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Preliminary Report. Fourth season of the Saudi-French mission in al-Kharj, Province of Riyadh, 23 January - 27 February 2015

Jérémie Schiettecatte, Abdalaziz Al-Ghazzi, Charlène Bouchaud, Antoine Chabrol, Rémy Crassard, Julien Cuny, Michele Dinies, Yamandu Hilbert, Hervé Monchot, Thomas Sagory, et al.

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Jérémie Schiettecatte, Abdalaziz Al-Ghazzi, Charlène Bouchaud, Antoine Chabrol, Rémy Crassard, et al.. Preliminary Report. Fourth season of the Saudi-French mission in al-Kharj, Province of Riyadh, 23 January - 27 February 2015. [Research Report] CNRS, UMR8167 Orient & Méditerranée. 2015. halshs-01186755

HAL Id: halshs-01186755

<https://shs.hal.science/halshs-01186755v1>

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PRELIMINARY REPORT

FOURTH SEASON OF THE SAUDI-FRENCH MISSION IN AL-KHARJ

- PROVINCE OF RIYADH -

23 JANUARY - 27 FEBRUARY 2015



Preliminary report

Fourth season of the Saudi-French mission in al-Kharj

- Province of Riyadh -
23 January - 27 February 2015

Prepared under the supervision of
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DINIES, Yamandu HILBERT, Hervé MONCHOT, Thomas SAGORY & Pierre SIMÉON**

PARIS
2015

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INTRODUCTION

Preamble

Al-Kharj area is one of the major oases of the Najd, in the very heart of the Kingdom of Saudi Arabia. Specific environmental conditions made this area one of the most attractive regions of Central Arabia for settled communities. And as a consequence, the region of al-Kharj appears as an obvious stopping place and main crossroad on the commercial routes that linked Yemen and the Ḥijāz to the Gulf and Mesopotamia.

Stimulated by this prospect, a Joint Cooperative Agreement for Archaeological Surveys and excavations in the oasis of al-Kharj was signed in September 2011 between the Saudi Commission for Tourism and Antiquities (SCTA), Riyadh, and the Centre National de la Recherche Scientifique (CNRS), Paris. A scientific team was formed under the supervision of Abdalaziz al-Ghazzi (King Saud University, Riyadh) and Jérémie Schiettecatte (CNRS, Paris).

The aim of the research is to characterize the diverse prehistoric, protohistoric, pre-Islamic, and Islamic archaeological remains as well as to illustrate the environmental context that made it possible for people to settle in such an arid region.

For the past three years, the archaeological study of this region has open up new horizons for the comprehension of the peopling and settlement process, and of circulation and contacts within the Arabian Peninsula, from prehistory down to the mediaeval period.

The fourth season of survey and excavation was carried out from January 23 to February 27, 2015.

Team

Saudi Part

- Prof. Abdalaziz AL-GHAZZĪ (King Saud University, Riyadh) – head of the project
- Prof. Sālīm bin Aḥmad Ṭayrān (King Saud University, Riyadh) – archaeologist
- Abdalaziz AL-HAMMAD (Saudi Commission for Tourism and Antiquities, Riyadh) – archaeologist
- Dr Sa'īd bin Dubays AL-UTAYBĪ (Saudi Commission for Tourism and Antiquities, Riyadh) – archaeologist
- Dr Abdalaziz b. Fahd B. NAFĪSSA (Saudi Commission for Tourism and Antiquities, Riyadh) – archaeologist
- Khalid AL-HAFĪ (Saudi Commission for Tourism and Antiquities, Riyadh) – archaeologist

European Part

- Dr Charlène BOUCHAUD (postdoctoral fellow, National Museum of Natural History, Paris) – archaeobotanist
- Antoine CHARBOL (Ecole Française d'Athènes, PhD candidate) – geomorphologist
- Dr Rémy CRASSARD (CNRS, Lyon) – archaeologist
- Julien CUNY (INRAP, Lille) – archaeologist
- Michèle DINIES (Deutsches Archäologisches Institut, Berlin, PhD Candidate) – palynologist
- Prof. Eric FOUACHE (Paris-Sorbonne University - Abu Dhabi) – geomorphologist
- Dr Yamandù HILBERT (Maison de l'Orient et de la Méditerranée, Lyon) – archaeologist
- Fanny LARUAZ (Panthéon-Sorbonne University, Paris, Master Student) – archaeologist
- Dr Hervé MONCHOT (postdoctoral fellow, National Museum of Natural History, Paris) – archaeozoologist
- Dr Michel MOUTON (CEFAS, Jeddah) – archaeologist
- Alexia ROSAK (Paris-Sorbonne University, Master Student) – archaeologist
- Thomas SAGORY (Ministry of Culture, Paris) – photographer
- Dr Jérémie SCHIETTECATTE (CNRS, Paris) – head of the project
- Dr Pierre SIMEON (postdoctoral fellow, Pergamonmuseum, Berlin) – archaeologist

Support

The scientific issues dictating our field activities address those set out in four research programmes. These funded the major part of the field activities:

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- Programme 'Oasis d'Arabie déserte', conducted by G. Charloux (UMR 8167 'Orient & Méditerranée', Paris), funded by the Ministry of Foreign affairs, Paris; this programme also supports field activities in Dumat al-Jandal and Najran;
- Laboratoire d'excellence 'Resmed – Religion et Société en Méditerranée', conducted by J.-Cl. Cheynet (UMR 8167 'Orient & Méditerranée', Paris), funded by the Agence Nationale pour la Recherche in Paris [ANR-10-LABX-72];
- Programme 'EmOAD – Emergence des Oasis de l'Arabie Déserte', conducted by J. Schiettecatte (UMR 8167 'Orient & Méditerranée', Paris), funded by the IDEX SUPER (Sorbonne Universités à Paris pour l'éducation et la recherche) of Sorbonne Universités.
- Regular activities of the Research Centre from the Saudi Commission for Tourism and Antiquities, Riyadh, headed by Abdallah al-Saud.

Besides, several institutions and programmes contributed by their financial and technical support to the field activities:

- King Saud University, Riyadh (researchers and logistics);
- Paris Sorbonne University - Abu Dhabi (researcher, funding and logistics);
- CNRS through the research centres UMR 8167 'Orient & Méditerranée', Paris, UMR 7209 'Archéozoologie & archéobotanique, Paris, and UMR 5133 'Archéorient', Lyons (researchers and logistics);
- Académie des inscriptions et belles-lettres, Paris (academic grant);
- Deutsches Archäologisches Institut, Berlin (researcher and logistics);
- Ecole française d'Athènes (researcher);
- Institut National de Recherches Archéologiques Préventives, Paris (researcher);
- 'Service de Coopération et d'Action Culturelle' of the French Embassy, Riyadh (logistics).



Al-Yamâma: team and field workers

Acknowledgments

We would like to thank these institutions most warmly for their support. We are also most grateful to people who put their trust in our work and did their best to make fieldwork possible and easier in Riyadh and Paris: HRH Prince Sultan bin Salman bin Abdulaziz (President of Saudi Commission for Tourism and Antiquities [SCTA] and Chairman of the Board of Directors of SCTA), Prof. Ali al-Ghabban (Vice-President of SCTA for Antiquities and Museums, Riyadh), Abdallah al-Saud (Head of the Research and Excavation Centre, SCTA, Riyadh), Jean-Louis Laveille (Cultural Advisor, French Embassy in Riyadh), Cyrille Le Déaut (Cooperation Attaché, French Embassy in Riyadh), Marie-Véronique Diamant (CNRS, Ivry-sur-Seine).

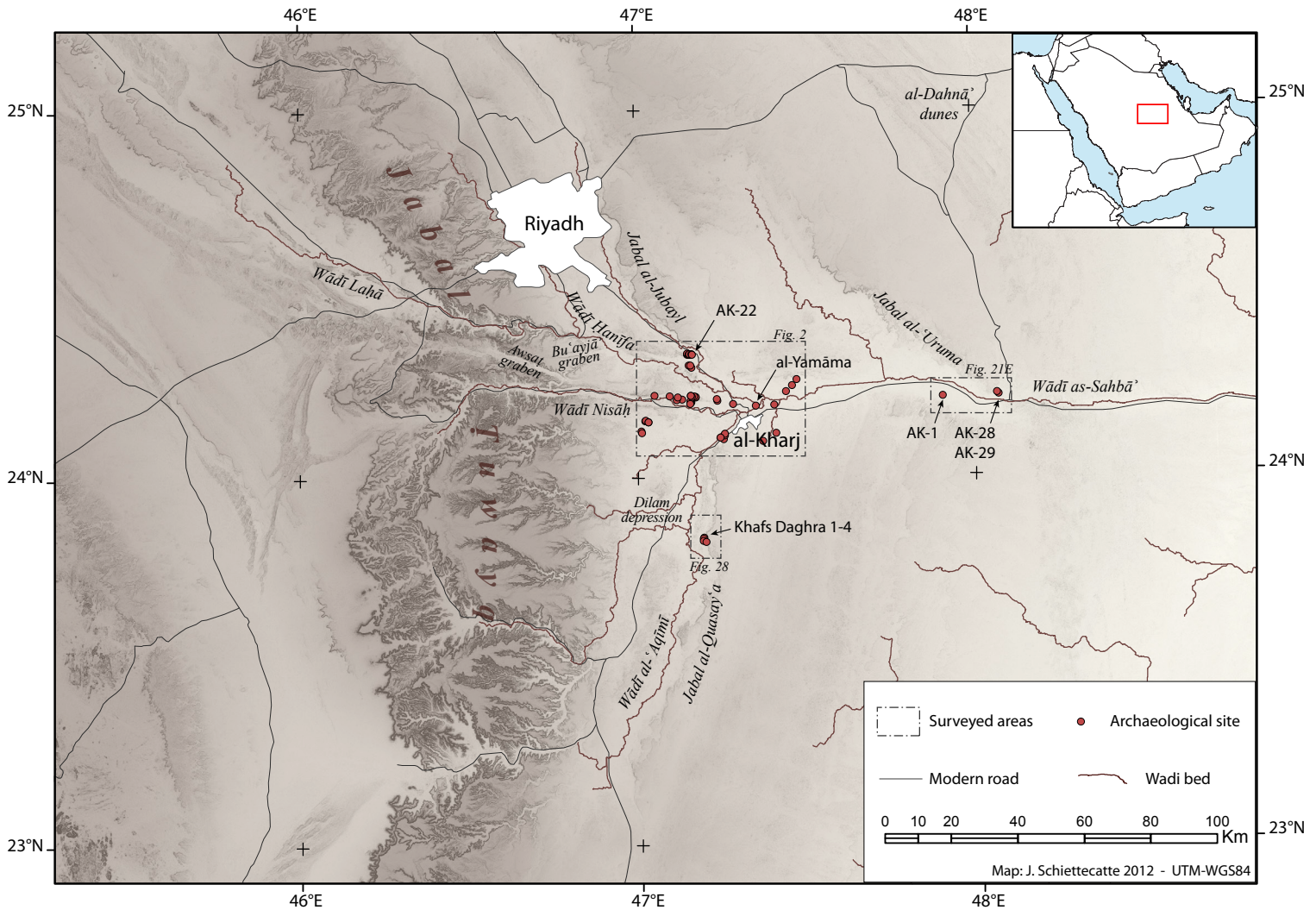


Figure 1 - The location of the oasis of al-Kharj and its setting (J. Schiettecatte – Saudi-French Archaeological Mission in al-Kharj).

Geographic setting

Al-Kharj area is located 70 km south-west of the capital of the Kingdom of Saudi Arabia, Riyadh. The area lies between latitude 23.8° and 24.4° N. and longitude 46.9° and 48° E. (fig. 1).

The Najd region is characterized by a hot, dry climate. Modern annual rainfall rarely exceeds 100 mm: for the period 1980–2007, the annual mean was 94.6 mm and the amount of rainfall was irregular throughout the year, with rain occurring mainly from November to April. The hydrological network includes a large wādī system, with no permanent river. However, water resources from several of the largest aquifers of the Arabian Peninsula have allowed agriculture and farming to develop (SANLAVILLE 2000: 73–75, 210–211).

Al-Kharj is the main city in this area. The rapid growth of the city makes it sprawl into the former palm groves and absorb older villages in its neighbourhood (al-Yamāma, al-Salmiyya, etc.). The second city of the oasis is al-Dilam. This huge agglomeration has more than 376,000 inhabitants. A well-developed road network connects the city of al-Kharj with the capital Riyadh to the north-west, with the United Arab Emirates to the east, and the Wādī al-Dawāsir to the south-west.



Figure 2 - The two major swallow holes in 'Ayn al-Dīla', looking north-west (photograph: Th. Sagory – Saudi-French Archaeological Mission in al-Kharj).

Geological background

The geological context explains the location of al-Kharj area in the Arabian platform. Large units of limestone and sandstone of Jurassic and Cretaceous form more or less eroded plateaus, dissected by valleys (wādīs). Nowadays there is very little flow in them, but in the past it was sufficient to incise them several tens of metres. The major part of wādīs within the oasis of al-Kharj is influenced by series of grabens originating from the opening of the Red Sea, marked by west-east faults.

In the valleys, more recent sedimentary cover includes both fluvial deposits (silt, clay, etc.) and eolian deposits, with barkhan fields in numerous places. Current erosion comes mainly from wind, since the very low rainfall has minimal impact on the ground. Because of the sedimentary context, karst morphologies are common in the oasis of al-Kharj: the most impressive features are swallow holes south-west of al-Kharj (VASLET *et al.* 1991: 35–36) (fig. 2). Three swallow holes are located in ‘Ayn al-Ḍila’, with a diameter of 60 to 80 m, and an average depth of 50 m. These features were formed by the phenomenon of dissolution in calcareous layers.

Topography

The simple geological context provides an easy explanation of the topographical context of the area of al-Kharj.

The oasis is a large, funnel-shaped valley in sandstone and limestone plateaus incised by many wādīs. The joint action of drainage and uplift of the crystalline basement in depth led to the formation of cuestas with escarpments north, north-west and south-west of the oasis.

The area is bounded on the west by a Jurassic mountain, the Jabal Ṭuwayq, through which flows the Wādī Nisāḥ from west to east inside grabens. The Wādī Ḥanīfa comes from Riyadh in the north-west, along the cuesta of the Jabal al-Jubayl, and this escarpment forms the northern boundary of the oasis. South-west, the Wādī al-‘Ayn comes from the slopes of the Jabal Ṭuwayq, and then follows the escarpment of the Jabal al-‘Uruma, on the south side of the oasis. These three main wādīs reach the centre of the oasis and join to form the Wādī al-Sahbā’, which crosses the whole oasis from west to east in the valley bounded by the Jabal al-Jubayl and the Jabal al-‘Uruma. It continues toward the east and is lost in the sands of al-Dahnā’ desert.

The three mountain massifs located around the oasis are almost parallel and bound it to the north, west, and south. The confluence of the wādīs within these mountains forms the cluse of al-Kharj, thus cutting the Jabal al-Jubayl and the Jabal al-‘Uruma into two parts. In this area, the Jabal Ṭuwayq reaches 1,050 m, while the Jabal al-Jubayl and the Jabal al-‘Uruma have average maximum altitudes around 550 m north of the oasis and 500 m south of the oasis.

The central valley with the wādīs slopes gently from west (mean altitude ca. 470 – 480 m a.s.l.) to east (mean altitude ca. 380 m a.s.l.). The oasis ends at the gates of al-Dahnā’ desert.

The confluence of the main wādīs is unclear within the oasis, partly due to the expansion of the city of al-Kharj and the development of infrastructure (road network, farms, etc.). The wādīs are also partly disturbed by other human activities.

The largest archaeological site, al-Yamāma, is near a heavily altered wādī. It is located within the valley but is several metres higher than the surrounding area, which preserved the site from potential flash floods.

Archaeology in al-Kharj: past research and present issues

The favourable environment which made this oasis so promising for archaeological and historical studies should have been all the more inviting given that this area is frequently mentioned in pre-Islamic poetry and Islamic tradition (WÜSTENFELD 1874, THILO 1958, BIN KHAMIS 1978, AL-ASKAR 2002, AL-JUHANY 2002).

In spite of this, archaeological remains in Central Arabia have rarely been noticed. Philby mentioned the presence of tumulus fields, underground water channels and a large ancient settlement, al-Yamāma, during

a journey in the Najd in 1917–18 (PHILBY 1919; 1920). In 1945, Col. G. de Gaury reported the presence of tumulus fields nearby al-Kharj (DE GAURY 1945). A few years later, Philby completed the description of the oases of al-Kharj, al-Aflāj and the Wādī Dawāsir (PHILBY 1949). In 1978, a comprehensive archaeological survey of the Kingdom of Saudi Arabia was carried out in Central Arabia and identified sixteen sites in the oasis of al-Kharj alone (ZARINS *et al.* 1979), confirming the potential of the area. Consequently, in the late 1980s and the 2000s, Abdalaziz al-Ghazzi initiated soundings at four sites in the oasis: on the settlement of Ḥazm ‘Aqīla (AL-GHAZZI 1996, 2009), on that of al-Yamāma (AL-GHAZZI 2010), in the necropolis of al-‘Afja (AL-GHAZZI 2011a), and on the water channel of Abraḡ Farzān (AL-GHAZZI 2011b).

Although limited by their duration or by their scope, these previous studies registered the existence of a variety of sites where one could expect to find answers to several of the current research issues in the Arabian Peninsula.

Regarding PREHISTORY, one of the main current research issues in the Peninsula concerns the dispersal of the first Anatomically Modern Humans (AMH) during the Palaeolithic. A debate also exists about trying to understand where the Arabian Neolithic comes from: Levantine influence or local developments from autochthonous populations? Recent palaeo-environmental and palaeo-climatic studies revealed the possible influence of the wet phases in the development of a production economy. If much has been done in South and East Arabia, the centre of the Peninsula remains unexplored. Environmental studies combined with lithic analysis have therefore been carried out since 2011 in order to address these issues.

The PROTO-HISTORICAL OCCUPATION of the oasis is obvious, through the presence of several necropolises that struck all the travellers and archaeologists passing by in the past. At two of them, al-‘Afja and ‘Ayn al-Dīla’, hundreds of dry-stone turret graves or tumuli are visible. The main issues are the date of their building, and the time span of their use. In Yemen, these tombs delivered artefacts from the third and first millennium BC. Is this indicative of long-lasting funerary practices, or of the reuse of these tombs much later on? Another question regards the cultural affiliation of these funerary practices and people who built the tombs. In West and South Arabia, these tombs were collective and are generally associated with (semi)nomad or pastoralist groups; contrarily, along the Persian Gulf coast and in the Bahrain and Dhahran area, these tumulus tombs were designed for a single body and were the practice of sedentary people. Al-Kharj area is the buffer zone between these two cultural spheres; the study of the burial practices here could be indicative of the very nature of people, of their origin and their way of living. One of these necropolises was investigated in 2013 (see SCHIETTECATTE & AL-GHAZZI [ED.] 2013).

Ascribing a time-span to the sedentarisation process in al-Kharj area is also crucial. Did this process begin right from the third millennium BC, as it can be observed in the Oman Peninsula during the Hafit period, or in Bahrain area during the Dilmun period? Or are we to observe in al-Kharj area an alternate and specific model? Is the sedentarisation process linked to the domestication of the palm tree, as in the Oman Peninsula, or to other criteria such as long-distance trade?

Another issue concerns the LATE IRON AGE AND EARLY CHRISTIAN ERA, a transitional period in the Arabian Peninsula. New populations appeared in historical sources and archaeological contexts; they settled in the Oman peninsula (e.g. Mleiha), in South Arabia (penetration of Arab groups in the Jawf valley), in North-west Arabia (Nabataeans). They all shared common features, particularly in their funerary practices. And yet, the origin of these groups is still unknown. The study of a site in Central Arabia could throw new light on this process.

Finally, issues regarding the LATE PRE-ISLAMIC AND THE ISLAMIC PERIOD are numerous. A sharp decline of the settlement density can be observed in South, West and North Arabia from the 4th century onwards and accelerated during the 6th century. This process might have been partly linked to changes in the environment. Is this process to be observed in Central Arabia? Arab-Islamic sources and preliminary fieldwork results indicate a different trajectory for this region, which might have been continuously occupied from the Late Pre-Islamic period until the end of the 12th century. Finally, a deep sounding on the site of al-Yamāma indicates a temporary abandonment of the site at the end of the 12th century. One wonders what might

have led to such a situation.

As one can see, archaeological research in the oasis of al-Kharj is driven by many questions, and preliminary results are raising new issues. This prompted us to set up complementary field investigations, dealing with the long term, from Palaeolithic to modern times, from the environmental, archaeological and historical point of view.

Purpose of the 4th season, programme, schedule

During the previous field seasons (2011-2013), the aim has been to provide a comprehensive view of the evolution of regional occupation from the Palaeolithic to the Islamic era. This has been achieved through the creation of archaeological and geomorphological maps of the oasis, and the study of significant sites: AK-22, AK-31 (Palaeolithic); ‘Ayn al-Ḍila‘ (protohistoric necropolis) and al-Yamāma (Late Pre-Islamic / Early Islamic settlement).

The fourth season is in line with this previous research, the aim being:

- To continue the prehistoric survey of al-Kharj region along the Rufā’ graben and to excavate the Middle Palaeolithic site AK-31.
- To initiate the excavation of 6 graves in the protohistoric necropolises of the Jibāl Umm al-Sha‘āl.
- To continue the excavation at al-Yamāma in areas N6 (the mosque and its surrounding) and K17 (stratigraphic sounding to the south of the site).
- To continue the study of animal bones coming from al-Yamāma.
- To initiate an archaeobotanical study at al-Yamāma.
- To initiate the geomorphological and palynological study of al-Kharj oasis through the sampling of cores in the palaolake of al-Hayathim.

1. The Prehistory of in the region of al-Kharj: survey in the Rufā’ graben and excavation at AK-31

From February 14 to 27, two prehistorians, Rémy CRASSARD and Yamandù HILBERT resumed the SURVEY OF AL-KHARJ OASIS, focusing on the Rufā’ graben where 6 new Palaeolithic sites were identified.

Moreover, they undertook a SOUNDING AT THE STRATIFIED MIDDLE PALEOLITHIC SITE AK-31, whose potential was considered during the previous field season as very promising.

2. The Bronze Age in al-Kharj region: excavation at Jibāl Umm al-Sha‘āl

From January 25 to February 26, 6 dry-stone GRAVES ASCRIBED TO THE BRONZE AND IRON AGE have been excavated on the southern edge of the rocky outcrop of Umm al-Sha‘āl, near the left bank of the Wādī Ḥanīfa. The excavation was conducted by prof. Abdalaziz AL-GHAZZI, who was accompanied by Sālim ṬAYRĀN, Sa‘īd AL-‘UTAYBĪ, Abdalaziz AL-HAMMAD, Abdalaziz B. NAFĪSSA and Khalid AL-HAFĪ.

3. The Late Pre-Islamic and Early Islamic periods: excavation at the site of al-Yamāma

During the fourth season, the EXCAVATION OF THE MOSQUE partly unearthed during the second and third season was resumed and achieved: clearing of the entire prayer room; undertaking of two soundings under the floor of the prayer room in order to identify previous occupations; emptying of pits in the prayer room. Moreover, the excavation was extended to the north-west of the mosque in order to uncover dwellings partly recovered by the mosque. This operation was taken in charge by Jérémie SCHIETTECATTE and Alexia ROSAK from January 25 to 31 and then by Pierre SIMÉON and Alexia ROSAK from February 1 to 26, they were accompanied by Sa‘īd bin Dubays AL-‘UTAYBĪ and Abdalaziz bin Fahd BIN NAFĪSSA.

To the south of the site (area K17), a sounding was carried out by Julien CUNY, Fanny LARUAZ and Khalid AL-HAFĪ in order to get a stratigraphic sequence of the occupation in this southern part of the settlement. It has been

conducted from January 25 to February 26.

The DRAWINGS of pottery were done by Julien CUNY.

The completion of the TOPOGRAPHIC MAP of the mosque was done by Jérémie SCHIETTECATTE with a D-GPS Trimble R4.

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AN AERIAL PHOTO COVERAGE has been completed thanks to the use of a kite by Thomas SAGORY on February 18-23. These photographs allowed to proceed, through the photogrammetry, to the reconstruction of a 3D model of the Great mosque (area N6).

4. Environmental researches

This season, we put the accent on environmental studies through complementary approaches:

- Faunal remains coming from the excavation at al-Yamāma have been studied by Hervé MONCHOT from February 6 to 26. Plant remains (charcoals, seeds) coming from the excavation at al-Yamāma have been sampled and sorted out on the field for further lab analyses by Charlène Bouchaud, from February 6 to 26. These two operations aim at giving an outline of the evolution of agricultural productions, husbandry and hunt practices during historical periods.
- At al-Hayāthim, a deep section of a palaeolake has been studied and sampled by Antoine CHABROL, Eric FOUACHE, Michèle DINIES, Michel MOUTON and Abdalaziz AL-HAMMAD from February 6 to 14 for lab analyses in the field of sedimentology and palynology. Core-samples will aim at defining the evolution of Holocene vegetation and waterflows in al-Kharj areas.

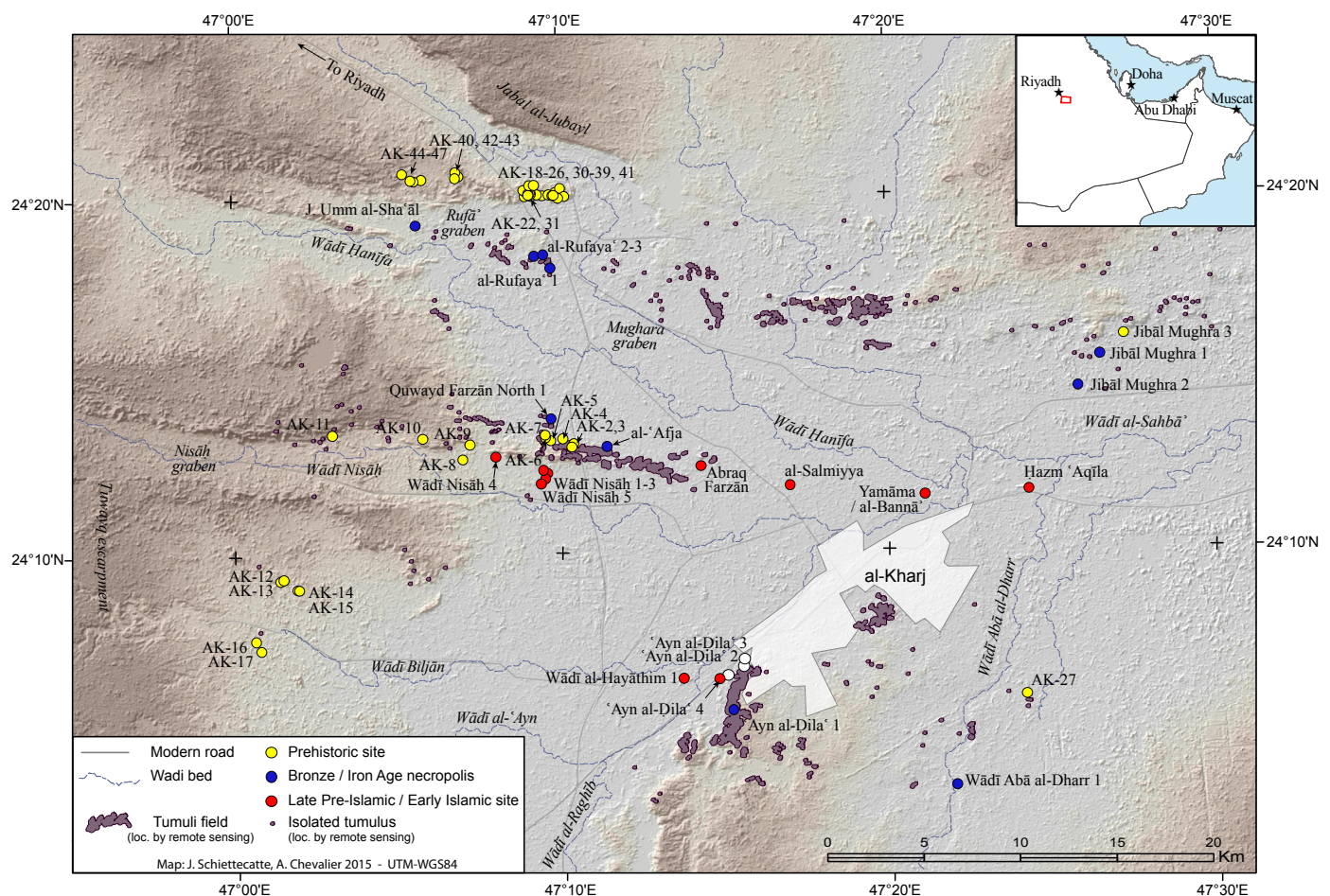


Figure 3: Archaeological map of the oasis of al-Kharj (J. Schiettecatte – Saudi-French Archaeological Mission in al-Kharj).

Recording system

The nomenclature adopted for the recording of sites is as follow:

- Prehistoric sites are named AK (for al-Kharj) followed by a number in the order of their discovery, e.g. AK-01, AK-02, etc.
- Protohistoric and historic sites are named by their location, followed by a number if several sites have been discovered in a single area, e.g. al-‘Afja, ‘Ayn al-Ḍila’ 1, ‘Ayn al-Ḍila’ 2.

The nomenclature we adopted for recording stratigraphic units and structures during the excavation at al-Yamāma and ‘Ayn al-Dila’ 1 is as follow:

- Stratigraphic units (called UF for *unité de fouille*) are numbered continuously, from 001 to *n*. Series of numbers have been attributed to the different excavated areas: 001 to 299 in al-Yamāma (area N6-O7); 400-499 in al-Yamāma (area K17); 1000 to 1099 in ‘Ayn al-Dila’ 1 (area H9-H10).
- Structures are numbered continuously, from 001 to *n*, preceded by a letter indicative of the nature of the structure (W = Wall; F = Floor; P = Pit; H = Hearth; Ni = Niche; R = Room; A = Access; Po = Posthole; Co = Column; St. = other structure). For example, W.001, W.002, W.003, Co.004, etc. Series of number have been attributed to the different excavated areas: 001 to 299 in al-Yamāma (area N6-O7); 400 to 499 in al-Yamāma (area K17); 1001 to 1099 in ‘Ayn al-Dila’ 1 (area H9-H10).

The nomenclature we adopted for recording artefacts, pottery and samples from protohistoric and historic sites is as follow:

- Artefacts: initials of the site + number of the stratigraphic unit or ‘surf’ when sampled on surface + number from 1 to *n*.
Example 1: WH1.surf.3 for the third artefact collected on surface on the site of Wādī al-Hayāthim 1.
Example 2: Y.022.5 for the fifth artefact collected in layer no 22 during the excavation at al-Yamāma.
- Pottery: a specific number was attributed to each sherd indicative of a pottery shape (base, rim, handle, etc.). The number is written in the same way as those of artefacts. The only exception concerns sherds sampled on the surface of the site of al-Yamāma, where the abbreviation ‘surf’ (for surface) is preceded by a square number – the site of al-Yamāma has been divided in squares of 50 × 50 m identified by a letter (A to R from west to east) and a number (1 to 21 from north to south).
Example 1: Y.001.1 for the first sherd from the first stratigraphic unit during the excavation at al-Yamāma.
Example 2: Y.P6.surf.1 for the first sherd collected on the surface of the site of al-Yamāma, in the square P6.
- Samples: this category includes non-manufactured material (e.g. ash, bone, charcoal, date stone, eggshell, mother of pearl, shell, slag, plant), building material (baked brick, earthen coat, earthen floor, mudbrick, plaster) or pieces of unidentified artefacts (fragments of bronze, flint, glass, iron and steatite). They are all numbered S (for sample) + number of the stratigraphic unit or ‘surf’ when sampled on the surface + number from 1 to *n*.
Example: S.005.1 for the first sample (here bones) collected in the stratigraphic unit no 5 during the excavation at al-Yamāma.

All these data are recorded within a homogeneous recording system which has been set up to meet the requirements of both the survey of al-Kharj area and the excavation of the site of al-Yamāma. It is constituted of several related databases designed using FileMaker Pro 10 software. It has been created by J. Schiettecatte and G. Charloux and is based on databases used by the past on previous projects. It has been completed by a photographic database based on the one used by the Saudi-French Mission in Madā’in Ṣāliḥ (dir. L. Nehmé, Fr. Villeneuve, D. al-Talhi) and designed by Jérôme Haquet (engineer at the UMR 8167 of the CNRS). These

related databases are:

- Database of archaeological sites of al-Kharj area;
- Database of photographs taken during survey and excavation;
- Database of stratigraphic units;
- Database of archaeological structures;
- Database of archaeological artefacts;
- Database of pottery;
- Database of samples.

The database of archaeological sites has been designed so as to be exported and used on a GIS (Geographic Information System), the software being used is ArcGis Desktop 10 designed by ESRI (**fig. 3**).

PREHISTORY

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Introduction

Since 2011, a joint Saudi-French comprehensive survey program has been mapping prehistoric sites across the diverse landscapes surrounding the modern town of al-Kharj (SCHIETTECATTE *et al.* 2013; CRASSARD & HILBERT 2013a). During the first season (2011), survey activities were focused on the wider surroundings of al-Kharj (CRASSARD & HILBERT 2011) and allowed the discovery of 29 Middle Paleolithic surface sites. The third season (2013) was concentrated along the Rufā' Graben system, 15 km north of al-Kharj (CRASSARD & HILBERT 2013b). Aside from the discovery of additional 10 sites in this area, excavation at the stratified Middle Paleolithic site of al-Kharj-31 (AK-31) was undertaken. A test pit of 2 x 2 m was excavated to a maximum depth of 80 cm disclosing more than 300 artifacts. Given the potential of the Rufā' Graben for providing clues to the Middle Paleolithic occupation of central Saudi Arabia, survey and excavation activities were concentrated in this general area this season. In addition, excavations at the stratified site of AK-31 have been extended to understand the deposition of the site and the material culture found therein.

Methods: survey and lithic analyses

Since the first season of the comprehensive survey, a comparable survey methodology and artifact analytical protocols has been applied, making it possible to find and analyze a total of 893 artifacts from 47 prehistoric sites. For an outline of the methodology used throughout the survey in 2015, see the methodology section of the 2011 and 2013 survey reports (CRASSARD & HILBERT 2011, 2013b). An important change has been made to the survey and analytical protocols that streamlined the process. Survey sheets, GPS, analysis sheets and databases have been uploaded into a handheld tablet device. Survey sheets have been made using Filemaker Pro 13 and were filled in during the field work. The archaeological localities have also been described with systematic criteria, such as:

- Name of the closer topographic feature (e.g. wādī, jabal...);
- Location (latitude and longitude, altitude, type of topography, anthropic structure in the vicinity, general aspect of the locality);
- Site description (state of preservation of the site, artifacts position, density and quantity by m², estimated surface of the site and estimated explored surface, potentiality of the site, preliminary dating);
- Raw material (state and type of raw material);
- Techno-typology (general dimension of pieces, types of artifacts, preliminary observations on the material, functional interpretation);
- Final notice (general potentiality of the discovered site).

Therein, information on each of the site location, disposition, archaeological period, raw material, techno/typology and general observations were recorded. An additional database containing the location of the sites was created using the MotionX HD GPS program, which aside from GPS coordinates includes photographs of each site.

Analytical protocols of the artifacts were also converted into a Filemaker Pro 13 database. Metrical attributes, typology and morphology of the artifacts were recorded individually; artifacts were then photographed and drawn to produce high-quality illustrations and diacritic schemes.

Excavations at AK-31

The AK-31 site is located at the foot of a low jabal, less than 200 m away from AK-22, to the northwest. It is situated at the eastern portion of the southern fringe of the Rufā' Graben, within the Ashqar Marāgha segment. A low plain filled with recent eolian sediments dissected by small erosional gullies marks the immediate surroundings of the site. It has been recognized as a surface scatter of medium density, with medium to small sized artifacts. Characteristic artifacts from the surface encompass Nubian cores; preferential Levallois with centripetal preparation and some bidirectional flake production on flat cores. The scatter is approximately 80 x 30 m and artifacts have been found on a slight slope and on a flatter area. Artifacts show different patination stages ranging from pieces with heavily rounded edges to pieces relatively fresh and pristine edges. Originally, no surface collection had been made at the site, as it was expected to return for a proper surface collection and excavations. Raw material used at the site has been identified as grey quartzite, cropping out in the immediate proximity further up the talus slope. Preliminary excavations at a 2 x 2 m test-pit (Square 1) have been carried out at the edge of a modern gully, which exposed a rich and promising sedimentary succession. The goal was to assess the potential for buried artifacts and possibly estimate the age of the AK-31 assemblage.

Excavations at the Middle Paleolithic stratified site of AK-31, which during 2013 have reached 80 cm across Square 1, were resumed in 2015. Deep soundings were made in the eastern side of Square 1 and reached a depth of 200 cm. Two additional squares –Square 2 and 3– were excavated towards the north of the excavated area, which stretched out over 6 x 2 m (fig. 4). In these two later squares excavations were halted after reaching a depth of 80 cm, because down this level the sediment become increasingly concreted and excavations difficult. While artifacts across all squares were concentrated on the upper 70 cm of the sequence, isolated artifacts were found in the deep sounding at 90 and at 170 cm below surface. Excavations have been conducted in 10 cm spits and the excavated material sieved.

In order to further understand depositional factors at the site as well as to provide a chronological anchor for the excavated lithic assemblage, both geochronological and sedimentological samples were taken. A total of 16 Optically Stimulated Luminescence (OSL) dating samples were taken from the eastern section of the test-pit. The OSL samples were taken by jamming metal tubes of different lengths into the sediment using a hammer (fig. 5). Tubes were of 15 and 10 cm length, in order to shield the sediment samples from light. Tubes had to be opaque and robust, paper sheets were inserted into the ends of the tube to eliminate any light pollution. Following these steps, the tubes containing the sediment samples were retrieved from the section and sealed using tape. The position of the OSL samples was both marked on the section drawing, and photographed. Additional sediment samples were required for the dosimetry rate readings, which will be conducted in the laboratory by the dating unit. For this step, a 100 mg sediment sample was taken from around the OSL sample, attention was given that the sediment sample was from the same sedimentary unit as the OSL sample.

Additional sediment samples for granulometry, magnetical susceptibility and phytolith analysis were taken from the section. These were taken in a column in 10 centimeter intervals by filling the sediment into small bags, approximately 50 mg were taken for each sample. In conjunction with the OSL samples and from the dates these will provide, it is expected to reconstruct the site formation process and date the archaeological material at the site.

A total of 809 lithics, including 69 flakes smaller than 2 cm, have been excavated and analyzed, all collected as well after systematic sieving. All lithics show typical Middle Paleolithic Levallois methods of flaking, including the preferential methods. A very large proportion of artefacts show cortical remains, indicating the use of this site in the first steps of the operational sequence in the processes of producing preferential and/or recurrent flakes. A complete analysis of the technology implied at AK-31 has been carried out on-site, of which a full study is being done for final publication. With the potentiality of obtaining OSL dating at AK-31, and with a comprehensive sedimentological and geomorphological study, this site will be one of the few to serve as a reference to document the Middle Paleolithic variability in the Arabian Peninsula.



Figure 4: Middle Palaeolithic site AK-31: General view of the excavation (Y. Hilbert - Saudi French archaeological Mission in al-Kharj).



Figure 5: AK-31: OSL sampling (Y. Hilbert - Saudi French archaeological Mission in al-Kharj)

Survey along the northern half of the Rufā' Graben

Six additional sites were mapped along the Rufā' Graben (Table 1, fig. 6) on the western side of the Highway 65, which leads to Riyadh. Previous survey in this area was concentrated on the eastern side of Graben. Approximately 30 km in lengths and between 0.8 and 1.5 km in diameter, in its north south axis, the Rufā' graben is composed of three segments, respectively from west to east: the 'Ammāj segment, the Sha'āl segment and the Ashqar Marāgha segment. The northern face of the graben is marked by the Jabal Umm al-Sha'āl with its roughed cliff rising 80-100 meter above the bottom of the graben. Beyond the cliff this feature extends towards the northeast as a flat undulating plateau composed of beige bioclastic, bioturbated limestone and clayey limestone (Sulayy formation). The graben's southern face is for the greater part masked by superficial deposits except for its eastern crest also composed of Sulayy formation limestone. The eastern portion of the Rufā' Graben is marked by a variety of lacustrine, wetland and Khabra deposits attesting the presence of lakes in the area during the Quaternary.

As with previous years, prehistoric surface sites were generally associated with large raw material outcrops, in this particular area beige fine-grained quartzite. The quality of this raw material varies strongly from block to block, when of good quality it is more than suitable for the production of lithic artifacts. Middle Paleolithic artifacts are most commonly found on these large raw material outcrops. This trend is also present on the side of the graben system surveyed in 2015, with artifacts attributed to Middle Paleolithic being the most common types found.

Date	Site	Latitude (dec. deg.)	Longitude (dec. deg.)	Alt. (m. a.s.l.)
14-26/02/2015	AK-42	24.345030	47.115020	528
14-26/02/2015	AK-43	24.342275	47.114900	510
14-26/02/2015	AK-44	24.341696	47.097756	515
14-26/02/2015	AK-45	24.341009	47.093620	483
14-26/02/2015	AK-46	24.341436	47.092114	505
14-26/02/2015	AK-47	24.344503	47.087890	507

Table 1. List of Palaeolithic sites discovered during the 2015 season in al-Kharj.

Of special interest for the reconstruction of the Middle Paleolithic occupation of this area and central Arabia are sites AK-43 and AK-47, both being very rich surface scatters with a high amount of artifacts found across their respective surfaces. Of these, only AK-43 was intensively sampled. Given the high-density of artifacts at this high-quality raw material outcrop, two sampling strategies were adopted. One collection was made across one portion of the site and targeted cores, tools and specifically diagnostic debitage, while a second collection samples a 7 × 1 m strip where artifacts were collected in total (fig. 7).

The first collection will help to establish the different reduction modalities used, while the second will provide insights into site composition in general. The most common reduction system found at AK-43 is the Nubian Levallois reduction system, which had previously been detected at AK-22 (CRASSARD & HILBERT 2013a) (fig. 8).

Perspectives

The variability observed within the Arabian lithic assemblages shows different traditions that likely reflect different populations that inhabited the Arabian Peninsula during the second half of the Late Pleistocene, adding to the complexity of the regional prehistoric record. The discoveries in the region of al-Kharj are of particular interest as they show variability within the Levallois methods, including the Nubian "types". The

location of al-Kharj is also particularly crucial in the actual debates encompassing the origins of our species, as it is right in the centre of the Arabian Peninsula, at the crossroads of potential currents of cultural influences and human movements. Finding these sites at this very location shows the high potential of Arabia as a whole in discussing our origins, as remote regions, far from the coasts, induce other interpretation models in explaining the peopling of Asia, and by extension of the Earth. Further research in al-Kharj will then dramatically fill this gap in our still very limited knowledge of Upper Pleistocene human occupations in Arabia.

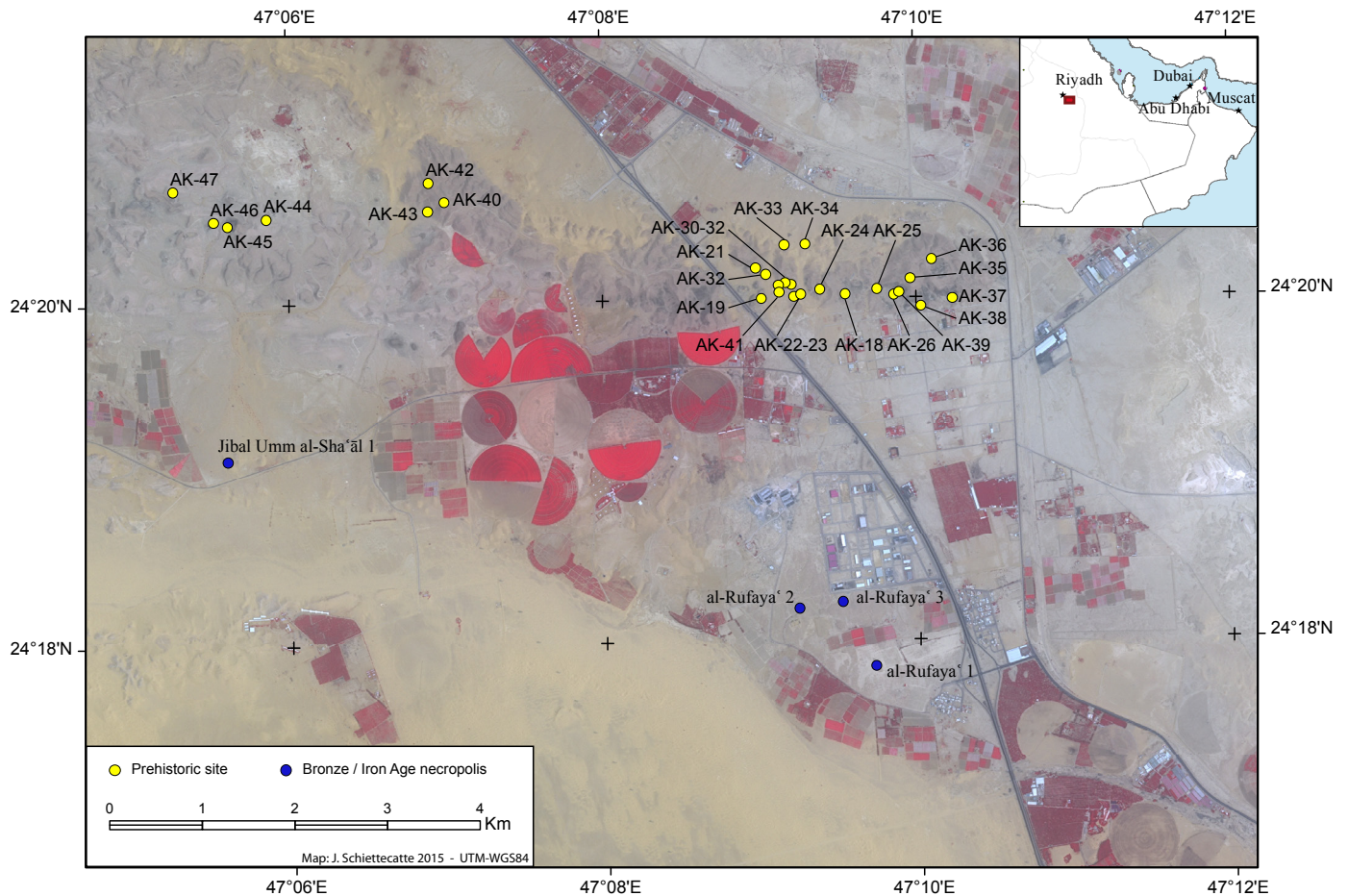


Figure 6: Map of the Pleistocene and Protohistoric sites in the Rufā'-Rufaya' area (J. Schiettecatte - Saudi French archaeological Mission in al-Kharj - include content © CNES 2012, Distribution Astrium Services / Spot Image S.A., France, all rights reserved).



Figure 7: AK-43: Systematic surface collection (Y. Hilbert - Saudi French archaeological Mission in al-Kharj)

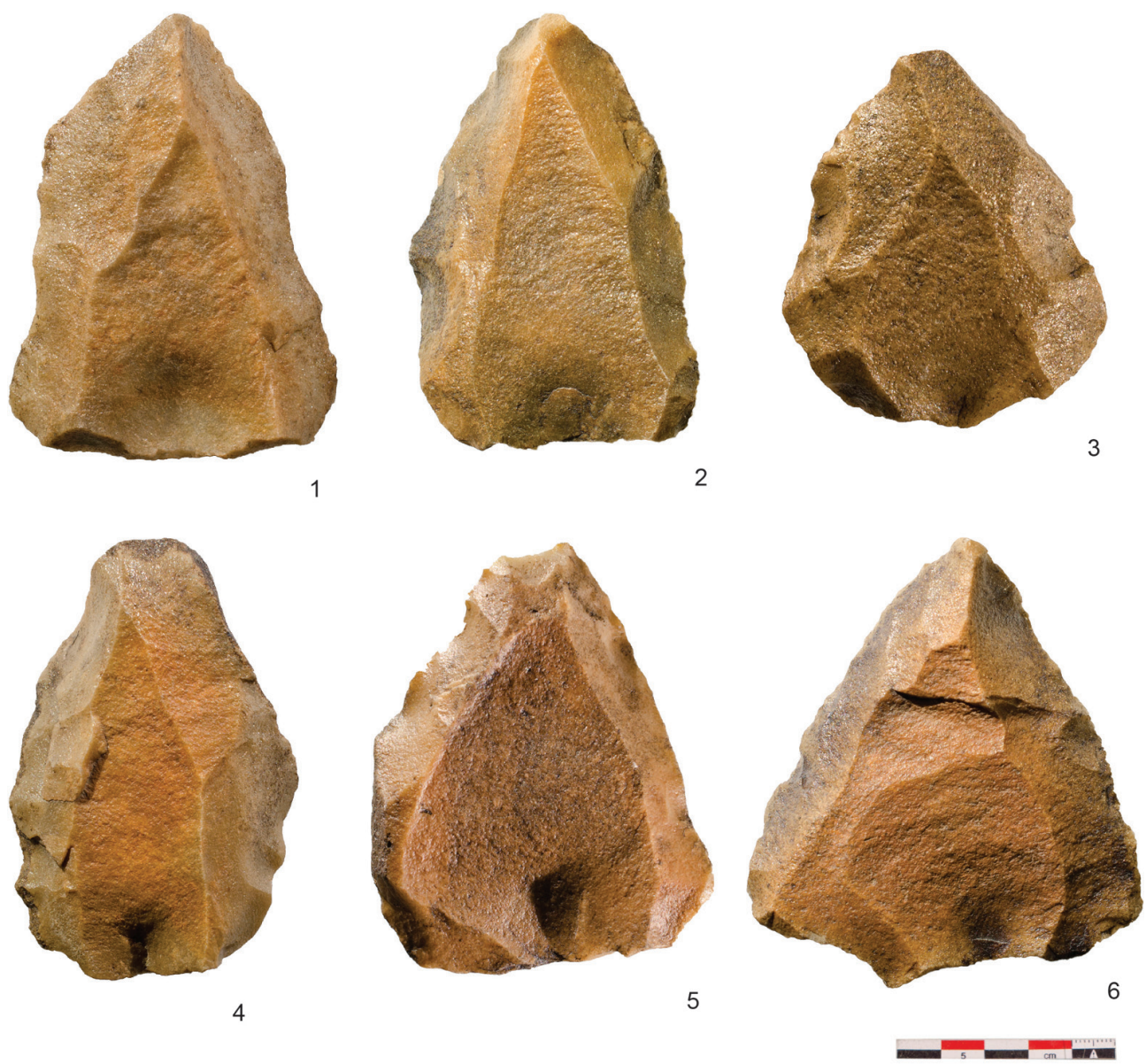


Figure 8: AK-43: Nubian cores (Y. Hilbert - Saudi French archaeological Mission in al-Kharj)

**LATE PRE-ISLAMIC
&
ISLAMIC PERIODS**

AL-YAMĀMA - THE GREAT MOSQUE (AREA N6 - BUILDING 1)

Pierre SIMÉON (Pergamonmuseum, Berlin)

Jérémie SCHIETTECATTE (CNRS, UMR 8167, Paris)

With the participation of Alexia ROSAK, Sa'īd al-'UTAYBĪ & Abdalaziz BIN NAFĪSSA

Description of the site of al-Yamāma

Al-Yamāma is the largest ancient settlement reported in the region of al-Kharj. It is located in the centre of al-Kharj oasis, one kilometre to the north-west of the Industrial City, and west of the confluence of the Wādīs Ḥanīfa and Nisāḥ.

The existence of this site was first reported by H. St. J. Philby in 1920. During the Comprehensive Survey of Saudi Arabia in 1978, the site received the registration number 207-30 (ZARINS *et al.* 1979: 27, 30). Finally, soundings were carried out in the late 1980s by Abdalaziz al-Ghazzi, north and west of the site, for his PhD thesis at the University College London. They revealed well-preserved mudbrick structures. A pottery typology was subsequently put together (AL-GHAZZI 2010).

The archaeological area stretches over 75 ha, north-west of a village named al-Yamāma, on the edge of palm groves. Two other names are locally used to designate the site: al-Bannā' and al-Mahraqa. Al-Bannā' is a recent name meaning the source of mud that could be reused for recent building activity by inhabitants of the neighbourhood.

The site has been identified with the mediaeval city of Jaww al-Khiḍrīma (AL-JUHANY 2002: 45; AL-GHAZZI 2010: 45–47, ROBIN & ARBACH *in press*) mentioned by Ibn Khordādhbeh as 'Jaww al-Khiḍrīma' (KHORDĀDHBEH 1889: 113) and by al-Balādhurī as 'al-Khiḍrīma' in the 9th cent. AD (BALĀDHURĪ 1916: 141–142), by al-Mas'ūdī as 'Jaww' in the 10th century AD (AL-MAS'ŪDĪ 1861–1877 iii: 106, 276, 287–288), and by Yāqūt as 'Jaww al-Khaḍārim in Yamāma' (*Jaww al-Khaḍārim bī-l-Yamāma*) in the 12th cent. AD (YĀQŪT 1866–1873 ii: 120, 161). Finally, two South Arabian pre-Islamic inscriptions mention the toponym Jawwān (*Gwn*) in association with Kharjān (*Hrgn*) and Yamamatān (*Ymmtn*), respectively inscription 'Abadān 1, dated to AD 360 (ROBIN & GAJDA 1994) and 'Irāfa 1 from the 5th cent. AD (GAJDA 2004). The toponym Jawwān is likely to be identified with the mediaeval Jaww [al-Khiḍrīma] also associated with the valley of al-Kharj and the region of al-Yamāma (regarding the toponyms Jaww, al-Kharj and al-Yamāma).

Today, al-Yamāma is only used to name a village in the vicinity of al-Kharj, near the archaeological site. We are inclined to see it as a legacy of the time when this site, the ancient Jaww al-Khaḍārim, was nicknamed al-Yamāma.

Most of the archaeological area was fenced in the 1980s. It enclosed a 75-ha-wide area, 1,000 m from north to south and 750 m from east to west. Many mudbrick structures are visible on the ground, together with a large quantity of pottery sherds. Archaeological structures are also to be seen outside the fenced area, principally to the north-west of the site. Another concentration of outcropping mudbrick walls has been located 700 m north-east of the site (figs. 9–10).

According to South-Arabian inscriptions, Arab-Islamic sources, pottery sampled on the ground, surface coins dated to the early Christian era (AL-GHAZZI 2010: 89–90, pl. 23/1–2), the deep sounding carried out in the northern part of the site and the excavation of Buildings 1 and 2, the occupation of the site dates from at least the 2nd to the 18th cent. AD (SCHIETTECATTE *et al.* 2013; SCHIETTECATTE & AL-GHAZZI (ed.) *in press*).

Building 1 - the Mosque

The construction straddles areas N6 and O6, in the northern part of the site (figs. 10–12).

During the first excavation season (2011), the north-west corner of a large columned hall that was partly visible on surface was exposed in the southern part of Sounding 1. Two large mudbrick walls (W. 002, oriented E–W, and W. 006, oriented N–S) bordering a room (R. 013) with a plastered floor (F. 015) and two large mudbrick columns standing on this floor (Co. 004–005) were brought to light. This construction was labelled Building 1.

During the second season (2012), we concentrated our efforts on the excavation of the western and central naves of the columned hall. Several things proved it to be the Great Mosque of the site (fig. 10): the presence of a large columned hall with three rows of ten columns preceded by a large courtyard to the east and a square recess (*mihrāb*) built in the middle of the western wall (*qibla* wall). The fact that very few artefacts were found, despite sieving the fill and rubble, also supported this interpretation.

The third season (2013) was devoted to pursuing and extending the excavation of the prayer room and part of the courtyard (area N6, Building 1).

In the fourth season (2015), both the prayer room (R. 013) and the courtyard were entirely cleared. Three pits dug through the plaster floor F. 015 were emptied. Two trenches were dug under floor F. 015 (Trench A & B). Soundings were carried out in the north-western corner of the courtyard (Trench C), west of the mosque (Trenches D & E) and to the north of the mosque (Trench F) (fig. 10 & fig. 12: coloured areas).

The aim was to define the earliest occupation of the mosque (Building 1) and to characterize previous stratigraphical and architectural phases before the construction of Building 1. The foundations were reached in trenches A, B and E. Older structures (Buildings 3, 4 and 5) were identified.

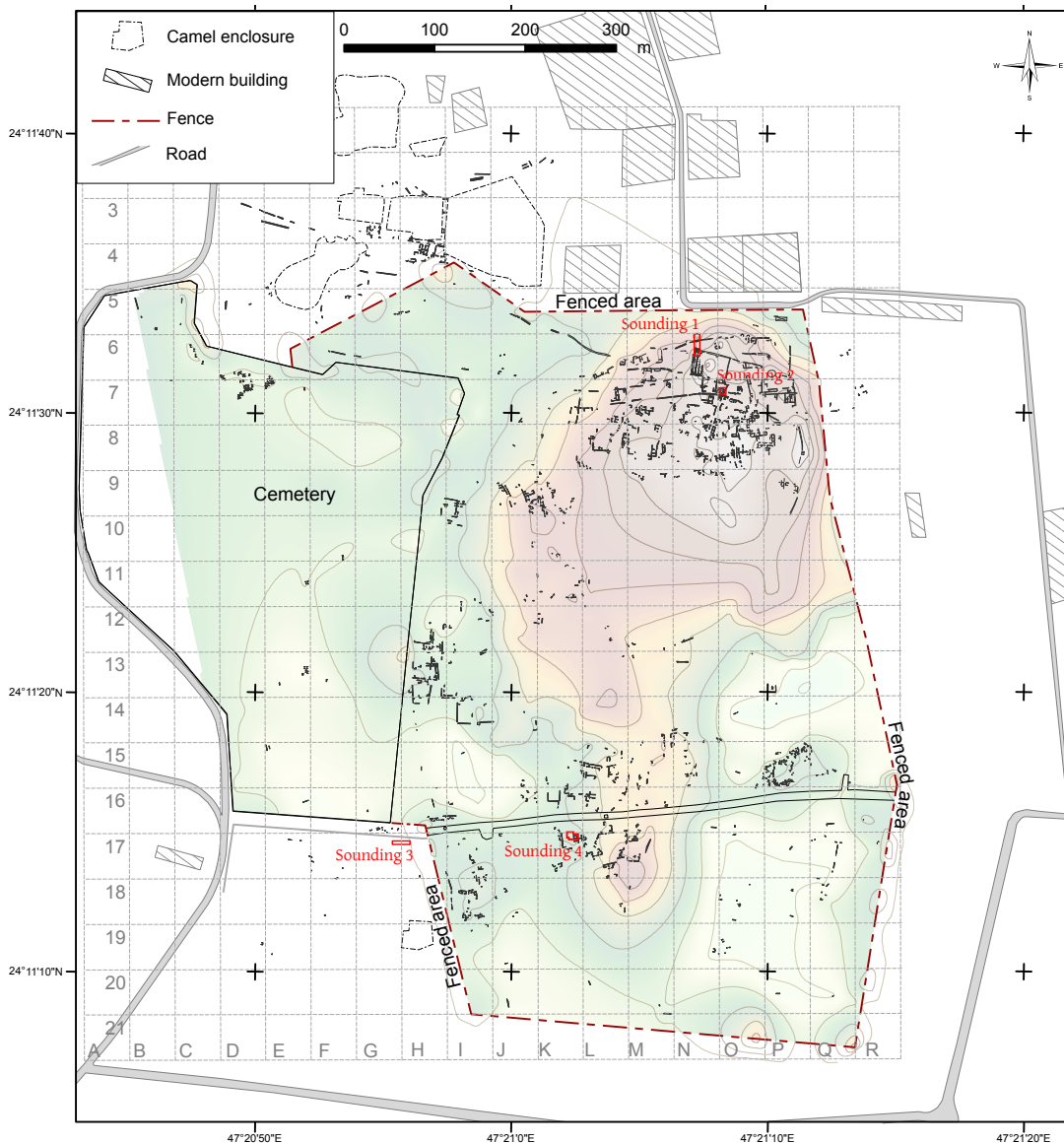


Figure 9: al-Yamāma: topographic map of the site (M. Niveleau, J. Schiettecatte - Saudi French archaeological Mission in al-Kharj).



Figure 10: Al-Yamāma: detailed map of the mosque area (areas N6 & O6) - Location of Trenches A & B, Pits P. 185, 186 & 187 as well as the soundings carried out in 2015 (pink colour) (M. Niveleau, J. Schiettecatte - Saudi French archaeological Mission in al-Kharj).



