

ICON-PAINTING WITH TIME TRANGRESSIVE LAYERS IN SLOBODA UKRAINE DURING THE CENTURIES

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Abstract

The research is aimed at identifying late paintings and analysis of the reasons for these cases, as well as the development of separation methods preserving the time transgressive multi-layered works of art. This paper shows a list of icon-painting schools and workshops, the works of which were most widespread on the territory of Sloboda Ukraine and were most often overpainted in the 17th-20th centuries. The results of the development and implementation of methods of iconography restoration with time transgressive paintings have been presented.

Keywords: *Time transgressive painting; Restoration; Icon, Overpainting, Existence; Restoration technique; Separation; Renewal; Attribution.*

Introduction

Each work reveals the spirit of that time, of the epoch of its creation, a reflection of its philosophy and realities. It has preserved the originality and uniqueness of stylistic, technical and technological features intrinsic to the various periods of history, ethnography, and folkways. Often, a new painting, fragmentary or entire, was painted over a wood board or even a monumental painting.

The history of world restoration has many cases of works overpainted as requested or preferred by the owner. There are icons, paintings and murals, which have been fragmentary or entirely overpainted by a restorer. At that, the works were changed several years or centuries after their creation. That changed both the stylistic and technological features of the work disregarding the pictorial features of the lower layer of the artwork.

There were many icon-painting workshops in different regions on the territory of Ukraine. They varied both in their professional artistic level and in the creation technique. There were also art and icon-painting workshops on the territory of Sloboda Ukraine. Individual painters with their own workshops and apprentices could be considered to be the founders of small private art workshops.

A later overpainting, hiding an earlier painting, is usually an artistic handicraft, frequently removed by restorers. However, in some cases, the late overpainting is a highly artistic work of art over the original painting. Later overpainting reflect the stages of the art works' life, that is existence, and help to explore their history.

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In Ukraine, the issues of attribution and distribution according to certain characteristics of time transgressive icon-painting have not been given the attention requisite till present.

The only scientist in Ukraine studying the icon-painting centres of Sloboda Ukraine, namely the Chuhuiv and Borysivka workshops, is the art critic V. Shulika [1]. The scientific works of V. Shulika are aimed at the study of iconography, stylistics, and the technological features of ecclesiastical art in Sloboda Ukraine of the middle 19th - early 20th centuries. The issues of attribution of icon-painting to time transgressive painting are out of his scientific interests.

On the territory of Sloboda Ukraine, there is a certain number of icons with images of different times, where the overpainting is of the same high or even of a better professional artistic level as the original image, which is more important for the history of art [2]. The separation method must be applied for qualitative conservation of all layers of painting at different times, and not just washing off and destroying the top layer of the painting.

The time transgressive painting can be found not only in canvas paintings but also in icons and monumental paintings. For conservation and making all the painting layers visible, they need separation. However, due to many reasons, mostly process ones, it is impossible or dangerous for the work of art, so far [2].

Therefore, the objectives of the research described in the paper are:

- To establish a list of icon-painting schools, whose works are predominant in everyday life on the territory of Sloboda Ukraine, as well as to identify those works that were most often overpainted;
- To identify the classification features of icons with overpainting based on such indicators as the type of icon-painting school, the plot between the upper painting and the lower (author's), the type of interlayer between the painting layers, the reason for the renewal, the variety of techniques and dating at time transgressive painting;
- To carry out the attribution of time transgressive painting by separation while preserving all layers of works; To establish the factors influencing the appearance of painting at different times in the icons existing on the territory of Sloboda Ukraine; To determine the influence of the overpainting on the preservation of the lower "author's" painting, revealing it by separation. Creation of a methodology that allows preservation of all the later layers of painting as separate works of different times with introduction of them into scientific circulation.

Methods for the restoration of works with multi-layer painting are being developed in the global restoration practice within European countries such as Poland, Ukraine, Belarus and Russia [3, 4].

An example of monumental art with multi-layered painting restoration is the Transfiguration Church of the St. Euphrosine monastery of the 12th century, located in the town of Polotsk, Belarus, where three layers of painting have been revealed. The frescoes of the temple were renovated several times. There were two renovations in the 19th century: in the year 1833 and in the year 1885. The temple restoration began in 2007. The temple shows entire oil overpaintings, repeating the author's plot. Originally the artwork was made in tempera. However, the overpainting layers have entirely different artistic features.

The curator of the restoration object, Vladimir Sarabyanov, proposed the following method of the monumental multi-layer painting separation: First, the front surface of the oil painting is sealed with gauze. Then the composition of solvents is selected to soften the oil painting layer but not to affect the lower layer of the painting. The fresco of the Polotsk temple is very durable, which makes the work easier. A solvent compress is applied to a section of the wall for a defined time. The exposure time is selected empirically.

Separation of a large composition area may take a month. Then the removed painting layer is to be cleared, levelled, and the backside of the separated painting is to be plasticized. After it, the backside of the separated painting is glued onto a canvas with further removal of

the gauze fabric from the front side. It results in a piece of art, but not on the wall, but on canvas" [5].

The oil overpainting is softened but remains adhered to the gauze. Then this softened area is carefully cut from above with a scalpel, gradually bending the gauze from the wall along with the cut oil painting down. Two persons do it, each on his own side. It is similar to animal skinning. Gradually, everything is cut off from the wall and rolled [5].

This method was developed and used only for the restoration of murals. For separation of multi-layered easel time-transgressive painting, it can be used in a scheme or direction form, where a new technology should be developed, considering specific conditions and features. The Polotsk Picture Gallery exhibits a monumental painting of the 19th century, the first one in the world which was separated and transferred to a new basis, over 100m² area with the paintings of the 12th century.

The easel painting separation methods started developing in the restoration in the Grabar centre in Moscow in the 1920s. The first attempts of multilayer painting separation development resulted in great damage to all the painting layers. Over time, the techniques were improved, but they had many shortcomings, which did not allow them to be repeated [2, 6].

