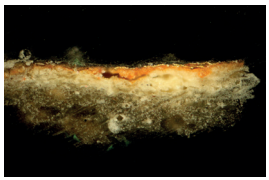
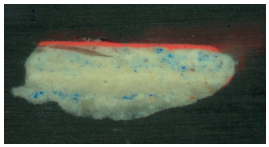
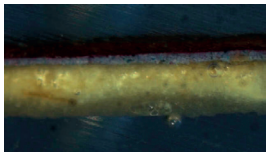
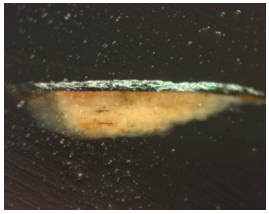
Elements were identified by the energies of their characteristic X-ray peaks. The pigments and other inorganic materials were determined on the bases of characteristic chemical elements from the XRF spectra of the analyzed samples. The study of the pigments provides information regarding the period when an icon was created, and eventually repaired or restored; all this information is important in establishing the icon school as well as the icon authenticity.

Results obtained by optical microscopy, micro chemical and XRF analyses of the icon Virgin Mary and little Christ are given in **Table 1**:

Samples are presented with microphotography of the cross-sections	**Surface color of the sample**	**Detected elements**	**Paint stratigraphy Results of the analyses for each layer of the sample**
S1 	Gold	Ca, Sr, Au, Fe (XRF) Fe, Au (microchemical analyses)	Gold leaf placed over the red bolus Gypsum and animal glue as binder
S2 	Green	Ca, Sr, Pb, Cu (XRF) Cu, Pb (microchemical analyses)	Natural resin varnish **Top layer:** Green copper pigment mixed in oil resin binder **Bottom layer:** Ultramarine mixed with Lead white Gypsum and animal glue as binder
S3 	Yellow-green	Ca, Sr, Fe, Pb, Hg, Au (XRF) Fe, Pb, Hg (microchemical analyses)	**Top layer:** Gold dust pigment **Bottom layer:** Cinnabar mixed with Red ochre and Lead white Gypsum and animal glue as binder
S4-a S4-b 	Textile fibers	Microscopic analyses	S4-a –flex fibers S4-b –cotton fibers
S5 	Red-brown	Ca, Fe (XRF) Fe (microchemical analyses)	Natural resin varnish **Top layer:** Red ochre **Bottom layer:** Charcoal black pigment Gypsum and animal glue as binder
S6 	Incarnate from the hand	Ca, Sr, Fe, Hg (XRF) Fe, Hg (microchemical analyses)	**Top layer:** Lead white mixed with Cinnabar and Charcoal black **Middle layer:** Yellow ochre mixed with lead white **Bottom layer:** Blue color – Prussian blue

S7 	Red-orange	Ca, Sr, Hg, Pb (XRF) Hg, Pb (microchemical analyses)	Natural resin varnish Cinnabar **mixed** with Lead white and Lead minium Gypsum and animal glue as binder
S8 	Green-bluish	Ca, Fe, Pb, Cu, Au(XRF) Fe, Pb, Cu (microchemical analyses)	**Top layer:** Lacquer layer of azurite mixed with lead white **Bottom layer:** Silver leaf and red bole Gypsum and animal glue as binder
S9 	White	Ca, Sr, Pb, Fe (XRF) Pb, Fe (microchemical analyses)	**Top layer:** Lead white **Bottom layer**: Red ochre
S10 	Red	Ca, Fe, Au (XRF) Fe, Au (microchemical analyses)	**Top layer:** Red lacquer layer of red ochre mixed with oil-resin medium **Bottom layer:** Gold leaf placed over the red bolus Gypsum and animal glue as binder
S11 intervention	White grey	Solubility and histo-chemical analyses	White wax layer – post intervention on the original varnish layer
S12 	Green	Cu, Fe, Cr (XRF) Cu, Fe (microchemical analyses)	**Top layer – intervention:** Chrome green pigment **Middle layer:** Copper green pigment **Bottom layer:** Charcoal black
S13 	Gilding	Ca, Fe, Au (XRF) Fe, Au (microchemical analyses)	Natural resin varnish Gold leaf placed above orange bole Gypsum and animal glue as binder
S14 	Green transparent lacquer layer	Ca, Fe, Au, Cu (XRF) Fe, Cu, Au (microchemical analyses)	**Top layer:** Lacquer layer of copper green pigment in oil resin medium **Bottom layer:** Gold leaf placed above orange bole

