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برنامج خادم الحرمين الشريفين للعناية بالتراث الحضاري للمملكة



الهيئة العامة للسياحة والتراث الوطني

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REPORT ON TWO EXCAVATION SEASONS
IN THE OASIS OF AL-KHARJ • 2011–2012
SAUDI ARABIA

Jérémie Schiettecatte

Abdulaziz Alghazzi


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**Jérémie Schiettecatte
Abdulaziz Alghazzi**

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Foreword

Antiquity is the most distinctive component of a country's national and cultural heritage, as well as a scientific and cultural treasure, an economic source and a cornerstone of the tourism sector.

SCTH, represented by the Antiquity and Museums Sector, offers an opportunity to scholars and experts to publish their research work, academic dissertations and studies with the goal of protecting, raising awareness and promoting Saudi Arabian antiquities through all available means, including publication and authorship.

This book is the end product of implementing the policy of the Antiquity and Museum Sector, in promotion of the objectives of the custodian of the two holy mosques program for the kingdom's cultural care, By making available scientific publications that highlight and boost the public interest and awareness about the Saudi Arabian culture, the cradle of Islam, we are able to bridge the cultural links and communication across the continents that have existed since ancient time.

SCTH president
Sultan Bin Salman Bin Abdulaziz

Glimpse

As part of the action plan for the Antiquities and Museums Sector of the Saudi Commission for Tourism and National Heritage (SCTH) has given special attention to scientific research and developed different publication venues in which results of ongoing discoveries, researches and archaeological investigations are presented so as to promote and raise public awareness and knowledge on all archaeological sites and research activities in the Kingdom, to enrich libraries with specialized publications and to provide students and researchers with valuable resources on Saudi cultural heritage.

In this regard, Antiquities and Museums Sector has released a series of publications - archaeological studies and introductory books to raise awareness among the general audience about the importance of archaeology and their role in preserving them. Further, several academic dissertations, periodicals and scientific magazines have been published.

Furthermore, SCTH is keen to provide various gateways for publications to make them accessible to the public such as CDs, electronic media and the website.

Vice-President General Supervisor on the custodian of the two holy mosques program for the kingdom's cultural care
Prof. Ali bin Ibrahim Al Ghabban

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- the Ministry of Foreign Affairs in Paris;
- the French Embassy in Riyadh;
- the Centre National de la Recherche Scientifique (CNRS) in Paris;
- the research centre 'Orient & Méditerranée' (CNRS, Université Paris-Sorbonne, Université Panthéon-Sorbonne, École pratique des hautes études) in Paris;
- the École et Observatoire des Sciences de la Terre at the University of Strasbourg;
- the Académie des Inscriptions et Belles-Lettres in Paris;
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INTRODUCTION

Two field seasons in the oasis of al-Kharj

Al-Kharj area is one of the major oases of the Najd, in the very heart of the Kingdom of Saudi Arabia (**fig. 1**). Specific environmental conditions have 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 Hijāz to the Gulf and Mesopotamia.

There was little doubt that the archaeological study of this region would 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.

Stimulated by this prospect, a Joint Cooperative Agreement for Archaeological Surveys 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 direction of ‘Abd al-‘Aziz al-Ghazzi (King Saud University, Riyadh) and Jérémie Schiettecatte (CNRS, Paris).

The aim of the research was 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.

The first season of survey and excavation was carried out from September 20 to October 21, 2011, it was mainly devoted to establishing an archaeological map of the oasis (**fig. 2**) and to studying two significant sites: AK-22 (Palaeolithic) and al-Yamāma (Late Pre-Islamic/Islamic periods).

The second season, from November 11 to December 18, 2012, was devoted to pursuing the excavation of al-Yamāma, and to the realization of a geomorphological map of the oasis.

This book presents the results of this research.

Funding

The scientific issues which dictated our field activities have been addressing those set out in four research programmes. They funded the major part of the field activities:

- the 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;

- the 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];
- the programme “SYRAB – Écrit et écriture dans la formation des identités en monde araméen et arabe III^e-VII^e siècle”, conducted by Fr. Briquel-Chatonnet and L. Nehmé (UMR 8167 ‘Orient & Méditerranée’, Paris), funded by the Agence Nationale pour la Recherche in Paris [ANR-09-BLAN-0328-01];
- the regular activities of the Research Centre from the Saudi Commission for Tourism and Antiquities, Riyadh, headed by Jamal Omar.

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

- the CNRS and the University Paris-Sorbonne through the research centre UMR 8167 ‘Orient & Méditerranée’, Paris;
- the programme “Médée”, conducted by E. Fouache (Université Paris-Sorbonne, Abu Dhabi), funded by the Ministry of Foreign Affairs, Paris;
- the École et Observatoire des Sciences de la Terre at the University of Strasbourg;
- the Académie des Inscriptions et Belles-Lettres, Paris;
- the Service de Coopération et d'Action Culturelle of the French Embassy, Riyadh.

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 KHAMĪS 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).¹ 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, ‘Abd al-‘Aziz 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.

1 PHILBY 1920: 167: “The district of Kharj falls naturally into three divisions: the southern and tapering portion of the triangle in which there are no habitations, no cultivation, and no feature of interest; a central section occupying about half of the remaining portion, in which lies at the present time the centre of such agricultural and political activity as the district enjoys; and finally the northern or, if I may call it so, the mediaeval and prehistoric section, in which, thanks to a score of peaceful years, the desolate ruins of a former prosperity are slowly but surely quickening to new life.”

Regarding **prehistory**, one of the main current research issues in the Peninsula concerns the dispersal of the first Anatomically Modern Humans (AMH) in Arabia 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 during the 2011 and 2012 seasons in order to address these issues (Chapters 1 and 2).

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-Ḍila’, 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 3rd and 1st 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 Arabian 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. None of these necropolises were investigated during the two first seasons, but their study will start in 2013. Nevertheless, a brief description of them is presented in the 2011–2012 survey report (Chapter 3).

Ascribing a time-span to the sedentarization process in al-Kharj area is also crucial. Did this process begin right from the 3rd 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 sedentarization 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. Although no occupation from that period has yet been revealed in the oasis, we are still confident that the most ancient occupation of the site of al-Yamāma, not reached so far, might enlighten us about this issue.

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, East 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 (Chapters 4 to 11) indicate a different trajectory for this region, which might have been continuously occupied from the

Late Pre-Islamic period² until the end of the 12th century. Finally, a pottery sampling on the site of al-Yamāma (Chapter 9) 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.

Programme of the 2011 and 2012 seasons

The first two field seasons aimed at providing an initial overview 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 two significant sites: AK-22 (Palaeolithic) and al-Yamāma (Late Pre-Islamic/Early Islamic periods). Small teams of specialists from different domains worked in a complementary way in various fields.

DRAWING THE GEOMORPHOLOGICAL MAP OF THE OASIS

In November and December 2012, geomorphologists A. Chabrol, G. Fortin and E. Fouache, accompanied by archaeologists A. al-Ḥamad and J. Schiettecatte, produced a geomorphological map of the area (geological, hydrographical, pedological cover). The purpose was manifold: crossing environmental with archaeological data in order to understand settlement strategies; to understand how the environment evolved during the Holocene; and to identify the water resources at different periods, and the connection between these resources, agricultural capabilities and the settlement process. See Chapter 1.

DRAWING THE ARCHAEOLOGICAL MAP OF THE OASIS

■ *Prehistoric survey of the oasis and study of site AK-22*

In October 2011, two prehistorians, R. Crassard and Y. Hilbert, and an archaeologist, A. al-Ḥamad, conducted a survey of al-Kharj oasis and the surrounding area to identify Palaeolithic and Neolithic sites. It yielded 29 sites. The most significant one, AK-22, has been given special attention. See Chapter 2.

■ *Historical survey of the oasis*

In October 2011 and November 2012, intermittently, archaeologists G. Charloux, A. al-Ghazzī, M. Mouton, J. Schiettecatte and P. Simeon, and the epigrapher Ch. Robin, visited and registered previously known and newly discovered archaeological sites in al-Kharj area, dating from the Bronze Age to modern times. See Chapter 3.

■ *Toponymic and historical study of the oasis*

In October 2011, the epigraphers and historians M. Arbach and Ch. Robin initiated a study of the present-day place names attested in the area in order to compare them and identify them with those mentioned in ancient sources (pre-Islamic inscriptions and early Islamic sources). It led to the understanding of the toponymic and tribal history of this area on the eve of Islam and during the early centuries of the Islamic era. See Chapter 4.

² “Late Pre-Islamic period” has been chosen as a substitute to unsatisfactory exogenous terminology such as “Hellenistic Period” or “Sasanian Period”. It stretches from the 2nd century BC to the 6th century AD.

■ *Topographic and geomagnetic survey*

During both seasons, the main archaeological settlement of the oasis, al-Yamāma, received most of our attention. The first step was the creation of the map of the site and its remains, be they those visible on surface through the use of topographic methods and devices by J. al-Harbī and M. Niveleau, or concentrations of underground remains through a geomagnetic survey conducted by B. Gavazzi, R. al-Khatib and M. Munschy. See Chapters 5 and 6.

■ *Periodization of the occupation*

In order to identify the time-span of occupation of the site and the different phases of this occupation, a deep sounding, Sounding 1, was initiated on the highest part of the site by G. Charloux, A. al-Hamad, M. Mouton and J. Schiettecatte. It led to the drawing up of a ceramic typology for each period of occupation by M. Mouton and P. Simeon. It was completed by surface sampling, which provided some insights on the phases of expansion/contraction of the site. See Chapters 7 and 9.

■ *Characterizing the urban structure of the site*

Three areas have been explored:

Area N6: excavation of the Great Mosque of the site (Building 1) by A. al-Aklabi, S. al-Dawaysh, A. al-Hamad, A. al-Hinu, A. al-Qarni, J. Schiettecatte, P. Siméon and H. al-Tayri. See Chapter 8.

Area O7: opening of Sounding 2 in a dwelling structure, Building 2, by H. Monchot and L. Munduteguy. See Chapter 10.

Area G17: opening of a test trench, Sounding 3, by M. Mouton. There, the remains of kilns have been unearthed, possibly part of a pottery workshop. This operation has just started and is not reported here. Further details are available in the unpublished preliminary report of the second season (SCHIETTECATTE *et al.* 2012: 44–46).

■ *Characterizing the environmental context of the site*

In addition to the geomorphological study already mentioned, which provided some insights on the geographic setting of the site and its access to groundwater, an archaeozoological study has been conducted during the two seasons by H. Monchot on the faunal remains from the excavation at al-Yamāma. See Chapter 11.

■ *Restoration*

Considering the very good state of preservation of the ruins of the mosque at al-Yamāma, its unearthing has to be followed by a restoration of the remains (strengthening of the mudbrick walls and preservation against weathering).

In November 2012, D. Gandreau and S. Moriset, specialists of mudbrick restoration, from the High School of Architecture and CRATerre (International centre for earth construction) in Grenoble (France), joined the project for a one-week stay so as to define the best restoration procedure to be applied, taking into account the local environment and the nature of the structures. They drew up a restoration project for the mosque and other remains of al-Yamāma that could be applied from 2013 onwards with the agreement and financial support of the SCTA. It can be consulted in the unpublished 2012 report (SCHIETTECATTE *et al.* 2012: 83–103).

Moreover, in order to preserve the mudbrick structures during the excavation process, several experimental techniques were tried out on the site. It was decided to cover weakened structures. Thus, a thin layer of a mixture made of mud, straw, water and camel dung was applied over parts of the Buildings 1 and 2 (respectively the Great Mosque and a dwelling structure) by D. Gandreau, S. Moriset and L. Munduteguy.

COMPLEMENTARY DOCUMENTATION

L. Munduteguy drew the lithic material recovered from the prehistoric survey as well as pottery and artefacts from the excavation in al-Yamāma during the two field seasons.

In December 2012, Th. Sagory spent a week in the oasis to carry out an aerial photographic cover of the main archaeological sites by kite and balloon.

Photographs of pottery and artefacts were done by L. Munduteguy, Th. Sagory and P. Siméon; those of lithics by R. Crassard and Y. Hilbert.

Recording system

The nomenclature we adopted for the recording of sites is as follows:

- **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 is as follows:

- **Stratigraphic units** (called UF for *Unité de fouille*) are numbered continuously. Series of numbers have been attributed to the different excavated areas: 001 to 099 in area N6 (Sounding 1 and Building 1); 100 to 199 in area O7 (Sounding 2 in Building 2); 200 to 299 in area G17 (Sounding 3).
- **Structures** are numbered continuously, 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 numbers have been attributed to the different excavated areas: 001 to 099 in area N6 (Sounding 1 and Building 1); 100 to 199 in area O7 (Sounding 2 in Building 2).

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

- **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) (figs. 83, 85).

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 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. Charlux 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 French-Saudi Mission in Madā'in Šālīḥ (dir. L. Nehmé, Fr. Villeneuve, D. al-Talhi) and designed by Jérôme Haquet (engineer at the UMR 9993 of the CNRS).³ An empty sheet of each of these related databases is shown in appendices to this introduction. These related databases are:

- Database of archaeological sites of al-Kharj area (Appendix 1);
- Database of photographs taken during survey and excavation (Appendix 2);
- Database of stratigraphic units (Appendix 3);
- Database of archaeological structures (Appendix 4);
- Database of archaeological artefacts (Appendix 5);
- Database of pottery (Appendix 6);
- Database of samples (Appendix 7).

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.

The team

In order to encompass a broad geographical and chronological approach, specialists in different fields have been called in. Their skills made it possible to go through both the environmental and cultural evolution of the oasis from the Middle Palaeolithic, down to the modern era.

Table 1 lists the team members in alphabetical order (see also Appendix 11).

³ Details regarding this database are provided in NEHMÉ *et al.* (dir.) 2010: 19.

AL-AKLABI ‘Abdallah	Archaeologist	Saudi Commission for Tourism and Antiquities, Bisha
ARBACH Mounir	Epigrapher	Researcher, CNRS, Paris
CHABROL Antoine	Geomorphologist	Post-doctoral fellow, École Française d’Athènes, Athens
CHARLOUX Guillaume	Archaeologist	Research engineer, CNRS, Paris
CRASSARD Rémy	Prehistorian	Researcher, CNRS, Lyon
AL-DAWAYSH Sultan	Archaeologist	Department of archaeology and museums, Kuwait
FORTIN Guillaume	Geomorphologist	Master student, Université Paris-Sorbonne, Paris
FOUACHE Éric	Geomorphologist	Professor, Université Paris-Sorbonne, Abu Dhabi
GANDREAU David	Mudbrick restorer	Expert, CRAterre, Grenoble
GAVAZZI Bruno	Geophysicist	PhD student, Université de Strasbourg
AL-GHAZZI ‘Abd al-‘Aziz	Archaeologist	King Saud University, Riyadh
AL-HAMAD ‘Abd al-‘Aziz	Archaeologist	Saudi Commission for Tourism and Antiquities, Riyadh
AL-HAMDAN Fahad	Representative	Formerly Saudi Comm. for Tourism and Antiquities, al-Kharj
AL-HARBI Jiza	Surveyor	Saudi Commission for Tourism and Antiquities, Riyadh
HILBERT Yamandú	Prehistorian	Postdoctoral fellow, UMR 5133 ‘Archéorient’, Lyon
AL-HINU ‘Abd al-‘Aziz	Archaeologist	Saudi Commission for Tourism and Antiquities, Riyadh
AL-KHATIB Rozan	Geophysicist	PhD student, Université de Strasbourg
MONCHOT Hervé	Archaeozoologist	Postdoctoral fellow, Labex ResMed, Université Paris-Sorbonne
MORISSET Sébastien	Mudbrick restorer	Architect, CRAterre, Grenoble
MOUTON Michel	Archaeologist	Researcher, CNRS, Nanterre
MUNDUTEGUY Lætitia	Archaeologist, drawer	Master Student, Université Panthéon-Sorbonne, Paris
MUNSCHY Marc	Geophysicist	Professor, Université de Strasbourg
NIVELEAU Mathieu	Surveyor	Freelance
AL-QARNI ‘Awadh	Archaeologist	Saudi Commission for Tourism and Antiquities, Riyadh
ROBIN Christian	Historian	Emeritus researcher, CNRS, Paris
SAGORY Thomas	Photographer	Engineer, Ministry of Culture, Paris
SCHIETTECATE Jérémie	Archaeologist	Researcher, CNRS, Paris
SIMÉON Pierre	Archaeologist, ceramicist	Postdoctoral fellow, UMR 8167 ‘Orient & Méditerranée’, Paris
TAYRAN Salem	Epigrapher	King Saud University, Riyadh
AL-TAYRI Hamid	Archaeologist	Department of Archaeology and Museums, Kuwait

Table 1 | List of the members of the archaeological mission in al-Kharj in alphabetical order – first and second seasons

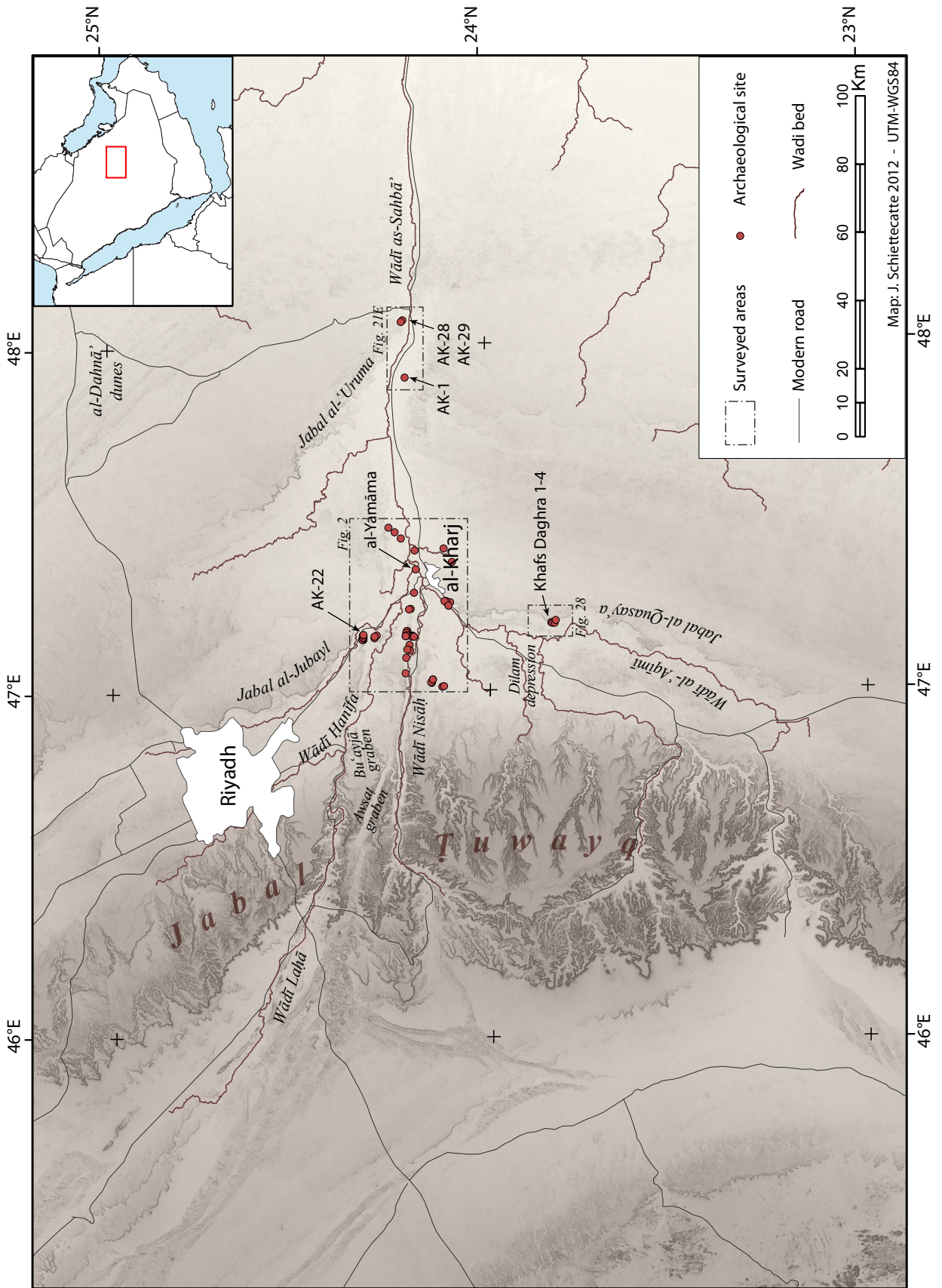


Figure 1 The location of the oasis of al-Kharj and its setting (J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

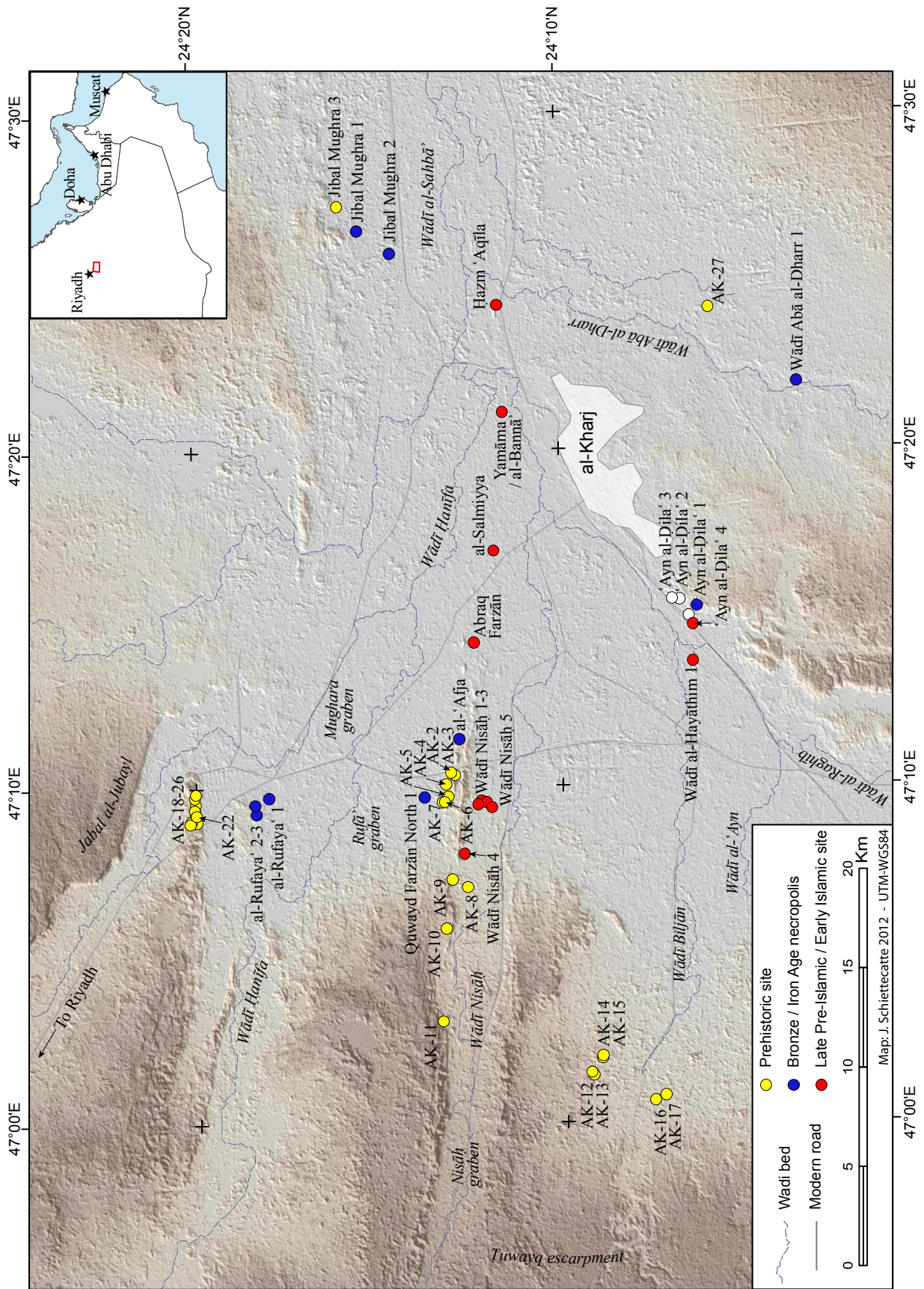


Figure 2 Archaeological map of the oasis of al-Kharj (J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

THE OASIS OF AL-KHARJ



CHAPTER 1

GEOGRAPHIC AND GEOMORPHOLOGICAL CONTEXTS

Antoine CHABROL – *Scientific Member at the École française d'Athènes*

Guillaume FORTIN – *Master's student at the University of Paris–Sorbonne, Paris*

Eric FOUACHE – *Professor at the University of Paris–Sorbonne, Abu Dhabi*

Geographic situation

Al-Kharj area is one of the major oases of Central Arabia, 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.⁴ The hydrological network includes a large wādī system, with no permanent river. However, water resources from several of the largest aquifers (SANLAVILLE 2000: 73–75, 210–211) of the Arabian Peninsula have allowed agriculture and farming to develop.

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 neighbourhoods (al-Yamāma, al-Salmiyya, etc.). The second city of the oasis is al-Dilam. This huge agglomeration has more than 376,000 inhabitants.⁵ 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.

Geological background

GLOBAL OVERVIEW

The Peninsula belongs to the Arabian Plate, and is divided into three major geological parts (**fig. 3**).

The coast along the Red Sea, called Tihāma, is the eastern margin of the Red Sea rift. It is a sedimentary plain stretching from the north-west of the Arabian coast to the south tip, and is bounded to the east by the Sarawat Mountains. This margin is part of the opening graben of the Red Sea, which started to form 30 million years ago.

The Arabian Shield represents the uplift of the plate due to compressive and tectonic uplift events. Bounded at the west by the Tihāma coastal plain, the Precambrian crystalline

4 *Surface annual climatological report* of the Saudi Presidency of Meteorology & Environment Protection – <http://www.pme.gov.sa/>

5 Data from the 2010 records of the Central Department of Statistics & Information of the Kingdom of Saudi Arabia.

rocks of the shield are delimited to the north, south and east by younger sedimentary rocks. Much evidence of volcanic activity can be found within the shield: craters, volcanoes and lava fields (ar. “*harrat*”). Though most of this volcanic activity took place in past geological times (less than 30 million years ago) some has occurred in historical times (VINCENT 2008: 57–59).

Lastly, the Arabian platform underlies the Arabian Shield from the centre of the Peninsula to the Arabian Gulf plain, and consists of Phanerozoic sedimentary rocks (VINCENT 2008: 59–62). This is a plateau region (inherited from the uplift of the Arabian Shield) in the central part and a plain area near the Arabian Gulf. Sedimentary rocks (mostly limestone and sandstone) are the result of numerous cycles of marine transgression and regression; their thickness increases from the west to the east (GRAINGER 2007: 109–112).

THE OASIS

The geological context of sedimentary rocks 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-Yamāma is influenced by series of grabens originating from the opening of the Red Sea, marked by west-east direction faults.

In the valleys, more recent sedimentary cover includes both fluvial deposits (silt, clay, etc.) and aeolian deposits, with barchan 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) (figs. 4–5). 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

REGIONAL 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 (fig. 6).

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 mountain, and this escarpment forms the northern boundary of the oasis. South-west, the *Wādī al-‘Ayn* comes from the slopes of 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 Jabal al-Jubayl and 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 Jabal al-‘Uruma into two parts (fig. 7). In this area, the Jabal Ṭuwayq reaches 1,050 m, while Jabal al-Jubayl and Jabal al-‘Uruma have average maximum altitudes around 550 m north of the oasis and 500 m south of the oasis.

THE OASIS OF AL-KHARJ AND THE SITE OF AL-YAMĀMA

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.

Methodology

INTRODUCTION/PRESENTATION

The geomorphological study and the general map are based on cartographic analysis as well as exploration and field surveys. All data were entered into a single Geographic Information System (GIS: software: ArcGIS Desktop 10; spatial reference was UTM WGS 84).

The aim of the study was to delineate areas showing Holocene geomorphologic dynamics within the oasis of al-Kharj, and to explain the distribution of archaeological sites through interpretation of these results.

FIELDWORK METHODOLOGY

The preparatory work was carried out using maps and satellite imagery (Table 2). Field exploration was conducted in areas that seemed interesting or necessary for the understanding of dynamics, structures and soil development (lake or stream deposits, faults, surface geology, etc.). Each excursion was recorded, with photographs, GPS coordinates and notes in association with information from the geological map.

DOCUMENT	DATE	NB. OF TILES
Geological map 1:250,000	1991	1
Saudi topographical maps 1:50,000	1983	8
Russian topographical maps 1:200,000	1979	1
Landsat imagery ETM+	1983-89-2003-2011	4
SPOT imagery	2011	4
Worldview imagery	2011	1
Corona imagery	1976	2
DEM ASTER (30m)	2010	4
DEM SRTM (90m)	2005	1
Google Earth Land Cover	2003-2011	-

Table 2 | List of maps and satellite imagery used

In such arid regions, water is the determining condition for human settlement. The reconstruction of fluvial dynamics therefore allows the most interesting areas in terms of archaeological potentiality to be defined.

Priority was given to the wādī system within the oasis, major wādīs (Wādī Nisāḥ, Wādī Ḥanīfa, Wādī Sahbā') as well as minor ones. When no evidence of recent fluvial activity was found, the team searched for evidence of past fluvial activity, such as alluvial terraces, which could provide information about past wādī beds. In addition, the geological map reveals two palaeolakes within the oasis, one south-west of al-Kharj, the other one north-west of the city.

GEOMORPHOLOGICAL CARTOGRAPHY

Once all necessary data had been collected, the first step consisted of a centralization within the GIS. When necessary, digital and cartographic documentation was georeferenced. The database of archaeological sites was also added to the GIS.

The second step consisted of the digitization of the geological map, converting features into polygons (**fig. 8**).

Once fully digitized, ArcGIS data were exported in an Adobe Illustrator format. Starting from the polygon layer, the work consisted of grouping together polygons with similar values, and attributing a pattern corresponding to the conventional representation of the rock to them. We have mainly focused on the quaternary dynamics related to our research topic (alluvial deposits, terraces and palaeolakes). Finally, illustrations indicating tectonic and structural elements have been added as well as known elevations. The final map is intended to show the general geomorphological background in the oasis of al-Kharj (**fig. 9**).

Holocene dynamics

The geomorphological study focused on five different areas whose dynamics have structured the landscape of the oasis (**fig. 10**). In this field study, we can make an initial assessment of the Holocene geomorphological dynamics.

SLOPE DYNAMICS

Slope dynamics are minimal in the region. These slopes are mainly affected by the phenomenon of thermal fracturing. The fine particles (clay, silt, sand) are in turn subject to a sometime intensive deflation, especially in the north of the Wādī Nisāḥ (many fields of barchans). South of the Wādī Nisāḥ, the presence of a large 'glacis' has been noted; it lies at the foot of a limestone plateau (zone 2). This 'glacis' whose slope is very slight is cut through by the Wādī al-'Ayn. Even the slopes that are affected by large-scale faults are not subject to intense erosion, for example, to the north of the Wādī Sahbā'. Rivers often incise already fractured rocks (**fig. 11**) and their dynamics do not allow them to form large alluvial fans at the mouths of the valleys. The best evidence to illustrate the weakness of these dynamics is archaeological: in the necropolis located on the southern side of al-Kharj, even the tombs on the line of the greatest slope are still in place and have not been affected by erosion.

Regionally, all the observations argue for high slope stability, at least during the Holocene.

WĀDĪ DYNAMICS

Regionally, the four main wādīs are the Wādī al-'Ayn to the south (zone 2), the Wādī Ḥanīfa to the north-west (zones 3–4), the Wādī Nisāḥ to the west (zone 1) and the Wādī Abā al-Dharr to the east (zone 5).

■ *Physiography*

The Wādī Nisāḥ is bordered by the slopes of a graben made of limestone and sandstone formations. Its course is constrained, it does not reach the plain of al-Kharj and ends in *khabra* deposits.

The Wādī al-‘Ayn, to the south, is larger and has a few tributaries. They have incised the limestone plateau to the west and the large ‘glacis’. The talwegs are more pronounced but the bed of the Wādī al-‘Ayn remains narrow and shallow in the plain. Currently, its course stops at the town of al-Kharj.

The Wādī Ḥanīfa is more complex. Associated with several tributaries, it is probably the cause of most of the alluvial sedimentation in the plain of al-Kharj. It stops around the archaeological site of al-Yamāma. Several palaeo-channels found downstream of the site, in the valley of the Wādī Sahbā, can however be attributed to it. This is a sign of more significant past dynamics.

The Wādī Abā al-Dharr, south-east of al-Kharj, is the most active. The downstream part is still in water and is used to irrigate agricultural areas, particularly using a reservoir approximately 200 m in diameter. In its upper part, this wādī is much more incised and bordered by well-marked alluvial Pleistocene terraces. These terraces refer to past hydrological dynamics incommensurate with those currently underway and certainly going back to the Pleistocene.

■ *Terraces*

The alluvial terraces are only present in the Wādī Abā al-Dharr. Several factors may explain their presence: it is a small stream and its gradient is steeper than the other wādīs. We can assume that it is most sensitive to past changes in climate and hydrology. The terraces are mainly located in the middle and upper course. We found at least three different levels of terraces (**fig. 12**). All are made of pebbles, sand and gravels, sometimes cemented for the highest terraces. These terraces are the only morphological indicators of regional Quaternary climatic fluctuations.

■ *The lower alluvial terrace in the plain of al-Kharj*

The Holocene alluvium is not very thick in the plain of al-Kharj and around the archaeological site of al-Yamāma. The study of abandoned wells in villages around the site (**fig. 13**) shows the existence of a low terrace consisting of pebbles and gravels (**fig. 14**). This terrace is the product of much more powerful past alluvial dynamics. The study of six different wells allows us to locate this terrace between 3 and 5 m below the actual topographic surface of the archaeological site. Without any absolute date, it is difficult to comment on the age of this lower terrace, but it is generally accepted in the Arabian Peninsula that these terraces were established during the late glacial period or during the early Holocene. Therefore, a sedimentation of about 4 m over the last 8,000 years in the middle of the plain can be inferred.

■ PALAEOLAKES

To the south-west of al-Kharj and to the north of the Wādī Nisāḥ, two large, flat areas can be interpreted as palaeolakes. The first is currently crossed by the Wādī al-‘Ayn and the second is located at al-Barra, at the foot of a graben, near a palaeo-course of the Wādī Ḥanīfa (**fig. 9**).

These large tracts of former lakes (**fig. 15**) were filled with water due to a rise in the water-table, probably during periods of wetter climate. These lakes are conspicuous in the topography. A survey conducted in the first lake indicates the presence of a very hard

brown clay layer, about 60 cm deep. This clay, encrusted with gypsum, bears witness to the sedimentological setting of an area of shallow water. It is difficult to date the end of the existence of these lakes precisely. However, a radiocarbon date was done on a shell from the lake of the Wādī Ḥanīfa. The resulting date is 7,000 ± 400 years BP-uncal. (VASLET *et al.* 1991: 33).

GENERAL DYNAMIC OF THE RIVERS

Overall, the Holocene dynamics are minimal. Sedimentation is slightly marked and refers to past dynamics. Surface flow is also very limited. We can assume that most of the water resources are underground and mainly through groundwater underflow that could emerge locally and create shallow lakes.

At this point of our study, we can conclude that the large surfaces of the plain of al-Kharj are today fossil surfaces, mainly affected by the phenomenon of deflation and accumulation of sand.

Discussion on the links between geomorphological and palaeo-environmental changes and human occupation

THE ISSUE OF WATER RESOURCES

In desert environments, this issue is central to the comprehension of the settlement process. This question should take into account the dynamics of past environmental evidence which are sometimes tenuous.

In the plain of al-Kharj, the last major flows back to the surface apparently belong to the late glacial period and early Holocene, as evidenced by the existence of the lower terrace observed down the wells. There is no evidence of development of surface watercourses. Lakes would not even have been a valuable resource: the amount of gypsum found on their surface indicates brackish or salty water, so probably unsafe to drink. Thus, the main source of water is groundwater which flows under the surface of the alluvial deposits (underflow).

Archaeological evidence provides insights into the precarious aspect of this groundwater: the underground water channel at Abraq Farzān was dug several times (at least twice), which could be indicative of a decrease in the level of the groundwater, at least during the last 2,000 years. Today, water for irrigation comes from pumping fossil water located about 300 m below the surface.

LOCATION OF ARCHAEOLOGICAL SITES

Superimposing the archaeological sites on the geomorphological map is revealing: all the sites are located on stable areas and nearby former water sources (**figs. 16, 18, 49, 79**).

During the Palaeolithic, the location of lithic resources was clearly very important since many occupations were found near quartzite deposits, but never far from the wādīs.

During the Bronze Age, the vast necropolises are all located on the slopes overlooking old watered areas: south of al-Kharj, one overlooks the palaeolake; in the graben of the Wādī Nisāḥ, they overlook the river and are located around another palaeolake. In the Wādī Abā al-Dharr, dozens of similar tombs were discovered during the geomorphological survey: they are all located on a slope overlooking the wādī bed.

FUTURE STUDIES

To understand the relationship between archaeological and geomorphological dynamics better, environmental contexts throughout the Holocene should be studied.

- A systematic study of the fluvial terraces, combined with OSL datings should provide us with a chronology of the hydrological dynamics throughout the late Quaternary.
- A drilling campaign in the plain of al-Kharj, around the site of al-Yamāma, associated with radiocarbon dates, should allow us to reconstruct the dynamics of the Holocene infilling.

The diachronic approach of the results, coupled with the results of archaeological surveys will allow us to create predictive archaeological maps, providing answers to essential issues such as the location of Neolithic sites.

Conclusion

This first regional geomorphological study resulted in the drawing of a geomorphological map. This study was conducted using several cartographic sources and an intensive field survey.

Overall, it appears from this study that the Holocene dynamics are minimal in the area, the slopes are stable and only affected by deflation. The streams studied showed that their surface dynamics are also minimal. The thickness of the Holocene alluvial plain confirms these low flows. Water resource is groundwater and is through groundwater underflow, only exceptionally flowing on the surface.

The study of the past environmental dynamics is very important for the archaeological study of the area: it provides an understanding of the settlement process which escapes us today and provides orientation for forthcoming archaeological surveys.

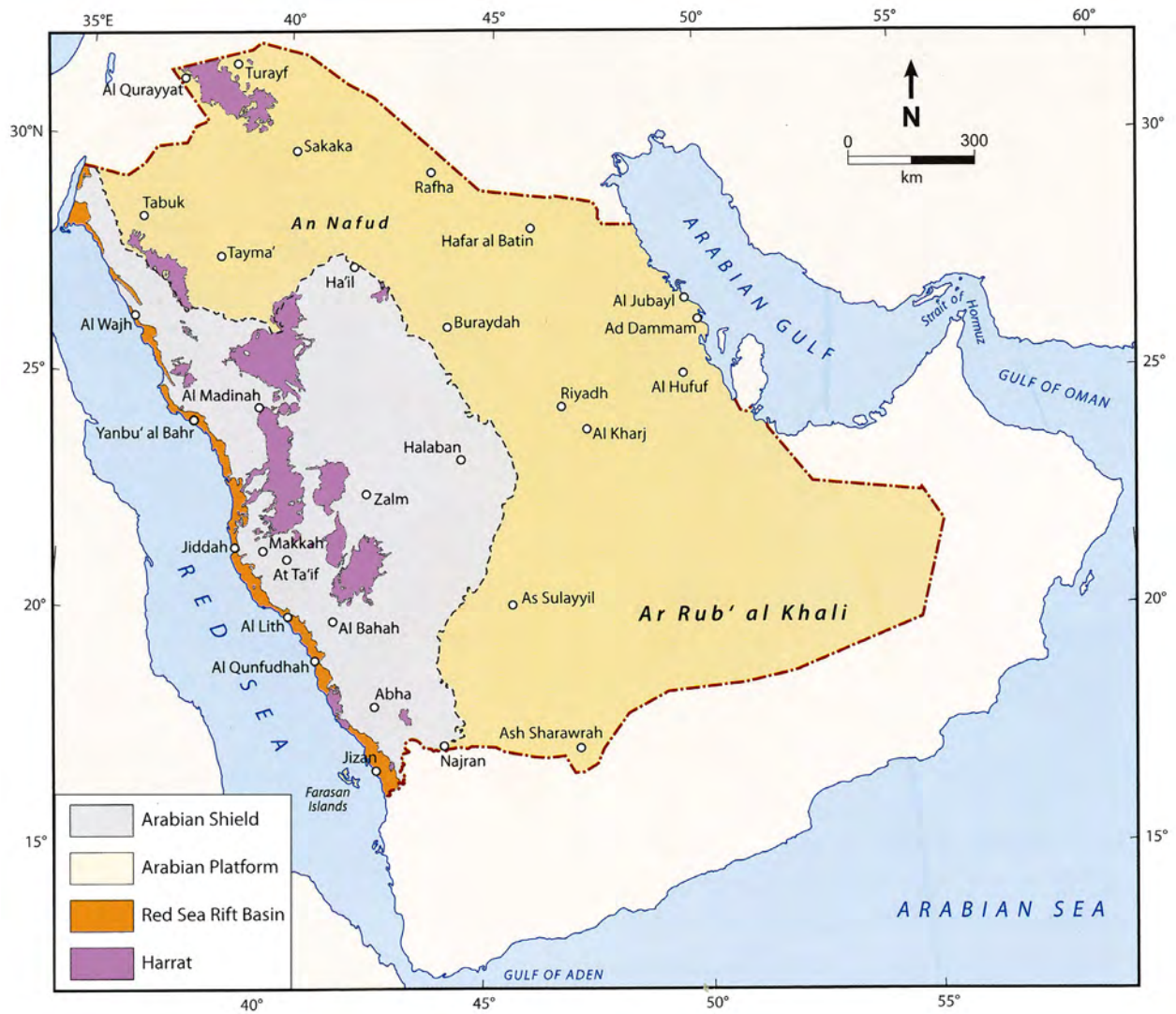


Figure 3 The main geological units of Saudi Arabia (from GRAINGER 2007: 46, fig. 3.4)

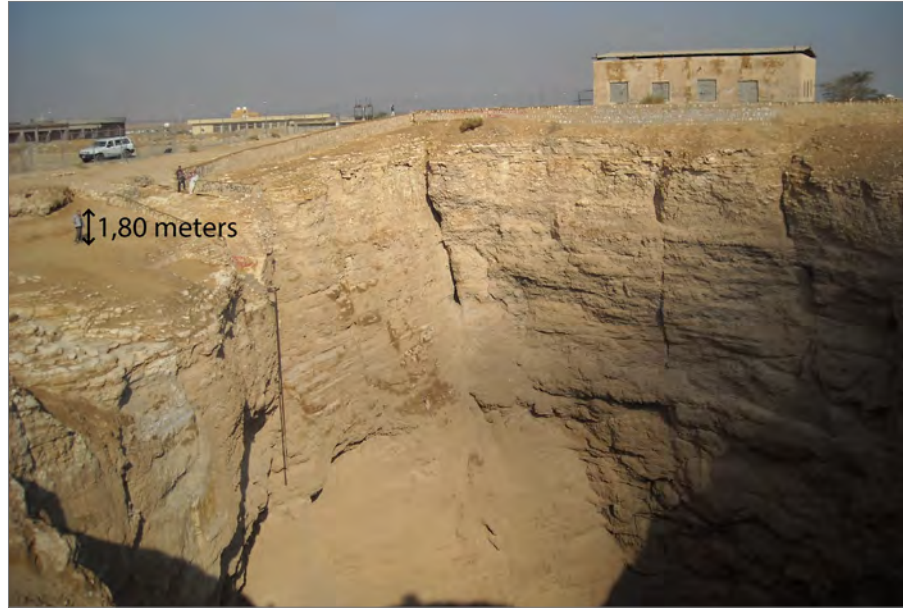


Figure 4 One of the swallow holes in 'Ayn al-Dīla', southwest of the city of al-Kharj (photograph: G. Fortin)



Figure 5 The two major swallow holes in 'Ayn al-Dīla', looking northwest (photograph: Th. Sagory – French-Saudi Archaeological Mission in al-Kharj)

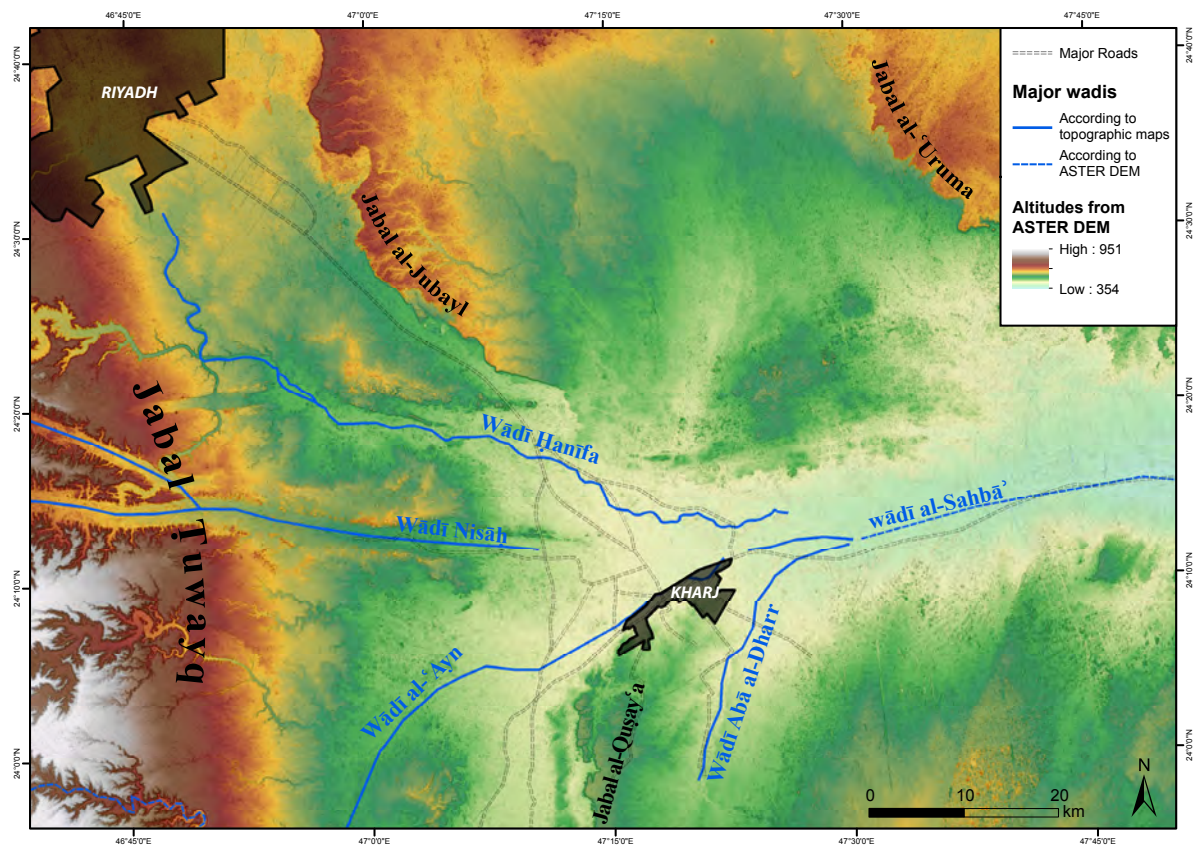


Figure 7 General overview and elevation of the oasis of al-Kharj (G. Fortin, after the DEM-ASTER 30 m)

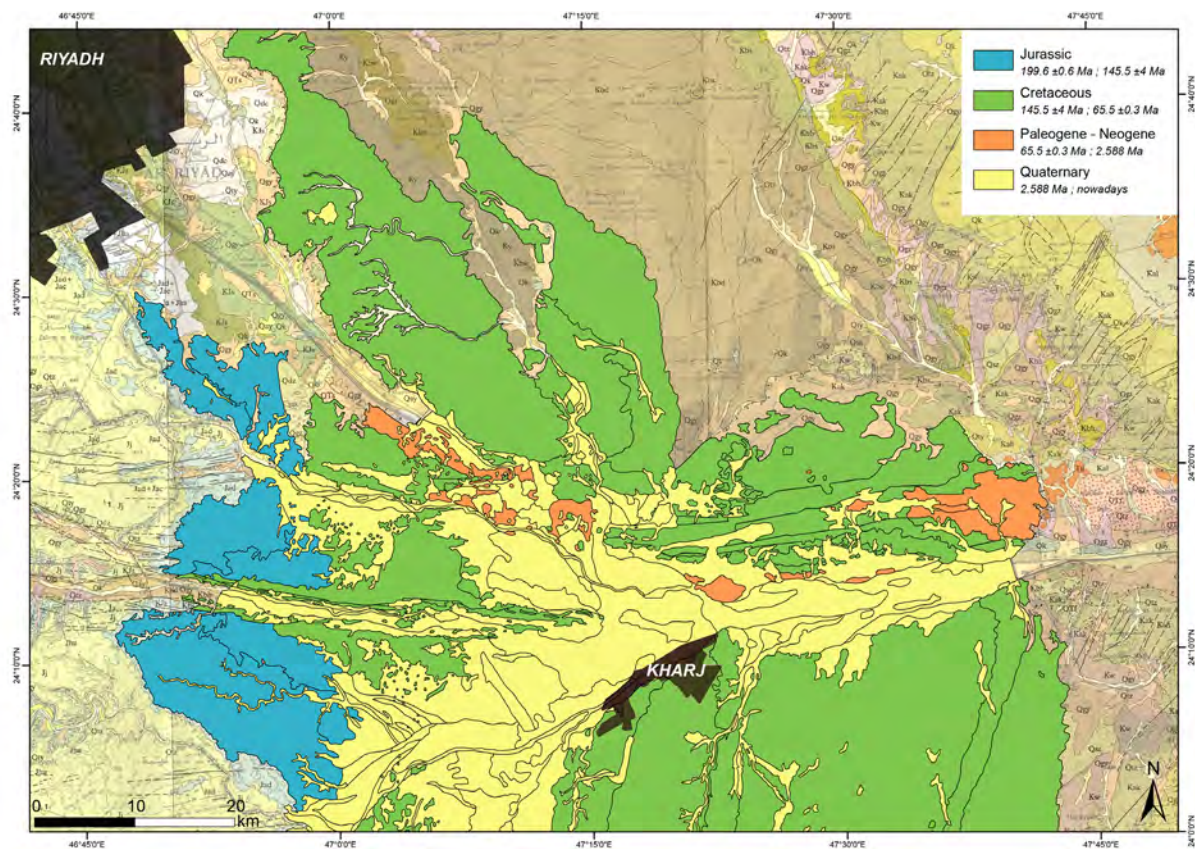


Figure 8 Vectorization and digitization of the geological map of the study area (Digitization: G. Fortin, after the *Geologic Map of the Ar-Riyadh Quadrangle, Sheet 24 I* by VASLET *et al.* 1991)

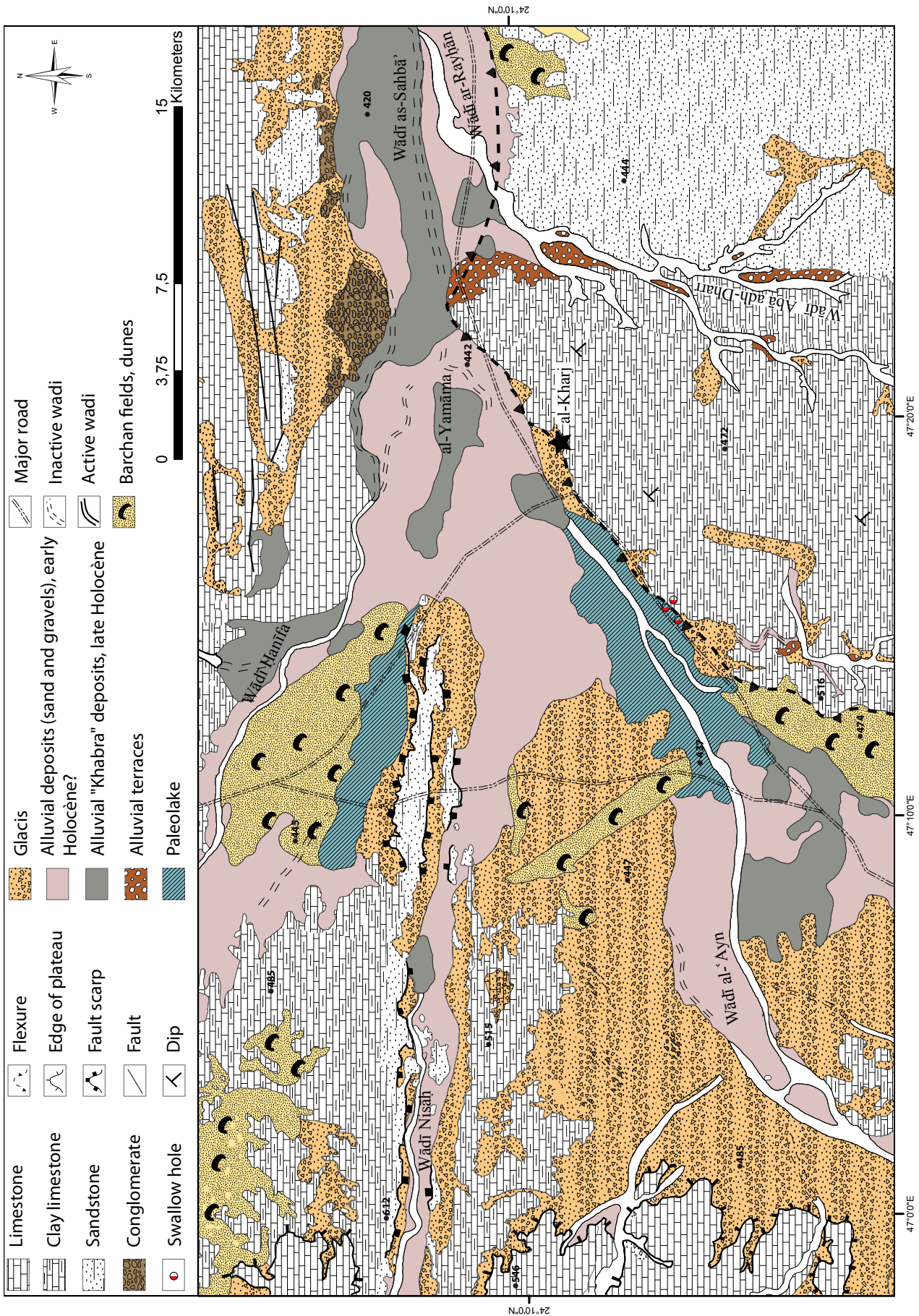


Figure 9 Geomorphological map of the study area (A. Chabrol and G. Fortin)

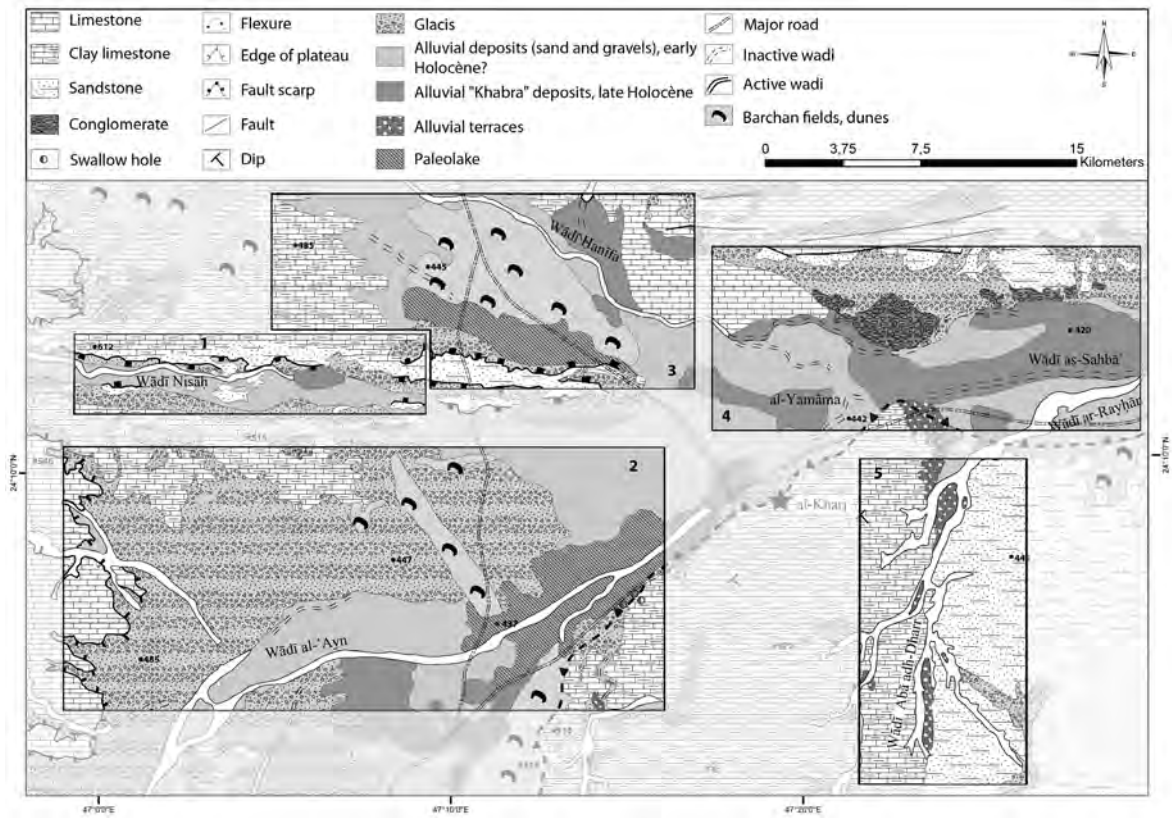


Figure 10 Location of the surveyed areas (A. Chabrol and G. Fortin)

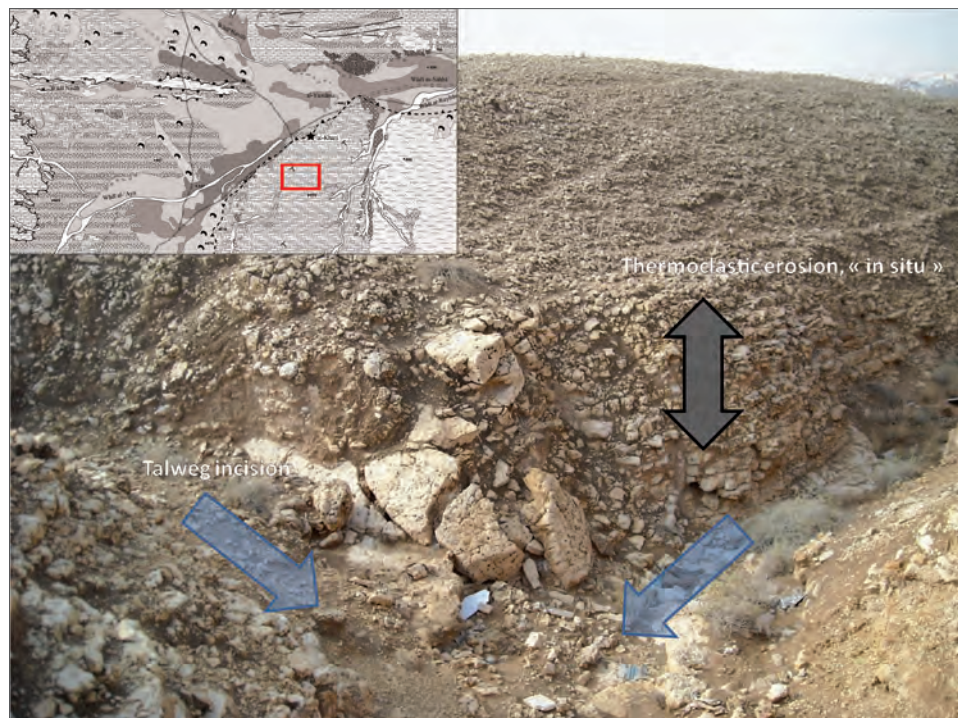


Figure 11 *In situ* thermoclastic erosion and incision of the thalwegs (A. Chabrol and G. Fortin)

Figure 12 Alluvial terraces in the Wādī Abā adh-Dharr (A. Chabrol and G. Fortin)

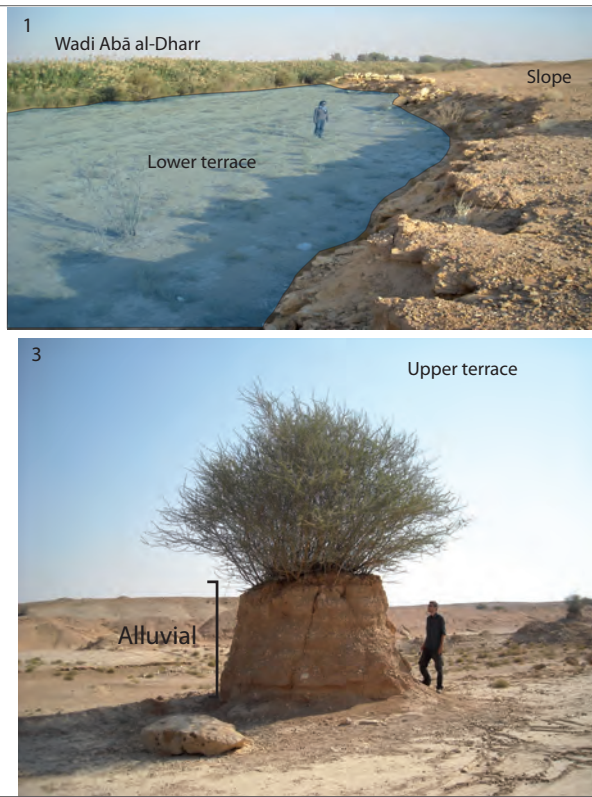


Figure 13 Old villages near the site of al-Yamāma (G. Fortin, after Google Earth 7.0. 2013. Yamāma – 24.19°N-47.33°E, 427 m. Includes DigitalGlobe™ product)

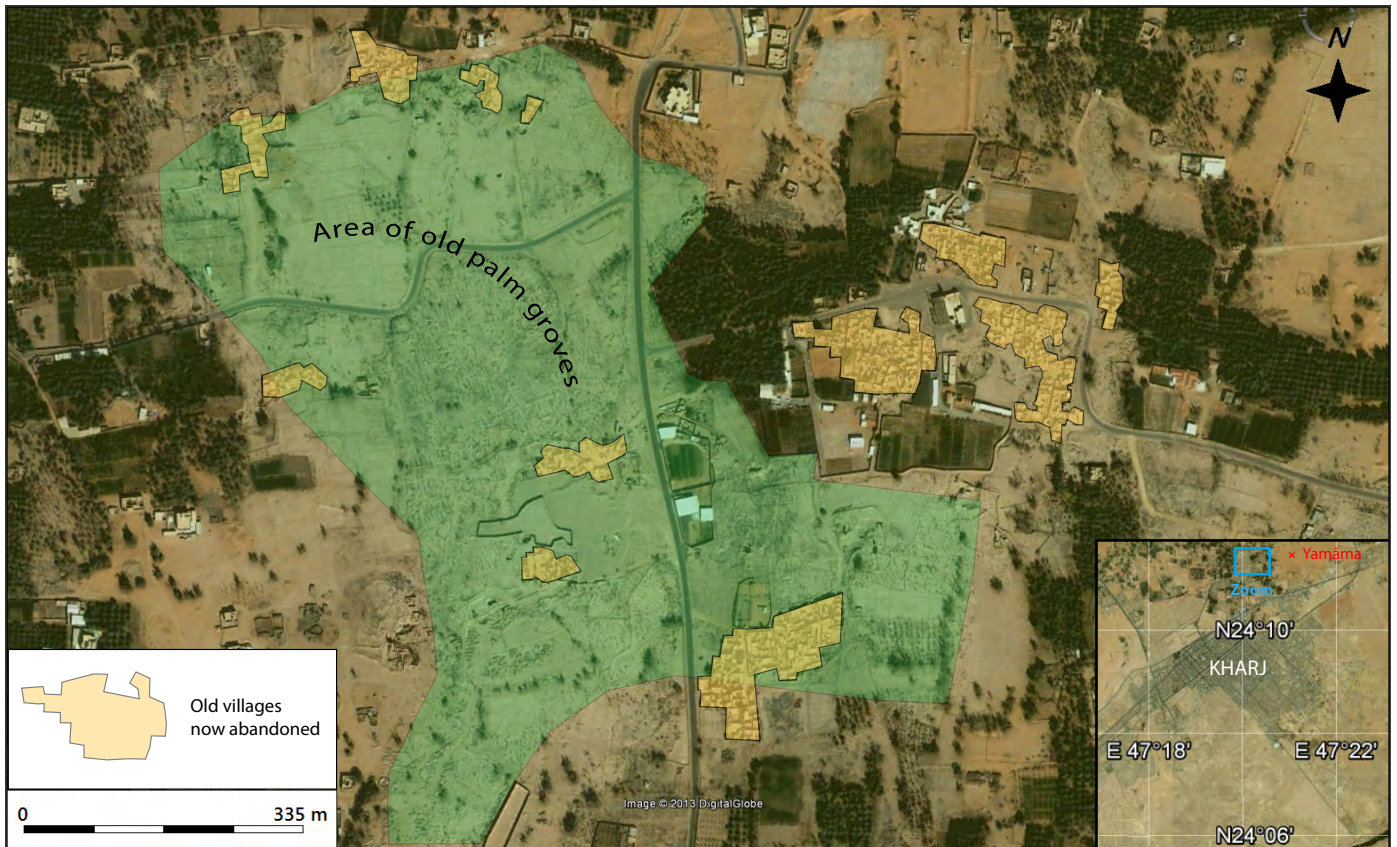




Figure 14 Low alluvial terrace in a well, seen in an abandoned village east of the archaeological site of al-Yamāma (A. Chabrol and G. Fortin)

Figure 15 View of the palaeolakes. The low topography clearly indicates the palaeo-banks (A. Chabrol and G. Fortin)



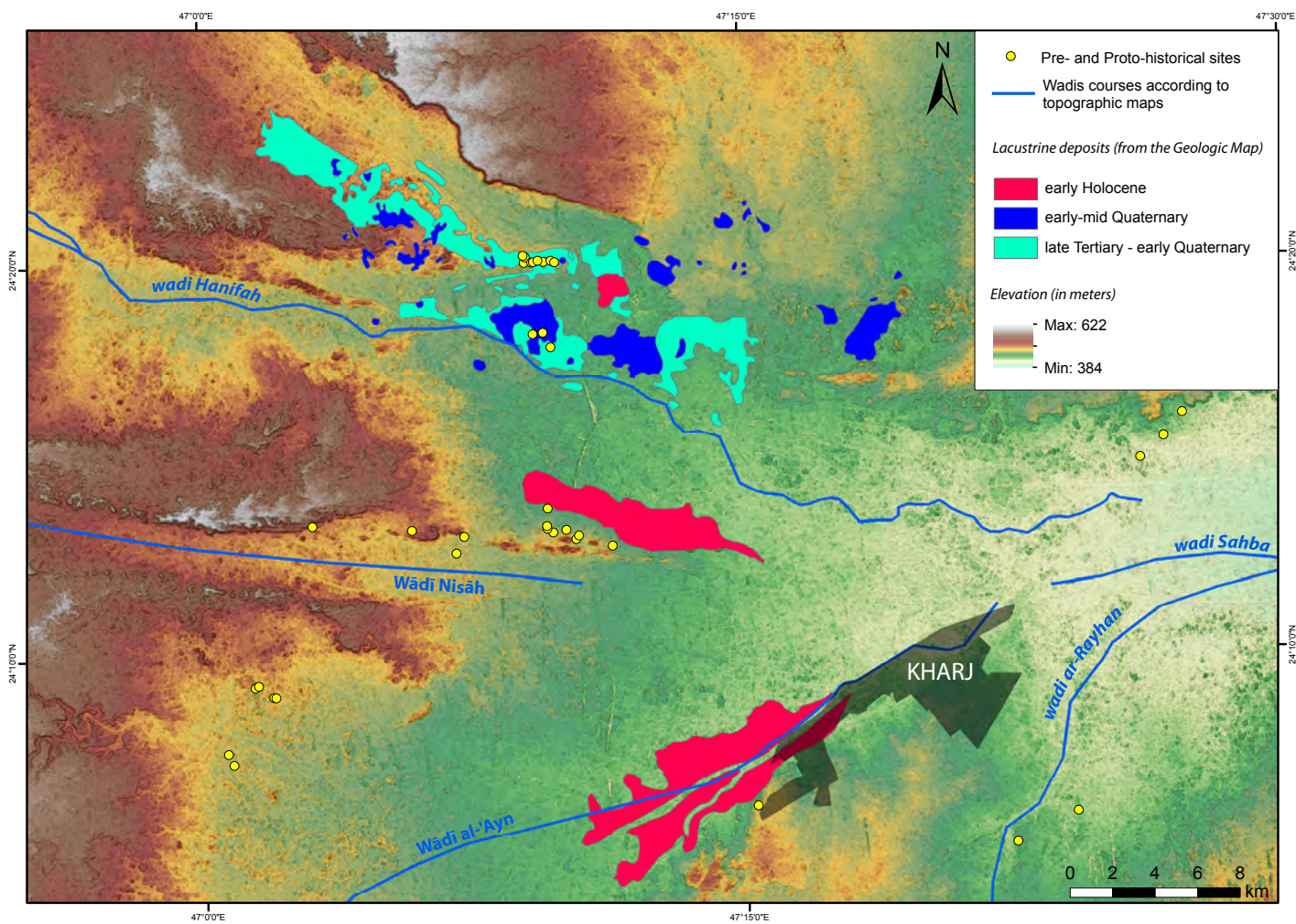


Figure 16 Archaeological sites superimposed on the map of palaeolakes in the region of al-Kharj (G. Fortin and J. Schiettecatte)

CHAPTER 2

THE PREHISTORY OF THE REGION OF AL-KHARJ

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The significance of al-Kharj region within the Arabian context

Al-Kharj is located in the central part of the Arabian Peninsula thus providing a new point of reference for regional and intraregional comparisons with other sites known in the Kingdom of Saudi Arabia, Yemen, Oman and the United Arab Emirates. Given the dearth of Palaeolithic sites in the area surrounding the city of al-Kharj, the results presented here greatly expand our knowledge concerning prehistoric occupations and population dispersal across the central portion of Saudi Arabia.

Comprehensive studies on the Arabian Palaeolithic are a relatively recent phenomenon, compared to the long-standing traditions of research in Europe, Africa or the Levant. In recent years, the myriad excavations and survey activities in Yemen and Oman (AMIRKHANOV 2006; ROSE 2006; CRASSARD 2009a; DELAGNES *et al.* 2012, 2013; ROSE *et al.* 2011; HILBERT 2012, 2013; HILBERT *et al.* 2012; USIK *et al.* 2013) have provided considerable amounts of data fuelling many discussions and reflections on the role that this region has played across prehistory (AMIRKHANOV 2008; CRASSARD 2008a, 2008b, 2009a, 2009b; MARKS 2008; ROSE & BAILEY 2008; PETRAGLIA & ROSE 2009; PETRAGLIA *et al.* 2011, 2012; CRASSARD *et al.* 2013a).

Equally poorly understood, the Arabian Neolithic is represented by only a few lithic assemblages retrieved from datable context. Thus, the source of the Arabian Neolithic is highly debated: are we dealing with external influence (Levantine), local developments from autochthonous populations (ZARINS 2001, 2013; UERPMANN *et al.* 2009, 2013; CHARPENTIER & CRASSARD 2013; CRASSARD & DRECHSLER 2013; MCCORRISTON 2013; HILBERT 2013), or an amalgamation of both these scenarios? If the Arabian Neolithic is derived from Levantine sources, overlapping technological affinities between both regions should be detectable. Palaeo-environmental and palaeo-climatic studies, on the other hand, indicate that, at least in South-Western Arabia, the prevailing climatic conditions during the early to middle Holocene were conducive to the autochthonous development of a producing subsistence economy (e.g. MCCORRISTON *et al.* 2002; MARTIN *et al.* 2009; LÉZINE *et al.* 2010; PRESTON & PARKER 2013). These studies, combined with extensive lithic analyses are needed to define this period properly and better understand the Neolithic of Arabia.

Based on the aforementioned questions, the 2011 field season of the Saudi-French team was dedicated to the following research agenda:

- Exploring a region where very little work has been done before;
- Exploring a key area for understanding the spread of the first Anatomically Modern Humans (AMH) (Palaeolithic);
- Exploring an area unknown for Early-Mid Holocene occupations (Neolithic).

Methodology

SURVEY METHODOLOGY (OCTOBER 2011)

The survey activities centred on two primary objectives: 1) exploration of the whole periphery around al-Kharj (survey of northern, eastern, southern and western parts around the modern city of al-Kharj); 2) exploration of raw material outcrops, sources of knapping stones for Pleistocene and Early/Mid-Holocene populations. These survey activities were primarily based on the examination of the regional geomorphology and the study of geological maps.

Use of open access satellite imagery (Google Earth) and GPS tracking allowed the survey team to navigate across the studied area without great difficulties. Transects of varying distances (4 to 5 km) across different areas of al-Kharj region were surveyed, mostly on foot. Upon encountering surface lithic scatters, selective collecting of pre-determined diagnostic pieces was carried out. No systematic collecting was undertaken, as only few seemingly pristine surface sites were identified. Given the post-depositional and erosive phenomena that have afflicted the surface scatters encountered, such spatially constrained collection strategies do not reveal the techno-typological characteristics of the representative prehistoric phases. Test trenches were excavated on selected occasions in order to assess the potential for yielding buried archaeological remains at some of the sites (e.g. AK-22).

Twenty-nine sites were discovered during the three weeks of survey (**figs. 17–18**). These were labelled respectively AK-01 to AK-29 (AK standing for al-Kharj). Each site was located spatially using a Global Positioning System device (hand-held GPS); the localities were described with systematic criteria, such as:

- Date of survey;
- Name of the site;
- Name of the closest topographic feature (e.g. wādī, Jabal, ...);
- Localization (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, position of artefacts, density and quantity by m², estimated surface area of the site and estimated explored area, potential of the site, preliminary dating);
- Raw material (state and type of raw material);
- Techno-typology (general dimension of pieces, types of artefacts, preliminary observations on the material, functional interpretation);
- Final notice (general potential of the site).

METHODOLOGY OF LITHIC ANALYSIS

Description of the technical process is an important criterion for defining and comparing material cultures and subsequently allows researchers to draw parallels between assemblages (e.g. BAR-YOSEF & VAN PEER 2009; TOSTEVIN 2011). Once these criteria are set, archaeologists condense the information in order to establish local technological industries (*sensu* KLEINDIENST 2006). Understanding prehistoric lithic production techniques is therefore a critical component of Palaeolithic and Neolithic studies, as the lithic industries (stone tools and flaked stones in general) are often the only remnants of human activities found in arid environments due to their resilience against destruction. The sites discovered in the region of al-Kharj in 2011 are surface sites and will not provide any absolute dates. The only way to

place these industries into a comprehensive time-frame is by comparing the techniques used with other dated sites from the Arabian Peninsula and from neighbouring areas. The sites found during the 2011 season have been attributed to the Middle Palaeolithic, which dates roughly to between 150,000 and 50,000 years before present (BP).

Previous research has revealed an abundance of sites attributed to the Middle Palaeolithic period in Arabia (ZARINS *et al.* 1979; WHALEN & SCHATTEN 1997; PETRAGLIA & ALSHAREKH 2003; PETRAGLIA 2005; ROSE 2006). These vestiges are mainly characterized by the use of the Levallois reduction method (see next paragraph for a detailed description). As previously noted, find spots have been primarily associated with surface sites. The high degree of patina observed on the artefacts coupled with the technological observations strongly indicates a Pleistocene age for the majority of these finds. Although the use of patination as an indicator of antiquity should be done with caution (e.g. HURST & KELLY 1961; RÖTTLÄNDER 1975, 1978), its use across comparable environments and similar raw materials offers some degree of reference when placing surface scatters into a chronological frame. The problem remains the absolute dating of surface material and the capability to linking Levallois production with human and faunal remains. Given the lack of contextualized site, it is imperative to provide a comprehensive record of the myriad surface assemblages in order to provide a source for regional comparison between these Levallois-dominated assemblages.

The Levallois concept is characterized by the production of flakes, blades or points in a predetermined manner through the implementation of different methods of flaking (*débitage*) (BOËDA 1994). This concept of *débitage* was used for nearly 500,000 years, from the African Early Stone Age until the Late Stone Age (MARKS & CONARD 2008; BARHAM & MITCHELL 2008). More generally, however, Levallois flake production is associated with the Middle Palaeolithic (DELAGNES *et al.* 2007). The Levallois concept was widely described and illustrated through the study of various assemblages (e.g. BORDES 1961; BOËDA 1991, 1994; DELAGNES 1992; VAN PEER 1992; VAN PEER *et al.* 2010). The Levallois production scheme is recognized across different continents: Europe, Middle East and North-East Africa (e.g. CREW 1975; MEIGNEN & BAR-YOSEF 1988, 1991, 2004; BAR-YOSEF & MEIGNEN 1992; VAN PEER 1992; DIBBLE & BAR-YOSEF 1995; MEIGNEN 1995; DELAGNES & MEIGNEN 2006; DELAGNES *et al.* 2007).

In the Arabian Peninsula, Levallois *débitage* has been identified in Yemen, first by CATON-THOMPSON (1938, 1953) and then by Van Beek (VAN BEEK *et al.* 1963), Inizan (INIZAN & ORTLIEB 1987) and AMIRKHA NOV (1991, 1994). Archaeological investigations of surface sites mention the presence of Levallois *débitage* in Saudi Arabia in the Jubba basin (PETRAGLIA *et al.* 2011), in the United Arab Emirates at Jebel Faya' NE-1 [Jabal al-Fāya] (ARMITAGE *et al.* 2011) and in the region of Filī close to Sharjah (SCOTT-JACKSON *et al.* 2008; WAHIDA *et al.* 2008), in Dhofar (ROSE *et al.* 2011) and in Yemen across the Wādī Wa'sha, the Wādī Ṣanā and the general Ḥaḍramawt region (Eastern Yemen: CRASSARD 2008a, 2009a; CRASSARD & THIÉBAUT 2011), as well as in the Western Highlands at the interface of the Tihāma coastal plain at the Wādī Surdud sites (DELAGNES *et al.* 2012, 2013; SITZIA *et al.* 2012). Thanks to these discoveries across the Arabian Peninsula, the dating of four sites by the Optically Stimulated Luminescence (OSL) method provided dates for the Levallois presence in the Peninsula between, at least, 110,000 to 42,000 BP.

Geological analysis of the micro-regions

GEOMORPHOLOGY OBSERVATION AND NOTES ON AL-KHARJ AREA

The area of al-Kharj is characterized by a variety of geological features that have attracted human populations since prehistoric times, such as the presence of suitable lithic raw material, the varying topographic landscape and the presence of subsurface (and at times

perennial surface) waters (see Chapter 1). A short description of al-Kharj quadrangle will be given here; it is based on the geological maps of the Riyadh quadrangle Sheet 241 and the accompanying explanatory notes published by the Saudi Ministry of Petroleum and Mineral Resources (VASLET *et al.* 1991). Additional field observations made by the authors are also taken into consideration.

A succession of north-west trending *cuestas* composed of Late Jurassic to Cretaceous formations with south-west facing scarps characterize the northern part of the Riyadh area. Further south the scarps are oriented towards the south-west. This change of orientation and the dip of the *cuestas* are caused by the Central Arabian Arch (POWERS *et al.* 1966). At al-Kharj the north to south running scarps are cut by the convergence of the Central Arabian Graben system composed of the Nisāḥ, Awsaṭ, Bu'ayjā' and 'Ujmān, Rufā' and the Mughara grabens (figs. 1, 17).

The west-east axis of the dip from the Red Sea Hills to the Central Arabian Shield caused the emergence of subsurface waters in the form of springs and marshes in the Riyadh area during the Quaternary and beyond. The presence of sub-surface waters is caused by the local tectonics; the rupture of the Arabian Shield by the tectonics that created the Central Arabian Graben systems would have activated natural artesian springs in the area. Given that the evolution of the graben systems underwent several phases, activation of such artesian springs would have been recurrent. The most recent tectonic event affected the Rufā' Graben, offsetting the locally outcropping Rufā' formation by 16 m. Given the lack of agreement concerning the age of the Rufā' Formation, possibly Mid- to Late Quaternary, this tectonic event may have occurred in relatively recent times (Quaternary). Examples of aquifer structures may be seen in the south of the quadrant (VASLET *et al.* 1991).

Of additional interest are the karst sinkholes south of al-Kharj; these features are up to 80 m deep and would have provided important perennial water sources for prehistoric population inhabiting the Central Province.

The paleo-wādīs in the area are marked by the homocline of the Arabian Shelf and the Central Arabian Graben System. Main fluvial structures in the region run from the Ṭuwayq Escarpment across the Ṭuwayq Plateau (fig. 19) in a general west-east course. Towards the centre of al-Kharj area, the wādī courses follow the above-mentioned graben structures such as the Wādī Nisāḥ (fig. 20) and the Wādī al-Sahbā'. South-east of Riyadh, a series of wādīs drain southward into the Wādī al-Sahbā' and have brought considerable amounts of fluvial deposits into al-Kharj cluse. Furthermore, small southward running wādīs dissect the low al-'Uruma escarpment to the east of al-Kharj (VASLET *et al.* 1991).

Lacustrine deposits formed during the early Holocene in al-Kharj cluse; radiocarbon dates of 9,000-7,000 BP (VASLET *et al.* 1991: 33) are consistent with other radiometric readings across Central and Southern Arabia (McCLURE 1976, 1978; PARKER *et al.* 2006a; PREUSSER 2009, CRASSARD *et al.* 2013b). These deposits are characterized by thin lacustrine and palustrine (wetland) sediments.

AREAS SURVEYED DURING THE 2011 SEASON

Given the limitations encountered during the 2011 al-Kharj prehistoric survey, namely the intense urbanization and agricultural usage of the area and the short duration of the field season, this study was restricted to the following areas: The Nisāḥ Graben, the southern area of the Rufā' Graben and the northern part of the Dilam depression. Sporadic visits were also undertaken to assess the potential of the following areas in and around al-Kharj: the eastern part of the Ṭuwayq Plateau, the Mughara graben and the area south-east of al-Kharj (fig. 21).

■ *The Nisāḥ Graben (sites AK-1 to AK-11) (fig. 21a)*

Extending over 75 km and averaging 2.5 km in width between its northern and southern faces, the Nisāḥ Graben is the most prominent of these formations in the area. Starting in the Ṭuwayq Jurassic limestone mountain chain, the Nisāḥ Graben extends eastwards into the suburbs of al-Kharj. This formation is divided into four segments: the Kuḥayl, the Kuḥla, the Sadḥān and the Hayāthim segment respectively from west to east. The Hayāthim segment, is the longest, spanning approximately 40 km, and is marked by diverse geological formations of the Thamām Group. These early Cretaceous formations are characterized by interchanging limestone beds in its lower portion while its upper portions are formed by calcret sandstone members. Undifferentiated Quaternary deposits of both aeolian and fluvial character cover the area within the graben and around its northern and southern edges. The Nisāḥ Graben was not filled by any lacustrine events in the course of the Quaternary or beyond.

While the geology of the eastern portion of the Nisāḥ Graben is well exposed, an extensive aeolian blanket covers its western portion making survey problematic (fig. 22). The eleven sites recorded along the northern and southern face of the Hayāthim segment were associated with raw material outcrops (fig. 18). Primarily beige to brown, black weathered, fine-grained ferruginous sandstone, locally silicate-cemented (quartzite) raw material was used. This resource is found outcropping from the Dughum member (Biyād sandstone). To a lesser extent (in the case of site AK-07) beige cherty limestone outcropping from the Yamāma member (lower early Cretaceous formation) was used. No fine-grained chert outcropping from primary deposits has been observed in this sector.

■ *The Dilam depression (sites AK-12 to 17) (fig. 21c)*

South of the Nisāḥ Graben a low depression dotted with low inselbergs, remnants of Jurassic and Cretaceous limestone, stretches across ca. 20 km (fig. 23). Inactive and partially active gravel sheets, Holocene lacustrine deposits and dune systems mask the geology of the Dilam depression. Extensive farms situated in this area cover these sediments which are extremely conducive to agriculture. To the west, a series of eastwards draining, seasonally active wādīs and gravel sheets may be described. Here the geology of the Dilam depression is most visible; mainly beige to creamy laminated limestone, dolomitic limestone and evaporite solution of the Sulayy formation (Upper Breccia Complex and the Arab C-member of late Jurassic age) are seen.

The sites found in the Dilam depression were either at the foot of low inselbergs, mostly remnants of the Yamāma formation, and across the gravel plain itself. Throughout the low and dissected landscape, disaggregated fluvial deposits of undetermined age were mapped (VASLET *et al.* 1991: 28). These fluvial deposits, possibly related to the Late Tertiary to Early Quaternary uplift of the Red Sea Hills, are to a larger extent (90%) composed of rounded quartz cobbles, and composed for 10% of other well-rounded shield and cover rocks (granite, diorite and rhyolite).

Three sites have been found associated with these unnamed fluvial deposits (AK-14, AK-15 and AK-17). These show a great variety in raw materials used and possibly a chronologically broad attribution.

■ *The Rufā' Graben (sites AK-18 to 26) (fig. 21b)*

Approximately 30 km long and between 0.8 and 1.5 km wide, in its north-south axis, the Rufā' Graben is composed of three segments, respectively from west to east: the 'Ammāj segment, the Sha'al segment and the Ashqar Marāgha segment. The northern face of the graben is marked by Jabal Umm ash-Sha'al with its rough cliff rising 80-100 m above the bottom of the graben. Beyond the cliff, this feature extends towards the north-east 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, which is 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 (fig. 16).

Survey activities were undertaken close to the contact zone between the Sulayy limestone and the Cretaceous sandstone formations in the eastern portion of the Ashqar Marāgha segment. Here, high quality, fine-grained quartzite and siltstones presenting dark weathered cortex were observed. Surface sites have been found associated with these raw material sources.

■ *Additional localities visited (AK-NULL-01 to 06)*

As mentioned above sporadic visits to areas adjacent to al-Kharj quadrangle were made during the 2011 survey campaign. These produced few results compared to the Nisāḥ, the Rufā' Graben and the Dilam depression. Either isolated artefact occurrences or the complete absence of Palaeolithic vestiges were noted. Areas surveyed and found devoid of archaeological sites have been labelled NULL sites and numbered in consecutive order.

AK Null 01 and 02 (fig. 21f) were on the Ṭuwayq plateau. This low limestone plateau is dissected by deeply incised wādī systems running from east to west. The currently dry wādī beds are filled with fluvial detritus composed of poorly sorted limestone gravels and cobbles of varying sizes. A braided pattern characterizes the sediments within the wādī beds and reflects the last event before the wādī dried out. Approximately 50 to 70 m above the wādī bed the extensive undulating limestone plateau stretches, with a gentle west-east dip, for over 30 km towards the east. No raw material sources, either in primary or secondary context could be identified. The high energy sedimentary environment inside the wādī systems were considered to be possible reasons for the absence of Palaeolithic sites in this area.

AK Null 03 was mapped on the Jabal Umm ash-Sha'āl plateau north of the Rufā' Graben; similar to the Ṭuwayq plateau this area is marked by wādī systems running from west to east. These wādī systems were less incised than the Ṭuwayq Plateau. Again the absence of suitable raw material was regarded as cause for the lack of Palaeolithic sites. Also, the intense agricultural use of this area imposed severe constraints to survey activities.

The Mughara Graben has yielded both NULL sites and a few isolated occurrences; north of al-Tawḍiḥiyya, isolated occurrences AK-28 and 29 and a NULL site (AK Null 04) were mapped (fig. 21e). The area was marked by a low, inactive gravel plain, dissected by small seasonally active run offs; outcrops of unnamed fluvial deposits (discussed in the Dilam depression section) were identified here. A few isolated undiagnostic stone tools were found associated with these outcrops. To the north, a gently rising scarp (Yamāma formation) may be seen. Here, a few raw material outcrops were identified. As in similar outcrops around al-Kharj area, the Yamāma formation contained up to one-metre-thick silicified and ferruginized hard ground horizons. These have been used as raw material sources at other Paleolithic sites in the Nisāḥ Graben. Here, these sediments appeared to display a higher iron oxide content, reducing knapping capabilities. Again, the absence of Palaeolithic sites may relate to the lack of suitable raw material.

Results

During the 2011 prehistoric survey, Middle Palaeolithic sites of varying size have been identified. Unfortunately, little evidence hinting at this area's Early/Mid-Holocene occupation was found. Only a few isolated artefacts were discovered and tentatively attributed to a post-Palaeolithic period based on fresher state of weathering, as well as different techniques used by the flint-knappers. This absence does not mean a total absence of Neolithic presence in the region of al-Kharj. The general topography of this flat region could also explain this absence (see Chapter 1), as the alluvial plain surrounding the oasis area has experienced considerable sediment build-up over the course of the Holocene. This sediment accumulation probably caused the re-deposition, dismantling and burial of Early Holocene sites and former surface scatters. Survey of the first terraces and higher mounds equally failed to produce evidence of Early/Mid Holocene human occupation. These higher elevations, however, have produced a considerable quantity of Middle Palaeolithic artefacts, raising the question of whether the absence of younger material is a function of the mode of subsistence and land use of Holocene human groups in the area.

The predominance of Middle Palaeolithic sites could be explained by geomorphology, geology and the analysis of the landscapes in conjunction with the palaeo-environmental data. The various wetter phases that occurred during the Pleistocene would have transformed the hostile environments of Central Arabia into a semi-arid savannah, capable of sustaining a much larger biomass than under present conditions; human populations would be attracted to such environments (PARKER & ROSE 2008; ROSE & PETRAGLIA 2009; FLEITMANN & MATTER 2009). The Middle Palaeolithic period represents a long timeline across which numerous waves of human expansion could have occurred. The various Middle Palaeolithic industries found across al-Kharj area could therefore represent multiple diachronic dispersals of human groups across Central Arabia. Thus, it is possible to argue that the sites discovered around al-Kharj are the product of various stages of peopling across considerable chronological depth. The variability seen across these lithic industries, however, gives considerable information about the cultural and cognitive development of the Hominids who manufactured them. The technological variability of the Levallois *débitage* found within the collected assemblages, coupled with previously known and studied artefacts from the Northern and Southern Arabian Peninsula, indicate some degree of movement across Arabia without erasing the possibility of identifying local variability.

LIST OF SITES DISCOVERED

All 29 sites discovered during the 2011 survey are surface sites characterized by the production of stone tools. The archaeological material found consists of lithics. They are mostly ferruginous quartzite and various other types of coarse-grained raw materials; a small number of artefacts were made on chert. Most of the lithics found have been attributed to the Palaeolithic, most probably the Middle Palaeolithic. **Table 3** lists the localities, the date of discovery, the name of the site, latitude, longitude and approximate altitude (in metres above sea level).

DESCRIPTION OF SITES AND ASSOCIATED LITHIC INDUSTRIES

■ AK-01

Little sign of disturbance by older and younger archaeological occurrences were observed. The presence of possible Bronze Age cairn/tower tombs at the base of the jabal was noted.

Presence of Levallois *débitage* and cores, typical of the Middle Palaeolithic of Arabia (fig. 25). Potential for comparisons with Northern and Southern Arabian Levallois assemblages.

SITE	LATITUDE (DECIMAL DEGREE N)	LONGITUDE (DECIMAL DEGREE E)	ALTITUDE (METRES ABOVE SEA LEVEL)	DATE
AK-01	24.212180	47.904730	461	02/10/2011
AK-02	24.215930	47.172590	494	02/10/2011
AK-03	24.217580	47.173770	471	03/10/2011
AK-04	24.219881	47.167978	467	03/10/2011
AK-05	24.218980	47.162014	471	03/10/2011
AK-06	24.220591	47.159326	471	03/10/2011
AK-07	24.221595	47.159159	472	03/10/2011
AK-08	24.210669	47.117059	473	04/10/2011
AK-09	24.217671	47.120739	472	04/10/2011
AK-10	24.220538	47.096546	504	04/10/2011
AK-11	24.222623	47.050613	508	04/10/2011
AK-12	24.154530	47.023319	483	05/10/2011
AK-13	24.155370	47.024801	493	05/10/2011
AK-14	24.150531	47.031849	478	05/10/2011
AK-15	24.150337	47.032837	479	05/10/2011
AK-16	24.126590	47.010537	482	05/10/2011
AK-17	24.121931	47.013013	476	05/10/2011
AK-18	24.333689	47.159155	473	08/10/2011
AK-19	24.333340	47.150241	472	09/10/2011
AK-20	24.335700	47.150731	474	09/10/2011
AK-21	24.336320	47.149659	481	09/10/2011
AK-22	24.333481	47.153702	474	09/10/2011
AK-23	24.333720	47.154454	474	09/10/2011
AK-24	24.334178	47.156502	477	10/10/2011
AK-25	24.334149	47.162540	475	10/10/2011
AK-26	24.333563	47.164320	474	10/10/2011
AK-27	24.097690	47.402649	439	12/10/2011
AK-28	24.214588	48.070783	369	13/10/2011
AK-29	24.219290	48.065610	384	13/10/2011

Table 3 | List of prehistoric sites discovered during al-Kharj survey 2011

■ AK-02

Surface site on the second terrace of a flat inselberg chain (**fig. 26**). Raw material is present and characterized by slabs of pale quartzite (beige with darker striation). Artefacts present a light patination. The artefacts are undiagnostic, mostly large flakes and single platform, unidirectional cores. No Levallois technology was observed. Cairn tombs, 3 m in diameter, were noted in the general area of the lithic scatter. A connection between the structures and the surface scatter is unlikely.

■ AK-03

Surface site close to the asphalt road along the northern edge of a small mountain chain north of Wadi Nisāḥ. The surface scatter covers an 80 × 40 m area at the foot of the jabal (**fig. 27**). Artefacts were found on a relatively flat surface with a slight dip to the N/NW towards the gravel plain. The site is cut by two erosion gullies filled with aeolian sediments. Middle Palaeolithic Levallois (centripetal recurrent) cores and *débitage* and one biface preform were collected (**fig. 28**). The artefacts are generally intermediate to large in size. Their patination and weathering varies, suggesting that the site consisted of at least two occupation events. Some of the artefacts present classical rounded edges from wind/water weathering (desert varnish). Raw material, mostly yellow quartzite, has been observed near the site. Possibly Bronze Age tombs were identified in the proximity of the scatter on a shallow slope.

■ AK-04

The site covers an area of approximately 50 × 50 m in the proximity of a dark weathered sandstone outcrop (**fig. 29**). Very low artefacts density (less than 1 piece/m²). Quartzite was seen outcropping close to the site (approximately 50 m away). Artefacts were found on a slightly inclined surface. A few Middle Palaeolithic artefacts, mostly big flakes with heavy patination; no cores were found (an informal collection was undertaken).

■ AK-05

The site AK-05 covers ca. 50 × 50 m in the immediate proximity of an inselberg (**fig. 30**); artefacts are scattered across a flat surface. Low artefact density (0–3/m²). Flakes showing well-faceted striking platforms (Middle Palaeolithic) were observed. Cores were also collected and were identified as Levallois centripetal recurrent cores. Quartzite raw material is available in the vicinity of the site (50 m).

■ AK-06

Site on the foot of a black quartzite jabal (raw material outcrop), on a slightly dipping surface facing south (**fig. 31**). Artefacts made on quartzite, low density (0–3 per m²). Informal collection of Levallois centripetal recurrent cores and flakes (Middle Palaeolithic) (**fig. 28**).

■ AK-07

Site on top of an inselberg (above AK-06), with a flat surface dipping slightly towards the centre (**fig. 32**). Moderate to high density of artefacts with 1–7 per m². Concentrated zones of lithic scatters were observed. Raw material outcrops directly in the proximity of the site. Exogenous raw material was found at the site (like chert, a raw material not outcropping on site). The Levallois centripetal recurrent reduction method characterizes the artefacts collected. Many cores and some Levallois flakes were identified.

■ AK-08

Site directly on a raw material outcrop (large quartzite blocks) on the south side of a small isolated mound in the middle of a confluence of the Wādī Nisāḥ and one of its small

tributaries (*shi'b*) (**fig. 33**). The site may be described as having low artefact density (0–2 per m²). Artefacts are spread across a gentle slope and display a dark patina. The site covers ca. 30 × 20 m. Artefacts are for the most part large undifferentiated/undiagnostic flakes with unidirectional scar patterns. Although the technology may be described as largely undiagnostic, the heavy weathering observed on the artefacts suggest a Pleistocene age.

■ **AK-09**

Site close to some raw material (yellow quartzite slabs/blocks). Located at the foot of the northern chain of the Wādī Nisāḥ on a slightly inclined alluvial surface (**fig. 34**). The artefacts are heavily weathered (desert varnish) in comparison to the freshly eroding raw material found at the site. The site is marked by a low density (0–1 per m²) of artefacts generally exhibiting Levallois (mainly centripetal recurrent) technology. Site spreads across an area of ca. 50 × 20 m and is likely to be Middle Palaeolithic.

■ **AK-10**

Isolated preferential centripetal preparation Levallois flake and big almond-shaped plano-convex biface. Poor visibility since the area is covered by sand. A few quartzite flakes with no specific technological attributes are present. Very low artefact density (less than 1 per m²) on a slightly sloping area.

■ **AK-11**

Site is located directly on a raw material outcrop and marked by a low to moderate artefact density (0–3 per m²). The site spreads across an area of ca. 30 × 30 m, starting on a moderate to steep slope across to a slightly dipping surface below the raw material outcrop (big blocks of dark quartzite). A small erosion gully cuts the talus slope of the jabal close by; erosion did not affect the surface scatter. Low to moderate density, mainly intermediate and large flakes (possible preform preparation on site). A good example of Middle Palaeolithic recurrent centripetal Levallois core was collected (**fig. 28**).

■ **AK-12**

A few isolated (0–1 artefacts per m²) finds spread across approximately 100 m². The site is located close to a low-lying limestone scarp remnant. Raw material is present on the slope of the limestone hill (dark quartzite). One large biface and a few undiagnostic flakes were recorded; chronological attribution is difficult (**fig. 28**).

■ **AK-13**

The site is located on top of a limestone inselberg on a raw material source (dark quartzite), above site AK-12 (**fig. 35**). Reduction of a few single blocks of raw material; these were collected exhaustively for possible and most probable refits. Reduction of large 40 to 50 kg raw material blocks, most probably for using huge flakes as cores; this is probably a raw material procurement site. Artefacts concentrate in small patches of 2 m².

■ **AK-14**

High density site on a low alluvial fan remnant situated on low gravel plain (unnamed alluvial deposits) (**fig. 36**). Moderate to high density site with approximately 1–7 artefacts per m². The site spreads across an area of 100 × 200 m. AK-14 is located on a slight slope and on flat terrain delineated by low hills. Varied raw materials have been identified at the site and are incorporated within the unnamed alluvial deposits; mainly middle-sized blocks and slabs of flint/chert and a little quartzite (also possibly chalcedony). Multi-occupational site with a robust Pleistocene/Middle Palaeolithic component. Some possibly Holocene flaking

was also observed, unfortunately chronological attribution is based on undiagnostic *débitage* and lighter patination in comparison to Pleistocene material. The Pleistocene component is marked by centripetal recurrent Levallois, Levallois preferential, single and multi-platform cores, and biface technologies.

■ **AK-15**

Continuation of site AK-14. High density scatter on low alluvial fan remnant positioned on low a gravel plain west of AK-14. Approximately 1–7 artefacts per m². Site spreads across 10 × 20 m and up onto the slopes of one of the surrounding small hill. Varied raw materials, mainly middle-sized blocks and slabs of flint/chert and quartzite (refits were made on site from an exhaustive collection). Mainly Pleistocene/Middle Palaeolithic. There may be some Holocene flakes and elongated flakes (few). The technology is characterized by centripetal recurrent Levallois, Levallois preferential (**fig. 37**).

■ **AK-16**

Low density site (0 to 1 artefact per m²) spread across an area of 20 × 50 m. The scatter is situated on a limestone inselberg directly on the raw material source (**fig. 38**). Artefacts are on a slightly inclined slope. Fine-grained raw material. A Levallois core and a few flakes indicate a likely Middle Palaeolithic surface scatter.

■ **AK-17**

Low density site (0–2 artefacts per m²) on an elevated alluvial fan remnant situated on a flat alluvial plain. A few flakes and Levallois cores. Varied types of raw material ranging from dark quartzite, flint and chert of different colours. The site spreads over an area approximately 50 × 50 m. Raw material of small dimensions has been found present near the scatter. As a function of the diminutive size of the raw material, artefacts are equally diminutive. Patination and technological observation support the idea of AK-17 dating to the Middle Palaeolithic.

■ **AK-18**

The site was found north of al-Kharj city, along the King Abdulaziz Highway that leads to the greater Riyadh area. The surface scatter is situated in the proximity of a raw material outcrop (dark quartzite) (**fig. 39**). Fine-grained ferruginous sandstone and some pieces made on chert have also been identified indicating some raw material transport to and from the site. The scatter is generally marked by its low density (0–3 artefacts per m²). The site extends over approximately 20 × 30 m. Different stages of patination were observed, indicating repeated visits to the site. Single platform unidirectional and Levallois cores were identified; also a heavy, thick laminar component coupled with an elongated flake production was observed on site.

■ **AK-19**

Surface site on the foot of a jabal, on a raw material outcrop (dark quartzite). A low density artefact scatter (0–2 artefacts per m²) on a slope marks the site. Artefacts are large to medium sized. The flakes and cores generally have a dark patination, though some have a lighter patina, indicating a multi-component site in terms of its occupational history. The principle mode of *débitage* identified fits comfortably within the Levallois production system. The scatter covers approximately 100 × 20 m and was partly destroyed by caterpillar machines on its south boundary. Diagnostic pieces, mainly Levallois cores or cores with Levallois intention (facial *débitage*) were collected. Preparation of selective striking platforms; complete peripheral preparation is very rare.

■ AK-20

Site on a low rise located in a small valley between hills and inselbergs of quartzite. Raw material was found at the site; mostly dark and yellow quartzite. The site is a low density scatter (0–4 artefacts per m²), over approximately 20 × 20 m, on a flat surface. Levallois technology (small to medium-sized flakes) and one small (probably Holocene) biface (fig. 40).

■ AK-21

Site on a low rise, the remnant of a low terrace covered by dark quartzite. Raw material present (dark and yellow quartzite). Site covers an area of approximately 50 × 20 m, on the lower and middle slope. Moderate density (0–3 artefacts per m²). Levallois technology (small to medium-sized flakes), with a collection of Levallois recurrent centripetal cores (fig. 41).

■ AK-22

Surface site in a slight dip. Moderate to high density (1–15 artefacts per m²). The site spreads across 30 × 50 m. Source of raw material present (dark and yellow quartzite) ranging from poor to high quality. A massive number of Levallois cores were collected on the site. The collection also includes blanks and some technical pieces (debordant flakes, centripetal recurrent flakes and possible end products) (figs. 43–45). Lithic industry is characterized by Levallois preferential *débitage* with a strong tendency towards point and flake production. Also, the presence of Levallois preferential bidirectional technology (with obvious preparation of the distal part of the core) is noted. Tools were also collected, such as side-scrapers and informally retouched blanks. The patination is homogeneous, as are the technological patterns. Little faceting of butts on flakes. *Débitage* and cores range from small to large size. A topographic map of the site and its surroundings was done using a total station (11/10/2011) (fig. 42). Two small test pits were dug (12/10/2011) on the site, but it proved to be only a surface site. Artefacts were incorporated within a 10 to 30 cm thick colluvial horizon situated on top of an evaporite layer.

■ AK-23

Same as AK-22 only a lower concentration, on the NE part of the dip. Numbered as a different site, it is in reality a small extension of AK-22, after a small space without artefacts. A few pieces only (fig. 41).

■ AK-24

Low density (0–2/m²) site on a raw material outcrop (dark quartzite). The site is located on the foot of a jabal, and extends across an area of 10 × 10 m. A few flakes and Levallois preferential technology were observed. Two isolated Levallois cores with preferential flake.

■ AK-25

On the foot of a jabal, close to a raw material source (red/black quartzite, and maybe a little chert). Collection of a few pieces of grey/beige chert, including Levallois and tools. Partly destroyed by bulldozers, no potential. 40 × 5 m (0–1/m²).

■ AK-26

Surface site along a lower terrace at the foot of a jabal, on a raw material (dark quartzite and chert) outcrop, flakes and cores scattered across 80 × 15 m both on the slope and flat surface, medium-size Levallois preferential. Mainly large artefacts were observed, few flakes, as they were probably washed away from the upper parts of the terrace and the jabal. Low density (0–2 per m²).

■ AK-27

Isolated finds close to a low raw material outcrop (Yamāma formation, due to the presence of fossilized wood). A blade-dimensioned blank with lateral retouch found, probably Holocene. Artefact made on non-local raw material, fine-grained grey chert.

■ AK-28

Isolated artefact found on flat gravel plain. Much rounded quartz gravel present, ca. 3–10 cm in size (unnamed alluvial deposits see-AK-14, AK-15 and geological map). Chert present at site. Artefact made on grey chert with striations, steep abrupt retouch on lateral edge of chunk.

■ AK-29

Isolated artefacts on elevation, quartz and quartzite side scraper collected. Very low concentration: attribution is not possible. Raw material not found, aside from a little quartz gravel.

AK-22 as a reference site for the Middle Palaeolithic in Central Arabia

MAIN DESCRIPTION OF LOCALIZATION: TOPOGRAPHY, GEOLOGY, RAW MATERIAL VARIABILITY AND TEST-TRENCHES

The surface scatter of AK-22 is located at the eastern portion of the southern fringe of the Rufā' Graben, within the Ashqar Marāgha segment. The 20 × 60 m scatter is on a slight east to west slope and flanked by Dughum Member inselbergs on its northern and southern sides (fig. 42).

As was stated above, the Rufā' Graben is marked by the contact between the Sulayy Limestone and the Cretaceous Dughum member and Yamāma formations. At AK-22, only the Dughum member outcrops are visible, while the closest reported Yamāma formation outcrops are 6 km to the east and west of the site. The Dughum outcrops, characterized by secondarily ferruginized and silicified, fine- to coarse-grained, beige to brown sandstone (quartzite) of the Biyāḍ formation, were identified as the source of the locally used raw material. These are present within the lowest portion of the Dughum lithology.

This quartzite is by far the most common raw material used at the site; violet siltstone is used to a lesser extent. A depression filled with recent aeolian sediments dissected by small erosion gullies marks the immediate surroundings of the site. Additional Dughum member cuestas are visible to the north-east, east and south-east of the site. Large Rufā' formation outcrops (lacustrine deposits of possible Late Quaternary age) were reported 2 km south of AK-22.

In order to assess the potential for buried artefacts and possibly estimate the age of the AK-22 assemblage, two test-pits were dug close to the erosion gullies cutting the lower portion of the site (fig. 42). Although both trenches were placed less than 2 m apart from each other, the sediment sequence revealed very distinct strata.

Test-pit 1, placed on a slight dip on the northern side of the erosion gully, presented a 15–20 cm-thick, coarse colluvium horizon containing small- to medium-sized, poorly sorted limestone clasts. This horizon also contains artefacts showing no difference in patination from the artefacts collected on the surface. Technologically, little difference was seen between the buried and the exposed artefacts indicating a rather recent displacement of this stratum. The upper colluvium horizon is on top of a cemented, evaporitic layer containing equally poorly sorted, deteriorating sandstone clast inclusions. This layer appears to be cut

by erosion gullies that have subsequently been filled in with detrital sediments; no artefacts were found in this layer.

A trench 80 cm deep was dug into the southern side of the erosion gully that cuts through the southern section of AK-22. No artefacts were found in any of the strata uncovered. The upper 10–15 cm was composed of loose, recent aeolian sediment. The underlying sedimentary unit was composed of fine- to coarse-grained deteriorated sandstone. This unit becomes more cemented towards the bottom of the section. No inclusions were observed, supporting the notion of little post-depositional disturbance. Patches of evaporite appear throughout the section.

Central for additional work and possible dating of the deposition of the AK-22 artefacts is the relation between the lower cemented strata observed in both test-pits and the activation of the erosion gully that cuts through the site. Currently, no conclusive date based on the stratigraphy revealed at the site can be given. It can be said that the displacement, which affected the colluvium horizon containing the artefacts, was fairly recent. Hopefully, additional test-pits along the course of the erosion gully may reveal artefacts that were buried prior to the latest post-depositional displacement of the scatter.

LEVALLOIS OCCURRENCES AT AK-22: RECURRENT VS. PREFERENTIAL

Of considerable importance for discussions concerning technological analogies and human dispersal from Africa into Arabia and expansion events within the Peninsula is the presence of specific forms of the Levallois method identified at the site AK-22 (figs. 43–45). Preferential flake production is the most frequently documented Levallois *débitage* method at the site. Nevertheless, the recurrent centripetal or recurrent uni-/bi-directional methods have also been observed. Investigation of the cores reveals a consistent preparation using the distal part of the core, a peculiarity that has already been observed in assemblages from the southern part of the Arabian Peninsula (Dhofar and Ḥaḍramawt). This particular type of preparation, in conjunction with the observed Levallois core morphologies, suggests an intrinsic connection between the AK-22 samples and the Nubian Complex sites found across North Africa and Southern Arabia (fig. 46). The material from AK-22 provides an excellent reference for discussion and comparisons with assemblages from the main Middle Palaeolithic sites known in the Arabian Peninsula, such as Jubba, al-Mundafan, Ḥaḍramawt, Dhofar, Jebel Faya [Jabal al-Fāya] and Filī (CRASSARD & HILBERT 2013).

Conclusion: future work

Because no Early/Mid-Holocene occupation was detected during the 2011 survey, it is important for work to concentrate on this aspect during the next survey seasons at al-Kharj. The Rufā' formation, composed of lacustrine deposits interfingered with aeolian sediments described by VASLET and colleagues (1991), will be of interest over the coming seasons of the prehistoric survey. Given the presence of Tertiary cobbles in the lacustrine portions of the exposed section in the Rufā' area (fig. 16), a Quaternary age for these deposits has been suggested by the authors. Ages of MIS 9, 7 or 5 for these sediments are conceivable. The study of the geological maps has also revealed the presence of lacustrine sediments with good potential for surveying, especially around the Nisāḥ Graben. The area around the site of al-Yamāma, and the area south-east of al-Kharj are also promising. The region of Dūmat al-Jandal, in the province of al-Jawf also offers a good prospect for new comparative work, along with the Najrān region, where Pleistocene and Holocene lakes have already been surveyed by members of our team (CRASSARD *et al.* 2013a).

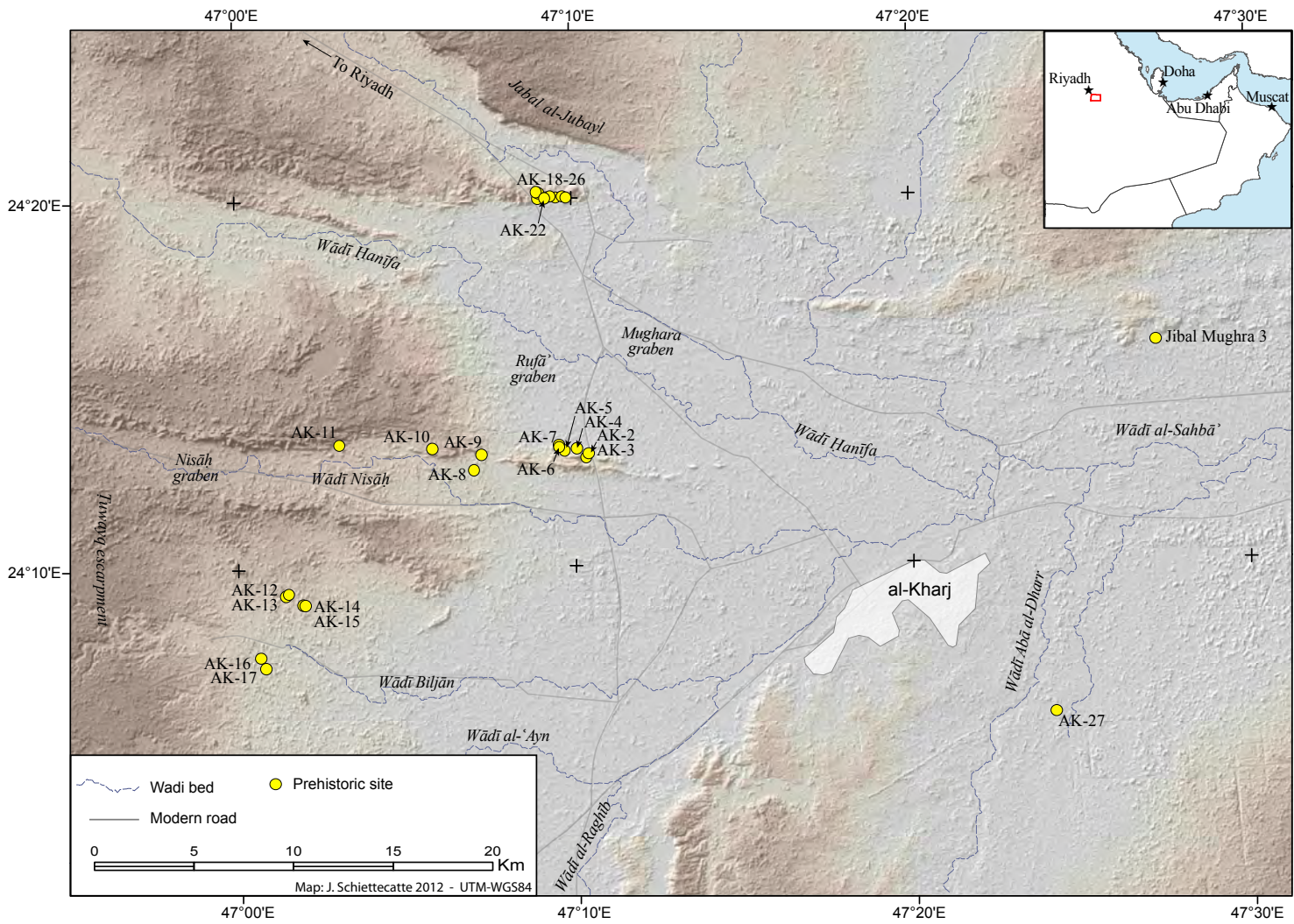


Figure 17 Map of the Palaeolithic sites in the region of al-Kharj (J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

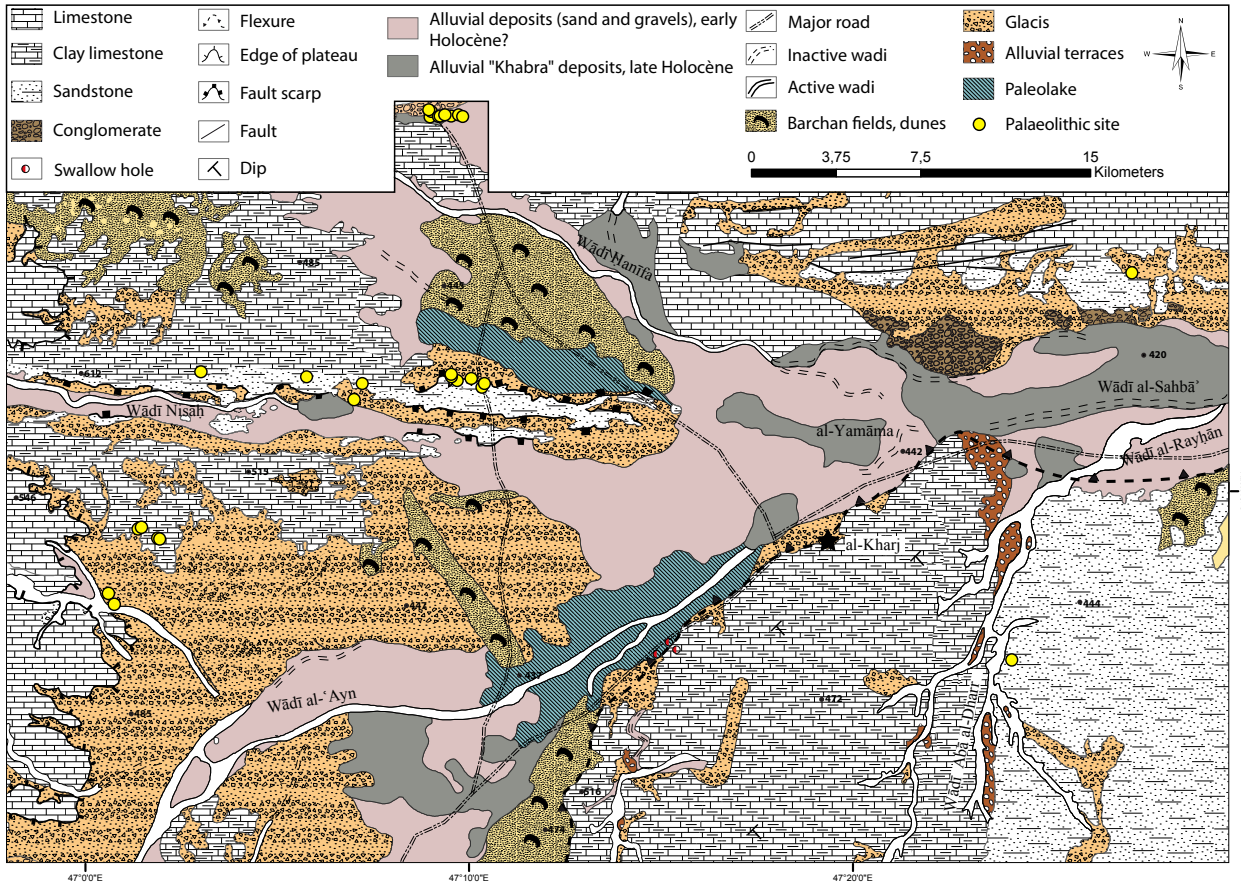


Figure 18 Palaeolithic sites superimposed on the geomorphological map of al-Kharj area (A. Chabrol, G. Fortin and J. Schiettecatte)



Figure 19 Fluvial structure incised in the Tuwayq escarpment (photograph: R. Crassard – French-Saudi Archaeological Mission in al-Kharj)



Figure 20 Graben structure of the Wādī Nisāh, across the Jabal Ṭuwayq (photograph: R. Crassard – French-Saudi Archaeological Mission in al-Kharj)

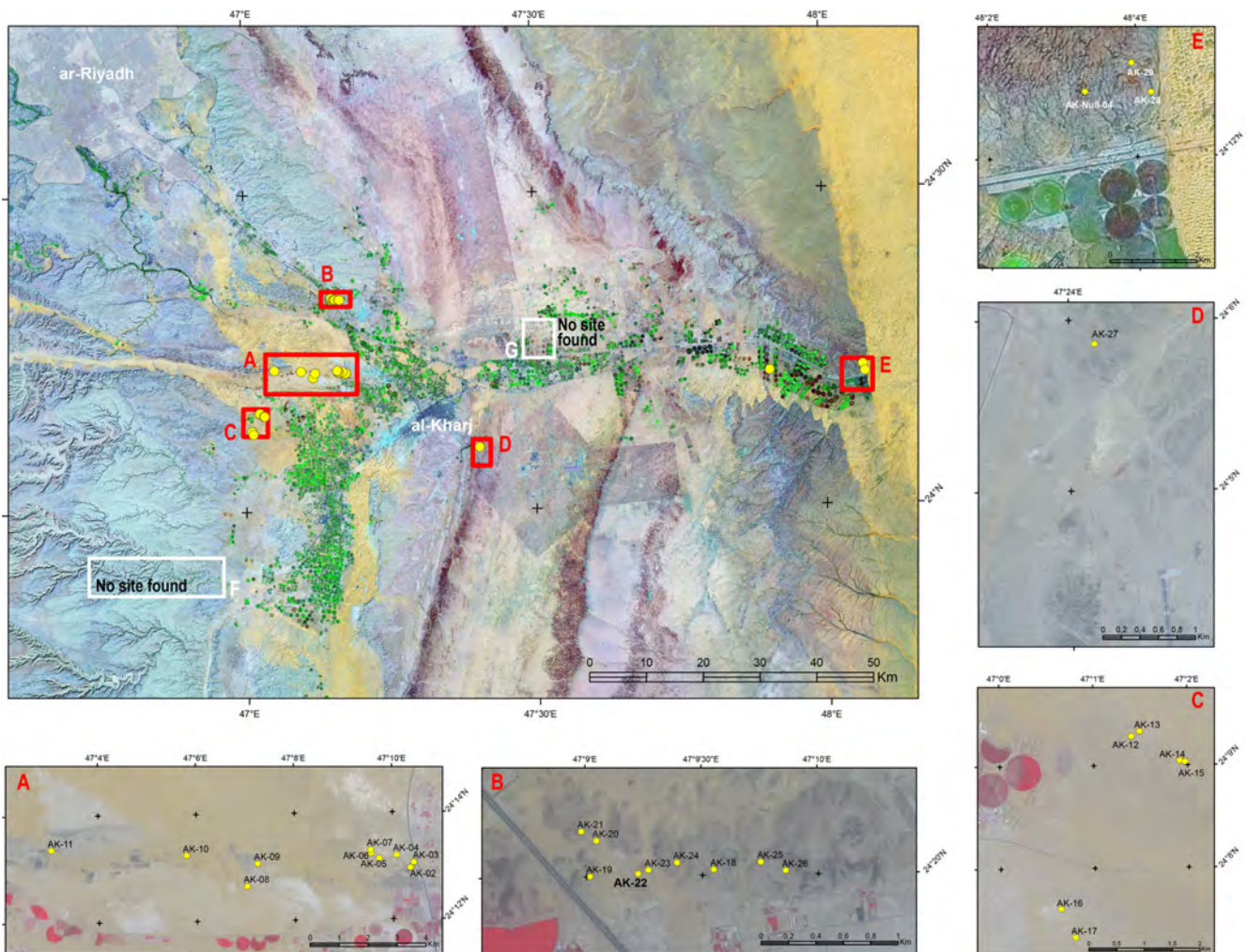


Figure 21 Map of the surveyed prehistoric areas (J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj. Map A, B, C and D include content © CNES 2012, Distribution Astrium Services/Spot Image S.A., France, all rights reserved. Map A and E include content © Landsat ETM+, all rights reserved)



Figure 22 The Nisāh Graben
(photograph: R. Crassard –
French-Saudi Archaeological
Mission in al-Kharj)



Figure 23 The Dilam depression
(photograph: R. Crassard –
French-Saudi Archaeological
Mission in al-Kharj)



Figure 24 Site AK-01 (photograph: Y. Hilbert – French-Saudi Archaeological Mission in al-Kharj)

▼ **Figure 25** Site AK-01: AK-01.9, preferential Levallois core with centripetal preparation; AK-01.21, recurrent centripetal non-preferential Levallois core; AK-1.14, 18, 20, 26, 35, flakes (drawings: L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)

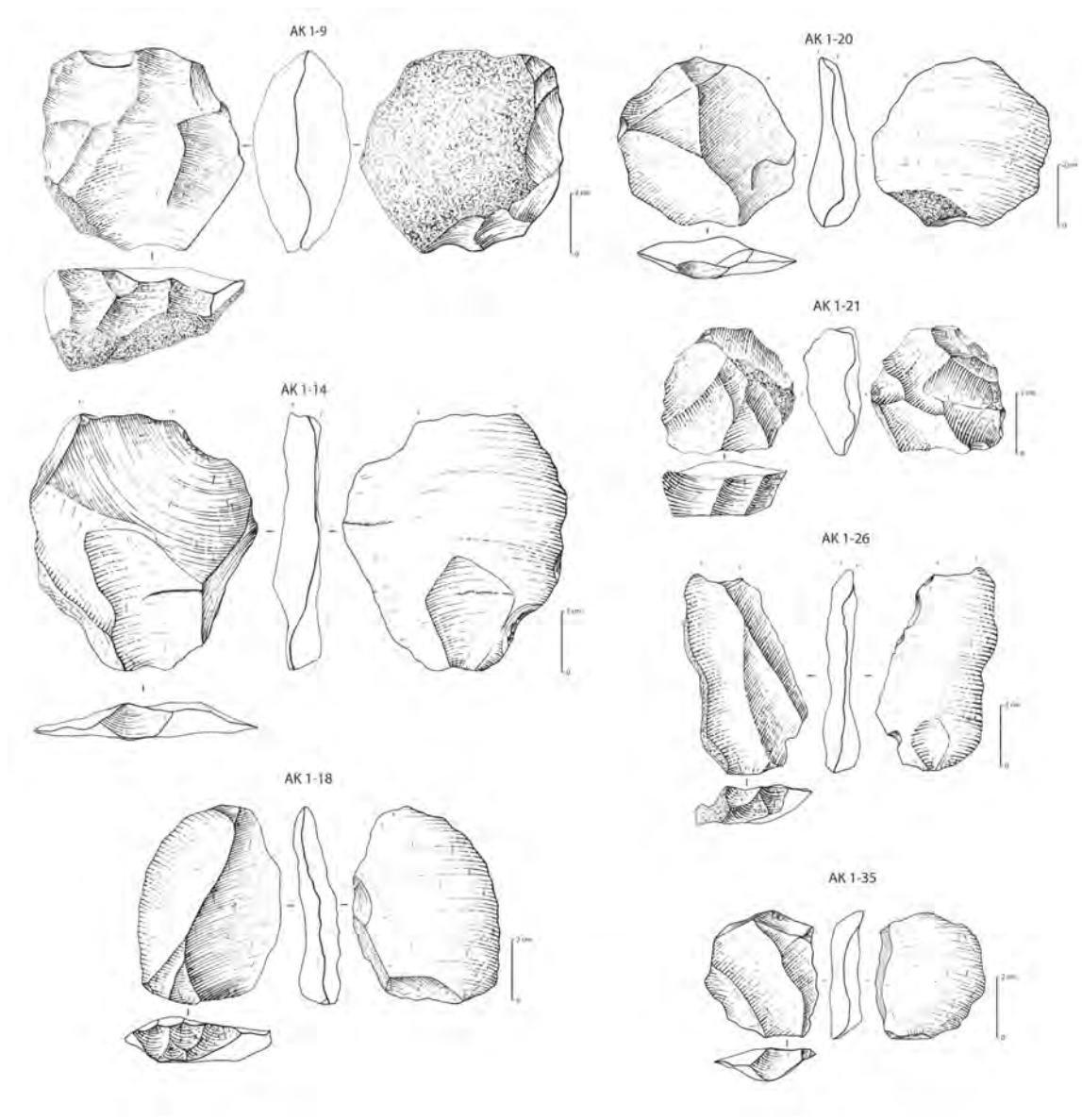




Figure 26 Site AK-02 (photograph: Y. Hilbert – French-Saudi Archaeological Mission in al-Kharj)

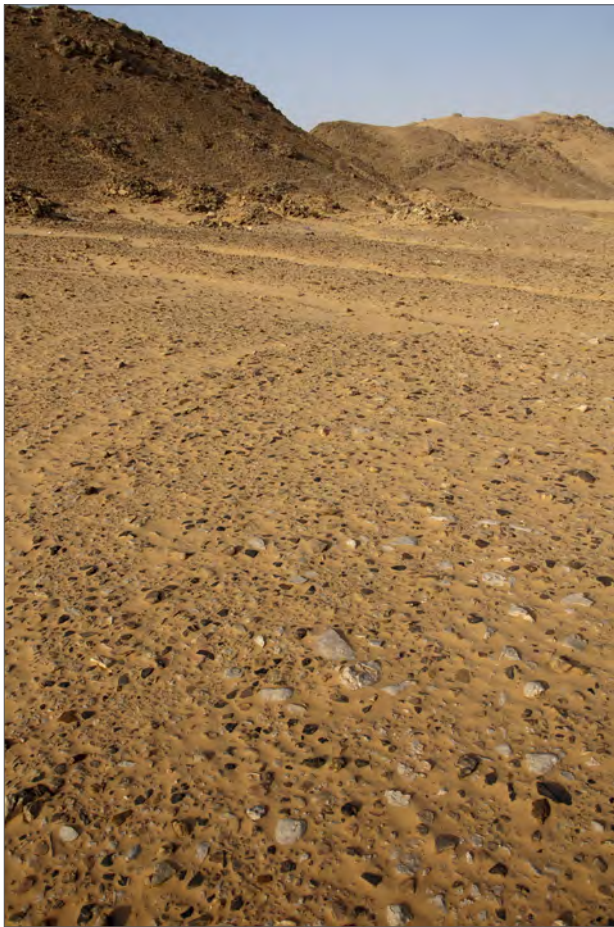


Figure 27 Site AK-03 (photograph: Y. Hilbert – French-Saudi Archaeological Mission in al-Kharj)

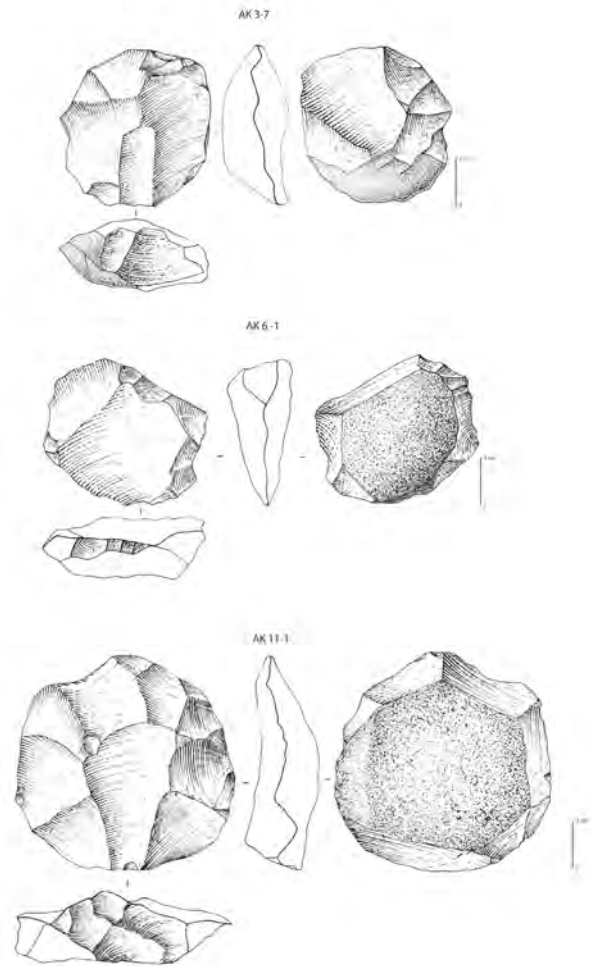


Figure 28 AK-03.7: recurrent centripetal non-preferential Levallois core; AK-06.1: preferential Levallois core with centripetal preparation; AK-11.1: preferential Levallois core with centripetal preparation; AK-12.1, sub-triangular handaxe with untrimmed but (drawings: L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)

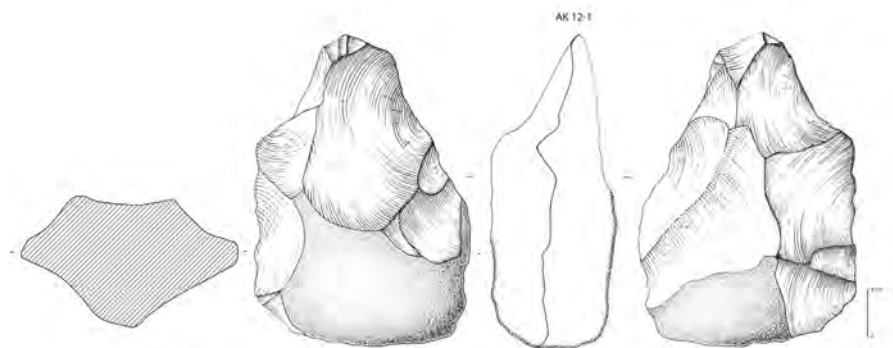


Figure 29 Site AK-04 (photograph: Y. Hilbert – French-Saudi Archaeological Mission in al-Kharj)



Figure 30 Site AK-05 (photograph: Y. Hilbert – French-Saudi Archaeological Mission in al-Kharj)



Figure 31 Site AK-06 (photograph: Y. Hilbert – French-Saudi Archaeological Mission in al-Kharj)



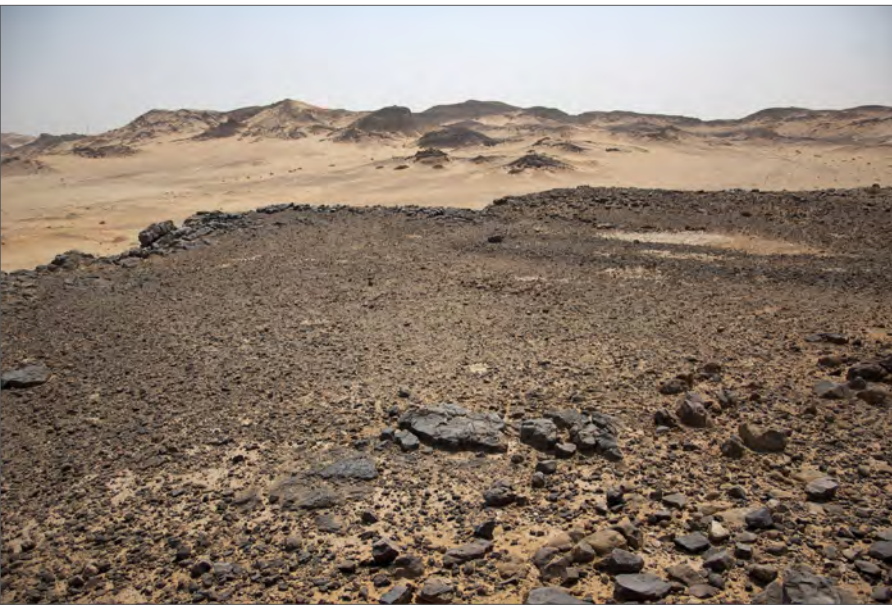


Figure 32 Site AK-07 (photograph: Y. Hilbert – French-Saudi Archaeological Mission in al-Kharj)



Figure 33 Site AK-08 (photograph: Y. Hilbert – French-Saudi Archaeological Mission in al-Kharj)



Figure 34 Site AK-09 (photograph: Y. Hilbert – French-Saudi Archaeological Mission in al-Kharj).



