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## Treatment of a 19th-Century Varnished Map in the Library of Congress Geography and Map Division

### INTRODUCTION

Pearce's *New Map of the State of North Carolina* (ca. 1870) is a very large map in the Library of Congress Geography and Map Division. It is an engraving with red, orange, green, and blue hand coloring. Due to its illegible condition and research value, it was brought to the Conservation Division for treatment. A treatment was proposed to improve the map's readability by removing the obscuring silk facing and blanching varnish while addressing other condition issues.

Originally, the map measured 60 × 82 in. and consisted of six conjoined sheets of paper. It was presumably issued as a wall map, varnished, and attached to two rods for rolled storage. However, with use over time, tears, numerous losses, and fractured areas developed in the primary support.

As an early 20th-century preservation intervention, the map had been removed from the rods, cut into eight sections, lined with paper and a heavy white fabric, and faced with a sheer silk gauze that was pasted to its surface to prevent further losses. This was a common preservation strategy practiced by the Government Printing Office for large-formatted works (fig. 1).



Fig. 1. Lower right section before mending compared to the seven untreated ones.

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Proceedings from the AIC-sponsored event, "Varnished Wall Maps: A Collaborative Seminar to Investigate Treatment Methodology," September 14–16, 2022.

## TESTING AND TREATMENT

Pretreatment testing determined that the starch adhesive was water soluble, and the varnish was soluble in ethanol. The ink and color washes appeared stable in water and ethanol. During the examination, it became clear that the paper, in addition to numerous tears and losses, was also structurally weak and delaminating in many areas.

The presence of a paper lining in contact with the original map support made it possible to remove the cloth backing mechanically by tearing it off in strips. To remove the paper lining and silk facing, the decision was made to use alpha-amylase enzymes (Sigma A6381) to break down the multiple adhesive layers to minimize the mechanical impact on the map's fragile paper. Each map section was saturated with enzyme solution, placed between two sheets of clear polyester film, and floated over a tray of warm water to increase the activity of the enzymes (fig. 2). After 30 minutes, the paper lining was removed by placing the map face down on nonwoven polyester webbing and clear polyester film. The thick, softened adhesive was

scraped off with a spatula and by rolling damp cotton wool over the surface.

The map was rinsed on an incline by gently spraying it with water until the solution ran clear. The silk facing was left on until the last step, as it held multiple small paper fragments in place while allowing the adhesive to be rinsed through the open weave of the silk. Once the silk was removed, the map was placed between sheets of nonwoven polyester webbing for a final rinse.

At this point, the map was given a temporary lining of rayon paper adhered with A4M methyl cellulose adhesive and dried under weights. This lining is more easily reversed than Japanese tissue adhered with wheat starch paste.

As expected, the varnish blanched further during the aqueous treatment. Once dry, each of the map sections was immersed in a series of ethanol baths to remove the varnish. Cotton wool was used to gently brush the surface to disperse the varnish. The varnish was completely removed after the third bath, and the map sections were allowed to air-dry in the fume hood.

The final steps were to align the pieces that had shifted during washing, infill the areas of loss, and apply a final lining.



Fig. 2. Map section in alpha amylase solution between two sheets of clear polyester film floating over a tray of warm water.





Fig. 3. Placing paper pulp in the areas of loss with the aid of transmitted light.

The temporary rayon paper lining was easily removed by spraying the map section with water while it was supported on nonwoven polyester webbing. The numerous small pieces

were aligned while the map was still wet and face up on clear polyester film on a light table. It was necessary to continually spray the map with water to keep the pieces adhered to the clear polyester film to prevent drying.

Paper pulp was created to infill the areas of loss by macerating old papers that matched the color of the map in a blender. The map was placed face down on a sheet of nonwoven polyester webbing and clear polyester film while continuing to work on the light table. Tweezers were used to pick up fibers suspended in a pulp slurry and placed in the loss (fig. 3). Transmitted light helped to gauge the right amount of fibers to add and to distribute them evenly in the loss. Once an area of loss was filled, the water was blotted off through polyester webbing to set the fibers in place prior to lining.

Two map sections were lined together with machine-made kozo sheets (19 gsm) adhered with wheat starch paste, thus reducing the number of map sections from eight units to only four quadrants. The sections were dried between nonwoven polyester webbing, blotters, felts, and weights until dry (fig. 4). Each map quarter was encapsulated in clear polyester film with an insert of acid-free buffered bond paper behind it.



Fig. 4. The four completed quadrants placed together.

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