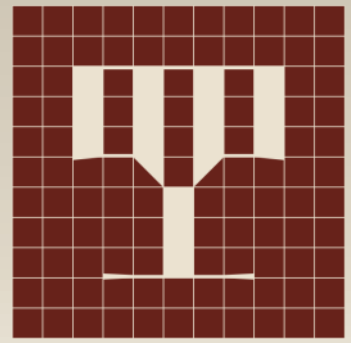


Conservation-restoration of a 17-century hand-coloured map



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INTRODUCTION

The map *Dalmatia Istria Bosnia Servia Croatia e parte di Schiavonia*, which is kept in the Map Collection of the National and University Library in Zagreb, was made in 1684 by a famous Italian cartographer Giacomo Cantelli da Vignola. It's an etching on paper that was later hand-coloured with green, red and yellow pigment. It was originally part of the *Mercurio Geografico*, the famous Italian Baroque atlas made by the Roman printer Giovanni Giacomo de Rossi. The second edition from 1692 (from which this map originates) contains 150 maps of all parts of the world.

STATE OF PRESERVATION

The map was in a poor state of preservation. It was folded and wrinkled with mechanical damage alongside all the edges. The green pigment has degraded and changed colour in the lower part of the map. There are stains caused by microorganisms in the lower corners, earlier restorations (inadequate infills and repairs with adhesive tapes), the paper is extremely mechanically damaged and flakes along the lower edge.

Two dry stamps are along the lower edge, while the red Novak Collection stamp is situated in the lower right corner. The paper is rag with a watermark in the middle of the left half of the sheet (the Lamb of God in a double circle with the letters A above and N below the circle).



The map before conservation treatment.



UV photograph before treatment.



IR photograph before treatment.



The map after conservation treatment.



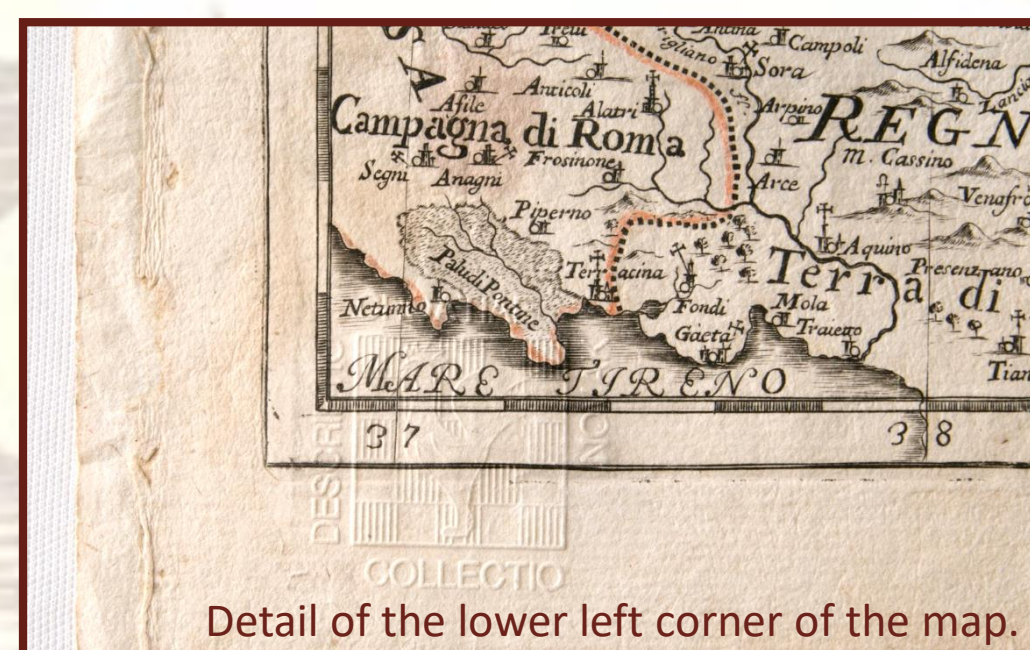
The map placed in protective housing.

RESEARCH

Before the conservation-restoration treatment, research was done to select the most suitable conservation-restoration method. Preliminary studies included tests of solubility, acidity, water absorption and the presence of transit metal ions, as well as analysis of the state of the map under and IR radiation. Pigments were characterized by X-ray fluorescence analyses (XRF). Properties that are important for determining the optimal method of conservation-restoration for the map were determined. The lower edge of the map was evidently exposed to unwanted quantities of water or moisture. Tidelines are clearly visible under UV radiation.