Figure 35 Site AK-13 (photograph: Y. Hilbert – French-Saudi Archaeological Mission in al-Kharj)



Figure 36 Site AK-14 (photograph: Y. Hilbert – French-Saudi Archaeological Mission in al-Kharj)



Figure 37 Site AK-15: AK-15.13, preferential Levallois core with centripetal preparation (photograph: Y. Hilbert – French-Saudi Archaeological Mission in al-Kharj)

Figure 38 Site AK-16 (photograph: Y. Hilbert – French-Saudi Archaeological Mission in al-Kharj)



Figure 39 Site AK-18 (photograph: Y. Hilbert – French-Saudi Archaeological Mission in al-Kharj)

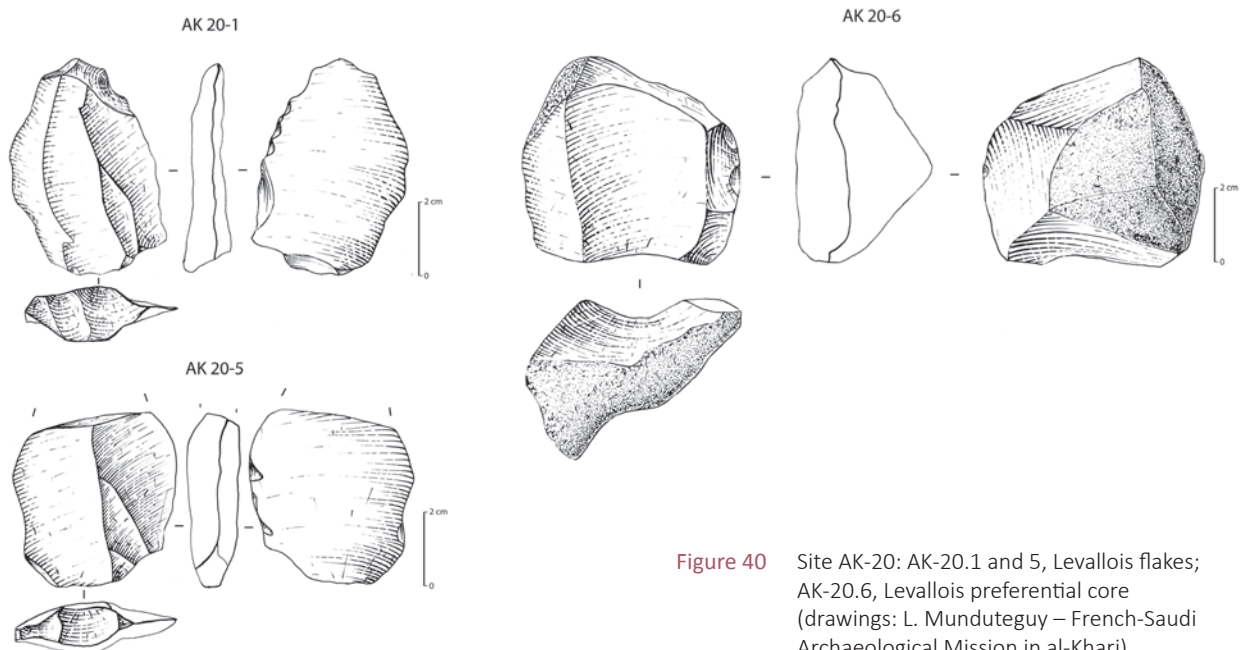


Figure 40 Site AK-20: AK-20.1 and 5, Levallois flakes; AK-20.6, Levallois preferential core (drawings: L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)

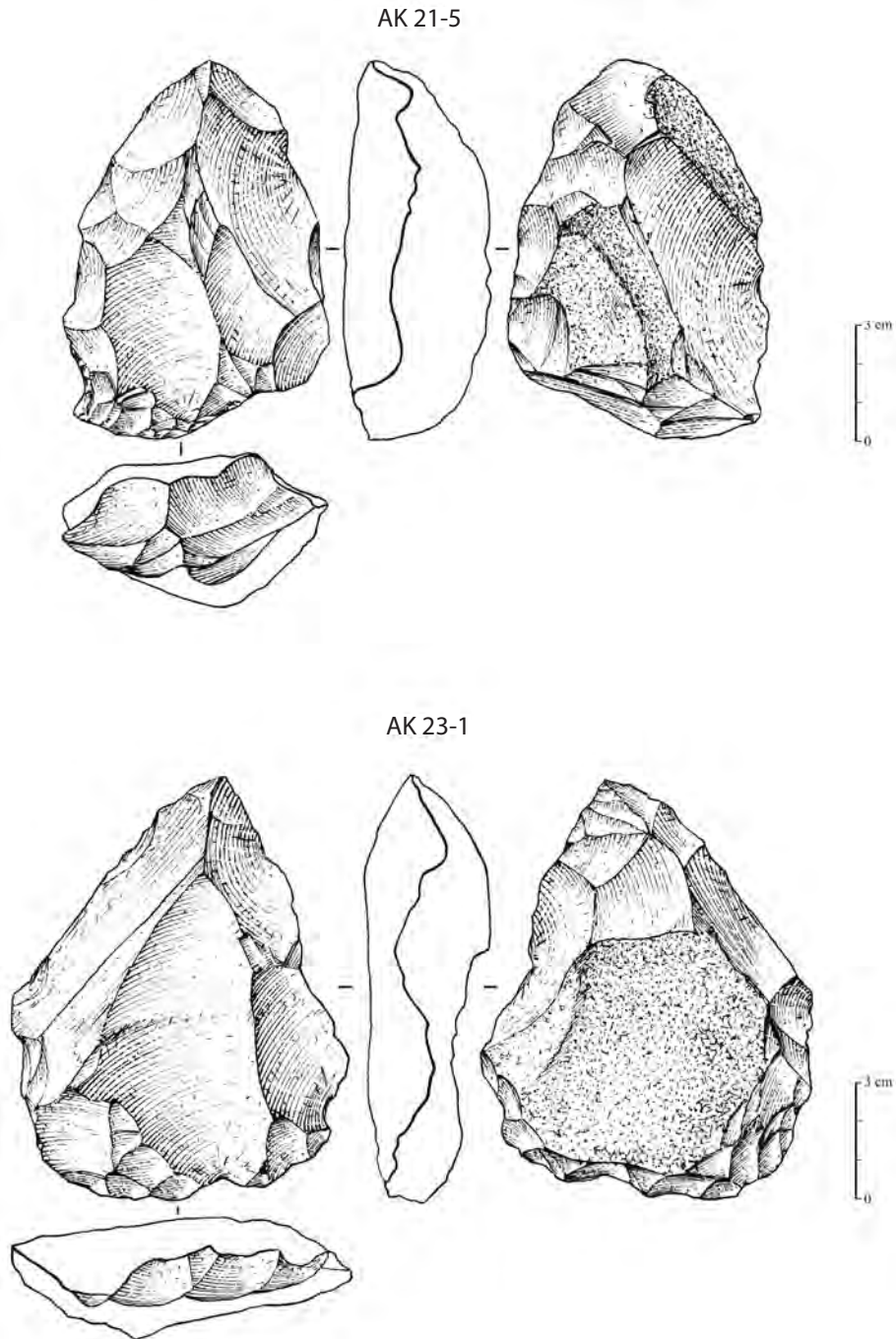


Figure 41 AK-21.5, abandoned un-struck Nubian core; AK-23.1, Nubian core with type 1 preparation (drawings: G. Devilder – French-Saudi Archaeological Mission in al-Kharj)

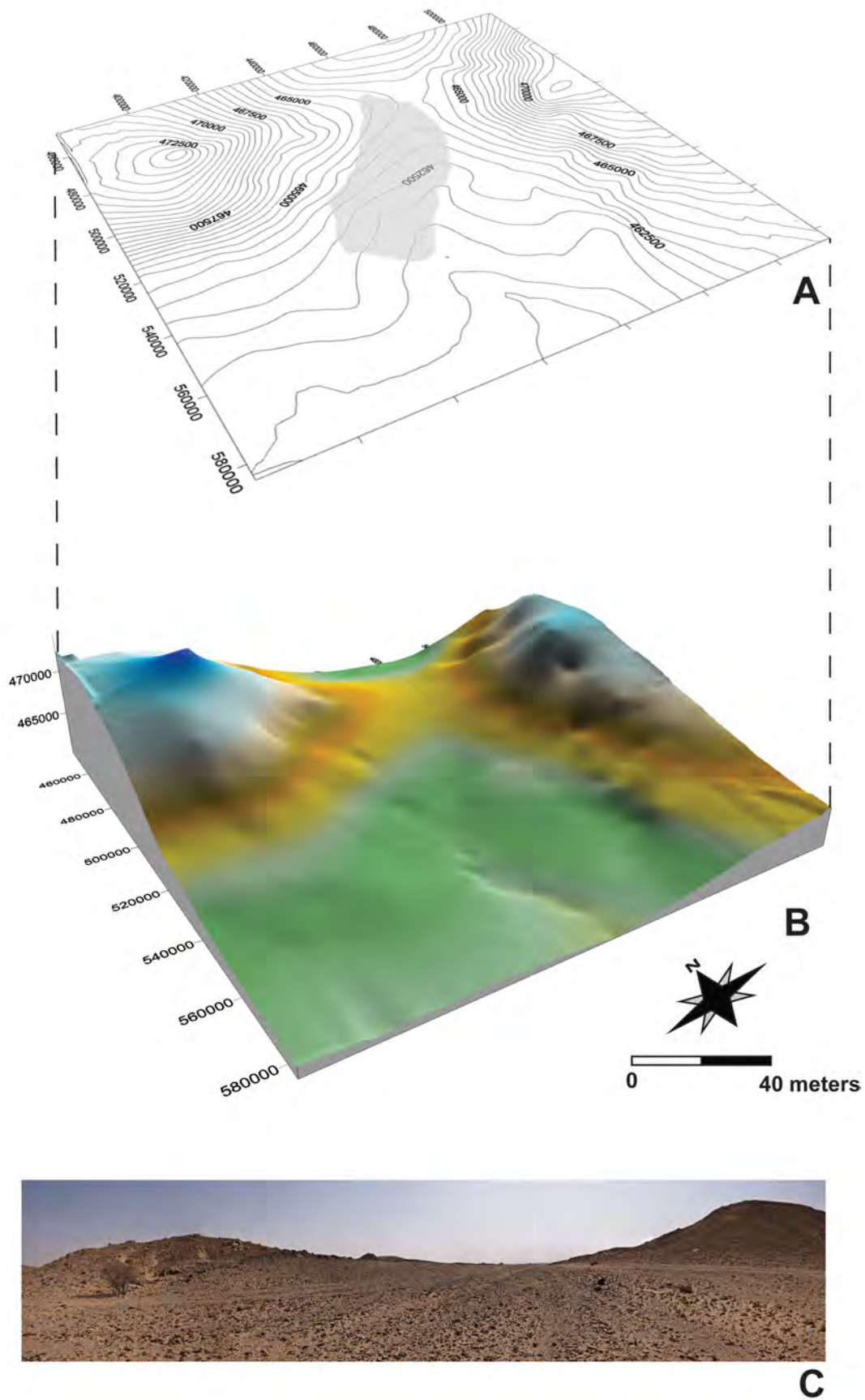


Figure 42 Topographic map of the site AK-22 (Y. Hilbert – French-Saudi Archaeological Mission in al-Kharj)

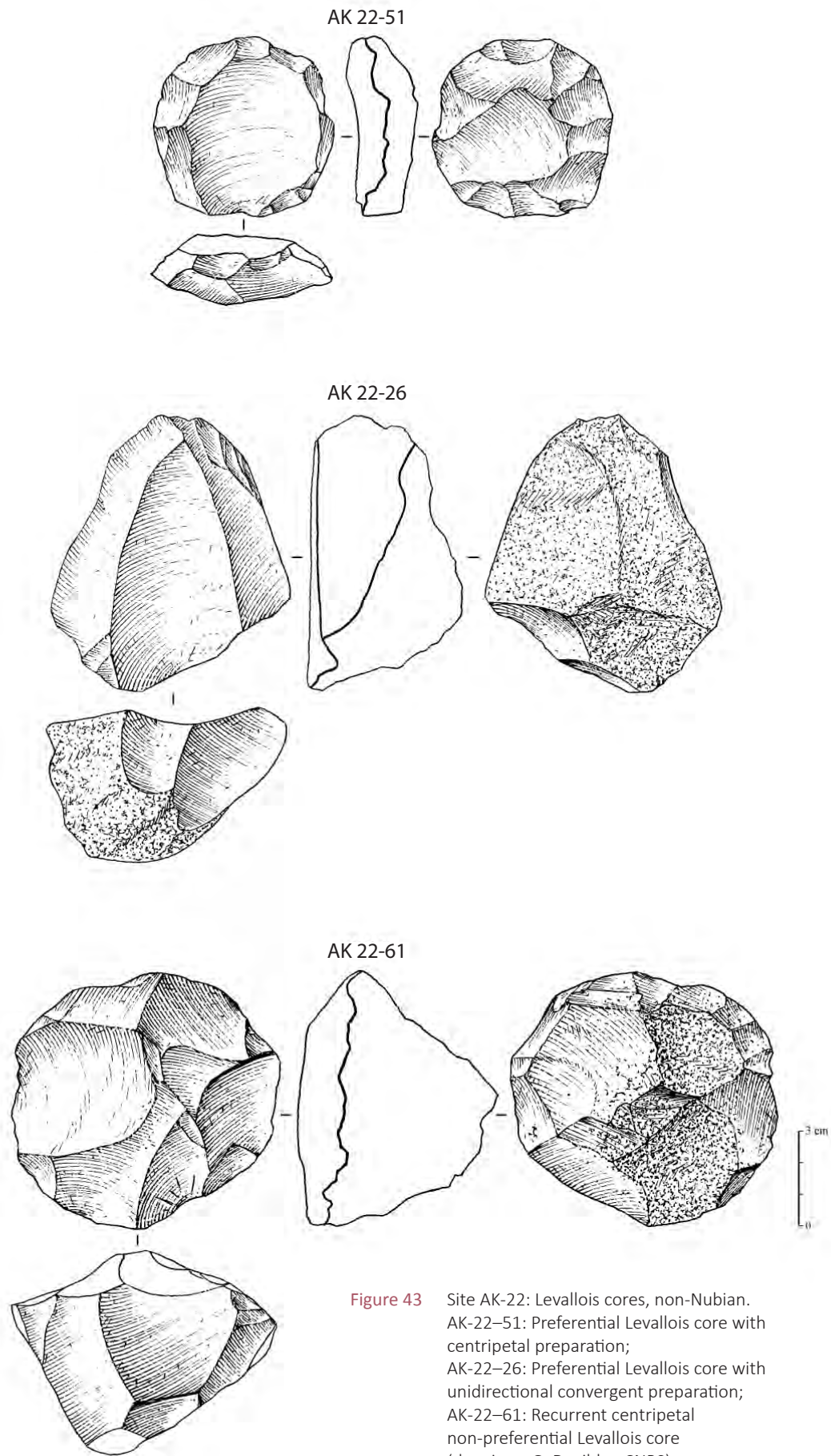


Figure 43 Site AK-22: Levallois cores, non-Nubian.
 AK-22-51: Preferential Levallois core with centripetal preparation;
 AK-22-26: Preferential Levallois core with unidirectional convergent preparation;
 AK-22-61: Recurrent centripetal non-preferential Levallois core
 (drawings: G. Devilder, CNRS)

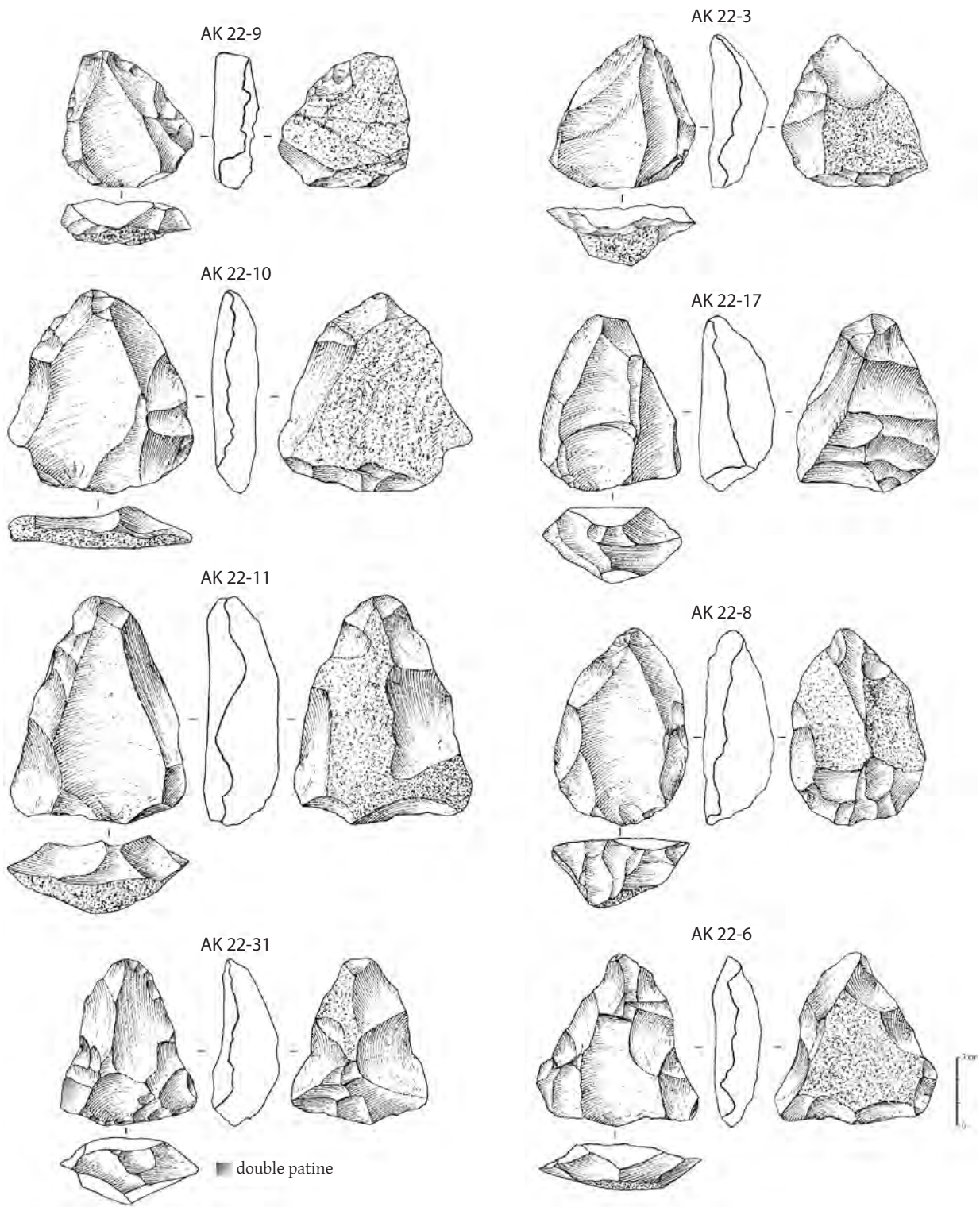


Figure 44 Site AK-22: Nubian preferential Levallois cores (drawings: G. Devilder, CNRS)

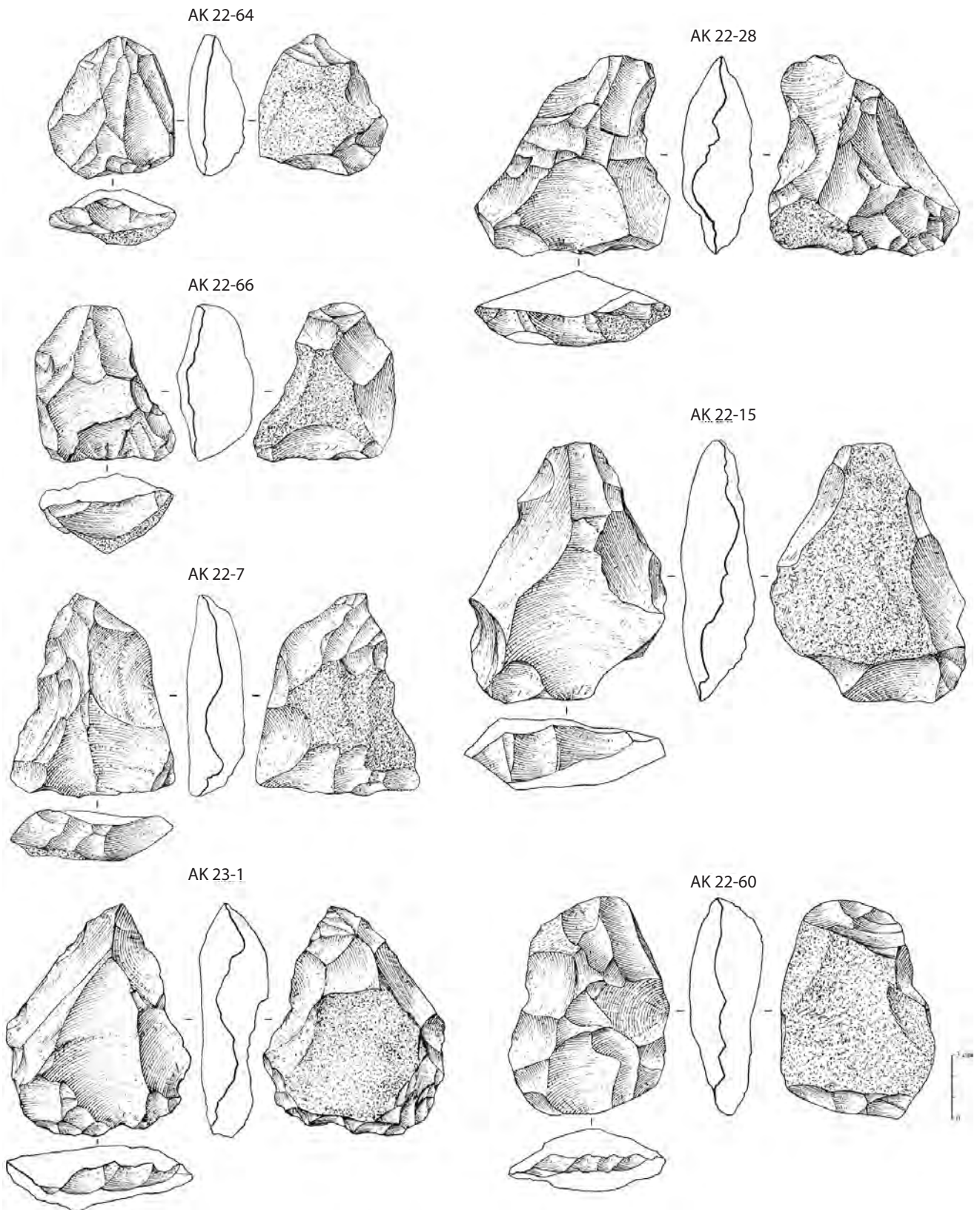


Figure 45 Site AK-22: Nubian preferential Levallois cores (drawings: G. Devilder, CNRS)

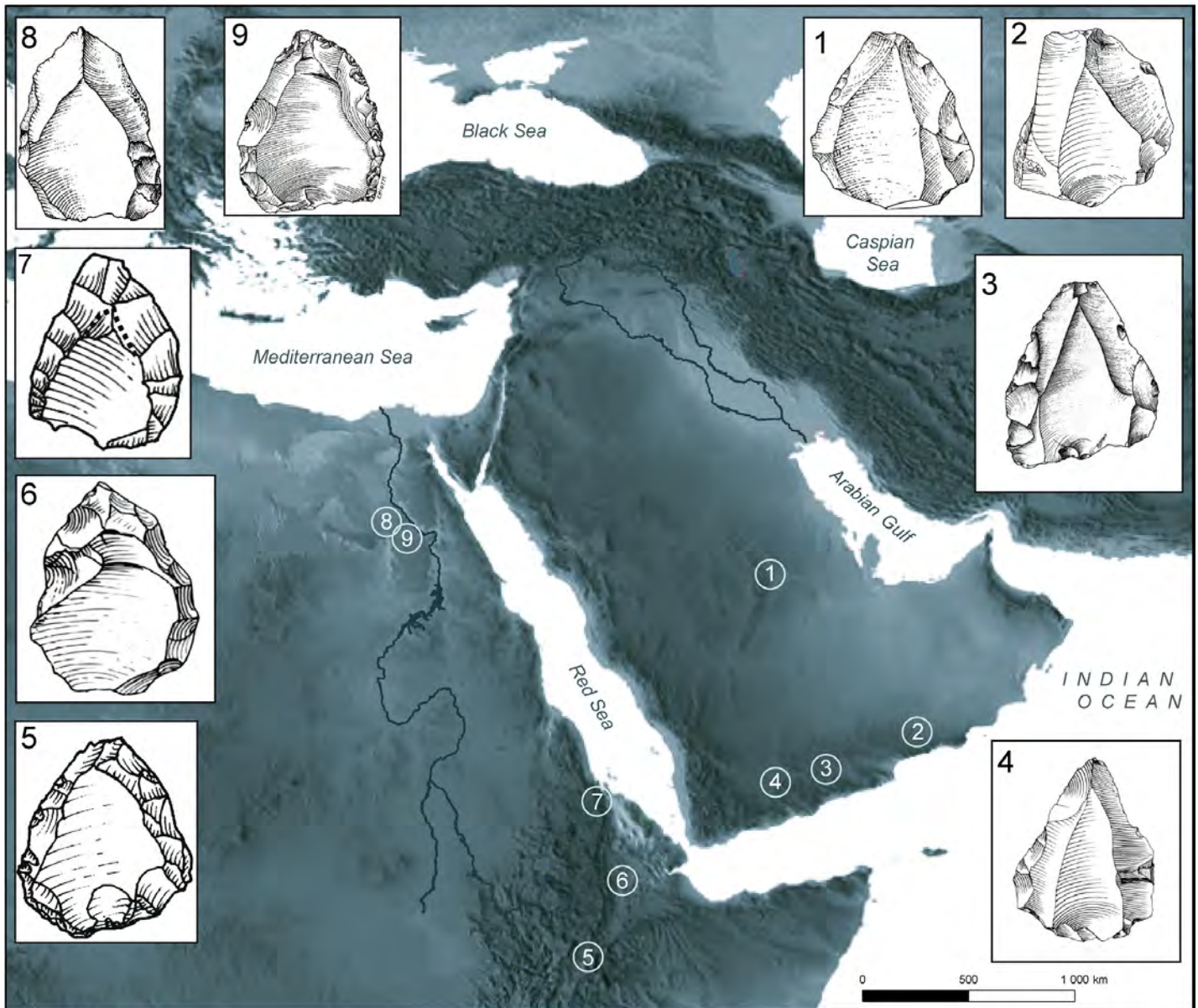


Figure 46 Distribution of main sites with Nubian cores in Eastern Africa and Arabia (map: O. Barge, E. Régagnon, R. Crassard & Y. Hilbert, CNRS, Lyon). Illustrated cores do not represent actual size. 1. AK-22 (this study); 2. Aybut al-Auwal (ROSE *et al.* 2011); 3. Shabwa (INIZAN & ORTLIEB 1996); 4. Ḥaḍramawt (CRASSARD 2008a); 5. Aduma (YELLEN *et al.* 2005); 6. Gademotta (WENDORF & SCHILD 1974); 7. Asfet (BEYIN 2013); 8. Nazlet Khater 1 (VERMEERSCH *et al.* 1990); 9. Abydos (CHIOTTI *et al.* 2007)

CHAPTER 3

PROTOHISTORIC AND HISTORIC SURVEY OF THE REGION OF AL-KHARJ

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There is a strong local tradition that in the halcyon days of the ancient kingdom of Yamama, the valley was dotted with prosperous villages and oases so closely set together that on a certain occasion the news of the birth of a son to a certain notable of Ayaina, the most northerly settlement of the Wādī, was known at Yamama, the capital, some 80 miles distant, the same evening, having been proclaimed by word of mouth from housetop to housetop down the valley. In those days, the story goes, God visited His wrath upon His people in the shape of a double scourge of locusts and plague, from whose effects the stricken land has never recovered.

PHILBY 1920: 164.

Less systematic than that of prehistoric sites, the survey of sites from the protohistoric and historic periods was carried out intermittently during the first week of the first season. Over the following weeks, outside of working hours at al-Yamāma, some spare time provided occasions for visiting archaeological sites around al-Kharj.

The purpose was twofold: on the one hand, to locate already known archaeological sites mentioned in previous works; and on the other, to complete the archaeological map with new discoveries.

The survey was carried out by J. Schiettecatte and A. al-Ghazzi. Several members of the team joined them on different occasions: A. Chabrol, G. Charloux, R. Crassard, G. Fortin, E. Fouache, A. al-Hamad, F. al-Hamdan, Y. Hilbert, M. Niveleau and P. Simeon. Dharih al-Dawsri, an inhabitant of Farzān, added his knowledge to the survey.

Two sites were registered by the geomorphological team (A. Chabrol, G. Fortin, E. Fouache) during their fieldwork. They were accompanied on that occasion by A. al-Hamad.

The registered sites were located by hand-held GPS (Garmin Etrex), described in a database and photographed. When present, pottery and/or artefacts were sampled.

21 sites have been identified so far, distributed as follows (**table 4**):

- 11 Bronze or Iron Age necropolises/isolated tomb;
- 1 Late Pre-Islamic settlement (Wādī al-Hayāthim 1);
- 2 Late Pre-Islamic/Islamic settlements (Ḥazm ‘Aqīla and al-Yamāma);
- 5 isolated Islamic settlements (Wādī Nisāḥ 1–5);
- 2 Islamic (?) underground water channels (‘Ayn Farzān and ‘Ayn al-Ḍila‘ 4).

Besides, five site numbers have been allocated to sinkholes: Khafs Daghra 1 and 2; ‘Ayn al-Ḍila‘ 2, 3 and 4.

SITE	LATITUDE	LONGITUDE	ALT.	PERIOD	TYPE
al-‘Afja	24.21330	47.18980	478	Bronze/Iron Age	Necropolis
‘Ayn al-Ḍila’ 1	24.10181	47.25492	473	Bronze/Iron Age	Necropolis
‘Ayn al-Ḍila’ 2	24.11278	47.25825	442	-	Sinkhole
‘Ayn al-Ḍila’ 3	24.11602	47.25865	439	-	Sinkhole
‘Ayn al-Ḍila’ 4	24.10674	47.24584	437	Late Pre-Islamic/Islamic	Hydraulic structure & sinkhole
Abraq Farzān	24.20642	47.23792	448	Islamic	Hydraulic structure
Ḥazm ‘Aqila	24.19378	47.40507	419	Late Pre-Islamic/Islamic	Settlement
Jibāl Mughra 1	24.25371	47.44246	431	Bronze/Iron Age	Necropolis
Jibāl Mughra 2	24.23899	47.43112	416	Bronze/Iron Age	Necropolis
Khafs Daghra 1	23.83458	47.19247	472	-	Sinkhole
Khafs Daghra 2	23.83185	47.19148	475	-	Sinkhole
Khafs Daghra 3	23.82676	47.19130	510	Bronze/Iron Age	Necropolis
Khafs Daghra 4	23.82321	47.19930	556	Bronze/Iron Age	Necropolis
Quwayd Farzān North 1	24.22665	47.16154	456	Bronze/Iron Age	Necropolis
al-Rufaya’ 1	24.29743	47.16193	451	Bronze/Iron Age	Necropolis
al-Rufaya’ 2	24.30313	47.15388	460	Bronze/Iron Age	Necropolis
al-Rufaya’ 3	24.30372	47.15849	465	Bronze/Iron Age	Necropolis
Wādī Abā al-Dharr 1	24.05499	47.36556	446	Bronze/Iron Age	Necropolis
Wādī al-Hayāthim 1	24.10724	47.22774	435	Late Pre-Islamic	Settlement
Wādī Nisāḥ 1	24.20399	47.15969	462	Islamic	Dwelling
Wādī Nisāḥ 2	24.20145	47.15870	462	Islamic	Dwelling
Wādī Nisāḥ 3	24.20552	47.15772	462	Islamic	Dwelling
Wādī Nisāḥ 4	24.21188	47.13335	468	Islamic	Dwelling
Wādī Nisāḥ 5	24.19916	47.15635	461	Islamic	Dwelling
al-Yamāma	24.19200	47.35189	430	Late Pre-Islamic/Islamic	Settlement

Table 4 | List of historic sites discovered during al-Kharj survey 2011–2012

Many of the sites discovered during the 1978 Comprehensive Survey were identified and precisely located during the 2011–2012 seasons, but 11 could not be relocated, either due to the lack of data available to locate them precisely or because of their destruction due to recent building activity or agricultural expansion in the region.

Three of these sites, 207-21, 207-22, 207-23, yielded pre-Islamic material (ZARINS *et al.* 1979: 27); 207-25 and 207-27 are plain, circular tumuli (*ibid.*: 23); 207-29 is a tumulus field overlooking the Wādī Sahbā’ on a prominent ridgeline (*ibid.*: 23); the remaining sites are 207-32, 207-33, 207-34, 207-35 and 207-36 (*ibid.*: pl. 2).

A last settlement (207-24) is mentioned in the report of the Comprehensive Survey of the Central Province (*ibid.*: 27-28). It is described as a settlement with Late Pre-Islamic material located to the east of a dried-up sinkhole (‘Ayn al-Ḍila’ 4). This area has been highly urbanized since then and the remains might have been wiped out. The description reported walls forming long, narrow rooms (*ibid.*: pl. 17b). A sounding was done in one of these rooms, revealing limestone and mudbricks walls. Natural ground was reached between 1 and 2 m below the surface.

Bronze Age and Iron Age necropolises

DATE AND LOCATION

All the sites dated to the Bronze or Iron Age are either isolated tombs or tumulus fields. (figs. 1, 47-48). This dating is based on previous research carried out as part of the Comprehensive Survey of Saudi Arabia (ZARINS *et al.* 1979) and soundings done in the past ([AL-] GHAZZI 2011a) at 'Ayn al-Ḍila' 1 and al-'Afja (see below). No settlement dated to this period has yet been discovered. It is not possible to say whether these necropolises were those of mobile groups or if contemporary settlements are to be sought beneath the sedimentary deposits in the alluvial plain.

The location of these necropolises is dictated by the local geology and geomorphology (fig. 49). They are all located at the interface between a limestone or sandstone formation and the alluvial plain, and more specifically by a source of water in the plain (wādī bed, sinkhole or palaeolake).

The sites al-Rufaya' 1, 2 and 3 are spread across a limestone terrace (Rufa' formation) and overlook the course of the Wādī Ḥanīfa.

The sites Jibāl Mughra 1 and 2 are located respectively on a sandstone outcrop (Late Cretaceous Wasī formation) and on a rocky outcrop bordered by Quaternary sheet gravel, both close to a palaeo-course of the Wādī Ḥanīfa.

The sites Khafs Daghra 3 and 4 and the site 'Ayn al-Ḍila' 1 are all on the western and north-western edge of the Jabal al-Qusay'a, a clayey limestone plateau (Early Cretaceous Sulayy formation) in close proximity to the water sinkholes, Khafs Daghra 1 and 2, and 'Ayn al-Ḍila' 2, 3 and 4 respectively (figs. 4-5). Today, the recent drop of groundwater resulting from intensive pumping prevents these natural wells from constantly refilling as they used to some decades ago (figs. 50-51). Photographs from the 1910s (PHILBY 1920: 165) and the 1970s show how significant these water sources could have been for past communities.

Beyond its proximity to the sinkholes, the necropolis 'Ayn al-Ḍila' 1 also overlooks the lacustrine deposits of a palaeolake crossed by the Wādī al-'Ayn.

Similarly, the sites of Quwayd Farzān North 1 and al-'Afja are located either at the top or at the foot of the sandstone outcrop of Quwayd Farzān, an Early Cretaceous formation (Biyāḍ sandstone) bordered to the north by the Holocene lacustrine deposits, the palaeolake of al-Barra.

As mentioned in Chapter 1, the former lakes would have been filled with water due to a rise of the water-table, probably during periods of wetter climate. A radiocarbon date on a shell from the lake of al-Barra shows lacustrine activity during the Early/Mid-Holocene humid optimum (¹⁴C date of 7,000 ± 400 years BP-uncal by VASLET *et al.* 1991: 33). But the fact that the two largest Bronze Age necropolises of al-Kharj area (Ayn al-Ḍila' 1 and al-'Afja) are located almost on the shores of palaeolakes suggests a possible rise of water-tables and an increase in lake levels during the Early Bronze Age, a wetter period recognized as the Mid-Late humid Holocene. It is regionally attested in the 'Awāfi lake sequence in the UAE (PARKER *et al.* 2006a, 2006b), in the Dead Sea transgression phases (MIGOWSKY *et al.* 2006), and in the Ḥaḍramawt fluvial system (BERGER *et al.* 2012).

Therefore, the location of these necropolises are dictated by both the geological context (rocky outcrops providing building material) and the hydrological context (proximity of water sources such as wādī beds, sinkholes at a time when they offered water, and possibly active lakes). Lastly, the topography might have also been decisive: necropolises are spread over terraces, plateaus and outcrops, away from the threat of floodwaters, and are in a dominant position. As markers in the landscape, they could have been part of the appropriation of land by Bronze Age populations.

■ *al-'Afja*

This necropolis stretches over 7.5 km from west (24.221°N – 47.155°E) to east (24.201°N – 47.228°E), along the Quwayd Farzān, a sandstone outcrop (fig. 52). Hundreds of tombs are visible over the outcrop. The main concentration occurs south of the town of al-'Afja (24.213°N – 47.19°E), where more than 180 tombs have been counted. The site was mentioned by Philby (PHILBY 1920: 161, 1921: 26) and by the Saudi Comprehensive Survey (ZARINS *et al.* 1979: 23), where it was registered under the label 207-31.

Tombs are built in dry-stone masonry. Most of the graves are circular; a few have a tail up to 20 m long. The most monumental ones are stepped: two or three stone cylinders are built one above the other (fig. 53). Another category consists of tapered structures, with the basic outline of an elongated wedge (fig. 54).

Several graves were excavated in 2004–2005 ([AL-]GHAZZI 2011a). One of these (Area 2, no. 4) yielded a bronze socketed spearhead (*ibid.*: 204, pls. 10, 109) reminiscent of those found in the Yabrīn oasis, Dhahrān, and Bahrain, dated to the early second millennium BC (BIBBY 1973: fig. 57; [al-]MUGHANNAM 1988: pl. 3/A; CLEUZIOU 1989: 29; LOMBARD 1999: 58). Grave L10 yielded an iron axe and an iron pin ([AL-]GHAZZI 2011a: pl. 110), which attest to reoccupation during the Iron Age at the earliest. This process of reoccupation of Bronze Age tombs more than a millennium after their abandonment is already well attested in Ḥaḍramawt, Yemen (CRASSARD *et al.* 2011; MCCORRISTON *et al.* 2011).

■ *'Ayn al-Dīla' 1*

By far the largest necropolis of the oasis, 'Ayn al-Dīla' 1 is 4.4 km long and up to 0.5 km wide (fig. 55). Though most of this necropolis has been fenced by the SCTA, it extends beyond the fence particularly to the south-west.

The site is mentioned by Philby (PHILBY 1920: 169) who described it as “a rocky ridge called Qusaia, whose summit is surmounted by a vast concourse of cairn-like mounds of stones and mortar, less striking than though reminding one of the Firzan ruins”.

G. de Gaury visited the site in the early 1940s (DE GAURY 1945: 152) and described three different kinds of tombs. In 1978, archaeologists taking part in the Comprehensive Survey of the Kingdom of Saudi Arabia registered this site with the label 207-20 (ZARINS *et al.* 1979: 23–25). Two kinds of tombs can be distinguished:

- Circular tombs (fig. 56): the most numerous type (ca. 3,000 tombs) includes ordinary round mounds of dry stones (De Gaury's type 1 and Zarins's type A). The funerary chambers are said to be delimited by large orthostats (ZARINS *et al.* 1979: 23, pls. 8b, 12). Some of these (ca. 15 tombs) are round tumuli, considerably higher, with larger stones and a flat earth-covered top (De Gaury's type 2). To the south-east of the necropolis, Zarins and his colleagues mention the same kind of tombs encircled by a wall of well-laid stones (Zarins's type B; ZARINS *et al.* 1979: 23, pl. 12). One of these circular tombs was excavated (ZARINS *et al.* 1979: 24). The funerary chamber had already been plundered. It was encircled by limestone slabs.
- Tapered structures (De Gaury's type 3): long mounds or walls about 1 m high and between 9 and 41 metres long. They are concentrated south of the fenced area. At least 24 of these tombs are visible on satellite imagery. After excavation, one of these tapered structures proved to be a tomb (ZARINS *et al.* 1979: 25), a funerary chamber was laid out at the head of the structure.

Sherds sampled on the ground in the past have been indiscriminately attributed to the pre-Islamic period (ZARINS *et al.* 1979: 27, 34).

This tumulus field closely resembles those in Bahrain and Dhahran. Excavating some of these tombs in the 2013 season should allow us to tell whether or not they are culturally affiliated.

■ *Khafs Daghra 3*

Isolated tomb on the Jabal al-Qusay'a, a limestone plateau. This partially collapsed turret grave is a dry-stone construction on the edge of the plateau (**fig. 57**).

■ *Khafs Daghra 4*

On the Jabal al-Qusay'a, a limestone plateau, east of the Wādī Abā al-Dharr and west of the Wādī al-ʿAqīmī, this necropolis comprises a dozen tombs made of limestone masonry. Some of these graves have a tail. One has a winding tail (**fig. 58**); its funerary chamber has been plundered, it had been sealed up by a large capstone.

■ *Jibāl Mughra 1*

North of the Wādī Ḥanīfa and south of the sandstone outcrop of the Jibāl Mughra on the northern edge of the main valley of al-Kharj oasis, two isolated graves stand on the edge of a rocky terrace. They consist of a hump of collapsed dry-stone masonry (**fig. 59**). The black sandstone used in the masonry had been collected directly from the surrounding ground.

■ *Jibāl Mughra 2*

A circular structure stands on the top of a small rocky outcrop to the north of the Wādī Ḥanīfa and south of the sandstone outcrop of the Jibāl Mughra on the northern edge of the main valley of al-Kharj oasis, a few hundred metres north of the railway line from Riyadh to the Gulf region. It is delineated by limestone boulders. Many limestone blocks are scattered all over. The nature of this dry-stone structure has not been determined yet (**fig. 60**).

■ *Quwayd Farzān North 1*

Down the slopes of a glaciis between the Quwayd Farzān, a sandstone outcrop, and the lacustrine deposits of al-Barra. Several graves are partly covered with sand. They are either circular or rectangular; built in dry-stone masonry of large sandstone blocks (**fig. 61**). The enclosing wall was made of large orthostats. The capstone of one grave is visible, it is a large sandstone slab laid over large orthostats. A few tombs have a tail up to 15 m long.

■ *Al-Rufaya' 1*

On a barren limestone terrace, one kilometre west of the highway from al-Kharj to Riyadh, and close to the alluvial plain crossed by the Wādī Ḥanīfa, the remains of a dry-stone tapered structure are preserved. It is 26 m long and the head is 6 m wide. Building material comes from the immediate surroundings.

■ *Al-Rufaya' 2*

One kilometre north-west of al-Rufaya' 1, the remains of a dry-stone circular grave are preserved. It is built in material taken from the immediate surroundings. On one side, the surrounding wall is visible: slabs of limestone are layered in regular courses (**fig. 62**).

■ *al-Rufaya' 3*

450 m east of al-Rufaya' 2, is a necropolis with 10 dry-stone graves. Different kinds of tombs were observed: a 60-m-long tapered structure (**fig. 63**), circular tombs with or without

tail, the largest being 9 m in diameter. They are built of the local limestone. The necropolis has been badly damaged by recent industrial activity in the neighbourhood.

■ *Wādī Abā al-Dharr 1*

East of the bed of the Wādī Abā al-Dharr, on the slope of the limestone plateau, several graves were reported by geomorphologists G. Fortin and A. Chabrol. They are circular, built of limestone slabs most probably taken from the surrounding ground (fig. 64). Tombs are built in dry stone masonry; some have their enclosing walls made of vertically set slabs.

Late Pre-Islamic and Islamic sites

THE SETTLEMENTS

Eight settlements have been investigated so far (fig. 65); a large one (al-Yamāma), two small settlements (Ḥazm ‘Aqīla and Wādī al-Hayāthim 1), and five isolated dwellings (Wādī Nisāḥ 1 to 5). Their occupation is dated either to the Late Pre-Islamic period (Wādī al-Hayāthim 1), or the Islamic period (Wādī Nisāḥ 1 to 5) or both (al-Yamāma and Ḥazm ‘Aqīla).

■ *Al-Yamāma/al-Bannā’*

This site is the largest ancient settlement reported in the region of al-Kharj. It is located in the centre of al-Kharj oasis, 1 km to the north-west of the Industrial City, and west of the confluence of the Wādī Ḥanīfa and Nisāḥ.

The existence of this site was first reported by H. St. J. Philby in 1920.⁶ 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 ‘Abd al-‘Aziz 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. Al-Mahraqa means a fire place and is of modern origin ([AL-]GHAZZI 2010: 44).

The site has been identified with the mediaeval city of Jaww al-Khiḍrīma ([AL-]JUḤANY 2002: 45; [AL-]GHAZZI 2010: 45–47) mentioned by Ibn Khordādhbeh as ‘Jaww al-Khiḍrīma’ (KHORDĀDHBEH 1889: 113) and by al-Balādhurī as ‘al-Khiḍrīma’ in the 9th century 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 century AD (YĀQŪT 1866–1873 ii: 120, 161).

In the Late Pre-Islamic/Early Islamic periods, the name al-Yamāma did not refer specifically to a site but rather, it designated the whole region extending to the west of the

6 PHILBY 1920: 168: “Three miles to the eastward lies the once important city of Yamama, now a straggling village of four small hamlets embedded in palm-groves shorn of their former glory; on the north side a broad expanse of sand rolls up to the edge of the oasis, and here and there from under it appear the clay ruins of what were once the walls and houses, shops and palaces, of the capital of a mighty kingdom. It is clear that the old city lay in the angle formed by the Nisah and Hanifa channels at their junction in the head of the Sahaba nearby, and the fact that what remains now of the old settlement is that part of it which lies along the edge of the Nisah and away from the Hanifa, on which side there is a deep sea of drifted sand, would seem to bear out the theory that the catastrophe which laid the place in ruins was a flood in the Hanifa channel.”

Jabal Tuwayq. Its capital city was nevertheless known as al-Yamāma, after the name of the region under its control. The problem resides in the fact that this capital city has not always been the same city. In the time of al-Mas'ūdī, in the 10th century AD, al-Yamāma was the nickname for Jaww al-Khaḍārim.⁷ But in the 14th century AD, Ibn Baṭṭūṭa gave the name al-Yamāma to the city of Ḥajr, in the vicinity of modern Riyadh.⁸

Finally, two South Arabian pre-Islamic inscriptions mention the toponym Jaww^{ān} (*Gwⁿ*) in association with Kharj^{ān} (*Hrgⁿ*) and Yamamat^{ān} (*Ymmtⁿ*), respectively inscription 'Abadān 1, dated to AD 360 (ROBIN & GAJDA 1994) and 'Irāfa 1 from the 5th century AD (GAJDA 2004). The toponym Jaww^{ān} 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, see Chapter 4).

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. 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 (fig. 66).

Many mudbrick structures are visible on the ground, together with a large quantity of pottery sherds (fig. 67). According to South-Arabian inscriptions, Arab-Islamic sources, pottery sampled on the ground (see Chapter 9), 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 (see Chapter 7) and the excavation of Buildings 1 and 2 (see Chapters 8 and 10), the occupation of the site dates from at least the 4th century BC to the 18th century AD.

The excavation of al-Yamāma was resumed in 2011; Chapters 5 to 11 are devoted to these operations.

■ Ḥazm 'Aqila

The site is located in the central valley of the oasis, ca. 4 km south-east of al-Yamāma, on top of alluvial deposits on the southern bank of the Wādī al-Sahbā', west of the confluence between this watercourse and the Wādī Abā al-Dharr. The remains of a dense ancient settlement used to be visible on the ground, but recent farming activity and industrial buildings have badly damaged it. It is now crossed by the main road going from al-Kharj to the Gulf; the site has been bulldozed and is used as a rubbish dump so that most of the archaeological remains have disappeared though a few sherds are still scattered on the ground.

Before being damaged, the site was registered by the Comprehensive Survey of the Central Region of Saudi Arabia in 1978 with the number 207-26 (ZARINS *et al.* 1979: 27). They reported the presence of pre-Islamic fossil indices: coarse yellow buff ware and plain sandy red ware with yellow lime grit inclusions as well as Islamic pottery types (incised buff ware and glazed ware; ZARINS *et al.* 1979: pl. 18).

Archaeological investigations were carried out on the site in 1988 ([AL-]GHAZZI 1996, 2009). At that time, the site was already cut in two parts by the asphalt road and partly damaged. It

7 [AL-]MAS'ŪDĪ 1861–1877 iii: 276, 288: 'Ils campaient tous dans le Yémamah, qui était connu alors sous le nom de Djaw [Jaww al-Khaḍārim] (...) Le roi fit attacher Yémamah en croix à la porte de Djaw, et il voulut que Djaw fut appelé Yémamah, nom que ce pays porte encore de nos jours'

8 IBN BAṬṬŪṬA 1982 ii: 129: 'D'Alhaça, nous nous rendîmes à la ville d'Alyemâmah, aussi appelée Hadjr'

was estimated to extend across 1 km² ([AL-]GHAZZI 1996: 44). A room in a house was excavated (3 × 2.8 m). It was delineated by walls in which courses of mudbrick alternated with courses of stones. Walls were coated with plaster. It was preserved on to a height of 2 m and a only single phase of occupation was mentioned.

A. al-Ghazzi reports red pottery sherds with limestone grits, which are comparable to the Arabian Red Ware found in the ‘Hellenistic’ levels at Failaka, and green porous burnished ware with yellow and black pebbles ([AL-]GHAZZI 1996: 46). He also sampled surface fragments of alkaline glazed jars with an applied decoration incorporating a rope pattern (*ibid.*: 127 pl. 31); these jars were Mesopotamian productions (MASON & KEAL 1991: 57–61), attested in this area in the 7th–early 8th century AD (pre-Samarra period, NORTHEDGE 1997: 214) and at Sīrāf, in Iran, in Level 2 (650–750 AD, WHITEHOUSE 1968: 14).

Most of the sherds sampled on the surface during our visit (**fig. 68**) belong to three category identified at al-Yamāma (see Chapter 9): *common and coarse buff greenish ware with medium to thick grits, pinkish cooking ware with white exploded grits* and *medium red sandy ware*. At al-Yamāma, the first type was found in large quantity in Sounding 1 (phase 2 and mostly phase 3, UF 056, UF 057), in the circulation levels outside Building 1 (phase 1) and in Sounding 3, south-west of the site. This type seems to be a long-lasting regional production attested during the whole Islamic period of occupation at al-Yamāma. At al-Yamāma, the *medium red sandy ware* and the *pinkish cooking ware with white exploded grits* comes mostly from the intermediate levels of Sounding 1 (phase 3, UF.056, UF.057).

Although a pre-Islamic occupation has been postulated in the past ([AL-]GHAZZI 1996: 46–48), an Early Islamic occupation of the site cannot be ruled out either.

■ *Wādī al-Hayāthim 1*

The site Wādī al-Hayāthim 1 is located on the southern edge of the Wādī al-Hayāthim, 6 km south of the village of al-Hayāthim, 5 km east of the village of al-Ḍubay‘a and approximately 2 km west of the water sinkholes of ‘Ayn al-Ḍila‘.

As we visited the site after rain, mudbrick walls were particularly clear on the ground. A few mudbrick structures were visible in the shape of very low mounds (**fig. 69**). One of these buildings has a mudbrick platform ca. 5 × 5 m wide.

On the surface, scattered sherds were sampled, as well as a few bronze fragments, stone tools (grinder/crusher), ostrich egg fragments, and a fragmentary alabaster vase⁹ (**figs. 70–71**).

Pottery sherds mainly fall into two categories:

- Red ware with grey-black core and very abundant chaff temper (**fig. 70**). This type has mainly been found at al-Yamāma in the lower levels of Sounding 1 (phase 4);
- Green chaff tempered jars with a vertical neck and a rounded rim (**figs. 70–71**). This kind of jar is well attested in South Arabia: at Jujā in levels 2 and 1 (2nd cent. BC–5th cent. AD, HANSEN *et al.* 2004: figs. 34, 37); in levels VII to X of the stratigraphic sounding at Shabwa, 2nd cent. BC–1st cent. AD (BADRE 1991: fig. 16.338, fig. 32.258–265); and in the ‘Lower Period’ levels of area 4 at Qanī, 1st cent. BC/AD (AKOPIAN 2010: figs. 59.525, 61.548).

According to the surface pottery, this site would date back to the late centuries BC/early centuries AD.

9 WH1.surf.3: Fragmentary alabaster vase. l. 7.5 cm, w. 4.1 cm, th. 2.1 cm. Vase or lid in polished alabaster, flat bottom, curved wall, square & thick rim. Inner side is concave and shallow.

■ *Wādī Nisāḥ 1 to 5*

In the river bed of the *Wādī Nisāḥ*, south of the sandstone outcrop of Quwayd Farzān, five sites with two or three low mounds each covered with stones, pebbles and pottery have been located: *Wādī Nisāḥ 1 to 5* (fig. 72).

The sites vary from 30 to 50 m in diameter; the mounds encircle a lower central area (courtyard?). Located over the glaciis of the Quaternary sheet gravels, immediately north of the *wādī* bed, the sites were protected from floods. Geomorphological surveys in that area showed that here surface flow is very low and that most of the water resources are groundwater underflow that could emerge locally and create shallow lakes. These structures, located near a *wādī* bed with easily accessible groundwater (by digging wells), might have been small farms or seasonal settlements for pastoralists.

In *Wādī Nisāḥ 5*, pottery sampled on the ground included in particular:

- *Handmade and wheel-turned grey gritty ware* (fig. 73), also found in Sounding 1 at al-Yamāma (phase 3, UF.057);
- fragments of yellow to buff jars with a blue glaze (fig. 74);
- the rim of a bowl with vertical wall, yellow fabric, and a fine green glaze applied without slip (fig. 74). This production is known in *Sīrāf*, Iran, in levels dated to the late 8th–9th centuries (WHITEHOUSE 1979: 49) and in Susa in contemporary levels (ROSEN AYALON 1974: 168, fig. 389; KERVRAN 1977: 125, fig. 36 no 20).

These small settlements were occupied at least during the Abbasid period and probably later on.

■ THE DRAINING CHANNELS (KHARAZ)

Recorded hydraulic structures are all of the same kind: they are underground water channels (draining galleries) locally called *kharaz*, bringing water from a source to cultivated areas 5 to 6 km away. On the surface they resemble the Iranian *qanāt*, but differ from them by the way they gather the water. *Qanāt* are catching galleries, supplied by a deep aquifer (phreatic table), whereas the *kharaz* of al-Kharj area either gather surface runoff (from artesian springs) or sinkhole water; they can also be draining galleries fed by the seepage of underflow in the alluvial plain or alluvial fans. These systems are dependent on the variation of the subsurface water table and cannot be considered as perennial. They depend on seepage into the gallery from a shallow water table, or from the flow of a water source which can dry up seasonally.

The hydraulic technique of the *kharaz* resembles that of the Omani Iron Age *falaj* (catchment of shallow water tables from alluvial fans, BOUCHARLAT 2003), but differs in the building technique. The Omani *falaj* that appeared at the end of the 2nd millennium BC (*ibid.*: 169) are zigzagging galleries with narrow shafts ([AL]-TIKRITI 2010), while the *kharaz* of al-Kharj are straight galleries, punctuated by shafts 3 to 4 m wide, dug every 11 metres.

Thus, from the point of view of hydraulic technique, the *kharaz* of al-Kharj resemble the Omani Iron Age *falaj*, from the point of view of building techniques, they are reminiscent of the Iranian *qanāt*.

Tracing back the origin of these structures and dating them is uneasy. Nowadays, these hydraulic systems are dried up, generally filled with rubbish and partly destroyed. But in the 1920s, the subterranean galleries that Philby described were still in use (PHILBY 1920: 167–168). A much older *terminus ante quem* for their digging is provided by the description of the neighbourhood of the capital city of al-Yamāma (which we are inclined to identify with Jaww al-Khiḍrīma (see Chapter 4; SCHIETTECATTE *et al.* 2013: 299–300), i.e. the modern site

of al-Yamāma) by the Persian traveller Nāṣir-i Khusraw, in the mid-11th century AD, who mentions subterranean channels watering the palm groves.¹⁰

Tracing a relationship between the Omani *falaj*, a technique abandoned at the end of the Iron Age (BOUCHARLAT 2003, MOUTON & SCHIETTECATTE 2014) and the *kharaz* in al-Kharj, attested at the latest in the 11th century AD, would be inconsistent. However, a relationship between the Iranian *qanāt*, that appeared during the 1st millennium AD (BOUCHARLAT 2001: 177–178, 2003: 169), and the *kharaz* of al-Kharj could be a working hypothesis, providing that the technique was adapted to the specific regional environmental conditions (presence of abundant sub-surface water and digging of draining galleries rather than galleries drawing on the deep water table). This influence is all the more probable since Persians farmers and mineworkers settled in the region, according to several sources from the 9th–13th centuries AD inventoried by Morony (MORONY 2002: 28–29):

- In *Kitāb futūḥ al-buldān*, Balādhurī (9th century AD) mentions the presence of Persians in Bahrain at the time of the Muslim conquest;
- In *Kitāb al-futūḥ*, Ibn Aʿtham al-Kūfī (10th century AD) mentions that at the end of the Muslim conquest, Persians living at Qaṭīf stayed on as farmers;
- In *Kitāb al-Jawharatayn al-ʿatīqatayn al-māʾiʾatayn min al-ṣafra wa-l-bayḍāʾ*, al-Hamdānī (10th century AD) describes the mining site of Shamām, in the Najd, as a village with 1,000 *Majūs* (Mazdeans) and two fire temples. The site, prosperous in former days, was abandoned at the time of his writing.

■ From Abraq Farzān to al-Salmiyya

The first underground water channel was approximately 5 km long, linking the foot of a sandstone outcrop, Abraq Farzān, to the village of al-Salmiyya, to the east.

Philby described the structure at a time when it was still in use (PHILBY 1920: 167–168): “Firzan, at the base of which rises a spring, from which a subterranean channel, with well shafts at intervals, runs eastward for 3 miles to the village and oasis of Sulaimiyya. (...) The aqueduct, to which I have referred, is of the type called by the Arabs *Kharaz* or *Saqi* and known to the Persians as the *Kariz*, namely, a subterranean channel, in this case some 4 fathoms [7.32 m] deep at the top end, pierced at frequent intervals by well-shafts designed to admit workmen for the inspection, cleaning or repair of the aqueduct. I have seen specimens of such channels in the Sirr and Qasim, and shall soon have occasion to describe those of the Aflaj, but the best-known specimen in the Wahhabi territory is that of Qatif, where we are on strong and even indisputable ground in ascribing the workmanship to the Persians themselves or to Persian influence.”

This underground channel was also described during the Comprehensive Survey of the Central Province (ZARINS *et al.* 1979: 29). And it was the subject of a detailed study by A. al-Ghazzi ([AL-]GHAZZI 2011b)

The channel is fed by two branches (**fig. 75**). The first one begins as an open-air canal, which takes water from an artesian spring west of the Abraq Farzān outcrop. This section goes down into an underground channel whose course can be followed from the surface by shafts more than 3 m wide. One section runs from north-west to south-east for 500 m along which 35 shafts are still visible. It is joined by a second branch coming from the south-west, visible for 500 m thanks to 41 shafts. The initial section of this branch has been wiped out by modern cultivation and it is not possible to say whether it was fed by another artesian spring

10 KHUSRAW 1881: 225: “Le district de Yemamèh est sillonné par des eaux courantes et des canaux souterrains, et on y voit des plantations de dattiers.”

or by seepage from the groundwater underflow. The fact that the subterranean channel was dug at least twice could be linked to a drop in the groundwater level (see Chapter 1). This could indicate that the branch was watered by seepage rather than an artesian spring.

These two branches merge into a single channel which runs toward south-east, and which is preserved for 600 m (46 shafts). One kilometre to the east, a 220-m-long section (15 shafts) has been spared from the frantic recent building activity, probably thanks to a high voltage line which prevented construction in that area.

The numerous shafts of this underground channel are dug every 10 to 12 m (**fig. 76**). The upper part of these shafts is faced with stones; a mudbrick edge, approximately 50 cm high, encircled the top (**fig. 77**).

The outlet of the channel was still visible in the village of Salmiyya in 2011, north-north-west of the town of al-Kharj, and 5 km away from its source. At that time, the site was being destroyed by road construction and only two shafts connected to this channel were still visible, filled with rubble.

■ 'Ayn al-Ḍila' 4

The site of 'Ayn al-Ḍila' 4 is located 1.5 km south-west of the two sinkholes 'Ayn al-Ḍila' 2 and 3. It designates both a 144-m-long sinkhole filled with rubble, and a subterranean water channel that connects this sinkhole with that of 'Ayn al-Ḍila' 3 (**fig. 78**). The *kharaz* is badly preserved over a 1-km-long stretch, following a southwest-northeast axis.

On a Google Earth image dated to 2003 (24.1068°N – 47.2471°E), before the channel was damaged, its line could be traced by 63 well-shafts. An initial section 80 m long began on the eastern edge of the sinkhole, where the channel had its source 10 m below ground-level (ZARINS *et al.* 1979: 29). Then, with an angle of 45° to the north-east, the channel ran for 1,120 m and disappeared 250 m west of the sinkhole of 'Ayn al-Ḍila' 2.

When the Comprehensive Survey of the Central Province was carried out, the source was dried up and the structure abandoned. Such was not the case in the 1920s when Philby travelled in al-Kharj (PHILBY 1920: 169): “the lucerne fields of Qurain are irrigated by a narrow open channel fed by a triple *kariz* [*kharaz*], whose three heads lay just below high-water level in the sides of three natural reservoirs called Ain Samha, Ain al Dhila, and Ain Mukhisa. For some years only the first of these has been in actual operation, but they are all of similar character, and I shall select for detailed description the most striking of them, the Ain al Dhila, which lies in a great cleft at the foot of a rocky ridge called Qusaia (...). The water, which has apparently sunk in level a few inches below the outlet leading into a *kariz* on the northern side, appears to be of a deep blackish-green colour as it lies in the reservoir, but is in fact transparently clear and colourless, though with a slight tinge of a light greenish hue.”

Thus, according to this description, the *kharaz* watered the area of Qurayn, 5 km downstream.

■ SETTLEMENT STRATEGY DURING THE LATE PRE-ISLAMIC AND ISLAMIC PERIODS

The early Islamic sources describe the valley of al-Kharj as a densely populated area and as part of the wider region of al-Yamāma.¹¹ Yet only a few settlements have been found, most often when located in remote or fenced areas (**fig. 65**). This scarcity, in contradiction with

11 See in al-Hamdānī and Yāqūt the several settlements in the Kharj valley and a description of the valley as the most fertile in the Yamāma region ([AL-]HAMDĀNĪ 1968: 139–140; YĀQŪT 1866–1873, ii: 419; iv: 529, 577, 630). On the settlement pattern of al-Yamāma and the high number of inhabitants, see WÜSTENFELD 1874: 198–214; [AL-]JUḤĀNY 2002: 39–48

written sources, can be related to either a permanent occupation of most of the fertile areas of the oasis, thus hiding more ancient occupation, and/or to the modern urbanization process that has led to the rapid disappearance of many sites (e.g. Ḥazm 'Aqīla mentioned above, and site 207-24 near 'Ayn al-Ḍila' 4 mentioned above).

Be that as it may, the location of these sites is dictated by factors other than those in play during earlier times. Proximity of water sources and knapping or building material were decisive in the location of pre- and protohistoric sites, but the pattern evolved. All the settlements from the Late Pre-Islamic and Islamic periods are located in close proximity to the alluvial plain (Wādī Nisāḥ 1-5) or above the alluvial deposits, near the confluence of wādīs (Wādī al-Hayāthim, al-Yamāma, and Ḥazm 'Aqīla) (**fig. 79**). This settlement strategy is dictated by the close proximity of arable lands. The geomorphological survey has shown the weakness of surface runoff in this oasis and how the exposure of sites to potentially destructive floods was limited (see Chapter 1). Recent destructive floods in al-Kharj region were largely the consequence of a recent urbanization that prevents the flows from following their natural course.

Equally, the geomorphological survey has demonstrated the importance of groundwater underflows in the alluvial plain and how shallow the water table was before the intensive pumping of the last 40 years.

Basically, within the alluvial plain, digging wells was the easiest way to stock up on water for agriculture, animals and human needs. Simple structures 7 to 10 m deep provided an easy access to the water table (**fig. 14**) and were sufficient to make the most of the groundwater underflow.

But at a certain stage of their development, local populations started to profit from all the water sources available in the oasis for agricultural purposes, including those outside the alluvial plain (sinkholes, artesian sources) by digging monumental structures, the *kharaz*, over 5 to 6 km long. This increased their agricultural productivity. We are inclined to associate these developments with the coming of Persian communities during the Sasanian period, a period also described by Arab-Islamic sources as one during which the region was densely settled.

The fact that the few ancient settlements located in the oasis are for the moment dated to the Late Pre-Islamic and Early Islamic period has reinforced the idea of a time of growth and expansion. Until further work is done, this is but a working hypothesis.

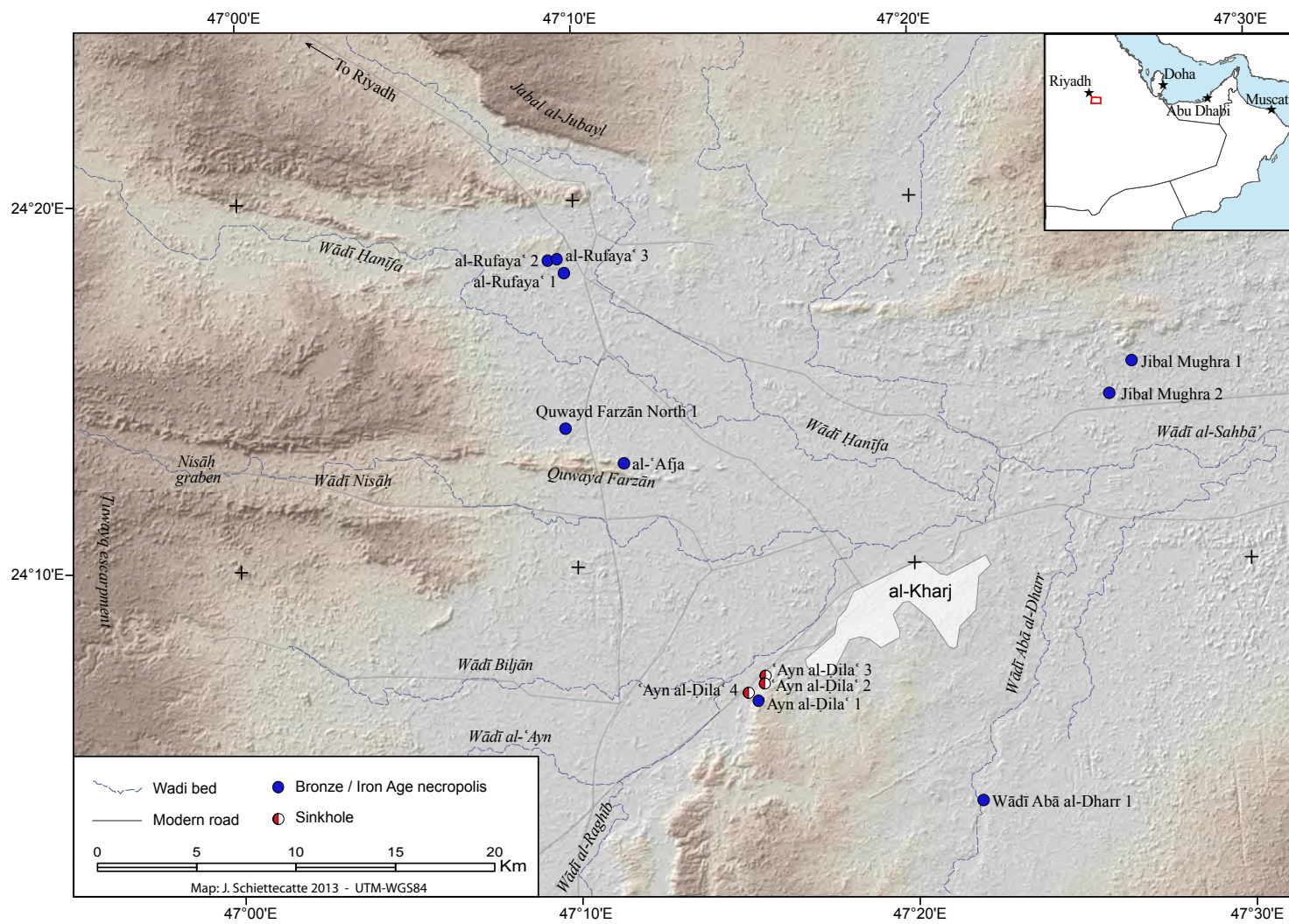


Figure 47 Map of the Bronze and Iron Age sites in the region of al-Kharj (J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

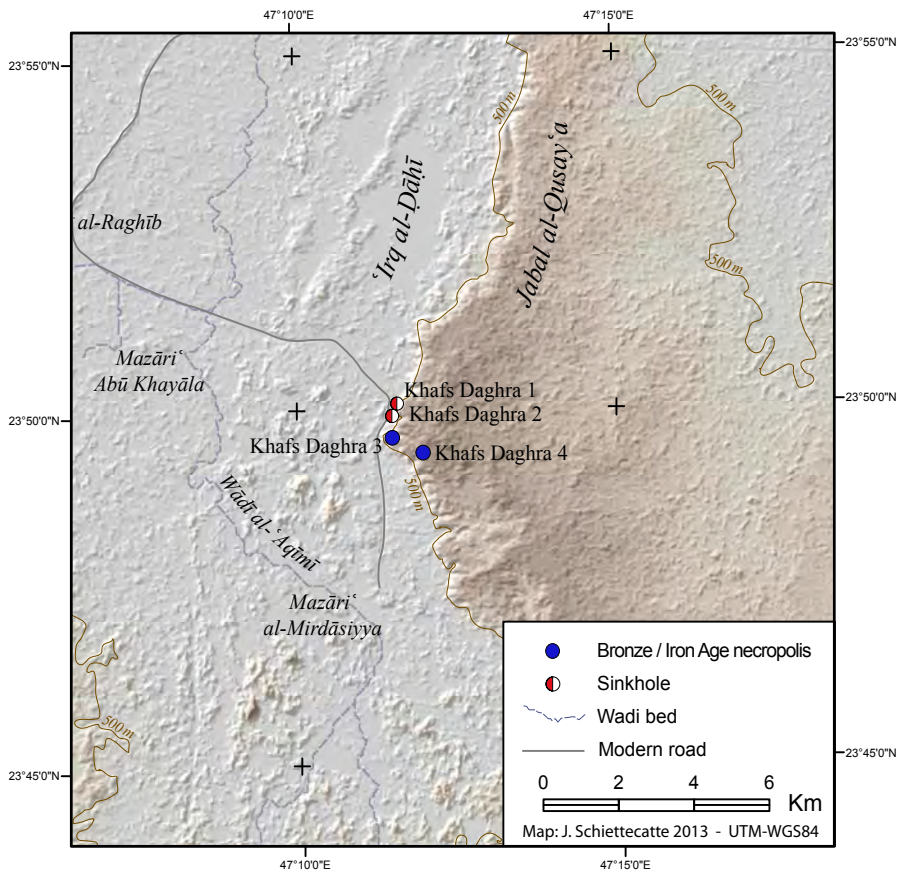


Figure 48 Map of the Bronze and Iron Age sites of the Khafs Daghra area, south of al-Kharj [for location, see fig. 1] (J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

Figure 49 Bronze and Iron Age sites superimposed on the geomorphological map of al-Kharj area (A. Chabrol, G. Fortin and J. Schiettecatte)

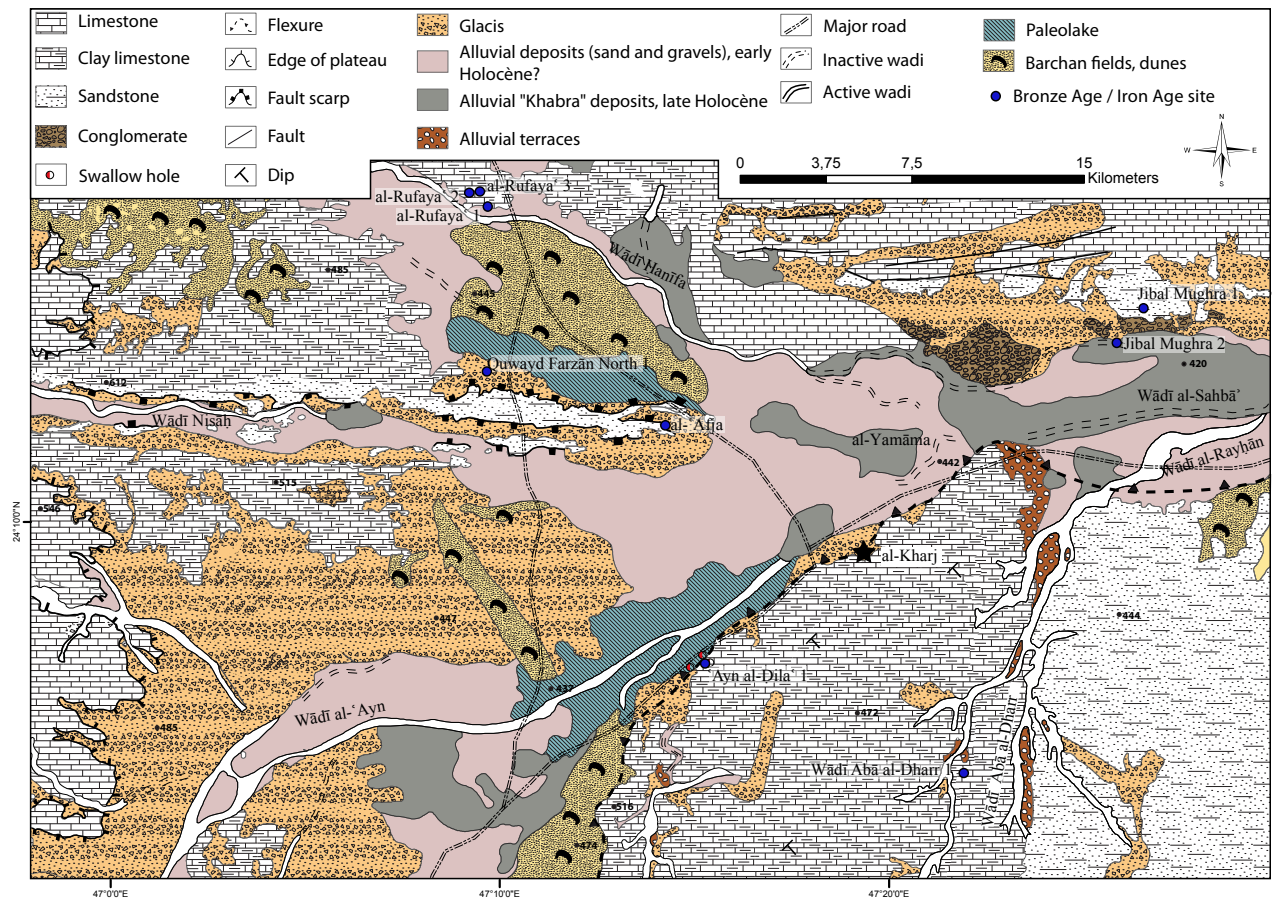




Figure 50 Sinkhole at 'Ayn al-Dila' 2 in January 1975, looking southeast (Courtesy of Saudi Aramco World/SAWDIA)



Figure 51 Sinkhole at 'Ayn al-Dila' 2 in 2011, looking southeast (photograph: J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)



Figure 52 Necropolis at al-'Afja, over the Quwid Farzān, a sandstone outcrop, looking east (photograph: P. Siméon – French-Saudi Archaeological Mission in al-Kharj)



Figure 53 A monumental stepped tomb at al-'Afja (photograph: M. Niveleau – French-Saudi Archaeological Mission in al-Kharj)



Figure 54 A tapered structure at al-'Afja (photograph: M. Niveleau – French-Saudi Archaeological Mission in al-Kharj)



Figure 55 Aerial view of the necropolis at 'Ayn al-Dīla', on the limestone plateau of the Jabal al-Qusay'a, looking west (photograph: Th. Sagory – French-Saudi Archaeological Mission in al-Kharj)

Figure 56 Necropolis at 'Ayn al-Dila', tumulus field looking west (photograph: J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)



Figure 57 Khafs Daghra 3: isolated tomb (photograph: J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)



Figure 58 Khafs Daghra 4: circular tomb with a winding tail (photograph: M. Mouton –French-Saudi Archaeological Mission in al-Kharj)



Figure 59 Jibāl Mughra 1: circular tombs (photograph: J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)



Figure 60 Jibāl Mughra 2: circular structure (photograph: J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)



Figure 61 Quwid Farzān North 1: rectangular tomb edged with vertical orthostats; the Quwid Farzān, a sandstone outcrop, appears in the background (photograph: G. Fortin – French-Saudi Archaeological Mission in al-Kharj)

Figure 62 al-Rufaya' 2: dry-stone grave with its peripheral wall (photograph: J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)



Figure 63 al-Rufaya' 3: rectangular dry-stone grave (photograph: J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)



Figure 64 Wādī Abā adh-Dharr 1: Four graves (background) and an undetermined structure (foreground) (photograph: G. Fortin – French-Saudi Archaeological Mission in al-Kharj)



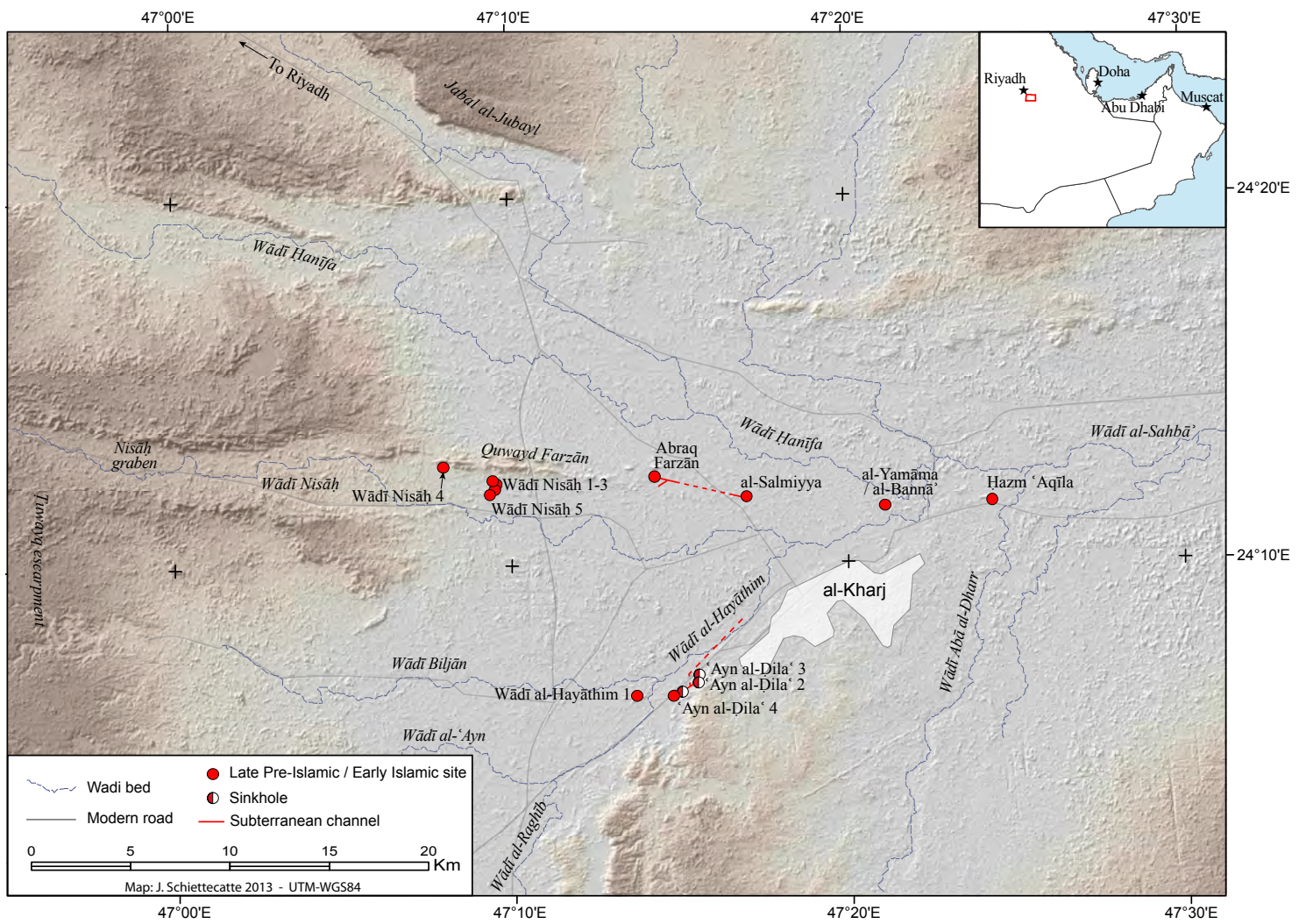


Figure 65 Map of the Late Pre-Islamic and Islamic sites in the region of al-Kharj (J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

Figure 66 Al-Yamāma: map of the archaeological area and fenced area
(J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj/
Includes World-View-2 Products © DigitalGlobe™, distributed by e-GEOS)





Figure 67 Al-Yamāma: aerial view of the north-eastern area of the site, looking southeast (photograph: Th. Sagory – French-Saudi Archaeological Mission in al-Kharj)



Figure 68 Hazm 'Aqila: surface pottery sherds (photograph: P. Siméon – French-Saudi Archaeological Mission in al-Kharj)



Figure 69 Wādī al-Hayāthim 1: remains of a mudbrick structure (photograph: G. Fortin – French-Saudi Archaeological Mission in al-Kharj)



Figure 70 Wādī al-Hayāthim 1: artefacts and pottery sherds sampled on the surface (photograph: P. Siméon; computer graphics: J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

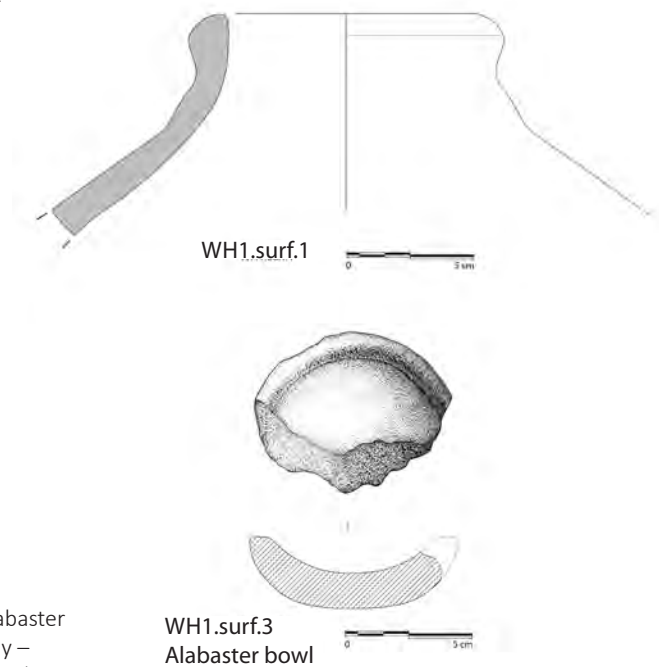


Figure 71 Wādī al-Hayāthim 1: WH1.surf.1: green chaff tempered ware from surface; WH1.surf.3: alabaster vessel from surface (drawings: L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)



Figure 72 Wādī Nisāḥ 1: remains of an isolated structure on the edge of the wādī (photograph: J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)



Figure 73 Wādī Nisāḥ 5: Coarse grey ware sampled on the surface (photograph: P. Siméon; computer graphics: J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

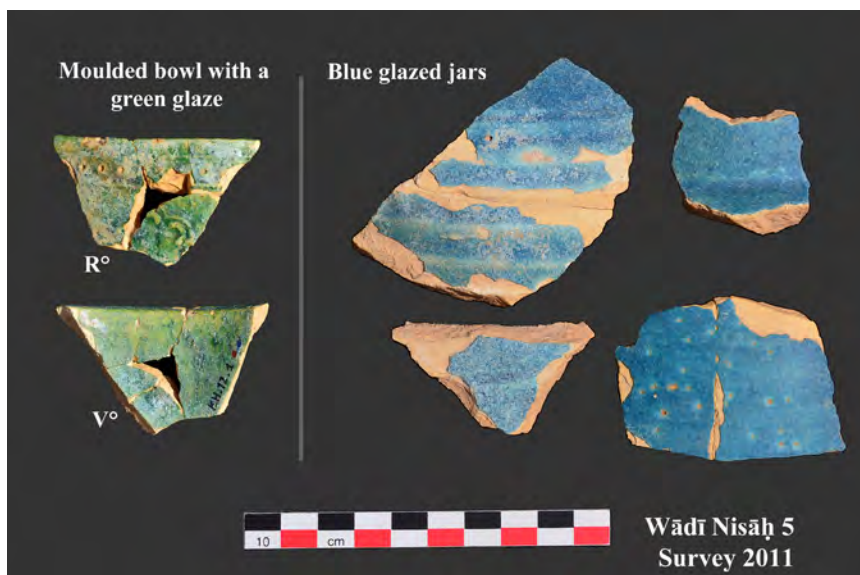


Figure 74 Wādī Nisāḥ 5: glazed pottery sampled on the surface (photograph: P. Siméon; computer graphics: J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)



Figure 75 Abraç Farzân: Aerial view of the *kharaz* at the junction of the two branches (photograph: Th. Sagory – French-Saudi Archaeological Mission in al-Kharj)



Figure 76 Abraç Farzân: Aerial view of the *kharaz*, detail of the shafts in the section down the junction of the two branches (photograph: Th. Sagory – French-Saudi Archaeological Mission in al-Kharj)

Figure 77 Abrağ Farzān: view of the *kharaz*, detail of a shaft from the ground in 2011 (photograph: J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

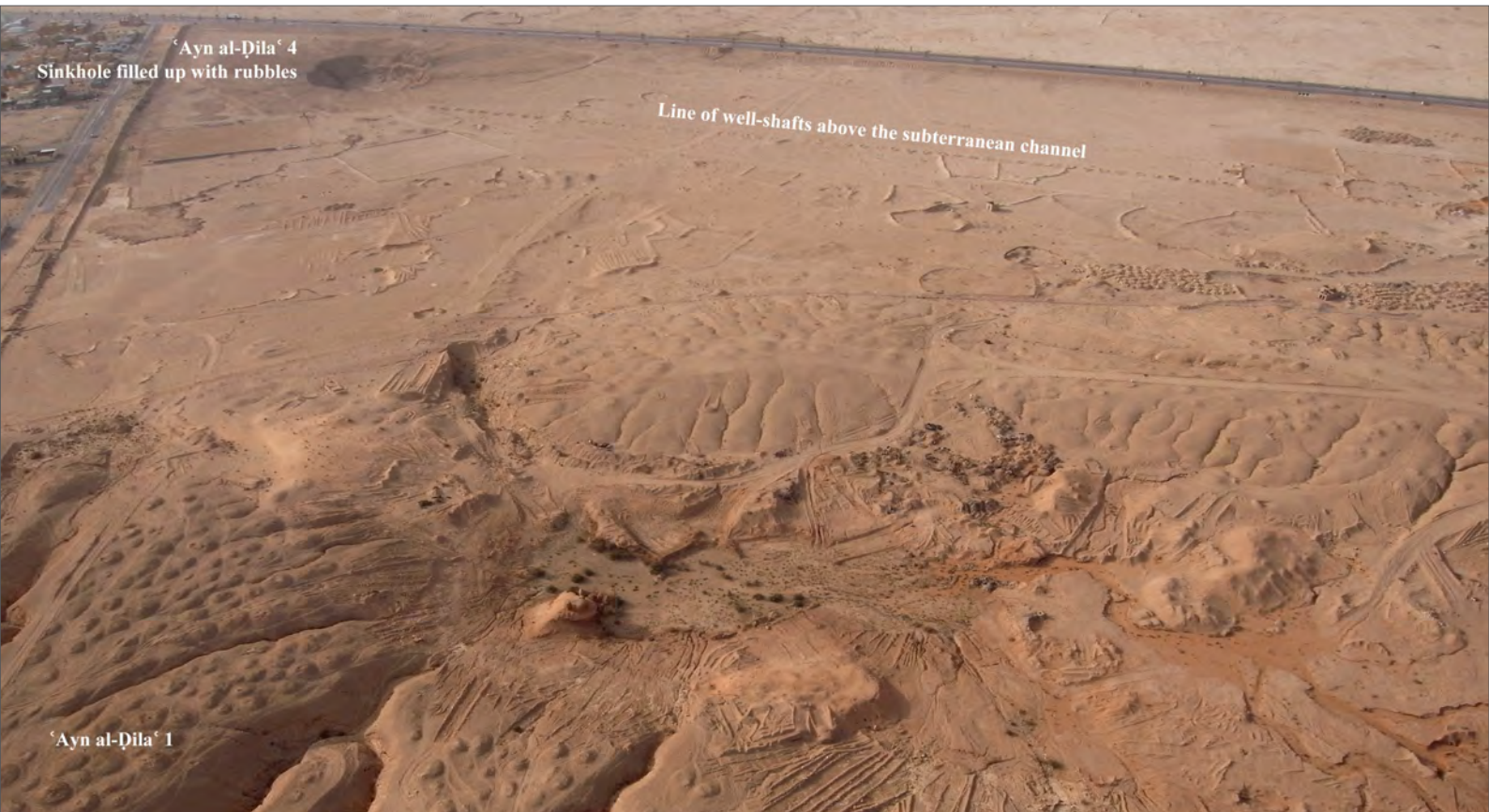


Figure 78 'Ayn al-Dīla' 4: Aerial view of the *kharaz* and the sinkhole in the background (photograph: Th. Sagory – French-Saudi Archaeological Mission in al-Kharj)

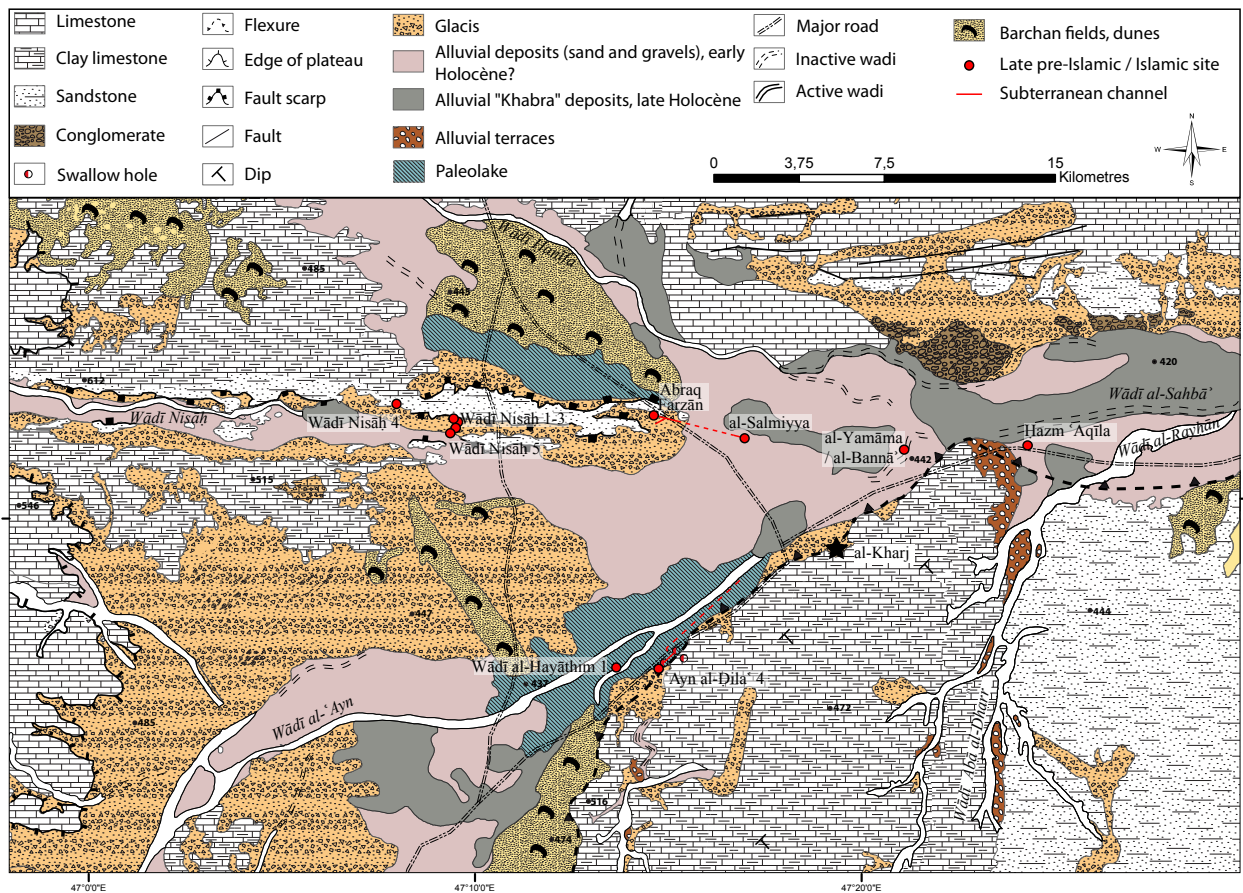


Figure 79 Superimposition of the Late Pre-Islamic and Islamic sites on the geomorphological map of al-Kharj area (A. Chabrol, G. Fortin, J. Schiettecatte)

CHAPTER 4

NOUVEAUX JALONS POUR UNE GÉOGRAPHIE HISTORIQUE DE LA YAMĀMA : LES TOPONYMES MENTIONNÉS DANS LES INSCRIPTIONS SUDARABIQUES

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La géographie historique de la région appelée en arabe al-Yamāma (en français la Yamāma) a déjà été étudiée minutieusement par le chercheur séoudien ‘Abd Allāh Ibn Khamīs (1978). Aujourd’hui, sur certains points, les conclusions de cet auteur peuvent être complétées ou amendées grâce aux inscriptions préislamiques découvertes récemment. L’objet de cette contribution est de faire l’inventaire et l’identification de la vingtaine de toponymes d’Arabie centrale que ces inscriptions – toutes ḥimyarites – mentionnent. Il n’a pas semblé utile de reprendre ici la question compliquée de l’extension de la Yamāma, qui varie considérablement selon les auteurs et les époques. Comme les inscriptions sudarabiques ne mentionnent qu’un petit nombre de noms propres de l’Arabie déserte, le plus simple consistait à donner à la Yamāma le sens le plus large, toute l’Arabie du centre, entre Najrān, le Ḥijāz, le nord, le Golfe (appelé aux premiers siècles de l’Islam al-Baḥrayn) et ‘Umān, quitte même à déborder quelque peu jusqu’aux rivages du golfe Arabo-persique.

L’inventaire des toponymes de l’Arabie centrale est complété par la reproduction des textes qui les mentionnent afin de faciliter la consultation du contexte.

Les toponymes

L’inventaire des toponymes d’Arabie centrale que l’on trouve dans les inscriptions ḥimyarites permet de progresser dans deux directions. Une première avancée réside dans un remarquable progrès des connaissances grâce au nombre assez élevé des entrées ; on peut en déduire d’une part une stabilité de la toponymie beaucoup plus importante qu’on ne l’aurait pensé¹², d’autre part une confirmation du fait que les Ḥimyarites intervinrent dans toute l’Arabie déserte à partir du milieu du iv^e siècle et en annexèrent une grande partie sous les règnes d’Abīkarib As‘ad (c. 375-445) et de son fils Ḥassān Yuha‘min (c. 400-450)¹³. La seconde avancée consiste dans une révision de la signification précise des termes al-Yamāma, al-Kharj et Jaww dans l’Antiquité et aux premiers siècles de l’Islam (**fig. 80**). C’est par cette dernière que nous commençons.

UNE NOUVELLE DÉFINITION DES RAPPORTS ENTRE AL-YAMĀMA, AL-KHARJ ET JAWW

Si l’on en croit ‘Abd Allāh Ibn Khamīs, al-Kharj serait un toponyme d’époque islamique, correspondant à l’antique Jaww ou Jaww al-Khaḍārim : « Jaww al-Khaḍārim, al-Kharj

12 Voir ASKAR 2002 : 13, sur les difficultés de l’entreprise.

13 Ces dates correspondent à la période de corégence avec le père et à celle de règne de premier rang.

aujourd'hui »¹⁴ ou encore « le nom prédominant pour (cette région) à l'époque (préislamique) était — semble-t-il — Jaww d'après l'opinion de certains savants alors qu'al-Kharj est islamique »¹⁵. Ailleurs, il peut arriver qu'Ibn Khamīs formule les choses un peu différemment : « Jaww, (c'est-à-dire) Jaww al-Khaḍārim, (à savoir) al-Kharj et ses environs » (IBN KHAMĪS 1978-I : 295 B). Quant à al-Yamāma, c'est d'une part une vaste région appelée aussi Jaww, al-'Arūḍ ou encore al-Qurayya (*ibid.* : 15), d'autre part un village d'al-Kharj¹⁶.

'Abd Allāh al-'Askar adopte une position semblable, considérant que la Yamāma s'appelait autrefois « Jaw, al-'Irdh et Qariyah »¹⁷, et que « al-Khadharim¹⁸ était parfois appelé Jaw ou Jaw al-Khadharim... Son nom moderne est al-Kharj. Il est devenu la capitale de la Yamāma à l'époque de Tasm et 'Judais' »¹⁹.

Avec de telles explications, il n'est pas facile de s'y retrouver. Cette confusion résulte d'une méthode qui consiste à prendre un site et à additionner les informations relevées dans toutes les sources. Comme ces sources sont de dates diverses et que leurs auteurs sont plus ou moins bien informés (et parfois plus ou moins cohérents), il n'est pas étonnant que les divergences soient nombreuses. De fait, il est bien préférable d'examiner les données auteur par auteur et de comprendre la logique qui sous-tend chaque description.

Les inscriptions sudarabiques confirment d'emblée que la reconstruction d'Ibn Khamīs présente des faiblesses. L'hypothèse que le toponyme al-Kharj apparaisse avec l'Islam, prenant la place de Jaww, se révèle infondée puisqu'al-Kharj (sous la forme Khargān) et Jaww (sous la forme Gawwān) sont attestés ensemble au IV^e siècle de l'ère chrétienne (ci-après è. chr.), dans le récit d'un raid « contre Gawwān et Khargān ». Les deux noms ne désignent pas successivement un même lieu mais nomment deux endroits différents, probablement de même nature. La formulation suggère par ailleurs que les Ḥimyarites (qui arrivent probablement du sud) attaquent successivement Gawwān, puis Khargān.

Une inscription du V^e siècle, qui oppose Yamāmatān (arabe al-Yamāma) à Hagar^{um} (arabe Hajar, aujourd'hui al-Hufūf), suggère que ces deux termes nomment des centres importants ainsi que le territoire qui en dépend.

La *Description de la péninsule Arabique (Ṣifat jazīrat al-'Arab)* de l'encyclopédiste yéménite al-Ḥasan al-Hamdānī (né en 893 et mort après 970) est l'ouvrage qui donne la description la plus détaillée de l'Arabie déserte avant l'époque moderne. Or elle utilise une nomenclature qui s'accorde parfaitement avec les données des inscriptions. Al-Hamdānī emploie le terme al-Yamāma avec deux significations. D'une part c'est une très vaste région en Arabie centrale, « la terre d'al-Yamāma » (*arḍ al-Yamāma*) ([AL-]HAMDĀNĪ Ṣifa : 115/26), mais aussi simplement « al-Yamāma ». D'autre part, al-Yamāma est un nom de lieu, dont il donne les coordonnées ([AL-]HAMDĀNĪ Ṣifa : 45/8). Dans cette acception plus restreinte, al-Yamāma est manifestement la vaste oasis qui englobe al-Kharj et Jaww al-Khaḍārim, comme l'indique explicitement l'énumération des lieux qui en relèvent²⁰.

Il en résulte que la Yamāma est le nom de la vaste oasis au sud-est d'al-Riyāḍ, qui comprend deux parties principales, Jaww et al-Kharj. C'est aussi le nom de la région dont elle est le centre.

14 IBN KHAMĪS 1978-I : 296 A, entrée « Ḥajr al-Yamāma ».

15 *Ibid.* : 373 A, entrée « al-Kharj ».

16 *Ibid.* : 373 A, entrée « al-Kharj », dans la liste des bourgs de l'oasis.

17 [AL-]ASKAR 2002 : 10. Pour une vocalisation plus rigoureuse de ces toponymes, se reporter à Ibn al-Khamīs.

18 Lire « al-Khiḍrīma ».

19 [AL-]ASKAR 2002 : 23-24. Lire « Jadīs » et non « Judais ».

20 [AL-]HAMDĀNĪ Ṣifa : 139/5-23, cité ci-dessous en traduction sous l'entrée « Yamāmatān ».

La localisation respective de Jaww et d'al-Kharj est indiquée allusivement par al-Hamdānī. Jaww se trouve à l'est puisque c'est par elle qu'on accède à al-Yamāma en venant d'al-Baḥrayn ([AL-]HAMDĀNĪ *Ṣifa* : 139/8). Par ailleurs, al-Kharj, qui est séparé d'al-Khiḍrīma (le centre de Jaww) par une étape ([AL-]HAMDĀNĪ *Ṣifa* : 166/14), se trouve probablement à l'ouest.

Ces indications permettent de formuler l'hypothèse de travail que les vestiges d'al-Bannā'/al-Yamāma sont le site de la ville médiévale d'al-Khiḍrīma (le centre de Jaww), et probablement celui du bourg (dont on ignore le nom) qui était le centre de la Gaww^{um} antique. La stratigraphie d'al-Bannā'/al-Yamāma, avec ses deux phases préislamiques et ses deux phases islamiques (voir le chapitre 7), s'accorde avec une telle hypothèse, mais il ne s'agit pas encore d'un argument définitif.

Le bourg moderne appelé al-Yamāma, à quelques kilomètres au nord d'al-Kharj et à proximité immédiate du site d'al-Bannā'/al-Yamāma, ne semble pas avoir été appelé ainsi dans le passé : son nom n'apparaît dans les sources qu'au XIX^e siècle (SMITH 2004). Nous faisons l'hypothèse qu'il s'agit d'un établissement de fondation récente auquel on a donné un nom historiquement évocateur, sans exclure que le nom de l'ensemble de l'oasis se soit maintenu dans l'une de ses parties. Jusqu'à preuve du contraire, l'emplacement de ce bourg n'a aucune signification particulière pour la toponymie de l'Antiquité et du Haut Moyen-Âge.

■ *GAWWUM (Gw^m) et GAWWĀN (Gwⁿ), arabe Jaww, Jaw al-Yamāma, puis Jaww al-Khaḍārim*

Inscriptions : al-'Irāfa 1/7 (Gw^m) et 'Abadān 1/17 (Gwⁿ).

Nom de la partie orientale de la vaste oasis d'al-Yamāma. Il ne prend pas l'article en arabe si on se fonde sur al-Hamdānī : voir « la palmeraie de Jaww », *nakhl Jaww* ([AL-]HAMDĀNĪ *Ṣifa* : 139/10 — la traduction est donnée sous l'entrée « Yamāmatān »).

En sudarabique, Gaww est indéterminé dans al-'Irāfa 1/7 (Gw^m), mais déterminé dans 'Abadān 1/17 (Gwⁿ).

Aujourd'hui, le nombre total des endroits appelés Jaww ou al-Jaww en Arabie séoudite se situe entre 200 et 300 (*Mawsū'at asmā' al-amākin* 2003 II : 428-437). Malgré le caractère très commun de cette appellation, la localisation de Gaww^{um} dans l'oasis de Yamāmatān est assurée : l'inscription 'Abadān 1/17 mentionne une expédition « contre Gawwān et Khargān » ('ly Gwⁿ w-Hrgⁿ), associant les deux toponymes. Quant à l'inscription al-'Irāfa 1/7, elle cite Yamāmatān à la ligne 5 et Gaww^{um} (Gw^m) à la ligne 7.

Du fait de sa relation avec Yamāmatān et Khargān, le sudarabique Gaww^{um}/Gawwān peut être identifié avec le Jaww al-Yamāma (appelé aussi Jaww al-Khaḍārim) des sources arabo-islamiques. Pour al-Hamdānī, c'est par Jaww al-Khaḍārim qu'on entre dans al-Yamāma en venant de l'est ([AL-]HAMDĀNĪ *Ṣifa* : 139/8).

Le terme « al-Khaḍārim » qui permet de distinguer le Jaww de la Yamāma de ses nombreux homonymes est un pluriel, probablement celui de **khiḍrimī*, adjectif de relation formé sur al-Khiḍrīma. Al-Hamdānī prétend qu'al-Khiḍrīma est synonyme de Jaww al-Khaḍārim ([AL-]HAMDĀNĪ *Ṣifa* : 139/5, 161/24) mais il faut sans doute comprendre qu'elle en est le centre. Il précise ainsi qu'al-Khiḍrīma se situe à une étape (*marḥala*) d'al-Kharj ([AL-]HAMDĀNĪ *Ṣifa* : 166/14). Al-Khaḍārim signifierait donc « les habitants d'al-Khiḍrīma » ou, si on préfère, « les Khiḍrimites »).

Selon al-Hamdānī, al-Khiḍrīma a été dominée successivement par les banū 'Ubayd de Ḥanīfa, les Āl Abī Ḥafsa et finalement al-Ukhayḍir b. Yūsuf al-'Ulwī qui s'y établit ([AL-]HAMDĀNĪ *Ṣifa* : 163/3-4). Malgré la ressemblance des noms, il ne semble pas que l'anthroponyme al-Ukhayḍir dérive d'al-Khiḍrīma ou d'al-Khaḍrā' (une localité voisine) : la dynastie est appelée les banū 'l-Akhḍar b. Yūsuf ([AL-]HAMDĀNĪ *Ṣifa* : 139/5-6), ce qui conduit à supposer qu'al-Ukhayḍir est un diminutif d'al-Akhḍar (CASSEL 1966-II : 147).

Avant d'être appelée Jaww al-Khaḍārim, l'oasis a été nommée Jaww al-Yamāma : c'est cette désignation que l'on trouve chez le poète préislamique al-A'shā Maymūn (BLACHÈRE 1952 : 321-325 ; THILO 1958 : 46). Noter qu'al-A'shā Maymūn fut reçu à Jaww al-Yamāma par Hawdha b. 'Alī 'l-Suḥaymī 'l-Ḥanafī, un important chef tribal de l'Arabie centrale, mort en 630 è. chr. (CASSEL 1960 : 710).

Gaww^{um} (identifié avec Jaww al-Khaḍārim) se trouve à 100 km au sud-est d'al-Riyāḍ et à 280 km à l'est de Ma'sal. Voir TAVO B VII 1 ; THILO 1958 : 46 ; IBN KHAMĪS 1998 : 260-261.

[AL-]HAMDĀNĪ *Ṣifa* : 139/4-8 :

« (Après al-Sahbā', le mont Anqad et al-Rawḍa), tu arrives à al-Khiḍrima — à savoir **Jaww al-Khaḍārim** —, ville, villages et sūq où (se trouvent) les banū 'l-Akhḍar b. Yūsuf ; elle est l'habitat [*dār*] des banū 'Adī b. Ḥanīfa, l'habitat des banū 'Āmir b. Ḥanīfa, l'habitat de 'Ijl b. Nuḡaym et les habitats de Hawdha b. 'Alī 'l-Suḥaymī 'l-Ḥanafī ; c'est avec elle (al-Khiḍrima/Jaww al-Khaḍārim) que commence la **Yamāma** en direction d'al-Baḥrayn ».

[AL-]HAMDĀNĪ *Ṣifa* : 140/4 :

« ... à al-Rawḍa de Jaww al-Khaḍārim ».

Dans les inscriptions ḥimyarites, Gawwān, *Gwⁿ*, est probablement une simple variation graphique de Gaww^{um} : il n'est pas rare de rencontrer une telle hésitation dans les inscriptions sudarabiques, surtout pour les noms étrangers (par exemple, l'arabe al-Ḥārith ou al-Mundhir peut être transcrit *Hrt^m* et *Mḍr^m*, sans article).

■ **KHARGĀN** (*Hrgⁿ*), arabe al-Kharj

Inscription : 'Abadān 1/17.

Nom de la partie occidentale de la vaste oasis de Yamāmatān, à une centaine de kilomètres au sud-est d'al-Riyāḍ. Le nom d'al-Kharj est attesté dans les sources médiévales avec la même signification. Aujourd'hui, il désigne l'ensemble de l'oasis. L'identification est assurée parce que, dans l'inscription 'Abadān 1/17, Khargān est mentionnée avec Gawwān, nom de la partie orientale de Yamāmatān, dans le récit d'un raid « contre Gawwān et Khargān » (*'ly Gwⁿ w-Hrgⁿ*).

Voir TAVO B VII 1 ; THILO 1958 : 58-59 ; IBN KHAMĪS 1978-I : 371-378 ; SMITH 2004 ; [AL-]HAMDĀNĪ *Ṣifa* : 139/15, 22 ; 150/11-16 ; 153/12 ; 154/11 ; 163/5 ; 166/13, 14 ; etc. (se reporter à la traduction de la page 139, sous l'entrée « Yamāmatān » ; *Mawsū'at asmā' al-amākin* (2003 II : 599 : al-Kharj [al-Sayḥ]), 24°09'N – 47°19'E).

■ **YAMĀMATĀN** (*Ymmtⁿ*), arabe al-Yamāma

Inscription : al-'Irāfa 1/5.

Nom de la vaste oasis qui inclut Khargān (arabe al-Kharj) et Gaww^{um} (arabe Jaww, Jaww al-Yamāma et Jaw al-Khaḍārim). Le nom d'al-Yamāma est attesté dans les sources médiévales avec la même signification.

L'extension de l'oasis d'al-Yamāma est esquissée par al-Hamdānī qui en énumère les diverses localités, notamment Jaww al-Khaḍārim et al-Kharj :

« (Après al-Sahbā'²¹, le mont Anqad et al-Rawḍa), tu arrives à al-Khiḍrima, (à savoir **Jaww al-Khaḍārim**), ville, villages et sūq ... ; c'est avec elle que commence la **Yamāma** en direction d'al-Baḥrayn... ; à droite, il y a le wādī Rawḥān qui vient d'al-Dām²²... ; il se déverse ensuite vers la palmeraie de **Jaww** et ses forts (*ḥuṣūn*), notamment al-Ghubayb,

21 Wādī à une centaine de kilomètres à l'est d'al-Yamāma (TAVO B VII 1 et THILO 1958 : 114, carte Nordarabien, Teil D).

22 Wādī au sud de la moderne al-Yamāma et à l'est d'al-Kharj (TAVO B VII 1 et THILO 1958, carte Nordarabien, Teil D). L'indication que le wādī Rawḥān est « à droite » localise Jaww al-Khaḍārim dans la partie méridionale de l'oasis.

dhū 'l-Arāka, al-Aq'as, al-Riyyān, al-'Uyūn et al-Zabiya ; sur la gauche, il y a al-'Ayn d'où vient al-Sayḥ al-kabīr, et à droite al-Manşif, fort des banū 'Āmir b. Ḥanīfa, puis al-Munayşif qu'arrose al-Munkhariq (le « Rapide »), à savoir le Munkhariq de Nisāḥ²³. Ensuite, en aval, ce sont les villages relevant de la **Yamāma** : al-Ḍubay'a, al-Malḥā', al-Kharj, qui se trouve dans une dépression sableuse (*qana' al-raml*) — le *qana'* est une dépression (*qā'*) — et al-Ramla. Cette dernière est au pied (*aşl*) d'al-Dām ; on l'appelle Ramlat al-Maghşil. Entre al-Dām et al-Ramla, il y a al-Liwā, un passage (*sikka*) entre la hauteur (*al-quff*) et le sable où on trouve une eau appelée al-Suwaydiyya dans le lit (*madfa'*) du wādī 'l-Maghşil. Ce wādī s'écoule depuis Qaṭmān, Jawwajān et al-Shi'na, en bas (*bi-suffl*) d'al-Jabbāna, Jabbānat al-Kharj. Voici ce qu'est la **Yamāma** : des forts (*ḥuṣūn*) dispersés, des palmeraies et des jardins, et une élévation (*quff*) sur la droite, entre elle et Nisāḥ, appelée Aklab. Ce sont les habitats des banū Qays b. Tha'laba — elle appartenait auparavant aux banū Sa'd b. Zayd Manā' — qui s'en sont emparés. Al-**Kharj** est (le nom d'une dépression (*qā'*) semblable à Birk et de forts (*ḥuṣūn*), qu'alimentent les wādī (*yudfa'u fi-hi min al-awdiyya*) Na'ām et Birk et le wādī 'l-Majāza²⁴... » ([AL-]HAMDĀNĪ *Şifa* : 139/5-23).

Al-Hamdānī précise aussi que c'est par al-Khiḍrīma qu'on accède à al-Yamāma en venant d'al-Baḥrayn ([AL-]HAMDĀNĪ *Şifa* : 139/5-8).

Selon lui, al-Yamāma désigne aussi la vaste région d'Arabie centrale dont l'oasis est le centre, comme nous l'avons vu.

De nos jours, l'appellation al-Yamāma (pour l'oasis) a été supplantée par al-Kharj. Il existe cependant une petite bourgade nommée al-Yamāma au nord de l'oasis d'al-Kharj (THILO 1958 : 114, carte Nordarabien Teil D ; SMITH 2004 ; *Mawsū'at asmā' al-amākin* 2003 V : 554, 24°11'25"N et 47°20'00"E). Il semblerait que cette bourgade ait reçu ce nom assez récemment, apparemment au XIX^e siècle.

À l'époque d'al-Hamdānī, al-Yamāma était le nom de l'ensemble de l'oasis, tandis qu'al-Kharj et Jaww en étaient des parties. Cette relation entre les toponymes donne un sens satisfaisant aux inscriptions antiques. C'est pourquoi nous l'adoptons pour la période préislamique.

Al-Yamāma se trouve à 90-100 km au sud-est d'al-Riyāḍ et à quelque 270-280 km à l'est de Ma'sal.

AUTRES TOPONYMES

■ ABĀN^{um} ('bn^m), arabe Abān

Inscription : al-'Irāfa 1/6.

Il s'agit des deux monts Abān, Abān al-Aswad et Abān al-Abyaḍ (dans les sources arabes et encore aujourd'hui), respectivement sur les rives nord et sud du wādī 'l-Ruma (ci-dessous Rumatān). L'identification est sûre parce que Abān est mentionné avec Rumatān (« Abān^{um}, Mt^{lm} et Rumatān »). Les monts Abān se trouvent à une distance d'environ 420 km à l'ouest-nord-ouest d'al-Riyāḍ et 265 km au nord-ouest de Ma'sal (voir TAVO B VII 1 ; THILO 1958 : 24, carte Nordarabien Teil C ; [AL-]UBŪDĪ 1979-1 « Abān » : 221-247 ; [AL-]HAMDĀNĪ *Şifa* : 123/22, 126/20 [dans la liste des « montagnes célèbres chez les Arabes, mentionnées dans leurs poèmes »] ; 144/18 [« puis les deux Abān, Abān al-Aswad et Abān al-Abyaḍ, deux montagnes entre lesquelles passe la dépression d'al-Ruma »] ; 145/13 ; 178/4). L'identification de 'bn^m avec l'anthroponyme Abān (CASSEL 1966-II : 101) est à écarter.

23 Le wādī Nisāḥ, orienté ouest-est, passe un peu au nord d'al-Kharj : TAVO B VII 1 et THILO 1958, carte Nordarabien, Teil D.

24 Wādī orienté sud-nord, se déversant dans l'oasis d'al-Yamāma : THILO 1958, carte Nordarabien, Teil D.

Dans la *Mawsū'at asmā' al-amākin* (2003 II : 21), les noms répertoriés sont *jibāl Abān al-Aḥmar* (de 25°27' à 25°32'N et de 42°44'10" à 42°48'E) et *jibāl Abān al-asmar* (de 25°45' à 25°51'N et de 42°57'05" à 43°01'E).

■ *'Aramatum* ('rmt^m), arabe *al-'Arama*, *al-'Uruma*

Inscription : al-'Irāfa 1/5.

'Aramat^{um}, aujourd'hui al-'Arama, plateau orienté du nord-ouest vers le sud-est, long de 300 kilomètres et large d'une trentaine, à une centaine de kilomètres à l'est-nord-est d'al-Riyāḍ et à quelque 280 km à l'est-nord-est de Ma'sal (TAVO B VII 1 ; THILO 1958 : 31 (al-'Arama/al-'Arma), carte Nordarabien Teil D ; IBN KHAMIS 1978-II : 145-154 ; [AL-]HAMDĀNĪ *Ṣifa* : 137/8, 15 ; 138/5, 14, 24 ; 139/1, 2, 25 ; 140/5 ; 141/19, 23).

Dans la *Mawsū'at asmā' al-amākin* (2003 IV : 197-198), la vocalisation est « al-'Uruma » ; les coordonnées varient de 24°14' à 26°16'N et de 45°40' à 48°03'E.

■ *BIRK^{um}* (Brk^m), arabe *Birk*

Inscription : al-'Irāfa 1/2.

C'est le fameux wādī Birk (dans les sources arabes et encore aujourd'hui), prolongement du wādī 'l-Rikā' (TAVO B VII 1 ; THILO 1958 : carte Nordarabien Teil D) qui coule d'ouest en est puis fait un coude vers le nord pour se déverser dans l'oasis d'al-Kharj. Il se trouve à quelque 140 km au sud d'al-Riyāḍ et à quelque 160 km au sud-est de Ma'sal (TAVO B VII 1 ; THILO 1958 : 36-37, carte Nordarabien Teil D ; IBN KHAMIS 1978-I : 150-156 ; [AL-]HAMDĀNĪ *Ṣifa* : 139/22, 23 [wādī] ; 140/6 ; 148/24 ; 155/13).

Voir *Mawsū'at asmā' al-amākin* (2003 V : 288 : « wādī Birk »).

■ *HAGAR^{um}* (Hgr^m), syriaque *Hagar*, arabe *Hajar*, aujourd'hui *al-Hufūf*

Inscriptions : al-'Irāfa 1/5 ; Murayghān 3/4.

Hajar^{um}, aujourd'hui al-Hufūf²⁵, oasis d'al-Baḥrayn, à savoir de la rive occidentale du golfe Arabo-persique, à quelque 60 km de la mer et à 300 km à l'est d'al-Riyāḍ (TAVO B VII 1 ; THILO 1958 : 51-52, carte Nordarabien Teil D). Elle n'est pas incluse dans l'appellation Yamāmatān comme le prouve l'expression « de Yamāmatān jusqu'à Hagar^{um} » dans l'inscription al-'Irāfa 1/5 (*bn-Ymmtⁿ 'dy Hgr^m*).

Hagar et Pîṭ-Ardashīr (= al-Khaṭṭ en arabe, Ḥaṭṭā en syriaque) ont le même évêque en 576 et constituent alors un même siège épiscopal de l'église syrienne orientale (voir ci-dessous l'entrée « Khaṭṭ »). Mais en 676, chacune des deux villes a son propre évêque, Pusai à Hagar et Shāhīn à Ḥaṭṭa (*Synodicon orientale* : 482). Entre ces deux dates, plus précisément en 552-553, à l'époque d'Abraha, Hagar^{um} et Khaṭṭ forment encore une unité administrative (ROBIN & ṬAYRĀN 2012).

