

# BRVKENTHAL. ACTA MVSEI

## VII. 4



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**VII. 4**

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**A COPY THAT DOES JUSTICE TO ITS MODEL: THE MASSACRE OF THE INNOCENTS BY  
PIETER BRUEGHEL THE YOUNGER  
(SIBIU, MUZEUL NAȚIONAL BRUKENTHAL)**

**Dominique ALLART, Christina CURRIE and Steven SAVERWYNS**

*Hoe dat daereen gantsch gheslacht soecken te verbidden een Boerigh kindt dat een der moordighe krijght luyden ghevat heeft om te dooden den rouwe en t'versterven der Moeders en ander werckinghen wel nahgenomen wesende.* Karel van Mander<sup>1</sup>

**Abstract:** *The relationship between Pieter Brueghel the Younger's Massacre of the Innocents in Sibiu and Pieter Bruegel the Elder's original version in Hampton Court is examined as part of a technical study of the copy's techniques and materials. The authenticity of its atypical signature is affirmed. The oak panel with its maker's mark, black chalk underdrawing, preparatory layers, use of the blue pigment smalt and aspects of painterly handling are discussed in relation to other works examined by the same artist. The likely copying process is also considered.*

**Keywords:** *Bruegel, Brueghel, Massacre, underdrawing, cartoon, smalt, black chalk*

**Abstract:** *Legătura dintre tabloul Masacrul Inocenților pictat de Pieter Brueghel cel Tânăr aflat în colecția Muzeului Național Brukenthal, Sibiu și versiunea originală a lui Pieter Bruegel l cel Bătrân din Hampton Court este cercetată în studiul tehnicii picturale și al materialelor folosite în copii. Autenticitatea semnăturii atipice este confirmată. Panoul de stejar cu semnătura executantului, desenul pregătitor cu negru de cărbune, straturile de preparație, folosirea smaltului și aspectul pensulației sunt dezbătute în relație cu alte picturi de același artist studiate.*

**Cuvinte-cheie:** *Bruegel, Brueghel, masacru, carton, smalt, negru de cărbune*

From September 2011 to April 2012, Pieter Brueghel the Younger's *Massacre of the Innocents* from the Muzeul Național Brukenthal in Sibiu (Romania) came to the Royal Institute for Cultural Heritage in Brussels for examination and restoration in preparation for the exhibition *Brueghel, Cranach, Tizian, van Eyck. Meisterwerke aus der Sammlung Brukenthal* at the Villa Vauban in Luxembourg. The results of this study are given here.<sup>2</sup>

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<sup>1</sup> How one sees an entire family begging for the life of a peasant's child that a cruel soldier has seized to kill, and the desperation and swooning of mothers, and also other equally distressing scenes (Van Mander 1604 (1994-1999), fol. 233 v°, translation by the authors). Karel van Mander is describing a painting by Pieter Bruegel the Elder of the Massacre of the Innocents, which according to him is in the Imperial collections. It is most likely the original version of the composition, discussed below.

**An original composition by Pieter Bruegel the Elder. Copies by Pieter Brueghel the Younger.**

Various medieval sources, and particularly the *Legenda aurea* by Jacques de Voragine, describe in great detail a terrible event mentioned briefly in Saint Matthew's Gospel (11: 16-18): the execution of all male infants aged two and under in Bethlehem and its vicinity, on the orders of King Herod. (Réau 1957, 267-272; Kirschbaum 1970, 510-514).<sup>3</sup>

The composition painted by Pieter Bruegel the Elder (c. 1525/30-1569) is one of the most poignant

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<sup>2</sup> The present study is a slightly modified English version of the essay in the catalogue of this exhibition: D. Allart *et al.* 2012, 73-87.

<sup>3</sup> On the same subject in Renaissance art, especially in the Netherlands, see also Kunzle 2001, 35-62.

ant interpretations of the story (Fig. 2). The artist heightened the dramatic impact of the scene by locating it in a contemporary setting; under his brush, it is transformed into a tragedy striking a peaceful Flemish village in deepest winter.<sup>4</sup> The ruthless and pitiless soldiers, the terrorized peasants and the blood-stained victims may refer to the on-going civil war in the Netherlands against the Spanish occupant.<sup>5</sup> But Bruegel portrayed the horrors of the scene in such a way as to render it compelling, even attractive. The viewer is not immediately aware of the tragedy taking place, first drawn towards the richly coloured and decorative paint surface. The gradual discovery of the violence being meted out on innocent families is therefore all the more shocking: pleading or distraught mothers clutching small maimed or bloody bodies; parents trying to protect or hide those children still alive and – in shocking contrast – the impassivity of the soldiers in armour, ranked in tight formation at the back of the village green, the resigned impotence of the cavalryman with the feathered hat to whom the desperate peasants plead in vain,<sup>6</sup> the imperturbable calm of the brutish soldiers executing orders. As is often the case with Bruegel, the human drama takes place in a beautiful landscape, in this case enhanced by snow under a bright sky, which renders the absurdity of the scene even more striking. It is hardly surprising that this magnificent composition was reproduced many times.

It was Pieter Brueghel the Younger (1564/5-1637/8), elder son of Pieter Bruegel, who popularised the image the most. He carried out numerous faithful same-size copies of his father's model, several of which have come down to us.<sup>7</sup> The

painting in the Brukenthal collection stands alongside the best versions (Fig. 1).<sup>8</sup>

This composition is not the only one that Pieter Brueghel the Younger copied after Pieter Bruegel the Elder. His career began in 1584-5, years after the death of his father when he was a young boy of four or five. He exploited Bruegel the Elder's reputation and success on the art market by specialising in the production of replicas (identical copies after painted models) and pastiches (works in which 'Bruegelian' motifs were freely integrated) of his father's works.<sup>9</sup> With the help of his studio assistants, he contributed to the spread of his father's best-loved compositions with numerous versions of variable quality, according to a targeted clientele.

In the case of the Sibiu painting, the main issues for investigation were the technical means the copyist employed in order to produce such a faithful replica and the question of access to the original version.<sup>10</sup> In fact – astonishing as it might seem – Pieter Brueghel the Younger was not always able to see the paintings that he so faithfully reproduced: during the period he started working, Pieter Bruegel the Elder's paintings were dispersed in private collections and many were inaccessible. Our research on the copies of the son enabled us to establish that in certain cases, he had to make do with preparatory material inherited from his father, no doubt jealously guarded by the family. This material must have included sketches, small-scale drawings and cartoons; it was sufficiently precise to enable the execution of faithful reproductions to the same scale that only diverged from the models here and there and in certain colours. In other instances, though, it would seem that Pieter Brueghel the Younger was able to examine the original

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<sup>4</sup> In treating the subject as a winter scene, the artist took into account the Feast of the Holy Innocents, celebrated on 28 December. Similarly, he often placed Nativity scenes in snowy winter landscapes. This is the case of the *Census at Bethlehem* (Brussels, Royal Museums of Fine Arts), a work that has sometimes been considered a pendant to the *Massacre of the Innocents*, and the *Adoration of the Magi* in Winterthur (Dr Oskar Reinhart Collection "Am Römerholz").

<sup>5</sup> For an excellent summary of opinion concerning the possible political allusions in the painting, as well as useful commentary, see Campbell 1985, 18-19. See also the catalogue entry by the same author in Shawe-Taylor and Scott 2007, n° 14, 88-91.

<sup>6</sup> According to Charles de Terlinden, and reiterated by Lorne Campbell, this figure could be a herald: Terlinden 1942, 251; Campbell 1985, 14.

<sup>7</sup> Two of the best copies from Pieter Brueghel the Younger's workshop are mentioned below, in notes 12-13.

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<sup>8</sup> Oil on panel, 115.2 x 163.7 cm, signed 'P BRVEGEL' in the lower right corner, Sibiu, Muzeul Național Brukenthal, inv. n° 148. The oldest known reference to this work relates to its acquisition in Vienna by Baron Samuel von Brukenthal (1721-1803). It was perhaps a gift by the Empress Maria-Theresa. On this, see Marlier 1969, 73, n° 2; Campbell 1985, 15-16; Ertz 1998-2000, n° E291.

<sup>9</sup> On Pieter Brueghel the Younger, see particularly Marlier 1969; Ertz 1998-2000; P. van den Brink 2001; Currie, Allart, 2012.

<sup>10</sup> Occasionally, Pieter Brueghel the Younger copied the work of other artists. In particular, he painted several examples of the *Massacre of the Innocents* after an alternative model, lost today, attributable to Maerten van Cleve. On this subject, see Currie, Allart 2012, vol. 2, 646-669 (with prior bibliography).

model by his father.<sup>11</sup> This was the case for the present composition, as we will demonstrate below.

Before treating this question, several points concerning the model by Pieter Bruegel the Elder should be raised. For a long time, art historians wavered between several good quality versions, all similar to one other: a version in the Kunsthistorisches Museum in Vienna,<sup>12</sup> another in the former Baron Decamps collection in Brussels,<sup>13</sup> a version in the British Royal Collection in Hampton Court,<sup>14</sup> and the version in the Brukenthal collection in Sibiu.<sup>15</sup> Today, the issue can be considered solved: everyone acknowledges the original prototype by Bruegel the Elder as the painting in Hampton Court. Unfortunately, this work has come down to us in a much-altered state. Many changes have been introduced to attenuate the atrocity of the scene. The dead children have been replaced by trivial motifs – bundles of washing, animals and various utensils – and in this way, the biblical episode has been metamorphosed into a village pillage scene. Details have been painted out, such as the scattered clothing of a dead baby that was lying on the knees of its mother in the snow (Fig. 15c). Flames had been added to suggest burning houses, but these were removed during restoration in 1941-2 (Campbell 1985, 14).

The painting in Hampton Court has a prestigious ‘pedigree’. Before entering the English Royal Collection in 1660-1662, it belonged to Queen Christina of Sweden (1626-1689), and prior to that was in the Imperial collection. At the beginning of the

seventeenth century, it was owned by Emperor Rudolf II of Hapsburg (1552-1612), the great collector of Bruegel’s paintings. In his *Schilder-Boeck* (Haarlem, 1604), Karel van Mander attests to this, drawing attention to the moving nature of the work (Van Mander 1604 (1994-1999), fol. 233-234, vol. I, 192-195). From 1617, old inventories and written sources describe the work as a scene of pillage, indicating that the changes were prior to this date; it even possible that they were made at the behest of Rudolf II himself.<sup>16</sup> A lack of evidence prevents us from tracing the painting’s history further back. We do not know therefore the circumstances in which Bruegel the Younger was able to examine and copy it. It was in any case before Rudolf II acquired the painting, as Bruegel the Younger was not able to see the superb collection of works by his father that the Emperor had amassed at Prague. It cannot have been later than 1593, the date inscribed on the Lons-le-Saunier version,<sup>17</sup> which is also the earliest signed and dated painting by Bruegel the Younger.

Bruegel the Younger reproduced the original version of the *Massacre of the Innocents* as it appeared before its transformation. The copies that he or his studio executed therefore reflect details that were present in the original before it was changed into a scene of the sacking of a village. The most disturbing of these are the dead children, clearly depicted in the Sibiu painting. It is also possible to make out white crosses on the standard floating about the soldiers (Fig. 3a), whose arrangement suggests the coat of arms of Jerusalem, in reference to King Herod who ordered the massacre. This motif seems to have initially appeared on the Hampton Court painting, before being replaced by the heraldic motif of the ‘lion passant’ (Fig. 3b).<sup>18</sup> In the Sibiu version, the cavalryman with the feathered hat to whom the peasants beg in vain to intervene wears a tabard with a double-headed eagle, in reference to the Imperial power that Herod claimed to serve (Fig. 4a). In the original version, traces of the double-headed eagle can be made out under the purely ornamental motif that

<sup>11</sup> This issue, simplified here, is at the core of the work by Currie and Allart 2012.

<sup>12</sup> Oil on panel, 116 x 160 cm, signature cut, lower right: BRVEG. See particularly Marlier 1969, p. 72, n° 1; Demus *et al.* 1981, 118-122; Ertz 1998-2000, n° E298.

<sup>13</sup> Transferred from wood to canvas, 115 x 164.5 cm, signed in the lower right ‘BRVEGEL’, Paris, Ader Picard Tajan, 28 March 1979, n° 144; Sotheby’s London, 7 December 2005, lot 23; Christie’s London, 3 July 2012, lot 45; Marlier 1969, 69, 72, n° 3; Ertz 1998-2000, n° E296.

<sup>14</sup> Oil on panel, 109.2 x 158.1 cm (cut along the top, bottom and right), remains of a signature, date missing or lost, Hampton Court, The Royal Collection, Her Majesty Queen Elizabeth II, RCIN 405787, Campbell 1985, n° 9, 13-19; *Id.*, in Shawe-Taylor and Scott 2007, n° 14, 88-91.

<sup>15</sup> Theodor von Frimmel attributed the Sibiu version to Pieter Bruegel the Elder in 1915: Von Frimmel 1915-1916, 136.

<sup>16</sup> On the provenance of the work: Campbell 1985, 14, 17. On the hypothesis of a transformation at the behest of Rudolf II: *Id.*, in Shawe-Taylor and Scott, 88.

<sup>17</sup> Oil on panel, 117 x 163 cm, signed and dated 1593, Lons-le-Saunier, Musée des Beaux-Arts, inv. n° 6.

<sup>18</sup> The coat of arms of Jerusalem perhaps had a double meaning, according to Lorne Campbell: King Philip II of Spain also considered himself King of Jerusalem (Campbell 1985, 14).

has covered it over (Fig. 4b). The star on the inn sign, an obvious allusion to the Star of Bethlehem, has disappeared in the original version, where only the inscription 'Dit is inde ster' remains;<sup>19</sup> it is clearly visible in the Sibiu copy (Fig. 5a-b). In the Hampton Court painting, the face of the rider dressed in black leading the armed troop has been retouched;<sup>20</sup> it is impossible to make out his original appearance through this paint (Fig. 6b). In certain copies by Brueghel the Younger, and in particular the Sibiu painting, his long forked beard suggests the appearance of Don Fernando Álvarez de Toledo, the feared Duke of Alba (1507-1582). He was sent to the Netherlands in 1567 by Philip II of Spain to quash the waves of rebellion that had reached crisis point in 1566 (Fig. 6a). Criticism of the Duke of Alba and his bloody repression became more overt after he had left the Netherlands in 1573. It is hard to envisage beforehand, as it would have been violently suppressed.<sup>21</sup>

<sup>19</sup> *Ibid.* See also the entry of L. Campbell in Shawe-Taylor and Scott 2007, n° 14, 88-91, especially 90, where the author suggests a judicious link with the house of Hieronimo de Curiel, an agent of Philip II whose actions made him one of the most hated figures in the Netherlands. This house was in the Kipdorp in Antwerp, and was called 'De Sterre van Bethleem'. On the subject of this house where – a troubling coincidence – the painting by Bruegel with the *Census at Bethlehem* seems to be located at an early date, see also Currie, Allart 2012, vol. 1, 102-103.

<sup>20</sup> It would appear to be the 'drossart du Brabant' (local magistrate of Brabant), according to Charles Terlinden (Terlinden 1942, 250-251). This character, who, in Brabant, was initially appointed to follow up on complaints against officers, was also later the one who tracked down vagrants and punished them for offenses that were not recognised as such by the laws of the land ('des cas énormes et privilegiez dont la cognoissance et judicature n'appartient pas aux lois du pays mais doivent être puniz et corrigez seignoreusement'). On the duties of a 'drossart', see Pouillet 1882-1892, 118, §215. The identification suggested by Terlinden was taken up by many writers, but should probably be reconsidered (on-going study by Dominique Allart).

<sup>21</sup> Stanley Ferber previously maintained that Pieter Bruegel the Elder had indeed taken this risk. He based his opinion on the version in the Kunsthistorisches Museum in Vienna (that he thought to be the original) where, as in the Sibiu version, the character in question wears a long beard like that of the Duke of Alba: cf. Ferber 1966, 205-219. Unfortunately, it is impossible to gauge the original appearance of this character in the Hampton Court painting, which has been retouched in this area (Campbell 1985, 14).

The theory that Bruegel dared allude to the formidable governor presupposes that the painting dates from 1567

### An ambiguous signature

Artists' signing their works was not frequent in the Renaissance. In the Netherlands in the sixteenth century, and still more in the seventeenth, it was not an established tradition. Pieter Bruegel the Elder was therefore somewhat unusual among his contemporaries for having signed the majority of his paintings. His elder son did not follow his example, adding his signature to a relatively limited number of works leaving his workshop. It is difficult to give a reasoned explanation on this point. Although Pieter Brueghel the Younger's signature often appears on high quality paintings, this is not always the case; furthermore, several of his most remarkable works lack signatures.<sup>22</sup>

The spelling of both father and son's signatures varied throughout their careers. Up until 1559, Pieter Bruegel the Elder signed 'brueghel' (in lower case letters). Afterwards, it became 'BRVEGEL' in Roman capitals. It appears in this form on most paintings by the artist, often accompanied by a date in Roman numerals. The inscription is punctuated by dots placed at mid-height of the characters. Pieter Brueghel the Younger's signature is similar to that of his father in the use of Roman capitals, but distinguishes itself by the presence of the initial of his first name and the spelling: up until 1616, he signed 'P·BRVEGHEL' (with an 'H' after the 'G'); after that date he used the form 'P·BREVGHEL'.<sup>23</sup>

There are exceptions, however, and the signature on the Sibiu painting is one of them (Fig. 7). It is in the lower right corner, as in the original model.<sup>24</sup> It is written in the form 'P·BRVEGEL'. Its style, in Roman capitals, the presence of dots at mid-height

at the earliest, as 1567 was the year in which Don Fernando Álvarez de Toledo arrived in the Netherlands with his *tercios*. This compelling hypothesis – generally rejected by art historians – will be reconsidered elsewhere by Dominique Allart.

<sup>22</sup> On this subject, see Currie, Allart 2012, vol. 3, 812.

<sup>23</sup> At the initiative of Georges Marlier, author of the first great monograph on Brueghel the Younger (Marlier 1969), we cite the artist's name using the first spelling, so as to distinguish him from his father whose name is generally spelt 'Bruegel' by art historians. For a more detailed discussion of the signatures of Pieter Bruegel the Elder and Pieter Brueghel the Younger, see Currie, Allart 2012, 74-81.

<sup>24</sup> In the original version in Hampton Court, the signature is only partially visible, as the painting has been cut down slightly along its lower and right sides (see note 14). It is only possible to make out the upper part of the inscription 'BRVEG'. On this, see Campbell 1985, 15.

of the characters, and even – more surprisingly – in the spelling of the name, closely imitates the signature of Bruegel the Elder, to such a degree that it is worth considering whether the copyist wished to pass off his replica as an original by his father. Yet Brueghel the Younger has never been suspected of such dubious practice before. Usually, in his signed works, the presence of a date prevents any confusion. Examples of ambiguous signatures from the point of view of spelling remain the exception.<sup>25</sup> Nonetheless, in the Sibiu painting, binocular microscope examination confirmed that the signature in the form ‘P·BRVEGEL·’ was intact and authentic in every way. We cannot therefore completely ignore the possibility that Brueghel the Younger could have signed his replica in such a way as to cause it to be mistaken for an original by his father.<sup>26</sup> But it would be incautious to be overly affirmative, given the presence of the initial ‘P’ for ‘Pieter’, a characteristic of the signatures of the copyist and never found on paintings by his father.

### In the Workshop of Pieter Brueghel the Younger

The technical study of the Brukenthal collection’s *Massacre of the Innocents*, seen in the context of research carried out over the past few years by the KIK-IRPA on a large number of paintings from Pieter Brueghel the Younger’s workshop, shows that the work is entirely typical of the artist’s production. Furthermore, its underdrawing and exquisite painterly handling place it among the artist’s highest quality works and betray without a shadow of a doubt the hand of the master rather than that of a workshop assistant.

#### Support

The painting is executed on an oak panel, made up of four planks butt joined and held in place by wooden dowels. The boards are of the highest quality radial cuts, although two planks contain sapwood, which is susceptible to insect damage.<sup>27</sup> The panel was prepared by an external supplier, as

evidenced by the presence of a panel-maker’s mark on the reverse (Fig. 8). This mark consists of three unevenly sized crossbars, and has been struck twice; the second time more firmly and partially going over the first. It remains unidentified, although could possibly be that of Hans Van Haecht (working dates: 1589-c. 1621), as it is quite similar to the symbol drawn beside his name in a list of Antwerp panel-makers and their marks from 1617 (Van Damme 1990, 195, 205, 234).<sup>28</sup> The mark is unaccompanied by the Antwerp brand, which was a quality control mark certifying inspection of the finished panel by the dean of the guild of St Luke. This could mean that the panel was made prior to 1617, since branding was not obligatory before then.<sup>29</sup>

Along the left and right sides, there are unprepared borders with *barbes* of ground. These are mirrored by corresponding rebates on the reverse of the panel (Fig. 9). These redundant features, seen in the majority of Brueghel the Younger’s large-format panels, most likely housed temporary, grooved battens sometimes described as channel edge supports; the battens would have been slotted onto the sides of the panels at right angles to the grain of the wood prior to ground application, and removed just before framing. Their purpose would have been to prevent warping and to facilitate handling of the panel during painting, as well as providing a provisional reinforcement for the newly joined planks. Bruegel the Elder’s original version of the *Massacre of the Innocents* may also have been temporarily protected in this manner, as there is an unprepared border on the left side (the right side of the panel has been cut down).<sup>30</sup>

#### Preparatory layers: Ground and Imprimatura

<sup>28</sup> We thank both Jørgen Wadum and Jean-Albert Glatigny for pointing out the similarity between the marking on the back of the Brukenthal panel and that of Hans Van Haecht.