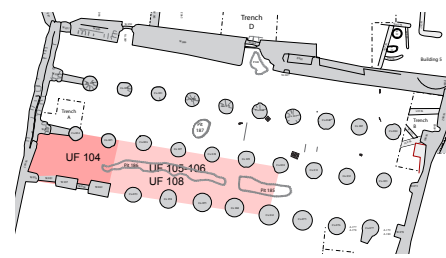
Figure 11: Aerial view of Building 1 (Mosque) (Thomas Sagory - Saudi-French archaeological mission in al-Kharj).



Figure 12: Al-Yamāma. Plan of Building 1: white: working area; pink= pits and trenches; yellow= levelled mud-brick structures (Building 3) (M. Niveleau & J. Schiettecatte - Saudi-French archaeological mission in al-Kharj).

Stratigraphy of Building 1 in the prayer Hall (R. 013)

The large south-north baulk (28x1,5 m) was still standing in the southern half of the eastern nave of Building 1. The baulk has been entirely removed this season in order to clear the eastern nave of R. 013 in Building 1 and to have a complete overview of the plaster floor F. 015. Its removal showed 5 occupation phases already described in the rest of the prayer room (R. 013) during the previous field seasons (2012, 2013), in particular in the central mihrāb area. These occupations are presented from the most recent to the oldest one.



The 5th occupation level (F. 039)

The last remnants of the 5th occupation level of Building 1 were floor F. 039, a crust of hardened sand. This floor was abutting small mudbrick walls built between the different columns of the eastern row, thus closing the access between the courtyard and R. 013 (figs. 13-14): W. 058 closing the access between Co. 054 and Co. 053, made of three courses of mudbricks of undetermined size, and W. 059 between Co. 054 and Co. 055, made of one course of mudbricks. These walls were directly built above a sand accumulation (UF 104, 105, 106).

During the previous seasons, this 5th occupation had already been characterized by the restoration of a thin mudbrick wall (W. 044) made of irregular mudbricks at the back of the central mihrāb (Ni. 160).

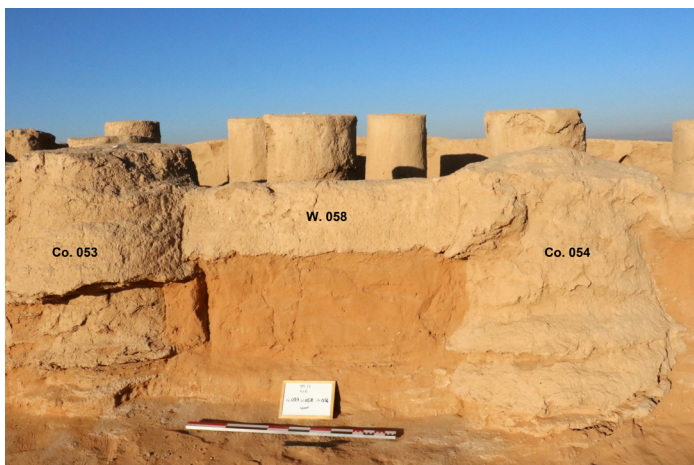


Figure 13: Al-Yamāma, Building 1. Late mudbrick wall W. 058 between Co. 053 and Co. 054 built above sand deposit - looking west (A. Rosak - Saudi-French archaeological mission in al-Kharj).

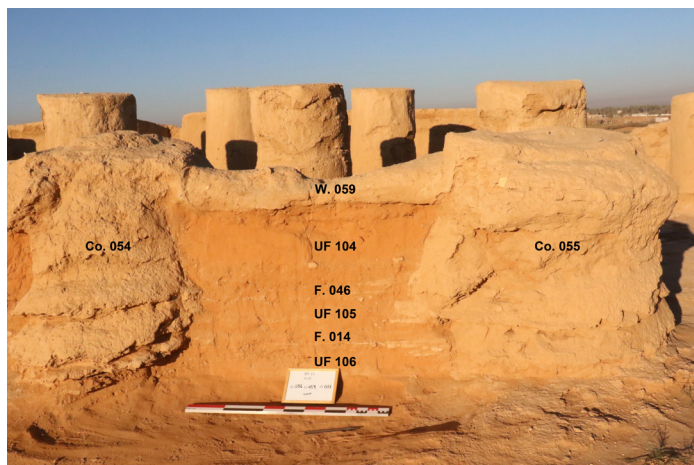


Figure 14: Al-Yamāma, Building 1. Late mudbrick wall W. 059 between Co. 054 and Co. 055 built above sand deposit - looking west (A. Rosak - Saudi-French archaeological mission in al-Kharj).

The 4th occupation level (F. 046, UF 104)

Under F. 039, a 30-cm-thick eolian sand deposit recovered another thin floor, F. 046. This brownish-orange soft sand layer yielded few artefacts (4 sherds, 1 iron pin [Y.104.1] after sieving). The sediment of UF 104, between floors F. 039 and F. 046 was sampled for archaeobotanical investigations but no botanical rest have been found in spite of careful sieving (see BOUCHAUD's report). At the bottom of UF 104, floor F. 046 was a thin hardened sandy crust which was only partially preserved.

During the previous seasons, this 4th occupation phase had already been characterized by the building of a thin mudbrick wall (W. 044) made of irregular mudbricks at the back of the central mihrāb (Ni. 160).

In the courtyard, the peristyle to the north of the courtyard bordered by small columns built during the previous phase (3rd occupation phase) was destroyed as indicated the collapse of Co. 193 and its capital (W. 172) on the floor of the courtyard (F. 086). As only one of the 9 capitals were found in the courtyard, we might guess that the large stones and mudbricks used in these capitals were then reused in the restoration of the prayer hall. It was also probably at this period that two long pits were dug in the courtyard, P. 194 and P. 195.

The 3rd occupation level (F. 014, UF 105)

Under floor F. 046, an eolian deposit of soft brownish orange sand (UF 105) was recovering floor F. 014. This layer only yielded few artefacts including an iron pin (Y.105.1), a fragment of a glass bangle (Y.105.3) and a musket bullet (Y.105.4), both indicative of a modern occupation (17th-18th centuries). No botanical remains were found; faunal remains included 7 camel bones, 10 caprine bones and a single ostrich egg-shell fragment.

F. 014 was an irregular sandy crust partially preserved by patches (fig. 15).

In the courtyard, the constructions of a thick hardened and irregular surface is contemporary to the laying of floor F. 014. Moreover nine small columns bordering a peristyle to the north of the courtyard were built. As shown during the previous season, the central miḥrāb (Ni. 160) was opened to the west during this occupation phase.

The 2nd and 1st occupation levels (F. 015 and his fifth sub-phases, UF 106, UF 108)

Under F. 014, an orange soft sand layer, c. 15-20 cm thick, was removed (UF 106, equivalent to the last season UF 030), and floor F. 015 was fully uncovered (fig. 16). The sieving of the sediment yielded 41 sherds, a few bones of camel, caprine, lizard, chicken and other birds, and a few charcoals. This material could be intrusive and linked to rejection from the digging of pits through F. 015 (fig. 16, left). Indeed, two long pits (P. 185, P. 186) have been dug in the eastern nave, most probably for the reuse of older building material. They have been excavated after the building of F. 015, which has been smashed down during the digging, and before F. 014 was laid down. In the southern half of the central nave, during the season 2013, a collapse of mudbricks was found (UF 089) between F. 014 and F. 015 (fig. 17). The 2015 excavations revealed that it corresponded to the top of the filling of a third pit (P. 187).

Thanks to the removing of the long baulk in the eastern nave, we had a complete view of the prayer hall of Building 1 (figs. 11, 16). The whitish-grey hardened floor F. 015 appears very damaged in the eastern nave. During the two last seasons (2012 and 2013), 13 game boards engraved on floor F. 015 were found. The now complete clearing of F. 015 led to the discovering of 5 additional engraved game boards (fig. 18): two of the so-called type "game of the fourteen", one of the "alquerque" type, one being a circle, and one a rectangle made of three successive lines whose purpose is still unclear. This corpus of 18 game boards is a unique set.

A careful observation of F. 015 showed several sub-phases including at least two phases of occupation (1st and 2nd occupation phases of Building 1). The first corresponds to the building of the mudbrick columns above F. 015. The second phase of occupation is characterized by the restoration of floor F. 015 with a thick coating of compacted clayey earth (up to 5-6 cm) (fig. 19).

If floor F. 015 was used in Building 1 as a flat surface supporting the columns, it is in fact much older than this building and belong to another earlier architectural structure, Building 3, whose remains are levelled on the ground and only partially visible (fig. 12: yellow parts). It has been already noticed during the previous seasons that F. 015 was abutting levelled structures built in mudbrick. New levelled structures were discovered in the eastern nave (W. 214, W. 201, W. 205, W. 213, W. 203, W. 212 - figs. 20-21), abutted by F. 015. They were also covered by the earthen coating restoration of the floor during the 2nd occupation phase of Building 1.

In the eastern nave, the earthen coating restoration of the floor was present almost everywhere. This layer of restoration (UF 108) has been removed. Where F. 015 was not preserved prior to the restauration, we directly uncovered another plaster floor (F. 182) which belongs to Building 3 and was laid down prior to F. 015 (see below). UF 108 is equivalent to UF 107 into Trench A.

The entire eastern nave opens on to the courtyard, excepted during the 5th occupation phase, when walls were closing the space between most of the columns. During the 1st, 2nd and 3rd phases, the corresponding floors F. 015 and F. 014 were connected to a built threshold. Corresponding to F. 015, eleven doorsteps

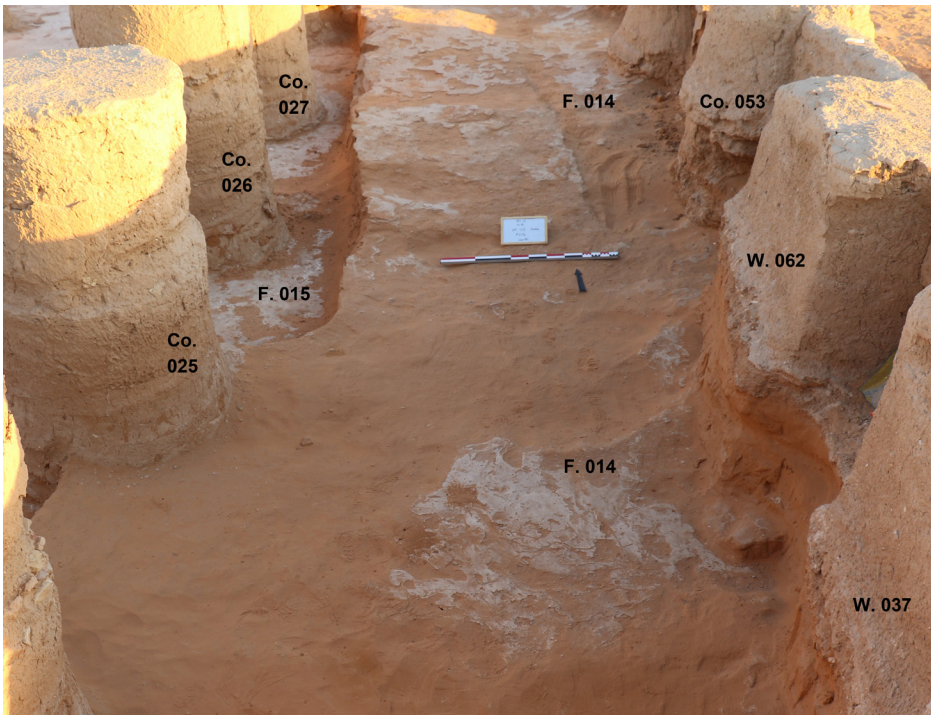


Figure 15: Al-Yamâma - area N6 - Building 1. Base of UF 105, floor F. 014 partially preserved. Looking north (J. Schiettecatte - Saudi-French archaeological mission in al-Kharj).



Figure 16: Al-Yamâma - area N6 - Building 1. Eastern (left), central (middle) and western (right) naves of the prayer hall with its plaster floor F. 015. Looking south (Th. Sagory - Saudi-French archaeological mission in al-Kharj).



Figure 17: Al-Yamâma - area N6 - Building 1. UF 089 over floor F. 015. Looking south-east (P. Siméon - Saudi-French archaeological mission in al-Kharj).



A



B



C



D

Figure 18: Al-Yamāma, Building 1, R. 013. Game boards engraved on floor F. 015: A) game board no 14 of the albuquerque type; B) game boards no 15 & 16 of the “game of the fourteen” type; C) game board no 17, unknown rectangular type; D) game board no 18, unknown circular type (P. Siméon - Saudi French archaeological mission in al-Kharj).

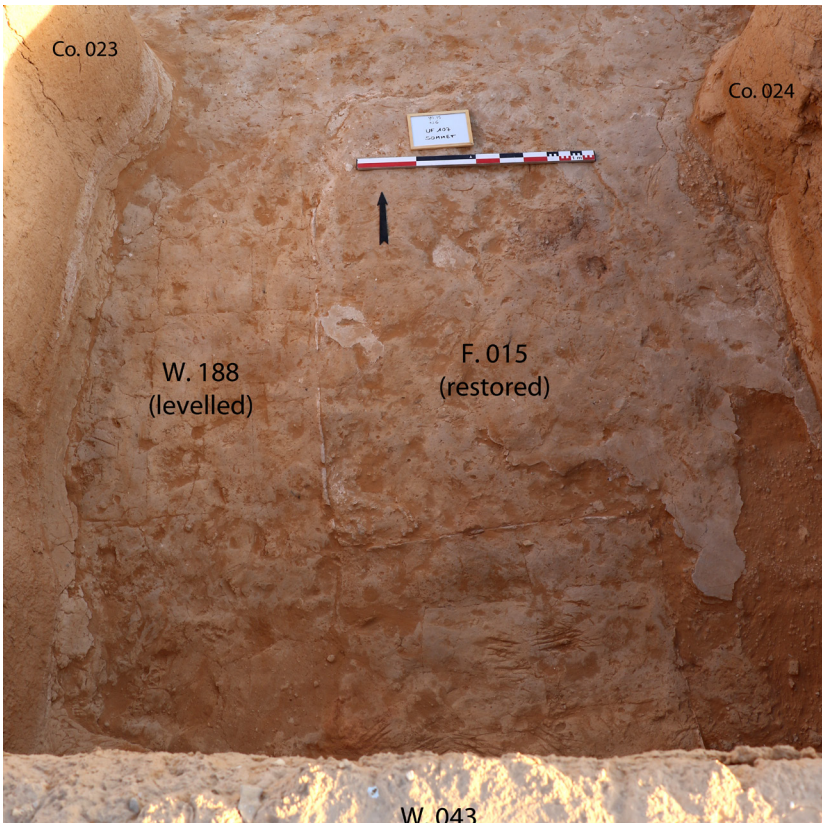


Figure 19: Al-Yamāma, Building 1, R. 013. Floor F. 015 with earthen coating restoration (J. Schiettecatte - Saudi French archaeological mission in al-Kharj).

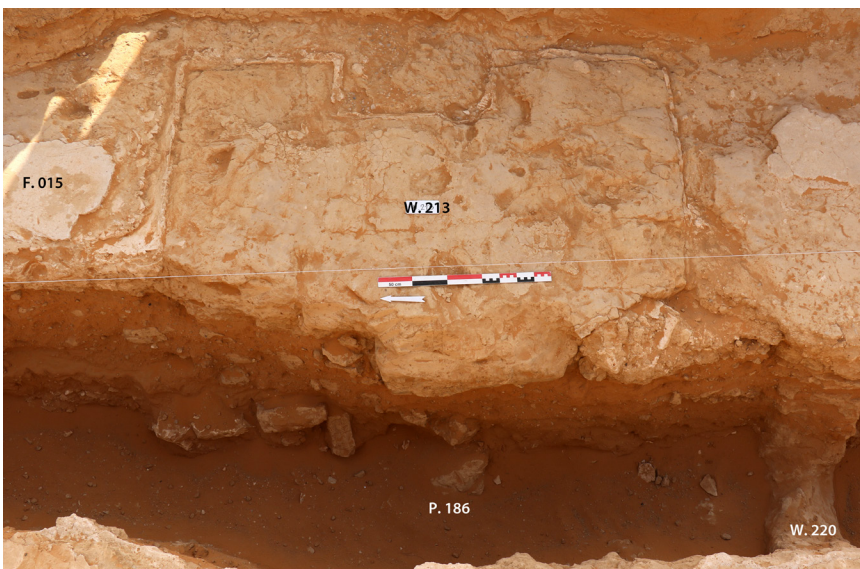


Figure 20: Al-Yamāma, Building 1, R. 013. Levelled pillar W. 213, east of the pit P. 186. Looking east (P. Siméon - Saudi French archaeological mission in al-Kharj).



Figure 21: Al-Yamāma, Building 1, R. 013. Levelled pillar W. 201, east of the pit P. 186. Looking east (P. Siméon - Saudi French archaeological mission in al-Kharj).

were built with flat stones between each columns and pillars (figs. 22-23); they probably remained untouched when floor F. 015 was restored. Their stones, by size and type, are almost similar to the stones of wall W.235 (partially covered by F. 015 and belonging to Building 3). Stones could have been reemployed and might come from the pits P. 185 and P. 186. Threshold connected to F. 014 are made of packed earth (fig. 23).

Trench C in the north-western corner of the courtyard

In the north-western corner of the courtyard, in 2013, we pulled out of the sand on a 7-m-wide band south of the northern wall (W. 002). Nine small columns were found aligned (fig. 12), forming a portico (*riwāq*). Stratigraphic sequence (figs. 26-30) give an overview of the levels related to Building 3 and they complete architectural observations made in Trenches A and B (see below).

It appears that the small columns were built on F. 014 (figs. 24-25, fig. 28). C. 45 cm under F. 014, two successive plaster floors were built: F. 182 and F. 192. The upper floor F. 182 was built on a 20-cm-thick layer of packed greyish earth with angular pebbles and white grits. The oldest built floor (F. 192) was built on a homogeneous yellowish packed earth level, c. 15 cm thick.

Both floors F. 182 and F. 192 were cut by two large and long pits P. 194 and P. 195 (figs. 28-29). P. 195 recuts the second P. 194. P. 195 was filled with eolian sand and fragments of mudbrick (UF 135). The filling of P. 194 (UF 121) included many rounded pebbles at the bottom, probably coming from the partially destroyed preparation of F. 192.

Both pits end on a level of melted mudbrick (F. 190/UF 124). This level was once exposed to the weathering as indicated by traces of water streaming on its surface (fig. 25). This level is reminiscent of the UF 151 found in Trench B (figs. 64-65). This layer of melted mudbrick covered a mudbrick structure preserved over three courses of square mudbricks (38×38×8-9 cm) with 5-cm-thick joint. This structure was built directly above eolian sand (fig. 31). The size of its bricks are identical to those of the structures visible on the ground of F. 015 (W. 200, 201, 203, 212, 213, 216). These structures pre-existing Building 1, are part of Building 3.

To the north-east of the courtyard, at the end of the peristyle, we found in 2013 an architectural geometric element (W. 172) interpreted at the time as a merlon or a crow step. Enlargement of excavation in this area revealed in fact a capital made of mudbricks and large flat stones connected to the small column Co. 193 (figs. 32-34). Part of the column shaft was lying on the ground, on floor F. 086 (corresponding to F. 046 inside the prayer hall R. 013, i.e. the 4th occupation level. According to the different fragments of column Co. 193 and its capital, the minimal height of the small columns in the peristyle was 1.72 m. Since no other capital was found during the excavations, we can guess they have been taken down and their materials reused elsewhere.

The Southern part of the courtyard

The northern wall of room R. 099 (W. 153), belonging to a house abutting the mosque to the south, had collapsed in the courtyard of the mosque. Uncovered in 2013, the wall was removed this season (UF 112) in order to clarify extension of F. 086. As observed during 2013 season. Its mudbricks were convex and rectangular (33×25×8 cm) (fig. 35). No material was found into the wall structure. As stated in the previous report (2013), this house belongs to the last period of occupation of al-Yamāma (17th-18th centuries).

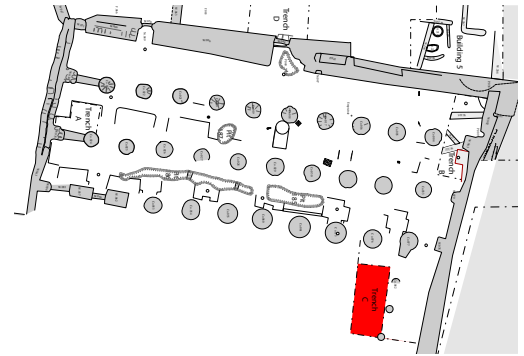




Figure 22: Al-Yamāma, Building 1. Threshold between R. 013 and the courtyard, and W. 078 and Co. 077, contemporary to F. 015. Three stones on the outer side; two mudbricks on the inner side. Looking east (P. Siméon - Saudi French archaeological mission in al-Kharj).



Figure 23: Al-Yamāma, Building 1. Threshold between R. 013 and the courtyard, and Co. 054 and 055, contemporary to F. 015 and F. 014. Looking east (P. Siméon - Saudi French archaeological mission in al-Kharj).

▼ Figures 24-25: Al-Yamāma, Building 1, courtyard. Trench C. Left: Looking south; right: Looking north (P. Siméon - Saudi French archaeological mission in al-Kharj).



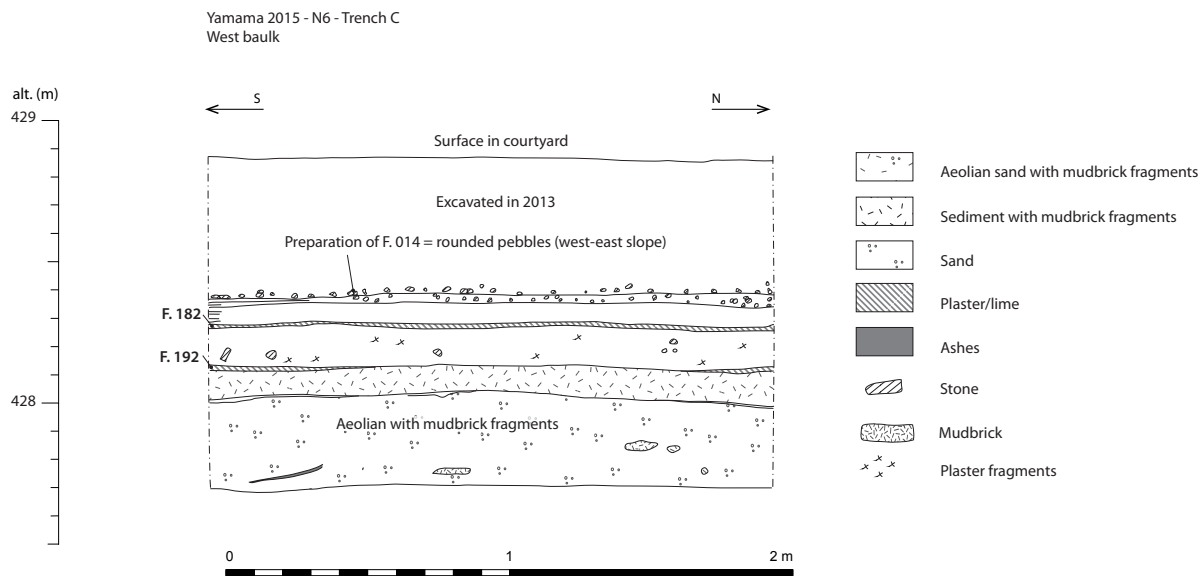


Figure 26: Al-Yamāma, Building 1, courtyard. Trench C: west baulk (P. Siméon/A. Emery - Saudi French archaeological mission in al-Kharj).

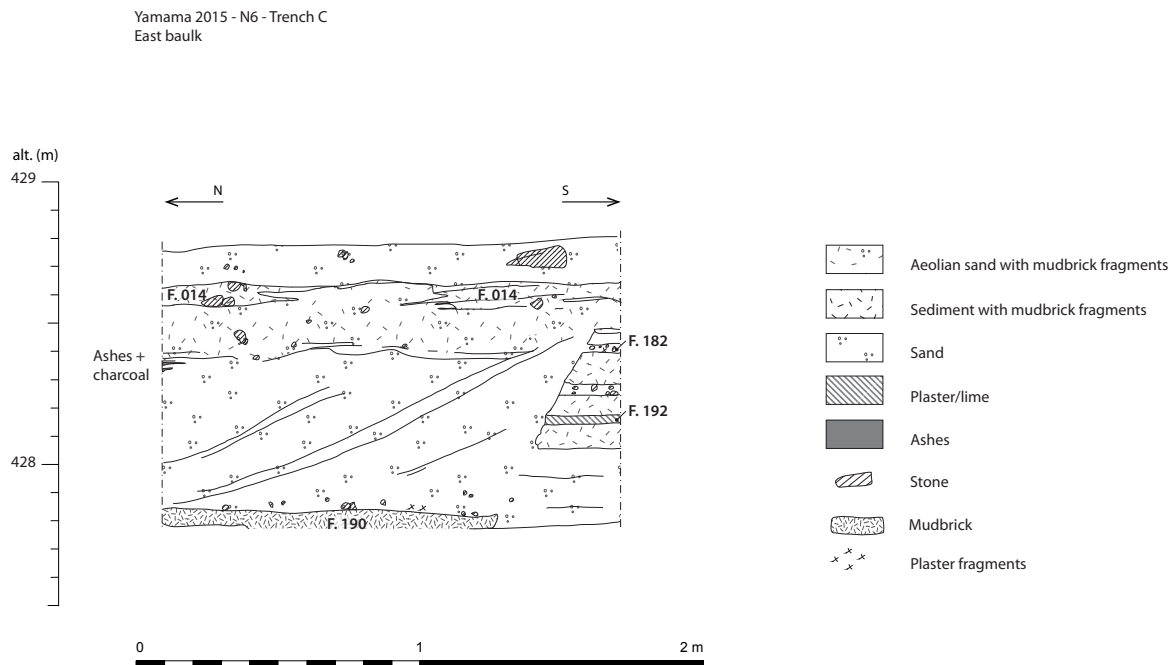


Figure 27: Al-Yamāma, Building 1, courtyard. Trench C: east baulk (P. Siméon/A. Emery - Saudi French archaeological mission in al-Kharj).

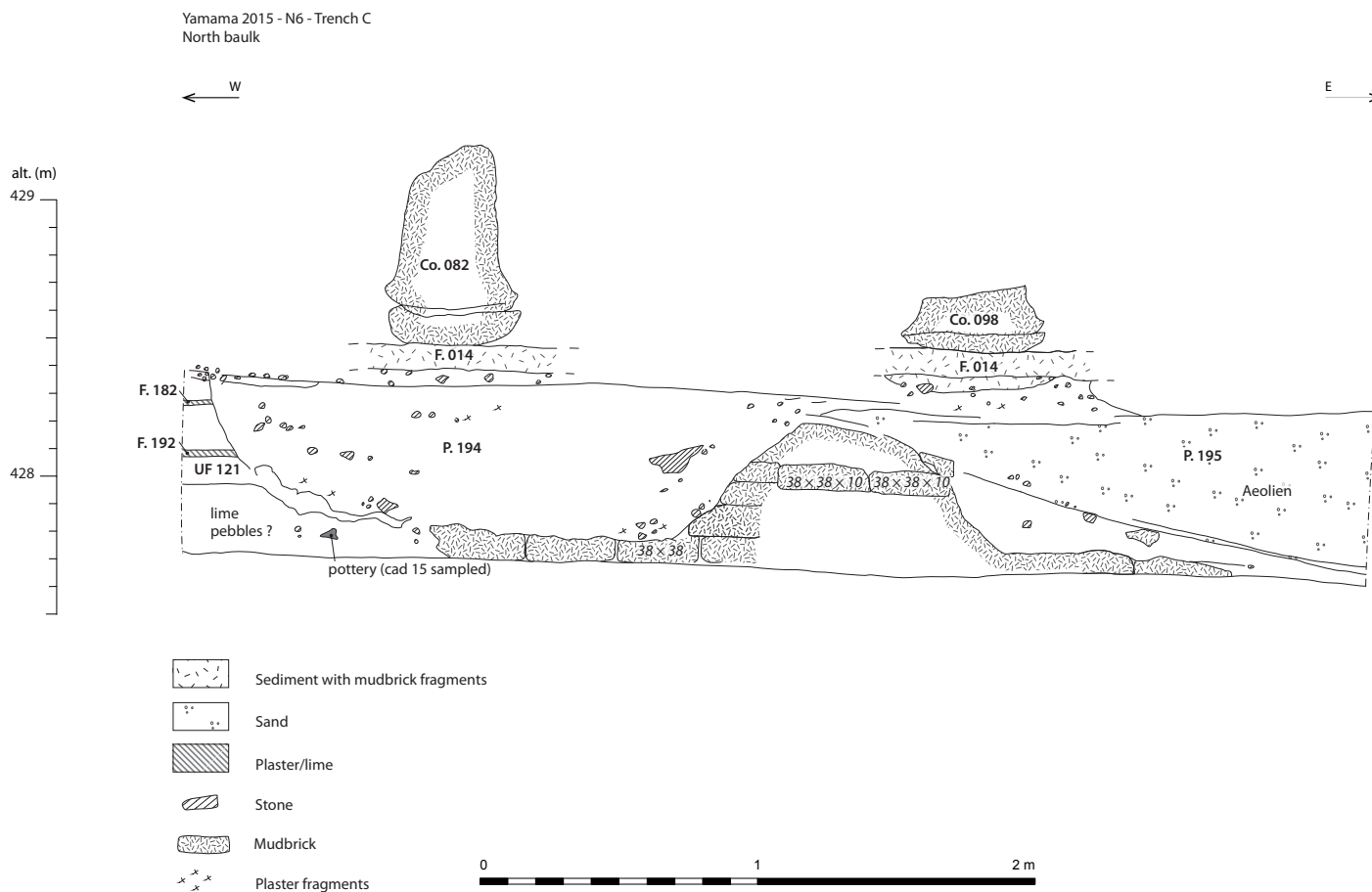


Figure 28: Al-Yamāma, Building 1, courtyard. Trench C: north baulk (P. Siméon/A. Emery - Saudi French archaeological mission in al-Kharj).

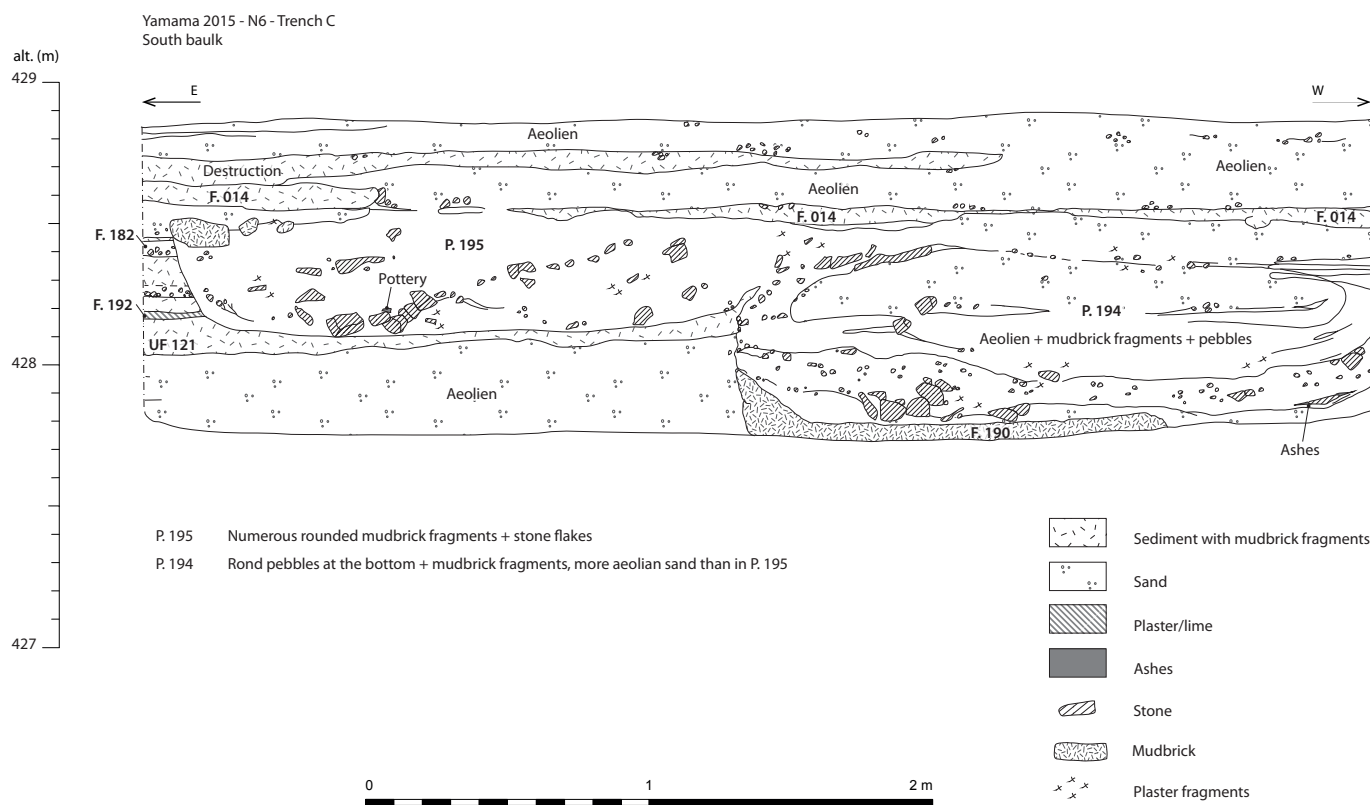


Figure 29: Al-Yamāma, Building 1, courtyard. Trench C: south baulk (P. Siméon/A. Emery - Saudi French archaeological mission in al-Kharj).

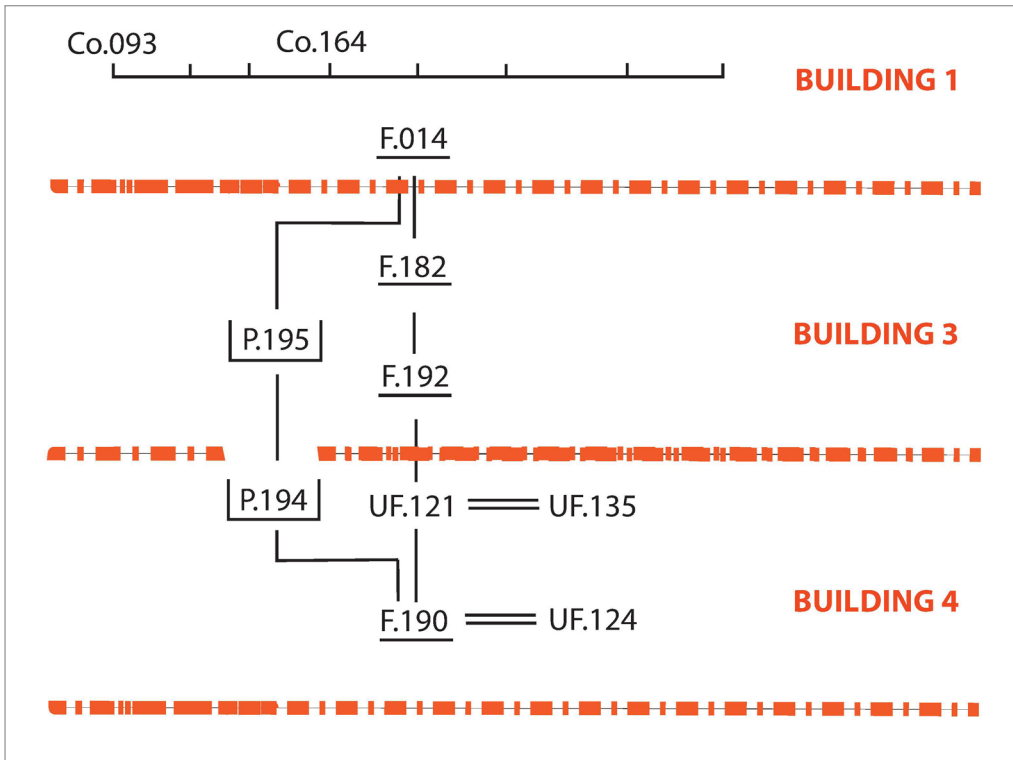


Figure 30: Al-Yamāma, Building 1, courtyard. Trench C: stratigraphic chart (P. Siméon - Saudi French archaeological mission in al-Kharj).



Figure 31: Al-Yamāma, Building 1. Trench C: W. 196 at the bottom of the trench (P. Siméon - Saudi French archaeological mission in al-Kharj).



◀ Figure 32: Al-Yamāma, Building 1, Courtyard. Bases of the small columns of the peristyle bordering the courtyard to the north. Looking west (P. Siméon - Saudi French archaeological mission in al-Kharj).



▲ Figure 33: Al-Yamāma, Building 1, Courtyard. Small column Co. 193 and its capital W. 172. Looking south (P. Siméon - Saudi French archaeological mission in al-Kharj).



Figure 34: Al-Yamāma, Building 1, Courtyard. Small column Co. 193 and its capital W. 172. Looking east (P. Siméon - Saudi French archaeological mission in al-Kharj).



Figure 35: Al-Yamāma, Building 1, Courtyard. Small column Co. 193 and its capital W. 172. Looking south (P. Siméon - Saudi French archaeological mission in al-Kharj).

Trench A & B: excavation of Building 3, a monumental structure under Building 1

Previous excavations (2012-2103 seasons) of the central mihrāb (Ni. 160) damaged by pit (P. 040) and investigations over the floor F. 015 (2011-2013 seasons) reveal the existence of a former monumental building with at least 13 pillars and a former columned hall visible to the north of the central nave (fig. 12: yellow structures).

A closer look at F. 015 from pit P. 187 shows a long fault turned north-south corresponding to the vertical limit of a plastered vertical face of a wall(?) running down the central nave of Building 1 over at least 6 meters (figs. 36-37). This fracture line visible on F. 015 indicates a rupture. The western face of this vertical structure is coated with grooved plaster; this could belong to the first stage of Building 3. Plaster elements were found in the upper part of the filling of P. 187 in 2013 (UF 089: Y.089.1), and in Trench B (UF 133) (fig. 38-39) which should be somehow connected to this grooved plaster coating.

In order to have a clearer knowledge of this Building 3 and previous buildings, we opened two soundings within the prayer room R. 013: Trench A in the southern end of the central nave, at the foot of wall W. 043, and a second one, Trench B, in the north-west corner of R. 013, in the western and central naves, along W. 002.

Trench A

UF & structures: F 107, F. 182, UF 116, UF 122, W. 188, P. 183, P. 184, UF 109, UF 110.

This trench measures 2.35 × 2.70 m. It has been excavated in the southern extremity of the central nave of R. 013, between Co. 024, Co. 023, W. 034, and W. 035 (figs. 11-12; figs. 40-43).

We successively removed a 5-cm-thick layer of densely packed earth above floor F. 015 (restoration of the floor) and then plastered floor F. 015 itself. It was resting on a 10-to-15-cm-thick layer of mixed materials (UF 107: broken fragments of plastered floor, fragments of plastered wall coating sometimes with red paint, hard clay). This constituted a dense layer which provided an horizontal surface necessary for the laying out of F. 015 (fig. 44). UF 107 was covering another plaster floor, F. 182, which was also abutting all the levelled structures of Building 3 (W. 188, St. 173, 174, 175, 176) (fig. 45). Some of the plaster fragments from UF 107 belonged to this former floor, which was broken in some parts. Almost no ceramic/faunal/botanical material was found in UF 107 with the exception of a single camel bone and 4 sherds (cat. 6, 12, 24 and 35).

Two small pits (P. 183, P. 184) were going through F. 182 at the foot of pillar W. 035. Filled with eolian sand (UF 109-110), they were probably created by the water infiltration along the southern wall of Building 3 and 1 (fig. 45).

Plastered floor F. 182 was laid over a 8-10-cm-thick preparation layer (UF 116). This was made of hard clay above a level of sand and small rounded stones. Lentils of white and grey rounded pebbles (fluvial origin) sometime happened between the floor and the packed earth preparation. This layer yielded 12 sherds (cat. 1, 2 and 36), 2 caprine bones and charcoals.

The levelled structures St. 173 and W; 188 against which F. 182 was abutting where preserved over 2 to 3 courses of square mudbricks (38 × 38 cm).

Under floor F. 182 and its preparation, there was only orange eolian sand (UF 122) with a few charcoals, 4 bones (camel, caprine), and 17 sherds (cat. 1, 2, 12, 16, 17c, 28 and 35) (figs. 40-42, fig. 46). This is indicative of a human presence nearby but no structures were found there. This layer was excavated on a thickness of 1.2 m before we decided to stop due to the narrowness of the trench (stop at 427.30 m a.s.l.).

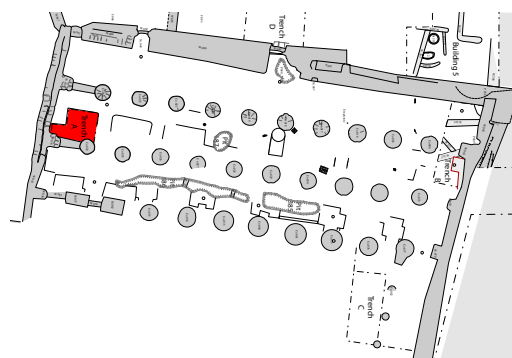
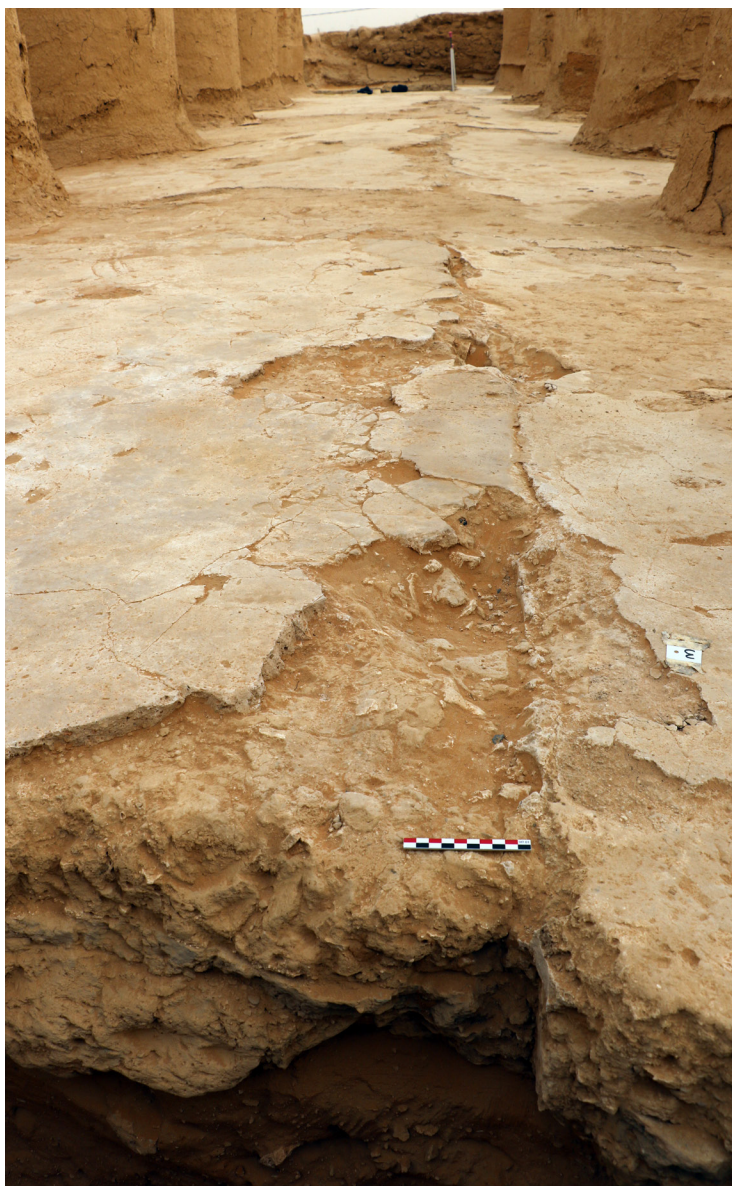


Figure 36: Al-Yamāma, Building 1, R. 013, central nave. F. 015 seen from P. 187. A vertical fault corresponds to the outer plastered face of a wall (P. Siméon - Saudi French archaeological mission in al-Kharj).



▼ Figure 37: Al-Yamāma, Building 1, R. 013, central nave. Details of the vertical fault in F. 015 and the vertical outer plastered face of a wall (P. Siméon - Saudi French archaeological mission in al-Kharj).

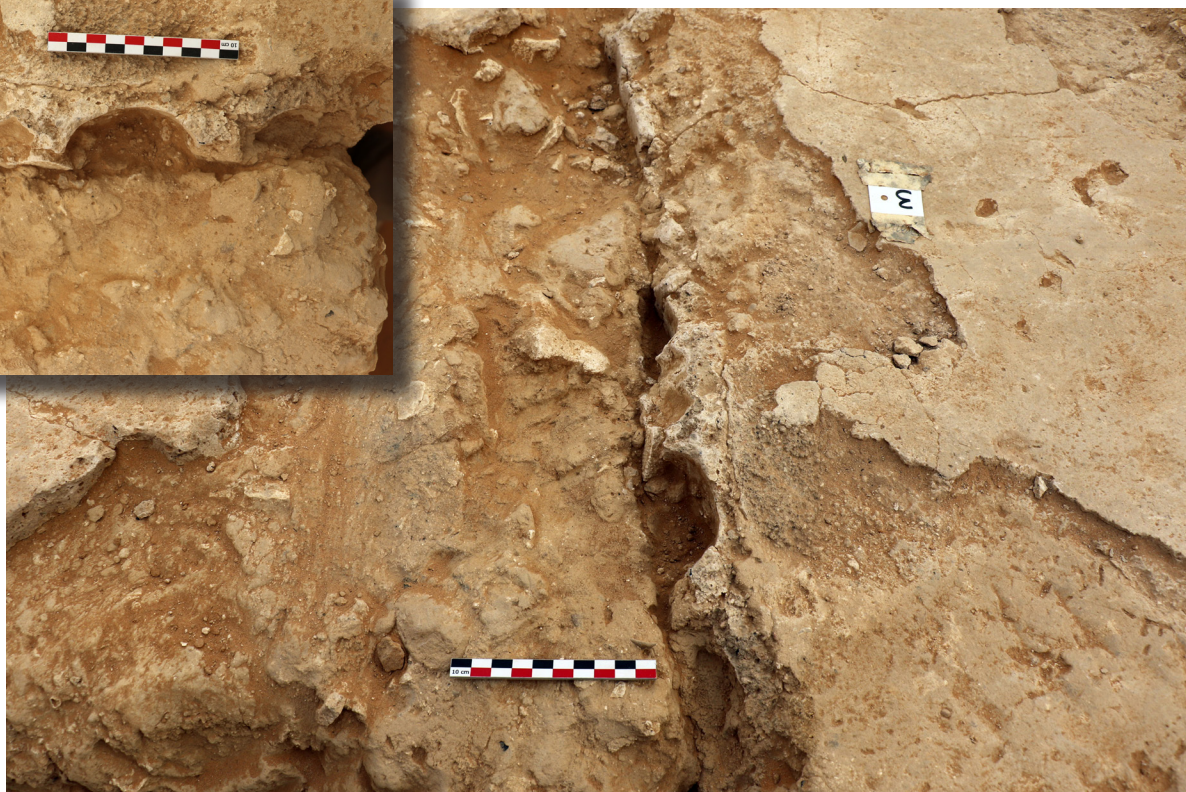




Figure 38: Al-Yamāma, Building 1, central nave. Plaster mouldings on the top of the filling of P. 187 (UF 089) (L. Munduteguy - Saudi French archaeological mission in al-Kharj).



Figure 39: Al-Yamāma, Trench B. Plaster moulding on the top of the filling of P. 203 (UF 133) (P. Siméon - Saudi French archaeological mission in al-Kharj).

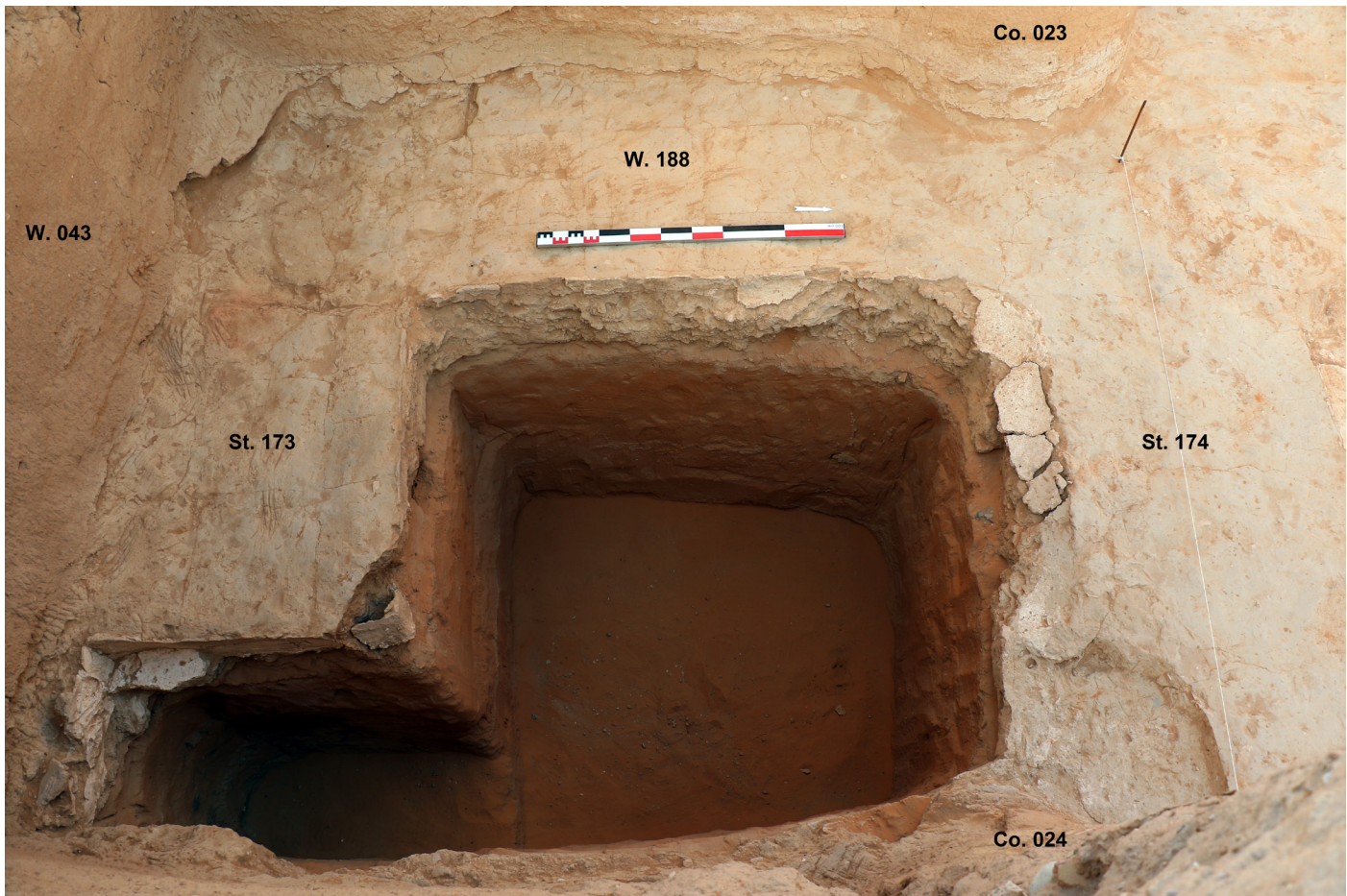
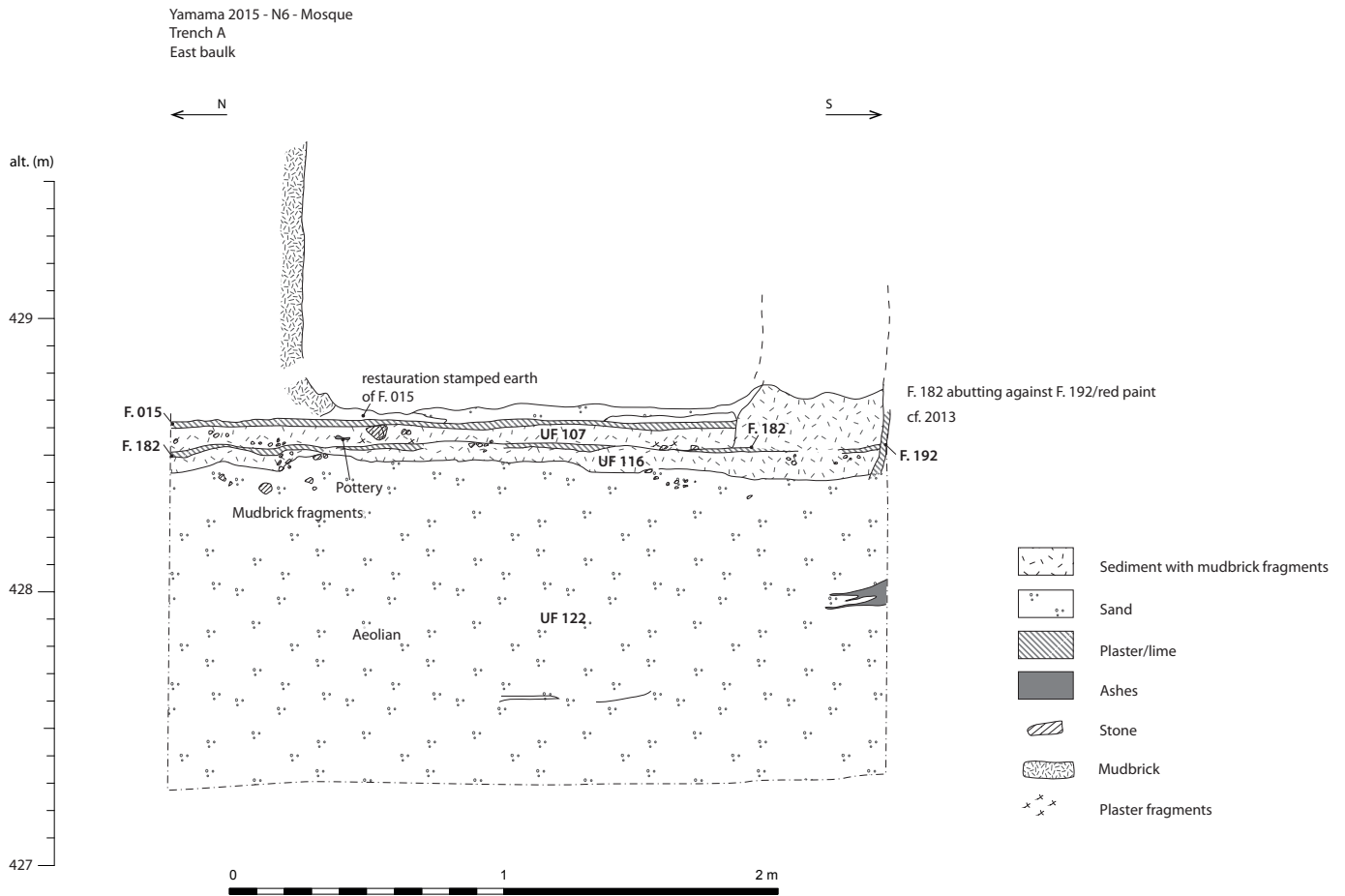
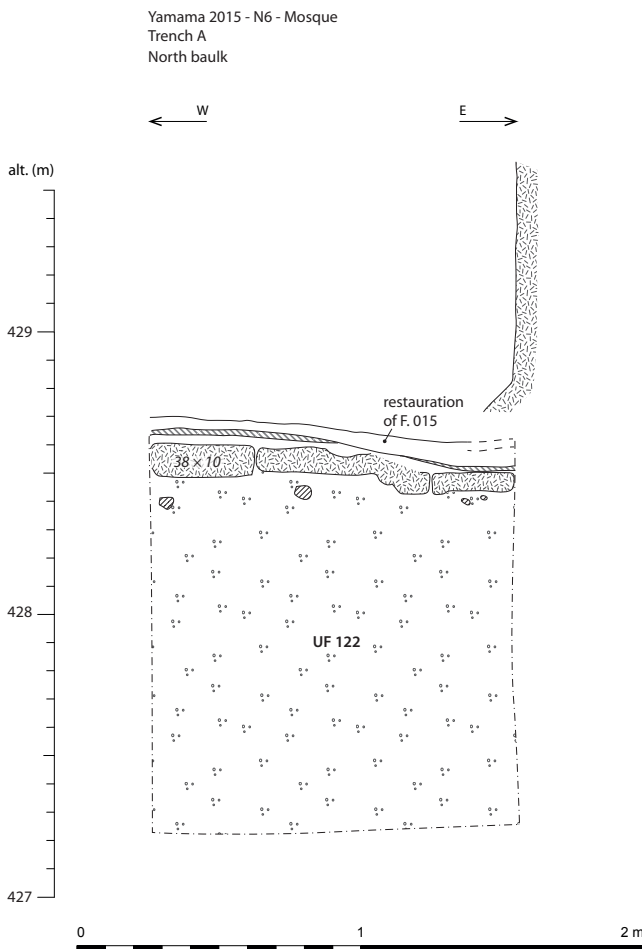


Figure 40: Al-Yamāma, Building 1, R. 013. Trench A: zenithal view, looking west (P. Siméon - Saudi French archaeological mission in al-Kharj).

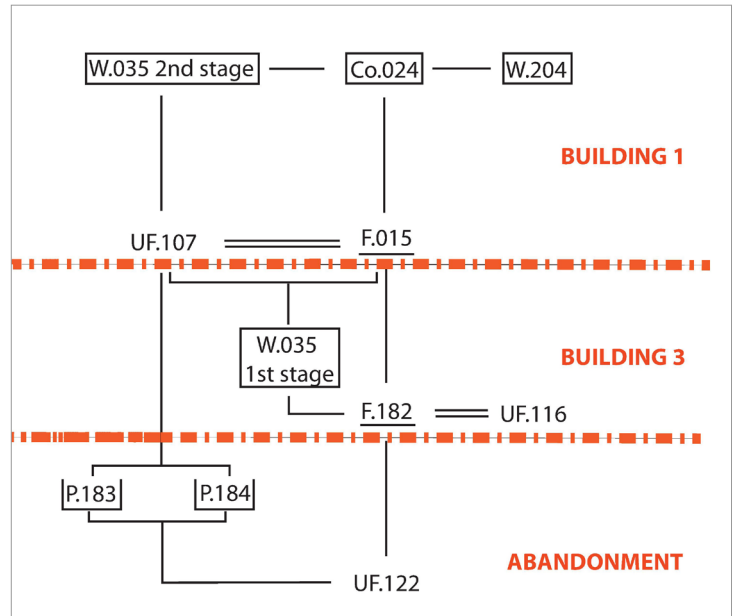


▲ Figure 41: Al-Yamāma, Building 1. Trench A: east baulk (P. Siméon/A. Emery - Saudi French archaeological mission in al-Kharj).



◀ Figure 42: Al-Yamāma, Building 1. Trench A: north baulk (P. Siméon/A. Emery - Saudi French archaeological mission in al-Kharj).

▼ Figure 43: Al-Yamāma, Building 1. Trench A: stratigraphic chart (P. Siméon - Saudi French archaeological mission in al-Kharj).



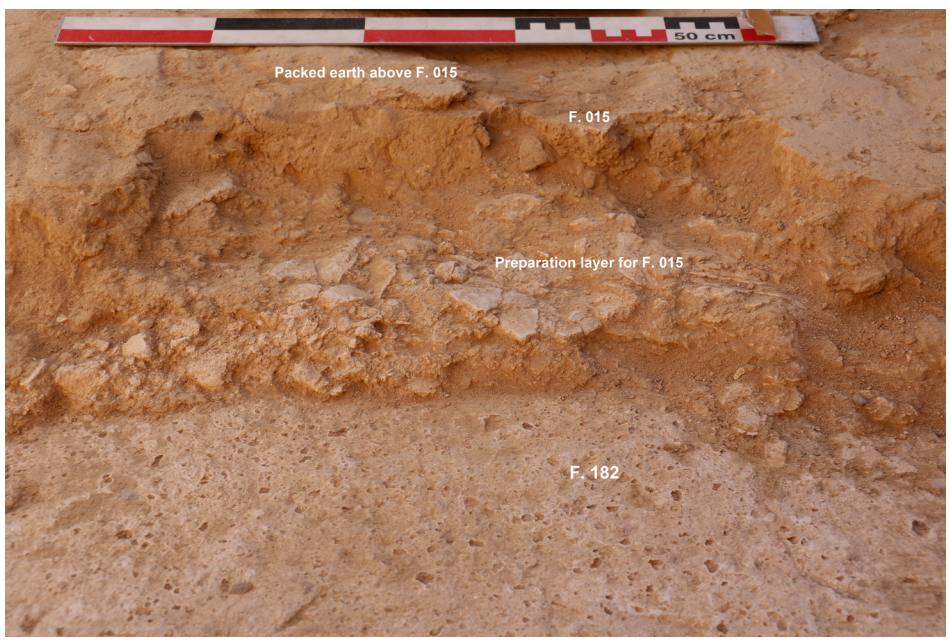


Figure 44: Al-Yamāma, Building 1, R. 013. Trench A : detail of UF 107, a preparation layer for F. 015, above F. 182 (J. Schiettecatte - Saudi French archaeological mission in al-Kharj).

