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TWO OLD KINGDOM STONE BLOCKS FROM AKHMIM AND SAQQARA AT THE CAIRO MUSEUM

BY

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ABSTRACT

[EN] The current paper examines two limestone funeral stone blocks that originated during the same period but were recovered from two different locations: one is an upper portion of a stela from Akhmim (JE 27659 – CG 1582 – SR 2/15956) and the other depicts a mural scene from Saqqara (CG 1528 – SR 2/14843). They originated from private tombs of high-ranking individuals dating back to the Old Kingdom. Currently, they are housed at the Egyptian Museum in Cairo. The two stelae were cataloged, including a copy of their inscriptions. However, no comprehensive study on analyzing all components was conducted. The aim of this study is to evaluate and fully understand the issue from all perspectives. Inscriptions provided important administrative and religious titles for officers who played an important role in the Egyptian state, including overseer of the scribe of the fields, scribe of the house of the offerings, and inspector of the royal documents. Both stelae provided clear insight into the administrative and religious structure during the Old Kingdom.

KEYWORDS: Akhmim, Saqqara, Old Kingdom, private tomb, Ka-Wdjai, Nefer-Hotep, offering formula.

[AR]

كتلتين حجريتين جنازيتين بالمتحف المصري بالقاهرة

تهدف هذه الورقة البحثية الحالية إلى دراسة لوحتين جنازيتين من الحجر الجيري تعودان لنفس الفترة الزمنية ولكن من منطقتين مختلفتين: الأولى هي جزء علوي من باب وهي من اخميم (JE 27659 – CG 1582 – SR 2/15956)، والأخرى هي منظر جداري من سقارة (CG 1528 – SR 2/14843). وهما مجلوبتان من مقابر لكبار رجال الدولة في عصر الدولة القديمة. وهما الآن محفوظتان في المتحف المصري بالقاهرة، اللوحتان تم فهرسهما مع نسخة من النصوص الكتابية. ولم تتم عليهم دراسة وافية لكل محتوياتهما من قبل. واللوحتان تمداننا برؤية واضحة للطقوس والعادات الدينية خلال الدولة القديمة. ان تحليل المناظر والنقوش والطرز الفنية سوف يسهم في زيادة فهمنا للمعتقدات الدينية في عصر الدولة القديمة. بالإضافة الى ذلك تمدنا هذه النقوش القاب ادارية ودينية هامة لموظفين مهمين، والذين لعبوا دوراً هاماً في الدولة المصرية مثل: المشرف على كتابة الحقول، كاتب بيت القرابين وكذلك المشرف على الوثائق الملكية. وهذه الالقب تعطي صورة واضحة عن التركيب الديني والاداري للدولة خلال عصر الدولة القديمة.

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I. INTRODUCTION

This study is intended to shed light on and conduct a detailed study of two blocks made of limestone. The first one was an upper part of a stela (JE 27659 – CG 1582 – SR 2/15956) discovered at the cemetery of Akhmim in Upper Egypt, and the other was a mural scene (CG 1528 – SR 2/14843) from the necropolis of Saqqara. They originated from the private tombs of the ancient Egyptian elites, dating back to the late Old Kingdom. The blocks were previously recorded in the *Egyptian Museum Catalogue* without providing any translation or analysis of the artistic or textual contents. They provided a clear insight into funeral practices and customs during the Old Kingdom. Additionally, inscriptions provided important administrative and religious titles for officers who occupied important jobs in the Egyptian state, including overseer of the scribe of the fields, scribe of the house of the offerings, and inspector of the royal documents.

II. BLOCK ONE: FUNERARY STELA OF KAI-WDJAI, CALLED IWRI [FIGURES 1/A-B]

This stela originated from Akhmim, the capital city of the Ninth upper Egyptian province. The private necropolis of Akhmim occupies the northwest mountain of El-Hawawish¹. Most of its tombs date back to the Late Old Kingdom. They were plundered by the local people until the 20th century, but many stelae were recovered by travelers and Egyptologists. This stela was acquired by Ernesto Schiaparelli and arrived at the Egyptian Museum in Cairo in 1887². EDWARD BROVARSKI divided them into three groups according to their stylistic attributes³. The current stela honored Ka-Wdjai, whose beautiful name was Iwri, and he was expected to fulfill an important role of responsibility in service of the nome during the sixth dynasty based on the designated titles. The tomb from which this stela originated remained unidentified. The stela attracted attention because of its vivid colors.

¹ KANAWATI 1980: 1-17.

² The Stela, together with other objects had been acquired by Schiaparelli in 1885 and denoted to the Egyptian Museum in 1887. BROVARSKI 1985: 139.

³ BROVARSKI 1985: 117-153, PL.2; DUMARS 2009: 41, FIG.29.



[FIGURE 1/A]: Funeral Stela of Kaiudjay © Photographed by the author



[FIGURE 1/B]: Funeral Stela of Kaiudjay © Facsimile by the author

1. Description

Provenience: Akhmim (unidentified tomb)

Registration: (JE 27659 – CG 1582 – SR 2/15956)

Measurements: 85.00 cm high, 68.00 cm wide

Material: Fine limestone

State of Preservation: The stela is in a satisfactory condition and still retains much of its original coloration. Although some changes may have occurred over time, the fundamental visual appearance is largely intact.

Inscriptions: It has an upper hieroglyphic inscription incised in three horizontal lines. There are two short vertical inscription columns: One faces directly the deceased's face, while the other is placed at the right of the offerings table.

Scenes: The scene depicts the owner in a traditional funerary gesture, seated upon a low-backed chair with lion-shaped legs and a wooden box beneath [FIGURE 1/B]. He is dressed in a short kilt and a large pectoral and wears a shoulder-length wig. He has a short beard. The dresses, together with accessories, indicate high rank. He is depicted before an offering table laden with tall and thin loaves of bread. With his right hand, he touches the bread loaves on the table, while the left one holds a handkerchief tightly to his chest. Below the offering table are two vessels: One ewer and a basin for hand washing and the other is a «*hst*» vessel and container of oil

offerings were introduced by the king to the gods and then they reversed them after being satisfied with the deceased. The third part is the required offerings, including thousands of loaves of bread, beer, wine, etc. The fourth part refers to the tomb owner as a receiver of the offerings⁶. However, in this case, the king was a representative of the god Horus⁷. This formula was first invoked only by Anubis, but later, it was also addressed to Osiris and to other gods connected with earth, resurrection, and death⁸. These gods were not receivers of the offering but donors together with the King or, in some cases, instead of him, after being satisfied⁹. During the Middle Kingdom, royal names were included in this formula as granters, or it could be meant as the necessary royal and divine approval for the individual to be buried within the royal cemetery and transferred into the afterlife. However, no real offerings were given to the deceased from the royal or divine stores. Offerings were supplied from the deceased's own proprieties¹⁰.

- The formula «*im3hw hr 3 ntr*» was popular and had a strong connection with the «*Htp- di- Nswt*» offering formula¹¹. It was first attested during the second dynasty¹², in the realm of the dead and pertained to the enduring connection between the deceased and the great god, i.e., Osiris¹³. «*im3hw*» was used for living high-ranking persons. In this context, the title referred to the individual in conjunction with a person such as the king or with a profession. Consequently, it defined individual's social and administrative status of persons who enjoyed a very good reputation during their lifetime. The title was also held by persons who achieved the tomb of their own father, mother or wife to obtain recognition from the public or the deceased¹⁴. Moreover, it was assumed that this title was held by both the dead and the living in recognition of their accomplishments during their lifetime¹⁵. Thus, the title's holder would be eligible to receive royal gifts manifested in food, drinks, and funerary equipment¹⁶. Writing out the full word «*im3hwt*» without any disorder, abbreviations, or omitted signs represented a classic style of calligraphy from the Old Kingdom¹⁷.
- The formula «*rn.f nfr*» preceded the second name of the same individual. During the Old Kingdom, it was customary for individuals to possess two names: An official name and a secondary name known as «the beautiful name». The later name could be a shortened

⁶ BARTA 1968: 55; FRANKE 2003: 40.

⁷ SMITHER 1939: 34-37; GARDINER 1978: 170 -171; BARTA 2011: 85, 249.

⁸ HASSAN 1951: 48; BOLASHCOV 2001: 65.

⁹ FRANKE 2003: 40-41.

¹⁰ ALLEN 2006: 15.

¹¹ ABD EL SATTAR 2023: 6.

¹² KHAL 2002: 33.

¹³ FISCHER 1963: 35, 41; JONES 2000: 11[42].

¹⁴ BLACKMAN 1910: 126; JUNKER 1934: 53; ERMAN & GRAPOW (eds.): *Wb* 1971: vol.1, 81- 82; CHAUVET 2004: 137-155.

¹⁵ CHAUVET 2004: 137-155.

¹⁶ MORET 1897: 57-90.

¹⁷ BORAİK 2016: 8.

version of the official name. However, over the course of the Middle Kingdom, the usage of the beautiful name declined. It experienced resurgence during the late period¹⁸.

- The formula «*dpḥt ḥtp*» in the relevant context refers to the offering table or the required offerings and sacrifices¹⁹.

Philological Notes

- The hieroglyphs for the word «*Nsw*» were a modification of «*Niswt*». The word «*ḥtp*» referred to food offerings given its contextual usage within offering scenes in order to describe the funerary meals. This interpretation was supported by later evidence, where the word is sometimes followed by a determinative of food. In addition to the above-mentioned concepts, the formula served as a decorative element²⁰.
- The complete «*im3ḥw*» form was a typical writing of the late Old Kingdom²¹.
- The hieroglyphs for «*ntr ʿ3*» without a determinative were common during the Old Kingdom. They referred to numeral deities, including Osiris, in addition to the dead king²².

Personal Names

- The two personal names held by the owner of this stela, «*k3-Wd3i*» and «*iwry*», were exceptionally uncommon and were never utilized throughout other recorded finds. They appeared only in this stela²³. It could be argued that this individual was not originally from Egypt.

Titles

- The title «*ḥry-tp nsw*» referred to a high-ranking person. It described the officer who was in the personal server of the king in his bedroom²⁴. The title was common, starting from the Old to the New Kingdoms²⁵. This high-ranking position was connected with other important roles performed by elites, who held positions in various areas across Egypt, including: «Overseer of scribes and overseer of the pyramid city»²⁶.

Artistic Comments

- The bench with no armrests or back was typical of the Old Kingdom²⁷.
- The depiction of the offering table reaching the knee of the tomb's owner height was typical and common throughout the late fifth dynasty²⁸.

¹⁸ GÜNTER 2013: 3.

¹⁹ ERMAN & GRAPOW (eds.): *Wb* 1971: vol.3, 184; FAULKNER 1991: 312.

²⁰ GARDINER 1915: 80-81.

²¹ LEPROHON 1994: 45.

²² ABD EL SATTAR 2023: 4-5.

²³ RANKE 1935: 18: 9-339 [7]; SCHEELE-SCHWEITZER 2014: 225: [201- 696], [3439].

²⁴ GUNN 1941: 145.

²⁵ WARD 1982: 142: 1226; JONES 2000: 788: [2874]; AL-AYEDI 2006: 464 [594].

²⁶ DAVIES 1901: PL. 9; ČERNÝ 1947: 56.

²⁷ SWINTON 2014: 74.

- The scene had a «*hst*» on the left side of the offering table pedestal and an ewer and a basin on the opposite side; those two vessels became part of the offering scenes in provincial tombs in Upper Egypt starting from the late sixth dynasty²⁹.
- The box under the chair was not common during the Old Kingdom.

III. BLOCK TWO: STELA OF: NEFER - HOTEF AND HIS SON: NEFER -HER -(NY)- PTAH [FIGURE 2]

This stela was discovered by A. MARIETTE in 1888 in the *serdab* of tomb N^o.B12 situated at the north of the step pyramid of Saqqara. The superstructure of the tomb consisted of a vestibule and a *serdab*. This stela was discovered with a double statue depicting the tomb owner and his wife inside the *serdab*. All these finds joined the Egyptian Museum collection in Bulaq. Now, they are exhibited in the Egyptian Museum in Cairo³⁰.

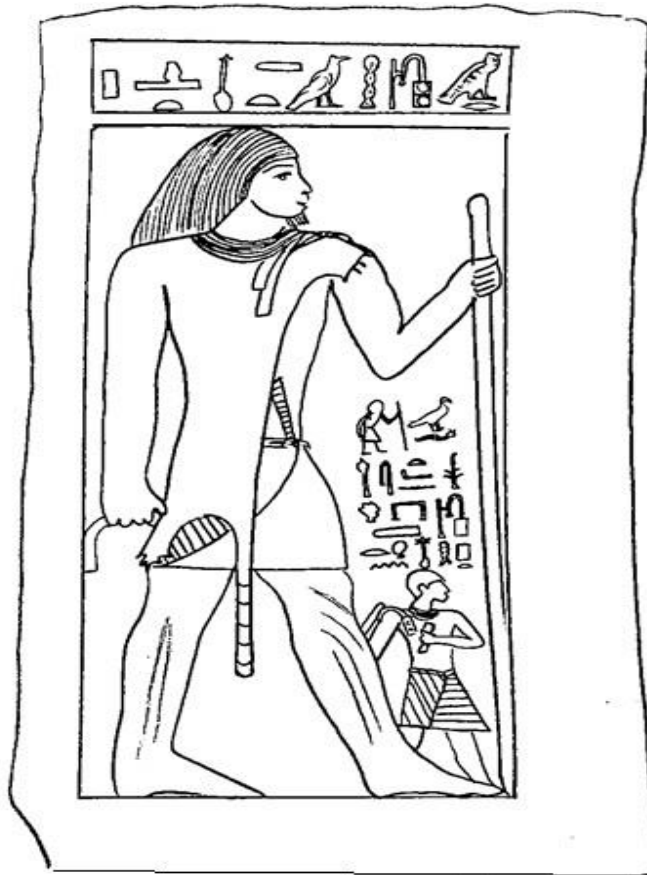


[FIGURE 2/A]: Funeral Stela of Nefer-Hotep and his son © Photographed by the Author

²⁸ SWINTON 2014: 68.

²⁹ BROVARSKI 2004: 76.

³⁰ MARIETTE 1889: 103-104; BORCHARDT 1911: 277-278, PL.20; BM 1978: 451.



[FIGURE 2/B]: Funeral Stela of Nefer-Hotep and his son © Facsimile by the author

1. Description

Provenience: Tomb N^o.B. 12 Saqqara (North of the Step Pyramid)

Registration: (CG 1528 – SR 2/14843), [FIGURE 2/B]

Measurements: 155.00 cm high, 67.00 cm wide

Material: Fine limestone

State of Preservation: It is in a satisfactory condition and still retains much of its original coloration. Although some changes may have occurred over time, the fundamental visual appearance is largely intact.

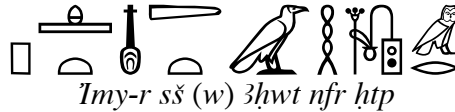
Inscriptions: It has an upper hieroglyphic inscription incised in three horizontal lines. There are two short vertical inscription columns: One faces directly the deceased's face, while the other is placed at the right of the offerings table.

Scenes: The scene depicts the owner of the stela accompanied by his eldest son. They are carved in high relief. The father is depicted on a large scale in a walking attitude with his left leg forward in a wide stance, muscles are clearly incised. He wears a short kilt, and a leopard skin with a hanging tail arrives at his calves. He also wears a large pectoral and a wig, which arrives at shoulder-length and is swept back in the wing style typical of that period. He has a short, elite beard. In his right hand, he holds a piece of parchment or animal skin. With his left hand, he holds a tall wooden staff. He is surmounted with a sunk hieroglyphic inscription in one horizontal line.

His eldest son is depicted on a smaller scale in front of his father's left leg, standing with his left leg forward in a wide stance. He wears a short-lined kilt and a large pectoral. He touches his father's left leg with his right hand. In his left hand, he holds a papyrus. On his right shoulder, he carries a complete scribe's outfit. He is surmounted with a sunk hieroglyphic inscription in four horizontal lines.

2. Transcription, Transliteration and Translation

Hieroglyphic inscriptions were copied with photography by Borchardt without translation or comments³¹.



Imy-r sš (w) 3hwt nfr htp

Overseer of the scribes of the field, Nefer-Hotep

Above the son

Line 1: Line 1:

s3.f smsw

His eldest son

Line 2: Line 2:

shd ʿw nswt

Inspector of the royal documents

Line 3: Line 3:

sš pr-hry-wdb

Scribe of the house reversionary (of offerings)

line 4: line 4:

Nfr-hr-n(y)-Pth

Nefer-Her.in Ptah

3. Commentary

Personal Names

- The personal name «*Nfr-htp*» was common during the Old, Middle and New Kingdoms. It was attested in various locations and held by numerous high-ranking individuals³². The son's personal name «*Nfr-hr-n(y)-Pth*» was common and held by many elites during the fifth and sixth dynasties in the Giza and Saqqara necropolis³³. Both names were connected with the god Ptah since it was a popular custom during the Old Kingdom, especially for those whose residence and burial were in the capital³⁴.

³¹ BORCHARDT 1911: 277-278, PL.20.

³² RANKE 1935: 14.

³³ MARIETTE 1885: 199; RANKE 1935: 198[9]; SCHEELE-SCHWEITZER 2014: 474.

³⁴ DOXEY 2001: 490.

Titles

- The title «*imy-r sš(w) 3hwt*» was clearly attested during the fifth dynasty. It referred to a high-ranking personage and an important official who administered agricultural production³⁵. Neither religious nor administrative textual sources provided detailed information describing the nature of this occupation. It first emerged during the fifth dynasty³⁶. The actual writing used was consistent with titles from the Old Kingdom. Individuals who held this title likely also held other titles, such as «scribe of the royal documents, priest of Re, overseer of the scribes of agricultural products distribution and solely companion», indicating a highly ranked person. The holder of this title performed various duties, including establishing royal estates, supervising farm labor, detecting instances of work disruption, overseeing border demarcations between cultivated plots, setting conflicts among farmers, surveying cultivated lands, and determining taxes. This occupation was documented in some instances as a vocation passed down from one generation to another within the same family lineage³⁷.
- The title «*shd ʿw nswt*» referred to a high-ranking personage since the Old Kingdom³⁸. The person who carried this title was an individual whom the king held in high esteem and confidence. Individuals who carried this title also held the title «*imy-r sš(w) ʿhwt*», which was held here by his father.
- «*sš hry pr wdb*» Gardiner suggested another meaning for this title as «scribe of the house of the Master»³⁹. Moreover, this title referred to a specific department related to the redistribution of offerings. It had a strong impact on the state's economy. Scholars translated this title as «scribe of the department of the chief redistribution»⁴⁰. It existed from the second dynasty⁴¹. This department was involved in various labors, including supervising provincial fieldwork. This title was related to another title, «the scribe of the fields», held by the father of this officer in this stela, suggesting that the father helped his son reach this position.

Artistic Comments

- The presence of the son on a small scale reaching the father's knee referred to him as an heir and showcased his duty to achieve burial procedures and perform rituals and offerings in the tomb after the burial of the father⁴². The son stood with his hair and uncovered ears, unlike his father. This could indicate some kind of difference in social and administrative status.

³⁵ KAPLONY 1981: 394-395; JONES 2000: 206 [770]; PIACENTINI 2002: 445; AL-AYEDI 2006: 46.

³⁶ JAMES 1974: 12, PLS.18 & 33.

³⁷ BOESSER 1988: 73-74.

³⁸ JONES 2000: 914.

³⁹ GARDINER 1938: 88; JONES 2000: 604.

⁴⁰ PAPA ZIAN 2013: 77-79.

⁴¹ KAPLONY 1963: FIG.313.

⁴² HELCK 1956: 66.

IV. CONCLUSION

This study tried to translate and discuss the texts inscribed on these stone blocks. The most significant of such titles and costumes were prevalent during the Old Kingdom. The blocks had administrative titles, which shed light on the jobs held by the owners of the stelae.

The study introduced two examples of elites from the Old Kingdom originating from different regions. The first came from Upper Egypt, while the other represented Lower Egypt's art. There were noticeable stylistic differences in the art of the two blocks. The second example from Saqqara demonstrated a highly refined representation reflective of the advanced artistic tradition that developed in Lower Egypt during the Old Kingdom.

The two personal names held by the owner of the first stela, «*k3-Wd3i*» and «*iwry*», were exceptionally uncommon and were not commonly utilized throughout other recorded finds. They appeared only in this stela. It could be argued that this individual was not of Egyptian descent. Meanwhile, the traditional names cited on the second stela adhered to individuals with the god as part of their personal name. It was the traditional costume of the Old Kingdom.

The title on the second block, «*shd ʿw nswt*», referred to a high-ranking personage since the Old Kingdom. Persons who held this title were held in high esteem by the king and served as confident and trusted advisers. Additionally, individuals who held this title held the title «*imy-r sš(w) 3hwt*» which was held here by his father. It could be argued that such a profession passed from father to son. The presence of the son on a small scale referred to him as his heir and showcased his duty to achieve burial procedures and perform rituals and offerings in the tomb after the burial of the father.

The depictions of the two owners were common in some features, such as the wig, which was swept back and arrived at the length of his shoulders in the form of a bird wing and covered completely his ears, which was common for individuals of high rank in the Old Kingdom. Regarding the dress, the owner of the second stela seemed to be of an administrative and social status higher than the owner of the first stela due to the richly ornamented kilt and the detailed leopard skin over it.

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- [= Wb.]

THE STELA OF NESHOR FROM AKHMIM AT THE BRITISH MUSEUM EA 1018 (27TH DYNASTY)

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ABSTRACT

[EN] This paper examines the 27th dynasty stela of Neshor EA 1018, which is from Akhmim but currently housed at the British Museum. BUDGE provided a brief description of the stela, and the texts were republished by JANSEN-WINKELN without translation and no analytical study. The study will discuss the meanings of the names and titles included on the stela, and the genealogy of the Neshor's family; it will also provide a copy and translation of the text, and provide a commentary on the marks and artistic features of the stela. The limestone stela is a round-topped with sunken relief, and is divided into three parts in four registers. The stela's dimensions are: Height. 52 cm, width. 34 cm, and 10 cm in thickness. The reliefs depict vignettes of Bd 16 and 17, as well as Bd 110, which is not attested on other stelae from Akhmim until now. These Bd chapters ensure the owner's rebirth by joining Re in his journey, the solar-Osirian unity, and allowing the deceased to dwell in the field of reeds. The text in the lower part consists of 13 lines containing the offering formula, the deceased and his family's genealogy going back eight generations, wishes for the deceased in the afterlife, and finally the dedication of the stela to Neshor by his eldest son.

KEYWORDS: Akhmim, Bd 16, Bd 17, Bd 110, 27th dynasty, Neshor, stela.

[AR] لوحة نس حور من أخميم بالمتحف البريطاني EA 1018 (الأسرة السابعة والعشرون)
يهدف البحث إلى دراسة لوحة نس حور المحفوظة بالمتحف البريطاني المسجلة برقم EA 1018 من أخميم وتؤرخ بالأسرة السابعة والعشرون. قام بادج بعمل وصف مختصر للوحة وأعاد يانسن فنكلن نشر النصوص ولكن بدون ترجمتها وبدون دراسة تحليلية. سوف يناقش البحث معنى الأسماء والألقاب ونسب عائلة نس حور، مع نسخ وترجمة النصوص والتعليق على العلامات والخصائص الفنية للوحة. اللوحة موضوع الدراسة هي لوحة دائرية القمة من الحجر الجيري ومنقوشة بالنعش الغائر، ومقسمة إلى ثلاثة أجزاء في أربعة صفوف، بارتفاع 52 سم وعرض 34 سم وسمك 10 سم، وتصور فقرات تصويرية من الفصلين 16 و 17 من كتاب الموتى، بالإضافة إلى الفصل 110 الذي حتى الآن لم يظهر على لوحات أخرى من أخميم، تؤكد هذه الفصول على البحث من خلال مشاركة المتوفي لرع في رحلته وبعثه بجانب الوحدة الشمسية الأوزيرية ودخوله لحقول الإبارو. النص المسجل في الجزء السفلي يتكون من ثلاثة عشر سطر ويذكر صيغة تقديم القرابين وعائلة نس حور لثمانية أجيال، مع آماني للمتوفي في العالم الآخر، وأخيرًا اهداء اللوحة لنس حور بواسطة ابنه الأكبر.

I. INTRODUCTION

Firstly, I would like to mention that all figures of the stela in this paper were published with the permission of the British Museum on June 28, 2022. The Stela of Neshor which was found at Akhmim, Sohag is currently stored at the British Museum and was purchased from JOSEPH SAMS in 1834 [FIGURES 1-2]¹. It is a round-topped limestone stela with sunken relief and dates to the 27th dynasty². With just minor surface damage at the lunette, the stela is in good condition. Some parts contains red paint.

BUDGE and MUNRO provided some information about the owner, his family, and his titles; Munro dated the stela to circa 520 BC³. BUDGE also wrote a descriptive study of the stela, transcribing the texts in 1880⁴. His study had some errors concerning the hieroglyphs; another transcription was made by Jansen-Winkel, where he corrected most of these errors⁵. Although these publications are important, they contain transcription errors and lack an analytical study, religious context of the scenes, and paleographical commentary. Thus, the author offers a revised version of the text and scenes with this publication.

¹ «Stela», https://www.britishmuseum.org/collection/object/Y_EA1018, accessed on (18/05/2022); «TM 58877, Stele, London»; https://totenbuch.awk.nrw.de/objekt/tm58877?fbclid=IwAR2ZWdaRJ3HMPuKyoRrHuXHLSSnHjb8UDh9GW66twmQJ3Fou4X_qWulXxb8, accessed on (16/07/2023); «TM 58877»; <https://www.trismegistos.org/tm/detail.php?tm=58877&fbclid=IwAR2rUil5hbo0oIAsrEdkNnlJzlsBxiZvraOPseFTm04KsNCvLDnXLqJ0>, accessed on (20/07/2023).

² It was dated to the 30th dynasty in *PM* 1962, vol.5, 22 and by BUDGE. BUDGE 1909A: 68, PL.8; BUDGE 1909B: 253, N^o.941.

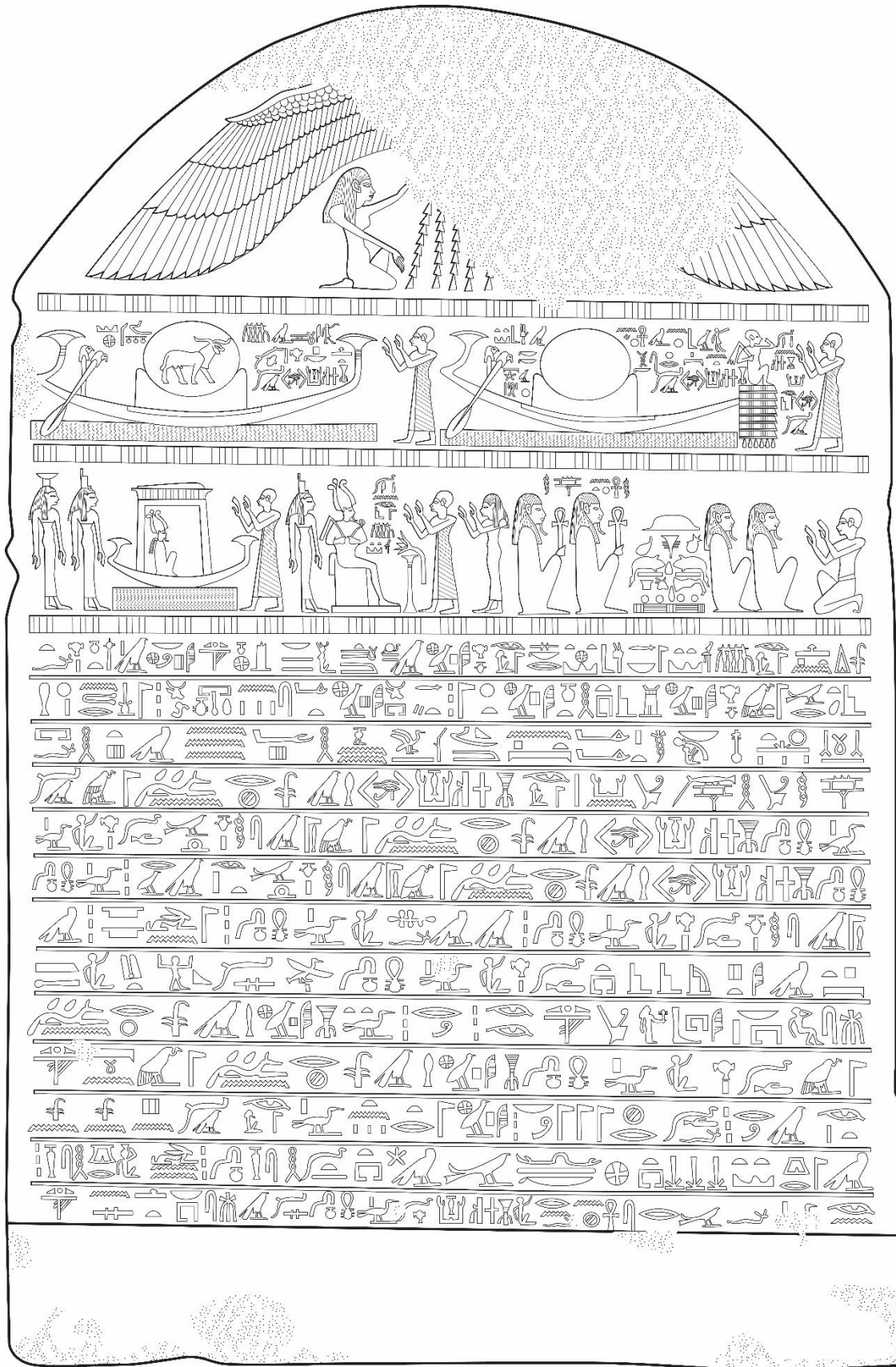
³ MUNRO 1973: 314, PL.50; BUDGE 1909B: 235, N^o.941.

⁴ BUDGE 1886: 358-365.

⁵ JANSEN-WINKELN 2014: 983-984, N^o.419.



[FIGURE 1]: The stela of Neshor EA 1018 © The British Museum.



0 25 cm
[FIGURE 2]: Line drawings of the stela © Done by Ahmed Abdelhalim.

II. DESCRIPTION

Measurements: H.: 52 cm; W.: 34 cm; T.: 10 cm.

The stela is in sunken relief and divided into three parts separated by bands ornamented with geometric shapes. There are remnants of red paint.

1- The Lunette

A partly damaged winged sun disk. Only part of the right and left wings, and five sunrays have survived. The wings have four bands of feathers, with the third one painted red. On the left side of the lunette, there is a depiction of a kneeling woman with a tripartite-striped wig, which exposes a detailed ear. Her arms are open and shown embracing the damaged sun disk. Likely, the same figure was mirrored on the other side. Together, the figures may represent Isis and Nephthys adoring the sun disk with its extended as its rays extend downward. The winged sun disk motif is attested on other stelae from Akhmim⁶, and is related to Bd 16, which is discussed later.

2- The Middle Part

- The First Register

Neshor is depicted standing with natural short hair⁷ and wearing a long, wavy cloak, which exposes his feet. He raises his arms in adoration. There is a vertical column of text in front of him, oriented from the right to the left. Noteworthy, the text is in the opposite direction of Neshor, which is unusual; it says:

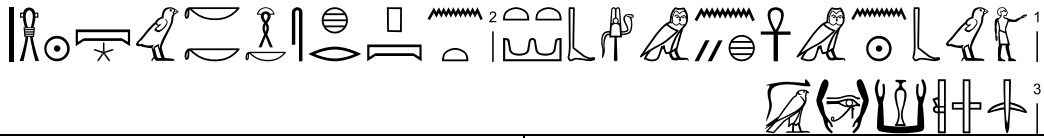


<i>ḏd mdw in smꜣty imi-ỉs ḥsk ḥpt-wḏꜣt Wsir Ns-Ḥr</i>	Words to be said by the stolist, councilor ⁽¹⁾ , the <i>ḥsk</i> priest, the <i>ḥpt-wḏꜣt</i> , Osiris ⁽²⁾ , Neshor.
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A solar boat is depicted in front of Neshor, carrying the horizon and its sun disk, which is painted red. A young child is suckling his thumb and holding a flail in his right hand. He sits on a solar mat covering the brow. The stern is papyrus-shaped, and there are two hawk-headed oars in front of it. The entire boat is above a rectangular mat with zigzagging, narrow lines representing the water. There is a text-oriented from the right to the left that says:

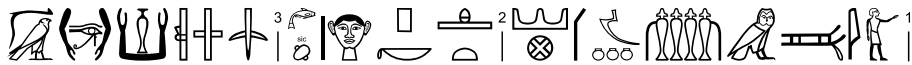
⁶ For instance, stela CG 22141, Meux 51. MUNRO 1973: PLS.47 & 49, ABB.166 & 168; «TM 111732, Stele, unbekannt», <https://totenbuch.awk.nrw.de/objekt/tm111732#>, accessed on (27/09/2023); «TM 58577, Stele, Kairo», <https://totenbuch.awk.nrw.de/objekt/tm58577#>, accessed on (27/09/2023).

⁷ KAMAL 1904: PL.LXXIV/4.



1	<i>i wbn(.f) m ḥnht m iʒbtt</i>	O! He who rises in life, in the east
2	<i>nt p(t) hr skkw sʒ</i>	of the sky ⁽³⁾ , from the darkness ⁽⁴⁾ , protection (for) ⁽⁵⁾
3	<i>smʒty imi-ʒs ḥsk ḥpt-wdʒt Ns-Ḥr</i>	the stolist, councilor, the ḥsk priest, the <i>ḥpt-wdʒt</i> , Neshor.

The following scene depicts Neshor in the same position and in front of another solar boat carrying a solar disk with a ram inside it; the difference here is that the prow and the stern are papyrus-shaped. There is a text-oriented from the right to the left, which states:



1	<i>i ʔtm ḥnty mʒnw</i>	O! ⁽⁶⁾ Atum, foremost ⁽⁷⁾ of the western mountain,
2	<i>ḥtp.k hr ḥʒt?</i>	may you rest on ⁽⁸⁾ (your) corpse? ⁽⁹⁾ ,
3	<i>smʒty imi-ʒs ḥsk ḥpt-wdʒt Ns-Ḥr</i>	the stolist, councilor, the ḥsk priest, the <i>ḥpt-wdʒt</i> , Neshor

This section end is interrupted by with a broken piece, but the scenes remain intact.

- The Second Register

Neshor is shown kneeling in adoration, and wearing a short kilt. In front of him are two unnamed squatting mummified figures with a long tripartite-striped wig, which leave the ears exposed, and having a long beard. They are followed by a mat that carries different offerings, which are painted red, along with an additional two squatted figures painted red. These figures are the same as the previous figures described, but they are shown holding the *ankh* sign. Their names are $\overline{\text{Ndm-ḥnht}}$ «who lives with pleasant»⁸ and $\overline{\text{Tʒw-ndm}}$ «the pleasant air»⁹.




Next, Neshor, in the same appearance and position as his in the first register, is followed by a woman, probably his wife, who is in the same position. She wears a tripartite-striped wig, tucked behind the ear, and a long, tight dress that ends at her ankles. She is painted red. Both Neshor and his wife are standing in front of the enthroned Osiris, who wears the *atef* crown, a long beard, and a long, tight garment, with the hands shown holding the crook and the flail. There is a text-oriented from the right to the left that says:

⁸ LEITZ 2002: vol.4, 599.

⁹ LEITZ 2002: vol.7, 457.



<i>dd mdw in Wsir hntt imntt</i>	Words to be said by Osiris, foremost ⁽¹⁰⁾ of the west.
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There is a small offering table with a lotus on it in front of Osiris. Isis is standing behind him, who appears to be the same as the woman behind Neshor, but her arms are at her sides; her name is not mentioned but  is placed on her head. Finally, Neshor is standing in the same position and appearance in front of a boat carrying a shrine belonging to a squatting figure, probably Osiris, who wears the *atef* crown and a long beard. The boat has a papyrus-shaped brow and stern and rests over a rectangular mat with zigzagging, narrow lines, which represent water. Isis and Nephthys are standing behind the boat; their names are not mentioned but  and  are placed on their heads.

3- The Lower Part






The lower part of the stela is a text composed of thirteen horizontal lines, which are separated by incised borders. The text reads from right to left and says:










1	<i>ḥtp di nsw n Wsir ḥntt imntt nṯr ʿ3 nb ʿbdw Skr-Wsir ḥr-ib ʾIpw – R-Ḥr-ʿḥty-ʾtm nb tʿwy ʾwnw Mnw nb ʾIpw Ḥr-nd-ḥr-it.f</i>	An offering which the king gives ⁽¹¹⁾ to Osiris, foremost of the west ⁽¹²⁾ , the great god, lord of Abydos ⁽¹³⁾ , Sokar-Osiris ⁽¹⁴⁾ who resides in Akhmim ⁽¹⁵⁾ , Re-Horakhty-Atum ⁽¹⁶⁾ , lord of the two lands (of) Heliopolis, Min lord (of) Akhmim ⁽¹⁷⁾ , Horus, protector of his father
2	<i>ʿst wrt mwt-nṯr ḥr(t)-ib ʾIpw ʿpr(t)-ʿst ḥnwt ʾIpw Psdt ʿʿt ḥnti pr-ʾIpw dit.sn prt.ḥrw t ḥnkt ihw ʿbdw snṯr</i>	Isis the great, mother ⁽¹⁸⁾ of the god (i.e., Horus), who resides in Akhmim, Aperet ⁽¹⁹⁾ -Isis, lady of Akhmim, the great ennead foremost ⁽²⁰⁾ of the temple of Akhmim, may they give invocative offerings (of) bread, beer, oxen, fowls, incense ⁽²¹⁾
3	<i>šs mnḥt ḥt nfr(t) nbt wʿb(t) ndm(t) dd n pt kmʿ tʿ innt ḥʿpi m tph(t).f</i>	alabaster, cloth ⁽²²⁾ , every good, pure and sweet thing, what the sky ⁽²³⁾ gives, the earth creates ⁽²⁴⁾ and the Nile brings of its cavern ⁽²⁵⁾ .
4	<i>tʿw ndm n mḥw n kʿ n Wsir smʿty imi-is ḥsk ḥpt-wdʿt ḥm-Ḥr rh nsw ḥry-sʿtʿ n mwt-nṯr Ns-Ḥr</i>	and the sweet northern wind for the <i>ka</i> ⁽²⁶⁾ of Osiris, the stolist, councilor, the <i>ḥsk</i> priest, the <i>ḥpt-wdʿt</i> , priest of Horus, king's acquaintance, chief of secrets ⁽²⁷⁾ of the mother of the god, Neshor
5	<i>sʿ mi nw smʿty imi-is ḥsk ḥpt- wdʿt ḥm-Ḥr rh nsw ḥry-sʿtʿ n mwt-nṯr ḥm-nṯr Ḥr-sndm-ib wr šn Dd-Ḥr sʿ</i>	son of the like-titled ⁽²⁸⁾ , the stolist, councilor, the <i>ḥsk</i> priest, the <i>ḥpt-wdʿt</i> , priest of Horus, king's acquaintance, chief of secrets of the mother of the god, priest of Horus who delights the heart ⁽²⁹⁾ (one belonging to) the great ocean? ⁽³⁰⁾ Djedhor son
6	<i>mi nw smʿty imi-is ḥsk ḥpt-wdʿt ḥm-Ḥr rh nsw ḥry-sʿtʿ n mwt-nṯr ḥm-nṯr Ḥr-sndm-ib wr šn ʾrt-(nt-)Ḥr-irw sʿ mi nw</i>	of the like-titled the stolist, councilor, the <i>ḥsk</i> priest, the <i>ḥpt-wdʿt</i> , priest of Horus, king's acquaintance, chief of secrets of the mother of the god, priest of Horus who delights the heart (one belonging to) the great ocean? son of Irethoriru son of the like-titled
7	<i>ḥm-nṯr Ḥr-sndm-ib Dd-Ḥr sʿ mi nw Ḥr-m-sʿ.f sʿ mi nw wn ʿʿw nṯr m</i>	priest of Horus who delights the heart Djedhor, son of the like-titled Horemsef, son of the like-titled the doors opener of
8	<i>pt m ʾipt-swt Dd-Ḥr sʿ mi nw Ns- pʿ-kʿ-šwty mʿ-ḥrw</i>	heaven in Karnak ⁽³¹⁾ Djedhor, son of the like-titled Nespakashuty true of voice
9	<i>ms.(n) nb(t)-pr ihb(t) n Mnw ʾrt- ir.w sʿt smʿty ʾIpw ḥm-Ḥr rh nsw ḥry-sʿtʿ n</i>	Born ⁽³²⁾ of the lady of the house, the dancer ⁽³³⁾ of Min, Irtiru ⁽³⁴⁾ daughter of the stolist (of) Akhmim, priest of Horus, king's acquaintance, chief of secrets
10	<i>mwt-nṯr Dd-Ḥr sʿ mi nw smʿty ʾIpw ḥm-Ḥr rh nsw ḥry-sʿtʿ n mwt-nṯr ḥri šsr-n-Mnw</i>	of the mother of the god Djedhor ⁽³⁵⁾ son of the like-titled, the stolist (of) Akhmim, the priest of Horus, king's acquaintance, chief of secrets of the mother of the god, Min's laundry attendant




11	<i>Irt-(nt-)Hr-irw dd.f hr ntrw nbw Ipw ntr.tn b3 Wsir Ns-Hr pn nn</i>	Irethoriru. He says before all ⁽³⁶⁾ the gods of Akhmim make the <i>ba</i> ⁽³⁷⁾ of this Osiris, Neshor divine, this one
12	<i>m igrt Snwt n nk.t m dw3t dt hs nw wnn.f hr hsw</i>	in the Necropolis (of) Akhmim ⁽³⁸⁾ without a wound ⁽³⁹⁾ in the <i>Duat</i> forever, and be (i.e the <i>ba</i>) praised where he is among the praisers
13	<i>ir.n s3.f wr s'nh rn.f sm3ty imi- is hsk D(d)-hr s3 mi nw Ns-Hr ms (n) nb(t)-pr Htp-ns-mnw</i>	made by his elder son to make his name lives, the stolist, councilor the <i>hsk</i> priest Djedhor ⁽⁴⁰⁾ son of the like-titled Neshor, born of the lady of the house ⁽⁴¹⁾ Hetepnesmin.




III. COMMENTS

(1) : The sign  is replaced with  by BUDGE; this is the case in other mentions of the title¹⁰. It should be noted that the sign  is in the opposite direction of the text, as it should be , it is reversed every time mentioned on the stela. This is a common feature on stelae from Akhmim¹¹. According to Leahy, the reversion of the sign started *circa* 620 BC and is attested on stelae from Akhmim dated to the second half of the 6th century BC and onwards¹².

(2) : the name of Osiris was transcribed  by BUDGE; the same case is in the text in front of Osiris in the second register of the middle part, and in the eleventh line in the lower part¹³. The use of the determinative  in the name of Osiris is a common feature during the Late and Ptolemaic Periods¹⁴, Leahy mentioned that this form is not attested before the late eighth century BC and it was not introduced at Thebes in the early 25th dynasty¹⁵.

(3) : The word is missing the  sign, and the  sign is replaced with  by BUDGE¹⁶.

(4) : The determinative of the word *skk* is replaced with  by BUDGE and  by Jansen-Winkel¹⁷.

(5) : The sign was replaced with , which BUDGE considered to be the determinative of the word *skk*, while JANSEN-WINKELN used a small stroke  for its determinative¹⁸.

(6) : The signs are transcribed  by BUDGE¹⁹.

¹⁰ BUDGE 1886: 359.

¹¹ For instance, stela CG 22151. ABDELHALIM 2015: 17, FIG.2 & Stela CG 22141 = GEM 15403. «TM 58877»; <https://www.trismegistos.org/tm/detail.php?tm=58877&fbclid=IwAR2rUil5hbo-0oIAsrEdkN-nlJz-lsBxiZvraOPseFTm04KsNCvLDnXLqJ0>, accessed on (20/07/2023).

¹² LEAHY 1977: 57-58; LEAHY 1980: 174.

¹³ BUDGE 1886: 359, 364.

¹⁴ LEAHY 1979: 142.




















¹⁵ LEAHY 1977: 51; EWIS & RABIE 2022: 25-26.

¹⁶ BUDGE 1886: 359.

¹⁷ BUDGE 1886: 359; JANSEN-WINKELN 2014: 893.

¹⁸ BUDGE 1886: 359; JANSEN-WINKELN 2014: 893.

¹⁹ BUDGE 1886: 359.

- (7) : BUDGE used the sign  instead; the same case is in the first line in the lower part²⁰.
- (8) : Both BUDGE and JANSEN-WINKELN used the small stroke as a determinative¹, and BUDGE ended the sentence here, without mentioning the rest of the line²¹.
- (9) : The sign on the stela is not clear; BUDGE did not mention it and it was the sign  according to JANSEN-WINKELN²².
- (10) : BUDGE transcribed the sign ²³.
- (11) : The offering formula, where the verb *di* is the second element, appeared during the 13th dynasty, according to Vernus and Ilin-Tomich²⁴ and was common since the 18th dynasty. This practice continued into the Late period, most commonly in the form *hṭp* followed by *t* and *p*, and rarely with the form *hṭp* followed by *p* and *t*. Sometimes it appears in abbreviated form, as *hṭp* followed by *t*²⁵.
- (12) : This form of *hntt imntt* was one of the most common features during the Late Period²⁶, and the use of *imntt* instead of *imntyw* is common²⁷.
- (13) : Abydos, written with the *Tawer* symbol, is one of the important dating criteria of the Greek and Roman Periods²⁸. During the 25th and 26th dynasties, the determinative  was used instead of ²⁹.
- (14) : Sokar became Sokar-Osiris during the Middle Kingdom, which continued until the Greek-Roman period. He was one of the visiting deities in Akhmim and was mentioned in their offering formula³⁰.
- (15) : *Ipw* the ancient Egyptian name of Akhmim, a city on the eastern bank of the Nile, is about 450 km south of Cairo, and about 200 km north of Luxor. Akhmim was the former capital of the ninth Upper Egyptian Nome. After Thebes and Abydos, it is considered the third most important site for Late Period funerary stelae³¹.
- (16) : BUDGE used the determinative  instead of .
- (17) : BUDGE omitted the sign  ?

²⁰ BUDGE 1886: 359-360.

²¹ JANSEN-WINKELN 2014: 893.

²² BUDGE 1886: 359.

²³ BUDGE 1886: 360.

²⁴ VERNUS AND ILIN-TOMICH mentioned that this form is attested during the reign of Neferhotep I – Sobekhotep IV in the 13th dynasty and was used as an indicator of the pre-Second Intermediate period date and used onwards. VERNUS 1991: 141-142; ILIN-TOMICH 2017: 15-17.

²⁵ BARTA 1968: 203-208.

²⁶ LEAHY 1977: 63.




























²⁷ LEAHY 1977: 51; EWIS & RABIE 2022: 25-26.

²⁸ LEAHY 1977: 63.

²⁹ LEAHY 1977: 63; ELSAYED 2019: 316; EWIS & RABIE 2022: 34.

³⁰ ZAYED 1968: 149-150; LEAHY 1977: 242-243; LEITZ 2002, vol.6, 667; EWIS & RABIE 2022: 33.

³¹ GAUTHIER 1925: vol.1, 67; MUNRO 1973: 117; KUHLMANN 1983: 9; EL-MASRY 2008: 207, note.1; BRECH 2013: 15-16; ABDEL NASSER *et Al.* 2015: 187; ABDELRAHMAN 2021: 162.

- (18) : BUDGE omitted the letter ³². *mwt-ntr* is an epithet usually used for Isis³³.
- (19) : The use of the sign  in the name Aperet-Isis is unique, as the name of the deity is usually written with  or ³⁴. Aperet-Isis is an ancient Egyptian local deity at Akhmim, where her cult was spread widely. Her cult started during the late 18th dynasty and lasted until the Roman period. Occasionally she was shown with the head of a lioness with the sun-disk and uraeus on her head, but most often she was shown in human form with the Hathoric emblem, surmounted by two feathers. Her name is translated as «She who equips the throne» or «she who is provided with a throne». Her titles were mostly associated with Akhmim. For example, she was called the lady of Akhmim and was referenced in several stelae from Akhmim until the Roman Period. Her roles were to protect the king and carry the offerings of the Nile for the 9th Upper Egyptian Nome in the Opet temple at Karnak³⁵.
- In addition, BUDGE replaced the sign  with ³⁶. The sign  is a cursive form, which appeared during the 6th century BC. During the Ptolemaic period, the normal shape was used again³⁷.
- (20) : JENSEN-WINKELN transcribed it ³⁸. The use of the head of the ox for *hnt* (foremost) was usual in the Late period³⁹.
- (21) : BUDGE replaced the sign  with , and JANSEN-WINKELN transcribed the determinative ⁴⁰, however, it is attested on the stela as .
- (22) : *šs-mnht* JANSEN-WINKELN transcribed it ⁴¹.
- (23) : The scribe here mistakenly wrote  before . So, BUDGE transcribed it .
- (24) : the  sign was transcribed  by BUDGE, and he replaced the determinative with ⁴².
- (25) : The addition of *m tph̄t.f* to this phrase is attested from the 18th dynasty until the Roman period⁴³.

³² BUDGE 1886: 361.

³³ KLOTZ 2014: 726.

³⁴ LEITZ 2002: vol.2, 105.

³⁵ Aperet-Isis appears on other stelae from Akhmim; for instance, CG 22151, CG 22007, CC 22053, CC 22095, etc. ABDELHALIM 2015: 3, note. 13; EL-GAZZAR & ABD EL-NABY 2022: 146-176.

³⁶ BUDGE 1886: 361.

³⁷ LEAHY 1977: 59.

³⁸ JANSEN-WINKELN 2014: 984.


































³⁹ For instance, the stela JE 18250. EWIS & RABIE 2022: 26.

⁴⁰ BUDGE 1886: 362; JANSEN-WINKELN 2014: 984.

⁴¹ JANSEN-WINKELN 2014: 984.

⁴² BUDGE 1886: 362.

⁴³ DERCHAIN-URTEL 1989: 113-114.

- (26) : According to LEAHY, the use of the  *n* started in 625 BC, and onwards as a sacred hieroglyph before the name⁴⁴. On the other hand, BUDGE replaced the stroke with a smaller one⁴⁵.
- (27) : It was transcribed  by BUDGE and  by JANSEN-WINKELN⁴⁶.
- (28) : *nw/nn* means «that»; it appeared in the dedications since the 22nd dynasty. It is used in genealogies, meaning «with the same titles and rank as his father and grandfather»⁴⁷.
- (29) : Horus Senedjemib means «Horus who delights the heart». An epithet of Horus is attested on other stelae from Akhmim, for instance, CG 22007, CG 22074, and CG 22077⁴⁸.
- (30) : BUDGE transcribed it  ⁴⁹. *wr šn* means: (one belonging to) the great ocean? an epithet related to Osiris/deceased⁵⁰. It was also the name of the first and thirteenth nomes of Lower Egypt (Memphis & Heliopolis)⁵¹.
- (31) : BUDGE transcribed it  and  by JANSEN-WINKELN⁵². However, there is a scribal error, so it should be .
- (32) : JANSEN-WINKELN used the sign  instead⁵³.
- (33)  *ihb*: BUDGE and JANSEN-WINKELN replaced the sign  with  and BUDGE replaced the female determinative with a male  ⁵⁴.
- (34) : BUDGE replaced the second  sign with  and the vertical strokes with horizontal ones .
- (35) : BUDGE transcribed the name missing the letter .
- (36) : BUDGE replaced the determinative with horizontal strokes ⁵⁵.
- (37) : the scribe of the text mistakenly used the sign  instead of .
- (38) : The sanctuaries devoted to the god Min, particularly those of the temple of Akhmim, were referred to as *snwt* since the Middle Kingdom⁵⁶. On the other hand, BUDGE replaced  with .

⁴⁴ LEAHY 1977: 50, 65.

⁴⁵ BUDGE 1886: 362.

⁴⁶ BUDGE 1886: 362; JANSEN-WINKELN 2014: 984.

⁴⁷ ERMAN & GRAPOW (eds.) 1971: *Wb*, vol.2, 37, 10-11; EL-ENANY 2010: 82; ABDELHALIM 2015: 9.

⁴⁸ LEITZ 2002: vol.6, 406; ABDELHALIM 2015: 10.

⁴⁹ BUDGE 1886: 362.

⁵⁰ ERMAN & GRAPOW (eds 1971: *Wb*, vol.4, 493.15, 494.1; LEITZ 2002: vol.7, 96.

⁵¹ GAUTHIER 1928: vol.5, 138-139.

⁵² BUDGE 1886: 363; JANSEN-WINKELN 2014: 984.

⁵³ JANSEN-WINKELN 2014: 984.

⁵⁴ BUDGE 1886: 364; JANSEN-WINKELN 2014: 984.

⁵⁵ BUDGE 1886: 364.






⁵⁶ KEES 1922: 122, 125-136; SCHARFF 1927: 95; GAUTHIER 1928: vol.5, 38-39.

(39)  : BUDGE replaced the horizontal line of the letter *n* with ⁵⁷.

(40)  : The name Djedhor here is missing the letter  due to a scribal error.

(41)  : BUDGE replaced the sign  with .⁵⁸

Furthermore, it should be noted that:

- The letter *n* is written as a horizontal line  in the twelfth line; probably the scribe copied this part of the text from a papyrus scroll?⁵⁹.
- Some signs had incised lines, for instance, ,  and .
- The circle  was used for the writing of the letter *h* and Re in the middle part. The circle was used for, *Psdt* and *h* only in the third and ninth lines in the lower part.

IV. ANALYSIS

According to MUNRO, this stela is from Akhmim and dates to circa 520 BC, the end of the 26th dynasty or the beginning of the 27th dynasty. It belongs to Group B «solar stela», which is characterized by the depiction of Bd 16, which includes the deceased in front of Rehorakhty and Atum, Shu raising the sun, the *ba* bird, hailing baboons and the text of Bd 15⁶⁰.

1. The Deities

They are described as the deities of Akhmim and its necropolis. Each deity has an epithet related to Akhmim. Other deities have the title *hry* «in the middle of/residing» in Akhmim as visiting deities⁶¹. Although Nephthys is depicted, she is not addressed in the text.

As for the four squatted figures in the third register, YAHIA suggests that they could be related to the four sons of Horus or the deities of the Netherworld. She added that they also might be what the deceased need: the sky (kheper), the earth (Geb), life (Osiris), and breath or air (Shu)⁶².

According to LETIZ, one of the four squatted deities, *Ndm-^hnht*, also appeared as a sitting deity with the *ka* sign upon his head. In addition, he was related to Horus-Behditi and Re. Furthermore, the king was regarded as either him, his son, or a living representation of him. A figure of the god is shown rising to the sky with the moon's left eye; he rises before the sky like the one who glows as gold in front. He bestows long life upon people who are inferior to him. *Tz^w-ndm* was related to Khnum, who makes the grain abundant, and was related to Amun as well. Notably, he is also mentioned as *ndm tz^w n s^h n.f* «Sweet breath for the one who calls him»⁶³.

One can conclude from the roles of those two deities, along with the two unnamed figures, that they provide Neshor with protection, long life, health, food and

⁵⁷ BUDGE 1886: 364.

⁵⁸ BUDGE 1886: 364.

⁵⁹ ABDELHALIM 2015: 14.

⁶⁰ MUNRO 1973: 314, 120-121, 127.

⁶¹ ABDELHALIM 2015: 15, note 13.

⁶² YAḤYA 2014: 227.

⁶³ LETIZ 2002: vol.4, 599.

the breath of life. They are also related to Bd 110 and the field of reeds, which is discussed later.

2. Neshor

He wears a traditional Persian cloak, which is long and wavy cloak. The cloak is probably tucked in at the top edge of the garment and not visible because he is seen in side profile. Persians and Egyptians wore wavy clothes during the 27th dynasty⁶⁴. This kind of clothing is also attested on the stela of Khonsuirdisu UC 14506, which is at the Petrie Museum; this stela is possibly from Memphis and dates to the early 27th dynasty⁶⁵. Other examples of this cloak appear on a 27th dynasty niche stela of a family, currently preserved at the Royal Scottish Museum, Edinburgh (N^o.1956.134) possibly originally from Sais. In this stela, both men wear the Egyptian version of 27th dynasty Persian costume, which is a long, wavy cloak tucked in on the chest⁶⁶. That confirms that the stela of Neshor dates to the 27th dynasty.

3. The Scenes

The scene in the lunette is a vignette from Bd 16, which depicts Isis and Nephthys kneeling in an adoration position to the sun-disk with extended rays⁶⁷. This scene is attested on other stelae from Akhmim, such as stela BM 1730⁶⁸. Bd 16 depicts the sunrise and does not include any captions. It is considered an illustration of Bd 15 or 17⁶⁹ and refers to the rebirth of Re every day⁷⁰.

The scenes depicted in the first register of the middle parts are probably vignettes of Bd 17, which were commonly represented from the Late Period to the Ptolemaic period, and usually depicted along with Bd 16⁷¹. One can compare the scenes as follows: 1. The first boat = scene from Bd 17, which depicts the deceased worshipping Kheperi in the *m^cndt* [FIGURE 3]⁷².

⁶⁴ The Egyptians who worked for the Persian administration particularly preferred wearing Persian clothes. It seems that the senior officials of the era tried to resemble uniformed invaders, which is why the clothes of some statues appearing with specific wavy folds. For instance, a male statue at the Brooklyn Museum 71.139 from the Late Period. HORNBLOWER 1920: 14-41; HUSTON & RUSSMANN 2010: 961; AL-ḤUSAYNĪ 2020: 282; «Egyptian Man in a Persian Costume»; https://www.brooklynmuseum.org/opencollection/objects/3807?fbclid=IwAR2GVMYQINCJoVPu2a_gMe_7qpCGFvxYKK5SUIAEW9Fz0PbBZbyzyZ7U4dc, accessed on (21/09/2023).

⁶⁵ MUNRO 1973: 334–335, PL.60, ABB.205; STEWART 1983: 8, PL.11, N^o.18; KEES 2015: 118, 140, FIG.4a; «Memphis: stela of Khonsuirdis»; <https://www.ucl.ac.uk/museums-static/digitalegypt/memphis/uc14506.html>, accessed on (25/12/2023).

⁶⁶ BOTHMER *et Al.* 1960: N^o.66, FIG.159, PL.63.

⁶⁷ QUIRKE 2013: 51.

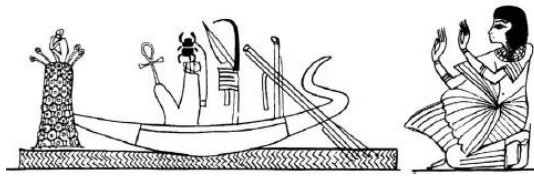
⁶⁸ MUNRO 1973: PL.49, ABB.169.

⁶⁹ MOSHER 2016: 1, 38-39.

⁷⁰ QUIRKE 2013: 51.

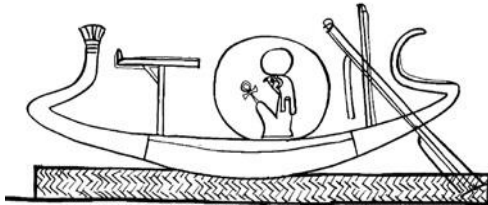
⁷¹ For instance, the papyrus of Padiherupakhered from Thebes dates to the 30th dynasty. «TM 108932, Papyrus, Aberdeen»; <https://totenbuch.awk.nrw.de/objekt/tm108932#P.%20Aberdeen%20ABDUA%202084023.%201-7>, accessed on (09/09/2023).

⁷² TARASENKO 2014: 250.



[FIGURE 3]: The *m^cndt* from Bd 17. TARASENKO 2014: 250.

2. The second boat = scene from Bd 17, which depicts Atum in the *m^skt* [FIGURE 4]. On the papyrus of Iufankh, the ram was depicted on a standard⁷³.



[FIGURE 4]: The *m^skt* from Bd 17. TARASENKO 2014: 250.

Moreover, one could associate the right side of this register with the east and the left side with the west. In the first register, Atum, foremost of the western mountain (the ram), sets and enters the Netherworld in the west. Neshor's corpse descends with him according to the text. Then he is reborn at the sunrise of the new day, which is represented by the red disk, and the child sitting on the prow covered with a solar mat on the east. In addition, the text confirms the rebirth by mentioning, «He who rises in life in the eastern sky». This is also demonstrated by the direction of the oars, which show boats rowing from the west to the east.

This idea is clearly represented on stela Leiden 8 and stela BM 1160⁷⁴: two boats in the lunette, one carrying the ram (Atum), i.e., the sunset and the other carrying the scarab (Kheper), i.e., the sunrise.

THOMAS states that the boats travel from west to east and that the ram sometimes represents the night sun and the child represents dawn⁷⁵, confirming our argument.

Moreover, the red color is applied to some parts of the stela, emphasizing the solar theme. Red was thought to be associated with the color of the sun because it serves the same purpose as gold and yellow in symbolizing the sun of the morning and evening, which guarantees the daily rebirth of the deceased⁷⁶.

MUNRO related the second register of the middle part to Bd 110, where the scenes are arranged horizontally, and not vertically, which is more common⁷⁷ and where Osiris

⁷³ TARASENKO 2014: 250.

⁷⁴ In addition, the Akhmim stela are familiar with these scenes, however, represented in different ways. For instance, stela CG 22141 = GEM 15403 and stela BM 1730 depict the deceased worshipping the sun god on boats, along with a scene from Bd 16 of raising the sun disk by a human bust and the hailing baboons. MUNRO 1973: PL.47, ABB. 166, PL. 49, ABB. 169, PL. 51, ABB. 172, PL. 55, ABB. 188. See also stela, CG 22017, 23032 both from Akhmim, depicting the two solar boats. KAMAL 1904: PLS.VII, XI.

⁷⁵ THOMAS 1956: 66.

⁷⁶ PINCH 2001: 184; TAYLOR 2001: 166-167.

⁷⁷ Another rare horizontal depiction of Bd 110 attached scene is attested on the papyri of Imhotep from the Ptolemaic Period at the Metropolitan Museum of Art 35.9.20. MUNRO 2017: 62, FIG.4.21.

has replaced a scarab-headed deity⁷⁸. This chapter is related to the field of reeds, and it is related vignette (section A)⁷⁹ appeared in the Late and Ptolemaic periods in scenes depicted across four registers⁸⁰ [FIGURE 5].



[FIGURE 5]: The attached scene of Bd 110 from papyrus BM 10479. GESELLENSETTER 1997: TAF. 10.

Thus, the scenes can be compared in the following order, from left to right:

1. The deceased worships Osiris? inside the boat, and Isis and Nephthys are behind the boat = The first scenes of the scarab-headed deity inside a boat, sometimes referred to as Horakhty, the great god; the rising sun on the horizon according to the text. The scene likely reflects the deceased's wish to take part in the solar boat voyage⁸¹.

The depiction of Osiris? in the boat is unusual. However, it might refer to the Solar-Osirian unity. To ensure rebirth, the sun god/deceased must unite with Osiris before sunrise; this idea is expressed in one of the passages in Bd 17: «Yesterday is Osiris, tomorrow is Re»⁸².

2. The deceased is worshipping Osiris and Isis = The second scene.

3. The deceased worshipping four squatted deities = The third and fourth scenes combined. In Bd 110, the third scene shows the god Hu «divine saying» of the creator god. His counterpart is Sia «divine knowledge». Both deities belong close together and are companions of the sun god. The pair of gods is often closely related to Thoth and are servants of truth and justice. The relationship to the representation of the field of reeds can be explained by the fact that the deceased worshipped the sun, Osiris, and several other gods⁸³. On Neshor's stela, only two deities are named: *Nḏm-ḥnḥt* and *Tꜣw-ndm*. Their names indicate that they are associated with the field of reeds.

The arrangement of the scenes as in the second register of the middle part is also directed from left to right, which is the case with the first register. One can conclude that the vignettes of Bd 16 and 17 demonstrate the deceased's wish to join Re in his journey and Bd 110 conveys his wish to dwell in the field of reeds. Noteworthy, Bd 110 is a distinctive feature of the stela of Neshor.

⁷⁸ For instance, the papyri Berlin P. 10477 & Hildesheim 5248. MUNRO 1973: 129; LÜSCHER 2000, PL.9, 28.

⁷⁹ MOSHER 2001: 102.

⁸⁰ QUIRKE 2013: 243.

⁸¹ GESELLENSETTER 1997: 196-197.

⁸² BUDGE 1898: 49; NIWIŃSKI 1987-1988: 90; QUIRKE 2013: 52.

⁸³ GESELLENSETTER 1997: 198-199.

4. The Text

The thirteen textual lines on Neshor's stela contain the offering formula, an introduction to the owner and his titles, and genealogical information about the owner's family, their names and titles. Additionally, the text concludes with wishes for the afterlife and a dedication of the stela by Neshor's elder son, ensuring that his name would live on.

Names and genealogy:

Neshor⁸⁴: *Ns-Hr*, the owner and son of Djedhor (a) and Irtiru. The name means «He who belongs to Horus». The name was very common during the 27th dynasty and the Greek and Roman periods⁸⁵.

Djedhor (a): *Dd-Hr*, the name means «Horus said» and was very common during the Late Period⁸⁶. He is the father of Neshor. According to stela CG 22141 and California 86, he is the son of Irethoriru and Tawher, along with his brother Neshor and sisters Irtiru and Nespamai.

Irethoriru (a): *Irt-(nt-)Hr-irw*, the name which was very common during the Late period, means «the eye of Horus is turned against them»⁸⁷. He is the father of Djehor (a) and the grandfather of the owner, Neshor. The name continued into the Greek and Roman periods. The name was also feminine, as it is attested on a woman's stela from Aswan⁸⁸.

Djedhor (b): *Dd-Hr*, he is the father of Irethoriru, the grandfather of Djedhor (a), and the great grandfather of the owner, Neshor.

Horemasaef: *Hr-m-s3.f* the name appeared for the first time during the Old Kingdom, and means «Horus is his protection»⁸⁹. He is the father of Djedhor (b), the grandfather of Irethoriru, the great-grandfather of Djedhor (a), and the second great grandfather of the owner, Neshor.

According to MUNRO, Horemsaef was a son of Nespakashuty and a brother of Djedhor (c)⁹⁰; however, according to our stela and stela CG 22141 = GEM 15403, Horemsaef is the son of Djedhor (c)⁹¹.

Djedhor (c): He is the father of Horemsaef, the grandfather of Djedhor (b), the great grandfather of Irethoriru, the second great grandfather of Djehor (a), and the third great grandfather of the owner, Neshor.

⁸⁴ The name was common during the late period and was held by men and probably a woman, according to the stela BM 338. *PN* 1935: vol.1, 178.7.

⁸⁵ For other persons with this name see: CG 22023, 22025, 22141 = GEM 15403 from Akhmim, CG 22022, 22031, from Abydos. Two women had this name, CG 22027 from Akhmim & CG 22131 from Abydos. ABDELHALIM 2019: 20.

⁸⁶ *PN* 1935: vol.1, 411.12.

⁸⁷ *PN* 1935: vol.1, 42. 11.

⁸⁸ ABDELRAHMAN 2021: 164.

⁸⁹ *PN* 1935: vol.1, 248.12.

⁹⁰ MUNRO 1973: 120.

⁹¹ JANSEN-WINKELN 2014: 976-977, N^o. 414.

He held the title *wn ʕwy ntr pt m ipt-swt*, a title related to Thebes, in addition to his titles related to Akhmim. According to Munro, perhaps at some point in his life he left Thebes, after ending his career there, and moved to Akhmim⁹².

According to stela BM 624, he had a son called Neapakashuty, named after his grandfather Nespakashuty (attested on our stela)⁹³.

Nespakashuty: *Ns-p3-k3-šwtj* The name, which appears for the first time in the Middle Kingdom, means «He belongs to *k3-šwtj*». He is Djedhor's (c) father, the grandfather of Horemsaef, the great grandfather of Djedhor (b), the second great grandfather of Irethoru, the third great grandfather of Djedhor (a), and the fourth great grandfather of the owner, Neshor.

The genealogy on stela CG 22141 = GEM 15403 gives us information about more generations of the family. On our stela, the genealogy concludes with Nespakashuty, who is given in CG 22141 the titles *imi-r niwt* and *t3ty*⁹⁴ (same as BM 624) and was mentioned as the son of *imy-r pry hq n pr-Imn* «the head of the treasury of Amun»⁹⁵, Djedankhoriufankh son of *3pw-hr*⁹⁶. That means he was a vizier; Nespakashuty was also mentioned on sarcophagus CG 41031⁹⁷, which also includes Djedhor's (c) name.

DE MEULENAERE followed the genealogy of the name Nespakashuty. His study, which examined BM 624, CG 22141 and CG 41031 concluded that this Nespakashuty was a son of Djedankhoriufankh and was married to a woman named Takhabaset. The titles of this family indicated to him that they were of Theban origin. Djedankhoriufankh had to settle in Thebes, where he was «chief of the treasury of the domain of Amun» according to CG 22141. Nespakashuty must have received his high rank during the 25th dynasty.

During his lifetime, Nespakashuty's family dispersed in Thebes. Two of his sons were granted distinguished ranks: Nespamedou succeeded him as vizier, Djedankhoriufankh rose to the priesthood of Amun as the third prophet and Djedhor (c) served in Thebes as *wn ʕwy pt m ipt-swt*, subsequently becoming chief of a branch of priestly officials established at Akhmim⁹⁸.

Irtiru: *irt-ir.w* The name was common during the Late period⁹⁹. She is the mother of the stela's owner, Neshor. Her stela, from the late 26th dynasty E 19958 (C44) is now at the Louvre Museum. The stela mentions that she is a daughter of Djedhor (d) and Djedmehitusankh and that she is a granddaughter of Irethoriru¹⁰⁰.

Djedhor (d): He is the father of Irtiru and the grandfather of the owner, Neshor.

Irethoriru (b): The father of Djedhor (d), the grandfather of Irtiru and the great grandfather of the owner, Neshor.

⁹² MUNRO 1973: 120.

⁹³ JANSEN-WINKELN 2014: 975, N^o.412.

⁹⁴ WARD 1982: 31, N^o. 224.

⁹⁵ STRUDWICK 1985: 276-280.

⁹⁶ KAMAL 1904: 123.

⁹⁷ KAMAL 1904: 122-23; BUDGE 1909B: 242, N^o.889.

⁹⁸ DE MEULENAERE 1963: 76-77.

⁹⁹ PN 1935: vol.1, 42.10.

¹⁰⁰ «Stèle cintrée; stèle à deux registres»; <https://collections.louvre.fr/en/ark:/53355/cl010022650#>, accessed on (14/10/2023).

It can be deduced that for generations, the son had the same titles as his father, grandfather, and so on. This practice, known as «papponymy», is attested during the

Late period and refers to the tradition in which the eldest son is named after his grandfather and inherits his title. Claude applied this concept the stela of Neshor; she mentioned that Neshor's father, Djedhor (a) had the same name as his grandfather, Djedhor (b). That suggests that he is most likely Irethoriru's firstborn son, because Djedhor (a), (b) and Irethoriru, all bore the title «priest of Horus *sn̄dm ib*». One can notice that in the next generation, Neshor did not hold this title; also, he was not named Irethoriru like his grandfather. According to that, he might have had an older brother named Irethoriru, who inherited this title if it continued within the family¹⁰².

Titles

Stolist¹⁰³ *sm̄sty*: It can also mean «one who clothes the god», especially Min and Horus, or «the priest of clothes»¹⁰⁴. It was a title related to the god Min in Akhmim, Coptos and Thebes¹⁰⁵. According to Quirke, he is a person in charge of roping the cult image and the king¹⁰⁶. In addition, he seems to have played a role in the preparation of the royal mummy. As a decorator of mummies, the god Anubis occasionally held this title as well¹⁰⁷.

Besides clothing, the stolist was responsible for cleaning and anointing the god's statue. In addition, he appears in *sd*-festivals and the divine service at Memphis, particularly for Min¹⁰⁸. The title was very common¹⁰⁹, attested since the Old Kingdom for the clergy of the god Min, and continued until the Greek and Roman periods¹¹⁰.

The councilor *imi-is*¹¹¹: is a very common title, mainly found on funerary stelae from the Greek-Roman period. Moreover, it is not unique to the towns of Min, Coptos, or Akhmim, and was found as early as the Old Kingdom. It can also mean «He who is in the office»¹¹² or «He who is in the *is*/room/palace». A person was assigned to the personal service of the king and took part in the *sd* festival. Probably not before the Late period, this title was given to a priestly figure associated with the god's statue, responsible for overseeing the funerary cult in the tombs of the necropolis¹¹³.

***hsk* priest**: This title originated as a local priestly title associated with Osiris at Abydos, the title's most important location, during the 19th dynasty. It was connected to the local

¹⁰² CLAUDE 2021: 41.

¹⁰³ MCFARLANE 1991: 77-78; KLOTZ 2016: 449.

¹⁰⁴ VERNUS 1978: 68; DE MEULENAERE 1978: 66.

¹⁰⁵ GRDSELOFF 1943: 362; KLOTZ 2016: 449.

¹⁰⁶ WARD 1982: 150, N°.1292; QUIRKE 2004: 127.

¹⁰⁷ GAUTHIER 1931: 39, 45, 50.

¹⁰⁸ GAUTHIER 1931: 39-43, 49-50; MONTET 1950: 18-23; HELCK 1954: 45-47; WARD 1982: 150, N°.1294; 2000: N°. 3252; QUIRKE 2004: 127; JONES, KÜFER & SIEGMANN 2007: 147; ABDELHALIM 2015: 2, note 10.

¹⁰⁹ MONTET 1950: 18- 23; WARD 1982: N°. 1291; JONES 2000: N°. 887-889,3, 250, 3252-3; KLOTZ 2014: 758.

¹¹⁰ GAUTHIER 1931: 39.

¹¹¹ YOYOTTE 1954: 95; WARD 1982: 9, N°.23; QUIRKE 2004: 127; KÜFER & SIEGMANN 2007: 147, 215, N°.22; ABDELHALIM 2015:2, note. 11.

¹¹² GAUTHIER 1931: 66-67; HELCK 1954: 29-30; ERMAN & GRAPOW (eds.) 1971: *Wb*, vol.1, 127; LEAHY 1980: 174, N°. 20; JONES 2000: N°.247; QUIRKE 2004: 50; COULON & MASSON 2010: 153, 137; ABDELHALIM 2015: 2, note 11.

¹¹³ GAUTHIER 1931: 66-67.

priests of Min in Akhmim in later times¹¹⁴. Usually, it is mentioned immediately after the title *imi-is*¹¹⁵, and related to the offering-cult for the *ka* of the dead¹¹⁶.

hpt-wdꜣt: Most often, this title is mentioned after the title *hsk*, which means «to embrace/surround with one's arms the eye of Horus»¹¹⁷. GOYON mentioned that the title was very common on stelae from Akhmim dedicated to individuals related to Min, Mut, Neith and other deities. Its role is not very clear; it seems that someone with this title participated in divine worship and had access to the sanctuary, where one would present the *wedjat* eye, the sacred jewel and symbol of integrity of the divine body of the divinity, during the festivals of the month. GOYON translates the title as «one who takes the *wedjat* eye» which the priest performs in connection with the god at the start of the sacred service¹¹⁸.

ZINE AL-ABEDINE agrees with the previous opinion. He added that the priest entered the sanctuary wearing a *wedjat*. He stated that the title is not known to have existed before the end of the 25th dynasty but that it continues into the Ptolemaic period. It is typically associated with Upper Egyptian priests and is not frequently seen in Lower Egypt¹¹⁹.

ELNAGGAR suggests that this title is read *shn-wdꜣt* and is related to the eye of the moon myth, according to Bd 64, where *shn wdꜣt* «hugged the *wedjat*» is mentioned. *shn* also means «seek/search» and the titleholder is an alternative to the deity or the king in protecting the eye¹²⁰.

Priest of Horus who delights the heart *hm-ntr Hr snꜣm-ib*¹²¹: Since the Old Kingdom, the title *hm-ntr* has been associated with several deities¹²². As for «who delights the heart», it is a title associated with the god Horus¹²³.

The servant of Horus *hm-Hr*: This is the most common specific title for Horus of Edfu encountered in private documents¹²⁴. Furthermore, it was more prevalent in Akhmim and is connected to Min, where it occasionally appears in the expanded form «priest of Horus in Akhmim»¹²⁵.

Master of secrets *hry šstꜣ*¹²⁶ It can also mean «chief of secrets/he who is over the secrets»¹²⁷. In addition to dressing the king and the god's statue in the sanctuary, he carried out many duties in festivals and burial ceremonies, rituals and daily life¹²⁸.

¹¹⁴ GAUTHIER 1931: 68; ERMAN & GRAPOW (eds.) 1971: *Wb*, vol.3: 164; KLOTZ 2014: 763, 736.

¹¹⁵ GAUTHIER 1931: 68-69.

¹¹⁶ QUIRKE 2004: 130.

¹¹⁷ GAUTHIER 1931: 69-70.

¹¹⁸ MORET 1902: 83-89; GOYON 1967: 93, N°7; MUNRO 1973: 254, PL.29.

