EXPERIMENTAL PAINTING: RESEARCH AND CONSERVATION

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Abstract

The paper discusses two main aspects: incorporating experimental painting in student workshops and presenting results from the Proinvent project for enhancing research excellence. Techniques like collage, decollage, and unconventional material use were explored. The postdoctoral role under the Proinvent project involved lectures and workshops, focusing on acrylic colour use and enriching students’ art experiences.

Keywords: Contemporary art; Mixed media; Experimental painting; Art conservation; European project.

Introduction

The paper focuses on two main research paths: the implementation of experimental painting and mixed media in the art workshops dedicated to students and the description of the artistic results obtained so far in the Proinvent project, a programme aimed at increasing performance and innovation in doctoral and postdoctoral excellence research. As part of the research, brainstorming sessions and presentations of techniques and artists who participated in the Venice Biennale, as well as in their own workshops, were carried out. The activities were centred on techniques that can be depicted through the unconventional use of incompatible materials in painting.

Within the European project Proinvent, implemented in partnership with the "Lower Danube" University from Galați as the main applicant and with the National University of Arts "George Enescu" from Iași as a partner, the author participated as a postdoctoral researcher from October 2022. The lectures were also supported by students with the aim of expanding stylistic horizons and knowledge of contemporary art. The target group included students from the departments of Painting and Fine Arts - Painting of the "George Enescu" National University in Iași. They have understood and delved into the boundless possibilities of artistic expression through the use of experimental techniques, which characterise a significant part of contemporary art. Various forms of expression were explored. Emphasis was placed on spontaneity, fluid and free brushwork, and the use of incompatible materials, such as water, oil, industrial paint, rust, organic elements from nature, coffee, sand, wax, and more.

It experimented with the techniques of collage and decollage, traditionally used with paper or textile materials, as well as with materials that wouldn't be considered the first impulse that comes to mind when we mention collage. Other explored and recognised techniques of the XXth century include grattage, frottage, and decalcomania, as well as processes like

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juxtapositions, merging structures, dripping, splashing, pulling, and scraping, and many more. Nevertheless, the emphasis was placed on working with acrylic colours as the main element.

Due to an Erasmus placement trip to Venice in the year 2022, the students managed to visit the renowned Biennale and other significant museums and galleries, subsequently successfully fulfilling their research, presentations, and practical works. The artistic journey of a young student studying the arts becomes much clearer after they get to explore other artistic scenes different from those in their own city or native country.

The valorization of the paintings made in the current art schools begins with their elaboration [1–3], in correlation with the mentoring activity of the recognised artists and the study of the evolution of the pictorial materials, the artistic techniques, and the current procedures of putting them into practice.

For example, the use of incompatible painting materials can provide, in a short time or after maturation (drying, strengthening, consolidation, etc.), evolutionary effects of notoriety, which can affect the state of preservation in a negative sense and must necessarily be controlled and stopped, or can create chromatic effects and unique plastics (with aesthetic-artistic value, attractive as an artefact) [4–8].

In this sense, recent works of some young painters were studied, emphasising both the aesthetic-artistic analysis as well as the study of new chromatic and plastic effects achieved through innovative modern technologies with the involvement of incompatible materials or new formulations of compositions using modern pictorial raw materials with high preservation [4, 5].

Materials and techniques

Visual artists often wonder if artworks created using experimental techniques will hold up over time or if they'll face issues with materials working well together. Concerns about material compatibility are always present. This is the reason why we've gone with acrylic colours as the main choice: they provide versatility.

When contemplating a piece of art made by using a mix of different methods, especially when trying out new techniques, a question arises naturally: what trajectory might the restoration process undertake? Certainly, it will be a difficult one, more challenging than the one that accompanies the progression of works created using pictorial techniques deemed traditional, such as oil painting or tempera painting. The consistency and layering of paints applied in a manner divergent from their initial conceptualization for use play a significantly pivotal role in comprehending and foreseeing a potential trajectory for the work at hand. For instance, within the realm of painting, the utilisation of viscous and dense paints juxtaposed with those possessing a lesser density and structure results in favourable adhesion between layers, contingent upon the ample drying time afforded to the applied pigments.