■ *HALIBĀN* (Ḥlbn), arabe *Ḥalibān*

Inscription : Murayghān 1 = Ry 506/6, 8-9.

Dans ce bourg au centre de Najd, à 90 km au sud de Ma'sal et à 255 km au sud-ouest d'al-Riyāḍ, Abraha a reçu pendant l'été 552 la soumission de 'Amr fils du roi d'al-Ḥīra al-Mundhir (505-554), à la suite de ses victoires dans le wādī dhu-Markh (voir ci-dessous) et à Turābān (voir ci-dessous) (ROBIN 2012a).

25 Selon VIDAL 1971, la graphie ancienne est al-Hufhūf.

Cet événement a été évoqué dans deux fragments poétiques attribués à al-Mukhabbal, originaire de la tribu Sa'd de Tamīm (BLACHÈRE 1952 : 259), qui aurait participé aux combats dans les rangs d'Abraha :

*Ḍarabū li-abrahata al-umūra maḥallu-hā // Ḥalibānu fa-ḥṭalaqū ma'a 'l-aqwāli
Wa-Muḥarraḡun wa-l-Ḥārithāni kilā-humā // shurakā'una fi '-ṣihri wa-'l-amwāli*

« Ils décidèrent pour Abraha les actions (de guerre), dont l'emplacement // est Ḥalibān. Alors ils s'élancèrent avec les princes Muḥarraḡ et les deux Ḥārith, tous deux // étaient nos associés, par la parenté et les richesses ».

Ou encore :

*Wa-yawma Abī Yaksūma wa-'n-nāsu ḥuḍḍarun // 'alā Ḥalibāna idh tuḡaḍḍā maḥāmīlu-h
(dans l'édition d'Iklīl 2 d'al-Hamdānī par Muḥammad al-Akwa' : tuḡaḍḍā maḥāṣīlu-h)
Fataḥnā la-hu bāba 'l-Ḥuḍayri wa-rabbu-hu // 'azīzun yumashshī bi-'l-suyūfi arājīlu-h
(Iklīl 2, édition d'al-Akwa' : al-Khaḍīr ... tamashshā bi-'l-suyūfi arājīlu-h)*

« Le jour d'Abū Yaksūm²⁶, les gens étaient présents // à Ḥalibān, quand parvenaient ses convois chargés de tributs (quand ses objectifs étaient atteints) Nous lui avons ouvert la porte d'al-Ḥuḍayr (al-Khaḍīr), dont le maître est puissant ; ses fantassins défilent avec les sabres (les [chameaux] munis de selles marchaient avec les sabres » (KISTER 1965 : 431-433).

Le nom de Ḥalibān apparaît aussi dans la poésie de Jarīr (THILO 1958 : 53). Voir enfin *Mawsū'at asmā' al-amākin* (2003 II : 529, « Ḥalabān », deux entrées : 23°29'30"N et 44°23'20"E ; 23°31'00"N et 44°26'00"E).

■ **KHAṬṬ (Ḥṭ)**, syriaque *Ḥaṭṭā*, persan *Pīṭ-Ardashīr*, arabe *al-Khaṭṭ*, aujourd'hui *al-'Uqayr*

Inscription : Murayghān 3/4.

Ce site de la côte du golfe Arabo-persique, siège d'un évêché de l'église syrienne orientale, a été identifié avec al-Qaṭīf (MARQUART 1901 : 42 ; *Synodicon orientale* : 672 ; FIEY 1969 : 218-219). Trois arguments conduisent à préférer al-'Uqayr.

Le premier est qu'al-Balādhurī distingue al-Qaṭīf et al-Khaṭṭ :

Wa-'azala rasūl Allāh ṣ al-'Alā' thumma wallā 'l-Baḥrayn Abān b. Sa'īd b. al-'Āṣī b. Umayya wa-qawm yaqūlūna inna 'l-'Alā' kāna 'alā nāḥiya min al-Baḥrayn min-hā 'l-Qaṭīf wa-inna Abān kāna 'alā nāḥiya ukhrā fi-hā 'l-Khaṭṭ wa-'l-awwal athbat,

« The prophet dismissed al-'Alā' and assigned to al-Baḥrayn Abān b. Sa'īd b. al-'Āṣī b. Umayya. According to other reports, al-'Alā' was assigned to one district of al-Baḥrayn, a part of which was al-Qaṭīf, and Abān to another in which lay al-Khaṭṭ. The former report, however, is the more authentic » ([AL-]BALĀDHURĪ *Futūḥ*, texte : 81, traduction : 124).

Le deuxième argument est que, contrairement à une opinion souvent exprimée, le site d'al-'Uqayr n'est pas une fondation d'époque islamique mais un site qui existe déjà avant l'Islam, comme le prouve la présence d'inscriptions hagarites (MOUTON 2009 : 194 ; [AL-]MUGHANNAM *et al.* 2000 : 79).

Le dernier argument est qu'al-'Uqayr est le port naturel de Hagar alors qu'al-Qaṭīf se trouve sans doute sur la côte, mais au nord, sensiblement plus loin.

Plusieurs sources soulignent la proximité nécessaire de Hagar et de Khaṭṭ. En 576, les deux villes ont eu le même évêque, « Mar Isaac, évêque de Hagar et Pīṭ Ardashīr » (*Synodicon orientale* : 387). Or *Pyṭ 'rdšyr* est le nom persan de Khaṭṭ²⁷ qui rapporte qu'Ardashīr I (224-

26 Abū Yaksūm est la kunya d'Abraha d'après le nom de son fils aîné.

27 Voir [AL-]ṬĀBARĪ *Ta'riḫ* I, texte (ed. De Goeje) : 820 ; traduction (ed. Nöldeke) : 20 et n. 3 ; traduction (ed. Bosworth) : 16 et n. 64.

242) fonda huit villes, notamment une « au Baḥrayn, Fasā/Pasā Ardashīr qui est la ville d'al-Khaṭṭ » (*wa-bi-'l-Baḥrayn Fasā Ardashīr wa-hiya madīnat al-Khaṭṭ*). En arabe, en plus de « Fasā Ardashīr », on a relevé les variantes *Fynā*, *Fsād* et *Fsār* (al-Ṭabarī), *Btn* (Ḥamza) et *Fwrān* (Dīnawarī) (MARQUART 1901 : 42). En 676, Ḥaṭṭā a son propre évêque qui se nomme Shāhīn (*Synodicon orientale* : 482).

Le couple Hagar^{um}-Khaṭṭ se retrouve chez les auteurs classiques sous la forme Chattenia-Gerrha (Polybe, *Histoire*, XIII.II.9), Gerrha-Attene (Pline, *Histoire naturelle*, VI.32.147-148) ou Attaiôn... Gerrhaiôn (Ptolémée, *Géographie*, VI.7.15-16)²⁸.

C'est enfin l'inscription Murayghān 3 qui, dans une énumération de régions très éloignées les unes des autres, mentionne « [Ha]gar^{um}-et-Khaṭṭ ».

La ville est mentionnée dans la poésie préislamique, notamment par al-A'shā Maymūn (THILO 1958 : 59).

■ *MA'SAL* ou *MA'SAL GUMḤĀN* (M's'l^m ou M's'l Gmḥⁿ), arabe *Ma'sal* ou *Ma'sal al-Jumḥ*

Inscriptions : Ma'sal 1 = Ry 509/5 (*b-wdyⁿ M's'l Gmḥⁿ*), Ma'sal 2 = Ry 510/3 (*M's'l^m Gmḥⁿ*) et al-'Irāfa 1/4 (*M's'l^m M's'l Gmḥ^m*).

Cette ravine déserte de l'Arabie centrale, à un peu plus de 200 km à l'ouest d'al-Riyāḍ, avait une valeur symbolique importante puisque c'est là que trois souverains ḥimyarites ont commémoré leur venue en Arabie centrale (Ma'sal 1, 2 et 3). C'est également à Ma'sal que le souverain (dont le nom est perdu, peut-être Ḥaśśān Yuha'min) a accueilli « Nu'mānān et Muḍar », c'est-à-dire une délégation de la tribu de Muḍar conduite par son roi al-Nu'mān, probablement pour faire allégeance.

Le nom de Ma'sal se trouve dans la poésie arabe préislamique (THILO 1958 : 68-69).

Voir enfin *Mawsū'at asmā' al-amākin* (2003 V : 12 : « Māsal » : 24°15'N et 44°41'E).

■ *DHU-MARKH* (ḍ-Mrḥ), arabe *dhū Markh*

Inscription : Murayghān 1 = Ry 506/5 (*b-wd (ḍ-)Mrḥ*).

La localisation de ce wādī (*wd*) présente des difficultés parce les toponymes médiévaux et modernes qui ont une graphie comparable ou approchante sont innombrables : la *Mawsū'at asmā' al-amākin* (2003) en mentionne près de cent. Cela tient sans doute au fait que *markh* est le nom d'un arbuste commun (*cynandum vinimale* selon Kazimirski).

'Abd al-Mun'im SAYYID (1988 : 132) a proposé de retenir le wādī Marakh qui se trouve à une vingtaine de kilomètres au sud-est d'al-Zilfī, à 250 km au nord-ouest d'al-Riyāḍ et à 300 km au nord de Ḥalibān. Cette localisation n'est pas impossible mais elle n'est pas sûre.

■ *Mt'l^m*

Inscription : al-'Irāfa 1/6.

Nous avons peut-être ici une transcription fautive du lieu-dit Mutālī', qui se trouve dans le wādī 'l-Ruma, à une trentaine de kilomètres à l'est des monts Abān (THILO 1958 : 73-74, n° I, carte Nordarabien Teil C). L'identification se fonde sur le contexte géographique (le texte énumère « Abān^{um}, Mt'l^m et Rummatān ») et la ressemblance des noms.

■ *NĪRĀN* (Nyrⁿ), arabe *al-Nīr* ou *Nīr*

Inscription : al-'Irāfa 1/3.

Nīr ou al-Nīr, petit massif de Najd au sud-ouest d'al-Shurayf, à quelque 130 km à l'ouest de Ma'sal et à 330 km à l'ouest d'al-Riyāḍ (TAVO B VII 1 ; THILO 1958 : 77, carte Nordarabien Teil C ;

28 ROBIN & PRIOLETTA 2013.

HUBER 1891 Atlas feuilles 13 et 14 ; [AL-]HAMDĀNĪ *Şifa* : 126/23 [l'une des « montagnes célèbres chez les Arabes, mentionnées dans leurs poèmes »] ; 146/11-17 ; 153/13 ; 172/24 ; 173/22, 23 ; 176/11 ; 177/4, 5).

Voir *Mawsū'at asmā' al-amākin* (2003 II : 138-139 : « Jibāl al-Nīr »).

■ **QARMĀ** (Qrmy), arabe *Qarmā'* (?)

Inscription : al-'Irāfa 1/5.

Il s'agit probablement de *Qarmā'* (THILO 1958 : 79), village du wādī Qarqarā (à une soixantaine de kilomètres à l'ouest d'al-Riyād et quelque 140 km à l'est-nord-est de Ma'sal : TAVO B VII 1 ; THILO 1958 : carte Nordarabien Teil D). Le village s'appellerait aujourd'hui Ḍarmā (IBN KHAMĪS 1978 II : 92-98). Une autre interprétation, fondée sur le texte, serait de supposer que *Qarmā* est le nom de la région qui s'étend entre Yamāmatān et Hagar^{um} : il existe de fait une zone sableuse appelée Qurayma au voisinage de Qaṭar (*Mawsū'at asmā' al-amākin* 2003 IV, 386 : 20°24'20"N et 51°22'00"E) mais la correspondance phonétique est imparfaite.

■ **RUMATĀN** (Rmtⁿ), arabe *al-Ruma*

Inscription : al-'Irāfa 1/6.

L'identification de *Rumatān* avec le wādī 'l-Ruma (dans les sources arabes et aujourd'hui) est sûre du fait de la proximité avec *Abān* (voir ci-dessus) : « *Abān^{um}*, *Mt'lm* et *Rummatān* ». Or le wādī 'l-Ruma passe entre les monts *Abān al-Abyaḍ* et *Abān al-Aswad* (TAVO B VII 1 : « *al-Ruma* » ; THILO 1958 : carte Nordarabien Teil C : « *Ruma* » ; HUBER 1891 : Atlas feuille 13, « *Roummah* »), à 220 km et plus au nord-nord-ouest de Ma'sal (voir aussi [AL-]HAMDĀNĪ *Şifa* : 144/19 ; 145/20). L'un des affluents de la rive droite (au sud) du wādī 'l-Ruma est le wādī 'Āqil, où se trouvait *Baṭn 'Āqil* (TAVO B VII 1), l'une des résidences du roi Ḥujr Ākil al-Murāb et de ses descendants (ROBIN 2012b : 71). Une autre identification possible, mais qui offre une correspondance moins satisfaisante, est le toponyme *Rāma* (dans les sources arabes et encore aujourd'hui), à 75 km plus à l'est, sur la rive droite du cours inférieur du wādī 'Āqil (TAVO B VII 1 ; THILO 1958 : 85, carte Nordarabien Teil C ; HUBER 1891 : Atlas feuille 13 ; [AL-]UBŪDĪ 1979-3 : 981-998). Étape sur la piste *Makka-Baṣra*, *Rāma* est mentionnée dans la poésie, ce qui n'est pas le cas du wādī 'l-Ruma. L'identification de *Rmtⁿ* avec l'anthroponyme *Rumma* (CASKEEL 1966 II : 491, un seul exemple postérieur à l'Islam) est à écarter.

Voir *Mawsū'at asmā' al-amākin* (2003 V : 370 : « wādī 'l-Ruma »).

■ **SHARAFĀN** (S²rfⁿ), *al-Sharaf*

Inscription : al-'Irāfa 1/3.

Ce toponyme est à rechercher dans *Najd*, puisqu'il est mentionné entre *Thahyān* et *Nīrān* (« jusqu'à *Thahyān*, les eaux de *Sharafān*, et *Madhḥig^{um}* à *Nīrān* »). À l'époque d'al-Hamdānī, il existait effectivement un wādī 'l-Sharaf à proximité d'al-Nīr (= *Nīrān*) :

« *al-Nīr* est à l'extrémité de *Ḥimā Ḍiriyya* – *al-Nīr* est une montagne qui appartient à *Ghāḍira* –, *al-'Uqr* dans *al-'Āliya*, *al-Shurayf* à l'est et *al-Sharaf* à l'ouest, qui est l'un des wādīs de *Najd* » ([AL-]HAMDĀNĪ *Şifa* : 177/5).

Le wādī 'l-Sharaf semble avoir un autre nom aujourd'hui : si la *Mawsū'at asmā' al-amākin* mentionne quatre wādī 'l-Sharaf (2003 V : 396), aucun ne se trouve dans le centre de la péninsule.

En revanche *al-Shurayf* se trouve toujours dans la toponymie : c'est un massif qui se trouve à quelque 80 km au nord-ouest de Ma'sal (TAVO B VII 1 ; THILO 1958 : 95, carte Nordarabien Teil D ; [AL-]HAMDĀNĪ *Şifa* : 147/3, 8, 9, 10, 15 ; 169/21-23 ; 173/15-19 ; 177/5 ; 178/12). Quant à *Ḍiriyya*, elle se place à 65 km au nord-ouest d'al-Nīr (TAVO B VII 1 ; THILO 1958 : carte Nordarabien Teil C).

■ *SIGAH* (S¹gh), arabe *Sijā*

Inscription : 'Abadān 1/29.

Le puits de Sigah (b^rn S¹gh) peut être identifié de façon assurée avec les puits de Sijā, à mi-chemin entre al-Riyāḍ et Makka. Les princes Yaz'anides du Ḥaḍramawt y remporte une victoire sur « la tribu de 'Abdqaysān à Siyyān aux eaux du puits Sigah, entre le Pays de Nizār^{um} et celui de Ghassān » (s²rtⁿ 'bdqys¹ⁿ b-S¹yⁿ 'ly mw b^rn S¹gh bynn 'rḍ Nzr^m w-'rḍ Ġs¹ⁿ). Les puits de Sijā/Sajā (« ab'ār Sijā » : *Mawsū'at asmā' al-amākin* 2003 I : 320, 23°32'25"N et 42°45'00"E) se trouvent à 300 km au nord-est de Makka ou respectivement à 210 et 410 km à l'ouest-sud-ouest de Ma'sal et al-Riyāḍ (TAVO B VII 1 ; THILO 1958 : 89, carte Nordarabien Teil C ; HUBER 1891 : 730-731, Atlas feuille 14).

Cette identification présente cependant une petite difficulté : voir Siyyān, ci-après.

■ *SIYYĀN* (S¹yⁿ), arabe *al-Siyy*

Inscription : 'Abadān 1/29.

Siyyān peut être identifié avec la zone appelée al-Siyy à quelque 100-200 km au nord-est de Makka. Selon l'inscription 'Abadān 1/29, les princes Yaz'anides y remportent une victoire sur « la tribu de 'Abdqaysān (ar. 'Abd al-Qays) à Siyyān (al-Siyy) aux eaux du puits Sigah, entre le Pays de Nizār^{um} et celui de Ghassān » (s²rtⁿ 'bdqys¹ⁿ b-S¹yⁿ 'ly mw b^rn S¹gh bynn 'rḍ Nzr^m w-'rḍ Ġs¹ⁿ).

Mais l'inscription précise que, dans Siyyān, la bataille a eu lieu « aux eaux du puits Sigah ». Or le puits de Sigah (si on l'identifie avec les puits modernes de Sijā, comme cela paraît vraisemblable) se trouve à 380 km au nord-est de Makka (voir ci-dessus). Apparemment, le puits de Sigah se trouve en dehors de la zone appelée Siyyān, à quelque 200 km de distance au nord-est.

La localisation précise de Siyyān (arabe al-Siyy), appellation disparue aujourd'hui, est problématique. Ulrich THILO (1958 : 92) situe cette steppe dans la partie méridionale de Wajra (elle-même « à l'extrémité d'al-Siyy », *fī ṭaraf al-Siyy*, selon [AL-]BAKRĪ *Mu'jam* : entrée « Wajra »). Toujours selon al-Bakrī, al-Siyy se trouve à trois étapes de Makka, entre dhāt 'Irq et Marrān, soit à quelque 100-220 km à l'est-nord-est de Makka (TAVO B VII 1 ; THILO 1958 : carte Nordarabien Teil C ; LECKER 1989 : 12-15).

Voir aussi YĀQŪT (*Mu'jam* : entrée « al-Siyy »), qui mentionne la Ḥarrat Laylā et le wādī 'Aqīq, effectivement dans la même région (TAVO B VII 1 ; THILO 1958 : carte Nordarabien Teil C) ; voir également al-Hamdānī (*Ṣifa* : 143/4 ; 164/26 ; 170/8 ; 180/25 ; 215/23).

Les deux données topographiques de 'Abadān 1/29 paraissent contradictoires. Pour les concilier, deux possibilités se présentent. La première est qu'il ait existé plusieurs « puits de Sigah », notamment un dans Siyyān = al-Siyy. La seconde possibilité est que la Siyyān antique désigne une steppe plus vaste, s'étendant plus loin vers le nord-est que la al-Siyy des premiers siècles de l'Islam. Nous retenons la seconde proposition puisque la *Mawsū'at asmā' al-amākin* (2003) ne connaît qu'un seul Sijā.

■ *THAHYĀN* (Thyⁿ), arabe *Thahlān*

Inscription : al-'Irāfa 1/3.

Les toponymes S²r^fi et Nyrⁿ, qui sont mentionnés dans la même ligne, permettent d'identifier Thyⁿ avec le jabal voisin nommé Thahlān (dans les sources arabes et encore aujourd'hui), à quelque 65 et 265 km à l'ouest de Ma'sal et d'al-Riyāḍ (TAVO B VII 1 ; THILO 1958 : 104, carte Nordarabien Teil C-D ; [AL-]HAMDĀNĪ *Ṣifa* : 146/5 [jabal], 6 ; 147/1, 2 ; 180/15). Le passage du *lām* de l'arabe au *yā'* du saba'ique, qui peut surprendre, peut résulter d'une évolution phonétique, sans qu'une d'une faute de copie avec confusion du *lām* et du *yā'* soit

exclue. En faveur de l'identification, on invoquera la géographie (le jabal Thahlān se trouve entre les jabal al-Shurayf et al-Nīr, à quelque 70 km à l'ouest de Ma'sal) et la grande rareté de ces noms. La *Mawsū'at asmā' al-amākin* (2003) semble ignorer ces toponymes.

Le jabal Thahlān a joué un rôle dans l'histoire des Ḥujrides : c'est là que le mystérieux Qays (apparemment Qays b. Salama b. al-Ḥārith) aurait été défait par un Naṣride d'al-Ḥīra. Cet épisode qui n'est pas enregistré dans la saga des Ḥujrides, est évoqué dans une célèbre « ode suspendue » (*mu'allaqa*) qu'al-Ḥārith b. Ḥilliza aurait récité devant 'Amr b. al-Mundhir (554-569) (BLACHÈRE 1952 : 252) ; il se trouve dans un rappel des mérites de la tribu d'al-Ḥārith, Bakr b. Wā'il (ROBIN 2008 : 78-79).

« Ô toi qui nous calomnies auprès de 'Amr, mettras-tu un terme à tes fausses imputations ?
Nous avons à sa bienveillance trois titres que personne ne saurait nous contester.
L'un, nous l'avons acquis à l'orient de Shaqīqa, lorsque parurent avec leurs drapeaux de nombreuses tribus issues de Ma'add,
se pressant autour de Qays, fortes de la présence de ce héros du Yémen, à l'aspect imposant
Et les 'Awātik (*al-'Awātik*), cette horde redoutable que des glaives longs et étincelants pouvaient seuls arrêter,
nous les avons forcés à reculer en leur faisant des blessures pareilles à des ouvertures par lesquelles s'échappe l'eau contenue dans les outres ;
nous les avons poussés jusque sur les hauteurs de **Thahlān**, et chassés devant nous en rougissant leurs cuisses de leur sang »
(traduction d'après CAUSSIN DE PERCEVAL 1847 II : 370 [vers 47-53]).

La traduction de Pierre Larcher illustre les variations dans l'interprétation :

47 Ô toi qui parles, et qui dissertes sur notre compte // Auprès de 'Amr, cela aura-t-il une fin ?
48 ['Amr] aux bienfaits duquel trois titres nous avons // Et dont chacun emporterait la décision !
49 Le premier fut l'orient de Shaqīqa, quand donc // Ma'add y est venu, bannière à chaque clan,
50 Autour de Qays, se fortifiant de ce bélier, // Du pays de l'arbre à tanin, blanc éperon,
51 De tant de [fils] de nobles femmes, que rien n'arrête, // Si ce n'est une troupe, blanche d'armes, innombrable !
52 Or, nous les avons repoussés à coup de lance : // On eut dit l'eau jaillissant par le trou d'une outre !
53 Et nous les avons rabattus sur la paroi // De Thahlān en désordre, et cuisses en sang
(traduction LARCHER 2000 : 138).

Le toponyme Shaqīqa est inexpliqué. Il rappelle le nom de la mère ou de l'aïeule du roi naṣride al-Mundhir (voir ROBIN 2008 : 185).

Il n'est pas impossible que la bataille de Thahlān soit connue dans la littérature sous le nom de *Yawm Kulāl al-awwal*. Cette dernière, qui opposa deux fils d'al-Ḥārith b. 'Amr b. Ḥujr Ākil al-Murār, Salāma et Ma'dīkarib, est habituellement située entre al-Kūfa et al-Baṣra dans le sud du 'Irāq (LYALL 1906) mais il existe un Kulāb dans la montagne de Thahlān (TAVO B VII 1) qui semble préférable.

■ **TURĀBĀN** (Trbn), *aujourd'hui Turābān*

Inscription : Murayghān 1 = Ry 506/6 (*b-mnhl* —).

Il s'agit très vraisemblablement du point d'eau nommé aujourd'hui Turābān, dans la région d'al-Nīr (ci-dessus, « Nīrān »). L'inscription Murayghān 1 le qualifie de *mnhl* or c'est ce

même terme qu’emploie Aḥmad al-Jāsir : « Turābān, point d’eau (*manhal*) dans le wādī l-Surra, qui appartient aux al-Shiyābīn, près d’al-Khāšira (province d’al-Riyāḍ) » (JĀSIR 1977 I : 195). Ce point d’eau est localisé par l’ATLAS (1999 : table 14) sous l’appellation « Fayḍat Turābān » (23°45’ N et 43°26’ E), à 100 km à l’WNW de Ḥalībān. Selon la *Mawsū‘at asmā’ al-amākin* (2003 IV : 314), les coordonnées sont soit 23°46’00’’N et 43°25’20’’E, soit 23°45’00’’N et 43°26’00’’E).

GROOM (1983 : 86) rend *fayḍa* par « a wide, usually sandy depression into which many wadis flow ».

Aḥmad al-Jāsir distingue ce *Manhal Turābān* d’une « aiguade (*min mawārid*) des al-Shiyābīn et des Quthma, dans la région de ‘Afīf, dans un wādī de même nom, à l’ouest d’al-Nīr (province d’al-Riyāḍ) » (JĀSIR 1977 I : 195). Mais les deux toponymes, qui sont exactement dans la même région et appartiennent à la même tribu — les al-Shiyābīn —, sont probablement à identifier.

La racine TRB est très productive en toponymes. La *Mawsū‘at asmā’ al-amākin* (2003) mentionne notamment : Turāba, al-Turba, Turaba, Turuba et fayḍat Turābān. L’un de ceux-ci, Turaba (bourgade à 127 km à l’est d’aṭ-Ṭā’if et important wādī : ATLAS [1999] : 21°13’N 41°38’E ; carte au 1/500 000° TPC J-6A ou celle au 1/1 000 000° ONC J-6), avait été préféré dans le passé, pour trois raisons. La première est que Turaba est un toponyme connu. Une deuxième raison est que Turaba n’est pas éloigné de Makka ; or on identifiait alors, à la suite de KISTER (1965) la campagne d’Abraha commémorée dans Murayghān 1 = Ry 506 avec la Campagne de l’Éléphant ; enfin, Turaba relevait des banū ‘Āmir b. Ṣa’ṣa’a (dans lesquels on reconnaissait les *bny-‘mr^m* de Ry 506) ([AL-]BAKRĪ *Mu‘jam* : entrée « Turaba », *wa-huwa mawḍa’ fī bilād banī ‘Āmir*).

Ce dernier argument, qui paraissait déterminant, était en fait illusoire (ROBIN 2012b : 80-82) : le texte indique explicitement que les *bny-‘mr^m* sont les chefs de Ma’add^{um} ; il s’agit donc des descendants des banū ‘Amr, c’est-à-dire des descendants de Ḥujr Ākil al-Murā’ī b. ‘Amr. Quand Ibn al-Kalbī en traite, il intitule son chapitre : « Voici les banū ‘Amr b. Mu’āwiya », *wa-ha’ulā’i banū ‘Amr b. Mu’āwiya* (IBN AL-KALBĪ *Nasab* : 168).

■ YABRĪN (Ybrn), arabe *Yabrīn*

Inscription : ‘Abadān 1/7 et 7.

Nom d’une importante oasis de l’Arabie orientale, située à 280 km à l’est-sud-est d’al-Riyāḍ. Selon la *Mawsū‘a asmā’ al-amākin* (2003 V : 553), ses coordonnées sont de 23°11’ à 23°17’N et 48°58’ à 49°02’E. L’expédition militaire des Yaz’anides qui l’atteint avait d’abord visé Mahrat (aujourd’hui al-Mahra, province côtière du Yémen, frontalière de ‘Umān).

Les textes

■ ‘ABADĀN 1 (JUILLET 360)

Cette inscription, datée de juillet 360 è. chr. (dhu-madhra’ān 470 ḥimyarite), est gravée sur un gros rocher de la rive gauche du wādī ‘Abadān, qui débouche sur la ville de Niṣāb (l’antique ‘Abadān), à 260 km à l’est-sud-est de Ṣan‘ā’. Elle commémore les succès d’une famille princière du Ḥaḍramawt occidental, les dhu-Yaz’an, pendant trois générations, hauts faits militaires tout d’abord puis aménagements divers dans leurs possessions.

Ses auteurs sont Malshān Aryam et ses fils Khawliyy^{um} Yazīd, Shuriḥbiṭl [...], Ma’ḍīkarib [...] et Marthad^{um} [...], fils de Malshān, ainsi que Barīl^{um} Yamgid, Khawliyy^{um} Yazīd et Shuriḥbiṭl [...] fils de Ma’ḍīkarib.

Bibliographie : ROBIN & GAJDA 1994 ; MÜLLER 2010 : 50-54 ; ROBIN 2012b : 90-93.

■ *La quatrième campagne (vers 340 è. chr.)*

Elle est dirigée par Malshān et deux de ses fils, Khawliyy^{um} et Shuriḥbiṭl.

- 6 ...[w-]b'dn hwt s'ib' Mls²ⁿ w-bny-hw Hwlym
 7 w-S²rḥb'l 'rd[... ...]w-'[r]b Ḥḍrmt ws¹[...]w w-bn 'rḍ Mhrt 'ly 'w'rn w-wrdw Ybrn w-bn
 Ybrn
 8 [... ...] bn 'rbn [...]s¹[...]s²rqn w-tbḡy-w (')kl(')hgrm w-[.....] k-s³(')w w-gb'-w-
 9 [... ...] ḡnmw kl 'bl 'b'l Ṣ(dy)n (s¹)n(y)tn w-mḥ(fd)n (Zfd)[...]
 10 [... ...]gb'w b-'r 'bdn b-s¹b'm wrḥm

Traduction

- 6 [...] Ensuite sont partis en expédition Malshān et ses fils Khawliyy^{um}
 7 et Shuriḥbiṭl vers le Pays de [... ...] et les bédouins de Ḥaḍramawt et du
 pays de Mahrāt, contre ; ils sont arrivés à Yabrīn et, de Yabrīn,
 8 des Arabes. ils se sont rassemblés et sont retournés... ..
 9 [... ...] ils ont pris comme butin tous les chameaux des maîtres de
 10 [... ...] ils sont retournés dans la place-forte de 'Abadān le septième mois

■ *La sixième campagne (vers 345 è. chr.)*

Elle est dirigée par Khawliyy^{um}, Shuriḥbiṭl, Ma'dīkarib et Marthad^{um}.

- 12 ...] s'ib' Hwly^m w-S²rḥb'l w-M'dkrb w-tbkr 'm-hmw 'h-hmw Mrtd^m w-s¹=
 13 [... ...] w-(M)rd^m w-M(s²)rqⁿ w-Dyftⁿ w-'rb Ḥḍrmt w-tqdm-hmw 'lht Yz'n mns³rt^m
 14 [... ...] w-(')s³r Hwly^m T'lt bn S³ll^m s'y^d 'y^d^m w-hrgw w-zfrw 'hwt-hw w-
 15 kl n[... ...]m w-ḡnmw[... ...]s¹by^m [w-]hms¹ m't^m w-tny [']lfn 'bl^m w-s¹tqdw w-hrgw
 ts¹t
 16 'frs^{1m} [... ...]

Traduction

- 12 [...] Khawliyy^{um}, Shuriḥbiṭl et Ma'dīkarib sont partis en expédition, alors que leur
 frère Marthad^{um} participait au combat pour la première fois avec eux et ...
 13 [... ...] et Murād^{um}, Mashriqān, Ḍayfatān et les Arabes du Ḥaḍramawt, dont les
 Yaz'anides avaient pris la tête à l'avant-garde
 14 [... ...] Khawliyy^{um} a capturé Tha'labat fils de Salū^{um}, chef d'Iyādh^{um} ; ont tué et
 vaincu ses frères et
 15 tous les .. [... ...] et ils ont pris comme butin [... ...] captifs ainsi que deux
 mille cinq cents chameaux ; ils ont saisi et tué neuf
 16 chevaux [... ...]

■ *La huitième campagne (vers 350 è. chr.)*

Elle est dirigée par Khawliyy^{um} et ses frères.

- 17 ... Hwl]y^m w-'hwt-hw bny Mls²ⁿ 'ly Gwⁿ w-Hrgⁿ w-tqdmw
 18 s²b-hmw w-'b'l Mrb w-[... ...]mt w-S²dd^m w-Hwlⁿ d-Ḥbb w-s²b-hmw 'b'l Ms²rqⁿ w-Dy^f=
 19 tⁿ w-k(w)n kl gys²-hmw mns³[rt] w-tlt m't^m 'frs^{1m} w-hrbw 'hms^{1m} Hrgt w-s²r^m bn
 M'd^m w-h=
 20 rg w-zfr nḡr-hmw w-gys²-hmw s¹[... ...] w-m't s¹by^m w-ḡnmw tty m'tⁿ w-tlt 'lfn 'bl^m
 21 w-s¹tqdw w-hrgw hms¹t w-s²ry 'frs^{1m}

Traduction

- 17 ... Khawliyy^{um} et ses frères, fils de Malshān, contre Gawwān et Khargān ; ils ont pris
 la tête de
 18 leur commune et des citoyens de Marib [... ...]..., Shaddād^{um} et Khawlān dhū-
 Ḥabāb et leur commune, les citoyens de Mashriqān et de Ḍayfa-
 19 tān ; toute leur armée était en avant-gar[de... ...] et trois cents cavaliers ; ils ont
 fait la guerre contre le vaillant Kharigat (?) et quelques tribus de Ma'add^{um} ; ont

- 20 tué et vaincu leurs nobles et leur armée .. [... ..] et cent captifs ; ils ont pris
comme butin trois mille deux cents chameaux
21 et ont saisi et tué vingt-cinq chevaux

■ *La douzième campagne (peu avant juillet 360 è. chr.)*

Elle est dirigée par Ma'dīkarib et Marthad^{um}.

- 27 w-b'dn hwt s'ib' M'dkrb w-Mrtd^m 'ly M'=
28 d^m b'dn k-hṭqf 'h-hmy S²rḥb'l [... environ 8 signes...] s²b-hmw 'b'l M[s²r]qⁿ w-Dyftⁿ w-Kdt
w-Mdhg^m w-Mrd^m w-kn g(y)s²-hmw tny 'lfⁿ 's¹d^m w-s¹ty w-m'=
29 t 'frs^{1m} w-tbkr Br^{1m} bn M[dkr]b [... ..] M'd^m w-hwkbw 's²rtⁿ 'bdqys¹ⁿ b-S¹yⁿ 'ly mw b'rⁿ S¹gh
bynn 'rḍ Nzr^m w-'rḍ Ḡs^{1m} w-ḥr=
30 bw 's²rtⁿ S²n^m w-bny Nkrt w-bny (Sb)rt [... ..] ('b)dqys¹ⁿ w-'s³r Mrtd^m tⁿ(y) 's¹ⁿ w-hrg
Br^{1m} 's^{1m} bḍ^{1m} w-'s³r tny 's¹ⁿ w-hrg
31 (n)[z](r)-hmw w-gys²-hmw ḥmsy w-m't m(hr)[gt]^m (b)d'^(m) w-'s³wr^m w-hrgw w-s¹tnqḍw
tmnt 's²r 'frs^{1m} w-ḡnmw 'rb' m'^t s¹by^m w-'r=
32 b't 'lf^m 'bl^m w-tny 's²r 'lf^m d'^[n^m]

Traduction

- 27 Ensuite Ma'dīkarib et Marthad^{um} sont partis en expédition contre Ma-
28 'add^{um} après que leur frère Shuriḥbi'l eut été libéré de ses obligations [... ..]
Ma[shri]qān, Ḍayfatān, Kiddat, Madhḥig^{um} et Murād^{um} — les effectifs de leur armée
s'élevaient à deux mille guerriers et cent soixante
29 cavaliers — alors que Barīl^{um} fils de [Ma]dīkarib participait au combat pour la
première fois [... ..] Ma'add^{um} et ...[.....].. la tribu 'Abdqaysān à Siyyān, aux eaux du
puits Sigah, entre le Pays de Nizār^{um} et le Pays de Ghassān ; ils ont
30 fait la guerre à la tribu Shann^{um}, aux banū Nukrat, aux banū Ṣabirat [... ..]
'Abdqaysān ; Marthad^{um} a capturé deux hommes ; Barīl^{um} a tué un homme au
combat et a capturé deux hommes ; ont tué
31 leurs n[ob]les et leur armée cent cinquante tués au combat et prisonniers ; ils ont
tué et saisi dix-huit chevaux et ont pris comme butin quatre cents captifs, quatre
32 mille chameaux et douze mille mou[tons]

■ AL-'IRĀFA 1 (DEUXIÈME QUART DU V^E SIÈCLE È. CHR. ?)

Le bloc portant une inscription fragmentaire en relief, remployé dans le petit village d'al-'Irāfa, provient du site voisin de Zafār, la capitale de Ḥimyar. La mention de Tanūkh (nom que les Ḥimyarites donnent au royaume d'al-Ḥīra), l'énumération d'une dizaine de toponymes d'Arabie centrale et la réception à Ma'sal (en Arabie centrale) d'une délégation de Muḍar, conduite par un certain Nu'mānān (arabe al-Nu'mān), conduisent à penser que l'auteur du texte, dont le nom est perdu, est un roi de Ḥimyar, peut-être Ḥaśṣān Yuha'min. De manière hypothétique, le texte relaterait une expédition en Arabie centrale au cours de laquelle toute une série de régions auraient fait leur soumission.

Provenance : Zafār (texte remployé aujourd'hui dans une habitation du village voisin d'al-'Irāfa).

Bibliographie : GAJDA 2004 ; ROBIN 2008 : 200-201, fig. 3.

Date : de manière sûre après 325 et avant 522 ; assez vraisemblablement pendant le deuxième quart du v^e siècle.

Le bloc inscrit semble intact à droite, ce qui signifie que le texte commençait sur un autre bloc (ou plusieurs) placé à droite. Le texte se poursuivait à gauche et peut-être en bas sur d'autres blocs. Nous avons donc ici une petite partie d'un document relativement long.

1 ...]# ...(s¹) Brd^m w-(n)mr Tnh w-bdⁱ w bn-hmw m^tm [...
 2 ...]#(d)t-rbⁿ s¹fl Brk^m w-ⁱdyw Brk^m w-ws³-hmw l [...
 3 ...]#(rt) ⁱdy Thyn ⁱmwh S²r^f w-Mdhg^m Nyrⁿ w-mwr-hw [...
 4 ...]# ...^ttⁱm N^mnⁿ w-Mdr b-M^sl^m M^sl Gmh^m [...
 5 ...N[]]#(m)nⁿ w-hllw Qrmy bn-Ymmtⁿ ⁱdy Hgr^m w-ⁱrmt^m w- [...
 6 ...]# ⁱbn^m w-Mt^lm w-Rmtⁿ bny S¹ly s²y-hmw (w-m). [...
 7 ...]#(t)-hmw w-ⁱfrs¹-h(m)w [w-](d)ky-hmw b-Gw^m w-ml(k).. [...

Traduction

1 ...]# ...Burd^{um} et les chefs de Tanūkh, et ils en tuèrent cent [...
 2 ...]# ...en aval de Birk^{um} et ils atteignirent Birk^{um} et se soumirent à eux... [...
 3 ...]# ...jusqu'à Thahyān, les eaux de Sharafān, et Madhḥig^{um} à Nīrān, et ils l'assiégèrent [...
 4 ...]# ... Nuⁱmānān et Muḍar à Ma[']sal^{um}, Ma[']sal Gumḥ^{um} [...
 5 ... Nu[]]#(ma)nān, et ils prirent possession de Qarmā, de Yamāmatān jusqu'à Hagar^{um}, de [']Aramat^{um} et de [...
 6 ...]# Abān^{um}, Mt[']lm et Rummatān, les banū Sulīyy, (à savoir) leur s²y (?)... [...
 7 ...]# leurs ...et leurs cavaliers, et il les envoya à Gaww^{um} et le roi (?) [...

MA[']SAL 1 = RY 509 (DANS LES DÉCENNIES QUI PRÉCÈDENT 450 È. CHR.)

Ce texte rupestre est gravé sur la paroi d'une ravine désertique, en Arabie centrale, à 205 km à l'ouest de la moderne al-Riyāḍ. Il a pour auteur le roi Abīkarib As'ad et son fils Ḥaśśān Yuha'min, que la Tradition arabo-islamique considère comme de grands conquérants.

Le texte qui commémore l'annexion de l'Arabie centrale par Ḥimyar, sans donner de date, inaugure une nouvelle titulature, dite « très longue ». Il est certainement postérieur à c. 400-420 du fait de la mention de Ḥaśśān, dont le nom n'apparaît que pendant la seconde partie du règne d'Abīkarib ; il n'est pas sûr qu'il soit postérieur à 433, même si une inscription donnant cette date emploie encore la titulature longue.

Le roi de Ḥimyar ne mentionne pas l'intronisation du roi kindite Ḥujr le Mangeur d'herbes amères (Ḥujr Ākil al-Murār) qui, selon la Tradition arabo-islamique, aurait régné alors sur Ma'add. On relèvera cependant une indication intéressante : le Ḥaḍramawt et Kinda sont mentionnés en premier respectivement dans l'énumération des troupes ḥimyarites et dans celle des contingents arabes. Les rois de Ḥimyar confirment donc de façon allusive le rôle éminent des princes dhu-Yaz'an et de Kinda dans la conquête de l'Arabie déserte, comme l'indiquait déjà l'inscription [']Abadān 1 (ci-dessus).

Bibliographie : ROBIN 1996 ; MA[']SAL 1999 : 25-34.

1 [']bkrb [']s¹d w-bnw-hw Ḥs³n Yh[']mn mlky S¹b[']/
 2 w-d-Rydn w-Ḥḍrmwt w-Ymnt w-[']rb Ṭwd w-Thmt/
 3 bny Ḥs³n Mlkrb Yh[']mn mlk S¹b['] w-d-/
 4 Rydn w-Ḥḍrmwt w-Ymnt rḡdn ḍn mrḡdn b-wd=/
 5 yn M[']s¹l Gmhⁿ k-s¹b[']w w-hllw [']rḡ/
 6 M[']dm (b-)mw nzlm bn [']s²b-hmw w-b-s²b-h=/
 7 mw Ḥḍrmwt w-S¹b['] [w-]bny Mrb w-[']ṣ(ḡ)rt/
 8 [']qwl-hmw w-(ḡ)lm [kl] mḡtwt-hmw w-[']t=/
 9 ly-hmw w-ṣyd-hmw w-qbd-hmw w-b-[']rb-h=/
 10 mw Kdt w-S¹(['])d w-(['])lh w-H.[?]

Traduction

1 Abīkarib As'ad et son fils Ḥaśśān Yuha'min, rois de Saba',
 2 de dhu-Raydān, du Ḥaḍramawt et de Yamnat, et des Arabes du Haut-Pays et de la Côte,
 3 fils de Ḥaśśān Malkīkarib Yuha'min, roi de Saba', de dhu-

- 4 Raydān, du Ḥaḍramawt et de Yamnat, ont fait graver cette inscription dans le wād-
- 5 ī Ma'sal Gumḥān, quand ils sont venus et ont pris possession du Pays
- 6 de Ma'add^{um} lors de l'installation de garnisons fournies par certaines de leurs communes, avec leur commune
- 7 Ḥaḍramawt et Saba' — les fils de Marib —, les cadets
- 8 de leurs princes, les (plus) jeunes de leurs officiers, leurs ag-
- 9 ents, leurs chasseurs et leurs troupes, ainsi qu'avec leurs Arabes,
- 10 Kiddat, Sa'd, 'Ulah et H[...] »

MA'SAL 2 = RY 510 (JUIN 621)

Le texte est gravé à côté du précédent, Ma'sal 1 = Ry 509, sur la paroi d'une ravine désertique, en Arabie centrale, à 205 km à l'ouest de la moderne al-Riyād.

Le roi Ma'dīkarib Ya'fur commémore une expédition contre le plus connu des rois d'al-Ḥīra, le fameux al-Mundhir. Il ne mentionne ni victoire, ni butin : on peut supposer que son raid a été infructueux. Mais comme il commémore son passage en Arabie centrale, il est probable qu'il n'a pas subi d'échec.

Ma'dīkarib a atteint une région appelée 'rq Kt'. Il est vraisemblable que Kt' est la ville de Kuthā' entre l'Euphrate et le Tigre. Le sens de 'rq est plus incertain : ce peut être le 'Irāq ou un substantif signifiant « canal ».

L'armée de Ma'dīkarib Ya'fur est épaulée par des éléments originaires de Muḍar, commandés par les banū Tha'labat. Comme ces derniers sont appelés ailleurs « Arabes des Romains », le raid pourrait bien avoir été entrepris à la demande de l'empereur Justin, en réaction contre la capture de deux généraux romains par al-Mundhir (AVNER *et al.* 2013).

Bibliographie : ROBIN 1996 ; MÜLLER 2010 : 95-96.

- 1 M'dkrb Y'fr mlk S1b' w-d-Rydn w-H(d=)
- 2 rmt w-Ymnt w-'rb-hmw Ṭwḍm w-Thmt
- 3 (h)wrw w-wtf ḍn ms'ndn b-M's'lm Gmḥn
- 4 'ly mhn-s'b'tm b-'rq Kt' l-hm ḍn
- 5 dyn-hmw 'rbn qs'dm w-ḥrb-hmw Md=
- 6 rm w-s'b'w b-'s'²b-hmw S1b' w-Ḥmyrm w-Rḥb=
- 7 tn w-H(d)rmt w-Y(m)n w-b-'m 'rb-hmw Kdt w-Mḍ=
- 8 ḥi[g]m w-b-'m bny Ṭ'lbṭ w-Mḍr-w-s'b'w-
- 9 b-wrḥn ḍ-qy[z]n ḍ-l-'ḥd-w-ṭṭy-w-s'ṭ m'tm

Traduction

- 1 Ma'dīkarib Ya'fur roi de Saba', de dhu-Raydān, du Ḥa-
- 2 ḍramawt et de Yamnat, et de leurs Arabes dans le Haut-Pays et sur la Côte
- 3 a établi et a publié ce texte à Ma'sal^{um} Gumḥān (sic)
- 4 au retour d'une expédition dans le 'Irāq de Kūta' ('rq Kt'), parce que l'avaient appelé
- 5 les Arabes en révolte alors que Mudhdhir^{um} leur faisait
- 6 la guerre ; il était en campagne avec ses communes Saba', Ḥimyar^{um}, Raḥba-
- 7 tān, Ḥaḍramawt et Yamna, avec ses Arabes Kiddat et Madh-
- 8 ḥi[g]^{um} et avec les banū Tha'labat et Mu(ḍa)r. Il était en campagne
- 9 [au mo]is de dhu-qay[zā]n (juin) six cent trente-et-un »

MA'SAL 3 (PEU APRÈS 474-475 È. CHR.) (FIG. 81)

Inscription inédite, de lecture difficile du fait de sa localisation dans un renfoncement du rocher, à une vingtaine de mètres à droite de Ma'sal 1 et 2. La lecture est provisoire.

L'inscription a été découverte par Guillaume Charlot lors d'une visite touristique le 2 avril 2008. Seul un tiers du texte a pu être déchiffré, avec l'aide d'un miroir.

- 1 S²rḥb^l Ykf w-bny-hw 'bs²mr Nwf w-Lḥy^t Ynf
- 2 'mlk S¹b' w-d-Rydⁿ w-Ḥḍrmwt w-Ymnt w-'rb-hmw Ṭwd=
- 3 ^m w-Thmt s¹trw (b)-dn mrfdⁿ h(g s¹b'w s¹b't) ... b-ḥrfⁿ d-
- 4 l 'rb't w-ṭmny w-ḥms¹t m't^m (h).....(r w) bn-hw
- 5 w-ws¹'-hmw gys^{2m}ms³.t(n) (s¹)ṭy w-m't
- 6 kl-hmw b-mhr(g)hm w... ..
- 7 r-hmw ṭḍkyw b-Tnh w... ..
- 8 m w-hqlt nqs¹-hw w-(dn)
- 9 .m w-ml²w l-ṭny wrhyn .h/ngr.
- 10 hmw (s²)ry mhrgt^m w-s¹b' m't
- 11 .m w-'s²ry 'frḥ
- 12 (nh) w-(g)ys²-hw mf/qs¹rbh/h.w.t
- 13 m't ...wrm w 'frs¹m w-(s¹ty)
- 14 ... bn (')b(d)qys¹
- 15
- 16 ' ..(hm)w

Une traduction suivie est encore prématurée. Nous nous limiterons aux deux points les plus importants : le nom des auteurs et la date.

ll. 1-3, S²rḥb^l Ykf w-bny-hw 'bs²mr Nwf w-Lḥy^t Ynf² 'mlk S¹b' w-d-Rydⁿ w-Ḥḍrmwt w-Ymnt w-'rb-hmw Ṭwd^{3m} w-Thmt.

On a ici pour la première fois le nom du premier corégent de Shuriḥbiṭl Yakkuf, Abīshimr Nawf.

ll. 3-4, b-ḥrfⁿ d-|l 'rb't w-ṭmny w-ḥms¹t m't^m, « en l'an | 584 » de l'ère ḥimyarite, soit 474-475 è. chr.

Noter encore la mention de Tanūkh (l. 7) comme dans al-'Irāfa 1 (ci-dessus) et celle de 'Abd al-Qays (l. 14), comme dans 'Abadān 1 (ci-dessus).

Le roi ḥimyarite Shuriḥbiṭl Yakkuf était déjà connu par trois textes comportant une date et par trois autres n'en ayant pas²⁹ :

- ZM 2000, avril 470 (d-ṭbtⁿ 580 ḥim.) : S²rḥb^l mlk S¹b' w-d-Rydⁿ w-Ḥḍrmwt ;
- RES 4919 + CIH 537 = L 121, août 472 (d-ḥrfⁿ 582 ḥim.) : 'mlkⁿ S²rḥb|[l' Ykf w-bny-hw ...] Nwfn w-Lḥy^t Ynwfw-M'dkrb Yn'm 'mlk S¹b' etc.
- CIH 644, février [46]5 ou [47]5 (d-ḥltⁿ [575 ou 58]5 ḥim.) :]b^l Ykf mlk S¹b' w-d-[
- RES 4969 = Ja 876 : [... 'mr'-hmw | S²rḥb^l] Ykf [w-'bs²mr Nwf | w-Lḥy^t]t Ynf w-M'dkrb Yn['m 'mlk S¹b' w-d-Rydⁿ | w-Ḥḍrmw]t w-Ymnt w-'rb-h[mw Ṭwd^m w-Thmt]
- RES 4298 (...]kf mlk S¹b' etc.)
- Gl 1194 (...]rḥb^l Yk[...).

Il semblerait que Shuriḥbiṭl Yakkuf ait régné seul tout d'abord puis avec trois corégentes, enfin avec deux.

■ MURAYGHĀN 1 = RY 506 (SEPTEMBRE 552)

L'inscription est gravée sur un rocher qui domine les puits de Murayghān, à 230 km au nord de Najrān. Le roi Abraha y commémore une expédition victorieuse de reconquête de l'Arabie déserte, quatre ans après la stabilisation de son régime.

Bibliographie : MÜLLER 2010 : 118-119 ; ROBIN 2012a.

29 Pour la bibliographie de ces inscriptions, se reporter à KITCHEN 2000 et à MÜLLER 2010 (pour les seules inscriptions datées).

1 croix b-hyl Rḥmnⁿ w-Ms¹h-hw mlkⁿ 'brh Zybmⁿ mlk S¹b' w-d-Rydⁿ w-Ḥḍrmw(t)
 2 w-Ymnt w-<r>'rb-hmw Ṭwd^m w-Thmt s¹trw ḍn s¹trⁿ k-ḡ(z)yw
 3 M^dm ḡzwtⁿ rb^tn b-wrḥⁿ ḍ-tbtⁿ k-qs¹dw kl bny-'mr^m
 4 w-ḍky mlkⁿ 'bgbr b-'m Kdt w-'l w-Bs²r^m bn-Ḥṣn^m b-'m
 5 S¹d^m w-M(r)[d^m]w-(.ḍ)rw qdmy gys²ⁿ 'ly bny-'mr^m Kdt w-'l b-w(d ḍ)-Mr(h) w-Mrd^m w-S¹d^m
 b-wd/
 6 b-mnhl Trbⁿ
 w-hrgw w-'s³rw w-ḡnmw ḍ-'s¹m w-m(.)' mlkⁿ b-Ḥlbⁿ w-dnw
 7 kz(m) M^dm w-rhnw w-b'ḍn-hw ws³-hmw 'mr^m bn Mḍrⁿ
 8 w-rhn-hmw bn-hw w-s¹thlf-hw 'ly M^dm w-qflw bn Ḥl=
 9 [b]⁽ⁿ⁾ [b-](h)y(l) Rḥmnⁿ wrḥ-hw ḍ-'lⁿ ḍ-l-tny w-s¹ty w-s¹=
 10 t m²t^m

Traduction

1 Croix Avec la puissance de Raḥmānān et de son Messie, le roi Abrahā Zybmⁿ, roi de Saba', de dhū-Raydān, du Ḥaḍramawt
 2 et de Yamnat, et de leurs Arabes dans le Haut-Pays et sur la Côte, a inscrit ce texte quand il razzia
 3 Ma'add^{um} pour la quatrième fois, au mois de dhū-thābatān (= avril), quand se révoltèrent tous les banū 'Amr^{um} ;
 4 le roi envoya Abīgabr avec Kiddat et 'Ula, et Bishr^{um} fils de Ḥiṣn^{um} avec Sa'd^{um} et Mu[rād^{um}] ; les deux chefs de l'armée engagèrent le combat contre les banū 'Amr^{um}, Kiddat et 'Ula dans le wādī dhu-Markh, et Murād^{um} et Sa'd^{um} dans un wādī
 6 à l'aiguade de Turābān, et ils firent des tués, des prisonniers et du butin en abondance ; le roi tint une assemblée à Ḥalibān et firent allégeance
 7 les rebelles de Ma'add^{um} qui remirent des otages ; à la suite de cela, se soumit à lui (Abraha) 'Amr^{um} fils de Mudhdirān
 8 qui lui remit en otage son fils alors qu'il (= 'Amr^{um}) l'avait établi comme gouverneur sur Ma'add^{um} ; il revint de Ḥali-
 9 [bā]n [avec] la puissance de Raḥmānān, au mois de dhu-'allān (= septembre) six cent soixante-deux »

MURAYGHĀN 3 (DANS LES MOIS QUI SUIVENT SEPTEMBRE 552 È. CHR.)

L'inscription est gravée en grands caractères sur un rocher bien en vue, à gauche de l'entrée de la vallée qui conduit aux puits de Murayghān. C'est un bulletin de victoire, non daté, dans lequel le roi Abraha rend public la liste des régions qui viennent de lui faire allégeance. Le texte est certainement postérieur au récit de l'expédition (voir Muraygān 1 ci-dessus) ; il est nécessairement antérieur à l'accession de 'Amr fils d'al-Mundhir (ou fils de Hind) sur le trône d'al-Ḥīra à l'été 554.

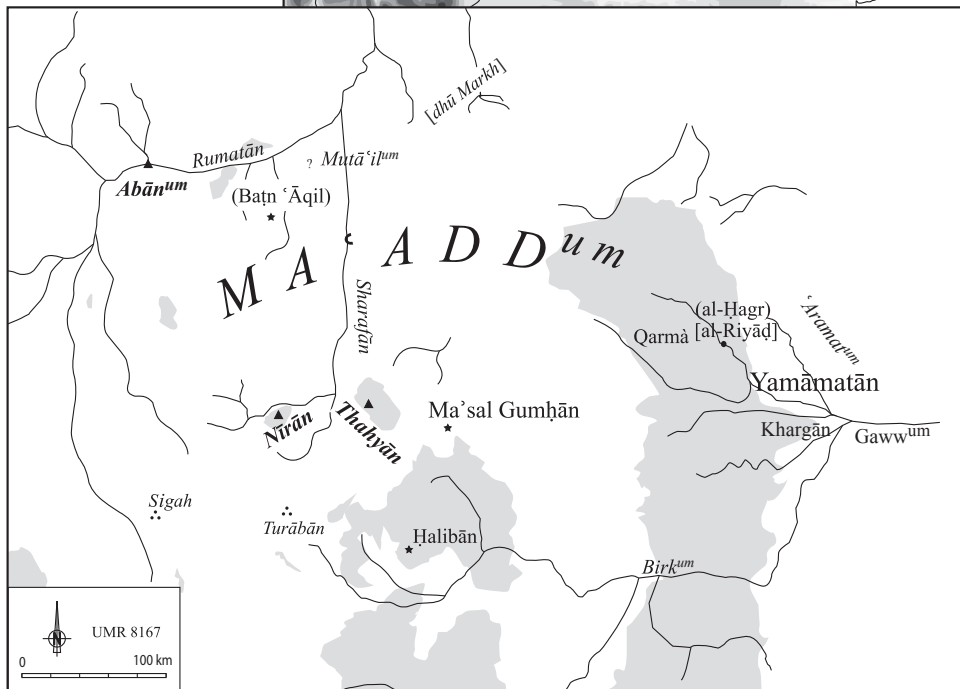
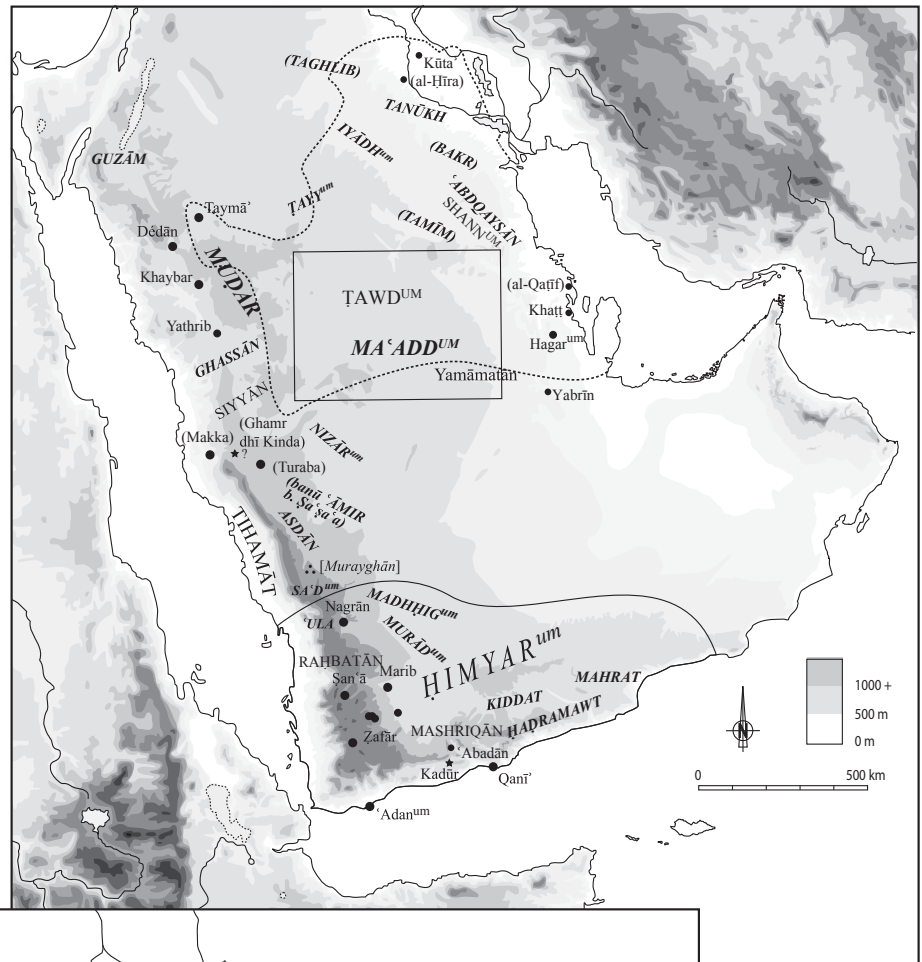
Date : probablement entre septembre 552 et juin 554.

1 croix mlkⁿ 'brh Zybmⁿ mlk S¹b' w-d-Rydⁿ w-Ḥḍrmt w-Ymnt
 2 w-'rb-hmw Ṭwd^m w-Thmt s¹trw ḍn s¹trⁿ k-qflw bn 'rd M^dm
 3 k-s¹tqḍw 'rb M^dm '(m)[n M]ḍrⁿ w-ṭrdw 'mr^m bn Mḍrⁿ w-s¹=
 4 tqḍw kl 'rb M^dm [w-H]ḡr^m w-Ḥṭ w-Ṭy^m w-Yṭrb w-Gz(m)

Traduction

1 Croix Le roi Abraha Zybmⁿ, roi de Saba', dhu-Raydān, Ḥaḍramōt et Yamnat,
 2 et de leurs Arabes du Haut-Pays et du Littoral, a écrit cette inscription quand il est revenu du Pays de Ma'add^{um},
 3 quand il s'empara des Arabes de Ma'add^{um} enlevés à [Mu]dhdirān, chassa 'Amr^{um} fils de Mudhdirān et
 4 s'empara de tous les Arabes de Ma'add^{um}, [Ha]ḡar^{um}-et-Khaṭṭ, Ṭayy^{um}, Yathrib et Guzā(m)

Figure 80 Carte de l'Arabie aux IV^e-VI^e siècles de l'ère chrétienne (G. Charloux)



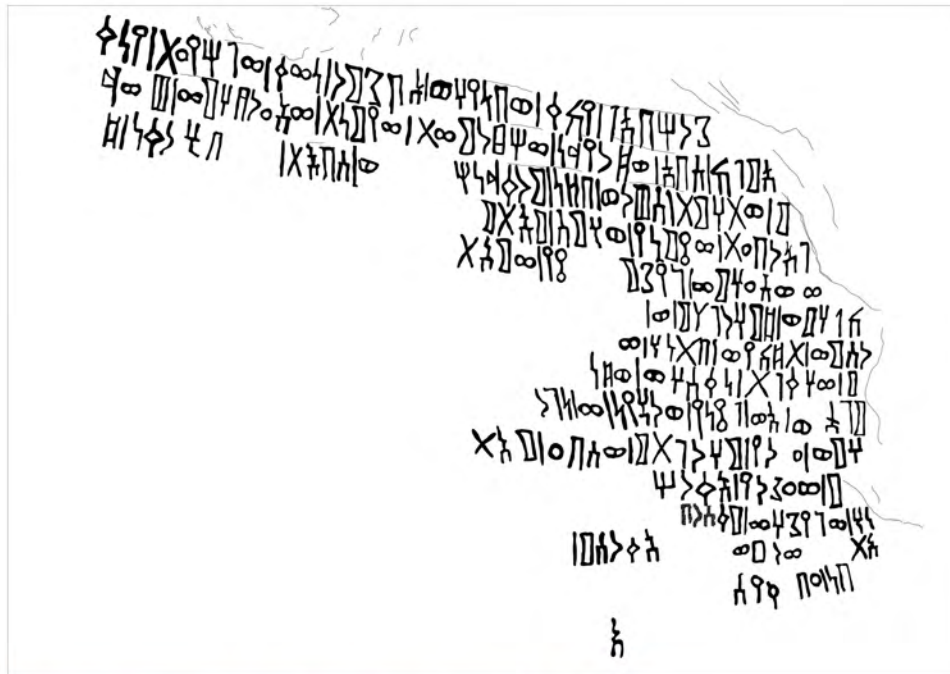
Légende

Yathrib, Nīrān, SIYYĀN, ṬĀYY^{um}
 (Baṭn 'Āqil), (BAKR)
 [Murayghān]

Bourgs (villes, résidences royales, forteresses), toponymes (lieux-dits, puits, vallées, montagnes, plateaux), régions, tribus, mentionnés par les sources antiques
 Bourgs et tribus antiques, connus par les seules sources arabes
 Bourgs et lieux-dits contemporains

- Villes
- ★ Résidences royales, forteresses
- ▲ Montagnes
- ∴ Puits, points d'eau

..... Limite des territoires qui furent, à un moment ou à un autre, sous l'autorité d'un Kindite (d'après TAVO B VI 7)



A



B



C



D

Figure 81 L'inscription Ma'sal 3 (peu après 474-475 è. chr.). A) Fac-similé ; B) Angle supérieur droit ; C) angle supérieur gauche ; D) droite des lignes centrales (Fac-similé: Wisam Khalil ; clichés : Ch. Robin – Mission archéologique franco-saoudienne dans la province de Najrān)

THE SITE OF AL-YAMĀMA



CHAPTER 5

AL-YAMĀMA: THE MAP OF THE SITE

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The topographic survey of the site was carried out by Mathieu Niveleau (2011–2012), accompanied by Jiza al-Harbi (2011). The aim was manifold:

- to establish a 50-m orthogonal grid on the site;
- to draw a map of the site showing the numerous structures that are visible on the ground;
- to provide archaeologists with altimetric data;
- to establish the edges of the soundings according to the grid of reference;
- to plan the excavated archaeological structures.

The devices used for this survey were:

- a total station Leica TS 06;
- a total station Leica TCR 407;
- a differential-GPS Trimble R4;

The topographic frame

As no previous topographic work has been carried out on the site, a polygon had to be set up (**fig. 82**). Angular closings of the polygon are 0.0059 grade, 0.0713 m in planimetry and 0.0038 m in altimetry. Two permanent ground stations have been set (St.4 and St.6), in the form of engraved breeze-blocks buried in the sand but slightly sticking out of the ground.

Setting up a grid

To facilitate the location of excavated areas, a virtual grid turned toward cardinal points has been set up. It is a 50 m grid ; each square is named alphanumerically (A, B, C, ... followed by 1, 2, 3, ...) (**fig. 83**).

Characterizing the relief of the site

It has been decided to attribute the approximate altitude of 430 m a.s.l. to the permanent ground station St.1, a value obtained on Google Earth on this station. All the altitudes taken on structures and archaeological layers are based on this arbitrary reference.

So as to benefit from a perennial altitude landmark, a nail in stainless steel was driven deep into the asphalt road, north of the site. Its altitude is 424.62 m a.s.l.

After two seasons of topographic data collection on the field, 8,792 topographic points were gathered in a database, being either the limit of a natural feature (relief), a modern structure (fence, road, etc.) or archaeological remain. All these points have X, Y and Z values. A projection of topographic points in ArcGIS software made it possible to realize an interpolation of the Z value of these points, using the Inverse Distance Weighted method to obtain a Digital Elevation Model (DEM) of the site (**fig. 84**). Contour lines with an interval of 1 m have been derived from the DEM.

The analysis of the DEM has some limitations. The DEM and contour lines were established on the basis of large set of points but unequally distributed over the site. The relief of areas where points are numerous is therefore more accurate than that where points are few. Where points are missing, the DEM is derived from a theoretical interpolation and is necessarily approximate. Another limitation is constituted by the fence and enclosing walls along which sand accumulates, thus creating an artificial relief having no connection with the topography of the archaeological site (e.g. the levee along the south-eastern section of the fence).

In spite of these constraints, several areas can clearly be distinguished in the archaeological zone:

- a relatively flat area (green colour) covers most of the site, at an altitude of ca. 423–424 m a.s.l. It is covered with pottery sherds and above-ground mudbrick walls;
- a large mound (red and brown colour), reaching 432 m a.s.l., ca. 350 m in diameter, in the north-east area with an extension towards south-west. A deep sounding has revealed that most of this mound is of anthropic origin, being the result of the superimposition of successive occupations alternating with aeolian accumulations. Over the northern half of the mound and on the southern extension, mudbrick walls and pottery sherds are numerous. The southern half of the mound is covered in sand and not much is to be seen on the ground;
- a shallow depression in the south-west area and two larger ones in the south-east area, have a minimal altitude of 420.7 m a.s.l. Few structures are visible on the surface of these depressions. So far, there is no hypothesis to explain their presence.

Mapping the structures on the ground (**fig. 85**)

METHOD

Two kinds of walls were distinguished: those visible on the ground, drawn by continuous lines, and those that we can assume to be present, drawn with dotted lines. When the two faces of the wall were visible, 4 points were taken, for those with only a single face visible, only 3 points have been taken (2 on both the extremities of the visible face) and a third one giving the orientation of the wall and an approximate thickness.

DISTRIBUTION WITHIN THE FENCED AREA

The mapping started in the northern part of the site, where the structures are the most numerous and clearly visible (**fig. 86**). The central area did not yield a dense pattern of above-ground walls. The relief of this area is uneven, covered by many dunes. The natural ground level is high compared to the rest of the site. This could explain the apparent lack of structures. The southern area has only been slightly covered by the sand and the walls here are again numerous. To the south-east, only a few walls were visible, whereas a cluster of

honeycomb-shaped structures has been seen in the central-eastern side of the site, north of the ancient track (**fig. 87**).

DISTRIBUTION OUTSIDE THE FENCED AREA

The mapping of the remains outside of the fence was done using a differential GPS, which can be manipulated by only one operator.

A large walled area, west of the site, is described by local inhabitants as a cemetery. There, an important concentration of tombs were mapped. They are characterized by the presence of a mudbrick at both extremities of the grave. North of this area, a circular structure was noted. The presence of pebbles nearby made it possible to identify this structure as a well. There are no obvious walls in this cemetery. The geomagnetic survey carried out in this area confirmed the absence of major underground structures.

North of the site, the presence of camel enclosures made it difficult to map all the structures. Nevertheless, walls of small square rooms or caissons are frequent around the camel enclosures, in the vicinity of the fence (**fig. 88**). They could be seen as the continuity of the archaeological area. In this north-western area, a long east-west wall is visible for more than 90 m and could be the continuation of a long wall also visible in the protected area.

Seven hundred metres north of the fenced area, another cluster of surface walls was observed and mapped (**figs. 85, 89**). Nevertheless, no continuity of the settlement has been seen between this small concentration of walls and the main site of al-Yamāma to the south. Several walls of small rooms were mapped. A larger and more complex structure was also seen, surrounded by several concentric walls.

East of the site, the ground has been badly damaged by modern building activity and new work is still in progress there. Identifying ancient structures in this area is therefore difficult. Several spots of melted mudbricks coming from collapsed structures are to be seen but only a few walls can be distinguished. In a trench dug as part of the modern building activity, an ancient mudbrick structure was clearly visible. This pit and the walls were mapped before their destruction.

The south-western part of the area has been carefully studied since most of the pre-Islamic material comes from this location. Nevertheless, recently abandoned palm-groves, whose marks are still visible, have badly damaged the area. Above-ground walls are rare.

Finally, no structures were seen south-east or south of the fenced area. This part has also been badly damaged by recent palm-groves and road construction.

Setting up the limits of the excavated areas

Three soundings and one excavated area were plotted:

Sounding 1, in area N6 (**fig. 86**): an initial rectangle measuring 7 m (EW) × 25 m (NS) was drawn to include part of a long wall and part of a columned building (Building 1).

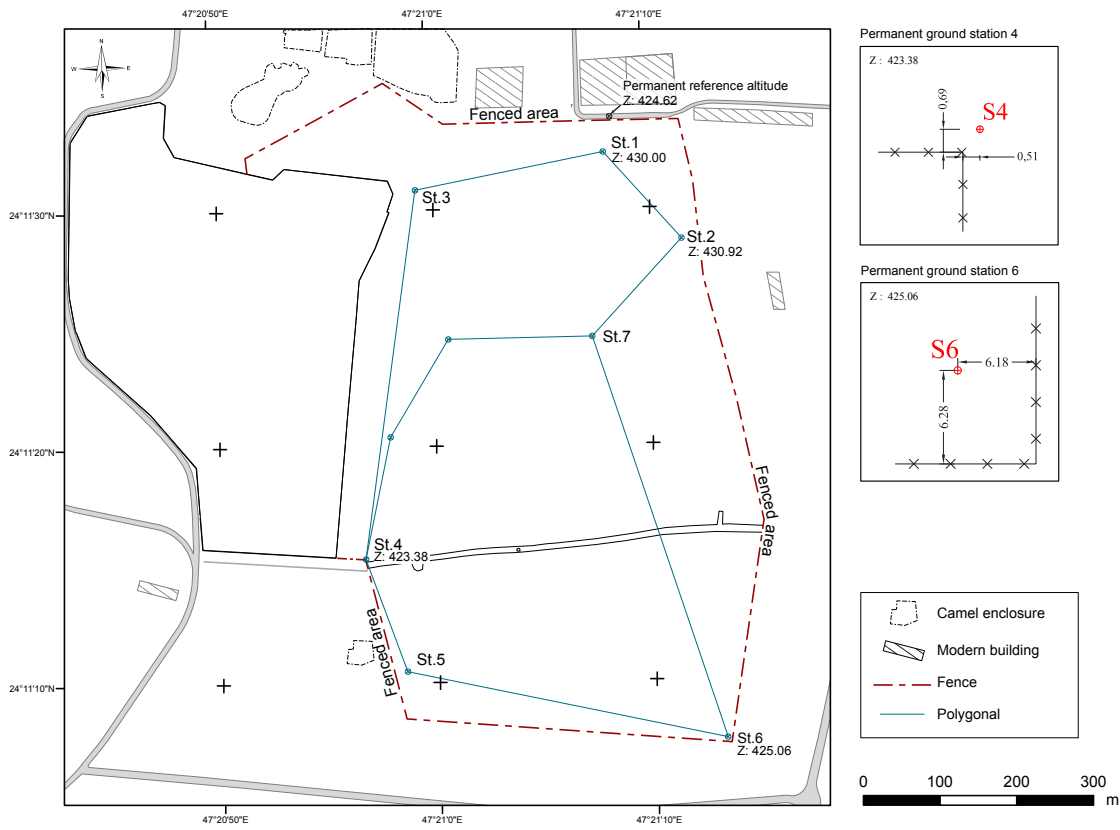
Sounding 2, in area O7 (**fig. 86**): it measures 7 m (EW) × 5 m (NS) and includes two rooms of the Building 2.

Sounding 3 straddles area G17-H17 (**fig. 87**): it measures 10 m (EW) × 1 m (NS).

Building 1, in area N6 (**fig. 86**): this area consists of the enlargement and extension of Sounding 1 towards the south. Together with Sounding 1, this area is 50 m long (NS) and 19 m wide (EW).

Mapping the excavated structures

The plan of Building 1 has been completed (**figs. 99, 118**). Concerning the walls and columns whose bricks were visible, a drawing was made from horizontal photographs orthorectified using AutoCAD software. This technique was effective for the walls W. 043 and W. 006, the buttresses W. 034 and W. 035, the niches, the western access of Building 1, as well as the columns. The map is accurate to within 1 to 2 cm. The general map of Building 1 also shows the position of special features on its floor (traces of former columns, game boards incised on the floor, pits) (see Chapter 8).



▲ **Figure 82** Al-Yamāma: map of the polygon setup used as topographic reference on the site (M. Niveleau, J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

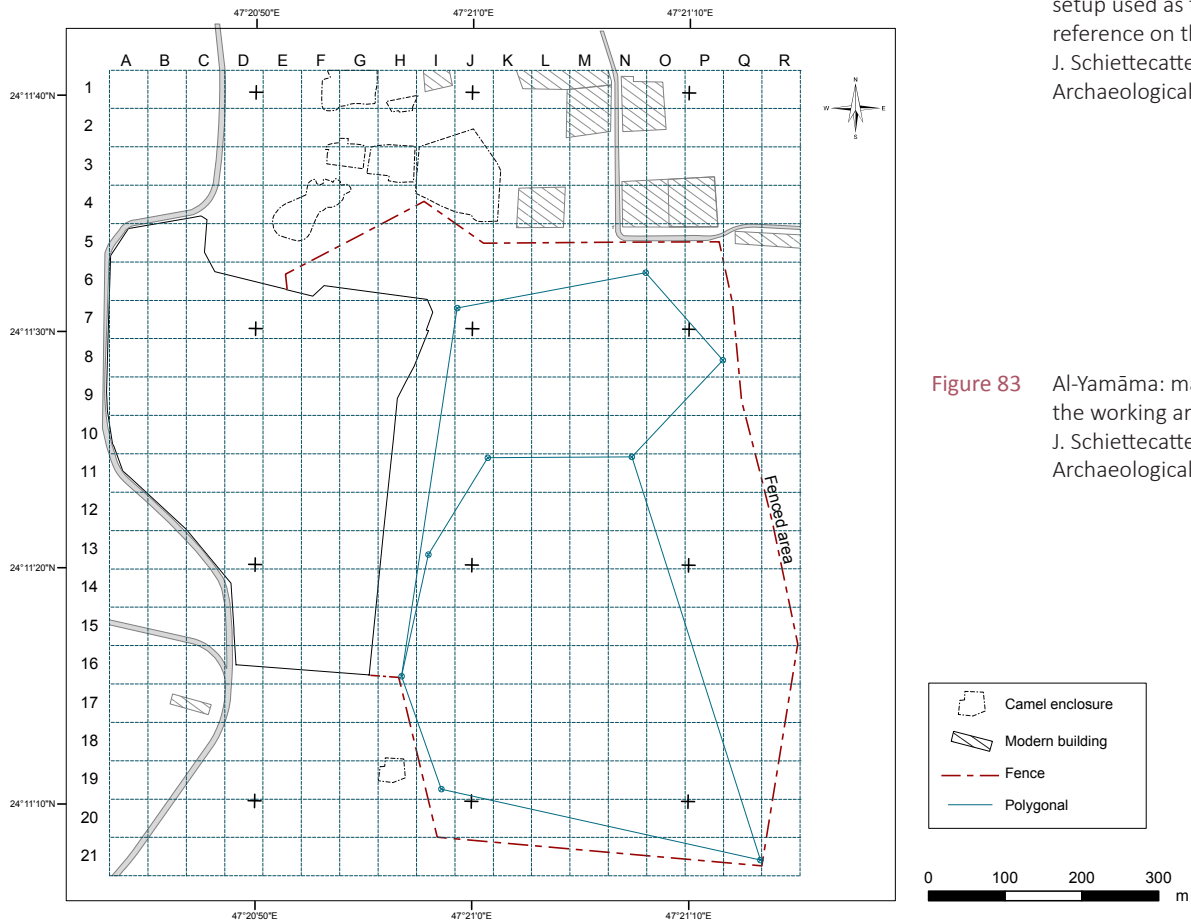


Figure 83 Al-Yamāma: map of the grid defining the working areas (M. Niveleau, J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

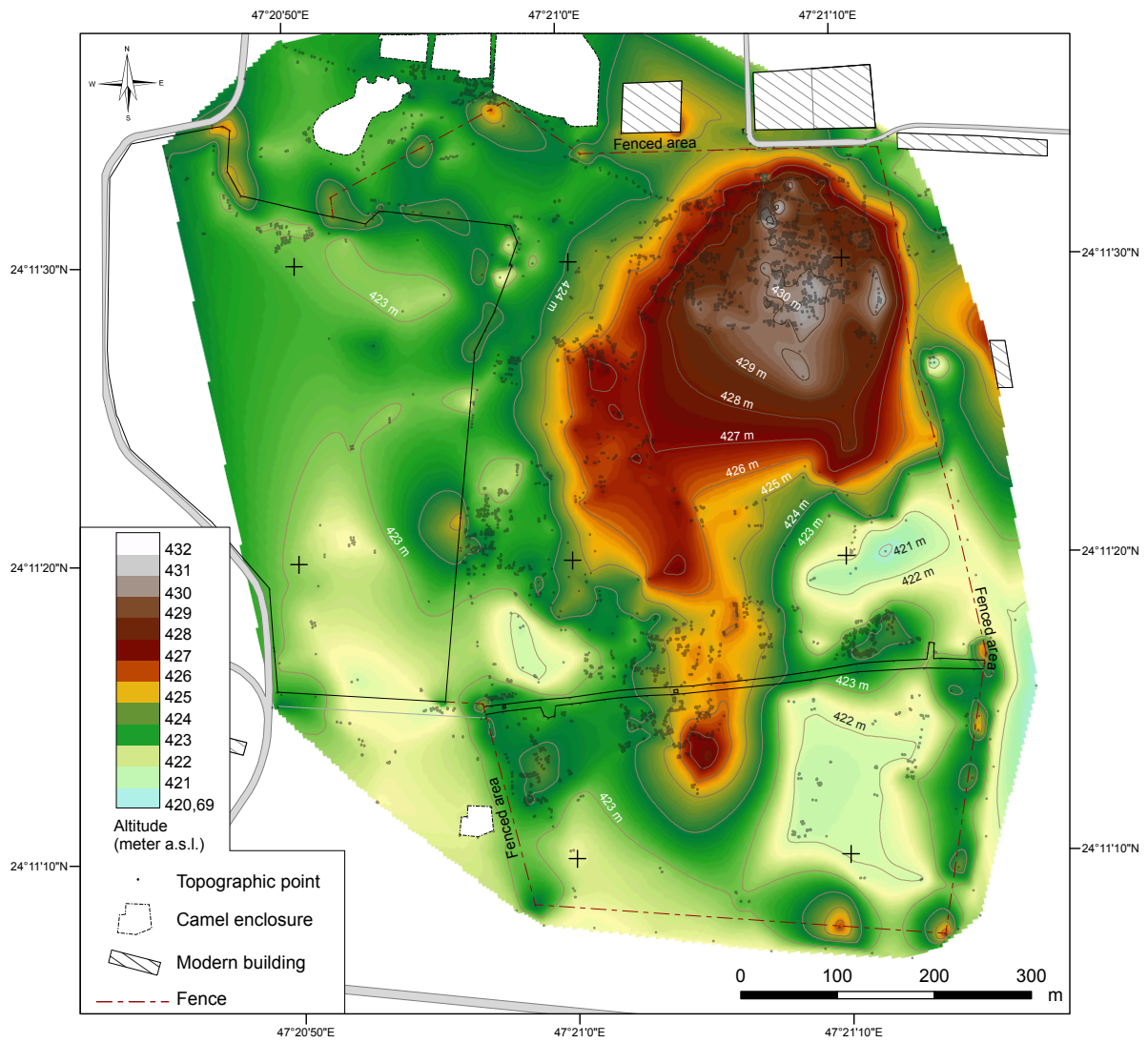


Figure 84 Al-Yamāma: topographic map of the site (M. Niveleau, J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

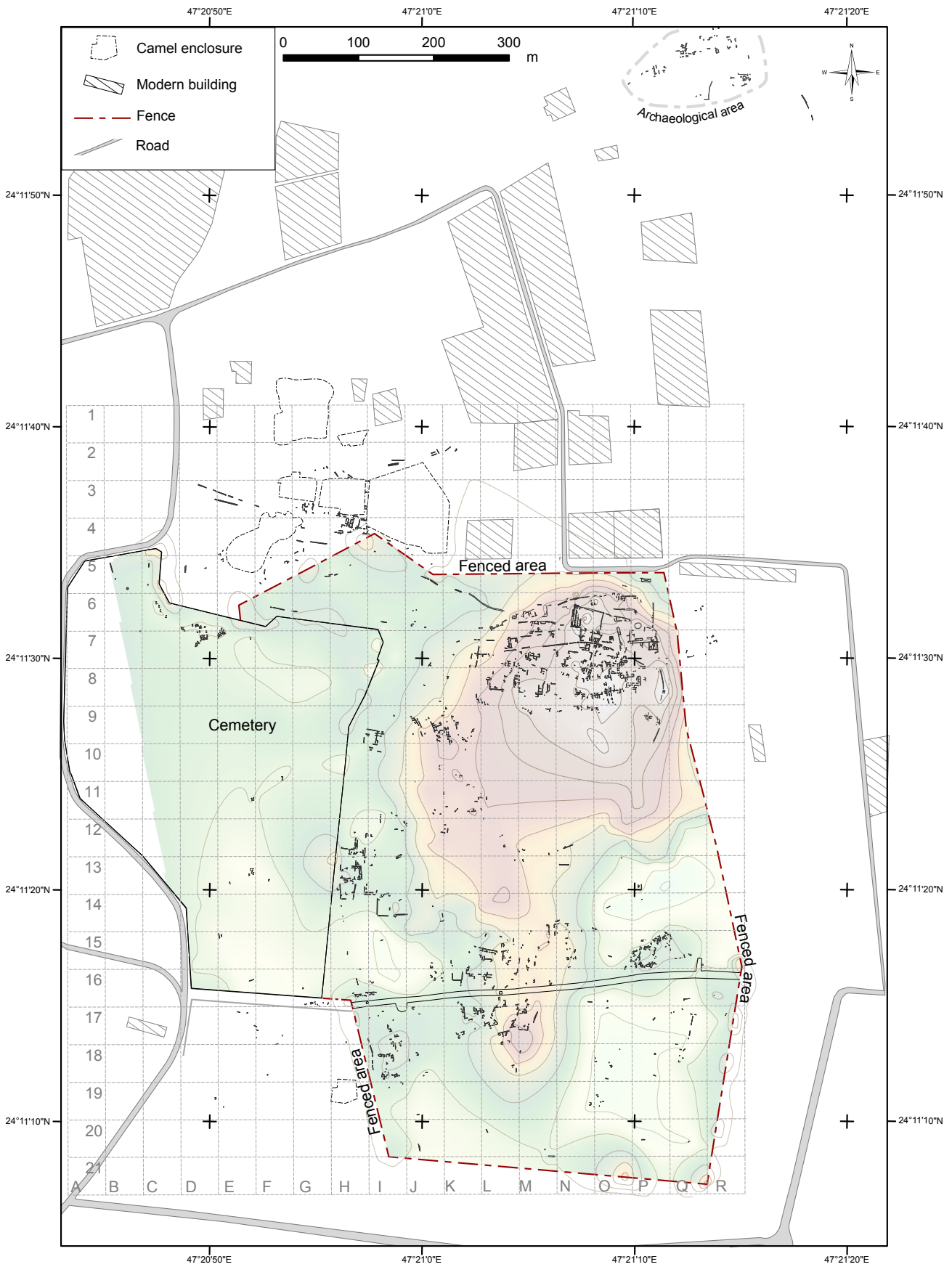


Figure 85 Al-Yamāma: map of the archaeological structures visible on the ground (M. Niveleau, J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

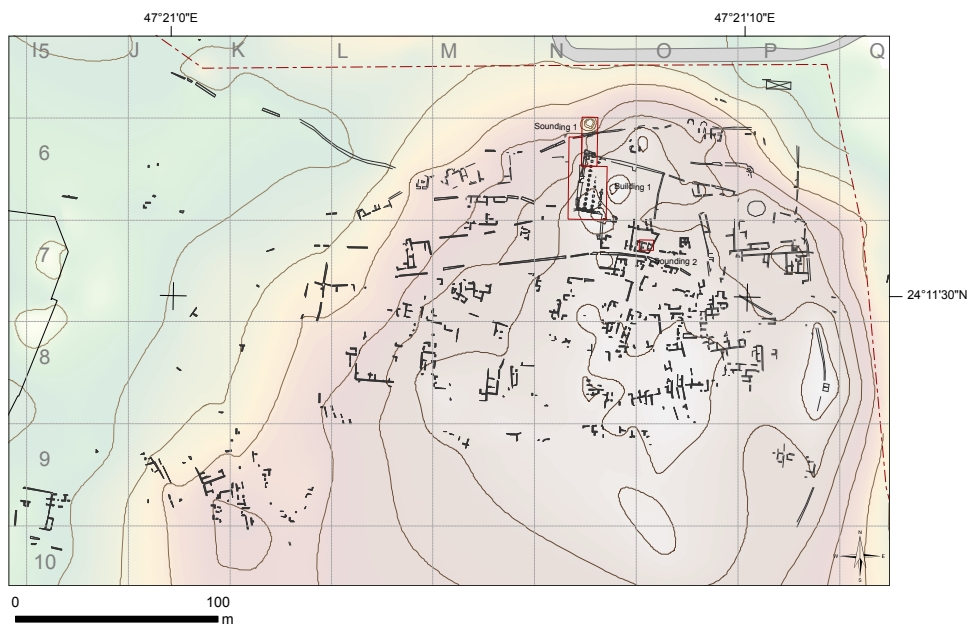


Figure 86 Al-Yamāma: map of the archaeological structures visible on the ground – detail of the northeastern area, within the fence (M. Niveleau, J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

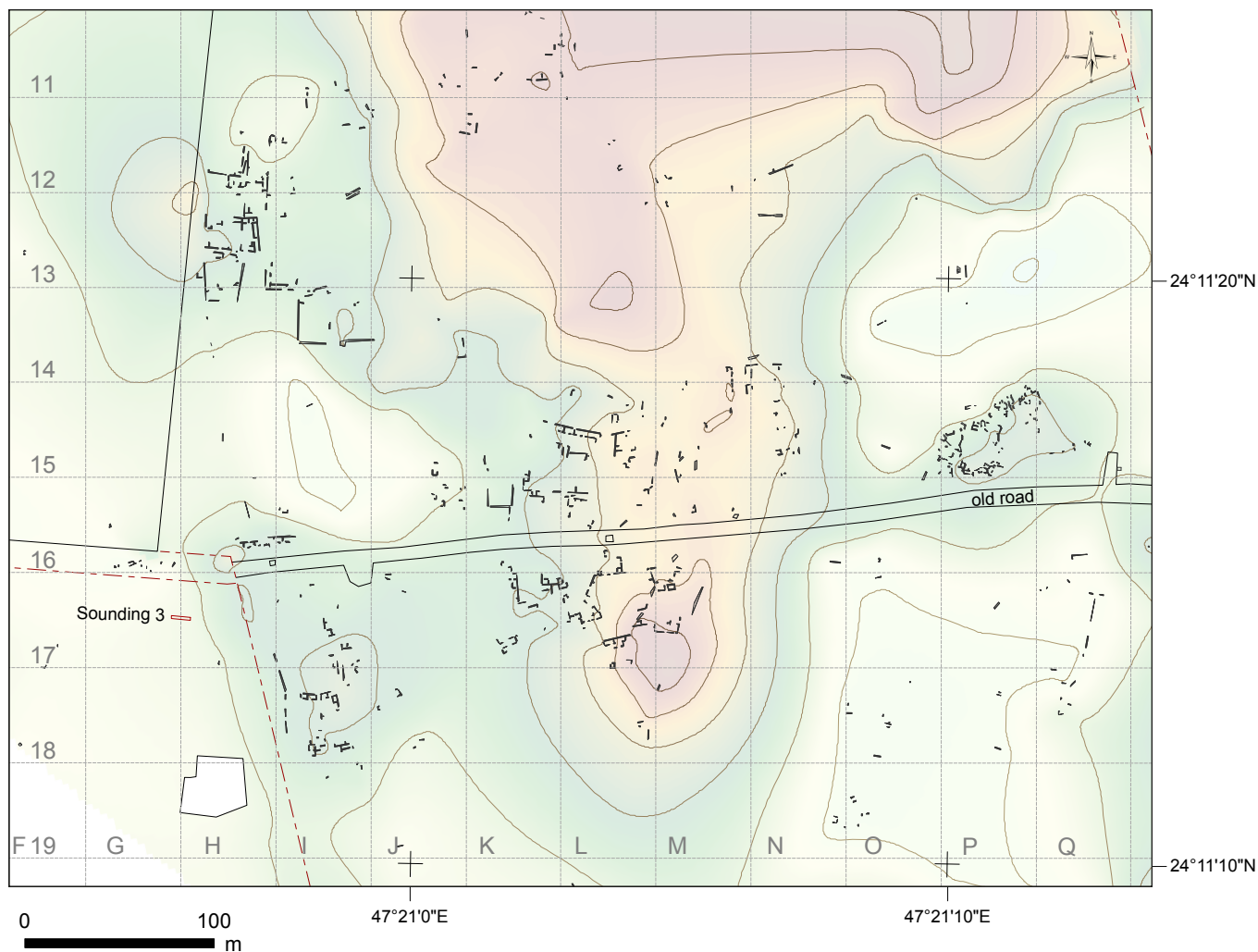


Figure 87 Al-Yamāma: map of the archaeological structures visible on the ground – detail of the southern area, within the fence (M. Niveleau, J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)



Figure 88 Al-Yamāma: map of the archaeological structures visible on the ground – detail of the north-western area, outside the fence (M. Niveleau, J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

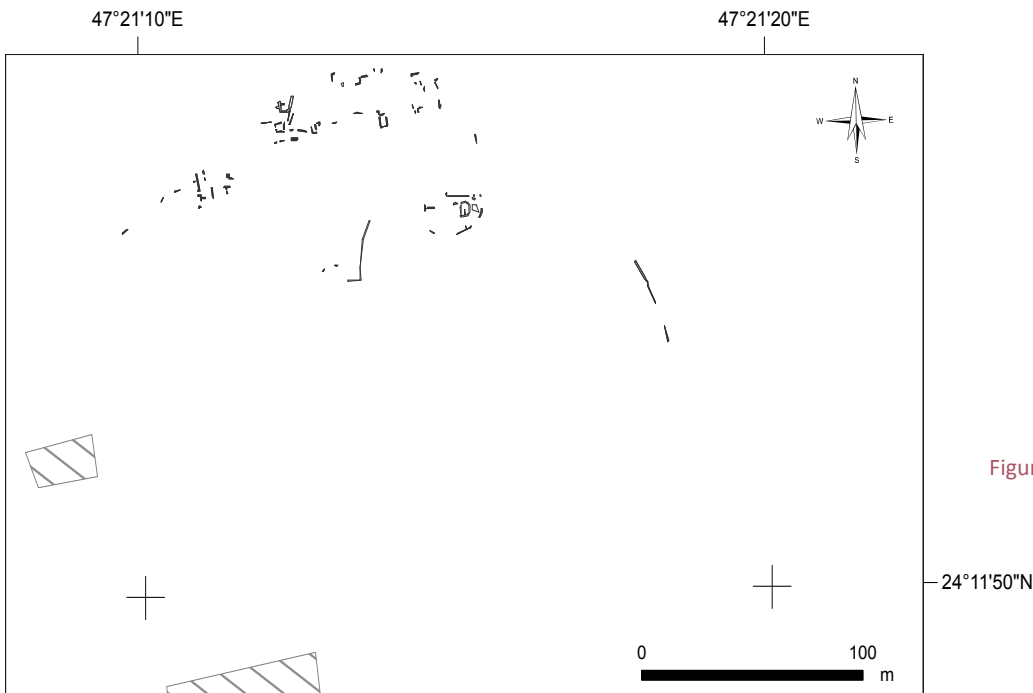


Figure 89 Al-Yamāma: map of the archaeological structures visible on the ground – detail of the northern area, outside the fence (M. Niveleau, J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

CHAPTER 6

AL-YAMĀMA: GEOMAGNETIC MAPPING

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Introduction

Archaeologists often deal with buried objects and structures over large surfaces. Most of the time, extensive excavations of a whole site cannot be conducted as they are highly time and labour consuming. Thus, only carefully selected parts of a site are actually excavated.

An elegant solution to localize and investigate a site at a greater scale is to use sub-surface geophysics. This discipline consists in the study of the ground from a few centimetres to hundreds of metres below the surface using non-invasive techniques. Six different methods are available. They are separated into two groups: active and passive. Seismic, electric, electro-magnetic and geo-radar methods are active, i.e. they are defined as the study of the reaction of the media to stimuli (respectively acoustic waves, DC current, low frequency AC current and high frequency AC current). Gravimetry and geomagnetism are passive. They deal with the study of disturbances in earth fields (respectively gravity and magnetic fields), i.e. inherent capacities of the medium, hence no stimuli are required for the measurements.

According to Linford (LINFORD 2006: 2205–2257), geomagnetism is probably the most widely used geophysical technique for archaeological purposes for two main reasons:

- the rapidity of measurement allows extensive surfaces to be covered with a high density of data within a relatively short time;
- as most of the man-made traces show a contrast of magnetization with their surrounding media, even subtle archaeological features might be identified.

At al-Yamāma, geomagnetic mapping was chosen for the same reasons. The aim was to investigate the whole site to determine the different areas of possible remains. Moreover, we used an original device based on fluxgate vectorial magnetometers, which are usually used in space and airborne studies (PRIMDAHL 1979: 241–253; NABIGHIAN *et al.* 2005: 33–61), in order to improve on the rapidity and density of data acquisition normally obtained with the commercial gradiometers developed for archaeology.³⁰

30 Comparison of the commercial gradiometers for archaeology: BARTINGTON & CHAPMAN 2004: 19–34.

Method

PRINCIPLE AND DEVICES

The earth's magnetic field is vectorial, i.e. it is defined for every point in space by both a direction and an intensity measured in Tesla (T). Almost 99% of the field is relatively stable and comes from deep internal sources: core, mantle, crust (CAMPBELL 2003; ROY 2010). Around 1% comes from external sources, mainly from the interaction between the earth and the sun, and is highly time-dependant (COURTILLOT & LE MOUËL 1988: 389–476; THÉBAULT *et al.* 2010: 95–127). Nevertheless, local features of natural or man-made origin might generate subtle disturbances in the earth's magnetic field: the magnetic anomalies. The principle of the method is to measure and map these anomalies and to identify the ones created by humans.

In order to apply the technique, two devices were used on the site: the 'backpack' and the 'sledge'. Both work on the same principle. The difference lies in the speed and precision of the measurements.

The Backpack (**fig. 90**) is composed of the following parts:

- Four magnetometers (Bartington MG-03MC70) are fixed on an aluminium stick 50 cm apart from each other. The structure is attached to a backpack in such a fashion that the sensors lie horizontally in front of the operator, one meter above the ground.
- A GPS antenna (Trimble 5800) is fixed to the top of the backpack.
- An electronic digitizer is attached to the backpack. It acquires the magnetic and GPS data (respectively at 30 and 1 measurements per second) and stores them on a SD card. It also has a remote control to start and stop the measurements as well as to record points of interest. The digitizer is linked to a mini-PC, itself linked to a head mounted display (HMD) on which magnetic and positioning data are shown in real-time. The remote control allows the operator to interact directly with the computer without removing the backpack.

With such a configuration almost continuous and geo-referenced magnetic profiles (30 samples per second) are recorded every 50 cm, one meter above the ground.

The Sledge (**fig. 91**) uses most of the Backpack components with the following differences:

- The magnetometers are fixed at the front part of a sledge, 10 cm apart from each other and a few centimetres above the ground.
- The GPS is attached at the back, 90 cm away from the captors.
- The digitizer is fixed in the middle of the sledge.
- The mini-PC and HMD are not used.

With this configuration the magnetic profiles are acquired every 10 cm, at 10 cm above the ground.

In both cases the device is powered by a 12 V, 7 Ah lead sealed battery placed within or on top of the digitizer.

FASHION OF MEASUREMENT AND DATA PROCESSING

The sessions of measurements always follow the same routine with both devices. The difference is the number of operators required for the data acquisition: a single person with the Backpack, two with the Sledge.

■ Calibration

Fluxgate magnetometers are not absolute but relative devices. Each sensor shows its own errors in offset, sensitivity and angle. In order to get the same signal from each of the four

captors they must be calibrated at the beginning and end of each session of measurements: the device is rotated in all directions above a fixed point where it is assumed that the magnetic field is constant and therefore that the measured disturbances are only due to the device itself. Corrections can then be calculated by different mathematical methods. The approach for the calibration of the magnetometers of the Ørsted satellite (OLSEN *et al.* 2003: 11–18) was selected because of its proven efficiency in the detection of unexploded ordnance (UXO) with the same device (MUNSCHY *et al.* 2007: 168–183).

■ *Static measurements*

On the site the effects of the change of temperature on the sensors and the diurnal variations of the magnetic field due to external sources are both sources of time-dependant variations. At the scale of a session of measurement (60 to 90 minutes) both are assumed to create a linear drift, which can be easily corrected by measuring the differences over a same point (the static point) at the beginning and end of each mapping session.

■ *Mapping*

The device is carried along pre-set routes (every 2 m for the Backpack, every 50 cm for the Sledge) in a back and forth fashion. The beginning and end of each route is recorded using the remote. Thus magnetic profiles are acquired every 50 or 10 cm over the whole area of investigation.

■ *Data processing*

Once the data are calibrated and the time-dependant variations corrected, the magnetic anomalies are calculated along each profile by subtraction between the measured total field and a modelled regional field. By interpolation between each profile a grid of the magnetic anomalies of the area is generated and displayed for interpretation.

Results

During the two field campaigns, around 180 km of profiles were measured with the Backpack. This corresponds to an area of approximately 30 hectares divided into four different zones (**fig. 92**):

- 1/ Three quarters of the site within the fences;
- 2/ A test in the cemetery outside the western wall;
- 3/ A test in the south-west, close to a camel enclosure, where some fossilized agricultural structures are still visible on the surface.
- 4/ A fourth zone of 1,875 m² was covered with the Sledge.

THE BACKPACK

■ *Zone 1*

In the first zone numerous elements can be observed (**fig. 93**). The anomalies on the edges are most likely due to the structures closing the area: a wall on the west and a metallic fence elsewhere. These differences of sources explain the differences of the shapes of the anomalies. In addition, the massive anomalies in the north are most likely due to the buildings across the access road.

Apart from these, two other main types of anomalies can be identified: bodies of very low frequency which are probably linked to the underlying geology, and higher frequency anomalies forming lines. Some of the latter are due to remains of walls still visible on the

surface. Because of the similarities of the signal it may be assumed that the other lines correspond to similar structures which have been completely buried. In this way the magnetic map can be used as a tool to fill the gaps between different surface elements as well as finding new ones.

Figure 94 displays both the walls visible on the surface and the magnetic lines. The latter are less precise than the former but allow the completion of some walls, especially in the northern part. In the south and the west, the anomalies reveal unexpected structures. However, the eastern part seems to be empty of any remains, apart from one long east–west structure. Only a few more structures are present in the central-western part. Thus it seems that the area is composed of two main zones with a high density of remains: one in the north and one in the south. Nevertheless the south-western quarter still needs to be investigated to understand the full extent of the south area.

Another type of anomaly can also be noted: small dipolar anomalies (**figs. 97–98**). They could be linked to metallic waste (barrels, car pieces, etc.) as well as ancient kilns for ceramics or smith work. Further investigation is required before drawing any conclusions.

■ Zone 2

On the second zone (**fig. 95**) low frequency anomalies can be observed. They are most likely due to underlying geological features except for the square anomaly in the south (within the black circle). Such shapes are often related to human activities. Further analyses (excavation or other geophysical investigations) would be required to confirm or invalidate a human origin. The same reflection can be applied to the line pointed out by the arrows. Given these facts it seems that the area is worth further investigations.

■ Zone 3

On the third zone (**fig. 96**) the only noticeable element is an east–west alignment showing an anomaly of more than 1,000 nT. This could easily be caused by the metal water-pipe whose opening is visible a few hundred metres to the east. From an archaeological point of view, the lack of other structures would indicate that further measurements do not seem relevant.

THE SLEDGE

The measurements with the Sledge (**fig. 97**) were carried out above a zone where a concentration of misfired and wasted pottery sherds (usually found close to kilns) is visible on the surface (zone 4 on **fig. 92**; area L7 and L8 on **figs. 85–86**). There, the magnetic map obtained with the Backpack (**fig. 98**) shows a strong anomaly which could be interpreted as the trace of the burning place of a kiln.

Despite a problem of calibration on the south-western part of zone 4 (**fig. 97**), different structures can be seen with a greater precision than with the Backpack (**fig. 98**). The alignments are most likely due to walls (arrows). Parts of them are visible on the surface (**fig. 98**) and the anomalies reveal their continuation underground. The centre of the strong anomaly in the south-west could be the location of a ceramic kiln (marked by a circle on **fig. 97**).

Conclusion

The magnetic cartography conducted on the site of al-Yamāma proved the efficiency of the use of vectorial magnetometers for archaeological purposes. The method also showed an important complementarity with the surface surveys which gave precise information for

the interpretation of the sources of the signal. In fact, the results obtained with the Backpack revealed the presence of two main areas with a high density of buildings partly or totally covered by sand: to the south-east and in the centre-west of the site. Moreover, the technique allowed the surrounding areas to be investigated to detect zones of potential interest.

However, comparison with the surface structures showed that only the main elements could be mapped in such fashion. A solution to this lack of precision was found by using the Sledge on a targeted zone. The map obtained this way revealed much subtle details at the cost of speed of measurements.

Thus, the combination of the two devices proved to be a powerful tool to investigate the sub-surface of al-Yamāma. In order to complete the study, the south-western quarter as well as targeted areas will be mapped using the Backpack and the Sledge in the next field season.

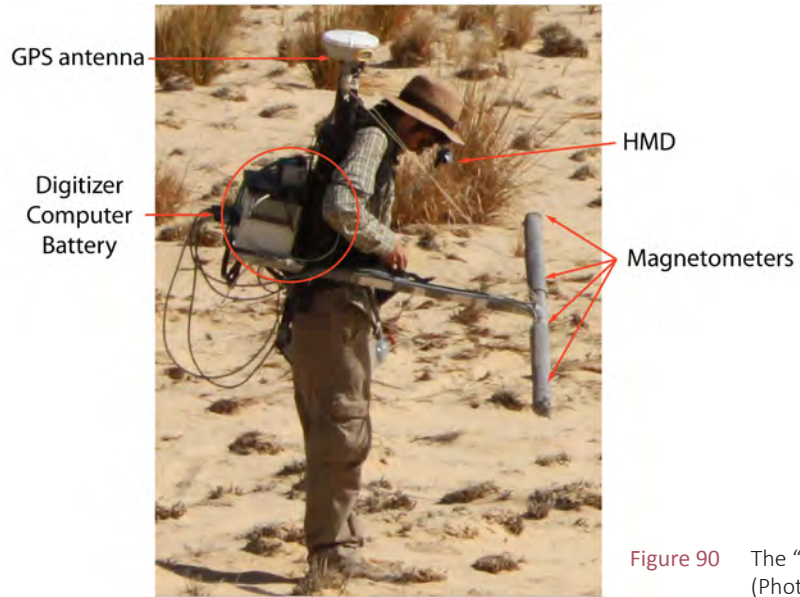


Figure 90 The "Backpack" device
(Photograph: F. Colin)

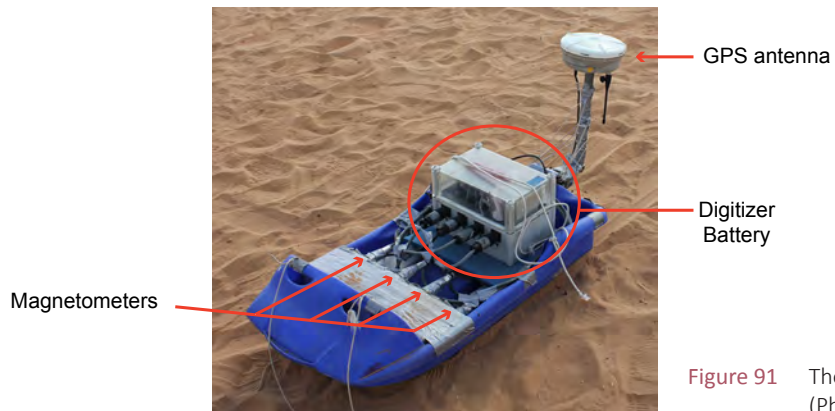


Figure 91 The "Sledge" device
(Photograph: B. Gavazzi)

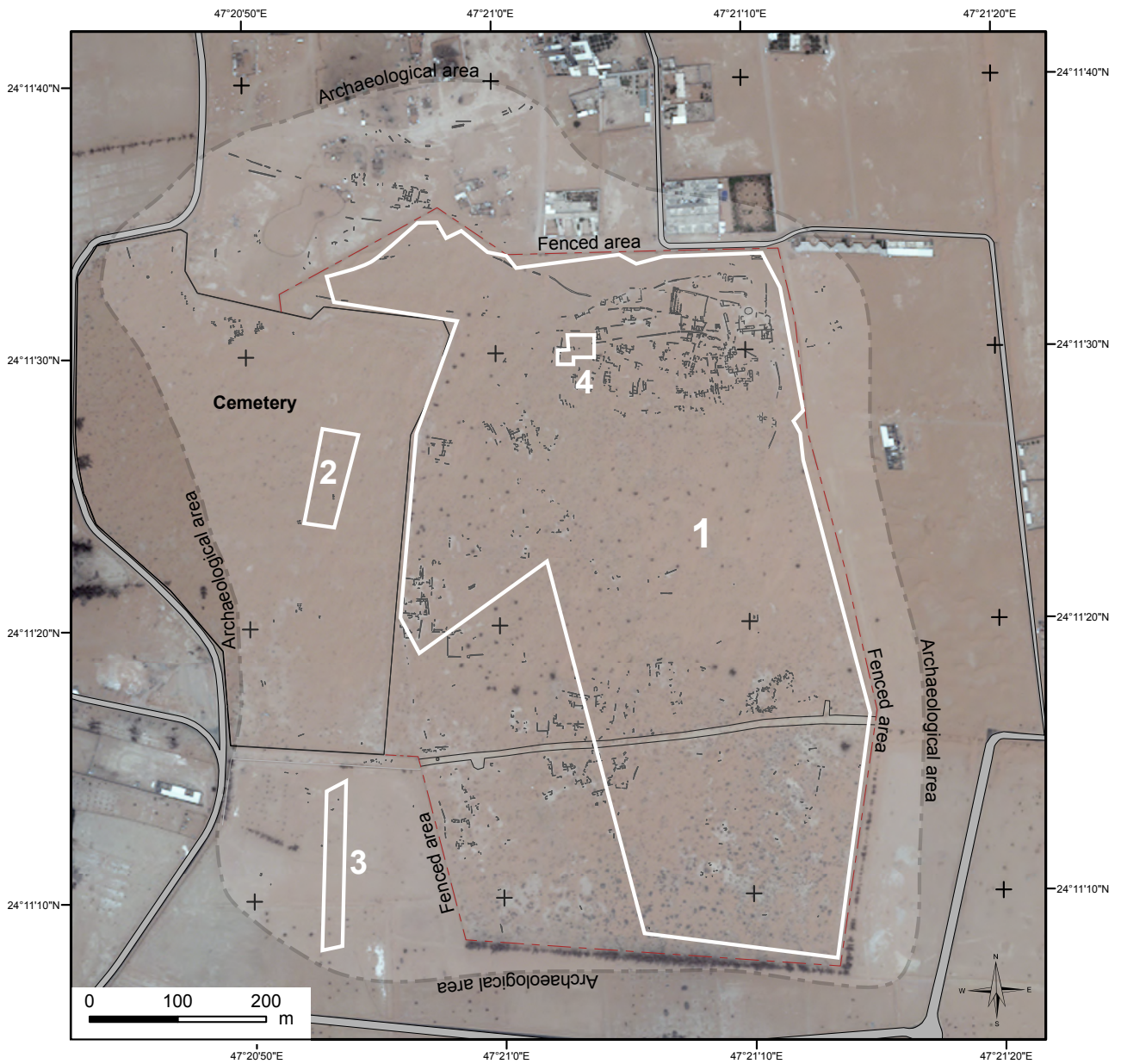


Figure 92 Al-Yamāma: map of the different zones of geomagnetic survey. Zones 1, 2 and 3 were investigated with the Backpack, Zone 4 with the Sledge (B. Gavazzi, J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj/Includes World-View-2 Products © DigitalGlobeTM, distributed by e-GEOS)

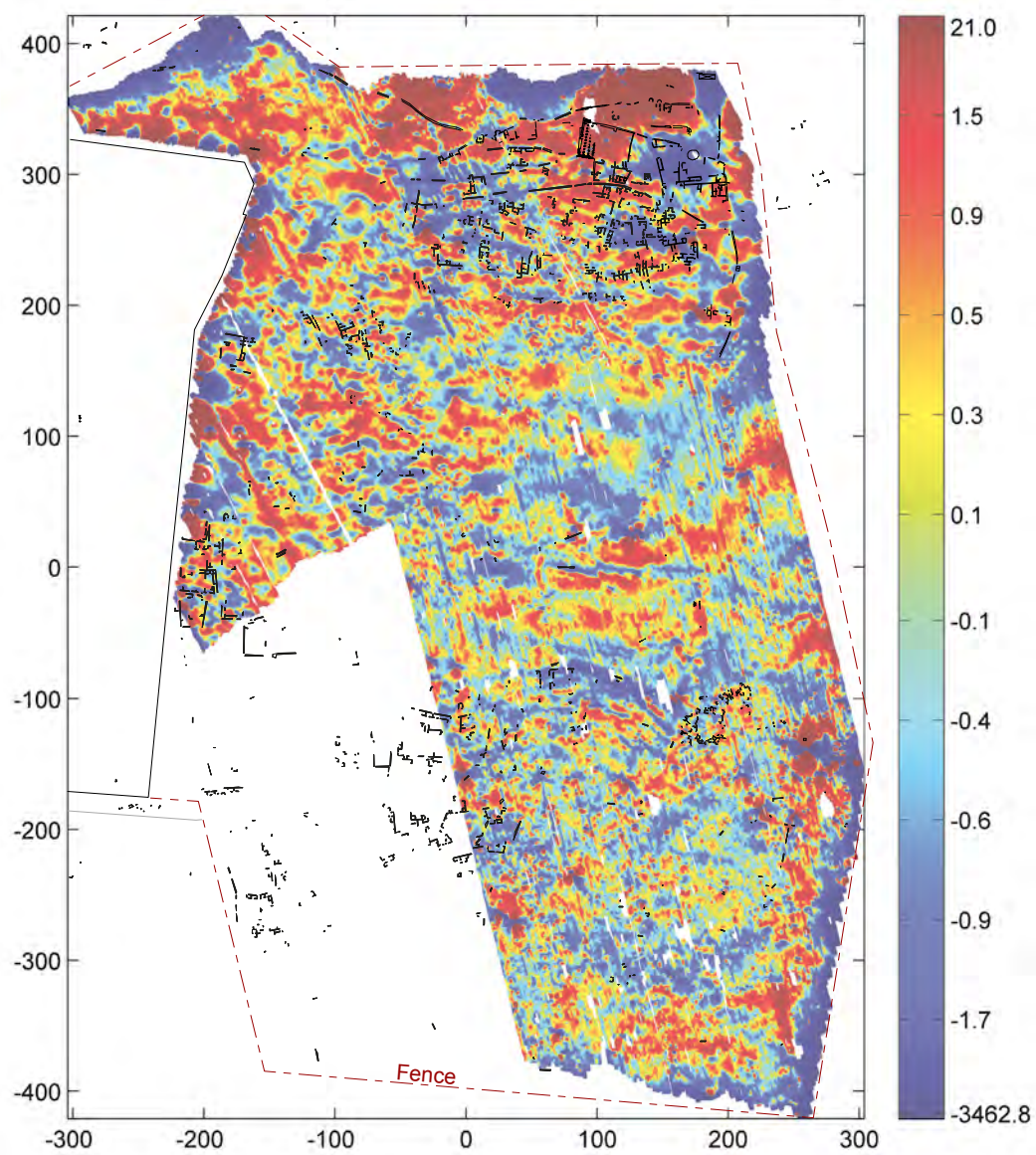


Figure 93 Al-Yamāma: superimposition of archaeological remains visible on the surface over the map of the magnetic anomalies of the zone 1. Scale in m, colour-bar in nT, mudbrick walls in black (B. Gavazzi, R. al-Khatib, M. Munsch; design: B. Gavazzi, M. Niveleau, J. Schiettecatte)

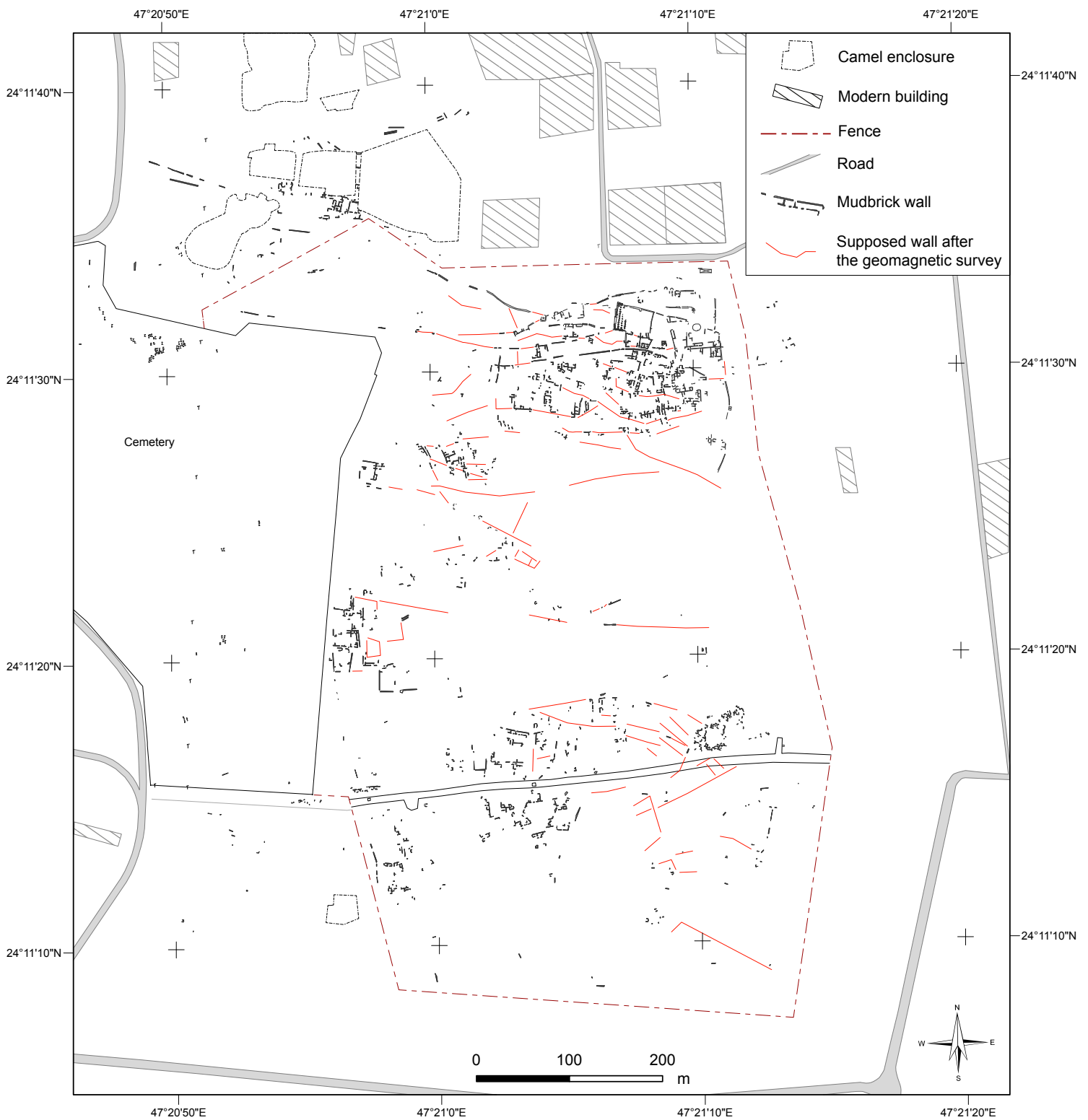


Figure 94 Al-Yamāma: map of the archaeological structures visible on the ground and reconstitution of the layout of underground structures according to magnetic data (B. Gavazzi, M. Niveleau, J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

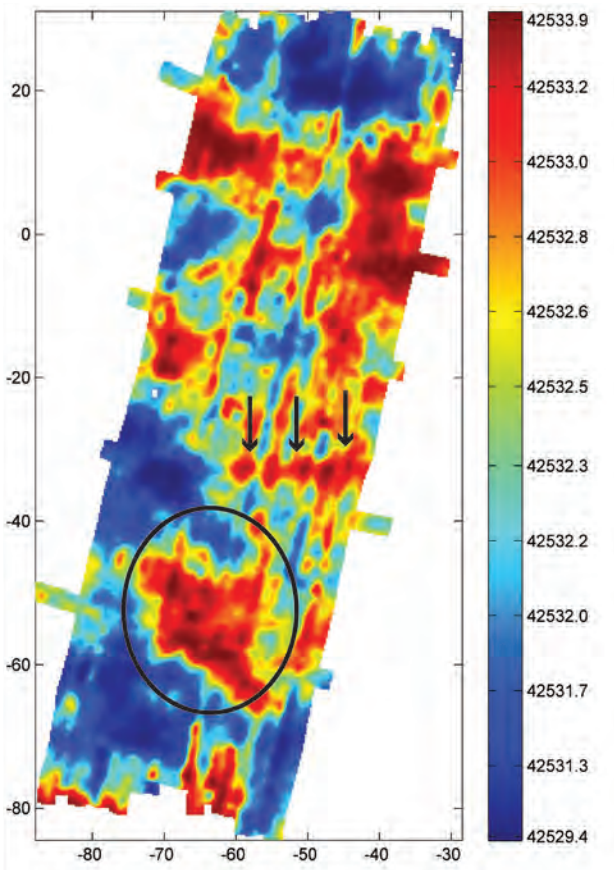


Figure 95 Al-Yamāma – zone 2 of the geomagnetic survey: map of the magnetic anomalies. Scale in metres, colour-bar in nT (B. Gavazzi)

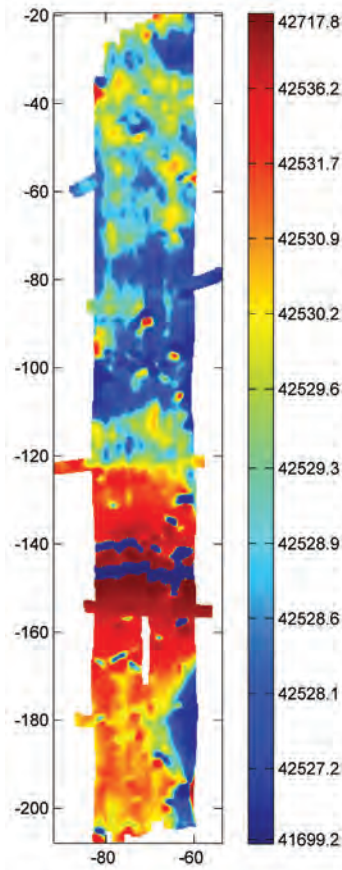


Figure 96 Al-Yamāma – zone 3 of the geomagnetic survey: map of the magnetic anomalies. Scale in metres, colour-bar in nT (B. Gavazzi)

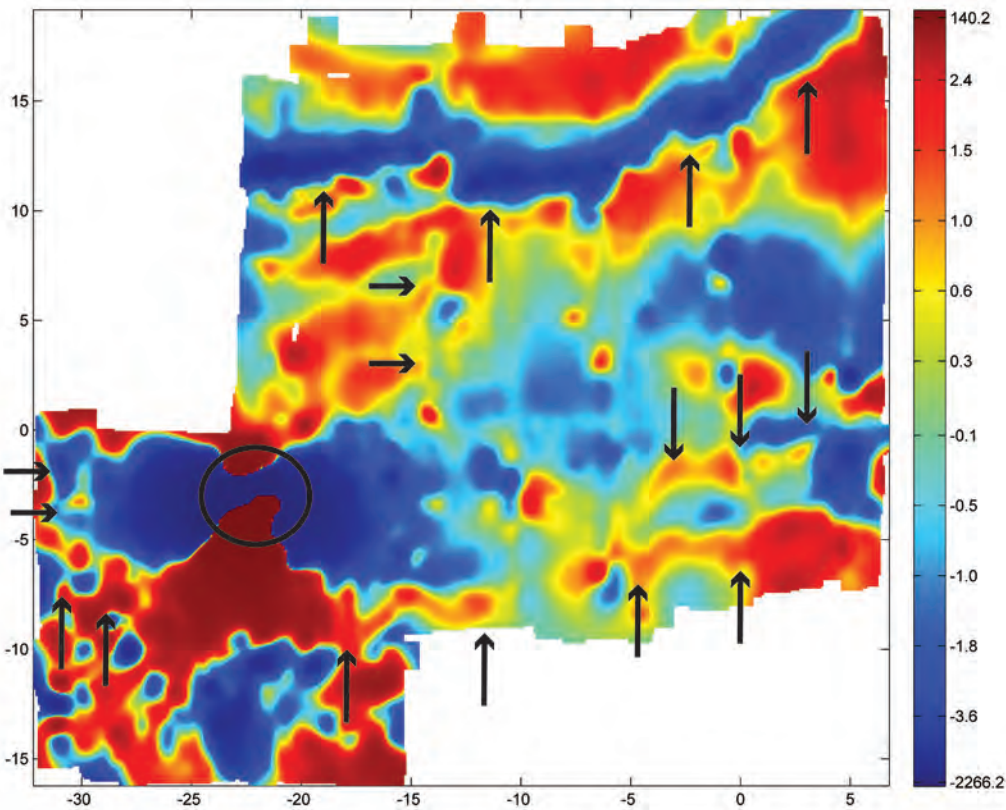


Figure 97 Al-Yamāma – zone 4 of the geomagnetic survey: map of the magnetic anomalies. Scale in metres, colour-bar in nT (B. Gavazzi)

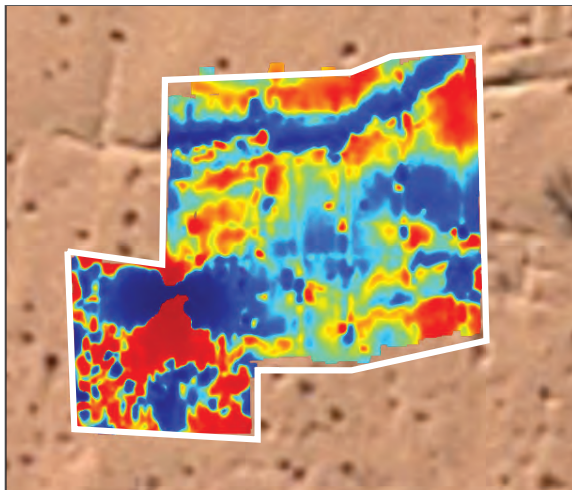
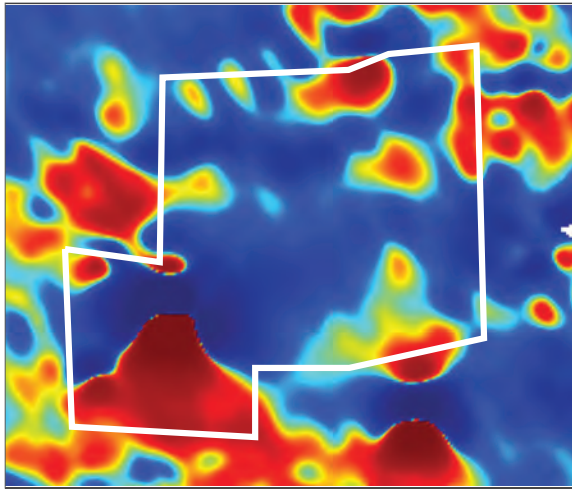
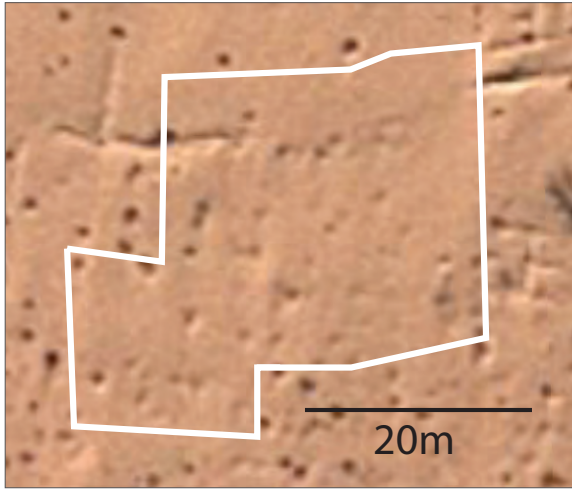


Figure 98 Al-Yamāma – zone 4 of the geomagnetic survey: comparison between satellite image (left), Backpack map (middle) and Sledge map (right) (B. Gavazzi)

CHAPTER 7

AL-YAMĀMA (AREA N6): SOUNDING 1

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Sounding 1 was a deep sounding intended to produce a long stratigraphic sequence of the site of al-Yamāma and give preview of the ceramic corpus for each period of occupation. Begun in the first season, the sounding was completed during the second season. This chapter presents the stratigraphic sequence and the material assemblage. The pottery assemblage will be discussed in detail in Chapter 9, together with the pottery from the mosque (Building 1).

