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An Inventory and documentation of human skeletal remains discovered at the Khemissa archaeological site

Dr. Mansouri Farida
Institut D'archéologie-Université Alger2, Algeria
Email : farida.mansouri@univ-alger2.dz

Denidni Souad Ayatarahmane
Institut de traduction-Université Alger2, Algeria.
Email :souad.ayatarahmane.denidni@univ-alger2.dz

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ABSTRACT

This research focuses on the identification of human skeletal remains discovered at the archaeological site of Khamissa (Thubursicu Numidarum) in the Wilaya of Souk Ahras, one of the most prominent archaeological sites in Algeria. The study aims to provide a detailed description of the skeletal remains using technical cards as a primary tool for data collection and documentation. This includes information such as sex determination, positioning, bone condition, and the depth at which the remains were found, in addition to an examination of the surrounding soil layers.

This research offers a valuable database that can serve as a reliable foundation for future studies. It contributes to enriching the archaeological knowledge of the Khamissa site and provides new perspectives on systematic methods for archaeological data collection and analysis.

Keywords: Khamissa, skeletal remains, archaeology, technical cards, documentation.

INTRODUCTION

The importance of studying archaeological skeletal remains lies in their ability to provide valuable information about the health of past populations, their dietary habits, and lifestyles. Moreover, such studies enable a deeper understanding of burial practices and funerary rituals that were prevalent during those periods, thereby enhancing our understanding of the cultural and social history of ancient societies.

This research addresses a central question: how to effectively collect, document, and analyze discovered skeletal remains during excavation using precise scientific methods. A particular focus is placed on technical record sheets that accurately describe these skeletons, detailing aspects such as sex, position, burial type, bone preservation status, measurements, and the depth and soil layers in which they were found. Our scientific approach combines theoretical analysis with fieldwork,

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focusing on skeletal remains within their archaeological context to address their definition, significance, and methods of analysis. Furthermore, the research methodology and documentation procedures are discussed, including sample collection methods and the preliminary steps of scientific analysis and recording – especially given that the dating of these skeletal remains is currently imprecise.

First – Skeletal Remains in the Archaeological Context

1. Definition of Archaeological Skeletons

Archaeological skeletons are the remains of human bones discovered at archaeological sites, which provide valuable information about ancient civilizations. These skeletons are studied within a subfield of archaeology known as physical or biological anthropology, which focuses on the study of human bones to interpret the biological, social, and cultural history of ancient communities (Larsen, 2015, p.23). This scientific field enables researchers to use bones as a means to understand various aspects of past human life, offering important insights into population composition, health, and lifestyles.

2. Archaeological Significance of Skeletons

Skeletons hold great importance in the archaeological context for several reasons. They offer direct information about individuals who lived in the past, allowing researchers to understand various aspects of their lives, such as age at death, sex, health status, and sometimes causes of mortality. Through the analysis of this data, archaeologists and anthropologists can construct a comprehensive picture of life in ancient times (Buikstra & Thorbekk, 1993, p.5).

Moreover, the study of skeletons contributes to uncovering the environmental and social conditions in which individuals lived, helping to understand the dynamics of ancient societies and their interactions.

Skeletons are considered an important biological record, revealing details often undocumented in historical records. For example, the study of bones can uncover signs of ancient diseases such as tuberculosis and leprosy, as well as injuries and fractures that may have resulted from accidents or violence (Roberts & Manchester, 2005, p.4). This type of analysis provides crucial information about the population's health and the prevalence of diseases and injuries, allowing for comprehensive interpretations of healthcare levels and living conditions during those periods.

3. The Human Skeleton

Scientific Name	Abbreviation	Number in the Skeleton
Cranium	Cr	1
Mandibula	Ma	1
Atlas	At	1
Epistropheus/ Axis	Ep	1
Vertebrae cervicalis	Vce	12

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Vertebrae thoracica	Vt	5
Costae	Cos	24
Sternum	Ste	1
Vertebrae lumbalis	Vl	5
Sacrum	Sa	1
Vertebrae caudalis	Vca	Fused (Terminal Segment / Tailbone)

A– Upper Limbs

Scientific Name	Abbreviation	Number in the Skeleton
Scapula	Sc	2
Clavicula	Cl	2
Humerus	Hu	2
Radius	Ra	2
Ulna	Ul	2
Carplia	Ca	16
Metacarpalia	Mc	10
Phalanges interior	Ph	Per digit: 2–3