<sup>29</sup> Jørgen Wadum also noted the same mark on a version of the *Procession to Calvary* by Pieter Brueghel the Younger, 121.2 x 162.7 cm, Copenhagen, Statens Museum for Kunst, inv. n° KMS1645. This maker’s mark, which features on a panel also made up of four oak planks, is not accompanied either by the Antwerp brand. We thank Jørgen Wadum for sharing this finding with us.

<sup>30</sup> For further observations on unprepared lateral borders in Flemish panel painting of the sixteenth and early seventeenth centuries, see Currie, Allart 2012, vol. 1, 246-248 and vol. 3, 732-733.

<sup>25</sup> We do not consider atypical inscriptions mentioned by authors who have clearly transcribed them without having examined them.

<sup>26</sup> It is worth mentioning a similar signature on another version of the same composition, a painting in the former Descamps collection (see note 13). This painting could not be examined *in situ* by the authors of the present article, who cannot comment on the authenticity of its signature.

<sup>27</sup> We thank Pascale Fraiture, dendrochronologist at the KIK-IRPA, for this observation.

Only one small cross-sectional sample of the painting could be taken, at the border of a paint loss in the blue sky (Fig. 10a-b). The sample was analysed by scanning electron microscopy with energy dispersive X-ray detection (SEM-EDX) and micro-Raman spectroscopy (MRS). It shows a classical stratigraphy for an easel painting of the late sixteenth and early seventeenth century, with a white chalk and glue ground followed by a tinted sealing layer known as an *imprimatura* consisting of lead white and a small amount of charcoal, probably in oil. The thin paint layer lies on top.

The white chalk ground may have been applied by a professional *witter* (primer) or by the panel-maker.<sup>31</sup> It would have been applied in more than one session and smoothed down after drying with a metal scraper, knife or spatula. Finishing would have been done with an abrasive material such as horsetail, cuttlefish or sharkskin. Some deep diagonal scratches in the ground in the vicinity of the church were inadvertently left behind.

The *imprimatura*, as well as sealing the chalk ground, was almost certainly applied in Brueghel's workshop as it also played a role in the tonality of the painting. Its slightly beige tint gives a warm appearance to the work as a whole. It was applied in wide sweeping brushstrokes that are slightly visible in infrared (Fig. 13).

#### *The Underdrawing*

As might be expected in a copy and typical for Brueghel's paintings, there is a complete and detailed underdrawing, applied directly on the *imprimatura*. This is fully visible in infrared reflectography and discernible in places with the naked eye through translucent paint (Figs. 11, 13, 16a).

Prior to the study of the *Massacre of the Innocents*, we had identified several cases of the artist using graphite as underdrawing medium. This was a significant finding: up to this point graphite had never been positively identified in Brueghel's underdrawings, nor indeed in those of any of his Flemish contemporaries.<sup>32</sup> The medium of the Sibiu painting's underdrawing was interesting to consider in this context.

Our XRF analyses on underdrawings of Brueghel's

paintings had led to inconclusive results, due to interference from other elements present in the paint layer(s), *imprimatura* or ground.<sup>33</sup> Measurements with MRS on cross-sections containing the underdrawing were more successful. However, since it was not possible to obtain a cross-section of the *Massacre of the Innocents* with the underdrawing present, we attempted to identify the drawing material non-invasively using MRS. We noticed a small section of underdrawing exposed at the surface at the corner of a snowy rooftop, free of any overlying paint, which made it feasible to conduct non-invasive analysis (Fig. 12). After removing the varnish – which can fluoresce and thus obscure the MRS signal – we took measurements of black particles in the underdrawing that were clearly visible with the 20x objective of the optical probe of the Raman instrument.

In contrast to our previous studies of underdrawings in paintings by Brueghel the Younger, black chalk – and not graphite – was identified as the drawing material. To confirm the optical probe measurements, we sampled a few particles of the drawing material and analysed them with the classic MRS set-up. For each and every particle we obtained a spectrum pointing to black chalk.

In conclusion, the analyses carried out up until now on underdrawings by Pieter Brueghel the Younger show that they were sometimes executed in graphite and sometimes in black chalk.

#### *The Use of Preparatory Cartoons*

Our research has shown that the systematic use of cartoons lies at the heart of Brueghel the Younger's copying practice. Through the superposition of our tracings of his paintings, we have demonstrated that in some cases whole compositions and in others groups of motifs fit together perfectly; indeed, in certain instances, we were able to show that these also superpose partly or wholly over the original versions by Bruegel the Elder that they reproduce. But in the vast majority of Brueghel the Younger's works, there are no physical traces of the use of cartoons and the actual method of image transfer remained a mystery for a long time. A version of the *Battle between Carnival and Lent* finally revealed the secret of Brueghel's copying practice. In this painting, infrared reflectography unmasked the presence of dotted outlines in several places, betraying without a shadow of a doubt the use of a pricked cartoon or sets of smaller pricked cartoons (Fig. 14) (Currie, Allart 2012, vol.

<sup>31</sup> See Wadum 1998, 165-168, for an overview of the application of grounds by specialist *witters* and panel-makers in the early seventeenth century.

<sup>32</sup> On this, see Currie, Allart 2012, vol. 3, 752-755. See also, in the same volume, Appendix IV on the scientific examination of the underdrawing (Christina Currie and Steven Saverwyns, 980-1001).

<sup>33</sup> *Ibid.*

2, 348-356). These working sheet or sheets would have shown the motifs to be transferred, each pricked along their outlines. To transfer the design, the cartoon would have been laid on the final support and a dark pigment carefully pounced through the holes (in this case carbon black, which shows up clearly in infrared reflectography). The result would have been a series of dotted lines on the final surface, which the artist would then have joined up in graphite or black chalk. He would then have wiped away all traces of the loose powder, so as to prevent it from sullyng the paint.<sup>34</sup> The fact that pouncing dots have survived in certain areas in the *Battle between Carnival and Lent* is therefore an oddity; it is likely that in these zones the *imprimatura* was not completely dry during the pouncing process and that the black particles became trapped in it.<sup>35</sup>

It is worth pointing out that this copying method led to freehand underdrawing. As a result, the drawing lines detected in infrared are not mechanical and impersonal, as might be the case with tracing, for example. They retain a certain wiry character, and can sometimes be quite spontaneous and expressive, making it possible to comment on style. In this respect, the underdrawing in the Sibiu *Massacre of the Innocents* compares favourably with that of the *Battle between Carnival and Lent* as well as those in a series of other paintings by Pieter Brueghel the Younger (Figs. 13-14). Lively but precise, without corrections, the underdrawing has clearly been applied freehand, but guided by now-invisible dotted lines from a pricked cartoon. Background trees, on the other hand, are unlikely to have been transferred by cartoon. These are underdrawn much more loosely and freely, as in other compositions where we have shown that similar motifs are rarely included in the cartoons.

#### Paint layer

In the *Massacre of the Innocents*, the vivid and varied colour harmonies, attention to each and every anecdotal detail, and delicate and often inspired brushwork are particularly striking.

To gain an idea of the palette, several colours were analysed non-invasively using XRF. This revealed that many reds contain mercury, pointing to the use of vermilion. In some parts, the vermilion-

containing paint shows the first signs of discolouration to mauve, which affects many of Brueghel's works, often quite severely (Fig. 22a). In the more intensely blue parts of the painting XRF analysis detected copper, suggesting the use of azurite. For the green parts two different pigments (or pigment mixtures) may have been used. In some measuring spots a true copper containing green pigment such as verdigris or malachite might have been used, while in others a copper containing green or blue pigment was mixed with lead-tin yellow, either to modify the hue or to create green.

One of the most eye-catching distinctions between the Sibiu copy and other copies is the difference in colour in certain garments: while in other copies some of these are blue, in the Sibiu version these zones are greyish (Fig. 4a). All XRF measurements from these zones point to the presence of the element cobalt, a marker for the blue pigment smalt.<sup>36</sup> Smalt is a powdered potash glass, containing cobalt, which was widely used in European oil painting. Its colourfastness however is often problematic, and it has a well-known tendency to fade, due to the leaching of alkali and alkaline earth components. Clearly, in the Sibiu copy, the smalt has turned from blue to a more greyish blue or even colourless layer as observed now (Fig. 15a-c).

The cross-section of the sky shows a single layer of azurite mixed with lead white. This is unlike the results we have obtained for skies in the majority of Brueghel the Younger's paintings, where smalt was found to be the blue colouring matter. But it is possible that Brueghel the Younger chose azurite in the case of the *Massacre* in order to imitate as closely as possible the intense bright blue sky in his father's original version.

#### Sequence of execution and brushwork

The artist painted from background to foreground, closely respecting the outlines of the underdrawing. He left blank spaces – known as 'reserves' – for forms yet to be executed. This method of working is clearly revealed in the X-radiograph of the painting, where dark spaces represent these reserves (Fig. 16b).

Brueghel's close attention to anecdotal detail and painterly expression are particularly striking in the Sibiu painting. His approach to brushwork is essentially graphic; forms are built up in an additive manner with little blending and differently col-

<sup>34</sup> Practical reconstructions using Brueghel's techniques proved how easy it is to wipe away pouncing marks from an oil-based *imprimatura*, see Appendix III (Currie and Ghys) in Currie, Allart 2012, vol. 3, 957-979.

<sup>35</sup> *Ibid.*

<sup>36</sup> On the analysis of smalt, see for example Stege 2004, 121-142.

oured areas are juxtaposed. Paint is applied sparingly, except where a certain thickness is required by the pigment, as with azurite and smalt. Faces are painted with short strokes and dabbed-on highlights, and finished with delicately painted outlines in black, brown and transparent red (Fig. 21). A variety of materials are brought to life with Brueghel's lively textured brushwork, as in the feather plumage of heralds (Fig. 4a). The cold, glinting surface of soldiers' plate armour is adroitly handled through the application of light grey and white highlights and black strokes on a mid-grey base, finished off with deft wet-in-wet lines to suggest the joints between the plates (Fig. 17a). Buildings are painted thinly in subtle ochres, pinks and browns. Timbered doors and windows are given definition with fine black or brown outlines, whilst grouting between bricks is carefully rendered.

Garments illustrate a range of subtle brushwork; these are usually modelled in one session and in one hue, paint strokes generally following the contours of the figure or fall of the fabric. Details are sometimes added wet-in-wet, for example, the white cross on the flag (Fig. 3a). Fashionable slashes in clothing are also drawn through still-soft paint, as in the flamboyant breeches of a soldier (Fig. 22).

As in many other wintery scenes, and following the example of his father, Brueghel literally 'dirtied' the white snow with footprints and animal hoof prints, which are suggested by loose brushstrokes in the still-soft snow paint (Fig. 16b-c). Later on, he applied white touches on hardened paint to suggest freshly fallen snow on tree branches (Fig. 18) and thin blue strokes in relief for icicles hanging on rooftops (Fig. 17).

Diagonal striations in the blue sky suggest the use of a fine-toothed comb to even out and thin down the blue paint while it was still soft (Fig. 18). The artist also used a readily available tool – his fingers – to soften transitions between dark paint and the bright snow (Fig. 19).

### **An autograph work by Pieter Brueghel the Younger**

Brueghel the Younger's workshop included apprentices and journeymen, as well as his son Pieter as a student from around 1603-1604.<sup>37</sup> With such

personnel at his disposal, it is clear that Brueghel would not have personally executed all the paintings he produced for the market.

The fact that Brueghel's underdrawings were applied freehand, albeit guided by pouncing marks, means that particularities of style can often be distinguished. Our study of Brueghel's works defined a core group of paintings whose underdrawings are ostensibly by his own hand rather than by workshop assistants (Currie, Allart 2012, vol. 3, 1017-1018). Underdrawings belonging to this group display an exceptional mastery of gesture, anatomy, movement and facial expression, together with a certain assuredness and liberty of touch. The figures are outlined with broken lines, which join up and sometimes double over each other, and have expressive notations for certain internal details, such as the bends of arms or legs or garment folds. These small details are indicated lightly, with lively rapid strokes and occasional hatching. Faces are stylised, with a characteristic treatment of the eyes (several strokes in an open circle around the pupil) and noses (nostrils and lower edge of nose as an approximate 'w'); there is also a tendency to emphasise jaw lines. All these qualities can be attributed to the underdrawing in the *Massacre of the Innocents*, which compares favourably to the underdrawing in another version of the same composition in the core group in the Royal Museums of Fine Arts, Brussels (Fig. 20a-b).

Among the paintings we examined from Brueghel's large production, we have also distinguished a group of paintings with common stylistic traits. These works are of high quality, and many are signed. The group largely coincides with the one showing common traits in the underdrawings (Currie, Allart 2012, vol. 2, 348-356). It is reasonable to attribute this group to the hand of the master himself. The works are delicately and precisely painted, and motifs are applied in an essentially graphic style although there is some variety in handling. Faces are particularly characteristic, vigorously modelled to the point of caricature, with lively light accents of white paint. Typical notations include the treatment of eyes in profile, which are defined with an upside-down 'v' (Fig. 21a-b). Again, the *Massacre of the Innocents* fits perfectly within this group.

### **Pieter Bruegel the Elder's original painting as model**

In paintings for which Brueghel the Younger must have consulted Bruegel the Elder's originals, his versions closely imitate his father's colour scheme,

<sup>37</sup> Born in 1589, he became a master as *meestersson* at the Guild of Saint Luke in Antwerp in 1608. On the studio personnel of Pieter Brueghel the Younger, see Currie, Allart 2012, vol. 1, p. 50 (with previous bibliography).

motifs and even brushwork (Currie, Allart 2012, vol. 3, 816-822). This appears to be the case for the *Massacre of the Innocents*. The peculiarly brushy application of paint in the blue sky of the Sibiu version closely mimics the sky of the original. The same can be said for the soldier's slashed costume in the lower right foreground, where cuts in the fabric are literally cut through the soft paint (Fig. 22a-b). Moreover, in several faces, the Sibiu copy reflects the original version's stylised eyes with large pupils, and even the emotional pathos (Fig. 23a-b, 24a-b). Finally, the choice of smalt for certain draperies may have been conditioned by the probable use of the pigment in corresponding draperies in the original version (Fig. 15).

In terms of colour and motif, Brueghel the Younger's scheme for the *Massacre of the Innocents* reflects his father's choices in each and every detail. The only difference is due to the passage of time: there are more faded blues in the Sibiu copy. In the case of a motif that was altered during the painting stage in the original – a sword wielded by a soldier – the copy imitates its painted position rather than

the underdrawn one (Fig. 25a-b). On the other hand, a lance leaning against a tree, visible in the Sibiu version's underdrawing but dropped during painting, clearly features in the original painting (Fig. 17). The motif appears in other versions by Brueghel the Younger, so its exclusion in the paint layer of the Sibiu copy is probably an oversight. All things considered, it is highly likely that Brueghel the Younger had the original in front of him while painting the Sibiu *Massacre of the Innocents*.

### Conclusion

The Sibiu *Massacre of the Innocents* conforms to a series of standardized techniques and a style of painting typical of works from Brueghel the Younger's workshop. But it is also a work of exceptional quality that ranks among one of the artist's own most exquisite productions. Its faithfulness in composition, style and colour to the original version explains why in the past it was sometimes attributed to Bruegel the Elder.

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### LIST OF ILLUSTRATIONS

1. Pieter Brueghel the Younger, *Massacre of the Innocents*, 115.2 x 163.7 cm, signed ‘P·BRVEGEL·’, Sibiu, Muzeul National Brukenthal, after conservation treatment © KIK-IRPA Brussels
2. Pieter Bruegel the Elder, *Massacre of the Innocents*, 109.2 x 158.1 cm, partial signature, London, The Royal Collection, Her Majesty Queen Elizabeth II © 2011 Her Majesty Queen Elizabeth II
3. Standard, with white crosses in the copy, painted over with a ‘lion passant’ in the original © KIK-IRPA Brussels
  - a Brukenthal version
  - b original version
4. Herald’s tabard, with a double-headed spread eagle in the copy, covered by an ornamental pattern in the original © KIK-IRPA Brussels
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5. Inn sign, the star only visible in the copy © KIK-IRPA Brussels
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6. Rider in black, the long white beard in the copy probably alluding to the Duke of Alba © KIK-IRPA Brussels
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7. Signature, lower right corner, Brukenthal version © KIK-IRPA Brussels
8. Panel-maker’s stamp on the reverse of the Brukenthal version © KIK-IRPA Brussels
9. Unprepared left border with *barbe*, Brukenthal version © KIK-IRPA Brussels
10. Cross-section from the upper right sky, Brukenthal version © KIK-IRPA Brussels
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  - b ultraviolet light
  3. blue sky paint (azurite, lead white, earth pigments, carbon black)
  2. *imprimatura* (lead white, chalk?, charcoal)
  - ground (chalk, one particle of red earth)
11. Underdrawing of buildings, infrared reflectography, Brukenthal version © KIK-IRPA Brussels
12. Exposed underdrawing in corner of snowy rooftop, Brukenthal version © KIK-IRPA Brussels
13. Underdrawing of pleading mother, Brukenthal version, infrared reflectography © KIK-IRPA Brussels
14. Underdrawing with dotted outlines from the use of a pricked cartoon, detail, Pieter Brueghel the Younger, *Battle between Carnival and Lent*, Brussels, Royal Museums of Fine Arts, infrared reflectography © KIK-IRPA Brussels
15. Distraught women, showing faded blues in the Brukenthal version © KIK-IRPA Brussels
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16. Playful dogs, showing underdrawing, painterly reserves and wet-in-wet footprints, Brukenthal version © KIK-IRPA Brussels
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18. Snow-covered tree branches and bird’s nest, with diagonal striations in the blue sky paint, Brukenthal version © KIK-IRPA Brussels

19. Fingerprints, softening the transition between dark paint and bright snow, Brukenthal version © KIK-IRPA Brussels
20. Underdrawing: Pieter Brueghel the Younger's own style in two copies of the *Massacre of the Innocents* © KIK-IRPA Brussels
  - a Brukenthal version
  - b Brussels, Royal Museums of Fine Arts
21. Painting: Pieter Brueghel the Younger's own style in the painting of profiled eyes © KIK-IRPA Brussels
  - a Brukenthal version
  - b *Kermis of St George*, private collection
22. Soldier's slashed costume, with identical treatment of motif, colour and brushwork in the original and the Brukenthal copy © KIK-IRPA Brussels
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  - b original version
23. Group around distraught woman, with similar brushwork and expression in the original and the copy © KIK-IRPA Brussels
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  - b original version
24. Group of women around doorway, the stylised eyes with large pupils in the original mimicked closely in the copy © KIK-IRPA Brussels
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  - b original version
25. Swordsman, with a different position for the sword in the underdrawing of the original © KIK-IRPA Brussels
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a Brukenthal version                      b original version

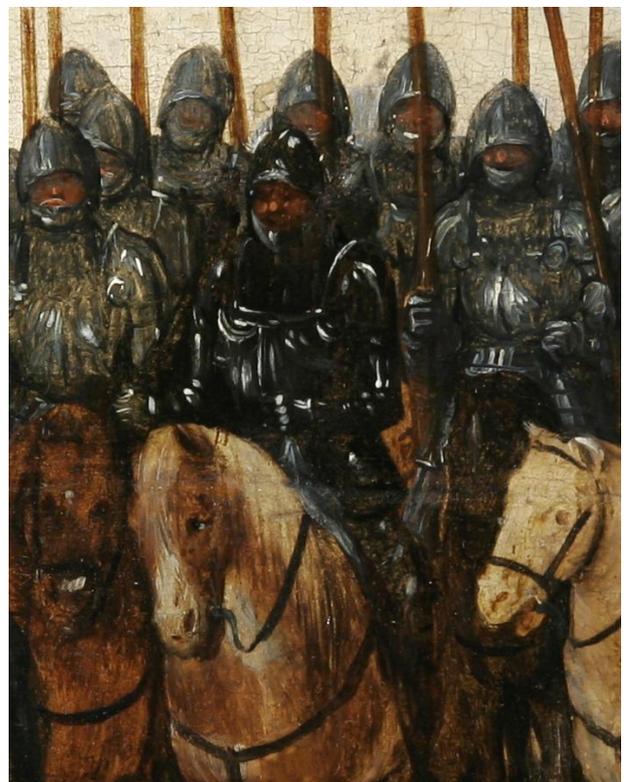
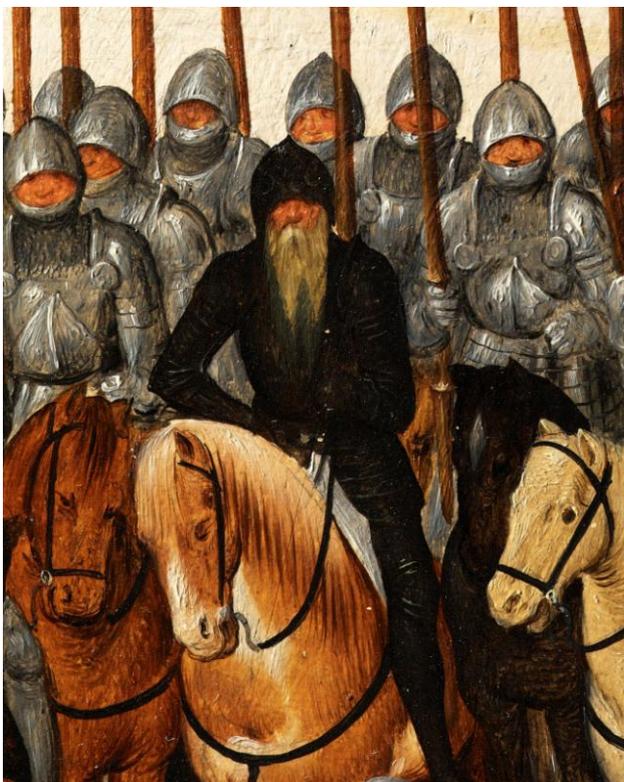