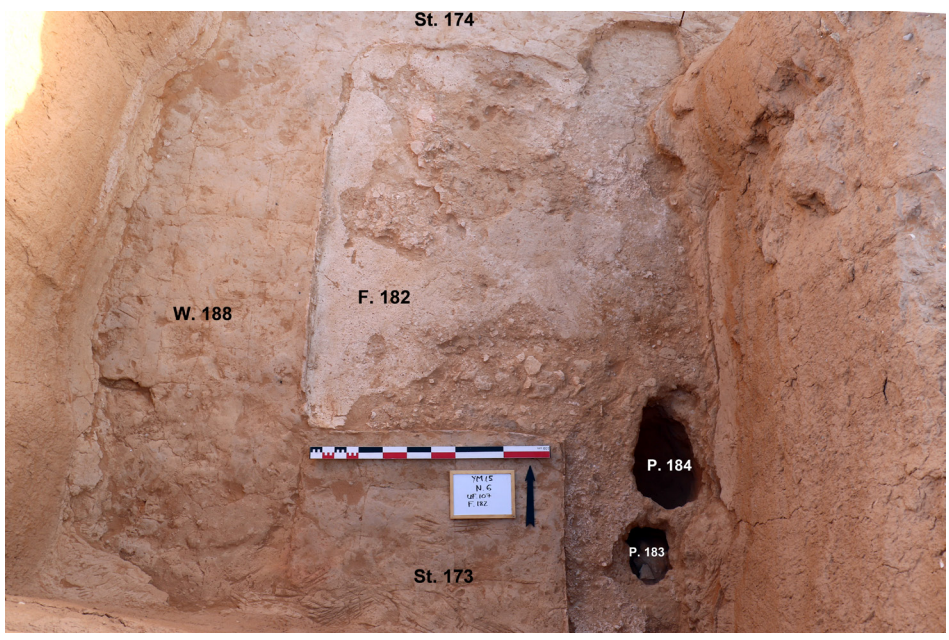


Figure 45: Al-Yamāma, Building 1, R. 013. Trench A : floor F. 182 abutting levelled structures of Building 3 (P. Siméon - Saudi French archaeological mission in al-Kharj).



Figure 46: Al-Yamāma, Building 1, R. 013. Trench A : UF 122 = eolian sand accumulation under F. 182 (P. Siméon - Saudi French archaeological mission in al-Kharj).

Trench B

UF & structures: UF 127, UF 128, F. 182, UF 130, UF 131, UF 134, F. 192, UF 141, UF 144, UF 145, UF 147, UF 150, UF 151, UF 152, UF 153, UF 154, UF 156, UF 159, UF 160, F.224, W.255, UF 230, P. 198.

In order to locate the foundations of the northern and western walls of the prayer hall (W. 002 and W. 006) as well as previous occupations, a second trench, Trench B, turned east-west, was opened in the north-west corner of the prayer hall (R. 013), at the northern extremity of the western and central naves. It measured 5 × 2 m (figs. 47-52). It was first divided in two parts with a central bench turned north-south which provided a stratigraphic sequence of the sounding (figs. 50-51). From top to bottom, the sequence can be described as follow.

Built floor F. 015 covered the 3/4 of the sounding area. It was only disturbed to the north-west by a small pit (P. 198), whose filling (UF 128) proved it to be a hearth. It went through floor F. 015 and into wall W. 199 under this floor (fig. 58); its filling included a fragment of glass and charcoals (including a carbonized date stone).

The dismantling of F. 015 (UF 127) did not yield any artefact/botanical/faunal remain. In the western nave F. 015 was sometime directly built above F. 182 (UF 130) (fig. 49). In the central nave, as we observed in Trench A, F. 015 have a non-homogeneous preparation layer (UF 131) made of packed earth, plaster fragments and rounded pebbles forming patches (fig. 53: upper left). This layer has been prepared to equalize the irregular surface of UF 134 (fig. 49).

Floors F. 182 and F. 192 were separated by a 20-to-25-cm-thick destruction layer of dense dark brown melted mudbricks and plaster fragment (UF 134 - figs. 53-55). These fragments probably came from a previous plaster floor or a wall coating.

Along W. 090, to the north-east of Trench B, F. 192 was covered with a small heap of fragments of plaster coating with red painting (UF 140) (fig. 55), in some other part of the trench, accumulation of rounded pebbles (UF 136 and 143) corresponded to repair of F. 192 and levelling of its surface.

Two small structures were built together with F. 192: a small pillar (W. 211) built within UF 144, the floor preparation layer of F. 192, which seems to have been an intermediate stage between northern pillars W. 090 and W. 003 (fig. 57), and small wall W. 199 (dismantled with ref. UF 142) built above F. 192 and covered by

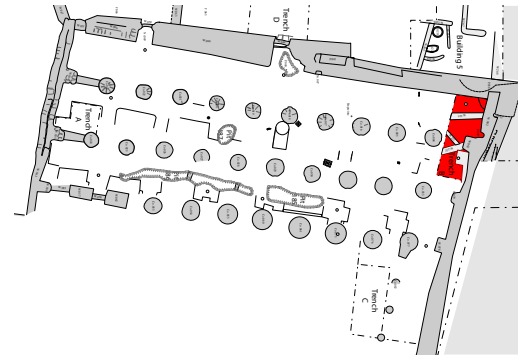


Figure 47: Al-Yamāma, Building 1, R. 013. Trench B: general view after completion (Th. Sagory - Saudi French archaeological mission in al-Kharj).

Figure 48: Al-Yamāma, Building 1. Trench B: Eastern section (P. Siméon/A. Emery - Saudi French archaeological mission in al-Kharj).

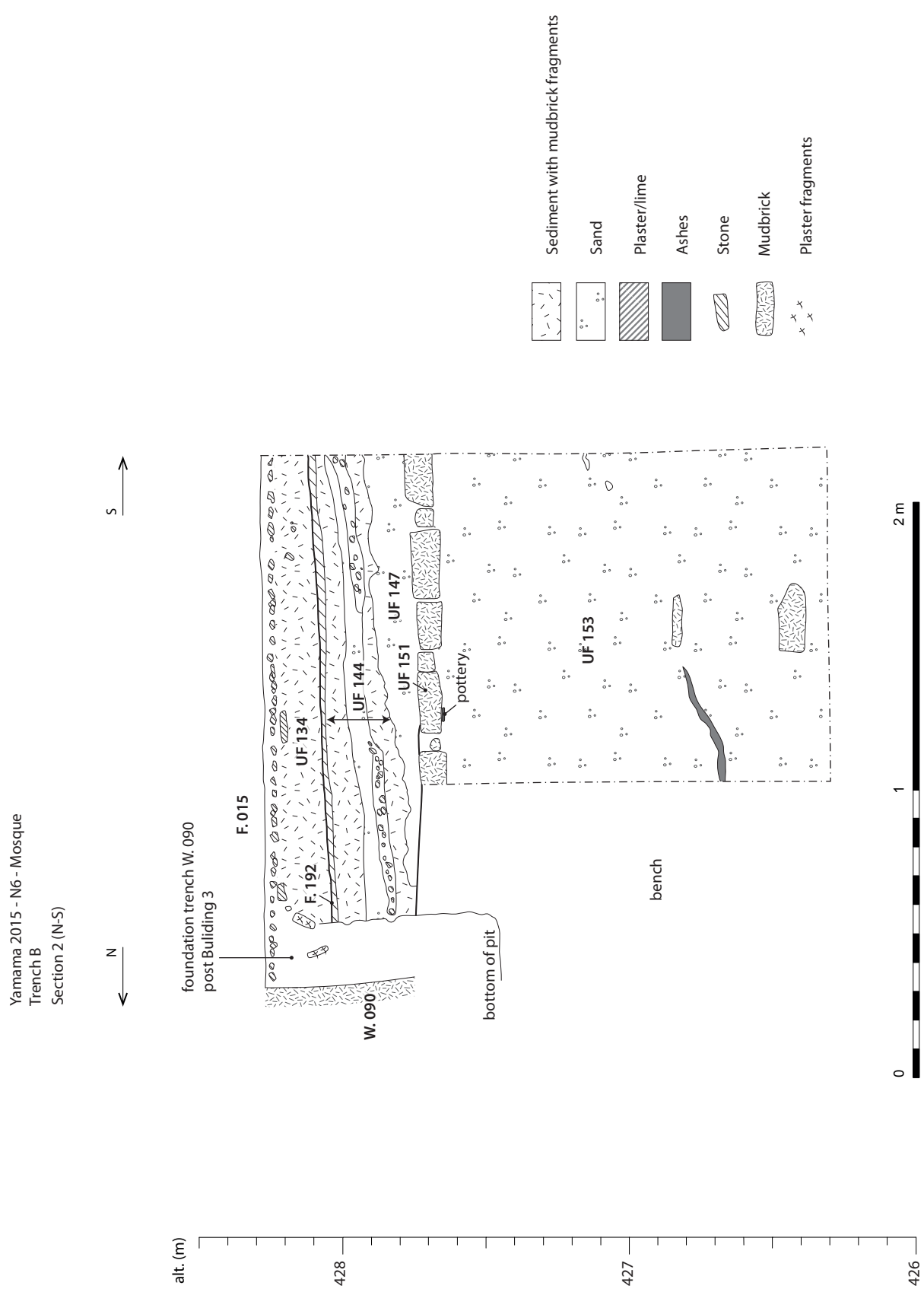
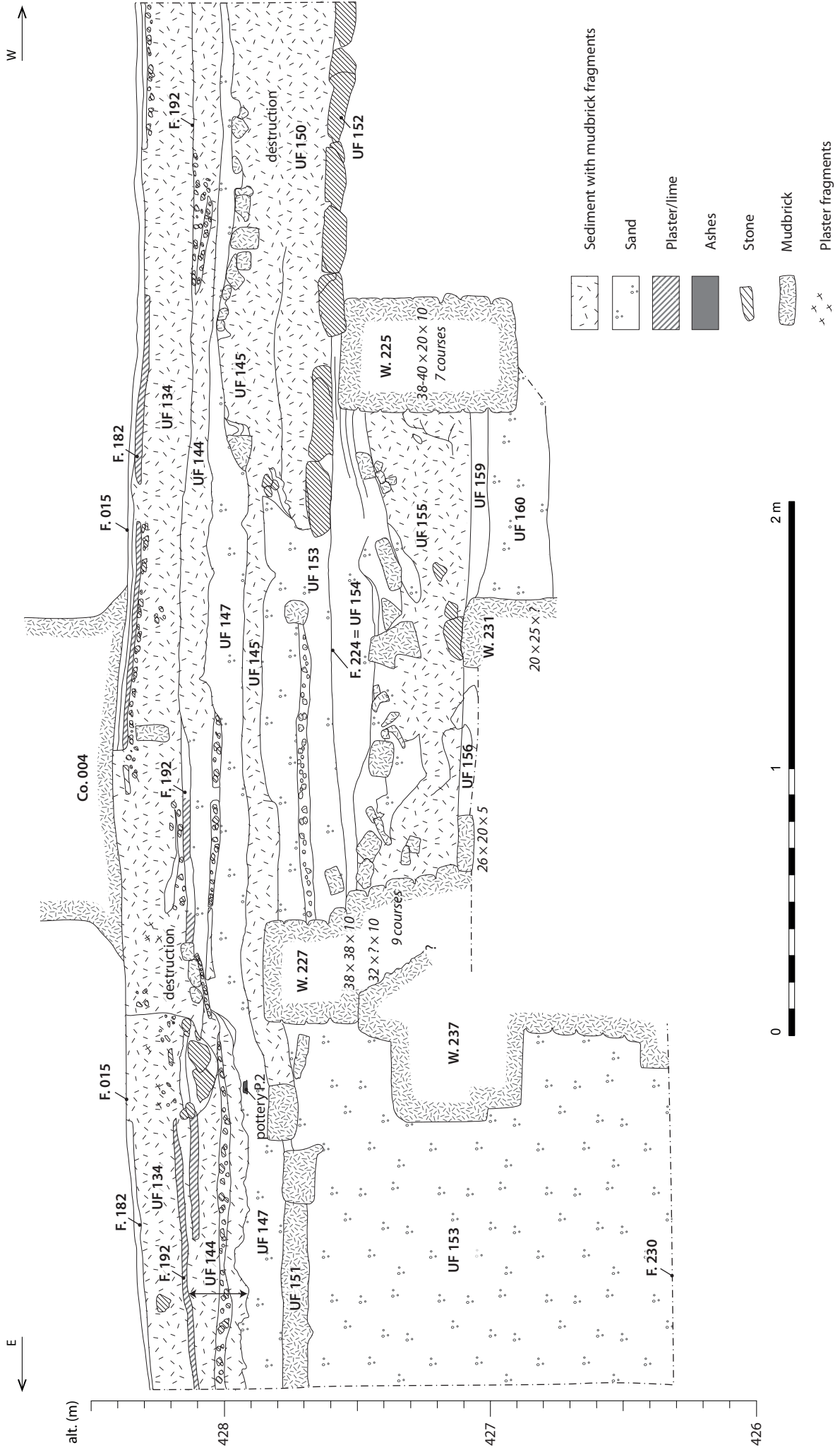


Figure 49: Al-Yamāma, Building 1. Trench B: Southern section (P. Siméon/A. Emery - Saudi French archaeological mission in al-Kharj).

Yamama 2015 - N6 - Mosque
Trench B
Section 1 (E-W)



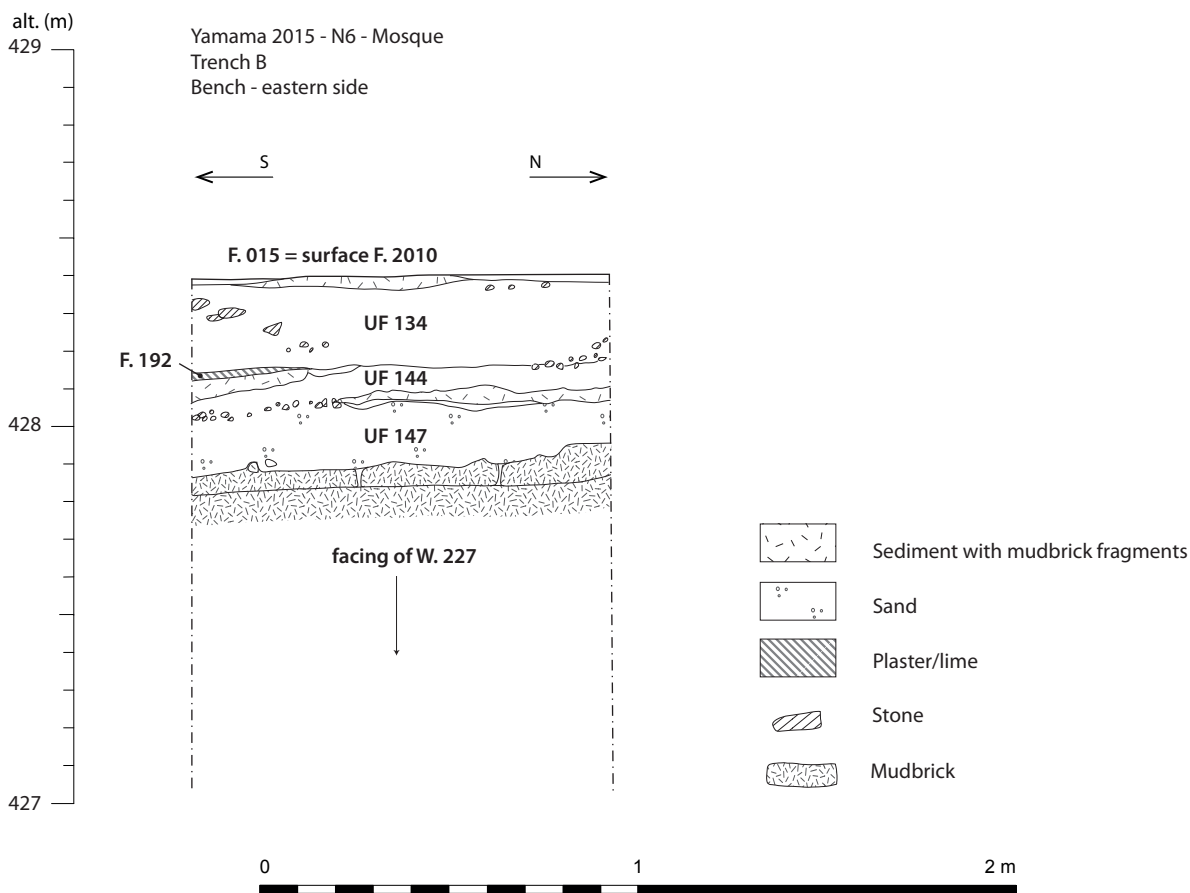


Figure 50: Al-Yamāma, Building 1. Trench B: Central bench - eastern side (P. Siméon/A. Emery - Saudi French archaeological mission in al-Kharj).

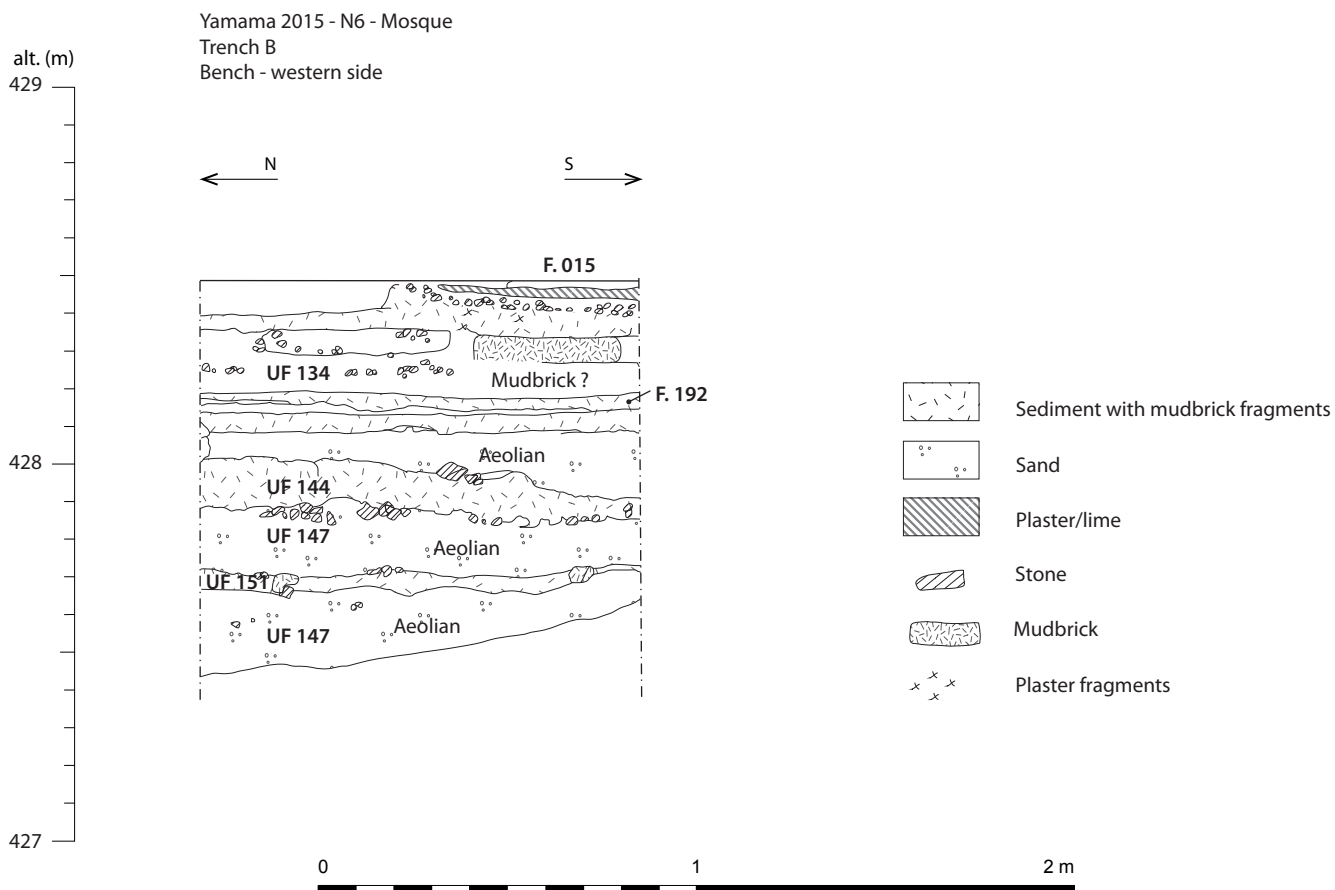


Figure 51: Al-Yamāma, Building 1. Trench B: Central bench - western side (P. Siméon/A. Emery - Saudi French archaeological mission in al-Kharj).

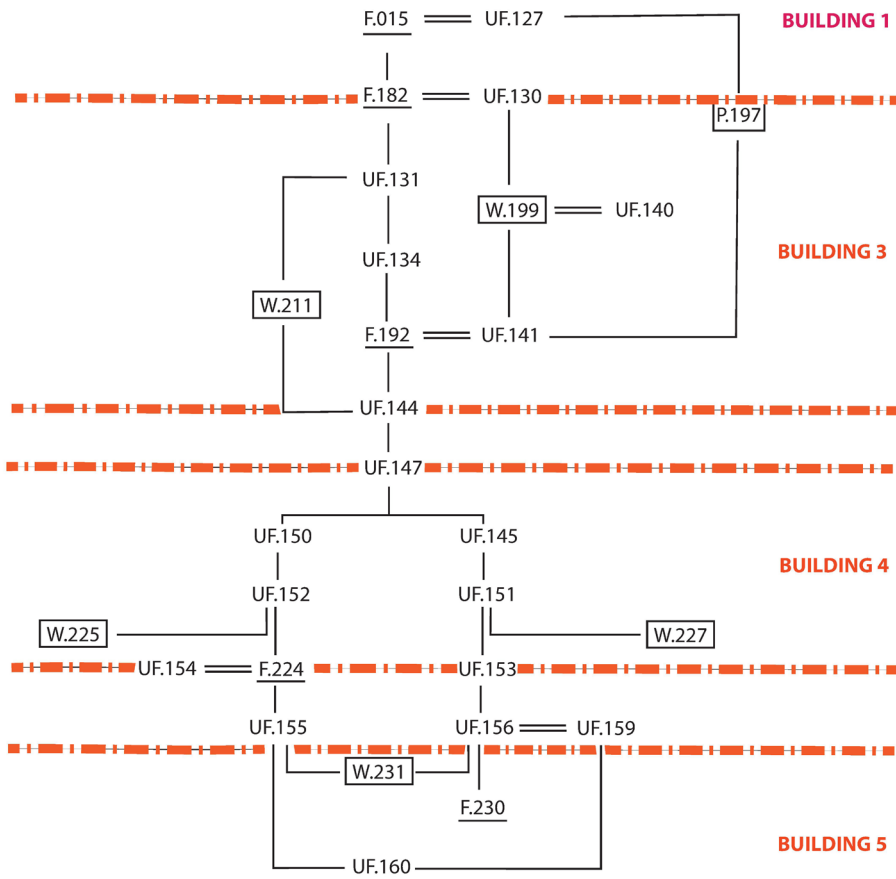


Figure 52: Al-Yamāma, Building 1. Trench B: stratigraphic chart (P. Siméon - Saudi French archaeological mission in al-Kharj).



Figure 53: Al-Yamāma, Eastern half of Trench B: UF 131= preparation layer at the top of UF 134 (P. Siméon - Saudi French archaeological mission in al-Kharj).



Figure 54: Al-Yamāma, Eastern half of Trench B: preparation layer of F; 015. Looking south (P. Siméon - Saudi French archaeological mission in al-Kharj).



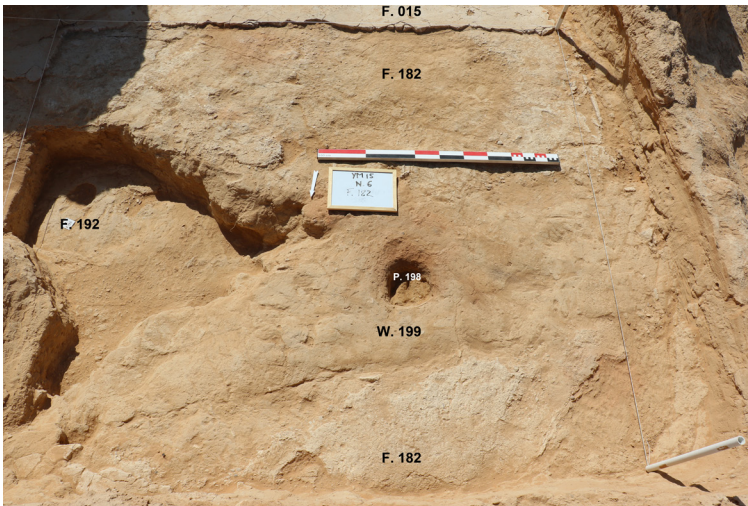
Figure 55: Al-Yamāma, Eastern half of Trench B: UF 134 over F. 192. Looking south (P. Siméon - Saudi French archaeological mission in al-Kharj).



Figure 56: Al-Yamāma, Eastern half of Trench B: floor F. 192. Looking south (P. Siméon - Saudi French archaeological mission in al-Kharj).



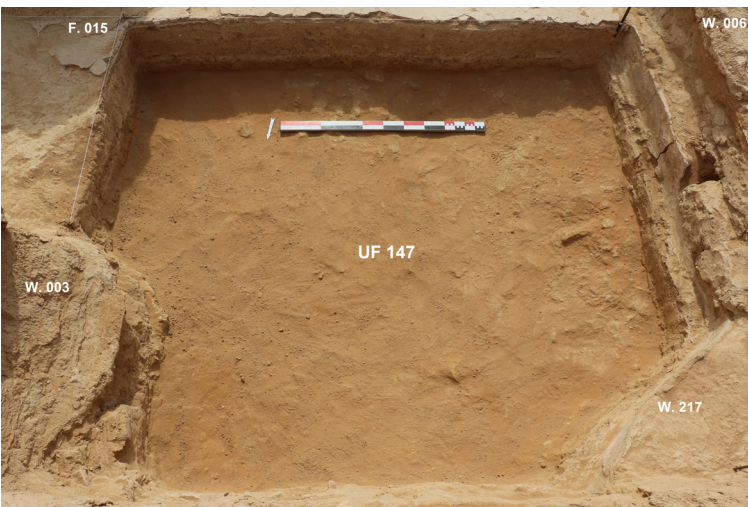
Figure 57: Al-Yamāma, Eastern half of Trench B: preparation layer of floor F. 192 (top of UF 144). Looking south (P. Siméon - Saudi French archaeological mission in al-Kharj).



◀ Figure 58: Al-Yamāma. Western half of Trench B: succession of F. 192, F. 182 and F. 015. Looking south (P. Siméon - Saudi French archaeological mission in al-Kharj).



▲ Figure 59: Trench B: fragments of plaster from F. 192 (P. Siméon - Saudi French archaeological mission in al-Kharj).



◀ Figure 60: Al-Yamāma. Western half of Trench B: UF 147 - eolian sand between two phases of occupation. Looking south (P. Siméon - Saudi French archaeological mission in al-Kharj).

▼ Figure 61: Al-Yamāma. Trench B: UF 147 - eolian sand between two phases of occupation. Looking west (P. Siméon - Saudi French archaeological mission in al-Kharj).



F. 015 (**fig. 58**). It comprised three courses of small square bricks (15 to 20 cm in width). The axis of this wall, north-east/south-west is different from the axes of the walls from Building 1.

F. 192 is about 2-5 cm thick (UF 141). Its composition is different from the one of F. 015 or F. 182: it was made of lime and shows an abundant red, pink and greenish grit temper (**figs. 56, 59**). F. 192 went up on walls W. 006 (western wall) and W. 217 (NW corner of Trench B). When used as wall coating, the plaster was painted in red; it was preserved up to 20 cm high (F. 015 is abutting on it at the top). Floor F. 192 was damaged in the eastern part of the trench (**fig. 56**) and in some parts, it is simply made of densely packed earth including a lot of pebbles. F. 192 was built on a thick preparation level made of dark brown densely packed earth with straw (UF 144 - **fig. 57**). This layer only yielded 2 sherds (cat. 1).

Under UF 144 an irregular level of aeolian sand (UF 147, 5-15 cm thick) indicates a rupture in the stratigraphy and in the occupation of the area (**figs. 48-49, 60-61**). This eolian sand layer is covering a thick collapse layer (UF 145, UF 150), made of fragments of thick dark-brown mudbricks, intermingled with sand pockets. The slope of this collapse, from west to east, and the presence of fragments of mudbricks to the west indicate that it was a former state of wall W. 006 which fell down (see below). In the eastern half of Trench B, mudbricks laid flat on the sand (dimensions: 20-23 × 28 × 7 cm) (UF 151). In these layers, material was more abundant:

- UF 145: 16 sherds (cat. 2, 6, 12, 15, 28, 35, 36), 1 camel bone, 2 caprine bones, 1 flint, painted plaster coating;
- UF 147: 13 sherds (cat. 2, 16, 26, 28, 29, 35, 36), 15 caprine bones, 1 lizard bone.
- UF 150: 2 sherds (cat. 2, 35).

Under this collapse, a paving covered the western side of Trench B. It was made of very large stones laid flat on the ground (UF 152 - upper altitude 427.58 to 427.68 m a.s.l., **fig. 62**). We noticed that this altitude corresponded to the one of floor F. 189 (427.54 m), outside of the Building 1, just west of wall W. 006. UF 152 only yielded 2 sherds (cat. 1, 35). This paving covered a south-north wall (W. 225) (**fig. 63**), very eroded to the North, and a soft bright green sediment sloping from south to north (UF 154). Its aspect and texture remind latrine sediment.

In the eastern half of Trench B, the mudbrick layer (UF 151) covered a 1.4-m-thick layer of eolian sand (UF 153), abutting a large brickwork to the west (**figs. 64-65**). This structure is made of at least three walls, one of them being hard to outline (**fig. 65**): on the top W. 227 (South-East/North West axis, 9 courses, bricks of 38 × 38 × 10 cm); it was partly built above W. 237, apparently perpendicular to W. 227, and which is protruding to the east. The altitude of its base is the same as that of W. 225 (426.90 m) (**fig. 49**). UF 153 yielded several animal bones (7 bones of caprine, 3 of lizard, 1 ostrich eggshell fragment) and 18 sherds (cat. 1, 2, 13, 15, 26, 35, 36).

In the western half of Trench B, the mudbrick layer (UF 151 = UF 145) covered a layer of aeolian sand (UF 153). At the basis of this layer, a floor F. 224 is associated to the stone paving (UF 152) and is abutting W. 227 to the east. Floor F.224 covered a second mudbrick wall, W. 225, parallel to W. 227 and 1.5 m west of it. It is preserved over 7 courses of mudbricks (38-40 × 20 × 10 cm). Floor F.224 sealed a thick collapse layer of mudbrick fragments and sand pockets (UF 155 - **fig. 63**). This collapse layer was located between W. 227 and W. 225. This space was defined as room R. 234. UF 155 yielded 5 bones of caprine and 7 sherds (cat. 2, 12, 26, 36).

This collapse covered an irregular mudbrick paving (UF 156, UF 159) (**figs. 63, 66**). Some of the bricks were c. 20 × 25 × 7 cm. They were at the same altitude than the basis of W. 225 and W. 227. This paving (UF 156, UF 159) recovered a third wall (W. 231, South-West/North-East) and an eolian sand level, UF 160 (**fig. 66**). Due to the narrowness of the area, we were only able to remove a limited part of this eolian sand layer to the west (UF 160). W. 225 appeared to be built directly on it.

Excavation was stopped on the sand layer UF 153 in the eastern half and UF 160 in the western half, at an altitude of 426.32 m (east) and 426.77 m (west) (**figs. 65-66**).

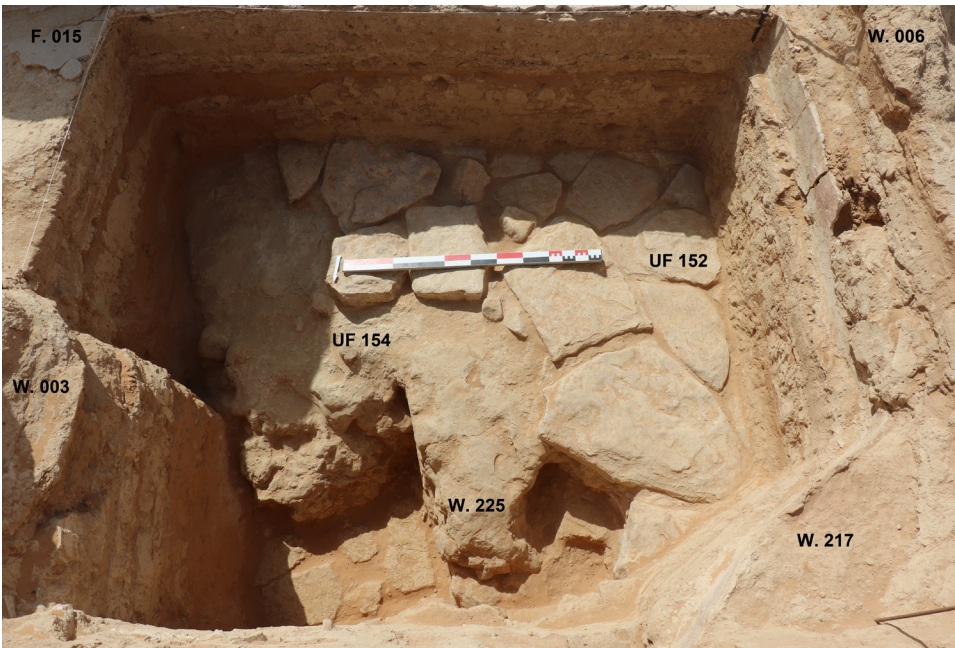


Figure 62: Al-Yamāma. Western half of Trench B: stone paving (UF 152). Looking south (P. Siméon - Saudi French archaeological mission in al-Kharj).

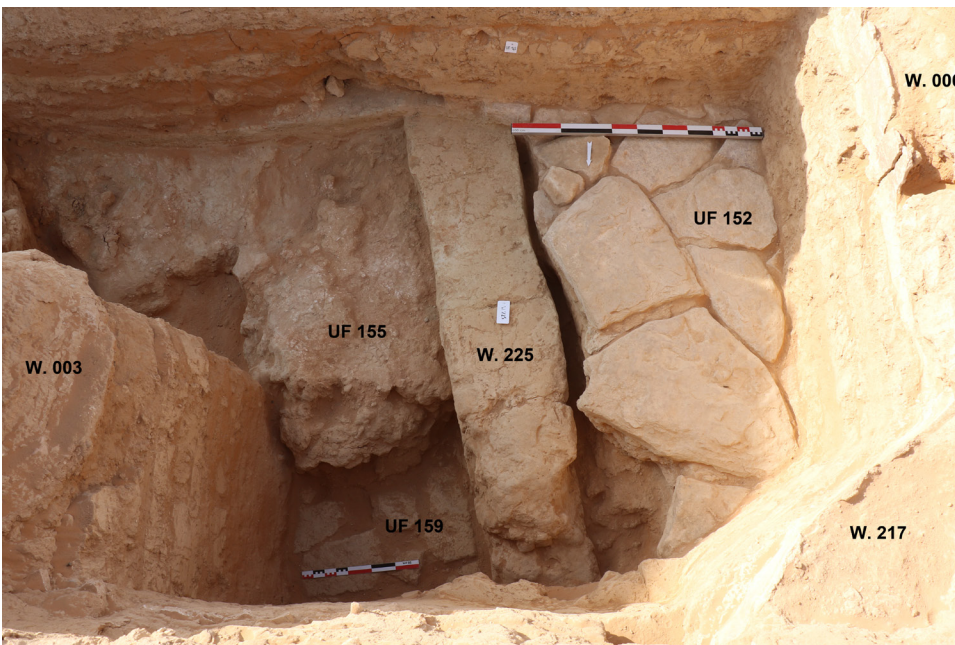


Figure 63: Al-Yamāma. Western half of Trench B: stone paving (UF 152) and wall W. 225. Looking south (P. Siméon - Saudi French archaeological mission in al-Kharj).

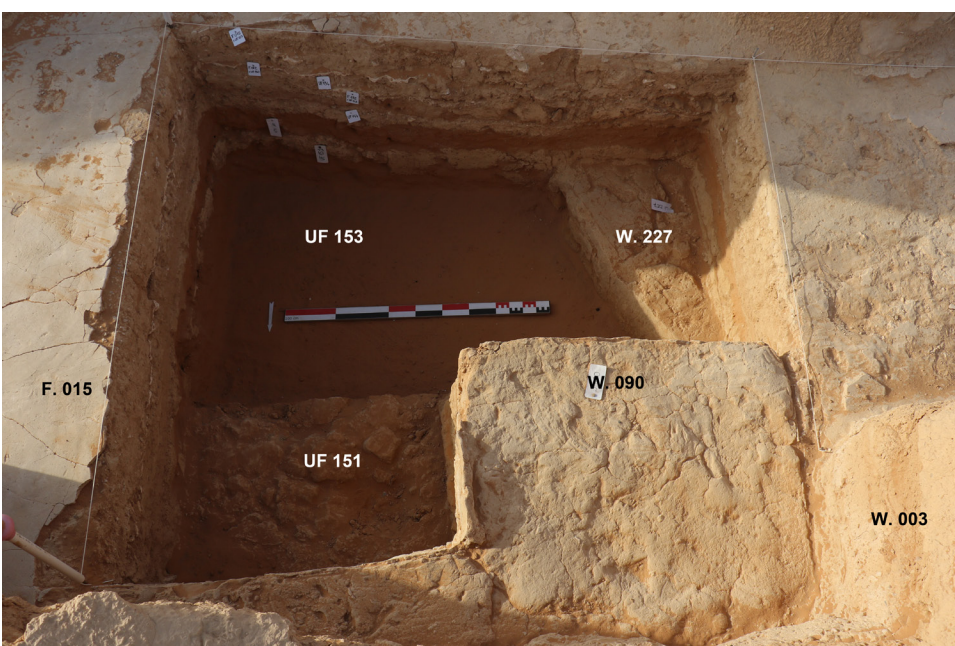


Figure 64: Al-Yamāma. Eastern half of Trench B: eolian sand layer (UF 153) against wall W; 227. Looking south (P. Siméon - Saudi French archaeological mission in al-Kharj).

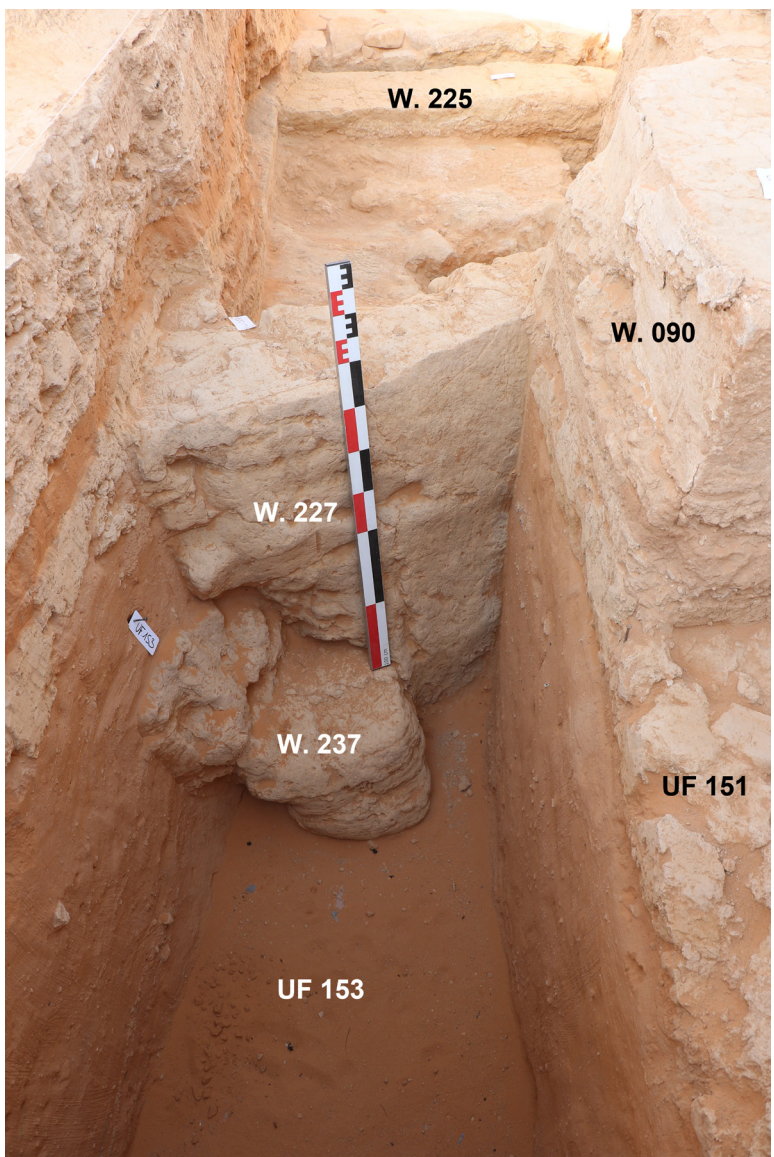
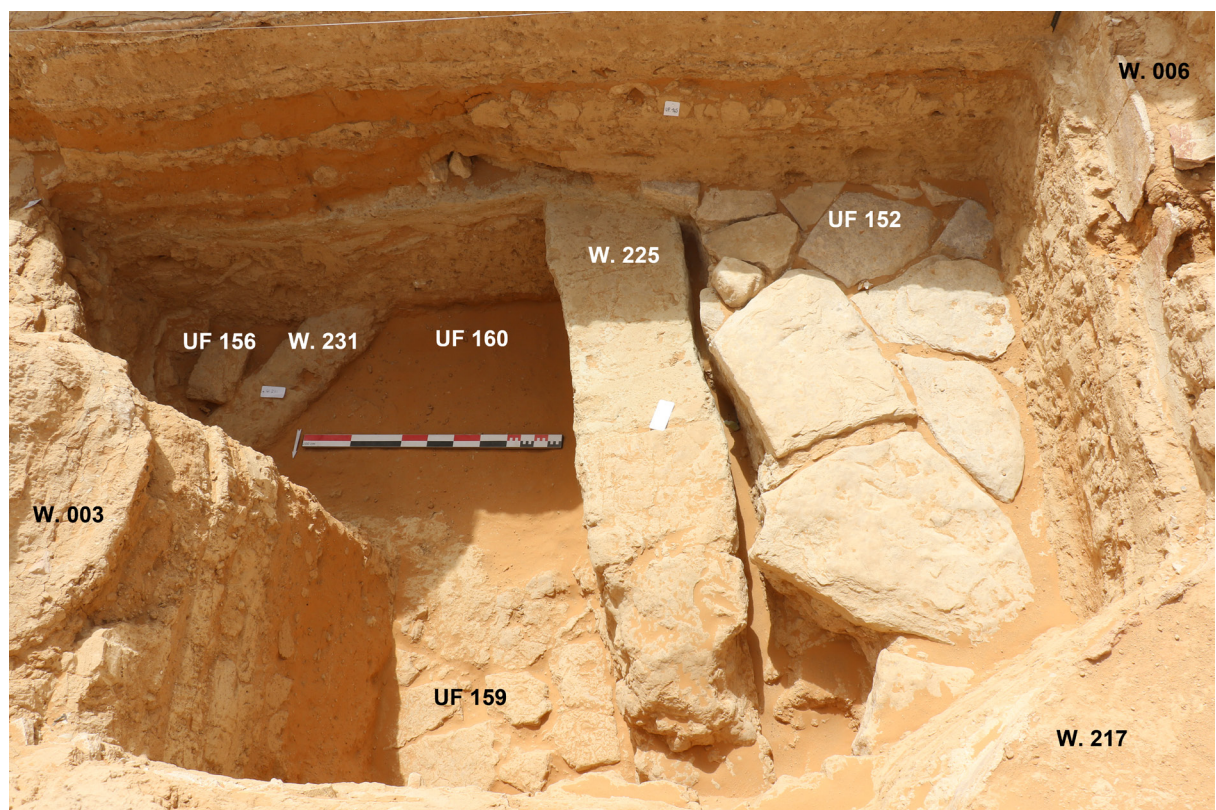


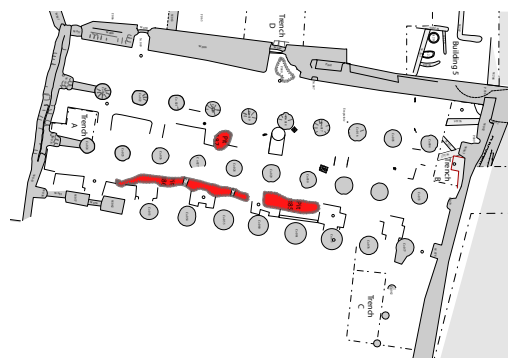
Figure 65: Al-Yamāma. Trench B: eolian sand layer (UF 153) against walls W. 227 & W; 237. Looking west (P. Siméon - Saudi French archaeological mission in al-Kharj).

▼ Figure 66: Al-Yamāma. Western half of Trench B after completion. Looking south (P. Siméon - Saudi French archaeological mission in al-Kharj).



Pits in the prayer hall (P. 185, P. 186, P. 187)

Two long and narrow north-south pits (P. 185 and P. 186) and a large ovoid pit (P. 187) appears in the central and eastern naves (fig. 67). They are going through F. 015. The three pits P. 185, P. 186 and P. 187 provide interesting and complementary stratigraphical sections under floor F. 015 and under Building 1 and Building 3 (levelled structures and their different floors F. 182 and F. 192). Traces of digger tools were clearly visible on pillar W. 201, somehow similar to traces already observed in the pit dug through the main mihrāb (Ni. 160, see the report of the 2012 season).



Pit 185 (UF 111, W. 203, W. 215)

P. 185 is a narrow and elongated pit (3.50 × 0.75 m) dug through floor F. 015, from the levelled pillar W. 203 to the north, to the levelled pillar W. 215 to the south (figs. 67-69). The hardness of these pillars might have compelled the diggers to stop extending the pit. The pit was filled with a thick layer of homogeneous eolian sand (UF 111) (figs. 68-69), numerous fragments of mudbrick (undetermined size, 8-10 thick), rare large stones (max 30 × 30 cm), and fragments of plastered floors F. 015 and F. 182. UF 111 also included a large amount of camel (44) and caprine (16) bones, and 16 sherds (cat. 2, 14, 15, 35, 36 and 42). Three rims of dark brown burnished ware and red slip ware were found in the bottom filling.

In the eastern section, a sequence similar to the one observed in Trench A can be seen (fig. 68): plastered floor F. 192 goes up on the outer face of mudbrick structures only preserved on 2 or 3 courses (W. 203 and W. 215). These structures were levelled during the construction of Building 1. F. 192 is recovered by a preparation layer of the plaster floor F. 182. This latter is recovered by packed earth which might have been either the preparation layer for F. 015 or repairs done in the places where F. 015 was missing during the 2nd occupation of the mosque (cf. above). A difference with Trench A is the presence of a horizontal layer of mudbricks laid flat on the sand. Their function is unclear.

Pit 186 (UF 115, W.220, W.221, R.233)

Floor F. 015 was smashed down by the digging of a second pit (P. 186), one meter south of P. 185. It is in the same axis, along the eastern nave of the mosque. it is a long and narrow pit (8.50 × 0.75 m) (fig. 67, 69-70, 72). The pit was filled up with a homogeneous layer of eolian sand (UF 115) similar to the one described in P. 185 (mudbrick fragments where less numerous). A fragment of a yellow fired brick with vegetal temper (5 cm thick) was found in this pit.

P. 186 cut two massive pillars (W. 201 and W. 213 - see figs. 20-21), which are parts of the levelled structures of Building 3. These structures are preserved over 3 to 4 courses of square mudbricks (two sizes 34-38 × 8-10 cm and 25 × ? × 10 cm) (fig. 72).

At the bottom of P. 186, two small mudbrick walls appeared, W.220 and W.221, oriented South-East/North-west (fig. 70). Part of their bricks had been removed when the pit where initially dug, the aim of these pits being probably to extract building material. 24 sherds were found in this pit (cat. 2, 5, 6, 12, 13, 15, 26, 35, 36 and 42). The presence of the type 15 (red ware with grey-black core and very abundant chaff temper) is interesting since this type is up-to-now only attested in the preislamic layers from the bottom of Sounding 1 (Phase 4: 4th-1st cent. BC) (see report 2012 and SCHIETTECATTE & SIMÉON in press). A dating only based on this sherd in an eolian sand layer however would be too rash.

Pit 187 (UF 114)

This ovoid pit (1.10 × 1.37 m) has been dug through floor F. 015 in the central nave of R. 013, between Co. 019, 020, 027, and 028 (figs. 67, 71). The top of pit P. 187 already partially appeared in the 2013 season. at the bottom of UF 082, just under F. 014 (4th occupation level of Building 1). Its top was filled with fragments of fired

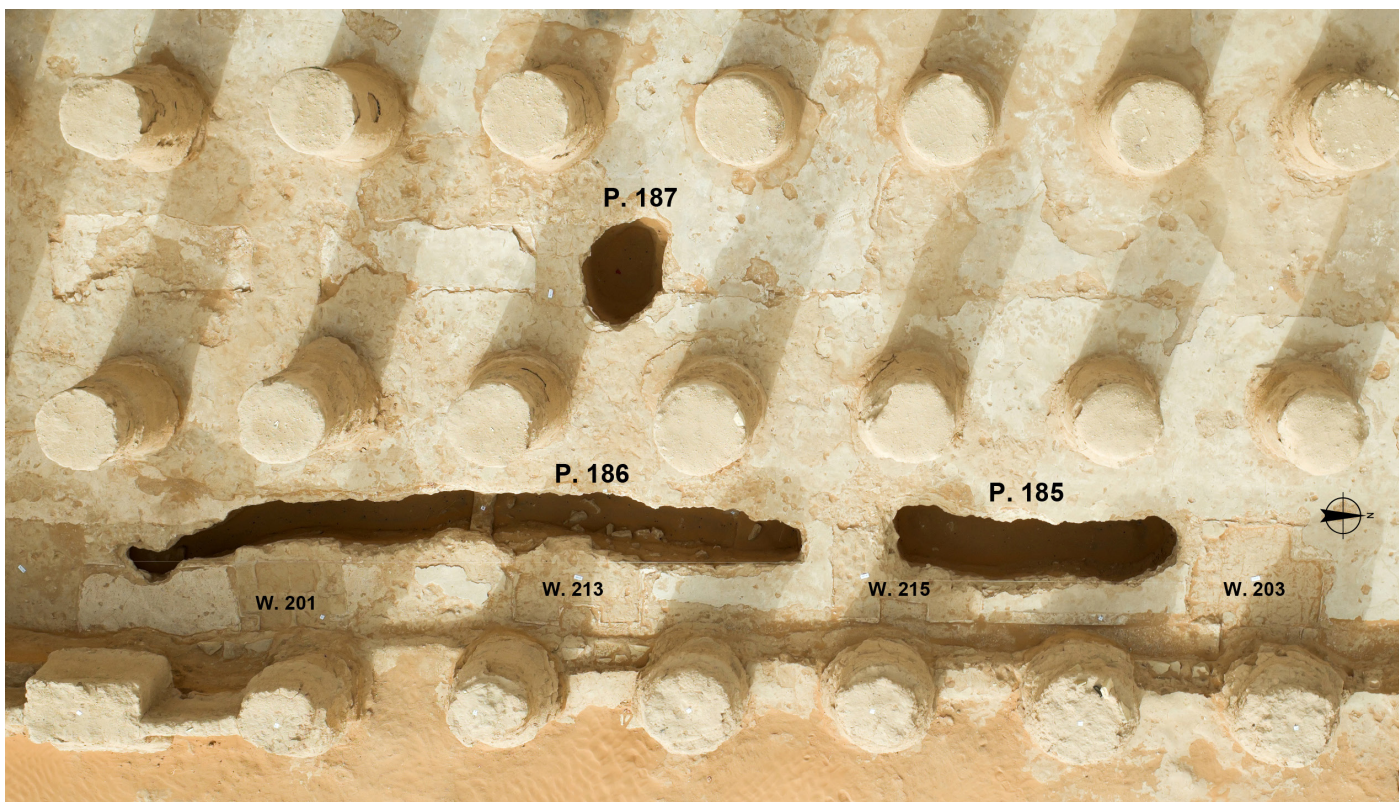


Figure 67: Al-Yamāma, Building 1, R. 013. Pits dug through F. 015 (P. Siméon - Saudi French archaeological mission in al-Kharj).

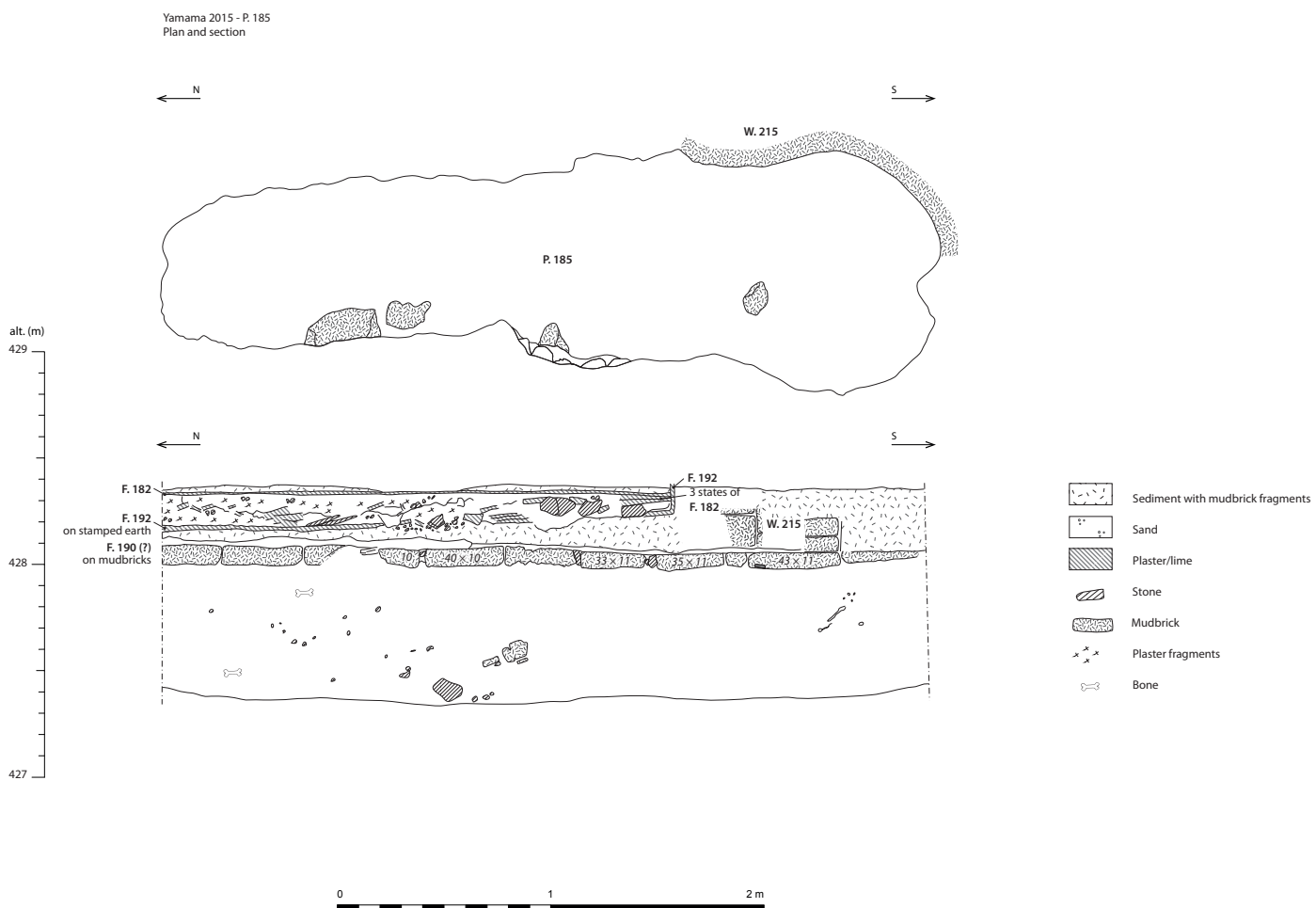


Figure 68: Al-Yamāma, Building 1, R. 013. Pit P. 185: plan and eastern section (P. Siméon/A. Emery - Saudi French archaeological mission in al-Kharj).



Figure 69: Al-Yamāma, Building 1, R. 013. Pits P. 185 and P. 186 in the eastern nave. Looking south (P. Siméon - Saudi French archaeological mission in al-Kharj).

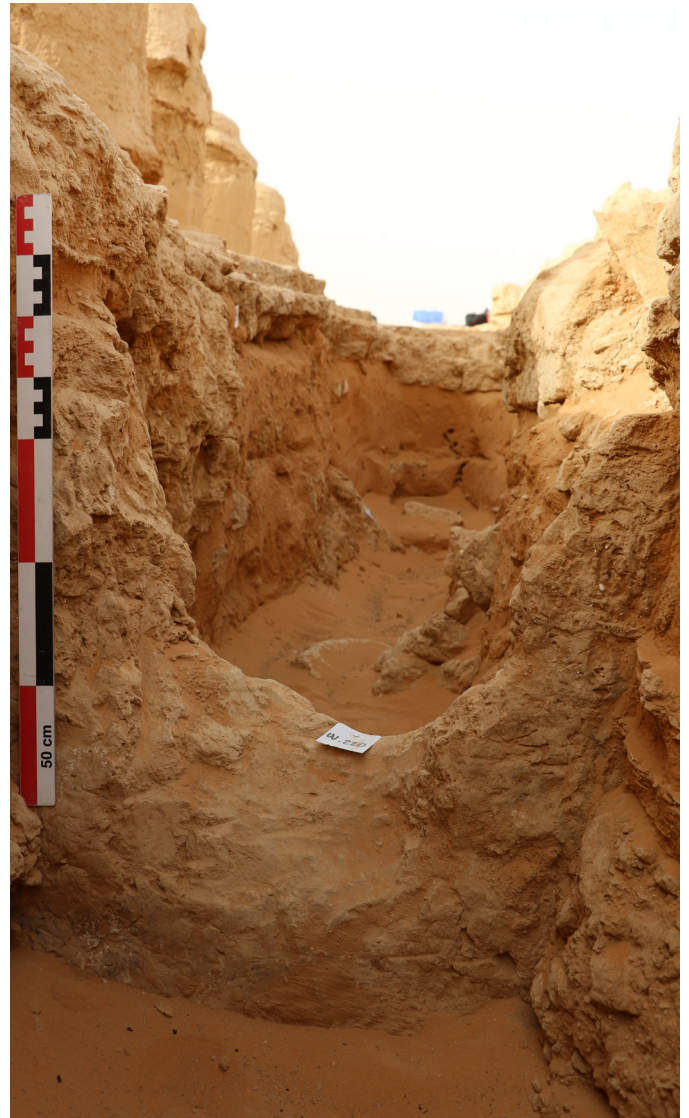


Figure 70: Al-Yamāma, Building 1, R. 013. Pit P. 186 from inside; W. 220 in foreground. Looking north (P. Siméon - Saudi French archaeological mission in al-Kharj).

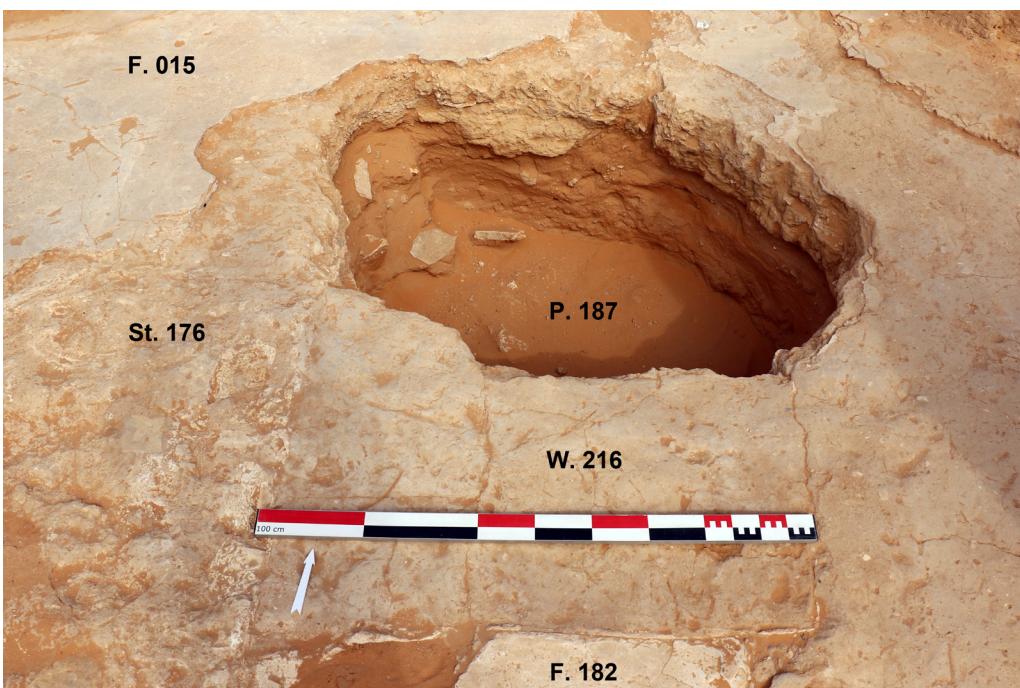


Figure 71: Al-Yamāma, Building 1, R. 013. Pit P. 187; levelled wall W. 216 in foreground. Looking north (P. Siméon - Saudi French archaeological mission in al-Kharj).