B– Lower Limbs

Scientific Name	Abbreviation	Number in the Skeleton
Pervis/coxa	Pe	1 (from the two halves)
Femur	Fe	2
Patella	Pa	2
Tibia	Ti	2
Fibula	Fi	2
Tarsalia	Ta	Tarsalia10 (excluding the ankle and heel)
Talus	Tal	2
Calcaneus	Cal	2
Metarasalia	Mt	10
Phalanges posterior	Php	Per digit 2-3

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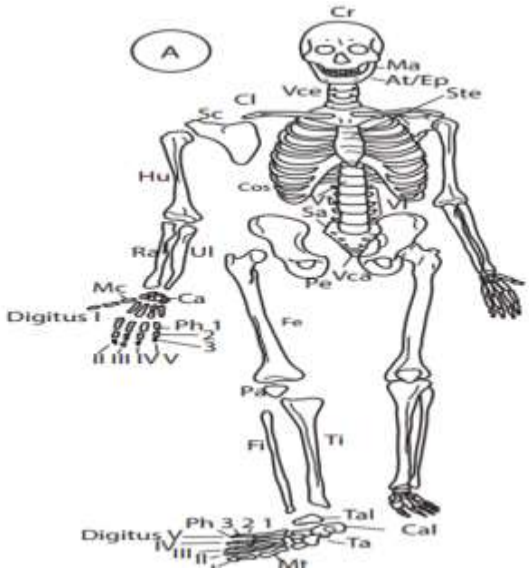

Figure 2: Human Skeleton

Digits II, III, IV, and V (fingers/toes) of both the hand and foot typically have three phalanges each, while Digit I (the thumb/big toe) has only two phalanges. These digits connect proximally to their respective metacarpal or metatarsal bones.

4– Techniques and Methods of Analysis

Various techniques and methods are used in the analysis of skeletal remains, ranging from simple visual inspection to advanced technologies such as magnetic resonance imaging and genetic analysis. The most important of these methods include:

A. Visual Examination:

This is the first step in analysis and involves assessing the general condition of the bones and identifying any visible signs of disease or injury (White, Black, & Folkens, 2012, p.89). This basic step allows researchers to observe the visual characteristics of the bones, such as deformities or pathological marks that may indicate specific conditions experienced by the individual.

B. Radiocarbon Dating:

An essential technique used to determine the age of bones by measuring the ratio of carbon-14, which helps in accurately dating archaeological remains (Taylor & Bar-Yosef, 2014, p.34). This technique is a key tool in establishing the chronological age of bones, thereby contributing to placing archaeological finds in their correct historical context.

C. DNA Analysis:

Used to analyze DNA extracted from bones, providing information about ethnic origins and genetic relationships between individuals and ancient communities (Pääbo, 2014, p.102). This type of analysis allows for understanding the genetic ancestry of populations and uncovering migrations and interactions among different communities over time.

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D. Medical Imaging:

Such as X-rays and magnetic resonance imaging (MRI), which allow for viewing the internal structure of bones and detecting abnormalities or injuries that are not visible to the naked eye (Brickley & McKinley, 2004, p.56). These advanced techniques enable archaeologists to examine skeletal remains in great detail, helping to accurately diagnose pathological conditions and ancient injuries.

Second – Research Methodology and Documentation in the Study of Archaeological Skeletons

1. Collection of Archaeological Samples

The study of skeletal remains begins with the systematic and precise collection of samples from the archaeological site. This process requires the application of advanced excavation techniques to ensure the extraction of bones with minimal damage. Excavation is typically carried out using delicate tools such as small brushes and tweezers to avoid harming the bones (Renfrew & Bahn, 2016, p.57).

In other words, this meticulous process contributes to preserving the integrity of the discovered bones, which in turn allows for accurate and comprehensive laboratory analysis. This initial stage is crucial for ensuring the quality of the samples and providing a solid foundation for subsequent analysis.