Fig. 6. Rider in black, the long white beard in the copy probably alluding to the Duke of Alba © KIK-IRPA Brussels  
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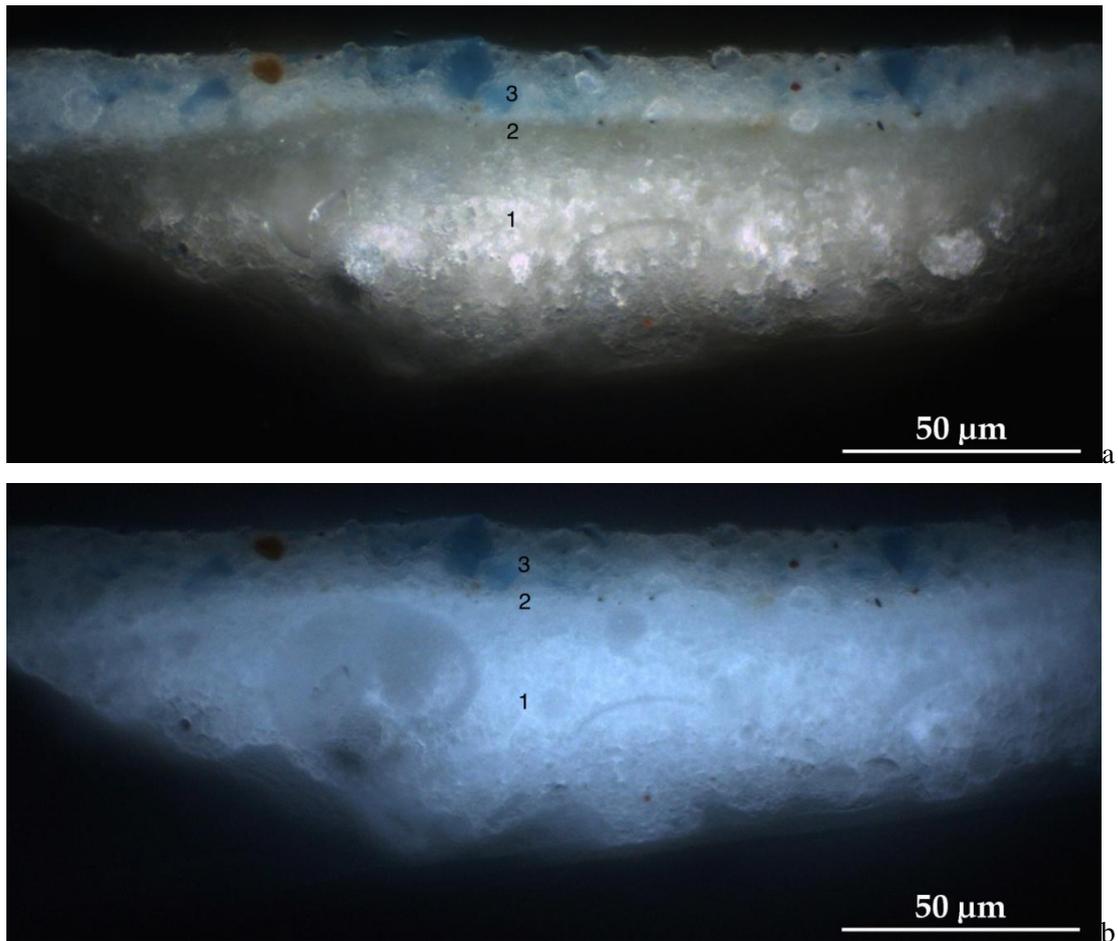
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9. Unprepared left border with barbe, Brukenthal version © KIK-IRPA Brussels



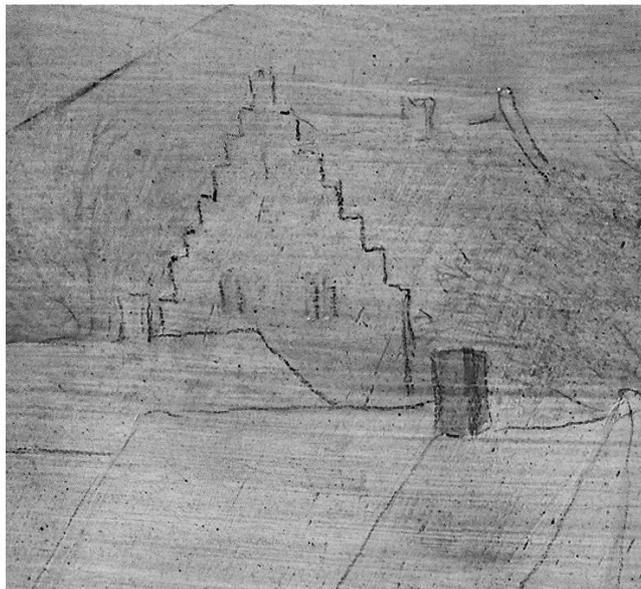
10. Cross-section from the upper right sky, Brukenthal version © KIK-IRPA Brussels

a visible light                      b ultraviolet light

3. blue sky paint (azurite, lead white, earth pigments, carbon black)

2. imprimatura (lead white, chalk?, charcoal)

1. ground (chalk, one particle of red earth)



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12. Exposed underdrawing in corner of snowy rooftop, Brukenthal version © KIK-IRPA Brussels



12. Exposed underdrawing in corner of snowy rooftop, Brukenthal version © KIK-IRPA Brussels



14. Underdrawing with dotted outlines from the use of a pricked cartoon, detail, Pieter Brueghel the Younger, *Battle between Carnival and Lent*, Brussels, Royal Museums of Fine Arts, infrared reflectography  
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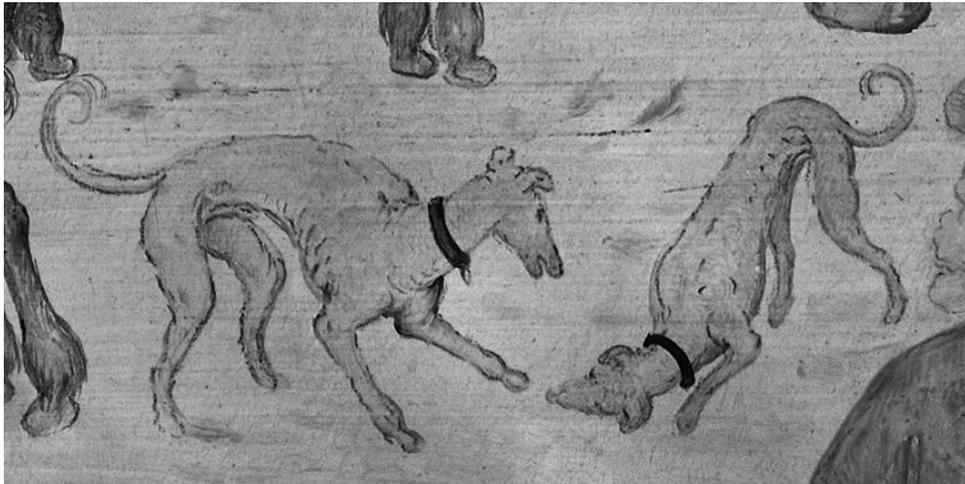


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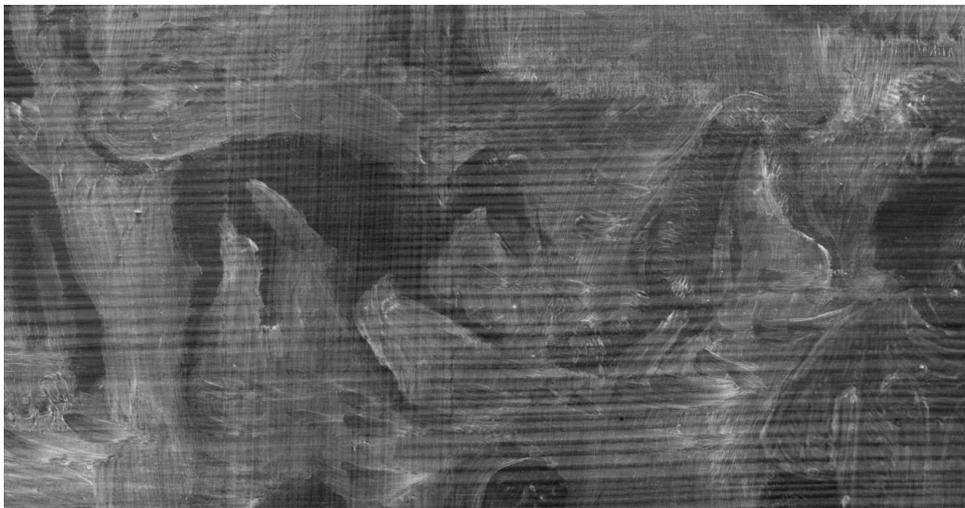


c

Distraught women, showing faded blues in the Brukenthal version © KIK-IRPA Brussels  
a Brukenthal version  
b Brussels, Royal Museums of Fine Arts  
c original version



a



b

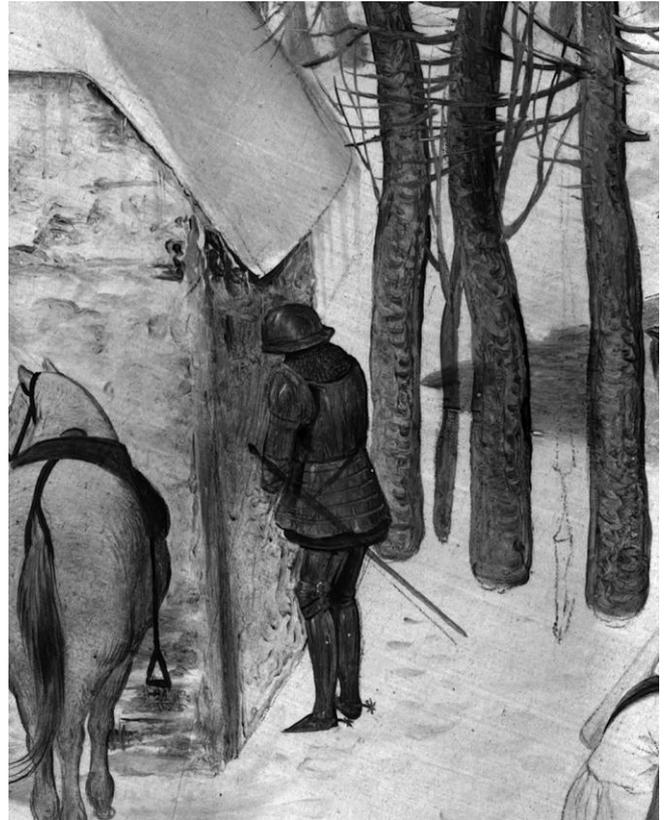


c

16. Playful dogs, showing underdrawing, painterly reserves and wet-in-wet footprints, Brukenthal version © KIK-IRPA Brussels  
a infrared reflectography  
b X-radiograph  
c normal light



a



b



c

Fig. 17. Soldier relieving himself. The lance only appears in the underdrawing of the Brukenthal version © KIK-IRPA Brussels  
a Brukenthal version  
b Brukenthal version, infrared reflectography  
c original version



18. Snow-covered tree branches and bird's nest, with diagonal striations in the blue sky paint, Brukenthal version © KIK-IRPA Brussels



a



c

19. Fingerprints, softening the transition between dark paint and bright snow, Brukenthal version © KIK-IRPA Brussels





22. Soldier's slashed costume, with identical treatment of motif, colour and brushwork in the original and the Brukenthal copy © KIK-IRPA Brussels  
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b original version



a



b

23 Group around distraught woman, with similar brushwork and expression in the original and the copy ©  
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25. Swordsman, with a different position for the sword in the underdrawing of the original © KIK-IRPA

Brussels

a Brukenthal version

b original version



**THE MASSACRE OF THE INNOCENTS BY PIETER BRUEGHEL THE YOUNGER:  
A NECESSARY CONSERVATION-RESTORATION TREATMENT?**

**Françoise ROSIER and Jean-Albert GLATIGNY**

**Abstract:** *The conservation history of Pieter Brueghel the Younger's Sibiu version of The Massacre of the Innocents is discussed in the context of the 2011-2012 conservation-restoration treatment at the Royal Institute for Cultural Heritage in Brussels. The reasons necessitating the current intervention are given, followed by a description of the structural treatment of the oak panel and the consolidation, cleaning, retouching and varnishing of the paint layer.*

**Keywords:** *Brueghel, Massacre, conservation, panel, cradle, cleaning, varnish*

**Abstract:** *Scurta istorie a operațiilor de restaurare este dezbătută în contextul tratamentului de restaurare conservare efectuat în anii 2011-2012 de Royal institute for Cultural Heritage din Bruxelles. Motivul necesității intervențiilor curente este dat, urmat de descrierea tratamentelor de structură a panoului de stejar, de consolidarea, curățarea, retușarea și vernisarea stratului pictural.*

**Cuvinte-cheie:** *Brueghel, masacru, conservare, panou, cadru, curățire, vernisare*

The *Massacre of the Innocents* does not have any visible conservation problems (Fig. 1). The paint layer is in exceptionally good condition – even cracks caused by the normal ageing process have hardly developed. Why then would we consider carrying out conservation treatment? In fact, the main problems are found on the hidden side of the painting: the reverse side (Fig. 2). The last restoration only treated the front side, leaving the reverse untouched. For the current campaign a more holistic approach was adopted in which the painting was considered both as an image and as a three-dimensional work of art.

### Recent conservation history

Part of the conservation history of the painting can be reconstructed through meticulous observation of the painting and by studying archival sources. Several structural interventions have been carried out, the oldest of which seems to be the application of a fixed softwood framework that was glued all around the borders of the reverse side of the panel, probably an early attempt to keep it flat.<sup>1</sup> This rigid structure,

was perceived as posing an important risk to the paint layer and not as a characteristic inherent to the material used. This highly interventionist panel reinforcement system was much used in nineteenth-century Europe. However, the very conception of the cradle, in the present case made up of moveable elements with thick square profiles, meant that they soon became blocked following variations in atmospheric

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as simple wooden battens glued to the reverse or a fixed framework with or without cross-members such as the ones that were used to stretch up a canvas. These techniques could still be observed in the nineteenth century. See Schiessl 1995, 217.

<sup>2</sup> Eduard Gerisch (1863-1913) restored 879 paintings in Vienna and in Sibiu.

<sup>3</sup> Reverse side, lower right corner (23 x 3.5 x 0.9 cm).

<sup>4</sup> The cradle was known in France since 1770. It was invented by furniture maker Jean-Louis Hacquin, but was only commonly applied during the nineteenth century. Cradles were used until the first half of the twentieth century, when their suitability started to be questioned. See Bergeon *et al.* 1995, 269. From a theoretical viewpoint it seems logical to suppose that the addition of a cradle was a nineteenth-century intervention, but when the woodwork and its light colour are taken into account, a more recent treatment is feasible.

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<sup>1</sup> Remains of this first framework are still present on the reverse of the panel. In the eighteenth century various systems were used to keep panels flat, such

humidity. This inevitably led to splits and cracks in the original panels that they were intended to protect. The application of a cradle also frequently necessitated adaptation of the uneven reverse side of a panel.<sup>5</sup> In the Sibiu panel only the joins were attenuated and the presence of a panel-maker's mark and traces of a mechanical handsaw on the rest of the surface confirm that the original thickness of the panel has been retained.

The damage caused by the presence of the cradle led to further interventions, carried out in the course of the nineteenth century. The restoration files mention four treatments between 1957 and 2000, most of which took place in the National Museum of Art of Romania in Bucharest, where the painting was kept between 1948 and 2005.<sup>6</sup> In 1957 restorer Octavian Coroiu consolidated the splits in the panel.<sup>7</sup> He also cleaned the painting,<sup>8</sup> filled and retouched losses and applied a new varnish. In 1966 the painting was again in his workshop since the splits continued to progress, causing areas of lifting paint.<sup>9</sup> He consolidated the splits with carpenter's glue and consolidated the paint layer. Losses were again filled and retouched.

The panel suffered some damage during the Romanian Revolution of 1989. Small losses and traces of fire damage in the lower left corner

probably occurred during this difficult period (Fig. 5). The museum's restoration workshop was almost completely destroyed at the time.

In 1996-1997 the painting was restored for the exhibition *Museo della Permanente* in Milan.<sup>10</sup> Restorer Mihaela Nacu examined the painting and noted the presence of a blocked cradle and six reinforcement blocks on the splits.<sup>11</sup> She removed the protective paper from the fragile zones of the painting and consolidated the paint layers.<sup>12</sup> The losses in the support, caused by bullet impacts, were filled. She also removed the surface dirt and attenuated the varnish and the old retouching. The losses in the paint layers were filled to the correct level and retouched using watercolour and pigments in oil.<sup>13</sup> She applied a new layer of varnish, consisting of dammar resin in turpentine. Although the removal of the cradle and replacement by a backing in balsa wood were envisaged after the painting's return from the exhibition, this treatment was not ultimately carried out.<sup>14</sup>

#### Current approach and treatment

The preceding summary described the reoccurring problems that were caused by the blocked cradle. But in the case of the Sibiu panel, these were exacerbated by the nature of the wood itself that was used for the cradle members: fast growing oak, denser than the original oak and sawn tangentially (Fig. 3). The conservation treatment could not therefore be limited to unblocking the cradle to allow the moveable battens to slide again, but had to take on its complete removal.

The cradle was thus progressively removed, starting with the fixed cross-battens, in order to avoid sudden relaxation of the panel (Fig. 6).

<sup>5</sup> The planks making up the panels often have a trapezoidal shape that is linked to their extraction, see *S.O.S. Peintures anciennes: sauvegarde de 20 œuvres sur panneau restaurées en 1995-96 dans le cadre du Fond du Patrimoine culturel mobilier de la Fondation Roi Baudouin*, exh. cat, Brussels, 1996, 24.

<sup>6</sup> During the Romanian Revolution of 1989 the painting was stored in a safe place.

<sup>7</sup> Unpublished treatment report. The treatment began on 14 May 1957 and was finished in June of the same year. Coroiu used carpenter's glue and fish glue with the addition of honey. Cleaning of the painting started on 24 May. On 1 June fillings were applied and the painting was retouched and varnished. The entire treatment was carried out over a two-week period.

<sup>8</sup> When the painting was examined by Mihaela Nacu in 1996, brownish traces of an old varnish were visible in the sky. These were most probably remains of an old varnish left in place after the treatment by O. Coroiu.

<sup>9</sup> Unpublished restoration report. The treatment started on 7 March 1966 and was finished on 11 March of the same year.

<sup>10</sup> From October 1996 to February 1997.

<sup>11</sup> Unpublished treatment report. It is possible that the wood blocks were applied during the consolidation of the support in 1957 or 1966. This intervention, however, is not clearly mentioned in the treatment report and another undocumented intervention was possibly carried out during the turbulent period of the revolution.

<sup>12</sup> Fish glue 10%.

<sup>13</sup> 'Maimeri' colours were used for the retouching. See Szmit-Naud 2006, 66-75.

<sup>14</sup> At that time analyses were carried out by the Central Research Laboratory for Objects of Art and Science in Amsterdam to identify the ground, pigments, and binding medium, as well as the layer structure of the varnish.

Removal of the cradle facilitated access to the splits, which were consolidated using fish skin glue.<sup>15</sup> Sieved sawdust and glass micro balls were sometimes added to the fish glue to fill losses in the original support. After this treatment, the panel had to be given additional support since the large painting is too heavy to rest solely on the lower plank's fragile edge. Hence the panel was supported with cross-bars with supple aluminium T-profiles that slide into a series of oak blocks adapted to the surface of the panel (Fig. 7).<sup>16</sup> This reinforcement system with sliding aluminium cross-bars<sup>17</sup> (Fig. 8) is a vast improvement on the old wooden cradle since it is very light and has reduced surface contact with the original panel. The reinforcement blocks can also be used to fix the painting in its frame in a way that provides better weight distribution. Three corners of the panel were also broken. These losses were repaired with oak insertions (Fig. 15).

In order to treat the panel, the previous dammar varnish had to be removed as well as retouching on the joints and splits. Removal of this retouching, carried out in oil-bound pigments, was in any case advisable as it would have become increasingly difficult to remove over time. Furthermore, certain details of the composition emerged from underneath this old restoration, such as the noseband and bit of the horse at the right of the scene (Figs. 9-12).

Cleaning the whole painted surface was not initially a priority since the dammar varnish applied during the last conservation treatment was still recent and is not known to have adverse effects on ageing. Areas of the varnish, however, did have to be removed from splits

and the lower join in order to treat the support. Local removal of varnish would have led to differences in thickness that would have been difficult to attenuate without applying a new layer on top of the existing one. In addition, the varnish tended to obscure the painting's texture with an homogeneous effect similar to that of a photograph printed on glossy paper. A supplementary varnish layer would have further accentuated this, flattening the subtle texture of Brueghel's brushwork. The current technical study reveals the wide variation in Brueghel's painterly effects, ranging from delicate translucent touches to impasto. One of the main aims of the restoration was to preserve these qualities.

