

Polychrome relief decoration in the Sanctuary of the Hathor Shrine: preliminary remarks



Abstract: The article reports on a conservation project carried out in the Sanctuary of the Hathor Shrine at the Temple of Hatshepsut in Deir el-Bahari within the framework of the Polish-Egyptian Archaeological and Conservation Expedition in 2023. The project, launched this season, aims to investigate the technique and technology of Eighteenth Dynasty polychrome relief decoration in the Sanctuary and to assess the state of its preservation in order to establish an appropriate conservation approach. In addition, an appraisal of previous conservation and restoration treatments in the Hathor Shrine was conducted. Preliminary cleaning tests were also performed to aid planning further works. The research led to a preliminary identification of deterioration factors, as well as types of damage to the limestone, plaster, and painting layers. Unique in this respect were the changes in color of the polychrome decoration and limestone, likely caused by high-temperature chemical reactions.

Keywords: Ancient Egypt, Temple of Hatshepsut, Hathor Shrine, Theban necropolis, Eighteenth Dynasty, conservation project, wall paintings, Egyptian polychrome decoration

The Hathor Shrine is situated in the southwestern part of the Middle Courtyard of the Temple of Hatshepsut [Fig. 1]. It was one of the earliest complexes built in the temple (Wysocki 1986: 226), with its western part embedded in the Esna Shale rock formation. The Shrine

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The conservation project is conducted within the framework of the research program of the Polish-Egyptian Archaeological and Conservation Expedition to the Temple of Hatshepsut at Deir el-Bahari, in cooperation with the Faculty of Conservation and Restoration of Works of Art at the Academy of Fine Arts in Warsaw. The project is financed by the Minister of Education and Science under the "Pearls of Science" Program, awarded to the author based on decision No. PN/01/0163/2022, conducted at the Polish Centre of Mediterranean Archaeology, University of Warsaw.

stands out as one of the largest and most prominent structures within the temple. It comprises two Hypostyle Halls, a Vestibule, and a Bark Hall, all leading to the Sanctuary. The Shrine is adorned with painted relief decorations.

The Sanctuary, a rectangular room with a vaulted ceiling and two niches symmetrically placed in the northern and southern walls [Fig. 2], is one of the few parts of the Temple where depictions of Queen Hatshepsut have survived. The decoration portrays Hatshepsut as a male king, wearing a false beard and

a double crown, protected by two deities: Hathor and Amun. Other scenes depict Hatshepsut drinking Hathor's milk, as well as making offerings together with Thutmose III while being under the goddess's protection. The vaulted ceiling of the Sanctuary is adorned with stars. In contrast to other areas of the Temple, the niches have preserved intact representations of the architect Senenmut, executed in relief and bearing remains of polychrome decoration (Meyer 1982: 200; Beaux et al. 2012: Pls 64–67, as cited in Barwik 2020: 15).