Results obtained by optical microscopy, microchemical and XRF analyses of the icon *Jesus Christ the Emperor* are given in **Table 2**:

Samples are presented with microphotography of the cross-sections	**Surface color of the sample**	**Detected elements**	**Paint stratigraphy Results of the analyses for each layer of the sample**
S1 	Green transparent lacquer layer	Ca, Sr, Pb, Fe, Cu Au (XRF) Pb, Cu, Au (microchemical analyses)	**Top layer**: Lacquer layer of green pigment in oil resin medium (the same as sample14) **Middle layer:** Gold pigment **Bottom layer:** Charcoal black pigment mixed with lead white and red ochre
S2 	gilding	Ca, Fe, Au (XRF) Fe, Au (microchemical analyses)	Natural resin varnish Gold leaf placed above orange bole Gypsum and animal glue as binder
S3 	Red	Ca, Sr, Pb, Hg, Fe (XRF) Pb, Hg, Fe (microchemical analyses)	Natural resin varnish Cinnabar mixed with small amount of Red ochre and Lead white Gypsum and animal glue as binder
S4 	Grey-lilac color	Ca, Sr, Pb, Hg, As (XRF) Pb, Hg (microchemical analyses)	Natural resin varnish **Top layer:** Cinnabar mixed with Yellow orpiment **Bottom layer**: Ultramarine mixed with Lead white, Cinnabar and Charcoal black Gypsum and animal glue as binder
S5 	Yellow-silver	Ca, Sr, Fe, Ag (XRF)	Natural resin varnish Silver leaf placed above orange bole Gypsum and animal glue as binder

DISCUSSION

The icons analyzed in this paper are representative examples of the post-Byzantine painting dating from the 19th century. Tables 1 and 2 summarize detected elements, the main pigments, and other components identified in the analyzed icons, for each layer of sample stratigraphy.

The ground layer (white preparation covering the wooden support) was applied over the whole surface of the wooden panels, having the average thickness of 50 – 200 μm. The thick preparation was generally applied in one coat, clearly visible under microscopic observation. The combined information of XRF spectra and microchemical qualitative analyses of the ground layers indicate the presence of calcium sulfate (gypsum) as mineral charge, appreciable amount of strontium (Sr), attesting the use of alabaster rich gypsum. Histochemical analyses of the binder present in preparation layer of various samples indicate animal glue (proteinaceous material). Preparation layer is the same for both icons, according to the morphological, chromatic, and compositional characteristics.

The XRF analysis combined with the microchemical analysis evidenced that some pigments used for the icons, such as chrome green, synthetic ultramarine and Prussian blue, were chronologically characteristic for 19th century, while other identified pigments are mainly inorganic, earth and mineral pigments, traditionally used in previous centuries, such as: lead minium, cinnabar and red ochre for red, copper based pigment for green, azurite for blue, yellow orpiment and ochre for yellow as well as white lead for white[4]. As a general observation, lead is present in practically all measured areas which suggest a widespread of lead white pigment use, most likely mixed with other pigments to give certain nuance and color tone. The basic lead carbonate was used both in mixtures with other pigments in the paint layer and as pure pigment. The colored layers are applied continuously and the boundaries between one layer and another are clearly distinguishable. The paint is applied mostly in a single layer, or rarely it consists of 2 – 3 layers as in the painting modeling of the incarnate (sample number 9, taken from the hand of Virgin Mary). It was performed with successive application of three subsequent layers characterized by different color. Histochemical staining tests indicate the present of proteinous and oil component, these analyses suggest that binder medium used in both icon is a mixture of egg yolk and small amount of oil.