The existing glossy, thick and yellowed varnish was therefore removed (Fig. 13). The yellow tint of the old varnish was not conducive to the pale winter light, intensely blue sky and cool tones of the snowy landscape. It reduced the spontaneity of the zones that are painted more lightly, often in ochre tones, and gave them a degree of finish equal to areas painted in opaque colours.

The few losses, caused by accidental damage, were filled<sup>18</sup> and retouched<sup>19</sup> taking care to limit the inpainting to a minimum and avoid any visual detraction from the original paint (Figs. 14-16).

Finally, the painting was varnished with a thin layer of dammar. The scene, mainly executed in light tones, does not require a thick varnish to ensure the saturation of its colours. Indeed, a thin and slightly matt varnish is all that is needed to facilitate the appreciation of its delicate brushwork and colours and to protect the paint-

<sup>15</sup> Norland Products High Tack Fish Glue, manufactured from cod skin.

<sup>16</sup> This technique was used on many paintings, amongst which exceptionally large works such as Rubens' *Descent from the Cross* in Antwerp Cathedral and *The Family of Saint Anne* in the St Waudru church in Herentals. The panels treated with this technique are still in reasonable condition.

<sup>17</sup> The first metal battens, made from cylindrical hollow steel, were developed in Rome at the Istituto Centrale per il Restauro by R. Carita in 1953. They were designed to slide in wooden blocks lined with metal to reduce friction. They were superseded by H-shaped aluminium profiles developed at the Louvre by C. Huot in 1967 and 1970. See Bergeon-Langle, Huot 2009, 448.

<sup>18</sup> Fillings are based on chalk and animal glue.

<sup>19</sup> Retouching was carried out in watercolour and Gamblin Conservation Colors. Both materials were chosen for their long-term stability and finely ground pigment particles, making them perfectly suited to lightly cover zones where the *imprimatura* is visible. Gamblin Conservation Colors were developed following a meeting on modern conservation materials at the Smithsonian Institution in 1989 in which oil colour producer Robert Gamblin participated. The company collaborated with professionals in conservation (René de la Rie, Mark Leonard and Jill Whitten) to develop these paints using Laropal A81 as binder, a synthetic urea aldehyde resin with low molecular weight.

ing from dust and dirt. The comprehension of the work as a historical object is also preserved.

**Conclusion:**

To a general public, the conservation treatment may not appear to be particularly spectacular since there are no fundamental changes to the image, but it has solved hidden structural problems within the panel. The treatment of these structural problems finally put an end to the long series of ineffective restorations carried out in the twentieth century. The long-term

preservation of the painting is now safeguarded, which was our main priority. Visual appreciation of the composition was also subtly enhanced by the removal of the glossy yellowed varnish layer and its replacement with a thinner and more discrete protective coating.

We would like to thank Dana Damboiu (Curator at the National Museum of Art of Romania) and Ioan Muntean (Conservator-restorer at the National Museum of Art of Romania) for the information they kindly shared with us.

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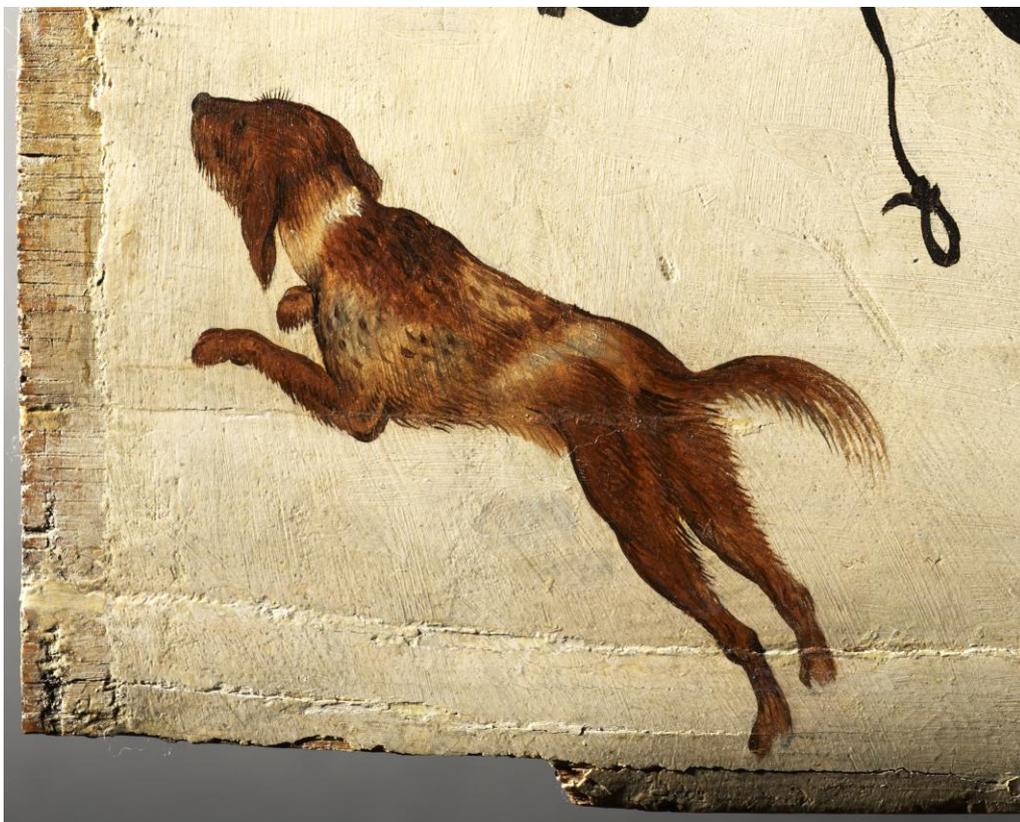
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## SPECIFIC RESTORATION PROBLEMS OF VESSELS FROM THE STARČEVO-CRIŞ CULTURE

Cristina Daniela SCĂRLĂTESCU

**Abstract:** *The archaeological Starčevo–Körös–Criş ceramics raises a series of problems concerning the conservation and restoration interventions. Due to the conditions the pieces are placed in until their discovery, and to the characteristics of this type of ceramics, certain interventions, meant to reinstate their integrity, are required, both for restoring the materials structure and for the reconstruction of the vessel itself.*

**Keywords:** *ceramics, vessel, consolidation, conservation, restoration, reconstruction*

**Abstract:** *Ceramica arheologică de tip Starčevo–Körös–Criş ridică probleme în ceea ce priveşte intervenţiile de conservare şi restaurare. Datorită condiţiilor în care piesele ceramice se află până la descoperirea lor în timpul săpăturilor arheologice, şi a caracteristicilor acestui tip de pastă ceramică, se impun diverse intervenţii care au rolul de a restabili integritatea acestora, atât în ceea ce priveşte refacerea structurii materialului ceramic, cât şi reconstrucţia propriu-zisă a vasului.*

**Cuvinte cheie:** *ceramică, vas, consolidare, conservare, restaurare, reconstrucţie*

The Starčevo–Körös–Criş cultural manifestations are, generally, considered to be a part of a larger early Neolithic complex outspreaded in Thessaly, Macedonia, Bulgaria, ex-Yugoslavia, Romania and Hungary. The first researches were started by M. Gribić in 1928 at Starčevo site, near Belgrade. A few years later, in Hungary, more discoveries of this kind were made, defined by F. Tompa in 1941 as the Körös culture, named after the Körös river, whose water catchments area encompasses a part of Western Romania and Eastern Hungary. In Romania, the river being called Criş (Fig. 1), these kinds of discoveries were called *Criş culture*, and as such the terminology is a translation of *Körös culture*.

The archaeological researches carried out at Cioara point, in Hunedoara County, and Cristian, in Sibiu County, in 2011, brought to light ceramic fragments belonging to this culture and after their identification three vessels have been reconstructed.

The coarse ceramics is the most common one, with chaff, chopped straws or sand used as degreaser. It has a rough touch and a lumpy semblance. The burning is incomplete, reducing and unequally distributed on the surface of the vessel. Therefore, the fragments have various colours, from yellowish brown to dark grey (Dărămuş, Cioancă, 2000, 11).

The vessels are burned in an oxidizing environ-

ment, at 700-800°C. Besides the use of organic materials as degreasers, the globular shape, the annular bottom and the perforated protuberances used as handles are characteristic for the ceramics belonging to this culture.

In the case of semi fine ceramics, fine sand and chaff were used as degreasers, and it was more elaborately executed. The burning process was also a reduction one, but it was superior to the one applied to the coarse type. The colour of the paste varies from scarlet to brown (Lazarovici, 1979, 37).

The technique used for the ornamentation is very diverse, impression, sprocket, plastic or relieved ornaments, incision, grooves or painting are used. The ornaments are also varied, and the most common are lines, ribbons, triangles or scrolls.

The vessels are difficult to reconstruct. The cause is represented by the excessive fragmentation and the modifications of shape produced by the pressure exercised by the soil, and that is the main cause of decay (Oakley, 2003, 15) (Fig 2). It can cause tensions on the walls of the vessel, followed by fractures. Ceramics coming from an archaeological site presents a series of particular degradations, depending on the type of soil, the kind of paste the vessel is made of, the conservation state of the object before burial, *etc.* (Luca, 2001, 55).

Another cause of degradation is constituted by the nature of the paste the vessel is made of, a porous one, with a high level of hygroscopicity. The excess of water in the structure determines a high frailness of the constituent material (Oakley, 2003, 12).

Due to the advanced frailty, the vessels are usually lifted with the soil they were discovered with, until restoration begins, and this method allows keeping the values of humidity as close to the ones in the environment the fragments laid in before discovery. Also, this method allows keeping the shape of the vessel.

The cleaning process implies the mechanical removal of the soil fragments, and a chemical removal of the adherent deposits of dirt. In this case, due to the porosity of the material, brushes of various hardness were used, and locally, scalpels and wooden tools. Chemical cleaning was executed with mixtures of distilled water and non-ionic detergents used in restoration, chemical compounds that gather on the separation surfaces, and modify the properties of the liquids they are mixed with (Istudor, 2011, 277). This operation was followed by their neutralization in successive distilled water baths. Then the fragments were left to dry on filter paper.

Due to the brittleness of the material, structural consolidation was needed. Therefore the consolidation substance was sprayed on the surface, and this allowed the quantity of substance applied on the surface of the pots to be controlled. A slow drying of the consolidating agent was performed in a controlled polythene tent.

The interventions effected on the fragments had the role to consolidate them and to render their resistance as much as possible. Their selection was made depending on each case and on the specific restoration methodology for this type of ceramic material.

The reconstruction in this case, taking into consideration the high brittleness of the fragments, implied the identification, and the numbering of the fragments, and then the application of adhesive tape in order to insure the joins, and to avoid the loss of small fragments. Also, another aspect that makes the reconstruction even more difficult is the fact that, due to the characteristics of this type of paste, the edges of the fragments are, generally, very deteriorated, and affixing them implies also a concurrent structural consolidation, or an additional filling with gypsum or plaster. Another aspect, that must not be forgotten, is that the fragments

often suffer dimensional modifications in the soil, because of their position in the site, before their discovery. This also makes reconstruction more difficult, because of the disparities between fragments from the same vessel, and restoration implies their optimal placement in the assembly.

For joining the fragments, the adhesive was chosen considering the hardness of the paste, thus tensions in the structure of the pots could be avoided after restoration was completed. The joined fragments were placed in a sand box; until the adhesive was dry, to insure their stability (Fig. 3). Also, in the areas where losses were visible, due to the porosity of the material, and along break-edges, fillings were executed. The gaps caused by missing material were filled in after a mould was made out of dental wax. The fillings were finished with various types of abrasive paper, and the excess filling material was removed from the surface of the original fragments using a steam cleaning unit, adjusted after taking into consideration the brittleness of the ceramic material (Fig. 4).

Due to the fact that the vessels are to be inventoried, the retouching was not performed. They will be preserved and will return in the laboratory for the restoration to be complete (Fig. 5, 6). After restoration treatments, that implied a structural and mechanical stabilization, the vessels were placed in a controlled environment, in a position that can insure equilibrium.

Ceramic objects form a substantial part of collections in museums all over the world. The discovery of large numbers of ancient ceramic objects might suggest that these inorganic materials are relatively durable. However, all composite materials are vulnerable to decay and require proper care and conservation treatment, in specialized laboratories. The Criş ceramics is an exception, because it requires a series of additional conservation and restoration interventions, especially oriented on the consolidation of the ceramic paste. This can constitute a challenge respecting the choice and the application of treatments, due to the materials the ceramics was made of, its age and the condition of the soil it lied in. The restoration methods, in the cases presented above, implied rendering the original integrity to the ceramic paste, through repeated consolidation treatments, in order for the reconstruction of the vessels to be performed.

Due to the advanced brittleness of the ceramic paste, and to the similar conservation problems of the restored fragments, they underwent the same

type of treatment, according to the restoration methodology for this type of vessels.

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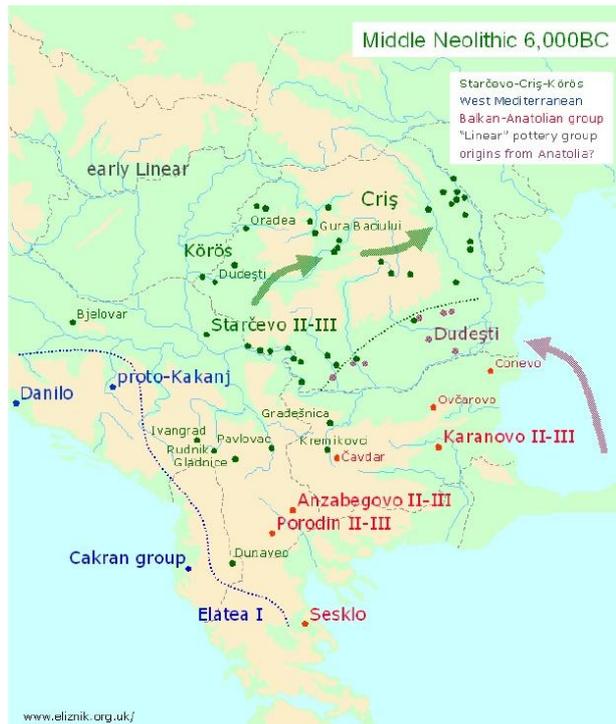
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2. Ceramic vessels; detail during restoration



3. Ceramic vessels; detail during restoration



4. Ceramic vessels; detail during restoration



5. Ceramic vessels; after restoration



6. Ceramic vessels; after restoration

## BARON BRUKENTHAL'S POCKET WATCH RESTORATION

Dr. Dorin BARBU\*

**Abstract:** Baron Samuel von Brukenthal's pocket watch did not work for at least 180 years. The conservator, the watchmaker and the glassblower teamwork have restored the functionality of this watch. In this article are presented the operation applied

**Keywords:** restoration, metal, music box, pocketwatch.

**Abstract:** Ceasul de buzunar al baronului Samuel von Brukenthal nu mai funcționa de cel puțin 180 de ani. Munca în echipă a restauratorului, ceasornicarului și sticlarului au redat funcționalitatea acestui ceas. În acest articol sunt prezentate operațiile de restaurare folosite pentru acesta.

**Cuvinte-cheie:** restaurare, metal, dispozitiv musical, ceas de buzunar.

Baron Samuel von Brukenthal's pocket watch was manufactured in a workshop of the Swiss town Geneva by J. Ruegger between the years 1780-1800. The golden hour plate is protected by glass and on the backside the pocket watch is shielded by two lids of the same metal as the hour plate. The hour plate is decorated with various plant as well as geometric engraved ornamentations, Arabic numerals and thin, arrow shaped pointers. The watch diameter is 6.3cm, it weighs 147 grams. Inside it has two independent mechanisms, one that belongs to the watch, the other one to the comb and pinned barrel musical device.

### CONSERVATION STATUS

1. The watch wasn't working, the spring catch was jammed, and deposits of mechanical products and clogged oil could be found on all the elements of the watch.
2. The music wasn't working as well, the spring was stretched to the limit, the plate of the comb and pinned barrel musical box lid was broken.
3. The turning key was missing
4. The glass was missing

### RESTORATION

For the intervention upon the watch mechanism I turned to the oldest specialist of the German watchmakers within Sibiu, mister F.H.

1. The watch mechanism: the cylinder was removed; the wheel mechanism was jammed because of the gear that moved the cylinder, it was bent – only pincers were used in order to straighten it.

The pointers were removed, the hour plate, the Maltese cross, the screws that secured the spring's body, the conical peg of the spring driven wheel and finally, the wheel with click stop. The rivet that secured the safety was weakened and the circular spring went under the wheel with click stop, jamming it. After removal, the rivet was tightened; all the elements were cleansed with extraction gasoline, dried and greased with Moebus Swiss oil, then reassembled. The cylinder pivots show some wearing that in certain positions can stop the watch, especially when the spring isn't fully turned. The pointers were cleansed of rust by using a fine fiberglass brush; afterwards they were treated with Balistol® (White 1995, 5) and wiped clean with a cotton cloth. The frame together with lids were degreased with acetone, then cleansed and protected with a special Silbo silver designed cloth (Heinrich 1994, 194).

2. The musical mechanism has a four wheel module; its purpose is to maintain a uniform speed of the cylinder, they have an area of 1cm<sup>2</sup>. The last gear with eight points had the spindle of the axle broken. The axle had to

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be unhardened in order to make a hole of 0,3mm in which a nozzle was pressed, processed later on a lathe. I've also noticed that the button that triggered the music was worn-out so another one had to be made on lathe with the appropriate length. The music box lid was straightened, and then glued with Devcon two-component Epoxy resin; the splice has a 1 mm width.

3. The key: its body was made of brass on lathe, drilling machine, then by grinding; the keys end was made by using fretwork, grinding and engraving techniques, the two components was fixed by two 0,8 mm rivets.
2. The glass: for its manufacture I turned to the artist Ion Tamâian from Sibiu that had made a mould in which several glass globes

were blown, then cut by flame, polished, the thinnest of them was adjusted to the watch frame dimension. The glass was fixed within the frame by using 5 points of Loctite super strong gel.

Only through teamwork we managed to restore this important item of Brukenthal National Museum. The pocket watch was displayed in a unique exhibition *Trésors de la collection Brukenthal: Brueghel, Cranach, Titien, Van Eyck*, at Villa Vauban Art Museum of the City of Luxemburg where was presented masterpieces of the 15th to 18th century from the collection of Baron Samuel von Brukenthal from April 27 to October 14, 2012.

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## LIST OF ILLUSTRATIONS

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3. Lid I before restoration.
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1. The clock before restoration.



2. The clock after restoration.



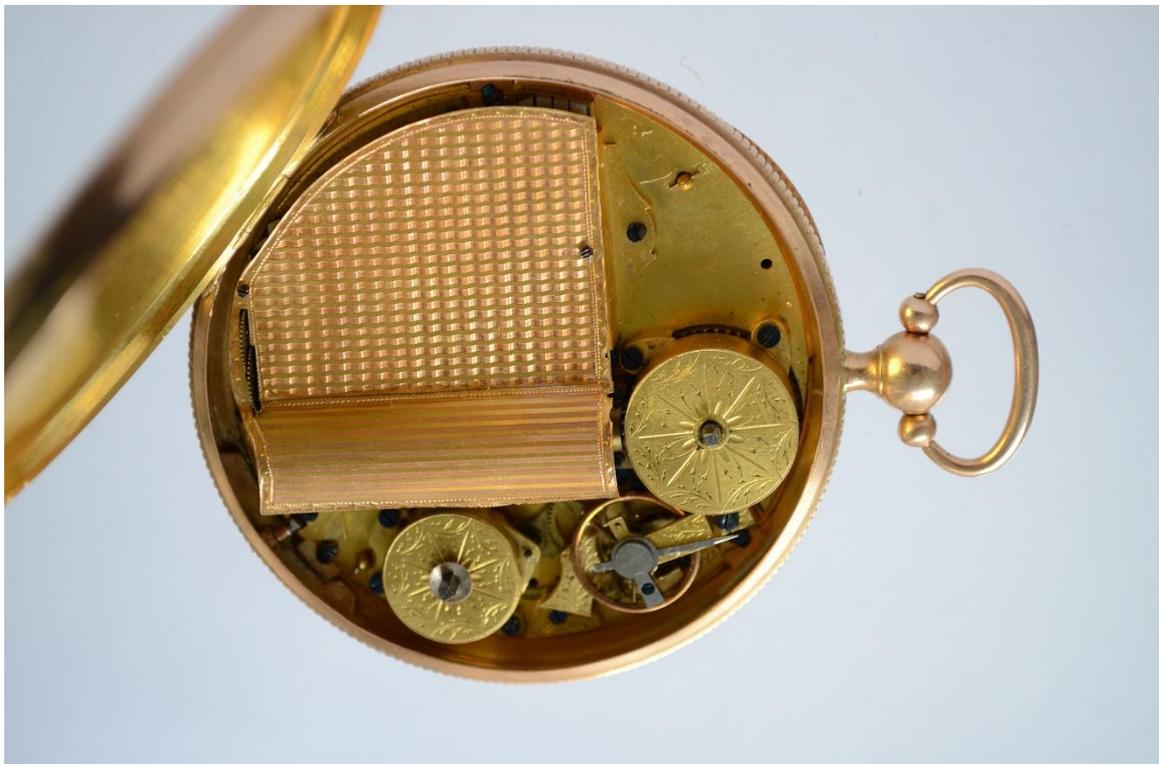
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6. The mechanism after restoration.



