



**HAL**  
open science

## **Report on the Third Excavation Season (2010) of the Madâ'in Sâlih Archaeological Project**

Daifallah Al Talhi, Laila Nehmé, François Villeneuve, Christian Augé,  
Christophe Benech, Charlène Bouchaud, Guillaume Charloux, Caroline  
Durand, Zbigniew T. Fiema, Eric Fouache, et al.

► **To cite this version:**

Daifallah Al Talhi, Laila Nehmé, François Villeneuve, Christian Augé, Christophe Benech, et al.. Report on the Third Excavation Season (2010) of the Madâ'in Sâlih Archaeological Project. L. Nehmé, D. al-Talhi, F. Villeneuve. Riyadh, Saudi Commission for Tourism and Antiquities, 326 p., 2014, Series of Archaeological Refereed Studies, 23, 978-603-8136-02-7. halshs-00542793

**HAL Id: halshs-00542793**

**<https://shs.hal.science/halshs-00542793>**

Submitted on 3 Dec 2010

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

# Report on the Third Excavation Season (2010) of the Madâ'in Sâlih Archaeological Project

Prepared under the supervision of L. Nehmé, D. al-Talhi and F. Villeneuve

With contributions by

Chr. Augé, Chr. Benech, Ch. Bouchaud, P. Courbon, E. Fouache, G. Charloux, C. Durand,  
Z. T. Fiema, Y. Gerber, S. Marion de Procé, L. Nehmé, J. Rohmer, J. Studer and F. Villeneuve,  
and the drawings of J. Humbert and S. Eliès



December 2010



Paris, Decembrer 2010  
Page set Claire Carpentier,  
UMR 8167, Orient & Méditerranée  
27 rue Paul Bert, 94204 Ivry-sur-Seine cedex, France





# Report on the Third Excavation Season (2010) of the Madâ'in Sâlih Archaeological Project

Prepared under the supervision of L. Nehmé, D. al-Talhi and F. Villeneuve

With contributions by

Chr. Augé, Chr. Benech, Ch. Bouchaud, P. Courbon, E. Fouache, G. Charloux,  
C. Durand, Z. T. Fiema, Y. Gerber, S. Marion de Procé, L. Nehmé, J. Rohmer,  
J. Studer and F. Villeneuve,

and the drawings of J. Humbert and S. Eliès



# Sommaire

<b>Introduction</b>	p. 7
<b>Area 1</b> Guillaume Charloux	p. 19
<b>Area 2, Northern Sector</b> Jérôme Rohmer	p. 47
<b>Area 2, Southern Sector</b> Zbigniew T. Fiema	p. 91
<b>Studies on the Rampart</b> François Villeneuve (to come)	p. 103
<b>Report on Ith 78 and IGN 132</b> Laïla Nehmé	p. 105
<b>Area 8</b> Solène Marion de Procé	p. 167
<b>Area 9</b> Zbigniew T. Fiema	p. 189
<b>Geomagnetic Survey</b> Christophe Benech	p. 217
<b>Archaeobotanical Report</b> Charlène Bouchaud	p. 233
<b>Pottery Study</b> Yvonne Gerber and Caroline Durand	p. 253
<b>The Coins</b> Christian Augé	p. 273
<b>Preliminary Report on Faunal Remains</b> Jacqueline Studer	p. 281
<b>Additional Study on the Geography</b> Éric Fouache	p. 295
<b>Appendix showing the location of the topographical stations</b> Paul Courbon	p. 307
<b>Conclusion</b>	p. 313
<b>Figures in A3 format</b>	p. 316



## Introduction

Between the 10<sup>th</sup> January and the 28<sup>th</sup> February 2010, the archaeological project at Madâ'in Sâlih carried out its third excavation season at the ancient site of Hegra, a medium-sized Nabataean town on the southern border of the Nabataean kingdom and later of the Roman province of Arabia (fig. 1). This season follows the second, on which a complete (unpublished) report was presented to the excavation committee in January 2010.

Seven excavation areas were selected in 2010 (fig. 2), one of which lies outside the residential area (Ith78, 60500) and the others inside it (Areas 1, 2, 3, 8, 9, IGN 132, fig. 3). They are presented below under the authorship of each area supervisor, and scientific coordination is ensured by the project directors.

Apart from the excavations themselves, several specialists contributed to our knowledge of the ancient occupation at the site:

- Christian Augé (see his report in this volume) studied all the coins which were found during the 2009 and 2010 season;
- Jacqueline Studer (see her report in this volume) studied the fauna, mainly of Area 1;
- Éric Fouache (see his report in this volume) answered complementary questions regarding the geography of the site (natural depositions, ancient settlements around the wells, etc.);
- Christophe Benech (see his report in this volume) undertook a geophysical survey in limited parts of the site (see fig. 3) in order to test the accuracy and advantages of his methodology and technology in comparison with those used at the site by A. Kermorvant between 2002 and 2005.

As in 2008 and 2009, the chapters below are a complete report on all the project's activities. It is presented to the *ministère des Affaires étrangères*, as well as to our umbrella organisations, our partners and to a certain number of French and foreign scholars who will thus be able to disseminate the results of the project's work throughout the academic world. But first and foremost, it is a working document for the team members and their future colleagues on the project and must, therefore, provide detailed and accurate information on the work carried out in the field. The existence of this report is a *sine qua non* for the success of future excavation seasons.

## Acknowledgments

As each year, the directors of the project would like to thank all the institutions and people who helped make this second season a success:

- the Supreme Commission for Tourism and Antiquities in Riyadh (SCTA) ;
- *la Division des sciences sociales et de l'archéologie* of the *ministère des Affaires étrangères* in Paris;
- *l'Ambassade de France* in Riyadh and the *Consulat général de France* in Jeddah;
- the Saudi Arabian Embassy in Paris and its Cultural Bureau;
- the Archaeological Museum in al-'Ulâ;
- *l'UMR 8167* of the *CNRS, Orient & Méditerranée*, Ivry sur Seine;
- *l'UMR 7041* of the *CNRS, Archéologie et Sciences de l'Antiquité*, Nanterre;
- the University of Paris 1;
- *l'Institut français du Proche-Orient (IFPO)*;
- the Simone and Cino del Duca Foundation.

Grants from the Senate, Total and OTV Île de France were obtained in 2008 and are recalled here. They helped in the acquisition of material and the preparation of publications.

The project directors would also like to thank the members of the Madâ'in Sâlih team for their professionalism, efficiency and co-operation. We would also like to give particular thanks to Mr. Daniel Ollivier and Mr. Christian Couturaud of the *Service de coopération et d'action culturelle (SCAC)* of the *Ambassade de France* in Riyadh, and to Mr. Alain Marquer and Mr. Yann Gayet of the Jeddah branch of the SCAC. Finally, we would like to express our warmest thanks to Mr. Mutlaq al-Mutlaq, our inspector and good friend, who solved all the daily problems of the project. Without him and all the others who helped us, the project could not have been organized in the way it was.

## Affiliations, directors and participants

### *Affiliations*

The project works under the aegis of the following bodies, to which its directors are affiliated and which evaluate its work:

- *la Division des sciences sociales et de l'archéologie* of the *ministère des Affaires étrangères* in Paris;
- *l'UMR 8167, Orient & Méditerranée*, (Ivry sur Seine); *UMR 7041, Archéologie et Sciences de l'Antiquité* (Nanterre).
- the Supreme Commission for Tourism and Antiquities, Riyadh.

### *Directors and participants*

The project is directed by Daifallah al-Talhi, professor at the University of Hâ'il, by Laïla Nehmé, researcher at the CNRS in the *Orient & Méditerranée* section and by François Villeneuve, professor at the University of Paris 1. These three directors took it in turn to be on the site, so that at least one, or more usually two or even all three directors, would be present at the site so as to provide the best possible supervision of the work.

Twenty-two persons, whose names and roles are presented in the table below, participated in the 2010 season:

<b>Surname First name</b>	<b>Nationality</b>	<b>Institutional affiliation</b>	<b>Role</b>	<b>Work on the project</b>
Augé Christian	French	CNRS	numismatist	study of the coins
Benech Christophe	French	CNRS	geophysician	geophysical survey
Bernel François	French	engineer, IFPO Damascus	conservator of metal objects	conservation
Bouchaud Charlène	French	PhD student at the University of Paris I (archaeobotanical laboratory of the UMR 7041)	specialist in archaeobotanical remains	analysis of the archaeobotanical remains
Charloux Guillaume	French	CNRS	archaeologist	area 1
Courbon Paul	French	retired	topographer	topography
<i>ad</i> -Dahsh Mâjid	Saudi	Saudi Commission for Tourism and Antiquities (SCTA)	archaeologist	area 1
Durand Caroline	French	post-doctoral researcher, University of Lyon II	ceramicist	ceramic analysis
Eliès Sylvie	French	CNRS	draughtsperson	drawing (ceramics and objects)
Fiema Zbigniew	Polish	Academy of Finland	archaeologist	areas 2 and 9
Fouache Éric	French	professor at the University of Paris X	geographer	geographical analysis
Gaiani Serge	French	retired	camp manager	administration, photography of objects
Gerber Yvonne	Swiss	PhD student at the University of Basel	ceramicist	ceramic analysis
Humbert Jean	French	IFPO	draughtsman	field drawings
Marion de Procé Solène	French	PhD student at the University of Paris 1	archaeologist	area 8
<i>al</i> -Mutlaq Mutlaq	Saudi	assistant director of the al-‘Ulâ Museum	archaeologist	conservation
Nehmé Laïla	French	CNRS	archaeologist	area 6
Rohmer Jérôme	French	PhD student at the University of Paris 1, ATER	archaeologist	area 2
Sabhân Ibrahim	Saudi	SCTA	archaeologist	restoration
Studer Jacqueline	Swiss	Geneva Natural History Museum	archaeozoologist	
<i>al</i> -Talhi Daifallah	Saudi	SCTA	archaeologist	director, restoration
Villeneuve François	French	professor at the University of Paris 1	archaeologist	director, area 3, survey of the rampart

Three participants belong to the Saudi Commission for Tourism and Antiquities (from al-‘Ulâ and Riyâd), one from a Saudi university (Hâ’il) and seventeen from various research institutions in France and Europe, three of which are not French (the Academy of Finland, the University of Basel and the Natural History Museum of Geneva). Two persons are affiliated to the *Institut français du Proche-Orient* (F. Bernel and J. Humbert). There are three students from the Universities of Paris 1 (Ch. Bouchaud, S. Marion de Procé, J. Rohmer). The CNRS provided three researchers (Chr. Augé, Chr. Benech and L. Nehmé) and two engineers (G. Charloux and S. Eliès) and the University of Paris 1 and 10 one professor each (F. Villeneuve and E. Fouache respectively). Finally, two very competent retired persons, P. Courbon and S. Gaiani, joined the team.

### **Financing and partnerships, 2010 season**

Financing for the project were provided by contributions from both the public and private sectors as follows:

#### ***Public Partners***

- *le ministère des Affaires étrangères* (government grant);
- *l’Ambassade de France in Riyadh* (government grant);
- the Saudi Arabian Embassy in Paris (logistical support, visas)
- *l’UMR 8167, Orient & Méditerranée* and *UMR 7041, Archéologie et Sciences de l’Antiquité* (individual missions)
- *l’Institut français du Proche-Orient* (availability of personnel);
- the Saudi Commission for Antiquities and Museums (help in kind).

#### ***Private Partners***

*French firms:*

For the publication of the monumental tombs: OTV Île de France (Veolia Eau).

For the purchase of equipment only (not for field work): 2008 grant from Total.

#### ***Prizes***

2008: the project won the Grand prize for archaeology of the Simone and Cino del Duca Foundation.

In the future, we will still rely heavily on contributions from the *ministère des Affaires étrangères*, which has long been interested in the excavation project at this major site. This contribution is the only regular one and also provides a source of legitimacy to our work in Saudi Arabia. Equally, the support of the *Ambassade de France* in Riyadh is essential for our field work to take place.

## Practical aspects

### *Cars*

The project rented four cars in Jedda from a private rental agency (Hanco).

### *Lodging*

The team was once again housed in the flat next to the Museum of al-‘Ulâ. On top of the pre-fabricated building of three rooms with bathrooms which was purchased in 2009, the Department of Antiquities built two new rooms and a tent at the back of the Museum, for use by the team.

### *Security*

The Saudi security services (general security, traffic police, etc.) ensured discrete and effective full-time protection of the team members, both by the presence, day and night, of a military guard at the Museum and by a systematic motorised escort of all team members travelling by car, whether in town or for longer journeys. However, this protection was less « close » than in 2009.

### *Publications*

The preparation of the publication of the volume devoted to the necropolises of the site has been going on in 2010. The publisher will be the *Publications de la Sorbonne*, which is the publisher of the University of Paris 1 (director Bertrand Hirsch).

The 350-page volume (in English) presenting the work of the first season, 2008, has been printed in Riyad. A contribution for *Atlat* on the results of the 2009 and 2010 seasons is ready.

The project has also been associated with the preparation of the exhibition “Routes d’Arabie” which was organized in the Louvre from July to September 2010. A chapter on Madâ’in Sâlih was written by L. Nehmé for the Catalogue of the exhibition and she also provided a contribution for the journal *Archeothema*.

### *Conference papers and presentations*

A journalist from *Le Monde*, Pierre Le Hir, visited the site in February 2010 and wrote a one page article on the 6<sup>th</sup> of March, “Sur la piste des Nabatéens”.

Many people visited the site during the season, including a group from KAUST University in Jedda and a group of thirty expatriots, including several members of the French Embassy, spent a weekend in al-‘Ulâ. All these people were welcomed by the team and were offered a complete tour of the site.

### **Restoration**

Some restoration and presentation work was carried out in 2010 by I. Sabhân (preparation of mudbricks for restoration).

## Training

In 2010, the project welcomed several PhD students and post-doctoral researchers.

Charlène Bouchaud: preparing a thesis at the University of Paris 1;

Yvonne Gerber: finishing a thesis at the University of Basel (Switzerland);

Solène Marion de Procé: preparing a thesis at the University of Paris 1;

Jérôme Rohmer: finishing a thesis at the University of Paris 1;

Note : Charlène Bouchaud has the official agreement from the Saudi authorities to use the data from the excavation for her thesis.

*Post-doctoral researchers:*

Caroline Durand.

## Work carried out in 2010

In 2010, one excavation area only was located outside the ancient city wall (fig. 2, south of Jabal Ithlib, Ith78). The other areas were all within the city wall (fig. 3-4). Some of them had been started in 2008 and continued in 2009, namely Areas 1, 2 and 3, while others were opened in 2009, namely Areas 7 and 8, or in 2010, namely Area 9 and IGN 132.

In the urban centre, works were undertaken in the following areas (fig. 3):

**Areas 1 and 2** are the two large trenches which brought to light domestic structures dated from the 1<sup>st</sup> century BC to the beginning of the 7<sup>th</sup> century AD, for which see the reports by G. Charloux, Z. T. Fiema and J. Rohmer in this volume;<sup>1</sup>

**Area 3** covers all the operations undertaken along the city wall and its adjacent structures;

**Area 8** covers the remains of a large building, found both by geophysical detection and remains visible on the surface. The latter consisted of the upper surface of three sandstone column drums and the upper, rectangular, surface of a very large ashlar block, oriented north-south, which were mentioned in the 2008 report (see the introduction to that report “A large monument with columns near the centre of the residential area?”). In 2009, it was possible to remove the surface layer from this building and in 2010, extensive excavations and deep soundings shed some light on the overall structure and chronology of the monument (see the contribution of S. Marion de Procé in this volume);

**Area 9**, opened during the second half of the 2010 season, is the southernmost point of our excavations. The 5x5 square opened so far has revealed several phases of a domestic occupation. See the report of Z. T. Fiema in this volume;

---

<sup>1</sup> In Area 1, the 2010 season was undertaken with the collaboration of M. ad-Dahsh, from the SCTA in Riyadh.

In and around **IGN 132**, excavations started in 2010. IGN 132 is one of the few rocky outcrops which stand in the middle of the residential area. The excavations revealed the presence, north of the outcrop, of two terrace walls. An open air sanctuary, accessible through a rock-cut staircase, was probably built on top of the outcrop. To the east of the latter were found several stone basins, three of which complete (see the report by L. Nehmé in this volume).

Finally, the rock-cut chamber Ith78 (60500), also excavated in 2010, revealed a *triclinium*, on which see also the report by L. Nehmé.



Fig. 1. Location of site

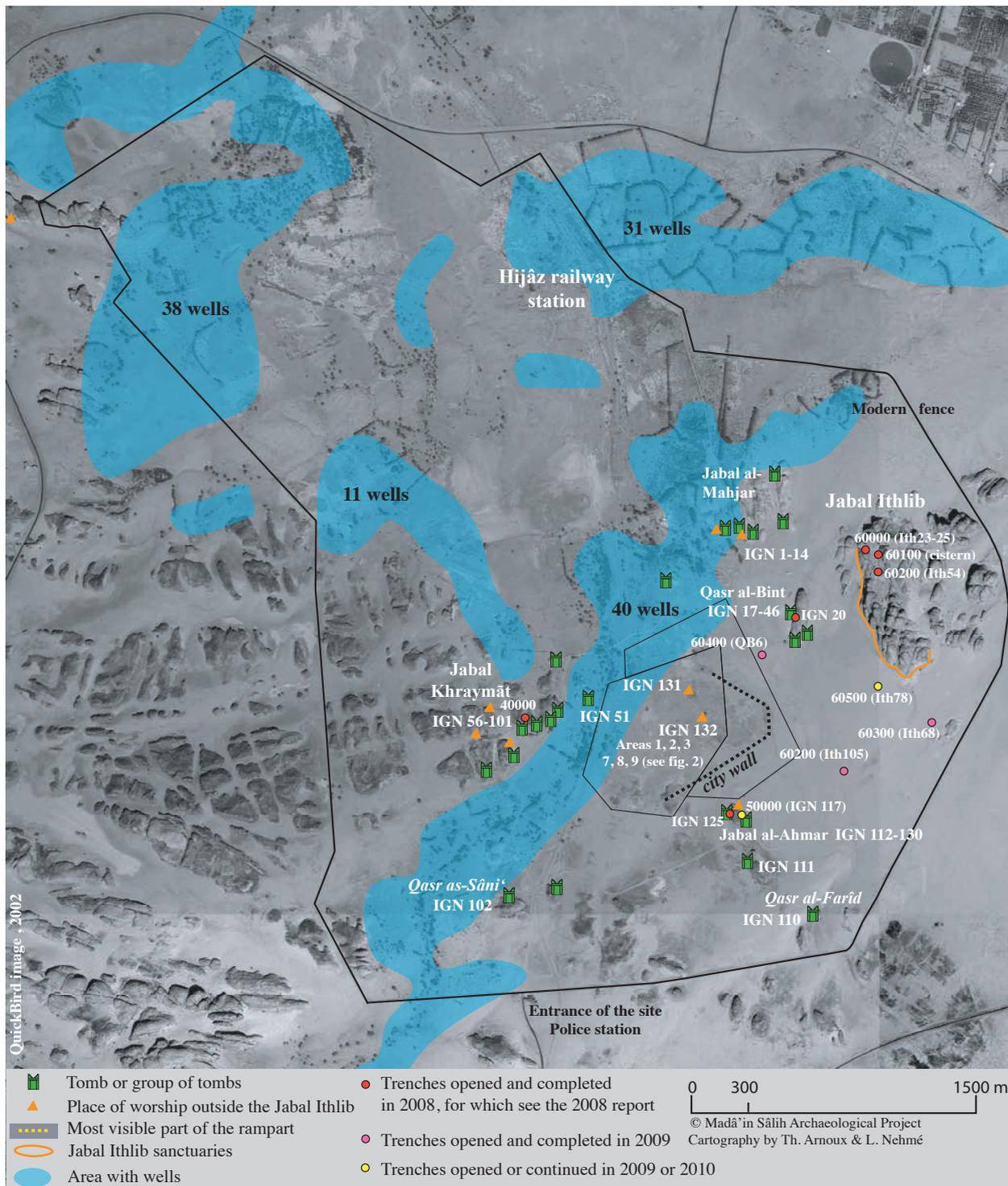
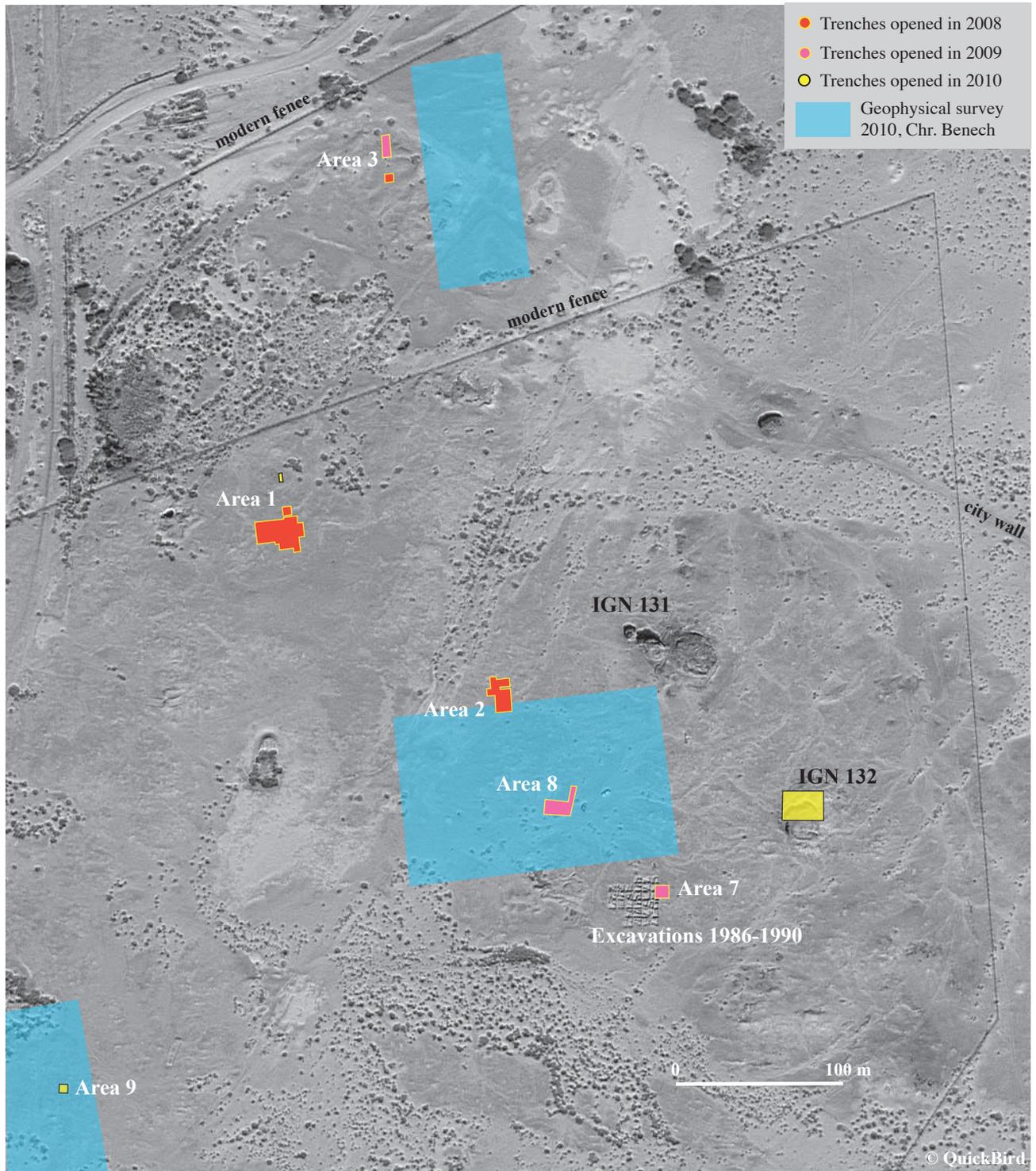


