BRVKENTHAL. ACTA MVSEI

XVI. 4

MINISTERUL CULTURII

MUZEUL NAŢIONAL BRUKENTHAL

BRVKENTHAL

ACTA MVSEI

XVI. 4

Sibiu / Hermannstadt, 2021

ISSN: 1842-2691

MUZEUL NAȚIONAL BRUKENTHAL

Editura Muzeului Naţional Brukenthal

Începând cu anul 2009, revista a fost indexată în baze de date internaţionale astfel:
2009 − INDEX COPERNICUS http://www.journals.indexcopernicus.com/karta.php?action=masterlist&id=4759
2010 − EBSCOHOST http://www.ebscohost.com/titleLists/tnh-coverage.htm
2012 – SCOPUS http://www.elsevier.com/online-tools/scopus/content-overview
2015 − ERIH PLUS https://dbh.nsd.uib.no/publiseringskanaler/erihplus/periodical/info?id=484924
Începând din anul 2011, publicaţia este vizibilă şi pe platforma editorială **SCIPIO** (http://www.scipio.ro/web/brukenthal.acta-musei).

Starting with 2009, the publication is indexed in the following international date-bases:
2009 − INDEX COPERNICUS:http://www.journals.indexcopernicus.com/karta.php?action=masterlist&id=4759
2010 – EBSCOHOST http://www.ebscohost.com/titleLists/tnh-coverage.htm
2012 – SCOPUS http://www.elsevier.com/online-tools/scopus/content-overview
2015 − ERIH PLUS https://dbh.nsd.uib.no/publiseringskanaler/erihplus/periodical/info?id=484924
Starting with 2011, the publication is to be found on **SCIPIO** editorial platform (http://www.scipio.ro/web/brukenthal.acta-musei).

Orice corespondenţă referitoare la această publicaţie rugăm a se adresa la:
Muzeul Naţional Brukenthal, Piaţa Mare 4-5, 550163, Sibiu. **Tel:** +40/269/217691, **Fax:** +40/269/ 211545;
E-mail: iulia_m_pascu@yahoo.co.uk; **Website**: www.brukenthalmuseum.ro
Autorii îşi vor asuma întreaga responsabilitate pentru informaţia de specialitate din materialele trimise, care vor fi supuse procesului de peer review, ale cărui detalii pot fi consultate la http://www.brukenthalmuseum.ro/publicatii/01.htm.
Ghidul pentru autori se regăseşte pe website: http://www.brukenthalmuseum.ro/publicatii/01.htm

Please send any mail or messages regarding this publication at:
Brukenthal National Museum, Piaţa Mare 4-5, 550163, Sibiu. **Phone number**: +40/269/217691; **Fax** +40/269/211545;
E-mail: iulia_m_pascu@yahoo.co.uk**; Website**: www.brukenthalmuseum.ro
The entire responsibility for the specialized information of the article's content is to be assumed by the author; all materials will be submitted to a peer review process. The details can be found at http://www.brukenthalmuseum.ro/publicatii_en/01.htm.
The guide for the authors can be found at: http://www.brukenthalmuseum.ro/publicatii_en/01.htm.

TABLE OF CONTENTS

REVIEWERS FOR BRUKENTHAL ACTA MUSEI XVI.4

The staff is deeply grateful to the following specialists who gave of their time to review manuscripts submitted in 2021 for publication in ***Brukenthal Acta Musei*** **XVI.4**:
BUCUR Mirel Vasile, "Lucian Blaga" University of Sibiu, Romania
CORNEANU Sebastian "Lucian Blaga" University of Sibiu, Romania

BRUKENTHAL NATIONAL MUSEUM IN 2020: A CHRONICLE OF RESTORATION EXHIBITIONS AND EVENTS

Dana Roxana HRIB*

Abstract: *The present study is a synthetic presentation of Brukenthal National Museum's cultural offer in the field of restoration during 2020 and other significant aspects.*

Keywords: *Brukenthal National Museum, restoration, 2020.*

***Rezumat*:** *Articolul de față constituie o prezentare sintetică a ofertei culturale a Muzeului Național Brukenthal în domeniul restaurării, pe parcursul anului 2020.*

Cuvinte-cheie: *Muzeul Național Brukenthal, restaurare, 2020.*

1. Temporary exhibitions[1]

a. Organized at the museum locations

_No winter lasts forever by Ioan Muntean (Brukenthal Palace, Cartography Cabinet, 12.02-3.05.2020): the 22 landscapes painted by Ioan Muntean, museum restorer, should be noted, first of all for the illustration of winter – different from the other three seasons because of the absence of chromatic abundance and because of a special brightness, elements defined generically as *effets de neige* (snow effects). The approach of the artistic process by Ioan Muntean is classic, starting from direct experience, of a *plein-air* type, the physical exit in nature helping him to observe the winter in spaces with identity, specific to the south of Transylvania. Direct observation becomes a method by which he manages to both illustrating the place and mirroring the associated human experiences, such as a dialogue between the wild land and the one touched by human hand, the compositions alternating the rendering of the areas covered by immaculate snow, with areas of plowed land. A project spanned for about a year and a half (from a passing winter, to the coming one), this series of landscapes has a strong narrative support, which can be distinguished in the experimentation of light rendering and the narrow color palette.

_Sense and sensibility. Female artists from Sibiu and their guests (Brukenthal Palace, Temporary Exhibitions Halls, 6.03-3.05.2020): refusing the stereotype and proposing to confer a true, deep and complex dimension to the celebration of femininity and spring, Brukenthal National Museum brought into the public attention an exhibition signed by a group of thirty-two female artists among which painters, graphic artists, decorative artists from Sibiu and their guests; among the exhibiting artists were the Brukenthal Museum restorers Celestina Albișor and Cristina Fău.

_Sibiu Contemporary Art Festival (Museum of Contemporary Art, 1.09-30.09.2020): a project organized by Brukenthal von Studio Association and co-financed by the City Hall of Sibiu through the Cultural Agenda, reunited 20 artists, aiming at involving a wide variety of artists active nationally and internationally, in the long run; among the exhibiting artists were the Brukenthal Museum restorers Ioan Muntean, Andrei Popa, Ilie Mitrea, Celestina Albișor and Cristina Fău.

_Sibiu artists of Sibiu UAP Branch and their guests, at the Inter-county Salon of Visual Arts (Casa Albastră / Blue House, Multimedia Room, 5-29.11.2020): organized by Brukenthal National Museum together with UAPR Sibiu Branch and co-financed by the City Hall of Sibiu, the exhibition presented works by 50 artists (painting, graphics, sculpture, textiles, glass, metal, etc.); among the exhibiting artists were the Brukenthal Museum restorers Celestina Albișor, Ilie Mitrea, Ioan Muntean and Andrei Popa.

b. Travelling exhibitions

_The Baron by Ilie Mitrea (Thalia Hall, Sibiu, 15.10.2020 – 15.01.2021): in partnership with the

* Brukenthal National Museum / Muzeul Național Brukenthal, dana.hrib@brukenthalmuseum.ro

[1] The short descriptions of temporary exhibitions are selected from the texts given by the curators for public information.

State Philharmonic of Sibiu, the exhibition presented a series of portraits of Samuel von Brukenthal, painted by Ilie Mitrea, the works being in the collection of Brukenthal Museum.

2. Online exhibitions:

_*Magic of Restoration. Restorer and Artist*

http://www.brukenthalmuseum.ro/virtuale/restaurare/index_en.html

3. Participating in temporary exhibitions

_*Fluo Immersion* by Andrei Popa (Fine Arts Museum Brașov, 5.06 – 5.07.2020)

_*Angels and demons* by Ioan Muntean (Bistrița-Năsăud Museum, 9.07 – 31.08.2020)

4. Events / Book launches:

_Catalog of the Contemporary Art Festival in Sibiu (Museum of the Contemporary Art, 8.09.2020)

5. Scientific symposiums

_Online Symposium "Relevance of the characterization of the support material in the approach of the restoration methodology" (27.11.2020): the theme was based on the restoration norms in force and the specialization programs organized by the Ministry of Culture on various supports, aiming at approaching the restoration methodology starting from the nature of the constituent support.

All restoration interventions are determined by the nature of the constituent support and, in complex cases of composite parts, an interdisciplinary collaboration between specialties is required.

Restoration experts from the museum network were invited to the session, as well as specialists from the university.

6. Publishing

_Alexandru Constantin Chituță, Radu Tătaru, Andrei Popa, *Fluo immersion 5*, Ed. Muzeului Național Brukenthal, Sibiu, 2020, ISBN 978-606-8815-66-4

Exhibition catalog

_Alexandru Constantin Chituță, *Ilie Mitrea, Palindrom*, Ed. Muzeului Naţional Brukenthal, Sibiu, 2020, ISBN 978-606-8815-72-5

Exhibition catalog

_Iulia Mesea, Celestina Albișor, Cristina Fău, *Sens și sensibilitate*. *Artiste din Sibiu și invitatele lor*, Sibiu, Editura Muzeului Național Brukenthal, 2020, ISBN 978-606-8815-63-3
Online:
http://www.brukenthalmuseum.ro/publicatii/03_3.htm
_Iulia Mesea (coord.), *Salonul interjudețean de arte vizuale al Filialei UAP Sibiu 2020*, Sibiu, Editura Muzeului Național Brukenthal, 2020, ISBN 978-606-8815-73-2
_Ioan Muntean, Dana Roxana Hrib, *No winter lasts forever*, Sibiu, Editura Muzeului Național Brukenthal, 2020, ISBN 978-606-8815-61-9, RO/EN

7. Participating in projects / exhibition

_*NAG (Noaptea Albă a Galeriilor / Long Night of Galleries) 2020*
2 – 4.10, Habitus Hall, organized by "Brukenthal von Studio" Association
Brukenthal Museum participants, restorers: Celestina Albișor, Cristina Fău, dr. Ilie Mitrea, Ioan Muntean, Andrei Popa
_*"Little Prince" National Exhibition of Contemporary Art*, 25th edition
September 2020, Satu Mare Art Museum
Brukenthal Museum participants, restorers: Celestina Albișor, Cristina Fău
_International Exhibition of Contemporary Art, 7th edition
27.10 – 22.11.2020, Satu Mare Art Museum
Brukenthal Museum participants, restorers: Celestina Albișor, Cristina Fău

8. Participating in projects

_*Sibiu Contemporary Art Festival* (Museum of Contemporary Art, 1.09-30.09.2020): a project organized by Brukenthal von Studio Association and co-financed by the City Hall of Sibiu through the Cultural Agenda.

REFERENCES

_Dana Roxana Hrib (coord.), Muzeul Național Brukenthal din Sibiu, Raport de activitate 2020
http://www.brukenthalmuseum.ro/despre_noi/rapoarte.html
_online source on events:
http://www.brukenthalmuseum.ro/index2.php/en/news/
_online source on exhibitions:
http://www.brukenthalmuseum.ro/index2.php/en/exp

TRANSYLVANIAN SHIELDS - „PAVĂZĂ”. ASSESSMENT OF LEATHER DEGRADATION AND RESTORATION INTERVENTIONS

Ruxandra-Ioana STROIA*
Radu SCHULLER**

Abstract: *The article presents three Transylvanian Shields - "Pavăză" of the end of the 15-th century, from the medieval collection of the Museum of History "Altemberger House", on which restoration interventions were made in order to stabilize the leather on the wooden support for subsequent interventions at the level of the pictorial layer. The study presents the factors that influenced the degradation of the leather support, the state of conservation and the restoration interventions performed.*
Keywords*: Transylvanian Shield -"Pavăză", leather, painted leather, restoration*

Rezumat**:** *În articol sunt prezentate trei scuturi- Pavăză Transilvăneană de sfârşit de secol 15, din colecţia medievală a Muzeului de Istorie Casa Altemberger, asupra carora s-au făcut interventii de restaurare cu scopul de a stabiliza pielea pe suportul de lemn pentru intervenţiile ulterioare la nivelul stratului pictural. Studiul prezintă factorii care au influenţat degradările suportului piele, starea de conservare şi intervenţiile de restaurare efectuate.*
Cuvinte-cheie: *scut - pavăză transilvăneană, piele, piele pictată, restaurare.*

A. The objects description and preservation Transylvanian Shield - "Pavăză" is a curved shield, rectangular in shape, wide at the bottom, with the upper part cut diagonally from the top left corner to the middle right. The shape was designed to protect most of the body from sword blows but also to leave room for sight. (Huszártárcsa 2021). It has been used in Eastern Europe since the 15-th century and appears in use for more than 150 years. It was used by the Ottomans, Poles, Romanians, Croats, and Austrians and especially by the Hungarian Hussars (Diaconescu, Roman 1981, 53; 63)

Brukenthal National Museum - Museum of History "Altemberger House" holds in its collection a number of 25 shields named in the inventory books as Transylvanian Shield - "Pavăză". They belonged, according to the documents in the archives, to the impressive Collection of Weapons of the City Hall of Sibiu, weapons from the 15th-19th centuries.

Three shields from this collection are the object of the present exhibition and have the following inventory numbers: 1. M3819/ 9879, 2. M3836/9881 and 3. M3842/9861. (Fig, 1a, b; 2a, b; 3a, b)

They are dated 1475-1501 and were made by Transylvanian craftsmen of the time.

They are composite objects made of spruce wood, covered on the inside and outside with painted leather. The outside is painted in oblique red and white stripes and has a yellow-golden border.

The inside has a uniform dark green background with red and ochre borders.

The leather on the outer side is fixed directly to the wooden substrate and the inner side, between the leather and the wood, has a gesso preparation. (Fig. 1c, d; 2c, d; 3c, d)

The fastening strap system, made of thick calfskin, is attached to the support with iron rivets of pyramidal shape. (Fig.1e, f; 2e, f; 3e, f)

The dimensions (H, W, cm) are: 1. M3819/ 9879: H- 112,5cm, W- 68 cm, 2. M3836/9881: H- 122cm, w- 58cm, 3. M3842/9861: H- 117cm, W- 68cm.

The pieces have been severely degraded due to the ageing of the materials and the effects of environmental factors which have caused distortions of the leather caused by internal stresses of a hydroscopic nature in both the wood and the leather. Old insect infestation holes are visible but do not generally affect the appearance of the object. The exterior is

* Brukenthal National Museum / Muzeul Naţional Brukenthal, ruxandrastroia@gmail.com
** Brukenthal National Museum / Muzeul Naţional Brukenthal, sradu84@yahoo.com

stable, with very small portions with detachment of the pictorial layer from the leather backing. This is in contrast to the interior which has suffered major losses, tears, peeling and rippling of the leather affecting the aesthetic appearance of the object.

The following types of degradation are encountered:

- physical-mechanical degradation: deformation, folds, stretching, tears with or without loss of material, dents, scratches, dust deposits, deposits of greasy substances, dirt anchored and adhering to the entire surface, wax deposits, loss of paint layer
- physical-chemical degradation: stiffening, embrittlement, discoloration, rust stains, deposits of white salts on fastening straps, stains of various types
- inactive biological degradation: flight holes and galleries caused by insects; stains due to mound attack
- damage caused by human activity: ropes and cables used for exposure

The purpose of restoration is to stabilize the leather on the wooden support for subsequent interventions on the pictorial layer.

Restoration interventions have respected the principle of minimal intervention; all materials used are neutral and reversible.

- pest control and disinfection
- removal of previous inappropriate interventions
- cleaning tests
- dry cleaning - dry brushing, vacuuming, use of scrapers of different hardness. The dusty and dirty surface is cleaned first by brushing with soft brushes. Then the piece is covered with a veil and vacuumed with the mini vacuum cleaner. Light dirt is removed using special scrapers of different hardness. First the scraper is used only on an inconspicuous surface. All particles resulting from the scraping of the cleaned surface are carefully removed with the mini vacuum cleaner (CCI Note 8/2 1992).
- wet cleaning – chemical sponges, nepheline bedding, and hydroalcoholic solutions were used. For cleaning with neophal, a sandwich-type absorbent bed is made of several layers of overlapping materials: filter paper, two layers of cotton cloth and polyethylene film. Under close supervision, the operation is repeated several times, not more than 30 minutes. For the removal of the corrosion products deposited on the leather, use cotton-tipped wooden sticks and a 30% ethyl alcohol solution wax stain removal with electric spatula and white spirit 100grd.
- moistening to flatten the leather and return it to its original shape. Due to the fractured and wavy condition of the leather, moistening was required to flatten the leather before fixing and strengthening. A Gore-tex pad was placed over the distorted leather, moistened filter paper, and thin layer of wadding, filter paper and non-stick, heat-resistant polyester sheet placed over the paper. This sandwich was tensioned with sandbags of different weights. These allowed a repositioning of the deformed leather on the shape of the wooden support. The procedure was repeated until the desired results were obtained. It required a long waiting time until the object allowed equilibrium with the environment.
- gluing, refixing, spot reinforcement gluing was done with a mixture of natural and synthetic adhesives: rice starch and polyvinyl acetate 1:1 and/or Klucel G (hydroxy-propyl cellulose). Any adhesive residue remaining on the surface was easily removed with solvent applied on cotton swabs.
- reinforcement of areas with tears and losses
- duplication of fragile areas

The leather restoration was successfully completed. Although the losses are in the aspect of the object, the lather is now sufficiently stable on the wooden support so that the restoration of the pictorial layer can proceed.

Conclusions: Through the study and restoration of three Transylvanian Shield - "Pavăză", a working protocol has been devised regarding the conservation and restoration of this type of objects. The protocol will be used for the other objects in the collection, when specialized interventions on them will be necessary.

Acknowledgement:

Thanks to Ms. Monica Silaghi for the English version of this article.

REFERENCES

CCI Note 8/2 1992 — CCI Notes 8/2, *Care of Alum, Vegetable and Mineral-tanned Leather*, 2010 [PDF] Available at: https://www.canada.ca/en/conservation-institute/services/conservation-preservation-publications/canadian-conservation-institute-notes/care-alum-vegetable-mineral-leather.html (Accessed 25.08.2021)

Diaconescu, Roman 1981 — Speranta Diaconescu, Elena Roman, ‘Probleme privind terminologia armelor medievale’, *În istoriografia românească* (III) 1981. [online] Available at: http://cimec.ro › muzee › TezaurArmeRM1_www.cimec.ro, https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwip55b_2tryAhUF16QKHb1CCXUQFnoECBYQAQ&url=http%3A%2F%2Fcimec.ro%2Fmuzee%2FArticole-SI-PCN%2FTezaurArme-RM1_1981.pdf&usg=AOvVaw3mZ5LcTa7rz9zqA5p02CKQ (Accessed 27.08.2021)

(Huszártárcsa 2021) — *Huszártárcsa* [online] Wikipedia. Available at: https://hu.wikipedia.org/wiki/Husz%C3%A1rt%C3%A1rcsa (Accessed 1.9.2021)

LIST OF ILLUSTRATIONS

1. Transylvanian Shields - "Pavăză" Nr. inv. M3819/ 9879
   a. Front side ensemble before restoration
   b. Back side assembly before restoration
   c. Painted leather front side detail
   d. Painted leather/gesso/wood back side detail
   e. Fastening strap support with iron rivets- detail
   f. Fastening strap support with iron rivets- detail
   g. Macroscopic aspects of the degradation of leather - detail
   h. Macroscopic aspects of the degradation of leather - detail
   i. Back side assembly after restoration
2. Transylvanian Shields - "Pavăză" Nr. inv. M3836/ 9881
   a. Front side ensemble before restoration
   b. Back side assembly before restoration
   c. Painted leather front side detail
   d. Painted leather/gesso/wood back side detail
   e. Fastening strap support with iron rivets- detail
   f. Fastening strap support with iron rivets- detail
   g. Macroscopic aspects of the degradation of leather - detail
   h. Macroscopic aspects of the degradation of leather - detail
   i. Back side assembly after restoration
3. Transylvanian Shields - "Pavăză" Nr. inv. M3842 /9861
   a. Front side ensemble before restoration
   b. Back side assembly before restoration
   c. Painted leather front side detail
   d. Painted leather/gesso/wood back side detail
   e. Fastening strap support with iron rivets- detail
   f. Fastening strap support with iron rivets- detail
   g. Macroscopic aspects of the degradation of leather - detail
   h. Macroscopic aspects of the degradation of leather - detail
   i. Back side assembly after restoration

Note: For preparing the photographic documentation of objects there contributed Mr. Alexander Olănescu (objects and photos before and after restoration), Ms. Ruxandra-Ioana Stroia and Mr. Radu Schuller (photos during restoration objects).

LISTA ILUSTRAŢIILOR

1. Scut - pavăză transilvăneană Nr. inv. M3819/ 9879
   a. Imaginea de ansamblu înaintea restaurării -Exterior
   b. Imaginea de ansamblu înaintea restaurării - Interior
   c. Detaliu piele cu pictură- Exterior
   d. Detaliu piele cu pictură / gesso/ lemn - Interior
   e. Detaliu curele de prindere şi nituri
   f. Detaliu curele de prindere şi nituri
   g. Aspecte macroscopice ale degradării pielii – detaliu
   h. Aspecte macroscopice ale degradării pielii – detaliu

2. Scut - pavăză transilvăneană Nr. inv. M3836/ 9881
   a. Imaginea de ansamblu înaintea restaurării -Exterior
   b. Imaginea de ansamblu înaintea restaurării - Interior
   c. Detaliu piele cu pictură- Exterior
   d. Detaliu piele cu pictură / gesso/ lemn - Interior
   e. Detaliu curele de prindere şi nituri
   f. Detaliu curele de prindere şi nituri
   g. Aspecte macroscopice ale degradării pielii – detaliu
   h. Aspecte macroscopice ale degradării pielii – detaliu
3. Scut - pavăză transilvăneană Nr. inv. M3842 /9861
   a. Imaginea de ansamblu înaintea restaurării -Exterior
   b. Imaginea de ansamblu înaintea restaurării - Interior
   c. Detaliu piele cu pictură- Exterior
   d. Detaliu piele cu pictură / gesso/ lemn - Interior
   e. Detaliu curele de prindere şi nituri
   f. Detaliu curele de prindere şi nituri
   g. Aspecte macroscopice ale degradării pielii – detaliu
   h. Aspecte macroscopice ale degradării pielii – detaliu

Nota: La realizarea documentaţiei fotografice a obiectelor au contribuit: dl. Alexandru Olănescu (fotografiile obiectelor înainte și după restaurare), d-na Ruxandra-Ioana Stroia și dl. Radu Schuller (fotografiile din timpul restaurării obiectelor).

a.

b.


c.


d.


e.


f.


g.

h.


i.

1. Transylvanian Shields - "Pavăză" Nr. inv. M3819/ 9879
   a. Front side ensemble before restoration
   b. Back side assembly before restoration
   c. Painted leather front side detail
   d. Painted leather/gesso/wood back side detail
   e. Fastening strap support with iron rivets- detail
   f. Fastening strap support with iron rivets- detail
   g. Macroscopic aspects of the degradation of leather - detail
   h. Macroscopic aspects of the degradation of leather - detail
   i. Back side assembly after restoration

a.

b.


c.


d.


e.


f


g.

h.


i.

2. Transylvanian Shields - "Pavăză" Nr. inv. M3836/9881
   a. Front side ensemble before restoration
   b. Back side assembly before restoration
   c. Painted leather front side detail
   d. Painted leather/gesso/wood back side detail
   e. Fastening strap support with iron rivets- detail
   f. Fastening strap support with iron rivets- detail
   g. Macroscopic aspects of the degradation of leather - detail
   h. Macroscopic aspects of the degradation of leather - detail
   i. Back side assembly after restoration

a .

b.


c.


d.


e.


f.


g.

h.


i.

3. Transylvanian Shields - "Pavăză" Nr. inv. M3842/9861
   a. Front side ensemble before restoration
   b. Back side assembly before restoration
   c. Painted leather front side detail
   d. Painted leather/gesso/wood back side detail
   e. Fastening strap support with iron rivets- detail
   f. Fastening strap support with iron rivets- detail
   g. Macroscopic aspects of the degradation of leather - detail
   h. Macroscopic aspects of the degradation of leather - detail
   i. Back side assembly after

THE RESTORATION OF HARDWARE OBJECTS OF COMMON USE FROM 15TH - 19TH CENTURIES FROM COLLECTION OF THE HISTORY MUSEUM

Călin BOBIC*

Abstract: *The collection of hardware of common use (hinges, handles, fittings for gates, keys, etc.) from the XV - XIX centuries from the collection of the History Museum within the Brukenthal Museum Complex in Sibiu offers important information about iron processing methods, their evolution, purpose and the functionality for which they have been made. In this paper we present different types of objects of common use from the perspective of restoration and conservation.*
Keywords*: hardware, hinges, fittings, restoration, conservation*

Rezumat**:** *Colecția de feronerie de uz comun (balamale, clanțe, armături pentru porți, chei, etc) din secolele XV - XIX din colecția Muzeului de Istorie din cadrul Complexului Muzeal Brukenthal din Sibiu oferă informații importante despre metodele de prelucrare a fierului, evoluția lor, scopul și funcționalitatea pentru care au fost confecționate. În lucrarea de față prezentăm diferite tipuri de obiecte de uz comun din perspectiva restaurării și conservării.*
Cuvinte-cheie: *Feronerie, balamale, armătură, restaurare, conservare*

Introduction

Documentary sources show that from the first half of the 15th century, the production of iron objects is related to the existence and organization of the blacksmiths' guild, from which other specialized guilds will appear until the 19th century, for example: archers, locksmiths, swordsmen, gunsmiths, tinsmiths, silversmiths, etc. (Pascu 1954, 169).

The variety of hardware products is generated by the purposes for which they were made. They also become artistic elements in the emblems of guilds (ornamental applique, flower of key, scythe with crossed handle, padlock, hinge, doorknob, wind flag, gate hammer, etc.), in a direct relationship with the artistic styles from the Middle Age. These objects with a decorative and/ or functional role are found on crates of guilds, closing/ locking mechanisms, keys, doors, gates, windows, balconies, fountains or in grille assemblies, etc. (Negulici 2003, 11-16)

From the perspective of the diversity of finished products, iron processing is experiencing significant progress, depending on the needs of use and the method of execution (casting, forging, stamping, riveting, and drilling). In parallel with the processing of iron, the technology has also developed in the processing of non-ferrous metals (copper, tin, lead), in order to make objects of common use, household and artistic.

Description of Hardware Objects

The batch of iron objects of common use in the collection consists in:

Armature of iron for gate

The piece is made of iron, by forging, cutting, hot welding and finishing by filings, in a Transylvanian workshop in the XVII century.

Hinge

The piece is made of iron, by forging, hot cutting and finishing by filings in a Transylvanian workshop in the XVII century.

Iron cross

This piece is made in a Transylvanian workshop in the 15th century, by forging, stamping and finishing by filings. It is provided at the bottom with a fixing sleeve.

Cast iron lion

The metal decoration is made in a Transylvanian workshop in the 18th century, by casting and finishing. It is used as an ornament for a gate.

* Brukenthal National Museum / Muzeul Național Brukenthal

Circular handle for the gate

The circular handle for the gate is provided with a rosette, which has a decorative role. The piece is made in a Transylvanian workshop in the 19th century. The piece is made of iron by forging, stamping, drilling and finishing by filings.

Piggy bank

The piece is made in a Transylvanian workshop in the 18th century and has a cylindrical shape. The lid provided with a slot for inserting coins is fixed to the body of the piggy bank. The purse has a locking system provided with a padlock, but which is no longer preserved. The piece is made of iron by forging, riveting, stamping and fixing by filing.

Whirligig (Dex 1975)

The object is made of iron, by forging and hot welding, in a Transylvanian workshop in the 18th century.

Box for spice

The piece is made of brass in the XVII-XIX centuries, in a Dutch workshop. It is made by rolling, gluing, riveting, incision and finished by polishing. The box is used to preserve oriental spices, has a rectangular shape, with rounded corners, and is richly decorated with geometric and vegetable motifs. An inscription in oriental characters is engraved on the lid.

Diagnosis

The collection of hardware of common use (hinges, handles, fittings for gates, keys, etc.) from the XV - XIX centuries from the collection of the History Museum shows various physical and chemical degradations and functional wear as follows:

Armature of iron for gate.

The piece has corrosion products, in an uneven layer on the entire surface, dust, dirt and functional wear.

Hinge.

The piece shows discontinuous and non-uniform deposits of corrosion products specific to iron. Also, there are deposits of dust and dirt on the entire surface, which obstruct the proper functioning of the part.

Iron cross.

The piece has non-uniform corrosion products, dust, dirt and functional wear.

Cast iron lion.

The piece has a state of accentuated degradation on the entire surface and is covered with dust and dirt. In some parts, exfoliation of corrosion products in layers is observed. There are also traces of bronze on the surface of the piece.

Circular handle for the gate.

The piece has corrosion products, in an uneven layer on the entire surface, dust, dirt and functional wear.

Piggy bank.

The piece presents non-uniform corrosion products, dust, dirt and functional wear and deforestation of the base and body of the piggy bank.

Whirligig.

The piece has a state of accentuated degradation, it is covered with a continuous and non-uniform layer of corrosion, and on certain parts, the corrosion products exfoliate.

Box for spice.

The surface of the piece is completely covered with a continuous and uneven layer of corrosion products, specific to copper. Traces of blows and deformations can be seen on the cover and on the sides of the piece.

Following the data analysis, it turns out that the pieces in this batch of the collection require restoration and conservation operations.

Restoration and Conservation Hardware Objects

The restoration itself includes differentiated technological flows for each part, respecting the following operations:

Armature of iron for gate.

Washing with non-ionic detergent Romopal OF-10 of 1% concentration;

Drying and degreasing with ethyl alcohol of analytical purity;

Chemical cleaning in phosphoric acid of 10% concentration as combined with intermediate brushing under running water until complete disappearance of corrosion products on the surface of the parts;

Neutralization in distilled water and drying in ethyl alcohol of analytical purity;

Final filming with Balistol.

Hinge

Washing with non-ionic detergent Romopal OF-10 of 1% concentration;

Drying and degreasing with ethyl alcohol of analytical purity;

Mechanical cleaning with rotating steel brush;

Filming with Fertan;

Final filming with Balistol.

Iron cross

Washing with non-ionic detergent Romopal OF-10 of 1% concentration;

Drying and degreasing with ethyl alcohol of analytical purity;

Mechanical cleaning with rotating steel brush;

Filming with Fertan;

Final filming with Balistol.

Cast iron lion

Washing with non-ionic detergent Romopal OF-10 of 1% concentration;

Drying and degreasing with ethyl alcohol of analytical purity;

Mechanical cleaning with rotating steel brush;

Filming with Fertan;

Final filming with bronze on the outside of the piece.

Circular handle for the gate

Washing with non-ionic detergent Romopal OF-10 of 1% concentration;

Drying and degreasing with ethyl alcohol of analytical purity;

Mechanical cleaning with rotating steel brush;

Filming with Fertan;

Final filming with Balistol.

Piggy bank

Washing with non-ionic detergent Romopal OF-10 of 1% concentration;

Drying and degreasing with ethyl alcohol of analytical purity;

Straightening of the base and body of the piggy bank;

Mechanical cleaning with rotating steel brush;

Filming with Fertan;

Final filming with Balistol.

Whirligig

Washing with non-ionic detergent Romopal OF-10 of 1% concentration;

Drying and degreasing with ethyl alcohol of analytical purity;

Mechanical cleaning with rotating steel brush;

Filming with Fertan;

Final filming with Balistol.

Box for spice

Washing with non-ionic detergent Romopal OF-10 of 1% concentration;

Drying and degreasing with ethyl alcohol of analytical purity;

Chemical cleaning in phosphoric acid of 20% concentration as combined with intermediate brushing under running water until complete disappearance of corrosion products on the surface of the parts (Stambolov 1985, 52).

Neutralization in distilled water and drying in ethyl alcohol of analytical purity;

Final polishing with Autosol.

Conclusions

Restoration of the group of common use hardware items from the 15th - 19th centuries from the collection of the History Museum is realizing with respect the following stages: evaluation of the state of conservation of the pieces, establishing the technological process for each piece and restore itself.

Restoring lot of common use hardware in the XV - XIX of the collection of the Museum of History is made with the following steps: assessing the conservation status of parts, establishing technological process for each piece and restore itself.

The restoration of these hardware items is necessary from an exhibition point of view because it allows knowing the activity of iron processing within the guild and, in particular, their utility at community level.

REFERENCES

DEX, 1975	*Dicționarul explicativ al limbii române*, București, editura Academiei RSR, 1975.
Pascu 1954	Stefan Pascu *Meșteșugurile din Transilvania până în sec.XV* Editura Academiei Republicii Populare Romîne,1954
Negulici 2003	D. Negulici, 'Feronerie brașoveană secolele XV-XIX', *Ecran Magazin*, Brașov, 2003
Stambolov 1985	T. Stambolov, *The Corrosion and Conservation of Metallic Antiquities and Works of Arts*, Amsterdam 1985.

LIST OF ILLUSTRATIONS

1. Armature of iron for gate. Before restoration
2. Armature of iron for gate. After restoration
3. Hinge. Before restoration
4. Hinge. After restoration
5. Iron cross. Before restoration
6. Iron cross. Before restoration
7. Cast iron lion. After restoration
8. Cast iron lion. Before restoration
9. Circular handle for the gate. Before restoration
10. Circular handle for the gate. After restoration
11. Piggy bank. Before restoration
12. Piggy bank. After restoration
13. Whirligig. Before restoration
14. Whirligig. After restoration
15. Box for spice. Before restoration
16. Box for spice. After restoration

LISTA ILUSTRAŢIILOR

1. Armătură din fier pentru poartă. Înainte de restaurare
2. Armătură din fier pentru poartă. După restaurare
3. Balama. Înainte de restaurare
4. Balama. După restaurare
5. Cruce de fier. Înainte de restaurare
6. Cruce de fier. După restaurare
7. Leu din fontă. Înainte de restaurare
8. Leu din fontă. După restaurare
9. Mâner circular pentru poartă. Înainte de restaurare
10. Mâner circular pentru poartă. După restaurare
11. Pușculiță. Înainte de restaurare
12. Pușculiță. După restaurare
13. Prâsnel. Înainte de restaurare
14. Prâsnel. După restaurare
15. Cutie pentru condimente. Înainte de restaurare
16. Cutie pentru condimente. După restaurare

1. Armature of iron for gate.
Before restoration

2. Armature of iron for gate.
After restoration

3. Hinge. Before restoration

4. Hinge. Before restoration

5. Iron cross. Before restoration

6. Iron cross. After restoration

7. Cast iron lion. Before restoration

8. Cast iron lion. After restoration

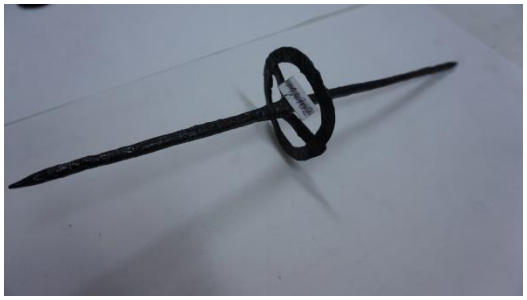
9. Circular handle for the gate. Before restoration

10. Circular handle for the gate. After restoration

11. Piggy bank. Before restoration

12. Piggy bank. After restoration

13. Whirligig. Before restoration.



14. Whirligig. After restoration

15. Box for spice. Before restoration

16. Box for spice. After restoration

CONSERVATION AND RESTORATION OF AN 1831 FOLK PAINTED HANGING CUPBOARD

Andrei BUDA*

Abstract: *The restored piece is a wall cabinet made of wood, metal elements and painting. During the study I discovered, stratigraphically, a technical feature - the bottoms without primer and varnish, which is highlighted in this article. This peculiarity is specific to many pieces of painted furniture that we also find in the collection of the ASTRA Museum. The techniques for making wood and painting joints were described, which makes it possible to integrate this case study into a future broader research of the techniques and materials used to make Saxon furniture pieces.*
Keywords*: wall cabinet, restoration, conservation, tempera, wood*

Rezumat**:** *Piesa restaurată este un dulap de perete (armăroaie) confecționată din lemn, elemente metalice și pictură. În timpul studiului am descoperit, stratigrafic, o particularitate tehnică - fondurile lipsite de grund și vernis, lucru marcat în acest articol. Această particularitate este specifică multor piese de mobilier pictat întâlnite de noi și în colecția Muzeului ASTRA. Au fost descrise tehnicile de realizare a îmbinărilor lemnului și a picturii, lucru ce face posibilă, integrarea acestui studiu de caz într-o viitoare cercetare mai amplă a tehnicilor și materialelor folosite la confecționarea pieselor de mobilier săsesc.*
Cuvinte-cheie: *dulap de perete (armăroaie), restaurare, conservare, tempera, lemn*

Introduction

"Throughout its history, Transylvania has been a blessed territory of tolerance and interference as a result of the events that took place in this period of Europe. Here, the cultural currents from western and central Europe met and merged, organically, against the background of the local civilization with baroque-oriental influences. This local interweaving of different cultural funds has contributed to the realization of artistic representations manifested in all fields (Malearov, Ștefan 2012, 6). For almost four hundred years, furniture painting has been ubiquitous in most European countries and beyond. This decorating technique differs by the stylistic approach, as a consequence of the large distances between areas and the passage of time. With the arrival of the new generations, a series of changes took place. One of them was the innovation of the shapes and decorations of the furniture so that it can be sold (Roswith 2015, 8).

The selected wall cabinet comes from Agnita, where it was discovered and recovered during a field research. The former owners claim that the piece originates from Veseud, this being taken from the parental house, demolished many years ago. The piece is dated, having above the door, painted in black, the year of realization: 1831. It entered the restoration for two essential reasons: from the desire of the current owner to have it in the private collection in a much better condition and because the piece was suitable very well as an object of the dissertation.

Part description

The cupboard has a rectangular shape and consists of two important elements: the frame and the door. The piece contains two categories of materials: organic and inorganic. The organic ones are: wood, adhesive, binder and varnish; and the inorganic ones are part of the pigments and metallic elements. These materials were identified by physical, chemical and biological analyses (briefly described in Chapter 4 of the paper). The total dimensions of the wall cabinet are: 98.8 / 60.7 / 2.3 cm; and the dimensions of the door: 25 / 4.5 / 3.5 cm. The elements that make up the support are made of spruce wood - *Picea abies* (according to the analysis report). The frame consists of four elements: two vertical and two horizontal plates, joining in half. The joint is perfectly executed, being visible only on the back of the piece (Fig. 2; RLV 3). In the upper and lower part of the frame there are two profiled rods, glued together and mechanically fixed with wooden nails (Fig. 1 and 4); the door is made of a single plate, and on its back are mounted

* Student at Lucian Blaga University from Sibiu, Faculty of Social and Human Sciences, Department of History, Heritage and Protestant Theology, Conservation and Restoration Section; email: andrei.buda@ulbsibiu.ro

perpendicular to the direction of the fibre two half-recessed sleepers, with trapezoidal section (dovetail), being much narrower at one end to be able to slide more easily. The door is fixed to the frame with metal hinges fastened with metal nails; the locking system consists of a metal element fixed to the frame. When it is operated by rotation it reaches the door and locks it (Fig. 1, 7 and 8).

The painting technique is tempera. The pigments are of mineral origin, they are obtained synthetically by chemical oxidation of metals (brief description in chapter 4 of the paper). Both binder and varnish are organic materials. The role of the binder is to ensure the cohesion of the coloured particles of the pigments as well as the adhesion of the colour layer to the primer, while the varnish has the role of protecting the colour layer. The stratigraphic study indicates the order and thickness of the layers present. Starting from the level of the wooden support, there is a layer of glue over which the chalk primer was applied. Over the primer, the colour layer was applied by brushing, consisting of thin layers, on the background areas and in multiple and consistent layers to the floral decorations present on the door. These details were observed by optical microscopy, in direct and radiant light and by taking samples for stratigraphy (discussed in Chapter 4 of the paper). The green background on the frame and the blue on the door show no primer or varnish, the colour layer was applied directly on the wood. This type of weak, varnished tempera, or in some cases with very thin varnish, occurs mainly in wooden churches (Niels, Dana, Livia 2019, 108).

The most important decoration is present on the door and consists of two rectangular boxes containing plant elements. The boxes, arranged one below the other, contain the same motif, a vase of flowers symbolizing the tree of life. The arrangement includes peonies or roses, carnations, daisies (?) and irises. Above the door are the owner's initials and the year 1831, framed by a decorative border (Figs. 7 and 8). The complementary red-green contrast on the frame is used; and blue-orange on the door. On the profiles (upper and lower) there is a painting that imitates the wood fibre typical of landlers (Fig. 7 and 8); this decorative motif consists in an alternation of oblique lines made in colour gradients.

State of conservation

The state of preservation of the constituent elements is relatively good. Constituent material losses can be approximately 3%. We can conclude that the piece was kept in conditions of high humidity, and the degradation of the painting layer motivated its repainting (repainting) (Fig. 1; RLV 1).

* The piece has entered the restoration process without the profile at the bottom; before a new one was made for completion, the owner found the original item missing.

** Adobe Photoshop was used to more accurately determine losses and deposits / repaintings.

Wooden support

The condition of the wooden support, taking into account the microclimatic conditions in which the piece was kept, is unexpectedly good. Although the halos confirm that the piece has been stored for a long time in conditions of high humidity, it does not show significant deformations of the panel or biological attack[1]. The most significant degradations are the loss of wood material, visible on the front. These appeared when inserting metal nails to fix the piece to the wall. Other degradations of a functional nature have occurred over time in the locks and hinges (Fig. 1). The lower plate has one of the joints dislocated (Fig. 2) and glued. At the joints, small longitudinal cracks appear. On the whole surface, the piece has non-adherent or poorly adherent deposits (Fig. 2; RLV 2), and in the lower part, moisture halos.

The colour layer

As in the case of wood panel, the most significant degradations are the loss of material (pigments, binder, varnish) from the bottom of the piece, caused by excess moisture. The intervention that raises problems in the restoration process is the repainting of the original painting (Fig. 1; RLV 1-repainting marked with dark green, purple). The repainting on the frame is green, and on the door and on both profiles it is white. From the observations made we found that the subsequent paint did not have such a good adhesion to the original painting and exfoliated in some areas (Fig. 1). The poor adhesion of the subsequent paint can also be explained by its application without a prior cleaning of the original colour layer or by the different nature of the binder. This practice of repainting a piece of painted furniture after undergoing aesthetic changes is common (Niels, Postolache, Bucșa 2020, 182-183). Beneath the repaint layer are cracks of technique (especially in the pasty touches of the floral decoration), detachments of scales, or

[1] The absence of biological attack is to some extent also due to the arsenic-based pigment present in the color layer (the arsenic-based pigment was determined optically and by XRF analysis

powder in some cases. The varnish kept under repainting was browned, brittle and cracked. Dust deposits, spider webs with fragments of repainting scales attached and exoskeleton fragments of some insects were found on the entire surface of the piece.

Metallic elements

Due to the use of the piece, some metal nails that fastened the hinges to the wooden panel were ejected and lost. All the metallic elements present on the visible parts the same paint that is present on the frame of the coat of wall cabinet. The hinge shaft has thinned over time due to mechanical work (functional wear). Some surfaces had oxides (rust).

The state of preservation is supplemented in the chapter Diagnosis (Tab. 3)

Scientific investigations

Scientific investigations have an essential role in the restoration process, providing scientific support to the work of the restorer. The physical analyses performed on this piece are non-invasive and non-destructive. Chemical analyses that involved sampling to identify pigments and binders or stratigraphic ones are micro-invasive and micro-destructive. In all cases, the samples taken were extracted from degraded areas that allowed this, but not so degraded that the results of the analysis were inconclusive.

Wood essences

There were two samples needed to identify the wood species. The first was extracted from the frame support, from a joint area not at all visible. The second was extracted from the lower cross member, more precisely from the joint area with the door panel. Samples were taken when the piece was disassembled using a scalpel. The maximum dimensions of a sample did not exceed 7 mm in length. After sampling, the samples were processed by boiling; cross-sectional and longitudinal sections were performed and observed under a microscope. After observing the microscopic characteristics of the cells, it turned out that in both cases the wood essence used is the same - spruce wood (*Picea abies*) (Ghelmeziu, Suciu 1959, 180-183; analysis bulletin).