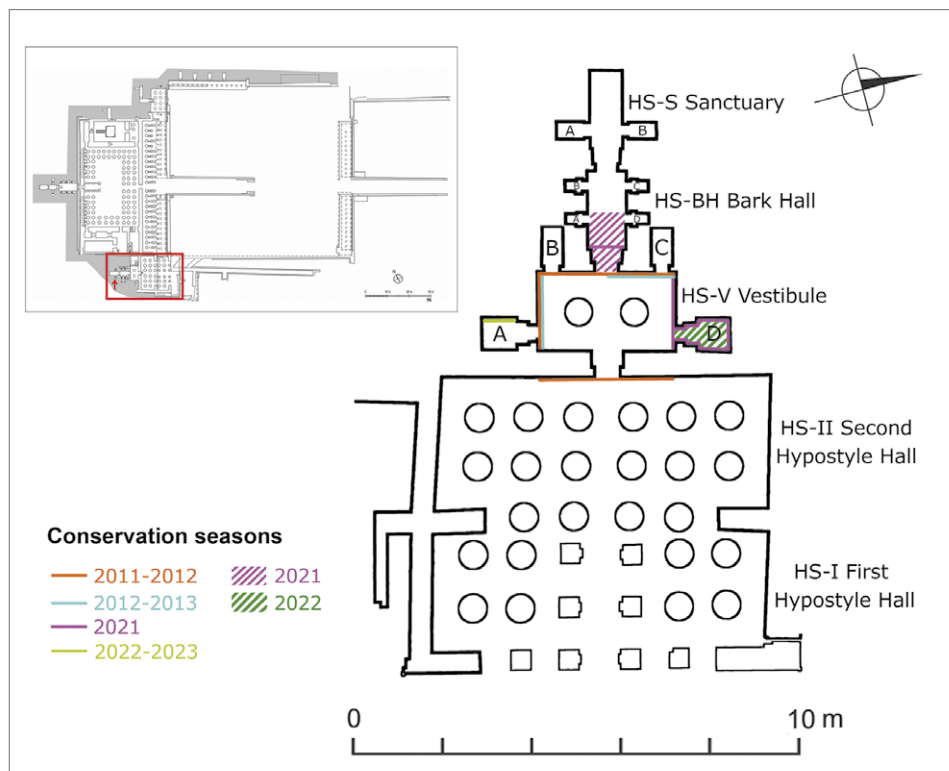


Fig. 1. Plan of the Hathor Shrine located on the Middle Terrace of the Temple of Hatshepsut. The colored lines and patterns mark the walls and ceilings the decoration of which was subject to conservation work according to reports cited in this article (PCMA UW | drawing N. Beaux, processing P. Staszkievicz). Inset: location of the Sanctuary within the Hathor Shrine on the Middle Terrace of the Temple of Hatshepsut (PCMA UW | drawing T. Dziedzic, processing P. Staszkievicz)



Fig. 2. General view of the Sanctuary of the Hathor Shrine (PCMA UW | photo M. Jawornicki)

PAST CONSERVATION WORK

The Hathor Shrine has been subject to several conservation, restoration, and reconstruction efforts in the past. In the 1920s and 1930s, Émile Baraize reconstructed the walls of the outer hypostyle of the Shrine, restoring them to their full height (Karkowski 1997: 46). However, research of the Polish–French Epigraphic Mission has found numerous inaccuracies in the resulting restoration. Additionally, over 60 blocks kept in storage have since been identified as originating from these walls (Karkowski 1994: 81). What is more, during a comprehensive examination of “the pillars and column texts of the colonnade (...) many errors in Baraize’s old restoration were discovered” (Karkowski 1994: 81) and attributed to “a total lack of Egyptological consultation” (Karkowski 1997: 55).

Conservation work undertaken prior to the 2000s was scarcely documented, with no available records of these activities. Rajmund Gazda’s March 2000 assessment called for a comprehensive protection, restoration, and conservation program for the Shrine, particularly focusing on its structure and distinctive decorations (Szafrński et al. 2000).

The 2011–2012 season’s report mentions conservation treatments implemented in the Vestibule of the Hathor Shrine, particularly on the southern wall, the lower part of the western wall, and the upper part of the façade (for

the locations of the subsequent restorations, [see *Fig. 1*]). The outer face of the southern wall, which had been exposed to the sun for almost a century, showed significant deterioration. The conservation treatments included stabilization of the painted reliefs and refilling of gaps between blocks (Szafrński and Barwik 2012: 4–5).

Conservation continued in the 2012–2013 season, focusing on the southern wall and the northern part of the western wall of the Vestibule (Gazda et al. 2013: 4–5). The treatment consisted, among others, in mechanical and chemical cleaning, consolidating the pulverized painting layer, and filling the lacunae.¹ The uppermost blocks of the Vestibule’s façade were subject to conservation as well.