Fig. 2. Areas excavated in 2010



**Fig. 3.** Satellite image showing the excavated areas within the residential area



**Fig. 4.** From left to right: excavation areas 8, 2 and 1



## **Area 1**

Guillaume Charlot (CNRS, UMR 8167)



## Area 1

Guillaume Charloux (CNRS, UMR 8167)

The first season of excavations in Area 1 (2008), which is located in the northwestern part of the urban centre, aimed mainly at establishing the stratigraphy of the site and at clarifying the nature of the later occupation phase at Hegra (6<sup>th</sup>–7<sup>th</sup> centuries AD).<sup>1</sup>

During the second season, in 2009 (fig. 1), we continued our investigation, with two main objectives: 1/ to uncover more of the remains of the upper domestic building phase in order to get a more complete view of it. In this context, excavations focused on the southern part of the area and on the street which borders the house to the north; 2/ make a small sounding about 20 m north of the area (trench H, see fig. 1). The latter was opened in an area with high geophysical resistance, on the surface of which was a large amount of heavily fired and deformed pottery fragments. The suggested hypothesis was that these fragments came from an oven which may have been *in situ*.

During the third season, in 2010, it was decided to expand the area of excavation to the east and try to reassess the archaeological sequence established in 2008.<sup>2</sup> That sequence consisted of three archaeological levels, numbered 1 to 3, from the surface down to virgin soil, and the upper level was divided into four phases, 1a to 1d. Phase 1a corresponded to the last occupation of the site and the excavations revealed, beyond any doubt, that the structures were reused from one phase to the next, thus showing continuous architectural development (fig. 3). The 2010 season confirmed the existence of six phases, with a slight but significant change: the two oldest levels, 2 and 3, which had been distinguished from level 1 (phases 1d to 1a) in 2008, may now be associated with Phase 1. Indeed, in 2010, we observed that a mudbrick wall goes down to virgin soil and connects all levels into one single architectural programme, without any break. It is, therefore, possible to renumber the phases from 1 to 6, i.e. from the first settlement at the site to the last, assuming with some confidence that there will be no future change in the stratigraphic sequence. It should be noted, however, that architectural continuity does not mean that the occupation was *uninterrupted*, a point which is much more difficult to prove archaeologically. Unfortunately, the study of the pottery has not yet provided an accurate dating for all the archaeological phases, but it seems that Phases 3 and 4 should be dated to the first century AD, i.e. the Nabataean period, and Phase 6 to the 6<sup>th</sup>–7<sup>th</sup> centuries AD.

In 2010, dwellings of the most recent phase, Phase 6 (previously 1a), were opened up to the east, in trench J (see fig. 1), in order to reach the crossing of the three alleys observed on the surface and also to

---

1. See Charloux, al-Mûsa and Marion de Procé in Nehmé, al-Talhi and Villeneuve 2010, p. 51-86.

2. Between five and twelve workmen were employed. Field supervisor, G. Charloux, was assisted in 2010 by M. ad-Dahsh for two weeks. Note that floor layers have been systematically dry sieved using a 5 to 8 mm mesh.

define the limits of the southern quarter, which was being studied as a priority. So far, Phase 6 has been exposed over an area of about 34.5 m east-west by 27 m north-south.

The earlier phases, 1 to 5, were reached under rooms 10110 and 10113, in the middle of Area 1, covering an area of approximately 42 m<sup>2</sup> (see fig. 1). Remains of walls also appeared under the floors in trench J. Trench H, laid out about twenty metres north of the main excavation area, was extended northwards. The results from this sounding (completion of the excavation of an animal burial, excavation of a Nabataean floor and of some lower phases) remain basic and are presented at the end of this report. A suggested correlation is made between the levels in this trench with those of the main excavation area (trenches A-G and J).

## Phase 1

Phase 1 was built directly on virgin soil, which was confirmed as natural soil 2008.<sup>3</sup> Phase 1 is marked by the presence of solid mudbrick walls made of rather pure beige clay, contrasting with those from the more recent phases (3-6), which have a coarser, plant temper (fig. 5).

The walls of Phase 1 (10275, 10276, 10278 and 10281), about 95 cm thick, are made of alternating courses of two rows of headers and three rows of stretchers (see wall 10275 on fig. 5). They appear to be founded in a pit dug down an average of 25 cm into virgin soil, the edges of which are perfectly straight. The walls meet at right angles and form a rectangular room (10289, measuring 3.14 x 1.58 m) the opening for which has not been found.<sup>4</sup> The building to which the room belongs continues to the south (space 10290) and the empty space to the east has been numbered 10291. Space 10293, to the north of wall 10278, was partly exposed in 2008 but, in 2011, it will need to be excavated under the Phase 2 floor 10260. The orientation of the walls is roughly north-south and east-west, an orientation that was kept in the following phases (fig. 4).

One of the most remarkable aspects of Phase 1 lies in the nature of the fill of room 10289 and the adjacent spaces, 10290, 10291 and 10293. We have systematically brought to light layers of dark black charcoal (10252 in room 10289, 10259 in room 10290, 10262 and 10263 in space 10291 to the east of wall 10275, 10085–10087 and 10069 in 10293). These layers are heterogeneous with no finds but they contain huge amounts of rodent droppings and date palm remains<sup>5</sup> (fig. 6). These layers, which are an average of 30 cm thick, are laid on a smoothed substrate and look like household waste. Since the faces of the adjacent walls do not show any traces of fire, we assume that the charcoal layers were dumped there in a later phase. Therefore, in Phase 1, the virgin soil must have served as a floor or surface on which to install various structures (fig. 7). The lack of finds is nevertheless surprising.

## Phase 2

Walls 10278 and 10281 of Phase 1 continue in the following phase, whereas walls 10275 and 10276 seem to have been partially destroyed (figs 8 and 5). Two other constructions, of which only one course of mudbricks survives, 10277 and 10288, were also built in this phase. The first was founded in a rather

3. The sieving of the thick clay-silt layer in which we dug deeply yielded no anthropogenic material.

4. The connection between walls 10275 and 10278 on the one hand, and walls 10276 and 10281 on the other is still uncertain due to the presence of walls from the more recent phases.

5. See Ch. Bouchaud's report in this volume.

deep, curving trench (10267) and the second on a levelled surface; this clearly distinguishes them from the walls of the preceding phase. Their function has not yet been established.

The distinguishing feature of this phase is the discovery of five different types of postholes, found in space 10292 (between walls 10281 to the west, 10278 to the north and 10288 to the east). Holes 10265, 10266, 10271 and 10273 are an average of about 20 cm in diameter and do not always show traces of a wooden post (which shows that they were removed after use). The packing for the posts in holes 10282 and 10283 consists of small stones, 10 to 15 cm wide (fig. 9).

Amongst the original structures a wide, shallow pit (10272) was noted, at the bottom of which some stones and a few pot sherds had been laid flat. This pit is cut into the virgin soil along wall face 10275, which presupposes that the latter was still in place when the pit was dug; unless, of course, the pit belongs to Phase 1.

To the of north pit 10272 is another pit, 10264, which seems to be more recent, and which suggests that in this phase there was a succession of archaeological events. Pit 10264 is filled with a fine and powdery, thick, grey ashy layer that is like most of the layers of this and the next phase (for example 10253, 10256, 10257 and 10266). The composition of these layers makes their edges very hard to distinguish. A long, thin rectangular sandstone block was found set on edge at the bottom of the pit (see fig. 5).

The presence of the postholes raises the question of the arrival of the Nabataeans at Hegra and other Nabataean sites. As A. Retzleff notes,<sup>6</sup> they may indicate the settling of mobile populations and can be compared with what happened at az-Zantûr in Petra at the end of the second and early first century BC, as well as in Aqaba in the late first century AD. Settlers had to go through this process before building permanent houses, a phenomenon well known throughout the Near East for a very long period.<sup>7</sup>

However, the process is not so clear in Area 1 of Hegra. Indeed, in at least four cases, the postholes found seem to be later than the earliest remains: they cut part of wall 10276 and cut into pit 10272 as well as layers 10259, 10262 and 10263. The main problem, of course, lies in the relative dating of the postholes, particularly those in virgin soil. Nevertheless, it seems clear that they belong to the second phase.

Another question concerns the relationship between walls 10277 and 10288 and the postholes. Are they contemporary? How should one connect traces of camps with masonry structures? Are the former temporary installations? Were they still standing after the first abandonment of the site? Whatever is the case, we do not know how the buildings of Phase 1 were roofed and it is therefore difficult to suggest what roofing was used in Phase 2.

North of this trench is space 10293, the southern limit of which is marked by wall 10278. In this space was a slightly blue grey, powdery floor layer 10260. Lying flat on this layer very few pot sherds and some large fragments of a sandstone basin of a type that continues into Phase 6 (fig. 10). The relationship between this layer and those further west, in the deep sounding done in 2008 (10082-10083), remains indeterminate, even though they have more or less the same characteristics and are at the same altitude (fig. 11).

6. Retzleff 2003, p. 331.

7. See Finkelstein 1995.

### Phase 3

In Phase 3, a pit (fill 10268) was dug to rob the mudbricks of the Phase 1 walls 10275 and 10276. The choice of location of this robbing pit, at the corner of the two walls, is perfectly intentional and can be explained by the need to obtain the maximum number of mudbricks from as narrow a pit as possible. The robbing pit (10268) goes down almost in a straight line along the foundation trench of the dismantled walls and reaches their bases (fig. 7 and 13). This shows that some of the Phase 1 walls were still visible in Phase 2 and at the beginning of Phase 3. However, there are still some stratigraphic problems since posthole 10266 (currently attributed to Phase 2) cuts wall 10276 (Phase 1). Therefore, it is possible that the structures with postholes were used for a longer time and that posthole 10266 should be put in Phase 3.

An enigmatic circular structure of compacted earth (10299), about 40 cm in diameter, rests on the top of wall 10275 (fig. 14). This might be the imprint of the bottom of a jar that would have been dug into the Phase 3 floor, then moved during the course of this phase.

The Phase 1 and 2 walls were certainly destroyed in Phase 3, with the exception of 10281 and the western part of 10278. Several new structures were built (10006-10072, 10098, 10204, 10231, 10235, 10300), along guidelines that remained the same right up to the final phase (fig. 12).

This phase saw the construction of a long wall (10098) that forms the northern edges of rooms 10294 and 10295. It is on this wall, 10098, that wall 10005, which formed the edge of alley 10183 in Phase 6, was built in Phase 5. The construction of this long wall (10098) suggests that the alley came into existence in Phase 3. Building a wall along the line of an older wall is a reoccurring phenomenon in Area 1, since this is also the case for wall 10231 (Phases 3-5), placed on the eastern part of 10278 (Phases 1-2), and for wall 10006-10072 (Phases 3-4/5) which extends wall 10281 (Phases 1-4) northwards. In Phase 6, the long wall 10001 is slightly offset in relation to wall 10204 of Phases 3-5.

Room 10294, which seems to have been quite large, is delimited in the south by wall 10231. The eastern end has not been exposed even though we excavated a little below wall 10064. Very little material was found on the floor 10245-10251. A small circular hearth 10250 was noted in the southern part.

Room 10295, in which two buried jars, 10067\_P1 and 10067\_P2,<sup>8</sup> were found in 2008, is separated from room 10294 by wall 10204-10235. The south side is formed by the preserved eastern part of wall 10278 and the east side by 10006. The room is small (6.5 m<sup>2</sup>) and might have been used as a storage space. Where access into the adjacent rooms was has not been determined.

Two powdery layers, 10240 and 10256 (with a small hearth 10254), form the floors of rooms 10296 and 10300, which are divided by a long wall, 10204-10235.

The Phase 3 walls are the first to have a stone foundation (fig. 15) and it should be noted that walls of this type appear more or less at the same time in the other excavation areas in Hegra.<sup>9</sup> The only exception is one wall made entirely of mudbricks (10231).

8. The floor levels are 10067-10071-10073.

9. See the reports by Z. T. Fiema and J. Rohmer in Nehmé, Talhi, Villeneuve 2010, p. 87-154.

The mudbricks used in these wall are different from those used in the walls of Phases 1-2 and are undeniably of poorer quality. The brown-beige clay used is coarser, and the quantity of plant temper used is much greater. During excavation, the mudbricks have a more irregular surface and identifying the joints is more difficult.

Also, several walls are covered with a thick, granular yellow coating, which was an undercoat for a fine, but rarely preserved, white coating. This is the case in rooms 10294, 10295 and 10296, in which the coating fell on the floor. In the northeast corner of room 10295, many small architectural blocks covered the fallen coating, and amongst them was a sort of sandstone plaque, 10226\_S1, (16.4 x 12.3 x 7 cm), that was nicely squared with partly bevelled edges (fig. 16). A large basin fragment, left in a baulk, was also in this destruction layer.

## Phase 4

Architectural changes carried out during Phase 4 were minimal (fig. 17, Plan of Phase 4). A mudbrick wall, 10230, appeared to the southeast of the trench that divided space 10300 in two. Another wall, 10229, which seems to be *in situ*, but is in poor condition, might have been used as a bench along wall 10231. The presence of a bench (10280) against the south face of wall 10278, in room 10296, is also possible.

A determining feature is the significant increase in the altitude of the floors of the rooms as compared to the floors of the previous phase, due to a thick fill of mudbrick (see fig. 3). The architectural modifications being limited, the presence of this fill can be explained either by partial destruction of the walls or by an intentional deposit.

Several thin superimposed floors, 10246, 10244 and 10228, about the base of wall 10230 in room 10301. The finds were quite abundant in the last surface (10228), notably including one or two more or less complete jars and half a circular rotating millstone (fig. 18). The space was presumably dedicated to domestic activities.

Although only one door has been identified, access to room 10296, located to the west of 10301, must have been through the middle of wall 10235. In fact, the layer of floor 10228 extends in this direction over the mudbrick masonry of the wall. A point of interest is that the threshold of door 10232 of Phase 5 is in this exact spot. As in 10301, we have identified a succession of fine floors (10237 and 10239) in room 10296.

In room 10294, floor 10242 seems to represent several short occupations because a layer of aeolian sand was found in the southern part, deposited on the beaten earth floor that had been created on the surface of the fill 10226-10249. Two hearths, 10238 and 10243, were also uncovered. A small iron sickle was found on the floor in the southeast corner of the exposed space, near the lid of a small stone vessel (fig. 19).

Access to room 10295 from room 10294 was probably in the same place as the threshold of the Phase 5 door 10233. Finally, in room 10295, the floor that corresponds to 10242 is probably 10259. This layer was excavated in 2008.

## Phase 5

A change in the pattern of circulation occurred in the eastern part of the area in Phase 5 (fig. 20). The upper part of walls 10281, 10278 and 10072 (southern part of 10006) was removed, and the narrow wall 10055 was built, oriented east-west. Thus, to the south, a large space appeared, 10302, the floor of which 10060-10217 (and a small hearth 10224 to the south) was easily cleared (fig. 21). Even though the connection of this floor with walls 10204 and 10235 were not observed in the field, there is no doubt that room 10302 gave access, to the east, to rooms 10301 and 10304. Two stone door thresholds (10232, 10233) were indeed found in wall 10204-10235. The first, 10232, consists of a single long, rectangular block of well-dressed white sandstone. The second, 10233, is composite and may have had two states: a first state consisting of a sandstone block like the one in threshold 10232, and a second state during which this block was covered by two stones and was joined, to the west, by two rows of coarser rectangular blocks, thus creating two steps. The first state may belong to Phase 4 (fig. 22 and see fig. 11). The modification of room 10294 (Phases 3-4) during Phase 5 required giving it a new number, 10304. An imposing wall, 10064, which divides the older space and marks the edge of the new room to the east, was indeed built during this phase. The room now measures 3.70 x 3.30 m. Very little archaeological material was found on the floor. However, many small, unshaped sandstone blocks, measuring an average of 20 cm per side, were found in the western half of the room. During the last state of this phase, the floor seems to have sloped fairly clearly from east to west. There was a thick layer of aeolian sand, 10203, concentrated in the south of the space, which is in the same place as the aeolian sand 10225 from the previous phase.

To the north of wall 10055 lies room 10303, the floor of which (10004) was excavated in 2008. No access to the adjacent rooms was identified with certainty. However, the presence of small blocks and pot sherds at the north end of wall 10204 suggests that a passageway towards room 10304 was made in the mudbrick masonry of wall 10204 (fig. 23).

During Phase 5, the edge of room 10301 is marked by wall 10064 to the east, the foundation trench of which cuts the east side of wall 10230 from the previous phase. This last, which was partly destroyed, seems to have served as a bench.

As in room 10304, some small sandstone rocks were exposed on floor 10218, that have no obvious purpose. An enigmatic circular pile (fig. 24) was placed in the way of the door leading to room 10302, in front of threshold 10232. Was this a deliberate pile? The stones surround an empty circular space about 25 cm in diameter which resembles a posthole. However, unlike the packing in a posthole, these small sandstone rocks slope southwards and are laid flat.

We also noted sparse traces of a greenish, granular coating (very different from the coatings of the previous phases) in the southern part of room 10301.

