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Investigation and restoration of the icon on glass *New Testament Trinity*

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Summary

In this paper we will emphasize the physical, chemical and biological investigations and we will detail the process of restoring the wooden icon New Testament Trinity, no. of inventory 781, attributed to Iacov of Rășinari[1], assigned to the middle of the eighteenth century.

The icon was restored[2] within ASTRA Centre for Heritage following the project „MUSEIKON. A new icon museum revives a restored historic building in Alba Iulia".

Iconographic description

Icon, 44x32 cm in size, represents the *Holy New Testament Trinity* scene in which Father and Son are represented seated. Father, represented as an old man with white hair, appears to the right of the icon, blessing Christ. They are represented with royal crowns and halos supporting the cross. Holy Spirit is represented as a dove. The inscription is on both sides of the Holy Spirit[3].

The chromatic used: red, blue, ochre, green, white, black, brown, gray, orange, silver foil.

[1] Assignment, researcher Ana Dumitran, PhD.

[2] Restauration project responsible - Expert painting restauration Geanina Ionescu, PhD,. ASTRA National Museum Centre; Restaurers: Anamaria Floca; Marius Iuga; Valentin Puchianu; Florin Păun.

[3] Cavarnos 2005, p. 163.

Fig. 1, 2. Both sides assembly, before restoration

Fig. 3, 4. Both sides assembly, before restoration

Terms related to previous restorations

The lower rod of the icon was replaced with a rod from another icon, on which inventory number *37* is written in light green colour (improper intervention). The rod was mounted through metal nails. We assumed that it was applied as a result of the loss of the original rod. We implemented the local preventive strengthening of the paint layers to avoid further loss of areas with gaps.

Conservation status before restoration

The icon *The New Testament Trinity* has a support made of a single board carved tangentially from softwood, worked on the back side with the spokeshave. A semi-recessed constituent beam is mounted on the back panel as a counter-fibre. There can be seen a moderate Xylophagous insect attack on the back of the panel. The layers of painting show cracks of old, separations and gaps of different depth and areas. A serious weakening of the paint layers and general wearing of the colour layer can be noticed. The old varnish is yellow and browny. Superficial dirt, sticky and clogged is present on the entire surface and shields the painting.

Diagnosis

The conservation status of the icon before restoration was conditioned by the aging of materials, tangential carving of the board of which the panel is made up, the aging of the glue, faulty conservation, accidents, liturgical use. All these factors have led to the separation of the upper rod from the support, cracks of age and gaps of the paint layers, wear of the colour layer, aging and darkening of the varnish, deposit and clogging of dirt and wax deposits. We note the functional wear of the wooden panel. The lower rod added after a previous intervention following the loss of the original rod will be disassembled in order to achieve a profile similar to the original.

Interpretation of radiographic image[4]

The relatively small size of the icon have imposed the execution of two radiographic exposures[5] for getting radiographic imaging of the entire surface. They were subsequently processed[6] to form one overall radiographic image. The panel was consolidated with a beam.

The inscription, faces, hands of the characters, the dove and certain parts in white colour are all highlighted in light shades that indicates the use of white lead (basic lead carbonates, $2Pb(CO_3) \bullet Pb(OH)_2$), a diagnosis also confirmed after carrying out chemical investigations according to the chemical analysis report no. 524/2015.

Similarly, there are areas painted in red, which indicates that the painter used red lead or cinnabar, which give the same type of radiographic signal[7]. The microchemical analyzes determined the nature of the red pigment, confirming the presence of red lead (lead oxide, Pb_3O_4), according to the chemical analysis report no. 524/2015.

The panel's imperfections or knots in the wood structure appear as bright areas. Wood fiber is well evidenced, resembling to resinous wood structure. There are also shown the joggles with which the frame's rods are fastened. In shades of dark gray, with irregular aspect, we can see the gaps in the paint layers. The cracks' network in the paint layers is visible in the radiography as a network of irregular, dark lines.

