Fatimid Dinar Dated 364 A.H. Discovered in Qurh Site, Al Ula Governorate, Saudi Arabia

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Abstract

In Excavation Season XIV in 2017 at Qurh by the Department of Archaeology, College of Tourism and Archaeology, King Saud University, Saudi Arabia, a rare gold dinar was found, minted in Egypt in 364 A.H. (975 A.D.) by Al-Mu'izz li-Din Allah. The dinar was discovered in square C17, area 3, Qurh (Almabiat) site. It was numbered 27 in the archaeological registry. Square C17 is an architectural extension of the excavation squares C18, C19, C20, D17, D18, D19, and D20. The dinar is the first discovered gold coin in the excavation seasons that began in 2005 at the site. The findings of Qurh are varied in terms of material, manufacturing technology, and provenance. Thus, they include local and imported artifacts. Examining the gold dinar showed a thick layer of dust and calcifications on the surface. The present study tackles the scientific method of examining the gold dinar, diagnosis of deterioration products and causes, stages of restoration and conservation, and analysis of the inscriptions on the reverse and obverse after restoration.

Keywords: Archaeological excavations, Qurh (Almabiat), Fatimid dinar, Restoration of antique coins.

INTRODUCTION

Qurh had an important historical status before and after Islam. The Nabataeans made it a turning point in the ancient commercial route between Al-Hijr (*Madā'in Sālih*) and Dedan, the capital of Lihyan, in the mid-first millennium B.C. through Wadi Rum, a distance of 25 km. This route was known in the early Islamic period as the Darb al-Hajj (Pilgrimage Road). Qurh was one of the most significant commercial markets in the pre-Islamic period and continued to flourish in the Islamic periods. Historical sources reported that the Prophet (Peace be upon him) passed by it after Fatih Khayber (Victory at the Battle of Khayber) in 7 A.H. and invited its inhabitants to Islam, but they refrained. Thus, the Prophet (Peace be upon him) conquered it and spent four days there. The Sham-Egyptian Hajj route aided in developing this city in the early Islamic period. (al-Maqdisī 1906: 33-43) described Qurh: "This town is, indeed, Syrian, Egyptian, 'Irāqī, and Hijāzī town all together in one. However, its water is indigestible, its dates of middling quality. The public bath is outside the town". This description highlights the importance of the city, as shown

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in the writings of early Arab and Muslim geographers and historians (Ghabbān 2010; Guerra and Tissot 2013; Reale et al. 2012).

Since the spring of 2004, the Department of Archaeology, King Saud University has carried out excavations at the site and has discovered many architectural remains and archaeological artifacts, including the gold dinar studied here that was minted in Egypt in 364 A.H. by the Fatimid caliph Al-Mu‘izz li-Din Allah. The dinar was discovered in the excavations of Season XIV (2017) in area 3 of square C17. The coin was numbered 27 in the archaeological registry. It is the first gold coin found in the excavation seasons at the site. Unfortunately, the coin has suffered from severe dirt, dust, and calcifications. Because it was exposed to several deterioration factors, e.g., humidity, rain, calcification, and landfills, the gold dinar has deteriorated. After treatment and restoration, inscriptions could be read. This work includes restoration, defining deterioration phenomena and factors, as well as the current deterioration status of the dinar. The following section introduces the location of Qurh geographically, historically, and culturally. It highlights the archaeological efforts of King Saud University at the site.

OBJECTIVES OF THE STUDY

1. Scientific method for examining the first gold dinar discovered in the Qurh excavations.
2. Diagnosis of deterioration products and causes.
3. Stages of restoration and conservation of the gold dinar.
4. Analysis of the inscriptions of the dinar after restoration.

METHODOLOGY OF THE STUDY

The researchers adopted the descriptive and analytical approach to investigate the manifestations and causes of damage to the coins excavated in the excavations. In addition, it analyzed the inscriptions on the dinar. This approach was applied in the conservation of gold coins and applied on the gold dinar (as a case study).

Qurh: The Metropolis of Wadi al-Qura

The Qurh archaeological site is 25 km south of Al ula Governorate. It is near Hajret Mughira amid a flat plain surrounded by moderately high mountains. It oversees the Western Mughira catchment area, where water collects from some valleys and mountain passes before being directed to Wadi Aljezl. Moreover, the Hijaz railway from Damascus to Medina passes along the eastern part of the site (Map 1).

Map (1): Alula Governorate, Saudi Arabia
(Quoted from the Royal Commission for Alula)

Historical and geographical sources reported that Qurh, the metropolis of Wadi al-Qura, experienced commercial activity dating back to the pre-Islamic period (al-Wāqidī 1966). Since then, Qurh became a main station on the Sham-Egyptian Hajj Route; it was highlighted in the writings of Arab and Muslim travelers and geographers, such as al-Istākhrī (340 A.H./ 951 A.D.), Al-Maqdisi (380 A.H./ 990 A.D.), Yāqūt al-Hamawī (626 A.H./ 1129 A.D.), and many others who passed through the city to perform Hajj and Umrah. While some of them, e.g., Al-Maqdisi and al-Istākhrī, praised its renaissance, others, e.g., (al-Ḥamawī 1957: 321) reported its decline. However, they agreed that Qurh was the metropolis of Wadi al-Qura (al-'Omaīr et al. 2006).

al-Iṣṭākhrī described Qurh, saying, "No city in Hijaz after Mecca and Medina is larger than Al-Yamamah and Wadi al-Qura with many palm trees and water springs... It is inhabited with flourishing trade". (al-Iṣṭākhrī 1937: 19) reported that the Arabian Peninsula could be divided "into four extensive provinces and four large districts. The provinces are al-Hijāz, al-Yaman, 'Umān, Hajar; the districts Ahqāf, Ashhār, Al-Yamāma, Qurh". He also stated that Qurh (present Wadi al-Qura) is matchless in Hijaz, except for Mecca, in terms of population, trade, and good things. It has a strong fort with a castle. It is surrounded by villages and palm trees that produce cheap dates, good bread, abundant water, delightful houses, and bustling markets. Moreover, it has a trench, three gates, and a mosque in the alleys. (al-Ḥamawī 1957: 338) gave a general description of the decay of Wadi al-Qura and cited Ibn Al-Munthir that "it was called Wadi al-Qura (valley of villages) because it has villages from the beginning to the end (Ibn Baṭṭūṭah 1960: 133).