Several wall tops (10308, 10309, 10310) appeared after excavation of the floors in trench J (see fig. 20 and 25). They cannot be securely assigned to Phases 3 or 4. Attributing them to Phase 5 is the most reasonable because of the extension of 10231 towards the east. The walls enclose spaces 10297, 10298 and 10307, the floors of which were not excavated in 2010. The ending of the mudbricks in mudbrick wall 10309 might indicate the presence of a door leading to space 10307.

## Phase 6

Phase 6 is undoubtedly the best documented archaeologically (fig. 26). In Area 1, the 2008–2010 seasons have brought to light the extension of a group of contiguous housing, crossed by an east-west alley reaching a crossroad to the east, dating to around the 6<sup>th</sup> century AD.

The Phase 5 walls 10005 and 10064 were still standing in Phase 6. However, the other elements of the quarter were remodelled whilst still respecting the orientation of the structures. To the north, long north-south walls (10008-10090, 10001-10162, 10064) reach the edge of the alleyway (10005-10007-10126). They are joined by perpendicular walls (10100-10043, 10268, 10046, 10135, 10161) which define rectangular or square rooms, some of which were probably unroofed. The walls are pierced by doors whose jambs and thresholds of good quality white sandstone (10092, 10044, 10045, 10179) are preserved where they have not been destroyed by the powerful erosion that affects the site. The finds recovered are very varied (pottery and stone vases, grinding material, animal bones, metal objects etc.) and seem to have been left *in situ* when the site was abandoned.

Excavations in 2010 focused mainly on trench J,<sup>10</sup> in the east of the area (fig. 27). A large courtyard 10184 was uncovered; its north side is semi-circular because wall 10126 curves to follow the alley 10183. The west side of the courtyard is marked by walls 10064 (due to a recess in the space to the northwest), 10132, 10144, 10139, 10173 and 10197. They form two adjacent projections which must surely have created a visual impact on visitors when they entered the courtyard. The doorway seems to have been located opposite, at the eastern end of the courtyard, as suggested by two long white sandstone doorjambs found on the ground in the crossroads. However, the walls in trench J have been heavily eroded and the location of access routes remains uncertain.

Another problem arises with the difference in elevation between the floors in trench J and in trenches A-G, which is very clear in section B (see fig. 11). Two explanations are possible:

- 1/ trench J belongs to Phase 6 and the difference can be explained by the existence of a system of terraces (as we had assumed until now);
- 2/ the floors of trench J should be attributed to Phase 5 because the altitude of the floors of trenches A-G in Phase 5 are identical to those of the floors in trench J.

The lack of connection between the east and west trenches in Area 1 explains this uncertainty, which will be elucidated in 2011, particularly using the study of the abundant finds from each of the rooms in trench J.

In courtyard 10184, the archaeological material on floor 10151-10172 was deliberately pushed towards the corners, away from the central passage. The concentrations of material are dense, often very ashy, with a lot of faunal material. They look like the rubbish from cooking hearths (10159, 10274). A small circular storage unit (10287), half-buried in the ground, was discovered north of the courtyard (fig. 28).

---

10. We also completed the excavation of the western part of floor 10016 in room 10110, begun in 2008 and continued in 2009.

Its floor is made of a rough paving of large irregular blocks. The lower part of its walls is also covered with sandstone blocks and the superstructure was made of a single row of mudbricks. The structure was destroyed a few centimeters above the second course of mudbricks. The inside was filled with fine dust, ashy in some places (10196). It contained a lot of pottery as well as many horns of rams, such as those on other floors of trench J. A possible posthole (10207), containing some remains of date palm, was excavated to the east of the storage unit 10287.

In the south of the trench, we continued the excavation of room 10185, which had been started in 2009. Floor 10174 was extended southwards, again revealing a reasonable quantity of pottery and faunal remains. In this room, two deep hearths, 10269 and 10270, were found on either side of door 10306, in wall 10173, the threshold of which consists of a long white sandstone block. This door leads to room 10305 (floor 10279), only a small area of which has been excavated. It produced common material and a few large sandstone blocks as well as a large piece of metal in the shape of a wavy ring handle (fig. 29). This object looks like a piece used to extend a trammel hook, but other uses are equally possible.

There are two wide, flat sandstone blocks in the centre of wall 10197, in the same course as the foundation blocks, which must have marked the access into courtyard 10184.

## Trench H

Trench H (see fig. 1), in which excavations began in 2009, is dealt with separately in this report because its archaeological phases are difficult to equate with those in trenches A-G and I-J due to the distance between them. Five stages of construction were revealed thanks to the extension of the sounding both northwards and southwards (fig. 30). As in the main excavation area, they show architectural continuity.

The top stage, 5, revealed the bottom of an oven which we had looked for unsuccessfully in 2009 (*locus* 10119). Its very poor condition does not justify continuing its excavation (fig. 31, stage 5).

Stage 4 is marked by a succession of thin floors which, in 2009, were grouped together under the number 10122 (see fig. 31, stage 4, and fig. 33). It made it possible to obtain a micro-stratigraphy of floors from the Nabataean period. The few pot sherds found were laying flat, in layers of slightly different colours and textures. These floors were associated with walls 10127 and 10286 and covered all the exposed area.

Contrarily, the lower floor 10123 (stage 3) joins the south face of a mudbrick wall (10286) that marks the edge of a large paving stone that functioned as a threshold as well as the two walls mentioned above.

During an earlier stage (stage 2), which was seen only in a narrow sounding opened to the north of trench H, wall 10127 seems to have been used with the perpendicular wall 10234. To the west, a mudbrick wall 10284 joined 10234. In a first stage, the bottom of a very thick-walled pottery container, 10220\_P1, was placed against the face of wall 10234. Its contents, 10221, sealed by a hard crust, comprised a few pot sherds, some small stones and compacted earth. In a second stage, in the eastern part of the sounding, a very ashy layer (10216) covered a sandstone block placed edgewise against the northern wall face of 10234. It is possible that these two stages are part of the same phase.

The excavation of stage 1 exposed a floor (10227-10236-10247) containing a lot of archaeological material, notably several large marble beads (?) (fig. 33).<sup>11</sup> An identical bead from the main excavation

11. The central hole in the beads is very elongated and wide. This can be explained by the friction of the cord used

area belongs to Phase 2. The floor 10227-10236-10247 passes under the base of wall 10234 (fig. 34).

A pit 10241, dug into this floor, was filled with many pot sherds laid flat against its southern edge. It is rectangular in shape and belongs to a coarsely built channel.

Virgin soil was not reached in 2010 in sounding H.

Taking into account both the levels and the material found, one can assume that there is a relationship between the stages in trench H and the phases in the main trenches (stage 5 = Phase 5, stage 4 = Phase 4, stage 3 = Phase 3 etc.). A chronological equivalence between stage 1 and Phase 2 is not impossible, particularly because of the presence of the identical beads found in both. A comparison of floor elevations is not conclusive because of the distance separating the soundings.

The finds seem to cover the 1<sup>st</sup> century BC and the 1<sup>st</sup> century AD.

## Conclusion

The 2010 season brought to light many floors which produced abundant archaeological finds (fig. 35).

Work was slowed down in the extensive areas opened, notably those in the dwelling quarter of Phase 6, because of the need to excavate these floors and extract the material from them. Given that the 2011 season will be the last in the first four-year excavation season, the main objectives for Area 1 will be the following:

- establish the connection between trench J and trenches A-C to the west, which should clarify and refine the archaeological sequence of Phase 6. To achieve that, we will continue to excavate the quarter towards the south in the hope of connecting up the two trenches.
- show the continuity of alley 10193, from the Nabataean period to the 4<sup>th</sup> century AD. To achieve this result, we will continue to excavate the lower phases, 1-5, begun in 2010, and we will extend the excavation to the adjacent alley.<sup>12</sup>

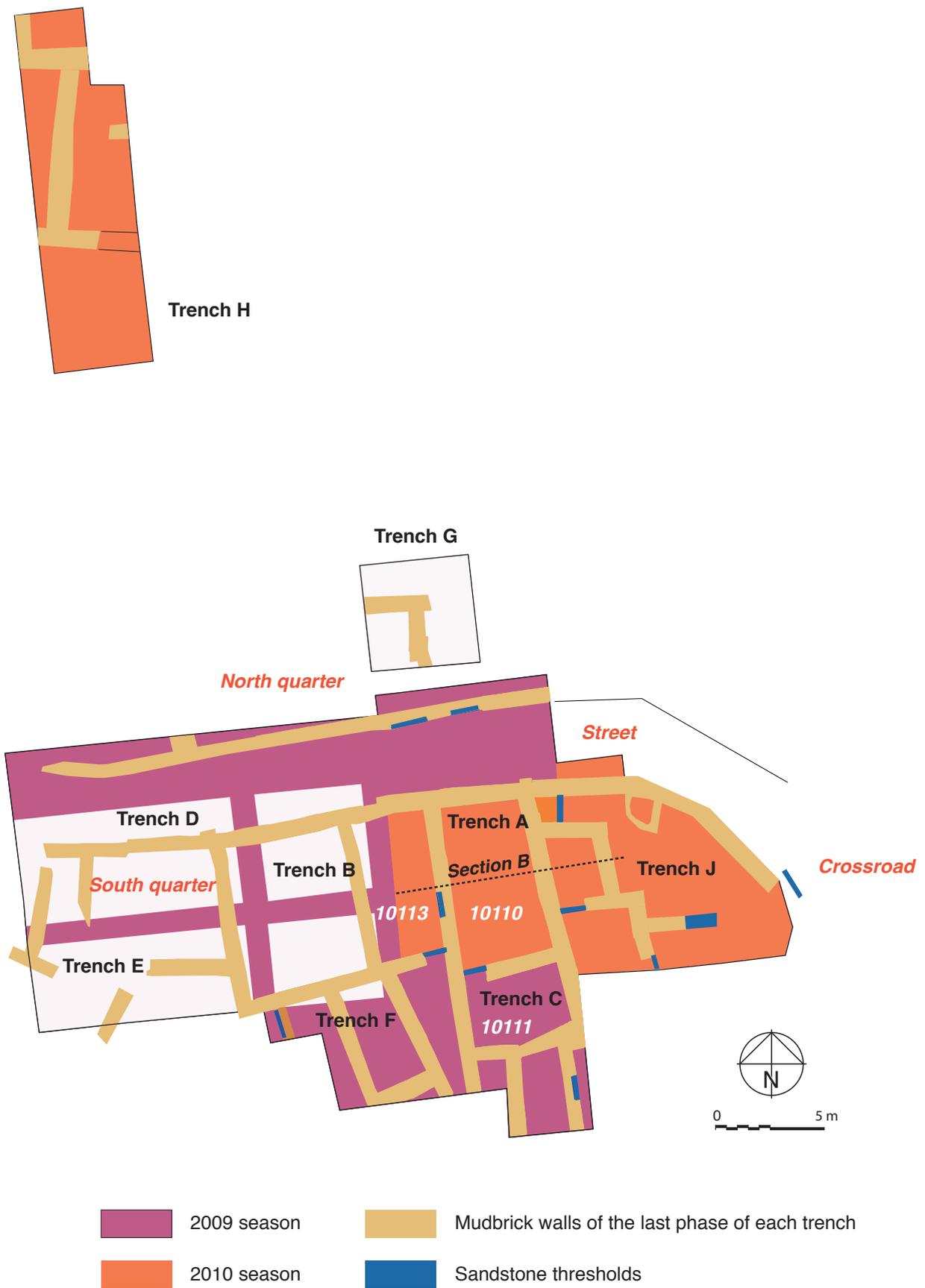
## Bibliography

- Bignasca A., Desse-Berset N., Fellmann Brogli R., Glutz R. *et alii* 1996. *Petra. Ez Zantur I. Ergebnisse der Schweizerisch-Liechtensteinischen Ausgrabungen 1988-1992*. Terra archaeologica 2. Mainz am Rhein.
- Finkelstein I. 1995. *Living on the Fringe. The Archaeology and History of the Negev, Sinai and Neighbouring Regions in the Bronze and Iron Ages*. Monographs on Mediterranean Archaeology, vol. 6. Sheffield, Sheffield Academic Press.
- Nehmé L., al-Talhi D. and Villeneuve F. 2010. *Report on the First Excavation Season at Madâ'in Sâlih, Saudi Arabia, 2008*. Riyadh ("Area 1", p. 51-86 ; Area 2, p. 87-154).
- Retzleff A. 2003. "A Nabataean and Roman Domestic Area at the Red Sea Port of Aila", *Bulletin of the American Schools of Oriental Research* 331, p. 45-65.

---

to make the necklace, unless one considers these beads were used as loom weights.

12. Trench H will not be reopened in 2011.



**Fig. 1.** Area 1, sketch plan showing the location of the excavations undertaken in 2009 and 2010



**Fig. 2.** Area 1, trenches C-J after 2010 season

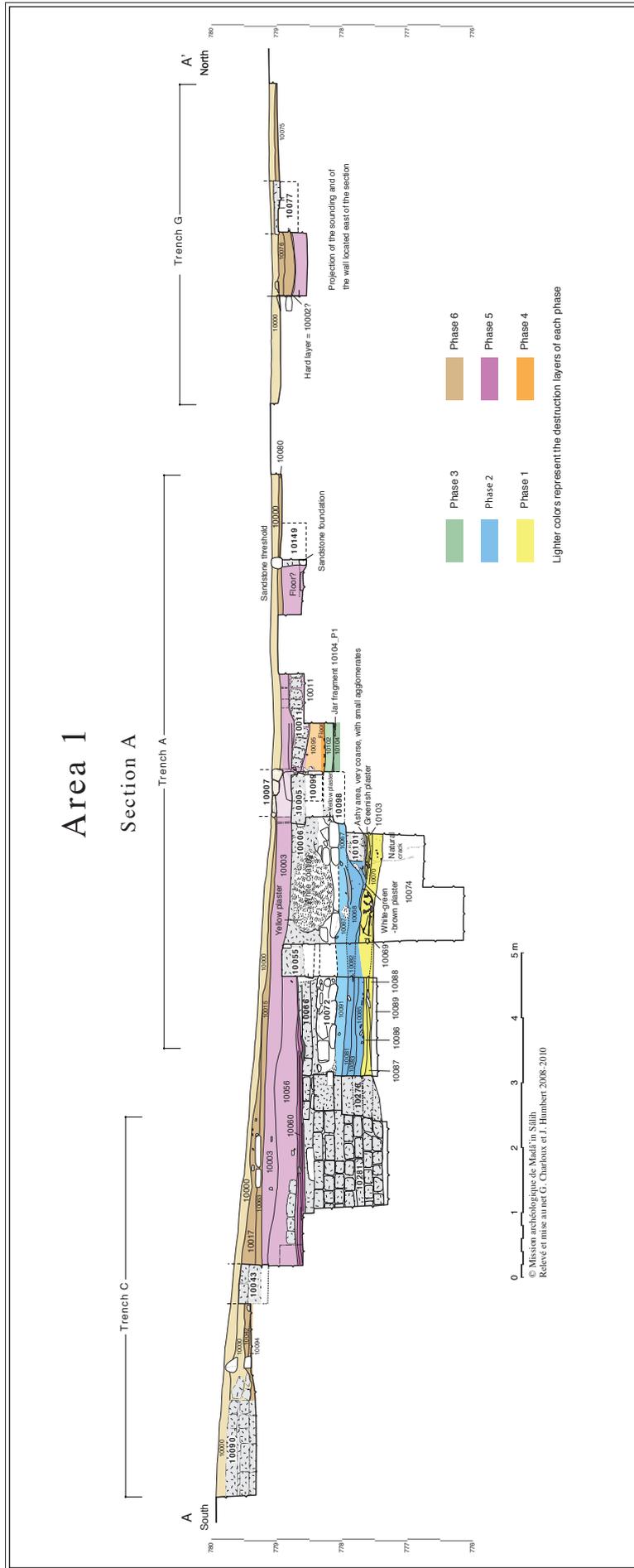
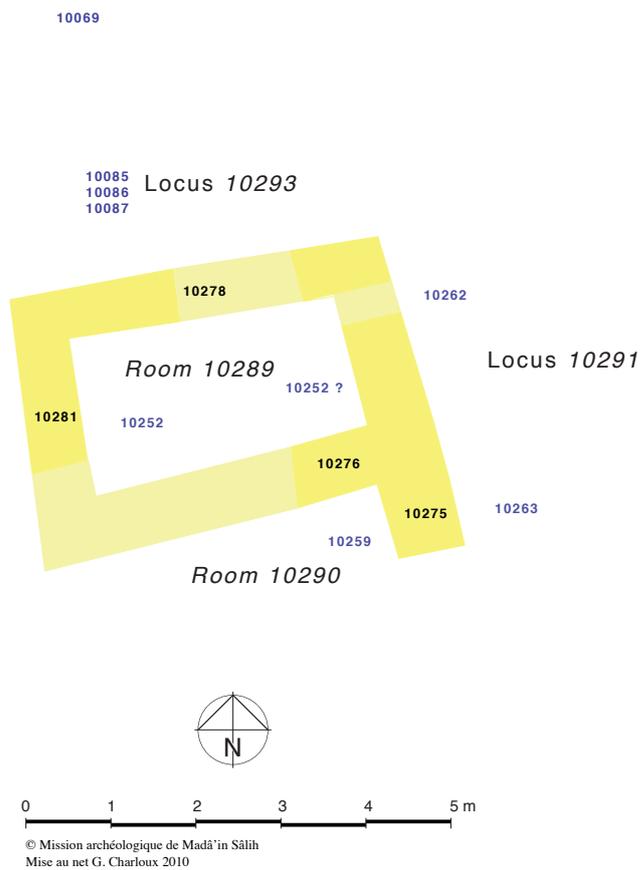
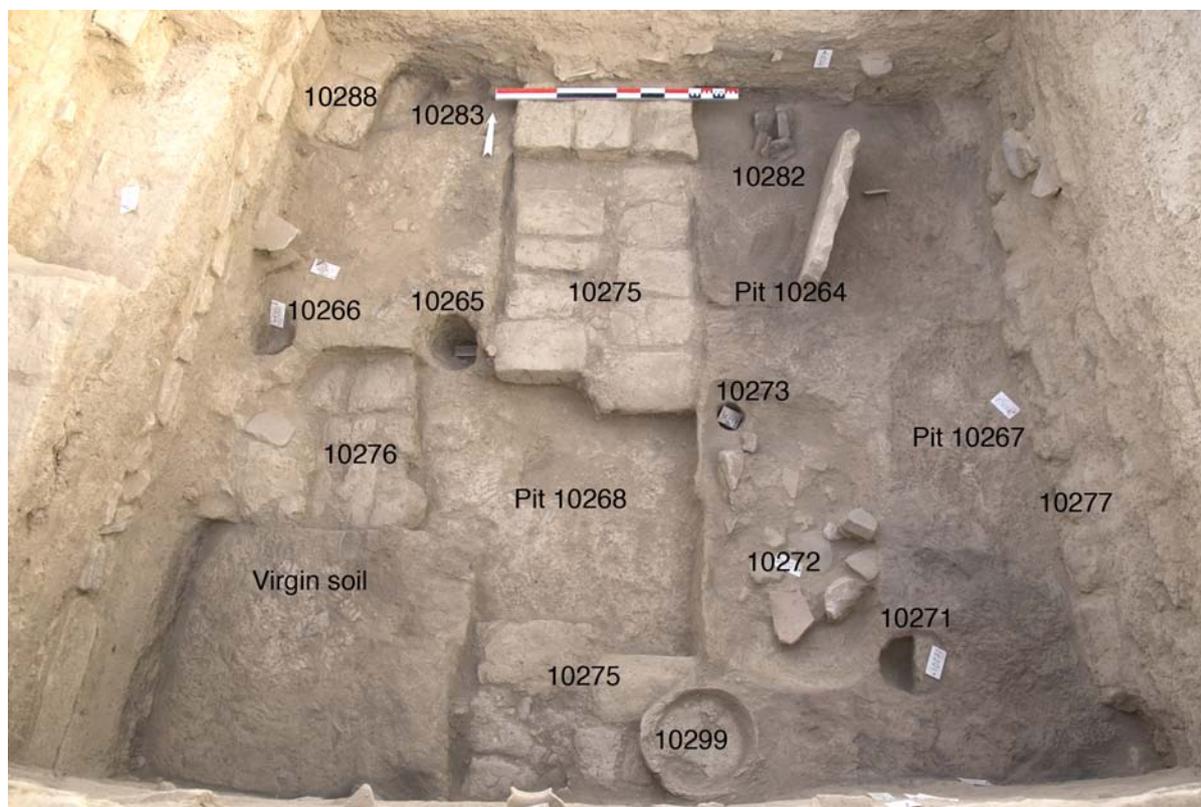


Fig. 3. Trenches A-C-G, north-south section "A"