Europe began dealing with that problem in the second half of the 20th century. A technology was developed for the restoration of multi-layered easel time transgressive painting. A mechanical method was based on the surface tension force of high-grade glue. The surface tension force of high-grade glutin glue, either pure or modified with additives, should have enabled the separation of a painting from its base, that is, from the lower painting. Therefore, the method is called "dry", "Torun" or "mechanical". The method is similar to the "strappo" method - which is used for the separation of frescoes. For the first time, the separation of two paintings on a wooden base using surface separation with glue was applied in 1976 at the Nicolaus Copernicus University, in Toruń, Poland [2, 6]. The procedure was the basis for the graduation project of Eva Derkach under the supervision of Dr. Sofia Volnevich. The author of the project did not soften the upper tempera layer of the painting as opposed to other methods.

The disadvantages of this method are as follows: high-grade glue and high temperature at long-lasting heating cause small cracks in the top layer of the painting. The detachment stage of this method is the most difficult one, the process is uncontrollable due to uncontrollable temperature parameters, probable to cause destruction of a monument.

Experimental

Materials

The research used materials to separate images of time transgressive paintings. Material Polyvinyl butyral (PVB - C₈H₁₄O₂) from which the film was prepared for separating layers of time transgressive painting on icons. Materials Polyvinyl alcohol (PVA - C₂H₄O) and Dibutyl phthalate (DBP - C₆H₄COOC₄H₉) were used to duplicate the upper painting layer onto a new base. Ethyl alcohol 96% was used as a solvent.

Methods

To study the works for the presence of time transgressive paintings, the typological, comparative, analytical, technical and technological, experimental and chemical methods have been used [7-9].

The attribution of the work has been carried out by an expert who has made his conclusion based on visual and instrumental methods of research. The visual research method has been based on the experience of an expert art critic. Instrumental studies have been carried out using UV, X-ray, IR and Microscope [10-12].

The study in the UV wavelength range has been performed using lamp PRK-7M, illuminator - OT with light filters OF-8, ZhS-3 and UFS-6. It helps to identify the nature of the overpainting (if it is entire or partial).

The research in the IR range of wavelengths has been carried out with the help of a television set of the Kommunar plant; wavelength range - 700nm. Infrared rays pass through a layer of dust and varnish in order to detect the colour layer of the artwork and the entire volume of craquelure that covers the picturesque surface.

The radiograph allows revealing the author's painting, the drawing and technique of the lower layer of painting under the overpainting.

Microscopic examinations were performed using a microscope: binocular MBS-2. During the research, it is important to specify the destruction of the basis, primer and the paint layer; in order to clarify the colour of the primer; the nature of the paint and its thickness; the presence of a varnish film and the presence of an intermediate layer between the layers of time transgressive painting.

Results and discussion

Chemical methods of separation

The general disadvantages of the known chemical methods include the following: the solvents of the proposed composition do not provide satisfactory softening of the intermediate layer, but only the glue-chalk primer located between the layers of the painting, resulting in large damage to the lower layer of the painting, occurring when they are separated, causing the loss of two works. In addition, they are meant for separation of tempera painting, only with an interlayer of glue-chalk primer and on a wooden base, where the image is separated fragmentarily, and not as a whole [2].

The sources given above make little account of or give no parameters of the separation process. They are intended for overpainting of small icons, no composition or solvent exposure time for the intermediate glue-chalk primer on a wooden base softening is indicated.

Consequently, concerning a time transgressive painting on a wooden base with a separating layer consisting of glue and chalk primer, there is no information about the method of separating painting layers, the technology of casting an adhesive film of polyvinyl butyral (PVB), the selection and parameters of the solvent used to soften the interlayer between time transgressive paintings, as well as the method and materials used to transfer the removed (separated) painting onto a new base.

The literature contains information that, now the European countries are working on the creation of methods that allow separating two works of different times and ensuring both are completely safe. In Ukraine, until today, lower importance was paid to the issue of preservation and research of paintings of different times [13, 14]. The techniques have only been developed to remove the upper painting and to reveal the lower one. It is easier to wash off an overpainting than to lay it apart and transfer it to a new basis while harming the cultural heritage of Ukraine.

In the world restoration practice, some European countries such as Poland, Ukraine and Belarus are engaged in the development of methods for the restoration of multi-layer painting works.

The method is based on the restoration of the painting, using methods of separation of time transgressive paintings by applying fragments of adhesive film, further making it bigger and integral using the Pettenkofer method. This method enables the separation of large images both fragmentary and as a whole, to soften any type of primer, to separate both easel and monumental oil and tempera paintings. This method allows stratifying multi-layer painting without mechanical damage.

It has been established that the optimal features for PVB film formation are the uniformity of its thickness and smoothness. These film features are ensured through drying of a ready PVB solution in a closed vessel, with little air access, at long-lasting alcohol evaporation. The optimal features of PVB film to sustain the weight of the separated paint layer and the primer, have been established. This type of film prevents the deformation of the separated top

layer of the painting. The film is 0.300 and 0.375mm thick, it is made of a 10% solution of PVB in 96% ethyl alcohol. Sufficient flexibility is provided with the addition of Dibutylphthalat (DBF plasticizer) (1% of the solution). PVB adhesive film, which is optimal as of thickness, elasticity and smoothness, has been developed, enabling for satisfactory separation of easel and monumental time transgressive paintings. A method of time transgressive painting separation, enabling the separation of large images both fragmentarily and as a whole, has been developed. In addition, it allows softening all types of interlayers, stratify easel and monumental, as well as oil and tempera types of painting. This method enables the separation of the artworks preventing the mechanical damage of any layer thereof.

A general approach for the attribution and examination of an icon with time transgressive painting has been developed. It includes the following: the development of a method of stratification of time transgressive painting by transferring it to a new basis. And the recovery of the author's layer of painting for its further study [15].