2. Laboratory Analysis Procedures

After collecting the samples, they are transferred to the laboratory where they undergo a series of examinations and analyses. During this stage, the bones are cleaned and visually inspected to determine their overall condition and to identify any visible signs of disease or injury. The initial visual examination provides a general overview of the bone condition, allowing specialists to detect any deformities or lesions that may indicate health conditions or specific incidents. This process includes several stages:

A. Medical Imaging:

X-rays or magnetic resonance imaging (MRI) are used to examine the internal structure of the bones and detect any abnormalities or internal injuries (Brickley & McKinley, 2004, p.60). Medical imaging enables a detailed understanding of bone structure and helps identify health problems not visible to the naked eye, contributing to a more comprehensive analysis of the individuals' health status.

B. DNA Analysis:

DNA extraction techniques are applied to analyze genetic material and determine the ethnic origins and genetic relationships between individuals (Pääbo, 2014, p.107).

DNA analysis is an advanced step that allows researchers to explore genetic relationships, providing deeper insight into ethnic origins and patterns of human migration over time.

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C. Stable Isotope Analysis:

This technique is used to study diet and geographic mobility based on isotope ratios found in bones (Price, 2015, p.42).

Stable isotope analysis provides accurate information about individuals' dietary habits and geographic movement, helping to construct a comprehensive picture of their lifestyle and the environment in which they lived.

2. Documentation of Findings

Documentation is an essential part of the research process in the study of archaeological skeletal remains. All collected and analyzed data must be accurately recorded in scientific records to ensure the possibility of future review and reanalysis. Documentation includes the following components:

A. Recording Initial Data:

This involves logging all basic information related to the sample, such as the sample number, geographic location, date, and a general description of the specimen (Larsen, 2015, p.30). Recording initial data is a vital step in archaeological documentation, ensuring a precise reference for further detailed analysis.

B. Recording Analysis Results:

All results obtained from various examinations—including visual inspections, imaging, DNA, and isotope analyses—must be carefully documented (Buikstra & Ubelaker, 1994, p.50). This ensures a comprehensive record of all tests performed, contributing to a multidimensional and integrated analysis of the skeletal remains.

C. Photographic Documentation:

Photographic recording is an important aspect of documentation. High-quality images should be taken of the bones from various angles to document their condition and visible observations (White, Black, & Folkens, 2012, p.102). Photographic documentation provides visual evidence to support recorded data, thereby enhancing the accuracy and reliability of the research.

D. Utilization of Digital Databases:

It is preferable to use digital databases for storing and organizing data, as this facilitates efficient searching, retrieval, and advanced data analysis (Renfrew & Bahn, 2016, p.63). Utilizing digital databases allows for quick and structured access to information, thereby improving the effectiveness and efficiency of archaeological research.

3. Data Analysis and Conclusion

After collecting and documenting all data, the next stage is to analyze the findings and extract essential information about the individuals and communities studied. This includes:

A. Age and Sex Analysis:

Determining the age and sex of individuals by examining the morphological characteristics of bones, such as the size and shape of the skull and pelvis (White, Black, & Folkens, 2012, p.110).

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Age and sex analysis is fundamental in studying skeletal remains, as it allows for an understanding of the demographic composition of ancient societies and helps interpret the roles of individuals within them.

B. Health Status Analysis:

Assessing the health of individuals by examining signs of disease and injury on the bones, which provides information about chronic illnesses, fractures, and quality of life (Roberts & Manchester, 2005, p.75). Health status analysis contributes to a comprehensive view of living conditions and overall health in ancient societies, allowing researchers to infer the levels of healthcare and nutrition they received.

C. Dietary Pattern Analysis:

Using isotope analysis to determine the dietary patterns of individuals, offering insights into food sources and changes in diet over time (Price, 2015, p.49). Analyzing dietary patterns helps in understanding food habits and environmental changes that affected the availability of food resources, thereby enhancing our knowledge of the economic and social adaptations of ancient communities.

D. Interpreting Data in the Archaeological Context:

Placing the findings within their broader archaeological context to understand relationships between individuals and communities, as well as social and environmental changes (Larsen, 2015, p.35). Interpreting data in context allows for integrated and holistic insights into social and environmental interactions, strengthening our ability to reconstruct the life stories of individuals and societies through time.

Third – Skeletal Remains Discovered at the Archaeological Site of Khemissa

It is necessary to begin by referencing the archaeological site where the excavation was carried out, which dates back to an ancient period. It is also essential to specify the precise location of the excavation, based on field data and geographic criteria recorded during the excavation process. In addition, technical data sheets for the discovered skeletal remains must be provided, containing key information that allows for the systematic and organized documentation of the remains—facilitating the process of drawing final conclusions.