A conservation project conducted in the Vestibule of the Hathor Shrine in the years 2009–2015 addressed the critical condition of the ceiling, marked by cracks and erosion due to water damage. Additional structural issues were caused by steel beams that had been installed to reinforce a central block. As a result of the project, key elements were supported with a steel structure, and a light sandwich panel roof was installed to safeguard the ceiling against further damage (Brzozowska and Michiewicz 2015: 134–136).

In 2020 and 2021, conservation efforts in the Hathor Shrine concentrated on the removal of soot and wasp nests

1 Cleaning was done using Sepiolite and Contrad 2000, while Paraloid B72 in toluene and acetone was used for the consolidation of the pulverized paint layer.



Fig. 3. Fragment of the painted relief decoration on the southern wall of the Sanctuary of the Hathor Shrine observed under visible light (PCMA UW | photo P. Staszewicz)

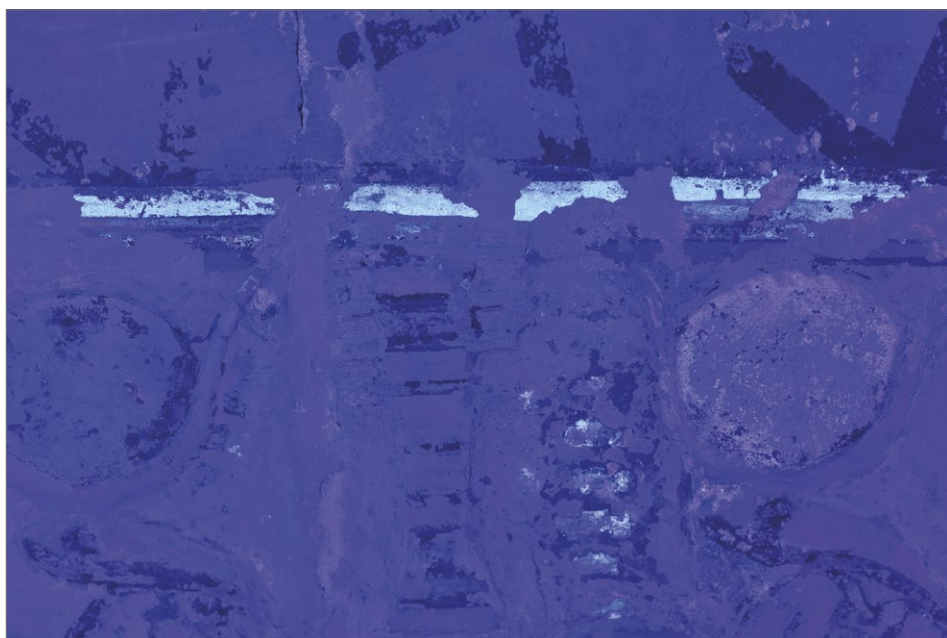


Fig. 4. Fragment of the painted relief decoration on the southern wall of the Sanctuary of the Hathor Shrine, observed under ultraviolet light, showing distinct luminescence in the strip above the uraeus frieze (PCMA UW | photo P. Staszewicz)

as well as on countering plaster degradation and involved cleaning, chemical treatments, and grout injections (Chudzik et al. 2020: 3; 2021: 3). The work included stabilizing the pigments and plaster. In 2021, the treatments focused on the “eastern part of ceiling in the Bark Hall, a lintel of the gate leading to this room, northern niche of the Vestibule (ed. note: niche D), as well as northern wall of the Vestibule” (Chudzik et al. 2021: 3).

In March 2022, the state of preservation was preliminarily assessed and cleaning tests were performed in the northern niche of the Vestibule (niche D), especially on its ceiling (Borawska, Czerniec, and Staszkievicz 2023).

In 2022–2023, a decorated block fragment, unearthed during excavations in the Hathor Shrine, was restored to its original location within the western wall of the southern niche of the Vestibule (niche A) (Patryk Chudzik, personal communication 2024).