¹¹⁹ ZINE AL-ABEDINE 2013: 30, 32.

¹²⁰ AL- NAĞAR 2022: 362

¹²¹ WARD 1982: 110, N°922.

¹²² JONES 2000: 551; QUIRKE 2004: 124.

¹²³ LEITZ 2002: vol.6: 406.

¹²⁴ VERNUS 1978: 178; KLOTZ 2014: 754-755.

¹²⁵ GAUTHIER 1931: 71-73; KLOTZ 2014: 758, 764.

¹²⁶ MÜNSTER 1968: 131; WARD 1982: 119, N° 1004; JONES 2000: 609, N° 2233; BALANDA 2009: 334-336.

¹²⁷ TAYLOR 2001: 164.1611; AL-AYEDI 2006: 42, N° 1389; KLOTZ 2014: 741.

¹²⁸ BEATTY 1999-2000: 71.

King's acquaintance *rh-nsw*¹²⁹: It can also mean «one known to the king»¹³⁰, or «Intimate of the king». The title, which typically occurs among the title lists in Akhmim, first appeared during the Old Kingdom and continued until the Greek-Roman periods¹³¹.

Min's laundry attendant *hri-šsr n Mnw*: It can also mean «Attendant garments/linen garments of Min». He was in charge of Min's linen room¹³².





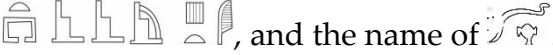

Gate Keeper of the Doors of Heaven in Karnak *wn-šwy-pt m Ipt-swt*: It can also mean «doorkeeper/porter of the two gates in Karnak»¹³³ or «opener of the doors of heaven»¹³⁴. The doors of heaven mean the doors of the shrine that house the statue of the deity. The title bearer was a member of the exclusive group who had permission to perform rituals on the statue and recite certain spells while opening the doors. Throughout the 26th dynasty, the title was widely used¹³⁵.

Dancer of Min *ihb n Mnw*: Men held this title as well; it is typically written with a man or woman carrying a sistrum¹³⁶. Min's dancers participated in his festival. BRUNNER-TRAUT further speculates that the title may refer to people who perform devotional songs and hymns¹³⁷.

Lady of the house *nbt-pr*: the title means married woman, which appeared from the Middle Kingdom to the Ptolemaic period, on almost every funerary stela¹³⁸.

V. CONCLUSION

The stela most likely dates to the 27th dynasty, given the popularity of the name Neshor during this time, the Persian cloak that Neshor wears, and the late 26th dynasty dating of the stela of his mother, Irtiru.

The paleographical study shows the typical features of the signs that appeared during Late Period stelae and stelae from Akhmim. For instance, their use of  and  signs, the writing of Osiris's name , and the reversed  sign. In addition, there are very few scribal mistakes, which is evidenced for instance, in the writing of , and the name of .

Additionally, the study provided an updated version of the text since Budge and Jansen-Winkel's publications. Furthermore, it has a new transcription of the god Aperet-Isis's name.

The stela is organized by: vignettes Bd 16 & 17 and 110, featuring a unique depiction of Osiris in the attached scene, instead of the usual representation of Khepri. Furthermore, the Bd 110 includes depictions of *Nđm-nht* and *Išw-nđm* among the deities. In addition, it was the only depiction of these two deities and Bd 110 on Late

¹²⁹ WARD 1982: 104, N°. 857a.

¹³⁰ TAYLOR 2001: 137.1334.

¹³¹ AL-AYEDI 2006: 325.1039; GORRE 2009: 8; QUIRKE 2009: 308.

¹³² GAUTHIER 1931: 106-107.

¹³³ ERMAN & GRAPOW (eds.) 1971: *Wb*, vol.1, 311. 5; MUNRO 1973: 120; AL-AYEDI 2006: 252.806.

¹³⁴ ERMAN & GRAPOW (eds.) 1971: *Wb*, vol.1, 164, 16; KLOTZ 2014: 756.

¹³⁵ ČERNÝ 1948: 120; EL-LEITHY 2020: 935.

¹³⁶ GAUTHIER 1931: 113; BRUNNER-TRAUT 1958: 76; DE MEULENAERE 1989: 47-49.

¹³⁷ BRUNNER-TRAUT 1958: 80-81.


¹³⁸ WARD 1982: 99, N°.823; ROSHDY & ABOU AL-ELIA 2021: 11; EWIS & RABIE 2022: 26.

period stela. These vignettes ensure that Re will be reborn in his journey, fulfilling the Solar-Osirian unity, this reflects the deceased's wish to join Re's journey to ensure his resurrection with Osiris, and finally dwell in the field of reeds.

The stela outlines eight generations of the family from Nespakashuty (25th dynasty) to Djedhor (e) (27th dynasty). The family likely had Theban origins, as Horemsaef held a title related to Karnak. The family's titles, which were commonly found on funerary stela from Akhmim and elsewhere, also indicate that they belonged to the elite class. The only title that does not reflect elite standing was the uncommon title «Min's laundry attendant *ḥri-šsr n Mnw*».

The text mentions the offering formula invoking several deities of Akhmim as well as visiting deities, followed by an introduction of the owner, his titles, details regarding the owner's ancestors' titles and genealogy, as well as wishes for the afterlife. Finally, the stela was dedicated by the deceased's elder son to maintain the memory of the deceased's name.

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A STRIDING STATUE OF HOR «XV» (CAIRO MUSEUM JdE 38045)

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ABSTRACT

[EN] The current paper aims to fully publish the striding statue of the divine father named *Hor (XV)*, who lived in the intermediate period between the 25th and 26th dynasties. *Hor* belonged to a famous priestly family and was the father of Padiamunnebnestutauy, one of the most famous priests who held the title «the Third Prophet of Amun», and who is designated by the letter C. GEORGES LEGRAIN discovered this statue in the Karnak Cachette. The paper describes the dimensions, facsimile of scenes and texts, description, copy, transliteration, and translation of the texts, orthographic and paleographic comments and general comments on the texts, titles, and scenes, in addition to the artistic features of the statue. It also includes an introduction to the owner of the statue and his family

KEYWORDS: Striding statue, *Hor XV*, Divine father, Padiamunnebnestutawy (C), Karnak Cachette, 25th - 26th dynasties, Third prophet of Amun.

[AR]

تمثال واقف لـ حور «15» JdE 38045

يهدف البحث الحالي إلى نشر كامل لتمثال في وضع المشي للأب الإلهي لأمون والذي حمل اسم حور الخامس عشر، وقد عاش خلال الفترة الانتقالية ما بين نهاية عصر الأسرة الخامسة والعشرين وبداية الأسرة السادسة والعشرين، وكان ينتمي إلى عائلة كهنوتية شهيرة، لقد كان حور الخامس عشر والدًا لأحد أشهر الكهنة الذين حملوا لقب الكاهن الثالث لأمون خلال تلك الفترة وهو با دي أمون نب نسوت تاوى والذي يحمل رقم C. وعُثر على هذا التمثال في خبيثة الكرنك على يد ليجران. تتضمن الورقة الحالية تاريخ اكتشاف التمثال، ووصف لأبعاد التمثال، ورسم خطي للمناظر والنقوش، ووصف للمناظر، ونسخ وقراءة صوتية وترجمة كاملة للنصوص الواردة على سطح التمثال، وتعليقات هجائية وخطية على النصوص والألقاب، والسمات الفنية للتمثال. بالإضافة إلى تعليقات عامة على النصوص والمناظر وبعض الأفكار التي تضمنتها النصوص. كما تحتوى على نبذة عن صاحب التمثال وعائلته.

I. INTRODUCTION

According to Karnak Cachette's database¹, the upper part of the statue under investigation was discovered on May 27, 1905, and was given an excavation number (K 689). There is no information about the date and conditions of the discovery of the lower part (Cairo Museum II/43). LEGRAIN-KUENTZ described the statue as that of «an anonymous person» whose «legs are broken» and which measures only 40 cm high². The statue is now on display under the number S 5/9362.

In his article about the supplements to the Theban dossier concerning the third prophet of Amun Padiamunnebnestawy (C), DE MEULENAERE³ described the statue and cited it as including texts that bear the name and titles of *Hor XV's* son Padiamunnebnestawy, who gave this statue to his father. Although Jansen-Winkel⁴ transcribed the text, he missed some words on the left tenon. Bothmer also cited the statue⁵. Vitmann included the text over the base as an example of the priestly titles of this period⁶. In Pressl's index⁷, the owner of the current statue was mentioned mistakenly as *Hor XVI*. However, there has been no full publication of the statue.

II. DESCRIPTION

Material: Crystalline hard limestone

W: 12 cm

H: 60.5 cm

Depth: 26 cm

base height: 5 cm

The statue represents *Hor XV* in a striding attitude upon a base, which includes a hieroglyphic text on its sides (**Glyph. 5**) and on its top **Glyphs. 1 & 2**). He holds a folded kerchief in each fist, wearing a plain flared wig, leaving the ears uncovered. This long wig is attached to the back pillar at shoulder level. The statue's head is flattened in shape and is visibly raised in the apotheosis attitude⁸; it shows a flat nose and a mouth spread wide, and smiling faintly with closed lips. His chest is adorned by an amulet made up of two pear-shaped plates separated by a kind of thorn. *Hor XV* is dressed in a *skinny* kilt with a central tab, entirely pleated and held up with a belt with no buckle. The nipples are clearly defined, and the torso is bare and divided into two symmetrical parts by a deep vertical furrow [FIGURES 1-2].

¹ «CK 624»; <https://www.ifao.egnet.net/bases/cachette/ck624>, accessed on (05 /01/2024).

² The actual height of the upper part during excavation

³ In the text around the base, he only transcribed the left, front and the beginning of the right sides. DE MEULENAERE 2012: 43-44.

⁴ JANSEN-WINKELN 2009: 501.

⁵ BOTHMER 1970: 44-45.

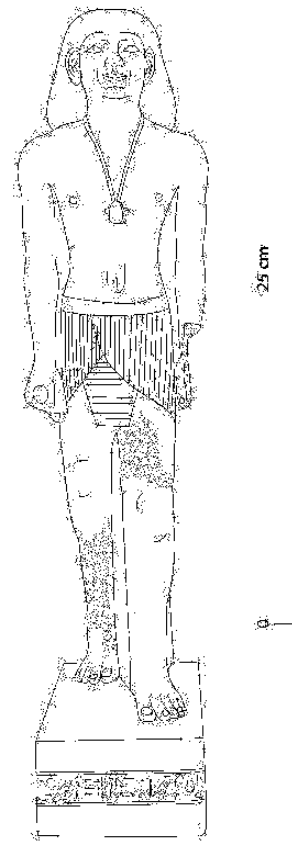
⁶ VITTMANN 1978: 80-81.

⁷ PRESSL 1998: 159 [A 3].

⁸ BOTHMER 1970: 37ff.

The statue has a back pillar that stops at the shoulder level⁹ and is inscribed with a hieroglyphic column (**Glyph.3**) [FIGURES 3-4]. On the left tenon is a representation of Hor XV's son Padiamunnebnestawy, in a priestly appearance and summoning gesture, in which he raises his right arm while the left hand holds a folded cloth. He wears a puffy pleated skirt whose lower end is rounded and covered with panther skin; in front of him is a hieroglyphic text (**Glyph. 4**) [FIGURES 5-6].

Condition: The statue suffered from moisture-related abrasion, given the waterlogged condition in which the cachette was discovered¹⁰. The deterioration is evident on several parts of the surface and caused damage to some parts of the texts, to the point of making some of them illegible. There was also damage to the back of the wig, the back pillar and the legs. The outer part of the left hand and small parts of the base are missing. Moreover, as the statue was discovered broken into two pieces, it was slightly restored around the legs and knees



[FIGURE 1]: Statue of Hor XV © Photo taken by Sameh Abdel-Mohsen

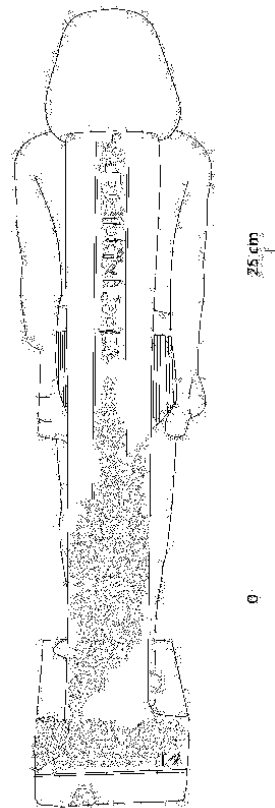
[FIGURE 2]: Line drawing © Ahmed Abdel-Halim

⁹ Although PERDU NOTED that this phenomenon could be an exception because the striding statues of the south workshops are generally provided with back support more or less beyond the level of the shoulders, there are some examples whose owners wear the same wig (JE 37992, 37389). PERDU 2012: 331, N^o. 24.

¹⁰ Like many limestone statues that came from Karnak cachette and suffered from deterioration. LEGRAIN 1906: 144-145; PRICE 2011: 16, N^o. 34.



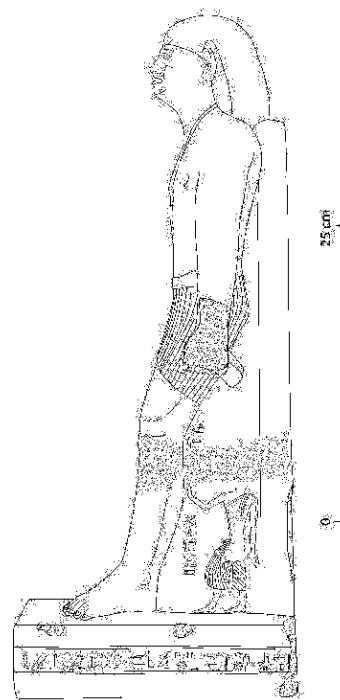
[FIGURE 3]: Back pillar of the statue Statue of Hor XV © Photo taken by Sameh Abdel-Mohsen



[FIGURE 4]: Line drawing © Ahmed Abdel-Halim



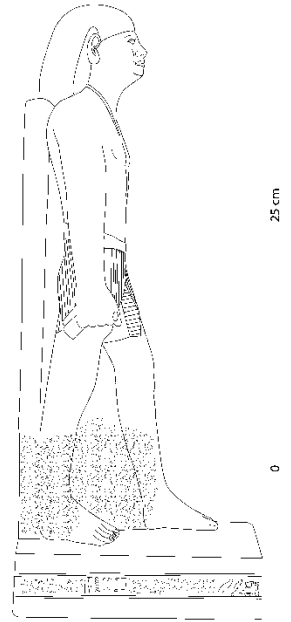
[FIGURE 5]: Left side of the statue Statue of Hor XV © Photo taken by Sameh Abdel-Mohsen



[FIGURE 6]: Line drawing © Ahmed Abdel-Halim



[FIGURE 7]: Right side of the statue Statue of Hor XV © Photo taken by Sameh Abdel-Mohsen



[FIGURE 8]: Line drawing © Ahmed Abdel-Halim

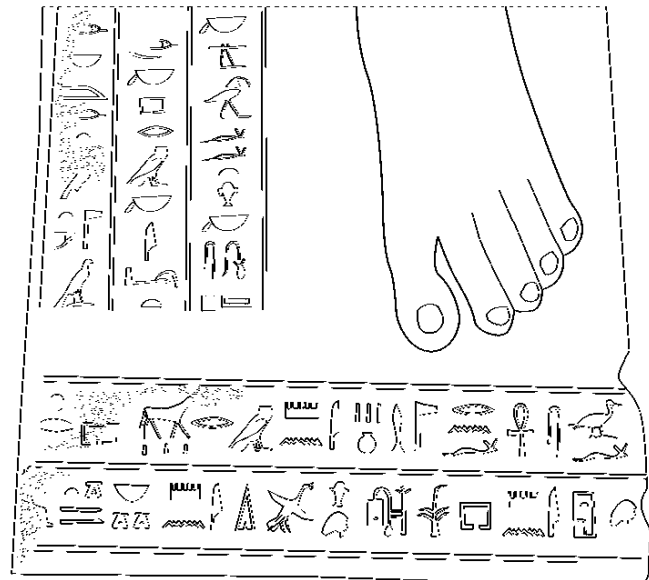
III. TEXTS

1- Over the Base

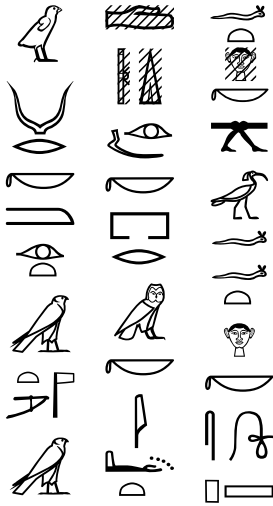
Two texts are inscribed over the base [FIGURES 9-10]; the first one is inscribed in 3 columns in front of the right leg, going from right to left. The upper part of the text is damaged (Glyph. 1).



[FIGURE 9]: The base of the statue Statue of Hor XV © Photo taken by Sameh Abdel-Mohsen



[FIGURE 10]: Line drawing © Ahmed Abdel-Halim






fzi hr.k ^(a) is *zh.f*^(b) *fzi hr.k w3š*
spd m33.k pr(t) im.k^(c) *w^eb.tw*^(d)
wp r.k mi irt Hr^(e) *it(-ntr) mri- ntr Hr*

Lift up your face, (you) who has passed away, lift up your face with his Oh being respected and effective, may you behold the one who emerged from you, the one who has cleansed you and opened your mouth according to what Horus did, the divine father, god's beloved, Hor.

Comment

Although DE MEULENAERE commented that the text is difficult to translate due to its its different versions¹¹, the first passage of the text is derived from utterance 662 of PT¹², where the deceased king is summoned to return from the dead. Besides the offering tables¹³, such as¹⁴ CGC 23107¹⁵; N^o. 21 from Abydos¹⁶, the text was attested on the statues JE 36908¹⁷, CGC 48615¹⁸ and CGC 960,¹⁹ which offers variants that are partially more correct. The occurrence of the text on offering tables could be connected with PT 1879 because it came after a passage concerning supplying the dead with food²⁰ and then the son giving the father the first cold water to make him rise²¹.

(a) *fzi hr*: means, first of all, «to raise one's (own) head»²², either to look at the god or out of hostility²³. However, it can also mean «to raise (another's) head» for reviving. The latter must be what is meant here when we consider the dedication of the statue by his son Padiamunnebnestawy. It is likely he who raised his father's head.

The word *fzi* is abbreviated, in contrast to the two common forms that are written on offering tables from Abydos (CGC 23107 and N^o. 21)  and on the statues from Thebes (JE 36908 and CGC 48615) . Meanwhile on statue CGC 960, it is written abbreviated .

¹¹ DE MEULENAERE 2012: 44.

¹² SETHE 1910: 1879.

¹³ DE MEULENAERE 2008: 304.

¹⁴ DE MEULENAERE 2012: 44, N^o. 22.

¹⁵ KAMAL 1909: vol.1, 89.

¹⁶ PEET 1914: 118, FIG. 81.

¹⁷ JANSEN-WINKELN 2002: 100.

¹⁸ JANSEN-WINKELN 2002: 104, FIG. 4.






¹⁹ BORCHARDT 1934: 5.

²⁰ SETHE 1910: 1876.

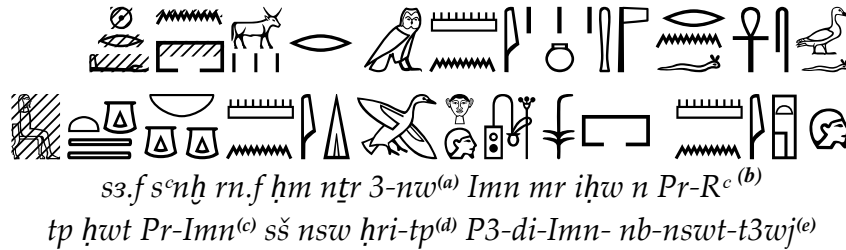
²¹ SETHE 1910: 1878.

²² ERMAN et Al (eds.) 1926: WB.1, 572 (13-15); WITTMANN 1995: 319, N^o.182.

²³ VERNUS 1980: 227 (ah).

- (b) For the root of *ʒh* and its significance²⁴.
- (c) The expression is written in the common form without *n* (i.e., transitive)²⁵, in contrast to the rare case of JE 36908²⁶.
- (d) The sign  is strange. The same thing occurred on JE 36908  and CGC 48615 , while on CGC 960, it was written as . JANSEN-WINKELN²⁷ also commented that the form is strange and questioned what  (D 36) means.
- (e) In the current text, the coordination particle *is(t)* is omitted²⁸. However, it is attested on JE 36908, CGC 48615 and CGC 960, which was most likely an archaism. Accordingly, this must imply what Horus accomplished for Osiris²⁹.

The second text on the base is two rows inscribed in front of the left leg, going from right to left (**Glyph. 2**)



His son, who causes his name to live, the Third Prophet of Amun, head of cattle of the Re-Domain from the roof of Amun's Domain, chief royal scribe Padiamunnebnestawty.

Comment: The previous text is the dedication formula or a dedicatory label, as Grallert named it,³⁰ although the verb *iri* is not used³¹. According to PRICE³², the statue in question is the only example of a striding statue in Karnak Cachette, which also happens to have this dedication formula from this period. The other examples vary between block, naophorous, and with the figure of Osiris. From later periods, there are only a few examples of the striding statues, such as the statue of Djedhor³³ from the 30th dynasty and the unpublished statue of Hornefer³⁴ from the Ptolemaic period³⁵. Although on the two later statues, the dedicatory formula is inscribed in two different positions (the left side on the statue of

²⁴ JANSEN-WINKELN 1996: 201ff.

²⁵ Such as CGC 48615. Offering tables N^o. 21 from Abydos; CGC 23107.

²⁶ JANSEN-WINKELN 2002: 103, N^o. 25.

²⁷ JANSEN-WINKELN 2002: 104, N^o. 27.

²⁸ EDEL 1955: 317, 829.

²⁹ JANSEN-WINKELN 2002: 104, N^o. 28.

³⁰ GRALLERT 2007: 36.

³¹ GRALLERT 2001: 98, 107.

³² PRICE 2011: 100ff.

³³ Caire RT 8/12/24/5, JANSEN-WINKELN 2001: 94ff.

³⁴ New York MMA 17.120.145

³⁵ «CK 646»; <https://www.ifao.egnet.net/bases/cachette/ck646>, accessed on (18 /01/2024); PRICE 2011: 71.

Djedhor and the back pillar, col.1 of the statue of Hornefer), the position of the formula on the current statue is the most common. However, there were exceptional cases³⁶. The arrangement of the inscription around the feet corresponds to the positioning of dedicatory formulae found in the graffiti on the roof of the temple of Khonsu from the Late period³⁷.

- (a) A religious occupational title was held by the third highest priestly rank in the priesthood of the god Amun, situated at the Temple of Amun in Karnak. The office of the Third Prophet of Amun was created in the early 18th dynasty³⁸ and became widespread during the Third Intermediate and Late periods³⁹. According to JANSEN-WINKELN⁴⁰, Padiamunnebnestutaway (C) himself was married to a princess. Since he was no longer in office just a few years after Thebes joined the Saitic sphere of power, she is hardly a relative of Psametik I but a daughter of a Nubian king (Taharka)⁴¹. He probably owed his position as the third prophet of Amun to this marriage.
- (b) GAUTHIER mentioned that «*Pr-R^c*» is the sacred name of the city of Heliopolis and the name of the temple is specifically dedicated in this same city to the sun god⁴². Although VANDIER noted that: «unfortunately, the expression is confusing⁴³, we could find it in numerous cities, which were honored with a sanctuary of the sun god: Edfu, Thebes, Abydos, Sais, and even Derr, in Nubia»'. This expression was most likely used as a designation of Heliopolis city or the sanctuary of the sun god in several Egyptian cities. However, through the expression «*Pr-Imn*»⁴⁴ in the current context, there is no doubt that it refers to the sanctuary of the god Re at Karnak Temple. Kees assumed that the sanctuary, which was renovated in the 20th dynasty largely by Ramses III, seems to have become known from this time on by a special name: as *Pr-R^c tp hwt Pr-Imn* «the Re domain of the roof of the Amun's domain (Temple)»⁴⁵.
- (c) Since the 22nd dynasty, the position of 'cattle chief' must have been very desirable because members of the most distinguished Theban families profess to hold such an office and were also prophets of Amun Re in Karnak. Moreover, they mostly took part in secondary cults in Karnak, including Khonsu Temple or Mut Temple. The position seems to be inherently connected to the office of the third prophet of Amun in Karnak. Since the 21st dynasty, the title was often left to the 3rd prophet of Amun, usually together with the special service of Re himself⁴⁶. Kees mentioned that this title attested the prosperity of the foundation because the herds of cattle formed the main

³⁶ PRICE 2011: 101-102, TAB 4.

³⁷ JACQUET-GORDON 2003: 94; PRICE 2011: 102.

³⁸ TAYLOR 2001: 148; aL-AYEDI 2006: 342.

³⁹ VITTMANN 1978: 66ff.

⁴⁰ JANSEN-WINKELN 2006: 238-239.

⁴¹ The name of this princess is attested only on JE 36980. JANSEN-WINKELN 2006: 239, N^o. 66; DE MEULENAERE 2012: 57-59.

⁴² GAUTHIER 1925: 100-101.

⁴³ VANDIER 1965: 143ff.

⁴⁴ GAUTHIER 1925: 54.

⁴⁵ KEES 1949: 436; STADELMANN 1969: 174-175; JANSEN-WINKELN 1985: 98, (68).

⁴⁶ KEES 1959: 64.

component of the god's sacrifice, and the corresponding position of «Amun's cattle chief» was the domain of the highest officials and priests. A well-known example from the 18th dynasty is Senmut, Hatshepsut's favored official. Kees added that the name of the Re domain of the roof of the Amun district occasionally appeared alongside the Heliopolitan high priest title «Greatest of those who behold»⁴⁷ in Karnak (since the 21st dynasty) and there was no reason to prevent this *tp hwt* «roof temple» of the *pr-Imn* from being equated with the altar in the north-east part of the festival temple of Thutmosis III.

The title was connected to the title *hm ntr 3-nw Imn* in several statues dating from the 25th to 26th dynasties such as JE 36908⁴⁸, JE 37150⁴⁹, CGC 48635⁵⁰, T 7/6/24/5⁵¹, JE 36664⁵², Coffin Luxor Museum R844⁵³ and a granite base from Karnak Temple⁵⁴ [TABLE 1].

Object N ^o .	Title
JE 38045	
JE 36908	
Granite base from Karnak Temple	
JE 37150	
CGC 48635	
JE 36664	
Coffin Luxor Museum R844 of <i>P3-di-Imnt</i> (III)	
T 7/6/24/5	

[TABLE 1]: Forms of the title © Done by the researcher

The table shows that the paleography of the title on the current statue was not common. The name of the god Re was written after the sign of *Pr*, which was unusual because the name of the god should have been placed according to honorific transposition.

⁴⁷ KEES 1949: 436-437.

⁴⁸ JANSEN-WINKELN 2002: FIG. 3.

⁴⁹ KEES 1959: 54-67.

⁵⁰ BOTHMER 1981: 75-83; JANSEN-WINKELN 2014: 203-204.

⁵¹ JANSEN-WINKELN 2006: 231-240.

⁵² JANSEN-WINKELN 2014: 292-294.

⁵³ BRUYÈRE 1956: 16-18.

⁵⁴ VARILLE 1950: 160-161.

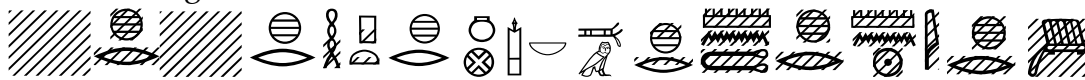
So, it could be a mistake by the scribe. One could compare it with the statue of Padiamunnebnestawty (JE 36908), where the expression was written correctly. Furthermore, the sign of Re, which should be a determinative, preceded the name itself. The word *mr* was written as (owl+r) in the two statues JE 38045 and 36908, which belonged to Padiamunnebnestawty and his father, while the tongue of Ox (GARDINER F 21) was commonly used on other objects to give the same sense, while sometimes only *r* (D 21) was used.

(d) The statue in question is the only evidence that Padiamunnebnestawty (C) held the title «chief royal scribe». In his other texts (JE 36908 and T 7/6/24/5), he was the scribe of god's documents. According to Jansen-Winkel⁵⁵, he was clearly the central figure of this part of the family, held the title of third prophet of Amun, and was the only «chief royal scribe» in his family.

(e) Padiamunnebnestawty, the son of Hor XV, was the elder third Amun Prophet of that name (c)⁵⁶.

2- On the back pillar: (Glyph. 3)

One column from right to left:



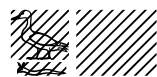
imsh.w hr Imn-R^c hr Mntw hr Tm nb Iwnw hr Pth hr///// hr ///

Honored by Amun-Re ^(a), by Monthu, by Atum the lord of Heliopolis, by Ptah, by ///// by
 /////^(b)

- a) In the transcription of JANSEN-WINKELN⁵⁷, the sign of Re is missing.
- b) One can expect that the last damaged part should contain the name of the owner.

3- Left side, on the connection tenon between the leg and the back pillar (Glyph. 4)

On top of Padiamunnebnestawty's hand was a text in two rows facing left, which, although unfortunately damaged, one could make out the first word of the two rows:



s3.f///Imn/////

his son///// Imn



Comment: The damaged part -which could barely be seen- should bear the most familiar title of Padiamunnebnestawty (C) which was «*hm ntr 3-nw Imn*». One could compare this with statue CGC 42248⁵⁸ in which the priestly character of the owner's son

⁵⁵ JANSEN-WINKELN 2006: 238.

⁵⁶ VITTMANN 1978: 75-95.

⁵⁷ JANSEN-WINKELN 2009: 501.


⁵⁸ JANSEN-WINKELN 2014: 154-155.

appeared accompanied by his titles. In Jansen-Winkel's transcription, this text is missing⁵⁹. In front of him is one column, facing left:



P3-di-Imn- nb-nst^(a)-t3wj^(b)
 //// Padiamunnebnestawy

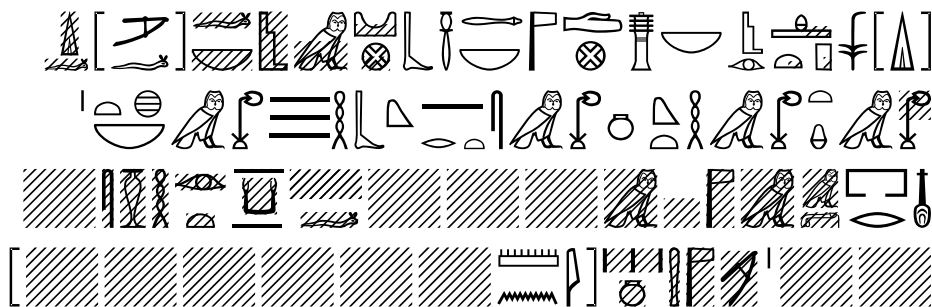


(a) The name was written with only one  (W 12) to give the sense «*nswt*», in contrast to the three in (Glyph.2), although there is enough space. This form with one sign also occurred on statues JE 36908⁶⁰ Louvre A 117⁶¹.

(b) For this name, cf. RANKE, *PN I*, 122 (6).

Around the base (Glyph. 5):

An offering formula was inscribed on the four sides, interspersed with gaps, starting from the left side of the statue:



ḥtp^(a) di nsw (n) wsir nb ḏdw ntr ʿ3 nb ʿbdw m st.f nb^(b) mr.f di.f
ḥ3 m t ḥ3 m ḥnqt ḥ3 m sntr^(c) qbḥ ḥ3 m ḥt nb(t)
nfr(t) pr(.i) m b3ḥ m ntr/(i)m////////.f n k3 n irt ḥs(i)////////
mri (ntr) ḥm ntr 3-nw [Imn] ^(d)

An offering given by the king to Osiris, the lord of Busiris, the great god, the lord of Abydos in his entire place, his beloved, may he give thousands of bread, thousands of beer (to) refresh, thousands of every beautiful thing which comes out in front of the god there /// for the soul of who makes praising//////// god's beloved, the Third Prophet [Amun] ////.

a) The arrangement of the word *ḥtp* differed because the sign *p* preceded *t* in contrast to the common form that occurred in several texts from the same period, e.g., JE 36908⁶², JE 38607⁶³ and JE 48635⁶⁴. This form was also attested on JE 36711⁶⁵, JE 89618⁶⁶ and JE 37137⁶⁷.

⁵⁹ JANSEN-WINKELN 2009: 501.

⁶⁰ JANSEN-WINKELN 2002: 95-104.

⁶¹ PIERRET 1874: 36-39.

⁶² JANSEN-WINKELN 2002: FIG.1.

⁶³ JANSEN-WINKELN 2014: 210.

⁶⁴ BOTHMER 1981: 75-83.

- b) This expression was common in offering formulas, especially in the Middle Kingdom⁶⁸.
- c) The *n*-sign was written in its hieratic form⁶⁹, which was common during the Late Period.
- d) The damaged part at the end of the text should contain the name of Padiamunnebnestutauy. One could compare it with the text on offering table N^o. CL 104 G from Karnak⁷⁰.

IV. COMMENTARY

1- Artistic and Textual Features

There can be no doubt that the statue dates to the period between the end of the 25th and early 26th dynasties. The certain dating is according to the well-known biography of Hor XV's son, Padiamunnebnestutawy (c), who lived during the time of Taharka and Psamtik I and married the daughter of Taharka⁷¹. The artistic features also provides further evidence, such as the narrow median line, which first appeared on early Late Period striding figures⁷². The bulky contoured wig and the way it flares out from behind the shoulders is very similar to some statues of the same period⁷³. The faint smile was revived perhaps as a reaction against Kushite realism- around the middle of the 7th century BC. Statues shown with two kerchiefs in both hands was also a specific feature of this period, which disappeared after the time of Psamtik I⁷⁴, such as statue JE 56836⁷⁵. Bothmer⁷⁶ and Bresciani⁷⁷ situated it typologically at the end of the 25th dynasty according to the biography of Hor XV who surely lived at the end of the 25th dynasty. However, it is better to date it to the period between the 25th and 26th dynasties, because the statue was dedicated to Hor XV by his son Padiamunnebnestutawy, who was still in his position as the third prophet of Amun until the 9th year of Psamtik I or perhaps slightly later.

2- Owner

Hor XV was a member of one of the generations of notables of the well-known Besenmut family who occupied high positions in the service of Amun Re in Thebes⁷⁸ [FIGURE 11]. As there were several members in the famous family who had the name *Hor*,

⁶⁵ GUNN et AL 1931: 798.

⁶⁶ BAKHRY 1968: 15-25.

⁶⁷ JOSEPHSON et AL 1999: 43-44.

⁶⁸ POLOTSKY 1929: 58, N^o. 79; VANDIER 1936: 63.

⁶⁹ MÖLLER 1909: N^o. 331; KURTH 1999: 69-96; ABDELHALIM 2015: 14; REFAAT 2023: 175.

⁷⁰ GOYON 1971: 58.

⁷¹ JANSEN-WINKELN 2006: 239, N^o. 66; DE MEULENAERE 2012: 57-59.

⁷² RUSSMANN 1973: 40, N^o. 32

⁷³ JE 37992 & Je 37389, BOTHMER 1960: 31ff, AFFARA 2005: 5-18.

⁷⁴ BOTHMER 1960: 32.

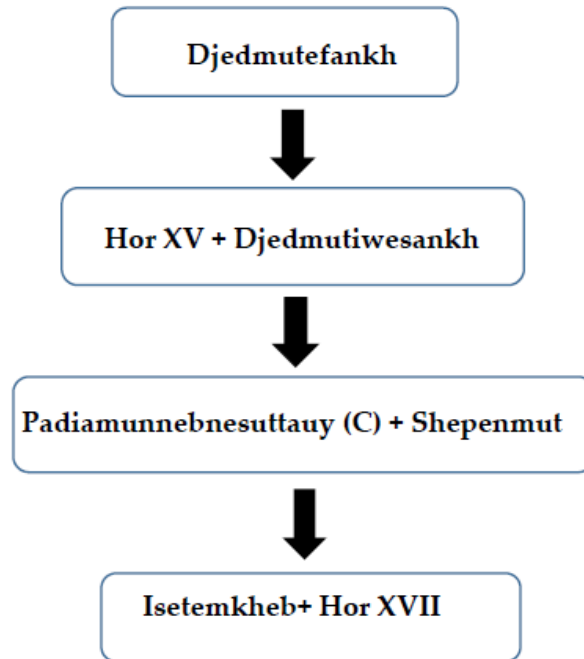
⁷⁵ JOSEPHSON & ELDAMATY 1999: 100-102.

⁷⁶ BOTHMER 1970: 45.

⁷⁷ BRESCIANI 1985: 115.

⁷⁸ For the family and genealogy of Hor XV, see: PARKER 1962: 22-23; VITTMANN 1978: 75-95; KITCHEN 1995: N^{os}. 190-195.

his name was designated in the literature as Hor XV. The statue in question had particular importance through the name of the son Padiamunnebnestawty (C), who occupied the position of the 3rd prophet of Amun until a short time after the 9th year of Psamtik I⁷⁹ when his name and full positions were mentioned on the adoption stela of Nitocris⁸⁰. By the 14th year of Psamtik I, his son, Hor XVII, succeeded him. In contrast to the son Padiamunnebnestawty (C), Hor XV did not occupy high positions in the domain of Amun.



[FIGURE 11]: Family tree

For both of the statues in question and JE 36908⁸¹, Hor XV was only mentioned as *mri- ntr* «the beloved of the god». Three other documents had Hor XV's name and positions⁸², all of which were dedicated by his successors. On the group statue Louvre A 117⁸³, he called *It-ntr mri-ntr Pth-wbn-m33*.⁸⁴ «the divine father, god's beloved, Ptah at the sight of whom Re rises». While on the statue JE 37410⁸⁵, which was dedicated to Padiamunnebnestawty (C) by his son Horkheb, Hor XV, he was mentioned as *hm-ntr Mntw nb W3st mri- ntr*. «The Prophet of Montu, the Lord of Thebes, beloved of the god».

Thus, the most common title of Hor XV was *It- ntr mri- ntr*, which occurred three times, while other titles occurred only once. Judging by his rather modest functions as «divine father, loved by the god», similarly attested on JE 36908, JE 37410 and Louvre A

⁷⁹ KITCHEN 1995: 193.

⁸⁰ CAMINOS 1964: 71-101.

⁸¹ BRESCIANI 1985: 114-116; JANSEN-WINKELN 2002: 95-104.

⁸² PARKER 1962: 22-23.

⁸³ PIERRET 1874: 36-39; JANSEN-WINKELN 2014: 173-174.

⁸⁴ LECLANT 1961: 225 (Ay); KEES 1962: 65, N^o. 5.

⁸⁵ JOSEPHSON et AL 1999: 52-54.

117, Hor XV, the father of the third prophet of Amun Petamunnebnestoutaoui was certainly not counted among the Theban notables of his time. However, his social rank did not change by the addition of the titles «prophet of Monthu, Lord of Thebes» and «prophet of Ptah at the sight of whom Re rises» which JE 37410 and Louvre A 117 included. Of these two priesthoods, only that of the god Ptah was found, according to JE 36908, between his son's titles⁸⁶.

3- General Comments

- A. The amulet: As mentioned above, Hor XV wore a cord around his neck that included two pear-shaped amulets, separated by a kind of thorn. This amulet was attested since the Old and Middle Kingdoms⁸⁷ and is seen again in the late 25th dynasty and early 26th dynasty in both reliefs and sculptures⁸⁸. There is still no specific name for this amulet. Bothmer called the amulet a «double amulet»⁸⁹, while DAVIES described it as a «pin and knot amulet»⁹⁰. Further, Vandersleyen defined it as «double amulet»⁹¹, while Tefnin identified it as a bivalve amulet and considered it archaizing, and one of the most interesting dimensions of Egyptian art of the first millennium⁹². Describing an amulet resting on the chest of a statue now in Brussels, VANDERSLEYEN said it was an unidentifiable pendant made of two pear-shaped plates separated by a thorn⁹³. DE MEULENAERE noted that because of the lack of an appropriate term, it is better to call it «the curious pendant», composed of two pear-shaped plates, sometimes with thorns and sometimes without, suspended from a necklace. He gathered several examples ornamented with this amulet and mentioned, «The meaning of this type of ornament remains mysterious; at first glance, everything seems to indicate that it was reserved for notable figures, kings and high officials, but several documents demonstrate that at least in the Late period, this conception must be nuanced». Chronologically, its appearance was limited to the 25th and 26th dynasties and thus fits perfectly into the archaic tendencies of the time. It was worn by the most part distinguished dignitaries and the officials who were not occupying such a high rank from Thebes⁹⁴.
- B. Hor XV wore a wig⁹⁵ that left the ears uncovered and which fell on the upper torso, flaring toward the ends of the shoulders⁹⁶. This style was common on the statues dating to the end of the 25th dynasty and the time of Psamtik I in Thebes and even in the

⁸⁶ DE MEULENAERE 2012: 44.

⁸⁷ EPRON 1939: PL.VI; XXXII; BOTHMER 1985: 102, N^o. 22.

⁸⁸ BOTHMER 1985: 102.

⁸⁹ BOTHMER 1960: 7.

⁹⁰ DAVIES 1981: N^o. 69.

⁹¹ VANDERSLEYEN 1975: 333.

⁹² TEFNIN 1988: 51.

⁹³ VANDERSLEYEN 1975: 264, PL.209b.

⁹⁴ DE MEULENAERE 2010: 51.

⁹⁵ BRANDLE 2008: 356.

⁹⁶ PERDU 2012: 38.

Delta⁹⁷. This style was also frequently used in two and three-dimensional figures during the early 26th dynasty, e.g., the stela of a Memphite family⁹⁸, CGC 42249⁹⁹. Although it was commonly thought that this style disappeared after the beginning of the 26th dynasty, specifically after the time of Psamtik I before being revived in the 4th century, there were rare examples attested during the time of the king Amasis¹⁰⁰.

- C. It is noted that the head of the statue tilts upward; this attitude appeared in several statues that date back to the 25th dynasty and the beginning of the 26th dynasty. The origin of this phenomenon in the repertory of the Kushite artisans was clear; it was a revival of a prototype, either of the 12th dynasty or of the 18th dynasty, which was originally derived from Old Kingdom's sculptors¹⁰¹. The logical interpretation of this attitude was that in lifting his face and raising his sight, the ancient Egyptian performed an act of respect as expressed in PT 1879, which referred to the deceased king returning from the dead¹⁰². Furthermore, Bothmer connected this attitude with the New Kingdom statues of kneeling worshipers, who looked upward to see the sun rays. This wish was also indicated in a very different way in the two-dimensional scenes representing the deceased or his chair resting on a baseline which was not flat but slightly inclined toward the direction where the deceased was facing; this direction was the place of the rising sun, the east¹⁰³.
- D. The archaism of the Old Kingdom traditions was shown in texts and images. As mentioned above, the text (**Glyph.1**) was derived from the Old Kingdom Pyramid Texts. In terms of artistic features, the depiction of the head lifted upward was discussed above. Additionally, the broad, shallow groove running along the torso can be seen as an attempt to emulate the artistic style of the Old Kingdom¹⁰⁴. Russmann noted that this somewhat unnaturalistic depiction of the torso is known from other sculptures from the early 26th dynasty, and was characteristic of the period; it was clearly derived from the narrower line that divided the trunk of the Old Kingdom's statues¹⁰⁵. One could also note this narrow median line on the kneeling statue of Amenemhat from the early 26th dynasty¹⁰⁶ and on striding statues from the early Late Period, such as JE 39403¹⁰⁷ and 39404¹⁰⁸. In addition, the amulet on the chest was one of many archaizing features of this period.

⁹⁷ MARKOVIĆ 2022: 326.

⁹⁸ COONEY 1953: PL.XLIX.

⁹⁹ ROEDER 1935: 395-398.

¹⁰⁰ MARKOVIĆ 2022: 327.

¹⁰¹ BOTHMER 1970: 47.

¹⁰² See: **Glyph. 1**.

¹⁰³ BOTHMER 1970: 47.

¹⁰⁴ For more examples, see: BOTHMER 1960: Nos.18-19, PL.16.

¹⁰⁵ RUSSMANN 1973: 40.

¹⁰⁶ RUSSMANN 1973: 33-46.

¹⁰⁷ LECLANT 1965: PL.LXIV; RUSSMANN 1973: 40, N^o.32.

¹⁰⁸ LECLANT 1965: PL.LXV; RUSSMANN 1973: 40, N^o.32.

V. CONCLUSION

Although the artistic and textual features date the statue to the end of the 25th dynasty, it is better to date it to the period between the 25th and 26th dynasties because of the biography of the son Padiamunnebnesttauy (C) who lived during this time and dedicated the statue to his father. Furthermore, these artistic and textual features continued until the beginning of the 26th dynasty or a bit longer. As was common, the statue was dedicated by the son of the Third Prophet of Amun, Padiamunnebnesttauy (C), to his father Hor XV who represented an integral branch of this priestly family. By comparing the titles on the current statue with those on other statues, it becomes clear that Hor XV, who lived during the reign of King Taharka, did not hold the same high positions among the Theban gods as his ancestors and successors. The features of the statue, emulating Old and Middle Kingdom statuary, represented the so-called archaizing style, which had been shown in arts and texts during the 25th and 26th dynasties.

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HONEY CONSUMPTION AND UTILIZATION IN LATE ANTIQUE EGYPT

BY

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ABSTRACT

[EN] Bee honey (*Api mellifera*) is one of the most cherished and valuable natural substances that has been in constant usage since prehistoric times until the present day. The use of honey has a very long history; in the dynastic period, it was considered the «tears of the sun god» and was appreciated for its nutritional and medicinal properties. Honey has been used for various reasons, e.g., for medicinal purposes, cooking and religious rituals. The same use continued in Byzantine and Late Antique Egypt, as recorded in the Coptic texts, which mentioned the use of honey in food, drinks and medical remedies. I endeavor to present an analysis of the most important types of honey in the Late Antique period, in comparison with ancient Egyptian counterparts. This paper aims to highlight the various kinds of honey, receptacles and measures of honey. Moreover, it presents Coptic titles, professions and names associated with honey. It presents unpublished texts that provide information about honey. With this research, I want to investigate how and why the economic scope of apiculture in ancient Egypt evolved and the impact of this evolution on beekeeping and bee-related material culture, including titles and trade throughout post-Pharaonic and late Antique Egypt. The behavior and hive type of the Egyptian bee species, as well as the development of beekeeping from the predynastic until the New Kingdom, are briefly discussed in order to set the stage for the main debate. The primary topics of discussion are the trade, titles and material culture of bee products in post-Pharaonic and late Antique Egypt.

KEYWORDS: Honey, honeycomb, ostraca, pharmacy, ritual, remedy, wax.

[AR]

استهلاك العسل واستخدامه في مصر القديمة المتأخرة

يُعد عسل النحل (*Api mellifera*) من أعلى واثمن العناصر الطبيعية التي كانت تستخدم باستمرار منذ عصور ما قبل التاريخ وحتى الآن. ويعود تاريخ استخدام العسل إلى تاريخ طويل جداً، ففي عصر الأسرات، كان يُعتبر العسل «دموع إله الشمس»، وقد حظي بتقدير كبير نظراً لخصائصه الغذائية والطبية. وقد تم استهلاك العسل بطرق مختلفة، بما في ذلك الأغراض الطبية والطهي والطقوس الدينية. ولا يزال الاستخدام نفسه معروفاً في مصر البيزنطية ومصر القديمة المتأخرة من خلال النصوص القبطية التي تذكر استخدام العسل في الطعام والشراب والعلاجات الطبية. أسعى هنا إلى تقديم تحليل لأهم أنواع العسل، مقارنة بنظيراتها المصرية القديمة. يهدف هذا البحث إلى تسليط الضوء على أنواع العسل المختلفة وأوعيته ومقاييسه. وعلاوة على ذلك، تعرض الألقاب والمهن والأسماء القبطية المرتبطة بالعسل. وعلاوة على ذلك، تتناول هذه الورقة البحثية النصوص غير المنشورة التي تحتوي على معلومات عن العسل. من خلال هذا البحث، أريد أن أتحرى كيف ولماذا تطور النطاق الاقتصادي لتربية النحل في مصر القديمة، وكذلك كيف انعكس هذا التطور في تربية النحل والثقافة المادية المتعلقة بالنحل والألقاب والتجارة في مصر ما بعد الفرعونية ومصر القديمة المتأخرة. ستم مناقشة سلوك ونوع خلية النحل المصري، وكذلك تطور تربية النحل في فترة ما قبل الأسرات حتى عصر الدولة الحديثة بإيجاز من أجل تمهيد الطريق للمناقشة الرئيسية. ستكون الموضوعات الرئيسية للمناقشة هي التجارة والألقاب والثقافة المادية لمنتجات النحل في مصر ما بعد الفرعونية ومصر القديمة المتأخرة.

INTRODUCTION

The Egyptian bee is a member of the *Apis mellifica* honeybee species. *Apis mellifica* is native to the ancient worlds of the Middle East, Africa, Madagascar and Europe. It has a wide range of geographical variations that are distinguished by its environmental adaption¹. The bee was a favorite insect among the ancient Egyptians from ca. 3500 BC until the Roman era. In ancient literature and tomb inscriptions, the bee was used to signify kingship and legitimacy in Lower Egypt². It was mentioned in the Pyramid texts and Egyptian mythology and it was connected to several major gods. Its honey was employed in several religious rituals, offered as gifts to the gods and the dead and was utilized in many aspects of their daily lives³.

Budge claims that according to a magical papyrus in the British Museum (N^o10051, Salt 825), the gods had a strong relationship with specific plant substances: «When RA weeps copiously the water falling on the ground becomes «the flies that build,» i.e. bees and these, working with the flowers in every garden, produce honey and wax»⁴. All plant substances and tree oil mentioned in the text, «i.e. myrrh, cedar trees, papyrus plants and Nārt tree», were believed to be effective medicines and were integral in all the rituals and ceremonies related to the resurrection of the dead. In the case of honeybee, Budge argued that «in the Graeco-Roman period children and others were buried in pots filled with honey and the body of Alexander the Great is said to have been preserved in «white honey which had not been melted»⁵.

The Greek philosopher Aristotle, the first scientific beekeeper, introduced honey into scientific study for the first time in his book *Historia Anim alium*. Hippocrates, the physician, documented the health advantages of honey as well⁶. He recommended using vinegar and honey for pain, water and honey for thirst and a concoction of honey, water and other ingredients for fevers. Moreover, Hippocrates prescribed honey as a remedy for a wide range of ailments, such as baldness, eye disorders, wounds and contraception. Ancient Greek mythology prominently used honey and bees as emblems of virginity, rebirth and fertility.

The Romans had a great deal of experience with beekeeping, regulating it according to taxation and attaining excellent standards of productivity, variety and quality. Virgil, Varro, Columella and Pliny the Elder were among the Roman agricultural writers who investigated bees and beekeeping techniques extensively. The finest honey, according to the physician Pedanius Dioscorides, is delicious and strong, has a nice smell, is yellowish and is not liquid but «sticky» and fine⁷.

The Old Testament also refers to manna, a different and legendary sweetener said to have descended from the sky in the form of rain on chilly nights in the desert [FIGURE 1].

¹ BECK 2021: 1–2.

² THOMAS 1978: 32.

³ EL–SEEDI *et Al.* 2022: 2–3.

⁴ BUDGE 1996: 24.

⁵ BUDGE 1996: 25.

⁶ GERMANIDO 2020: 5.

⁷ GERMANIDO 2020: 4.



[FIGURE 1]: Collecting the manna falling from the sky. French manuscript illumination, Old Testament, MS M. 638, folio 9v, 1244-1254 BC, Pierpont Morgan Library, New York GERMANIDOU 2020: 1.

In Byzantine Egypt, evidence of beekeeping is scarce compared to the ancient Egyptian period. Johnson and West argued that beekeeping was «probably more extensive than the records indicate»⁸. They reported that since there were no additional sweeteners, honey had to have been used. Dates, which were utilized as the poor man's honey, have always been abundant in Egypt; therefore, honey was likely used, not dates. Indeed, «date-honey» is mentioned. There is a chance that raisins were employed similarly as well. As for honey, the evidence seems to indicate that it was restricted to the wealthy. This might shed new light on how honey was used in these historical literary texts⁹.

I. HISTORICAL EVIDENCE OF BEEKEEPING

1-Old Kingdom

The earliest evidence of beekeeping in ancient Egypt dates back to 2450 BC from the sun temple of the king Nyusera in Abusir (fifth dynasty). A relief from the Chamber of the Seasons shows beekeeping activities such as working in the hives, as well as the pouring and pressing of the honey. These images are now housed in the Egyptian Museum in Berlin. The relief illustrates in detail the removal of the comb from the hives as well as the extraction and storage of the honey [FIGURE 2]¹⁰. Hieroglyphic writings that translate to «hymning, filling, pressing and sealing of honey» between each

⁸ MIKHAIL 2000: 115.

⁹ MIKHAIL 2000: 115–116.

¹⁰ KRITSKY 2010: 51.

scene serve as further evidence for what is visually represented¹¹. The first image, which is located at the very left edge of the relief, shows a keeper kneeling before what appears to be nine hives, portrayed as pipes likely built out of mud or clay. He is carrying what appears to be an oval-shaped object, which is difficult to identify due to damage to the image, while simultaneously harvesting honey with the other hand. It is argued that the oval-shaped object could be a piece of cow dung, which was used to smoke the bees¹². Or, while «calling for the queen», the keeper may have used an oval-shaped jug to regulate the swarm by enclosing the queen and the workers. This alternative theory is disputed by Kritsky¹³. Above the scene, the word *nft* is used to mean «creating a draught, or current of air» or «blowing or smoking»¹⁴. The word *nft* can also mean «loose» or «slacken»¹⁵.

In the second scene, three men are shown dumping the honey that has been extracted from the hives into larger pottery jars and other vessels placed on the ground. The term *mḥ*, which means «to fill» is placed above the scene. The man standing to the left is pouring the honey into a container with a nozzle on its side which might aid in separating the honey from the wax¹⁶.

The third scene, which is severely damaged, shows two men confronting one another. Based on the positioning of their hands and posture, it appears that a container—identical to the one in the previous scene—was originally between them¹⁷. The term *[j]f*, appears above the image, which is translated to mean «to press» or «to wring out»¹⁸. The inscription indicates that they are likely pressing the honey to get rid of any undesired contaminants.

The final scene shows a kneeling man, facing right, in the process of sealing a round container in front of him to preserve the honey. The container is likely loaded with honey from the relief's last scene. The caption above the scene reads *ḥtm bjt* meaning «to seal the honey», which indicates that the honey containers were sealed¹⁹. This relief is important evidence that beekeeping was a well-established industry in Egypt during the mid-late 5th dynasty²⁰.

After Nyuserra's rule, the prominence of beekeeping in the Old Kingdom persisted under his successor Unas (?– ca. 2345 BC), the last ruler of the fifth dynasty²¹. Evidence for beekeeping could be found in a severely damaged relief (FIGURE 3) that originally adorned Unas's causeway in Saqqara, which featured a straightforward scene of «collecting honey». Three sealed, spherical honey containers, resembling those discovered at Nyuserra's sun temple, are shown in the image. Inscriptions on top of the

¹¹ HAMMAD 2018: 3.

¹² RANSOME 1937: 26.

¹³ KRITSKY 2015: 1011; HAMMAD 2018: 3.

¹⁴ BECK 2021: 7.

¹⁵ GARDINER 1979: 574.

¹⁶ BECK 2021: 7.

¹⁷ RANSOME 1937: 27.

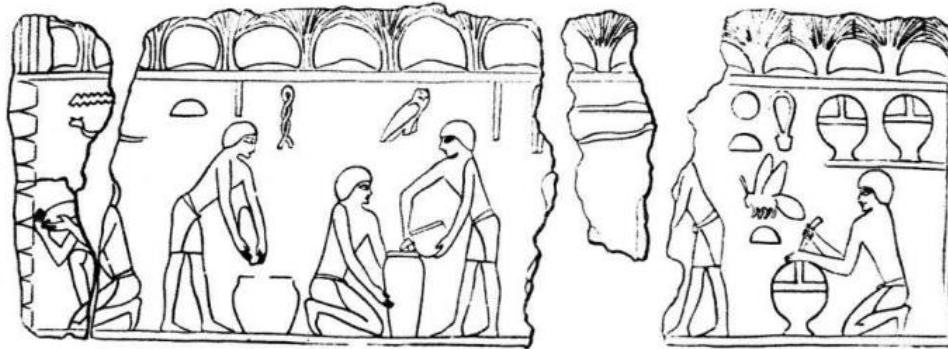
¹⁸ BECK 2021: 9.

¹⁹ BECK 2021: 9.

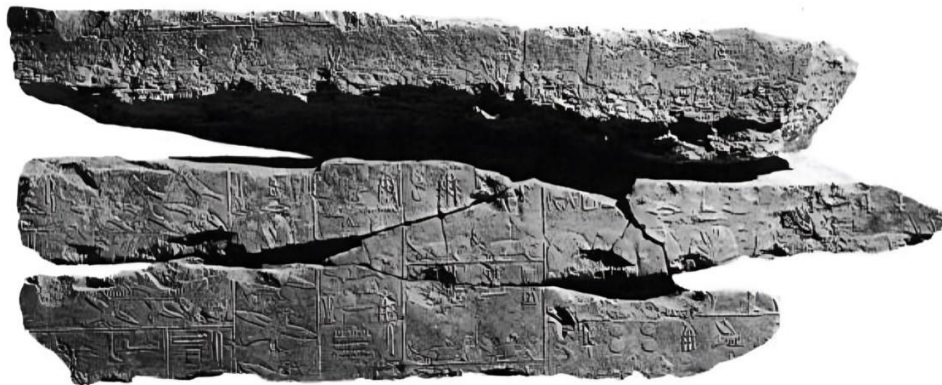
²⁰ HAMMAD 2018: 4.

²¹ NETZLEY 2003: 297.

containers are assumed to read «*hekat* of honey»²². By the end of the Old Kingdom and throughout Pepi II's protracted rule (2278–2184 BC), honey had become crucial for trade²³. The governor of Aswan, Sabni, undertook multiple trade missions to Nubia and brought back 100 donkeys loaded with honey, oil and other goods as gifts. His autobiography, carved on the walls of his tomb in Aswan, mentioned these and other goods²⁴.



[FIGURE 2]: Relief from the Solar Temple of Nyuserra, fifth dynasty. KRITSKY 2010: 12.



[FIGURE 3]: The badly damaged relief of the causeway of Unas. KRITSKY 2015: 20.

2. Middle Kingdom

Senusret III's rule (1870–1831) in the Middle Kingdom provided other traces of beekeeping. Blocks that remained from his causeway at Dahshour depict a beekeeping relief, in which three bees are flying back and forth between two sets of horizontal hives like those at the *Nyuserra* Solar Temple. The relief attests to the fact that Old Kingdom-style beekeeping techniques and procedures did not change much²⁵. Additionally, beekeeping titles were still used in ancient Egyptian administration, as seen by the titles inscribed on a scarab seal from the thirteenth dynasty for a man named *Intef*. The scarab seal is currently housed in the British Museum Nr^o.EA30550 [FIGURE 4]. The inscriptions on the back of the seal reads: *h^cty-^e jmy-r bjtyw rkh-nsw* «Chief Beekeeper and King's Acquaintance»²⁶.

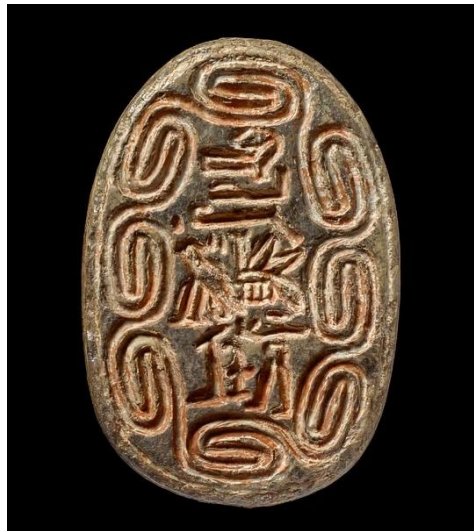
²² «A *hekat* is a common unit of volume used in ancient Egypt equivalent to 4.6 liters/1 gallon». KRITSKY 2013: 1186.

²³ HAMMAD 2018: 4.

²⁴ HAMMAD 2018: 4.

²⁵ KRITSKY 2015: 23

²⁶ BECK 2021: 14.



[FIGURE 4]: Steatite scarab № EA30550, the 13th dynasty © The Trustees of the British Museum «The British museum»; <https://www.bmimages.com/preview.asp?image=01613317959>, accessed on (19/08/2023).

3-New Kingdom

Scenes depicting the importance of beekeeping, which grew in popularity during the New Kingdom, were found in several non-royal tombs, such as the tomb TT7388, which belonged to Amenhotep, Hatshepsut's Chief Steward²⁷. Two significant episodes were depicted in Rekhmira's tomb (TT10094); first, he is shown receiving taxes in the shape of various gifts, including honey. Second, the most complete beekeeping scenario from ancient Egypt was also found in the tomb of Rekhmira, where the owner was seen supervising a team of workers as they provided food for the temple. Part of the scene showed two men preparing honey bread for the temple by mixing flour and honey, a scene that made researchers deduce that the ancient Egyptians were aware of the various sorts of honey, including the «white honey» of the Delta, which was solely used by monarchs and in temples. This kind of honey was thought to be entirely fresh and virginal after being initially removed from the combs by skilled beekeepers. It was also referred to as «white milk» [FIGURE 5]²⁸. Other scenes were found in tombs TT69, belonging to Menna, TT52, belonging to Nakht and TT56 which belonged to Userhat²⁹.



[FIGURE 5]: Part of the scene of preparing the provisions for the temple showing baking honey loaves. The tomb of Rekhmira at Thebe. HAMMAD 2018, PL.9.

²⁷ HAMMAD 2018: 6.

²⁸ HAMMAD 2018: 7.

²⁹ HAMMAD 2018: 8-9.

4-Late Period

Evidence of beekeeping throughout the Late Period came from two Saite-period tombs in Asasif: tomb TT414, belonging to Ankh-her and TT279 which belonged to Pabasa. The beekeeping scenes in the two tombs were strikingly similar, however, the depiction in the latter tomb is damaged. One of the most outstanding beekeeping scenes is depicted in two registers in Pabasa's tomb [FIGURES 6/A-B]. The first scene on the top depicted a standing figure dousing a storage jug with honey. The lower scene depicted a person bending down before eight hives with ten bees in each, arranged in two rows. It is argued that the man on his knees was a priest doing a cultic act while making a sign of respect with his hands³⁰. By the Ramesside period, beekeepers were an integral part of the temple staff, as specified in the Elephantine Decree of Ramesses III, which ensured their protection. The presence of apiaries inside or close to the temple showed that the economic scale grew and expanded to meet demand from temples and other spheres of society. By this time, beekeeping reached a significant economic scale and all social classes in Egyptian society could easily access its products³¹.



[FIGURE 6/a]: The upper register of the beekeeping scene of the Tomb of Pabasa TT 297.
HAMMAD 2018: 11



[FIGURE 6/b]: The lower register of the beekeeping scene of the Tomb of Pabasa TT 297.
HAMMAD 2018: 11.

³⁰ NAGY 1974: 313; BECK 2021: 24.

³¹ BECK 2021: 29.

5-Ptolemaic, Greco-Roman and Late Antique Period

Through the Ptolemaic and Roman eras and beyond, the practice of beekeeping persisted in Egypt, specifically in Faiyūm³². Honey was used in traditional sacrificial ceremonies to the Nile in the Greco-Roman era and was among the materials offered to the sacred Nile River in Oxyrhynchus on 24 July 342 AD. Tourists used to offer honey to the sacred crocodiles in the Arsinoe region³³. In addition, it was used as a main meal, as mentioned in the tenth book in Homer's *Odyssey*, written in 800 BC. It was used in many cooking recipes³⁴. Moreover, beeswax was used to paint the famous Fayoum portraits, where the «encaustic» technique, which required beeswax, was used³⁵. In Byzantium and the medieval West, beekeeping flourished until the discovery of sugar and its ultimate «dominance» as a primary sweetener. However, this amazing material is still an important component of our food and a representation of the strength and fragility of the natural world. Documents from Byzantine Egypt described people in settled regions who kept hives on the rooftops of their homes. These remarkable cases highlighted the fact that it is not impossible to abandon the potential of pre-modern urban beekeeping or to mix housing and beekeeping³⁶.

There is only limited evidence of apiculture throughout the Late Antique period. Apicultural products are cited in many literary works, ranging from medical texts, pharmaceutical treatises and magical prescriptions to legal and administrative documents. Honey may be referenced in several legal and administrative documents as transactions, taxes, or rules. These documents could offer details on how honey was regulated and taxed in post-Pharaonic and early Islamic Egypt.

6-Late Antique Egypt

A contract, from the monastery of Apa Apollo near Hermopolis, contains information about leasing 214 beehives from the beekeeper Lazarus, provides evidence for beekeeping in Late Antique Egypt. On 12 June, three monks (Elias, Papnoute and Germanus) leased this number of beehives, demonstrating the value of honey in the diet of monks. The text also showed that monks kept bees on their own as well; the document shielded Lazarus from any objections made by Enoch, a competing beekeeper:

P.Mon.Apollo I 47; SB Kopt. I 52

«I, the *papa* Elias with Brother Papnoute and the notary Germanus, the monks of the *topos* of Apa Apollo, write to Lazarus the son of Apollo, the beekeeper from Tbate. You drew up a lease for us for 214 beehives. Now, we are liable to you for Enoch, the beekeeper, so that he does not sue you over them. If he or anybody associated with him sues you, you are safe from them, for we have reached an agreement with him»³⁷.

³² SAGRILLO 2001: 43; KELHOFFER 2005: 61.

³³ SHALABY 2022: 423.

³⁴ HOMER, 1949: 361; SHALABY 2022: 425.


³⁵ SHALABY 2022: 441.


³⁶ JIM/ÉNEZ 2022: 163.

³⁷ SATZINGER & SIJPESTEIJN 1988: 50.

Later, monks took up residence in Rameses IV's (KV2) tomb in the Valley of the Kings. The monks left a lot of traces of their presence behind. Besides discovering graffiti all over the tomb, the excavators discovered turned-over jars, or amphorae, that served as beehives³⁸.

II. TERMS OF HONEY

The native Coptic word for honey is ⲉⲃⲓⲱ (ⲉⲓⲱ; ⲉⲃⲓⲱ³⁹; ⲉⲃⲃⲓⲱ⁴⁰) with the nominal form ⲉⲃⲓⲉ- being derived from the Egyptian *bj.t*. It corresponds to the Greek word μέλι, Arabic عسل⁴¹. The bee in Coptic is known by ⲁⲓⲛⲉⲃⲓⲱ  «honey fly» or «bee»⁴² Egyptian *3ff n bj.t*, is commonly abbreviated to *bj.t*⁴³. «Honeycomb» in Sahidic Coptic is ⲙⲟⲩⲗⲉ⁴⁴ and Bohairic ⲛⲏⲏⲓ⁴⁵.

The king's name during the first dynasty was  *nsw bjty* «he who united the two lands» or «he who joined the Sedge to the Bee». Since the bee was closely tied with royal ideology that defined the king as the sovereign of Lower Egypt, it was regularly utilised in ancient Egyptian literature throughout ancient Egyptian history up until the Roman period⁴⁶.

ⲉⲃⲓⲱ, when associated with fruits, most likely refers to thickened, cooked fruit juice, such as ⲉⲓⲱ ⲛⲛⲟⲩⲗⲉ which literally means «sycamore honey» and referring to sycamore syrup or juice (Ch 113). ⲉⲃⲓⲱ ⲛⲃⲏⲏⲛⲉ «date honey» or «date syrup» is (Ch 216), دبس in Arabic. ⲉⲓⲱ ⲛⲕⲛⲧⲉ «fig honey» or «fig syrup» probably appears in (*P.Ryl. Copt*) as ⲉⲓⲱ ⲛⲕ**ⲉ. Till⁴⁷ reconstructed it as ⲉⲓⲱ ⲛⲕⲛⲧⲉ.

III. TYPES OF HONEY

The Coptic texts recorded some different types of honey as follows:

ⲉⲃⲓⲱ ⲛⲁⲧⲙⲟⲩⲱ «waterless honey» which is solid, non-liquid honey, according to Dioscorides⁴⁸. It appears in several medical recipes, particularly for treating eye diseases such as those in Ch.89, Ch.195 and Ch. 202 which address a condition called ⲓⲱⲩ (blot), as well as Ch.205, Ch.207 and Ch. 208. In Ch.177, it appears as a remedy for skin disease and in Ch 140, it is used to treat testicular pain⁴⁹.

ⲉⲃⲓⲱ ⲛⲁⲧⲁⲓⲕ literally means «breadless honey»⁵⁰. It refers to the honey that contains no solid components (?). Till assumed that this may be contrasted with ⲉⲃⲓⲱ ⲛⲁⲧⲙⲟⲩⲱ⁵¹. It appears in an incomplete medical recipe cf. *O.Crum* 487⁵².

³⁸ CROMWELL: Bee Stories, <https://papyrusstories.com/2018/06/25/bee-stories/>, accessed on (04/11/2023).

³⁹ CRUM 1939: 52b.

⁴⁰ As in (O. Frangé, N^o.633, Fouilles belges dans la nécropole thébaine, N^o.291818, dates to 600 – 799 AD).

⁴¹ TILL 1951: 64.

⁴² CRUM 1939: 23b.

⁴³ SAGRILLO 2001: 173.

⁴⁴ CRUM 1939:166a.

⁴⁵ CRUM 1939: 227b.

⁴⁶ HAMMAD 2018: 1.

⁴⁷ TILL 1951: 66.

⁴⁸ TILL 1951: 65–66.

⁴⁹ SAWY 2022:157.

⁵⁰ SAWY 2022: 110.

⁵¹ TILL 1951: 66.

⁵² OSTRACON, London, EEF 151, 7.3 x 8.4 cm, 7th–8th century BC Originating in Deir al-Bahari. SAWY 2022: 25.

ΕΒΙΩ ΝΑΤΑΚΤΟΝ: «Attic honey», ατακτον= Greek Ἄττικόν⁵³. This type of honey appears in a spell for a good singing voice⁵⁴. It also appears in the love spell *Cairo JdE* 42573⁵⁵, which instructs the use of the gall of the hare, the sweat of a person's chest and the blood of a big finger, semen and Attic (?) honey. It was given to the intended woman on the 14th day of the moon.

ΕΒΙΩ ΜΜΕ: literally means «true honey» i.e., real or pure honey. This probably means honey that has not been adulterated with any additives. P.456 (Or. 6061, №.1088) mentions an account of genuine honey with some other stuff, such as wine olive oil, onion and mats, to be delivered on a boat. Also, *O.Frange* 100, a letter from Frange mentions ογλοκ εβιω μμε «a lok of pure honey». In addition, εβιω μμε «pure honey» is used for healing purposes as against gangrene in Ch.144.

ΕΒΙΩ ΕΝΩΟΥΒ† its meaning is not clear and Till mentions that he does not know its meaning. This type of honey appears in the medical recipe *SBKopt* I 003, ll. 8-19 against knocking⁵⁶.

ΕΒΙΕΖΟΥΤ: «Wild honey» appears in Or. 3581A(14)⁵⁷ and in Bodl. MS Copt. (P) a.2, 68-70 with other types of honey⁵⁸. The significance of «wild honey» is that John the Baptist is said to have eaten it in the New Testament Gospels of *Mark* and *Matthew*. *Mk.* 1:6c indicates that while in the wild, «John was in the habit of eating locusts and wild honey» and *MT* 3:4c claims that his provisions «consisted of» these foods⁵⁹.

IV. RECEPTACLE AND MEASURES OF HONEY

Various types of storage receptacles constructed of various materials were used to keep honey, according to historical papyri that document the interests and everyday activities of the Egyptians. Because they were aware of how easily heat and moisture might harm honey, various containers were used and then sealed to keep the contents safe⁶⁰.

It might be challenging to estimate how much a vessel might contain in some cases. It is not always clear even when there is information about this in texts. Each of the three substances —wine, oil and honey—required different measurements; a similar amount of honey weighs more than a comparable amount of wine, although wine and oil are quite compatible⁶¹.

The Most Common Measures of Honey in Coptic Texts Are

1. καπ⁶² «receptacle or measure for corn and honey» appeared in *P.Ryl.Copt.* 355⁶³ a letter from a person named Apollo, who may be a monk to a superior; perhaps he requests

⁵³ CRUM 1939: 52b.

⁵⁴ BKU 8 (L.33).

⁵⁵ CHASSINAT 1921.

⁵⁶ TILL 1951: 66.

⁵⁷ CRUM 1905: 74.

⁵⁸ RICHTER 2017: 521.

⁵⁹ KELHOFFER 2005: 59.

⁶⁰ HAMMAD 2018: 12.

⁶¹ VORDERSTRASSE 2014: 207.

⁶² CRUM 1902: 113b.

⁶³ CRUM 1909: 168.

πκαπ ενεφιω «a measure of honey» with 40,000 reeds and 4 workmen. It occurs as βαπ in *P.Mon. Epiph* 536⁶⁴.

2. κελη, κλε «vessel for liquids» oil and honey, Arabic زير⁶⁵.
3. κοειζ νεβιω: «box of honey» appears as κοει νεβιω, κοει= κοειζ in a part of a letter to be sent to the writer μωγςησ πρσζτ «Moyses the fuller».

V. MEDICAL USAGE OF HONEY

Ancient Egyptian medical writings contained about 500 recipes that reference honey to be used for various purposes. There were also recipe collections from the Ptolemaic and Roman periods that indicates that honey was used in medicine. Honey is found as an ingredient in various remedies, oral prescriptions, suppositories, ointments, bandages, incense and eye remedies. Von deines/Gradow assumed that honey was used as a sweetener in many medicinal recipes⁶⁶.

Honey's numerous characteristics have been studied. Because of its acids, inhibins (chemicals that stop bacteria from growing) and antioxidants, it has an antibacterial effect. Due to the high sugar concentration in honey, microbes are inhibited by osmotic pressure, which helps prevent their growth. This sugar content also gives honey its hygroscopic properties and contributes to its preservative qualities. Its flavonoids, which are secondary plant compounds that have positive health effects, have anti-inflammatory and antispasmodic action on colds. Additionally, it benefits the cardiovascular and immunological systems. However, proper storage is crucial to maintaining these active components in honey for a long time. Honey is harmed by dampness, heat and light⁶⁷.

Honey is included as an ingredient in medicinal preparations. Some medical recipes recommend cooking other ingredients in honey. However, most recipes do not require heat and only a few uses lukewarm honey. Till argues that honey is very popular for ingested medicines. Apart from the fact that healing powers were ascribed to honey itself, it was often used as a taste corrector because of its pleasant and strong flavor. Ingestible medicines containing honey are prescribed for the following diseases⁶⁸.

Against Gas in the Stomach

Ch 69

(135) Ομεος ογστομαχος εγτεμτωμ ντηγ ερε τεγλο νιβε τεπν ηη βαωουγω ως ιηοκΞ

(136) ζοσν ναραβικον εφιω θνοογ κσλωσ † ναρ νφογωμ φναογχαλ

(135) Likewise, a stomach heavy with gas, so that it stops blowing: Cumin, pepper, rue, mustard, (136) Arabic natron, honey; crush them well; give him to eat it; he will recover⁶⁹.

⁶⁴ CRUM & EVELYN WHITE 1926: 289

⁶⁵ CRUM 1939: 102a.

⁶⁶ GDM VI, 166 § 1; FEIERABEND 2009: 197.

⁶⁷ FEIERABEND 2009: 197.

⁶⁸ TILL 1951: 66.

⁶⁹ My English translation of the French translation by CHASSINAT 1921: 176, with slight modifications.

Against Intestinal Worms

Ch 110 prescribed a remedy against a specific type of worm called τμος κωοειω «the dust-Mos»⁷⁰ in which the meaning of μοc was unknown⁷¹. The recipe recommended three remedies against worms: firstly, a suppository of fresh blue vitriol and wine, which would cause the worms to exit the body; secondly, smoking blue-vitriol with wheat broth to make the worms move towards the bottom; lastly, drinking one cup of purslane, cow milk and honey for three days⁷².

Ch.110

(235) ογα ερε ρενμικ ἡρητῳ φαγμογτε εροογ χε τμικ ωοειω χι ἡογανιγαμ εφογωτ (236) ἑνοογ (*sic*) ρι ηρη φ ογκλεμ ναρ σεναει επεσнт εῖς τεκτι πανικαμ εγχελλοc ἡσογω (237) τεφρωγ τεκκαπνιζε ἡμογ ἡελκο ἡναμ σεναει επεσεнт εῖς ἡγ χι ἡογερμογρε (238) ἡἡ ογερωτε ἡερε ἡἡ ογεφω † ογαποτ ναρ ἡρητῳ ἡἡ ἡ πεστογ ἡωορῡ

(235) Someone who has worms inside him to which is called to dust (?): Take fresh blue vitriol; (236) crush with wine; administer as a suppository, introduce them downwards the bottom. Or put vitriol in a wheat decoction; (237) he (the patient) drinks it and smokes it with the tamarisk bark; introduce them downwards the bottom or take purslane, (238) cow milk and honey; give a cup to him in three days. Cook them at first⁷³.