**Fig. 4.** Plan of Phase 1



**Fig. 5.** Walls of Phase 1 and buried structures of Phase 2



Fig. 6. Dark layer 10259 at the bottom of section D, trench C, towards the south

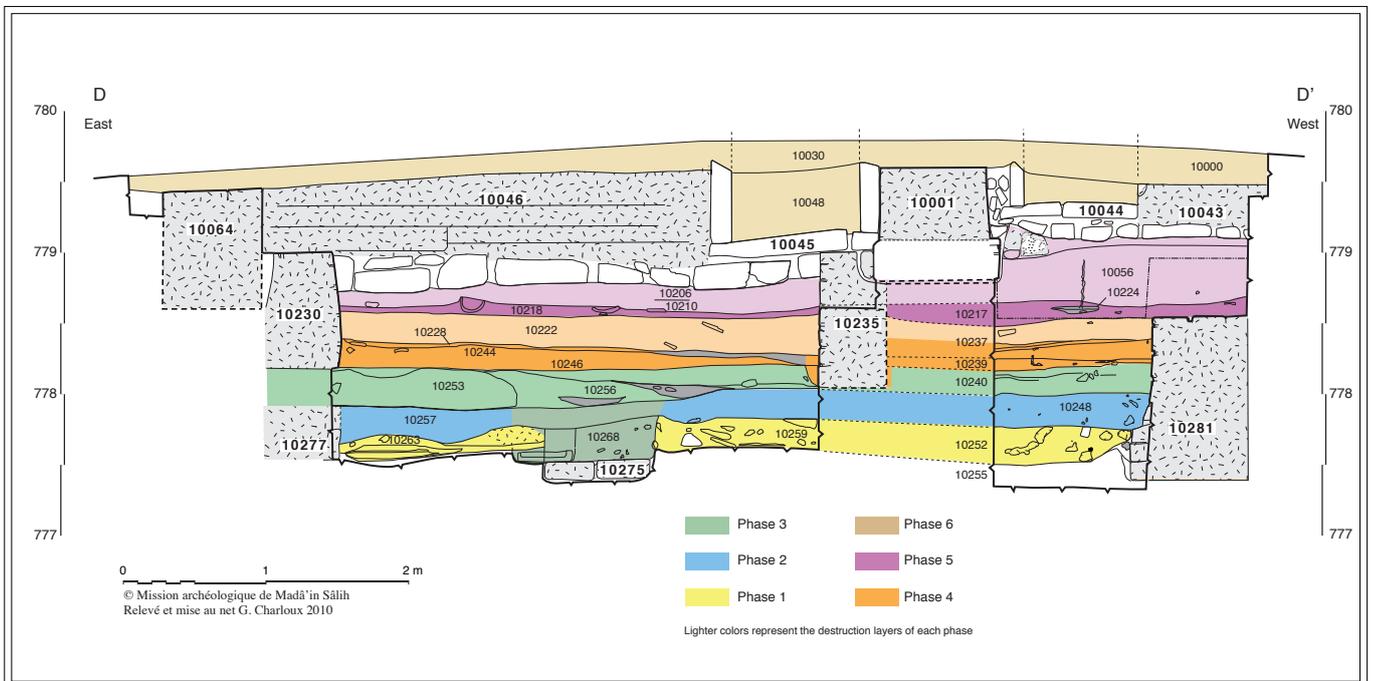
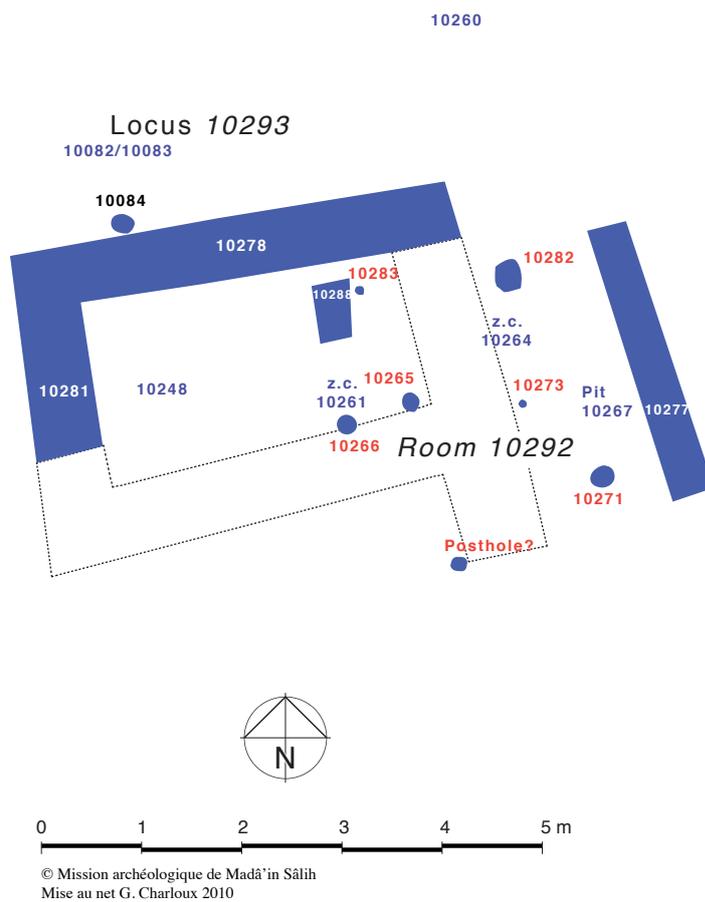


Fig. 7. Trench C, east-west section



**Fig. 8.** Plan of phase 2



**Fig. 9.** Posthole 10282, towards the north



**Fig. 10.** Eastern part of floor 10260, towards the south

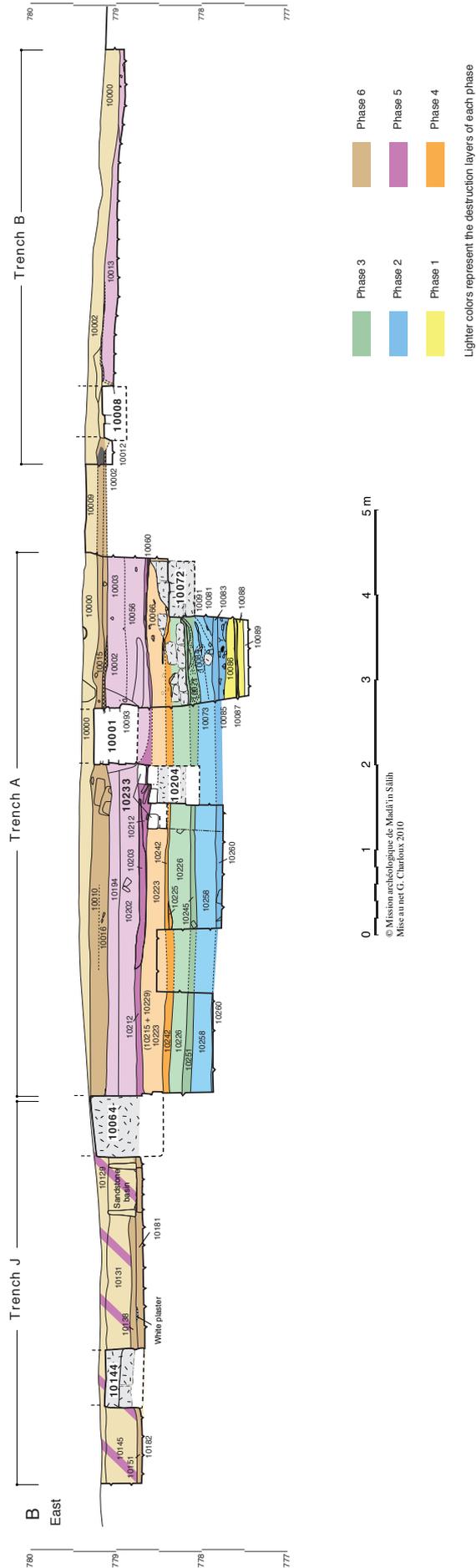


Fig. 11. Trenches J-A-B, east-west section "B"

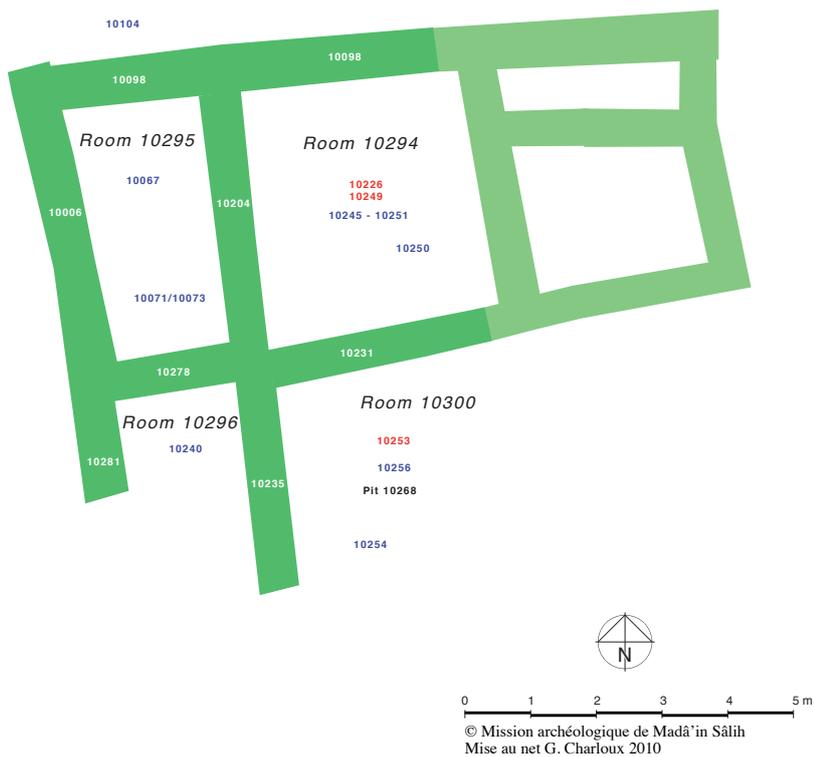


Fig. 12. Plan of Phase 3

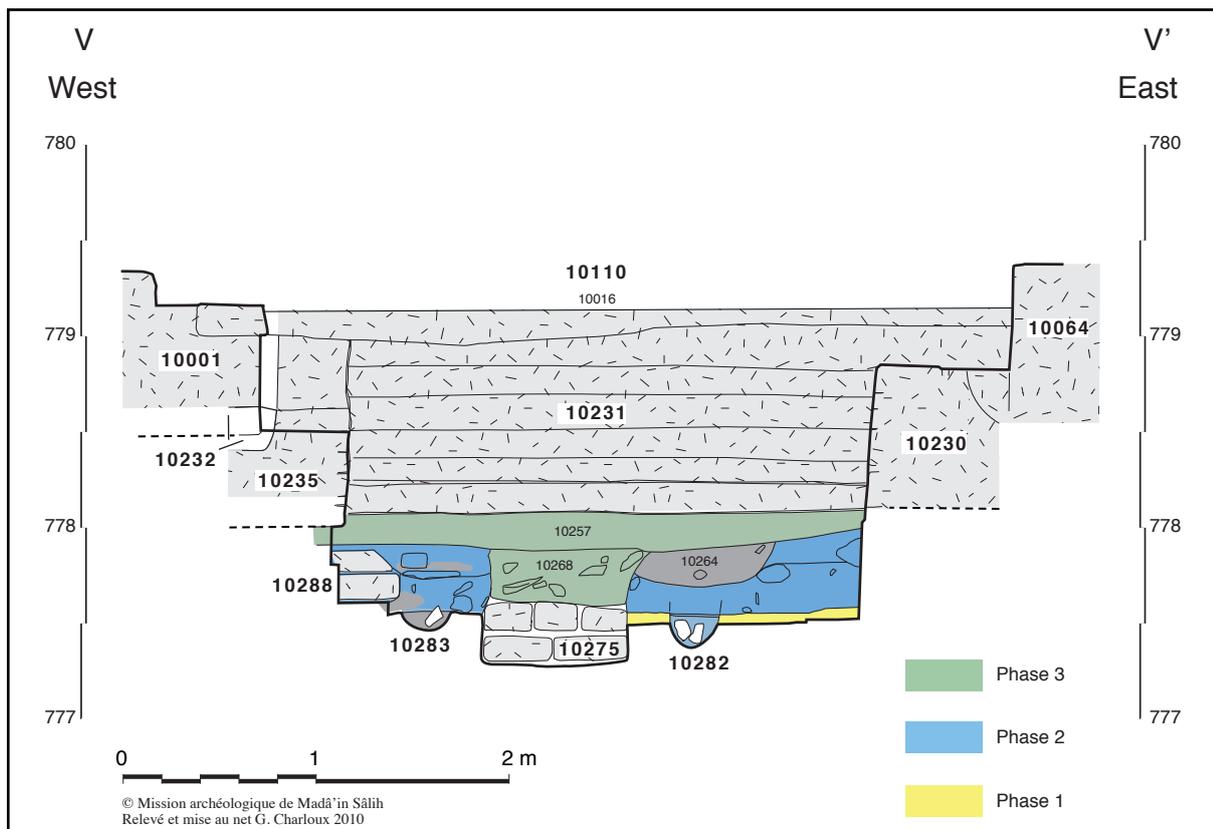


Fig. 13. Trench C, east-west section "V"



**Fig. 14.** Circular beaten earth structure 10299, trench C, towards the east



**Fig. 15.** Wall 10235 with stone foundation, trench C, towards the west



**Fig. 16.** Architectural stone 10226\_S1 found in the destruction layer lying on top of a yellow plaster



**Fig. 17.** Plan of Phase 4



**Fig. 18.** Floor 10228, towards the west



**Fig. 19.** Iron sickle and stone lid found in floor layer 10242, towards the southwest



Fig. 20. Plan of Phase 5



Fig. 21. Floor 10217, towards the south



Fig. 22. First step of threshold 10233 (Phase 5), on top of floor 10242 of Phase 4, towards the west



**Fig. 23.** Ceramics in the pathway between walls 10005 and 10235 (here partly destroyed), towards the south

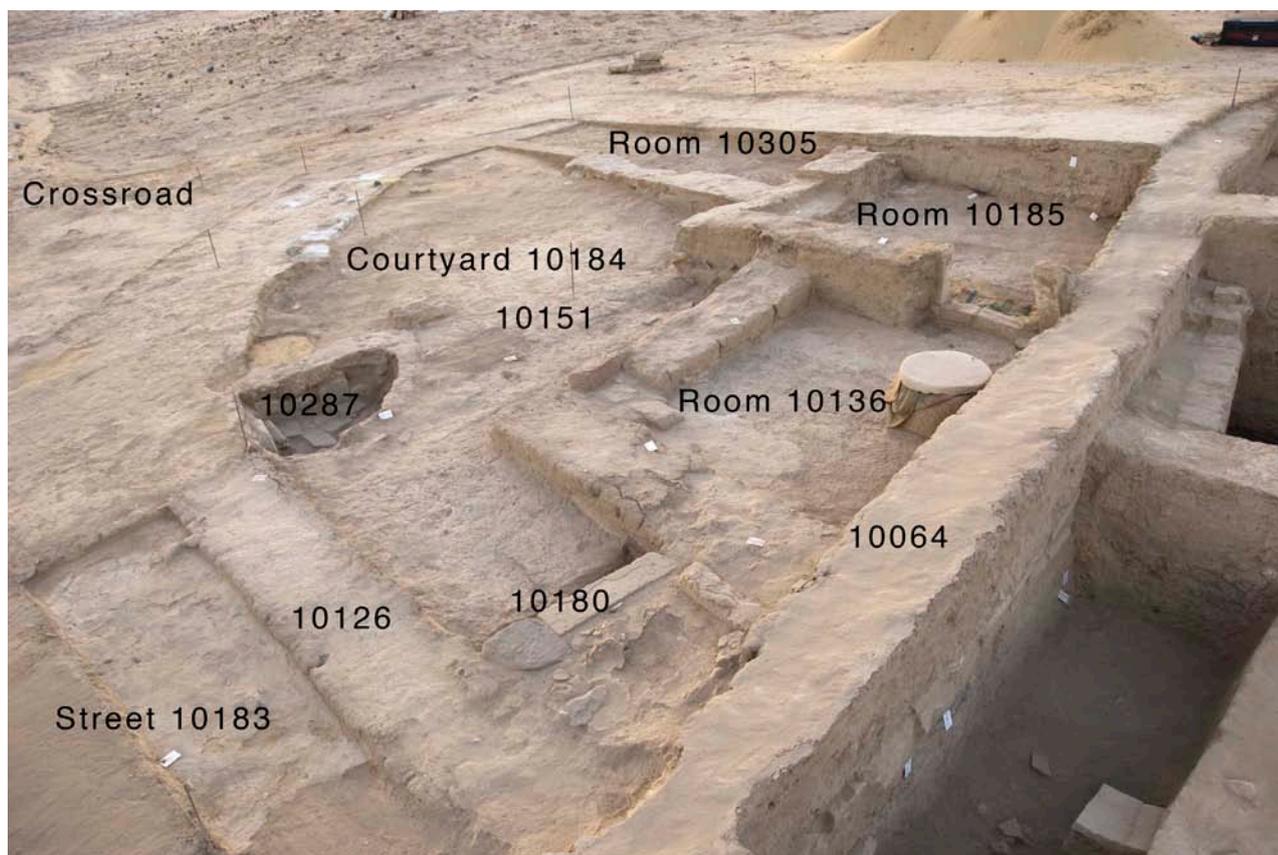


**Fig. 24.** Circular stone structure with a hole, located in the door in wall 10235, with floor 10218 to the east, towards the south



**Fig. 25.** Masonry of mudbrick walls 10231 and 10310 appearing under floors of upper phase in trench J, towards the east