Stratigraphic and UV fluorescence analyses, done under optical microscope, reveal the presence of tick protective, varnish layer over the entire surface of the icons. Fluorescence typical of soft natural resins such as dammar and mastic has been observed[5]. An exceptionally thin layer of wax over the varnish layer was applied to produce the non-transparent mat effect which confirms the use of wax as a protective coating during previous conservation made in 70 years from the 20th century[6].

The presence of several different pigmented layers of lacquer was also observed, but only on certain parts of the iconography, especially on the parts where silver or golden leaf (gilding) were present. Their pigmentation depends on which mineral pigment or organic lake was used, but on both icons we notice yellow, brown, green and pink-reddish lacquer. These layers represent a complex mixture consisting of natural resin, a small amount of dried oil and pigment, where the proportion of pigments are less than the amount of resin-oil binder according to the results obtain by staining and solubility tests. Staining tests with bromocresol purple conducted on lacquer samples taken from transparent painted surfaces above

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4 Metka Kraigher-Hozo, *Slikarstvo, metode slikanja i materijali*, Svjetlost, Sarajevo, 1991, 271–330

5 R. de la Rie, "Fluorescence of paint and varnish layers", Parts I, II, III, *Studies in Conservation*, vol. 27, pp 1–7, 65–69, 102–108

6 Јован Петров, „Технологијата на иконописот во делата на Зографите Михаил и Даниил Монах од с. Самарино", *Битолски научно-културни собири (1974–1975)*, Мисла–Скопје, 1976, 146–150

the gilding showed that the amount of resin was much higher than pigments particles dispersed in resin-oil medium. Also, solubility tests with organic solvents for resin and sodium hydroxide for oil showed that the amount of the not dissolved components (pigments) was significantly less than the dissolved part belonging to the medium.

According to the results obtained from the XRF analysis on gilded samples, detected elements Fe (iron) derived from clay bole and Au (gold), Ag (silver) which are the components of the golden and silver sheets, indicate the use of traditional water gilding technique for the gilding of both icons.[7] A sample for textile analysis, from the icon Virgin with the Christ, was taken from the textile which was laid almost in the middle of the wooden support as a vertical strip. Morphological investigation of textile fibers was carried out using optical microscopy which provides sufficient information to confirm the type of fibers. Analyses show that the specimen is a mixture of two different types of fibers that can be observed under the magnification of 200x (Table 1). Analyses revealed that types of some fibers are typically a twisted ribbon in appearance under the microscope and have typical cotton morphological features, convolutions and tick walls, which confirm that some of the tested fibers are cotton. The other type of fiber present in the sample is smooth with cross marking nodes, no lengthwise striations and narrow lumen which confirms flax fibers. On the other icon we did not find the presence of textiles[8].

CONSERVATION-RESTORATION PROCESSES

The conservation-restoration process took place in the laboratory starting with the fixation of the iconography surface with the protection paper glued with 5 % animal glue. Such protection allowed the lifting parts of the iconography to be annulled by injecting a warm animal glue solution. The back of the wooden supports, especially the active wormwood sections, was impregnated with Paraloid B 72 solution (2–8 %). The old stains were removed, and refilled with new conservatory primer leveled to the painting layer, which was subsequently retouched in monochromatic type.