Against Testicular Disease

Ch 169 recipe treating testicles that are sick κατα ωρ. The word ωρ is for οορ means «moon»⁷⁴, which could perhaps mean «every month». However, the recurrent testicular disease is unknown⁷⁵:

Ch.169

(328) ογα ερε νεφχοειт φωνε κατα ωρ ἑνω ρενσωβε ἡταφνε φλωωλογ ογοωμογ ρι εβιω τσοογ ρι σελρω

(328) Someone whose testicles are sick permanently: Crush stack of laurel leaves; shake them in sieve; mix them with honey; make him drink with hot water⁷⁶.

Against Rectum Pain

Ch.226 recommended a specific remedy made from wolf dung. A remedy that is considered a part of medico-magical prescriptions⁷⁷.

Ch.226

(405) Ομοεοc πμερτο ετ†κκαc κοпрοc κλκκκοc εφρωχ εφἑνηγ ρι ἡἡ ναλαγ ογοωμογ ρι εφω τσογ αλλα χι πβε (*sic*) ἡωορῡ ογδοκιμον πε

⁷⁰ CRUM 1939: 184b.

⁷¹ TILL 1951: 24.

⁷² SAWY 2022: 146.

⁷³ My English translation of the French translation by CHASSINAT 1921: 234.

⁷⁴ CRUM 1939: 257b.

⁷⁵ SAWY 2022: 160.

⁷⁶ My English translation of the French translation by CHASSINAT 1921: 285.

⁷⁷ SAWY 2022: 145.

(405) Likewise: The great intestine that has pain: Burnt wolf droppings, crushed with white pepper; knead them with honey, drink it, but take your salary first, it is tested⁷⁸.

Against Inner Diseases

Ch.234 prescribes remedy for ογα εφωδνε επεφκαρογν ε̄ν σινωδνε νιμ «someone who suffers from any illness in his inner parts»:

Ch.234

(416) ογα εφωδνε επεφκαρογν⁷⁹ ε̄ν σινωδνε νιμ σμηρηης ϑ̄ δ̄ αραβικον ϑ̄ ε̄ κακιας (*sic*) ϑ̄ δ̄

(417) κογ̄ετ̄ ϑ̄ δ̄ ηθ̄ χ̄ ν̄αγρ̄ ϑ̄ τ̄ θ̄νοογ̄ ᾱγο̄αμογ̄ εφιδ̄ † ναγ̄ ρῑ μοογ̄ εφζημ̄ ☉

(416) Someone who suffers from any ailment in his inner parts (i.e. internal diseases): Myrrh one drachma, gum Arabic five drachmas, acacia four drachmas, (417) costus one drachma, wild rue four drachmas; crush them; knead them with honey; apply to him (the patient) with warm water⁸⁰.

Against Vomiting

P.Carlsberg 500 recommends an oral remedy against vomiting:

ετβε νιρωμε καθολ ντεγτροφη πεσπερμα ντεϊβοτανη ριμοογ ριη[ρ]π ριεβιδ μα[ρεφ]ω φναλο «For persons who vomit their food: The seed of this herb together with water and wine and honey. Let him drink, he will recover».

For Intestine

CHASSINAT papyrus recipe **Ch.75** prescribed a drinking remedy τω for the large intestine: ογτω ετβε πνοσ̄ ν̄μαξ̄τ̄ «A potion to the large intestine» consists of: myrrh, castoreum, green vitriol, spurge and honey⁸¹.

Ch.74 recommends καθαρισμος⁸² «Laxatives» consist of one ounce of pepper, watercress seed, scammony and eight ounces of natron and spurge which are to be crushed well and mixed with honey.

Gums have Gangrene

Ch.159

(314) ογᾱ ν̄τᾱ πααγ̄ ν̄νεφναχε̄ ρ̄ογαμοε⁷⁹⁹ χ̄ῑ ζ̄ ν̄κρατος̄ ν̄αρατος̄ ν̄αρτιμεσις̄ εφρωχ̄ μ̄ν̄ ογεφιδ̄ χρω̄ εροογ̄

«(314) Someone whose gums have gangrene: Take seven burnt ambrosia branches and honey; use for them».

Against Eye Diseases

P.Sarga 21, ll. 7-9

ογβαλ̄ εβτ̄ μοααγ̄ α.̄ πε̄ νβαλ̄ ναβ̄ [ω] κ̄ ριμοογ̄ νεμχ̄ωλ̄ ριεβιδ̄ †εῑ εφ̄ [...]ογμονε̄ ογσιωε̄ νβαμπε̄ ριεβιδ̄ π̄

⁷⁸ My English translation of the French translation by CHASSINAT 1921: 317, with slight modifications.

⁷⁹ ρογν̄ «inward parts». CRUM 1939: 686b.

⁸⁰ My English translation of the French translation by CHASSINAT 1921: 322, with slight modifications.

⁸¹ SAWY 2022: 139.

⁸² Cf. καθαρισμός «cleansing, purification, purificatory offering». LIDDELL, SCOTT & JONES (eds.) 1996: 850a.

«An eye that waters: ... of raven's eye (8) and water of onions and honey. Apply (them) to [it ... a goat's gall and honey ...]»³⁹⁰.

Ch.89

(172) ογμοογ μ̄ν ογσιου εφ̄ε̄ν ογβαλ κοπροσ⁴¹⁰ ν̄σερομπε θνοογ (sic) καλωσ ρι εφ̄ω ν̄ατμοογ χρ̄ω

«(172) A cataract and a blot in an eye: pigeon droppings; crush them well with honey without water; apply»⁴¹¹.

Ch.204 & 205 recommend honey as a remedy against eye that have mist - for treating the darkening of the eye:

Ch.204

(371) Ομεοσ ογρλοσ̄τ̄ν ρ̄ν ν̄βαλ εσ εγο μ̄μοογ αμμωνιακογ θγμιματοσ β̄ νιτρον β̄ εφ̄ω ν̄ατμοογ χρ̄ω

«(371) Likewise: A mist in the eyes or (eyes) that are suffering from cataracts: ammonia gum two obols, natron two obols, honey without water; apply»⁴¹⁶.

Ch.205

(372) ομεοσ εφ̄ω ν̄ατμοογ σιωε ν̄ζθω≡ χρ̄ω

(372) Likewise: Honey without water, calf's gall; apply⁴¹⁷.

Against Cataract

Ch.165

(323) ογα ερε νεφβαλ ογ̄ν μογ̄ν̄ρ̄όγ̄ν σιωε ν̄ρη̄τ̄σ σιωε ν̄ερσο̄ι εβ̄ω κ̄ρμεσ ν̄χαρ̄τησ ν̄ριερᾱτικον χρ̄ω

(323) Someone whose eyes have cataract: Gall of ichneumon (?), gall of chicken, honey, hieratic paper ash; apply⁴²⁴.

VI. COPTIC TITLES, PROFESSIONS AND NAMES ASSOCIATED WITH HONEY

In Coptic texts, particularly in legal documents, lists and letters, several jobs related to honey are mentioned, including honey delivery. These roles appear as follows:

σανεβιω «honey dealer (seller)»:

In a list form the monastery of Epiphanius in Thebes, the honey-seller Aron αρων βελη σανεβιω was mentioned:

Epiph. 561, a list (?)

«The mother of T ..., (the) smith; Aron the blind, the honey-seller; Anatolius (son?) of Thabau; the camel 4 Epiphanius wished (?) to bring up»⁸³.

A honey-seller σανεβιω was recorded in an inscription at Bawit⁸⁴: απα απολλω ροις εψαζ πανσε πασανεβιω «Apa Apollo watch over the master Paese the honey dealer»⁸⁵ In

⁸³ CRUM & EVELYN WHITE 1926: 295.

⁸⁴ MASPERO & DRIOTON 1932–1943: 99, №. 268 1.2.

⁸⁵ My translation

addition, it appeared in the unpublished letter № 272 (CC)⁸⁶: ΔΔ]ΥΕΙΔ ΠΣΑΝΕΒΙΩ «David the honey dealer»⁸⁷.

ΕΒΙΤ; ΕΒΕΙΤ «honey dealer»

The second title associated with honey was ΕΒΙΤ; ΕΒΕΙΤ (pl. ΕΒΙΕΤΕ), which means «honey dealer»⁸⁸ was found in P.Mich.inv. 2066, (recto)⁸⁹ dating back to the 6th-7th centuries⁹⁰. The title ΕΒΕΙΤ appeared in *P.Mon.Apollo I 47*; *SB Kopt. I 52*⁹¹, which was a deed for surety from the Hermopolite Monastery of Apa Apollo and associated with two names, i.e., ΑΠΟΛΛΩ ΠΕΒΙΕΤ «Apollo the honey-dealer» and ΕΝΩΧ ΠΕΒΙΕΤ «Enoch the honey-dealer».

During Pharaonic period, some beekeepers were part of the temple staff. Beekeepers could be found serving in Coptic monasteries⁹². Up to the Middle Ages, bees were kept in monasteries. A papyrus from the monastery of Apa Apollo in Hermopolites states the following:

«You have given us a lease for two hundred and fourteen⁹³ honeybees. We now vouch for Enoch, the beekeeper, that he will not deceive you in their affair. If he deceives you - (he) or a man of his - you are free with regard to them... And if anything happens to you in your place concerning the matter of our bees, then we reject your claim»⁹⁴.

According to this security certificate, the monastery rented 214 hives of bees to Lazaros, a beekeeper from Tbake. The bees were looked after by Enoch, the beekeeper of the monastery and his staff. The honesty of Enoch, the monastery's beekeeper, was guaranteed by this letter. However, as Lazaros was the renter, the monastery was not responsible for any harm the bees could create⁹⁵.

Few texts addressed the amount of hives over which the owner or a beekeeper was responsible. From the security document mentioned above it could be seen that the monastery leased 214 of its hives. It could be assumed that it had other sticks. Some surviving documents from the Ptolemaic period gave further numbers.

One owner leased 1,000 hives to beekeepers in Herakleopolis and Memphis (PCZ III 59368.). Two brothers owned 487 hives, which were divided between the Herakleopolites and the Memphites. Eighty-seven of these were farmed in Toka. Another beekeeper from Herakleopolis had 5,000 bee colonies in his homeland and Oxyrhynchus (*P.Oxy. Inv. 34 4B.73/B (1-2)a*)⁹⁶. These sources showed that in addition to

⁸⁶ CRUM 1921: 74.

⁸⁷ My translation

⁸⁸ CRUM 1939: 52b.

⁸⁹ «*P. Mich. inv. 2066; Recto*», <https://quod.lib.umich.edu/a/apis/x-8791/2066r.tif>. University of Michigan Library Digital Collections, accessed on (21/11/2023).

⁹⁰ «Metadata», <https://papyri.info/apis/michigan.apis.8791>, accessed on (22/12/2023).

⁹¹ SATZINGER & SIJPESTEIJN 1988: 49-51; Clackson 2000: 122, N^o.50.

⁹² FEIERABEND 2009: 75.

⁹³ It is argued that the number of 214 honey bees probably meant the individual hives, as a bee colony consisted of 30,000-70,000 bees. FEIERABEND 2009: 75.

⁹⁴ English translation from the German translation of SATZINGER & SIJPESTEIJN 1988: 49f.

⁹⁵ FEIERABEND 2009: 75.

⁹⁶ PARSON 2007: 111f.

small beekeeping operations with a few hundred hives, there were also those with several thousand hives⁹⁷.

VII. LITURGICAL USES OF HONEY

Honey was employed in several different ways and associated with numerous theological and metaphysical ideas following the birth of Christianity. For instance, John the Baptist subsisted in the wilderness on a diet of locusts and wild honey, whereas Jesus, following his resurrection, consumed a honeycomb and fish.

Honey was used for liturgical purposes, in BM 1007 (Or. 5899 (1)) Fol. a: a prayer of exorcism, contained magical words and an invocation to the angel Gabriel to be recited over water, oil and honey.

In *Canones Apostolorum*¹: ογορ ογέρωτ nem ογέβιω εγθητ επλινμορ ηνωω ητε νητ δε αφχορ δε τνατ νωτεν νογκαρι εφβατ ηέρωτ ρι έβιω⁹⁸. And a milk with a honey agrees to the filling/completion of the promises of the Fathers⁹⁹.

BKU 1 8, l. 33, (BERLIN P. 8318)¹⁰⁰ Magical text for good singing voice contained list of martyrs of Sebaste: «ALAPHABE EPHOUAU SAENOUOPH KAAPHPE KOPH! I adjure you by your names and your powers and your amulets, so that you might work your 20 powers upon it and perform for me a good thing without any evil, 1 but good for me. When I drink from it, 1 let my tongue become exalted like a sweet trumpet 1 in my mouth, like raw honey»¹⁰¹.

VIII. HONEY AS NUTRIENT CONTENT

There is evidence of honey consumption in the Byzantine and Arab eras. Contrary to what the archives showed, «beekeeping» was probably more widespread in Byzantine Egypt than in previous periods. Given the lack of additional sweeteners, this must have been the case¹⁰². Before sugar was introduced after the Crusades, honey was the only sweetener that was available for many years and was the main ingredient in different kinds of cakes¹⁰³. In addition, honey was needed as an ingredient for intoxicants and pastries. Due to its antioxidant capabilities, it was a welcome addition to a variety of recipes for cooking, baking, herbal tea and food preservation.

Honey was a vital food item served during certain days and seasons in monasteries. Furthermore, wax was a fundamental component of the so-called encaustic technique and was combined with Chios mastic to create a dye that applied to sculptures in addition to its obvious application for candles¹⁰⁴. Moreover, as I discuss below, honey was widely used in medical recipes. Both honey and wax were used for many purposes in several medical recipes.

⁹⁷ FEIERABEND 2009: 76.

⁹⁸ DE LAGARDE 1883: 257.

⁹⁹ My translation.

¹⁰⁰ Published without image, Translation: LEXA 1925: 163, №.III; KROPP 1931-2: 109–113, №.33; MEYER & SMITH 1994: 244–246, №.121.

¹⁰¹ MEYER & SMITH 1994: 246.

¹⁰² MIKHAIL 2000: 116.

¹⁰³ BAGNALL 1993: 31.

¹⁰⁴ GERMANIDOU 2017: 96.

Dates, which was like a cheap version of honey, have long been abundant in Egypt. In fact, «date honey» was mentioned in texts. Similar applications existed for raisins as well. Data suggests that mostly wealthy people used it, which might provide fresh insight into the use of honey in historical literary works. Honey was sometimes thought to represent wealth and nobility¹⁰⁵. Here are some Coptic desserts food names: The Bohairic word κηβι; κεβι means «honey cake»¹⁰⁶.

Mizr: Honey appeared to be used in some drinks in the Islamic period, such as a specific type of beer called *mizr*, which seems to have been produced from grains (and sometimes honey)¹⁰⁷.

Honey is frequently mentioned in the Bible as food. In fact, John the Baptist mostly lived off of locusts and wild honey «*John wore clothing made of camel's hair, with a leather belt around his waist and he ate locusts and wild honey*»¹⁰⁸.

The Bible has numerous references to honey, including its use as nourishment along with milk and butter: «*It shall be in that day that a man will keep alive a young cow and two sheep; So it shall be, from the abundance of milk they give, that he will eat curds; For curds and honey everyone will eat who is left in the land*»¹⁰⁹. «*And because of the abundance of the milk they give, there will be curds to eat. All who remain in the land will eat curds and honey*»¹¹⁰.

Honey was used to make a special kind of food called «*manna*»: ἀγῶ ἀγμοῦτε ἐπέφραν νοβι νόηρη ἠπισρανῆ δέπμαννα νεφο δε ντζε νοῦβρεῶνῆ εφοῦοβῶ ερετεφῆπε ο ντζε νοῦαγκρις ρνοῦεβῶ¹¹¹ «*The people of Israel called the bread manna. It was white like coriander seed and tasted like wafers made with honey*»¹¹².

When Jesus first appeared to his apostles after his resurrection, he asked for food and received a honeycomb and grilled fish. To prove to the apostles that he was indeed raised from the dead and wasn't just a ghost or an illusion, Jesus ate the food: «*But while they still did not believe for joy and marveled, he said to them, «Have you any food here?» So they gave Him a piece of a broiled fish and some honeycomb. And He took it and ate in their presence*»¹¹³.

Honey was eaten with locusts: «*John's clothes were made of camel's hair and he had a leather belt around his waist. His food was locusts and wild honey*»¹¹⁴ and with flour: «*So you were adorned with gold and silver; your clothes were of fine linen and costly fabric and embroidered cloth. Your food was honey, olive oil and the finest flour. You became very beautiful and rose to be a queen*»¹¹⁵.

¹⁰⁵ MIKHAIL 2000: 116.

¹⁰⁶ CRUM 1902: 99b.

¹⁰⁷ MIKHAIL 2000: 107.

¹⁰⁸ MK. 1: 6.

¹⁰⁹ Is. 7:21-22.

¹¹⁰ Is. 7:22.

¹¹¹ CAROLINE T. SCHROEDER, ZELDES *et Al.*, *Coptic SCRIPTORIUM*, 2013–[2023]; <http://copticcriptorium.org>, accessed on (02/01/2024).

¹¹² EX. 16: 31.

¹¹³ LK.24: 42.

¹¹⁴ MT.3: 4.

¹¹⁵ EZ.16: 13.

Moreover, with milk only «Your lips drop sweetness as the honeycomb, my bride; milk and honey are under your tongue. The fragrance of your garments is like the fragrance of Lebanon»¹¹⁶.

IX. HONEY AND MAGIC

Honey played an essential role in Coptic magical formulae. A great number of magical formulae recommended reciting the prayer or spell on honey, such as *P. Lond. Copt.* 1007/ British Library MS Or. 5899(1)¹¹⁷, a part of a prayer of exorcism. The prayer contained magical words that invoke the angel Gabriel, to be recited over water, oil and honey¹¹⁸.

«(a) THEMOUNPH [...] ZARZAL ... PHIRACHACHA ..., send me today, Gabriel, the archangel who has received the good news of the son of the almighty until today, so that he might come down on this water and this oil [...] and this honey and mark the water and fill it with healing and favor and peace and uprightness and salvation»¹¹⁹.

P. Mich. MS 136, 2-14¹²⁰ a book of ritual spells for medical purposes, contained a spell for a malignant disease; it recommended using honey and other ingredients. Another recipe recommended that honey be used on sores «A little fresh fat from a sow: Grind it. Put it on sores that have appeared at the anus, along with real honey»¹²¹.

In *Köln* N^o.20826¹²², honey appeared to be used in the ritual with other power words, which were recommended to be written on the tongue of the person using the spell for protection. In addition, honey was recommended to be used in a Love spell *Cairo JdE* 42573, 3, ll.1-5:

ΟΥΩΩ ΒΑΠ ΠΙΩΕ ΜΠΣΑΡΑΒΩΩ ΜΝ ΤΒΩΤΕ ΝΤΕΚΜΕΣΤΝΖΗΤ ΜΗ ΠΕΣΝΟΦ
ΕΠΕΚΝΟΒ ΝΤΗΗΒΕ ΜΝ ΠΚ[[ΣΠΡΜΑ]] ΤΒΒΟΟΥ ΖΪ ΕΦΙΩ ΝΑΤΑΚΤΟΝ¹²³ ΝΣΟΥ̅ΙΔ̅ ΜΠΟΟΥ
ΣΠΡΜΑ ΤΑΦ ΝΑΣ ΝΕΣ†ΧΟΣ

«Desire. Take the gall of the hare and the sweat of your chest and the blood of your big finger and your [[semen]]. Purify them with Attic (?) honey. On the 14th day of the moon. Semen. Give it to her, fasting»¹²⁴.

¹¹⁶ SO. 4: 11.

¹¹⁷ CRUM 1905: 417–418, N^o.1007. Translations: KROPP 1931: 123, N^o.38; MEYER & SMITH 1999: 103–104, N^o.57.

¹¹⁸ CRUM 1905: 417.

¹¹⁹ Translation: MEYER & SMITH 1994: 103.

¹²⁰ WORRELL 1935: 17–37, N^o.4; MEYER & SMITH 1994: 83–90, N^o.43; PERNIGOTTI 1995: 3715–3717, N^o.21.

¹²¹ Translation: MEYER & SMITH 1994: 89.

¹²² RÖMER & THISSEN, 1990: 175–181; VAN DER VLIET 1998: 119–122; MEYER & SMITH 1994: 110–111, Nr^o. 59; SCHENKE 2017: 247–252.

¹²³ ΔΤΑΚΤΟΝ, i.e, Greek ἄτᾱκτον mistake for ἄττικόν? CRUM CD 52B or ἄκρατος «unmixed» cf. CDO sv. ἀκρατον: ἄτηκτος CHASSINAT, www.coptic-magic.phil.uni-wuerzburg.de/index.php/text/kyp-t-1680, accessed on (19/ 03/ 2023).

¹²⁴ KORSHI DOSOO, EDWARD O.D. & PREININGER (eds.) «KYP T1680: Love spell», Kyprianos Database of Ancient Ritual Texts and Objects, www.coptic-magic.phil.uni-wuerzburg.de/index.php/text/kyp-t-1680, accessed on (11/10/ 2023).

Coptic magical texts contained a number of ritual analogies to animals and the honey-bee was used as one of these analogies in a spell for sex and favor, i.e., *London Hay* 10414a (recto)¹²⁵.

«That she may be (like) a honey (-bee) seeking (honey), a bitch prowling, a cat going from house to house, a mare going under (sex-) crazed (stallions)»¹²⁶ (verso) «At the moment that you will sprinkle yourselves in the dwelling place and gather for me the entire generation of Adams and all the children of Zoe, as they bring me every gift and every bounty, they must gather before me, all of them, like a honey bee into the mouth of a beehive»¹²⁷.

Berlin 8318/ BKU 1 8¹²⁸, a spell for a good singing voice, recommended using wild honey to cause drunkenness, along with other ingredients: «This is the mixture in the chalice: 21 grape seeds; 12 grains wild mastic, with a little wild honey diluted with a little Tobe water [...] and grapes (?) and a torch that burns three days; this bit of white wine with a ... on a reed mat with clothing ... at night while you eat bread ... these ... when ... write in a book, bind ... another one, is bound to his mouth ... is bound ... drink it»¹²⁹.

Another spell for the same purpose, i.e. a good singing voice, is *P.Yale* inv. 1791¹³⁰, where white honey was mentioned with other ingredients: «White honey; white wine; To be water (?). Offer greetings (?) 21 times (?), ... 21 times (?). This is the preparation of the chalice»¹³¹.

London Oriental Manuscript 6794¹³², a spell to obtain a good singing voice, «You write the amulets with real honey, undiluted, unscorched, on an alabaster tablet. Wash them in white wine. White grapes-21. Wild mastic-21. Arabian gum, called «claw.» A white robe»¹³³. The Coptic hoard of spell *Michigan* 593¹³⁴ is a codex with 20 pages, dating back to the 4th-6th century BC. It lists honey twice within the spell: the first time involves reciting the spell on honey 15 times and the other time instructs one to eat the fried hawk's egg with honey: «You are to recite it seven 15 times over some honey and some licorice root. It sets a reminder within you, for ever and ever, in your mind and spirit. Take a hawk's egg and fry it, then eat it over the honey, purifying yourself for forty days until its mind appears to you»¹³⁵. The spell contains *Voces magicae* and the invocation is used for various purposes such as reptile bites, fevers, swellings, spleen

¹²⁵ MEYER & SMITH 1994: 169–170, №.80; CRUM 1934: 1/2, 51–53; 3/4: 195–200; KROPP 1930–1931: vol.1, №. M; vol.2, №. XIV; ZELLMANN–ROHRER 2020: 169–179; ZELLMANN–ROHRER 2022: 1049–1064.

¹²⁶ Translation: MEYER & SMITH 1994: 167.

¹²⁷ MEYER & SMITH 1994: 169.

¹²⁸ LEXA 1925: 163, №. 3; KROPP 1931: 109–113, №.33; MEYER & SMITH 1994: 244–246, №.121.

¹²⁹ MEYER & SMITH 1994: 246.

¹³⁰ «This papyrus is inscribed on both sides and contains two individual ritual instructions, the first one is for gaining a good singing voice, the second is a love spell for attracting a woman. Both spells are accompanied by drawings and magic signs». DZWIZA 2013: 850–854, SAP-K-XY-003; 855–858, SAP-K-XY-004. MEYER & SMITH 1994: 246–248, №. 122; 348–353; PETERSEN 1964: 38–39, №.53.

¹³¹ MEYER & SMITH 1994: 47.

¹³² KROPP 1931.2: 104–109, №. 32; MEYER & SMITH 1994: 279–280, №.129.

¹³³ MEYER & SMITH 1994: 280.

¹³⁴ MEYER & SMITH 1994: 304–310.

¹³⁵ MEYER & SMITH 1994: 305.

diseases, headaches, vertigo, hemorrhages, against enemies, for protecting the house and sheep, for protecting ships at sea, for desire, evil eyes and for other purposes.

X. CONCLUSION

Ancient Egyptians favored bees because these insects were associated with royal ideology, as a symbol of legitimacy. This is why bees are shown on the cartouches of all reigning sovereigns throughout Egyptian history. Bees were extremely important since they were connected to several gods in the ancient Egypt pantheon.

Ancient Egyptians understood the value of bees because they were the only source of honey. They began beekeeping in the Old Kingdom and the practice continued through to the Roman Empire. In addition, honey was associated with certain religious ideas and practices; certain priests adopted the alias of beekeepers, taking responsibility for gathering the honey needed for religious rites dedicated to various gods, including Amun and Min. In the post Pharaonic and Late Antique periods, honey was used in a wide variety of applications and connected to a wide range of theological and philosophical concepts. John the Baptist, for example, survived in the desert by eating locusts and wild honey, whereas Jesus, after his resurrection, ate fish and honeycomb. In addition, honey appeared in daily life texts such as letters, sales contracts and in some magical spells. Despite the paucity of sources on beekeeping in Coptic texts, honey was a major ingredient in many medical prescriptions. Thus, honey was considered to be one of the most important products that had nutritional, economic, religious, magical and medicinal value throughout the ages.

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ARCHITECTURAL CHARACTERISTICS OF THE ISLAMIC DOMED CHAMBERS IN CHINA

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ABSTRACT

[EN] This paper examines the architectural characteristics of Islamic domes in China. It presents an examination of five mausoleum domes in Guangzhou and Yangzhou, such as the Dome of Saad bin Abi Waqqas in Guangzhou, the Dome of Bahauddin, the Dome of Jamal al-Din, the Dome of Saganda and the Dome of Fana, all of which are in the Islamic cemetery in Yangzhou. As for the mosques, a total of 11 domes were erected in the mosques of Hangzhou, Beijing, Shanghai, Dingzhou and Shenyang. Therefore, the total number of domes examined by the study was 16. In addition to the descriptive and architectural approach, the study provided a historical approach to ascertain the history of dome architecture and an analytical comparative approach to the architectural characteristics of both local and Islamic architecture to determine the extent of influence and impact between the two styles. Except for the Shenyang Dome, built during the Ming dynasty (1368-1644 AD), most of the domes date back to the Yuan dynasty (1271-1368 AD). Thus, this case raised many questions. For instance, the study raised a question about the appearance of domes during the Yuan dynasty but not in subsequent eras. A local Chinese roof was added over the domes during the Ming dynasty. The study formulated hypotheses about the appearance of double-shell domes and their relationship to political and social variables during the Ming Dynasty. In this regard, the study explored the domes of Islamic architecture in China and demonstrated the extent of the contribution of the Muslim community to Chinese architectural arts.

KEYWORDS: Chinese Muslims, Chinese domes, Gabled roofs, Transition zones, Lingjiaoyazi, Dougong.

[AR]

السمات المعمارية للغرف الإسلامية المقببة في الصين

يتناول هذا البحث الخصائص المعمارية للقباب الإسلامية في الصين الداخلية. وتقدم الدراسة فحصاً لعدد خمسة قباب ضريحية في كل من مدينتي قوانغتشو ويانغتشو مثل: قبة سعد بن أبي وقاص في قوانغتشو، وقبة بهاء الدين، وقبة جمال الدين، وقبة ساغندا، وقبة فانا، وجميعها تقع في المقبرة الإسلامية في يانغتشو. أما بالنسبة للمساجد؛ فقد أُقيمت 11 قبة في مساجد هانغتشو، وبكين، وشانغهاي، ودينغتشو، وشنيانغ؛ بذلك يكون إجمالي عدد القباب التي فحصتها الدراسة 16 قبة. بالإضافة إلى المنهج الوصفي والمعماري، تقدم الدراسة منهجاً تاريخياً للتأكد من تاريخ عمارة القبة، ومنهجاً تحليلياً مقارنة للخصائص المعمارية لكل من العمارة المحلية والإسلامية لتحديد مدى التأثير والتأثر بين الأسلوبين. باستثناء قبة شنيانغ التي بنيت في عهد أسرة مينغ (1368-1644م)، فإن تاريخ معظم القباب تعود إلى عصر أسرة يوان (1271-1368م)؛ لذا فإن هذه الحالة تثير العديد من التساؤلات. وتطرح الدراسة سؤالاً حول ظهور القباب في عصر أسرة يوان دون العصور اللاحقة. تمت إضافة سقف صيني محلي فوق القباب خلال عهد أسرة مينغ، وقد أثارت الدراسة تساؤلاً حول تلك النقطة، كما قدمت فرضيات حول ظهور القباب ذات الغطاء المزدوج خلال عصر أسرة مينغ وعلاقة هذه الحالة بالمتغيرات السياسية والاجتماعية خلال تلك الحقبة. وفي هذا الصدد، تسعى الدراسة إلى استكشاف قباب العمارة الإسلامية في الصين، والتعرف على أساليبها المعمارية والفنية، وبيان مدى مساهمة المجتمع المسلم في الفنون المعمارية الصينية.

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I. INTRODUCTION

The study adopted several methods to achieve its objectives: The historical approach, by exploring the historical references on the mosques and the descriptive approach, by discovering the architectural features of the domes and their structure in successive historical documents. In addition to the analytical study, we formulated some hypotheses and ideas about the architecture of the dome. Although the Muslim communities in China were minorities in a multi-ethnic and multicultural country that was not ruled by Muslims, they were not isolated from the Islamic civilization and Islamic arts of the Islamic world. These communities contributed greatly to the Islamic and Chinese civilizations. Muslims built their mosques, schools, mausoleums and cemeteries with a mixture of Chinese and Islamic artistic styles. Generally, Islamic domes in China can be divided into funerary and mosque domes. The paper examines 16 domes, including mausoleum domes and mosque domes.

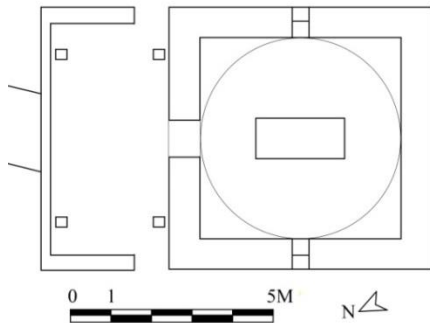
II. THE DOME OF SAAD IBN ABI WAQQAS (WANGESUMU)

Guangzhou has an Islamic cemetery called the Guangzhou Mausoleum of Ancient Islamic Sage, located in the Guihuagang District of Yuexiu District [FIGURES 1-5]. Its popular name is Wangesu Tomb (宛葛素墓) [FIGURES 1-5]. Chinese Muslim sources indicate that Saad Ibn Abi Waqqas built the Huaisheng Mosque in the city, which retains an inscription dated 1206, indicating that the mosque was built by the uncle of the Prophet Abu Waqqas in the first Muslim embassy to China in 630 AD. This claim is generally accepted by Chinese Muslims and supported by much historical evidence. According to Chinese historians, such as the historian He Qiaoyuan (何乔远) (1558-1632 AD), the historian of Fujian province, who pointed out that the Prophet Mohamed sent a delegation of Sahaba (companions) to China headed by the Saad Ibn Abi Waqqas. He Qiaoyuan wrote, «the country of Modena [al-Madīna in the Arab countries] have Mahanbade (the Prophet Muhammad) who was born in the Sui dynasty era during the first year of the Kaihuang period [581 AD] ... He had four companions who came to China as missionaries during the Tang dynasty, in the Wude period [618 - 626 AD, the reign of Emperor Gaozu of Tang]. One of them went to Guangzhou, the other went to Yangzhou and two of them went to Quanzhou, [these two] were buried in this mountain [Lingshan mountain]»¹.

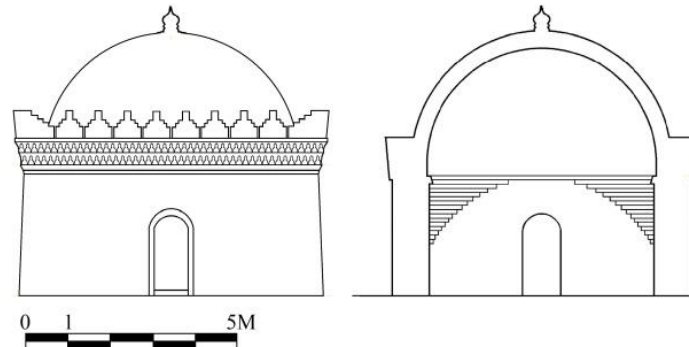
In any case, the foregoing shows that the details of the visit of Saad Ibn Abi Waqqas to China in 587 AD are far from logical as the venerable companion was born in 592 AD, which makes the «alleged visit» took place five years before his birth. Accordingly, the construction of the Huaiheng mosque and his tomb are completely unrelated to Saad Ibn Abi Waqqas, who never visited China. The mosque, like many mosques in China, was probably built by an Arab merchant or preacher who

¹ CHEN 2015: 15.

immigrated to China. It seems that the mausoleum dome attributed to Ibn Waqqas was built during the Yuan dynasty when Muslims rebuilt the Huaisheng Mosque in 1350, during the era of Emperor Huizong (1333- 1370) [FIGURES 1/A-B & 2].



[FIGURE 1/A]: Plan of Wangesumu dome © Done by the researcher



[FIGURE 1/B]: Sections of the Wangesumu dome © Done by the researcher

al-Ashab Mosque in Quanzhou retains a Chinese stele erected in 1350 AD, whose inscriptions mention that the Huaisheng Mosque was built by Saad bin Abi Waqqas. We quote from it: «During the seventh year of the Kaihuang period [587 AD], the Sahaba Saade Wogesi (撒阿的鞞葛思) sailed and came from the country of Dashi (the Arabs). Ibn Abi Waqqas built a mosque in the city of Guangzhou and the mosque was named Huaisheng». This inscription is the oldest Chinese historical reference and text on Saad bin Abi Waqqas’s visit to China and the building of the Huaisheng Mosque in the city of Guangzhou in 587 AD².



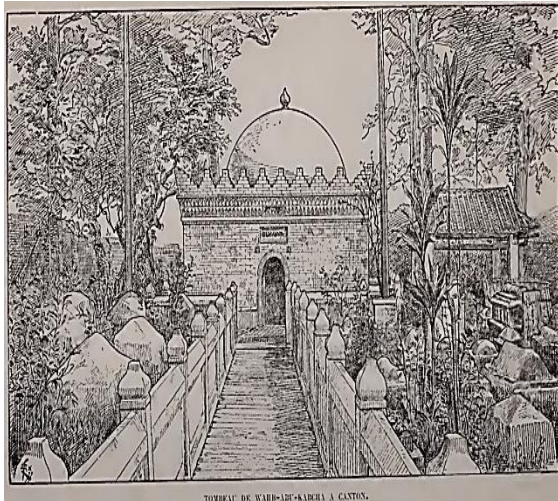
[FIGURE 2]: Exterior and interior views of the Wangesumu dome © Photo taken by the researcher

Philibert DABRY DE THIERSANT (d. 1898), the French consul to China, visited the shrine between 1857 and 1871 AD and presented a painting for it [FIGURE 6]. He published it in 1878 AD in his book (*Le Mahometisme en Chine et dans le Turkestan Oriental*). He described the picture presented to the shrine [FIGURE 3] as follows: «The cemetery contains around thirty domed tombs, made of brick covered with lime and

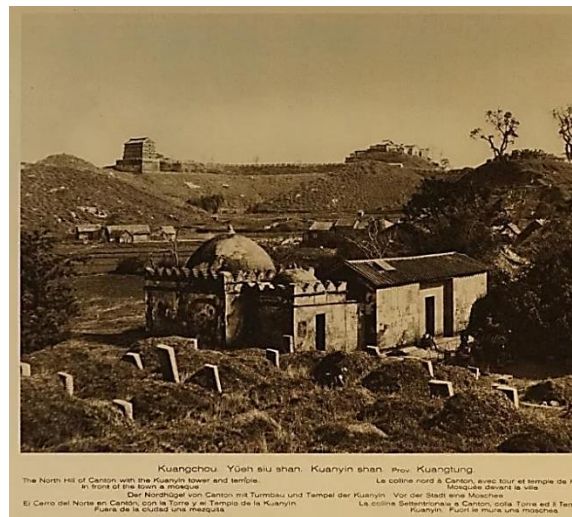
² HAGRAS 2023 A: 706-727.

without any inscription. In the center of the cemetery, there is a square building, topped with a dome 5.64 m high. It is in this small building that the tomb of Wahb-Abi-Kabcha is located, which bears the name of Kiang-fen, the tomb of the echo. The walls are 0.50m thick and 6.60 m wide. You enter the interior through a small door above, which has been engraved, in Arabic characters, the following inscription: «O my God, you whose doors are always open to piety and goodness, open them so that we may receive your many benefits». In the middle of the chamber is a rectangular parallelepiped, made of bricks, 2.50 m long by 1.02m wide and 0.40 m high»³.

Ernst Borchmann (d. 1949), a German architect and photographer, also visited the city and presented a picture of the mausoleum in his study entitled (*Baukunst und Landschaft in China*), published in 1923⁴. According to Burchman's photo [FIGURE 4], the dome of Saad bin Abi Waqqas is located on the northern hill of the city. In addition to the dome of Saad, another dome appears in Burchman's photo. Although this non-extant dome has smaller dimensions than the Dome of Saad, it is structurally considered entirely similar, especially in its architectural elements.



[FIGURE 3]: The Wangesumu between 1857-1871 AD by De Thiersant. by De Thiersant, *Le Mahometisme en Chine*, 1878, the front page.



[FIGURE 4]: The Wangesumu in 1923 AD by Borchmann. BORCHMANN 1871: 232.

III. THE DOMED MAUSOLEUMS IN YANGZHOU

Yangzhou has an Islamic cemetery known as Xianxian-Mu (先贤墓) [FIGURES 8-10]. The cemetery contains four domes: The Dome of Sheikh Bahauddin, the Dome of Mohamed Jamaluddin, the Dome of Saganda and the Dome of Fana [FIGURES 5-8]. There is a popular tale among Chinese Muslims that the Abbasid Caliph in Baghdad sent an envoy named Bahauddin to China during the Southern Song dynasty

³ DE THIERSANT 1878: 99.

⁴ BOERSCHMANN 1923: 232.

(1127-1279 AD), who spread Islam in Yangzhou and established a new mosque in 1275. The mosque was built during the Yuan dynasty (1271-1368 AD) by an Arab cleric named Bahauddin (普哈丁)⁵. According to historical texts, Bahauddin arrived in Yangzhou during the Xianchun (咸淳) period (1265-1274); after three years, he moved his residence to the south of the city⁶. Sheikh Bahauddin settled in Yangzhou during the Southern Song dynasty and died in the first year of the Deyou (德祐) period [1274-1275 AD] (corresponding to 1275 AD). One of the popular stories among Chinese Muslims associated with Sheikh Bahauddin is that after he completed the construction of the Xianhe Mosque, he moved to Shandong. On his way back from Jining to Yangzhou in 1275, he passed away in the cockpit of a ship, so he was buried in a knoll on the East Bank of the Guanhe River by Yuan Guang'an (元广恩), the governor of Yangzhou⁷.



[FIGURE 5]: Dome of Yangzhou Cemetery: Left (Fana dome), Right (Bahauddin dome) and the middle (Jamaluddin dome) © Photo taken by the researcher



[FIGURE 6]: The Chinese inscription above the entrance of the Fana dome © Photo taken by the researcher

The tomb of Buhaoding (补好丁), also known as Puhading (普哈丁) in Yangzhou and «Babayao» (巴巴窑) is located on the pier on the east bank of the canal outside Dongguan, Yangzhou and occupies an elevated position⁸. There are indications for the Dome of Bahauddin in the Records of Janquan County (甘泉县志) that read: «The tomb of Bu Haoding, a monk from the Western Regions, is located on the east bank of the Guanghe River outside Dadongmen. Haoding traveled to Guangling and was buried here. He is usually called "huihuifen (回回坟)»⁹.

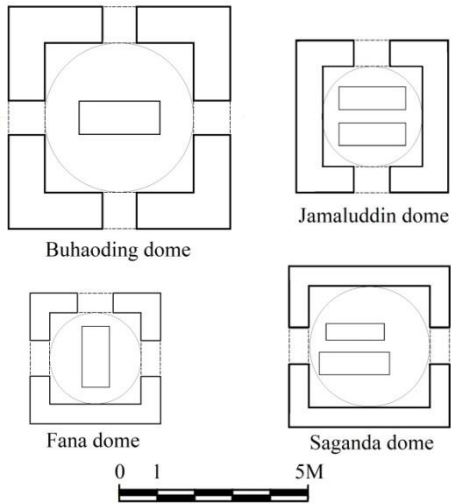
⁵ HUIYI 1733: vol.24, 393.

⁶ CPPCC 1999: 115.

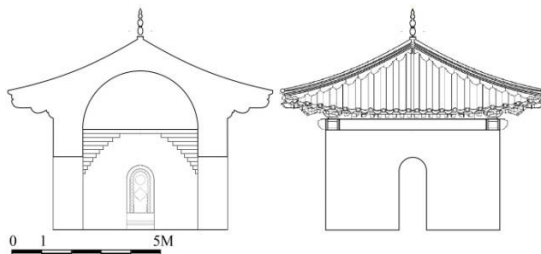
⁷ HUAIN 1989: 46.

⁸ TING 2011: 70-76.

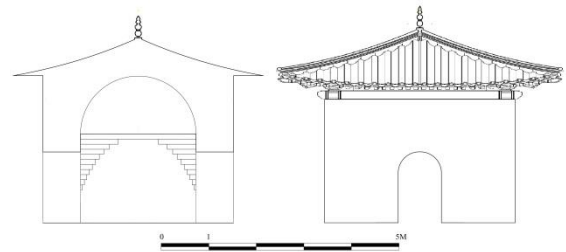
⁹ EZHI 1742: 18.



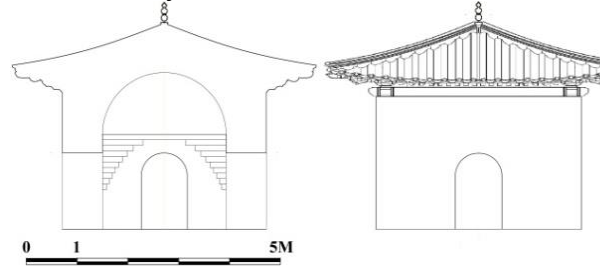
[FIGURE 7]: Plans of the Islamic domes in Yangzhou ©Done by the researcher



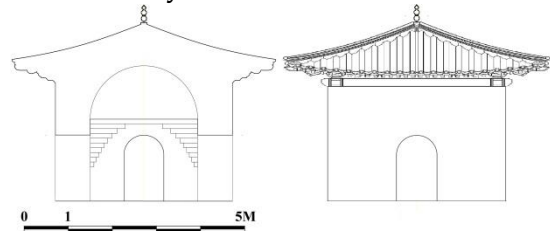
[FIGURE 8]: Sections of Bahauddin dome © Done by the researcher



[FIGURE 9]. Sections of Saganda dome © Done by the researcher



[FIGURE 10]: Sections of Fana dome © Done by the researcher



[FIGURE 11]: Sections of Jamaluddin in the dome © Done by the researcher

The domes of Fana [FIGURE 5], Jamaluddin and Saganda are located next to the Bahauddin Dome. There is a Chinese inscription hanging horizontally on the wall of the Fana Tomb, erected in 1776 AD [FIGURE 6], which reads: «In the first year of the Deyou [1275 AD] during the Song dynasty, Buhading came from the Western regions. He is a sixteenth-generation descendant of the Great Sage Prophet. In the third year of the Jingyan period [1278 AD] during the Song dynasty, the sage Saganda came from the western provinces. In the first year of the Ming Emperor Chenghua, [1464 AD], the sage Mahamode came from the western regions. In the fifth year of the Ming Emperor Zhanghua [1486 AD], Zhanmaluding came from the Western Provinces. In the eleventh year of the Ming Emperor Hongzhì [1497 AD], the Sage Fana came from the Western Provinces. In the year known as Bingshen [1776 AD] of the Qianlong era, the reconstruction process was completed»¹⁰ [FIGURES 9-11].

¹⁰ This translation is done by the author.

IV. DOMES OF THE MOSQUES

The erection of wooden domes over the square of the *mihṛāb* probably was a tradition among Chinese Muslims during the Song era. The dome of the Niujie Mosque in Beijing is an example¹¹. However, it seems that the erection of brick domes in the mosques of China was one of the influences of Persian architecture. The Seljuks had their first dome in Iran over the sanctuary of the Friday Mosque in Isfahan. The study counted 11 domes in Chinese mosques as follows: Three domes of the *mihṛāb* in Dongxi Mosque in Beijing, the dome of the *mihṛāb* in Tongzhou Mosque in Beijing, three domes of the *mihṛāb* of the Phoenix Mosque in Hangzhou, the domes of the Moon Tower and the *mihṛāb* in the Shanghai Mosque, the dome of *Mihṛāb* of Qinyang Grand Northern mosque in Henan and the dome of the *mihṛāb* of the Dingzhou Mosque in Hubei. Their structure dates back to the Yuan dynasty, except for the Qinyang Mosque, which was built in the Ming dynasty.

V. DOMES OF HANGZHOU MOSQUE

One of the oldest mosques in China, the Hangzhou mosque, stands in the city of Hangzhou on the west side of Zhongshan Road. It is known as the Zhenjiaosi (真教寺), as well as Fenhuangsi (凤凰寺), which literally means the Phoenix Mosque¹². The earliest historical references to the mosque were in the Song dynasty. The Local History of Hangzhou (杭俗遗风) includes a text about it, from which we quote: «*Huihui tang* (回回堂) [i.e. Muslim worship hall - mosque] is located in the «Wenjin» area south of the Grand Imperial Street [Song dynasty Palace Street], which is the place where Huihuijiaomen (回回教民) [Muslim community] gather together to worship, so it is called *libaisi* (礼拜寺) [mosque]. Its square hall rises sharply to a height of five or six Ren [about 10 m.]. It has colorful paintings on the façade and there is a decorative panel with the characters «*huijiao*» (回教) [Islamic]. It has a circular door in the center and a dome is built inside. It looks like a bell from afar ... it is not known how the interior was decorated, this is unique in the city of Hangzhou»¹³. This text is of great importance, as FAN ZUSHU (范祖述), the writer of the text, was a Song historian, strongly suggesting that the initial structure of the mosque may date back to the pre-Song dynasty. During the Yuan dynasty, it was rebuilt by the merchant Aladdin in 1281 AD¹⁴ and extensive renovations and repairs were undertaken during the Yuanyu period (1314-1320 AD). However, the current dome architecture dates back to the Song dynasty, as believed by most researchers¹⁵ [FIGURES 12-14].

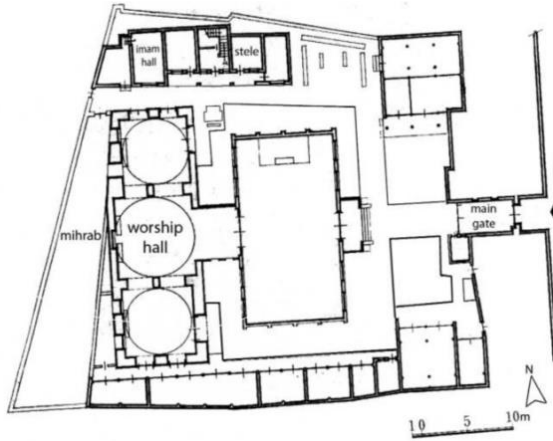
¹¹ HAGRAS (2023C): 81-104.

¹² TING 2011: 70-76.

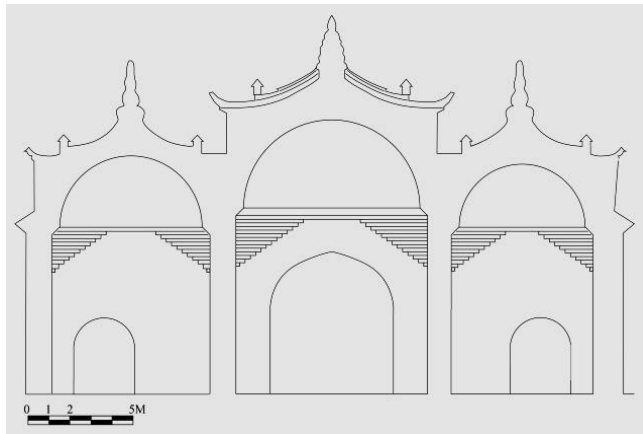
¹³ ZUSHU 1996: 153.

¹⁴ STEINHARDT 2008: 330-361.

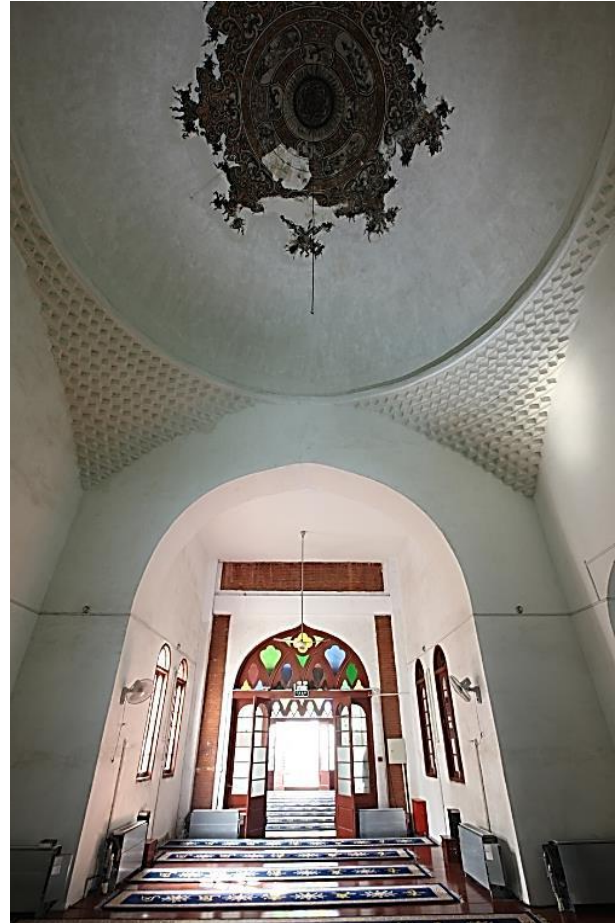
¹⁵ TONG 2000: 148.



[FIGURE 12]: Plan of Hangzhou Mosque. STEINHARDT 2008: 330:361.



[FIGURE 13]: Sections of Hangzhou domes © Done by the researcher



[FIGURE 14]: Interior view of the middle dome in Hangzhou Mosque © Photo taken by the researcher

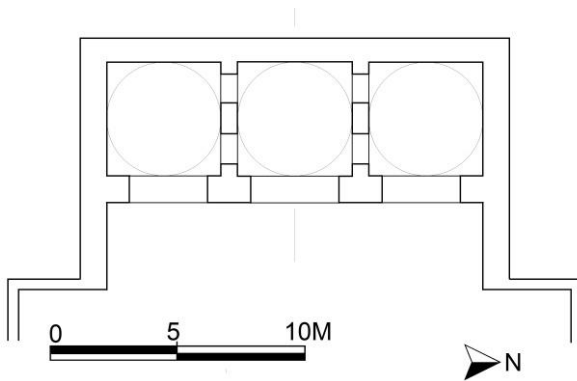
The prayer hall is the oldest and most important part of the mosque. It is the only architectural remains of the mosque from the Yuan dynasty. It consists of two spaces. The entrance porch is a rectangular projection, which measures 9 m. from north to south and 7 m. from east to west. The prayer hall is a rectangular space length from north to south 26 m. and from east to west 7 m. It consists of three domed chambers on the north-south axis. The wooden wall of the *mihrāb* is carved and inscribed with verses from the *Qur'an*; panels and pillar foundation stones belong to the Song dynasty era¹⁶.

VI. DOMES OF BEIJING MOSQUES

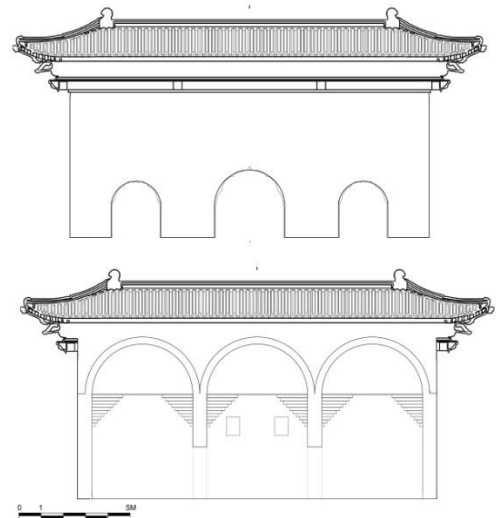
Two ancient mosques from the Yuan dynasty stand in Beijing: the Dongxi Mosque and the Tongzhou Mosque. The Dongsu Mosque is located on the southwest side of Dongsu Street in Dongcheng District. It is one of the largest mosques in Beijing and one

¹⁶ MIANZHI 1993: 107.

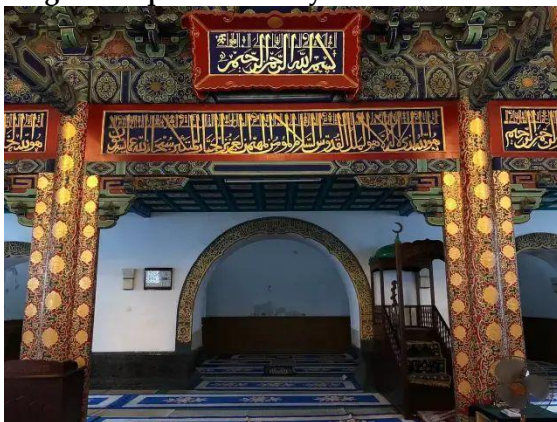
of the four official mosques of the Ming dynasty in Beijing.¹⁷ Its establishment dates to the Yuan dynasty (1271-1368 AD). The mosque was built by Sanad al-Din. However, there are two opinions about Sanad al-Din's construction of this mosque. First, Sanad al-Din built the mosque in the late Song dynasty (960-1279 AD) when the Niujie Mosque in the city contained a stone tablet mentioning that another Arab sheikh named Sanad al-Din built another mosque in Beijing. Second, most researchers believe that the mosque dates to the Yuan dynasty, in 1346 AD, during the era of Emperor Huizong (1333-1370 AD)¹⁸. The architecture of the *mihrāb* hall dates to the Yuan dynasty (1271-1368 AD). It is a rectangular space divided into three square rooms, each of which is roofed with a dome¹⁹ [FIGURES 15-18].



[FIGURE 15]: Plan of the *mihrāb* chambers of Dongsi Mosque © Done by the researcher



[FIGURE 16]: A section of the Dongsi Mosque © Done by the researcher



[FIGURE 17]: The main façade of the *mihrāb* chamber in the Dongsi Mosque © Photo taken by the researcher



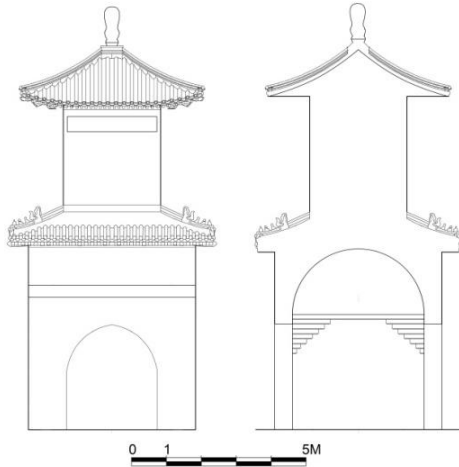
[FIGURE 18]: The transition zone of Dongsi domes © Photo taken by the researcher

¹⁷ SHE 2009: 67.

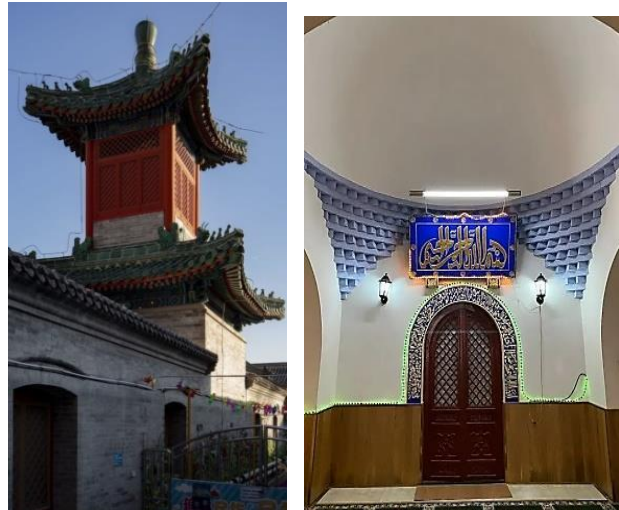
¹⁸ NING 2007: 29.

¹⁹ HAGRAS 2016: 84.

The Tongzhou Mosque is located in the Tongzhou suburb in the southeastern region of Beijing. This is one of the largest suburbs with the highest Muslim population density in the capital²⁰. Its construction dates to the Yuan dynasty (1271-1368 AD) during the reign of Ayurbarwada Buyantu Khan (1311-1320 AD)²¹. The *mihṛāb* hall is located on the western side of the prayer house and opens with an arcade of five pointed arches. It consists of five squares, the middle of which is covered by a brick dome²² [FIGURES 19-20].



[FIGURE 19]: Sections of the Tongzhou dome © Done by the researcher



[FIGURE 20]: Exterior and interior views of the Tongzhou dome © Photo taken by the researcher

VII. DOMES OF SHANGHAI SONGJIANG MOSQUE

Songjiang Mosque is the oldest mosque in Shanghai [FIGURE 21]. It is located in the Songjiang district. The original architecture dates to 1295 AD by one of the Muslim commanders, Nasr al-Din²³. According to local historical records of the region, the Muslim ruler was appointed governor of Songjiang in 1295 AD and held the position of Darughachi, the official responsible for appointing tax and administrative officials in the Mongol government²⁴. The mosque maintains two domes: the dome of the moon tower [FIGURES 22-23] and the dome of the *mihṛāb* chamber [FIGURES 23-25].

²⁰ SAI 2009: 13.

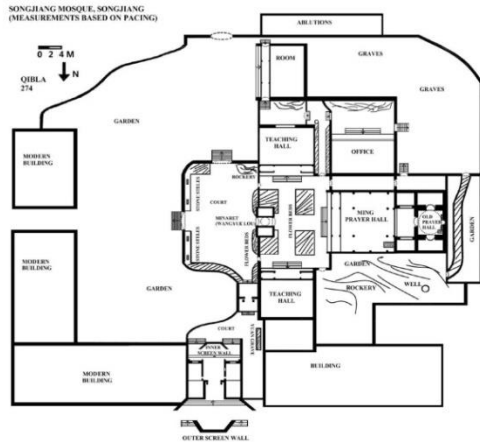
²¹ XUN 2003: 330.

²² HAGRAS 2016: 84.

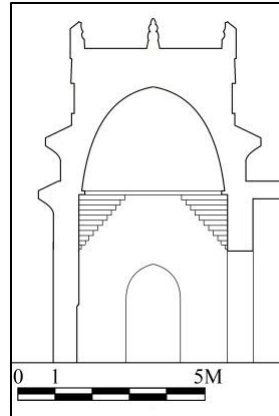
²³ SHANGAHI GOVERNMENT 2014: 349.

²⁴ BRITNELL 1997: 223.

Hamada Hagra



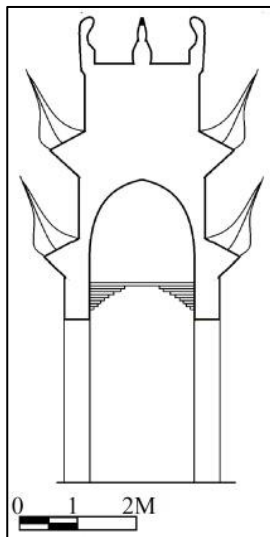
[FIGURE 21]: Plan of Shanghai Songjiang Mosque © by CHEN 2015: 87



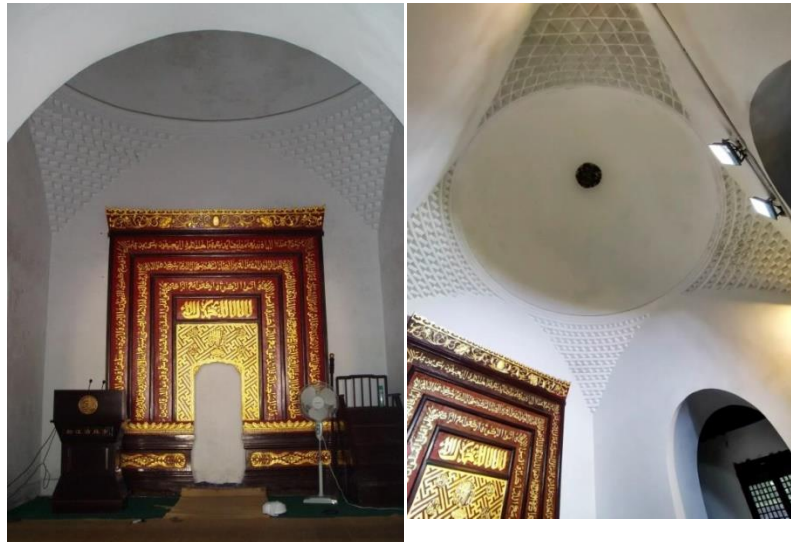
[FIGURE 22]: A section of the moon tower © Done by the researcher



[FIGURE 23]: Interior of the moon tower, https://commons.wikimedia.org/wiki/File:Songjiang_Mosque_and_Gate,_Shanghai.jpeg, accessed on (01/09/2025).



[FIGURE 24]: A section of the *mihrāb* chamber of Songjiang © Done by the researcher

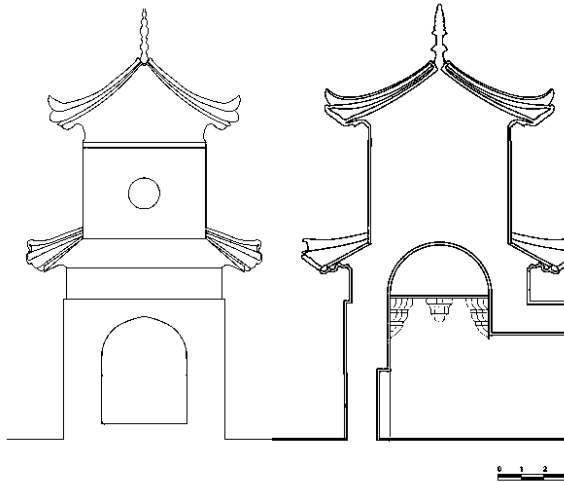


[FIGURE 25]: Interiors of the *mihrāb* chamber © Photo taken by the researcher

VIII. DOME OF DINGZHOU MOSQUE

Dingzhou Mosque is one of the oldest mosques in China. It is located on Jiefang Street in western Dingzhou City, Hebei Province. It was rebuilt in 1343 during the Yuan dynasty (1206-1368). A stone stele records the history of the mosque's construction and the architectural reforms during the Yuan dynasty. We quote from it: «In the third year of the Zhizheng period [1341-1370, the third Era of Toghon Temür] of the Yuan dynasty, Pū gōng (普公), the commander of the military divisions (兵马) of Zhong Shen (中山) ...

there is an ancient temple, called libaisi (礼拜寺) ... It is not known when it was founded, but it is now small in size and difficult to accommodate. Decades have passed since its establishment. Its renovation began and after two years of construction, the main hall was completed»²⁵. The *mihṛāb* hall follows the Yuan structure; it is a square chamber covered with a brick dome²⁶ [FIGURES 26-28].



[FIGURE 26]: Sections of Hebei Dingzhou Mosque © Done by the researcher



[FIGURE 27]: The main façade of the dome in the Dingzhou Mosque © Photo taken by the researcher



[FIGURE 28]: Exterior and interior views of Dingzhou dome © Photo taken by the researcher

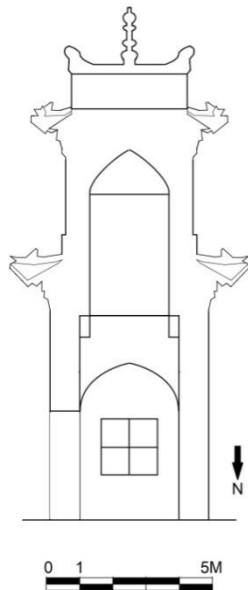
IX. DOME OF THE QINYANG GRAND NORTHERN MOSQUE

The mosque is the largest of the city's mosques. The *mihṛāb* hall was built during the Ming dynasty, while the other parts were built in the Qing era. According to the

²⁵ For Chinese text see: PING 2008: 103-104.

²⁶ PING 2008: 103-104.

inscription in the mosque, it is dated to the 18th year of the Wanli period (1590). «In the 12th year of the Wanli era, the Muslim community led a donation campaign to finance the construction process and the construction was completed. Within a year, however, the *mihṛāb* chamber was built in the era of Emperor Chongzhen of the Ming dynasty, in the Xinwei year [1631 AD]» [FIGURES 29-32]. In the thirteenth year of Guangxu, the mosque was rebuilt. The inscription reads: «The mosque was destroyed by fire in the first year of Chongzhen [1627 AD]. In the fourth year [1630], the gate, the courtyard and the halls were rebuilt... »There were three brick rooms in the temple and the back of the temple, which was restored and expanded. The *mihṛāb* chamber is divided into three squares in one row, each covered by a dome. Each is a square with a side length of 6.9 m²⁷ [FIGURES 29-32].



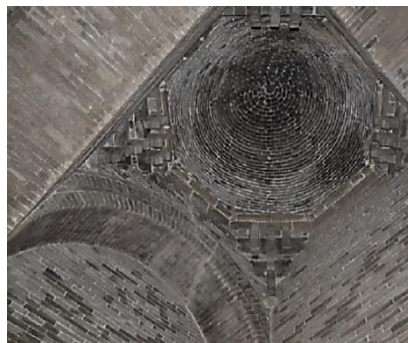
[FIGURE 29]. Section of the Qinyang dome © Done by the researcher



[FIGURE 30]: Exterior view of the Qinyang dome²⁸



[FIGURE 31]: The façade of the Qinyang dome © Photo taken by the researcher



[FIGURE 32]: Interior view of the Qinyang dome © Photo taken by the researcher

X. THE Analytical Study

1- The Structure of the Domed Chambers

The layout of all the domes is a square room; no other layouts are shown. In terms of dimensions, there are notable discrepancies, as no dome could compare with the domes of the *mihṛāb* of the Mosque in Hangzhou, which has a side length of 11.9 m. and

²⁷ JIN 2023: 1-21.

²⁸ «Qin Yō No Hokudai Tera . Reihai Ōdō No Ato yāo Tono No Yane- 沁陽の北大寺。礼拝大堂の後窑殿の屋根»; https://www.ne.jp/asahi/arc/ind/6_china/northern/xqinyang_3.htm, accessed on (01/09/2025).

a diameter of 8.5 m. The Dome of Saad bin Abi Waqqas (Wangesu) in Guangzhou (the largest Islamic shrine dome in China) is ranked second, with a side length of 7 meters and a diameter of 5.5 m. The other domes are the dome of the *mihṛāb* of the Songjiang Mosque in Shanghai (side length 5.8 m, diameter 4.2 m), the dome of Bahauddin in Yangzhou (side length 5.9 m, diameter 3.88 m), the dome of the *mihṛāb* of the Dongxi Mosque in Beijing (side length 6.1 m, diameter 3.75 m), the dome of the *mihṛāb* of the Tongzhou Mosque in Beijing (side length 6.1 m, diameter 3.75m), the dome of the *mihṛāb* of the Qinyang Grand Northern Mosque in Henan (side length 4.7 m, diameter 3 m), the dome of the *Mihṛāb* of Dingzhou Mosque in Hubei (side length 4m, diameter 3m), the dome of Saganda (side length 4m, diameter 3m), the dome of Jamal al-Din in Yangzhou (length 4m side, 2.5 m diameter) and the Fana dome in Yangzhou (3.25 m side, 2.2 m diameter). The dome of the moon tower in Songjiang Mosque has the smallest dimension, with a side length of 2.6 m. and a diameter of 1.6 m [FIGURES 1 & 7].

On the other hand, there is a noticeable difference in the heights of the domes. Except for the dome of the Songjiang Mosque's Tower (9.4 m.), no dome can compete with the dome of the Phoenix Mosque in Hangzhou (12.7 m.). The other domes are smaller, such as the *Mihṛāb* domes of Dongsi Mosque (7 m.), Songjiang (7 m.), Waqqas (6.8 m.), Dingzhou (6 m.), Tongzhou (5 m.), Bahauddin (5 m.), Qinyang Great Northern Mosque (4.6 m.), Fana (3.5 m.), Jamal al-Din (3.5 m.) and Saganda (3.5 m.), respectively.

2- The Ground Level

The ground level is the first part of the chamber; it is a square area in the lower section of this structure. It is completely enclosed by walls on the four sides, which have transition zones that provide the structural requirements for the dome. However, there are disparities. The wall thickness of both the Dongsi and Tongzhou domes (1.2 m.) notably contrasts with the Hangzhou dome (1.7 m.), making it difficult to compare them. Those of Dingzhou, Qinyang, Buhaaddin, Waqqas, , Jamal al-Din, Fana, Saganda and Songjiang's dome of *mihṛāb* are noticeably smaller, with walls measuring 1, 1, 1, 0.8, 0.7, 0.5, 0.5 and 0.5 m. thick, respectively [FIGURES 1 & 7]. The ground level of the domed chambers of the mausoleums is similar, except for the Dome of Waqqas, which has only one entrance, while the domes of mausoleums have more than one entrance. The Dome of Bahauddin and Fana each have four entrances, while the Dome of Saganda and Jamal al-Din each have two entrances. All entrances are arched with semicircular arches. It was emphasized that there were no windows opened on the four sides.

The ground levels of the domed chambers of the mosques are similar, with no entrances opened in the *Qibla* wall as usual. The function of domes in mosques is completely different from that of shrines. The dome was erected above the *mihṛāb* area and was a sanctuary, so the exterior of the domess on the eastern side was pierced with a huge entrance to be an extension of the mosque's prayer hall. As for the entrances,

their arches differ in style. Pointed arches appear only in each of the three domes of the Dongxi Mosque and in the entrance of the middle dome of the Phoenix Mosque in Hangzhou, while pointed arches took over all other entrances. The arches of the domes of the Tongzhou Mosque, Dingzhou Mosque, Songjiang Mosques and the two side domes of Hangzhou are all pointed.

3- The Transition Zone

The transition zone is the second (middle) part of the structure. It lies between the level of the ground square and the dome itself. The dome rises from a sixteen-sided windowless drum and rests on an octagonal transition zone of four pendentives, one at each corner. These geometric transformations created the eight-sided lower prism. Structurally, these triangles are important in transmitting local forces partly so that horizontal and vertical forces are concentrated on small areas of the transitional level. Only two types of transition zones have been found in China's domes: the Lingjiao Yazhi and the Dougong.

4- The Lingjiaoyazi (the Triangle Brick Corbels)

The Lingjiao Yazhi (菱角牙子) is known as the triangle brick corbels or the dentilated corbeling²⁹. These sets are formed by placing bricks in the transition area so that their corners and uprights protrude from the zenith of the building in the form of triangles or teeth, like saw teeth, at an angle of 45 degrees³⁰. It is an architectural style and method that aims to transform the lower square into a round neck on which the dome helmet rests by building the corner from the bottom with an inverted triangle that begins with a prominent course followed by more prominent courses until reaching the level of the dome's rotation at the top. This element is one of the local traditional features of architecture in China. It appears in Chinese Buddhist buildings and supports the multiple balconies of the Buddhist pagoda of the Tang-Song dynasties, such as the Liaodi Pagoda of Kaiyuan Monastery in Dingzhou³¹ and the Dayanta Pagoda in the city of Xi'an³². Examples of the Lingjiao Yazhi appeared in Islamic architecture in Egypt during the Ottoman era in some mausoleum domes in Zāwīyat al-Amwāt in Minya, south of Cairo³³. It also appeared in most of the minarets of Sana'a in Yemen³⁴.

However, the sets of triangle brick corbels, Lingjiaoyazi, were used as transition zones in the domes of Chinese Islamic architecture in the form of an inverted triangle with the top down, similar to the muqarnas sets in Islamic architecture. This element

²⁹ JIN 2023: 1-21.

³⁰ LANG 2003: 139.

³¹ BENN 2002: 62.

³² INGLES 1982: 141-150.

³³ DARWISH 2008: 256-303.

³⁴ YOUSSEF 2004: 151.

dominated the Islamic domes in China. It was a transition zone for all domes except for the dome of the *mihrab* of the Dingzhou Mosque. The architect deliberately placed dividing strips between the rows of horns in the transition zone. The number of the sets of triangle brick corbels of the domes varied from one to another due to the diameter and height of the dome. The transition zone of the moon tower in Songjiang Mosque was the smallest and was formed by 5 rows. In contrast, the Phoenix domes reached 15 rows.

5- The Dougong Brackets

The Dougong is a structural element of interlocking wooden brackets, one of the most important in Chinese architecture³⁵. It is a unit consisting of several mortises bearing blocks, arms and beams³⁶. Dougong consists of dou (blocks) and gong (arms)³⁷, placed between the top of the column, the front beams, the eaves purlins, or between the frames. Additionally, the layers added on the beams protrude to form an arch-shaped load-bearing structure³⁸. The function of the dougong is to provide increased support for the horizontal beams spanning the vertical columns or piers by transferring weight over a larger area from the beam to each column. Adding multiple sets of them also reduces the stress on the horizontal beams as they transfer their weight to the column. Interlocking wooden arches are the most complex architectural element in wooden structures that follow traditional Chinese architecture. Their composition, complex structure and general wooden structure make them the architectural elements least affected by earthquakes due to their great flexibility and strength. They can absorb earthquake vibrations and the largest amount of energy thanks to the architectural composition and the spaces between their wooden pieces³⁹.

The dougong was also used for decorative purposes in traditional Chinese architecture. It was carved in an intertwined and complex manner and its most important feature is symmetry. The dougong consists of several wooden elements: Tiā oyánhéng (挑檐桁), Tiāojiān liángdòu (挑尖梁斗), Áng (昂), Qiào (翘), Zuòdòu (坐斗), Pí ngbǎn fāng (平板枋), Éfāng (额枋) and Yánzhù (檐柱)⁴⁰. However, the dougong did not appear as a transitional zone for Islamic domes in China except for two examples: The dome of the Dingzhou Mosque and the dome of Qingyang Grand Northern Mosque. The Dougong of Dingzhou is made of wood [FIGURE 28], while in Qingyang is a brick [FIGURE 32]. The emergence of Dougong as a transition zone for domes is a rare example not only in Islamic architecture but also in Chinese architecture. To the author's

³⁵ SICHENG 2006: 16-17.

³⁶ JIN 2023: 1-21.

³⁷ CARROLI 2006: 164.

³⁸ LIANGSI 2001: 291-292.

³⁹ JUN-HAI 1999: 106-112.

⁴⁰ HAGRAS 2016: 179.

knowledge, this technique has not appeared in other domes in China. Thus, both domes of the Dingzhou Mosque and Qinyang Mosque are important examples of a mixture of Chinese and Islamic architecture and show how the architects harmonized the traditions of Chinese architecture with the traditions of Islamic architecture.

6- The Dome's Shell

The thickness of the brick course of the cylinder wall gradually decreases from bottom to top, which reduces the weight of the dome. This technique creates a stepped surface in the form of an arched shape (shell)⁴¹. All the domes were built according to the hemispherical shape, except for the domes of the moon tower and the *mihrab* in the Songjiang Mosque in Shanghai, which were built in a pointed shape [FIGURE 22].

7- Why were Domes Erected in Chinese Mosques?

The dome is one of the methods used to cover ceilings. Domes appeared in China in the first millennium BC⁴², such as the Sun Wu tomb in Nanjing which was built in the Six Dynasties (222-589 AD) and is the largest brick dome⁴³. During the Han dynasty (206 BC–220 AD), some domes were built over tombs and featured domed ceilings, archways and vaulted chambers⁴⁴. For instance, the brick burial chamber of the tomb of Emperor Xuanwu (d. 515) of Northern Wei (386–535) at Luoyang has vaults and a domed ceiling⁴⁵. However, during later periods, domes did not spread as widely in China as they did in the Islamic world, but domes appeared in some domes of the Song dynasty (960–1279)⁴⁶.