In situ observations conducted in the Sanctuary of the Hathor Shrine during the 2023 fall season recognized evidence of previous treatments, including filling of the lacunae, grout injections, and consolidation of the paint layer. In addition, a comparison with photographic records from 2019 revealed partial clearance of wasp nests, bird and bat excrements, and the progress of deterioration in some areas of the decoration.

PROJECT ASSUMPTIONS

The project launched in 2023 seeks to identify the technique and technology of the polychrome relief decoration executed during the Eighteenth Dynasty in the Sanctuary of the Hathor Shrine. It aims to document and assess the current

condition of the polychrome decoration in order to establish an appropriate conservation approach. These measures are essential for carrying out the necessary conservation treatments and preparing detailed documentation.

WORK UNDERTAKEN IN THE 2023 FALL SEASON

Preliminary work in the Sanctuary of the Hathor Shrine was carried out during the 2023 fall season of the Polish-Egyptian Archaeological and Conservation Expedition. The main objectives for the season were to start documentation, collect samples for scientific analysis, conduct a preliminary assessment of the state of preservation, and carry out preliminary cleaning tests. The scope of documentation work included *in situ* examination, identification of the chronology of the painted decorations,

observation and preliminary photographic documentation in visible and ultraviolet light [Figs 3, 4], as well as observation with a portable digital microscope² [Fig. 5]. The work also consisted in a preliminary assessment of the state of preservation and identification of deterioration factors and types of damage of the limestone, plaster, and painting layers.

Embedded in the rock formation, the Sanctuary of the Hathor Shrine survived the earthquake that struck Deir

el-Bahari between 1200 and 900 BC (Karakhanyan and Avagyan 2010). Nonetheless, the decoration of the Sanctuary still suffered damage as a result of fire, human activity, and natural processes. Particularly remarkable in this context are the color changes that affected the polychrome decoration: areas originally painted yellow have turned red [Fig. 6:A]. This phenomenon is most likely the result of transition of a yellow ochre pigment, commonly found in New Kingdom wall



Fig. 5. Semi-transparent, yellowed layer covering the white paint layer, visible in the micro-photograph of the strip above the uraeus frieze (PCMA UW | photo P. Staszkieicz)

paintings and derived from local minerals (Afifi, Galal, and Ali Hassan 2020: 256). Initially composed of hydrated iron oxides such as goethite ($\text{FeO} \cdot \text{OH}$) and limonite ($\text{FeO} \cdot n\text{H}_2\text{O}$) (Colinart 2001), the yellow pigment turns red as these minerals transition to dehydrated red iron oxide (Fe_2O_3)—known as red ochre—when exposed to high temperatures. Transitions of this type usually take place at temperatures above 250–300°C, when goethite dehydrates, forming a disordered hematite. A complete crystallization of hematite occurs at temperatures exceeding 850°C, resulting in a red color (Domingo and Chieli 2021). In many cases, for instance in the Vestibule, the original yellow color is sometimes still found in the lower parts of the walls, where paintings were protected from the heat by layers of rubble [Fig. 6:B]. This phenomenon was also observed in Theban tombs, e.g. TT 104 and TT 112 (Hofmann 2015: 3). While the present study has identified only iron oxide transformations, similar phenomena of material transformation, such as the phase transformation of gypsum to an-