RESTORATION PROCESS – THE REGENERATION OF THE VARNISH LAYER

Additional tests were performed for total dissolution of the varnish layer in an attempt to completely remove the old, yellowed and damaged varnish. During this process we monitored the properties of the varnish, its thickness, the time for its solubility, and the ability to dissolve only the surface layer. By temporarily saturating these areas with organic solvents, we found that the paint layers were intact beneath the degraded surface coating. The main reason for the decision to regenerate the surface layer of the varnish was the specific artistic style of the painters and the safety of preserving the painted layers with pigmented varnishes as parts of the iconography. Another peculiarity is the use of yellow lacquer that overlays the silver foils (fig. 5) as an imitation of golden leaves. These reasons justify the regeneration as an applied method, so by dissolving the surface varnish we provide a sufficient amount of liquid varnish, which could cover the parts of the iconography where the varnish was missing and needed. For the areas where the varnish was cracked we lightly scraped the surface varnish with the fine-grit sandpaper just

7 Jaroslav Folda, Lucy J. Wrapson, *Byzantine Art and Italian Panel Painting*, Cambridge University Press, 2015, 248

8 Bruno Luniak, *Identification of Textile Fibers Qualitative and Quantitative Analysis of Fibre Blends*, London, 1953

Fig. 6

to refill the depth of the cracks, which afterwards the dust from these sandblasted varnish dissolves together with the other surrounded areas when the process of the dissolution starts (fig.6-a). The dissolved varnish, by flowing into the voids, leveled the rough surface and produced the saturation by equalizing the surface.

The regeneration process was carried out with a solvent having the character of rapid solubility[9] and rapid volatility. This choice of solvent (mostly dioxolane) allowed the control of the solvent penetration and its soluble effect on the varnish. Regeneration took place successively, part on the surface of the iconography and the other part on the gilding. The regeneration process had to be controlled due to the duration of the dissolving. Depended on the applied surface of the crack's net, the regeneration was lightly performed especially on the delicate pigmented lacquers. Thus, in those parts where the varnish cracks were deeper the surrounding areas provided a sufficient amount of dissolved varnish to overflow to the unsaturated site (fig. 7-a). In this way, the dissolved varnish was dispersed to achieve evenness and full coverage even in places where it was damaged (fig. 7-b).

Due to the size of the icons, the regeneration was performed, considering the parts with the same color which were treated with organic solvents in a ratio adjusted for color insolubility. The solubility of certain colors is also taken into account, as well as those where pigmented varnishes are evident, especially in the gilded area, as well as the blue colored cloth, the facial coatings, where the conservation process has been treated with solvents with a lower level of dissolution, enough to stop the process, if there was a risk of serious damage to the iconography. The gilding parties were most carefully regenerated because of the reflections of the gold foil.

Dissolving the dense layer of varnish provided a sufficient amount to cover the iconography in a uniform layer applied with a brush from the places where the varnish was deposited, and the diluted discharge was collected in a glass vessel, recirculated and used for the final touch. The areas where there

9 Hedley Grantham, "Solubility parameters and varnish removal: A survey", *The Conservator* 4, 1980, 12–18.

Fig. 7

was significant loss of varnish layers had to be addressed. All losses needed to be filled with liquid varnish just to match with the surrounding surface and produce the equal saturation of the colors of the iconography. Such delicate decisions and processes allowed the preservation of the original varnish layers, while ensuring sufficient transparency and surface smoothness (fig. 8).

CONCLUSION

The regeneration method of the varnish became very popular at the end of the nineteenth century[10] as at that time removing varnish layers was much more hazardous to the original paint layers; restorers simply did not have the knowledge and array of methods at their disposal that we have nowadays. Of course the Pettenkoffer method did not remove the yellow tone of the varnish,[11] but this yellowness[12] was much appreciated in those days, especially on paintings by Rembrandt[13].

However, the regeneration method performed on these two icons has made the old varnish transparent, and by this method we have been able to preserve the layers of the varnish, which is important for both the restoration aesthetic principle[14] and the conservation principle of preserving a higher percentage of the original compound[15].