In contrast to Manichaeism, which was subjected to restrictions and sieges, a decree was issued in 732 AD that described Manichaeism as a heretical group that has nothing to do with Buddhism and mislead people. As a result, it called for severe suppression of this religion. However, as long as Islam did not threaten the feudal policy of the Tang dynasty and did not interfere in its policies, Muslims enjoyed religious freedom, which is represented in their autonomy, the construction of their houses of worship and their ability to practice their rituals without restrictions⁴⁷. During the Tang dynasty (618-907), Muslims were granted freedom to practice religion and build mosques. Moreover, the Tang court appointed a judge for Muslims in each city. AL-SIRAFI (10 century) says: «In khanfu (Guangzhou), a Muslim man was appointed by the king of China to rule among Muslims who go to that region as the Viceroy of China

⁴¹ HAGRAS 2023B: 868-890.

⁴² HILL 1996: 69.

⁴³ YUMAI 2019: 1-6.

⁴⁴ WANG 1982: 175-178.

⁴⁵ DIEN 2007: 187.

⁴⁶ STEINHARDT 1993: 369-381.

⁴⁷ PING 2008: 3.

and if Eid comes, he prays to Muslims and in the sermon, he praises the caliph of Muslims»⁴⁸. We could conclude that Muslims tried hard to preserve their religious identity and culture in a society that did not profess Islam; they maintained their connection with the country of Islam and prayed for the caliph of Muslims in Baghdad. The Tang court seems to have granted them freedom to perform their rites and practice their law, the most important of which was the appointment of a judge to judge between them⁴⁹.

As for the era of the Yuan dynasty (1279–1368 AD), IBN BATTUTA (d. 1369 AD), who visited China during that era, made a record about the Muslim community: «In some parts of this city (Khanfu-Guangzhou), there is a Muslim enclave in which there is a mosque, a *Zawiya* and a market. They have a judge and a sheikh. In all the countries of China, there must be» a sheikh, to whom the affairs of Muslims are referred. And he rules between them»⁵⁰. We are quoting from his record about al-Khansa (Hangzhou) « It has mosques and muezzins, we heard them calling the Zuhr prayer when we entered... They have a *zawiya* known as al-Uthmaniyah. It is well-built and has many endowments. Uthman built the mosque of this city and great endowments were given to both the mosque and the «*Zawiya*», the number of Muslims in this city is large»⁵¹.

According to the records of IBN BATTUTA, we could conclude that Muslims lived a golden age during that period. For instance, mosques became numerous, the call to prayer was performed and Muslims enjoyed absolute religious freedom, as Muslims under the rule of the Mongols were granted more political and economic privileges⁵². In addition, Muslims occupied the second class in the social pyramid of China during the era of the Mongol Yuan dynasty. They were classified directly as a class following the Mongol ruling class, which topped the social pyramid. Due to the large number of Muslims serving in the Mongol army, the Khan issued a decree stating that Muslims would be the second class in the Mongol Empire after the Mongols themselves⁵³.

However, the Muslims in China at the time were foreigners to the locals, who called them *Fanke* 蕃客 (guests - strangers)⁵⁴. Because China was not a Muslim country and was never ruled by Muslims, the local Muslims believed that they were an extension of the Islamic world close to the Chinese borders, so they preserved their customs, dress and languages, such as Arabic, Persian and Turkish. Chinese Muslims imitated the building techniques and methods of Islamic architecture and blended them with the local Chinese architecture. It is no wonder that domes became more common

⁴⁸ AL-SIRAFI 1999: 34.

⁴⁹ HAGRAS 2020: 68-76.

⁵⁰ IBN BATTUTA 1992: 634-635.

⁵¹ IBN BATTUTA 1992: 639.

⁵² MARSHALLSAY 2010: 1-12.

⁵³ ISRAELI 2012: 254.

⁵⁴ HAGRAS 2019: 134-158.

in mosques during the Mongol era, especially because the architectural sponsors were the merchant class, the clergy and the governors themselves⁵⁵. In the same context, the local Muslims also built towering minarets in their settlements according to the Islamic style; the minaret of the Huaisheng Mosque in Guangzhou is an example. This path did not stop there; they also built shrines for the clerics who had an influential role in local communities and contributed to the spread of Islam in China.

8- Why were double roofs erected in Islamic architecture during the post-yuan period?

After the Ming dynasty took control of China in 1365 AD, Muslims lost some of their privileges during the Yuan dynasty. That period was a decisive turning point in the history, character and culture of the local Muslims⁵⁶, as they began to gradually integrate into Chinese society⁵⁷, losing their independent status and fading away. Their old name (guests or foreigners) faded away and they began to rely on Chinese culture. They gradually abandoned, willingly or unwillingly, their original languages, such as Arabic, Persian and Turkish⁵⁸. Additionally, the emperors of the Ming dynasty issued a set of decrees and laws to hasten their integration into Chinese society; the first decree was in 1368 AD, in the first year of the reign of Hongwu (1368-1398 AD), which was to ban foreign languages, names and dress. This emperor's decree was an important step to forcibly assimilate them⁵⁹. Therefore, Muslims used the Chinese language instead of their native languages⁶⁰. It also placed some restrictions on travel, which isolated Muslims from contact with other Islamic communities outside China⁶¹. Muslims were prohibited from traveling outside the country or dealing with foreigners, so Muslims became completely isolated. In other words, the policy of Sinization pursued by the emperors of the Ming dynasty had paid off and Muslims were willingly or unwillingly assimilated into local Chinese society and became Chinese⁶².

The Ming court recognized Islam, issued decrees regarding mosques and gave them official status, which motivated the emergence of the term official mosques⁶³ during the Ming era. However, the appearance of the Chinese ceiling style over the domes raises many questions. Although the earliest examples of double-shell domes appeared in Persia, such as the Gunbadi-Qabus tower (397 AH/1006-1007 AD), the

⁵⁵ HAGRAS 2023 A: 706-727.

⁵⁶ LESLIE 1986: 105; DILLON 1999: 27.

⁵⁷ LESLIE 1998: 14.

⁵⁸ BENITE 2010: 421.

⁵⁹ PILLSBURY 1981: 18.

⁶⁰ HUZHEN 2006: 25-26.

⁶¹ MARSHALLSAY 2010: 3.

⁶² ISRAELI 1980: 83

⁶³ HAGRAS 2019: 134-158.

mausoleum of Abū'l Faḍl (the 5th AH /11th AD) and the mausoleum of Abū Sa'īd (the 5th AH/11th AD) are attributed to the first quarter of the 5th = AH /11th AD century⁶⁴. The style of double-shell domes in the Islamic world is an architectural technique aimed to protect the inner shell on the one hand and increase its height on the other hand. As for its appearance in China, other factors contributed to it becoming a tradition in the periods after the Mongol era. The style of double shell domes in the Islamic world is an architectural technique that aims to protect the inner shell on the one hand and increase its height on the other. As for its appearance in China, other factors contributed to it becoming a tradition in the periods following the Mongol era.

The prohibition of all foreign manifestations of Muslim culture during the Ming dynasty was an influential and major factor in the construction of Chinese ceilings over domes. Domes were a manifestation of foreign architecture in China. Muslims had to cover it from the outside to avoid violating Ming laws. Instead of demolishing the domes and in line with government laws, Muslim architects found a solution in the Chinese pyramidal ceilings to cover the foreign-style domes from the outside. This solution was ideal and suited the construction of domes; like the dome, the pyramidal roof had a square base, where the columns of the pyramidal roof rested on the walls and corners of the dome. Erecting the roof without affecting the dome was an easy matter, as the architect could increase its height according to the height of the dome. Double-shell domes appeared in Islamic architecture in China. The dome consists of two shells: the inner is the brick and the outer is the wooden pyramid roof. This architectural style is rare both in the mosques of the Islamic world and in China⁶⁵.

Domes in Chinese mosques have many common features. Firstly, the *mīhrāb* chamber remains the oldest structure in each mosque complex, while other parts have been renovated over the centuries⁶⁶. This phenomenon was not specific to the domes in the mosques mentioned above. Unlike other historical mosques in China, the layout of the courtyard mosque known as Siheyuan (四合院), which was commonly adopted by Chinese mosques, played an important role in maintaining the placement of the *mīhrāb* hall on the western side. Additionally, successive architectural expansions were carried out on the eastern side. Domes, as an architectural style of roofing, were quite suitable for the Gulianda (勾连塔) technique⁶⁷.

Although Chinese architecture was usually covered with one roof, all prayer halls were used for roofing not only one roof but multiple roofs. All of them were combined in a technique called *Gōuliándǎ*⁶⁸, which follows traditional Chinese architectural design and is used to merge two or more roofs so that each roof is mounted on top of the other

⁶⁴ HAGRAS 2023B: 868-890.

⁶⁵ JIN 2023: 1-21.

⁶⁶ JIN 2023: 1-21.

⁶⁷ HAGRAS 2023C: 81-104.

⁶⁸ HAGRAS 2017: 102-113.

and enclosed with the other rainwater drainage channels. This method also has a structural purpose and benefit. This design can later allow architects to expand and increase the area of the mosque to accommodate the increasing number of worshippers, which would be the result of increasing birth rates among Muslims or conversion to Islam. Because prayer houses were unable to accommodate large numbers, there is an urgent need to provide more space. Instead of building new mosques, architects resorted to adding new spaces and increasing the prayer area on the eastern side (towards the courtyard), without demolishing the existing old architecture. It has mounted roofs installed, merging with the old ones⁶⁹. This technique is less expensive than building new mosques.

The ceiling of the *mihṛāb* chamber consists of two layers: The inner dome and the outer «traditional Chinese» ceiling of a pyramidal or cross shape, which was later added or restored above the dome. Hangzhou mosque has the largest dome size, i.e., the size of the dome chamber in mosques has gradually decreased over time. Above all, the *mihṛāb* room is larger than the prayer hall of Hangzhou mosque, while the *mihṛāb* chamber has become smaller than the prayer hall of other mosques. This trend has become more pronounced in mosques built in the Ming dynasty⁷⁰.

9- The Architectural Elements

A. Dome's Windows

In contrast to many domes in the Islamic world, there are no windows in the shell of Islamic domes in China. The vertical windows are often open on one or two axes in the walls of the dome; two windows opened in each of the three domes of the Hangzhou mosque, two windows opened in the middle dome of the Dongsi mosque, as well as two windows in the Dome of the Dingzhou mosque. In contrast, the dome of the Wangesu mausoleum included a single window. No windows were opened in the domes of the Tongzhou Mosque, the Songjiang Mosque and the four domes in the Islamic cemetery in Yangzhou.

B. Decorations and Inscriptions

There are few decorations of Islamic domes in China. However, there are examples of some decorations that appear in the interior of the dome. For example, in the middle dome of the Donngxi Mosque, the center of the intrados of the dome is decorated with a rose consisting of eight lobes, surrounded by Arabic inscriptions in a circular shape that read: «سبحان الله» (Allah is free from imperfection), الحمد لله (all praise is due to Allah), لا إله إلا الله (there is no true god except Allah) الله أكبر (Allah is the Greatest) and لا حول ولا قوة إلا بالله العلي العظيم (There is no power or strength except by Allah) [FIGURE 18].

⁶⁹ HAGRAS 2019: 97-113.

⁷⁰ JIN 2023: 1-21.

This inscription is a quote from a famous hadith of the Prophet that has many virtues. AL-GHAZALI (d. 505 AH/ 1111 AD), reported that these words are the righteous good deeds that last⁷¹. al-Maqdisi (d. 643 AH/1245 AD) recorded that these words also remove sins just as a tree sheds its leaves. They are also one of the treasures of paradise. The central dome of the Hangzhou mosque is also decorated by a medallion with intertwined floral motifs and traditional Chinese patterns, while the center of the intrados of the dome of the Qinyang Grand North Mosque is decorated by an ornament of a single Arabic word, الله Allah.

C. Brick Patterns

In the dome of the Qinyang Grand Northern Mosque [FIGURE 32], the technical method used to decorate domes was plain brick patterning fortified with carved stucco joints and plugs; their repetition alone made an impressive effect. This technique was famous in Persian architecture of the Seljuk era.

D. Muqarnas

Muqarnas is a type of volumetric decoration with decorative edges. It is one of the Islamic architectural decorative elements that play an important role as a decoration. *Muqarnas*, in the form of sets built on top of each other, are used to decorate buildings or for a gradual transformation from one geometric shape to another. *Muqarnas* can be considered one of the effective elements in constructing domes. Usually, it is used for recessed surfaces of corners under the ceiling, but the location of this decorative element can be on top of walls, ceilings and corners⁷². The decoration with rows of *muqarnas* appeared only in one example, the Wangesu Dome, where the façade was decorated with two rows of *muqarnas* [FIGURES 1/B & 2].

E. Crenellations (Series of Spaced Merlons)

Crenellations are decorations in the form of cornices for the tops of walls, façades and buildings. Their origin goes back to Sassanid architecture, but it became a feature of Islamic architecture in the 4th AH/10th AD century. This decoration appeared in only one example, i.e., the Wangesu Dome in Guangzhou, where the façade was crowned with a series of spaced merlons [FIGURES 1/B & 2].

XI. CONCLUSION

The study examined 16 Islamic domes in China: 5 mausoleum domes, i.e., Wangesu Dome in Guangzhou; 4 domes in Yangzhou: Bahauddin Dome, Jamaluddin Dome, Saganda Dome and Fana Dome, as well as 11 domes in the mosques: three domes in Hangzhou Mosque, three domes in Beijing Dongsi Mosque, one dome in

⁷¹ AL-GHAZALI 2016: 390.

⁷² TABBAA 1985: 61-74; BLOOM 1988: 21-28.

Beijing Tongzhou Mosque, one dome in Hebei Dingzhou Mosque, one dome in Henan Qinyang Grand Northern Mosque and two domes in Shanghai Songjiang Mosque.

Domed chambers became more important and common for Chinese Muslims in the Yuan period because that era was a golden age for Muslims. However, during the Ming dynasty, the Court issued a set of strict laws that forbade Muslims from showing any foreign traditions, so no other domes were built after the Mongol era.

The study explained that there was a disparity in the dimensions of the domes, as no dome could match the dimensions of the three domes of the Hangzhou mosque in height or diameter. The smallest dimensions are found in the dome of the Moon Tower in the Songjiang mosque in Shanghai.

The study demonstrated that the dome, as a roofing style common to Islamic architecture, did not conflict with traditional Chinese roofs. Rather, the Muslim architect was able to harmonize the two structures together through *Gulianda*, a traditional Chinese architectural technique.

The study showed that the Muslim architect preserved the architecture of the domes as much as it could. In the post-Yuan dynasty years, domes were completely prohibited because they displayed foreign traditions. In compliance with the laws of the Ming dynasty, the architects found an architectural solution to preserve the domes. Instead of demolishing domes, they transformed them from the outside into a local Chinese shape: a pyramidal or cross-shaped roof over the domes.

Islamic domes in China have many types of transition zones, where the sets of triangle brick corbels, *Lingjiaoyazi*, appear side by side with the *duogong*. The two types are local architectural techniques, but the *duogong* appeared only in two examples: the domes of the Dingzhou mosque in Hubei and the Qinyang mosque in Henan. In contrast, the sets of triangle brick corbels occupied most of the transition zone in the other domes.

Unlike the Chinese local architectural traditions, in which the *dugongs* were wooden, the uniqueness of Muslim architecture was manifested in their brick construction, as in the transition zone of the Qinyang Dome. As an attempt to break the deadlock and add greater breadth and depth to the visual dimension within their domes, Chinese Muslims did not neglect these spaces by not including decorations. They covered the center of the intrados of the domes with ornamental units, mainly Arabic inscriptions and floral motifs. The dome of Qinyang Grand Northern Mosque was the only example that used plain brick patterning fortified with carved stucco joints and plugs.

Islamic architectural features appeared in the domes. The dome with the most Islamic architectural features was the Dome of Saad bin Abi Waqqas in Guangzhou. In addition to crowning its façade with crenellations (series of spaced merlons), its façade was decorated with two sets of *muqarnas*.

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ARCHAEOLOGICAL SITES IN THE KINGDOM OF SAUDI ARABIA: VISION 2030. THE ARCHAEOLOGICAL SITES IN THE QASSIM REGION AS A MODEL

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ABSTRACT

[EN] The study is about the tourism sector in Saudi Arabia and its alignment with Vision 2030, focusing on the «Discover Saudi Arabia» campaign. By issuing modern «tourist visas», Saudi Arabia aims to attract global travelers, leveraging its unique geography and historical heritage. The al-Qassim region, known for its archaeological sites from the Paleolithic era and its role as a historical transit hub, exemplifies these efforts. Its flat terrain, abundant water, and favorable climate supported early human settlement and agriculture. Discoveries like stone circles, tools, and inscriptions highlight ancient civilizations, while its geological features offer opportunities for ecotourism. Strategic initiatives to enhance tourism infrastructure in al-Qassim aim to position it as a key destination, contributing to Saudi Arabia's economic growth under Vision 2030.

KEYWORDS: al-Qassim location, topographic features, stone finds, stone Circles, petrified forests, archaeological Sites, tourism pillars.

[AR]

المواقع الأثرية في المملكة العربية السعودية: رؤية 2030 – المواقع الأثرية في منطقة القصيم – نموذجاً
تقدم هذه الدراسة نظرة عامة على قطاع السياحة في المملكة العربية السعودية ومبادراتها الاستراتيجية، «مسلطة الضوء» تتناول الدراسة قطاع السياحة في المملكة العربية السعودية وانسجامه مع رؤية 2030، مع التركيز على حملة «اكتشف السعودية». تهدف المملكة إلى جذب المسافرين من جميع أنحاء العالم من خلال إصدار تأشيرات سياحية حديثة، مستفيدة من موقعها الجغرافي الفريد وتراثها التاريخي. تمثل منطقة القصيم نموذجاً لهذه الجهود حيث تشتهر بمواقعها الأثرية التي تعود إلى العصر الحجري القديم ودورها التاريخي كمحطة عبور. ساعدت تضاريسها المنبسطة ووفرة المياه ومناخها الملائم في دعم الاستيطان البشري المبكر والزراعة. تُسلط الاكتشافات الأثرية مثل الدوائر الحجرية والأدوات والنقوش الضوء على الحضارات القديمة، بينما توفر ميزاتها الجيولوجية فرصاً للسياحة الجيولوجية. تهدف المبادرات الاستراتيجية لتعزيز البنية التحتية السياحية في القصيم إلى جعلها وجهة رئيسية، مما يسهم في نمو الاقتصاد السعودي وفقاً لرؤية 2030.

I. INTRODUCTION

The Kingdom of Saudi Arabia holds a prominent position as a global tourist destination renowned for its extensive archaeological sites. The efforts of the Saudi Arabian Supreme Tourism Authority align with the Vision 2030 initiative, which aims to position the country among the world's leading tourist destinations and attract a substantial influx of visitors through the -Discover Saudi Arabia- campaign. With the recent introduction of tourist visas, Saudi Arabia is rapidly emerging as an appealing destination for adventurous travellers. Strategically located at the crossroads of the Arab and Islamic worlds, Saudi Arabia has leveraged its unique geographical position to establish itself as a distinctive global hub. Tourism development plays a critical role in identifying, promoting, and preserving historical sites while raising community awareness about the significance of conserving cultural heritage. A prime example of the country's rich history is the al-Qassim region, known for its deep cultural heritage. Its central location within Saudi Arabia positions it as a vital transit route, enhanced by a network of highways, railways, and air routes that connect the region to different parts of the Kingdom.

The name «al-Qassim» is derived from «Qassim» referring to the sand dunes in the region that dominate its landscape. The al-Qassim region experiences a characteristic desert climate. Its moderate weather conditions are among the factors contributing to the success of tourism, particularly during the winter season. The region's topographical diversity, encompassing mountains, valleys, expansive deserts and irregular floods, captivates visitors and tourists alike. Furthermore, the area is home to numerous archaeological sites dating back to the Paleozoic Era, evidence of human presence and the proliferation of various civilisations over thousands of years. The abundance of stone tools in these sites signifies the existence of diverse prehistoric societies, which indicates the favourable climatic conditions in the region enabling human habitation. Among the notable historical sites in the al-Qassim region are Shuaib al-Adgham, the palace and «The rock of Antara», the inscriptions, drawings, and pebbles of the blade (Antarah bin Shaddad Rock) in springs of al-Jawa, as well as Jabal al-Qattan in Dhariya Governorate, Jabal Tamiya, Jabal Sawaj, Jabal at Tays and Jabal Kuifir in al-Nabhaniyah Governorate, among others.

II. AL-QASSIM LOCATION

The al-Qassim region is strategically positioned at the centre of the Kingdom, serving as a vital interconnection between the southern and northern parts of Saudi Arabia. Situated between the Red Sea and the Arabian Gulf¹, it occupies the northern portion of the central Arabian Peninsula², sloping northward onto the Najd Plateau, with an average elevation of approximately 800 M³ [FIGURE 1].

As the heart of the Arabian Peninsula, the al-Qassim region plays an important role as a transit hub for international trade routes. It has historically served as a meeting point for commercial caravans, facilitating the exchange of goods and contributing to

¹ AL-ĠĀRALLĀH 1997: 51.

² AL-QAHĪDĀN 2003: 11.

³ AL-MUŠAYQIH 2020: 3.

the expansion of commercial markets. Although considered a medium-sized region within the Kingdom, there are smaller regions in terms of area⁴. However, recent archaeological studies have suggested the intriguing possibility that the northwestern part of Qassim was once the homeland of the Nabataeans before they established their well-known kingdom⁵.

For centuries, the al-Qassim area has been a stopover point for pilgrims travelling to Mecca and Medina. The historical sites in the al-Qassim region provide an idea of what life was like in a desert oasis in pre-modern times. The petroglyphs preserved on stones indicate that the region has been inhabited since pre-Islamic times⁶.



[FIGURE 1]: al-Qassim location. AL-QAHĪDĀN 1999: 11.

Due to its important location at the junction of major trade routes, the region has witnessed a variety of historical events since the 9th AH century/15th century AD, most of which are closely tied to the zubaida route, which begins in Iraq, traverses al-Qassim, and ends in Mecca al-Mukkarama. This route has been used by Hajj caravans for centuries; the wells dug by Zubaidah, wife of the Caliph Haroon al-Rasheed to supply pilgrims with water still exist today. Over the years hundreds of settlements consisting of cities, towns, villages and Bedouin settlements have grown throughout the region, each depicting unique characteristics that are connected to the history, the local populations, economic activities, or intra and interregional linkage⁷.

III. LINGUISTIC MEANING OF AL-QASSIM

The linguistic significance of the term «Qassim» encompasses various meanings. In Arabic, «Qasam», which is «قَسَامٌ وَقَسْمٌ» «qasiamuym and qasm»⁸, refers to the act of breaking or dividing something, while «القصيم» indicates the moment when something

⁴ ALI 2022: 40.

⁵ AL-QAHĪDĀN 2003: 11.

⁶ KAMINSKI 2021: 12.

⁷ QASSIM URBAN OBSERVATORY 2020: 3.

⁸ AL-ŠAYBĀNĪ 1974: 124.

breaks and becomes evident. It can also be used metaphorically, for example, to describe someone who «breaks an incisor⁹».

Furthermore, «القصة» «*Qasma*» denotes a level piece of land that is abundant with trees. «القصة» «*Qasma*»: is a source of Alghadaa, arta (*Calligonum comosum*), and al-Salam trees. «al-Qassim» is a well-known location that serves as a gateway to Batn Falaj. According to Ibn Hanifa, «القصيم» «*al-Qassim*» is the land of al-Ghadha (*Haloxyton ammodendron*), with its plural form being «قَصَائِمُ و قَصَائِمُ» «*qasiauym* and *qasm*»¹⁰. Al-Isfahani described it as [a prosperous place with al-Ghadha and abundant water, villages, including the village of Ibn Amir]. Similarly, al-Hamdani described «al-Qassim» as [a vast region with numerous palm trees, sand, vitality, villages, and fortified structures]¹¹. Additionally, some sources suggest that «al-Qassim» can also refer to a sandy area where al-Ghadha grows¹².

«Al-Qassim» is also associated with the Banjed Province, which is organised around Wadi al-Rumah¹³. «Al-Qassim» also means location¹⁴. «Al-Qassim» can also be interpreted as a sprout or a place characterized by sandy terrain connected to al-Dahna¹⁵. Additionally, «al-Qassim» refers to Batn al-Sir, a valley located between Hajar and Najd¹⁶.

According to al-Azhari, «al-Qassim» means sand that fosters the growth of al-Ghadha¹⁷. Al-Qassim is renowned for a specific type of plant called al-Ghadha (*Calligonum comosum*), and the land where al-Ghadha thrives is referred to as al-Qassim. This term also conveys the notion of something that is easily breakable or cut¹⁸. «القسيمة *al-Qasimah*» signifies the spring of al-Ghadha¹⁹. «*al-Qassim*» also describes the nature of the land surrounding its major cities. These areas are predominantly sandy, fostering the growth of al-Ghadha, as called «*al-Qassimat*»²⁰. Yaqut al-Hamawi described al-Qassim as [the sand that produces al-Ghadha, and its plural form is «القصاصم» «*al-Qassim*» and its singular form is «قصمه» «*qasamh*». Abu Mansour said that al-Qassim is a place known for its flat terrain along the Falaj road].

Lisan al-‘Arab mentions that the origin of the word «القصيم» «*al-Qassim*» comes from «القصة» «*al-Qasma*» which denotes a flat land with abundant trees. It represents a source of al-Ghadha, arta (*Calligonum comosum*) and al-Salam trees, despite its sandy

⁹ This metaphor originates from classical Arabic expressions, where breaking someone’s front tooth (thaniya) symbolized not just physical harm but a deep insult or act of humiliation. It often appears in poetic or rhetorical contexts to signify dominance or retaliation.

¹⁰ AL-ĠĀRALLĀH 2003: 20-28.

¹¹ AL-HAMDĀNĪ 1884: 144.

¹² AL-MAIDĀNĪ N.D.: 331.

¹³ AL-BALĀDĪ 1982: 280.

¹⁴ AL-ZAMAḤṢRĪ 1999: 268.

¹⁵ AL-ZUBAIDĪ 2011: 1927.

¹⁶ AL-ḤAMAWĪ 1992: 124.

¹⁷ AL-AZHARĪ 2000: 386.

¹⁸ AL-QAHĪDĀN 1998: 2.

¹⁹ AL-ḤIMYARĪ 1999: vol.8, 514.

²⁰ AL-QAHĪDĀN 2003: 11.

nature²¹. Lapid Said: I met the al Ahlaf Corps in areas where Dakadak and Qasim have spread²².

According to some accounts, al-Qassim means sandy terrain, with Asadi milky water within the region. In the sandy soil, numerous wicker tents can be found, referred to as al-Juwayritah. It is believed that the inhabitants of al-Qassim used to reside in these wicker tents, which served as homes for tribes like Banū Abs and others. Moreover, the region is known for its abundance of palm trees²³. The name «al-Qassim» is attributed to the sandy soil and the swirling trees that flourish due to the fertility and ample water resources found there²⁴.

IV. THE HISTORY OF SETTLEMENT AT AL-QASSIM REGION

In 2017, KAMINSKI and PERDANA discovered some rare specimens of coiled multi-chambered *lituolids*. This finding represents the oldest known occurrence of multi-chambered foraminifera belonging to the *lituolid* group and pushes back the known geological history of the coiled multi-chambered foraminifera by about 40 million years²⁵.

Archaeological studies and surveys conducted by the Saudi Commission for Tourism and Antiquities. have provided valuable insights for the early settlement history of the centre Arabian Peninsula. These studies have revealed that the origins of stable life in this region can be traced back to the first millennium BC²⁶. During this era, settlements were primarily concentrated in the vast oases located in the central and northern parts of the Arabian Peninsula²⁷. The archaeological sites discovered in the area include remnants dating back to the Stone Ages, indicating that humans have inhabited the region for a significant period. These findings suggest that the central Arabian Peninsula offered favorable climatic conditions that supported human settlement and development²⁸ [FIGURE 2].

The Palaeozoic formations exposed in the al-Qassim province in Saudi Arabia are well-suited to become important sites for geo-tourism. Because the sedimentary formations are well-exposed and easily accessible, they have a strong capacity for development as tourist destinations²⁹.

The al-Qassim district of Saudi Arabia has strong potential for geo-tourism. There are excellent geological sites that are well-exposed and easily accessible. Furthermore, the Paleozoic formations are among the most important geological units in terms of natural resources, which drive the economy of the Middle East. Their educational value to geoscience students and specialists ranks high because they contain unique fossil and

²¹ AL- ALŪSĪ 2007: 35.

²²AL-MUŠAYQIḤ 2020: 3.

²³ ISKŪBĪ *et Al.* 1996: 1.

²⁴ IBN MANZUR 1993: vol.12, 486.

²⁵ KAMINSKI *et Al.* 2021: 12.

²⁶ AL-ĠĀRALLĀH 1997: 282-284.

²⁷ BUCCELLATI 1984: 5.

²⁸ AL-ĠĀRALLĀH 1997: 53.

²⁹ KAMINSKI *et Al.* 2021: 3.

microfossil occurrences that give us a new perspective on the evolution of land plants and marine microorganisms on our planet³⁰.

Prior to the advent of Islam, the al-Qassim region had significant cultural ties with various centres, largely due to its strategic location along major trade routes and the flourishing caravan trade. Consequently, its inhabitants became renowned merchants. The Roman historian Strabo attested to this, stating that [the Arabs were a people of trade and navigation, rather than a nation inclined towards warfare, whether on land or at sea]³¹. This commercial connectivity led to the emergence of key centers in northwestern Qassim such as Dumat al-Jandal (Taima)³², al-ʿUla, and the Kingdom of Kinda³³. Banu Kindah tribe settled in Batn Aqil (al-Aqili)³⁴ within the city of al-Rass, where the waters of al-Rass were among the territories governed by Banu Kinda³⁵. Notably, al-Harith bin Aql al-Marar, the grandfather of Imru' al-Qais bin Hajar, one of the Kindah kings, resided in al-Rass³⁶. The Kindah kings established their rule as tribal leaders in the middle of the Arabian Peninsula during the 5th and 6th centuries AD³⁷. Subsequently, the Banu Asad tribe settled in the region³⁸, alongside the presence of the Nabatean state.

The northwestern region of the Arabian Peninsula likely served as a significant center and homeland for the Nabataeans even before the establishment of their kingdom. Ashurbanipal inscriptions mentioned, in his annals, «battles he fought against the Nabataeans in a distant area devoid of water». This suggests that the original homeland of the Nabataeans, as described in the Torah and Assyrian annals, is situated south of the lands inhabited by the Banū Qaydra shepherds. This location is believed to be in Najd region, between Hail in the south and al-Qassim in the north, specifically in the desert northeast of al-Qassim³⁹. The scholar Klasser proposed that Benayot was a sheikhdom or kingdom that ruled in al-Qassim and existed contemporaneously with an Arab kingdom. The name Benayot is mentioned alongside the name Kedar in Assyrian texts, indicating their strength and sizable population⁴⁰. Following the decline of the Nabataeans, the region became a fertile ground for the establishment of Arab kingdoms. Arab tribes were distributed throughout the area, with some migrating to Hail and al-

³⁰ KAMINSKI *et Al.* 2021: 14.

³¹ AL-SAʿĪD 2003: 115.

³² Dumat al-Jandal (Taima) is believed to have played a crucial role as a key hub within an extensive network of trade routes spanning the Arabian Peninsula, connecting regions from south to north and east to west. During the late Roman era, it held significant importance and was likely integrated into a thriving commercial network. Situated in the heart of the al-Jawf region, Dumat al-Jandal stands as one of the renowned oases in the northern Arabian Peninsula, with its origins dating back to the Paleolithic Age (67-69). CHARLOUX & LORETO 2012.

³³ AL-ĠĀRALLĀH 1997: 284-292.

³⁴ A place near al-Rass. AL-ʿABBŪDĪ 1977: 26-27.

³⁵ AL-ĠĀRALLĀH 1997: 287.

³⁶ AL-BALĀDĪ 1986: 237.

³⁷ NEHME 2017: 151.

³⁸ Bani Asad settled in AL-BATTAH, which is a watershed from the homes of Bani Asad to Bani Wala. The poets mentioned AL-BATTAH, and he mentioned it with (Aqil & al-Aqili) and al-Rasin, which is considered to be al-Rass & al-Rasis. AL-ʿABBŪDĪ 1977: 23, 25-26.

³⁹ AL-ḌĪB 1987: 73.

⁴⁰ ʿALI 2001: 88.

Qassim. Forster suggests that the Romans followed the Yathrib road upon arriving at the port of Loki-Kumi and then proceeded towards al-Qassim. They ventured into Najd before continuing their journey along the road leading to Yemen⁴¹.

The al-Qassim region had various historical events dating back to ancient Arab times. These events include (the Day of Khazar⁴², the Day of Manaj, the Day of Jableh, the War of al-Basus, and the War of Dahis and al-Ghabra)⁴³. Many of these events were centred in the Najd Plateau⁴⁴ of which al-Qassim is a significant part.

Al-Qassim played a prominent role as an ancient commercial station, serving as a vital link connecting the central Arabian Peninsula with Mesopotamia and Persia. It served as a gathering point for caravan owners traveling from the southern regions of the peninsula, carrying goods, to rest and meet caravans arriving from the north. As a result, the region became a hub for trade and commercial exchange⁴⁵. This historical context confirms the active involvement of Arabian tribes in the transportation of commercial goods and their utilization of marketing centres beyond their own territories⁴⁶.

The archaeological discoveries in the region have provided substantial evidence of the rich cultural heritage during that era. Numerous inscriptions, rock writings, drawings, and labels have been found, shedding light on the cultural heritage of the region. Notably, inscriptions and writings in the Thamudic and Nabataean scripts were uncovered in the area of Uyūn al-Jawa. The Thamudic inscriptions found in Najd exhibited distinct characteristics differentiating them from the inscriptions in the Tabuk and Hijaz regions⁴⁷. This suggests a cultural connection⁴⁷ between ‘Uyūn al-Jawa, Hail, al-Jawf, and Petra⁴⁸. ‘Uyūn al-Jawa was evidently a settlement inhabited by permanent residents and served as a crucial junction for commercial routes. Various settlement terms were mentioned in the discovered inscriptions such as (ع ج ل) (ح ن ك) (م ر)⁴⁹ implying the presence of historical events in the pre-Islamic era, including the renowned tale of Dahes and al-Ghabra⁵⁰. Abandoned habitats of Arab tribes were also found in the region, such as Mount Tamiya, which the Banu Kalb previously inhabited,

⁴¹ ‘ALI 2001: 51.

⁴²The day of Khazzaz or (Khazazi) took place between the Arab tribes led by the kings of Kindah, the princes of Taghlib and Bakr, and the Qahtani tribes, especially Madhhij who were allied with it. ‘Omr bin Kulthum said in his Mu‘allaqlaq: We were in Khazzaz on the morning or the following day, on a tributary of Mesopotamia. ISKŪBĪ *et Al.* 1996: 3.

⁴³ AL-ĠĀRALLĀH 1997: 53.

⁴⁴ According to certain scholars, a geographical sequence can be observed from al-Atheeb to Dhat Irq, extending to al-Yamamah, Yaman, and the two mountains of Tay. The route extends from al-Mirbad to Wajarah, encompassing Dhat Irq or Tihama al-Bahr. The Bedouins have a saying: [If you ascend from Ajilz, assistance will be provided, with Ajelaz positioned above the two villages. Therefore, if the folds of Ira aid you, you will be saved from being accused]. He mentioned that Najd [the land located in the south of Iraq and the Levant and north of Tihama and Yemen] is a high land. So, al-Qassim is a thousand feet above Al Arid, and Hail is higher than al-Qassim. ‘ALI 2001: 35; AL-RĪHĀNĪ 2017: 24.

⁴⁵ AL-‘URAYNĪ *et Al.* 2018: 114.

⁴⁶ AL-SA‘ĪD 2003: 120-121.

⁴⁷ AL-ŠAYLA 1980: 191.

⁴⁸ AL-ĠĀRALLĀH 1997: 287.

⁴⁹ AL-ĠĀRALLĀH 1997: 294.

⁵⁰ AL-ḌIB & AL-‘UMAYR 1997: 111.

and later became home to the Kalb tribe, who moved from their original dwellings to al-Rabda⁵¹ and Jabal Tamiya⁵². Another area, al-Nabaj (al-Asiyah)⁵³, was previously occupied by the Qais tribe in the pre-Islamic era and later belonged to Abdullah bin Amir bin Kariz at the advent of Islam. Uthman bin Affan extracted water, developed springs, and planted palm trees in this area. Over time, other Arab tribes also joined and settled in these locations, including Majeed from the Quraish tribe⁵⁴. The distribution of tribes in Najd indicates that al-Qassim served as a home to several Arab tribes⁵⁵. This diverse tribal presence is one of the significant factors contributing to the historical depth of settlement in the region:

1. The region serves as a crossroads for both international and local commercial routes, forming a network of trade connections.
2. It is characterised by the presence of numerous valleys and water sources.
3. The area's terrain is predominantly flat, lacking significant mountainous obstacles, which facilitates easy movement and transportation between different locations.
4. There are several oases with accessible groundwater, along with expansive pastures and fertile lands. These natural resources played a crucial role in supporting the stability of the tribes inhabiting the region.
5. The region's natural and climatic conditions have been conducive to development of various crafts, including herding and agriculture, which have thrived in the area.⁵⁶

⁵¹ «Tamiya» «طمييه»: A famous red mountain located in the far west of al-Qassim region. YĀQŪT said «Tamiyah» is from their saying [Tamiyah Yatmi tamiyan]. AL-ABOUDI, 1978: 737.

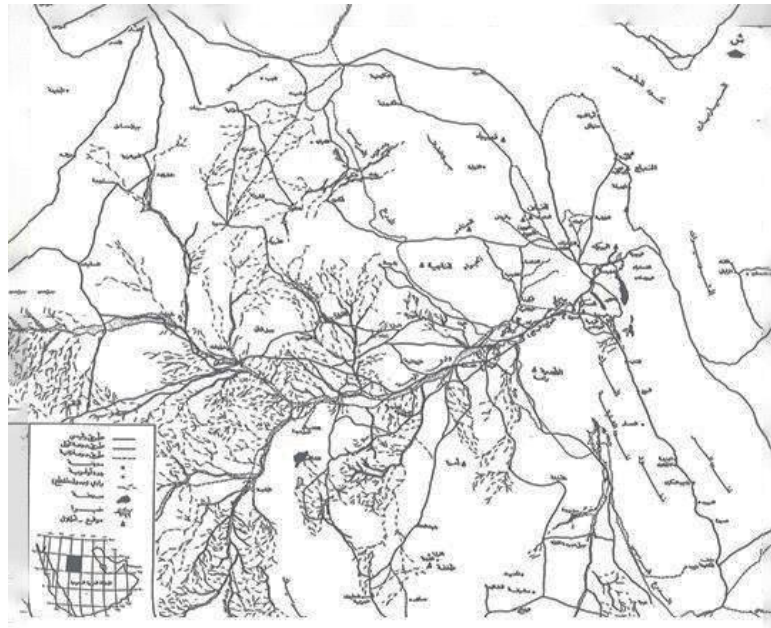
⁵² is now called Berka.

⁵³ Al-Asiyah is a small region situated on the northeastern periphery of al-Qassim. It acquired the name al-Nabaj due to its abundance of springs, which were known to draw water from multiple sources. Al-Hamdani describes it as [a land comprising numerous villages known as Nabaj, named after Bani Amer. It is characterized by its prolific springs, palm trees, and agricultural produce]. The name al-Asiyah originated from the presence of wells that yielded water, allowing it to float on the earth's surface during times of heavy flooding. AL-ŠARĪF 1940: 252; Al-Qassim belongs to the tribe of Abs, while al-Nabaj belongs to Majeed from the Quraysh tribe. AL-HAMDANI 1884: 165.

⁵⁴ AL-ŠARĪF 1940: 272.

⁵⁵ AL-SANĪDĪ 2009: 60.

⁵⁶ AL-ĠARALLĀH 1997: 52; AL-‘URAYNĪ *et Al.* 2018: 114.



[FIGURE 2]: The most important archaeological and historical sites and landmarks in al-Qassim region. AL-QAHĪDĀN 1999: 5.

V. TOPOGRAPHY OF THE AREA

The region displayed a unique geological landscape, predominantly characterized by its flat terrain and minimal topographical complexity, interspersed with rocky outcrops⁵⁷. The terrain composition varied based on its geological formation. During the late Permian period, the region experienced moderate weather conditions, warmth, and humidity, providing favourable conditions for the flourishing and diversification of life in al-Qassim region⁵⁸.

Al-Qassim serves as a remarkable example of the morphology of the Qassim fields, which showcases a succession of thick geological formations with varying degrees of hardness. These formations belong to the earliest geological eras and are referred to as the Saq group, as well as another group known as Tabūk⁵⁹.

The region of al-Qassim is geographically divided into two distinct parts:

1. The western part comprises the rocky Arabian Shield area⁶⁰, representing a portion of the high plateau of Najd. This includes several governorates in the western and southwestern areas, such as al-Rass, al-Nabhaniya, Dhariya⁶¹, Abanat and al-Naqra.

⁵⁷ ABŪ BAKR 2012: 41.

⁵⁸ AL-QAHĪDĀN 1998: 5-7.

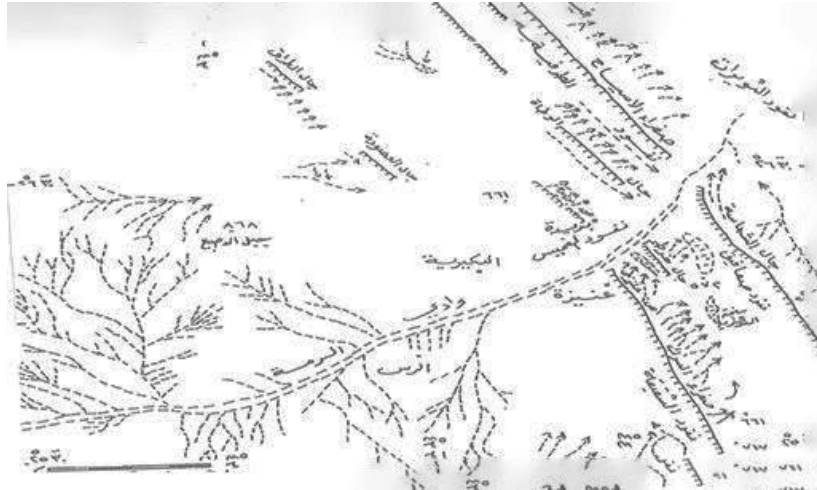
⁵⁹ BRANZAND 1985: 13.

⁶⁰ The name «the shield» was attributed to its exceptional hardness and remarkable resistance to pressure. Another theory about how the shields acquired their name is they served as the bedrock around which sediments accumulated, eventually forming the continental blocks. The rock formations of the Arabian Shield serve as the geological foundation not only for the land of Qassim but for the entire kingdom. The shape of the Arabian Shield corresponds to the geographical area of the kingdom, while approximately one-third of the region is composed of sedimentary rocks. AL-QAHĪDĀN 2003: 21.

⁶¹ Dhariya derives its name from the combination of the Arabic letters «dā'», «kasra rā'», and double stress. It was strategically located along the pilgrimage route from Basra to Mecca, approximately seven stages away from Medina. The name Dhariya originated from the presence of a well-known (**well-known needs to modify a noun**) as Athbah. According to Ibn al-Kalbi, Dhariya was named after Dhariya bint Nizar bin Ma'ad bin Adnan. ŠARĀB 1991: 104. Additionally, AL-SAMHOURI states that

This region is characterized by the presence of rocks from the Arabian Shield, with mountains composed of metamorphic igneous rocks. It is also intersected by watercourses like Wadi al-Rumma and its tributaries.

2. The eastern part is situated within the sedimentary region, which forms part of Najd al-Safla. Sedimentary rocks cover this area and features mountain ridges and expansive, predominantly sandy areas⁶². Notable sand clusters in this region include al-Asiyah veins, the sands of al-Sha'iqqa al-Wahlan, and the sands of al-Ghamis⁶³.



[FIGURE 3]: Map of Nafud al-Ghamis & al-Thuwayrath. AL-ĠĀRALLĀH 1997: 32.

These geo-morphological and topographical formations played a major role in human settlement and the establishment of many settlements that created permanent stability in the region.

VI. THE ARCHAEOLOGY OF THE AREA

The region is characterized by many ancient archaeological discoveries from the pre-Islamic period, which place the region among the settlement areas of ancient times. The most important of these discoveries are the following:

First: Stone Circles

A number of stone circles have been discovered in various locations near water sources, exhibiting an oval shape, with some being surrounded by piles of stones. These circles can be found not only on mountain tops but also in close proximity to one another, either stacked on top of each other⁶⁴ or as individual stone structures or groups dating back to early periods⁶⁵. The presence of these stone circles serves as compelling evidence of the existence of a civilization in the region. These circles served a variety of purposes, including:

Dhariya was a village named after a well called Dhariyah. IBN AL-KALBI adds that it was named after Dharbah bint Nizar, who was the mother of Khalwan bin Imran bin al-Haqq bin Qada'ah. AL-ASMA'I also supports this notion, stating that Dhariah bin Rabi'ah bin Nizar bin Ma'ad bin Adnan was the origin of the name. AL-BIYĀDĪ 2009: 218-219.

⁶² AL-ĠĀRALLĀH 1997: 32-38.

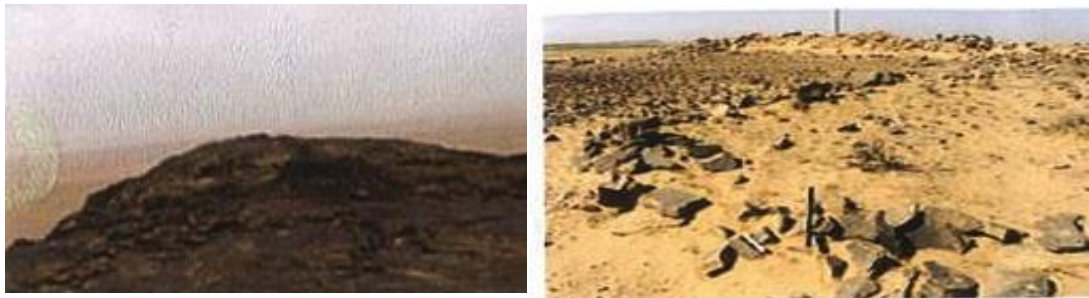
⁶³ AL-RASSINI *et Al.* 2022: 119.

⁶⁴ AL-'URAYNĪ *et Al.* 2018: 116.

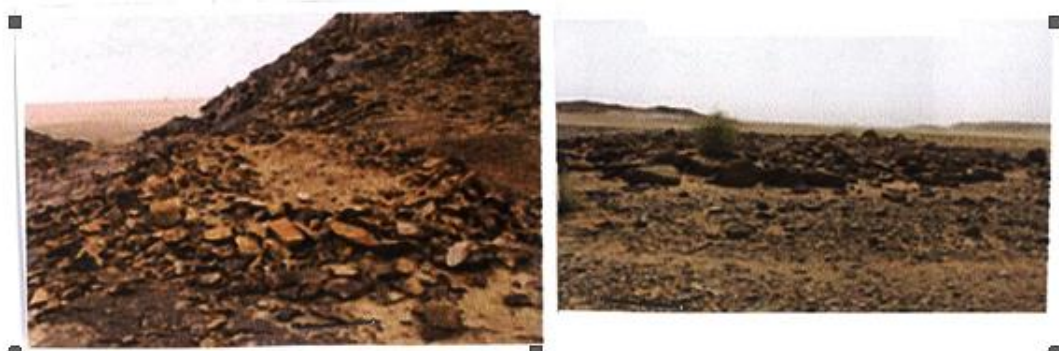
⁶⁵ AL-QAHĪDĀN 2003: 874-888.

- Pre-Islamic burials.
- Commercial convoy route markers.
- Ancient writings.
- As locations for worship, private and public cemeteries, caravan stations and transportation hubs, traps for wild animals, ritual purposes, and magic⁶⁶.

These circles may have upright columns or stone circles. Archaeological surveys conducted in the region have confirmed the presence of these stone circles in specific locations, such as al-Shamsiyah, Hanizal, al-Shihiyah and al-Fuwailiq⁶⁷ [FIGURES 4-5].



[FIGURE 4]: Square stone structures from Al-Shihiyah Center Location. AL-MUTAIRI *et Al.* 2018: 129.



[FIGURE 4]: Rectangular burials. AL-MUTAIRI *et Al.* 2018: 130.

Finds of the Second Stone Age

A significant number of stone tools have been discovered at various sites within the region. For instance, in Shuaib al-Adgham, located east of al-Qassim, stone tools dating back to the Middle Paleolithic Acheulean era were unearthed approximately 200 thousand years ago. Among these tools were both individual and grouped stone axes⁶⁸, notable for their precise craftsmanship and distinctive shapes⁶⁹.

Furthermore, in Zubaydah⁷⁰, situated north of Unayzah⁷¹, pottery and ceramics dating back to the fourth century BC were uncovered. Two types of pottery were found, one mixed with straw and the other mixed with coarse grains, exhibiting intricate decorations in rare colors. The majority of Zubaydah's pottery featured painted

⁶⁶ AL-RASSINI *et Al.* 2022: 148.

⁶⁷ AL-'URAYNĪ *et Al.* 2018: 129.

⁶⁸ REPORT FROM AL-QASSIM REGION HERITAGE AUTHORITY: 4.

⁶⁹ REPORT OF THE HERITAGE AUTHORITY IN AL-QASSIM REGION 2023: 4.

⁷⁰ AL-ĠĀRALLĀH 2003: 296-297.

⁷¹ BARR & QAZDAR 1979: 177.

designs⁷², indicative of the Hellenistic Greek era⁷³. During excavations, a coin was also discovered, dating back to the pre-Islamic era⁷⁴. Additionally, several copper and pottery fragments dating back to the first millennium BC were found in the area⁷⁵.

Black pottery with a distinct black surface has been unearthed in the central region, specifically in the tombs of al-Faw and the Zubaidah site. These pottery findings potentially date back to the 3rd century BC⁷⁶, suggesting that these sites were inhabited during that period. The discovery of these settlements indicates a flourishing of human habitation in the central region, extending from al-Faw in the south to al-Qassim in the north⁷⁷. This evidence points to the existence of ancient cultural and trade relations within the region [FIGURE 6].



[FIGURE 6]: Pieces of stone axes in Shuaib Al-Adgham and Al-Tarfiyya. HERITAGE AUTHORITY - ARCHAEOLOGY DEPARTMENT - QASSIM REGION BRANCH 2023: 4-7.

⁷² The site of Zubaida is located on the banks of Wadi al-Rumah, approximately one kilometer away from the road that connects Buraidah and Unayzah. This area is renowned for its exceptional fertility, making it the most fertile region in the central part of the country. The site was first discovered in 1397 AH/1977 AD near the cities of Buraidah and Unayzah. Although it was determined that the site dates back to the Hellenistic period, this finding does not align with the historical records of the Central Region. Excavations at the site, conducted through two small probes, suggest the possibility that the site went through multiple periods of settlement, with one of them potentially predating the Hellenistic period. BAZ & QAZDAR 1979: 177.

⁷³ REPORT FROM AL-QASSIM REGION HERITAGE AUTHORITY 2023: 12.

⁷⁴ AL-‘URAYNĪ *et Al.* 2018: 114.

⁷⁵ The date could be older, as they were discovered in numerical sites along with the colored pottery decorated with the grid pattern that was discovered, according to the researcher’s knowledge, in any site Adating back to the 5th century BC. AL-ĠAZZĪ 1993: 16-17.

⁷⁶ AL-‘URAYNĪ *et Al.* 2018: 114.

⁷⁷ AL-ĠAZZĪ 1993: 16-17.

Third: Fossils, Forest and Petrified Wood

Evidence strongly supports the notion that the region was characterized by dry environments that experienced heavy rainfall, leading to the formation of rivers and lakes. These rivers played a crucial role in transporting trees to basin areas and deep depressions, where sediments accumulated and ultimately forming fossils.

The presence of fossils, forests, and petrified wood in the region is predominantly found within layers of sedimentary rocks. The Unayzah Formation, known for its plant fossils and flat sand, represents some of the oldest rocks in the kingdom. The al-Qassim Petrified Forest, often referred to as the «al-Qassim Forest»⁷⁸ dates back to the Permian period and is recognized as one of the oldest fossilized plant formations. The age of these forests is estimated to range between 250-270 million years⁷⁹. Remarkably, the discovery of petrified wood and tree trunks indicates that certain parts of the region were submerged in water during the rainy era⁸⁰. This phenomenon serves as an intriguing attraction and draws tourists to the area⁸¹. Significant findings of petrified wood have been documented across various sites, including al-Asiyah, al-Quwaitir, al-Shaqqa⁸², Qusayba, al-Shamsiyah and al-Watat⁸³. Further, parts of fossilized plants have been found stretching from Buraidah⁸⁴ to Unayzah, with fossilized tree trunks embedded within layers of large stones⁸⁵. These findings underscore the antiquity of the area and provide evidence of its submersion in water during a distant geological era [FIGURES 7-9].



[FIGURE 7]: Fossilized fossils in al-Qassim region. HERITAGE AUTHORITY - ARCHAEOLOGY DEPARTMENT 2023: 6.

⁷⁸ AL-ĠĀRALLĀH 2003: 41.

⁷⁹ AL-AWADI & DAGHIRI N.D.: 4.

⁸⁰ AL-QAHĪDĀN 2003: 49.

⁸¹ AL-QAHĪDĀN 1998: 36-39.

⁸² Shaqaqa is a term characterized by a broken alif and al-rā'. Its dharej corresponds to a shuqta, indicating that it represents a split subject or object. The manzils along the route were affiliated with the Banu Khalid during the 7th and 8th centuries AH/13th -14th century AD. In colloquial usage, a shuqaqah refers to a rectangular portion of a verse of poetry woven into a poetic unit. The number of shuqaqahs determines the sequence of the verses. ŠĀRĀB 1991: 165: AL- ŠUĀIBI 2003: 153.

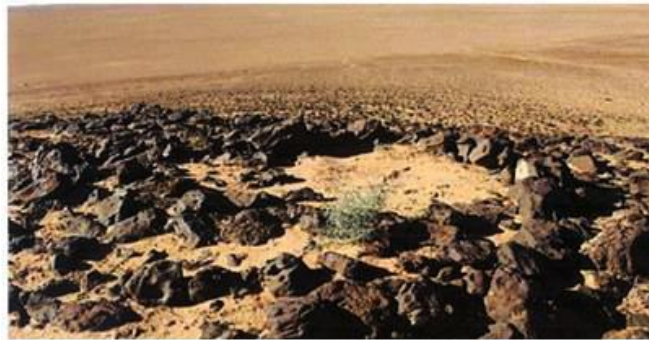
⁸³ Al-Wata is an integral geological formation within the greater Arabian Peninsula region. It is a cohesive geological plate that emerged during the Pleistocene era. This period experienced intermittent rainy periods, resulting in the formation of valleys and river networks within Al-Wata region. ŠĀWKAT 2001: 10-13.

⁸⁴ An important city in Najd, located in al-Qassim on Wadi al-Rumāh, surrounded by desert and palm plantations. Buraydah rises from the sea level at a lower altitude than Unayzah LORIMER 1969: 413 - 416.

⁸⁵ AL-ĤALĪFA *et Al.* 2010: 128.



[FIGURE 8]: Stone tombs and circles. HERITAGE AUTHORITY - ARCHAEOLOGY DEPARTMENT 2023: 7.



[FIGURE 9]: Traces of trees and petrified trunks. HERITAGE AUTHORITY - ARCHAEOLOGY DEPARTMENT 2023: 10.

Fourth: Rock Drawings and Engravings

Numerous archaeological sites have been discovered throughout the region, containing individual or collective writings and inscriptions in the Thamudic script. These inscriptions depict various aspects of hunting, warfare, and social conditions. Among the most notable sites are the following:

A- Al-Takuri Site

Situated west of Unayzah, this site is characterized by a black, rectangular hill composed of sedimentary rocks. Within this site, several inscriptions and drawings have been found. Notably, there is a depiction of a knight riding a horse, as well as a drawing of a scorpion. Additionally, there are drawings portraying camels⁸⁶ [FIGURE 8].



[FIGURE 10]: Rock drawings from the al-Takuri site – Unayzah. HERITAGE AUTHORITY - ARCHAEOLOGY DEPARTMENT 2023: 17.

⁸⁶ AL-'URAYNĪ *et Al.* 2018: 121.

B - Jabal Saq⁸⁷

Situated north of al-Bukayriyah, Jabal Saq is an archaeological site that has yielded remarkable discoveries. Among them are drawings depicting human figures and various animals such as camels and ibexes. Additionally, Thamudic inscriptions have been found at this location⁸⁸.

C- Jabal At-Tays

Located north of Jabal Saq, Jabal At-Tays is another site of archaeological significance. One notable discovery is a distinctive drawing of a lion, alongside a Thamudic inscription⁸⁹ [FIGURE 11].



[FIGURE 11]: A distinctive drawing of a lion - Jabal At-Tays.
AL-MUŠAYQIḤ 2020: 264.

D- Jabal Sawaj

Situated west of al-Qassim, Jabal Sawaj⁹⁰ has revealed significant findings, including writings in the Musnad script. Among the most notable inscriptions is the word «ع ض م ت» (greatness). In the northwest of the mountain, drawings depicting various animal shapes such as tigers, ibexes, cows, ostriches, and people in traditional engraving formations have been discovered. Additionally, an intriguing scene depicting an animal chase has also been found at this site⁹¹ [FIGURE 12].

⁸⁷ Jabal Saq comprises geological formations that can be traced back to the earliest geological era. These formations are known as Saq (pronounced «Saq»), named after Jabal Saq situated in the northwest of Aras. Additionally, it belonged to Bani Asad and located between al-Nabaj & al-Naqra, approximately 60 kilometers northwest of city of Buraidah. ISKŪBĪ *et Al.* 1996: 3.

⁸⁸ AL-‘URAYNĪ *et Al.* 2018: 128-129.

⁸⁹ AL-‘URAYNĪ *et Al.* 2018: 129.

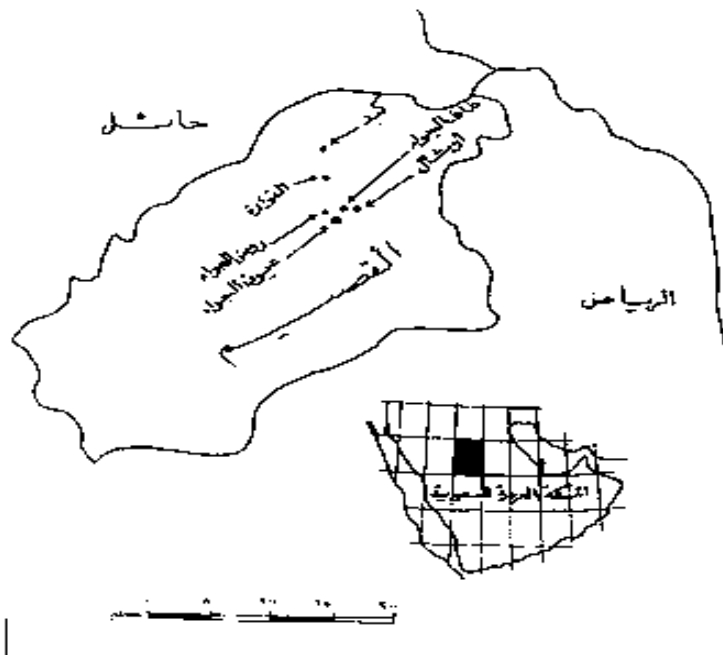
⁹⁰ Sawwaj is called Sawwaj al-Khail, which was one of the Protection horses of Darba. It is a black mountain. AL-BALĀDĪ 1982: 192-194.

⁹¹ AL-DĪB 1997: 179.



[FIGURE 12]: Rock drawings from Jabal Sawaj, al-Rass. AL-MUŠAYQIḤ 2020: 265.

E-Al-Hanader



[FIGURE 13]: It is located west of Uyun Aljiwa⁹². AL-ḌIB & AL-‘UMAYR 1997: 109.

⁹² Al-Jawaa, is plural form of «jaw». In its linguistic origin, it refers to a wide valley among other valleys. Al-Jawaa can also indicate the gap or space between houses or residential areas. Additionally, it can represent the inner part of the earth or a valley within the lands of ‘ain and Asad. Al-Jawaa is associated with the region of Najd and is linked to the concept of a wide and descending belly of the earth. AL-TABRIZI 1933: 177; AL-ḌIB & AL-‘UMAYR 1997: 109.

The site contains a collection of ancient drawings and writings, including notable inscriptions, such as:

Inscription (1): ل ر م ل ع ج ل

This inscription translates to «This calf belongs to R M L».



It consists of a simple noun, R M L, which forms a nominal phrase with R M and the second noun is the god L. The presence of A J L, meaning «son of the cow, » indicates the use of cows in agricultural practices.

Inscription (2): by ض و



This inscription consists of a single word that signifies «light» or «shinings». It reflects the concept of light in Arabic cultural heritage; among the rock drawings discovered, there were two red mountainous hills on top of Mishref Mountains, overseeing the slopes. One drawing portrayed a relatively large camel, indicating its movement. Another drawing depicted a horse in motion. Additionally, a captivating hunting scene was found on a smooth rocky surface. Another notable drawing showcased a human figure wearing clothing that covered their entire body down to the knees. In the figure's right hand, there was an arrow aimed towards a startled deer⁹³.

F- Castles (Kabd)

It extends northeast of Kabd, and a number of rock drawings and engravings were found therein, including:

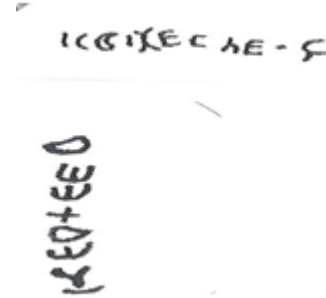
Inscription (1): ل س ح ج ت (ب) ح ط م

Translation: By S H G T Bin Htm

This Thamudic inscription likely represents a specific marking or identification of an animal.

Inscription (2): ل ر م ل (ب) ا ح ب ه ج ن ك

Translation: «This is the hank (camel) of R M L son of ahb»



This text holds significant importance as one of the most notable Thamudic texts. Its origins can be traced back to the middle Thamudic period, spanning from the 2nd century BC to the 3rd century AD. One interpretation suggests that «HANK» could be one of the names attributed to camels in Arabic. If this interpretation holds true, it would represent the fifth name found, alongside three other signs discovered in both Nabataean and Thamudic scripts (ش ق ل ت).

The abundance of suitable rocks for writing in the area likely prompted many individuals to record their news and memories, resulting in the discovery of numerous animal drawings and inscriptions. Notably, among these findings are drawings of a perforated ibex and a small ibex depicted in a walking position. The image of this small ibex is repeated across multiple rock surfaces, maintaining the same shape and size. Additionally, drawings of a large camel⁹⁴, appearing to be in a fast-walking or agitated

⁹³ AL-ĠĀRALLĀH 2003: 288; AL-ḌIB & AL-'UMAYR 1997: 118-119, 146.

⁹⁴ Camels are often found in relatively large sizes in Thamudic inscriptions. BEDNARIK & KHAN 2005: 54.

state, have also been uncovered⁹⁵. These rock drawings and inscriptions provide valuable insights into the cultural practices, artistic expression and the natural environment of the region during that period.

G- Salasl (al-Qawara)

The most important inscriptions include:

ت م ل ت ب ن م ر ا ل ق س

T M L T B N M R A L Q S

Translation: al-Lat bin Mar al-Qais



This inscription pattern can be traced back to the early or middle Thamudic period. It comprises the first compound name, which signifies «servant» or «slave» (Abdullat), and the second name, MR - Imru, representing the god Q AI S. The presence of this god, Qais, has also been discovered in the temple of Mada'in Saleh⁹⁶.

H- Hassa (al-Nasla) (Ghaf al-Jawa)

Situated in the region of Ghaf al-Jawa, this unique geological formation is known as Hassa al-Nasla, a large sedimentary rock mass that stands isolated from the surrounding mountain range near the town of Ghaf al-Jawa. The rocky mound is referred to as al-Hassa and is sometimes called Hassa al-Nasla. It has yielded engravings of animals and ancient drawings, including a distinct depiction of a camel. The camel drawing stands out because it portrays the animal with two long, identical necks, giving the impression of grazing. Additionally, a solitary ibex or mountain goat drawing has been unearthed. The ibex holds significance as one of the animal symbols associated with the lunar year in Sabaeen traditions, which is known as «Maqqa.» The drawing also contains Thamudic script writings at the bottom. Furthermore, a drawing of an animal resembling a giraffe and ancient Thamudic writings have been discovered at the site.

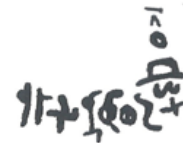
VI- THE INSCRIPTION OF HASAT AL- TALHA

ل س ع د ف ت ش و ق ا ل ت ه د

L S A D F T S H W O Q L T H D

Translated as «By Saad, who is longing for T H

D. »



This inscription, written in the late Thamudic period, signifies Saad is longing for thd, possibly sharing the same meter as «Tafal» from al-hadd.

VII- THE INSCRIPTION OMANI

ل د ش م ب ق م ل

L D S H M B Q M L

Translation: by D S H M bin Q M L



Intricate drawings of four camels accompany this text. It can be interpreted as a title deed or ownership claim by the inscription's writer, D S H M, for the camel. As for

⁹⁵ AL- DIB & AL-'UMAYR 1997: 129-131, 147-148; AL-HALĪFA *et Al.* 2010: 135.

⁹⁶ AL- DIB 1999: 184.

the phrase «Q M L», it seems to refer to the Arabic word for lice, an insect that inhabits hair⁹⁷.

Naqrat al-Dabaa (Ghaf al-Jawa)

Naqrat al-Dabaa is located approximately 13 km northwest of the town of Ghaf al-Jawa. It comprises a collection of yellow sedimentary rock blocks. Rocky depressions, trails, and uneven terrain characterise the site. The rock blocks display animal drawings on their surfaces. One notable engraving depicts three camels in a row, followed by a human figure with modest features. Another depiction portrays a group of 13 animals executed in a percussion style, with two rows, one above the other⁹⁸. Inscriptions have also been found at Ghaf al-Jawa at this site.

VIII- (ARIFJIN MANSOUR) OR (MARBAT AL FARAS)

Inscription⁹⁹ (1): Sh B W

It is believed that this inscription represents the name of a young man. This name appears in Nabataean and Hadhrami inscriptions in a similar form, known as Shbaa or Shba. The name is connected to the Arabic word «shab», which means «young man» or «youth».

Inscription (2):

وال و ب ر ن س (ش) لا س (ش)
WAL WB R N S (SH) LA S (SH)
WAEL BIN T S (SH) LA S (S)

It may be a proper name and consists of two proper names, the first and «Al» which are widely known in Semitic Arabic inscriptions, and the second is difficult to read.

Inscription (3):

ش ق ل ت / ش ق ل ت /
SH Q L T / SH Q L T /

The term «Shqlt» is interpreted as «watering from Al-Lat» It may refer to a blessing or favour sought from the goddess Al-Lat. Another possible meaning is «taking one's opinion» or «sobriety» In Nabataean culture¹⁰⁰, three women were known to bear this name, «Shqlt»¹⁰¹.

These inscriptions provide glimpses into the naming conventions, cultural practices, and religious beliefs of the time, but their precise meanings and contexts may require further research and study.

⁹⁷ AL- DIB & AL-'UMAYR 1997: 115-116, 142; AL-HALĪFA *et Al.* 2010: 137.

⁹⁸ AL- DIB & AL-'UMAYR 1997: 135-138.

⁹⁹ A pebble smaller in size than the Antara pebble was found on a high hill impacted by erosion; it contains some rock art. REPORT FROM AL-QASSIM REGION HERITAGE AUTHORITY 2023: 15.

¹⁰⁰ The first is the wife of al-Harith IV (9 BC/40 AD), who commemorated his memorial marriage. The inscription on the coin is one of Shaqila, the other is that of her husband. The second is Shaqila, his daughter. The third is Shaqila, the wife of Malik (40 - 70 AD), who appeared on some of the coins minted during the reign of her husband. AL- DIB& AL-'UMAYR 1997: 143.

¹⁰¹ AL- DIB & AL-'UMAYR 1997: 123-124, 150.

Al Dil al-Mutaksr (Authal)

It is a sedimentary rocky mountain characterized by its reddish colour. At the base of this mountain, one can find engravings and drawings of animals. Among these drawings is a depiction of a herd of approximately 11 camels on a smooth rock surface. Interestingly, ten of the camels are shown carrying what appears to be a howdah on their backs. This artwork captures a natural scene of camel caravans passing through the region at such time.



Among the inscriptions found at this site is
Inscription (1):

س و ج ب ر ف س
S W G B R F S

This inscription dates to the Middle Thamudic period. In this context, the letters «S W H» are commonly seen in Thamudic inscriptions. The first name is a proper name that signifies a traveller. The second name, R F SH, may be related to the term «rafsh» meaning eating and drinking. This inscription may be a prayer for security and wealth¹⁰². The name Rafshan is also found in Arabic heritage¹⁰³.

Hassa Ghaylan (al-Asiyah)

Situated to the north and northeast of Ain Bin Fuhaid. This area showcases a cluster of black igneous rocks adorned with intricate inscriptions and drawings depicting various animals like camels, deer and horses. Additionally, there are markings etched onto the rock Faces¹⁰⁴.



Antara Rock

Positioned northwest of Ghaf al-Jawad, there lies an ancient settlement center called (Jo-Qo). Its name possibly derives from the trees that thrive in the area, known for their ability to retain water over an extended period¹⁰⁵. It is at this site that the legendary poet Antara Ibn Shaddad used to meet with Abla his beloved in the shade of

¹⁰² AL- DĪB & AL-OMAIR 1997: 142-143; AL-ḤALĪFA *et Al.* 2010: 137-140.

¹⁰³ AL- DĪB 1999: 186.

¹⁰⁴ AL-RASSĪNĪ *et Al.* 2006: 152-153.

¹⁰⁵ AL-ḤALĪFA *et Al.* 2010: 126.

the rock. The rock itself features captivating rock art¹⁰⁶. In addition to ancient graffiti, this stone preserves some ancient petroglyphs depicting animals such as the oryx, which were once native to the al-Qassim area¹⁰⁷ [FIGURES 14-15].



[FIGURE 14]: Antara Rock. HERITAGE AUTHORITY - ARCHAEOLOGY DEPARTMENT 2023: 14.



[FIGURE 15]: Rock inscriptions (Hassa Ghailan), Turaif Center - al-Asiyah. AL-SABHAN 2006: 329.

Wadi Baqar

Within Wadi Baqar, one can discover a remarkable collection of rock inscriptions and drawings that vividly depict various animal shapes, including camels, horses, donkeys, and palm trees. These artistic representations were skilfully created using deep-drilling and perforation techniques.

Hussan al-Qawara

Situated amidst the landscape is the striking sandstone mountain known as Hussan al-Qawara. Its distinctive composition resembles the silhouette of a horse's head. This location held significant strategic importance as a crucial resting point for caravans. In addition to its natural allure, Hussan al-Qawara boasts a rich treasure of rock drawings portraying both human and animal forms. These intricate designs were meticulously crafted using the intaglio method¹⁰⁸ [FIGURE16].

¹⁰⁶ REPORT FROM AL-QASSIM REGION HERITAGE AUTHORITY 2023: 14.

¹⁰⁷ KAMINSKI *et Al.* 2021: 9.

¹⁰⁸ AL-ḤALĪFA *et Al.* 2010: 130-131.



[FIGURE 16]: Rock Art of Human and Animal Figures. HERITAGE AUTHORITY REPORT OF AL-QASSIM REGION 2023: 18.

Al-Dulaimah Site

This site encompasses a modest sandy mountain adorned with an array of captivating drawings. These illustrations, dating back to the Iron Age, grace the southeastern rocks and depict various creatures such as camels, ostriches, and ibexes. The site also holds significant historical value as it houses Thamudic writings, as well as inscriptions and memorial-type engravings from the Dadanian era¹⁰⁹.

XI- CONCLUSION

The Kingdom of Saudi Arabia has gained global recognition as a leading tourism destination, thanks to its unique and forward-thinking vision in the field of tourism and antiquities.

The initiatives introduced by the Commission for Tourism and Antiquities have laid the groundwork for the development of safe and attractive tourism experiences, with a strong emphasis on community participation. Al-Qassim region holds significant importance as a tourism destination due to its strategic location and historical significance, playing a pivotal role for thousands of years. Archaeological surveys and studies have revealed evidence of ancient settlements in al-Qassim region dating back to the first millennium BC, demonstrating its status as an ancient trading hub. The region is adorned with numerous rock drawings and Thamudic inscriptions, providing glimpses into the rich archaeological and cultural heritage of the area. The al-Qassim region has gained prominence as a tourist destination by exploring and preserving various archaeological sites, including stone artifacts, fossils, petrified forests, stone circles, inscriptions, and rock drawings.

The Commission for Tourism and Antiquities has played a pioneering role in aligning the development of the al-Qassim region with the objectives outlined in the kingdom's Vision 2030 initiative. The foundations of the tourism sector in the region have been significantly strengthened, solidifying its position as a sought-after tourist destination.

¹⁰⁹ REPORT FROM AL-QASSIM REGION HERITAGE AUTHORITY 2023: 18.

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AN ANALYTICAL STUDY OF MATERIALS CONSTITUENTS OF A HISTORICAL MAP ON A WOODEN FRAME OF UPPER EGYPT DATED TO 1882 AND THEIR MUTUAL DAMAGE

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ABSTRACT

[EN] This study analyzes one of the heritage maps of Upper Egypt, which dates back to 1882 and is now part of the Qasr al-Qobba Library. It discusses the theme and manufacturing techniques of the map and the effect of wood, textile and paper on the map's anatomic structure. Several tests and analyses were carried out to study how the map was manufactured and to chart where the map was damaged. The techniques included visual examination, infrared examination (IR), ultraviolet (UV), microbiological examination, digital, optical microscope, Raman, scanning electron microscopy (SEM) with energy dispersive X-ray spectroscopy (EDX) unit and Fourier-transform infrared spectroscopy (FTIR). The analytical study of the map with different methods allowed for determining how it was damaged. The results of the microscopic examination of microbiological isolates showed that the most common fungi were *Trichoderma*, *Aspergillus* and *Penicillium*. Microscopic examination showed that the type of printing was chromolithography. The damage rates in the functional groups of cellulose were also examined to identify the media as gum Arabic; the adhesive between the layers of the map was animal glue. The results revealed that pigments were identified as lazurite and carbon and the wood of the map frame was identified as beech. Textile and paper were identified as cotton. All these steps were preceded by measuring the pH of the paper. The analytical study is important in determining map-making techniques in 1882. This study examines how the presence of multiple layers and materials- such as fabric, wood and paper- affect the deterioration of this map.

KEYWORDS: Paper scraps, Raman, color pigments, chromolithography, lazurite.

[AR]

دراسة تحليلية لإحدى الخرائط التاريخية على إطار خشبي لمصر العليا يرجع تاريخها إلى عام 1882 مع دراسة التلف المتبادل بين مكوناتها يعرض هذا البحث دراسة تحليلية لإحدى الخرائط التراثية لمصر العليا والتي يرجع تاريخها إلى عام 1882 من مجموعة مكتبة قصر القبة. ويناقش موضوع الخريطة وتقنيات تصنيعها وتأثير عوامل التلف في بنيتها التشريحية، بما في ذلك الخشب والنسيج والورق. تم إجراء العديد من الاختبارات والتحليلات لدراسة تقنية تصنيع الخرائط مع رسم خريطة لمظاهر التلف. على سبيل المثال، الفحص البصري، الفحص بالأشعة تحت الحمراء (IR)، الأشعة فوق البنفسجية (UV)، الفحص الميكروبيولوجي، المجهر الرقعي، البصري، التحليل الطيفي باستخدام جهاز الرامان (Raman)، المجهر الإلكتروني الماسح (SEM) مع وحدة التحليل الطيفي للأشعة السينية المشتتة من الطاقة (EDX) والتحليل الطيفي للأشعة تحت الحمراء (FTIR). أتاحت الدراسة التحليلية للخريطة بطرق مختلفة تحديد مظاهر التلف. أظهرت نتائج الفحص المجهرية للعزلات الميكروبيولوجية أن الفطريات الأكثر شيوعاً هي (*Trichoderma - Aspergillus terreus Penicillium*) وأظهر الفحص المجهرية أن نوع الطباعة هو (الطباعة الحجرية). كما تم فحص معدلات الضرر في المجموعات الوظيفية للسليولوز وكذلك التعرف على الوسائط اللونية على أنه (الصمغ العربي)، والمادة اللاصقة بين طبقات الخريطة تم التعرف عليها على أنها (الغراء الحيواني). كما تم التعرف على الأصباغ على أنها لازوريت وكربون، والتعرف على خشب إطار الخريطة على أنه خشب زان. تم تحديد المنسوجات والورق على أنه قطن. وقد سبق كل هذه الخطوات قياس درجة الحموضة للورقة. وقد نجحت الدراسة التحليلية في تحديد تقنيات صناعة الخرائط في فترة 1882. مع دراسة التلف المتبادل الناتج عن تعدد طبقات و مواد الخريطة من نسيج وخشب وورق.