The developed method of restoration of artworks contains all stages in all known techniques, but each stage has its distinctive features. This enables improvement of the separation outcome, namely: reduction of losses during the separation, a better-quality transfer to a temporary basis.

The research results in the creation and obtaining of two patents for the restoration of works with time transgressive paintings. Chemical peeling method based on Polyvinyl Butyral adhesive film (PVB) [16, 17].

Works of art in their existence are exposed to time. This results in various degrees of damage. Sometimes the works are damaged by purposeful human actions, changing their original appearance. The combination of these factors makes it impossible to exhibit a work of art, and sometimes causes the decease of the work. Application of a new painting to the finished painting with preservation of the previous colour layer is quite a common phenomenon in the history of painting. Those actions hid the lower layer of the painting and a researcher could not see it. That happened for various reasons - political, aesthetic, material or even banal - the owner of the icon could not restore the work of art.

The iconography of the listed workshops is a very common phenomenon for Sloboda Ukraine. In general, they do not have a high artistic level, but there are also significant works of superb artistry that deserve to be preserved. These works show the most widespread plots. They are interesting for their artistic features and techniques. They are different and unique for each workshop.

Such works can be found in many museums and private collections not only in Ukraine but also in neighbouring countries. Mostly, such icons are mass-production, they are many of them, and they were created for public consumption. One of the most common icon-painting schools in Sloboda Ukraine is Borysivka.

Mostly, the Borysivka school iconography is quite primitive as of its artistic level. This conclusion comes from the fact that overpainted icons are found mainly in this school. It has been discovered that the overpaintings were made due to lack of materials, dissatisfaction of the owner with the artistic level of the work and the priority of more widespread iconography (Fig. 1).

The results of the research showed that Borysivka iconography was created in a certain way. In the beginning, an icon was painted for a revetment, and not vice versa, as it was done further to the known traditional technology. The faces and the hands, as well as the clothes of saints, were painted in one technique. The icons of Borysivka were made in oil, in a rather simple style - recognizable colour palette of icons, naive style of painting, sometimes similar to children drawing. A limited colour palette is a distinctive feature of these icons.



Fig. 1. The icon of Christ Pantocrator with an entire overwriting with a changing plot of Saint Nicholas. Both images are of the Borysov icon-painting workshop, XX century. Both paintings are made in oil.

Kholuy iconography is the next most widespread after Borysivka iconography in the territory of Sloboda Ukraine.

Since the 17th century, Kholuy became one of the traditional centres of icon-painting. The iconography of Kholuy spread in the territory of Sloboda Ukraine since the 18th century. Kholuy was one of the most popular icon-painting workshops of the Russian Empire. Up to two million icons, shrouds, embroideries, and church attributes were created there each year.

One of the characteristic features of the Kholuy icon-painting was using of silver. Images were graphic with the limited colour palette.

The overpainting on the icons of that school were made due to the considerable age of functionalism. Thus, they extant with the changed colouring of the author paint. In addition, the transparency of the varnish film on the painting distorts the image completely (Fig. 2).

The overpaintings on Kholuy icons were made due to the darkening of the varnish film on the paint layer. The silver was varnished, which eventually resulted in the black coating on the painting surface. This was because of the sulphur and silver combination. Restoration of these icons is an extremely difficult and complex process, more expensive than painting a new image over it. The Kholuy school of painting is ancient and the icons of this school degraded in time. Therefore, one of the reasons for the icons overpainting is the significant loss of the lower layer of the author's painting. Most of the works were overpainted with a change of the original plot. The age difference between the layers of time transgressive painting can be more than a century.

Icon-painting in Chuhuiv emerged due to the organization of a military topographer's school in the early 19th century. Drawing and painting were taught in classes. Graduates with a primary art education ventured into icon-painting [1]. Repin gave a more detailed description of the icon-painting development in his book "Far and Near" – writing about his childhood and the first Chuhuiv painting teachers. He also described other artists who lived in Chuhuiv. About the painters, Repin said that one artist was good, and another was not so good, but those statements did not allow a conclusion about the professionalism of a particular artist, as being only the opinion of Repin [1].



Fig. 2. The icon of Saint George of Kholuy school, early 19th century, with an entire overwriting with a changing plot of Selected Saints of Suzun workshop, late 19th century, two images in tempera

It is very difficult to determine the author's involvement in an icon, as the icons, as a rule, are not signed. Therefore, the work can only be attributed specifically to an icon-painting workshop. But some icons still have the signatures of the authors. The Chuhuiv icon-painters made to order not only icons, but also portraits and landscapes, which they signed, and the authorship could be determined by the characteristic manner of painting.

The main feature of the Chuhuiv school icons is the backside of the icon base - coating with oil. The colour of the coating is grassy or dark brown. This protected the icon base from various pests. Chuhuiv craftsmen used a coloured primer (ocher, red, green), which was also an attribute of the icons of that school. The Chuhuiv school was popular as of orders for icons. In the workshops, there were renovators, not restorers. This is also one of the main reasons for the appearance of overpaintings on the icons of these workshops.

Several types of overpainting of these icons have been established: fragmentary restoration, completely covering restoration with a plot copying and drawing the author's iconography, or restoration with a completely different plot (Fig. 3).

There were many icons with overpainting, made in the icon-painting centres described above, in the territory of Sloboda Ukraine. Therefore, the need arose to create a method for the preservation of all images of time transgressive painting for reliable attribution of the art monuments.

Methods of separating and preservation of later overpainting's started to develop late. They were preceded by methods of permanent removal of the later upper layers of a painting. The artworks lost during that time are uncountable.

During the past 10 years, over half a thousand works of different icon-painting schools on wooden bases in the territory of eastern Ukraine were studied. It was established that every tenth icon had several layers and overpainting at different times. They are entire or partial (fragmental) overpainting's. Distinctive features of these icons are icon-painting workshops, interlayer type, overpainting type, technique, degree of destruction of the painting layers, as set out in the Tables (Table 1 and 2).