Oil-based pigments laid over an acrylic layer will indeed adhere to the latter, though in the inverse scenario, where acrylic serves as the final stratum, a thin and occasionally transparent film might emerge. This phenomenon arises due to the distinctive chemical composition inherent to acrylic pigments, rendering the stratum vulnerable to detachment even through gentle contact. There exists the possibility of acrylic being repelled by the texture of oil, thereby rendering the superposition of layers unattainable. The exhibited manifestation occurs not only due to the glossy, non-adherent surface of oil colours but also due to the composition of acrylic colors. Authors Ion N. Şușală and Ovidiu Bărăulescu [9] explain the transparent nature of colours in the volume "Dicționar de artă. Termeni de atelier": "The specific quality of watercolour pigment is its lack of covering power, as well as that of a synthetic paint called acrylic, which is water-soluble but irreversible to any liquid after drying, light-resistant, and adhering to any kind of support. However, unlike watercolour, it has a broader range of technological solutions, extending to specific impastos of oil painting".
The presented situation assumes that each layer of paint was added after the drying of the previous one. However, the scenario where not all elements are dry, working wet on wet, yields a different outcome, with visual possibilities for an experimental character of expression. If we experiment with acrylic paints layered over oil paints or vice versa, the resulting structures will resemble drops of color. Working with extended surfaces of fluid color, they will be manipulated by the artist in a way that allows for expressive processing. Artist Lee Hammond [10] explains: "Acrylic paints are composed of dry pigments in a liquid polymer binder, which is a form of acrylic plastic".

In order to truly grasp the meaning of material behaviour, I always suggest controlled experiments and taking notes.

**Conservation-related aspects**

"The mission of a restorer, stated simply, involves two fundamental approaches: to remove as much as possible the additions, layered over time, that distort the work of art, and to add as little as possible himself" [1-3, 11]. Given these factors, as visual artists, we cannot help but wonder how the artworks will evolve and whether they can undergo a successful restoration process. All aspects that constitute a work are important, starting with the organic or inorganic composition of the paints used, the order of layering, and the conditions for storing the works.

In a study conducted at the National Moldova Museum Complex in Iași regarding the chemical composition of the paints used by painters such as Theodor Aman, Nicolae Grigorescu, Ştefan Luchian, Constantin D. Stahi, and Nicolae Tonitza, it is described how, during the historical period in which they were active (primarily the last decades of the XIXth century and the first decades of the XXth century), they managed to acquire high-quality painting materials by travelling abroad. The resulting artworks, following non-invasive investigative processes, reveal that they contain classical pigments (earth tones, lead white and red, etc.) as well as synthetic ones (cobalt blue, prussian blue, chrome yellow, titanium white, etc.) [12]. Pigments with the best long-term resistance are generally synthetic, as natural pigments tend to deteriorate within a shorter timeframe. The principal distinction between natural and synthetic pigments lies in the fact that synthetic pigments are created in a laboratory through a chemical process.

Taking these aspects into account, we cannot help but take into consideration the prospective evolution of our works of art and their possible successful restoration process. All the aspects that constitute a painting are important, beginning with the organic or inorganic composition of the pigments used, the order of layer placement, and the storage conditions of the works.

**Methods of Examination**

Various imaging and analytical techniques have been employed in the study of these artworks, including multispectral examination (direct visible light examination, ultraviolet light examination, oblique visible light examination, and infrared reflectography), optical microscopy, and X-ray fluorescence spectrometry.

**Multispectral Examination**

Multispectral examination was executed by exposing the paintings to multiple types of radiation with varying wavelengths.

Direct Visible Light Examination provides an image of the artwork that serves as a reference for comparison with other multispectral representations. The electromagnetic radiation interval spanning 380 to 760nm corresponds to the visible spectrum, appealing to the human eye.
An oblique visible light examination is carried out in visible light with a lateral source. It highlights the topography of the painting's surface, revealing the brushwork technique, variations in protruding surfaces, and degradations of different components of the artwork (cracks, fissures, tension disparities, canvas distortions, etc.). Oblique light examination is conducive to assessing the condition of varnish and paint layers as well as potential restoration interventions.

Ultraviolet Light Examination UV radiation is part of the electromagnetic spectrum with shorter wavelengths than visible light. This falls within the 300–400nm range. UV light examination can reveal the presence of varnishes containing natural resins due to their fluorescence under UV light. Ultraviolet light can also highlight previous restorations, especially retouching, which appears darker than the original varnish layers under UV light (since newer oil colours and paints are not fluorescent in UV light). Certain pigments exhibit characteristic fluorescence and can be identified.