In the later 6th A.H./ 12th A.D. century, the name Qurh was replaced by Al-'Ula. On visiting Al-'Ula, (Ibn Baṭṭūṭah 1960: 133) reported that "Al-'Ula is a large and beautiful village with palm gardens and running water in which Hijaj (pilgrims) stay to supply, wash cloths, and take along provisions. The inhabitants of the city are reliable. The traders of the

Levant (Sham) settle in this village to buy food and other things for the pilgrims” (al-Zahrānī 2009). Because of the importance of this early Islamic city, King Saud University has carried out archaeological excavations in Qarh since 2004, revealing many archaeological features and artifacts that suggest that the city was an integrated city with economic wealth, as shown in the archaeological significance of palaces, markets, streets, and artifacts over the last excavation seasons.

Excavation Method in Qurh (Almabiat): Season XIV, 2017

The square lattice design (10m×10m) for excavation trenches is the most appropriate because of the large, buried area, whether Islamic or pre-Islamic. That layout was adopted in Al-Rabadha and Alfaw as well as in Qurh and Dedan (Fig. 1).

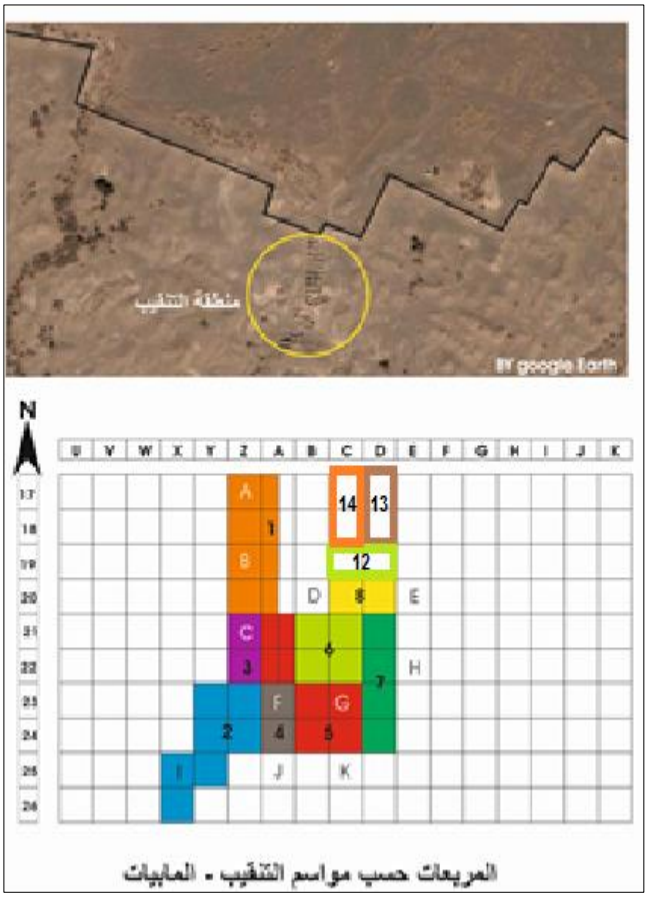


Figure (1): Square grid excavations based on seasons of excavation in Qurh
(Photograph of the authors)

The findings from Qurh varied in terms of material and manufacturing technology. Moreover, they include local and imported artifacts. The dinar studied here was discovered in the excavations of Season XIV in 2017, specifically in area 3, square C17. It was numbered 27 in the archaeological registry. Square C17 is an architectural extension of the excavation squares C18, C19, C20, D17, D18, D19, and D20 (Fig. 2).

Figure (2): Location of excavation square in Qurh, Southern Alula.
(Photograph of the authors)

Squares C17-C18, where the gold dinar was found, are an architectural extension of the palace whose units were discovered in Season VIII in 2011 and continued through Seasons XII, XIII, and XIV in 2015, 2016, and 2017. The architecture and plan of the palace illustrate that it was related to the market and the north gate of the city. Moreover, corridors and entrances linked the palace to the gate of the city. The palace was also linked to shops on the market. The plan of the palace shows that it comprised four halls from all directions encircled by residential and service areas. Additionally, the halls contained circular columns built of locally baked brick to hold the trellises that protect from sun rays. There is a straight staircase to the roof of the palace (Fig. 3).

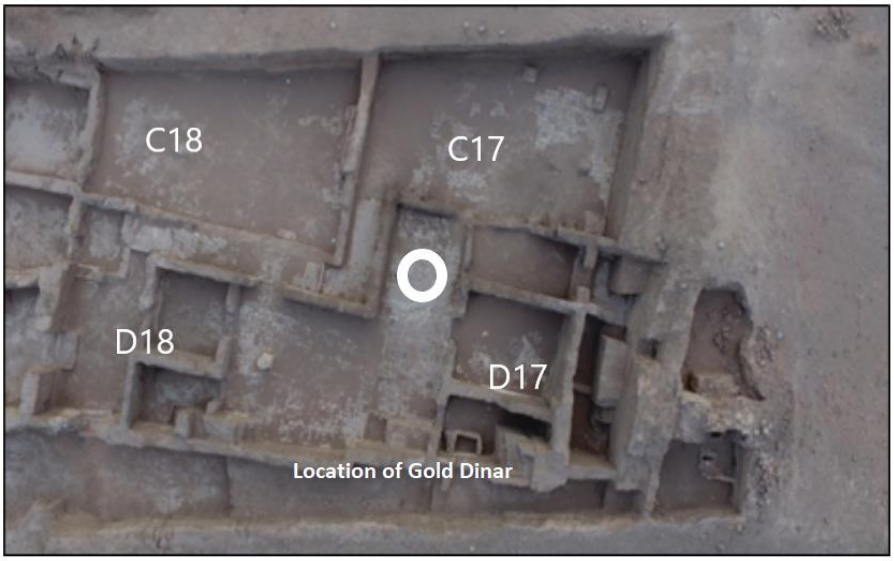


Figure (3): The excavation area of Season XIV in 2018 showing Square C17, where the gold dinar was found (Photograph of the authors).

Figure (4): The gold dinar in situ as found in Square C17.
(Photograph of the authors).

Deterioration Factors and Manifestations in Qurh Archaeological Site

The Almabiat Archaeological Site has experienced much deterioration, as shown in the buildings and artifacts. The factors are organic or inorganic in nature. To define these factors that affected the artifacts, including the gold dinar, soil properties should be identified to know the granular soil classification, plastic limit, and liquid limit. The field examination of the Qurh archaeological site showed the findings in the following subsections.

General Location

Qurh is in a mid-broad plain surrounded by flood drainage. It lacks means of natural defense. Thus, the sun shines throughout the day, and evaporation rates are high. If the surface water increases in the area, surface efflorescence takes place (al-Zahrānī 2009).

