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Conservation and Codicological Research of the Column-scroll "Cathedral Code of 1649"

Abstract

A unique manuscript - a handwritten column-scroll over 300m in length - was treated at the Preservation Laboratory of the Russian Academy of Science Archive. Thorough conservation treatment of "Cathedral Code of 1649" has allowed the scientists to carry out the codicological research. While unrolling the manuscript many important details about the scripting process, editing, combining the sheets in the scroll were discovered. A challenging decision, about rearranging the sheet sequence based on the scientific research, is described in this paper. Now the whole information about research and conservation treatment, and a digital copy of the Cathedral Code as well, are available for public access via the internet.

Keywords: Column-scroll manuscript, conservation, Cathedral Code of 1649

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1. Introduction

The "Cathedral Code of 1649"" is the original fundamental Russian legislation of the pre-Petrine era[1]. In form, it is also a unique manuscript - a handwritten column-scroll over 300 meters in length.

The decision to conserve the scroll was adopted at the end of 2007 by the former chief curator of the Russian State Archive of Ancient Documents Idea Balakaeva and was carried out within the framework of the National Heritage program. The conservation treatment of the Cathedral Code made it possible to perform a complicated codicological study of this monumental manuscript.

2. Preliminary research

The conservation treatment was carried out by highly qualified conservator Marina Volchkova at the Preservation Laboratory of the Russian Academy of Science Archive. Like any scientific conservation treatment, it began with research on the preservation state of the written monument. The Cathedral Code of 1649 was kept tightly wound on a wooden shaft and housed in a gilded silver case (Fig. 1).

Fig. 1: This gold-plated ark was made in 1756 by the decree of Catherine the Great to preserve the Cathedral Code.

[1] Russian State Archive of Ancient Documents, file 6.

In August 2008, the scroll without its case was brought to the Preservation Laboratory for the conservation procedure and rewound onto a wide hardboard cylinder (Fig. 2). The initial oak cylinder shaft was 19 cm long and 2 cm in diameter. The ends of the stick had different shapes: 0.5 cm and 1 cm long parts of a square cross-section and the upper cylindric end of smaller diameter and 1.5 cm long (Fig. 3).

Fig. 2: The scroll was unwound for digitizing and then wound back.

Fig. 3: A stick-shaft for winding the entire scroll.

The first few meters of the scroll showed that the manuscript was glued together from separate sheets of paper resembling the well-known Russian 'column-manuscripts'. However, it was not possible to make a conclusion on the general preservation state of the manuscript precisely, because of its scroll format and length, over 300 meters[2]. Therefore, a description of the damage was made throughout as the conservation progressed from beginning to end. Traces of numerous previous mends were noticeable even along the edges and on the opening pages. Tears had been mended using methods and materials that did not meet modern standards of scientific conservation treatment of documentary monuments. Those interventions included capacitor paper[3], gauze-type fabric, non-woven synthetic material, a paper containing wood pulp, PVA glue, and adhesive scotch tape. Most of the mending strips were glued without removing the old ones, with one on top of the other, sometimes up to three layers were found (Fig. 4 and 5).

[2] Volchkova et al. (2013), pp.44-46.

[3] https://www.russiangost.com/p-19835-gost-1908-88.aspx
Capacitor paper (GOST 1908-88) is the thinnest semitransparent fastness paper made of sulfate cellulose after total removing of all impurities, in particular, metal. Capacitor paper impregnated with a liquid dielectric (Trichlorobiphenyl) is used as a dielectric interlayer between aluminum foil plates in electrical capacitors. In the last century, this paper was frequently used for paper mends due to its features (4-15 mm in thin, density 0,8-1,35 g/cm3, pH 6-7, moisture content 6-9%).