Location

Sounding 1 was located in area N6, in the northern part of the site, in a spot where the difference in altitude between the highest and lowest points was sufficient to expect a deep occupation sequence (**figs. 85, 99**). The close proximity of a large mosque (Building 1) with columns visible on the ground, at the top of the mound, was also attractive.

The sounding was a rectangle measuring 7 × 25 m, oriented N–S. In order to prevent the collapse of the sounding walls that cut through the thick aeolian sand deposits, below a depth of 1.5 m, we were constrained to stepping in the sides twice by 1 m all round. This gradually reduced the surface of the excavated area, making the northern part of the sounding (deepest part) look like a reverse ziggurat (**fig. 100**). Unable to go deeper without endangering the workers and the archaeologists or without having to enlarge the sounding—which would mean removing an enormous volume of sand—the digging stopped under the base of wall W. 001, at a depth of 6 m. Virgin soil has not been reached so far. At the end of the 2012 season, the lowest level reached (421.30 m) was 8.70 m under the highest point of the mound (430 m). Four stratigraphic phases were defined, phase 1, at the top of the mound, being the most recent (**figs. 101–104**).

Having removed the aeolian surface deposit (UF 001) and cleaned the upper part of several structures, the sounding was divided into three parts (**figs. 100–102**):

- The northern part is a 7 × 8.5 m square located north of a long mudbrick wall, oriented E–W (W. 001). The deepest layers reached are in this part of the sounding. Due to the absence of buildings, this part is considered to have been an open area;
- The central part is a 6 × 8.5 m rectangle located south of wall W. 001 and north of the northern wall (W. 002) of a large structure (Building 1). It is also regarded as an open area, with evidence of compact surfaces (possibly a street);
- The southern part is a 6 × 8 m area and part of the main columned room of Building 1. It is bordered by W. 002 to the north, W. 006 to the west and it includes two columns (Co. 004, Co. 005).

Occupation sequence³¹

PHASE 1

This phase has been divided in two sub-phases:

Phase 1a: Erosion and aeolian sand accumulation during the latest phase of occupation of al-Yamāma, at a time when Building 1 was abandoned;

Phase 1b: Last occupation of Building 1 and circulation levels in the central and northern part of Sounding 1.

■ Phase 1a

Phase 1a consists mainly of an aeolian sand deposit (UF 001) covering the whole sounding.

In the **southern part** of the sounding, at the top of the mound, the thin and regularly windswept aeolian deposit covers horizontal layers of melted mudbrick alternating with sand hardened by exposure and rain (UF 007). Removal of these layers exposed the eroded top of the several structures used to divide the sounding in three parts (**figs. 99–100**): the long wall W. 001, the north-western corner of Building 1 and its two perpendicular walls W. 006 to the west and W. 002 to the north, and both columns Co. 004 and Co. 005 in Building 1.

In the **central part** of the sounding, surface erosion and runoff induced the formation of a 2-m-deep depression cut into earlier aeolian sand deposits (UF 015a). This basin was progressively filled up with layers of sand brought by wind and runoff, and by mudbrick fragments and nodules from the erosion and collapse of W. 002 (**figs. 101, 105**). Sherds belonging to different periods (from the 9th to the 18th centuries AD) are mixed together within these layers, either brought by runoff from the upper part of the site, or they were thrown away there by the inhabitants. The layers, from bottom to top, are:

- UF 017 (base: 426.70 m): this level seems to be the bottom of the large gully, a compact layer of melted mudbrick, nodules of mudbrick and pebbles. Bones of camel, goat, gazelle and spiny-tailed lizard were found in quantity. It yielded a few sherds, mostly common wares (*buff or red ware with medium to thick grits*,³² *medium red-orange sandy ware* and *pinkish cooking ware with white exploded grits*). This area might have been used as a dump. The excavation of Building 1 (see next Chapter), extended outside the building, to the north-west, and there, a compact layer corresponding to the one unearthed at the bottom of UF 017 was reached (UF 041) (**fig. 106**). It revealed the wide extent of the erosional depression formed to the north of the building.
- It is covered by a thick aeolian sand level (UF 015b). By mistake, no distinction was made during excavation between the northern and southern halves of the central part of Sounding 1. The edges of the basin in this level being almost invisible and having been missed, both layers were registered under the name number (UF 015). In the basin, the sieving of sediments yielded the same kind of bones as UF 017 and a few sherds of *common reddish ware with medium to thick grits* and a sherd of *Layla ware*. The presence of *Layla ware*, which elsewhere is attested only in phase 3 levels and which is therefore presumed to belong to earlier occupation phases (see Chapter 9), illustrates the mixing of sherds from different horizons that occurred within the context of the depression as a result of the gullying process or its use as a dump.

31 For a detailed description of stratigraphic units mentioned in the text, see Appendix 8; for that of the structures, see Appendix 9, for that of the artefacts, see Appendix 10. For the pottery assemblage, see Chapter 9.

32 In italic: pottery types defined in Chapter 9, **tables 5-6**.

- A horizontal, hardened layer of melted mudbrick and hard sand (UF 010) sealed the sand accumulated in UF 015b, and it was most probably a circulation level. The sediments were screened and yielded more than 5 kg of bones: camel, sheep, goat, gazelle and bovid, and 72 sherds—a mix of common wares (*buff or red ware with medium to thick grits* – **fig. 166**: no. 2, *fine reddish buff ware with cream slip* – **figs. 165**: no. 8, **167**: nos. 6–7), *coarse red-orange sandy ware with whitish surface, pinkish cooking ware with white exploded grits*, and once again a blend between categories from earlier phases (*Layla ware*) and coarse siliceous ware, possibly *fritware* (Y.010.12 – **figs. 107b, 172**: no. 2), post-dating the 14th century.
- This surface was covered by the collapse of the mudbrick wall W. 002 (UF 004). This collapse covers a layer of sand and gravel with a lot of faunal remains. Bones and sherds were also thrown onto the collapsed mudbrick: 5 kg of bones were found (mainly camel, sheep and goat, along with smaller numbers of gazelle, bovines and spiny-tailed lizard). Seventy-four sherds were found: *buff or red ware with medium to thick grits* (**figs. 165**: no. 5, **166**: no. 4, **168**: no. 6), *coarse red-orange sandy ware with whitish surface, pinkish cooking ware with white exploded grits* (**fig. 170**: nos. 2, 7), *thick buff ware with medium temper and reddish wash* (**fig. 171**: no. 3), and *well fired reddish to buff orange ware* (**fig. 169**: no. 6). Unsurprisingly, these pottery categories are also the most common in the upper layers of Building 1 (see Chapters 8 and 9). Fragments of glass bangles come from this level (**fig. 108**): dark green with triangular or semi-circular sections, and a deep red with an oval section and yellow inlays (Y.004.3 – **fig. 108b**). Similar red glass bangles were found in Julfār (U.A.E.) (HANSMAN 1985: fig. 19.j, pl. IV.o). They are dated to the 18th century through comparison with similar examples found in the Khuzistan (Iran) (*ibid.*: 81).
- The collapse layer (UF 004) is covered by several aeolian deposits with only a few fragments and nodules of mudbricks separated by compacted sand layers (UF 002 and 005). Only a few sherds were found in these levels, mostly *common buff or red ware with medium to thick grits* and three sherds of *handmade grey gritty ware*. Faunal remains were less numerous in these upper layers (mostly camel, sheep, goat and a few bones of gazelle and spiny-tailed lizard).

Phase 1a is not easy to date, due to the mixing of surface sherds into the hollow depression which went through earlier levels to the north of Building 1. There are, however, a few *terminus post quem* offered by a few sherds and bangles: the coarse siliceous ware, possibly *fritware*, from UF 010, the glass bangles from UF 004, both later than the 14th century, and a fragmentary bowl with a celadon glaze on the outer wall and transparent glaze on the inner wall (Y.001.9 – **fig. 107a**), a production from the province of Jiangxi dated to the late 17th–early 18th centuries (Bing ZHAO, pers. comm.). This bowl was found at the interface between UF 001 and UF 002 and could be indicative of the period when the hollow depression was finally completely filled up.

■ Phase 1b

In the **northern part** of the sounding, a 1-m-wide circulation level (F. 011, alt.: 427.06 m) was visible at the foot of wall W. 001; it was made of compacted sand mixed with melted mudbrick. Faunal remains were found on this surface, implying the area was a waste dump. A deep layer of aeolian sand accumulated against wall W. 001 (UF 003). The surface and the sand accumulation yielded more than 10 kg of faunal remains mainly of camel, sheep and goat. A few bones of donkey, dog and gazelle were also present. Only four sherds were found in this layer: three of *common buff greenish ware with medium to thick grits* and a sherd of post-14th century *fritware* (Y.003.1 – **fig. 107c**).

In the **central part**, the same circulation level, of compact sand mixed with melted mudbrick, was visible south of W. 001 and was also covered with the sand deposit UF 015a.

Almost no material was found there. To the south, this accumulation was incised by the deep depression of phase 1a.

In the **southern part**, this phase corresponds to the upper levels of the north-west corner of the large columned hall of the mosque (Building 1, room R. 013), bordered by two perpendicular walls: wall W. 002, running E–W, and wall W. 006, running N–S. In this area, an abutment (W. 003) appeared against the south face of W. 002, which is aligned with the two columns of triangular mudbricks; these latter were preserved for a height of more than one metre – Co. 004 (diam.: 108 cm; h.: 133 cm) and Co. 005 (diam.: 106 cm; h.: 147 cm).

Under a layer of collapsed mudbrick covered by post-abandonment deposits (upper part of UF 006 and UF 007), there were several layers of compact sand mixed with fragments of mudbrick alternated with layers of melted mudbrick from the collapse of structures and their gradual erosion and leaching along a slope oriented south-east–north-west. Only nine non-characteristic sherds of common wares were found in this level.

These layers cover late occupation and circulation levels within the building (UF 011 = UF 016) characterized by several thin, horizontal layers of sand compacted by standing water preserved in patches. The lowest one showed imprints of a mat made of palm leaves (Floor F. 014 – alt.: 428.52 m) (**figs. 109–110**).

No bones and very few artefacts were found in these layers: a small fragment of steatite vessel polished on both sides, and five sherds including common *buff greenish ware with medium to thick grits*, the base of a bowl in *fine reddish buff ware with cream slip* (Y.011.2 – **fig. 166**: no. 11) and a rim of *pinkish cooking ware with white exploded grits* (Y.016.1 – **fig. 170**: no. 9).

Until we have the results of the radiocarbon analysis, we cannot say whether floor F. 014 and the occupation level above it belong to phase 1b, or if it already marks the transition to phase 2. In the northern part of the sounding, where the phases have been clearly distinguished, the *pinkish cooking ware with white exploded grits* is particularly abundant in the phase 3 levels (72 sherds), still occurs in phase 2 levels (9 levels) but is absent from the levels of phase 1b. The *fine reddish buff ware with cream slip* is also well attested in phases 2 and 3. The presence of a sherd of each of these categories in UF 011 and 016 could indicate that floor F. 014 belongs to phase 2 rather than 1b; it remains to be confirmed by the radiocarbon dates.

Phase 1b yielded less than 20 sherds, only one of which is datable (post-14th century), and only two artefacts: a small fragment of a black glass bangle with a semi-circular section (Y.006.1) and a fragment of steatite vessel (Y.011.1). Phase 1b might be provisionally dated to the post-mediaeval period (15th–16th centuries).

PHASE 2

In the **northern part** of the sounding, phase 2 encompasses the occupation layers below those of phase 1 and below floor F. 011 (**figs. 101–102**). This means the layers predating wall W. 001, which forms the southern edge of the northern part.

At the base is a layer of eroded mudbrick fragments, standing on a thick deposit of aeolian sand. This destruction layer included part of a fallen mudbrick wall, which created a thick deposit sloping from the south-east corner of the sounding towards the north-west (UF 021 = UF 055; elevation 424.56/424.62 m at the base – **fig. 111**); four rows of mudbricks were visible, lying on their sides. Phase 2 is an architectural phase, even though no structural remains were found in the trench. The slope and the density of the destruction layer suggest that a structure had existed a short distance to the south-east. A large hearth was preserved in the lower part of the destruction layer (UF 054), protected by the thick deposit of mudbrick blocks.

In these destruction layers, very little material was found despite the systematic sieving of the sediments. Only 500 g of animal bones were retrieved (mainly camel, sheep, goat and dog) along with a single steatite fragment with a multifaceted outer side (Y.055.1) and sherds belonging to at least 15 vases. Common wares are the most numerous: *buff or reddish ware with medium to thick grits* (figs. 173: no. 6, 174: nos. 3–4), *fine and medium reddish buff ware with cream slip* (figs. 173: nos. 1, 3–4, 174: no. 2); there were also some *medium yellow sandy ware* (fig. 175: nos. 1–3), *pinkish cooking ware with white exploded grits* (fig. 175: no. 5), and more unusual, a flat base of yellow ware with a greenish-brown glaze (fig. 176: no. 5) and a rim of *fine buff ware with cross-hatch paint in red* (fig. 176: no. 3).

Above the destruction layer, sand accumulated progressively to a thickness of 2 m, alternating with at least two thin layers of mud particles mixed with faunal remains (UF 008, 012, 018 = UF 051, 052, 053). This loose sand accumulation contained very few pottery sherds, and these came from the lower part, close to the destruction layer. They are either the *common buff greenish ware with medium to thick grits* (figs. 173: nos. 2, 5, 7, 174: no. 1) or *slow wheel-turned reddish cooking ware* (fig. 175: nos. 6–7). On the other hand, more than 15 kg of faunal remains were found in this layer, mostly domesticated species (camel, sheep, goat and bovid) together with a few hunted species (oryx, gazelle, birds and spiny-tailed lizard), and also fox, ratel (or honey badger), cat and hedgehog. This huge quantity of faunal remains, mainly from edible species, suggests that the area became a waste dump once the collapsed structures began to be covered with sand.

In the **central part** of the sounding, a layer at the foot of wall W. 002 (UF 020) could be part of the phase 2. The small extent of this layer, makes it unclear whether it belongs to phase 2 or whether it is still part of the deep depression above it. It included *common buff greenish ware with medium to thick grits* (fig. 173: no. 5), *medium fine buff ware with white and red matt slip* (fig. 176: no. 1), *yellow sandy ware* (fig. 175: no. 2), yellow ware with green glaze and a fragment of an open *bowl with an opaque white glaze* (sherd Y.020.3) similar to Abbasid fine cream Samarra ware, attested elsewhere in 10th-century contexts (see Chapter 9 and figs. 107d, 176: no. 4).

The relationship between this layer and wall W. 002 has not been established so far.

In the **southern part** of the sounding, a former occupation level was found under floor F. 014, by removing 15 cm of densely packed sand alternating with layers of soft sand (UF 013 and 019). It was characterized by a hard plastered floor, F. 015 (alt.: 428.35 m) abutting walls W. 002 and W. 006, but running under the bases of both columns, Co. 004 and Co. 005 (fig. 112). The plaster floor is not preserved in the whole of room R. 013.

In spite of sieving the sediments, only one fragment of a slightly curved, finely shaped steatite vessel was found, together with only five sherds of pottery. Among these: a flat base in *yellow sandy ware*, well attested in phases 2 and 3; a rim of *pinkish cooking ware with white exploded grits* (fig. 170: no. 8), a type well attested in phase 3 levels and to a lesser extent in phase 2 levels of the northern part of the sounding; and the rim of a bowl in *fine grey ware with grey burnished slip* (fig. 176: no. 2), a rare type present in layers from phases 2 and 3.

Finally, a fragment of carbonized stem of palm tree (*Phoenix dactylifera*) was sampled within floor F. 015 and dated by AMS to the 8th–9th centuries.³³ If sand layers and thin floors above it might be dated to the post-mediaeval period, this shows that the first occupation levels of the mosque are much more ancient.

The pottery assemblage (see Chapter 9) together with this first radiocarbon date gives a large time span for phase 2, from the 8th–9th to the 12th–13th centuries.

33 Lyon-9732: Age 14C BP 1245 ± 30; 682–870 cal-AD (95.4% probability).

PHASE 3

This phase has only been recognized in the **northern part** of the sounding (figs. 102, 113).

A sand deposit 20 to 40 cm thick, with a few mudbrick nodules, separates the layers of phase 2 from the occupation layers of phase 3 (UF 056). These occupation layers are also an accumulation of sand deposits, 50 to 80 cm thick, including thin layers of ash, mud particles, small stones etc. In terms of archaeological material, it was the richest deposit explored in Sounding 1. It contained 4.7 kg of faunal remains (mostly camel, sheep and goat, but also remains of gazelle, small birds, ostrich, spiny-tailed lizard and cat), many fragments of plaster coating, 724 pottery sherds (see Chapter 9) together with a few fragments from five steatite vessels (fig. 114), a flint microlith (fig. 115a) a fragment of calcite container, a bronze ring (fig. 115b), two pieces of iron, possibly a blade and an arrowhead – fig. 115c–d), a fragment of a deep blue glass bangle (fig. 115e), a pestle (fig. 115g) and fragments of glass vessels.

At the base of the phase 3 deposits there was a layer of denser sediment, sloping towards the north-west, containing some remains of mudbricks and a few slabs, an abundance of very small chalk nodules and a fragment of plaster decoration (figs. 114, 115f), attesting to a building of some quality nearby.

These archaeological deposits indicate a permanent occupation related to some buildings lying to the southern part of the trench, in the higher part of the archaeological mound. Unfortunately, no diagnostic material was found that clearly indicates the period of occupation. The glass fragment (Y.057.2 – fig. 115e), triangular in section and shaped like a vertical handle, could be interpreted as a fragment of bangle dating to the late mediaeval period. We have to wait for the results of 14C analysis for a more accurate dating.

PHASE 4

This phase has only been recognized in the **northern part** of the sounding (figs. 102, 116).

From the top down, a 70-cm-thick accumulation of aeolian sand (UF 058) covers an upper occupation layer (UF 059; elevation 422.85/422.40 m). A line of thin lime particles was visible at the base of this occupation layer, together with patches of mixed ash (fig. 116). In the 40 cm of deposit forming UF 059, two hearths were found, marked by a concentration of ash and charcoal. Carbonized date stones were collected. Nodules of clay, fragments of plaster and a few fragments of mudbricks attest to the presence of some dwellings nearby. Pottery sherds were collected (see Chapter 9) as well as faunal remains (680 g of bones of camel gazelle, small birds and cat) and two tokens made of sherds with rounded edges. This is one of the earliest occupation deposits in the stratigraphy of the mound: its top slopes gently and its base is almost horizontal.

However, an earlier occupation layer (UF 061, elevation 421.70 m) was reached in a small sounding of 1 m² at the bottom of Sounding 1, under a deposit of aeolian sand almost 80 cm thick (UF 060). UF 060 contained sherds, bones (sheep and goat, gazelle and small birds), charcoal, carbonized date stones, fragments of ostrich eggshell and mother of pearl. A sample of carbonized *Chenopodiaceae* from a hearth has been dated to the 4th–2nd centuries BC (Sample Lyon-16206, 14C BP 2165 ± 30; cal-BC 360–116, 95.4% probability).

Occupation layer UF 061 is characterized by a thin level of ash and earth in loose sand, but without any indication of a construction nearby. Four sherds were collected, together with a few bones of camel, sheep and goat (356 g), and two stone tools (fig. 117).

This horizontal layer lies on an accumulation of aeolian sand without any archaeological material, which was excavated for a depth of only 30 cm. The excavation had to be stopped thereafter to prevent the collapse of the stepped baulks.

The material collected in the phase 4 deposits does not include any diagnostic artefacts of chronological value, but some significant pottery sherds do point to a pre-Islamic date, probably in the last centuries BC (see Chapter 9), which seems to be confirmed by the radiocarbon dating obtained in UF 060.

Earlier occupation deposits cannot be discarded, but the horizontality of the lowest layers suggests that there was no significant deeper human habitation. Virgin soil, probably a fluvial Holocene terrace of the wādī flowing to the south of the archaeological area, was not found. The base of the sounding is at 421.30 m a.s.l., approximately at the same level as the archaeological deposits unearthed in a trench opened in 2012 on the south-western fringes of the archaeological area (Sounding 3, area G17-H17 – **fig. 87**).

Conclusion

Despite the rarity of built structures in the area of Sounding 1, four phases have been clearly distinguished thanks to stratigraphic data and the material found. Whilst awaiting the results of complementary studies, the phases can be placed only within a broad time span. This chronology remains provisional and will be refined with the help of radiocarbon dates from samples in the process of being analysed.

The most ancient occupation of the site identified so far, phase 4, can be attributed to the last centuries BC, according to pottery material and a single radiocarbon date. A thick aeolian sand accumulation between phases 4 and 3 might correspond to a shift of occupation to another area of the site, or to its temporary abandonment.

Phase 3 has been ascribed to the last centuries of Abbasid period or possibly later considering the presence of the glass bangle fragment.

Phase 2 is characterized by building activity in area N6: a collapsed wall in the northern part of the sounding is indicative of the presence of a building nearby. According to a radiocarbon date from floor F. 015 in the mosque, this phase can be temporarily dated to after the Abbasid period (8th–12th centuries). The layers of this phase are covered with a thick aeolian sand accumulation which could indicate, once again, a temporary abandonment of the site, or at least of its northern part.

Finally, phase 1 is characterized by the building of a long wall (W. 001) and a succession of reoccupations within Building 1. Based on the *fritware* and *celadon* sherds and glass bangles, this phase is dated to the 15th–18th centuries.



Figure 99 Detailed map of areas N6, O6, N7 and O7 – Location of Soundings 1 & 2 and Buildings 1 & 2 (M. Niveleau, J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

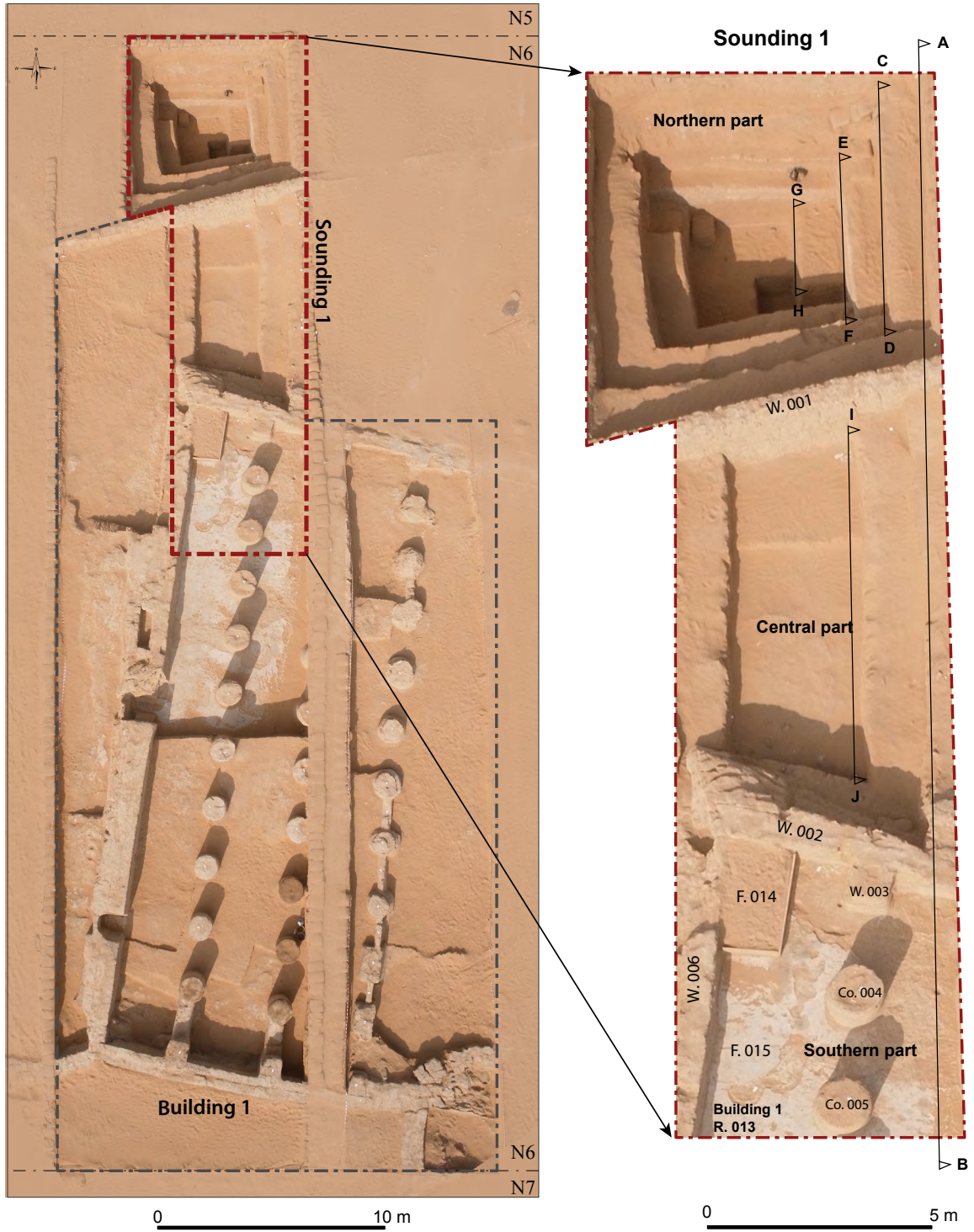
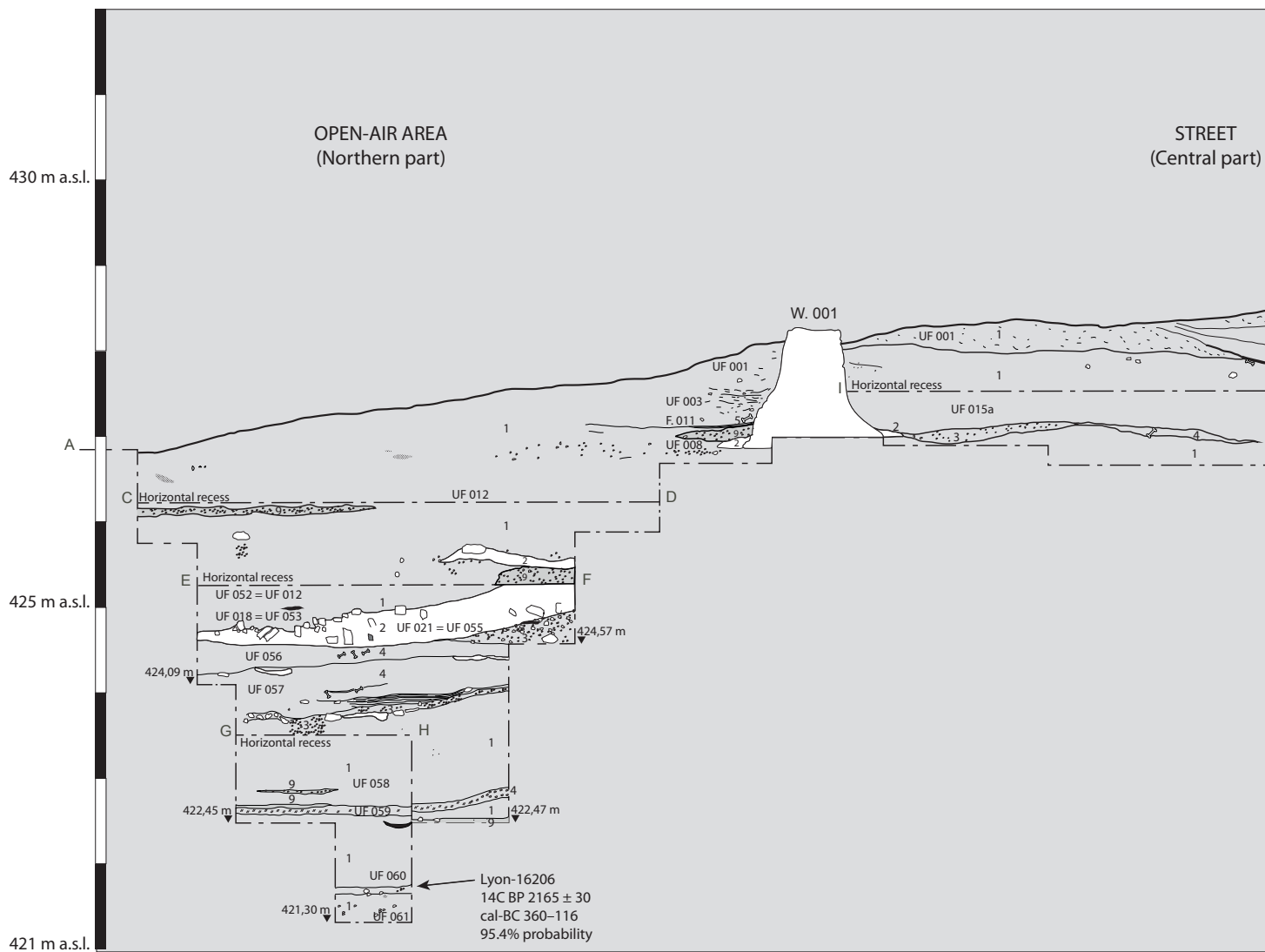


Figure 100 Aerial view of Building 1 and Sounding 1 (Th. Sagory – French-Saudi Archaeological Mission in al-Kharj)



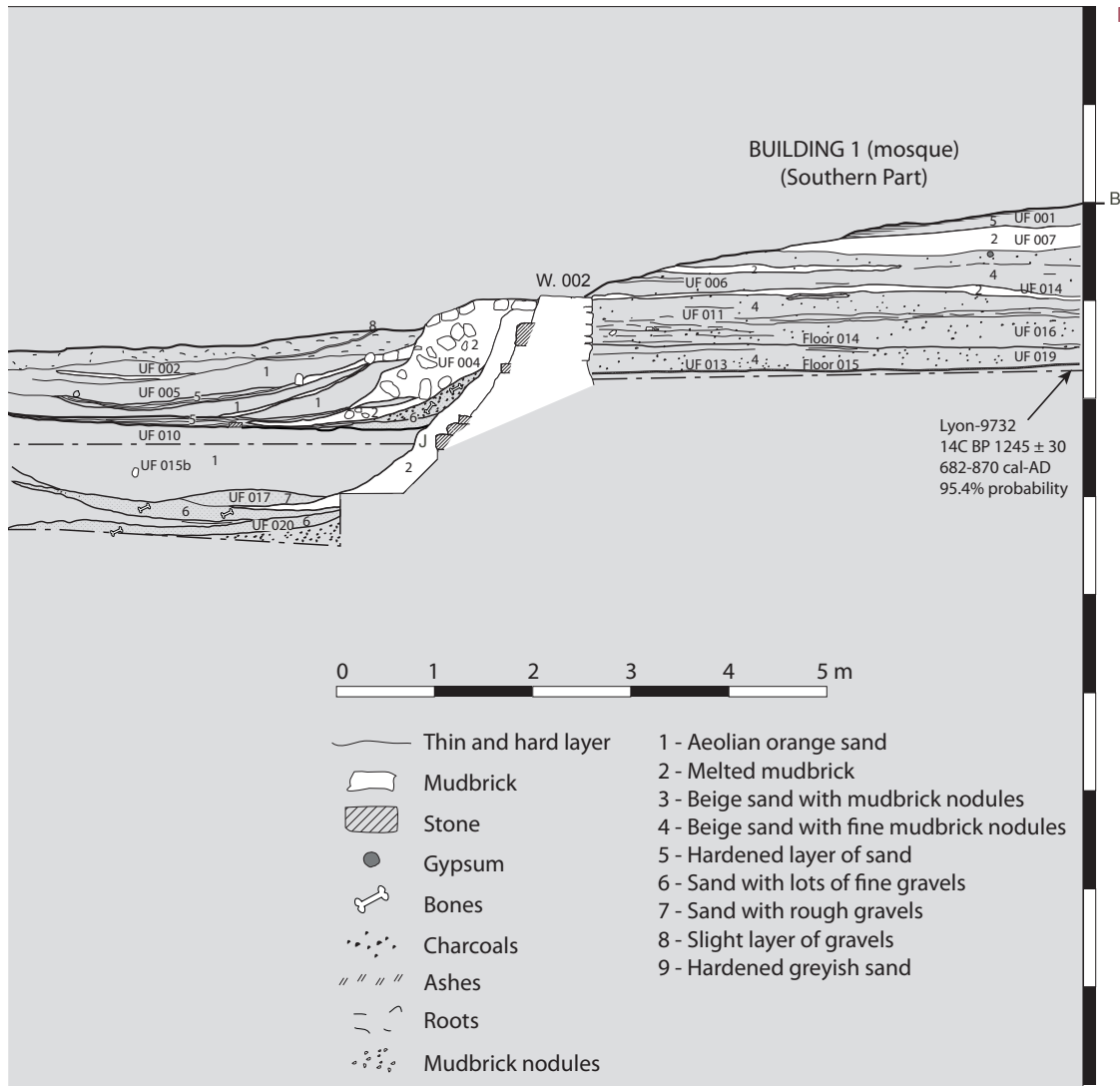
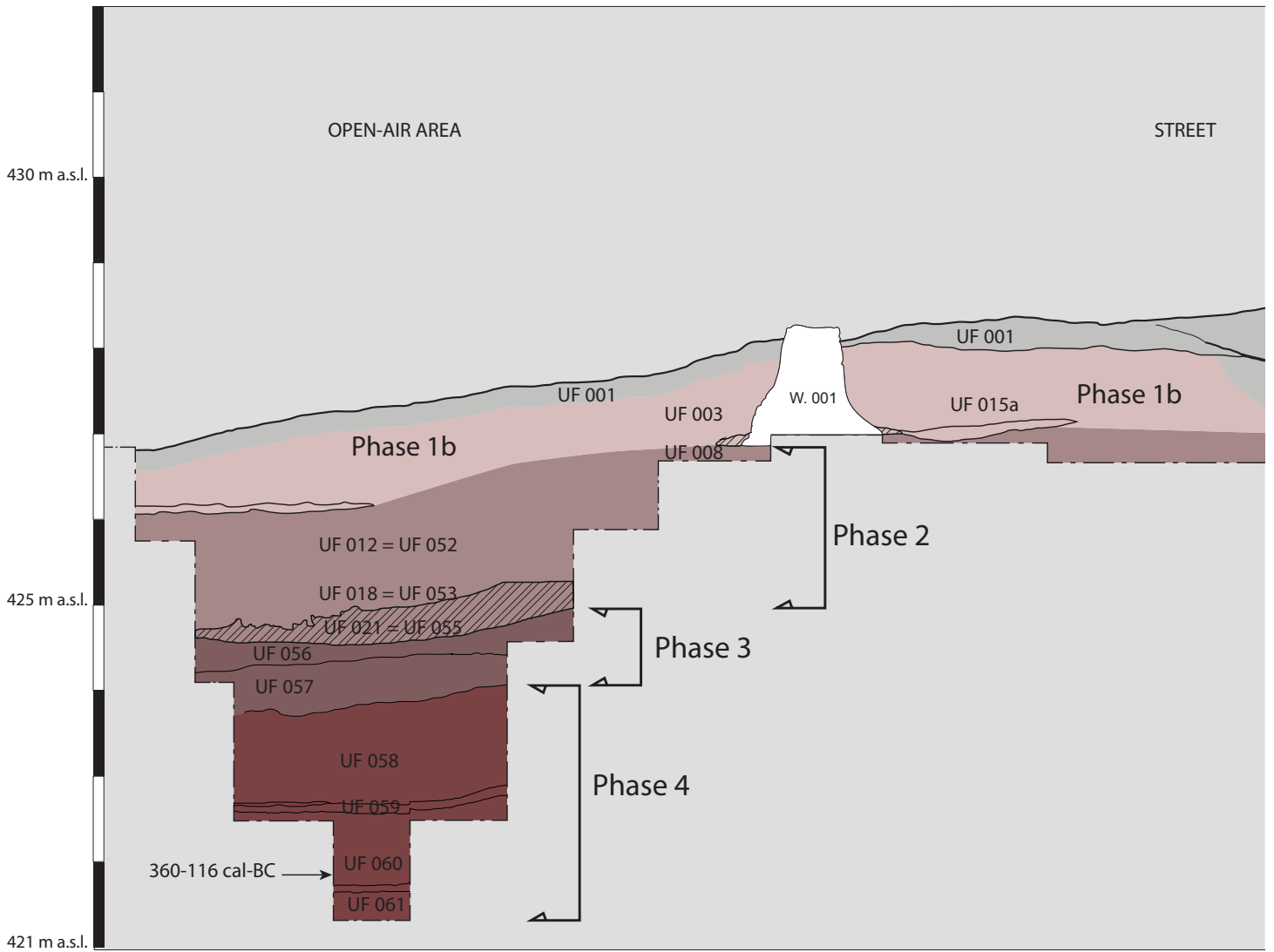


Figure 101 Al-Yamāma: Sounding 1, eastern stratigraphic section (J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)



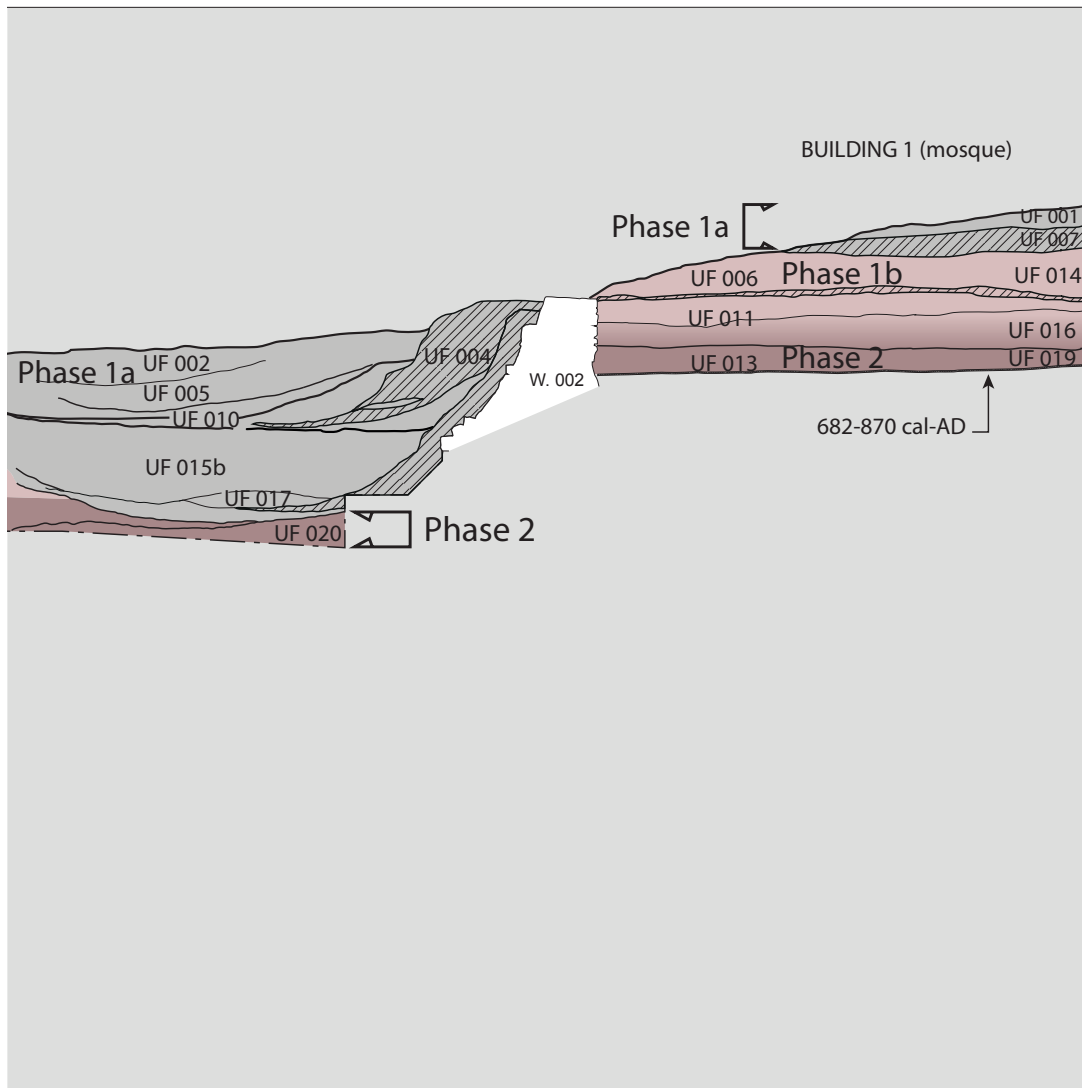


Figure 102 Al-Yamāma: Sounding 1, simplified eastern stratigraphic section showing phases 1–4 (J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

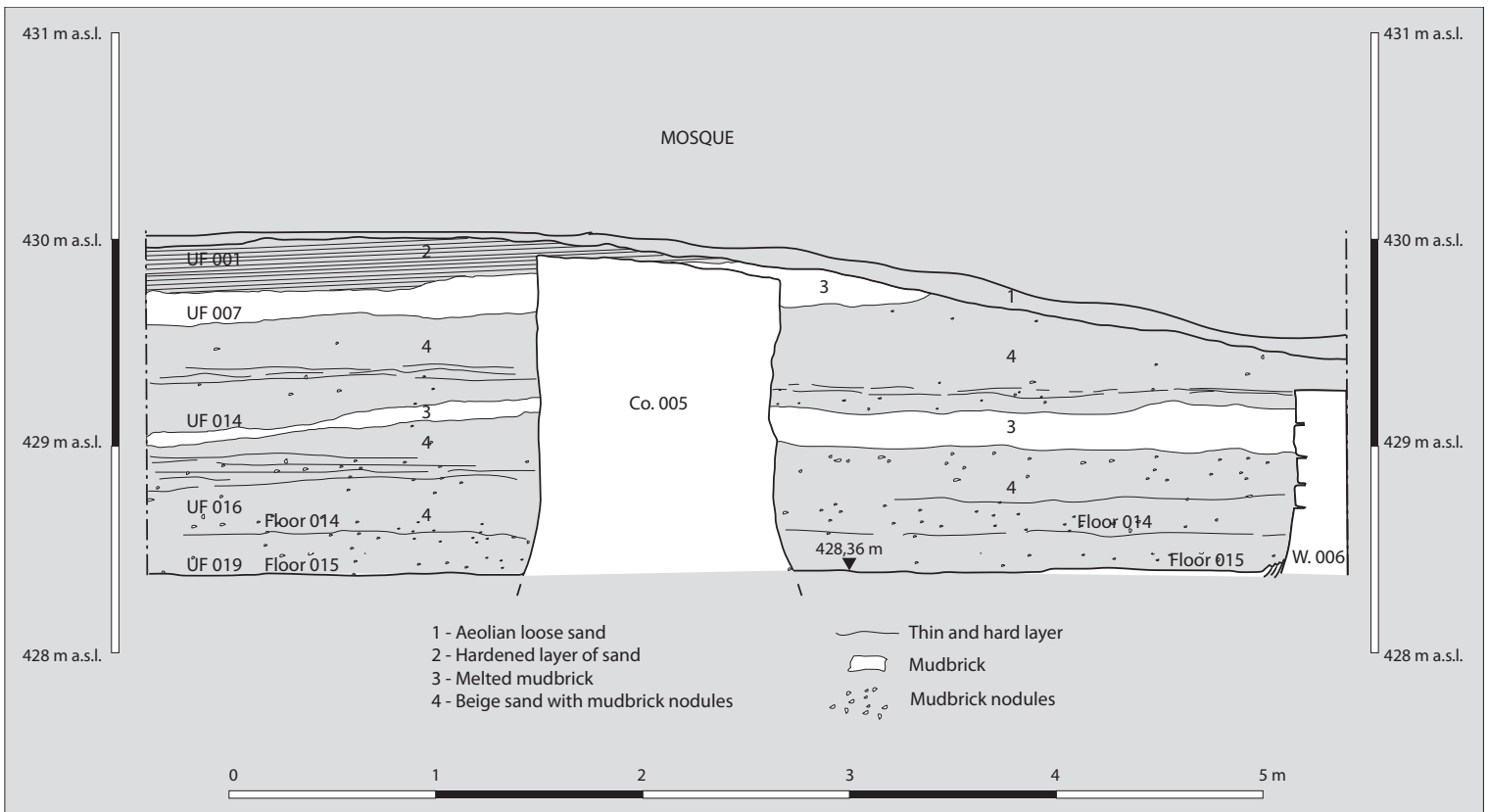


Figure 103 Al-Yamāma: Sounding 1, southern stratigraphic section
(J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

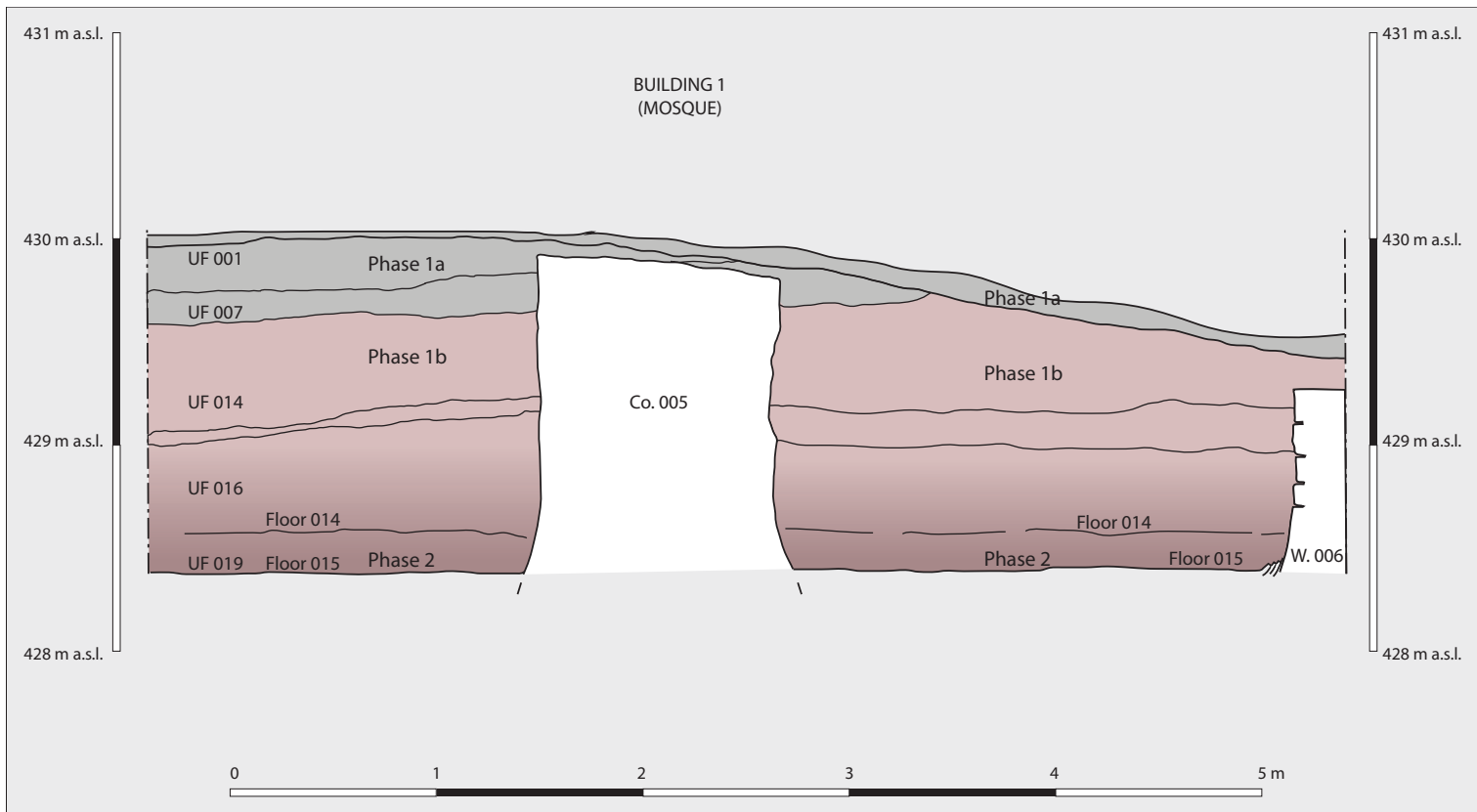


Figure 104 Al-Yamāma: Sounding 1, simplified southern stratigraphic section showing phases 1–2 (J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

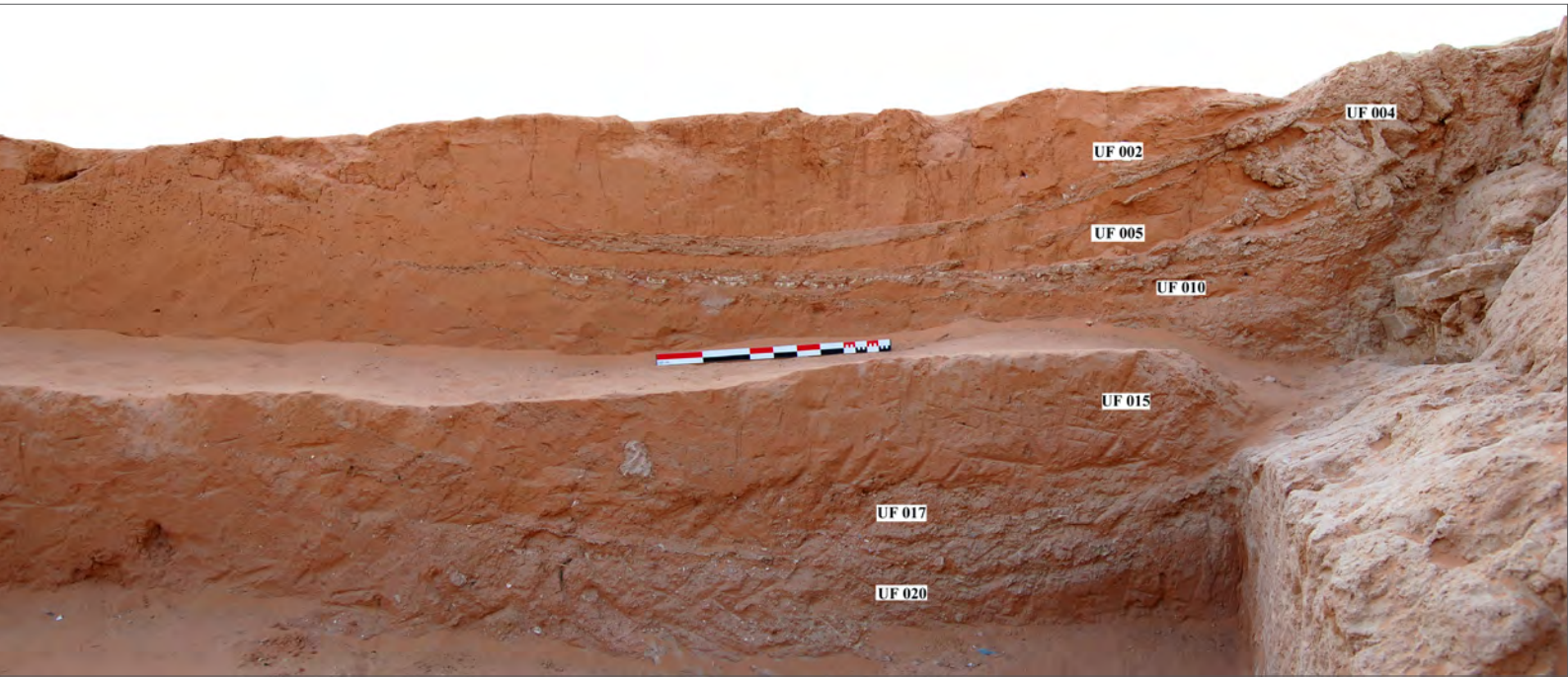


Figure 105 Sounding 1 (central part) – phase 1a: eastern section of the deep depression north of Building 1 (J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

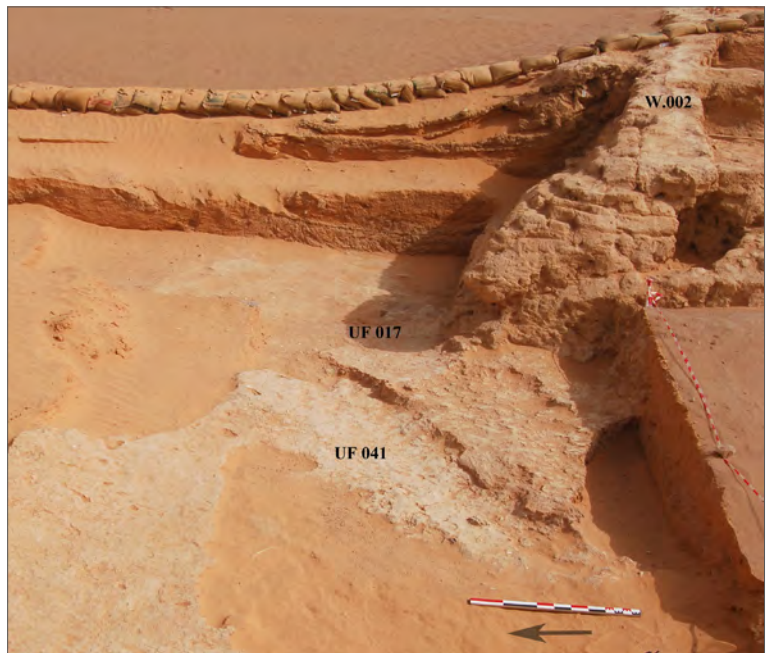


Figure 106 Sounding 1 (central part) – phase 1a: the bottom of the deep depression north of Building 1, looking east (J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

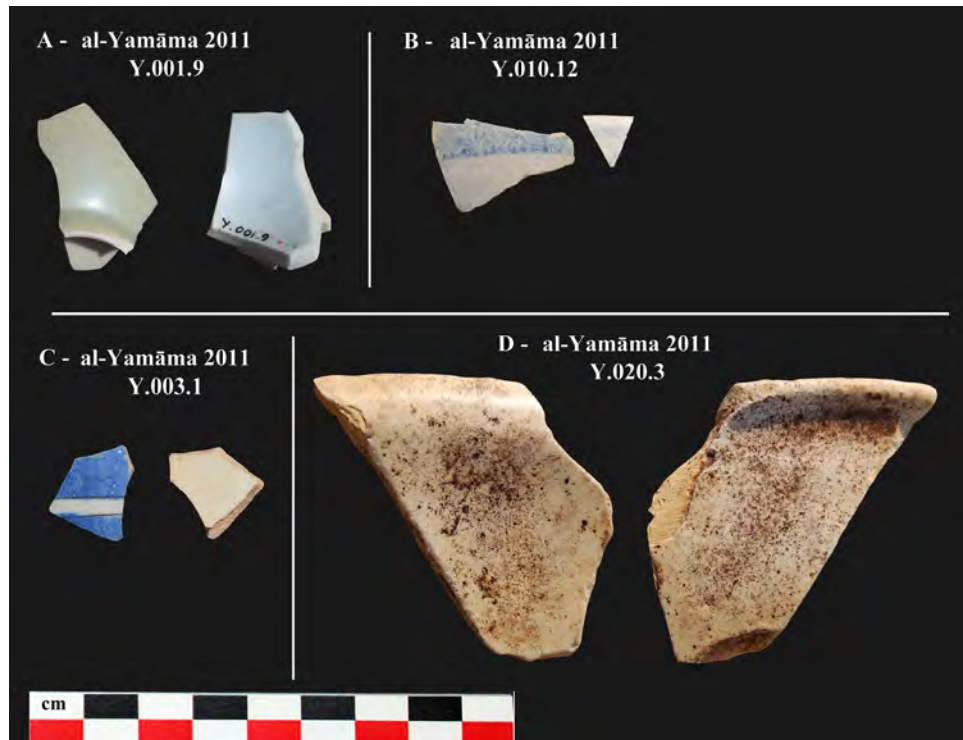


Figure 107 Sounding 1 – phases 1 and 2: pottery sherds acting as fossil markers: A) Y.001.9: bowl with a celadon glaze on the outer wall and transparent glaze on the inner wall; B) Y.010.12: coarse siliceous ware, possibly fritware; C) Y.003.1: fritware; D) Y.020.3: open bowl with an opaque white glaze (J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

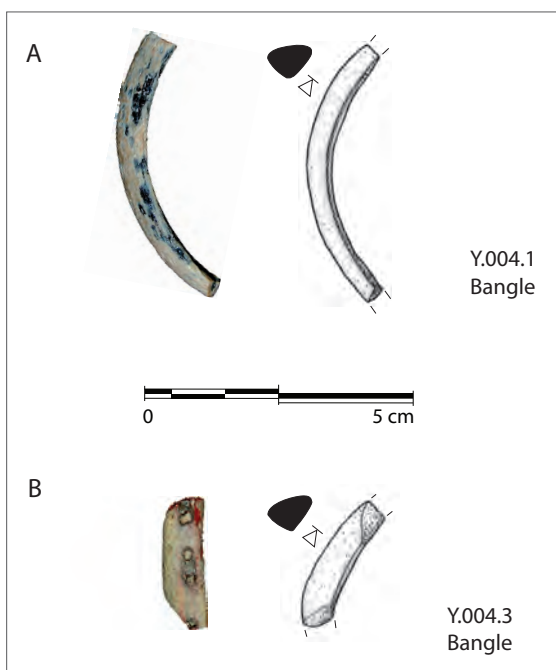


Figure 108 Sounding 1 – phase 1a: A) Y.004.1: black glass bangle; B) Y.004.3: red glass bangle with yellow and green paste inclusions (L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)

Figure 109 Sounding 1 (southern part) – Phase 1b/2: floor F. 014 made of compacted sand, in the north-west corner of Building 1 (J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

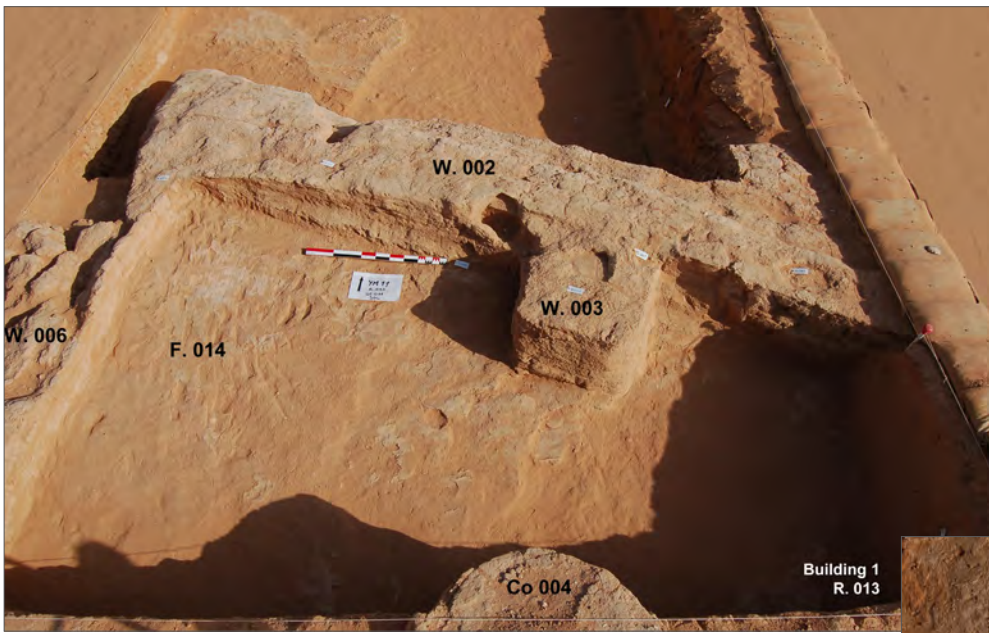


Figure 110 Sounding 1 (southern part) – Phase 1b/2: floor F. 014 – detail of imprints of a palm-leaf mat on the ground, north-west corner of Building 1 (J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)



Figure 111 Sounding 1 (northern part) – Phase 2: destruction layer made of collapsed mudbricks (J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)



Figure 112 Sounding 1 (southern part) – phase 2: floor F. 015 made of plaster, in the north-west corner of Building 1 (J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)



Figure 113 Sounding 1 (northern part) – eastern benches showing layers from phases 2, 3 and 4 (Th. Sagory – French-Saudi Archaeological Mission in al-Kharj)

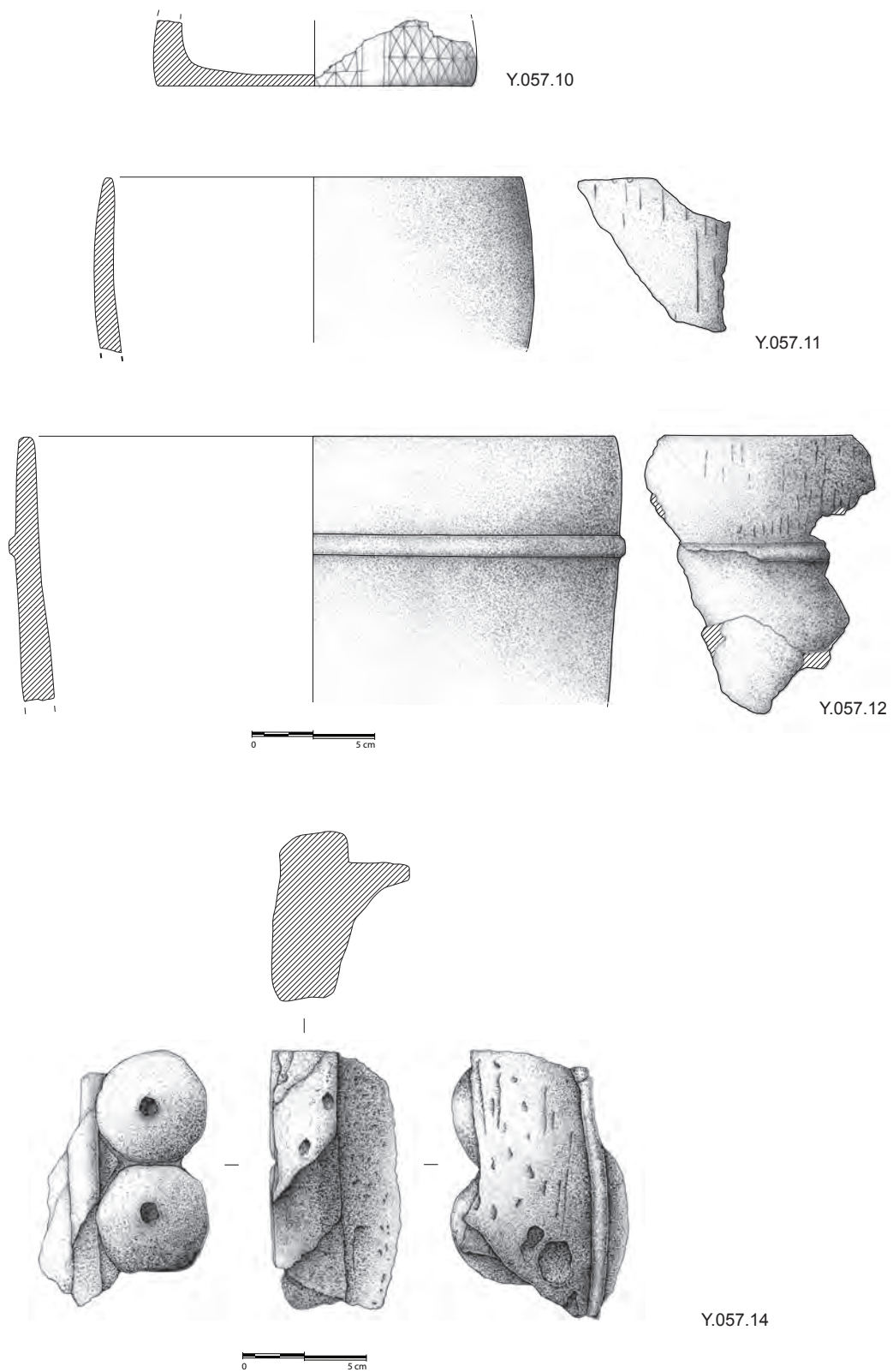


Figure 114 Sounding 1 (northern part) – Phase 3: steatite vessels (Y.057.10, 11, 12) and fragment of plaster decoration (Y.057.14) (L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)

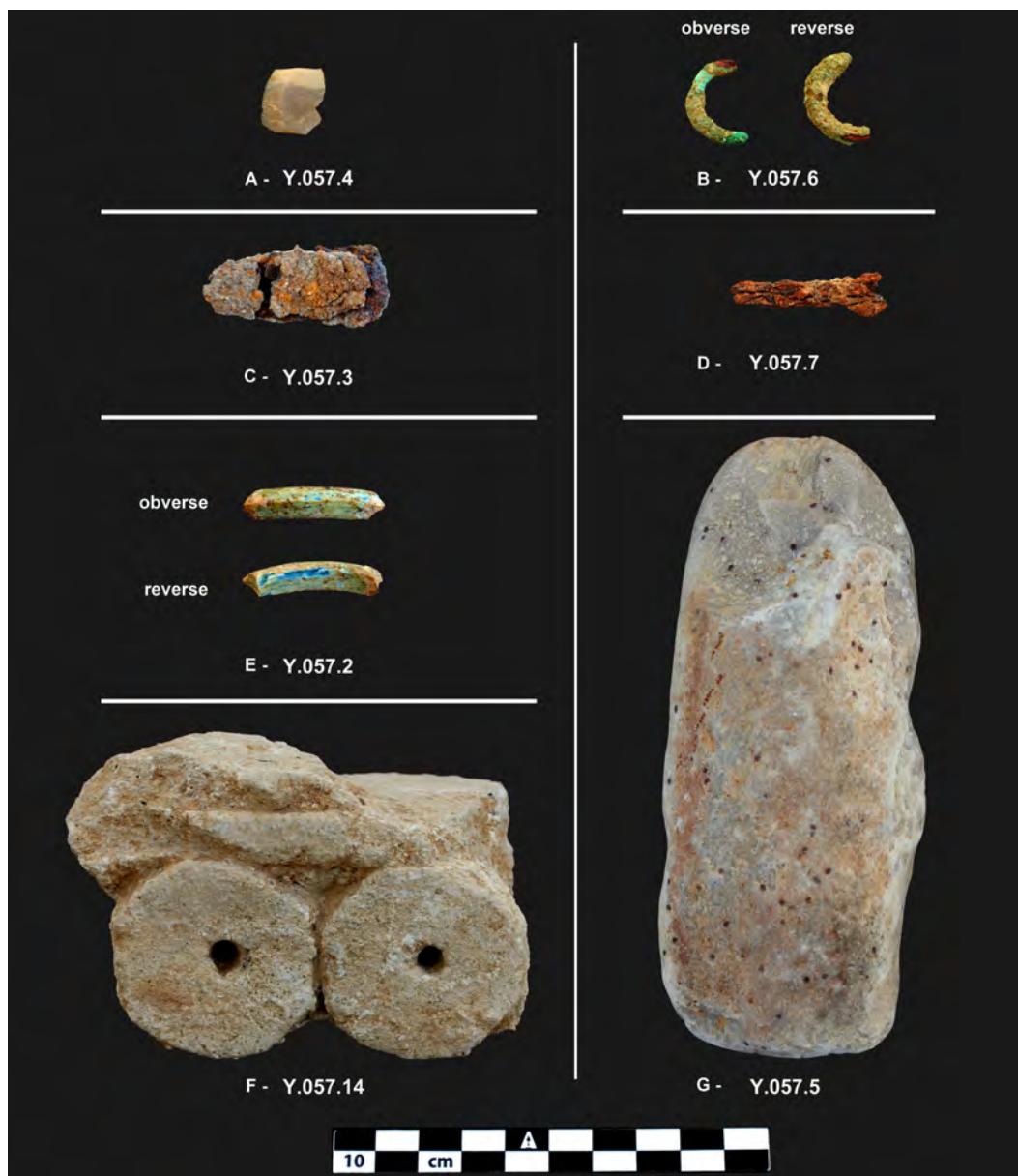


Figure 115 Sounding 1 (northern part) – Phase 3: artefacts found in the destruction level:

- A) microlith in flint (Y.057.4);
- B) fragment of bronze ring (Y.057.6);
- C) iron blade (?) (Y.057.3);
- D) iron arrowhead (?) (Y.057.7);
- E) fragment of glass bangle (Y.057.2);
- F) fragment of plaster decoration (Y.057.14);
- G) limestone pestle (Y.057.4)

(photographs: L. Munduteguy; graphics: J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

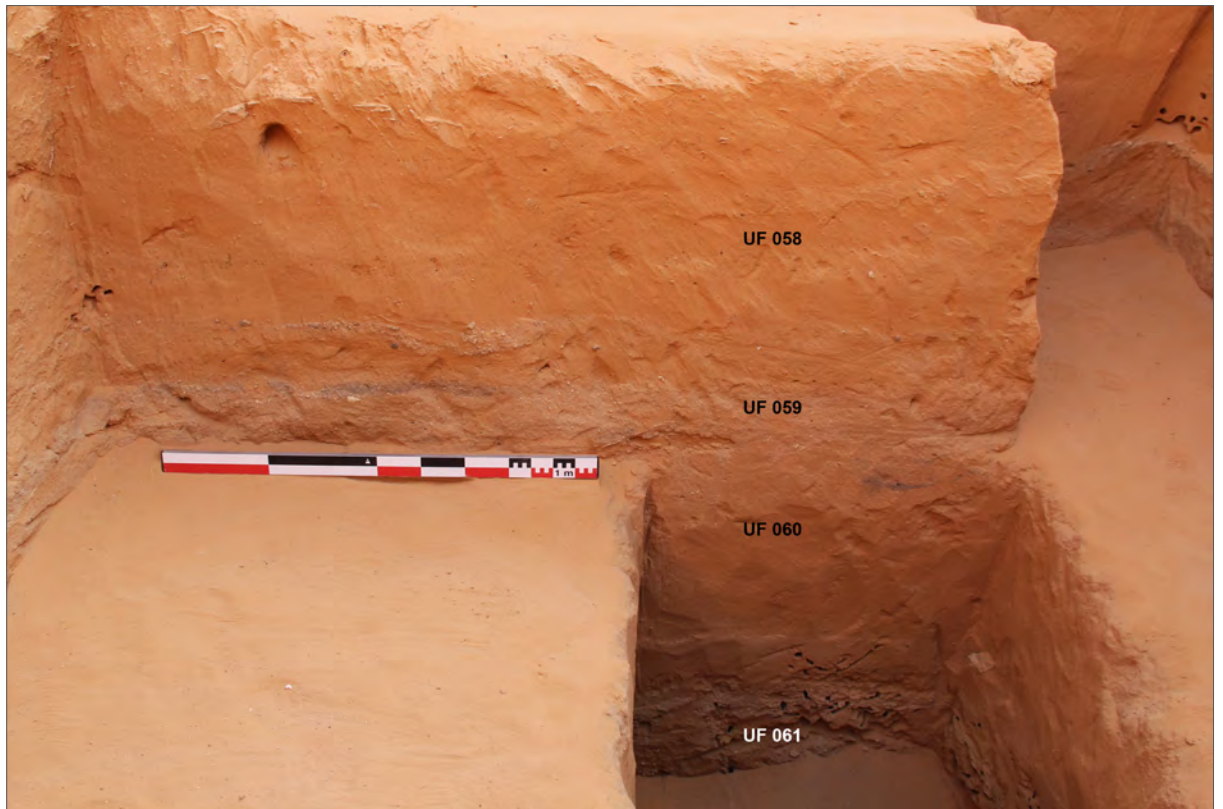


Figure 116 Sounding 1 (northern part) – Phase 4: eastern stepped baulks showing layers from this phase (Th. Sagory – French-Saudi Archaeological Mission in al-Kharj)



Figure 117 Sounding 1 (northern part) – Phase 4: stone tools found in the lower occupation level:
 A) millstone (Y.061.2);
 B) grinding stone/crusher (Y.061.1)
 (photographs: L. Munduteguy;
 graphics: J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

CHAPTER 8

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

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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. As described in the previous chapter, 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 were brought to light (Co. 004–005) (**fig. 112**). This construction was named Building 1.

During the second season (2012), we concentrated our efforts on the excavation of this large building. Several things proved it to be the Great Mosque of the site (**figs. 118–119**): the presence of a large columned hall with three rows of ten columns preceded by a large courtyard to the east; a square recess (*miḥrāb*) built in the middle of the western wall (*qibla* wall); and the fact that very few artefacts were found, despite sieving the fill and rubble, also supports this interpretation.

The construction straddles areas N6 and O6, in the northern part of the site. In order to excavate it, the southern limit of Sounding 1 was extended 25 metres further south, to align with the southern edge of area N6. Thus, an area of 30 × 18 m was delineated (**fig. 99**). A baulk, oriented north–south, was left through the building, so as to keep a stratigraphic record of the fill. Beyond the excavated area many structures were partly visible on the surface and it was crucial to determine how Building 1 related to these surrounding buildings. Therefore, in areas N6, N7, O6 and O7, the tops of more than 50 walls were cleaned so as to plan the immediate vicinity of the mosque (see **fig. 99**, Appendix 9).

Even though the excavation is not yet complete, some preliminary ideas on the architecture and chronology can already be expressed.

Description of the architecture

PLAN OF BUILDING 1

Building 1 is a monumental mudbrick mosque (**figs. 118–119**). It comprises a large columned prayer hall (R. 013),³⁴ 28 m long (N–S) and 12 m wide (W–E) (**fig. 120**). It is preceded by a large courtyard, 27 × 25.5 m. The courtyard is bordered by several structures to the south (including Building 2 [see Chapter 10]), by the prayer room to the west and most probably by a portico to the north. At the very end of the 2012 season, a small column (Co. 082) was partially

34 For a detailed description of the different structures: see Appendix 9.

excavated, protruding from the eastern baulk of the excavated area. It makes the presence of a 2.1 m-wide portico probable, parallel to the northern wall of the building (W. 002) (**fig. 118**).

The main columned hall (R. 013) is bordered by three mudbrick walls (W. 006 to the west, W. 002 to the north, and W. 043 to the south). Several architectural phases can be distinguished in their thickness and build, as well as in the stratigraphy and floor F. 015 (see below).

THE QIBLA WALL (W. 006)

This is a 29.3 m-long mudbrick wall. It has been damaged by the digging of pits (P. 038 to the north, P. 040 in the middle). Two large niches considered as *mihrāb* (pl. *maḥārīb*) are set in this wall: Ni. 160 in its centre; Ni. 049 to the south. There was a doorway through the southern end of this wall, which was bricked up in a later phase by wall W. 051.

The main rectangular niche (Ni. 160) is in the central part of the wall, facing west (**fig. 121**). This is the main *mihrāb* of the mosque. This niche was partly disturbed by a deep pit (P. 040) which cut through the whole stratigraphic sequence of the fill in the area and through floor F. 015 at the base of the niche. Numerous imprints of a large tool (spade) on the northern side and at the bottom of the pit are visible and attest the recycling of mudbrick in modern times. Excavation inside and outside the niche revealed several phases (**figs. 121–122**): an earlier floor, under F. 015, was found abutting a mudbrick wall closing Ni. 160 to the west. In a second stage, it was covered by the thick plaster floor F. 015. In a third stage, Ni. 160 was opened onto the outside by levelling the mudbrick wall that had closed the niche and covering it with sand. In this sand accumulation, there was a circulation level (floor F. 065) made of compacted sand (**fig. 123**). Given its altitude, it might have been equivalent to floor F. 014 inside the mosque. At a later stage, Ni. 160 was closed again to the west by a thin mudbrick wall (W. 044) built on the sand accumulation (**figs. 121–123**). A thin floor made of compacted sand (F. 046) abuts the lower part of this wall in niche Ni. 160. In a final stage, wall W. 044 was rebuilt (**figs. 122–123**) and wall W. 006 was plastered inside the building (**fig. 121**). A new circulation level (F. 039), characterized by a thin compacted layer of sand, abuts W. 044 at mid-height.

In the southern half of W. 006, a second niche (Ni. 049) is set in the wall, possibly a second *mihrāb* (**fig. 124**). It is narrower than the central one (Ni. 160). A thin mudbrick wall (W. 050) closes it to the west. This wall is not bonded with W. 006 but simply abutted against it. It appears to have been intended to close a doorway and transform it into a niche in a later phase of occupation of the building.

Within prayer hall R. 013, the *qibla* wall (W. 006) is adorned by three triangular niches with rounded angles (Ni. 047, 048 and 064), all the same size and set at regular intervals and at the same height (ca. 429.45 m a.s.l.). Two are set south of the central *mihrāb*: Ni. 048 and Ni. 064 (**fig. 121**). North of it, only one is partly preserved: Ni. 047; a second one, not preserved, can be reconstituted further north by symmetry with Ni. 064. Such niches are traditionally storage places for copies of the Qur'ān.

Qibla wall W. 006 is also characterized by several phases of construction. Its eastern part is the most ancient. It was built prior to the earliest occupation excavated so far (floor F. 015 abuts this wall). Later additions are visible in its northern part. The western side of the structure shows two or three successive mudbrick walls built one against the other from the outside, sometimes with empty spaces between them filled up with sand and ashes (**fig. 118**; P. 041).

In the collapse layer of W. 006 (UF. 031),³⁵ complete plano-convex mudbricks were found, measuring 35–40 × 20–25 × 9–10 cm.

35 For a detailed description of the different stratigraphic layers (UF): see Appendix 8.

The south-western corner of the building is still unclear. In its upper part, the *qibla* wall (W. 006) is not bonded with the southern wall (W. 043). Their thickness and the size of their bricks are different. They are probably not contemporary. There is a narrow door between them. This doorway was filled with sand, and at a later stage of occupation, a small wall (W. 051) was built over this aeolian accumulation so as to close the passageway. This wall is only preserved for a single course of mudbrick.

West of wall W. 006, perpendicular walls W. 063, W. 084 might correspond to structures placed alongside the mosque. This will be confirmed or otherwise by further excavation.

THE NORTHERN WALL (W. 002)

This mudbrick wall forms a glacis along the northern side of Building 1; a few stones were laid between the mudbrick courses to strengthen and stabilize the construction (**fig. 129**).

In an early stage, a mudbrick buttress abutted the wall (**figs. 125, 130** [in red]). Later on, it was levelled, and new buttresses (W. 003, W. 078 and W. 079) were built against the wall. These new buttresses are aligned with the three rows of columns and are contemporary with their construction. At a later stage, an opening in the wall (or a collapse?) was roughly filled up with fragments of mudbrick (**fig. 125**). On its outer face, W. 002 suffered from erosion and weathering. The wall is cut and gullied. Its collapse constitutes UF 004 (**fig. 129**).

To the east, W. 002 continues along the northern part of the courtyard. Its top has been cleaned for mapping purposes. In the middle of the wall, against its southern side, there is a large mudbrick buttress; from this buttress onwards, wall W. 002 narrows to the east.

THE SOUTHERN WALL (W. 043)

The southern wall is made of two parallel and regular mudbrick walls built side by side. A small mudbrick structure was built against the south-eastern portion of this wall; it is similar to Building 2 (see Chapter 10), possibly a dwelling from the 17th–18th centuries. This late structure was built with plano-convex mudbricks (25 × 15 × 12 cm).

THE PRAYER HALL (R. 013)

The prayer hall (R. 013) is divided into three naves, oriented north–south, each being bordered by a row of ten columns (eight columns and two pillars for the eastern row). Three buttresses are aligned with these rows of columns on both wall W. 002 to the north and W. 043 to the south.

The 28 circular columns are 95–108 cm in diameter. They are built of regular courses of 12 triangular/trapezoidal mudbricks bonded with a mud mortar (**fig. 126**). A mud coating was applied over the face. Two sizes of mudbrick have been recorded: the more common is 32 cm (two long inner sides) by 20 cm (outer side) and 7 cm thick (Co. 004–005, Co. 019–022); another is 40 × 26 cm (Co. 023 and 026). The latter is observed in the upper part of the higher columns and can be related to the late stage of occupation of the mosque (**fig. 126**).

Columns Co. 024–025 are off-centre in relation to the axis of the central row of columns. Above 429.60 to 429.70 m a.s.l., several columns of the central row (Co. 024–029) show traces of repairs characterized by eroded gaps filled with mud, stone fragments and pieces of fired bricks (**figs. 127, 129**).

The columns of the eastern row are poorly preserved because of weathering due to their exposure to the elements. To the south, there are two rectangular pillars instead of columns (**fig. 128**).

In the southern half of the prayer hall, the empty space between columns, pillars and buttresses was blocked by thin mudbrick walls at a later stage of occupation (W. 056 to 059, W. 080 and 081). These small walls abut the columns, pillars and buttresses. Their foundations are at a higher elevation, between 429.27 and 429.55 m a.s.l., directly on a layer of aeolian sand (fig. 128). This elevation corresponds to that of the higher floor F. 039 observed in the *mihrāb* and in the western nave (figs. 121–122). Blocking walls stand on a sand layer. These additions correspond to a later reoccupation of the building.

Six stages of occupation in the mosque

So far, the six latest stages of occupation have been identified in Building 1 through observation of the stratigraphy (fig. 129) and of details of floor F. 015 (figs. 130–132). Earlier occupations are expected below and are to be explored during the next field seasons.

THE FIRST, SECOND AND THIRD STAGES OF OCCUPATION VISIBLE ON FLOOR F. 015

In the chapter devoted to Sounding 1, the presence of a hard plastered floor (F. 015) has been mentioned at the bottom of the southern part of the sounding in R. 013. During the excavation of Building 1, this floor was uncovered in the whole north-western quarter of room R. 013 (figs. 119–120). A careful study of F. 015 yielded evidence of at least three stages of occupation (figs. 130–132):

1) Several superimposed layers of plaster coating anterior to the construction of F. 015 are visible against wall W. 006 (figs. 130 [in red], 133) and in Ni. 160 (*mihrāb*). F. 015 abuts them (fig. 103). The excavation is still in progress and earlier occupation levels are to be expected beneath the layers investigated so far.

2) Several columns, abutted by rectangular pillars, were built in mudbrick and coated with plaster. These were subsequently levelled and only their imprint is visible on the ground (figs. 125, 130 [in red], 134). Floor F. 015 does not cover these levelled structures but abuts them. The floor was built either at the same time as these pillars or at a time when they were still standing. In the *mihrāb*, although it has been largely destroyed by the digging of pit P. 040, the floor abuts a mudbrick wall to the west (fig. 122). The *mihrāb* was still closed to the west at that time.

Under the finishing plaster layer of F. 015, a rough plaster preparation was laid (fig. 135). Charcoal has been sampled in this layer. AMS 14C analysis on a sample of carbonized stem of palm tree has dated the floor preparation to the 8th–9th centuries AD.³⁶ The plaster finishing was laid in rectangles and the joints can be seen on the ground (fig. 130: in grey-blue). To the east, these joints are regular and parallel. The plaster was spread out with a circular gesture which has sometimes left a slight ridge (fig. 136).

At least six game boards were engraved or dug in floor F. 015. One type of game consists of three parallel dotted lines, with 14 holes per line. Two boards are complete, one is unfinished (figs. 137–139). This is known as the game of “fourteen” (*arba‘ata ‘ashara*) which involved placing chips into holes (ROSENTHAL 2013). This game, of the *manqala* type, is reminiscent of the “*senet*” in Ancient Egypt and its Nabataean derivations.³⁷ The second type of game board is designed to play “alquerque” (or *qirkat*); it is made of 5 × 5 points with lines between them to indicate allowed moves (fig. 140). It is well-known from the 10th century onwards (BELL 1969).

36 Lyon-9732(GrA): Age 14C BP: 1245 ± 30; 682-870 AD-cal (95.4% probability).

37 See <http://nabataea.net/games1.html> [consulted on October 02, 2013].

3) In a third stage, F. 015 was damaged, witness the traces of crashes on the floor and some circular, black burning marks possibly linked to the fall of burning timbers from the roof (figs. 131, 139). This episode was followed by restoration (fig. 132): former columns and pillars were levelled, the deep cracks on the floor and some traces of fire were covered with a layer of compacted earth and straw (fig. 141) and some holes were filled with reused fired bricks. New larger mudbrick columns (those visible today) and buttresses coated with mud were erected over the remains of the plaster floor F. 015. The mud coating on the columns and that used on the ground to restore the floor seem to be of the same composition. This mixture is also found on the inner face of walls W. 006 and W. 002. The restoration might have concerned the whole prayer hall R. 013.

The weight of the new mudbrick columns supporting the roof brought about new fissures in the plaster floor, radiating out from the columns (fig. 132).

The material found in the 20-cm-high sand accumulation above floor F. 015 (UF 013, 019, 030 – see figs. 122, 129) is not informative enough to determine its date. Part of this material (UF 013, 019) has already been mentioned in the previous chapter (phase 2, southern part of Sounding 1), underlining the fact that the rare sherds from this layer are comparable to those from phases 2 and 3 in the northern part of the deep sounding. The discovery of a coin (Y.030.1, in UF 030) did not yield further information. This coin is 11.6 mm in diameter and 1.8 mm thick but too corroded to be legible. The conservation in progress should provide further details.

STAGE 4: FLOOR F. 014

The sand accumulation above F. 015 (UF 013, 019, 030) was covered by a crust of compacted sand: floor F. 014 (figs. 109, 142). This floor has only been unearthed in the north-western quarter of Building 1. It is partly preserved in the western nave, along wall W. 006, inside the *mihrāb* and in front of it, over approximately 2.5–3 m². The compaction of the sand constituting the floor might be the result of water being poured on the ground, or else the condensation of water under matting. Imprints have been left on this ground. We have already mentioned that of a palm leaf mat found during the excavation of the southern part of Sounding 1 (fig. 110). We can add the imprint of a foot at the bottom of column Co. 016 (fig. 143).

Floor F. 014 corresponds to a period during which the so-called *mihrāb* (Ni. 160) was apparently opened onto the outside to the west (fig. 122). The hypothesis of a deep, salient *mihrāb* protruding to the west has to be discarded since no traces of walls have been found west of *qibla* wall W. 006. On the contrary, a floor made of compacted sand, F. 065, was unearthed at the same elevation as floor F. 014 (428.71 m a.s.l.) (figs. 123, 144). It cannot be said whether during stage 4, Building 1 was still a mosque with an open *mihrāb* (possibly closed with a curtain or a light structure) or if the function of the building changed when the *mihrāb* was transformed into a door.

No diagnostic materials come from the sand accumulation above floor F. 014 (UF 011, 016, 026), nor above F. 065 on the outside (UF 044) (figs. 122, 129). Artefacts are:

- A small sherd of a steatite vessel smoothed on both sides (Y.011.1);
- A triangular quartzite flake (Y.026.1);
- A fragmentary vertical neck of a small bottle in green glass with an everted rim (fig. 148).
- The rim of a jar in *pinkish cooking ware with white exploded grits* (fig. 170: no. 9), a pottery type present in phases 1, 2 & 3 of Sounding 1;
- And a fragment of the flat base of a jar in *fine reddish buff ware with cream slip* (fig. 166: no. 12), a pottery type frequently attested.

STAGE 5: FLOOR F. 046

Stage 5 has been excavated only in the north-western quarter of Building 1. It is characterized by a thin, compacted sand layer, F. 046, only preserved along wall W. 006 and in the *mihrāb* Ni. 160 (figs. 121–122, 145). Not easy to see, this level is intermingled within a 60-cm-thick sand accumulation (UF 026) and was not immediately recognized during excavation. No distinction was made between the upper part of UF 026 (above F. 046) and the lower part (under F. 046). This stage is also characterized by the construction of a thin mudbrick wall (W. 044) once again closing the *mihrāb* to the west; F. 046 is in continuity with the base of this wall (fig. 145). Wall W. 006 was covered with a fresh mud coating (fig. 121).

STAGE 6: FLOOR F. 039 AND THE LAST OCCUPATION OF BUILDING 1

After an accumulation of loose sand above F. 046 (upper half of UF 026), new architectural transformations were carried out (stage 6). Wall W. 044 closing the *mihrāb* was levelled and rebuilt. A plaster coating was applied on the parts of wall W. 006 close to the *mihrāb* (figs. 121, 146). A grey, compacted sand floor with plaster nodules, F. 046, was laid over 3 m² inside the *mihrāb* and in front of it. Along the *qibla* wall, to the right of the *mihrāb*, a 5-cm-high, rectangular step covered with white plaster was built (fig. 145). The digging of the pit P. 040 for mudbrick recycling after the abandonment of the building deeply damaged this area and makes it impossible to clarify the connection of this step with wall W. 006. The hypothesis of a low *minbar* cannot be discarded. A second recess in wall W. 006 (Ni. 049) was in use at this stage of occupation, possibly being a second *mihrāb* (fig. 124). In the rest of the prayer hall, floor F. 039 was simply made of compacted sand (fig. 147).

This last stage is marked by the restoration of columns (mentioned above) and the construction of thin walls W. 044 and W. 050 at the back of Ni. 160 and Ni. 049. It is also the time when thin mudbrick walls were built between columns and pillars separating the prayer room from the courtyard (fig. 128); the foundations of these walls are between 429.27 and 429.55 m a.s.l and F. 039 is laid at 429.27 m a.s.l. in Ni. 160.

The 50-cm-thick, dense sandy layer covering floor F. 039 has been excavated over the whole extent of Building 1 (UF 023, 026, 036–038, 040, 042–043). Only 14 fragments of rim or bases of pottery were found, being either common ware (*medium buff ware with medium to thick grits, fine and medium reddish buff ware with cream slip*) or coarse ware (*pinkish cooking ware with white exploded grits and slow wheel-turned reddish cooking ware*). They provide no chronological indication.

A single artefact was found in UF 043, near column Co. 023: a fragmentary bowl of an Ottoman clay smoking pipe (Y.043.1 – figs. 149: no. 3, 150). Clay pipes, known as *chibuk* (Turkish: *çibuk*), were produced extensively in the Ottoman empire from the late 17th to the early 20th century (SIMPSON 1998, 2009) and increased in popularity in the hinterland of Saudi Arabia from the 18th century onwards (BOUZIGARD & SAIDEL 2012). These pipes were made in three parts: a mouth-piece, a long wooden stem and a small moulded clay bowl. Only this last part was found. It is made of blackened earthenware, the fabric is dark grey without inclusions. The pipe bowl is spherical, topped by a vertical rim. It is adorned at the top by two rows of an ovoid pattern. Traces of red paint are visible. A cross is incised at the bottom of the bowl on the inside.

Two other fragments of clay pipe bowls have been collected on the surface, in the vicinity of Building 1 (areas N7 & O7) (figs. 149–150). The first (Y.surf.17) has a black core and brown to black surface with an incised decoration of two vertical grooves alternating with three vertical lines of dots. The second (Y.surf.13) is of a brown fabric with white inclusions, and its surface is blackened. The part receiving the stem is adorned at the top by a bulge incised

with dots. The remaining part of the spherical bowl is adorned with a frieze of lines incised diagonally. Their discovery, together with Bahla ware, Asian stoneware with celadon glaze and porcelain dated to the late 17th-early 18th centuries (see Chapter 9) is chronologically consistent.

The 6th stage of occupation of Building 1 is sealed by a dense collapse layer of sand, small stones, mudbrick fragments and a few large stones (UF 006, 007, 022 & 034), immediately under the surface (UF 001). The pottery assemblage from this destruction layer is as diverse as that from the surface, mixing a majority of common wares (*medium buff* and *reddish ware with medium to thick grits*, *fine and medium reddish buff ware with cream slip*), with sandy wares (*medium red-orange sandy ware*, *fine red-orange sandy ware with reddish slip*) and coarse wares attested in phases 1, 2 and 3 of Sounding 1. It also included some categories much more specific to the phase 3 (*medium reddish buff ware with black/reddish slip*, *medium fine buff ware with white and red matt slip*, *handmade cooking wares*, *blue/green glazed wares*), or specific to phase 1, e.g. a sherd of a small Chinese porcelain cup with a chocolate coating on the outer wall dated to the late 17th-early 18th centuries (see Chapter 9).

This collapse layer also yielded two fragments of black glass bangles (**fig. 148**: Y.022.4, Y.006.1), two lead musket balls (a kind of ball produced from the mid-15th to the mid-19th century) and a lead rattle bullet reminiscent of the Minié ball (second half of the 19th century) (**fig. 148**: Y.022.1, Y.022.3).

From all this material found in the collapse layer, only the recent artefacts (Chinese porcelain and rattle bullet) are helpful since they provide us with a *terminus ante quem* for the abandonment of Building 1 of around the 18th-19th centuries.

Comparisons and discussion

GENERAL FEATURES

Concerning stages 1 and 2, dated to the Abbasid period, comparisons in the Arabian Peninsula (8th-10th centuries) are fruitless. Only a few have been published: al-Mābiyāt (TALHI *et al.* 1986), al-Rabadha ([AL-]RASHID 1986), and Najrān ([AL-]ZAHRAŪ *et al.* 2001); and their plans do not show close similarity.

The design of the prayer hall at al-Yamāma is in line with the widespread hypostyle plan with arcades or porticoes (*riwāq*) running parallel to the *qibla* wall (HILLENBRAND 1994: 66). This feature was common in Arabian mosques until the 19th-20th centuries (KING 1986: 189 sq.). It is the one that Ibn Jubayr reported in his description of the mosque at al-Madīna in 1184, mentioning an unchanged plan since the time of the Abbasid caliph al-Mahdī (777-781) (KING 1986: 31; RABBAT 2013). This plan also characterizes the 8th century mosque of the Umayyad caliph al-Walīd b. al-Malik (ca. 705-715) in Damascus, and the mosque of ‘Amr b. al-‘Āṣ in Fuṣṭāṭ (late 7th-early 8th centuries – JOMIER 2013).

The roof of al-Yamāma mosque was most probably flat, covering the whole prayer hall. The presence of arcades above the columns in the first stage of occupation recognized so far is uncertain. Ibn Jubayr reports columns up to the roof without arcades in the prayer hall of al-Madīna mosque before the fire of 886 (SAUVAGET 1947: 94); arcades were only built in the courtyard (*ibid.*: 74).

Stage 3 at al-Yamāma has been considered as subsequent to a possible fire of the roof woodwork, the traces of which are visible in the shape of black patches on floor F. 015. Such an event was not unusual if we consider, for example, the case of the great Mosque of Damascus

where fires have been reported 9 times since the 11th century: 1069, 1157, 1166, 1174, 1247, 1340, 1401, 1879, and 1893 (BEHRENS-ABOUSEIF 2004: 279).

Concerning stages 3 to 6, the nearest parallels are the two mosques of al-Hufūf (270 km east of al-Yamāma). The first is the mosque of Ibrāhīm (known also as Masjid al-Qubba) dated from the mid-14th–mid-16th centuries; the second is al-Jabrī mosque built in 1417. The first mosque possesses two *maḥārīb*, a large and a small one, and columns with a bulge; the second has circular columns and rectangular pillars. Inner and outer walls of the mosque are covered with a thick coat of hard plaster (KING 1986: 173).

In spite of a late occupation of al-Yamāma mosque, contemporary with the Ottoman presence in the Ḥijāz, no specific Ottoman or Turkish features have been noticed and no major changes were made to it. None of the sixty early Ottoman mosques (early 13th–early 16th centuries) of Turkey studied by KURAN (1968) have a prayer hall with large columns or two *maḥārīb*.

■ COLUMNS (AR. ‘AMŪD)

The presence of a hypostyle prayer hall with columns is attested as early as the Early Islamic period, for example in the great mosque of al-Madīna (SAUVAGET 1947: 72) where columns were “covered with a coat of plaster, and polished zealously until they appear as white marble” (Ibn Jubayr quoted by KING 1986: 31). Columned halls characterize several Early Islamic mosques in Iraq and Iran, for example, Jāmī al-Hajjāj in Wāsiṭ (ca 702–705) and the Abbasid mosque of Tārikh Khān at Damghān in Iran (ca 750–786) (KING 1986: 172).

■ MIḤRĀB

Until the completion of the excavation of al-Yamāma mosque, it cannot be specified whether both the *maḥārīb* were built at the same time or if one of them corresponds to an earlier, smaller mosque, preserved after a possible enlargement of the building. Be that as it may, the presence of two *maḥārīb* in a *qibla* wall is not totally unusual. Golvin noticed that some important mosques have several *maḥārīb*, for example, four in the Umayyad Mosque of Damascus (Syria), in Konya (Turkey) and al-Azhar (Cairo, Egypt) (GOLVIN 1988: 54). He adds that the *miḥrāb*, perpendicular to the *qibla* wall, does not constitute an orientation, but corresponds to the place where the imam stands.

At al-Yamāma, no traces of decoration were found in the *miḥrāb*, a wide-spread characteristic in Eastern Arabia (WAFI 1988: 74).

■ CIRCULATION AND DOORWAYS IN THE QIBLA WALL

The discovery in stage 4 of a *miḥrāb* (Ni. 160) open onto the outside was quite unexpected and one wonders whether Ni. 160 could have temporarily lost its function and been replaced by Ni. 049. The presence of a doorway near the *miḥrāb* in the *qibla* wall is something exceptional, though it is known in a few North African mosques built between the 9th and the 12th centuries: the *ribāt* of Sūsa (Sousse) built in 850 (HILLENBRAND 1994: 77, fig. 2.146), the mosque of the castle of the Banū Hammad (*ibid.*: fig. 2.130) and the mosque Sidi Abū Madyan in Tilimsān (Tlemcen) built in 1136 (*ibid.*: 86, fig. 2.139).

The presence of a small passageway in the southern extremity of the *qibla* wall (corner between W. 006 and W. 043) is a feature which also characterized the Early Islamic mosque of al-Madīna (SAUVAGET 1947: 85), where it was reserved for the community leader. It is present in the mosque of Tārikh Khān in Damghān (750–786), in the left extremity of the *qibla* wall (FINSTER 1994: 185).

Conclusion

The excavation of Building 1 revealed a large mosque with at least 6 stages of occupation and/or transformations. As this report has been written before the completion of the excavation, earlier stages of occupation are expected, under those unearthed so far. Moreover, stages 1 to 5 have only been explored in the north-west quarter of the Building. Future work might change some of the ideas expressed here, and should yield further chronological indications. For the time being, the only reliable chronological elements are the 14C date from charcoal sampled in Floor F. 015, ascribing stage 2 in the 8th–9th centuries, and the Ottoman clay pipe found in a layer from stage 6, dated to the 17th–18th centuries.

More 14C analyses on samples from the several occupation layers are expected and will give a better picture of the evolution of the building through time.

For the moment, several questions are left unanswered. Concerning chronology, the date of the foundation of the mosque has yet to be established, and a temporary abandonment of the mosque between the 13th and the 15th century has to be checked (a hiatus in the occupation of the site has been postulated on the basis of the study of the pottery assemblage (see next chapter). Concerning architecture, several aspects need to be clarified: where is the access to the courtyard? Was there a minaret? Were there ablution rooms?

Be that as it may, even if Building 1 is not fully excavated, taking into account the dominant position of this mosque, on the highest point of the site, and its size, we are very likely dealing with the Great Mosque of the town described by Nāṣir-i Khusraw in the year 1051,³⁸ providing that the town named al-Yamāma in the 11th century corresponds to the actual site of al-Yamāma, the mediaeval Jaw al-Khaḍārim or Jaw al-Khiḍrima (see Chapter 4 and [AL-]JUHANY 2002: 45; [AL-]GHAZZI 2010: 45–47). As already mentioned, in the mediaeval period, al-Yamāma was not the name of a settlement but the name given to the whole region, and sometimes used as the nickname of its capital city. Thus, al-Yamāma has been the nickname of two different cities: Jaw al-Khaḍārim (see [AL-]MAS'ŪDĪ 1861–1877, iii: 276, 288) when the Banū Ukhayḍir ruled al-Yamāma region (865–c. 1060), but also Ḥajr under the rule of the Banū Ḥanīfa (YĀQŪT 1866–1873, i: 414, 707, 905; ii: 450; iv: 1027; IBN BATTŪTA 1982, ii: 129). When Nāṣir-i Khusraw went to the site, the Banū Ukhayḍir were still ruling the area as subordinates to the Qarmaytians ([AL-]JUHANY 2002: 48); therefore, Jaw al-Khaḍārim (the archaeological site today called al-Yamāma) was probably the main city and probably the one described by Nāṣir-i Khusraw.

38 KHUSRAW 1881: 223–224: “Yemamèh est un grand et vieux château, au pied duquel s'étendent la ville et le marché dans lequel sont établis des artisans exerçant tous les métiers. La grande mosquée est belle. Les émirs qui gouvernent depuis longtemps ce pays sont des descendants d'Aly; personne n'a pu les en dépouiller, car ils n'ont dans leur voisinage ni sultan ni roi redoutable”.

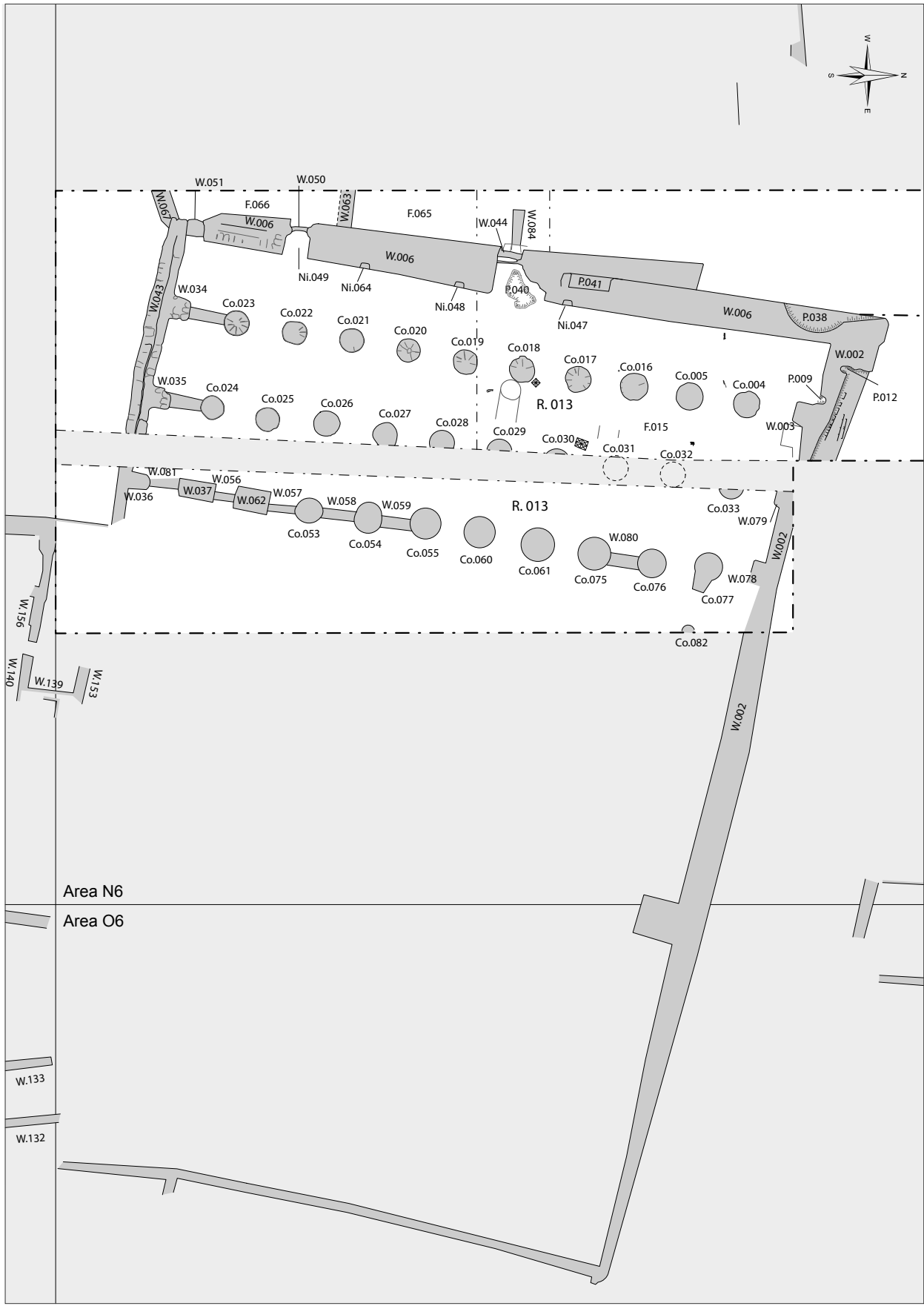


Figure 118 Al-Yamāma: plan of Building 1 (M. Niveleau, J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)



Figure 119 Aerial view of Building 1 (Th. Sagory – French-Saudi Archaeological Mission in al-Kharj)

Figure 120 Building 1 – Prayer hall of the mosque (R. 013), foreground: game board in floor F. 015, looking south (Th. Sagory – French-Saudi Archaeological Mission in al-Kharj)



Figure 121 Building 1 – *Mihrāb* (Ni. 160) in the *qibla* wall (W. 006), looking southwest (Th. Sagory – French-Saudi Archaeological Mission in al-Kharj)

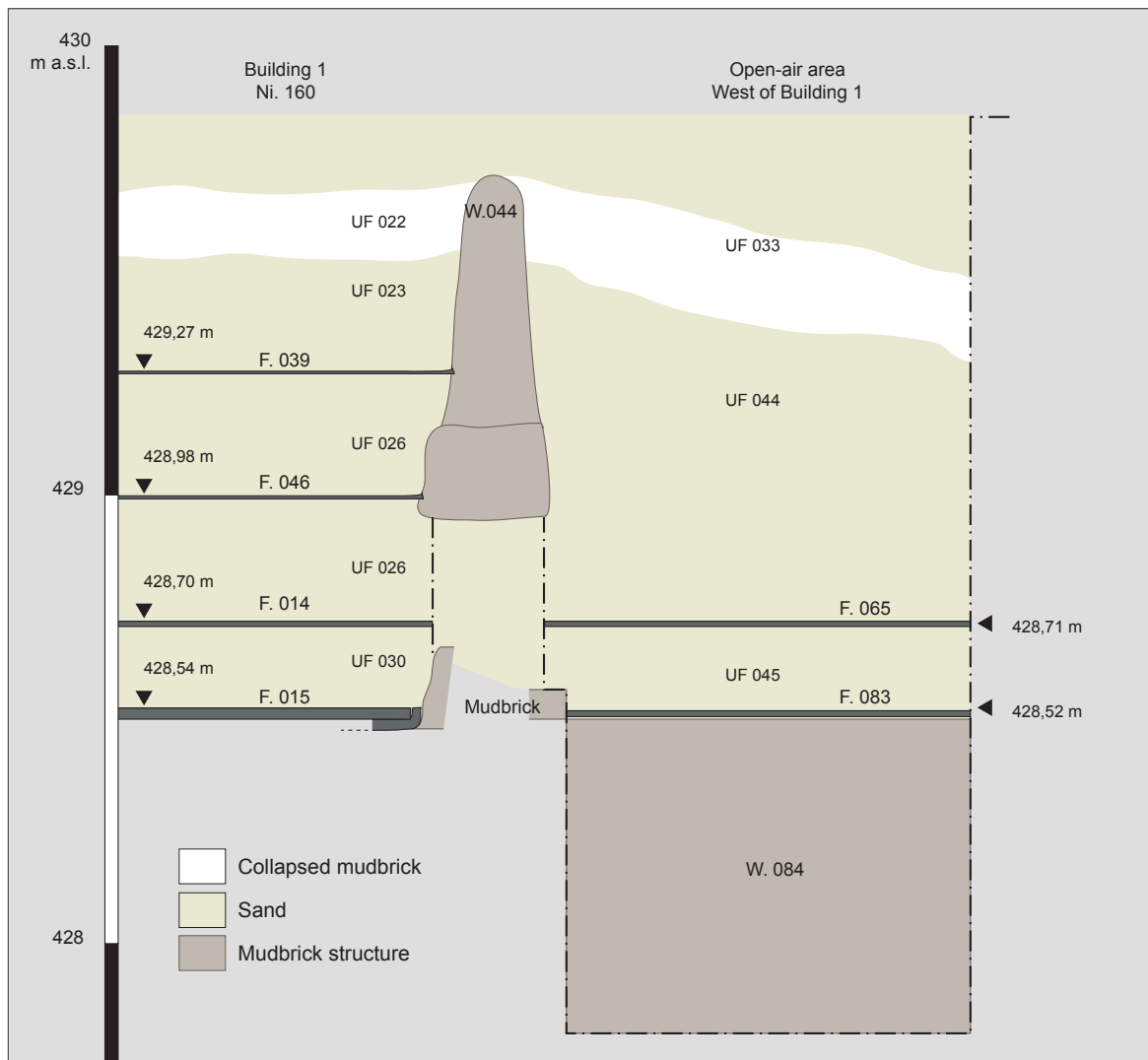


Figure 122 Building 1 – Schematic east–west section of the *mihrāb* (Ni. 160) and its outer side (J. Schiettecatte, P. Siméon – French-Saudi Archaeological Mission in al-Kharj)



Figure 123 Building 1 – *mihrāb* (Ni. 160) in the qibla wall (W. 006), looking east (P. Siméon – French-Saudi Archaeological Mission in al-Kharj)



Figure 124 Building 1 – Second *mihrāb* (Ni. 049) (?) in the *qibla* wall (W. 006), looking west (P. Siméon – French-Saudi Archaeological Mission in al-Kharj)

Figure 125 Building 1 – Northern wall W. 002 of the prayer hall (R. 013) with the earlier levelled buttress and the later mudbrick buttress W. 003, looking east (J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

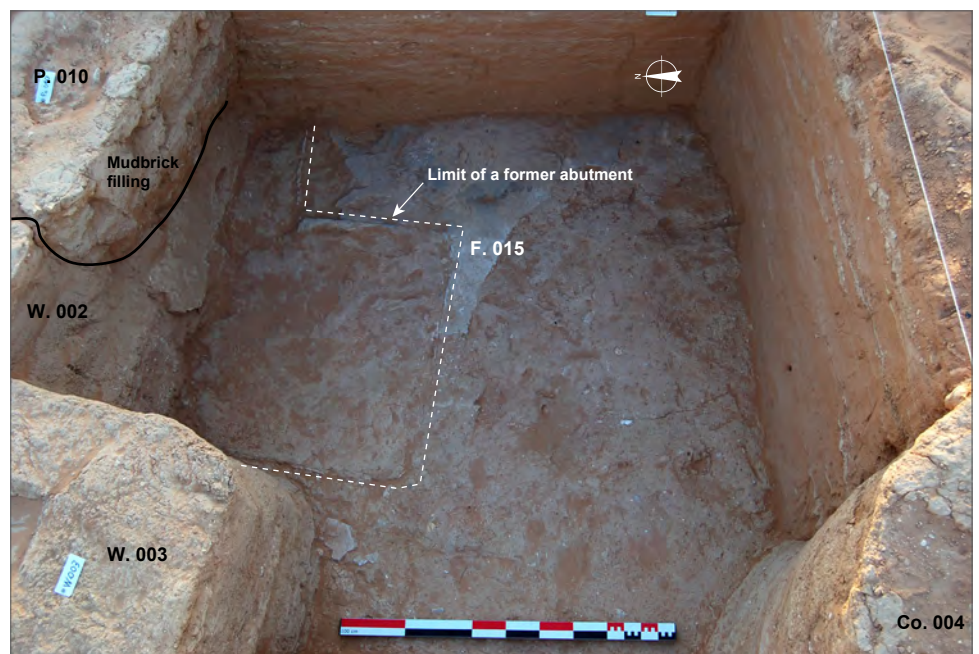


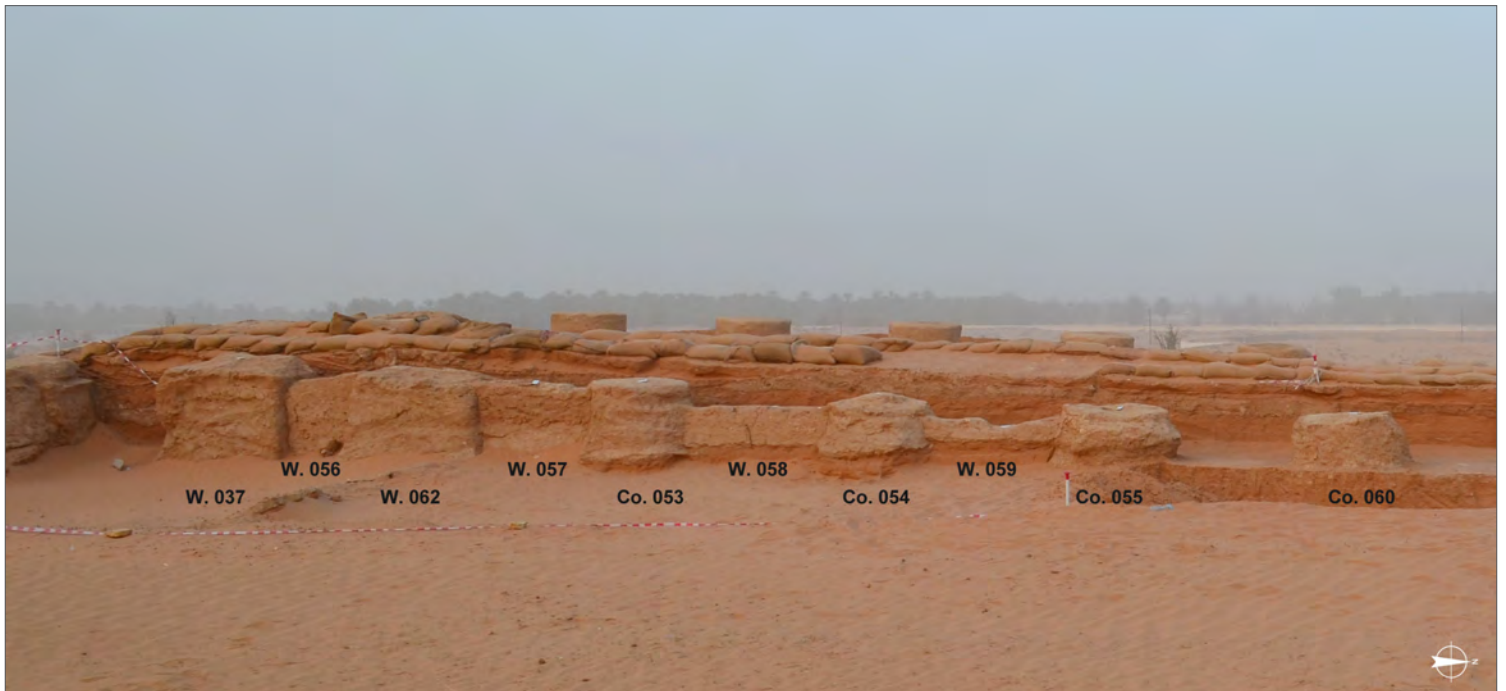
Figure 126 Building 1 – Mudbrick column Co. 023 from the top, looking west. Triangular mudbricks, mud mortar and mud coating are clearly visible (P. Siméon – French-Saudi Archaeological Mission in al-Kharj)



Figure 127 Building 1 – Mudbrick column Co. 024 (left) with repairs on the shaft, and buttress W. 035 (right), looking east (P. Siméon – French-Saudi Archaeological Mission in al-Kharj)



Figure 128 Building 1 – Southern half of the eastern row of mudbrick columns and pillars between the courtyard and the prayer room of the mosque, looking west (P. Siméon – French-Saudi Archaeological Mission in al-Kharj)



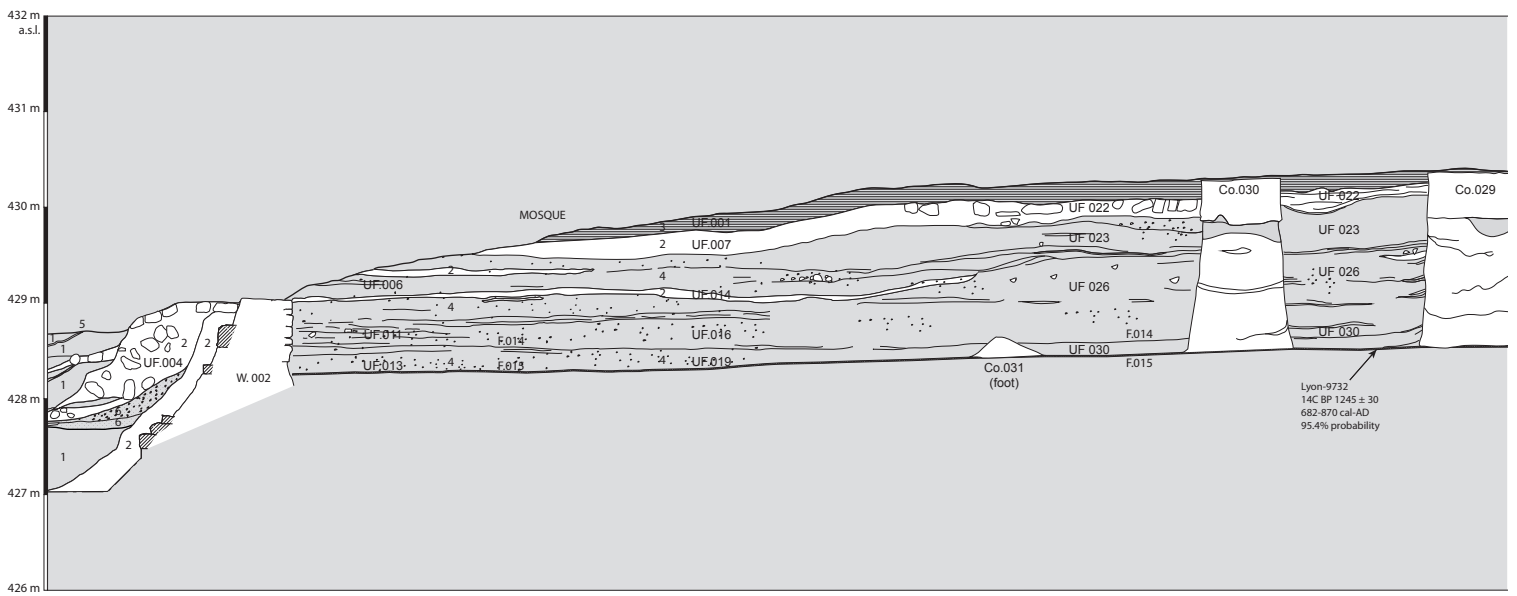
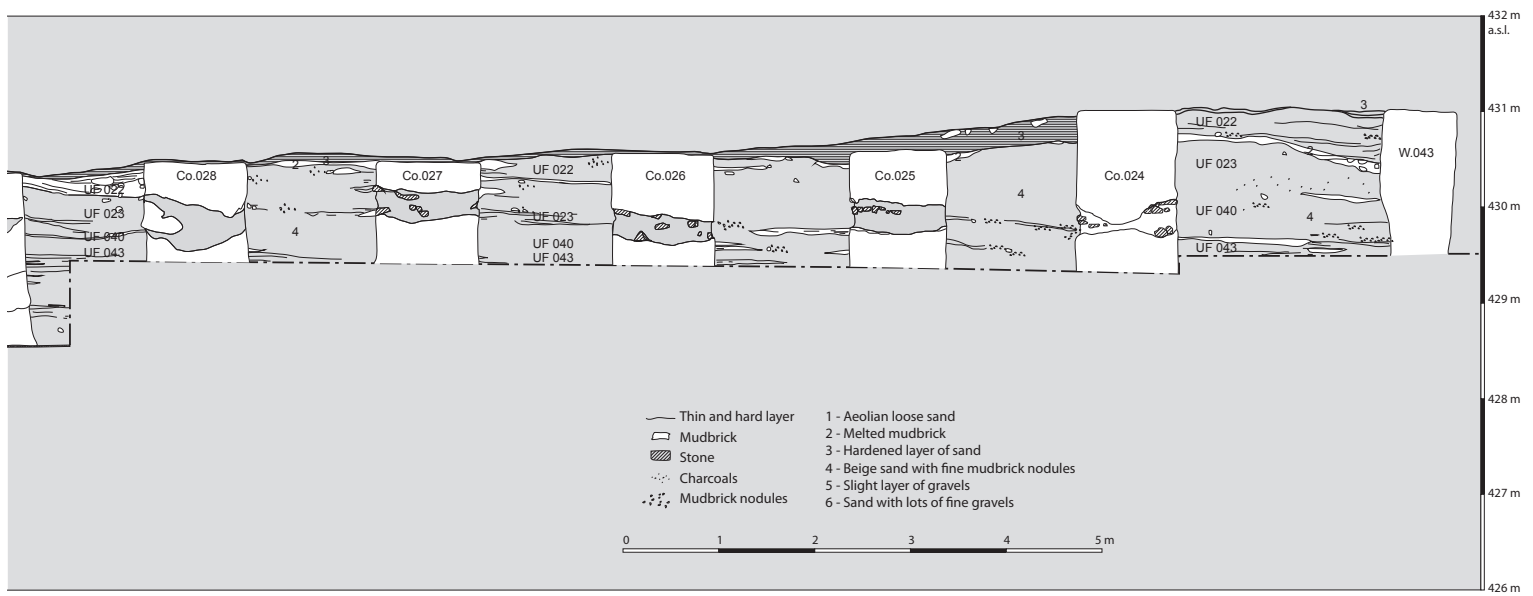


Figure 129 Al-Yamāma: Building 1 – Stratigraphic section, western face of the baulk oriented north–south which crosses the building (drawing: P. Siméon; graphics: J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)



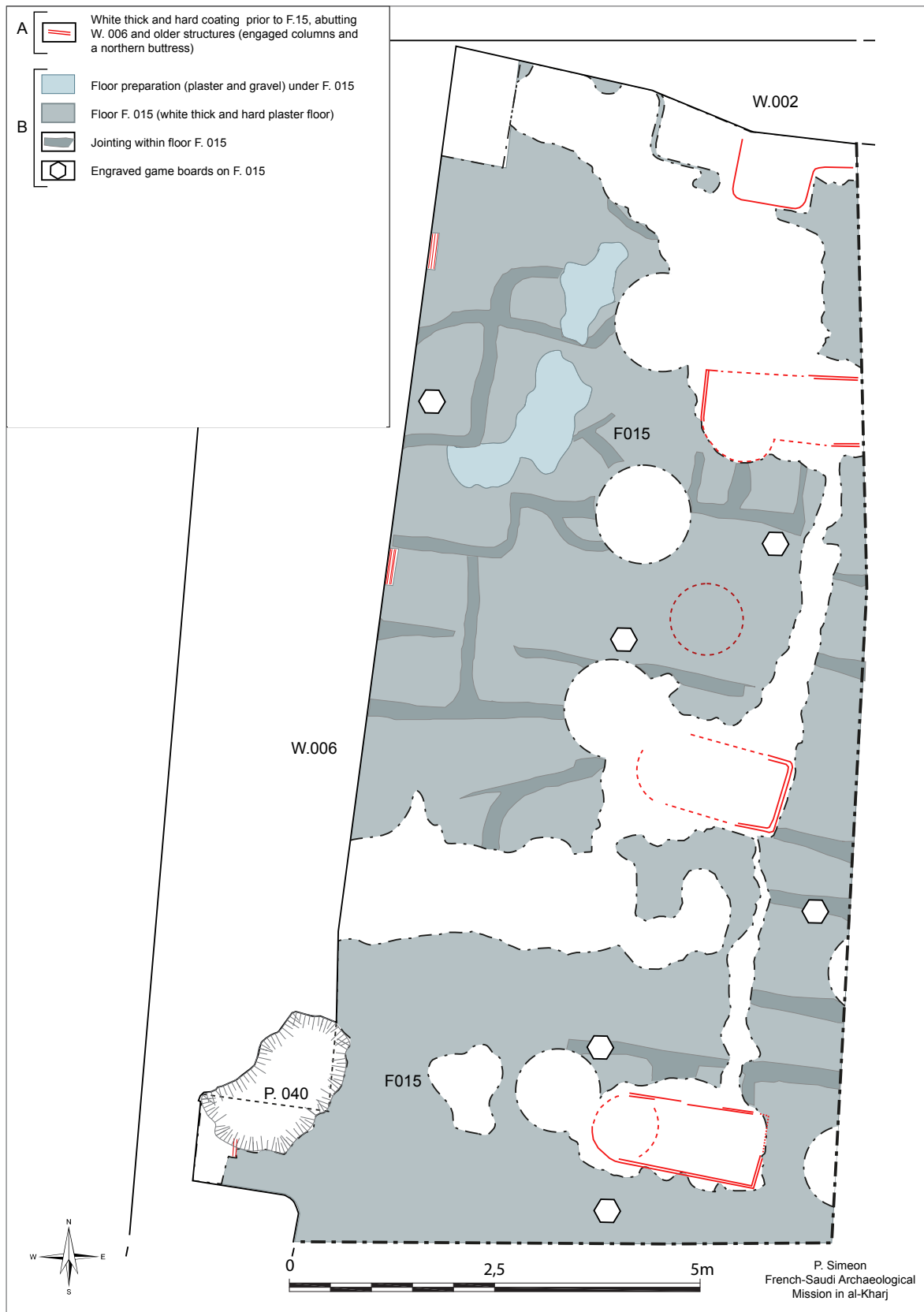


Figure 130 Building 1 – Drawing of elements from the first and second stages of occupation observed on floor F. 015, northwestern part of room R. 013 (drawing: P. Siméon; graphics: P. Siméon/J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

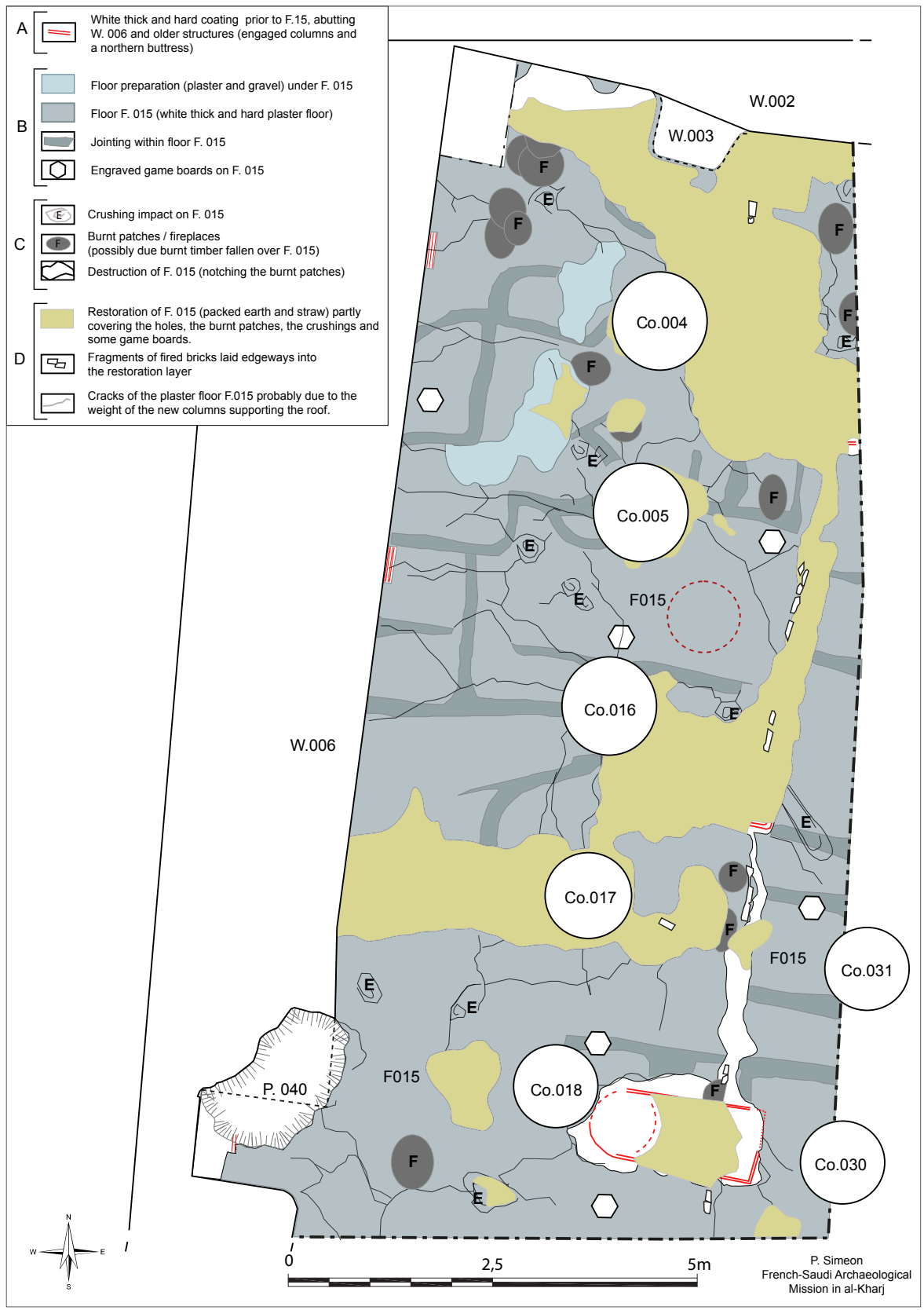


Figure 132 Building 1 – Drawing of elements from the third stage of occupation observed on floor F. 015, northwestern part of room R. 013 (drawing: P. Siméon; graphics: P. Siméon/J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

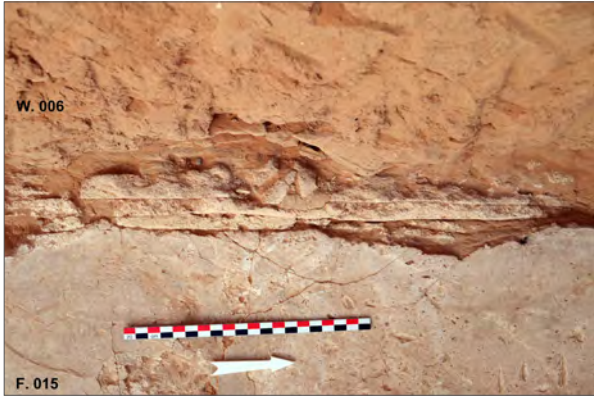


Figure 133 Building 1 – Room R. 013, first stage: detail of the ancient plaster coating over wall W. 006 preceding the construction of floor F. 015, looking west (P. Siméon – French-Saudi Archaeological Mission in al-Kharj)



Figure 134 Building 1 – Room R. 013, second stage: detail of the levelled structures abutted by plaster floor F. 015, at the foot of the 3rd stage column Co. 018, looking west (P. Siméon – French-Saudi Archaeological Mission in al-Kharj)

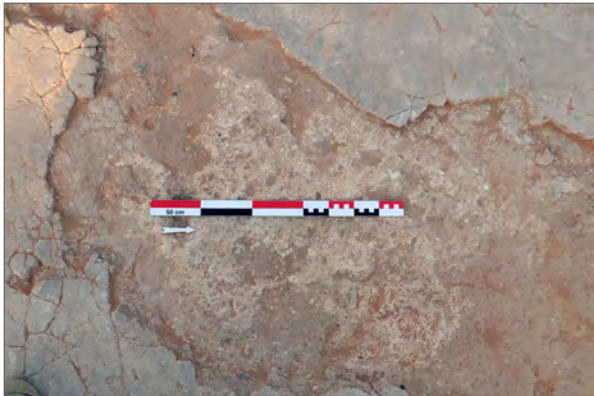


Figure 135 Building 1 – Room R. 013, second stage: detail of the rough plaster preparation under plaster floor F. 015, looking west (P. Siméon – French-Saudi Archaeological Mission in al-Kharj)



Figure 136 Building 1 – Room R. 013, second stage: detail of the ridges produced by workmen when spreading out plaster during the finishing of floor F. 015, looking west (P. Siméon – French-Saudi Archaeological Mission in al-Kharj)

Figure 137 Building 1 – Room R. 013, second stage: detail of the first board of the “game of fourteen” engraved on floor F. 015, looking west (P. Siméon – French-Saudi Archaeological Mission in al-Kharj)



Figure 138 Building 1 – Room R. 013, second stage: detail of the second board of the “game of fourteen” engraved on floor F. 015, looking north (P. Siméon – French-Saudi Archaeological Mission in al-Kharj)



Figure 139 Building 1 – Room R. 013, second stage: detail of the third board of the “game of fourteen” engraved on floor F. 015, looking west (P. Siméon – French-Saudi Archaeological Mission in al-Kharj)

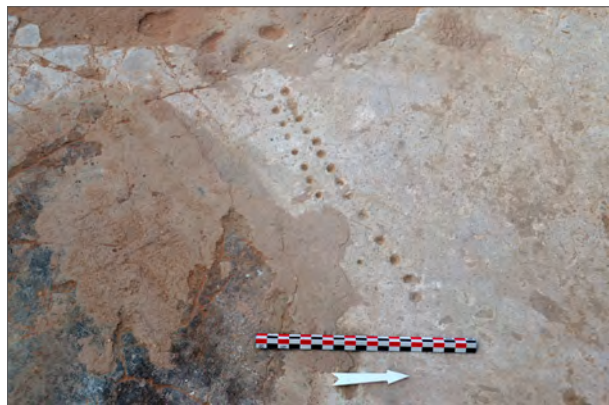


Figure 140 Building 1 – Room R. 013, second stage: detail of the alquerque game board engraved on floor F. 015, looking west (P. Siméon – French-Saudi Archaeological Mission in al-Kharj)



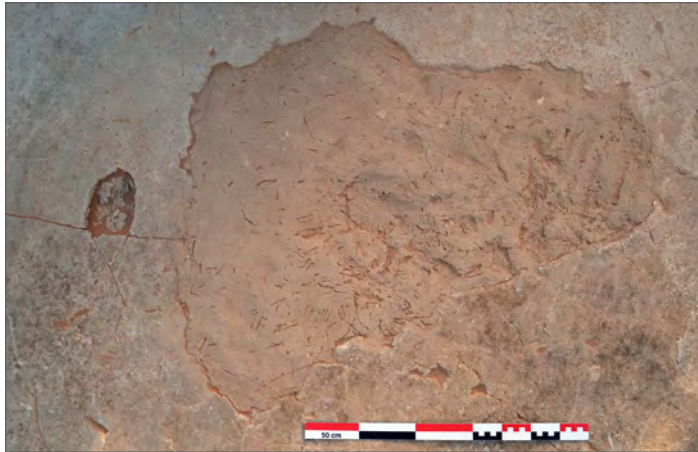


Figure 141 Building 1 – Room R. 013, third stage: detail of the restoration of floor F. 015 with compacted earth and straw, looking east (P. Siméon – French-Saudi Archaeological Mission in al-Kharj)



Figure 142 Building 1 – Room R. 013, fourth stage: floor F. 014 in the northwestern part of the prayer hall, looking south (P. Siméon – French-Saudi Archaeological Mission in al-Kharj)



Figure 143 Building 1 – Room R. 013, fourth stage: floor F. 014, detail of the foot imprint next to column Co. 017, looking north (P. Siméon – French-Saudi Archaeological Mission in al-Kharj)

Figure 144 Building 1, fourth stage: circulation level F. 065 west of Building 1, looking southeast (P. Siméon – French-Saudi Archaeological Mission in al-Kharj)

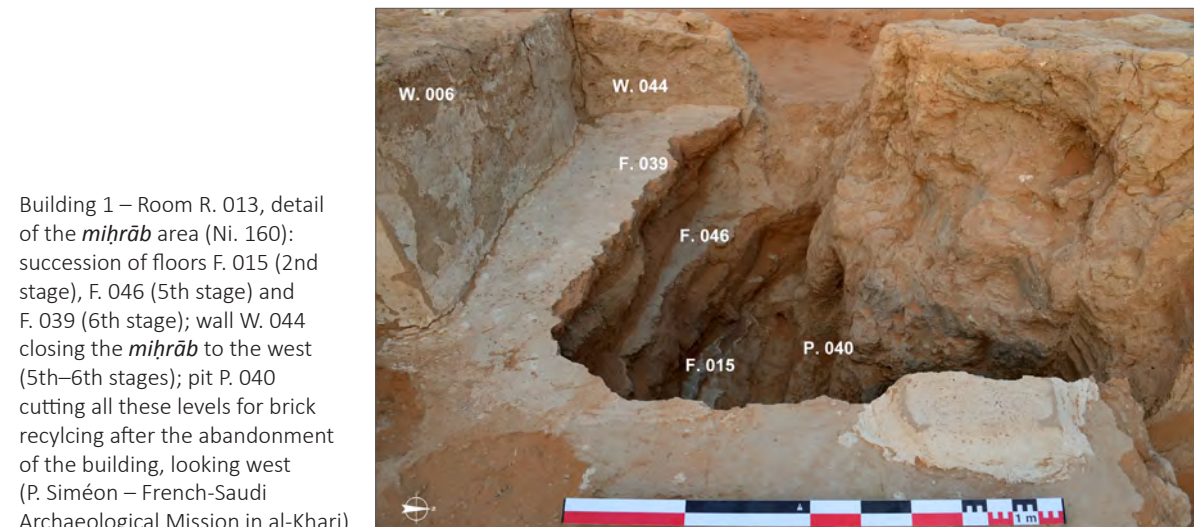
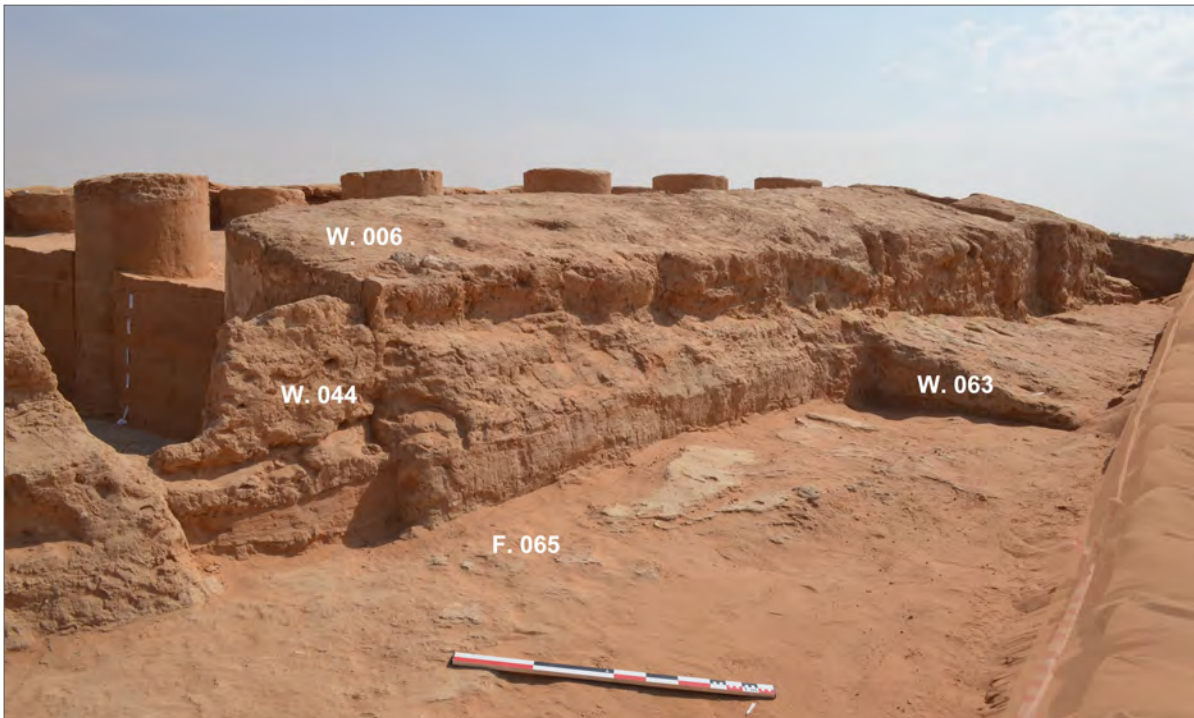


Figure 145 Building 1 – Room R. 013, detail of the *mihrāb* area (Ni. 160): succession of floors F. 015 (2nd stage), F. 046 (5th stage) and F. 039 (6th stage); wall W. 044 closing the *mihrāb* to the west (5th–6th stages); pit P. 040 cutting all these levels for brick recycling after the abandonment of the building, looking west (P. Siméon – French-Saudi Archaeological Mission in al-Kharj)



Figure 146 Building 1 – Room R. 013, detail of the architectural transformations of the 6th stage in the *mihṛāb* area (Ni. 160): floor F. 039; wall W. 044 closing the *mihṛāb* to the west; plaster coating over wall W. 006 and pit P. 040 cutting the floor, looking south-west (P. Siméon – French-Saudi Archaeological Mission in al-Kharj)



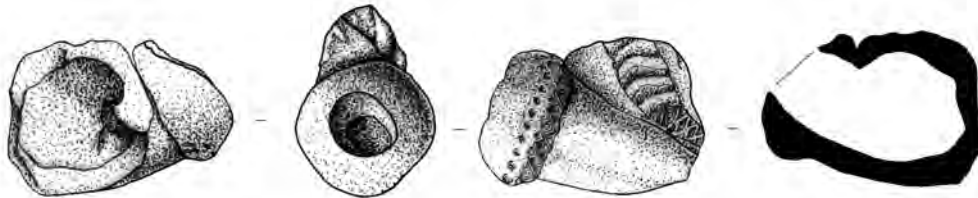
Figure 147 Building 1 – Room R. 013, detail of floor F. 039 in the south-western part of the prayer hall, looking south (P. Siméon – French-Saudi Archaeological Mission in al-Kharj)



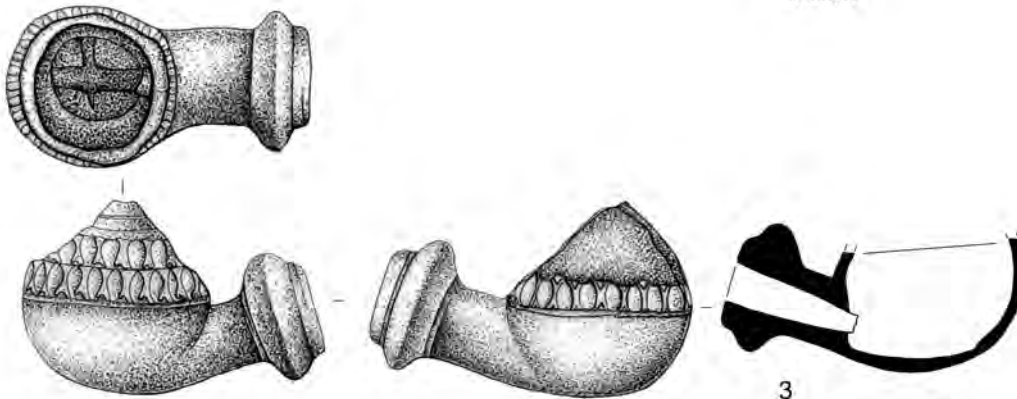
Figure 148 Building 1 – Artefacts from the 6th stage of occupation and from the collapse layer above it: Y.022.4: glass bangle; Y.006.1: glass bangle; Y.022.1: musket ball; Y.022.2: musket ball; Y.022.3: rifle bullet (Minié ball); Y.026.3: rim of a glass flask (L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)



1
al-Yamāma - Area N7
Y.Surf.17



2
al-Yamāma - Area O7
Y.surf.13

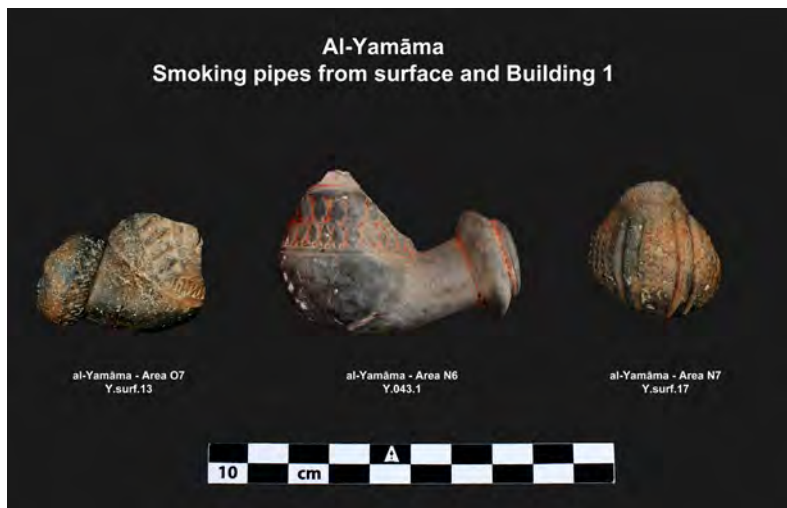


3
al-Yamāma - Area N6
Y.043.1



Figure 149 Clay pipe bowls from Building 1 and its surroundings (areas N7 and O7) (L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)

Figure 150 Clay pipe bowls from Building 1 and its surroundings (areas N7 and O7) (L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)



CHAPTER 9

AL-YAMĀMA (AREA N6): THE POTTERY ASSEMBLAGE

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For the purpose of the pottery study, 48 temporary categories have been defined so far, on the basis of macroscopic observations (**figs. 151-152, table 5** below).