Properties of the soil at Qurh

Studying the soil of Qurh is important because it reveals its relationship to degradation factors. Thus, the properties and effects of the soil on the artifacts, including the gold dinar under study, should be examined. Some tests were carried out to define the grain size distribution and physical properties of the soil, e.g., plastic limit, liquid limit, and specific weight. (al-Qaṣabī 1993) argued that understanding the nature and composition of the soil relies on identifying grain size distribution, which includes grain diameters and the proportion of each class. Soil texture plays a role, which depends on the fineness of grains and water proportion. The Atterberg limits are the limits between these cases and include the liquid limit, plastic limit, and shrinkage limit. These limits are highly important for soil classification, identification of properties, and soil formation ability. According to the Soil Classification System, ASTM Designation D-2487Unified, the collected soil from the site of Qurh can be identified as a mixture of silt and fine-grained sand.

Table (1): Physical properties of Qurh soil (al-Qaṣabī 1993: 98).

Soil Properties	Qurh Soil
Liquid Limit, LL, %	28.9
Plastic Limit, PL, %	26.7
Plasticity Index PI, %	2.2
Specific Gravity, SG	2.685
Gravel, %	5.2
Sand, %	55.5
Silt, %	29.3
Clay, %	10
Passing# 200 %	39.3
Soil classification: Unified system	(SM) Silty Sand, Sand-Silt mixture

Climatic Conditions (Temperature, Humidity, Rain... etc.)

Studying the surrounding climatic conditions is highly important because it helps diagnose the degradation of the artifacts and its causes. (al-Faqīr 2006) reported that the highest monthly temperature rates in Alula are in June, July, and August. The winter is cold. Relative humidity rises significantly in winter as it relates to lower temperatures. In other words, temperature and humidity fluctuate considerably in summer, up to 37°C in June, July, and August in Almabiat (Cronyn 1990). Rainfall is the main cause of high-water vapor. It varies in Alula in terms of quantity and time. That is, it rises by 45mm in April, then declines and ceases throughout summer.

Rainwater directly affects the Qurh archaeological site, especially when penetrating the soil and building materials through surface cracks. Moreover, they contain polluting gases, e.g., SO_2, NO_2, and CO_2, in the form of diluted acids. Despite being weak, H_2CO_3 is the most dangerous acid as it transforms insoluble $CaCO_3$ into soluble $Ca(HCO_3)_2$, which degrades the soil and the artifacts (Cronyn 1990). Figure (5) shows the average relative humidity, evaporation, and monthly rainfall in Alula from 1986 to 2001.

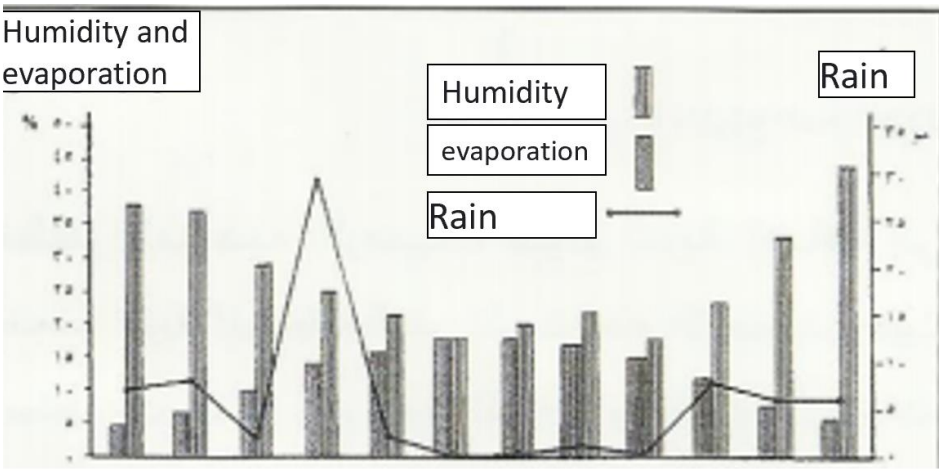


Figure (5): The average relative humidity, evaporation, and monthly rainfall in Al ula from 1986 to 2001 (Quoted from The General Authority of Meteorology and Environment Protection cited in (al-Faqīr 2006: 38).

Salt crystals on the surface of the gold dinar might result from solving soluble salts in the rainwater and penetration into the subsurface soil. In high temperatures and evaporation, such white salt crystals are left on the surface of the artifacts, including the gold dinar under study.

Manifestations and Causes of Degradation of the Gold Dinar, Figure (6) Gold (AU)

While gold was rarely used in manufacturing coins, silver, copper, and their alloys were the main materials of this industry (McDowell 1986). Gold is often found pure but not completely. Rather, it sometimes includes a small portion of silver (up to 40%), copper, and bismuth. It often takes the form of irregular plates, crusts, or masses. The gold artifacts and this texture occur in a pure fashion, virtually without any other texture components (Wagner et al. 2018). Gold is melted easily at 1063°C but does not dissolve in various acids except for *aqua regia* (a mixture of concentrated nitric and hydrochloric acids). It is relatively inert. Besides, no considerable changes occur on pure gold at normal conditions and room temperature. However, modern studies have cast doubt on the idea that noble metals are resistant to corrosion and oxidation or could not be affected by the surrounding environment. These studies have shown formation of a thin layer of gold oxide that protects its surface against any attack or oxidation. Oxygen molecules are stowed on the surface of gold, which is covered gradually with a single layer of oxygen. When this layer covers the entire surface, chemical absorption occurs between the surface of gold and oxygen. Moreover, oxygen atoms penetrate and unite with gold atoms to form a thick layer of Gold (III) oxide (Au_2O_3) (Ḥilmī 1994).

Microbial Decomposition of Gold

In general two types of bacteria attack and decompose gold, namely *Clostridium regular* and *Clostridium irregulars*, under acidic conditions and a PH of 5.9-4.7 as is the case in burial environments. However, the mechanism of the attack may be unclear. The chemicals resulting from the bacteria, decomposed organic materials, may be responsible for it. Gold was exposed to a solution containing such outputs of the decomposition of organic materials. Then, the bacteria mentioned above were added to the solution. Three weeks later, the amount of decomposed gold was 25.0- 50.0 mg/L (al-Zahrānī 2009; Stambolov 1985).

Interactions of the Surrounding (Gas, Liquid, or Solid) Medium

Interactions of Metal and Gas

Antique coins, including gold, are more exposed to gas than any other media. Atmospheric corrosion in this medium includes all gases interacting with metalwork (Stambolov 1985). When exposed to gases, metal coins acquire a thin layer of the reaction products. Gold coins are not affected when exposed to a gas medium. However, if they are affected by oxygen, a thin and invisible monolayer of gold oxide is created. This layer deionizes into gold and oxygen or prevents the metal surface below from continuing oxidation or exposure to physiochemical degradation **(Ḥilmī 1973).**

Interactions of Metal and Soil

Metal artifacts interact with the burial soil. Later, they adjust to the soil to reach a stable state in this medium. A bright yellow layer is formed on the surfaces of the uncovered golden objects due to the reaction of the salts in the soil with the silver or copper mixed with the gold. Many factors affect the degradation of metal coins buried in the soil, such as soil texture (sand, silt, and clay) and chemistry that controls the basic or acidic nature of the soil. Based on granule size and mineral components, soil can be divided into sand, silt, and clay (Ghunaym 2008). The soil of the archaeological site of Qarh was identified as a

mixture of silt and fine-grained sand. Coins are often found mixed with the remains of sand or soil particles (Selwyn 2004). It is the content of NaCl or other soluble salts in the soil, taking the form of white salt on the uncovered artifacts items.