Pigments and binder (UV; XRF; FTIR; Stratigraphs; XR; Micro-chemical)

The first analysis was X-radiography to highlight the original colour layer under repainting with X-rays. This required dismantling the door and transporting it safely to the radiography room of the Clinical Hospital of Paediatrics in Sibiu, where the investigation was carried out. The resulting image confirms the presence of pasty coughs under repainting. Some pigments, such as those based on lead or zinc, make it difficult to pass radiation, and radiographs these areas appear white-diffuse (Fig. 3), allowing us to analyse the painting in depth. After pickling, physical analyses were performed and samples were taken for stratigraphy and micro chemical tests. The corroboration of the physical and chemical analyses (XRF, XR, FTIR) with those performed in UV light (Fig. 6) allowed the identification of the pigments: R3835 - deep red: Cinnabar; R3836 - peony red: Cinnamon mixed with realgar, zinc white; R3837 - carnation red: realgar, minium, cinnabar and zinc white; R3838 - vase blue: organic blue, zinc white; R3839 - white flower vase, - white zinc, traces of realgar; FTIR: P4, 5, 6: calcium carbonate. The strongest and most obvious signal in UV light was provided by the white pigment based on zinc (John 2011, 132, 133). A pigment difficult to identify was that of the blue background of the door, because no method gave clear results. . Following the result received, it was concluded that it could be an organic dye - indigo, used as a pigment (Margós, Sajó, Minami 2020, 167-172). Also, the stratigraphy made (Sandu et al. 2012, 862) provided clues about the thickness of the primer and the touches of colour, as well as about their arrangement / overlap.

Following the analysis of pigments and organic materials, we conclude that we are talking about an original piece of furniture; results compared to those described in ISIS 20 (András, István, Takeshi 2020, 162-181).

Cleaning tests

The solvent combinations were taken over and adapted from the publications signed by Erminio Signorini (Signorini 2010, 17-22) and Guttmann Márta Júlia (Guttmann 2013, 80-97). They were extracted from mixed articles that act effectively on unwanted layers on wood and paint. Different combinations were tested and used for: degreasing, cleaning and pickling of some surface layers, selected from the lists of the two authors. Other combinations of solvents were taken from Notions of painting chemistry signed by Ioan Istudor (Istudor 2011, 260-273).

Cleaning tests on the wooden support

Chemical tests for the removal of deposits remaining after mechanical cleaning have the role of smoothing the surface and removing acidic or hygroscopic products from the surface. These con-

sisted of testing more or less polar solvents in order to soften the deposits. The mixtures were applied with cotton swabs. Following the cleaning tests, the best results were given by alcoholic water, with low toxicity, good action time and good evaporation rate (from the wooden support) (Tab. 1).

Repaint pickling tests

The pickling tests consisted in the solubilisation of the subsequent paint without affecting the original colour layer. In the first phase, ionizing substances were tested, which did not give satisfactory results. Following these tests, we hypothesized that we could face an oil-based paint and changed the test solutions. The second set of mixtures gave satisfactory results, and the chosen combination was 5% ammonia water. The motivation for choosing this mixture consists in the good results offered in the removal of the repeating layer and in the background, in the low toxicity it has, objectives also recorded by Erminio Signorini (Signorini 2010, 19). Initially, the tests were performed with cotton swabs, but we obtained a higher efficiency using compresses (10/10 cm) with solvent applied for 5 minutes on the surface.

Polychromy cleaning tests

These tests were performed on the varnished areas and the same mixtures were used as for pickling. The combination of solvents was used: isopropanol + water + ethanol (9: 1: 1). Because the varnish solubilizes with a mixture from the same set of tests, it indicates that it could be a natural resin soluble in alcohol (Istudor 2011, 230, 233).

The restoration process

In this phase, overall photos were taken, photos that contribute to the description of the piece, photos that document the state of preservation of the piece before restoration and photos from the time of investigations. The analyses performed consisted of XR, XRF, FTIR, UV, visual, visible light and stratigraphic analyses.

The surface was dusted with a fine brush, avoiding dusty areas or loose scales of the paint layer. Before stripping the piece, a consolidation of the original colour layer was made, through the repainting layer. This was facilitated by the presence of cracks created over time in both layers, favouring the penetration of the consolidation in depth. The areas selected for this consolidation were the degraded ones, respectively the floral decorations on the door and the black frames on the frame. The consolidation consisted in the application of a 7% fish glue solution by brushing, through the Japanese sheet, then the restoration of the raised scales by pressing with the thermostatic spatula with melinex protection[2].

In the next stage, the piece was glued, in order to be re-glued correctly and to be able to perform more easily the cleaning of the versus and the joints, as well as the pickling of the subsequent layer.

After consolidation, verse cleansing tests were performed. The best results were obtained by using mixtures containing alcohol. The 1: 1 water-ethyl alcohol mixture was chosen. The choice made can be motivated by the fact that the alcohol in the composition dents weakly adherent deposits faster and speeds up the process of evaporation of water from the surface. The mixture was applied with a cotton swab.

Repaint pickling and effective pickling tests were perhaps the most difficult step, as they involved removing a layer of colour added later, covering the original painting. Of the tested mixtures, the best results were given by 5% ammonia water. The pickling was performed with compresses (10/10 cm) soaked with the chosen mixture. The compresses had a time of action of 5 minutes, after which they were removed and intervened with a cotton swab soaked in the same mixture to remove the solubilized layer. In areas where repainting was more consistent, it was removed in several stages. The varnish was thinned and levelled during pickling with the same mixture.

The metal elements (hinges, lock and original nails) were initially pickled by the subsequent paint that also appears on the surface of the piece. The same mixture was used as in polychrome case. Under repainting, the surface of the metal showed rust. The metal parts were immersed in 20% orthophosphoric acid for 5 minutes and then cleaned under a stream of water distilled with steel wool[3] (000 granulation). As a protection, a combination of Balistol oils[4] was applied by brushing.

[2] Thermoplastic foil based on polyethylene terephthalate (PET), sold by CTS Sibiu.

[3] https://www.mustash.ro/foite/3408-lana-de-otel-nr000-100-gr.html?gclid=CjwKCAjwtdeFBhBAEiwAKOIy5wIuePLEumTbic-qEu3b3SUioGbKNNY8BBGtwsTyL2jcq53SGJbWFuBoCGu0QAvD_BwE 1.06.2021 – 19:17

[4] https://armesibiu.ro/produs/ballistol-spray-ulei-arma-50ml/ 1.06.2021 – 19:21

After consolidation, pickling and cleaning, the part was reassembled. The adhesive used for the joints was 15% rabbit glue, and hand presses with end protection were mounted locally, to create much better contact between the surfaces. The presses were removed after 12 hours, the time required to evaporate the water and obtain optimal adhesion. Also in this stage, the metal elements (hinges and lock) were reassembled with the help of original nails.

The chromatic integration of the gaps of the colour layer was performed with watercolours[5], in the technique of imitative retouching. The varnish was made with 10% dammar dissolved in turpentine[6]. It was applied with a wide and very fine brush, in two layers, every 24 hours.

Throughout the restoration process, photographs were taken to document each operation. Currently, the piece is on display in the owner's private collection.

The photographs and sketches that appear in the text are made by the author, except for Fig. 5. Radiography (which belongs to Mr. Ciprian Șofariu, radiologist).

Conclusions

The contribution brought by this work consists in deepening the specialized bibliography from which we took over and adapted to this piece the most indicated cleaning mixtures. During the study I discovered, stratigraphically, a technical feature - the bottoms without primer and varnish, which is highlighted in this article. This peculiarity is specific to many pieces of painted furniture that we find in the collection of the ASTRA Museum. The techniques for making wood and painting joints were described, which makes it possible to integrate this case study into a future broader research of the techniques and materials used to make Saxon furniture pieces.

** * Acknowledgement:*

Biologist investigator Livia Bucșa, chemist investigators Irina Petroviciu, Cristina Carșote, Daniela Văcariu and Marta Guttmann, physicist investigator Gheorghe Niculescu, restorers Olimpia Coman Sipeanu, Cristina Dăneasă, Dorin Barbu and Ioan Brai, museographer Simona Malearov and doctor Ciprian Șofariu.

[5] Russian colors Petersburg
[6] Products purchased from the specialized company CTS Sibiu

REFERENCES

Niels, Postolache, Bucșa 2019	Niels Auner, Dana Postolache, Livia Bucșa, *Tehnologia lucrărilor de restaurarela monumentele din lemn,* Editura Hago Internațional, Ghimbav 2019
Constantinescu, Lindner-Barth, Buda 2020	Ecaterina Constantinescu, Katherina Lindner-Barth, Andrei Buda, *Restaurarea unui armăroi baroc din secolul al XVIII-lea*, Editur Haáz Rezső Muzéum, Odorhei, 2020
Roswith 2015	Capesius Roswith, Pictura de mobilier la sașii transilvăneni, Editura Honterus, Sibiu, 2015
Ghelmeziu, Suciu, 1959	Nicolae G., Suciu Petru N., *Identificarea lemnului*, Editura Tehnică, București, 1959
Guttmann 2013	Márta Júlia Guttmann, *Aspecte teoretice ale curățirii obiectelor din lemn*, în*Caietele Restaurării* 2013, Editura ACS, București, 2013
Istudor 2011	Ioan Istudor, *Noțiuni de chimia picturii*, Editura ACS, București, 2011
Malearov, Ștefan 2012	Simona Malearov, Camelia Ștefan, *Mobilier pictat transilvănean*, Editura ASTRA Museum, Sibiu, 2012
Margós, Sajó, Minami 2020	András Margós, István Sajó, Takeshi Minami, *Analize cu spectrometru portabil de raze X a pigmenților mobilierului pictat din secolul XVII-XIX din zona Sighișoara și Rupea – Contribuție la compoziția verdelui auripigment- indigo,* Editura Haáz Rezső Muzéum, Odorhei, 2020
Sandu et al. 2012	Irina Crina Anca Sandu, Stephan Schäfer, Magrini Donata, Bracci Susanna, and Cecilia Roque 'A Cross-Section and Staining-Based Techniques for Investigating Organic Materials in Painted and Polychrome Works of Art' *A Review Microscopy Society of America* 2012.
Signorini 2010	Signorini Erminio, 'Surface Cleaning of Paintings and Polychrome Objects in Italy: The Last 15 Years', *New Insights into the Cleaning of Paintings,* Smithsonian Contributions to Museum Conservation, New York, 2010

LIST OF ILLUSTRATIONS

LISTA ILUSTRAŢIILOR

	Mixtures	*Components*	*Ratio*
1	Distilled water	Water	1
2	Alcoholic water	Water, Ethanol	1:1
3	Water with C2000	Water, C2000	1:5%
4	Water with C2000	Water, C2000	1:10%
5	Ammonia water	Water, Ammonia	1:10 drops
	Alcoholic water with C2000	Water, Ethanol, C200	1:1:5%
	Alcoholic water and ammonia	Water, Ethanol, Ammonia	1:1:10 drops
*Percentages refer to the amount of solution in the total mass of the mixture 200 ml.			

Table 1. Mixtures used for cleaning tests on wood substrates

	Mixtures	*Components*	*Ratio*
1	Ammonia water	Water + Ammonia	1:5%
2	Solvanol	Isopropanol+ Water + Ethyl Alcohol	9:1:1
3	Solvanol and ammonia	Isopropanol + Water + Ammonia	2:1:2
4	Ethanol and ammonia water	Water +Ethyl Alcohol + Ammonia	1:1:3%
5	Strong orange	Water + Acetone + Ammonia + Ethanol	1:1:5%:1
*Percentages refer to the amount of solution in the total mass of the mixture 200 ml.			

Table 2. Mixtures used for repainting pickling tests

The wooden support and the pictorial layer

LOCATION	*DEGRADATION*	*CAUSE*	*TREATMENTS*
The entire surface of the folk painted hanging cupboard	*Massive adherent, non-adherent deposits*	*Inadequate storage and use conditions*	*Mechanical removal with a fine brush / scalpel*
Edges, back, in the area of the nail holes	*Defibration / splitting, cracks / fissures*	*The human factor, technical defects, microclimate fluctuations*	*Stopping by consolidation*
On the panel in the area of metal elements (hinges / locks)	*Wear, migration of oxides on the surface*	*Use of the door, humidity*	*Consolidation, removal of oxides*
On the unpainted surface of the wood	*Photochemical degradation*	*UV radiation, IR, visible light*	-
The joint area of the panels and the joint area of the sleepers in the door	*Contraction / release*	*Drying the wood and denaturing the glue*	*Mechanical consolidation*

The entire surface of the painting	*Repaint*	*The human factor*	*Mixing / mechanical pickling*
The bottom	*Powder*	*Humidity - diminishing the cohesiveness of the glue*	*Proper consolidation*
Relatively on the entire surface	*Thinning of polychrome*	*Cleaning / washing*	-
Consistent touches of flowers and borders on the side of the doors	*Frizz*	*Technical defect (thick, oily layers; non-compliance with drying time)*	*Consolidation itself*
In the area of joints	*Colour loss*	*Aging of the binder (decreased cohesiveness and adhesiveness of the binder), the human factor*	*Consolidation, chromatic integration*

Metallic elements

LOCATION	DEGRADATION	CAUSE	TREATMENT
At the level of hinges, locks and metal nails	*Superficial and deep oxidation*	*Excessive humidity*	*Chemical and mechanical cleaning; protective filming*
	Repainting	*The human factor*	*Pickling*

Table 3. Diagnostic

1. The front assembly before restoration

2. Reverse assembly before restoration

3. Radiography

4.Consolidation of the pictorial layer through the repainting layer

5. Pickling chemical pickling tests

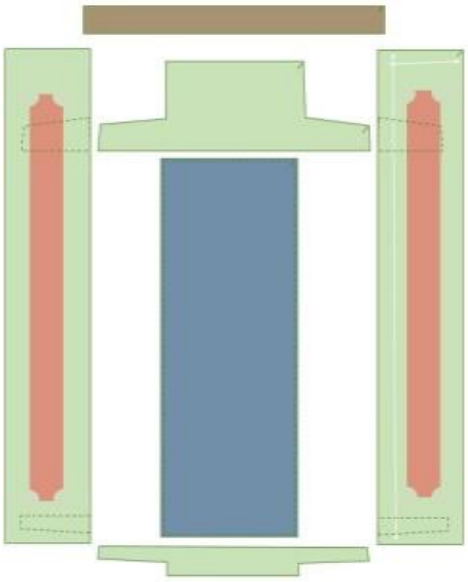
6. The original colour layer and repainting seen in UV light

7. Front assembly before integration

8. The front assembly after restoration

RLV 1. The state of conservation of the pictorial layer

RLV 2. The state of preservation of the wooden support



RLV 3. Component boards

"A DISASTER FOR THE HISTORY OF TRANSYLVANIAN ARCHITECTURE, A DISGRACE FOR THE LOCAL BODIES THAT 'TAKE CARE OF IT' AND A LOAD ON THE CONSCIENCE OF ARCHITECTS AND PEOPLE OF CULTURE FROM THIS COUNTRY"
THE FATE OF THE BÁNFFY CASTLE IN BONȚIDA DURING THE COMMUNIST REGIME IN ROMANIA

Ioana RUS-CACOVEAN*

Abstract: *The State's confiscation of Transylvanian castles and manor houses in 1950 and their transformation into state farms, Cooperatives of Agricultural Production (CAP) or Agricultural Machinery and Tractor Stations (AMTS) had severe consequences on their conservation, their heritage being stolen or systematically destroyed, together with their architecture which was at best neglected for several decades, but more often than that transformed without any approval and abused, until they became unusable. The title of this study was inspired by a report drawn in 1958 which illustrates the castle's state by that time, while the paper aims at presenting the fate of the Bánffy estate in Bonțida during the Communist totalitarian regime of the 20th century. The recent history of the ensemble may be reconstructed on the basis of the vast correspondence held by Cluj and Gherla's Regional Councils with The Directorate of Historical Monuments (DHM) from 1940 to 1986, claiming urgent reparation and conservation works, that were unfortunately always delayed for various reasons, like the lack of funds, lack of function for the edifice and eventually dropped right in the middle due to the famous reorganisation of DHM, which led to its loss of funding and most of all, authority..*

Keywords*: heritage, Bonțida, Bánffy Castle, Transylvania, 1950s-80s.*

Rezumat**:** *Confiscarea în 1950 de către stat a castelelor și conacelor din Transilvania și transformarea lor în ferme, Cooperative Agricole de Producție (CAP) sau Stațiuni de Mașini Agricole și Tractoare (SMAT) a avut consecințe severe asupra stării lor de conservare, inventarul mobil fiind furat sau distrus în mod sistematic, împreună cu patrimoniul arhitectural care a fost în cel mai bun caz neglijat timp de decenii, dar cel mai adesea transformat fără avize și abuzat, până când devenea de neutilizat. Titlul prezentului studiului a fost inspirat de un raport întocmit în 1958, ce ilustrează starea castelului la acea vreme, în timp ce lucrarea urmărește să prezinte destinul domeniului Bánffy din Bonțida în timpul regimului comunist din România. Istoria recentă a ansamblului poate fi reconstruită pe baza vastei corespondențe dintre Consiliile Regionale din Cluj și Gherla și Direcția Monumentelor Istorice (DMI) între 1940 și 1986, ce reclama lucrări urgente de reparații și restaurare, dar care din păcate au fost mereu amânate din varii motive, ca lipsa fondurilor, lipsa unei funcțiuni adecvate pentru castel și în cele din urmă abandonate definitiv din cauza faimoasei reorganizări a DMI, care a dus la pierderea finanțării și mai ales a autorității sale.*

Cuvinte-cheie: *patrimoniu, Bonțida, Castelul Bánffy, Transilvania, anii 1950-1980.*

Introduction

Possession of the Bánffy family since 1387, with a complex history over time, the Castle in Bonțida has undergone numerous transformations from manor house to Renaissance fortified residence in the 17th century, to the Baroque castle in the 18th century, completed with romantic elements in the next one. Seen today as maybe the most spectacu-

* Ioana Rus-Cacovean is lecturer, PhD, at the University of Decorative Arts and Design in Cluj-Napoca, Department of Theoretical Disciplines. The author's main research interests are art history and heritage conservation during the Communist regime. E-mail: ioana.rus@uad.ro.

lar Baroque ensemble in Transylvania, the Castle in Bonțida has been the subject of various extended studies since the beginning of the 20th century, that document its construction and transformation phases up to the interwar period, together with detailed analysis of its architecture and sculptures (Bíró, 1935; Kovács, 1955; B. Nagy, 1970; B. Nagy, 1973; Sabău, 1977; Sabău, 1982; Sabău, 1992; Dávid Gy. 2001; Sabău, 2002; Kovács, 2005; Bíró, 2007; Bicsok *et al.* 2012; Hegedüs *et. al.* 2017). Still, none of these studies go beyond the 1950s, the recent history of the ensemble usually standing for a short and sad conclusion, being often said that the castle slowly degraded after having been transformed into the quarters of the Agricultural Machinery and Tractor Station (AMTS)[1], and looted for decades by the villagers, who extracted building material from it. Or more recent, completed with its transformation into a heritage conservation centre and a venue for cultural events and a festival.

Thus, the present paper aims at reconstructing the ensemble's history during the 20th century, focusing mainly on the period since the end of World War Two, beginning with its confiscation by the State in 1950 up till 1986. We shall discuss the attitude of the villagers, the Cooperative of Agricultural Production (CAP)[2] and the AMTS towards this ensemble, in parallel with the immense efforts made by the Directorate of Historical Monuments (DHM)[3] to save it from demolition. The study is structured in a series of chapters whose titles were inspired by various citations and information extracted from documents found in the archives of the National Heritage Institute (NHI)[4], presenting the most tragic decades in the history of the Bánffy Castle in Bonțida, generally ignored by other studies.

A Baroque AMTS Headquarters

Owned and inhabited up till the outbreak of World War Two by Count Miklós Bánffy, the German troops used the castle's north wing as a military hospital and a warehouse for medical equipment during the war. However, when the Nazis were forced to leave the country, as a punishment for the count's negotiations with the Romanian and Hungarian governments to turn their weapons against Germany, they set the castle on fire, causing great damage to the main body and the western wing of the ensemble, which lost their roofs and part of their indoor floors. Prior to the arson, the troops stripped the castle of most of its furniture, artworks and books form the Bánffy family's library, with the intention of transporting them to Germany. But on their way back, the convoys with looted goods were bombed, so all of these were eventually lost (Hegedüs *et. al.* 2017, 93). We have very little information about the castle's state after this robbery and arson, the documents preserved in the archives of the NHI mentioning that left without a roof, it remained abandoned, lacking use and protection, so that in 1948 it was already in a process of advanced decay (CMI Fund, 1940).

With the communists' coming to power, and with their 1949 "Plan for the Liquidation of Landowners' Property", together with Decree no. 92 / 1950 for property nationalisation (*Buletinul oficial*, no. 36 / April 20, 1950), the State seized control over all economic and social-cultural units, as well as a large number of private residences, "*…to take away from the handful of exploiters an important means of exploitation*" (Ionescu-Gură, 2005, 486). After their confiscation, during a meeting held on October 18, 1949, the Central Committee of the Romanian Workers' Party discussed the distribution of manor houses to various ministries and institutions, assigning to the Ministry of Agriculture about 5.000 historic buildings, which were transformed into CAP (Ionescu-Gură, 2005, 498).

Following this "nationalization" law, like dozens of other manor houses in Transylvanian villages, the entire Bonțida estate, including the castle and its historic garden, had the same fate. Count Mi-

[1] In Romanian *Stațiunea de Mașini Agricole și Tractoare* (SMAT), n.a.
[2] In Romanian *Cooperativa Agricolă de Producție* (CAP), n.a.
[3] In Romanian *Direcția Monumentelor Istorice* (DMI). It is the generic name of the main institution in Romania that was responsible for the research and design of monument conservation, approval of projects, inventorying and restoring monuments, conducting their own monument restoration sites, between 1952 and 1989 always changing its official name: The General Directorate of Historic Monuments (1952-1959), The Directorate of Historic Monuments and The Directorate of Historical and Artistic Monuments (1959-1974), The Directorate of National Cultural Heritage (1974-1977), The Economic Directorate and of National Cultural Heritage (1978-1989), according to "Istoricul INP", *Institutul Național al Patrimoniului*, visited on August 15, 2021, https://patrimoniu.gov.ro/ro/utile/item/27-istoricul-inp.
[4] In Romanian *Institutul Național al Patrimoniului* (INP), n.a.

klós Bánffy retired to Budapest, where he died shortly afterwards, while the Ministry of Agriculture took over the estate, and installed the Bonțida AMTS on the premises. (Fig. 1.)

Due to the arson caused by the German troops, it is fair to say that the castle was not in its very best shape, as mentioned above: the interior must have already lost most of its belongings, the main body and the western wing of the ensemble had lost their roofs and part of their floors, there were several areas where the plaster was already missing, while some of the wings were deserted and nearly beginning to crumble, like the severely damaged round towers and the riding school, which, in the absence of repairs or minimal maintenance, gradually fell into ruin (CMI Fund, 1940).

Nevertheless, it is important to note that the correspondence in the NHI archives presents the Miklos wing, the stables, and the former kitchen by then occupied by the AMTS, still well-preserved, with most of their carpentry, door, and window frames and all the statues above the corniche intact. After installing on the premises, the AMTS transformed the Miklós building, which was the best-preserved one, into administrative offices and housing for its employees. They also turned the kitchen into a canteen, and the former stables into a workers' club (CMI Fund, 1940; DMI Fund, 1960-1966). (Fig. 9)

Needless to say, the AMTS never carried away any maintenance works, much less protection and repair interventions, regardless of the castle's severe state of degradation and the fact that they were responsible for its preservation as the owner and beneficiary of the ensemble after its nationalization. One may almost say they set to destroy it with the unrestricted "help" of the villagers, making no efforts for its preservation, but carrying out various inadequate and unapproved interventions on the buildings it occupied, respectively in the courtyard where in the few photos surviving from this period, the agricultural machines can be seen (DMI Fund, 1960-1966). (Fig. 8.)

Moreover, in 1948, the DHM found out from indirect sources that the Agricultural Chamber of Cluj asked the Ministry of Agriculture for permission to demolish the castle, in order to use the construction material for other buildings. And without waiting for an answer, in July they set to dismantle its gates and grilles, together with its windows, doors and wooden floors. The DHM reacted immediately, sending an order to stop the demolition works, but the castle had probably already been severely damaged (CMI Fund, 1940). (Figs. 2-5.)

One of the first reactions signalling the castle's state of advanced decay came in the same year from the Hungarian People's Union of Romania, in the form of a memorandum regarding several Transylvanian monuments. Consequently, in September 1948 the DHM warned AMTS Cluj and Bonțida, invoking the law for the conservation and restoration of historical monuments, according to which the owners and institutions that used them had to ensure their preservation, asking them to secure funding for the most urgent repairs, and take measures to safeguard the monument. But AMTS did not commit to these works, leaving the castle unguarded, which in June 1949 led to the collapse of a 25 m wall from the riding school and even to a new request to demolish it completely (CMI Fund, 1940). (Figs. 7. and 10.)

Following these events, as a delegate of the DHM, architect Ștefan Balș thoroughly researched not only the partially collapsed riding school, but also the entire ensemble, making a detailed survey of the castle. He pointed out that the coat of arms with inscription and dating on the main gate was hammered down and the remaining fragments were thrown into the nearby ditch (Fig. 6.), as well as AMTS's intention to remove the stone fountain with horse form the new club set in the stables. In his report, Balș recommended until the securing of funds for consolidation and repair works, the riding school wall to be temporary propped to avoid its complete collapse, the stable to be preserved in good condition, especially its main door frame and the manger-shaped shells inside, the remaining statues to be kept in place, and the fallen fragments to be gathered, inventoried, and moved inside, for their protection. These included the remaining fragments of the coat of arms and other several pieces still preserved on site, like 3 statues, a pool table, 4 wooden animal heads and 4 chess pieces. He also underlined the necessity to stop the unrestricted access inside the main wing, by walling up its doors and windows or closing them with wooden planks, as some of its vaults were already threatening to collapse (CMI Fund, 1940; DMI Fund, 1960-1966).

But the AMTS ignored these recommendations too, as shown by the DHM's correspondence, which records in the autumn of 1950, that the villagers of Bonțida and the neighbouring settlements still systematically "grinded" the castle, tearing

down walls and carrying away construction material. Despite the fact that on December 5, 1950, the People's Council of Bonțida published a ban on removing materials of any kind from the ensemble, the action remained echoless. A year later, on September 30, 1951, the director of the Historical Museum in Gherla found that some of the statues were already missing their heads, others threatened to fall and, despite the taken measures, people still secretly carried away materials from the main building, especially from its basement, further endangering the monument (Fig. 13.). However, it is not surprising that the villagers ignored the official ban, since the very AMTS treated the castle as a quarry for materials, still making demolitions and unadvised transformations, as well as appropriated the discovered pieces. For example, despite the repeated requests to hand them over to the museum in Gherla, the three bronze statuettes of approx. 30 cm, in good condition, bronze medals, glass and bronze lamps found in the Miklós building, in the room where the count had "his personal museum", were taken by the AMTS's leaders (CMI Fund, 1940; DMI Fund, 1960-1966).

The situation remained unchanged in 1953, when following several notifications from Prof. Sebestyén and the Institute of History and Philosophy in Cluj, which described again the deplorable state in which they found the castle, a delegate of the Technical Design Service along the Cluj Regional People's Council was sent to Bonțida. He signalled once more the lack of security, the constant theft of materials, including door and window stone frames, the mutilation of statues, the unrestricted access and destructive play of school children on the premises, stating that the remaining pieces were still in place only because of their size and weight, as they were too massive and difficult to disassemble. Consequently, the DHM reminded the Ministry of Agriculture and the General Directorate of AMTS that, according to the Decision of Council of Ministers no. 2447 / 1952, as the monument was in AMTS's use, they were directly responsible for the ensemble, and obliged to take immediate security, maintenance, and repair works, even if only temporary. They also opened a series of investigations, which brought to light some of the illegalities committed by the very AMTS employees, including cutting of 19 cubic meters of ash and sessile oak from the park, which were therefore confiscated (CMI Fund, 1940; DMI Fund, 1960-1966).

However, neither of these measures stopped the destructions, another DHM delegation noting that the AMTS employees eventually removed the stone fountain from the stable, dragged the sculpted horse out in a corner of the yard and chopped it down, while they continued to stock the canteen's kitchen with wood cut from the park. They also dismantled the stone blocks that formed the south-western tower's base and reused them as sidewalk tiles (DMI Fund, 1960-1966).

Unfortunately, proving a complete disorganization and lack of responsibility, when the communists "nationalized" private property, they distributed historic buildings to various institutions without preparing legal documents in this regard. Therefore, even though according to Article 7 of the Decision of the Ministers Council no. 661 / April 22, 1955 for The Preservation and Use of Cultural Monuments from PRR, *"the safeguarding, protection, conservation and restoration of cultural monuments, their appropriate scenery and area of protection is a permanent task of the People's Councils on whose territories these monuments are to be found"*, in the case of Bonțida, like elsewhere, there was no official record that the legal beneficiary of the estate was AMTS. And when DHM tried to clarify this situation, "*the comrades* [from the management of AMTS Bonțida, n.a.] *clearly refused to sign*" the handover report that was presented to them, despite the obvious evidence that illustrate various aspects of their activity and use of the architectural ensemble for years (CMI Fund, 1940; DMI Fund, 1960-1966). The administrative disorganization and foggy legal situation also bear part of the blame for the monuments' defacement during communism, allowing the beneficiaries to act recklessly, either by wearing out the historic buildings without any repairs until they became unusable, or by carrying out interventions simply without approval, of which the DHM found in other ways (Rus-Cacovean, 2017).

And thus, despite being enlisted as a Historic Monument in 1955, becoming at least in theory protected by law, in the absence of legal sanctions, DHM's interventions were left again without effect.

In the end, the inevitable consequence was that on May 2, 1956 "following a storm", but most likely also during new attempted thefts, the wall of the riding school with all its statues and door frame of the main entrance collapsed, causing the death of two people. The DHM delegate found the walls crumbled and stacked in the courtyard by the Bonțida People's Council, while the children of the nearby school continued to play freely on the tin

roof of the former stable, and the AMTS continued to remove the stone base of the tower, along with the masonry and stone steps from the terrace on the western façade (CMI Fund, 1940; DMI Fund, 1960-1966).

On June 1, 1958, architect Richard Lieblich found the castle *"in a lamentable state […], representing a disaster for the history of Transylvanian architecture, a disgrace for the local bodies that 'take care of it' and a load on the conscience of architects and people of culture from this country"*. In some of the rooms, the accommodated temporary workers pierced the outer walls to evacuate the stove chimneys, completely smoking the Baroque façades, and even used the castle's rooms as toilets (DMI Fund, 1960-1966).

Finally, as a desperate measure to save the castle, along with other former noble residences, the DHM attempted to evacuate the AMTS from these. Thus, they addressed the Council of Ministers in a secret document on November 17, 1954, informing it that countless monuments were *"misused, being occupied by various institutions without any official approval, and being exposed to destruction due to their improper use, unprofessionally transformed"*. To remedy this situation, they claimed the necessity for the architectural monuments used contrary to their character or destination and therefore exposed to ruin or degradation, to be *"taken without delay from the use and inventory of those who use or own them and oblige them to bear the cost of restoration works, depending on the damage they had caused"* (CMI Fund, 1940; DMI Fund, 1960-1966).

DHM also realized that in order to prevent its total destruction, it became mandatory not only to evacuate from the castle those who did not take care of it and whose activity was incompatible with it, but also to find a new and a more suitable beneficiary and a new destination. Thus, they initiated discussions on a regional level, with various companies and institutions to take over and repair the castle in Bonțida and transform it into a cultural or health unit. From 1958 to 1960, through various letters, they tried to persuade either the Herbák János Plant or the Babeș-Bolyai University in Cluj and the Ministry of Education and Culture to take over the castle, suggesting its reconversion into a rest home for workers or students. However, all these institutions flatly refused, stating that they had no interest in using this ensemble (DMI Fund, 1960-1966).

The only one interested in the monument was the Bucharest Film Studio, which used it as a setting for the "Court of Command" scenes, from the film *Forest of the Hanged*, directed by Liviu Ciulei. In order to comply with the director's requirements, on the basis of a report and with some supervision from the DHM, in December 1963, 10 trucks of rubble were stored at the castle, the inscriptions and recent drawings on the walls were cleaned, a temporary metal scaffolding was made to support a part of the roof structure and placed a few wooden doors inside. Also, they dug 10 bombshell pits and 20 meters of trenches in the courtyard and the park. In the absence of photographs from this period, the numerous frames in which the castle of Bonțida appears in the film aired in 1964, are extremely suggestive for the state of advanced degradation in which the ensemble was already (DMI Fund, 1960-1966; Ciulei Liviu, 1964). (Figs. 11-12.)

The design theme for a health home

Despite the fact that every approached institution refused to take over the castle, the DHM stubbornly insisted, and hoping to persuade someone in the near future, they set to draw up a design theme. The project was favourably approved on December 11, 1962, with its proposal of reconverting the castle into a rest or health home. Taking into account the importance and volume of restoration works, as well as the considerable amount needed, of 6.200.000. lei, the DHM recommended the Cluj People's Council to initiate a project for a Decision of the Council of Ministers, through which to obtain the necessary state funds, following the examples of the Hunedoara Castle and the Făgăraș Fortress (DMI Fund, 1960-1966, 1964, 1968).

On March 30, 1966, the DHM Design Team led by chief architect Mariana Anghelescu completed the documentation, with the intention of preserving all architectural features of the different wings, the reconstruction of the riding school, the restoration of the statues, the marking on the ground of the foundations discovered by archaeological excavations, and the protection of the Romantic Park. The project suggested the transformation of the ensemble into a health home that would ensure the monument's preservation, with rooms for the sick, a club and a meetings hall, a small documentary museum, a dining room, a kitchen, storage space, a laundry area, space for medical service, offices and housing for the medical and administrative staff,

sport areas and outdoor activities. They also included the historic mill of the castle in the design, planning to give it a commercial destination (DMI Fund, 1960-1966, 1964, 1968).

Not surprisingly, the People's Council of the Cluj Region managed only after a few more years to gradually collect very small amounts of money, which were not sufficient for the entire project, but were allocated for the most urgent works, while in the meantime, the castle further deteriorated. Its former chapel continued to be partially inhabited by the homeless, the AMTS water pump was installed in the kitchen, the stables and the gate were partially occupied by temporary workers, while the People's Council of Bonțida organized public celebrations in the immediate vicinity of the ruins, encouraging the deliberate destruction of walls and sculptures. Thus, in the spring of 1968, due to the demolition of the ground floor and basement walls by the villagers, who continued to use the ensemble as a quarry of materials, the masonry of the northern tower partially collapsed (DMI Fund, 1960-1966, 1964, 1968).

Moreover, finding out that the restoration of the castle was "about to begin", in order to "clear" it, on July 31, 1968, the Agricultural Directorate of Cluj County submitted to DHM a documentation, requesting their approval for the construction of a new AMTS headquarters and a canteen. As proof that they did not understand their responsibilities, they suggested the erection of this new building according to a standardised design, either right in the middle of the courtyard or between the Miklós building and the former kitchen of the castle. The proposal was of course rejected by the DHM, which recommended the AMTS's evacuation form the premises, and its installing on a lot completely outside the castle's protection area. They also advised AMTS's sanctioning, on the grounds that they did not comply with their legal obligations as beneficiary of a historical monument, together with the Executive Committee of the People's Council of Bonțida, which passively witnessed the degradation of buildings and the park, allowing the extraction of materials and the deforestation of the historical garden (DMI Fund, 1960-1966, 1964, 1968).

It was only in the autumn of 1968, 20 years after the monument was confiscated, that the first works on the castle began with the clearing of rubble, based on a project for urgent repairs, drawn up by the Directorate for Systematization, Architecture and Construction Design in Cluj. The project proposed once again the unconditional evacuation of the families living inside the castle, the hiring of a guard to stop the locals' theft of materials, the removal of vegetation grown on the ruins, the clearing of rubble above the vaults to unload the intact ones and allow them to dry, the stopping of further chaotically planting of shrubs, the removal of earth deposits around the building to ensure the drainage of rainwater, the repair of cracked walls, a temporary roof structure above the wing where the roof had collapsed and the restoration of the remaining parts, the strengthening of walls at the riding school, the reconstruction of the tin roof covering at the stables, protection works at the mill and the consolidation of statues. Finally, the documentation was completed in May 1969, with the proposal to place a reinforced concrete slab and a roof structure over the entire main wing, the tile roof coverings, the restoration of chimneys, consolidations, and restorations of the demolished walls, consolidation and underpinning of foundations, fencing the park with reinforced concrete poles and barbed wire (DMI Fund, 1968, 1969, 1953-1976).

In November 1970 a new documentation drawn up by the Design Institute for Systematization and Constructions in Cluj included the consolidation of the stables and the entrance gate, the consolidation of vaults, floors and foundations of the main wing and the lightning rod, as well as an expertise for the consolidation of the kitchen and its side leaning tower (DMI Fund, 1953-1976, 1970-1984).

However, on July 13, 1971, a delegation from the DHM found that, while work was being carried out at the main wing, the walls, and roofs of the other wings of the castle were still crumbling, such as the vault under the main gate, 6 vaults and pillars from the stables and a part of the roof with chimneys from the stables having collapsed in the spring of 1969 and 1970. Also, because there was still no proper new beneficiary for the castle, and the fencing was not complete, neither AMTS nor the other inhabitants of the ensemble had yet been evacuated (DMI Fund, 1953-1976, 1970-1984).

The works continued in 1972, but on November 13, the Decision of the Council of Ministers no. 1339 was published, on the basis of which the Investment Directorate near the Cluj Regional People's Council requested the cessation of works at the castle, except for those strictly necessary for the conservation of the interventions that had already been made, like closing of windows and doors, and a rainwater drainage system, provided that they were *"economical and as far as possible permanent in the event of resumption of restoration works"*. All this had to be done within the

limit of the 150.000 lei that had already been approved for 1973 (DMI Fund, 1970-1984).

Under these conditions, the few works implemented the following winter prove the haste to close the restoration site. On January 18, 1973, after analysing on site the works carried out until then, the DHM criticized them and recommended the restoration of the exterior plastering on the eastern side of the entrance and stables that had already degraded, insisting on resolving as soon as possible the roof of the stables by mounting the stone gargoyles. They also recommended the numbering and storage in the existing rooms of the valuable stone elements (statues, frames, slabs) scattered all over the enclosure (DMI Fund, 1970-1984).

Although the interruption of works was conditioned by their resumption in 1974, this did not happen again. In July 1976, the DHM sadly noted that despite their insistences, no beneficiary was still interested in taking over the monument, and despite the works made with great effort and expense, since 1974 the castle had been abandoned once again, being reoccupied by the homeless, and the process of ruin resumed, 5 more of the statues being thrown from their pedestals in October 1973 (DMI Fund, 1970-1984).

A request to demolish "the warehouse"

It is known that after 1977, the body with the highest authority in the field of monument protection in Romania lost its power and funds for research, design, and restoration, the former DHM being reorganised and renamed between 1978 and 1989 the Directorate of Economic and National Cultural Heritage (DENCH), its competencies being restricted to the registration and approval of monument restoration projects. The consequence was the scattering of specialists, the lack of means of reaction and obviously, the even more accentuated degradation of monuments (DMI Fund, 1970-1984).

Showing a real cynicism, or maybe just extreme ignorance, on July 24, 1977, the People's Council of Bonțida sent a request for the demolition of "the warehouse", which in fact was the castle's mill, that had been used as such for 240 years, and between 1949 and 1961 as storage for scrap metal by the AMTS. (Fig. 14.) The request was motivated by the building's advanced state of wear and its age of over 200 years, considering "the investment as fully depreciated" according to Law no. 62 / 1968, which regulated the service life for agricultural buildings at 50 years, while the current building was 252 years old (!). They also suggested the use of the material resulting from the mill's demolition for the construction of a new school in 1978, while the works would be carried out through "patriotic work of the villagers of Bonțida" (DMI Fund, 1970-1984).

On September 18, 1977, the DENCH rejected the request, reminding them once again of their obligations to preserve, restore and protect the historical monuments they had in use (DMI Fund, 1970-1984).

"Radio-Romania" Keeps Broadcasting

However, in the absence of other means to intervene and sanction the responsible, 12 years after the interruption of the restoration works, the AMTS and the CAP installed a mushroom farm in the stables, a chicken farm in the Miklós building, a beer bottling station in the former chapel, and a rabbit farm in the former kitchen (DMI Fund, 1970-1984).

On May 10, 1984, the Museum of Transylvanian History announced to DENCH that the park was extremely degraded, roofs and vaults collapsed everywhere at the castle, and south of it an inadequately integrated school was being built on site without the knowledge or approval of the responsible bodies (DMI Fund, 1970-1984).

In all these years, the only user interested in the castle, apart from the AMTS or the illegally accommodated families, was the director and screenwriter Dinu Tănase, who in 1985 placed the set of the film *"Radio-Romania" Keeps Broadcasting* in the buildings and courtyards of the ensemble in Bonțida. (Fig. 15.) This time, however, no protocol was drawn with DENCH to supervise and regulate the interventions, all the wings of the castle being severely affected by the battle sequences. In the scenes that capture the castle, there are explosions inside the kitchen's roof, in the main courtyard of the castle and on the ground floor of one of the towers, breaking the windows where they were still in place. Bullets were also fired at the walls and machine guns were mounted in the skylights on the roof, at the recoil of which one may see the tiles falling freely (Tănase Dinu, 1984) (Fig. 16.). We imagine that in the absence of any supervision by the DENCH, none of these

damages were remedied after the dismantling of the film set.

Conclusions

The fate of Bánffy Castle in Bonțida is representative for hundreds of other monuments in Romania, the photos from the early '90s being extremely suggestive: the ruin was abandoned even by those who grinded it for decades. Only fragments of the walls crowned by a rusty reinforced concrete floor were preserved, traces of DHM's desperate attempts to save the castle in the 1960s and 1970s, and without those who destroyed it as an act of neglect and systematic aggression for several decades ever being held accountable: the AMTS, the People's Council, the CAP, and the villagers.

The castle found a suitable owner and beneficiary only in 2003, when the Transylvania Trust Foundation took it over from the Local Council of Bonțida and later, after its retrocession in 2008, from Countess Katalin Bánffy, daughter of Miklós Bánffy (Hegedüs *et. al.* 2017). The foundation began a painstaking restoration and reconstruction endeavour, which is still ongoing at present, involving students and volunteers in the process, as an attempt to sensitise the public opinion and at least the generations to come towards the fate of historic monuments.

REFERENCES

a – archival documents:

CMI Fund, 1940	*Correspondence* regarding the Castle in Bonțida, CMI Fund, NHI Archives, Bucharest, 1940
DMI Fund, 1960-1966, 1964, 1968, 1969, 1953-1976, 1970-1984	*Correspondence, Surveys, Design Projects* regarding the Castle in Bonțida, Files no. 1145-1148, DMI Fund, NHI Archives, Bucharest 1960-1966, 1964, 1968, 1969, 1953-1976, 1970-1984

b – periodic publications:

Bíró 1935	Bíró József, *A bonczhidai Bánffy-kastély*. In: *Erdélyi Tudományos Füzetek* (75/1935), EME, Cluj.
Bíró 2007	Bíró József, *Erdélyi kastélyok*, In: *Erdélyi Mûvészet* (1 (26)/ 2007), Könyvkiadó, Odorheiu Secuiesc.
Hegedüs *et. al* 2017	Hegedüs Csilla, Eke Zsuzsanna, Makay Dorottya: *Restaurarea și revitalizarea Castelului Bánffy din Bonțida, jud. Cluj*. In: *Revista Monumentelor Istorice* (1/2017), p. 92-103.
Kovács 2005	Kovács András, *Bonchida – Bánffy-kastély*. In: *Erdélyi Műemlékek* (10/2005), Kriterion, Cluj.
Kovács 1955	Kovács András, *Castelul din Bonțida. Etape de construcție în stilul renașterii*. In: *Ars Transsilvaniae* (5/1995), p. 123-146.
Mărculescu 1971	Mărculescu Olga, *Reflectarea monumentelor istorice și de artă în filmul românesc*. In: *Buletinul Monumentelor Istorice* (2/1971), p. 40-48.
Rus-Cacovean 2017	Rus-Cacovean Ioana, *"SOCIALISM. HAPPINESS." The "NEW WAY" of the Haller Castle in Coplean after 1950"*. In: *Annales Universitatis Apulensis. Series Historica*, Universitatea „1 Decembrie 1918" din Alba Iulia (1/2017), p. 125-150.
Sabău 1977	Sabău Nicolae, *Teme iconografice în sculptura figurativă laică din Transilvania în perioada barocă.* In: *Monumente Istorice și de Artă. Revista muzeelor și monumentelor* (1/1977).
Sabău 1982	Sabău Nicolae, *Prolegomena la iconografia sculpturii baroce din Transilvania*. In: *Studii de istoria artei* (1982), Editura Dacia, Cluj.

c – books:

Bicsok *et al.* 2012	Bicsok Zoltán, Orbán Zsolt, *„Isten segedelmével udvaromat megépítettem...". Történelmi családok kastélyai Erdélyben* (2012), Gutenberg Kiadó, Miercurea Ciuc.
B. Nagy 1970	B. Nagy Margit, *Reneszánsz és barokk Erdélyben* (1970), Editura Kriterion, București.
B. Nagy 1973	B. Nagy Margit, *Várak, kastélyok, udvarházak. Ahogy a régiek látták* (1973), Kriterion, București.
Dávid Gy. 2001	Dávid Gy., Gyula, *A bonchidai Bánffy-kastély* (2001), Polis, Cluj.

