Technical and analytical investigation study of late period Egyptian stele from The Grand Egyptian Museum

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Abstract

Upper Egypt is well-known for its famous Pharaonic stone monuments. they give the unique creative work of humankind in ancient times. the monuments are signifcant for the cultural identity of Egypt and they are very important for the economic situation of the country, Sandstones from the Gebel el-Silsila area in south-western Egypt—as one group of the formerly so-called “Nubian sandstone”—the study deals with examination and analysis of painting sandstone Stela preserved in The Grand Egyptian Museum under the number (SR - 22106), with inscriptions and writings in hieroglyphics, Complimentary techniques were used in this study; the optical microscope, X-ray fluorescence spectrometry (XRF), Fourier transform infrared spectroscopy (FTIR), Electronic microscope scanner (SEM), The pigment color employed was red , which have been shown to be the protective iron oxide as well as the clay minerals compounds. By analyzing the color medium, it was found to be animal glue, and by examining and analyzing the manifestations of the deterioration phenomena, solid and thick calcium layers, limestone calcifications and assembly materials for a previously separate part, and a layer of calcium carbonate, gypsum and Arab glue were found in the pasting of a modern wooden base.

Keywords :

Gebel elsilsila , Nubian sandstone, Historical Stelae of late period , XRF , XRD, SEM , Polarizing microscope, Optical microscope,Animal Glue

1. Introduction

The Nubian sandstone was widely used in ancient Egypt, including the archaeological painting subject of study from the quarries of Jabal al-Silsila in Aswan. The quality of the stone and the chemical composition of the basic minerals that make up the stone, secondary minerals and bonding materials were studied. The characteristics of the sandstone component of the archaeological paintings under study were studied, using the methods And the modern scientific devices available, in order to determine the nature and composition of the archaeological stone, as well as to know the nature of the dirt and accumulations present on

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the surface (Klimek, B. et al., 2021; Despina Dimell, 2019). The idiomatic definition of the word plaque or memorial plaque in Latin: Stela and in the ancient Egyptian “weg” is a slab of stone or wood, whose height is usually longer than its width, erected in front of a grave to identify its owner (Abdel-Naby M G., 2004), or to remind of an important historical event. , or to define the borders of a country or the boundaries of a piece of land (Memoirs By1908.), and in the era of the modern state and the late era in which insecurity and the theft of graves from criminals and thieves spread, so middle-class men and women were satisfied with erecting a small plaque on the grave. The painting, in addition to the mummy’s sarcophagus, was one of the most important things to preserve the name of the dead and put it under the protection of one of the gods, and the stones are more used to withstand harsh conditions, including colored and non-colored ones. Most of the sandstone ruins are in Upper Egypt, since the times of Ancient Egypt (N. M. SHUKRI, 1945).) Until the present time, the Gebel Silsila quarries are located in southwestern Egypt, about 160 km south of Luxor and 50 km west of Aswan. The sandstone quarries extend on the west and east bank of the Nile Gebel Silsila sandstones known in the past as the so-called Nubian sandstone (Osama M., Mohamed K. Khallaf, 2020; Abd el Hadi MM., 2000 ; Hermina M, et al., 1989). The study aims to examine and analyze the archaeological painting and identify its components, as well as the colors used in the archaeological inscriptions and the organic medium used in that period in the implementation of the antique colored paintings, and assessing their damage. 2. Conclusions and Conclusion: This research paper deals with a case study of one of the ancient Egyptian archaeological Nubian sandstone panels from the late era of the twenty-fifth dynasty that includes writings and inscriptions for offering offerings. It is rich mainly from quartz grains, fine-grained clay minerals with a fine-grained bond with each other by iron oxides and a percentage of clay minerals, as shown by the percentage of halite salts. Quartz, the erosion of the edges of the crystals, and the irregularity of their sizes. The archaeological plate may be due to environmental weathering factors and the burial environment, and this is clearly evident in the back part of the archaeological plate, which shows damage resulting from the preservation environment, which led to the decomposition of quartz minerals and bonding minerals. By studying the red colored substance, it turned out to be red ocher (Fe2O3), which was produced by heating the yellow color to expel water and produce anhydrous ferric oxide, and by using infrared analysis Infra redFiurier Transform it was found that the organic mediator used in the red colored material is Animal Glue, which is the most widely used in the late afternoon. By studying the assembly and adhesive materials used in a recent restoration of the archaeological plaque, it was found that they were kasromyl or alhamra mortar. Arabic gum. We conclude from this research paper the widespread use of Nubian sandstone to accomplish many archaeological works of art, including stone paintings. It is recommended to provide the necessary materials for the treatment and restoration operations of the antiquities extracted from the excavations immediately after their extraction, especially those in the case of broken or separate parts, and taking into account the estimation of the weights of the stone artifacts that need to be assembled, bars of non-corrosive iron or fiberglass bars. It is also recommended to carry out full examinations and analyzes to identify the components of each antiquity, as well as the materials used in the inscriptions and colors, and a comprehensive report starting from their extraction from the burial environment through any restoration

operations, in order to use this report in the treatment and periodic maintenance of each artifact.

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