

SOME EXPERIENCE OF RESTORATION OF CARTOGRAPHIC DOCUMENTS

T. JU. Kolosova

Abstract: One of the most difficult problems that rises in front of the restorers during their work deals with cartographic documents covered with some substance.

As a rule, the only use of the methods of restoration in their classical version with traditional methods of chemical analysis does not lead to the desired results.

The task is complicated by the impossibility to foresee the effect of different substances on the elements of dye stratum and texts that are under covering substance.

In the report, we try to illustrate general tendencies of the approach to restoration of such a kind of documents by a concrete example.

We got for restoration a military map of Pillau (Eastern Prussian dated from the end of the 18th century - beginning of the 19th century. It is evident that the map is saturated with some unknown substance to give it strength against the effects of atmosphere, and to increase its operation qualities.

The base of the document is broken in three parts. All the previous attempts of its restoration did not succeed. In the result of the analysis, we have obtained the composition of the unknown substance (bees wax), and have elaborated the plan of restoration.

In the Federal Archives located in Moscow, there are stored a large quantity of the most various cartographic materials. So, our laboratory often deals with documents of this kind. The cartographic materials brought to us for restoration are very different in their manufacturing technology, in formats, and in the various states of damages that should be eliminated in the process of restoration.

There are a lot of problems arising when working with cartographic documents, and it is impossible to analyse each of them in our report. So, I am going to speak only about one problem that is the most interesting and difficult, both from the practical and theoretical points of view. Some of the aspects are, in our view, rather debatable. We mean restoration of the cartographic documents coated with some substance.

As it is well known, the coating substances are often used in manufacturing maps in order to increase their working qualities, i.e. mechanical durability, atmospheric stability, etc. Depending on time and place of manufacturing, they used various coating substances beginning from natural and to modern synthetic polymers. It should be noted that the coating substances have quite a various ability of penetrating into the paper base of the document. Sometimes, the substance just stays on the paper surface, but sometimes, it penetrates the paper and is actually a kind of impregnation.

The use of only the restoration methods in their classical variant using the traditional methods of a chemical analysis in working with cartographic documents coating with some substance, are often not sufficient. It is especially difficult when the map or plan is made in a complicated technique and when various means of painting and writing were used in the process of manufacturing.

In my paper, I tried to illustrate on a concrete example the general tendencies and approaches employed in our laboratory for the restoration of documents of such a kind.

I am going to speak about restoration of a map coated with a substance of unknown nature - the military plan of the fortress near the town of Pillau. This town was situated in East Prussia on the Frisch-Gaf flowing into the Baltic Sea. The fortress near the town protected the entrance into the Frisch-Gaf. Manufacturing of the said military plan is dated about the late 18th - early 19th centuries, the place of manufacturing is unknown. The plan is made on paper and written in German.

The imprint and texts are on one side of the document, the paintings being done in the water-colour technique.

It is considered that water-colours were widely used for colouring drawings, beginning from the 15th century. The Pillau plan was made in the typical technique : the sketch was put on the paper with the help of a pencil, then the main contour lines were outlined with Indian ink, and then the drawing was water-coloured. They used special methods of putting water-colours - washing out and pouring.

The Pillau plan was manufactured with water-colours of green, yellow, red, orange, grey tones, brown ink, and black Indian ink.

The whole surface of the document is covered with a coating substance of unknown nature. The coating in this case is a kind of impregnation as the paper base of the document is soaked through with it. The coating is transparent on the

whole but on the numerous small lines of fractures and bends it is not transparent and of a white colour.

The plan is torn into three parts, and, on the other side along the breakage lines, there are signs of a gluing substance left from the previous restoration that was not successful. Besides, the plan has two sticky labels and three stamps, that means the document belonged to different departments at different times. The stamp colour got through and, in some places, damaged the imprint.

We consider that the first obligatory condition for restoring the documents of such a kind consists in identifying the unknown coating substance which is done by corresponding methods. When working with the Pillau plan, we chose infra-red spectroscopy and chromatography-mass spectrometry. As a result, we received the data that permitted to fully identify the unknown coating substance as a mixture of bees wax and wool wax. It should be noted that the principles of choosing the analysis methods, working out their methodology and the methodology of interpreting the received results would make a separate theme beyond the present paper.

Identification of the unknown coating substance as wax permitted to explain its white colour on the breakage lines and the bends of the document as the result of uneven internal stresses and transformation of the wax in these places, from the amorphous into the microcrystalline state.

Later with the help of the traditional chemical methods of analysis, it was found out that the remaining parts of the gluing substance on the reverse side of the document was flour paste.

Thus, the pre-history of the document submitted for restoration becomes clear. The plan coated with wax was torn into several parts.

The attempts to restore the document in an ordinary way were not successful because of the paste low adhesion to wax.

The next, and may be the most important and disputable question that had to be solved, consisted in choosing the principal direction of restoration of the documents covered with a coating substance. Here, I would like to digress a little bit from the subject of restoring cartographic materials and to look at the subject in a much wider way.

The problem of coating substances is one of the most interesting and may be the most often discussed by the restorers of different trends - from the ancient painting to sculpture. The opinions much differ in this question, may be much more than in an other question. Are we right to intervene in the work of an

ancient master ? What were his goals in coating his work ? Whether he had some other motives beside the technological and pure functional ones ? What historical load does this coating bear at the present moment ? Is it worth to cover the restored object with a new coating ? Historians, archivists, art critics, together with specialists of scientific natural profile, play an important role in discussing these problem in all fields of restoration.