**Fig. 27.** Trench J, towards the east



**Fig. 28.** Paved storage room 10287, trench J, towards the east



**Fig. 29.** Metallic object found in the floor of room 10305, trench J, towards the west



Fig. 30. General view of trench H, towards the south

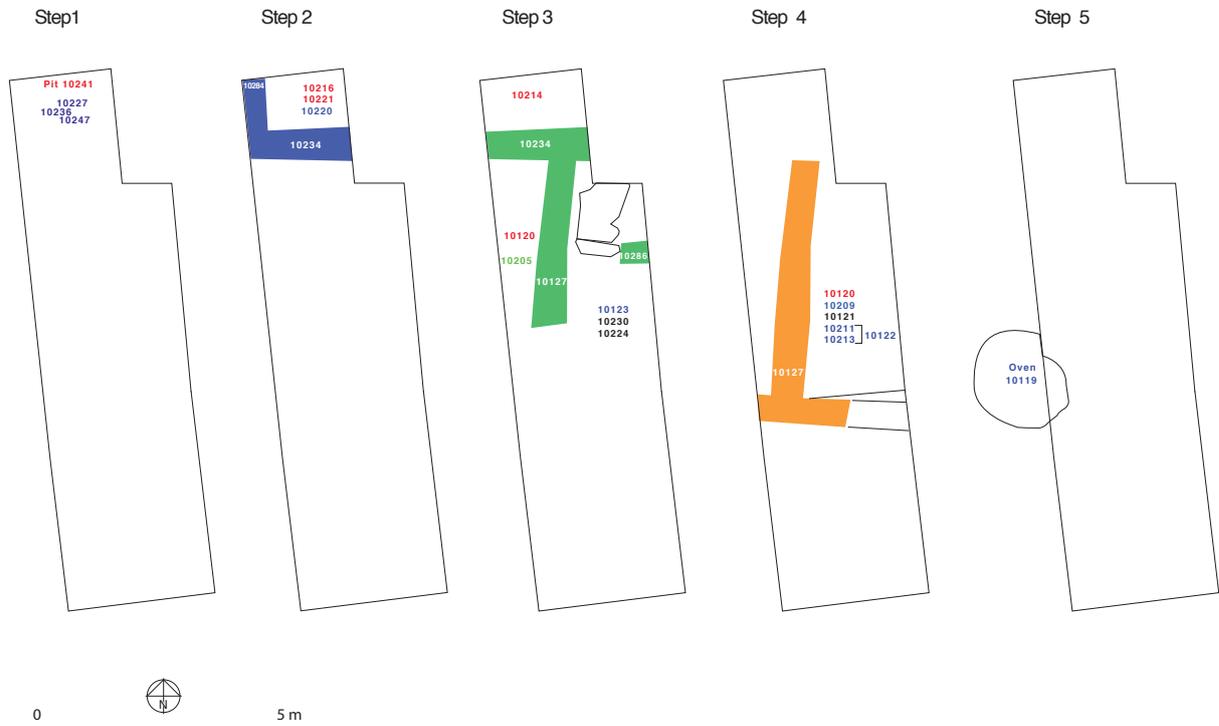
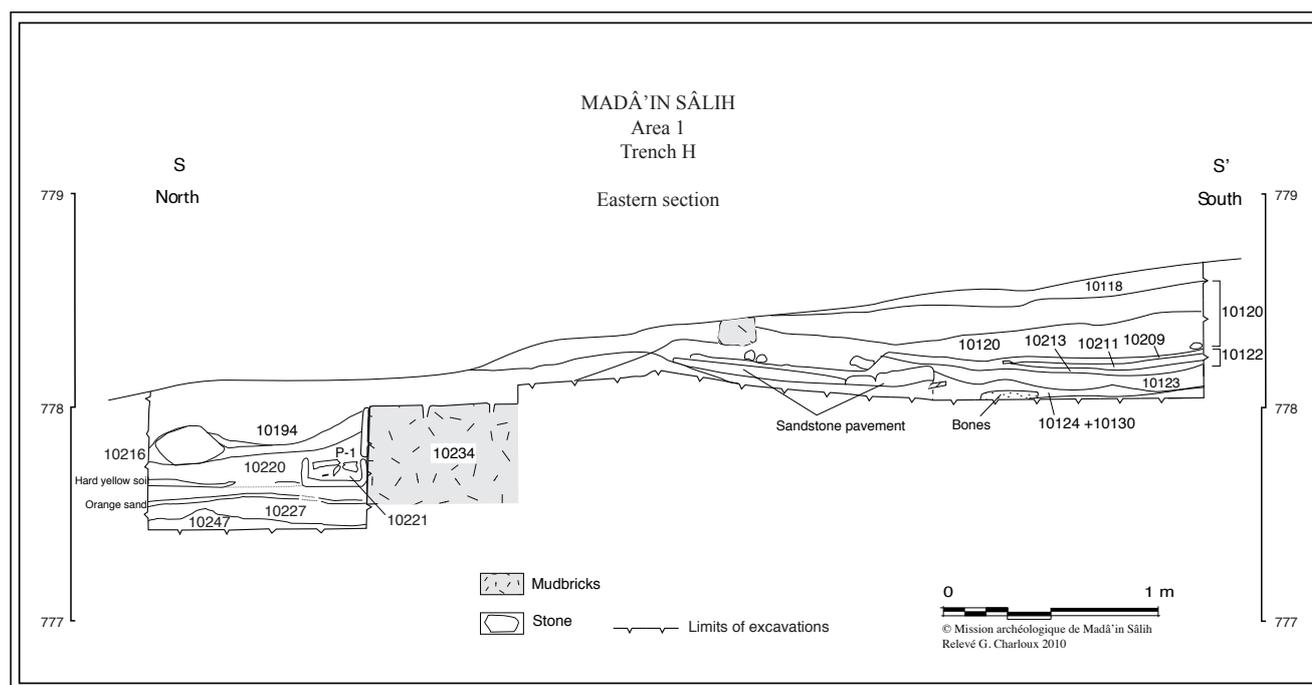


Fig. 31. Plan of sounding H and Phases 1 to 5



**Fig. 32.** Trench H, eastern section "S"



**Fig. 33.** Necklace of stone beads

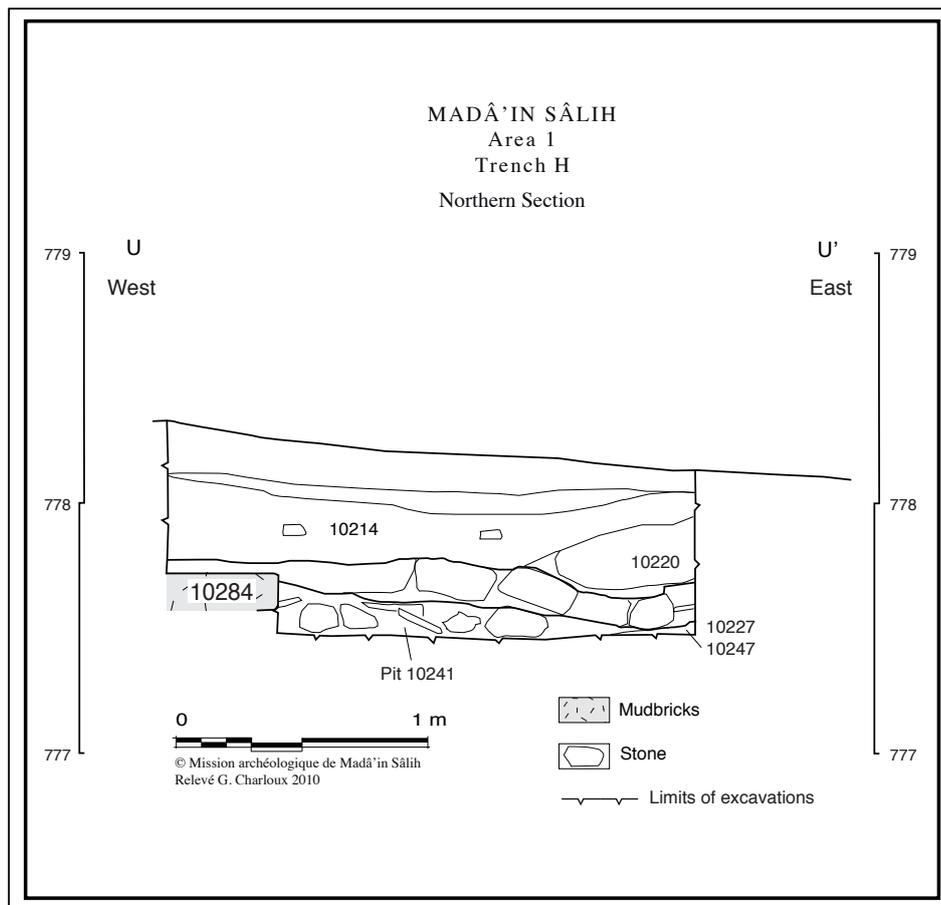


Fig. 34. Trench H, northern section “U”

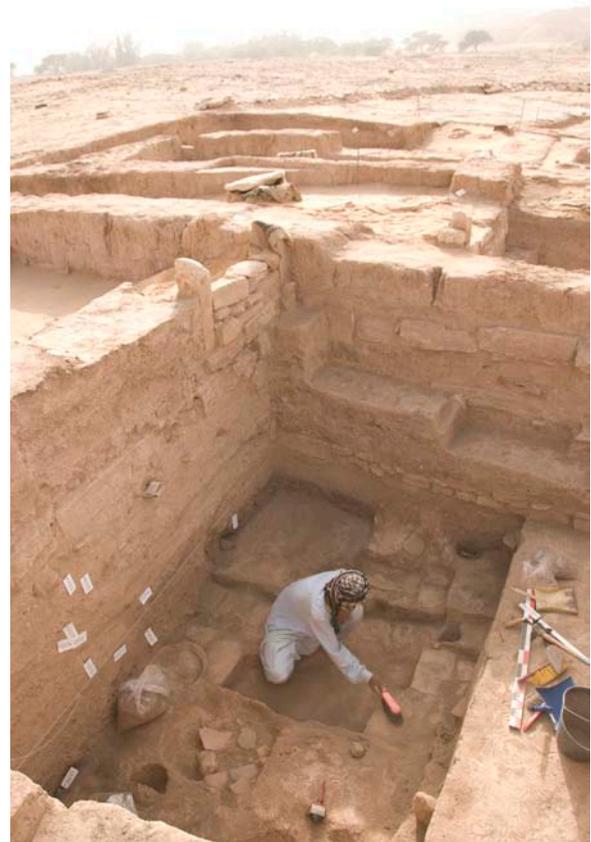


Fig. 35. Workman cleaning the structures of Phase 1 in trench C

## **Area 2 – Northern Sector**

Jérôme Rohmer (University Paris 1)



## Area 2 – Northern Sector

Jérôme Rohmer (University Paris 1)

Trenches C, F and H were excavated during the first three seasons at Madâ'in Sâlih (2008-2010; see fig. 1). Trench C (a north-south rectangle of 8 x 5 m) was opened in 2008 as an extension of trench A towards the north, on the other side of the street / passage which bisects the area. Trench F (a north-south rectangle of 8 x 6 m) was opened in 2009 as an eastern extension of trench C and a northern extension of trench B. In 2010, the work continued in trench F (excavation of a 2 m extension in the north and of the southern baulk), and a new trench (trench H) forming a *ca.* 7.50 m east-west and 3.50 m north-south extension was opened in the northwest, in order to follow the course of the northern wall of the ancient street (20002). The operations in this new sector consisted mostly in surface scraping, but a small 2.50 x 2.50 m sounding was opened at the western end of wall 20002.<sup>1</sup>

The excavations of these three trenches have led to the identification of five main architectural phases, spanning in time from the 2<sup>nd</sup> half of the 1<sup>st</sup> century BC until the eve of the Islamic period (5<sup>th</sup> – beginning of 7<sup>th</sup> century BC?). In addition to reporting on the areas excavated in 2010, I will try here to include the data from trench B (excavated in 2008 by M. al-Hâjirî) into this phasing.

### Phase 1 (2<sup>nd</sup> half of 1<sup>st</sup> century BC)

The earliest features found in the excavated area were uncovered in trench C during the 2008 season (fig. 2). They consist of levelled mudbrick walls built at a low altitude without stone foundations. The bases of these walls were set at an altitude ranging from 776.85 to 777.23 m. All of them are preserved up to an altitude ranging from 777.45 to 777.60 m, except for wall 22100 whose preserved elevation is lower (top: 777.25 m). No associated floors or occupation layers were found in connection with these walls. We ascribe them to Phase 1 because they were all levelled down in Phase 2.

The most significant of these features is certainly wall 22015, a 0.73 m wide wall running west-northwest – east-southeast on the entire width of trench C. In the west, it was probably abutted by a south-southwest – north-northeast wall built at roughly the same altitude (22100), whose eastern face has been destroyed by the stone foundations of a later wall (22006). In the southeast, these two walls delimited an area encompassed by the excavated trenches, but whose southern

---

1. The *loci* of trench C were given numbers from 22000 onward; those of trench F from 25000 onward; those of trench H from 27000 onward.

and eastern limits remain uncertain. In the probable southeastern corner of this area, two very damaged walls (22063 / 64) formed a right angle and delimited a smaller room. Along the northern face of wall 22064, a rectangular platform made of small square mudbricks was found (22024). The southern limit of the area may have been a predecessor of the later wall 20002 while the eastern limit may be wall 25025 / 39, which is attested in Phase 2 but which may have been built as early as in Phase 1.

The connection between these features and those found in trench F (in the east) remains hypothetical since there is no certain stratigraphic connection between the two trenches. The earliest mudbrick structures in trench F are built at a higher altitude than the preserved walls of Phase 1 in trench C: the altitude of their base ranges from 777.40 m to 777.57 m. However, since they are abutted by a relatively long sequence of occupation layers beginning in the 2<sup>nd</sup> half of the 1<sup>st</sup> century BC, it is possible that they already existed in Phase 1.

Since the architectural changes between Phases 1 and 2 concern only the features located in trench C, the stratigraphy of trench F is of little use to determine the date of Phase 1. In trench C, Phase 2 seems to begin in the late 1<sup>st</sup> century BC / early 1<sup>st</sup> century AD. Phase 1 should therefore be dated to the second half of the 1<sup>st</sup> century BC.

It is uncertain whether the end of Phase 1 was caused by a natural event or by human agency. However, the destruction of the structures of Phase 1 may well be the result of a deliberate plan to monumentalize the area.

## **Phase 2 (end of 1<sup>st</sup> c BC – mid 1<sup>st</sup> century AD)**

Phase 2 is marked by a large-scale reorganization of the area, at least in trench C (fig. 3). The walls of Phase 1 were levelled and they were replaced by sturdier and more monumental structures.

### *The Western Area (mostly trenches C and H)*

In the west, a massive north-northeast – south-southwest wall (22006) was built over wall 22100. In its extant state, this wall is made of two rows of dressed sandstone blocks of various sizes, with rubble fill. The blocks are laid on three courses and they rest on 1.40 deep stone foundations. The top of the stone courses forms a flat surface and it probably supported a mudbrick superstructure. In the south-west, at the limit between trenches A and C, the foundations of wall 22006 bond with those of the western part of wall 20002 (20002W), which is roughly perpendicular to 22006 and runs westwards. East of this angle, the upper courses of wall 20002 continue in the same direction (20002E), but with much less deep foundations.

Walls 22006 and 20002W delimit a wide area extending westward, outside the excavated area. Its northern limit remains undetermined. However, the entire east-west extension of this building has been uncovered during the 2010 season: wall 20002 stops *ca.* 8.40 m west from its angle with 22006 (fig. 4). There, it forms a right angle with a perpendicular wall running northwards (27016). A door was found in 27016, at the angle with 20002. However it is uncertain which phase this

door belongs to (see below, appendix on trench H). No partition walls belonging to Phase 2 were identified in this area. Therefore, it was probably not roofed and it may have been a large courtyard. A door located in wall 22006 enables the communication between this western area and the building located further east, which covers the most part of trench C (see 2008 and 2009 reports). This building was most probably delimited in the south by wall 20002E, since the lower courses of this wall have been carefully designed to encase the contemporaneous water channel 22018 (see below).<sup>2</sup> Its eastern limit was most probably wall 25025, whose existence is certainly attested in Phase 3 (see below) but which was probably already standing in Phase 2 (fig. 5). It has been uncovered on a very limited surface because a later wall (22061) was built above it in Phase 4. Its western face has been identified on the eastern edge of the main room and of the central room. Its eastern face cannot be fully ascertained, but it probably corresponds to the face of a wall found on the eastern side of 22061, in trench F (registered as *locus* 25039). In this case, wall 25025 / 39 would be a *ca.* 1 m wide mudbrick wall, which is thicker than the average but not impossible. The northern limit of the building has not been ascertained so far. The only access to it is provided by the door in 22006, in the west. Interestingly, wall 22002 does not seem to have any door opening southwards onto the street.

The excavated part of this building is divided into four rooms by west-northwest–east-southeast partition walls (22007, 22019, 22056), built in mudbricks with massive stone foundations (see 2008 report). The first two rooms from the south are rectangular and relatively narrow, whereas the main room, which is accessed through the door in 22006, forms a square about 3.40 m long on each side. Most of the northernmost room remains outside the area excavated so far. The communications between the rooms remain obscure, as no door has been identified in the partition walls. The thresholds and door jambs have perhaps been removed and reused in a later phase.

An interesting feature of this building is the presence of a water channel (22018 / 20014) running parallel to 22006 with a relatively steep slope towards the south (see 2008 and 2009 reports). It seems to have originated somewhere in the main room and it crosses walls 22019, 22007 and 20002. It is carefully encased in the foundations of these walls. It turns westwards in the “street” and stops abruptly there. This channel was probably a drain evacuating water from the main room down to the “street” in the south.

In the northeast corner of the main room, a door existed in wall 25025 / 39 during the subsequent phase, when the room was paved (fig. 5). However, its threshold is laid over the pavement. Therefore, the existence of a door in this place during Phase 2 cannot be ascertained.

---

2. Z. T. Fiema posits the existence of a predecessor of 20002 in the first phase of use of the channel 20014 / 22018 (see section “Area 2, southern sector” in this report). The evidence from trench C does not support this hypothesis. Indeed, the channel seems to have been in use only in Phase 2. Since wall 20002 is clearly designed to encase it, it seems unnecessary to postulate the existence of an earlier wall.

### *The Eastern Area (trenches F and B)*

Assuming that a door already existed there, it would have provided access to the eastern area. The latter area is delimited in the south by wall 21025, which has been uncovered in trench B and continues eastwards outside the excavated area.<sup>3</sup> Like 20002, wall 21025 does not feature any trace of a door opening southwards onto the “street”. From south to north, four rectangular rooms follow each other (fig. 6). These rooms are delimited by mudbrick walls built without stone foundations, perhaps inherited from Phase 1 (see above). They are built against wall 25025 / 39 but, as opposed to the building in trench C, they do not form a single consistent architectural unit. Indeed, they are delimited on their eastern side by three different walls which are significantly offset from each other.

The southernmost room is delimited in the east by wall 21016 and in the north by wall 25035 (internal dimensions: *ca.* 4.20 m east-west x *ca.* 3.10 m north-south). These walls were first identified during the 2008 and 2009 seasons, but they were fully uncovered in 2010. Wall 21016 is a *ca.* 0.65 m wide south-southwest – north-northeast wall made of two rows of mudbricks laid as headers. It is preserved on four to five courses. It abuts wall 21025 in the south and is abutted at its northern end by wall 25035. The two walls form a right angle. Wall 25035 is a *ca.* 0.65 wide wall running west-northwest – east-southeast, made of one row of stretchers and one row of headers.<sup>4</sup> It is preserved on three courses. It abuts wall 25039 in the west and forms a right angle with it. Two partly hewn flat stones, distant from each other by *ca.* 0.65 m, were inserted in its third course near this angle (fig. 7). They delimit a 0.65 m “void” in the wall which was later filled with a sandy deposit mixed with artefacts (25078; see below, Phase 3). These stones were probably elements of jambs and they indicate the presence of a door in this place. In 2008, M. al-Hâjirî had found a 32 cm thick layer of occupation probably abutting these walls (21009; see 2008 report).<sup>5</sup> This *locus* yielded a lot of imported pottery from Petra, mostly dating to the mid- or to the second half of 1<sup>st</sup> century AD, along with some earlier sherds. The excavation of the south baulk undertaken in 2010 suggests that this *locus* covers in fact multiple lenses of surfaces of use ranging from the late 1<sup>st</sup> century BC to the end of the 1<sup>st</sup> century AD. The very limited area left in the baulk did not allow to observe well identified floors, but at least three different surfaces could be distinguished within this *locus*: 25212-14, 25216 and 25218. The northern section of trench B, drawn in 2010, shows clearly that these surfaces run under the foundations of wall 25028 / 25042, which belongs

3. See M. al Hajirî's 2008 report, “Area 2 trench B”.

4. The extant state of this wall, as shown on the top plan, is deceptive. In 2009, the wall was thought to be only 0.50 m wide and to rest on a thicker protruding base. This misinterpretation, due to very bad state of preservation of the mudbrick, has led to a faulty “carving” of the wall and to the removal of *ca.* 15 cm of the width of its upper courses. However, the 2010 excavations have shown that it has a constant width of *ca.* 0.65 m.

5. The exact levels of this *locus* are not clear in the report, since only one altitude is given (777.82 m). This altitude seems to be that of the top of the layer. The altitude of the bottom can be inferred from the level of the top of the lower layer, *locus* 21014 (777.52 m). This will have to be checked on the *locus* sheets.

to Phase 4 (fig. 8). The lowermost surface, *locus* 25218 (alt. 777.63 – 777.66 m) featured ash pockets, bones and only one Nabataean sherd dated to the 1<sup>st</sup> century BC / 1<sup>st</sup> century AD. Surface 25216 (alt. 777.71 – 777.72 m) was covered with sherds, three coins, one polished stone and various small stones (fig. 9). All three coins belong to the Late Hellenistic head / owl group. However, the layer of disuse under this surface (25217) yielded an imitation of Nabataean small bronze coins of Aretas IV (struck between 6 and 3 BC), which rules out a dating in the 1<sup>st</sup> century BC. The uppermost surface, *locus* 25212 / 14 (alt. 777.76 – 777.79 m), probably corresponds to the destruction layer photographed in 2008 by M. al-Hājirī, and must probably be ascribed to Phase 3 (see below the section on Phase 3 and fig. 24).