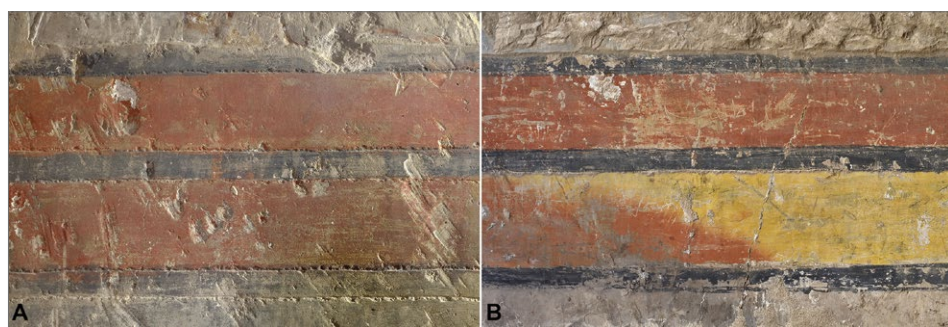


Fig. 6. Color change from yellow to red in the dado decoration: A – in the Sanctuary; B – on the northern wall of the Vestibule of the Hathor Shrine (PCMA UW | photo P. Staszkieicz)

- 2 These observations not only made the assessment of the state of preservation possible but also improved the understanding of the techniques and technologies used in the polychrome relief decoration. The data obtained from laboratory analyses will be published separately.

hydrite in historic plasters and stuccoes, have also been observed elsewhere in Egypt (Kamel, Marie, Ali, and Mahmoud 2014; Kamel, Marie, Mahmoud, and Ali 2014; 2015).

The transformations observed in pigments were not the only changes observed in the Sanctuary; the building materials themselves exhibited a substantial loss of integrity due to exposure to environmental agents. The limestone blocks from which the Sanctuary had been built significantly differed in color from the usual pale beige and were darkened to a blue-gray of varying intensity. Such color change is attributed to chemical reactions at high temperatures brought about by fire; the gray color is said to appear after heating the limestone to 350–400°C for ten minutes (Salmon et al. 2021: 605). Color changes of this type were also observed in the Southern Chapel of Amun in the Temple of Hatshepsut (Uchman-Laskowska 2010: 292).

While most limestone blocks with relief decorations in the Sanctuary seemed to be in good condition, some, particularly those located centrally in the northern and southern walls and in the vaulted ceiling, had irregular, rough surfaces that contrasted with the smooth faces of other blocks [Fig. 7]. The inferior state of preservation of these surfaces could be linked to the poor quality of the material and exposure to damaging factors, likely including salt decay. Many blocks, especially in the vaulted ceiling, bore remains of wasp nests as well as bird and bat excrements [Fig. 8]. The presence of such accretions on the surface of the painted reliefs is detrimental to their state of preservation, as it increases moisture absorption

and degrades the binder. Therefore, the state of the polychrome decoration on the stone blocks forming the vaulted ceiling varied depending on their exposure to these detrimental factors — some blocks barely retained any paint, while others featured only a thin layer of paint that appeared washed out. The original mortar filling the joints and irregularities in the stone blocks was delaminating and in need of stabilization. The overlying paint flaked off, exposing conspicuous spots of white mortar that drew the viewer's attention away from the polychrome decoration.

The polychrome reliefs in the Sanctuary bear mute testimony to the Temple's historical damage, dating back to Thutmose III and the Amarna period (14th century BC), with indications of later Ramesside (Nineteenth Dynasty) restorations. However, such traces of destruction are ubiquitous in the Temple (cf. Barwik 2013; Ćwiek and Sankiewicz 2008). Hatshepsut's images, titles, and *ka*-arms from the uraeus frieze were erased under Thutmose III, while damage inflicted by later Amarna iconoclasts focused on divine figures. Some of the destroyed names of Hatshepsut feature traces of guidelines in red paint indicative of attempts to replace them with new names (cf. Karkowski 2007; Beaux et al. 2012). These erasures were followed by Ramesside restorations done either by recutting the reliefs on the stone's reduced surface or by recreating them in plaster covered with a new layer of paint. In the Sanctuary of the Hathor Shrine all four walls feature deliberate damage to Hatshepsut's reliefs, with Ramesside restorations on the western, northern and southern

walls, primarily of Amun's figure and title. However, these repairs, made in plaster, are in poorer condition than the original decoration from Hatshepsut's reign due to the technique and technology used. Extensive losses of ground and paint layer in the restored areas reveal the stone's deliberately damaged surface.