Yamama 2015 - P.186
Plan and section



Figure 72: Al-Yamāma, Building 1, R. 013, Pit P. 186: plan and eastern section (P. Simeon/A. Emery - Saudi French archaeological mission in al-Kharj).

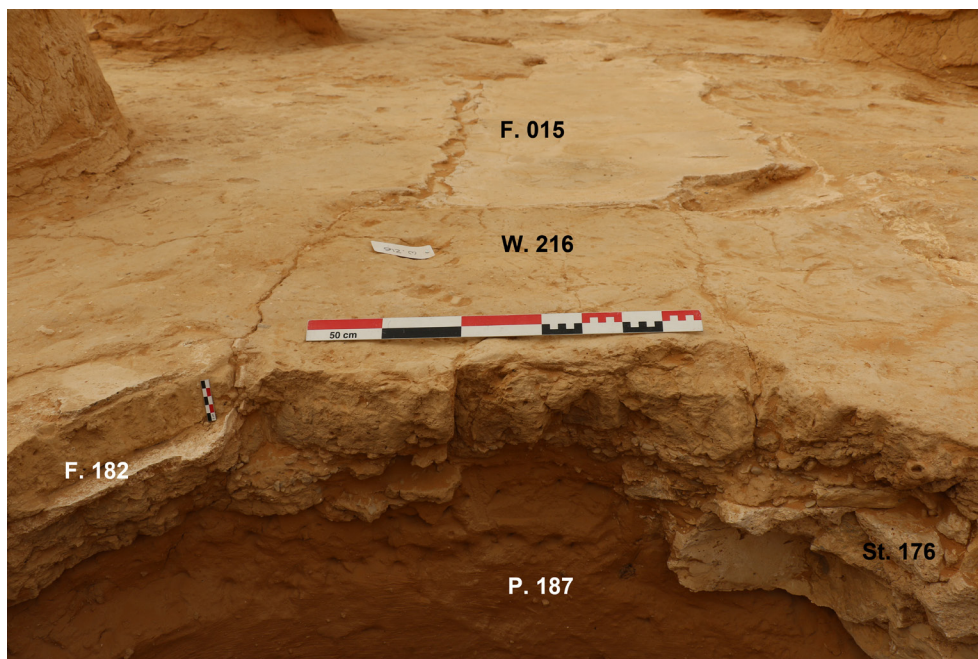


Figure 73: Al-Yamāma, Building 1, R. 013. Pit P. 187; levelled wall W. 216 and St. 176. Looking south (P. Siméon - Saudi French archaeological mission in al-Kharj).



Figure 74: Al-Yamāma, Building 1, R. 013. Pit P. 187; levelled structure St. 176. Looking south-west (P. Siméon - Saudi French archaeological mission in al-Kharj).

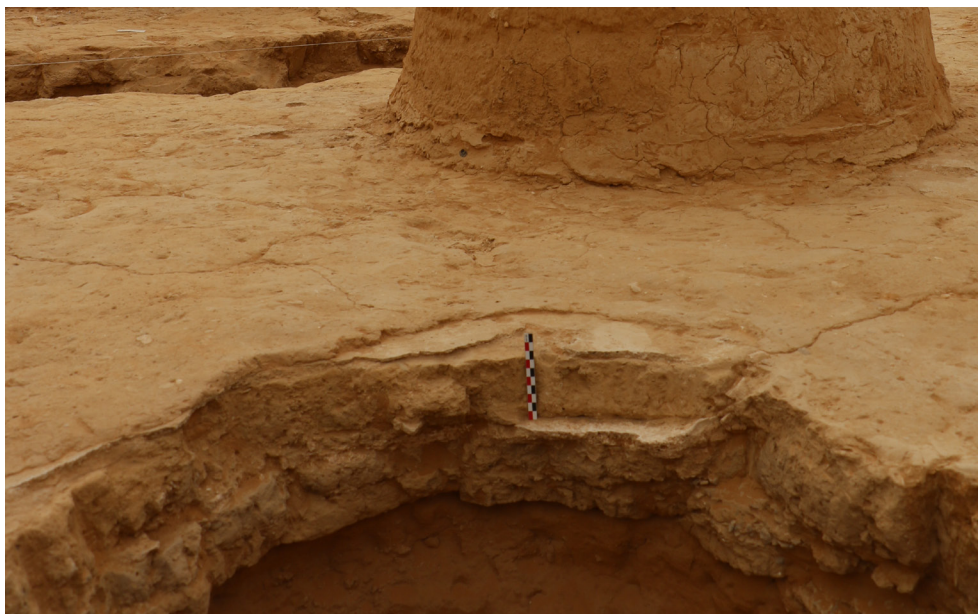


Figure 75: Al-Yamāma, Building 1, R. 013. Pit P. 187; superimposition of F. 182 and F. 015 with their preparation layer in packed earth. Looking south-east (P. Siméon - Saudi French archaeological mission in al-Kharj).

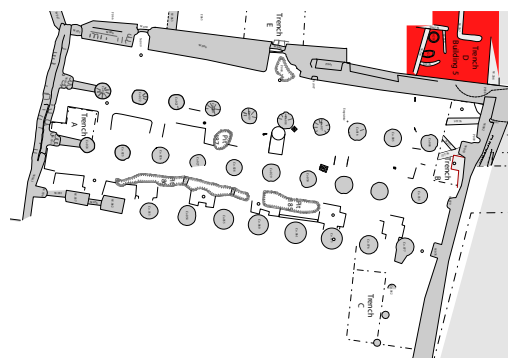
bricks, stones and fragment of plastered floor F. 015, associated with four sherds (types 6 and 35).

The filling of the pit (UF 114) was made of eolian sand, rare fragments of mudbrick, fragments of F. 015 and pre-existing plaster floor F. 182 mixed with numerous broken whitish calcareous stones. At the bottom of the pit, an accumulation of mixed material is clearly different from the eolian filling above it. Unfortunately the area was too narrow to be excavated without being sanded up by the benches. Only two sherds were recovered (cat. 1) and very few bones (undetermined).

In the upper part of the south-western section, a square pillar, W. 216, is built in mudbrick and only preserved over a single course; it is abutting a strong masonry made of large stones (40-50 cm) tied with a lime-based mortar. They are levelled at the height of F. 015 which is abutting on them (figs. 73-74). Large stones were missing into P. 187/UF 114, the aim of this pit being precisely the reuse of extracted building material. Against W. 216, the two floors, F. 015 and F. 182, already described in Trench A and B (remaining of Building 3), form a 30-cm-thick layer (fig. 75). It is equivalent to UF 107 + 116 in Trench A. They are built at the top of the thick eolian sand level (UF 114 equivalent to UF 122 in Trench A - compare figs. 71, 73 to figs. 40-41).

Trench D: a dwelling prior to the mosque

Carrying on the 2012 and 2013 investigations in this area, we resumed the excavation outside Building 1, at the foot of the western wall (W. 006) (figs. 76-77). During the previous seasons, we already unearthed a several meters wide depression (P. 088) where sediment and artefacts gathered. This depression intersects an open-air walking area (F. 087) to the south. Under walking area F. 087, a burial of a child was excavated last season (pit P. 094, burial S.P.094.1 - see SCHIETTECATTE & AL-GHAZZI (ed.) 2013: 102 sq.). The large depression (P. 088) to the north of the trench deeply disturbed the stratigraphical sequence and eroded the summit of walls W. 207 and W. 208.



In the southern part of Trench D, we removed a very compact layer (UF 132) corresponding to floor F. 087 (fig. 78). This greyish 10-cm-thick floor was better preserved to the south (south of W. 205). It was only partially preserved at the foot of W. 006 and in some patches over W.205 and W.207. By mistake, part of the depression P. 088 has been excavated within the same stratigraphic unit UF 132 (the exposure of its surface after the 2013 excavation season made it look like F. 087). Material was rich and abundant but its context is not sure because of the depression which has cut the floor and introduced more recent artefacts. UF 132 yielded animal bones (camel, caprine), ostrich eggshell, a fragment of a glass bangle and 119 sherds (including 26 shapes [foot, rim, handle, decor]: cat. 1, 2, 12, 15, 16, 17c, 19, 24, 26, 33, 35, 36, 41). Potteries included a complete conical bowl (fig. 79: Y.132.20), a white glazed sherd (fig. 79: Y.132.27), jar or open forms with everted rim, sherds with a dark brown fabric and a burnished surface (similar to the sherds found in UF 111 and 115 - pits P. 185 and 186 in the mosque, under Building 3), and a fragment of an open form with a black varnish convex base (fig. 79: Y.132.18 - Attic black varnish ware?).

The hardened level (UF 132 - F. 087) covered a thick orange eolian sand deposit (UF 138) as well as several mudbrick walls (W. 205, 205b, 207 and 208) bordering a rectangular area (R. 222) (fig. 80). A fragment of collapsed mudbrick column (Co. 206) was found edgewise in this area (fig. 81). In the upper part of this eolian deposit, large collapsed mudbricks (c. 40 × 10 × 7 cm) were unearthed in the north-west corner, along W. 208 and W. 207 (UF 139), the collapse covered an almost complete vessel broken flat (fig. 82: Y.139.2).

At the base of UF 138, in the corner of walls W. 205 and W. 205b, a tannūr (St. 218) made of mud appeared (fig. 83) and a complete ceramic bowl was preserved between the tannūr and wall w. 205 (figs. 83-84). The bowl was found together with a thick irregular layer of ashes and charcoal, faunal remains and sherds laid flat on the ground.

Under this layer, UF 148 was the an occupation phase characterized by a succession of horizontal layers made of ashes and faunal remains (UF 148) covering a layer of hardened sand and mud (floor F. 219). At the bottom of UF 148, the different elements of a furnished kitchen appeared: tannūr St. 218, an elongated basin (St. 226) and two low walls bordering the cooking area to the north (W. 229) and east (W. 228) (fig. 85). Ashes were particularly abundant around the tannūr. They have been sampled for anthracological studies. As well, the inner sediment of tannūr St. 218 was totally sampled for archaeobotanical study (UF 149).

West of R. 222, a door gave access to R. 223. To the north-east of this access, against W. 207, two limestone door sockets were superimposed (fig. 86).

Under F. 219 (base of UF 148), an eolian sand layer (UF 157, UF 158) was excavated in the central part of R. 222, down to a compact horizontal layer of sand on which the excavation has been stopped. UF 157 and UF 158 included a lot of small mudbrick fragments, a few stones, faunal remains and sherds. In this layer, to the east of R. 222, a concave milestone, (Y.157.3), two grinders (Y.157.1 and Y.152.2), and an incense burner with incised decorations (Y.152.4) were found (fig. 87).

The stratigraphical sequence of Trench D is summed up in fig. 88; the content of the UFs is summarized here:

- UF 138: bones (596 g.: caprine, gazelle, lizard, rodent, ostrich eggshell); carpological remains (*Triticaceae*, *Boraginaceae*, *Medicago cf. arabica*, *Plantago* sp.); 1 carnelian bead; 54 sherds (belonging to a minimum of 13 vases; cat. 1, 2, 4, 6, 10 [Layla ware with glossy surface], 11, 14, 19, 26, 35, 36, 42).
- UF 139: bones (80 g.: caprine); 31 sherds (belonging to a minimum of 11 vases; cat. 1, 2, 4, 12, 15, 19, 26, 29, 35, 36, 42).
- UF 148: bones (662 g.: camel, caprine, gazelle, lizard, ostrich eggshell); carpological remains (*Hordeum vulgare*, *Triticum turgidum* subsp. *durum*, *Phoenix dactylifera*, *Asphodelus* sp., *Medicago cf. arabica*, *Plantago* sp., *Poaceae*, *Zilla spinosa*); 2 door sockets; 77 sherds (belonging to a minimum of 15 vases; cat. 1, 2, 6, 11, 12, 15, 16, 26, 33, 35, 36).
- UF 149: bones (caprine, lizard); carpological remains (*Triticum turgidum* subsp. *durum*, *Phoenix dactylifera*, *Medicago cf. arabica*); 1 carnelian bead, 1 stone bead; 3 sherds (belonging to a minimum of 3 vases; cat. 2, 16, 35).
- UF 157: bones (338 g.: camel, caprine, lizard); 2 grinders; 1 millstone; 1 incense burner; 20 sherds (belonging to a minimum of 9 vases; cat. 1, 2, 5, 14, 15, 26, 35).
- UF 158: bones (122 g.: caprine); 8 sherds (belonging to a minimum of 5 vases; cat. 1, 2, 11, 12, 19).

Trench E : west of the *mihrāb* (Ni. 160)

The excavation which had been carried out in 2012 behind the *mihrāb* (Ni. 160) to answer the issue of a possible outer extension of the *qibla* wall to the west or an older stage of the *mihrāb* was resumed this season.

This sounding has shown that the central part of the *qibla* wall (W. 006) did not protrude to the west in its lower part; it had the same layout during the several phases of occupation of Building 1. It was founded at an altitude of 427.03 m a.s.l. (fig. 97).

In 2012, an east-west wall (W. 084) was unearthed. It was perpendicular to W. 006, in the same axis as the *mihrāb* Ni. 160 (fig. 89), and made of mudbricks (undefined size). This wall was built above floor F. 189, an irregular layer (5 to 10 cm thick) made of greenish sediment with ashes and thick fragment of plaster (UF 118). This floor was laid above a thin layer of angular pebbles.





Figure 76: Al-Yamāma. Trench D. Looking east (P. Siméon - Saudi French archaeological mission in al-Kharj).

Figure 77: Al-Yamāma. Plan of the NW corner of Building 1 and surrounding trenches/buildings (M. Niveleau, J. Schiettecatte - Saudi French archaeological mission in al-Kharj).

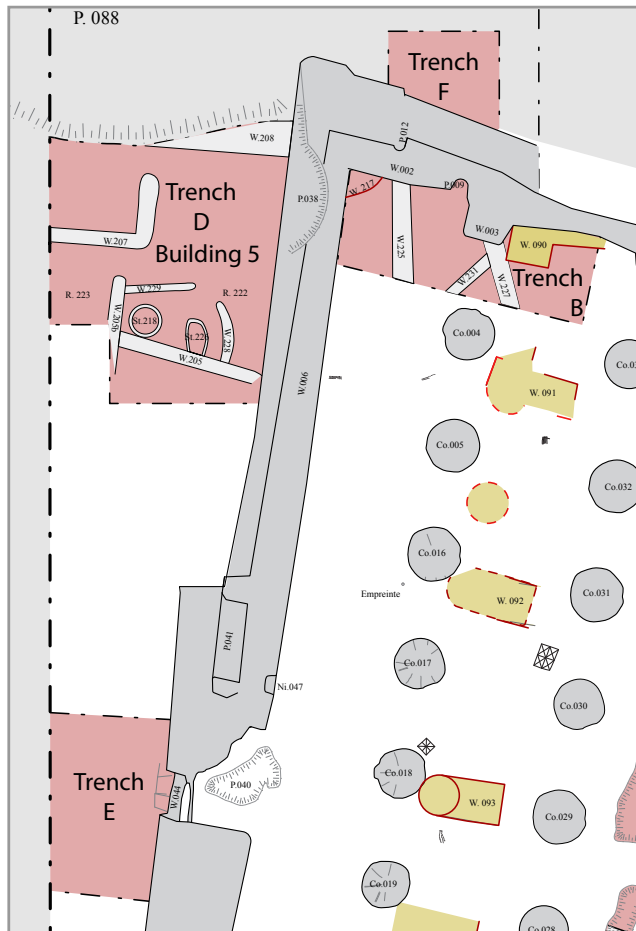
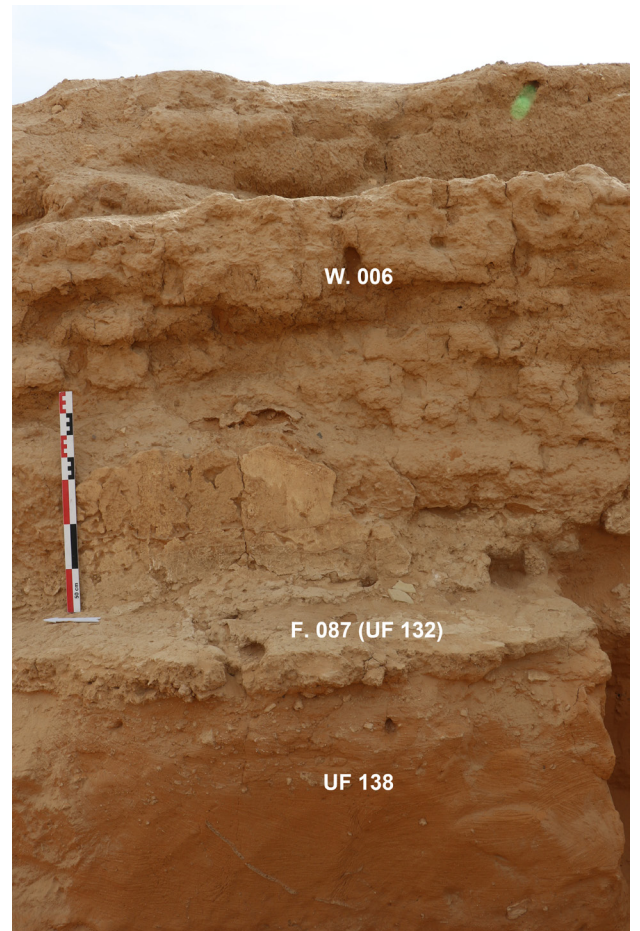


Figure 78: Al-Yamāma. Trench D. Floor F. 087 at the foot of wall W. 006. Looking east (P. Siméon - Saudi French archaeological mission in al-Kharj).



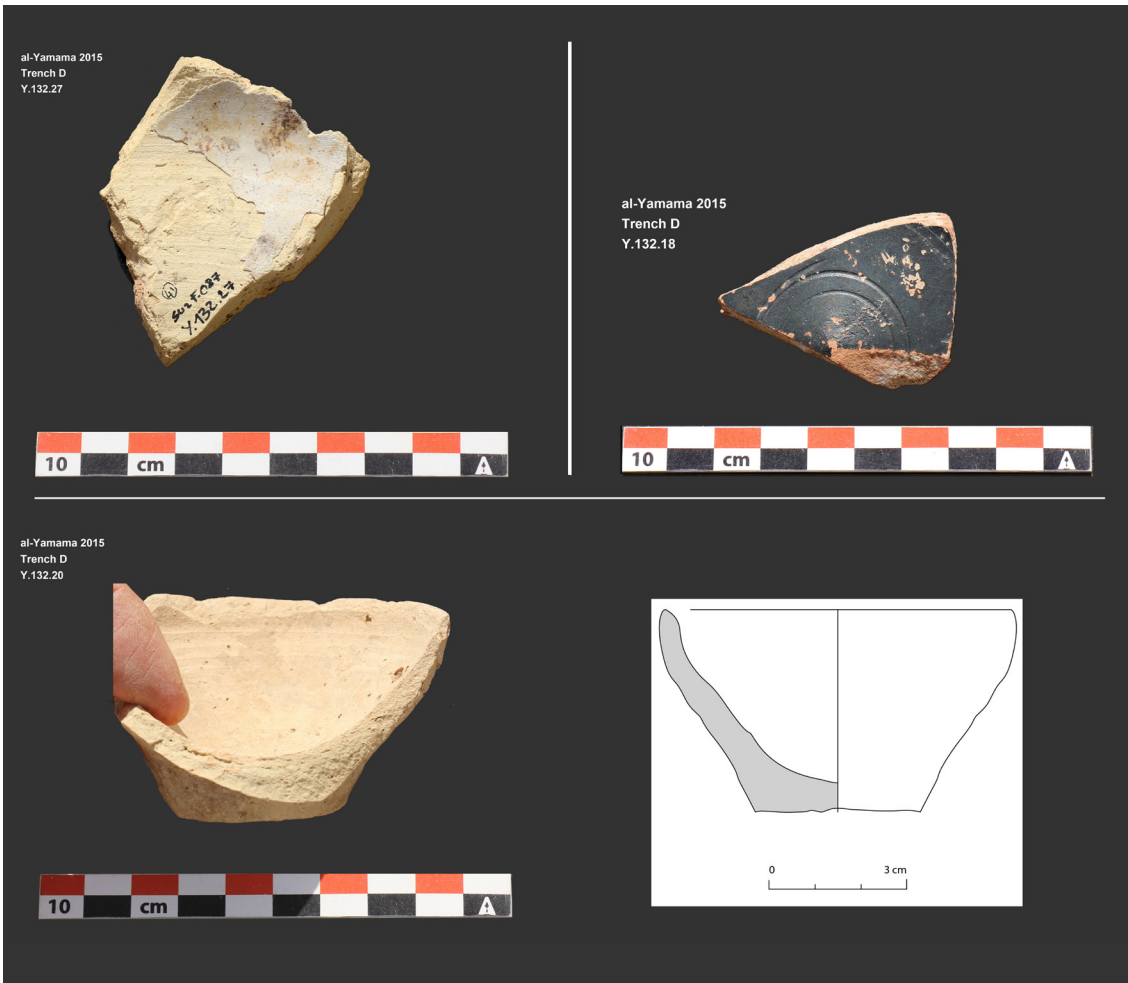


Figure 79: Al-Yamāma. Trench D. UF 132 (pit P. 088 and floor F. 087): Yellow ware with white glaze (Y.132.27); (Attic?) black varnish ware (Y.132.18) and cup in medium fine buff ware (cat. 12) (Y.132.20) (J. Schiettecatte, J. Cuny, A. Emery - Saudi French archaeological mission in al-Kharj).

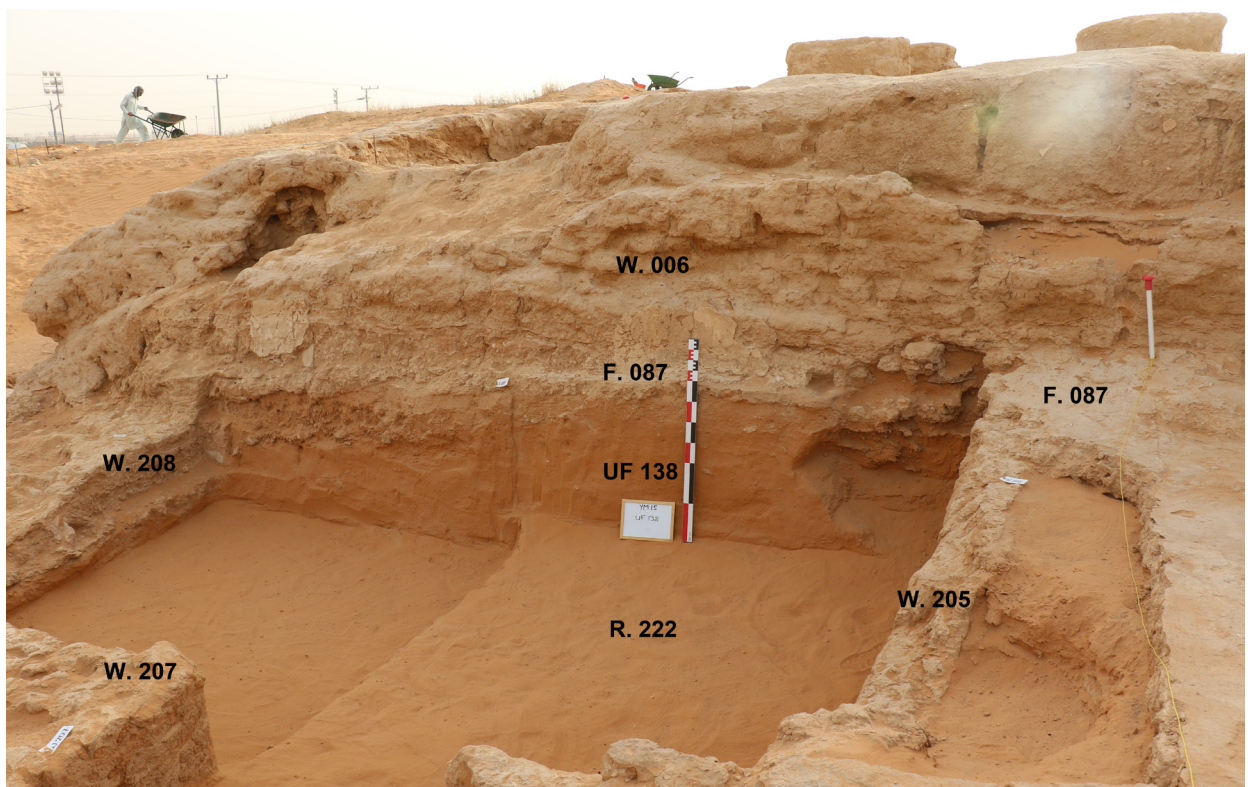


Figure 80: Al-Yamāma. Trench D. UF 138: sand deposit under floor F. 087. Looking north-east (P. Siméon - Saudi French archaeological mission in al-Kharj).

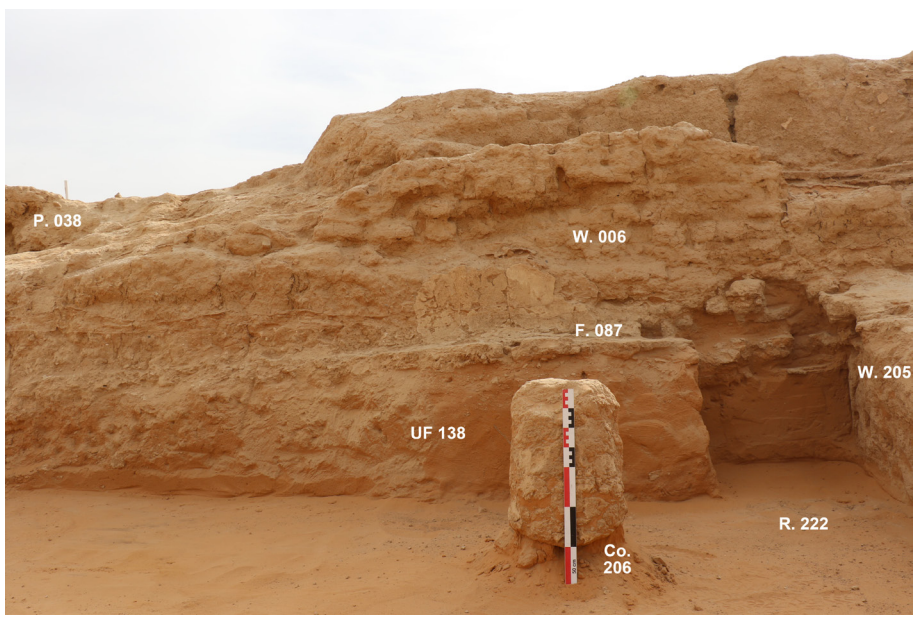


Figure 81: Al-Yamāma. Trench D. Small column fragment Co. 206 in the sand deposit of UF 138. Looking east (P. Siméon - Saudi French archaeological mission in al-Kharj).



Figure 82: Al-Yamāma. Trench D. Vessel Y.138.2 (cat. 1) (P. Siméon - Saudi French archaeological mission in al-Kharj).



Figure 83: Al-Yamāma. Trench D. Tannūr St. 218 at the basis of UF 138 and bowl Y.138.9 (P. Siméon - Saudi French archaeological mission in al-Kharj).

Al-Yamāma 2015
Trench D - Building 5
Y.138.9



Figure 84: Al-Yamāma. Trench D: Bowl Y.138.9 (J. Schiettecatte - Saudi French archaeological mission in al-Kharj).



Figure 85: Al-Yamāma. Trench D: Cooking area in R. 222. Looking south (P. Siméon - Saudi French archaeological mission in al-Kharj).



Figure 86: Al-Yamāma. Trench D. Door sockets between R. 222 and R. 223. Looking west (P. Siméon - Saudi French archaeological mission in al-Kharj).



Figure 87: Al-Yamāma. Trench D. Artefacts from UF 157: left: incense burner (Y.157.4), view from the top and two sides, upper right: millstone (Y.157.3), middle: grinder (Y.157.1), bottom: grinder (Y.157.2) (J. Schiettecatte - Saudi French archaeological mission in al-Kharj).

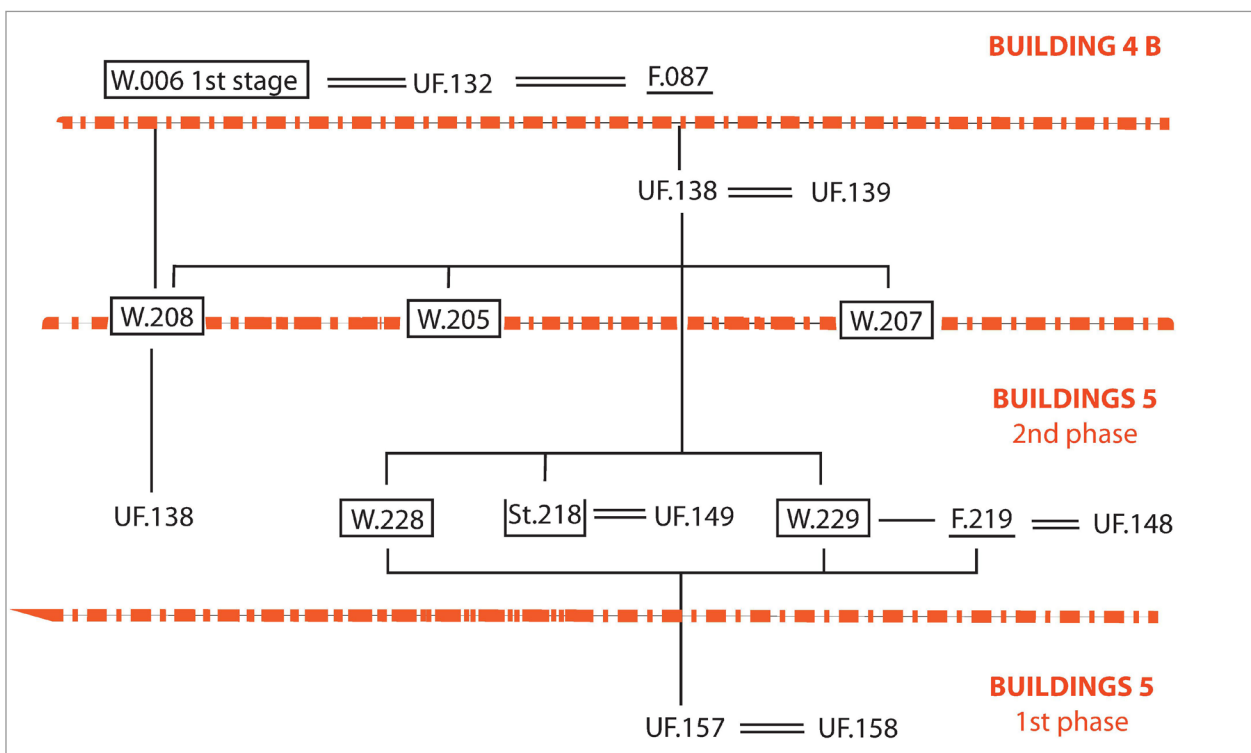


Figure 88: Al-Yamāma. Trench D: stratigraphic chart (P. Siméon - Saudi French archaeological mission in al-Kharj).

The western wall of the mosque (W. 006) was built atop UF. 118 as well and was abutting wall W. 084 (**fig. 90**). Wall W. 006 is founded slightly higher than W. 084. This latter could be part of a larger structure, it was built before W. 006 and was levelled and covered by floor F. 015. The altitude of floor F. 189 (428,07 m) corresponds to the base of UF 144 in Trench B (428.06 to 427.82 m; Building 3) and to the summit of the first stage of western wall W. 006 – Building 4).

Floor F. 189 covers a thick eolian sand layer with some ash pockets, possibly being fireplaces (UF 119-120) (**figs. 90-91**). These sand levels are not connected to any built structures. They are at the same altitude as the occupation levels in trench D (Building 5). Three sherds of turquoise alkaline glazed pottery were found in UF 119 (Y.119.2 - **fig. 92**). They are comparable to those found at Kush (UAE), in the phase III levels (late 8th-early 9th cent.) (Kennet 2004: TURQ, Type 72, p. 30, **fig. 5**).

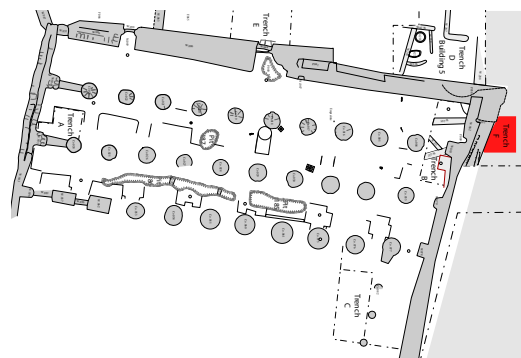
At the bottom of UF 120 (426.80 m a.s.l.), an occupation layer (UF 123 / F. 191) was characterized by a thick eolian sand deposit with a lot of ashes and charcoals. Excavation of Trench E was stopped at an altitude of 426.42 m a.s.l. because of unsteady baulks.

The stratigraphical sequence of Trench D is summed up in **fig. 93**; the content of the UFs is summarized here:

- UF 118: bones (96 g.: caprine); plaster fragments; 5 sherds (belonging to a minimum of 4 vases; cat. 1, 7, 13, 15).
- UF 119: bones (104 g.: camel, caprine, gazelle, lizard); carpological remains (*Hordeum vulgare*, *Hordeum vulgare*, *Triticum turgidum* subsp. *dicoccon*, *Phoenix dactylifera*, *Amaranthaceae*, *Plantago* sp., *Teucrium* sp.); 24 sherds (belonging to a minimum of 11 vases; cat. 1, 2, 15, 20, 26, 29, 33, 34, 35).
- UF 120: bones (64 g.: camel, caprine, gazelle, ostrich eggshell); 1 bronze pin; 21 sherds (belonging to a minimum of 10 vases; cat. 1, 5, 19, 24, 35, 37, 40).
- UF 123: bones (80 g.: camel, caprine, rodent) ; carpological remains (*Phoenix dactylifera*, *Arnebia tinctoria*, Boraginaceae, *Plantago* sp., *Teucrium* sp.); 4 sherds (belonging to a minimum of 4 vases; cat. 1, 2, 29, 35).

Trench F : north of the mosque

As a complement to Sounding 1, carried out in 2011-12, a small trench (Trench E) was dug at the foot of the northern wall of Building 1 (W. 002). Two thick and compact layers (UF 125 and UF 126), made of melted mudbricks resulting from the gullyng along wall W. 002 and water run-off from two large depressions (P. 038 and P. 088) to the north of it. The foundations of W. 002 appeared at 426.92 m a.s.l. (**fig. 94**). Wall W. 002 is built atop of an older wall turned south-east/north-west (W. 225) which has also been seen inside the mosque in Trench B. Its altitude corresponds to that of the walls of the cooking area in Trench D (R. 233).



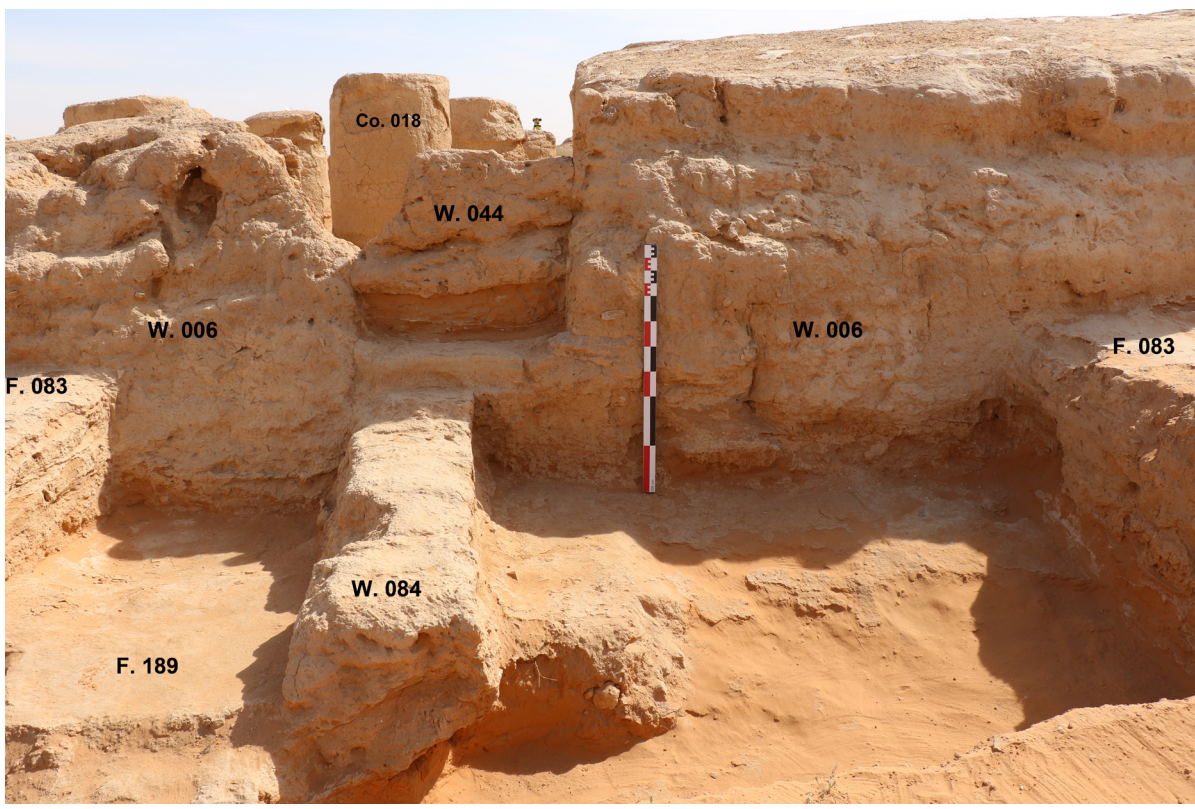


Figure 89: Al-Yamāma. Trench E: Floor F. 189 and wall W. 084. Looking east (P. Siméon - Saudi French archaeological mission in al-Kharj).



Figure 90: Al-Yamāma. Trench E: intermediary eolian deposit (UF 119). Looking east (P. Siméon - Saudi French archaeological mission in al-Kharj).

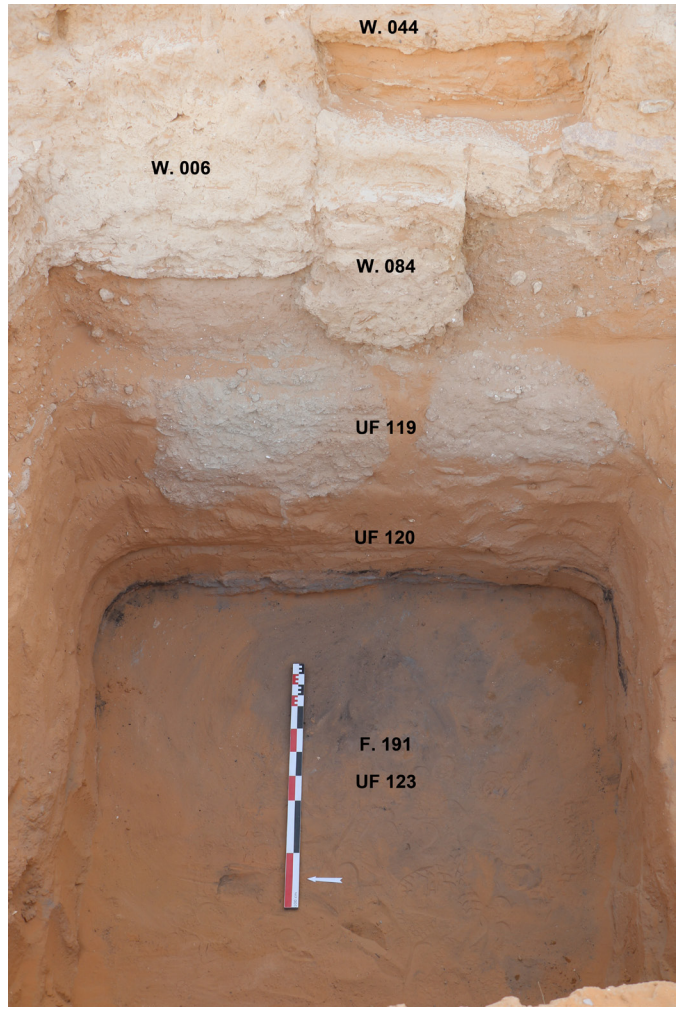


Figure 91: Al-Yamāma. Trench E: F. 191 at the bottom. Looking east (P. Siméon - Saudi French archaeological mission in al-Kharj).

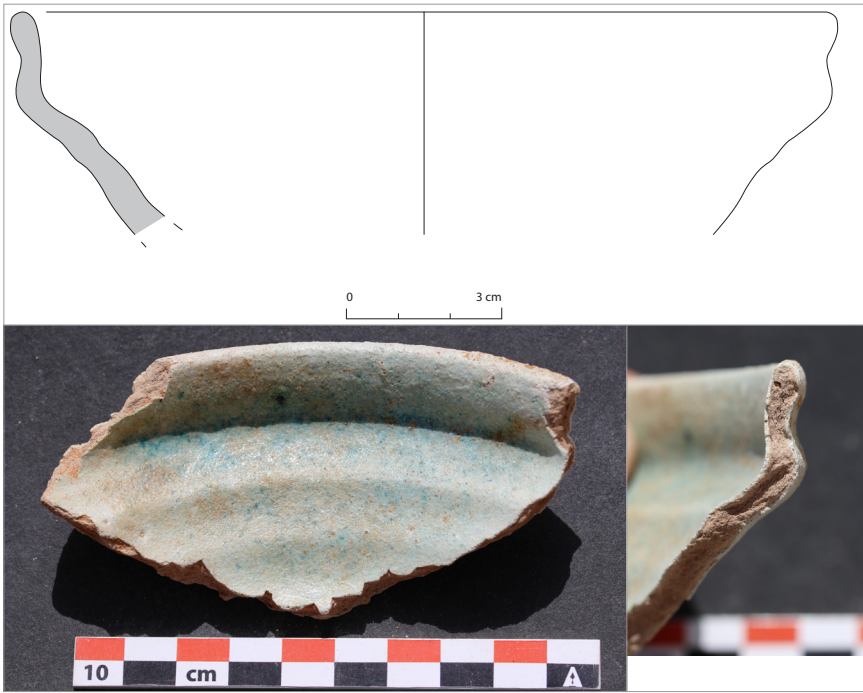


Figure 92: Al-Yamāma. Trench E: Turquoise glazed bowl Y.119.2 (drawing: J. Cuny / A. Emery; photo: J. Schiettecatte - Saudi French archaeological mission in al-Kharj).

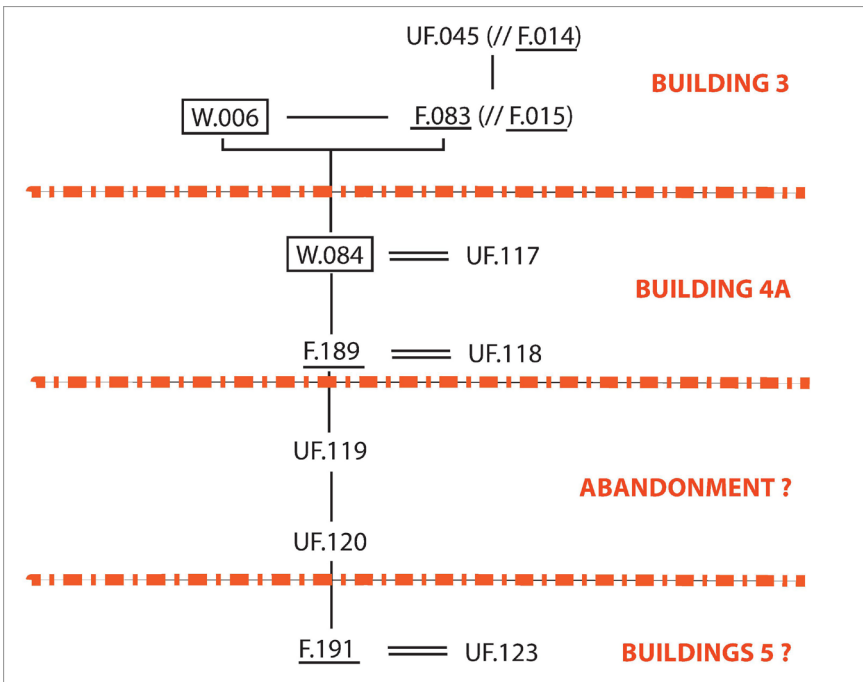


Figure 93: Al-Yamāma. Trench E: stratigraphic chart (P. Siméon - Saudi French archaeological mission in al-Kharj).



Figure 94: Al-Yamāma. Trench F: Foundations of W. 002 and W. 225 under it (P. Siméon - Saudi French archaeological mission in al-Kharj).

Interpretation and phasing of Buildings 1, 3, 4 and 5 (figs. 95-97)

The carrying out of 6 trenches inside and outside Building 1 as well as the emptying of pits P. 185, 186 and 187 highlighted several architectural phases, each corresponding to a main phase of occupation of area N6: Building 1 —the mosque— was built above two former monumental buildings, Buildings 3 and 4. Building 3 was clearly levelled for the needs of Building 1’s construction. To the west of area N6, Building 4 was built atop a dwelling area (Building 5).

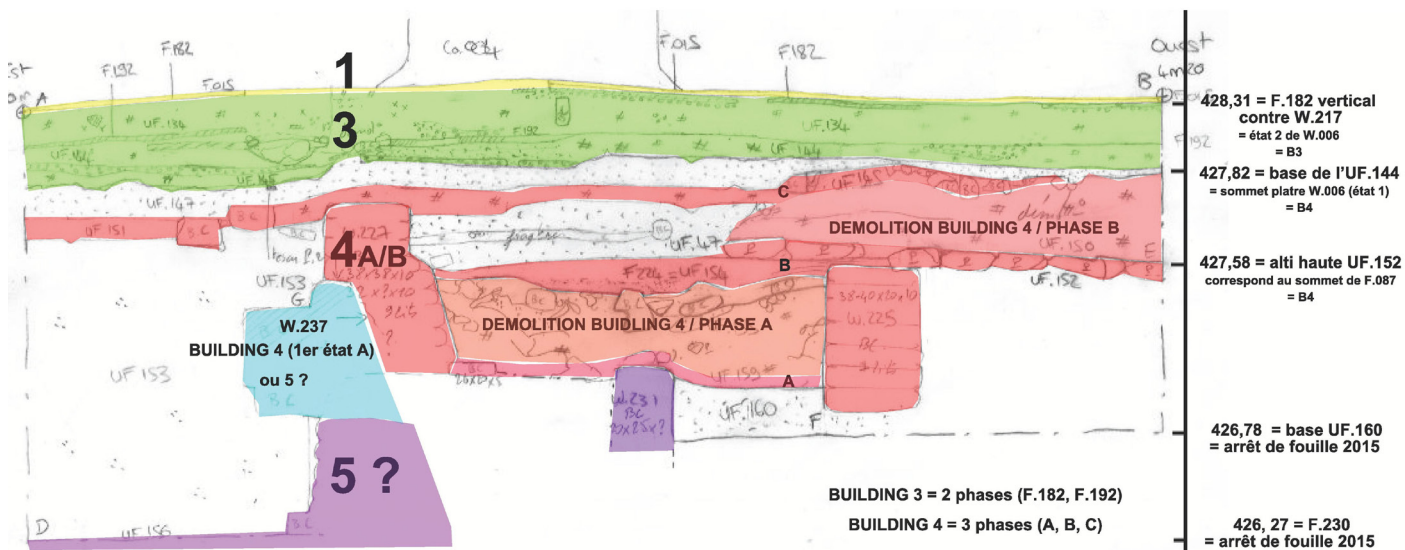


Figure 95: Al-Yamāma. Trench B: the successive architectural phases (P. Siméon - Saudi French archaeological mission in al-Kharj).

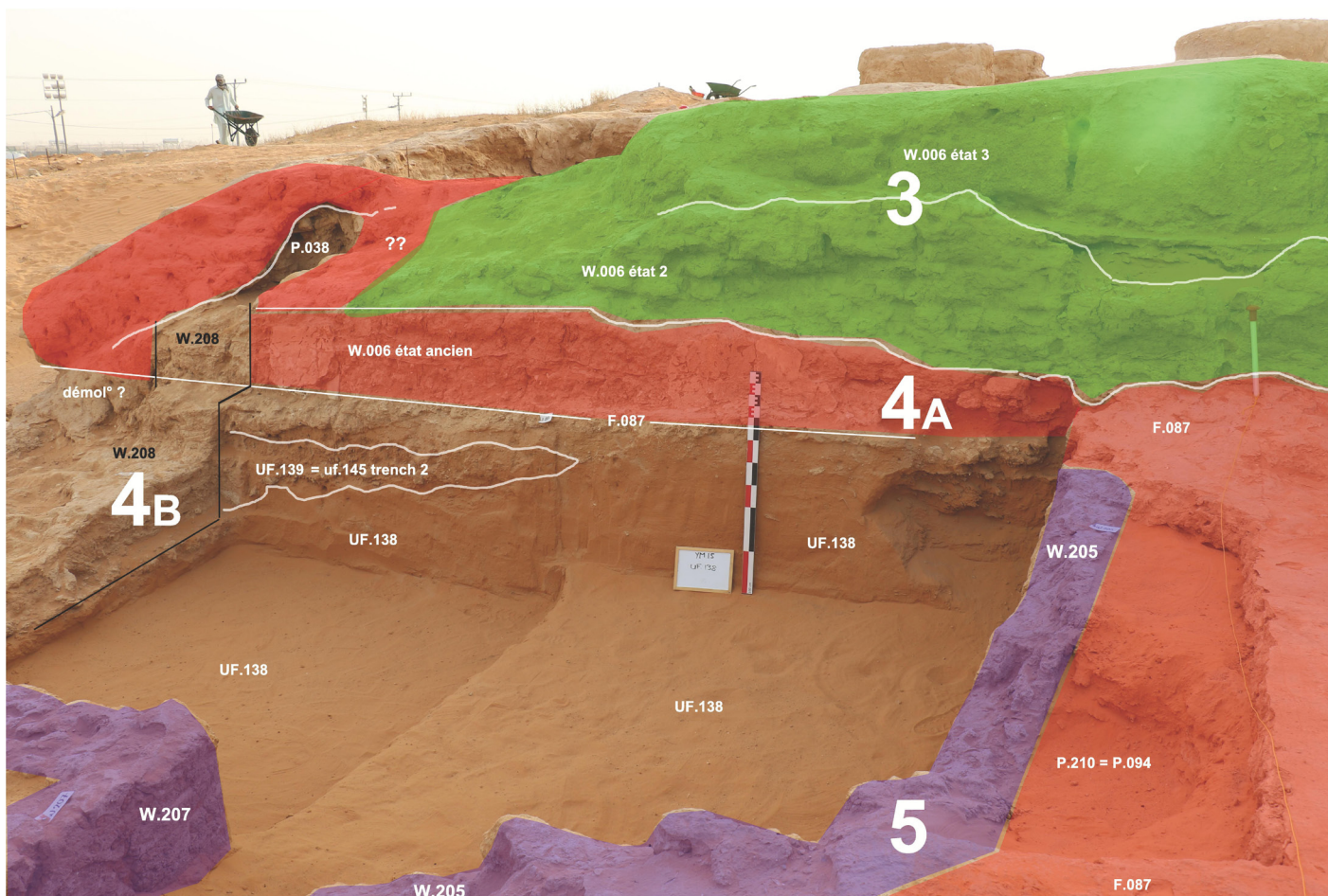


Figure 95: Al-Yamāma. Trench D: the successive architectural phases (P. Siméon - Saudi French archaeological mission in al-Kharj).

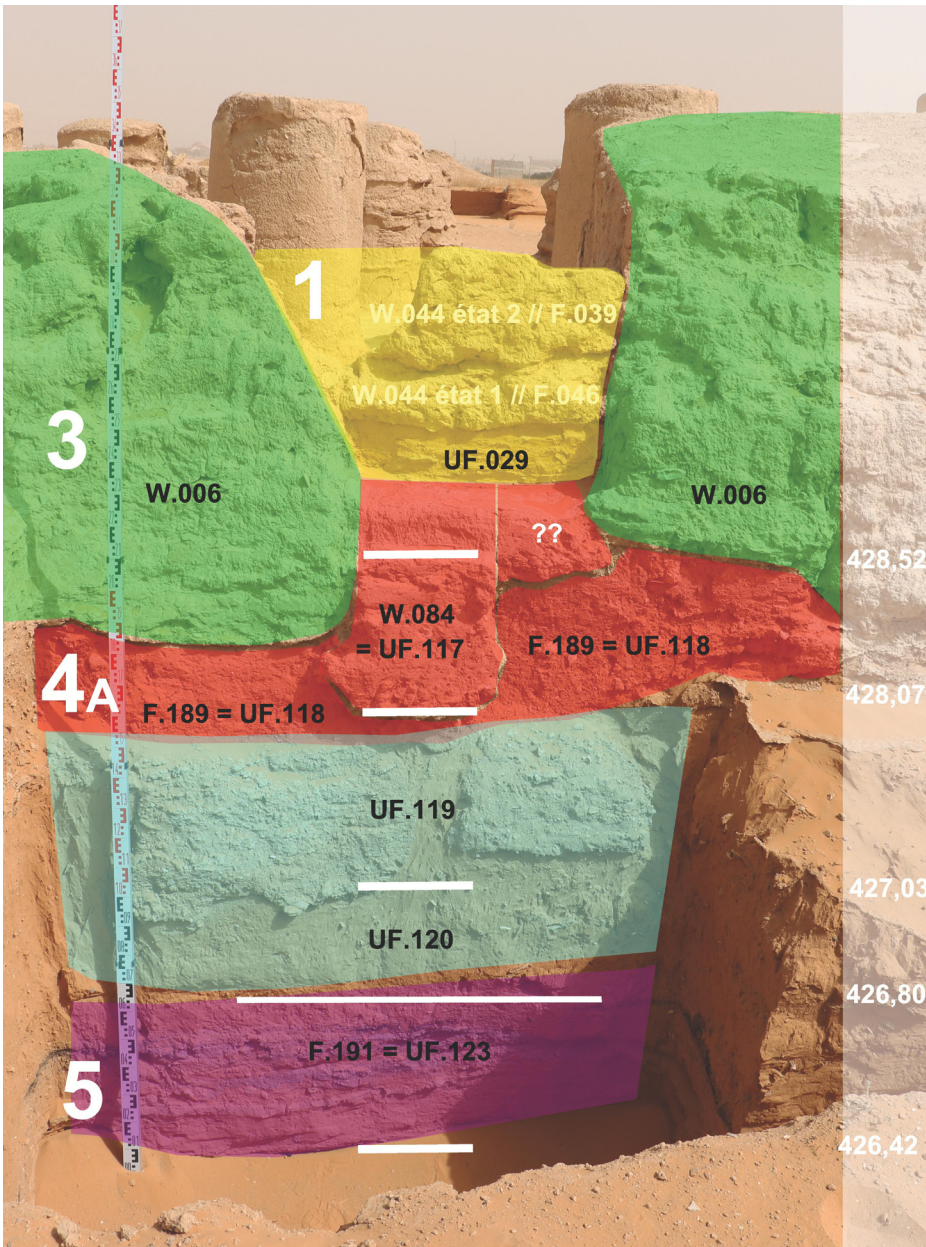


Figure 95: Al-Yamāma. Trench E: the successive architectural phases (P. Siméon - Saudi French archaeological mission in al-Kharj).

AL-YAMĀMA - SOUNDING 4 (AREA K17)

Julien CUNY (INRAP, Lille)

With the participation of Fanny LARUAZ and Khalid AL-HAFĪ

Location and aim of the sounding

During the fourth season, a new sounding has been opened in the southern part of the site, within the fence, in area K17. Many evidence pointed out the presence of Late pre-Islamic and Early Islamic occupation in this area:

- Two pre-Islamic coins were found on surface by Abdalaziz al-Ghazzi (AL-GHAZZI 2010: 89, pl. 23);
- Sounding 3, excavated by M. Mouton during the second season in area G17, 150 m further west, yielded two kilns (SCHIETTECATTE & AL-GHAZZI (ed) 2012: 44-46) dated to the 9th-10th centuries by ¹⁴C datings.
- No modern pottery (i.e. 15th to 18th cent.) had been recorded in the area during the surface sampling conducted all over the site.

The aim then was to dig a deep stratigraphical sounding through expected Early Islamic layers and possible earlier occupation phases.

Thus, an 8 × 6 m-wide area encompassing several outcropping mudbrick structures was circumscribed and excavated (figs. 98-99, 101). Each time we went 1 m down, benches were left against the excavation walls to avoid the breaking of the sandy sediment, which reduced progressively the excavated area. Because of this, the sounding had subsequently to be extended twice. It was first widened to the west to reach 10 × 6 m; and later on extended to the north and the west, thus excavating an irregular rectangle of approximately 12 × 10 m (fig. 108). In its deepest layers, due to the presence of a thick accumulation of loose sand under the house of the most recent phase, the sounding had to be restricted to a 3 × 2 m small trench (figs. 99, 118). From a surface at 424.07 m a.s.l., the digging was undertaken down to 419.11 m a.s.l. through a 5 m-deep stratigraphy. Due to lack of time, the sounding was stopped. The virgin soil has not been reached.

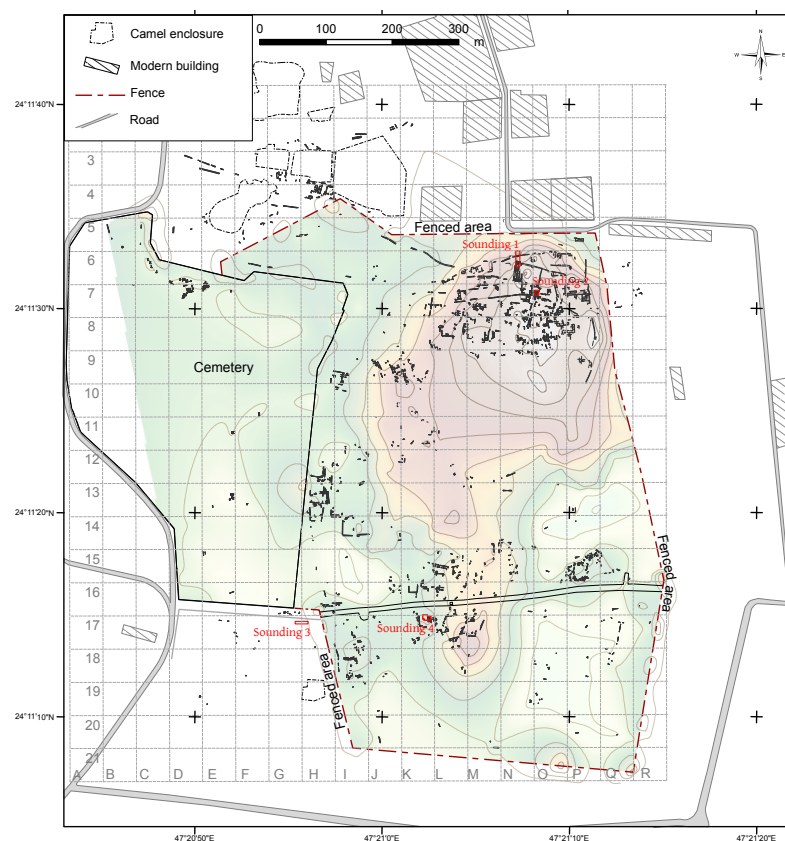


Figure 98: al-Yamāma: location of Sounding 4 on the topographic map of the site (M. Niveleau, J. Schiettecatte - Saudi French archaeological Mission in al-Kharj).