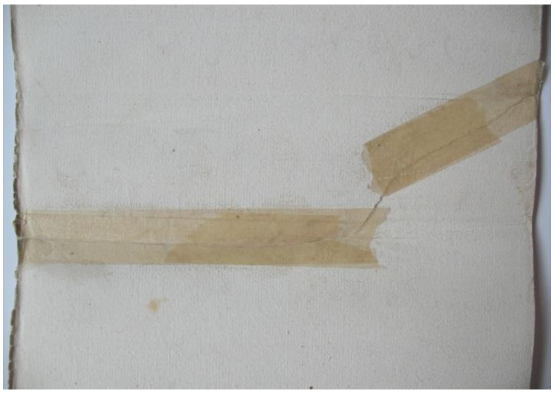

Fig. 4: An example of past mending using the capacitor paper.

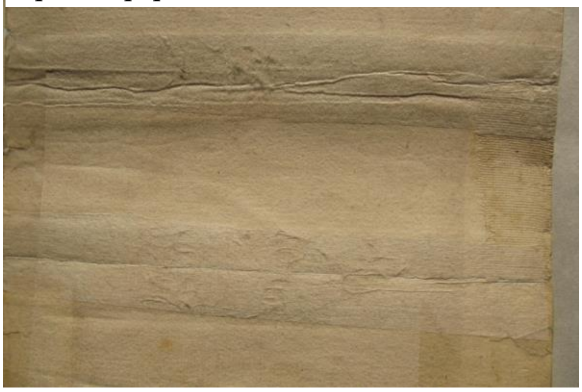

Fig. 5: An example of past mending: rigid seams.

In addition to visual examination, the paper base of the manuscript was studied using laboratory equipment: microscope Leica MZ12.5, with a digital camera DFC490 connected to a computer. Microscopic examination of the adhesives and mending materials used to repair the manuscript was also carried out. The hydrogen index (pH) of used repair materials and scroll paper was measured. pH measurements are needed to determine the degree of paper acidity, which in turn affects the long-term storage of a paper-based document. The pH measurements of the scroll were carried out using a HANNA HI 9025 pH-meter with HI 1413 contact electrode. Although the pH values 5.6-5.2 obtained indicate acidification of the paper, they are not critical for old rag paper. UV-light and fluorescence microscopy investigation of the ink was undertaken. It was discovered that the scroll was written with iron-gall ink and that it had not corroded the paper. Also, the necessary studies of the ink for sensitivity to moisture were carried out and the ink was found to be water-resistant. Studies on the water solubility of the adhesives used during the creation of the scroll, and its numerous mends, were also performed. It was found that the glue used by the creators of the scroll in the middle of the 17th century was of animal origin (gluten). The adhesives for the mending process mostly had a vegetable nature (starch), with the exceptions of some PVA and scotch tape adhesive.

Laboratory studies of biodeteriorations were carried out, as well. Visual examination revealed no obvious active centers of microbial infection. The archive storage conditions of the previous decades did not allow microorganisms to actively develop. However, to exclude hidden infection or the presence of viable fungal spores, it was decided to carry out sampling followed by laboratory analysis. When sampling from various types of damaged areas, non-destructive methods were used: micro-scraping of surface contaminants, sterile Tupfer-swabbing[4], and the bact-print method[5].

[4] Each sterile swab, placed in sterile tube, has one cotton tip on the end of a sturdy plastic stick. Sterile swabs are used to implant microorganisms onto a growth medium agar petri dishes.

A total of 48 samples were taken from the verso and recto, from dust areas, from folds of paper, and from the previous mends. The collected samples were examined under a microscope; some samples were transferred to a nutrient medium in Petri dishes. The results of laboratory analysis confirmed that there were no fungal infections of the scroll paper. Samples examined by luminescence microscopy showed no living cells. Analysis of Petri dishes confirmed the absence of mold contamination.