Observations can be made regarding the distribution of the most interesting categories by phases. Nevertheless, many of these types are little known, local productions still insufficiently represented to allow comment, and the quantity of sherds from archaeological contexts is still limited. All in all, 1775 sherds were collected;³⁹ 1134 sherds come from good contexts in area N6: 183 in the levels of phase 1, 144 in phase 2, 717 in phase 3 and 90 in phase 4.

This assemblage includes very few imported vessel fragments: as a result, external references are rare. A regional sequence of common pottery with precise chronological diagnostic markers has yet to be defined as a frame of reference. The soundings carried out by al-Ghazzi (2010) in the southern part of the archaeological area produced a much shorter stratigraphic sequence than did Sounding 1, and the pottery assemblage included industries poorly represented or absent from the deposits that we explored these last two seasons in area N6. This underlines that the typology presented here will be subject to changes in the near future. For the time being, a correlation between the two sequences cannot be established and, therefore, the pottery sequence of Sounding 1 must be addressed separately. Any typological parallel will potentially allow the remains in the southern area to be correlated with the phases recognized here; or not, if they belong to an occupation that was not widespread across the site.

Be that as it may, this preliminary typology should be considered as a working tool. Morphological criteria and future chemical analysis will progressively define workshop origins by grouping together various fabrics which were initially described separately, or will split an already existing category into several sub-types.

In order to simplify the presentation of the pottery assemblage, the categories have been grouped into seven larger types (common wares, sandy wares, sandy wares with comb decoration, coarse wares, grey scratchy wares, peculiar fabrics and imports) (**table 6**). In this chapter, these groups are considered in the four different phases of the site occupation defined in Sounding 1 and Building 1.

³⁹ This figure includes the 407 sherds from Sounding 3, south of the site, and not published in this report because the sounding was unfinished at the end of the 2012 season.

TYPE	DESCRIPTION
1a	Medium buff ware with medium to thick grits
1b	Common buff greenish ware with medium to thick grits
2	Common reddish ware with medium to thick grits
3	Medium fine buff ware with cross-hatch paint in red
4	Medium reddish ware with medium to thick grits
5	Medium fine buff ware with white and red matt slip
6	Pinkish cooking ware with white exploded grits
7	Medium red-orange sandy ware
8	Coarse red-orange sandy ware with whitish surface
9	Layla ware – well fired grey to deep reddish ware
10	Layla ware with glossy surfaces
11	Thick buff ware with medium temper and reddish wash
12	Medium fine buff ware
13	Medium buff ware with black striped red slip
14	Medium buff ware with grey inclusions
15	Red ware with grey-black core and very abundant chaff temper
16	Handmade grey gritty ware
17	Handmade cooking wares
18	Slow wheel-turned reddish cooking ware
19	Thick buff chaff tempered ware
20	Blue/green glazed ware
21	Glazed Islamic ware
22	Porcelain
23	Mediterranean amphorae
25	Black jars
26	Medium yellow sandy ware
28	Thin greenish ware
29	Well fired reddish to buff orange ware
30	Plane grey scratchy wares
33	Fine reddish buff ware with cream slip
34	Earthenware with blue and white decoration
35	Medium reddish buff ware with cream slip
36	Fine red-orange sandy ware with reddish slip
37	Medium reddish buff ware with black/reddish slip
38	“Clinky” coarse orange ware
39	White to yellow glazed ware
40	Coarse grey ware with whitish surface
41	Abbasid ware with an opaque white glaze
42	“Clinky” handmade ware with whitish surface
43	Bahla ware
44	Abbasid lustreware
45	Sgraffiato
46	Medieval underglazed decoration
47	Fritware
48	Celadon

Table 5 | List of the 48 temporary pottery types identified on the site of al-Yamāma – See photographs on **figs. 151–152, 159.**

GROUP	DESCRIPTION	TYPE
Common wares (fig. 153)	Medium buff ware with medium to thick grits	1a
	Common buff greenish ware with medium to thick grits	1b
	Common reddish ware with medium to thick grits	2
	Medium reddish ware with medium to thick grits	4
	Medium fine buff ware	12
	Thin greenish ware	28
	Fine reddish buff ware with cream slip	33
	Medium reddish buff ware with cream slip	35
	Medium reddish buff ware with black/reddish slip	37
Sandy wares (fig. 154)	Medium red-orange sandy ware	7
	Coarse red-orange sandy ware with whitish surface	8
	Medium yellow sandy ware	26
	Fine red-orange sandy ware with reddish slip	36
Sandy wares with comb decoration (fig. 155)	Layla ware - Well fired grey to deep reddish ware	9
	Layla ware with glossy surfaces	10
	Well fired reddish to buff orange ware	29
Coarse wares (fig. 156)	Pinkish cooking ware with white exploded grits	6
	Handmade grey gritty ware	16
	Handmade cooking wares	17
	Slow wheel-turned reddish cooking ware	18
	“Clinky” coarse orange ware	38
	Coarse grey ware with whitish surface	40
	“Clinky” handmade ware with whitish surface	42
Grey scratchy wares (fig. 157)	Plane grey scratchy wares	30
	Grey scratchy wares with grey slip	31
Peculiar fabrics (fig. 158)	Medium fine buff ware with cross-hatch paint in red	3
	Medium fine buff ware with white and red matt slip	5
	Thick buff ware with medium temper and reddish wash	11
	Medium buff ware with black striped red slip	13
	Medium buff ware with grey inclusions	14
	Red ware with grey-black core and very abundant chaff temper	15
	Thick buff chaff tempered ware	19
	Fine grey ware with grey slip (some burnished)	32
Imports (fig. 159)	Blue/green glazed ware	20
	Glazed Islamic ware	21
	Porcelain	22
	Mediterranean amphorae	23
	Black jars	25
	Earthenware with blue and white decoration (porcelain imitation)	34
	White to yellow glazed ware	39
	Abbasid ware with an opaque white glaze	41
	Bahla ware	43
	Abbasid lustreware	44
	Sgraffiato	45
	Medieval underglazed decoration	46
	Fritware	47
	Celadon	48

Table 6 | List of the seven groups of pottery types identified on the site of al-Yamāma

Phase 1

COMMON WARES (FIGS. 153, 164-168)

The most common ware in all the stratigraphic phases is a buff to reddish ware, medium to well fired, with a mineral temper including a few medium- to large-sized grits (**fig. 153**). In the upper levels (phases 1 and 2, to a lesser extent phase 3), the fabric appears to be more frequently greenish.

Constituting 71% of the phase 1 assemblage, common wares are characterized by different shapes: bowls and basins (**figs. 164-166**), juglets and jars (**figs. 167-168**).

Bowls with an everted triangular-shaped rim form a family with small variations (**fig. 164**: nos. 1-5). This type of rim was found in Quṣayr al-Qadīm (Egypt) (WHITCOMB & JOHNSON 1982: pl. 49b, eastern area, level E18C) associated with Northern Sung celadon pottery dated to the Middle Islamic period (960-1127). A triangular rim and conical wall also characterizes some pans from Tell Arqa (Lebanon), sometimes glazed inside (THALMANN 1978: fig. 31.3-6, level G and H, red fabric, diam.: 25-30 cm) dated to the first half of the 13th century.

Triangular collared rims, like the particular one in **fig. 164**: no. 2, are similar to sugar pots from Jordanian sites: those from the Wādī al-Yabis survey all have a ribbon outside, (MABRY & PALUMBO 1988: fig. 14.95-97, diam.: 30 cm); others were found at Tell Abu Sarbut (HASS *et al.* 1992: 338, fig. 7). Both sites are dated to the Ayyubid-Mamluk periods (mid-13th to the early 16th centuries). Similar shapes still occur in later periods, for example in the Wādī Faynān assemblage (Southern Jordan) (TOMBERT 2008: fig. A2.10 no. 114, pale grey fabric, diam.: 18 cm) dated to later Islamic and Ottoman periods.

This kind of bowl also exists in sandy fabric (**fig. 169**: nos. 3, 5) and fine sandy fabric (**fig. 169**: no. 6).

Most of the bowls must have had a flat base (**fig. 166**: nos. 7, 9), sometimes with a single groove (**fig. 166**: no. 8) or a slight projection (**fig. 166**: nos. 11-12).

Basins with everted walls and a simple rounded rim are frequent. Only one has a distinctive shape and wavy decoration on the outside (**fig. 165**: no. 5). This shape is known from the Nabataean and Roman periods onwards as shown by a similar basin found in Buṣrā (Syria) (WILSON & SA'D 1984: fig. 230, stratum 9). Other parallels in Wādī Faynān are dated to the Late Byzantine and Early Islamic period (ADAMS *et al.* 2008: figs. A5.40: no. 843, A5.44: no. 207, fig. A2.10: no. 102). The specific rim of this basin with inside inflexion is also well represented in al-Qubayba (BAGATTI 1947: fig. 30.10-11, first period) dated to the mid-12th-mid-13th centuries.

Many rims of juglets or jars were found in the phase 1 layers. A first group have an everted soft triangular rim (**fig. 167**: nos. 1-2). Similar shapes with a wavy decoration have been found in Bahrain in phase 10 dated to the 12th-13th centuries (KERVRAN *et al.* 2006: fig. 137.2).

The second group has a rounded everted rim (**fig. 167**: nos. 3-5). This shape also exists in coarse ware (**fig. 170**: no. 5). Two-handled jars with the same rim have been found in Quṣayr al-Qadīm (WHITCOMB & JOHNSON 1982: pl. 47b, level E18a-14); they are associated with Southern Sung celadon pottery (1128-1279 AD).

The third group is characterized by the upright triangular rim of bottle-necks (Y.001.4 - **fig. 167**: no. 9). This shape is common in Jabal Hārūn from the Byzantine to the Middle Islamic period (GERBER 2008: fig. 5.116 in phases 9-12: Byzantine/Early Islamic, fig. 6.142 in phase 12: Middle Islamic). In Wādī Faynān and Bahrain this shape survives until the Late Islamic period (TOMBER 2008: fig. A2.10 no. 113; ADAMS *et al.* 2008: fig. A5.34 no. 789 in sandy grey ware; FRIFELT 2001: fig. 119).

Few sherds of jars were found, probably due to the nature of the area. One has a flat and folded rim (Y.001.3 – **fig. 167**: no. 12).

Rims of carinated jars or bowls (?) similar to sherds Y.029.1 and Y.001.7 (**fig. 168**: nos. 1–2) appear in the levels of the first period (i.e. mid-12th–mid-13th centuries) of al-Qubayba with a larger diameter (16 to 22 cm) (BAGATTI 1947: fig. 23.1–8, 31.3–6).

A jar rim (**fig. 168**: no. 6) could correspond to biconical storage jars such as those found in the Islamic fortress of Bahrain, in Late Islamic levels (FRIFELT 2001: 64, fig. 88).

Finally, flat lids with a single groove (**fig. 168**: no. 8) are frequent in Islamic assemblages.

SANDY WARES (FIG. 169)

The sandy wares are mostly reddish to orange in colour (though a few vessels are yellow), well fired, with an abundant sand temper of small and medium size. Some vessels have a light whitish wash on the outside wall (**fig. 154**). This category represents 8.7% of the phase 1 assemblage; it includes bowls, basins and juglets (**fig. 169**).

The fabric and shape of the bowl with straight rim and two deep grooves (Y.031.4 – **fig. 169**: no. 1) is reminiscent of the neck of some juglets found in Bahrain dated to the 12th–13th centuries (phase 10) (KERVRAN *et al.* 2006: figs. 131.4, 131.6).

Rims of closed jars (**fig. 169**: no. 6) with a ribbon outside recall similar jars in the common ware group (**fig. 167**: nos. 6–7).

COARSE AND GREY WARE (FIG. 170)

Coarse wares and grey wares (12.5% of the phase 1 assemblage) include a variety of shapes: jars, juglets, cooking pots and bowls.

Hole-mouthed jars (i.e. Y.038.4 – **fig. 170**: no. 1) are rare. Such shapes in a similar coarse ware fabric exist at Burj al-Ahmar (Syria), in levels dated to the second half of the 13th and the 14th centuries (PRINGLE 1986: fig. 44.20).

Small cooking pots with handles (Y.034.18 – **fig. 170**: no. 3) are frequent at Jabal Hārūn from the Early Byzantine to the Middle Islamic levels (late 4th–5th centuries to the 12th century) (GERBER 2008: fig. 4.91). They are abundant at Dūmat al-Jandal (Northern Saudi Arabia) with diameters varying from 14 to 25 cm in levels 2 and 4, dated to the 10th–13th centuries (SIMÉON & LORETO forthcoming: level 2, DJ.09.A-45.2 and A.45.9; level 4, DJ.09A.41).

A basin rim (Y.028.2 – **fig. 170**: no. 1) has a similar shape and fabric to a basin with flat base and ribbed wall found in Barbar (Bahrain – FRIFELT 2001: 26, fig. 31). It is dated, through comparison, to the Middle Islamic period (9th–10th centuries).

PECULIAR FABRICS AND IMPORTED WARES (FIGS. 171-172)

These constitute 7.5% of the phase 1 pottery assemblage.

Only two peculiar fabrics were identified in phase 1 layers: *medium fine buff ware* and *thick buff ware with a reddish wash* (**fig. 158**: types 5 and 11). Shapes and decoration are poor. The bowl with a triangular collared rim (Y.022.5 – **fig. 171**: no. 1) is identical to several bowls in common ware (**fig. 164**: nos. 1–2).

A blue-green glazed bowl with a vertical rim, maybe carinated (**fig. 172**: no. 1), is reminiscent of an unglazed bowl or small jar in common ware (Y.029.1 – **fig. 168**: nos. 1–2). It is also comparable to a green glazed bowl from the first period (mid-12th–mid-13th centuries) at al-Qubayba (BAGATTI 1947: fig. 31.11–13).

A stoneware cup (**figs. 107a, 172: no. 4**) with a celadon glaze outside and transparent glaze inside, from the Jingdezhen kilns (province of Jiangxi) is dated to the end of the 17th/beginning of the 18th centuries (B. Zhao, pers. comm.).

Three over-fired sherds (**figs. 160, 172**) were found in the upper layer of Building 1 (UF 036) and in the collapse of wall W. 002 (UF 004). The fabric is grey and the surface turned green during the heating process. Two of them are small closed shapes (**fig. 172: nos. 6–7**). The rim of the first has melted and so its stance and diameter are unknown. The third one might be a bowl with everted rim (**fig. 172: no. 8**). In the context of the mosque (Building 1), these wasters are clearly intrusive and so could be related to a kiln area located 100 metres to the west (area L7-K7 – See Chapter 6 and **figs. 97–98**).

DISCUSSION

The phase 1 pottery from area N6 at al-Yamāma cannot be easily characterized. This phase yielded only a small amount of pottery from Building 1 and Sounding 1 (183 sherds), most of it common wares (71%). This lack of pottery is explained by the nature of Building 1, a mosque, which was by definition a sacred and clean space. Pottery sherds seem to have been mainly local productions (possibly the *common buff greenish ware with medium to thick grits*, as testified by the presence of ceramic wasters in the neighbourhood). Nevertheless, several shapes and/or fabrics are comparable to, or are clearly imports of products from the north-west (Jordan, Syria, Egyptian Red Sea coast), from the Gulf and for a few examples, from China.

Ceramic comparisons show how heterogeneous the phase 1 assemblage is. Although it is predominantly comparable to 12th–13th centuries productions, parallels have also been established with both Late Byzantine/Early Islamic periods, and the 16th–18th centuries. This discrepancy originates in the close proximity of these levels with the surface; this might have resulted in the intrusion of earlier and later material. It can also be explained by the fact that most of the material comes from the depression to the north of Building 1 (see Chapter 7) where sherds from different periods accumulated.

Nevertheless, a long-lasting occupation cannot be discarded, as shown by the numerous restorations of the *qibla* wall (W. 006), of the southern and northern walls (W. 043, W. 002), and by the successive floors above the plaster floor F. 015 (phase 2) in Building 1. Worship in Building 1 was maintained until the late 17th century. It is interesting to note that parallels can be established with 12th–13th and 16th–18th centuries productions, not with those from the 14th–15th centuries. This observation had also been made on the pottery sampled on the surface of the site (SCHIETTECATTE *et al.* 2013: 302). Such an absence could be interpreted as a temporary abandonment of al-Yamāma during this period.

Phase 2

COMMON WARES (FIGS. 173-174)

The common wares are proportionally less abundant in phase 2 than in phase 1 (49% of the pottery assemblage). But there is no noticeable change: they are still mainly either *medium buff ware with medium to thick grits* (type 1a, 43% of the common wares in phase 2) or *medium reddish buff ware with cream slip* (type 35, 21%). These are bowls, basins (**fig. 173**), jars and juglets (**fig. 174**). Some bowls with a simple rounded inverted rim (**fig. 173: no. 1**) are identical to those from phase 1 (**fig. 165: nos. 1, 3–4**); the same can be said for the flat bases from phase 2 (**fig. 173: nos. 8–9**) and phase 1 (**fig. 166**).

Everted triangular rims, frequent in phase 1, are only attested once here (Y.053.1 – **fig. 174**: no. 1). This shape has previously been compared with Middle to Late Islamic productions. A doubt exists regarding these rims, as to whether they correspond to juglets or small bowls with a flat base, like those presented in phase 1 (**fig. 164**: nos. 1, 3–4, 6).

SANDY WARES AND COARSE WARES (FIG. 175)

Sandy wares and coarse wares are more abundant than in the previous phase (respectively 16% and 18% of the pottery assemblage). Sandy wares are generally *medium yellow sandy ware* (66.5% of the sandy wares – **fig. 154**: type 26), a type unattested in phase 1 levels. However, the coarse wares in phase 2 comprise almost 50% of *pinkish cooking ware with white exploded grits* (**fig. 156**: type 6), as they did in phase 1. The shapes for these categories are bowls, basins and pots.

The rim of a carinated pot between neck and shoulder (Y.055.5 – **fig. 175**: no. 1) could be a drinking vessel; it has been considered as a goblet in Bahrain (KERVRAN *et al.* 2006: figs.131.1, 131.3–4) where it has been found in contexts dated to the 12th–13th centuries. This kind of carinated pot also appears in Tebtynis in Egypt, with a red and white slip, in a level from the 10th century (ROUSSET & MARCHAND 2001: 461, fig. 43a-b).

A rim of a bowl or ewer (Y.055.4 – **fig. 175**: no. 5) is similar to an over-fired sherd found during the 2011 survey on the site in areas K7-L7. The shape of the rim and the size of the neck are also identical with those of a small jug found in Bahrain (KERVRAN *et al.* 2006: fig. 131.10) dated to the 12th–13th centuries.

The cooking pot (Y.012.2 – **fig. 175**: no. 7) is similar to ones from Jabal Hārūn, from Early Byzantine to Middle Islamic periods (4th–12th centuries) (GERBER 2008: fig. 4.91). At Dūmat al-Jandal, such shapes belong to levels 2 and 4 (10th–13th centuries) and in Kush to the 11th–16th centuries (KENNET 2004: 116, figs. 19–20).

PECULIAR FABRICS AND IMPORTS (FIG. 176)

Peculiar fabric and imports represent 12.5% of the corpus in this phase. They are either basins or bowls (**fig. 176**).

Sherd Y.020.2 (**fig. 176**: no. 1) is decorated with a zigzag pattern, quite rare on pottery of this phase. It can be compared to Late Byzantine/Early Islamic ceramics (phase 9–12) from Jabal Hārūn (GERBER 2008: fig. 7.164).

The basin in a *medium fine buff ware with cross-hatch paint in red* is a type only attested in stratified levels from phase 2 (Y.021.1 – **fig. 176**: no. 3). It is comparable to the sandy ware basins from both phases 1 and 2 (**figs. 169**: no. 4, **175**: no. 2).

Finally, a large open *bowl with an opaque grey/white glaze* (**figs. 107d, 176**: no. 5) is known as Abbasid fine cream Samarra ware. Generally a white ware with blue-green decoration, this one may simply have an eroded monochrome or polychrome lustre. Such vessels have been found in Samarra (NORTHEGE & FALKNER 1983: figs. 52.533, 52.535). These wares were most probably produced in al-Baṣra (MASON & KEALL 1991; MASON 1997). They have been found in many sites in the Gulf area, in contexts dated to the middle of the Abbasid period (10th century), for instance in Bahrain with an olive-green decoration (FRIFELT 2001: 19, fig. 14) or Ra's al-Khayma (KENNET 2004: 32).

DISCUSSION

Phase 2 is poor in diagnostic material. The nature of the archaeological levels connected with the refurbishing of the external walls of the mosque could explain the long duration of this phase.

While some fabrics are as frequent as they were in phase 1 levels (*buff or reddish ware with medium to thick grits*), others make their first appearance in phase 2 (*yellow sandy ware*, for example).

Finally, the triangular collared rims, numerous in phase 1 (**fig. 164**), are almost absent in phase 2 (only one sherd recorded: Y.053.1 – **fig. 174**: no. 1).

Phase 3

The levels of phase 3 contain 54% of the pottery collected in Sounding 1, despite the fact that the volume of sediment was smaller than that of phase 1 and comparable to the volume of phases 2 and 4. Though the pottery is abundant, it is also very fragmented: most of the sediments were sieved, resulting in a collection of many small fragments.

Apart from the common wares, which are the most numerous (461 sherds, 64%), the two best-represented industries are the sandy wares (8.5%) and the *pinkish cooking wares* (13.5%).

COMMON WARES (FIG. 177)

Only jars were registered in common wares. Some medium-sized vessels with no neck could have been used as cooking pots or for storage (**fig. 177**: nos. 4–5). Their triangular rim is a common shape in regional wares; for instance on the comb decorated *medium sandy red-orange ware* bowls (**fig. 178**: no. 6).

Two jars of *medium reddish buff ware with cream slip* and *medium buff ware with medium thick grits* have a short neck and a thickened, hanging, grooved rim (**fig. 177**: nos. 1–2). One of them, better levigated, has a cream slip outside (**fig. 177**: no. 1).

Also in *common buff ware with medium thick grits* there was a medium-sized jar with a short vertical neck and a flat rim, decorated with incisions forming a kind of cordon (**fig. 177**: no. 3). The same kind of shape is also found in a *pinkish cooking ware with white exploded grits* (**fig. 179**: no. 3). This type of neck can belong to vessels used as cooking pots, which are uncommon in regional productions of southern and eastern Arabia (Oman Peninsula, Central Oman, Ḥaḍramawt, Yemen), where the cooking pots are usually very open shapes with almost vertical walls and a rim slightly closing the mouth (SEDOV 2007: pl. 12.8–10), or imported Indian globular vessels with out-turned rim (SEDOV 2010: fig. 92). The incised vertical neck of the pots found here are to be related to north Arabian traditions, as attested in the Nabataean assemblage (SCHMID 2000, Abb. 249–279).

SANDY WARES (FIG. 178)

The sandy wares represent 8.5% of the phase 3 pottery and 68% of all the sandy wares collected in Sounding 1. For comparison, in the phase 2 levels, sandy wares represent 19% of the pottery and 23% of the sandy wares found in Sounding 1. 81% of the sandy wares found in Sounding 1 were concentrated in phases 2 and 3.

In *medium sandy red-orange ware*, small jars with slightly everted neck and thickened flat rim are common (**fig. 178**: no. 1). The large bowl Y.057.14 (**fig. 178**: no. 6) compares to series that are also very frequent at Thaj, even if an exact parallel cannot be found. More precise

morphological parallels are found in the Dhahran region, in a different ware described as “pink/buff with grits” (POTTS 1984: fig. 13.1–2).

In *yellow sandy ware*, we found the neck of a jar with a thickened round rim lined by a groove (**fig. 178**: no. 3).

In a finer sandy fabric are two dishes or shallow bowls with flat or oblique rim, slightly hanging towards the inside of the vessel (**fig. 178**: nos. 4–5).

A larger dish, or shallow bowl, in well-fired, medium sandy, reddish–light brown ware is characterized by a triangular rim, curving to the inside of the vessel (**fig. 178**: no. 6). This type of rim is common on vessels of this fabric with a comb decoration; in the example here, the fragment was perhaps too small to have preserved any decoration. This industry is well represented in al-Kharj and al-Aflaj regions and has been defined as pre-Islamic ([AL-]GHAZZI 2010: 160–161), a dating which is still to be confirmed. In our opinion, it must be related with the black sandy ware known as *Layla ware* (**fig. 155**), with the same geographical distribution and a comparable comb decoration tradition.

COARSE WARES (**FIG. 179**)

Coarse cooking pots and bowls, in a *pinkish ware with white exploded grits* (**fig. 156**), or in a *handmade gritty ware* (**fig. 156**), are numerous in phase 3: 52% of the sherds of these fabrics were collected in phase 3 deposits, where they represent 13.5% of the pottery (**fig. 179**). Coarse ware bowls with convex wall and round or thinned or thickened rim (**fig. 179**: nos. 4–6) are often decorated with one or several horizontal incisions.

GREY WARES (**FIG. 180**)

This category constitutes less than 1% of the pottery assemblage in phase 3. Light grey slips are found in two different wares (4 and 5 fragments, possibly the remains of a single vessel of each kind). These are open shapes, in a *grey scratchy wares with grey slip* (**fig. 180**: no. 6) and a very *fine grey ware with grey slip* (**fig. 180**: no. 7).

PECULIAR FABRICS (**FIG. 180**)

The *medium fine buff ware with white and red matt slip* (**fig. 158**: type 5) is poorly represented in Sounding 1 (1.8% of the pottery collected), but most of the fragments (65%) are from phase 3; a single fragment was found in phase 2 and 25% of the fragments are from phase 1. The chronological distribution of this industry is not significant. Morphologically, the vessels belong to types well known in the Late Pre-Islamic and Early Islamic periods. The fabric is peculiar, with a clearly identifiable whitish and red slip finish; no parallel was found (**fig. 180**: nos. 1–5).

GLAZED WARE (**FIG. 180**)

Glazed pottery is rare in all the layers in Sounding 1; in phase 3 it represents 0.8% of the collected fragments. A single glazed vessel shape was registered: a shallow bowl with a long flaring rim (**fig. 180**: no. 8). A flat base might be a second fragment of a totally decayed glazed vessel (**fig. 180**: no. 9).

The bowl compares with types from the 1st–2nd centuries AD at ed-Dur (MOUTON 2008: fig. 71.24–25), some vessels being identical (HAERINCK *et al.* 1993: fig. 1.3). The same type of vessel is found in deposits dated to 50–225 AD at Uruk-Warka in Iraq (FINKBEINER 1992: no. 410; FINKBEINER 1993: 7). Parallels can also be found in levels dated to the beginning of the Islamic

period, but in these later vessels the rim appears to be separated from the oblique wall by a ledge (for instance at Kush, KENNET 2004: types 101, 104).

DISCUSSION

Despite the amount of material collected, nothing diagnostic was found that allowed a precise dating of phase 3. The systematic sieving of the sediments produced many very small fragments which are not significant. Some morphological types found parallels in pre-Islamic assemblages of Eastern Arabia. However, the regional Islamic pottery sequence is still poorly documented, though recent debates reveal the continuity of many ceramic types across most of the 1st millennium AD. The finding of a fragment of a glass bangle characteristic of the Islamic period prevents us from dating phase 3 securely to late Antiquity.

Phase 4

COMMON WARES

In phase 4, most of the registered common wares are bowls. A single neck of a jar was found, in common buff ware with a thin mineral temper, a medium thick wall and a slightly everted rim with horizontal grooves (fig. 181: no. 1). A comparable vessel was found at Mleiha, with a more everted rim, in a PIR.B-period deposit, dated to the mid-2nd–1st century BC (MOUTON 2008: fig. 35.11).

Shallow bowls with an everted rim immediately above a kind of carination are characteristic of common ware in phase 4 (fig. 181: nos. 5–7). The fabric is of good quality: a buff ware, well levigated and fired; two pieces have a cream wash (fig. 153: type 33), the third one being red slipped (figs. 153: type 37, 181: no. 5). This type of shallow, twisted bowl is usual in the glazed pottery industry from late Antiquity and the very early Islamic period. Comparable bowls, with a wider everted rim and more reddish ware, were found during a survey in the vicinity of Jubayl (POTTS 1984: fig. 5:5), and in a buff–pinkish ware at ‘Ayn Jāwān (POTTS 1984: figs. 8.16, 10.1) and Dhahran (POTTS 1984: fig. 13.5), in the Eastern Province of Saudi Arabia. In the Oman peninsula, it was found at Mleiha in a well-levigated, fine ware, in levels of the PIR.B period, dated to the mid-2nd–1st centuries BC (MOUTON 2008: fig. 35.6), and at ed-Dur in deposits dated to the 1st–2nd centuries AD (MOUTON 2008: fig. 79.4). At Petra, in Jordan, this shape appears in very small numbers in deposits dated to the middle of the 2nd–1st centuries BC (SCHMID 2000: 44–45, Abb. 113). It stays in use until the Early Islamic period in the Gulf region, at Jazīrat al-Ḥulayla (Emirate of Ra’s al-Khayma) between the 5th and the 8th century AD (SASAKI 1996: fig. 10.94–118), and the same shape but with a shorter rim (fig. 181: no. 5) is also frequent in glazed ware until the 8th century AD, for instance at Kush (Ra’s al-Khayma) (KENNET 2004: 30, fig. 5 type 72).

PECULIAR FABRICS

Characteristic of the lowest levels reached in Sounding 1 is the *red ware with grey-black core and very abundant chaff temper* (fig. 158: type 15). The external wall often shows a whitish/light yellow, irregular wash. A total of 57 sherds of this fabric were found in the whole of Sounding 1, 80% in phase 4, and only ten sherds in the upper levels (phases 2 and 3).

The same industry is found in the pre-Nabataean/Hellenistic layers at Madā’in Šāliḥ, dated to the 2nd century BC (DURAND 2011: fig. 5: 10262_P05, and pers. comm.). At Madā’in Šāliḥ, this ware is associated with the reddish fabrics characterizing the Hellenistic assemblage, clearly distinct from the later more buff and greenish industries. At Mleiha, in the Oman Peninsula

(Emirate of Sharjah), *red ware with grey-black core and very abundant chaff temper* is also attested in the early levels of the PIR.A period, dated to the mid-3rd–mid-2nd centuries BC, where it represents 2.7% of the pottery collected. In the following period, PIR.B, dated to the mid-2nd–1st centuries BC, it is much less frequent (MOUTON 2008: 42, 64).

A flat base and the neck of a jar with a thickened round rim are the only shapes found in this category at al-Yamāma (fig. 182: nos. 4–5).

Two fragments of *medium fine buff ware with white and red matt slip* (see fig. 158: type 5) were found in phase 4. This very peculiar fabric is better represented in phases 1 and 3. The only shape registered in phase 4 is a bowl with a vertical wall and simple round rim (fig. 182: no. 3).

GLAZED WARE

A single fragment of light green glazed vessel was found in phase 4: a small narrow neck with an everted round rim (fig. 182: no. 1), probably of a flask with twin handles at the base of the neck. The fabric is buff-yellow.

A morphological parallel is found at ed-Dur (Emirate of Umm al-Qaiwayn) in a context of the PIR.C period, dated to the 1st–2nd centuries AD (MOUTON 2008: fig. 73.1). Also in the Gulf region, at Failaka, glazed bottles with a flat everted rim are recorded in the so-called Hellenistic contexts (HANNSTAD 1983: pl. 29.304). At Bahrain, similar vessels were found in the Saar cemetery, dated to the 1st century BC–2nd century AD (SALLES & LOMBARD 1999: 168, figs. 240–242).

DISCUSSION

The phase 4 assemblage consists mainly of open shapes. Jars are rare (two necks and possibly a base or two) and they appear to be of small or medium size. The absence of large containers attesting to storage of goods is remarkable. These characteristics are related to mobility. The finds in Sounding 1 are probably not representative of the whole site. However, they could indicate that non-sedentary groups of people lived on the site, as part of a larger population including a sedentary group settling permanently at al-Yamāma. Perhaps they occupied parts of the oasis seasonally. Indeed, no remains of any construction have been found in the excavated levels of phase 4.

The significant vessels and types registered in this phase indicate a pre-Islamic occupation. Most of the morphological parallels refer to types that were in use for an extended time, from the last centuries BC until the Early Islamic period. The *red ware with grey-black core and very abundant chaff temper* is the most abundant industry registered. It is well represented, characteristic of phase 4 and has parallels in the Arabian Peninsula with material found in contexts dated to the 3rd–1st centuries BC, a date confirmed by the radiocarbon analysis carried out on a sample from this phase (see Chapter 7). This date is therefore provisionally attributed to phase 4.

Surface sampling and provisional reconstruction of the urban layout

Several pottery types can already be considered as chronological markers, either because they can be ascribed to one or two occupation phases of the site based on the results from Sounding 1, or because they are well-known and well-dated imported productions. Their sampling across the surface of the whole site provided us with an insight into the extent of the settlement at different stages of its occupation.

THE PRE-ISLAMIC OCCUPATION (FIG. 161)

The pre-Islamic occupation (phase 4 in Sounding 1) is provisionally dated to the turn of the millennium (ca. 3rd century BC–2nd century AD), a single pottery type is relevant:

- *Red ware with grey-black core and very abundant chaff temper* (figs. 158: type 15, 182: nos. 4–5). Since more than 80% of the sherds belonging to this category come from the phase 4 layers of Sounding 1 (47 sherds against 5 for phase 3 and 5 for phase 2), it can be considered as a chronological marker for the earliest occupation of the site identified so far. It has only been found in Sounding 1, no sherds were sampled elsewhere on the surface.

The only surface evidence of this early occupation is two pre-Islamic coins found in the late 1980s ([AL]-GHAZZI 2010: 89–90, pl. 23/1–2).

The extent of the site during phase 4 cannot be established with any certainty (fig. 161). The evidence is scarce and unconnected to any buildings. This could be the result either of a complete covering over of the early occupation by the later ones, or the reflection of a very limited occupation.

THE LATE PRE-ISLAMIC / EARLY ISLAMIC OCCUPATION (FIG. 162)

Pottery types are:

- *Medium fine buff ware with cross-hatch paint in red* (type 3 – figs. 158, 83: nos. 1–3; see also [AL]-GHAZZI 2010: 102–103, pls. 57–63). It is characterized by a well-fired, buff to red fabric, a few medium black and red grits, whitish to greenish surfaces and a criss-cross pattern painted in red to brown. Vessels are open bowls, with a medium to thin wall and a rounded rim. A few sherds (6) were found in stratified levels of phase 3. On the surface, they are found in the southern part of the site, in close proximity with *Layla ware*, which is ascribed rather to phase 2 layers. Similar sherds have been sampled on the surface in the Layla/Aflaj area, ca. 230 km south of al-Kharj, on sites 212-59 and 212-66 (ZARINS *et al.* 1979: 33, pl. 25.181–183). Site number 212-59 has a wide chronological range and is of no help for the dating. Site 212-66 has been dated to the Late Pre-Islamic period by the presence of blue glazed pottery, ‘Faw ware’, and so-called ‘Hellenistic bowls’ (ZARINS *et al.* 1979: 33). At Thaj, bowls of a different fabric with a criss-cross pattern painted below the rim were found in phases IV–V of the deep sounding (GAZDAR *et al.* 1984: 72, pl. 79.b); they are associated with rouletted ware dated to the first centuries AD (GAZDAR *et al.* 1984: 80). These parallels point to a long-term tradition in eastern Arabia which could have extended from the Late Pre-Islamic to the Early Islamic period.
- *Layla ware* (figs. 155: types 9-10, 183: nos. 4–10): they are characterized by a very well-fired grey or black ware, scratchy surfaces (type 9) or roughly vitrified, over-fired surfaces (type 10). They often have a comb-incised decoration, with a wide range of patterns. They are either large open bowls with a medium wall (fig. 183: nos. 7–10), or thick jars with a square or triangular rim (fig. 183: nos. 4–6). This category has been previously dated to the 1st–6th centuries AD (ZARINS *et al.* 1979: 32), or perhaps earlier ([AL]-GHAZZI 2010: 156–157). Sounding 1 yielded very few sherds of these types (5 in phase 3, 2 in phase 2). They are here indicative of a long lasting production until the early Islamic period.

On the surface, they have only been found in the southern half of the site, frequently in association with the *medium fine buff ware with cross-hatch paint in red*.

- *Blue/green glazed ware* (fig. 159: types 20–21). These types are generally characterized by a well-levigated, yellow to light buff ware with a green to deep blue glaze, sometimes striped, and sometimes with a punctate pattern. Some examples can be ascribed to the Late Pre-Islamic or Early Islamic periods (type 20); others are typical examples of Baṣra exports

from the late 8th to late 10th centuries (type 21). They have been found on the surface over almost all the site. Two sherds of splashware from areas J9 and L17 are associated to this group and can be dated to the middle Abbasid period (9th–12th centuries) (**fig. 184**: nos. 1–2).

- *Abbasid Lustreware* (type 44). A single fragment of monochrome lustreware bowl has been found in the south-western part of the site (Y.G17.surf.1, area G17 – **figs. 159, 184**: nos. 1–2). This production is most probably from the Baṣra area, in the 9th–10th centuries AD.
- *Sgraffiato* (type 45 – **fig. 159**): two sherds of sgraffiato ware have been found in areas O15 and P12, in the eastern part of the site, and can be dated to the late 10th–13th centuries (A. Rougeulle, pers. comm.).

Sherds dated to the Sasanian to the Abbasid periods have been found all over the site (**fig. 162**) and this period corresponds to the maximum extent of the settlement. However, the documentation remains too poor to determine the phenomenon of urban contraction or expansion within this long timespan.

MODERN OCCUPATION (**FIG. 163**)

In Sounding 1, the pottery assemblage is not large enough to permit any distinction of local pottery types which would only be ascribed to this period. Modern occupation can therefore only be recognized on the surface through recent imports. These are:

- *Porcelain* (**figs. 159**: type 22, **184**: nos. 5–6). They are recent imports, including a small blue and white porcelain cup produced in Fujian or Guangdong in the 17th–18th centuries (Y.P9.surf.4 – B. ZHAO, pers. comm.) and small porcelain cups with a chocolate coating on the outer wall produced in Jingdezhen (province of Jiangxi) in the late 17th–early 18th centuries (Y.022.4 and Y.102.3 – B. ZHAO, pers. comm.).
- *Earthenware with blue and white decoration (porcelain imitation)* (**figs. 159**: type 34, **184**: no. 3). A fragment of a plate (Y.O7.surf.1) was found on the surface in the north-eastern part of the site. It is of buff fabric with no visible temper and a decoration on glaze imitating the figurative decoration of Chinese porcelain. It might be a Persian production.
- *Bahla ware* (**figs. 159**: type 43, **184**: nos. 9–10). Three sherds have been found in the north-eastern part of the site (areas N6 and P9): an annular base, a fragmentary wall of a jar and the rim of a large bowl. The fabric is grey, fine and dense, with no visible temper and a greenish-brown glaze covers both the inner and outer sides. These *Bahla wares* (also called *Khunj wares*), are most probably imported from Iran and Oman, and dated to the 16th century onwards (KENNET 2004: 42–43).
- *Fritware* (type 47 – **fig. 184**: no. 7). Siliceous wares are possibly fritwares; they have been sampled in the north/north-eastern part of the site (areas J9, N6 and P8) and can be dated to the 15th century onwards (A. Rougeulle, pers. comm.).
- *Celadon* (**figs. 159**: type 48, **172**: no. 4). Finally, two fragments of stoneware cups with a celadon glaze outside and transparent glaze inside have been found in area N6. These are imports from the Jingdezhen kilns (province of Jiangxi) and date to the late 17th–early 18th centuries (B. Zhao, pers. comm.).

Interestingly, all the late 15th–early 18th-century sherds have been found in a rather small area, restricted to the north-eastern part of the site (**fig. 163**). It is also in this area that two fragments of pipe bowls posterior to the 17th century were found (**figs. 149–150**). In the absence of 13th–15th century sherds, it seems to be indicative of a late and limited reoccupation of the site. In spite of the contraction of the settlement, the site was

still connected to international trade/circulation networks, as reflected by the presence of Chinese, Omani/Iranian and Syrian imports.

Concluding remarks

The pottery assemblage at al-Yamāma differs significantly from assemblages documented in the Gulf region. Sandy wares from the Eastern Province of Saudi Arabia are not very numerous. Glazed wares are scanty, whereas it was widely distributed on all the sites along the shores of the Gulf down to the Oman Peninsula in Antiquity and the Islamic period. Parallels with North Arabian industries or with the South-Western Arabian material are few. The al-Yamāma assemblage appears to be characterized by very local or regional industries of central Arabia (al-Kharj area, al-Aflāj area). The scarcity of imported vessels could be indicative of the weak integration of the region into the long-distance, trans-Arabian trade.

The few parallels established between some of the pottery sherds found on the site and those found in the Gulf and the Near-East has nevertheless allowed us to draw up the outlines of a chronology for al-Yamāma. An ancient occupation (phase 4), apparently quite limited, is dated to the turn of the 1st millennium BC/AD. During the Sasanian period at the earliest, the site went through a considerable expansion; this main occupation of the site continued until the end of the Abbasid period. No pottery type can clearly be assigned to the time range covering the 13th to mid-15th centuries. This silence speaks in favour of a hiatus in the occupation of the site, which is in accordance with written sources. No author after Yāqūt (1179–1229) mentions the city of Jaw al-Khaḍārim (al-Yamāma); in the 14th century, Ibn Baṭṭūṭa says that the main town in the region of al-Yamāma is Ḥajr (near Riyadh). After that, the highest area of the site, to the north-east, was reoccupied from the end of the 15th to the 18th century (phase 1b (?) and 1a).

In Sounding 1, Phase 1 corresponds to the pre-Islamic occupation, Phase 4 to the modern occupation. Ascribing Phase 2 and 3 in a chronological frame remains too hypothetical to be done in the absence of the results of 14C datings.

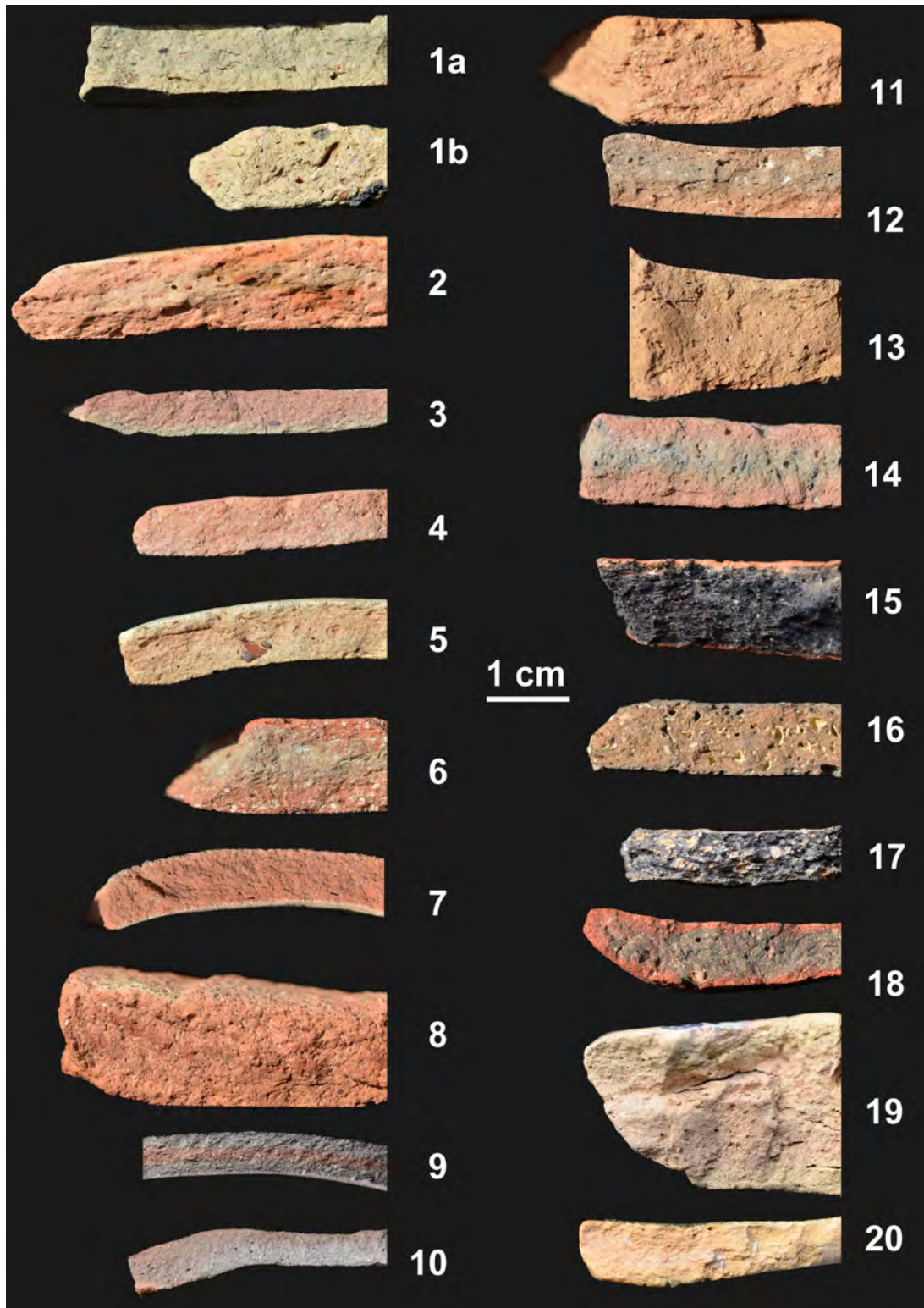


Figure 151 Sounding 1 & Building 1: Macro-photographs of the fabrics of pottery types 1 to 20 (photographs: P. Siméon; graphics: J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

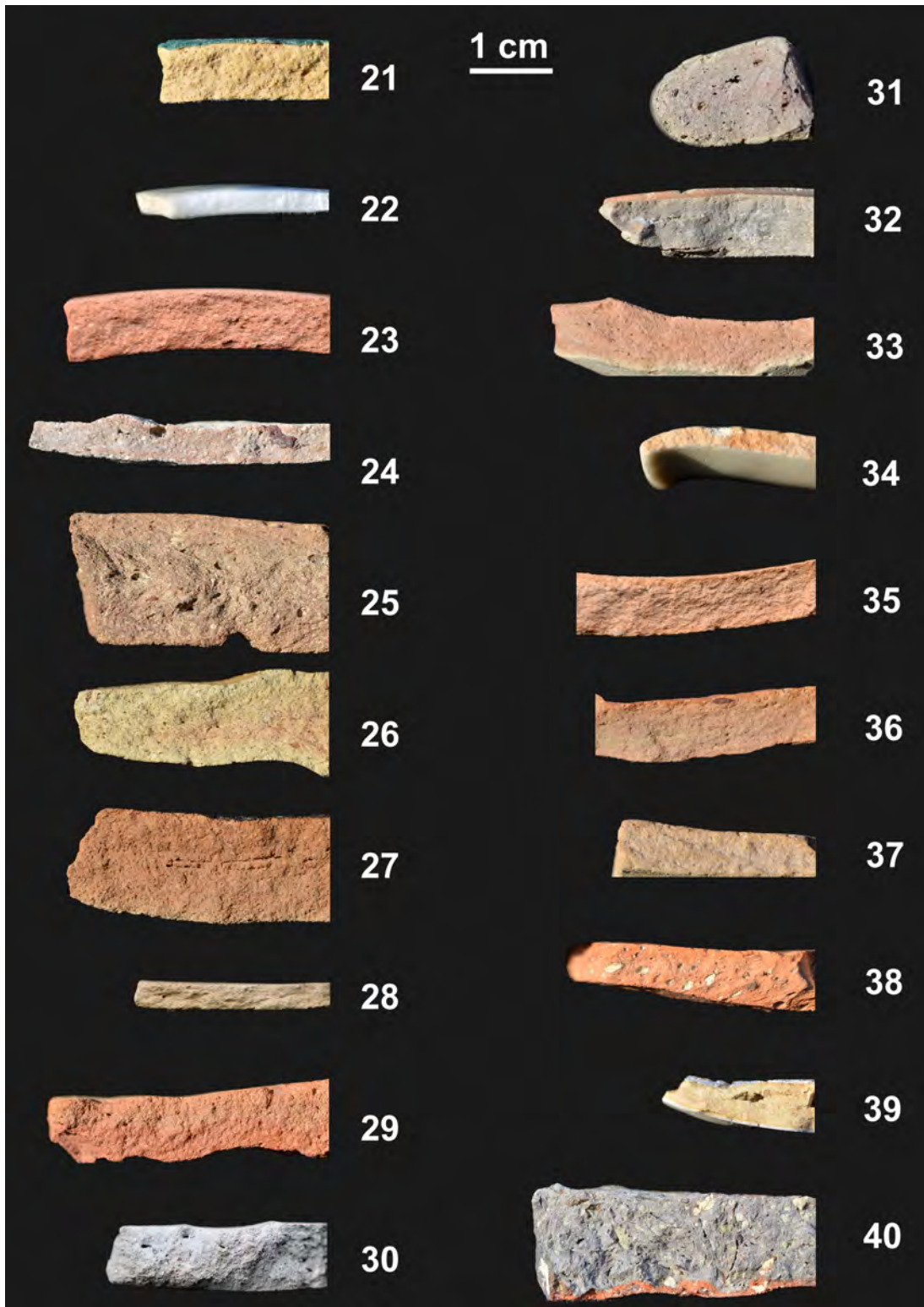


Figure 152 Sounding 1 & Building 1: Macro-photographs of the fabrics of pottery types 20 to 40 (photographs: P. Siméon; graphics: J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

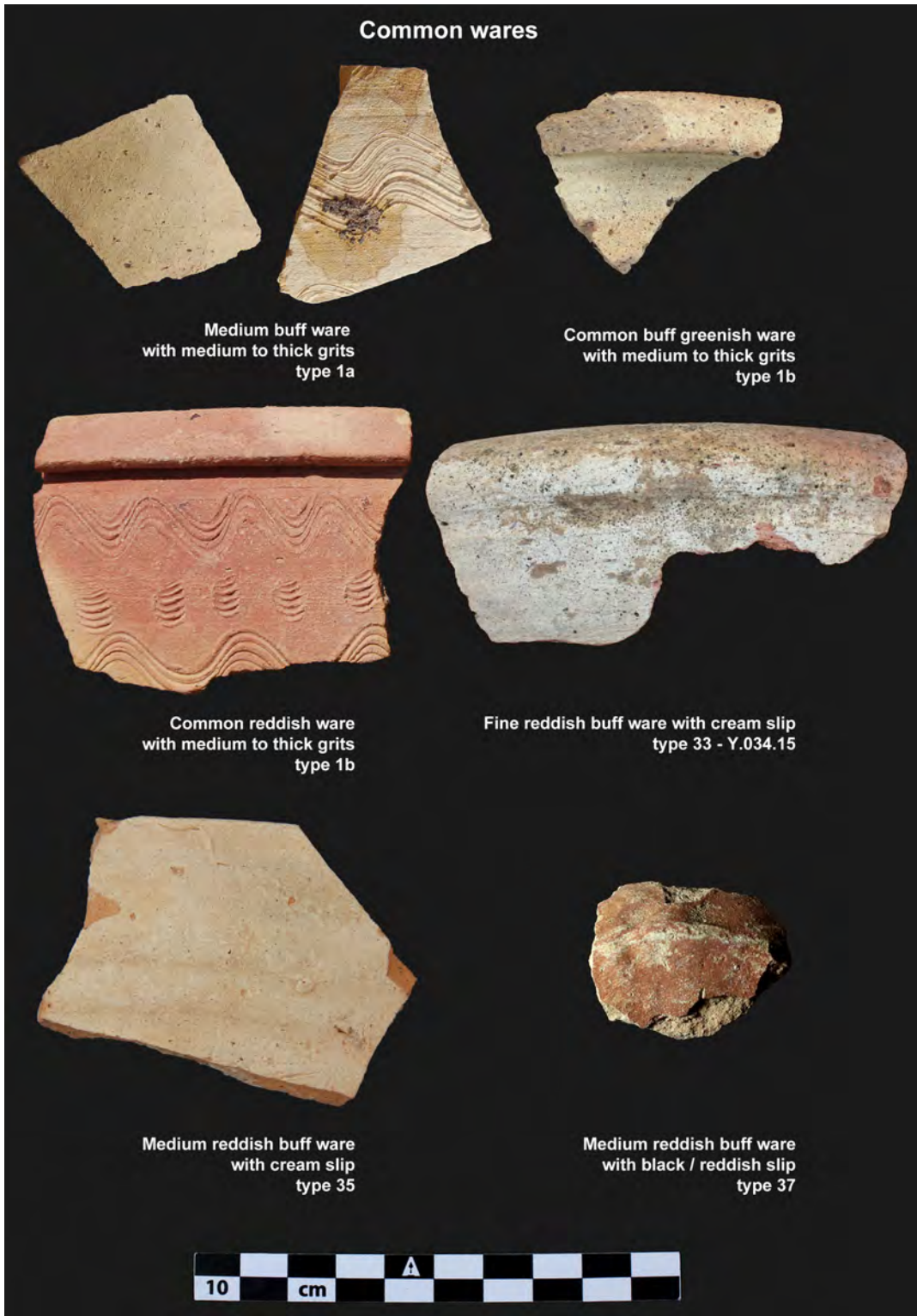


Figure 153 Common wares (photographs: M. Mouton, L. Munduteguy; graphics: J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

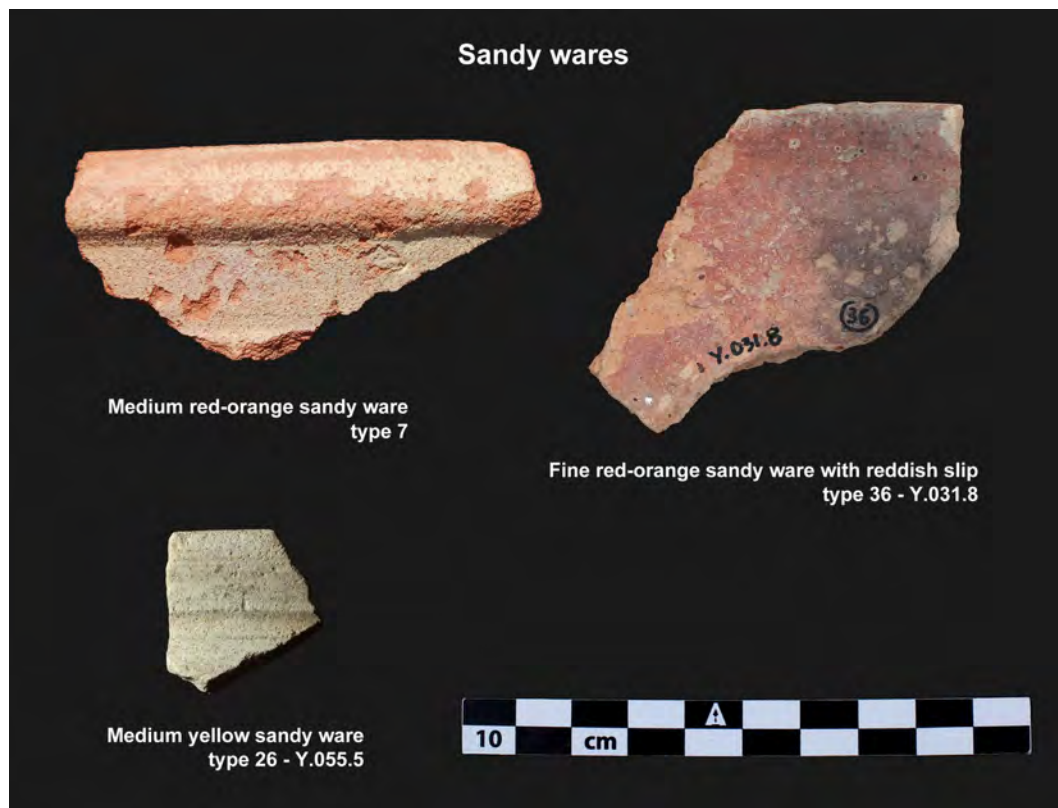


Figure 154 Sandy wares (photographs: M. Mouton, L. Munduteguy; graphics: J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

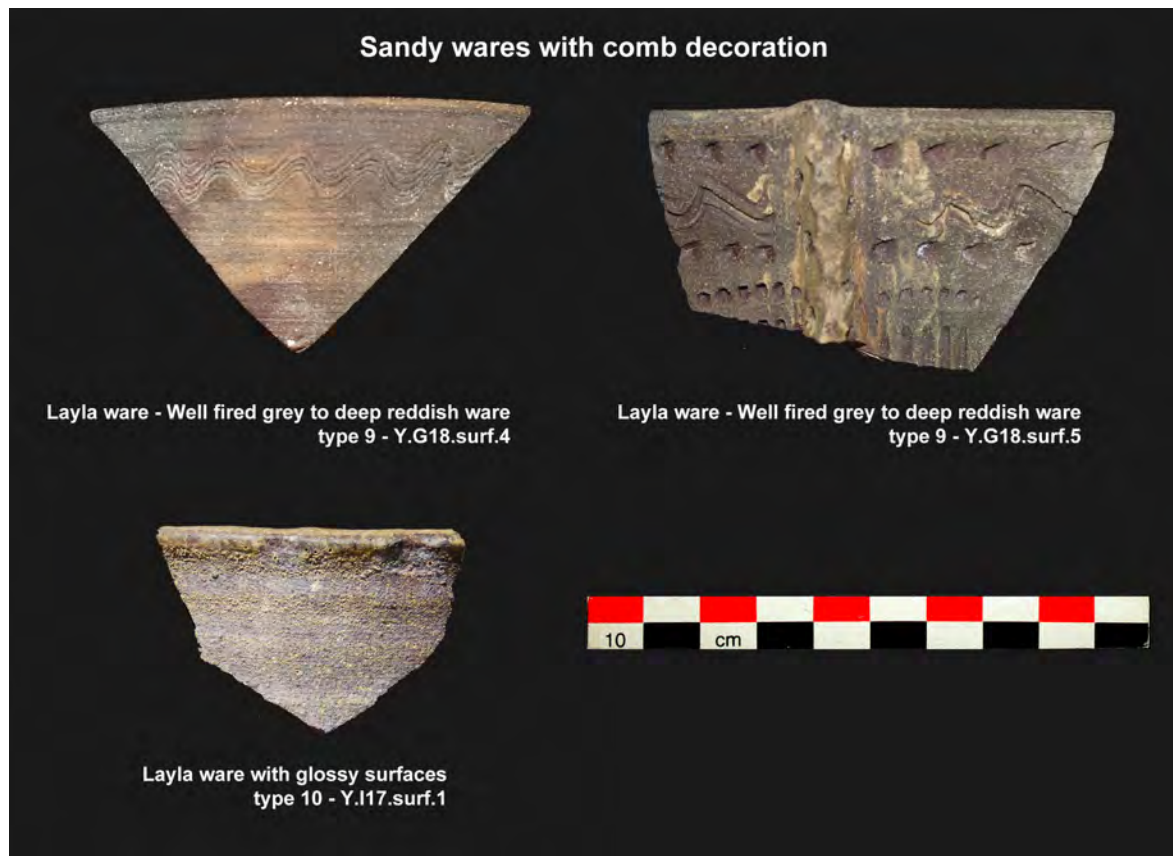


Figure 155 Sandy wares with comb decoration (photographs: M. Mouton, L. Munduteguy; graphics: J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)



Figure 156 Coarse wares (photographs: M. Mouton, L. Munduteguy; graphics: J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)



Figure 157 Grey scratchy wares (photographs: M. Mouton, L. Munduteguy; graphics: J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)



Figure 158 Peculiar fabrics (photographs: M. Mouton, L. Munduteguy; graphics: J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

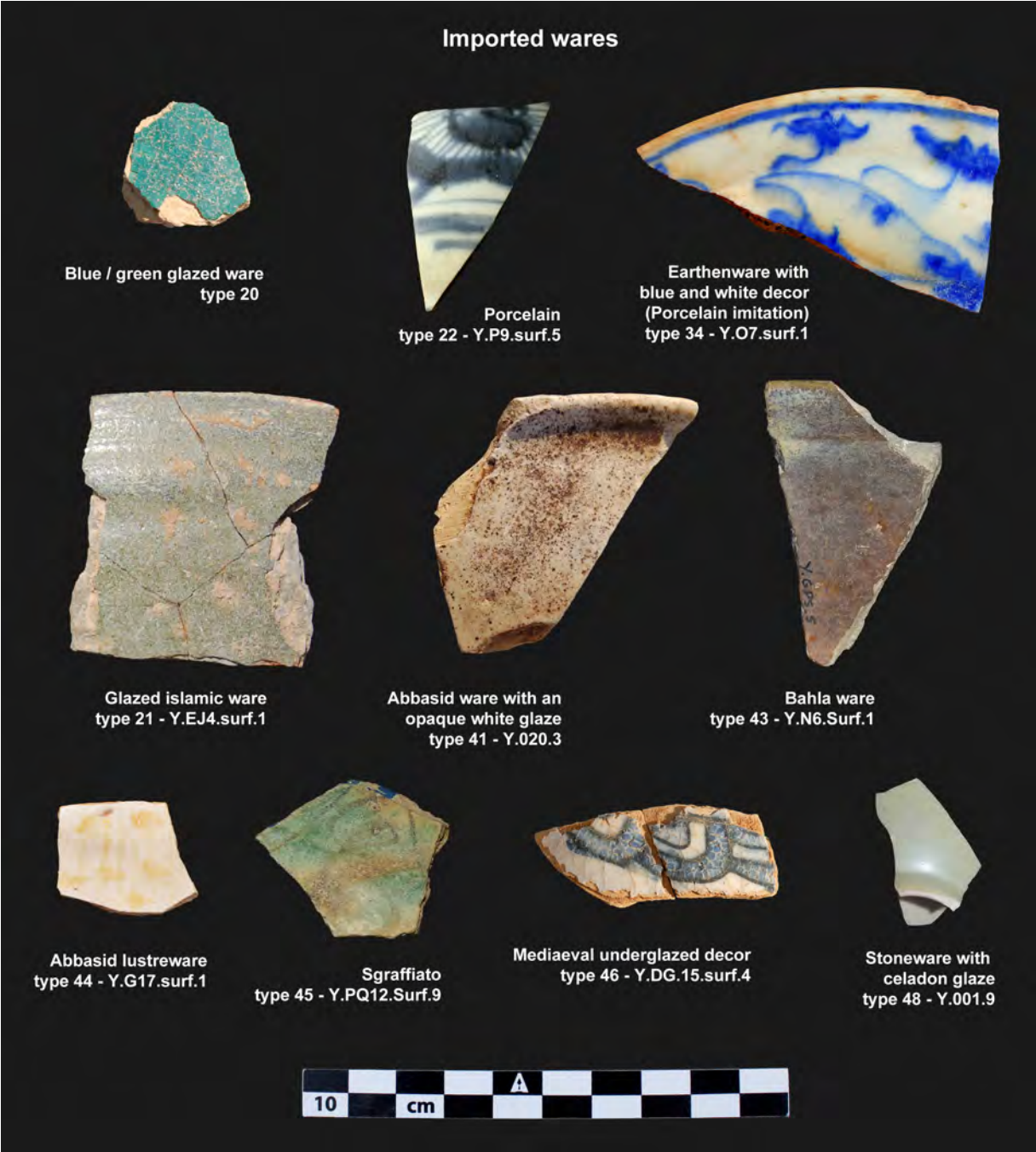


Figure 159 Imported wares (photographs: M. Mouton, L. Munduteguy; graphics: J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)



Figure 160 Ceramic wasters (over-fired sherds) from Building 1 (photographs: M. Mouton, L. Munduteguy; graphics: J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

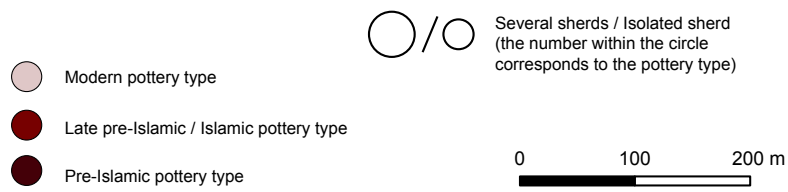
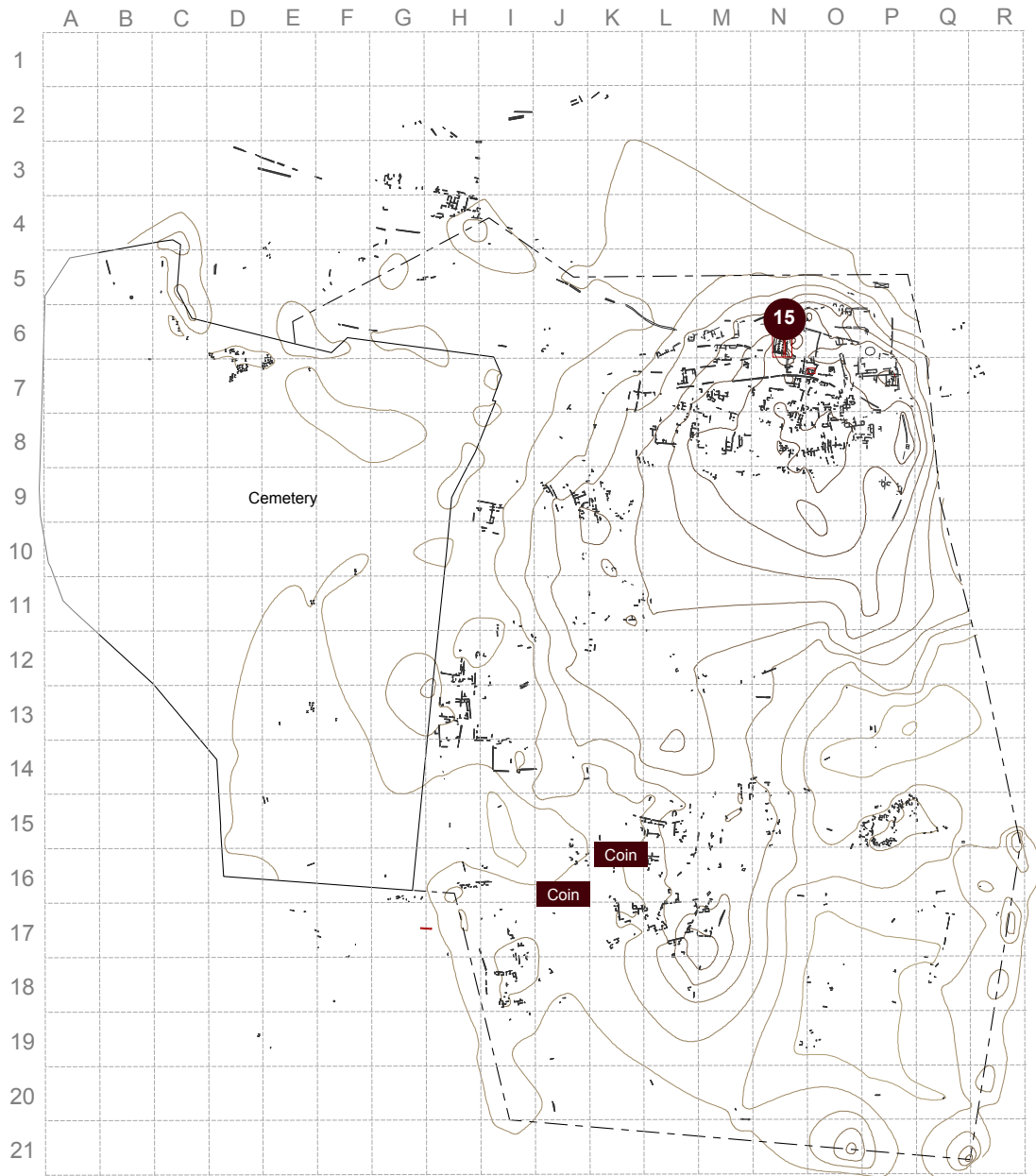


Figure 161 Al-Yamāma: distribution map of chronological markers for the pre-Islamic period (coins and pottery) (J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

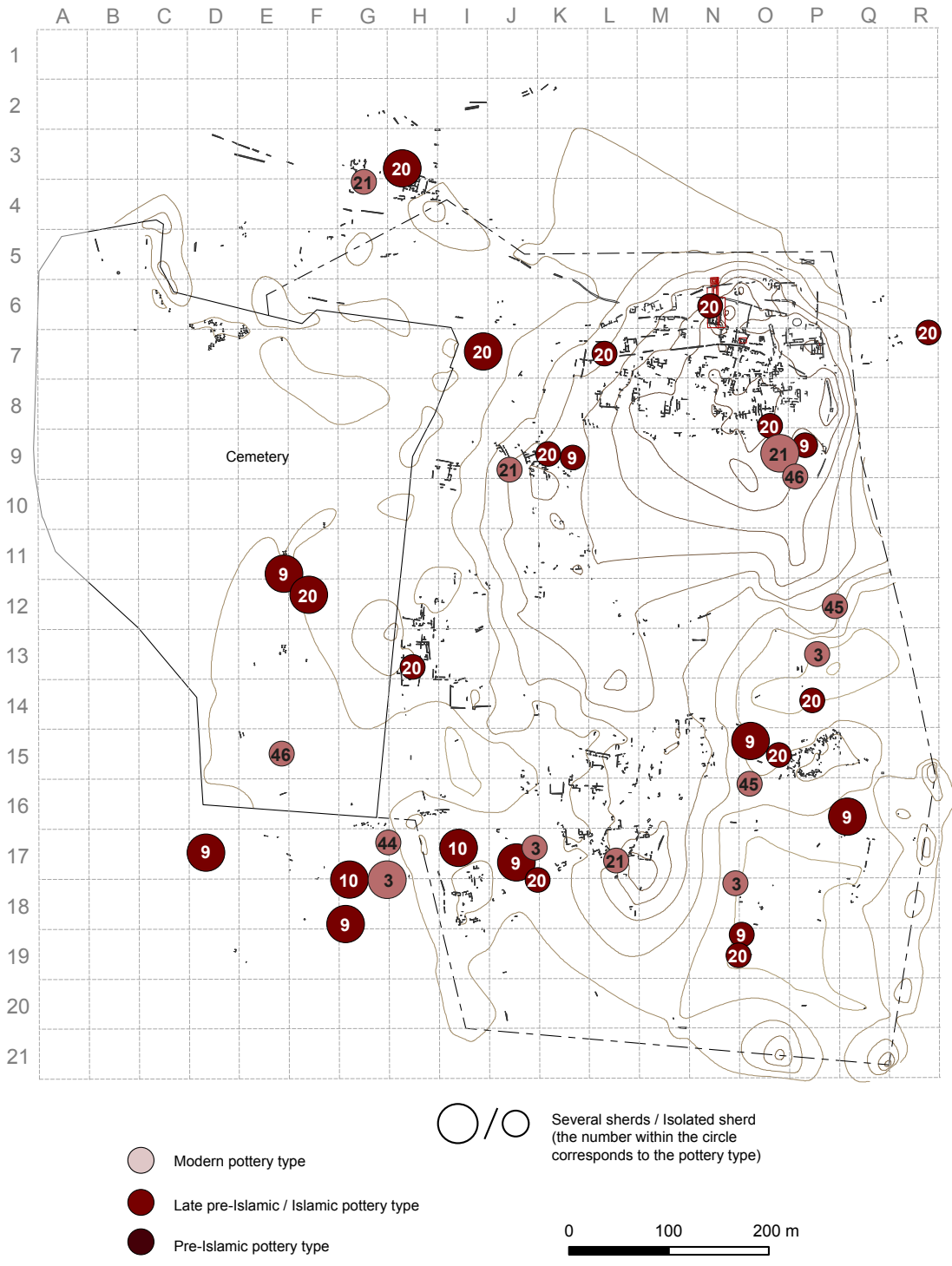


Figure 162 Al-Yamāma: distribution map of chronological markers for the late pre-Islamic / Early Islamic period (J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

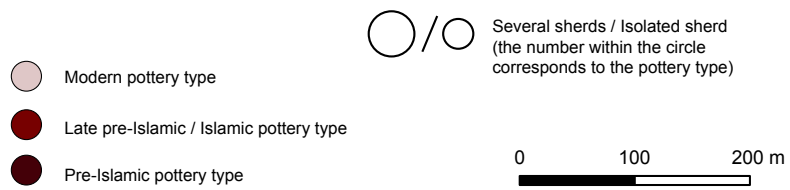
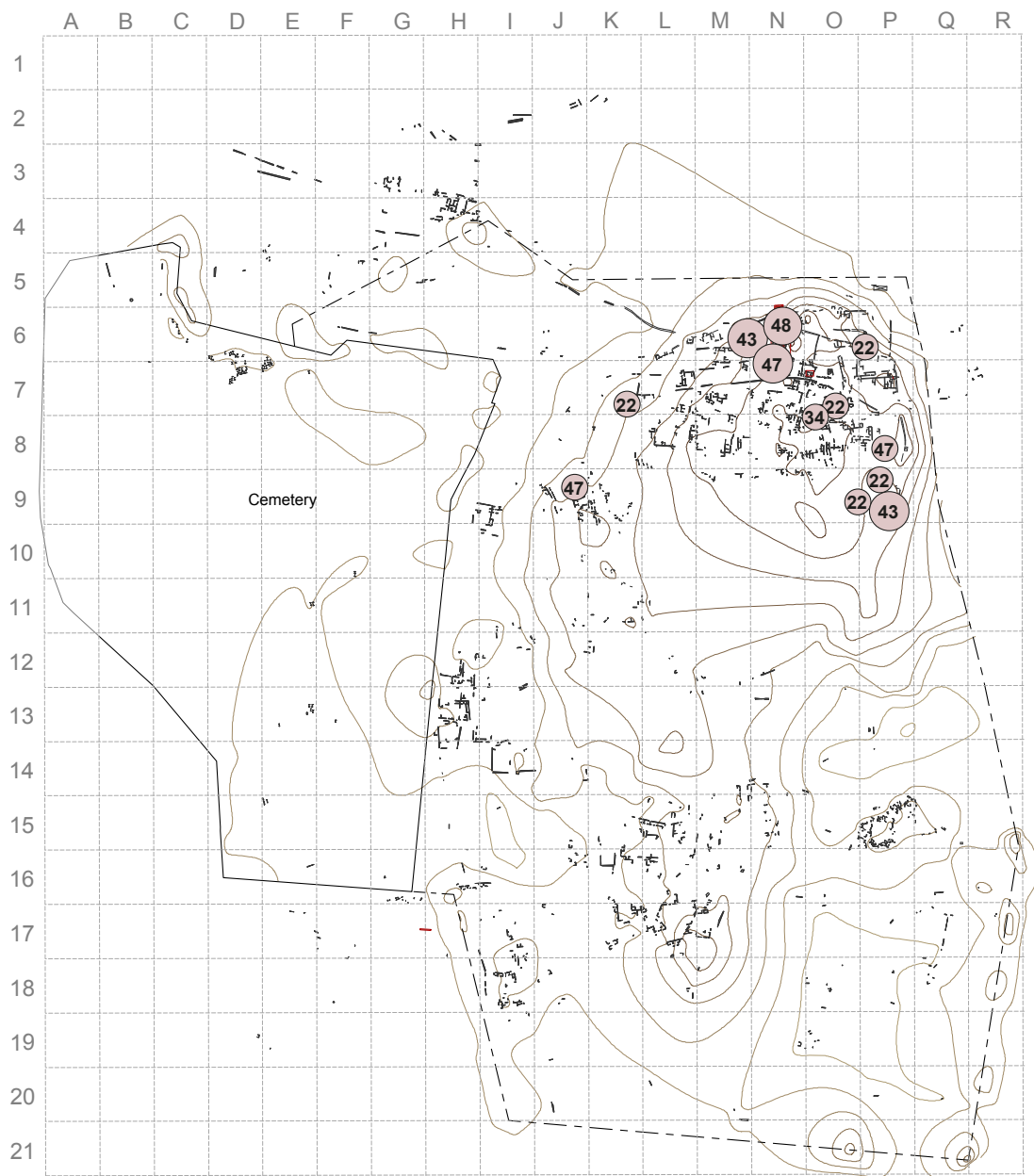


Figure 163 Al-Yamāma: distribution map of chronological markers for the modern time (J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

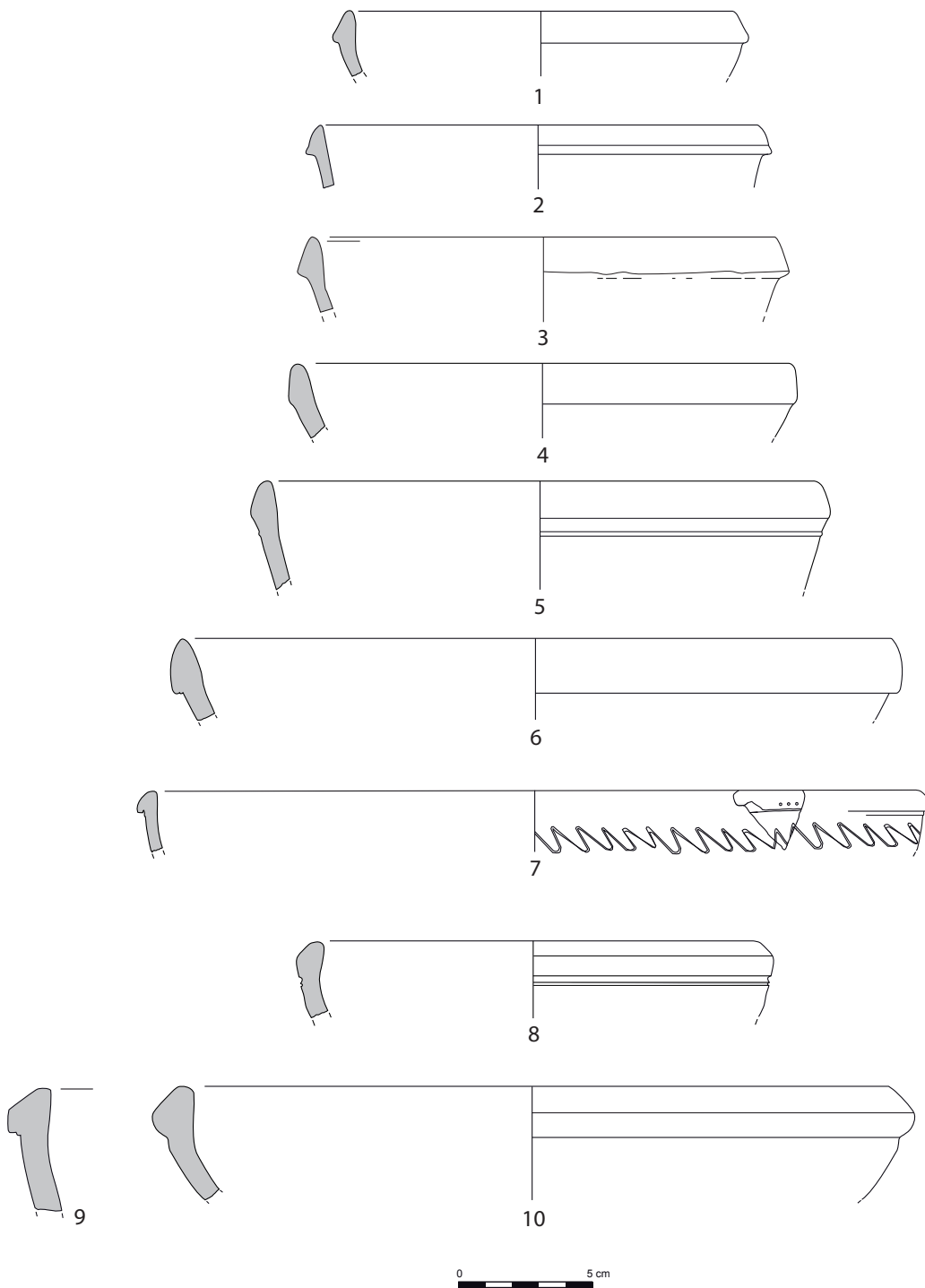


Figure 164 Al-Yamāma – Phase 1:
Common wares, open
shapes (L. Munduteguy –
French-Saudi Archaeological
Mission in al-Kharj)

- 1 – Y.034.8, Medium reddish buff ware with cream slip (type 35), diam.: 14 cm
- 2 – Y.028.3, Medium reddish buff ware with cream slip (type 35), diam.: 16 cm
- 3 – Y.001.2, Common reddish ware with medium to thick grits (type 2), diam.: 18 cm
- 4 – Y.034.16, Medium buff ware with medium to thick grits (type 1a), diam.: 16 cm
- 5 – Y.034.4, Medium reddish ware with medium to thick grits (type 4), diam.: 20 cm
- 6 – Y.038.2, Common buff greenish ware with medium to thick grits (type 1b), diam.: 26 cm
- 7 – Y.031.12, Medium reddish buff ware with cream slip (type 35), diam.: 28 cm
- 8 – Y.034.6, Medium reddish buff ware with cream slip (type 35), diam.: 16 cm
- 9 – Y.046.4, Common buff greenish ware with medium to thick grits (type 1b)
- 10 – Y.034.15, Fine reddish buff ware with cream slip (type 33), diam.: 26 cm

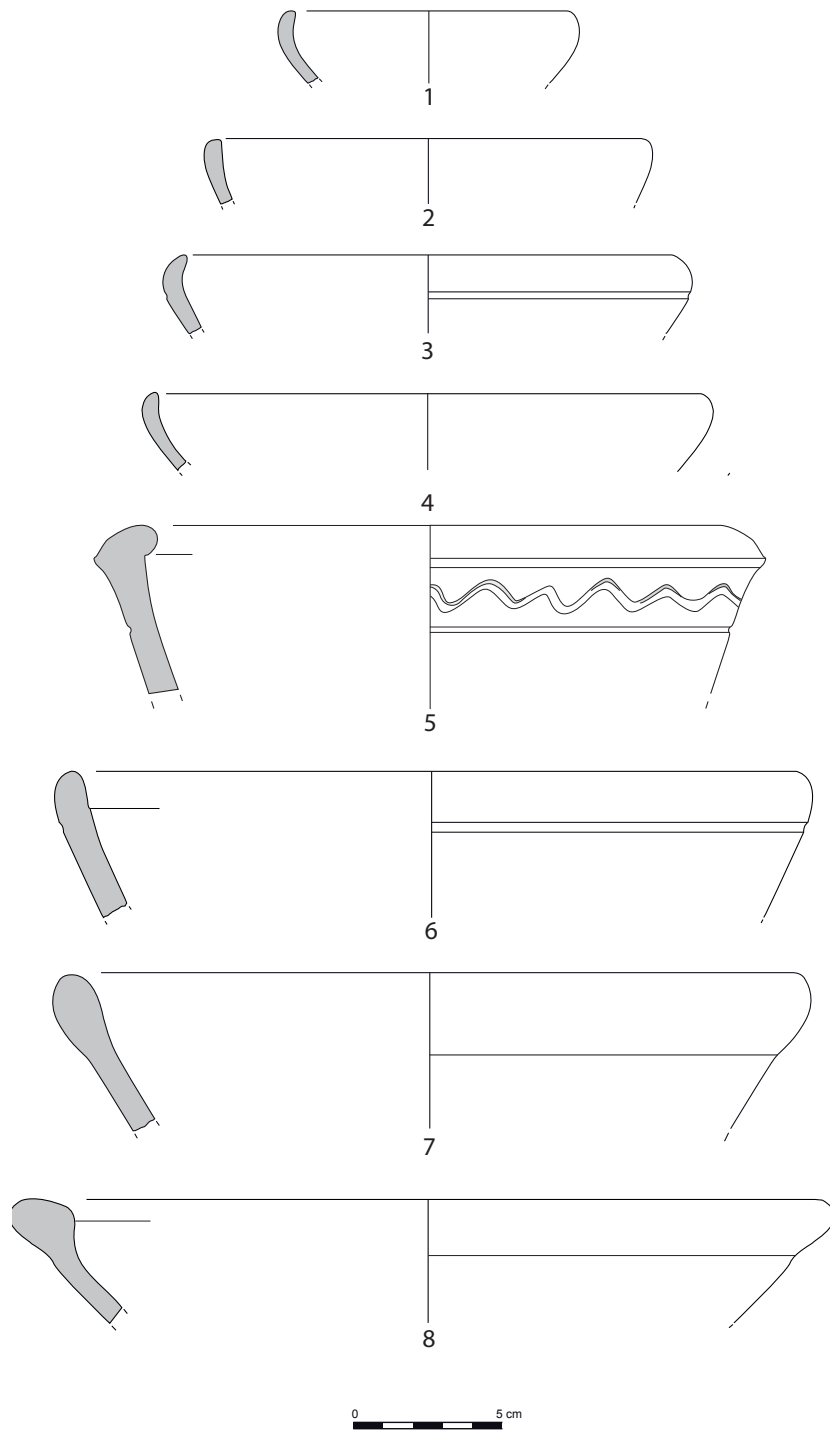


Figure 165 Al-Yamāma – Phase 1:
Common wares, open
shapes (L. Munduteguy –
French-Saudi Archaeological
Mission in al-Kharj)

- 1 – Y.041.2, Medium buff ware with medium to thick grits (type 1a), diam.: 9 cm
- 2 – Y.022.3, Medium reddish ware with medium to thick grits (type 4), diam.: 14 cm
- 3 – Y.046.8, Medium reddish buff ware with cream slip (type 35), diam.: 16 cm
- 4 – Y.034.7, Medium buff ware with medium to thick grits (type 1a), diam.: 16 cm
- 5 – Y.004.1, Common reddish ware with medium to thick grits (type 2), diam.: 22 cm
- 6 – Y.022.6, Medium reddish buff ware with black/reddish slip (type 37), diam.: 24 cm
- 7 – Y.046.1, Medium reddish ware with medium to thick grits (type 4), diam.: 24 cm
- 8 – Y.010.11, Fine reddish buff ware with cream slip (type 33), diam.: 26 cm

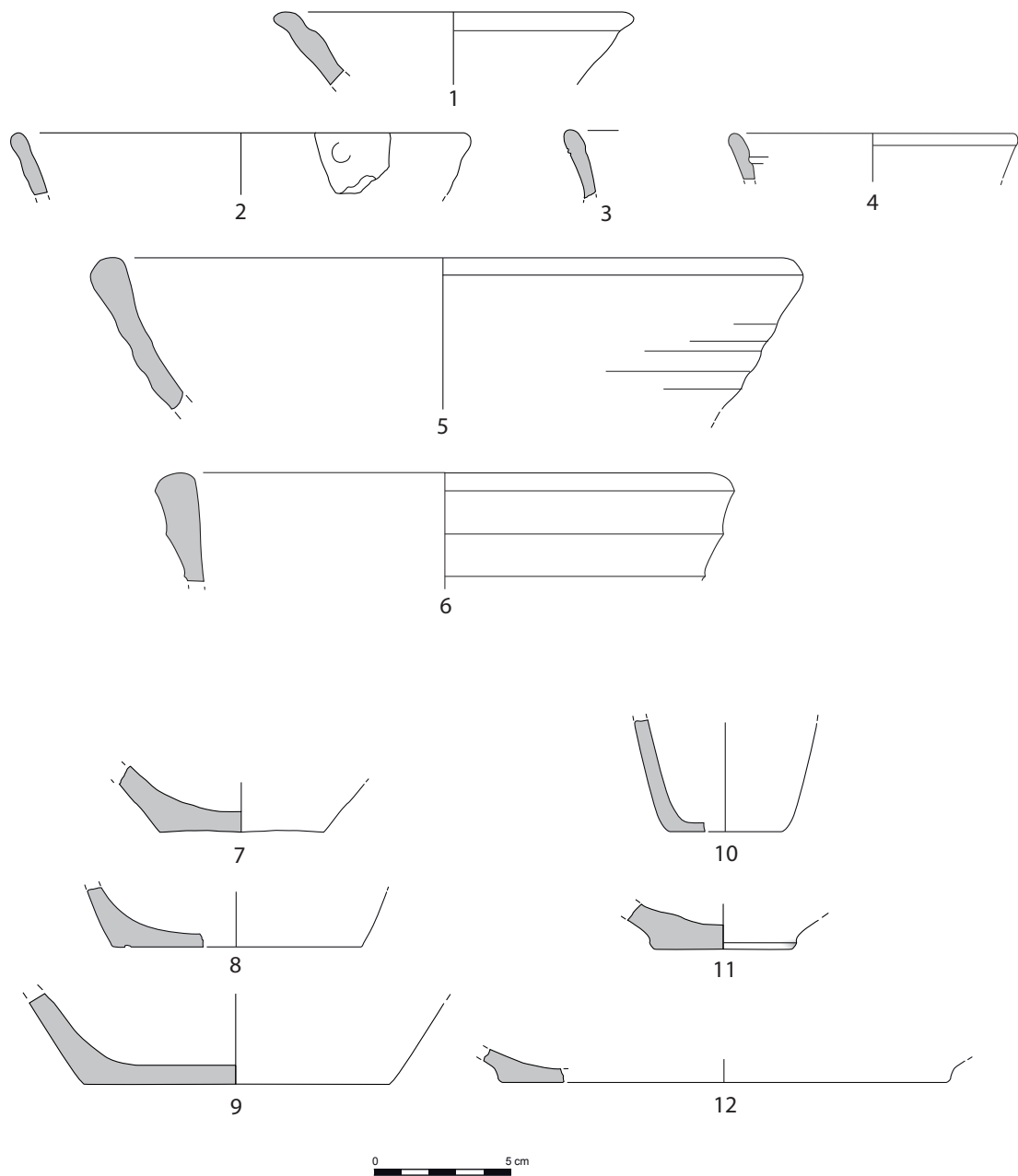


Figure 166 Al-Yamāma – Phase 1:
Common wares, open
shapes (L. Munduteguy –
French-Saudi Archaeological
Mission in al-Kharj)

- 1 – Y.010.6, Medium reddish ware with medium to thick grits (type 4), diam.: 12 cm
- 2 – Y.010.9, Medium buff ware with medium to thick grits (type 1a), diam.: 16 cm
- 3 – Y.037.1, Medium reddish ware with medium to thick grits (type 4), diam.: unknown
- 4 – Y.004.9, Medium buff ware with medium to thick grits (type 1a), diam.: 10 cm
- 5 – Y.046.2, Medium buff ware with medium to thick grits (type 1a), diam.: 24 cm
- 6 – Y.001.8, Common reddish ware with medium to thick grits (type 2), diam.: 21 cm
- 7 – Y.038.1, Medium buff ware with medium to thick grits (type 1a), diam.: 6 cm
- 8 – Y.041.4, Medium reddish buff ware with cream slip (type 35), diam.: 9 cm
- 9 – Y.010.7, diam.: 11 cm
- 10 – Y.029.4, Medium reddish buff ware with cream slip (type 35), diam.: 4 cm
- 11 – Y.011.2, Fine reddish buff ware with cream slip (type 33), diam.: 5 cm
- 12 – Y.026.1, Fine reddish buff ware with cream slip (type 33), diam.: 16 cm

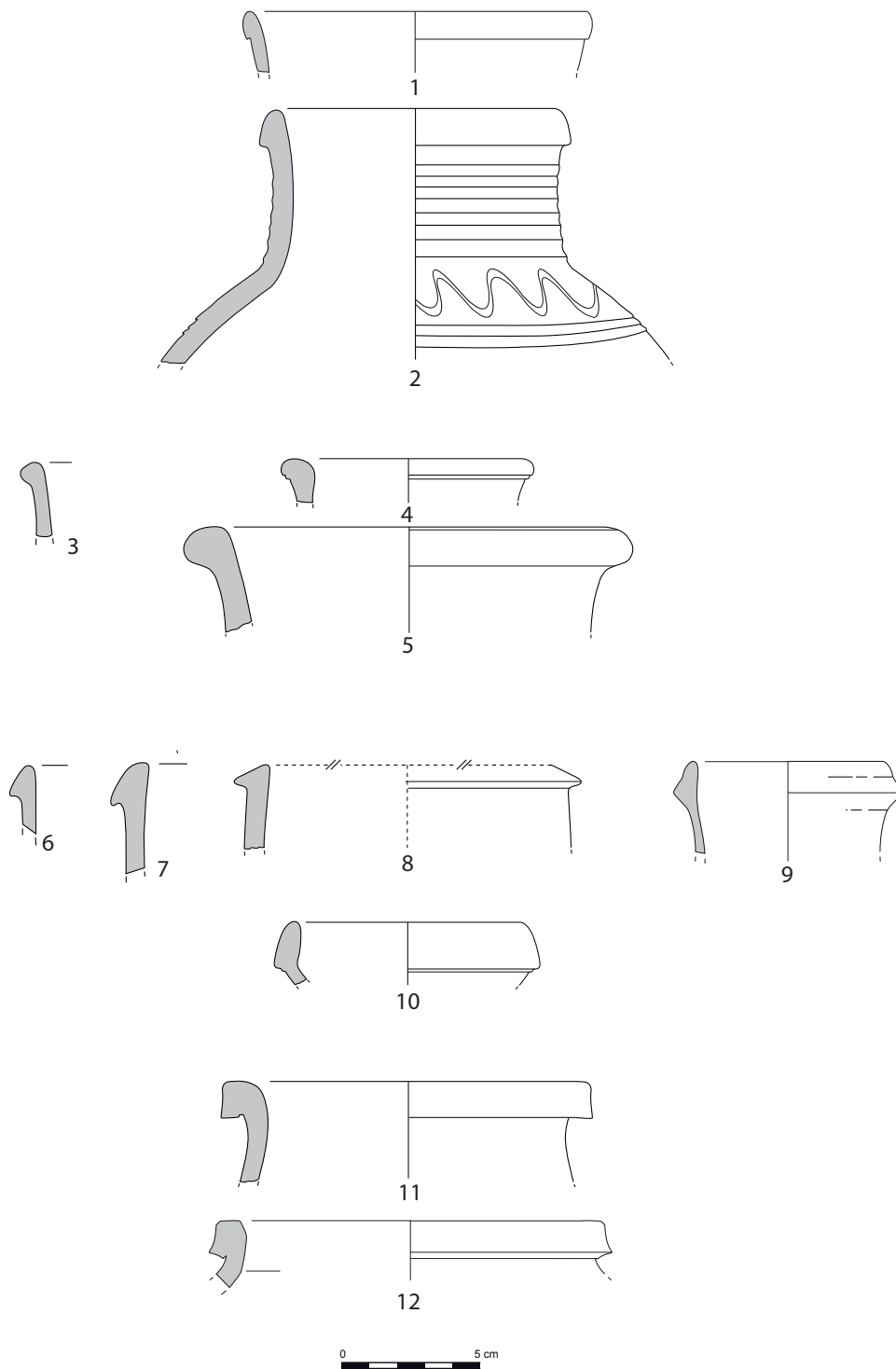


Figure 167 Al-Yamāma – Phase 1:
Common wares, closed
shapes (L. Munduteguy –
French-Saudi Archaeological
Mission in al-Kharj)

- 1 – Y.023.3, Medium reddish buff ware with cream slip (type 35), diam.: 12 cm
- 2 – Y.046.7, Medium reddish buff ware with cream slip (type 35), diam.: 10 cm
- 3 – Y.048.3, Medium reddish ware with medium to thick grits (type 4), diam.: unknown
- 4 – Y.034.2, Medium buff ware with medium to thick grits (type 1a), diam.: 8 cm
- 5 – Y.022.10, Medium reddish buff ware with black/reddish slip (type 37), diam.: 14 cm
- 6 – Y.010.8, Fine reddish buff ware with cream slip (type 33), diam.: unknown
- 7 – Y.010.1, Fine reddish buff ware with cream slip (type 33), diam.: unknown
- 8 – Y.023.5, Common buff greenish ware with medium to thick grits (type 1b), diam.: 20 cm
- 9 – Y.001.4, Medium reddish ware with medium to thick grits (type 4), diam.: 8 cm
- 10 – Y.031.11, Medium reddish buff ware with cream slip (type 35), diam.: 8 cm
- 11 – Y.034.12, Common buff greenish ware with medium to thick grits (type 1b), diam.: 12 cm
- 12 – Y.001.3, Common reddish ware with medium to thick grits (type 2), diam.: 14 cm

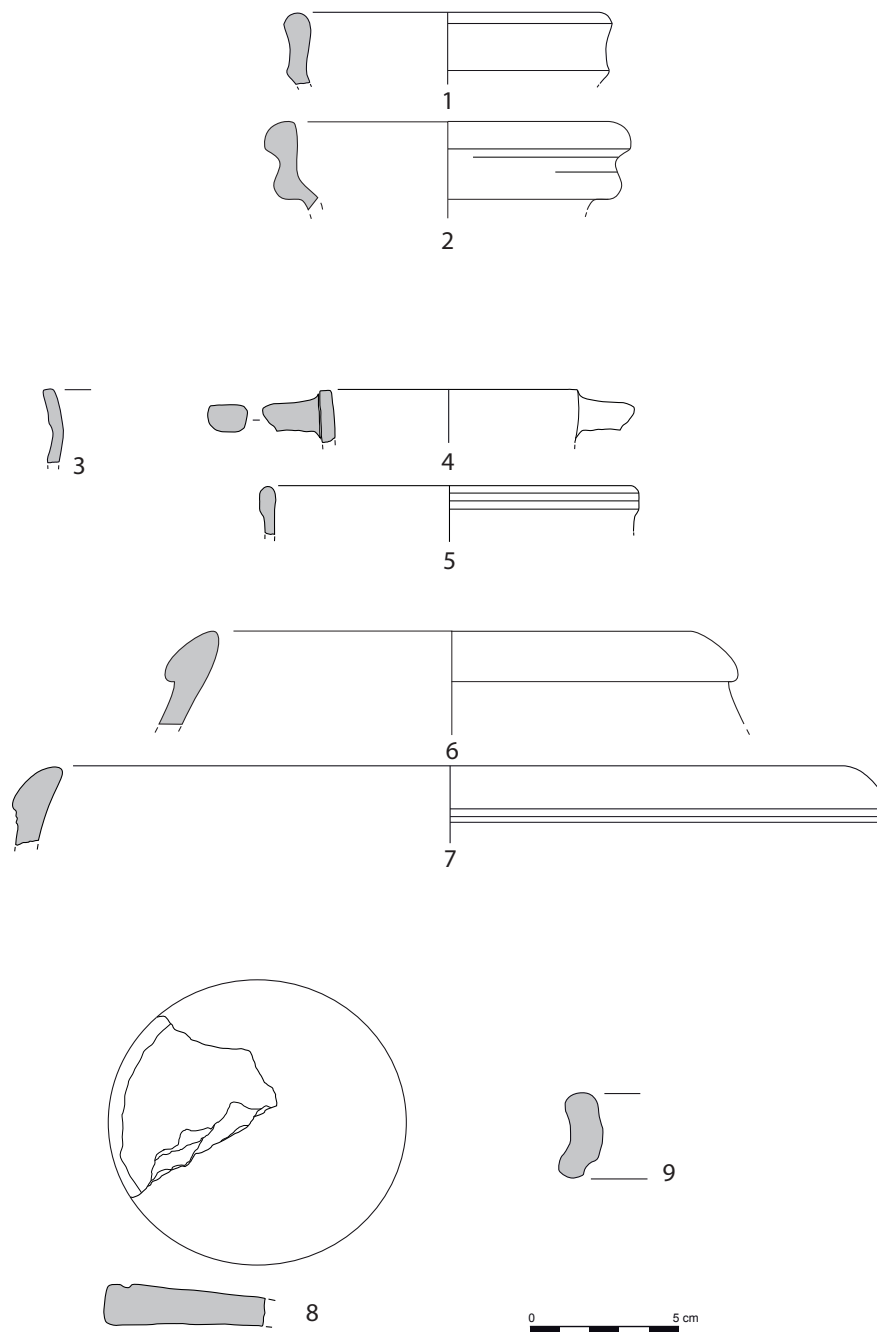


Figure 168 Al-Yamāma – Phase 1: Common wares, open and closed shapes (L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)

- 1 – Y.029.1, Medium buff ware with medium to thick grits (type 1a), diam.: 10 cm
- 2 – Y.001.7, Medium reddish ware with medium to thick grits (type 4), diam.: 12 cm
- 3 – Y.048.2, Medium buff ware with medium to thick grits (type 1a), diam.: unknown
- 4 – Y.044.1, Medium buff ware with medium to thick grits (type 1a), diam.: 8 cm
- 5 – Y.031.9, Medium reddish buff ware with cream slip (type 35), diam.: 12 cm
- 6 – Y.004.2, Common reddish ware with medium to thick grits (type 2), diam.: 19 cm
- 7 – Y.031.10, Medium reddish buff ware with cream slip (type 35), diam.: 26 cm
- 8 – Y.048.1, Medium buff ware with medium to thick grits (type 1a), diam.: 10 cm
- 9 – Y.046.3, Medium buff ware with medium to thick grits (type 1a), support (?)