The constituent metallic element and the two non-constituent nails used to place the non-constituent lower rod give a very strong radiographic signal. In the area of contact between the panel and the frame rods, radiographic signal is strong due to the thickness of the primer. The silver foil does not show any radiographic signal.

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[4] Expert painting restaurer Geanina Ionescu, Ph.D.

[5] dr. Ciprian Şofariu, Sibiu Pediatric Hospital, Radiology and Medical Imaging Service.

[6] Expert painting restaurer Mirel Bucur, Ph.D.

[7] Ionescu 2014, pp. 20-21.

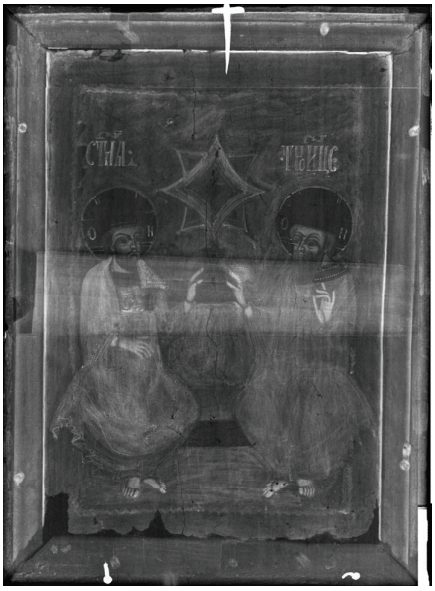

Fig. 5. Radiography of the icon

Chemical investigation[8]

Samples were subjected to specific microchemical tests. The results of chemical investigations show the presence of a compact primer, based on plaster (possibly as dihydrate, $CaSO_4 \cdot 2H_2O$) , applied in several layers. Some layers show a little oily.

The results of microchemical tests allow us to observe, with probability, the presence of the following pigments: red lead (lead oxide, Pb_3O_4), white lead (basic lead carbonates, $2Pb(CO_3) \cdot Pb(OH)_2$), clays. The ocher pigment sample is extremely small. Microchemical identification of lead test, on the ocher sample is not very conclusive in the laboratory. The silver foil is an alloy, possibly containing Ag. The varnish is a resin-brown appearance.

[8] Chemist investigator Daniela Văcariu, ASTRA National Museum Centre, Sibiu.

Biological investigation[9]

Following the results of biological tests to identify the wood essence, it was found that the wood used for the panel and beam is softwood. The results obtained after biological sampling show that the wooden material from which the panel and beam were made is fir (*Abies alba*), because no resin-producing channels have been seen. These samples were prepared and analyzed in the light microscope by performing cross-sections.

The panel has some holes caused by *Anobium punctatum* Xylophagous insects - inactive. Therefore, it did not require treatment with insecticide solution, according to the biological analysis bulletin no. 141/2015.

Description of the restoration work carried out

After a thorough examination of the piece and analyzes that have provided essential data for the restoration operations, we used a light dusting with soft brushes on the painted surface, avoiding areas with severe separation of the paint layers.

Before the prophylactic consolidation process of the paint layers, we removed the wax buildup from the painted surface: mechanically, with the scalpel, and pads soaked in solvent (white spirit). Their penetration into the structure of the paint layers is an irreversible operation and totally inappropriate.

It then followed the partial preventive consolidation of the paint layers. This operation was made using Japanese paper over which we brushed a solution of isinglass 3% with the addition of a preservative: 0,1% salicylic acid.

Due to the tensions of the support, the upper rod broke away from the support, requiring the notching of the corners at the ends and realignment on the panel. The area below the rod skimmed, 20% hide glue was brushed and remounted on the panel with vices. The intervention was difficult, given that the frame's rod was not removed from the support, the paint layers having continuity on the frame.

[9] Biologist investigator Ileana Chirtea, ASTRA National Museum Centre, Sibiu.

