

**FINAL REPORT**



**DATE:** October 6, 2005  
**ACCESSION #:** 03.005

**OWNER:** Lafayette College  
Skillman Library  
Easton, PA 18042  
Attn: Diane Shaw

**TITLE/DESCRIPTION:** Book of Breathings/Book of the Dead  
**DATE:** 1<sup>st</sup> century AD  
**MEDIUM:** Black writing inks; black and colored drawing inks (brown, red, green, blue, white, pink/purple)  
**SUPPORT:** Papyrus  
**SIZE:** 10 1/2" X 71"

**DOCUMENTATION:** The condition of the object prior to treatment and following treatment has been documented photographically for the Center's records.

**ANALYSIS AND TREATMENT**

The object was removed from the glass using a methylcellulose poultice, through a barrier of Japanese tissue. Minor offset of media was observed in the water-damaged areas.

The support and media were thoroughly examined prior to treatment. Scientific analysis of the media was undertaken in conjunction with the Philadelphia Museum of Art's conservation scientists Beth Price and Kenneth Sutherland. Identification of the media is useful when determining a treatment protocol because some pigments and even support materials are sensitive to commonly used solvents, especially water.

Minute pigment samples were taken from discrete areas of the design; other samples were taken from the glass where they were adhered. The samples were examined using scanning electron microscopy (SEM) and energy dispersive x-ray spectroscopy (EDS); the combination of these two analytical techniques provides detailed identification of the elements found in the pigment.

With SEM, an electron beam is scanned across the surface of a sample. When the electron beam scans the surface, x-rays are emitted. The EDS, an apparatus that identifies which elements are present in a sample, detects the energy and wavelength of the x-rays. The data is presented in the form of a spectrum, copies of which are enclosed with this report. As many pigments contain very specific elemental compositions, their identification can in many instances prove straightforward. Given the friability of the media, there are traces of other pigments in the samples. The results of the scientific analysis show that the pigments found on the papyrus are consistent with those typically used by the ancient Egyptians. The table that follows presents a summary of the results of the analysis.

**Summary of Results of the Analytical Study- Pigment Identification**

Color	Elements Present	Primary Pigment
Blue	Si, Ca, Cu, Al, Cl, Na, Mg, S	Egyptian Blue [CaCuSi <sub>4</sub> O <sub>11</sub> ]
Yellow	As, S, Na, Si, K	Orpiment [As <sub>2</sub> S <sub>3</sub> ]
Green	As, S, Si, Ca, K, Al, Cu, Fe	Orpiment [As <sub>2</sub> S <sub>3</sub> ]
Red/Red Brown	Fe, K, Ca, Cl, Si, Hg, S, As, Al, Na	Vermillion [HgS] and Iron Oxide [Fe <sub>2</sub> O <sub>3</sub> ]
White/Beige	As, K, Ca, S, Na, Si	Orpiment [As <sub>2</sub> S <sub>3</sub> ]
Black	C, Ca, K, Cl, Na, S, Si, Mg, P, Al	Carbon [C]

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Extensive spot testing with water and solvents was undertaken on discrete portions of the media and on the support fragments to determine the feasibility of aqueous cleaning. Various consolidants were applied to discrete areas of insecure media in order to choose a consolidant strong enough to secure the media without changing its color.

While a great deal of discoloration was removed from the papyrus in localized areas during spot testing, the media was far too delicate to withstand aqueous treatment, even after consolidation. The object was surface cleaned with kneadable erasers to reduce dark patches of grime; care was taken to avoid the delicate media and weak areas of the support. After surface cleaning, the media was consolidated with a 1% solution of Paraloid B-72 (acrylic resin) and xylene, applied by brush on the suction table.

The tears and broken areas of the papyrus were mended with strips of Japanese tissue (tengujo) and hydroxypropylcellulose (Klucel-G) in ethanol while working under transmitted light. Delaminated areas in the papyrus were re-attached with methylcellulose (Methocel A4m). After re-alignment of the fragments, it was found that the water damage caused the papyrus to shrink in the affected areas. The shrunken areas were gently manipulated by several sessions of local Gore-Tex® humidification and flattening. The water-damaged areas on the verso were reinforced with Japanese tissue and hydroxypropylcellulose (Klucel-G) in ethanol. Stains were reduced on the suction table using the 1:1 mixture of ethanol and water applied with a small brush. After stain reduction, the areas were re-sized with dilute methylcellulose (Methocel A4c). Losses in papyrus were filled with acrylic toned Japanese paper (kizukishi) and methylcellulose (Methocel A4m.) The object was overall humidified between Gore-Tex® and flattened between felts and blotter under the glass plate and moderate weights.

## HOUSING

The papyrus was mounted to a Tycore panel (an alkaline paperboard with an interior honeycomb structure) using multiple wrap hinges of acrylic-toned Japanese paper and wheat starch paste.

The mounted papyrus was placed in a sealed package. The sealed package consists of ultraviolet filtering acrylic glazing, the mounted object, acrylic spacers covered with acrylic-toned rag paper, alkaline backing materials, and MarvelSeal® (a nylon, foil, polyethylene laminate). The MarvelSeal® was sealed to the glazing with 3M™ Double Coated Tape 415 and heat. The sealed package protects the artifact from particulate matter and helps mitigate environmental changes.

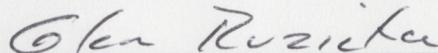
## FRAMING

The sealed package was secured into a new, custom-made wood frame selected by the client.

## ANALYSIS

The results of the media analysis performed in the analytical lab at the Philadelphia Museum of Art are enclosed with this report.

**Treatment Conducted by Soyeon Choi, Morgan Zinsmeister and Joan Irving**



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Authorized Personnel of the Conservation Center