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## ELEMENTS OF TECHNOLOGY AND DEGRADATION CAUSES REGARDING CAPIDAVA'S POTTERY (the 9th to 11th CENTURIES)

Simona Maria CURSARU-HERLEA\*

**Abstract:** *Researching early medieval pottery has an important role in defining some aspects of material culture, in learning about the way and life conditions of our ancestors. Pottery offers precious data for understanding and fundament the changes in craft production and implicitly in the social structure between the first and the second millennia of our era. Thus, this article proposes a presentation of the work technique used by potters in Dobrudja (and especially Capidava's area) from the IX to the XI centuries, for obtaining ceramic objects, and also their degradation causes. Degradation of Capidava's pottery seems to have been favoured by the existence of some technological vices, the underground conditions, the epochal accidents, by the attempts of in situ restoration by unaccredited persons and by the disregard concerning the sampling, manipulation and transport. All of it derives from the joint action of several factors that can be grouped in: physical – chemical factors, physical – mechanical factors, biological factors and the human factor.*

**Keywords:** *Romania, Dobrudja, middle Ages, pottery, technology, degradation causes.*

**Abstract:** *Studierea ceramicii medievale timpurii are un rol important în precizarea unor aspecte ale culturii materiale, în cunoașterea modului și condițiilor de viață ale strămoșilor noștri. Ceramica oferă date prețioase pentru înțelegerea și fundamentarea procesului de transformări petrecute în structura producției meșteșugărești și implicit în structura socială la cumpăna dintre cele două milenii ale erei noastre. Astfel, acest articol își propune prezentarea tehnicii de lucru folosite în secolele IX-XI de olarii din Dobrogea (și din zona Capidavei în special) pentru obținerea obiectelor ceramice, dar și factorii de degradare ai acestora. Degradarea ceramicii de la Capidava se pare că a fost favorizată de existența unor vicii tehnologice, de condițiile de zacere în sol, de accidentele de epocă, de încercările de restaurare efectuate pe șantierul arheologic de către persoane neacreditate și de nerespectarea regulilor de prelevare, manipulare, ambalare și transport. Toate acestea au la bază acțiunea coroborată a mai multor factori pe care i-am putea grupa în: factori fizico-chimici, factori fizico-mecanici, factori biologici și factorul uman.*

**Cuvinte cheie:** *România, Dobrogea, Capidava, evul mediu, ceramică, tehnologie, factori de degradare.*

Before approaching the subject of the article, we consider it necessary to briefly mention the political context of Dobrudja (with specific emphasis on Capidava), during the 9th to 11th centuries, for the readers to understand better certain aspects connected to the ceramic technology from that period, as well as some aspects regarding the degradation process (repeated invasions and fires, building collapses etc.).

In the context of the Lower Danube frontier fall, at the beginning of the 7th century under the Avars-Slavic pressure (Sâmpetru 1971, 217-242), and later on under the Bulgarian pressure, the Byzan-

tine control over Dobrudja decreased considerably. Certainly, the byzantine influence did not cease after the Avars-Slavic invasion and after the creation of the first Bulgarian state formation South of Danube (Barnea I. 1971, 205-219; Barnea I., Ștefănescu 1971, 7-31; Florescu R., Ciobanu 1972, 381-400), formation recognized by the Emperor Constantine IV Pogonatus (668-685), through the treaty from 681 (Barnea I. 1971, 205-206; Barnea I., Ștefănescu 1971, 7; Diaconu 1972, 373-378; Obolensky 2002, 78). At the beginning of the ninth century, a formation of *stratiotai* (frontiers and peasants) is been depicted at Capidava, aborigines that lived in surface houses improvised between

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the walls of the ex-Roman – Byzantine construction (Florescu R., Covacef 1988-1989, 210, 244).

In the second half of the 10th century, in the context of disputes between the Byzantine Empire and Kiev Russia, that threatened to occupy the region, it seems that Capidava was also affected and habitation shortly interrupted. Peace in the region was reinstated after the victory in 971, of John Tzimiskes vs. the prince at Kiev Sviatoslav at Durostorum-Silistra, the citadel shines again. John Tzimiskes reorganizes the territories on the Lower Danube and rebuilds the citadels standing on the old Scythian *limes*. Capidava regains thus its place among the main fortifications of the Byzantine defensive system.

This new age starts from in the year 971 and knows three distinct moments (Florescu R., Covacef 1988-1989, 244): a) the period up to the Bulgarian revival from 980; b) the period between the anti-Bulgarian campaign of the Emperor Basil the Second in 986 and the Pechenegs raids in 1036; c) the period between 1036 and the Udes attack from 1064 (Florescu R., Covacef 1988-1989, 244)<sup>1</sup>.

The early medieval fortified setting at Capidava setting (the 9th to 11th centuries), a space of intense living (Florescu Gr., Florescu R., Diaconu 1958, 135-138; Florescu R. 2004, www.capidava.ro, 06. 08. 2009), mostly overlaps the Roman-Byzantine citadel, the research brought into light the extended living area in the *extra muros* zone (Pinter, Ţiplic, Urduzia 2008, 85-86).

Because of a complex situation, both the houses inside the citadel and the ones *extra muros* were not entirely researched. The surface investigated so far led to the discovery of hovels, typical for that period, except, as mentioned above, the first stratigraphic sequence with surface houses (Florescu R., Covacef 1988-1989, 210, 244).

The hovels (Florescu R. 2004, 1-5) – houses that have a varied part of elevation beneath the soil (Corbu 2006, 22) – seem to be the most adequate for living under a period of invasions and wars. They are easy to build, do not require ample tech-

nical knowledge and have the advantage of being naturally thermo isolated from the ground both in summer or winter. They have the roof with two slopes with wood beams structure and covered in organic materials – reed and straws.

In quantity, the ceramics represent the most important category of archaeological material from Capidava and from other researched areas in Dobrudja. Basically, the early medieval ceramic material could be classified in:

1. Pots used for cooking and storage: pots without handles, pots with tubular handles, pots with one handle, buckets
2. Pots used for serving the meals: bowls, plates, patella
3. Pots used for liquids and drinking: jugs, cups
4. Recipients for storing supplies: supply pots
5. Recipients for product transport: amphora
6. Objects for illuminating: rush lights (eathern lamps)
7. Objects used as accessories in human enterprise: trawl weights

The existence of a large number of objects and ceramic fragments implies, of course, a big amount of work necessary for an efficient investigation. Therefore, we were obliged to use only those methods that we mostly know and that are more expedite, such as: macroscopic examination (with the magnifying glass), photographing and drawing the pots and the ceramic fragments; selectively, also microscopic examinations have been made, micro chemical tests and digital micro photographs<sup>2</sup>. These investigations were made on a sample of 350 pieces (fragments and whole vessels) and were extended for a period of 11 years. Thus, in the following we want to present the results of these investigations, namely those relating to work technique used in the 9th-11th centuries by potters in Dobrogea (and Capidava area in particular), but also factors of degradation of ceramics from this period.

<sup>1</sup>R. Florescu and Covacef propose this chronology, having as a criteria the stratigraphic expertise and the typology of the houses (Mănuclu-Adameş teanu 1996, 326), on the basis of three coins belonging to Emperor Constantine IX (1042 - 1055), considered to be the last monetary findings and determine the living ceased in 1046. An aspect to remember is that two other coins were found here, belonging to Empress Theodora (1055-1056, v. Florescu Gr. *et alii* 1959, 562-563).

<sup>2</sup> Analysis (microscopic examinations, micro chemical tests and digital micro photographs) for characterizing the ceramic paste have been conducted in the laboratory for physical – chemical investigations belonging to the National Museum Complex ASTRA Sibiu, by the expert in physical – chemical investigations and preventive conservation Martá Guttman, and since 2011 by Daniela Lazurean at the same laboratory.

Regarding the decorative techniques, in this period the following could be found: incision and impressions, polishing, painting with red slam, the golden slip, enamelling and relief decorum (belts, vertical baguettes, arches, buttons and animal depictions).

Regarding the ceramic paste from this period, common clay<sup>3</sup> (the paste originally grey or violet), or kaolin clay<sup>4</sup> (the paste initially light beige or white). These types of clay can be found nearby. The great amount of kaolin pots discovered, can be, also, explained by the very rich kaolin resources found in the area between Cernavoda and Capidava (Comș a M. 1985, 99-101).

Consequently, it seems that most of the pottery had been modelled in the workshops from around the citadel (no such workshop has been found until the present day within the citadel), maybe in the south-eastern part, where the clay resources are. This is also confirmed by the discovery in a shore slip, east to the citadel, of a clay oven with reverberate burning, which contains fragments of early medieval pottery. (Florescu Gr., Florescu R., Diaconu 1958, 232, 247). We can presume that around the oven the workshops were also situated, and the lack of information is due to the small amount of research conducted in this area.

Dark red paste is specific for other pottery workshops, paste that can be found especially at vases decorated with the little wheel and the pots that have a non-fat paste with sand and mica, sand and chaff, sand and smashed shells, micro pebble and smashed fragments. These pots appear to be generally originating from Northern Dobrudja, where they can be found frequently, even from Moldavia, those with micro pebble and smashed fragments and from Byzantine centres in the northern Black

Sea may be rooted the pots that have the paste with sand and chaff. Also, some categories of pots, which are import goods - such as amphorae, some jugs etc. - have a clearly different paste from the most pots in Capidava, and generally finds analogies in the paste type from some centres in the Byzantine Empire.

Sometimes the paste can contain several ingredients like iron oxides or ochre, and some degreasers are used, also, to give the paste more cohesion and hardness. We concluded that the pots at Capidava have as degreasers sand; micro pebble; sand and micro pebble; sand and quartz; sand and limestone; sand, quartz and limestone; sand, micro pebble and quartz; micro pebble, limestone and quartz; micro pebble and quartz; rarely sand of different dimensions, sand and chaff, micro pebble and smashed fragments or sand and smashed shells. Actually we think that some degreasers were natural and some were intentionally added by the potter. Natural degreasers that are found in the clay's composition are the quartz (SiO<sub>2</sub>) and the micro pebble (granules from 3 to 6 mm), that still remain after the clay's homogenization. The degreasers, the potter intentionally introduced to limit the tensions produced during the drying, are all mention above.

Sometimes the paste was used in pure state or with very smooth sand as a degreaser, obtaining a homogenous aspect. This smooth paste is associated sometimes with a reductive burning and an incised decorum realised from polishing, with lines and net lines, but can also be found at some enameled pots burnt oxidant, at pottery with golden slip and sometimes at pottery from kaolin clay decorated with red slam.

Examination of degreasers, although quite difficult, can often bring valuable information. In addition to pinpoint the area from which the pots come from, we can make some chronological observations. Thus, we find that in the first half of the ninth century degreasers such as sand and micro pebble or just micro pebble dominated. From the second half of the ninth century to the middle of the tenth sand predominates, followed by sand and micro pebble and micro pebble. From the second half of the tenth century we see that in addition to these degreasers, in the clay's paste, other elements like quartz and limestone; were introduced, in association with sand and micro pebble, sometimes both. Exceptionally, pots that have as degreasers: sand, sand and smashed shells, micro pebble and crushed micro pebble, may appear.

After careful research of early medieval pots discovered in Capidava, we concluded that the ma-

<sup>3</sup> We understand by common clay the sedimentary material made from a mixture of clay, silicon oxide, aluminiumoxide, iron, calcium, magnesium, and sodium and potassium oxides. Friable when dry, easy to shape when water is added, it becomes hard and shattered when burned. Due to the iron, after the burning it becomes reddish.

<sup>4</sup> We understand by kaolin the clay easy modelled, that contains a small amount of iron oxides and a big amount of kaolin. The kaolin clay in Dobrudja has a beige colour, sometimes pink. They consist of kaolinite, halloysite, montmorillonite, muscovite and other minerals and stones as impurities (sand, calcareous, iron oxides), and parts from rocks that haven't been already grinded. The resulted colour after burning has various white shades.

majority the slow hand wheel group shaped, could be concluded that the use of this wheel, throughout South-Eastern Europe has become more common in the ninth and tenth centuries (Olteanu, Șerban 1969, 24; Comșa M. 1961, 292-296). Thus, we can afford to disagree with the view expressed by the authors of archaeological monograph, which shows that the incised pots were produced using the wheel worked by foot (Florescu Gr., Florescu R., Diaconu P. 1958, 163, 193). But we cannot contradict the existence of a number of pots-the high-style ceramics category-which are made on the fast wheel. Some of them seem to be import goods, but most of them are local production (Florescu R. 1956, 290-292; Barnea I., Ștefănescu 1971, 273; Cursaru Herlea 2010, 161-194).

In the early eleventh century it seems that, in Dobruja, a modelling technique of superior pots has been adopted, the fast wheel, but it is not used for modelling commonly used ceramics (sandy incised pottery), which will continue to be modelled on the slow wheel, but will maintain the exclusive attribute of certain ceramic species for at least a century (Diaconu, Vâlceanu 1972, 106-107; Vâlceanu 1972, 408).

Throughout the early medieval period there were several types of wheel by hand or knee (Comșa M. 1961, 292-296). Pots from Capidava seem to have been worked at three types of hand wheel, somehow different:

- The wheel with over height spindle from the level of the working surface, and the spindle covered by a convex wooden plate. The bottom of the pots worked on such a wheel is convex on the interior and concave at the exterior, with a hollow on the middle of the exterior surface made by the over heighted spindle.
- The wheel with over height spindle from the level of the working wheel and the spindle covered by a wooden plate or more metal plates fixed on a wooden one. When the plate covering the spindle was flat, the bottom of the pot was flat both inside and out, sometimes the bottom edges pouring over the plate forming a kind of ring, narrower or wider, around the bottom edge. If the plate was convex, the bottom surface of the pots was convex inside and concave outside.
- The wheel with the upper part of the spindle hidden inside the surface of the working wheel. Bottom pots worked on such a wheel are flat.

The bottom of the pots worked on the last two types of wheel is either smooth or it may have

signs in relief. The negative sign is made by notching the surface of the wheel (or wooden board), the positive prints appear during the "throwing" process. These relief signs, called in the literature, most commonly, "the potter's marks" appear only on pots made at the hand wheel.

The pot was removed from the disk with a stick or by hand, (finger marks remained on the pot's bottom). For this operation to be done more easily and not damage the mark release, the disc was strewn with sand. The type of pot preferred for marking was without handles, but mark potter can be found also on the bottom of bowls, and oil lamp flagons.

The pots were burned oxidizing and reduction. Burning was usually below 1000°C, most parts being burned between 600°C and 800°C (Florescu Gr., Florescu R., Diaconu P. 1958, 163). The oxidizing burn imprints the kaolin clay pots with colours such as beige and very rarely light pink, and to those from common clay colours with such as light brick and dark red. But often we find examples in which combustion is heterogeneous, and these have a darker core and the outer and inner surface stained. After discussions with several potters we can say that this heterogeneous combustion (stained) is due to many factors, namely: position of the pots in the oven and contacts with the fuel (those placed near the fire can be burned unevenly-stained), counts the type of fuel the wood species dryness of the wood, if it was mixed with dry leaves, dry grass or other kind of fuel) and cooling mode (sudden or slow, with a period in which the fire still smouldering). Given that heterogeneous combustion (stained) covers large geographical and chronological areas, we find it hard to believe that a reduction burning was desirable, but due to improper muffled furnace, the oxygen continued to break in, resulting different shades (Corbu 2006, 131). Not even the idea that it was panned to obtain a speckled appearance based on aesthetic or functional principles (Corbu 2006, 131) seems credible. It is clear however it couldn't be an incomplete combustion, as in this case pots would be crumbling and certainly would not last.

A large amount of pots have suffered secondary (often partial) burns due, most likely, to the burn of the settlement and the use of fire in cooking. Secondary combustion changed the original colour, namely parts of them that burned to dark grey or black.

Unlike oxidative burning, the reduction burning gives the pots gives a dark - grey or black colour. You can see some correlation between different

types of ceramic combustion. Thus, ceramic polished grey lines and some pottery jugs from the high-style category are reduction burned, while the other categories are burned, in general, oxidant (homogeneous and especially heterogeneous).

Degradation of archaeological ceramics can be enhanced by the existence of technological flaws, the underground soil conditions, the accidents in time, attempts at restoration of the archaeological site of accredited persons and violation of the sampling, handling, packaging and transport rules. All these are based on combined action of several factors that we could be grouped into: physical and chemical factors, physical and mechanical factors, biological factors and human factors.

As for the ninth-eleventh century Capidava ceramics, from the destructive factors point of view a category can be stated, first, that is the series of technology-related errors, most likely the technology development stage, and the negligence of potters. We state the following technology errors:

- burning at low temperature (between 600 °C and 800°C) and heterogeneous burning(uneven) led, most of the times, to a poor mechanical strength to both physical and chemical agents of the environment in which the item was kept, this destructive processes raised numerous conservation and restoration issues.
- the presence of coarse degreasers (micro pebble, calcareous concretions) and in appreciable quantities, gave a homogenous paste, with a divided granular structure, without strong links, which led also to poor physical and mechanical resistance, favouring cracking and disintegration ever since then.
- insufficient drying of ceramics before the burning is another technological defect that leads to the formation of water vapours during combustion, vapours whose pressure can lead to internal cracks or even visible ones.
- other technological defects from the modelling phase, from the separation of the potter's wheel or from drying, are the pot's deformations, decorum; or failed or incorrect combinations of some elements. Touching the pots during drying or burning resulted in the separation of some ceramic material and the existence of ceramic surplus at others.
- while the ceramic support was too porous and full of impurities, the enamel cracked and broke away. The enamel detachment could have been possible also due to environmental factors.

These technological vices contribute to the degradation of the ceramic material both while being underground and after the uncovering. That is the reason why urgent measures of conservation and restoration are necessary. Emphases these technological vices is an important decisional factor in adapting the conservation and restoration methodology.

Among the destructive factors we can also state the underground condition, because most of the times at Capidava, pottery were found in the ground, at different depths:

- the soil pressure, especially in wet conditions, but also by the collapse of buildings, in terms of earthquakes or another natural disasters, sometimes leading to distortion of objects, cracking, and then crushing them.
- the frost-defrost cycle could provoke the pots to crack
- the prolonged hydration of the ceramics, in a high humidity of the soil (heavy rain, flooding) could lead to mechanical stress and hence the structural disaggregation, through a different expansion of the ceramic paste components. Water is an element that leads to the weakening of the ceramic as a carrier of chemical agents and also as an element itself.
- Capidava soil is rich in soluble and insoluble salts were that are filtered, most of the times, into the structure of ceramic. After uncovering, the water starts to evaporate due to changes in temperature and triggers the crystallization of salts, followed by a phenomenon of tension and internal pressure, which can sometimes lead to real explosion of the ceramic structure. The repeating cycle of crystallization, leaching into the soil or by removing the object from the ground (flood drought followed by sudden variations in relative humidity) is, for a longer period of time, the major cause of the loss of its cohesion. It is important, to determine the nature of salts present in pores, to make chemical analysis before restoration of the items; the chemist recommendation should also consider the chemicals with which the restorer can interfere with to remove and neutralize these salts. For many ceramic pieces from Capidava salts were deposited on the surface as a crust of calcium carbonate( $\text{CaCO}_3$ ), insoluble in water and the chemist's recommendation was the use of weak acids(in concentration of 20-25%) - acetic acid or citric acid, non-toxic and relatively easily to neutralize with.

When uncovered, the object bears the imprint of that long cohabitation with the ground and for this situation not to get worse, now is the moment the object is to be given special first aid measures (Moldoveanu 2003, 331-341). For this reason the presence of a conservator or restorer on the archaeological site is required.

Time accidents are very common cause of ceramic materials degradation. As stated above, many ceramic pieces from Capidava have suffered secondary burns (often partially) due, most likely, to the arson of settlement and the use of fire in cooking. These firings have led sometimes to discoloration, degradation of ceramic surface, and in case of enamelled pots to enamel's calcination.

Most of the times, with secondary burns also crushing occurred during the houses' collapse. In this case, the dispersion of fragments in different points led to burnings with different temperatures and therefore the variable degradations and uneven colours.

Degradations resulted from secondary burning are irreversible. Through preservation and restoration of this kind of items we want to re-establish their integrity; to consolidate them, and never remove all the degradations suffered at that time, since the object must give details to viewers or researchers about its entire life (from modelling to restoring).

Often the human factor is the most harmful for the ceramic and, most often from carelessness or inattention. I met people really passionate about what they do at Capidava, but sometimes from too much passion they tried to do things that were inappro-

priate for the archaeological site and I refer in particular to unaccredited people attempts to "restore", carried out on site in inadequate conditions.

More specifically it is about bonding fragments with adhesives close at hand, without taking into account the carbon deposits, and that restoration follows certain rules and has a flow that is established after meeting with a committee of specialists. These interventions carried out on site, made the laboratory work more difficult and submitted the objects to further tensions.

The general rules for sampling, handling, packaging and transport have been followed on this site, especially in the last 11 years, but in terms of storage we have faced over time with an acute lack of space and optimal microclimate conditions (Cursaru-Herlea 2011, 646).