Ionescu-Gură, 2005	Ionescu-Gură Nicoleta, *Stalinizarea României. Republica Populară Română: 1948-1950. Transformări instituționale* (2005) Editura ALL, București.
Sabău 1992	Sabău Nicolae, *Sculptura barocă în România* (1992), Meridiane, București.
Sabău 2002	Sabău Nicolae, *Metamorfoze ale barocului transilvan. Sculptura* (2002), vol. I., Editura Dacia, Cluj.
d - historic movies:	
Tănase Dinu 1984	*"Radio Romania" Keeps Broadcasting / Emisia continuă*, directed by Tănase Dinu, 1984
Ciulei Liviu 1964	*The Forest of the Hanged / Pădurea spânzuraților*, directed by Ciulei Liviu, 1964

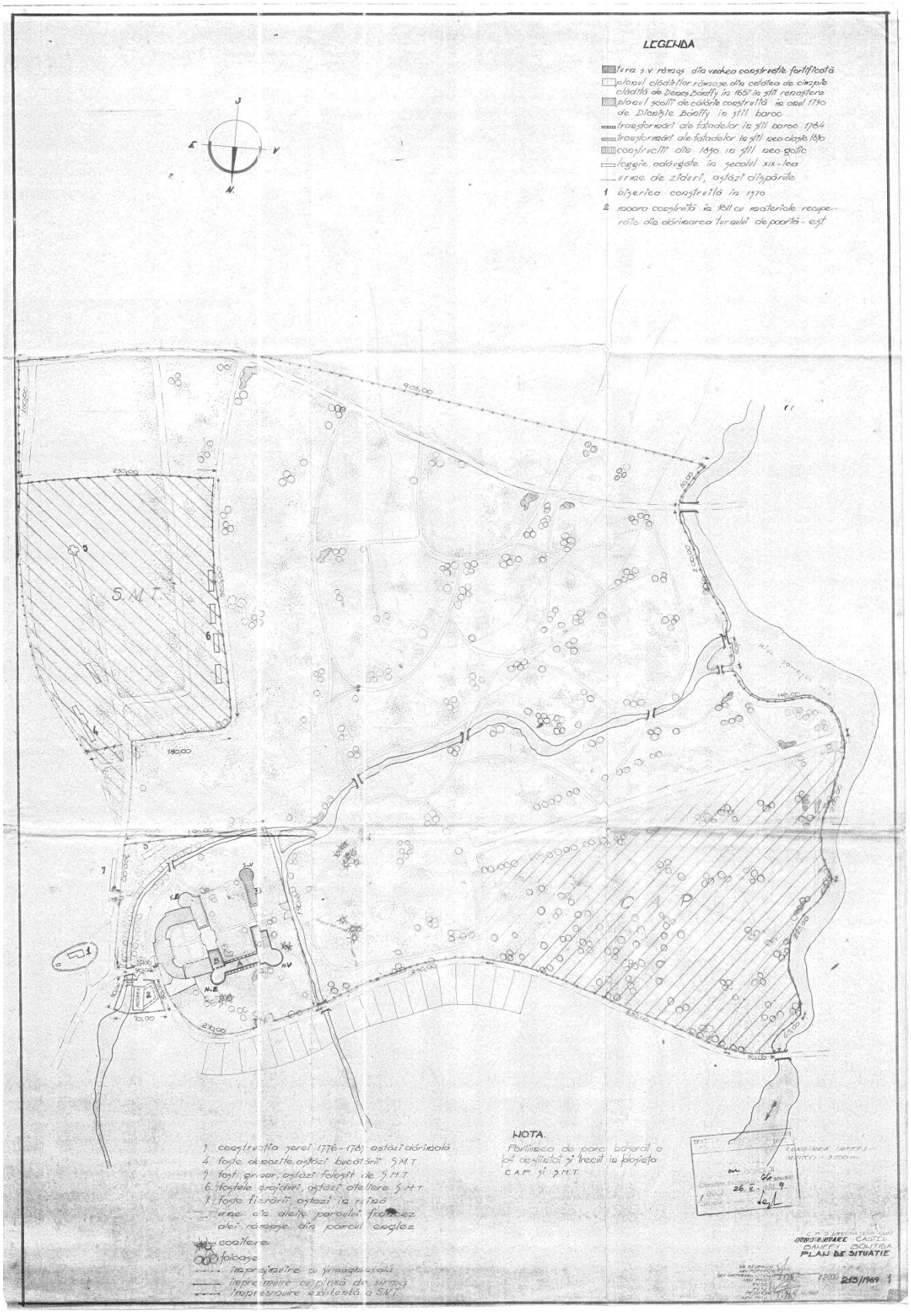
LIST OF ILLUSTRATIONS

1. Survey and plan of the ensemble in 1969, signalling the new owners and beneficiaries (AMTS and CAP), NHI archives, DHM Fund
2. Survey of the southern façade of the castle in 1966, NHI archives, DHM Fund
3. Survey of the northern façade of the castle in 1966, NHI archives, DHM Fund
4. Survey of the courtyard and the western façade of the main gate in 1966, NHI archives, DHM Fund
5. Survey of the western neo-Gothic wing and the former kitchen of the castle in 1966, NHI archives, DHM Fund
6. Sketch in pencil and aquarelle by architect F. Fischer in 1953, showing the main gate of the castle, and its surrounding ditch, NHI archives, DHM Fund
7. Sketch in ink and aquarelle by architect F. Fischer in 1956, showing the partially collapsed former riding school, NHI archives, DHM Fund
8. The main wing of the castle and its courtyard in 1964, NHI archives, DHM Fund
9. The façade of the stables in 1964, NHI archives, DHM Fund
10. The façade of the riding school before collapse, NHI archives, DHM Fund
11. Screen capture from *The Forest of the Hanged*, 1963, showing leading actor Victor Rebengiuc against the southern façade of the castle's main wing and its courtyard
12. Screen capture from *The Forest of the Hanged*, 1963, showing director and actor Liviu Ciulei against the southern façade of the castle's main wing
13. The northern façade of the main wing in 1964, NHI archives, DHM Fund
14. The castle's mill in 1977, NHI archives, DHM Fund
15. Screen capture from *"Radio Romania" Keeps Broadcasting*, 1985, showing the southern façade of the main wing and its courtyard
16. Screen capture from *"Radio Romania" Keeps Broadcasting*, 1985, showing the bullets being fired at the walls and machine guns mounted on the window stone frames

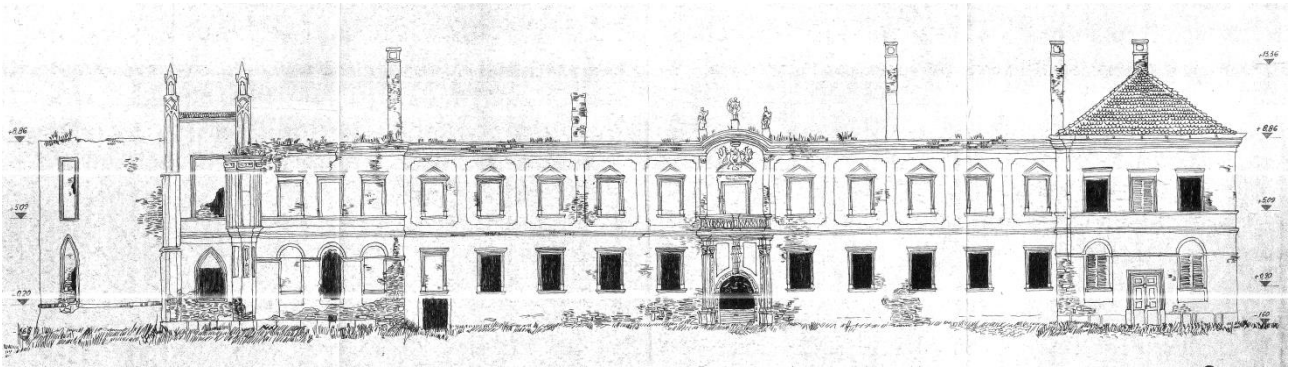
LISTA ILUSTRAȚIILOR

1. Releveul și planul ansamblului în 1969, cu semnalarea noilor proprietari și beneficiari (SMT și CAP), arhiva INP, fond DMI
2. Releveul fațadei de sud a castelului în 1966, arhiva INP, fond DMI
3. Releveul fațadei de nord a castelului în 1966, arhiva INP, fond DMI
4. Releveul curții și al fațadei de vest a porții principale în 1966, arhiva INP, fond DMI
5. Releveul fațadelor de vest ale aripii neogotice și fostei bucătării a castelului în 1966, arhiva INP, fond DMI
6. Schiță în creion și acuarelă realizată de către arhitectul F. Fischer în 1953, ilustrând poarta principală a castelului și șanțul înconjurător, arhiva INP, fond DMI
7. Schiță în tuș și acuarelă realizată de către arhitectul F. Fischer in 1956, ilustrând zidurile prăbușite parțial ale fostului manej, arhiva INP, fond DMI
8. Aripa principală a castelului și curtea acestuia în 1964, arhiva INP, fond DMI
9. Fațada grajdurilor în 1964, arhiva INP, fond DMI
10. Fațada manejului înainte de colaps, arhiva INP, fond DMI
11. Captură de ecran din filmul *Pădurea spânzuraților*, 1963, cu actorul principal Victor Rebengiuc în curtea castelului și fațada de sud a aripii principale în fundal
12. Captură de ecran din filmul *Pădurea spânzuraților*, 1963, cu regizorul și actorul Liviu Ciulei și fațada de sud a aripii principale în fundal
13. Fațada de nord a aripii principale în 1964, arhiva INP, fond DMI

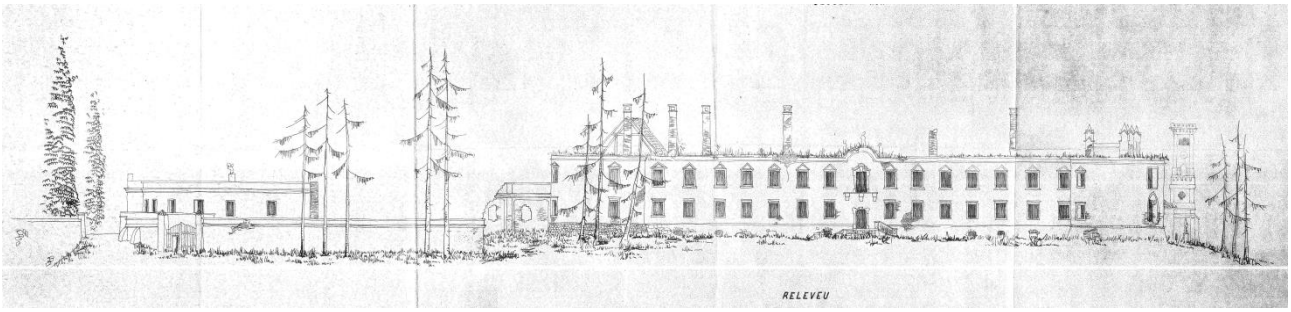
14. Moara castelului în 1977, arhiva INP, fond DMI
15. Captură de ecran din filmul *Emisia continuă*, 1985, cu fațada de sud a aripii principale și curtea castelului
16. Captură de ecran din filmul *Emisia continuă*, 1985, ilustrând loviturile provocate de gloanțe în pereți și mitralierele montate pe ancadramentele de piatră ale ferestrelor



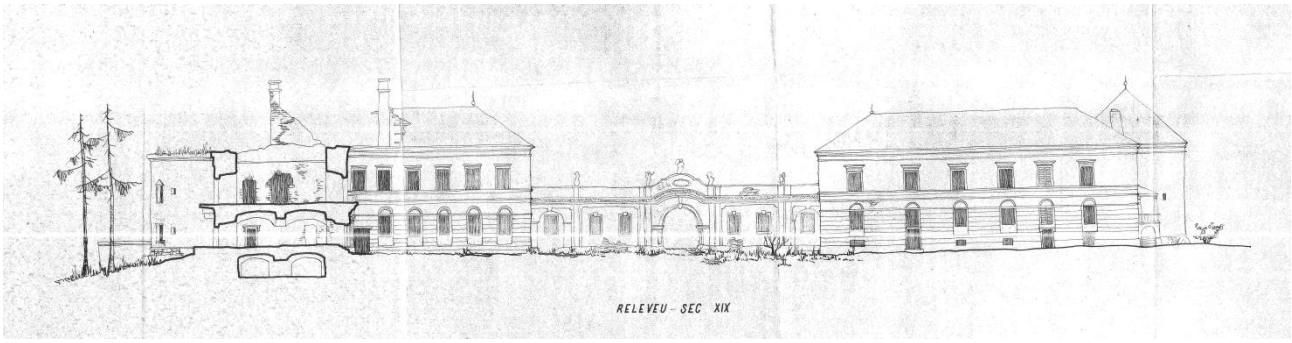
1. Survey and plan of the ensemble in 1969, signalling the new owners and beneficiaries (AMTS and CAP)



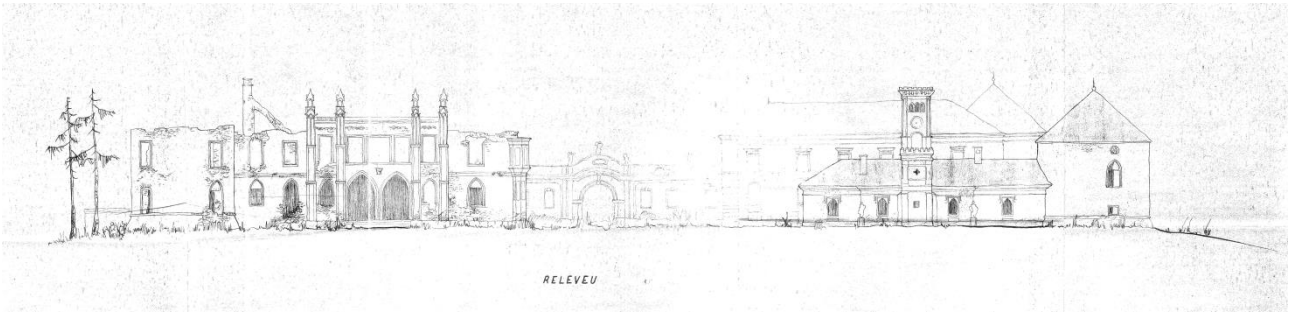
2. Survey of the southern façade of the castle in 1966



3. Survey of the northern façade of the castle in 1966



4. Survey of the courtyard and the western façade of the main gate in 1966



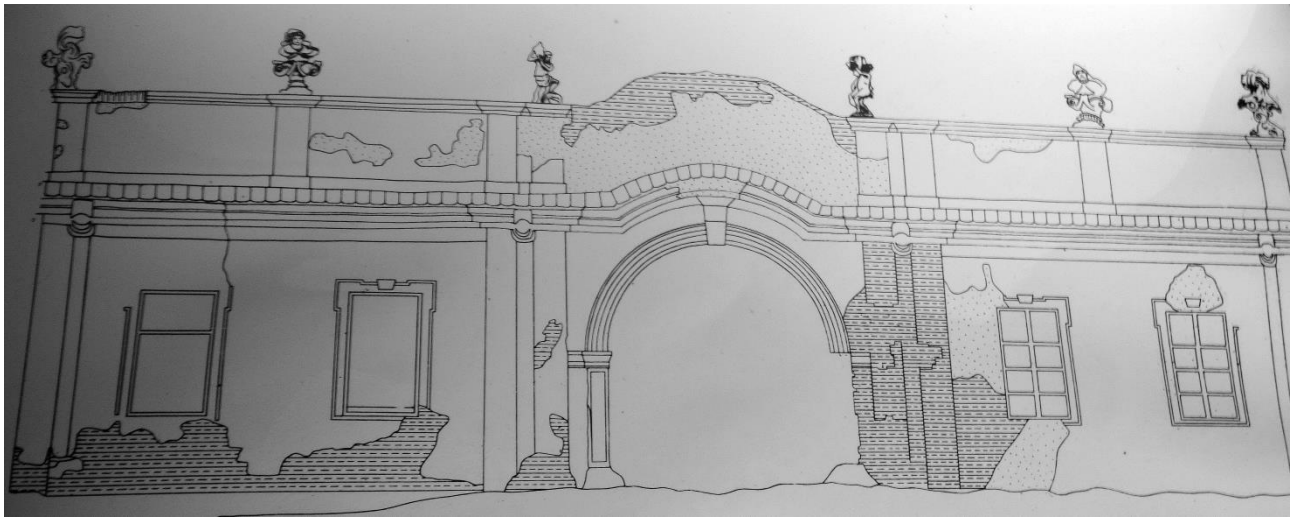
5. Survey of the western neo-Gothic wing and the former kitchen of the castle in 1966

6. Sketch in pencil and aquarelle by architect F. Fischer in 1953, showing the main gate of the castle, and its surrounding ditch

7. Sketch in ink and aquarelle by architect F. Fischer in 1956, showing the partially collapsed former riding school

8. The main wing of the castle and its courtyard in 1964

9. The façade of the stables in 1964



10. The façade of the riding school before collapse

11. Screen capture from *The Forest of the Hanged*, 1963, showing leading actor Victor Rebengiuc against the southern façade of the castle's main wing and its courtyard

12. Screen capture from *The Forest of the Hanged*, 1963, showing director and actor Liviu Ciulei against the southern façade of the castle's main wing

13. The northern façade of the main wing in 1964

14. The castle's mill in 1977

15. Screen capture from *"Radio Romania" Keeps Broadcasting*, 1985, showing the southern façade of the main wing and its courtyard

16. Screen capture from *"Radio Romania" Keeps Broadcasting*, 1985, showing the bullets being fired at the walls and machine guns mounted on the window stone frames

REMARKS ON AN INDIAN SABRE FROM A PRIVATE COLLECTION IN ȘELIMBĂR, OCCASIONED BY ITS CONSERVATION

Dorin BARBU*
Ioan BRAI**
Alexandru Gh. SONOC***

Abstract: *The blade of the pulwar (which may be dated in late 18th-early 19th c.) does not come from Afghanistan, but most likely from Hyderabad, if considering the chintamani craftsman mark on it, as on an 18th c. talwar of a Nizam of Hyderabad. During the 18th c., a production of pulwar hilts is documented both in Hyderabad and in Delhi. The pulwar hilt's missing quillon arm was replaced by a similar one, copied after its still existing counterpart.*

Keywords*: Indian sabre, pulwar, craftsman marks, chintamani, reconstruction, metal conservation*

Rezumat**:** *Lama pulwar-ului (care poate fi datat la sfârșitul sec. XVIII – începutul sec. XIX) nu provine din Afganistan, ci cel mai probabil din Hyderabad, dacă se ia în considerare marcajul de meșteșugar cu chintamani de pe aceasta, ca pe un talwar din sec. XVIII al unui nizam de Hyderabad. În sec. XVIII o producție de mânere de pulwar este atestată atât la Hyderabad, cât și la Delhi. Brațul dispărut al gărzii pulwar-ului a fost înlocuit cu unul similar, copiat după pandantul său încă existent.*

Cuvinte-cheie: *sabie indiană, pulwar, marcaje de meșteșugar, chintamani, reconstituire, conservarea și restaurarea metalelor*

1. The item's description.

The Oriental sabre published on this occasion (Fig. 1-5) is a *pulwar* from a private collection in Șelimbăr (Sibiu County). It shows traces of functional wear and had even worse specific damages (Fig. 1). It is not richly ornamented and does not imitate spectacular items from famous collections. All these elements indicate that it is not a panoply replica or a simple touristic souvenir of a recent date, intended to be used as house decoration, but a true weapon, of an older age.

The *pulwar* was bought for 750 lei in August 2020 as a *talwar* at a flea market in Cluj-Napoca, from an unknown seller claiming to live in Pitești. It was in bad condition, with an arm of its quillon missing (Fig. 1). In restored condition (Fig. 2), it has a total length of 84cm and weighs 1061g. Excepting the specific *pulwar* quillon, the hilt with a disk-shaped pommel recalls typical 18th c. *talwar* hilts of "Indo-Muslim" type (Fig. 4). The ends of the 9.65 cm long quillon arms are shaped as two strongly stylized lotus flowers, but the ends of its c. 8 cm long langets are leaf-shaped. The grip is thicker in its part which is closer to the pommel. The disk-shaped pommel (with a diameter of 58.19mm) is almost flat or better said slightly concave (in the point's direction), with a low dome. Between the dome and the disk there is a washer, shaped as a flower with 13 petals of unequal width. The spike (or skull crusher) is c. 35mm long (Fig. 3). The blade (with a visible length of 70cm and a maximal width of 3.52cm at the upper end of a 7.5cm long visible ricasso) is flat, with a maximal thickness of 5.74mm and is fixed in the iron casted hilt by the means of a rivet whose both ends recall the shape of a flower. The depth of the blade's curvature is 6cm. The blade does not have any fuller. It is very well preserved and still acceptably sharpened, excepting the 3.14cm width elman, which is less sharpened. Due to its symmetrical edge, the blade's cross-section is pentagonal. On the right side of the blade (if held as in using position) there are two marks: one consisting of three dots (*chin-*

* Brukenthal National Museum / Muzeul Naţional Brukenthal, barbu_dorin_laboratory@yahoo.com
**Brukenthal National Museum / Muzeul Naţional Brukenthal, john30x@yahoo.com
***Brukenthal National Museum / Muzeul Naţional Brukenthal, sandysonoc@yahoo.com

tamani), on the lower part of the forte side, at 3cm from the end of the ricasso (Fig. 4), and of another dot, at 3.5cm from the end of the elman (Fig. 5). The spine of the blade is plane and without any smith mark or decor.

This *pulwar*'s length seems even to be quite common among sabres of the same type, as a 19th c. Afghan *pulwar* (Fig. 11) from the collection of the Peter the Great Anthropology and Ethnography Museum in Saint Petersburg (inv. nr. 6488-42 a, б), collected from the Kafirs (an Indo-Iranian people of animist faith influenced by Hinduism from Afghanistan's Nuristan province, forcibly converted to Islam in 1895), has a total length of 85 cm and the width of its blade is 2.8cm (Malozetova 2015, 500-501, cat. nr. 44, fig. 44), thus only 5 mm wider. A 19th c. Afghan *pulwar* from the same museum (inv. nr. 3502-56 a, б) is even larger, its length being 106 cm and the width of its blade is 3cm (Malozetova 2015, 498-500, cat. nr. 43, fig. 43). However, an 18th c. *pulwar* described as *talwar* from a private collection, coming from northern or central India (Karlova *et al.* 2015, 222, cat. nr. 137) has a total length of 97cm and its blade is 3.3cm width. The weight of the *pulwar* published on this occasion seems also to be quite common among sabres of this type and corresponds to that of the heaviest talwars of its age, but of course it is lower than that of the heaviest *tegas*. Its length does not exceed too much the lengths of a *tega* and of a *talwar* with *shamshir* blade from the same private collection (Fig. 6), which both belongs to the shorter class of their category.

2. The *pulwar*. General historical remarks.

Since late 19th c., the *pulwar* (sometimes spelled *pulowar* or *pulouar*) is often described as an Indian sword, actually as a variety of *talwar* (Egerton 1896, 51, pl. III/7; Stone, La Rocca 1999, 517, fig. 661), but more recently also as an Afghan *talwar*, due mainly to the belief that, as the popularity of the *talwar* grew and spread farther and farther, inclusively to the north, its look was slightly modified by the Afghans (see Map 1), who continuously fought against the Rajputs, but often without success (Whithers 2012, 93). Its hilt made of steel is topped by a pommel similar to that mounted on a *talwar*, but whose edges are so strongly protruded upward that they form a kind of hemispherical cup (Kwaśniewicz 2012, 155; cf. Nosov 2011, 189), which may show a short and straight spike. Like a *talwar*, the *pulwar* has long langets and a barrel shaped grip (Nosov 2011, 189), but its shorter quillon is curved towards the blade (Stone, La Rocca 1999, 517, fig. 661; Nosov 2011, 189; Kwaśniewicz 2012, 155) and its ends may be shaped as dragon's heads, flower buds etc. (Nosov 2011, 189). W. Egerton mentioned 2 pulwars from the Russian Imperial collection in Tsarskoe Selo, both 2 ft 4 ½ in (i. e. 72.39 cm) long and coming from Alwar in Rajputana, stating about one of them (which was believed to have been used *"probably only by rajahs and chiefs"*) that its quillons have endings in the shape of dragon heads and about the second that its blade is serrated and bears an inscription (Egerton 1896, 109, cat. nr. 392).

On the *pulwar*'s origin there are divergent opinions (Nosov 2011, 189): Robert Elgood considers that the hilt was developed in Deccan, but the quillon is inspired by mid-16th c. Persian sabres and that the pommel comes from southern India (Elgood 2004, 258-259), but other researchers claim for this sabre an Arabic (Jaiwant Paul 2005, 46) or Afghan origin (Richardson 2007, 10). It should be noted however that on Ottoman weapons and on the European weapons inspired by them, quillons curved towards the blade's point are considered (Żygulski, Jr. 1979) as an undoubted element of "Indo-Persian" influence, but without to refer specifically to the pulwars, and also without to quote any example of authentic Indian weapons dated earlier than the Persian, Ottoman and European weapons showing such an element. Without to forget that occasionally some Oriental sabres on which they are occurring were and continue to be described as talwars instead of pulwars and due to the fact that apparently all pulwars are considerably later than the Persian, Ottoman and European weapons with such quillons, the opinion that the quillons turned towards the blade's point may have been loaned by the Ottomans from Persia or from India needs stronger arguments.

In fact, the quillons curved to the point of the blade, as they are occurring on *pulwar* hilts, may have a distant Mongolic origin, as they are documented already during the 13th-14th c. on Mongolic sabres from the Kuban region (Gorelik 2002, 64, fig. 7-8), in the Ukraine or in the Kuban region (Gorelik 2002, 64, fig. 10) and in the southern Ural region (Gorelik 2002, 64, 11), 16-17), as well as on a Mongolic dagger or war knife found in the former territory of the Volga Bulgars (Gorelik 2002, 65, fig. 3), but also on Mongolic sabres of the same age, depicted in illuminations by painters from Tabriz (Gorelik 2002, 64, 16-17). Following Syed Zafar Haider (Haider 1991) and completing the latter's evolutionary scheme, Konstantin Nosov believes that on sabres and swords such quillons

appeared already earlier, during 1000-1270 (Nosov 2011, 182). Considering the spread of the weapons with quillons curved towards the blade's point, as well as their depiction by painters from Tabriz (in the Iranian province of Eastern Azerbaijan), quillons of this type may have come both to Anatolia and Persia during the 13th-14th c., although in these two regions they are frequently documented much later. Such curved quillons are known also in the Timurid Empire, as would indicate a 15th c. sabre from Iran or Central Asia in the armoury of the Topkapı Sarayı Müzesi in Istanbul, whose jade quillon ends are shaped as dragon heads (Lentz, Lowry 1989, 222, cat. nr. 121).

On Ottoman sabres such quillons (even showing endings shaped as heads of predatory mammals) are known in late 15th-early 16th c., as evidenced by a sabre from the State Hermitage in St. Petersburg, which has a casted hollow hilt, as fashionable (according to Vsevolod Obraztsov) in late 15th c. even in Egypt and in Eastern Europe (Obraztsov 2014, 68-69). The shape of this sabre's blade is similar rather to that of the early medieval Turkic sabres (or of a less curved *kılıç* with a narrower elman) than to that of a *shamshir*. Casted hilts are not specific to the Persian shamshirs, but rather to various sabres and swords from India, Afghanistan and Nepal, as the *talwar*, the *khanda*, the *firangi*, the *nagan*, the *sosun pattah* and even the hunting *shamshir* (produced mostly in Rajasthan), respectively the *pulwar* and the curious S-shape bladed *khora* sabre from Nepal, to which may be added as well a dagger concealed in the hilt of a mace from Delhi (Egerton 1896, 108, fig. 25), but in these regions such quillons occur apparently even later than in the Timurid Empire, Anatolia and Persia, maybe even later than in Central Europe and in the Balkans. Some of such Indian weapons are surely later (or even much later) than the mentioned Ottoman sabre from St. Petersburg and unlike it, the most of them have another important specific feature, namely the disc-shaped pommel of the so-called "Indo-Muslim" hilt. On Ottoman swords quillons curved towards the blade's point may occur sometimes even in 16th c. (thus almost at the same time as on Ottoman sabres), as evidenced by an item kept at the State Hermitage Museum in St. Petersburg (Obraztsov 2014, 70-71). Generally, on Ottoman weapons these quillons are more frequent especially during the 17th c., both on broadswords (Yurginov 2010, 181, fig. 322) and on sabres, both on *kılıç* and on *gaddare* (Yurginov 2010, 181, fig. 323). The *gaddare* with quillon ends recalling stylized ram horns from Peter the Great's collection in the Kremlin Armoury in Moscow (Tikhomirova 1995, cat. nr. 32) is dated by the *tughra* of Sultan Ahmet I (1603-1617). An Albanian sabre from Musée de l'Artillerie in Paris, whose blade is of a particular shape (wide and without elman), has a hilt pommel shaped as an eagle head and quillon curved towards the blade's point (Demmin 1869, 412, cat. nr. 83, fig. 83), but is actually a Balkan variant of the Ottoman *kılıç* which may be dated (most likely) in the 17th c.

Made of metal, quillions of this kind are well documented on Persian sabres in the first half of the 17th c. (Kwaśniewicz 2012, 185) and continue to be typical for the following decades of the 17th c. (Mechi i sabli 2018, 194), but in 18th c. they are fitted also on Persian swords (Yurginov 2010, fig. 324). They occur indeed on typical weapons from India and Afghanistan, but later than in Anatolia and Persia. Apparently, in India they are mentioned on hunting shamshirs made in Rajasthan, dated from late 18th c. till mid-19th c. (Mechi i sabli 2018, 193), but also (with ends shaped as tulips) on an 18th c. *pulwar* described as *talwar* (Fig. 10) coming from northern or central India (Karlova *et al.* 2015, 222, cat. nr. 137).

On sabres and swords quillons of this type may be connected not only with the fashion, but even with imported Persian blades (sometimes even older ones), which were mounted in regional specific hilts, and not only by Ottoman workshops. Thus, in 16th c. Transylvania, for the sabre of Miklós Zrínyi (nowadays, kept at the Magyar Nemzeti Múzeum in Budapest) a Persian blade was fitted into a new and richly decorated sabre hilt with such a quillon, whose ends were shaped as real or mythic predatory mammal heads (Temesváry 1982, 47, pl. III). On European blades, plane quillons curved towards the point are known on Venetian swords in late 16th c. (Hradský, Habáň 2001, 33), but in other territories of northern Italy or in Germany already in early 16th c. (Hradský, Habáň 2001, 37). In the second half of the 16th c. and in early 17th c. on German swords with European blades occur elaborated forms of quillons, which are developed from the simplest Oriental model of quillons curved towards the blade's point (Hradský, Habáň 2001, 36-39). In 17th c. the Polish-Lithuanian aristocracy appreciated 15th-16th c. Persian blades, mounted in Ottoman hilts with quillons suiting the "Indian taste", as evidenced by an Ottoman sabre from King Jan III Sobiesky's booty from the besiegers of Vienna, now kept at the Wawel Castle in Cracow (Żygulski, Jr. 1979, 222, fig. 225). A particular variety of sabre, known there as (*karabela*) *indyczka*, i. e. "Indian (sabre)", which (according

to Zdzisław Żygulski, Jr.) was either imported from India or produced in Poland, shows a quillon curved in this way, but with floral endings (Żygulski, Jr. 1979, 218, fig. 222). A Russian sabre of Turkish type, called *klych* (i. e. клычи), showing a similarly curved quillion, shaped as tendrils or strongly stylized dragon heads, which is currently kept now at the State History Museum in Moscow, is dated in the first quarter of the 17th c. and was made in the Kremlin Armoury workshops in Moscow (Astvatsaturyan *et al.* 1993, 89, cat. nr. 1, pl. 13). Undoubtedly inspired by an Ottoman *kılıç* (hence also its name), it may be connected with the same taste for Persian and Persianate Indian luxury items which haunted at that time in the Ottoman Empire and in Poland, both because of these quillons and of its very wide blade with elman, which recalls a *tega*. In 18th c. India *pulwar* quillons were produced both in Hyderabad and Delhi (Karlova *et al*. 2015, 222), obviously under Persian influence. *Pulwar* quillons with endings shaped as stylised heads or flowers are documented especially on 19th c. items (Yurginov 2010, fig. 326), mainly in Afghanistan, not only on pulwars (Fig. 7-9 and 11-16), but also on sabres (Malozetova 2015, 490-495, cat. nr. 39-40, fig. 39-40. On 19th c. – early 20th c. Afghan pulwars and other swords and sabres: Miloserdov 2019).

Considering the facts presented above on the origin of quillons curved towards the blade's point and on the date of Ottoman, Persian, Indian and Afghan weapons and hilts with such quillons, their presence on European sword and sabres should no more be considered as reflecting an "Indo-Persian" influence, but rather an Ottoman-Persian or simply (but less precisely) an Oriental influence.

3. Remarks on the *chintamani* motive used as blade mark.

The mark with three dots (*chintamani*) on the blade of the *pulwar* (Fig. 4) is obviously a craftsman mark, but it may have also a magical, protective meaning, as on Ottoman carpets (Paquin 1992, 109-110; cf. Kadoi 2007, 44). This meaning is connected rather with an Inner Asian (particularly, Turko-Mongolic and Iranian) cosmology and an animal symbolism (Kadoi 2007, 40 and 42), namely with the spots on the leopard fur (Rageth 2016, 87) and thus with a social imagery in which this animal's pelt is a symbol of power (Ionescu 2006, 54; cf. Rageth 2016, 87), than with the Hindu and Buddhist miraculous stone or jewel to which is attributed the power to accomplish every wish of its possessor, wherefrom early 20th c. art historians borrowed this motive's name (Kadoi 2007, 35). Although rarely at that time, this name was used especially by the researchers of Ottoman carpets from Anatolia: Wilhelm von Bode, who knew this term, referred to this motive as "Buddhist globes" (Bode 1902, 49 and 132-133; Bode 1922, 24), "overlapping globes" or "threefold globes" (Bode 1922, 60) and Károly Csány as "spheres" and "leopard spots" (Pásztor 2020, 78). However, even to later researchers the carpets adorned with this motive are known also as rugs "with dots", "with balls", "with leopard pelt" or "with cat paws" (Ziegler, Ziegler 2020, 28). As resulting from an Ottoman register of maximal prices dated 1640, the Anatolian white ground carpet with niche and *chintamani* motives was called *Selendi'nin peleng nakışlı seccadesi*, i. e. "the prayer rug of Selendi with the leopard motive" (Kütükoğlu 1983, 178; cf. Boz 2016, 176). The Ottomans called this motive not only *pelengi*, but also *shah-i benek* (Kadoi 2007, 35, n. 11), which means they associated it not only with the leopard pelt, but also with kingship. For this reason it was even recommended to the Turkish researchers to use for this pattern its Ottoman name and not *chintamani*, as the latter is connected with Buddhism (Kütükoğlu 1983, 72; Balpınar, Hirsch 1988, 95) and misleading, as it does not look like the Buddhist one (Kadoi 2007, 43). Recently, Yuka Kadoi emphasized that "the terminological adherence of *çintamani* decoration in Islamic art to Buddhism precludes any further discussion on its formative process", although "there are in fact little, if any, clues to trace exactly how the Buddhist jewels directly affected the formation of the triple-ball pattern in Islamic art" (Kadoi 2007, 35).

The Buddhist variant of the *chintamani* motive with a different shape (in a flaming frame, recalling the Chinese models) occurs in Persia only during the Ilkhanid dynasty, when the first rulers favoured the reintroduction of Buddhism (Kadoi 2007, 37). But between this period and the recognition of the *chintamani* motive in the Islamic art there is a significant gap and also iconographic discrepancies among the different stages of its occurrence, which hinder the verification of this motive's supposed Buddhist origin (Kadoi 2007, 35). As a symbol of power, the *chintamani* motive consisting of three dots in a triangular display occurs on Timurid coins and in Timurid miniatures, but entered even in the conscience of European travellers and cartographers (Kadoi 2007; Kadoi 2010): in the Catalan Atlas (1375), which is considered as the zenith of the European medieval cartography (Drees 2001, 119-120; Roth 1940, 69-

72) and is attributed to Cresques Abraham, a Jew from Mallorca (Porcel 2002, 24), the flag of the Timurid Empire is depicted showing three red dots on a black ground (Fig. 19). In a hunting scene (fol. 16v.) in one of the earliest copies (made in Shiraz in 1436, most likely as a commission of Ibrahim Sultan) of Sharaf ad-Din Ali Yazdi's eulogistic text *Zafarnama* ("The Book of Victory") composed in 1424 and kept at the Arthur M. Sackler Gallery of the Smithsonian Institution in Washington, Timur Lenk is rendered under a parasol (a traditional Persian symbol of kingship, suggesting the possession of *farr-i izadi*, "the divine glory"), which is adorned with a repeated golden *chintamani* pattern (Fig. 19), intended maybe to enhance his glory as a cosmic ruler, as the parasol is a symbolic substitute of the sky (Kadoi 2010, 153, fig. 9 a-b). However, in the scene depicting the conquest of Baghdad on a folio from a dispersed *Zafarnama* by the same author, copied in Shiraz in 1435-1436 from the Metropolitan Museum of Art in New York (inv. nr. 55.121.17), the pattern on the parasol looks very different: chevrons displayed to build a Maltese cross. Ruy González de Clavijo, a Castilian ambassador who visited Timur Lenk's court in 1404, mentioned that the ruler's emblem, consisting of "three circlets which, as said, are like the letter O thrice repeated to form a triangle", which symbolizes that he is the lord of the "all three parts of the world", is also the imprint of his seal and that he ordered to put this sign on all buildings he has erected and on the coins he has struck, as well as on all coins issued by the tributary princes (Kadoi 2010, 149; cf. Clavijo 1782, 143). During the conquest of Samarkand (according to a popular tradition) Timur Lenk dipped three fingers in the blood of an enemy and pressed them on the door of the mosque to indicate the capture (Train 1997, 85), but there are few evidences on architectural remains, on arms and armours and on other objects for the use of this symbol as Timur Lenk's *tamgha*, i. e. emblem or better said property marking (Kadoi 2007, 39-40), although most likely right like as a symbol of the Timurid military and political power, the *chintamani* motive spread therefore also to Anatolia, where during the Ottoman Civil War (1402-1413), following Sultan Bayezid I's defeat and capture in the battle of Ankara by Timur Lenk (July 20, 1402), it may have been appropriated by the Ottoman princes who undoubtedly were for a while his vassals (On Timur Lenk's policy towards the Ottoman princes: Kastritsis 2007, 44-50 and 198-199). Musa Çelebi, who was even Timur Lenk's captive, issued later (in 1410 CE/813 AH) in Edirne an *akçe* (Fig. 21) bearing only his name as *Musa b. Bayezid*, without any title (Kastritsis 2007, 198), on which three dots displayed in the shape of a triangle are discretely depicted, hidden in the obverse's inscription with the issuer's name. This variant of the *chintamani* motive became a favourite design in Ottoman textiles possibly as early as the late 15th c. but most probably during the 16th c. (Kadoi 2007, 41). It continued to be used by the sultans as a symbol related to their absolute power, nothing recalling now the short period when it indicated that the Ottoman princes were actually vassals of the Timurids, although sometimes it continued to be depicted almost identically as on Timur Lenk's coins (Fig. 20) issued in Samarkand in 1383 CE/785 AH (Kadoi 2010, fig. 5). Thus, in mid-16th c. it occurs on the backrest of an inlaid wooden campaign throne (Fig. 22) in the Topkapı Sarayı Müzesi in Istanbul (inv. nr. 2/2879), which was made for the Ottoman sultan Süleyman I (Atıl 1987, 167-168, fig. 107). It is not similar to the Ilkhanid ones and does not occur on the backrest's top, as in the Ilkhanid paintings is depicted the Buddhist variant of the *chintamani* motive, which is actually used as a simple pictorial device and not the Timurid motive consisting of three dots displayed as a triangle, which is associated with indigenous Inner Asian cosmology and animal symbolism (Kadoi 2007, 40 and 42). In late 16th c., in an anonymous miniature dated c. 1600, Sultan Mehmet III (1595-1603) is portrayed (Fig. 23) sitting on his throne, against a wall decorated with a pattern (Binney 1973, 64-65, cat. nr. 19), even more similar to that on the Samarkand coins mentioned above. Bursa, a former Ottoman capital located at one of the Mediterranean ends of the Silk Road, had an important role in the Irano-Anatolian silk trade and due to the Ottoman guilds system had a major role in the assimilation and spread of this motive in the ornamentation of various Ottoman applied arts items (Kadoi 2007, 40-43).

These historical realities do not support the opinion of Y. Kadoi, who considers that the motive consisting of three dots displayed as a triangle may have appeared independently in the Ottoman and in the Timurid ornamentation (Kadoi 2007, 42), although she accepts that the similarity between the two patterns "has something to do with Turco-Iranian decorative circumstances generated by the interaction between the Timurid and Ottoman states, along with the rise of tribal federations of Turcoman origin in eastern Anatolia, Caucasus, northern Iran and northern Iraq during the 14th and 15th c." (Kadoi 2007, 42-43). As Y. Kadoi pointed

(Kadoi 2007, 34), "this engaging motif still awaits further art-historical investigations, not only as reflection of pattern-conscious Ottoman culture but also as a masterful rework of Inner Eurasian elements into a new motif suitable for indigenous cultural requirements in the art of pre-modern Middle East". The use of the Timurid variant of the *chintamani* motive as a symbol of the sovereign's power would suggest that Timur Lenk's great-great grandson, the former Emir of Ferghana and following of Samarkand and of Kabul and later first Mughal Emperor (*Badshah*) Zahir ud-Din Muhammad, known as *Babur* (i. e. "Tiger") may have brought this symbol to India, where it spread till late 17th c. with the conquests of his successors.

However, items adorned with the *chintamani* motive's variant of Timurid origin consisting only of three dots in a triangular arrangement occur less frequently in India than on Ottoman textiles, on quite few items which were made if not only for princely users, at least for aristocratic ones. Thus, this motive is depicted twice in a miniature by Shiva Das in a copy of Auhaduddin Anvari's *Divan* made in 1588 in Lahore for Emperor Akbar the Great (now at the Fogg Art Museum of the Harvard University in Cambridge, Massachusetts), which illustrates actually the beginning of a homoerotic poem dedicated to Khwaja Ziyauddin Maudud Ahmad-i Isami, a high-ranking official from Herat: on the lover's gown and on the beloved's bed sheet (Schimmel, Welch 1983, 74-75, pl. I). It occurs as well on the red trousers of Rostam (who wears over his helmet the scalp of a leopard) on a page showing his 7th labour (the slaying of the White Div) on a page from a dispersed sub-imperial Mughal *Shahnama* dated 1608 in the Los Angeles County Museum of Art (inv. nr. M.71.49.3). In an illustration dated c. 1700-1710 from a dispersed "Shangri" *Ramayana* series (style IV) by a Pahari artist probably from Bilaspur which shows Sita asking Rama to fetch the golden deer for her, the same variant of the *chintamani* motive adorns Sita's purple *sari* (Losty 2016, 70-73, cat. nr. 27). A pink bolster adorned with this motive, belonging to a young prince (personifying Raga Madhava, the sentiment of sweetness, "as in bees drawn to a lotus" and the corresponding musical mode, associated with a springtime melody), is depicted on a page from a dispersed *Rāgamālā* from the collection of the Museum Rietberg in Zürich (inv. nr. RVI 1226), painted by the Second Bahu Master at c. 1720 (Guy, Britschgi 2011, 121, cat. nr. 62).