The green pigment was identified as copper-based (presumably verdigris), the red pigment in the lower left corner of the map was identified as minium, while the red and yellow pigments used in the middle of the map were apparently of organic origin, as XRF spectra did not record the presence of inorganic substances greater than that present in plain paper.

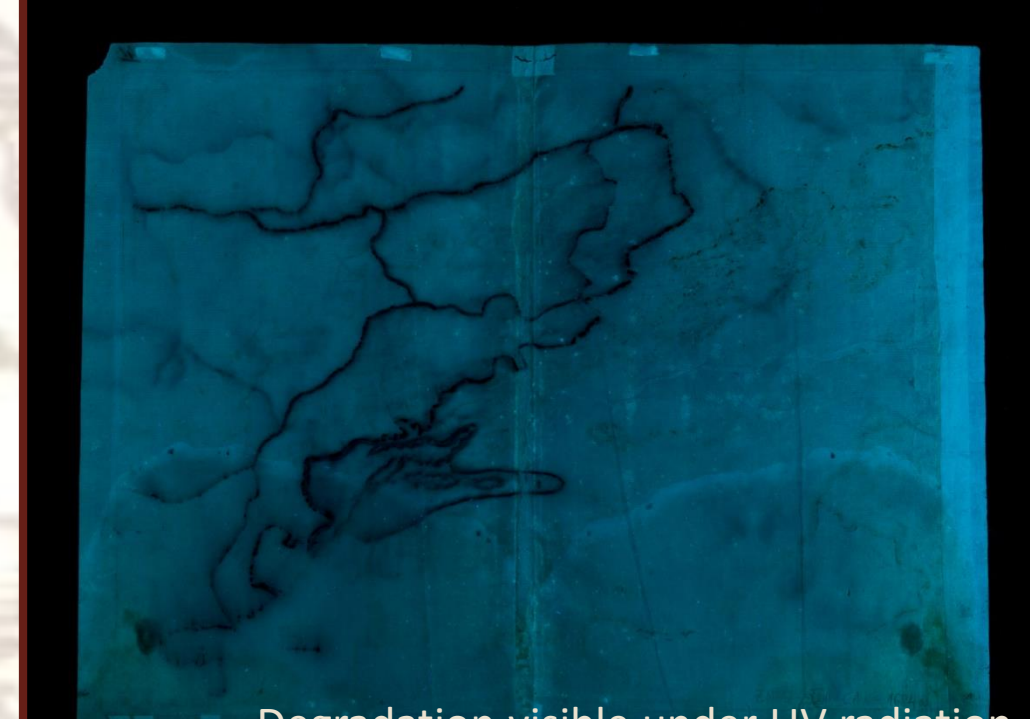
Subsequent interventions on the back certainly needed to be removed as their chemical composition and inadequate application significantly contributed to the accelerated deterioration of the map. The paper support had to be flattened and strengthened so that further use of the map would not create new damage.



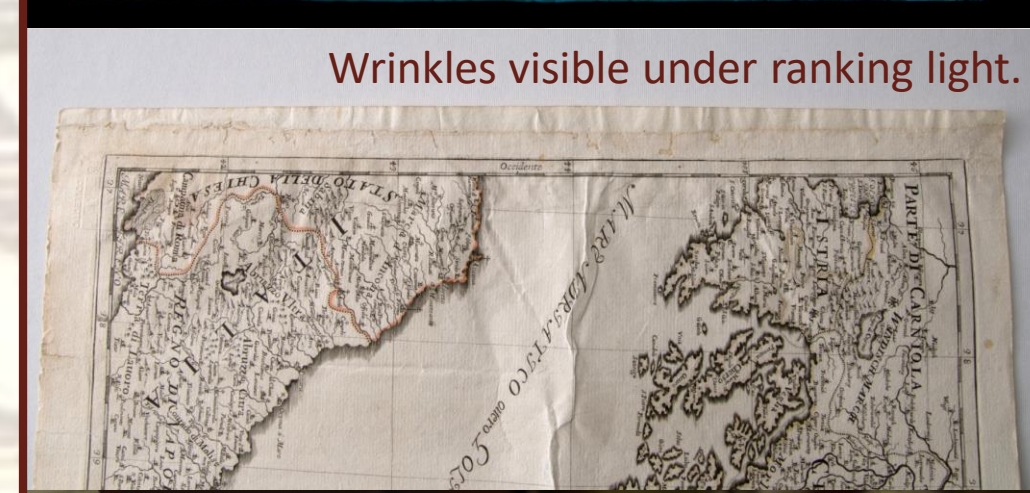
Detail of the lower left corner of the map.