In conclusion we can say that all fluctuations in the political Dobrudja are reflected more or less in the degree of development of the material culture implicitly on the pottery from this area. Instability, the financial situation, the mood of individuals often left their mark on the technique, in the form and decoration. In fact, ceramics from this period are part of a natural evolution of the previous century ceramics and correspond to a certain stage of social and economic development of communities in the Lower Danube, regardless of ethnic origin (Diaconu, Vâlceanu 1972, 129). We also believe that highlighting all factors of degradation of the 9th-11th century ceramics from Capidava is an important deciding factor in choosing the optimal methodology for its conservation and restoration.

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## COMPARED STUDY AND RESTORATION OF TWO 18th CENTURY ICONS WITH THE THEME "JESUS THE TEACHER"

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**Abstract:** *The restoration of the icons painted on wood with the theme „Jesus the Teacher”, implied using different treatment methods in different ways, based on the specific problems of each piece. During the restoration a comparison from the point of view of the execution techniques and the degradations of the two icons was made. Therefore, different conclusions could be drawn respecting the way certain characteristics of the materials, both those constituent, and those used for the restoration process, change in different situations.*

**Key words:** *icons, restoration, traditional techniques*

**Abstract:** *Restaurarea icoanelor pe lemn cu tema Iisus Învățător, a presupus folosirea metodelor de tratare în maniere diferite, în funcție de problemele specifice ale fiecărei piese. În cursul lucrărilor de restaurare s-a încercat compararea celor două icoane din punctul de vedere al tehnicilor de execuție și degradărilor. Astfel, s-au putut trage concluzii diferite privind felul în care anumite caracteristici ale materialelor, atât cele constitutive, cât și cele folosite pentru restaurare, se schimbă în situații diferite.*

**Cuvinte cheie:** *icoane, restaurare, tehnici tradiționale*

The technical aspect cannot be ignored when historical factors and diverse ages requests are referred to, in panel painting.

The art of the first Christians is the result of the pre Christian cultures, such as Judaism, Hellenism with its oriental varieties or the roman spirit. The primary Church was in contact with the roman culture, where image played an important role (Brehier, 1994, 28-29).

The Christians created new symbols, incomprehensible for pagans: the grapevine, the Secrecy of the Life of the Lord, and most importantly, the fish (Sendler, 2005, 14-18).

For the Christians, the fish, symbolizing the messianic nourishment, becomes the symbol of Christ, due to the fact that every letter of the word refers to Christ: Jesus Christ – Son of God – The Savior. Starting from the 2nd century the symbol is seen on sarcophaguses, tombstones, on the walls of the catacombs, and also on small objects. There is thematic and style cohesion, the same symbols being also seen in Asia Minor, Spain, Northern Africa and Italy.

Starting with the increasing power of the emperor Constantine, art became the reflection of the divine omnipotence. A new program of types and images

was created. Christ appears portrayed as a beardless young man now, with gentle features although other times he was represented as a bearded philosopher (Arhim. Boghiu, 2001, 42). He is not a teacher anymore, but a real master, sitting on the throne, surrounded by apostles and saints.

From the Hellenic environment, the Byzantine art would inherit the harmony, the measures, the rhythm and the grace. Christ is portrayed with long hair and beard, and dark coloured eyes. The cross and the lamb are unique symbols for the representation of Christ in the iconography (Arhim. Boghiu, 2001, p.59). Amongst the cosmic elements, the sun and the moon were chosen as symbols. Towards the 4<sup>th</sup> century, in the time of Constantine the Great, the image of the Savior in the catacombs is more individualized, closer to portrait.

The two restored icons came from a monastery called "Sub Piatră" in Alba County and have been dated from the 18th century. The study and the restoration of the two pieces were realised as a bachelor's degree final paperwork, for the Restoration and Conservation Department of the Lucian Blaga University in Sibiu, under the coordination of Dr. Olimpia Coman Sipeanu, expert restorer. In both images, Jesus the Teacher is represented with

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red and blue apparel. The tunic, with large sleeves (Monahia Iuliania, 2001, 130), in a warm red hue, is in this case, decorated with a red, orange and white floral pattern.

The golden background signifies the absolute light. The gold has no material colour, being different from common yellow.

In the restored icons, Christ appears with the Gospel, with the inscription „*veniți blagosloviți părintelui meu de moșteniți împărășia care e gătită*”, in his left hand. In the lower sides, both icons (Fig. 1, 2) have inscriptions making reference to the donors.

Also, the first icon has an additional inscription saying “*Această icoană au plăti oniga nicola(e) cu soțu...na*”. The second: “*această icoană...oa...gavr(ii)l cu soțu mărie*”.

On the frames of the icons, the red colour is visible, and on the interior, alongside the painted surface, there is a golden border, intended to contour and highlight the entire painting. The frames role is to isolate the image from the rest of the world, to insure its uniqueness. This system was used in our country, influenced by the Russian painting techniques, from the 13th century until the 18th century. The history of wooden panel painting begins in the 5th century, in the roman cultural environment, continuing through the Middle Ages. The wooden panels played a major role in the European painting. The knowledge about panel execution techniques is very important for possible conservation and restoration interventions.

The biological tests executed on the two wooden panels conducted by Dr. Livia Bucșa, revealed the fact that they were made of fir (*Albies alba*). In both cases, the same technical solution was used for the execution of the marked out in relief frame and aureole, which were carved in the thickness of the panels.

The first icon (Fig. 3) presents metal nails, in the centre of the upper side, used for hanging. Traces of a rough tooling could also be observed on the back of the panel. As far as the second icon is concerned (Fig. 4), although the execution technique is similar, in this case, the traverse on the back, meant to consolidate the panel, is attached with three wooden nails. They reach the painted surface from the back and have caused deteriorations such as colour detachments. Also, on the back of both icons, the existence of a layer of canvas intended to consolidate the areas where gnars could produce cracks, could be observed.

Both panels, most probably, have been cut with a saw and the finishing process has been executed with the hand plane and other similar tools.

The chemical investigations, effected by Chemist Marta Guttman, on samples from the painted layers, revealed the fact that the gesso, in both cases, is made of gypsum ( $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ), used through the ages for the preparation of watercolour painted panels, oil painted walls, and this custom is still preserved (Istudor, 2011, 184). Several names are used for it in Erminies. Over the gesso layers, there usually laid a layer of bolus; a clay that had the role of forming a very smooth surface for the gold leaf to be attached on.

The chemical investigations revealed the fact that the clay used, in most of the gessos in watercolour painting, has an animal origin, possibly made of animal skin. Also, in the gesso composition, traces of oil were discovered, determined through burning tests.

As far as pigments are concerned, the tests revealed the usage of lead white, which lead us to the conclusion that the icons were painted before 1834, when it was use of zinc white, a brighter pigment, but with less coverage power (Istudor, 2011, 132). Also, cinnabar red, lead red, ultramarine blue and carbon black were used.

For the hair in the painting, brown sienna was used, from the hydrated iron oxides category, with good coverage qualities. These pigments are resistant to light and have good compatibility with the others.

The gold leaf was obtained, in ancient times, by pressing golden coins (this practice being banned by law), or other pieces of metal, using a traditional technique. Then it was laid over a red bolus layer, shale umber made of iron oxides (Istudor, 2011, 163).

The pigments used for the colours were disposed in successive layers, according to the technique of the icon painting. In both cases, oil was discovered in the composition of the colours.

The varnish was determined through burning tests. The resin used in the varnish is a natural one, and this was determined by the emanated scent. Over the varnish layer, a film of oil, which produced an intense effervescence, was discovered. The oil resulted from repeated interventions of maintenance and rendering the brightness of the varnish layer.

The degradations of the wooden supports are due to the natural and technique defects, to the physical phenomena that affected them, or to the biodegradation attacks. Also, the cutting techniques, the dilatations and contractions of the wood produced deteriorations.

Due to the wooden nails that affix the traverse on the back of the second icon, tensions on the sup-

port occurred after its inflection, consequently cleavages could be observed in the central part of the panel. In the right extremity there was a large cavity crossing the panel vertically. In the case of the first icon, these aspects were not so visible because of the absence of the wooden nails. The rugged painted surface was executed in a defective technique in both cases.

After the radiographic analysis, executed at the "Luther" Pediatric Hospital in Sibiu the different levels in the panels could be observed in the frame and the halo. Also, the cracks and cavities could be seen crossing through the wooden panels and reaching the painted surfaces (Fig. 5).

In the middle of the superior edge, a very powerful radiographic signal was emitted by the metallic nails used for hanging.

The biological examination revealed the fact that the attack was produced by *Anobium punctatum*, but its distribution was reduced and the attack was no longer active.

The first icon presented on the right side of the painted surface severe damages, colour detachments and losses. Also, losses of gesso material and discolorations could be observed. The preparation of the support presented „blind” detachments and roof shaped detachments. The painted layers presented traces of frazzle around the lacunae.

The second icon also had an irregular surface, responsible for the existence of „blind” detachments of the painted layers, which could be identified with a simple easy knock on the surface. Detachments of the painted layers were visible in the face area. In the places where the wooden nails were passing from behind, a thin layer of canvas could be seen.

On the surface of the painting, flying orifices produced by the xylophages insects were visible, in a smaller number compared to the back of the panel.

In the central lower side, in both cases, detachments of the canvas, discovered under the gesso, could be seen. This was visible especially at the first icon, on the right side, where the most pronounced degradations were located, and the aspect of the paint layers was dusty, due to the candles fired in the proximity of the icon.

In the upper side, this icon presented the traces of a mechanical shock, which produced the detachment of the dusty paint layers. On the characters face, a delve, probably caused by a hit, could be seen.

Unlike the first icon, the second one has several areas where lacunae were visible, especially the lower area of the frame, but also on the rest of the edges. The colour was in a better condition than the one on the other painting, due to the fact that

the varnish congestions and its browning are not as much present as they are on the first icon.

The wearing out degree of the back gesso is also visible in both icons corners.

Both icons presented varnish congestions and also adherent deposits of grime and oil.

The entire surface was covered with scratches on the varnish level, wax deposits that obstructed the readability of the work of art that, in time, tensioned the paint layers causing their degradation and detachments.

The mechanical cleaning consisted in a dedusting, achieved with soft brushes, and the removal of wax deposits. This operation was realized by softening the wax deposits with mixtures of solvents and removing them with scalpels.

The prophylactic consolidation was made by covering the entire painted surface with Japanese paper veil applied with skin clay in a 6% concentration, and it followed the local temporary consolidation (Fig. 6). This coverage was maintained during the entire restoration process carried out on the back of the icons.

On the painted surfaces an ironing was performed, with an electric spatula at 70-90°C, alternated with the application of cold presses having the role to ensure a thermal stabilization of the heated area. This operation was realized in order to consolidate the painted layers (Fig. 7).

The removal of the metallic nails used for hanging was executed in order to re-establish the objects initial integrity.

The disinfection was performed using Per-Xil 10, as a precaution, due to the fact that the xylophages insects attack was no longer active.

The cleaning of the back of both panels was made with a mixture of ammonia and distilled water, used for the removal of grime deposits on the entire surfaces. The glue deposits, traces of a former gluing of the panels, were removed using compresses immersed in hot water, and for the mechanical removal scalpels were used.

A degreasing of the cavities and fractures was realized with ethanol in order to prepare them for the consolidation/filling, and the filling of the lacunae was executed with a putty made of sawdust and glue, in order to obtain a wood like effect.

On the second icon, in the areas where fractures were passing through the panel and reached the painted layers, an additional adhesive consolidation was executed with bamboo spigots and glue, followed by a compression of the area in a thumb-screw until the consolidation was achieved.

After consolidation of the wooden support was completed, the Japanese paper veil was removed

from the painted surface using compresses immersed in hot water.

It was followed by a degreasing of the lacunae, with mixtures of ethanol, distilled water and ammonia, and also with egg yolk emulsion mixed with a few drops of ammonia. The filling of the lacunae was realized with putty made from a 6% concentrated solution of skin glue and distilled water mixed with chalk dust (Fig. 8). The filling was followed by a burnish of these surfaces with abrasive paper of different texture. Then polishing was realized with egg yolk emulsion and cork.

The cleaning of the painted surfaces was executed with mixtures of solvents that were chosen based on the type of deposits (Fig. 9).

The retouching was executed with water colours (Fig. 10, 11).

The revarnishing was realized with a substance made of dammar resin dissolved in turpentine.

The recommended values of temperature are situated between 18 and 20°C. As far as the relative humidity of the air is concerned, it must be between 55 and 65%. Also, the illumination must not be orientated directly on the surface of the two paintings, in order to avoid the risk of photodegradation. The icons must be placed far from heating sources, due to the fact that an excessive exsiccation of the panels could produce undesirable tensions in the weight of the panels that might also deteriorate the painted layers.

The restoration interventions revealed similarities respecting the execution techniques of the two icons. In both cases fir (*Albies alba*) was used, and two sleepers were inserted in "martin tail" manner. Also the painting was laid on the same kind of gesso, and the same pigments were used to obtain the colours. There are also similarities in the case of the resin based varnish, and in both cases the presence of oil, applied on the painted surface, for maintenance and brightness of the images, was discovered.

As far as the distinctions between the two icons are concerned, the presence of the wooden nails used for affixing the sleepers on the back of the second icon, were discovered. This aspect generated a different evolution of its degradations, tensions of the support, followed by cracks and cleavage, taking place. Also, numerous detachments of the painted layers occurred. In the case of the first icon, most of the degradations, varnish congestions, losses of paint and deposits of smoke, were visible on the painted layers level, due to its former location in the proximity of a heat source. Thus, the conclusion is that the two artworks have been executed by the same craftsman in the same period of time. The restoration then implied different types of interventions, based on the degradations determined by the different microclimate they have been placed in a long time.

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## LIST OF ILLUSTRATION

1. First icon; before restoration
2. Second icon; before restoration
3. First icon: back side
4. Second icon: back side
5. X-ray; detail
6. Prophylactic consolidation; detail
7. Consolidation of the painted layers
8. Filling the lacunae
9. Cleaning
10. First icon; after restoration
11. Second icon; after restoration

## LISTA ILUSTRĂȚILOR

1. Icoana 1; ansamblu înainte de restaurare
2. Icoana 2; ansamblu înainte de restaurare
3. Icoana 1: verso
4. Icoana 2: verso
5. Radiografie; detaliu
6. Consolidare profilactică; detaliu
7. Consolidarea straturilor picturale
8. Chituire
9. Curățire
10. Icoana 1; ansamblu după restaurare
11. Icoana 2; ansamblu după restaurare



1. First icon; before restoration



2. Second icon; before restoration



3. First icon: back side



4. Second icon: back side



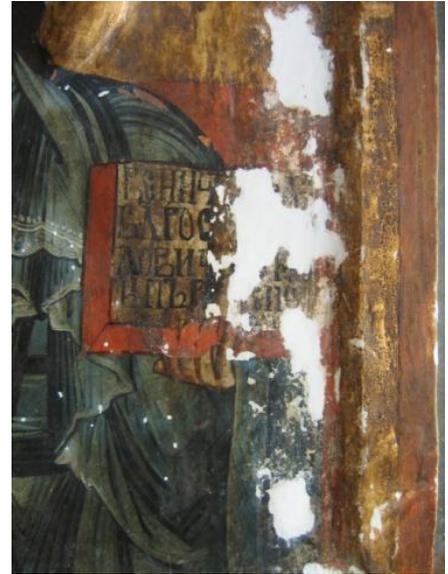
5. X-ray; detail



6. Prophylactic consolidation; detail



7. Consolidation of the painted layers



8. Filling the lacunae



9. Cleaning



10. First icon; after restoration



11. Second icon; after restoration



## THE RESCUE OF A POPULAR OCCULT BOOK (BRONTOLOGION / GROMOVNIK) OF THE EARLY 19<sup>TH</sup> CENTURY

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Alexandru Gh. SONOC\*\*

**Abstract:** This paper presents the steps of the restoration of a popular occult book, written in the Romanian Cyrillic alphabet: a Book of Thunders (Brontologion or Gromovnic), which is dated in the early 19th century. The restoration of the book and the conservation measures were decided in accordance with the existing rules and procedures. The progression of the restoration works, as well as of the research concerning the book is also reflected in its restoration file. The preliminary study concerning the historical and cultural importance and the condition report of this book is followed by the presentation of the results of the physical and chemical analysis, as well as of the details of the restoration works. The restoration techniques and materials to be used were chosen according to the nature of the specific degradations for old books and the particular case of this item.

**Keywords:** Brontologion / Gromovnic, popular occultbook (keraunomancy), specific degradations, restoration and conservation operations

**Rezumat:** În această lucrare sunt prezentate etapele restaurării unei cărți populare oculte scrisă în alfabet chirilic românesc: un Gromovnic datat la începutul secolului al XIX-lea. Restaurarea și măsurile de conservare a cărții au fost decise cu respectarea normelor și procedurilor în vigoare. Progresul lucrărilor de restaurare și al cercetării referitoare la carte este reflectat și în dosarul ei de restaurare. Analizei preliminare pentru stabilirea semnificației culturale și a stării de conservare a cărții îi urmează expunerea rezultatelor analizelor fizico-chimice și sunt detaliate operațiile de restaurare efectuate. Tehnica de restaurare și materialele utilizate au fost alese în corelație cu natura degradărilor specifice cărților vechi și cu cazul particular al problematicei acestui exemplar.

**Cuvinte-cheie:** Gromovnic, carte populară ocultă (keraunomanție), degradări specifice, operații de restaurare și conservare

### I. Historical and cultural importance.

In the Romanian society, unlike to other parts of Europe, the secular popular books entered later, as a result of the particular historical conditions in which the Romanian civilization developed (Ciobanu 1992, 239). Of these works, the occult books (either the magical or the divinatory ones), were largely spread (Călinescu 1982, 43). The divinatory works are based on the idea that any change in the world is linked to the constellations and to the celestial bodies and that because of this mysterious relationship or of that one, between dreams and the real world, the future can be fore-

told (Cartoian 1974, I, 217). Among the astrological works which circulated in the Byzantine society and in the South Slavic world, about which N. Cartoian said that they were known by the Romanian since the 16<sup>th</sup> century (Cartoian 1974, I, 220), there is also the *Gromovnic* (i.e. *The Book of Thunders*).

A *Gromovnic* (from *Громовник*) or *Vrontologhion* (from *Βροντολόγιον*) or, less commonly, *Fulgeralnic* (according to the later translation into Romanian of its name of Slavonic or Greek origin, which may be due to the Latinized influence of the Transylvanian and probably inspired by the *libri-*

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*fulgurales* of the Etruscan priests, as well as by various names of the liturgical and occult Romanian books) is a popular occult book of Syro-Egyptian origin, including so-called predictions, not only of meteorological, economic and even political nature, but also about the human fate, which are drawn from the interpretation of the thunders and lightning in relation to the site, the sign and even the time of the day in which they occur (Cartoian 1974, I, 224sq.; Ciobanu 1992, 258). It is therefore not a simple divinatory astrological work, but one with a more complex character, a keraunomantic one. Sometimes, the *Gromovnic* is combined with a *Sismologhion* (from *Σεισμολόγιον*, i.e. *The Book of Earthquakes*), if it contains interpretations of the earthquakes which occur in a particular sign or in a specific time of the day (Cartoian 1974, I, 225sq). As other popular occult books, like the *Zodiac* or the *Rojdanic* (i.e. *The Zodiac*), the *Lunicul* (i.e. *The Book of the Moon*), *Tâlcuirea* (or *Socotirea*) *Viselor* (i.e. *The Interpretation* (or *Counting*) *of Dreams*) and the *Trepetic* (i.e. *The Book of the Muscular Twitching*), which were often copied or printed together with the *Gromovnic* and the *Sbornic* (i.e. almanacs or books containing writings on various themes) and calendars, the reading of this work, which was considered as "devilish" by the Church, was prohibited to the believers and the civil law of the 17<sup>th</sup> century, inspired by the Slavic-Byzantine Nomocanons, punished it too (Cartoian 1974, I, 219sq). However, there were many astrological books in the libraries of the monasteries (Cartoian 1974, II, 25) and they were copied and printed by monks and priests, so that in the 19<sup>th</sup> century such works were published even by the Metropolitan Bishopric of Moldova in Iași and *Calendarul pe șapte planete* (i.e. *The Calendar of Seven Planets*), printed here in 1816, became a source of inspiration for various later editions, which were published in Bucharest and Brașov (Cartoian 1974, I, 220).

Further on in time, even the communist authorities banned the printing and distribution of occult literature, which was considered as "obscurantist", and so the access to the specimens which were preserved in public libraries was allowed to the ethnographers and to the researchers of the ancient literature only with a special approval of the directors of the libraries or of the leaders of the cultural and higher education institutions or of the central and local structures of the Council for Socialist Culture and Education.

In Romania, the *Gromovnic* had a wide circulation from the 18<sup>th</sup> century and was printed (sometimes illegally) both in small private and ecclesiastical workshops. One of the oldest-known Romanian *Books of Thunders* is included in *Sbornicul Slavo-Român* (i.e. *The Slavic-Romanian Almanac*), the first book issued of the printing workshop which was installed in Alba Iulia, in 1639 by the orthodox Bishop Ghenadie, with support from Walachia and with the consent of the Reformed Prince George Rákóczi I (1630 -1648) of Transylvania, who was interested in a possible conversion of the Romanian population to his faith (Cartoian 1974, I, 225; Ciobanu 1992, 258.). In 1703, Costea Dascălul (i.e. The Teacher) from Șcheii Brașovului copied a (now already extinct) translation entitled *Vrontologhion* of a Greekwork, which was richer in details than the version printed in 1639 in Alba Iulia, but included it also in a *sbornic* (manuscript no. 1436 the Library of the Romanian Academy), along with two other secular works, *Darovania* (i.e. *The Giving*) and *Istoria lui Sindipa* (i.e. *The History of Sindipas*). (Cartoian 1974, I, 23, 225sq). Currently, there are known several versions of this popular occult book, translated from Slavonic or Greek and, the most common, *Gromovnică al lui Iraelie Impăratul, carele au fostă numărătorul de stéle* (i.e. *The ThunderBook of Emperor Heraclius, Who Was a Counter of Stars*), which was assigned to the Byzantine Emperor Heraclius (610-641). The second edition of this work was published in Bucharest in 1795, and a third edition was issued in 1817 (Cartoian 1974, I, 232).

