Chapter 5
Investigation and Analysis of Ancient Dyed Textiles

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ABSTRACT

A material investigation is a very important step in the documentation of the component's properties for materials of an object, in estimating its condition, and in considering appropriate conservation treatments. Textile fibers are the fundamental unit of material that makes up fabrics and textiles. Fibers are frequently classed as either natural or man-made, though there are also several categories and sub-types. Natural fibers are further categorized based on their origin (vegetable, animal, or mineral). According to that, this chapter deals with investigation methods for both main components of ancient textiles, fibers, and dyes; as the analysis of the materials utilized in textile dyeing could also be a valuable tool to know how an object originally looked, how old it is, and where it comes from. This data allows conservators to settle on appropriate procedures for restoration and dating textiles depending upon its manufacturing discovery date and its type of dye.

INTRODUCTION

A material investigation is a very important step in the documentation of the component's properties for materials of an object, in estimating its condition, in considering appropriate conservation treatments (Timor-Balazs & Eastop, 1998). Textile fibers are the fundamental unit of material that makes up fabrics and textiles. Fibers are frequently classed as either natural or man-made, despite the fact that there are several categories and subtypes. Natural fibers are further categorized based on their origin (vegetable,

animal, or mineral). Man-made fibers are subdivided consistent with their base material (natural polymer, synthetic polymer, or other). There are more than 1,500 manufacturing fiber factories in the globe.

Man-made fiber makers account for the majority of such plants, followed by cellulosic and glass fiber producers. In Asia, the most produced fiber plants are situated. There are 145 fiber production factories in the United States, the vast majority of which are synthetic (Goodpaster & Liszewski, 2009).

Investigation Methods of Fibers

Investigation methods are grouped into two main groups: instrumental analytical methods, which usually require the experience of scientists, and laboratory investigations, which may be carried out by textile conservators (Timor-Balazs & Eastop, 1998).

Undertaking tests on degradation is very important when making a condition report on museum textiles. With these results, the conservator can predict the effects of various treatments and determine the appropriate environmental factors for further conservation. Chemical damage can be caused by processing chemicals (alkalis, acids, oxidants, swelling agents and solvents), ultraviolet radiation and light, heat, aggressive environmental agents, and micro-organisms.

The effect of these damaging factors has been discussed for individual groups of fibers (Timor-Balazs & Eastop, 1998).

Textiles have a huge potential in archaeological research, having the ability to talk about chronological, social, and cultural aspects of past societies, and at an equivalent time providing us with a unique opportunity to be very close to the historic or prehistoric individual. Substantial information about past societies is often yielded from the study of textiles, but this information depends on the analytical tools and methods used.

A textile has information about the process and therefore the tools utilized in the varied stages of its production. The decoding of textile is imperative for the understanding of the various processes involved in its production, and therefore the methods may vary consistent with the state of preservation.

For instance, the processing of a fiber material from the source to the ultimate thread and therefore the sewing and weaving will tell breeding systems and the technological knowledge of that time and indicate more subtle information about human desires and visual preferences. Fiber identification is a crucial starting point in textile research because it indicates the properties of this material and the possible uses (Mannering & Skals, 2014).

Aim and Methods of Fiber Identification

The aim of identifying the fiber of textile is to understand the contents of the fabric. Methods employed for identification are categorized into physical and chemical tests but the first step in the identification of fibers is always inspection of fabric for appearance and feel of the hand.

Collecting reference samples and making your own database is the first step to fiber identification.

In conservation, although it requires sampling, physical methods, such as microscopic examination, are favored over chemical methods such as burn, melt, and stain tests, from the principle of non-destruction. Instrumental analysis like Fourier transforms infrared spectroscopy (FTIR) and Scanning electron microscopy (SEM) can also aid fiber identification but should be referred to a specialist. (Ishii, 2013)

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