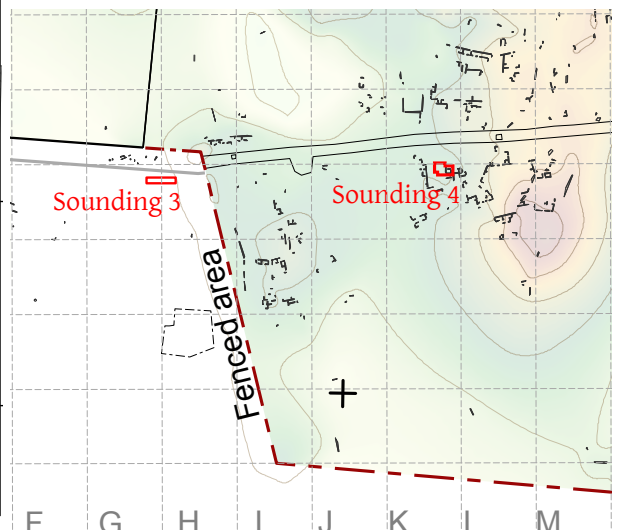




Figure 99 : Al-Yamāma. Area K17 : Sounding 4. Aerial view at the end of the season (Th. Sagory – Saudi French archaeological mission in al-Kharj).

General stratigraphy and phases

Four main phases have been distinguished:

Phase 1 is the last occupation phase, characterized by mudbrick dwelling structures. Three rooms were excavated: R. 404, R. 406, and R. 417, belonging to one or possibly two houses placed side by side extending to the north-east and to the south-west (fig. 100). The rooms were possibly adjoined by courtyards or open spaces whose parts of were excavated in the north-east corner and the north-west quarter of the trench.

Phase 2 is represented by a sequence of sterile aeolian sand, c. 1 meter deep (422.29 to 421.14 m a.s.l.). It marks a period of abandonment, alternating with thin layers of pure mud. It is unclear whether the layers of mud have an anthropogenic origin (for some kind of irrigation) or are natural (flooding?).

Phases 3 and 4 are two periods of occupation represented by two overlapping walls unearthed in the small trench (3 × 2 m) dug in the deepest sequence under the sand of phase 2.

Phase 1: a dwelling area (fig. 101)

In the eastern half of the sounding, the walls circumscribing two rooms (R. 404 and R. 406) were visible on the ground before excavation started. These rooms belonged to a house which developed towards east and north around a possible courtyard or an open space. R. 404 has been fully unearthed, while only part of R. 406 has been excavated, as it continued to the north.

R. 404 is c. 7,5 m², delimited by walls W. 400, W. 401, W. 402 and W. 403. These walls were built in mudbricks and had an average width of 45 cm. They were coated with a mixture of earth and straw, particularly well preserved on the outer face of W. 402. In the angles, the walls were not tied together but were simply abutting one against another, and were directly built on the underlying layer of eolian sand of phase 2, with a foundation which did not exceed 25 cm in depth (as indicated by the uncoated foot of the wall). The walls were preserved up to 1.40/1.50 m. In the middle of W. 401 a small window (St. 409), 25 cm wide, was preserved at eye level and opened to the east. It was the only direct source of light. The upper courses of the walls had been levelled, but probably not far from the original location of the ceiling. To the north-west, an access opened onto R. 406, but the actual state of preservation of the structure of the house made the exact dimension of the original door unclear.

R. 404 has been fully excavated, excepted a bench left to the east against W. 401 (fig. 102). It contained several layers to be linked with at least three stratigraphical sub-phases.

The original floor F. 416 was made of a thick hardened mud layer (c. 422.30 m a.s.l.) and was partially broken so that the underlying eolian sand (UF 428) was exposed. It cannot be determined whether one or more fireplaces or pits (for garbage or some other use) were originally dug on that floor. This could be the case for two pits, namely near the entrance and at the foot of W. 400 (fig. 102, to the right), but no clear limit could be found and it cannot be said whether they were intentionally dug or if they were the result of the subsidence of the floor, either due to the unsteady underlying layer of loose sand or to the collapse of structures. Over floor F. 416, UF 413 constituted the remains of the last occupation phase of that part of the house (**sub-phase 1a**). UF 413 is a grey layer up to 25-30 cm thick composed of slight grey ash with darker grey-black ashy patches and charcoals. Among some stones, four fragments of rotating millstones have been brought to light: two of them, belonging to a single object, laid near the entrance of the room, set upside down (fig. 103). They both fit together and show an axial hole and another hole set on the side of the object in order to insert a stick and make it rotate. The two other fragments (Y.413.2) had been thrown the one in the centre of the room, and the other near the western wall (fig. 104). They had a larger diameter (40 cm) than the former stone (26 cm) and a single hole in the centre. Set together, the four fragments probably composed the two parts of the same entire object. No other artefact were brought to light, with the exception of two limestone slabs, the first (40 × 36 × 3.5 cm) was set upright against northern wall W. 402; the second (50 × 47 × 8 cm) was laid horizontally in the middle of the room over the ashy layer (fig. 105).

The sediment of UF 413 has been sampled almost entirely for sieving. It contained 1.644 kg of animal bones: mainly camel, caprine, gazelle and lizard, but also cattle, equid, rodent, bird and ostrich eggshell (see hereafter the contribution of Hervé Monchot). This layer also yielded many seeds, in particular date stones (see hereafter the contribution of Charlène Bouchaud: table 5 p. 102). All in all, only two small sherds (cat. 1, 16) have been picked up, which suggests, along with the results of the fauna analysis, that the room was cleaned after the last principal occupation and that UF 413 is mostly the result of squat or temporary reuse of the space.

Over UF 413, the fragments of collapsed mudbricks mixed in a sediment made of melted mud and sand in a 35 cm-thick layer (UF 411) witness the collapse of the upper part of the walls and possibly of the roof (**sub-phase 1b**). After an undetermined period of abandonment during which the weathering (wind and water) created the exposed layer F. 410 and damaged the walls by partially sapping them, the remaining empty space of the room was filled with orange eolian sand (UF 401; **sub-phase 1c**). Other weathered layers of mixed sand and mud constituted the sub-actual surface (UF 405) (fig. 102).

Directly to the north of R. 404 and connected to it by an access between W. 402b and W. 403, room R. 406 was only partially excavated since it continues further north, beyond the limit of Sounding 4. It constitutes a narrow and long room which possibly served as a corridor. Its bordering walls W. 405 and W. 408 are respectively leaning against W. 402 and W. 403. It cannot be said whether they were built at the same time as those of R. 404 or if they are the result of some later addition. Be that as it may, the final layout, completed by the remains of walls visible on the ground outside Sounding 4, gives the image of a construction organized around a courtyard or at least an empty central space. Indeed the north-eastern space of Sounding 4, east of R. 406 and north of R. 404, was without any doubt an open-air area (fig. 106). Such was also the case for the area to the west of W. 408.

The stratigraphical sequence within R. 406 is roughly similar to that of R. 404: layers of eolian sand and water-hardened mud with sand (UF 406, UF 409) and of collapsed mudbricks (UF 412) respectively correspond to a period of abandonment and of collapse; they cover an accumulation of fine grey sand mixed with ash, a lot of charcoals, faunal remains and stones (F. 419) corresponding to a period of occupation.

The same simple stratigraphical sequence was registered in R. 417, to the west of R. 404. This room continues south of Sounding 4 and is bordered by walls W. 403, W. 413 and W. 414. The sequence include an occupation layer (UF 415) covered by a collapse layer (UF 416). W. 413 is leaning against W. 403 and was then built after it. W. 413 is built above floor F. 421 and a levelled wall (W. 422), all built over the eolian sand of Phase 2 (fig. 107). This shows the presence of a previous architectural phase in that area.



Figure 100: Al-Yamāma. Area K17: Sounding 4. General view looking south-east (J. Cuny – Saudi French archaeological mission in al-Kharj).

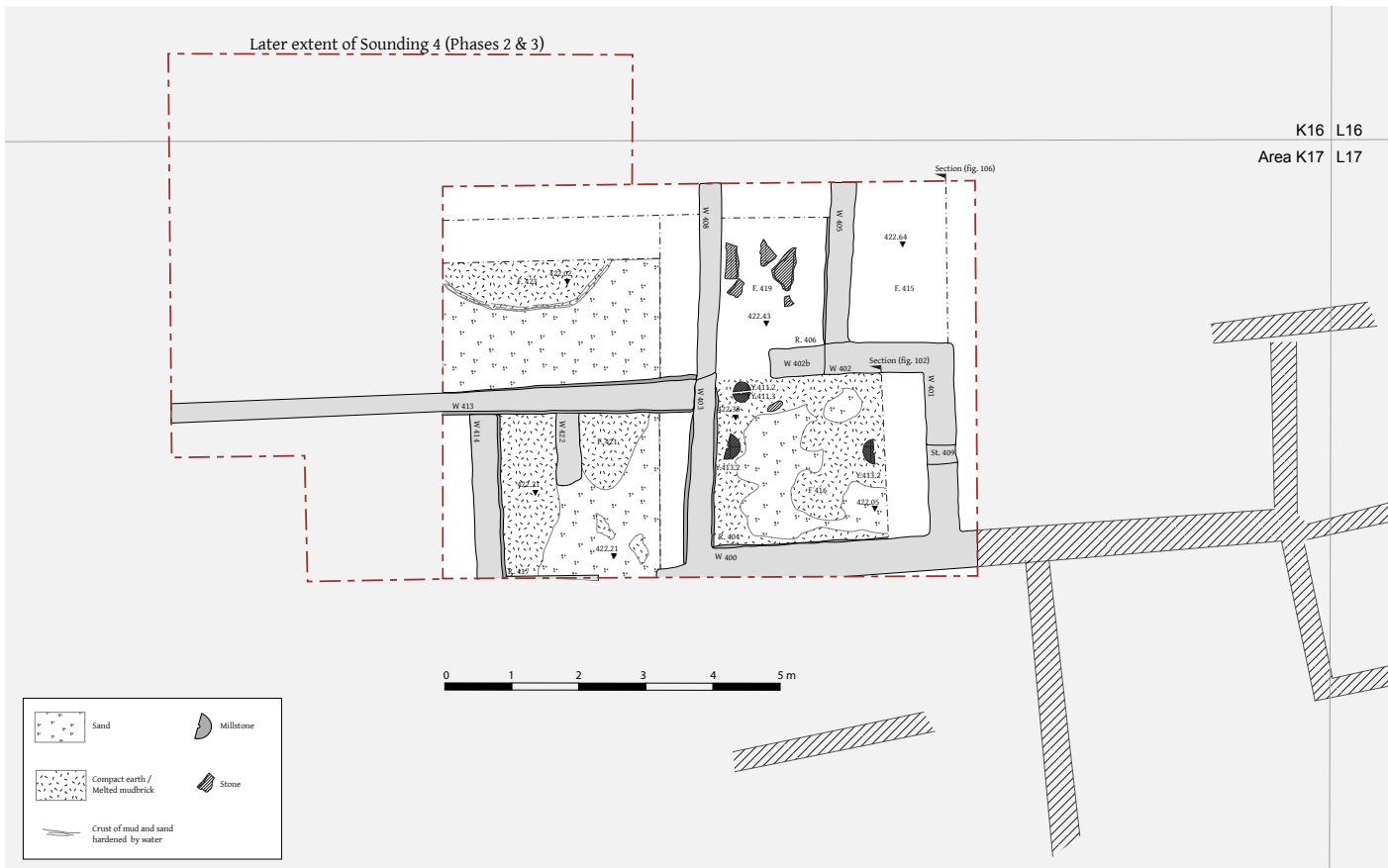


Figure 101: Al-Yamāma. Area K17: Sounding 4. Plan of Phase 1 level (J. Schiettecatte, J. Cuny – Saudi French archaeological mission in al-Kharj).

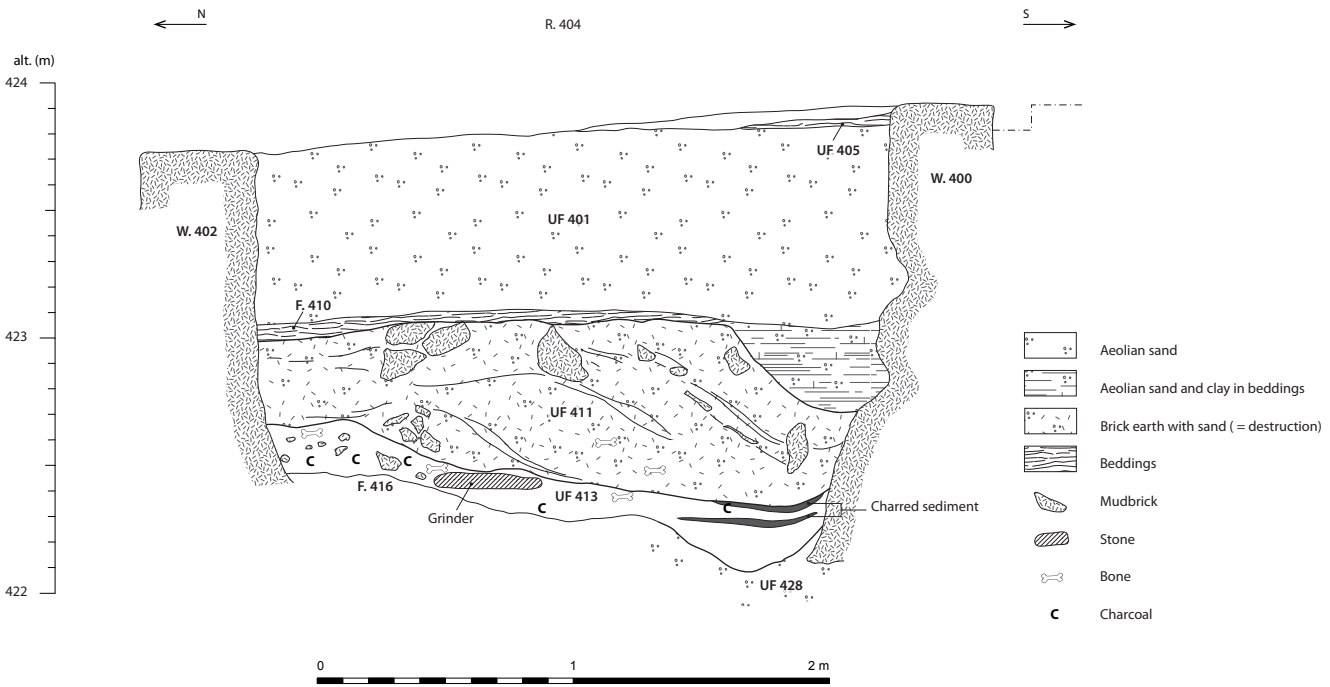


Figure 102: Al-Yamāma. Area K17: Sounding 4. Eastern stratigraphical section in R. 404 (J. Cuny / A. Emery – Saudi French archaeological mission in al-Kharj).

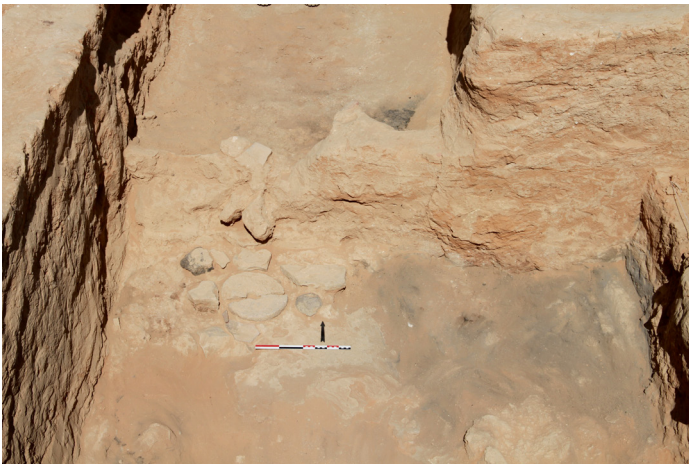


Figure 103: Al-Yamāma. Area K17: Sounding 4. R. 404: Millstone fragments (Y. 411.2; Y.411.3) on F. 413 (J. Cuny – Saudi French archaeological mission in al-Kharj)



Figure 104: Al-Yamāma. Area K17: Sounding 4. R. 404: Millstone fragments (Y. 413.2) on F. 413 (J. Cuny – Saudi French archaeological mission in al-Kharj)



Figure 105: Al-Yamāma. Area K17: Sounding 4. R. 404: limestone slabs over F. 413 (J. Cuny – Saudi French archaeological mission in al-Kharj)

Yamaha 2015 - K17 - Sounding 4
East baulk, northern part - Section B

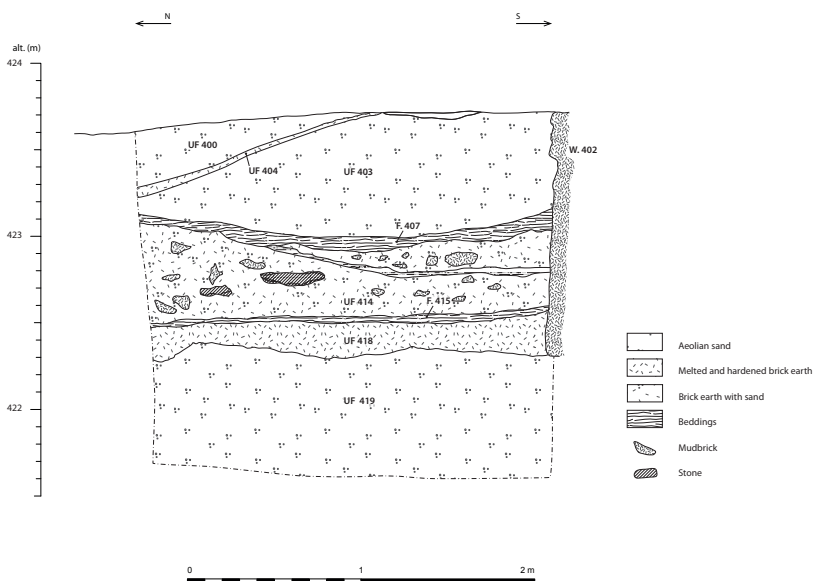
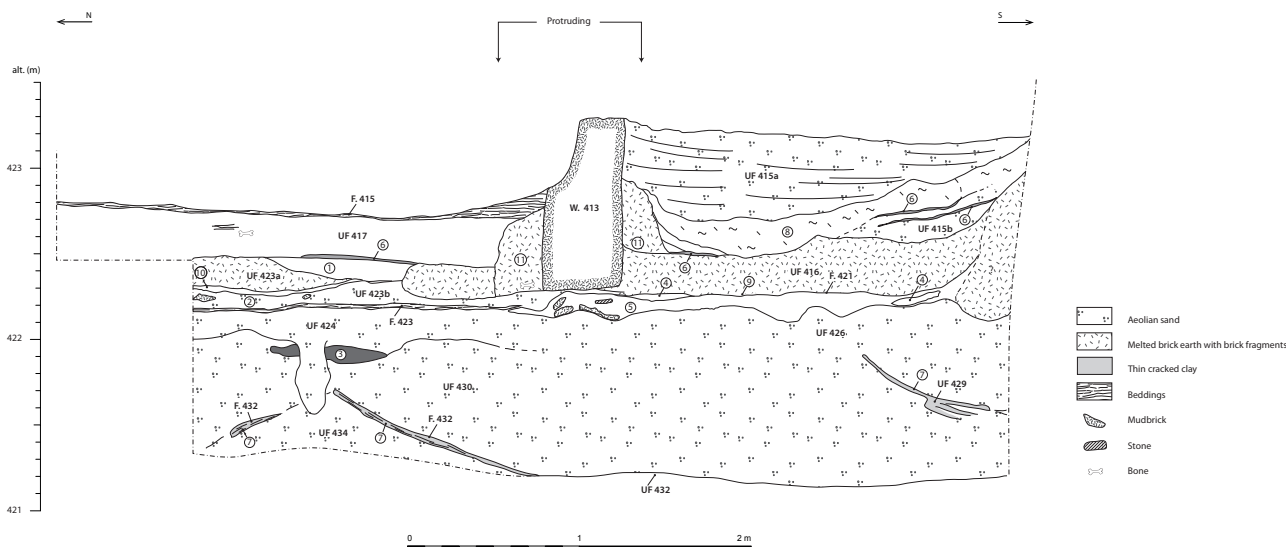


Figure 106: Al-Yamāma. Area K17: Sounding 4. Eastern stratigraphical section in the open-air area to the NE of Sounding 4, west of W. 405 and north of W. 402 (J. Cuny / A. Emery – Saudi French archaeological mission in al-Kharj).

Yamaha 2015 - K17 - Sounding 4
North-South section - Section C



- | | |
|---|---|
| <ul style="list-style-type: none"> ① Sandy/slightly ashy heterogeneous layer (similar to UF 417) ② Fallen brick fragments with more sand than in UF 423a ③ Ashy and charry layer ④ Thick white lime mortar, hardened ++ ⑤ Heterogeneous - orange/grey sand, numerous small mudbrick fragments (0.5 to 1 cm, round, rolled over), lime pellets = raising for 9 ⑥ End of light-coloured ashy layer ⑦ Very thin homogeneous clay level ("mud"), cracked by drying up ⑧ Fallend mudbrick fragments, heterogeneous, bone, pebbles, quite loose ⑨ Bedded clay on a thin layer of pebbles + mortar pellets = F. 421 ⑩ Beige thin and homogeneous sand ⑪ Hardened, very homogeneous melted mudbrick, with large bones = from the collapse of W.413 | <ul style="list-style-type: none"> 416 Very hard and homogeneous melted mudbrick earth, a few pebbles and thin lime pellets 424 Light concretions of orange to light grey sand, numerous small stones and micro-charcoals = occupation on sand dune 430 Orange sterile sand, very homogeneous 423 Fallen mudbrick fragments with slightly hard melted brick earth + small pebbles (max. 2 cm, +), rare lime pellets (-) 417 Very heterogeneous: orange to grey sand, numerous small stones and nodules, micro-charcoals, bone, with pockets of beddings. |
|---|---|

Figure 107: Al-Yamāma. Area K17: Sounding 4. Central stratigraphical section - eastern baulk (J. Cuny / A. Emery – Saudi French archaeological mission in al-Kharj).

The north-western quarter: an open-air area with pits (fig. 108)

In the north-western quarter of Sounding 4, the extension of Sounding 4 towards west allowed the excavation of an open-air area (fig. 108). It was occupied by subsidiary structures: pits had been dug, possibly as silos, all associated with the architectural remains of Phase 1 and divided into two sub-periods (figs. 109-112). Pit P. 424 (filled by UF 427) and pit P. 425 (UF 431) are the most ancient, directly dug in the sand of UF 430 (phase 2) (figs. 110, 113-114). They have been dug prior to the building of W. 413 and may have been contemporary to the first architectural phase under R. 417, characterized by F. 421 and W. 422 (see supra, fig. 107). There is unfortunately no stratigraphical link with R. 404 and R. 406 but we nevertheless consider that they are contemporary in the broadest sense. Those two first pits had sub-vertical walls and a flat base. The most important (P. 424: 1,15 m wide at the top, from 421.27 m a.s.l. to 421.90 m) was filled with grey sand mixed with a lot of light grey ash, lots of charcoals, and few animal bones (figs. 111, 113). Small sherds, including a cup with an underglaze blue decor would indicate a rather recent date, in the modern times (c. 17th cent.). A quite identical filling has been noticed for UF 431. It seems to be the witness of a final use of the pits as garbage, a final use probably different to the one which drove their digging.

UF 436 and UF 423 are a sand accumulation which led to a raising of the ground level and definitely covered the first pits of the area (figs. 112-114). A series of new pits was dug again through these layers: P. 426 filled with UF 435 and P. 427 filled with UF 437, which again contained a huge amount of homogeneous grey ash.

Phase 2

This period witnesses to a general abandonment of the area, although some sort of human activity can still have taken place in the neighbourhood. It is represented by a sequence of several layers of loose sterile orange aeolian sand (UF 419 = 424 = 426 = 428; UF 430; UF 434). Building of Phase 1 was built directly atop this sand accumulation (figs. 107, 113-115). Through the layers of sand, two layers are made of a thin crust of earth/mud hardened by stagnant water or run-off (UF 429; UF 432). These layers keep the natural shape of the basin formed by sand accumulation and might have a natural origin (figs. 116-117).

Phase 3 (figs. 118-120)

Under the first sand layer of Phase 2, in the baulk, a stone wall (W. 429) appeared at 420 m a.s.l. (figs. 118, 121). UF 440 might be an occupation layer abutting it. It contained a few potsherds and an ashy sediment that has been sampled for radiocarbon dating. The subsequent layers are to be interpreted as the collapse (UF 439) and the abandonment (UF 433) of this architectural phase.

Phase 4

An unequal layer of aeolian sand (UF 441), up to 40 cm thick, under W. 429, covers mudbrick wall W. 430. This wall belongs to the earliest phase uncovered so far (upper altitude: 419.50 m a.s.l.) (figs. 119-120, 122). UF 442 which is leaning against the wall and which contained a few amount of sherds and charcoals, indicates a light occupation. Sample of charcoals have to be dated. Interestingly, this layer is the only one in Sounding 4 which yielded sherds of *Red ware with grey-black core and very abundant chaff temper* (cat. 15). This pottery type has been abundantly found in the bottom of Sounding 1 (area N6, 2012 season), in layers dated to the 4th-1st cent. BC by 14C analysis.

UF 442 covered layer of sand (UF 443), also leaning against wall W. 430. It possibly means the abandonment of a prior phase of occupation of the building which included W. 430. UF 443 is the last and deepest layer excavated in the sounding during the February 2015 season. Excavation stopped at 419.11 m a.s.l.

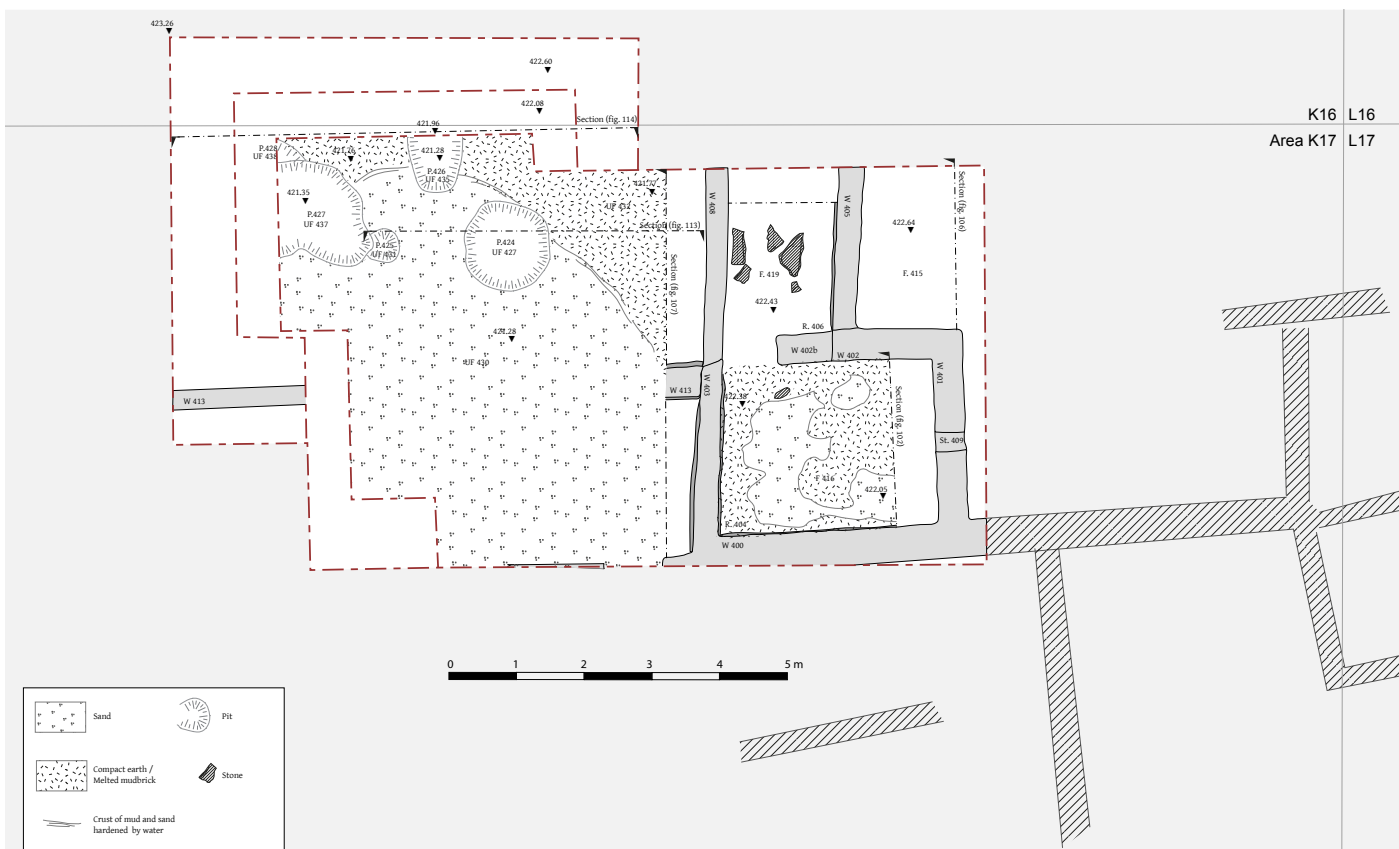


Figure 108: Al-Yamāma. Area K17: Sounding 4. Plan of Phase 1 level (previously to the building of W. 413 and W. 414) (J. Schiettecatte, J. Cuny – Saudi French archaeological mission in al-Kharj).



Figure 109: Al-Yamāma. Area K17: Sounding 4. NW quarter: pit P. 424. Looking north-west (J. Cuny – Saudi French archaeological mission in al-Kharj).

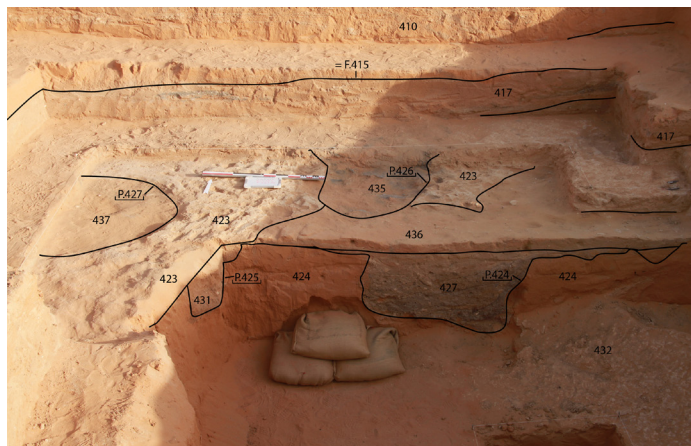


Figure 110: Al-Yamāma. Area K17: Sounding 4. NW quarter: pits P. 424, P. 425, P. 426, P. 427 (J. Cuny – Saudi French archaeological mission in al-Kharj)



Figure 111 Al-Yamāma. Area K17: Sounding 4. NW quarter: pit P. 424 dug in UF 424 and filled with UF 427 (J. Cuny – Saudi French archaeological mission in al-Kharj).



Figure 112: Al-Yamāma. Area K17: Sounding 4. NW quarter: western baulk with pit P. 426 (J. Cuny – Saudi French archaeological mission in al-Kharj).

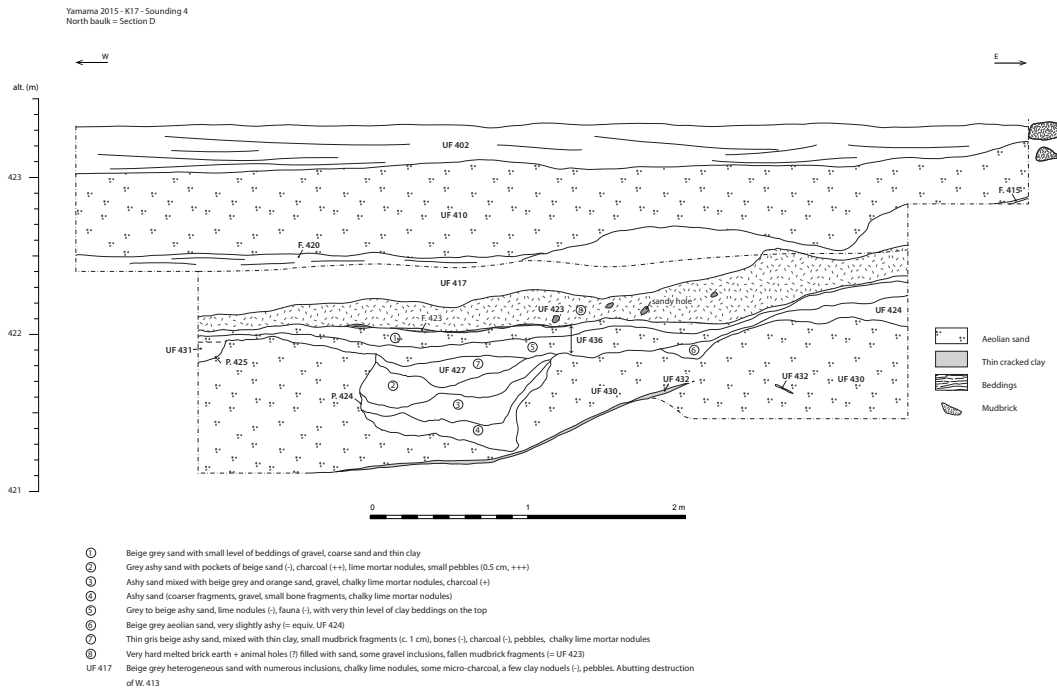


Figure 113: Al-Yamāma. Area K17: Sounding 4. NW quarter: stratigraphical section of the north baulk before its removing (location on **fig. 108**) (J. Cuny/A. Emery – Saudi French archaeological mission in al-Kharj).

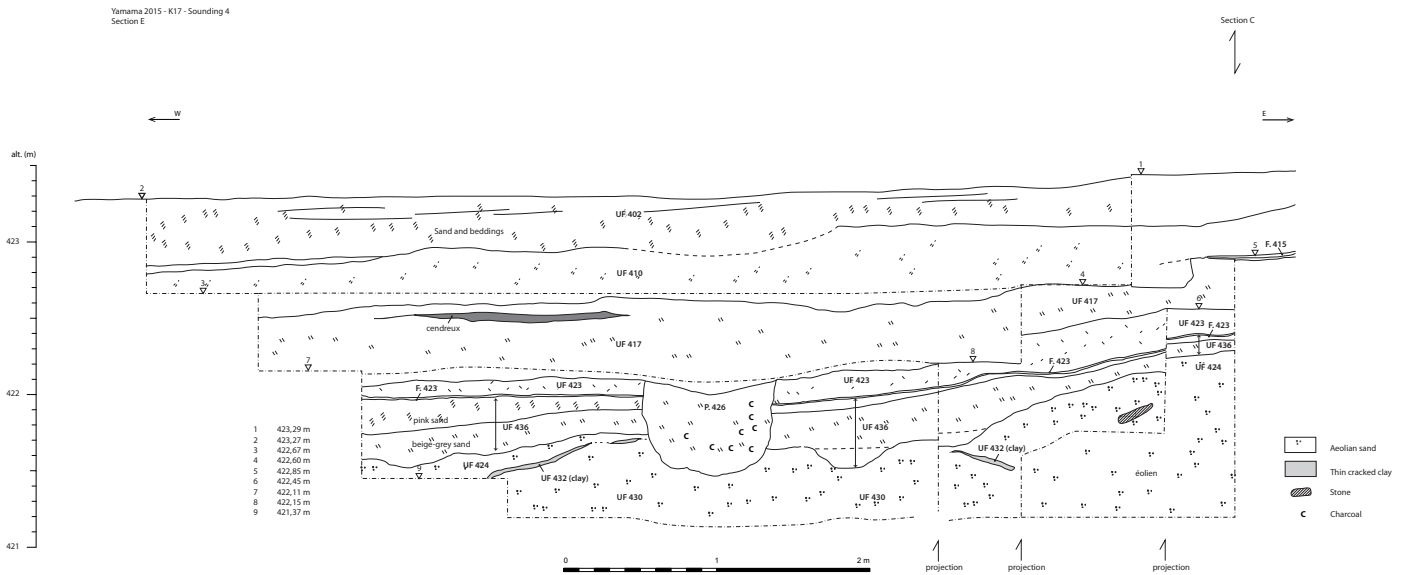


Figure 114: Al-Yamāma. Area K17: Sounding 4. NW quarter: stratigraphical section of the north baulk (location on **fig. 108**) (J. Cuny/A. Emery – Saudi French archaeological mission in al-Kharj).



Figure 115: Al-Yamāma. Area K17: Sounding 4. Eolian sand accumulation of Phase 2. Looking east (J. Cuny – Saudi French archaeological mission in al-Kharj).



Figure 116: Al-Yamāma. Area K17: Sounding 4. Western half, Phase 2: mud layer (UF 432) under sand layers (UF 424 and 430). Looking south (J. Cuny – Saudi French archaeological mission in al-Kharj).



Figure 117: Al-Yamāma. Area K17: Sounding 4. Western half, Phase 2: crust of earth hardened by water run-off (UF 429) (J. Cuny – Saudi French archaeological mission in al-Kharj).

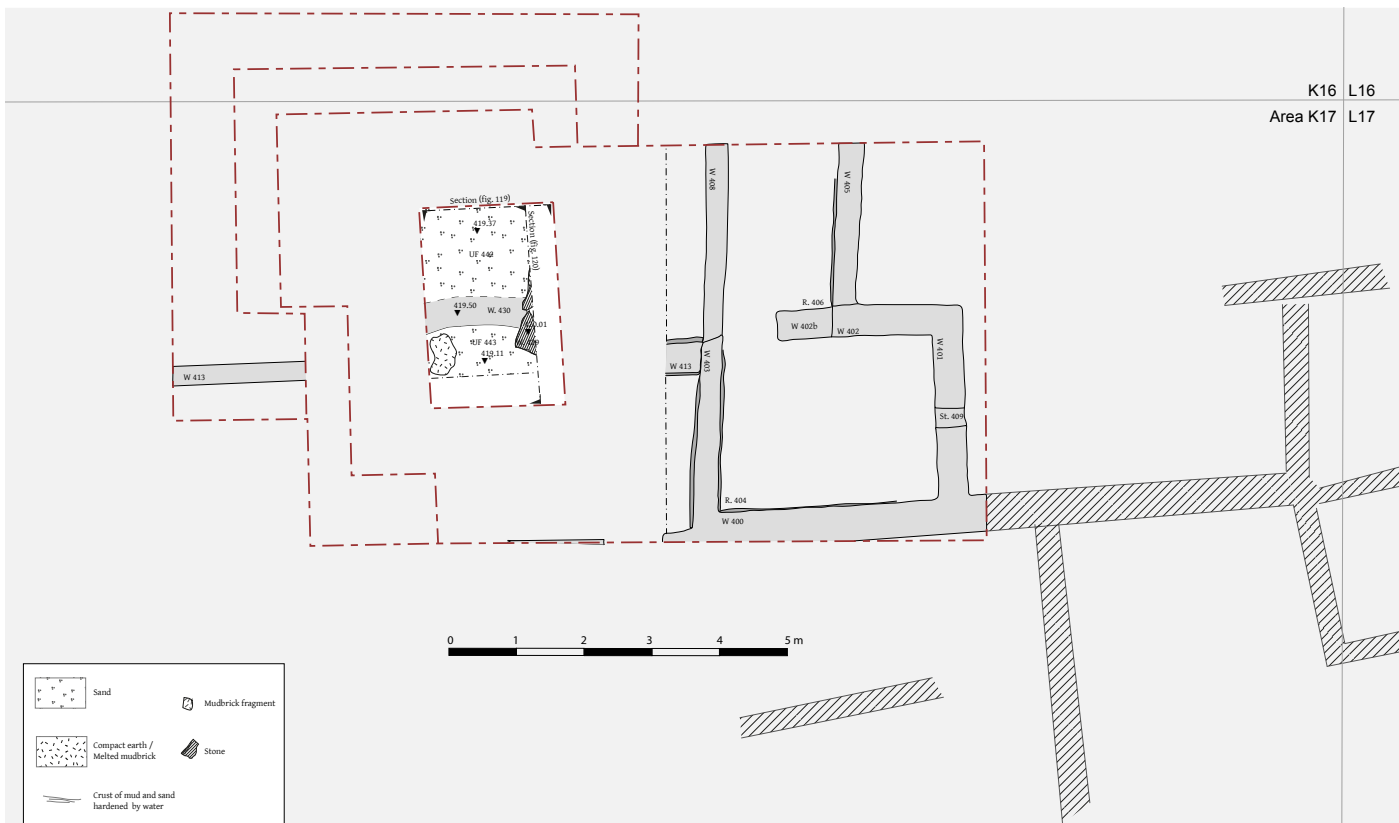
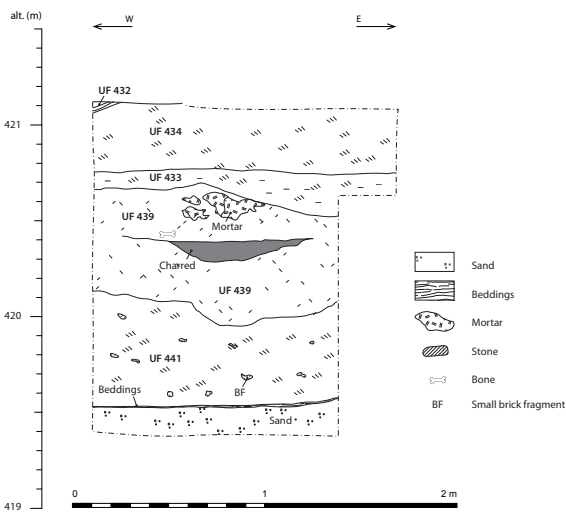


Figure 118 : Al-Yamāma. Area K17: Sounding 4. Plan of Phase 3 level (J. Schiettecatte, J. Cuny – Saudi French archaeological mission in al-Kharj).

Yamama 2015 - K17 - Sounding 4
Section F



Yamama 2015 - K17 - Sounding 4
Section G

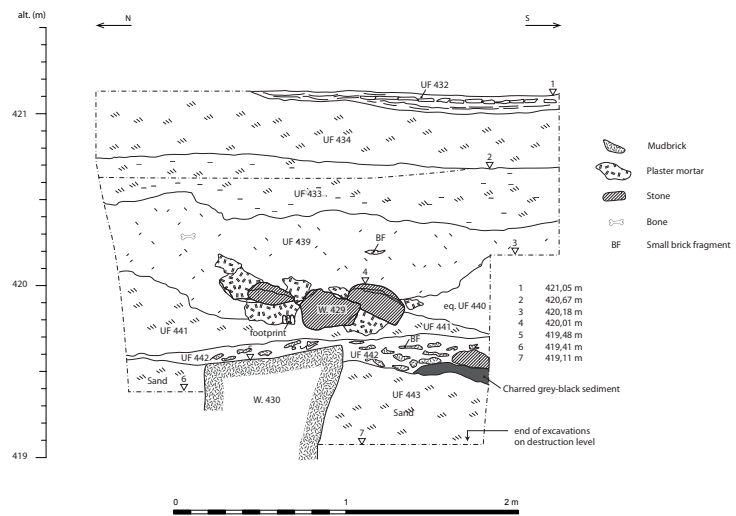


Figure 119: Al-Yamāma. Area K17: Sounding 4. Stratigraphical section of the north baulk in the deepest trench of Sounding 4 (J. Cuny/A. Emery – Saudi French archaeological mission in al-Kharj).

Figure 120: Al-Yamāma. Area K17: Sounding 4. Stratigraphical section of the east baulk in the deepest trench of Sounding 4 (J. Cuny/A. Emery – Saudi French archaeological mission in al-Kharj).



Figure 121: Al-Yamāma. Area K17: Sounding 4. Deepest trench of Sounding 4: W. 429 appears in the eastern baulk. Looking south (J. Cuny – Saudi French archaeological mission in al-Kharj).



Figure 122: Al-Yamāma. Area K17: Sounding 4. Deepest trench of Sounding 4: stone wall W. 429 and mudbrick wall W. 430. Looking south (J. Cuny – Saudi French archaeological mission in al-Kharj).

ENVIRONMENTAL STUDIES

AL-YAMĀMA - ARCHAEOBOTANICAL STUDY

Charlène BOUCHAUD (Muséum national d'histoire naturelle, Paris)

Introduction

The fieldwork took place from 5 to 26 February 2015. It constitutes the first archaeobotanical campaign on the site of al-Yamāma. The aim of the archaeobotanical study of al-Kharj is twofold. We focus first on a palaeoethnobotanical approach by studying the plant economy of the site, in particular the evolution of the local agrarian system and the fuel management practices, the different plant uses and processes in domestic and cultic contexts, as well as the potential long-distance trade of plant products. Secondly, we would like to undertake a palaeoenvironmental study in order to reconstitute the plant environment dynamics during the occupation of the site. This study is part of a wider archaeobotanical project involving the sites of Madā'in Šālīḥ (ancient Hegra) and Dūmat al-Jandal that will contribute to a better understanding of the origin and development of the oasian agrobiodiversity and its impact on the environmental evolution.

The archaeobotanical material in al-Yamāma is composed of all the plant macro-remains preserved within the sediment excavated on the archaeological site, i.e. on the one hand the seeds, fruits and others non-woody remains, like leaves and roots (carpological remains) and on the other hand the charcoals (anthracological remains). The work on the field mainly consisted to process the soil samples in order to extract the plant macro-remains from the sediment before exporting them to France where they will be analyzed in the archaeobotanical laboratory of the UMR 7209 (National Museum of Natural History). The study of the carpological remains will be used mostly for reconstructing the agrosystem evolution and the herbaceous natural vegetation. The charcoals analysis will mostly contribute to our knowledge on fuel selection and palaeoenvironmental reconstruction.

Methodology

Sampling strategy

For this first field season, the objective was to assess the preservation of the plant material in the different excavated areas and to evaluate its potential in terms of richness and diversity, in order to prepare an adequate sampling strategy. A first sampling procedure was designed beforehand and implemented during excavations thanks to the direct collaboration with the archaeological team.

Previous works in Arabian Peninsula show that plant macro-remains found in archaeological contexts are generally preserved by charring (BOIVIN & FULLER 2009; BOUCHAUD 2013; LOMBARD & TENGBERG 2001; TENGBERG in press). This process of charring occurred because of the ancient contact with fire (fire, domestic fuel, culinary accident, specific process as roasting, dumping, etc.). In this case, the sediment which contain charred plant is generally ashy (grey-dark color) if the concentration of carbonized material is high (primary deposit as fireplace, accumulation of several dumps, processing area) or non-ashy if the carbonized material is less abundant (secondary deposit with mixing activities, occupation level with scattered charcoals).

According to this general view, different types of samples were made. First, small samples of sediment (3-10 liters) were randomly taken in various layers mostly composed of occupation layers, pit fillings, fireplaces, ovens (*tannūr*) and ashy deposits. Bigger samples were made in the richest layer, and one layer of critical importance (UF 413, 280 liters) was completely sampled. We assume that the assemblage of plant macro-remains preserved in these samples is mainly related to human activities and selection processes. So their study will offer palaeoethnobotany outcomes. However, some of these samples, in particular the sandy accumulation and occupation layers can be considered as "synthetic" deposits, i.e. "scattered charcoal in the archaeological layer from long-term deposition and mixing, difficult to link precisely to specific activities, but with a reliable significance concerning the environment" (THÉRY-PARISOT *et al.* 2010: 143).

In parallel, we selected three different ashy layers –already sampled for plant macro-remains analysis– for phytoliths analysis (study of the mineral concretion produced by plants) in order to compare the results obtained by the two approaches ¹ (Table 2).

Samples processing

Fifty-three samples, corresponding to 33 different excavation units (UF) or features taken by the archaeologists during the two last seasons (2013 and 2015) and representing a total volume of 579 liters, were dry-sieved on a column of geological sieves (2 mm, 1 mm and 0.5 mm mesh sizes, fig. 123). The largest material (2 mm fraction) was hand sorted on the field in order to separate the charcoal fragments, seeds and fruits, other types of organic material (like dung, or food preparation), bones (macro and micro-fauna) and archaeological artifacts (as pottery and pearls). ² For a majority of samples, the refuses of the 0.5 mm fraction were hand-floated in order to decrease the time of sorting stage. The 1 mm-fraction was sometimes floated too when the sample presented a high concentration of charred material.

The flotation process consisted to pour slowly the sediment in a bucket partly full of water. The charred elements, whose density is lighter than water one, floated on the surface and were collected thanks to a flexible sieve (0.3 mm mesh size) (fig. 124). This latter was then put in form of a small bag and put to dry in the shade (to avoid the fragmentation of the charred element during the drying stage) (fig. 125).

Some of the samples from the UF 413 and F-419 (hearth) have been sub-sampled, i.e. the total volume of the sample has been sieved through the 2 mm and 1 mm-mesh sieves but only one half has been sieved through the 0.5 mm-mesh sieve. In this case, the quantitative results will be weighted at the analysis stage.

All the 2 mm fractions were sorted during the fieldwork. The 1 mm and 0.5 mm fractions were partly sorted by using a field binocular microscope. Charcoals fragments were only sorted on the 2 mm fraction.

Two samples (148-1 in the mosque area and 442 in the residential sector) have been selected for radiocarbon dating as they are likely to correspond to the most ancient occupation of each sector reached this year. For each one, fragmented date palm stones were isolated and given to A. Zazzo (UMR 7209, National Museum of Natural History) for processing before dating by Artemis program.

Identification

All the plant remains are preserved by charring, except for some mineralised *Boraginaceae* nutlets.

The carpological remains coming from the thin (0.5 mm and 1 mm) and heavy (2 mm) fractions should be identified thanks to a binocular microscope (magnification: 8 to 60) by the observation of morphological criteria, notably the shape, the size, the epidermis ornamentation or the hilum position and the comparison of modern material (CAPPERS & BEKKER 2013; CAPPERS *et al.* 2012; CAPPERS & NEEF 2012). Some preliminaries identifications were made during the campaign but most of the wild plants could not be identified and counting could not be made.

The charcoal fragments coming from the 2 mm fraction should be identified through a high-power microscope with incident light (not present on the field). The analysis requires each fragments of selected charcoal to be broken in three sections (transversal, tangential, radial). The identification is based on the observation of the cell structure (the number of vessels, their disposition, the rays width, type of intervacular punctuations, etc.) which are characteristics of a species or a genus according to different atlas of reference (FAHN *et al.* 1986; JAGIELLA & KURSCHNER 1987; NEUMANN *et al.* 2001). Some identifications were made during the campaign for the most characteristic species (as the date palm, see below).

In order to continue the first identifications, the sieved and partly sorted samples were exported to the archaeobotanical laboratory of the National Museum of Natural History (UMR 7209) (Table 3).

¹ The phytoliths analysis will be made in collaboration with Michèle Diniès (DAI, Berlin).

² A very warming thanks to Hervé Monchot, the archaeozoologist of the team (UMR 7209, MNHN) who spent several days to sort the sieve refuses. Many thanks too to Fanny Laruz, Alexia Rozak, Jérémie Schiettecatte and Julien Cuny for their appreciated temporary help for sieving and sorting stages.



Figure 123: The column of the geological sieves (up) and the different refuses of sediment after sieving stage (bottom) (Ch. Bouchaud - Saudi French archaeological mission in al-Kharj).



◀ Figure 124: Flotation process (Ch. Bouchaud - Saudi French archaeological mission in al-Kharj).



Figure 125: Drying of the flotation residues (Ch. Bouchaud - Saudi French archaeological mission in al-Kharj). ▶

The first results

Richness, diversity and future sampling strategy

As expected, the random sampling revealed that apparent pure sandy layers don't contain plant residues, or very few, whereas dark and ashy layers present a relative high concentration of charred plant material. Wood charcoal is ubiquitous in the archaeological soil, even in the Aeolian sediment layers where only micro-charcoal fragments (<2 mm) are present. Nevertheless, these latter ones have not been extracted because their small size avoids correct taxonomic identification.

In the future, if we have to choose the simplest strategy due to time constraints, we can concentrate the sampling on these apparently dark layers. In parallel, only some selected samples will be made on apparent non-ashy soil sediment in order to get dispersed charcoals for the palaeoenvironmental analysis (see above). In this case, a large quantity of sediment (100-200 liters) should be directly sieved during the excavation using a big 2 mm- mesh sieve.

Fruit and seed remains are less abundant than charcoals, and, as expected, are mostly found in the occupation layers of the sector K17 (Sounding 4). On the 27 samples took in K17 (Sounding 4), 24 contain fruit and seed remains (88.9%) whereas for the same number of samples coming from the mosque area, only 13 contained carpological remains (48.2%) (Table 2). This discrepancy is also observed on the representation of the biodiversity: 21 taxa are identified in K17 (Sounding 4) whereas only 15 taxa are found to date in the mosque samples (Table 4).

The preliminary carpological study

At least 24 taxa are recognized in total. They can be classified according to economic or ecological factors as cultivated fruit trees (1 taxa), cereals (5 taxa), pulses (1 taxa), oil and textile plants (1 taxa) and wild plants (16 taxa).³ As the chronological setting of the different loci is not definitely established yet, the preliminary results are presented without relative dating consideration. Furthermore, as no quantification is made, results are discussed according to their ubiquity (presence/absence).

Fruit tree

The only clearly cultivated fruit tree is the date palm (which is not a tree according to the botanical definition as it is a monocotyledon plant). Fragmented and whole charred date palm seeds (the "stone") are ubiquitous in both excavation areas, supporting the existence of a palm grove in the surroundings. Fragments of charred date palm stipe (the "trunk"), petiole (rachis of the leaf) and lamina (leaflet) are very often found among the charcoal assemblages (for example in UF 076). The sample 036-1 contains several pieces of probable plaster with imprints of date palm leaves visible at the surface. All these elements clearly indicate the cultivation of the date palm and its large use as food, fuel and building material, as it is always the case in the oases of the Arabian Peninsula (BOUCHAUD *et al.* 2012).

Cereals

At least five different cereal species are identified. A first group corresponds to cereals originating from Near East, including two hulled cereals –i.e. the barley (*Hordeum vulgare*) and the emmer (*Triticum turgidum* subsp. *dicoccon*)– and one free-threshing cereal –the durum wheat (or macaroni wheat, *Triticum turgidum* subsp. *durum*). These cereals are domesticated since the Neolithic period in Near East before spreading in the surrounding regions (ZOHARY *et al.* 2012: 39–46, 51–56). In Levant, durum wheat gradually replaces emmer during the Bronze Age whereas emmer stays dominant in Southern Arabia until the end of the first millennium BC (BOIVIN & FULLER 2009: 146). The preliminary results at al-Yamāma show that durum wheat is the most frequent in the samples. Common wheat (*Triticum aestivum* subsp. *aestivum*) seems to be absent –as it

³ This number of identified taxa is a minimum as all the samples have not been analyzed, most of all the thin fractions. Furthermore, the indeterminate elements (indicated as "others" in the table 4) have not been counted in this report.

is observed in the north-western Arabia (BOUCHAUD in press)– whereas it is present in sites located in Eastern and Southern Arabia during Antiquity and Islamic period (BOIVIN & FULLER 2009). Wheat and barley cereals are generally winter crops, sown during the autumn and harvested during the spring or early summer.⁴

The second cereal group corresponds to African species (*Panicoideae* tribe). They contain sorghum (*Sorghum bicolor*) and other indeterminate taxa from the same tribe (perhaps pearl millet, *Pennisetum glaucum*). It is not excluded that some of these indeterminate seeds of *Panicoideae* correspond to wild grasses. The domestication process of the sorghum and pearl millet is still in debate but probably took place during the first millennium BC, or second millennium in subtropical Africa (FULLER in press; HAALAND 1999; ROWLEY-CONWY *et al.* 1999; VAN DER VEEN 2011: 100). Their introduction in Arabian Peninsula is unclear but we know that they are staple crops in Southern part during medieval period (BOIVIN & FULLER 2009). They are not cultivated at all in northern Arabia, probably because of their ecological requirement and their photoperiodism period. Sorghum and pearl millet are summer crop, requiring sun and water during their growing season that occurs during summer.

Whereas barley and wheat are present in both excavation areas –with the predominance of wheat remains– sorghum and other *Panicoideae* are only attested in K17 (Sounding 4) (UF 413 and 425).

By-products remains –straw and chaff– are sporadically found in the thinnest fractions. Their presence is likely to illustrate their use as fuel (and probably fodder, see below) after the processing stage of cereal crops, threshing, winnowing, husking (VAN DER VEEN 1999), occurring near or inside the city.

Textile/oil plants

At least two samples of K17 (Sounding 4) contain remains of cotton (*Gossypium* sp.) in form of whole and fragmented seeds and seed coats. One complete seed in UF 413 has still tiny fibers (the linters) adhesive to the seed coat. Cotton is a subtropical plant which can correspond to two species, one coming from India (*Gossypium arboreum*) and the other from Africa (*G. herbaceum*). To date, archaeobotanical, textile and textual evidences show that cotton (either Indian or African species) is introduced probably in the middle of the 1st century BC in Eastern Arabian Peninsula and at the end of the 1st century AD in Northwestern Arabia (BOUCHAUD in press; BOUCHAUD *et al.* 2011). The low quantity of cotton seeds found in al-Yamāma doesn't allow to confirm the production of this plant in the ancient city. Indeed, cotton seeds could circulate inside the raw cotton ball coming from elsewhere, as it is shown by archaeological examples in the Egyptian Eastern desert (BOUCHAUD *et al.* 2011: 409). However, due to the history of the plant in Arabia, the hypothesis of local production is worth being considered. In this case, seeds could have been directly discarded after the ginning process (separation of the fibers from the seeds).

The absence of pulses

Only one hypothetical chickpea (cf. *Cicer arietinum*) seed was found in K17 (Sounding 4) (hearth F.419). Pulses are generally not very well represented in archaeological sites where only charred material is preserved, notably because of the agricultural and culinary processes of these plants that do not involve the use of fire (or at least less than cereals or other crops). Nevertheless, lentils (*Lens culinaris*) are generally found in Arabian oases and, in less extent, pea (*Pisum sativum*), common vetch (*Vicia sativa*), bitter vetch (*Vicia ervilia*) (BOIVIN & FULLER 2009; BOUCHAUD 2013). It is thus curious to these species are seemingly absent at al-Yamāma.

Wild plants

Wild plants can be separated into two groups. The first correspond to weeds growing on anthropogenic habitats, in particular disturbed ground, as asphodels (*Asphodelus* sp.) and smallflower mallow (*Malva* cf. *parviflora*, **fig. 126**) and some Boraginaceae. The others are typical desert plants, including one tree plant (*Acacia* sp.), shrubs (Amaranthaceae like *Haloxylon persicum*, *Zilla spinosa*, **fig. 126**) and herbaceous species (*Aizoon* cf. *canariense*, the colocynth – *Citrullus colocynthis*, wild medick – *Medicago* cf. *arabica*, grasses). They give

⁴ Some varieties of hulled barley or free-threshing wheat can be spring types, they are planted in early springtime and mature later than same summer.

indication on the ecological state of the site, which seems to be very similar to modern one. Several reasons explain their presence on a charred state on archaeological layers. One part of them is likely to be brought “by accident” with the wood used for fuel (notably the woody species), others could be naturally brought by wind before being caught on the fireplaces during their use. Finally, all of these seeds could be eaten by animals, passed through the digestive system, and preserved within the dung used as fuel. Indeed, charred camel dung and indeterminate dung fragments were found in a lot of archaeological layers (**Table 4**). Ethnographic and archaeobotanical researches show that seeds consumed by animals are likely to be preserved by charring in the archaeological sites due to the regular use of dung, mixed with others elements (straw, olive stones, etc.) as fuel, notably in semi-arid and arid habitats (ANDERSON & ERTUG-YARAS 1998; MILLER 1984).

Two observations in relation with the archaeological contexts (tables 5-6)

Area N6, the mosque

Very few seeds or fruits remains are present inside the Mosque, as it is common in sacred space. What is more surprising is the almost absence of seeds and fruits within and around the tannūr T. 218 in room R. 222, in the dwelling structure under the mosque (Samples n° 138, 148-1, 148-2, 148-3, 149-1, 149-2, 149-3). Some seeds (date stones, one hard wheat grain and one barley grain, wild plants) are recognized but the majority of the charred plant remains correspond to charcoal fragments, probably resulting for their fuel utilization. Dung is also present, suggesting that it was used as fuel too and perhaps this explain the presence of the seeds (see above). This assemblage is not similar to common archaeobotanical assemblage generally associated with domestic oven where we can find a mixture of fuel, dung and food plant (as well as bones) residues (BOUCHAUD 2011: 248; REDDY 1998). This discrepancy maybe suggests a re-use of this oven for a non-alimentary purpose. Nevertheless, the two elements of complete barley and wheat grains, the bones and the fish remains found inside the oven would illustrate the rest(s) of limited cooking activities.