Chemical Corrosion

Chemical corrosion is sometimes called dry corrosion, which takes the form of a thin layer of patina or pollution. It results from the interaction of the metal with dry gases above the dew point of the environment or in the absence of a liquid phase. Vapors and gases are often the corrodents. Oxygen is the gas that attacks most in normal conditions and results in an oxidation film (Fontana 1987).

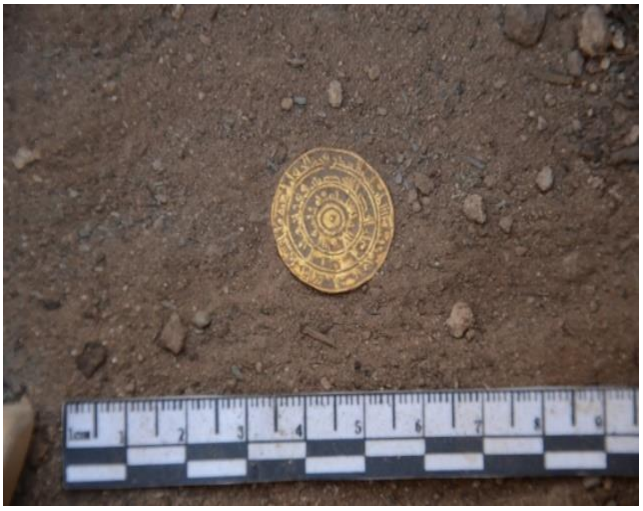
Bio-chemical Corrosion

It is a degradation that (in)directly affects metal due to the biological activity of microorganisms or the chemical activity associated with microbiological growth, e.g., bacteria, fungi, and algae (Fontana 1987).

Forms of Corrosion on the Gold Dinar

The most significant forms of corrosion observed on the gold coin (Fig. 6) include

- Erosion Corrosion: It takes place when the metal is damaged due to the shared effect of the flow of gases and liquids and the friction of solids with the surface of the metal. This causes damage to the protective layer and forms electrochemical cells. The final result is erosion and corrosion of the metal.
- Pressure Corrosion: It results from the joint pressure of mechanical stress and the corroding medium; the result is the cracking of the metal. Most alloys are exposed to this type of corrosion.
- Stress Corrosion: It occurs as a result of exposing metals and metal alloys to circular stress when the surrounding corroding liquid is stressed as it moves circularly. As a result, cracks and gaps weaken and corrode the metal (Ghunaym 2008).



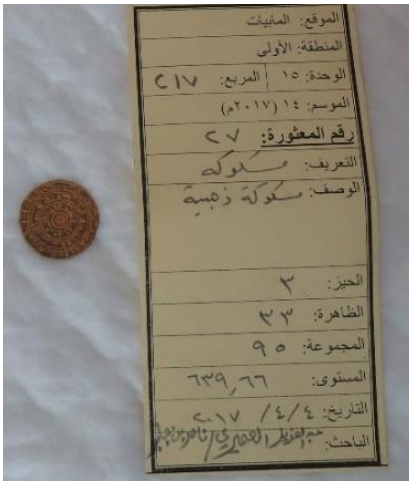


Figure (6): shows the documentation of the uncovered gold dinar in situ and the registration card (above) and the manifestations of degradation of the coin (dust, soot, mud calcifications, and salts) (below) (Photograph of the authors).

Restoration and Conservation of the Gold Dinar (Figures 7 and 8)

Some issues shall be considered before the restoration and conservation of the gold coin, i.e., maintaining its inscriptions, avoiding the effect of using materials in the long term, regular maintenance, and having appropriate display and storage conditions. Because of its uniqueness, rarity, and being made of gold on which no severe corrosion layers are formed like coins of other metals, including copper or bronze, manual restoration was used to avoid complex chemical treatments that may affect the coin in the future. This method also helps to maintain the yellow surface layer of gold and highlight the beauty and originality of the coin.

Registration and Documentation of the Gold Dinar

The dinar was registered before, during, and after restoration in the light of photos taken. Various manifestations of degradation were revealed, including mud calcifications, salts, dust, and dirt that obliterated inscriptions.

Cleaning Methods

Cleaning is one of the conservation processes for coins. It is the most significant and difficult stage because sand granules and soil components take a heterogeneous form that may obliterate the details of the examined coin. It aims at protecting and restoring the original shape of the metal coin (Jedrzejewska 1977). Cleaning the gold dinar under study included several steps as follows:

Mechanical Cleaning

Mechanical cleaning was applied topically to be controlled and stopped at any moment and not to cause any chemical change to the dinar. Several manual methods and tools, e.g., a small soft brush, fine needles fixed in wooden or metal handles, fine chisels, furs, and stripes, were used in mechanical cleaning to remove the various sediments on both sides of the gold dinar. Moreover, an electrical milling machine was used carefully in cleaning by fixing heads of metal or stone, e.g., Carborundum. Cleaning was performed several times gradually until inscriptions appeared on the obverse and reverse sides. It is worth noting that great attention was paid during cleaning to avoid contact with the surface or inscriptions of the coin.

Chemical Cleaning

Chemical test cleaning with acidified thiourea, or “silver dip”, removes tarnish and preserves gold. Still, research has shown that there are problems with this method, including the potential leaching of copper, micro-etching, residual surface complexes, and increasing light reactivity. The pros and cons of each method were considered, and thiourea

was selected as the least harmful. Methods for the safe use of thiourea in this context are discussed, and a new approach with non-woven cotton pads is introduced for cleaning (O'Connor et al. 2015).

To remove the remaining mud layer, the coin was immersed in a basin of warm water. Then, it was dried. After that, nitric acid (1%) was used to remove the limestone layers from the surface of the gold coin using a small soft brush and sometimes wooden sticks wrapped in pure cotton fibers to clean the areas between inscriptions. A solution of formic acid was used to remove the hardened remaining salts on the surface. The gold coin is immersed in an acid solution (5%) in a glass for thirty minutes in a well-ventilated place (Cronyn 1990).

Buffing and Polishing

The dinar was polished manually using sandpapers or dry rub of these granules. Final polishing was done using a cloth polishing brush (Plenderleith and Werner 1982).