The door in 25035 enabled the communication between the large southernmost room and the smaller room located north of it (internal dimensions: *ca.* 3.50 m east-west and *ca.* 1.90 m north-south). This room was delimited in the south by wall 25035, in the east by wall 25043 and in the north by wall 25087. Wall 25043 was first identified in 2009, but on a very limited surface since the installation 25024 lay over it. This installation was removed in 2010 and wall 25043 was fully uncovered. It is a *ca.* 0.60 m wide mudbrick wall made of one row of stretchers and one row of headers. It is preserved on two courses. It abuts wall 25035 in the south, and it most probably connected, one way or another, with wall 25087 in the north. However, this connection lies under the later wall 25009E and cannot be clarified so far. Wall 25087 also lies mostly under wall 25009 and only its northern face has been uncovered. It is preserved on two courses but a third course has probably been mistakenly removed during the excavations. It does not show any trace of a door. In this room, a clear floor had been identified in a small sounding (F1) made during the 2009 season (25033; alt. 777.64 – 777.69 m; fig. 10). This floor was covered with scattered bones, stones and sherds, and a complete cooking pot was resting on it (see 2009 report). It was dated to the early 1<sup>st</sup> century AD. In 2010, the whole room was excavated, which led to a more complex picture of the stratigraphy of the area. Multiple lenses of surfaces of use and occupation layers were found: 25051, 25055, 25057 / 59, 25062 / 64 / 67. The lowermost occupation layer (which includes *loci* 25067, 66, 64, 63 and 62) rests on a sandy soil, and was marked by the presence of horizontally laid flat stones (fig. 11). It is located between 777.56 and 777.60 m, and therefore lies under 25033. It contained very few sherds, some animal bones and two coins. One coin is a Ptolemaic issue; the other is an early issue of Aretas IV. The sherds include a rim of “Parthian” ware and an undetermined unpainted Nabataean bowl, both provisionally dated to the 1<sup>st</sup> century AD. This occupation layer lies under the level of floor 25033, and therefore has to be dated to the very late 1<sup>st</sup> century BC and the early 1<sup>st</sup> century AD. Over this occupation layer, a very dense sequence of surfaces (25059, 57 and 55) attests a relatively continuous occupation between 777.64 and 777.75 m (fig. 12, 13, 14). These surfaces correspond broadly to 25033. Several sherds from these surfaces confirm a dating in the 1<sup>st</sup> century AD: a Nabataean painted bowl between phases Schmid 1 and 2a, two “two red lines” Nabataean painted bowls and a rim of a bowl in Parthian ware. The uppermost surface identified in this room (25051) lies *ca.* 15 cm higher. It is unclear whether the

layer separating this surface from the lower ones is a layer of disuse or contains a surface (25052). However, this surface is clearly associated with the blocking of the door in 25035, and as such it should be associated with Phase 3 (see below).

In the north, on the other side of 25087, an even narrower room is delimited by walls 25083 and 25075 (internal dimensions: 2.12 to 2.42 m north-south x *ca.* 2.50 m<sup>2</sup> east-west; fig. 15). Wall 25075 is a *ca.* 0.65 m wide south-southwest – north-northeast mudbrick wall made of two rows of headers. It connected with wall 25087 in the south, but the exact relationship between these two walls remains uncertain. It is abutted by wall 25083 in the north, and bends slightly eastwards after this connection. “Wall” 25083 is a strange irregular feature which can be divided into three parts separated by a cut in the masonry (fig. 16). Its western part, stretching on 0.70 m, consists of three rows of approximately square mudbricks and looks like a regular wall. It is 0.65 m thick. Its central part (length 0.53 m) is still made of three rows of square mudbricks and is still *ca.* 0.65 m wide, but it bends slightly towards the south. The eastern part (length 0.70 m) continues the course of the central one but widens progressively from the west to the east (0.66 to 0.81 m). Its masonry is less clear and it seems to be filled, in the centre, with fragments of broken bricks. In section, its bricks turn out to be laid at a slightly lower altitude than the rest of the wall. The heterogeneity of this feature is striking, and it is difficult to explain. One may wonder whether the irregular eastern part of the wall corresponds to a door. In this room, several surfaces were identified. The lowermost one (25090; alt. 777.64 – 777.66 m) had few artefacts: two polished stones and two undated sherds. However, it featured a 11 cm deep hearth with a diameter of 35 cm, covered with a flat stone (25094; fig. 17). A few centimetres higher, an uncertain surface with several horizontally laid flat stones was identified (25086; fig. 18). The uppermost surface associated with the room is *locus* 25081 (alt. 777.78 – 777.82 m; fig. 19). This surface featured some sherds, three stone objects (a fragment of vessel, a small cap for a bottle, a polished stone) and included a hearth covered with piled stones. Two Nabataean fine ware sherds, one of which is painted (“two red lines” type), allow to date this *locus* between the late 1<sup>st</sup> century BC and the 1<sup>st</sup> century AD. However, the material from the layer of disuse located directly below (25082) allows to restrain this interval to the 1<sup>st</sup> century AD. This surface may possibly be ascribed to Phase 3.

A fourth room lies north of 25083. It is delimited by wall 25075 in the east, but most of it remains outside of the excavated area. A layer of loose silty soil with ash attesting to some kind of human activity was found in this area (25096; alt. 777.62 – 777.71 m; fig. 16).

Other structures lie east of the above-described rooms, but they remain largely outside the excavated area. In the narrow corner formed by wall 25075 and the eastern baulk of trench F, the beginning of a mudbrick wall running perpendicular to 25075 was identified (25301). At least one certain surface abutting this wall and wall 25075 was identified (25099; see fig. 20). This surface and the layer of disuse covering it (25092) yielded a significant amount of early Nabataean pottery (“two red lines” type), provisionally dated to the (late?) 1<sup>st</sup> century BC.

Apart from wall 25301, no wall has been identified in this area, either during the excavations or in

the final eastern section. Since surface 25099 is not found in the section south of wall 25009E, an early mudbrick wall (the continuation of 25087?) may have run under wall 25009, but this could not be ascertained on the ground. South of this, no east-west mudbrick wall was found.<sup>6</sup> Therefore, the large area east of walls 25043 and 21016 was perhaps unpartitioned. In 2009, an occupation layer (25021) and a surface (25036) perhaps abutting wall 25043 have been found in the southeast corner of trench F, but it is much higher than the other surfaces of Phase 2 and it is perhaps to be associated with Phase 3. It yielded a large amount of pottery, among which Nabataean painted sherds dated to the 1<sup>st</sup> century AD.

### *Dating and remarks on the end of Phase 2*

The evidence from trenches C and F points to a date of Phase 2 in the interval between the late 1<sup>st</sup> century BC and the mid-1<sup>st</sup> century AD. In trench C, the material from layers of filling contemporaneous with the construction of the channel provides a *terminus post quem* for the beginning of Phase 2 in the late 1<sup>st</sup> century BC / early 1<sup>st</sup> century AD (see 2009 report). This *terminus post quem* is confirmed by the evidence from trenches F and B, where the surfaces and occupation layers associated with the structures of Phase 2 have yielded a material ranging from the 2<sup>nd</sup> half of the 1<sup>st</sup> century BC to the beginning of the 2<sup>nd</sup> century AD.

The date of the end of Phase 2 is more uncertain. The evidence from trench C is rather scarce, but suggests a *terminus ante quem* in the second half of the 1<sup>st</sup> century AD (see 2009 report). In trenches F and B, the structures of Phase 2 continued – with some minor changes – into Phase 3 (see below). The uppermost surfaces and occupation layers associated with these structures may therefore belong to Phase 3. In particular, the room delimited by walls 25035, 25043 and 25087 clearly features two phases. In its initial state, this room was accessed through a door in 25035. Most of the surfaces identified in this room are clearly contemporaneous with this state. In a second phase, this door was blocked. The door blocking is abutted by only one surface (25051), dated to the late 1<sup>st</sup> / early 2<sup>nd</sup> century AD (see below). If this minor modification is related to the transformations which affected the other parts of Area 2 during Phase 3, the end of Phase 2 can be dated to the mid- or second half of the 1<sup>st</sup> century AD.

Phase 2 probably ended with an episode of partial destruction, since several features of this phase were abandoned (channel 22018), levelled (wall 22019) or restored (wall 25035) in the subsequent Phase 3. However, this destruction was probably less important in the northern sector than in the southern one, where most of the walls were levelled (see Z. T. Fiema's report). The cause of this destruction (natural or intentional) cannot be ascertained yet.

---

6. The 2008 report about trench B does not mention any east-west mudbrick wall east of wall 21015. This is impossible to check in the section because of the presence of wall 25006.

### Phase 3 (mid-1<sup>st</sup> – early 2<sup>nd</sup> century AD)

In the northern sector, Phase 3 is marked by minor architectural transformations, which do not affect the general layout of the buildings (fig. 21). Here, Phase 3 appears rather as a sub-phase of Phase 2. We chose however to keep it as a phase in order to facilitate the concordance with the southern sector.

#### *The Western Area (mostly trenches C and H)*

The main events characterising Phase 3 are the disuse of channel 22018 and the construction of pavement 22010 in the main room of the central building (see 2008 and 2009 reports). Pavement 22010 is made of rectangular sandstone slabs of various dimensions, carefully bonded with the surrounding walls with white coating. The rather large dimensions of most slabs compared to the size of the room lead to think that they are reused and possibly taken from a larger (public?) building.<sup>7</sup> On the southern side of the paved room, wall 22019 was levelled and a thinner wall, made of only one row of roughly hewn stone blocks, was built over it. The water channel 22018 does not run under the pavement, and no connection between these two features can be seen: the channel was therefore disused when the pavement was built. Besides, in the southern rooms, the channel was found deprived of its capstones and filled up with earth.

An impressive layer of abandonment, including several complete pots, was found over the pavement (22010; fig. 22). Most of these vessels were locally-made and functional (jars, cooking pots). This suggests that, despite its rather exceptional pavement (only one other pavement has been found at the site so far), this room had a domestic function and was at least partly devoted to storage. Unfortunately, the pottery from this *locus* has not been dated so far. However, the presence of these vessels crushed *in situ* is evidence for a major episode of abandonment and disuse at the end of Phase 3. Apparently, the inhabitants of Phase 3 left the area relatively quickly and in a sudden way, leaving most of their domestic apparatus behind. The northern part of trench F drawn in 2009 confirms this scenario (fig. 23). The pavement was recovered by a 20 cm thick layer of melted clay, with occasional ash pockets, probably corresponding to the melting of the mudbrick walls (25023, 25017). Over this layer was a layer of looser silt which is probably alluvial deposit from the nearby wadi (25014). The floor of Phase 4 was laid over this layer of alluvial deposit. This stratigraphical evidence suggests that the abandonment of the area was followed – or caused – by a flood.

#### *The Eastern Area (trenches F and B)*

In the rest of the area, other layers of abandonment may be related to this episode of destruction. As mentioned above, in the southern room of the eastern sector, the top of *locus* 21009 (excavated by M. al-Hâjirî in 2008) seems to be a layer of destruction or abandonment, with crushed pottery vessels (fig. 24). Unfortunately, *locus* 21009 is mixed, since it includes a 30 cm thick layer under

7. I thank I. Sachet for this observation.

this level (alt. 777.52 – 777.82 m). However, the layer of abandonment / destruction probably corresponding to its top has been isolated during the excavations of the baulk between trenches B and F in 2010: *loci* 25212 / 14 (alt. 777.76 – 777.79 m; fig. 25). A base of stone vessel which was lying upside down over this surface (25012\_S1) suggests that it is the same level of abandonment / destruction. It yielded a rich material. Among the nine coins found, three are Nabataean issues of Aretas IV and Shaqilat (16 / 18-40 AD); one is a Nabataean issue dated to the reign of Malichos II and Shaqilat (40-70 apr. J.-C.); the five others belong to the Late Hellenistic head / owl group. The associated pottery is rather poor and is dated to a broad interval between the 1<sup>st</sup> century BC and the 1<sup>st</sup> century AD. However, some sherds from the lower level of disuse (25215) restrain the dating range to the end of the 1<sup>st</sup> century AD.<sup>8</sup> This surface was covered with a *ca.* 20 cm thick layer of silt with few artefacts (25211), which probably corresponds to a period of disuse following Phase 3.

In trench F, above the sequence of surfaces associated with the first state of the southern room (i.e. with Phase 2), a clear floor with scattered sherds and a nearly complete *in situ* cooking pot abutted the door-blocking in wall 25035. The material from this surface can be relatively securely dated to the late 1<sup>st</sup> / early 2<sup>nd</sup> century AD. The presence of the pot *in situ* strongly suggests an episode of abandonment.

### *Dating and remarks on the end of Phase 3*

The above mentioned evidence from key *loci* associated to Phase 3 (22010, 25212 / 14, 25051) leads to date this phase to an interval beginning in the 2<sup>nd</sup> half of the 1<sup>st</sup> century AD and probably ending in the early 2<sup>nd</sup> century AD. The major episode of abandonment and destruction which brought this phase to an end corresponds to the evidence from the southern sector, where all the structures seem to have been washed away or covered by a massive flood.

### **Phase 4 (2<sup>nd</sup> century – early 4<sup>th</sup> century AD)**

As opposed to the southern sector, the northern sector witnessed a new significant phase of building activity and occupation after the destruction of Phase 3. New walls were built above the levelled walls of Phase 3 (fig. 27). Although they were not always built directly over earlier walls, they keep the overall orientation defined in Phase 1. Most of these walls are made of mudbricks resting on stone foundations.

### *The Western Area (trenches C and H)*

In trench C, a new wall, 22035, was built over wall 22006, blocking up its door (see 2009 report). The area west of it was partitioned. A *ca.* 0.65 m thick west-northwest – east-southeast mudbrick wall (22052) was built against the blocked up door of 22006. It continues westward outside the

8. This dating is confirmed by the pottery study of *locus* 21009, which included a significant proportion of pottery from the late 1<sup>st</sup> century AD (together with earlier sherds from the lower levels).

excavated area. A clear layer of occupation with a large area of ash abutted its base (22002; 22051). This layer yielded few datable pottery but several coins were found in it: 22002\_C1 is a Roman city-coin featuring Annia Lucilla, the wife of Lucius Verus, on the obverse (161-169 apr. J.-C.); 22051\_C1 is an “Arabian drachma” issued under the reign of Trajanus, probably between 111 and 117 AD. The third coin, 22002\_C2, was found in 2010 when scraping the surface of trench H, immediately east of trench C (fig. 28): it is a Roman provincial issue probably dated to the 2<sup>nd</sup> or 3<sup>rd</sup> century AD.

In trench H, a roughly built L-shaped wall abutting wall 20002W in the south was found (27018; fig. 28). It is 0.23 to 0.35 m thick and it is made of unhewn stones. This wall was abutted by the above-mentioned occupation layer (22002), and therefore it must be ascribed to Phase 4. A similar wall also abutting wall 20002 and probably belonging to the same phase, was found 3 m west (27017). In Phase 4, the large area enclosed by 22006, 20002 and 27016 was therefore divided into several rooms.

In the southwestern corner of this area, a door, with an *in situ* threshold and a fallen jamb, was identified in wall 27016 (fig. 29). It is tempting to ascribe this door to the last significant architectural phase, i.e. Phase 4, since its elements were left in as they fell. However, it is still uncertain which phase this door and the floor which abuts it (27004 / 6) belong to (see below appendix on trench H).

East of 22006, the southern wall of the building (20002E) remained in use. As for the partition walls, wall 22056 was obviously still standing, since it is abutted by an occupation layer of Phase 4 (25010 / 11). Wall 22007 is also likely to have subsisted, but the case of wall 22005 is more uncertain. However, these east-west walls abutted, in the east, a new north-south wall with stone foundations (22061), built above the levelled wall 25025 / 39. A surface abutting these walls was found 25 to 40 cm above the level of the pavement (25010 / 11; fig. 23). Scattered sherds and stones, among which a fragment of stone basin laid over it. It included two deep hearths (?) with a *ca.* 30 cm diameter (25013). A *ca.* 1.20 m long threshold in wall 22061 indicates the presence of a door near the angle with 22056, approximately at the same place as the previous door of Phases 2 and 3. This door led to the eastern area.

### *The Eastern Area (trenches F and B)*

East of wall 22061 (trenches F and B), a very thick mudbrick wall (25009) bisects the area along a west-northwest – east-southeast axis. North of this wall lies an unpartitioned rectangular area closed in the north by a 0.53 m thick mudbrick wall built on stone foundations (25134; fig. 30). The eastern part of this area remains outside of the trench. Along wall 25134, a rectangular mudbrick feature, perhaps continuing under the eastern baulk, was found (25135; fig. 31). It is 0.78 m wide north-south and at least 1.49 m long east-west. It was probably a platform or a base, but we do not know what it supported.

The inner dimensions of this structure (4.20 north-south, at least 4.30 m east-west) make it by far the largest “room” in the whole Area 2. This may lead us to doubt whether it was roofed. The relative scarcity and the mostly functional nature of the material it yielded support this hypothesis. Indeed, it

yielded less material – and a coarser one – than the small room located south of it (see below). Only one coin, and very few metallic objects were found there. In 2009, two grinding stones were found on surface 25008 and in occupation layer 25012 (fig 32; see 2009 report). At least one of these grinding stones (25008 S1) seemed to be *in situ* – and not fallen from an upper terrace. As grain processing activities probably took place outside, this area was probably an open air courtyard.

In this courtyard, several surfaces and occupation layers had already been observed in 2009 (25008 / 25005b, 25012; see fig. 23 and 2009 report). In 2010, the excavation of the northern extension of trench F gave us an opportunity to precise this stratigraphic sequence. The lowermost surfaces identified in 2010 are very close to each other and range in altitude from 778.12 to 777.18 m (25129, 25126, 25123; fig. 33, 34). They seem to belong to one thick occupation layer corresponding to a relatively continuous occupation of the area, and probably equalling *locus* 25012 (excavated in 2009). These surfaces yielded mostly common local pottery. However, each one of them featured some sherds of Nabataean common painted ware, which is a hallmark for 2<sup>nd</sup> / 3<sup>rd</sup> century levels in Petra. A few potentially earlier sherds (a rim of cooking pot with bevelled lip and a fragment of “Parthian” glazed ware) were found on 25129. Assuming that there was no contamination from lower layers, these sherds may draw the *terminus post quem* for the occupation of this courtyard up to the 1<sup>st</sup> half of the 2<sup>nd</sup> century AD. The above mentioned surfaces probably equal occupation layer 25012, found within the initial boundaries of trench F during the 2009 season. This layer was marked by the presence of an abandoned basalt grindstone (25012\_S1) and was sealed by a thin lens of yellowish concretions. These were first interpreted as a floor bedding for the upper surface (25008), but E. Fouache identified them as sandstone concretions deposited by flowing water. This suggests a short episode of disuse with alluvial deposition between 25012 and the subsequent occupations.

This break in the occupation was confirmed in the northern extension, since the next clear surface (25111) contains a clearly different pottery assemblage and is associated with new architectural installations (fig. 35).<sup>9</sup> Surface 25111 probably corresponds to surface 25008 and occupation layer 25005b (excavated in 2009; see fig. 23). Its altitude ranges from 777.25 to 777.29 m. It yielded only local pottery (which could not be dated so far), among which two fragments of a pottery pipe. Among other finds, there was also a coin of Aretas IV (25111\_C1), which is obviously of no use to date this late layer, but shows that 1<sup>st</sup> century AD Nabataean currency remained in use for a very long period. Surface 25111 is probably contemporaneous with the adjunction of the installation which was found in the northwest corner of the courtyard (*loci* 25112 / 25113; fig. 31, 36, 37). This installation consists in two parts. The first one is a rectangular buttress made of small stones, built along the corner made by walls 22061 and 25134 (25112). It is *ca.* 0.57 m wide east-west, 0.95 m long north-south, and

9. As a safety precaution, a surface was registered between 25123 and 25111 during the excavations (*locus* 25118, alt. 777.21-777.23 m), but it does not seem to be an actual use surface.

0.40 m high. It is made of unhewn and roughly hewn stones (sandstone and limestone?). Next to it was a second feature made of three upright stones delimiting – with the eastern face of 25112 – an empty rectangular area (outer dimensions: 0.57 east-west, 0.80 m north-south, height 0.33 m; inner dimensions: 0.25 east-west and 0.56 north-south, depth 0.23 m). The northern and southern stones (limestone) were rather small and roughly hewn so as to feature flat sides. The eastern stone (white powdery sandstone) was bigger and seemed to be hewn only on its inner side. The bottom of this feature was made of a wide horizontally laid flat stone. Both features seem to form a single installation, which was probably associated with surface 25111. Indeed, the lowermost stones of 25112 and 25113 were laid in an upright position, which suggests that they were buried. Therefore, their top must correspond to the surface associated with the installation. The purpose of this installation was probably storage (small cupboard or closet?). However, it is not clear why a stone pier such as 25112 had to be built only for the sole purpose of storage. The empty space in 25113 was filled with a lot of sherds, soil and ash. Our first assumption was that the sherds were fragments of some *in situ* crushed pots which were stored there, and that the ash corresponded to their content. However, the pottery study of this *locus* showed that the sherds do not form complete vessels, and the sample of ash turned out to be deprived of any organic remains other than wood.