Right this motive occurs as well on the same part of the sabre's blade (namely on the end of the ricasso) on an 18th c. *talwar* in southern India, belonging to a Nizam of Hyderabad (McNab 2010, 291), i. e. a Muslim prince. A similar pattern is known on the lower part of the blade of a *talwar* from a private collection, dated in late 18th to 19th c., but believed to come from northern India (Fig. 14), whose hilt is decorated with *koftgari* and *zarnishan* and with cabochon turqoises in silver bezels (Karlova *et al.* 2015, 224, cat. nr. 139). It should be noted that although *pulwar* hilts are generally associated with Afghanistan, in 18th c. they were produced (as mentioned above) also in Hyderabad and Delhi (Karlova *et al*. 2015, 222). However, unlike the Indian sabres bearing the *chintamani* mark whose hilts were made most likely in Hyderabad, the above mentioned 18th c. *pulwar* (described however as *talwar*) made in northern or central India (Fig. 10) shows two different marks, one illegible and one with Arabic letterings (Karlova *et al*. 2015, 222, cat. nr. 137). Thus, its hilt of a superior artistic quality, with quillon ends shaped as tulips, may have been produced in Delhi and served as model to 19th c. Afghan pulwars (Fig. 9 and 11), among which should be particularly noted that (Fig. 11) in the Peter the Great Anthropology and Ethnography Museum in Saint Petersburg (inv. nr. 3502-56 а, б), whose blade does not bear any craftsman mark, but is decorated by engraving (Malozetova 2015, 498-500, cat. nr. 43, fig. 43). Unlike the previously mentioned items (inclusively the *pulwar* published on this occasion) whose blades bear the *chintamani* craftsman mark, on a 19th c. *pulwar* with *shamshir* blade sold by the auctioneer Ashoka Arts (reference nr. 1024) the *chintamani* motif is on a different point of the blade: right where the end of a discontinuous fuller reaches the elman.

Both on the aforementioned sabre of a Nizam of Hyderbad and on the 19th c. Afghan pulwars from the Peter the Great Anthropology and Ethnography Museum in Saint Petersburg (Malozetova 2015, 498-501, cat. nr. 43-44, fig. 43-44), the flower-shaped rivet heads used to fix the blade into the hilt, as well as the ends of the quillon, which are shaped as stylized flowers and not as stylized heads of the Indian sea monster *makara*, as E. I. Malozetova claims (Malozetova 2015, 499-501), but also on other pulwars (Fig. 7-8, 11), are similar to those of the *pulwar* published on this occasion (Fig. 4). The latter does not have the bowl-shaped pommel, which is typical for 19th c. Afghan pulwars (Malozetova 2015, 500-501, cat. nr. 44, fig. 44). The pommels of the 19th c. Afghan pulwars

(Fig. 7-9 and 11), inclusively those from the above mentioned museum in Saint Petersburg, are recalling actually the pommels of much earlier *talwar* hilts (Fig. 13), from the 16th-17th c. (Elgood 2011, 226-227, fig. 9), as the newer would have been inspired by the older ones. These early *talwar* hilts were depicted already by pre-Mughal Indian book painters, as in an early 16th c. miniature depicting the lamentation of Laurik, the hero of the *Chandayana* (a love story by the famous 14th c. Sufi poet Mulla Daud) from a series coming from the Sultanate of Delhi, kept in the Prince of Wales Museum (nowadays the Chhatrapati Shivaji Maharaj Vastu Sangrahalaya) in Bombay/Mumbai (gouache on paper, 21 x 15 cm, inv. nr. 57.1/62) (Goswamy 1986, 124-125, cat. nr. 86). They may be seen as well in Mughal illuminations, as in a hunting scene attributed to Miskin (Fig. 15), illustrating the fable *The Fox's Fear* in a copy of Auhaduddin Anvari's *Divan* made in 1588 in Lahore for Emperor Akbar the Great (now at the Fogg Art Museum of the Harvard University in Cambridge, Massachusetts) (Schimmel, Welch 1983, 119-122, pl. 13).

A page from a dispersed Mughal *Hamzanama* (i.e. "The Story of Hamza", respectively of Hamza ibn Abdul-Muttalib, a foster brother, companion and paternal uncle of the Islam's Prophet Muhammad) dated c. 1570 from the Metropolitan Museum of Art in New York (inv. nr. 24.48.1), which renders Mesbah the Grocer with the spy Parran (Kossak 1997, 32-33, cat. nr. 7), shows that in late 16th c. in India there was already a large variety of sword and sabre hilts (Fig. 16).

Unlike to the 19th c. Afghan pulwars (Fig. 7-9 and 11), the pommel of the Indian *pulwar* published now (Fig. 4) is obviously inspired by the disc-shaped pommels of the "Indo-Muslim" *talwar* hilts, which occurs as well on 19th c. Afghan talwars, like that (Fig. 12) in the Peter the Great Anthropology and Ethnography Museum in Saint Petersburg (Malozetova 2015, 497-498, cat. nr. 42, fig. 42), whose quillions does not recall those of late 18th c. – early 19th c. Indian talwars with "Indo-Muslim" hilts, as would be expected, but right those of the 16th c. – early 17th c. Indian talwars (Fig. 13).

This would suggest that the *pulwar* restored in the Laboratory of the Brukenthal National Museum (Fig. 2) is earlier then the most Afghan pulwars and resulted by fitting a late 18th c. – early 19th c. Indian *talwar* blade, produced most likely in Hyderabad, by the same workshop who made the *talwar* of the Nizam of Hyderabad in an 18th c. *pulwar* hilt, which was produced most likely in Hyderabad as well. Besides the typical *pulwar* quillion, this sabre's hilt shows elements from various variants of the so-called "Indo-Muslim" hilt type: the dome recalls the *Delhishahi* hilt, the spike the *Shahjahani* hilt and the langets the *Purbi* (i. e. "eastern") hilt (Nosov 2011, 187-189). A good analogy (although excepting especially the lake of a spike and the wider blade recalling rather a *tega* with *pulwar* hilt) is a sabre from Muzeum Wojsko Polskiego in Warsaw, which is dated in 17th-18th c. (Żygulski jun. 1986, fig. 115), but erroneously considered to be a *talwar*. By comparison with other pulwars, due to the shape of its pommel and to its longer spike, as well as considering the look of its blade, the recently restored *pulwar* may be dated in late 18th c. – early 19th c., because 17th-18th c. pulwars (Fig. 7 and 10) are more strongly curved than 19th c. ones (Fig. 8, 9, 11), which are more frequent on the antiques market. Although this sabre is less curved than 17th-18th c. pulwars, due to its flat disk it seems closer to an 18th c. *pulwar* on sell by Worth Point, as the pommel of the latter is not a bowl, but a slightly concave disk.

In Afghanistan, as evidenced by late 19th c. photographs, pulwars were used by the native police organized by the British army (respectively, by the Kabul Field Force commanded by Frederick Sleigh Roberts) during the Second Afghan War (Fig. 17), but also by traditional native warriors, even almost two decades after the British conquest (Fig. 18). Apparently, if considering especially the photograph rendering the native policemen, sabres (pulwars and shamshirs) were worn mostly by the commanders (and very likely by wealthy people in general), maybe because traditionally, as in India too, firearms were considered (despite their important role) to be proper for low-class people, due to the fact that they make the face, hands and cloths filthy (Elgood 2011, 232). Being a part of the native traditional male costume and most likely also a sign of authority, the pulwars were proudly displayed even later by conservative community leaders, in various traditional ceremonies and in law enforcement, but also in acts of vigilantism and of personal revenge.

4. Conservation status

After their arrival at the laboratory, it was discovered that not only the *pulwar*, but also the other two sabres (the *talwar* and the *tega*) from the same collection were covered in a continuous and uneven layer of mechanical and corrosion products characteristic for iron, on both the blades and the

handles. A slight deterioration is visible on all three blades, as a result of repeated handling. One of the sabres, namely the *pulwar*, has a piece missing from the guard. The objects present no signs of previous restoration work (Fig. 1).

5. Performed restoration operations

The sabres were dusted with a fiberglass brush, and degreased with acetone. The blades were mechanically cleaned with a rotating brush. The handles were sandblasted with glass beads (200-300µm), and then polished on a rotating brush, to bring back its metallic shine. The handles were cold blued, with cold blue solution from Ballistol. The *pulwar*'s missing quillon arm was forged out of mild steel (unhardened), using its still existing pendant as a reference, then filed down into shape and welded to the handle using a brass alloy (the same method originally used). The welded area was sanded down using sandpaper of various grit sizes. The guard and handle were then cold blued. Finally, the sabres were coated in a protective layer of Ballistol oil (Fig. 6).

6. Conclusion

The late 18th c. – early 19th c. *pulwar* published on this occasion is neither richly adorned, nor made of Damascus steel. However, it may be considered as a surprise, because it is not of Afghan, but of Indian provenance: it comes most likely from the same workshop (most likely from Hyderabad and not from Delhi) which worked also for the Nizam, as would suggest the *chintamani* pattern on its blade. Indian pulwars are less frequent than the 19th c. Afghan ones. This sabre, which survived the destruction of the mass of weapons stored in Indian armouries and sold as scrap metal after the Indian Revolt of 1857, illustrates a late period in the development of the Indian swords and sabres with "Indo-Muslim" hilt. Being collected with the intention to be donated or bequeathed to a museum collection, its conservation and study was worth.

REFERENCES

Alekseev 2014	Alekseev Dmitry, *Энциклопедия оружия*, Moskva (2014).
Astvatsaturyan *et al.* 1993	Astvatsaturyan E. G., Monakhov S., Shokarev Yu., *Ancient weapons from the Collection of the State History Museum, Moscow / Старинное оружие из собрания Государственного Исторического музея*, Moscow (1993).
Atıl 1987	Atıl Esin, *The Age of Sultan Süleyman the Magnificent*, Washington – New York (1987).
Balpınar, Hirsch 1988	Balpınar Belkıs, Hirsch Udo, *Carpets of the Vakıflar Museum Istanbul / Teppiche des Vakıflar- Museums Istanbul*, Wesel (1988).
Binney 1973	Binney Edwin 3rd, *Turkish Miniature Paintings and Manuscripts from the Collection of Edwin Binney, 3rd*, Los Angeles (1973).
Bode 1902	Bode Wilhelm, *Vorderasiatische Knüpfteppiche aus älterer Zeit*, Leipzig (1902).
Bode 1922	Bode Wilhelm, *Antique Rugs from the Near East*, 3rd revised edition, New York (1922).
Boz 2016	Boz Levent, *White ground 'birds' carpets of Selendi and their reflections in European art and lifestyle*. In: *Studia et documenta Turcologica* 3-4, Cluj-Napoca (2016), p. 175-189.
Buttin, Buttin 1933	Buttin Charles, Buttin François, *Catalogue de la collection d'armes anciennes européennes et orientales de Charles Buttin*, Rumilly (1933).
Byam 2011	Byam Michele, *Arms & Armor*, 3rd, revised edition, New York (2011).
Clavijo 1782	Clavijo Ruy González de, *Historia del Gran Tamorlan, e itinerario y enarracion del viaje y relacion de la embajada que Ruy Gonzalez de Clavijole hizo por mandado del muy poderoso Señor Rey Don Henrique el Tercero de Castilla*, 2nd edition, Madrid (1782).
Demmin 1869	Demmin August, *Die Kriegswaffen in ihrer historischen Entwicklung von der Steinzeit bis zur Erfindung des Zündnadelgewehrs*, Leipzig (1869).
Drees 2001	Drees Clayton J., *The Late Medieval Age of Crisis and Renewal, 1300-1500: A Biographical Dictionary*, Westport (2001).
Egerton 1896	Egerton Lord of Tatton, *A Description of Indian and Oriental Armour Illustrated from the Collection Formerly in the India Office Now Exhibited at South Kensington and the Author's private Collection with an Introductory Sketch of the Military History of India*, new edition, London (1896).
Elgood 2004	Elgood Robert, *Hindu Arms and Ritual: Arms and Armour from India, 1400-1865* (Ahmedabad: Mapin Publishing, 2004).
Elgood 2011	Elgood Robert, *Swords in the Deccan in the Sixteenth and Seventeenth Centuries: their manufacture and the influence of European imports*. In: Haidar Navina Najat, Sardar Marika (eds.), *Sultans of the South: Arts of India's Deccan Courts, 1323-1687*, New York (2011), p. 218-233.
Elgood 2016	Elgood Robert, *Arms & Armour at the Jaipur Court: The Royal Collection*, New Delhi (2016).
Goetz 1950	Goetz Hermann, *The Art and Architecture of Bikaner State*, Oxford (1950).

Gorelik 2002 — Gorelik Mikhail Viktorovich, *Армии монголо-татар X-XIV веков. Воинское искусство, оружие, снаряжение*, Moskva (2002).

Goswamy 1986 — Goswamy B. N., *Essence of Indian Art*, San Francisco (1986).

Guy, Britschgi 2011 — Guy John, Britschgi Jorrit, *Wonder of the Age: Master Paintings of India 1100-1900*, New York – Ahmedabad (2011).

Haider 1991 — Haider Syed Zafar, *Islamic Arms and Armour of Muslim India*, Lahore (1991).

Hendley 1892 — Hendley Thomas Holbein, *Damascening on Steel or Iron as Practised in India*, London (1892).

Hradský, Habáň 2001 — Hradský Juraj, Habáň Pavel, *Čaro chladných zbraní*, Bratislava (2001).

Ionescu 2006 — Ionescu Ștefan (ed.), *Osmanische Teppiche in Siebenbürgen*, Berlin (2006).

Jaiwant Paul 2005 — Jaiwant Paul E., *Arms and Armours: Traditional Weapons of India*, New Delhi (2005).

Kadoi 2007 — Kadoi Yuka, *Çintamani. Notes on the Formation of the Turco-Iranian Style.* In: *Persica* 21, Leuven (2007), p. 33-49.

Kadoi 2010 — Kadoi Yuka, *On the Timurid flag*. In: Markus Ritter, Lorenz Korn (red.), *Beiträge zur islamischen Kunst und Archäologie*, 2nd vol., Wiesbden (2010), p. 143-162.

Karlova 2015 — Karlova E. M., *Оружие Индии в собрании Музея Востока / Indian arms in the collection of the Museum of Oriental Arts*. In: Karlova E. M., Pastukhov A. M., Popov A. Yu., Uspenskaya E. N., *Смертельная красота: оружие Индии и Китая. Каталог выставки / Deadly Beauty: Arms and Armour of India and China. Exhibition Catalogue*, Moskva (2015), p. 49-59.

Karlova *et al.* 2015 — Karlova E. M., Pastukhov A. M., Popov A. Yu., Uspenskaya E. N., *Смертельная красота: оружие Индии и Китая. Каталог выставки / Deadly Beauty: Arms and Armour of India and China. Exhibition Catalogue*, Moskva (2015).

Kastritsis 2007 — Kastritsis Dimitris J., *The Sons of Bayezid: Empire Building and Representing in the Ottoman Civil War of 1402-1413*, Leiden – Boston (2007).

Kütükoğlu 1983 — Kütükoğlu Mübahat S., *Osmanlılarda narh müessesesi ve 1640 tarihli narh defteri*, İstanbul (1983).

Kwaśniewicz 2012 — Kvasnevich Vlodzhimezh [Kwaśniewicz Włodzimierz], *Лексикон холодного и метательного оружия*, Sankt-Peterburg (2012).

Lentz, Lowry 1989 — Thomas W. Lentz, Glenn D. Lowry, *Timur and the Princely Vision: Persian Art and Culture in the Fifteenth Century*, Los Angeles – Washington 1989).

Losty 2016 — Losty J. P., *Court Painting from Persia and India (1500-1900)*, London (2016).

Malozetova 2015 — Malozetova E. I., *Холодное оружие народов Ближнего Востока в коллекциях МАЭ*. In: *Сборник Музея антропологии и этнографии* LXI, Sankt-Peterburg (2015), p. 358-537.

McNab 2010 — McNab Chris (ed.), *Knives and Swords: A Visual History*, New York (2010).

Mechi i sabli 2018 — * * *, *Мечи и сабли*, Moskva (2018).

Miloserdov 2019 — Miloserdov D. Yu., *Холодное оружие Афганистана XIX-начала XX века / Edged Weapons of Afghanistan 19th – Early 20th Century*, Sankt-Peterburg (2019).

Nosov 2011	Nosov Konstantin Sergeevich, *Традиционное оружие Индии*, Moskva (2011).
Obraztsov 2014	Obraztsov Vs. N., *Оружие востока в собрании Эрмитажа*, Sankt-Peterburg (2014).
Paquin 1992	Paquin Gerard, *Çintamani*. In: *Hali Magazine* 64, Lodon (1992), pp. 104-144.
Pásztor 2007	Pásztor Emese, *Ottoman Turkish Carpets in the Collection of the Budapest Museum of Applied Arts*, Budapest (2007).
Porcel 2002	Porcel Baltasar, *Los chuetas malorquines. Quince siglos de racismo*, Barcelona (2002).
Rageth 2016	Rageth Jürg, *A Selendi rug. An addition to the cannon of white-ground Çintamani prayer rugs*. In: *Hali Magazine* 98, London (2016), p. 84-108.
Richardson 2007	Richardson Thom, *An Introduction to Indian Arms and Armour*, Leeds (2007).
Roth 1940	Roth Cecil, *The Jewish Contribution to Civilization*, New York (1940).
Schimmel, Welch 1983	Schimmel Annemarie, Welch Stuart Cary, *Anvari's Divan: A Pocket Book for Akbar. A Divan of Auhaduddin Anvari, Copied for the Mughal Emperor Jalaluddin Akbar (r. 1556-1605) at Lahore in A. H. 996 / A. D. 1588. Now in the Fogg Art Museum of Harvard University*, New York (1983).
Stone, La Rocca 1999	Stone George Cameron, La Rocca Donald J., *A Glossary of the Construction, Decoration and Use of Arms and Armor in All Countries and All Times*, Mineola (1999).
Temesváry 1982	Temesváry Ferenc, *Fegyverkincsek, díszfegyverek*, Budapest (1982).
Tikhomirova 1995	Tikhomirova Elena, *Оружие коллекции Петра I*, Moskva (1995).
Tirri 2003	Tirri Anthony C., *Islamic Weapons: Maghrib to Moghul*, Fort Lauderdale (2003).
Train 1997	Train John, *Oriental Rug Symbols: Their Origin and Meaning from the Middle East to China*, London (1997).
Uspenskaya 2015	Uspenskaya E. N., *О воинской культуре Индии / On the military culture in India*. In: Karlova E. M., Pastukhov A. M., Popov A. Yu., Uspenskaya E. N., *Смертельная красота: оружие Индии и Китая. Каталог выставки / Deadly Beauty: Arms and Armour of India and China. Exhibition Catalogue*, Moskva (2015), p. 9-47.
Welch 1985	Welch Stuart Cary, *India: Art and Culture, 1300-1900* (New York: The Metropolitan Museum of Art – Rolt, Rinehart and Winston, 1985).
Whithers 2012	Uizers Kharvi Dj. S. [Whithers Harvey J. S.], *Мечи и сабли. Иллюстрированная энциклопедия*, Moskva (2012).
Yurginov 2010	Yurginov P., *Малая энциклопедия холодного оружия*, Moskva (2010).
Ziegler, Ziegler 2020	Ziegler Agnes, Ziegler Frank-Thomas, *Spre lauda Domnului și pentru cinstita breaslă, pentru a fi podoabă și de folosință. Covoare otomane din Biserica Neagră*, Brașov (2020).
Żygulski, Jr. 1979	Żygulski, Jr. Zdzisław, *Islamic weapons in Polish collections and their provenance*. In: Elgood Robert (ed.), *Islamic Arms and Armours*, London (1979), p. 213-238.
Żygulski jun. 1986	Żygulski jun. Zdzisław, *Broń wschodnia – Turcja, Persja, Indie, Japonia*, Warszawa (1986).

LIST OF ILLUSTRATIONS

1. The *pulwar* before its conservation. Private collection.
2. The *pulwar* after its conservation. Private collection.
3. The pulwar's pommel after its conservation.
4. The *chintamani* shaped craftsman mark.
5. The dot shaped craftsman mark.
6. Indian sabres: a *tega*, a *talwar* with *shamshir* blade and the *pulwar*. Private collection.
7. Afghan *pulwar* with a 19th c. hilt and older (17th-18th c.) blade. Private collection.
8. 19th c. Afghan *pulwar*. Detail. Private collection.
9. 19th c. Afghan *pulwar*. Private collection.
10. 18th c. *pulwar* believed to be a *talwar* from northern or central India. Private collection.
11. 19th c. Afghan *pulwar*. Peter the Great Anthropology and Ethnography Museum, Saint Petersburg.
12. 19th c. Afghan *talwar*. Detail. Peter the Great Anthropology and Ethnography Museum, Saint Petersburg.
13. 16th-17th c. Indian *talwar* with blade bearing an European mark. Private collection.
14. Late 18th to 19th c. *talwar* believed to come from northern India. Private collection.
15. Attributed to Miskin, *The Fox's Fear*. Detail. Illumination from a copy of Auhaduddin Anvari's *Divan* from Lahore, 1588. Fogg Art Museum of the Harvard University in Cambridge, Massachusetts.
16. *Mesbah the Grocer with the Spy Parran*, illumination from a dispersed *Hamzanama*, c. 1570. Metropolitan Museum of Art, New York.
17. Afghan policemen in Kabul (1879). Photograph by John Burke. British Library, London.
18. Afghan warrior armed with a shield and *pulwar* (1895). Private collection.
19. Timur Lenk's flag in the Catalan Atlas (1375) attributed to Cresques Abraham. Bibliothèque nationale de France, Paris.
20. *Timur Lenk at Hunting*, illumination in a *Zafarnama* manuscript from Shiraz, c. 1436. Detail. Arthur M. Sackler Gallery, Washington.
21. Silver coin issued by Timur Lenk in Samarkand, 1383 CE/785 AH. Ashmolean Institute, Oxford.
22. *Akçe* issued by Musa Çelebi in Edirne, 1410 CE/813 AH. Private collection.
23. Campaign throne of Sultan Süleyman I, mid-16th c., Topkapı Sarayı Müzesi, Istanbul.
24. Anonymous Ottoman painter, *Portrait of Sultan Mehmet III sitting on his throne*, c. 1600. Former collection of Edwin Binney, 3rd.

Map 1. Map of India (after Welch 1985).

LISTA ILUSTRAŢIILOR

1. *Pulwar*–ul înainte de restaurare. Colecție privată.
2. *Pulwar*–ul după restaurare. Colecție privată.
3. Capul *pulwar*-ului după restaurare.
4. Marcaj de meșteșugar, sub formă de *chintamani*.
5. Marcaj de meșteșugar, sub formă de punct.
6. Săbii indiene: o *tega*, un *talwar* cu lama de *shamshir* și *pulwar*-ul. Colecție privată.
7. *Pulwar* afgan cu mâner de sec. XIX și lama mai veche (sec. XVII-XVIII). Colecție privată.
8. *Pulwar* afgan, sec. XIX. Detaliu. Colecție privată.
9. *Pulwar* afgan, sec. XIX. Colecție privată.
10. *Pulwar* din sec. XVIII considerat drept *talwar*, India de Nord sau Centrală. Colecție privată.
11. *Pulwar* afgan, sec. XIX. Muzeul de Antropologie și Etnografie "Petru cel Mare", Sankt Petersburg.
12. *Talwar* afgan, sec. XIX. Muzeul de Antropologie și Etnografie "Petru cel Mare", Sankt Petersburg.
13. Indian *Talwar* sec. XVI-XVII cu lamă purtând o marcă Europeană. Colecție privată.

14. *Talwar* de la sfârșitul sec. XVIII/sec. XIX, despre care se crede că ar proveni din nordul Indiei. Colecție privată.
15. Atribuit lui Miskin, *Spaima vulpii*. Detaliu. Miniatură dintr-o copie din Lahore a *Divanului* lui Auhaduddin Anvari, 1588. Fogg Art Museum of the Harvard University in Cambridge, Massachusetts.
16. *Băcanul Mesbah și iscoada Parran*, miniatură dintr-o *Hamzanama* dezmebrată, cca. 1570. Metropolitan Museum of Art, New York.
17. Polițiști afgani în Kabul (1879). Fotografie de John Burke. British Library, Londra.
18. Războinic afgan înarmat cu scut și *pulwar* (1895). Colecție privată.
19. Steagul lui Timur Lenk în the Atlasul Catalan (1375) atribuit lui Cresques Abraham. Bibliothèque nationale de France, Paris.
20. Fig. 20 – *Timur Lenk la vânătoare*, miniatură dintr-un mansucris al unei *Zafarnama* din Shiraz, cca. 1436. Detaliu. Arthur M. Sackler Gallery, Washington.
21. Monedă din argint emisă de Timur Lenk la Samarkand, 1383 CE/785 AH. Ashmolean Institute, Oxford.
22. *Akçe* emisă de Musa Çelebi la Edirne, 1410 CE/813 AH. Colecție privată.
23. Tron de campanie al sultanului Süleyman I, mijlocul sec. XVI, Topkapı Sarayı Müzesi, Istanbul.
24. Anonim otoman, *Portretul sultanului Mehmet III șezând pe tron*, cca. 1600. Fosta colecție Edwin Binney III.

Harta 1 – Harta Indiei (după Welch 1985).

1. The *pulwar* before its conservation. Private collection.

2. The *pulwar* after its conservation. Private collection.

3.

4.

3. The pulwar's pommel after its conservation.
4. The *chintamani* shaped craftsman mark.

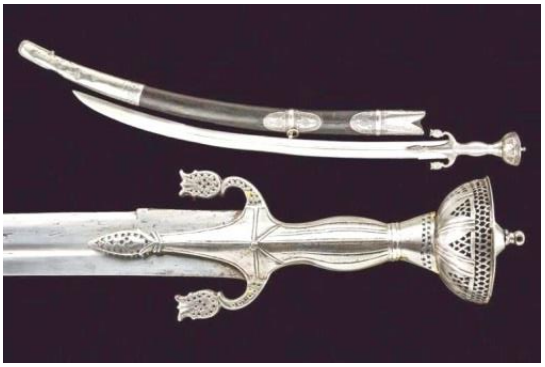
5. The dot shaped craftsman mark.

6. Indian sabres: a *tega*, a *talwar* with *shamshir* blade and the *pulwar*. Private collection.


7.

8.

7. Afghan *pulwar* with a 19th c. hilt and older (17th-18th c.) blade. Private collection.
8. 19th c. Afghan *pulwar*. Detail. Private collection.



9. 19th c. Afghan *pulwar*. Private collection.

10. 18th c. *pulwar* believed to be a *talwar* from northern or central India. Private collection.

11. 19th c. Afghan *pulwar*. Peter the Great Anthropology and Ethnography Museum, Saint Petersburg.

12. 19th c. Afghan *talwar*. Detail. Peter the Great Anthropology and Ethnography Museum, Saint Petersburg.

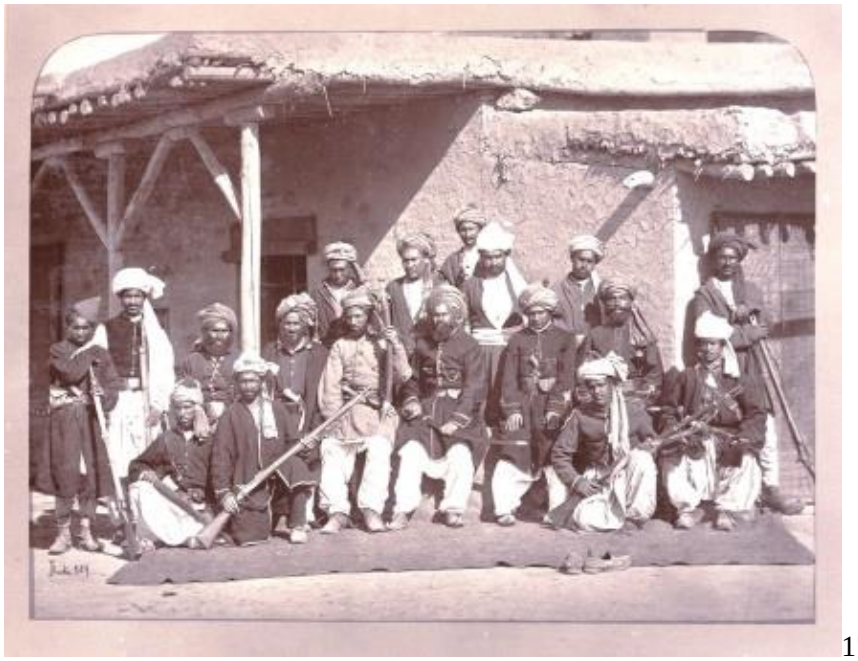
13. 16th-17th c. Indian *talwar* with blade bearing an European mark. Private collection.

14. Late 18th to 19th c. *talwar* believed to come from northern India. Private collection.

15.

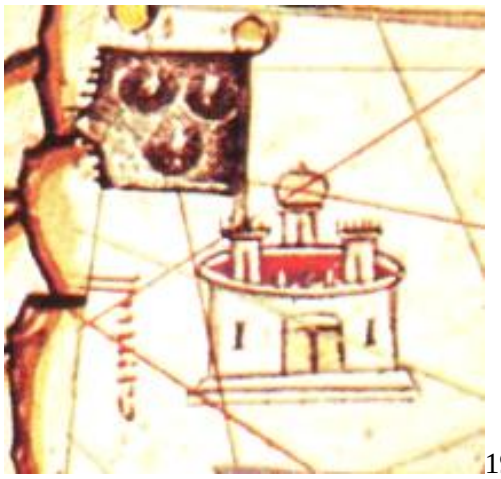
16.

15. Attributed to Miskin, *The Fox's Fear*. Detail. Illumination from a copy of Auhaduddin Anvari's *Divan* from Lahore, 1588. Fogg Art Museum of the Harvard University in Cambridge, Massachusetts.
16. *Mesbah the Grocer with the Spy Parran*, illumination from a dispersed *Hamzanama*, c. 1570. Metropolitan Museum of Art, New York.


17.


18.

17. Afghan policemen in Kabul (1879). Photograph by John Burke. British Library.
18. Afghan warrior armed with a shield and *pulwar* (1895). Private collection, London.


19.


20.

19. Timur Lenk's flag in the Catalan Atlas (1375) attributed to Cresques Abraham. Bibliothèque nationale de France, Paris
20. *Timur Lenk at Hunting*, illumination in a *Zafarnama* manuscript from Shiraz, c. 1436. Detail. Arthur M. Sackler Gallery, Washington.



21.


22.

21. Silver coin issued by Timur Lenk in Samarkand, 1383 CE/785 AH. Ashmolean Institute, Oxford.
22. *Akçe* issued by Musa Çelebi in Edirne, 1410 CE/813 AH. Private collection.


23.

24.

23. Campaign throne of Sultan Süleyman I, mid-16th c., Topkapı Sarayı Müzesi, Istanbul.
24. Anonymous Ottoman painter, *Portrait of Sultan Mehmet III sitting on his throne*, c. 1600. Former collection of Edwin Binney, 3rd.

Map 1 – Map of India (after Welch 1985).

ARTWORKS BY NICOLAE TONITZA CONSERVATION STATE AND TREATMENT

Polixenia-Georgeta POPESCU*
Iulia-Maria PASCU**
Cristina MIHU***

Abstract: *The article presents the conservation state of the paper that is the support for Nicolae Tonitza's drawings and graphic arts. The artworks showed degradations of the paper's corners, edges and surfaces on which the painter drew or painted. Changes in the properties of the backing paper are also highlighted. The artworks' state of conservation of the works was established by visual observation and direct observation with the help of an optical microscope. Conservation and restoration interventions have been correlated with the established state of conservation.*

Keywords*: graphic arts, optic microscopy, paper, degradation, conservation and restoration.*

Rezumat: *În articol este prezentată starea de conservare a hârtiei, suport pentru desene şi picturi de şevalet de Nicolae Tonitza. Lucrările prezentau degradări ale colţurilor, marginilor şi ale suprafeţelor hârtiei pe care pictorul a desenat sau a pictat. Au fost puse în evidenţă şi modificări ale proprietăţilor hârtiei suport. Starea de conservare a lucrărilor a fost stabilită prin observaţie vizuală şi observaţie directă cu ajutorul microscopului optic. Intervenţiile de conservare şi restaurare au fost corelate cu starea de conservare stabilită.*

Cuvinte-cheie: *grafică de şevalet, microscopie optică, hârtie, degradări, conservare şi restaurare.*

Introduction

Drawings and graphic arts by Nicolae Tonitza from the Cabinet of prints and drawings collections required conservation and restoration interventions of the paper support. These showed degradation of the corners, edges and surfaces of the paper support for drawing and painting.

The paper has a complex composition and structure. In general, the stability of the paper depends on the composition and the external conditions in which it is used and stored (temperature, humidity, exposure to light and noxious substances, risk of biological contamination). The state of conservation of the works was established at the macroscopic level by visual observation. At the microscopic level, the state of conservation of the works was established by direct observation with the help of the optical microscope of the surfaces of their paper supports (Schweidler 2006, 223).

In order to characterize the paper and establish the state of conservation, through the surface of the paper, in this article, we refer to that part of the paper, of different thicknesses, in contact with the environment, on which the degradations were highlighted by direct observation using the optical microscope (the term surface is not used in the sense of its definition in physics). For the examination with the help of the optical microscope, the works (paper support and colour layers) were handled, to avoid tensioning, with the help of a cardboard support on which the works were placed, the cardboard being moved horizontally in the microscope field to highlight the various degradations and aspects related to the conservation state of the works. The manipulation of the works during their investigation was done in compliance with the specialized indications (Kosek 2004, 80-84).

The general conservation state: the artworks presented physical degradation, chemical degradation,

* Brukenthal National Museum / Muzeul Naţional Brukenthal, popescupolixeniageorgeta@gmail.com
** Brukenthal National Museum / Muzeul Naţional Brukenthal, iulia_m_pascu@yahoo.co.uk
*** Brukenthal National Museum / Muzeul Naţional Brukenthal, cristina.mihu@brukenthalmuseum.ro

photo oxidation and two artworks had biological degradation.

What all had in common was the grime accumulated on the surface and embedded into the support fibres, also the discoloration of the paper.

The corners degradations presented were the following: tears and perforations of the paper, some with paper losses, the change of the initial shape of the corners - dog ear, the uneven appearance of the paper surface, discoloration and losses in the colour layer, the unknown nature stains.

The artworks edges presented some damage, usually small tears but also delamination with losses, split, losses and perforations. The surfaces of the drawings and watercolours paper presented on some areas an uneven appearance (were visible planar deformations, and scratches). Stains, tideline, flaking and losses in the colour layer, crease, cockling and buckling. On the reverse of some works were visible delamination and the uneven appearance of the backing paper.

Some artworks have written notes by the author. The drawings and the notes he have made on the artworks are interesting not only from the artistic point of view but also from a historical one, being made in a difficult period of the First World War in which Nicolae Tonitza have directly participated.

Conservation State for each work

By studying the surfaces of the works with the help of the optical microscope, the degradations were highlighted.

Shed in the country - yard in Mangalia by Nicolae Tonitza, inv. X 20

Shed in the country-yard in Mangalia is a graphic art made in watercolour and black ink on paper laminated on cardboard. The work had degradations at three of the four corners, at all edges and on areas of the work surface. The corners had tears and splits in the paper: the upper right corner, the upper left corner (Fig. 1) and the lower left corner, the surface of the support had an uneven appearance, the upper right corner and the lower left corner. Flaking of the colour layer was also visible in the lower left corner. The upper edge (Fig. 2) had losses from the support material, at the left side edge were visible the edge damage of the paper and losses from the colour layer. The right side edge had tears and holes in the paper support with loss of material from the support (Fig. 3), at the lower edge were visible stains and tidelines (Fig.4). The surface of the work had on some areas an uneven appearance, tidelines and losses in the colour layer.

The portrait of Ştefan Luchian by Nicolae Tonitza, inv. X 22

The work is a pencil drawing on paper. The following parts of the work were degraded: three of the four corners, the upper and lower edge and areas of the work surface. The upper left corner (Fig. 5) had a fringed edge, at the upper right corner were visible the uneven appearance of the paper surface and stains of unknown nature. The lower right corner (Fig. 6) had fringes of the edge and an uneven appearance of the paper surface, with losses in the colour layer. At the upper and lower edges of the work was visible delamination of the surface of the support paper, at the upper edge there were stains of unknown nature (Fig. 7). Uneven-looking areas and spots were visible on the surface of the work support paper (Fig. 8).

Prisoner's shoes by Nicolae Tonitza, inv. X 23

Prisoner's Shoes is a drawing on plain paper with ink and coloured pencils. Degradation of the work: three of the four corners, the upper edge, the left side edge and areas of the work surface were affected. The upper left corner (Fig.9) showed tears in the support paper and aspects that indicated previous interventions on the work. Tears in the paper were visible in the right corner, the lower left corner had an uneven appearance of the paper surface, and there were tears as well. The upper edge on some areas had an uneven appearance of the paper surface, stains and losses of the support material were visible (Fig. 10). The left side edge had an uneven appearance (Fig. 11). The degradations visible on the surface of the work were the uneven appearance of the paper, tears (Fig. 12) and losses in the colour layer.

Instigator by Nicolae Tonitza, inv. X 26

The work is a sketch on paper with ink and pencil. They had degradations: a corner, the upper edge and the left and right side edges, areas of the work surface. The upper left corner showed losses from the support material, the deformation of the corner edge and an uneven appearance of the paper surface (Fig. 13). The upper edge was fringed and there were losses of support material. At the left side edge the surface of the paper looked uneven. The right side edge of the work was deformed (Fig. 14). The surface of the work had areas with a uneven appearance, there were tears with losses from the support material (Fig. 15), flaking of the paper surface with losses from the colour layer,

traces of folding of the paper support with its deformation (Fig. 16).

Booths in Mangalia (Shop in Mangalia) by Nicolae Tonitza, inv. X 33

Booths in Mangalia (Shop in Mangalia) is a painting artwork on paper laminated on cardboard in watercolour and black ink. They had degradations: a corner, the upper edge, the left side edge and areas of the work surface. At the upper right corner of the work were visible the uneven appearance of the paper surface and losses from the support material (Fig. 17). The upper edge of the work had an uneven appearance on the left side and in the middle area of the paper surface and there were visible losses from the support material (Fig. 18). At the left side edge were visible the uneven appearance of the paper surface and losses from the support material (Fig. 19). The surface of the work had areas with uneven appearance, exfoliation and loss of colour, stains (Fig. 20). On the left side, towards the edge were visible the uneven appearance of the surface and losses from the support material.

Regep Ali by Nicolae Tonitza, inv. X 36

The work is a drawing on paper in watercolour and black ink. The upper two corners and the lower right corner of the work, the upper edge, the right side edge and areas of the work surface were degraded. The upper corners of the work showed losses from the support material (Fig. 21). At the bottom right corner were visible the uneven appearance of the paper surface and a tear with losses in the support material. The upper edge had an uneven appearance of the surface, a linear deformation of the support and a tear (Fig. 22). At the right side edge were visible areas with loss of support material, stains and exfoliation of the paper. The surface of the work had areas with an uneven appearance, a tear (Fig. 23) and perforations with loss of the support material (Fig. 24).

Interior with stove by Nicolae Tonitza, inv. X 56

Interior with stove is a drawing in pen and red pencil on paper. Degradations of the work were present at the two upper corners, all edges, areas on the surface and on the reverse of the work. The upper left corner had an appearance of the surface and losses of the support material. The upper right corner of the work also showed an uneven appearance of the surface and losses from the support material (Fig. 25). At the upper edge of the work was visible a tear with loss of support material (Fig. 26). The left side edge (Fig. 27) and the bottom edge had tear with loss of support material. At the right side edge was visible the delamination of the surface with loss from the support material. The surface of the work presented an uneven aspect of the surface, stains, tears, losses from the support material (Fig. 28). The reverse of the work had delamination of the surface of the paper support.

Study for "Strike" by Nicolae Tonitza, inv. X 102

The work is a pencil drawing on paper. They had degradations: two corners, edges and areas of the work surface. The upper left corner had an uneven appearance of the paper surface, edge deformation, and loss of media material. The lower left corner had the initial shape modified by loss of support material and an uneven appearance of the paper surface (Fig. 29). Degradation of the edges of the work: at the upper edge was visible the loss of a support material portion, the left and right side edges (Fig. 30) were fringed and with losses from the support material, the surface of the paper had an uneven appearance. The lower edge had stains and the uneven appearance of the paper surface was visible (Fig. 31). On the reverse of the work, the surface of the paper had delamination and a uneven appearance (Fig. 32).

Landscape with houses by Nicolae Tonitza, inv. X 112

Landscape with houses is a drawing with black ink on paper. Degradations of the work: were visible at the two upper corners, the lower edge and the side edges, areas of the work surface. The upper left corner (Fig.33) of the paper presented an uneven appearance of the paper surface and losses from the support material. In the upper right corner were visible: the uneven appearance of the paper surface and leaks from the backing material. The left side edge had an uneven appearance of the paper surface and losses from the backing material. The lower edge of the work had a rupture with loss of support material (Fig. 34). The right side edge had an uneven appearance of the surface (Fig. 35). The surface of the work had areas with an uneven appearance, areas where the delamination of the paper support and stains was visible (Fig. 36).

Two self-portraits by Nicolae Tonitza, inv. X 122

Two self-portraits is a drawing on paper made with ink. It has degradations: one of the upper corners, the side edges and areas of the work surface. The upper left corner of the paper had an irregular appearance due to the loss of material from the paper support (Fig. 37). The edges of the paper had an uneven appearance of the paper surface with losses

from the support material, stains of unknown nature, and perforations in the paper (Fig. 38). On the surface of the work were visible areas with an uneven appearance of the paper, exfoliation, loss of colour layer (Fig. 39), stains of unknown nature (Fig. 40).

Kirdjali, prisoners in camp by Nicolae Tonitza, inv. X 125

Kirdjali, prisoners in camp is a drawing made on paper laminated on cardboard with black ink, black pencil and coloured pencils. Degradations of the work were: at one of the upper corners, the upper and lower edges and work's surface areas. The uneven appearance of the paper support was visible in the upper left corner and at the top edge of the paper. The lower edge of the paper showed areas with an irregular appearance of the paper surface and delamination with losses from the support material (Fig. 41- 42). The surface of the work had areas with uneven appearance of the paper, flaking of the colour layer, stains (Fig. 43) (Fig. 44). On the reverse of the work were visible exfoliations and areas of the paper surface that had an uneven appearance.

Woman in a dressing gown by Nicolae Tonitza, inv. XI 1216

Woman in a dressing gown is a drawing made in pen and colour wash on paper. It had degradations: two corners, one at the top and one at the bottom, the lower edge, and the right side edge, areas of the drawn surface and on the reverse of the work. The uneven appearance of the paper support in the upper left corner, perforations and losses in the support material were visible (Fig. 45). The lower right corner had an uneven appearance of the paper surface, losses from the support material and the colour layer (Fig. 46). At the right side edge of the work were visible the uneven appearance of the paper surface, delamination, perforations, losses of the support material, losses of the colour layer (Fig. 47). At the lower edge were visible the uneven appearance of the paper surface and losses from the backing material. The surface of the work presented areas with an uneven aspect of the surface of the support paper, losses from the support material, flaking and losses from the colour layer (Fig. 48). On the reverse of the work were visible delamination of the surface of the paper support and losses of the support material.

Fatma by Nicolae Tonitza, inv. X 37

The work is made on paper laminated on cardboard in watercolour and black ink. Degradations of the work: the upper left corner of the support paper as well as the upper left corner of the cardboard support on which the paper was laminated, the left side edge of the cardboard and the support paper for drawing and areas of the work surface. The upper left corner had an uneven appearance of the paper surface, delamination, loss of the support material and the colour layer (Fig. 49). The surface of the paper showed areas with an uneven appearance and losses in the colour layer (Fig. 50) (Fig. 51). The left side edge of the drawing paper as well as the corresponding edge of the cardboard had an uneven appearance of the surface, delamination and loss of the support material (Fig. 52).

