

Chapter 4

Painting on Fibers: Methods of Pigment Analysis on Ancient Egyptian Painted Textiles

Hussein Marey Mahmoud

 <https://orcid.org/0000-0002-1598-1580>

Faculty of Archaeology, Cairo University, Egypt

ABSTRACT

In ancient Egypt, color expressed both symbolic and aesthetic value. For decorating purposes, the ancient Egyptians used an intensive chromatic palette based on a broad source of natural and artificial origins. Beside dyeing, decorating textiles in ancient Egypt had different forms, such as embroidery or the painting of a smooth coating applied on the textile matrix. Physical analytical approaches are an essential request prior any restoration project. In this chapter, the benefits of a wide range of non- or micro-destructive methods to study the physiochemical behavior of pigments used in ancient Egyptian painted textiles are presented. To garner data concerning the ancient materials, special techniques are used, such as the environmental scanning electron microscopy with energy dispersive X-ray spectroscopy (ESEM-EDX), X-ray fluorescence (XRF), laser-induced breakdown spectroscopy (LIBS), micro-Raman spectroscopy (μ -Raman), Fourier transform infrared spectroscopy-attenuated total reflection (FTIR-ATR), colorimetry, and visible reflectance spectroscopy (vis-RS).

INTRODUCTION

The ancient Egyptians were familiar with their polychrome objects, tombs, and temples. In ancient Egypt, textiles enjoyed different forms and applications, even though the majority of the surviving ancient Egyptian textiles are not colored. Broadly, the ancient Egyptians used flax plants (*Linum usitatissimum*) for manufacturing and weaving different textile objects, such as garments, mummy wrapping, etc. (Clark, 1944; Vogelsang-Eastwood, 1992). To decorate the textile fibers, dyeing techniques were usually applied, most significantly using vegetable dyes (Ahmed, 2009). Iron oxide (red ochre) was a leading material used since Early Dynastic period for dyeing linen fibers (Wouters et al., 1990). In effect, the colored traces

DOI: 10.4018/978-1-7998-4811-0.ch004

Painting on Fibers

found on the Tarkhan dress (late fourth-millennium BC, preserved at the UCL Petrie Museum), which was excavated by Flinders Petrie in 1913 in the cemetery of Tarkhan (about 50 km south of Cairo), are clear evidence on this kind of dyeing with iron oxide minerals. Other examples on this technique were reported in textile fragments from the Workmen's Village at Amarna, from the 21st Dynasty (1069–945 BC) and the Ptolemaic period (Nicholson & Shaw, 2009; p. 278). It is said that surviving fragments of painted linen shrouds from the 18th Dynasty (1500 BC) with texts from the "Book of the Dead" are a significant example of the functional application of painted textiles in numerous funeral-purpose objects.

Figure 1 shows examples of different forms of painted textiles from various chronological periods. For polychrome surfaces, micro-equipment's allow a complete structural-chemical image about each single pigment and the underlying layers. Further, scientific analyses help to understand any modifications that occurred to the original materials or old materials used in previous restorations. For this goal, special techniques are used, namely the environmental scanning electron microscopy with energy dispersive X-ray spectroscopy (ESEM-EDX), X-ray fluorescence (XRF), Laser-induced breakdown spectroscopy (LIBS), micro-Raman spectroscopy (μ -Raman), Fourier transform infrared spectroscopy-attenuated total reflection (FTIR-ATR), colorimetry and reflectance spectroscopy (vis-RS). Following the above, this chapter will cover the upcoming issues:

Figure 1. a) The linen shroud of Hori (1295–1070 BC), (source: Metropolitan Museum assoc. No. 44.2.3), b) A painted linen fragment (1292–1190 BC) (source: Cooper Hewitt Smithsonian Design Museum, assoc. No 1915-24-1-a), c) A close-up view of a Roman painted fragmentary linen from Antinoopolis (A.D. 170–200) (source: Metropolitan Museum, assoc. No. 09.181.8)



31 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

www.igi-global.com/chapter/painting-on-fibers/315836

Related Content

Metagenomics-Guided Assessment of Water Quality and Predicting Pathogenic Load

Sayak Ganguli, Rupsha Karmakar, Meesha Singhand Mahashweta Mitra Ghosh (2022). *Handbook of Research on Monitoring and Evaluating the Ecological Health of Wetlands* (pp. 71-91).

www.irma-international.org/chapter/metagenomics-guided-assessment-of-water-quality-and-predicting-pathogenic-load/295741

Supporting Digitization of Traditional Medicinal Knowledge Through Technologies in KwaZulu-Natal, South Africa

Petros Nhlovu Dlamini (2023). *Digital Preservation and Documentation of Global Indigenous Knowledge Systems* (pp. 68-86).

www.irma-international.org/chapter/supporting-digitization-of-traditional-medicinal-knowledge-through-technologies-in-kwazulu-natal-south-africa/327928

Wetland Ecosystem Monitoring Through Water Quality Perspectives

Shahid Ahmad Dar, Sami Ullah Bhatand Sajad Ahmad Dar (2022). *Handbook of Research on Monitoring and Evaluating the Ecological Health of Wetlands* (pp. 51-70).

www.irma-international.org/chapter/wetland-ecosystem-monitoring-through-water-quality-perspectives/295740

Water Pollution of Wetlands: A Global Threat to Inland, Wetland, and Aquatic Phytodiversity

Soumi Datta, Dwaipayan Sinha, Vidhi Chaudhary, Somnath Karand Anjana Singh (2022). *Handbook of Research on Monitoring and Evaluating the Ecological Health of Wetlands* (pp. 27-50).

www.irma-international.org/chapter/water-pollution-of-wetlands/295739

Indigenous Livestreaming in Brazil: A Methodological Case for Reflective Distant Witnessing

Tom Kisson-Mamede (2023). *Digital Preservation and Documentation of Global Indigenous Knowledge Systems* (pp. 262-281).

www.irma-international.org/chapter/indigenous-livestreaming-in-brazil/327938