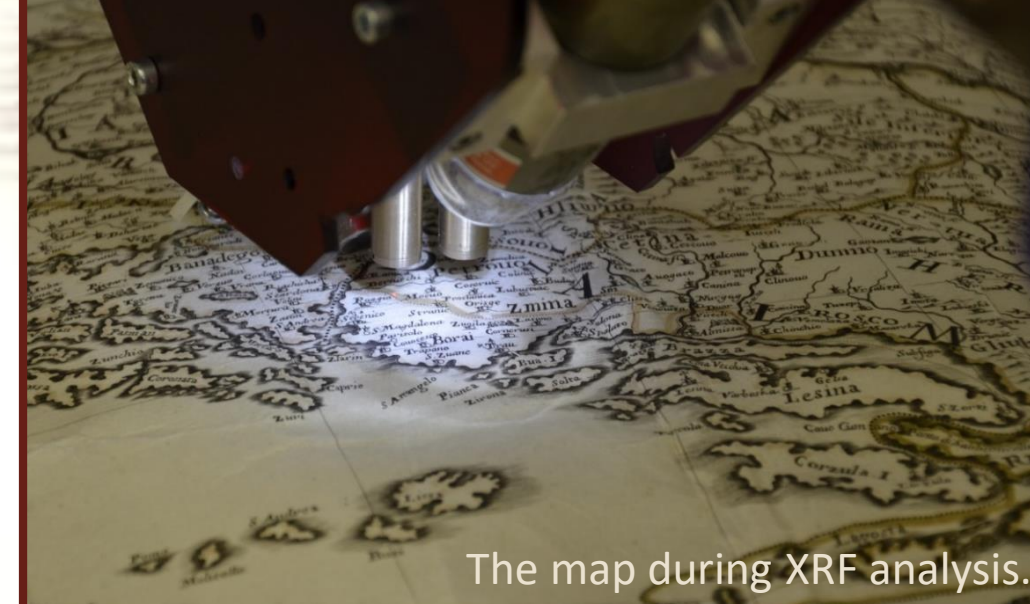
Copper pigment based degradation on the back.



Degradation visible under UV radiation.



Wrinkles visible under raking light.



The map during XRF analysis.