Drawing *Reflections on freedom* by Nicolae Tonitza, inv. X 124.

The work is a drawing on paper in ink and pencil. It had degradations: the upper corners and the lower left corner, the side edges, the lower edge of the work and areas of the work surface. The upper left corner had an uneven appearance of the edges (it was fringed). The support paper in the corner area had surface delamination. The lower left corner had a modified appearance compared to the original appearance (it was rounded by loss of material from the substrate) and an uneven appearance of the surface of the substrate paper. The upper right corner had a loss of support material that changed the original shape, delamination and an uneven appearance of the support paper surface (Fig. 53). The left side edge had exfoliations and an uneven appearance of the paper surface with the change of its flatness (Fig. 54). The lower edge had an uneven appearance of the paper surface and exfoliation. The right side edge had a modified appearance due to loss of material from the support, the presence of exfoliations and uneven areas on the surface of the paper (Fig. 55). The surface of the work had an uneven appearance of the paper and delamination (Fig. 56).

Conservation treatment

To carry out the conservation treatments, those interventions that would, in the future, diminish the risk of characteristics modification of the paper were chosen. The appropriate choices of treatments methods for conservation were made following scientifically documented conservation treatments (Van der Reyden 1992, 123-131), available from the literature related to the practice and ethics of paper conservation (Hölling 2017, 5).

Shed in the country - yard in Mangalia by Nicolae Tonitza, inv. X 20

The structural composition of this mixt media (India ink, watercolour) artwork is composed of paper

laminated on cardboard. About this system, Tonitza has written in his book (Tonitza 1964, 58) that for a better drawing, the paper should be mounted on secondary support. The secondary support is an integral part of the work and should be retained during the conservation treatment. In this case, it is in a good conservation state with moderate damage.

The dimensions are not regular – cardboard is irregular, the maximum dimensions are 297x390mm; paper 268x346mm. It has a total thickness of 1mm, the cardboard 0.75mm, and the paper 0,25mm (Fig. 57).

Conservation treatment:

Dry cleaning to diminish the following conservation problems embedded and surface dirt, adhesive residues that were present on the watercolour front side, on the cardboard and in a lesser degree, also, on the paper was applied. For this treatment, brushes, sponges, erasers, scalpels were used.

A starch paste was applied to consolidate the paper to the secondary support where small delaminated areas occurred (Fig. 58).

The portrait of Ştefan Luchian by Nicolae Tonitza, inv. X 22

The pencil drawing has the following dimensions 216x174x0.2mm (Fig. 59).

Conservation treatment:

A backside surface cleaning was made to remove embedded and surface dirt. The media on the front side could not withstand a surface cleaning. Adhesive residues and the old attachment system residue composed of moisture-sensitive adhesive and calendered paper were removed through aqueous techniques alternatively with mechanical means (Fig. 60).

Prisoner's shoes by Nicolae Tonitza, inv. X 23

Mixt media (iron gall ink, coloured pencils) drawing on plain low-quality paper ripped from a notebook. Nicolae Tonitza used notebooks to mark the immediate and often insignificant observations (Tonitza 1964, 59).

The dimensions are 163x190x0.05mm (Fig. 61).

Conservation treatment:

Certain areas were not capable to withstand a surface cleaning. In subsequent, a local dry cleaning was applied using brushes, sponges, erasers, scalpels.

The pressure-sensitive tape had actively affected the paper and had to be removed to avoid further damage. Dry techniques combined with aqueous techniques were applied.

Iron gall ink had penetrated, deteriorated, and corroded the paper support due to its acidity and thickness and produced mechanical damage. The weak areas were reinforced, on verso, with Japanese tissue (Titus et al. 2009, 30) and methyl-cellulose (Albro et al. 2008, 164).

Before all tears were mended with Japanese tissue and methyl-cellulose, the artwork was placed in a press to flatten out (Fig. 62).

Instigator by Nicolae Tonitza, inv. X 26

Mix media drawing on paper, the media used for drawing are India ink, iron gall ink, copying pencil, pencils and blue pencils. The artwork paper is mechanical wood pulp paper with the following dimensions: 336x418x0.1mm (Fig. 63).

Conservation treatment

First, dry cleaning was done to remove embedded and surface dirt. Some caution in areas with pressure and abrasion sensitive media was needed. Due to all planar deformations: cockling and bucking, creases, dog-ear, handling dents presented, the artwork was placed in a press where, in time, the drawing had regained its planar proprieties. The tears were mended with Japanese tissue and starch paste. Also, the losses and holes were filled with Japanese paper inserts fixed with starch paste. The colour layer lost its coherence and visual integrity in the areas where physical damage occurred, inpainting restored the image continuity (Ash, Homolka 2014, 87) (Fig. 64).

Booths in Mangalia (Shop in Mangalia) by Nicolae Tonitza, inv. X 33

The mix media (watercolour, India ink) painting on a sheet of paper laminated on cardboard has the following dimensions: cardboard 298x373x0.7mm; the sheet of paper 279x333x0.3mm (Fig. 65).

Conservation treatment

The embedded and surface dirt was removed by surface cleaning. The front side surface cleaning had taken into consideration the pressure and abrasion sensitive media. The adhesive and paper residues present at the cardboard front side and partial at the paper edge was diminished by dry techniques. Furthermore, it was detached the old mending with pressure-sensitive tape.

Tears were mended with Japanese paper and starch paste to stabilize the artwork structural stability. The lost areas were compensated as follows: where the cardboard was with neutral pH cardboard insert and starch paste, and where the paper was, with Japanese paper insert and methyl-cellulose (Fig. 66).

Regep Ali by Nicolae Tonitza, inv. X 36

The dimensions are 139x246x0.1mm (Fig. 67).

Conservation treatment

Meticulously implemented surface cleaning due to the pressure and abrasion sensitive media – ink and watercolour – was done to remove embedded and surface dirt.

Over the work, weights were placed to flatten the planar deformations (undulation, creases, cockling and buckling). Later it was introduced in the press.

The main conservation problem was the paper embrittlement due to the low-quality mechanical wood pulp paper. Plenty of tears appeared throughout the length of the artwork edges; those were stabilized and mended with thin reinforcing repair paper made of Japanese tissue and starch paste to attach it. Laminated fills, made with Japanese paper, were inserted to compensate for small-scale losses that emerged in two areas (Fig. 68).

Interior with stove by Nicolae Tonitza, inv. X 56

Mixt media (iron gall ink, red coloured pencil) drawing on low-quality mechanical wood pulp paper has fallowing dimensions: 166x207x0.1mm (Fig. 69).

Conservation treatment

The surface cleaning was done with extra care in areas where pressure-sensitive media penetrated, deteriorated, and corroded the paper support and areas where media could not withstand an in-depth dry cleaning. The old hinges composed of moisture-sensitive adhesive and calendered paper and pressure-sensitive tape residue were removed through aqueous techniques alternatively with mechanical means. The artwork was put under light weights first and after in the press to flatten wrinkles, dog-ear, buckling and cockling. All edges had, to different degrees, physical damage exemplified by linear separation of the support into partially separate pieces. They were mended with Japanese tissue and starch paste. One corner had loss compensation with a Japanese paper insert fixed with starch paste; the aim was to aid in the artwork mounting (Fig. 70).

Study for "Strike" by Nicolae Tonitza, inv. X 102

This drawing in charcoal with signature in iron gall ink had conservation treatment in 1981 reported in the Record of the Conservation Treatment G63/1981. It contained data about conservation state: paper discolouration, edge damage, adhesive residues, and embedded dirt; paper proprieties: medium-length fibres, medium sizing; and the conservation treatment: dry technique cleaning, mending, and lost compensation, the adhesive used was methyl-cellulose (Glutofix).

The dimensions are 117x221x0.1mm (Fig. 71).

Conservation treatment

Extreme friability of the media made any treatment problematic. Therefore dry cleaning was done solely on the backside to remove embedded and surface dirt; brushes, sponges, erasers, scalpels were used. Through dry techniques, the adhesive residues were diminished. They were localized on the artwork backside in the lower area and the right edge. Tears were mended with thin reinforcing repair paper made of Japanese tissue. Japanese paper inserts were fixed with is methyl-cellulose to compensate for small-scale losses (Fig. 72).

Landscape with houses by Nicolae Tonitza, inv. X 112

India ink drawing on notebook calendered paper has the following dimensions 160x200x0.05mm (Fig. 73).

Conservation treatment

To reduce embedded and surface dirt was applied dry techniques using brushes, sponges, eraser materials, scalpels. During dry cleaning was taken into consideration the fact that media may be adversely affected by the direct application of surface cleaning materials. The old hinges composed of calendered paper fixed with moisture-sensitive adhesive were removed through aqueous techniques alternatively with mechanical means. Due to all planar deformations: cockling and bucking, creases, dog-ear, handling dents presented, the artwork was placed in a press where, in time, the drawing had regained its planar proprieties. The left edge area where the sheet of paper was torn from the notebook had physical damage exemplified by tears and a soft, uneven fibrous edge. These conservation problems were mended with reinforcing Japanese tissue and methyl-cellulose. The left corner had loss compensation with a Japanese paper insert fixed with starch paste; the aim was to aid in the artwork mounting (Fig. 74).

Two self-portraits by Nicolae Tonitza, inv. X 122

Mix media (Iron gall ink, pastels) drawing has the dimensions 165x207x0.1mm (Fig. 75).

Conservation treatment

The dry cleaning was done to remove embedded and surface dirt, but the extreme friability of the media made the treatment problematic. The adhesive residues localized on the lower edge at the artwork backside were diminished by dry techniques. Tears and holes were stabilized and mended with thin reinforcing repair paper made of Japanese tissue and starch paste to attach it (Fig. 76).

Kirdjali, prisoners in camp by Nicolae Tonitza, inv. X 125

Mix media (iron gall ink, coloured pencils, Waxy Crayons) drawing on paper laminated on cardboard has the following dimensions: cardboard 175x195x0.5mm; paper 169x188x0.1mm (Fig. 77).

Conservation treatment

The media could not withstand a surface cleaning, so it was decided for a surface cleaning done on the artwork backside that removed embedded and surface dirt. Paper residue localized on the paper lower edge was detached using aqueous techniques alternatively with mechanical means. The paper edges had abrasion, lifting of fibres, skinning, and delamination consolidated with methyl-cellulose. It was decided against paper loss compensation since it did not detract from image continuity during mounting. The loss compensation was done in the lower-left corner of the secondary support with neutral pH cardboard insert fixed with starch paste (Fig. 78).

Woman in a dressing gown by Nicolae Tonitza, inv. XI 1216

Iron gall ink drawing on paper has the dimensions: 256x156x0.13mm (Fig. 79).

Conservation treatment

Dry cleaning was done to remove embedded and surface dirt using dry techniques that did not affect the media. The planar deformations: cockling and bucking were diminished when the artwork was placed in a press where, in time, the drawing had regained its planar proprieties. Iron gall ink had penetrated, deteriorated, and corroded the paper support and produced weak areas with a low structural strength that were reinforced, on verso, with Japanese tissue and methyl-cellulose. The tears were mended with Japanese tissue and starch paste. Also, the losses and holes were filled with Japanese paper inserts fixed with starch paste. To regain the image continuity inpainting was made with coloured pencils (Fig. 80).

Fatma by Nicolae Tonitza, inv. X 37

The dimensions of the watercolour paper laminated on cardboard are the cardboard 131x331x0.7mm; paper 90x268x02mm (Fig. 81).

Conservation treatment

Through surface cleaning that had taken into consideration the fact that media may be adversely affected by the direct application of surface cleaning materials, the embedded and surface dirt was removed. Adhesive residues placed on the watercolour front side, on the cardboard and in a lesser degree on the paper were diminished through aqueous techniques alternatively with mechanical means. Tears of the cardboard support were mended with Japanese paper and starch paste to stabilize the artwork structural stability. On the left edge of the cardboard support, loss compensation was done with a neutral pH cardboard insert fixed with starch paste (Fig.82).

Reflections on freedom by Nicolae Tonitza, inv. X 124

The dimensions of this India ink and pencil drawing on paper are 372x322x0.35mm (Fig. 83).

Conservation treatment

Surface cleaning was applied to remove embedded and surface dirt. It was meticulously implemented due to the pressure and abrasion sensitive media that is ink and pencil. Adhesive residues and the old attachment system residue composed of pressure-sensitive tapes were removed through aqueous techniques alternatively with mechanical means. The artwork was placed in a press where the drawing had regained its planar proprieties previously lost to cockling and bucking, creases, dog-ear, handling dents. Japanese paper insert was fixed with is methyl-cellulose to compensate for small-scale losses on the upper left corner. Visual integrity was lost due to physical damage; inpainting restored the image continuity (Fig. 84).

Conclusion

The paper and cardboard support on which the works were made weren't in a good conservation state and presented a plain to see fragility and numerous Physical and Photochemical degradations. The paper surface damages were emphasized with direct observation through a stereomicroscope and capturing aspects of the surfaces (microphoto-

graphs at a 40x magnification) images. The aspects that were highlighted allowed the detailed characterization of the conservation status of the analysed works. The conservation treatment, appropriate chosen, were carried out to ensure the stability of artworks.

Authors' Contributions:

Popescu Polixenia-Georgeta: establishing the state of conservation and highlighted the degradations through the study by optical microscopy of the artworks, microphotographs and highlighting the observed details.

Pascu Iulia-Maria: characterization of the artistic technique of the works and the conservation interventions carried out for the stabilization of the works.

Mihu Cristina: establishing the state of conservation of the works recorded in the conservation records.

REFERENCES

Albro et al. 2008 — Sylvia Albro, Julie L. Biggs, Claire Dekle, Mary Elizabeth Haude, Cyntia Karnes, Yasmeen Khan, 'Developing Guidelines for Iron-Gall Ink Treatment at the Library of Congress', *The Book and Paper Group Annual*, 27 , 2008, [Pdf] available at: https://www.conservation-wiki.com/wiki/BPG_Media_Problems#Ink [Accessed 11 September 2021]

Ash, Homolka 2014 — Nancy Ash, Scott Homolka, 'Art on Paper Discussion Group 2014; Re-integrating Design/Deceiving the Eye; Compensation Issues for Works on Paper' *The Book and Paper Group Annual*, 33, 2014, [Pdf], available at https://cool.culturalheritage.org/coolaic/sg/bpg/annual/v33/bpga33-14.pdf [Accessed 11 September 2021]

Hölling 2017 — Hanna Hölling, 'The technique of conservation: on realms of theory and cultures of practice', *Journal of the Institute of Conservation*, 2017, ISBN: 1945-5232 [Pdf] available at:https://core.ac.uk/download/pdf/111008625.pdf [Accessed 17 August 2021]

Kosek 2004 — Joanna M. Kosek, 'Conservation mounting for prints and drawings: a manual based on current practice at the British Museum', *London: Archetype in association with the British museum*, 2004, [online] available at: https://books.google.ro/books?id=QwSfDwAAQBAJ&pg=PA93&lpg=PA93&dq=Conserva-tion+mounting+for+prints+and+drawings:+a+manual+based+on+current+practices+at+the+British+Museum/+Joanna+M.+Kosek&source=bl&ots=4EEn0EHxJw&sig=ACfU3U3SwXmIKAuHee3EokQP1wWkh5hDOQ&hl=ro&sa=X&ved=2ahUKEwieu6mfxbzyAhW8_rsIHe_kCkAQ6AF6BAgeEAM#v=onepage&q=Conservation%20mount-ing%20for%20prints%20and%20drawings%3A%20a%20manual%20based%20on%20current%20practices%20at%20the%20British%20Museum%2F%20Joanna%20M.%20Kosek&f=false1, [Accessed 18 August 2021]

Schweidler 2006 — Max Schweidler, *Restoration of engravings, drawings, books and other works on paper*, translated, edited and an appendix by Roy Perkinson, Getty Conservation Institute, Los Angeles, 2006, [Pdf] available at: https://www.getty.edu/publications/resources/virtuallibrary/9780892368358.pdf, [Accessed 18 August 2021]

Titus et al. 2009 — Sonja Titus, Regina Schneller, Enke Huhsmann, Ulrike Hähner, Gerhard Banik, 'Stabilising local areas of loss in iron gall ink copy documents from the Savigny estate' *Restaurator-international Journal for The Preservation of Library and Archival Material - RESTAURATOR*. 30. 16-50. 10.1515/rest.003, 2009, [Pdf] available at: https://www.researchgate.net/publication/249945217_Stabilising_local_areas_of_loss_in_iron_gall_ink_copy_documents_from_the_Savigny_estate [Accessed 20 August 2021]

Tonitza 1964 — Nicolae Tonitza, *Scrieri despre artă,* ed. Meridiane, București, 1964

Van der Reyden 1992 — Dianne van der Reyden, 'Recent Scientific Research in Paper Conservation', *JAIC* 31, 1992, [online] available at: https://repository.si.edu/bitstream/handle/10088/8141/mciJAIC1992-DvR.pdf?isAllowed=y&sequence=1 [Accessed 17 August 2021]

LIST OF ILLUSTRATIONS

1. 40x microphotography, *Shed in the country - yard in Mangalia*, inv. X 20, upper left corner, loss of support material
2. 40x microphotography, *Shed in the country - yard in Mangalia*, inv. X 20, upper edge, loss of support material
3. 40x microphotography, *Shed in the country - yard in Mangalia*, inv. X 20, right side edge, loss of support material
4. 40x microphotography, *Shed in the country - yard in Mangalia*, inv. X 20, lower edge, stains and tidelines
5. 40x microphotography, *The portrait of Ştefan Luchian*, inv. X 22, upper left corner, uneven appearance and fringe of the edge
6. 40x microphotography, *The portrait of Ştefan Luchian*, inv. X 22, lower right corner, fringe of the edge, uneven appearance of the surface with losses in the colour layer
7. 40x microphotography, *The portrait of Ştefan Luchian*, inv. X 22, upper edge, stains and exfoliation of the paper-support surface
8. 40x microphotography, *The portrait of Ştefan Luchian*, inv. X 22, paper surface, spots and uneven areas
9. 40x microphotography, *Prisoner's shoes*, inv. X 23, upper left corner, tears in the support paper, aspects that indicate previous interventions on the work
10. 40x microphotography, *Prisoner's shoes*, inv. X 23, upper edge, losses from the support material
11. 40x microphotography, *Prisoner's shoes*, inv. X 23, left side edge, uneven appearance
12. 40x microphotography, *Prisoner's shoes*, inv. X 23, tear in the paper support
13. 40x microphotography, *Instigator*, inv. X 26, upper left corner, changing the shape of the support edge with affecting the flatness
14. 40x microphotography, *Instigator*, inv. X 26, right side edge, changing the shape of the edge
15. 40x microphotography, *Instigator*, inv. X 26, paper surface, tear with loss of support material
16. 40x microphotography, *Instigator*, inv. X 26, surface, crease with modification of the appearance of the support on the fold line
17. 40x microphotography, *Booths in Mangalia (Shop in Mangalia)*, inv. X 33, upper right corner, uneven appearance of the paper surface and losses of the support material
18. 40x microphotography, *Booths in Mangalia (Shop in Mangalia)*, inv. X 33, upper edge, uneven appearance of the paper surface
19. 40x microphotography, *Booths in Mangalia (Shop in Mangalia)*, inv. X 33, left side edge, uneven appearance of the surface and losses from the support material
20. 40x microphotography, *Booths in Mangalia (Shop in Mangalia)*, inv. X 33, surface, spots and uneven appearance
21. 40x microphotography, *Regep Ali*, inv. X 36, upper right corner, loss of support material
22. 40x microphotography, *Regep Ali*, inv. X 36, upper edge, tear, uneven appearance of the paper surface and its planar deformation
23. 40x microphotography, *Regep Ali*, inv. X 36, surface, tear, uneven appearance of the paper
24. 40x microphotography, *Regep Ali*, inv. X 36, paper surface, perforation with loss from the support material
25. 40x microphotography, *Interior with stove*, inv. X 56, upper right corner, losses from the support material, uneven appearance of the surface
26. 40x microphotography, *Interior with stove*, inv. X 56, upper edge, tear with loss of support material
27. 40x microphotography, *Interior with stove*, inv. X 56, left side edge, tear with loss of support material
28. 40x microphotography, *Interior with stove*, inv. X 56, tear, uneven appearance of the paper surface
29. 40x microphotography, *Study for "Strike"*, inv. X 103, lower left corner, modification of the initial shape by loss of material from the support, uneven appearance of the paper surface
30. 40x microphotography, *Study for "Strike"*, inv. X 103, right side edge, fringe of the edge, losses from the support material, uneven appearance of the paper surface

31. 40x microphotography, *Study for "Strike"*, inv. X 103, lower edge, spots of unknown nature, uneven appearance of the paper surface
32. 40x microphotography, *Study for "Strike"*, inv. X 103, reverse, exfoliation and uneven appearance of the paper surface
33. 40x microphotography, *Landscape with houses*, inv. X 112, upper left corner, losses from the support material, uneven appearance of the surface
34. 40x microphotography, *Landscape with houses*, inv. X 112, lower edge, tear with loss of support material
35. 40x microphotography, *Landscape with houses*, inv. X 112, right side edge, uneven appearance of the paper surface
36. 40x microphotography, *Landscape with houses*, inv. X 112, paper surface, uneven appearance, paper exfoliation
37. 40x microphotography, *Two self-portraits*, inv. X 122, upper left corner, uneven appearance of the edge with loss of the support material
38. 40x microphotography, *Two self-portraits*, inv. X 122, edge, loss of support material, perforation in support
39. 40x microphotography, *Two self-portraits*, inv. X 122, uneven appearance of the paper surface with areas with losses in the colour layer
40. 40x microphotography, *Two self-portraits*, inv. X 122, spots on the surface of the paper
41. 40x microphotography, *Kirdjali, prisoners in camp*, inv. X 125, lower edge, uneven appearance of the support edge, exfoliation of the paper surface, loss of the support material
42. 40x microphotography, *Kirdjali, prisoners in camp*, inv. X 125, lower edge, uneven appearance of the support edge, exfoliation of the paper surface
43. 40x microphotography, *Kirdjali, prisoners in camp*, inv. X 125, paper surface, uneven appearance and exfoliation of the colour layer
44. 40x microphotography, *Kirdjali, prisoners in camp*, inv. X 125, paper surface, uneven appearance and spots
45. 40x microphotography, *Woman in a dressing gown*, inv. XI 1216, upper left corner, uneven appearance of the paper surface, perforations, losses of the support material
46. 40x microphotography *Woman in a dressing gown*, inv. XI 1216, lower right corner, uneven appearance of the paper surface, losses of the support material and of the colour layer
47. 40x microphotography *Woman in a dressing gown*, inv. XI 1216, right side edge, uneven appearance of the paper surface, perforations, losses from the support material
48. 40x microphotography, *Woman in a dressing gown*, inv. XI 1216, areas with uneven appearance of the paper surface, loss of colour layer
49. 40x microphotography, *Fatma*, inv. X 37, upper left corner, uneven appearance of the paper surface, exfoliation and loss of the support material and the colour layer
50. 40x microphotography, *Fatma*, inv. X 37, paper surface, exfoliation and loss of colour layer
51. 40x microphotography, *Fatma*, inv. X 37, uneven appearance of the paper surface
52. 40x microphotography, *Fatma*, inv. X 37, left side edge, uneven appearance of the cardboard surface and the edge of the paper cased on it
53. 40x microphotography, *Reflections on freedom*, inv. X 124, upper right corner, loss of the support material with the change of its shape, exfoliation and the uneven appearance of the paper surface
54. 40x microphotography, *Reflections on freedom*, inv. X 124, left side edge, exfoliation and uneven appearance of the paper surface, changing its flatness
55. 40x microphotography, *Reflections on freedom*, inv. X 124, right side edge, change in appearance due to loss of support material, exfoliation and uneven appearance of the paper surface
56. 40x microphotography, *Reflections on freedom*, inv. X 124, surface, uneven appearance of the paper surface, exfoliation
57. *Shed in the country - yard in Mangalia* inv. X 20 Ensemble before restoration
58. *Shed in the country - yard in Mangalia* inv. X 20 Ensemble after restoration
59. *The portrait of Ştefan Luchian* inv. X 22 Ensemble before restoration
60. *The portrait of Ştefan Luchian* inv. X 22 Ensemble after restoration
61. *Prisoner's shoes*, inv. X 23 Ensemble before restoration

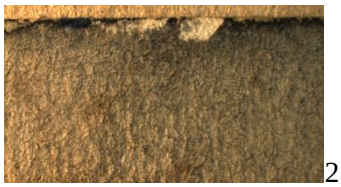
62. *Prisoner's shoes*, inv. X 23 Ensemble after restoration
63. *Instigator*, inv. X 26 Ensemble before restoration
64. *Instigator*, inv. X 26 23 Ensemble after restoration
65. *Booths in Mangalia (Shop in Mangalia)*, inv. X 33 Ensemble before restoration
66. *Booths in Mangalia (Shop in Mangalia)*, inv. X 33 Ensemble after restoration
67. *Regep Ali* , inv. X 36 Ensemble before restoration
68. *Regep Ali*, inv. X 36 Ensemble after restoration
69. *Interior with stove*, inv. X 56 Ensemble before restoration
70. *Interior with stove*, inv. X 56 Ensemble after restoration
71. *Study for "Strike"*, inv. X 102 Ensemble before restoration
72. *Study for "Strike"*, inv. X 102 56 Ensemble after restoration
73. *Landscape with houses*, inv. X 112 Ensemble before restoration
74. *Landscape with houses*, inv. X 112 Ensemble after restoration
75. *Two self-portraits*, inv. X 122 Ensemble before restoration
76. *Two self-portraits*, inv. X 122 Ensemble after restoration
77. *Kirdjali, prisoners in camp*, inv. X 125 Ensemble before restoration
78. *Kirdjali, prisoners in camp*, inv. X 125 Ensemble after restoration
79. *Woman in a dressing gown*, inv. XI 1216 Ensemble before restoration
80. *Woman in a dressing gown*, inv. XI 1216 Ensemble after restoration
81. *Fatma*, inv. X 37 Ensemble before restoration
82. *Fatma*, inv. X 37 Ensemble after restoration
83. *Reflections on freedom*, inv. X 124 Ensemble before restoration
84. *Reflections on freedom*, inv. X 124 Ensemble after restoration

LISTA ILUSTRAŢIILOR

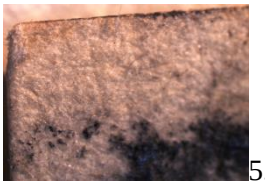
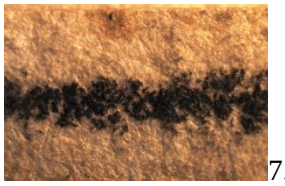
1. Microfotografie 40x, "Şopron la ţară-curte la Mangalia", inv. X 20, colţul de sus din stânga, pierderi de material din suport
2. Microfotografie 40x, "Şopron la ţară-curte la Mangalia", inv. X 20, marginea superioară, pierderi de material din suport
3. Microfotografie 40x, "Şopron la ţară-curte la Mangalia", inv. X 20, marginea laterală din dreapta, pierderi de material din suport
4. Microfotografie 40x, "Şopron la ţară-curte la Mangalia", inv. X 20, marginea inferioară, pete şi halouri de umiditate
5. Microfotografie 40x, "Portretul lui Ştefan Luchian", inv. X 22, colţul de sus din stânga, aspectul neuniform şi franjurarea marginii
6. Microfotografie 40x, "Portretul lui Ştefan Luchian", inv. X 22, colţul de jos din dreapta, franjurarea marginii, neuniformitatea suprafeţei cu pierderi din stratul de culoare
7. Microfotografie 40x, "Portretul lui Ştefan Luchian", inv. X 22, marginea superioară, pete şi exfolierea suprafeţei hârtiei-suport
8. Microfotografie 40x, "Portretul lui Ştefan Luchian", inv. X 22, suprafaţa hârtiei, pete şi zone cu aspect neuniform
9. Microfotografie 40x, "Încălţăminte de prizonier", inv. X 23, colţul de sus din stânga, fisuri în hârtia suport, aspecte care indică intervenţii anterioare asupra lucrării
10. Microfotografie 40x, "Încălţăminte de prizonier", inv. X 23, marginea superioară, pierderi din materialul suport
11. Microfotografie 40x, "Încălţăminte de prizonier", inv. X 23, marginea laterală din stânga, aspect neuniform
12. Microfotografie 40x, "Încălţăminte de prizonier", inv. X 23, fisură în suportul din hârtie
13. Microfotografie 40x, "Instigatorul", inv. X 26, colţul de sus din stânga, modificarea formei marginii suportului cu afectarea planeităţii
14. Microfotografie 40x, "Instigatorul", inv. X 26, marginea laterală din dreapta, modificarea formei marginii

15. Microfotografie 40x, “Instigatorul”, inv. X 26, suprafaţa hârtiei, ruptura cu pierdere din materialul suport
16. Microfotografie 40x, “Instigatorul”, inv. X 26, suprafaţă, urme de pliere cu modificarea aspectului suportului pe linia de pliere
17. Microfotografie 40x, “Tarabe la Mangalia (Pravălie la Mangalia)”, inv. X 33, colţul de sus din dreapta, neuniformitatea suprafeţei hârtiei şi pierderi din materialul suport
18. Microfotografie 40x, “Tarabe la Mangalia (Pravălie la Mangalia)”, inv. X 33, marginea superioară, neuniformitatea suprafeţei hârtiei
19. Microfotografie 40x, Tarabe la Mangalia (Pravălie la Mangalia)”, inv. X 33, marginea laterală din stânga, aspect neuniform al suprafeţei şi pierderi din materialul suport
20. Microfotografie 40x, Tarabe la Mangalia (Pravălie la Mangalia)”, inv. X 33, suprafaţa hârtiei, pete şi aspectul neuniform
21. Microfotografie 40x, “Regep Ali”, inv. X 36, colţul de sus din dreapta, pierderi din materialul suport
22. Microfotografie 40x, “Regep Ali”, inv. X 36, marginea superioară, fisură, neuniformitatea suprafeţei hârtiei şi deformarea liniară a acesteia
23. Microfotografie 40x, “Regep Ali”, inv. X 36, suprafaţa hârtiei, fisură, neuniformitatea suprafeţei
24. Microfotografie 40x, “Regep Ali”, inv. X 36, suprafaţa hârtiei, perforaţie cu pierdere din materialul suport
25. Microfotografie 40x, “Interior cu sobă”, inv. X 56, colţul de sus din dreapta, pierderi din materialul suport, neuniformitatea suprafeţei
26. Microfotografie 40x, “Interior cu sobă”, inv. X 56, marginea superioară, ruptură cu pierdere din materialul suport
27. Microfotografie 40x, “Interior cu sobă”, inv. X 56, marginea laterală din stânga, ruptură cu pierdere din materialul suport
28. Microfotografie 40x, “Interior cu sobă”, inv. X 56, fisură, neuniformitatea suprafeţei hârtiei
29. Microfotografie 40x, Studiu pentru “Grevă”, inv. X 103, colţul de jos din stânga, modificarea formei iniţiale prin pierdere de material din suport, neuniformitatea suprafeţei hârtiei
30. Microfotografie 40x, Studiu pentru “Grevă”, inv. X 103, marginea laterală din dreapta, franjurarea marginii, pierderi din materialul suport, neuniformitatea suprafeţei hârtiei
31. Microfotografie 40x, Studiu pentru “Grevă”, inv. X 103, marginea inferioară, pete de natură necunoscută, neuniformitatea suprafeţei hârtiei
32. Microfotografie 40x, Studiu pentru “Grevă”, inv. X 103, revers, exfolieri şi neuniformitatea suprafeţei hârtiei
33. Microfotografie 40x, “Peisaj cu case”, inv. X 112, colţul de sus din stânga, pierderi din materialul suport, neuniformitatea suprafeţei
34. Microfotografie 40x, “Peisaj cu case”, inv. X 112, marginea inferioară, ruptură cu pierdere din materialul suport
35. Microfotografie 40x, “Peisaj cu case”, inv. X 112, marginea laterală din dreapta, neuniformitatea suprafeţei hârtiei
36. Microfotografie 40x, “Peisaj cu case”, inv. X 112, suprafaţa hârtiei, aspectul neuniform, exfolieri ale hârtiei
37. Microfotografie 40x, “Două autoportrete”, inv. X 122, colţul de sus din stânga, neuniformitatea marginii cu pierdere din materialul support
38. 38. Microfotografie 40x, “Două autoportrete”, inv. X 122, margine, pierdere din materialul suport, perforaţie în suport
39. Microfotografie 40x, “Două autoportrete”, inv. X 122, suprafaţa neuniformă a hârtiei cu zone cu pierderi din stratul de culoare
40. Microfotografie 40x, “Două autoportrete”, inv. X 122, pete pe suprafaţa hârtiei
41. Microfotografie 40x, “Kirdjali, prizonieri în lagăr”, inv. X 125, marginea inferioară, neuniformitatea marginii suportului, exfolierea suprafeţei hârtiei, pierdere din materialul suport
42. Microfotografie 40x, “Kirdjali, prizonieri în lagăr”, inv. X 125, marginea inferioară, neuniformitatea marginii suportului, exfolierea suprafeţei hârtiei
43. Microfotografie 40x, “Kirdjali, prizonieri în lagăr”, inv. X 125, suprafaţa hârtiei, aspectul neuniform şi exfolierea stratului de culoare

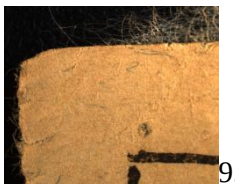
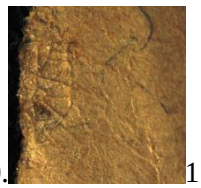
44. Microfotografie 40x, "Kirdjali, prizonieri în lagăr", inv. X 125, suprafaţa hârtiei, aspect neuniform şi pete
45. Microfotografie 40x, "Femeie în halat de casă", inv. XI 1216, colţul de sus din stânga, neuniformitatea suprafeţei hârtiei, perforaţii, pierderi din materialul suport
46. Microfotografie 40x, "Femeie în halat de casă", inv. XI 1216, colţul de jos din dreapta, neuniformitatea suprafeţei hârtiei, pierderi din materialul suport şi din stratul de culoare
47. Microfotografie 40x, "Femeie în halat de casă", inv. XI 1216, marginea laterală din dreapta, neuniformitatea suprafeţei hârtiei, perforaţii, pierderi din materialul suport
48. Microfotografie 40x, "Femeie în halat de casă", inv. XI 1216, zone cu aspect neuniform al suprafeţei hartiei, pierderi din stratul de culoare
49. Microfotografie 40x, "Fatma", inv. X 37, colţul de sus din stânga, neuniformitatea suprafeţei hârtiei, exfolieri şi pierderi din materialul suport şi din stratul de culoare
50. Microfotografie 40x, "Fatma", inv. X 37, suprafaţa hârtiei, exfolieri şi pierderi din stratul de culoare
51. Microfotografie 40x, "Fatma", inv. X 37, neuniformitatea suprafeţei hârtiei
52. Microfotografie 40x, "Fatma", inv. X 37, marginea laterală din stânga, aspectul neuniform al suprafeţei cartonului şi al marginii hârtiei caşerată pe acesta
53. Microfotografie 40x, "Reflecţii despre libertate", inv. X 124, colţul de sus din dreapta, pierdere din materialul suport cu modificarea formei acestuia, exfolieri şi aspectul neuniform al suprafeţei hârtiei suport
54. Microfotografie 40x, "Reflecţii despre libertate", inv. X 124, marginea laterală din stânga, exfolieri si aspectul neuniform al suprafetei hârtiei, modificarea planeităţii acesteia
55. Microfotografie 40x, "Reflecţii despre libertate", inv. X 124, marginea laterală din dreapta, modificarea aspectului prin pierdere de material din suport, exfolieri şi aspectul neuniform al suprafeţei hârtiei
56. Microfotografie 40x, "Reflecţii despre libertate", inv. X 124, suprafaţă, aspect neuniform al hârtiei, exfolieri
57. Șopron la țară-curte la Mangalia, inv. X 20 Ansamblu înainte de restaurare
58. Șopron la țară-curte la Mangalia, inv. X 20 Ansamblu după restaurare
59. Portretul lui Ştefan Luchian, inv. X 22 Ansamblu înainte de restaurare
60. Portretul lui Ştefan Luchian, inv. X 22 Ansamblu după restaurare
61. Încălţăminte de prizonier,inv. X 23 Ansamblu înainte de restaurare
62. Încălţăminte de prizonier,inv. X 23 Ansamblu după restaurare
63. Instigatorul, inv. X 26 Ansamblu înainte de restaurare
64. Instigatorul, inv. X 26 Ansamblu după restaurare
65. Tarabe la Mangalia (Prăvălie la Mangalia), inv. X 33 Ansamblu înainte de restaurare
66. Tarabe la Mangalia (Prăvălie la Mangalia), inv. X 33 Ansamblu după restaurare
67. Regep Ali, inv. X 36 Ansamblu înainte de restaurare
68. Regep Ali, inv. X 36 Ansamblu după restaurare
69. Interior cu sobă, inv. X 56 Ansamblu înainte de restaurare
70. Interior cu sobă, inv. X 56 Ansamblu după restaurare
71. Studiu pentru "Grevă", inv. X 103 Ansamblu înainte de restaurare
72. Studiu pentru "Grevă", inv. X 103 Ansamblu după restaurare
73. Peisaj cu case, inv. X 112 Ansamblu înainte de restaurare
74. Peisaj cu case, inv. X 112 Ansamblu după restaurare
75. Două autoportrete, inv. X 122 Ansamblu înainte de restaurare
76. Două autoportrete", inv. X 122 Ansamblu după restaurare
77. Kirdjali, prizonieri în lagăr, inv. X 125 Ansamblu înainte de restaurare
78. Kirdjali, prizonieri în lagăr, inv. X 125 Ansamblu după restaurare
79. Femeie în halat de casă, inv. XI 1216 Ansamblu înainte de restaurare
80. Femeie în halat de casă, inv. XI 1216 Ansamblu după restaurare
81. Fatma, inv. X 37 Ansamblu înainte de restaurare
82. Fatma, inv. X 37 Ansamblu după restaurare
83. Reflecții despre libertate, inv. X 124 Ansamblu înainte de restaurare
84. Reflecții despre libertate, inv. X 124 Ansamblu după restaurare

 1.  2.  3.  4.

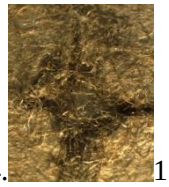
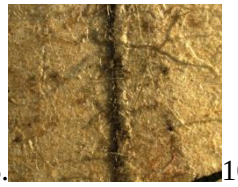
1. 40x microphotography, *Shed in the country - yard in Mangalia*, inv. X 20, upper left corner, loss of support material
2. 40x microphotography, *Shed in the country - yard in Mangalia*, inv. X 20, upper edge, loss of support material
3. 40x microphotography, *Shed in the country - yard in Mangalia*, inv. X 20, right side edge, loss of support material
4. 40x microphotography, *Shed in the country - yard in Mangalia*, inv. X 20, lower edge, stains and tidelines

 5.  6.  7.  8.

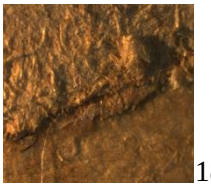
5. 40x microphotography, *The portrait of Ştefan Luchian*, inv. X 22, upper left corner, uneven appearance and fringe of the edge
6. 40x microphotography, *The portrait of Ştefan Luchian*, inv. X 22, lower right corner, fringe of the edge, uneven appearance of the surface with losses in the colour layer
7. 40x microphotography, *The portrait of Ştefan Luchian*, inv. X 22, upper edge, stains and exfoliation of the paper-support surface
8. 40x microphotography, *The portrait of Ştefan Luchian*, inv. X 22, paper surface, spots and uneven areas

 9.  10.  11.  12.

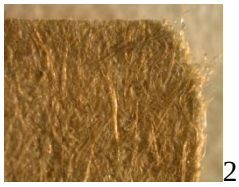
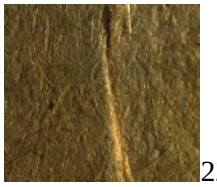
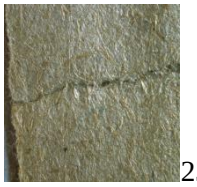
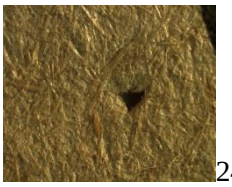
9. 40x microphotography, *Prisoner's shoes*, inv. X 23, upper left corner, tears in the support paper, aspects that indicate previous interventions on the work
10. 40x microphotography, *Prisoner's shoes*, inv. X 23, upper edge, losses from the support material
11. 40x microphotography, *Prisoner's shoes*, inv. X 23, left side edge, uneven appearance
12. 40x microphotography, *Prisoner's shoes*, inv. X 23, tear in the paper support

 13.  14.  15.  16.

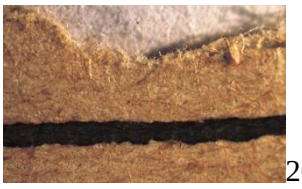
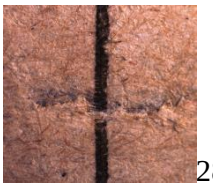
13. 40x microphotography, *Instigator*, inv. X 26, upper left corner, changing the shape of the support edge with affecting the flatness
14. 40x microphotography, *Instigator*, inv. X 26, right side edge, changing the shape of the edge
15. 40x microphotography, *Instigator*, inv. X 26, paper surface, tear with loss of support material
16. 40x microphotography, *Instigator*, inv. X 26, surface, crease with modification of the appearance of the support on the fold line

 17.  18.  19.  20.

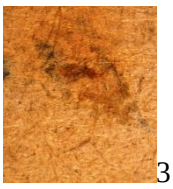
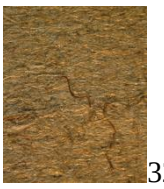
17. 40x microphotography, *Booths in Mangalia (Shop in Mangalia)*, inv. X 33, upper right corner, uneven appearance of the paper surface and losses of the support material
18. 40x microphotography, *Booths in Mangalia (Shop in Mangalia)*, inv. X 33, upper edge, uneven appearance of the paper surface
19. 40x microphotography, *Booths in Mangalia (Shop in Mangalia)*, inv. X 33, left side edge, uneven appearance of the surface and losses from the support material
20. 40x microphotography, *Booths in Mangalia (Shop in Mangalia)*, inv. X 33, surface, spots and uneven appearance

 21.  22.  23.  24.

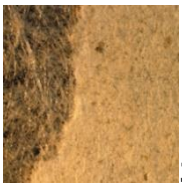
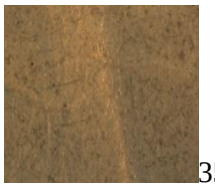
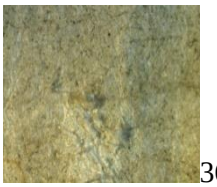
21. 40x microphotography, *Regep Ali*, inv. X 36, upper right corner, loss of support material
22. 40x microphotography, *Regep Ali*, inv. X 36, upper edge, tear, uneven appearance of the paper surface and its planar deformation
23. 40x microphotography, *Regep Ali*, inv. X 36, surface, tear, uneven appearance of the paper
24. 40x microphotography, *Regep Ali*, inv. X 36, paper surface, perforation with loss from the support material

 25.  26.  27.  28.

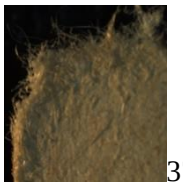
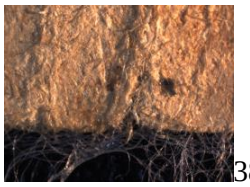
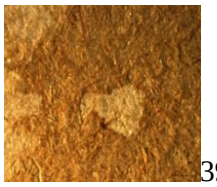
25. 40x microphotography, *Interior with stove*, inv. X 56, upper right corner, losses from the support material, unevenity of the surface
26. 40x microphotography, *Interior with stove*, inv. X 56, upper edge, tear with loss of support material
27. 40x microphotography, *Interior with stove*, inv. X 56, left side edge, tear with loss of support material
28. 40x microphotography, *Interior with stove*, inv. X 56, tear, uneven appearance of the paper surface

 29.  30.  31.  32.