Infrared Reflectography. Infrared radiation extends beyond the visible spectrum, ranging from 780 to 20000nm. Reflectography employs a sensitive detection system between 1000 nm and 1700nm. Materials, particularly pigments, either reflect or absorb radiation based on their nature and thickness. Thus, a paint layer that appears reflective under direct sunlight may become partially transparent, enabling exploration of underlying layers. This non-destructive method allows visualisation of carbon-based sketches beneath colour layers. However, it's challenging to apply this method when the background is coloured, as in many 17th-century artworks, and the sketch is drawn using a non-carbon medium. The XIXth century reverted to a bright, white background, rendering infrared reflectography viable. This technique is highly effective when paint layer pigments minimally absorb infrared radiation and in locations with thinner paint layers. It also facilitates analysis of the artist's technique, potential historical interventions on the painting, and restoration actions like retouching.

The works were studied using an M-IR 10 infrared reflectography system, CTS, which comprises a camera attached to a tripod equipped with an infrared measurement sensor (IR10.2). The captured digital images were transferred to a computing system via a USB video connection. The camera sensor captured images in the near-infrared domain, with a spectral range ranging from 720 to 1100nm and a resolution of 5 megapixels. The lighting consists of two low-emission 250-watt halogen lamps that emit IR light without generating excessive heat.

**Optical Microscopy**

Optical microscopy is a scientific method for examining artwork. For paintings, this investigation allows for meticulous examination of the canvas, colour layers, the painter's technique, cracks, fissures, other forms of degradation, signatures, and fingerprints. The paintings were examined using a Nikon SMZ 800 microscope, with magnification ranging from 50x to 65x. The selection of analysis points corresponds to the chromatic palette of pigments employed by the artists in their creations.

**Non-destructive analysis**

Non-destructive analysis of paint materials was done using X-ray Fluorescence Spectrometry (XRF). The elemental analysis of inorganic pigments and ground layers was conducted in situ via X-ray fluorescence spectrometry (XRF). X-ray fluorescence spectrometry is a rapid and non-destructive analysis method based on the ability of chemical elements to emit energy in the form of X-rays when exposed to an excitation source (proton beam, electron beam, or X-ray beam). Since each element emits X-rays of characteristic energies, X-ray fluorescence spectrometry provides insights into the chemical elements present in an object. In situ determination of inorganic components within pigments and preparation layers was carried out using a portable SciAps X 200 XRF spectrometer. The apparatus is equipped with a Rh anode X-ray tube, operating at maximum parameters of 45kV voltage and 200μA current intensity. For spectrum acquisition and semiquantitative analysis, the Soil software was chosen for light matrices, with an excitation duration of 60 seconds. In selecting analysis points,
consideration is given to the focal spot size of the apparatus, ensuring each recorded spectrum predominantly corresponds to a single colour.

Practical and scientific results

I contend that any emerging artist has the duty to comprehend the specificities of the materials composing their works with the aim of refining their overlay in an experimental context. Otherwise, the artworks might deteriorate even within the artist's lifetime, thereby compromising their quality. The presented scenario is addressed through preventive conservation of the artwork, embodying "a set of permanent activities aimed at countering the actions of all factors that intervene in the mechanisms of deterioration or destruction of movable cultural assets, which can be carried out by an accredited conservator" [13]. It is essential to note that at times, there is a deliberate intention for an artwork to have a limited lifespan, as observed in the renowned works of the artist Anselm Kiefer. Whether we seek to expedite the process of degradation or prolong it, the acquisition of fundamental knowledge about conservation and restoration is indispensable.

Due to the inherently experimental nature of the paintings present in this project, with materials being utilised in an unconventional manner, disregarding the customary layering, and focusing solely on aesthetic characteristics, we may not be able to predict with great precision their long-term behavior. However, we can observe their evolution throughout our lifetimes and continue to study them. It's worth noting that acrylic, as a medium of expression, is relatively new (having been developed and explored since the 1950s) compared to oil paints, popularised by the artist Jan Van Eyck in the XVth century, or tempera, used since ancient Egyptian times. The renowned Fayum mummy portraits, some executed in encaustic wax and others in tempera, even containing organic pigments, bear witness to their remarkable durability over time. Thus, each artist who chooses to work in this manner assumes the potential for a more pronounced degradation over time in experimental works compared to those executed using traditional techniques. Similarly, purchasers of artwork also take on the responsibility of being well-informed regarding this aspect.