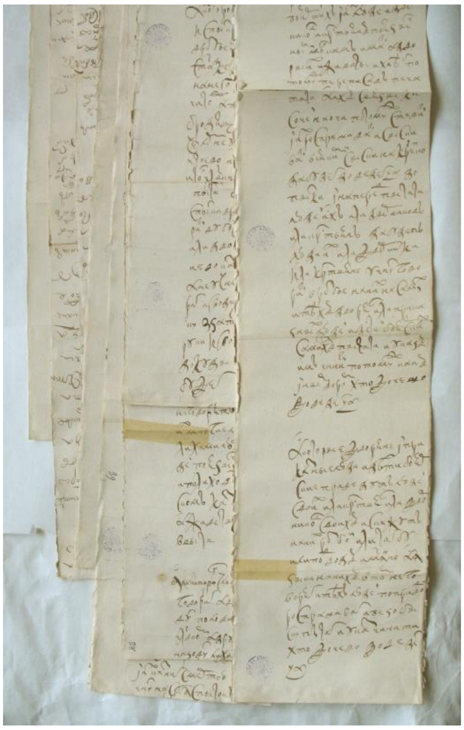

Fig. 6: Scroll sheets were separated for the conservation treatment.

3. Conservation Treatment Plan

The scroll form of the Cathedral Code and the technical complexity of removing previous mends led to the proposal of the the following plan of conservation treatment:1) To separate the scroll sheets (about 1 m in length) using water compress applied to the places of the initial gluing or mended cracks during the gradually unrolling the manuscript (Fig. 6).

2) To humidify the sheets to reverse previous mends[6].

3) To repair the cracks and consolidate the breaks with wheat flour glue and Japanese long-fiber equal-strength paper and to dry these pages in a press.

4) To attach (or to join) together all these fragments in one single scroll after the conservation treatment (Fig. 7).

4. Codicological Research

The decision to divide the scroll into sheets provided a unique opportunity for a complete codicologist study of this manuscript, including detailed examination of scroll making technique.

The process of how people created the scroll in the 17th century is apparent in the Cathedral Code itself. On the first introductory pages, it is stated that,

[5] Bact-print containers are used in microbiology for taking an imprint of microorganisms from different surfaces, on a growth medium agar and the subsequent study of their germination in a thermostat. Single-use bact-prints are made of biologically inert material.

[6] We put two dry blotters on the sheet or certain area, added the moistened blotter, and covered the whole area with plastic or polyethylene, and left this sandwich for 30 min.

according to the sovereign's decree, lists of different "rules", "spells", and "orders", and "judicial codes" were going to be enacted, but also that new laws had to be "written" and "expounded". All data collected in the course of conservation treatment and codicological visual research were included in a detailed report on what was written anew and how, how it was "read", and how it was "changed"[7].

sheets 4-5, on sheets 11-12, on sheets 17, on sheet 21, and on sheet 140. The page numbers on the verso of the scroll, although they went from the beginning to the end, also did not correspond to the actual number of sheets in the manuscript. The first failure occurred on sheet 211 (written twice), next on sheet 304 (written twice), and some mistakes were noticed on sheets 887-888.