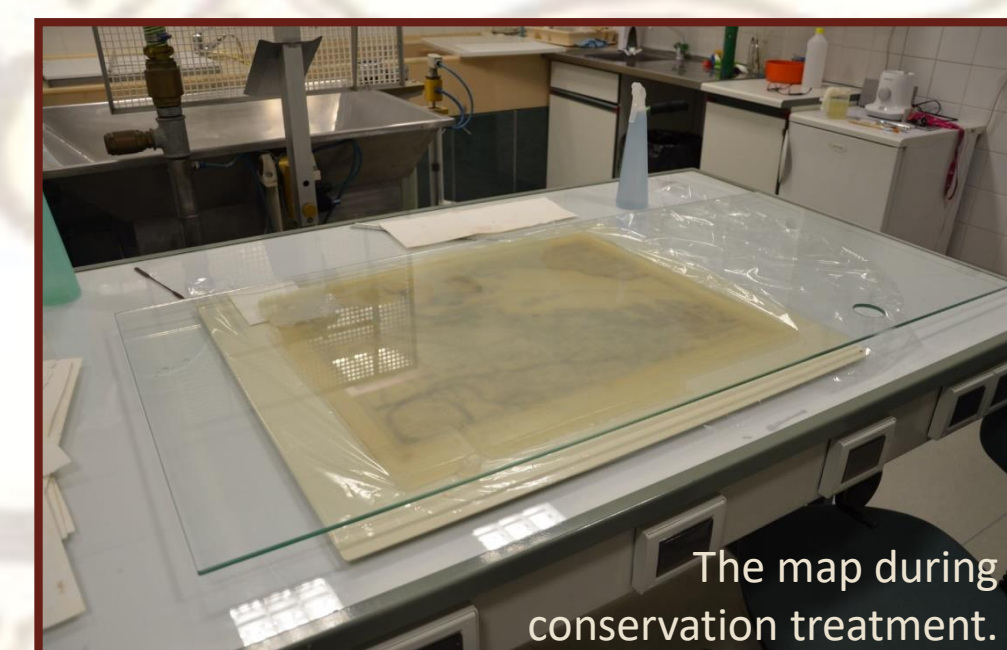
CONSERVATION-RESTORATION TREATMENT

As the removal of subsequent interventions and straightening required wetting, and the map contained a water-soluble stamp and green copper pigment whose degradation is promoted in the presence of water/moisture, it was decided to moisten the map locally with rigid aqueous Gellan gel, while the rest of the map was treated with alcohol agar gel to avoid mechanical stress, cracking or unwanted tide lines at the places where Gellan gel ends.

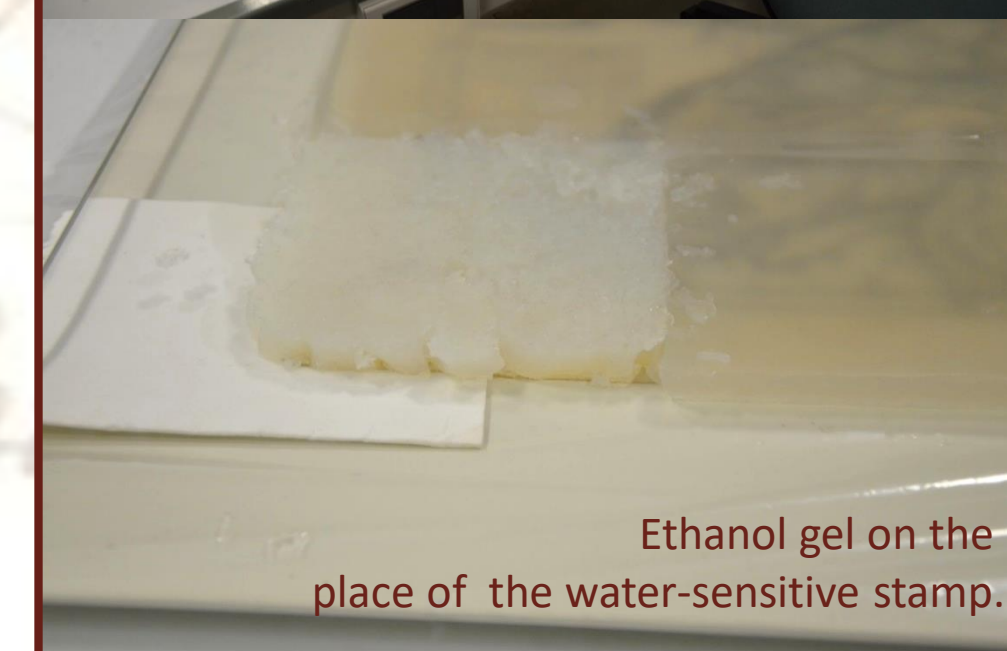
A 4% Gellan gel in 0.4% aqueous calcium acetate solution was made. To a 5% agar gel in water ethanol was added between the transition from sol to gel state (at about 30°C) so a final ethanol gel concentration of about 80% was achieved.

After cooling, the gels were cut in such a way that the water-sensitive areas were treated with an alcohol gel and the rest with water gel. After the action of the gels, inadequate earlier restorations were easily separated from the back and the map was flattened so that adequate infills and strengthening of paper could be done.

Mending was carried out with methylcellulose adhesive and Japanese tissues. Drying was done in a costume-made hard-soft sandwich comprised of Hollytex, blotting paper cut out in a way that dry stamps would not be flattened, woollen felts and wooden boards. After the conservation-restoration treatment, the map was placed in a custom-made protective housing and returned to the Collection in controlled microclimatic conditions with constant supervision of the conservator-restorer available.



The map during conservation treatment.



Ethanol gel on the place of the water-sensitive stamp.



Removing earlier restorations from the back.



The map after conservation treatment.



Mending with Japanese tissues.

Thanks are due to the conservation team: dr.sc. Vladan Desnica from the Laboratory of Conservation-restoration department, Academy of fine arts in Zagreb (for XRF analyses), Damjan Kopričanec (for protective housing), Sonja Hrelja and Darko Čižmek (for the photographs), all from National and University Library in Zagreb.