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I. INTRODUCTION

Maps have an important role in human history. Since prehistoric times, people have cared about mapping roads, the night sky, hunting areas and directions in caves, on bones or other engravable materials. Maps have played a significant role in human history. In present times, these maps and their makers serve as a powerful medium to revive forgotten knowledge¹. These methods have evolved through ages and civilizations in simple and sometimes complicated manners².

The ancient Greek civilization is credited with developing and understanding cartographic methods. They made many maps scientifically³. Greek scientists and geographers conducted research on cartography and developed methods of mapping the earth, population areas, territorial divisions and climatic zones. But these methods were all lost. It could be assumed that the Greeks were the first to apply the rules of geography to cartography, in order for the latter to become a real science⁴. Geography and cartography were developed continuously by Greek scholars.

Because of their rich informational content, maps are natural treasure with artistic and educational value that must be preserved. Additionally, they are evidence of geography and cosmology⁵. Maps are categorized into two types: Topographic maps, which show the landscape of a country or the world and celestial maps, which contain celestial forms and constellations⁶. The main aims of cartography are education and study. A third type of map is a stereo map, used for decoration with the spherical shape of the Earth⁷. How a map is made is influenced by the diversity of raw materials and differs from one period to another. Sometimes economic conditions can also effect how a map is made⁸.

The oldest map found was a cave painting dating back to 6100-6300 BC in Anatolia. The Babylonian civilization also drew maps on clay tablets and the ancient Egyptians knew the art of drawing maps on the walls of temples and tombs, in addition to scrolls. All of the above were attempts at rudimentary cartography without rules, art, or science of modern map-making techniques⁹. The art of making maps established a foundational technique that persisted throughout history, following the Greeks' introduction to cartographic practices. This tradition has evolved with only minor advancements in materials used over time. The method of making maps can be explained as follows¹⁰:

The first cartographic technique used a layer of reinforced textile covered with two layers of thin, good textile as a support for the color layer. After this, a layer of paper pulp paste with the addition of adhesive was applied, which was then stuck with a clip

¹ AWADH *et Al.* 2017: 41-47.

² STEVENSON 1921: 2-3.

³ SAVAGE 1985: 3-4.

⁴ DEETZ 1943: 4-6.

⁵ KAHN 1994: 90-91.

⁶ HUAHUA 2006: 969-973.

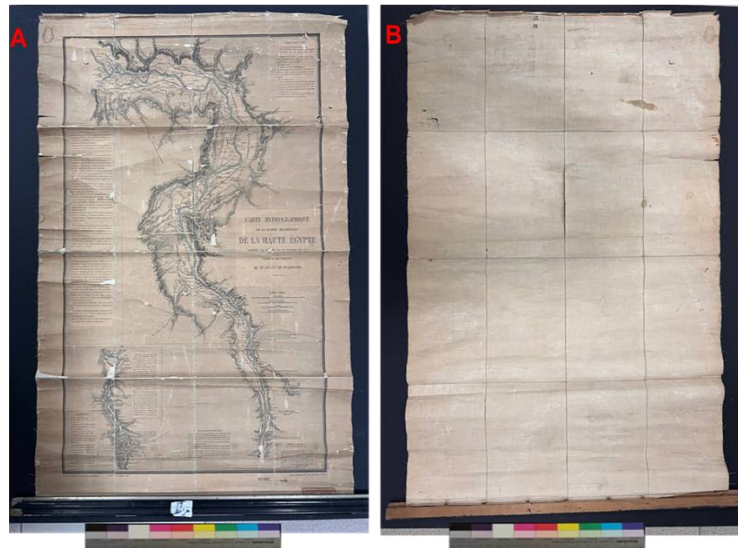
⁷ WILSON *et Al.* 2018: 714.

⁸ KAHN 1994: 90-91.

⁹ BRENTJES 2012: 135-146.

¹⁰ DUCZA 2013: 8-13.

of embossed or hand-drawn printed or watercolored paper¹¹. Finally, a protective layer was applied by sealing the paper with a varnish after allowing the colors to dry, safeguarding both the color layer and the paper's surface¹². It was common to use different types of wood, such as oak, ebony and beech, to support the sides and to fix the types of steel nails with an adhesive¹³. Cartography has evolved continuously in how maps are drawn, colored and printed, while maintaining the manufacturing technique. The research is concerned with the analytical study of one of the maps from the collections of the Qasr al-Qubba Library, which is now preserved in the restoration laboratory of the Faculty of Archeology/Ain Shams University. This map, which is of Upper Egypt in 1882, will be transferred to the Alzaefaran Museum at the university after its preservation is complete [FIGURES 1/A-B]. The study is concerned with studying the technique of making the map by studying the layers that make up the map and identifying the components of each layer through a set of tests and analyses. Additionally, it investigates the factors contributing to the damage of the map, including their characteristics and causes.



[FIGURES 1]: One of the heritage maps of Upper Egypt dating back to 1882 is preserved in the heritage library of the Faculty of Archeology/Ain Shams University. A. to the front side. B. to the backside © The Qasr al-Qobba Library

1. Multiplicity of the Stratigraphic Structure of the Map and the Effect of Damage Factors on their Components

Since its beginnings, the technique of map making starts by applying a layer of textile topped with a layer of paper pulp as an adhesive material. The surface is then polished, allowing for the printing or drawing of the maps to be applied. Wooden supports are attached at the ends. This multi-layered structure involves different materials, which may result in damage. In addition, some bleaching materials are used, such as chlorine, which raises the degree of alkalinity¹⁴. Additionally, the materials used

¹¹ VAN DER REYDEN 1986: 23.

¹² BAYNESCOPE 1985: 13.

¹³ VALERIO 1987: 98.

¹⁴ REICHARDT 1938: 510.

for polishing the paper such as alum (potassium sulfate and aqueous ammonium), causes acidic traces that accelerate the damage of cellulose fibers, reducing its polymerization in the long term and ultimately increasing acidity which damages the paper¹⁵.

The damage to maps may be caused by external factors, such as heat, humidity and light exposure to the basic components of the layered structure of maps, such as:

- The effect of damage factors on cellulose, the main component of paper, textile and wood, is highly hygroscopic and susceptible to moisture. At high rates of humidity and dryness, cellulose absorbs and releases water, weakening the material's mechanical properties. This leads to expansion and contraction impacting the layers of the map¹⁶, and resulting in various forms of damage, including fissures, cracks and separations and even the detachment of the upper textile layer¹⁷.
- Lignin is a key component of paper made from wood pulp or plant fibers and wooden props. It contains a high percentage of carbon and hydroxyl. When exposed to ultraviolet rays, lignin causes fading of the paper. Fluctuations in humidity can lead to the formation of acids, which negatively affect the paper and its colored materials, as well as wood. This results in increased acidity in the paper¹⁸.
- Color media and adhesive materials, such as gum Arabic, animal glue, starch and gelatin, are affected by the fluctuation of humidity and temperature¹⁹. These changes can cause the media to melt, followed by subsequent drying. Repeating the process causes the loss of viscosity and the inability of the medium to fulfill its function and bind the granules of the colored materials. Ultimately, there can be a total or partial loss of the color layer, weakening the adhesive material of the paper that bonds the paper scraps to the surface. This results in the separation of the paper scraps layer²⁰. Furthermore, weather changes affect the color layer. The nature of the resulting damage depends on the coloring materials and dyes and their chemical composition. For instance, coloring materials with carbon black, such as soot black, are more stable than others with lead, silver and copper²¹.
- The varnish layer is vulnerable to environmental factors, especially the oxidation reactions caused by light and heat, leading to weakness, pounding, fragility and yellowing. When exposed to dust and dirt, the dust grains penetrate the pores and paper fibers, which negatively affects the layers of paper and colors, lessening the clarity of the graphics. In addition, mechanical stresses, cracks and flaking of the varnish result from continuous fluctuations in temperature and humidity. The type and extent of damage depends on the type of varnish, application methods and layer thickness²².

¹⁵ LIPPINCOTT 2011: 281.

¹⁶ EMAN 2020: 9-21.

¹⁷ ABDEL-KAREEM 2005: 121–130.

¹⁸ HANADI et Al 2022: 1-19.

¹⁹ SMITH 1969: 153.

²⁰ BRUCKLE 2009: 289-290.

²¹ CARRILO *et Al.* 2004: 2229–2234.

²² DUPONT 2013: 234-240.

- Using wood as props affects the textile layer, paper scraps and the varnish layer as a result of the mechanical stress resulting from fluctuations in temperature and humidity²³, which affects wood based on wood type. For instance, softwood differs from hardwood in their ability to withstand stress, which, in turn, affects the map and the mechanical strength of its layered structure; this can cause damage between the wood²⁴, textile and layered structure of the map. In addition, using steel nails to fix the textile to the wooden prop causes tearing and rust spots. Additionally, steel nails cause mechanical strains on the wooden props, including longitudinal and transverse cracks in the wood²⁵.

Consequently, we could say that the expansion and contraction of materials, as a result of temperature fluctuations, affects each layer separately. The layered damage depends on the quality and thickness of each layer and that expansion and contraction occurs in different directions. This results in the separation of each layer from one another. Frequent mutual damage, along with the impact of other damaging factors such as ultraviolet rays, pollutants and dirt, ultimately lead to irreversible damage.

II. MATERIALS AND METHODS

To determine the types of damage in the map's components, some examination and analysis devices were used. All examination and analysis work was carried out in the Ancient Egyptian Museum in Cairo.

1. Archaeological and Historical Description

The idea of developing the content and the manufacturing process of the map began in 1854 when Lenand Devlond initiated a plan to dig a canal in the Gebel el-Silsila area. The map measures 129 cm long and 97,3 cm wide and provides important historical information on some villages and manors of Upper Egypt. It contains six texts [FIGURE 2] written in French, which present information on the theme of the map, the project of digging a canal in the Gebel el-Silsila area. The text also provides an accurate description of the area and population, the region's commercial and historical importance and water level. The texts are translated as follows:

A. Translation of the First Text

The first text shows the type of map (a hydrographic map), location (a map of Upper Egypt) and the designer of the map, Lenand Devlond. The map was made in 1854, during the war period.

B. Translation of the second text

It presents a definition of some terms and guiding lines included in the map.

- Al-Kafr (manor): It is a small village whose inhabitants are part of the larger village.
- Naga (hamlet): It term is synonymous with Kafr. Some of its residents are Bedouin Arabs.
- Port
- Valley

²³ EMAN *et Al.* 2018: 1131-1149.

²⁴ EMAN *et Al.* 2017: 87-98.

²⁵ HORIE 2010: 504.

- The underlined names refers to the locations of the ancient cities.
- The names underlined with dashes references ancient sites with antiquities.
- Monastery
- All large canals are dug manually, supervised by Mr. Lenand.
- Dams and anchorage areas are marked with three points.
- Daily work on Mr./ Lenand's projects that began in 1832.

C. Translation of the Third Text

The text provides an overview of the relations among the inhabitants of Esna, Edfu and the oases. It describes trade, such as the transport of grain when the Darfur convoys arrive and pass the oases. Zinc mines on the road from Durr al-Azim to the passages of *Sultan* Selim are utilized. Therefore, Sheb Edfu is considered the main trade route for exchanging goods with the rest of Africa. Bandar Darbar is a place for marketing the peasants' trade in Gebel el-Silsila.

The chain of mountains up to Edfu contains mountains and blocks of limestone and sandstone that appear near Gabal El-Silsila, a source of pure sandstone. There is a description of the stunning scenery of the quarries that have been used since the time of the pharaohs: We note the beautiful buildings used as houses in the Roman era as a natural extension of the river. When heading east towards the Red Sea and the Nile, we find quarries of imperial porphyry and breccia with fascinating colors in the south.

D. Translation of the Fourth Text (b)

The text details the topography and slopes of the location of the canal project of Gabal El-Silsila. It mentions that the slopes of Aswan have no paths and the distance from Philae Island to Aswan is about 100 meters, following the river bed, with a level difference of 5.85 ms inserted in the map. At a distance of 5 kilometers upstream and downstream, the water flows more smoothly. It is easy to ascend through the high water by towing without ropes. Large boats are pulled by ropes in the descending, while light boats are towed through hatches and rafts. The pathways are more difficult in shallow water; we only need to deepen the main pathway.

E. Translation of the Fifth Text

The text describes the digging of a canal in the Gabal al-Silsila area (located 65 km north of Aswan. The Nile narrows and each bank becomes a steep cliff²⁶. The map describes the height of the river between the two rocks where Gabal al-Silsila narrows. It also describes the width of the river when the water level rises. The average speed at the entrances and the difference between these numbers and the inscribed text on the map of Lower Egypt represents the amount of water used in cultivating the Egyptian lands from Aswan to the Delta.

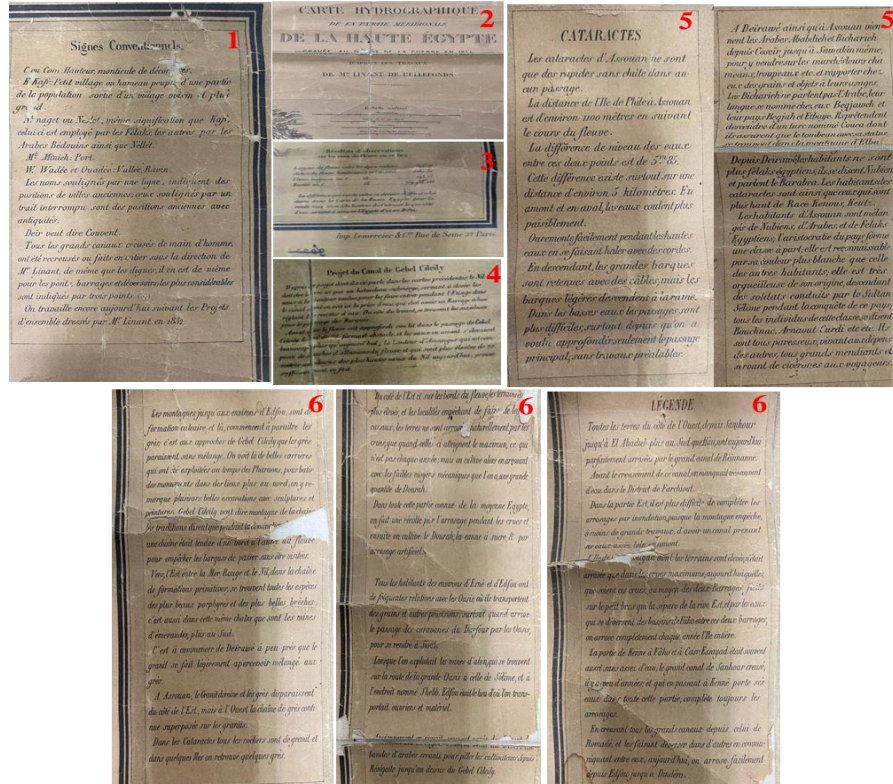
F. Translation of the Sixth Text

The sixth text details the plan for the Gabal al-Silsila Canal project. The Nile must be limited by a submerged dam to raise the water level and allow water to pass through the canal in case the level of the Nile declines. In addition to building the dam, there

²⁶ STEVENSON 1921:175

will be a berth from the east before the river deepens, passing through Gabal El-Silsila. However, the soil may be a barrier, causing the water level to rise..

The six texts on the map illustrate the importance of this type of map, its historical value and the extensive studies on the area in which the project was implemented. The map is historical, describing local inhabitants, commercial activity, language and all relevant data, e.g., the state, speed and height of the Nile.



[FIGURE 2]: The map contains six texts (1) © The Qasr al-Qobba Library

2. Visual Examination and Photographic Documentation

As an initial step, the map was examined to identify and record visual damage, as the mechanisms and causes of damage can be easily identified²⁷. The visual damage to the maps was photographed.

3. IR-UV Examination and Imaging

IR-UV examination helps examine the dark and luminous areas, an detects damage and fine technical details. It was carried out using a Nikon D90 digital camera equipped with an 840 IR filter. The IR wavelength ranged from 645 to 925 nm at specified intervals, ultraviolet ranged (254, 312 and 365 nm) and transmitted ultraviolet (365 nm).

4. PH Measurement

The pH values of the printed paper layer were measured with pH measurement strips. A drop of distilled water was placed on the paper, followed by a measurement strip. The color change of the slide was compared to the standard values to determine the pH value.

²⁷ EMAN *et Al.* 2021: 11.

5. Microbiological Examination

Some swabs were taken from the surface of the map by direct rubbing to study the type of fungal infection. Paper and wood are organic materials that contain cellulose, a material on which different types of fungi grow. The nutrition media used for fungi and the growth of fungal colonies were equipped in the Microbiology Laboratory at the Grand Egyptian Museum. The process is as follows:

The first nutrient medium: PDA (potato dextrose agar medium)

The second nutrient medium: Lignin cellulose agar medium was used for swabs taken from monuments containing cellulose, such as wood, textile and paper. It consisted of [TABLE 1].

NaNO ₃	2.0 g/L	Lignin cellulose	10g/L
KCl,	0.5 g/L	Agar	20g/L
MgSO ₄ .7H ₂ O	0.5g/L	KH ₂ PO ₄ .3H ₂ O	1.0 g/L
FeSO ₄ .7H ₂ O	.01g/L		

[TABLE 1]: © Done by the researcher

These salts were dissolved in a container of thermal glass by mixing them with water. The mixture was sterilized in an autoclave for 20 minutes. Microbial swabs (three swabs from different places on the surface of the map) were cultivated on the surfaces of the media's dishes and incubated in a special incubator at 28°C- 30°C for 3-15 days²⁸.

6. Digital Microscope Examination

The digital microscope is a non-destructive and easy-to-use examination method that provides good results for detecting damage to the surface of the artifact²⁹. A Veho USB digital microscope was used with visible light and a 1.3 MP digital camera (variable magnification ranging from 20 to 500× depending on the working distance and the sample).

7. Optical Microscopy

An optical microscope, Zeiss Stereo DV 20 apparatus, was used with transmitted light. It was equipped with an optical B 9 digital camera to identify the wood, fungi and bacteria species. An investigation method called Vertical photomicroscopy (VPM)³⁰ was used to examine the cross-sections of the map layers.

8. Polarizing Microscope (PLM)

A Discovery V20 Zeiss polarizing microscope with an Axiocam MRC5 camera was used for studying the paper type and textile³¹.

²⁸ Hanadi *et Al.* 2022: 1-9.

²⁹ ABDALLAH 2022: 491-514.

³⁰ EBTEHAL 2022: 196-204.

³¹ HANADI *et Al.* 2022:1-19.

9. Scanning Electron Microscopy with Energy Dispersive X-ray Spectroscopy (SEM/EDX)

Elemental analysis of a sample of green color was carried out using a SEM/EDX (Model FEI quanta 3D 200I)³² in the Grand Egyptian Museum. ESEM images, captured by backscattered electrons (BSE), were taken with a Quanta 3D 200i scanning electron microscope produced by FEI

Specifications

Image Resolution: 512 by 442

Image Pixel Size: 1.73 μm

Acc. Voltage: 20.0 kV

Magnification: 399.

10. Raman Spectroscopy - BRUKER (SENTERRA II)

The samples were analyzed using Raman spectroscopy to study the color spectrum of organic dyes³³. Samples of the black and blue colors were taken [TABLE 2].

Sample	Measurement Data
Sample 1 (black color)	Laser type: 785 Laser Power: 1% Integration time: 3000 ms Coadditions: 4 Resolution: 4 cm^{-1}
Sample 2 (blue color)	Laser type: 785 Laser Power: 1% Integration time: 7000 ms Coadditions: 3 Resolution: 4 cm^{-1}

[TABLE 2]: © Done by the researcher

11. Fourier Transform Infrared Spectrometer (FTIR)

The samples were prepared using the potassium bromide method. The powder of samples was mixed with potassium bromide at a ratio of 2:100, then grained and compressed in a special bag to form a round transparent disk (0.01: 1.0 cm). After that, it was measured using FTIR (JASCO FT/IR -6100 FT-IR at a frequency ranging from 400 to 4000; cm^{-1}). FTIR was used to study the damage in the functional groups of cellulose in the paper sample and to identify color media and adhesives.

III. RESULTS

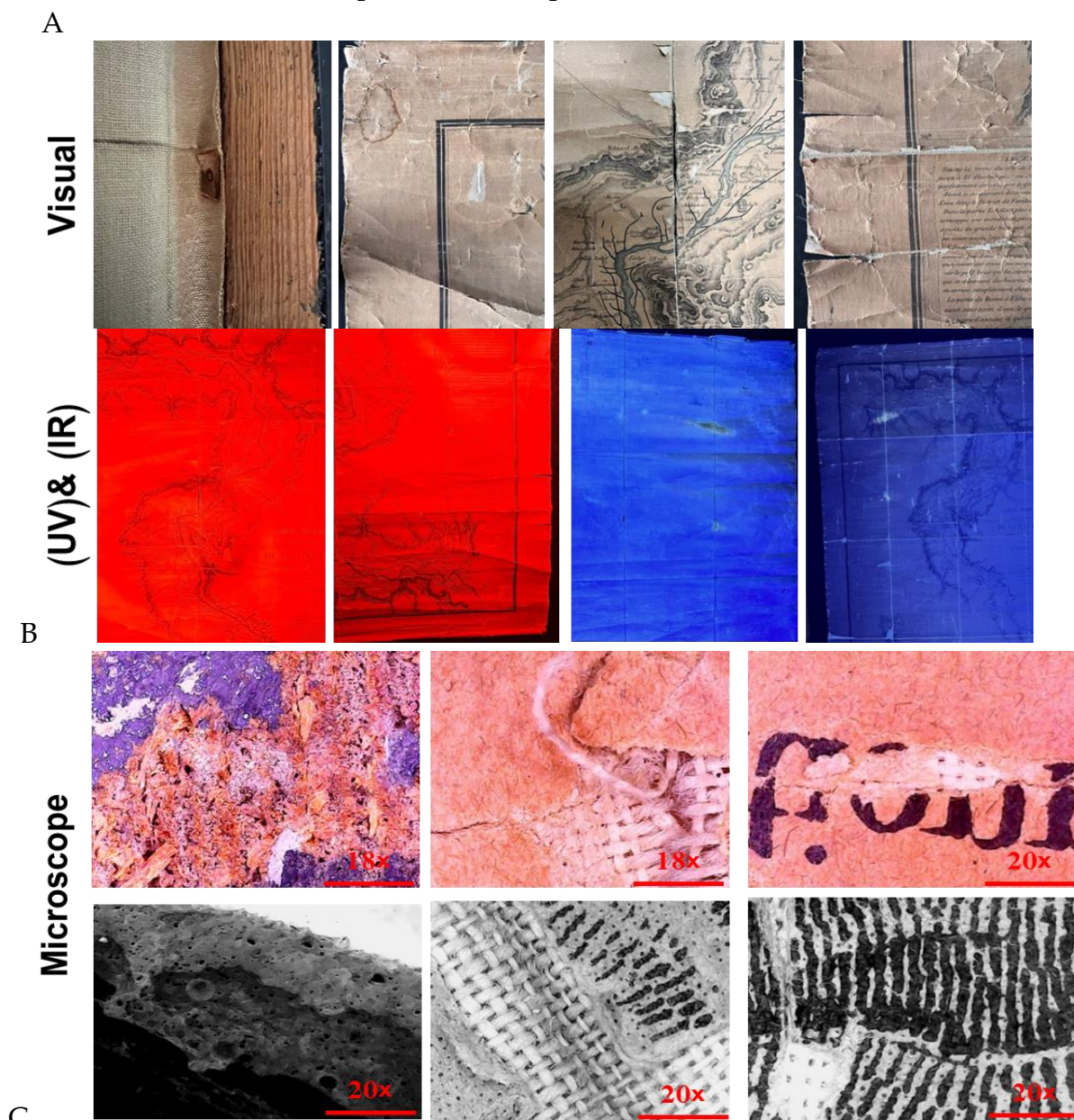
1. Studying Damage Manifestations

The visual examination, digital microscope examination and IR-UV imaging, [FIGURES 3/A-C], showed that the map had lots of damage, including fine and broad tears, across the map. Additionally, the map had lost parts of its scraps and there were major separations in the areas where the paper scraps were assembled. The loss of the color layer, missing letters of some words, made it difficult to read some texts. There were surface spots, ink fading, as well as torn parts of the textile, especially in the area of fixing the nails with the wooden props. In addition, there were discrepancies in

³² MOSTAFA *et Al.* 2021: 142-157.

³³ MOHIE 2018: 101-116.

dyeing and colors from one area to another. These damages were a result of the materials used to make the map, such as textiles, wood, metals and dyes. The difference in the rate of expansion and contraction of different materials under climate changes, caused mechanical stresses in parts of the map.



[FIGURES 3]: Visual, Microscopic Examinations

2. PH Measurement

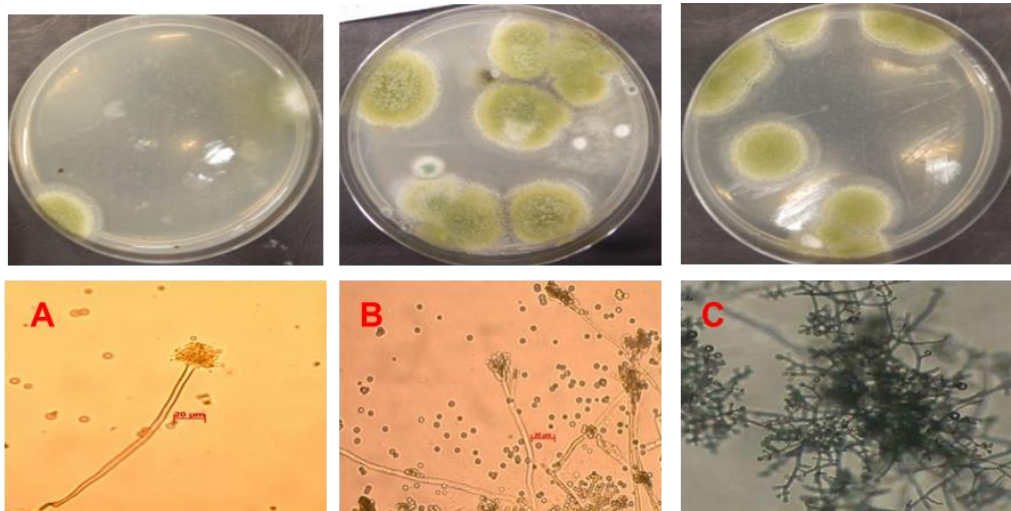
Record the hydrogen exponent of paper 5.

3. Identification of Fungi

The results of microscopic examination of microbiological isolates showed that the most common fungi were *Trichoderma*, *Aspergillus* and *Penicillium* [FIGURES 4/A-C] because paper, textile and wood, as organic materials, are highly vulnerable to fungal damage, especially cellulose-decomposing fungi³⁴. Fungi feed on the carbon in the cellulose chains, affecting the polymerization of cellulose and losing power.

³⁴ VLAK *et Al.* 1996: 2-29.

Additionally, there were some iron-fungi that fed on mineral elements, inks and colors of paper. The fungal infection looked like color spots, which was a result of the transformation of mineral ions into color spots due to the oxidation of uncolored ferrous oxide into brown ferric oxide³⁵.



[FIGURE 4]: Isolated fungi on the map is identified by using different manuals³⁶ (A) *Penicillium* (B) *Aspergillus terreus* (C) *Trichoderma*

4. Studying the Technique of Making the Map Understudy

Details and manufacturing technique: The cross-section examination of the map corner under (VPM) revealed five layers [FIGURE 5].

A. The First and Second Layers:

The stand was made of textile and covered with an adhesive layer.

B. The Third Layer: The layer of Paper Scraps

Mapping using paper scraps was introduced for stereo maps. According to FIORINI, FRANCESCO ROSSELLI worked on printing maps between 1445 and 1510 in Florence, creating scrappings in 1507. Waldseemüller is credited with the oldest application of known paper scrappings, namely with a work of Leonardo da Vinci's in 1514³⁷. The number of scraps used to make a map was not defined. Over time, it was highlighted that the best numbers of scraps were 12, 16, 18, 24 and 36. The idea of scraps was easily and accurately applied³⁸. The map focused on in this study consisted of 16 scraps, which was prepared by drawing a set of four scraps on the surface of the textile. Then, they were spread out, printed, moistened, stretched on the surface and pasted with an adhesive. The more the areas of adhesion between the scraps are unclear, it indicates the quality of manufacturing. The difficulty of this technique is highlighted in achieving cohesion and irregular expansion between the scraps due to climate changes, including heat and humidity³⁹.

³⁵ ADEKUNJO 2013: 55-56.

³⁶ DOMSCH 2007: 672.

³⁷ STEVENSON 1921: 175.

³⁸ NEEDHAM *et Al.* 2004: 1380-1780.

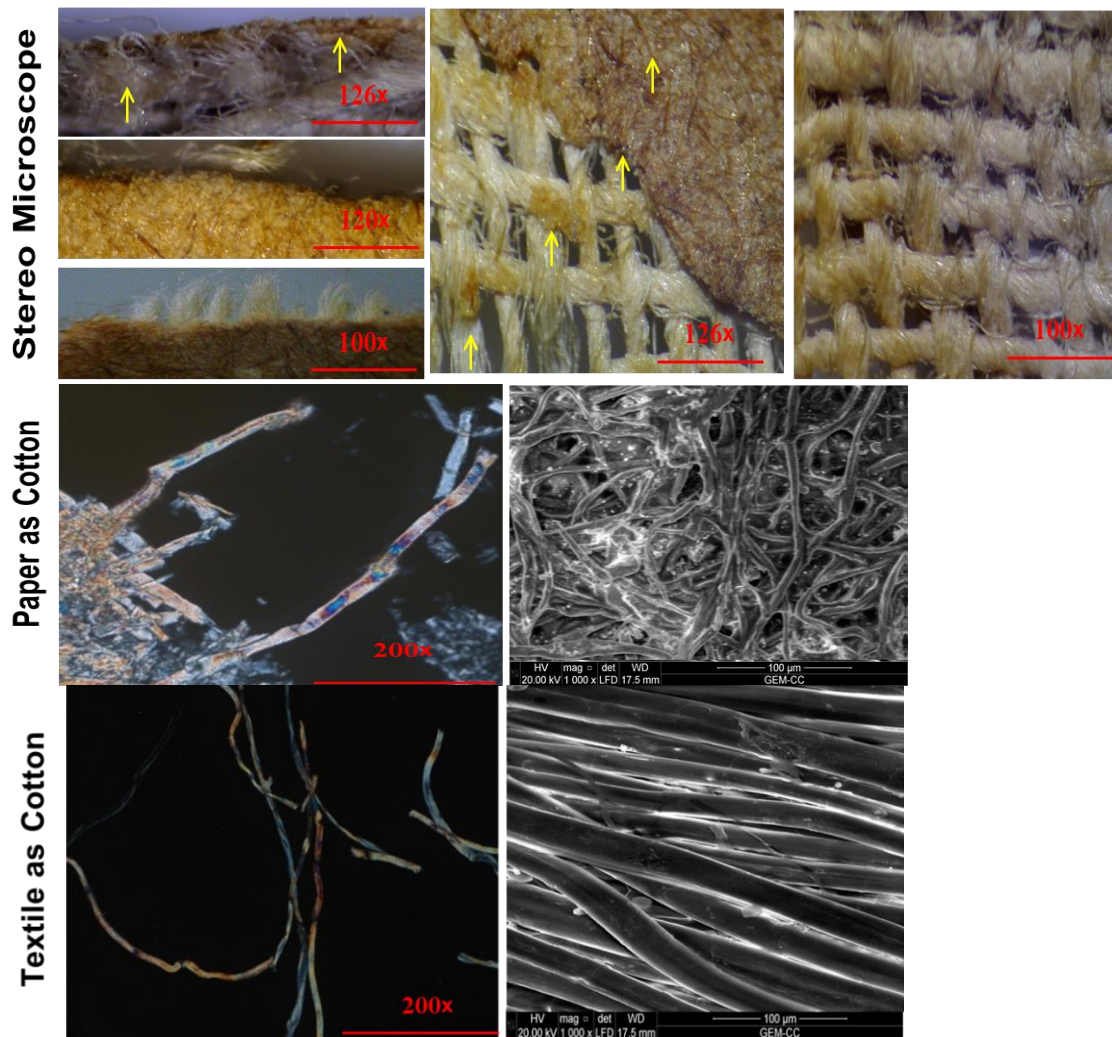
³⁹ BAYNESCOPE 1985: 13.

C. The Fourth Layer: Colors and Printing

The map of this study is printed. The art of printing has been associated with cartography since the early sixteenth century. Printing involves inscribing the details, followed by printing on a silk screen and dividing the result into the required number of scraps. This map was divided into 16 Scrappings, each covering a part of the map. The printing methods of silk screens varied, such as Chromolithography. Additionally, the colored material containing carbon black is more stable than those with lead, silver and copper⁴⁰.

D. The Fifth Layer: Varnish

A varnish layer is applied to isolate the color layer from the wooden props at a fixed time using steel nails. In sum, the multiplicity of layers with the different materials used in each layer and the treatments in manufacturing is a major factor contributing to how maps are damaged. Each layer affects the other. The damage of the map may result from the different rates of interaction of each layer with other factors, including temperature, humidity and light.



[FIGURE 5]: Examining the multi-layer technique of the map and quality of the fabric 16 x 24 threads per 1 cm, the fabric is plain 1/1. paper and textile type was specified as Cotton by examination by PLM and scanning electron microscope. ANIL 1986: 1-6.

⁴⁰ BRUCKLE 2009:289-290.

5. Identification of Paper

The type of paper affects the map's quality over time. Paper made from wood pulp, as well as from cotton and linen, has been widely used. However, paper made from wood pulp is susceptible to damage and a decrease in pH. It also contains a high percentage of lignin and mineral impurities, making it prone to light oxidation⁴¹. In the case of the map in this study, it was necessary to identify the type of paper to determine the causes and factors of damage. Examining a sample of paper capillaries using a polarizing and (SEM) microscope showed that the map paper was made of long cotton fibers ranging (10-65 nm). Cotton fibers are flat and ribbon-like in structure and appear twisted under a microscope⁴² [FIGURE 5].

6. Identification of Textile

Examination of a sample of the capillaries of the tissue using a polarizing and (SEM) microscope revealed that the tissue was made of long cotton fibers ranging in length from 11-69 nanometers. Canvas was identified, based on the shape of the straight, knot-free and twisted fibers. The digital examination also revealed several signs of tissue deterioration. To estimate the quality of the fabric, weft and warp counts can be assessed. A high-quality warp and weft [FIGURE 5] has a count of 16 x 24 threads per 1 cm², Plain1/1.

7. Identification of the Type of Printing

The digital microscope examination showed that the printing type appeared as harmonious dots, which were small in some places and thicker in others. This technique is known as chromolithography [FIGURE 3] and was developed by the German scientist ALOYS SENFELDER in 1798. This method uses two materials that do not dissolve in the other, namely fat and water. Additionally, limestone is used as a carrier for the printing design and its surface is completely smooth and clean. Therefore, the surface is well prepared before the printing process. Then, the design to be printed is created, ink is placed and spread by a roller and then the stone is placed and pressed on top of the paper to be printed⁴³.

8. Identification of Wood

The edges of the map were supported with rough upper and lower props. Unfortunately, the upper one is completely missing. The light microscope of wood slices from three longitudinal, transverse and tangential sectors helped determine the type of wood. In the transverse section, broad rays could be seen easily, in addition to the invisible narrow rays and zigzag growth rings at the intersection of the rays and growth rings. Most vessels took the form of clusters. The longitudinal section appeared in the examination with single and multi-sequence rays in addition to the scalariform pits. Consequently, the wood used as a prop was identified as beech after being compared to standard samples⁴⁴. Beech and oak have been used since the beginning of

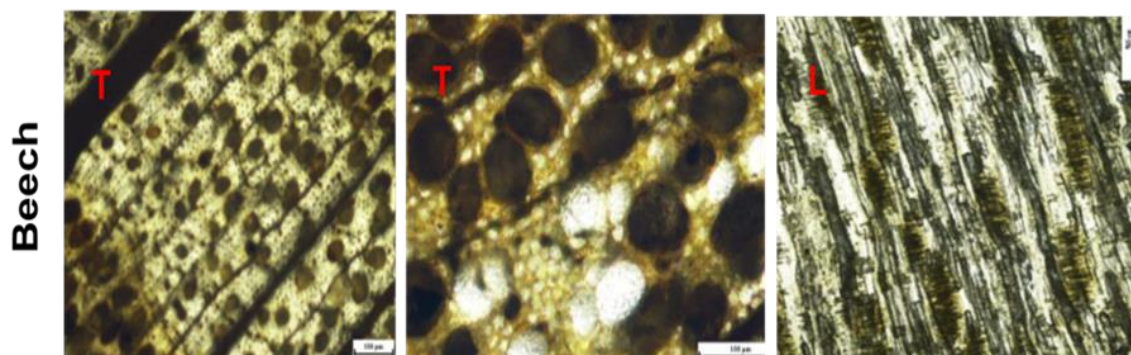
⁴¹ MUGE 2015: 335-342.

⁴² ANIL1986: 1-6.

⁴³ LACH 2010: 440.

⁴⁴ CRIVELLARO 2013: 222-234.

the history of map making as props for stereo and flat maps [FIGURE 6] of beech: a-b) A cross-section of a sample of beech wood shows the distribution of porous vessels scattered in the form of clusters or single rays of varying size, including wide rays that can be easily visible and narrower rays, along with curly growth wings: c) Longitudinal section characterized by mono-rays and many sequences in addition to the stair vessel.



[FIGURE 6]: Micro-images of wood slices under the microscope illustrate the anatomical properties of beech: T = transverse section of a sample of beech wood showing the distribution of porous vessels scattered in the form of clusters or single rays of varying size, a wide beam that can be seen easily and narrow rays in addition to the growth ring curly L = tangential longitudinal characterized by mono-rays and many sequences in addition to the stair vessel

9. Damage Manifestations in the Functional Groups of Paper

FTIR examination helped identify the functional groups of cellulose, the main component of the paper. The rate of cellulose deterioration was due to fluctuations in temperature and humidity, accompanied by movement and convergence of the cellulose chains and the formation of new bonds⁴⁵. This process was accompanied by a change in the chemical composition of cellulose as a result of the loss or gain of the water molecule in the hydroxyl (OH) groups⁴⁶. Since the vibrational spectrum of cellulosic materials is on the complex side, a good candidate for tracking changes in cellulosic materials resulting from hydrolysis and oxidation are carbonyl groups (-COOH, -CHO and -CO) which occur on the broken ends of macromolecular chains.(2011)⁴⁷ The region around 1750-1600 cm⁻¹ was proved to be the most convenient area for monitoring cellulose degradation.

Comparing the FTIR spectrum of the bio-deteriorated sample with the standard one (whatman No.1 paper), showed that comparing the sample with a standard sample of cellulose showed the formation of bonds (C=O) in the region of (1637 cm⁻¹). The intensity of absorption in this region increased with increasing water evaporation from the paper [FIGURE 7]. This carbonyl group was produced as a result of water loss from the bond (C=OH) at C2-C3 in the cellulose polymer⁴⁸. The appearance of a C=O group instead of a C-O group in the range of 1637 cm⁻¹ indicated the rate of oxidation of cellulose⁴⁹ and its increase suggested the rate of damage to cellulose fibers. This change in the cellulose chains occurred as a result of the loss of the water from the molecule in

⁴⁵ KISHINO & NAKANO 2004: 552-557.

⁴⁶ ŁOJEWSKA *et Al.* 2006: 597-603; KATJA KAVKLER & DEMŠAR 2012:1-9.

⁴⁷ ŁOJEWSKA 2006: 597-603; ABDEL-MAKSOUDE & EL-AMIN 2011: 129-150; KAVKLER & DEMŠAR 2012: 19-31.

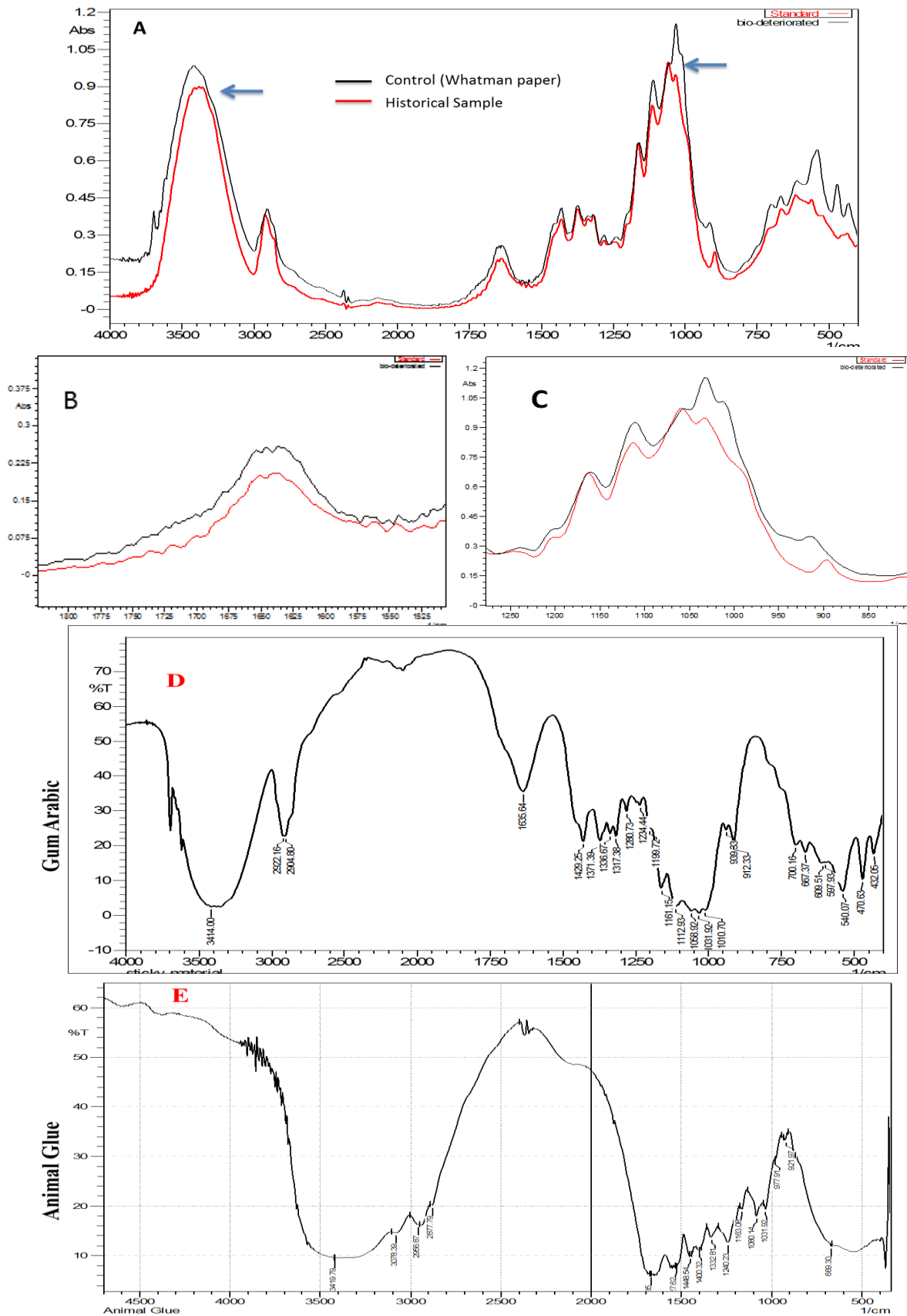
⁴⁸ WANG *et Al.* 2003: 47-52; ALI *et Al.* 2018.

⁴⁹ ABDELRAHMAN 2018: 103-120.

the free hydroxyl (OH) groups in the amorphous regions of the cellulose at 3433 cm^{-1} . Furthermore, the hydroxyl (OH) group appeared with a sharp extension at the region (3410 cm^{-1}). [TABLE 1] shows the functional groups of the standard sample of cellulose and the sample under study. These results showed the rate of damage and oxidation of cellulose, the main component of paper [TABLE 3].

Functional group	Wavelength (cm-1) of a cellulose standard sample	Wavelength (cm-1) of a sample	Interpretation
OH stretching	3388 cm^{-1}	3417.15 cm^{-1}	Assigned to the hydroxyl groups in
CH stretching	2926 cm^{-1}	2910.87 cm^{-1}	Assigned to the hydrocarbon group in cellulose, hemicellulose and lignin
C=O stretching	1637 cm^{-1}	1641.64 cm^{-1}	Resulted from changes in cellulosic materials caused by hydrolysis and oxidation
C-O stretching	$1115\text{-}1063\text{ cm}^{-1}$	1033.26 cm^{-1}	Assigned to cellulose and hemicellulose
CH	898 cm^{-1}	916.26 cm^{-1}	Assigned to cellulose

[TABLE 3]: The functional groups of the standard sample of cellulose and the sample under study. Comparing the sample under study with a standard sample of cellulose © Done by the researcher



[FIGURE 7]: Assessment of deterioration using FTIR (A). The main component of the paper (B-C). FT-IR analysis of median green and adhesives. SCHWANNINGER 2004: 23-40

9. Identification of Pigments, Media and Adhesives

The map contained two main colors: black and blue.

A. Blue Pigment

A sample of the blue pigment was obtained. More specifically, some spectra were measured at different points for the largest area where blue was present. The cleanest and flattest areas in the samples were measured. After that, characterization was carried out using a Raman spectrometer in the range of 4000-500 cm^{-1} . Raman spectrometer is often used for molecular analysis and characterization of inorganic pigments of artworks, with various databases available for old and modern pigments. A wide range of art and historical materials was studied using this non-destructive spectral technique. Additionally, coupling the Raman spectroscopy with LIBS is beneficial, as it can obtain molecular information and combine the advantages of the two techniques⁵⁰. In some cases, two different effective devices are used in the measurements with two laser sources. Several signs indicate that the blue color may be lazurite $(\text{Na,Ca})_8[(\text{S,Cl,SO}_4,\text{OH})_2](\text{Al}_6\text{Si}_6\text{O}_{24})$ a dark blue pigment originally made by lapis lazuli being ground into powder⁵¹. Lazurite was the most expensive pigment and was used by Renaissance painters. It remained expensive until artificial ultramarine was invented in 1826 (Osticioli, Mendes, Francisco and Becucci, 2009). The results of Raman spectroscopy indicated that the color could be lazurite [FIGURE 8/A], which aligns with ultramarine in chemical composition. Drawing a distinction between them is very difficult except in the case of having calcium bound to lazurite in the dyeing mixture⁵². Ultramarine is mainly composed of sodium (Na, Al, S and SiO_2). Therefore, SEM-EDX was used to carry out the analysis, which provided six spectra at different points. It showed Na, Al, S and SiO_2 , in addition to calcium, the characteristic element of lazurite [FIGURE 8/B].

B. Black Pigment

The black pigment was easily identified using Raman spectroscopy based on the chemical composition and analyzing one or two points. The results showed carbon. They agreed with UV [FIGURE 8/C].

C. Identification of Binding Media

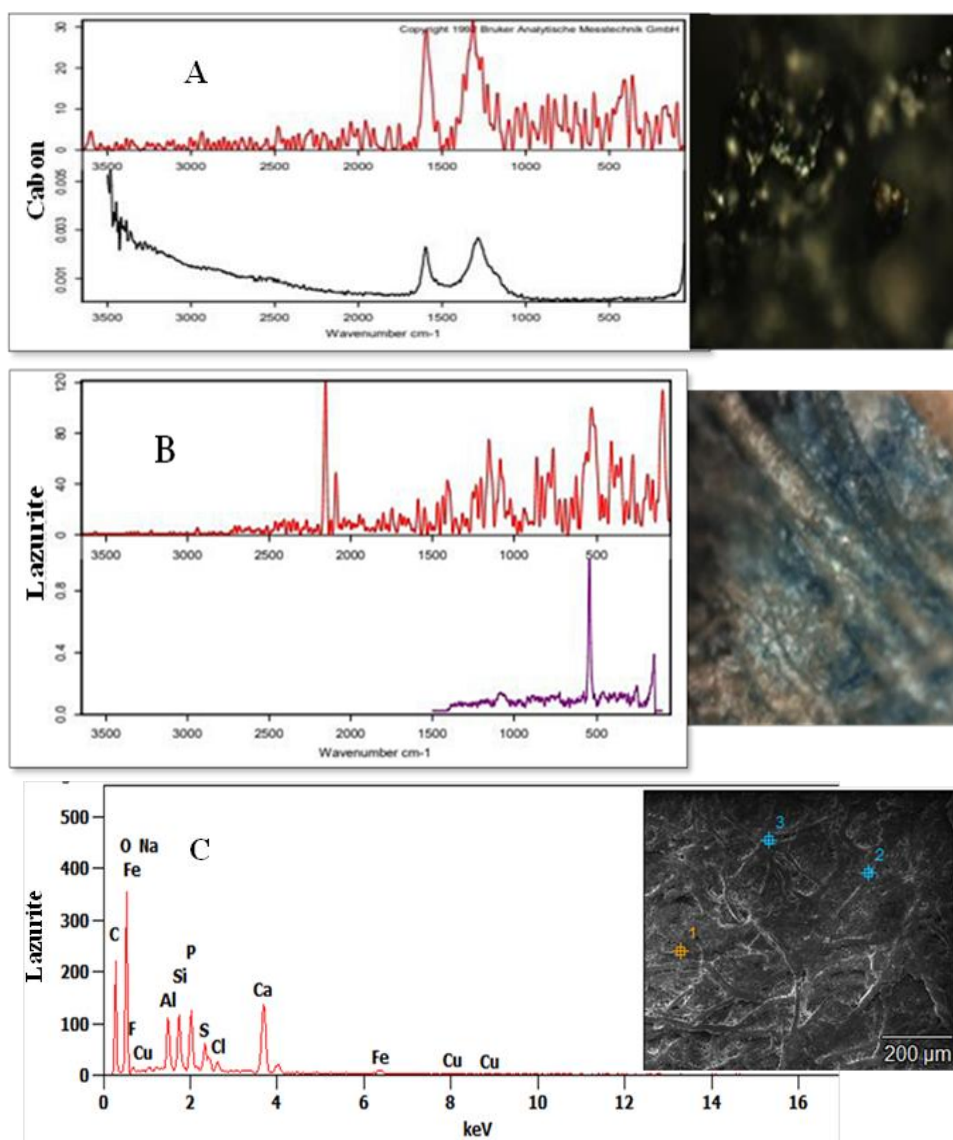
In the FT-IR spectrum of the blue dye [FIGURE 7/B], bands at 3414 cm^{-1} were assigned to the (OH) group and C–H stretching vibrations occurred in the stretching region (2922.16-2904.80 cm^{-1}) of hydrocarbons groups. Bands at 1635.64, 912.33 and 700.1 cm^{-1} , bands at 1371.39 cm^{-1} are assigned to the C–H group which by its chemical composition is similar to natural hydrocarbons such as gum Arabic. Band at 1030 cm^{-1} due to C–O, indicated the characteristics of polysaccharides. Absorption bands at 1161-1010.7 cm^{-1} were attributed to C–O stretching bands. The binder material might be gum Arabic. Bands at 597-540 cm^{-1} suggested the possibility presence of orpiment (As_2S_3) and iron oxide at 470.63-432.05 cm^{-1} ⁵³.

⁵⁰ WANG *et Al.* 2023.

⁵¹ SIRRO *et Al.* 2021.

⁵² KOOCHAKZAEI *et Al.* 2022.

⁵³ ABDEL-MAKSOUDE *et Al.* 2022: 491-514.



[FIGURE 8]: Raman spectroscopy of the pigment. (A = Black(Carbon) & B = Green (Lazorite) pigments. SEM images and EDX analysis of black pigments (C) . CLAYBOURN 2000: 61–71.

D. Identification of Dhesives

Some functional groups characteristic of animal gum appeared during the analysis of samples of paper and textiles. By comparing the functional groups of the sample under study with the standard samples showed that the functional groups matched those of the glue [FIGURE 7/C]. That is, the comparison revealed the functional group (N-H $1500\text{--}1565\text{ cm}^{-1}$). This was confirmed by the N-H expansion band at $3200\text{--}3500\text{ cm}^{-1}$ and corresponding bands of expansion frequencies for the carbonates ($1490\text{--}1370\text{ cm}^{-1}$), ($1, 910\text{--}870\text{ cm}^{-1}$), suggesting the presence of animal glue used as a bonding material between paper and textiles.

IV. DISCUSSION

The map that is the subject of the study was made using 16 scraps of paper fixed to a textile stander. Microscopic examination confirmed that it was cotton. FTIR analysis confirmed that the adhesive was animal glue. This manufacturing technique is consistent with the technique of globes that appeared in the period 1445 to 1510⁵⁴.

⁵⁴ STEVENSON 1922.

The variety of organic materials used in making the map caused the spread of fungal infections, which is consistent with Adekonjo. O.A2013 and is consistent with the result of the microbiological examination in the presence of cellulolytic fungi *Trichoderma*, *Aspergillus* and *Penicillium*.

A digital microscope showed that the outer surface of the printing, which used small dots in some places and thicker dots in others, used chromolithography. This is a technique that was developed by the German scientist ALOYS SENFELDER in 1798

Raman helped identify the dyes used in the black color (carbon) and the blue color (LAZURITE). SEM-EDX confirmed that the blue color was lazurite, which was used by painters in the Renaissance (Osticioli 2009).

Through microscopic examination and comparison with standard samples (Alan Crivellaro2014), it was found that the wood was beech.

The pH of the paper was recorded as 5. TÉTREULT and DUPONT, 2000, 201 stated that and increase in acidity decomposed the cellulose chains and that with elevated humidity, the splitting of the cellulose chains increases.

The use of wood as a support for the edges of the map has resulted in significant damage to the differeng rates of expansion and contraction between the wood and the attached tissue. This has caused mechanical stress, leading to the separation of the layers. This damage is compounded by damage from fixing the wood tissue with steel nails.

V.CONCLUSION

The presence of multiple layers in the map, combined with the use of incohesive paper scraps and ongoing climate changes, lead to irregular expansion and shrinkage between the layers. This resulted in damages to the map, which were noticed during its examination and analysis and is consistent with what was stated by Baynescope, AD, 1985.

Studying this map is of great importance because it includes a record about the creation of a canal in the Jabal al-Silsilah area. Additionally, the map includes data related to the nature of the site, such as the land, the mountains and rocks, the decline in water levels, the height of the mountains, the villages and cities and the traditions and customs of the people living in the area. This aligns with what KAHN.C.H., E.L 1994 & DEETZ.C.H.1934 stated about maps being a national treasure of their great artistic and educational value.

Microscopic examination is an important way to identify the type of cloth, paper and wood that are used in maps. It has been proven that cotton is the basis for making paper and cloth. Additionally, it has been shown that the wood used in this map is beech. The digital microscope is one of the simple microscopes that gives accurate results in identifying the type of printing. FTIR analysis is an important method for identifying the adhesive material. This tool showed that the adhesive material used in the map is animal glue. Raman analysis and SEM-EDX are very useful methods for identifying colors and pigments.

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AN ANALYTICAL STUDY TO EVALUATE THE PRESERVATION STATE FOR ONE OF EIFFEL'S STRUCTURES IN EGYPT: THE SUSPENSION BRIDGE IN GIZA ZOO

BY

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ABSTRACT

[EN] The Eiffel Suspension Bridge in Giza Zoo is one of Gustave Eiffel's works, custom-made by Khedive Ismail. It was constructed to be used as an elevated platform that enabled a wide view of the zoo and it continued to be used for this purpose for a long time until it was closed to ensure its safety. The study aims to highlight the importance of the bridge and evaluate its state of preservation through archaeological studies and architectural drawings to clarify its various parts and conduct examinations and analyses to determine its alloy composition and corrosion products. Revit application (one of the building information modeling (BIM) technology programs) was used to assist in the architectural documentation of the bridge. It resulted in several architectural drawings (horizontal and vertical plans, sections and details) of the different bridge parts. A set of examination methods were used: a. a portable digital microscope (p-DM) to identify the surface deterioration phenomena of the metal structure and the different bridge parts, b. an optical microscope (OM) to determine the type of wood used as the bridge's deck, c. a microstructure investigation for the bridge's structure alloy. In addition to these analyses: a. Portable X-ray fluorescence (p-XRF), b. Carbon, Hydrogen, Nitrogen and Sulfur (CHNS) analyzer for elemental composition, c. X-ray diffraction (XRD) to clarify the corrosion products resulting from exposure to the surrounding environment, d. Fourier-transform infrared spectroscopy (FTIR) to define the functional groups that make up the paint layers used in the bridge.

KEYWORDS: Eiffel Bridge, Historic Metallic Bridges, Suspension Bridges, Analytical Study, Conservation and Preservation, Low-Carbon Steel, Medium-Carbon Steel.

[AR] دراسة تحليلية لتقييم حالة حفظ أحد منشآت إيفل في مصر: الكوبري المعلق بحديقة حيوان الجيزة كوبري إيفل المعلق بحديقة حيوان الجيزة أحد أعمال جوستاف إيفل؛ وقد صُنِعَ بتكليف من الخديوي إسماعيل. أنشئ الكوبري لاستخدامه منصة مرتفعة تتيح رؤية واسعة لحديقة الحيوان، واستمر استخدامه لهذا الغرض لفترة طويلة؛ حتى أُغلق للتأكد من سلامته. تهدف هذه الدراسة إلى إبراز أهمية الكوبري وتقييم حالة الحفاظ من خلال الدراسات الأثرية والرسومات المعمارية لتوضيح أجزائه المختلفة، وإجراء الفحوصات والتحليل للتعرف على السبيكة المستخدمة في صناعته ونواتج تآكلها. أُستخدم تطبيق الريفيت (أحد تقنيات نمذجة معلومات البناء (BIM) للمساعدة في التوثيق المعماري للكوبري، ونتج عنه عدد من الرسومات المعمارية (مساقط أفقية ورأسية، وقطاعات، وتفصيل) لأجزاء الكوبري المختلفة والتي تدعم توثيق عناصره. أُستخدمت مجموعة من طرق الفحص: أ. الميكروسكوب الرقمي المحمول (p-DM) للتعرف على مظاهر التلف السطحية للهيكل الفلزي وكذلك لأجزاء الكوبري المختلفة، ب. الميكروسكوب الضوئي (OM) لتحديد نوع الخشب المستخدم لسطح الكوبري، ج. فحص البنية الداخلية الدقيقة للسبيكة المستخدمة في صناعة الكوبري، بالإضافة إلى مجموعة من التحاليل: أ. جهاز تفلور الأشعة السينية المحمول (p-XRF) و ب. التحليل باستخدام CHNS elemental analyzer للتعرف على التركيب العنصري للسبيكة المستخدمة في صناعة الكوبري، ج. التحليل بحيود الأشعة السينية (XRD) للتعرف على نواتج التآكل الناتجة عن التعرض للبيئة الخارجية، د. التحليل بطيف الأشعة تحت الحمراء (FTIR) لتوضيح المجموعات الوظيفية التي تشكل طبقات الدهان المستخدمة في طلاء الكوبري.

I. INTRODUCTION

The Eiffel Bridge in Egypt is located 3,215 km away from the Eiffel Tower in Paris, France. It is located inside the Giza Zoo in the Giza Governorate of Great Cairo, west of the Nile River [FIGURES 1/A-C]. Like the Eiffel Tower, the Eiffel Bridge is located in a vital area within the zoo which includes many historic buildings in addition to its natural heritage. Nearby are the Giza Pyramids, Fatimid and historic Cairo and Cairo University (the second oldest Egyptian university). It also has a distinguished location among many surrounding museums (the Egyptian Museum, the National Museum of Egyptian Civilization and the Grand Egyptian Museum in Cairo).



[FIGURES 1]: A. Location of the Giza Governorate and its zoo in Egypt; B. Location of Eiffel Bridge inside Giza Zoo; C. Detail of the bridge's location © Google Earth accessed on (17/01/2024)

Khedive Ismail, who ruled Egypt between 1863 and 1879¹, ordered the construction of the Suspension Bridge. It was designed by engineer Alexandre Gustave Eiffel and implemented by his company (Eiffel et Cie) (1875–1879). [FIGURES 2/A-F] shows the official stamp of Eiffel's company found on many of his designs. Manufacturing the bridge was completed more than ten years before the Eiffel Tower was built when the garden was a part of the Giza Palace and before its official opening in 1891².

¹ MOUSA 2019: N^o.4, 718-733.

² KHALIL & ABD EL FATTAH 2023: 73-108.



[FIGURES 2]: A. Gustave Eiffel, the designer and manufacturer of the bridge; B. Testing the Suspension Bridge in 1911 and the western entrance with a floral decoration from which the main cable emerges; C. A recent photo shows Eiffel's signature on one of the sides of the bridge's entrances without the floral decoration and a small gate was added; D. Detail of Gustave Eiffel and the company's construction marks on the bridge; E. Signature of Gustave Eiffel; F. Place of manufacturing the bridge
© Photo taken by the authors

It is noteworthy that engineer Gustave Eiffel (1832–1923)³ had different works in Egypt such as a bridge in the city of Nag' Hammadi which is still standing and was called the Nile Bridge. It is located in Qena (554 km from Cairo). It was constructed between 1896 - 1897⁴. Furthermore, the lighthouse in Ras Gharib was erected in 1871 at the request of Isma'il Pasha⁵.

The Eiffel Bridge is one of the suspension bridges. The design of suspension bridges went through several stages, relying on the use of rope or cable to bear the loads and consisting of a main cable containing suspension cables that raise the deck.

³ LEMOINE 2018: 218-223.

⁴ MAHFOUZ & AL-NAZIR 2013, «EIFFEL SUSPENSION BRIDGE IN CAIRO»; <https://www.greategypt.org /2019/09/eiffel-suspension-bridge-in-cairo.html>, accessed on (07/07/2023).

⁵ «EIFFEL'S LIGHTHOUSE IN RAS GHARIB LISTED AS ARCHAEOLOGICAL BUILDING»; <https://sis.gov.eg/Story/151813/Eiffel%E2%80%99s-lighthouse-in-Ras-Gharib-listed-as-archaeological-building?lang=en-us>, accessed on (03/11/2024).

The main cable is tied into an anchorage to prevent the bridge from swaying (moving) from the impact of wind and heavy loads⁶. Iron was used to prolong the life of suspension bridges; generally, iron cables were used for the first time in 1823. In 1810, James Finley built the first suspension bridge (Jacobs Creek Bridge) using wrought iron cables and with a flat deck in Pennsylvania, USA to carry horse carts and pedestrians. This bridge lasted for 25 years⁷.

Many suspension bridges were constructed in Great Britain during the 19th century. These bridges were able to withstand strong winds, although some collapsed due to storms⁸. France adopted wire cables for suspension bridges and the metal was steel or wrought iron⁹. Cast iron was used on a small scale. Wrought iron was used in old truss bridges because it is less susceptible to rust, while steel, which is more susceptible to rust, was used for its strength in newer truss bridges¹⁰.

Rolled iron and steel in metal bridges took various shapes, including plates, bars, rods, angles and channels. One of the methods used to fix large beams such as channels and angles, was to use bar plates or both. They were connected by one of the following methods: Battens, lattice or V-shaped connection (v-lacing)¹¹.

To determine the handling mechanism and develop a plan to preserve metal structures, Mandeno¹² addressed a set of important criteria that must be met such as: a. determining the type of alloy, whether it is cast iron, wrought iron, steel, or a mixture of them; b. locating the metal structure on a map to determine how close or far it is from traffic routes and how to provide energy to conserve it; c. studying environmental impacts such as sun exposure, wind, dew points, exposure to high humidity as a result of clouds, fog, or pond water and the possibility of overcoming these factors; d. examining the method of supporting the metal structure, whether by partially burying it in the ground, attaching it to a base or free-standing; e. investigating the possibility of transporting the metal structure for conservation in an engineering workshop; f. recording status report work with photography to determine the level of deterioration and assessing the type and level of preservation needed.

II. PRACTICAL DEVELOPMENT

1. Description of Eiffel Bridge

The suspension bridge is one of the first elevated viewing platforms for a zoo in the world. It displays the emblem of Khedive Isma'il, featuring the letters IP (abbreviation of the name and title of Khedive Isma'il «Isma'il Pasha»)¹³, decorated with

⁶ HOLTH, «AN INTRODUCTION TO HISTORIC BRIDGES 2010-2015»; <https://historicbridges.org>, accessed on (03/08/2023).

⁷ Gazzola 2015: 1-4.

⁸ Gazzola 2015: 1-4.

⁹ CIVELEK & TOKLU 2015: 201-206.

¹⁰ HOLTH, «AN INTRODUCTION TO HISTORIC BRIDGES 2010-2015»; <https://historicbridges.org>, accessed on (03/08/2023).

¹¹ HOLTH, «AN INTRODUCTION TO HISTORIC BRIDGES 2010-2015»; <https://historicbridges.org>, accessed on (03/08/2023).

¹² MANDENO 2008: 9.

¹³ MOUSA 2019: N^o.4, 718-733.

three stars, a crescent and a star beneath it and a royal crown above. Resolution N^o.295 of 2010 registered the Giza Zoo among the Islamic and Coptic monuments. Therefore, the Eiffel Bridge was registered as one of the distinctive buildings in the Zoo, along with several others, including the Royal Jabaliya, the Japanese kiosk, the Royal Rest House, the old gate and the remains of the Haramlik Palace¹⁴.

The Eiffel Bridge is one of the suspended bridges that consists of two parts¹⁵ [FIGURES 3/A-D; 4/A-E]: a. substructure: the bridge is designed on two stone abutments of unshaped stones with a random layout. It is a single simple span bridge consisting of one space between the two abutments and structurally independent, b. The superstructure part of the bridge is upright, not slanted and its sides consist of a group of repeating units one meter high. The bridge is fixed on both sides on a weight bearing stone. Eiffel's bridge deck (the surface of the bridge that carries the traffic) is made of wood and there are deck stringers that are used to hold the deck.



[FIGURES 3]: A. General view of the Eiffel Suspension Bridge; B. The ramp leading to the bridge at the stone abutment; C. The structure of the bridge; D. Its entrance from one end and fixing the main cable into an underground anchorage © Photos taken by the authors

¹⁴ Egyptian Facts (al-Waqā'i' al-Misriyya) Journal, 2010; <https://www.laweg.net/framePlain.aspx?action=ViewActivePages&ItemID=54250&Type=6&NID=68919>, accessed on (23/07/2023).

¹⁵ CHAVEL & LESHKO 2012: N^o.FHWA-IF-11-045, 4; HOLTH, «AN INTRODUCTION TO HISTORIC BRIDGES 2010-2015»; <https://historicbridges.org>, accessed on (03/08/2023).



[FIGURES 4]: Parts of the bridge: A. The stone abutment and its tower; B. Main cables of the bridge; C. Deck stringers of the wooden deck; D. Eiffel's bridge plaque identifying the emblem of the Khedive Isma'îl; E. The main components of the superstructure part of the bridge © Photos taken by the authors

The entrance to the bridge is decorated on either side with two columns each topped with a capital decorated with floral decorations and small cantilevers, while the base is also adorned with plant leaves. Above the entrance there are coils of palmette executed in the Baroque and Rococo style on both sides of the monogram, the emblem of the Khedive¹⁶.

The small gate is decorated with intersecting slanted sticks that form equal rhombuses. When the gate is closed, it forms a semicircular arch at its top. The small gate has two side parts in the form of parallel arches. The lower part of the hand railing is distinguished by the use of a floral decoration based on the lily (iris) flower.

2. Architectural Documentation

Registration and documentation are among the most important procedures that ensure the preservation of archaeological and historic constructions¹⁷. Documentation includes all the work that would collect, analyze and record all data and information related to the monument. Building information modeling technology (BIM) provides many advantages for the conservation of metal structures. It can be applied in all stages

¹⁶ ABU AL-ENEIN 2021: 455.

¹⁷ ALI 2021: 1343-1354; ALI *et Al.* 2022: 397-418.

of the conservation project or in one of its stages. It was used in the current study for the architectural documentation of the bridge. BIM provides a lot of analytical work that supports decision-making in conservation projects such as architectural registration and documentation work, ease of data processing, the possibility of making an inventory of the quantities required for conservation work, the possibility of cost analysis in all stages of the project and better visualization of the project in all stages of implementation¹⁸. There are many ideas and programs that produce 3D modeling, including architectural programs such as Autodesk Revit and Graphisoft ArchiCAD; cost calculation programs, e.g., Cost Estimate Autodesk QTO and Innovaya; programs that support achieving sustainability, including Autodesk Green Building Studio and Graphisoft EcoDesigner. All these programs and others can be used to make plans to preserve metal structures¹⁹.

The Autodesk Revit 2023 program (a BIM technology program) was used to produce two- and three-dimensional drawings of the bridge such as horizontal and vertical plans, sections and perspectives with great detail. These drawings facilitated accurate quantification of the structure, the development of time schedules for restoration and periodic maintenance and improved coordination among the various specializations and stakeholders involved in the preservation project²⁰.

3. State of Preservation

The Eiffel Bridge was built in the Zoo to form a high platform allowing a distinct view of all parts of the park. Later, it was closed to carry out restoration work under the scientific principles determined by studies of its construction materials. Since the bridge was closed, it has only been opened for limited visits; the necessary studies have not been completed and no restoration work has been done.

Upon visiting the site, the bridge appears in a stable condition on its two artificial plateaus, which were designed for supporting it. However, the structural evaluation process requires a separate study to confirm its structural stability.

The bridge is affected by its open environment, including fluctuations of temperature between night and day and the different seasons of the year; humidity rates, rainfall and dew points are considered. We could use Elmetwaly's research results²¹ to monitor and study the environmental conditions at Cairo University in 2016. The damage rates increase because of high and fluctuating temperatures (up to 8.8° C in January and 58.9° C in June), dew point (between -3.6° C in January and 24.2° C in August) and variations in relative humidity (RH) (between 7.5% in March and 79.3% in January).

The concentrations of atmospheric pollutants (sulfur dioxide gas SO₂ and nitrogen dioxide gas NO₂) are high when compared with the allowed percentages in archaeological areas, as the percentage of sulfur dioxide gas in the Giza Square area (close to the park site) ranges from 9 to 27 µg/m³ and the percentage of nitrogen dioxide

¹⁸ KJARTANSDÓTTIR *et Al.* 2017: 30.

¹⁹ SELIM 2015: 7.

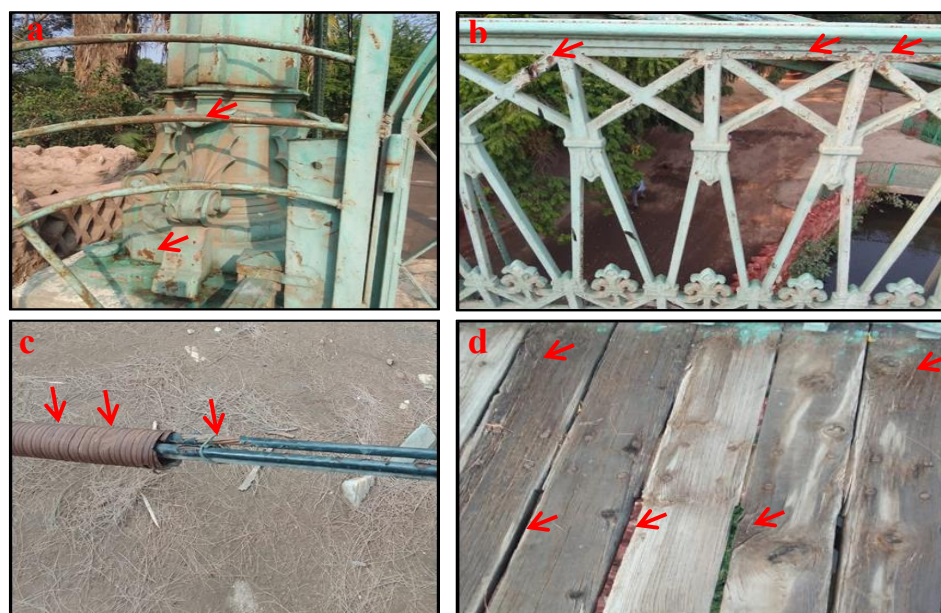
²⁰ SHAMS 2023: 147–159.

²¹ ELMETWALY 2021: 338.

gas ranges from 19 to 79 $\mu\text{g}/\text{m}^3$ as a result of traffic congestion and various industrial activities in the area. The region also suffers from a high percentage of suspended particles (PM_{10}), ranging from 75 to 197 $\mu\text{g}/\text{m}^3$ in Giza Square. By comparing Elmetwaly's²² results with the current statistics in 2023 for the Giza region, the temperature is up to 5° C in January and 43.6° C in June. Meanwhile, the humidity levels vary between 48% in May and 65% in December and the dew point is between 3° C in February and 17° C in August and September. It is confirmed that there are fluctuations in temperatures, humidity levels, dew points and suspended particles, which help stimulate the formation of many corrosion products. Relative humidity plays a major role in the oxidation of metals. Higher relative humidity levels exceeding 70% can frequently lead to significant corrosion²³. They also help dissolve air pollutants and increase corrosion rates. The impact of pollutants is exacerbated by high humidity and suspended particles, which can induce corrosion across various categories, including those that are innocuous, intrinsically corrosive and indirectly corrosive²⁴; this, in turn causes the corrosion of the Eiffel Bridge.

The metal structure of the bridge needs restoration, as all metal structures, especially the hand railing and wire cable, have corroded and the surface paint layers have descaled and failed to protect the metal substrate. The bridge deck appears to be in poor condition as a result of the deterioration of the wooden panels and the separation of screws from their places, putting the wooden boards and screws at risk of being lost [FIGURES 5/A-D].

One of the objectives of the study is to determine the bridge construction materials and their condition through analytical methods.



[FIGURES 5]: A & B. Aspects of deterioration of the bridge; C. Corrosion of metal structure; D. Deterioration of the wooden deck © Photos taken by the Authors

²² ELMETWALY 2021: 338.

²³ SCOTT & EGGERT 2009: 112.

²⁴ SCOTT & EGGERT 2009: 112.

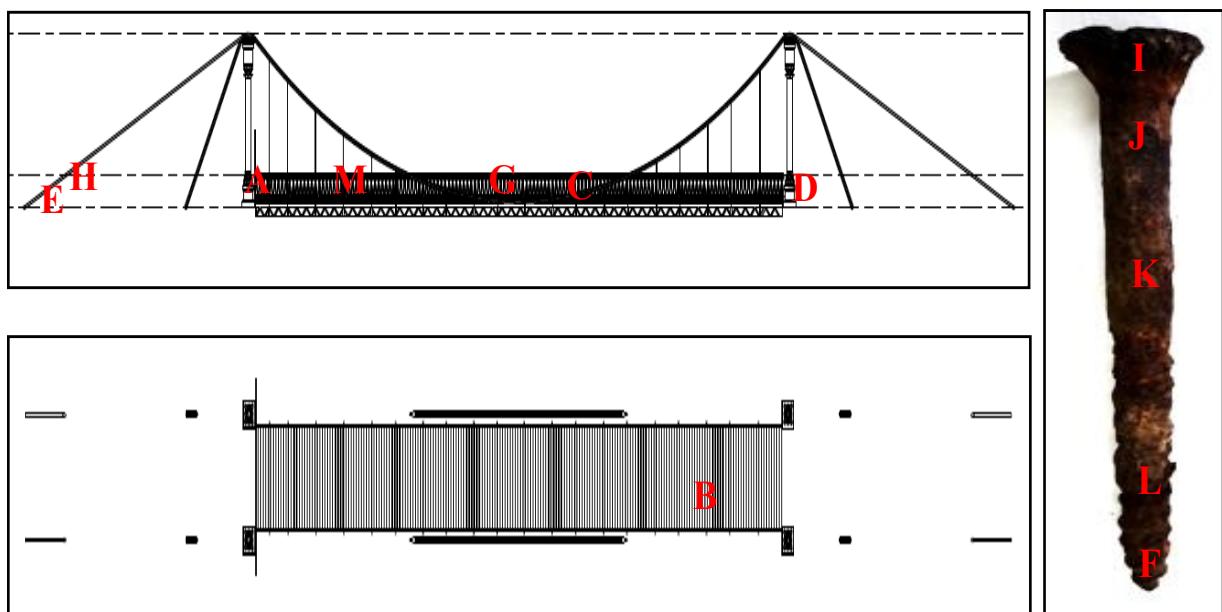
4. Analytical Methodology

A. Sampling

A group of small samples representing the bridge's paint, wooden deck, alloy and corrosion products was taken to conduct the necessary examinations and analyses [TABLE 1 & FIGURE 6] while key connecting elements such as wooden deck and screws, were studied in-situ.