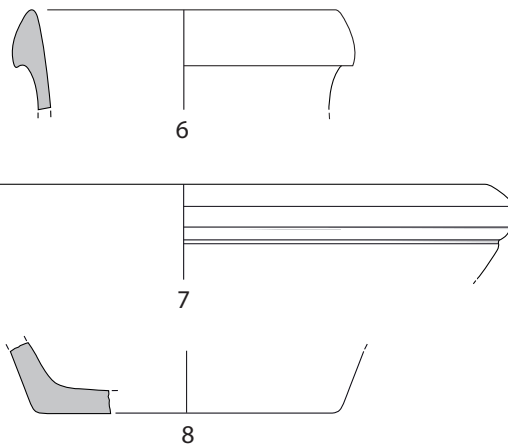
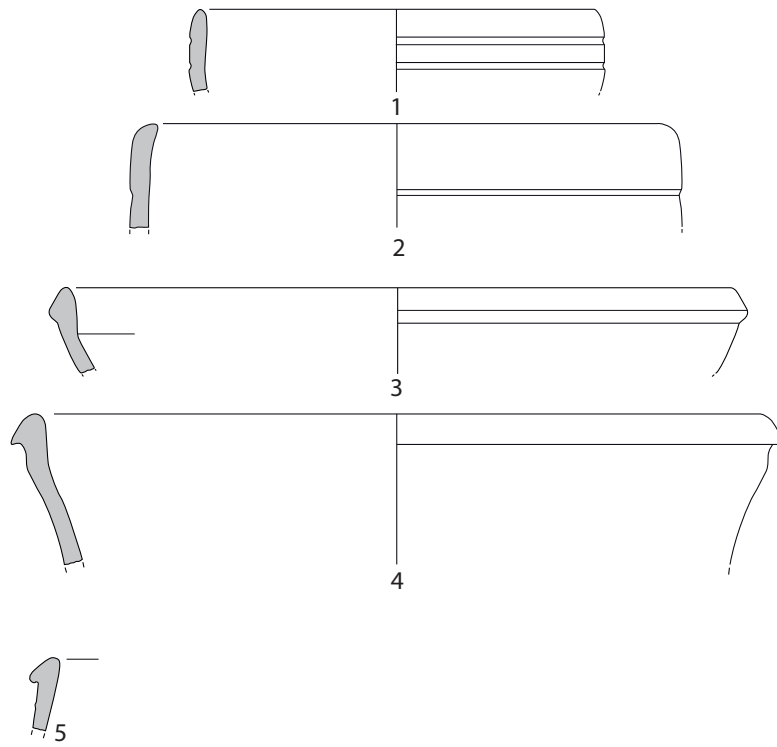


Figure 169 Al-Yamāma – Phase 1: Sandy wares (1 to 5) and Fine sandy wares (6 to 8) (L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)

- 1 – Y.031.4, Medium red-orange sandy ware (type 7), diam.: 13 cm
- 2 – Y.022.7, Fine red-orange sandy ware with reddish slip (type 36), diam.: 17 cm
- 3 – Y.022.12, Medium red-orange sandy ware (type 7), diam.: 22 cm
- 4 – Y.031.8, Fine red-orange sandy ware with reddish slip (type 36), diam.: 24 cm
- 5 – Y.039.1, Medium yellow sandy ware (type 26), inclination and diameter unknown
- 6 – Y.004.8, Well fired reddish to buff orange ware (type 29) diam.: 10 cm
- 7 – Y.022.8, Well fired reddish to buff orange ware (type 29), diam.: 20 cm
- 8 – Y.032.1, Well fired reddish to buff orange ware (type 29), diam.: 10 cm

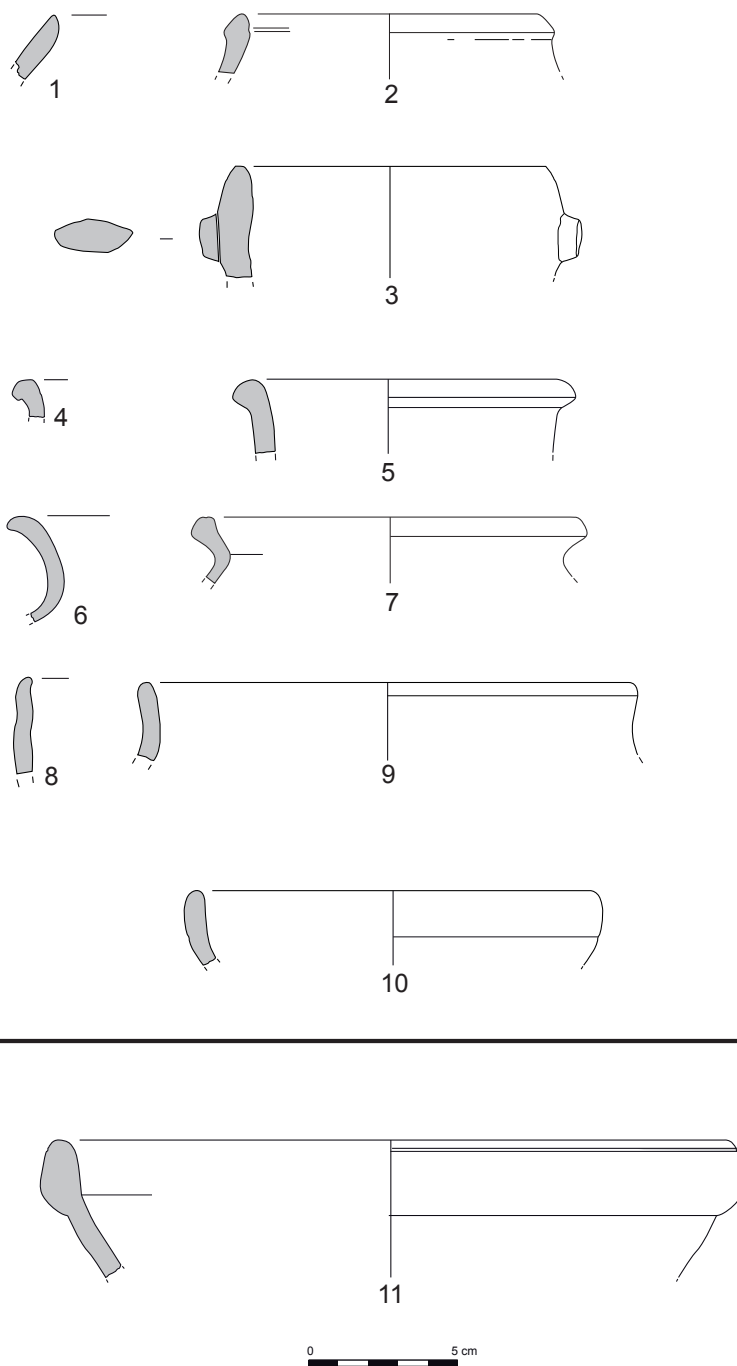


Figure 170 Al-Yamāma – Phase 1: Coarse wares (top) and Grey scratchy ware (bottom) (L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)

- 1 – Y.038.4, Pinkish cooking ware with white exploded grits (type 6), diam.: unknown
- 2 – Y.004.6, Pinkish cooking ware with white exploded grits (type 6), diam.: 11 cm
- 3 – Y.034.18, Handmade cooking wares (type 17), diam.: 10 cm
- 4 – Y.046.6, Slow wheel turned reddish cooking ware (type 18), diam.: unknown
- 5 – Y.033.1, Slow wheel turned reddish cooking ware (type 18), diam.: 10 cm
- 6 – Y.029.2, Pinkish cooking ware with white exploded grits (type 6), diam.: unknown
- 7 – Y.004.7, Pinkish cooking ware with white exploded grits (type 6), diam.: 12 cm
- 8 – Y.013.2, Pinkish cooking ware with white exploded grits (type 6), diam.: unknown
- 9 – Y.016.1, Pinkish cooking ware with white exploded grits (type 6), diam.: 16 cm
- 10 – Y.034.3, Slow wheel turned reddish cooking ware (type 18), diam.: 13 cm
- 11 – Y.028.2, Grey scratchy wares with grey slip (type 31), diam.: 22 cm

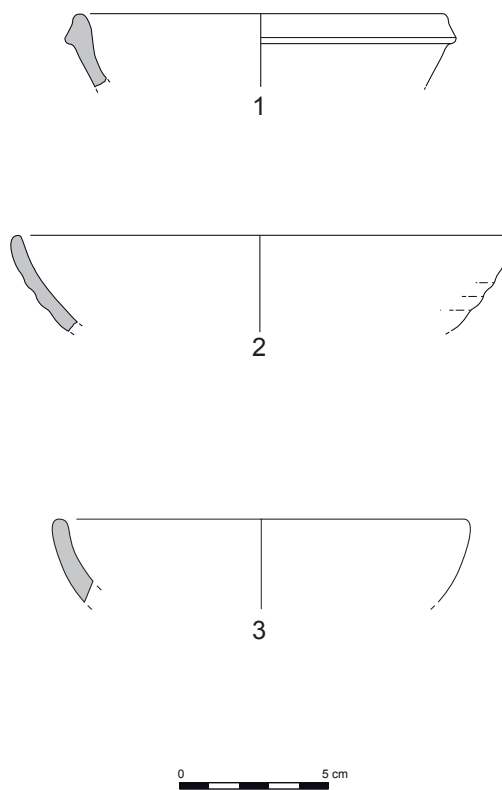


Figure 171 Al-Yamāma – Phase 1: Peculiar fabrics (L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)

- 1 – Y.022.5, Medium fine buff ware with white and red mat slip (type 5), diam.: 12 cm
- 2 – Y.029.3, Medium fine buff ware with white and red mat slip (type 5), diam.: 16 cm
- 3 – Y.004.5, Thick buff ware with medium temper and reddish wash (type 11), diam.: 14 cm

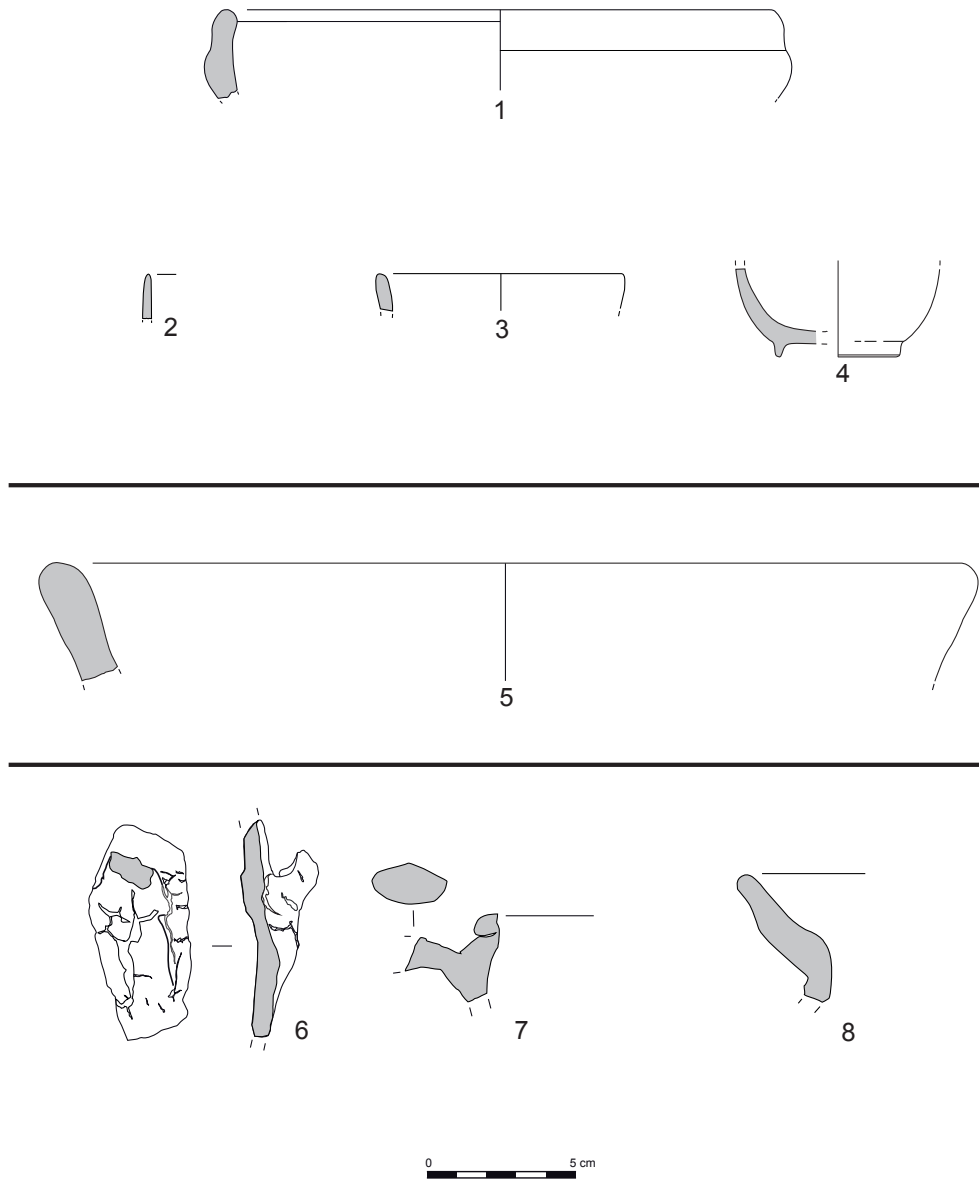


Figure 172 Al-Yamāma – Phase 1: Imported wares, glazed wares, over-fired sherds (L. Munduteguy French-Saudi Archaeological Mission in al-Kharj)

- 1 – Y.025.1, Abbasid ware with an opaque white glaze (type 41), diam.: unknown
- 2 – Y.010.12, Frit ware, dark blue (cobalt ?) line under transparent glaze (type 47), diam.: 8 cm
- 3 – Y.001.9, Porcelain with celadon glaze outside, transparent glaze inside (type 48), diam.: 4 cm
- 4 – Y.028.1, Eroded blue glaze inside/outside (type 20), diam.: 18 cm
- 6 – Y.023.2, diam.: 30 cm
- 7 – Y.036.1, Over-fired body of a closed shape with handle (possibly in buff ware with medium to thick grits – type 1a), diam.: unknown
- 8 – Y.041.7, over-fired sherd, grey to greenish fabric
- 9 – Y.041.6, over-fired sherd, grey to greenish fabric

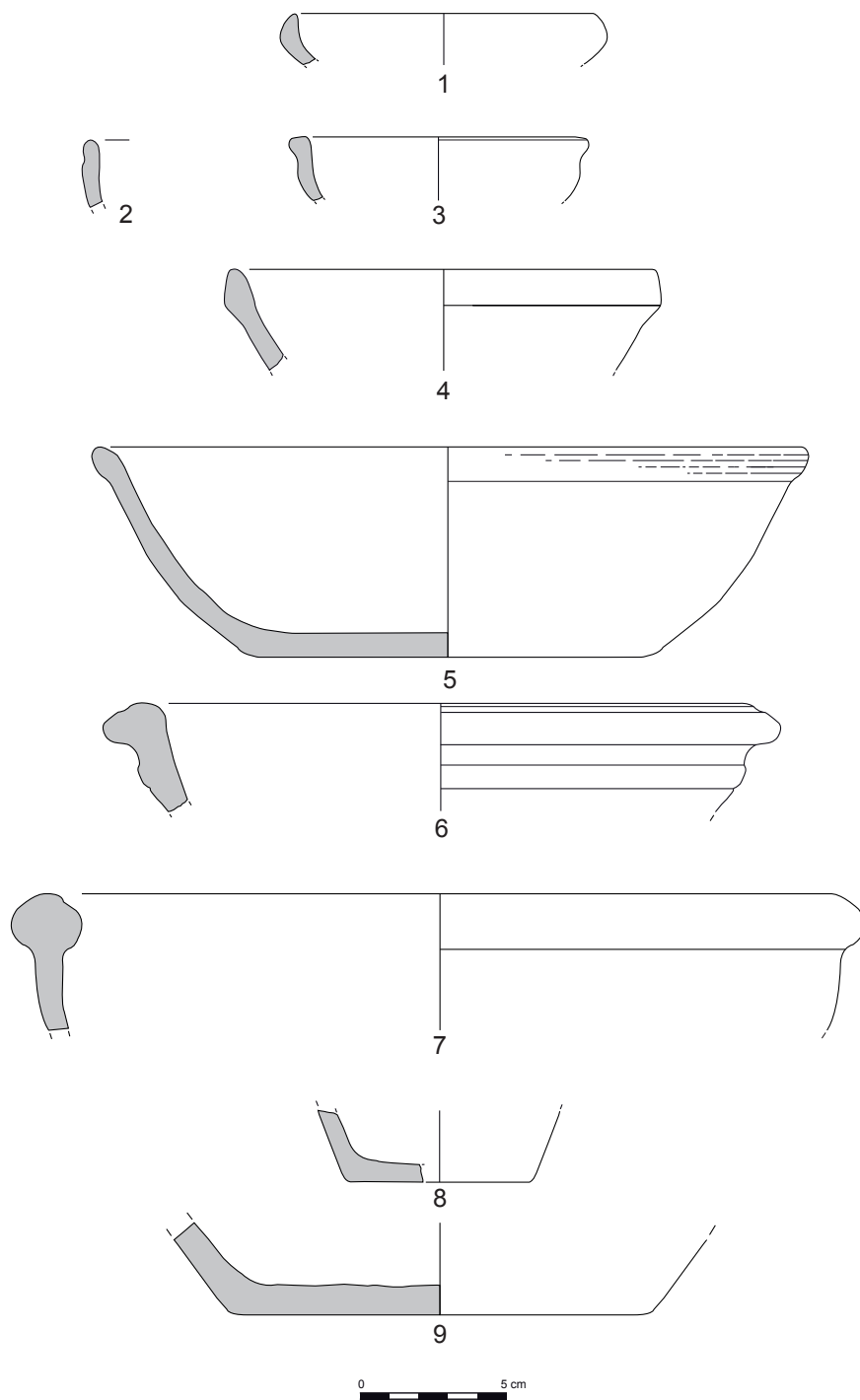


Figure 173 Al-Yamāma – Phase 2:
Common wares, open
shapes (L. Munduteguy –
French-Saudi Archaeological
Mission in al-Kharj)

- 1 – Y.055.8, Fine reddish buff ware with cream slip (type 33), diam.: 10 cm
- 2 – Y.018.2, Medium buff ware with medium to thick grits (type 1a), diam.: unknown
- 3 – Y.055.1, Medium reddish buff ware with cream slip (type 35), diam.: 9 cm
- 4 – Y.030.1, Medium reddish buff ware with cream slip (type 35), diam.: 14 cm
- 5 – Y.020.4, Medium buff ware with medium to thick grits (type 1a), diam.: 23,5 cm
- 6 – Y.055.9, Fine reddish buff ware with cream slip (type 33), diam.: 20 cm
- 7 – Y.012.1, Medium buff ware with medium to thick grits (type 1a), diam.: 26 cm
- 8 – Y.055.3, Medium buff ware with medium to thick grits (type 1a), diam.: 6 cm
- 9 – Y.018.1, Common buff greenish ware with medium to thick grits (type 1b), diam.: 14 cm

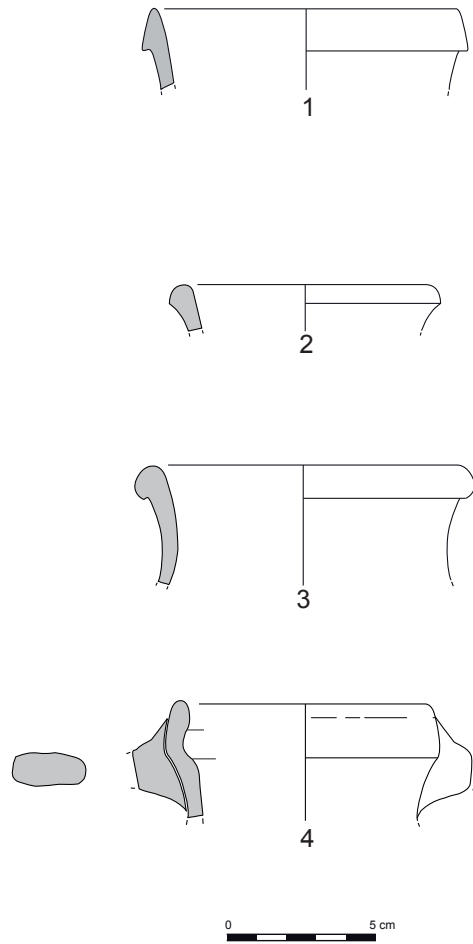


Figure 174 Al-Yamāma – Phase 2:
Common wares, closed
shapes (L. Munduteguy –
French-Saudi Archaeological
Mission in al-Kharj)

- 1 – Y.053.1, Medium buff ware with medium to thick grits (type 1a), diam.: 10 cm
- 2 – Y.055.10, Medium reddish buff ware with cream slip (type 35), diam.: 8 cm
- 3 – Y.055.2, Medium buff ware with medium to thick grits (type 1a), diam.: 10 cm
- 4 – Y.021.2, Medium buff ware with medium to thick grits (type 1a), diam.: 8 cm

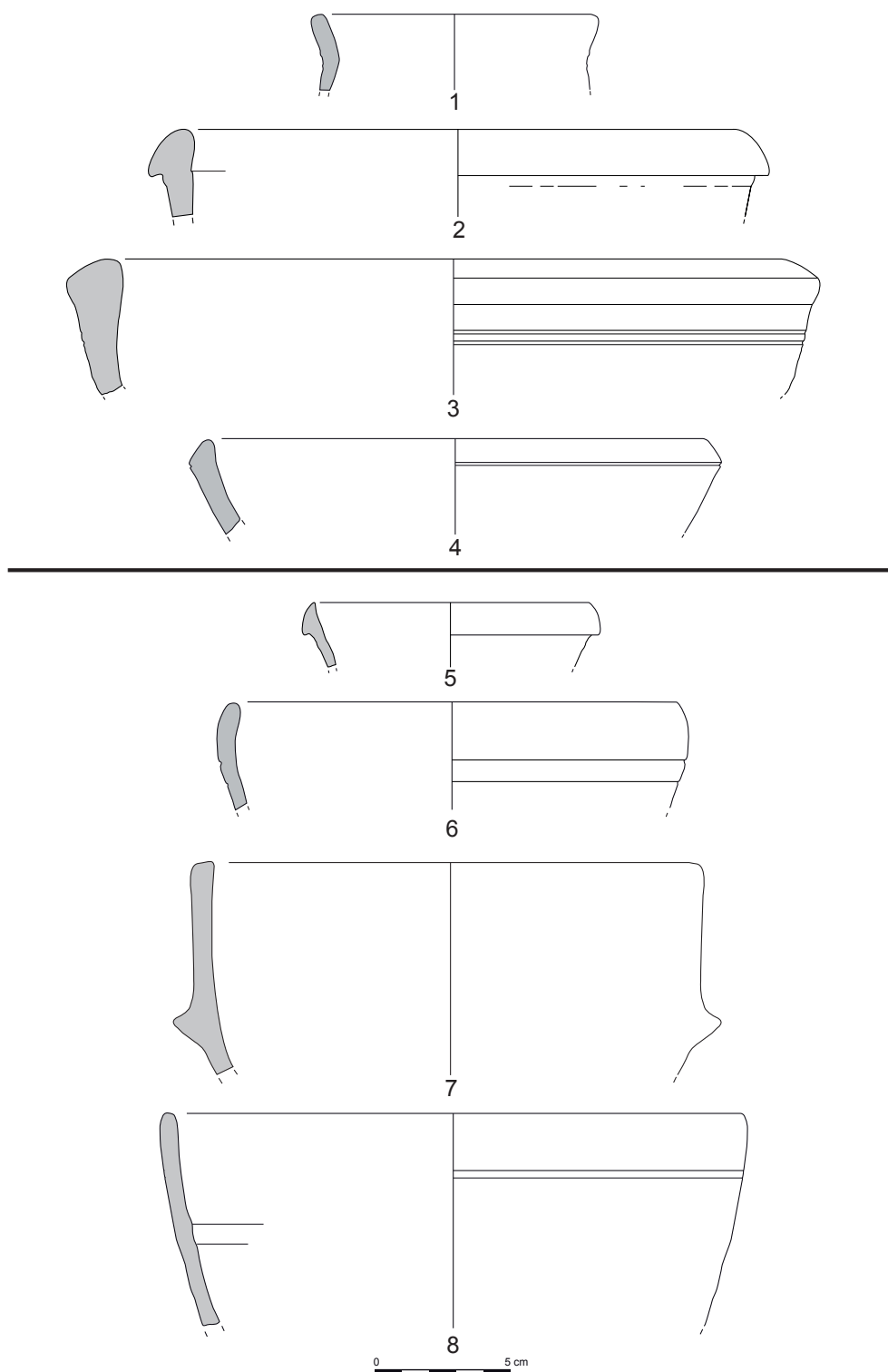


Figure 175 Al-Yamāma – Phase 2: Sandy wares and coarse wares (L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)

- 1 – Y.055.5, Medium yellow sandy ware (type 26), diam.: 10 cm
- 2 – Y.020.1, Medium yellow sandy ware (type 26), diam.: 20 cm
- 3 – Y.055.7, Medium yellow sandy ware (type 26), diam.: 24 cm
- 4 – Y.055.12, Well fired reddish to buff orange ware (type 29), diam.: 18 cm
- 5 – Y.055.4, Pinkish cooking ware with white exploded grits (type 6), diam.: 10 cm
- 6 – Y.055.6, Slow wheel turned reddish cooking ware (type 18), diam.: 16 cm
- 7 – Y.012.2, Slow wheel turned reddish cooking ware (type 18), diam.: 18 cm
- 8 – Y.052.1, diam.: 21 cm., Slow wheel turned reddish cooking ware (type 18)

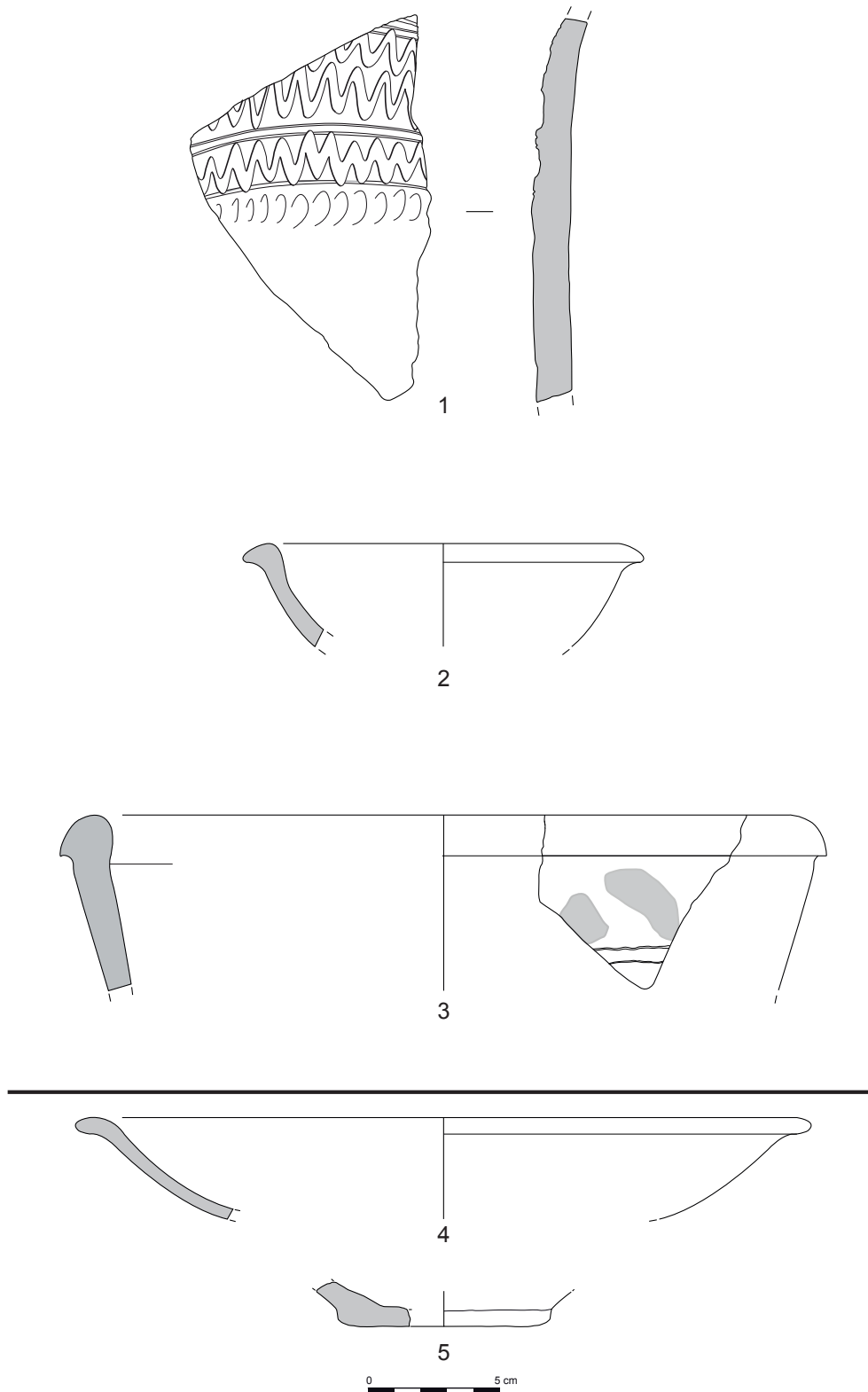


Figure 176 Al-Yamāma – Phase 2: Peculiar fabrics and imported glazed wares (L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)

- 1 – Y.020.2, Medium fine buff ware with white and red mat slip (type 5), body of a large closed shape, gouged decoration outside, red slip inside, diameter unknown
- 2 – Y.013.1, Fine grey ware with grey burnished slip (type 32), diam.: 13 cm
- 3 – Y.021.1, Medium fine buff ware with cross-hatch paint in red (type 3), diam.: 26 cm
- 4 – Y.020.3, Abbasid ware with a monochrome lustre, well levigated yellow fabric, opaque white glaze (type 44), diam.: 26 cm
- 5 – Y.055.11, White to yellow glazed ware (type 39), diam.: 8 cm

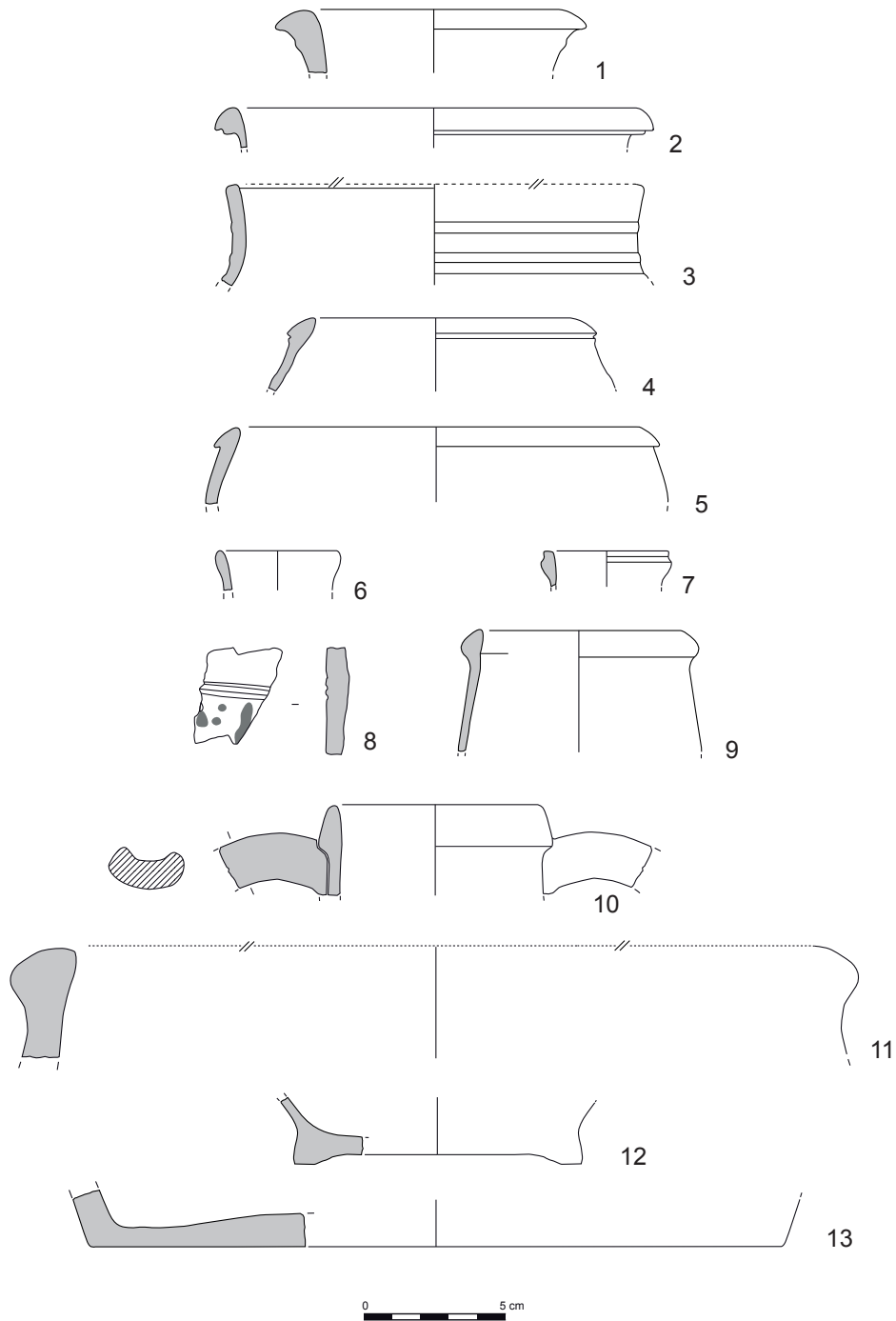


Figure 177 Al-Yamāma – Phase 3: Common ware jars (L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)

- 1 – Y.057.44, Medium reddish buff ware with cream slip (type 35), diam.: 9 cm
- 2 – Y.057.23, Medium buff ware with medium thick grits (type 1a), diam.: 14 cm
- 3 – Y.057.22, Medium buff ware with medium thick grits (type 1a), diam.: 14 cm. (?)
- 4 – Y.057.54, Medium buff ware with medium thick grits (type 1a), diam.: 9 cm
- 5 – Y.057.21, Medium buff ware with medium thick grits (type 1a), diam.: 14 cm
- 6 – Y.057.57, Medium reddish buff ware with cream slip (type 35), diam.: 4 cm
- 7 – Y.057.29, Medium buff ware with medium thick grits (type 1a), diam.: 4 cm
- 8 – Y.057.46, Medium reddish buff ware, painted black on a cream slip (type 35), diameter and inclination unknown
- 9 – Y.057.28, Medium buff ware with medium thick grits (type 1a), diam.: 7 cm
- 10 – Y.057.47, Fine reddish buff ware with cream slip (type 33), diam.: 9 cm
- 11 – Y.057.25, Medium buff ware with medium thick grits (type 1a), diam.: 26 cm
- 12 – Y.056.8, Medium reddish buff ware with cream slip (type 35), diam.: 10 cm
- 13 – Y.057.15, Medium fine buff ware (type 12), diam.: 24 cm

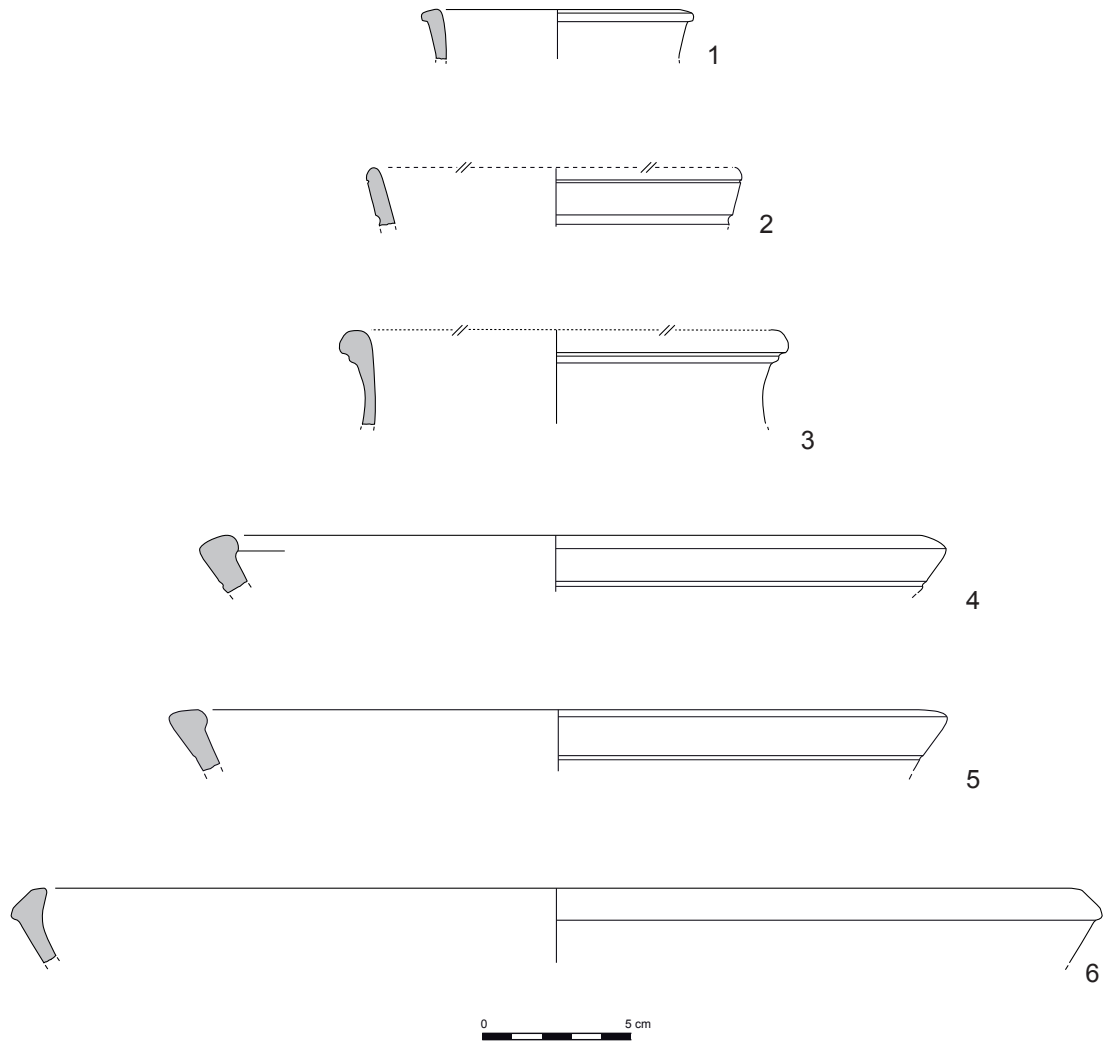


Figure 178 Al-Yamāma – Phase 3: Sandy wares (L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)

- 1 – Y.057.12, Medium sandy red-orange ware (type 7), diam.: 8 cm
- 2 – Y.056.12, Fine red-orange sandy ware with reddish slip (type 36), diam.: 12 cm (?)
- 3 – Y.057.10, Medium yellow sandy ware (type 26), diam.: 14 cm. (?)
- 4 – Y.056.12, Fine red-orange sandy ware with reddish slip (type 36), diam.: 24 cm
- 5 – Y.057.58, Fine red-orange sandy ware with reddish slip (type 36), diam.: 24 cm
- 6 – Y.057.14, Medium sandy red-orange ware (type 7 or 29 if comb decoration preserved), diam.: 34 cm

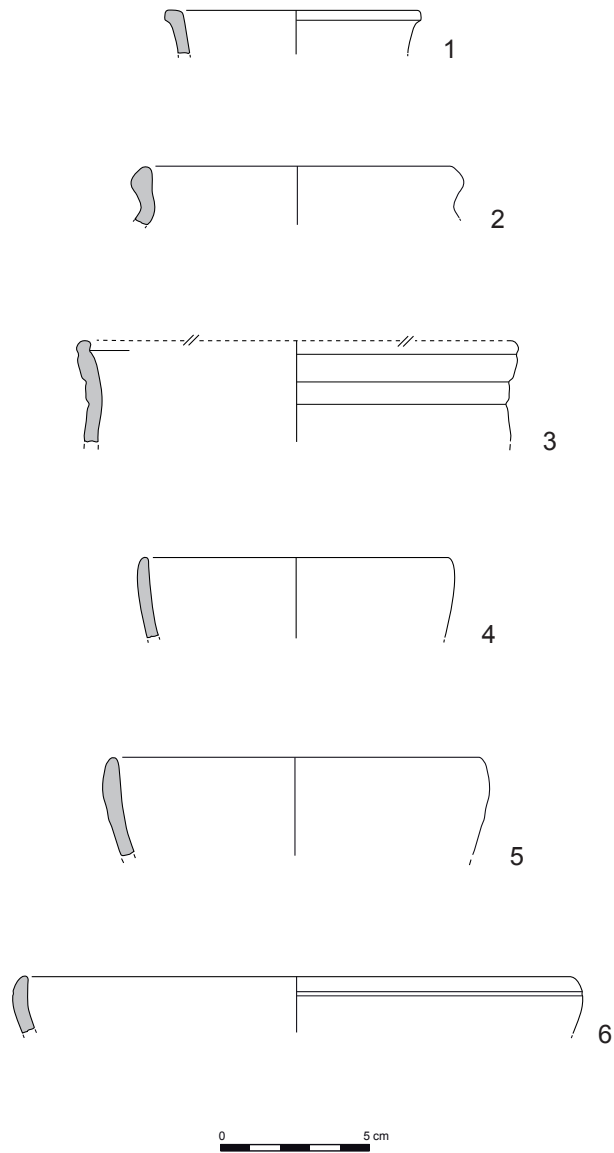


Figure 179 Al-Yamāma – Phase 3: Coarse wares (L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)

- 1 – Y.056.18, Pinkish cooking ware with white exploded grits (type 6), diam.: 8 cm
- 2 – Y.057.18, Wheel turned reddish gritty cooking ware (type 18), diam.: 10 cm
- 3 – Y.057.16, Pinkish cooking ware with white exploded grits (type 6), diam.: 14 cm (?)
- 4 – Y.057.5, Handmade grey gritty ware (type 16), diam.: 10 cm
- 5 – Y.057.17, pinkish cooking ware with white exploded grits (type 6), diam.: 12 cm
- 6 – Y.057.20, wheel turned reddish cooking ware (type 18), diam.: 18 cm

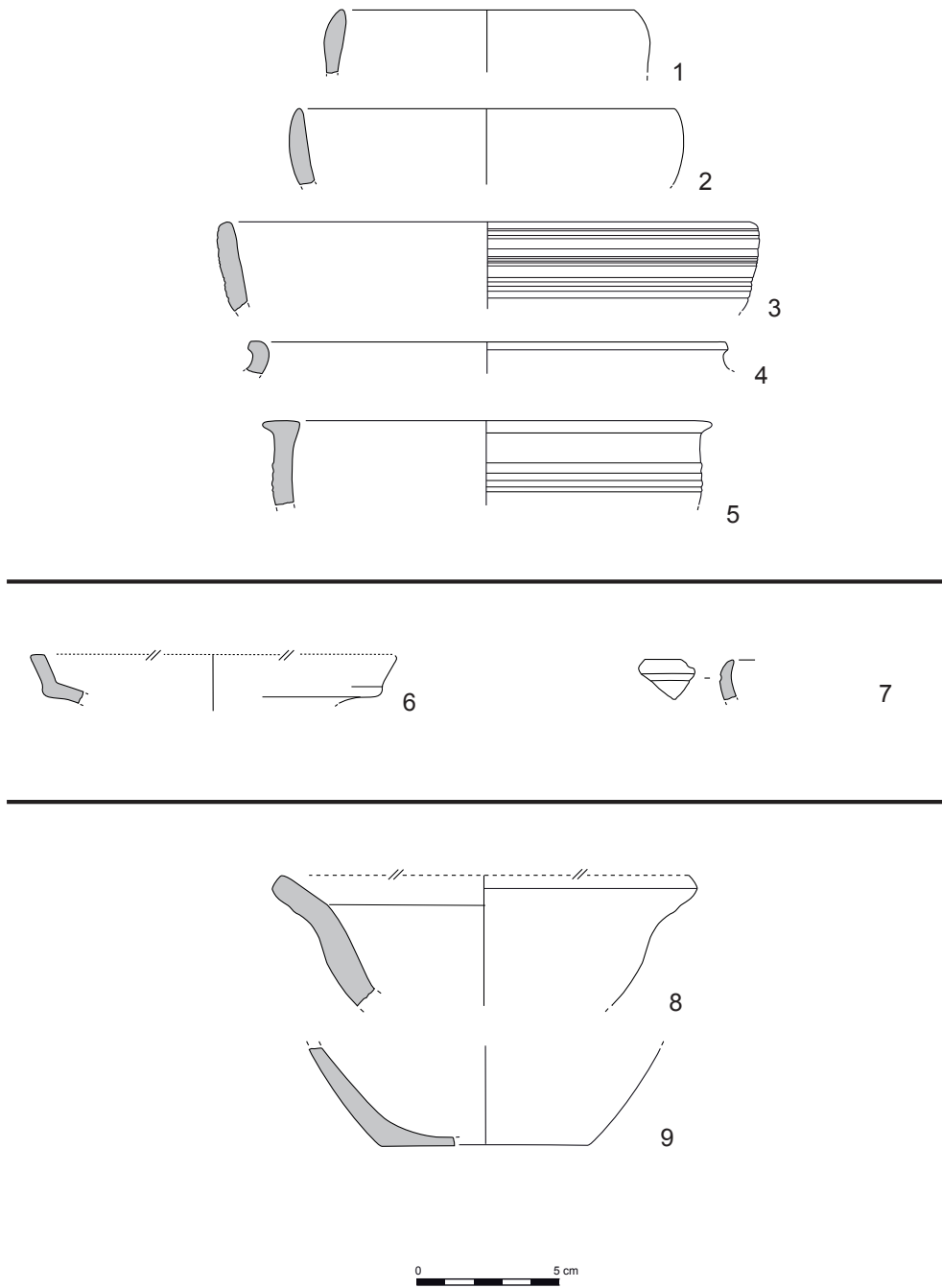


Figure 180 Al-Yamāma – Phase 3: Peculiar fabrics, Grey wares and Glazed wares (L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)

- 1 – Y.056.25 Medium fine buff ware, mat whitish and red slip (type 5) diam.: 10 cm
- 2 – Y.056.2 Medium fine buff ware, mat whitish and red slip (type 5) diam.: 13 cm
- 3 – Y.056.1 Medium fine buff ware, mat whitish and red slip (type 5) diam.: 18 cm
- 4 – Y.056.5 Medium fine buff ware, mat whitish and red slip (type 5) diam.: 16 cm
- 5 – Y.057.1 Medium fine buff ware, mat whitish and red slip (type 5) diam.: 14 cm
- 6 – Y.057.9, Grey ware, scratchy fabric, grey slip (type 31) diam.: 8 cm
- 7 – Y.056.9, Fine grey ware, deep black slip (type 32), diam.: unknown
- 8 – Y.056.14, Fine buff ware, decayed glazed (type 20), diam.: 14 cm
- 9 – Y.057.41, Fine buff ware, decayed glazed (?), diam.: 7 cm

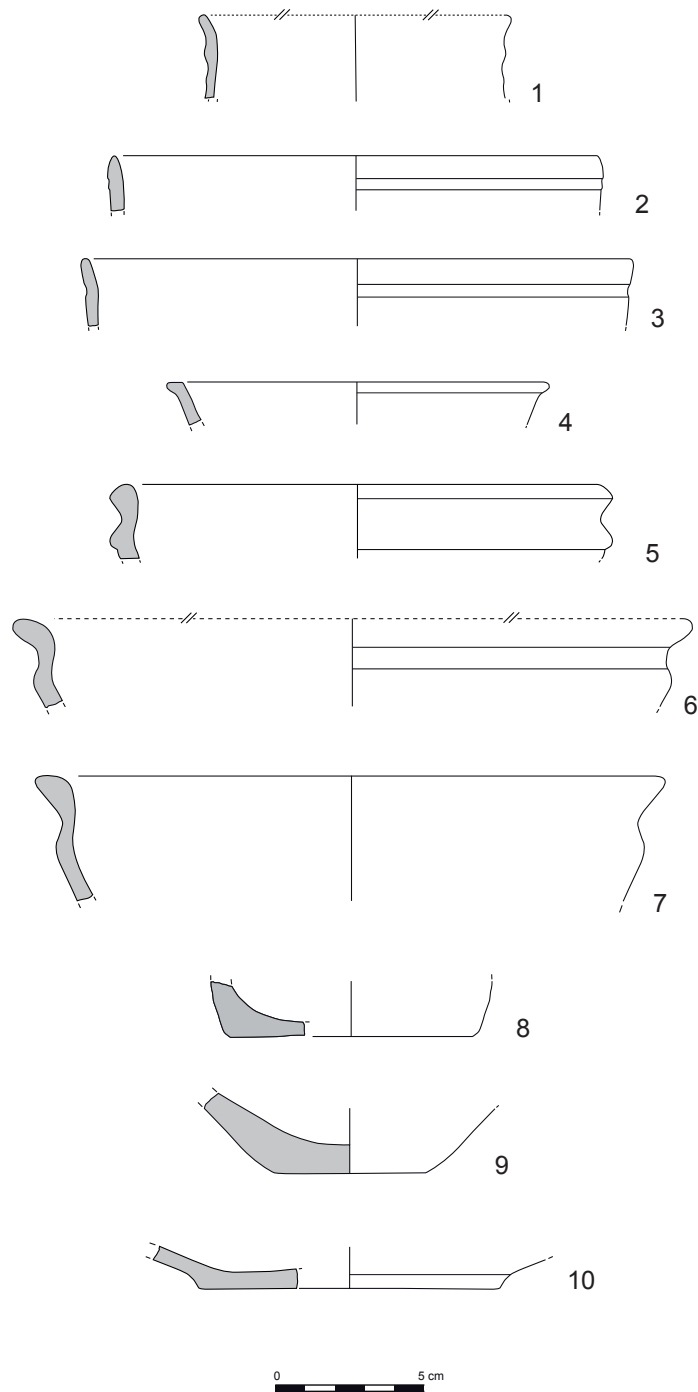


Figure 181 Al-Yamāma – Phase 4: Common wares (L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)

- 1 – Y.060.5, medium buff ware with medium grits, cream slip (type 1a), diam.: 10 cm ?
- 2 – Y.060.6, fine reddish buff ware with cream slip (type 33), diam.: 16 cm
- 3 – Y.060.7, fine reddish buff ware with cream slip (type 33), diam.: 18 cm
- 4 – Y.059.2, fine reddish buff ware with cream slip (type 33), diam.: 12 cm
- 5 – Y.060.10, fine buff ware, light grey core, deep red slip inside and in the outside wall until the carination (type 37), diam.: 15,5 cm
- 6 – Y.059.4, fine reddish buff ware with cream slip (type 33), diam.: 22 cm ?
- 7 – Y.060.4, fine reddish buff ware with cream slip (type 33), diam.: 20 cm
- 8 – Y.058.3, medium reddish buff ware with black/reddish slip (type 37), diam.: 8 cm
- 9 – Y.059.3, fine reddish buff ware with cream slip (type 33), diam.: 5 cm
- 10 – Y.060.11, fine buff ware (type 4), diam.: 10 cm

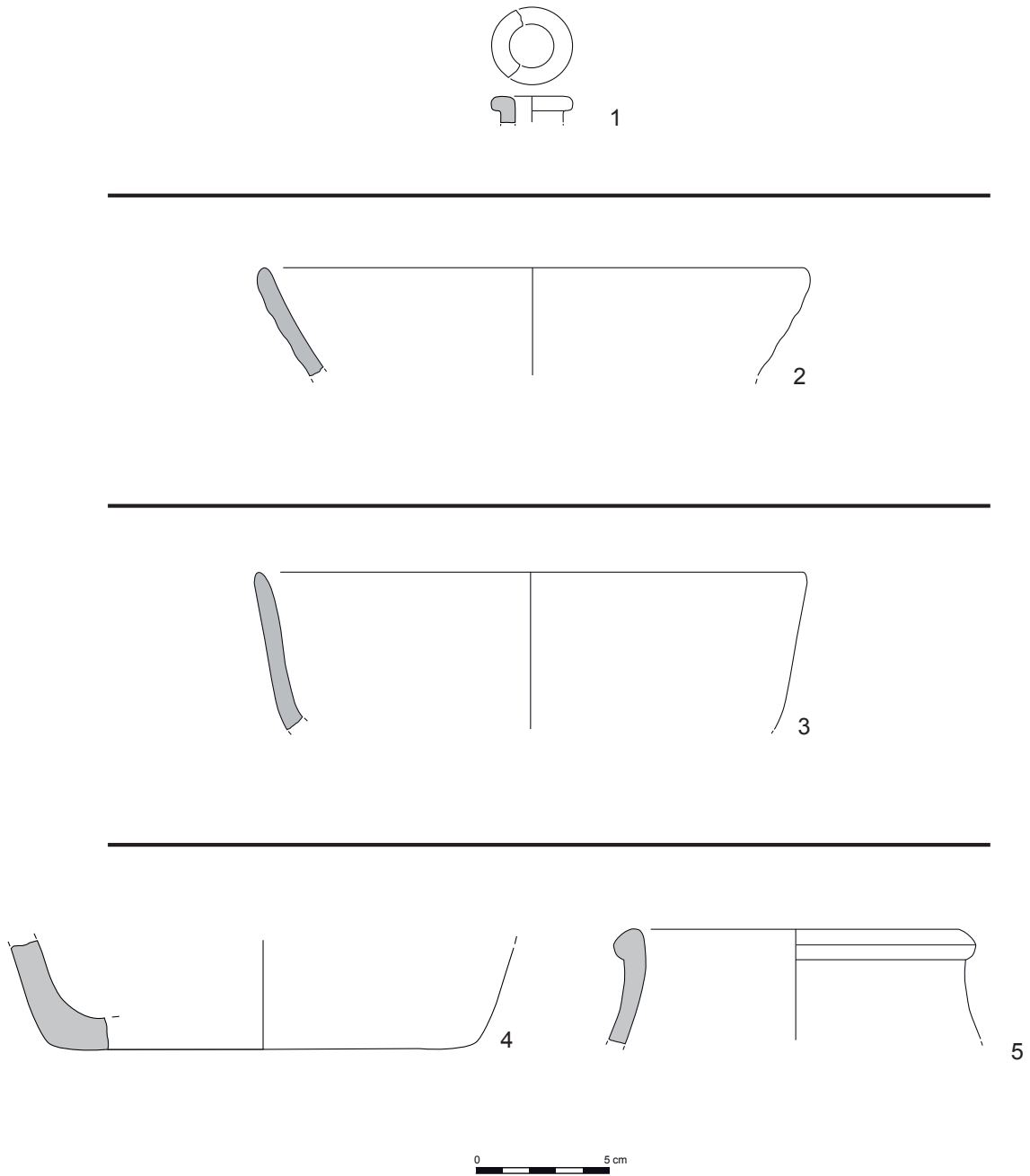


Figure 182 Al-Yamāma – Phase 4: Glazed ware, coarse ware and peculiar fabrics (L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)

- 1 – Y.060.3, green glazed ware (type 20), diam.: 3 cm
- 2 – Y.058.2, coarse ware, slow wheel turned reddish cooking ware, light grey on the surface outside (type 18), diam.: 20 cm
- 3 – Y.058.1, medium fine buff ware with whitish and red mat slip (type 5), diam.: 20 cm
- 4 – Y.060.12, reddish ware with grey-black core and very abundant chaff temper (type 15), diam.: 16 cm
- 5 – Y.059.1, reddish ware with grey-black core and very abundant chaff temper (type 15), diam.: 12 cm

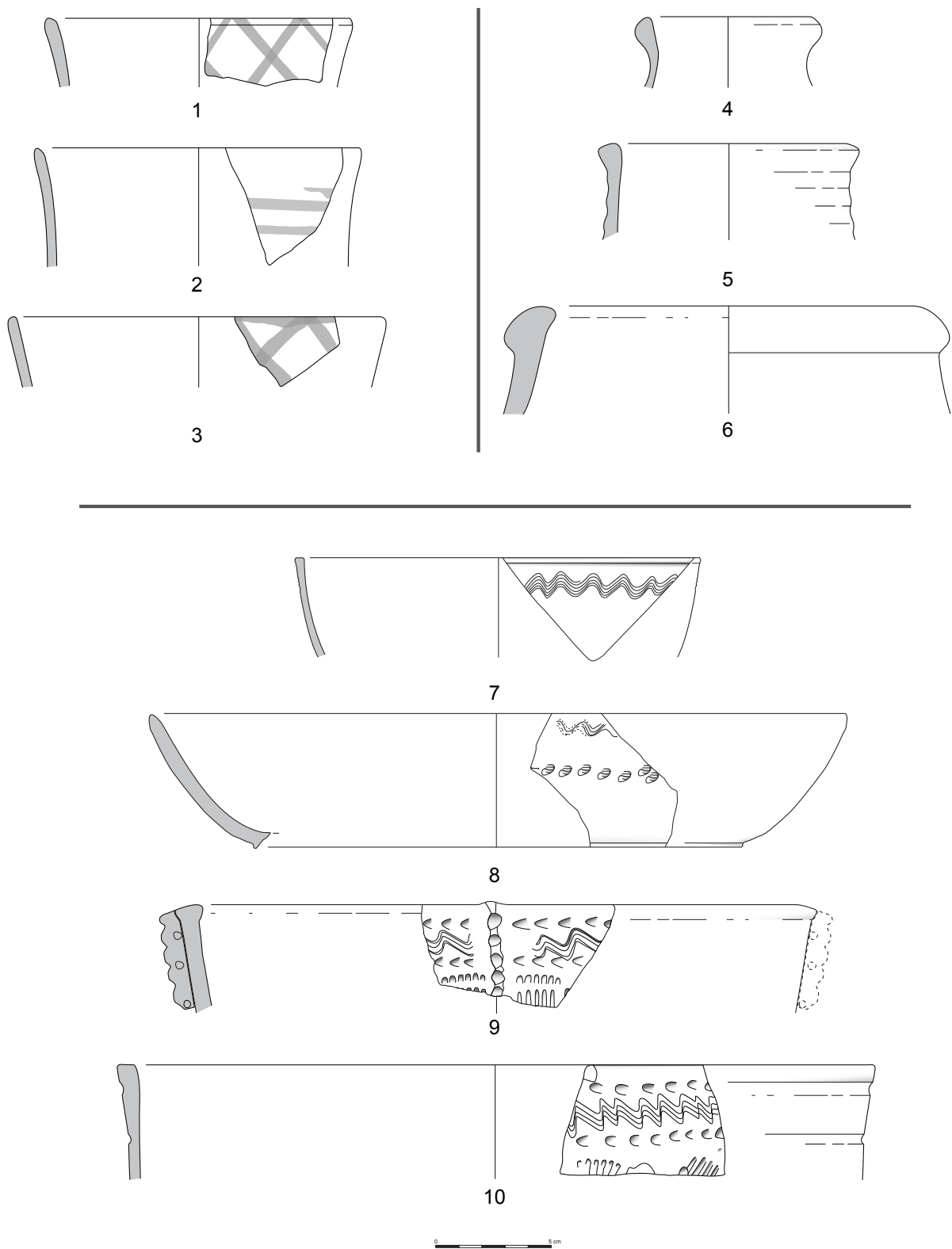
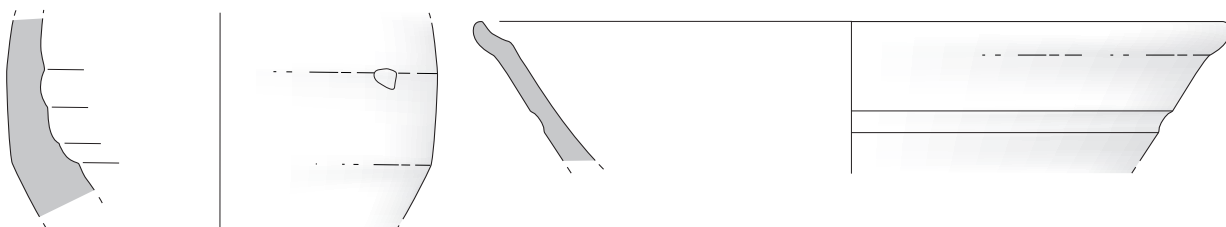
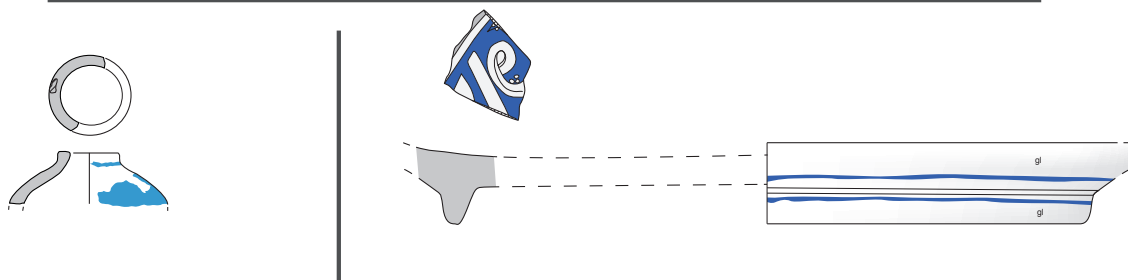
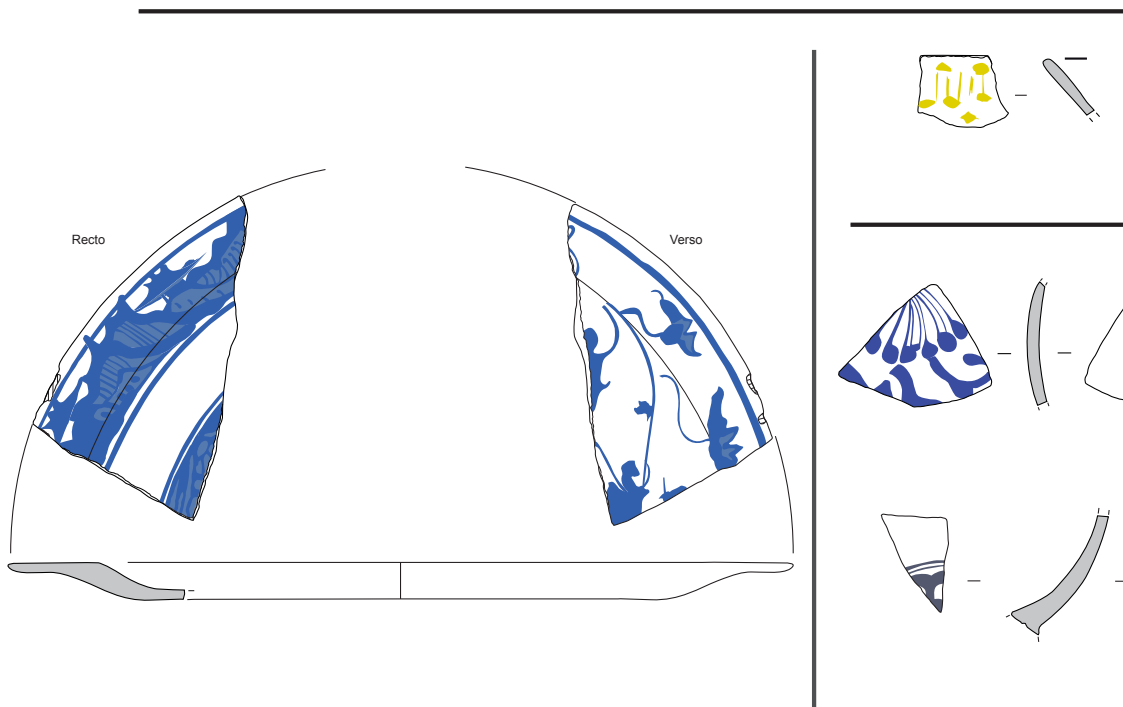
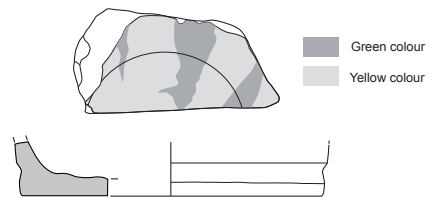
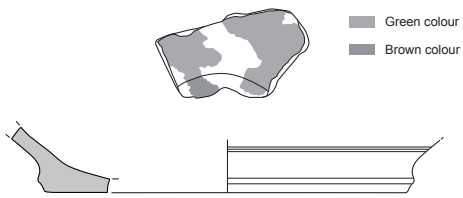


Figure 183 Al-Yamāma – Surface: Fine buff painted ware and Layla ware (L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)

- 1 – Y.G18.surf.11, Medium fine buff ware with cross-hatch paint in red (type 3), diam.: 13 cm
- 2 – Y.G18.surf.8, Medium fine buff ware with cross-hatch paint in red (type 3), diam.: 14 cm
- 3 – Y.G18.surf.10, Medium fine buff ware with cross-hatch paint in red (type 3), diam.: 16 cm
- 4 – Y.G18.surf.6, Layla ware with glossy surfaces (type 10), diam.: 7 cm
- 5 – Y.I17.surf.1, Layla ware with glossy surfaces (type 10), diam.: 10 cm
- 6 – Y.G18.surf.2, Layla ware with glossy surfaces (type 10), diam.: 16 cm
- 7 – Y.G18.surf.4, Layla ware (type 9), diam.: 17 cm
- 8 – Y.G18.surf.3, Layla ware (type 9), diam.: 29 cm
- 9 – Y.G18.surf.5, Layla ware (type 9), diam.: 26 cm
- 10 – Y.G18.surf.7, Layla ware (type 9), diam.: 32 cm



0 1 5 cm

Figure 184 Al-Yamāma – Surface: Splashwares, Lustreware, Porcelains, Porcelain imitation, Siliceous wares and Bahla wares (Drawings: L. Munduteguy, P. Siméon; graphics: A. Émery, L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)

- 1 – Y.L17.surf.1, Splashware: fine red ware with brown to green paint (type 21), diam.: 12 cm
- 2 – Y.J9.surf.1, Splashware: fine orange ware with yellow-brown to black paint (type 21), diam.: 10 cm
- 3 – Y.O7.surf.1, Porcelain imitation: buff ware with blue and white décor (type 34), diam.: 26 cm
- 4 – Y.G17.surf.1, Lustreware (type 44), diam.: unknown
- 5 – Y.K7.surf.1, Blue and white porcelain with a floral décor (type 22), diam.: unknown
- 6 – Y.P9.surf.5, Blue and white porcelain with a floral décor (type 22), diam.: unknown
- 7 – Y.P8.surf.3, Siliceous fabric, with an eroded blue and grey glaze (type 47?), diam.: 3 cm
- 8 – Y.N6.surf.2, Earthenware with inglaze blue decoration (cobalt or copper ores?) under a transparent glaze, diam.: 21 cm
- 9 – Y.P9.surf.7, Bahla ware: Grey to brown fabric with a green-brown glaze (type 43), diam.: unknown
- 10 – Y.N6.surf.1, Bahla ware: Grey to brown fabric with a green-brown glaze (type 43), diam.: 25 cm

CHAPTER 10

AL-YAMĀMA (AREA O7): BUILDING 2/SOUNDING 2 – A DWELLING

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Location

In the north-west corner of area O7, immediately to the south of the yard of the Great Mosque (Building 1), a five-room building with an enclosed courtyard (Building 2) was visible on the ground. A small sounding (Sounding 2), 7 × 5 m, was opened in this mudbrick structure (figs. 99, 185). It straddles two rooms (R. 108 and R. 109) and encroaches upon two others (R. 110, R. 113) and upon the courtyard (R. 112).

Architectural description

This long rectangular building is divided into five almost rectangular rooms. The western room (R. 136) opens onto the street to the south (access door A. 123). This is the only entrance to the building. This room measures 4.3 × 2.1 m and leads to another rectangular room of the same dimensions (R. 113) to the east and, through a door (A. 137), to a large rectangular courtyard (R. 112), ca. 11 × 5.3 m. From the courtyard, the rest of the building is accessible: a rectangular kitchen (R. 108), 2.1 × 1.6 m, through a door (A. 111) and a rectangular room (R. 109), 2.8 × 2 m, through another door (A. 115). Finally, room R. 109 opens onto a long rectangular room in the south-east corner of the building (R. 110), measuring 4.2 × 1.7 m. The partition wall W. 102, between rooms R. 109 and R. 108 is not bonded with walls W. 101 and W. 104 but abuts them; it seems to be a late addition, cutting what had been a single room in two. At the same time, the door A. 111, between walls W. 103 and 104, was cut open through what had been a solid wall.

Walls were built of rectangular mudbrick laid in regular courses. They are all one mudbrick wide. The mudbricks almost all conform to a single module: 40 × 24 × 15 cm; the only wall using a different module (30 × 20 × 12 cm) is the additional wall W. 102 between rooms R. 108 and 109.

All the walls were covered on the inner side with a thin mud or a plaster coating (W. 106–107); this rendering is generally only preserved on the lower part of the wall.

The doorways did not yield any evidence of closing devices. The thresholds have no door socket, and are simply made of mudbricks lying flat on the ground.

Inside room R. 108, the upper parts of walls W. 100 and W. 101 have been damaged by an animal burrow (fox? ratel?); the hole is wide and shows the imprints of large claws (fig. 186).

Stratigraphy

The whole structure was covered by a thick aeolian sand deposit (UF 100) which was removed over the area of Sounding 2 (**fig. 186**). It yielded very little material (172 g. of bones and some fragments of plaster). Having removed this layer, the excavation focused only on rooms R. 108 and R. 109 (**fig. 187**).

ROOM R. 108

During the excavation, a 20-cm-wide baulk was kept along the southern wall W. 101. It shows the stratigraphy clearly (**figs. 187-188**).

Under a surface crust made of sand hardened by stagnant water, a layer of loose aeolian sand (UF 100), 10 to 20 cm thick, covered an inclined dense collapse layer made of fallen mudbricks and melted mud (UF 101a). These layers yielded nine small sherds of either common or sandy wares.

Below, UF101b is a 15 to 30-cm-thick layer of loose aeolian sand which might have preceded the collapse of the walls and followed the abandonment of Building 2. This layer is almost devoid of artefacts (only two indistinct sherds of common ware) but contained approximately 1 kg of bones (mainly of camel, sheep and goat, and to a lesser extent, gazelle and dog). Their presence might be explained either by the reuse of this place as a dump, or as intrusive material from the occupation layer below (UF 102).

The occupation layer (UF 102) is characterized by ca. 20 cm of sand mixed with ash coming from the regular emptying of an oven (St. 114) built in the south-east corner of room R. 108 (**figs. 189-190**). This layer yielded very few artefacts: 5 stone tools and 14 sherds of either common ware, sandy ware, glazed ware or porcelain (see below). Conversely, more than 5.5 kg of bones were collected (1.25 kg from the oven alone), mainly of camel, sheep, goat and gazelle, some of them showing traces of burning. Twenty-five camel bones and twenty-three sheep or goat bones have cut marks or chop marks; these traces are located throughout the skeletons, suggesting butchery activities nearby (see Chapter 11 – **fig. 198**).

The oven measures 90 × 42 cm. It is built of clay and mudbrick fragments, against the corner of the south and east walls (W. 101 and W. 100). The oven walls are 16 cm thick at the top; the lower part is made of a thin wall of clay hardened by the heat. The bottom of the oven was partially composed of a hard layer of clay. This structure was filled up with sand, charcoal and ash of the same density as the rest of UF 102. Among the faunal remains found inside the oven was a complete camel head with its mandible. None of the bones from the oven showed traces of burning, possibly because the meat was steamed, a practice still to be observed today in the Yemeni Tihāma where the meat is wrapped in a banana tree leaf and steamed in clay oven (*tannūr*) (**fig. 191**). Similar ovens can still be seen in some houses of the abandoned village of Umm ʿUtayba, near al-Yamāma (**fig. 192**). Both those of Tihāma and Umm ʿUtayba are supplied with wood from above, as was probably the case for the one at al-Yamāma, which was dug into the ground and emptied from the top.

The ashy layer (UF 102) covered a layer of loose sand with mudbrick fragments (UF 103) which abutted wall W. 100 to the east but went under wall W. 102 to the west. This proves, as already mentioned, that wall W. 102 was built in a second phase of occupation of Building 2. The construction of the clay oven is contemporary with that of wall W. 102 (at that time, the sandy accumulation of UF 103 was hollowed out in order to settle the oven). The sandy layer UF 103 might correspond to the first occupation phase. No pottery was found there, and only 0.1 kg of bone fragments.

Due to lack of time, the excavation stopped at an elevation of 428.08 m a.s.l. without having reached the foundation layers of the house.

ROOM R. 109

The stratigraphic sequence is almost the same as that described in room R. 108 (figs. 187, 193): a layer of aeolian sand (UF 100/R. 109) covered a collapse layer of fallen fragmentary mudbricks (UF 101/R. 109). Faunal remains were rather abundant in this destruction layer (1.25 kg), including many domesticated species (camel, ovicaprid, bovid, donkey, cat?) and hunted or intrusive wild species (ratel, sand grouse, spiny-tailed lizard). As postulated for the previous room, the presence of these bones after the abandonment of the house might be the result of a reuse of this area as a dump.

Under the collapsed walls, a thin layer of aeolian sand covered another thin layer of ashy sand (UF 102/R. 109). The first one is equivalent to UF 101b in room R. 108, the second to UF 102 in room R. 108. The ashy layer of sand covered a hard horizontal surface of mudbrick fragments and densely packed sand, floor F. 159 (fig. 194). Through this floor, a 13-cm-deep hearth (diam.: 28 cm) had been dug and lined with hard clay and mudbrick fragments. It was filled up with ash and charcoal. The ashy layer above floor F. 159 is explained by a regular emptying of the hearth, its content being spread on the ground. The floor abuts all the walls and dates back to the second occupation phase of room R. 108 (characterized by the oven and the thick ashy layer). Only a few fragments of bone (0.2 kg) were found in this occupation layer. The room was devoid of pottery sherds and artefacts.

The excavation stopped at an elevation of 428.22 m a.s.l., at the base of this second occupation level. The first occupation, previous to the building of wall W. 102, has not been reached so far.

Artefacts

As mentioned above, the two rooms R. 108 and R. 109 yielded a limited quantity of artefacts and sherds, almost all from the second occupation level of room R. 108 (UF 102 – fig. 189). These are:

- Five complete or fragmentary stone discs (Y.101.1, Y.102.2, Y.102.5 – fig. 195). The best preserved one (Y.102.2) is a flat circular stone with rounded edge made of beachrock, diameter: 27 cm, thickness: 5.1 cm. The upper face has partly turned red, probably due to exposure to fire. Two of these artefacts show traces of fire. Their function is unclear; they could have been jar stoppers, oven covers, cooking plates or worktops.
- Two flat limestone pebbles: one (fig. 195: Y.102.4) is a brown, partly burnt pebble broken on one side (9.7 × 6 × 3.2 cm); the other (fig. 195: Y.102.3) is a grey to brown rectangular pebble, broken on one side (8.3 × 7.8 × 2.5 cm), found in the upper part of the oven (St. 114). They could have been used as grinders.

Regarding the few pottery sherds, the first occupation phase (UF 103) was devoid of ceramics, and none of those coming from the collapse layer (UF 101) yielded functional or chronological information.

The second occupation phase in room R. 108 (UF 102) contained 14 sherds. These are:

- a majority of *common buff greenish ware* and *red-orange sandy ware* including a jar handle;
- a fragment of *cooking ware with white exploded grits*;
- a thin rounded rim of brown ware with a glaze. The fabric and the glaze are badly damaged by exposure to severe heat. No parallel can be drawn;

- three sherds of one or two *porcelain* cup(s) (**fig. 196: Y.102.3**) with a ring base, slightly everted walls and a thinned rim. These coffee cups with a milk chocolate cover on the outer face and a transparent cover on the inner face are late 17th–early 18th century productions from the Jingdezhen kilns in the province of Jiangxi, China (B. ZHAO, pers. comm.). This chronological marker is the only one available so far to date the second occupation of Building 2.

Discussion

The small Sounding 2 in Building 2 sheds light on a dwelling structure belonging to the last phase of occupation of the site (phase 1).

At least two stages of occupation have been distinguished, though the earlier one was found only in the lower part of Room R. 108. Lack of time prevented the complete excavation of this first occupation. The absence of artefacts and pottery means that it cannot be dated precisely.

On the other hand, the second occupation level could date to more modern times (17th–18th centuries), a period already observed in the upper layers of Sounding 1 and Building 1.

In Building 2, the second occupation corresponds to the re-planning of the structure. A larger room was cut in two (R. 108 and 109) and a kitchen installed in the smaller part – witness the oven and the stone tools. Although it seems that domestic activities took place in the other room (R. 109), as suggested by the hearth, its function cannot be specified.

After the last occupation, the inhabitants took the time to clear the furniture and artefacts. Almost nothing was left but animal bones, a few pottery sherds and some broken stone tools.

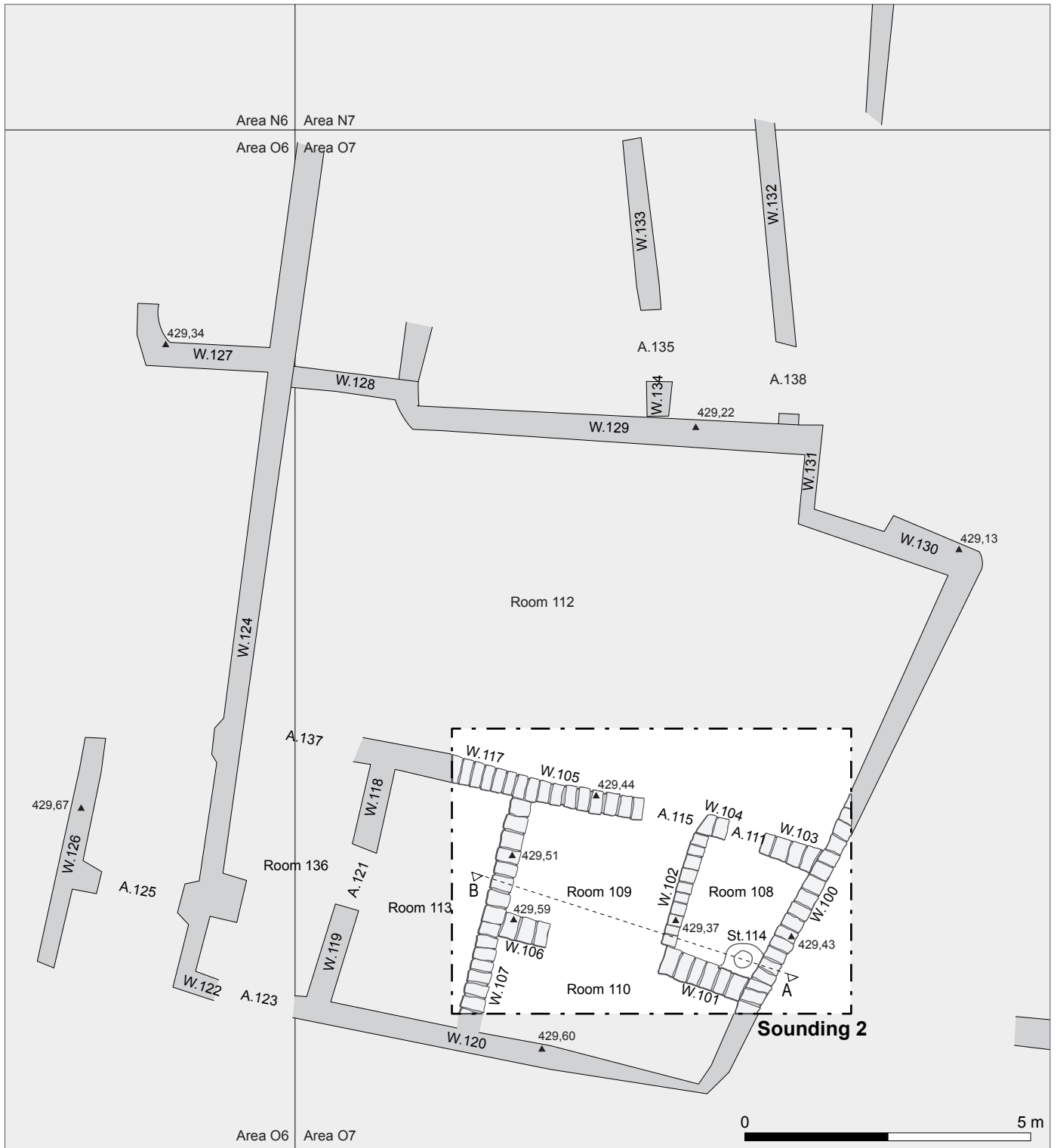


Figure 185 Al-Yamāma – detailed map of Building 2 (area O7) and location of Sounding 2 (M. Niveleau, J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

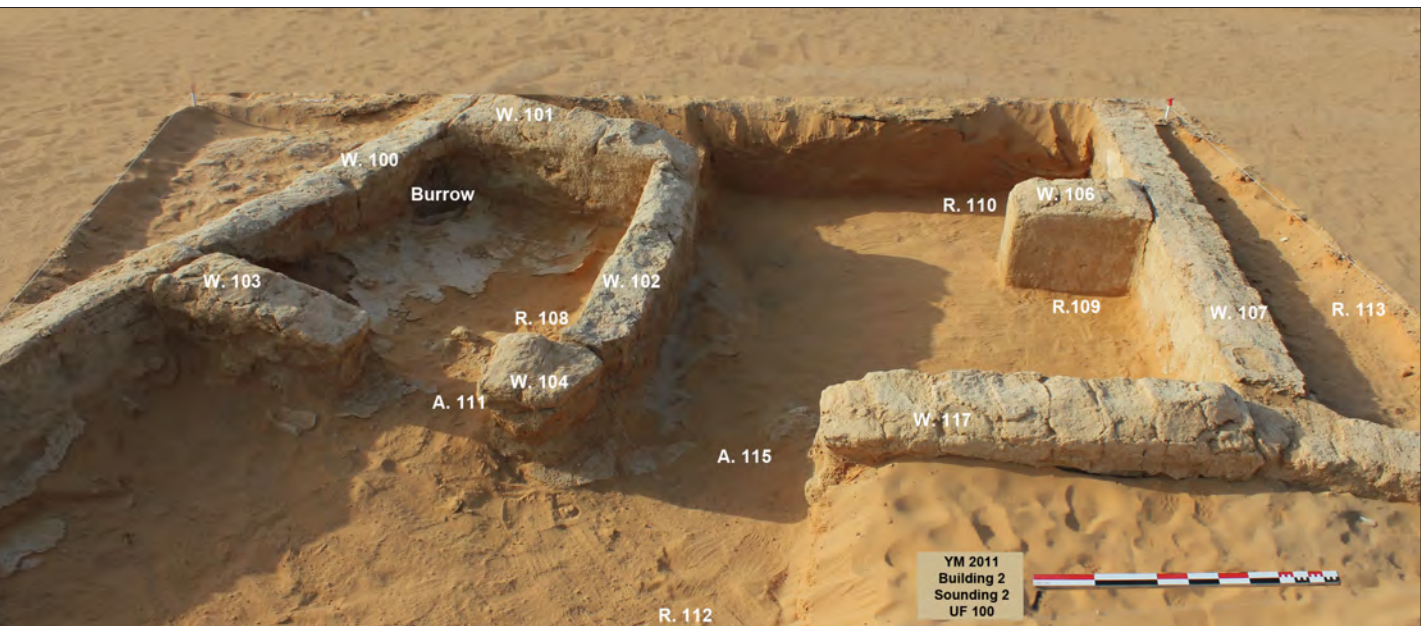


Figure 186 Building 2, Sounding 2: mudbrick structures after the removal of surface aeolian sand, looking south (L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)

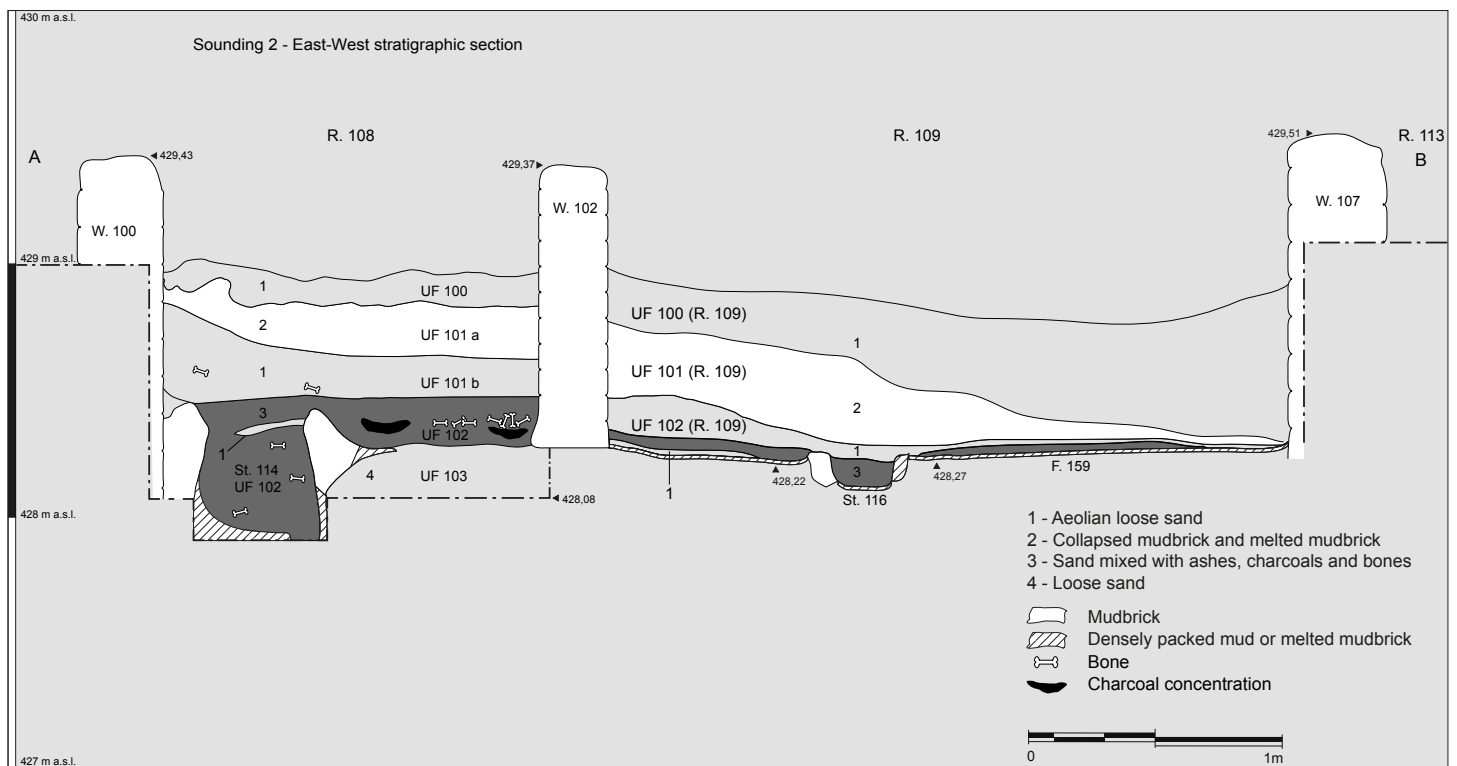


Figure 187 Building 2, Sounding 2: east-west stratigraphic section (drawing: L. Munduteguy, graphics: J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

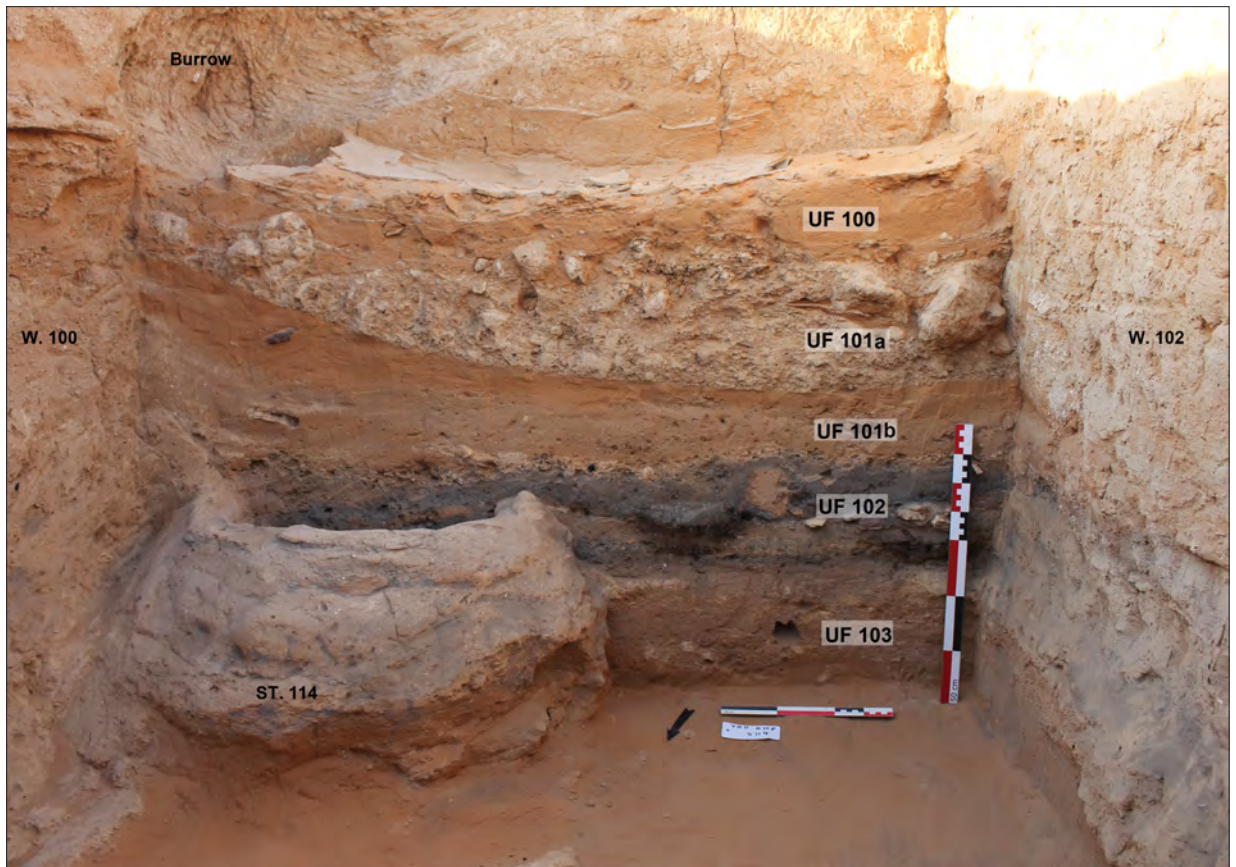


Figure 188 Building 2, Sounding 2: east–west stratigraphic section in room R. 108, looking south (L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)



Figure 189 Building 2, Sounding 2: base of the ashy layer (UF 102) in room R. 108 corresponding to the second occupation of the building, looking south (L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)



Figure 190 Building 2, Sounding 2, room R. 108: oven St. 114 from the top (L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)

Figure 191 Tihāma (Yemen): clay oven used for steaming lamb meat wrapped in banana tree leaves (J. Schiettecatte)



Figure 192 Umm ‘Utayba (neighbourhood of al-Kharj) – clay oven in an abandoned house (L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)

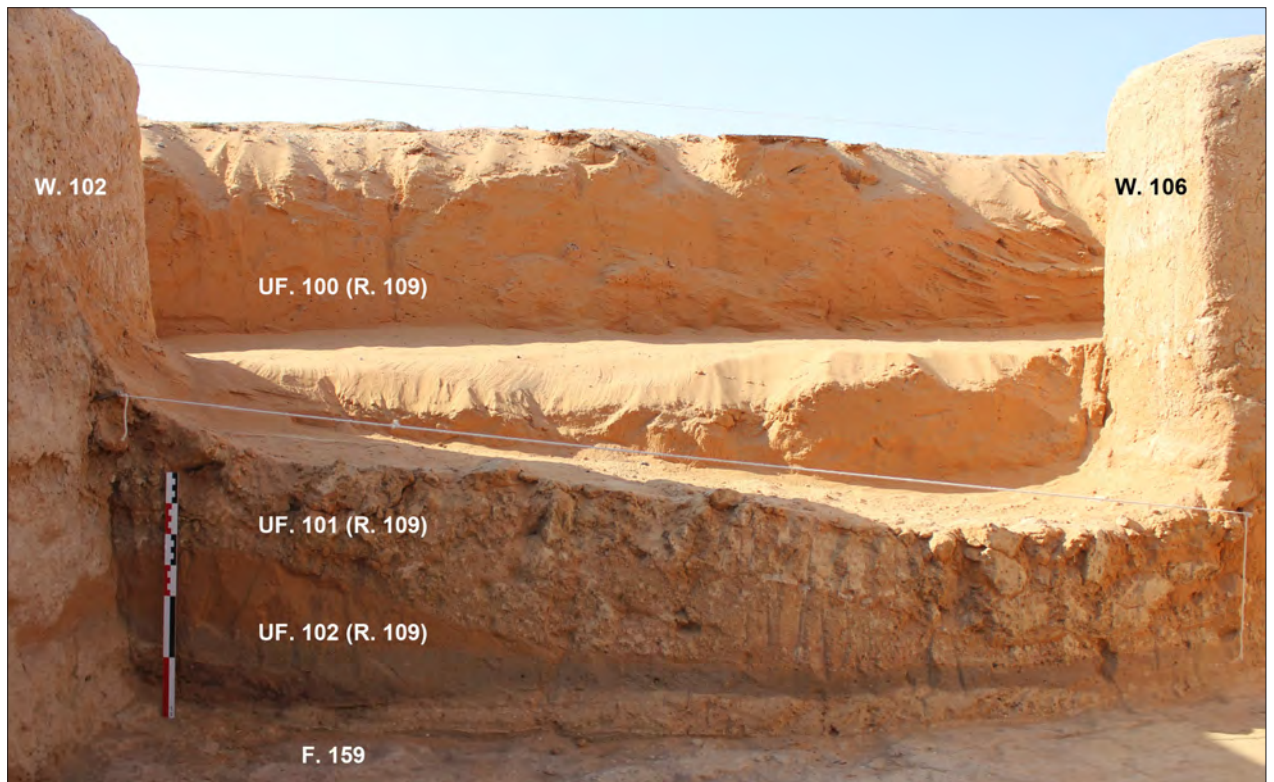


Figure 193 Building 2, Sounding 2: east-west stratigraphic section between rooms R. 109 and R. 110, looking south (L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)

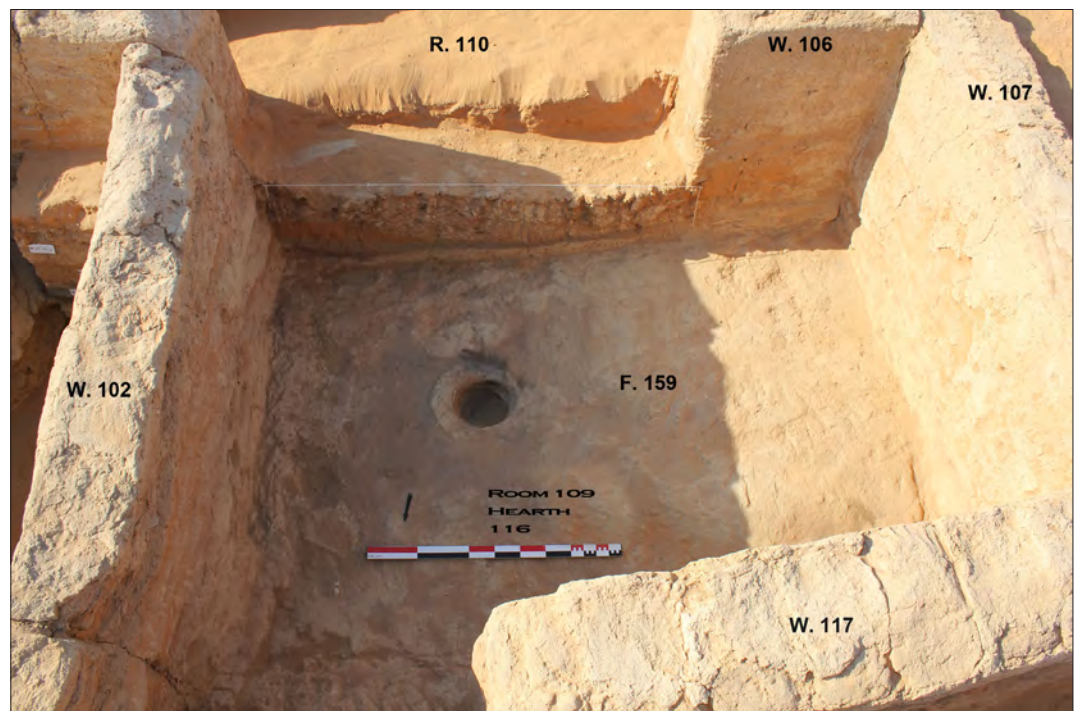


Figure 194 Building 2, Sounding 2: base of the ashy layer (UF 102) in room R. 109 corresponding to the floor of the second occupation of the building, looking south (L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)



Figure 195 Building 2, Sounding 2: stone tools from the second occupation of the building:
 Y.102.2: complete stone disc;
 Y.102.5: set of 3 fragments of stone discs;
 Y.102.4: stone grinder (?);
 Y.102.3: stone grinder
 (J. Schiettecatte – French-Saudi Archaeological Mission in al-Kharj)

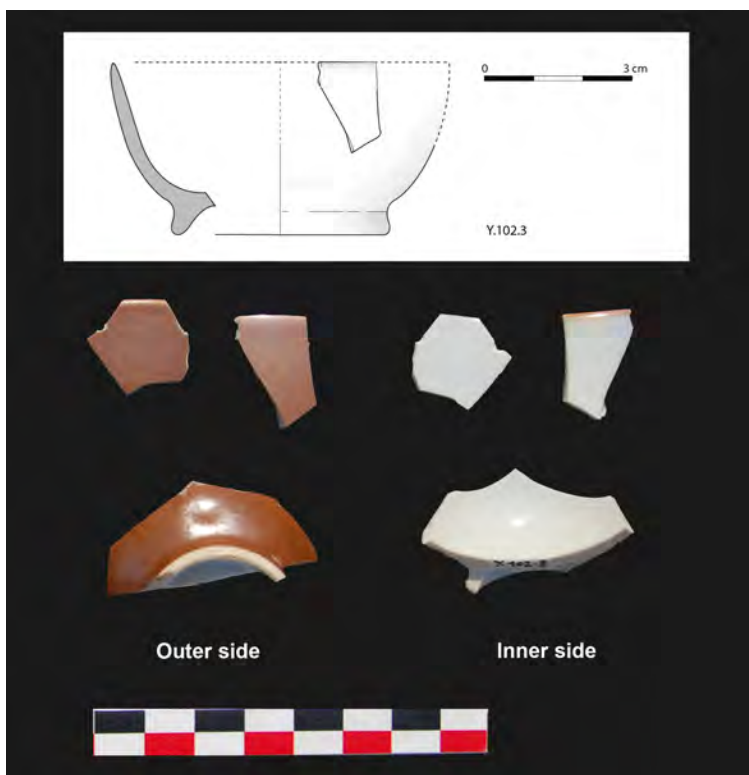


Figure 196 Building 2, Sounding 2: porcelain cup Y.102.3: coffee cup with a milk chocolate cover on the outer face and a transparent cover on the inner face (17th–18th century) (L. Munduteguy – French-Saudi Archaeological Mission in al-Kharj)

CHAPTER 11

THE FAUNAL REMAINS OF AL-YAMĀMA: FROM CAMELS TO SPINY-TAILED LIZARDS

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The abundance of bones scattered everywhere on the surface, particularly where archaeological structures are visible, is a striking feature of the site of al-Yamāma. Intense weathering of the area has exposed these ancient faunal remains. In addition, despite the presence of a fence, the site is currently used for dumping carcasses (sheep, goat, camel or donkey), and is also a popular *rendez-vous* for barbecues. Therefore, it was no surprise to find many faunal remains during the archaeological excavations.

Generally, bones recovered during archaeological excavations have various origins (LYMAN 1994): (1) a natural origin independent of human activities. This is the case especially of intrusive animals, such as rodents and carnivores, which died *in situ* through illness, accidents, fire, flood, collapse of structures etc. These animals are often commensal of human activities; (2) an anthropogenic origin. The bones represent food-waste found either *in situ* (i.e. in an oven or on an occupation floor) or in dump areas. Bones may also come from domestic animals which died naturally, due to illness or by accident and were rejected without being consumed. These may have been buried or simply thrown away.

The zooarchaeological study is important not only for understanding the environment of al-Yamāma oasis but also to understand the subsistence strategies of the site's inhabitants and the sources of their food. In the long-term, it also aims at a better understanding of the development dynamics of the management and exploitation of animal resources during each phase of occupation in the different areas of the settlement and then an evaluation of the main diachronic changes registered.

As the excavation project is still in its infancy, the sampling is still rather limited so that fitting the results into an absolute chronology is not yet possible in all cases. Therefore, the conclusions presented here remain tentative and should be considered as a preliminary hypothesis. Consequently, the aim of this paper is not to attempt a detailed analysis of diet at al-Yamāma during Islamic times or temporal changes during the different phases of occupations, but rather to give an outline and indicate the potential that can be addressed in future excavations.

Bone location

Faunal remains come from two main archaeological contexts: Sounding 1/Building 1 (figs. 99–100 – see Chapters 7–8), and Sounding 2/Building 2 (figs. 99, 185 – see Chapter 10):

- **Sounding 1/Building 1 (mosque).** Sounding 1 was dug along the slope of the mound, in the north-eastern part of the site (area N6). It comprises (A) an open area north of a

long east–west wall (W. 001); (B) a circulation area bordered by W. 001 to the north and the northern wall of Building 1 (W. 002) to the south; (C) to the south, a large mudbrick mosque (Building 1).

- **Sounding 2 (dwelling area).** This sounding straddles two rooms in a mudbrick house (Building 2), devoted to cooking and domestic activities (R. 108, R. 109). The discovery of many burnt bones associated with an oven (*tannūr*) in room 108 reflected the eating habits of the last occupation phase on the site.

Generally, the bones came from three types of contexts: (1) human circulation/occupation levels (floors, pathways, fire places), mostly in and around the mosque; (2) sedimentary (sandy) aeolian fill (dump areas): bones (carcasses) were abandoned or thrown away against some walls, away from the pathway; (3) the collapse of mudbrick structures.

PHASE	SPATIAL/CHRONOLOGICAL CONTEXT	UF	N
0	PHASE 0 – Late modern		
0.1	Surface deposit, aeolian accumulation following the abandonment of the site or latest collapse layer of Building 1	001; 002; 007; 022; 035; 050; 100	380
0.2	Building 1 – Pit fill following the abandonment of the building	024 (W. 006); 025 (miḥrāb); 028 (W. 006)	35
1	PHASE 1 – Modern		
1.1	Building 2 – Sounding 2: dwelling structure	101 (abandon/collapse); 102 (1st occupation); 103 (2nd occupation)	575
1.2	Sounding 1 – Northern part: refuse dump along wall W.001	003; 008	252
1.3	Sounding 1 – Central part		
1.31	Group 1 – Refuse dump in late aeolian accumulation or in collapse of W. 003; probably contemporary of the latest occupation levels of Building 1	004; 005; 010; 032; 039	417
1.32	Group 2 – Circulation/accumulation north of Building 1	015; 017; 041	626
1.4	Building 1 – West of the building (west of W. 006)		
1.41	Group 1 – Refuse dump in late aeolian accumulation possibly contemporary to the latest occupation levels in Building 1	029; 031	92
1.42	Group 2 – Circulation/accumulation to the west of Building 1 (interface between phases 1 & 2)	033; 044; 045; 046; 048	258
1.5	Building 1 – Inside the building		
1.51	Late reoccupation (mosque)	023; 026; 027; 034; 036; 037; 043	332
1.52	Courtyard	038	14
2	PHASE 2		
2.1	Sounding 1 – Northern part: refuse dump in a layer of collapse and sand accumulation	012; 018; 021; 051; 052; 053; 054; 055	2605
2.2	Sounding 1 – Central part: circulation level	020	73
2.3	Building 1 – Early level of the mosque	030	3
3	PHASE 3	056; 057	795
4	PHASE 4 – Pre-Islamic	058; 059; 060; 061	702

Table 7 | Location and stratigraphic context of bone provenience in al-Yamāma excavations (N = number of bones)

In order to distinguish the different spatial and chronological contexts of bone provenience, each group of bones is referred to by two numbers. The first, from 0 to 4, refers to the site occupation phases distinguished so far. Since phases 0 and 1 have been explored in many different contexts, they have been subdivided by using a dot followed by a number (1.1, 1.2, etc.) which refers to spatial criteria (Sounding 1, Sounding 2, etc.). The number following the dot has no chronological value (**Table 7**).

Phase 0.1 (UF 001, 002, 007, 022, 035, 050 and 100) represents the surface deposit or a post-abandonment aeolian accumulation immediately beneath the surface; it will not be studied in detail. Indeed, the bones are the result of a series of events with no stratigraphic context. The same is true for phase 1.41 (UF 029, 031), which represents a refuse dump in a late aeolian accumulation probably contemporary with the latest occupation of the mosque.

Methodology

BONE PRESERVATION

The faunal material was identified in the field by the author during the 2011 and 2012 excavation seasons and shows the characteristic state of preservation of bone assemblages usually found in desert areas. The bone fragmentation is intense, especially for the mammals, which are represented by a high proportion of splinters (unidentified fragments). So, with the exception of the small, short, strong and compact bones (i.e. carpals, tarsals and phalanges), very few long bones (i.e. humerus, radius, ulna, femur and tibia), skulls, vertebrae or bone of belts were complete. Except one case (dog), no articulated joints were found.

This fragmentation is the result of several ante-depositional processes (e.g. butchery techniques) and post-depositional processes (e.g. trampling, weathering and, of course, excavation techniques). During the taphonomic characterization of the bone material the following agents had to be considered:

- Selection and slaughter of an animal followed by primary as well as secondary butchering are the first steps in the post mortem exposure of animal bones. In relation to these human activities, cut marks and the dispersal of bones from the same carcass are worth considering.
- Following the consumption of the meat or other modes of utilization (butchering, skinning, cooking, bone working etc.) animal bone may be deposited in several stages. There were many weathered bones in the faunal assemblage recovered at al-Yamāma. This suggests a long exposure to the damaging effects of sunlight and temperature fluctuations (BEHRENSMEYER 1978; ANDREWS & WHYBROW 2005; TODISCO & MONCHOT 2008).
- Meat and bone consumption by both humans and other animals (e.g. dog, rodent) may reduce the number of bones to be found. But the small number of dog or rodent bones on the site, and the rare gnawing or chewing marks on the bone surfaces, as described in BINFORD (1981) or FISHER (1995), does not seem to be in favour of a dispersal of bones by these animals.
- A substantial part of the excavated bone material was simply gathered by hand; sieving through a 2.5 mm mesh was only done for the circulation/occupation layers of Building 1 and Sounding 1 (UF 010, 015, 013, 019, 017, 020, 030), the lower levels of the northern part of Sounding 1 (phases 3 & 4: UF 053 to UF 061) and for the content of the oven (St. 114) in Building 2. This might affect the extent to which the bone assemblage is representative.

SPECIES IDENTIFICATION

Bone specimens were identified to the lowest possible taxonomic category and anatomical element, or portion thereof. When necessary, published literature, including Barone's anatomy atlas (BARONE 1986) and Smuts and Steiger's papers on the camel (SMUTS & BEZUIDENHOUT 1987; STEIGER 1990) were used. The criteria of bone identification for birds were based on COHEN & SERJEANTSON (1996) and MACDONALD (1992).

Sheep and goats were distinguished using morphometrical criteria (e.g. BOESSNECK *et al.* 1964; PRUMMEL & FRISCH 1986; HELMER 2000; FERNANDEZ 2001). However, despite the extensive literature, specific separation is not always easy, a large majority of the criteria are not a 100% reliable and the very diagnostic elements, such as horncores, are generally poorly preserved. So the sheep and goat remains were placed in a combined sheep/goat category, i.e. ovicaprids.

Specimens which proved difficult to identify, or whose identification needed checking, were separated and taken to Paris (France) for subsequent evaluation. Identifications were attempted for all bone fragments. For those showing few morphological features (e.g. the many mid-shaft long bone fragments) due essentially to high bone fragmentation, the unidentified fragments were recorded in size categories:

- SM: Small-sized mammal, unidentified ovicaprid-gazelle-dog size;
- MM: Medium-sized mammal, unidentified veal-oryx-camel calf size;
- LM: Large-sized mammal, unidentified horse-cattle-camel size;
- IND: Indeterminate mammal fragments.

QUANTIFICATION

The method for determining the number of identifiable specimens used in this study is the most widely used faunal parameter available for the characterization of faunal assemblages from archaeological excavations. The quantification of bone remains is based on the total number of identified specimens (NISP), on minimum number of individuals (MNI) and on minimum number of elements (MNE). The MNI is defined as "the smallest number of individual animals needed to account for the specimens of a taxon found in a location" (RINGROSE 1993: 126). The MNE is an estimate of the skeletal abundance, that is, the minimum number of skeletal parts or portions necessary to account for the specimens under study (LYMAN 2008: 218). NMI and NME will not be calculated by UF, but grouped by subset defined stratigraphically and spatially (Table 7).

AGEING

To estimate the age at death two main methods have been used. The first is by estimating the stage of tooth eruption and analysing dental wear; for the sheep/goat we referred to the work of PAYNE (1973) and for the camel to the work of LESBRE (1903). The second method, epiphyseal fusion, is less reliable as a result of the various taphonomic processes affecting the skeletal remains, especially those of young immature individuals and those with a high marrow and spongiosa content. For ovicaprids we used the dates of bone fusion published by BARONE (1986). As no age data for the development of the postcranial skeleton in camels are available in the literature, the data for slow-maturing cattle breeds from the 19th and early 20th century were used (DRIESCH & OBERMAIER 2007: tab. 6).

SURFACE MODIFICATION

■ *Cut and chop marks*

Butchering consists of a set or series of sets of human activities directed towards the extraction of consumable resources from a carcass. It has a temporal duration, made up of the set and order of activities carried out to extract these resources from a carcass (i.e. butchering pattern, LYMAN 1987: 252). So, during butchering, anthropogenic marks are the result of several carcass-processing activities like skinning, dismemberment or disarticulation or meat removal (filleting) (e.g. BINFORD 1981; LYMAN 1987; MONCHOT 1996). Two categories of damage resulting from tool use were identified, namely cut marks and chop marks (HORWITZ & MONCHOT 2002). Cut marks are incisions resulting from the cutting movement of a sharp-edged implement on the bone's surface. They are elongated, linear striations of variable length and width. Chop Marks are defined as broad, deep and relatively linear depressions that often have a V-shaped cross-section (FISHER 1995). Internal striations within the main groove may be observed. Chop marks are the result of a heavy blow to the bone with a sharp implement.

■ *Burning*

The degree of burning visible on bones was classified by colour on an ordinal scale from 0 to 6. These visible grades of burning range from unburned (code 0) to intermediate burning stages centring on carbonization (100% carbonized or pure black = code 3) to the most advanced phase known as calcination (100% calcined or pure white = code 6) (STINER *et al.* 1995).

METRIC EVALUATION

The good preservation of animal bones from the site provided an opportunity for gathering relatively numerous bone measurements, although the broad age range posed problems in the evaluation of these data. All the measurements and abbreviations used are according to Driesch's standard (DRIESCH 1976). Measurements were taken using a calliper rule and are expressed in millimetres.

Definition of the measurements present in the text:

L = Length;	Dp = Greatest depth of the proximal end;
GL = Greatest length;	Dd = Greatest depth of the distal end;
GM = Greatest length of the medial half (astragalus);	DLS = (Greatest) diagonal length of the sole (phalanx 3);
B = Breadth;	LO = Length of the olecranon (ulna);
Bp = Greatest breadth of the proximal end;	SD = Smallest breadth of the diaphysis;
Bd = Greatest breadth of the distal end;	SDO = Smallest depth of the olecranon (ulna);
Bl = Breadth of the lateral half (astragalus);	DPA1 = Depth across the <i>Processus anconaeus</i> (ulna);
Bm = Breadth of the medial half (astragalus);	DPA2 = Smallest depth across the coronoid process (ulna);
Btro = Greatest breadth of the distal trochlea (humerus);	

Results: species present

The total bone assemblage at al-Yamāma comprises 7728 faunal remains, with a total weight of nearly 78.4 kg. The fauna list presented in **table 8** summarizes the various species on the basis of the number of identifiable bone specimens (NISP): the mammals largely dominate; birds and molluscs are very rare, respectively with a NISP of 11 and 4. Reptiles

are represented by 145 bones of spiny-tailed lizard. No fish bones were identified. Only 2424 remains (31.4%) were identified to the level of species, family or order.

Domestic mammals formed the majority of the assemblage, represented by the following species: camel, ovicaprid (sheep/goat), cattle, equid (donkey/horse/mule), dog and cat. Wild mammals were represented by gazelle, Arabian oryx, fox, honey badger, desert hedgehog, and finally the spiny-tailed lizard.

Tables 9 and 10 show the bone distribution in the different stratigraphic units (UF) defined during the 2011 and 2012 excavations:

- Sounding 1/Building 1 (mosque): 7012 bone fragments (92.05%)
- Sounding 2 (dwelling structure): 606 bone fragments (7.95%)

COMMON NAME	LATIN NAME	SOUNDING 1 NISP	SOUNDING 2 NISP	TOTAL		
				NISP	%	MNI
HERBIVORA						
Camel	<i>Camelus dromedarius</i>	984	153	1137	47.2	27
Sheep/Goat	<i>Ovis aries/Capra hircus</i>	811	88	899	37.3	30
Gazelle	<i>Gazella sp.</i>	69	26	95	3.9	12
Oryx	<i>Oryx leucoryx</i>	1		1	<0.1	1
Cattle	<i>Bos taurus</i>	12		12	0.5	2
Bovid		39		39	1.6	--
Horse/Donkey/Mule	<i>Equus sp.</i>	11	1	12	0.5	4
CARNIVORA						
Dog	<i>Canis familiaris</i>	40	7	45	1.8	5
Fox	<i>Vulpes sp.</i>	4		4	0.2	3
Cat	<i>Felis catus</i>	4		4	0.2	2
Honey badger	<i>Mellivora capensis</i>	1	1	2	0.1	2
BIRDS						
Chicken	<i>Gallus gallus</i>	2	2	4	0.2	2
Ostrich	<i>Struthio camelus</i>	2	1	3	0.1	--
Spotted sandgrouse	<i>Pterocles senegallus</i>		1	1	<0.1	1
Bird indet.		2	1	3	0.1	--
INSECTIVORA						
Desert hedgehog	<i>Paraechinus aethiopicus</i>	1		1	<0.1	1
REPTILIA						
Spiny-tailed lizard	<i>Urosmastix aethiopicus</i>	127	18	145	6.0	17
MOLLUSCS						
		4		4	0.2	--
MAMMALS (UNIDENTIFIED)						
Small mammal		222	54	276	--	--
Medium mammal		70	11	81	--	--
Large mammal		242	29	271	--	--
Unidentified		4366	213	4579	--	--
TOTAL		7012	606	7618	100	109

Table 8 Species list from the 2011–2012 excavations at al-Yamāma (NISP: Number of identified specimens; % NISP: only for the identifiable element; MNI: minimum number of individuals)

UF	TYPE OF DEPOSIT/STRUCTURE	WEIGHT (G)	N	NUMBER OF IDENTIFIED SPECIMENS														INDETERMIN.									
				CAMEL/DROMEDARY	OVICAPRID (SHEEP/GOAT)	GAZELLE	CATTLE	DONKEY	ORYX	DOG	FOX	RATEL	CAT	OSTRICH	BIRD	UROMASTYX	LARGE MAMMALS		MEDIUM MAMMALS	SMALL MAMMALS							
SOUNDING 1 & BUILDING 1																											
UF 001	Aeolian sand surface deposit	4378	71	29	11	1												2	27								
UF 002	Aeolian sand deposit	1196	33	10	9	2			1									2	4	5							
UF 003	Aeolian sand deposit over circulation area and waste deposits	10384	213	132	41	3	6											3	19	4	2						
UF 004	Collapse layer/waste deposits	5002	91	40	19	3	9													1	14						
UF 005	Aeolian deposit mixed with collapsed mudbrick	1002	56	12	22	2												6	1	3	9						
UF 007	Erosion post-abandonment	54	11		1																10						
UF 008	Aeolian deposit/waste deposits	2302	39	29	6	1														1	2	+++					
UF 010	Accumulation/Circulation level	5044	183	54	48	10	15											1	6	1	44	4					
UF 012	Aeolian deposit/Waste deposit	4784	159	77	47	1	11											2	1	2	8	9	+++				
UF 015	Aeolian deposit/circulation level	980	71	9	26	5														6	2	17	5				
UF 017	Aeolian accumulation - Gully area	4040	234	27	51	19	1													55	2	6	39	34			
UF 018	Aeolian accumulation/collapse layer	3776	83	50	21	1															4	4	3				
UF 020	Circulation level	2632	73	28	27	4															4	1	6	2			
UF 021	Collapse layer	54	4	2																			2				
SOUNDING 2 (DWELLING STRUCTURE)																											
UF 100	Aeolian sand surface deposit	72	34	4	3																	8	1	18			
UF 101/R.108	Collapse layer/accumulation post-abandon	984	100	20	22	5																2	8	4	39		
UF 102/R.108	2nd occupation layer (ashy sand) – R 108	4218	182	61	41	20																1	4	7	33	7	
UF 102/St.114	Structure 114 (oven filling) – R108	1420	101	43	2																			4	1	5	46
UF 103	1st occupation layer (sand) – R108	102	10	2	1																				4	2	
UF 101/R.109	Collapsed mudbrick and aeolian sand deposit following abandonment – R109	1250	167	18	16		1																	1	2	8	101
UF 102/R.109	2nd occupation layer (ashy sand) – R 109	200	15	5	3	1																			1	1	3
TOTAL		53874	1930	652	417	75	39	7	1	11	3	2	2	2	4	96	50	54	185	330							

Table 9 Number of animal remains from the stratigraphic layers of Sounding 1/Building 1 and Sounding 2 – 2011 season (C = Chicken; S = Spotted Sandgrouse; I = Indeterminate; +++ = numerous splinter/bone fragments, not counted)

UF	TYPE OF DEPOSIT/STRUCTURE	WEIGHT (g)	N	NUMBER OF IDENTIFIED SPECIMENS															
				CAMEL/DROMEDARY	OVICAPRID (SHEEP/GOAT)	GAZELLE	CATTLE	DONKEY	DOG	FOX	CAT	HEDGEHOG	BIRD	UROMASTYX	LARGE MAMMALS	MEDIUM MAMMALS	SMALL MAMMALS	INDETERMIN.	
BUILDING 1																			
UF 022	Sand deposit, collapsed mudbrick	150	97	26	1												70		
UF 023	Collapse/aeolian sand deposit	512	83	8	12				1							28	1	1	31
UF 024	Pit filling	10	4		4														
UF 025	Pit filling	22	8	1	1													6	
UF 026	Accumulation between two late occupations	8	3		1														2
UF 027	Accumulation post-abandon	8	4																4
UF 028	Filling between two walls	18	23	1	1														21
UF 029	Aeolian sand deposit	9	5		1														4
UF 030	Occupation/Accumulation	5	3																3
UF 031	Collapse over aeolian deposit	766	87	10	9				1(H)								8		59
UF 032	Aeolian sand deposit	1444	44	22	1														21
UF 033	Circulation/Accumulation	1268	123	18	19	1											15	3	65
UF 034	Collapse/Aeolian sand deposit	2424	234	51	20				1								11	1	150
UF 035	Aeolian deposit/Collapse layer	764	101	12	16				3								14		49
UF 036	Accumulation above occupation – Aeolian sand deposit	18	1	1															
UF 037	Accumulation above occupation – Aeolian sand deposit	8	2																2
UF 038	Accumulation above occupation – Aeolian sand deposit	183	14	5	1				1										7
UF 039	Aeolian sand deposit	484	43	7	8												4		24
UF 041	Accumulation in a gully area	1450	321	32	34	1			3(D)	2							6	16	221
UF 043	Accumulation between two occupations	102	5	1	3														1

Table 10 | Number of animal remains from the stratigraphic layers of Sounding 1/Building 1 – 2012 season (double page)

■ *Dromedary or Arabian camel* (*Camelus dromedarius*)

The dromedary is, together with the ovicaprids, the best-represented species in terms of number of identifiable specimens at al-Yamāma (n = 1108). From Antiquity onwards, the dromedary played an important role in the human exploitation of desert regions and it is not surprising to find camel bones in almost all stratigraphic units. All parts of the skeleton were identified in the bone assemblage (i.e. head, trunk, forelimb, hindlimb and extremities) (fig. 197).

Figure 197 needs some comments:

- No complete long bones have been found. All parts of the long bones are present in the assemblage, but the long bones suffered intense weathering, producing many splinters. It is difficult to identify clearly the origin of this fragmentation: is it of natural origin (trampling, weathering, etc.) or is it directly the result of human activities such as cutting carcasses into quarters, marrow extraction, or bone reduction for cooking or roasting, or a mix of these origins?
- Complete or sub-complete vertebrae are rare. The fragmentation (i.e. body, *processus spinosus*, *processus articularis*) increases the NISP.
- Ribs (n = 140) are also very fragmented, which also increases the NISP: 40 vertebral articular end fragments, 100 shaft fragments and 4 sternal end fragments.
- The small bones, i.e. carpals, phalanges, tarsals, sesamoids and caudal vertebrae are generally under-represented.

The camel skeletal distribution according to the different stratigraphic/spatial contexts on the site is detailed in **tables 18 to 22** at the end of this chapter. A minimum number of individuals of 27 is estimated. Although all the skeletal elements were identified on the site, suggesting that people brought the whole individual there, it is still unclear whether these remains represent whole carcasses scattered under the influence of taphonomic conditions or whether they represent discarded skeleton portions, or a mixture of both.

The age distribution according to the long bones, phalanges or vertebrae, i.e. unfused bones, was as follows:

UF 003: 20 unfused bones (5 proximal femur, 3 proximal humerus, 2 distal radius, 3 distal metapodial, 1 distal tibia, 1 phalanx 1, 1 calcaneus and 4 vertebrae) ▷ two individuals aged ca. 3.5 years.

- UF 004: 5 unfused bones (2 distal metapodial; 1 distal radius; 1 proximal tibia and 1 vertebra) ▷ Individual aged < 4 years.
- UF 005: 1 distal tibia unfused ▷ Individual aged < 2 years.
- UF 008: 1 distal metapodial ▷ Individual aged < 2.5 years.
- UF 010: 5 bones (1 distal humerus; 1 phalanx 1; 1 distal metapodial; 2 long bone indet) ▷ Individual aged < 1.5 years.
- UF 012: 3 vertebrae ▷ Individual aged > 4 years.
- UF 015: 1 proximal femur; 1 phalanx 2 ▷ Individual aged < 1 year.
- UF 017: 1 phalanx 1 ▷ Individual aged < 1.5 years.
- UF 020: 1 distal metapodial ▷ Individual aged < 2.5 years.
- UF 022: 4 vertebrae; 1 proximal tibia; 2 distal femur ▷ Individual aged < 4 years.
- UF 023: 1 proximal humerus ▷ Individual aged < 4 years.

- UF 031: 1 vertebra; 1 distal metapodial ▷ Individual aged < 2.5 years.
- UF 033: 2 proximal tibia (epiphysis and metaphysis); 2 vertebrae; 1 long bone indet. ▷ Individual aged < 4 years.
- UF 034: 1 proximal tibia ▷ Individual aged < 4 years.
- UF 041: 2 vertebrae ▷ Individual aged > 4 years.
- UF 050: 1 proximal tibia ▷ Individual aged < 4 years.
- UF 051: 1 vertebra ▷ Individual aged > 4 years.
- UF 055: 2 distal metapodial and 1 distal radius.
- UF 101: 3 vertebrae ▷ Individual aged > 4 years.
- UF 102: 2 phalanx 1 (epiphysis and metaphysis); 1 phalanx 2; 2 distal metapodial (epiphysis and metaphysis); 1 calcaneus; 1 vertebra ▷ Individual aged < 1 years.

All the other individuals present in the assemblage with fused epiphyses were over 4 years old. Determining the age distribution on the basis of the teeth was less satisfactory. The poor preservation of upper and lower jaws and isolated teeth makes estimating the age of the slaughtered camels delicate. In a desert environment, tooth preservation is bad. Although the number of isolated teeth may seem high ($n = 158$), they are generally fragmented and are mainly represented by 67 enamel fragments. The rest of the tooth elements are composed of 30 incisor/canine, 14 lower teeth, 20 upper teeth, and 27 fragments of unidentified molar. Two milk teeth were found among the assemblage, a lower D4 in UF 052 and an upper D3 in UF 055, and they belong to individuals aged 2–3 years (LESBRE 1903). On the other hand, several very abraded teeth belong to older individuals (e.g. in UF 003, 004, 057, 101, 102) aged 6 years or more (LESBRE 1903).

The predominance of adult camels corresponds well to an age profile one might expect for pack animals. According to HORWITZ & ROSEN (2005), three different camel management strategies based on male-female ratio and age profile – one for milk, a second for meat and a third for transport/draught – might be expected. Furthermore, they noted that camel herd composition is expected to differ between an urban site, a camel caravan and herds kept by nomadic camel herders. It might be possible, in the future, to test these assumptions on the material from al-Yamāma, by trying to identify the sex ratio using a modern statistical method, the mixture analysis (MONCHOT & LÉCHELLE 2002). This analysis is based on the premise that males are larger than females. Unfortunately, at the moment, the weakness of the measured sample does not allow a reliable statistical study.

That camels were eaten is attested by several features: traces of burning, presence of fine cut marks made by a knife which reflects skinning (S), dismemberment (D), or filleting (F) activities (**fig. 198**) and by the presence of chop marks (especially on vertebrae) made by a cleaver, which underlines primary butchery of the carcass:

- 32 bones present traces of burning: pelvis in UF 018; 2 distal femur in UF 052; proximal femur in UF 053; distal humerus in UF 003; proximal humerus in UF 041; fibula in UF 102; a mandible in UF 008; proximal radius in UF 102; 4 ribs in UF 001, 028, 102; part of a skull (maxilla) in UF 102; 2 teeth in UF 017 and 102; 4 thoracic vertebrae in UF 003 and 032; distal tibia in UF 022; 3 proximal tibia in UF 052 and 102; ulna in UF 102; 4 body of vertebra in UF 003 and 102; 3 epiphysis fragments of long bone in UF 017 and 023.
- 20 bones present cut marks: pisiform in UF 020 (D); scaphoid in UF 012 (D); 5 ribs in UF 003, 008, 012, 033 and 102 (F); 2 lumbar vertebrae in UF 010 and 102 (F); phalanx 1 in UF 004 (S); 2 phalanx 2 UF 001, 102 (S); thoracic vertebra in UF 018 (F); distal radius in UF 102 (D);

2 calcaneus in UF 017 and 102 (D); tarsal bone IV in UF 061 (D); distal tibia in UF 012 (D); 2 bodies of vertebrae in UF 003 and 102.

- 22 bones present chop marks: 2 pelvis in UF 053 and 056 (D/F); 4 distal humerus in UF 032, 051 and 056 (D); 3 proximal humerus in UF 003, 032 and 102 (D); lumbar vertebra in UF 038 (D); 2 thoracic vertebrae in UF 051, 102 (F); phalanx 1 in UF 053 (S); 3 phalanx 2 in UF 010 and 102 (S); sacrum in UF 012 (D); distal radius in UF 012 (D); proximal radius in UF 012 (D); astragalus in UF 022 (D); proximal tibia in UF 003 (D); proximal femur in UF 002 (D).

These elements are found everywhere on the site in different stratigraphic layers, especially in the ashy layer near the oven in the Sounding 2 (UF 102 in R108: n = 25). These traces were found throughout the skeleton suggesting a complete treatment of carcasses on the site.

■ *Ovicaprids or sheep and goats (Ovis aries/Capra hircus)*

Ovicaprids are represented by 902 specimens – tooth and bone fragments; they were found in almost all the stratigraphic layers (**tables 9 and 10**) and all parts of the skeleton were identified (**fig. 197**). The ovicaprid skeletal distribution according the different stratigraphic/spatial phases of the site is detailed in **tables 18 to 22** at the end of this chapter. It is possible to estimate a minimum number of 30 individuals. Moreover, it is likely that much of the small mammal bone fragments also come from ovicaprids.

It is not surprising to find many sheep/goat individuals given the important role played by these animals in the diet of the inhabitants of desert areas. At al-Yamāma, they were the main source of meat, but also of milk. This is confirmed by the presence butchery marks (cut and chop marks – **table 11**) and traces of burning (n = 43 – **table 12**).

As with the camel, the burnt elements are found everywhere on the site in different stratigraphic contexts, with a concentration (n = 23) in the ashy layer near the oven (St. 114) in Sounding 2 (UF 102), which makes sense. In most cases, the heat was not sufficient to completely char the bone. Examination of the colour and the macroscopic appearance of the bones show that the vast majority of these bones are brown/black, belonging to burned colour stages 2, 3 and 4 (STINER *et al.* 1995). It is reasonable to think that the reduction by fire resulted directly from human activities, cooking, roasting and preparation of food, since the hearths were not far from the deposits, but it could also have resulted from other actions such as accidents or cleaning the garbage by the fire.

UF	PHASE	N	BONE	LOCATION	ACTIVITY INTERPRETATION
101	1.1	1	Scapula	Distal end	Dismemberment/Disarticulation
102	1.1	1	Thoracic vertebra	Processus spinosus	Meat removal (filleting)
008	1.2	1	Pelvis	Acetabulum	Dismemberment/Disarticulation
010	1.31	1	Pelvis	Acetabulum	Dismemberment/Disarticulation
041	1.32	1	Pelvis	Ischium	Dismemberment/Disarticulation
015	1.32	1	Pelvis	Ischium	Dismemberment/Disarticulation
033	1.42	1	Humerus	Distal end	Dismemberment/Disarticulation
043	1.51	1	Tibia	Distal end	Dismemberment/Disarticulation
043	1.51	1	Rib	Shaft	Meat removal (filleting)
057	3	1	Humerus	Distal end	Dismemberment/Disarticulation
056	3	3	Rib	Shaft	Meat removal (filleting)

Table 11 | Inventory of anthropogenic traces (cut and chop marks) on ovicaprid bones

UF	PHASE	N	ELEMENT	FRAGMENTATION	SIDE
001	0.1	1	Pelvis	Acetabulum	--
001	0.1	1	Femur	Proximal extremity (head)	--
001	0.1	1	Metapodial	Distal extremity (condyle)	--
001	0.1	1	Tarsal	Cubonavicular	Right
022	0.1	1	Phalanx 1	Proximal extremity	--
100	0.1	1	Carpal	Scaphoid	Left
028	0.2	1	Vertebra	Body (corpus)	Impair
101	1.1	1	Tarsal	Cubonavicular	Right
102	1.1	1	Femur	Diaphysis	--
102	1.1	1	Femur	Distal extremity (condyle)	--
102	1.1	4	Long bone	Diaphysis	--
102	1.1	9	Long bone	Spongiosa (epiphysis)	--
102	1.1	1	Mandible	Body (M1M2M3)	Left
102	1.1	1	Mandible	Symphysis	--
102	1.1	1	Metatarsal	Diaphysis	--
102	1.1	1	Phalanx 1	Complete	--
102	1.1	1	Phalanx 2	Complete	--
102	1.1	1	Rib	Body (shaft)	--
102	1.1	1	Teeth	Upper M2	Left
102	1.1	1	Vertebra	Disc	Impair
003	1.2	1	Humerus	Proximal extremity (head)	--
003	1.2	1	Radius	Proximal extremity	Right
003	1.2	1	Tarsal	Talus	Right
015	1.32	1	Phalanx 1	Proximal extremity	--
015	1.32	1	Rib	Vertebral extremity	--
017	1.32	1	Femur	Distal extremity (condyle)	--
046	1.42	1	Patella	Complete	--
034	1.51	1	Humerus	Distal extremity	Left
012	2	1	Phalanx 1	Proximal diaphysis	--
051	2	1	Tarsal	Talus	Right
057	3	1	Pelvis	Fragment	--
057	3	1	Femur	Proximal extremity (trochanter)	Right

Table 12 | Inventory of anthropogenic traces (burning) on ovicaprid bones

The presence of some unfused bone gives us some indications on the age of the slaughtered animals (BARONE 1986; CLAVEL 2005):

- Scapula: 1 proximal unfused end (5–7 months);
- Humerus: 1 proximal unfused end (25–36 months);
- Radius: 1 proximal unfused end (3–6 months) – 2 distal unfused ends (23–30 months);
- Femur: 14 proximal unfused ends (20–26 months) – 9 distal unfused ends (20–26 months);
- Tibia: 7 proximal unfused ends (20–26 months) – 4 distal unfused ends (12–18 months);
- Calcaneus: 3 proximal unfused ends (36 months);

- Metapodial: 21 distal unfused, mainly isolated condyle (16–18 months);
- Phalanx 1: 3 (7–10 months);
- Phalanx 2: 3 (6–8 months).

Ageable mandibles plus isolated teeth have been grouped according to the stages of PAYNE (1973) but, as with the camel, mandibles with teeth are rare and do not allow a reliable calculation of a mortality profile. Nevertheless, it has been noticed that juveniles are very poorly represented in the assemblage; there was only:

- 1 left mandible with D3D4 and 1 maxillary with D2 to M3 in UF 003. Stage D: 1–2 years
- 1 right maxillary fragment with D3D4 and a right lower D4 in UF 015. Stage D: 1–2 years

No yearlings were found in this assemblage; this may be the result of taphonomic conditions. All other individuals present on the site were adult (Payne's stages E-F: 2–4 years), and even older individuals (Payne's stages G-H-I: > 4 years old) were found in UF 012, 052, 053, 101 and 102.

Although it is difficult to draw rigorous conclusions on ovicaprid farming strategies (see HELMER *et al.* 2007) at al-Yamāma, it seems clear that ovicaprids were exploited for their meat. Young and females were certainly preserved to constitute future herds, as well as for milk.

■ *Gazelle* (*Gazella sp.*)

Ninety-five bones of gazelle could be identified among the different stratigraphic layers of al-Yamāma, suggesting the importance of hunting amongst the inhabitants. They make up 3.9% of the identified fragments. The gazelle bones present characteristic osteomorphological features and a preliminary biometric study shows clearly that these are a rather smaller species (e.g. the Arabian gazelle, *Gazella arabica* also called the Saudi gazelle, *Gazella saudiya*) than the mountain gazelle (*Gazella gazella*) (PETERS 1989; THOULESS *et al.* 1991; MUNRO *et al.* 2011) (**table 13**). The Saudi gazelle, contrary to usual practice, 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 animal that was apparently hunted to extinction in its Middle Eastern homeland, Saudi Arabia.