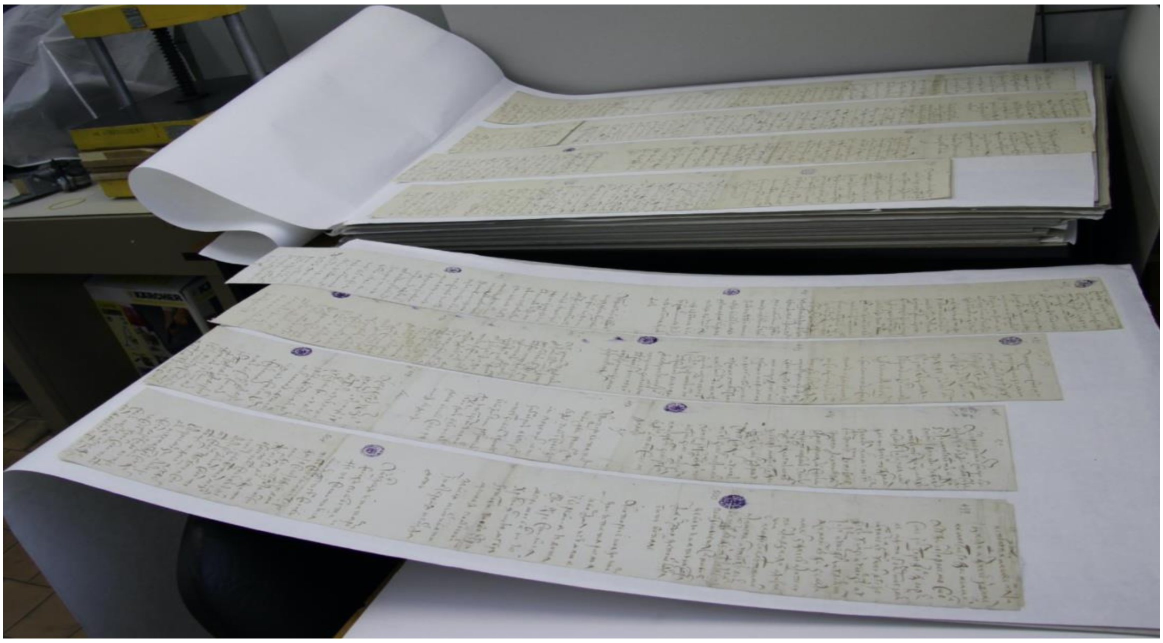

Fig. 7: Scroll sheets after conservation treatment are prepared for joining.

During a visual examination of the document, inconsistencies in the numbering of the sheets on the recto and verso of the scroll were identified by the conservator. This confusion made it impossible to describe the manuscript correctly. The numbers running along the front side of the Cathedral Code scroll only went up to number 205, not to the end. The sheet number failure was found five times: on

Therefore, in order to maintain a precisely documented conservation and codicological description of the manuscript, the researchers decided to recount and renumber the entire scroll in the right order and in accordance with the sheet amount. The scroll is made up of exactly 960 sheets. The new correct numbering served as the basis for compiling the scroll description. The renumbering of the handwritten scroll was approved because the previous numbering had never been

[7] Link to the digital copy of Cathedral Code

referred to in scientific literature. The old numbering was recorded only once in a digital copy of the Cathedral Code scroll, made at the Russian State Academy of Architecture and Civil Engineering before its conservation treatment. This decision was made by the restoration council of the Preservation Laboratory of the Russian Academy of Science on 17 December 2009.

During conservation treatment, the codicological nuances and details had been noted in the workbook or recorded using digital photography. This allowed all accumulated data to be collected into a unified electronic table-description of all 960 pages of the scroll.

Essential technical features of the scribes' work were noted: strictly following order of *vergé* arrangement, *pontuseaux*, watermarks, and text. It was determined how the "paper cutting" for the scroll took place, and how the text writing upon free sheet space took place. A whole sheet of handmade paper (~34x42 cm in size) was cut through the middle of the short side so that each part of the watermark always ended up on each piece. And these central parts of the sheet always turned out to be the left margins of the scroll sheets. The text had always been arranged along the pontuseaux lines and never covered the watermarks (Fig. 8).

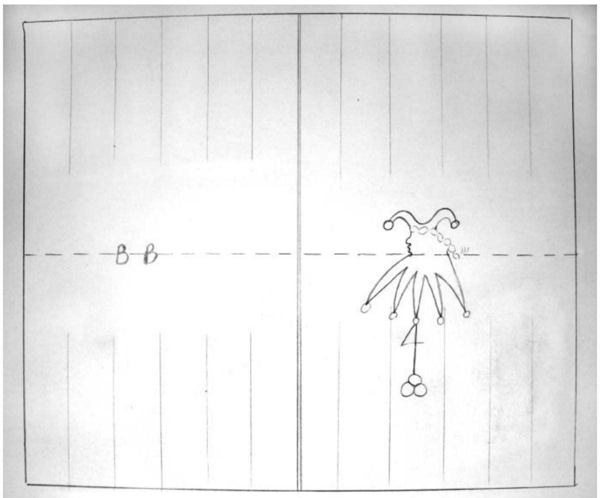

Fig. 8: Cutting pattern of handmade paper used to create the scroll.

These rules were strictly observed on all 960 sheets of the scroll without a single exception. This demonstrated the high professional skills of the people who created the Codex. Paper with four watermarks was used in the manuscript: "Jester", "Strasbourg lily", "Passover lamb", and "Lorraine cross under the crown". This method of conservation treatment through separating the scroll sheets made it possible to perform a digitization of all watermarks, which are presented in this document. The photographs of the watermarks are indicated by the number of the sheet and linked to a specific part of the general Cathedral Code description on the interactive table.