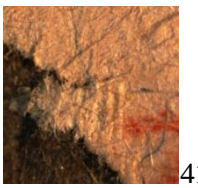
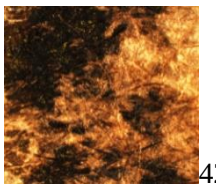
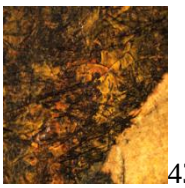
29. 40x microphotography, *Study for "Strike"*, inv. X 103, lower left corner, modification of the initial shape by loss of material from the support, uneven appearance of the paper surface
30. 40x microphotography, *Study for "Strike"*, inv. X 103, right side edge, fringe of the edge, losses from the support material, uneven appearance of the paper surface
31. 40x microphotography, *Study for "Strike"*, inv. X 103, lower edge, spots of unknown nature, uneven appearance of the paper surface
32. 40x microphotography, *Study for "Strike"*, inv. X 103, reverse, exfoliation and uneven appearance of the paper surface

 33.  34.  35.  36.

33. 40x microphotography, *Landscape with houses*, inv. X 112, upper left corner, losses from the support material, uneven appearance of the surface
34. 40x microphotography, *Landscape with houses*, inv. X 112, lower edge, tear with loss of support material
35. 40x microphotography, *Landscape with houses*, inv. X 112, right side edge, uneven appearance of the paper surface
36. 40x microphotography, *Landscape with houses*, inv. X 112, paper surface, uneven appearance, paper exfoliation

 37.  38.  39.  40.

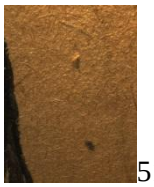
37. 40x microphotography, *Two self-portraits*, inv. X 122, upper left corner, uneven appearance of the edge with loss of the support material
38. 40x microphotography, *Two self-portraits*, inv. X 122, edge, loss of support material, perforation in support
39. 40x microphotography, *Two self-portraits*, inv. X 122, uneven appearance of the paper surface with areas with losses in the colour layer
40. 40x microphotography, *Two self-portraits*, inv. X 122, spots on the surface of the paper

 41.  42.  43.  44.

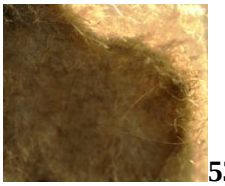
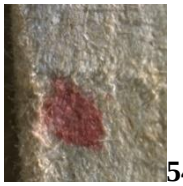
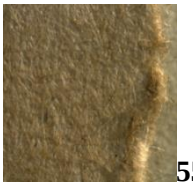
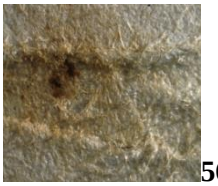
41. 40x microphotography, *Kirdjali, prisoners in camp*, inv. X 125, lower edge, uneven appearance of the support edge, exfoliation of the paper surface, loss of the support material
42. 40x microphotography, *Kirdjali, prisoners in camp*, inv. X 125, lower edge, uneven appearance of the support edge, exfoliation of the paper surface
43. 40x microphotography, *Kirdjali, prisoners in camp*, inv. X 125, paper surface, uneven appearance and exfoliation of the colour layer
44. 40x microphotography, *Kirdjali, prisoners in camp*, inv. X 125, paper surface, uneven appearance and spots

 45.  46.  47.  48.

45. 40x microphotography, *Woman in a dressing gown*, inv. XI 1216, upper left corner, uneven appearance of the paper surface, perforations, losses of the support material
46. 40x microphotography *Woman in a dressing gown*, inv. XI 1216, lower right corner, uneven appearance of the paper surface, losses of the support material and of the colour layer
47. 40x microphotography *Woman in a dressing gown*, inv. XI 1216, right side edge, uneven appearance of the paper surface, perforations, losses from the support material
48. 40x microphotography, *Woman in a dressing gown*, inv. XI 1216, areas with uneven appearance of the paper surface, loss of colour layer

 49.  50.  51.  52.

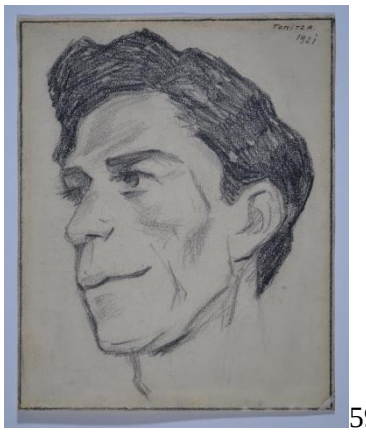
49. 40x microphotography, *Fatma*, inv. X 37, upper left corner, uneven appearance of the paper surface, exfoliation and loss of the support material and the colour layer
50. 40x microphotography, *Fatma*, inv. X 37, paper surface, exfoliation and loss of colour layer
51. 40x microphotography, *Fatma*, inv. X 37, uneven appearance of the paper surface
52. 40x microphotography, *Fatma*, inv. X 37, left side edge, uneven appearance of the cardboard surface and the edge of the paper cased on it

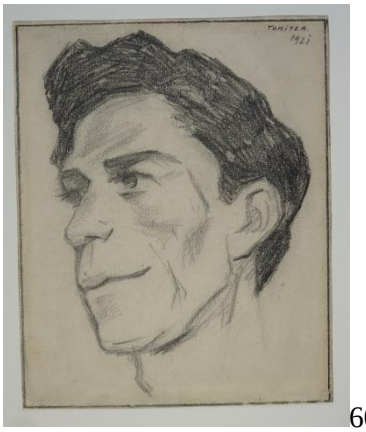
 **53.**  **54.**  **55.**  **56.**

53. 40x microphotography, *Reflections on freedom*, inv. X 124, upper right corner, loss of the support material with the change of its shape, exfoliation and uneven appearance of the paper surface
54. 40x microphotography, *Reflections on freedom*, inv. X 124, left side edge, exfoliation and uneven appearance of the paper surface, changing its flatness
55. 40x microphotography, *Reflections on freedom*, inv. X 124, right side edge, change in appearance due to loss of support material, exfoliation and uneven appearance of the paper surface
56. 40x microphotography, *Reflections on freedom*, inv. X 124, surface, uneven appearance of the paper surface

 57.  58.

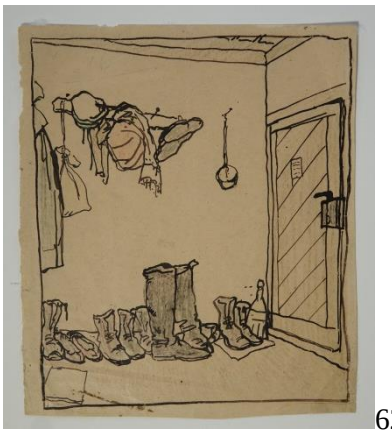
57. *Shed in the country - yard in Mangalia*, inv. X 20 Ensemble before restoration
58. *Shed in the country - yard in Mangalia*, inv. X 20 Ensemble after restoration



59. 

60.

59. *The portrait of Ştefan Luchian*, inv. X 22 Ensemble before restoration
60. *The portrait of Ştefan Luchian*, inv. X 22 Ensemble after restoration


61. 
62.

61. *Prisoner's shoes*, inv. X 23 Ensemble before restoration
62. *Prisoner's shoes*, inv. X 23 Ensemble after restoration


63. 
64.

63. *Instigator*, inv. X 26 Ensemble before restoration
64. *Instigator*, inv. X 26 23 Ensemble after restoration


65.

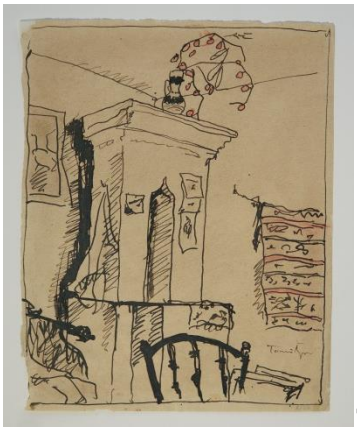
66.

65. *Booths in Mangalia (Shop in Mangalia)*, inv. X 33 Ensemble before restoration
66. *Booths in Mangalia (Shop in Mangalia)*, inv. X 33 Ensemble after restoration


67.

68.

67. *Regep Ali*, inv. X 36 Ensemble before restoration
68. *Regep Ali*, inv. X 36 Ensemble after restoration


69.

70.

69. *Interior with stove*, inv. X 56 Ensemble before restoration
70. *Interior with stove*, inv. X 56 Ensemble after restoration


71.

72.

71. *Study for "Strike"*, inv. X 102 Ensemble before restoration
72. *Study for "Strike"*, inv. X 102 56 Ensemble after restoration


73.

74.

73. *Landscape with houses*, inv. X 112 Ensemble before restoration
74. *Landscape with houses*, inv. X 112 Ensemble after restoration


75.

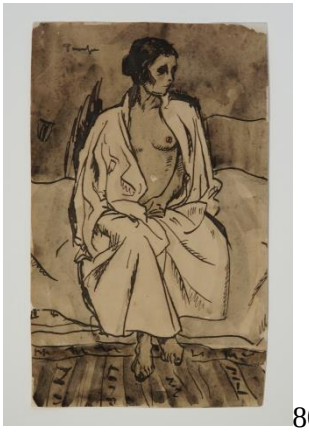
76.

75. *Two self-portraits*, inv. X 122 Ensemble before restoration
76. *Two self-portraits*, inv. X 122 Ensemble after restoration


77.

78.

77. *Kirdjali, prisoners in camp*, inv. X 125 Ensemble before restoration
78. *Kirdjali, prisoners in camp*, inv. X 125 Ensemble after restoration


79.

80.

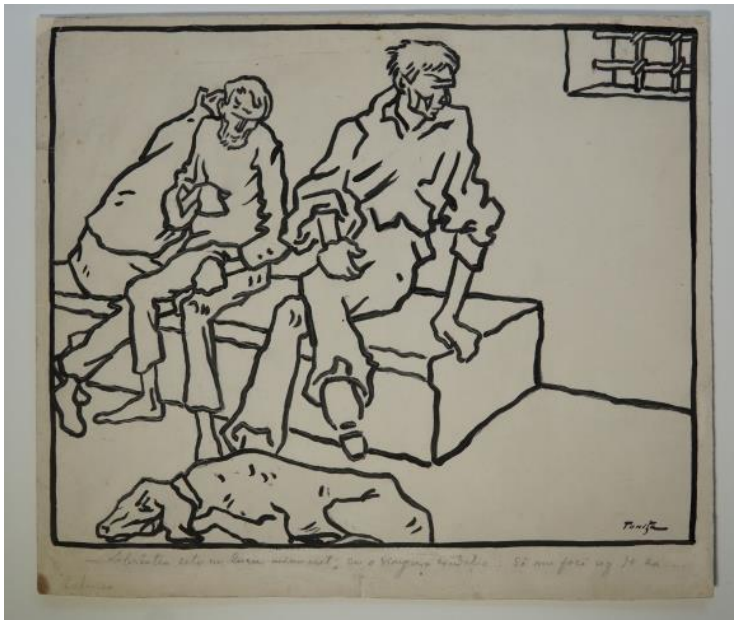
79. *Woman in a dressing gown*, inv. XI 1216 Ensemble before restoration
80. *Woman in a dressing gown*, inv. XI 1216 Ensemble after restoration


81.

82.

81. *Fatma*, inv. X 37 Ensemble before restoration
82. *Fatma*, inv. X 37 Ensemble after restoration

83. *Reflections on freedom*, inv. X 124 Ensemble before restoration



84. *Reflections on freedom*, inv. X 124 Ensemble after restoration

CACTUS SPECIOUS

Ioan MUNTEAN*

Abstract: *The painting Cactus specious made by the artist Franz Neuhauser Jr. it is atypical for his creation. The subject of this artwork is chosen as the fruit of the close connection he had for twenty years with Baron Samuel von Brukenthal, who was the owner of the painting, and it reveals Brukenthal's passion for gardening and collecting exotic plants. These plants were brought to the European continent from America, through expeditions led by the Viennese Masonic lodge "The True Concord". Specimens of the plants enter into Brukenthal's possession, aided by Viennese Masonic circles. These aspects, as well as the spectacular way in which this cactus blooms in the evening, with a large flower that has a sweet vanilla scent, make Franz Neuhauser Jr. keen to immortalize this moment.*
Keywords: *Brukenthal, Neuhauser, Selinecereus grandiflorus, gardening, freemasonry.*

Rezumat: *Lucrarea Cactus specious realizată de pictorul Franz Neuhauser jr. este atipică pentru creația lui artistică. Subiectul acestei picturi este ales ca rod al legăturii apropiate pe care a avut-o timp de douăzeci de ani cu baronul Samuel von Brukenthal, acesta fiind propietarul picturii. Pictura dezvăluie pasiunea lui Brukenthal pentru grădinărit și pentru colectarea de plante exotice. Plantele au fost aduse din America, pe continentul european și prin expediții conduse de loja masonică vieneză „Adevărata Concordie". Exemplare din plantele aduse, intră în posesia lui Brukenthal, ajutat fiind de cercurile masonice vieneze. Aceste aspecte precum și modul spectaculos prin care înflorește acest cactus, seara cu o floare mare ce are miros dulce de vanilie, fac ca Franz Neuhauser jr. să-și dorească să imortalizeze acest moment.*
Cuvinte-cheie: *Brukenthal, Neuhauser, Selinecereus grandiflorus, grădinărit, masonerie.*

The painting executed by the artist Franz Neuhauser jr., signed and dated in 1794, is one of the pieces from which we can deduce both directly and in a broader context a number of unique aspects. The author is known to be part of a Viennese painter's family, active in Sibiu in the late eighteenth and early nineteenth centuries. "*One of the most important contributions to the development of painting in Transylvania had, at the end of the eighteenth century and the first decades of the next, the Viennese painters of the Neuhauser family, settled in Sibiu in 1783: Franz Adam Neuhauser (father) and his sons Joseph (1767-1815), Gottfried (1772-1836), Johann (1774-1815) and Franz Neuhauser jr. (1763 - 1836).*" (Mesea 2012, 28). Normally, the first contact with painting, Franz Neuhauser jr. has had in his father's studio, and before settling in Sibiu we know that he attended the Art Academy in Vienna for a year. Once in Transylvania, he came in contact with Samuel von Brukenthal, who was the governor of the province at the time, and the collaboration between the two would last for 20 years, until 1803 when Samuel von Brukenthal died. One of the direct fruits of this collaboration is also the present painting. Franz Neuhauser was linked to the baron's painting collection, which he cared for as a restorer but which he also researched, together with the painter Johann Martin Stock (1742 - 1800) and they organized the first catalogue of the collection. A part of this painting collection directly influenced his artistic activity, he executed numerous copies and they served as "teaching material" in his intense teaching activity. About this didactic activity, Dr. Iulia Mesea stated: "*Neuhauser founds a private drawing school, of good quality and even reputation, if we consider the names of some of his students: Falka Samuel, future director of the imperial printing house in Pest, Kiss Samuel, Barabás Miklós, one of the most famous Hungarian painters of the 19th century, Barra Gábor, director of the lithographic workshop of the Reformed College in Cluj, Andreas Bielz, founder of one of the first lithographic workshops in Bucharest and probably Johann Böbel, painter and illustrator from Sibiu.*" (Mesea 2011, 60). Returning to the prolific artistic

* Brukenthal National Museum / Muzeul Naţional Brukenthal, ioni_muntean@yahoo.com

activity that Franz Neuhauser left behind, we notice this to be structured in two main directions. First of all, according to the customs of the time, he makes portraits in which various members of the patrician class are represented; in general these portraits are focused on the rendering of the character's physiognomy and on the details of clothing. In this field of activity he does not excel and does not rise to the artistic finesse of the portraits made by the painter mentioned above, Johann Martin Stock, so that Franz Neuhauser's name will remain known mainly for the landscape register of his artistic activity. The landscape in all its forms is present in Neuhauser's creation and because of this he is "*considered the founder of Transylvanian landscaping, his ideas and style marking all Transylvanian landscapers of the nineteenth century*" (Mesea 2011, 60).

Returning to the restored work, it is not a generic part of any of these genres mentioned above (portraits or landscapes) making it is unique for Neuhauser's artistic creation. Therefore, if we no longer find in Neuhauser's creation other paintings with the theme of still nature, we can deduce that the motivation, the impetus that determined him to make this work is elsewhere. We must first focus on the subject of this painting and notice that it is a very exotic one for that time. The plant rendered by Neuhauser is an extremely rare one for those times, *Cactus grandiflorus* or *Selinecereus grandiflorus* (Fig. 1). This flower has its origins on the American continent, being therefore extremely rare in Europe. In Vienna it is mentioned for the first time in the private seed inventory of Baron Carl von Hűgel, in 1832. Coincidentally, in Sibiu of 1794 we know about two of the "Queen of the Night" plants, one in the greenhouse of Martin Hochmeister jr., a printer and publisher about whom Lisa Fischer mentioned that: "*in August the cactus was preparing to bloom, and Hochmeister immediately told his friends and acquaintances. The plant was placed on a table and surrounded by wind lanterns, and those gathered were patiently waiting for the event that was to take place at about ten o'clock in the evening*." (Fischer 2007, 120).

About the second specimen of this species we can say that it was owned by Samuel von Brukenthal, and thus painted by Franz Neuhauser. In 1803, the year of Brukenthal's death, 150 exotic plants of American origin were inventoried. These plants were brought to Europe, first to Vienna in 1783 and 1785; with the expeditions sent by Joseph II and organized by the Masonic lodge "The True Concord". Brukenthal's connections with the Masonic brethren facilitated his supply of specimens of these new species, which have been in the inventory of the Avrig Garden since 1787 (Feyer 2008).

The state of conservation of the painting before restoration was deficient, with numerous degradations present at the level of stratigraphy. (Fig 2). The work is executed in the oil technique on canvas with thin layers of colour, superimposed, with a generally smooth appearance, only on the light area of the flower, small white reliefs being present. In carrying out the work, the painter used the brown, bolus-based preparation layer in order to obtain an isochromatic aspect. From this intermediate tone of colour, he applied thin layers of browns to achieve dark areas and colours such as ochre, green or white for the light areas. The composition of the work is a central one in which the viewer's attention is attracted by the open cactus flower.

The canvas was anchored on a wooden chassis, constructed without tensioning wedges and the trapezoidal section of its sides. The fact that the chassis was not provided with the space needed between canvas and the wooden part, determined the appearance of cracks in the stratigraphy of the painting on the inner edge of the chassis. This chassis mark is easily visible in side light. The canvas was de-tensioned, and it was not possible to tension it without the wedges. The lack of a minimum tension in the textile support amplified the network of cracks, which in some places lead to cleavages at the level of the support layer (Fig. 3). Due to improper handling, performed over time, the textile support was pierced in two places with blows from back to front. Another visible blow caused unevenness but did not pierce the support. The linen canvas was made by hand, with a medium grain and many inequalities of the threads. The coloured layers have a good adhesion to the preparation, only on the contact area with the frame there are exfoliations and gaps of it. The work was not protected by a layer of varnish and because of this the dust, smoke and adherent dirt, especially insect droppings came into direct contact with the colour layer.

The operations performed began with the photographic documentation before restoration. The main restoration operation was consolidating the textile support, which due to oxidation could no longer be properly tensioned (Fig. 4). I opted for a doubling of it by using fish glue. In choosing this type of adhesive, I also took into account the size

of the network of cracks and the stratigraphic cleavages at the level of the support. The cleaning operation was initiated by performing tests, gradually, starting from weak cleaning solutions to stronger solutions (Fig. 5). I was able to perform an optimal cleaning operation with a weak solution of ammonia water, the adherent layer of dirt being easy to remove. The areas with stratigraphic gaps were filled with putty made of calcium carbonate and rabbit glue in a concentration of 6%, and then these surfaces were sanded and brought to the level of the original colour layer. The chromatic integration of the painting was done in two stages, in imitation style: in the first stage the watercolour were used, and later after the general varnishing, the retouch colours completed the operation (Fig. 6, 7).

REFERENCES

Feyer 2008 Cornelia Feyer, *Grădini lui Brukenthal,* Sibiu, (2008).

Fischer 2007 Lisa Fischer, *Edenul de dincolo de codri: Samuel von Brukenthal. politician, colecționar, francmason la Sibiu/Hermannstadt,* Sibiu, (2007).

(Hoy 2009) Rich Hoy, *Selenicereus grandifloras*, [online] available at: https://upload.wikimedia.org/wikipedia/commons/0/07/Selenicereus_grandiflorus_Rich_Hoyer.JPG [Accessed 25 August 2021]

Mesea 2007 Iulia Mesea, *Pictori din Taransilvania în centre artistice europene,* Alba Iulia, (2007).

Mesea 2011 Iulia Mesea, *Peisagişti din sudul Transilvaniei între tradițional și modern sfârșitul sec.al XVIII-lea – mijlocul sec.al XX-lea,* Alba Iulia (2011).

Mesea 2012 Iulia Mesea, *'*Arta germanilor din Transilvania secolele *18-19' Die Kunst der Deutschen aus Siebenbürgen 18-19. Jahrhundert*, Alba Iulia (2012).

LIST OF ILLUSTRATIONS

1. Cactus Selenicereus grandiflorus, photo by Rich Hoy (Hoy 2009)
2. The work before restauration, photo by Ioan Muntean
3. The cracks network before restauration, photo by Ioan Muntean
4. Cleaning of the paintings verso, photo by Ioan Muntean
5. Cleaning test, photo by Ioan Muntean
6. Chromatic integration, photo by Ioan Muntean
7. The painting after restoration, photo by Ioan Muntean.

LISTA ILUSTRAŢIILOR

1. Cactus Selenicereus grandiflorus, fotografie Rich Hoy (Hoy 2009):
2. Lucrarea înainte de restaurare, fotografie Ioan Muntean
3. Rețeaua de cracluri înainte de restaurare, fotografie Ioan Muntean
4. Curățarea versoului lucrării, fotografie Ioan Muntean
5. Test de curățare, fotografie Ioan Muntean
6. Operațiunea de integrare cromatică, fotografie Ioan Muntean
7. Pictura după restaurare, fotografie Ioan Muntean.

 1.  2.

1. Cactus Selenicereus grandiflorus, photo by Rich Hoy (Hoy 2009)
2. The work before restauration, photo by Ioan Muntean

3. The cracks network before restauration, photo by Ioan Muntean

 4.  5.

4. Cleaning of the paintings verso, photo by Ioan Muntean
5. Cleaning test, photo by Ioan Muntean

6. Chromatic integration, photo by Ioan Muntean

7. The painting after restoration, photo by Ioan Muntean

CREATING PROPER STORAGE CONDITIONS FOR METAL HERITAGE OBJECTS IN THE HISTORY MUSEUM OF SIBIU "ALTEMBERGER HOUSE"

Răzvan MALANCA*
Raluca Maria FRÎNCU**

Abstract: *This paper illustrates the redevelopment stages of a storage for metallic heritage objects, which arose from the need for permanent preventive conservation and can be considered a second part of the general project of redevelopment and organization of the centralized storage space for heritage objects in Sibiu`s History Museum.*

Keywords*: redevelopment of storage; preventive conservation; typo-dimensioning.*

Rezumat**:** *Acest articol ilustrează etapele reamenajării unui depozit de bunuri culturale metalice, lucru a cărei necesitate a luat naștere din preocupările permanente de conservare preventivă și poate fi considerat o adoua parte a proiectului general de reamenajare și organizare a depozitului centralizat de bunuri culturale al Muzeului de Istorie din Sibiu.*

Cuvinte-cheie: *reamenajearea unui deposit, conservare preventivă, tipodimensionare.*

Introduction

This paper illustrates basic steps with complementary measures and argumentations, that were undertook during the process of creating proper storage conditions for an inventory of museum objects made out of metal, specifically iron. This project can be consider as a part of the broader and ongoing preoccupation of ensuring proper storage conditions in Sibiu's History Museum, as it was first illustrated in my 2017 article entitled: "The Preservation of Brukenthal`s Wooden Coffers Collection" (Malanca 2017, 679) as the History Museum is part of the Brukenthal National Museum Complex.

Description of the old storage

As I have showcased in my previous article, conditions in the old storage room are limited not only by the narrow space itself, but also had limitations in terms of improper shelving that did not correspond to morphological and dimensional properties of the objects they contained. It should be noted that improper storage can lead to degradation over time, that in the case of metal objects are represented by favouring oxidation of iron when in contact with wood that constantly retains or emanates humidity. The wood shelving was very shaky. It retained a lot of dust and also represented a fire hazard. Some large wooden objects were also improperly stored alongside the shelving, blocking the access way. In order to make sure that further degradation did not occur to these objects while in storage, action needed to be taken (Photo 1, 2). After meticulous planning, the objects were relocated inside the centralized storage and the old shelves were dismantled.

The Planning Process

Out of all the phases that constitute a reorganization of storage, the most important of all is the elaboration of the project. The designing faze is a complex activity, and the result is the project. The project is a set of written and drawn works in which are established not only the place where the object will be placed, but also the other information associated with this location, such as where, how, in what context, the organization, succession, etc. (Moldoveanu 2010, 213). So before any physical action could be carried out, there was some planning to be done by conducting an onsite survey to provide an overview of the collection requirements. With this in mind I began measuring at first the dimensions of the room to evaluate the space and establish basic parameters, followed by the measuring and determining the exact

* Brukenthal National Museum / Muzeul Național Brukenthal, malancarazvan@yahoo.com
**Brukenthal National Museum / Muzeul Național Brukenthal, ralucafro@yahoo.com

dimensions and morphological structures of the larger objects that were to be stored. At this point I had also established that some large metal objects were going to be moved into the new storage, so the fitting process began in accordance to their size, ensuring proper fitting through the door and making sure that enough space for manoeuvre was allowed inside the storage space when building the new shelving. Varying sizes of objects and cardboard boxes were taken into account and assigned specific placements according to their own volume and contentment weights, while making sure the space was optimized and made use of at its full capacity (Fig. 1, 2, 3) One of the most difficult decisions in organizing a storage is that of establishing the criteria on which objects are to be grouped. The great diversity of shapes and sizes of the objects that make up the museum collections requires finding the logical criteria for their grouping. Each criteria used brings advantages in terms of how they manage to address the requirements of a correct storage and answers the need of optimal, rational and complete usage of space. Out of all these criteria, typo-dimensioning makes the most sense by answering best to the heritage preservation requirements. *Typo-dimensioning* is a technique for storage of heritage goods that successively groups objects, first according to their constitutive materials nature, than in accordance to their morphological type and in the end by their forms and sizes (Moldoveanu 2010, 210, 211). The technique was conceived and applied by Aurel Moldoveanu, more than 45 years ago.

Sanitization

In accordance to preservation recommendations enforced by heritage conservation law, the storage space has been thoroughly cleaned and sanitized by washing the walls with anti mould solution followed by painting carried out by the museums specialized personnel (Photo 3, 4). Also, electrical and thermal installations were reviewed at that time.

Installations checking and maintenance

The main risk factor that was addressed was the electrical grid and installation, the way it is used by itself or by electrical consumers inside the storage. The operation of electrical installation and equipment can cause fires in any of their segments: switchboards, circuits, terminal parts such as sockets, switches, lighting fixtures, etc. Thus the following recommendations are in effect: checking the installations before switching on; making use only of electrical installations, appliances and equipment in good condition; switching off the power at the end of the day, which should be supplied separately from security systems (alarms, sensors, smoke detectors); overloading of installations beyond the permissible load must be avoided; the performance of maintenance, repairs, overhauls and upgrades shall be carried out only by authorized personnel (Moldoveanu 2010, 317). The other installation that had to be checked was the central heating system were piping should be checked for corrosion or tell-tale signs of potential failure, but the recommendations that stand are to avoid having such systems altogether inside the storage room.

Creating the new storage modules

The new shelving was divided into two main modules with various compartmentations that coincide to the larger objects specifications (proportions), ensuring a typo-dimensional storage that was thought through in advance as shown in the planning phase. I have opted for a fixed metal structure that was built and painted by museum caretaker personnel under my supervision, guidance and help, in accordance to the blueprints that I had drawn up (Photo 5-8).

Collection care

Each metal object was subjected to cleaning, starting with a superficial dusting of larger particles by means of a light brush, followed by a wet cleaning using microfiber wipes dipped in a 50% alcohol solution in distilled water (Photo 9). The objects themselves were tagged, grouped and organized into morphological and typological structures to ensure a swift relocation of a specific category by the means of a simplified table of inventory that mentions the storage shelve or box, the category of goods and their appropriate inventory number. For the tagging of objects I have made use of an automatic label maker. This allowed tagging the various objects by sticking the label onto itself as opposed to previous tagging that consisted in sticking labels onto the object (Photo 10, 11.) While these operations were carried out, the newly renovated space had the time to stabilize in terms of microclimate. A period of at least three months is necessary and enforced by heritage preservation laws for a renovated space and up to six months for newly constructed ones. Only after the walls were properly dried up and after a period of more than three months was the inventory brought into the newly refurbished space and placed into each objects designated place on the shelves. To verify the walls humidity I have used a non-invasive, dielectric, multi measure moisture meter, (humid meter) that works on the principle of electro induction,

with a measuring range between 5 and 40 mm in depth, depending on the density of the material being measured. Upon measuring, the wall was found to have 19% moisture content (Photo 12).

Monitoring

After the new storage was completed and all the work was done, came the time to make sure that the microclimate of the room was in accordance to the norm, and that relative humidity (R.H.) and temperature (T) was set and their values constantly measured. For this purpose a data logger was previously placed inside the room, one that measures said values at an interval of 30 minutes and registers its measurements in a graphic that can be later downloaded (Photo 13). On the relative humidity chart we can observe that R.H. values gradually stabilized at around 30% RH, ideal for metal objects storage (Fig. 4).

The graphic provided by the data logger (Fig.4) depicts the measurements of temperature (T) values as well as relative humidity (RH) easing up the correlation between them. We can observe from left to right (up to down) measurements taken at the moment of the refurbishment and the gradual stabilisation and continuity of stable T & RH values.

More on the collections

Sibiu was for four centuries the largest craft centre in Transylvania. In the Medieval collection of the History Museum - Altemberger House, there are many objects and products of Sibiu craftsmen, among them are the hardware objects made by local blacksmiths. The craft of iron working was widespread in everyday life, metal products being necessary for all social categories. Iron processing in the Middle Age was very large spread, especially in terms of product diversity, because of these new crafts industries that appear are more and more specialized, and depending on the needs of use and due to the development of trade, a large and varied number of products can be noticed. In 1521, the blacksmiths from Sibiu, Sighişoara and Bistriţa filed a complaint against the merchants who brought imported objects in the detriment of the local ones (Pascu 1954, 169-170). The large number of objects and products belonging to the guilds that dealt with iron processing, existing in the museum's collections demonstrate their importance locally. Along with the specific objects of the guild (coffers; signs; summoner; money box) many special products made by local craftsmen are kept - keys, padlocks, latches, wind flags, metal ornaments, doors, lanterns, metal boxes, dating from the fifteenth centuries -XIX (Beşliu 2007, 20). One of the most valuable pieces is the money box of Baron Samuel von Brukenthal, an extremely important piece in terms of artistic value but especially a memorial one. The hardware products that are kept in the collection of our museum attest to a remarkable continuity of the craft of iron processing and at the same time a special moulding of it on the known artistic styles. Researching the locksmith products from our museum's collection, we find that they are particularly ingeniously crafted and very beautifully decorated, some of them being true works of art and able to demonstrate once again the mastery of craftsmen in Sibiu.

Along with the hardware objects, another representative collection for the History Museum is the science and technology one, it includes objects belonging to fields such as optics, acoustics and time measurement. The value of this collection is constituted by the special objects that exist, among which are the tower clock mechanisms from different evangelical churches in the area – the clock mechanism of the church in Marpod, Bradu. In the 19th century, after the modernization works at the tower of the Evangelical Church in Sibiu, the two dolls from the Jaquemart type mechanism entered the collection of our museum. Also from the church in Sibiu comes the first astronomical clock that worked in our area, attested in 1784 (Wollmann 2015, 269). Along with the mechanisms for tower clocks, the collection is completed with other types of time measuring instruments such as sundials, hourglasses, table and pocket clocks (Frîncu 2016, 560). Another extremely interesting category of objects are the tools used before the introduction of the metric system, then objects used for orientation and knowledge of outer space such as the sextant, compass and the telescope. The cameras and utensils needed for image processing complete the collection. The first telephone line was opened in Sibiu in the autumn of 1895 (Sigerus 2016, 62), one of the first devices used is in our collection.

Conclusions

In conclusion, the old and dusty shelving made out of reused wood was barely suitable for storing domestic goods, yet alone heavy heritage objects made out of metal. Considering the lack of implication or care, the indifference that this objects were subjected over the last decades, or the lack of awareness of political entities that should be pri-

mary preoccupied by these problems, consisting of museum funding for heritage preservation and care, in disfavour of heritage usage and pecuniary projects, it should be also noted that museum officials are doing their best toward a successful achievement of heritage preservation, and that sadly and inexplicably are constantly being turned down by local or higher authorities. I want to thank the collections curator, my colleague Raluca Maria Frîncu, for recognizing the need to address these problems and for all of her support in seeing the project done. Credits also go to her for the detailed description of the collections being stored. With all said and done I want to finally assert that as long as we have the predilection to do less for our heritage we are passively and inadvertently contributing towards its oblivion.

.

REFERENCES

Beșliu 2007	Olga Beșliu, Raluca Maria Frîncu, *Din istoria breslelor sibiene/ Aus der Geschichte der Hermannstädter Zünfte*, Sibiu, 2007.
Frîncu 2016	Raluca Maria Frîncu, *Ceasuri de masă din colecția Muzeului Național Brukenthal-Muzeul de Istorie Casa Altemberger*, Făgăraș, 2016.
Malanca 2017	Răzvan Malanca, 'The Preservation of Brukenthal`s Wooden Coffers Collection', *Brvkenthal ACTA MVSEI*, p. 679-688, Sibiu, 2017.
Moldoveanu 2010	Aurel Moldoveanu, *Conservarea preventivă a bunurilor culturale*, Târgoviște, 2010.
Pascu 1954	Ștefan Pascu, *Meșteșugurile din Transilvania până în secolul al XVI-lea*, București, 1954

LIST OF ILLUSTRATIONS

Photo

Figure

LISTA ILUSTRAŢIILOR

Foto

Figură

1. Ansamblul schematic al noilor module pentru depozitare
2. Schema detaliată a primului modul
3. Schema detaliată a modulului doi"
4. Graficul data togger-ului ilustrând valorile de microclimat în depozit în timpul reamenajării și dealungul proceslui de stabilizare a valorilor umidității relative și temperaturii

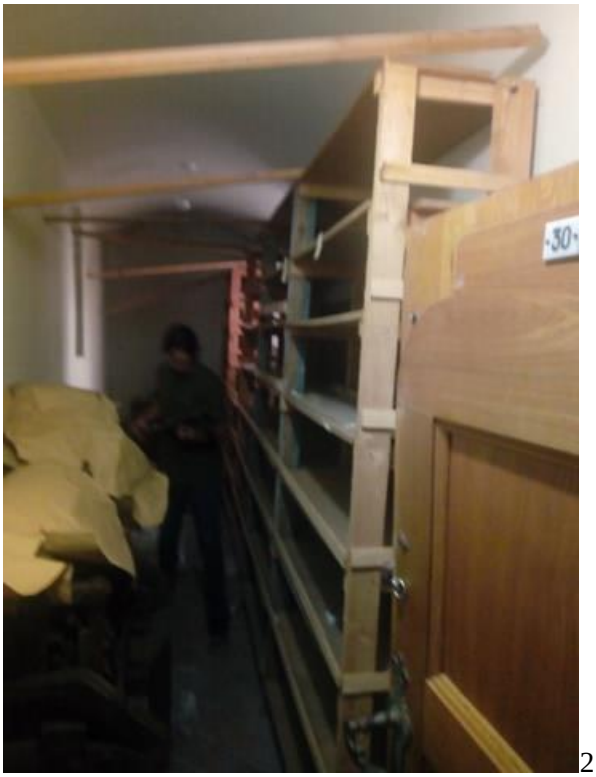

1

2

Photo 1. 2. The old storage

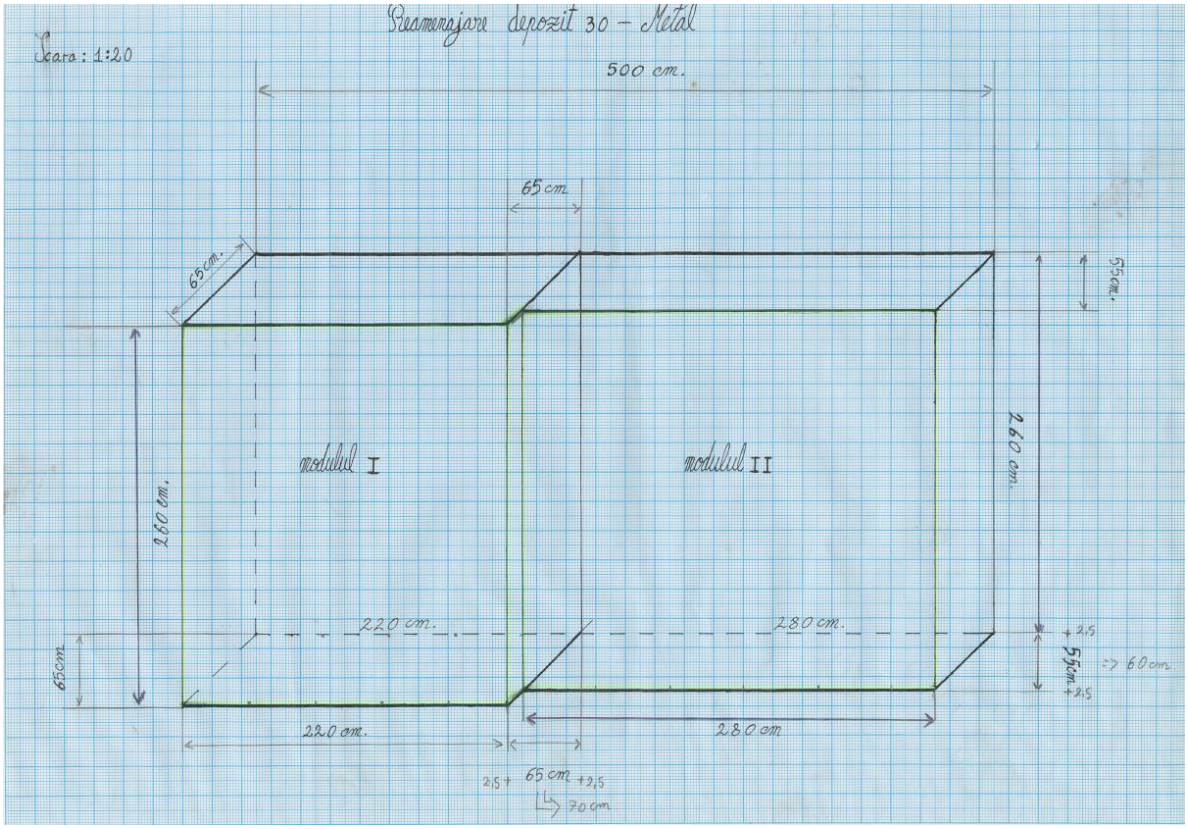


Fig. 1. Overall blueprint of the new storage modules

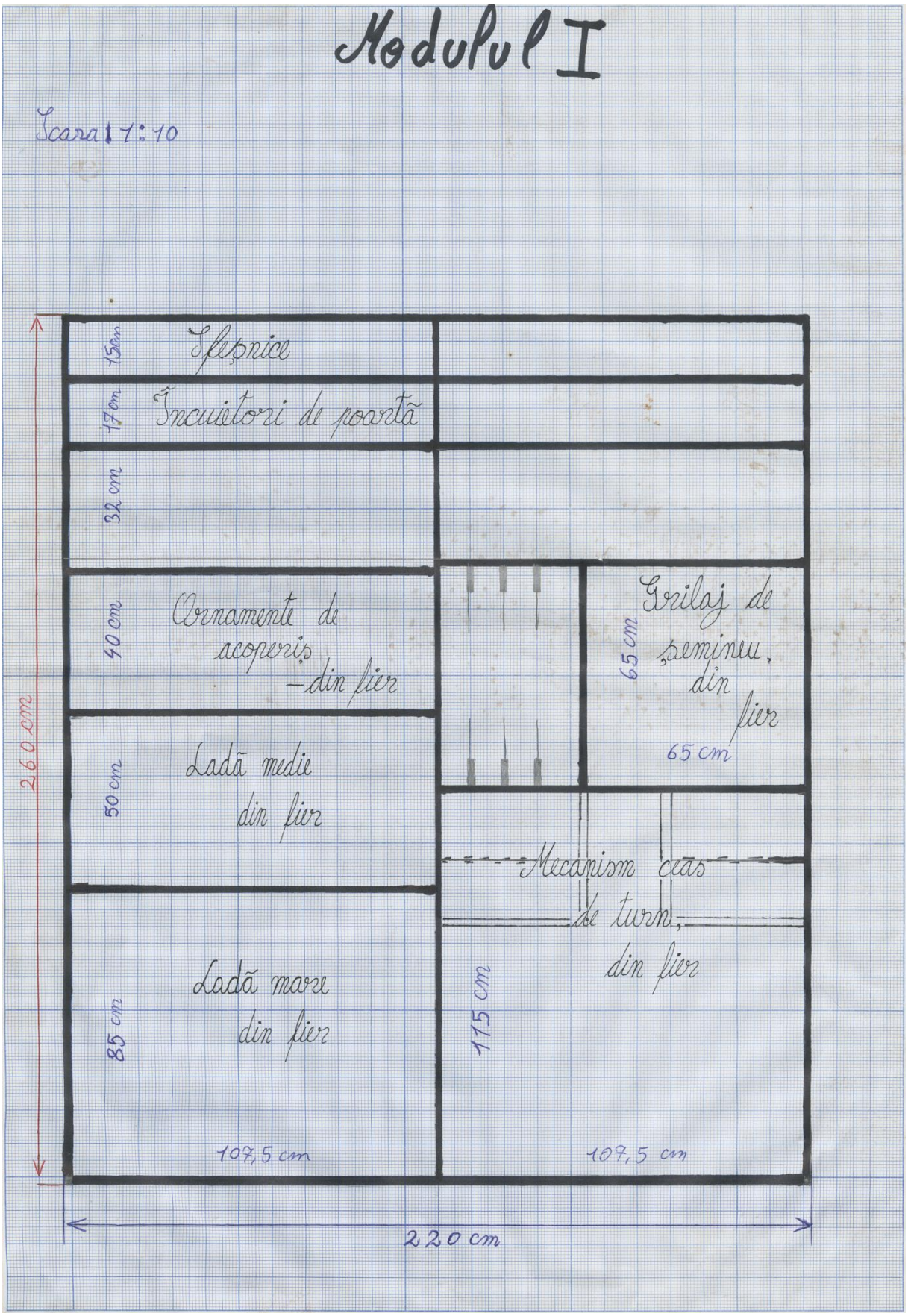


Fig. 2. Detailed blueprint of the first module

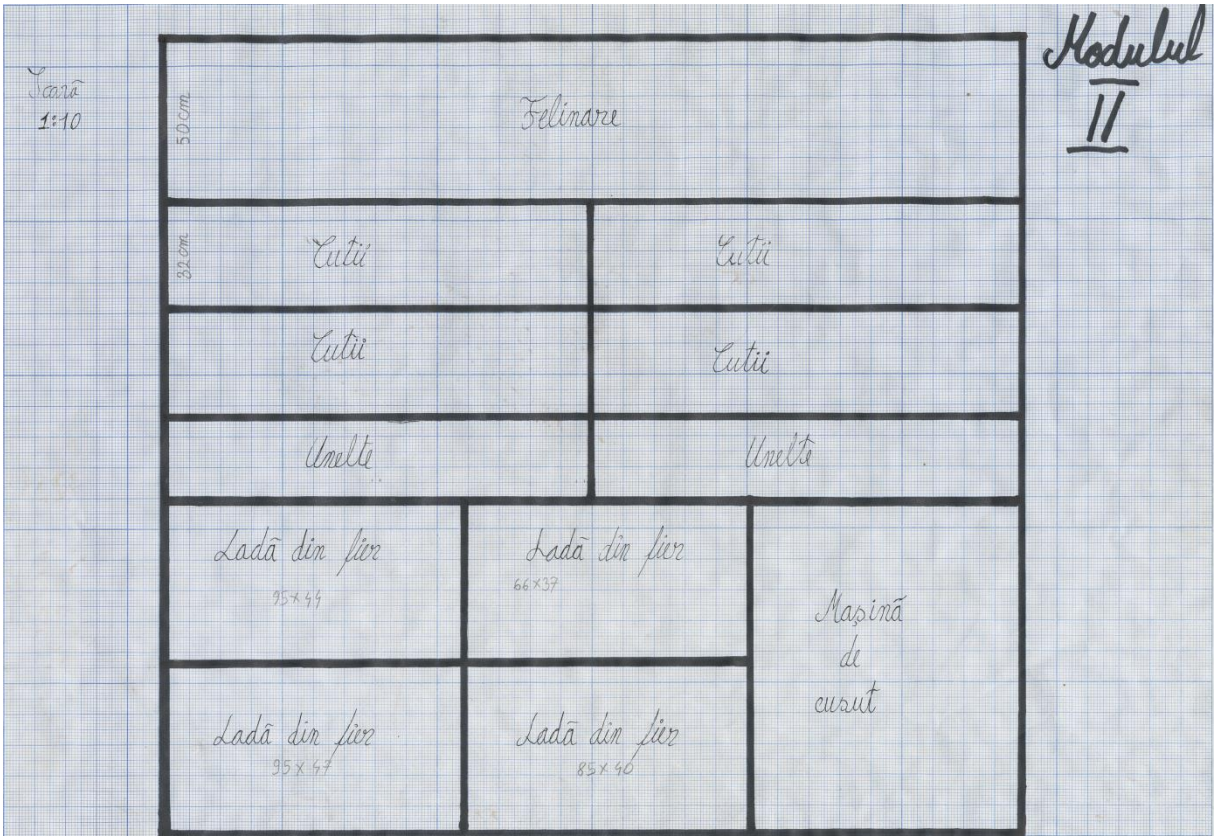
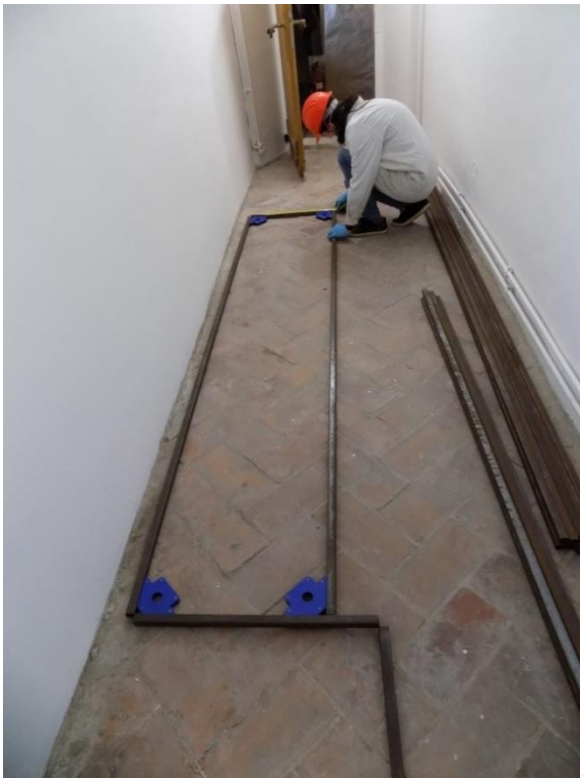
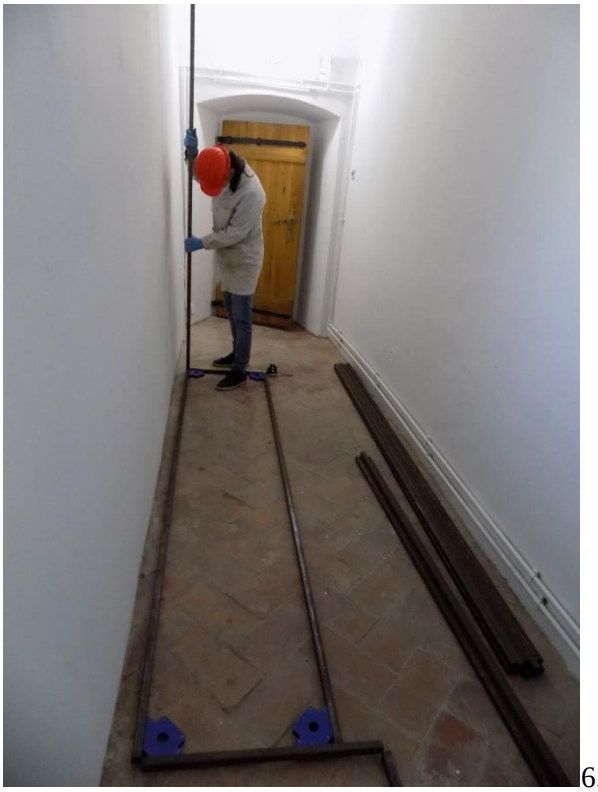


Fig. 3. Detailed blueprint of the second module


3.