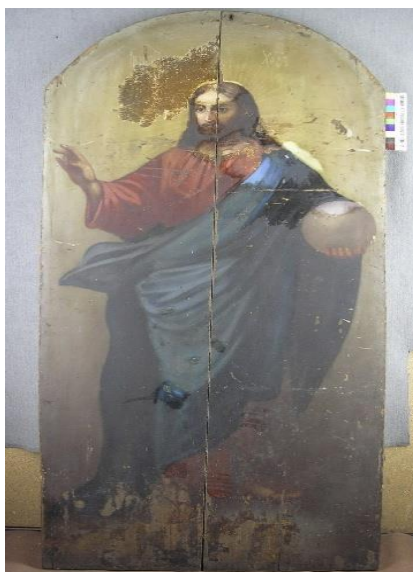


Fig. 3 The icon of Christ Pantocrator, late 19th century, with an entire overwriting repeating the author’s iconography of Christ Pantocrator, early 20th century. Chuhuiv icon-painting workshop.

Table 1. Iconography with entire overpainting

Icon-painting workshop/school	Number of studied icons total/ with overpainting	Time of creation of the top layer /lower layer painting	Type of interlayer between the layers of time transgressive painting	Technique Top/bottom
Borysivka	70/4	Middle century/early 20 th century	Varnish film	Oil/Oil
Suzun	10/2	Middle 19 th century/ late 19 th century.	Primer	Tempera/Tempera
Kholuy	50/5	Middle 19 th century/late 20 th century.	Primer	Tempera/Tempera
Chernihiv	10/3	Middle century/early 20 th century	Varnish film	Oil/Oil
Chuhuiv	70/10	Middle century/early 20 th century	Varnish film	Oil/Oil
Volyn	10/2	Middle century/early 20 th century	Varnish film	Oil/Tempera
Palekh	10/1	Middle century/early 20 th century	Varnish film	Oil/Tempera
Mstera	10/1	Middle century/early 20 th century	Varnish film	Oil/Tempera
Unknown iconography	10/2	Middle century/early 20 th century	Varnish film	Oil/Tempera

Table 2. Iconography with fragmental overpainting

Icon-painting workshop/school	Number of studied icons total/ with overpainting	Average overpainting percentage (%)	Time of creation of the top layer /lower layer painting	Type of interlayer between the layers of time transgressive painting	Technique Top/bottom	
Nev'yansk	30/1	35	Middle century	19 th	Varnish film	Oil/Tempera
Moskow	40/3	45	Middle century	19 th	Varnish film	Oil/Tempera
Kholuy	60/1	45	Middle century	19 th	Varnish film	Oil/Tempera
Chernihiv	10/2	15	Middle century	19 th	Varnish film	Oil/Oil
Chuhuiv	70/6	60	Early century	20 th	Varnish film	Oil/Oil
Vetkov	10/1	10	Early century	20 th	Varnish film	Tempera/Tempera
Halychina	10/4	35	Middle 18 th century		Varnish film	Oil/Tempera
Lipovan	10/3	25	Early century	20 th	Varnish film	Acrylic/Tempera
Unknown iconography	10/2	27	Middle 19 th century		Varnish film	Oil/Oil

The research revealed 53 icons with various types of overpainting. The overpaintings are divided into entire and fragmentary overpainting. 29 icons had entire overpainting with a repeated or changed plot.

A number of 24 icons had fragmentary overpainting, distributed under the following characteristics: non-qualifying restoration interventions; improving the artistic level of painting on icons; temporary preservation of the paint layer.

The overpainting on the icons were made due to considerable age of functionalism, thus they extant with the changed colouring of the author paint. The transparency of the varnish film on the painting surface changes. In most cases, artists used hot drying oil as a protective coating for icons. The masters applied thick layers, and over time, the varnish darkened and changed the painting colour scheme.

The overpainting on the icons were made due to the darkening of the paintings, which were sometimes painted on silver. These are icons of Kholuy, Palekh, Mstera and Galicia workshops.

Several icons of Chuhuiv and Borisov workshops were revealed, where the earlier layer of painting was lost insignificantly. In that time, the icon-painter could use the old painting and composition. The painting was applied over the author's varnish film, or with an intermediate layer of primer.

Icon-painting in Chuhuiv was a highly developed craft, as far as by the late 19th century there were 7 churches in Chuhuiv town. There were many icon-painters in the city. The most famous of them are Bunakov, Shamanov, Trikaze, Kraynenko, Filipp Myashin, Ivanik, Persani, Ivzhenko, Pihtyarev, Repin etc [1].

Several icons of the Moscow and Chuhuiv schools with fragmentary oil overpainting were revealed. The overpainting parts are located in the destroyed areas of the lower paint layer around the image perimeter in the form of a frame. The purpose of this type of overpainting is to temporary stop the paint layer destruction.

Consequently, the main reasons for the preservation of late overpainting on icons are the need for documentary reflection of changes in tastes, traditions, technological and aesthetic factors in icon-painting over time, as well as interest in the history of a particular work existence.

Having analyzed the reasons for the appearance of entire overpainting on icons, tendencies are traced to supplement the author's iconography or completely replace it with more popular subjects. This is due to a change in the artistic taste and the view of the icon owner.

Where some paint layers hide other layers, separation should be used - only this way the top layer of the painting can be preserved.

The restoration practice in Ukraine did not pay much attention to the development and improvement of the technology of separation of multi-layered time transgressive painting. Late overpainting were not preserved. Therefore, the methods of irrevocable removal of late images were improved, resulting in damage to the cultural heritage. Therefore, it is necessary to pay special attention to this problem.

Consequently, the most common existing icons on the territory of Sloboda Ukraine are the works of Borysivka, Kholuy and Chuhuiv icon-painting workshops. In general, the icons of these workshops were created for the general population, which prompted their mass character and the appearance of overpainting.