When working with the Pillau plan, we, together with the keepers of the document - the specialists of the Russian State Military Historical Archives - discussed three possible variants :

- 1) Removing the old coating substance and restoration with the methods of the classical restoration of documents without covering the document with a new coating,
- 2) Removing the old coating substance and restoration with the methods of the classical restoration of documents with covering the document with a new coating (identical to the old one or of modern synthetic materials),
- 3) Keeping the old coating substance and choosing non-traditional methods and materials of restoration.

When choosing the most optimum of these variants, we followed the following considerations :

Most likely that the wax was put on the plan for purely practical aims - first of all in order to prevent the non-water-resistant water-colours, Indian ink, and ink from getting under water and moisture, and to permit using the plan in the open air. This assumption was confirmed later. Large quantity and small particles of soot were found on the coating - evidently, the plan was used in its time directly on the theatre of military operations.

Probably, the document was coated just with wax, as, at that time, wax was the best coating substance meeting the requirements of military maps. Paraffin, the closest analogue of wax, that is cheaper and that makes non-sticky coating excluding dusting was used only in 1830. At the present time, this main functional feature of wax as a coating substance providing a possibility to use a document in the open air is fully lost.

Now, the presence of a protecting coating substance on the Pillau plan, in our view, turned from the positive to the negative factor.

The work of researchers with the drawing is complicated by the optical unevenness of the coating caused by the presence of a large quantity of small

white lines. Besides, when working with the document, even with great care, it gives new white lines caused by unevenness of stresses appearing in the wax. Some stickiness of the coating substance also negatively affects the physical durability of the document.

Among the positive moments of the document coating substance, one can certainly mark its historical technological information. Having analysed all these arguments and considerations when working out the problem of the principal direction of the Pillau plan restoration, we, together with archivists, have come to the conclusion of advisability of removing the old coating substance, i.e. wax, and restoration of the document by the methods of classical restoration without covering the document with a new coating.

The variant of coating the document with a coating substance of some modern synthetic polymer was rejected as not answering the purpose of the further storage, use, and studying of the said historical source.

The next important question arising after taking the principal solution of removing the old coating in the process of restoration is the question of the practical realisation of this solution.

Naturally, the main problem of employing one or another reagent for removing the wax consists in the relation of this reagent to all elements of the water painting, texts, and later stamps.

Usually, we start selecting of a reagent on the basis of our knowledge of the techniques and ways of putting a coating substance on the document by the old masters. As a rule, the used method is reversible. And employment of this method in the reverse direction is in most cases absolutely harmless for all elements of the imprint and text.

When doing this work, it was assumed that a so-called « cold method of putting wax » was used for covering the document with wax. Both the « cold » and « hot » methods were known from the ancient times and from times immemorial were widely used for putting wax on various surfaces (for example, in encaustics). If, with the « hot » method, the wax is melted, with the « cold » method, the wax is put on the surface as an emulsion that is prepared by dissolving wax in the corresponding solvent. From the ancient times, they used turpentine as a solvent.

So, we suggested turpentine as the first reagent to try removing the old coating substance from the Pillau plan. However, unfortunately, we could not use turpentine for removing the wax coating from the document as, at the first test, we

found out that it caused significant spreading of the paints entering into the stamps composition and stamped later on the wax.

So, we had to exclude turpentine from the suggested solvents and to continue searching of the suitable reagent. In our searching, we based on the physical chemical features of the dyeing staffs used in water painting.

In this case, it would be a mistake to speak about « water painting in general » without chronological and geographical limitations. There exist rather various ways in the materials and physical chemical features in antique painting, medieval, the 20th century European painting, Near and Far East painting, etc. It is known that the 18th and early 19th centuries broke the old seclusion of the European countries, so that, now, it would be impossible to speak about some colourful materials of one or another European country. The new inventions and materials in the field of dyeing staffs were immediately distributed among all European capitals and trade centres. This is why speaking about the 18th and 19th centuries, it is possible to speak only in the general European scale concerning the water painting elements.

Thus, not having any data about the exact place of the document manufacturing place and taking only into consideration its European origin and rough time of manufacturing, we generalised the data on the physical chemical features of the imprint components of the said period and chose a number of suitable solvents.

For our further work, we chose benzene, benzol, and carbon tetrachloride.

Later on, having compared all experimentally received and literature data on dissolving wax, dyeing staffs used in the water painting technique and in the modern stamps imprints, we ultimately stopped our choice on benzol.

Using benzol, we removed the coating substance from the Pillau plan and then we restored it, using the common methods and materials of the classical restoration.

In conclusion, I would like to mention once more that, in our view, the plan of restoration of cartographic documents covered with some coating substance, beside all other questions directly concerning restoration, should obligatory include the following three points :

- 1) identification of the unknown coating substance,
- 2) the scientifically grounded decision of the necessity in its removing. This question should undergo a complex expertise, and not only natural scientific but also historical and artistic,

- 3) working out of the methodology of removing the coating substance (of course, if the decision about its removing is taken). The main requirement should concern a securing complete preservation of all the elements of painting and text in the document.

We are sure that real scientific restoration of cartographic materials covered with some coating substance is possible only after a careful study of these questions.

T. Ju. Kolosova
Federal Archives
Laboratory of microfilming and restoration
Moscow
Russia