The gazelle remains were found in 17 different stratigraphic contexts in Sounding 1/ Building 1:

- UF 001 (n = 1): a complete left talus;
- UF 003 (n = 3): a proximal fragment of a right fused ulna; a left pelvis fragment; a proximal fragment of a fused calcaneus;
- UF 004 (n = 3): a proximal fragment of an unfused calcaneus; a lumbar vertebra; a condyle of a distal fused metapodial;
- UF 005 (n = 2): a thoracic vertebra; a burnt fragment of a right pelvis;
- UF 008 (n = 1): a proximal articular end of a left metatarsal (Bp = 18.1 mm);
- UF 010 (n = 10): nine bones belong to a hindlimb: a phalanx 1, a phalanx 3, a distal extremity of a phalanx 2, two condyles of a metatarsal, a left talus, a left central-fourth tarsal, a shaft fragment of a tibia and a right distal articular end of a tibia. The last bone is a right proximal fragment of a radius;
- UF 012 (n = 1): a right mandible with P2 and P3 (adult individual);
- UF 015 (n = 5): a right fibula; a right talus; a medial part of a left proximal radius; a thoracic vertebra; a right proximal of a metacarpal;

	BL	BM	BD	BP	DLS	Dd	DP	GL	GM	SD
RADIUS										
UF 102/R. 108				24.8			13.6			
UF 056				19.4			11.2			
<i>Gazella gazella</i> (M)				26.85±1.02			14.62±0.43			
<i>Gazella gazella</i> (F)				24.78±0.82			13.83±0.56			
TIBIA										
UF 017			18.2			14.2				
UF 056			19.5			17.1				
<i>Gazella gazella</i> (M)			22.47±0.30			19.98±0.55				
<i>Gazella gazella</i> (F)			21.42±0.99			18.61±0.81				
TALUS										
UF 001	13.9							24.3		
UF 059	13.2	13.4	14.2	13,0				24.7	22.2	
UF 060	13.8	13.8	15.4	12.8				25.7	24.3	
<i>Gazella gazella</i> (M)	15.72±0.73	15.90±0.79	16.71±0.72					28.38±1.03		
<i>Gazella gazella</i> (F)	14.99±0.44	15.41±0.73	16.29±0.48					27.68±0.88		
METATARSAL										
UF 056			21.8	17.9		15.5	17.5	101.2		17.4
UF 102				17.7			18.5			
<i>Gazella gazella</i> (M)				20.24±0.71			15.72±0.73			
<i>Gazella gazella</i> (F)				21.49±0.60			20.66±1.07			
PHALANX 1										
UF 010			8.5	7.3		7.5	11.5	37.1		
UF 017			7.7	8.5		8.1	11.8	34.9		
UF 017			7.6	8.7		8.3	11.9	37.3		
UF 017				7,8			11.9			
UF 055			6.9	7.1		7.9	11.2	35.9		
UF 050			8.1	9.1		8.1	13.1	37.0		
UF 050			8.2	9.8		8.1	13.2	36.7		
PHALANX 2										
UF 056			6.1	6.8		8.1	9.7	19.2		
UF 050			7.1	7.9		8.4	11.3	20.7		
UF 057			7.6	7.7		8.1	11.9	20.9		
<i>Gazella gazella</i> (M)			8.01±0.54	9.43±0.56		10.68±0.74	12.36±0.78	22.68±0.88		
<i>Gazella gazella</i> (F)			7.51±0.32	8.85±0.22		9.95±0.50	11.54±0.71	21.59±1.20		
PHALANX 3										
UF 017				8.2	21.2					
UF 010				8.9	24.3					

Table 13 | Measurements of gazelle bones at al-Yamāma (in mm) (data for mountain gazelle from MUNRO *et al.* 2011: tab. 3)

- UF 017 (n = 19): 4 phalanx 1; a distal right tibia; a right diaphysis fragment of a radius; a left proximal fragment of a unfused femur; a left lower P4; an left incisor; a left medial distal of a radius; a fragment of central-fourth tarsal (burnt); a right proximal fragment of a metacarpal; a left medio-proximal fragment of a radius; an unfused fragment of calcaneus; a distal end of a right humerus; a right sub-complete calcaneus; a phalanx 3; a patella; a distal metaphysis of a tibia;
- UF 020 (n = 4): a right magnum; a right unciform; a body fragment of vertebra; a right distal diaphysis on a humerus;
- UF 041 (n = 1): a complete fused distal metapodial;
- UF 050 (n = 4): two phalanx 1; a phalanx 2; a distal diaphysis fragment of a metapodial;
- UF 055 (n = 2): a phalanx 1; a fragment of a left mandible with M1M2 (old individual);
- UF 056 (n = 7): a phalanx 2; two distal condyle of an unfused metapodial; a left distal end of a tibia; a right proximal end of a radius; a right proximal diaphysis fragment of a tibia; a complete left metatarsal;
- UF 057 (n = 4): a phalanx 2; a right central-fourth tarsal; a horncore fragment; a proximal scapula;
- UF 059 (n = 1): a complete left talus;
- UF 060 (n = 1): a complete right talus.

In Sounding 2 (dwelling structure), 26 bones were identified in three UFs representing a minimum of two individuals:

- UF 101, room 108 (n = 5): two lunates (right and left); a rear-skull fragment; two lumbar vertebrae;
- UF 102, room 108 (n = 20): 2 proximal articular ends of metatarsal (right and left); 8 thoracic vertebrae (**fig. 203**: nos. 3–5); 2 horncore fragments; a right mandible with P2 to M3 (first old individual, teeth very abraded, wear stage V, MUNRO *et al.* 2009); a right mandible with P2P3P4 (second old individual); a right mandible with M3 (second old individual); two lumbar vertebrae; a left articular end of a scapula; a left proximal extremity of a radius; a left proximal end of an ulna;
- UF 102 room 109 (n = 1): a right distal extremity of a radius.

All parts of the skeleton are present. If the assemblage seems to show a predominance of feet, we have to be careful because many bone fragments could not be specifically identified and can be classified as ‘small herbivore’ as well (ovicaprid vs gazelle). This is particularly true for the skulls, vertebrae, ribs and long bones (shaft fragments with no diagnostic features).

According to the stratigraphic contexts (**table 7**), these remains represent a minimum of 12 individuals: two adults in late phase 1 of Sounding 1; five individuals in phase 1 of Sounding 1; one adult in phase 2 of Sounding 1; one adult in phase 3 of Sounding 1; one adult in phase 4 of Sounding 1 and two old individuals in Sounding 2. It would seem likely that gazelle were killed occasionally, whether to supplement resources or to provide variety.

■ *Cattle (Bos sp.)*

The cattle bone assemblage is relatively small, comprising 12 fragments of bone. It seems likely that the bones are from the domestic humpless cattle (*Bos taurus*) but the presence of humped cattle (*Bos indicus*) has not been excluded. Differentiation between these two species depends on the recovery of cranial/jugal parts (GRIGSON 1980) or of thoracic vertebrae. There is some evidence for *B. indicus* from Qala‘at al-Bahrayn (UERPMANN & UERPMANN 1997).

In terms of element representation according to simple fragment counts, the assemblage is dominated by cranial and hindlimb elements:

- UF 033 (n = 1): a second complete phalanx (GL = 35.6; Bp = 24.2; Dp = 23.7; Bd = 18.8; Dd = 22.1);
- UF 051 (n = 2): a fragment of a proximal metatarsal; a distal fragment of a humerus;
- UF 052 (n = 2): fragment of a mandible; diaphysis fragment of a tibia;
- UF 053 (n = 7): four teeth (an upper M3 right; an upper M2 right; a lower M2 right; a fragment of an upper molar); a fragment of a left cubonavicular which presents a slicing action; a fragment of a right cubonavicular; a proximal fragment of a right metatarsal. The teeth belong to an adult.

Cattle seems to have been consumed at al-Yamāma. Nevertheless, its presence is marginal compared to ovicaprid and camel and could be explained by its demanding ecological requirements (e.g. water and pasture). It is easily replaced by the camel in harsh environments.

■ *The Arabian oryx (Oryx leucoryx)*

Oryx is attested in the faunal assemblage by a tooth, a right upper M2, found in Sounding 2 (UF 102, R. 018). Because of the intense fragmentation of bones and teeth and the difficulty in recognizing oryx bones (PETERS *et al.* 1997), other parts may be present among the various fragments classified as bovids or MM. The oryx has also been identified at Dūmat al-Jandal (a distal tibia: MONCHOT in press) and Tell Hesban in Jordan (one fragment of the horncore: DRIESH & BOESSNECK 1995).

The Arabian oryx is a medium-sized antelope, weighing up to 90 kg; it is exceptionally well adapted to life in the desert. Its natural habitat is a harsh climate and barren terrain with little water in which it sometimes has to cover distances of over 150 kilometres in search of new grazing.⁴⁰

■ *Equids (Donkey/Horse)*

Distinguishing between horse (*Equus caballus*), donkey (*Equus asinus*) and hybrid mule bones is not easy. Only eleven remains attest the presence of equids:

- Six bones found in the UF 003 belong to a right foot: a navicular (L = 38.8; B = 31.4), a cuneiform (L = 34.6; B = 28), a proximal part of a metatarsal III (Dp = 37.2; Bp = 33.6), a complete metatarsal II, a second phalanx and one fragment of a distal end of a metatarsal. Their small size would indicate a donkey;
- In UF 031, a complete distal extremity of a metapodial might belong to a large equid, i.e. an hybrid (**table 14**);
- In UF 041, three small-sized bones (donkey): a complete right navicular (L = 33.6; B = 26.1), a distal extremity of a metapodial (**table 14**) and a medial fragment of a right distal tibia extremity;
- Finally, a phalanx 2 was found in Sounding 2 (UF 101, Room R. 109).

All these bones belong to feet, that is, non-meaty bones. The small size of the assemblage analyzed so far, plus the absence of cut marks, seems to indicate that equid meat was rarely, if ever, consumed. Donkeys might be seen as beasts of burden in this part of the site. Equids remain rare at al-Yamāma.

40 <http://www.arabian-oryx.gov.sa/>

EQUID DISTAL METAPODIAL III	MES. 10	MES. 12
Al-Yamāma UF 031 (metapodial)	51.0	37.7
Al-Yamāma UF 041 (metapodial)	33.6	26.2
Donkey: <i>Equus asinus</i> (metacarpal)	35.4 ± 2.49	26.2 ± 2.29
Donkey: <i>Equus asinus</i> (metatarsal)	35.0 ± 2.63	27.1 ± 1.94
Hybrid: <i>Equus asinus</i> Male × <i>Equus caballus</i> Female (metacarpal)	51.8 ± 2.83	40.1 ± 3.50
Hybrid: <i>Equus asinus</i> Male × <i>Equus caballus</i> Female (metatarsal)	54.0 ± 3.94	40.4 ± 2.88
Hybrid: <i>Equus asinus</i> Female × <i>Equus caballus</i> Male (metacarpal)	38.3 ± 2.47	29.5 ± 1.41
Hybrid: <i>Equus asinus</i> Female × <i>Equus caballus</i> Male (metatarsal)	38.5 ± 3.53	35.0 ± 2.12
Horse: <i>Equus caballus</i> (heavy) (metacarpal)	63.2 ± 4.44	48.5 ± 3.39
Horse: <i>Equus caballus</i> (heavy) (metatarsal)	65.6 ± 4.77	50.3 ± 3.23

Table 14 Biometry of the distal end of equid metapodial III (Mes. 10= Distal transverse diameter; Mes. 12= Depth of the sagittal crest) and comparison with some equid populations according to EISENMANN & BECKOUCHE 1986

CARNIVORES

■ *The dog (Canis lupus f. familiaris)*

Forty-seven dog remains were found in the site, 40 in Sounding 1, and 7 in Sounding 2. It represents a minimum of 5 individuals:

In Sounding 1:

- UF 003 (n = 3): one complete right distal end of a femur (Bd = 39.8; Dd = 28.6); one incomplete left distal end of a femur; one fragment of a left proximal femur (Bp = 52.7; Dp = 22);
- UF 004 (n = 1): a complete metatarsal 2;
- UF 023 (n = 1): a left distal radius sub-complete;
- UF 034 (n = 1): a metapodial diaphysis;
- UF 035 (n = 3): an atlas; an axis fragment; a right distal of radius (Bd = 22.2; Dd = 16.4);
- UF 038 (n = 1): a complete left mandible without teeth;
- UF 041 (n = 2): a right fragment of a maxilla; a canine;
- UF 053 (n = 3): an atlas; an axis; a diaphysis;
- UF 055 (n = 25): 4 phalanx 1; 4 phalanx 2; 4 phalanx 3; 4 sesamoids; 1 capitatum; 1 hamatum; 1 trapezoid; 4 metacarpals; a left distal of a femur (Bd = 27; Dd = 39.6); a left proximal of a femur (Bp = 36.5; Dp = 16.1). Excepting the femur elements, these 23 bones belong to an articulated right forelimb.

In Sounding 2:

- UF 101/R. 108 (n = 2): part of an incisor with I1I2I3 of a left mandible; a thoracic vertebra;
- UF 102/R. 108 (n = 4): a left distal humerus (Bd = 38; Dd = 32.6; Btro = 27.6); a proximal left ulna (LO = 32.9; SDO = 26.4; DPA1 = 29.3; DPA2 = 17.6); a proximal left femur (Bp = 40.8; Dp = 19.4); a right pelvis almost complete;
- UF 103/R. 108 (n = 1): a left ulna almost complete.

Though never abundant, dogs are often mentioned in zooarchaeological lists (e.g. Dūmat al-Jandal: MONCHOT in press; Khirbet es-Samra [unpublished report by the author]; Upper Zohar: CLARK 1995). At al-Yamāma except the articulated forelimb found in the UF 055, the

dog bones are most often single bones mixed with those of other species; there is no more or less complete skeleton, as for instance in Tell Hesban, which can be easily interpreted as a quick and perfunctorily buried carcasses (DRIESCH & BOESSNECK 1995: tab. 5.12). At al-Yamāma, two atlas or first cervical vertebra of dog found in UF 035 and in UF 053 present numerous disarticulation cut marks (**fig. 199**). These traces on dog are not rare in the literature and were described in the excavation of the mosque in Bahrayn (SMITH 2005). They can be interpreted as a sign of head removal, possibly for meat consumption (BETTINI 1998). Some cut marks on dog bones were also found in area 9 at Madā'in Šāliḥ (STUDER 2011).

It is worth noting the very shallow marks (i.e. pits, furrows...) on bones made by dogs or other small carnivores (fox) which generally rummage through the garbage or scavenge abandoned herbivores carcasses.

■ *Fox (Vulpes sp.)*

Two fragments of a mandible (**fig. 203**: no. 10), one right and one left, were identified as those of a fox in UF 012 while in the UF 001 a proximal radius shows clearly the presence of a small-sized canid, a fox (*Vulpes sp.*). Fox is represented also in UF 057 by a canine.

These bones can be assigned, on the basis of size, to the red fox (*Vulpes vulpes*) rather than the smaller Ruppell's sand fox (*Vulpes rueppellii*) or Blanford's fox (*Vulpes cana*), all of which are known to occur in the region at the present day (HARRISON & BATES 1991).

■ *Cat (Felis catus)*

Cats are represented at al-Yamāma by only four bones. A first thoracic vertebra and a right proximal radius were found in the UF 053. A right and left mandible belonging to one individual were found in the room R. 109 of Building 2 (UF 101, **fig. 202**: nos. 1–2). Rarely abundant on archaeological faunal lists from the Near and Middle East, the cat has nevertheless been identified in the multi-period urban site of Bey 002 (Martyr's Square, Beirut, Lebanon, OUESLATI 2008), in Bilād al-Qadīm (Bahrain, SMITH 2005), in the mediaeval levels of the Great Mosque in Sīrāf in Iran (DRIESCH & DOCKNER 2002) and in the mediaeval site of Qalhāt in Oman (unpublished report by the author).

MEASURE (SEE FIG. 200)	YAMĀMA	MOS 01C-5	MOS 01C-6	MOS 01C-8	MOS 01C-12	EN II-3A	WILD CAT
1	53.7	60.5				62.8	60.85
2	51.6					60.7	57.42
3	47.2					54.6	54.28
4	44.4					53.5	50.98
5	19.6	20.1	18.3			22.6	20.50
6	7.1×3.1						
7	7.2	7.0			7.2	9.2	
8	23.1						25.64
9	9.6	11.0	11.8	11.7		11.3	10.22
10	8.1	9.7	c.10.0			9.8	8.48

Table 15

Dimensions of the al-Yamāma cat mandible compared to other sites: MOS: Bilād al-Qadīm, Bahrayn (SMITH 2005: tab. 5.1); EN II-3A: *Felis silvestris* from Bademağaci (DE CUPERE *et al.* 2008); Wild cats: *Felis silvestris*, 11 females and 10 males from the Upper Nile Province, Sudan (DAYAN *et al.* 2002)

The small size of the mandible (**fig. 200, table 15**) seems to indicate a domesticate cat, *Felis catus* rather than the wild cat (*F. silvestris*) or the Sand cat (*Felis margarita*), the wild cousins of the domestic cat which occurs in this area (HARRISON & BATES 1991).

No traces of cut marks were found on any cat bones; it seems likely that the animals were not skinned. At al-Yamāma, cats may have been domesticated and would have fulfilled an important role in controlling rats and other small rodents (BEECH 2007).

■ *Honey badger/ratel* (*Mellivora capensis*)

The honey badger (ratel) is a species of mustelid with an extensive range across sub-Saharan Africa and through the Middle East as far north as Turkmenistan and southwest Kazakhstan, then eastwards to India and Nepal. But it is considered rare or to exist in low densities across most of its range (VANDERHAAR & HWANG 2003; BEGG *et al.* 2008). Despite its name, the honey badger does not closely resemble other badger species, it bears more anatomical similarities to weasels.

Two bones, a rear of a skull found in the UF 012 (**fig. 203**: no. 11) and a right hemimandible (**fig. 202**: no. 6) without teeth found in the UF 101 of room R. 109, attest to the presence of *M. capensis*. Moreover, the mandible showed traces of burning and its dimensions are (according to **fig. 200**):

- Measure 3: 66.4 mm
- Measure 4: 62.3 mm
- Measure 5: 44.3 mm
- Measure 7: 14.3 mm
- Measure 9: 7.8 mm
- Measure 10: 9.4 mm

Rarely described in the fossil or archaeological faunal assemblages of the Arabian Peninsula, the ratel mustelid was present in the Levant from the lower Pleistocene in 'Ubeidiya to the PPNB in Nahal Hemar (BELMAKER pers. comm.); another remain was described from the Jordanian site of Tell Hesban (DRIESCH & BOESSNECK 1995: 92). Honey badgers are serious poultry predators and their strength makes them difficult to deter (ROSEVEAR 1974).

INSECTIVORA

■ *Desert hedgehog* (*Paraechinus aethiopicus*)

A mandible of desert hedgehog, belonging to the genus *Paraechinus aethiopicus*, was found in the UF 052 (**fig. 201**). *P. aethiopicus* is known to hibernate in unoccupied burrows of other animals (HARRISON & BATES 1991). It feeds on insects and other invertebrates, sometimes also on eggs, small vertebrates and vegetation. It is widespread throughout arid deserts and dry steppes. It tends to favour areas where food is more easily available, such as oasis and vegetated wādīs (HUTTERER 2008). This behaviour may account for its presence on the site (i.e. died there naturally), although the possibility cannot be excluded that hedgehogs were consumed.

This species was described notably in the Byzantine levels of Upper Zohar in Jordan (CROFT 1995: 93) and in the PPNB settlement at Netiv Hagdud, some 25 km north of the Dead Sea (TCHERNOV 1994: 40).

BIRDS

Only 11 remains (8 bones and 3 eggshell fragments), belonging to three bird species were identified.

■ *Ostrich (Struthio camelus)*

The ostrich is represented by 3 fragments of eggshell found in Building 2 (UF 102, R. 108) and in Sounding 1 (UF 015 and UF 056) (**fig. 203**: no. 6). Remains of eggshell were also found on the surface of the site (i.e. area P9). Though ostrich bones are effectively absent on archaeological sites (except the Palaeolithic site of Umm el-Tlel in Syria, BONILAURI *et al.* 1990 and in the late Hellenistic & Early Mamluk levels of Tell Hesban in Jordan, BOESSNECK 1995: tab. 8.2), eggshell fragments are frequent (POTTS 2001; STUDER 2010; MONCHOT in press).

The Near Eastern Ostrich or Arabian Ostrich (*Struthio camelus syriacus*) has become extinct within the past few decades. Ostriches appear frequently on prehistoric petroglyphs and in Islamic verse, especially in the poetry from Arabia itself, where the birds were common.

The pleasures of ostrich hunting, for example, were extolled, and large numbers of ostriches and eggs were considered an indication of prosperity (STONE 1982). Although the wide distribution of ostrich in Arabia can be demonstrated by ethno-historic evidence and the representational and eggshell evidence just reviewed, the universal absence of ostrich bones in faunal inventories from excavations in the Arabian Peninsula nevertheless suggests that ostriches were not killed for their meat in ancient Arabia, as was the case in Mesopotamia (POTTS 2001: 186).

■ *Domestic fowl (Gallus gallus)*

Four remains represent the domestic fowl, i.e. chicken. One skull (**fig. 203**: no. 8) and a distal fragment of a tarsometatarsus were found in the house (Building 2: UF 102, R. 108), and one fragment of a diaphysis of a tibiotarsus and one fragment of eggshell were found in a phase 4 level of Sounding 1 (UF 059). Macroscopic inspection does not show any evidence of human use such as cut marks or other traces of slaughtering. Nevertheless, we can interpret this bone as a food refuse although domestic fowl were not primarily used for consumption.

■ *Spotted sandgrouse (Pterocles senegallus)*

A right carpometacarpus (**fig. 202**: no. 7) of a spotted sandgrouse (*Pterocles senegallus*) was found in the house (UF 101, room R. 109). The dimensions are: breadth of the proximal extremity = 8.2 mm; greatest length = 28.4 mm; diagonal of the distal end = 7.1 mm. The spotted sandgrouse is a ground-dwelling bird and feeds on seeds and other plant material that it finds in the scrubby vegetation of its dry habitat (GOODERS 1979). This species is edible.

■ *Indeterminate birds.*

- UF 057: a scapula and a carpometacarpus (identification in progress);
- UF 053 a proximal end of a right femur;
- UF 102 (R. 109): a diaphysis fragment of a fibula.

REPTILES

■ *Spiny-tailed lizard (Uromastix aegyptia)*

Spiny-tailed lizards are represented by 145 skeletal remains found in various archaeological levels. They belong to the Egyptian spiny-tailed lizard or mastigure (*Uromastix aegyptia microlepis*) which is found in central Saudi Arabia, 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 in Arabic as *ḍabb*. It is a burrowing lizard which has a predilection for open habitats with sand and gravel substrates, and sparse vegetation (WILMS *et al.* 2010). This lizard is a diurnal species that becomes active during the daytime when the outside temperature does not exceed 40°C. They have the ability of physiological colour change. At high temperatures

the animals show a light brown to yellow or greenish coloration with a black throat and small black dots on the neck and dorsum. At high temperatures they show a dark grey coloration (CUNNINGHAM 2001; 2013; WILMS & BÖHME 2000; 2007; WILMS *et al.* 2009).

The use of faunal reference collections in the French National Museum of Natural History in Paris made it possible to validate the field identifications. Among the lizard bone assemblage, the main diagnostic characteristic of the genus is the presence in adult specimens of a premaxillary bone forming a sharp, tooth-like bony structure replacing the incisor teeth of the juvenile stage (MOODY 1980; WILMS & BÖHME 2007; WILMS *et al.* 2009). Another characteristic is provided by the dentary and maxillary pleurodont teeth, which become firmly ankylosed to the bone as acrodont teeth. The acrodont teeth are truncated blunt cylinders with a rounded labial surface. Generally, in the oldest specimens the crowns are worn to such an extent that a continuous cutting edge is formed without distinguishable teeth. In *Uromastyx*, the jugal possesses a strong dorsal process but the infratemporal process is absent; the dentary is short and robust with a squarish anterior profile and a high coronoid process. On the dentary, wear surfaces are visible on both the dental bone between the teeth and on the teeth themselves. The splenial is fused with the dentary. The vertebrae are procoelus and flattened, possess a broadly rounded and smooth centrum and the condyle is set off the centrum by a neck (COOPER *et al.* 1970; COOPER & POOL 1973; MOODY 1980; AUGÉ 1988, 2005).

Some of the elements studied belong to relatively large individuals, approximately 500 mm in total length and 300 mm in SVL (snout length). Thus, among the different species of *Uromastyx* currently present in the Arabian Peninsula, the estimated total length of our individuals is only reached, or even exceeded, by *U. aegyptica*, also the only species currently present in the area where the site is located. In other species, the maximum known length is smaller, apparently not exceeding 400 mm and their present distribution does not include the region of al-Kharj (WILMS & BÖHME 2000, 2007; WILMS *et al.* 2009).

We observed an abundance of vertebrae ($n = 83$, 57.6% – **fig. 202**: no. 8), which is not surprising in view of the number of vertebrae present in the animal (49: 8 cervical, 16 dorsal, 2 sacral, 23 caudal). The trunk is also represented by 91 elements (63.2%). Nevertheless, most elements are present in the different structures studied: 20 remains (13.9%) belong to the skull (**fig. 202**: nos. 3–5), 10 (6.2%) to the forelimb and 24 (16.7%) to the hindlimb (**table 16**). The bones are complete or rarely fragmented and show essentially unaltered surfaces, except a vertebra in UF 057 which clearly shows marks of corrosion from the acidic gastric juices of a predator, while a tibia found in UF 017 shows a cut mark produced by a cutting tool. An anthropogenic origin seems to be attributable to at least some of the material studied.

The presence of spiny-tailed lizard bones mixed with other faunal remains from domestic or hunted species as well as a cut mark probably made by a cutting tool suggest an anthropogenic origin for some of this faunal material. This origin is confirmed by the stratigraphic contexts in which lizards were encountered, often in domestic dumping areas or in the occupation level of the dwelling (Building 2) (**table 16**). While this is the first evidence for the consumption of lizards in an archaeological context, such a practice is well documented in historical sources, in travellers' reports from the late 19th and early 20th centuries, and in recent ethnographic studies (MONCHOT *et al.* 2014).

MOLLUSKS

Five fragments of seashell were found in levels from phases 1 and 3. The species determination is in progress, two of them are *Pinctada margaritifera*. The presence of seashells is a solid indication that exchange with groups from the Arabian Gulf or the Red Sea occurred.

UF	SKELETAL ELEMENTS																	NR
	SKULL				TRUNK		FORELIMB					HINDLIMB						
	PM	M	J	D	V	R	S	H	R	U	I	Is	P	F	T	Fi	Mt	
002					1													1
004				2	2													4
005		1		1	1	1			1		1							6
010					1													1
012					1													1
015		1		1	4													6
017		3	2		36	4	1	1			1	1	2		2	2		55
020				1	3													4
023					19			2	1		2		2	2				28
041					6													6
044	1	1																2
053										1								1
055													1					1
056				1	1					1						1	2	6
057		1			1	1											1	4
058																	1	1
101				3	7	2		1		1					1	2		17
102				1														1
TOTAL	1	7	2	10	83	8	1	4	2	3	4	1	4	3	3	5	4	145

Table 16 Skeletal elements of *Uromastix aegyptius* from different stratigraphic layers (UF) of al-Yamāma
 PM = premaxillary; M = Maxillary; J = Jugal; D = Dentary; V = Vertebrae; R = Rib; S = Scapula; H = Humerus; R = Radius; U = Ulna; I = Ilium; Is = Ischium; P = Pubis; F = Femur; T = Tibia; Fi = Fibula; Mt = Metatarsal; NR = number of remains; MNI = Minimum number of individuals

Discussion

If one considers the assemblage as a whole (**table 17**) it is apparent that no particular specialist source such as bone-working or specialized butchery dominates. There are no major concentrations of a particular bone that might be associated with any large-scale activity. Much of the assemblage relates to small-scale domestic activities.

THE MOSQUE AREA (SOUNDING 1/BUILDING 1)

Given that Building 1 was a mosque, it is not surprising to find little or no faunal material within its walls, either in the praying room or the courtyard. Most of the remains found in the building come from upper collapse layers.

On the other hand, many faunal remains were found in the immediate vicinity of the mosque, along its walls. These are leftovers abandoned there when passing near the building (traffic levels).

In the layers from phases 3 and 4 (pre-Islamic and early Islamic periods), prior to the building of the mosque, there is no major difference in the assemblage: camels, sheep and goats are dominant and are found together with the occasional gazelle, spiny-tailed lizard, bird and ostrich. Nevertheless, despite sieving the sediments, some species that are only rarely attested in the later phases are completely absent here: cattle, donkey, oryx, dog, ratel, cat and hedgehog. Since phases 3 and 4 have only been distinguished at the bottom of the northern part of Sounding 1, in a small area, the absence of these species could simply be the consequence of the limited extent of the excavated layers.

THE HOUSE AND ITS OVEN (BUILDING 2/SOUNDING 2)

Besides the mosque and the surrounding open area, the excavation of a dwelling with a kitchen equipped with a clay oven (*tannūr*) provided some interesting information about animal processing during the site's last phase of occupation (phase 1). The presence of many burnt bones, essentially ovicaprid, indicates cooking or roasting activities. The thickness of the ashy layer associated with the oven shows that the latter was emptied several times. The oven might have served a multiple purpose: bread was possibly baked in it, followed by meat, which was either roasted in the embers, or steamed, or cooked on the top, above a clay (as in the past) or metal (as done today) sheet (see MULDER-HEYMANS 2002). After the abandonment of the oven, it was used as a dump for numerous bones, including a camel skull.

BONE ASSEMBLAGE

Camel and ovicaprids make up a significant proportion of the assemblage from al-Yamāma throughout the excavated sequences. The zooarchaeological results clearly show a subsistence economy largely based on these animals (**tables 8 and 17**). They are purveyors of meat, milk and wool. The camel cannot be simply regarded as a basic animal for the human diet, as sheep and goat were. In other words, the camel was used for transportation during many trips into the desert from one oasis to another. Camels were a dietary element, a beast of burden, a source of raw material for artefact manufacture and a cultural symbol (STUDER & SCHNEIDER 2008).

The high proportion of camel and ovicaprids is not unusual in this area; they were the most commonly exploited terrestrial animals from Late Pre-Islamic/Early Islamic contexts at Dūmat al-Jandal (MONCHOT in press) and during the Nabataean period at Madā'in Šāliḥ (STUDER 2010, 2011).

Also, the proportion of wild animals, eaten or not, is relatively high. For the herbivores, the gazelle could have been hunted by al-Yamāma's inhabitants in the vicinity of the city or brought in by different visitors passing through the oasis. Carnivores may have been killed during the hunting session, or simply killed within the walls of the city, when attracted there by food or garbage.

These results paint a picture that mirrors ethnographic description of Bedouin life in recent decades in the Saudi Arabian desert. The continuation of these two seasons of excavations, and the extension to other areas in the city should allow us to better understand the lifestyle and diet of the inhabitants of al-Yamāma and its evolution over the last two millennia.

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SPECIES	CAMEL									
PHASE	PHASE 1.2		PHASE 1.31		PHASE 1.32		PHASE 1.42		PHASE 1.51	
UF	UF 003–008		5 UF		UF 015–017–041		5 UF		7 UF	
Elements	NISP	MNE	NISP	MNE	NISP	MNE	NISP	MNE	NISP	MNE
Skull	6	2	8	2	2	1	1	1	1	1
Mandible	10	4	10	4	2	1	2	1	7	2
Isolated teeth	4	4	9	9	8	7			1	1
Enamel fragment			4	--	1	--				
Atlas	1	1	1	1	1	1				
Axis	1	1								
Other cervical vert.	1	1	5	3	3	2				
Thoracic vertebra	16	7	7	6	2	1	3	2	1	1
Lumbar vertebra	3	3	4	2	3	2	1	1	2	1
Vertebra indet.	6	4	2	1	4	2	4	2	2	1
Sacrum			1	1						
Sternum	1	1								
Rib	21	13	18	7	8	3	8	2	7	3
Scapula	4	3	9	3	1	1	1	1	2	2
Humerus	13	7	7	3	2	2			2	1
Radius	9	6	5	3					1	1
Ulna	2	2	1	1	1	1				
Carpal	8	8	3	3	4	4	1	1		
Metacarpal									2	2
Pelvis	3	2	1	1			2	1	2	1
Femur	11	6	5	2	2	1	1	1	1	1
Patella	2	2					1	1	1	1
Tibia	6	4	5	4	3	2	4	2	4	2
Fibula (malleolus)	2	2	3	3	2	2				
Astragalus			1	1					1	1
Calcaneus	1	1	1	1	1	1			1	1
Other tarsal	1	1	5	5	1	1				
Metatarsal	2	1			1	1				
Metapodial	10	6	13	4	2	1	4	2	7	2
Phalanx 1	4	4	4	3	5	3			2	2
Phalanx 2	4	4	1	1	2	2				
Phalanx 3	1	1								
Sesamoids					2	2				
Long bone (shaft)	8	--					2	--	12	--
Long bone (epiphysis)			2	--	5	--	1	--	2	--
TOTAL	161	101	135	74	68	44	36	18	61	
MNI	4		3		1		2		1	

Table 18 | Skeletal representation of dromedary in Sounding 1 & Building 1 (Phases 1.2, 1.31, 1.32, 1.42, 1.51) as defined in table 7 (NISP = number of identified specimens; MNE = minimum number of elements; MNI = minimum number of individuals)

SPECIES	OVICAPRID									
PHASE	PHASE 1.2		PHASE 1.31		PHASE 1.32		PHASE 1.42		PHASE 1.51	
UF	UF 003–008		5 UF		UF 015–017–041		5 UF		7 UF	
Elements	NISP	MNE	NISP	MNE	NISP	MNE	NISP	MNE	NISP	MNE
Horncore					1	1	1	1	1	1
Skull	9	2	5	2	4	2	10	2	2	2
Mandible	4	3	4	2	4	2	1	1	1	1
Isolated teeth	1	1	2	2	2	2	2	2	2	2
Enamel fragment					4	--				
Atlas							1	1		
Axis			2	1	4	3	1	1	1	1
Other cervical vert.			1	1	3	3			1	1
Thoracic vertebra	2	2	1	1	3	3				
Lumbar vertebra	4	2	4	3	2	2				
Caudal vertebra										
Vertebra indet.			2	1	2	1	4	2	2	1
Sacrum										
Sternum										
Rib	1	1	15	6	13	6			1	1
Scapula	1	1	1	1	8	6	1	1	1	1
Humerus	3	2	6	5	3	2	3	2	2	1
Radius	2	1	3	3	4	2	3	2	2	2
Ulna			2	2	1	1				
Carpal					4	4				
Metacarpal	1	1	4	3			1	1	1	
Pelvis	1	1	7	5	5	3	3	1	5	2
Femur	7	4	8	5	7	3	1	1	2	1
Patella					2	2	1	1	1	1
Tibia	4	2	9	5	4	3	2	2	5	3
Fibula (malleolus)			1	1	2	2			1	1
Astragalus	1	1								
Calcaneus	1	1			1	1			1	1
Other tarsal			2	2	2	2				
Metatarsal			3	1	3	1	1	1		
Metapodial	3	2	9	5	9	5				
Phalanx 1	1	1	1	1	6	5	1	1	2	2
Phalanx 2	1	1	1	1	6	6			1	1
Phalanx 3			1	1	1	1				
Sesamoids					1	1				
Long bone (shaft)			2	--					1	--
Long bone (epiphysis)			2	--						
TOTAL	47	29	98	60	111	75	37	22	36	26
MNI	3		5		3		2		2	

Table 19 Skeletal representation of ovicaprid in Sounding 1 & Building 1 (Phases 1.2, 1.31, 1.32, 1.42, 1.51) as defined in table 7 (NISP = number of identified specimens; MNE = minimum number of elements; MNI = minimum number of individuals)

SPECIES	CAMEL							
PHASE	PHASE 2.1		PHASE 2.2		PHASE 3		PHASE 4	
UF	8 UF		UF 020		UF 056–057		UF 058–061	
Elements	NISP	MNE	NISP	MNE	NISP	MNE	NISP	MNE
Skull	11	3			15	2		
Mandible	12	5						
Isolated teeth	27	20			7	7	1	1
Enamel fragment	48	--	7	--	10	--	3	--
Atlas	1	1						
Axis					1	1		
Other cervical vert.	2	1						
Thoracic vertebra	10	7			1	1		
Lumbar vertebra	2	1	1	1	2	1		
Caudal vertebra					2	2		
Vertebra indet.	22	10	1	1	4	2		
Sacrum	1	1	1	1				
Sternum								
Rib	37	10	2	1	8	3	1	1
Scapula	1	1			1	1		
Humerus	18	9	1	1	4	2		
Radius	16	5			4	2		
Ulna	3	3			2	2	1	1
Carpal	3	3	6	6	1	1	1	1
Metacarpal							1	1
Pelvis	13	5	2	1	1	1		
Femur	23	9	3	2	1	1		
Patella	1	1			1	1	1	1
Tibia	9	5			1	1		
Fibula (malleolus)	2	2						
Astragalus	2	2						
Calcaneus								
Other tarsal	3	3					1	1
Metatarsal	3	1			1	1		
Metapodial	9	4	5	2	4	1		
Phalanx 1	5	5			1	1		
Phalanx 2	3	3			1	1		
Phalanx 3	1	1						
Sesamoid			1	1	1	1		
Long bone (shaft)	19	--	3	2				
Long bone (epiphysis)	1	--						
TOTAL	308	121	28	16	74	36	10	7
MNI	5		1		3		1	

Table 20 Skeletal representation of dromedary in Sounding 1 & Building 1 (Phases 2.1, 2.2, 3 and 4) as defined in table 7 (NISP = number of identified specimens; MNE = minimum number of elements; MNI = minimum number of individuals)

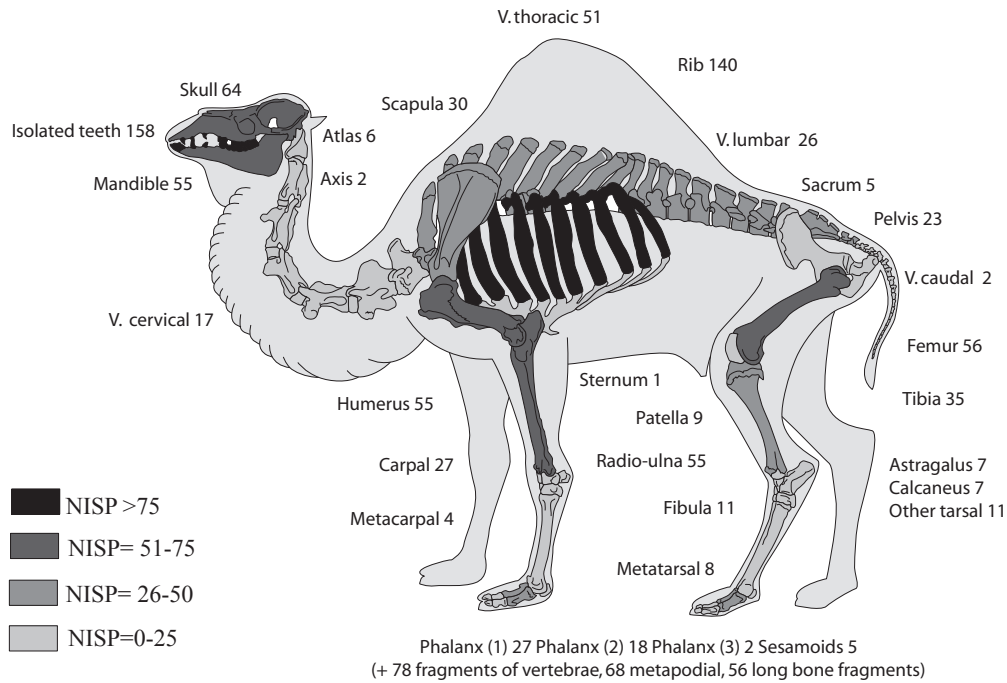
SPECIES	OVICAPRID							
PHASE	PHASE 2.1		PHASE 2.2		PHASE 3		PHASE 4	
UF	8 UF		UF 020		UF 056–057		UF 058–061	
Elements	NISP	MNE	NISP	MNE	NISP	MNE	NISP	MNE
Horncore								
Skull	31	3			3	1	1	1
Mandible	31	8	1	1	4	2	4	1
Isolated teeth	29	26	1	1	3	3	3	3
Enamel fragment	14	--			22	--	11	--
Atlas	3	3						
Axis	4	3						
Other cervical vert.	6	6						
Thoracic vertebra	11	10			5	5		
Lumbar vertebra	15	11	3	2	3	2		
Caudal vertebra								
Vertebra indet.	5	3			7	6		
Sacrum	1	1			1	1		
Sternum					2	2		
Rib	18	5	1	1	9	3		
Scapula	13	4	1	1	2	1		
Humerus	8	5	2	2	4	3		
Radius	7	4	2	2	2	2		
Ulna	4	3			3	3		
Carpal	1	1			1	1		
Metacarpal	6	5			1	1		
Pelvis	8	5	1	1	11	4	1	1
Femur	6	3			9	4	1	1
Patella			1	1				
Tibia	10	5	1	1			1	1
Fibula (malleolus)								
Astragalus	1	1					1	1
Calcaneus	1	1	1	1	1	1		
Other tarsal	1	1	1	1	2	2		
Metatarsal	2	1			1	1	1	1
Metapodial	13	9	6	5	4	3		
Phalanx 1	5	4					2	2
Phalanx 2	2	2	3	3	1	1		
Phalanx 3	3	3	2	2			1	1
Sesamoid								
Long bone (shaft)	7	--						
Long bone (epiphysis)	2	2						
TOTAL	268	138	27	25	101	52	28	13
MNI	5		2		2		1	

Table 21 Skeletal representation of ovicaprid in Sounding 1 & Building 1 (Phases 2.1, 2.2, 3 and 4) as defined in table 7 (NISP = number of identified specimens; MNE = minimum number of elements; MNI = minimum number of individuals)

SPECIES	CAMEL		OVICAPRID		CAMEL		OVICAPRID	
PHASE	PHASE 1.1		PHASE 1.1		PHASE 1.1		PHASE 1.1	
UF	UF 101		UF 101		UF 102–103		UF 102–103	
Elements	NISP	MNE	NISP	MNE	NISP	MNE	NISP	MNE
Skull	1	1	1	1	12	3		
Mandible	2	1	1	1	5	3	5	2
Isolated teeth	2	2	4	4	25	25	2	2
Enamel fragment			11	--			2	--
Atlas								
Axis			1	1				
Other cervical vert.					2	1	1	1
Thoracic vertebra	2	1			5	3	4	3
Lumbar vertebra					2	2		
Vertebra indet.	8	4			9	6	1	1
Sacrum							1	1
Sternum								
Rib	7	3	5	2	13	4	1	1
Scapula	5	2	1	1	2	2	1	1
Humerus	1	1			1	1		
Radius	1	1	2	2	2	1		
Ulna					1	1		
Carpal								
Pelvis					1	1		
Femur	2	1			1	1	2	1
Patella	1	1			1	1		
Tibia	1	1			1	1		
Fibula (malleolus)					1	1		
Astragalus			1	1				
Calcaneus					2	2		
Other tarsal			2	2			1	1
Metatarsal			4	3	1	1	2	1
Metapodial	1	1			8	2	4	2
Phalanx 1					5	4	3	3
Phalanx 2	1	1			3	3	4	4
Phalanx 3								
Sesamoids					1	1		
Long bone (shaft)	3	3	3	--	1	--	4	--
Long bone (epiphysis)					4	--	9	--
TOTAL	38	24	36	18	109	70	47	24
MNI	2		3		3		2	

Table 22 Skeletal representation of dromedary and ovicaprids in Sounding 2 (NISP = number of identified specimens; MNE = minimum number of elements; MNI = minimum number of individuals)

Camel



Sheep/Goat

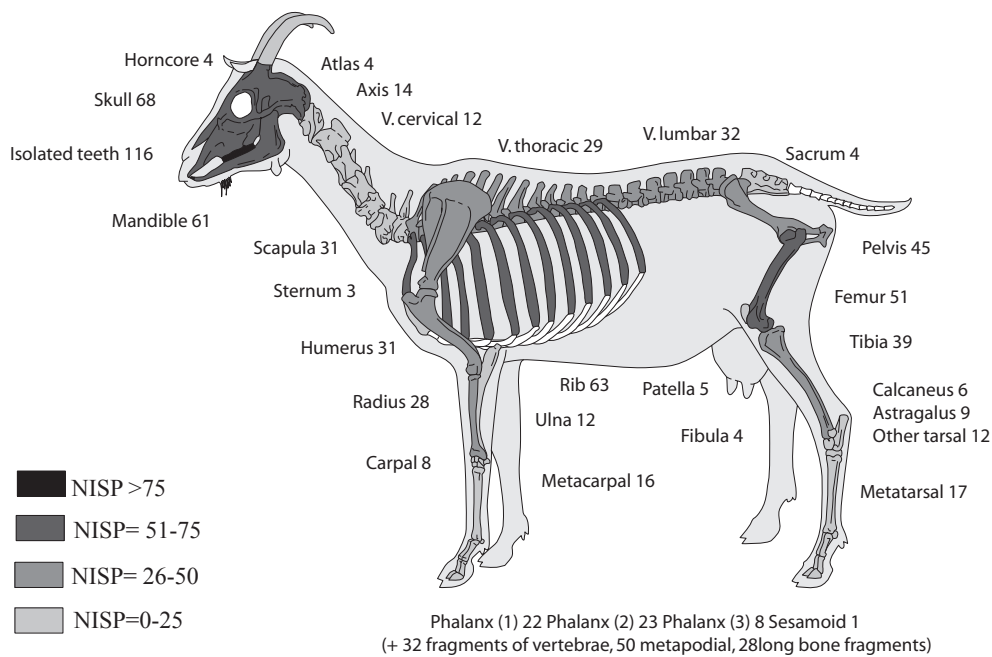


Figure 197 Skeletal bone representation of camel and ovicaprids in number of identified specimens (NISP) for the whole bone assemblage (H. Monchot)

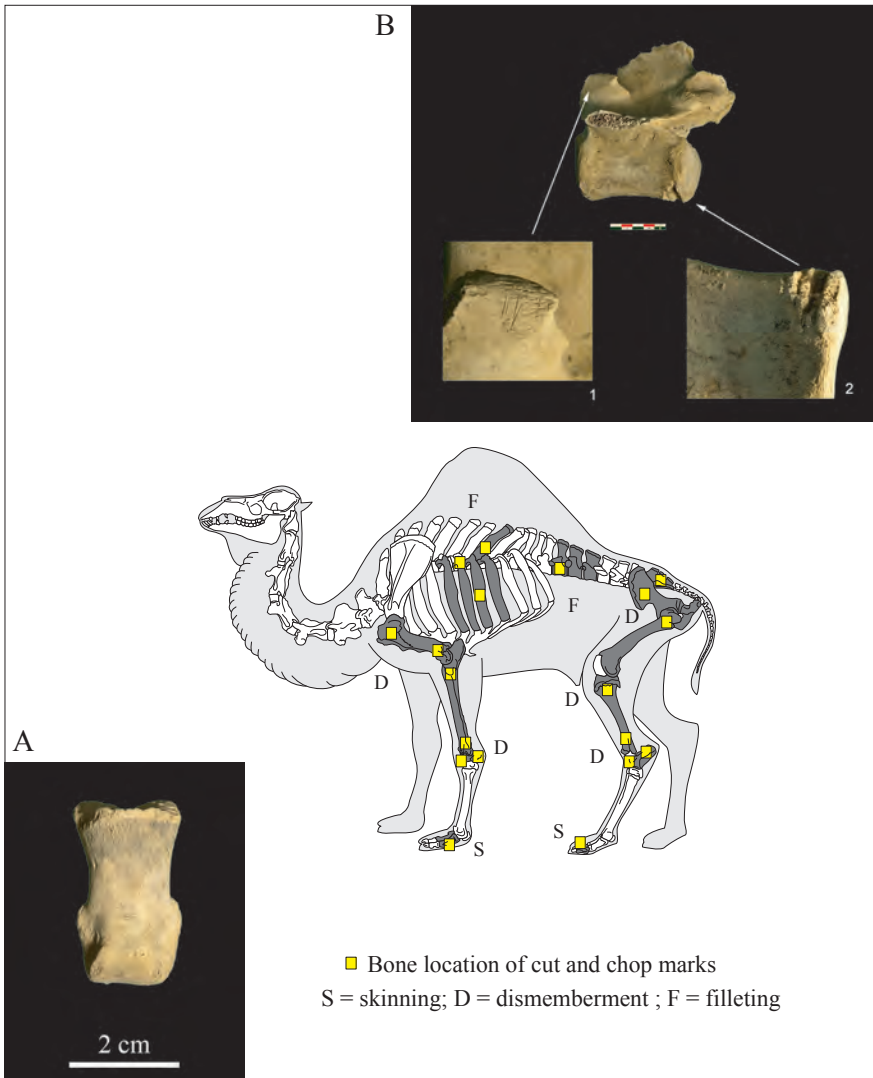


Figure 198 Location of cut marks and chop marks on camel skeleton (A= cut marks on a second phalanx; B= cut marks and chop marks on thoracic vertebra) (H. Monchot)

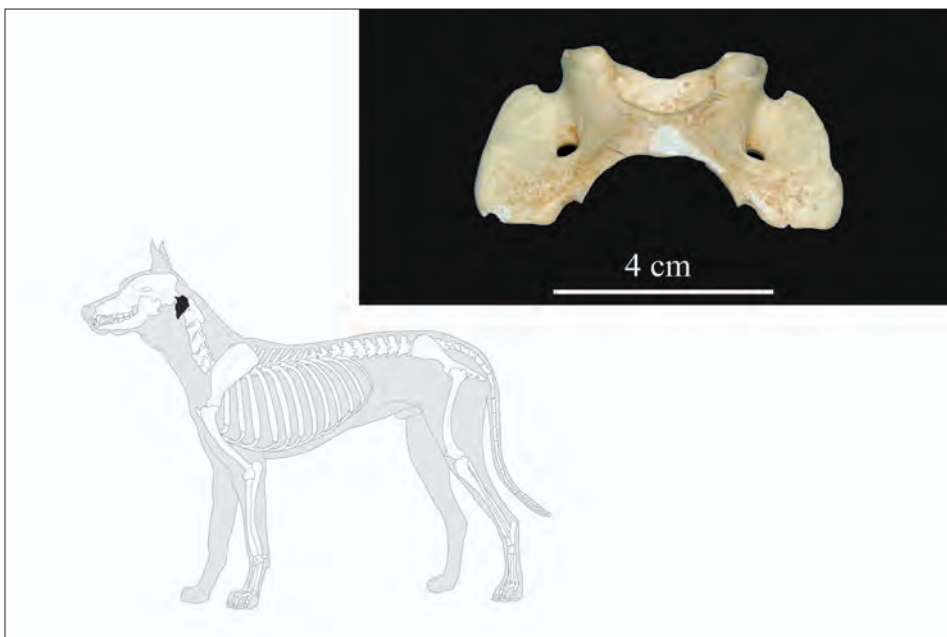


Figure 199 Dog atlas with cut marks (UF 053, phase 2) (Photograph: H. Monchot/drawing: M. Coutureau & V. Forest 1996: www.archaeozoo.org)

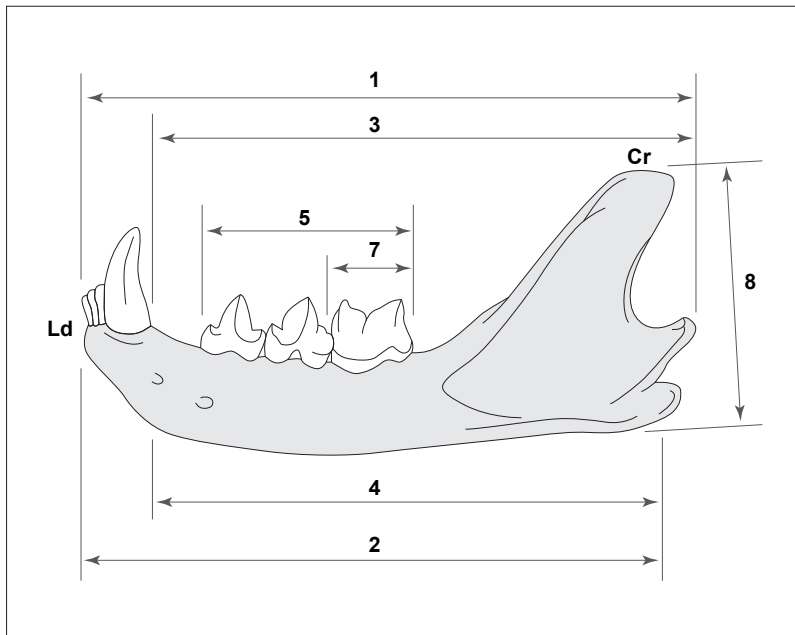


Figure 200 Measurements in mm of a *Felis* mandible (after DRIESCH 1976): (1) Total length: length from the condyle process-infradentale; (2) Length from the indentation between the condyle process and the angular process-infradentale; (3) Length: the condyle process-aboral border of the canine alveolus; (4) Length from the indentation between the condyle process and the angular process-aboral border of the canine alveolus; (5) Length of the cheektooth row, P3-M1, measured along the alveoli; (6) Length and breadth of the M1 measured at the cingulum, not shown in the figure; (7) Length of the carnassial alveolus; (8) Height of the vertical ramus: basal point of the angular process-coronion; (9) Height of the mandible behind M1 measured on the buccal side; (10) Height of the mandible in front of P3 measured on the buccal side (H. Monchot)

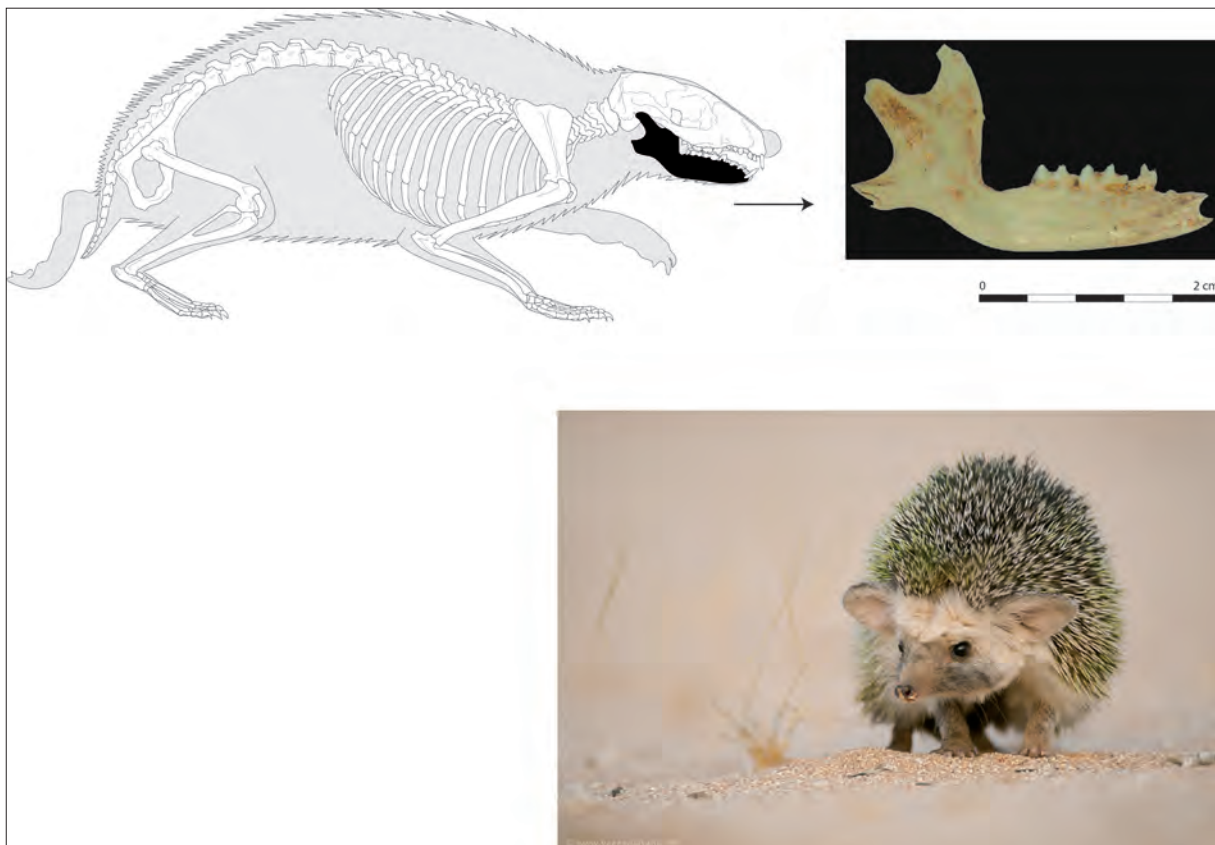


Figure 201 The desert hedgehog's mandible from al-Yamāma (drawing: M. Coutureau 1997, www.archaeozoo.org; photograph: Y. al-Sahli, www.yazeedalsahli.net © 2012)

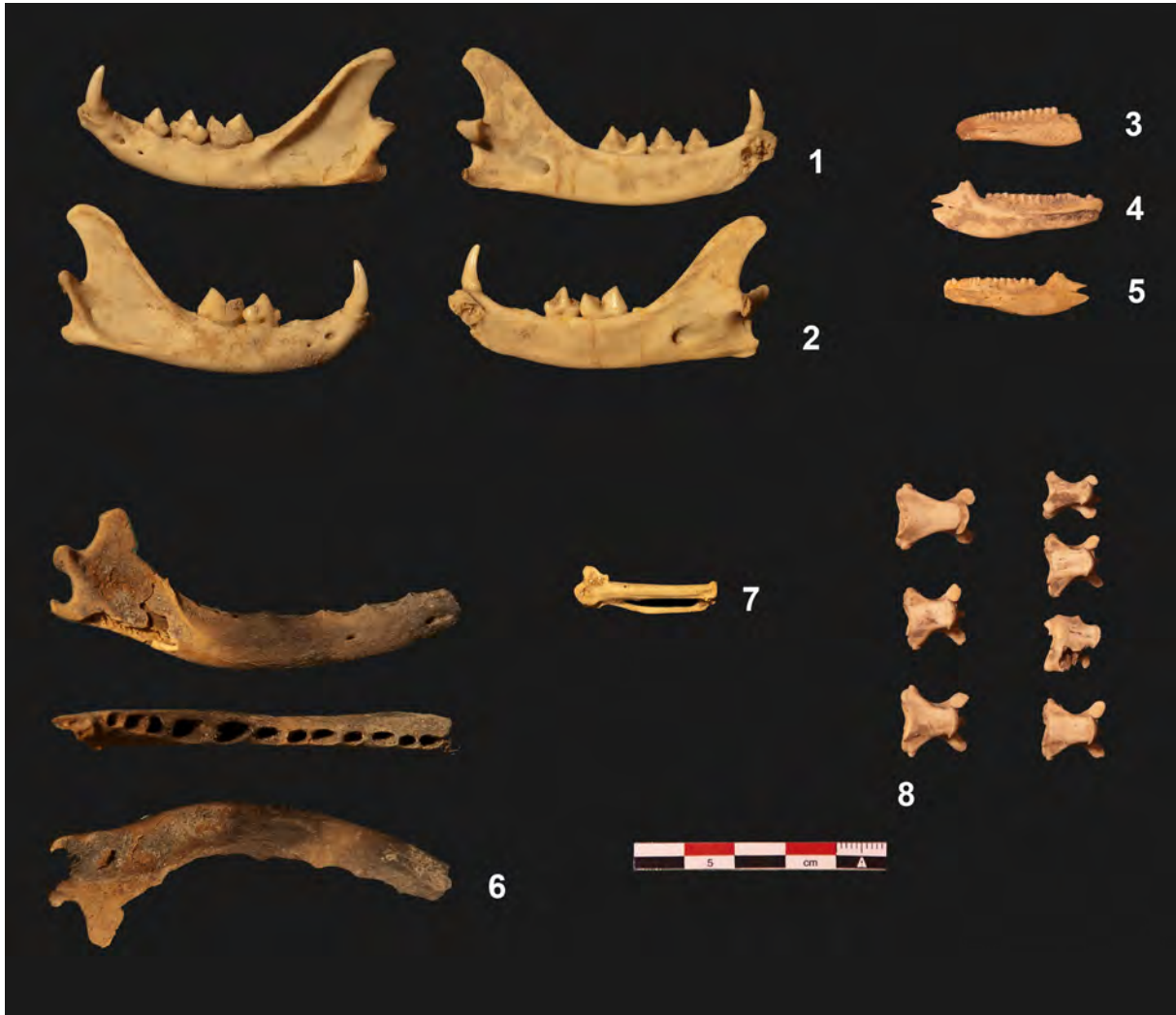


Figure 202 Some species found at al-Yamāma:
 (1–2) right and left mandibles of cat (*Felis catus*);
 (3–4–5) dentary-jugal bones and
 (8) vertebrae of spiny-tailed lizard (*Uromastix aegyptia*);
 (6) mandible of a ratel/honey badger (*Mellivora capensis*);
 (7) right carpometacarpus of spotted sandgrouse (*Pterocles senegallus*)
 (Photograph: Y. H. Hilbert)

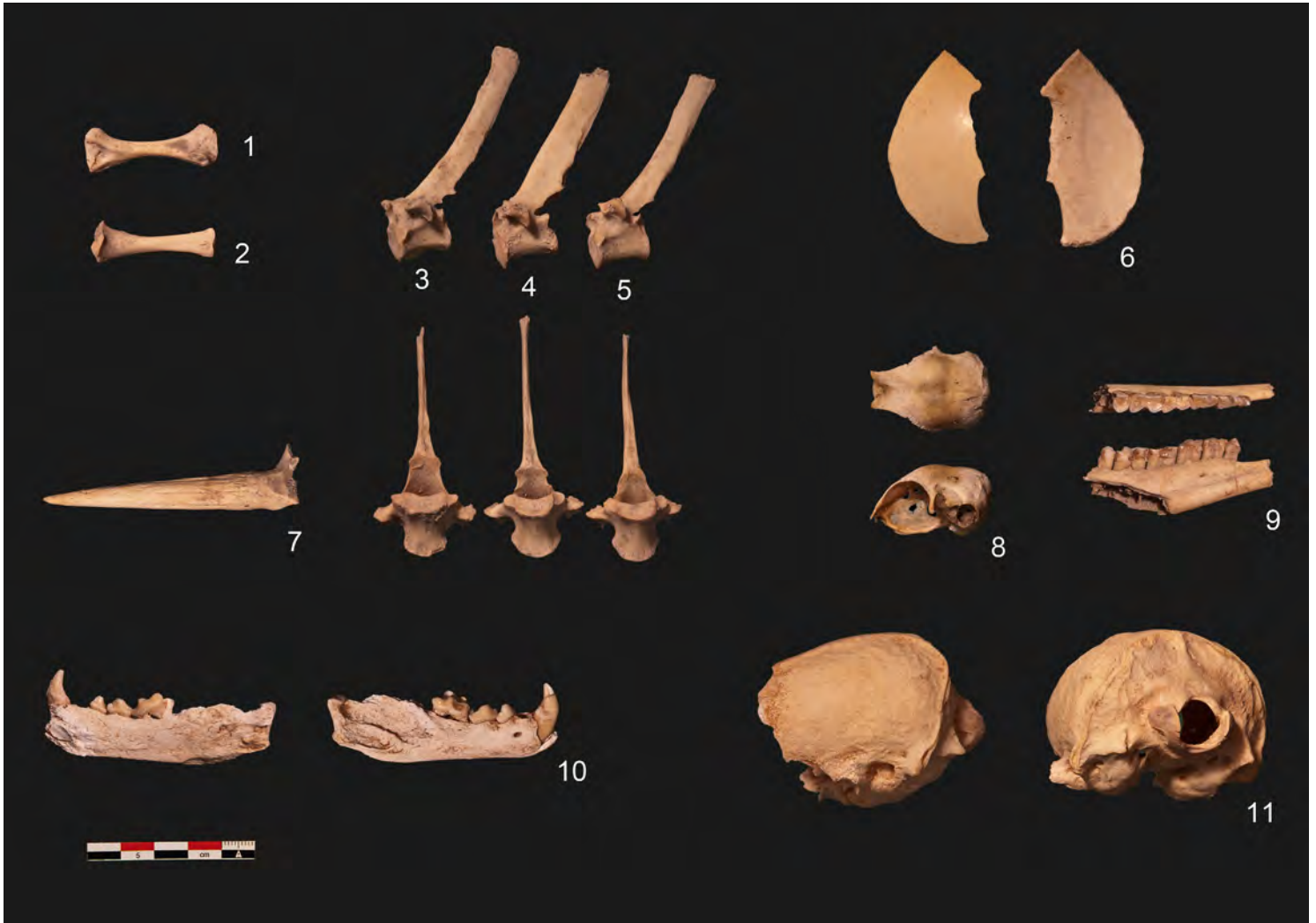


Figure 203 Some species found at al-Yamāma:
 (1–2) ovicaprid foetal bones;
 (3–4-5) thoracic vertebrae of gazelle (*Gazella* sp.);
 (6) fragment of ostrich eggshell (*Ostrich struthio*);
 (7) horncore of a female gazelle (*Gazella* sp.);
 (8) chicken skull (*Gallus gallus*);
 (9) mandible of an old gazelle (*Gazella* sp.);
 (10) right mandible of a fox (*Vulpes* sp.);
 (11) back of a skull of a ratel/honey badger (*Mellivora capensis*)
 (Photograph: Y. H. Hilbert)

APPENDICES



APPENDIX 1

DATABASE OF ARCHAEOLOGICAL SITES OF AL-KHARJ AREA

FRENCH SAUDI ARCHAEOLOGICAL
MISSION IN THE OASIS OF
AL-KHARJ

ARCHAEOLOGICAL SITES

N°

Name of the site

Date of the visite

Latitude

Longitude

Altitude

GPS point

Period of Occupation

Undetermined

Pleistocene

Holocene

Bronze Age

Iron Age

Late Preislamic Period

Islamic period

Graffiti & inscriptions

Graffiti - animal

Graffiti - symbol

Graffiti - human

Graffiti - text

Rock inscription

Stone inscription

Artefacts

Pottery

Lithic

Stone tools

Remains

Isolated dwelling

Densely settled area

Place of worship

Tomb/nécropolis

Hydraulic structure

Well

Cistern

Workshop

Inscription / graffiti

Lithic industry

Other

Building material

Stone

Mudbrick

Fired brick

Coated wall

Description

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APPENDIX 2 DATABASE OF PHOTOGRAPHS TAKEN DURING SURVEY AND EXCAVATION

FRENCH SAUDI ARCHAEOLOGICAL MISSION IN THE OASIS OF AL-KHARJ		N°image	Région	Année	a,b,c...	
Photographer	<input type="text"/>	Entered by	<input type="text"/>	Photo type	<input type="text"/>	
<div style="border: 1px solid black; height: 300px; width: 100%;"></div>						
Date & heure de création <input type="text"/>						
Caption	<input type="text"/>					
Type	<input type="text"/>					
Additional remarks	<input type="text"/>					

APPENDIX 3 DATABASE OF STRATIGRAPHIC UNITS

FRENCH SAUDI ARCHAEOLOGICAL MISSION IN THE OASIS OF AL-KHARJ		STRATIGRAPHIC UNITS	
Number	<input type="text"/>	Area	<input type="text"/>
		year	<input type="text"/>
under UF	<input type="text"/>	interpretation	<input type="text"/>
equal UF	<input type="text"/>		
above UF	<input type="text"/>		
Contact with structure	<input type="text"/>	upper altitude	<input type="text"/>
		lower altitude	<input type="text"/>
Nature of the sediment	<input type="text"/>		
Inclusions	<input type="text"/>		
description	<input type="text"/>		
sample	<input type="text"/>	Artefacts	<input type="text"/>
Pottery	<input type="text"/>		

APPENDIX 4 DATABASE OF ARCHAEOLOGICAL STRUCTURES

FRENCH SAUDI ARCHAEOLOGICAL MISSION IN THE OASIS OF AL-KHARJ		STRUCTURES	
Number	Area	Year	Date
Type	<input type="checkbox"/> Wall (W) <input type="checkbox"/> Floor (F) <input type="checkbox"/> Pit (P) <input type="checkbox"/> Built hearth (H) <input type="checkbox"/> Niche (Ni) <input type="checkbox"/> Room (R) <input type="checkbox"/> Access (A) <input type="checkbox"/> Posthole (Po) <input type="checkbox"/> Column (Co)		
Identical to	Constituent UF		
under UF	UF against the structure		
above UF	Contact with structure		
Length	Height		
Width/diameter			
upper altitude	Building material		
lower altitude	Appareillage		
	Courses number		
	Mean size of the stones/bricks		
description			

APPENDIX 5 DATABASE OF ARCHAEOLOGICAL ARTEFACTS

FRENCH SAUDI ARCHAEOLOGICAL MISSION IN THE OASIS OF AL-KHARJ		ARTEFACTS	
Number	<input type="text"/>	Type	<input type="text"/>
Area	<input type="text"/>	UF	<input type="text"/>
Year	<input type="text"/>	Material	<input type="text"/>
State of conservation		Dimensions	
<input type="text"/>		<input type="text"/>	
<input type="text"/>		<input type="text"/>	
Description		Drawing	
<input type="text"/>		<input type="text"/>	
Drawing <input type="checkbox"/>		<input type="text"/>	
		<input type="text"/>	
		Picture	
		<input type="text"/>	
		<input type="text"/>	

APPENDIX 6 DATABASE OF POTTERY

FRENCH SAUDI ARCHAEOLOGICAL MISSION IN THE OASIS OF AL-KHARJ		POTTERY	
Number	<input type="text"/>	Year	<input type="text"/>
Pottery Category	<input type="text"/>		
Shape	<input type="text"/>		
Parallel in the catalogue of the pottery shapes	<input type="text"/>		
Remark	<input type="text"/>		
Drawing	<input type="checkbox"/>	Picture	

APPENDIX 7 DATABASE OF SAMPLES

FRENCH SAUDI ARCHAEOLOGICAL MISSION IN THE OASIS OF AL-KHARJ		SAMPLES	
Number	<input type="text"/>	Area	<input type="text"/>
		Locus	<input type="text"/>
		date	<input type="text"/>
Type	<input type="text"/>		
Material	<input type="text"/>		
Dimensions/Weight	<input type="text"/>		
Conservation Observation	<input type="text"/>		
Analysed	<input type="radio"/> OUI <input type="radio"/> NON	By	<input type="text"/>
Dating	<input type="text"/>		
Results	<input type="text"/>		

APPENDIX 8
TABLE OF THE STRATIGRAPHIC UNITS



NO	AREA	UNDER UF	EQUAL UF	ABOVE UF	CONTACT WITH STRUCTURE	UPPER ALTITUDE	LOWER ALTITUDE	SEDIMENT AND INCLUSIONS	LOCATION/DESCRIPTION	ARTEFACTS	SAMPLES	INTERPRETATION
001	N6	Surf.	-	002 003 004 007 028 029 032 034 035	R. 013 W. 001 W. 006 W. 043 Co. 004 Co. 005	429.22 (S) 426.81 (N)	429.10 (S) 426.71 (N)	Aeolian sand mixed with pebbles, stones and fired bricks	Surface layer. Broken bones and sherds including a celadon glazed stoneware	Scraper Bottle neck (x 2) Bead	Plaster Eggshell Glass Bone Baked brick	Surface Phase 1a
002	N6	001	-	004 005	W. 001	429.10 (S) 428.97 (N)	428.70	Sand mixed with nodules of mudbrick	In the central part of Sounding 1, removal of aeolian sand and unearthing of a hardened ground (melted mudbrick) forming a large channel or depression oriented E-W. It is laid above the last collapse of W. 002/W. 006 (mosque) [UF. 004].	-	Plaster Slag Charcoal Mudbrick Bone	Aeolian deposit Phase 1a
003	N6	001	-	008	W. 001	428.97	428.06	Aeolian sand with melted mudbrick	In the northern part of Sounding 1, removal of aeolian sand accumulated against W. 001. Many large bones laid horizontally next to the wall. About 80 cm under the surface, along the wall W. 001, floor (F. 011) made of melted mudbrick with hardened sand. Possibly a circulation level.	-	Plaster Bone	Circulation area – waste deposits Phase 1b
004	N6	001 002	005	006 009 024	W. 002 W. 003 W. 006 P. 007-010 P. 012 R. 013	429.25	427.83	Fallen mudbricks, pebbles and aeolian deposit	In the central part of Sounding 1, removal of aeolian sand accumulated on W. 002. Under this deposit, unearthing to the south of W. 002, of the fallen parts of this wall to the north and to the west. The fallen mudbricks are in slope, toward north. At the foot of this slope, aeolian sand deposit have been hardened by running water and then cracked after having dried. Holes dug into W. 002 (pits P. 007, P. 008, P. 009, P. 010 and P. 012).	Bangle (x 3) finery	Plaster Mudbrick Charcoal Shell Bone	Collapse layer – waste deposits Phase 1a
005	N6	002	-	010 015	W. 001	428.77	427.69	Sand (aeolian deposit) with mudbricks (3 complete and fragments)	In the central part of Sounding 1. Removal of a thick deposit of aeolian sand with only few inclusions and mudbricks recovered by the hardened sand deposit at the basis of UF. 002.	Scraper	Bone	Aeolian deposit mixed with collapsed mudbricks Phase 1a

NO	AREA	UNDER UF	EQUAL UF	ABOVE UF	CONTACT WITH STRUCTURE	UPPER ALTITUDE	LOWER ALTITUDE	SEDIMENT AND INCLUSIONS	LOCATION/DESCRIPTION	ARTEFACTS	SAMPLES	INTERPRETATION
006	N6	004	007 022 034	011	W. 002 W. 003 W. 006 Co. 004 R. 013	429.04	428.79	Sand (aeolian deposit) alternating with horizontal layers of melted mudbrick, fragmentary mudbricks.	In the southern part of Sounding 1, south of W. 002 and east of W. 006, in R. 013. Removal of a layer of sand with fragments of mudbricks alternating with layers of melted mudbrick. Unearthing of the buttress W. 003, south of W. 002. Ashes in the north-western corner of R. 013.	Bangle	Charcoal Plaster Mudbrick Bone	Collapse layer/accumulation post-abandon Phase 1b
007	N6	001	006 022 034	014	W. 006 Co. 004 Co. 005 R. 013	429.84	429.60- 429.30	Sand (aeolian deposit) hardened by exposure and rain alternating with horizontal layers of melted mudbrick, fragmentary mudbricks and pebbles	In the southern part of Sounding 1. Removal of a layer of hardened sand with fragments of mudbricks alternating with layers of melted mudbrick. Unearthing of the columns Co. 004 and Co. 005.	-	Charcoal Bone	Erosion post-abandonment Phase 1a
008	N6	003	-	012	W. 001	428.06	427.08	Sand (aeolian deposit)	In the northern part of Sounding 1. Removal of F. 011 and of a thick layer of sand deposit.	-	Glass Bone	Aeolian deposit – waste deposits Phase 2
009	N6	004	-	W. 002	W. 002 P. 012	428.76	428.27	Sand and hardened mudbrick	In the central part of Sounding 1. NW of W. 002, emptying of pit P. 012 dug into the wall by water erosion. Filled with soft sediment (sand, mudbrick fragments) and large bones.	-	Bone	Pit – Waste deposit Phase 1a
010	N6	004	005	015	W. 002	427.93	427.60	Aeolian sand hardened by rain, pebbles and melted mudbrick	In the central part of Sounding 1 North of the glaucis of W. 002, under the destruction layer UF. 004, removal of a hardened layer made of melted mudbrick and hard sand being either the basis of the collapsed layer (UF. 004) or a circulation level. Many bones and sherds.	-	Plaster Charcoal Bone	Accumulation/ Circulation level Phase 1a
011	N6	006	016	013	W. 002 W. 003 W. 006 Co. 004 R. 013 F. 014	428.79	428.51	Thin layers of sand hardened by water	In the southern part of Sounding 1. Removal of several thin layers of hardened sand. Unearthing of floor F. 014 with imprints of a mat made of palm leaves.	Vessel	Ash Charcoal	Occupation Phase 1b

NO	AREA	UNDER UF	EQUAL UF	ABOVE UF	CONTACT WITH STRUCTURE	UPPER ALTITUDE	LOWER ALTITUDE	SEDIMENT AND INCLUSIONS	LOCATION/DESCRIPTION	ARTEFACTS	SAMPLES	INTERPRETATION
012	N6	008	052	018 053	-	426.74- 427.08	425.34	Sand (aeolian deposit)	In the northern part of Sounding 1. Removal of a thick layer of sand deposit running under wall W. 001. No evidence of circulation layer or any structure.	-	Plaster Date stone Iron Bone	Aeolian deposit- Waste deposit Phase 2
013	N6	011	019 030	F. 015	W. 002 W. 003 Co. 004 R. 013 F. 014 F. 015	428.51	428.36	Compact sand with nodules of mudbrick	In the southern part of Sounding 1. Removal of 10 cm of sediments with few material. Unearthing of floor F. 015. It is made of hard plaster abutting the walls and column Co. 004.	Vessel	Plaster Charcoal	Occupation/ Accumulation Phase 2
014	N6	007	006	016	Co. 004 Co. 005 W. 006 R. 013	429.60- 429.30	428.98- 428.77	Aeolian sand with fragments of mudbrick	In the southern part of Sounding 1. In R. 013, in the area surrounding Co. 004 and Co. 005, east of W. 006. Removal of a hard layer of collapsed mudbrick.	-	Charcoal Iron	Collapse/Accumulation post abandonment Phase 1b
015	N6	010	-	017	W. 001 W. 002	427.60	427.13	Aeolian sand with a few nodules of mudbrick	In the central part of Sounding 1, from W. 001 to the north, to W. 002 to the south. Removal of a sandy layer partially covered to the south by a layer with pebbles and melted mudbrick. To the north, at the foot of W. 001, a floor made of melted mudbrick has been unearthed (equivalent to F. 011, north of W. 001). Many bones and sherds.	-	Eggshell Bone	Aeolian deposit/ circulation level Phase 1a
016	N6	014	011 026 036 040 042 043	019	Co. 004 Co. 005 W. 006 R. 013	428.98- 428.77	428.69	Sand horizontally laid with nodules of mudbrick	In the southern part of Sounding 1. In R. 013, removal of several thin layers of compact sand. Unearthing of F. 014.	-	Charcoal Plaster	Occupation Phase 1b
017	N6	015	-	020	W. 001 W. 002	427.13	426.82- 426.70	Sand, melted mudbrick, pebbles and nodules of mudbrick	In the central part of Sounding 1. North of W. 002, sand recovering a hardened ground made of melted mudbrick, nodules of mudbrick and pebbles. Bottom of a gully area recovered afterward by the collapse of Building 1 (W. 002-W. 006).	-	Charcoal Flint Bone Eggshell	Aeolian accumulation – Gully area Phase 1a

NO	AREA	UNDER UF	EQUAL UF	ABOVE UF	CONTACT WITH STRUCTURE	UPPER ALTITUDE	LOWER ALTITUDE	SEDIMENT AND INCLUSIONS	LOCATION/DESCRIPTION	ARTEFACTS	SAMPLES	INTERPRETATION
018	N6	012 052	053	021 055	-	425.34 424.73	425.14- 424.73	Aeolian sand and melted mudbrick	In the northern part of Sounding 1. Removal of a layer of sand mixed, to the south, with melted mudbrick and mudbrick fragments. These fragments constitutes a homogeneous layer of mudbrick without any visible structure. Between these destruction layers, presence of sand hardened by water deposit. The proximity of a structure is very likely if we are to consider the upsurge of the number of bones and pottery.	Stone tool	Charcoal Plaster Bone	Aeolian accumulation/collapse layer Phase 2
019	N6	016	013 030	F. 015	Co. 004 Co. 005 W. 006 R. 013 F. 015	428.69	428.36	Compact sand with mudbrick nodules.	In the southern part of Sounding 1. In R. 013, removal of the compact sand floor F. 014 and of a 20 cm deep layer of dense sand. Unearthing of the plaster floor F. 015. The plaster floor is not preserved in the whole room. West of Co. 005, the ground is darkened over a surface ca. 30 cm wide.	-	Charcoal	Occupation/ Accumulation Phase 2
020	N6	017	-	Arbitrary stop	-	426.82	426.69	Sand mixed with pebbles	In the central part of Sounding 1, at the foot of W. 002, removal of a layer with many pebbles covering a layer of sand mixed with mudbricks. White glazed Abbasid pottery.	Bone pipe	Bone	Circulation layer Phase 2
021	N6	018 053	055	056	-	425.14- 424.73	424.99- 424.60	Sand and melted mudbrick, nodules of mudbrick, fragments of mudbrick, complete mudbricks.	In the northern part of Sounding 1, removal of a layer of collapsed mudbricks. Under this layer, many fragments of mudbrick in aeolian sand deposit. No structures were clearly identified.	-	Bone	Collapse layer Phase 2
022	N6	Surf.	006 007 034	023 025 027	W. 006 R. 013 Co. 016- 023 W. 034 Co. 024- 028 W. 035 W. 043	430.33 to 431	429.55 to 430.7	Sand, small stones, mudbrick fragments and large stones.	Building 1. NW quarter of R. 013, later on extended to the whole western half of the room. Removal of a layer of hardened sand with fragments of mudbricks alternating with layers of melted mudbrick. Unearthing of columns Co. 016-029 (diam.: c. 105 cm) built in mudbricks. In close proximity to the mihrab, fragment of collapsed mudbrick covered with mud coating recovered by a thin white plaster. In the corner between W. 034 and W. 043, and between W. 035 and W. 043: succession of horizontal layer of compacted sand due to water seepage. Very few pottery. Among these, a fragment of cup with a chocolate glaze cover outside (Y.022.4).	Bullet (x 2) Bangle Flat stone	Plaster Bone Glass	Aeolian accumulation/collapse layer Phase 1

NO	AREA	UNDER UF	EQUAL UF	ABOVE UF	CONTACT WITH STRUCTURE	UPPER ALTITUDE	LOWER ALTITUDE	SEDIMENT AND INCLUSIONS	LOCATION/DESCRIPTION	ARTEFACTS	SAMPLES	INTERPRETATION
023	N6	022	014	026 036 040	W. 006 R. 013 Co. 016-023 W. 034 Co. 024-028 W. 035 W. 043 F. 039	429.55 to 430.7	429.27 to 430	Sand with very few nodules of mudbrick, few small stones.	Building 1. Western half of R. 013. Thick layer of aeolian sand deposit between 2 layers of collapsed mudbrick. Uncovering of the floor F. 039: hardened ground made of grey sand with chaff imprints only partially preserved into the mihrāb and some 2 m ² in front of it. Immediately to the NE of the mihrāb: small step (5 cm high) covered by a thin layer of plaster cut at the rear by pit P.040. First step of a minbar? To the south, uncovering of a collapsed layer and of hardened sand levels superimposed, along W. 043. Presence of ashes from hearth emptying.	Spindle whorl	Plaster Bone Glass Steatite Charcoal Date stone Vegetal (imprints)	Collapse/accumulation above late occupation Phase 1
024	N6	004	-	W. 006	W. 006 P. 038	428.10	427.70	Broken mudbricks mixed with sand and large nodules of mudbrick	Building 1. Within W. 006, to the north of the wall, next to the NW corner of Building 1. Filling up of a pit dug into wall W. 006, possibly for the recycling of the building material. Filled up with sand and mudbricks. The filling is recovered by the collapse of W. 006. Few bones, 2 sherds. One piece of plaster with red paint on the external surface.	-	Bone Plaster Glass	Pit filling Phase 1
025	N6	022	-	hard mud level under F. 015	W. 006 F. 039 F. 046 P. 040 F. 014 F. 015 Ni. 160	429.78	428.34	Sand, few small stones, ashes and mudbrick fragments (some of them burnt)	Building 1. Within the mihrāb, pit P.040 has been dug through W. 044 and W. 006 for mudbrick recycling, the inner part of the mihrāb Ni. 160 and goes through several floors F. 039, F. 046, F. 014, F. 015. It is filled with loose yellow sand (30–40 cm) and then, with sand and fragments of mudbrick, some of these being slightly burnt. W. 006 is cut to the north of the mihrāb. Numerous imprints of a large tool (spade) on the northern side of the pit and at the bottom. Concentration of ashes to the NO of the pit.	-	Plaster Shell Earthen coat Bone	Pit filling Phase 1
026	N6	023	014 016 036 040 042 043	030	W. 006 Co. 016 R. 013 Co. 017 Co. 018 Co. 029 Co. 030	429.27	428.71 to 429.15	Loose aeolian brown orange sand, slightly compacted by humidity. Hard and compact thin layers around Co. 029-030.	Building 1. NW quarter of R. 013. Continuation to the unearthing of columns Co. 016–018. Uncovering of two different hardened floors made of grey sand (F. 046 and F. 014) in the western part of the room. These 2 floors are separated by a layer of sand.	Flake Button Bottle neck	Charcoal Earthen floor Glass Bronze Flint Bone	Accumulation between two late occupations Phase 1

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027	N6	022	022 023	W. 006	R. 013 W. 006 Ni. 047	430.03	429.56	Sand and fragments of mudbrick, very loose brown-orange colour.	Building 1. Filling of a small triangular niche (Ni. 047) decorating wall W. 006, opening onto R. 013, north of the mihrāb. Almost empty of material.	-	Bone	Accumulation post-abandon Phase 1
028	N6	001	-	W. 006	W. 006 P. 041	429.78	429.06	Succession of grey sand with large nodules of mudbrick and fragments of mudbrick; ashes and charcoals; dark yellow.	Building 1. In the space between 2 buttresses of W. 006, the western side of W. 006 and the eastern side of wall W. ???, ca. 2 m to the north-west of the mihrāb, empty space filled with mudbrick fragments, nodules and sand over 10 to 20 cm. Under it, thick layer of dark grey ashes and charcoals in slope, recovering a layer of brown sand, partly mixed with ashes. Ashes at the bottom of the pit, few charcoals and a burnt bone. Filling removed over ca. 50 to 60 cm.	-	Charcoal Bone Baked Brick Glass	Filling between two walls Phase 1
029	N6	001 W.044	-	031	W. 006 W. 044 F. 046	430.03	428.80	Aeolian loose yellow sand	West of Building 1, west of W. 006 and W. 044. Removal of a thick layer of aeolian sand, clearing of a layer of collapsed mudbricks coming from W. 006 and of a massif of melted mudbrick at the bottom of W. 006.	Stone vessel	Bone Flint Slag Plaster	Aeolian deposit/ collapse layer Phase 1
030	N6	026	013 019	F. 015	W. 006 R. 013 F. 015 Co. 016-019	428.71 to 429.15	428.50	Dense orange sand with tiny mudbrick nodules.	Building 1. NW quarter of R. 013, under F. 014. Removing of a ca 20 cm thick layer of sand covering F. 015. At the foot of Co. 016, series of hardened sand layers.	Coin	Bone Plaster Charcoal Date stone Fabric?	Occupation/ Accumulation Phase 2 (?)
031	N6	029	-	033	W. 006 W. 044	430.03	429.47	Fallen mudbrick fragments over aeolian sand deposit; nodules of mudbrick, plaster fragments, few stones, baked brick, a fragment of painted plaster	West of Building 1, west of W. 006 and W. 044. Removing of a layer of collapsed mudbricks from W. 006. It covers a thick layer of aeolian sand deposit (60 to 80 cm). Uncovering of an horizontal ground level made of hardened melted mudbrick at the foot of W. 006. Possibly a circulation level. Clearing of the western face of W. 006: thick wall in its lowest part (ca. 1 m thick) with two faces made of mudbrick and an inner filling made of sand/mudbrick. Plaster on the outer face of the wall partly preserved. In the upper part, the wall is only 2 bricks thick (ca. 45 to 50 cm). Many complete plano-convex bricks were found in this layer, 38 x 24 x 10 cm.	Clay artefact	Bone Plaster Glass Baked Brick	Collapse over Aeolian deposit

NO	AREA	UNDER UF	EQUAL UF	ABOVE UF	CONTACT WITH STRUCTURE	UPPER ALTITUDE	LOWER ALTITUDE	SEDIMENT AND INCLUSIONS	LOCATION/DESCRIPTION	ARTEFACTS	SAMPLES	INTERPRETATION
032	N6	001	015a 039	039	W. 001	428.77	427.69	Aeolian sand	North-west of Building 1. Extension of the central part of Sounding 1 to the west, south of W. 001 and NW. of the corner of W. 002/W. 006. Removing of a thick aeolian deposit. Clearing of the southern face of W. 001 in its upper part.	Stone tool Bead Bottle neck Coin (?)	Bone	Aeolian sand deposit Phase 1b
033	N6	031	-	044 and arbitrary stop	W. 006 W. 044 W. 051 W. 050 W. 063 W. 067 F. 065 F. 066	428.75	428.68	Aeolian sand and fragments of mud-brick	West of Building 1 (west of W. 006, W. 067 and W. 044). Removing of a thick aeolian sand deposit and uncovering of two hardened sand layer, possibly circulation floors (F. 065 and F. 066), both being separated by W. 063. Few pottery, many bones. Uncovering of the western face of W. 006, W. 044, W. 067. W. 067 is only preserved on 1 course and is built above a layer of sand.	-	Bone Glass	Circulation – accumulation Phase 1
034	N6	001	022 023	037 038	R. 013 W. 036-037 W. 043 W. 056-059 W. 062 W. 078-079 Co. 028-030 Co. 053-055 Co. 060-061	429.61	429.18	Aeolian sand, compacted layer due to water exposition	Building 1. Eastern nave, extension of the excavated area after having left a bench oriented north-south through Building 1. Removing of a layer of aeolian sand deposit and of collapsed mudbrick under this layer. This collapsed layer is very dense in proximity of W. 043 to the south, and near the northern structures Co. 075–077, Co. 033, W. 078–079. In the sand layer, presence of small patches of sand hardened by exposure to rain and water deposits. Uncovering of the eastern limit of R. 013 made of pillars and columns joined up by small walls. From south to north: 1 buttress (W. 036), 1 void linked to a pillar to the north by a mudbrick threshold, two pillars (W. 037 & W. 062) and 3 columns (Co. 053–055) linked by small walls (W. 056-059), then 3 columns without wall in between (Co. 060-061 & Co. 075). These small walls between columns have been added in a later phase; they are built above a thick layer of sand and tied to adjacent columns/pillars in their upper part. All of them have their base at approximately the same altitude. It correspond to the altitude of a late refectory of columns. The summit of the columns to the north are badly preserved (mushroom shape with an enlargement of columns at the altitude of the bases of the walls added between them).	-	Bone Plaster Steatite	Accumulation post abandon/ Collapse layer Phase 1

NO	AREA	UNDER UF	EQUAL UF	ABOVE UF	CONTACT WITH STRUCTURE	UPPER ALTITUDE	LOWER ALTITUDE	SEDIMENT AND INCLUSIONS	LOCATION/DESCRIPTION	ARTEFACTS	SAMPLES	INTERPRETATION
035	N6	001	034	Arbitrary stop	W. 043 W. 106 W. 142	429.89	429.14	Aeolian loose sand with nodules and fragments of mudbrick	South of Building 1. South of W. 043, east of W. 142, north of W. 106. Removing of a layer of aeolian deposit in slope (W→E) recovering a thick layer of collapsed mudbrick (W. 043 fallen down flat).	-	Baked Brick Bone	Aeolian deposit/ collapse layer Phase 1
036	N6	023	upper half of 026 040	042	R. 013 F. 039 W. 006 W. 043 Co. 019-023	429.85	429.37	Aeolian sand deposit with nodules of mudbrick	Building 1. Southern half of the western nave in R. 013. Removing of a sand deposit above a hardened layer of earth (F. 039) preserved in the central part of the room and in the corner of W. 043 and W. 006.	-	Bone	Accumulation/ occupation Phase 1
037	N6	034	036 (?) 040 (?)	047	R. 013 W. 057-059 W. 062 Co. 053-055	429.86	429.13 to 429.27	Aeolian sand deposit	Building 1. Eastern nave of R. 013, east of the N-S bench. Uncovering of a hardened ground in gentle slope from east to west, made of irregular hardened grey sand/earth. This ground level could be identical to F. 039 or F. 046 in the western nave.	-	Bone	Accumulation/ occupation Phase 1
038	N6	034	-	Arbitrary stop	R. 013 W. 037 W. 056-058 W. 062 Co. 053-055 Co. 060-061 Co. 075-077 W. 078 Co. 082	429.24	428.84	Aeolian sand deposit	Building 1, courtyard to the east of R. 013, east of Co. 075-077 and W. 080 and going then southward, down to W. 062. Uncovering of a thick aeolian sand deposit (ca. 30 to 50 cm thick) previously sealed by the collapsed layer removed in UF. 034. Uncovering of a horizontal hardened ground. Ca. 1.5 m east of Co. 077, uncovering of the western half of a small column (ca. 40 cm) partly engaged in the bench (= Co. 082). It could be indicative of the presence of a portico to the northern side of the courtyard.	-	Bone Plaster	Accumulation/ occupation Phase 1
039	N6	Surf. 041	032 015a	Arbitrary stop	W. 001	427.74	427.18	Aeolian sand deposit	North-west of Building 1 and of the corner between W. 002 and W. 00. South of W. 001. Widening of the central part of Sounding 1 toward west, over ca. 5 m wide. On a strip 2 m large, removing of loose aeolian sand deposit (ca. 20 cm thick) abutting W. 001 to the north. To the south, it is covered by a crust of melted bricks (bottom of the gully area already seen at the base of UF 017.	-	Bone Plaster Steatite	Aeolian sand deposit Phase 1b

NO	AREA	UNDER UF	EQUAL UF	ABOVE UF	CONTACT WITH STRUCTURE	UPPER ALTITUDE	LOWER ALTITUDE	SEDIMENT AND INCLUSIONS	LOCATION/DESCRIPTION	ARTEFACTS	SAMPLES	INTERPRETATION
040	N6	023	upper half of 026 036	043	R. 013 Co. 019-028 W. 034-035 W. 043 F. 039	429.85	429.37	Compact sand deposit.	Building 1. Southern half of the central nave in R. 013. Removing of a hard sand deposit ca. 30 cm thick) above a compact layer of earth (F. 039). Absence of pottery.	-	-	Accumulation/occupation Phase 1
041	N6	Surf.	010 015 017	039 and arbitrary stop	-	427.18	426.75	Small pebbles, gravel and aeolian sand deposit	North-west of Building 1 and of the corner between W. 002 and W. 00. South of W. 001. Widening of the central part of Sounding 1 toward west. Clearing of a depression whose ground is made of hard melted mudbrick (coming from W. 001) and joining the basis of the collapse of W. 006. It is recovered with layers of small pebbles/gravel and aeolian sand deposit. It constitutes a former gully area joining UF. 010, UF. 015 and UF. 017 to the east. Mix of material of several periods including glass bangle and blue-and-white Chinese porcelain.	Bangle	Bone Charcoal Plaster Bronze Flint Glass	Accumulation in a Gully area Phase 1a
042	N6	036	Lower half of 026 043	Arbitrary stop	R. 013 W. 006 W. 043 Co. 019- Co. 023 F. 039 F. 046	429.27	429.24 to 429.38	Densely accumulated sand and layer of compact earth	Building 1. Southern half of the western nave in R. 013. Removing of a hard sand deposit between two hardened layer of earth (top: F. 039 & bottom: F. 046). Absence of pottery.	-	Plaster	Accumulation between two occupations Phase 1
043	N6	040	Lower half of 026 042	Arbitrary stop	R. 013 Co. 019-028 W. 034-035 W. 043 F. 039 F. 046	??? 429.37 ???	429.15 to 429.29	Densely accumulated sand and layer of compact earth	Building 1. Southern half of the central nave in R. 013. Removing of a hard sand deposit between two hardened layer of earth (top: F. 039 & bottom: F. 046). F. 046 is only preserved in few places (north and south of the area). Absence of pottery. An Ottoman clay pipe has been found.	Pipe	Bone	Accumulation between two occupations
044	N6	033	-	045 F. 065	W. 006 W. 044 F. 065	429.70	428.71 to 427.97	Sand with fragments and nodules of mudbrick	West of Building 1, west of W. 006 and W. 044, in a small sounding ca 4 x 2 m to the west of the mihrāb Ni. 160. Removing of a collapsed layer made of nodules and fragments of mudbrick. Clearing of a horizontal floor set against W. 006: F. 065 (428,71 to 428,62). It is only preserved over ca. 1 m to the west. Many fragments of plaster, ashes and bones.	-	Plaster Bone	Collapse layer over a circulation level Phase 1

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045	N6	044	-	046 048	W. 006 W. 084 F. 065 F. 083	428.71	428.52	Collapsed mudbrick, nodules of mudbrick, stones (> 15 cm) and sand	West of Building 1, west of W. 006 and W. 044, in a small sounding ca 4 x 2 m to the west of the mihrāb Ni. 160. Removing of F. 065 and of a layer of collapsed mudbrick with nodules of mudbrick and stones. 10 cm under F. 065, presence of another floor (F. 083) preserved in the eastern half of this small sounding.	-	Bone	Collapse layer over circulation level Phase 2 (?)
046	N6	045	048	Arbitrary stop	W. 006 W. 084 F. 083	428.52	428.15	South of W 084: sand North of W 084: fragments of mudbricks	West of Building 1, west of W. 006 and W. 044, in a small sounding ca 4 x 2 m to the west of the mihrāb Ni. 160. Removing of F. 083, clearing of the top of a mudbrick wall turned EW (W. 084). South of W. 084: Removing of a layer of sand with patches of ashes, several fragments of plaster (equiv. to UF. 048) North of W. 084: removing of a layer of collapsed mudbrick (W. 084) fallen down over a layer of sand. Large fragments of plaster and bones.	-	Bone Plaster Charcoal	Collapsed mudbrick (north W 084) & accumulation (south W 084). Phase 2
047	N6	037	-	Arbitrary stop	R. 013 W. 057-059 W. 062 Co. 053-055	429.13 to 429.27	428.87	Sand deposit	Building 1. In the eastern nave of R. 013, east of the N-S bench, uncovering of a hardened ground made of irregular compacted grey sand/earth. It goes under W. 059, W. 058 and W. 057 (late addition between columns). This ground level could be identical to F. 046 in the western nave.	-	-	Accumulation over occupation Phase 1
048	N6	045	046	Arbitrary stop	F. 083	428.52	428.13	Sand and fragments of mudbrick	West of Building 1, west of W. 006 and W. 044, in a small sounding ca 4 x 2 m to the west of the mihrāb Ni. 160. In a southern extension of this sounding: removing of F. 083 under UF. 045. Removing of a layer of sand with fragments of mudbrick.	-	Glass Bone	Accumulation/ collapse (?) Phase 2
050	N6	008	012	051 052	-	426.32	425.89	Aeolian sand deposit	In the northern part of Sounding 1. Enlargement of the Sounding 1 toward the West. Removal of a thick layer of sand deposit.	-	Bone	Aeolian sand accumulation Phase 1a
051	N6	Surf.	012	052	-	426.19 to 426.38	426.11 to 426.05	Loose sand, with an irregular layer of mud fragments on the top	In the northern part of Sounding 1. Enlargement of the area excavated in 2011 (UF 012). Strip along the eastern bulk of the sounding, approximately 1 m large, 40 cm thick. To the north, concentration of animal bones of medium and large size in the sand under the layer of fragments of mud.	-	Bone	Aeolian sand accumulation/ Waste deposits Phase 2

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052	N6	012 051	012	018 053	-	426.05	425.74 to 425.11	Loose sand, patch of mud, with ash mixed with sand, two small flat stones	In the northern part of Sounding 1. Enlargement of the area excavated in 2011 (UF 012). Strip along the western baulk of the sounding, and along northern side of wall 001; approx. 1.20 m large.	Spindle whorl (?)	Bone	Aeolian sand accumulation/ Waste deposits Phase 2
053	N6	052 012	018	054 055	-	425.74 to 425.11	424.76 to 424.70	Aeolian loose sand, few small flat stones, fragments of thick lime plaster and to the south, irregular layers of mud fragments	In the northern part of Sounding 1. Enlargement of the area excavated in 2011 (UF 018). 2 strips approx. 50/60 cm thick, and 1.20 cm large one along the eastern bench, the other along the western bench.	Spindle whorl (?)	Bone Charcoal Plaster	Aeolian sand accumulation/ Waste deposits Phase 2
054	N6	018 053	-	021 055	-	424.80	424.76	Patch of ash	In the northern part of Sounding 1. Fire place directly on the loose sand covering the collapse mudbrick deposits of UF 055. A patch of approx. 1.2 m long (E-W), and 0.8 m large (N-S).	-	Bone Charcoal	Fire place Phase 2
055	N6	053 054 018	021	056	-	424.70 to 425.17	424.56 to 424.62	Sand and mudbrick fragments	In the northern part of Sounding 1. Collapse layer of melted mudbrick, irregular thickness, in slope to the north. Very dense in the centre of the trench. At the extremities towards the west and the north, the layer is formed of just loose eroded fragments of mudbrick rolled from the top of the layer. To the NE, part of a mudbrick wall was lying on the ground, with 4 rows of mudbricks visible on their side. Water deposits above the sediments.	Stone vase	Baked Brick Plaster Slag Glass Charcoal Bone Flint	Collapse layer Phase 2
056	N6	055	-	057	-	424.56 to 424.62	424.13 to 424.21	Loose sand with few mud fragments and small stones	In the northern part of Sounding 1. Sandy layer approx. 40 cm thick	-	Plaster Eggshell Shell Charcoal Bone Over-fired clay Bronze Steatite	Aeolian sand accumulation/ light occupation (?) Phase 3

NO	AREA	UNDER UF	EQUAL UF	ABOVE UF	CONTACT WITH STRUCTURE	UPPER ALTITUDE	LOWER ALTITUDE	SEDIMENT AND INCLUSIONS	LOCATION/DESCRIPTION	ARTEFACTS	SAMPLES	INTERPRETATION
057	N6	056	-	058	-	424.13 to 424.21	423.45 to 423.90	Loose sand and fragments of mudbrick to the south	In the northern part of Sounding 1. A deposit of collapsed mudbrick concentrates to the SE corner of the area. The layer is in slope towards the north, and contains a few small stones and several fragments of plaster. A construction of quality was built nearby, probably to the south, taking into account the slope. Fire place on the mudbrick layer, and a very ashy level to the north. This layer contains a large number of pottery sherds.	Bronze object Stone vessel (x 6) Plaster decor Bangle Iron blade (?) Microlith Spindle whorl (?) Ring	Bone Charcoal Glass Iron Baked Brick Shell/ Mother of Pearl Plaster Chick peas Slag Steatite	Collapse layer and Open air occupation level Phase 3
058	N6	057	-	059	-	423.45 to 423.90	422.82 to 422.88	Aeolian sand	In the northern part of Sounding 1. Thick aeolian sand deposit with few inclusions in the upper part of the level (interface with UF. 057).	-	Bone Glass Charcoal	Aeolian deposit Phase 3/4
059	N6	058	058	060	-	422.85	422.40	Aeolian sand, at the bottom: mudbrick nodules, fragments of broken burnt mudbricks, ash and charcoals	In the northern part of Sounding 1. Open air occupation layer. A line of thin lime particles was visible at the base of this layer, together with patches of ashes. Two hearths marked by a concentration of ash and charcoal. Carbonized date stones were collected. Nodules of clay, fragments of plaster and a few fragments of mudbricks attest to the presence of structure nearby. Pottery sherds, faunal remains (680 g of bones of camel gazelle, small birds and cat) and two tokens made of sherds with rounded edges	Token	Bone Charcoal Bronze Plaster Date stones Eggshell	Aeolian accumulation/occupation Phase 4
060	N6	059	-	061	-	422.40	421.70	Loose sand with few nodules of mudbrick, few fragments of broken burnt mudbricks	In the northern part of Sounding 1. Aeolian sand accumulation with a thin layer of particles of white gypsum at the base, and two circular patches of ashes. Chenopodiaceae coming from a hearth dated to the 4th-2nd centuries BC (Sample Lyon-16206, 14C BP 2165 ± 30; cal-BC 360-116, 95,4 % probability). Few sherds and faunal remains	Token Stone ball (sling bullet ?)	Eggshell Charcoal Date stone Bone Mother of pearl	Sand accumulation/occupation Phase 4

NO	AREA	UNDER UF	EQUAL UF	ABOVE UF	CONTACT WITH STRUCTURE	UPPER ALTITUDE	LOWER ALTITUDE	SEDIMENT AND INCLUSIONS	LOCATION/DESCRIPTION	ARTEFACTS	SAMPLES	INTERPRETATION
061	N6	060	-	Arbitrary stop	-	421.70	421.30	Loose sand with few nodules of mudbrick and ashes	In the northern part of Sounding 1. Open air occupation layer. 5-6 cm thick. Materialized by few ashes and small particles of mud.	Stone tool (x 2)	Bone	Sand accumulation/occupation Phase 4
100	O7	Surf.	-	101	W. 100-107 W. 117 A. 111 A. 115 R. 108-110 R. 112-113	428.96 to 428.83	428.85 to 428.65	Aeolian sand, surface deposits	In Building 2/Sounding 2. Aeolian sand deposit on surface of R. 108-110 and R. 112-113	-	Plaster Bone	Aeolian sand Phase 1a
101	O7	100	-	102	W. 100-107 A. 111 A. 115 R. 108-109	428.85 to 428.65	428.49	R. 108: 101a: collapsed mudbricks 101b: loose sand R. 109: collapsed mudbricks	In Building 2/Sounding 2. R. 108-109. R. 108 : UF 101a: Collapsed mudbricks. R. 108 : UF 101b: Aeolian loose sand deposit after the abandonment of the house. R. 109: Collapsed mudbricks equivalent to UF 101a in R. 108.	Stone tool	Plaster Bone	Collapse layer/accumulation post-abandon Phase 1a
102	O7	101	-	103	W. 100-107 A. 111 A. 115 R. 108-109	428.49	428.22	Ashy blue-grey sand	In Building 2/Sounding 2. R. 108-109. Layer of sand mixed with ash. Uncovering of the tannür St. 114 in the SE corner of R. 108, filled with ashes, sand and bones. In room R. 108: many bones and a few stone tools indicative of the function of kitchen of that room. Room 109: sand layer with a few ashes surrounding a small hearth (St. 116) dig in the ground (F. 159). Floor F. 159 made of compacted earth.	Flint flake Stone tool (x 6)	Charcoal Glass Flint Bone	Occupation level Phase 1a/b (?)
103	O7	102	-	Arbitrary stop	W. 100-101 W. 103-104 R. 108	428.22	428.08	Compact sand	In Building 2/Sounding 2. In R. 108, Compact sand with few inclusions and few material. This layer continues to the west, under W. 102.	-	Bone	Occupation level Phase 1 (b?)

APPENDIX 9
TABLE OF THE STRUCTURES



NO	TYPE	AREA	UNDER UF	ABOVE UF	CONSTITUTIVE UF	AGAINST UF	CONNECTED TO	LENGTH (CM)	WIDTH/DIA-METER (CM)	HEIGHT (CM)	UPPER ALT.	LOWER ALT.	MATERIAL	DESCRIPTION
001	Wall	N6	001	012	-	002 003 005 008 010 015 017	-	7000 [70 m]	90	150	428.97	427.47	mudbrick	Long wall turned E-W, visible on the surface. It crosses the northern part of the site. Both faces are battered. Possibly a wall encircling a plot of land. The three lower courses constitute a batter/glacis. The wall does not seem to be made of mudbrick but rather of horizontal layers of melted mud.
002	Wall	N6	004	-	-	002 003 005 008 009 010 011 013	W 003 W 006 P. 007 P. 009 P. 010 P. 012 R. 013 F. 014 F. 015	> 1500 [15 m]	> 180	> 160	429.16 to 428.86	-	mudbrick	Northern wall of R. 013 directed E-W. Battered on its northern face. W. 006 is perpendicular to it. W. 003 is abutting against it. The wall is made of courses of stones and mudbricks.
003	Wall	N6	004	-	-	006 011 013	W 002 P. 008 R. 013 F. 015	90	80	72	429.05	428.32	mudbrick	Abutment connected to W. 002 on its southern face and aligned with the western rank of columns in R. 013. Square section with rounded angles. Bricks are eroded and powdery so that courses are hardly visible.
004	Column	N6	001	-	-	006 007 011 013 016 019	R. 013 F. 014 F. 015	-	108	133	429.62	428.35	mudbrick	Located in the western row of columns of Building 1, west of R. 013, north of Co. 005, and south of the buttress W. 003. Column with a circular section, built with triangular mudbricks. Enlarged at the basis (truncated cone profile).
005	Column	N6	001	-	-	007 014 016 019	R. 013 F. 014 F. 015	-	106	147	429.84	428.39	mudbrick	Located in the western row of columns of Building 1, west of R. 013, north of Co. 016, and south of Co. 004. Column with a circular section, built with triangular mudbricks. The upper part of the column is eroded (powdery texture). Enlarged at the basis (truncated cone profile).
006	Wall	N6	001 004	-	-	006 011 013 007 014 016 019	W. 002 R. 013 F. 014	3000 [30 m]	195	> 100	428.69	-	mudbrick	Western wall of R. 013 directed N-S, perpendicular to W. 002. Large wall deeply eroded in its NW corner. Most of the upper part of the wall has collapsed in this area. Mudbricks are laid horizontally.

NO	TYPE	AREA	UNDER UJ	ABOVE UJ	CONSTITUTIVE UJ	AGAINST UJ	CONNECTED TO	LENGTH (CM)	WIDTH/DIA-METER (CM)	HEIGHT (CM)	UPPER ALT.	LOWER ALT.	MATERIAL	DESCRIPTION
007	Pit	N6	004	-	006	-	W. 002 R. 013	-	30	28	428.98	428.70	-	Burrow dug into W. 002, along its southern face. Filled up with sand.
008	Pit	N6	004	-	004	-	W. 003	24	24	30	429.00	428.94	-	Possibly a shallow pit dug into W. 003, filled up with sand and melted mudbrick.
009	Pit	N6	004	-	-	006	W. 002 W. 003	-	30	10	429.06	428.96	-	Pit (?) dug into the corner of W. 002 and W. 003. Circular in shape, it is filled with sand and mudbrick fragments.
010	Pit	N6	004	-	-	-	W. 002	40	30	20	429.06	429.04	-	Shallow pit dug into W. 002. Circular in shape.
011	Floor	N6	003	008	-	003 008	W. 001	-	ca. 100	-	428.06	428.06	melted mudbrick/ hardened sand	In the NE quarter of Sounding 1, along W. 001 on a width of 1 m, circulation level made of hardened sand with melted mudbrick. Bones horizontally laid.
012	Pit	N6	004	-	009	009	W. 002	50	50	30	428.76	428.27	-	Burrow or hole dug by water/erosion into W. 002, along its northern face. It is filled with sand and contains large bones (skull, scapula, mandible of camel).
013	Room	N6	001		001 004 006 007 011 013 014 016 019 022 023 026 027 030 034 036 037 038 ...		W. 002 W. 003 Co. 004 Co. 005 W. 006 P. 007 F. 014 F. 015 Co. 016 to Co. 033 W. 037 Ni 047 Ni 048 Ni 049 Co. 053 Co. 054 Co. 055 ...	2650 [26.5 m]	Up to 250 [2.5 m]	1200 [12 m]	430.81	428.32	-	Large pillared room with 3 ranks of 10 columns in mudbrick. Limited to the north by W. 002, to the west by W. 006 and to the south by W. 043. A square recess (mihrab) is built in the middle of the western wall. At the basis: floor made of plaster (F 015). Accumulation of 20 cm of sand hardened on the top and showing imprint of palm tree leaf mat (F 014). It was the prayer room of a mosque.

NO	TYPE	AREA	UNDER U/F	ABOVE U/F	CONSTITUTIVE U/F	AGAINST U/F	CONNECTED TO	LENGTH (CM)	WIDTH/DIAMETER (CM)	HEIGHT (CM)	UPPER ALT.	LOWER ALT.	MATERIAL	DESCRIPTION
014	Floor	N6	011	013	... 040 042 043 047	011 013	... W. 056 W. 057 W. 058 W. 059 Co. 060 Co. 061 W. 062 Ni 064 Co. 075 Co. 076 Co. 077 W. 078 W. 079 W. 080 W. 081	1200	0.2	220	428.52	428.49	hardened sand	Floor made of sand hardened by water (cracks due to the drying up of water) and showing the imprint of a mat made of palm-tree leaves: imprint in a herringbone pattern bordered by longitudinal imprints oriented north-south. The imprint of a foot is also visible This floor is only preserved between the western row of columns in R. 013 and wall W. 006.
015	Floor	N6	013	-	-	013 019	R. 013 W. 002 W. 006 Co. 004 Co. 005 Co. 016 Co. 017 Co. 018	> 1320 [13.2 m]	2	> 500 [5 m]	428.31/ 428.46	428.30 to 428.45	plaster	Floor made of a thick and hard layer of plaster abutting against W. 002 and W. 006 but going under the basis of columns Co. 004, 005, 016-018. A 14C analysis on charcoals sampled within this floor gave the 7th-9th cent. AD.

NO	TYPE	AREA	UNDER UF	ABOVE UF	CONSTITUTIVE UF	AGAINST UF	CONNECTED TO	LENGTH (CM)	WIDTH/DIA-METER (CM)	HEIGHT (CM)	UPPER ALT.	LOWER ALT.	MATERIAL	DESCRIPTION
016	Column	N6	001	-	-	022 023 026 030	R. 013 F. 014 F. 015	-	ca 106	ca 150	429.85	428.35	mudbrick	Located in the western row of columns of Building 1, west of R. 013, north of Co. 017, and south of Co. 005. Column with a circular section, built with triangular mudbricks. Enlarged at the basis (truncated cone profile).
017	Column	N6	001	-	-	022 023 026 030	R. 013 F. 014 F. 015	-	ca 100	ca 160	430.05	428.45	mudbrick	Located in the western row of columns of Building 1, west of R. 013, north of Co. 018, and south of Co. 016. Column with a circular section, built with triangular mudbricks. Enlarged at the basis (truncated cone profile).
018	Column	N6	001	-	-	022 023 026 030	R. 013 F. 014 F. 015	-	ca 100	ca 170	430.13	428.46	mudbrick	Located in the western row of columns of Building 1, west of R. 013, north of Co. 019, and south of Co. 017. Column with a circular section, built with triangular mudbricks. Enlarged at the basis (truncated cone profile).
019	Column	N6	001	-	-	022 023 036 042 043	R. 013	-	ca 92	-	430.35	-	mudbrick	Located in the western row of columns of Building 1, west of R. 013, north of Co. 020, and south of Co. 018. Column with a circular section, built with triangular mudbricks. Enlarged at the basis (truncated cone profile). The upper part is eroded.
020	Column	N6	001	-	-	022 023 036 042 043	R. 013	-	92	-	430.52	-	mudbrick	Located in the western row of columns of Building 1, west of R. 013, north of Co. 021, and south Co. 019. Column with a circular section. The upper part is well preserved. Few fragments of plaster on the top.
021	Column	N6	001	-	-	022 023 036 042 043	R. 013	-	97	-	430.66	-	mudbrick	Located in the western row of columns of Building 1, west of R. 013, north of Co. 022, and south Co. 020. Column with a circular section. The upper part is well preserved; the mud coating is still untouched. Pottery sherds inserted between mudbricks. Few fragments of plaster.
022	Column	N6	001	-	-	022 023 036 042 043	R. 013	-	95	> 120	430.75	-	mudbrick	Located in the western row of columns of Building 1, west of R. 013, north of Co. 023, and south Co. 021. Column with a circular section. The upper part is well preserved. The mud coating is still preserved. 12 courses of mudbrick are visible (incomplete unearthing). Few fragments of plaster within mudbricks.

NO	TYPE	AREA	UNDER U/F	ABOVE U/F	CONSTITUTIVE U/F	AGAINST U/F	CONNECTED TO	LENGTH (CM)	WIDTH/DIA-METER (CM)	HEIGHT (CM)	UPPER ALT.	LOWER ALT.	MATERIAL	DESCRIPTION
023	Column	N6	001	-	-	022 023 036 042 043	R. 013	-	100	-	430.82	-	mudbrick	Located in the western row of columns of Building 1, west of R. 013, north of W. 034, and south Co. 022. Column with a circular section. A low wall is linking this column to W. 034. Well preserved with its original mud coating. Few fragments of plaster, one sherd and a sheep scapula in the masonry. This column looks different by the size of the mudbricks : 26 x 40 cm, bigger than in the previous columns of this row.
024	Column	N6	001	-	-	022 023 040 043	R. 013	-	97	-	430.76	-	mudbrick, stones	Located in the central row of columns of Building 1, in R. 013, north of W. 035, and south Co. 025. Column with a circular section. A low wall is linking this column to W. 035. Well preserved with its original mud coating. Few fragments of plaster in the masonry. At mid-height, this column was eroded and repaired by fixing small stones in the mudbrick masonry. Coating was done anew on the upper part.
025	Column	N6	001	-	-	022 023 040 043	R. 013	-	99	-	430.36	-	mudbrick	Located in the central row of columns of Building 1, in R. 013, north of Co. 024, and south Co. 026. Column with a circular section. Well preserved with its original mud coating. Few fragments of plaster in the masonry. At mid-height, this column was eroded and repaired by fixing small stones in the mudbrick masonry. Coating was done anew on the upper part.
026	Column	N6	001	-	-	022 023 040 043	R. 013	-	-	> 100	430.48	-	mudbrick, stones	Located in the central row of columns of Building 1, in R. 013, north of Co. 025, and south Co. 027. Column with a circular section. Well preserved with its original mud coating preserved on one half of the column. Few fragments of plaster in the masonry. At mid-height, this column was eroded and repaired by fixing small stones in the mudbrick masonry. Coating was done anew on the upper part.
027	Column	N6	001	-	-	022 023 040 043	R. 013	-	-	> 100	430.42	-	mudbrick, stones	Located in the central row of columns of Building 1, in R. 013, north of Co. 026, and south Co. 028. Column with a circular section. Few fragments of plaster in the masonry. At mid-height, this column was eroded and repaired by fixing small stones in the mudbrick masonry. Coating was done anew on the upper part.

NO	TYPE	AREA	UNDER UJ	ABOVE UJ	CONSTITUTIVE UJ	AGAINST UJ	CONNECTED TO	LENGTH (CM)	WIDTH/DIA-METER (CM)	HEIGHT (CM)	UPPER ALT.	LOWER ALT.	MATERIAL	DESCRIPTION
028	Column	N6	001	-	-	022 023 040 043	R. 013	-	100	> 100	430.29	-	mudbrick	Located in the central row of columns of Building 1, in R. 013, north of Co. 027, and south Co. 029. Column with a circular section. At mid-height, this column was eroded and repaired by fixing small stones in the mudbrick masonry. Coating was done anew on the upper part.
029	Column	N6	001	-	-	022 023 026 030	R. 013 F. 015	-	107	184	430.36	428.52	mudbrick	Located on the northern area of Building 1, in the central row of columns, north of Co. 028 and south of Co. 030. This column is partly hidden within the stratigraphic bench crossing Building 1 from north to south.
030	Column	N6	001	-	-	022 023 026 030	R. 013 F. 015	-	85	177	430.31	428.54	mudbrick	Located on the northern area of Building 1, in the central row of columns, north of Co. 029 and south of Co. 031. This column is partly hidden within the stratigraphic bench crossing Building 1 from north to south. This column is eroded in its upper part and has been restored (mushroom shape).
031	Column	N6	001	-	-	022 023 026 030	R. 013 F. 015	-	-	170	430.12	428.42	mudbrick	Located on the northern area of Building 1, in the central row of columns, north of Co. 030 and south of Co. 032. This column is almost completely hidden within the stratigraphic bench crossing Building 1 from north to south. Only its widened foot and the circular upper face are visible respectively in the bench section and on the surface of the bench.
032	Column	N6	001	-	-	-	R. 013	-	-	-	-	-	mudbrick	We postulate the existence of this column in the northern part of R. 013 (Building 1), in the central row of columns, north of Co. 031 and south of Co. 033. This column is completely hidden within the stratigraphic bench crossing Building 1 from north to south.
033	Column	N6	001	-	-	034	R. 013	-	-	-	-	-	mudbrick	Located in the northern area of R. 013 (Building 1), northern column of the central row of columns, north of Co. 032. This column is partly hidden within the stratigraphic bench crossing Building 1 from north to south, east of it.
034	Wall	N6		-	-	-	W. 043	80	66	-	430.84	-	mudbrick	Located on the south-western part of Building 1. This wall is abutting W. 043. Well preserved. On the eastern corner, a pottery sherd is taken in the masonry.

NO	TYPE	AREA	UNDER UF	ABOVE UF	CONSTITUTIVE UF	AGAINST UF	CONNECTED TO	LENGTH (CM)	WIDTH/DIA-METER (CM)	HEIGHT (CM)	UPPER ALT.	LOWER ALT.	MATERIAL	DESCRIPTION
035	Wall	N6		-	-	-	W. 043	82	82	-	430.76	-	mudbrick	Located on the southern part of Building 1. Tied with wall 043. Well preserved on its upper part, slightly eroded on its western corner. Few fragments of plaster.
036	Wall	N6		-	-	-	W. 043	80	68	-	430.37	-	mudbrick	Located on the southern part of Building 1. Abutting against W. 043. Buttress with an eroded upper surface. Few fragments of plaster.
037	Wall	N6	001	-	-	034	W. 056 R. 013	148	80	-	430.40	-	mudbrick	Located on the southern part of Building 1, south-east of R. 013, north of W. 036, south of W. 056, east of Co. 024. W. 056 is abutting against it to the north. Rectangular pillar in mud(brick?), eroded by wind and sand. It belongs to the eastern row of columns and pillars separating the prayer room from the courtyard.
038	Pit	N6	004	-	024	024	W. 006 W. 002	-	60	60	428.10	427.70	-	This pit is dug into the mudbrick wall W. 006; it could be the consequence of water infiltration, or the recycling of the building material for other purpose. Another possibility would be a burrow (less convincing because no claw marks). It is filled up with sand and mudbricks.
039	Floor	N6	023	026	-	023 026	W. 006 Co. 019 Co. 28	-	-	-	429.27 to 429.37	429.37	nodules of mud-brick and hard sand	Late circulation level in R. 013 above sand deposit and under sand accumulation.
040	Pit	N6	022	-	025	022 023 026	W. 006 W. 044 F. 039 F. 014 F. 015	160	140	140	429.78	428.34	-	Within the mihrab, the pit P. 040 has been dug through W. 004 and W. 006, the inner part of the mihrab and F. 039. It is filled with loose yellow sand (30–40 cm) and then, with sand and fragments of mudbricks, some of these being slightly burnt. W. 006 is cut to the north of the mihrab, maybe due to mudbrick recycling. Numerous imprints of a large tool (spade) on the northern side of the pit and at the bottom. Concentration of ashes to the north-west of the pit. The pit is going down through F. 014, F. 046 and F. 015.

NO	TYPE	AREA	UNDER UF	ABOVE UF	CONSTITUTIVE UF	AGAINST UF	CONNECTED TO	LENGTH (CM)	WIDTH/DIAMETER (CM)	HEIGHT (CM)	UPPER ALT.	LOWER ALT.	MATERIAL	DESCRIPTION
041	Pit	N6	001	-	028	-	W. 006	166	55	75	429.78	429.06	-	Between two buttresses of W. 006, the western side of W. 006 and the eastern side of W. xxx, ca. 2 m to the north-west of the mihrāb, empty space filled with mudbrick fragments, nodules and sand over 10 to 20 cm. Under it, thick layer of dark grey ashes and charcoals in slope, covering a layer of brown sand, partly mixed with ashes. Filling removed over ca. 50–60 cm.
042	Wall	N6	surf.	-	-	022 023 026 040	W. 006 W. 034 W. 035 W. 036 W. 142	1300 [13 m]	80	-	430.18 to 430.60	-	mudbrick	Identical to W. 043.
043	Wall	N6	surf.	-	-	022 023 026 040	W. 006 W. 034 W. 035 W. 036 W. 142	1300 [13 m]	80	-	430.18 to 430.60	-	mudbrick	Southern wall of R. 013 and Building 1. It is either made of 2 mudbricks in width or of two walls abutting each other, each one being one brick in width. In this case, close to the buttress W. 036, these two abutted walls are merging into a single one.
044	Wall	N6	001	-	-	025 029	W. 006 F. 046 F. 039	130	38	75	429.7	428.95	mud	Small wall west of R. 013, abutting the northern and the southern part of W. 006, closing the mihrāb to the west in the latest phase of occupation of Building 1 after the mihrāb was opened onto the outside. This small wall is lying on a sand layer.
046	Floor	N6	026	026	-	026	W. 006 Co. 019 Co. 23	-	-	1 to 2	428.87 to 429.09	428.86 to 429.08	nodules of mud-brick, hard sand	Late circulation level (a little earlier than F. 039) in R. 013 above sand deposit and under sand accumulation. Hardened floor made of grey sand only preserved in the western nave of R. 013.
047	Niche	N6	027	-	027	027	W. 006 R. 013	40	23	13	429.69	429.56	-	Small niche only preserved in its lower part, in the eastern face of W. 006 (inner face, opening onto R. 013), north of the mihrāb. It is similar to two other niches in the same wall, Ni. 048 and 064 and it should have been triangular as them.

NO	TYPE	AREA	UNDER UF	ABOVE UF	CONSTITUTIVE UF	AGAINST UF	CONNECTED TO	LENGTH (CM)	WIDTH/DIAMETER (CM)	HEIGHT (CM)	UPPER ALT.	LOWER ALT.	MATERIAL	DESCRIPTION
048	Niche	N6	022	026	023	023	W. 006 R. 013	40	29	42	429.9	429.48	-	Small niche completely preserved, in the eastern face of W. 006 (inner face, opening onto R. 013), ca. 105 cm south of the mihrāb. It is similar to two other niches in the same wall, Ni 047 and 064. It has a triangular shape.
049	Niche	N6	023 036	-	023 036	-	W. 006 R. 013 F. 039	118	100	100	430.37	429.37	-	Large niche set within the southern part of W. 006, opening onto R. 013 to the east. It is cut off from the outside by W. 050 to the west. It has been partially unearthed, down to the floor F. 039.
050	Wall	N6	001	-	-	023 036 033	W. 006 Ni 049 F. 039	88	24	100	430.18	429.18	mudbrick	In the south-western part of R. 013, where W. 006 is interrupted by Ni 049. Small wall closing Ni 049 to the west. It has been partially unearthed, down to the floor F. 039. It is abutting against W. 006 to the north and to the south. This small wall seems to be of a late addition.
051	Wall	N6	001	023	-	023 026	W. 006 W. 043	75	67	15	430.33	430.18	mudbrick	In the south-western corner of R. 013, W. 006 is only preserved on its lower part. Above it, a sand layer corresponding to a possible opening is closed by a late and small wall: W. 051. This wall makes a junction between the upper part of W. 006 to the north and W. 043 to the south. It is only preserved on one course high.
052	Wall	N6	053	056	056	-	-	130	> 40	45	426.86	426.40	mudbrick	Northern part of Sounding 1, protruding from the southern bench. Irregular block of mudbrick, filling a pit dug in the sand. It could have been an approximate round base, or the corner or extremity of a structure. Three layers of fragments of mudbricks seem to form the block, but in a very irregular manner. Possibly the foundation of some construction.
053	Column	N6	001	-	-	034	W. 057 W. 058 R. 013	-	ca 83	> 86	430.09	-	mudbrick	Located in the eastern row of columns of Building 1. Partly eroded, the courses of mudbricks are not clearly visible. In a late phase of occupation of R. 013, small mudbrick walls were built against the column: W. 057 to the south (between the pillar W. 062 and Co. 053) and W. 058 to the north (between Co. 053 and Co. 054).
054	Column	N6	001	-	-	034	W. 059 W. 058 R. 013	-	ca 90	> 70	429.98	-	mudbrick	Located in the eastern row of columns of Building 1. Partly eroded, the courses of mudbricks are not clearly visible. In a late phase of occupation of R. 013, small mudbrick walls were built against the column: W. 058 to the south (between the column Co. 053 and Co. 054) and W. 059 to the north (between Co. 054 and Co. 055).