It has been established that the largest number of icons with overpainting found in the territory of Sloboda Ukraine are the works of the Chuhuiv school. Several types of overpainting of these icons have been identified: a fragmentary, entire overpainting, repeating the plot and drawing of the author's iconography, or with a completely different iconographic plot.

The process of separation of multilayer painting: making PVB film.

The PVB film uniformity and thickness are experimentally determined. The film is formed with a smooth surface and of uniform thickness when drying in a closed vessel, with little air access.

A 10% solution of PVB in ethyl alcohol is preliminarily prepared. 1.0ml of DBP plasticizer is added to the container with alcohol, after which dry PVB powder is added. The vessel with the mixture is placed in a water bath and stirred at low heating (40-60°C) for 30 minutes until PVB dry substance is completely dissolved, and the mass becomes transparent. The finished composition is cast on smooth glass at the rate of 20mL of liquid mass on a surface of 10cm² and dried in a closed vessel, with little air access for 20-24 hours. The finished film has the following properties: re-dissolves in ethyl alcohol has good adhesion, is neutral to the materials of the paint layer. The optimal property as of functional parameters is 0.375mm film thickness. The strength of this film allows supporting the weight of the separated paint layer and primer. Due to its elasticity, the film does not tear or deform the separated top layer of the painting [18].

The overpainting separation

The separation of painting with entire overpainting should be started from the corners or side sections of the piece, gradually moving the compresses towards the centre. Separation is carried out from one of the two smaller sides, perpendicular to the larger one. For fragmentary overpainting, the upper layer separation should be started from smaller fragments to larger ones.

The overpainting layer is softened with a 50% water-alcohol solution for 45 minutes after which a pre-prepared PVB adhesive film is applied to this area. The lower film surface is partially softened with ethyl alcohol and glued to the surface of the separated painting layer. The exposure time of the solvent under the film is about one hour. The overpainting layer retains its peeling properties during this time. The size of the area to be softened, followed by the application of a PVB film and peeling, does not exceed 5cm². All subsequent fragments are softened and then fixed with PVB film with a slight 2mm film overlap [18].

This method enables the separation of fragments from 0.5cm² to 1.5m², enabling the separation of the painting within these parameters entirely, in one step. The solvent-treated area of the overpainting is gradually separated with a thin blade by cutting the primer between the layers of the painting, without affecting the underlying layer.

After separation, the overpainting is transferred and fixed onto a plastic film stretched over a stretcher. The back of the separated painting is strengthened with a 3% solution of sturgeon glue on a new base [18].

Transferring an overpainting to a new basis

The prepared surface of the new base is glued with 1 - 2% PVA solution, with further drying. A 10% layer of PVA solution in ethyl alcohol is applied with a wide brush. A one-piece layer of the separated top layer of the painting is applied to the new base and carefully placed with a trowel. Excess glue is carefully removed. After that, the entire overpainting surface is covered with one layer of tissue paper and three layers of filter paper, and then evenly pressed. The filter paper is periodically changed until the PVA intermediate glue is completely dry, which usually occurs within three days [18].

The developed technology has been successfully implemented in the separation of three icons. The difference between them is different formats, different painting techniques, the time that elapsed between the overpainting and the author's image, as well as the distinctive features of the material layer between different layers of painting, differing in size; separation of painting (fragmentary or entire), proving its versatility and practicality in the separation of works with multi-layered painting.

The Icon of Saint Nicholas the Wonderworker

The study of this icon started in 2011. The work arrived at the Department of Restoration from the Holy Archangel Michael Convent in Odessa. The icon belongs to the Kholuy school of icon-painting, the tempera technique, late 18th century. Saint Nicholas the Wonderworker is an overpainting that hides the author's image.

The icon is an image of Saint Nicholas the Wonderworker, which has acquired a particularly wide development in the art of Christianity. The traditional waist-length image of the saint blessing with his right, slightly raised hand, and holding a closed gospel in his left, is one of the less common icons of a saint with an open gospel. Such images are known since the 18th century. At the edges of the figure of Saint Nicholas, Jesus Christ is painted with the Gospel and the Virgin Mary holding the omophoron, the inscription is Saint Nicholas the Wonderworker.

The icon of Saint Nicholas the Wonderworker was painted in the late 18th century. The work has traces of restoration interventions. The author's paint layer was made in oil, without preserving the plot and colour of the painting. As a result of trial clearings, losses of the paint layer were found, which were cast almost over the entire icon, especially along the board perimeter, as well as losses on the face and on the saint's clothes [19-22].

The X-ray examination revealed primer loss, both on the top layer of the Saint Nicholas the Wonderworker and on the lower layer of the painting.

The image of Saint Nicholas is a late overpainting, as evidenced by several studies. The X-ray image shows that the author's painting is quite well preserved; the approximate loss is 30%. The author's iconography depicts the full-length "Two Saints".

A prefabricated adhesive film PVB, softened with solvents, of max 1.0mm thickness, was applied to the overpainting layer. The lower film surface was partially dissolved in ethyl alcohol, causing it to be glued to the upper painting surface. The solvent was kept under the film for about one hour. The overpainting layer, during this time, retained its ability to separate. Therefore, the size of the treatment area, and then the application of PVB film and separation, did not exceed 5x5cm. All subsequent fragments were impregnated, softened and then fixed with PVB film with a small 2x3mm film overlapping.

The overpainting is separated in general without cutting the upper painting, first the remnants of the painting from the cut-back centre portion of the icon panel, then the inscriptions, and the saints Jesus and the Virgin Mary. Gradually, it was separated as a whole, without dividing it into fragments. Solvent and PVB-treated overpainting area was gradually separated with a scalpel. The primer of the overpainting was cut out without affecting the painting lower layer. The separated painting was covered with plastic wrap and pressed with a bagful of sand.