1. The Archaeological Site of Thubursicum Numidarum

The city of Thubursicum Numidarum, known today as Khemissa, is located in the far east of Algeria, specifically in Souk Ahras Province. It covers an area of 45 hectares and is built on a steep plateau from which the Majerda River originates.

The city shows evidence of human activity from various historical periods, as indicated by archaeological remains. At one time, it was known as the capital of the Numidians. According to discovered Latin inscriptions, the city belonged to a local tribe known as the "Numidarum Clan" that inhabited the region.

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This archaeological city was classified as a historical site within the national heritage in 1968 by a presidential decree (Official Journal No. 07/1968). This classification was later reviewed under Law 98/04 on the protection of cultural and historical heritage (Official Journal, 1998, p.44).

2. Excavation Site

The selection of the excavation location was not coincidental; it was the result of several historical and geographical considerations that reinforced its archaeological and scientific value. After careful surveying of the site, the excavation was carried out at the highest point of the area—on a plateau rising approximately 960 meters above sea level.

The excavation square covers an area of about 194 square meters, with a length of 16.80 meters and a width of 11.50 meters, according to the markers that defined the boundaries of the excavation unit.

The excavation was conducted in three phases:

- The first phase took place in June and July 2022,
- The second phase in October 2022,
- The third phase in September 2023.

During these periods, human skeletal remains and other materials were discovered. The site where these remains were found was part of the ancient urban center, where remnants of stones and mortar were associated with organized construction. Tracing these remnants revealed outlines of ancient walls.

At a depth of approximately 80 cm, remnants of roof tiles and a collapsed wall were uncovered in the northwestern section of the excavation square (A). At a depth of one meter, the intersection of two walls was found—one extending east to west, and another north to south—in addition to a central wall and a large, shaped stone block.

The skeletal remains were distributed across this area, particularly in the center and alongside the walls.

3. Technical Records

Record No. 01

Skeleton No. 01	
	**Skeleton Image**

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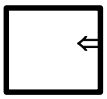
Presumed to be a female		**Sex**
Lying on the right side		**Position of the Skeleton**
On the right side, head facing south, legs facing north, face oriented eastward, lower limbs slightly bent backward		**Burial Method**
No visible signs of injury or damage		**Condition of the Bones**
142.36 cm ± 5 cm		**Height**
Soil Layer		
Disturbed burial environment or possibly an area of intense human activity	**Mixed soil layer with stones**	
Stable natural soil, possibly indicating a calm burial environment	**Normal soil layer**	
Soil with a high iron oxide content, possibly indicating specific chemical reactions affecting the bones	**Red soil layer**	
80cm		**Depth**

Record No. 02

Skeleton No. 02	
	**Skeleton Image**

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Presumed to be a male		**Sex**
Lying on the back		**Position of the Skeleton**
Supine position with arms extended at the sides, head facing south, legs facing north		**Burial Method**
No visible signs of injury or damage. The skeleton is complete, with all major bones in place, except for the skull, which is half damaged and crushed		**Condition of the Bones**
177.4 cm ± 5 cm		**Height**
Soil Layer		
Disturbed burial environment or possibly an area of intense human activity	**Mixed soil layer with stones**	⇐
Stable natural soil, possibly indicating a calm burial environment	**Normal soil layer**	
Soil with a high iron oxide content, possibly indicating specific chemical reactions affecting the bones	**Red soil layer**	
1meter		**Depth**

Record No. 03

Skeleton No. 03	
	**Skeleton Image**

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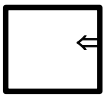
Presumed to be a male		**Sex**
Lying on the side		**Position of the Skeleton**
Lying on his side with arms positioned backward, head facing south, legs facing north		**Burial Method**
No visible signs of injury or damage; the skeleton is complete with all major bones in place, except for the skull, which shows signs of damage, including an opening		**Condition of the Bones**
166.97 cm ± 5 cm		**Height**
Soil Layer		
Disturbed burial environment or possibly an area of intense human activity	**Mixed soil layer with stones**	
Stable natural soil, possibly indicating a calm burial environment	**Normal soil layer**	
Soil with a high iron oxide content, possibly indicating specific chemical reactions affecting the bones	**Red soil layer**	
1.80 meter		**Depth**

Record No. 04

Skeleton No. 04

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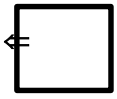
		**Skeleton Image**
		