The recently restored work from the collection of the National Museum Brukenthal, whose title page is sadly lacking, could be a copy of another edition, an older one and maybe even of another version of *The Book of Thunders*. A proof for an early dating is also the fact that it was not written in a transitional version of the Romanian Cyrillic alphabet, how it was customary in the middle of 19<sup>th</sup> century (ca. 1833-1860), before the official introduction of the Latin alphabet (1860-1862). Moreover, the chronological table of this book starts from 1814 which could be the year when it was printed or the next one. (Fig. 2)

For the first time since the Revolution of 1989, a *Gromovnic* was printed in 1993, in Iași, by the publishing house *Porțile Orientului* (i.e. *Gates of the Orient*), with the title of *Gromovnic din bătrâni pe 12 zodii și 7 planete, Pascalia, posturile și dezlegările lor* (i.e. *The Old Peoples' Book of Thunders, with 12 Signs and Seven Planets, Pascalis, Fastings and Their Absolutions*). The com-

plex, social and cultural, context of the first decade that followed the overthrow of the communist regime can be characterized by opportunism, but also by an insistent promotion of some national-Christian ideas of the interwar age through the challenging political speech. This book, which was spread among some social groups sharing the nostalgia of a traditional lifestyle, but which had few theological training, was published aiming obvious economic benefits. The advertising that was made even more recently for it in the local press, particularly in Moldova, for example, in *Gazeta de Cajvana* (i.e. *The Gazette of Cajvana*) of December 14, 2009 or in *Agenda de Iași* (i.e. *The Agenda of Iași*) of October 25, 2012 emphasizes the links of this book with the Romanian folkloric traditions, as well as the accuracy of the predictions made with it and their importance for the welfare of those who know them.

From this perspective, to restore a *Gromovnic* of the early 19<sup>th</sup> century is an useful cultural approach, for the recovery of a work which is relatively rare in the collections of old books and representative for the popular culture of the 17<sup>th</sup> – 20<sup>th</sup> century, in which the Orthodox Christianity overlapped an archaic religious sensitivity, of pagan tradition.

## II. The work procedure.

Before any restoration work on the book, a restoration file must be made, which contains all specific elements of the object, relating both to block of pages and to its binding. These elements are necessary to make a new binding, considering the authentic aspect of the book. There are recorded also the details of the conservation aspects, as well as all the stages of the interventions conducted for the restoration of the book, proofed by the photographic documentation which is attached to the file. The restoration file includes also the analysis record carried out on the book, which brings scientific information useful for an appropriate choosing of the methods and materials to be used in the restoration. Finally, the restoration file is a document which certifies the correctness of the restoration work which has been carried out on the book.

### II. 1. The preliminary analysis and the writing of the condition report.

Because the environmental conditions in which the book was preserved over the time, cannot be precisely determined, for the sake of the conservator's safety it was recommended to disinfect the book before any intervention. Therefore, the first step has been the disinfection of the book in a vacuum oven for 48 hours, using a solution of thymol in alcohol.

The next stage of work was to make detailed pictures of the book before the intervention and to write the condition report. At first were recorded the available historical data and at last the characteristics of the book were mentioned (the item description), highlighting the details of its condition.

Book description:

Title: Gromovnic

Category: Romanian old book

Inventory No.: 204791

Language: Romanian, written in Cyrillic alphabet

Type of work: Printed book

Owner: the Library of the Brukenthal National Museum in Sibiu

Size of the book: 16.8 X 11.1 cm

### II. 2. The condition report of the book.

The book, which has a single column text, with little ornamentation, was printed on a paper containing mechanical pulp. The text, printed in black ink, transpires, slightly affecting its readability.

The book body was in an advanced state of decay (Fig. 1-3), showing all kinds of degradations: biological, physic-chemical, and mechanical. There were remarked also traces of an inactive attack by wood-boring insects (galleries and flight holes). The paper presented a stronger browning of its sheets, mainly at the first and at the last ones. The paper appeared slightly rough, yellowed due to acidification, with adhering dirt and grease traces (vulgar patina). On some pages there are different notes in pencil, ink pen and blue ball-pen paste, as well as ink stains.

Throughout the book there was noticed also a previous "restoration", empirical made with rough patches applied to cracks and using thick paper, glued with flour pasting.

The sheets of the book had the following degradations: bending, folding, fringed borders, as well as at the bottom corners tearing both in the text and in the support appeared, loose and lacking sheets, loss of material support. On the sheets of the book were present too beeswax stains, deposits of dust and organic debris, halos of moisture and adhesive (flour pasting). The degradations showed by the *Gromovnic* both in the sheets of the book and in the spine are due to the environmental conditions, with high humidity, in which the book has been kept in storage. These inappropriate conditions have intensified the action of the microorganisms, which transformed the adhesives used for bonding (animal glue for the spine and starch on the sheets) to degradation compounds. The high humidity makes also the cellulose fibres of the paper struc-

ture to become soft, spongy and of low strength. This kind of damage is quite different from that caused by a high acidity of the paper, which is manifested primarily by its discoloration and friability (Patologia cărții, 68sq).

### II. 3. Physical and chemical analysis.

Could be identified, following the laboratory and microscopic tests on the structure of the paper used for the researched volume, both the nature of the fibres and some characteristics of the paper. The paper contained vegetal short and (less) medium sized fibres and had a very good degree of bonding, and pH = 6.

For the inks used, the solubility of the solvents (water and ethylic alcohol) on 'written' parts of the book was checked: the printing in black ink, the additional inscriptions in blue ink, the stamps on the endpapers and the additions made in pencil (black, red and blue). So, were tested over forty pages of the book, the laboratory tests demonstrating that the black ink which was used for printing is insoluble both in water and in a mixture of 50 % alcohol in water (Polixenia Popescu, *Buletin de analize nr. 1861/2010*).

The scientific information recorded by the physical and chemical investigation was used for an appropriate choosing of the methods and materials to be used to restore the book.

### II. 4. The restoration operations.

For the permanence of the paper it is recommended to remove and neutralize all the impurities which caused damage to the book and that all materials used to strengthen the damaged sheets have a high degree of purity and chemical stability and to resist to the harmful action of noxious agents, in normal storage conditions and under normal conditions of use (Patologia cărții, 1976, pag.9./Barrow 1972).

Because the book partly had lost its unit through degradation of the seam, of the ribs, through the loosing and degradation of the covers, we opted to restore it after the dissolution of the volume, to eliminate the dust and for a dry cleaning with a soft rubber and a scalpel, followed by a wet cleaning of the sheets.

The dry cleaning of the book (the elimination of the dust) was done with a brush of soft natural hair, especially from the spine and on each sheet individually. This operation was done with slight movements from the centre outwards, eliminating the deposits of dirt (dust, scraps of different materials, etc.). The beeswax deposits were removed with the scalpel, making a cross-shaped notch, but

without insisting, to avoid in this way to make the paper too thin and to break it.

The next operation was to make the "mirror", by foliation with a pencil, after which we switched to wet cleaning. The sheets were washed by immersion in a deeper tray, laying on a mixed (rigid) support, consisting by a plate and a plastic sheet. The sheet was turned on the other side with a second plastic sheet, to exclude its inappropriate handling. The water which was used for washing was about 30-45 °C. The washing was done with a brush, through radial motions from the centre outwards (Fig.4). Because for this operation was used also a pH-neutral cleaning agent, the washing was rigorous. After the sheets were washed, the following step was to stick them again, using a 0.2% CMC solution. For drying, the sheet was transferred from the plastic sheet on filter papers. From them, it was easily detached and left to dry free on the rack. Once dried, the sheets were pressed between two platters and filter papers, and they were left there for twenty-four hours. The next stage was to strengthen them with Japanese veil, where there were cracks and weakened areas (Fig. 5), using as adhesive a 1.5% aqueous solution of CMC (whose concentration depends on the work technique which is used, so to complete the sheet by "doubling" it with Japanese paper, the proportion is 2%). The holes which are in paper were covered with fluff of Japanese paper or "strips" ("strings") of Japanese paper.

After drying, the excess paper was cleaned by the knife and the edges were consolidated with adhesive, pressing with the rebating tool. After the end of the completing and consolidation works, the sheets were pressed. The excessive addition was eliminated by cutting the sheet at size, with a metal ruler and a utility knife.

The last restore operation was to form the sections, to sew them together and to complete the book block (Fig. 6).

All operations were recorded by photos, which were gathered in the photographic documentation which is attached to the restoration file.

### II.5. Recommendations for the conservation of the book.

Physical and mechanical damages can be caused to books both by improper handling and by an incorrect storage, in inadequate microclimate conditions. Inadequate levels of the relative humidity and of the temperature can lead to an increasing degradation by the action of internal factors, such as the presence of lignin and gluing materials in

the composition of the paper (Moldoveanu 2003, 20).

The proper handling of the books which belong to the cultural heritage, as well as ensuring of an optimal microclimate are major requirements to be complied with. Therefore, to protect this popular occult book was made a cardboard storage box, on whose label was inscribed the optimal storage conditions: temperature of 18-22/24 °C and relative humidity of 50-65%. (Moldoveanu 2003, 21)

### **III. Conclusions.**

A good restoration and conservation of the books which belong to the cultural heritage books re-

quires a special attention regarding the actions to be taken, beginning from the handling (the packaging, the transport) and continuing with the restoration and preservation, for exhibitions and scientific valorisation. The rules and procedures are used in order to protect the items which belong to the cultural heritage against the adverse effects that might arise by the negligence and carelessness of those who work with them. Therefore, the librarians and the keepers of old book collections conservatives is required to take appropriate measures to preserve in good condition the old books that have been restored, so that the future generation could study them too.

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## LIST OF ILLUSTRATION

- 1 Book before restoration.
- 2 Detail of the page with chronologic table and subsequent records, of the 20th century.
- 3 Page of the book before restoration.
- 4 Page during the restoration (wet cleaning).
- 5 Detail of the page during the restoration.
- 6 Book body after restoration.

## LISTA ILUSTRĂȚILOR

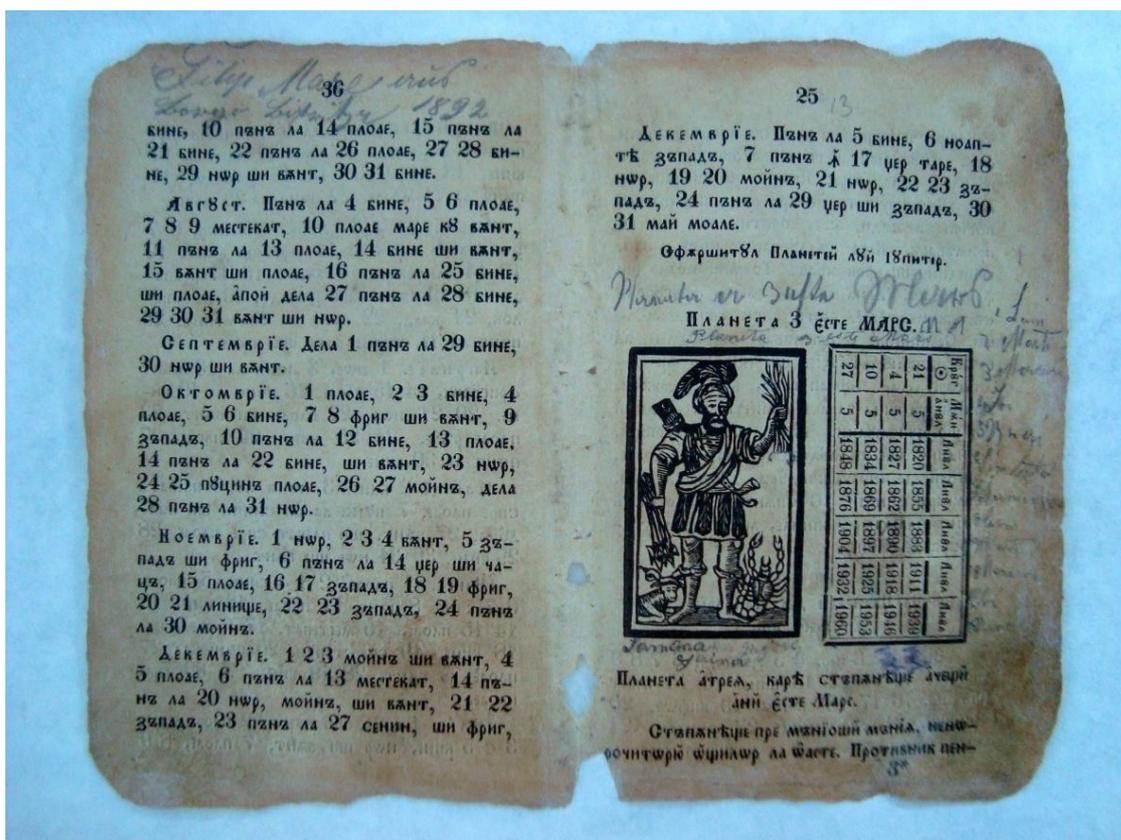
- 1 Carte înainte de restaurare.
- 2 Filă de carte cu tabel cronologic și însemnări ulterioare, din secolul al XX-lea.
- 3 Pagină de carte înainte de restaurare.
- 4 Pagină în timpul restaurării (curățare umedă).
- 5 Detaliu de pagină în timpul restaurării.
- 6 Corp carte după restaurare.



1 Book before restoration.



2 Detail of the page with chronologic table and subsequent records, of the 20th century.



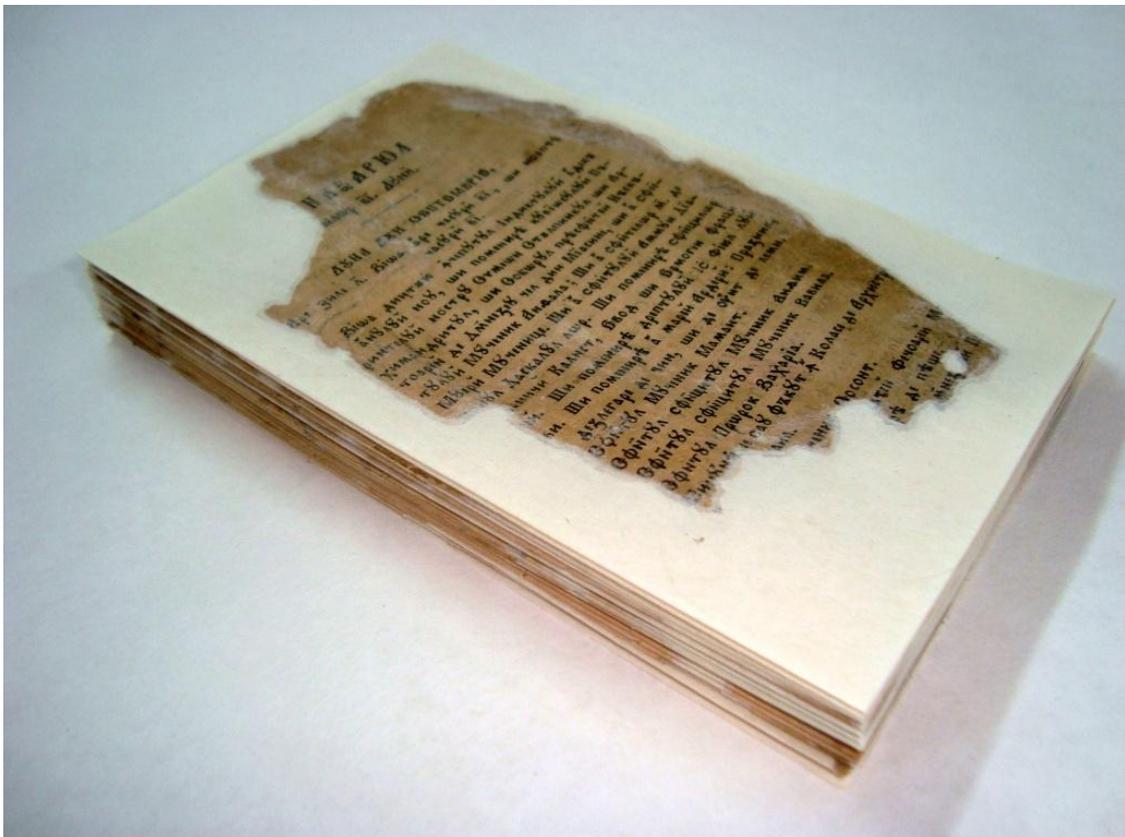
3 Page of the book before restoration.



4 Page during the restoration (wet cleaning).



5 Detail of the page during the restoration.



6 Book body after restoration.



**ARTUR COULIN. THE PORTRAIT OF ZRINYI IN ROME.  
AN APPROACH TO REMOVE OLD YELLOW VARNISH**

**Radu Constantin TĂTARU\***

**Abstract:** Over time, the varnish used by some painters to protect the surface of oil paintings, can deteriorate. It may crack, whiten or yellow. In the case of yellowing, the discoloration obscures the painting's original details and affects the overall tone. White and cream tones turn yellow, while blues turn green. Cleaning the yellowed varnish is a delicate process, but it may dramatically change the appearance of the oil painting.

**Keywords:** restoration, oil paintings, cleaning, varnish removal, colophonium.

**Rezumat:** Odata cu trecerea timpului, vernisul utilizat de pictori în vederea protejării suprafețelor pictate în ulei, se pot deteriora. Adesea, acestea pot dezvolta cracluri, se pot albi ori îngălbeni. În acest ultim caz, decolorarea opacizează detaliile originale ale picturii afectându-i întreaga tonalitate. Tonurile de alb și crem devin gălbui, în timp ce albastrurile virează în verde. Curățarea vernisului îngălbenit este un proces delicat, dar poate schimba în mod dramatic aspectul general al picturii.

**Cuvinte-cheie:** restaurare, pictură în ulei, curățare, înlăturarea vernisului, colofoniu.

Traditional varnishes applied to oil paintings have a notorious tendency to yellow in time. This applies to resins such as mastic or colophonium, as well as to oil varnishes which incorporate mixtures of drying oils and natural resins. Paintings covered with these varnishes will, in time, appear darkened and yellowed, and ultimately obscured. There is general agreement that at this stage, some form of cleaning is required in order to restore elements of the artistic intent. The ideal varnish for a painting should be one that will remain transparent and colourless in the long term, possess and retain adequate elasticity, provide protection for the paint layer, and, if necessary when it has aged, be removable using a gentle, non-polar solvent (Knut Nicolaus, 1999).

The varnish is the final, finishing layer of a painting. More important, however, are its optical properties: it saturates the colours, enhances contrast and gives an even gloss to the painting. It makes a painting look clear with more visible details, especially in dark regions (De la Rie, 1987). It imparts

depth, luminosity, and either a glossy or matte appearance to the painting layer, and gives it a degree of protection from the effects of mechanical and atmospheric stress (Knut Nicolaus, 1999). Varnish is one of the most sensitive layers in a painting. Because of its composition, large surface area and minimal thickness, it responds to mechanical stresses, environmental influences (such as dirt, climate and light), and restoration activity with changes of varying magnitude, including yellow or grey discoloration. Most of the varnishes age as a result of auto-oxidation, that is, in the presence of atmospheric oxygen; they turn yellow, lose their elasticity, shine and grow dull. As a result, these varnishes have to be removed from the paint layer at certain intervals. A strongly yellowed varnish also considerably changes the appearance of a painting. Not only the underlying colours change, but also contrast and balance between the colours, since not all colours change to the same extent. For this reason, the yellowed varnish has to be removed and replaced to restore the initial colours and appearance of the painting (Patrick Dietemann,

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2003).

Yellowing occurs predominantly in darkness; yellowed varnishes are bleached when exposed to light even for short time (R. De la Rie, 1988). The processes leading to yellowing and bleaching are not yet well understood, and no chromophores have been clearly identified (R. De la Rie, 1988; Van der Doelen, 1999; Feller, 1994). A straightforward hypothesis for varnish yellowing is the formation of unsaturated ketones. Some indication for this was found using infrared spectroscopy: absorption in the region of unsaturated carbonyl compounds is enhanced after aging of varnishes, especially after heat aging (R. De la Rie, 1988). However, it was not clear how these ketones should be formed in darkness because oxidation was believed not to occur without light. Also, it was shown that previously photo-aged varnishes undergo strong yellowing when thermally aged in an oxygen free atmosphere or even in vacuo (R. De la Rie, 1988; Privett, Blank, Covell, Lundberg, 1961).

Yellowing is a process proceeding in two steps: oxidation to colourless precursors, which react further to yellow compounds in a non-oxidative second step. Aldol addition, followed by elimination of the resulting hydroxyl group as water was postulated as the non-oxidative reaction, as supported by evidence for dehydration reactions being involved in the yellowing process (R. De la Rie, 1988; Privett, Blank, Covell, Lundberg, 1961). As an example, quinoid structures could arise by condensation of two diketone molecules (Formo, 1979).