A signature of the manuscript creators was found while unrolling the scroll. Narrow strips of paper between the sheets glued in the 17th century had been inserted (Fig. 9).

These insertions suggest the process of editorial corrections that had been made directly into the document before its completion. Namely, a narrow strip of paper that was left from the sheet with the changed text.

All scroll sheets were also measured in length and width. Differences in the size of individual sheets became additional material evidence of text editing during the scroll's creation. This data indicated the difference between a small editorial insert like 'notes and a 'standard' initial sheet of pre-prepared text.

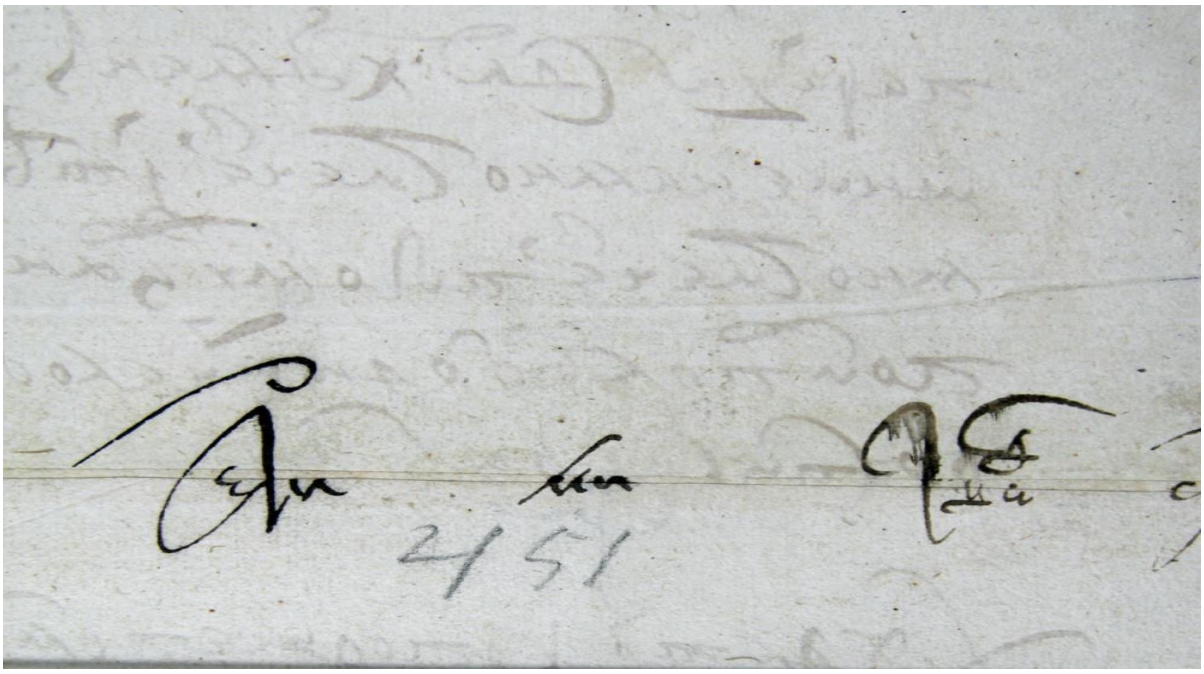

Fig. 9: An example of a narrow paper strip inserted between the sheets during the Cathedral Code editing.

used the rare opportunity to examine every particular sheet, and edit the Internet version of the text, dividing it into parts accordingly to the sheet numbering[8]. It was found that the last academic edition of the Cathedral Code in 1987 does not correlate with the sheet numbering in the original manuscript[9].

In addition, a study to identify the number of scribes of the manuscript was performed.