But, the presence of a "yellowish varnish" caused the monks to interfere and insist on complete removal of the old original varnish, saying that the icons were not completely cleaned. In this way the Church Party has failed to understand either Art or Science, but simply impose their personal taste, without the

10 Max von Pettenkofer, *Over Olieverven en het Conserveeren van Schilderijen door de Regeneratie-Behandeling*, vertaald door W.A. Hopman, 1871

11 Raymond H. Lafontaine, "Seeing through a Yellow Varnish: A Compensating Illumination System", *Studies in Conservation*, Vol. 31, No.3 (Aug., 1986), 97–102

12 Leo van Puyvelde, "The Cleaning of Old Painting (1932)", *History of Profession, Issues in the Conservation of Paintings*, edited by David Bomford, Mark Leonard, part II, 80

13 The alcohol vapors inside the box would soften and regenerate the degraded varnish, restoring its uniformity, and hence making the varnish translucent again. https://lookingthroughartblog.wordpress.com/2018/09/26/regenerating-rembrandts-night-watch-a-restoration-method-from-the-past/

14 Hedley Grantham, *On humanism, aesthetics and the cleaning of paintings*, Lecture series presented at the Canadian Conservation Institute, Unpublished. CCI (1985)

15 Dinah Eastop, Kathryn Gill, *Upholstery Conservation: Principles and Practice*, NY,USA, 2011, 98

Fig. 8

effort of broadening and deepening their knowledge about the specific style of the painters, their skills and technology, which until today still leaves us breathless. The final result was that the Church Party did not guaranteed the further permission to continue the conservation processes on the other 6 throne icons unless their belief was satisfied.

ILLUSTRATIONS

1: Details from both icons with pigmented transparent varnishes in different colors (black, red, green, brown) painted over the gilding
Детаљи обе иконе са пигментираним транспарентним лаковима у различитим бојама (црна, црвена, зелена, браон) осликаним преко позлате
2: The metal board nailed on the wooden joint and the elevation of the painting system above the metal nails
Метална плоча прикована на споју дрвених панела и подизање слојева на слици изнад металних ексера
3: Details of the (a) Worm work and (b) Cracks of the varnish layer
Детаљи: (а) црвоточина и (б) кракелуре у слоју лака
4: Sampling scheme and cross-sections microphotography on the icon *Jesus Christ the Emperor* and *Virgin Mary with the little Christ*
Шема узимања узорака и микрофотографије попречних пресека на икони *Исус Христос Владалац* и *Богородица са малим Христом*
5: Additional test probe made on the location where the silver foil is covered with the yellow varnish imitating gold surface

Додатна проба урађена на месту где је сребрна фолија прекривена жутим лаком који имитира позлаћену површину

6: (a) Detail of the areas where the varnish was cracked and lightly scrapped with the fine-grit sandpaper; (b) Dissolved varnish saturated by flowing into voids and leveling the rough surface

Детаљ зоне где је лак испуцао и лагано ошмирглан финим брусним папиром; (б) Растворени лак који је попунио кракелуре и нивелисао неравне површине

7: (a) The areas where there was significant loss of varnish layers were filled to match with the surrounding surface area; (b) The final smooth surface of the varnish after the regeneration method

(а) Зоне на којима је дошло до значајног губитка слојева лака су испуњене тако да одговарају околној површини; (б) Завршна глатка површина лака након методе регенерације

8: Final image after the conservation-restoration treatments of the two throne icons

Коначан изглед две престоне иконе након конзервације и рестаурације

LITERATURE

Eastop D., Gill K., *Upholstery Conservation: Principles and Practice*, Routledge, NY,USA, 2011.

Folda J., Wrapson J.L., *Byzantine Art and Italian Panel Painting, (The Virgin and the Child Hodegetria and the Art of Chrisography)*, Cambridge University Press, 2015.

Grantham H., "Solubility parameters and varnish removal: A survey", *The Conservator* 4, 1980.

Hozo M. Kraigher-, *Slikarstvo: metode slikanja i materijali*, Svjetlost, Sarajevo, 1991.

Lafontaine H.R., "Seeing through a Yellow Varnish: A Compensating Illumination System", *Journal Studies in Conservation*, Vol. 31, No.3, 1986.

Luniak B., *Identification of Textile Fibers Qualitative and Quantitative Analysis of Fibre Blends*, London, 1953.