After the painting separation, the lower icon was revealed. The iconography of the author's image also belongs to the Kholuy school, but before the early 18th century, it was made in tempera, as well as the overpainting. The icon depicts two saints in the left corner of the

artwork. Saint Modestus is an Orthodox saint who is considered the patron saint of cattle. Saint Blaise of Sebaste is depicted in the right corner of the artwork. The top of the icon depicts the Salvation in the clouds and a temple in the centre. The reasons for overpainting of the author's image are:

- Intense darkening of the varnish film.
- Approximately 30% loss of the author's image.
- Lack of restorers in the icon-painting workshop.

The icon of Salvation of The King of Kings

The icon of Salvation of The King of Kings belongs to the Chuguiv School of Icon-painting, oil, from 20th century.

After a visual research and trial clearings, it was found that the icon is a multi-layered painting. This caused a number of studies which discovered the type, material and nature of the paint layers, the preservation of the lower painting and its material, the presence and structure of the intermediate layer.

Partial X-ray examination confirmed the presence of the lower image of the composition and determined the good preservation of the pictorial layer. Similarly, X-rays revealed places of use of gold (by finding a relief ornament under it) and elements of the image (for example a book with a hand fragment, a part of the throne) of the early 20th century.

The X-ray examination shows a significant difference in the type of craquelure (in the lower painting it has a small grid on the ground, and in the upper - a large grid on the paint layer). No coincidences of the reflection of the craquelure structure of the lower painting on the upper layer were found. The presence of an intermediate layer avoided the sinking of the upper layer of paint, and no places of coincidence of the upper painting layer with the places of losses of the lower painting layer (in the presence of primer losses with craquelure). X-ray examination did not establish a complete picture of the painting lower layer due to the peculiarities of the constituent pigments used in the lower painting.

Microscopic examination showed that the intermediate layer is a substance of adhesive structure of uneven thickness. The primer of the lower painting is white, chalky, multi-layered. The connection of the primer with the base is unsatisfactory (about 30% of the talus). Similarly, in the places of losses the presence of canvas (intermediate layer of fabric or canvas) was revealed. Further, inserts of restoration primer on the lower paint layer were found, which were probably used in the places of lower layer losses, in order to level the surface for subsequent overpainting. The primer of lower painting and restoration inserts was of different nature, which was confirmed by further microchemical analysis.

The craquelures of the upper painting layer in the paint layer and in the protective varnish coating layer are caused by the natural material ageing and its thickness unevenness.

The IR research revealed additional elements of the lower layer: the text of the Gospel, plant elements, folds and other unrecognized structures.

This way, at the stage of technical and process research it was established that the iconography of the two images partially coincided. The upper image represented Christ as an independent image (figure), while the lower painting represented Christ in a multi-figure composition, which was confirmed after the separation.

The overpainting was separated starting from the top of the painting, gradually moving to the centre. Since the upper painting was large, different areas were separated in fragments. Adjustments allowed increasing the separated area from 2-3cm to 10cm².

To soften the intermediate layer, a Pettenkofer box was used as the most effective method using a sufficiently high temperature of 60 - 70°C. The exposure time was 30-40 minutes.

After the main process of softening the upper paint layer area, the PVB film was fixed on the alcohol-treated overpainting area, which was further softened with alcohol vapours, which allowed increasing the adhesion to the upper paint layer. The overpainting area was gradually separated with a scalpel, making an incision of the overpainting without affecting the lower layer. The exfoliated fragment of the upper painting was transferred to a pre-prepared

temporary base – polyethylene film. The remnants of the intermediate layer were removed mechanically with an additional compress of the same solution, using a Pettenkofer box for 10-15 minutes. The next solvent compress was placed next to, along the border of the already separated part of the overpainting. After separation, one area moved to another and so on, gradually moving the compresses to the centre of the icon.

After the work separation, the author's plot of the icon opened. The author's image is a fragment of the icon of Christ Enthroned (the Deesis tier) about the late 18th century. According to the painting style and manner, the icon belongs to the art workshops of central Ukraine, oil.

The reasons for overpainting the author's image are:

- Intense darkening of the varnish film;
- Lack of restorers in the icon-painting workshop;
- Loss of exposure.

The restoration of the icon of Salvation of the King of Kings of the 20th century, and the second image "The King of Kings" of the 18th century, is an example of fragmentary separation. Both images are made in oil, size 1.5x1.0m². Both icons have been restored and are in the fund of the REWA department, KSADA.

The Icon of the Selected Saints

The Icon of the Selected Saints belongs to the iconography of Chernihiv Polissya. It is made in oil, in the early 20th century. After complex research, it was found that the icon of the Selected Saints is an overpainting that hides an earlier author's image.

The upper painting is an image of saints, made in oil on a pine board, the late 19th century. The icon of the Selected Saints was interpreted as "a family one" –made to order, having the same name as the name of the customer or his patron, as those saints were not depicted together in iconography before. Despite the contamination and darkening of the varnish film, the bright colouring of the picture can be seen. The icon depicts three saints standing on the brown ground in full length. The ground is covered with grass and stones. The figures are on a light blue background, which is typical of the iconography of the Ukrainian Baroque period of the late 18th century. The figures take up to two-thirds of the icon surface. The saints are depicted frontally, as well as the turns of the faces. The master managed to individualize each face.

The special significance of modelling the work inner space can be traced. The folk iconography of Chernihiv Polissya is abstracted from a specific historical time or plot. This is not the style of Orthodox doctrine, but the Christian mythology and folklore. Analysis of the works obtained as a result of the separation of time transgressive multilayer paintings indicates that icons are made by the authors of Chernihiv Polissya.

"Before painting an image on wood, Chernihiv masters covered the primer with red paint. After the first layer of paint dried, it was painted in white, yellow, green".

The range of colours of a single-colour or painted background is quite narrow: ocher, sometimes orange, red (brick with a touch of brown), brown, blue and black.