Future Protection of the Gold Dinar (Protective Coatings)

After cleaning and drying the gold dinar, it was coated with a protective layer. Protective coating layers protect the metal by forming a somewhat fine coating between the metal and the surrounding environment to decrease the penetration of oxygen and moisture to the surface of the metal. The protective material should be chemically stable and inert. It should have good moisturizing and spread features. Moreover, it should be applicable and removable easily. Paraloid B-72 diluted with acetone 3% was used (Ghunaym 2008) because it has stable colors and is not affected by moisture. It was applied using a brush.

The restoration was performed at the Conservation and Restoration of Excavations Laboratory in Alula. The first stage of mechanical cleaning shows the calcified dust and dirt (Photograph of the authors).

Dividing the dinar into squares and mechanical cleaning.


The stages of the restoration of the gold dinar using safe mechanical tools, e.g., brushes, milling, and sometimes stripes with sharp calcifications.

Figure 7: Stages of the restoration of the gold coin.
(Photograph of the authors).


Reverse of the gold dinar after restoration Obverse of the gold dinar after restoration

Figure 8: The gold dinar after restoration. (Photograph of the authors) .

Coins of the Caliph Al-Muizz li-Din Allah (341-365 A.H./ 952-975 A.D.)

Coins have important historical and documentary value. Tracing the coins of a state helps to fill in the historical gaps of the rulers because these coins contain the date of issue and the ruler. When ascending the throne, a king, a prince, or a ruler was keen to mint a new coin with the date of ascending the throne, name, and sometimes image as in the non-Islamic civilizations. Accordingly, the coin is the main and precise evidence of the building chronology of sites and periods.

The dinar of this study is known as the Mu‘izz dinar minted by Caliph Al-Mu‘izz li-Din Allah (Abu Tamim Ma‘ad ibn al-Mansur bi-Allah Isma‘il ibn al-Qaim bi-Amr Allah Abi al-Qasim Muḥammad ibn al-Mahdī abī Muḥammad ‘Ubayd Allah al-Alawi al-‘Ubaydi al-Fatimi a-Maghribi, entitled al-Mu‘izz li-Din Allah) (Al-Maqrīzī 1948) . He was born in Al-Mahdia on Monday, 11 Ramadan 319 A.H. He ascended the throne in the maghrib (*evening*) of Friday, 29 Shawal 341 A.H. He was the fourth Fatimid Caliph in North Africa and the first in Egypt. He was mainly interested in sending military campaigns to conquer and spread the Shi‘ite doctrine in Egypt. On 18 Sha‘ban 358 A.H. / 969 A.D.), the commander of his armies, Jawhar al-Siqilli, conquered Egypt and concluded a

reconciliation agreement with the people of Egypt to secure their lives and belongings. Moreover, he promised to reform and adjust minting to resemble the Al-Mansuriyah Coin ([1]) (Fahmī 1970). And (al-Nabrāwī 2003) Al-Siqilli built the capital Cairo as a fortress for the conquering Caliph and his followers against their Abbasid and Qarmati enemies. It was primarily known as al-Mu'izzīyah. Then, he began to build Al-Azhar Mosque in 359 A.H./ 970 A.D. which became the official scientific capital and the origin of the Ismaili Shi'ite doctrine. Al-Mu'izz arrived in Egypt in Ramadan 362 A.H./ 971 A.D.) (Fahmy 1970). Al-Mu'izz died in Cairo on Friday, corresponding to 17 Rabi' al-Awwal 365 A.H./ 974 A.D., at the age of 46. He was succeeded by his son Al-'Aziz Nizar (Ibn Taghrī Birdī 1992).

Types of Al-Mu'izz's Gold Coins

Type One: This model took the form of a center and four circles, including three margins Table (2).

Table (2): Details of Type one of the Mu'izz gold dinar

Obverse	Reverse
Center Al-'izz li-allah **Translation**: Honor belongs to Allah **Internal margin**: Lā ilaha ila allah waḥdahu. La sharāka lahu. Muḥammad rasūl allah. **Translation**: There is no god but Allah. He is One. He has no partner with Him. Muḥammad is the Messenger of Allah. **Middle margin**: Wa 'Alī ibn Abī Ṭālib waṣi ar-rasūl wa-na'ib al-fuḍul wa-zawj az-zahra al-batul **Translation**: And Ali ibn Abi Talib is the sponsor of the messenger, representative of fudul, and husband of Fatima. **External margin**: Muḥammad rasūl allah arsalahu bil-huda wa-dīn al-ḥaqq li-yuzhirahu ala' al-dīn kullihi **Translation**: Muḥammad is the Messenger of Allah. He sent him with guidance and the religion of truth to manifest it over all religion.	**Center** Al-qudrah li-allah **Translation**: Competence belongs to Allah. **Internal margin**: 'Abd Allah Ma'ad abu Tamim al-imam al-Mu'izz li-dīn amīr al-mu'minīn **Translation**: 'Abd Allah Ma'ad abu Tamim Imam Al-Mu'izz li-Din Allah, Commander of the Faithful **Middle margin**: Muḥy sunnat Muḥammad sayyid a-mursalin wa-warith majd al-a'ima al-mahdin **Translation**: Restorer of the Sunnah of Muhammad, the best messenger and heir of the greatness of the Mahdi imams. **External margin:** Bism allah al-ḥaqq al-mubīn. duriba hadha ad-dinar bi-al-manṣūrīyah sanat ithnayn wa-arba'īn wa-thalathumi'ah. **Translation**: In the name of Allah, who is perfect in justice. This dinar was minted in Al-Mansuriyah in year two and forty and three hundred.

Type 2: The Mu'izz dinar. Tables 2 and 3. The dinar under study found in the excavations of Qarh (Almabiat), Alula Governorate, belongs to this type. It has four concentric circles. The inner circle includes an obliterate circle or 'adl (justice) followed by three writings in the margins.

(1) The al-Mansuriyah coin was strong and weighed 23.5 karat.

Table (3): Details of Type Two of the Mu‘izz gold dinar

Obverse	Reverse
Center **Internal margin:** Lā ilaha ila allah Muḥammad rasūl allah **Translation**: There is no true god but Allah. Muḥammad is the Messenger of Allah. **Middle margin**: wa-‘ala afḍal al-wasiyyīn wa-wazīr khayr al-mursalīn **Translation**: and upon the best sponsor and the vizier of the best messenger) **External margin**: Muḥammad rasūl Allah arsalahu bil-huda wa-dīn al-ḥaqq li-yuzrihu ala‘ al-dkn Kullihi wa law karahu al-mushrikūn **Translation**: Muḥammad is the Messenger of Allah. He sent him with guidance and the religion of truth to manifest it over all religion, although they who associate others with Allah dislike it.	**Center** **Internal margin:** Al-mu‘izz li-dīn allah amīr al-mu’minīn Ma‘ad Abū Tamim **Translation**: Al-Mu‘izz li-Dīn Allah, Commander of the Faithful, Ma‘ad Abū Tamim **Middle margin:** Da‘a al-imām ma‘ad li-tawḥīd allah aṣ-ṣamad **Translation**: Imam Ma‘ad propagated the monotheism of Allah, the Eternal Refuge **External margin:** Bism allah duriba hadha ad-dinar [place and date of minting]. **Translation**: In the name of Allah. This dinar was minted [place and date of minting].