Pettenkofer M., *Over Olieverven en het Conserveeren van Schilderijen door de Regeneratie Behandeling*, vertaald door W.A. Hopman, 1871.

Петров Ј., „Технологијата на иконописот во делата на Зографите Михаил и Даниил Монах од с. Самарино", *Биторски научно-културни собири (1974-1975)*, Мисла, Скопје, 1976.

Поповска А., *Конзерваторско реставраторски методи и третмани на Охридската збирка икони*, Каламус, Скопје, 2018.

Plesters J., "Cross-sections and Chemical Analysis of Paint Samples, Studies in Conservation", *Journal, Studies in Conservation*, volume 2, Issue 3, 2014.

Puyvelde L., "The Cleaning of Old Painting" (1932), in: *History of Profession, Issues in the Conservation of Paintings*, edited by Bomford, David et Leonard, Mark , part II, Getty Conservation Institute, Santa Barbara 2005.

Bomford D., Leonard M., *Issues in the Conservation of Painting*, Getty Conservation Institute, Santa Barbara 2005.

R. de la Rie, "Fluorescence of paint and varnish layers", Parts I, II, III, *Journal, Studies in Conservation*, volume 27, 1982.

https://lookingthroughartblog.wordpress. com / regenerating-rembrandts-night-watch-a-restoration-method-from-the-past [pristupljeno: 26. 09. 2018.]

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ПРЕСТОНЕ ИКОНЕ ИКОНОСТАСА У БИГОРСКОМ МАНАСТИРУ: НИЈАНСЕ ИЗ ПРОШЛОСТИ

Резиме: Две престоне иконе, *Богородица са Христом* и *Исус Христос Владалац*, са иконостаса цркве Светог Јована Крститеља, припадају манастиру Бигорски (надомак града Дебра) у Македонији. Оне се убрајају у најважнија религијска уметничка достигнућа 19. века (1831-32), и рад су оца и сина – Михаила и Данила, монаха из Самаре (Северна Грчка). Ова два уметничка дела од изузетног значаја испитана су применом рендгенске флуоресцентне спектроскопије, микрохемијске анализе и оптичке микроскопије, помоћу којих су идентификовани пигменти који су коришћени за иконе који одговарају онима који су се користили почетком 19. века, а то су минијум, цинобер и црвени окер за црвену, хром зелена и пигмент на бази бакра за зелену, синтетички ултрамарин, азурит и пруско плава за плаву, жути орпимент и окер за жуту и оловно белу за белу боју. Припремни слој је исти на обе иконе и садржи животињски лепак и значајну количину стронцијума (Sr), што сведочи о употреби гипса богатог алабастером. Анализе вертикалне траке од тканине су идентификовале влакна лана и памука. Такође је примећено присуство неколико различитих пигментираних слојева лака, али само на појединим деловима покривеним сребрним или златним листићима (позлата). Њихова пигментација зависи од тога који минерални пигменти или органски лакови су коришћени, али на обе иконе се запажа жути, браон, зелени и ружичасто-црвенкасти лак. Ови слојеви представљају сложену мешавину која се састоји од природне смоле, мале количине сушивог уља и пигмента, где је удео пигмената мањи од количине уљано-смолног везива. Након испитивања и анализа оштећења, тим стручњака одобрио је као најприкладнију методу регенерације у којој се користи растварач који карактерише брза растворљивост и испарљивост, а који раствара постојећи лак тако да он доспе у пукотине и изравна неравну и кракелирану површину лака. Регенерација се одвијала у фазама, прво сликани слојеви, а затим позлата, пошто је процес регенерације било потребно контролисати, у зависности од мреже кракелура, као и пажљиво примењивати, посебно на осетљивим пигментираним лаковима. Методом регенерације примењеном на ове две иконе постигнуто је да стари лак постане транспарентан и да се сачувају слојеви пигментираних лакова и већи проценат оригиналног лака.

Кључне речи: престоне иконе, оштећења, лак, испитивања, XRF анализе, регенерација