The rod applied after a previous intervention through metal nails was extracted by removing the non-constituent metal nails. A new dry fir rod was made, considering the original profile of the rods. The rod was split and fitted with adhesive on the support with 20% hide glue through vices.

It then followed the dedusting of the icon's back side, with more abrasive brushes, removing the existing adherent dirt. Label removal was performed through a pad soaked in warm water. Cleansing the reverse side of the icon was made with ammonia water (3%), and chromatic integration of functional wear areas was done with water-based stain.

The proper consolidation of the paint layers then followed by brushing with 6% hot insiglass. The consolidation operation was done by alternating the hot press (electric spatula) with the cold press (bags with sand and marbles). Pressing with electric spatula was made through a Melinex foil, which has the property of being transparent and unadhesive.

After 24 hours we removed the Japanese foil with pads soaked in warm water, making sure that the excess water is removed with dry cotton pads to not allow water to get inside the paint layers and thus produce the phenomenon of deconsolidation.

The cleaning of the gaps followed, degreasing with ethanol and texturing of surfaces, gluing with 6% warm insiglass solution, gradual grouting with chalk dust and isinglass 6%, polishing with fine grain paper and finishing with cork. The excess grout was removed with cotton pads soaked in the emulsion of egg yolk with water 1:3. In the upper side of the icon, at junction of the rod with wooden panel and at the bonding of the frame's rods fat was removed, insiglass was injected 6%, it was grouted in several stages with a mixture of sawdust, tow, glue and pigment. The last layer of grout consisted of chalk dust and isinglass 6%.

Fig. 6. Aspect of the icon, after grouting

Following the cleaning tests, mixtures based on isopropanol +ammonia+water (90:10:10) and (50:25:25) gave satisfactory results. The mixture based on dimethylformamide (DMF) and ethyl acetate (1:2) gave the best results.

Due to the layer of varnish agglomerations and its disturbing browny appearance, we applied Japanese paper on small portions over which we brushed a mixture based on dimethyl formamide (DMF) and ethyl acetate (1: 2). Since the exposure time was very little, this method allowed us to permanently control the cleaning operation. Softening the adherent, clogged layers of dirt and varnish resulted in selective thinning and controlled and uniform levelling.

The levelling was to transport or varnish's circulation in areas where it was too thick to where it was too thin. Levelling is intended to protect the paint layers with a thin and uniform original varnish layer[10].

[10] Mâle 1976, p. 70.

**Fig. 7. Assembly of the icon,
after cleaning and during the chromatic integration**

After the cleaning intervention, we continued with the consolidation operation of the paint layers, where the glue solution has not penetrated due to the thick layer of varnish, sticky and clogged dirt. Consolidation was achieved by reactivating the glue using hot water compresses and an electric spatula through Melinex foil. Where we found new gaps, we tried to remove fat, grout and polish.

The chromatic integration of grouted areas was done with imitative and punctiform retouching. We used waterborne colours for the retouching (watercolours) so that the intervention is reversible, and the materials used are as close as possible to the original.

It then followed the checking of the retouch with the UV lamp. To protect the painting against external factors, we applied a layer of varnish based on natural resin (Dammar) essentially turpentine (6% concentration solution) by brushing.

The icon was opened in horizontal position, with quick moves, with a soft hair brush, in a room equipped with exhaust system. For

good skinning of the varnish layer, the icon was originally heated using IR lamp.

Fig. 8. Aspect during the chromatic integration

Recommendations on how to preserve the glass icon

We recommend that the icon *New Testament Trinity* should be stored or displayed in an environment with a relative humidity of 55-65%, a temperature of 18-20˚C, without extensive or sudden fluctuations in their values and the lighting should not exceed 180 lux.

The icon will be stored only after prior packaging in two package types: an inner, soft, chemically neutral one (Japanese paper), and a second more rigid packaging (cardboard with low acidity).

References

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