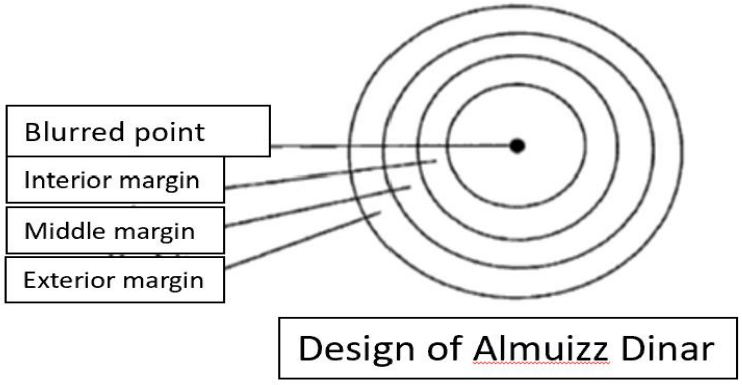
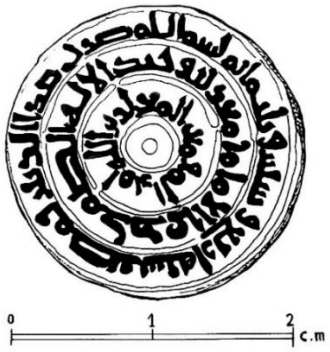


Figure (9): Design of the Mu‘izz dinar (Mohamed 2006).
(Design by the authors.)

Reading the Inscription on the Dinar (case study) (Tables 2 and 3): The dinar generally has three circles on both sides. While the inner circles concentrically encompass the inscriptions of the center, the outer circle surrounds the inscriptions of the margin. The reading of the inscriptions is:

Table (4): Types and inscriptions of the discovered gold dinar

Obverse	Reverse
Center Lā ilaha ila allah waḥdahu La sharīka lahu Muḥammad rasūl allah **Translation**: There is no god but Allah. He is One. He has no partner with Him. Muḥammad is the Messenger of Allah. **Margin** Bism allah duriba hadha al-dinar bi-miṣr sanat arba‘ wa-sittīn wa-thalathumi’ah (Ramadan 2004) **Translation**: In the name of Allah. This dinar was minted in Egypt in year four and sixty and three hundred.	**Center** Al-Mu‘izz li-Dīn Allah amīr al-mu’minīn Ma‘ad abū Tamim **Translation**: Al-Mu‘izz li-Dūn Allah Commander of the Faithful, Ma‘ad Abū Tamim **Margin** Muḥammad rasūl allah arsalahu bil-huda wa-din al-ḥaqq liyuzirahu ala‘ al-dīn kullihi **Translation**: Muḥammad is the Messenger of Allah. He sent him with guidance and the religion of truth to manifest it over all religion.



Obverse	Reverse
Internal margin: La ilaha ila allah muḥammad rasūl allah **Translation**: There is no god but Allah. Muḥammad is the Messenger of Allah. **Middle margin**: wa-‘ala afḍal al-wahy wa-wazīr khayr al-mursalīn **Translation**: and upon the best sponsor and the vizier of the best messenger) **External margin**: Muḥammad Rasul Allah arsalahu bil-huda wa-dīn al- ḥaqq l-yuzhirahu ‘ala al-dīn kullihi wa-law kariha al-mushrikūn. **Translation**: Muḥammad is the Messenger of Allah. He sent him with guidance and the religion of truth to manifest it over all religion, although they who associate others with Allah dislike it.	**Internal margin:** Al-mu‘izz li-dīn allah amīr al-mu’minīn **Translation**: al-Mu‘izz li-Dīn Allah. Commander of the Faithful. **Middle margin:** Da‘a al-imām Ma‘ad li-tawḥīd allah aṣ-ṣamad. **Translation**: The Imam Ma‘ad : propagated the monotheism of Allah, the Eternal Refuge. **External margin:** Bism allah. Ḍuriba hadha ad-dinar bi-miṣr sanat arba‘ wa-sittīn wa-thalathumi’ah. **Translation**: In the name of Allah. This dinar was minted in Egypt year four and sixty and three hundred.

Figure (10): Obverse and reverse of the gold dinar after extracting inscriptions (Mohamed 2006) (designed by the authors)

Kazan published a dinar after the examined one weighted 4.19 gm with a diameter of 2.15 mm (Muḥammad 2006; Ramaḍān 2004; Yūnus 2016).

Analysis of Inscriptions of the Dinar

The inscriptions of the dinar include the Qur’anic quote from Surat Tawbah (9), verse 33 and aṣ-Ṣaff (61), verse 9 up to “wa-law kariha al-mushrikūn” (trans: “although they who associate others with Allah dislike it” and the statement “wa-a‘la afdal al-waḥy wa-wazīr khayr al-mursalīn” (transation: “and upon the best heavenly revelation and the vizier of the best messenger”). This statement indicates the *wīsaya* (sponsorship) of Imam ‘Ali and that he was the best recommended, as he was the vizier of the Messenger, as stressed by the Shiites who reported some prophetic hadiths in this regard (Kazan 1984).

The statement “Da‘a al-Imām Ma‘ad li-tawḥīd allah aṣ-ṣamad” (trans: Imam Ma‘ad propagated the monotheism of Allah the Eternal Refuge) suggests that Caliph Al-Mu‘izz carried out the task of propagating the monotheism of Allah, the Eternal Refuge. This statement was inscribed because of being closely related to the Shi‘ite doctrine and suggesting that the Fatimid Caliph was the imam who propagated the worship of Allah, the One, and the Eternal Refuge. In other words, he thought Allah distinguished him by knowledge, and he propagated the truth and guidance to the right path. In this regard, the Shiites relied on the Qur’anic verse, “Then, we caused to inherit the Book those We have chosen of Our servants.” (Verse 32). When the Prophet (peace and blessings be upon him) was asked about the ones who should take this inheritance, “They are Ahl al-Bayt,” as he reported. Thus, the Fatimid imam was the legitimate heir of their knowledge and propagating monotheism. This statement was inscribed on the coin to suggest the continuity of the prophet's propagation.