Sample N ^o .	Sample Type	Location	Examination/Analysis
A	Paint	Colum Base	p-DM
B	Wood	Deck	OM
C	Alloy	Railing	Microstructure Investigation, p-XRF and CHNS Elemental Analyzer
D	Alloy	Colum Base	Microstructure Investigation, p-XRF and CHNS Elemental Analyzer
E	Alloy	Wire Cable	Microstructure Investigation, p-XRF and CHNS Elemental Analyzer
F	Alloy	Screw	Microstructure Investigation, p-XRF and CHNS Elemental Analyzer
G	Corrosion	Railing	XRD
H	Corrosion	Wire Cable	XRD
I	Corrosion	Screw	XRD
J	Corrosion	Screw	XRD
K	Corrosion	Screw	XRD
L	Corrosion	Screw	XRD
M	Paint	Railing	FTIR
N	Standard Paint	Commercial paint (local market)	FTIR

[TABLE 1]: The samples' given codes, types, location and the type of examination or analysis that was performed © Done by the Authors



[FIGURE 6]: Locations of the samples from the different parts of the bridge © Done by the Authors

Examination and analysis of the samples are listed as follows

B. Examination Methods

▪ Portable Digital Microscope (p-DM)

A portable digital microscope (Image sensor 1.3 Megapixels, magnification factor ranges from 5 to 1000 times) was used to examine the surfaces. This non-destructive method offered a way to study the characteristics of deterioration and damage affecting the green paint used to protect the bridge metal structures (In-situ and sample N^o.A), the iron screws used to fix the wooden panels with deck stringers (In-situ) and the wooden deck panels (in-situ)²⁵.

▪ Optical Microscope (OM)

Thin sections of wood were observed under transmitted light using an optical microscope (Model XSZ-10BN) equipped with an Amscop MD 500 digital camera to identify the type of used wood on the bridge's deck (Sample N^o.B).

▪ Microstructure Investigation

Tiny samples were taken from the railing (Sample No. C), column base (Sample No. D), wire cables (Sample N^o.E) and screws (Sample N^o.F). These were mounted in epoxy resin as a cross-section (EUXIT 50), ground with silicon carbide abrasive paper with grit sizes ranging from 600 to 4000 and then polished using alumina 0.3 μ m and diamond paste. The polished cross-sections were etched using 2 vol.% nital solution etchants (100 ml ethanol, C₂H₅OH + 2 ml nitric acid, HNO₃)²⁶. Nital is highly effective in revealing ferrite and highlighting ferrite grain boundaries in carbon steels²⁷. The microstructural examination was undertaken on a polished cross-section through an optical microscope (Zeiss Axiotech) attached to a digital camera (Zeiss Axiocam ERC5s), which helped assess the morphological features of the studied samples' microstructure²⁸.

C. Analysis Methods

▪ Portable X-Ray Fluorescence (p-XRF)

A Niton, model XLt 592 GKV, series 8138 with software version 4.2E (USA) was used to obtain the elemental chemical composition²⁹ of the railing, column base, wire cables and screws (Samples N^{os}.C, D, E and F, respectively). The measurements were conducted at each designated and cleaned area, with each measurement lasting for 60 seconds. The purpose of conducting XRF measurements was solely to determine the percentage of iron (Fe) or other elements in the iron alloy used in the bridge construction, rather than to ascertain its exact composition. The used XRF had instrumental limitations that prevented the detection of light elements such as carbon and oxygen.

²⁵ MOHAMED & ELMETWALY 2025: 1-20.

²⁶ SCOTT 1991: 69; SCOTT & EGGERT 2009: 164; KOWAL & SZALA 2020: 1-17.

²⁷ VOORT 2006: 158.

²⁸ IBRAHIM & IBRAHIM 2020: 2259-2267.

²⁹ SRIVASTAVA *et Al.* 2023: 1246–1259.

- **CHNS Elemental Analyzer**

The detection of carbon was not feasible using XRF analysis due to its inherent limitations³⁰. Thus, carbon (C), hydrogen (H), nitrogen (N) and sulfur (S) in the iron alloy were determined for the railing, column base, wire cables and screws (Samples N^{os}.C, D, E and F respectively) using the CHNS automatic analyzer (elemental analyzer Vario EL III – Germany). It is designed to quickly and simultaneously determine carbon and sulfur content in metals, alloys and ores.

- **X-Ray Diffraction (XRD)**

The XRD analysis was carried out with the second generation D2 Phaser powder diffractometer, supplied by the Bruker Corporation, Germany, to identify corrosion products taken from the railing (Sample N^o.G), wire cables (Sample N^o.H) and screw (Samples N^{os}.I, J, K and L).

- **Fourier Transform Infrared Spectroscopy (FTIR)**

Fourier transform infrared spectroscopy (JASCO FT-IR - 460 Plus Spectrometer, Essential FTIR V.3.50.114) was used to identify the green paint applied on the bridge surfaces (Sample N^o.M) by comparing it to a reference commercial paint in the local market (Sample N^o.N).

III. RESULTS AND DISCUSSION

1. Values and the Importance of the Bridge

The bridge holds significant value due to its location, history, method of construction and design. Therefore, the study focuses on proving the value of the bridge, which requires highlighting its importance and preservation.

- **Location value:** The Eiffel Bridge is located within the boundaries of the Giza Zoo, which is one of the oldest parks in the world and includes many monuments of natural and cultural value. It has a distinguished location in the Giza Governorate, which is rich in many archaeological monuments and within Great Cairo, which is also rich in many cultural landmarks such as museums and heritage and modern attractions. The bridge's location coordinates are 30° 1' 26 «N and 31° 12' 52» E³¹.
- **Archaeological and historical value:** The Eiffel Bridge dates to a ruler of the Alawite family, which was founded by Muḥammad ʿAlī Pasha, according to the presence of Khedive Ismail's emblem, which is placed above the bridge's entrance. This period was one of the most important in Egyptian history marked by many achievements, including the construction of many important buildings, monuments and archaeological sites.
- **Architectural value:** The Eiffel Bridge is one of the first zoo platforms designed to provide an expansive view. Its designer was the architect Gustave Eiffel who had extensive experience in designing and constructing bridges. Additionally, the Industrial Revolution and infrastructure development (especially in the field of

³⁰ SRIVASTAVA *et Al.* 2023: 1246–1259.

³¹«GIZA ZOO SUSPENSION BRIDGE»; <https://structurae.net/en/structures/giza-zoo-suspension-bridge>, accessed on (23/07/2023).

transportation) played an important role in the metal bridges industry³². Eiffel signed his name and the name of his company «G. EIFFEL & CIE CONSTRUCTEURS» on the zoo's bridge, while also specifying the place where the bridge was made: «LEVALLOIS-PERRET, PARIS». Eiffel realized the impact of wind on increasing loads, so his designs allowed most of the wind to pass through reducing overall load. Additionally, he designed cost-effective structures. These characteristics are reflected in the Eiffel Bridge's design, such as the side parts, which were designed from lightweight, hollow and repetitive decorative units. Although Eiffel designs reduced some loads such as wind, studies must be carried out to assess the bridge's stability under the impact of loads of all kinds (static and dynamic). These studies must consider the effects of aging over time and the condition of the materials and alloys in its construction³³. The bridge is suspended by main cables, as these cables extend from the beginning of the bridge to its end. They extend over the towers and are secured at the two ends of the bridge utilizing a stabilizing foundation or anchorage. The Eiffel Bridge was designed using tall support towers, so its slab appears solid and horizontal³⁴.

- **Technical value:** The Eiffel Bridge is one of the metal bridges with rivet connections. This type of bridge is characterized by ease and speed of implementation. But its drawback is the need for extreme precautions to ensure the accuracy of the connections, especially when the connections are assembled using screws and the holes for the screws and rivets were made inside the factory³⁵. Eiffel contributed to the design of many portable bridges in which the mounting holes in the bridge parts were matched, making them easier to assemble. This method is characterized by the fact that the bridge parts are assembled using screws, which are easy to disassemble and reassemble in different places with the help of non-manufacturers, thus facilitating the dissemination and use of bridges in many regions of the world³⁶. Eiffel supported the use of wrought iron in his constructions because of its strength, durability and lightweight nature; these qualities can be observed by studying the microstructure of the metal with appropriate examination methods to confirm the type of the iron used. This analysis also highlights the manufacturing process of the bridge, whether it was produced in a factory in France and then transported to be installed in its specified location using screws, or was constructed in Egypt. In all cases, the technical value of the bridge's construction is apparent in its design and the materials that have kept it standing and serving its purpose.
- **Artistic and aesthetic value:** The Bridge is distinguished by the use of floral decorations in the side handrails. In [FIGURE 2/B] the western entrance of the bridge has a distinctive floral decoration from which the main cable emerges. However, this decoration is not currently present on the top of the bridge's entrance as is clear in

³² RAMASWAMY 2009: 840-848.

³³ CHAVEL & LESHKO 2012: N°.FHWA-IF-11-045, 32 – 41; O'DONNELL *et Al.* 2017: 11-14.

³⁴ HOLMA & HERMANSSON 2015: 1-5.

³⁵ MINISTRY OF MUNICIPAL AND RURAL AFFAIRS, *Dalil tasmim al-jusur [Bridge Design Guide]*; <https://www.scribd.com/document/380829141/Bridges-Manual-Ar>, accessed on (30/01/2024).

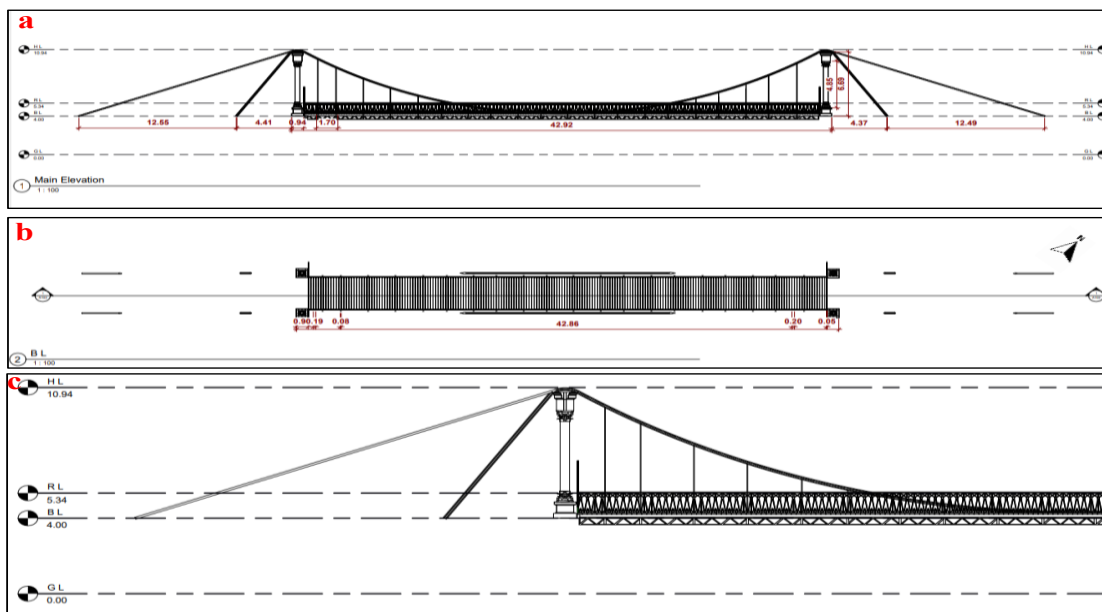
³⁶ RAMASWAMY 2009: 840-848.

[FIGURE 2/C]. The bridge is artistically valuable because of the use of Khedive Ismail's emblem, the presence of Eiffel's name and the inclusion of the name of the company responsible for its construction.

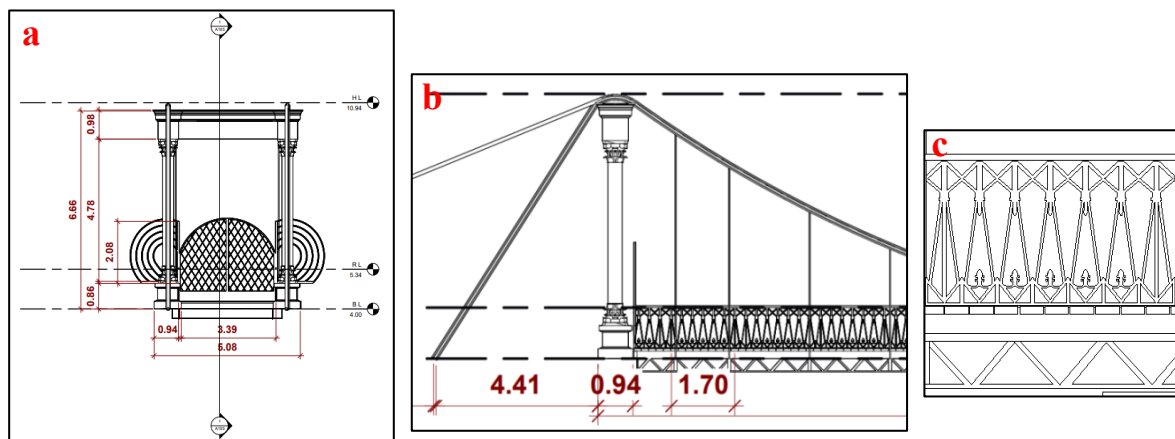
- **Functional value:** The Bridge connects two artificial hills, or plateaus, that were specifically designed to hold the bridge and perform its function as a high platform to provide a broad view of the zoo.

2. Architectural Documentation

Eiffel's Bridge architectural documentation seen in [FIGURES 7/A-C; 8/A-C] shows that its structure is a single-span, two-tower suspension bridge, used as a pedestrian bridge (footbridge). The bridge's length is 42.92 m and its effective width is 3.39 m. The bridge deck consists of 211 planks of wood that are $3.30 \times 0.19 \times 0.04$ m in dimension. The plans are secured with screws that are 0.02 m in diameter and 0.20 m in length, fastened by rotary motion. Screws were used in the bridge for two purposes: a. to assemble the metal parts of the bridge and b. to assemble the transverse wooden planks with the longitudinal wooden boards in the bridge's deck.



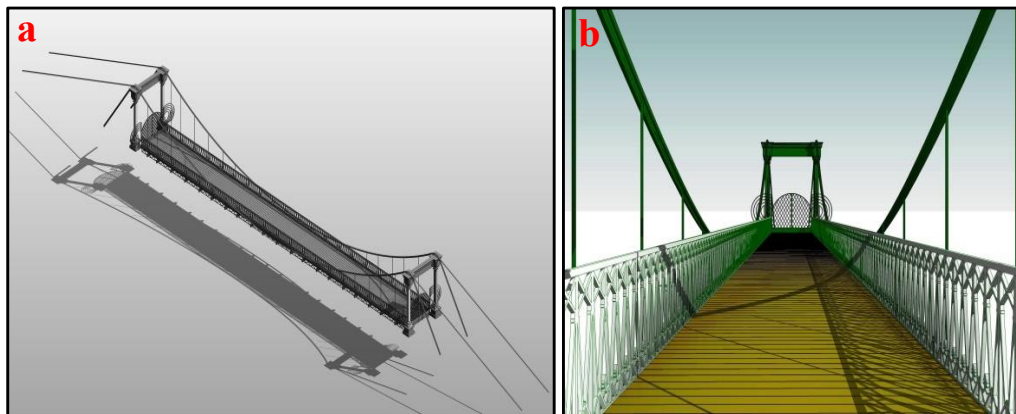
[FIGURES 7]: Eiffel Suspension Bridge: A. Plan; B. Elevation; C. Section © Done by the researchers



[FIGURES 8]: Eiffel Suspension Bridge: A. Elevation of the entrance; B. Detail of the entrance column; C. Hand railing © Done by the researchers

The condition of the metal structure determines the appropriate intervention method. These methods can be: a. performing preventive conservation by controlling its surrounding environment (temperature, humidity, lighting rates, ...), monitoring the factors and causes of deterioration, controlling the number of the bridge's visitors; b. interventional conservation with restoration works and techniques to maintain its structural stability and the sustainability of its architectural details; c. developing a plan for periodic follow-up and continuous evaluation to avoid any future problems³⁷.

The rehabilitation of metal structures depends on developing a proposal to restore and reuse them. The main goal of the rehabilitation plans is to preserve these structures and ensure that they do not enter the cycle of damage again. The metal structure may be reused for its original function³⁸, especially if it does not result in damage to the metal structure and the community does not lose the need for this use [FIGURES 9/A-B]. The Eiffel Bridge's functional value is linked to its being one of the first platforms in the world that provided a wide view of zoos. Its value also rests in its location inside the zoo, on the top of the two artificial plateaus. Therefore, studies should be conducted to preserve the bridge in its location and rehabilitate it so that it can be used in the same original function and remain open to the public³⁹.



[FIGURES 9]: A. 3D architectural drawing by Revit shows the general design of the bridge; B. 3D inner view of the bridge[©] Done by the researchers

3. Examination and Analytical Methodology

A. Examination

Portable Digital Microscope (p-DM)

A microscopic examination by a portable digital microscope was implemented for the green paint, screws and wooden deck surfaces. It showed the following:

- Despite the application of green paint to safeguard the metal parts of the bridge from corrosion, it proved ineffective [FIGURE 10/A] due to the presence of numerous cracks [FIGURE 10/B] and pores [FIGURE 10/C]. Although the orange primer was initially used as a corrosion inhibitor before applying the green coat, it also failed to provide adequate protection from corrosion [FIGURE 10/D]. The cross-section [Sample N^o.A] in [FIGURE 10/E] revealed the presence of multiple layers of paint in

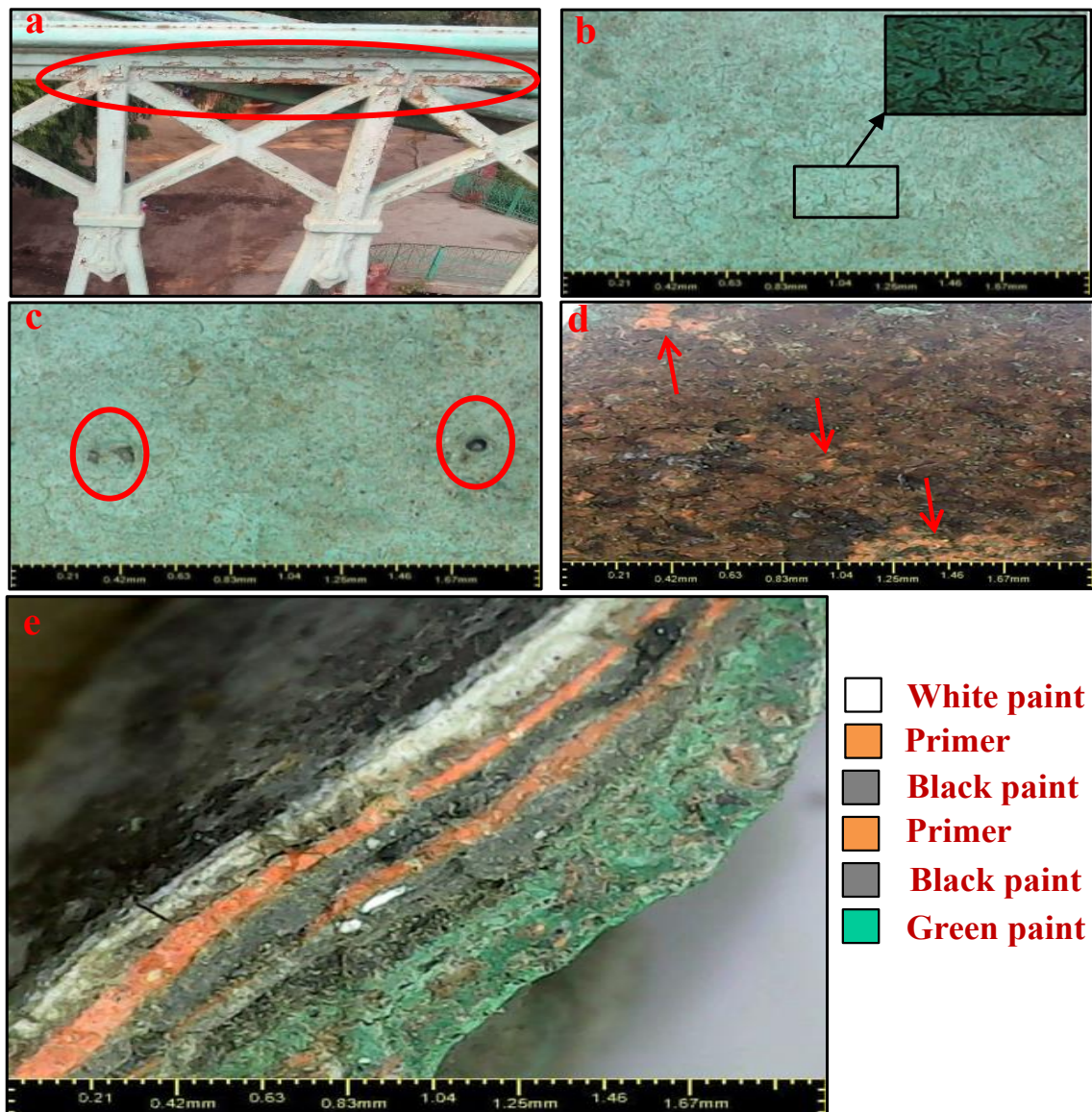
³⁷ ALI & ABD EL HAMEED 2023: 241-253.

³⁸ ALSADATY 2020: 119-138.

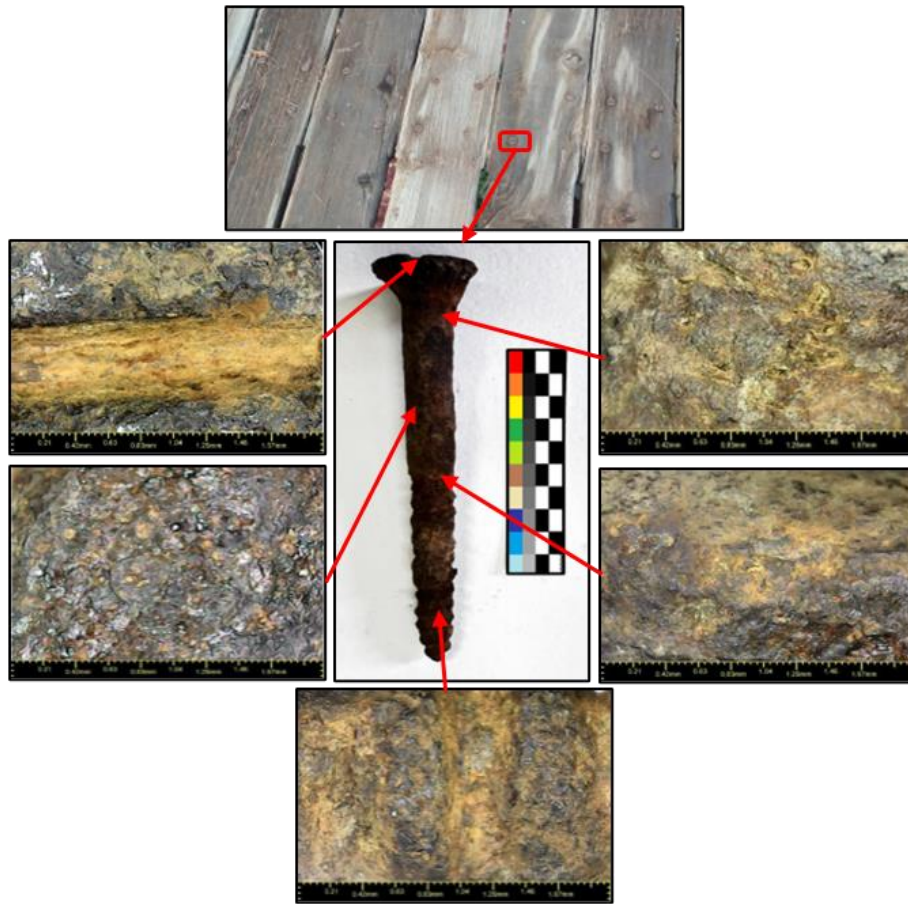
³⁹ ALI 2021: 1343-1354.

different colors (white, orange primer, black, orange primer, black and green paint layer, respectively), suggesting that these layers were applied during different periods.

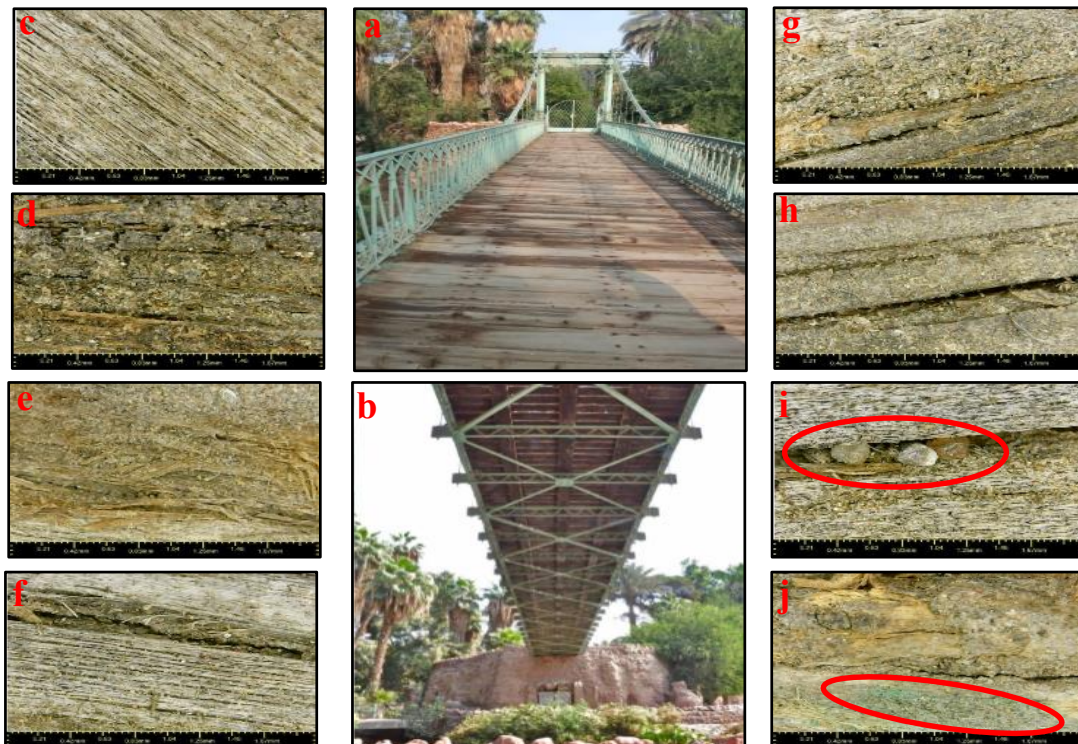
- A thick and rough layer of corrosion products completely covered the entire surface of the screw, showcasing various types of corrosion products [FIGURE 11]. They would be identified using XRD.
- The deck wood [FIGURES 12/A-B] exhibited significant weakness and was extensively cracked. The cracks varied in size and were [FIGURES 12/C-H] often filled with sand grains transported by the prevailing winds in the area [FIGURE 12/I]. There were also remnants of the green paint used to paint the bridge parts on the deck wood [FIGURE 12/J].



[FIGURES 10]: Microscopic examination of the paint surface, A. Failure of the paint layer to protect the metal substrate; B. Cracks; C. Pores in the paint layer; D. The presence of rust is evident underneath both the paint and the primer; E. A cross-section showing multiple paint layers © Photos taken by the authors



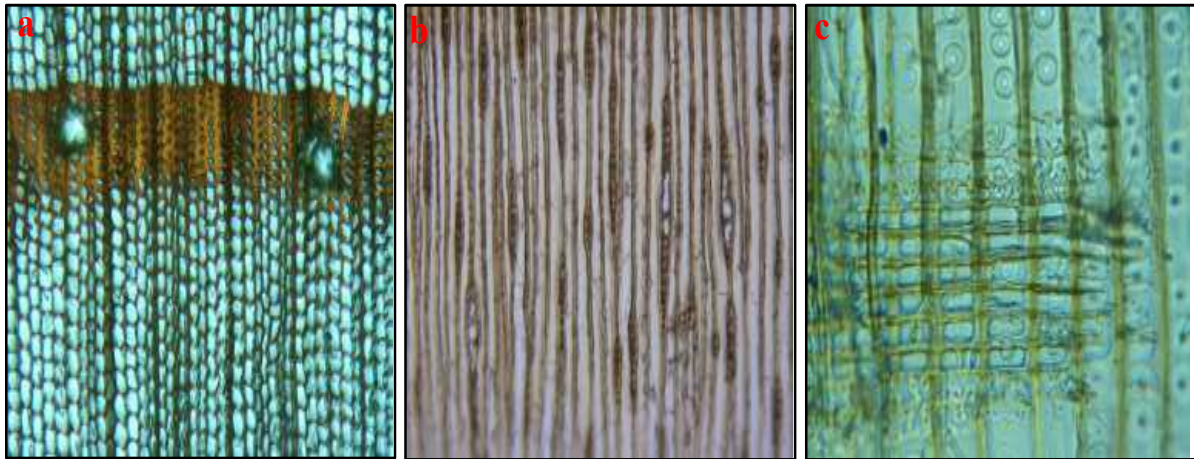
[FIGURE 11]: Microscopic examination of the screw exhibits a thick and uneven layer of corrosion products © Photos taken by the authors



[FIGURES 12]: Microscopic examination of the deck's wood, (C- H) weakness and various sizes of cracks; I. Sand grains inside the cracks; J. Remains of the green paint © Photos taken by the authors

B. Identification of Wood Species

Microscopic investigation indicated that the deck wood species [Sample N^o. B] was *PINUS SYLVESTRIS* (Common Pine) based on characteristics observed in the transverse section (TS): Distinct growth ring boundaries, an abrupt transition from early-to- late-wood and large resin canals with thin-walled epithelial cells. Tangential longitudinal section (TLS) shows a average height of rays 8 to 15 cells and resin canals in rays with thin-walled epithelial cells. In the radial longitudinal section (RLS) the ray tracheid exhibit dentated walls. The cross-fields between parenchyma cells and tracheids contain one (rarely two) large fenestriform pits [FIGURE 13]⁴⁰.



[FIGURES 13]: Microphotographs of *PINUS SYLVESTRIS* wood sections: A. Transverse section (TS); B. Tangential longitudinal section (TLS); C. Radial longitudinal section (RLS) © Photos taken by the authors

Pinus sylvestris wood refers to timber from the *Pinus sylvestris* tree, commonly known as Scots pine⁴¹. It grows in many regions around the world, including Europe, the Mediterranean of Northern Africa and Middle East and temperate Asia (China, Japan and Russia)⁴². As a result, Eiffel might have transported the *PINUS SYLVESTRIS* wood from France, or possibly from within Egypt, for the construction of the bridge's deck.

It is a softwood species known for its durability and workability, good mechanical properties and various applications in construction and woodworking⁴³. The use of softwood as a building material has a long tradition. Throughout history, softwood species such as *Pinus Sylvestris* were recognized as durable, easily worked building materials. Numerous softwoods are hard and strong enough to fit complex structural applications⁴⁴.

⁴⁰ WHEELER *et Al.* 2004: 1-70.

⁴¹ MÁTYÁS *et Al.* 2004: 1.

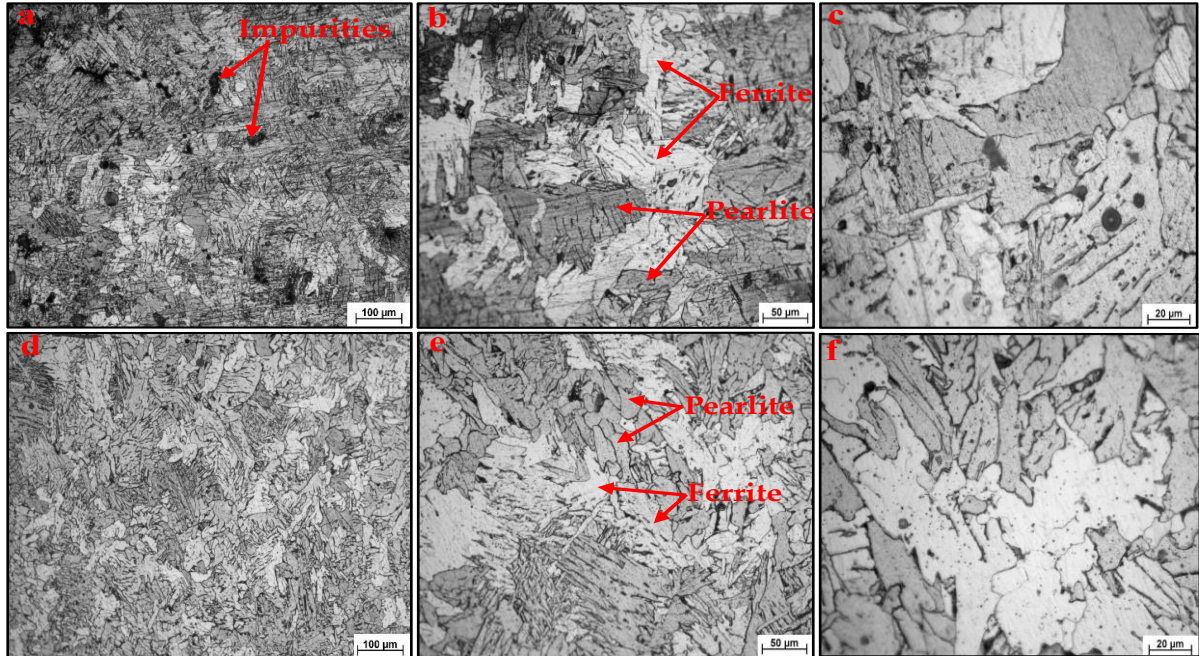
⁴² «*PINUS SYLVESTRIS*»; <https://www.euforgen.org/species/pinus-sylvestris>, accessed on (25/02/2024).

⁴³ MÁTYÁS *et Al.* 2004: 2.

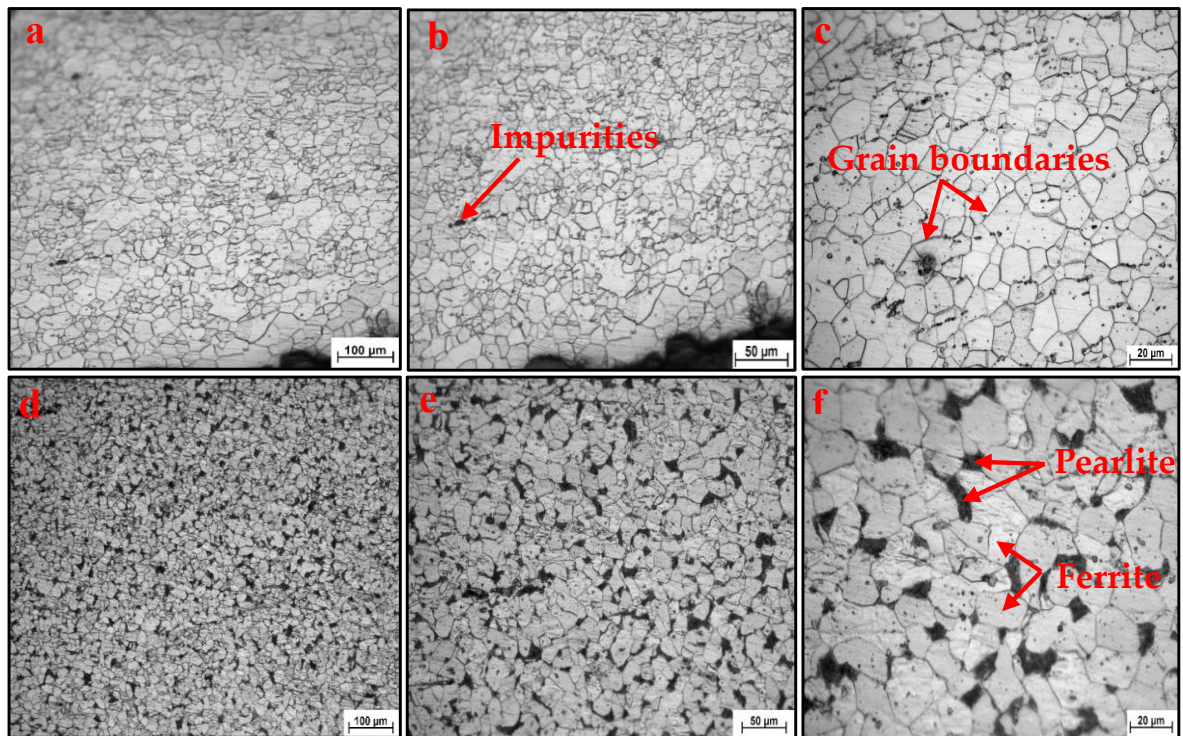
⁴⁴ BISPHAM 2015: 132: 126.

C. Microstructure Investigation

The etched samples taken from the bridge structures: The railing [Sample N^o.C], column base [Sample N^o.D], wire cables [Sample N^o.E] and screws [Sample N^o.F] are shown in [FIGURES 14/A-F; 15/ A-F]. They represent the microstructure of the two shapes of steel.



[FIGURES 14]: Microstructure of medium carbon steel, with ferrite (light-colored grains) and pearlite (dark-colored grains), A-C for railing; D-F for column base © Done by the authors



[FIGURES 15]: Microstructure of low carbon steel: Ferrite (light-colored grains) and pearlite (dark-colored grains) with a percentage of impurities, A-C for wire cable and D-F for screw © Done by the authors

[FIGURES 14] show the microstructure of medium-carbon steel, which was used to make the railing [FIGURES 14/A-C] and column base [FIGURES 14/D-F]. The microstructure of the medium-carbon steel consists of ferrite and pearlite constituents: Ferrite (light-colored grains), pearlite (dark-colored grains) and a few impurities (black). As the carbon content increases, there is a corresponding increase in the amount of pearlite, which is the dark etching constituent. The amount of pearlite continues to increase until it reaches a maximum of 100% at a carbon content close to 0.8%. Below 0.8% carbon, the other constituent present in the microstructure is ferrite⁴⁵. [FIGURES 14] show that the ratio of ferrite to pearlite is approximately 50/50 with a carbon content of 0.497% for both railing and column base. The medium-carbon steel is a versatile alloy known for its balanced carbon content.

The two samples of the railing [Sample N^o.C] and column base [Sample N^o.D] were taken near a joint area, where a change appeared in all the grains because of their exposure to high temperatures within the heat-affected zone (HAZ). HAZ is a zone that appears in the metal between the two zones of melted metal and the base metal. This zone appears when the metal is exposed to high temperatures from welding or mechanical cutting⁴⁶. So, the microstructure in [FIGURES 14] of a welded joint of medium-carbon steel in the railing and column base shows the morphology of the Widmanstätten structure as etching constituents, in which the microstructure contains the Widmanstätten pattern of ferrite and pearlite⁴⁷. It appears needlelike in the two-dimensional polish plane, but the morphology is lath or platelike in three dimensions⁴⁸. Widmanstätten structures are obtained under slow cooling or accelerated cooling conditions (in air). It is known that under these conditions, steels acquire conventional structures of ferrite-pearlite⁴⁹. Controlling microstructures in the base metal, welded joint and particularly in the coarse-grained heat-affected zone (CGHAZ) can be challenging due to the growing trend of using high heat input in welding processes⁵⁰.

[FIGURES 15] show the microstructure of the low-carbon steel used to make the wire cable [FIGURES 15/A-C] and screws [FIGURES 15/D-F]. The microstructure consists of ferrite and a lower content of pearlite constituents: Ferrite (light-colored grains) with dark grain boundaries and pearlite (dark-colored grains) and few impurities (black)⁵¹. Pearlite-reduced steels owe their strength to the presence of fine-grained ferrite and precipitation hardening mechanisms. Steels have low-carbon content, resulting in a microstructure that contains minimal to no pearlite [FIGURES 15/A-C]⁵². Both microstructure and morphology are characterized as equiaxed, indicating that the grain dimensions are approximately equal in all directions, forming equal axes. This type of

⁴⁵ BRAMFITT & BENSCOTER 2002: 4–5.

⁴⁶ ARANĐELOVIĆ *et Al.* 2023: N^o.1, 761.

⁴⁷ SAHA *et Al.* 2010: 187-190.

⁴⁸ BRAMFITT & BENSCOTER 2002: 32.

⁴⁹ TODOROV & KHRISTOV 2004: N^{os}.1–2, 49-51; SCOTT & EGGERT 2009: 165.

⁵⁰ CHO *et Al.* 2022: N^o.17, 1425.

⁵¹ SCOTT 1991: 31; BRAMFITT & BENSCOTER 2002: 32-35; CALLISTER 2007: 360; KOWAL & SZALA 2020: 1-17.

⁵² BRAMFITT & BENSCOTER 2002: 4–5, 32; SINGH 2016: 60.

microstructure is also referred to as polygonal ferrite, suggesting that the ferrite phase takes shape as an array of polygons⁵³.

D. Analysis

1. Portable X-ray Fluorescence (p-XRF)

The p-XRF analysis was conducted on the different bridge structures (railing, column base, wire cable and screw) [Samples N^{os}. C, D, E and F, respectively]. The results of the analysis are given in [TABLE 2].

Area	Element (Wt. %)										
	Fe	Mn	Zn	Ni	Pb	Cu	Ag	V	Cr	Pd	Zr
Railing [Sample N ^o . C]	97.31	0.68	0.60	0.27	0.22	0.13	0.11	0.51		0.03	0.14
	±	±	±	±	±	±	±	±	nd	±	±
	0.53	0.14	0.08	0.11	0.03	0.07	0.04	0.17		0.03	0.02
Column Base [Sample N ^o .D]	97.23	1.19	0.35	0.20	0.11	0.16	0.13	0.16		0.01	0.46
	±	±	±	±	±	±	±	±	nd	±	±
	0.56	0.17	0.07	0.12	0.03	0.08	0.04	0.16		0.03	0.03
Wire Cable [Sample N ^o .E]	99.32	0.02		0.39	0.03	0.03	0.09	0.05	0.06	0.01	
	±	±	nd	±	±	±	±	±	±	±	nd
	0.26	0.07		0.07	0.01	0.03	0.02	0.07	0.05	0.01	
Screw [Sample N ^o .F]	98.74	0.43	0.05	0.26	0.03	0.35	0.09	0.04		0.01	
	±	±	±	±	±	±	±	±	nd	±	nd
	0.34	0.09	0.02	0.09	0.02	0.07	0.03	0.09		0.02	

[TABLE 2]: p-XRF results of the different bridge parts (railing, column base, wire cable and screw) © Done by the authors

The p-XRF results revealed that the railing, column base, wire cable and screws of the bridge were constructed using iron as a main element with compositions of approximately 97.31%, 97,23, 99.32% and 98.74%, respectively and small percentages of some other elements that may affect the alloy.

Additional minor alloying elements [TABLES 2 & 3] can also be incorporated into steels for quality control or to improve their corrosion resistance, particularly for outdoor exposure. These metals (e.g., copper and manganese) form a compact and adherent oxide film, which contributes to the mitigation of their corrosion rate. The effects of different alloying elements in steel interact significantly, making precise control over the chemical composition of the steel essential to achieving the desired properties⁵⁴. Manganese (Mn) and nickel (Ni) play a crucial role as alloying elements in many steels. Their addition serves to enhance the strength and hardness of the solid solution, while increasing the steel's ability to be hardened. Manganese counteracts the brittleness caused by sulfur, which forms iron sulfide by facilitating the formation of manganese sulfide (MnS). When manganese is present at high levels, it contributes to the development of austenitic steel that exhibits improved resistance to wear and abrasion⁵⁵. Most low-carbon steels are in the form of flat-rolled products like sheets or strips, typically in a cold-rolled and annealed state. These steels exhibit excellent

⁵³ BRAMFITT & BENSOTER 2002: 32.

⁵⁴ WRIGHT 2002: 16; SELWYN 2004A: 110.

⁵⁵ BRAMFITT & BENSOTER 2002: 3; WRIGHT 2002: 17.

formability due to their low-carbon content and contain up to 0.4% Mn. Medium-carbon steels share similarities with low-carbon steels, but they differ in terms of their carbon and manganese content, ranging from 0.60% to 1.65%^{56,57}.

Nickel plays a crucial role in toughening steels, particularly at low temperatures. Copper (Cu) is commonly classified as an impurity or tramp element in most steels due to its tendency to promote hot shortness. However, it is intentionally added to certain steels to enhance their atmospheric corrosion resistance (0.15%-0.34%). In special steels, copper is incorporated to increase strength and hardness through a heat-treating process called aging. Notably, it is highly insoluble in iron at room temperature and does not form a carbide⁵⁸.

E. CHNS Elemental Analyzer

The results of the CHNS elemental analysis of the railing, column base, wire cables and screws [Samples N^o.C, E and F, respectively] are given in [TABLE 3].

Area	(Wt. %)			
	Carbon (C)	Hydrogen (H)	Nitrogen (N)	Sulfur (S)
Railing [Sample N ^o . C]	0.497	0.133	Nil	0.106
Column Base [Sample N ^o .D]	0.389	0.123	Nil	0.199
Wire Cable [Sample N ^o .E]	0.267	0.118	Nil	0.134
Screw [Sample N ^o .F]	0.204	0.173	Nil	0.186

[TABLE 3]: Results of CHNS elemental analysis (railing, column base, wire cable and screw) © Done by the authors

The CHNS elemental analyzer findings revealed that the railing and column base were produced using a medium-carbon steel alloy with carbon content of around 0.497% and 0.389%, respectively. On the other hand, the wire cables and screws were manufactured using a low-carbon steel alloy with carbon content of about 0.267% and 0.204%, respectively. Steels, which are commonly used, can be categorized based on their carbon content, specifically as low-carbon, medium-carbon and high-carbon varieties⁵⁹. The carbon content in this alloy typically ranged from 0.2% to 2% by weight⁶⁰. Carbon exists in the form of cementite, usually as part of pearlite. Steels with low-carbon have a carbon content of up to 0.30% and are relatively soft, while medium-carbon steels contain carbon ranging from 0.30% to 0.60%. High-carbon steels have a carbon content between 0.60% and 1.00%. Ultrahigh-carbon steels typically contain a higher carbon content, ranging from 1.25% to 2.0% C⁶¹. Steel is an alloy consisting of iron and carbon that is capable of being shaped or deformed and is known as

⁵⁶ SINGH 2016: 59.

⁵⁷ DOGARIU 2014: 33.

⁵⁸ BRAMFITT & BENSOTER 2002: 3; WRIGHT 2002: 17; SCOTT & EGGERT 2009: 37, 57, 116; DOGARIU 2014: 33.

⁵⁹ SCOTT 1991: 144; CALLISTER 2007: 360; SCOTT & EGGERT 2009: 16.

⁶⁰ SELWYN 2004A: 91, 96.

⁶¹ SELWYN 2004A: 96; CALLISTER 2007: 364; SINGH 2016: 59; SINGH 2020: 229-230.

malleable⁶². The mechanical properties are sensitive to the content of carbon⁶³. Carbon (C) plays a vital role as an alloying element in the majority of steels. Its addition serves to enhance the strength and hardness of the solid solution and to increase hardenability. When dissolved in iron, carbon forms ferrite and austenite. Furthermore, carbon combines with iron to create a carbide known as cementite (Fe_3C), which is an integral part of pearlite⁶⁴.

The presence of hydrogen (H) in steel is unfavorable. When trapped within the steel, it has the potential to initiate the formation of cracks such as hydrogen flakes or microcracks. Typically, measures are taken to minimize hydrogen content in liquid steel through methods such as vacuum degassing or employing slow cooling techniques following the transformation of austenite to ferrite. Sulfur (S) is typically an impurity in steel. However, in the case of special steels, sulfur is intentionally added to enhance machinability⁶⁵.

Eiffel preferred to use the two types of low and medium-carbon steels to make different parts of the suspension bridge in Giza Zoo. Carbon steel was widely utilized in the bridge industry⁶⁶. According to one study⁶⁷ medium-carbon steel exhibits higher tensile and yield strength compared to low-carbon steel, but its toughness is comparatively lower. However, both steels had similar hardness values⁶⁸. Medium-carbon steel has higher strength, hardness, resistance to wear, toughness and machinability but is less ductile and flexible. It is used in structures and the manufacture of railings (handrails)⁶⁹. Low-carbon steel is characterized by its strength, ranging from 50 to 150 ksi (350-1035 MPa), good notch toughness, ductility, malleability, weldability and corrosion resistance⁷⁰. It is used for the manufacture of nails, screws and metal structures⁷¹. So, it is commonly employed in the construction and bridge components and other large structures and buildings. While low-carbon steel is not as susceptible to rusting as high-carbon steel, it still requires proper care and protection to prevent corrosion and maintain its strength and durability⁷².

3.3.2.3. X-ray Diffraction Results

The results of XRD analysis of corrosion products taken from the railing (Sample N^o.G), wire cables [Sample N^o.H] and screws [Samples N^{os}.I, J, K and L] are given in [TABLE 4].

⁶² SCOTT 1991: 144; SCOTT & EGGERT 2009: 16.

⁶³ CALLISTER 2007: 360.

⁶⁴ BRAMFITT & BENSCOTER 2002: 3; WRIGHT 2002: 17; SELWYN 2004A: 91; MIKI *et Al.* 2002: 3-20; DOGARIU 2014: 33.

⁶⁵ BRAMFITT & BENSCOTER 2002: 3; WRIGHT 2002: 17.

⁶⁶ OH 1997: 1.

⁶⁷ LI 2020.

⁶⁸ LI *et Al.* 2020: 012026.

⁶⁹ DOGARIU 2014: 92-94; ARANĐELOVIĆ *et Al.* 2023: N^o.1, 761.

⁷⁰ DOGARIU 2014: 92-94; SINGH 2016: 61.

⁷¹ DOGARIU 2014: 92-94.

⁷² CALLISTER 2007: 360-361.

Corrosion Products	Railing [Sample N ^o .G]	Wire Cable [Sample N ^o .H]	Screw Samples			
			I	J	K	L
Magnetite Fe ₃ O ₄	√	√	√	√	√	√
Maghemite γ-Fe ₂ O ₃	√	√	√	----	√	√
Hematite α-Fe ₂ O ₃	√	√	√	√	√	√
Goethite α-FeO(OH)	√	√	√	√	√	√
Akaganeite β-FeO(OH)	√	√	√	√	√	√
Lepidocrocite γ-FeO(OH)	√	√	√	√	√	√
Butlerite Fe(OH)SO ₄ ·2H ₂ O	√	√	√	√	√	√
Quartz SiO ₂	----	----	√	----	----	√

[TABLE 4]: Corrosion products analyzed by XRD for railing, wire cable and screw © Done by the authors

During exposure, particularly in outdoor environments, corrosion products form on the surfaces of carbon steel, leading to atmospheric corrosion. When carbon steels are exposed to humid air in an outdoor setting, they undergo rapid corrosion. The resulting corrosion layer is characterized by its porosity, poor adhesion and frequent cracking. This type of structure offers minimal resistance to the entry of absorbed water or precipitation, allowing it to penetrate the underlying metal and continue the corrosion processes. Unless measures are taken to protect the iron such as applying a coating system, this corrosion will persist. Carbon steels corrode more quickly outdoors compared to other metals such as zinc, copper and aluminum⁷³. According to ISO 9223, the corrosion rates of carbon steel vary across different environments. These rates range from 0.05 mils per year in mild environments to 8 mils per year in severe conditions and can even reach up to 28 mils per year in highly corrosive marine exposures⁷⁴.

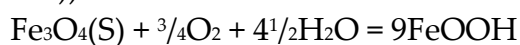
The analysis of corrosion product samples from the different bridge parts (railing, wire cable and screw) using XRD revealed the predominant components on the railing and wire cable were iron (III) oxide (magnetite (Fe₃O₄), maghemite (γ-Fe₂O₃) and hematite (α-Fe₂O₃) an inner layer and an outer layer consisting of iron (III) hydroxide oxide, typically (goethite (α-FeO(OH)), lepidocrocite (γ-FeO(OH)) and akaganeite (β-FeO(OH))⁷⁵ and iron (III) hydroxide sulfate dihydrate (butlerite (Fe(OH)SO₄·2H₂O)). Additionally, quartz (SiO₂) particles only appeared in screws [samples N^{os}.I & L] as present in the atmosphere⁷⁶.

⁷³ GRAEDEL & FRANKENTHAL 1990: N^o.8, 2386; KOGLER & OCEL 2002: 7; SELWYN 2004A: 104; LEYGRAF *et Al.* 2016: 303..

⁷⁵GRAEDEL & FRANKENTHAL 1990: N^o.8, 2387; OH 1997: 1; SELWYN 2004A: 104; SELWYN 2004B: 295; SCOTT & EGGERT 2009: 118-119; LEYGRAF *et Al.* 2016: 306.

⁷⁶ SARICIMEN *et Al.* 2011: N^o. 6, 303, 311.

Magnetite (Fe_3O_4) is frequently encountered as the prevailing iron oxide detected in archaeological iron materials⁷⁷. While magnetite is typically a highly stable mineral, it can undergo a yellow-brown alteration when exposed to water or a damp environment, resulting in surface transformation to goethite. In various conservation treatments, intentionally reducing other iron oxides or corrosion products to magnetite is a desired outcome. This preference is because magnetite has a higher density than hematite or goethite. As a result, the porosity of the corrosion layers increases, enabling more efficient removal of chloride ions present within the rust layers through washing⁷⁸. The protective function of magnetite within the corrosion product layer on archaeological artifacts is attributed not only to its strong thermodynamic stability but also to its dense structure and low molar volume⁷⁹. The magnetite that is produced will undergo swift transformation due to atmospheric oxygen, resulting in the typical corrosion products (iron oxyhydroxides (FeOOH))⁸⁰:



Maghemite ($\gamma\text{-Fe}_2\text{O}_3$) is a frequently encountered byproduct of the corrosion process. It is closely associated with transformations that can occur in goethite and lepidocrocite during oxidation. In rust formations, maghemite is commonly found in combination with goethite and magnetite⁸¹.

Hematite ($\alpha\text{-Fe}_2\text{O}_3$) is a commonly observed corrosion product. Numerous reaction pathways lead to its formation as the stable end product during the corrosion process or through the transformation of iron hydroxides⁸².

Goethite ($\alpha\text{-FeO}(\text{OH})$) plays a crucial role as the primary corrosion product for iron objects in various environments. It commonly forms the primary component of corrosion products on recently rusted surfaces⁸³. Goethite exhibits the highest thermodynamic stability among the various forms⁸⁴.

Lepidocrocite ($\gamma\text{-FeO}(\text{OH})$) is frequently encountered as an iron corrosion product and serves as an intermediary stage in certain corrosion processes that ultimately result in the formation of hematite. It exhibits stability across diverse environmental conditions, appearing either as a byproduct of corrosion processes or as a component blended with other iron oxides within corrosion crusts. Its formation often occurs through the oxidation of a ferrous salt. Recent studies on atmospheric iron corrosion proposed that the presence of lepidocrocite indicated that corrosion had not yet reached its most stable state⁸⁵. Lepidocrocite, while less stable than goethite, is frequently detected on iron surfaces that are exposed to the outdoor environment⁸⁶.

⁷⁷ JEGDIĆ *et Al.* 2012A: N^o. 3, 233-240; JEGDIĆ *et Al.* 2012B: 241-248.

⁷⁸ SCOTT & EGGERT 2009: 48, 119.

⁷⁹ JEGDIĆ *et Al.* 2012A: N^o.3, 233-240.

⁸⁰ SCOTT & EGGERT 2009: 112.

⁸¹ SCOTT & EGGERT 2009: 49.

⁸² SCOTT & EGGERT 2009: 40.

⁸³ STAMBOLOV 1985: 120-121; SCOTT & EGGERT 2009: 35.

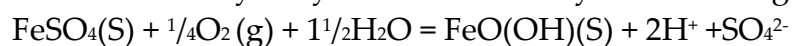
⁸⁴ SELWYN *et Al.* 1999: 217-232.

⁸⁵ SCOTT & EGGERT 2009: 37; JEGDIĆ *et Al.* 2012A: N^o.3, 233-240.

⁸⁶ SELWYN *et Al.* 1999: 217-232.

Akaganeite (β -FeO(OH)) is commonly observed and typically indicates ongoing corrosion of an iron object. Its formation is often associated with the presence of chloride ions⁸⁷ which can be introduced using chlorinated tap water—commonly high levels in chlorine—for cleaning bridge components, particularly in outdoor environments⁸⁸. The akaganeite structure—an iron oxyhydroxide framework—features tunnel-like channels that are partially occupied by chloride (Cl⁻) ions⁸⁹. Akaganeite bubbles form under elevated relative humidity (RH) conditions. At 75% RH, the formation took place within hours while at 54% RH, it occurred within a month, especially outdoors⁹⁰.

Sulfates, while less abundant, are commonly found in rust layers formed through atmospheric exposure, following oxides and oxyhydroxides⁹¹. Over time, carbon steel develops a stratified composition comprising various corrosion products that vary based on the surrounding environmental conditions. Located in an urban setting, the Suspension Bridge in Giza Zoo is exposed to pollution predominantly originating from sulfur dioxide gas (SO₂). The corrosion of carbon steel is expedited by acidic air pollutants, particularly sulfur dioxide, which readily adheres to metal surfaces and dissolves in water. Once dissolved, sulfur dioxide undergoes oxidation to form sulfuric acid, which speeds up the corrosion process of iron. The sulfate ions react with Fe²⁺ ions to produce iron (II) sulfate, which is readily soluble and exhibits varying degrees of hydration. This chemical reaction leads to the creation of iron hydroxide oxides and sulfuric acid. Sulfuric acid has hygroscopic properties, exacerbating the corrosion of iron⁹². Sulfate ions have the potential to precipitate as relatively insoluble iron (III) hydroxide sulfates such as butlerite Fe(OH)SO₄·2H₂O⁹³. Iron sulfate can undergo oxidation and hydrolysis as described by the following equation:



Finally, the presence of corroded low-carbon steel screws, which were employed to fix the decks of the wooden bridge, resulted in the deterioration of the cellulosic fibers within the wood that came into contact with the corrosion products. The degradation of the wood caused by the rusting iron was characterized by a noticeable decline in the xylan content and a reduction in the timber's pentosan levels⁹⁴, which represented the hemicellulose composition of the timber⁹⁵.

The long-term functionality and structural integrity of a steel bridge can be jeopardized by corrosion. If structural steel is not adequately protected or is left unprotected in the natural environment, it will corrode⁹⁶. In order to minimize the

⁸⁷ SELWYN *et Al.* 1999: 217-232; SELWYN 2004B: 296; SCOTT & EGGERT 2009: 37, 57, 116; JEGDIĆ *et Al.* 2012B: 241: 248; JEGDIĆ *et Al.* 2012A: N^o.3, 233-240

⁸⁸ MOHAMED *et Al.* 2014: 177-178; ELMETWALY 2014: 121-123; ELMETWALY 2021: 309-313.

⁸⁹ SELWYN *et Al.* 1999: 217-232.

⁹⁰ WANG 2007: 72-108; MEGAHED *et Al.* 2021: 5693-5702.

⁹¹ GRAEDEL & FRANKENTHAL 1990: N^o8, 2388.

⁹² SELWYN 2004A: 104-105; SCOTT & EGGERT 2009: 112, 116.

⁹³ SELWYN 2004A: 104-105.

⁹⁴ SCOTT & EGGERT 2009: 104.

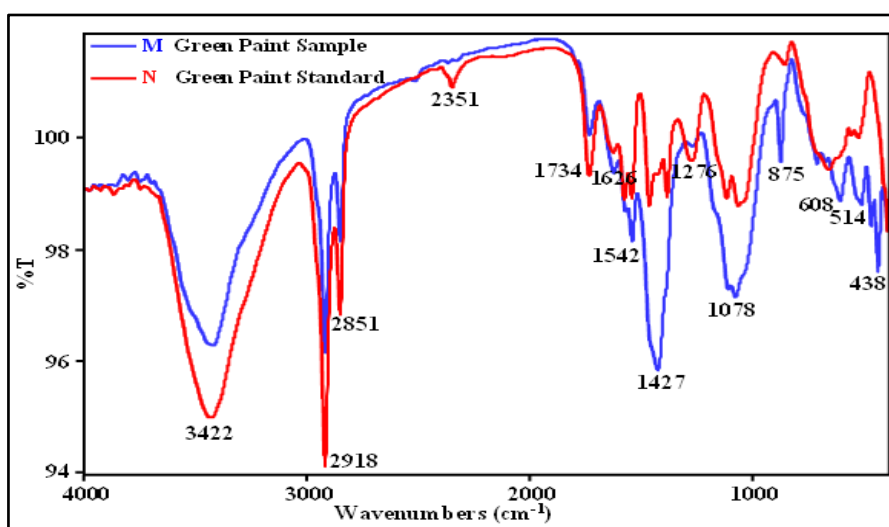
⁹⁵ WHISTLER 1950: 269–290.

⁹⁶ KOGLER & OCEL 2002: 1.

atmospheric corrosion of steel, various methods such as the application of coatings, are commonly employed. Multiple coatings or paints are typically utilized to mitigate the effects of atmospheric corrosion^{97,98}. Gustave Eiffel emphasized that painting is a critical factor in safeguarding metal works and durability increases proportionally with the level of meticulousness applied during the paint job⁹⁹.

F. Fourier Transform Infrared Spectroscopy (FTIR):

The FTIR spectrum of the green paint on the bridge [Sample N^o.M] was analyzed alongside the FTIR spectra of various green paints available in the local market (Sample No. N). The comparison revealed that the FTIR spectrum of the green paint used on the bridge closely matched that of a commercially produced synthetic green paint called ARTEX (Pachin) [FIGURE 16]. These commercial paints are widely utilized for numerous outdoor metal exhibits¹⁰⁰.



[FIGURE 16]: FTIR spectrum shows a comparison between the green paint from the bridge and a standard commercial green paint © Done by the authors.

IV. CONCLUSIONS

The Eiffel Bridge is among one of the many natural and cultural landmarks in the Giza Governorate and within Great Cairo. The study confirmed the multilayered importance of the bridge. The archaeological and historic evidence such as presence of Khedive Ismail's emblem above the bridge's entrance, shows that the bridge dates to the era of Muḥammad Ali Pasha's family. The architectural value demonstrated that the bridge was one of the first platforms designed inside zoological gardens to provide a panoramic view, while also featuring a distinctive single span, two tower suspension design.. Moreover, the design and manufacture of the bridge were attributed to the famous engineer Eiffel and his company in France. It was constructed about ten years before the construction of the Eiffel Tower, which gives the bridge comparable importance to the Eiffel Tower. The technical value showed that the bridge was manufactured of low and medium carbon steel which provided it with strength and

⁹⁷ OH 1997: 1.

⁹⁸ SCOTT & EGGERT 2009: 120.

⁹⁹ EIFFEL 1900: 216-222.

¹⁰⁰ MOHAMED *et Al.* 2014: 179.

durability in addition to lightweight which supported the manufacture of the bridge in its factory in France and then transporting it to be fixed in its specified location using screws. The artistic and aesthetic values illustrated that the bridge was distinguished by the use of floral decorations, both on its entrances, in the Corinthian capitals of columns, and the hand railings designed on both sides of the bridge. The functional value revealed that the bridge connected two artificial hills or plateaus that were designed to provide a wide view of the zoo.

The study highlighted the importance of architectural documentation using the Revit application, which provided many architectural drawings of the bridge that were useful in recording its parts and supported decision-making in the rehabilitation and preservation procedures. It covered conducting a set of tests and analyses to determine the used alloy in manufacturing the bridge, as well as its state, corrosion products, and deterioration phenomena. The study used portable examination and analysis devices as much as possible to avoid taking a large number of samples and to be satisfied with small, representative samples to conduct the remaining tests and analyses. The effect of the open environment surrounding the bridge appeared on the damage to its surface layers and the appearance of corrosion products, in addition to the separation of the surface paint layers. Analysis revealed that the bridge alloy was mainly composed of low and medium carbon steel by studying the microstructure of the alloy and determining carbon concentration through CHNS elemental analyzer, which confirmed that Eiffel used low and medium carbon steel in this bridge. XRD of corrosion products showed that they mainly consisted of iron (III) oxide (magnetite (Fe_3O_4), maghemite ($\gamma\text{-Fe}_2\text{O}_3$), and hematite ($\alpha\text{-Fe}_2\text{O}_3$), iron (III) hydroxide oxide (goethite ($\alpha\text{-FeO(OH)}$)), akaganeite ($\beta\text{-FeO(OH)}$), lepidocrocite ($\gamma\text{-FeO(OH)}$), and iron (III) hydroxide sulfate dihydrate (butlerite ($\text{Fe(OH)SO}_4\cdot 2\text{H}_2\text{O}$)). The results of the analysis using FTIR spectrum showed that the bridge was painted using a commercial green paint.

The study recommends urgent intervention to preserve the Bridge's various values and to develop a plan for regular conservation to preserve it. The Bridge should be on the tourism plan for cultural landmarks in Giza Governorate and Cairo to make it widely known while coordinating its urban within the zoo and placing guide signs to facilitate its access and maintain its boundaries within the park due to its close association with its location.

The research study of the Eiffel Bridge still needs many complementary studies, so researchers have plans to study the Bridge's ability to bear different loads and the extent of its stability and balance. Additionally, a detailed study is needed to monitor the impact of the surrounding environment and its variables on the bridge, especially since it is a metal structure that is affected by all factors in its open environment. A proposal shall be developed to conserve, preserve, and rehabilitate the Bridge.

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THE ROLE OF THE COMMUNITY LEARNING CENTER IN INCREASING COMMUNITY ENGAGEMENT IN MĪT RĀHĪNA

BY

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ABSTRACT

[AR]

دور مراكز التعلم المجتمعية في زيادة الانخراط المجتمعي في ميت رهينة

أصبحت السياحة أكثر أهمية مع مرور الوقت في جميع أنحاء العالم، لذلك أصبح الاهتمام بتنميتها قضية رئيسية في العديد من المجتمعات، حيث إن هذه المجتمعات من الموارد الرئيسية التي تعتمد عليها السياحة، يمكن تطوير السياحة بسبب وجود هذه المجتمعات في أماكن وأوقات معينة. أحد الأسباب الرئيسية لسفر السائحين من مكان إلى آخر هو تجربة المجتمعات نفسها لأسلوب حياة هذه المجتمعات. تمثل هذه المجتمعات المناظر الطبيعية التي يهدف السائح إلى رؤيتها. وتتيح منطقة ميت رهينة فرصة لدراسة هذا الموضوع حيث إن هناك دائما مصالح متضاربة بين رغبات المجتمع المحلي والجهات الحكومية. ولم يتم التوصل حتى الآن إلى حل وسط يرضي كافة الأطراف فيما يتعلق بالمشروعات التنموية الخاصة بالمنطقة الأثرية. لقد تم الاعتراف بالمشاركة المجتمعية كأحد أهم الأهداف والمبادئ لتحقيق السياحة المستدامة. تعد مشاركة المجتمع المحلي في حماية مواقع التراث العالمي أمراً أساسياً لتحقيق التنمية المستدامة وأهدافها. وتناقش الورقة البحثية الحاجة إلى بذل المزيد من الجهود لتثقيف وإشراك وتمكين أفراد المجتمع المحلي ومختلف أصحاب المصلحة من خلال مراكز التعلم المجتمعية. وتهدف إلى توضيح دور مراكز التعلم المجتمعي في إشراك المجتمع المحلي في برامجه وسياساته لتحقيق التنمية المستدامة. أحد المتطلبات الأساسية للاستدامة في التجديد البيئي هو تحسين الحياة الاجتماعية والثقافية والاقتصادية لهذه المجتمعات. بدون مجتمعات بشرية مستدامة، لا يمكن لعمليات التنمية السياحية أن تكون مستدامة. سوف تستخدم البيانات الأولية والثانوية التي تتعلق بهذا الموضوع.

[EN]

Tourism is becoming more crucial over time around the globe, so interest in its development has become a major issue in many societies, since these communities are among the main resources on which tourism depends. Tourism can be developed because of the presence of these communities in certain places and times. One of the main reasons for tourists traveling from one place to another is to experience the way of life of these communities. These communities represent the landscape that the tourist aims to see. Mit Rahina area gives an opportunity for studying this issue as there are always conflicting interests between the desires of the local community and the governmental authorities. So far no compromise has been reached that satisfies all parties with regard to development projects pertaining to the archaeological area. Community engagement has been recognized as one of the most important goals and principles for achieving sustainable tourism. Local community engagement in the protection of world heritage sites is fundamental to achieve sustainable development and its goals. The paper discusses the need for more efforts to educate, engage and empower local community members and various stakeholders through Community Learning Centers. It aims to explain the role of community learning centers in engaging the local community in their programs and policies for achieving sustainable development. A key requirement for sustainability in environmental regeneration is to improve the social, cultural and economic life of these communities. Without sustainable human communities, tourism development processes cannot achieve sustainability. This study utilizes primary and secondary data related to that topic.

KEYWORDS: Community Learning Centers, Community Engagement, Sustainability, Sustainable tourism, Stakeholders, Local community, Sustainable development.

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I. INTRODUCTION

The concept of sustainability has become an integral part of the planning process for tourism development. In order for this process to be effective and successful, the local community must be an essential partner in all stages related to that process. The word «community» is mentioned four times in the UNESCO World Heritage Convention with three instances referring to the international community and one emphasizing the involvement of local communities in preserving and safeguarding cultural and natural heritage. This underscores the prevailing interest in international law regarding communities, whether they are international or local¹.

This paper deals with the concept of community engagement and outlines an important principle for achieving it by proposing the establishment of a community learning center in Mit Rahina. This study shows that world heritage sites often lack an integrated approach that enables genuine participation of the local community in the planning and decision-making processes.

Community engagement is crucial for the development of sustainable tourism. A fundamental tenet of sustainable tourism development is the participation of the local community and meeting their needs. This process must be supported because it will assist in making informed decisions that contribute to environmental preservation and encouraging the local community to become more involved in the development processes. The local community must participate in the decision-making process, which will motivate them to preserve the practices and sites. This will also lead to an appropriate decision for all parties and will have the greatest impact on preserving the environment. To achieve sustainable tourism development, it is crucial to engage local communities in all stages of development within their region².

Most archaeologists have suggested that the village of Mit Rahina is the site of the ancient city of Memphis. Mit Rahina is a small village located near the center of Badrashin. Mit Rahina, Saqqara, Abu Sir, and the villages that surround it are served by an administrative center led by the governorate of Giza. Many of Mit Rahina's services are reliant on this governorate. Mit Rahina is significant because it represents the civil life of the ancient capital of Memphis. It is also important because it is adjacent to Saqqara necropolis, which is rich in ancient monuments, many of which are extant on the site today. Archaeological remnants of the eighteenth dynasty have been preserved on the site³. Although it depends on the palm industry, Mit Rahina's standard of living is low in general. The local community has relatively little interaction with the tourists to Memphis, and so the local community receives little or no economic benefit from tourism. According to the Central Statistical Organization and Statistics' 2017 census, Mit Rahina has a population of 34, 143 people. The bulk of the population is Muslim while Christians constitute a small proportion of the population. Mit Rahina and Abusir have a few social

¹ BYRD 2007: 62, N^o.2, 6.

² MOYO et Al. 2017: N^o.1, 4.

³ BADRY 2014: 21.

clubs where activities like literary workshops are held. Memphis' significance was unknown to the surrounding people. As a result, places like the west gate of Ptah Temple in Mit Rahina have become garbage dumps. Therefore, it is important to raise the awareness of the local community about the importance and history of the site and to involve them in the process of preserving and developing the site. This would inspire pride and encourage a desire to maintain the archaeological site⁴.

Mit Rahina has great archeological importance; it is the city of Memphis which had a major role in the history of ancient Egypt, starting from the First Dynasty until the end of the Thirteenth Dynasty. It also had a major role in the Greco- Roman era. Memphis's importance is due to: (a) it being the political capital of a united Egypt since the beginning of the first dynasty until the end of the Old Kingdom and in some periods of the Late Period, perhaps during the twenty-fifth and twenty-seventh dynasties, (b) Its political role in resisting foreign occupation during the Late Period, (c) its long civilizational role throughout the various eras of ancient Egypt until the Greek and Roman eras. It was also taken as a political capital and a place of government after the union between the North (Delta) and the South (Upper Egypt) around the year 3100 BC.⁵ Regrettably, the archaeological site suffers from neglect and is consistently vulnerable to systematic thefts and clandestine excavations. Addressing these challenges necessitates the implementation of a robust insurance plan for the archaeological site, along with initiatives aimed at raising awareness about its significance. Therefore, the region needs a strategic vision to develop it into a tourist attraction, that would generate income for the Ministry of Tourism and Antiquities and the local community. A significant gap exists between the current situation and the proposed scenario, primarily because the local community has been entirely disregarded. Furthermore, the local community felt that the authorities did not need them because they did not have enough experience and knowledge to engage them. Decisions were made to develop tourism without consulting them. Disregarding all international laws, including those outlined in the 1972 World Heritage Convention, undermines the vital role of local community involvement in development processes, as emphasized within the Convention. So the community felt completely excluded from the tourism planning and development process. In this regard, the former Chairman of the World Heritage Committee mentioned:

[W]ithout the understanding and support of the public at large, and without the respect and daily care of the local communities, which are the true custodians of World Heritage, no amount of funds or army of experts will suffice in protecting the sites.

Hence the importance of community-based institutions in creating continuous learning activities for community development, in the direction of improving behavior, and developing life skills for a sustainable future. Among these institutions are Community Learning Centers (CLCs) that play an important role in supporting sustainable

⁴ AERA 2017: 9.

⁵ BARBARI 2008.

development by providing lifelong learning opportunities for all members of the local community and working to improve their quality of life.

II. RESEARCH METHODOLOGY

The paper utilizes accessible primary and secondary scientific resources by reviewing the literature reviews that are related to the issue of community engagement in the tourism sector and proposing new insights on the role of Community Learning Centers on community engagement and tourism development.

III. THE TERMS COMMUNITY ENGAGEMENT AND COMMUNITY LEARNING Centers

Cultural tourism is famous for attracting tourists who have a desire to explore and learn. Cultural heritage is characterized by the combination of tangible and intangible heritage elements. According to the World Tourism Organization, cultural tourism constitutes about 20% of the total arrivals to cities that are famous for their cultural landmarks. This number grows when leisure tourists are included as they are interested in local culture. Furthermore, it's commonly recognised that cultural visitors are more considerate of cultural heritage. However, the local community also contributes significantly to the overall socioeconomic improvement of a particular region. So a lot of academics illustrate the importance of community engagement issues in achieving sustainable tourism development, economically (increasing income), socially (new job opportunities), environmentally (preserving the environment), and culturally (poverty alleviation and tourists' sense of satisfaction, which enhanced their overall experience). In order to develop tourism sustainably, it is necessary to meet the needs and expectations of both hosts and visitors. Without the effective engagement of the local community, it is extremely difficult to value and manage cultural resources. As a result, their interests must be taken into account when developing tourism strategies to achieve sustainable tourism. This was confirmed by the UNESCO World Heritage Convention which emphasized the importance of the role of the local community in preserving and safeguarding tangible and intangible cultural heritage. Such involvement encompasses a variety of actions such as identifying, promoting, enhancing, and revitalising various elements of intangible cultural heritage⁶.

The word «community» is defined differently in various sources; the word «community» has no comprehensive definition because its interpretation depends on context.

There isn't a consensus on what community engagement generally means. Some academics have stated that community engagement is: «*The process by which individuals who are not formally elected or appointed by government or agency decision-makers exert influence over decisions regarding programmes and policies that directly affect their lives*». Others define it as «*A process by which people can express their opinions and participate in decision-making*».

⁶ Moric et Al. 2021: 165.

However, they all concur that the community engagement will increase the efficiency with which resources are used and will facilitate the decision-making process. Community engagement plays a pivotal role in enhancing awareness among the local population and improving their receptivity towards their rights. Moreover, it contributes to augmenting their income from tourism⁷. Community engagement *'is described as participation by the community in specific activities, whether directly or indirectly, such as the development of ideas, the formulation of policies, the execution of programmes, and the evaluation of such programmes'*. Direct engagement means that every activity receives support from community members who contribute their time and resources. Meanwhile, indirect engagement involves the provision of the ideas, funds, and resources. Additionally, community engagement is a form of cooperation among all members of society to achieve common interests in the long run. This may contribute to solving problems and equitable distribution of benefits. As a result, community engagement serves as a trust-building process, facilitating the establishment of priorities and the creation of effective communication networks. Through a sustainable approach, it aims to achieve the best possible outcomes⁸.

In 1994, the UNESCO World Heritage Center issued the first call for local communities to participate in the management of World Heritage sites, stating:

*The great majority of local populations could and should be closely associated with the management and safeguarding of the sites...In any event, it is clear that the longterm conservation of properties inscribed on the list will never be guaranteed unless human heritage is first and foremost the concern of those who live alongside it*⁹.

Then, in 1995, the World Heritage Committee put into effect a formal, defensible policy that depended on community involvement in the preservation and management of heritage:

"Participation of local people in the nomination process is essential to make them feel a shared responsibility with the state party in the maintenance of the site" (UNESCO, 1996: paragraph.14)

The committee then reviewed the strategic goals in 2002 while also emphasising the crucial role that local communities play in the preservation, management, and protection of World Heritage Sites. This was done to commemorate the Convention's 30th anniversary. The operational guidelines were updated in 2014 to include a new paragraph that supports the concept of community engagement at all levels:

States Parties to the Convention are encouraged to ensure the participation of a wide variety of stakeholders, including site managers, local and regional governments, local communities, non-governmental organizations (NGOs) and other interested parties and partners in the identification, nomination and protection of World Heritage properties.