4.

Photo 3. 4. Sanitization


5.

6.

7.

8.

Photo 5. 6. 7. 8. Building new shelves

Photo 9. Cleaning the objects

10.

11.

Photo 10. 11. Labeling

12.

13.

Photo 12. 13. Monitoring

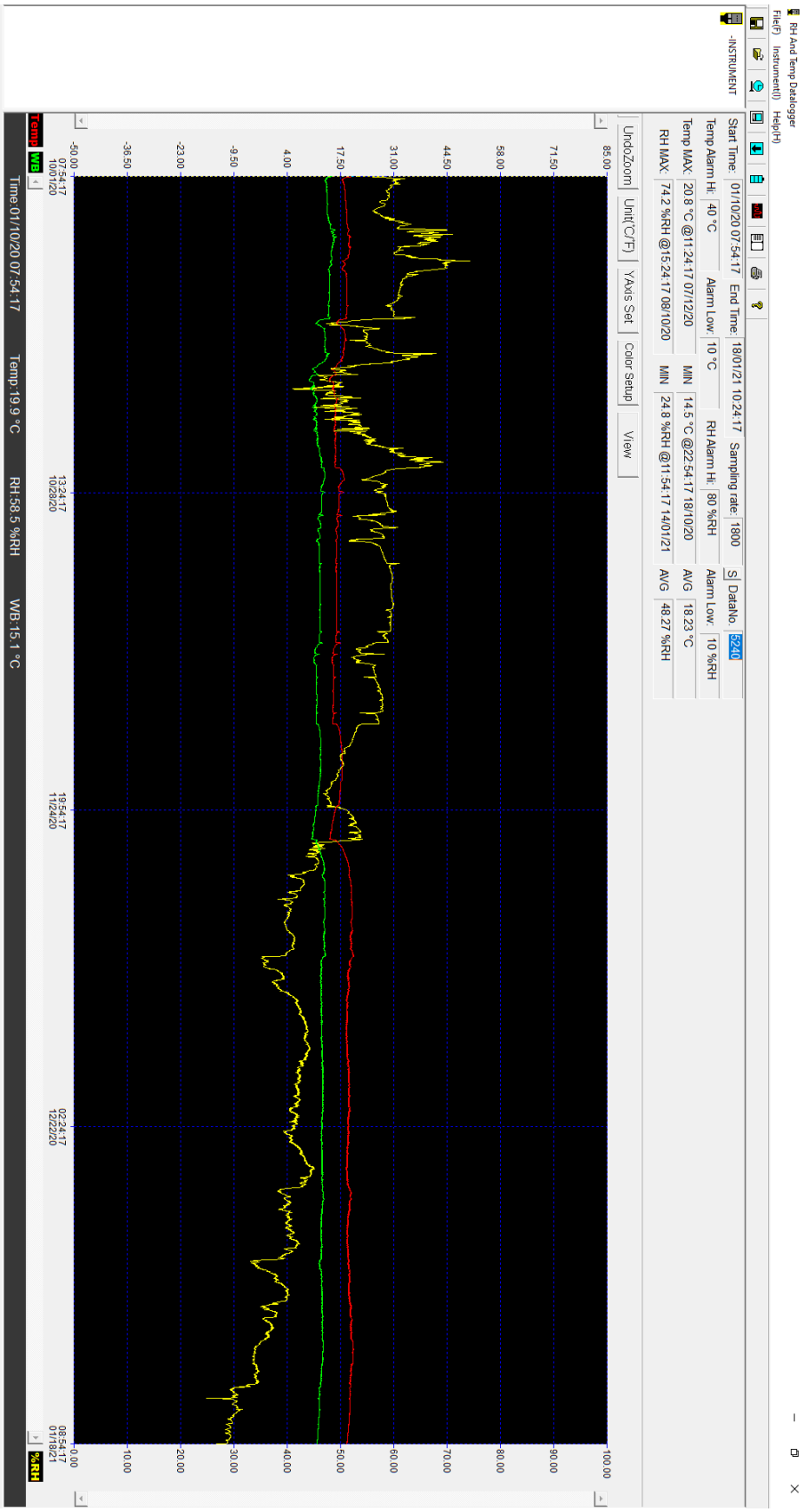


Fig. 4. Data logger graphic depicting microclimate in the metal storage during the redevelopment stages, and the stabilizations of RH and T values that followed.

Photo 14. Aspects of the new storage

Photo 15. Aspects of the new storage

FROM PSYCHROMETER TO DATA LOGGING TECHNOLOGY A BRIEF HISTORY OF PREVENTIVE PRESERVATION RELATED METROLOGY IN THE HISTORY MUSEUM OF SIBIU

Răzvan MALANCA*

Abstract: *As we get nearer to the jubilee landmark in preventive conservation, I'm proposing a reiteration of past and present instruments related to measuring temperature and humidity values in museums, with a case study on The History Museum of Sibiu past and present equipment.*

Keywords*: Preventive conservation instruments, preservation, psyhrometer, hygrometer, termohygrometer, termohygrograf, thermometer, datalogger.*

Rezumat**:** *Pe măsură ce ne apropiem de pragul jubiliar în conservare preventivă, propun o reiterare a instrumentelor, atât din trecut cât și cele din prezent, folosite la măsurarea valorilor umidității și temperaturii, printr-un studiu de caz asupra echipamentelor folosite dealungul timpului și până în prezent în cadrul Muzeului de Istorie din Sibiu.*

Cuvinte-cheie: *Instrumente pentru conservare preventivă, conservare, psihrometru, higrometru, termohigrometru, termohigrograf, datalogger.*

Introduction

Preventing deterioration is done by ensuring that the environmental, physical, and other conditions in which objects and collections are kept are appropriate to their preservation. Preventing deterioration is much more efficient and effective than rectifying the consequent damage (Keene 2002, 106). Environmental conditions for storage, transport and display should be defined, controlled and monitored. Relative humidity and violent changes in room temperature are threats to delicate materials (May, Jones 2006, 11).

The matter of preventive preservation related metrology arises the need for understanding physical effects of certain variations and the know how to make use of metric instruments that allow specialists to monitor and constantly adjust to optimum values the microclimate in which museum objects are located at any time.

As we get nearer to the jubilee landmark in preventive conservation, I'm proposing a reiteration of past and present instruments related to measuring temperature and humidity values in museums, with a case study on Sibiu`s History Museum past and present equipment.

Metrology is the science of measurements and their applications. It covers all theoretical and practical aspects of measurements, regardless of measurement uncertainty and purpose. It is part of physics that deals with accurate measurements, unit determination and measurement procedures, in all activities related to measurements, standards, measuring devices and instruments. Regarding the museum field, especially the preventive conservation of cultural artefacts, the main measurements made within the object of the field of activity aim at determining values of humidity and air temperature.

Humidity means water content. Air humidity is of particular interest in meteorology, medicine, construction, air conditioning and last but not least in the museum field, more precisely in the monitoring of the microclimate in which the objects from the museum inventory are found at any moment. For measuring air humidity, devices called hygrometers or psychrometers are used. Older models of hygrometers were based on the moisture sensitivity of a hair strand. The newest use various other methods, generally starting from the sensitivity to

* Brukenthal National Museum / Muzeul Naţional Brukenthal, malancarazvan@yahoo.com

moisture of some porous materials. Humidity recorders are widespread, usually located in air-conditioned rooms, where valuables are kept, such as museum objects, libraries and others (Millea, 2008, 116-118.).

The water vapour content in the air, or the humidity of the air, is expressed as absolute humidity or relative humidity.

Absolute humidity is the mass of water values relative to the air mass containing it. It is a value expressed in grams of water (g) per kilogram (kg) of air, (g / Kg).

Relative humidity is the ratio, usually expressed as a percentage, between the partial pressure of water vapour in a given amount of air and the pressure of saturating water vapour in the same amount of air at a given temperature.

Relative humidity is usually noted as a percentage followed by the letters RH (*relative humidity*), for example 45 % RH. In other words, the relative humidity characterizes the degree of saturation with water values of the atmosphere: 0% RH means absolutely dry air, and 100% RH means saturated air with water values (maximum humidity). If the saturation point is reached, the condensation phenomenon occurs and water vapour begins to turn into liquid water (drops).

The degree of saturation of the air with water values depends largely on the temperature, the two values being in a relation of inverse proportionality. Thus, an atmosphere that is saturated (100% RH) at 10 °C will be relatively dry and (19% RH) at 38 °C at the same vapour content. Because of this, in many cases absolute units are preferred, or most often *the dew point*, i.e. the temperature at which condensation takes place. In current parlance, "air humidity" or "atmospheric humidity" means relative humidity. At the same time, air that is too dry can be harmful to objects in storage, especially in enclosed and heated rooms, were the relative humidity can reach well below the ideal value in winter time. Books in libraries, furniture, antiques, paintings, musical instruments, etc. they can be affected and damaged over time just by being placed inside a microclimate were the air is too dry. Too little moisture prevents a normal electrostatic balance of objects in a room from being reached. It can be stated that the value of 50% RH, with maximum deviations of ± 10% RH, is ideal both for health and for the proper functioning and storage of most objects, equipment, etc. (Millea, 2008, 116- 118). Preservation and museum planning prepares comprehensive concepts in the sector of preventive conservation. A key point here is the monitoring of environmental conditions. Museums endeavour to keep their rooms as climatically stable as possible in order to protect the cultural assets stored there. For most of the objects in storage, a relative humidity of between 45% and 55% has proven suitable (Lerber 2011, 1). If necessary, this value can be maintained with the help of devices called *air humidifiers*, used to increase the degree of saturation, and with the help of *dehumidifiers*, used to restore the microclimatic balance when the relative humidity values exceed the permissible higher values (Millea 2008, 116- 118.).

The **PSYCHROMETER** - The term "psychrometer" was patented in the year 1818 by Ernst Ferdinand Augusta, a German inventor, and it is derived from the Greek word for "cold measure". It is a versatile instrument (both hygrometer and thermometer) used to determine the atmospheric humidity and to measure the air temperature, being able to establish the correlation between the two values according to predetermined diagrams (Foto 1, 2). There are also aspiration psychrometers, which are used to determine the maximum and minimum temperature values in a given time interval. In the image noted (Fig.1) you can see the *Asmann* type psychrometer and the technical blueprint of this instrument that has been widely used in our country. The instrument in the image was used in the second half of the last century, in the museum where I work today as a preservation specialist, the *„Altemberger House"* History Museum, in Sibiu. The instrument was used for checking and calibrating thermohygrographs that were placed in the exhibition spaces and to determine values of temperature and humidity in the storage rooms. The psychrometer consists of two thermometers mounted in parallel, having at the top the ventilation device provided with a tension spring. One of the thermometers has the mercury reservoir in a cotton or gauze sleeve with a length of 3-4 centimetres, a sleeve that needs to be dampened during the use of the instrument, which gives it the name of *wet thermometer*. The operation principle of the instrument consists in lowering the temperature of the wet thermometer as a result of water evaporating from the sleeve area. The rate of evaporation of water, and therefore the decrease in temperature, will be determined by the values of relative humidity, as follows: if R.H. of the air is high, a small amount of water will evaporate and the temperature will register a lesser drop in value. If the values of R.H. are low, the evaporation rate will be

high and the temperature will decrease proportionally.

The accuracy of this instrument gives it the status of a standard for metrological calibration of other instruments used to measure relative humidity values, such as the thermohygrometer and thermohygrograph. A working standard is a standard commonly used to calibrate or verify measuring instruments or systems. An international standard is a standard recognized by the signatories of an international agreement and intended for worldwide use. Standardized reference data are provided by a recognized authority, which are linked to a property of a phenomenon, body or substance or a system of components with a known composition or structure, obtained from an identified source, critically evaluated and verified in terms of accuracy.

For the efficient use of the psychrometer in order to obtain a record of the values of R.H. as accurate as possible, Aurel Moldoveanu recommends the following:

- Keeping the cotton sleeve with which the wet thermometer is moistened as clean as possible, as dust, but especially greasy deposits can spoil the results;
- The use of deionized or distilled water, because tap or river water will lead to the crystallization of mineral salts, a phenomenon that will change the readings;
- Ensuring the thermodynamic balance of the water used, as well as the instrument itself. Only water acclimatized to the environment in the space where the determinations will be performed will be used;
- Make sure that both thermometers indicate equal values before starting the operation;
- The complete turning of the ventilation spring to ensure operation for at least 4 minutes;
- Keeping the instrument away from the body and breath of the person handling it. It is recommended to be held with outstretched arms at eye level so that the values indicated by the wet thermometer can be read;
- During the operation of the instrument, the temperature of the humid thermometer will be monitored to record the lowest value for calculation. Under no circumstances should the value of the wet thermometer be recorded after the ventilation device has stopped. The final measured value will be given by the arithmetic mean of three consecutive samples, made in an interval of 16-20 minutes;

Determination of R.H. values with the psychrometer

- The temperature indicated by the dry thermometer is recorded;
- The instrument is switched on;
- The lowest value of the wet thermometer is recorded;
- Subtract the value indicated by the wet thermometer from that indicated by the dry thermometer;
- The diagram is opened on the page where the temperature indicated by the dry thermometer is found;
- Look at the top of the table for the figure showing the temperature difference between the two thermometers, resulting from the previous calculation.;
- Go down the column until you find in the horizontal plane the value of the dry thermometer, and in the respective field you will find the resulting value of R.H. (Moldoveanu, 2010, 90,91,92).

The **HYGROMETER** – is an analogue instrument for measuring relative humidity values, composed of two main bodies (Photo 3, 4): the dial containing the measurement scale, with values between 0 and 100% and the body that stores the operating mechanism of the cursor in the dial (Fig.2). This mechanism is comprised between two parallel metal strips, approximately 30 centimetres long, arranged successively in a frontal position, with openings on the left and right sides. In the place between the two flat metal bands, a thin strand of human hair is found tensioned in an upward position, blond hair is regularly used because of its higher hygroscopicity that makes it more sensitive than in other cases. In 1783, the Swiss physicist Horace Bénédict de Saussure built the first hygrometer using human hair to measure humidity. Tensioning the hair strand is achieved by a simple system of counterweights or small pulleys and bimetallic lamellar springs, of a very fine mechanics. The side openings allow the hair to communi-

cate with the ambient air from the place where the measuring instrument is placed. Depending on the amount of moisture in the air, the hair will react by absorbing or desorbing moisture, varying subtly in size, a variation that is translated by the mechanics behind the cursor needle over the graduated scale of the dial, thus indicating the value of relative humidity in the environment, at any given time the instrument is checked. Coupled with an alcohol (Fig. 5.) or mercury thermometer, the device becomes a thermohygrometer, but the relative humidity and temperature values can only be correlated when the indicated values are read. It is not necessary to detail the principle of operation of a thermometer.

The **TERMOHYGROGRAF** – is the device that constantly records the values of relative humidity and ambient temperature, translating the measured values on a diagram wrapped on a rotating drum, in the form of graphical oscillations drawn over the diagram marked with values (Photo 6, 9). The mechanism that drives the drum is similar to that of the clock, requiring its periodic tensioning in order to put the device into operation. The principle of operation is similar to those of hygrometers, the thermohygrograph being equipped with two slider rods, both with nibs at the tip, driven by levers connected to systems sensitive to variations in the ambient air.

The **TERMOHYGROMETER** – is the first step taken towards the digitization of microclimate values measurements in museum spaces. It is mainly a plastic case, battery powered digital device with internal or external wired sensors that are sensible to temperature and humidity changes. The device is able to show in real time the measured values on a liquid crystal digital screen, the downside being it is not an instrument that also records its readings. The values are periodically read and the data is introduced into an Excel table that generates a graphic (Fig.3). One feature that puts the preserver at an advantage is the ability to set up sensors in hard to reach or enclosed environments or showcases allowing the main body of the thermohygrometer to be placed out of sight, or at easy access points for reading shown values. Such devices are still currently in use in Sibiu`s History Museum (Photo 7).

The equipment presented so far was the state-of-the-art technology used for preventive conservation in museums in the second half of the twentieth century and even in the first decade of the twenty-first century, with examples coming entirely from the Brukenthal National Museum. The technological evolution of metrological equipment has facilitated in recent years the endowment of the museum with more compact and more efficient equipment. Thus, nowadays the *„Altemberger House"* History Museum has 25 data logger devices, such devices being purchased for the entire Brukenthal Museum complex.

The **DATALOGGER** - refers to a digital, battery powered device, equipped with built-in sensors and a microprocessor to monitor and record data such as temperature and relative humidity values at any given time in a closed environment. Additional sensors can be added to some devices, extending their range and allowing measurements to be taken from the outside of the space where the device is placed. Probe sensors are smaller than the loggers themselves and can be placed into hard to access locations such as inside a sealed case with the sensor cable leading to the logger on the case exterior where it is accessible for downloading. Data logging devices usually come with their own software used to initiate and set parameters for monitoring, downloading, viewing and analysing recorded data. The logger delivers highly precise and reliable data recordings (Arenstein et al. 2011, No.3).

Companies nowadays offer large varieties of data loggers and to be able to select which data logger is best suited to your measuring tasks, they offer an easy way to do just that. You have the choice between different casings, battery capacities and sensors (Lerber 2011, 1).

The following information was obtained from of various such equipment specification sheets that mainly have the same purpose. The comparison itself was undertook by conservation specialists at the American Museum of Natural History and National Park Service, and presented in their publication named *„The Conserve O Gram"* with the title: *„Comparing Temperature and Relative Humidity Dataloggers for Museum Monitoring"*. Overlaying their result with our own equipment for data logging (Photo 8), I had found them to be very similar in terms of specifications, thus rendering various data logger functions and features to be more or less general. Variations may occur in terms of operating systems and overall structures.

The operating range of a data logger is determined by sensor type and quality. Manufacturers specify range using different terms (e.g. operating, working, reading, or sensor range) but they are not necessarily synonymous. Specification sheets may use one term to indicate the physical limits to which a

unit can be exposed, and another to indicate the working range for the sensor. Loggers usually have functional ranges beyond the temperatures expected in a collection environment and may even function during heat or freeze treatments. The calibration of your unit can be checked using small chambers and saturated salt solutions. Use this procedure before installing newly purchased units. Discard inexpensive units that are found to be inaccurate, as recalibration is not cost efficient. Battery life is a function of battery type and the sampling rate. A logger set to read every five seconds will not last as long as one sampling every hour. Specifications are usually based on a moderate sampling rate (i.e., sampling every 20 - 30 minutes) as is generally recommended for long-term collections monitoring. Features such as various types of displays and alarms also impact battery life. Loggers have non-volatile memory, which means that data is saved even if the battery is removed or dies. For general trend monitoring, a logger should have enough battery life to provide one full year of monitoring. Memory capacity is impacted by the sampling rate. Memory capacity is listed by the number of paired readings (T and RH readings) while others list the total number of individual readings. To compare these figures, divide this total by the number of operating channels, which is generally two: one for T and one for RH. Some loggers allow extra channels to be enabled for additional features (external probe) or other types of readings (light). If more channels are activated, fewer sets of readings will be collected. To facilitate comparison, all product specifications have been translated into the number of pairs of T and RH readings. Some loggers are given a basic, one point calibration, generally performed at room temperature and 50% RH, guaranteeing that the logger will be accurate at a mid-range RH. A logger calibrated at two or more points is checked at an additional low or high RH level and is more likely to take accurate readings across its range. Loggers are factory tested for accuracy within the manufacturer's specifications, which is generally sufficient for collections monitoring. Electronic sensors are more durable and have faster response times than hair hygrothermographs or hygrometers but they also require periodic recalibration. Manufacturer recommended recalibration times range from 6 months to 3 years, with most advocating annual calibration. Some loggers allow the user to compensate for minor sensor drift by recalibrating the unit using accompanying software or adjusting the data in the software after download. Most, however, must be sent back to the manufacturer if they are not performing within their accuracy parameters.

To compare the combined impact of memory capacity and sampling rate, the loggers were launched for a 15-minute sampling period. The duration that the logger can run at this interval before reaching memory capacity is listed. Alternative data is provided for the few loggers, where 15 minutes was not a selectable option. Most loggers allow the user to set the sample rate (how frequently a T and RH reading is taken) during the launch process. Intervals range from 1 second to 24 hours, lasting days or years. Users can also select various start and stop options during the launch.

All loggers offered at least two of the following activation options:

• immediate launch

• delayed start: user sets date and time in the future

• trigger or push button: user activates logger or uses a magnet to trigger the logging process

Users can determine if the logger stops record-ing when the memory is full or overwrites earlier data to continue recording. If the former option is chosen, downloads should take place before the memory reaches capacity to ensure that there is no gap in monitoring. If the latter option is selected, download the logger regularly to ensure that data is not lost. During the launch process, many loggers allow users to input upper and lower limits of a target range. If the parameters are exceeded, an alarm setting will be activated resulting in a visible alert. This feature indicates that an environmental event occurred and data should be downloaded and reviewed. Note that alarms negatively impact battery life.

Loggers offer a LCD screen for a visible display of real-time data. This is useful for checking current conditions without downloading data. However, if the logger is not in a readily visible or frequently accessed location, or real time readings are not needed, this feature may not be worth the corresponding drain on battery life.

Size may be a determining factor in monitoring inside storage cases, dioramas and shipping crates. Casings are normally made of hard plastic but colours and shapes vary. The compact size of the loggers allows them to be placed unobtrusively inside the display cases, but larger loggers are more easily secured in place. This comes as a huge ad-

vantage in comparison with the large, cumbersome build of a termohygromether.

Most data loggers can be downloaded while in use. This function allows for data backup or retrieval from the logger without relaunching. Monthly downloads on a logger without this capacity will result in 12 short graphs. Loggers that continue logging during the data retrieval process provide a single, long dataset. This avoids spending time organizing or combining multiple data sets. The *Overlay Graphs for Comparison* is a key feature that allows for easy visual comparison of the conditions of different monitored spaces (Fig. 4). Data on standalone loggers is retrieved by connecting *in-situ* to a laptop or bringing the unit to a desktop computer. If this is impractical, consider loggers that provide alternative down-load methods such as an option to download using a flash drive or proprietary data collection device. A few of the loggers listed in this *COG* have wireless functionality or related wireless models which is noted when applicable. Most companies provide free software upgrades over time, but there is still the need for confirmation that the logger software is compatible with a Microsoft Windows platform (Arenstein et al. 2011, No.3).

The data loggers used today in Sibiu`s history museum provide to the preservation specialists with accurate data recordings and easy to read and compare microclimatic graphs. The devices themselves are daily read when showing real time values of temperature and humidity, so that the humidifiers or dehumidifiers are put into use according to said values. The microclimate graphs are downloaded periodically and store in archive, after giving a sense of microclimatic stability in museum spaces.

All of the older analogue instruments, presented in this paper, are to be registered in the *Modern and Contemporary* collection of the History Museum in Sibiu

.

REFERENCES

Arenstein et al 2011 — Rachael Perkins Arenstein, Samantha Alderson, *Conserve O Gram 3/3 - Comparing Temperature and Relative Humidity Dataloggers for Museum Monitoring* [online] available at: http:// www.nps.gov/history/museum/publications/conserveogram/cons_toc.html

Bancea 2009 — Olga Bancea, *Îndrumător ventilații, Determinarea umidității relative a aerului cu psihrometrul* "ASSMAN", No. 5., editura Politehnică, Timișoara, 2009.

Keene 2002 - — Suzanne Keene, *Managing Conservation in Museums,* Second edition, Butterworth-Heinemann, Great Britain, 2002.

Lerber 2011 - — Karin von Lerber, *Climate monitoring at the historic Zurich medical collection* 2011, [online] available at: http://www.msr.ch/en/fields-application/climate-monitoring-preventive-conservation-MSR145.html

May, Jones 2006 - — May, Jones *Conservation Science, Heritage Materials*, Edited by Eric May and Mark Jones, The Royal Society of Chemistry, 2006.

Milea 2008 - — Aurel Milea, *În lumea măsurărilor şi a unităţilor de măsură*, Editura AGIR, Bucureşti, 2008,

Moldoveanu 2010 - — Aurel Moldoveanu, *Conservarea Preventivă a Bunurilor Culturale*, Ediția a IV-a revizută și adăugită, Editura: Cetatea de Scaun, Târgoviște, 2010.

LIST OF ILLUSTRATIONS

Photo

1. "Asman" type psychrometer - from the Brukenthal National Museum, History section.
2. Diagram for measuring with the psychrometer
3. H1 hygrometer - type A, analog instrument, manufactured in Sibiu
4. "Prazisions" hygrometers - equipped with a common mercury thermometer, becomes a thermo-hygrometer
5. Alcohol thermometer, used in the past at the Brukenthal National Museum to determine the temperature values in storage and exhibition spaces - 1960
6. Thermohygrograph
7. Digital thermohygrometer
8. Data logger
9. Microclimate graph recorded with thermohygrograph

Figure

1. The "Asman" type psychrometer – (sketch after the Bancea)
2. Operating principle of hygrometers
3. Microclimate graph made manually after entering in Excel the data indicated by the digital thermo-hygrometer
4. Microclimate graph generated by the data logger software according to the recordings

LISTA ILUSTRAŢIILOR

Foto

1. Psihrometrul de tip "Asman" – din dotarea Muzeului Național Brukenthal, secția Istorie.
2. Diagrama pentru măsurarea cu psihrometrul
3. Higrometru H1 – tip A, instrument analog, fabricat la Sibiu
4. Higrometre "Prazisions"– dotat cu termometru cu mercur de uz comun, devine termohigrometru
5. Termometrucu alcool, folosit în trecut la Muzeul Național Brukenthal pentru determinarea valorilor temperaturii din spațiile de depozitare și cele expoziționale – 1960
6. Termohigrograf
7. Termohigrometru digital
8. Datalogger
9. Grafic de microclimat înregistrat cu termohigrograful

Figură

1. Psihrometrul de tip "Asman"- schiță după Bancea.
2. Principiul de funcționare al higrometrelor
3. Grafic de microclimat realizat manual după introducerea în Excel a datelor indicate de termohigrometrului digital
4. Grafic de microclimat generat de softwareul dataloggerului conform înregistrarilor

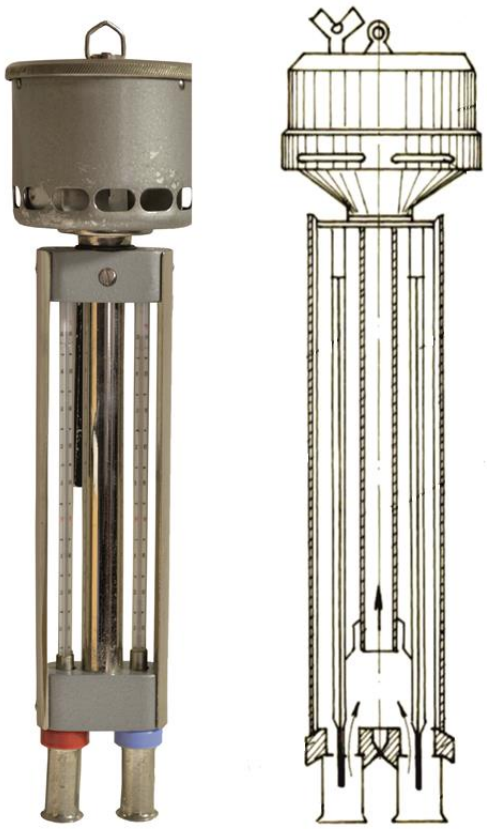


Fig. 1. The “Asman” type psychrometer – (sketch after the Bancea, 2009)

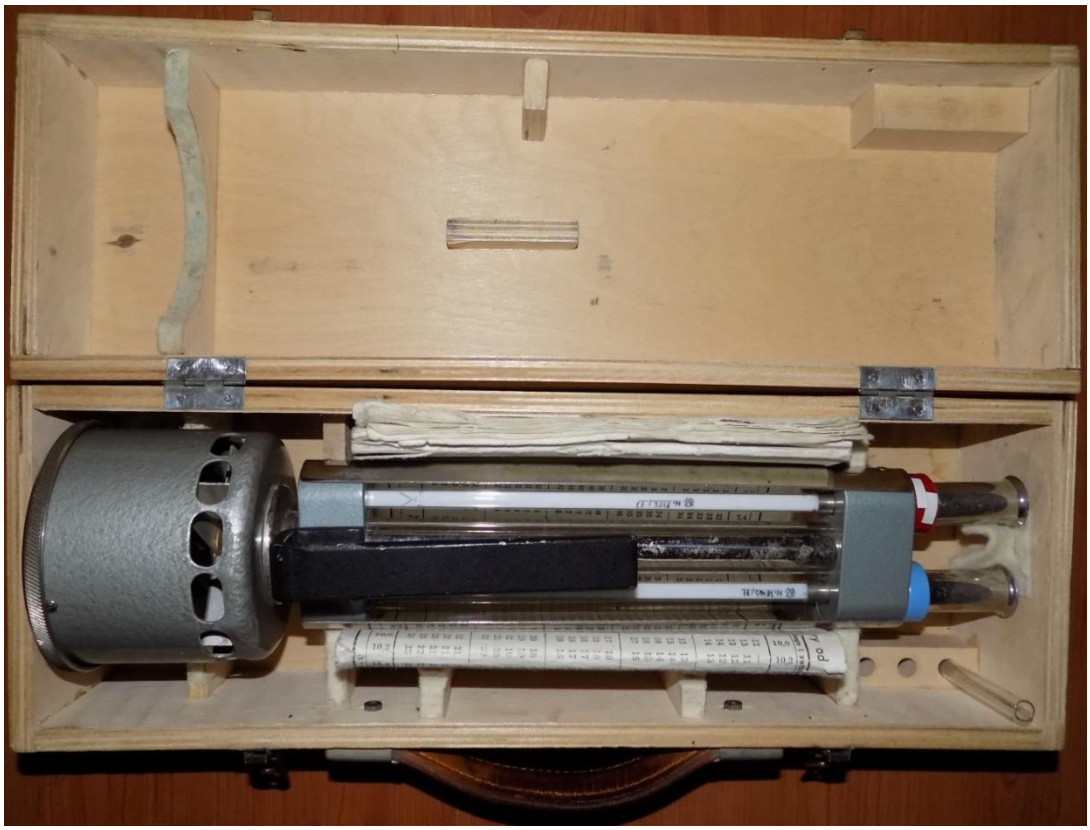


Photo 1. “Asman” type psychrometer - from the Brukenthal National Museum, History section.

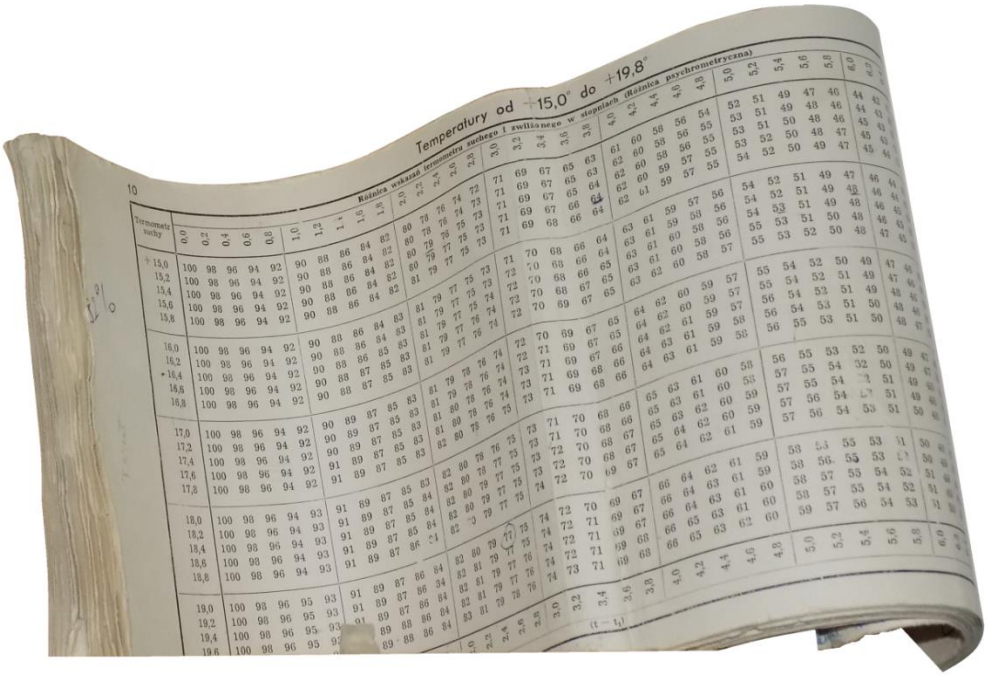


Photo 2. Diagram for measuring with the psychrometer

Photo 3. H1 hygrometer - type A, analog instrument, manufactured in Sibiu

Photo 4. "Prazisions" hygrometers - equipped with a common mercury thermometer, becomes a thermohygrometer

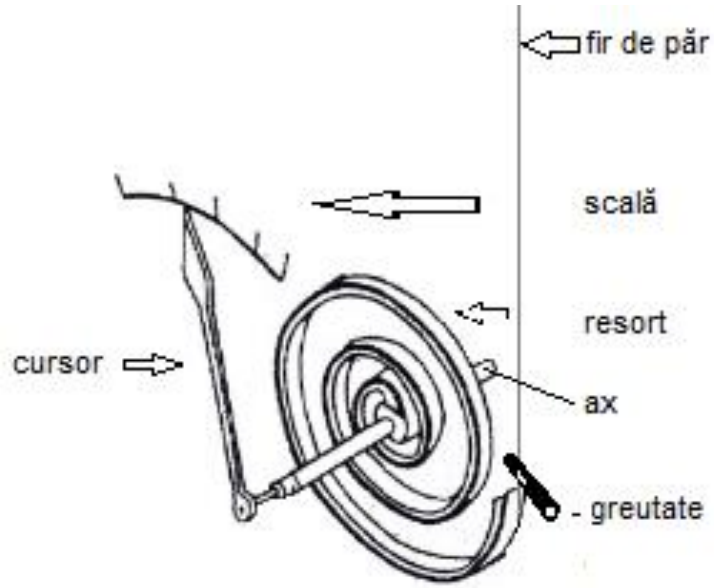


Fig.2. Operating principle of hygrometers

Photo 5. Alcohol thermometer, used in the past at the Brukenthal National Museum to determine the temperature values in storage and exhibition spaces - 1960

Photo 6. Thermohygrograph

Photo 7. Digital thermohygrometer

Photo 8. Datalogger

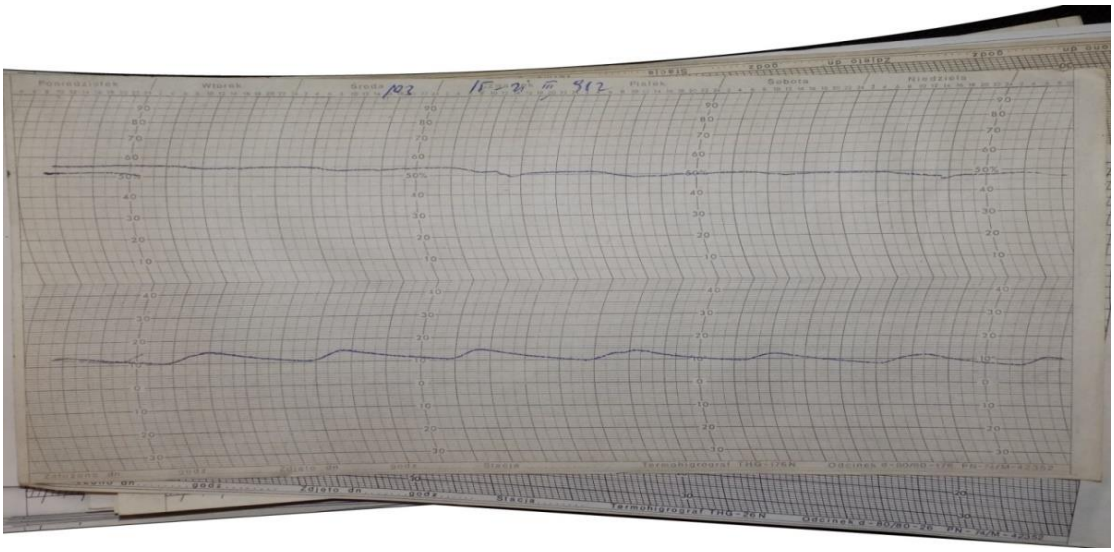


Photo 9. Microclimate graph recorded with thermohygrograph

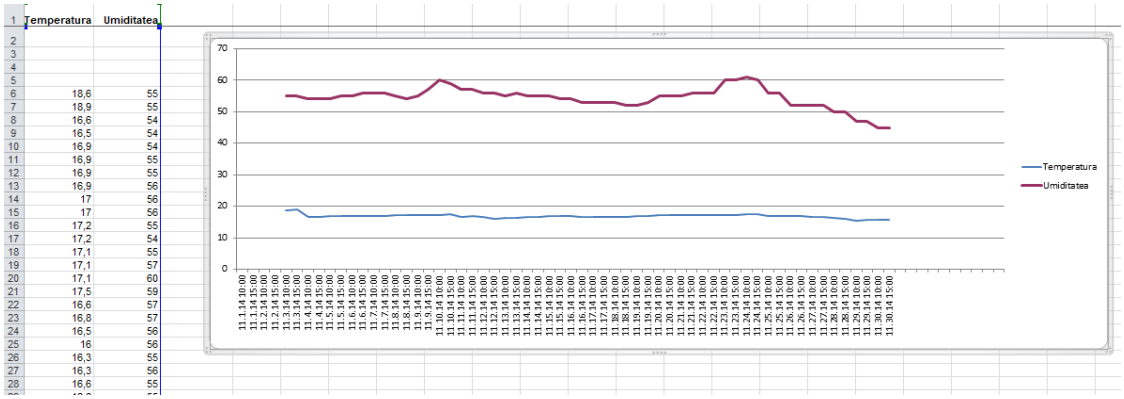


Fig. 3. Microclimate graph made manually after entering in Excel the data indicated by the digital thermohygrometer

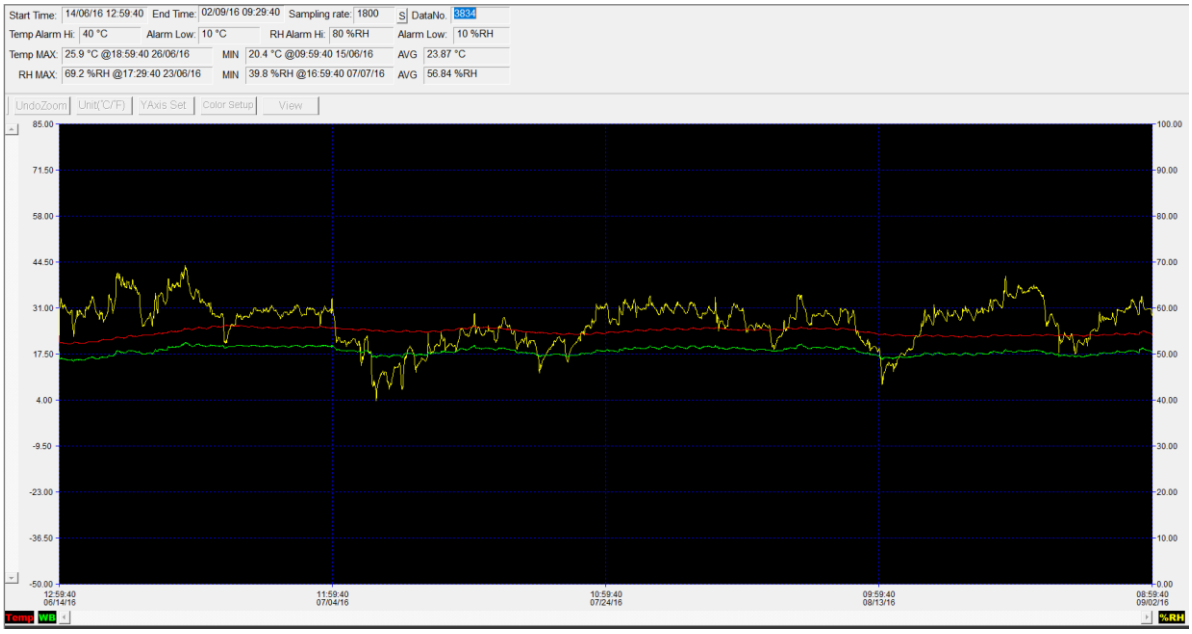


Fig. 4.Microclimate graph generated by the data logger software according to the recordings

ASPECTS REGARDING CERAMIC CONSERVATION AND RESTORATION CASE STUDY: ORIENTAL TRANSPORT AMPHORA

Simona Maria CURSARU-HERLEA*
Mariana Ionela RĂILEANU (MILITARU)**

Abstract: *The paper presents the stages followed in the process of conservation and restoration of an Oriental Transport Amphora, type Carthage LR 1, discovered as a result of constant archaeological researches done at Capidava (Topalu village, Constanta county), in 1998, in the 3rdsector. The amphora was discovered fragmented - 32 fragments, which have been improperly glued on the archaeological site. This amphora restoration was carried out within the laboratory of "Lucian Blaga" University of Sibiu (Department of History, Heritage and Protestant Theology).*

Keywords*: Romania, Dobrogea, pottery, amphora, conservation, restoration.*

Rezumat**:** *Lucrarea prezintă etapele parcurs înprocesul de conservare și restaurarea unei amfore orientale de transport, tipul Carthage LR 1, descoperită în urma cercetărilor arheologice sistematice efectuate la Capidava (com. Topalu, jud. Constanța), în anul 1998, în sectorul III. Amfora a fost descoperită în stare fragmentară, fiind vorba de 32 de fragmente, care au fost lipite necorespunzător pe șantierul arheologic. Restaurarea acestei amfore s-a realizat în cadrul laboratorului-școală al Universității ,,Lucian Blaga" din Sibiu (Departamentul de Istorie, Patrimoniu ș iTeologie Protestantă).*

Cuvinte-cheie: *România, Dobrogea, ceramică, amforă, consevare, restaurare*

Introduction:

The oriental transport amphora (inv. No 4657), which is the subject of the case study of this article, was discovered as a result of systematic archaeological researches done at Capidava (Topalu village, Constanta county), in 1998, in the *3rd* sector, area W77, at 0.50 m depth (Opriș 2003, 54).