This research data led to further work on the complete codicological description of a unique documentary monument. Historians and researchers primarily investigated issues related to the text of the Cathedral Code. They

The features of the handwriting were able to be examined in comparison at any place of the scroll. The researchers found that 7 scribes took part in the

[8] Mankov et al. (1987), p. 448.
[9] Cathedral Code, text (webpage).

writing of the column-scroll. All the different styles of each scribe were digitized and inserted in the MS Excel data table. In this table, a series of different handwriting styles were recorded in certain colours and linked to a number on the manuscript sheet. Using this interactive table everyone can find the sequences of handwriting styles, a series of watermarks-filigrees, the sheet sizes in length and width, and link to the sheet number. This table will soon be available for public use. All these opportunities make the process of manuscript creation clear and accessible to the investigation.

5. The Last Stage Challenges

The last stage of conservation treatment was the joining of all sheets back into a single column-scroll, before winding the scroll on the original shaft. At the end of this procedure, the scroll was placed into the ark-case from the Catherine II epoch[10]. Therefore, it was crucial to apply the right method to join the sheets. Prior studies showed that the glue used by the creators of the manuscript was of water-soluble protein origin, specifically of the bone type. All these adhered joints were strong and stable. No weakened adhesions were observed.

However, the scroll had more than 120 breaks that formed near the joint areas (Fig. 10).

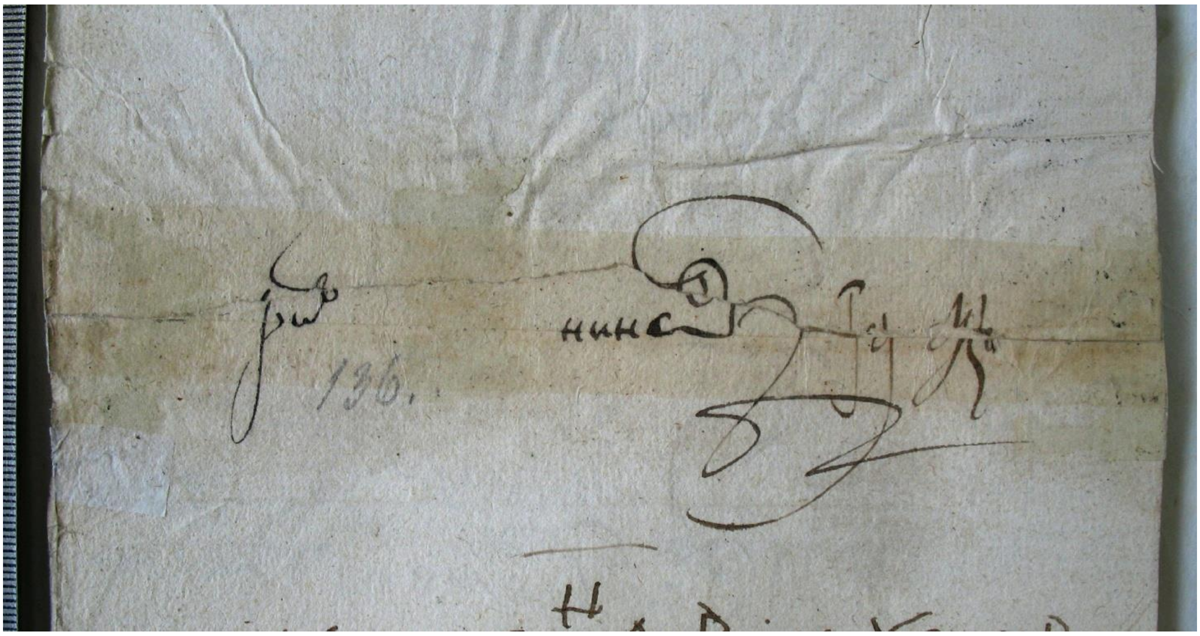

Fig. 10: The breaks formed near the joint areas after the archival restorations in the mid 20th century.

[10] Eskin/Volchkova (2018), pp. 437-459.

They could have appeared due to the weakening of paper fiber strength along the joints, probably as a result of past heating of the paper to stabilize glue.

They could have appeared due to the weakening of paper fiber strength along the joints, probably as a result of past heating of the paper to stabilize glue. In the recent conservation treatment, a wheat starch paste was applied by the conservator to glue the sheets together and a press method with felts was used to avoid deformations (Fig. 11).