Area K17, Sounding 4, the residential area

UF 413 is very heterogeneous in terms of sediment nature and color (from sandy to ashy sediment, from white to dark color), plant richness and diversity. The highest density of plant (and bones) remains seems to be located in the eastern part (south and north), corresponding to the most ashy part of the layer. The samples coming from the grid pattern in the western part of the layer (squares A, B, C, E, F) are quite poor in plant residues. The large volume of the burnt deposit and the presence in it of a mixture of cultivated and wild seeds, fruits, charcoals, dung, charred and non-charred bones and some potteries are likely indicating several domestic refuses accumulating through time. The presence of big pieces of charcoal in some part of the layer (notably in the eastern part) could indicate the burning of decayed architectural elements (as date palm stipe used as beams).

Conclusion

The first archaeobotanical campaign in al-Yamāma is very encouraging. The preservation of the plant material is good and the preliminary carpological study reveals a strong biodiversity. The assemblage of cultivated plants evokes the presence of oasian agrosystems characterized by northern (Near East) and southern (Africa/Southern Arabia) influences offering all the common staple crops for local needs and maybe for exchange economy (with likely cotton production). These results fit well in the global view of the traditional Arabian agrosystems as it can be seen through archaeobotanical studies. Only the absence of pulses is quite surprising, but it may be due to methodological process. The analyses to come in the MNHN laboratory will be devoted to the final sorting of the thin fractions (1 and 0.5 mm) and the identification of the indeterminate carpological remains as well as charcoal assemblages.



Figure 126: Modern *Malva parviflora* (top) and *Zilla spinosa* (bottom) (Ch. Bouchaud – Saudi French archaeological mission in al-Kharj).

Table 2: Data samples, process and nature of plant remains

Year	Area	N°UF or Structure	Context type	Relative datation	N°Sample
YM 2013	N6	036	Eolian deposit	Modern (15th-18th c.)	036-1
					036-2
YM 2013	N6	042	Eolian deposit	Modern	042-1
					042-2
YM 2013	N6	076	Fireplace	?	076
YM 2015	N6	104	Occupation layer	Modern	104
YM 2015	N6	105	Occupation layer	Modern	105
YM 2015	N6	106	Occupation layer	Modern	106
YM 2015	N6-test trench 1	107	Construction level	?	107
YM 2015	N6	111	Pit filling P.185	?	111
YM 2015	N6	114	Pit filling P.187	?	114
YM 2015	N6	115	Pit filling P.186	?	115
YM 2015	N6 (Ext)	119	Fireplace	?	119-1
					119-2
YM 2015	N6 (Ext)	123	Soil	?	123
YM 2015	N6- test trench 2	128	Pit filling P.197	?	128
YM 2015	N6- test trench 2	129	Fireplace in a wall	?	129
YM 2015	N6-R222	138	Abandonment layer	?	138
YM 2015	N6-R222	148	Ashy dump around the tannūr T.218	?	148-1*
					148-2
					148-3
YM 2015	N6-R222	149	Tannūr filling	?	149-1
					149-2
					149-3
YM 2015	N6-R222	P.226	Filling of the small cavity located east of the tannūr	?	P-226
YM 2015	N6- test trench 2	154	pit latrine?		154-1
					154-2
YM 2015	K17-Sdg4 (R404)	401	Eolian deposit	Recent-Modern	401
YM 2015	K17-Sdg4 (Ext)	402	Eolian deposit	Recent-Modern	402
YM 2015	K17-Sdg4 (Ext)	403	Eolian deposit	Recent-Modern	403
YM 2015	K17-Sdg4 (R404)	411	Demolition	Modern	411
YM 2015	K17-Sdg4 (R404)	413	Occupation layer / Ashy dump	Modern (15th-18th cent.)	413
					413-1/4NE-1
					413-1/4NE-2
					413-1/4NE-3
					413-1/4SE-1
					413-1/4SE-2
					413 square A
					413 square B
					413 square C
					413 square E
					413 square F
					413 sac 1

Sample detail	Sample Volume (l)	Dry-sieving			Flotation after sieving		Charcoals	Seeds & fruits	Sample for phytoliths
		2 mm	1 mm	0,5 mm	1 mm	0,5 mm			
	10	x	x	x			x		
	10	x					x		
	10		x	x			x		
	10	x	x	x			x	x	
	8	x	x	x			x	x	
	8	x	x	(x)					
	5	x	x	x					
	6	x	x	x			x		
	2	x	x	x			x		
	3	x	x	x					
	3	x	x	x					
	2	x	x	x					
	10	x	x			(x)	x	x	
	10	x			(x)	x	x	x	
	10	x	x			(x)	x	x	
	1	x	x	x			x	x	
	2	x	x	x			x	x	
	5	x	x	x			x	x	
around the tannūr	10	x	(x)	x			x	x	
around the tannūr	8	x			(x)	(x)	x	x	
F.219 (floor south of the tannūr)	8	x			(x)	(x)	x		
Upper part	20	x					x	x	
Intermediary part	14	x	x			(x)	x	x	
Bottom part	8	x	x			(x)	x	x	
	6	x	x	x					
	3	x	x	x					
	3	x	x	x					
	6	x	x	x			x	x	
	2	x	x	x			x	x	
	2	x	x	x			x	x	
	4	x	x	x					
Mix of the whole layer	90	x						x	
	20	x	x	x (10l)**			x	x	
	20	x	x			(x)	x	x	
	20	x			x	(x) (10l)	x	x	
	20	x			x	(x) (10l)	x	x	
	20	x			(x)	(x) (10l)	x	x	
Western part	20	x			(x)	(x) (10l)	x	x	
Western part	20	x			(x) (10l)	(x) (10l)	x	x	x
Western part	10	x	x			(x)		x	
Western part	10	x			(x)	(x)	x	x	
Western part	10	x			(x)	(x)	x	x	
	20	x			x	(x) (10l)	x	x	

Year	Area	N°UF or Structure	Context type	Relative datation	N°Sample
YM 2015	K17-Sdg4 (R406)	F.419	Soil/occupation layer	Modern	F.419
YM 2015	K17-Sdg4 (Ext)	420	Fireplace/Ashy dump	Modern	420
YM 2015	K17-Sdg4 (Ext)	423	Demolition/backfill	?	423
YM 2015	K17-Sdg4 (Ext)	425	Fireplace/Ashy dump	?	425
YM 2015	K17-Sdg4 (Ext)	427	Pit filling	?	427-1
					427-2
YM 2015	K17-Sdg4 (Ext)	435	Pit filling	?	435-1
					435-2
YM 2015	K17-Sdg4 (Ext)	439	Demolition	?	439
YM 2015	K17-Sdg4 (Ext)	442	Demolition	?	442*
YM 2015	K17-Sdg4 (Ext)	443	Abandonment layer	?	443
(x) : the fraction has not been sorted					
* Seeds and leaves of date palm found in theses samples have been selected for radiocarbon dating					
** number in brackets indicates the volume sub-sampled for this fraction					

Sample detail	Sample Volume (l)	Dry-sieving			Flottation after sieving		Charcoals	Seeds & fruits	Sample for phytoliths
		2 mm	1 mm	0,5 mm	1 mm	0,5 mm			
	20	x	x (10l)			(x) (10l)	x	x	
	3	x	x	x			x	x	
	4	x	x	x			x	x	
	4	x			(x)	(x)	x	x	
	10	x		x	(x)		x		x
	10	x	x			(x)	x	x	
	7	x			(x)	(x)	x	x	
	6	x			(x)	(x)	x	x	
	8	x	x			x	x	x	
	5	x	x	x			x	x	x
	18	x	x			x	x		

Table 3: Proposal for exports from al-Kharj to France (total = 144 bags)

Season	Area	Sample	Charcoal	Seeds & fruits	Phytoliths	Total bags
YM 2015	N6	106	x			1
YM 2015	N6	107	x			1
YM 2015	N6	119-1	x	x		4
YM 2015	N6	119-2	x	x		4
YM 2015	N6	123	x	x		4
YM 2015	N6	128	x	x		2
YM 2015	N6	129	x	x		2
YM 2015	N6	138	x	x		4
YM 2015	N6	148-1	x	x		4
YM 2015	N6	148-2	x	x		4
YM 2015	N6	148-3	x			3
YM 2015	N6	149-1	x	x		2
YM 2015	N6	149-2	x	x		4
YM 2015	N6	149-3	x			3
YM 2011	N6	076	x	x		4
YM 2013	N6	036-1	x			1
YM 2013	N6	036-2	x			1
YM 2013	N6	042-1	x			1
YM 2013	N6	042-2	x	x		2
YM 2015	K17-Sdg4	401	x	x		3
YM 2015	K17-Sdg4	402	x	x		3
YM 2015	K17-Sdg4	403	x	x		4
YM 2015	K17-Sdg4	413		x		1
YM 2015	K17-Sdg4	413-1/4NE-1	x	x		4
YM 2015	K17-Sdg4	413-1/4NE-2	x	x		4
YM 2015	K17-Sdg4	413-1/4NE-3	x	x		4
YM 2015	K17-Sdg4	413-1/4SE-1	x	x		4
YM 2015	K17-Sdg4	413-1/4SE-2	x	x		4
YM 2015	K17-Sdg4	413-squareA	x	x	x	5
YM 2015	K17-Sdg4	413-squareB	x	x		4
YM 2015	K17-Sdg4	413-squareC		x		3
YM 2015	K17-Sdg4	413-squareE	x	x		4
YM 2015	K17-Sdg4	413-squareF	x	x		4
YM 2015	K17-Sdg4	413-sac1	x	x		4
YM 2015	K17-Sdg4	F-419	x	x		4
YM 2015	K17-Sdg4	420	x	x		2
YM 2015	K17-Sdg4	423	x	x		2
YM 2015	K17-Sdg4	425	x	x		4
YM 2015	K17-Sdg4	427-1	x		x	4
YM 2015	K17-Sdg4	427-2	x	x		4
YM 2015	K17-Sdg4	435-1	x	x		4
YM 2015	K17-Sdg4	435-2	x	x		4
YM 2015	K17-Sdg4	439	x			2
YM 2015	K17-Sdg4	442	x	x	x	3
YM 2015	K17-Sdg4	443	x			1
YM 2015		P2-Coupe wadi-1	x			1
YM 2015		P2-Coupe wadi-2.1	x			1
YM 2015		P2-Coupe wadi-2.2	x			1
YM 2015		P2-Coupe wadi-2.3	x			1

Table 4: Ubiquity of the taxa in each excavation area

Area		K17	N6
Number of samples		17	17
Cereals			
<i>Hordeum vulgare</i> _caryopsis	barley grain	3	
<i>Hordeum vulgare</i> _rachis	barley rachis	1	2
cf. <i>Triticum turgidum</i> subsp. <i>dicoccon</i> _caryopsis	emmer grain		2
<i>Triticum turgidum</i> subsp. <i>dicoccon</i> _glume base	emmer glume base	1	1
<i>Triticum turgidum</i> subsp. <i>durum</i> _caryopsis	hard wheat grain	8	1
<i>Triticum turgidum</i> subsp. <i>durum</i> _rachis	hard wheat rachis	4	3
Triticaceae_caryopsis			
<i>Sorghum bicolor</i> _caryopsis	sorgho	3	1
Panicoideae_caryopsis		2	
Cerealium_stem	straw	1	
Pulses			
cf. <i>Cicer arietinum</i> _seed	chickpea	1	
Fruit trees			
<i>Phoenix dactylifera</i> _seed	date stone	20	
Textile/oil plant			10
<i>Gossypium</i> sp._seed	cotton seed	1	
cf. <i>Gossypium</i> sp._seed	cotton seed	1	
<i>Gossypium</i> sp._seed coat	cotton seed coat	2	
Wild plant			
<i>Acacia</i> sp._seed	acacia	3	
<i>Aizoon</i> cf. <i>canariense</i> _seed		1	
Amaranthaceae_seed		1	1
<i>Anchusa</i> sp._nutlet		1	1
<i>Arnebia tinctoria</i> _nutlet			
<i>Asphodelus</i> sp._seed	asphodel	3	1
Boraginaceae_nutlet		4	1
Brassicaceae_seed			2
<i>Citrullus colocynthis</i> _seed	colocynth	3	1
<i>Malva</i> cf. <i>parviflora</i> _seed	smallflower mallow	3	
<i>Medicago</i> cf. <i>arabica</i> _seed	wild lucerne	3	
<i>Plantago</i> sp._seed	plantain	7	4
Poaceae_caryopsis	grass	2	4
<i>Salsola</i> type_seed		4	1
<i>Teucrium</i> sp._seed		4	
<i>Zilla spinosa</i> _silique			1
Others			1
Coproliths camel		1	
Coproliths rodent			2
Coproliths indeterminate		18	1
Indet-Arc		2	4
Seed indeterminate		1	2
ashy mass			1
Organical material		1	1

Table 5: Preliminary carpological results from Area K17 (Sounding 4)

AREA K17 (Sounding 4)										
Sample number (after UF number)	401			402			403			413
Volume (l.)	6			2			2			90
Mesh sieving (mm)	2	1	0.5	2	1	0.5	2	1	0.5	2
CARPOLOGICAL REMAINS										
Cereals										
<i>Hordeum vulgare_caryopsis</i>										
<i>Hordeum vulgare_rachis</i>										
cf. <i>Triticum turgidum</i> subsp. <i>dicoccon_caryopsis</i>										
<i>Triticum turgidum</i> subsp. <i>dicoccon_glume</i> base										
<i>Triticum turgidum</i> subsp. <i>durum_caryopsis</i>										
<i>Triticum turgidum</i> subsp. <i>durum_rachis</i>										
Triticaceae_caryopsis										
<i>Sorghum bicolor_caryopsis</i>										
Panicoideae_caryopsis										
Cerealium_stem										
Pulses										
cf. <i>Cicer arietinum_seed</i>										
Fruit trees										
<i>Phoenix dactylifera_seed</i>										+
Textile/oil plant										
<i>Gossypium</i> sp._seed										
cf. <i>Gossypium</i> sp._seed										
<i>Gossypium</i> sp._seed coat										
Wild plant										
<i>Acacia</i> sp._seed										
<i>Aizoon</i> cf. <i>canariense_seed</i>			+							
Amaranthaceae_seed										
<i>Anchusa</i> sp._nutlet										
<i>Arnebia tinctoria_nutlet</i>										
<i>Asphodelus</i> sp._seed								+		
Boraginaceae_nutlet										
Brassicaceae_seed										
<i>Citrullus colocynthis_seed</i>										
<i>Malva</i> cf. <i>parviflora_seed</i>										
<i>Medicago</i> cf. <i>arabica_seed</i>		+	+							
<i>Plantago</i> sp._seed		+	+						+	
Poaceae_caryopsis										
<i>Salsola</i> type_seed					+	+		+	+	
<i>Teucrium</i> sp._seed			+							
<i>Zilla spinosa_silique</i>										
Others										
Coproliths camel										+
Coproliths rodent										
Coproliths indeterminate										
Indet-Arc										
Seed indeterminate		+								
ashy mass										
Organical material								+		
ANTHRACOLOGICAL REMAINS										
	x			x			x			

AREA K17 (Sounding 4)													
Sample number (after UF number or structure number)	413-sq.F	413-sac1	F.419	420	423	425	427-1	427-2	435-1	435-2	439	442*	443
Structure			F.419						P.426	P.426			
Volume (l.)	10	20	20	3	4	4	10	10	7	6	8	5	18
Mesh sieving (mm)	2	2 1	2 1	2	2 1	2	2	2 1	2	2	0.5		
CARPOLOGICAL REMAINS													
Cereals													
<i>Hordeum vulgare_caryopsis</i>													
<i>Hordeum vulgare_rachis</i>													
cf. <i>Triticum turgidum</i> subsp. <i>dicoccon_caryopsis</i>													
<i>Triticum turgidum</i> subsp. <i>dicoccon_glume</i> base													
<i>Triticum turgidum</i> subsp. <i>durum_caryopsis</i>								+	+	+			
<i>Triticum turgidum</i> subsp. <i>durum_rachis</i>							+						
Triticaceae_caryopsis													
<i>Sorghum bicolor_caryopsis</i>							+						
Panicoideae_caryopsis							+						
Cerealium_stem							+						
Pulses													
cf. <i>Cicer arietinum_seed</i>			+										
Fruit trees													
<i>Phoenix dactylifera_seed</i>	+	+	+	+	+		+	+	+	+		+	+
Textile/oil plant													
<i>Gossypium</i> sp._seed													
cf. <i>Gossypium</i> sp._seed			+										
<i>Gossypium</i> sp._seed coat				+									
Wild plant													
<i>Acacia</i> sp._seed													
<i>Aizoon</i> cf. <i>canariense_seed</i>													
Amaranthaceae_seed											+		
<i>Anchusa</i> sp._nutlet													
<i>Arnebia tinctoria_nutlet</i>													
<i>Asphodelus</i> sp._seed							+						
Boraginaceae_nutlet			+										
Brassicaceae_seed													
<i>Citrullus colocynthis_seed</i>								+					
<i>Malva</i> cf. <i>parviflora_seed</i>			+										
<i>Medicago</i> cf. <i>arabica_seed</i>			+										
<i>Plantago</i> sp._seed			+										
Poaceae_caryopsis			+										
<i>Salsola</i> type_seed													
<i>Teucrium</i> sp._seed													
<i>Zilla spinosa_silique</i>													
Others													
Coproliths camel													
Coproliths rodent													
Coproliths indeterminate	+	+	+	+			+	+	+	+			
Indet-Arc									+				
Seed indeterminate													
ashy mass													
Organical material													
ANTHRACOLOGICAL REMAINS													
	x	x	x	x	x	x	x	x	x	x	x	x	x

* Radiocarbon dating of charred date palm seeds of the sample

Table 6: Preliminary carpological results from Area N6 (mosque)

AREA N6											
Sample number (after UF number or structure number)							test trench 1	Ext.	Ext.		
	036-1	036-2	042-1	042-2	076	106	107	119-1	119-2		
Structure											
Volume (l.)	10	10	10	10	8	6	2	10	10		
Mesh sieving (mm)	2	2	2	0.5	2	1	2	2	2	1	2
CARPOLOGICAL REMAINS											
Cereals											
<i>Hordeum vulgare_caryopsis</i>											+
<i>Hordeum vulgare_rachis</i>						+			+		
cf. <i>Triticum turgidum</i> subsp. <i>dicocon_caryopsis</i>					+						
<i>Triticum turgidum</i> subsp. <i>dicocon_glume</i> base									+		
<i>Triticum turgidum</i> subsp. <i>durum_caryopsis</i>					+						
<i>Triticum turgidum</i> subsp. <i>durum_rachis</i>											
Triticaceae_caryopsis											
<i>Sorghum bicolor_caryopsis</i>											
Panicoideae_caryopsis											
Cerealia_stem											
Pulses											
cf. <i>Cicer arietinum_seed</i>											
Fruit trees											
<i>Phoenix dactylifera_seed</i>								+	+	+	
Textile/oil plant											
<i>Gossypium</i> sp._seed											
cf. <i>Gossypium</i> sp._seed											
<i>Gossypium</i> sp._seed coat											
Wild plant											
<i>Acacia</i> sp._seed											
<i>Aizoon</i> cf. <i>canariense_seed</i>						+					
Amaranthaceae_seed											+
<i>Anchusa</i> sp._nutlet											
<i>Arnebia tinctoria_nutlet</i>											
<i>Asphodelus</i> sp._seed											
Boraginaceae_nutlet											
Brassicaceae_seed				+							
<i>Citrullus colocynthis_seed</i>											
<i>Malva</i> cf. <i>parviflora_seed</i>											
<i>Medicago</i> cf. <i>arabica_seed</i>				+							
<i>Plantago</i> sp._seed											+
Poaceae_caryopsis											
<i>Salsola</i> type_seed											
<i>Teucrium</i> sp._seed											+
<i>Zilla spinosa_silique</i>											
Others											
Coproliths camel								+		+	
Coproliths rodent					+						
Coproliths indeterminate											
Indet-Arc											
Seed indeterminate											
ashy mass					+						
Organical material											
ANTHRACOLOGICAL REMAINS											
	x	x	x	x	x		x	x	x		x

* Radiocarbon dating of charred date palm seeds of the sample

AL-YAMĀMA - ARCHAEOZOOLOGICAL STUDY

Hervé MONCHOT (*Muséum national d'histoire naturelle, Paris*)

The faunal material from the excavations of 2013 and 2015 seasons of the site of al-Yamāma was studied by the author during this last field mission (February 2015). Thus the corpus of the excavation of area N6, the mosque and its surrounding area was completed, while the new material from Sounding 4 (domestic context in area K17) was added. The methodology follows the one published in 2012 (MONCHOT in press b). Taking advantage of the presence of Ch. BOUCHAUD, archaeobotanist, within the team, it was important to note that some samples of sensitive UF (eg, floor, pit, ashy layers) were sieved with a 2 mm mesh.

This year, 6782 bone remains were found during this last archaeological excavation, 2548 belonging to the Mosque area (Area N6, Building 1) while the remaining bones belonged to Sounding 4, in area K17 (n= 4234). As previously the faunal assemblage is widely dominated by the couple camel/caprine in both areas. The **table 7** –at the end of this chapter– presents the species distribution by UF i.e. stratigraphic assignments.

The association of camel & caprine

As it has already been shown in previous results (MONCHOT 2014), the bone assemblage is clearly dominated by the camel (*Camelus dromedarius*) and by the caprine, sheep/goat (*Ovis aries/Capra hircus*). These species make up a significant proportion of the assemblage from al-Yamāma throughout the excavated sequences and the zooarchaeological results clearly show a subsistence economy largely based on these animals. They are purveyors of meat, milk and wool. For the camel, it served also as transportation mean from oasis to oasis. The high proportion of camel and caprine is not unusual in this area; they were the most common of the exploited terrestrial animals from Late Pre-Islamic/Early Islamic contexts at Dūmat al-Jandal or for earlier periods in Saudi Arabia.

Some of the ovicaprids or camel bones show cutting or butchering marks (**fig. 127**) which are the result of disarticulation or filleting processes. The variety of butchery marks proves that the inhabitants of al-Yamāma consumed camel and sheep/goat meat. This is not an unexpected result since faunal remains represent consumption debris recovered in domestic quarters.

The gazelle (*Gazella* sp.)

Numerous samples could be identified as gazelle among the different UF of al-Yamāma, most of them coming from area K17 (Sounding 4). It suggests an important hunting activity by the inhabitants (**fig. 128**). The gazelle bones present characteristics osteomorphological features and a preliminary biometric study shows clearly that these were smaller species (e.g. the Arabian gazelle, *Gazella arabica* also called the Saudi gazelle, *Gazella saudiya*) than the mountain gazelle (*Gazella gazella*) (MUNRO *et al.* 2011; THOULESS *et al.* 1991). The Saudi gazelle is not regarded as a subspecies of *G. Dorcas* (YOM-TOV *et al.* 1995). It is important to note that the Arabian gazelle, the smallest one, was an elusive gazelle that was apparently hunted to extinction in its Middle Eastern homeland, Saudi Arabia.

The spiny tailed-lizard (*Uromastyx aegyptia*)

The presence of spiny-tailed lizard, already confirmed during the previous excavation seasons (MONCHOT *et al.* 2014), was confirmed. Numerous bones (n=163) were found in Sounding 4 (area K17), in a domestic context and in the Building 1, the Mosque (area N6) (n=33).

The Egyptian spiny-tailed lizard or mastigure (*Uromastyx aegyptia microlepis*) is present in central Saudi

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Arabia, the Sultanate of Oman, the United Arab Emirates, Kuwait and in the north and south of Iraq (WILMS *et al.* 2009). This lizard is locally known to the Arabs as *ḍabb*. It is a burrowing lizard which has a predilection for open habitats with sand and gravel substrates, and sparse vegetation. This abundance of lizards remains associated with leftovers, especially in Sounding 4, confirms its anthropogenic origin, i.e. its consumption by the inhabitants.



Figure 127. Right ulnar carpal bone of a camel showing disarticulation cut marks (area K17, Sounding 4, UF 414) (Y. Hilbert - Saudi French archaeological mission in al-Kharj).



Fig. 128. Disarticulation cut marks (removal of a head) on an atlas of a (female) gazelle (area K17, Sounding 4, UF 411) (Y. Hilbert - Saudi French archaeological mission in al-Kharj).



Fig. 129. Eggshell of ostrich found in domestic context (area K17, Sounding 4, UF 415) (Y. Hilbert - Saudi French archaeological mission in al-Kharj).

The ostrich (*Struthio camelus*)

The ostrich is represented by twenty-eight fragments of eggshell found everywhere in the domestic context of Sounding 4 (n=20) or in the mosque area N6 (n=8) (fig. 129). If the ostrich bones are quasi-absent in archaeological sites (with the possible exception of the Paleolithic site of Umm El Tlel in Syria: BONILAURI *et al.* 1990), the eggshell fragments are known from various archaeological sites in Saudi Arabia (POTTS 2001; STUDER 2010; MONCHOT in press a) or in Iran, Iraq, Bahrain or eastern Syria (see references in SUMMER 2003).

The Middle Eastern Ostrich or Arabian Ostrich (*Struthio camelus syriacus*) is an extinct subspecies of the ostrich which once lived on the Arabian Peninsula and in the Near East. Ostriches also appear frequently on petroglyphs from prehistory to modern time and then in Islamic verse, especially in the poetry from Arabia itself, where the birds were common. Although the flesh is edible and the fat useful, the ostrich has been primarily valued for its plumage, notably the tail feathers, and for its large eggs (LAUFER 1926).

The question of the presence of ostrich eggs is interesting. Indeed, it is difficult to know whether they have been consumed or if the eggs were used as container (MOOREY 1994) or decorative elements like beads as found in many countries in South Africa (TAPELA 2001; KANDEL & CONARD 2005).

Domestic fowl (*Gallus gallus*)

Only 6 remains represent the domestic fowl, i.e. chicken. One skull fragment, a distal fragment of a metatarsus and a proximal fragment of a tibiotarsus (UF 106) and one fragment of humerus diaphysis (UF 156) were found in test trench A (Mosque, area N6) whereas one fragment of a left proximal femur (Bp=17.1; Dp=10.6) and one fragment of a left distal femur (Bd=15.3; Dd=11.4) belonging certainly to the same individual, were found in UF 435 (Sounding 4, area K17). The macroscopic inspection does not show any evidence of anthropic use such as cut marks or others traces of slaughtering. Nevertheless we can interpret these domestic fowl bones as food refuses although these species were not primarily used for consumption.

The presence of some fragments of eggshell found in the sieve residue is questionable. Indeed, they can be issued from chicken or from wild galliformes, species widely hunted and consumed.

Other species already attested during the previous seasons

Alongside sheep, goats and camel, the inhabitants of the oasis also kept other domestic animals, such as dog (*Canis lupus f. familiaris*), donkey (*Equus asinus*) or cat (*Felis catus*). These species are represented in very low percentage and had other role within the local economy and were not generally used for food. Thus, the discovery of bones from these animals at archaeological sites is not a sign of consumption. In rare cases, however, bones have been discovered with cut marks indicating that meat (or skin removal) was cut off with a knife, presumably for consumption.

- The donkey is represented by a second phalanx in UF 434 and a proximal fragment of a first phalanx in UF 413. Donkey as the camel was used as a beast of burden.
- The cat is present by a proximal radius and a fragment of ulna in UF 137 (test trench A, mosque, area N6) and by three bones (proximal tibia, proximal ulna and distal femur) in UF 435 (Sounding 4, area K17, dwelling).
- Dogs may have been killed during hunting sessions, or within the walls of the city, where attracted by food or garbage.
- This year three bones of cattle (*Bos Taurus*) were found and no bones of oryx (*Oryx leucoryx*) were identified even if its presence is suspected. Indeed the oryx bones are very similar in size and morphology to those of caprine (PETERS *et al.* 1997); the intense fragmentation made their identification difficult.

New species

Several new species have been discovered this year, including two species of sea fish.

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Serranidae

The first one, a dorsal spine, belongs to the family of Serranidae (Perciforme order) was in the area N6, UF 132 (fig. 130). The family contains about 450 species in 64 genera, including the sea basses and the groupers (subfamily Epinephelinae). Many serranid species are brightly colored, and many of the larger species are caught commercially for food. It is not possible to be more specific yet about the origin of the grouper, this family is well represented in the Red Sea as in the Arabian Gulf. Groupers bones belonging to a minimum of seven specimens were found in Madā'in Šāliḥ (STUDER 2010). The presence of marine fish bones as far inland as al-Yamāma offers insights into dietary habits and trade.

Clupeidae

Two very small vertebrae belongs to a Clupeidae (fig. 131) found after the sieving in UF 148, which represent sediment present around *tannūr* T. 218. This is the fish family of the herring, shad, sardine, ilish and menhaden. They include many of the most important food fish in the world, and are also commonly caught for production of fish oil and fish meal.

Cape hare

Ubiquitous animal that can live in diverse environments such as steppes, agricultural areas and even the desert, when vegetation is sufficient, the Cape hare (*Lepus capensis*) is represented in UF 417 (Sounding 4, area K17) by a distal humerus (Distal breadth= 9,6; Distal depth= 5,9), a proximal ulna and a skull fragment. Cape hare was also identified in Madā'in Šāliḥ in 4th-7th century AD level (STUDER 2010).

Rodents

Numerous rodent bones were identified and the species identification is ongoing (fig. 132). Nevertheless one sub-complete skull of a *Meriones* has been found in UF 422 (Sounding 4, area K17). The *Meriones* is a rodent species in the family Muridae and includes the gerbil. The genus contains most animals referred to as jirds, rodents which tend to inhabit arid regions including clay desert, sandy desert, and steppe, but are also in slightly wetter regions, and are an agricultural pest.

Golden Eagle and unidentified birds

Some bones of birds belonging to two or three species were found and the specific determination is ongoing. However it can already been said that a proximal ulna discovered in UF 417 (Sounding 4, area K17) proves the presence of a large Accipitridae certainly a golden eagle (*Aquila chrysaetos*) (fig. 133) (LEPAGE 2007). While this raptor may have been captured for his feathers, Bundy reported communal roosting of Eastern Imperial Eagles in Saudi Arabia and northern India (BUNDY 1985 quoted in WATSON 1988).



Figure 130. Dorsal spine of a Serranidae (Mosque area, area N6, UF 132) (Y. Hilbert - Saudi French archaeological mission in al-Kharj).

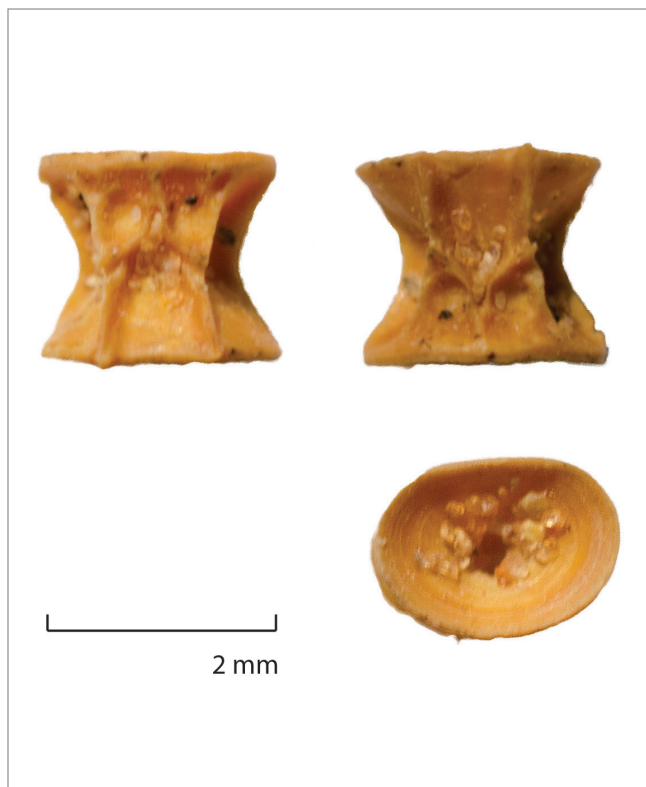


Figure 131. Vertebrae of Clupeidae (Mosque area, area N6, UF148) (Y. Hilbert - Saudi French archaeological mission in al-Kharj).

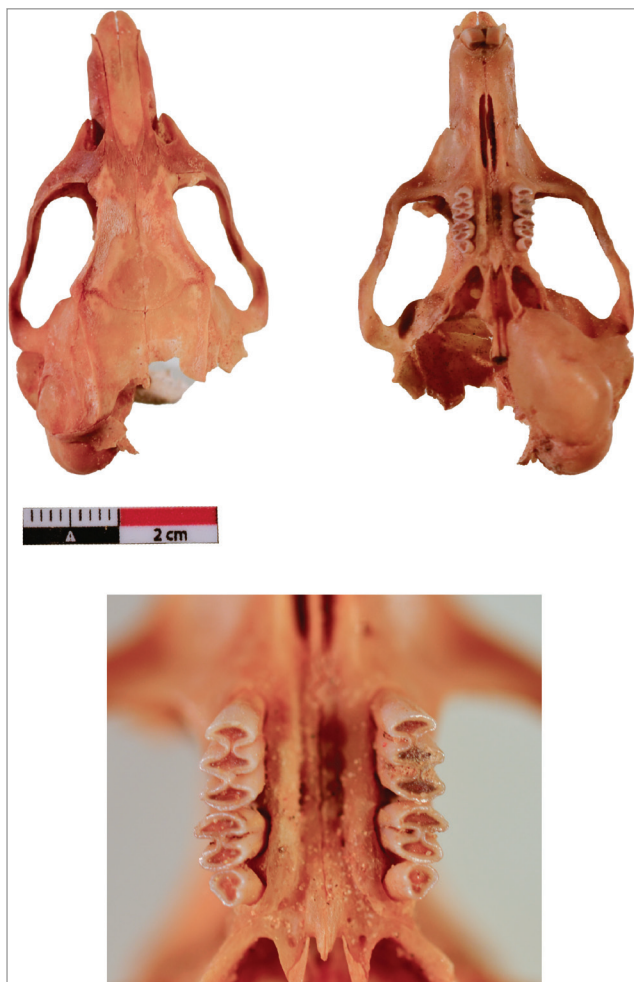


Figure 132. A merione skull (area K17, Sounding 4 - UF 422) (Y. Hilbert - Saudi French archaeological mission in al-Kharj).

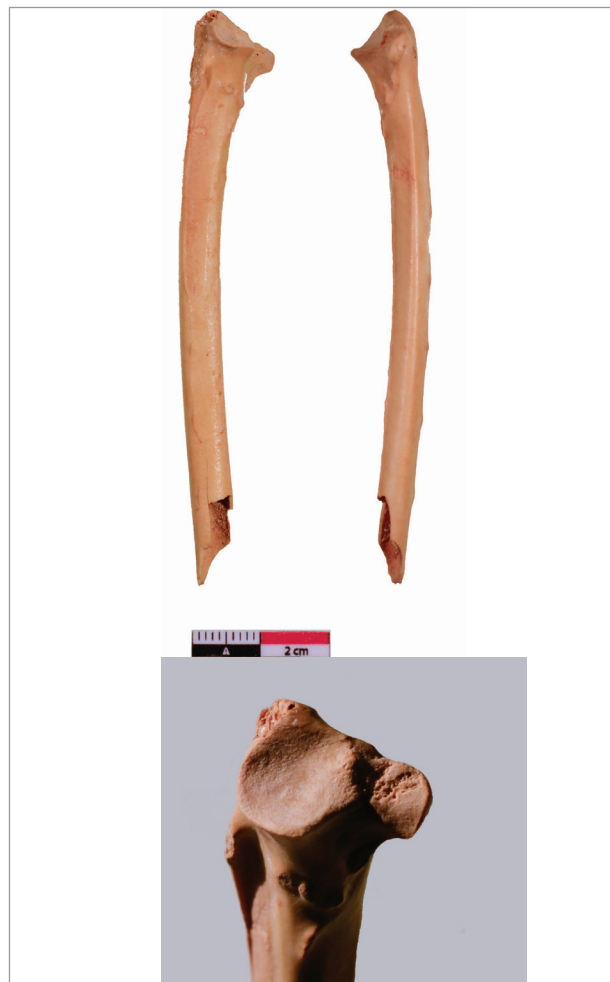


Figure 133. Proximal ulna of a large Accipitridae (Golden eagle) - UF 417 (Sounding 4, area K17) (Y. Hilbert - Saudi French archaeological mission in al-Kharj).

UF	N	Camel	Cap	Gaz	Bos	Dog	Cat	Hare	Equid	Lizard	Rodent	Chicken	Bird	Ostrich	SH	MH	LH	IND
146	2		1															1
147	37		15							1								21
148	306	8	99	4						6				2			6	181
149*	22		1							1								20
153	37		7							3				1				26
155	16		5														2	9
156	76	2	22								4	1				5		42
157	150	2	6							10								132
158	37		9														1	27
159	42		7							4							3	28
218*	87		2															85
P.226	3		2															1
401	23	7	5															11
402	13	2	1											1				9
409	2			1														1
410	29	14	8															7
411	663	68	198	7	1					22			1	1	2	1	70	292
412	27	8	5															14
413*	793	36	117	23	2				1	57	1		5	1	33		24	494
414	24	4	8							1					2			9
415	351	66	35			1				11			4	7		2		225
416	10	4																6
417	330	34	82			1		3		14	3		9	2		1	21	160
418	85	25	20															40
419*	263	10	59	1						36	4		3		9	3	16	122
422	147	47	16							5	1		3	1			8	66
423	335	58	96	3						7	1		3	1			10	156
424	127	17	32							1			2	2	2			71
426	50	1	7															42
427*	135	14	33			2								1	5		6	74
430	12	1	2											1				8
431	2		1															1
433	128	2	7														11	108
434	28		7						1									20
435*	90	17	20				2			3		2						46
437	214	26	101	1						3			2	2			3	76
439*	224	22	14							1							10	177
440	13	1	3															9
441	116	23	18							2								73
TOT	6782	745	1410	45	3	11	5	3	2	196	23	6	34	28	99	17	372	3784

HOLOCENE ENVIRONMENTAL CHANGES IN THE REGION OF AL-KHARJ

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Vegetation changes in the region of al-Kharj during the Holocene

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Natural vegetation as 'indicator' for possible subsistence strategies

Biomes and on a more regional to local scale the different types of ecosystems as parts of the biome constitute the environment where humans live in. Following Campbell biomes are "... the world's major (plant and animal) communities, classified according the predominant vegetation and characterized by adaptation of organisms to that particular environment" (CAMPBELL 1996).

The biome, or more specific the different types of ecosystems of a region, thus may be considered as a most prominent factor for subsistence, at least in the past. Scarce and less diverse plant cover restricts animal populations to a limited amount or even induce migration into more favorable regions. This holds true for wild animal populations as well as domesticated animals, flocks tended by herders. Scarce and less diverse plant cover therefore restricts the resources of gatherer, hunter and herder communities. Abundant and (highly) diverse vegetation in contrast creates more favorable conditions for human occupation and subsistence. The vegetation of a region may therefore be considered as 'indicator' for the subsistence practice that can be carried out in the region under concern.

The distribution and occurrence of vegetation is determined by climate and other abiotic factors like soils and the geological formations. Temperature and precipitation are the most important climatic components affecting the plant cover of a region. Yet, changing amounts of precipitation may not necessarily result in vegetational changes because of the resilience of ecosystems / vegetation formations. Often a specific threshold value has to be exceeded before ecosystems reorganize and the plant cover of a region changes. Therefore, reconstructing the vegetation development of a region through time is a more reliable 'indicator' for possible subsistence strategies of a region than the reconstruction of past climate changes solely.

At least since the Holocene, human agency is another prominent factor that shapes the natural vegetation cover. Tracing the cultivation of (domesticated) plants is an unambiguous evidence of the manipulating presence of human populations. Decline of woody taxa or change in the composition of vegetation formations, however, may be ascribed to climate change or land use. Aridification as well as (intensive) nomadic grazing may e.g. trigger changes in the plant cover composition. In many cases it is difficult to ascribe vegetation changes to climate or human agency. The most promising approach are therefore multiproxy investigations, bringing together archaeology, historical, climate and environmental sciences.

Recent vegetation

The actual dominating vegetation formations of central and eastern Saudi Arabia are (very) open xeromorphic dwarf-shrublands and rock/gravel and sand desert communities. The rimth saltbush shrublands (*Haloxylon salicornicum*-formations), the arfaj shrublands (*Rhanterium eppaposum*-formations), and *Calligonum-Artemisia* formations (*Calligonum comosum*, *Artemisia monosperma*) on sand are most common (fig. 134), alternating and/or associated with e.g. *Gymnocarpus decander*, *Fagonia*, *Blepharis*, *Astragalus* and *Heliotropium* species (EL RAHMAN 1986: 42-45; KÜRSCHNER 1998: 78-79, 88-89; ZOHARY 1973: 227-231). For al-Kharj region the dwarf-shrublands alter/are associated with grass 'steppes' with *Stipa tortilis* (VESEY-FITZGERALD 1957). The vegetation of different wādīs of the Riyadh area has been investigated (e.g. ALATAR *et al.* 2015; ALYEMENI & ZAYED

1999) as well as sand dunes south of Kharj (ALYEMENI 2000).

The luxuriant growth of e.g. *Rhayza* and *Calatropis*, non-palatable invasive neophytes, documents the intensive (over) use of the natural resources (ALATAR *et al.* 2015; AL-ROWAILY *et al.* 2012) (fig. 135). Even the widespread arfaj shrublands in northern Arabia (*Rhanterium* communities), highly appreciated because of their high potential for grazing, may be the result of anthropogenic promotion since (pre)historical times (GUEST 1966).

The actual vegetation is thus mainly the result of the long lasting and during the last century much intensified land use. Reconstructing the past vegetation of the al-Kharj region by palynological and/or phytolithe investigations may reveal what the natural vegetation was like during the Holocene, how climate changes though the Holocene triggered vegetational changes and how and since when vegetation was shaped by human agency.

Holocene vegetation records of the Arabian Peninsula

During the last decades geomorphological studies and investigations of speleothems improved our knowledge about the latest Pleistocene and Holocene climate and landscape evolution of Arabia (e.g. Davies 2006; Fleitmann *et al.* 2007; Hoorn & Cremaschi 2004; Lézine *et al.* 1998, 2002, 2007, 2010; LIPPI *et al.* 2011; Parker *et al.* 2006; Parker & Goudie 2008; Preusser 2009; Preston *et al.* 2012, 2015). Palynological investigations however, especially continuous sequences, are rare, mainly due to the scarcity of suitable sediments for pollen analysis.

The eight published palynological and phytolithe investigations show a 'greening of the landscapes' during the early to mid-Holocene and the onset of arid conditions with vegetation formations similar to the actual vegetation during (at least) mid-Holocene (BONNEFILLE & RIOLLETT, 1988; DINIES *et al.* in press; GARCIA ANTON & SAINZ OLLERO 1999; LÉZINE *et al.* 1998, 2002, 2007, 2010; PARKER *et al.* 2004, 2006; PARKER & GOODIE 2008; URBAN & BUERKERT 2009). Yet, minor climatic fluctuations during the mid and late Holocene may have triggered less prominent vegetational changes that may have influenced human land use.

For the central Arabian region, palynological investigations are missing up to now. Additionally, the palynologically investigated sequences from other parts of the Arabian Peninsula record the vegetation only during some millennia or an even shorter periods. Further pollen analytical investigations thus are highly desirable to verify whether the emerging vegetational changes and subsistence pattern hold true.

Field work

Two extended flat depressions in the west of al-Kharj oasis were interpreted as probably shallow palaeolakes active during the early Holocene (FOUACHE *et al.* 2012; SCHIETTECATTE *et al.* 2012).

Lakes are suitable archives for pollen analysis. To test whether the sediments of these flat depressions bear pollen, the southern palaeolake, at al-Hayāthim, and crossed by the Wādī al-'Ayn (fig. 3), was sampled during the field season in February 2015.

Sampling

An already existing artificial, about 5.5 meter deep trench in the southwestern 'palaeolake' at al-Hayāthim was discovered (fig. 136). In order to know whether the basal sands with pebbles of the trench are underlain by (further) possible limnic sediments another trench was dug by an excavator, 4.5 meter deeper than the first trench (fig. 137). This 10 m-deep trench was sampled every 1 to 30 cm for granulometry and palynological/phytolithe investigations. A total of 151 samples were taken. The sediments were described while sampling. The results of these preliminary field descriptions are summarized in the preliminary event stratigraphy (fig. 138).

Preliminary event stratigraphy

A simplified preliminary stratigraphy, according to the field description of the sediments is summarized

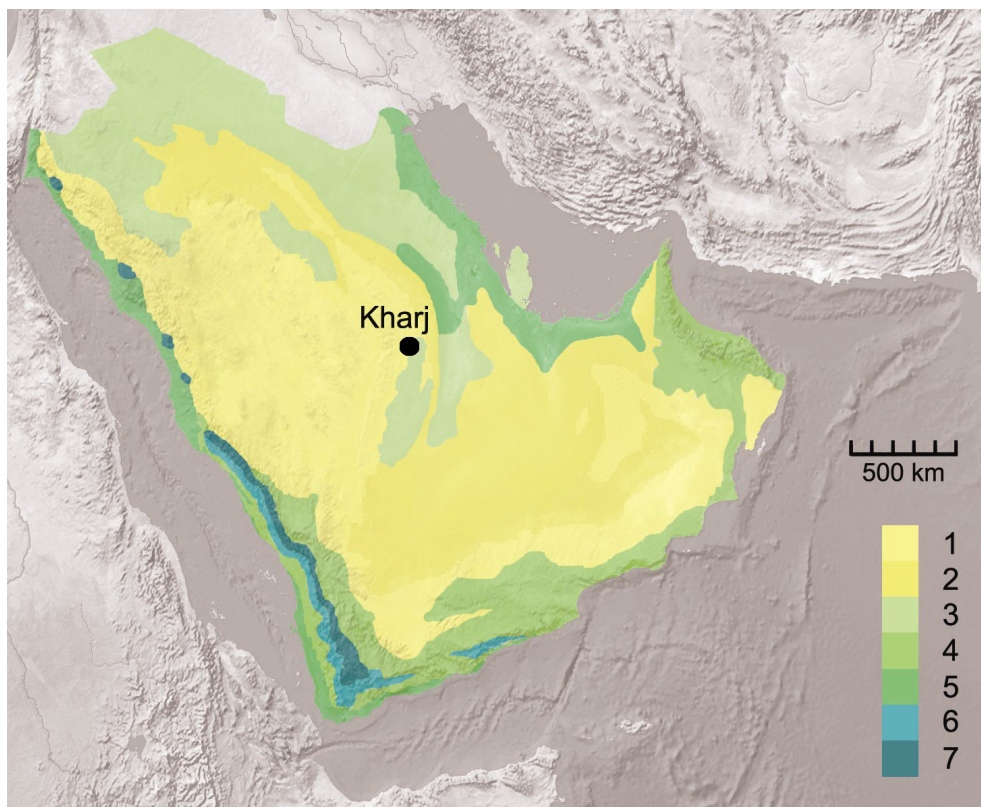


Figure 135: Heavily grazed landscapes in the Kharj region (top: with *Calatropis*; bottom: with *Rhayza*)

in figure 138. Assuming that the described continental-scale climatic changes may be recognized in the deposits of the Wādī al-‘Ayn depression at al-Hayāthim, we may postulate that the uppermost unit was built up during late Holocene, perhaps through episodic floodings. The underlying unit dominated by silt and probably post-sedimentary gypsum crystals may mirror a shallow, ephemeral lake (or an ancient ground water horizon). The subsequent silty sediments with smallest plant remains may mirror slightly wetter conditions, intercalated with fluviatile sand/pebbles during latest Pleistocene/early Holocene. Of course this preliminary interpretation is highly speculative and will be revised by dating and further analysis (e.g. AMS dating of pollen concentrations if pollen are preserved and/or OSL dating of basal and intercalated sand layers).

Outstanding investigations

Test samples of the different units will be prepared for pollen and phytolith analysis. If the sediments or parts of the sediments prove to be suitable for palynological investigations further samples will be analyzed in order to achieve a high time resolution. Additionally, if the sediments are suitable for pollen analysis, AMS-dating of pollen concentrations will help to build up a reliable chronology. Analogous, if the sediments or parts of the sediments prove to be suitable for phytolith analysis further samples will be analyzed in order to achieve a high time resolution.

Perspectives

As mentioned above, continuous palynological records in the interior of eastern Arabia are missing and thus we are ignorant of the past Holocene vegetation and its changes –a key commodity for hunter-herd communities, together with water availability. Even if the superimposed climate changes are known, the impact of these broad, continental-scale changes at a more local level is unknown –but these impacts are crucial for human populations. Additionally the palynological and sedimentological investigations will perhaps yield hints whether the monsoonal precipitation regime affected al-Kharj region or not during early-to-mid Holocene.

To summarize, if the sediments are suitable for pollen and/or phytolith analysis the outstanding reconstruction of the Holocene vegetation development will furnish clues for possible subsistence strategies and by chance even evidence unambiguously human agency by recording continuously the beginning and development of crop cultivation in al-Kharj region.

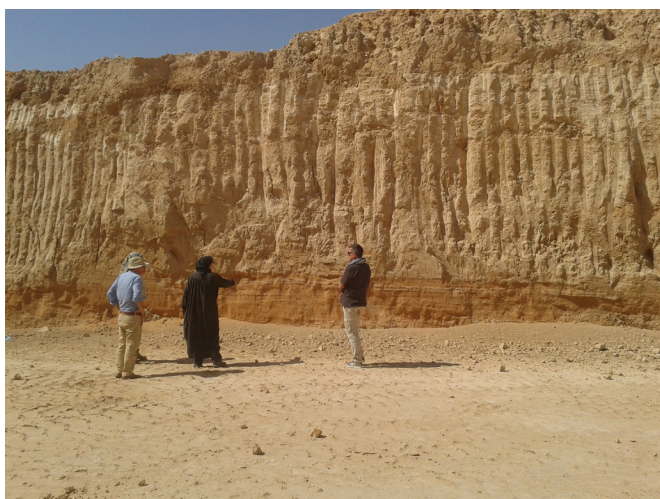


Figure 136: Al-Hayāthim ‘palaeolake’. Existing trench c. 5.5 m deep (Saudi French archaeological Mission in al-Kharj).



Figure 137: Al-Hayāthim ‘palaeolake’. Excavator digging another 4.5 m-deep trench (Saudi French archaeological Mission in al-Kharj).

Al-Hayathim

Profile Yam P2

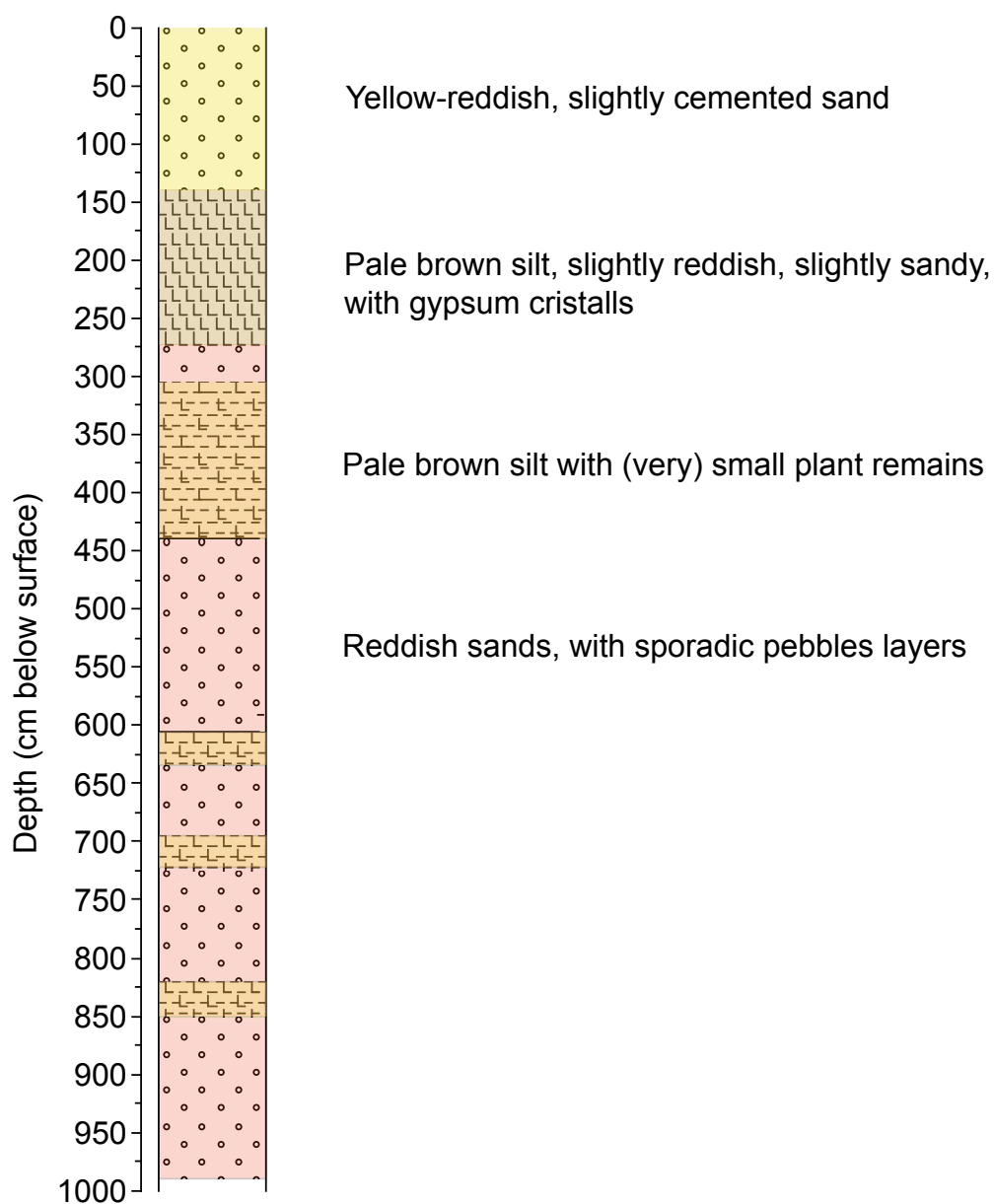


Figure 138: Al-Hayāthim 'palaeolake'. Preliminary stratigraphy of the trench Yam P2, Wādī al-ʿAyn depression at al-Hayāthim and its preliminary interpretation (Saudi French archaeological Mission in al-Kharj).

The palaeolake of al-Hayāthim: Geomorphological study

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REFERENCES

- ABD EL-RAHMAN A.A. 1986. The desert of the Arabian Peninsula. In M. Evenari, Noy-Meir I. & Goodall D. (eds), *Ecosystems of the world, 12B, Hot deserts and arid shrublands*. Amsterdam: Elsevier: 29-54.
- ALATAR A., EL-SHEIKH M., THOMAS J., HEGAZY A. & EL-ADAWY H. 2015. Vegetation, floristic diversity, and size-classes of *Acacia gerrardii* in an arid wadi ecosystem. *Arid Land Research and Management* 29: 335-359.
- AL-ASKAR A. 2002. *Al-Yamama in the Early Islamic Era* (Salsala dirāsāt Athariyya Muḥakma, 10). Dryden – Riyadh: Ithaca Press – King Abdul Aziz Foundation for Research and Archives.
- ALYEMENI M. 2000. Ecological studies on sand dunes vegetation in Al-Kharj region, Saudi Arabia. *Saudian Journal of Biological Sciences* 7.1: 65-87.
- ALYEMENI M. & ZAYED K. 1999. Ecology of some plant communities along Riyadh Al-Thumamah Road, Saudi Arabia. *Saudi Journal of Biological Science* 6.1: 11-25.
- ANDERSON S., ERTUG-YARAS F. 1998. Fuel fodder and faeces: an ethnographic and botanical study of dung fuel use in Central Anatolia. In M. Charles, P. Halstead & J. Glynis (eds.), *Fodder: Archaeological, Historical and Ethnographic Studies, Environmental Archaeology*. Oxford: Oxbow Books: 99-109.
- BALĀDHURĪ, ABŪ L-ḤASAN / ED. E. PH. KH. HITTI 1916. *The Origins of the Islamic State being a Translation from the Arabic, accompanied with Annotations, Geographic and Historic Notes, of the "Kitāb futūḥ al-buldān" of al-Imām abu-l 'Abbās Aḥmad ibn Jābir al-Balādhurī*. Vol. 1 = Studies in History, Economics and Public Law, vol. LXVIII, no. 163 (New York 1916 [reedited in 2002: Georgias Press]).
- BIN KHAMĪS A.M. 1978. *Mu'jam al-Yamāma* (2 volumes). Riyadh.
- BOIVIN N., FULLER Q.D. 2009. Shell middens, ships and seeds: Exploring coastal subsistence, maritime trade and dispersal of domesticates in and around the ancient arabian peninsula. *Journal of World Prehistory* 22: 113-180.
- BONILAURI S., BOËDA É., GRIGGO G., AL-SAKHEL H. & MUHESEN S. 1990. Un éclat de silex moustérien coincé dans un bassin d'autruche (*Struthio camelus*) à Umm El Tlel (Syrie centrale). *Paléorient* 33(2): 39-46.
- BONNEFILLE R. & RIOLLET G. 1988. Palynologie des sédiments Holocènes de sites archéologiques du Qatar. In M.-L. Inizan (ed), *Préhistoire à Qatar. Mission archéologiques française à qatar*, t. 2. Paris: Editions Recherches sur les civilisations: 137-145.
- BOUCHAUD C. 2013. Exploitation végétale des oasis d'Arabie : production, commerce et utilisation des plantes. L'exemple de Madâ'in Sâlih (Arabie Saoudite) entre le IVE siècle av. J.-C. et le VIIe siècle ap. J.-C. *Ethnoécologie* 4 [doi:http://ethnoecologie.revues.org/1217].
- BOUCHAUD C. 2011. *Paysages et pratiques d'exploitation des ressources végétales en milieux semi-aride et aride dans le sud du Proche-Orient : Approche archéobotanique des périodes antique et islamique (IVE siècle av. J.-C.-XVIe siècle ap. J.-C.)* (Thèse de doctorat). Paris: Université Paris 1 Panthéon-Sorbonne.
- BOUCHAUD C. In press. Agrarian legacies and innovations in the Nabataean territory. *ArchéoSciences*.
- BOUCHAUD C., TENGBERG M., DAL PRÀ P. 2011. Cotton cultivation and textile production in the Arabian Peninsula during antiquity: the evidence from Madâ'in Sâlih (Saudi Arabia) and Qal'at al-Bahrain (Bahrain). *Vegetation History and Archaeobotany* 20: 405-417.
- BOUCHAUD C., THOMAS R., TENGBERG M. 2012. Optimal use of the date palm (*Phoenix dactylifera* L.) during Antiquity: Anatomical identification of plant remains from Madâ'in Sâlih (Saudi Arabia). In E. Badal

(ed.), *Wood and Charcoal. Evidences for the Human and Natural History*. Valencia: Universitat de València: 173–185.

- CAMPBELL N. 1996. *Biology*. Menlo Park: The Benjamin/Cummings Publishing Company.
- CAPPERS R.T. & BEKKER R.M. 2013. *A manual for the identification of plant seeds and fruits*. Groningen: Barkhuis.
- CAPPERS R.T.J. & NEEF R. 2012. *Handbook of plant palaeoecology*. Groningen: Barkhuis.
- CAPPERS R.T.J., NEEF R. & BEKKER R.M. 2012. *Digital atlas of economic plants in archaeology*. Groningen: Barkhus & Groningen University Library.
- CRASSARD R., HILBERT Y.H. 2011. Prehistoric survey of the oasis and its neighborhood. In: Schiettecatte, J., Al-Ghazzi, A. (ed.), 2011: 17-30.
- CRASSARD R., HILBERT Y.H. 2013a. A Nubian Complex Site from Central Arabia: Implications for Levallois Taxonomy and Human Dispersals during the Upper Pleistocene. *PLoS ONE* 8(7): e69221.
- CRASSARD R., HILBERT Y.H. 2013b. Prehistoric Survey. In: Schiettecatte, J., Al-Ghazzi, A. (ed.), 2013: 15-23.
- DAVIES C. 2006. Holocene paleoclimates of southern Arabia from lacustrine deposits of the Dhamar highlands, Yemen. *Quaternary Research* 66: 454-464.
- DE GAURY G. 1945. A Burial Ground in Al-Kharj. *The Geographical Journal* 106/3: 152–153.
- DINIES M., PLESSEN B., NEEF R. & KÜRSCHNER H. In press. When the desert was green. Grassland expansion during the early Holocene in northwestern Arabia. *Quaternary International* 2015 [<http://dx.doi.org/10.1016/j.quaint.2015.03.007>].
- FAHN A., WERKER E., BAAS P. 1986. *Wood anatomy and identification of trees and shrubs from Israel and adjacent regions*. Jerusalem: the Israel academy of Sciences and Humanities.
- FLEITMANN D., BURNS S., MANGINI A., MUDELSEE M., KRAMERS J., VILLA I., NEFF U., AL-SUBBARY A., BUETTNER A., HIPPLER, D. & MATTER A. 2007. Holocene ITCZ and Indian monsoon dynamics recorded in stalagmites from Oman and Yemen (Socotra). *Quaternary Science Reviews* 26: 170-188.
- FOUACHE E., FORTIN G. & CHABROL A. 2012. Geomorphological study of al-Kharj oasis. In: Schiettecatte, J., Al-Ghazzi, A. (ed.), 2012: 73-82.
- FULLER D.Q. In press. The economic basis of the Qustul splinter state: cash crops, subsistence shifts, and labour demands in the post-meroitic transition. In M. Zach (ed.), *Kushite World. Proceedings of the 11th International Conference for Meroitic Studies* (Beitrag zur Sudanforschung Beiheft Series). Vienna: 1–28.
- GAJDA I. 2004. Ḥimyar en Arabie centrale – un nouveau document. *Arabia* 2: 87–98.
- GARCIA ANTON M. & SAINZ OLLERO H. 1999. Étude palynologique menée dans le secteur de Mleiha. In M. Mouton (ed), *Mleiha I, Environnement, stratégies de subsistance et artisanats* (TMO 29). Lyon: Maison de l'Orient Méditerranéen: 83-87.
- AL-GHAZZI A. 1996. A preliminary report of an excavation at Hazem Agila in al-Kharj oasis/central region of Saudi Arabia. *Atlat* 14: 43–51.
- AL-GHAZZI A. 2009. *Awān fukhāriyya min mawqa' Ḥazm 'Aqīla (muḥāfaḍat al-Ḥarj/Manṭaqat al-Riyādh)*. Riyadh: Dārat al-malik 'Abd al-'Azīz.
- AL-GHAZZI A. 2010. *A Comparative Study of Pottery from a site in the al-Kharj Valley, Central Arabia*. (Series of ar-

chaeological refereed studies, 1). Riyadh: Saudi Commission for Tourism and Antiquities.