In its efforts to improve community engagement in the preservation and management of heritage, the World Heritage Committee seeks to formalize and

⁷ MUSTAPHA 2013: 104.

⁸ KIA 2021: 94.

⁹ UNESCO 1994.

institutionalize this process. This includes considering local customs, which can play a significant role in the protection of world heritage sites.

In order for the local community to be involved in the processes of preserving, safeguarding, and managing heritage, the community must be well educated and work to increase its awareness of the significance of its heritage, civilization and history. When a community embraces a significant archaeological site, this community must be well-educated and prepared as the tourism industry poses challenges. Before beginning any kind of physical tourism development, this community should first be aware of the various aspects of tourism. For communities that are less educated, learning programs and lessons must be introduced gradually. The educational process must take its time with those communities that are relatively less educated. A tourism culture must be accepted and developed gradually by the local community. A growing number of local residents in remote communities work in the tourism industry, but have no prior tourism experience and can't find time to receive conventional training. While there is considerable focus on training and educating workers in the tourism sector, there is a noticeable scarcity of literature regarding methods for educating and empowering local communities in tourism. Up until now, government programs have placed a focus on providing high-quality services, or meeting the needs of visitors. These programs represent the lowest level of participation. Residents are not given the opportunity to learn about issues related to tourism development or to gain self-assurance and empowerment¹⁰. Looking at all the goals of sustainable development, it was found that they all call for education, training, or at the very least increasing awareness for one or more groups of people. This cannot be achieved through formal education system in schools, but through a comprehensive and sustainable program to educate adults¹¹.

When discussing non-formal education or adult education, Community Learning Centers have emerged as a prominent concept in various experiences. They represent one of the most effective methods for educating people informally and outside the classroom. CLCs are regarded as places for informal learning. CLCs are an effort to promote literacy or some other form of community engagement. At the core of these concepts is a fundamental notion, which is to develop a community structure that enables community members to interact and participate in new learning processes¹². The following is an adaptation of the APPEAL Training Materials for Continuing Education Personnel's definition of a Community Learning Centre (CLC):

A CLC is a local educational institution outside the formal education system, for villages or urban areas, usually set up and managed by local people to provide various learning opportunities for community development and improvement of people's quality of life to learn new things in a rapidly changing, difficult world.

¹⁰ COLE 2005: 22.

¹¹ ROGERS 2019: 5.

¹² MAHAPHUJURA 2005: 3.

A community learning center should be a place where people feel comfortable so that all topics can be discussed easily and simply. It must also be a neutral place, free from political or ideological perspectives. Community Learning Centers can be located inside any public center or somewhere inside a school. Community Learning Centers do not follow a policy of compulsory education, nor are they mere meetings and discussions that are not subject to restrictions or conditions. Instead, they focus primarily on stimulating and providing learning initiative until the community begins to realize that learning is enjoyable. Community Learning Centers are democratically managed, and there is no coercion in the educational process, which is necessary for achieving sustainable development goals¹³.

The first global obligation that UNESCO gave to community learning centers was the Belém Framework.¹⁴ which aims to achieve the principle of community engagement and participation and to give learning opportunities to all. Among these commitments are:

Creating multi-purpose community learning spaces and centres and improving access to, and participation in, the full range of adult learning and education programmes for women, taking account of the particular demands of the gender specific life-course.

Nevertheless, CLC is not a novel idea; it has been in existence in Asia and the Pacific countries since the late eighties. Those countries focused on developing the human element more than on just pure economic development:

Human development means more investment in developing people's capabilities, whether in education, health or the promotion of technical skills. Human development entails guaranteeing that economic benefits will be distributed equitably in order to improve people's quality of life. The goal of people-driven development is to give everyone the opportunity to actively take part in the development process¹⁵.

IV. THE RESEARCHER'S PERCEPTION OF THE COMMUNITY LEARNING CENTER

The project's concept centers around the creation of a community learning center (CLC) in one of Egypt's most important cemeteries, the Memphis cemetery. The project intends to build and improve the capacity of the local community through education and training activities. The basic idea of the community learning center revolves around a mechanism aimed at empowering local communities, social transformation, and quality of life through lifelong learning, improving communication and social integration with a rapid response to community requirements. Formal and non-formal education can be found in Community Learning Centers, which are set up in simple and inexpensive places to provide learning in flexible ways. Therefore, it is not required to erect new buildings, but rather centers can be established in existing buildings such as youth clubs, health

¹³ JØORN 2006:25-26.

¹⁴ The Belém Framework is the final report that was made because of the sixth global conference on the education of the adults (CONFINTEA VI), which has occurred since 1949 and is held approximately every 10 or 12 years, it is one of the many international conferences of UNESCO concerned with adult education, in addition to creating a career in educating adults.

¹⁵ TAM LE 2017 :2.

centers, basic learning schools, or events house. The most important point is that all community members have access to these places.

It will be preferable for CLC to receive government support. The government will help in creating programs that are appropriate to the requirements and resources of society and which match the demands of the work market. Additionally, the government has the ability to connect various community centers to expand the extent of the preparation of programs and can hire competent organisers and educators, which is necessary for running high-quality activities and programs. Two factors for CLC sustainability have been identified by UNESCO: (a) The educational programs provided must be commensurate with the needs of the community, and (b) enough resources must be provided for these programmes. Stakeholder involvement is also crucial to ensuring the sustainability of the CLC¹⁶. Community members' participation can assist Community Learning Centres in receiving helpful criticism for their upcoming improvement. Consequently, three crucial actors are required: the local community, the government and development collaborators who work together in their best efforts to keep Community Learning Centres sustainable¹⁷. In order for the local community to acknowledge, comprehend, and appreciate the significance of tourism, many workshops addressing these themes must be held (discussion and consultation sessions, the role of the community, Tourism-related benefits, knowing how the tourism industry operates, roles and expectations must be defined). The first stage should involve a introductory discussion sessions, which have two formats:

- Formal sessions: may be organised so that local residents can come to an agreement and decide on matters of local concern.
- Informal sessions: can be organised to allow for open discussion of issues; open-ended questions can be created to highlight fundamental requirements and needs, hopefully finding solutions for these problems.¹⁸

After these discussions, the priorities that can be worked on can be identified. This allows for community engagement in identifying the problems it faces, and defining the priorities that must be addressed. In this first stage, the largest possible number of local community members must be invited to discuss which tourism activities in the village are most appealing to tourists from their perspective¹⁹. This can be done in the form of brain storming session to encourage people to share their suggestions and ideas so that the workshop can rank and assess the suggested activities. Additionally, periodic meetings will be held in the community learning center. These meetings will cover important topics such as development projects that affect the community. These meetings will act as a channel for communication between the local community and the community learning

¹⁶ ASMIN 2018: 61.

¹⁷ NEAK 2020.

¹⁸«Community Empowerment through Community Learning Centres in Mid and Far Western Regions of Nepal», <https://unesdoc.unesco.org/ark:/48223/pf0000151170>. 2006 Unesdoc.unesco.org, accessed on (10/12/2023)

¹⁹ HAMZAH 2009: 23.

center²⁰. The Community Learning Center can organize workshops for crafting based on the preferences of the community, such as the carpet industry prevalent along the Saqqara line and heritage handicrafts. Women could be employed to create crafts and also work as caterers, thus contributing to the local economy and preserving cultural traditions. If the women received training in catering, they could serve rustic food to tourists. These classes should be open to attendees from the local community and should be attended by a range of talented professionals in the field. This kind of activity is regarded as a source of income, as it helps them earn more money through increased sales. Many of them will become skilled in these crafts. Such courses will be an incentive for the local community to get more involved in the community learning center²¹. Alongside the workshops, some modules should be included in the capacity building program for the local community, which are intended to foster the community's knowledge and skills such as :

- Development of products.
- The safety of food culture.
- Raising awareness programs.

These modules will be presented in conjunction with the workshops, The community will also be engaged in discussions to better understand the detrimental effects of tourism and find suitable solutions to encourage older individuals to share their knowledge of customary traditions to younger generations.

• **Development of Products**

The local community must be able to reap benefits by investing in their local crafts and so it is important to give local communities information about the types of things that tourists will buy. They must be aware that tourists greatly value local products. Local crafts, souvenirs, and food products are three of the most in-demand industries and if tourists had the opportunity to see the production cycle, sales would increase. Tourists prefer small sample sizes for local products. If crafts serve as mementos, representing the essence of a site, tourists will indeed find them more appealing and meaningful souvenirs of their experience. Several lessons should be given on what the tourists value and pay their cash for, and how the products they purchase are a reflection of the places they have travelled to²².

• **The Safety of Food Culture**

For those interested in setting up projects offering different types of food and drinks to tourists, it is important to take into account the menu's variety, the use of local ingredients, and the provision of well-balanced meals featuring lots of vegetables and fresh fruit. A large number of villagers will offer tourists high-protein, pricy meals thinking that they are providing them with the best food. But, tourists frequently do not enjoy these

²⁰ SHAHEEN 2001: 15.

²¹ TAMLE 2017: 65.

²² COLE 2005: 18.

types of meals. Some of them follow a vegetarian diet, as well as others, due to the meat's toughness, excessive fat content, or bone content. To put it another way, the meat falls short of what visitors anticipate. There are misconceptions about catering because of different cultural perspectives. The way food is prepared frequently disgusts tourists. Therefore, basic hygiene courses are essential for the local community.

• Raising Awareness Programs

The Welcome Host Program is one of the most well known programs of tourism awareness, which is highest priority. This program has been implemented in numerous countries and has successfully altered certain negative behaviors and attitudes towards visitors and tourists, ultimately enhancing their experience. It extends beyond those who work in the tourism sector, and reaches to a variety of situations and experiences. Most of these scenarios are with the local community, who are called the «front line workers». This program has been successfully implemented in Canada based on the assumption that

«if we leave a good impression with customers, the chances are that our business will grow, they will stay longer, spend more money in our communities and return to visit us again»

Study trips will be useful in this regard, which are more effective than classrooms instructions because it allows people to be exposed to real situations. They will have the opportunity to experience being served, and be able to assess the quality of the hospitality and assistance they received. From this, they will learn that visitors can be picky and fastidious and demand the highest quality throughout their visit. Such significant examples gained from these trips will help them develop new ideas to improve their products and visitor experience as well²³. These trips can also be made for school students. Lecturers can also use the story-telling method to teach the students about this significant village in Egyptian history. Mit Rahina village has varied and distinctive cultural sites²⁴. Another approach could involve organizing competitions among students with prizes awarded as incentives, motivating and encouraging continued attendance and active participation in the activities of the community learning center.

The center must also have a library open to the public, which is essential for fostering its tourism-based programs, as well as supporting cultural and social programs and education. It will also include other important activities like reading the printed materials. Although only a few centers offer these services, it is preferable to have them available.²⁵

It was concluded that :

- Every center has its own activities that differ from the other centers according to the local needs of the community as well as its economic, social and cultural activities.

²³ HAMZAH 2009: 30.

²⁴ HUONG 2021: 1–12.

²⁵ «Guide Manual for Community Learning Centers», <https://unesdoc.unesco.org/ark:/48223/pf0000123825?posInSet=3&queryId=443026a7-cf7e-42a9-ab57-af51c6142115,9>, accessed on (20/11/2023)

- The basic activities of the Community Learning Centers are educational in the first place.
- The Community Learning Centers have to offer a variety of programs that frequently receive guidance from experts and members of the community as well²⁶.

V.CONCLUSION

It is impossible to manage and preserve cultural heritage without engaging people actively and creatively. Engagement extends beyond the simple act of attending a cultural event. Participating in cultural activities or seeing art is not the only definition of participation. It is a more profound definition that includes 'independence, empowerment and democracy'. Cultural education will thrive when the value of crafts and other forms of intangible cultural heritage is reaffirmed, fostering active participation from citizens. Furthermore, establishing a reliable, scientific safeguarding framework is essential to achieve a sustainable balance between culture and the environment. It's necessary to change our way of thinking, and the community should understand that every action has consequences in reality. Therefore, we can conclude that cultural heritage education is a tool that can facilitate the shift from a detrimental community to a sustainable community. The local community must understand the cultural and spiritual value of the archaeological site of Mit Rahina. Hence the importance of community-based institutions in creating continuous learning activities for the sake of community development, in the direction of improving behavior, and developing life skills for a sustainable future. Among these institutions are Community Learning Centers that play an important role in supporting sustainable human development by providing lifelong learning opportunities for all members of the local community and working to improve the quality of life.

²⁶ «CLC (Community Learning Centres) Management Handbook», <https://unesdoc.unesco.org/ark:/48223/pf0000139548>. Unesdoc.unesco.org, 2003, accessed on (15/1/2023).

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USING PR TOOLS AND ACTIVITIES IN MUSEUMS FOR A BETTER COMMUNITY ENGAGEMENT: EGYPT VISION 2030

BY

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ABSTRACT

[EN] This research paper investigates the relationship between the public relations (PR) tools and activities in museums and Egypt Vision 2030 of Sustainable Development in achieving the best practices for community engagement. PR activities are not limited to mass communication. There are many other ways of gaining sustainable community engagement and interacting with Egypt Vision 2030 and its upcoming programs. PR is the discipline that looks after reputation, with the aim of earning understanding and support and influencing opinion and behavior. It is the planned and sustained effort to establish and maintain goodwill and mutual understanding between an organization and its public. Moreover, the paper explains PR as the activity's organizations engage in to create a positive image for an institution, to emphasize the impact of the effective relationship between the museum and PR tools (traditional media and digital media) and the PR activities, such as events and social media, to promote the museum. A positive tendency is certainly in the relationship between PR activities in a museum sustainability context and meeting Egypt Vision 2030. The study revealed that the museum could benefit from PR activities to accomplish the museum's message, show its value and the impact of best practices of using the museum's public relations concept to build up a positive reputation and more community engagement. The study recommends that implementing a digital media plan into museum operations will result in a high level of visitor satisfaction, who will become the institution's finest ambassadors, spreading its positive reputation through word-of-mouth information. Additionally, it helps in promoting several of the 'Egypt Vision 2030' SDGs, especially concerning the use of green energy, contributing to climate control and promoting quality and gender equality.

KEYWORDS: Public Relations, Community Engagement, Sustainability, Grand Egyptian Museum (GEM), Marketing, Hospitality, Heritage

[AR]

استخدام أدوات وأنشطة العلاقات العامة في المتاحف لأفضل تواصل مجتمعي: رؤية مصر
يتناول هذا البحث العلاقة بين الأدوات الخاصة بالعلاقات العامة والأنشطة المنفذة في المتاحف ورؤية مصر ٢٠٣٠ للتنمية المستدامة وذلك لتحقيق أفضل ممارسات للمشاركة المجتمعية. إن أنشطة العلاقات العامة لا تقتصر على الاتصال الجماهيري، لكنها تضم الكثير من الأدوات الأخرى لتحقيق غاياتها. وهناك العديد من الطرق الأخرى للحصول على مشاركة مجتمعية مستدامة ومتفاعلة مع رؤية مصر ٢٠٣٠ وبرامجها القادمة فيما يتعلق بالمتاحف. تعد العلاقات العامة النظام الذي يهتم بأمر السمعة وتهدف لكسب الفهم والدعم والتأثير في الرأي والسلوك. إنها الجهد المخطط المستدام لتأسيس والحفاظ على حسن النية والتفاهم المتبادل بين المنظمة، التي تتمثل في البحث الحالي بالمتاحف، والعامة. إضافة إلى ذلك، يفسر هذا البحث العلاقات العامة بأنها الأنشطة التي تتبناها المنظمات وتقوم بها لخلق صورة إيجابية للمؤسسة والتأكيد على أثر العلاقة الفعالة بين المتحف وأدوات العلاقات العامة مثل (وسائل الإعلام التقليدية ووسائل الإعلام الرقمية) وأنشطة العلاقات العامة، مثل: الأحداث ووسائل التواصل الاجتماعي وغيرها التي تهدف للترويج للمتحف ويمكن ملاحظة اتجاه إيجابي في العلاقة بين أنشطة العلاقات العامة في سياق استدامة المتاحف وتلبية رؤية مصر 2030. وتكشف الدراسة أيضاً أن المتحف يستفيد من أنشطة العلاقات العامة لتحقيق رسالة المتحف وإظهار قيمته وتأثيره الأفضل. ممارسات استخدام مفهوم العلاقات العامة للمتحف لبناء سمعة إيجابية ومزيد من المشاركة المجتمعية. توصي الدراسة أن تنفيذ خطة إعلامية رقمية في عمليات المتحف ستؤدي إلى ارتفاع مستويات رضا الزوار الذين سيصيرون صفوة سفراء المتحف، مما يساهم في رفع السمعة الإيجابية له. علاوة على ذلك، تنفيذ هذه الخطة يمكن أن يساهم في تحقيق العديد من أهداف التنمية المستدامة في رؤية مصر 2030، خاصة فيما يتعلق باستخدام الطاقة الخضراء والسيطرة على التغيرات المناخية وتعزيز المساواة بين الجنسين.

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I. INTRODUCTION

The purpose of public relations (PR) is to foster positive connections among diverse internal and external stakeholders and audiences. It differs from marketing or advertising because PR is fundamentally about establishing relationships and creating a positive and effective public image. The target audience for the PR strategy is anybody who helps the firm achieve its goals (suppliers, customers, visitors, industry partners, employees and rivals). It supports all other marketing, public relations and fundraising initiatives. It provides a strong basis for future museum visits, financial support, relationship development, program financing, etc. by winning over the audiences and stakeholders. The audiences' attitudes and values should be studied well to achieve corporate goals for professional development. The scholars and agencies of PR categorized six elements of public relations as follows: Management function, relationships between an organization and its public, analysis, evaluation through research, management counseling, implementation and execution of a planned course of action, communication, evaluation through research and goodwill performance¹.

PR forms traditionally are printed publications, press, television, radio and events, as well as digital PR comprises online publications, blogs, podcasts, social media and online events. With all the tools social media and content creation websites offer, it is simple to make the organization's statement unique and distinctive. Being creative is crucial since search engine optimization (SEO) and visibility are the primary goals of digital PR². Traditional PR is more direct for two reasons: its format and its distinctive goals, which rely on shaping public opinion through the organization's positioning and emphasis on the traditional channel that was selected to be used. Certain organizations may benefit from combining the two strategies due to the varied goals that various firms may have³.

PR, whether traditional or digital, has benefits. Knowing the differences between the two is helpful when determining which strategy to use. Whatever the chosen PR strategy the essential thing is to stay up to date with changes in the market to employ the most effective strategies⁴. Using PR tools can promote the effectiveness of websites that assist museums in achieving their strategic goals, such as growing memberships, donations and volunteerism. They convey a desirable brand and institutional knowledge. Once interactive elements are used, they help with relationship goals with the target audience. When target audiences perceive the websites as dependable, practical informational resources accessible around the clock, these connections are further strengthened. Social media is a low-cost method of digital communication that has the capacity to reach a sizable, connected audience. Because of the low costs, nonprofit organizations were early adopters of social media. There is a positive and interactive relationship between PR tools and activities and long-term community

¹ MCKIE 2017: 1-18.

² GORYACHEV 2019: 233-237.

³ CHATTERJEE 2020: 102103.

⁴ ILIEVA 2023: 97-101.

engagement in museums since special events are one of the most likable tactics used by museums to earn money or involve museum enthusiasts in the organization⁵.

II.METHODOLOGY

This research paper adopted a quantitative approach by collecting and reviewing references about sustainability, community engagement, PR and Egypt Vision 2030, including all the conventions that discussed digital interpretation activities and research conducted, e.g., books, articles, thesis and photos that focus on such topics related to museum and sustainable communities through PR and media field.

It further depended on an analysis of PR tools and activities of the museum, highlighted the importance of PR and the social and cultural value of sustainability, linked it with the museum scenario and people's interest and estimated its impact on achieving sustainable community engagement through interacting with Egypt Vision 2030 social and cultural programs.

III.PUBLIC RELATIONS

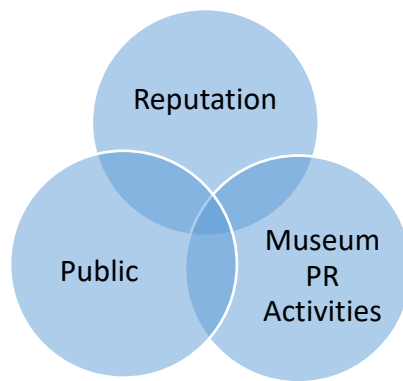
The Public Relations Society of America (PRSA) states, «Public relations helps an organization and its audience understand and adapt mutually to each other. It broadly applies to companies as a collective group, not just a business; and publics encompass a range of different stakeholders»⁶. Lisa Buyer–the Buyer Group argues that PR communicates the news and can impact, receive and react to the news for a company via the media. PR is the art and science of communicating to the right audience in the right voice. PR is the communication hub of an organization. It influences and creates a company's image, reputation, company's perception and culture. PR connects a company and its public via direct messages or editorial media, including online content, broadcast, radio, videos, or social media platforms. Before social media, a company had one voice; now, social media covers many voices that contribute to a company's image, reputation, brand perception and public community. Finally, according to the Western Australian Museum, «Public relations is the management of public opinion to earn the goodwill and understanding of the public. The public for a museum is not just its visitors but also the staff and volunteers, members, government officials and potential sponsors»⁷.

These explanations and definitions of PR lead the research to conclude the main features of the positive museum PR experience, which include the museum activities as a non-profit organization and the goodwill (the reputation) between the museum and its public [CHART 1].

⁵ SCHROEDER 2018 : 210.

⁶ EHLING *et Al.* 2013: 357-393.

⁷ GRUNIG 2014: 115-195.



[CHART 1]: The Main Features of the Positive Museum PR Experience © Done by the Researchers

1. PR Tools and Activities

Museums use a range of methods for PR, such as annual reports, brochures and magazines for both staff and the public (both in printed and digital form), Websites to demonstrate accomplishment, speeches, blogs and podcasts. Press releases, news conferences and publicity are some of the most popular PR efforts. A positive PR can be generated by sponsorships, product placements and social media. The main tools of PR are the media channels, which release and post news about the museum’s updates and content through PR forms (traditional and digital PR), as well as announce museum programs, events and conferences [CHART 2].



[CHART 2]: PR Tools © Done by The Researchers

Print media on paper sheets comprise items such as newspapers, magazines, books, brochures, banners, newsletters and bulletins/ publications. Print media can be stored, transferred and read at any time, making them more adaptable. Print media, while less visually appealing than electronic media in many ways, can be given in a more complete, comprehensive and targeted manner to meet the needs of the consumer community⁸.

Broadcast is one of the most powerful sorts of media. Because it has the largest audience, broadcast is the most popular media genre. It also has a variety of applications. It not only transmits information but also informs and entertains all its users. Another way to keep up with current events is to watch television⁹.

Digital media: billions of people worldwide have incorporated the internet, social media, mobile apps and other digital communications tools into their daily lives. There

⁸ RATMININGSIH & BUDASI 2020: 2019: 49-55.

⁹ BLANCO-PONS *et Al.* 2019: 4268.

are already about 4.54 billion active internet users worldwide, or 59% of the population¹⁰.

Alternative media: People can use imagination and creativity because of new and improved technologies. One of the main technologies of the revolution is virtual reality (VR), which also includes augmented reality (AR), three-dimensional printing technologies, the internet, big data, artificial intelligence (AI) and cloud computing. Digital technologies are used to draw attention easily and quickly from the public, enhance visitors' museum experiences through the visual impact and wealth of information provided by digital media, allow for hands-on experience and enhance interactivity in museums, reinforce educational effects and appeal, particularly to the younger generation¹¹. According to Jonathan Steuer, the best and most comprehensive definition of VR is a real or simulated environment in which a perceiver experiences telepresence.

2. The Impact of PR on Museum Community Engagement Approach

According to the new museum definition, it is aligned with some of the major changes in the role of museums, focusing on the importance of inclusivity, community participation and sustainability. Furthermore, Kadoyama states that community engagement is about an approach to «Assess the museum's understanding of and relationship with its various communities and the communities' perception of and experience with the museum. It helps museums gather better input from their constituents, develop a more nuanced view about the community's demographics and needs, respond to the changing nature of its audiences and incorporate these findings into planning and operational decisions»¹².

Thus, there is a positive and interactive relationship between PR activities and long-term community engagement in museums since special events are one of the most likable tactics used by museums to earn money or involve museum enthusiasts in the organization. Museum PR can build unique modes of participation that are brave and demanding, reflecting the cultural context of their communities and nations¹³ and can value and involve community organizations in all elements of the museum¹⁴. Museums may strengthen their position in, within and for society and remain relevant through creating education and public engagement activities using different forms, such as campaigns and series on social media, virtual tours and community initiatives in response to community needs, addressing contemporary concerns and supporting essential principles such as democracy and sustainable development¹⁵. Concluding from these community engagements, achieving the museum community mission requires qualified hospitality team members as part of PR responsibilities (hospitality) to provide activities that lead to positive museum experiences (activities) [CHART 3].

¹⁰ DWIVEDI *et Al.* 2021: 102168.

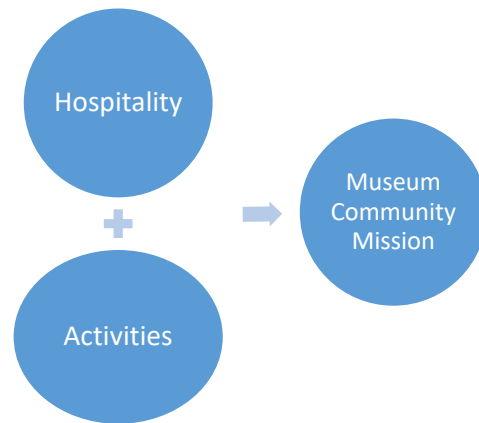
¹¹ YU, XINGE *et Al.* 2019 : 473-479.

¹² KADOYAMA 2018 : 186.

¹³ MORSE & MUNRO 2018: 357-378.

¹⁴ BOUDREAU 2019: 518-521.

¹⁵ CHIPANGURA & MATAGA 2021: 122.



[CHART 3]: Museum Community Mission © Done by the Researchers

3. Egypt Vision 2030

The «Egypt Vision 2030» blueprint proposes a national development strategy centered on industrialization and economic modernization. This has emphasized infrastructure investment in metropolitan regions, as well as the digitalization of government and economic services¹⁶. Furthermore, the Sustainable Development Goals and the 2030 Agenda can develop a thorough understanding of sustainability and its ramifications. The 2030 Agenda is the successor of the Millennium Development Goals and is organized around the so-called Sustainable Development Goals (SDGs); a total of 17 goals¹⁷.

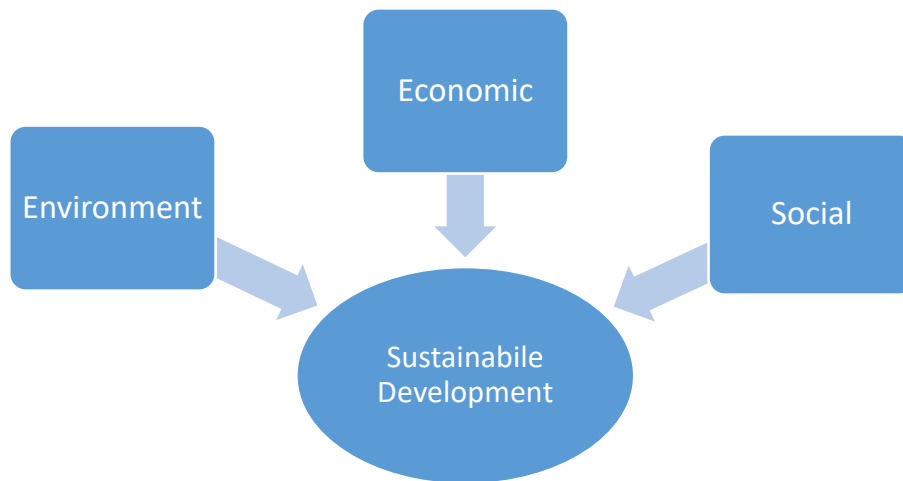
The United Nations Brundtland Commission defined sustainability in 1987 as «meeting the needs of the present without compromising future generations' ability to meet their own needs». Today, about 140 developing countries are looking for solutions to meet their development needs, but with the increasing threat of climate change, tangible steps must be made to ensure that progress today does not negatively impact future generations. The term 'sustainability' is increasingly used by academics, policymakers and communities to describe the ability of the current generation of people to live well and achieve their goals without risking future generations' ability to do the same¹⁸. Considering the ICOM new museum definition, representatives from over 500 museums worldwide voted to pass the new definition at the ICOM Extraordinary General Assembly in the Czech Republic's capital, with 92% voting in favor of the new definition, which includes phrases like «inclusivity», «accessibility», «sustainability» and «ethics»¹⁹. Furthermore, it divides sustainable development into three pillars (social, economic and environment) [CHART 4].

¹⁶ CHEN *et Al.* 2020: 4.

¹⁷ ROMERO *et Al.* 2020: 5035.

¹⁸ SHIRAZI & KEIVANI 2021: 2340.

¹⁹ «Museum Definition»; <https://ich.unesco.org/en/USL/handmade-weaving-in-upper-egypt-sa-eed01605>, accessed on (05/04/2023).



[CHART 4]: Three Pillars of Sustainable Development © EL-MEGHARBEL 2015 with Alteration by the Researchers.

The SDGs are the framework for building a better and more sustainable future for everybody. They target global issues, such as poverty, inequality, climate change, environmental degradation, peace and justice. The 17 goals are all interconnected and it is critical that we achieve them all by 2030 to leave no one behind²⁰ [FIGURE 1].

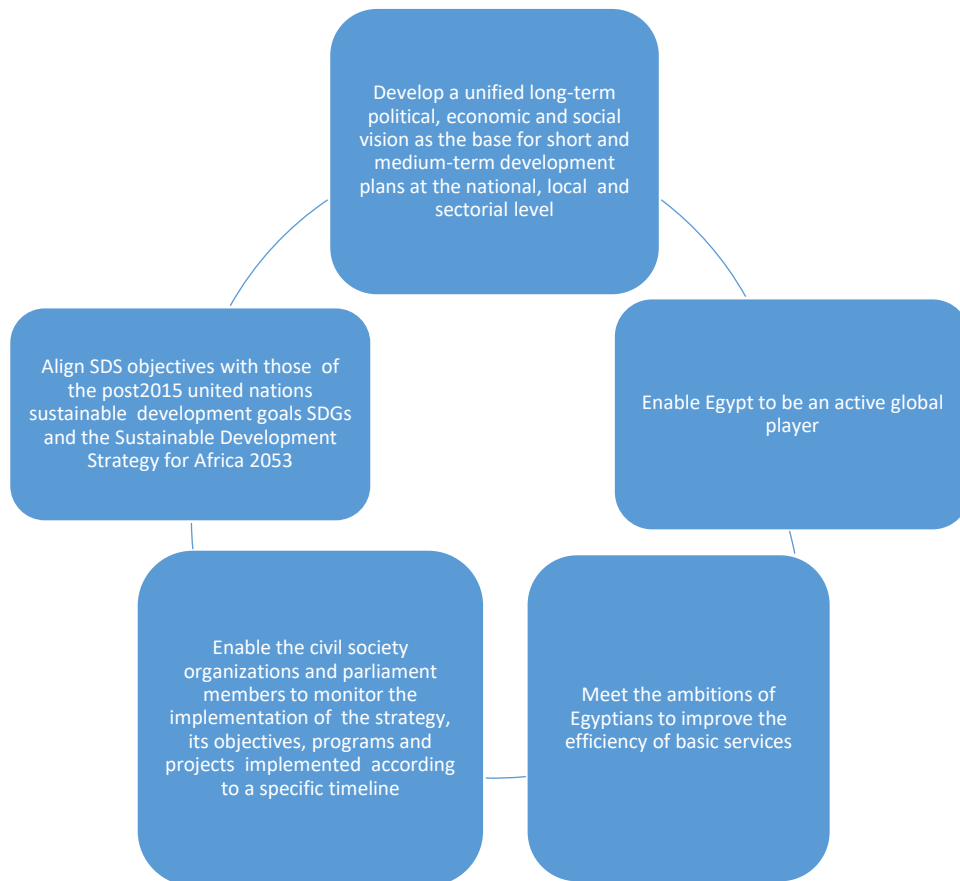


[FIGURE 1]: Sustainable Development Goal © United Nations 2015.

A. Egypt Vision 2030 envisions an efficient and effective government administrative body characterized by professionalism, transparency, justice and responsiveness, provides quality services, can be held accountable, increases citizen satisfaction and significantly contributes to the achievement of Egypt's development goals and the improvement of the Egyptian people's status. The following graphic depicts the key goals of Egypt Vision 2030²¹ [CHART 5].

²⁰ «Sustainable Development»; <https://www.un.org/sustainabledevelopment/>, accessed on (04/06/2023)

²¹ «Sustainable Development Strategy (SDS; <https://arabdevelopmentportal.com/publication/sustainable-development-strategy-sds-egypt-vision-2030>, accessed on (05/07/2023).

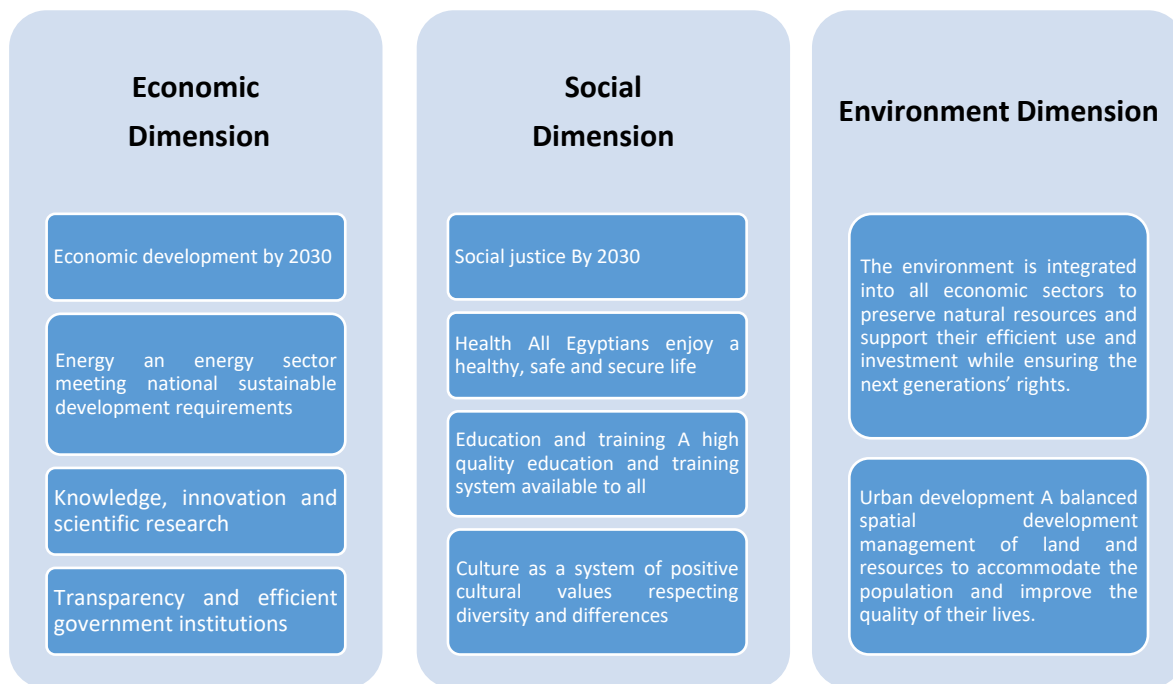


[CHART 5]: Goals of Egypt Vision 2030, (Sdsegypt, 2015) with Alteration by the Researchers.

Egypt will undergo a comprehensive resurrection by 2030, capitalizing on its enviable position, distinct Egyptian identity and historical period to achieve long-term development and a greater standard of living for all Egyptians²². Egypt's competitive and diverse economic and social systems marked by participation, solidarity, fairness, balanced ecology protecting the country's natural and human resources, will rely largely on research, knowledge and innovation²³ [CHART 6].

²² EL-MEGHARBEL 2015: 5.

²³ «Sustainable Development Strategy (SDS; <https://arabdevelopmentportal.com/publication/sustainable-development-strategy-sds-egypt-vision-2030>, accessed on (05/07/2023)).



[CHART 6]: Three Sustainable Pillars of Egypt Vision 2030; Sdsegypt, 2015 with Alteration © Done by the researchers.

B. Egypt's Culture Program Until 2030

This point outlines the different social and cultural programs that will be targeted by Egypt to achieve the main concept of SDGs by the end of 2030. A museum can involve these programs in its mission to be adapted to its vision and value²⁴.

- Reviewing the laws and regulations relating to the preservation of cultural assets
- Constructing and reorganizing the cultural system
- Adopting a range of initiatives to increase societal awareness of culture and history.
- Creating a comprehensive database for Egyptian cultural goods and activities
- Increasing the infrastructure's effectiveness and enlarging its reach
- Preserving and advancing traditional crafts
- Fostering and enhancing the cultural industries
- Preservation and protection of heritage

4. How Effective are PR Tools and Activities in the SDGs of Egypt Vision 2030 in museums?

After the explanation of the definition of PR in the museums, its impact on museum community engagement and Egypt Vision 2030, especially the social and cultural programs, is going to be targeted by Egypt to achieve the main concept of SDGs by the end of 2030. The research proposes that PR highlights using some of the SDGs of Egypt Vision 2030 in museums. PR promotes SDGs, such as quality education and gender equality [FIGURE 5], through the children's museum, educational programs for all age groups, regardless of gender and promoted PR activities. As a mega cultural

²⁴ «Egypt vision 2030»; https://arabdevelopmentportal.com/sites/default/files/publication/sds_egypt_mvision_2030.pdf, accessed on (04/07/2023).

project, the Grand Egyptian Museum (GEM) provides opportunities for partnerships in heritage presentation, education, marketing, promotion and gender equality. PR also promotes further SDGs about using green energy and climate control [FIGURE 5] in museums. Green or sustainable building design and construction is a method of using resources wisely to create healthier, higher-quality and more energy-efficient structures. The goal of green building is to strike a balance between high quality construction and little environmental effect.

IV.RESULT

Regarding the previously mentioned points about the PR meaning, tools and activities, there is a strong relationship between the museum community mission and PR tools and activities to reach the best community engagement through its positive PR experience. Furthermore, the museum can participate in Egypt's efforts to raise awareness and apply different social and cultural programs inside and outside the museum to achieve its message through PR tools and activities.

A positive tendency can be seen in the relationship between PR activities in a museum sustainability context and meeting Egypt Vision 2030. PR activities can help the museum accomplish its mission, show its value and impact best practices of using the museum's PR concept to build up a positive reputation and more community engagement. The implementation of a digital media plans into museum practice results in a high level of public satisfaction.

PR Applications Experiences: PR highlights using some of the SDGs of Egypt Vision 2030 in museums. PR promotes SDGs, such as quality education and gender equality [Figure 5], through the children's museum and educational programs for all age groups, regardless of gender and promoted PR activities.

V.DISCUSSION

The following points display the social and cultural initiative programs Egypt is working on to implement the best practices of the cultural SDGs for its people, history and resources, demonstrating how Egypt Vision 2030 is aligned with museum sustainability goals.

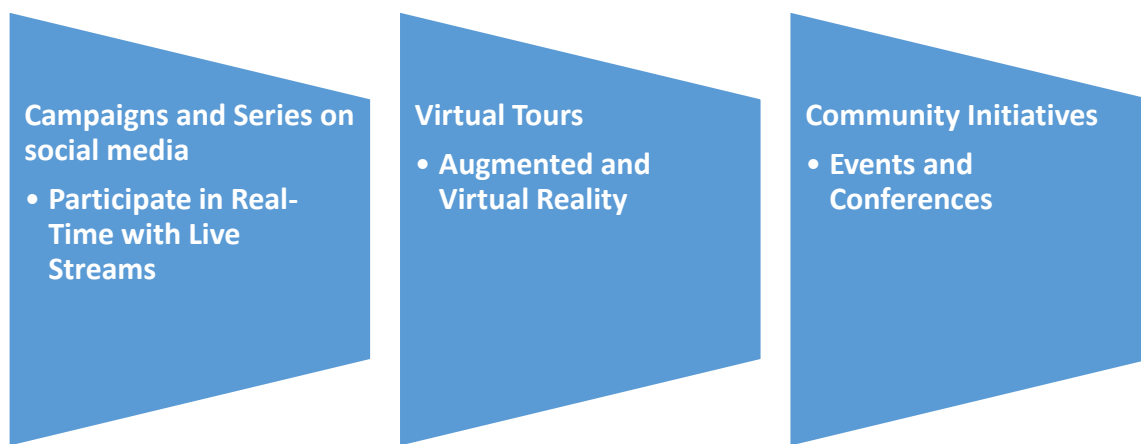
The researcher agrees with El-Megharbel that the different programs that are going to be applied until 2030 by Egypt Vision 2030 to achieve the main concept of SDGs should include that the museum can participate in Egypt to raise awareness and apply different social and cultural programs inside and outside the museum to achieve its mission through PR tools and activities.

The researcher agrees with Schroeder, Ratminingsih and Budasi on using PR tools and activities in different circumstances as follows:

In normal times, PR provides activities in museums to achieve the concept of sustainable community engagement of museums. It provides a great alternative to almost all advertising drawbacks, which is vital to non-profit organizations. Even for cultural-property customers, who are more advertisement-resistant, public relations allow greater space for attracting the consumers' attention to a specific historical site. PR in museums and cultural institutions may be considered a part of communication activities. At the same time, it can be a precursor for further museum marketing

activities. In the minds of customers and specific targeted groups, it may evoke a positive attitude towards the institution. As PR influence's public opinion, not only does it have an impact on museum attendance but also fundraising from the state and private sectors²⁵.

In crisis times, PR activities help museums engage with their public without barriers. Thus, 90% of museums and galleries worldwide were compelled to close their doors in March 2020 due to the COVID-19 outbreak and institutions dedicated to culture and heritage were left in a challenging situation. Despite the up to 80% income loss that occurred right away²⁶. Museums and galleries found themselves as community leaders, bringing people together and, in the words of Arts Council England's JOHN MCMAHON (2020), «providing hope - a means of processing uncertainty and trauma and an outlet for grief for families kept apart». Practically speaking, this meant transferring resources and services online and UNESCO has noted over 800 different responses to the epidemic by museums and galleries²⁷.



[CHART 7]: PR Activities in Museum © Done by the Researchers

GEM, as a mega cultural project, provides opportunities for partnerships in heritage presentation, education, marketing, promotion and gender equality. PR also promotes further SDGs about using green energy and climate control [FIGURE 5] in museums. Green or sustainable building design and construction is a method of using resources wisely to create healthier, higher-quality and more energy-efficient structures. The goal of green building is to strike a balance between high quality construction and little environmental effect²⁸.

GEM is dedicated not just to conserving cultural heritage but also to sustainability. It is one of Egypt's first ecologically friendly green cultural buildings, supporting social harmony, economic prosperity and environmental conservation²⁹. ATEF MOFTAH, the

²⁵ LUKÁČ *et Al.* 2021: 8191.

²⁶ KING *et Al.* 2021: 487-504.

²⁷ «Museums around the world in the face of COVID-19»; <https://unesdoc.unesco.org/ark:/48223/pf0000373530>, accessed on (18/05/2023).

²⁸ CADELANO *et Al.* 2019: 3192.

²⁹ ESSAM, A. 2023: «The Grand Egyptian Museum: Egypt's Gift to The World»; <https://www.egypttoday.com/Article/4/126993/The-Grand-Egyptian-Museum-Egypt%E2%80%99s-Gift-to-The-World>, accessed on (05/05/2023).

general supervisor of the GEM project and the surrounding area, explained that all aspects of green building and sustainable development are being integrated into the museum project, including obtaining green building certificates, in line with its cultural value and being one of the world's most important and largest museums³⁰. Furthermore, the project of accrediting the museum as a green building and obtaining the Egyptian Green Pyramid certificate necessitates the application of a number of conditions and specifications that must be met in the museum building, which is currently being implemented by studying the services provided to the public as follows:

- Including transportation and ease of access to the museum through the creation of dedicated bike paths, parking lots and electric car use.
- Raising the efficiency of water and energy consumption inside the museum by reusing water and reducing its consumption -especially those used in gardening.
- Utilizing a measurement system, leak detection system, heat reduction system and the use of renewable energy sources.
- Management of indoor environment quality by improving ventilation performance using natural ventilation and studying building physics that must comply with the minimum required ventilation rates³¹.

VI. CONCLUSION

PR is the strategic communication that a museum utilizes with the public to maintain or cultivate its public image and/or respond to public discourse. If a museum values its reputation, it will most likely invest in excellent PR, in which a PR professional promotes the brand's reputation, idea, product, position, or accomplishments in a positive way.

PR tools are media channels owned, operated, or used by the museum and can take the form of websites, mobile apps, blogs, former Twitter, YouTube channels, Facebook pages and anything else that social media can think of to achieve sustainable community engagement and meet 'Egypt Vision 2030' cultural program target by 2030. This is the new PR world and it offers fantastic prospects for public relations practitioners. Again, the museum has control over the content and its diversity allows it to reach out to various public, which is an appealing communication opportunity.

Non-profit organizations can use PR to address practically any advertising and marketing issue. Even among consumers who are less susceptible to marketing than those who buy cultural property, PR provides more opportunities to bring attention to a certain historical location. PR may be regarded as a sort of communication activity at museums and other cultural organizations. It can also serve as a platform for future

³⁰ ESSAM 2022: «Grand Egyptian Museum wins the Green Building award from Environment & Development Forum»; <https://www.egypttoday.com/Article/4/119162/Grand-Egyptian-Museum-wins-the-Green-Building-award-from-Environment>, accessed on (04/05/2023).

³¹ EL-AREF (2022): «The Grand Egyptian Museum will be the first eco-friendly museum in Egypt: GEM supervisor-general»; <https://english.ahram.org.eg/NewsContent/1/1238/461765/Egypt/Tourism/The-Grand-Egyptian-Museum-will-be-the-first-ecofri.aspx>, accessed on (18/05/2023).

museum marketing initiatives and help clients and other key target audiences build favorable perceptions of the institution. PR influence's public opinion, which in turn influences state and private sector fundraising as well as museum attendance.

PR at museums can assist in bridging the cultural gap that Egypt Vision 2030 is attempting to narrow via different traditional and digital activities. As a result, museums can use their PR division to reach their target audience of various segments of the local and global communities, maintain relationships with their audience through traditional and digital public relations and offer various services in conferences, events and media channels. Implementing a digital media plan into museum operations will result in a high level of visitor satisfaction, who will become the institution's finest ambassadors, spreading its positive reputation through word-of-mouth information. Additionally, it helps in promoting several of the «Egypt Vision 2030» SDGs, especially concerning the use of green energy, contributing to climate control and promoting quality and gender equality.

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DISPOSAL AND DEACCESSION PRACTICES AT THE EGYPTIAN MUSEUM IN CAIRO

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ABSTRACT

[EN] The documentation system of the Egyptian Museum in Cairo is well managed, but the records of deaccessioned artifacts did not receive proper attention and are not fully linked to the The Museum System and registers. In this article, the researcher examines how artifacts are deaccessioned and disposed of at the Egyptian Museum in Cairo since the launching of its collections in 1858 until the present and how relevant curatorial practices have evolved through its long history. This article outlines the steps taken by the curatorial department to manage the disposal of artifacts and discusses the museum's rich history of curatorial practices. Despite having well-established collection management, the Egyptian Museum in Cairo lacks written policies and procedures for documentation, disposal and collection management. This case study emphasizes the importance of documenting curatorial practices and the curatorial role in the management and documentation of museum collections. This paper aims to gather, analyze and improve the procedures, guidelines and traditions related to artifact disposal at Egyptian Museum in Cairo. It showcases the role of the curatorial department and individual staff in the day-to-day practices of managing one of the most crucial aspects of the collection. Additionally, this paper investigates and explains many of the critical actions the museum has taken when disposing of artifacts. In conclusion, it emphasizes the importance of implementing written policies and procedures for collection and disposal, which can facilitate the management of the collection and its documentation.

KEYWORDS: Collection management, collection procedures, disposal, disposal procedures, Egyptian museum, history of museum collection, museum collection policy.

[AR]

إجراءات وممارسات الاستنزال بالمتحف المصري بالقاهرة

برغم الإدارة الجيدة لنظم التوثيق والتسجيل بالمتحف المصري في الوقت الحاضر إلا أن سجلات المقتنيات التي تم استنزالها لم تربط بالشكل الكامل بقواعد البيانات أو سجلات المقتنيات. لذا فإن هذا المقال يرصد ممارسات إنزال أو استنزال المقتنيات الأثرية في المتحف المصري بالقاهرة، وكيف تطورت ممارسات العمل علي مجموعة المتحف عبر تاريخ المتحف. ويوضح الخطوات التي اتخذها قسم الأمناء بالمتحف لإدارة عمليات إنزال أو استنزال المقتنيات الأثرية؛ كما يناقش التاريخ الثري للمتحف بممارسات العمل حول مجموعته. فعلى الرغم من وجود تقاليد راسخة لإدارة المجموعات المتحفية، إلا أن المتحف يفتقر إلى السياسات والإجراءات المكتوبة للتوثيق والإستنزال وإدارة المجموعات المتحفية. وتؤكد دراسة الحالة هذه على أهمية توثيق ممارسات العمل ودور الأمناء في إدارة وتوثيق مجموعات المتاحف. يهدف هذا البحث إلى جمع وتحليل وتحسين الإجراءات والمبادئ التوجيهية والتقاليد المتعلقة بأستنزال القطع الأثرية بالمتحف المصري. ويستعرض دور أمانة المتحف (القسم والأفراد) في الممارسات اليومية لإدارة أحد أهم جوانب المجموعة المتحفية. بالإضافة إلى ذلك، يبحث ويبين العديد من الإجراءات الحاسمة التي اتخذها المتحف عند ممارسات الإستنزال للمقتنيات الأثرية. ويؤكد على أهمية تبني سياسات وإجراءات مكتوبة للإقتناء والأستنزال، والتي يمكن أن تسهل إدارة المجموعة وتوثيقها.

I. INTRODUCTION

The Egyptian Museum in Cairo is the oldest museum in Egypt. It is home to the national collection of antiquities, which has been growing since its establishment in 1858¹. The collection is well-curated and the museum has followed a streamlined system for documentation and accession². The museum has been involved in significant activities related to accession, documentation, presentation and research from its first start in 1858 until the present³. Sometimes, due to the rapid growth of its collection, the museum has had to dispose of artifacts that do not align with its scope or for other reasons, such as sale,⁴ gift, damage or loss. The number of deaccessioned artifacts has increased significantly over the past decade as thousands of objects are transferred to GEM, NMEC and other SCA museums⁵. However, there have been concerns raised regarding disposal procedures and documentation. Thus, it is highly recommended to follow the Egyptian Museum RCMDD protocol⁶ for the deaccession process and to create a policy for collection management, documentation and disposal.

Fortunately, the Museum System (hence after TMS) keeps deaccessioning records that can be found as notes in the museum registers (JE, SR, TR and CGC). However, sometimes, these records lack crucial details or are inadequate. Therefore, strict regulations and disposal procedures need to be adhered to during deaccessioning. These actions and records raise significant queries leading to discussions about drafting a written policy for collection and/or disposal to prevent avoidable mistakes that may result in the loss of valuable artifacts and/or their records.

II. RESEARCH QUESTION AND METHODOLOGY

Unless there are specific restrictions, museum objects can be deaccessioned⁷. However, clear criteria should be included in the museum policies for deaccession and collection management⁸. Although the Egyptian Museum in Cairo has a well-managed documentation system, deaccessioned artifacts are not given proper attention and deaccessioning paperwork is not linked to the TMS. An effective collection policy must take this issue into account. This paper addresses two main questions: In what ways has the absence of collection and disposal policies and procedures impacted the Egyptian Museum's management of its collections, records and curatorial practices? How does the lack of disposal policies and procedures affect the collection?

¹ RASHED 2017: 1-11.

² BOTHMER 1974: 111-122; ABOU-GHAZI 1988: 1-13; RASHED & QUIRKE 2024: 147-212ff.

³ RASHED & BDR-EL-DIN 2018: 41-63.

⁴ The RCMDD protocol states that while this has happened in the past, it is rare now because antiquities are no longer sold or given away. RCMDD PROTOCOL 2011: 220.

⁵ Interview by the author, (01/07/2023) to (21/12/2023). This comes also together with a survey taken by the author on the TMS and the register book, (1/7/2023) to (21/12/2023).

⁶ RCMDD protocol is the manual for the documentation and collection management procedures at the Egyptian Museum. This manual was issued by the Registration and Collection Management and Documentation department at the Egyptian Museum in Cairo in 2011.

⁷ ICOM addressed deaccession as a possible action in the Code of Ethics for Museums (2.12-2.17). All museums should adopt a policy regarding both accession and deaccession and follow its procedures. MURPHY 2016: 386, 386-389 «Appendix III – CIMAM: Principles of Deaccession».

⁸ MALARO 2005: 15.

The Egyptian Museum has no written policy or detailed procedures for disposing artifacts, as evidenced by the frequent occurrence of unstandardized practices regarding the disposal of objects throughout the museum's history. Furthermore, this is evident in the lack of curatorial experience at the time this research was conducted and its related survey was carried out.

In this article, the author discusses the procedures, actions and steps that the Egyptian Museum in Cairo follows when deaccessioning artifacts, based on the Egyptian Museum in Cairo's curatorial practice, written guidelines following the Egyptian Antiquities Acts and the ICOM Code of Ethics. Additionally, the article stresses the significance of collecting curatorial practices and experience from retired and current curatorial staff and the need to establish standardized collection and disposal policies. In the article, examples of deaccessioning criteria and the potential consequences of not having clear deaccessioning procedures are given. In accordance, the author collected qualitative data through direct interviews with retired and current staff members. Additionally, he investigated literature, museum registers (JE, TR and SR: 1858-2023) and official documents of the museum and its collections based on his extensive experience. A discussion of the historical development of disposal and analysis of disposal cases are provided to illustrate the current state of deaccession at the Egyptian Museum in Cairo.

III. MUSEUM PROCEDURES FOR OBJECTS DISPOSAL

Deaccession is the formal process and act of removal of an object from a museum's collection. In cases where the law does not prohibit deaccession⁹, a museum may decide to do so following its collection policy and the ICOM code of ethics. In its Code of Ethics, ICOM uses the terms «deaccessioning» and «disposal» to describe the action of removing objects from a collection¹⁰. This section discusses the methods and steps for

⁹ Deaccession is a legal but rare action since museums have more concern to manage, sustain and extend their collections. The possibility of disposing of items from the collection is intended to support the growth of the collection. The passionate debates on deaccessioning are focused on the art collections that are linked to art market and to financial issues. Apart of that, deaccessioning is concerned with scope of collecting and condition, as in case of deteriorated or damaged objects. It is essential for each institution to adopt a policy regarding collection and deaccession and adhere strictly to it. A register must also be kept for all objects that are disposed of, including photographs and information. Prior to considering the removal of a work from a museum's collection, curatorial reasons for deaccessioning must be established. The deaccessioning process should be carried out in accordance with the museum's collection policy, with the sole purpose of enhancing the collection's quality, scope and appropriateness when it is carried out to advance the museum's mission. The following criteria must be met before an item is acceptable for disposal: redundant or duplicated; not required for research purpose; in poor physical condition or deteriorated; beyond the institution's care capabilities; illegally collected; false or wrong attributed; not consistent with the mission and scope and collection policy of the museum. MAIRESSE 2016: 220; MURPHY 2016: 387.

¹⁰ Following the Code of Ethics, museum policies often consider listing definitions for terms that are used in their policies. For instance, the Metropolitan Museum of Art Collections Management Policy (CMP) defines the term as follows: «deaccession means that a work is removed from the collection and considered for disposal by sale, exchange or other means. Any deaccession of a work should be solely for the advancement of the Museum's mission». MAIRESSE 2016: 218f; *ICOM CODE OF ETHICS FOR MUSEUMS* 2017; THE MET CMP 2023: 11 [section VI: deaccessioning].

deaccession in light of the code of ethics and Collection Policies. The ICOM Code of Ethics 2.12-2.17 governs the disposal and removal of collections, as well as the methods of removal and disposal¹¹. Collection and disposal policies should comply with national and international laws and agreements based on the codes.

The ICOM Code of Ethics, Article 2.13, outlines the process of deaccessioning from Museum Collections, as follows: «The removal of an object or specimen from a museum collection must only be undertaken with a full understanding of the significance of the item, its character (whether renewable or non-renewable), legal standing and any loss of public trust that might result from such action»¹². According to this paragraph, disposing collections can be a legal option for managing and developing them. It is noted that disposal must always follow acquisition policies and procedures, as outlined in the code of ethics¹³.

According to the Code of Ethics, museums can dispose of objects based on ethical and legal rules and collection policies. The museum's governing body decides to deaccession an object, which involves the director and curator(s)¹⁴. The museum must review an object's legal status before deaccessioning it to determine whether it is within its legal and ethical rights to dispose of it¹⁵. The museum must also decide how to dispose of objects following strict policies and procedures [Code 2.15]. The collection policy specifies the means and procedures for following the museum's governance policy, internal rules and practice. A good example of deaccession is provided in the collection policies of the Metropolitan Museum of Art¹⁶ and the Victoria and Albert Museum (London)¹⁷. The Metropolitan's CMP has established clear criteria for deaccession:

1. The work does not further the mission of the Museum.
2. The work is redundant or is a duplicate and is not necessary for research or study purposes.
3. The work is of lesser quality than other objects of the same type in the collection or about to be acquired.
4. The work lacks sufficient aesthetic merit or art historical importance to warrant retention.
5. The Museum is ordered to return an object to its original and rightful owner by a court of law; the Museum determines that another entity is the rightful owner of the object; or the Museum determines that the return of the object is in the best interest of the Museum.
6. The Museum is unable to conserve the object in a responsible manner. 7. The work is unduly difficult or impossible to care for or store properly¹⁸.

¹¹ MAIRESSE 2016: 218f; *ICOM CODE OF ETHICS FOR MUSEUMS* 2017: 9-13 [section 2]; *ICOM GUIDELINES ON DEACCESSIONING* 2019: 2; *THE MET CMP* 2023: 11 [section VI: deaccessioning].

¹² *ICOM CODE OF ETHICS FOR MUSEUMS* 2017: 12 [article 2.13].

¹³ MALARO 2005: 15.

¹⁴ *ICOM CODE OF ETHICS FOR MUSEUMS* 2017: 12 [article 2.14 and 2.7; 2.8].

¹⁵ *ICOM CODE OF ETHICS FOR MUSEUMS* 2017: 9-13 [section 2]; *GUIDELINES ON DEACCESSIONING* 2019: 2.

¹⁶ *MMA CMP* 2023: 11-12 [section VI: deaccessioning].

¹⁷ *V&A CMP* 2009.

¹⁸ *MMA CMP* 2023: 11-12.

In the case of the Egyptian Museum, the RCMDD protocol states the methods of disposal and the procedures that must be followed to dispose of an object, as discussed below. Museums have a responsibility to document their collections and keep a record of each object that has been accessioned or deaccessioned. Even if an object has been removed from a museum's collection, it is still the museum's property until it is legally transferred to another public collection or museum. According to ICOM's Code of Ethics section 2.15, museums need to maintain precise records of all deaccessioned objects: «Each museum should have a policy defining authorised methods for permanently removing an object from the collections through donation, transfer, exchange, sale, repatriation or destruction and that allows the transfer of unrestricted title to any receiving agency. Complete records must be kept for all deaccessioning decisions, the objects involved and the disposal of the object. There will be a strong presumption that a deaccessioned item should first be offered to another museum»¹⁹. While the Egyptian Museum in Cairo has a well-managed documentation system, the records of deaccessioned artifacts do not receive appropriate attention and the deaccessioning paperwork is not typically linked to the register book or database. This is a crucial issue that must be considered when creating a collection policy. The Metropolitan Museum of Art provides an excellent example of maintaining accurate records of its collections as addressed in its policy:

«The Museum, through its curatorial, registrar and conservation departments, shall maintain accurate, up-to-date records on the identification, location and condition of all objects in the collection, as well as of ongoing activities such as exhibitions, loans, research and correspondence with donors, artists and scholars. These records should be recorded in the Museum's collections management database (TMS). Any original paper files regarding the acquisition of objects should also be retained. Each curatorial department maintains coherent, organized records on accessioned, non-accessioned and deaccessioned works of art, departmental loans, exhibition loans and works of art brought into the Museum for possible purchase or gift²⁰».

According to ICOM's Code of Ethics, museums and their governing bodies are responsible for maintaining collections in the public trust. To meet this obligation, staff members are required to avoid conflicts of interest²¹ and any revenue generated from the sale of deaccessioned objects must be used exclusively to enhance the collection and not for any other purpose. This is outlined in section 2.16: Income from Disposal of Collections Museum: «Collections are held in public trust and may not be treated as a realisable asset. Money or compensation received from the deaccessioning and disposal of objects and specimens from a museum collection should be used solely for the benefit of the collection and usually for acquisitions to the same collection»²². This is further detailed in the Metropolitan Museum's CMP which states: «No Trustee, Officer, employee, volunteer or family member of such individuals may purchase deaccessioned works of art directly from the Museum or at auction if consigned by the

¹⁹ ICOM CODE OF ETHICS FOR MUSEUMS 2017: 12 [article 2.15].

²⁰ MMA CMP 2023: 13.

²¹ ICOM CODE OF ETHICS FOR MUSEUMS 2017: 12 [article 2.15].

²² ICOM CODE OF ETHICS FOR MUSEUMS 2017: 12 [article 2.17].

Museum. All funds received from deaccessioned works shall be used to fund the purchase of other works, subject to Subsection D of Section IV below»²³. It is illegal to trade artifacts in Egypt and selling them through deaccession is prohibited under the Antiquities Act N^o.117 of 1983 issued on 16/8/1983 and its amendment by the Antiquities Act N^o.3 of 2010 issued on (14/02/2010). Consequently, the Egyptian Museum has discontinued the practice of selling artifacts.

IV. PROPER DISPOSAL PRACTICES: PROCEDURES AND ACTUAL IMPLEMENTATION

In this section, we discuss the procedures, steps and methods for deaccessioning objects at the Egyptian Museum in Cairo. Documentation guidelines (the RCMDD protocol book) and curatorial traditions that pertain to disposal are discussed; however, no document presently covers the entirety of the procedures for disposal. The author collected information from RCMDD's guidelines, TMS and interviews by the author with the staff. A few cases for disposal as a possible option are described in the protocol. However, the current staff has no experience with these procedures and options.

Deaccession is a rare action, except for objects sent to other SCA museums, so that there are no disposal cases that either the RCMDD or any member of the current curatorial staff has encountered. These cases are discussed here to emphasize the importance of implementing a written disposal and/or collection policy. In order to draw on the historical development and the current situation of deaccession at the Egyptian Museum in Cairo, the historical development of disposal is discussed together with an analysis of disposal cases from the collection.

1-Disposal Procedures and Guidelines According to SCA Policy and Rcmdd Protocol

Artifacts will rarely be deaccessioned, since antiquities are no longer sold or given away, although it happened in the past before enacting the Egyptian Antiquities Act N^o.117 of 1983 (The Executive Policy and Regulations of the Antiquities Protection Act provides an explanation and clarification of artifacts accession and disposal)²⁴. The museum used to sell duplicate objects and records of those artifacts are documented in the Sales Register. This action started even earlier at the Egyptian Museum in Boulaq. According to the decree of (16/05/1883), all antiquities in the Boulaq Museum and those in future museums, belonged to Egypt. Regardless, in 1883, Maspero began selecting «less significant» objects to sell before they were accessioned. The director gradually implemented antiquities sales to bolster the Antiquities Service's finances²⁵.

An object is considered deaccessioned if it is marked in an official register book as «sold; disintegrated; buried in the garden; given». Such objects should be recorded in the museum database as deaccessioned²⁶. Section 2.15 of the Code of Ethics for Museums²⁷ states that the process of deaccessioning and disposing of an object should be carefully documented in the museum's collections records and that these records should become a permanent part of the museum's records, maintained even after an

²³ MMA CMP 2023: 11-12.

²⁴ SCA's decree N^o.712 for 2010)

²⁵ PETRIE 1931: 51, 59, 72; KHATER 1960: 281; PIACENTINI 2017: 76-87.

²⁶ RCMDD PROTOCOL 2011: 220.

²⁷ ICOM CODE OF ETHICS FOR MUSEUMS 2017: 11-13 [article 2.15].

object has left a museum's collection. The RCMDD protocol covers three categories of deaccessioned objects²⁸ as follows:

- A. *Objects that have been deaccessioned from both the Egyptian Museum in Cairo and the SCA.* Examples are objects that have been sold or have disintegrated²⁹. This case is discussed, below, where procedures are revised and examples are given.
- B. *Objects originally registered at the Egyptian Museum that have been sent to other SCA museums in the past and are no longer considered Egyptian Museum in Cairo objects.* These are not considered to be deaccessioned, as they are still property of the SCA, so are covered under «Objects Leaving Museum» in both the register book and the database³⁰. These objects are no longer associated with the museum and have been entered into another SCA museum. They are deaccessioned from the Egyptian Museum in Cairo 's collection but still are SCA property so that records of these objects are kept for future requests.
- C. *Objects leaving the Egyptian Museum now and in the future, but remaining within the SCA system.* These are not considered to be deaccessioned, as they are still SCA's property, so are covered under «Objects Leaving the Museum» in both the register book and the database. It is important also to include information about their new permanent and current location as well as accession numbers at their new destination (museum)³¹. It is noted that N^o.2 and 3 address the same issue, however, RCMDD protocol discusses the past action in N^o.2, while N^o.3 addresses the future actions for object transfer either for permanent or long-term loans within the SCA museums.
- D. According to N^o.3, the object movement may be a permanent transfer or a long-term loan to other SCA museums, such as those in Hurghada and Sharm El-Sheikh. It is noted also that the protocol gives no guidelines for objects that leave the museum for museums that are not SCA members such as the Military Museum or the Antiquities Museum at the Library of Alexandria. These cases, among others, are discussed below.

The protocol describes actions required to deaccession objects from TMS. However, there is no description of the procedure, specifically the makeup of the deaccessioning committee and their responsibilities and decision-making procedures³². It does not cover some other critical cases such as the situation, procedures and actions that must be taken regarding stolen and lost objects. Sometimes, there is confusion regarding the distribution of authority and decision-making between the museum's General Director, the Museums Sector head and SCA due to the absence of a collection policy.

²⁸ RCMDD PROTOCOL 2011: 220-22.

²⁹ RCMDD PROTOCOL 2011: 220; see: *the Egyptian Museum Sale registre* [official document].

³⁰ RCMDD PROTOCOL 2011: 220.

³¹ RCMDD PROTOCOL 2011: 220.

³² The Egyptian Museum in Cairo should consider disposal of the destroyed or deteriorated objects, an action that is allowed under the ICOM code of ethics and guidelines. This includes the poor physical condition of the object so that restoration is not practicable or would compromise its integrity and objects that are damaged beyond reasonable repair and are of no use for study or teaching purposes. *ICOM CODE OF ETHICS FOR MUSEUMS 2017; ICOM GUIDELINES ON DEACCESSIONING 2019: 2-4.*

2-Traditions and Practices of Deaccession

For the current paper, it was essential to collect and document curatorial practice and traditions through research and data collecting so that a complete picture could be presented of past and present deaccessioning practices. The full picture was obtained by interviewing current and retired museum directors, collection managers, curators and registrars. The interviews support the author's position on the need to implement a standardized disposal/collection policy as well as the concern about losing a part of the curatorial tradition due to staff retirement. The current curatorial staff's knowledge regarding object disposal is very limited, due to lack of experience. This is understandable, considering that disposal is a rare action in museums in general and that there is no collection policy. Apart from the transfer of objects to other SCA museums, none of the current staff have experienced alternative disposal options. The interviews showed that the retired curators were more informed than current staff because they had experienced other disposal cases. It indicates that some curatorial traditions [such as disposing of an object due to deterioration as discussed hereafter] and collective knowledge have not been transferred and may be at risk of being lost.

Over the last decade, the many members of the museum's professional retired. This increased the risk of improper adherence to museum procedures because traditions may require a long time to be transferred from one generation to another. Although many new and well-trained staff were assigned, they lacked experience with the collection and the interval between the retirements and the new appointments did not allow work traditions to be passed successfully from one generation to the next. As a result, the management of the Egyptian Museum in Cairo collection is under serious threat. Based on the interviews, one can summarize the following remarks:

- New curatorial staff need training in curatorial work, documentation, daily observation and object tracking. Each newly assigned curator needs to work with all sections for a short period of time to understand how the functions of the museum are interconnected.
- New staff members usually need a few months of practice to become familiar with the work traditions. In rare cases, certain curatorial activities require a longer time to gain the necessary experience. It may take up to five years—or even a lifetime—to become fully acquainted with procedures. Typically, there is no written guide to follow and most curatorial positions rely upon a significant amount of time and experience handed down from one generation to the next.
- Many curators are not entirely aware of the procedures for object accession, documentation and disposal.
- The museum lacks plans for curatorial practice and experience circulation, revision and updating of its collection policy, procedures and guidelines. In the day-to-day practice of curating, staff are not given specific opportunities to share their experience.
- Most of the staff do not possess enough experience or knowledge regarding the procedures and actions that should be followed when disposing of damaged artifacts. None of the current curators had experienced deaccessioning an object because of its condition. One Section IV curator reported that she had received two objects in very poor condition and she had no idea about how she could dispose of them. These objects cannot be returned or preserved anymore, but she had been instructed to keep

them in her custody since they were entered into the register (the case is discussed further, below).

- In the Special Register, curators always note the new destination, the curator who received custody and the date of transfer of the deaccessioned artifact. Due to limited access to databases, sometimes the curators use Excel sheets to keep track of records. Since there are no specific guidelines, curators follow different methods based on personal experience to document their work.
- The staff noted that sometimes after objects are disposed of and transferred to another museum, they are returned to the Egyptian Museum in Cairo. This has happened several times with objects selected and transferred to GEM and Sharm el-Sheikh Museums.
- A staff interview reveals a critical issue that must be addressed: long-term loans are confused with disposals. This confusion is due to the absence of a collection policy and to curators' lack of experience. This event occurred during the transfer of artifacts to El-Zafarn Palace Museum as the author has discussed.

V. DEACCESSIONING/DISPOSAL PRACTICE: CASES AND ACTIONS

In this section, the researcher discusses the actual procedures, steps and methods for deaccessioning objects at the Egyptian Museum in Cairo. In accordance with RCMDD protocol and interviews with the curatorial department, procedures and steps might be outlined for object disposal as follows hereafter. The protocol defines RCMDD's role as documenting the deaccession process and updating museum records. It provides information only on how to dispose of an object in TMS, including updating the object inventory. Furthermore, the protocol outlines the deaccession methods as follows: sold, disintegrated, buried in the garden or given. Therefore, the inventory in the register book must be marked with one of these statuses and signed by the curator/committee. Information regarding the new location (museum) should also be added to the register and database³³.

Staff interviews indicate that curatorial traditions define the procedures and steps for object disposal as part of day-to-day practices. The director is responsible for forming committees for the deaccession and transfer of objects to other SCA museums. The committee is typically comprised of three to four curators, the RCMDD registrar, a member of the Security Movement and a curator from the museum who will receive the objects. The SCA general secretary or the Museums Sector head forms the committees and issues the final reports. In the opinion of the museum Vice Director for Archaeological Affairs, some exceptions may occur, including cases where conservators, lawyers or curators from the museum sector are involved³⁴. Other deaccession options follow the same procedures, however, it is a rare occurrence because staff members have no experience with alternative disposal options. For instance, deaccessioning objects because of poor condition, deterioration or damage occurs in very few cases. Luckily, one retired curator shared her experience with object

³³ RCMDD PROTOCOL 2011: 220-22.

³⁴ Interview by author, (01/07/2023 to 21/12/2023).

disposal under poor conditions, where SCA rules were followed³⁵. Disposal examples are discussed hereafter to illustrate the actual steps as they have been taken at the museum.

1-Objects Leaving Egyptian Museum in Cairo and Transferred to Another SCA Museums

The Egyptian Museum in Cairo acts as the national museum of Egyptian antiquities. From its early beginnings in the mid-nineteenth century, it collected artifacts from all over Egypt, including Coptic, Greco-Roman and Christian antiquities³⁶. As time passed, the scope of the museum's collection has been revised and refined several times, but those changes have never been published. With the establishment of the Greco-Roman Museum (1892) and the Coptic Museum (1908), the relevant collections from the Egyptian Museum in Cairo collection were transferred to the new museums. Following this, Egypt established a number of local museums and the Egyptian Museum in Cairo served as the primary source of collections for most of these institutions. A percentage of the EMS's collections were deaccessioned/disposed of and transferred to these institutions. Due to the fact that the Egyptian Museum in Cairo is under the auspices of the SCA, this is a routine action in accordance with the Egyptian Antiquities Act and the SCA's policy and strategy (Antiquities Act N^o.117 of 1983 and its amendment by the Antiquities Act N^o.3 of 2010)³⁷.

Museums must keep records of the objects they dispose of according to ICOM's Code of Ethics (2017), section 2.15, «Complete records must be kept of all deaccessioning decisions, the objects involved and the disposal of the object. There will be a strong presumption that a deaccessioned item should first be offered to another museum». The EMS documents the transfer of artifacts to other SCA museums. Every object is recorded and accessible for official use and research. The official register and database hold records of disposed objects that can be accessed and easily tracked³⁸ [FIGURE 1]. Examples are as follows:

A. JE 37518-bis/SR.1/3239. A standing statue of the god Amun or Tutankhamun³⁹, now in Luxor Museum (N^o.J.198). The database and the Special Register record notes its disposal and transfer into Luxor Museum (its entry is signed/not stamped)⁴⁰. A copy of the disposal report of the statue among other objects transferred to Luxor Museum is attached to the register and dated to (06/03/2004) [FIGURE 2]. The disposal report counts a number of artifacts including, for instance, ostrakon JE 25063; boat model JE 30519; Tutankhamun chariot JE 61993a-d⁴¹.

³⁵ Interview by author, (01/07/2023 to 21/12/2023) with Sabah Abdel Razak, the former General Director and Curator of the basement collection (September 2023).

³⁶ ABOU-GHAZI 1988: 1-13; DOYON 2008: 8-30; RASHED & BDR-EL-DIN 2018: 41-63.

³⁷ The SCA policy defines how antiquity collections are collected, managed and distributed among Egyptian museums. SCA POLICY 2010.

³⁸ THE EGYPTIAN MUSEUM IN CAIRO SPECIAL REGISTER of Section II 1960-2024: II, 12-13.

³⁹ PECK 1971: 77-8, PL.XXIII [2]

⁴⁰ JE 37518. According to the register book and TMS. THE EGYPTIAN MUSEUM IN CAIRO. TMS 2023.

⁴¹ According to the register book, the deaccessioning report and the TMS. THE EGYPTIAN MUSEUM IN CAIRO TMS 2023.

B. JE 33767/JE 33797-xxx/CG 42005/ SR.3/9812, a headless squatting statue of prince Intefaa. The statue was transferred from the Egyptian Museum in Cairo to the Alexandria National Museum⁴² along with other artifacts, including e.g. JE 43268/SR.5/10279 and a marble head of a woman⁴³.

C. JE 53153/SR.2/1076, a dish with four small bowls in one piece, from the Old Kingdom, pottery, Giza. The object was transferred to the Suez Museum together with other examples including JE 30213/SR.2/1281/CGC 4798 and a Model of Ship with rowers.

Although RCMD protocol states that the deaccessioned object's inventory number at its new location (museum) should be noted in TMS, in many cases it is not associated with the register entry⁴⁴. However, several remarks were noted during the revision of the register books (Journal d'Entrée, Temporary Register and Special Register) during the survey for this paper. Most disposed of artifact inventories are not stamped. Check for instance, JE 36666⁴⁵ and JE 36667⁴⁶ [FIGURE 3]. The museum stopped this practice without explanation⁴⁷. It is worth noting that there is no official rule that requires the record of deaccessioned objects to be stamped. Instead, notes are usually added to inventories that indicate the new destination, the curator who received custody and the date. Occasionally a copy of the official report of the deaccessioning and the transfer of the objects is attached to the objects' inventories in the register book. Compare for instance SR.2.4477 (JE 68922) and SR.2.15557, two inscribed blocks that were disposed of by the Egyptian Museum in Cairo and transferred to the Imhotep Museum at Saqqara in July 2007 [FIGURES 4/A-B].

Several examples of stamped inventories can be found in the Special Register, Temporary Register and Journal d'Entrée where objects that were transferred to the Coptic Museum or Nubian Museum and other museums are stamped with a dedicated stamp. For instance JE 37386 (SR.2.9332), an Asymmetric statue of Harwa, dynasty 25th (44 cm Schist), is currently at the Nubian Museum [FIGURE 5] and TR 20.10.14.3 a block statue of Mes-Amun [FIGURE 6]. Both register entries are stamped for disposal with the Nubian Museum.