For the next step, it was necessary to wind the scroll onto the original wooden shaft. As was mentioned above, the shaft design assumes the presence of two side stop discs that direct the manuscript scroll for compact winding. Such shafts have been used in Torah scrolls. Therefore, to optimize the winding process, a temporary stop disc at one end of the shaft was used (Fig. 12).

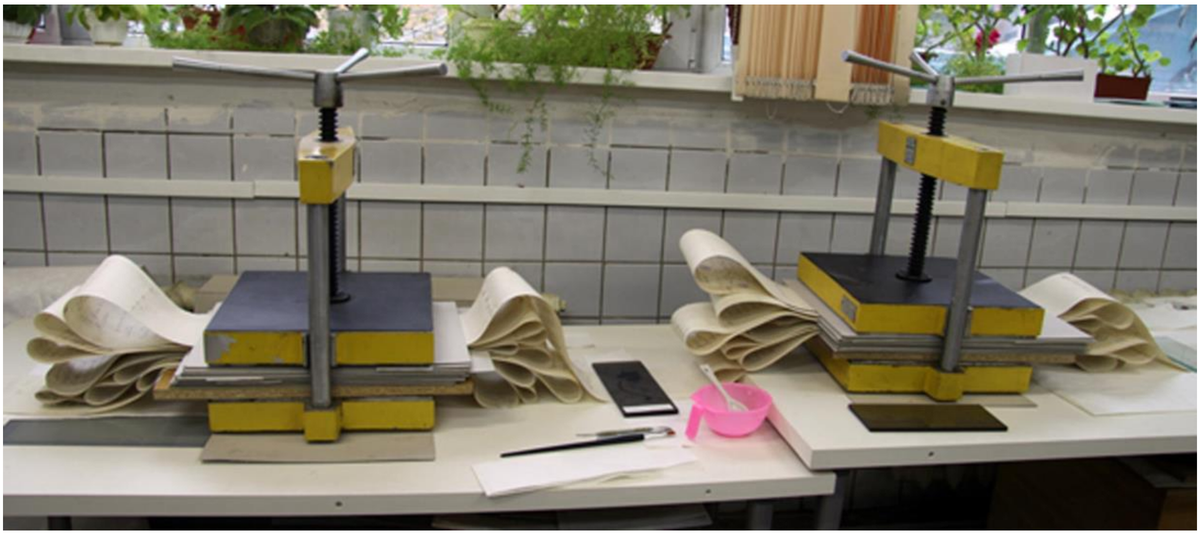

Fig. 11: Several glued sheets were stacked together, sandwiched by cardboard and felt layers and kept under pressure until dry.

Fig. 12: A cardboard disc at one end of the shaft was used to optimize the winding process.

While winding the scroll it became clear that all mended mechanical damages (breaks and tears) to the sheet edges had been caused by its tight winding in the past. The edge of the scroll had been touched and torn by the stop discs. The first rewinds, which took place even during the creation of the document, also left their own traces: the sheets were not rewritten due to breaks but were carefully "repaired" by carefully gluing them with rag paper and wheat glue. One of these has preserved the signature of the scribe (Fig. 13).

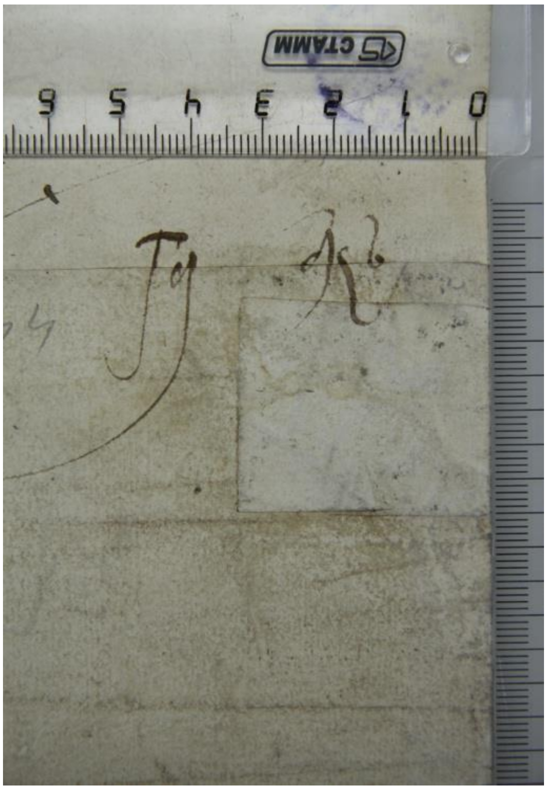

Fig. 13: An example of an alteration made during the scroll creation: the patch bears the signature of the scribe.

