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**Study of technology, treatment and conservation of archaeological
glazed potter objects, excavation from excavations, with application
on some chosen objects from Fayoum**

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This research aims at studying the ceramics of Fayoum in terms of materials and features of such materials as well as examining ways of manufacturing the ceramic, the factors of deterioration that negatively affect the pieces, the methods and approaches to restore it based on scientific rules and theories. It also tackles the restoration and treatment methodology through cleaning, consolidation and extracting salts. Besides, it examines samples that are similar to the monument parts "from the area of the excavations" through testing and analyzing the samples to determine the appropriate methods of treatment. Finally, it comes to the practical application of the stages of restoration and treatment of selected samples of glazed pottery extracted from Fayoum excavations.

The study consists of three sections as follows:

Part 1 Chapter I: Ceramics Emergence and Development in Fayoum Fayoum is an artistic center for ceramic production, which is characterized by a special style and type of ceramic products.

Chapter II: The raw materials that forms the glazed pottery and method of manufacturing This chapter covers the raw materials constituting the body of the pottery, namely clay, and its chemical structure of silica, alumina and Feldspars. And the types of clays, and the impurities it may contain, the characteristics of the clays and the various substances used to modify and improve the properties, in addition to studying layers of glazing, its components, fluxing aids, the coloring oxides, the characteristics of glazing layers. This chapter also deals with a study of the steps and stages of glazed pottery and firing kilns used in the manufacturing process.

PART II Chapter I: Deterioration Factors Influencing Glazed Pottery

The Study deals with the endogenous factors include the inconsistency in physical properties, and the faulty manufacturing that may occur during the various manufacturing steps such as the process of restructuring, drying or firing. Besides, there are defects as result of faulty use or of the purpose for which the model is made.

There are exogenous factors , which include factors associated with burial environment, represented in ground water and salts that have deterioration effect on the piece before and after the excavation.

The deterioration Factors associated with the exposure environment play significant role in the damage of glazed pottery as a result of temperature, moisture, air pollutants, and biodeterioration, as well as the damage resulting from storage defects .

Chapter II: Methods of Registration and Examination of Glazed Pottery This chapter is divided into two parts; firstly: study the different methods of registration, i.e. archaeological, artistic, photographic and engineering registration before, during and after all stages of treatment and restoration. The second part is to study ways of examination and analysis by using polarized and scanning electron microscopes as well as X-Ray analysis in order to reach scientific methods based on scientific basis for the pre-treatment process.

Chapter III: Methods of Treatment and conservation of Archaeological Glazed Pottery This chapter studies the various cleaning processes; such as mechanical cleaning, chemical cleaning, ultrasonic cleaning, laser cleaning, as well as the advantages and disadvantages of each method to determine the appropriate one. It also deals with the study of ways to extract salts and the rules and conditions applied to the extraction process, as well as examine materials and methods for consolidation, joining and Completion.

Part III Chapter I: Experimental Study

This chapter shows the study and examination of 7 samples of glazed pottery from the same area of excavations from which the samples that have been treated and restored were excavated so as to be similar in composition and manufacturing in addition to the similarities in all the circumstances of the burial environment, exposure and thus be similar in the problems and deterioration features. The Polarizing Microscope has been used in the study of metal components of the model, the shape and size of granules, which help us to know the types of clay, how it is manufactured and to realize any deterioration resulting from

defects in the granules of the sample.

The Scanning Electron Microscope has been used to study the same samples. It illustrated the condition of the clay granules, the burning circumstances, the manufacturing steps including the body, the glazing layer, as well as explained the link between the glazing layer of the body and the deterioration features such as cracks and air bubbles. Moreover, it examined the restoration materials, and reflected the extent of penetration and lining of the supporting substance around the granules.

X-Ray analysis was also used, which was helpful to identify the components of the monument material and was therefore useful to know clay's components used and the effect of the impurities found. This helped to determine properly the aspects of existing deterioration and hence decide the appropriate method of treatment based on scientific results.

Chapter II: Applied Study

This chapter deals with the application of the two samples of glazed pottery, which reflect several features of deterioration aspects, such as spots, patches of soot, fall of some glazing parts, crystallization of salts of sodium chloride resulting from the burial environment. The two samples were found in broken pieces. After assembling them, it has been found that the two models lost some of their parts.

Before the treatment, a full registration process for all parts of the model was done. It reflected all the deterioration aspects. The treatment process began with mechanical cleaning by different brushes, using water compresses to lubricate and soften the dirt so as to facilitate their removal. The salts were extracted by a compress of paper pulp, sticking it to the surface of the model and changing it from time to time before it dries. Then, the weak parts were supported by the Paraloid B72 dissolved in acetone with a concentration of 5%, based on the results of examining the penetration and lining of the sample granules by using the Scanning Electron Microscope.

The joining process was done by using Polly vinyl acetate, while the completion process of the first sample was done by means of salt-free gypsum. One of the parts of the pot lost its supporting pieces. Therefore, the salt-free gypsum was chosen to be used due to its instant dryness to consolidate with the surrounding parts and hence complete the shape. In sample II, modern ceramic powder plus Paraloid B72 dissolved in acetone with a concentration of 60% were used. It gave excellent results in the experimental study in terms of solidity, color and

components similar to the original material of the model, as the monument material is the same as the one used in the completion process. The decoration has been completed with the ceramic colors that have a glossy surface similar to the glazing layer, for that reason no other material such as Paraloid 72 is used