⁴² According to the register book and TMS. THE EGYPTIAN MUSEUM IN CAIRO TMS 2023.

⁴³ According to the register book and TMS. THE EGYPTIAN MUSEUM IN CAIRO TMS 2023.

⁴⁴ Based on a check of the register book and TMS by the author. THE EGYPTIAN MUSEUM IN CAIRO TMS 2023.

⁴⁵ JE 36666 (CK 689 and K.58. Omar Pacha Collection 399), a block statue of Padihorpare son of Kapefhamonthu and Neschonsu. The statue came from the Karnak Cachet in 1904. TMS marked the entry as stolen. The cachet database stated that the statue was on sale at Sotheby's in London, on (14/07/1986), №. 140. Now in Baltimore (probably in the Walters Museum?). Karnak Cachet online database and TMS.

⁴⁶ JE 36667 (CK 828). A block statue of Pakharkhonsu from the Karnak Cachet. The JE marked the entry as in Baltimore WAG 170 (22.210), while the TMS noted it as stolen. Karnak Cachet online database and TMS.

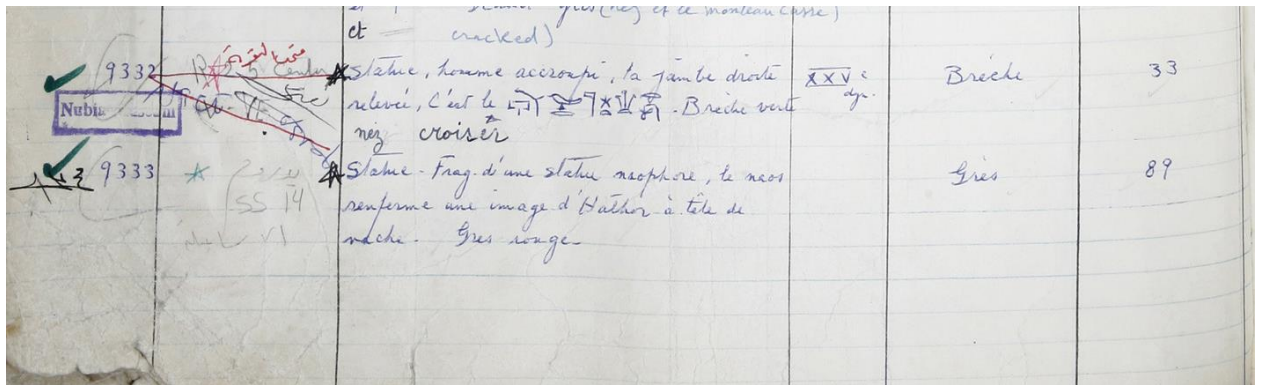
⁴⁷ The stamp bears the name of the museum that the object was transferred to. It is an official stamp of the new museum that proves it officially permanently acquired the object. The record should be stamped beside the object inventory in the register book. In the past, the museum used to stamp artifacts that they deaccessioned. However, this practice has been discontinued without any clear explanation or known date. Based on Staff Interviews and checking the museum registers. Interviews by the author, (01/07/2023 to 21/12/2023).

رقم القطعة	الوصف	التاريخ	المكان
3239	Statue of a seated female figure (JE 38689/SR.2-3239)	1984	Luxor Museum
3241	Statue of a seated female figure (JE 38689/SR.2-3241)	1984	Luxor Museum
3242	Statue of a seated female figure (JE 38689/SR.2-3242)	1984	Luxor Museum
3243	Statue of a seated female figure (JE 38689/SR.2-3243)	1984	Luxor Museum
3244	Statue of a seated female figure (JE 38689/SR.2-3244)	1984	Luxor Museum
3245	Statue of a seated female figure (JE 38689/SR.2-3245)	1984	Luxor Museum
3246	Statue of a seated female figure (JE 38689/SR.2-3246)	1984	Luxor Museum
3247	Statue of a seated female figure (JE 38689/SR.2-3247)	1984	Luxor Museum
3248	Statue of a seated female figure (JE 38689/SR.2-3248)	1984	Luxor Museum
3249	Statue of a seated female figure (JE 38689/SR.2-3249)	1984	Luxor Museum
3250	Statue of a seated female figure (JE 38689/SR.2-3250)	1984	Luxor Museum
3251	Statue of a seated female figure (JE 38689/SR.2-3251)	1984	Luxor Museum
3252	Statue of a seated female figure (JE 38689/SR.2-3252)	1984	Luxor Museum

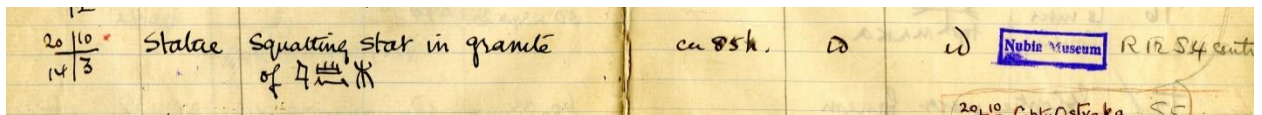
[FIGURE 1]: A handwritten note in the Egyptian Museum in Cairo Special Register records the disposal and transfer of the statue JE 38689/SR.2-3239 from the Egyptian Museum to the Luxor Museum in 1984. THE EGYPTIAN MUSEUM IN CAIRO SPECIAL REGISTER of Section II 1960-2024: II, 12-13 © The Egyptian Museum of Cairo.

حضرنا استكوم
 حرمنا في اليوم السبت ١٦/٣/٢٠٠٤
 نكتب في اليوم السبت ١٦/٣/٢٠٠٤
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 ١٠٠- استكوم

[FIGURE 2]: A disposal report dated March 6, 2004 and attached to the museum register lists objects that were disposed of and transferred to the Luxor Museum. THE EGYPTIAN MUSEUM IN CAIRO SPECIAL REGISTER of Section II 1960-2024: II, 11 © The Egyptian Museum of Cairo.



[FIGURE 5]: Stamped entries for disposal in the SR: JE 37386 (SR.5/9332) Asymmetric statue of Harwa, currently at the Nubian Museum © The Egyptian Museum of Cairo.



[FIGURE 6]: Stamped entries for disposal in the TR: TR 20.10.14.3 a block statue of Mes-amun, currently at the Nubian Museum © The Egyptian Museum of Cairo.

This practice of stamping should be reconsidered in any future museum collection policy. Disposed artifacts must be stamped with a dedicated museum stamp following strict rules and descriptive procedures. The stamping of deaccessioned objects is an official step that ensures the status on the objects are updated, the new dimension is noted and that unclear or repeated curatorial behavior is avoided.

There have been several cases where the curator has not written a note about the disposal and transfer to the object in the Special Register, nor is the inventory signed by the curator (a representative of the new destination/museum) who received the object. Following the museum procedures and SCA policy, this is an obligatory action. Failure to follow the rules could pose a problem for the responsible curator. However, this action has occurred repeatedly at the museum. One may count several cases in which curators failed to provide tracking of the artifacts they had in their custody. One documented case involved the head of Section II who retired in 2016. He has been requested to assign the responsibility of custodian of artifacts to another curator before retiring⁴⁸. Consequently, the Committee for the Delivery and Receipt of Antiquities compiled a list of nine objects that were not tracked and checked; as a result, a report was presented to the Museum Director, the museums' Sector Director and SCA General Secretary. A second committee formed by the museums' sector reduced the number of unaccounted-for objects from nine to two. This committee reported that seven of the nine objects had been disposed of and transferred to other SCA museums without a note in the register. The committee checked the objects at their new destination and the official documents that verified their transfer. Then, it issued an official report to the Museum Sector and SCA to close the case⁴⁹. The committee also left an official note in

⁴⁸ Interview by author, (01/07/2023 to 21/12/2023). Interviewing museum staff with Dr./ Gamal El-Balm, Section II curator at that time and member of the committee.

⁴⁹ Interviews by author, (01/07/2023 to 21/12/2023) with Dr./ Gamal El-Balm, Chief Curator of the second section August 2023.

the inventories of the seven objects on the Special Register⁵⁰. The committee concluded in its final report that two objects had not yet been located. As the case had been referred to administrative prosecution, a case was opened against the curator in charge for the loss of the antiquities. In addition to charging the curator with the value of the two objects, the Chief Prosecutor signed and dated the register as having been visited and handled⁵¹. Thus, the current status of these items is officially documented for any future operations. The following are examples of the lack of proper disposal/desaccessions procedures and how they were resolved:

Objects transferred to other SCA museums without a note or a signature in the register: JE 40027/SR.2/5020, a pottery dish. This object was disposed of and transferred to the Imhotep Museum without a note or a signature on the Special Register. Upon investigation, the museum sector committee reported that it had indeed been transferred to the Imhotep Museum. Official documentation for the transfer and the register book of the Imhotep Museum were double-checked and approved. To close the case, the curator of the Imhotep Museum and the committee head signed a note in the museum register in 2021. One of the committee's members declared that seven cases of missing artifacts were resolved in 2016. The committee identified and checked these objects in other SCA museums⁵².

Object Lost because of Dereliction of Duty: Although rare and an event that should never happen, two objects were lost from the custody of former chief curator Mahmoud El-Halwagy (retired in 2016), a former head of Section II. The committee that was formed to check the transfer of the collections under his custody to the custody of another curator reported the loss of JE 98911/SR.2/19439, a small stone palette and SR.2/5527/T.R.13.9.32.1, a mace head dated to Predynastic period⁵³. After the objects were verified as lost, the curator was charged and the chief prosecutor signed the inventories in red ink dated (05/12/2016).

Objects under Serious Threat: SCA decisions are sometimes made without feasibility or clarity. There are many instances when objects have been transferred permanently from one museum to another and then, after a time, returned to their original museum. After disposing many artifacts to the GEM, The National Museum of Alexandria, Imhotep Museum and Greco-Roman Museum and the Egyptian Museum in Cairo reacquired them a few years later. Sometimes an object moves between several destinations on its way back to the Egyptian Museum. The tracking of objects and the recording of records can be affected by such multi-step actions. For example SR.2/15399/CGC 105⁵⁴ is an Old Kingdom group statue of a man and his family. The statue was

⁵⁰ For example, JE 40027. Based on a check of the register book and TMS by the author and the Interview with Dr./Gamal El-Balm, the curator in charge at that time. Interviews by author,)01/07/2023 to 21/12/2023).

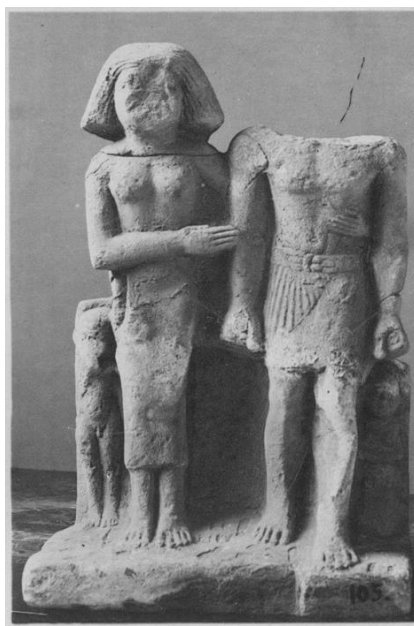
⁵¹ Interview by author, 1/7/2023 to 21/12/2023 and interview with Dr./Gamal El-Balm, chief curator of Section II 2023. The note has been also checked in the Special Register. SR.2/ 9439 (JE 98911) & SR.2/5527 (TR.13.9.32.1).

⁵² Interview by author, (01/07/2023 to 21/12/2023) with Dr./ Gamal El-Balm 2023; these records haven also been checked in the Special Register under his supervision.

⁵³ JE 98911 and T.T.13.9.32.1. The records have been double-checked in the Special Register and TMS. *THE EMC TMS* 2023.

⁵⁴ BORCHARDT 1911: CGC I :82-83, Bl.23.

officially disposed of and transferred to the Imhotep Museum on (06/04/2006) and then returned to the Egyptian Museum in Cairo in 2018 [FIGURE 7]. Another example is a seated statue of *Iwf* and his wife, which was excavated by H. Junker at Giza in 1926. The statue was officially disposed of from the museum and transferred to the old Airport Museum in the 1960s and then to the Suez Museum. When the Suez Museum closed, the statue was placed in that museum's storage. In 2022, it was transferred from Suez to the Hurghada Museum where it briefly lost its registration information completely. After a long investigative process, it was identified by its earlier inventory number at the Egyptian Museum as JE 49691/SR.2/15683⁵⁵. It is noted also that the SR note for the deaccessioning and the transfer to the Airport Museum is mostly damaged and unreadable.



[FIGURE 7]: CGC 105 (SR.2/15399). An Old Kingdom group statue of a man, his wife and two children. The statue was officially disposed of and transferred to the Imhotep Museum on April 6, 2006 and then returned to the Egyptian Museum in Cairo in 2018 © The Egyptian Museum of Cairo.

The latter case indicates a critical issue in collection management, procedures, decision-making and planning for new museums under SCA. It is essential to follow strict procedures and planning when selecting and transferring artifacts. It is recommended that the SCA consider long-term loans between museums rather than assigning a new museum-based inventory number for a single object as it travels between collections.

2- Sold Objects

In the past, the museum had permission to sell duplicates and less significant objects. Until the Antiquities Act N^o.117 of 1983, there was a room dedicated to the sale of antiquities at the museum. Selling artifacts in the museum started under the direction of Maspero in 1883 when he decided to sell less important and duplicate objects⁵⁶. Objects sold by the museum are recorded either in the Journal d'Entrée (JE), in the

⁵⁵ The records have been checked in the Special Register and TMS. TMS 2023.

⁵⁶ PETRIE 1931: 51, 59, 72; KHATER 1960: 281; PIACENTINI 2017: 76.

Temporary Register (TR) or in the Sales Register. In the latter, all data about the sold objects is recorded, including the sale date, the buyer and the price⁵⁷. In her discussion of the Sale Room, Piacentini listed examples of sold objects that were listed as duplicate or less significant items⁵⁸. In 2010, additional instructions, rules and penalties related to the trade and illegal collecting of antiquities were introduced. Antiquities trafficking is explicitly prohibited in Article 8 of the Antiquities Act N^o.3 of 2010⁵⁹. Many duplicate and less significant objects were marked for sale in the sale register and therefore are not listed in the museum register at that time⁶⁰.

On the other hand, several objects that have been entered into the official register (JE) were later sold by the museum. Although TMS indicates that these objects were sold, the Journal d'Entrée has no notes on these sales. Selected examples include JE 7181⁶¹ a bronze Figurine of Amun, from the 3rd Intermediate Period. According to TMS, it was deaccessioned/sold [FIGURE 8].

No d'ordre	Lieu et date de la découverte	Matière	Designation du Monument						
7181	Lettre de l'Etat	Bronze	Statue d'Amun, bronze de l'époque	0,14	4	S. B.	May 6	32219	P 14
7182			Statue d'Amun	0,15	5	S. B.	May 6		
7183			Statue d'Amun	0,15	4	S. B.	May 6	32219	P 14

[FIGURE 8]: A copy of JE vol.2, 8-9 including the entry for JE 7181: a bronze Figurine of Amun, 3rd intermediate period. The entry was left without any notes regarding its disposal. The Egyptian Museum Journal D'entree

⁵⁷ Interviews by author, (01/07/2023 to 21/12/2023) with the staff, including Ms./ Sabah Abdelrazak, former General Director of the museum and Dr./ Lotfy Abdelhamied, vice director and chief curator 2023.

⁵⁸ PIACENTINI 2017: 75-87.

⁵⁹ THE EGYPTIAN ANTIQUITIES ACT 1983: act N^o. 117 of 1983 and its amendment by the Antiquities Act N^o. 3 of 2010.

⁶⁰ The author investigated the Egyptian Museum in Cairo Sale register (November 2023). Although the objects were not sold because of the Antiquities Act of 1983 they are still undocumented and have not provided permanent accession numbers at the museum. This conclusion is based on the author's investigation of the Sale Register and the doublechecking of some items that are listed in the register and labelled as still in the museum. The curator in charge of these collections informed the author that the museum is preparing to register these collection at the time the survey for this study was conducted.

⁶¹ JE 1858-2024: II, 8-9 [JE 7181].

TMS notes the sale of the following objects in the Huber Collection: JE 7314 Goddess Taweret, bronze, h. 7cm,⁶² JE 7657,⁶³ faience standing baboon amulet; JE 7277⁶⁴ Bronze figurine of the goddess Nephthys, 8 cm; JE 5232/ CG 5382⁶⁵ double knot amulet, h. 3.4 cm. However, although it was noted that these items were disposed of, the register book was not updated to reflect their sale. Noteworthy is the fact that Mariette ranked these objects as either [4] or [5] based on an object ranking system he established,⁶⁶ which assigned values from 1 (highest) to 6 (lowest), according to their level of importance⁶⁷ This explains why the museum later decided to sell such objects that were considered to be less important.

3-Objects Buried in the Garden⁶⁸

In the past, the museum disposed of objects that had no importance by burying them in the garden. These were probably very small fragments or blocks of no perceived value. This practice is mentioned in the protocol only within the description of the old curatorial practice, although the museum database does not list any examples. The museum no longer follows that practice, as the accession of newly excavated artifacts now occurs only after revision and selection according to the Egyptian Museum in Cairo's scope of collecting. Since buried objects in the museum garden were considered to be without value, it is assumed that they were not entered into the museum system registration at all.

Several objects were discovered during the renovation of the museum garden in 2023. They included stone fragments of stelae and statues. It is unclear whether these objects were intentionally buried or left in the garden with little attention or observation. The primary investigation revealed that the buried items were often small fragments that were broken from statues and stelae without valuable features, therefore the curators decided to get rid of them. Among these, a small fragment of a stela was found in 2023; likely, it bears a JE number and after checking its inventory, the stela was found in the museum overlooking this little part/fragment.

4-Gifted Objects⁶⁹

Following the code of ethics for museums, one of the legal methods of disposal is to transfer an object to another public collection as a gift. This often occurs when an object is outside the scope of the museum's collections. However, there are other occasions as well. The oldest known evidence of a gifted collection from the Egyptian

⁶² JE 1858-2024: II, 16-17 [JE 7314].

⁶³ JE 1858-2024: II, 30-31 [JE 7657].

⁶⁴ JE 1858-2024: II, 12-13 [JE 7277].

⁶⁵ REISNER 1907: 23, PL. II.

⁶⁶ JE 1858-2024: II, 12-13 [JE 7277], 16-17 [JE 7314], 30-31 [JE 7657].

⁶⁷ For object classification and ranking, check: RASHED & QUIRKE 2024: 150, FIG.4.

⁶⁸ Even though this particular action has been discontinued, we should still discuss it as it used to be a common practice in the museum. Collection Management and Procedures must take into account both current and past practices regarding the collection and its documentation.

⁶⁹ Even though this particular action has been discontinued, we should still discuss it as it used to be a common practice in the museum. Collection Management and Procedures must take into account both current and past practices regarding the collection and its documentation.

Museum was the collection of the Asbakeya Museum in the 1850s. Abbas Helmy I and his successor Said Pasha used the collection to sustain their diplomatic relations either with Ottoman Sultan Abdel Aziz or with the Archduke Maximilian of Austria who visited Egypt in 1855⁷⁰. One may count also the coffin of the lady Bok (?) (JE 3338) that was registered in the Egyptian Museum⁷¹. In the 1880s, the coffin was gifted to Spain and it now is part of the collection of the National Museum of Archaeology in Madrid [FIGURE 9].



[FIGURE 9]: A coffin of Lady Bok(?) from Qurna is held at the National Museum of Archaeology in Madrid and was acquired by the Egyptian Museum in 1858 under JE 3338. It has not yet been removed from the museum's register © The National Museum of Archaeology in Madrid.

Before the Antiquities Acts of 1983 and its amendment in 2010, Egyptian law permitted the government to use duplicate artifacts as diplomatic gifts. As a result, many of the artifacts used as gifts were recorded in the sale register instead of the permanent register book. The author was allowed to investigate the Sale Register where many objects are listed for sale. Diplomatic gifts are still at the museum in a dedicated room in the basement and still awaiting to be accessioned to the JE, since sales and gifts are currently prohibited by the Egyptian Act.

5-Objects Entered into the Museum Journal but Never Brought to the Museum.

When Mariette was in charge of the museum and commissioner of the Antiquities Service⁷², he entered many objects from his excavations into the register but left them at

⁷⁰ RASHED 2017: 1-11: 2ff; EL-FAR *et Al.* 2022: 1-9.

⁷¹ RASHED & QUIRKE 2024: 165f, FIG.19, Appendix 22. The coffin was never brought to the museum from Qurna.

⁷² According to interviews with staff, the Journal d'Entrée and the diary of Mariette. RASHED & QUIRKE 2024: 147f, FIG.5c; Interviews by the author, 1/7/2023 to 21/12/2023.

the excavation site⁷³. This case has not been considered even in the guidelines for documentation (RCMDD protocol). **The status of these objects in the TMS should be revised and they should be identified and marked as never having entered the museum.** Examples can be tracked in the first three volumes of the *Journal d'Entrée*, including JE 3338 (a coffin) and probably JE 3342 (a glazed steatite fly scaraboid, present location unknown)⁷⁴.

Coffin JE 3338 was from a burial shaft excavated by Mariette at Qurna in 1858. The finds group was entered into the register book JE 3317–3348 as one set. JE 3338 is a yellow and white wooden coffin of a lady named «Bok». The entry is marked with two vertical lines across the description field, probably to indicate that it was not brought from the site to the museum. In the location field, a note reads: «En magasin à Gournah» («in the Qurna storeroom»). This note was copied by M. Cousin into the *Journal d'Entrée* in 1881–1886. This means that it remained in the Qurna storeroom until that date. Probably, this is the coffin that was gifted to Spain through Daninos in 1886 [FIGURE 9]⁷⁵.

6-Disintegrated or Damaged Objects

TMS gives no indication of whether an object was deaccessioned due to damage or disintegration. The interviewed staff emphasized that none of them had personally experienced this situation, although they agreed that disposal might occur in rare occasions because an object was completely deteriorated⁷⁶. The former General Director⁷⁷ recalled an instance involving two small fragments of a deteriorated copper object that lacked any recognized features. The item, registered as JE 27380 (S.R.3/4014)⁷⁸, is in very poor condition and has lost its original appearance. Following the SCA procedures, a museum committee was formed under the supervision of the director of the Coptic Museum to report the condition of the object and recommend its disposal. The item is no longer in the custody of the curator, but the SCA has not yet decided whether to dispose of it⁷⁹.

⁷³ The nature of the *Inventaire de Boulaq* (*Journal d'Entrée*) was initially created as not only a collection audit document but also an excavation finds register for Mariette's operations. The range of information fields of *Journal d'Entrée* seems to be unique to the joint curatorship and fieldwork that Mariette practiced in Egypt. At the start of the *Inventaire de Boulaq*, Mariette explained his system for ranking artifacts on a scale of one to six, where the sixth lowest level sixth represents monuments of zero significance («Monuments d'un intérêt presque nul»). I assume that the object at level (6) was probably left at the site and not brought to the museum at all. RASHED & QUIRKE 2024: 150, FIG.4; DEWACHTER 1985: 109, PL.20.

⁷⁴ Check Mariette's notes to JE 3338. JE 1858-2024: I, 212-13.

⁷⁵ RASHED & QUIRKE 2024: 165f, FIG.14, Appendix 22. The coffin was acquired by the National Museum in Madrid: *Museo Arqueológico Nacional*, Madrid, N^o. MAN 15208. PONS-MELLADO *et Al.* 2018: 397-404; 2021, 318-322; RASHED & QUIRKE 2024: 165f, Appendix 22, FIG.19.

⁷⁶ Unfortunately, the researcher failed to track the documentation of processing such a case since no case had been documented in the past.

⁷⁷ Interviews by the author, 1/7/2023 to 21/12/2023.

⁷⁸ JE 27380; THE EGYPTIAN MUSEUM IN CAIRO SECTION III SPECIAL REGISTER 1960-2024: III, 54; The Checking Committee Report 2021 [official document; unpublished].

⁷⁹ An interview with Mrs./ Aliaa Diaa, curator in charge of Section III who faced this case in her custody. Interviews by author, (01/07/2023) to (21/12/2023).

This is not the only case of a damaged object that was marked for disposal. However, the museum lacks strict procedures for disposal and so the curatorial staff has no clear protocol for what should be done⁸⁰.

Examples of Damaged/ Lost Objects

Throughout its history, the Egyptian Museum in Cairo collection has suffered several accidents that caused some objects to be lost. Threats include Nile floods⁸¹, a general lack of security, revolutions and wars.

It is crucial to establish the proper procedures to be followed in such a case. The primary investigation should result in compiling a list of objects in very poor condition due to damage or deterioration and hence have lost their value to the collection. The Egyptian Museum in Cairo curators identified a few examples. One of the interviewed curators experienced a situation with which they could not cope because they had limited knowledge of how to dispose of deteriorated objects. They were able to solve the matter only when they followed retired curators' advice⁸². This again highlights the importance of collecting curatorial practices and documenting them in the form of procedures that guide curatorial staff at present and in the future. Objects that were recommended to be deaccessioned included JE 5744/SR.4/691, a burned papyrus and CG 43261/SR.4/701, a burned wood unclassified object⁸³. Both objects are in such poor condition that they cannot be restored. Such a case should be addressed in the museum's collection and disposal policy. It is recommended to remove the objects from museum custody through deaccessioning rather than disposal because they could advance further research on the objects' material.

Other cases in which an object might be lost, damaged or stolen due to the lack of proper care and attention by the curator in charge⁸⁴ need to be addressed with very clear instructions and guidelines in line with the Egyptian Antiquities Act. In this

⁸⁰ Based on interviewing a number of the retired and current curatorial staff at the museum. Interview by the author, 1/7/2023 to 21/12/2023.

⁸¹ In the Nile inundation of 1878, the museum building in Bulaq was flooded and some of the museum's collection was lost. During the 1879–1880 reconstruction of the museum following that flood, there was a major theft involving a box of scarabs. Unfortunately, Mariette did not make a full list of objects lost after the accident, although he succeeded in retrieving a number of lost objects. Maspero mentioned that «one box, containing nearly all the historical series, was stolen». NEWBERRY 1907: VII with N^o. 1. The theft may be directly relevant to the difficulties in re-locating many small objects in the first three volumes of the JE. It is noted that the TMS labels the current location of these objects among others as «Lost object», indicating that tracking its location has failed and the object cannot be identified at present. [check the Egyptian Museum in Cairo -TMS]. LEBÉE 2021: 35-39.

It is noted that the majority of the missing objects are small items such as amulets, scarabs, accessories, etc. Unfortunately, there has been no complete count of lost objects since that time. Thus, these objects are considered in the TMS as «unlocated items». LEBÉE 2021: 35-39; RASHED & QUIRKE 2024: 147-212.

⁸² Interviews by the author, 1/7/2023 to 21/12/2023.

⁸³ Check the Special Register and TMS: JE 5744/SR.4/691; CG 43261/SR.4/701.

⁸⁴ The museum has unfortunately experienced multiple instances of artifact theft throughout its history. All incidents have been fully documented by TMS, which includes details about all stolen objects and the circumstances surrounding each incident. The system also maintains records in its register and database of both retrieved objects and those that are still classified as «Stolen». Certain objects, such as those listed below, fall under the «stolen” artifacts: JE 62006; 94481; 55175; 47906; 9080; 30208; 52976; 68987; 60716.1.

situation, the SCA forms a committee to review the case and evaluate the loss. As a result, the committee presents a report with a recommendation for the needed action and the estimated value of the object that must be reimbursed by the curator in charge is calculated. A similar case occurred at least once when two objects were lost in Section II and the curator was subsequently charged with the value of the lost objects. The Museums Sector formed an official committee to estimate the value of the objects and the curator had to pay⁸⁵. The inventories are SR.2/9439 (JE 98911), a Predynastic small palette made of schist and SR.2/5527 (TR.13.9.32.1), a disk mace head made of porphyry⁸⁶. Although this is a rare case and the museum should avoid being in such a situation again, the accident confirms that the museum must have a policy in place with strict penalties and instructions to staff to avoid such accidents.

7-Replicas and Reproductions

Replicas and reproductions are recorded in the register book despite the establishment of a new inventory for educational and reproduction materials (EDU inventory)⁸⁷. JE 96279/ S.R.4/1542, for instance, is a replica of an object from a Russian Museum that V. GOLENISCHEFF donated to the museum, as noted in the register⁸⁸. When considering the collection/disposal policy, it is crucial to consider this sort of case. It is recommended that casts and reproductions be removed from the museum's custody through deaccessioning rather than disposal. The Metropolitan Museum of Art serves as a suitable model to follow when it comes to handling deaccessioning forgeries (fake objects). Their CMP stipulates: «The Museum may deaccession but generally does not dispose of works determined to be forgeries. Curatorial departments generally retain these works for study purposes or seek the Director's permission to destroy the objects, unless it can be determined that disposal can be accomplished in a responsible manner without confusion for a possible buyer. Works incorrectly attributed or dated may be deaccessioned, provided that the new information or attribution is provided»⁸⁹.

VI. RECOMMENDATIONS

Based on this evaluation of the actual needs of the Egyptian Museum as discussed in this study, there are several actions that can be recommended to improve the work at the museum. These recommendations include:

- The museum needs to establish a collection policy and written procedures for deaccession/disposal.

⁸⁵ Interview with Dr. Gamal El-Balem, chief curator of Section II. Interviewed by the author, 1/7/2023 to 21/12/2023.

⁸⁶ For more about these cases check the Special Register and TMS 2023.

⁸⁷ It is noted that these objects were inventoried even before the creation of the Education Number (EDU). The RCMDD office created this new inventory system in 2008. Its purpose is to assign numbers to objects that are not considered antiquities or art pieces, which can include replicas of antiquities, molds created from antiquities and items like Lego statues found in the Children's Museum.

⁸⁸ The register and database do not provide detailed information on the museum name that holds the original object.

⁸⁹ MMA CMP 2023:12.

- The curatorial staff require training to enhance their skills because of the retirement of some professional staff. It is recommended to conduct workshops to transfer knowledge and curatorial practices from retired staff to younger ones.
- A monthly round table discussion might be introduced for the curatorial department to collectively address critical issues, take necessary actions and revise old traditions as well as share new experiences.
- A committee needs to be formed to count and document all objects that have been disposed of or transferred to other museums in the past and present. It should also consider the following:
 - A. Dedicating a stamp specifically for disposal purposes, which should be used only under supervision.
 - B. All records for disposed objects must be stamped with this stamp in both the Special Register and journal. The committee should consist of a chief curator, at least two other curators, a lawyer, an administrator and a registrar.
 - C. Reports, orders and official documents related to the deaccessioning of objects must be linked to the records on the database. This information is updated in some cases while they are missing in other cases. For instance, e.g. JE 36973, *Kneeling theophorous statue of Padimennebnesuttauy* is currently in New York, however, the database has no remarks for its disposal nor its current location.
 - D. A register for disposal must be issued where all the disposed objects are to be listed with their inventories, records and disposal dates. This register will be used for tracking and official and administrative use only.
- Strict rules and clear guidelines for the disposal and long and short-term loans to other museums should be considered and implemented.

VII. CONCLUSIONS

This article discusses disposal/deaccession practices at the Egyptian Museum of Cairo and their development throughout the museum's history. It points out the critical problems that occur due to the lack of collection policies and procedures and how that affects the documentation of the collection and its records. The absence of policies and strict procedures increase misleading decisions, duplicated and overlapping actions and the loss of records.

Discussions with the curatorial staff have revealed that the museum lacks written policies and procedures for collection and disposal. As a result, their accounts of work and procedures differ and may be incompatible, as demonstrated by the examples from the collection and curatorial practice that have been discussed. Some conclusions may be outlined as follows:

1. The museum lacks written collection and disposal policies and procedures.
2. The museum needs to adopt a system for artifact tracking inside and outside the museum and to update object records.
3. The staff lack experience, which is made obvious from changes in the curatorial department and retirements.
4. There were several instances in which the curatorial staff failed in critical situations because they had no strict disposal and documentation procedures to follow.

5. The museum was unable to dispose of some objects due to deterioration and poor condition in several instances. This occurs due to the lack of clear and strict procedures to follow.
6. It is necessary for the SCA to update its policy on collection management at SCA museums and to establish clear and stringent rules for the transfer of artifacts between museums.

It has been found that the museum is not always in complete control of managing its collection, especially when the SCA plans to transfer objects to other SCA museums. During interviews, it became clear that there was disagreement with the museum's decision to dispose of or lend objects to other museums for an extended period. Occasionally, the SCA requests that the Egyptian Museum in Cairo transfer objects to another museum permanently or as a long-term loan and the Egyptian Museum in Cairo is not always involved in these decisions. Curators might be forced to transfer objects to another museum before receiving official written orders. If we compare the case of the long-term loan for the Zafran Palace Museum and the Military Museum, the curators shared different experiences with the object transfer process.

7. To properly document the collection, the museum requires thorough research into inventorying, tracking systems and the history of objects.

In summary, the ongoing discussion has emphasized the importance of establishing policies for the collection, documentation and disposal of objects, as well as developing written procedures for managing and disposing of collections. A process for collecting and documenting the collection practices of retired and current curatorial staff and must be launched. Then, the museum can form a committee to formulate policies and procedures. This is an agreed-upon action by the museum's General Director, who values and supports these recommendations and their prompt implementation.

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CONSERVATION APPROACHES OF INDUSTRIAL HERITAGE IN THE MIDDLE EAST: THE CASE STUDY OF ALULA STATION, HEJAZ RAILWAY, SAUDI ARABIA AND RAMSES RAILWAY STATION AND MUSEUM, CAIRO, EGYPT

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ABSTRACT

[EN] This study is about the conservation of the industrial heritage of transportation applied to two railways in the Middle East. Conservation policies at industrial stations safeguard many aspects of industrial activities at various sites. Thus, clear conservation guidelines are required to preserve authenticity according to the nature of such heritage. The scope of industrial heritage defined by the Nizhny Tagil Charter in 2003 is a point of analysis. This Charter discusses the importance of conservation, the material evidence of the structures and buildings built for industrial activities, the tools and processes used and the landscapes and towns connected with them. The present study focus on the Hiaz Railway Route in Saudi Arabia, inscribed on the UNESCO Tentative World Heritage List in 2015, the Alula Station, one of the most important stations in Saudi Arabia because of its historical and religious value, as well as the Ramses Railway Station and the Railway Museum in Cairo, Egypt. This study includes an overview of the meanings and values of industrial heritage and the preservation policies for industrial heritage which are significant challenges for heritage specialists, given the specialized nature of this type of heritage. Industrial heritage is one aspects of culture that reflect the exchanges between people and technology. Moreover, this study presents a sample scenario of the industrial heritage museum in Alula Station which uses railway heritage to enable visitors to experience and learn about the role of rail transportation, highlighting the museums' function in preserving and communicating industrial heritage. Museums preserve and exhibit artifacts and documents of the rail transportation industry which is an effective method of preservation.

KEYWORDS: Authenticity, industrial heritage, museums, railways, heritage values.

اتجاهات الحفاظ على التراث الصناعي في الشرق الأوسط، دراسة حالة: سكة حديد الحجاز في المملكة العربية السعودية محطة العلا

[AR]

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تهدف هذه الدراسة إلى التعريف بأليات الحفاظ على التراث الصناعي من خلال تحليل خطين للسكك الحديدية في الشرق الأوسط. إن سياسات الحفاظ على التراث الصناعي مطلوبة لحماية كثير من جوانب الأنشطة الصناعية في مختلف المواقع التراثية، ولابد من إرشادات واضحة للحفاظ على الأصالة، وفقاً للطبيعة الخاصة لهذا النوع من التراث. إن نطاق التراث الصناعي الذي حدده ميثاق نيجني تاجيل في عام ٢٠٠٣ هو نقطة تحليل، حيث يناقش الميثاق أهمية حفظ ودراسة الأدلة المادية والمباني المشيدة للأنشطة الصناعية، والأدوات والعمليات المستخدمة فيها، والمناظر الطبيعية والمدن المرتبطة بها. يتناول البحث دراسة طريق سكة حديد الحجاز في المملكة العربية السعودية، المدرج على قائمة اليونسكو التمهيدية للتراث العالمي في عام 2015، مع التركيز بشكل خاص على محطة العلا، وهي إحدى أهم المحطات في المملكة لقيمتها التاريخية والدينية. كما يتناول البحث محطة سكة حديد رمسيس ومتحف السكك الحديدية في القاهرة، مصر. ويقدم الإطار التحليلي لمحة عامة عن معاني وقيم التراث الصناعي وسياسات الحفاظ على التراث الصناعي، والتي تمثل تحديات كبيرة للمتخصصين في التراث نظراً للطبيعة المتخصصة لهذا النوع من التراث. التراث الصناعي هو أحد الوسائط الثقافية التي تعكس التبادلات بين الفرد والتكنولوجيا. وتقدم الدراسة نموذجاً لسيناريو متحف يعرض التراث الصناعي في محطة العلا ويعرض تراث السكك الحديدية بتعريف الزائر بالدور الذي لعبه النقل بالسكك الحديدية، وإبراز دور المتاحف في الحفاظ على التراث الصناعي ونشره، حيث تحافظ المتاحف على القطع الأثرية والوثائق الخاصة بصناعة النقل بالسكك الحديدية وتعرضها، ويعد ذلك وسيلة فعالة من وسائل الحفاظ

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I. INTRODUCTION

This study is about industrial heritage elements and associated landscapes along the Hejaz Railway in Saudi Arabia and Ramses Railway Station and Museum in Cairo, Egypt. The study focus on the conservation methods applied to two railways as examples of industrial heritage and explores how these approaches affect the value of cultural industry landmarks in the Middle East.

Industrial heritage remains include machinery, buildings, workshops, factories, mills, mines, processing and refining sites, warehouses, energy generation and transmission facilities, transport infrastructure and locations associated with social activities linked to industry¹. Industrial heritage is of great importance in the lives of societies as it links to the values, identities and cultures of people. It has a scientific and technological value to the history of engineering, construction and manufacturing. The machine is not only a material object. It also carries the memories of its makers and bears witness to the difficulties and events that shaped people's lives.

In the 1950s, the term «industrial archaeology» was introduced in the United Kingdom². In 1962, the debate became more prominent when major railway traces, such as the Euston Station in London and the Coal Exchange, were destroyed. The first International Conference on the Conservation of Industrial Heritage took place in 1973. However, the official recognition of industrial preservation developed only in 1978, during the 3rd International Congress for Conservation of Industrial Monuments in Stockholm with the establishment of the International Committee for the Conservation of the Industrial Heritage (TICCIH). This establishment aimed to promote a debate on the preservation of industrial heritage and international cooperation. In 1986, the Portuguese Association of Industrial Archaeology (APAI) was founded to study, protect, conserve and value the material and immaterial traces of industrial society³. The debate on the meaning of industrial heritage was finally settled in 2003 with the publication of the Nizhny Tagil Charter (7) in Russia during the XII International Congress of TICCIH⁴. The Charter for the Identification and Protection of the Industrial Heritage, the Nizhny Tagil Charter for the Industrial Heritage, was signed in Moscow in 2003 by TICCIH and the International Council on Monuments and Sites (ICOMOS). It defines industrial heritage as «the remains of the industrial culture that are of social, historical, architectural, technological, or scientific value». The industrial heritage includes railways which focus on history and physical monuments, such as stations, viaducts and tunnels⁵.

The second major document is the Dublin Principle, issued in 2011, which broadens the concept of industrial heritage preservation to include intangible elements, such as technological know-how. It highlights the importance of researching and

¹ «NIZHNY TAGIL Charter for the Industrial Heritage», <https://www.icomos.org/18thapril/2006/nizhny-tagil-charter-e.pdf>, accessed on (02/10/2023),1-6.

² PALMER & NEAVERTON 1998: 12-30.

³ ALBUQUERQUE 2020: 183-195.

⁴ TICCIH NIZHNY TAGIL CHARTER 2003: 2-3.

⁵ TICCIH NIZHNY TAGIL CHARTER 2003: 6-7.

documenting industrial structures, sites, landscapes and related machinery, equipment, records or intangible aspects that are essential to their conservation⁶.

According to international frameworks for understanding industrial heritage, railways are considered a significant category of this heritage. The present research paper addresses the most significant challenge in preserving industrial heritage: its connection to the policy of interpretation and protection. The products of this heritage, whether machines or buildings, require highly qualified specialists to address deterioration.

II. RESEARCH METHODS

For this study, primary data was collected from field visits to a section of the Hejaz Railway route in Alula County, the Egyptian Railway Museum and Ramses Station in Cairo from September to November 2023. Key stakeholders in preserving industrial heritage in the Middle East were targeted in the cases of Egypt and Saudi Arabia, including conservators and archaeologists working at the Royal Commission for Alula (RCU) in Saudi Arabia and the conservators and curators at the Egyptian Railway Museum in Cairo.

The methods used by the researcher are:

- Distributing interview questions on the conservation, management and interpretation of the Hejaz Railway Heritage Site in Saudi Arabia and the Ramses Railway Museum in Egypt to collect in-depth information on the opinions, thoughts and experiences of directors and officials of the conservation of industrial heritage in both cases.
- Field visits to the Hejaz Railway Heritage Site in Saudi Arabia and the Ramses Railway Museum in Egypt (observation and analysis) to become familiar with facts that people may be unwilling to discuss in the interviews.
- Interview questions for elderly people in Alula to learn about the history of building the Hejaz Railway, memories of the line's operation and its importance in transporting pilgrims to Holy Lands.
- Direct observation and collective discussions, analyses of policy documents, self-analysis and results from activities undertaken in both Alula and Egypt.
- In situ research and examination of many industrial buildings in Alula and Egypt that are linked to railways.

III. CONTENT

Railway Heritage Conservation

Railways are part of the world's industrial heritage because they were the primary means of transportation during the Industrial Revolution. They contribute to the growth of industrialization globally, serving many industries⁷. Railway heritage, a key component of industrial heritage, includes structures such as sheds, station buildings and railway works as well as railway bridges, viaducts, tunnels and their surrounding landscapes. It also encompasses technical equipment, archival materials and movable

⁶«DUBLIN PRINCIPALS 2011», <https://ticcih.org/about/about-ticcih/dublin-principles>, accessed on (02/10/2023).

⁷ COULLS 1999: 1–33.

artifacts⁸. Railways are analyzed in relation to the landscapes they cross. They are a tool used to (view and understand) landscapes as well as agents that transform the landscape⁹.

A railway has two basic components: the infrastructure and the rolling stock. Stations, viaducts and tunnels are major elements of railway infrastructure. The terms «railroad» and «railway» are of the same age and were originally synonymous. Following the introduction of steam locomotives and before electric motive power, the term railway was more widely used in England and railroads in the United States¹⁰.

Transportation (e.g., railways, canals and harbors) is one of the industrial structure classification systems developed by the Historic American Engineering Record (HAER), a sub-division of the United States National Park Service¹¹.

The scope of industrial heritage defined by the Nizhny Tagil Charter is a point of analysis. The Charter discusses the importance of conservation and studies the material evidence of the structures and buildings built for industrial activities, the tools and processes used and the landscapes and towns connected with them. The starting point of all reflections on the principles of preservation is the Venice Charter (1964) which describes some fundamental principles of conservation and preservation widely accepted theoretically and in practice¹². The Nara Document (1994) which highlights modern conservation theory, aimed to define the «test of authenticity in design material and workmanship» and was developed to implement during the 1972 World Heritage Convention. It defines conservation as «all operations designed to understand a property, know its history and meaning, ensure its material safeguard and, if required, its restoration and enhancement»¹³. The Nara Document on Authenticity defines the meaning of 'authenticity as the essential qualifying factor concerning values. The conservation of cultural heritage in all its forms is rooted in the values attributed to heritage¹⁴. A property meets the conditions of authenticity if its cultural values are truthfully and credibly expressed via reliable information sources through a variety of attributes¹⁵.

Information sources are all physical, written, oral and figurative sources that make it possible to know the nature, specificities, meaning and history of heritage. These significant attributes include: 1. form and design; 2. materials and substance; 3. use and function; 4. traditions, techniques and management systems; 5. location and setting; 6. languages and other forms of intangible heritage; 7. Spirit and feeling—attributes that

⁸ BURMAN 1997: 18-33.

⁹ LIN, XIANG & SANG 2022: 99.

¹⁰ WILSON 1915: 1-3.

¹¹ FALSER 2003: 2-10.

¹² «VENICE CHARTER, International Charter for the Conservation and Restoration of Monuments and Sites»; https://www.icomos.org/centre_documentation/bib/2012_charte%20de%20venise.pdf, accessed on (11/10/2023).

¹³ «NARA Document on Authenticity»; <https://www.icomos.org/en/charters-and-texts/179-articles-en-francais/ressources/charters-and-standards/386-the-nara-document-on-authenticity-1994>; <https://whc.unesco.org/archive/nara94.htm>, accessed on (23/10/2023).

¹⁴ NARA: 1994.

¹⁵ «Operational Guidelines for the Implementation of the World Heritage Convention», 2/2012, 82-86; <https://whc.unesco.org/en/guidelines/>, accessed on (23/10/2023).

are important indicators of character and sense of place (e.g., in communities maintaining tradition and cultural continuity); 8. other internal and external factors.

The UNESCO World Heritage Convention of 1972 laid down measures to capture, protect and preserve cultural assets to preserve the history and memory of humanity. More specifically, heritage may consist of monuments, buildings and spaces that are historically, artistically or scientifically valuable¹⁶. The main goal of conservation was developed through other significant international charters, e.g., the Athens Charter for the Restoration of Historic Monuments of 1931¹⁷. The UNESCO Convention was a continuation of the «Convention of 1954 for the Protection of Cultural Properties in the Event of Armed Conflict» adopted in the Hague (Netherlands), which was the first international treaty adopted worldwide. This included both immovable and movable heritage, such as architectural, artistic and historical monuments, archaeological sites, works of art, manuscripts, books and other artifacts of artistic, historical and archaeological significance as well as all kinds of scientific collections, regardless of provenance or ownership¹⁸.

The European Federation of Museums and Tourist Railways produced the Riga Charter in 2002, which outlined twelve standards for restoring and operating historic railway equipment. This Charter refers to railway equipment, which may include buildings or infrastructure as part of the railway ensemble. Pursuant to Article N^o. 7 of the Riga Charter, it is important to employ original materials and techniques when conserving historic railway items. Article N^o. 8 of the Riga Charter reports that historic railway equipment can be restored without returning to its original condition. Some equipment acquires historical significance later in operation. Article N^o. 11 highlights the importance of planning and recording each stage of the restoration process, keeps a record of these processes for at least the item's lifetime and identifies socially valuable uses for historic railway items that can help preserve them¹⁹.

Railway museums function as educational tools for railway preservation and manage the collection of railways rolling stock and infrastructure according to globally acknowledged criteria for the preservation of heritage assets and locations²⁰.

TICCIH states the importance of recording the physical features and condition of the objects of industrial heritage, especially in industrial sites. Such recordings should be placed in a public archive because they provide evidence of activities, tell stories and promote a sense of identity and understanding of cultures. It sheds light on the process of recording such types of heritage, which include written descriptions, drawings, photographs and video films of moving objects, as well as references to supporting

¹⁶ «Basic Texts of the 1972 World Heritage Convention», <https://whc.unesco.org/en/basictexts/>, accessed on (23/10/2023).

¹⁷ «ATHENS CHARTER 1931», <https://www.icomos.org/en/167-the-athens-charter-for-the-restoration-of-historic-monuments>, accessed on (02/10/2023).

¹⁸ «Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict 1954», <http://www.unesco.org/new/en/culture/themes/armed-conflict-and-heritage/convention-and-protocols/1954-hague-convention/>, accessed on (23/10/2023).

¹⁹ «RIGA CHARTER – A Significant New Initiative. Conservation Guidelines for Operational Railway Museums, Federation of European Museum and Tourist Railways 2002», https://www.cotma.org.au/documents/misc/riga_charter-turntable_article.pdf, accessed on (10/10/2023), 1-3.

²⁰ RIGA CHARTER 2002: 1-2.

documentation. Moreover, it highlights the intangible aspects of industrial heritage, where the memories of people involved in any industrial activity are unique and irreplaceable resources that should be recorded²¹.

IV. THE CASE STUDY ON ALULA STATION (HEJAZ RAILWAY), SAUDI ARABIA

The first train of the Hejaz Railway from Damascus arrived in Medina on August 22, 1908. It was constructed by the Ottomans. The railway had several stations and some bridges²².

The motive for establishing the Hejaz Railway, beginning at Damascus, was to serve the pilgrims of the Holy House of God in Mecca by providing a modern means of transportation to the Holy Lands. Work was halted at the beginning of World War I in 1914. Nevertheless, the railway offered pilgrims a more affordable and convenient means of completing the long journey to the Holy Cities. It also facilitated the movement of troops, especially after the beginning of World War I²³.

Following the war, the line was divided into three sections (the Syrian section, the Palestinian section and the Hejazi section). A further attempt to revive part of the line began in the 1960s when abandoned stations were refurbished and parts of the railway embankment restored, but the work was never completed. The Hejazi part remained in ruins, but the railways in Jordan and Syria were maintained in local service²⁴. Umm Al-Qura newspaper documented discussions between the Saudi government, Britain and France about attempts to revive the railway in 1928 by the Saudi government [FIGURE 1/A].



[FIGURE 1/A]: the Umm al-Qura newspaper’s archive, discussions between the Saudi government, Britain and France to revive the railway in 1928, <https://alsahra.org/2006>, accessed on (02/10/2023).

Alula station is a well-preserved station on the Hejaz line, giving a good idea of how the architecture of the railway would have appeared when in use. September 1, 1909 was the inauguration date of Alula Station. The station, located on the east side of

²¹ «TICCIH, The International Committee for the Conservation of the Industrial Heritage», <https://ticcih.org/>, accessed on (10/10/2023).

²² BAKR 1981: 174-176.

²³ BAKR 1981: 174-176.

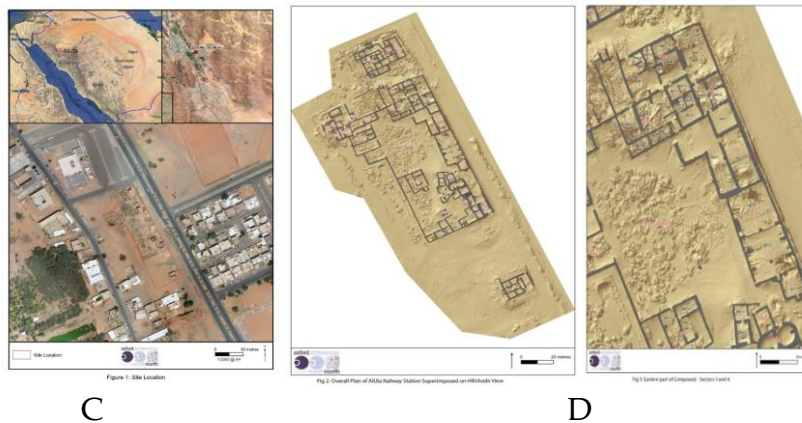
²⁴ GHABAN 1993: 220.

the Wadi Alula, is comprised of five structures and has maintained ancillary features, such as the water tower and the wind turbine over the well that was used for storing and raising water during the station’s operation²⁵. The maps of the station buildings and structures prepared by the Royal Commission for Alula are shown in [FIGURES 1/C- F], while a map of the station can be found in [FIGURE 1/B].

The site visit presents a critical phase of the evaluation process. ICOMOS provides a World Heritage Site Visit Report that enables members or experts to make brief, informal reports on any observations made during their visit to any World Heritage Site²⁶. Based on this report, the author describes the infrastructure of Alula Station [TABLE 1]. Hejaz Railway is on UNESCO’s tentative list²⁷ and Alula Station is one of the stations included on it.



[FIGURE 1/B]: A map of ALula station © Googlemaps.



[FIGURES 1/C-D]: Details of the station buildings and structures © Royal Commission for Alula.

²⁵ NICHOLSON 2005: 34. Observation by the author during the visit to Alula Station in November 2023, guided by Michael Jones, RCU Royal Commission for Alula.

²⁶ «ICOMOS International Council on Monuments and Sites, a World Heritage Site Visit Report»; <https://www.icomos.org/en/pub/395-english-categories/world-heritage/8263-fill-in-a-world-heritage-site-visit-report2>, accessed on (23/10/2023).

²⁷ «Hejaz Railway - UNESCO World Heritage Centre»; <https://whc.unesco.org/en/tentativelists/6026/>, accessed on (23/10/2023).

served as one of its side walls. The windows and front entrance were blocked with dirt, making it impossible to enter from the front. The wooden staircase in the back is gone and a ladder is required to access the upper floor.

The fourth station building

This two-floor building with a tiled pitched roof is made of light-colored sandstone blocks and has mud brick construction outside the front entrance. The ground floor has three rooms—two on the north side and one bigger one on the south—while the top floor has two. There is a well under the wind-powered water pump. Inside the shaft is a railroad wagon's base. A little square access hole leads to an underground storage space [FIGURES 2/A-E] shows the details of the Alula Station's buildings and water tower.

Conservation or restoration work completed or in progress:

Conservation of Alula Station is in progress.

Threats to the integrity and authenticity of the property:

Fences for protection can be traced in front of the station.

Signs leading to and within the property:

Work is still in progress.

Were you aware of the values for which the property was inscribed on the World Heritage List?

Yes No

Are these values clearly communicated to the public?

Yes No

Estimation of your personal satisfaction (scale of 0-10 points): the work is still in progress and cannot be rated

Additional comments

The remains of some rolling stock are situated outside the station, on the opposite side of the road, including two wagon frames and the bases of four other wagons. These are the only remaining items of rolling stock in Alula County outside the protected area of Mada'in Salih. Rocks beside the former track embankment north of the station bear inscriptions left by the railway construction workers, who believed in its religious importance in transferring pilgrims to the Holy Lands in Mecca and Madina. In the rail industry, the term 'rolling stock' refers to trains. It covers many different types of vehicles used to operate services or maintain the track [FIGURES 3/A-B]. In Alula station, the evidence of the original lamps and the early lighting system is still in situ, such as the original windows and stairs²⁸ [FIGURES 4/A-B].

HCC Heritage Conservation Consulting in Alula identified the reuse of Hejaz Railway rails in the construction works of the Alula Old Town Restoration Project. Rails with historical inscriptions were delivered to the Alula Museum for storage. The reuse of Hejaz rails in the urban fabric of Alula is obvious in many cases throughout Alula, such as the remains of the Hejaz Railway main line construction in Alula²⁹. The remains of the Hejaz Railway main line construction in Alula are in good condition. For instance, the Hejaz Railways bridge, named after the architect near El Mozam station, is still there [FIGURES 5/A-D].

[TABLE 1]: Infrastructure of Alula Station © Done by the researcher.

²⁸ Observation by the author during the visit to Alula Station in November 2023, guided by Dr./ Michael Jones, RCU. Royal Commission for Alula. Interview by author, (05/10/2023).

²⁹ BENDAKIR.M, HCC Heritage Conservation Consulting. Interview by author, (05/10/2023).



A

[FIGURE 2/A]: Alula Station: The water tower and wind turbine employed windmills to lift the water from the deep wells © Photos taken by the researcher.



B



C

D

E

[FIGURES 2/ B-E]: Alula Station: interior of the water tower, original pipework and a boiler © Photos taken by the researcher.



A

B

[FIGURES 3/A-B]: The remaining rolling stock in Alula © Photos taken by the researcher.



A



B

[FIGURES 4/A-B]: The evidence of the original lamps and historical building details © Photos taken by the researcher.



A

[FIGURES 5/A]: The remains of the Hejaz Railway's main line © Photos taken by the researcher.



B

[FIGURES 5/B]: The reuse of Hejaz rails in the urban fabric of Alula. The term 'urban fabric' describes the physical characteristics of urban areas, i.e., cities and towns © Photos taken by the researcher.



C



D

[FIGURES 5/C- D]: The Hejaz Railways' bridge over Muazzam area, named after the architect, is near al-Muazzam Station © Photos taken by the researcher.

Alula Station is the perfect place for an open-air museum, which can preserve the archaeological and industrial evidence found in all stations of the Hejaz in Alula [FIGURES 6/A-C]. Evidence of historic buildings, ladders and original windows (Al-Baraika Castle, Bir al-Jadeed Station, Khashm Castle, Sana'a Station-Elfakeer Fort, Elbaday Station, Sahl El Matran Station, as well as Zmord Station and Fort), [FIGURES 6 /D-E; 7/A-C] show the remains of ceramic vessels, such as glazed earthenware, produced in alMuazzam Station during the early 20th century.

The mission of the museum is to highlight industrial heritage in the Arab region and the Muslim world, with a focus on Alula Station, one of the main stations of the Hejaz Railway. The museum aims to inspire younger generations by emphasizing the importance of railway heritage and to foster critical discussions within the Saudi community about preserving this legacy.

The station is located in Alula, one of the ancient oases in the northwest of Arabia. It was an important cultural center in the sixth century BC and the capital of the Kingdom of Dedan and then the Kingdom of Lihan. It was also a commercial and cultural center for the State of Ma'in. During the Nabataean era, the importance of Alula declined and al-Hijr emerged as the capital. The Messenger, may God bless him and grant him peace, passed through Alula on his way to Tabuk. During the Umayyad era, Alula was a small village, as narrated by al-Tabari. Settlement in Alula continued throughout Islamic history since the early seventh century AH. and it became the only inhabited city on the Hajj route between Medina and Tabuk. After all the cities and villages in the Wadi al-Qura district disappeared in the early Islamic period, the oldest description of them from that period was mentioned by Ibn Shuja' al-Dimashqi, who passed through Alula in 623 AH. The old town of Alula has survived and retained its ancient architectural style and layout. The traveler Ibn Battuta described Alula in the 8th century AH/14th century AD, describing how pilgrims benefiting from the water available in it, the honesty of its inhabitants and their good treatment of the pilgrims³⁰.

³⁰ NASSIF 1986: 5-6.



A B C

[FIGURES 6/A-C]: The remains of metal parts of the Hjaz Railway al-Muazzam Station © Photos taken by the researcher.



D E

[FIGURES 6/D-E]: Evidence of historic buildings, ladders and original windows (Al-Baraika Castle, Bir Al-Jadeed Station, Khashm Castle and Sana'a Station) © Photos taken by the researcher.



F

[FIGURE 6/F]: Evidence of historic buildings' design of the stations of Elfakeer Fort, Elbaday Station, Sahl El Matran Station as well as Zmord Station and Fort © Photos taken by the researcher.



A B C

[FIGURES 7/A- C]: The remains of ceramic vessels such as glazed earthenware, produced in the early 20th century in al-Muazzam Station © Photos taken by the researcher.

Design of the Industrial Heritage Museum in Alula

A sample scenario of the Industrial Heritage Museum in Alula, Saudi Arabia (Talking Museum) was designed by the author. The museum documents the stories and memories of pilgrims of the Hejaz Railway in Saudi Arabia and is located at the same site as Alula Station. The museum preserves the original design and authenticity of the station, featuring a train with five carriages inspired by the historic Hejaz Railway. This train serves as the main building of the museum, housing the exhibits and showcasing the collection. The Time Train Museum at Alula Station, located in Alula Station, Saudi Arabia, is an Industrial Heritage Museum supported by key stakeholders, including the Royal Commission for Alula, UNESCO and important public institutions in Alula. The museum's collection features Alula station's driven water pump, along with industrial artifacts at the site, such as historical machines, manuscripts, photos and archival papers.

The scenario employs holographic projections to allow the objects in a museum exhibition to «talk» during the user's visit and explain the industrial devices in the Arab and Muslim worlds. Focusing on Alula Station highlights industrial heritage's social value as records of the lives of ordinary men and women. As such, it provides an essential sense of identity.

The visitor explores the buildings and infrastructure in their original context and experiences the stories, places and engineering marvels behind the Hejaz Railway in the train model. The theme of the first carriage title is «History» (Gallery №.1: Historical Background about the History of the Industrial Heritage in the Arab and Muslim World). The theme of the second carriage title is «Experience» (Gallery №.2), recreates the atmosphere of the Hejaz Railway carriage, complete with the conductor and ticket man. The display is augmented by the old ticketing machine used in this process with a sample of tickets that encourages visitor interaction. The theme of the third carriage title is «Memory» (Gallery №.3), highlights and presents the memories and the historical and religious significance of the Hejaz Railway for pilgrims (Recording: Famous Quotes with Archive Photos). The theme of the fourth gallery is «Panorama. Gallery №.4», which highlights all the stations of the Hejaz Railway in a VR visual reality tour from Damascus to Alula Station. The theme of the fifth carriage is «Next Station. Gallery №.5», which highlights the last station of Hejaz Railways in El Madina and introduces the Railway Museum in El Madina. Some exhibitions in the Arab world highlight the history of the Hejaz Railway.

An important method of preserving abandoned industrial buildings and monuments is based on adaptive reuse, which finds new meanings and functions in changing landscapes. Abandoned places must be transformed and revived into active places to survive and many have interesting stories to tell. The reuse of industrial buildings for modern cultural activities as a solution to the conservation dilemmas encountered by these buildings and their custodians has been growing in the last two decades, ensuring sustainable and environmentally friendly presences in both the city and the landscape. In this way, industrial spaces have become hosts to culture and heritage and continue to play a central role in their region's storytelling³¹.

³¹ RIBOERA & NESTICO2020: 166-177.

V. THE CASE STUDY ON RAMSES STATION RAILWAY MUSEUM AND RAMSES RAILWAY STATION, CAIRO, EGYPT

Ramses Station was built when the first railway line in Egypt was opened to transport passengers between Cairo and Alexandria. Afterward, the building was expanded twice: once in 1892 and again in 1955. Known as the «Egypt Station», it has been a statement for Egypt's modern history, politically, socially, culturally and artistically, for over 160 years. Due to its significant heritage and architectural value, Ramses Station has been registered on the heritage lists of the National Authority for Urban Harmony, established by Presidential Decree No. 37 of 2001³². The headquarters were opened in August 2004. The distinctive decorations of the Ramses station building style are registered in the inventory lists of architectural heritage pursuant to Law No. 144 of 2006³³.

The old station (the first Cairo Station), located not far from the present station and designed by Edwin C. Baines, was built between 1856 and 1857³⁴. The name Cairo Railway Station was published in *the London News* on August 16, 1856, p. 179³⁵. The building was damaged in a fire in 1882 but rebuilt in 1893. The statue of King Ramses II was placed in the heart of the Square in 1955, giving its name to Midan Ramses, «Ramses Square». Although the statue of Ramses II was moved from the Square in 2006, the name has remained the official and popular name³⁶. In the past, Ramses Station was called Bāb al-Ḥadīd³⁷, where the film director Youssef Chahine drew inspiration for his famous film «Bab al-Hadid», whose events take place at Ramses Station. Egyptian railways and Ramses Station were an inspiration for Egyptian poets and singers. The release of an Arabic classical movie in the 1950s starring Emad Hamdy and Samia Gamal called «The Night Train» reflects the events of an entire era witnessed by the Egyptian railway, documenting the period through its storyline. Thus, the train is not just a building but a witness to a period and its events. [FIGURES 8/A-; 9/A- C& E] show the details of the urban fabric of Ramses Station and the classical Egyptian movies that present Egyptian railways and Ramses Station.

³² «National Authority for Urban Harmony»; <http://urbanharmony.org/download/pdf/Ar.pdf>, accessed on (23/10/2023).

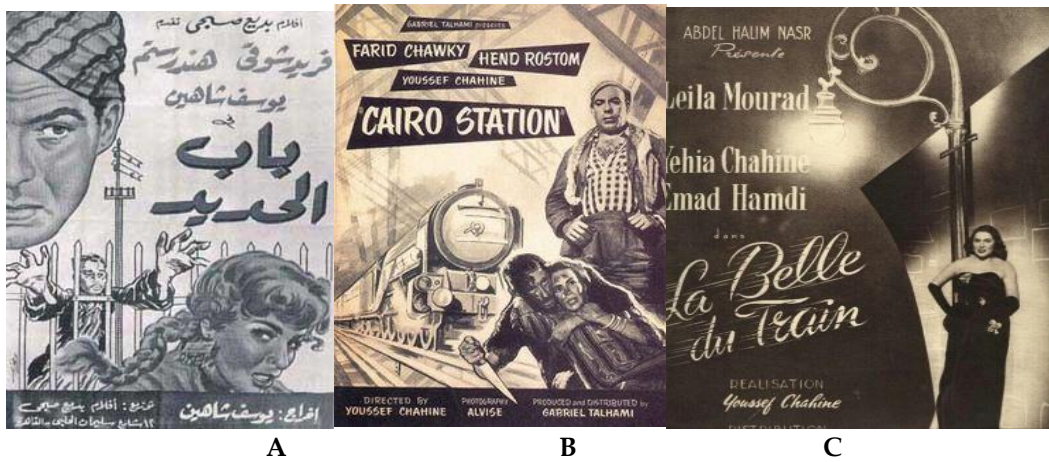
³³ «Return of the Facades of Ramses Station»; <http://www.urbanharmony.org/download/pdf/mahatet%20misr.pdf>, accessed on (23/10/2023).

³⁴ «Old Station First Cairo Station»; <https://www.bibalex.org/alexmed/Attachments/Publications/Files/news%20letter%20issue%206.pdf>, accessed on (12/10/2023).

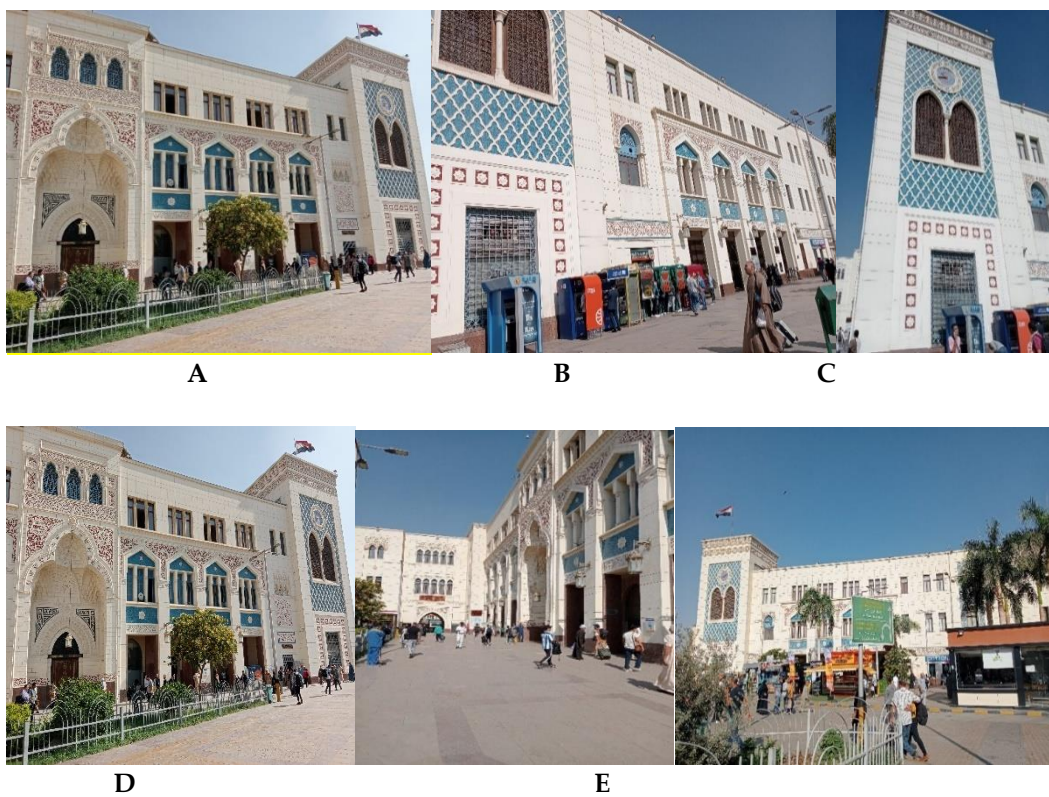
³⁵ «Illustrated London News»29 / 1856, <https://babel.hathitrust.org/cgi/pt?id=mdp.39015013762649&seq=33>, accessed on (23/10/2023).

³⁶ «Egypt Railways. Cairo Governorate Electronic Portal», <https://www.enr.gov.eg/En/>, accessed on (23/10/2023).

³⁷ GORDON 2012: 217–237.



[FIGURES 8/A-C]: Classical Egyptian movies; <https://www.filmaffinity.com/en/film940599.html>, accessed on (02/10/2023).



[FIGURES 9/A-E]: The details of the urban fabric and physical characteristics of Ramses Station.

© Photos taken by the researcher.

The Egyptian Railway Museum was built on October 26, 1932 and opened during the International Railway Conference on January 15, 1933, to tell the story of trains in Egypt. It is located across two floors inside the Ramses Station building in Ramses Square, downtown Cairo. It displays the history and development of various means of transportation, from animals and sailboats to trains, from ancient Egypt until the invention of steam trains. The second floor tells the story of the development of steam trains and railway tools since they were first used in Egypt in the 19th century³⁸. In front of the museum is a steam locomotive painted green, which was made by the British

³⁸ «Egyptian State Railways Company»; <https://enr.gov.eg/ticketing/public/login.jsf>, accessed on (23/10/2023).

firm Robert Stephenson in 1865 in cooperation with the Egyptian Railways. Robert Stephenson was the builder of the Darlington and Stockton Railway in northern England in the 1820s and was the son of George Stephenson, whose company built was the world's earliest modern railway³⁹ [FIGURES 10/A-B].

Ramses Station and Railway Museum have been suggested to be included on the World Heritage List based on the following criteria: Criterion (IV)⁴⁰. The historical buildings of Ramses Station are in good condition and the Railway Museum, with its unique collection, adds to the value of the station. The conservation of the museum's collection underscores the importance of industrial heritage as cultural property. This can only happen by providing a suitably preventive conservation environment for the industrial collection, which is also a challenge since most of the objects in the collection are very large, composite or complicated in terms of preservation and maintenance. Industrial collections are made of various materials, including metals, wood, textiles, lacquers, rubbers and plastics, each with its own problems⁴¹.



A



B

[FIGURES 10/A-B]: A steam-painted green locomotive made by the British firm Robert Stephenson in 1865 © Photos taken by the researcher

The Egyptian Railway Museum features many rare items, including approximately seven hundred models of steam trains, spanning from their coal-powered origins to diesel.. In addition to machines and equipment, one method of preserving industrial heritage is through display and interpretation. The most important one is a model of a steam locomotive, the second largest steam locomotive in Egypt and the gilded royal train of Khedive Ismail, which was specially made in

³⁹ HUGHES 1981: 17-32.

⁴⁰ «UNESCO World Heritage List of Nomination»; <https://whc.unesco.org/en/criteria>, accessed on (23/10/2023).

⁴¹ BAKER & MCMANUS 1992: 77-85.

Newcastle, England, in 1859. It includes six carriages for Khedive Ismail, his family, officers, princesses and train drivers. It also contains models of diesel cars, the oldest of which dates to 1855, a 1906 passenger train locomotive and models of the 1854 Benha Railway Bridge which was the earliest constructed. An interactive model sheds light on the main Cairo Railway Station in Ramses Square, in addition to detailed models of the Tanta (1933), Cairo Saray al-Qobba (1940), Edfu (1928), Alexandria Sidi Gaber (1948), Assiut (1928) and Port Said (1955) stations. A copper weight dating to 1853, which was used by the state railway company for supplying steam engines with water, is also on display. The museum also features a comprehensive panorama of an entire railway line, along with displays on the evolution of ticket printing, including the tools used and the first ticket printing machine, which was introduced in 1890⁴².

VI. FINDINGS

Based on the interviews and focus group discussion, the findings raised the issue of the conservation of industrial heritage of both machines and structures. Museums can highlight the importance and interest of railway components as industrial heritage and provide knowledge, stories and information about railway routes. They preserve and exhibit railway heritage which is an effective method of preservation.

The responses of the interview questions were directed to the conservators and archaeologists working at RCU to evaluate the current state of conservation of the industrial collections.

- The Hejaz Railway is UNESCO's tentative list⁴³.
- The RCU has rare archival manuscripts and maps of the Hejaz railway and its construction. The RCU displays these rare archive materials in the international exhibitions⁴⁴.
- The most logical and efficient approach to providing long-term preservation for the Hejaz Railway would be to employ all or a part of it as a heritage line.
- Selecting a station on the line to be an open-air museum can enhance the historical value and worldwide interest in the railway, maximize the potential for visitor engagement and experience and preserve the archaeological and industrial evidence found at all stations of the Hejaz in Alula.

The responses of the interview questions for elderly people in Alula, Saudi Arabia, were used to learn what the local community thinks about building the Hejaz Railway, the line's operation and its importance in transporting pilgrims to the Holy Lands. The interviews measured the extent of knowledge and level of acquaintance with industrial heritage in Saudi Arabia.

- The Saudi community in Alula is an agricultural, not industrial, community. Some of the older generation participated in the preparatory work before railway construction in the early phase, including the operation of laying out the rails and

⁴² Observation by the researcher during his visit to the Railway Museum in November 2023. The Egyptian State Railways Company.

⁴³ «Tentative list of UNESCO»; <https://whc.unesco.org/en/tentativelists/6026>, accessed on (23/10/2023).

⁴⁴ Face-to-face interview with Jonathon Wilson, Royal Commission for Alula. (BENDAKIR. M, HCC Heritage Conservation Consulting). Interview by the researcher, (October 5, 2023).

sleepers over the ready formation. Because of early construction problems and the long delays at the end of 1902, a greater number of foreign employees were hired.

- Hejaz Railway was used for transporting goods as well as for transferring pilgrims.
- Hejaz Railway is closely tied to memories of visits to the Holy Lands in the early 20th century.
- Reviving the railway path can be very effective for people in Alula, Saudi Arabia.
- Many workers who participated in the construction of Hejaz Railway wrote some words on the rocks nearby, highlighting its religious value. For example, one inscription, written in Arabic, is the Testimony of Faith: "I bear witness that there is no deity but God and I bear witness that Muhammad is the Messenger of God."

The results of the interview questions posed for key stakeholders about preserving Egypt's industrial heritage, specifically the case of Ramses Station and the Railway Museum in Cairo.

- The Railway Museum is attached to the station and affiliated with the Egyptian Ministry of Transportation.
- The conservation of the Railway Museum in Egypt focused mainly on the preservation of the museum's collection through the display of items from the railway, which is a means of conserving Egyptian railway heritage. The display explains why and demonstrates how the collections of the Railway Museum continue to be conserved.
- The complexity of the nature of industrial heritage is one of the major challenges in the conservation process.
- Recreating the context of industrial heritage through the display of the machine maintains the soul of the objects. The reconstruction of a machine should consider authenticity and provide an interactive experience for visitors.
- Some models on display in the museum show how the machine works. Historical trains and some rare documents were recorded in the antiquity records of the Supreme Council of Antiquities and the Ministry of Tourism and Antiquities, demonstrating the cooperation between ministries in preserving industrial heritage in Egypt.
- The Khedive period in Egypt is a part of Egyptian history that the state works to protect.
- Cairo Station is registered in the records of heritage buildings of the Urban Harmony Authority of the Cairo Governorate and the antiquities registry because it is more than one hundred years old. All restoration and modernization projects for the station took into account the standards of preserving the authenticity of the historical station. The museum is part of the station and is currently managed by the Ministry of Transport, with the assistance of the expertise of the Ministry of Tourism and Antiquities in preservation operations, if necessary.

VI. CONCLUSION

The paper argues that industrial railway heritage in the Middle East, in the case of Egypt and Saudi Arabia, is a rich topic. Railway station buildings can be preserved and transformed into an industry museum. The railway station's industrial heritage is a driver of urban regeneration and social cohesion. The Industrial Heritage Museum at Alula Station, developed as a «talking museum» and provides a unique and immersive experience by capturing the stories and recollections of Hejaz Railway pilgrims.

Holographic projections and interactive displays increase visitor interaction and preserve the authenticity of industrial history. The Egyptian Railway Museum displays vast collections concerning the development of railways through rare and important pieces, from models of steam trains to the gilded royal train used by Khedive Ismail. In this way, the museum interprets industrial heritage and educates its visitors about changes in railway technology. The Alula Museum can display industrial history by recording the stories and memories of Hejaz Railway pilgrims using holographic projections and interactive displays. This method, inspired by the Egyptian Railway Museum, informs visitors about advances made in railway technology. The approach is a good example of the role that museums can play both in understanding and protecting industrial heritage.

The interviews and focus group discussions provided the opportunity to create awareness of the need for preserving industrial heritage in general and the machines and structures, in particular. Museums are also very important in the safekeeping and interpretation of railway history. To attain this holistic understanding of the conservation, management and interpretation of the Hejaz Railway Heritage Sites in Saudi Arabia and the Ramses Railway Museum in Egypt, different methods were utilized. The in-depth interviews with directors and officials provided valuable insights into their views on the conservation of industrial heritage. Field visits allowed for observation of those aspects that might not have been disclosed through interviews, while interactions with the elderly community in Alula set forth a historical context in which the Hejaz Railway and its importance are revealed. Also, direct on-site observations, analysis of policy documents and industrial building investigations on the spot in both locations contributed to getting an overall idea about how industrial heritage is related to railways. The multi-disciplinary research methodology highlighted the need to preserve industrial heritage by pointing out various ways of capturing information comprehensively and accurately.

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