The icon of the Selected Saints is of exceptional interest because the saints stand in a row, in almost identical positions. The icon depicts Saint Marina the Great Martyr - patroness of children and assistant in childbirth, Saint Antonina the Great Martyr is the patron saint of those who bears her name, and of Saint Ustym the Great Martyr in the centre. At the top in the centre on the clouds discerns the image of Sebaot God with a blessing gesture. The whole composition is drawn on an ocher-green-blue background; the figures are arranged in a row facing the viewer. The figures are located almost in the same line. The figure of Saint Marina the Great Martyr is located strictly in front of the viewer, in contrast to the other two figures. The figures of Ustym and Antonina are depicted with a slight three-quarters reversal.

The flat images of saints were achieved by using pure colours without shades and shadows. We should say separately about corporality, actually – the absence thereof. Saint Marina the Great Martyr and Saint Antonina the Great Martyr is depicted without eyelashes and

almost without eyebrows because hair implies sinfulness and this does not correspond to the image of a vestal virgin.

The central figure is the image of Saint Ustym the Great Martyr: dark green tunic with long sleeves, high elegant boots, long red clothes on the shoulders of the tunic length. In his right hand, raised up, Ustym holds a cross, left hand bent at the elbow. Saint Antonina the Great Martyr stands to the right of Ustym. She is also wearing a dark green tunic with long, wide sleeves, a red cloak over the tunic, spreading on the ground with soft smooth folds. She is wearing a white scarf covering her head and shoulders. The arms are crossed on the chest; the right hand is above the left, holding a cross. Saint Marina the Great Martyr is wearing dark green clothes, an ochre scarf on her head, covering her shoulders. The crossed arms are pressed to the chest, the left arm is completely covered with a mantle, in the right hand, and there is also a cross on the top.

In the centre of the icon, above the head of Saint Ustym the Great Martyr, there is a waist-length figure of Sebaot God in a red robe with a green cloak blessing the saints, in the clouds.

The separation of image layers enabled attributing the original author's plot.

A study of the painting below depicting Saint Nicholas showed that the technological features and colour scheme of painting can also be attributed as a painting of iconography of Chernihiv Polissya, made in the same technique, which dates to the early 19th century. The painting is an image of Saint Nicholas, which is very popular in the iconographic art of Christianity and is particularly wide developed. Traditionally, the waist-length image of a saint is on a brown background, blessing with his right, slightly raised hand and holding the open Gospel in his left. Less common are the icons of the saint with the closed Gospel with the image of the inscription above (Nicholas the Wonderworker).

This way, the research has shown that both layers of the painting have similar technical, technological and artistic features, indicating their belonging to the same school in Chernihiv Polissya and over a hundred years' time difference.

The overpainting on the icons in the territory of Sloboda Ukraine were made due to:

- unqualified restoration interventions
- loss of the icon functional significance due to changes in the official church requirements for the iconography;
- loss of exposure;
- Improving the artistic level of icon-painting.
- temporary conservation of artwork.

Technical and technological research of the icon has established that the upper oil painting is thin and smooth (semi-transparent). The composition of the interlayer between the layers of time transgressive paint is a thin bonding with emulsion primer. The obtained evidence allowed adjusting the technology of picturesque images layering. The compress exposure time is reduced to 10 minutes due to thin top painting and the quick softening ability of the emulsion primer layer. Also, the film thickness changed due to the lower load of the separated painting.

The developed technology enabled the preservation and uncovering all layers of painting. The separation of time transgressive painting enabled attributing both images, including those closed to researchers, and to introduce them into scientific circulation.

Restoration of the icon of the Selected Saints of the 20th century, and with the lower image of Saint Nicholas of the 19th century is an example of fragmentary separation. Both images are made in oil.

The presented research results are aimed at solving the problem of preserving cultural heritage, in particular the preservation of time transgressive multilayer paintings on a single basis, located over each other and having an interlayer. The proposed method is covered by two patents.

Conclusions

The list of icon-painting schools, the works of which were most widespread on the territory of Sloboda Ukraine, are the icon-paintings of Borysivka, Kholuy and Chuhuiv icon-painting workshops have been established. A number of 53 icons with time transgressive paintings, on the territory of Sloboda Ukraine, have been found. Among the icon-painting schools there are: Chuhuiv, Borysivka, Kholuy, Chernihiv, Palekh, Mstera, Vetkovsk, Moscow, Volyn, Lipovan and Suzun.

The classification features of icons with overpainting on the territory of Sloboda Ukraine have been presented, including a variety of schools or workshops, the composition of the interlayer between the different layers of painting, the purpose of renewal (new image), a type of technique and dating of different time images. 29 icons with entire overpainting which repeat the plot or with a new plot, have been found. 24 icons with fragmentary overpainting have been found, distributed according to the following features: unqualified restoration interventions, improvement of the artistic level of the painting on the icon, temporary conservation of the paint layer.

The overpainting of icons originating in the territory of Sloboda Ukraine is made due to:

- unqualified restoration interventions
- loss of the icon functional significance due to changes in the official church requirements for the iconography
- loss of exposure
- Improving the artistic level of icon painting
- temporary conservation of the paint layer.

The time transgressive multi-layered painting separation technique using specially developed films has been introduced. The technique allows providing safety of all the painting layers, made in oil and tempera, both in fragmentary and entire separation, both on a canvas and on a board.

A study has been conducted to identify the multilayer time transgressive painting separation that prevailed in Sloboda Ukraine of the 17th -20th centuries. There are prospects for the study of this area with monumental paintings and artworks on canvas having several layers of images made on a single basis.