This golden type was the most common one in the reign of Caliph Al-Mu‘izz li-Dīn Allah. It was minted from 343 A.H. to 365 A.H. in many mints, such as Al-Manṣūrīyah, Al-Mahdīyah, Fez, Morocco, Egypt, Al-Madinah Al-Mu‘izzīyah, and Palestine. It is the official coin of the Fatimid Caliphate adopted by Caliph Al-Mu‘izz li-Dīn Allah, on which his name was inscribed. Thus, it was called the Mu‘izz dinar. The oldest known version of mint was 341 A.H. in the mint of Egypt about 17 years before the Fatimid conquest (Fahmī 1970; al-Ḥusaynī 1975).

It was used for media and propaganda because coins were the sign of kings and sultans. Minting this dinar, as well as others, supported the propaganda work. Thus, adopting this dinar by Al-Mu‘izz played a considerable role in mastering exchange markets. After the conquest of Egypt in 358 A.H., Al-Mu‘izz li-Dīn Allah, and the Fatimid government supported minting this model of dinars (Ramaḍān 2004).

The mint of Egypt actively minted the Mu‘izz dinar to flood the markets, as reported by al-Maqrīzī that “minting the Mu‘izz dinar “assaka al-ḥamra” was excessive” Therefore, Al-Mu‘izz li-Dīn Allah and the Fatimid government maintained the value of the Mu‘izz dinar against other coins.

Type Three (Table 5) takes the form of two concentric circles on both sides. While the inner circle contains the inscriptions of the center, the margin inscriptions are on the inner and outer circles. The inscriptions read (Ramaḍān 2004)

Table. (5): Type Three of the Mu‘izz dinar in the form of two concentric circles on both sides. While the inner circle contains the central inscriptions, the margin inscriptions are on the inner and outer circles.

Obverse	Reverse
Center Ma‘ad La Ilaha Illallah Waḥdahu La Sharika Lahu Amir almu’minin **Translation**: Ma‘ad / There is no true god but / Allah. He is One/ He has no partner with Him / Commander of the Faithful **Margin** Muḥammad Rasul Allah Arsalahu Bilhuda wa Din al ḥaq leudherahu ala‘a Eldin Kuleh **Translation**: Muḥammad is the Messenger of Allah/ He who has sent him with guidance and the religion of truth to manifest it over all religion.	**Center** Al-imam Muḥammad Rasul Allah Al-Mu‘izz li-Din Allah **Translation**: Imam / Muḥammad / is the Messenger of / Allah **Margin** Bism Allah Ḍuriba hadha Addinar+ Tareekh Assak **Translation**: In the name of Allah. This dinar was minted/ [Date of minting]

Proposed Maintenance and Display Methods of the Gold Dinar

Metal coins should be displayed in a stable environment where humidity does not exceed 45% (Stolow 1987), and the temperature is not higher than 19°C. The showcase is controlled using special devices or silica gel (H_2SiO_3) to reduce humidity. It should be checked regularly to observe any change to the gold coin during conservation or display. The authors suggest designing a showcase of metal coins that meets the museum environment and the requirements of museum display. For example, the showcase should be made of reinforced glass with lightning and UV filters. The proposed cladding consists of double-layer aluminum encompassing a layer of polyethylene for elasticity. Besides its high elasticity, this material is largely resistant to external factors and inert, with attractive colors that match wood, metal, etc. It is also scratch and UV-resistant and cleanable. Lightning units of externally controlled fiber optics are fixed on the showcase to be closed when there are no visitors. It has a drawer containing silica gel, alarms, and anti-theft devices. A screen with devices to measure lightning, humidity, and temperature monitors the interior of the showcase. A hollow carrier of coins made of glass and different sizes that fit the size of gold coins are added. From the outside, the showcase has touch screens to show historical information instead of paper identification cards. The author recommends displaying the gold dinar under study as a magnified image by explaining the main items of writing that the visitor can identify (McDowell 1986).

RESULTS

In Season XIV, the excavations of the Department of Archaeology, College of Tourism and Archaeology showed a rare gold, Mu‘izz dinar minted in Egypt in 364 A.H. It is the first of its kind in the excavations of King Saud University.

Al-Mu‘izz li-Dīn Allah minted three models of gold coins. The dinar under study follows the second model called the Mu‘izz dinar, which takes the form of four concentric circles. While the inner circle is blurred, the other three are writing marginalia. When archaeologists uncover a coin or another interesting artifact, their first interest is to use them in dating the associated layers or the context. This immediate interest sometimes results in poor sampling strategies, affecting the successive analytical procedure.

Burial for long periods in the soil has a considerable impact on the manifestations of deterioration, such as dirt, calcified soil, and white salt crystals. According to the Soil Classification System, ASTM Designation D-2487Unified, the soil of the excavation site of Qarh was identified as a mixture of silt and fine-grained sand.

Coins are often valuable keys to absolute dates. They can help upgrade the process of manufacturing and additions with gold. Therefore, mechanical and manual cleaning was adopted because they do not cause any chemical change and could be controlled at any moment.

Documentation and registration processes with their various types, especially photography, are very important. Taking photos of coins is not a simple art. Therefore, a strong carrier to keep the camera stable and balanced daylight from one side are adopted. The light hits the coin from a certain angle to cause a slight shadow to help see the details. Moreover, the camera should be close enough so that the coin covers most of the camera lens. for the photos is preferred to allow as much detail as possible when enlarged.

Mechanical cleaning was applied topically to be controlled and stopped at any moment . Other cleaning options, such as electrolytic cleaning, gels, or lasers, required further lengthy testing and research. This research has demonstrated that the efficiency of cleaning gold artifacts depends on the procedure applied and the composition of the gold.

In the museum exhibition of coins, it is preferable to allow seeing their obverse and reverse, to consider the conditions of good display, and to control relative humidity (not more than 45%). In storage, each coin is kept separately with a card containing its number, date of discovery, place, and material.

Restoration should be carried out directly after the excavation seasons, divided into excavation and restoration and conservation to maintain the excavations and the archaeological site. Furthermore, regular maintenance of the excavation site should be done throughout the year.

Every artifact is studied and restored as a special case. There should be an interest in registration and documentation before and after restoration. Additionally, international laws and conventions are adhered to keep rare coins while maintaining the coins’ archaeological and historical look.

A restoration laboratory should be established on the excavation site for quick treatment of excavated materials, and specialists, who are fully aware of the archaeological materials, restoration and display materials and methods, as well as legislation and laws governing restoration on-site, are recruited.

DISCUSSION

Several artifacts were found in Qurh, including stones, pottery, metals, and ceramics. Qarh is located in the mid-broad plain surrounded by flood drainage. It lacks the means of natural defense. Thus, the sun shines throughout the day, and evaporation rates increase. If the surface water increases in the excavation area, surface efflorescence takes place. Therefore, a rainwater drainage system should be established to keep rainwater away from the excavation site.