- AL-GHAZZI A. 2011a. *Mashrū‘ masaḥ w-tawthīq al-Manshāt al-ḥajariyya fī maḥīṭ ‘Aynī Farzān. Al-mujāllad al-awal. Dirāsāt maydāniyya muqārna li-l-muqābarā al-rakāmiyyat al-ḥajariyya.* Riyadh: Dārat al-malik ‘Abd al-‘Azīz.
- AL-GHAZZI A. 2011b. *Mashrū‘ masaḥ w-tawthīq al-Manshāt al-ḥajariyya fī maḥīṭ ‘Aynī Farzān. Al-mujāllad al-thānī. Qanāt al-rī fī Farzān ‘Aynī Farzān wa-fukhār-ha (Dirāsāt maydāniyya tawthīqiyya athāriyya muqārna).* Riyadh: Dārat al-malik ‘Abd al-‘Azīz.
- GUEST E. 1966. *Introduction to the Flora of Iraq.* Kew – Baghdad: Royal Botanic Gardens – University of Baghdad.
- HAALAND R. 1999. The puzzle of the late emergence of domesticated sorghum in the Nile Valley. In C. Gosden & J. Hather (eds.), *The Prehistory of Food.* London: Routledge: 397–418.
- HOORN C. & CREMASCHI M. 2004. Late Holocene palaeoenvironmental history of Khawr Rawri and Khawr Al Balid (Dhofar, Sultanate of Oman). *Palaeogeography, Palaeoclimatology, Palaeoecology* 213: 1-36.
- JAGIELLA C. & KURSCHNER H. 1987. Atlas der Holzer saudi Arabiens: die Holzanatomie der wichtigsten Baume und Straucher Arabiens mit einem holzanatomischen Bestimmungsschlüssel, Beih. *Tubinger Atlas Vorderen Orients.* Wiesbaden: Verlag Dr. Ludwig Reichert.
- AL-JUHANY U. M. 2002. *Najd before the Salafi reform movement. Social, political, and religious conditions during the three centuries preceding the rise of the Saudi state.* Reading – Riyadh: Ithaca Press – King Abdul Aziz Foundation for Research and Archives.
- KANDEL A.W. & CONARD N.J. 2005. Production sequences of ostrich eggshell beads and settlement dynamics in the Geelbek Dunes of the Western Cape, South Africa. *Journal of Archaeological Science* 32: 1711-1721.
- KHORDĀDHBEH, ABU’L-KĀSIM ‘UBAIDALLAH IBN ‘ABDALLAH IBN / ED. M. J. DE GOEJE, 1889. *Kitāb al-masālik wa-l-mamālik. Auctore Abu ‘l-Kāsim Obaidallah ibn Abdallah Ibn Khordādhbeh et excerpta e Kitāb al-Kharādj auctore Kodāma ibn Dja’afar quae cum versione Gallica edidit, indicibus et glossario instruxit M.J. de Goeje.* Leiden: Brill.
- KÜRSCHNER H. 1998. Biogeography and introduction to vegetation. In S. Ghazanfar & M. Fisher (eds.), *Vegetation of the Arabian Peninsula.* Dordrecht: Kluwer Academic: 63-98.
- LAUFER B. 1926. *Ostrich Egg-Shell cups of Mesopotamia and the Ostrich in Ancient and Modern Times (Anthropology Leaflet 23).* Chicago: Field Museum of Natural History.
- LEPAGE D. 2007. Checklist of birds of Saudi Arabia. Bird Checklists of the World. *Avibase.* Retrieved 26 April 2007.
- LÉZINE A.-M., ROBERT C., CLEUZIQU S., INIZAN M.-L., BRAEMER F., SALIÈGE J.-F., SYLVESTRE F., TIERCELIN J.-J., CRASSARD R., MÉRY S., CHARPENTIER V. & STEIMER-HERBET T. 2010. Climate change and human occupation in the southern Arabian lowlands during the last deglaciation and the Holocene. *Global and Planetary Change* 72: 412-428.
- LÉZINE A.-M., SALIÈGE J.-F., MATHIEU R., TAGLIATELA T.-L., MÉRY S., CHARPENTIER V. & CLEUZIQU S. 2002. Mangroves of Oman during the late Holocene: climatic implications and impact on human settlements. *Vegetation History and Archaeobotany* 11: 221-232.
- LÉZINE A.-M., SALIÈGE J.-F., WERTZ C., WERTZ F. & INIZAN M.-L. 1998. Holocene lakes from Ramlat as-Sab’atayn Yemen illustrate the impact of monsoon activity in southern Arabia. *Quaternary Research* 50: 290-299.

- LÉZINE A.-M., TIERCELIN J.-J., ROBERT C., SALIÈGE J.-F., CLEUZIQU S., INIZAN M.-L. & BRAEMER F. 2007. Centennial to millennial-scale variability of the Indian monsoon during the early Holocene from a sediment, pollen and isotope record from the desert of Yemen. *Palaeogeography, Palaeoclimatology, Palaeoecology* 243: 235-249.
- LIPPI M., BELLINI C., BENVENUTI M. & FEDI M. 2011. Palaeoenvironmental signals in ancient urban settings: The heavy rainfall record in Sumhuram, a pre-Islamic archaeological site of Dhofar (S Oman). *The Holocene* 21,6: 951-965.
- LOMBARD P. & TENGBERG M. 2001. Environnement et économie végétale à Qal'at al-Bahreïn aux périodes Dilmoun et Tylos. Premiers éléments d'archéobotanique. *Paleo* 27: 167-181 [doi:10.3406/paleo.2001.4727].
- AL-MAS'ŪDĪ, 'ALĪ IBN AL-HUSAYN / ED. C. BARBIER DE MEYNARD C. & A. PAVET DE COURTEILLE. 1861-1877. *Les prairies d'or [Murūj al-dhahab wa ma'ādin al-Jawhar], traduction française de [Charles-Adrien-Casimir] Barbier de Meynard et [Abel] Pavet de Courteille*. 9 vol.. Paris: Imprimerie impériale.
- MILLER N.F. 1984. The use of dung as fuel: an ethnographic example and an archaeological application. *Paléorient* 10: 71-79.
- MONCHOT H. 2014. Camels in Saudi oasis during the last two millennia, the examples of Dūmat al-Jandal (Al-Jawf Province) and al-Yamāma (Riyadh province). *Anthropozoologica* 42(2): 195-206.
- MONCHOT H. In press a. The faunal remains: preliminary results. In G. Charloux & R. Loreto (eds.), *Dūma II. Report of the Saudi-Italian-French Archaeological Project at Dūmat al-Jandal (Saudi Arabia)*. Riyadh: Saudi Commission for Tourism and antiquities.
- MONCHOT H. In press b. Chapter 11 - The faunal remains of al-Yamāma: from camel to the spiny-tailed lizard. In J. Schiettecatte J. & A. Al-Ghazzi (ed.), *Al-Kharj I. Report on two excavation seasons in the oasis of al-Kharj (2011-2012)*. Riyadh: Saudi Commission for Tourism and Antiquities: 251-285.
- MONCHOT H., BAILON S. & SCHIETTECATTE J. 2014. Archaeozoological evidence for traditional consumption of spiny-tailed lizard (*Uromastyx aegyptia*) in Saudi Arabia. *Journal of Archaeological Science* 45: 96-102.
- MOOREY P.R.F. 1994. *Ancient Mesopotamian Materials and Industries: the Archaeological Evidence*. Oxford: Clarendon Press.
- MUNRO N.D., BAR-OZ G. & HILL A.C. 2011. An exploration of character traits and linear measurements for sexing mountain gazelle (*Gazella gazella*) skeletons. *Journal of Archaeological Science* 38: 1253-1265.
- NEUMANN K., SCHOCH W., DÉTIENNE P. & SCHWEINGRUBER F.H. 2001. *Woods of the Sahara and the Sahel: an anatomical atlas*. Bern: Paul Haupt.
- PARKER A.G., ECKERSLEY L., SMITH M., GOUDIE A., STOKES S., WARD S., WHITE K. & HODSON M. 2004. Holocene vegetation dynamics in the northeastern Rub' al-Khali desert, Arabian Peninsula: a phytolith, pollen and carbon isotope study. *Journal of Quaternary Science* 19,7: 665-676.
- PARKER A.G. & GOUDIE A. 2008. Geomorphological and palaeoenvironmental investigations in the southeastern Arabian Gulf region and the implication for the archaeology of the region. *Geomorphology* 101: 458-470.
- PARKER A.G., GOUDIE A., STOKES S., WHITE K., HODSON M., MANNING M. & KENNET D. 2006. A record of Holocene climate change from lake geochemical analyses in southeastern Arabia. *Quaternary Research* 66: 465-476.
- PETERS J., VAN NEER W. & PLUG I. 1997. *Comparative postcranial osteology of hartebeest (Alcelaphus buselaphus), Scimitar oryx (Oryx dammah) and Addax (Addax nasomaculatus), with notes on the osteometry of Gemsbok (Oryx gazella) and Arabian Oryx (Oryx leucoryx)* (Annales Sciences Zoologiques 280), Ter-

vuren: Musée Royal de L'Afrique Centrale.

- PHILBY H. ST J. 1919. *Southern Nejd. Journey to Kharj, Aflaj, Sulaiyyil and Wadi Dawasir in 1918*. Cairo: The Arab Bureau.
- PHILBY H. ST J. 1920. Southern Najd. *The Geographical Journal* 55/3-4: 161-185.
- PHILBY H. ST J. 1949. Two notes from Central Arabia. *The Geographical Journal* 113: 86-93.
- POTTS D.T. 2001. Ostrich distribution and exploitation in the Arabian peninsula. *Antiquity* 75: 182-190.
- PRESTON G., PARKER A.G., WALKINGTON H., LENG M. & HODSON M. 2012. From nomadic herder-hunters to sedentary farmers: The relationship between climate change and ancient subsistence strategies in south-eastern Arabia. *Journal of Arid Environments* 86: 122-130.
- PRESTON G., THOMAS D., GOUDIE A., ATKINSON O., LENG M., HODSON M., WALKINGTON H., CHARPENTIER V., MÉRY S., BORGI F. & PARKER A.G. 2015. A multi-proxy analysis of the Holocene humid phase from the United Arab Emirates and its implications for southeast Arabia's Neolithic populations. *Quaternary International* [<http://dx.doi.org/10.1016/j.quaint.2015.01.054>].
- PREUSSER F. 2009. Chronology of the impact of Quaternary climate change on continental environments in the Arabian Peninsula. *Comptes Rendus Geoscience* 341: 621-632.
- REDDY S.N. 1998. Fueling the hearths in India: the role of dung in paleoethnobotanical interpretation. *Paleo* 24: 61-69 [[doi:10.3406/paleo.1998.4677](https://doi.org/10.3406/paleo.1998.4677)].
- ROBIN CH. & ARBACH M. in press. Nouveaux jalons pour une géographie historique de la Yamāma. In J. Schiettecatte & A. al-Ghazzi (eds.) 2011: 51-68.
- ROBIN CH.J. & GAJDA I. 1994. L'inscription du wādī 'Abadān. *Raydān* 6: 113-137.
- AL-ROWAILY S., AL-BANA M. & AL-DUJAIN F. 2012. Changes in vegetation composition and diversity in relation to morphometry, soil and grazing on a hyper-arid watershed in the central Saudi Arabia. *Catena* 97: 41-49.
- ROWLEY-CONWY P., DEAKIN W. & SHAW C.H. 1999. Ancient DNA from Sorghum. In M. Van der Veen (ed.), *The Exploitation of Plant Resources in Ancient Africa*. New York: Kluwer Academic: 55-61.
- SANLAVILLE P. 2000. *Le Moyen-Orient arabe, le milieu et l'homme*. Paris: Armand Colin.
- SCHIETTECATTE J., AL-GHAZZI A. (ED.), 2011. *Preliminary report of the first season of the Saudi French Mission in al-Yamāma. Al-Kharj area*, on-line: <https://halshs.archives-ouvertes.fr/halshs-00670367>.
- SCHIETTECATTE J., AL-GHAZZI A. (ED.), 2012. *Preliminary report. Second season of the Saudi French Mission in al-Yamāma. Al-Kharj area*, on-line: <https://halshs.archives-ouvertes.fr/halshs-00797003>.
- SCHIETTECATTE J., AL-GHAZZI A. (ED.), 2013. *Preliminary report. Third season of the Saudi French Mission in al-Kharj*, on-line: <https://halshs.archives-ouvertes.fr/halshs-01062149>.
- SCHIETTECATTE J. & AL-GHAZZI A. (ED.), in press. *Al-Kharj I. Report of two excavation seasons in the oasis of al-Kharj (2011-2012)*. Saudi Arabia. Riyadh.
- SCHIETTECATTE J., AL-GHAZZI A., CHABROL A., FORTIN G. & FOUACHE E. 2012. Le peuplement protohistorique et historique de l'oasis d'al-Kharj (province de Riyād, Arabie Saoudite). *Comptes rendus des séances de l'Académie des Inscriptions et Belles-Lettres*, 2012, III (juillet-octobre): 1365-1399.
- SCHIETTECATTE, J., AL-GHAZZI, A., CHARLOUX, G., CRASSARD ET AL., 2013. Al-Kharj oasis through time: first results of

- archaeological fieldwork in the province of Riyadh (Saudi Arabia). *Proc. Sem. Arabian Stud.* 43, 285-308.
- SCHIETTECATTE, J. & SIMÉON P., in press. Al-Yamāma (area N6): Building 1 – The Great Mosque. In J. Schiettecatte & A. al-Ghazzi (eds). *Al-Kharj I. Report of two excavation seasons in the oasis of al-Kharj (2011-2012)*. Saudi Arabia. Riyadh.
- STUDER J. 2010. Preliminary Report on Faunal Remains. In L. Nehmé, D. al-Talhi & F. Villeneuve (ed.), *Report on the Third Excavation Season (2010) of the Madâ'in Sâlih Archaeological Project: 285-293* [<http://halshs.archives-ouvertes.fr/halshs-00542793>].
- SUMMER W.M. 2003. *Early urban life in the land of Ashan: excavations at Tal-e Malyan in the highlands of Iran*. Philadelphia: University of Pennsylvania, Museum of Archaeology and Anthropology.
- TAPELA M.C. 2001. An archaeological examination of Ostrich eggshell beads in Bostwana. *Journal of African Studies* 15(1): 60-74.
- TENGBERG M. In press. Vegetation History and Wood Exploitation at Kush (Ras al-Khaimah, UAE), 4th-17th/18th centuries AD. First Results of the Charcoal Analysis. In D. Kennet (ed.), *Palaeoenvironmental Studies at Kush*.
- THÉRY-PARISOT I., CHABAL L. & CHRZAVZEZ J. 2010. Anthracology and taphonomy, from wood gathering to charcoal analysis. A review of the taphonomic processes modifying charcoal assemblages, in archaeological contexts. *Palaeogeography, palaeoclimatology, palaeoecology* 291: 142–153.
- THOMAS J. N.d. *Flora of Saudi Arabia* [<http://plantdiversityofsaudiarabia.info/biodiversity-saudi-arabia/flora/Flora.htm> – 21/03/2015].
- THOULESS C.R., GRAINGER J.G., SHOBRAK M. & HABIBI K. 1991. Conservation status of gazelles in Saudi Arabia. *Biological Conservation* 58: 85-98.
- URBAN B. & BUERKERT A. 2009. Palaeoecological analysis of a late Quaternary sediment profile in northern Oman. *Journal of Arid Environments* 73: 296-305.
- VAN DER VEEN M. 1999. The economic value of chaff and straw in arid and temperate zones. *Vegetation History and Archaeobotany* 8: 211–224 [doi:10.1007/BF02342721].
- VAN DER VEEN M. 2011. *Consumption, Trade and Innovation: Exploring the Botanical remains from the Roman and Islamic Ports at Quseir al-Qadim, Egypt*. Frankfurt: Africa Magna Verlag.
- VASLET D., AL-MUALLEM M.S., MADDAH S.S., BROUSSE J-M. ET AL. 1991. *Geologic Map of the Ar-Riyādh Quadrangle, Sheet 24 I, Kingdom of Saudi Arabia [1:250,000] & Explanatory Notes to the Geologic Map of the Ar-Riyādh Quadrangle, Sheet 24 I, Kingdom of Saudi Arabia*. Riyadh: Ministry of Petroleum and Mineral Resources.
- VESEY-FITZGERALD D. 1957. The vegetation of central and eastern Arabia. *Journal of Ecology* 45.3: 779-798.
- WATSON J. 1988. *The Golden Eagle*. London: T & A.D. Poyser
- WILMS T., BÖHME W., WAGNER P., LUTZMANN N. & SCHMITZ A. 2009. On the Phylogeny and Taxonomy of the Genus *Uromastix* Merrem, 1820 (Reptilia: Squamata: Agamidae: Uromastycinae) – Resurrection of the Genus *Saara* Gray, 1845. *Bonner zoologische Beiträge* 56(1/2): 55-99.
- WÜSTENFELD F. 1874. *Bahrein und Jemâma. Nach arabischen Geographen beschrieben*. Göttingen: Dieterichschen Buchhandlung.
- YĀQŪT SHIHĀB AL-DĪN ABĪ ‘ABD ALLĀH B. ‘ABDALLĀH AL-ḤAMAWĪ AL-RŪMĪ AL-BAGHDĀDĪ / ED. F. WÜSTENFELD. 1866–1873. *Kitāb mu‘jam al-buldān. Jacut’s geographisches Wörterbuch, aus den Handschriften zu Berlin, St. Peters-*

burg, Paris, London und Oxford, herausgegeben von Ferdinand Wüstenfeld. 6. vol. (Deutsche Morgenländische Gesellschaft, in Commission bei F. A. Brockhaus). Leipzig: F.A. Brockhaus. [Reed. 1924].

YOM-TOV Y., MENDELSSHON H. & GROVES C.P. 1995. *Gazella dorcas*. *Mammalian Species* 491: 1-6.

ZARINS J., IBRAHIM M., POTTS D. T. & EDENS CH. 1979. Saudi Arabian Archaeological Reconnaissance 1978. The preliminary report on the third phase of the Comprehensive Archaeological Survey Program — The Central Province. *Atlat* 3: 9-42.

ZOHARY M. 1973. *The geobotanical foundations of the Middle East*. Stuttgart: Fischer.

ZOHARY D., HOPF M. & WEISS E. 2012. *Domestication of Plants in the Old World: The origin and spread of domesticated plants in Southwest Asia, Europe, and the Mediterranean Basin*. Oxford: OUP.

استخدمت المونة الطينية في جميع المدافن دون استثناء، بل ملئت بها الفراغات بين الأحجار أو استكملت النواقص باستخدام المونة الطينية التي وجدناها ذائبة سهلة الحفر والنقل. وهذا على خلاف مدافن عين فرزان التي استخدم فيها الحجر دون استخدام أي نوع من المونة.

في المدفن 2 استخدم الحجر المهذب في بناء الجدار الجنوبي للمدفن 2ب. كما استخدمت الألواح الحجرية المهذبة في بناء الغطاء الخارجي للمدفن 2 والمدفن 12 والمدفن 15.

أكد لنا العمل في أم الشعال أن المدافن تتركز في الأماكن التي يوجد فيها مياه دائمة مثل العيون، وتقل كلما أبعاد الإنسان عنها. وفي ذات الوقت توجد في كل مكان إلا أن كثافتها تقل كلما بعد الإنسان عن مصادر المياه الدائمة مثل العيون. فوجود المدافن في كل مكان، مع تفاوت كثافتها، يدل على أنها انتاج أمة كانت تربطها عقيدة واحدة، وحدت طريقة الدفن لدى معتقيها. وتدل كثافتها حول مصادر المياه الدائمة على أنها ترتبط بأمة مستقرة شكّلت الزراعة المصدر الأول لاقتصادها.

ومن حيث المعثورات الأثرية على قلتها فتحمل دلالات جيدة. فوجود الصدفة الحلزونية في الخندق المنفذ في الجانب الشمالي من الغطاء الخارجي للقبر رقم 2 يدل على أن للموقع صلات تجارية مع بلدان بعيدة تشرف على بحار منها جاءت تلك الصدفة الحلزونية. أما بقايا العظام ووجودها في غير أماكنها التي عادة ما توضع عليها يدل على التخريب والنهب مرات عديدة. أما تعدد المدفونين مثل ما وجدنا في المدفن رقم 6 يدل على إعادة الاستخدام. وبالنسبة إلى الكسرة الفخارية التي وجدت في الجهة الشمالية للغطاء الخارجي فهي ذات دلالة استيطانية وزمنية، وإن كنا لا نعرف على وجه التحديد الزمن الذي تعود إليه. ومع ذلك تجدر الإشارة إلى أن الفخار عُثر عليه بأعداد قليلة في مدافن سبخة أم الحمام بالقرب من مدينة بقيق، وفي مدافن عين فرزان في العفجة، وفي مدافن الربيعية في جزيرة تاروت. ولكن يجب أن نشير إلى أن المدافن الركامية الحجرية لا تحتوي في غالب الأحوال على معثورات أثرية، إما بسبب السرقة أو إعادة الاستخدام أو عادات الدفن عند الشعوب التي أوجدتها.

المدافن. فالمدافن عادة ما توجد في أماكن بعيدة عن الأماكن التي يوجد فيها الأحياء، وبعضها يوجد على تلال وجبال أرضها ليست هدفاً للإنسان المستقر، لذا فنسبة حدوث تعرضها للاختفاء بإعادة الاستخدام قليلة. أما المستوطنات فتوجد في غالب الأحوال في مواضع تتوفر فيها مستلزمات بقاء الإنسان مهما اختلفت الأزمان، فهي هدف للإنسان منذ زمن بعد زمن، لذا فنشاطات الإنسان اللاحق تطمس آثار الإنسان السابق. وهكذا تتكرر عملية الطمس من أمة إلى الأمة. وعليه فإن تشخيص المستوطنات يحتاج إلى أعمال ميدانية ضخمة تجري في المستوطنات التي يعتقد أن لها علاقة بتلك المدافن، وربما أن المستوطنات اختفت تحت تكوينات الرمال التي عادة ما يكون تكوينها في المناطق المفتوحة سريع، والأماكن المفتوحة هي أماكن وجود المستوطنات.

الاستنتاج

من حيث المنشآت الحجرية تؤكد لنا من العمل في الموضوع أن هناك إعادة استخدام لبعض المدافن، فنجد أن المدفن 2 أعيد تقسيمه إلى مدفين وأضيف إليه مدفنًا خارج جداره الخارجي. كما أن تعدد الجثث في المدفن 6 ليدل على إعادة الدفن في المكان، فالعظام المكتشفة تدل على وجود هيكل لإنسان كبير العمر ووجود أجزاء من جماجم لأناس بالغين ولشخص صغير يدل على الشيء ذاته؛ ووجود عظام تحت الهيكل العظمي وفي اتجاه يختلف يدل على وجود جثة ثالثة أقدم من الجميع.

من حيث التصميم الخارجي قدم لنا المدفن رقم 15 تصميمًا جديدًا لأول مرة نراه في المواقع التي سبق أن عملنا فيها. فالمدفن ظهر بجانبين متقابلين مقوسين وجانبين متقابلين مستقيمين ليظهر الشكل أسطواني جميل، وفي الوسط يوجد مكان الدفن. أما بقية المدافن فشكلها الخارجي رجمي يتسع قطره في الأسفل ويأخذ بالتناقص مع ارتفاع المدفن إلى الأعلى.

استخدم المعماري الألواح الحجرية في بناء مكان الدفن في المدفن 6 في المنطقة الأولى ليوجد استدارة كاملة، كما استخدم الكتل الحجرية في المدفن رقم 3 ليوجد شكلاً دائرياً جميلاً. فمن حيث استخدام الألواح الحجرية لإيجاد مكان دفن دائري فرمما أن هذا المدفن الأول من نوعه، أما استخدام الكتل الحجرية مع ألواح حجرية أو شظايا فوجد في عدد من المواقع.

يوجد في المدفن 2 ب جدار مستقيم مبني بكتل حجرية جيرية مشكلة بشكل جيد وهو أمر يوحي بأن المدافن ذات العلاقة، (أرقام 2، 2أ، 2ب)، كانت متأخرة عن البقية، بالإضافة إلى استخدام المونة الطينية بشكل كثيف لسد الفراغات بين الكتل الحجرية أو لربط الكتل ببعضها ببعض.

ظهر البناء الداخلي في المدفين 12، و15 بشكل خشن، إذ تمتد رؤوس الأحجار بشكل يجعل من النزول إلى مكان الدفن أمراً خطراً، فرؤوس تلك الأحجار شبيهة برؤوس سكاكين متقابلة، وهذا على خلاف ما يوجد في المدافن الركامية التي تظهر اعتناءً كبيراً في الوجه الداخلي لجدار مكان الدفن.

جميع الأرضيات التي اكتشفنا في جميع المدافن صخرية، تشكلها بلاطات حجرية هي جزء من القاعدة الجبلية التي تقوم عليها المدافن في الغالب إن لم يكن في الكل.

صورة 62- لمكان الدفن في المدفن رقم
15 تبين تثبيت العمود بمونة طينية على
الحجر الذي يقع تحته



دلالة الانتشار المكاني

تنتشر المدافن الركامية في جميع أنحاء المملكة العربية السعودية، وتتفاوت كثافتها من مكان إلى آخر، علماً أنها تكون كثيفة في الأماكن التي توجد فيها مصادر للمياه دائمة مثل العيون التي تجري على سطح الأرض، وتقل كثافتها في الأماكن التي تكون غير بعيدة عن مصادر المياه الدائمة وحواف الأودية الضخمة التي تتصل بالأراضي الخصبة حيث توجد مصادر المياه الدائمة، وتصبح فردية الوجود في الأماكن الرعوية. ويدل انتشارها المكاني على أنها مرتبطة بأمة زراعية اقتصادها قوي عماده الزراعة والتجارة، وقلتها في بعض الأماكن تدل على أنها تتبع، إما لقرى زراعية، أو مواقع حدودية، أو لأنصاف رعاة يقيمون في الأماكن المعشبة إقامة موسمية. واستخدامها الواسع من قبل المستقر والراعي ونصف الراعي يدل على أنها مرتبطة بمعتقد وحد بين تلك الفئات وهذا يعني أننا نتحدث عن أحد الأمم التي جاء ذكرها في القرآن الكريم وكتب التاريخ الإسلامية المبكرة. وعندما نطبق هذه النظرية على الانتشار المكاني للمقابر الركامية في واحة الخرج وضواحيها نجد أنها تنطبق بشكل واضح ومتكامل، فأكبر المواقع تقع عند العيون، ثم تقل على الأطراف مثل جبال أم الشعال والشديدة وجبال خفس دغرة ووادي النظيم. ثم تقل على الأودية الصغيرة التي تخترق جبال أم الشعال، والمرتفعات المنخفضة التي تطل على شعيب النظيم في جنوب واحة الخرج، وكذلك مرتفعات وادي نساح الواقعة إلى الغرب من واحة الخرج، والمرتفعات التي تقع بين واحة الخرج وبلدة الحائر، وعلى الأطراف الشرقية لهضبة عليّه والروابي المطلّة على وادي بلجان الضخم الذي يصب في بلدة الضبيعة.

أين المستوطنات؟

مع أن وجود المستوطنات الضخمة التي عايشت تلك المدافن العملاقة أمر متفق عليه، ولكن السؤال الذي غالباً ما يطرحه الباحثون في تاريخ الاستيطان هو: أين المستوطنات التي تعاصر تلك المدافن: سؤال وجيه وجوابه ملح، ولكن لا يأتي جواب قاطع إلا بدليل قاطع، والدليل القاطع من وجهة نظرنا على وجود المستوطنات هو وجود المدافن لأنه لولا وجود أحياء لما نتج مدافن أموات. ولا يزال الدليل القاطع على تحديد مواقع تلك المستوطنات غير محدد. لماذا تبقى المدافن وتختفي المستوطنات؟ سؤال يمكن أن نجد الجواب عليه في طبيعة وجود المستوطنات التي تختلف عن طبيعة وجود



صورة 61- يتبين في الوسط لوح حجري
يحمل آثار الآلة التي فصلته عن أصله



صورة 60- لوح حجري مثبت في الزاوية
الشمالية الغربية الجدار الشمالي للمدفن رقم 15

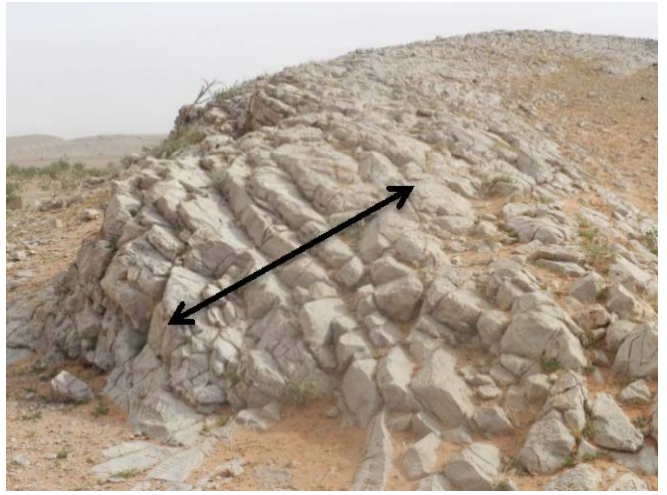
كيف تم بناء المدافن

مع أننا غير متيقنين من كيفية بنا تلك المدافن، إلا أننا متأكدين أن المعماري وضع في نصب عينية قوة التشييد لكي يحول دون حدوث تحرك في الكتل الحجرية يؤدي إما إلى انهيار المبنى أو الإضرار بمكان الدفن. وعمل على تحقيق ذلك باستخدام التوزيع واستخدام الثقل المناسب والتداخل عند الزوايا والإمالة. فمن الواضح أن اختلاف أحجام الأحجار لعب دوراً في توزيع الأحمال، كما أن تداخل الأحجار وتشريكها زاد من قوة تحمل البناء ومتانته والحد من تأثير قوة السحب والانزلاق. أما الإمالة، وخاصة في الغطاء الخارجي للمدفن الذي ربط بجدار مكان الدفن، فساعدت في قوة الاحتمال وتثبيت الجدران كسناد حُصر بجدار محيط، إما أن يكون بألواح حجرية منصوبة عمودياً في الأرض، أو بكتل حجرية ضخمة رصت بعضها فوق بعض.

يبدو أن جدران مكان الدفن تشييد تزامنياً مع الغطاء الخارجي وبتداخل في منطقة الالتقاء على امتداد الجدار إلى الأعلى وارتفاع الجدران في آن واحد. ويستمر المعماري بالتشييد حتى يصل إلى الارتفاع المطلوب لجدران غرفة الدفن، فيبدأ المعماري بتشكيل فوهة غرفة الدفن بمد الجزء الخارجي للمدفن إلى الداخل مدمكاً بعد مدمكاً وتثقل الأحجار من الخارج بأحجار ارتفاع الغطاء الخارجي وتثبيتها بوضع ألواح عرضية كلما دعت الحاجة إلى أن تضيق فوهة الدفن؛ ثم يُشكل أغطية فوهة غرفة الدفن، ويتلو بتفصيل الفراغات بشظايا حجرية، وبعدها يكسو الكل أتربة وأحجار صغيرة ومتوسطة الحجم؛ ثم يضع كتل حجرية على دفنة أغطية فوهة مكان الدفن إمعاناً في حمايتها، ثم يدفن حجارة التثقل بفرشة من الأتربة وكسر الحجارة. وبعد ذلك يرفع المسطبة إلى الأعلى حتى تتجاوز قمة مكان الدفن بارتفاع يتفاوت من مدفني إلى آخر، والأرجح أنه يتماشى مع حجم المدفن؛ فكلما كان المدفن كبيراً ومرتفعاً أصبح ارتفاع المسطبة العليا أكثر.



صورة 57- ألواح حجرية جيرية يمكن فصلها
عن بعضها البعض



صورة 56- عروق لطبقات كتل حجرية جيرية
بيضاء يمكن فصلها على شكل كتل سميكة

من الواضح أن بعض الحجارة خضعت للتشكيل البسيط، فتظهر على ألواح حجرية جيرية بيضاء آثار لأداة كبيرة تشبه رأس الفأس استخدمت لتهيئة قاعدة الحجر المثلث أو لفصله عن لوحته الأصلية، والأرجح أنها آثار تمهيد قاعدة الحجر المثلث ليأخذ شكل القوس (صور 58-61).



صورة 59- لوح حجري طولي عليه آثار الأداة
التي استخدمت في الفصل



صورة 58- لوح حجري مثلث على قاعدته
آثار الأداة التي استخدمت في الفصل

الدراسة التحليلية والمقارنة

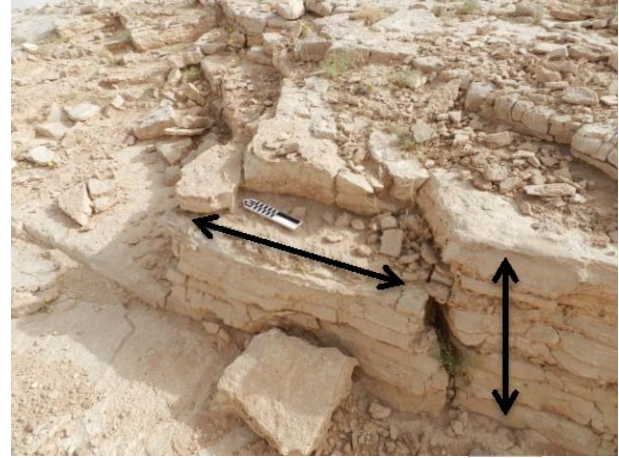
تشير الدراسات السابقة إلى أن أم الشعال من أقدم الأماكن استيطاناً في حوض الخرج؛ فقد سبق أن أخذت من بعض المنشآت الحجرية عينات عضوية حللت بواسطة كربون 14 المشع واعطت تواريخ تتراوح بين 18000 و12000 قبل الوقت الحاضر (أطلال العدد 11). فيوجد في المنطقة موقع يقع شرق منطقة الدراسة بثمانية كيلومترات أجريت فيه حفريات أثرية وأرخ بالعصر الحجري القديم الأعلى. ولا يستبعد أن يسفر البحث في هذه المنطقة عن اكتشافات أقدم نماذج المدافن الركامية في العالم القديم.

مصدر مادة البناء

من الواضح أن موقع الدراسة هو المصدر لمادة البناء التي استخدمت في تشييد المدافن الركامية الحجرية فيه. فمن مكونات سطح الموقع، بمنطقتيه الأولى والثانية، طبقات أفقية لصخور جيرية تشعبها شقوق طولية، وتفصلها عدسات من الطين والرمل (صورة 54)، ومن السهل فصل تلك الطبقات عن بعضها البعض ومن ثم تجزئتها إلى ألواح حجرية متعددة الأحجام والأشكال، ويتم استخدامها من دون تهذيب (صورة 55) وأحياناً تكون مهذبة الأطراف.



صورة 55- طبقات ألواح حجرية صفراء اللون قابلة للفصل بسهولة



صورة 54- طبقات ألواح حجرية تظهر بينها طبقات غير سميكة لرواسب طينية تساعد على فصل الطبقات الحجرية عن بعضها البعض

ويوجد نوع آخر من المكونات عبارة عن عروق مكونة من كتل حجرية إما أن تكون عمودية متعاقبة (صورة 56)، أو أفقية متوالية (صورة 57)، ويوجد بينها في كلا النوعين فواصل سهلت عملية فصلها عن بعضها البعض بأحجام متنوعة وأشكال مختلفة واستخدمت في عمارة المدافن كما جاءت من الحجر دون تهذيب أو تشكيل، سوى التثليث في حالة الحصص على شكل دائري، أو استخدام لأي نوع من المونة التي عادة ما تستخدم لربط الكتل والألواح والشظايا الحجرية، إلى جانب سد الفراغات.

الأصداف بشكل عام ترتبط بمواقع العصر الحجري الحديث ما قبل الفخار والعصر الحجري الحديث الفخاري، كما أن لها علاقة بالمدافن ربما لأمر عقائدية. وفي الخندق الذي حفرنا في الربع الشمالي للمدفن رقم 2 عثرنا على صدفة حلزونية لها سطح أملس وعليها شيء يشبه اللون الأحمر (صورة 53). وقد سبق أن عُثر على أصداف استخدمت كتمايم في مواقع تؤرخ بالألف السادس قبل الميلاد، كما وجدت في مدافن في المملكة العربية السعودية ودول مجلس التعاون الخليجي اريحت بالألف الثالث قبل الميلاد، ويُرى أنها كانت تستخدم كتمايم أو تعاويذ. وعلاوة على دلالتها العقائدية، فوجودها في موقعنا يدل على صلات تجارية مع أماكن تقع بالقرب من البحار أو تشرف عليها حيث توجد الأصداف، ومن تلك الأماكن كان تصدير الأصداف للأجزاء الداخلية البعيدة عن البحار.



صورة 53- صدفة حلزونية ناعمة الملمس، الخندق في الربع الشمالي للمدفن 2

الفخار

غالباً ما يكون الفخار شحيحاً في مواقع المقابر الركامية الحجرية، وبخاصة الفردية منها، ولكن يحدث أن يُعثَر على كسر متناثرة هنا وهناك وفي الغالب حول المقابر لا داخلها. وفي موقعنا عثرنا على كسرة واحدة في الغطاء الخارجي للمدفن رقم 12. تظهر الكسرة بعجينة حمراء تميل إلى الوردي خشنة تخالطها حبيبات حجرية بيضاء صغيرة ومتوسطة الحجم تظهر في بنية الكسرة وعلى سطحها الداخلي والخارجي، شواءها جيد ومؤكسد، إذ لا يظهر فيه آثار للكربون أو تنوع للون. تظهر على السطح الخارجي (صورة 50) بطانة يبدو أن لونها الأصلي كان أصفر وتحول إلى أصفر معتم مع الزمن. ويظهر على السطح الداخلي بطانة زهرية اللون (صورة 51) تحولت مع الزمن إلى زهرية تميل إلى الرمادي. الشبيه بهذا النوع من الفخار ينسب إلى فترات سابقة على ظهور الإسلام، ويسود غالباً في مواقع شرقي المملكة العربية السعودية ودول مجلس التعاون الخليجي. ووجودها في الموقع وبالقرب من المدفن 12 يدل على إما أن تكون جزء من آنية ماء كان لصوص المدفن يستخدمونها فتكسرت أثناء نبشهم للموقع، أو أنها مخرجة من داخل مكان الدفن أثناء نبش اللصوص لمكان الدفن. لا نستطيع الجزم بشيء، ولكن نشير إلى أنه سبق أن عثرنا على كسر فخارية خارج وداخل مدفن منبوثة في موقع عين فرزان، وهي قريبة الشبه بالكسرة التي عثرنا عليها بالقرب من الغطاء الخارجي للمدفن رقم 12.



صورة 51- السطح الداخلي للكسرة الفخارية



صورة 50- السطح الخارجي للكسرة الفخارية

المعادن

عُثر على محبس أصبع (صورة 52) ربما أنه من النحاس، ويشير مكان العثور عليه أنه ليس قديم، إذ عُثر عليه بالقرب من المنشأة رقم 18، وهي عبارة عن موقد صغير يرجح أن يكون من عهد قريب تركته عائلة كانت تتنزه في المكان.



صورة 52- محبس من المعدن، ربما من النحاس، حالته سليمة.

- 4- جزء من العمود الفقري، 5- عدد من خرزات الظهر، 6- عظم العصعص (الصورتان 46-47)، ، 7- جزء كبير من الجمجمة (صورة 48)، 8- جزء من فك فيه خمسة أسنان باقية (صورة 49)، 9- مريط الكتف بالعضد، 9- أجزاء من جمجمة طفل، 10 أجزاء من عظام الساق مع الركبة، ووجدت عظام أطرف وأجزاء أخرى من الجسم.



صورة 46- مجموعة من العظام، المدفن 6



صورة 48- جزء من فك فيع خمسة أسنان



صورة 47- مجموعة من العظام المدفن رقم 6



صورة 49- جزء كبير من جمجمة إنسان

المعثورات

لا شك أن المدافن الركامية شحيحة في موجوداتها المنقولة، وهو شح يتعارض مع ضخامتها، وما تنم عنه من قوة اقتصادية وثروات متعددة المصادر. فما السبب في شح المعثورات؟ ربما وجد البعض السبب في تعرضها للنهب، وربما أن السبب يرجع لعادة الدفن آنذاك. ولكن لو لم يكن مع الميت أشياء يحتاجها الحي لما تعرضت جميع تلك المدافن للسرقة والنهب. ولكن، من الناحية الأخرى، من المحتمل أن السبب عقدي، فيكون ما يدفن مع الميت خاضعاً لنظام الوراثة فيما يتصل بتوزيع ثروة الميت، فقد يكون نصيب الميت هو ما يدفن معه، وربما كان نصيب الميت، في نظام تلك الأزمنة القديمة، قليل، وقد يقتصر على سلاحه. ومع ذلك وجد في تلك المدافن وحوها مواد أثرية قليلة تنم عن وجود استيطان مبكر في مكان الدراسة. وتشمل المادة الأثرية الآتي: الأدوات الحجرية، والعظام، والفخار، والمعادن، والأصداف.

الأدوات الحجرية

تنتشر في منطقة الدراسة وحوها تلال تكسوها الأحجار ذات الأوجه البنية المائلة للسواد. وهذه الأحجار كانت مصدر صناعات الإنسان في العصر الحجري القديم الأعلى. ومن إحدى الأكمات الواقعة على الإحداثيات: $24^{\circ}19,628'N$ $47^{\circ}05,418'E$ والتي لا تبعد عن موقع المدافن أكثر من 5, 1 كم شمال غرب، عثرنا على ثلاث أدوات حجرية أحدها بلطة جميلة؛ والثانية والثالثة سكينان أحدهما قلبية الشكل (صورة 45)، والأخرى سيفيه الشكل.



صورة 45- سكين ذات حد واحد، قلبية الشكل

العظام

وجد بقايا عظام آدمية في المدافن 2، و2أ، و3، و6، و12. وفي جميع المدافن إلا المدفن رقم 6، تظهر العظام مشتتة ومهترئة بل في بعض الأحيان ذائبة. أما في المدفن 6 فظهرت كمية من العظام (الصور 46-49) لا تزال متماسكة وإن كانت سريعة الكسر. فعلى عمق ما يقرب من خمسين سنتيمتراً من ارتفاع المدفن الباقي وجدنا هيكلًا عظمياً موضوع بهيئة القرفصاء رأسه في الغرب ورجليه في الشرق. كان الهيكل بحالة غير جيدة، ولكن عظامه القوية لا تزال باقية، فجمعنا ما استطعنا جمعه، واشتمل ما جمعنا على 1- عظام سيقان، 2- عظام الفخذ، 3- بعض الأضلاع،

التقيب

تم تنقيب منشأة واحدة (صورة 44) في المنطقة الثالثة، وهي عبارة عن رصف من الحجارة من مدماك واحد وبشكل بيضاوي يتجه من الجنوب إلى الشمال. يقع على سفح أكمة صخورها جيرية البعض منها أصبحت أوجهه سوداء أو بنية غامقة مائلة إلى السواد. في محاولة لمعرفة وظيفة هذه المنشأة قمنا بحفر تلك المنشأة وكانت البداية بحفر رأسها الذي أضح أنه مستدير الشكل، وبعد النزول فيه قليلاً أنقطع الحجر الذي تبين لنا أنه عبارة عن مدماك واحد نظم على سطح الأرض.

مثل هذه المنشأة وجد في سلطنة عُمان وفسر على أنه مضابي كبيرة، ولكننا لم نجد أي أثر للرماد أو سواد على الأحجار وقد يفسر اختفاء الفحم وعدم وجود السواد على أوجه الصخور بامتداد الزمن والأمطار والرياح. وإن لم يكن مضابي فربما أنه يمثل نمط قديم لمداخن تحلل ما تحتها بالكامل ويرجح القدم لكون المنشأة بسفح أكمة غير مرتفعة تكسوها الحجارة ذات الوجوه السوداء والتي كانت مادة صناعة الأدوات الحجرية في العصر الحجري القديم الأعلى. بل وجد فيها ثلاث أدوات حجرية جميلة أحدها بلطة مداورة مشطوفه على حافة واحدة وجهة واحدة، أما الأداة الثانية فسكين على شكل مثلث، والأداة الثالثة سكين على شكل حنية سيف.



صورة 44 - لمنشأتين في المنطقة الثالثة، الصورة في المقدمة تم تنقيب رأسها المستدير

المنطقة الثالثة

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تشكل المنطقة الثالثة الأرض الممتدة من النهاية الشمالية للتلين وحتى السفوح الجنوبية لجبال أم الشعال بطول ربما وصل إلى كيل ونصف الكيل، ويعرض من الغرب إلى الشرق يصل كيل واحد. يتوسط المنطقة الثالثة وادي ينحدر من جبال أم الشعال إلى الجنوب حتى يلاقي بطين وادي حنيفة في الرفايح. وبالرغم من أن المنطقة كانت مزارع، تنتشر في الموقع أكوام من الحجارة على الرغم من أن آثار حرث الموقع واضحة، وبتفحص تلك الأكوام الحجرية وجدنا ما يمكن أن يكون مدافن ربما أنها إسلامية التاريخ وربما تكون أبكر (صورة 42)، ومنها ما يمكن أن يكون مواقد (صورة 43). علماً أن هناك من أفاد أنها تجميع للحجارة كنتيجة لحرث الموقع.



صورة 42 - لبعض التجمعات الحجرية في المنطقة الثالثة



صورة 43 - لبعض التجمعات الحجرية في المنطقة الثالثة



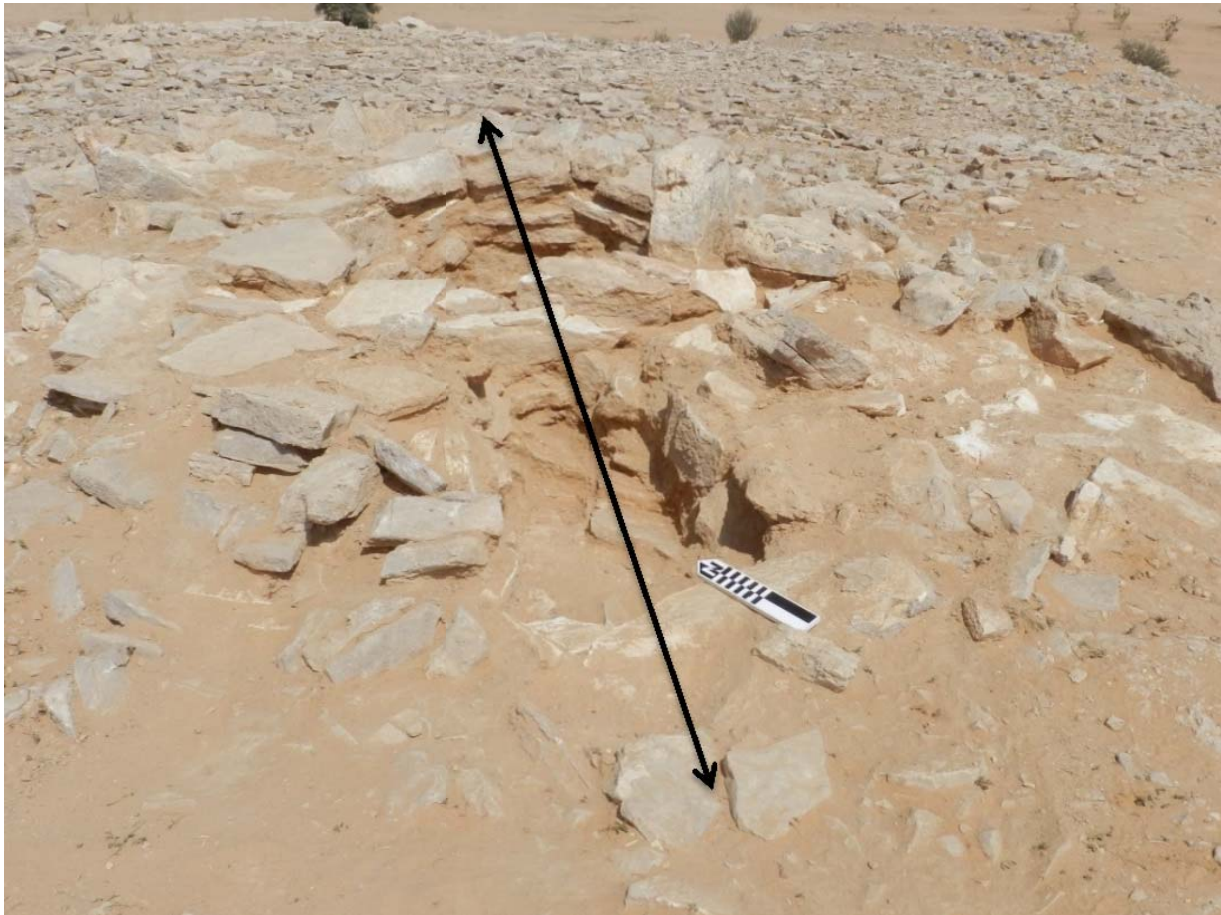
صورة 40- لمكان الدفن في المدفن رقم 16 بعد التنقيب



صورة 41- للعمود الحجري الذي نصب في الجدار الشرقي لمكان الدفن في المدفن رقم 16 ليقوي الجدران

عمارة المدفن الداخلية

شُيد مكان الدفن على الأرض الصخرية التي تُمثل البلاطة التي وُضع عليها الميت (صورة 38). على تلك البلاطة بسط المعماري أساسات مكان الدفن المتمثلة بألواح حجرية طويلة وداخلها مع بداية الغطاء الخارجي، ثم نُفض بجدار مكان الدفن بألواح حجرية مثلثة الشكل وركز عموداً حجرياً في الجهة الجنوبية الشرقية من جدار مكان الدفن قواه بتثبيته على أحجار المدماك السفلي وتداخله مع أحجار الغطاء الخارجي وقوى به بقية الجدار (صورة 41). استمر المعماري بالبناء بألواح حجرية مثلثة تساعد على تدوير جدار ومكان الدفن. قوى جدار مكان الدفن بربطه بالغطاء الخارجي عن طريق تداخل الأحجار ليكون البناء وحدة واحدة مترابطة. لا يمكن معرفة شكل فوهة مكان الدفن وكيفية تشكيلها المعماري، علماً أن المدماك الحجري الأعلى تكونه أحجار تمتد رؤوسها إلى الداخل يدل على أن المعماري عمد إلى تضييقها، وأن ما أزيل منها قليل.



صورة 39- للمدفن 16، بعد تنقيبه وتنقيب خندق يخرق ربة الجنوبي الغربي لمعرفة علاقة جدار الدفن بركام الغطاء الخارجي

المدفن رقم 16

الإحداثيات: 24°19,127'N 47°05,649'E

الارتفاع: 485 m

القياسات: قطره 60، 1م، عمق مكان الدفن 40سم، قطر فوهة مكان الدفن 60سم.

الموقع والحالة

يقع هذا المدفن على الطرف الشمالي للحافة الغربية للمنطقة الثانية، وكان في حالة سيئة نتيجة لتعرضه للنهب وتحريك حجارتها الخارجية فلم يبق من ارتفاع غطاءه الخارجي سوى 40سم ومن المؤكد أنه كان أعلى من ذلك، ومن الواضح أنه هرمي الشكل (صورة 38).

عمارة المدفن الخارجية

يتضح أن المدفن من المدافن الركامية بالرغم من تدمير اللصوص لغطائه الحجري. ولإزالة معظم غطاءه الحجري لا يمكن التكهن فيما إن كان بمساطب أو أحزمة أم أنه مركوم بالتداخل مع جدار مكان الدفن (صورة 38).
قمنا بحفر خندق على امتداد الربع الجنوبي الغربي للغطاء الخارجي، فبين أن الحجار مركومة بشكل متقن وباستخدام أحجام متنوعة تساعد على تداخل الحجارة بعضها ببعض. واتضح أيضاً أن حجارة الغطاء الخارجي متداخلة مع حجارة جدار مكان الدفن ومغروسة فيها وهذه تقنية تزيد في قوة ثبات الاثنين (صورة 39).



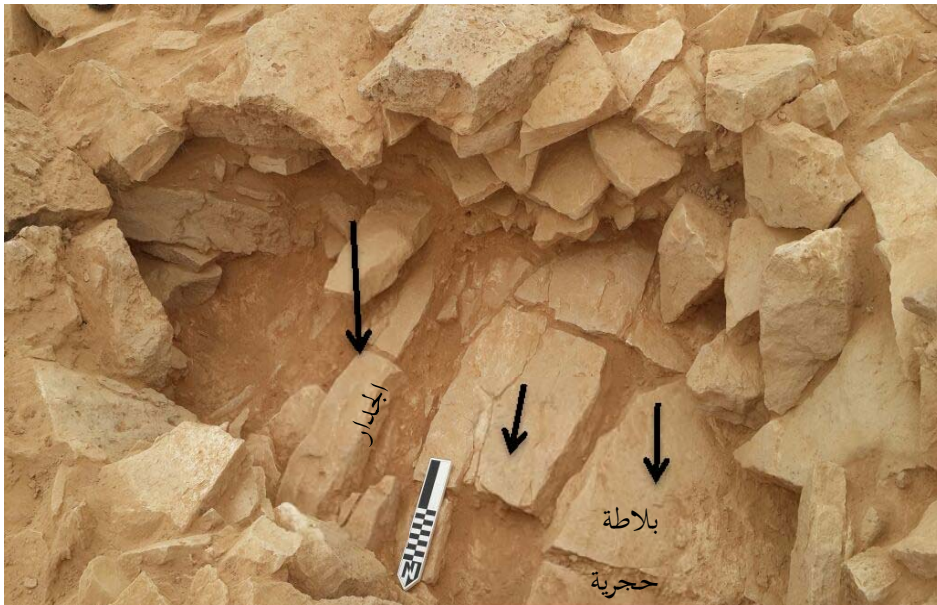
صورة 38- للمدفن رقم 16 قبل التنقيب



صورة 36- للمدفن 15 بعد تنظيف محيطه الخارجي بالكامل وبداية التنقيب في مكان الدفن في منتصف المدفن

عمارة المدفن الداخلية

يظهر المدفن بشكل بيضاوي مقسماً إلى جزأين، الجزء الجنوبي وهو الأصغر، والجزء الشمالي. يبلغ عمق المدفن 80سم، ويبلغ طول مكان الدفن من الشمال الغربي إلى الجنوب الشرقي 60، 1م وعرضه من الشرق إلى الغرب 10، 1م. ويقوم جداره الداخلي على بلاطات حجرية مرصوفة طبيعياً (صورة 37). شيد المعماري الجدار الداخلي بالتزامن مع المصطبة الأولى والتداخل مع أحجارها. استخدم البناء ألواح وكتل حجرية لها رؤوس مدببة ممتدة إلى الداخل (صورة 37).



صورة 37- للمدفن 15 بعد تنظيف مكان الدفن، وتظهر في اليسار البلاطات الحجرية الأرضية، وفي اليسار الجدار الذي يحتمل أنه كان يفصل مكان الدفن إلى مدفين

المدفن رقم 15

الإحداثيات: 24°19,127'N 47°05,651'E

الارتفاع: 482 m

القياسات: يبلغ طوله من الشمال إلى الجنوب 50، 4م، ومن الشرق إلى الغرب 40، 3م، عمق مكان الدفن 80سم؛ طول مكان الدفن من الشمال الغربي إلى الجنوب الشرقي 60، 1م وعرضه من الشرق إلى الغرب 10، 1م.

الموقع والحالة

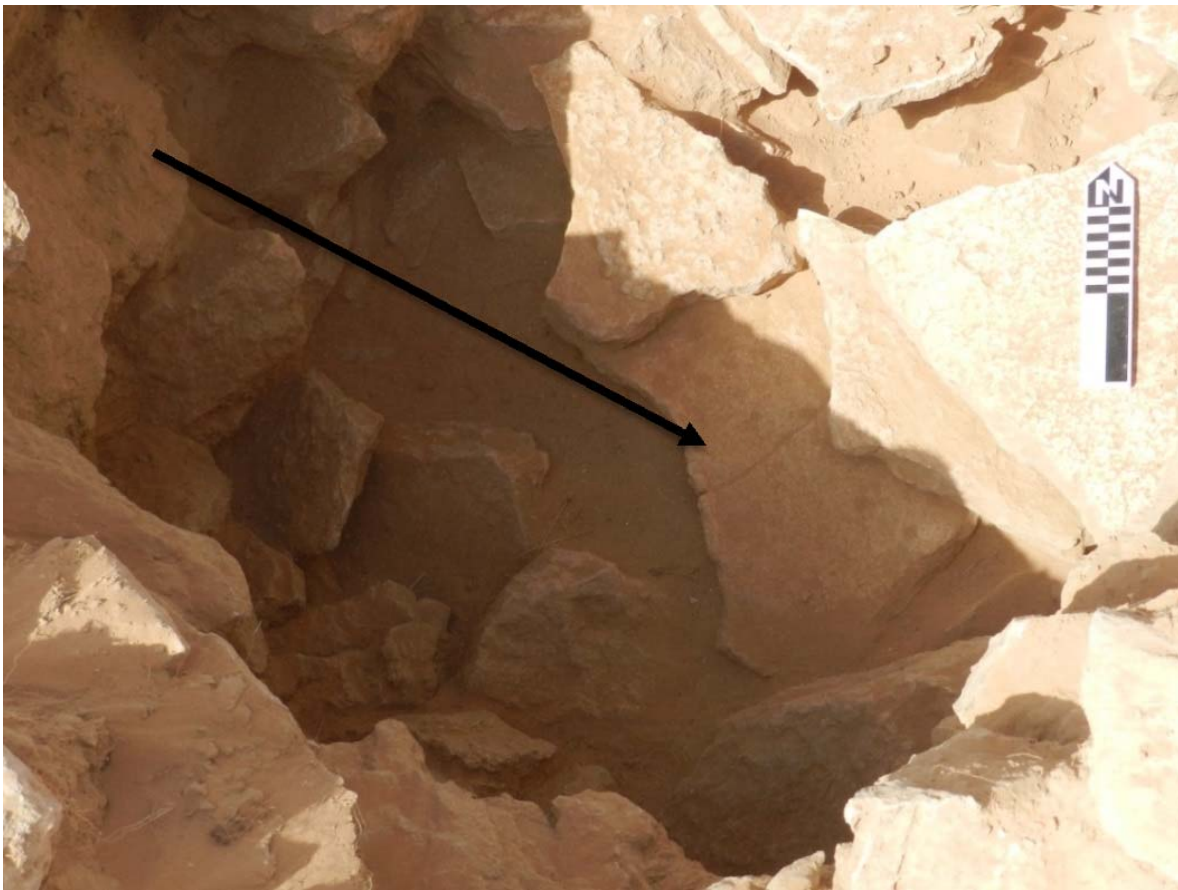
يقع المدفن على الطرف الشمالي للمنطقة الثانية وإلى الشرق من المدفن رقم 15 وإلى الشمال مباشرة من المدفن رقم 14. تعرض المدفن للتدمير الجائر من قبل لصوص المدافن فأزيل الجزء الأعلى لمكان الدفن وحرب محتواه. يظهر المدفن بشكل فريد لم يسبق أن رأينا شبيه له، فتأخذ نهايتيه الشمالية والجنوبية شكل التقوس ليظهر المدفن بشكل برميلي (صورة 35).