My work within the Proinvent project during the internship period involved examining 12 paintings on canvas created by students of the "George Enescu" National University of Arts, under the guidance of the staff from the Center for Conservation and Restoration at the "Moldova National Museum Complex", Iași (project partners).

Anka Vîrlan’s work is executed in mixed techniques composed of acrylic colours, ink, and gilded foil added at the end, over the previous dried layers (Fig. 1). As in the works that follow, the examination under direct visible light reveals an overall image of the artwork. Through oblique visible light examination, the working technique and brushwork are highlighted. Ultraviolet light reveals the absence of varnish, and in infrared reflectography, we can observe the preparatory drawings of the building and the boat. Due to the way materials have been overlaid and controlled, it is inferred that there is no imminent risk of degradation.

Ioana Gavril presents two works (Figs. 2 and 3). "Untitled" is a marker drawing on canvas, with the first layer consisting of a thin acrylic film. "Pink Facade" is created using the technique of photographic transfer, over which a monochrome oil glaze is juxtaposed. Under oblique visible light, the relief of brushwork is not visible in the former work, whereas in the latter, textures and small local reliefs of the working technique become apparent. Other differences between the works can be observed, such as the absence of varnish in Ioana Gavril’s first piece but its presence in the second. If not exposed to sunlight, markers can withstand the test of time without yellowing. In this case, the photographic transfer is protected by varnish. A similarity lies in both works, where the preparatory drawing cannot be discerned either with the naked eye or through IR reflectography.
Fig. 1. Anka Vîrlan, *Untitled* (detail), mixed media, examined in visible light, oblique visible light, UV light, infrared reflectography

Fig. 2. Ioana Gavril, *Untitled* (detail), mixed media, examined in visible light, oblique visible light, UV light, infrared reflectography
Fig. 3. Ioana Gavril, *Pink Facade* (detail), mixed media, examined in visible light, oblique visible light, UV light, infrared reflectography

Fig. 4. Ana Amariei, *Hidden Secrets* (detail), mixed media, examined in visible light, oblique visible light, UV light, infrared reflectography
The tests show us that Ana Amariei's work (Fig. 4) does not exhibit signs of rapid degradation due to the order in which the layers of materials were arranged. Photographic transfer was used, and it was further enhanced with a linseed oil glaze. The structures were created using coloured acrylic relief paste and varnished with linseed oil.

The artist and restorer Remus Ioan Popa contributed to the project with the artwork "Venice Carnival" (Fig. 5). In the mixed media he employs, he uses wax, damar resin, loose pigments, shellac, aniline, and gold leaf (23k pureness). These materials collaborate seamlessly, forming a mixed technique that poses no compatibility issues. Despite their differences, in oblique visible light, sections can be clearly seen where overlays and subtle reliefs of materials are present. Examination under ultraviolet light reveals that the artwork lacks varnish but showcases the fluorescence of the damar resin within the composition of the colour layers. The drawing that would compose the artwork isn't visible through infrared reflectography, suggesting either the colour layers are thick and numerous or the work was executed directly with a brush without a preliminary pencil or charcoal drawing.

Fig. 5. Popa Remus Ioan, Venice Carnival, (detail), mixed media, examined in visible light, oblique visible light, UV light, infrared reflectography

Due to the complexity of the materials constituting the utilised mixed technique, an examination through optical microscopy (Fig. 6) was conducted, highlighting the layers of colour and working technique.

It was discovered that the colour is a mixture of binder and granules of ochre, red, brown, and white pigments. Non-destructive analysis of painting materials using X-ray fluorescence spectroscopy (XRF) indicates that among the colours used are English Red (Fe and Ca) and Ochre (Fe and Ca), and the metallic gold leaf component consists of Au 9.33% and Hg 0.671%.