Rainfall varies in Alula in terms of quantity and time. That is, it rises by 45mm in April, then declines and ceases throughout summer. Rainwater directly affects the Qarh Archaeological Site and its contents, especially when penetrating the soil and building materials through surface cracks because running water contains air pollutants that enhance degradation (Cronyn 1990).

Artifacts are tangible moments in time. From that point on, they deteriorate. They manifest inherent problems of material, structure, and environmental contact (Hoge 1997).

Burial for a long period has a considerable impact on the manifestations of deterioration. The surface was covered with a thick layer of dirt and calcified soil. Two types of bacteria attack and decompose gold, namely *Clostridium regular and Clostridium irregulars*, in acidic conditions and PH (5.9-4.7), as is the case of burial environments (Stambolov 1985). Many factors affect the degradation of metal coins buried in the soil, such as soil texture and chemistry, which defines the base or acid soil (Ghunaym 2008).

White salt crystals on the surface of the gold dinar might result from solving soluble salts in the rainwater and penetration into the subsurface soil. In high temperatures and evaporation, such white salt crystals are left on the surface of the items found.

Despite being a relatively inert metal, a thin layer of Gold (III) oxide protects the surface of the gold against any future attack because metal artifacts interact and then adjust with the burial environment later. When excavating gold coins, a bright yellow layer is formed due to the salts in the soil that interact with silver or copper mixed with gold.

For the future protection of the gold coin, Paraloid B-72 diluted with acetone 3% was applied by a brush because it has stable colors and is not affected by moisture (Ghunaym 2008). Safety precautions should be considered when holding or using anti-stain or protection materials, such as wearing rubber gloves, breathing masks, and protective clothes (Muḥammad 2000).

Conservation and preservation are based on common sense, and many of the principals involved are so commonplace that they are often overlooked. Responsible collection management begins with determining the appropriate balance between the preservation of a collection and the demands of access to that collection (Hoge 1997)

Different cleaning methods have been used for years to remove tarnishing from gold or silver. However, scientific studies that assess the treatment's impact on gold and the tarnishing rate are very scarce (Palomar et al. 2016).

Results show that the best museum exhibition of coins is to allow seeing their obverse and reverse, considering the conditions of good display, and controlling relative humidity (not more than 45%). In storage, each coin is kept separately with a card containing its number, date of discovery, place, and material.

Air pollutants in the exhibition and storage areas result from pollution gases in the museum areas and the materials accompanying the collections, especially the materials from which harmful vapors are emitted at room temperature (Ryhl-Svendsen 2006). Gas

compounds are dangerous because they turn into carboxylic acids even with very little humidity (Clarke and Longhurst 1961). For instance, acetic acid and formic acid in the exhibition and storage areas cause the corrosion of metals and the formation of a blue corrosion layer (Thickett and Odlyha 2000). Their vapors can also be emitted from the wooden components of the exhibition and storage areas (Trentelman et al. 2002). To prevent pollution in these areas, filters can be used to clean and purify the air from harmful solids, gas, or liquid pollutants (Ryhl-Svendsen 2006).

When relative humidity exceeds the limit (65%) in the exhibition and storage areas, dehumidifiers are used. Moreover, some air supply units are used to supply air to the showcases at a certain level of relative humidity. They are more developed than the cell of Peltier that cools or dries the air and controls humidity (Bradley 2005). When the source of pollution is in a closed area with ancient metals, deterioration is more severe, faster, and causes mechanical and chemical changes (Bacci et al. 2008).

Gold alloys are subject to tarnishing when exposed to high humidity, sulfur-containing atmospheres. The formation of thin tarnish layers on decorative objects produces an aesthetically unacceptable brownish coloration (Bastidas et al. 2008).

Preventive conservation or good housekeeping is the vanguard of maintenance. With cleaning and restoration, we may be thinking too much of remedial conservation, which may be useful but is not always required. As we have seen, there are many hazards to which coins and medals may be subjected through time. In our care, they can best be protected by the preventive measures of avoiding, blocking, and detecting. We avoid as far as possible improper handling and environmental fluctuations; we block moisture and air pollution; we monitor the appearance and micro-environment of the specimens. Our rules, our guidelines, are the 29 means for stabilization, for seeing as little deterioration as possible take place during the brief span of our watch here on earth (Hoge 1997).

دينار فاطمي مؤرَّخ في عام 364 هجريَّة مُكتَشَف في موقع قرح، محافظة العلا المملكة العربيَّة السعوديَّة

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ملخص

كشفت تنقيباتُ قسم الآثار بكليَّة السياحة والآثار، جامعة الملك سعود، بالمملكة العربيَّة السعوديَّة، عن دينار ذهبيٍّ نادر ضُرِبَ في مصر سنة 364 هجري (975ميلادي) للمعزِّ لدين الله، وذلك في موسم التنقيب الأثري الرابع عشر2017م، في مدينة قرح (المابيات)، وتحديدًا في مربع التنقيب C17 حيز 3، وجرى إيداعُهُ بالسجلِّ الأثري برقم 27، ويمثِّلُ المربَّعُ C17 امتدادًا معماريًّا لمربَّعات التنقيب C18 C19 C20 و .D17 D18 D19 D20 وَيُعَدُّ هذا الدينارُ أوَّلَ عِملَةٍ ذهبيَّةٍ يُعثَرُ عليها خلالَ مواسم الحفر في هذا الموقع، الذي بدأ الحفر فيه عام 1425هـ. وقد شَكَّلَت معثوراتُ مدينة قُرح المكتشفةُ تميُّزًا وَتَنَوُّعًا بالمادَّة والتصنيع، فمنها ما هو مستوردٌ ومنها ما هو مصنعٌ محليًّا. من خلال الملاحظة، وُجِدَ أنَّ الدينارَ الذهبيَّ مُغَطًّى بطبقةٍ كثيفة من الأتربة وهناكَ تكلُّساتٌ ملحيَّةٌ على سطحه منَ التربة. وعليه، فقد تناول هذا البحثُ الأسلوبَ العلمَّي في دراسة الدينار الذهبيّ وتشخيصِ نواتج التَّلَفِ وتحديدِ مسبّباتها، وكذلك مراحل الترميم والعلاج والصِّيانة، وتحليل النصِّ المكتوب على وجه الدينار وظهره الذي ظهر بعد معالجتها وترميمها، كما خرج البحثُ بِعِدَّةِ نتائجَ وتوصيات.

الكلمات الدالة: الحفريات الأثريَّة، قرح (المابيات)، دينار فاطمي، دينار ذهبي نادر، ترميم القطع الأثريَّة.

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