The multiple mends to the breaks and tears indicate the number of rewinds made in past. It also became clear that the previous conservators used a "triple" seam made of thin semi-transparent paper for through breaks (Fig. 14).

Such a joint allowed for the scroll to be wound very tightly but it partly covered the text. These rigid joints caused tension near seams leading to deformations and breaks. Scientific conservation guidelines do not approve such a treatment of written monuments. Therefore, in our case, the gluing and mends were made only on verso using thin Japanese long-fiber paper of equal strength (Kozo). Such a seam does not assume a power load during rewinding. So, in its final form, the scroll became a little bit puffier. It barely fit the case, with little waves at the ending sheets (Fig. 15).

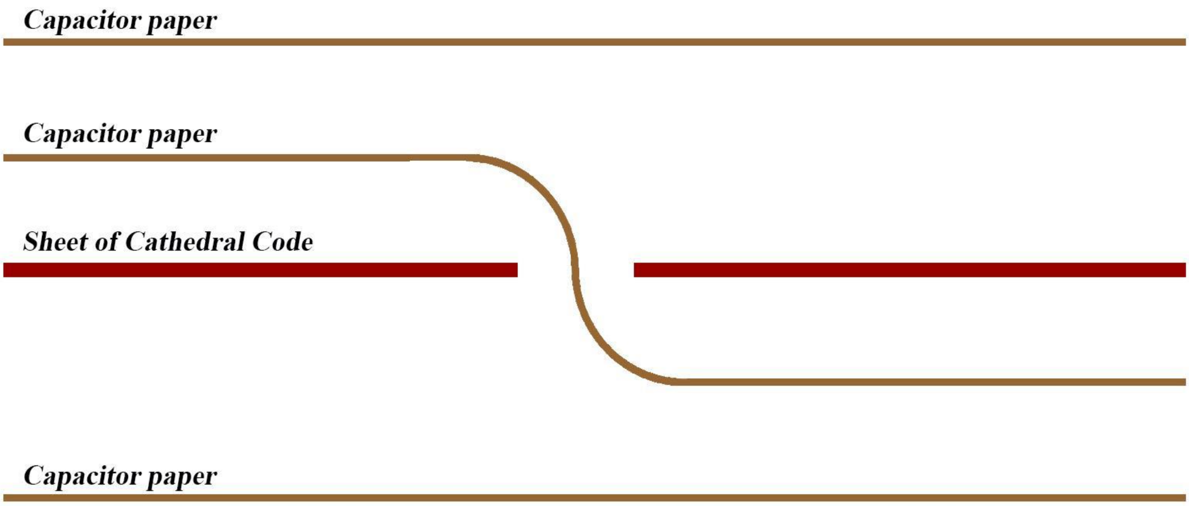

Fig. 14: Method used for break mending during previous restorations.

Fig. 15: After conservation the Cathedral Code was placed back into the gold-plated ark.

Due to the complex and thorough conservation treatment of the manuscript, and after codicological research, as well as the creation of a detailed electronic table-description, and making this information publicly available through digitization the necessity for removing the scroll from the housing and the need to handle has greatly been reduced. This means that the long-term preservation of this unique document is guaranteed not only by qualified conservation treatment but by the careful efforts of researchers and curators.

In 2015 for the first time, a documentary monument of Rosarchive - the column-scroll "Cathedral Code" of 1649 - was recommended for inclusion in the UNESCO Memory of the World Register for the protection of the World Documentary Heritage[11].

[11] Link to UNESCO website

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