References

- [1] V. Shulika, *Chuguiv icon of the XIX - early XX century Repin's collection*, **Chuguiv Repinsky, Issue 1**, Repin Chuguyiv. Art and Memorial Museum of I. Repin, 2020, pp. 49 – 59.
- [2] A. Doluda, M. Terekhov, *Research of stratification of different-time painting*, **International Scientific Restoration Conference. Scientific Restoration. History, Modernity, Ways of Modernization**, Scientific and Restoration Centre of Ukraine, Kyiv, September 11-14, 2018, pp. 165-170.
- [3] I.C.A. Sandu, S. Bracci, M. Lobefaro, I. Sandu, *Integrated Methodology for the Evaluation of Cleaning Effectiveness in Two Russian Icons (16th-17th Centuries)*, **Microscopy Research and Technique**, **73**(8), 2010, pp. 752-760. DOI: 10.1002/jemt.20817.
- [4] I.C.A. Sandu, S. Bracci, I. Sandu, M. Lobefaro, *Integrated Analytical Study for the Authentication of Five Russian Icons (XVI-XVII centuries)*, **Microscopy Research and Technique**, **72**(10), 2009, pp. 755-765. DOI: 10.1002/jemt.20727.
- [5] V. Sarabyanov, *About the restoration of the Preobrazhenskiy temple of Polotsk*, **Pravmir**, June 11, 2013. URL: <http://www.pravmir.ru/unikalnyj-xram-i-ego-unikalnaya-restavraciya>, [Last accessed: 05.26.2015]
- [6] A. Doluda, M. Terekhov, *Experience of separation of multi-time transgressive painting*, **All-Ukrainian Scientific Conference of Teaching Staff and Students of KSADA, Based on The Results of the 2017-2018 Academic Year**, Kharkiv, 2018, pp. 18-22.

- [7] J.-P. Guillet, M. Roux, K. Wang, X. Ma, F. Fauquet, H. Balacey, B. Recur, F. Darracq, P. Mounaix, *Art Painting Diagnostic Before Restoration with Terahertz and Millimeter Waves*, **Journal of Infrared Millimeter and Terahertz Waves**, **38**(4), 2017, pp. 369–379.
- [8] R.A. Cristache, I.C.A. Sandu, A.E. Simionescu, V. Vasilache, A.M. Budu, I. Sandu, *Multi-analytical Study of the Paint Layers Used in Authentication of Icon from XIXth Century*, **Revista de Chimie**, **66**(7), 2015, pp. 1034-1037.
- [9] R.A. Cristache, I.C.A. Sandu, A.M. Budu, V. Vasilache, I. Sandu, *Multi-analytical Study of an Ancient Icon on Wooden Panel*, **Revista de Chimie**, **66**(3), 2015, pp. 348-352.
- [10] I.C.A. Sandu, S. Bracci, I. Sandu, *Instrumental analyses used in the authentication of old paintings - I. Comparison between two icons of XIXth century*, **Revista de Chimie**, **57**(8), 2006, pp. 796-802.
- [11] I.C.A. Sandu, C. Luca, I. Sandu, V. Vasilache, M. Hayashi, *Authentication of the ancient easel paintings through materials identification from the polychrome layers - II. Analysis by means of the FT-IR spectrophotometry*, **Revista de Chimie**, **59**(4), 2008, pp. 384-387.
- [12] I.C.A. Sandu, V. Vasilache, I. Sandu, C. Luca, M. Hayashi, *Authentication of the Ancient Easel-paintings through Materials Identification from the Polychrome Layers III. Cross-section Analysis and Staining Test*, **Revista de Chimie**, **59**(8), 2008, pp. 855-866.
- [13] M. Calderon Mejía, M. Tascon, D. Gallegos, D.G. Pondal, M. Bini, L. Liccioli, S. Barone, L. Giuntini, M. Fedi, F. Taccetti, F. Marte, *The role of restoration and scientific examination for the accurate attribution of a European painting in South America*, **Rendiconti Lincei - Scienze Fisiche e Naturali**, **31**(2), Special Issue: SI, 2020, pp. 431–442.
- [14] S. Alizadeh, *Cleaning and Restoration of an Oil Painting with a Polymer Gel in Iran*, **Conservation Science in Cultural Heritage**, **17**, 2017, pp. 139-147. DOI: <https://doi.org/10.6092/issn.1973-9494/7952>. [Last accessed: 5.12.2020].
- [15] M. Terekhov, A. Doluda, N. Antonenkova, *Method of restoration of different time painting*, **Patent UA04642**.
- [16] M. Terekhov, A. Doluda, N. Antonenkova, *Method of manufacturing an adhesive film for the restoration of paintings of different times*, **Patent UA04643**.
- [17] M. Terekhov, *Method of chemical stratification of different-time painting with an intermediate layer of soil*, **VII International Forum "Design Education 2017"**, Kharkiv, October 9-12, 2017. pp. 331-335.
- [18] J. Gancarczyk, J. Sobczyk, *Data mining approach to image feature extraction in old painting restoration*, **Foundations of Computing and Decision Sciences**, **38**(3), 2013, pp. 159-174, DOI: 10.2478/fcds-2013-000. [Last accessed: 5.12.2020].
- [19] V. Vasilache, I.C.A. Sandu, S. Pruteanu, A.T. Caldeira, A.E. Simionescu, I. Sandu, *Testing the cleaning effectiveness of new ecological aqueous dispersions applied on old icons*, **Applied Surface Science**, **367**, 2016, pp. 70-79. DOI: 10.1016/j.apsusc.2016.01.128.
- [20] T.C. Iurcovschi, V. Vasilache, I. Sandu, Z. Marius, O. Pintilie, A.V. Sandu, *New Ecological Solutions Involved in the Cleaning of a 19th Century Icon*, **Applied Sciences-Basel**, **10**(3), 2020, Article Number: 1175, DOI: 10.3390/app10031175.
- [21] S. Pruteanu, V. Vasilache, I.C.A. Sandu, A.M. Budu, I. Sandu, *Assessment of Cleaning Effectiveness for New Ecological Systems on Ancient Tempera Icon by Complementary Microscopy Techniques*, **Microscopy Research and Technique**, **77**(12), 2014, pp.1060-1070, DOI: 10.1002/jemt.22437.
- [22] S. Pruteanu, I. Sandu, M.C. Timar, M. Munteanu, V. Vasilache, I.C.A. Sandu, *Ecological Systems Applied for Cleaning Gilding in Old Icons*, **Revista de Chimie**, **65**(12), 2014, pp. 1467-1472.

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