NO	TYPE	AREA	UNDER UF	ABOVE UF	CONSTITUTIVE UF	AGAINST UF	CONNECTED TO	LENGTH (CM)	WIDTH/DIA-METER (CM)	HEIGHT (CM)	UPPER ALT.	LOWER ALT.	MATERIAL	DESCRIPTION
055	Column	N6	001	-	-	034	W. 059 R. 013	-	ca 99	> 58	429.84	-	mudbrick	Located in the eastern row of columns of Building 1. Partly eroded, the courses of mudbricks are not clearly visible. In a late phase of occupation of R. 013, a small mudbrick wall (W. 059) was built against the column, to the south, to close the space between it and the column Co. 054.
056	Wall	N6	001	-	-	034 038	R. 013 W. 037 W. 062	83	24	> 85	430.16 to 430.27	-	mud or mudbrick	Located in the eastern row of columns of Building 1. Small mud(brick?) wall built against the pillars W. 037 (to the south) and W. 062 (to the north), which closed the space between these pillars. This wall is higher than other mudbrick walls closing the spaces between columns in the eastern row of columns and might have been built in an earlier phase than the other ones.
057	Wall	N6	001	-	-	034 038	R. 013 Co. 053 W. 062	125	24	84	430.11 to 430.17	429.33	mudbrick	Located in the eastern row of columns of Building 1. Small mudbrick wall built against the pillar W. 062 (to the south) and Co. 053 (to the north), closing the space between the pillar and the column. The basis of the wall widens. As W. 056, this wall is higher than other mudbrick walls closing the spaces between columns in the eastern row of columns; it might have been built in an earlier phase than the other ones. It is founded on sand.
058	Wall	N6	001	-	-	034 038	R. 013 Co. 053 Co. 054	154	44	40	429.85 to 429.93	429.53	mudbrick	Located in the eastern row of columns of Building 1. Small mudbrick wall built against the columns Co. 053 (to the south) and Co. 054 (to the north), closing the space between the columns. The wall is founded at a higher altitude than the columns on which it abuts. It lies on a layer of sand; it has been built in a later phase of occupation of R. 013.
059	Wall	N6	001	-	-	034 038	R. 013 Co. 055 Co. 054	132	40	26	429.81	429.55	mud or mudbrick	Located in the eastern row of columns of Building 1. Small mudbrick wall built against the columns Co. 054 (to the south) and Co. 055 (to the north), closing the space between the columns. As W. 058, the wall is founded at a higher altitude than the columns on which it abuts. It lies on a layer of sand; it has been built in a later phase of occupation of R. 013.

NO	TYPE	AREA	UNDER UJ	ABOVE UJ	CONSTITUTIVE UJ	AGAINST UJ	CONNECTED TO	LENGTH (CM)	WIDTH/DIA-METER (CM)	HEIGHT (CM)	UPPER ALT.	LOWER ALT.	MATERIAL	DESCRIPTION
060	Column	N6	001	-	-	034 038	R. 013	-	ca 105	> 55	429.78	-	mudbrick	Located in the eastern row of columns of Building 1, north of Co. 055 and south of Co. 061. Badly eroded on the top (mushroom profile).
061	Column	N6	001	-	-	034 038	R. 013	-	< 120	> 95	429.63	-	mudbrick, stones	Located in the eastern row of columns of Building 1, north of Co. 060 and south of Co. 075. Badly eroded on the top (mushroom profile). Repairs with stones in the upper part.
062	Wall	N6	001	-	-	034 038	W. 056 W. 057 R. 013	140	80	> 95	430.15	-	mudbrick	Located in the eastern row of columns/pillars of Building 1, south-east of R. 013, north of W. 037 and W. 056, south of W. 057 and Co. 053, east of Co. 025. Tied with W. 056 to the south and W. 057 to the north. Rectangular pillar in mudbrick.
063	Wall	N6	001	-	-	033	W. 006 F. 065 F. 066	> 130	ca 60	37	?	?	mudbrick	West of Building 1 and west of W. 006. Perpendicular to W. 006 and abutting it; turned east-west. Partially unearthened, on the top and on its northern face. Badly eroded on the top, following a westward slope. Two courses of mudbricks have been seen. Two floors abut on it, F. 065 and F. 066, both being circulation level outside the mosque (Building 1).
064	Niche	N6	023	036	036	036	W. 006 R. 013	37	22	33	429.73	429.4	-	Small niche fully preserved, in the eastern face of W. 006 (inner face, opening onto R. 013), ca. 210 cm north of Ni. 049. It has a triangular shape and is similar to the other niches Ni. 047 and Ni. 048 in the same wall.
065	Floor	N6	033 044	045	-	033 044 045	W. 006 W. 063	-	-	1	428.66 to 428.79	428.65 to 428.78	hardened clay and sand	West and outside of Building 1; west of W. 006, north of W. 063. F. 065 is a circulation level made of compact clay and sand hardened by passing and stamping. This floor is contemporary to F. 014 (in Building 1) and contemporary to the opening of the mihrab toward west before sand accumulated in it and W. 044 was built.
066	Floor	N6	033	-	-	033	W. 006 W. 063	-	-	1	429.02 to 429.06	429.01 to 429.05	hardened clay and sand	West and outside of Building 1 and west of W. 006, south of wall 063. F. 066 is a circulation level made of compact clay and sand hardened by passing and stamping. This floor could be contemporary to F. 065 inside the Building 1.

NO	TYPE	AREA	UNDER UJ	ABOVE UJ	CONSTITUTIVE UJ	AGAINST UJ	CONNECTED TO	LENGTH (CM)	WIDTH/DIAMETER (CM)	HEIGHT (CM)	UPPER ALT.	LOWER ALT.	MATERIAL	DESCRIPTION
067	Wall	N6	001	-	-	033	W. 006 W. 043 F. 066	> 300	65 to 80	-	429.96	-	mudbrick	South-west of Building 1. Wall 067 is anchored on the south-western corner of Building 1, tied (?) with W. 043; W. 067. It is oriented north-east-south-west. It has been partially unearthed, on the top and on both faces. It sinks under ground level to the south-west, beyond the limits of the excavated area. Bricks are visible on the top: 2 rows of mud-bricks on both edges and half a brick in between. The floor F. 066, a circulation level outside Building 1, abuts on it.
068	Hearth	G17	202	-	204	203	-	138	> 100	> 100	422.40	421.42	plaster/ clay	Sounding 3 – Kiln. Trapezoidal in plan. Lined by a 4–5 cm thick plaster, built against a massive mud layer filling a pit previously dug into an anthropic rubble deposit. The plaster lining the chamber is heavily burnt, together with the mud (reddish) on the backside of it, almost 8 cm deep. The chamber was filled in the upper part by loose sand, and down progressively with small irregular blocks of mud (fragments of the vault?) forming a compact layer cemented by the salinization due to the irrigation into the farm in modern times. Under this filling, a floor made of yellow clay, well levigated, nearly 10 cm thick, separates the upper chamber from the combustion chamber. This was revealed by a pit in the floor opening to an empty space partially filled by loose sand progressively infiltrated.
069	Hearth	G17	202	-	206	-	-	> 75	-	> 30	422.57	422.30	plaster/ clay	Sounding 3 – Kiln. Excavation of a narrow strip at its southern extremity. Lined by a 4–5 cm thick plaster, heavily burnt, together with the mud layer on the back side of it (reddish). The chamber was filled by a very compacted layer of mud and plaster fragments. Along the eastern side of the internal chamber, a clay floor was preserved. To the west, the limit is not clear, as the plaster is not preserved, but the deeply burnt layer of mud lines the structure.

NO	TYPE	AREA	UNDER UJ	ABOVE UJ	CONSTITUTIVE UJ	AGAINST UJ	CONNECTED TO	LENGTH (CM)	WIDTH/DIA-METER (CM)	HEIGHT (CM)	UPPER ALT.	LOWER ALT.	MATERIAL	DESCRIPTION
070	Room	G17	202	-	205	-	W.072 W.073 W.074	210	> 100	> 50	422.59	422.11	-	Sounding 3 – Room, limited by walls W.072 to the north, W.073 to the east and W.074 to the west. To the west and the east, the limits of the walls appear clearly, due to the difference of sediment, but only W.073 has a regular face. To the north, W.072 was well lined near the corner but not to the east where the limit seems to correspond to a pit, the layer at the base forming a concavity. Against W.073 a loose fire place related with heavy burning traces on the wall. To the west, a layer of white plaster forms a circular area, coming up against walls W.072 and W.074.
071	Room?	G17	201	-	202	-	W.073	220	> 100	40	422.62	422.19	-	Sounding 3 – This area has not been clearly delimited. It corresponds to a space between the western face of the so-called W.073 and a limit oriented NW–SE observed in the mud at the eastern extremity of the trench. But none of these limits were confirmed as no faces of walls could be found. The filling of the area is of a very dense sediment comparable to mudbrick, mixed with some white gypsum irregular blocks.
072	Wall	G17	201	-	-	205	W.074 R.070	ca. 130	22	-	422.62	422.19	mud or mudbrick	Sounding 3 – Brown mud. Irregular face to the south and a rounded limit to the east.
073	Wall	G17	202	-	-	205 202	R.070	> 115	?	> 50	422.62	422.11	mud or mudbrick	Sounding 3 – Wall? or just the face of a pit (in R. 070). The west face is clearly visible, lined by the difference of sediment of the so-called wall W.073 and the ashy filling of the room R.070. But no face was found to the east, nor any limit in the ground.
074	Wall	G17	202	-	-	205 202	W.072 H.069 R.070	> 80	24	> 20	422.59	422.40	mud or mudbrick	Sounding 3 – North–south wall closing R. 070 to the west. The two faces were lined by the differences of sediments, but no faces of plaster or bricks were clearly found. No brick limits can be seen in the ground.
075	Column	N6	001	-	-	034 038	R. 013	-	< 120	> 90	429.69	-	mudbrick	Located in the eastern row of columns of Building 1, east of R. 013, north of Co. 061 and south of Co. 076 and W. 080. Badly eroded on the top (mushroom profile). Several phases of restoration are visible, in the shape of superimposed "mushroom annulus". With the last one of these restorations, a small wall W. 080 has been built between this column and Co. 076, abutting them both.

NO	TYPE	AREA	UNDER UF	ABOVE UF	CONSTITUTIVE UF	AGAINST UF	CONNECTED TO	LENGTH (CM)	WIDTH/DIA-METER (CM)	HEIGHT (CM)	UPPER ALT.	LOWER ALT.	MATERIAL	DESCRIPTION
076	Column	N6	001	-	-	034 038	R. 013	-	< 120	> 92	429.76	-	mudbrick	Located in the eastern row of columns of Building 1, east of R. 013, north of Co. 075 and W. 080, and south of Co. 077. Badly eroded on the top (mushroom profile). Several phases of restoration are visible, in the shape of superimposed "mushroom annulus". The last one of these restorations is accompanied by the building of a small wall W. 080 between this column and Co. 075, abutting them both.
077	Column	N6	001	-	-	034 038	R. 013	-	< 110	> 80	429.61	-	mudbrick	Located in the eastern row of columns of Building 1, east of R. 013, north of Co. 076 and W. 080, and south of buttress W. 078. Badly eroded on the top (mushroom profile). A rectangular appendix is built against this column, east of it, ca. 60 x 46 cm.
078	Wall	N6	001	-	-	034 038	R. 013 W. 002	50	?	> 50	429.32	-	mudbrick	Located north of the eastern row of columns of Building 1, north-east of R. 013, north of Co. 077, against W. 002, on its southern side. Badly eroded buttress tied with W. 002, similar to W. 003 and W. 079.
079	Wall	N6	001	-	-	034 038	R. 013 W. 002	30	?	> 42	429.21	-	mudbrick	Located north of the central row of columns of Building 1, north of R. 013, north of Co. 033, against W. 002, on its southern side. Rectangular buttress tied with W. 002, similar to W. 003 and W. 078.
080	Wall	N6	001	038	-	034	R. 013 Co. 075 Co. 076	130	34	24	429.51	429.27	mudbrick	Located in the eastern row of columns of Building 1. Small mudbrick wall built against the columns Co. 075 (to the south) and Co. 076 (to the north), closing the space between the columns. As W. 058, the basis of this wall is higher than that of the columns on which it abuts. The wall lies on a layer of sand; it has been built in a later phase of occupation of R. 013.
081	Wall	N6	034	-	-	034	R. 013 W. 037 W. 036	105	-	-	?	-	mudbrick	Located in the eastern row of columns of Building 1. Possibly a threshold built between buttress W. 036 (to the south) and pillar W. 037 (to the north). Only unearthed on the upper face and partly buried under the bench which cross Building 1 from north to south.

NO	TYPE	AREA	UNDER UJ	ABOVE UJ	CONSTITUTIVE UJ	AGAINST UJ	CONNECTED TO	LENGTH (CM)	WIDTH/DIAMETER (CM)	HEIGHT (CM)	UPPER ALT.	LOWER ALT.	MATERIAL	DESCRIPTION
082	Column	N6	001	-	-	034	-	-	48	> 22	429.03	-	mudbrick	Located in the north western corner of the courtyard east of R. 013, 2 m east of Co. 077. Small column built in mudbrick, partially uncovered in the eastern part of the excavated area. Half of this column is hidden in the bench. It could be the first column of a portico running along the northern side of the courtyard. This small column is only preserved on its lower part.
083	Floor	N6	045	048 046	-	045 048 046	W. 006	-	-	2	428.52 to 428.54	428.50 to 428.52	hardened earth/sand	West of W. 006, in a small sounding dug behind the mihrab, F. 083 is a circulation level outside the mosque abutting on W. 006, over the remains of W. 084. It is made of compact clay and sand hardened by passing and stamping.
084	Wall	N6	044 045	-	-	046 048	W. 006	150	60	> 30	428.52	-	mudbrick	West of Building 1 and west of W. 006, wall 084 is perpendicular to W. 006 and abutting it; W. 084 is turned east-west. It is only preserved on three courses high and stops 150 cm west of W. 006 without being link to any visible structure. It could have been levelled when the mihrab of Building 1 was opened looking west. It is not possible to say whether it belong to an older phase of Building 1 (protruding wall of a former mihrāb) or to a structure built against Building 1.
100	Wall	O7	100	-	-	100 101 102	W. 101 W. 103	1050 [10.5 m]	36	-	429.43	-	mudbrick	Building 2 – Long wall, NNE-SSW. Eastern wall of R. 108, R. 110 & R. 112. Mud coating visible between walls 100 and 101. Hole in the corner with W. 101 (burrow).
101	Wall	O7	100	-	-	100 101 102	W. 100 W. 102	155	47	-	429.56	-	mudbrick	Building 2 – Southern wall of R. 108 and northern wall of R. 110. Irregular mudbricks. Mud coating visible.
102	Wall	O7	100	103	-	100 101 102	W. 104 W. 101	200	30	117	429.37	428.20	mudbrick	Building 2 – Western wall of R. 108 and eastern wall of R. 109. Mud coating on the wall. Presence of bones, charcoal and straw. Small mudbricks (about 20 x 30 x 12 cm). This wall is abutting W. 101 & W. 104, it is founded at a higher altitude and it has been built later on, to make a separation between rooms 108 and 109. Built on sand without foundation nor care.

NO	TYPE	AREA	UNDER UF	ABOVE UF	CONSTITUTIVE UF	AGAINST UF	CONNECTED TO	LENGTH (CM)	WIDTH/DIA-METER (CM)	HEIGHT (CM)	UPPER ALT.	LOWER ALT.	MATERIAL	DESCRIPTION
103	Wall	O7	100	-	-	100 101 102	W. 100	98	36	-	429.41	-	mudbrick	Building 2 – Northern wall of R. 108 and southern wall of R. 112. In its upper part, this wall is separated of W. 104 by A. 111. In its lower part, under the base of A. 111, this wall is identical to W. 104. They belong to a single structure that has been cut when A. 111 was set up, during the late occupation of Building 2.
104	Wall	O7	100	-	-	100 101 102	W. 102	52	38	-	429.00	-	mudbrick	Building 2 – Northern wall of R. 108 and southern wall of R. 112, connected with W. 103 by A. 111. In its upper part, this wall is cut off from W. 103 by A. 111. In its lower part, under the base of A. 111, this wall is identical to W. 103. They belong to a single structure that has been cut when A. 111 was set up, during the late occupation of Building 2.
105	Wall	O7	100	-	-	100 101 102	W. 107	195	39	-	429.45 to 429.30	-	mudbrick	Building 2 – Northern wall of R. 109 and southern wall of R. 112. Independent wall, not tied with W. 107. Mud coating on both faces.
106	Wall	O7	100	-	-	100 101 102	W. 107	86	40	-	429.59	-	mudbrick	Building 2 – Southern wall of R. 109 and northern wall of R. 110. Thick plaster coat on the wall (3–4 cm) on both sides of the junction with W. 107.
107	Wall	O7	100	-	-	100 101 102	W. 105 W. 106	412	39 to 45	-	429.51	-	mudbrick	Building 2 – Eastern wall of R. 113 and western wall of R. 109 & R. 110. Mud coating on the wall. On the west side, the coating also covers the junction with W. 117.
108	Room	O7	100	-	100 101 102 103	-	W. 100- W. 101 W. 102 W. 103 W. 104	208	160	-	428.96	427.95	-	Building 2 – Limited by W. 100 (E), W. 102 (W), W. 101 (S) and W. 103/W. 104 (N). Access by A. 111, to the north, between W. 103 & W. 104. Connected with R. 112 by the door A. 111.
109	Room	O7	100	-	100 101 102 103	-	W. 102 W. 105 W. 106 W. 107	280	202	-	428.83	428.22	-	Building 2 – Limited by W. 102 (E), W. 107 (W), W. 106 (S) and W. 105 (N). Connected with R. 112 to the north through the door A. 111 and to R. 110 to the south.
110	Room	O7	100	-	-	-	W. 100 W. 101 W. 106 W. 107	420	170	-	429.5	-	-	Building 2 – Limited by W. 100 (east), W. 107 (west), walls 106 and 101 (north), W. 120 (south). Connected with R. 109 to the north.

NO	TYPE	AREA	UNDER UF	ABOVE UF	CONSTITUTIVE UF	AGAINST UF	CONNECTED TO	LENGTH (CM)	WIDTH/DIA-METER (CM)	HEIGHT (CM)	UPPER ALT.	LOWER ALT.	MATERIAL	DESCRIPTION
111	Access	O7	100	-	100	-	W. 103 W. 104 R. 112 R. 108	63	35	-	429.00	-	-	Building 2 – Linking R. 112 to R. 108, this access has been set up during the last phase of occupation of Building 2. It is dug into the wall W. 103/W. 104. On the threshold, in its centre, a hole has been dug, with the shape of a foot. It could have been a step dug to make the access to R. 108 easier.
112	Room	O7	100	-	-	-	W. 100 W. 103 W. 104 W. 105 A. 111 A. 115	1100 [11 m]	530	-	429.00	-	-	Building 2 – Courtyard connected with R. 108 by A. 111, and connected with R. 109 by A. 115. Limited by walls 100 (east), 103,104,105, 117 (south), 130, 131, 129, 128 (north), 124 (west). The main entrance of this open space is located on the south-western (A. 137).
113	Room	O7	100	-	-	-	W. 105 W. 107	420	210	-	429.50	-	-	Building 2 – Delimited by W. 105 (north), 107 (east), W. 120 (south), W. 118 and W. 119 (west) and A. 121 to the south-west.
114	Hearth	O7	101	-	102	-	W. 100 W. 101	-	42	80	428.44	428.02	mud or mudbrick	Building 2 – Located in R. 108 at the corner made by W. 100 and W. 101. It is built with mud in a cylindrical shape; the upper part has the shape of a truncated cone. It is open on the top and filled up with sand mixed with ashes, bones and sherds (UF 102). Stepped bottom
115	Access	O7	100	-	-	-	R. 112 R. 109 W. 104 W. 105	100	38	-	429.30	-	-	Building 2 – Giving access to R. 112 & R. 109 and bordered by W. 104 & W. 105.
116	Hearth	O7	101	-	102	-	R. 109	-	28	15	428.27	428.12	-	Building 2 – Located in R. 109. Circular hole dug into the ground floor of the room. It was filled up with ashes and charcoals.
117	Wall	O7	Surf.	-	-	-	W. 105 W. 118 W. 107	320	40	-	429.44	-	mudbrick	Building 2 – Northern wall of R. 113. Tied with W. 107.
118	Wall	O7	Surf.	-	-	-	W. 117 A. 121	150	40	-	429.58	-	mudbrick	Building 2 - North-western wall of R. 113, close to A. 121 (south-western entrance of R. 136). Oriented north-south.
119	Wall	O7	Surf.	-	-	-	W. 120 A. 121	165	47	-	429.69	-	mudbrick	Building 2 - South-western wall of R. 113, close to A. 121. Oriented north-south.

NO	TYPE	AREA	UNDER U/F	ABOVE U/F	CONSTITUTIVE U/F	AGAINST U/F	CONNECTED TO	LENGTH (CM)	WIDTH/DIAMETER (CM)	HEIGHT (CM)	UPPER ALT.	LOWER ALT.	MATERIAL	DESCRIPTION
120	Wall	O7	Surf.	-	-	-	W. 119 W. 107 W. 100	760	40	-	429.60	-	mudbrick	Building 2 – Southern wall of R. 113 and R. 110. Oriented east–west.
121	Access	O7	Surf.	-	-	-		100	50	-	429.53	-	-	Building 2 – Between W. 118 and W. 119, this access is located on the western part of R. 113. Entrance of R. 113 and R. 136.
122	Wall	O6	Surf.	-	-	-	W. 124 A. 123	> 75	38	-	429.72	-	mudbrick	Building 2 – Located on the western corner of the house. Wall tied with W. 124. Oriented east–west.
123	Access	O6	Surf.	-	-	-	W. 120 W. 122	-	38	-	429.68	-	-	Building 2 – South-western access of R. 136. Identified as the only entrance of Building 2.
124	Wall	O6	Surf.	-	-	-	W. 127 W. 128 W. 122 A. 125	1515 [15,15 m]	40	-	429.25 to 429.76	-	mudbrick	Building 2 – Western wall of Building 2 bordering R. 112 and R. 136. A buttress against the southern part of this wall.
125	Access	O6	Surf.	-	-	-	W. 124 W. 126	144	40	-	429.72	-	-	Located on the south western area. Not connected with Building 2 (independent).
126	Wall	O6	Surf.	-	-	-	A. 125	442	40	-	429.67	-	mudbrick	Independent wall located on the northwestern part of Building 2. One buttress noticed on the wall lining access A. 125.
127	Wall	O6	Surf.	-	-	-	W. 124	230	40	-	429.34	-	mudbrick	Located to the north-west of area O6. Wall perpendicular to W. 124 and oriented east–west.
128	Wall	O7	Surf.	-	-	-	W. 124	174	37	-	429.27	-	mudbrick	Building 2 – Located on the north-western part of R. 112. Linked to W. 129 by a tiny wall bent at a right angle. Oriented east–west, upper part eroded.
129	Wall	O7	Surf.	-	-	-	W. 131 W. 128	730	42	-	429.22	-	mudbrick	Building 2 – Northern wall of R. 112. Oriented east–west. Perpendicular to W. 131. Wall partly collapsed inside R. 112 over 550 x 183 cm (8 courses of mudbricks laid on the ground). Upper part of the wall eroded.
130	Wall	O7	Surf.	-	-	-	W. 100 W. 131	300	60	-	429.13	-	mudbrick	Building 2 – North-eastern part of R. 112. Oriented east–west with its upper part eroded. Perpendicular to W. 100.
131	Wall	O7	Surf.	-	-	-	W. 129 W. 130	185	24	-	429.13	-	mudbrick	Building 2 – Oriented north–south. Perpendicular to W. 130 and W. 129. Upper part of the wall eroded.
132	Wall	O7	Surf.	-	-	-	A. 138	510	27 to 50	-	429.15	-	mudbrick	North of Building 2 – Isolated wall, oriented north–south; cut off from W. 129 by the door A. 138.

NO	TYPE	AREA	UNDER UF	ABOVE UF	CONSTITUTIVE UF	AGAINST UF	CONNECTED TO	LENGTH (CM)	WIDTH/DIAMETER (CM)	HEIGHT (CM)	UPPER ALT.	LOWER ALT.	MATERIAL	DESCRIPTION
133	Wall	O7	Surf.	-	-	-	A. 135	330	40	-	429.11	-	mudbrick	North of Building 2. Isolated wall, oriented north-south; cut off from W. 134 by the door A. 135.
134	Wall	O7	Surf.	-	-	-	W. 129 A. 135	80	36	-	429.13	-	mudbrick	North-east of Building 2. Oriented north-south, perpendicular to W. 129 and cut off from W. 133 by the door A. 135.
135	Access	O7	Surf.	-	-	-	W. 134 W. 133	125	40	-	429.09	-	-	North of Building 2. Access is located between W. 133 and W. 134, in front of A. 138.
136	Room	O7	Surf.	-	-	-	A. 123 W. 119 W. 124 W. 122	430	210	-	429.45	-	-	Building 2 – Room accessible from the street to the south by A. 123 and connected to the courtyard R. 112 by A. 137 to the north. This room is connected to R. 113 by A. 121 to the east.
137	Access	O7	Surf.	-	-	-	W. 124 W. 117	< 200	47	-	429.34	-	-	Building 2 – Access door between R. 136 and the courtyard R. 112.
138	Access	O7	Surf.	-	-	-	W. 132	90	34	-	429.09	-	-	North of Building 2. Access is located between W. 132 and W. 129, in front of A. 135.
139	Wall	O6	Surf.	-	-	-	W. 140 W. 153	270	50	-	429.27	-	mudbrick	South-east of Building 1. Eastern wall of a room to the south of the courtyard of the mosque. Oriented north-south, perpendicular to and tied with W. 140. A part of this wall has collapsed.
140	Wall	O6	Surf.	-	-	-	W. 139 A. 154	> 191	44	-	429.52	-	mudbrick	South-east of Building 1. Southern wall of a room to the south of the courtyard of the mosque. Oriented east-west. Tied with W. 139 and cut off the wall W. 156 by A. 154.
142	Wall	O6	Surf.	-	-	-	W. 043 W. 156 W. 143 W. 146	1220 [12,2 m]	50 to 90	-	429.95	-	mudbrick	Belongs to an architectural structure to the south-east of Building 1, south of the courtyard of the mosque. Oriented north-south, abutting against the southern wall of the prayer room of the mosque (W. 043). Tied with W. 146. Eastern wall of R. 157.
143	Wall	O6	Surf.	-	-	-	W. 144 W. 142	162	43	-	429.93	-	mudbrick	Belongs to an architectural structure to the south-east of Building 1, south of the courtyard of the mosque. Oriented east-west. Tied with W. 144; northern wall of R. 157.
144	Wall	O6	Surf.	-	-	-	W. 143 W. 145	195	40	-	429.97	-	mudbrick	Belongs to an architectural structure to the south-east of Building 1, south of the courtyard of the mosque. Oriented north-south. Tied with W. 143 and W. 145, western wall of R. 157.

NO	TYPE	AREA	UNDER UF	ABOVE UF	CONSTITUTIVE UF	AGAINST UF	CONNECTED TO	LENGTH (CM)	WIDTH/DIA-METER (CM)	HEIGHT (CM)	UPPER ALT.	LOWER ALT.	MATERIAL	DESCRIPTION
145	Wall	O6	Surf.	-	-	-	W. 144 A. 153	115	40	-	429.97	-	mudbrick	Belongs to an architectural structure to the south-east of Building 1, south of the courtyard of the mosque. Oriented east–west. Tied with W. 144. Cut off from W. 146 by the door A. 158. Southern wall of R. 157.
146	Wall	O6	Surf.	-	-	-	W. 142 W. 147 W. 150	300	40	-	429.88	-	mudbrick	Belongs to an architectural structure to the south-east of Building 1, south of the courtyard of the mosque. Oriented east–west. Tied with W. 142, abutting on W. 147 and W. 150. Cut off from W. 145 by the door A. 158. Southern wall of R. 157 and R. ---. Plaster fragment in the eastern corner.
147	Wall	O6	Surf.	-	-	-	W. 146 W. 148	> 305	40	-	429.76	-	mudbrick	Belongs to an architectural structure to the south-east of Building 1, south of the courtyard of the mosque. Oriented north–south. Abutted by W. 146 and W. 148. Northern limit unknown.
148	Wall	O6	Surf.	-	-	-	W. 147 W. 149	200	40	-	429.59	-	mudbrick	Belongs to an architectural structure to the south-east of Building 1, south of the courtyard of the mosque. Oriented east–west. Tied with W. 149 and abutting against W. 147.
149	Wall	O6	Surf.	-	-	-	W. 148	60	40	-	429.54	-	mudbrick	Belongs to an architectural structure to the south-east of Building 1, south of the courtyard of the mosque. Oriented north–south and tied with W. 148. Southern limit unknown.
150	Wall	O6	Surf.	-	-	-	W. 146 W. 152 W. 151	420	40	-	429.93	-	mudbrick	Belongs to an architectural structure to the south-east of Building 1, south of the courtyard of the mosque. Oriented north–south. Tied with W. 151, abutting against W. 146 and abutted by W. 152.
151	Wall	O6	Surf.	-	-	-	W. 150	370	25 to 40	-	429.91	-	mudbrick	Belongs to an architectural structure to the south-east of Building 1, south of the courtyard of the mosque. TOriented east–west. Eastern limit is unknown. Tied with W. 150 to the west.
152	Wall	O6	Surf.	-	-	-	W. 150	70	40	-	429.92	-	mudbrick	Belongs to an architectural structure to the south-east of Building 1, south of the courtyard of the mosque. Oriented east–west. Abutting against W. 150.
153	Wall	O6	Surf.	-	-	-	W. 139	200	40	-	429.13	-	mudbrick	Belongs to an architectural structure to the south-east of Building 1, south of the courtyard of the mosque. Oriented east–west. Tied with W. 139. Western limit unknown.

NO	TYPE	AREA	UNDER UF	ABOVE UF	CONSTITUTIVE UF	AGAINST UF	CONNECTED TO	LENGTH (CM)	WIDTH/DIAMETER (CM)	HEIGHT (CM)	UPPER ALT.	LOWER ALT.	MATERIAL	DESCRIPTION
154	Access	O6	Surf.	-	-	-	W. 156 W. 140	60	35	-	429.29	-	-	Belongs to an architectural structure to the south-east of Building 1, south of the courtyard of the mosque. Access between W. 156 and W. 140.
156	Wall	O6	Surf.	-	-	-	A. 154 W. 142	355	34	-	429.95	-	mudbrick	Belongs to an architectural structure to the south-east of Building 1, south of the courtyard of the mosque. Oriented east-west. Cut off from W. 140 by the door A. 154. Abutting against W. 142.
157	Room	O6	Surf.	-	-	-	W. 145 W. 144 W. 143 W. 142 A. 153	127	123	-	429.91	-	-	Belongs to an architectural structure to the south-east of Building 1, south of the courtyard of the mosque. Entrance to the south (A. 158). Cleaning on surface yielded a plate fragment with blue ornament (Asian porcelain).
158	Access	O6	Surf.	-	-	-	W. 146 W. 145	46	34	-	429.92	-	-	Belongs to an architectural structure to the south-east of Building 1, south of the courtyard of the mosque. Access to R. 157, between W. 145 and W. 146.
159	Floor	O7	102	-	-	102	W. 102 W. 107 St. 116	280	5	202	428.27	428.22	hard mud and sand	Building 2 – Floor in R. 109 made of mudbrick fragments and hard sand. The hearth St 116 is settled in this floor.
160	Niche	N6	001 006	-	023 025 026 030	023 025 026 030	W. 006 F. 014 F. 015 F. 039 P. 040 W. 044 F. 046	130	110	134	429.7	428.36	-	Building 1 – Mihrāb: large rectangular niche set in the middle of wall W. 006, looking west. Both the filling of the niche, the bordering wall W. 006 and the different floors within it are perturbed by a large pit (P. 040) dug in the area in order to pick up building material after the abandonment of the building.

APPENDIX 10
TABLE OF THE ARTEFACTS



NUMBER	TYPE	AREA	LOCUS (UF)	MATERIAL	DIMENSIONS	STATE OF CONSERVATION	DESCRIPTION
WH1.surf.1	Stone tools (x 2)	Wādī al-Hayāthim 1	Surface	Gabbro?	1: diam.: 76 mm, th.: 57 mm; 2: diam.: 85 mm, th.: 41 mm	Complete	Set of two pebbles in grey stone, round edge, flat and smooth upper/lower faces. Possibly grinders.
WH1.surf.2	Spindle whorl?	Wādī al-Hayāthim 1	Surface	Plaster	diam.: 21 mm; th.: 6.5 mm	Complete; eroded	Flat cylinder of plaster, trapezoidal in section, vertical hole drilled through, slightly on the bias.
WH1.surf.3	Stone vessel	Wādī al-Hayāthim 1	Surface	Alabaster	l.: 75 mm; w.: 41 mm; th.: 20.5 mm	Fragmentary	Small vase or lid in polished alabaster. Flat bottom, curved wall, square and thick rim. Inner side concave and shallow.
Y.001.1	Scraper	N6	001	Flint	l.: 60 mm; w.: 30 mm; th.: 15 mm	Complete	Grey flint flake with a cortical side. Retouch on one side and probably used as a scraper.
Y.001.2	Bottleneck	N6	001	Glass	h.: 16 mm; diam.: 21 mm; th.: 1.7 to 3.1 mm	Fragmentary; eroded	Vertical neck of a small bottle in green glass with a curved inclination at the basis. At the top, everted rim constituting a large flat disc. Kind of aryballos.
Y.001.3	Bottleneck	N6	001	Glass	h.: 19 mm; diam.: 17.5 mm; th.: 2.5 mm	Fragmentary; badly eroded	Vertical neck of a small bottle in glass. Blackened by weathering. Rounded rim.
Y.001.4	Bead	N6	001	Undetermined stone	diam.: 11 mm; th.: 4.5 mm; whole inner diam.: 3 mm	White weathering	Circular bead, with trapezoidal section, curbed edge, central hole round in section. A flake is missing on one side.
Y.004.1	Bangle	N6	004	Glass	l.: 47 mm ; w.: 8 mm; th.: 5 mm	Fragmentary and calcified	Deep blue or green glass calcified in white. No decoration visible. Rounded section in one side and thinned on the other side.
Y.004.2	Bangle	N6	004	Glass	l.: 25 mm; w.: 5 mm; th.: 4 mm	Fragmentary	Dark glass, flat inner face, convex outer face.
Y.004.3	Bangle	N6	004	Glass	l.: 25 mm; w.: 7 mm; th.: 6 mm	Fragmentary	Deep red glass with yellow glass paste incrustations by groups of three points in line; oval section.
Y.004.4	Finery	N6	004	Copper	l.: 22 mm ; w.: 23 mm; th.: 2 mm	Complete; corroded	Finery element, made of two smaller rings stuck to a larger one.
Y.005.1	Scraper	N6	005	Flint	l.: 48 mm; w.: 20 mm; th.: 10.5 mm	Complete	Elongated triangular brown flint flake; triangular in section; retouched on two edges. Possibly used as a scraper.
Y.006.1	Bangle	N6	006	Glass	l.: 25 mm; w.: 5 mm; th.: 4 mm	Fragmentary	Fragment of a bangle in black glass. Semi-circular section.
Y.011.1	Stone vessel	N6	011	Steatite	l.: 22 mm; w.: 23 mm; th.: 4.5 mm	Fragmentary	Sherd of a steatite vessel smoothed on both sides, round profile.
Y.013.1	Stone vessel	N6	013	Steatite	l.: 33 mm; w.: 25 mm; th.: 6 mm	Fragmentary	Sherd of steatite vessel slightly curved. Burnt external face; finely shaped, few traces of carving on the inner face.

NUMBER	TYPE	AREA	LOCUS (UF)	MATERIAL	DIMENSIONS	STATE OF CONSERVATION	DESCRIPTION
Y.018.1	Stone tool	N6	018	Limestone	l.: 50 mm; w.: 45 mm; th.: 11 mm	Fragmentary	Flat smooth pebble broken on the edges. Probably used as a tool (scraper, polishing stone).
Y.020.1	Pipe	N6	020	Earthen ware	l.: 30 mm; diam.: 14 mm	Fragmentary	Broken part of a pipe in ceramic, possibly the bottleneck of a vase. The outer side shows traces of red pigment; the inner face is darkened.
Y.022.1	Musket balls (x 2)	N6	022	Lead	diam.: 15 mm	Complete	2 spheroid balls for a rifle/musket. Flatten surface on one side and, for one of them, a 2 mm high appendix.
Y.022.2	Flat ring	N6	022	Copper alloy	diam. 18 mm; th. 1 mm	Complete; corroded; oxidized	Flat disc made in a copper alloy, with a large hole in the middle, ca. 6.5 mm in diameter. This bronze ring is flat on one side and incised with radial lines on the other side.
Y.022.3	"Minié" (?) ball	N6	022	Lead	l.: 18 mm; diam.: 9 mm	Complete	Lead bullet for a rifle, longitudinal section: conical; transverse section: circular. Flattened extremity; concave backside.
Y.022.4	Bangle	N6	022	Glass	l.: 21 mm; w.: 6 mm; th.: 4.5 mm	Fragmentary; weathered	Piece of a black glass bangle. The surface weathering lead to the formation of a white patina. Semi-circular section.
Y.022.5	Flat stone	N6	022	Limestone	l.: 59 mm; w.: 56 mm; th.: 13 mm	Complete	Limestone flat on 2 sides. Possibly an artefact.
Y.023.1	Spindle whorl?	N6	023	Earthen ware	diam.: 25.5 mm; th.: 21 mm	Complete	Irregular mud ball with a vertical hole.
Y.026.1	Flake	N6	026	Calcite?	l.: 67.5 mm; w.: 38 mm; th.: 9 mm	Complete	Triangular flake.
Y.026.2	Button	N6	026	Unknown			
Y.026.3	Bottleneck	N6	026	Glass	h.: 6.5 mm; l.: 25.5 mm; th. wall: 2.3 mm; th. rim: 3.5 mm	Fragmentary; weathered	Vertical neck of a small bottle in green glass curved at the basis. At the top, everted rim constituting a large flat disc. Kind of aryballos?
Y.029.1	Stone vessel	N6	029	Steatite	l.: 55 mm; w.: 53 mm; th.: 7.5 mm	Fragmentary	Fragment of a steatite bowl. Body slightly curved, round rim. Smooth on both sides, external side is blackened.
Y.030.1	Coin	N6	030	Bronze	diam.: 11.5 mm; th.: 2 mm	Corroded; oxidized	Small flat coin, illegible because of corrosion.
Y.031.1	Earthen ware artefact	N6	031	Earthen ware	diam.: 77 mm ; th.: 38 mm	Complete	Earthen ware ball, flattened on the lower face and showing a depression on the upper face, done by finger pressure (finger imprints). Light brown clay with mineral inclusions.
Y.034.1	Pestle?	N6	034	Limestone	l.: 85 mm; w.: 50 mm; th.: 47.5 mm	Fragmentary	Conical limestone broken at both extremities, circular in section, missing flakes on an extremity. Probably a pestle.
Y.034.2	Bead	N6	034	Green stone (jadeite?)	l.: 15 mm; diam.: 7 mm	Complete	Small bead in the shape of a skittle, hole pierced longitudinally.

NUMBER	TYPE	AREA	LOCUS (UF)	MATERIAL	DIMENSIONS	STATE OF CONSERVATION	DESCRIPTION
Y.034.3	Bottleneck	N6	034	Glass	h.: 9.5 mm; diam.: 29.5 mm; th. wall: 2.2 mm; th. rim: 5 mm	Fragmentary; weathered	Vertical neck of a small bottle in green glass, curved at the basis. At the top, everted rim constituting a large flat disc. Kind of aryballos?
Y.034.4	Coin?	N6	034	Copper alloy	l.: 14.15 mm; w.: 14.12 mm; th.: 2.97 mm	Fragmentary; corroded; oxidized	1/8 of a possible flat coin. In the shape of a piece of pie.
Y.041.1	Bone	N6	041	Bone	l.: 104 mm; w.: 22 mm; th.: 15 mm	Fragmentary; broken	Fragment of a diaphysis of a radius of sheep/goat with black deposit inside the bone. Probably due to a secondary use.
Y.041.2	Bangle	N6	041	Glass	l.: 47 mm; w.: 5 mm; th.: 4.7 mm	Fragmentary; weathered	Piece of a red to brown glass bangle. The surface weathering lead to the formation of a yellow patina. Inclusions of white patches. Square section with rounded corners.
Y.043.1	Pipe	N6	043	Earthen ware	l.: 57 mm; w.: 32 mm; h.: 39 mm	Fragmentary	Fragmentary pipe bowl in blackened earthenware. Dark grey fabric without inclusions. Horizontal pipe with a circular roll around it. The pipe bowl is a sphere topped by an everted wall and a vertical rim. It is adorned by two rows of an ovoid pattern. Cross incised at the bottom of the bowl (inner side).
Y.052.1	Spindle whorl?	N6	052	Earthen ware	diam.: 20 mm; th.: 16.5 mm	Complete	Irregular mud ball with a vertical hole.
Y.053.1	Spindle whorl?	N6	053	Earthen ware	diam.: 19.5 mm; th.: 17.5 mm	Complete	Idem.
Y.055.1	Stone vessel	N6	055	Steatite	l.: 44 mm; h.: 37 mm; th. of the wall: 14 mm	Fragmentary	Small fragment of the wall of a steatite vase. Smooth inner side; outer side: multifaceted carving; darkened.
Y.057.1	Bronze object	N6	057	Copper alloy	l.: 19.5 mm; w.: 16 mm; th.: 8.5 mm	Oxidized; corroded	Small bronze artefact partially preserved. Curved bronze rod with a round section at an extremity and a flatten section at the other one. This last one has been recently broken. The remaining part is missing. Nature of the object unknown.
Y.057.2	Bangle	N6	057	Glass	l.: 33 mm; w.: 7.5 mm; th.: 5.5 mm	Fragmentary; weathered	Deep blue glass bangle. Surface weathering led to the formation of a light green patina. Triangular section.
Y.057.3	Iron blade?	N6	057	Iron	l.: 43 mm; w.: 19.5 mm; th.: 8.5 mm	Fragmentary; broken; corroded; oxidized	3 fragments of an iron blade with a single sharp side (?).
Y.057.4	Microlith	N6	057	Flint or quartzite	l.: 15.5 mm; w.: 14.5 mm; th.: 3.5 mm	Complete	Small trapezoidal microlith, triangular section.
Y.057.5	Pestle?	N6	057	Limestone	l.: 132 mm; w.: 54.5 mm; th.: 40 mm	Complete	Grey limestone with black spots, elongated shape, ovoid transverse section. Flatten extremity. Missing flakes on the lateral side. Probably a stone tool used as a pestle.
Y.057.6	Ring	N6	057	Copper alloy	l.: 25 mm ; w.: 21 mm; th.: 6 mm	Broken in 2 pieces; corroded; oxidized	Circular ring with round section.

NUMBER	TYPE	AREA	LOCUS (UF)	MATERIAL	DIMENSIONS	STATE OF CONSERVATION	DESCRIPTION
Y.057.7	Iron object	N6	057	Iron	l.: 36.5 mm; w.: 10.5 mm; th.: 5.5 mm	Corroded; oxidized	Elongated piece of iron (rode or tang) enlarged at one end.
Y.057.8	Stone vessel	N6	057	Calcite	l.: 20 mm; w.: 18.5 mm; th.: 5 mm	Fragmentary	Small fragment of the body of a stone vase polished on both face. Slightly curved section.
Y.057.9	Stone vessel	N6	057	Steatite	l.: 31.5 mm; w.: 28 mm; th.: 13 mm	Fragmentary	Small fragment of a steatite vase. Curved profile. Polished on both face.
Y.057.10	Stone vessel	N6	057	Steatite	l.: 88 mm; h.: 70 mm; th. of the wall: 10.5 mm; Th. of the base 5.5 mm	Fragmentary	Fragment of the base and lower part of the wall of a steatite vessel. Flat bottom, smoothed on the upper face, irregular incision into the lower face. Vertical wall, polished on both faces. Decor incised on the outer face: vertical and horizontal lines delineating squares with diagonals.
Y.057.11	Stone vessel	N6	057	Steatite	l.: 62 mm; h.: 60 mm; th. of the wall: 9 mm	Fragmentary	Fragment of the upper part of the wall and the rim of a steatite vessel. Vertical wall with a round and thin rim. Smoothed inner side; multifaceted carving on the outer side; darkened.
Y.057.12	Stone vessel	N6	057	Steatite	l.: 115 mm; h.: 105 mm; th. of the wall: 7 mm (top) to 13 mm (down)	Fragmentary; broken in 3 pieces	Fragment of the upper part of the wall and the rim of a steatite vessel. Slightly everted wall with a square rim. Horizontal band in relief (square in section), 40 mm under the rim and 5 mm in height. Smoothed inner side; multifaceted carving on the outer side; darkened.
Y.057.13	Stone vessel	N6	057	Steatite	l.: 36 mm; h.: 16 mm; th. of the wall: 11 mm	Fragmentary	Small fragment of the wall of a steatite vessel. Horizontal band in relief around the wall. Smoothed inner side; multifaceted carving on the outer side; darkened.
Y.057.14	Architectural decor	N6	057	Plaster	l.: 100 mm; h.: 68 mm; th. of the wall: 54 mm	Fragmentary	Fragment of an architectural decor made in plaster. Front: two circles side by side under a horizontal band in relief. Upper face: flat with a stepped section. Lower face is broken. Rear face is curved and flattened.
Y.059.1	Token	N6	059	Earthenware	diam.: 25 mm; th.: 6.5 mm	Complete	Token made of a sherd with rounded edges. Red ware with grey-black core and abundant chaff temper.
Y.060.1	Token	N6	060	Earthenware	diam.: 23 mm; th.: 8 mm	Complete	Idem.
Y.060.2	Stone ball	N6	060	Limestone	diam.: 23.5 mm; th.: 20 mm	Complete	Irregular spheroid in limestone with small impacts on the surface. Possibly a projectile for a sling.
Y.061.1	Stone tool	N6	061	Limestone	l.: 119 mm; w.: 111 mm; th.: 53 mm	Complete	Limestone pebble; circular longitudinal section; ovoid transverse section. Traces of impacts and missing flakes indicating a use as a hammer or a crusher

NUMBER	TYPE	AREA	LOCUS (JF)	MATERIAL	DIMENSIONS	STATE OF CONSERVATION	DESCRIPTION
Y.061.2	Stone tool	N6	061	Sandstone	l.: 132 mm; w.: 81 mm; th.: 61 mm	Fragmentary	Rectangular sandstone block flattened on two sides. Possibly a stone tool.
Y.101.1	Stone tool	O7	101	Limestone	l.: 104 mm; w.: 75 mm; th.: 27 mm	Fragmentary	Stone with rectangular section, flattened on the top either by natural action or by human action. Possibly a stone tool.
Y.102.1	Flint flake	O7	102	Flint	l.: 20.5 mm; w.: 19.3 mm; th.: 6.5 mm	Complete	
Y.102.2	Stone tool	O7	102	Limestone conglomerate (beach rock?)	diam.: 270 mm; th.: 51 mm	Complete	Discoid stone, flat on both sides; rounded edge. The upper face partly turned red, probably due to exposure to fire. Black deposit on some parts. In the centre, a hollow may have been created by percussion. Possible use as a worktop for cooking.
Y.102.3	Stone tool	O7	102	Limestone	l.: 83 mm; w.: 78 mm; th.: 25 mm	Fragmentary	Rectangular pebble in brown limestone, broken on a corner and on one side. Possibly a stone tool: grinder, hammer?
Y.102.4	Stone tool	O7	102	Limestone	l.: 97 mm; w.: 60 mm; th.: 32 mm	Fragmentary	Brown burned limestone pebble, broken on one side. Possibly a stone tool: grinder, polisher, hammer?
Y.102.5	Stone tools (x 3)	O7	102	Limestone conglomerate (beach rock?)	-	Fragmentary	Group of 3 fragments of discoid stones, flat on both sides and with rounded edge. One is blackened by fire. This could have been used as a tool for cooking activities (worktop).
Y.205.1	Pendant	G17-H17	205	Glazed earthen ware	diam.: 31.5 mm; th.: 6 mm	Preserved on a half; weathered	Sherd of white glazed ware, yellow fabric, reused as a pendant: reshaped in a circle with a hole in its centre. Preserved only on a half.
Y.surf.01	Bronze artefact	P10	Surface	Bronze	l.: 61 mm; th.: 16 mm	Corroded; oxidized; fragmentary	Bronze stick with a bulbous extremity adorned with vertical flute.
Y.surf.02	Iron artefact	P6	Surface	Iron	l.: 52 mm; w.: 20 mm; th.: 12 mm	Fragmentary	Fragment of a thick point, flat on two sides.
Y.surf.03	Button	P15	Surface	Mother-of-pearl	diam.: 10 mm; th.: 1 mm	Complete	Circular button pierced with 4 holes.
Y.surf.04	Stone vessel	P8	Surface	Steatite	diam.: 180 mm; h.: 44 mm; th.: 6 to 9 mm	Fragmentary	Shallow round bowl or plate, with vertical wall. Round rim, flat base, slightly convex. Outer face roughly eroded. Smoothed inner face with horizontal irregular incisions (carving marks).
Y.surf.05	Flint flake	P10	Surface	Flint	l.: 41 mm; w.: 34 mm; th.: 9.5 mm	Complete	Triangular white/beige flint flake, retouched on the edge. Possibly used as a "lighter".
Y.surf.06	Spindle whorl	P10	Surface	Earthen ware	diam.: 37 mm; th.: 12 mm	Complete; few splinters missing	Spindle whorl vertically pierced in its centre (diam. 8 mm); conical section.

NUMBER	TYPE	AREA	LOCUS (UF)	MATERIAL	DIMENSIONS	STATE OF CONSERVATION	DESCRIPTION
Y.surf.07	Coin	O15	Surface	Copper alloy?	diam.: 18 mm; th.: 2 mm	Complete; oxidized	Small flat coin. Green oxidation, the core is grey. Ca. 2 to 3 g.
Y.surf.08	Bead	P10	Surface	Stone	diam.: 5.5 mm; th.: 4.5 mm	Complete	Small bead in black stone, square section with rounded edges, vertically pierced.
Y.surf.09	Stone vessel	K9	Surface	Steatite	l.: 30 mm; w.: 26 mm; th.: 8 mm	Fragmentary	Fragment of a dark green steatite vessel. Smoothed surface. Transversal hole visible on the broken edge, probably for a res-toration of the vase. Drilled holes are also visible on the verso of the object. This fragment has been reused, edge is polished; possible remains of a decoration in relief.
Y.surf.10	Ring	O6	Surface	Bronze/copper	l.: 38 mm ; w.: 3 mm; th.: 2.5 mm	Fragmentary	Large and thin ring.
Y.surf.11	Scraper	M6	Surface	Flint	l.: 65 mm; w.: 44 mm; th.: 14 mm	Complete	Brown flint flake with a cortical side. Retouched on one side and probably used as a scraper. This edge is blunt.
Y.surf.12	Undetermined	G18	Surface	Steatite	l.: 45 mm; w.: 41 mm; th.: 10 mm	Fragmentary	Steatite fragment, flat; rough on one face, smoothed on the other. On one broken edge, 5 holes pierced through the sherd.
Y.surf.13	Pipe bowl	O7	Surface	Earthen ware	l.: 42 mm; w.: 40 mm; th.: 25 mm	Fragmentary	Fragment of a pipe bowl in darkened ceramic. The fabric is brown with white inclusions. Vertical pipe adorned at the top by a bulge incised by dots and lattice pattern. The vertical pipe is attached to the rest of an hemisphere adorned with a frieze of lines incised diagonally.
Y.surf.14	Misfired sherd	C17-19 to G17-19	Surface	Earthen ware	l.: 117 mm; w.: 100 mm; th.: 7 mm	Fragmentary	Sherd with a green fabric, thin mineral temper, wheeled. Possibly a fragment of Layla ware. This sherd is distorted by misfiring (over-fired?) or by the collapse of ceramics in the kiln, during the process of heating. It could be indicative of the presence of pottery workshop in this area.
Y.surf.15	Misfired sherd	C17-19 to G17-19	Surface	Earthen ware	l.: 109 mm; w.: 67 mm; th.: 45 mm	Fragmentary	Melting of sherds with a green fabric, thin mineral temper, wheeled. Part of this agglomerate has vitrified and shows a red to dark green varnish. This melting might have been caused by misfiring (over-fired?) during the process of heating. It could be indicative of the presence of pottery workshop in this area.
Y.surf.16	Jewel	P7	Surface	Gold and turquoise	l.: 10 mm; w.: 8 mm; th.: 3.5 mm	Fragmentary; black deposit over the golden surface	Small piece of turquoise, ovoid, embedded in a flat piece of gold. Slightly curved surface on the opposite side. Black deposit on one half of the piece.

NUMBER	TYPE	AREA	LOCUS (UF)	MATERIAL	DIMENSIONS	STATE OF CONSERVATION	DESCRIPTION
Y.surf.17	Pipe bowl	N7	Surface	Earthen ware	w.: 33 mm; h.: 33.5 mm; th.: 6 mm	Fragmentary	Clay pipe with black core and brown to black surface. Part of the bowl is preserved: spheroid body with a vertical neck, incised decoration: 2 vertical grooves alternating with metopes adorned by vertical lines of dots.
Y.surf.18	Turquoise (?) Inlay	N6	Surface	Turquoise?	l.: 12.5 mm; w.: 11 mm; th.: 8.5 mm	Complete	Small ovoid inlay, probably in turquoise- carinated profile.
Y.surf.19	Bangle	O7	Surface	Glass	l.: 43 mm; w.: 7.5 mm; th.: 5 mm	Fragmentary; weathered	Piece of a black glass bangle. The surface weathering led to the formation of a white patina. Right triangle section with hypotenuse against the wrist.
Y.surf.20	Bead	P15	Surface	Amber	diam.: 18.5 mm; th.: 10.5 mm; whole inner diam.: 5 mm	Weathering	Circular bead, trapezoidal section, curved edge, central hole with an ovoid section.
Y.surf.21	Bead	G17	Surface	Shell?	diam.: 10 mm; th.: 6.5 mm	Complete	Cylindrical bead with a trapezoidal section. Ivory colour, possibly in shell (otherwise: bone, polished horn). Two drills: one vertically, one horizontally.
Y.surf.22	Bead	G17	Surface	Shell?	diam.: 10 mm; th.: 6.5 mm	Complete	Idem.

APPENDIX 11

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Hervé MONCHOT



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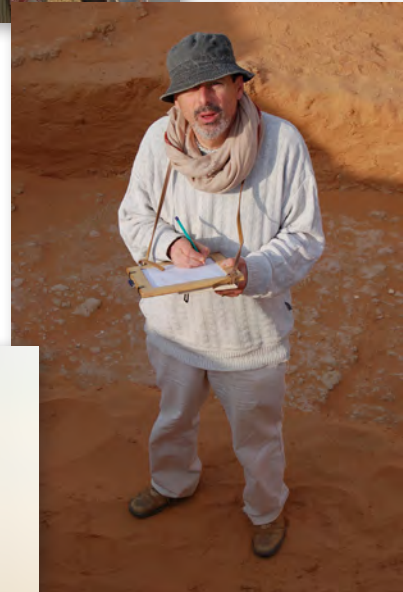
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LIST OF BIBLIOGRAPHICAL REFERENCES

ADAMS R., TOMBER T. & JOHNSON E.

- 2008 Appendix 5: Bronze Age and Iron Age pottery, and Classical and Islamic pottery catalogue. In G. Barker, D. Gilbertson & D. Mattingly (eds.), *Archaeology and Desertification The Wadi Faynan Landscape Survey. Southern Jordan*. Oxford: Oxbow Books: 1–50.

AKOPIAN A.M.

- 2010 Les fouilles du secteur 4. In J.-Fr. Salles & A. V. Sedov (eds.) *Qāni'. Le port antique du Ḥaḍramawt entre la Méditerranée, l'Afrique et l'Inde. Fouilles russes 1972, 1985-1989, 1991, 1993-1994* (Indicopleustoi, Archaeologies of the Indian Ocean, 6). Turnhout: Brepols: 123–148.

AMIRKHANOV H.

- 1991 *Palaeolithic in South Arabia*. Moscow: Scientific World [in Russian].
1994 Research on the Palaeolithic and Neolithic of Hadramaut and Mahra. *Arabian Archaeology and Epigraphy* 5: 217–228.
2006 *Stone Age of South Arabia*. Moscow: Nauka [in Russian].
2008 *Cave al-Guza the multilayer site of Oldowan in South Arabia*. Moscow: TAUS.

ARMITAGE S.J., JASIM S.A., MARKS A.E., PARKER A.G. ET ALII

- 2011 The southern route “out of Africa”: evidence for an early expansion of modern humans into Arabia. *Science* 331: 453–456.

ANDREWS P.J. & WHYBROW P

- 2005 Taphonomic observations on a camel skeleton in a desert environment in Abu Dhabi. *Paleontologica Electronica* 8/1: 17 p.

[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

ATLAS

- 1999 *Aṭlas al-Mamlaka al-‘arabiyya al-sa‘ūdiyya* (ṣadara bi-munasābat murūr mi‘at ‘ām ‘alā ta’sīs al-Mamlaka al-‘arabiyya al-sa‘ūdiyya). Riyadh: Wizārat al-ta‘līm al-‘ālī.

- AUGÉ M.
1988 Révision du lézard *Uromastix europaeus* (Reptilia, Lacertilia) de l'Oligocène français. *Revue de Paléobiologie* 7/2: 317–325.
- AUGÉ M.
2005 *Évolution des lézards du Paléogène en Europe*. (Mémoires du Muséum National d'Histoire Naturelle, Volume 192). Paris: Publications Scientifiques du Muséum.
- AVNER U., NEHMÉ L. & ROBIN CH.
2013 A rock inscription mentioning Tha'labā, an Arab king from Ghassān. *Arabian Archaeology and Epigraphy* 24-2: 237–256.
- BADRE L.
1991 Le sondage stratigraphique de Shabwa (1976–1981). *Syria* LXVIII: 229–314.
- BAGATTI B.
1947 *I monumenti di Emmaus el-Qubeibeh e dei dintorini. Risultato degli scavi e sopralluoghi negli anni 1873, 1887–90, 1900–2, 1940–1944* (Pubblicazione dello Studium Biblicum Franciscanum, 4). Jerusalem.
- [AL-]BAKRĪ, ABŪ 'UBAYD 'ABD ALLĀH B. 'ABD AL-'AZĪZ ... AL-ANDALUSĪ / ED. M. AL-SAQĀ
1945 [Mu'jam] = *Mu'jam mā 'sta'jam min asmā' al-bilād wa-'l-mawādi'* (al-Ma'had al-khalīfī li-l-abḥāth al-maghribiyya, Bayt al-Maghrib). 4 vol. 1945. Cairo: Maṭba'at Lajnat al-Ta'līf wa-'l-Tarjama wa-'l-Nashr.
- BALĀDHURĪ, ABŪ 'L-ḤASAN / ED. R.M. RIDWĀN
1932 [Futūḥ, text] = *Futūḥ al-Buldān*. Ed. Riḍwān Muḥammad Riḍwān. 1932. Cairo: al-Maṭba'a al-Miṣriyya.
- BALĀDHURĪ, ABŪ 'L-ḤASAN / ED. PH.KH. HITTI
1916 [Futūḥ, translation] = *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: Columbia University [reedited in 2002: Georgias Press].
- BAR-YOSEF O. & MEIGNEN L.
1992 Insights into Levantine Middle Paleolithic Cultural Variability. In H. Dibble & P. Mellars (eds.) *The Middle Palaeolithic: Adaptation, Behavior and Variability*. Philadelphia: University Museum, University of Pennsylvania: 163–182.
- BAR-YOSEF O & VAN PEER P.
2009 The chaîne opératoire approach in Middle Paleolithic archaeology. *Current Anthropology* 50/1: 103–131.
- BARHAM L. & MITCHELL P.
2008 *The First Africans: African Archaeology from the Earliest Toolmakers to most Recent Foragers*. Cambridge: Cambridge University Press.

- BARONE R.
1986 *Anatomie comparée des mammifères domestiques. Tome 1. Ostéologie.* Paris: Vigot Frères.
- BARTINGTON G. & CHAPMAN C.E.
2004 A high-stability fluxgate magnetic gradiometer for shallow geophysical survey applications. *Archaeological Prospection* 11/1: 19–34.
- BEECH M.
2007 The large mammal and reptiles bones. In A. Poulter (ed.), *Nicopolis ad Istrum III: A late Roman and early Byzantine City: the Finds and the biological Remains* (Reports of the Research Committee of the Society of Antiquaries of London, 67). London: Oxbow books: 154–197.
- BEEG K., BEEG C. & ABRAMOV A.
2008 *Mellivora capensis*. In IUCN 2011, *IUCN Red List of Threatened Species. Version 2011.2*. [downloaded on December 20, 2011].
- BEHRENS-ABOUSEIF D.
2004 The Fire of 884/1479 at the Umayyad Mosque in Damascus and an Account of its Restoration. *Mamluk Studies Review* 8/1: 279–297.
- BEHRENSMEYER A.K.
1978 Taphonomic and ecologic information from bone weathering. *Paleobiology* 4/2: 150–162.
- BELL R.C.
1969 *Board and table games from many civilizations.* Oxford: Oxford University Press.
- BERGER J.-FR., BRAVARD J.P., PURDUE L., BENOIST A. ET ALII
2012 Rivers of the Hadramawt watershed (Yemen) during the Holocene: Clues of late functioning. *Quaternary International* 266: 142–161.
- BETTINI L.
1998 Alimentation et poésie : un exemple du “Taghil al-Gahiliyya”. *Arabica* 45: 73–87.
- BEYIN A.
2013 A surface Middle Stone Age assemblage from the Red Sea coast of Eritrea: Implications for Upper Pleistocene human dispersals out of Africa. *Quaternary International* 300: 195–212.
- BIBBY T.G.
1973 *Preliminary survey in East Arabia 1968* (Jutland Archaeological Society Publications, 12). Copenhagen: Gyldendal.
- BIN KHAMĪS A.M.
1978 *Muʿjam al-Yamāma* (2 volumes). Riyadh.

BINFORD L.R.

1981 *Bones: ancient men and modern myths*. New York: Academic Press.

BLACHÈRE R.

1952 *Histoire de la littérature arabe, des origines à la fin du xv^e siècle de J.-C.* Paris: Librairie d'Amérique et d'Orient Adrien Maisonneuve [vol. 1–3: 1952, 1964 and 1966].

BOËDA É.

1991 Approche de la variabilité des systèmes de production lithique des industries du Paléolithique inférieur et moyen: chronique d'une variabilité attendue. In C. Karlin (ed.) *Préhistoire et ethnologie. Le geste retrouvé*. Paris : Maison des Sciences de l'Homme: 37-79.

1994 *Le concept Levallois : variabilité des méthodes* (Monographie du CRA 9). Paris: CNRS Éditions.

BOESSNECK J.

1995 Birds, reptiles, and amphibians. In Ø. S. LaBianca & A von den Driesch (eds.), *Faunal remains: taphonomical and zooarchaeological studies of the animal remains from Tell Hesban and vicinity* (Hesban 13). Berrien Springs: Andrews University Press: 131–168.

BOESSNECK J., MÜLLER H.-H. & TEICHERT M.

1964 Osteologische Unterscheidungsmerkmale zwischen Schaf (*Ovis aries*, Linné) und Ziege (*Capra hircus*, Linné). *Kühn-Archiv* 78: 1–129.

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.

BORDES F.

1961 *Typologie du Paléolithique ancien et moyen* (Cahiers du Quaternaire, 1). Paris: Éditions du CNRS.

BOUCHARLAT R.

2001 Les galeries de captage dans la péninsule d'Oman au premier millénaire avant J.-C. : Questions sur leurs relations avec les galeries du plateau iranien. In P. Briant (ed.) *Irrigation et drainage dans l'Antiquité : Qanats et canalisations souterraines en Iran, en Égypte et en Grèce*. Paris: Persika 2: 157–183.

2003 Iron Age Water-draining Galleries and the “Iranian qanât”. In D. T. Potts, H. al-Naboodah & P. Hellyer (eds.) *Proceedings of the first international conference on the archaeology of the United Arab Emirates (Abu Dhabi, 15-18 april 2001)*. London: Trident: 162–172.

BOUZIGARD A.C. & SAIDEL B.A.

2012 A note on the dating of the clay smoking pipes collected in the course of two archaeological surveys conducted in Saudi Arabia: the Comprehensive Survey of

Saudi Arabia (1976–1981) and Michael Gilmore's survey of the Darb al-Hajj. *Arabian Archaeology and Epigraphy* 23 (2012): 116–124.

CAMPBELL W.H.

2003 *Introduction to Geomagnetic Fields*. 2nd ed. Cambridge: Cambridge University Press.

CASKEL W.

1960 Al-A'shà Maymūn b. Qays . In *Encyclopédie de l'Islam, nouvelle édition*. Vol. I: 710–711.

1966 *Ġamharat an-nasab. Das genealogische Werk des Hišām ibn Muḥammad al-Kalbī*. 2 vol. Leiden: Brill.

CATON-THOMPSON G.

1938 Geology and archaeology of the Hadramaut, Southern Arabia. *Nature* 142: 139–142.

1953 Some Palaeoliths from South Arabia. *Proceedings of the Prehistoric Society* 19:189–218.

CAUSSIN DE PERCEVAL A.P.

1847–1848 *Essai sur l'histoire des Arabes avant l'islamisme, pendant l'époque de Mahomet, et jusqu'à la réduction de toutes les tribus sous la loi musulmane*. 3 vol. Paris: Firmin-Didot [reed. Graz: Akademische Druck- u. Verlagsanstalt, 1967].

CHARPENTIER V. & CRASSARD R.

2013 Back to Fasad... and the PPNB controversy. Questioning a Levantine origin for Arabian Early Holocene projectile points technology. *Arabian Archaeology and Epigraphy* 24/1: 28–36.

CHIOTTI L., OLSZEWSKI D.I., DIBBLE H.L., MCPHERRON S.R. ET ALII

2007 Paleolithic Abydos: Reconstructing Individual Behaviors across the High Desert Landscape. In Z. Hawass & J. Richards (eds.) *The Archaeology and Art of Ancient Egypt: Essays in Honor of David B O'Connor*. Cairo: Supreme Council of Antiquities Press: 169–183.

CLARK G.

1995 The mammalian remains from the early Byzantine Fort of Upper Zohar. In R. P. Harper (ed.), *Upper Zohar: an early Byzantine fort in Palestina Tertia. Final report of excavations in 1985–1986* (British Academy Monographs in Archaeology, 9). Oxford: Oxford University Press: 49–84.

CLAVEL B.

2005 Approvisionnement en viande et poissons dans un établissement religieux du XVII^e siècle : les Feuillantines de Paris. *Histoire médiévale et archéologique* 19: 111–122.

CLEUZIOW S.

1989 The Early Dilmun Period (Third and Early Second Millennium BC). In P. Lombard & M. Kervran (eds.) *Bahrain National Museum, Archaeological Collections. I. A selection of pre-Islamic antiquities from excavations 1954–1975*. Manama: Directorate of Museum and Heritage: 11–50.

- COHEN A. & SERJEANTSON D.
 1996 *A manual for the identification of bird bones from archaeological sites*. London: Archetype Publications Ltd. [revised edition].
- COOPER J.S. & POOLE D.F.G.
 1973 The dentition and dental tissues of the agamid lizard *Uromastix*. *Journal of Zoology, London* 169: 85–100.
- COOPER J.S., POOLE D.F.G. & LAWSON R.
 1970 The dentition of agamid lizards with special reference to tooth replacement. *Journal of Zoology, London* 162: 85–98.
- COURTILLOT V. & LE MOUËL J.L.
 1988 Time Variations of the Earth's Magnetic Field: From Daily to Secular. *Annual Review of Earth and Planetary Sciences* 16/1: 389–476.
- CRASSARD R.
 2008a *La Préhistoire du Yémen. Diffusions et diversités locales, à travers l'étude d'industries lithiques du Hadramawt* (BAR International Series S1842). Oxford: Archaeopress.
 2008b The “Wa'shah method”: an original laminar debitage from Hadramawt, Yemen. *Proceedings of the Seminar for Arabian Studies* 38: 3–14.
 2009a Middle Paleolithic in Arabia: the view from the Hadramawt region, Yemen. In M. D. Petraglia & J. I. Rose (ed.) *The Evolution of Human Populations in Arabia. Paleoenvironments, Prehistory and Genetics*. London: Springer Academic Publishers: 151–168.
 2009b Modalities and characteristics of human occupations in Yemen during the Early/Mid-Holocene. *Comptes Rendus de l'Académie des Sciences - Geoscience* 341: 713–725.
- CRASSARD R. & DRECHSLER P.
 2013 Towards new paradigms: multiple pathways for the Arabian Neolithic. *Arabian Archaeology and Epigraphy* 24/1: 3–8.
- CRASSARD R., GUY H., SCHIETTECATTE J. & HITGEN H.
 2011 Reuse of tombs or cultural continuity? The case of tower-tombs in Shabwa governorate (Yemen). In L. Weeks (ed.) *Death and Burial in Arabia and Beyond. Multidisciplinary perspectives* (BAR International Series 2107, Society for Arabian Studies Monographs No. 10), Oxford: Archaeopress: 173–177.
- CRASSARD R. & HILBERT Y.H.
 2013 A Nubian Complex Site from Central Arabia: Implications for Levallois Taxonomy and Human Dispersals during the Upper Pleistocene. *PLoS ONE* 8/7: e69221. doi:10.1371/journal.pone.0069221
- CRASSARD R., PETRAGLIA M.D., DRAKE N.A., BREEZE P. ET ALII
 2013a Middle Palaeolithic and Neolithic Occupations around Mundafan Palaeolake, Saudi Arabia: Implications for Climate Change and Human Dispersals. *PLoS ONE* 8/7: e69665. doi:10.1371/journal.pone.0069665

- CRASSARD R., PETRAGLIA M.D., PARKER A.G., PARTON A. *ET ALII*
 2013b Beyond the Levant: First Evidence of a Pre-Pottery Neolithic Incursion into the Nefud Desert, Saudi Arabia. *PLoS ONE* 8/7: e68061. doi:10.1371/journal.pone.0068061
- CRASSARD R. & THIÉBAUT C.
 2011 Levallois points production from eastern Yemen and some comparisons with assemblages from East-Africa, Europe and the Levant. In J.-M. Le Tensorer, R. Jagher & M. Otte (eds.) *The Lower and Middle Palaeolithic in the Middle East and neighbouring regions*, Liège: ERAUL.
- CREW H.
 1975 An evaluation of the relationship between the Mousterian complexes of the Eastern Mediterranean: a technology perspective. In F. Wendorf & A. E. Marks (eds.) *Problems in Prehistory: North Africa and Levant*. Dallas: SMU Press: 427–437.
- CROFT P.
 1995 Bird and small remains from Upper Zohar. In R. P. Harper (ed.), *Upper Zohar: an early Byzantine fort in Palestina Tertia. Final report of excavations in 1985-1986* (British Academy Monographs in Archaeology 9). Oxford: Oxford University Press: 87–95.
- CUNNINGHAM P.
 2001 Notes on the diet, survival rate, and burrow specifics of *Uromastix aegyptius microlepis* from the United Arab Emirates. *Asiatic Herpetological Research* 9: 30-33.
 2013 Daily activity pattern and diet of a population of the Spiny-tailed Lizard, *Uromastix aegyptius microlepis*, during summer in the United Arab Emirates. *Zoology in the Middle East* 2: 37–46.
- DAYAN T., WOOL D. & SIMBERLOFF D.
 2002 Variation and covariation of skulls and teeth: modern carnivores and the interpretation of fossil mammals. *Paleobiology* 28/4: 508–526.
- DE CUPERE B., DURU R. & UMURTAK G.
 2008 Animal husbandry at the Early Neolithic to early Bronze age site of Bademağacı (Antalya province, SW Turkey): evidence from the faunal remains. In E. Vila, L. Gourichon, A. M. Choyke & H. Buitenhuis (eds.), *Archaeozoology of the Near East VIII*. (TMO 49). Lyon: Maison de l’Orient et de la Méditerranée: 367–405.
- DE GAURY G.
 1945 A Burial Ground in Al-Kharj. *The Geographical Journal* 106/3: 152–153.
- DELAGNES A.
 1992 *L’organisation de la production lithique au Paléolithique Moyen. Approche technologique à partir de l’étude des industries de la Chaise de Vouthon (Charente)*, PhD dissertation, University of Paris X-Nanterre.

- DELAGNES A., CRASSARD R., BERTRAN P. & SITZIA L.
 2013 Human and cultural dynamics in southern Arabia at the end of the Middle Paleolithic. *Quaternary International* 300: 234–243.
- DELAGNES A., JAUBERT J & MEIGNEN L.
 2007 Les technocomplexes du Paléolithique moyen en Europe occidentale dans leur cadre diachronique et géographique. In B. Vandermeersch & B. Maureil (eds.) *Les Néandertaliens, biologie et culture*. Paris: Éditions CTHS: 213–219.
- DELAGNES A. & MEIGNEN L.
 2006 Diversity of lithic production systems during the Middle Palaeolithic in France. Are there any chronological trends? In E. Hovers & S. Kuhn (eds.) *Transition before the transition*. Santa Barbara: Springer: 85–107.
- DELAGNES A., TRIBOLO C., BERTRAN P., BRENET M. *ET ALII*
 2012 Inland human settlement in southern Arabia 55,000 years ago. New evidence from the Wadi Surdud Middle Paleolithic site complex, western Yemen. *Journal of Human Evolution* 63/3: 452–474.
- DIBBLE H.-L. & BAR-YOSEF O
 1995 *The Definition and Interpretation of Levallois Technology* (Monographs in World Archaeology, 23). Madison: Prehistory Press.
- DRIESCH A. VON DEN
 1976 *A guide to the measurement of animal bones from archaeological sites* (Peabody Museum Bulletin 1). Harvard: Harvard University Press.
- DRIESCH A VON DEN & BOESSNECK J.
 1995 Final report on the zooarchaeological investigation of animal bones finds from Tell Hesban, Jordan. In Ø. S. LaBianca & A von den Driesch (eds.), *Faunal remains: taphonomical and zooarchaeological studies of the animal remains from Tell Hesban and vicinity* (Hesban 13). Berrien Springs: Andrews University Press: 65–108.
- DRIESCH A. VON DEN & DOCKNER A.
 2002 Animal exploitation in medieval Siraf, Iran, based on the faunal remains from the excavations at the Great Mosque. *Bonner zoologische Beiträge* 50/3: 227–247.
- DRIESCH A VON DEN & OBERMAIER M.
 2007 The hunt for wild dromedaries during the 3rd and 2nd millennia BC on the United Arab Emirates coast Camel bone finds from the excavations at Al Sufouh 2, Dubai, UAE. *Documenta Archaeolobiologiae* 6: 133–167.
- DURAND C.
 2011 Pottery Study. In L. Nehmé (ed.) *Report on the Fourth Excavation Season (2011) of the Madâ'in Sâlih Archaeological Project*. <http://halshs.archives-ouvertes.fr/halshs-00671451>: 327–361.

- EISENMANN V. & BECKOUCHE S.
 1986 Identification and discrimination of metapodials of modern and Pleistocene Equus, wild and domestic. In R. H. Meadow & H.-P. Uerpmann (eds.), *Equids in the Ancient World* (Beihefte zum Tübinger Atlas des Vorderen Orients, Reihe A). Wiesbaden: 117–163.
- FERNÁNDEZ H.
 2001 *Ostéologie comparée des petits ruminants eurasiatiques sauvages et domestiques (genres Rupicapra, Ovis, Capra et Capreolus) : diagnose différentielle du squelette appendiculaire*. PhD Dissertation. Geneva University.
- FIEY J.M.
 1969 Diocèses syriens orientaux du Golfe Persique. In *Mémorial Mgr Gabriel Khoury-Sarkis*. Louvain : Impr. orientaliste: 177-219 [Reed. J.-M. Fiey 1979. *Communautés syriaques en Iran et en Irak des origines à 1552*. London: Variorum Reprints, II].
- FINKBEINER U.
 1992 Keramik der seleukidischen und parthischen Zeit aus den Grabungen in Uruk-Warka II. *Baghdader Mitteilungen* 23: 473–580.
 1993 Uruk-Warka. Fundstellen der Keramik der Seleukiden- und Partherzeit. In U. Finkbeiner (ed.), *Materialien zur Archäologie der Seleukiden- und Partherzeit im südlichen Babylonien und im Golfgebiet*. Tübingen: Ernst Wasmuth Verlag: 3–16.
- FINSTER B.
 1994 *Frühe iranische Moscheen vom Beginn des Islam bis zur Zeit salğuischer Herrschaft* (Archaeologische Mitteilungen aus Iran. Ergänzungsband, 19). Berlin: D. Reimer.
- FISHER J.W.
 1995 Bone surface modifications in zooarchaeology. *Journal of Archaeological Method and Theory* 2/1: 7–68.
- FLEITMANN D. & MATTER A.
 2009 The speleothem record of climate variability in Southern Arabia. *Comptes Rendus de l'Académie des Sciences - Geoscience* 341: 633–642.
- FRIFELT K.
 2001 *Islamic Remains in Bahrain*. Moesgaard: Jutland Archaeological Society.
- GAJDA I.
 2004 Ḥimyar en Arabie centrale – un nouveau document. *Arabia* 2: 87–98.
- GAZDAR M.S., POTTS D.T. & LIVINGSTONE A.
 1984 Excavations at Thaj. *Atlat* 8: 55–108.

- GERBER Y.
 2008 The Byzantine and early Islamic pottery from Jabal Hârûn (chapter 11). In Z.T. Fiema & J. Frösén (eds.), *Petra - The Mountain of Aaron. Volume I. The Church and the Chapel*. Helsinki: Societas Scientiarum Fennica: 287–329.
- [AL-]GHAZZI A.
 1996 A preliminary report of an excavation at Hazem Agila in al-Kharj oasis/central region of Saudi Arabia. *Atlal* 14: 43–51.
 2009 *Awân fukhâriyya min mawqa‘ Ḥazm ‘Aqila (muḥāfaḍat al-Ḥarj/Maṭṭaqat al-Riyādh)*. Riyadh: Dārat al-malik ‘Abd al-‘Azīz.
 2010 *A Comparative Study of Pottery from a site in the al-Kharj Valley, Central Arabia*. (Series of archaeological refereed studies, 1). Riyadh: Saudi Commission for Tourism and Antiquities.
 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.
 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.
- GOLVIN L.
 1988 Le *miḥrāb* et son éventuelle signification. In A. Papadopoulo (ed.), *Le Miḥrāb dans l’architecture et la religion musulmanes*. Leiden – New York: E. J. Brill: 53–55.
- GOODERS J.
 1979 *Birds of Heath and Woodland: Spotted Sandgrouse*. London: Orbis Publishing. p. 2–11.
- GRAINGER D. (DIR.)
 2007 *The geologic evolution of Saudi Arabia, a voyage through space and time*. Riyadh: Saudi Geological Survey.
- GRIGSON C.
 1980 The craniology and the relationship of four species of *Bos*: 5. *Bos indicus* L. *Journal of Archaeological Science* 7: 3–32.
- GROOM N.
 1983 *A Dictionary of Arabic Topography and Placenames*. Beirut – London: Librairie du Liban – Longman.
- HAERINCK E., PHILLIPS C.S., POTTS D.T. & STEVENS K.G.
 1993 Ed-Dur, Umm al-Qaiwain (U.A.E.). In U. Finkbeiner (ed.) *Materialien zur Archäologie der Seleukiden-und Partherzeit im südlichen Babylonien und im Golfgebiet*. Tübingen: Ernst Wasmuth Verlag: 183–194.

- [AL-]HAMDĀNĪ, ABŪ MUḤAMMAD AL-ḤASAN B. AḤMAD B. YA'QŪB / ED. M. 'L-AKWA'.
- 1967 [Iklīl 2, text] = *Kitāb al-Iklīl, al-juz' al-thānī, li-Lisān al-Yaman Abī Muḥammad al-Ḥasan b. Aḥmad b. Ya'qūb al-Hamdānī*. Ed. Muḥammad b. 'Alī 'l-Akwa' al-Ḥiwālī (al-Maktaba al-yamaniyya, 3). Cairo: al-Sunna al-muḥammadiyya.
- [AL-]HAMDĀNĪ, ABŪ MUḤAMMAD AL-ḤASAN B. AḤMAD B. YA'QŪB / ED. D.H. MÜLLER.
- 1968 [Şifa, text] = *Şifat Jazīrat al-'Arab. Al-Hamdānī's Geographie der arabischen Halbinsel nach den Handschriften von Berlin, Constantinopel, London, Paris und Strassburg*. Ed. David Heinrich Müller. 2 vol. Leiden: E.J. Brill [First edition 1884–1891].
- HANNESSTAD L.
- 1983 *Ikaros 2. The Hellenistic pottery from Failaka, with a survey of Hellenistic pottery in the Near East* (Jutland Archaeological Society Publications, XVI/2). Aarhus.
- HANSEN D.P., OCHSENSCHLAGER E.L. & AL-RADI S.
- 2004 Excavations at Jujah, Shibam, Wadi Hadhramawt. *Arabian Archaeology and Epigraphy* 15: 43–67.
- HARRISON D.L. & BATES P.J.J.
- 1991 *The Mammals of Arabia*. Sevenoaks: Harrison Zoological Museum Publications.
- HASS H., LAGRO H.E. & STEINER M.L.
- 1992 Second and third seasons of excavations at Tell Abū Sarbut, Jordan Valley (preliminary report). *Annual of the Department of Antiquities of Jordan* 36: 333–339.
- HELMER D.
- 2000 Discrimination des genres *Ovis* et *Capra* à l'aide des prémolaires inférieures 3 et 4 et interprétation des âges d'abattage : l'exemple de Dikili Tash (Grèce). *Ibex, Journal of Mountain Ecology* 5: 29–38.
- HELMER D., GOURICHON L. & VILA E.
- 2007 The development of the exploitation of products from *Capra* and *Ovis* (meat, milk and fleece) from the PPNB to the Early Bronze in the northern Near East (8700 to 2000 BC cal.). *Anthropozoologica* 42/2: 41–69.
- HILBERT Y.H.
- 2012 *An investigation of Late Palaeolithic stone tools Assemblages from the Nejd Plateau, Southern Oman*. PhD dissertation, University of Birmingham.
- 2013 Khamseen rock shelter and the Late Palaeolithic-Neolithic transition in Dhofar. *Arabian Archaeology and Epigraphy* 24: 51–58.
- HILBERT Y.H., ROSE J.I. & ROBERTS R.G.
- 2012 Late Palaeolithic core-reduction strategies in Dhofar, Oman. *Proceedings of the Seminar for Arabian Studies* 42: 101–118.
- HILLENBRAND R.
- 1994 *Islamic Architecture. Form, Function and Meaning*. Edinburgh.

- HORWITZ L.K. & MONCHOT H.
 2002 Choice cuts: hominid butchery activities at the Lower Paleolithic site of Holon, Israel. In H. Buitenhuis, A. M. Choyke, M. Mashkour & A. H. al-Shiyab (eds.), *Archaeozoology of the Near East V. Proceedings of the fifth international symposium on the archaeozoology of southwesern Asia and Adjacent areas*. Gröningen: ARC publication: 48-62.
- HORWITZ L.K. & ROSEN B.
 2005 A review of camel milking in the Southern Levant. In J. Mulville & A. K. Outram (eds.), *The Zooarchaeology of Fats, Oils, Milk and Dairying, Proceedings of the 9th ICAZ Conference, Durham 2002*. Oxford: Oxbow Books: 121-131.
- HUBER CH.
 1891 *Journal d'un voyage en Arabie (1883-1884). Publié par la Société asiatique et la Société de Géographie, avec Atlas*. Paris: Imprimerie nationale.
- HURST V.J. & KELLY A.R.
 1961 Patination of cultural Flints. *Science* vol. 134, no. 3474: 251-256.
- HUTTERER R.
 2008 *Paraechinus aethiopicus*. In IUCN 2012, *IUCN Red List of Threatened Species. Version 2012.2*. www.iucnredlist.org.
- IBN AL-KALBĪ, ABŪ 'L-MUNDHIR HISHĀM B. MUḤAMMAD B. AL-SĀ'IB / ED. N. ḤASAN
 1988 [Nasab, text] = *Nasab Ma'add wa-'l-Yaman al-kabīr*. Ed. Nājī Ḥasan. Beirut: 'Ālam al-kutub – Maktabat al-Nahḍat.
- IBN BATTŪTA, ABŪ 'ABDALLĀH MUHAMMAD IBN 'ABDALLĀH AL-LAWĀTĪ AL-ṬĀNJĪ / ED. C. DEFREMERY & B.R. SANGUINETTI
 1982 *Voyages. II. De La Mecque aux steppes russes et à l'Inde. Traduction de l'arabe de C. Defremery et B. R. Sanguinetti (1858). Introduction et notes de S. Yerasimos (Littérature et voyages)*. Paris: La Découverte – Poche.
- IBN KHAMĪS A.
 1978 *Mu'jam al-Yamāma*. 2 vol. (al-Mu'jam al-jughrāfī li-l-mamlaka al-'arabiyya al-sa'ūdiyya). S. l.
- INIZAN M.-L. & ORTLIEB L.
 1987 Préhistoire dans la région de Shabwa au Yémen du sud (R.D.P. Yémen). *Paléorient* 13/1: 522.
- [AL-]JĀSIR Ḥ.
 1977 *al-Mu'jam al-jughrāfī li-l-bilād al-'arabiyya as-sa'ūdiyya*. 2 vol. (nuṣuṣ wa-abḥāth jughrāfiyya wa-ta'rīkhiyya 'an Jazīrat al-'Arab, 19). Riyadh: Dār al-Yamāma.

- JOMIER J.
 2013 al-Fuṣṭāṭ. In P. Bearman, Th. Bianquis, C.E. Bosworth, E. van Donzel & W.P. Heinrichs (eds.), *Encyclopaedia of Islam, Second Edition*. Leiden: Brill Online [consulted on 04 October 2013].
- [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.
- KENNET D.
 2004 *Sasanian and Islamic pottery from Ras al-Khaimah: classification, chronology and analysis of trade in the Western Indian Ocean* (Society for Arabian Studies Monographs No. 1. BAR International Series, 1248). Oxford: Archaeopress.
- KERVAN M.
 1977 Les niveaux islamiques du secteur oriental du t p  de l'Apadana. II Le mat riel c ramique. *Cahiers de la DAFI VII* : 75–161.
- KERVAN M., HIEBERT F. & ROUGEULLE A. (EDS.)
 2006 *Qal'at al-Bahrain a trading and military outpost*. (Indicopleusto , Archaeologies of the Indian Ocean). Turnhout: Brepols.
- KHORD DHBEH, ABU'L-K SIM  UBAIDALLAH IBN  ABDALLAH IBN / ED. M.J. DE GOEJE
 1889 *Kit b al-mas lik wa-l-mam lik. Auctore Abu 'l-K sim Obaidallah ibn Abdallah Ibn Khord dhbeh et excerpta e Kit b al-Khar dj auctore Kod ma ibn Dja'afar quae cum versione Gallica edidit, indicibus et glossario instruxit M.J. de Goeje*. Leiden: Brill.
- KHUSRAW, N SIR-I / ED. CH. SCHEFER
 1881 *Relation du voyage de Nassiri Khosrau en Syrie, en Palestine, en  gypte, en Arabie et en Perse, pendant les ann es de l'h gire 437-444 (1035-1042), publi , traduit et annot  par Charles Schefer*. Paris: E. Leroux.
- KING G.R.D.
 1986 *The historical mosques of Saudi Arabia*. London – New York: Longman.
- KISTER M.J.
 1965 The campaign of  ulub n. A new light on the expedition of Abraha. *Le Mus on LXXVIII*: 425-436. [Reed. in M. J. Kister 1980. *Studies in J hiliyya and Early Islam*. London: Variorum Reprints, IV].
- KITCHEN
 2000 *Documentation for Ancient Arabia, Part II. Bibliographical Catalogue of Texts*. Liverpool
- KLEINDIENST M.R.
 2006 On Naming Things Behavioral Changes in the Later Middle to Earlier Late Pleistocene, Viewed From the Eastern Sahara. In E. Hovers & S. Kuhn (eds.)

Transition before the Transition: Evolution and Stability in the Middle Paleolithic and Middle Stone Age. New York: Springer: 13–28.

KURAN A.

1968 *The Mosque in early Ottoman Architecture*, Chicago: The University of Chicago Press.

LARCHER P.

2000 La Mu'allaqa de al-Ḥārith b. Ḥilliza : essai de traduction 'variationniste'. *Arabic and Middle Eastern Literatures* 3: 133–148.

LECKER M.

1989 *The banū Sulaym. A Contribution to the Study of Early Islam* (The Max Schloessinger Memorial Series, Monographs, IV). Jerusalem: The Hebrew University of Jerusalem.

LESBRE M.F.X.

1903 *Recherches anatomiques sur les camélidés.* (Archive du Musée d'Histoire Naturelle de Lyon, 8), Lyon.

LÉZINE A.-M., ROBERT C., CLEUZIQU S., INIZAN M.-L. ET ALII

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.

LINFORD N.

2006 The application of geophysical methods to archaeological prospection. *Reports on Progress in Physics* 69/7: 2205–2257.

LOMBARD P.

1999 Le matériel funéraire du Dilmoun ancien. In P. Lombard (ed.) *Bahreïn. La civilisation des deux mers de Dilmoun à Tylos.* Paris: Institut du Monde Arabe: 56–71.

LYALL CH.J.

1906 Ibn al-Kalbī's account of the First Day of al-Kulāb. In C. Bezold (ed.) *Orientalische Studien Theodor Nöldeke zum siebzigsten Geburtstag (2. März 1906) gewidmet von Freunden und Schülern.* 1. Band. Gieszen: Verlag von Alfred Töpelmann: 127–154.

LYMAN R.L.

1987 Archaeofaunas and butchery studies: a taphonomic perspective. *Advances in Archaeological Method and Theory* 10: 249–337.

1994 *Vertebrate taphonomy.* Cambridge: Cambridge University Press.

2008 *Quantitative Paleozoology.* Cambridge: Cambridge University Press.

MA'SAL

1999 *Ma'sal. Maṭbū'a 'ilmiyya tu'nà bi-dirāsāt al-kitābāt al-'arabiyya al-qadīma fī jazīrat al-'Arab.* Riyadh: Lajnat dirāsāt al-kitābāt al-'arabiyya al-qadīma fī qism al-ātār wa-'l-matāḥif bi-Jāmi'at al-malik Sa'ūd.

- MABRY J. & PALUMBO G.
 1988 The 1987 Wadi el-Yabis survey. *Annual of the Department of Antiquities of Jordan* 32: 275–305.
- MACDONALD K.C.
 1992 The domestic chicken (*Gallus gallus*) in Sub-Saharan Africa: a background to its introduction and its osteological differentiation from indigenous fowls (Numidinae and *Francolinus* sp.). *Journal of Archaeological Science* 19: 303–318.
- MARKS A.E.
 2008 Into Arabia, perhaps, but if so, from where? *Proceedings of the Seminar for Arabian Studies* 38: 15–24.
- MARKS A.E. & CONARD N.J.
 2008 Technology vs. typology: The case for and against a transition from the MSA to the LSA at Mumba Cave, Tanzania. In T. Aubry, F. Almeida, A. C. Araujo & M. Tiffagom (eds.) *Typology vs. Technology. Proceedings of the XV UISPP World Congress in Lisbon September 4-9* (BAR International Series, S1831). Oxford: Archaeopress: 123–131.
- MARQUART J.
 1901 *Ērānšahr nach der Geographie des Ps. Moses Xorenac'i, mit historisch-kritischem Kommentar und historischen und topographischen Excursen* (Abhandlungen der königlichen Gesellschaft der Wissenschaften zu Göttingen. Phil.-hist. Klasse, Neue Folge III, Nr. 2). Berlin: Weidmann.
- MARTIN L., MCCORRISTON J. & CRASSARD R.
 2009 Early Arabian pastoralism at Manayzah in Wadi Sana, Hadramawt. *Proceedings of the Seminar for Arabian Studies* 39: 271–282.
- [AL-]MAS'UDĪ, '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.
- MASON R.B.
 1997 Early Mediaeval Iraqī Lustre-painted and Associated Wares: Typology in a Multidisciplinary Study. *Iraq* LIX: 1–47.
- MASON R.B. & KEALL E.J.
 1991 The 'Abbāsīd glaze ware of Sīrāf and Baṣra connection: petrographic analysis. *Iran* 29 : 51–66.
- MAWSŪ'AT ASMĀ' AL-AMĀKIN
 2003 *Mawsū'at asmā' al-amākin fī 'l-mamlaka al-'arabiyya al-sa'ūdiyya*. 6 vol. Riyadh: Dārat al-malik 'Abd al-'Azīz – Hay'at al-masāḥa al-jiyūlūjiyya al-sa'ūdiyya.

McCLURE H.

- 1976 Radiocarbon chronology of Late Quaternary Lakes in the Arabian Desert. *Nature* 263: 755–756.
- 1978 Ar Rub' al Khali. In S. S. al-Sayari & J. G. Zötl (eds.) *Quaternary Period in Saudi Arabia. Vol. 1: sedimentological, hydrogeological, hydrochemical, geomorphological, and climatological investigations in central and eastern Saudi Arabia*. Wien: Springer Verlag.

McCORRISTON J.

- 2013 The Neolithic in Arabia: a view from the south. *Arabian Archaeology and Epigraphy* 24/1: 68–72.

McCORRISTON J., OCHES E.A., WALTER D.E. & COLE K.L.

- 2002 Holocene paleoecology and prehistory in highland southern Arabia. *Paléorient* 28/1: 61–88.

McCORRISTON J., STEIMER T., HARROWER M., WILLIAMS K. ET ALII

- 2011 Gazetteer of small-scale monuments in prehistoric Hadramawt, Yemen: a radiocarbon chronology from the RASA-AHSD Project research 1996–2008. *Arabian Archaeology and Epigraphy* 22: 1–22.

MEIGNEN L.

- 1995 Levallois lithic production systems in the Middle Paleolithic of the Near East: the case of the unidirectional method. In H.L. Dibble & O. Bar-Yosef (eds.) *The definition and interpretation of Levallois technology* (Monographs in World Archaeology, 23), Philadelphia: Prehistory Press: 361–379.

MEIGNEN L. & BAR-YOSEF O.

- 1988 Variabilité technologique au Proche Orient: l'exemple de Kebara. In L. Binford & J.-P. Rigaud (eds.) *L'Homme de Néandertal, vol. 4, La Technique*, Liege: ERAUL: 81–95.
- 1991 Les outillages lithiques moustériens de Kebara (fouilles 1982–1985) : premiers résultats. In O. Bar-Yosef & B. Vandermeersch (eds.) *Le squelette moustérien de Kebara 2*. Paris: Éditions du CNRS: 49–75.
- 2004 Réflexion sur la fin du Paléolithique moyen et les débuts du Paléolithique supérieur au Proche Orient. In P. Van Peer, P. Sémal & D. Bonjean (eds.) *Le Paléolithique moyen, Sessions générales et posters section 5, Actes du 16^e Congrès UISPP, Université de Liège, Belgique, 2-8 septembre 2001*. Oxford: Archaeopress: 235–245.

MIGOWSKI C., STEIN M., PRASAD S., NEGENDANK J. ET ALII

- 2006 Holocene climate variability and cultural evolution in the Near East from the Dead Sea sedimentary record. *Quaternary Research* 66: 421–431.

MONCHOT H.

- 1996 La consommation du mouflon (*Ovis antiqua*, Pommerol 1879) au pléistocène moyen à la Caune de l'Arago (Tautavel, Pyrénées-Orientales). *Géologie Méditerranéenne* XXIII/2: 101–115.

- In press 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., BAILON S. & SCHIETTECATTE J.
 2014 Archaeozoological evidence for traditional consumption of spiny-tailed lizard (*Uromastix aegyptia*) in Saudi Arabia. *Journal of Archaeological Science* 45 (May 2014): 96–102.
- MONCHOT H. & LÉCHELLE J.
 2002 Statistical non parametric methods for the study of fossil populations. *Paleobiology* 28/1: 55–69.
- MOODY S.M.
 1980 *Phylogenetic and Historical Biogeographical Relationships of the Genera in the Family Agamidae (Reptilia: Lacertilia)*. Ph.D. Dissertation. University of Michigan, Ann Arbor.
- MORONY M.G.
 2002 The Late Sasanian Economic Impact on the Arabian Peninsula. *Nāme-ye Irān-e Bāstān* 1/2: 25-37.
- MOUTON M.
 2008 *La péninsule d'Oman de la fin de l'Âge du fer au début de la période sassanide (250 av.-350 ap. J.-C.)* (BAR International Series, 1776, Society for Arabian Studies Monographs, 6). Oxford: Archaeopress.
 2009 The settlement patterns of north-eastern and south-eastern Arabia in late antiquity. *Arabian Archaeology and Epigraphy* 20: 185–207.
- MOUTON M. & SCHIETTECATTE J.
 2014 *In the desert margins. The settlement process in ancient South and East Arabia* (Arabia Antica, 9). Rome: L'Erma di Bretschneider.
- [AL-]MUGHANNAM A.S.
 1988 Excavation of the Dhahran Burial Mounds, Fourth Season, 1986. *Atlat* 11: 9–28.
 2000 A Preliminary Report on the Excavation of al-Uqair, north-west of Abu Zahmul in al-Ahsa Region. *Atlat* 15: 45-86 [engl.]; 55-95 [ar.]; pls. 12–26.
- MULDER-HEYMANS N.
 2002 Archaeology, experimental archaeology and ethnoarchaeology on bread ovens in Syria. *Civilisations* 49: 197-221.
- MÜLLER W.W.
 2010 *Sabäische Inschriften nach Ären datiert. Bibliographie, Texte und Glossar* (Akademie der Wissenschaften und der Literatur – Mainz, Veröffentlichungen der Orientalischen Kommission, 53). Wiesbaden: Harrassowitz.

- MUNRO N.D., BAR-OZ G. & STUTZ A.J.
 2009 Aging mountain gazelle (*Gazella gazella*): refining methods of tooth eruption and wear and bone fusion. *Journal of Archaeological Science* 36: 752–763.
- 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.
- MUNSCHY M., BOULANGER D., ULRICH P. & BOUIFLANE M.
 2007 Magnetic mapping for the detection and characterization of UXO: Use of multi-sensor fluxgate 3-axis magnetometers and methods of interpretation. *Journal of Applied Geophysics* 61/3–4: 168–183.
- NABIGHIAN M.N., GRAUCH V.J.S., HANSEN R.O., LAFEHR T.R. ET ALII
 2005 75th Anniversary: The historical development of the magnetic method in exploration. *Geophysics* 70/6: 33–61.
- NEHMÉ L., [AL-]TALHI D. & VILLENEUVE FR. (DIR.)
 2010 *Report on the first excavation season at Mada'in Sâlih, 2008, Saudi Arabia*. Riyadh: SCTA.
- NORTHEGE A.
 1997 Les origines de la céramique à glaçure polychrome dans le monde islamique. In G. Démians d'Archimbaud (dir.), *La céramique médiévale en Méditerranée. Actes du VI^e congrès de l'AIECM2, Aix-en-Provence, 13-18 novembre 1995*. Aix en Provence : Narration édition: 213–223.
- NORTHEGE A. & FALKNER R.K.
 1983 *Pottery from Samarra'. The surface survey and the Excavations at Qadisiyy 1983–89*. Unpublished report, 2 vol.
- OLSEN N., TØFFNER-CLAUSEN L., SABAKA T.J., BRAUER P. ET ALII
 2003 Calibration of the Ørsted vector magnetometer. *Earth, Planets, and Space* 55: 11–18.
- OUESLATI T.
 2008 Spatial fluctuation of food habits in byzantine Beirut (Bey 002, Bey 028, Bey 115), *Archaeozoology of the Near East VIII* (TMO 49). Lyon: Maison de l'Orient et de la Méditerranée: 629–640.
- PARKER A.G., GOUDIE A., STOKES S., WHITE K. ET ALII
 2006a A record of Holocene climate change from lake geochemical analyses in southeastern Arabia. *Quaternary Research* 66: 465–476.
- PARKER A.G., PRESTON G., WALKINGTON H. & HODSON M.J.
 2006b Developing a framework of Holocene climatic change and landscape archaeology for the lower Gulf region, Southeastern Arabia. *Arabian Archaeology and Epigraphy* 17: 125–130.

- PARKER A.G. & ROSE J.I.
 2008 Climate change and human origins in southern Arabia. *Proceedings of the Seminar for Arabian Studies* 38 : 25–42.
- PAYNE S.
 1973 Kill-off patterns in sheep and goats: the mandibles from Asvan Kale. *Anatolian Studies* 23: 281–303.
- PETERS J.
 1989 Osteomorphological features of the appendicular skeleton of gazelles, genus *Gazella* Blainville 1816, Bohor Reedbuck, *Redunca redunca* (Pallas, 1767) and Bushbuck, *Tragelaphus scriptus* (Pallas, 1766). *Anatomia, Histologia, Embryologia* 18: 97–113.
- 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, vol. 280). Tervuren: Musée Royal de l’Afrique Centrale.
- PETRAGLIA M.D.
 2003 The lower Paleolithic of the Arabian peninsula: occupation, adaptation and dispersal. *Journal of World Prehistory* 17/2: 141–179.
 2005 Hominin responses to Pleistocene environmental change in Arabia and South Asia. In M. J. Head & P. L. Gibbard (eds.) *Early–Middle Pleistocene Transitions: The Land–Ocean Evidence* (Geological Society, Special Publications, 247). London: 305–319.
- PETRAGLIA M.D. & ALSHAREKH A.
 2003 The Middle Paleolithic of Arabia: implications for modern human origins, behavior and dispersals. *Antiquity* 77: 671–684.
- PETRAGLIA M.D., ALSHAREKH A., BREEZE P., CLARKSON C. ET ALII
 2012 Hominin dispersal into the Nefud desert and middle Palaeolithic settlement along the Jubba palaeolake, northern Arabia. *PLoS ONE* 7/11: e49840. doi:10.1371/journal.pone.0049840
- PETRAGLIA M.D., ALSHAREKH A.M., CRASSARD R., DRAKE N. ET ALII
 2011 Middle Paleolithic occupation on a Marine Isotope Stage 5 lakeshore in the Nefud Desert, Saudi Arabia. *Quaternary Science Reviews* 30/13–14: 1555–1559.
- PETRAGLIA M.D. & ROSE J.I.
 2009 *The Evolution of Human Populations in Arabia. Paleoenvironments, Prehistory and Genetics*. London: Springer Academic Publishers.
- PHILBY H. ST J.
 1919 *Southern Nejd. Journey to Kharj, Aflaj, Sulaiyyil and Wadi Dawasir in 1918*. Cairo: The Arab Bureau.
 1920 Southern Najd. *The Geographical Journal* 55/3–4: 161–185.

- 1921 *Heart of Arabia: a record of travel & exploration*. London: Constable and Company Ltd.
- 1949 Two notes from Central Arabia. *The Geographical Journal* 113: 86–93
- POTTS D.T.
- 1984 Northeastern Arabia in the Later Pre-Islamic Era. In R. Boucharlat & J.-Fr. Salles (eds.), *Arabie orientale, Mésopotamie et Iran méridionale de l'Âge du Fer au début de la période islamique*. Paris: ADFP: 85–144.
- 2001 Ostrich distribution and exploitation in the Arabian Peninsula. *Antiquity* 75: 182–190.
- POWERS R.W., RAMIREZ I.F., REDMOND C.D. & ELBERG F.L. JR.
- 1966 *Geology of the Arabian Peninsula: sedimentary geology of Saudi Arabia* (U.S. Geological survey Professional paper 560-D).
- PRESTON G. W. & PARKER A. G.
- 2013 Understanding the evolution of the Holocene Pluvial Phase and its impact on Neolithic populations in south-east Arabia. *Arabian Archaeology and Epigraphy* 24/1: 84–97.
- PREUSSER F.
- 2009 Chronology of the impact of Quaternary climate change on continental environments in the Arabian Peninsula. *Comptes Rendus de l'Académie des Sciences – Geoscience* 341: 1–12.
- PRIMDAHL F.
- 1979 The fluxgate magnetometer. *Journal of Physics E: Scientific Instruments* 12/4: 241–253.
- PRINGLE D.
- 1986 *The red tower. Settlement in the Plain of Sharon at the Time of the Crusaders and Mamluks A.D. 1099-1516* (British School of Archaeology in Jerusalem series no 1). London: British School of Archaeology in Jerusalem.
- PRUMMEL W. & FRISCH H.-H.
- 1986 A guide for distinction of species, sex and body size in bones of sheep and goat. *Journal of Archaeological Science* 13: 567–577.
- RABBAT N.
- 2013 Riwāk. In P. Bearman, Th. Bianquis, C.E. Bosworth, E. van Donzel & W.P. Heinrichs (eds.), *Encyclopaedia of Islam, Second Edition*. Leiden: Brill Online [consulted on 03 October 2013].
- [AL-]RASHID I.A.
- 1986 *Al-Rabadhah, a portrait of Early Islamic civilisation in Saudi Arabia*. London: Longman.
- RINGROSE T.J.
- 1993 Bone counts and statistics; a critique. *Journal of Archaeological Science* 20: 121–157.

ROBIN CH.J.

- 1996 Le Royaume Ḥijride, dit “royaume de Kinda”, entre Ḥimyar et Byzance. *Académie des Inscriptions et Belles-Lettres, Comptes rendus des séances de l'année 1996*: 665–714.
- 2008 Les Arabes des « Romains », des Perses et de Ḥimyar (III^e-VI^e s. è. chr.). *Semitica et Classica* 1: 167–202.
- 2012a Abraha et la reconquête de l'Arabie déserte : un réexamen de l'inscription Ryckmans 506 = Murayghān 1. *Jerusalem Studies on Arabic and Islam* 39: 1–93.
- 2012b Les rois de Kinda. In A. al-Helabi, D.G. Letsios, M. al-Moraekhi & A. al-Abduljabbar (eds.) *Arabia, Greece and Byzantium. Cultural Contacts in Ancient and Medieval Times*. Riyadh: King Saud University: 59–129.

ROBIN CH.J. & GAJDA I.

- 1994 L'inscription du wādī 'Abadān. *Raydān* 6: 113–137.

ROBIN CH.J. & PRIOLETTA A.

- 2013 Nouveaux arguments en faveur d'une identification de la cité de Gerrha avec le royaume de Hagar (Arabie orientale). *Semitica et Classica* 6: 131–185.

ROBIN CH.J. & ṬAYRĀN S.

- 2012 Soixante-dix ans avant l'Islam, l'Arabie toute entière dominée par un roi chrétien. *Académie des Inscriptions et Belles-Lettres, Comptes rendus de l'année 2012*: 525–553.

ROSE J.I.

- 2006 *Among Arabian Sands: Defining the Palaeolithic of Southern Arabia*. Ph.D. dissertation, Southern Methodist University, Dallas.

ROSE J.I. & BAILEY G.N.

- 2008 Defining the Palaeolithic of Arabia? Notes on the Roundtable Discussion. *Proceedings of the Seminar for Arabian Studies* 38: 65–70.

ROSE J.I. & PETRAGLIA M.

- 2009 Tracking the origin and evolution of human populations in Arabia. In M. Petraglia & J. Rose (eds.) *The Evolution of Human Populations in Arabia. Palaeoenvironments, Prehistory and Genetics*. London: Springer: 1–12.

ROSE J.I., USIK V.I., MARKS A.E., HILBERT Y.H. ET ALII

- 2011 The Nubian Complex of Dhofar, Oman: an African Middle Stone Age industry in Southern Arabia. *PLoS ONE* 6/11: e28239. doi:10.1371/journal.pone.0028239

ROSEN AYALON M.

- 1974 *La céramique islamique de Suse* (Mémoires de la Délégation archéologique Française en Iran). Paris : Geuthner.

ROSENTHAL F.

- 2013 La'ib. In P. Bearman, Th. Bianquis, C.E. Bosworth, E. van Donzel & W.P. Heinrichs (eds.), *Encyclopaedia of Islam, Second Edition*, Leiden: Brill Online [consulted on 02 October 2013].

- ROSEVEAR D.R.
1974 *The carnivores of West Africa*. London: British Museum.
- ROTLÄNDER R.
1975 The formation of patina on flint. *Archaeometry* 17: 106–110.
1978 *Schwierigkeiten bei der Datierung von Silices. Mineralische Rohstoffe als kulturhistorische Informationsquelle*. Hagen: Kennicke.
- ROUSSET M.-O. & MARCHAND S.
2001 Secteur nord de Tebtynis (Fayyoum) Mission de 2000. *Annales Islamologiques* 35: 409–461.
- ROY K.K.
2010 *Potential Theory in Applied Geophysics*, Berlin – Heidelberg: Springer.
- SALLES J.F. & LOMBARD P.
1999 La céramique. In P. Lombard (ed.), *Bahrein. La civilisation des deux mers, de Dilmun à Tylos. Exposition présentée à l'Institut du Monde Arabe du 18 mai au 29 août 1999*, Paris – Gand : Institut du Monde Arabe – Snoeck-Ducaju & Zoon: 162–175.
- SANLAVILLE P.
2000 *Le Moyen-Orient arabe, le milieu et l'homme*. Paris: Armand Colin.
- SASAKI T.
1996 Umayyad and Abbasid finds from the 1994 excavations at Jazirat al-Hulayla. *Bulletin of Archaeology of the University of Kanazawa* 23: 179–222.
- SAUVAGET J.
1947 *La mosquée omeyyade de Médine : étude sur les origines architecturales de la mosquée et de la basilique*. Paris: Vanoest.
- SAYYID ABDEL MONEM A.H.
1988 Emendations to the Bir Murayghan Inscription Ry 506 and a new minor inscription from there. *Proceedings of the Seminar for Arabian Studies* 18: 131–143.
- SCHIETTECATTE J., [AL-]GHAZZI A., CHARLOUX G., CRASSARD R. ET ALII
2013 The oasis of al-Kharj through time: first results of archaeological fieldwork in the province of Riyadh (Saudi Arabia). *Proceedings of the Seminar for Arabian Studies* 43: 285–308.
- SCHIETTECATTE J., CHABROL A., GANDREAU D., GAVAZZI B. ET ALII
2012 *Second season of the Saudi-French mission in al-Yamāma, al-Kharj area (11 November – 18 December 2012)*. Unpublished preliminary report available on line: <http://halshs.archives-ouvertes.fr/halshs-00797003/>

SCHMID S.G.

- 2000 Die Feinkeramik der Nabatäer: Typologie, Chronologie und kulturhistorische Hintergründe. In S. G. Schmid & B. Kolb (eds.) *Petra. Ez Zantur II. Ergebnisse der Schweizerisch-Liechtensteinischen Ausgrabungen 1988-1992*. (Terra Archaeologica IV). Mainz: Philipp von Zabern: 1-199.

SCOTT-JACKSON J., SCOTT-JACKSON W., ROSE J.I. & JASIM S.

- 2008 Investigating Upper Pleistocene stone tools from Sharjah, UAE: Interim report. *Proceedings of the Seminar for Arabian Studies* 38: 43-54.

SEDOV A.V.

- 2007 The Cultural Quarter: Area F. In A. Avanzini (ed.) *A Port in Arabia between Rome and the Indian Ocean (3rd cent. BC - 5th cent. AD)*. *Khawr Rūrī Report 2*. (Arabia Antica 5). Rome: "L'Erma" di Bretschneider: 183-259.
- 2010 Les fouilles du secteur 6. In J.-Fr. Salles & A. V. Sedov (eds.), *Qāni'. Le port antique du Ḥaḍramawt entre le Méditerranée, l'Afrique et l'Inde. Fouilles russes 1972, 1985-1989, 1991, 1993-1994* (Indicopleustoi, Archaeologies of the Indian Ocean). Turnhout: Brepols: 183-281.

SIMÉON P. & LORETO R.

- Forthc. The pottery from Dûmat al-Jandal: Excavations levels (1 to 8) on the Qasr Marîd area.

SIMPSON ST J.

- 1998 'Where There's Smoke, There's Fire ...'. Pipe-smoking in the Ottoman Empire. *The British Museum Magazine* 31 (summer 1998): 14-17.
- 2009 The archaeology of the clay pipe in the Near East. *Al-Rafidān* XXX (2009): 1-9.

SITZIA L., BERTRAN P., BOULOGNE S., BRENET M. ET ALII

- 2012 The Paleoenvironment and Lithic Taphonomy of Shi'bat Dihya 1, a Middle Palaeolithic Site in Wadi Surdud, Yemen. *Geoarchaeology* 27: 471-491.

SMITH G.R.

- 2004 Al-Yamāma. In *Encyclopédie de l'Islam, nouvelle édition*. Vol. XI: 292-293.

SMITH I.

- 2005 The mammal, Bird, Reptile and Molluscs remains. In T. Insoll (ed.), *The Land of Enki in the Islamic Era. Pearls, Palms and Religious identity in Bahrain*. London - New York - Bahrain: Kegan Paul: 193-231.

SMUTS M.M.S. & BEZUIDENHOUT A.J.

- 1987 *Anatomy of the dromedary*. Oxford: Clarendon Press.

STEIGER C.

- 1990 *Vergleichend morphologische Untersuchungen an einzelknochen des postkranialen Skeletts des Altweltkamele*. PhD Dissertation. Ludwig-Maximilians-Universität, Munich.

- STINER M.C., KUHN S.L., WEINER S. & BAR-YOSEF O.
 1995 Differential burning, recrystallization and fragmentation of archaeological bone. *Journal of Archaeological Science* 22: 223–237.
- STONE C.
 1982 The camel bird of Arabia. *Saudi Aramco World* March/April 1982: 10–11.
- STUDER J.
 2010 Preliminary Report on Faunal Remains. In L. Nehmé, D. al-Talhi & Fr. Villeneuve (ed.), *Unpublished report. Report on the Third Excavation Season (2010) of the Madâ'in Sâlih Archaeological Project* [Report on-line: <http://halshs.archives-ouvertes.fr/halshs-00542793>]: 285–293.
 2011 Étude préliminaire des ossements analysés en 2011. In L. Nehmé (dir.), *Rapport sur la quatrième campagne (2011) de la mission archéologique de Madâ'in Sâlih* [unpublished report].
- STUDER J. & SCHNEIDER A.
 2008 Camel use in the Petra Region, Jordan: 1st century AD. In E. Vila, L. Gourichon, A. M. Choyke & H. Buitenhuis (eds.), *Archaeozoology of the Near East VIII* (TMO 49). Lyon: Maison de l'Orient et de la Méditerranée: 581–596.
- SYNODICON ORIENTALE / ED. CHABOT J.-B.
 1902 [Text and translation] = *Synodicon orientale ou Recueil de synodes nestoriens, publié, traduit et annoté par Jean-Baptiste Chabot* (Notices et extraits des manuscrits de la Bibliothèque nationale et autres bibliothèques, publiés par l'Académie des Inscriptions et Belles-Lettres, 37). Paris: Imprimerie nationale.
- AL-ṬABARĪ ABŪ JAʿFAR MUHAMMAD B. JARĪR / ED. DE GOEJE M.J.
 1964 [Taʿrīkh, text] *Taʿrīkh al-rusul wa-l-mulūk, I : Annales quos scripsit Abu Djafar Mohammed Ibn Djarir at-Tabari, cum aliis edidit M.J. De Goeje, Prima series, ii, recensuerunt J. Barth et Th. Nöldeke*. Leiden: Brill.
- AL-ṬABARĪ ABŪ JAʿFAR MUHAMMAD B. JARĪR / ED. NOLDEKE TH.
 1879 [Taʿrīkh, german translation] = *Geschichte der Perser und Araber zur Zeit der Sasaniden, aus der arabischen Chronik des Tabari, übersetzt und mit ausführlichen Erläuterungen und Ergänzungen versehen von Th. Noldeke* [Reed. Leiden: Brill, 1973].
- AL-ṬABARĪ ABŪ JAʿFAR MUHAMMAD B. JARĪR / ED. BOSWORTH C.E.
 1999 [Taʿrīkh, engl. translation] = *The History of al-Ṭabarī, vol. V, The Sāsānids, the Byzantines, the Lak(h)mids, and Yemen, translated by C.E. Bosworth* (Bibliotheca persica). New York: State University of New York Press.
- TALHI D., IBRAHIM M., MURSI J.M. & ASKUBI KH.
 1986 Exavation at Mabiyyat. Second Season. 1404-1405 / 1984-1985. *Atlal* 10: 58-63.

TAVO B VII 1

1987 *Tübingen Atlas des Vorderen Orients Teil B. Geschichte. VII. Die Ausbreitung des Islam bis zum ersten Kreuzzug (bis 1096) 1. Das islamische Arabien bis zum Tode des Propheten (632/11h) von Ulrich Rebstock.* Wiesbaden: Ludwig Reichert. 1987.

TCHERNOV E.

1994 *An early Neolithic village in the Jordan valley. Part II: the fauna of Netiv Hagdud.* (American Schools of Prehistoric Research Bulletin 44). Cambridge Mass.: Peabody Museum of Archaeology and Ethnology.

THALMANN J.-P.

1978 Tell 'Arqa (Akkar), campagne I-III, 1972-1974, chantier I, rapport préliminaire. *Syria* 55: 1-152.

THÉBAULT E., PURUCKER M., WHALER K.A., LANGLAIS B. ET ALII

2010 The Magnetic Field of the Earth's Lithosphere. *Space Science Reviews* 155/1-4: 95-127.

THILO U.

1958 *Die Ortsnamen in der altarabischen Poesie: Ein Beitrag zur vor- und frühislamischen Dichtung und zur historischen Topographie Nordarabiens* (Schriften der Max Freiherr von Oppenheim-Stiftung, 3). Wiesbaden: Harrassowitz.

THOULESS C.R., GRAINGER J.G., SHOBRACK M. & HABIBI K.

1991 Conservation status of gazelles in Saudi Arabia. *Biological Conservation* 58: 85-98.

[AL-]TIKRITI W.

2010 Heading North: An Ancient Caravan Route and the Impact of the Falaj System on the Iron Age Culture. In A. Avanzini (ed.) *Eastern Arabia in the First Millennium BC.* Rome: L'Erma di Bretschneider: 227-247.

TODISCO D. & MONCHOT H.

2008 Bone weathering in a periglacial context: the Tayara site (KbFk-7), Qikirtaq island, Nunavik (Canada). *Arctic* 61/1: 87-101.

TOMBER T.

2008 Appendix 2. Classical and Islamic pottery. In G. Barker, D. Gilbertson & D. Mattingly (eds.), *Archaeology and Desertification The Wadi Faynan Landscape Survey. Southern Jordan.* Oxford: Oxbow Books: 435-454.

TOSTEVIN G.B.

2011 Levels of Theory and Social Practice in the Reduction Sequence and *Chaîne Opératoire* Methods of Lithic Analysis. *PaleoAnthropology* 2011: 351-375 doi:10.4207/PA.2011.ART64.

- [AL-]‘UBŪDĪ M.
 1979 *Bilād al-Qaṣīm (al-Mu‘jam al-jughrāfi li-l-Bilāl al-‘arabiyya al-sa‘ūdiyya)*. (Nuṣūṣ wa-abḥāth jughrāfiyya wa-ta’rīkhiyya ‘an Jazīrat al-‘Arab, 21). 6 vol. Riyadh: al-Yamāma.
- UERPMANN H.-P., POTTS D.T. & UERPMANN M.
 2009 Holocene (re-)occupation of eastern Arabia. In M. Petraglia & J. Rose (eds.) *The Evolution of Human Populations in Arabia. Paleoenvironments, Prehistory and Genetics*. London: Springer: 205–214.
- UERPMANN M. & UERPMANN H.-P.
 1997 Animal bones from excavation 519. In F. Højlund & H. Andersen (eds.), *Qala’at al-Bahreïn. The Central Monumental Buildings*. Moesgaard: Jutland Archaeological Society: 235–264.
- UERPMANN H.-P., UERPMANN M., KUTTERER A. & JASIM S.A.
 2013 The Neolithic period in the Central Region of the Emirate of Sharjah (UAE). *Arabian Archaeology and Epigraphy* 24/1: 102–108.
- USIK V.I., ROSE J.I., HILBERT Y.H., VAN PEER P. ET AL.
 2013 Nubian complex reduction strategies in Dhofar, southern Oman. *Quaternary International* 300: 244–266.
- VAN BEEK G.W., COLE G.H. & JAMME A.
 1963 An archaeological reconnaissance in Hadramaut: a preliminary report. *Annual Report of the Smithsonian Institute* 1963: 521–545.
- VAN PEER P.
 1992 *The Levallois Reduction Strategy* (Monographs in World Archaeology, 13), Madison: Prehistory Press.
- VAN PEER P., VERMEERSCH P. & PAULISSEN E.
 2010 *Chert Quarrying, Lithic Technology and a Modern Human Burial at the Palaeolithic Site of Taramsa 1, Upper Egypt*. Leuven: Leuven University Press.
- VANDERHAAR J.M. & HWANG Y.T.
 2003 *Mellivora capensis*. *Mammalian Species* 721: 1–8.
- VASLET D., [AL-]MUALLEM M.S., MADDAH S.S., BROSSE 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.
- VERMEERSCH P., PAULISSEN E. & VAN PEER P.
 1990 Palaeolithic chert exploitation in the limestone stretch of the Egyptian Nile Valley. *The African Archaeological Review* 8: 77–102.

- VIDAL F.S.
1971 Al-Hufūf. In *Encyclopédie de l'Islam, deuxième édition*. Vol. III: 567–568.
- VINCENT P.
2008 *Saudi Arabia: an environmental overview*, London – Leiden – New York: Taylor & Francis
- WAFI A.-M.
1988 Les *mihrāb* et leurs ornements décoratives. In A. Papadopoulo (ed.), *Le Mihrāb dans l'architecture et la religion musulmanes*. Leiden – New York: Brill: 70–75.
- WAHIDA G., AL-TIKRITI W.Y. & BEECH M.
2008 Barakah: a Middle Palaeolithic site in Abu Dhabi Emirate. *Proceedings of the Seminar for Arabian Studies* 38: 55–64.
- WENDORF F & SCHILD R.
1974 *A Middle Stone Age Sequence from the Central Rift Valley, Ethiopia*. Warsaw: Polska Akademia Nauk.
- WHALEN N.M. & SCHATTEN K.E.
1997 Pleistocene sites in southern Yemen. *Arabian Archaeology and Epigraphy* 8: 1–10.
- WHITCOMB D. & JOHNSON J.H.
1982 *Quseir al-Qadim 1980: preliminary report*. (American Research center in Egypt, Preliminary reports, 7). Malibu: Undena Publications.
- WHITEHOUSE D.
1968 Excavations at Siraf, Firth interim report. *Iran* 6: 1–22.
1979 Islamic glazed pottery in Iraq and the Gulf: the ninth and tenth centuries. *Annali dell'Istituto Universitario Orientale di Napoli* 39: 45–61.
- WILMS T. & BÖHME W.
2000 A new *Uromastyx* species from south-eastern Arabia, with comments on the taxonomy of *Uromastyx aegyptia* (Forskål, 1755). *Herpetozoa* 13/3–4: 133–148.
2007 Review of the taxonomy of the spiny-tailed lizards of Arabia (Reptilia: Agamidae: *Lieilepidinae*: *Uromastyx*). *Fauna of Arabia* 23: 435–468.
- WILMS T., BÖHME W., WAGNER P., LUTZMANN N. & SCHMITZ A.
2009 On the Phylogeny and Taxonomy of the Genus *Uromastyx* Merrem, 1820 (Reptilia: Squamata: Agamidae: Uromastycinae) – Resurrection of the Genus *Saara* Gray, 1845. *Bonner zoologische Beiträge* 56/1–2: 55–99.
- WILMS T., WAGNER P., SHOBRAK M., LUTZMANN N. & BÖHME W.
2010 Aspects of the ecology of the Arabian spiny-tailed lizard (*Uromastyx aegyptia microlepis* Blanford, 1875) at Mahazat as-Sayd protected area, Saudi Arabia. *Salamandra* 46: 131–140.

WILSON J. & SA'D M.

1984 The Domestic material culture of Nabataean to Ummayyad period Busrâ. *Berytus* 32: 35–147.

WÜSTENFELD F.

1874 *Bahrein und Jemâma. Nach arabischen Geographen beschrieben.* Göttingen: Dieterichschen Buchhandlung.

YĀQŪT SHIHĀB AL-DĪN ABĪ 'ABD ALLĀH B. 'ABDALLĀH AL-ĤAMAWĪ AL-RŪMĪ AL-BAGHDĀDĪ / ED. F. WÜSTENFELD
1866–1873 [Mu'jam, text] = *Kitāb mu'jam al-buldān. Jacut's geographisches Wörterbuch, aus den Handschriften zu Berlin, St. Petersburg, 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].

YELLEN J., BROOKS A., HELGREN D., TAPPEN M. *ET ALII*

2005 The archaeology of Aduma Middle Stone Age sites in the Awash Valley, Ethiopia. *Paleoanthropology* 10: 25–100.

YOM-TOV Y., MENDELSSHON H. & GROVES C.P.

1995 *Gazella dorcas.* *Mammalian Species* 491: 1–6.

[AL-]ZAHIRĀNĪ A., AL-MASHAIRI S., AL-NAFISA A., AL-YAHYA A. & AL-BASYUNI A.

2001 Preliminary Report on the Excavations of al-Ukhdoud, Najran. Second Season 1417 A.H. *Atlal* 16 (2001): 13–21 [engl.]/13–35 [ar.].

ZARINS J.

2001 *The Land of Incense: Archaeological work in the Governorate of Dhofar, Sultanate of Oman, 1990-1995.* Muscat: Sultan Qaboos University Publications.

2013 Hailat Araka and the South Arabian Neolithic. *Arabian Archaeology and Epigraphy* 24/1: 109–117.

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. *Atlal* 3: 9–42.