

Madder Matters: Chemistry and Historic Textiles  
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Summary by Samantha Myette

In order to study material culture, one must first determine what the “material” is. In textiles, these materials include fibers, fabrics, dyes, and finishes. As a conservation scientist at the Harvard Art Museums, Dr. Julie H. Wertz synthesizes chemistry and historical knowledge to answer the question “what is it made of?”

Dr. Wertz began her career in the world of historic textiles by determining the components of a dye called “Turkey Red.” Turkey Red textiles were made of cotton and dyed naturally with madder root in a long and complicated process. These fabrics were mainly produced in Glasgow from the years 1785 to 1936 though they were also dyed in England, Switzerland, France, and Italy. This dye was unique because it was fast to washing, light, and crocking. Motifs could be discharge printed, opening up a range of design opportunities. The Historic Textile and Costume Collection at the University of Rhode Island holds a number of examples of Turkey Red.

Just like all matter, the components of textiles can be determined through chemical analysis. There are a number of spectroscopy tests that can be performed to determine the components of historical textiles such as x-ray fluorescence, scanning electron microscopy, Fourier-transform infrared spectroscopy, and chromatography. Chromatography is a technique that separates the chemical components of an object and can be used to determine the type of dye applied to a textile. It is a destructive technique as it requires a sample, which is important to consider when analyzing fragile historic textiles. It is essential to have reference materials to which a sample can be prepared. At Harvard, the Forbes Pigment Collection houses a large amount of old dyes and pigments that can be used for reference. Though these are complicated processes, every Textiles, Fashion Merchandising, and Design student at the University of Rhode Island is required to take an introductory chemistry course in order to prepare for such work.

The knowledge needed to analyze material in historical textiles extends beyond just chemistry. A conservation scientist should be aware of environmental, technological, and economic factors when considering how an object was made. Global trade was required for the production of Turkey Red. Cotton, for example, is grown in warmer climates, aluminum used in the dyeing process was sourced from Rome, and water and labor were local to Glasgow. Technological innovations allowed for faster production of cotton and synthetic dyes that eventually replaced Turkey Red. Contextual vocabulary is also important as language from the past differs from the present. It takes a certain level of research and understanding to interpret historical dye recipes. Historical knowledge is also useful when conservation scientists must collaborate with curators in the museum setting.

Chemistry is essential to understanding the world around us because it makes up the world around us. Textiles, along with the dyes and pigments that color them, are complicated, fragile materials that require careful analysis. Supplemental knowledge in economics, language, history, and technology makes for a well-rounded conservation scientist. Answering the question “what is this made of?” opens the door for a realm of possibilities for research.