Varnishes are usually removed by the mechanical and chemical action of a cotton swab drenched in organic solvents. Quite polar solvents are needed to remove an old and oxidized varnish, and this treatment may damage a painting: swelling and deswelling of the paint layers leads to mechanical stress, and soluble components can be leached out of the paint (Stolow, 1985). These effects are even more pronounced when the new varnish is applied, which is not surprising, since the amount and residence time of the solvent is even greater (Sutherland, 2000). Consequently, the solvent of a new varnish should be as non-polar as possible to minimize these effects.

## THE CASE STUDY

The author of the referred work is Artur Coulin (1869-1912), one of the most prominent Transyl-

vanian artists of the early twentieth century. Besides his contribution to the renewal of painting in Transylvania, he imposed himself by significant efforts made to stimulate the artistic and cultural life of the Transylvanian Saxons. He was among the initiators and founders of the „Sebastian Hann Association” (Sebastian Hann - Verein für Heimische Kunstbestrebungen) and throughout four decades of activity, has spurred the artistic development in Transylvania. Along with Friedrich Miess, he mentored the interwar period distinguished generation of artists from Braşov (Hans Eder, Hans Mattis-Teutsch, Eduard Morres, Walther Teutsch, Margarete Depner, Ernst Honigberger).

The oil painting, is a preliminary study on topic: the Hungarian Renaissance poet Miklos Zrinyi's visit to Rome, as part of the requirements imposed by Bishop Vilmos Fraknói (the guardian of the Hungarian National Museum, supervisor of all Hungarian museums and libraries, member of the Hungarian Academy of Sciences, establisher of the Hungarian Historical Institute in Rome, etc.), for providing one of the two study scholarships for the capital of Italy (Harald Krasser, 1970). In 1908, the final version of the painting assures one of these to Coulin.

The work's overall conservation status was good, excepting slight deformations of the canvas, some minor damages to the paint layer and the semi-opaque colophonium varnish, which has turned dirty and yellow (Fig.1).

### The Varnish:

The varnish used by Coulin on this specific work was colophonium, also known as „rosin”. He probably chose this because it was cheaper, easy to find and simple to prepare as varnish. Although probably not the best option, mainly due to its structure and different fields of use, it held up relatively well, protecting the paint layer without noticeable structure alterations.

Colophonium is the resinous constituent of the oleo-resin exuded by various species of pine (*Pinus alba*, *Pinus nigra*, *Pinus maritima*, *Pinus palustris*, *Pinus caribaea* etc.), known in commerce as crude turpentine. The separation of the oleo-resin into the essential oil-spirit of turpentine and common colophonium is effected by distillation. The essential oil is carried off at a temperature between 100° and 160°C, leaving fluid colophonium, which is run off through a tap at the bottom of the still, and purified by passing through straining wadding. It varies in colour, according to the age of the tree

from which the turpentine is drawn and the degree of heat applied in distillation, from an opaque, almost pitch-black substance, through grades of brown and yellow, to an almost perfectly transparent colourless glassy mass. Rosin is brittle and friable, with a faint piny odour. It is typically a glassy solid, though some resins will form crystals, especially when brought into solution (Palkin, Smith, 1938). The practical melting point varies with different specimens, some being semi-fluid at the temperature of boiling water, others melting at 100°C to 120°C. It is very flammable, burning with a smoky flame, therefore it is easily identifiable. It is soluble in alcohol, acetone, ether, benzene, turpentine essence and chloroform. It consists mainly of abietic acid (also known as abietinic acid or sylvic acid), 89-95 % (Fig.2), and combines with caustic alkalis to form salts (rosinates or pinates) that are known as rosin soaps. In addition to its extensive use in soap making, rosin is largely employed in making varnishes (including fine violin varnishes).

#### **The Cleaning:**

The main issues where to gradually clean the dirt from the surface then safely remove the coat of yellowed varnish, restoring the painting's original colour tones (Fig.3). Another particularity was that of the solidified colophonium drops. These had become very hard and required a different approach.

Firstly, the dirt was swabbed by applying a thin layer of carboxymethyl cellulose and ammonia gel, then clearing away the debris. Secondly, the siccativised varnish removal was done both chemically and mechanically. For this mixed procedure, the selected solution contained both essence of turpentine and isopropanol. This was swabbed directly above the hardened drops, then, when these softened, the residues were gently scalped away.

Thirdly, the removal of the remaining coat of varnish (Fig.4, 5) was done by using a solution of Acetone (80%) and White Spirit (20%).

Aprotic solvents such as acetone (dimethyl ketone), tend to have large dipole moments (separa-

tion of partial positive and partial negative charges within the same molecule) and solvate positively charged species via their negative dipole (Lowery, Richardson, 1987). Therefore, being a polar solvent, it dissolves many natural and synthetic resins, oils, and various waxes, as both cellulose nitrate and other cellulose derivatives. On the other hand, the non-polar various forms of white spirits are among the most important aliphatic hydrocarbons used by restorers. White spirits differ in composition, partly due to the type of mineral oil, which can contain aromatic substances, but also to manufacturers, which add aromatics, to improve the performance of the solvent. The properties of aliphatic hydrocarbons are determined by their aromatic content, this affecting strength as a solvent, ability to penetrate, and the viscosity of a resin solution.

By adding a small amount of white spirit to the predominant body of acetone, the solvent capabilities of the solution were increased (Fig.6). This led to an efficient cleaning process that successfully brought to light the painter's intended tints. This way, a new protective layer could be affixed, without any yellow hints inhibiting the clarity of the fresh varnish (Fig.7).

#### **Conclusion:**

The bond between yellowing and oxidation is rather complex. Varnish yellowing is most dramatic after initial light-induced oxidation and subsequently after long-term dark storage. This seems to show that oxidation agents enhance or lead to yellowing, but that coloration often does not monotonically increase with aging, because yellow compounds can be bleached by visible light. Thus, the degree of yellowing does not necessarily correlate with the degree of oxidation or the age of the varnish.

The aging of natural resins used as paintings varnishes is still insufficiently understood. Although progress has been made, questions concerning the aging pathways in light versus darkness, or the correlation of oxidation with yellowing, remain open.

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### **LIST OF ILLUSTRATIONS**

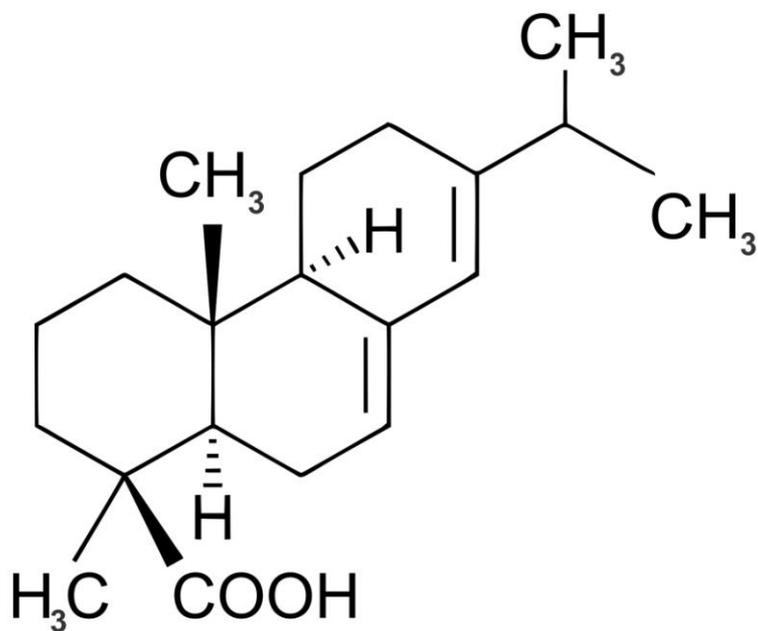
1. General view – before restoration.
2. Molecular structure of abietic acid, the main component of colophonium.
3. Cleaning test.
4. The varnish removal 1.
5. The varnish removal 2.
6. The TEAS diagram.
7. General view – after restoration.

### **LISTA ILUSTRĂȚILOR**

1. Ansamblu înainte de restaurare.
2. Structura moleculară a acidului abietinic, principalul component al colofoniului.
3. Test de curățare.
4. Înlăturarea vernisului 1
5. Înlăturarea vernisului 2
6. Diagrama TEAS.
7. Ansamblu după restaurare.



1 General view – before restoration.



2. Molecular structure of abietic acid, the main component of colophonium.



3. Cleaning test.

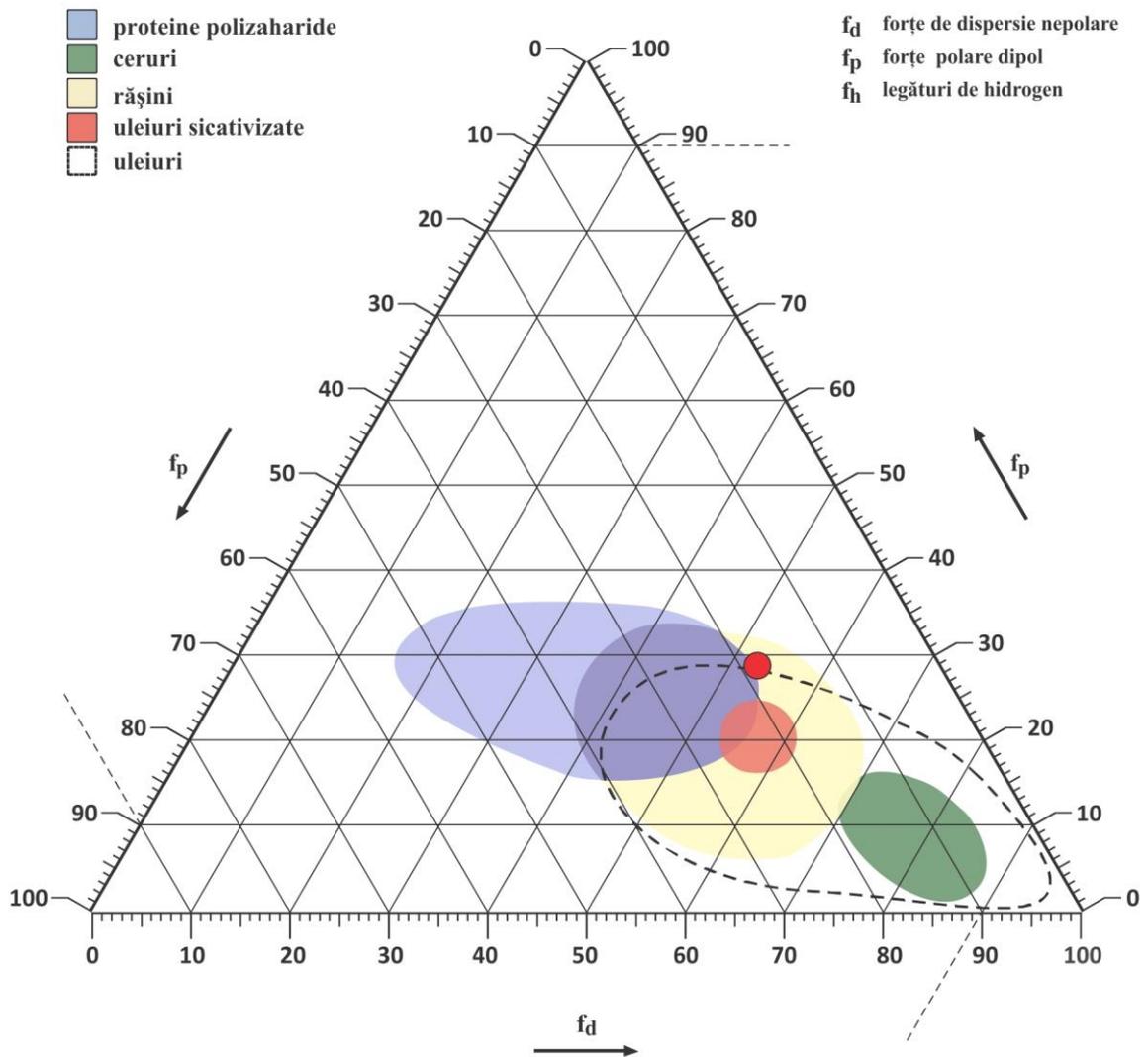




4. The varnish removal 1.  
747



5 The varnish removal 2.



	$f_d$	$f_p$	$f_h$
Acetone	47	32	21
White Spirit	90	4	6
Acetone (80 %)	$47 \times 80 / 100$	$32 \times 80 / 100$	$21 \times 80 / 100$
White Spirit (20 %)	$90 \times 20 / 100$	$32 \times 20 / 100$	$21 \times 20 / 100$
Acetone (80 %)	37.6	25.6	16.8
White Spirit (20 %)	18	6.4	4.2
Parameters of the mixture ●	55.6	32	21

6. The TEAS diagram.



7. General view – after restoration.

## MANIFEST

Casandra VIDRIGHIN\*

*Abstract: Through the "Manifest" educational project has been developed an interactive art exhibition, where the visual impact has played an important role and has given a social message.*

*Keywords: exposition, contemporary art, museum education, visual impact.*

*Abstract: Prin proiectul educativ "Manifest" s-a dezvoltat o expoziție de artă, interactivă, în care un rol important la ocupat impactul vizual și mesajul social.*

*Cuvinte cheie: expoziție, artă contemporană, educație muzeală, impact vizual.*

The "Manifest" project is part of the museum education program of Stone Restoration Laboratory, within the Brukenthal National Museum. By the means of this project, we propose to develop the vision of the high school teenager upon the contemporary art by stressing the importance of the visual impact and the message transmitted by a work or an art concept.

"Manifest" was materialized in confectioning some masks, as works of art, that were presented in an art exhibition at the Brukenthal National Museum in that last week of September 2012. These masks were created together with a group of pupils from the Gh. Lazar National College in the stone restoration lab. Their number is round 50 and they bear a social message. These masks were made of plaster, cardboard and paper with interventions of collage, acrylic colors and in some cases wire. During the execution process the accent was stressed on the importance of forming a support and a resistant and stable structure. The pupils learned how this support is made and how the same form can change its look and expression function of the elements that are put on it: drawing, color, volume, how things around us come to sustain and help to success of making these masks, such as: bowl, rubber gloves, plastic balls, an apple, phone wires and even our own body, here we refer to the molding technique of the human face. (Fig. 1-12)

The social message that was sent by these masks was structured on a support and an idea born from

the discussions carried on during the creation workshops. The lie, the hypocrisy, the technology, the falsity and the treason are some elements which are to be found round the nowadays teenager, and these features were stressed in the exhibition. This has been done by the expressivity and the way the works were exhibited as well as by making a movie underlining obviously the transmitted message. (Figure 13-19)

This manifest of the teenager is, maybe like a signal against the system in which they are attracted and trained to participate near some people and rules with which they don't totally agree. They discover in this way the taste of nothingness and the bitterness of non-existence.

In this respect we made an exhibition that we wanted to be an interactive one by the way the works were exhibited (far from the wall) and in which the visitor is a part of the artistic concept created by us. (Fig. 20-25) A playful search of a face and then of another one and so on, a change of places, transposing, symbolically speaking can change the personality and the identity. In fact a search for the identity of the teenager in an dehumanization world where the human values are crawling and change into the desired face in order to reach its interests. They crawl so much that sometimes they can fly. "We can't stop birds to fly but we can prevent them from making their nests there" (Chinese proverb). The human values degrades, lose their value under the form of a rigid

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mask, which doesn't communicate with the exterior, behind which is dark and behind which you can become the prisoner of your own freedom and not only that. "The fear of frustration, of disapproval or changing makes us hide our wishes" (Salome 2002). A search of the identity can become, quite often, a not finding or even a loss of the own self, a game in which everybody stands in the leading role. "Trying to reach the inaccessible we make to be impossible even that that could have been possible" (Watzlawick 1984, 49)

Besides these risks, these obstacles and barriers the teenager must try to define himself and to adopt a position. That's why the dark mask can also have a

positive interpretation, good for the individual. Communicating with the own self. The fact that the mask doesn't communicate visually with the exterior, that one can feel trapped, lonely in the own self can give the possibility of analysis of the own person, of meditation. There is the question and the curiosity of the why I look like, here comes the desire of mirroring which is not possible and in this way the imaginary develops, the imaginary that never cheats. An intimate space of the search of equilibrium of acceptance of the own self. "In the shadow of the own person there are going on the most beautiful meetings." (Salome 2002, 64, 121).

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2. Image during the workshops, the structure.
3. Image during the workshops, detail structure.
4. Image during the workshops, final form.
5. Image with some materials and tools used to making a support.
6. Image with finished plaster support
7. Image of support with applied elements.
8. Image with masks molding.
9. Image with masks molding with the application of the expression elements.
10. Participant at the creation workshops.
11. Participant at the creation workshops.
12. Participant at the creation workshops.
13. Image after displaying the exhibition.
14. Image after displaying the exhibition.
15. Assembly image after displaying the exhibition
16. Image of a part of exhibited works.
17. Assembly image after displaying the exhibition.
18. Detail image of the exhibition.
19. Mask detail.
20. Image with visitors during the exhibition.
21. Image with visitors during the exhibition.
22. Image with visitors during the exhibition.
23. Image with visitors during the exhibition.
24. Image with visitors during the exhibition.
25. Image with visitors during the exhibition.

## LISTA ILUSTRĂȚILOR

1. Imagine din timpul atelierelor, construcție support
2. Imagine din timpul atelierelor, structură.
3. Imagine din timpul atelierelor, detaliu structură.
4. Imagine din timpul atelierelor, forma finală.
5. Imagine cu cateva materiale și ustensile folosite la confecționarea unui support.
6. Imagine suport ghips finisat.
7. Imagine suport cu elemente aplicate.
8. Imagine mulaj fețe
9. Imagine mulaj fețe cu aplicarea elementelor de expresie.

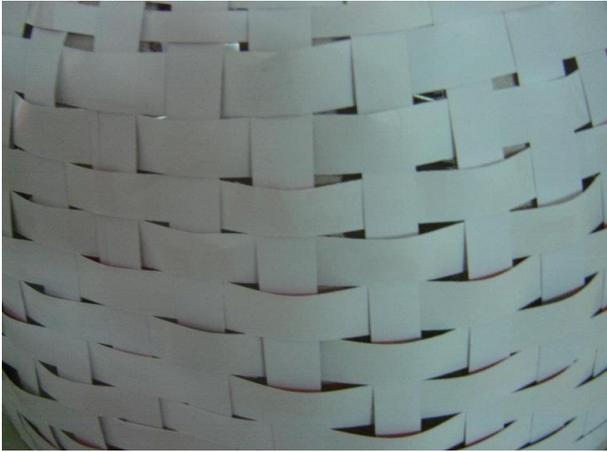
10. Participant la atelierele de creație.
11. Participant la atelierele de creație.
12. Participant la atelierele de creație.
13. Imagine după panotarea expoziției
14. Imagine după panotarea expoziției
15. Imagine de ansamblu după panotarea expoziției.
16. Imagine cu o parte din lucrările expuse.
17. Imagine de ansamblu după panotarea lucrărilor.
18. Imagine de detaliu a expoziției.
19. Detaliu de mască.
20. Imagine cu vizitatori din timpul expoziției.
21. Imagine cu vizitatori din timpul expoziției.
22. Imagine cu vizitatori din timpul expoziției.
23. Imagine cu vizitatori din timpul expoziției.
24. Imagine cu vizitatori din timpul expoziției.
25. Imagine cu vizitatori din timpul expoziției.



1. Image during the workshops, support construction



2. Image during the workshops, the structure.



3. Image during the workshops, detail structure.



4. Image during the workshops, final form.



5. Image with some materials and tools used to making a support.



6. Image with finished plaster support



7. Image of support with applied elements.



8. Image with masks molding.



9. Image with girls molding with the application of the expression elements.



10.



11.



12.

Participant at the creation workshops.



13. Image after displaying the exhibition.



14. Image after displaying the exhibition.



15. Assembly image after displaying the exhibition



16. Imagine de ansamblu dupa panotarea expozitiei.



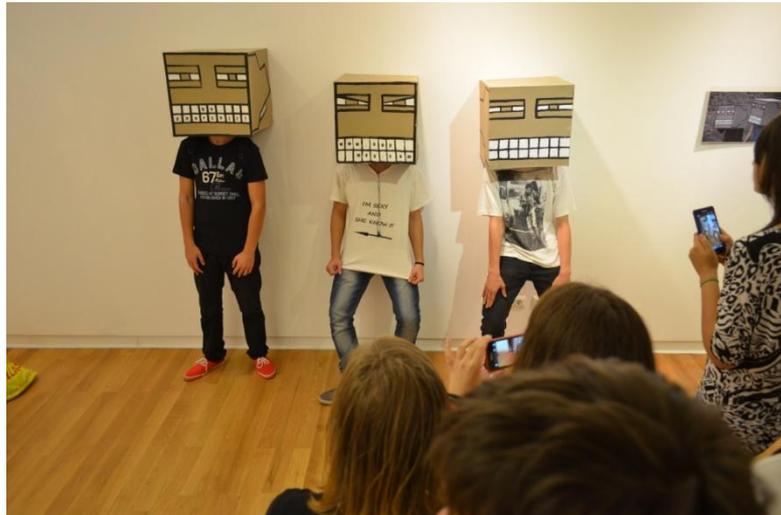
17. Image of a part of exhibited works.



18. Detail image of the exhibition.



19. Mask detail.



20. Image with visitors during the exhibition.



21. Image with visitors during the exhibition.



22. Image with visitors during the exhibition.



23. Image with visitors during the exhibition.



24. Image with visitors during the exhibition.



25. Image with visitors during the exhibition.