Presumed to be a young male due to the absence of the acromion bone		**Sex**
Lying on the side		**Position of the Skeleton**
Lying on his side with both arms bent in front of the chest, head facing south, legs facing north		**Burial Method**
The skeleton is incomplete, with several major bones missing; the skull shows signs of damage and fracture		**Condition of the Bones**
151.14 cm ± 5 cm		**Height**
Soil Layer		
Disturbed burial environment or possibly an area of intense human activity	**Mixed soil layer with stones**	
Stable natural soil, possibly indicating a calm burial environment	**Normal soil layer**	
Soil with a high iron oxide content, possibly indicating specific chemical reactions affecting the bones	**Red soil layer**	
1meter		**Depth**

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4. Additional Archaeological Observations

Images No. 05 and No. 06 reveal the presence of two other skeletal remains, which appear as piled clusters of bone fragments, suggesting that they likely belong to a single individual. It is assumed that these bones were reburied after being previously disturbed, as they were placed in a stacked position within the soil.

In addition, traces of ash were found, indicating earlier human activity involving the use of fire. These findings can be interpreted as part of funerary rituals or ancient burial practices that included the rearrangement of bones and the use of fire as a ceremonial element.

Figure No. (07) **Figure No. (08)**

5. General Description of the Technical Records for the Four Skeletal Remains

The four technical records present a set of archaeological findings representing diverse skeletal remains, which may belong to different time periods—or possibly to the same period—as the research is still ongoing and the excavation is not yet complete. The exact dating of these remains has not yet been determined. These records provide an approximate description of each skeleton in terms of sex, position, burial method, general condition, and estimated height, along with a study of the surrounding soil layers.

A. Sex and Position

- Skeleton No. (01) is likely that of a **female**, while skeletons No. (02) and (03) are presumed to be **male**, and skeleton No. (04) is likely a **young male**.

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- The shared burial position across all four skeletons was **lying on the side**, with the **head facing south** and the **feet facing north**, and the **arms bent toward the chest**, except for skeleton No. (04), whose arms were **extended**.

B. Condition and Burial Method

- All four skeletons lack visible signs of injury or cutting, which may indicate a **peaceful and organized burial**, except for the **skulls of skeletons No. (02), (03), and (04)**, which showed signs of **damage or fractures**, possibly due to **post-burial disturbances**.
- Skeletons No. (01), (02), and (03) are **generally well-preserved**, while skeleton No. (04) is **incomplete**, showing the **absence of several key cranial bones**.

C. Skeleton Height

The height of the individuals ranges between **142.36 cm and 177.4 cm**, reflecting the **natural variation in human stature** for the studied historical period.

D. Soil Layers

The surrounding layers were characterized by **compact, stone-mixed soil**. The depth at which the skeletons were found ranged from **80 cm to 1.20 meters**, which is considered a **typical burial depth** in many ancient—as well as modern—cultures.

CONCLUSION

The archaeological findings indicate that the four skeletal remains were buried in similar positions, with slight variations in burial details and overall preservation condition.

The consistent depth and soil layer suggest that the site was used by human populations over an extended period, reflecting a historically significant context marked by intensive human activity—possibly linked to specific funerary rituals.

The shared orientation of the head toward the south and the feet toward the north may reflect local burial traditions or cultural beliefs regarding spatial orientation, while the differences in skull damage may be attributed to varying environmental or historical factors. Overall, these findings offer a hypothesis that could provide valuable insights into ancient burial practices and contribute to a deeper understanding of the social and cultural environment of the community buried at this site.

In response to the research question posed in the introduction, it is evident that technical records have played a key role in collecting and documenting data related to the skeletal remains. This has enabled the formulation of hypotheses regarding potential funerary practices, even if they cannot yet be confirmed.

Based on these preliminary results, future research will address topics that may expand our understanding of these skeletal remains, including:

- Detailed analysis of the skeletons to determine genetic relationships and the demographic composition of the buried population.
- Analysis of organic materials and surrounding soil to understand the environmental conditions and their impact on the burial process and preservation of the remains.

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- Comparative study of skeletal remains from similar archaeological sites in North Africa to assess the diversity and distribution of burial traditions across the region.
- Search for additional archaeological evidence at the site, such as tools or other artifacts, which may help to date the skeletal remains more accurately and provide better insight into the cultural and social context.

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