The state of preservation of the painted decoration in the Sanctuary attests to notable differences between the paint layers lying directly on the stone, on the mortar-filled imperfections, and on the joints between the blocks. Even within the same substrate, the condition of the polychrome decoration varied depending on the original technique and technology, material quality, causes of damage, location, and past renovations. The polychrome relief surfaces suffered from

the acidic content of animal excrements accelerating binder disintegration and moisture absorption. Additionally, the potential presence of microorganisms such as fungi and bacteria may have also contributed to these degradation processes, particularly in areas with significant organic deposits. Furthermore, soot and burn marks contributed to the darkening of the polychrome areas. In some cases, only a thin layer of underpainting remains, with no top paint layer preserved. Beside the soot and burn marks, other contaminants included dark stains and white splashes, possibly from earlier conservation efforts, and an unidentified black dripping substance on the northern and southern walls, which has been earmarked for analysis. In certain areas, the paint layer showed poor adhesion



Fig. 7. Block from the northern wall displaying an irregular, rough surface likely caused by salt decay, potentially poor material quality, and exposure to damaging factors (PCMA UW | photo P. Staszkievicz)

and reduced cohesion, indicating binder degradation over time. At present, the polychrome decoration is obscured by a layer of yellowed accumulations, dirt, and likely an aged consolidant. These secondary layers not only alter the perception of the polychrome decoration, but also increase moisture retention, thus contributing to further degradation of the original substance.

Preliminary tests for cleaning the polychrome decoration were carried out prior to its conservation in order to develop a suitable conservation program and decide on optimal methods employing specific conservation media. The tests were performed on the northern wall of the Sanctuary. Both mechanical and chemical methods were attempted to evaluate their effectiveness. The mechanical methods involved the use of

brushes, dry cleaning sponges, and fiber-glass brushes. They proved insufficient as the sole means of cleaning but remained useful when applied jointly with other techniques. The cleaning tests were first performed on a limestone surface near the entrance to the niche, where no polychrome decoration was present. The removal of a yellowed build-up from the stone was initially tested in small areas using a cotton swab soaked in selected chemical agents and their mixtures. Further tests were carried out on the painted stone. The approach to treatment varied depending on the state of preservation and the composition of the plaster and paint layer in different areas of the decoration. For example, the paint layer on the plaster generally had weaker adhesion and cohesion, and thus was more vulnerable than the paint layer applied



Fig. 8. Vaulted ceiling in a poor state of preservation, with visible remains of wasp nests, as well as bird and bat excrements (PCMA UW | photo P. Staszkievicz)

directly to the stone surface. Due to the sensitivity of the paint layers, the method of applying cleansing agents using tissue compresses was implemented. Various chemical agents —ethyl alcohol, acetone, ammonia water, Contrad 2000— were used, with the best results achieved for an aqueous solution of ammonium car-

bonate. The mass percentages of the solutions, proportions of the mixtures, and application time were modified depending on the characteristics of the particular paint layer and the accumulations it carried. Extending the duration of the treatments by covering the treated paint layers with foil was tested as well.

CONCLUSIONS AND PROSPECTIVE WORK

The overarching aim of the conservation program executed in the Sanctuary of the Hathor Shrine is to stop the deterioration of the historic substance of the polychrome reliefs and to restore their aesthetic value, with an intention to open the Shrine for visitors in the future. Based on the preliminary examination of the state of preservation of the painted decorations, the causes of damage, as well as the outcomes of the preliminary cleaning tests, a provisional conservation program was proposed. However, there

is still a need to conduct more cleaning tests and to try out different techniques of stabilization and consolidation of the delaminated and powdery plasters and painting layers in order to determine the optimal methods and media for these purposes. Future activities will involve reintegration of the lacunas in the limestone, toning down the bright putties using the *acqua sporca* method to prevent them from distracting the viewer, and harmonizing the compositions of the polychrome decoration.

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