عمارة المدفن الخارجية

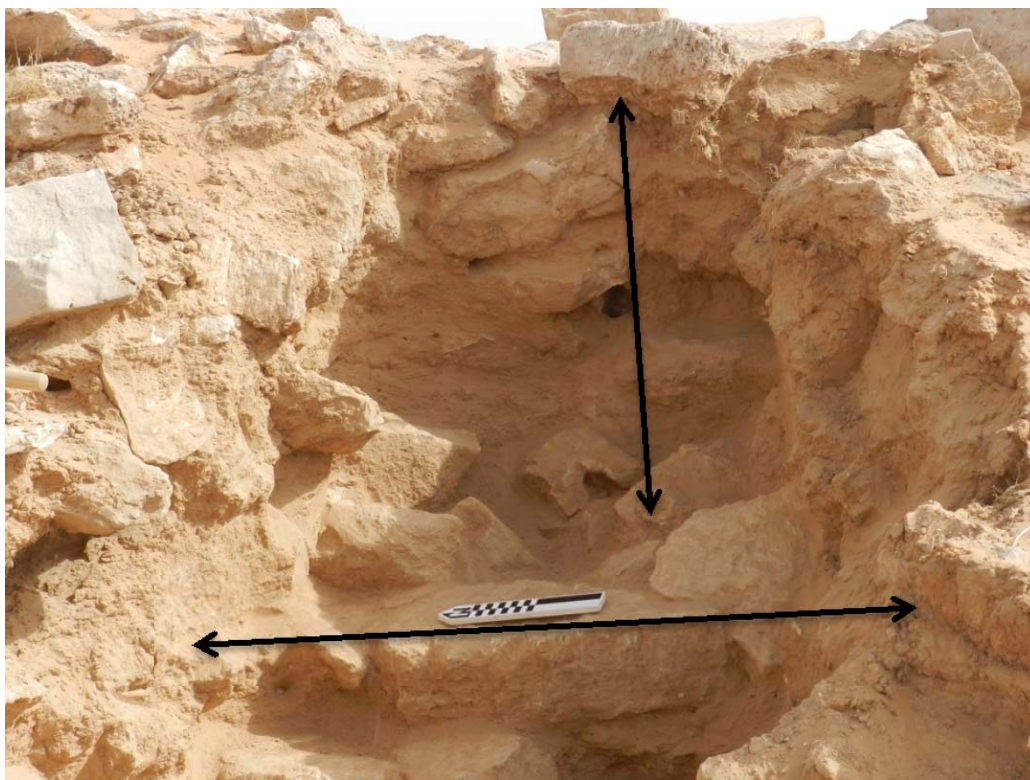
بُني المدفن بشكل طولي برميلي، الأرجح أنه كان مكوناً من مسطبتين، المسطبة الأولى التي يبلغ ارتفاعها 50سم وتتساوي مع النهاية العلوية للجدار المحيط الخارجي، والمسطبة الثانية التي توازي النهاية العلوية لفوهة الدفن والتي أزالها التخريب الذي أحدثه لصوص المدافن، ولم يعد منها إلا بقايا أحجارها السفلى (صورة 35).



صورة 35- للمدفن 15 بعد تنظيف محيطه الخارجي



صورة 33- لجزء لمكان الدفن في المدفن رقم 12 تظهر فيها الألواح المثلثة المتساقطة نتيجة للعبث في المدفن



صورة 34- لجزء من الخندق في الربع الجنوبي الغربي للمدفن رقم 12، يظهر في الخلفية البعيدة جدار مكان الدفن، ويظهر في الخلفية القريبة كيفية تداخل الأحجار

أما عمارة المدفن الداخلية فهي من أعقد ما يمكن أن يشاهد في المدافن الركامية، نظراً لارتفاع المدفن من ناحية وتعرضه للتخريب من الناحية الأخرى واستخدام أنواع مختلفة من الأحجار. من حيث الشكل فهو دائري هرمي يتسع في الأسفل ويضيق تدريجياً مع ارتفاعه إلى الأعلى. أما مادة العمارة فهي كتل حجرية لها رؤوس مدببة شبيهة برؤوس أقلام الرصاص (صورة 32). ركم المعماري الكتل الحجرية على بعضها البعض مع ربطها بأحجار الغطاء الخارجي عن طريق التداخل بين الأحجار، إلا أنه مدّ رؤوسها المدببة إلى الداخل. عمق مكان الدفن يصل إلى المترين وهو عمق يقبل في المدافن هرمية الشكل، لأن جدار مكان الدفن لا بد أن يتماشى مع ارتفاع الغطاء الخارجي للمدفن. ولكن وجود الأحزمة الخارجية التي توجد مساطب متتابعة تشير إلى أن عمق مكان الدفن اقل، علماً أننا لم نجد شيئاً مادياً يؤكد ذلك. عثرنا على الواح حجرية مستطيلة الشكل وصفراء اللون داخل المدفن (صورة 32)، وهو من أنواع الأحجار التي يوجد لها محاجر بالقرب من المدفن (صورة 55). من المحتمل جداً أن تلك الأحجار كانت أغطية فوهة مكان الدفن.



صورة 32- لبداية ظهور مكان الدفن في المدفن رقم 12 تظهر كيفية مد الحجارة لتكون دعائم لغطاء الدفن



صورة 30- لجزء من الربع الشمالي الشرقي للمدفن رقم 12 تظهر فيها الألواح المثلثة التي تكون المسطبة على محيط القبر



صورة 31- لجزء من الخندق في الربع الجنوبي الغربي للمدفن رقم 12 تظهر فيها منطقة تداخل الغطاء الخارجي بجدار مكان الدفن



صورة 28- للمدفن رقم 12 بعد تنظيف الربع الشمالي الشرقي من الأتربة وكسر الحجارة



صورة 29- لجزء من الربع الشمالي الشرقي للمدفن رقم 12 تظهر فيها الألواح المثلثة، والكتل والشظايا

المنطقة الثانية

تتكون المنطقة الثانية من تل جبلي متوسط الارتفاع تكونه الأحجار الجيرية بيضاء اللون مع ميل للون الرمادي. يمتد التل من الجنوب إلى الشمال بطول يصل إلى خمسين متراً تقريباً، ويميل إلى الغرب ليلتقي بالمنطقة الأولى. يوجد على التل عدد من المدافن الركامية الحجرية التي تعرضت للنش والتخريب والبعض منها أزيل بالتمام ولم يبق منه إلا أحجار متناثرة تدل على مكانه. تم تحديد مدفين واضحي المعالم على السفح الغربي للتل، وخمسة مدافن على قمة التل، ووقع الاختيار على ثلاثة مدافن للتنقيب والدراسة من الخمسة الواقعة على قمة التل.

المدفن 12

الإحداثيات: $24^{\circ}19,1'N$ $47^{\circ}05,659'E$

الارتفاع: 487 m

القياسات: محيطه الأسفل 30م، قطره 5، 8م، ارتفاعه 5، 2م، قطر فوهة الدفن 150سم، عمقها 90، 1م

الموقع والحالة

يقع على قمة الركن الجنوبي الغربي للمنطقة الثانية، ويظهر هذا المدفن بحجم يفوق جميع المدافن الأخرى في منطقة الدراسة (صورة 28). يبلغ ارتفاعه متران ونصف المتر، وقد يصل عندما كان سليماً ثلاثة أمتار. يبلغ محيطه عند قاعدته ثلاثين متراً تقريبا كلما ارتفع حتى يصل أضيق نطاق له عند القمة ليصل محيطه خمسة أمتار كمحيط لمسطبته الرابعة والأكثر ارتفاعاً. يظهر المدفن بشكل هرمي قوي بالأحزمة الدائرية، (الصورتان 29-30) لذا يضيق محيطه تدريجياً مع ارتفاعه إلى الأعلى.

عمارة المدفن الخارجية

تظهر عمارة هذا المدفن بشكل معقد تطلب جهداً كبيراً للوصول به إلى النهاية. الارتفاع الكبير للمدفن الذي ربما وصل إلى ثلاثة أمتار استوجب على المعماري توفير ما لا يقل عن تسعة آلاف حجر، وأن يستخدم تقنية معمارية تستوعب ذلك العدد الكبير من الأحجار مع المحافظة على قوة التشييد ليبقى المدفن لفترات طويلة تتماشى مع الاعتقاد بحياة الخلود الأزلية. ولارتفاع الغطاء الخارجي قسّمه المعماري إلى أحزمة أربعة. الأسفل منها شيده بألواح حجرية نصبها على البلاطة الحجرية التي شيده عليها المدفن واستوعب ما يمكن أن يسمى المسطبة الأولى بارتفاع يصل إلى 80سم بميول إلى الداخل ليتحقق في النهاية الشكل الهرمي، ثم رصف الحزام الثاني بارتفاع قدره 60سم بألواح حجرية مثلثة الشكل بسطحها على بعضها البعض بميول إلى الداخل وملاً المسطبة بالأحجار المتفاوتة الأحجام والأشكال. ثم شكل الحزام الثالث بألواح حجرية مثلثة الشكل وبارتفاع قدره 50سم، وملاً المسطبة بكتل حجرية متنوعة الأحجام والأشكال. وبعد ذلك شكل الحزام الثالث بارتفاع قدره 40 سم وبألواح حجرية تحقق له الاستدارة المطلوبة، وملاً الفراغ بأحجار متنوعة الأحجام والأشكال. بعد ذلك أسس الحزام الرابع بارتفاع 35سم مع تشكيل فوهة مكان الدفن التي قفلها بألواح حجرية وترتبه مفككة تخالطها كسر حجرية متوسطة الحجم لتأخذ ارتفاع قدره 25سم. ثم أقفل البناء بوضع كتل حجرية فوق أغشية مكان الدفن لئلا تكشفها الرياح، فوجود الأحجار الثقيلة يسمح للرمال المنقولة أن تتكوم وسط الفراغات الموجودة بين الأحجار ويصبح من الصعب على الرياح نقلها.

الإحداثيات:

الارتفاع:

الموقع والحالة: تقع إلى الشمال الشرقي من المنشأة 17، ويبدو أنها على حلتها الأولى ولم تتغير.

سير العمل

منشأة حجرية صغيرة تقع في المنطقة الأولى على خط تماسها مع المنطقة الثانية. يتكون البناء الداخلي من صف من الحجارة متوسطة الحجم (صورة 27).

بدأ العمل في هذه المنشأة يوم الأحد الموافق 1436/5/3 هـ وبعد أن تم تنقيب الرمل إلى عمق 15 سم عثرنا على كسر من فحم أخشاب سبق أن أوقد بها. وهذه المادة تؤكد استخدام تلك المنشأة كموقد ربما أنه كان بقسمين بدلالة وجود أحجار في وسط المنشأة كانت تُقسّمها إلى قسمين، لكل قسم وظيفة لها صلة بالنار.



صورة 27- موقد بعد تنظيفه، يظهر بشكل مستطيل، وتظهر بقايا الفحم في وسطه

منشأة رقم 17

الإحداثيات: 24°19,628'N 47°05,418'E

الارتفاع: 473 m

الموقع والحالة

تقع إلى الجنوب الشرقي من المدفن رقم 6، ويبدو أنها على حالتها الأولى لم يتغير. نظراً لكثرة المنشآت الشبيهة بهذه المنشأة رأينا أن نحفر واحدة منها فوق الاختيار على هذه المنشأة لحالتها الجيدة (صورة 26). وفي يوم السبت الموافق 1436/5/2 هـ بدأنا بكشف المنشأة رقم 17، فحفرنا وسطها وبعد عمق لا يزيد على بضعة سنتيمترات تبين لنا وجود رماد وكسر فحم صغيرة زدنا في الحفر واتضح وجود الرماد مخالطاً للتربة. وبهذه النتيجة تأكد لنا أن هذه المنشآت موقد ولكن عددها وانتشارها يوحي بأن المكان كان معسكر لجيش تقسم إلى فرق كل فرقة أوقدت لها ناراً، علماً أن المكان لا يزال مقصداً للمتزهين الذين قد يكون لهم دوراً في إيجاد تلك الموقد. منشأة حجرية صغيرة تقع في المنطقة الأولى على خط تماسها مع المنطقة الثانية. غطت الرمال معظم المنشأة ما عدا رؤوس جدرانها التي يمكن أن تُشاهد من على سطح الأرض.



صورة 26- موقد بعد تنظيفه يظهر بشكل دائري، وتظهر في وسطه بقايا الفحم والرماد



صورة 24: تبين العظمين الواقعين أسفل الهيكل العظمي



صورة 25- للمدفن رقم 6 بعد التنقيب تتضح الجدران والأرضية

عمارة المدفن الداخلية

قمنا في بداية الأمر بتنظيف سطح القبر من كسر الحجارة المتناثرة، ثم ازلنا الأتربة التي تكونت على سطح المدفن بعد تخريب اللصوص له. وخلال عملية التنظيف تبينت سطوح جدران مكان الدفن الباقية، فقمنا بتنظيف المكان لتحديد معالم غرفة الدفن، ليتم بعد ذلك تنقيب مكان الدفن. وبعد النزول فيه لنصف متر، بدأت بقايا العظام تظهر، ثم اتضح وجود جثة فيه موضوعة بمهينة القرفصاء رأسها في الغرب ووجهها إلى الجنوب وأقدامها في الشرق مفرصة (صورة 23).



صورة 23: تبين الهيكل العظمي

أسفل من هذه الجثة وجد عظامان كبيران تم رفعهما (صورة 24). ثم استمر الحفر حتى وصلنا إلى الأرضية الصخرية التي كانت الدفنه الأولى عليها.

بعد إزاحة الرمال من على سطح المدفن تبينت رؤوس بقايا جدران مكان الدفن وبعد الحفر قليلاً أتضح أن مكان الدفن قد شيد بشكل دائري كونه ألواح حجرية غالبيتها ذات أشكال مثلثة (صورة 25). تتراوح أطوال الألواح الحجرية بين 60سم و70سم، بينما يتراوح عرضها بين 40سم و50سم وضعت على أرضية صخرية قوية مثلت البلاطة التي وضع عليها الميت. وفي حالة وجود ألواح ينقص ارتفاعها عن ما جاورها من ألواح يكمل المعماري الارتفاع بإضافة ألواح حجرية أخرى تناسب المكان، أو يكمل الارتفاع بوضع لوح حجري ممتد على لوحين ليحقق ثلاثة أهداف، الهدف الأول هو توازن الارتفاع، والهدف الثاني هو تحقيق تثبيت الحجارة التي تقع أسفل، والهدف الثالث تأسيس قوة قادرة على حمل ما يأتي فوقها من ثقل (صورة 25 السهم). ثم يبدأ باستخدام ألواح حجرية مثلثة الشكل بمدّها إلى الداخل وتثبيتها بأحجار الغطاء الخارجي الموازي لها، ويستمر إلى أن يحقق التضييق المطلوب لفوهة مكان الدفن. ويبدو أنه استخدم ألواحاً حجرية طويلة لقفلة فوهة مكان الدفن.

المدفن 6

الإحداثيات: 24°19,090'N 47°05,585'E

الارتفاع: 483 m

القياسات: القطر 5، 3م، عمق مكان الدفن 65سم، قطر فوهة مكان الدفن 60سم.

الموقع والحالة

يقع هذا المدفن في الجهة الشمالية من المنطقة الأولى وقريب جداً من المدفنين 4 و5، ويبعد عن المدفن 3 قرابة المائة متر باتجاه الشمال. يبلغ عمق المدفن 55سم وقطر فوهته 65سم.

عمارة المدفن الخارجية

كان المدفن منبوشاً ومخرباً بشكل كبير، شكل غطاءه الخارجي من الحجارة، وعند اختياره للتنقيب كان الغطاء الخارجي وأغطية مكان الدفن قد أزيلت عن أماكنها، وتبدو فوهة مكان الدفن واضحة وعليها ركمت أغطيته التي تمت إزالتها عن أماكنها الأصلية (صورة 22). يبدو أن الغطاء الخارجي للقبر هرمي الشكل ومع ذلك قد يكون بشكل آخر لأن التدمير الذي حصل له من قبل اللصوص لم يبق على شيء من غطاءه الخارجي سوى أحجار منثورة بعضها نقل من المكان. ومن بقايا الحجارة المتناثرة تظهر مادة البناء حجرية كلسية بيضاء اللون يميل إلى الرمادي.



صورة 22- للمدفن رقم 6 قبل التنقيب



صورة 19- المدفن رقم 3 بعد اكتمال التنقيب



صورة 20- المدفن رقم 3، تشاهد في الأعلى الألواح الحجرية التي تضيق مكان الدفن



صورة 21- المدفن رقم 3، تشاهد في الأعلى ألواح ممتدة إلى الداخل بداية لتضييق فوهة مكان الدفن

المدفن 3

الإحداثيات: 24°19,067'N 47°05,622'E

الارتفاع: 467 m

القياسات: عمق مكان الدفن 75 سم، سعة الفوهة 70 سم، طول المدفن من الشمال إلى الجنوب

الموقع والحالة

يقع هذا المدفن إلى الشمال من المدفن رقم 2 ويبعد عنه بثلاثة أمتار تقريباً، ونظراً لتعرضه للتخريب فقد شنت حجارة غطائه الخارجي ولم يعد من ارتفاعه إلا ما يقارب 50 سم.

عمارة المدفن الخارجية

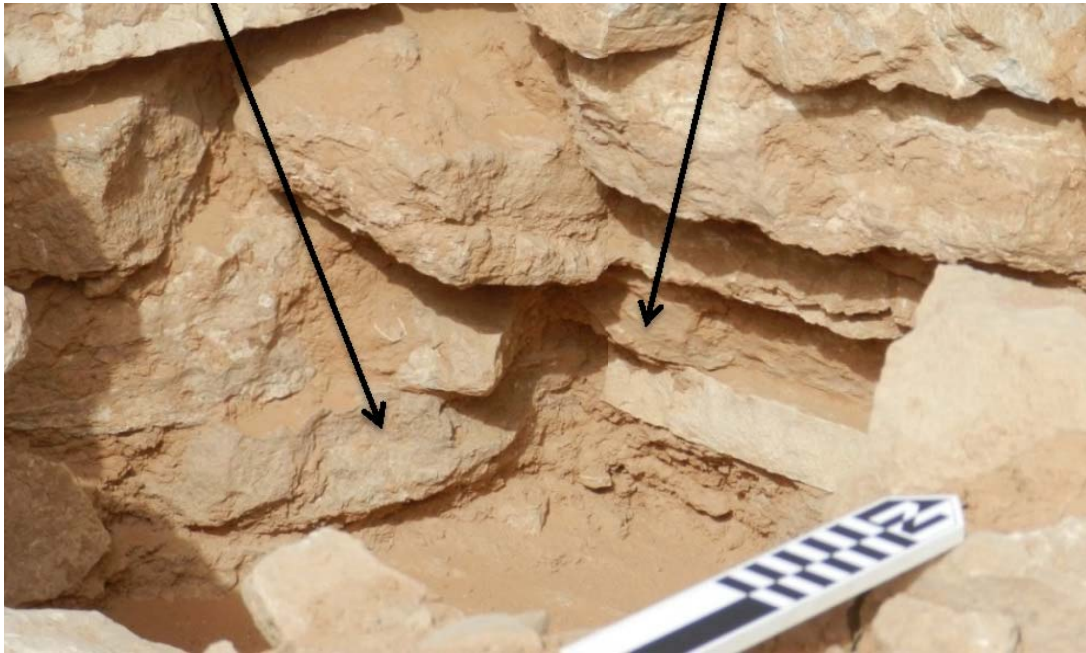
تعرض المدفن للنبيش الجائر الذي أزال غطائه الخارجي ولم يبق من ارتفاعه إلا أحجار متناثرة. وبالرغم من النبيش الجائر، نرجح أن المدفن كان هرمي الشكل مبني بالحجارة الجيرية اللينة التي كست الرمال جزءاً منها (صورة 18).



صورة 18- المدفن رقم 3 قبل التنقيب

عمارة المدفن الداخلية

شيد مكان الدفن بشكل دائري كامل الاستدارة. استخدمت الحجارة في بناء مكان الدفن (صورة 19). وضع المعماري المدمكين السفليين بكتل حجرية كبيرة الحجم شكّل منها دائرة رائعة ثم بنى عليها بأحجار طولية اختارها بعناية لتشكيل مكان الدفن بهيئة دائرية (صورة 20). وعند الارتفاع إلى ما يقارب من 60 سم بدأت الجدران بالميل الطفيف إلى الداخل لتضييق فوهة مكان الدفن ليصبح بالإمكان قفلها بحجر أو اثنين أو ثلاثة (صورة 21).



صورة 16- تبين كيفية تداخل الأحجار لتقوية البناء



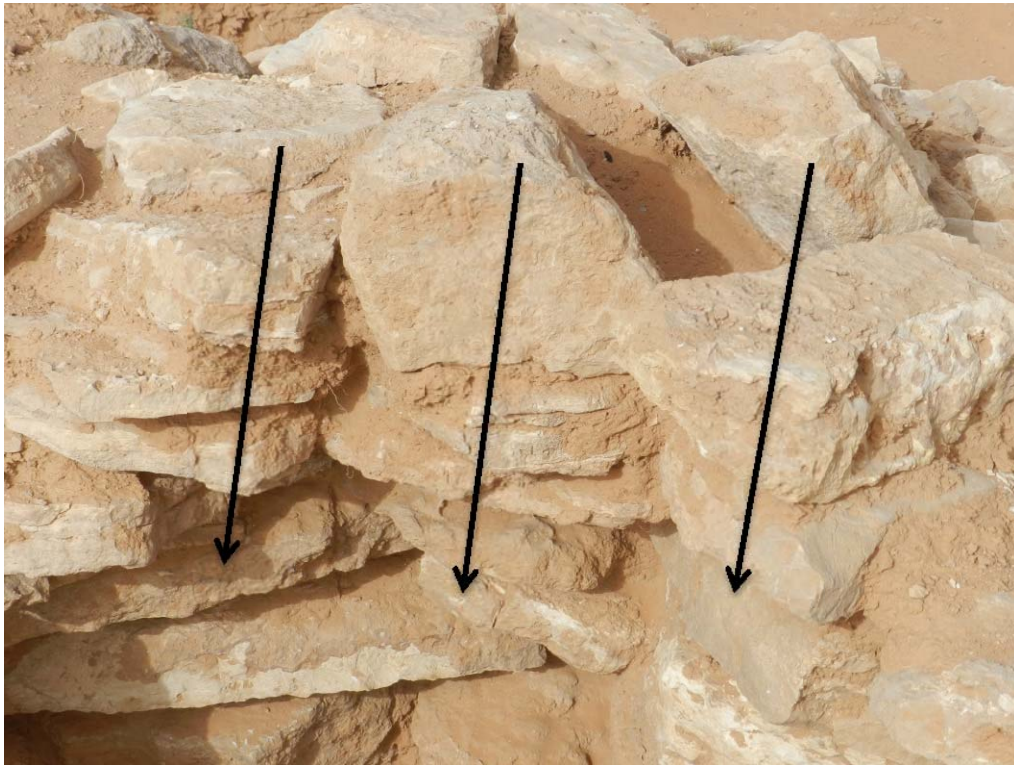
صور 17- تبين كيفية بناء الغطاء الخارجي للجزء الغربي من المدفن



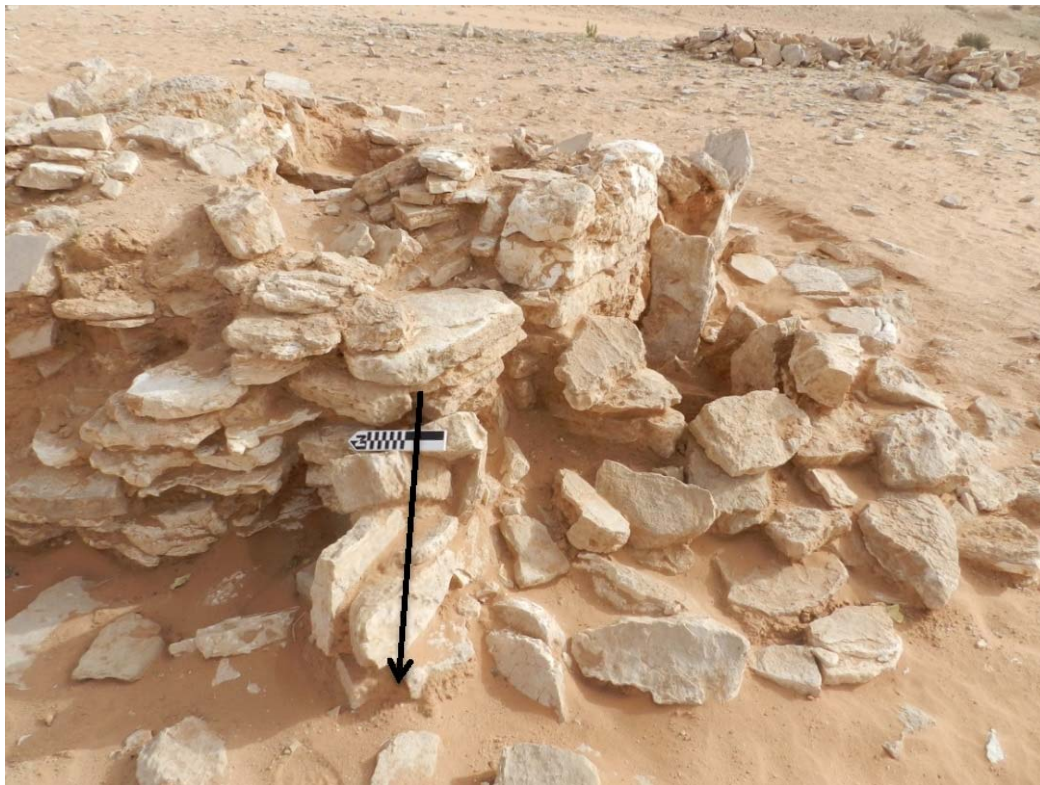
صورة 14- تبين المقابر الثلاثة من اليمين لليساار 2، و2ب، و2أ



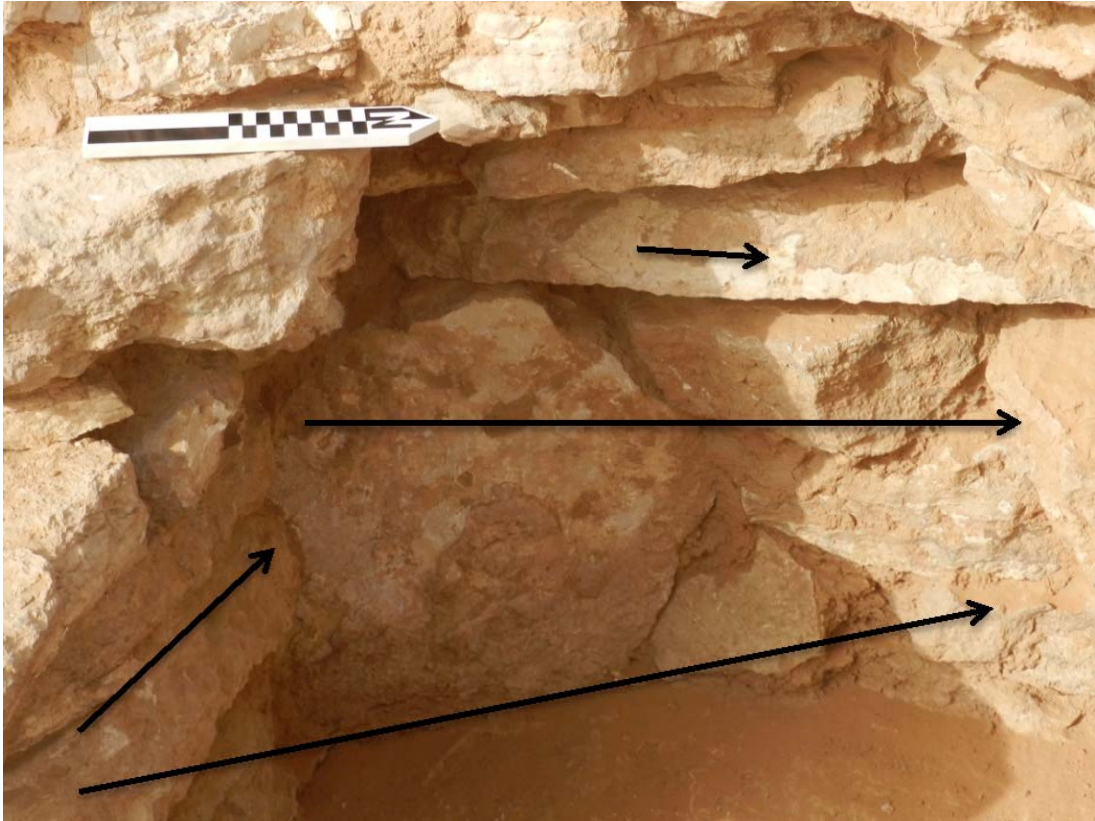
صورة 15- للخندق في الربع الشمالي للمدفن 2 تبين بها إحدى بلاطات أساس الخندق



صورة 12- تبين ركم الحجارة العلوية في محاولة لتحقيق الميول إلى الداخل



صورة 13- تبين كيفية بناء الركن الجنوبي الغربي للجدار الجنوبي للمدفن 2ب



صورة 10- تبين البناء السفلي لمكان الدفن في المدفن 2، يظهر حيث يوجد السهم الصغير لوح حجري ارسى على ثلاثة أحجار وحمل عدة أحجار وضعت عليه



صورة 11- تبين بداية ميلان جدار مكان الدفن إلى الداخل



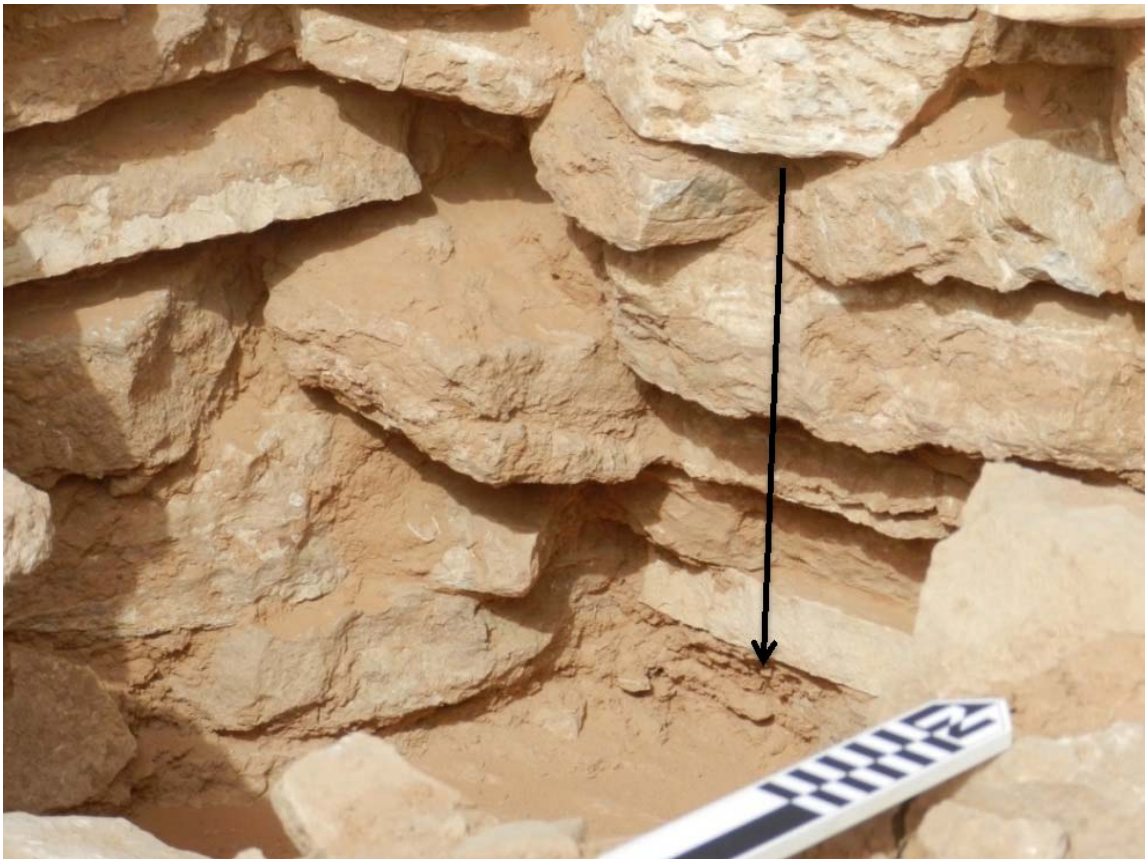
صورة 8 - تبين كيف بُني الجدار الشمالي للمدفن 2ب



صورة 9- تبين كيفية بناء الجدار الجنوبي للمدفن 2 و 2ب



صورة 6- تبين عمود من مكونات المدفن 2 وكيف غرس بين كتل حجرية ليثبت



صورة 7- جزء من جدار المدفن 2 يبين كيف رصت الحجارة وشرك بعضها ببعض



صورة 5- المدفن 2 وتظهر استدارة المدفن وكيفية بنائه، وفي مقدمة الصورة الجدار الجنوبي للمدفن
ب2

بُني المدفن 2 ب شكل طولي من الشرق إلى الغرب، فجاره الشمالي هو الجدار الجنوبي للمدفن 2، شيئا المداكان السفليان بحجارة خشنة السطوح وغير مهذبة، ويظهر عليها مدامكان حجريان شيئا بحجارة طولية الشكل، ومهذبة المظهر، وقطعها جيد (الصورتان 3، 9). أما جداره الجنوبي فهو مبني بشكل جيد وحجارة مهذبة. أما جداريه الشرقي والغربي فهما امتداد لزوايا جداري المدفن 2، الغربي والشرقي. اجتهد المعماري في تثبيت القبور الثلاثة باستخدام الحجارة الطولية لدعم الزوايا السفلى وتثبيتها لئلا تتحرك (صورة 13)، ثم قواها بالغطاء الخارجي الذي شيده بميول من الأعلى إلى الأسفل وهذا الميول اكسبه قوة تحمل عالية فأسفله تُبث ببلاطات حجرية طبيعية (صورة 15) على أجزاء منها قامت أمكنة الدفن في المدافن الثلاثة، ومن الأعلى ثبته بالمداميك العلوية لجدران أمكنة الدفن (صورة 15)، فأصبح الغطاء الخارجي مثبت لا يستطيع الانزلاق فثبت المعماري جدران أمكنة الدفن. أضف إلى ذلك أن الشكل المخروطي يوفر قاعدة عريضة يقل قطرها مع ارتفاعها إلى الأعلى، وبهذا التصميم تكون قدرة تحمل الجزء الأسفل كافية لتحمل ثقل الأجزاء العلوية. وبعد ذلك ينتهي المعماري بقفل فوهة مكان الدفن بألواح حجرية تتراوح بين حجر وثلاثة أحجار، وجد البعض منها ساقطة داخل أمكنة الدفن نتيجة لتعرض المدافن للنهب خلال العصور القديمة (صورة 3).

أما المدفن 2 فيبدو أنه بُني لاحقاً بشكل دائري مستقيماً من الجدار الجنوبي للمدفن 2ب، وإضافة الجدران الثلاثة، الشرقي والغربي والجنوبي بهيئة قوس بُنيت بألواح حجرية متفاوتة الارتفاعات. أما جداره الغربي فبني بكتل حجرية كبيرة الحجم.



صورة 3 - تبين المدفن 2ب في اليسار والمدفن 2 في اليمين



صورة 4- للمدفن رقم 2، تبين الأرضية الصخرية للمدفن وهي عبارة عن بلاطة واحدة

المنطقة الأولى

المنطقة الأولى عبارة عن تل جبلي قليل الارتفاع تكونه الأحجار الجيرية بيضاء اللون مع ميل للون الرمادي. يبلغ طوله من الجنوب إلى الشمال أربع مائة متر تقريباً، ويميل إلى الشرق ليلتقي بالمنطقة الثانية. يوجد على التل عدد من المدافن الركامية الحجرية التي تعرضت للنش والتخريب والبعض منها أزيل بالتمام ولم يبق منه إلا أحجار متناثرة تدل على مكانه. تم تحديد تسعة مدافن واضحة المعالم، ومن بينها وقع الاختيار على الأرقام 2، 2، 2، 2، 3، 6 للتنقيب والدراسة.

المدافن 2، 2، 2، 2، 2، 3

الإحداثيات: $24^{\circ}19,063'N$ $47^{\circ}05,623'E$

الارتفاع: 467 m

القياسات:

مدفن 3: عمق مكان الدفن 67 سم، قطر فوهته 60 سم طول المدفن من الشمال إلى الجنوب 5، 2 م.
مدفن 2أ، عمقه 70 سم، قطر فوهته 60 سم.

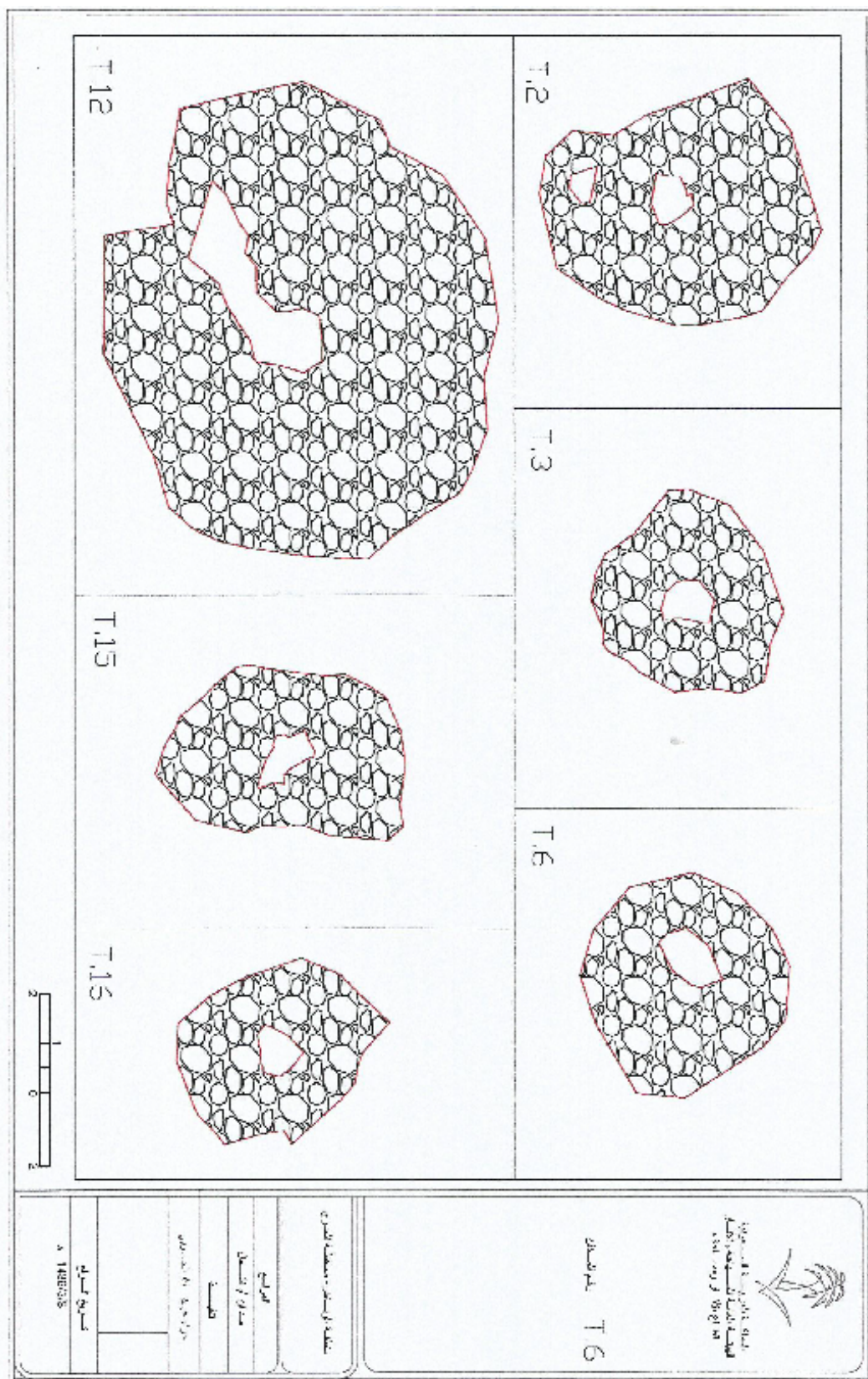
مدفن 2ب، جزء من مدفن 2 طولي من الشرق إلى الغرب 2 م، ومن الشمال إلى الجنوب 50 سم.

الموقع والحالة:

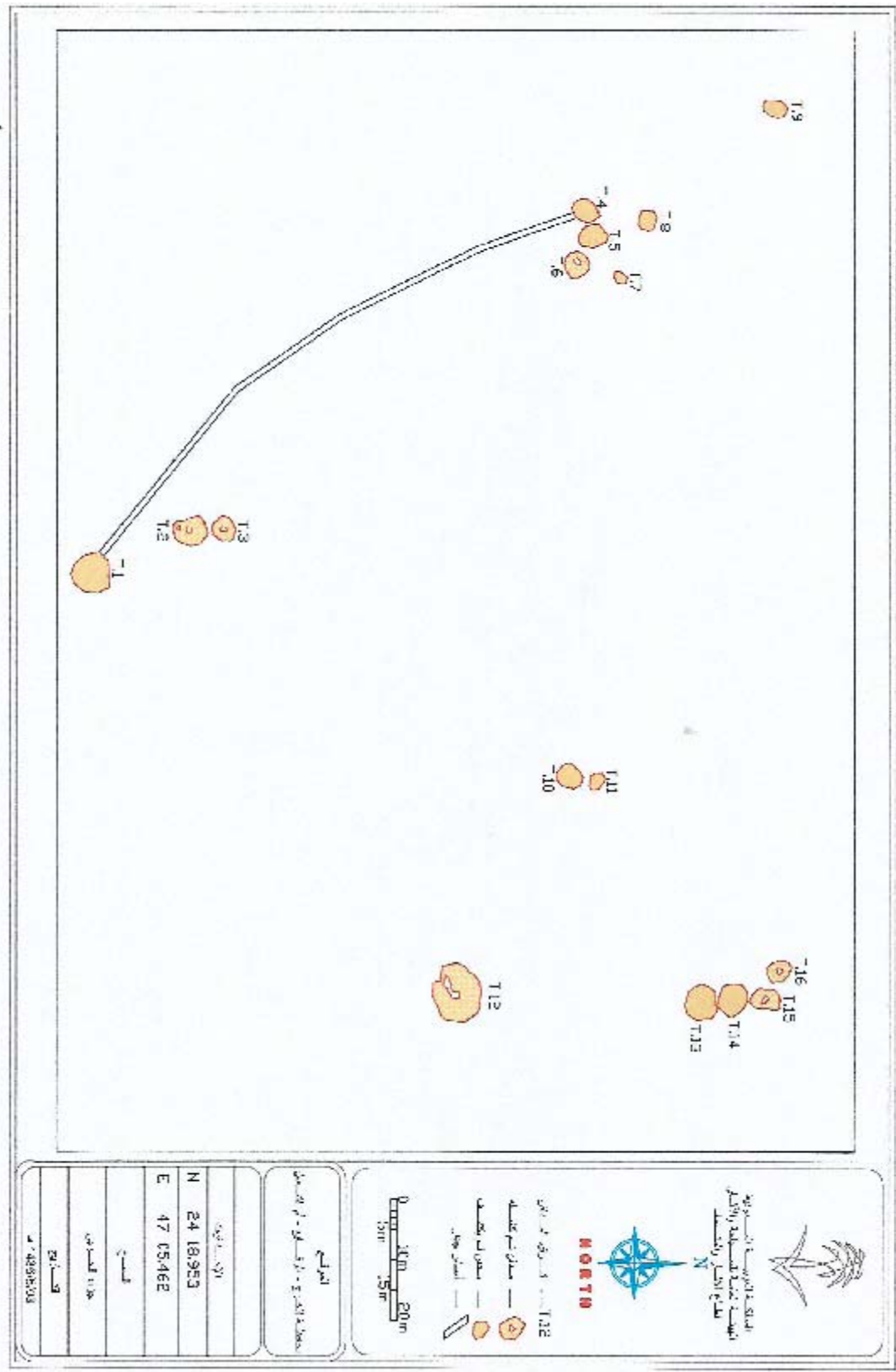
تقع هذه المدافن الثلاثة بالقرب من الطرف الجنوبي للمنطقة الأولى. وتعرض الغطاء الخارجي للمدافن للنش مما أدى إلى بعثرت أحجاره حتى الوصول إلى فوهات أمكنة الدفن، كما تعرضت أمكنة الدفن إلى نش نتج عنه خلط لمحتواها وبعثرة لبقايا الهيكل العظمي.

وبالرغم من أن هذه المدافن الثلاثة وجدت تحت غطاء خارجي واحد، إلا أن تتبع العناصر المعمارية يوحي بأنها غير متعاصرة. فمن الناحية المعمارية يبدو أن المدفن رقم 2 قد بُني أولاً؛ فجدارانه تختلف في طريقة بنائها عن جدران المدفنين الآخرين، 2أ و 2ب. وعليه ووفقاً لهذا التوقع فيظهر أن القبر 2ب قد أضيف عن طريق إنشاء الجدار الجنوبي للقبر 2 والجدار الجنوبي للقبر 2ب ببناء محكم وحجارة جيدة القطع ومتناسقة الأطوال والأحجام. بعد ذلك أضيف المدفن رقم 2 الذي أضيف بعد إضافة الجدار الجنوبي للمدفن 2ب. هذا احتمال، أما الاحتمال الثاني فيوحي بأن المقابر الثلاثة قد شُيدت في وقت واحد، ثم غُطيت بالغطاء الخارجي الذي أخرجها على هيئة قمع، أي مخروطية الشكل قطرها يضيق مع ارتفاعها إلى الأعلى، ولكن الاحتمال الأول هو الأرجح لوجود اختلاف في بناء جدران المدافن الثلاثة يدل على أن المدفنين 2أ، 2ب، قد أضيفا إلى المدافن (صورة 3).

بُني المدفن 2 بحجارة جيدة القطع وبأحجام كبيرة، ففي الأساس يقوم المدفن على الواح حجرية طبيعية، ثم وضعت عليها كتل حجرية كبيرة الحجم وتُقوى بوضع كتل شكلها طولي على الكتل الضخمة بحيث يمتد الواحد على اثنتين من الكتل الضخمة. وبعد الارتفاع إلى ما بين 50 و 60 سم تبدأ الجدران بالتقوس إلى الداخل من خلال استخدام أحجار مدّت إلى الداخل لكي تضيق فوهة فتحة مكان الدفن ليتمكن إقفالها بحجر أو اثنتين أو ثلاثة على الأكثر (صورة 4).



المدافن التي تم تنقيبها في المنطقتين الأولى والثانية



توزيع المدافن الركامية في المنطقتين الأولى والثانية



صورة 1- منظر عام للوادي الرئيس الذي يجري إلى الشرق من منطقة الدراسة منحدرًا من مرتفعات أم الشعال باتجاه وادي حنيفة في الجنوب



صورة 2- جزء من المنطقة الأولى، في الخلفية البعيدة يجري التنقيب في مجمع المدافن 2، و2أ، و2ب



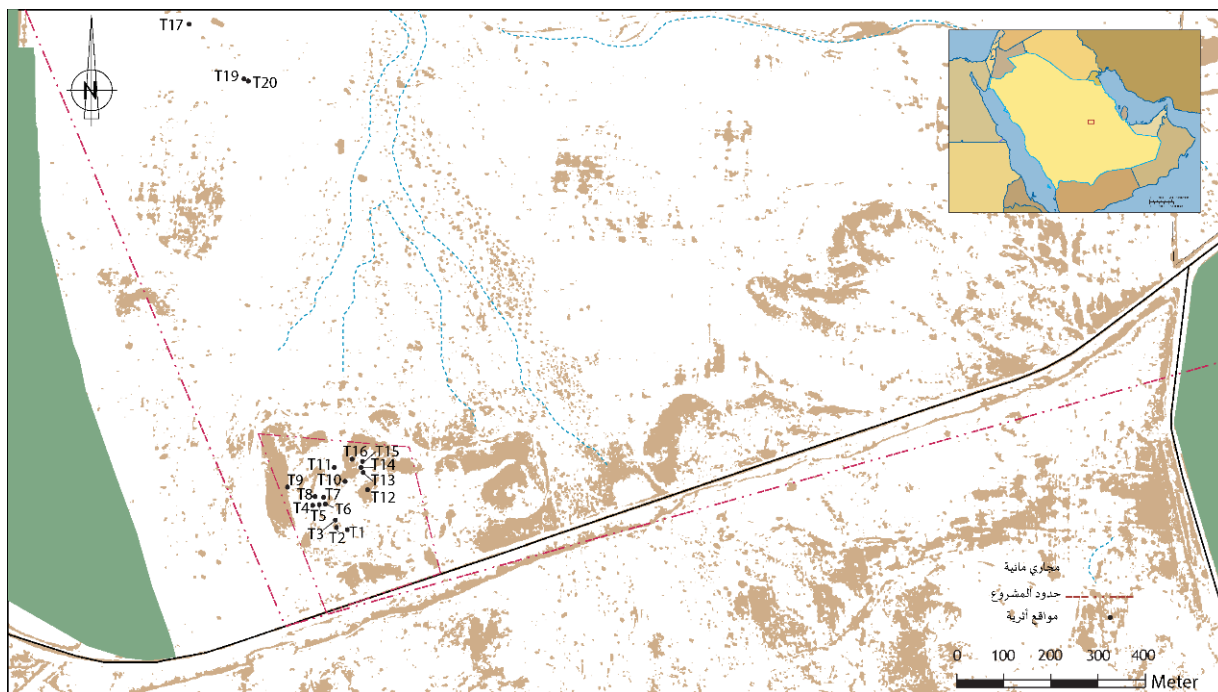
صورة جوية لجزء من المنطقة 1 تظهر عليها القبور 1، 2، 2أ، 2ب، 3



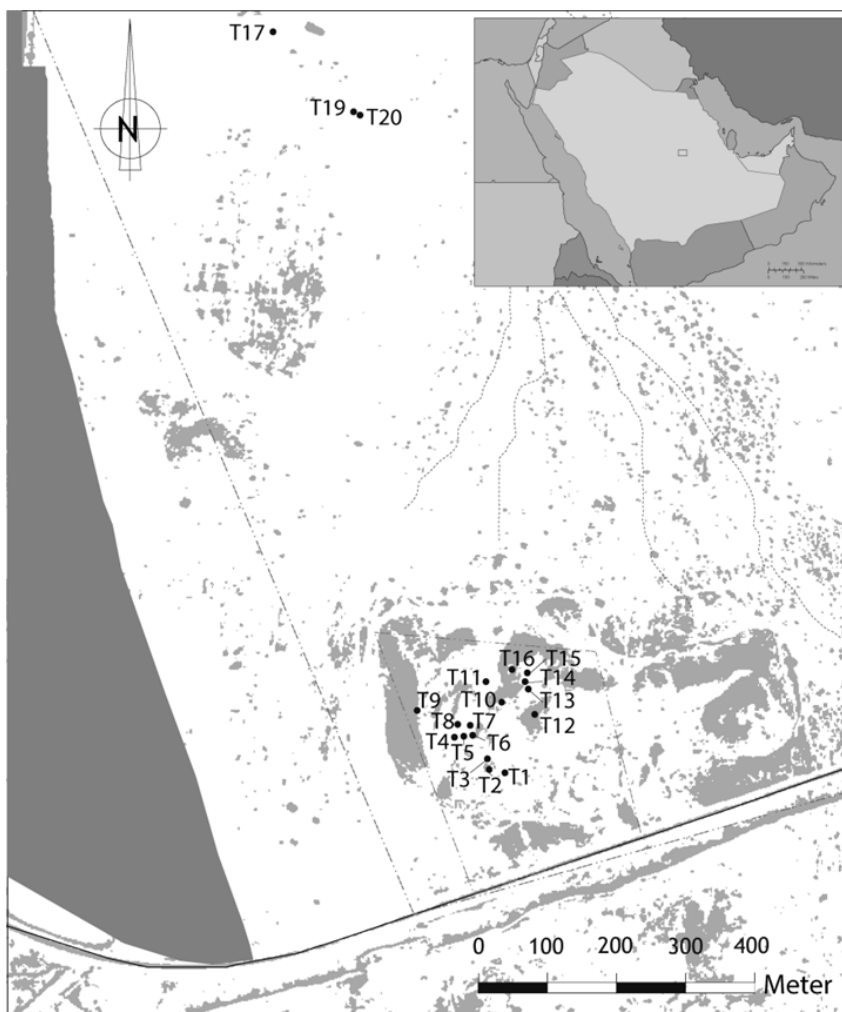
صورة جوية لجزء من المنطقة 1 تظهر عليها القبور 4-9



صورة جوية للمنطقة 2 تظهر عليها القبور 10-16



خريطة لمواقع التنقيب ضمن منطقة المسح العام



خريطة لمواقع التنقيب ضمن منطقة المسح العام

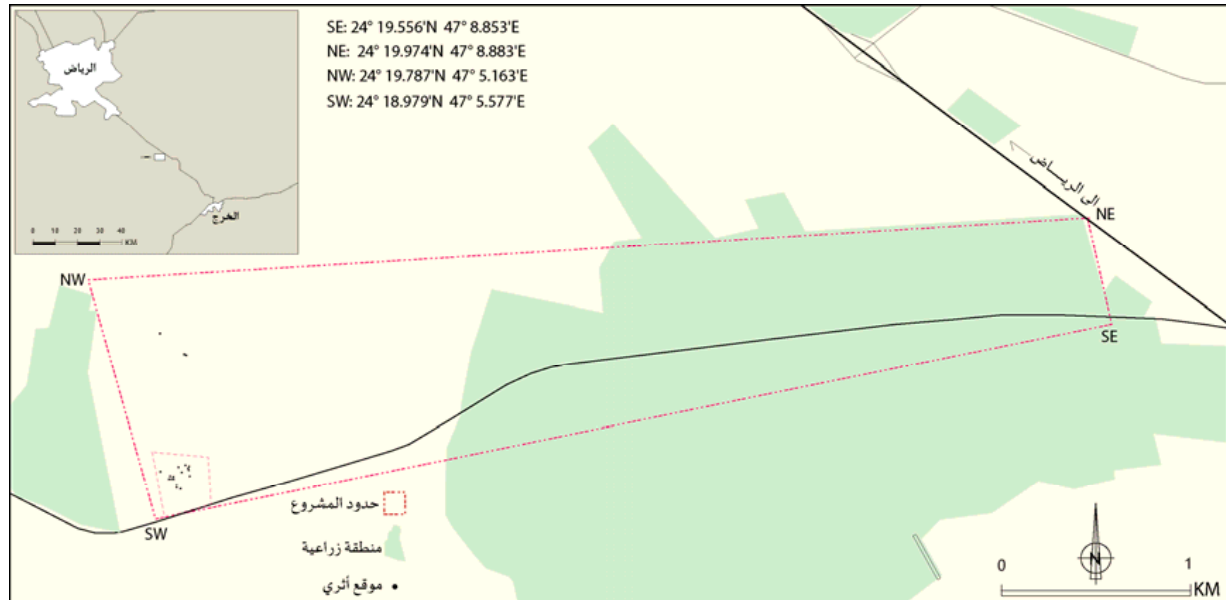
وقد قسمنا منطقة الدراسة إلى ثلاث مناطق، المنطقة الأولى عبارة عن هضبة تمتد من الجنوب إلى الشمال؛ أما المنطقة الثانية فعبارة عن هضبة موازية للهضبة التي تُكون المنطقة الأولى؛ أما المنطقة الثالثة للمسح فهو السهل المنبسط الواقع إلى الشمال من الهضبتين إلى أن يلاقي سفوح مرتفعات أم الشعال في الشمال، وهذا السهل سبق أن كان مزرعة لا تزال آثار النشاطات الزراعية باقية فيها إلى اليوم. تنتشر في هذه المنطقة ركامات حجرية صغيرة ثبت أن نسبة كبيرة منها موافد، وتشير كثرة الموافد في هذه المنطقة أنها كانت مسرحاً لإقامة جيش في المكان لفترة قصيرة.

يوجد في المنطقة الأولى عدد تسعة مدافن (الأرقام 1-9) لا تزال تحتفظ بشكلها مع أنها جميعاً قد تعرضت للنش في العصور القديمة والحديثة.

ويوجد في المنطقة الثانية سبعة مدافن (الأرقام 10-16) وجميعها تعرضت للنش إلا أنها لا تزال محتفظة بشكلها الأصلي. علاوة على ذلك يوجد بقايا مدافن، أحجار غطائها الخارجي منهوبة ربما للاستخدام في البناء الحديث قبل ظهور البناء الاسمنتي، أما بناءها الداخلي فقد خرب محتواه إلى حد كبير.

ومن بين الستة عشر مدفناً المنتشرة في المنطقتين (الأولى والثانية) تم اختيار ستة مدافن للتنقيب ثلاثة منها في المنطقة الأولى وهي 2، 3، 6، وثلاثة منها في المنطقة 2 وهي 12، 15، 16. وتضمن الغطاء الخارجي للمدفن رقم 2 في المنطقة الأولى مدفنين صغيرين، والبقية عبارة عن مدافن فردية.

أما المنطقة الثالثة فيوجد فيها حول المنطقتين الأولى والثانية منشآت حجرية صغيرة اخترنا اثنين منها فوجدناها موافد، وفي وسط المنطقة الثالثة يوجد أكمات عليها أحجار سود تستخدم في صناعة الأدوات الحجرية وجدنا حول واحدة منها منشأتين نقبنا رأس واحدة منهما ولم نعثر على شيء أو استمراراً للبناء.



خريطة لمنطقة المسح

التقرير العلمي لأعمال البعثة السعودية الفرنسية المشتركة في أم الشعال

موسم 1435هـ/1436هـ

مسح وتنقيب أم الشعال في الجزء الشمالي الشرقي من محافظة الخرج

أ.د. عبدالعزيز بن سعود الغزي

د. جبرمي شتيبيكات

أ.د. سالم بن أحمد طيران

د. سعيد بن ديبس العتيبي

أ. عبدالعزيز بن إبراهيم الحماد

أ. عبدالعزيز النفيسه

أ. خالد الحايي وآخرون

المقدمة

المدافن الركامية ليست فقط مدافن بل انجاز حضاري ابقى لنا جزءاً من منجزات وثقافة الإنسان القديم في المملكة العربية السعودية. فتعكس هذه المدافن الاعتناء بالبقاء الطويل الذي يتضح باستعمال المادة الحجرية الضخمة في بناء تلك المدافن، وربما أن لهذا الاعتناء علاقة بالخلود في الدار الآخرة الذي يؤمن به الإنسان القديم. وتعكس عمارة المدفن أيضاً فكراً معمارياً مميزاً استطاع المعمار من خلاله أن يجسد لنا قوة اقتصاده، وعمق عقيدته وفكره، وقدرته على التعامل مع المظاهر الطبيعية. وبخاصة الحجارة التي استطاع نزعها وتفعيلها في البناء

يُمثل مسح أم الشعال جزءاً من أعمال البعثة السعودية الفرنسية في محافظة الخرج للموسم الخامس. تقع أم الشعال في الجزء الشمالي الشرقي لمحافظة الخرج، ويحدها من الشرق خط الرياض الخرج ومن الغرب نفود الزويليات ومن الشمال تلال أم الشعال ومن الجنوب وادي حنيفة والرفائع التي تشرف على وادي حنيفة من الشمال. وتبلغ مساحة المنطقة المسوحة 7 كم من الشرق إلى الغرب، و4 كم من الجنوب إلى الشمال. أما المنطقة التي تركزت فيها أعمال الدراسة والتنقيب فتبلغ أبعادها 2 كم من الجنوب إلى الشمال و500 م من الشرق إلى الغرب.

المنطقة عبارة عن سهل مستوي بميل من الشمال الغربي وإلى الجنوب الشرقي ابتداءً من سفوح جبال أم الشعال إلى أن يلتحم بالرفائع، وهي تلال قليلة الارتفاع تشرف على وادي حنيفة من الشمال. تشكل هذه الأرض سهلاً فسيحاً تنحدر إليه الأودية من تلال أم الشعال في الشمال وتسيح فيه إلى أن تعانق وادي حنيفة الذي ينقل مياهها إلى الشرق ليفرغها في روضة السهباء.

تنتشر في هذه المنطقة التلال المتقطعة ومتوسطة الارتفاع المكونة من أحجار جيرية ولها قمم مستوية. تكثر على قمم هذه التلال المدافن الركامية ذات الأحجام المتفاوتة البعض من تلك التلال زحفت عليه المزارع خاصة في الجزء الشرقي من منطقة الدراسة الذي تنمو فيه المزارع بشكل سريع وواسع.