This amphora belongs to Carthage LR1 type, a type of amphora very commonly found in all settlements of the Roman-Byzantine period in Dobrogea (Paraschiv 2006, 89-90). These amphorae can often be also seen in the North of the Black Sea, especially around the Mediterranean Sea, starting with the 5th century A.D., most probably originating in the East of Cilicia, a Roman province situated in the South of Anatolia (Opaiț 2010, 2015).There are diverging opinions regarding the stuff carried in these amphorae but there are some clues that favour the wine (Opaiț 1996, 47-48; Opriș 2003, 5).

This amphora made of a homogeneous paste, degreased with soft sand, has been shaped on a fast wheel and burnt with homogeneous oxidant. The item has been discovered fragmented, the fragments being glued together on the archaeological site. Thus, when the amphora arrived in the restoration laboratory, we observed it had a pear shaped body and a concave/convex bottom with *umbo*. The decoration consists of grooves, in the area from below the handle to the bottom. A the shoulder level there is an illegible inscription (*tituli picti*), in red dye, which seems to be **χμγ**and other two markings, a β (?), and 2 little circles are placed in the lower part of the body and on the bottom there is a circle, also in red dye (Fig. 1- 4; see also Opriș 2003, 54, PLXVIII). The amphora dimensions when arriving in the lab: height: 47cm; maximum

* Lucian Blaga" University of Sibiu, simona.herlea@ulbsibiu.ro
**Peles National Museum, marysinaia@gmail.com

diameter: 18,5cm; mouth diameter: 9cm. The amphora capacity has been approximated to 8,72litres, and according to antic measure units, corresponding to a capacity of around 1*1 modius = 16 sextarii* (Opriș 2003, 53, 54).

State of Conservation of the amphora

The item consists of 32 fragments, which had been improperly glued on the archaeological site with polyvinyl acetate (according to the chemical analysis report no 595/13/Feb. 2017, drafted by de Vacariu Daniela, main chemist within CNM „ASTRA", Sibiu). The item has traces of adhesive at the fragments joint and stains of adhesive on some fragments (Fig. 1-3). On the inner and outer surfaces there are local spots/deposits of dirt, not too sticky (including dust and other impurities). On some fragments one can see exfoliations of the ceramic material and traces of a secondary burning(fig. 4).On the outer surface of some fragments, there are deposits of $CaCO_3$, moderately sticky, with the appearance of a whitish rind (Fig. 1-3; Analysis report no. 595/13/Feb. 2017). There are missing fragments of around 20% (fragments of the shoulder, belly, bottom and a handle).

Restoration and conservation works

Once the approval of the restoration commission obtained, restoration and conservation works started, following the approved restoration proposals as well as the principles of restoration.

1. Surface cleaning

This operation was carried by means of a soft brush so as to remove the deposits of dust.

2. Wet cleaning

In order to detach the fragments glued on the archaeological site and remove moderately attached dirt and polyvinyl acetate, the amphora has been immersed in aqueous solution with non-ionic detergent C2000 (1%), at a temperature of 40°C. After about 30 minutes, the polyvinyl acetate was softened, and the fragments have been easily detached. The removal of the polyvinyl acetate applied on the edges and of the moderately sticky dirt has been done mechanically, by means of a scalpel, a sponge and a brush (Fig. 5.6).

We mention that before immersing the amphora in water, we tested the resistance of the red dye from the markings.

3. The fragments rinsing was done under running water jet, then they have been immersed into a distilled water bath. At this moment, the dirt was removed; the fragments edges were cleaned of adhesive; besides the distilled water bath has also an anti-microbial role (Fig. 7).

4. Calcium carbonate removal ($CaCO_3$)

So as to remove deposits of carbonates, tests with different concentrations of acetic acid have been done and a low concentration of this acid has been decided, namely 5.88%. We prepared a bath with this acid concentration, and the fragments with depositions have been taken out of the distilled water bath and put into the acid bath (Fig. 8). First, tests for the red dye resistance have been done. After 40 minutes, when the effervescent reaction ceased, the carbonate deposits have been removed with a sponge, operation easily performed.

5. Fragments neutralisation

The fragments which have been introduced into the acid bath have been immersed into 8 consecutive baths of distilled water, until entire neutralization, verified with pH indicator paper.

6. Fragments drying

Drying was done at the ambient temperature. After neutralization, the 32 fragments were placed to dry on the stand and let there for 3 days (Fig. 9).

7. Fragments identification and numbering

For an easier assembling, the fragments have been identified and numbered, by applying labels with numbers (fig. 12). The fragments order will be followed during the bonding stage.

8. Fragments assembling

For sticking fragments together, polyvinyl acetate was used Bison type. Application of adhesive on edges was done by means of a brush; in a thin uniform layer (Fig. 13). The vessel was rebuilt gradually, from bottom to the mouth, following the necessary time for the adhesive drying (Fig 14).

9. Making of impressions/Making the moulds to fill in the missing parts

In order to complete the missing fragments from the bottom, dental wax was used, warmed in advance at IR lamp for 2 minutes (Fig. 15,16). Although the grooves on the amphora are not perfectly identical, a more exact impression of the given piece was attempted, and subsequently, plaster casting was done from inside (Fig. 18,19). Before plaster casting, polyvinyl acetate**,** Bison type was applied on the fragments edges (Fig. 17).

In case of missing fragments from the upper part of the amphora, the impression was done using modelling clay (Fig. 23).Clay impressions were taken on the given parts of the amphora, from inside, plaster casting being done from outside (Fig. 24, 25).

10. Missing parts completion

This operation was performed by means of modelling plaster. To prepare the binder, a spatula and a silicone bowl with water and plaster have been used. Before applying the plaster**,** polyvinyl acetate, Bison D3 type had been applied on the fragments edges, using a brush, in a thin and uniform layer, for a good adhesion (fig. 17, 24). The casting was done gradually, starting from the lower part to the upper part (Fig. 18- 20, 25).

11. Making Metal Fittings

To fix the fragment from the handle, some metal fittings of stainless steel wire (2 mm), have been prepared, and by means of a power drill and of a thin drill, 2 hole have been punched, one in the upper part in the handle area which had been preserved, and the other in the lower part, at the joint area between the handle and the amphora shoulder (Fig. 27). Also, two other holes have been done at both ends in the handle fragment which had been preserved (Fig. 26, 28). The fittings have been fixed with bi-component epoxy resin (Fig. 29).

12. The handle impression

After sticking and consolidation of the handle fragments, handle impression was performed, so as to make and cast the missing handle. The impression was done with modelling clay, trying to obtain a copy of this one as faithfully as possible (Fig. 30). After having performed impression and careful removal of the clay from the handle, a cap has been improvised at one end, where a hole was punched so as to remove air bubbles produced during the casting process. More fluid plaster has been gradually introduced through the upper part (Fig. 31). Once the plaster dried, the clay was removed with a drill (Fig. 32), and the new obtained handle has been fixed on the amphora with polyvinyl acetate**,** Bison type (Fig. 33).

13. Jointing cracks and gaps

While casting the plaster for the completion of the missing parts, the cracks and gaps have been jointed with the same mixture (plaster and water), both on the inner and outer sides of the amphora (Fig. 34-36).

14. Additions roughing

To ease the final finishing of additions, the impressions have been removed after each casting, once the plaster has strengthened a little bit, and the roughing was done on the still wet plaster, using appropriate tools (Fig. 37- 39).

15. Finishing additions

Once the plaster dried, finishing of additions was done, both on the inner and outer sides of the amphora, by means of the abrasive mesh and of the abrasive paper of different granulations (Fig. 40-42). This operation was performed gradually, after each area has been completed, roughed and then dried (Fig. 43-amphora after finishing).

16. Chromatic integration

Chromatic integration of additions has been obtained by paint brush, using water colours. Chromatic integration was done both on the outer (Fig. 44), and inner (Fig. 22) areas of the item, using a lighter shade than that of the amphora, following the principle of intervention legibility. Once done the chromatic integration, the amphora has been let at the ambient temperature for a day, so as to allow colour drying and to get it ready for the next stage (Fig. 45). After colour drying, the original area of the amphora was wiped with an eraser so as to remove the plaster dust from the amphora pores (Fig. 46).

17. Protective filming

Protective filming of the area chromatically integrated, both on the inner and outer sides, was done with Paraloid B72, 1% concentration, using ethyl acetate as a solvent. Filming was performed in two successive layers (Fig. 47). This filming role is to protect the areas chromatically integrated and to strengthen the entire area.

18. Final photography

Eventually, an item which preserves the imprint of time was obtained: height:=46.5 cm; mouth diameter =8.7 cm; maximum diameter = 36.2 cm (Fig. 48-50). The restoration was performed with reversible materials, without affecting the item integrity.

19. Making of packaging for the transportation of the amphora

Since the amphora had to go back from Sibiu (''Lucian Blaga'' University) to Capidava, it was necessary to ensure its protection during transportation. Therefore, we designed and made a packag-

ing meant to ensure safety transportation. The packaging (the box) was made of wooden planks (type C. see: Cursaru-Herlea 2018, 598). For thermal insulation of the content, the inner parts of the box have been padded with expanded polystyrene of 2 cm thickness. The amphora was put in the box, right-side up, in a balance position, in the impression made on the bottom of the box, and was wrapped in a white fine cloth of unbleached cotton and then in wadding. The box was well fixed in the transportation vehicle, by putting elastic materials of different thickness and appropriate density between it and other boxes or lateral parts of the transportation vehicle. Road transport was done unhurriedly, carefully, avoiding sudden stops, holes, bumps and unforeseen stops.

20. Making of the stand for the item exposure

For a safety exposure of the amphora, a tripod of wrought iron was made, which had been first descaled and protected against oxidation by varnishing. To protect the amphora from a direct contact with metal, a hempen rope was wrapped on the circular area of the tripod (Fig. 51).

The tripod was laid with the circle on the bottom of the packaging for transport, fixed upside down in the ditch of polystyrene (Cursaru-Herlea 2018, 604, fig. 15, 16).The amphora did not touch the tripod legs, being protected by stretching materials with which it had been covered. Thus, we made sure that the tripod could be reused each time the amphora would be exposed.

Proposals regarding handling and storage of the amphora

Handling is a very common operation, as the objects are studied; photographed, exposed, preserved, warehouses may be reorganized etc.

Generally, we recommended the following aspects should be taken into consideration when handling the amphora:

- Handling should be done by trained persons so that it should be handled properly;
- The persons in charge should wear white and clean cotton gloves;
- Several objects should not be handled simultaneously;
- The amphora should not be grabbed by handles; it should be taken by putting a hand on its bottom, and the other hand should sustain the amphora in its shoulder area;
- It shouldn’t be slammed and laid in a less stable balance.

It’s recommended to store the amphora in an appropriate area, with a microclimatic stability (with a temperature between 18-20˚C and UR 50-65%) and an incandescent light of 100 lx. Temperature and moisture variations will be avoided, these being harmful especially for restored ceramic.

Regarding storage conditions, it’s recommended to be an area closed by doors with glass (thus avoiding dust penetration), the amphora being laid in a balance position, the mouth wrapped in a protective cotton sleeve.

Regular checks are needed, as well as dust removal done by means of soft brushes, wet cleaning should be avoided.

Conclusions

The stages of conservation and restoration of this amphora were followed according to the state and degradations of the amphora. During the restoration interventions, the principles of restoration have been respected: the item integrity; the interventions are legible, the materials and substances used had been tested, being reversible and compatible with the item.

REFERENCES

Works in scientific journals:

Cursaru- Herlea 2018 — Simona Maria Cursaru-Herlea, 'Protection of Restored Pottery During Transport', în *Brvkenthal ACTA MVSEI* ,XIII, 4, p. 595-606, Ed. Muzeului Brukenthal, Sibiu, ISSN 1842-2691, 2018.

Opaiț 2010 — Andrei Opaiț, 'On the origin of Carthage LR Amphora', *BAR International Series* 2185, vol. II, p. 1015-1022, 2010.

Books:

Opaiț 1996 — Andrei Opaiț, *Aspecte ale vieții economice din provincia Scythia (secolele IV-VI p. Ch.). Producția ceramicii locale și de import*, Ed. Institutul Român de Tracologie, XVI, București 1996.

Opriș 2003 — Ioan C. Opriș, *Ceramica romană târzie și paleobizantină de la Capidava în contextual descoperirilor de la Dunărea de Jos (sec. IV-VI p. Chr.),* București, 2003.

Paraschiv 2006 — Dorel Paraschiv, *Amfore romane și romano-bizantine în zona Dunării de Jos (sec. I-VII p. Chr.)*, Iași, 2006.

LIST OF ILLUSTRATIONS

1. The amphora before restoration;
2. The amphora before restoration;
3. The amphora before restoration;
4. The amphora before restoration;
5. Mechanic cleaning;
6. Mechanic cleaning;
7. Fragments rinsing;
8. Acetic acid bath;
9. Fragments drying on the stand at ambient temperature;
10. The fragments of the amphora after cleaning and drying
11. The fragments of the amphora after cleaning and drying;
12. Fragments numbering;
13. Adhesive application;
14. Fragments assembling at the sand crate in a balance position;
15. Wax warming at IR lamp;
16. Wax impression;
17. Adhesive application on edges before plaster cast;
18. Plaster cast;
19. Plaster cast;
20. Fragments assembling at the sand crate;
21. Puttying cracks inside the amphora;
22. Chromatic integration of additions and puttying inside the amphora;
23. Clay impression;
24. Adhesive application on edges;
25. Plaster cast;
26. Making holes for fixing metal reinforcement;
27. Making holes for fixing metal reinforcement;
28. Assembling metal reinforcement;
29. Handle after fragment fixing;
30. Handle impression for making the missing handle;
31. Plaster cast in impression;
32. Impression detachment from clay;
33. Amphora after attaching plaster handle;
34. Cracks puttying;
35. Cracks puttying;
36. Cracks puttying;
37. Additions and putty degressive
38. Additions and putty degressive
39. Additions and putty degressive
40. Additions finishing
41. Additions finishing
42. Additions finishing;
43. Amphora after finishing;
44. Chromatic integration;
45. The amphora after chromatic integration;
46. Surface cleaning with an eraser to remove plaster dust;
47. Protective filming;

48. Amphora after restoration;
49. Amphora after restoration;
50. Amphora after restoration;
51. Amphora after restoration exposed on the metal tripod

LISTA ILUSTRAŢIILOR

1. Amfora înainte de restaurare;
2. Amfora înainte de restaurare;
3. Amfora înainte de restaurare;
4. Amfora înainte de restaurare;
5. Curățarea mecanică;
6. Curățarea mecanică;
7. Clătirea fragmentelor;
8. Baia de acid acetic;
9. Uscarea fragmentelor pe stativ la temperatura ambientală;
10. Fragmentele amforei după curățare și uscare
11. Fragmentele amforei după curățare și uscare;
12. 1Numerotarea fragmentelor;
13. Aplicarea adezivului;
14. Asamblarea fragmentelor la lădița cu nisip în poziție de echilibru;
15. Încălzirea cerii la lampa IR;
16. Amprentarea cu ceară;
17. Aplicarea adezivului pe canturi înainte de turnarea ipsosului;
18. Turnarea ipsosului;
19. Turnarea ipsosului;
20. Asamblarea fragmentelor la lădița cu nisip;
21. -Chituirea fisurilor în interiorul amforei;
22. Integrarea cromatică a completărilor și chituirilor în interiorul amforei;
23. Amprentarea cu plastilină;
24. Aplicarea adezivului pe canturi;
25. Turnarea ipsosului;
26. Realizarea orificiilor pentru fixarea armăturilor metalice
27. Realizarea orificiilor pentru fixarea armăturilor metalice;
28. Montarea armăturii metalice;
29. Toarta după fixarea fragmentului;
30. Amprentarea toartei pentru confecționarea toartei lipsă;
31. Turnarea ipsosului în amprentă;
32. Desprinderea amprentei din plastilină;
33. Amfora după montarea toartei realizată din ipsos;
34. Chituirea fisurilor;
35. Chituirea fisurilor;
36. Chituirea fisurilor;
37. Degroșarea completărilor și chituirilor;
38. Degroșarea completărilor și chituirilor;
39. Degroșarea completărilor și chituirilor;
40. Finisarea completărilor
41. Finisarea completărilor
42. Finisarea completărilor
43. Amfora după finisare,

44. Integrarea cromatică;
45. Amfora după integrareacromatică;
46. Ștergerea suprafeței cu gumă de șters pentru îndepărtarea prafului de ipsos;
47. Peliculizarea de protecție;
48. Amfora după restaurare;
49. Amfora după restaurare;
50. Amfora după restaurare;
51. Amfora după restaurare,expusă în trepiedul metalic

 1.
 2.
 3.
 4.

1. 2. 3. 4. The amphora before restoration;

 5.
 6.

5. 6. Mechanic cleaning

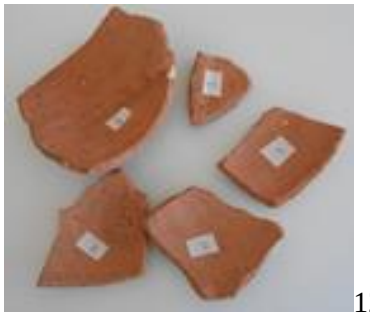
7. Fragments rinsing;

8. Acetic acid bath;

9 Fragments drying on the stand at ambient temperature;

10. The fragments of the amphora after cleaning and drying;

11Fragments numbering;



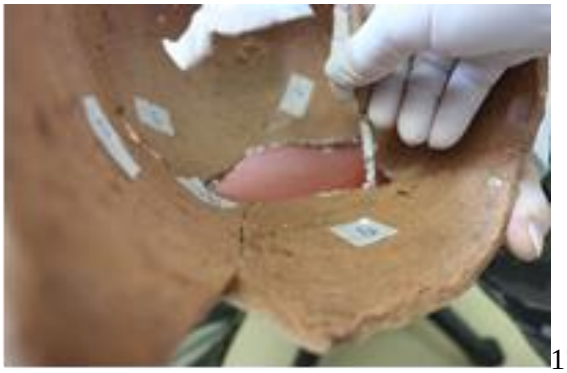
12.

13.

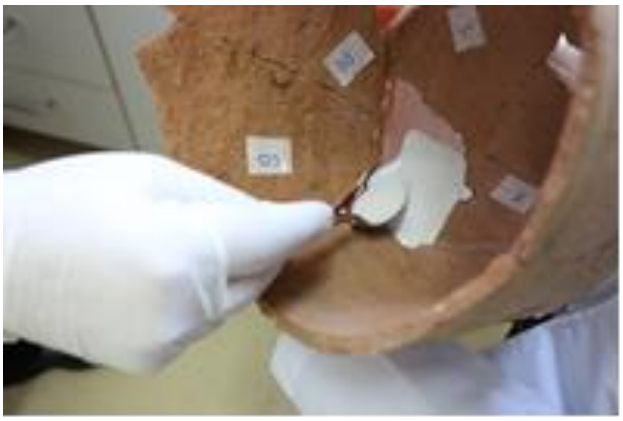
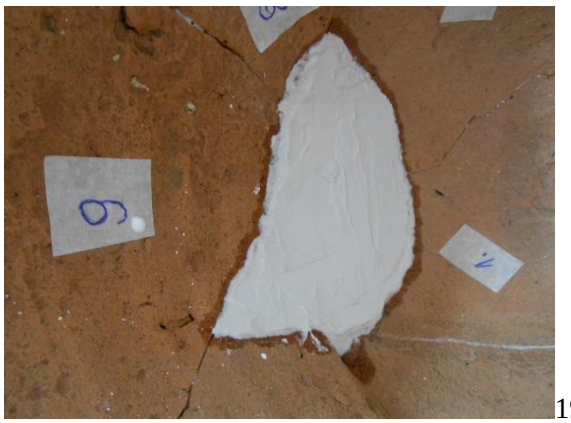
14.

12. Fragments numbering;
13. Adhesive application;
14. Fragments assembling at the sand crate in a balance position;


15.

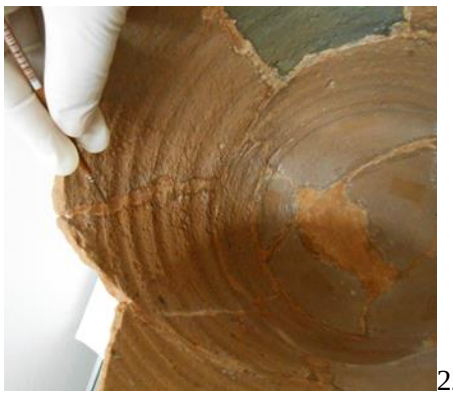
16.

17.

15. Wax warming at IR Lamp; 16. Wax impression; 17.Adhesive application on edges before plaster cast;


18.

19.

18. 19. Plaster cast;


20.

21.

22.

20. Fragments assembling at the sand crate;
21. Puttying cracks inside the amphora;
22. Chromatic integration of additions and puttying inside the amphora;

23. Clay impression;

24. Adhesive application; on edges

25. Plaster cast;

26.

27.

.

26. 27. Making holes for fixing metal reinforcement;

28. Assembling metal reinforcement;

29. Handle after fragment fixing;

30. Handle impression; for making the missing handle

31.

31 Plaster cast in impression;

32 Impression detachment from clay;

33. Amphora after attaching plaster handle;

34.

35.

36.

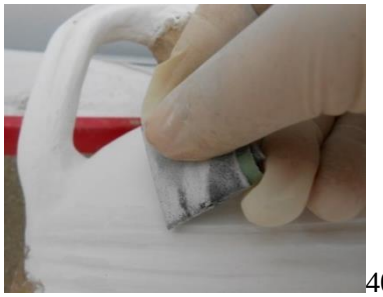
34. 35. 36. Cracks puttying

37.

38.

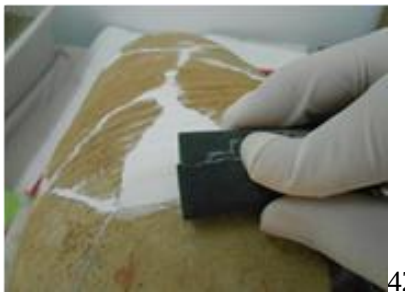
39.

37. 38. 39. Additions and putty degressive



40.

41.



42.

40. 41. 42. Additions finishing

43. Amphora after; finishing

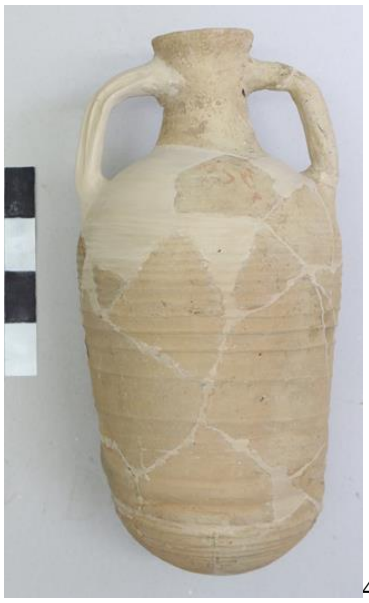
44. Chromatic integration;

45. The amphora after chromatic integration;

46. Surface cleaning with an eraser to remove plaster dust;

47. Protective filming;

48. Amphora after restoration;



49.

50.

51.

49. 50. Amphora after restoration
51. Amphora after restoration exposed on the metal tripod

SELECTION OF RESTORED BOOKS BELONGING TO THE LIBRARY OF THE BRUKENTHAL NATIONAL MUSEUM SIBIU AND THE LIBRARY OF THE METROPOLITAN CHURCH OF SIBIU, IN 30 YEARS OF ACTIVITY AS AN OLD BOOK-DOCUMENT RESTORER WITHIN THE RESTORATION AND CONSERVATION LABORATORY OF THE BRUKENTHAL NATIONAL MUSEUM SIBIU

Maria FOTA*

Abstract: *The article presents a small selection books belonging to the Library of the Brukenthal National Museum Sibiu and the library of the Metropolitan Church of Sibiu restored during 30 years of activity in the field, as well the treatment applied on.*

Keywords*: 30 years, restore, library, Brukenthal National Museum, Metropolitan Church of Sibiu, books.*

Rezumat**:** *Articolul prezintă o mică selecție de cărți care aparțin Bibliotecii Muzeului Național Brukenthal Sibiu şi Bibliotecii Mitropoliei Sibiu restaurate în cursul a 30 de ani de activitate in domeniu precum și tratamentele aplicate.*

Cuvinte-cheie: *30 de ani, restaurare, bibliotecă, Muzeul Național Brukenthal, Mitropolia Sibiu, cărți*

Introduction

"The book is primarily a fruit of the human mind. It contains a whole universe of ideas and feelings, through which we learn study and live the past and the present and we can glimpse the future of human society." (Tomescu 1968, 23)

Among the oldest cultural institutions in the city of Sibiu is the Brukenthal National Museum. One of the sections of this museum, whose activity is closely linked to the very existence of the museum, is the library.

Both the library and the museum are named after the former governor between 1777 and 1787 of Transylvania, Samuel von Brukenthal. Also, he has been its founder. Since 1817 it has been operating as a public library. According to the remaining information, at the time of opening it has numbered 15972 volumes.

These books belonged entirely to the baron Samuel von Brukenthal, who, in addition to his political preoccupations with the office he held, was a great lover of art and a great bibliophile. Brukenthal endeavoured to assemble a beautiful and valuable collection of paintings and an equally beautiful and valuable collection of books. The spacious palace gave him the opportunity to satisfy this ambition of a passionate collector, which sprang from his multilateral interest (Jugăreanu 1957, 3), pursuing scientific results in all fields, the baron procured the most recent books at that time.

Of the remaining collections, the library is in the possession of some of the most valuable volumes.

The old book fund of the Brukenthal Library, through its valuable copies, could illustrate a whole history of the book, being enriched by donations from the country and abroad.

Since 1948, when the Museum entered the state patrimony, the enrichment sources of the library have been provided by the funds provided by the Ministry of Education and Culture, with the help of which acquisitions are made through Collection and Antiques. Thus, both the old library fund and the new one are completed with books specific to our collections (Jugăreanu, 1957, 6).

The problems of conservation and restoration of books have been and still are a permanent concern of the work team of the library and the Conservation and Restoration Laboratory.

The degree of damage to the books entered in the

* Brukenthal National Museum / Muzeul Naţional Brukenthal, fota_maria_laboratory@yahoo.com

laboratory also dictated the chosen restoration methods. Whether a restoration was done on an unopened volume or on an unopened volume, the decisions were taken together with the members of the restoration commissions. However, the responsibility for restoration and momentary decisions rests exclusively with the restorer.

Selection of restored works from different collections.

1. *EVANGELIAR* - with teaching (teacher), book containing explanations inspired by various passages of the New Testament and sermons.

Our copy was printed in Bucharest in 1682, in Romanian with Cyrillic characters, on two columns in black and red ink (Bianu, Hodoș 1903, 246) (Fig. 1, 2).

The title page is framed with biblical scenes and on the back is the coat of arms of Wallachia. The book contains typographic ornaments (borders, engravings, vignettes, frontispieces and ornate initials).

The wooden boards are covered in brown leather with, initially gilded ornaments with biblical scene in the centre and the "Evangelists" in the corners. Floral decorations are localized on both covers and have traces of XIX century locks.

2. *MINOLOGHION*, Blaj, 1781-menolog-is the church book that includes the lives of the saints, arranged according to the calendar of the Orthodox Church, starting with September 1 and more precisely with the beginning of the new church year (Olteanu 1992, 252). In the monographic representation of the Minologhion of each day, an image corresponds to him depicting the saint standing or his martyrdom.

The book, published in Blaj in 1781, had a particularly large circulation in the churches of Transylvania (Bianu, Hodoș 1910, 273) and probably this was the reason that very few specimens of it had been preserved. The printing house of the Holy Trinity Monastery prospered in 18th century and from its presses came this *Minologhion*-with illustrations, frontispieces, vignettes, ornate initials, superbly made-book. The specimen in the library of the Brukenthal National Museum in Sibiu comes from a church in Bistriţa-Năsăud County, as the handwritten note on its pages testifies. The copy of the B.M.N.B.S. it is quite complete but in an advanced state of degradation. That was the reason why our attention was focused on it (Fig. 3-5).

3. *VARLAAM'S CAZANIA*, 1643, Iași - or Doctrine book is a collection of church speeches in which passages from the New Testament are explained. (Bianu, Hodoș 1903, 137) (Fig. 6, 7).

Through his scholarly activity, Metropolitan Varlaam opens the series of translations into Romanian of a large number of religious books widely spread in the 15th, 17th, and 18th centuries.

The Book of Metropolitan Varlaam had an extremely great influence on the spiritual and religious life of the Romanian people, through its orthodox content, the simplicity of its exposition and the vigour of its language. Printed in a large number of copies, the book is spread in all corners inhabited by Romanians. It also applies to ordinary readers, not just the church.

4. *MACARIE'S LITURGIER* 1508, Târgovişte.

The Liturgy is a religious book that contains the songs and the order of the liturgy, the main service in the Christian church (Bianu, Hodoș 1903, 1).

The 1508 Slavic liturgical book by hieromonk Macarie is the first printed book on the Romanian territory. This copy is one of the five preserved so far. It was brought by Metropolitan Nicolaie Bălan to the Metropolitan Library of Sibiu and stored in the Romanian old book collection.

5. *SUPER PRIMA CODICIS*, 1509, Venice.

The old foreign book *Super Prima Codicis* by Bartolus de Saxoferrato saw the light of day in 1509 in Venice.

Bartolus de Saxoferrato was a professor of Italian law and one of the most prominent jurists of the Middle Age. He belonged to the school known as commentators or postglosators.

After he died, the famous saying *nemo bonus iurista nisi bartolista* remains - no one is a good jurist unless he is a Bartolist (Bartolus de Saxoferrato, 2013).

Super Prima Codicis, copy belonging to B.M.N.B.S. has 204 numbered sheets, with Latin text placed on two columns (black print) and the frontispiece sheet (red print). Our copy is missing the covers (Fig. 8-11).

6. *CALENDARIUM*, 1559, Wittenberg de Kitthingen Paul Eber

The old foreign book CALENDARIUM is a print in Latin, with white sheets interspersed with manuscripts (reader's notes). Handwritten texts exceed the volume of the printed text and often transpire affecting the readability of the printed text. The

book lacks the end; the last sections are also those that have suffered greater degradation.

The binding: is made of handwritten parchment (front cover and spine), which has undergone profound physical and chemical changes to which is added a biological attack of insects from the Dermestidae family (Fig. 12-15).

7. *ABBATIS PANORMITANI COMENTARIA, I and II,* Nicolaus de Tudeschis, 16th century. Commentary (Reading) on the Decrees of Gregory IX

In the broadest sense, the term *decretalis* (eg *epistola decretalis*) means a pontifical letter containing a *decretum*, or a pontifical decision. In the strictest sense of the word, this term designates a response of the pope, given when he was asked for advice on a matter of discipline.

Among the main commentators of the Decretals is Panormitanus. These are the most important work of the great jurist, who in this work of enormous dimensions, sought to provide the ecclesiastical legal system with answers to secular legal questions. Panormitanus' comments remained one of the most esteemed legal treatises during the 15th and 16th centuries. Panormitanus probably began this work around 1411.

Currently, this book series is very rare and few libraries have all nine volumes, which are in most cases scattered, with only a small number of volumes in collections. The library of the Brukenthal National Museum is the happy owner of all the volumes (Fig. 16-19).

As board for the leather covers were used:

a) Front board - File from a Psalter in Hungarian- sec. in the 16th century.

b) Back board – Cicero's *Morales definitiores* a theological text, and the reproduction of a letter provided with the seals of Paulus Sambekreti and Ioannes Balass, regarding the acquittal of some accusations - *crimina reiecta*.

Restoration

Books that the restoration was done on bound text block: *Varlaam's Cazania; Minologhion, Abbatis Panormitani Comentaria, I and II.*

Books that the restoration was done on unbound text block: *Evangeliar, Macarie's Liturgier, Super Prima Codicis, Calendarium.*

The restoration made on bound or unbound text block till washing where the sheets treatment approaches, materials and solution use are totally different, followed the same steps: disinfection in vacuum, chemical analysis, photography before and after restoration, dry cleaning.

Wet treatment on unbound text block could be made through washing sheet by sheet on a rigid support or soft support like unwoven material immersed alternating in cold or warm at 40°C water and pH neutral detergent. After was the rise with cold water.

For wet treatment on bound text block was used hydro-alcoholic solution (1:1). The sheets, which were before and after the sheets in treatment, were protected against humidity. The repeating drying was made with blotting paper thought light pressing.

The filling of the losses was done in the "double" technique with Japanese paper. The tears were mended with Japanese tissue paper.

The intermediary and final pressing were important for fibre realigning, regaining of elasticity and to regain the planar proprieties of paper sheets.

Framing in format and photography completed the restoration of the text block that was followed by rebounding or bookbinding restoration.

Conclusions

In a period of 30 years, the books that were restored in the Restoration Laboratory from the Brukenthal National Museum were in a poor conservation state. The restoration was made, both, on bound and unbound text block.

Ether if they were books from Library of the Brukenthal National Museum the Foreign Old Book and Romanian Old Book Collection or other institutions their restoration was done with professionalism and maximal responsibility, and many were displayed at the national restoration shows or were described in specialized publications.

REFERENCES

Bartolus de Saxoferrato, 2013	*Bartolus de Saxoferrato,* [online] Wikipedia. Available at: https://en.wikipedia.org/wiki/Bartolus_de_Saxoferrato (Accessed 1.9.2021*)*
Bianu, Hodoș 1903	Ioan Bianu, Nerva Hodos, *Bibliografia Românească Veche -1508-1830* - Tom I, (1508-1716), Stabilimentul Grafic I. V. Socec, București, 1903
Bianu, Hodoș 1910	Ioan Bianu, Nerva Hodos, *Bibliografia Românească Veche -1508-1830* - Tom II (1716-1808), Atelierele Socec & Co, Soc. Anonimă, București, 1910
Jugăreanu 1957	Veturia Jugăreanu, *Biblioteca muzeului Brukenthal din Sibiu*, Editura de Stat Didactică şi Pedagogică, Bucureşti, 1957
Olteanu 1992	Virgil Olteanu, *Din istoria și arta cărții,* ed. Enciclopedică, 1992
Tomescu 1968	Mircea Tomescu, *Istoria cărții românești,* ed. Științifică, 1968

LIST OF ILLUSTRATIONS

1. *EVANGELIAR* 1682, before restoration;
2. *EVANGELIAR* 1682, after restoration;
3. *MINOLOGHION*, 1781, before restoration;
4. *MINOLOGHION*, 1781, detail, before restoration;
5. *MINOLOGHION*, 1781, detail, after restoration;
6. *VARLAAM'S CAZANIA*, 1643, before restoration;
7. *VARLAAM'S CAZANIA*, 1643, after restoration;
8. *SUPER PRIMA CODICIS*, 1509, before restoration;
9. *SUPER PRIMA CODICIS*, 1509, before restoration;
10. *SUPER PRIMA CODICIS*, 1509, after restoration;
11. *SUPER PRIMA CODICIS*, 1509, after restoration;
12. *CALENDARIUM*, 1559, before restoration;
13. *CALENDARIUM*, 1559, before restoration;
14. *CALENDARIUM*, 1559, after restoration;
15. *CALENDARIUM*, 1559, after restoration;
16. *ABBATIS PANORMITANI COMENTARIA*, I and II, 16th century, before restoration;
17. *ABBATIS PANORMITANI COMENTARIA*, I and II, 16th century, before restoration;
18. *ABBATIS PANORMITANI COMENTARIA*, I and II, 16th century, after restoration;
19. *ABBATIS PANORMITANI COMENTARIA*, I and II, 16th century, after restoration;

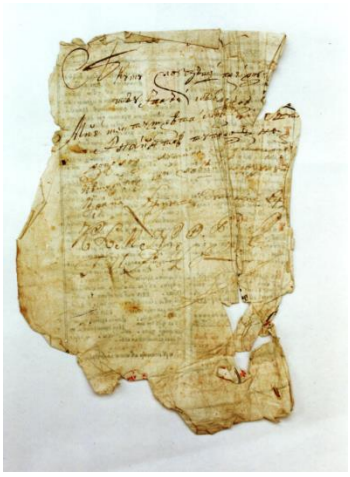
LISTA ILUSTRAŢIILOR

1. *EVANGELIAR* 1682, înainte de restaurare;
2. *EVANGELIAR* 1682, după restaurare;
3. *MINOLOGHION*, 1781, înainte de restaurare;
4. *MINOLOGHION*, 1781, detaliu, înainte de restaurare;
5. *MINOLOGHION*, 1781, detaliu, după restaurare;
6. *VARLAAM'S CAZANIA*, 1643, înainte de restaurare;
7. *VARLAAM'S CAZANIA*, 1643, după restaurare;
8. *SUPER PRIMA CODICIS*, 1509, înainte de restaurare;
9. *SUPER PRIMA CODICIS*, 1509, înainte de restaurare;
10. *SUPER PRIMA CODICIS*, 1509, după restaurare;
11. *SUPER PRIMA CODICIS*, 1509, după restaurare;
12. *CALENDARIUM*, 1559, înainte de restaurare;
13. *CALENDARIUM*, 1559, înainte de restaurare;
14. *CALENDARIUM*, 1559, după restaurare;
15. *CALENDARIUM*, 1559, după restaurare;
16. *ABBATIS PANORMITANI COMENTARIA*, I and II, 16th century, înainte de restaurare;
17. *ABBATIS PANORMITANI COMENTARIA*, I and II, 16th century, înainte de restaurare;
18. *ABBATIS PANORMITANI COMENTARIA*, I and II, 16th century, după restaurare;
19. *ABBATIS PANORMITANI COMENTARIA*, I and II, 16th century, după restaurare;

1. *EVANGELIAR* 1682, before restoration;

2. *EVANGELIAR* 1682, after restoration;

3. *MINOLOGHION*, 1781, before restoration;

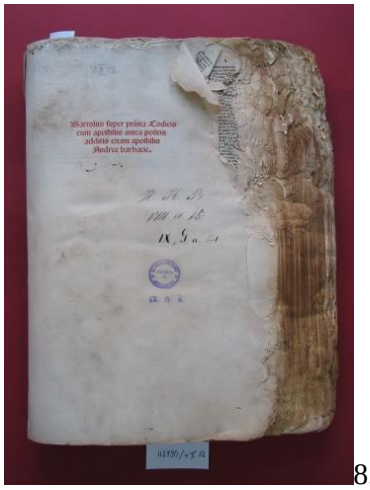


4. *MINOLOGHION*, 1781, detail, before restoration;

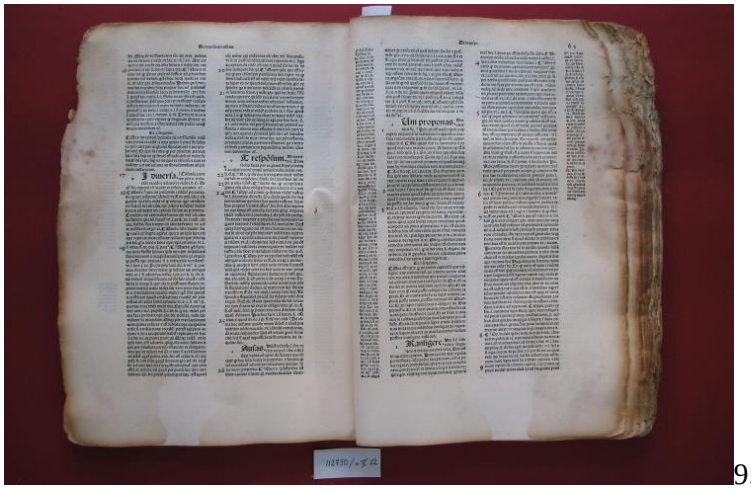
5. *MINOLOGHION*, 1781, detail, after restoration;

6. *VARLAAM'S CAZANIA*, 1643, before restoration;

7. *VARLAAM'S CAZANIA*, 1643, after restoration;



8.



9.

8. *SUPER PRIMA CODICIS*, 1509, before restoration;
9. *SUPER PRIMA CODICIS*, 1509, before restoration;

10. *SUPER PRIMA CODICIS*, 1509, after restoration;

11. *SUPER PRIMA CODICIS*, 1509, after restoration;

12. *CALENDARIUM*, 1559, before restoration;

13. *CALENDARIUM*, 1559, before restoration;

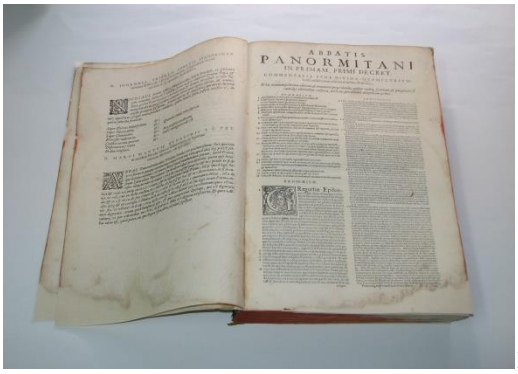
14. *CALENDARIUM*, 1559, after restoration;

15. *CALENDARIUM*, 1559, after restoration;

16.

17.

16. *ABBATIS PANORMITANI COMENTARIA*, I and II, 16th century, before restoration;
17. *ABBATIS PANORMITANI COMENTARIA*, I and II, 16th century, before restoration;



18.

19.

18. *ABBATIS PANORMITANI COMENTARIA*, I and II, 16th century, after restoration;
19. *ABBATIS PANORMITANI COMENTARIA*, I and II, 16th century, after restoration;