South of the northern courtyard, on the other side of wall 25009, walls 21002 and 21006 delimit a large rectangular area (see M. al-Hājirī's 2008 report for a description of these walls). Two perpendicular mudbrick walls (25042 / 21023 and 25028) divide this area into a small square room in the northwest and a larger L-shaped area in the southeast. These walls are *ca.* 0.65 m thick and rest on stone foundations (fig. 38). The layout of their bricks is not very clear but they seem to be made of one row of headers and one row of stretchers. An interesting feature is that the connection between these walls is made of carefully assembled stones, preserved on five courses (fig. 8). This is the only example of a stone-reinforced corner in Area 2.

The small northwest room is delimited by walls 25028, 25042 / 21023 and 25009. Its inner dimensions are *ca.* 3 m east-west and 2.25 m north-south. At the beginning of Phase 4, this room probably communicated with the northern courtyard through a door in wall 25009. Indeed, the *ca.* 1.27 m wide stone feature which rests on the western part of wall 25009 and abuts wall 22061 is probably a door blocking (25001; see 2009 report). This door was probably walled shut after the short period of disuse which took place during Phase 4 (see above). In their extant state, the other two walls do not feature any trace of door. However, these walls are very poorly preserved and possible thresholds may have been removed in a later period. The small room contained a sequence of several surfaces and occupation layers (25022, 25015) with upside down complete pottery objects (fig. 39). The material resting on the surfaces was particularly rich and included functional pots and stone vessels, fine local and imported pottery, several metal objects and two coins (see 2009 report). The complete pottery objects found on surface 25015 (in the south room of trench F) suggest at least a temporary

abandonment of the area in the course of or at the end of Phase 4. The 20 to 40 cm thick layer which covered it (25004) contained melted clay and yielded many charcoals and artefacts (sherds, stones, fragments of stone objects); it is not clear whether it is (or contains) an occupation layer, or whether it results from the collapse of the building at the end of Phase 4.

As for the L-shaped area, its widest part lay in trench B and was excavated in 2008 by M. al-Hâjirî. According to his report, *loci* 21000 and 21001 probably correspond to occupation layers associated with this area. The pottery from these *loci* could not be dated precisely so far, but it does not seem to be later than the 3<sup>rd</sup> century AD.<sup>10</sup> All coins from these *loci* date to the 1<sup>st</sup> century AD, but a metal object from 21001 with a Latin inscription is probably of “Late Roman” date. In 2010, the very small part of this area which was left in the baulk between trenches B and F was excavated (fig. 8). Over the layer of disuse sealing the occupation of Phases 2 and 3 (25211), a thick layer of silt with ash pockets and charcoals, containing a large amount of artefacts (25209) attests to a significant human activity in this area in Phase 4. This layer was covered with a more compact layer of silt and clay (25207), still containing many artefacts, among which a complete cooking pot. The hard clay in this *locus* can most probably be explained by the eventual melting of the mudbrick walls. Unfortunately, the pottery of these layers have not been dated so far.

### *Dating and general remarks on Phase 4*

The rich pottery collected on the floors and in the occupation layers of Phase 4 is relatively homogeneous from a chronological point of view. It is dated to a time span covering the 2<sup>nd</sup>, 3<sup>rd</sup> and early 4<sup>th</sup> century AD. The coins found in these contexts include Nabataean (25004\_C1 and C2, 25008\_C1, 25010\_C1, 25011\_C1) and 2<sup>nd</sup> century AD Roman issues (22002\_C1 and C2, 22051\_C1, 25012\_C1, 25015\_C1, 25022\_C1). The relative scarcity of coins from Phase 4 onward must be noted: out of the 38 coins found in trench F, only 10 can be associated with Phase 4 or Phase 5, while 23 are from earlier contexts. Moreover, ancient Nabataean issues represent a significant proportion of the coins (five out of eight in trench F). The amount of imported pottery seems to decrease accordingly. Although no hasty conclusions should be drawn from a single excavation area, these facts suggest a decline of the exchanges in 2<sup>nd</sup> / 3<sup>rd</sup> century AD Hegra.

As stated above, abandoned objects in the small room and in the northern courtyard of trench F (*loci* 25012, 25015) suggest that a small phase of disuse took place within Phase 4. Another episode of disuse probably brought this phase to an end, as suggested by the presence of a grindstone, obviously abandoned *in situ*, on surface 25008 (= 25111) in the northern courtyard.

10. 21000 has « certainly no Byzantine » (sic) sherds.

## Phase 5 (between the mid-4<sup>th</sup> century and the early 7<sup>th</sup> century AD?)

It is difficult to draw a consistent picture of what the latest occupation of the area looked like. Unlike Area 1, Area 2 has been affected by a strong erosion which has probably washed away most of the upper features. In Phase 5, some of the walls of Phase 4 were probably preserved up to a certain height and have been roughly restored with friable unhewn stones: stone wall 22034 was built over wall 22052; 22061 was restored with irregular stones (fig. 40). In the northern extension of trench F, the location of the hearths of Phase 5 (25109; 25103) shows that walls 22061 and 25056 were probably still in use during this phase. In some cases, only a thin line of small stones was laid over the earlier walls (e.g. *locus* 22004 over wall 22007; fig. 41). In one case, a small wall made of one row of irregular stones was not built over a pre-existing feature (wall 25002; fig. 42).

No proper floor associated with the walls of Phase 5 has been found. The only traces of this late occupation are hearths (25007; 25103; fig. 42, 43) and pits (25107/9; fig. 40) found directly under the surface.

It is uncertain whether the crudeness of these features actually reflects a precarious occupation of the area during Phase 5 or whether it is due to later damage (erosion, looting of building stones for the construction of the Hijâz railway, recycling of mudbricks to fertilize agricultural lands, etc). The comparison with Area 1, where the late structures are much better preserved, may support the latter option. Indeed, the latest architectural phase of this area, which probably corresponds to Phase 5 in Area 2, is still marked by a dense and permanent human occupation (see G. Charloux's report in this volume). However, the situation was not necessarily the same in all areas during this period, and it is possible that Area 2 witnessed a different kind of occupation, with cruder and perhaps non-permanent structures (see 2009 report). Such spatial differentiation or specialization within the urban area is an option to consider.

The few sherds found in the hearths (25103; 25007) and in the pit (25107/9) of Phase 5 date back to a time period comprised between the mid-4<sup>th</sup> and the early 7<sup>th</sup> century AD. It is so far impossible to precise the date of Phase 5 and to assess its chronological extension.

## Appendix on trench H

The results of the sounding made in trench F, at the corner of wall 20002 and 27016 (sounding H1), cannot be certainly connected to the general phasing so far, because its pottery has not been studied yet. The results will therefore be addressed separately here.

This 2.50 x 2.50 sounding was opened north of the eastern end of wall 20002 in order to check the angle of the vast northwest building or courtyard. A *ca.* 1.45 m long hewn stone lying on the surface and looking like a fallen door jamb suggested the presence of a door in this place.

## Wall 27016

The existence of this door – and thus of a north-south wall connected with wall 20002 – was quickly ascertained. Its threshold was found a few centimeters under the surface. The wall (27016) continues north of the door. Its upper course is made of mudbricks. It is 0.66 m thick and is made of a row of stretchers and a row of headers. The mudbricks are laid over two courses of roughly hewn stones, protruding by *ca.* 20 cm on the eastern side (fig. 4, 44). However, the upper stone course is missing under the door. The stones courses rest, in turn, over protruding foundations made of irregular stones. This construction technique closely parallels that of walls 20002 and 22006. Accordingly, although the bottom of the foundations was not reached this year, they are expected to be *ca.* 1.20 / 1.40 m deep.

## Floors and occupation layers

On the eastern side, a very clear floor with numerous artefacts lay over the upper stone course of wall 27016 (27004 / 6; fig. 29, 44).<sup>11</sup> It is contemporary with the use of the door. Among the artefacts were several crushed pots (probably complete) and a raw basalt stone with a hole – a mortar or more probably a door socket. A small pocket of ash was also registered in the southeast angle of the sounding. Under this surface was a layer of grey / brown silt with few artefacts. Still below, at the level of the top of the foundations, layers of silt mixed with ash, containing sherds and bones, were identified (27013 / 27014). These layers are the lowermost occupation layers found in the sounding. They rest on a layer of sandy silt whose bottom has not been reached.

On the western side, a probable surface was found at approximately the same level as 27004 (27009 / 10; fig. 45).<sup>12</sup> It featured one coin, one stone object (base of green sandstone vessel) and some light ash. It abuts wall 27016 although the stone courses of the wall, which are probably inset under the top course of mudbricks, were not uncovered on this side of the sounding. Another surface, with a lot of scattered stones, was found *ca.* 12 cm below (27012; fig. 46). The excavation was not carried on below this surface.

## Connection with the general phasing

To sum up, two distinct surfaces were identified on both sides of wall 27016. However, their relationship with the wall remains problematic. The uppermost surface is 0.14 to 0.22 m higher than the base of the wall. It lies *over* the upper stone course and abuts the mudbrick course. The problem is that it is unclear whether this mudbrick superstructure belongs to the initial state of the wall. Indeed, the fact that the mudbrick courses are inset by 20 cm in the east makes us doubt whether they were built at the same time as the stone courses. Therefore, there is a case that wall 27016 had several phases, and that surface 27004 / 6 does not correspond to the first one.

11. The surface in itself was registered as *locus* 27006; the occupation layer lying over it is *locus* 27004.

12. The surface in itself was registered as *locus* 27010; the occupation layer lying over it is *locus* 27009.

Assuming this, the occupation layers associated with the initial state of the wall would have to be 27013 / 14. However, they lie slightly under the theoretical base of the wall and, on the section, the foundation trench of wall 27016 seems to be dug through them (fig. 44). Accordingly, they seem to pre-date the construction of the wall.

Therefore, the available evidence is problematic, since no surface seems to be associated with the initial phase of wall 27016. This leaves us with several possible *scenarii*:

1. Layers 27013 / 14 are indeed earlier than wall 27016, and surface 27004 / 6 corresponds indeed to the second phase of the wall. Layers 27013 / 14 would therefore correspond to Phase 1, and 27004 / 6 to Phase 4. The occupation corresponding with the first phase of the wall (i.e. of phases 2 / 3) would be very light and would not appear in the section.
2. Layers 27013 / 14 are indeed earlier than the wall, and surface 27004 / 6 corresponds in fact to the first occupation of the northwest building / courtyard. Then, the upper stone courses of wall 27016 would be part of the foundations. In this scenario, 27013 / 14 would belong to Phase 1 (before the construction of the northwest building / courtyard) and 27004 / 6 would correspond to the occupation of Phase 2 / 3.
3. Surface 27004 / 6 abuts a restoration of wall 27016, and layers 27013 / 14 in fact abut the base of this wall (whose foundation would have protruded slightly over the surface). Then, layers 27013 / 14 should be ascribed to Phase 2 / 3, and 27004 / 6 to Phase 4.

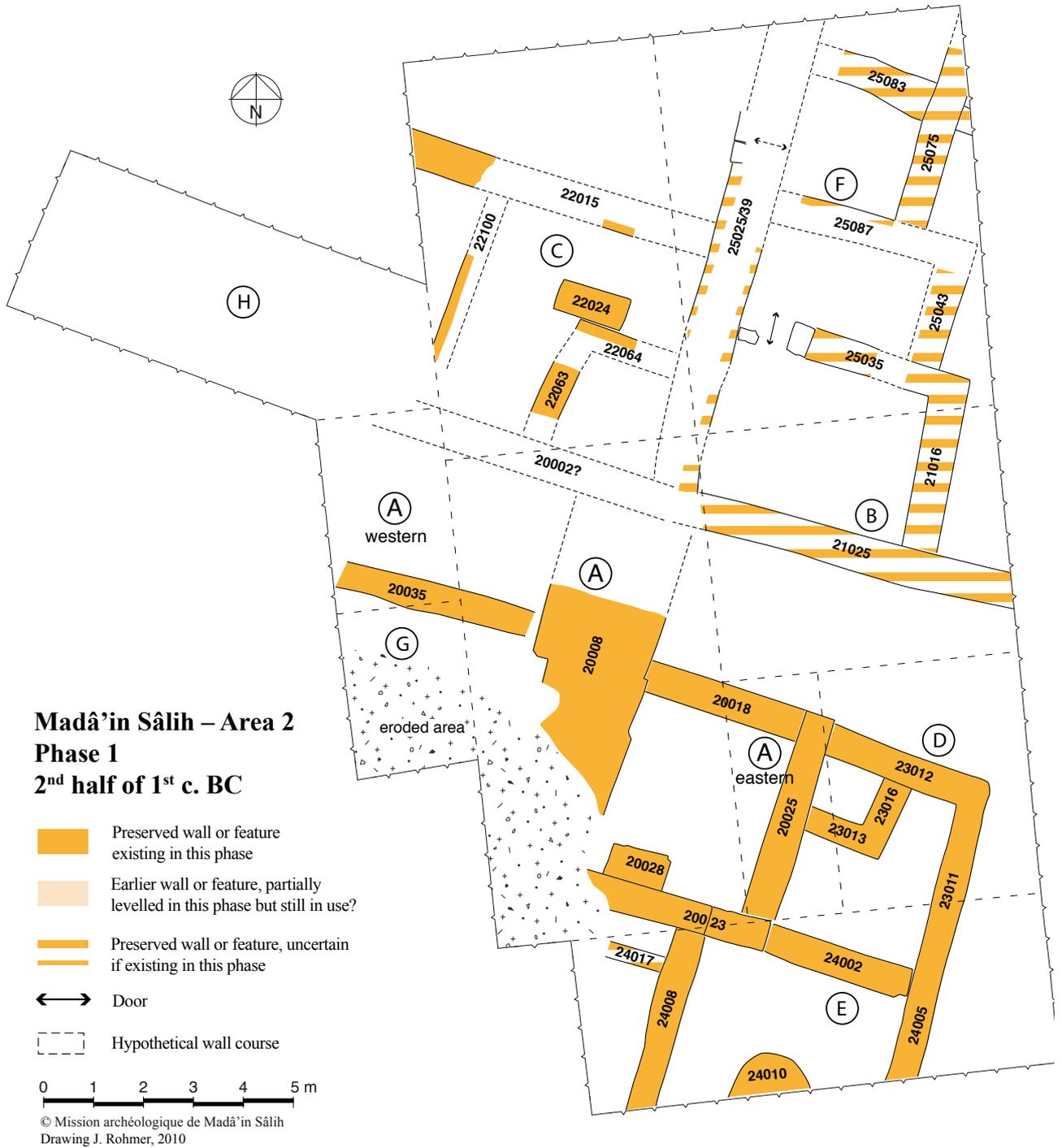
The exact relationship between the different occupation layers and wall 27016 will have to be ascertained next year by extending the excavations. Hopefully, the pottery study will also help us choose between these *scenarii*.

## Conclusion

The 2010 season has allowed to precise the stratigraphy of the northern sector of Area 2 and to connect the results from trenches C and F with those of previously excavated trench B. However, the concordance with the southern sector remains problematic. In particular, differing views subsist about the phasing of wall 20002E (built in Phase 3 according to Z. T. Fiema; in Phase 2 according to J. Rohmer). This apparently minor discordance entails significant consequences, since wall 20002 is obviously a defining component of the east-west street which crosses Area 2. Therefore, the issue at stake is in fact the date of the formation of the street itself.

However, this season has also opened new prospects of excavation, mostly in the northwest sector (trench H). Excavations in trench H have confirmed the existence of a very large structure delimited by walls 22006, 20002W and 27016, and sounding H1 has brought to light several rich occupation layers in it. The size of this structure and the exceptional care which was taken in building its wall suggest that it was particularly important, and raise the issue of its function. Therefore, the next season of excavations will focus on ascertaining the full north-south extension of this structure and assessing its occupational sequence. Hopefully, these works will also provide new data as to the date of construction of wall 20002 and contribute to solve the persistent problem of the dating of the street.





**Fig. 2.** Plan of Phase 1

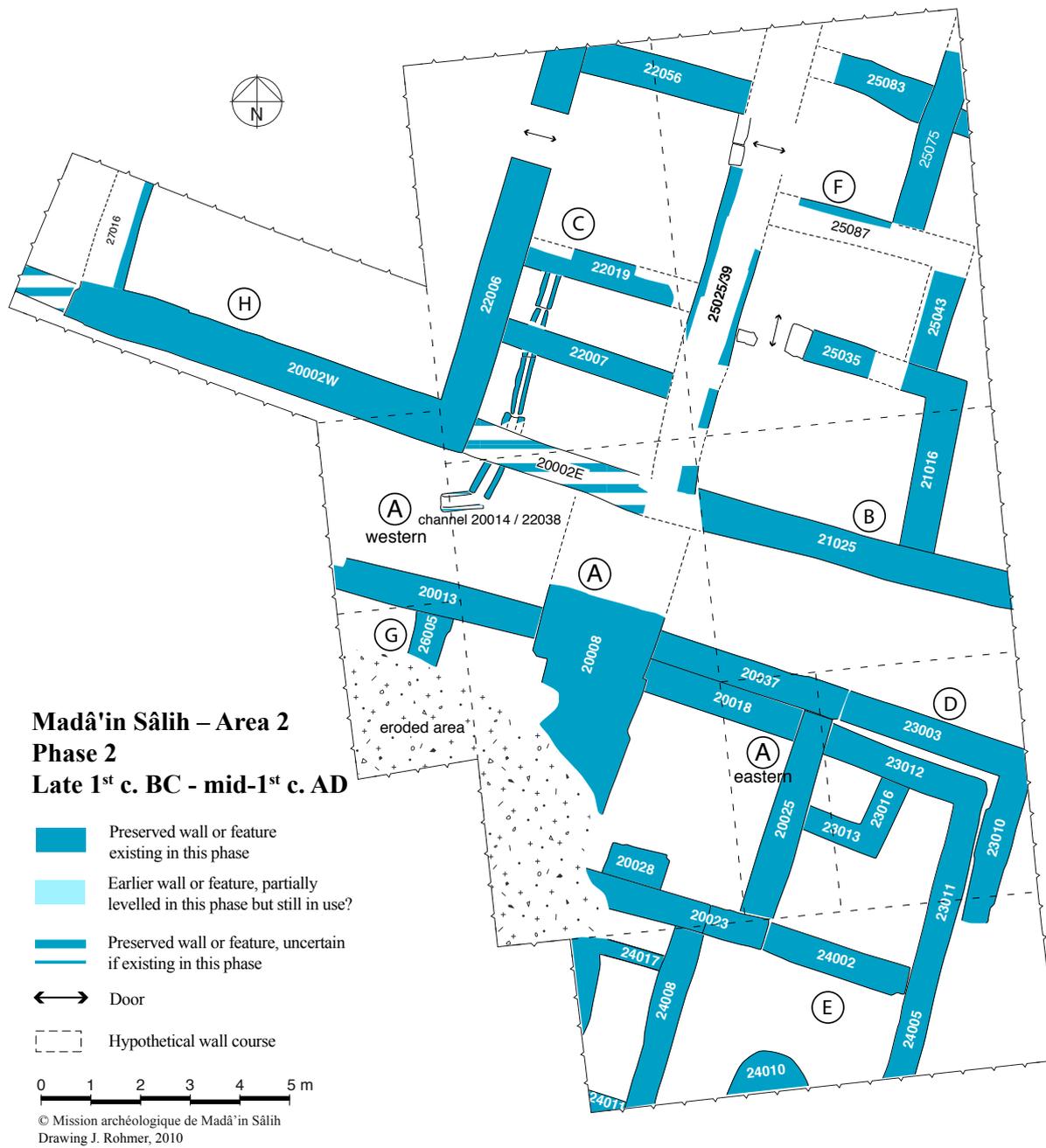


Fig. 3. Plan of Phase 2



**Fig. 4.** Sounding H1 viewed from the north.  
In the centre, wall 27016 and its door 27019. In the background, wall 20002