Daniela Ursaciuc (Fig. 7) employs fluid textures in which water and boiled linseed oil are layered together (visible in oblique light). Consequently, islands of oil are formed (highlighted under ultraviolet light). This structure, although artistically intriguing, carries a higher potential for degradation due to the incompatible materials it comprises. Acrylic is
Another current medium. The syringe technique is also approached with care. It involves using a syringe with an attached needle to trace the drawing's shape or create structures. The preparatory drawing is observable in infrared reflectography.

Fig. 6. Popa Remus Ioan, *Venice Carnival*, (detail),
Non-destructive analysis of painting materials using X-ray Fluorescence Spectrometry (XRF)

Fig. 7. Daniela Ursaciuc, *Untitled* (detail), mixed media,
examined in visible light, oblique visible light, UV light, infrared reflectography

The artwork underwent another examination via optical microscopy (Fig. 8), revealing areas with pigments granules clustering together. Using photographic transfers of personal photos from Venice, Victoria Cucoranu creates a composition in which she combines and
integrates washes of acrylic and ink (Fig. 9). In certain areas, the wet-on-wet technique is visible (clearly seen in oblique light).

The fluorescence of the colours used is evident under ultraviolet light examination, especially in the photographic transfer area. There’s a high probability that the inks used for the
image printing might have an influence on this matter. Infrared reflectography doesn't show traces of an initial drawing, indicating an emphasis on expressive, intuitive, gestural painting experience. The inks used are rather sensitive and may fade over time if not protected by the presence of a varnish to set them.

Mariana Hultoană's "Rădăcinile Pământului" (Fig. 10) showcases oil colours, acrylics, ink, paper collage, and components of a face mask that contains clay and charcoal (some of the elements composing the mixed technique are visible in direct light). The aforementioned materials, including the acrylic runoff placed atop a layer of oil colours, can dry and crack. As previously mentioned, if the artwork lacks varnish for protection, such delicate structures can detach due to the poor adhesion of plasticized acrylic onto a glossy surface formed by the oil colors. This has already occurred and is visible to the naked eye.

![Fig. 10. Mariana Hultoană, Rădăcinile Pământului, (detail), mixed media, examined in visible light, oblique visible light, UV light, infrared reflectography](image)

Under ultraviolet light examination, the varnish is absent, yet the fluorescence of the used colours is observable. Additionally, the artwork underwent another test: a non-destructive analysis of the painting materials using X-ray fluorescence spectroscopy (XRF), which determines the elemental analysis of inorganic pigments and the ground layer. The canvas's composition was found to include Ca, Ti, S, and Ba, constituting chalk, titanium white, and barium sulphate.

In various sections, we observe organic blue, zinc white, and a green containing Fe, and the visible end result is an earthy green and a yellow shade containing Fe and Zn, resulting in an ochre hue. It's a common practice among students to use materials of the same technique from different brands within the same artwork, which isn't always a prudent approach. While some pigments can easily withstand mixing and application on the surface and show long-term resistance, others repel each other, resulting in curdled colour consistency (a frequent occurrence when mixing oil colours from different brands). Certainly, in the experimentation with mixed techniques, where there are no restrictions, encountering such situations is highly likely.

Stefania Ciobanu also uses soil in her work "Pământul de pe apă" (Fig. 11), but not clay but rather common soil and acrylic colors. Following the tests conducted in direct visible light,
the following resolution was derived: the artwork presents a textured surface, especially in the area where soil was used. The long-term durability is questionable, particularly in this area due to its potential for cracking. Under ultraviolet light, it can be seen that there is no protective varnish layer. Certainly, it would protect the sensitive materials composing this work, but a glossy varnish would also diminish the expressiveness of the matte surfaces. Infrared reflectography reveals a preparatory drawing. Oil colours were detected through non-destructive analysis of painting materials using X-ray fluorescence spectroscopy (XRF).

Fig. 11. Stefania Ciobanu, Pământul de pe apă, (detail), mixed media, examined in visible light, oblique visible light, UV light, infrared reflectography

Fig. 12. Cristiana Aniță, A part of Venice, (detail), mixed media, examined in visible light, oblique visible light, UV light, infrared reflectography
The composition of the canvas preparation includes the subsequent components: Ca, Ti, Zn, and S, which form a fine chalky layer applied for protection, improved adhesion, spread, and subsequent luminosity of the colours utilized. The presence of titanium white, zinc white, a muted ochre composed of Fe, a brown ochre, a violet colour containing Ti, titanium white, zinc white, and organic blue were also discovered.

Cristiana Aniță joins the project with the work "A part of Venice" (Fig. 12), composed of different sections presenting Venice through photographic transfer and acrylic washes with various shades of blue.

The same tests were carried out. In summary, it can be asserted that the specific transparency of water-diluted acrylic and oil drips where transferred photographs overlap on the canvas exhibits the expected characteristics. This is the first work created within the project. Having been completed for almost a year, I can attest that there are no visible signs of degradation or yellowing. Better preservation can be achieved through intervention with a protective varnish layer.

Andrea Nedelcu's work, "Intimacy" (Fig. 13), represents a collage with paper as the main material. Different layers of paper are glued to the canvas surface. Some of them, through tearing or being detached, contribute to the formation of the intervention known as "decollage" (more easily observed in direct visible light).

Over the existing layers, we found intervention with varnish, pastels, and acrylic colours, forming structures through splashing, dripping, and scraping. The fluorescence of the colours used is clearly visible under ultraviolet light. Infrared Reflectography provides a very clear view of the drawing. The fragility of the paper and the manner of its application, while expressive, are not very conducive to long-term durability.

George Sâvescu's artwork, "Night Sky over Venice" (Fig. 14), engages with oil, acrylic, and tempera colours through gestural techniques like splashing to create an abstract composition. In the examination under oblique visible light, the small details forming the impastos—grainy textures made up of thickened colour—are clearly visible. These elements pose the risk of detaching from the canvas, either over time or due to external influences.

Fig. 13. Andrea Nedelcu, Intimacy, (detail), mixed media, examined in visible light, oblique visible light, UV light, infrared reflectography
Under ultraviolet light examination, the fluorescence of the varnish applied only in specific areas becomes apparent. No preliminary drawing was made before applying the colour layers; hence, nothing is visible in the infrared reflectography examination.

![Image](image.jpg)

**Fig. 14.** George Săvescu, *Night sky over Venice*, (detail), mixed media, examined in visible light, oblique visible light, UV light, infrared reflectography

Non-destructive analysis of painting materials using X-ray fluorescence spectroscopy (XRF) reveals that the ground layer is composed of Ca, Ti, Zn, Ba, and S. Zinc white and barium sulphate are also present, along with organic blue and organic yellow pigments.

**Conclusions**

Relevant research details of artworks created by students that follow the Bachelor's and Master's study programmes at the "George Enescu" National University of Arts in Iași were presented within this paper. The research was conducted by myself, as an artist and postdoctoral researcher, alongside the team from the Conservation and Restoration Center at the "Moldova National Museum Complex," Iași, for the Proinvent project.

Despite the mixed media approach, the elemental commonality binding all the works as part of a series and holding significance in the final exhibition is the use of acrylic colors. "The acrylic medium can be utilised with distinct aesthetic and artistic values in very delicate washes and glazes or in highly expressive impastos, producing rich texture and structure effects" [14]. These characteristics aid artists worldwide in exploring its incredibly versatile expressive potential.

Given the experimental and evocative nature not only of the technique employed but also its application, it's quite easy to overlook the layering sequence or the general approach when creating a work of this nature. Discovering the layering order, colour composition, and techniques largely contributed to making assumptions about the paintings' long-term durability. The experimental work benefits students by helping them practically understand how certain materials behave and the structures they can develop. Students learn in their academic journey about diverse methods of work to comprehend and decide upon which artistic directions to
pursue. Author Rudolf Arnheim, an art and film theorist and perceptual psychologist, wrote in his book "Art and Visual Perception": "We do not know what the art of the future will look like. No style constitutes the zenith of art. Each style is merely a way of seeing, an image of the sacred mountain that presents us with different aspects from different places" [15]. Hence, I encourage students to experiment until they find their artistic path, both initially and ongoing.

The subsequent stage of the Proinvent project, in which I am involved and which aims to elevate the standards of doctoral and postdoctoral research as well as innovation, entails showcasing the artworks within an exhibition space.

In conclusion, this scientific article offers artists, students, and researchers an insight into the pictorial experiments carried out by students of the "George Enescu" National University of Arts, whose research was aided by the equipment and staff of the Centre for Conservation and Restoration at the "Moldova National Museum Complex," project partners.

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