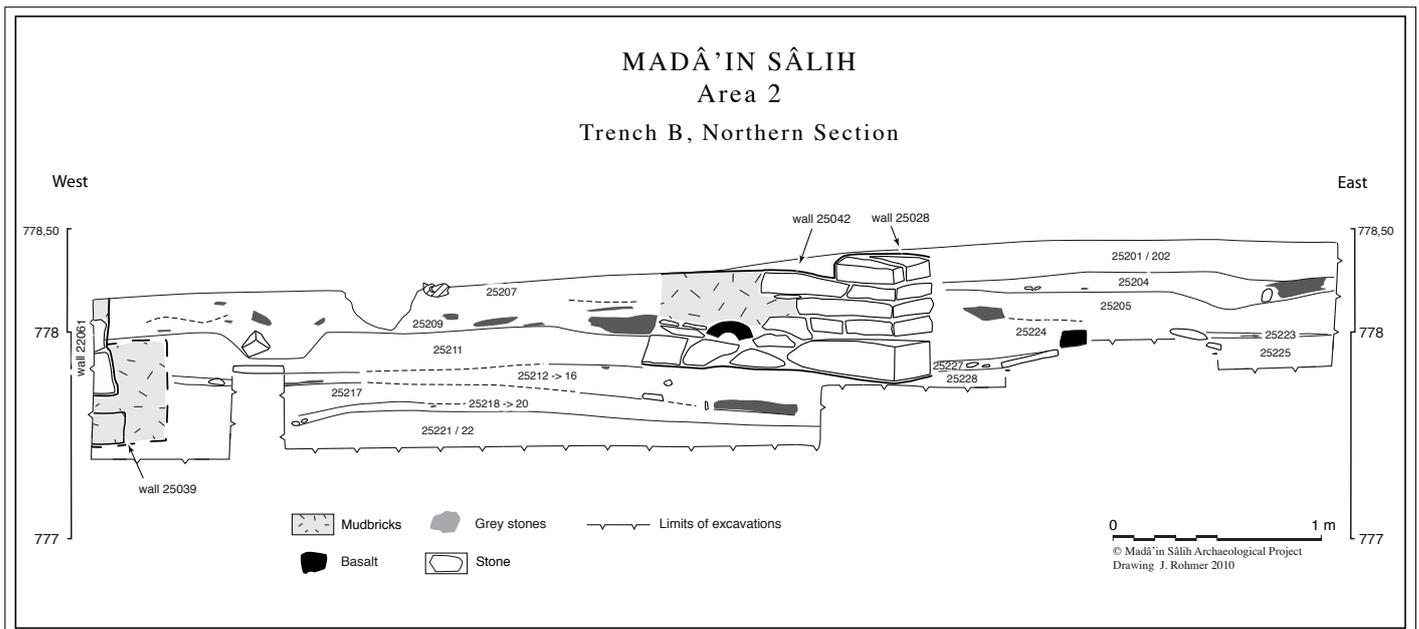
**Fig. 5.** In the foreground, pavement 22010; behind, wall 25025 with stone threshold (?) 25026 on the left; over it, stone foundations of later wall 22061. View from the west



**Fig. 6.** General view of trench F after excavation.  
In the centre, the lower walls delimit four rooms, from the foreground to the “street” in the background



**Fig. 7.** Wall 25035, with two stones in the background probably delimiting a door



**Fig. 8.** Trench B: drawing of the northern section



**Fig. 9.** Surface 25216 in the baulk between trenches F and B. View from the north



**Fig. 10.** Surface 25033 in sounding F1



**Fig. 11.** Trench F, southern room: surface 25064



**Fig. 12.** Trench F,  
southern room: surface 25059



**Fig. 13.** Trench F,  
southern room: surface 25057



**Fig. 14.** Trench F,  
southern room: surface 25055



**Fig. 15.** Room delimited by wall 25083 (in the foreground), wall 25087 (in the background, under later wall 25009), wall 25075 (on the left). On the right, a 0.50 m thick baulk was left. View from the north



**Fig. 16.** In the centre, wall 25083.  
In the foreground, locus 25096



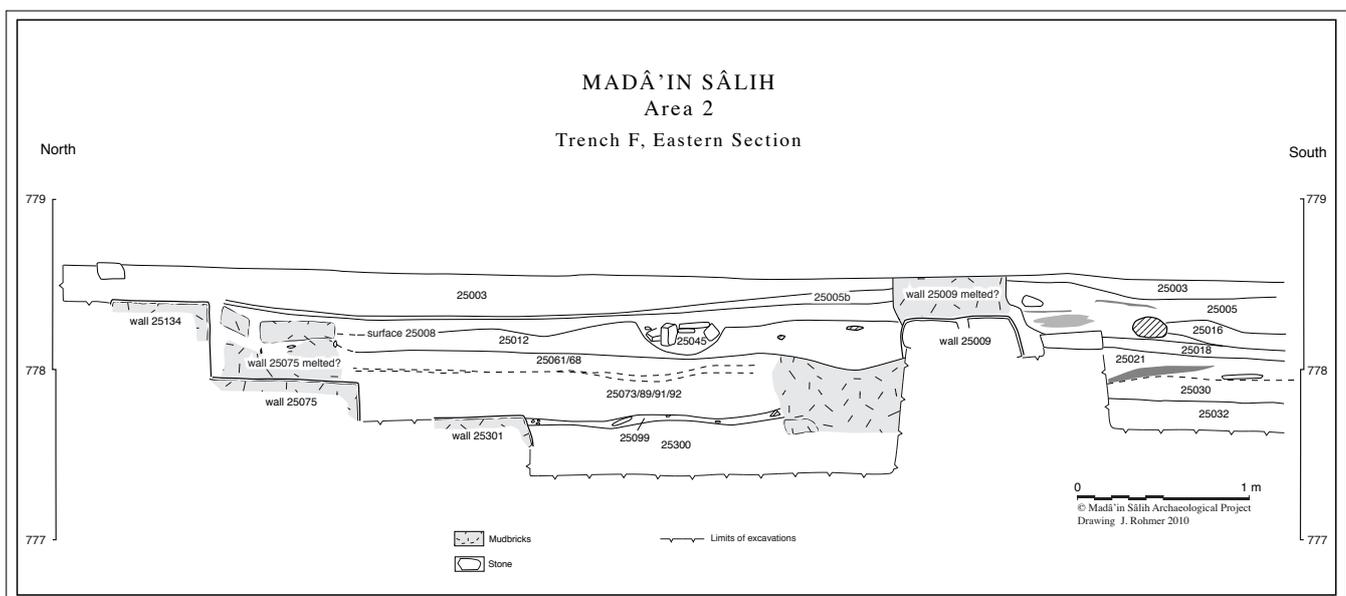
**Fig. 17.** In the centre, surface 25090, abutting wall 25083 on the right and wall 25075 in the foreground. Flat stone covering hearth 25094 in the foreground, along wall 25075. On the left, provisional baulk covering the northern face of wall 25087. In the background, provisional baulk under wall 22061. View from the east



**Fig. 18.** In the centre, surface 25090, abutting wall 25083 in the foreground, wall 25075 on the left, and wall 25087 in the background (not yet excavated, under wall 25009). On the right, provisional baulk under wall 22061. View from the north



**Fig. 19.** Surface 25081 in the north room of trench F. On the left, wall 25075. In the foreground, the top of wall 25083 can be guessed. View from the north



**Fig. 20.** Trench F: drawing of the eastern section





Fig. 22. Layer of abandonment over pavement 22010

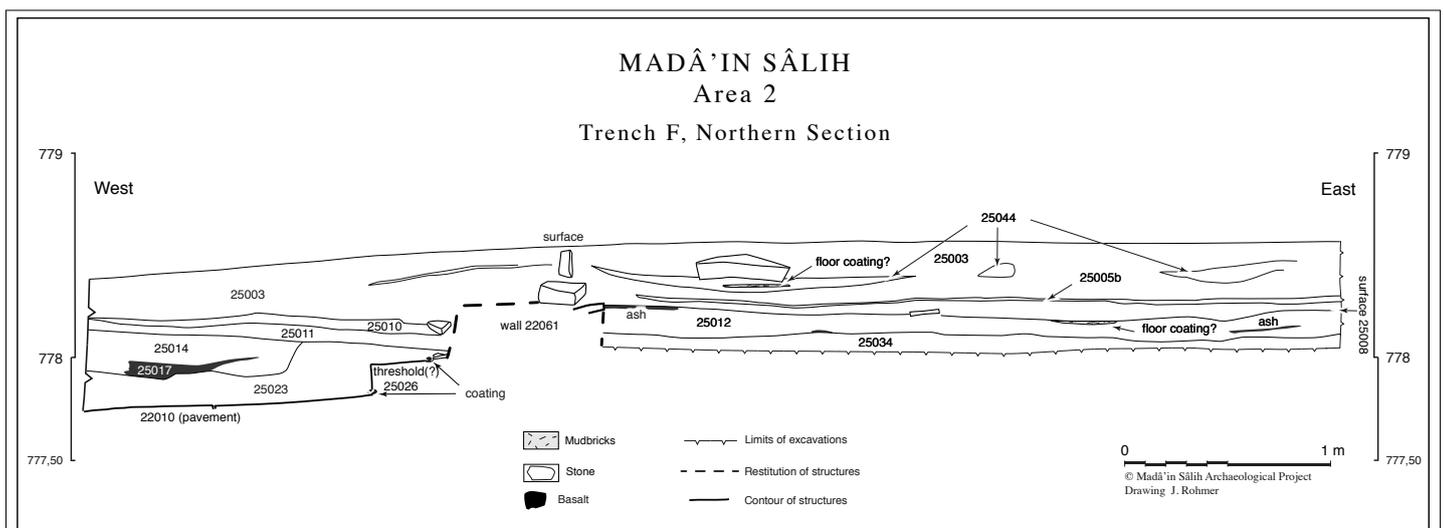


Fig. 23. Trench F: drawing of the northern section (at the end of the 2009 campaign)



**Fig. 24.** Top of *locus* 21009



**Fig. 25.** Surface 25212 in the baulk between trenches F and B. Base of stone vessel S1, upside down. Five coins were lying under it



**Fig. 26.** Trench F, southern room: surface 25051. View from the east

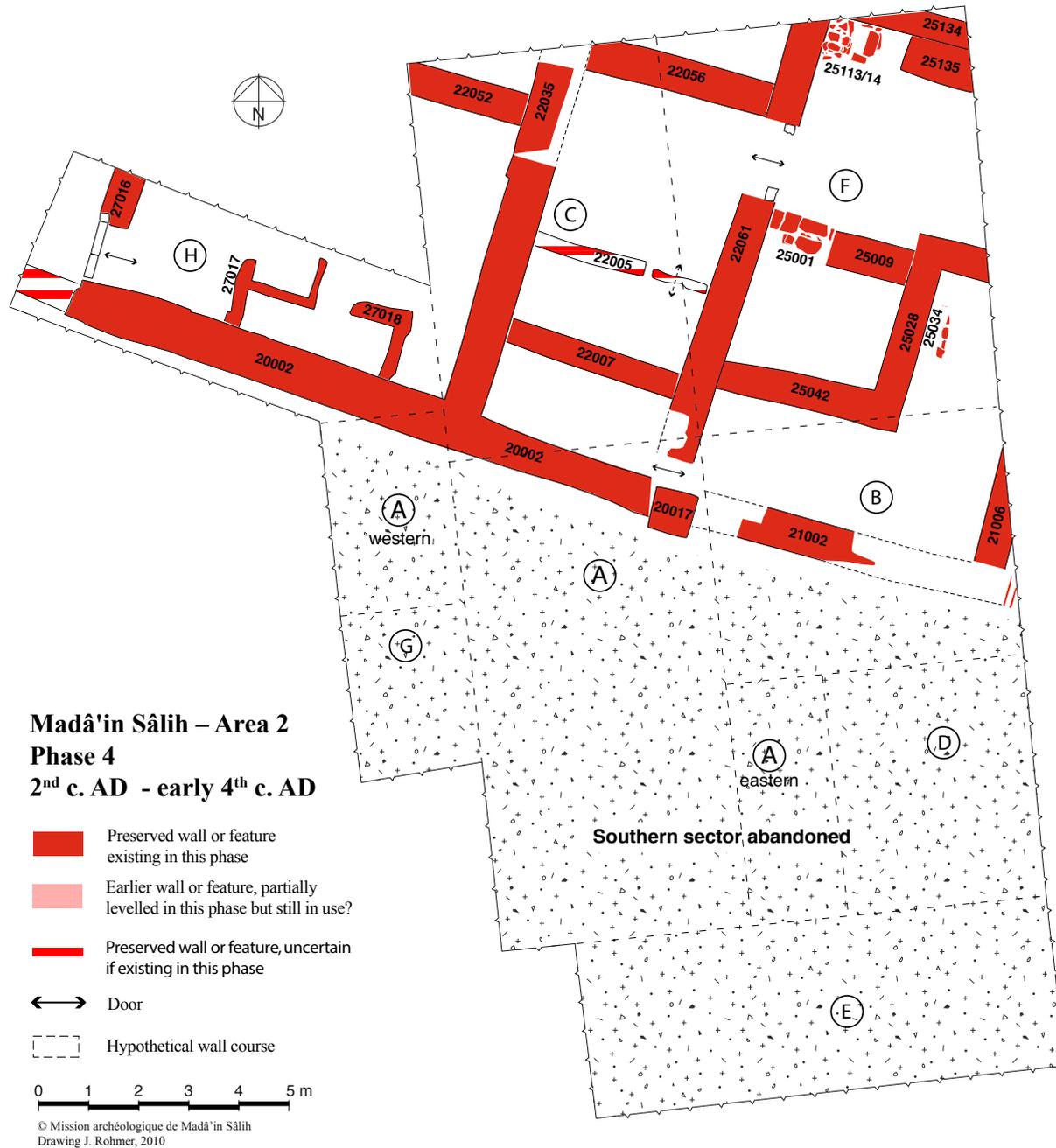


Fig. 27. Plan of Phase 4



**Fig. 28.** Continuation of layer 22002 into trench H (in front of the meter). It abuts wall 27018 on the right



**Fig. 29.** Sounding H1. Wall 27016 with door 27019. In the background, wall 20002. On the left, occupation layer 27004/6. View from the north



**Fig. 30.** Northern part of trench F after excavation, viewed from the south. Lower level: walls of Phases 2/3. Upper level: in the background, under the north baulk, wall 25134 and its stone foundation; on the left, wall 22061



**Fig. 31.** Surface 25131 in the northern extension. In the foreground, wall 25134 and mudbrick butress 25135. In the lower-right corner, features 25112 and 25113 (which are later than surface 25131)



**Fig. 32.** Trench F, northern area, viewed from the north: surface 25008



**Fig. 33.** Trench F, northern extension, viewed from the north: surface 25126



**Fig. 34.** Trench F, northern extension, viewed from the north: surface 25123



**Fig. 35.** Trench F, northern extension, viewed from the south: surface 25111



**Fig. 36.** Installation 25112/13 during excavation



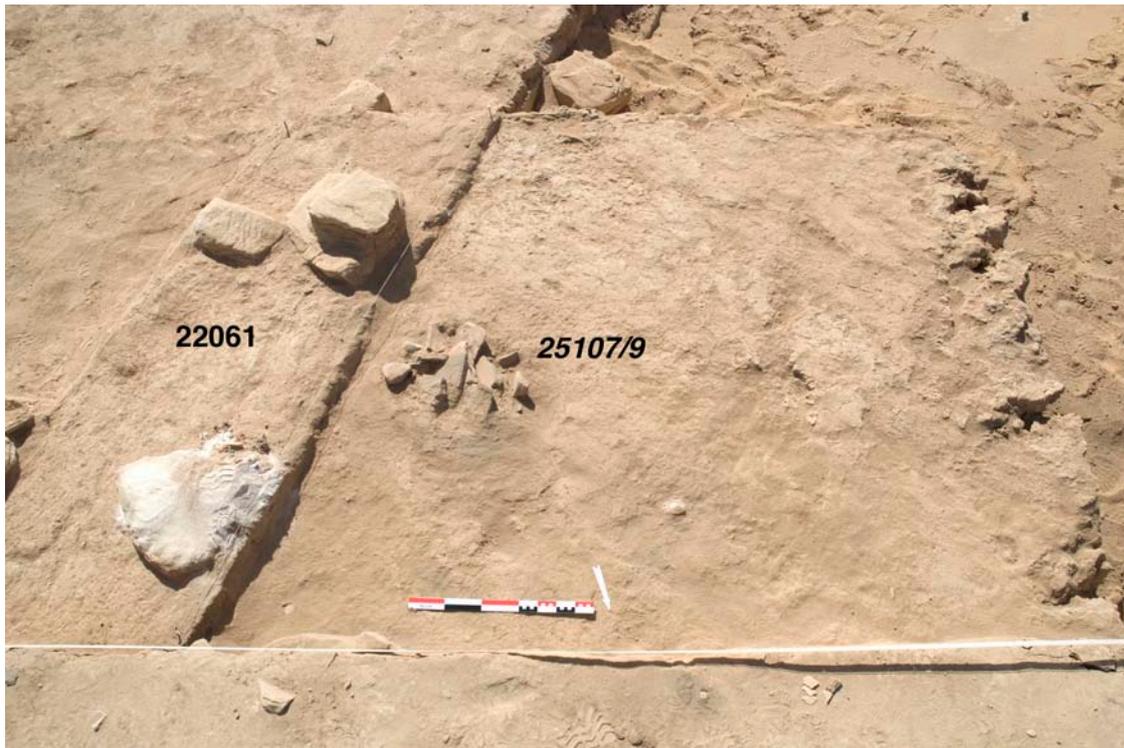
**Fig. 37.** Installation 25112/13 after excavation



**Fig. 38.** Southern part of trench F after excavation, viewed from the west.  
In the background, wall 25028 with its stone foundation, built over the earlier perpendicular wall 25035 (on the right).  
On the far right, part of wall 25042/21023 with its stone foundation.  
On the left, wall 25009



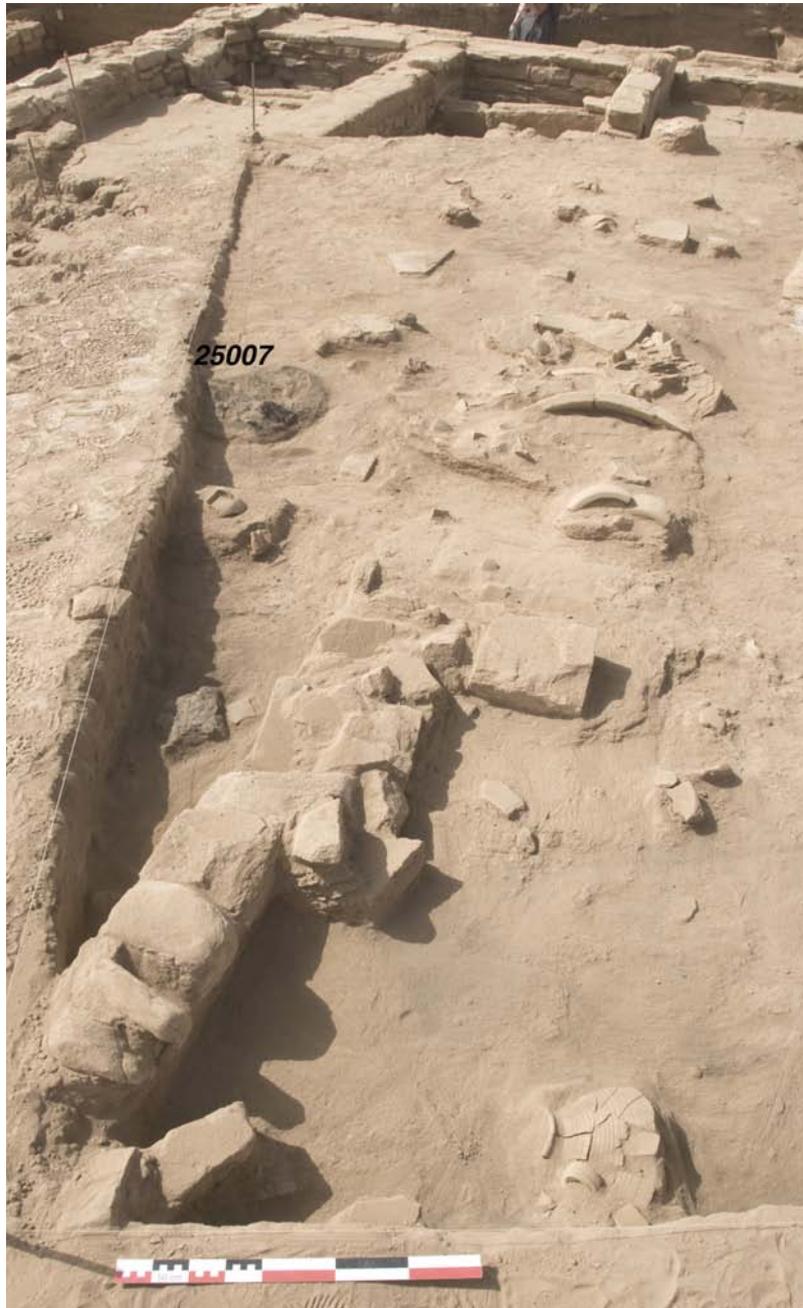
**Fig. 39.** Southern part of trench F during excavation, viewed from the north: surface 25015



**Fig. 40.** Northern extension of trench F, viewed from the north. On the left, top of wall 22061 restored with stones. Next to it, pit 25107/9, filled with stones



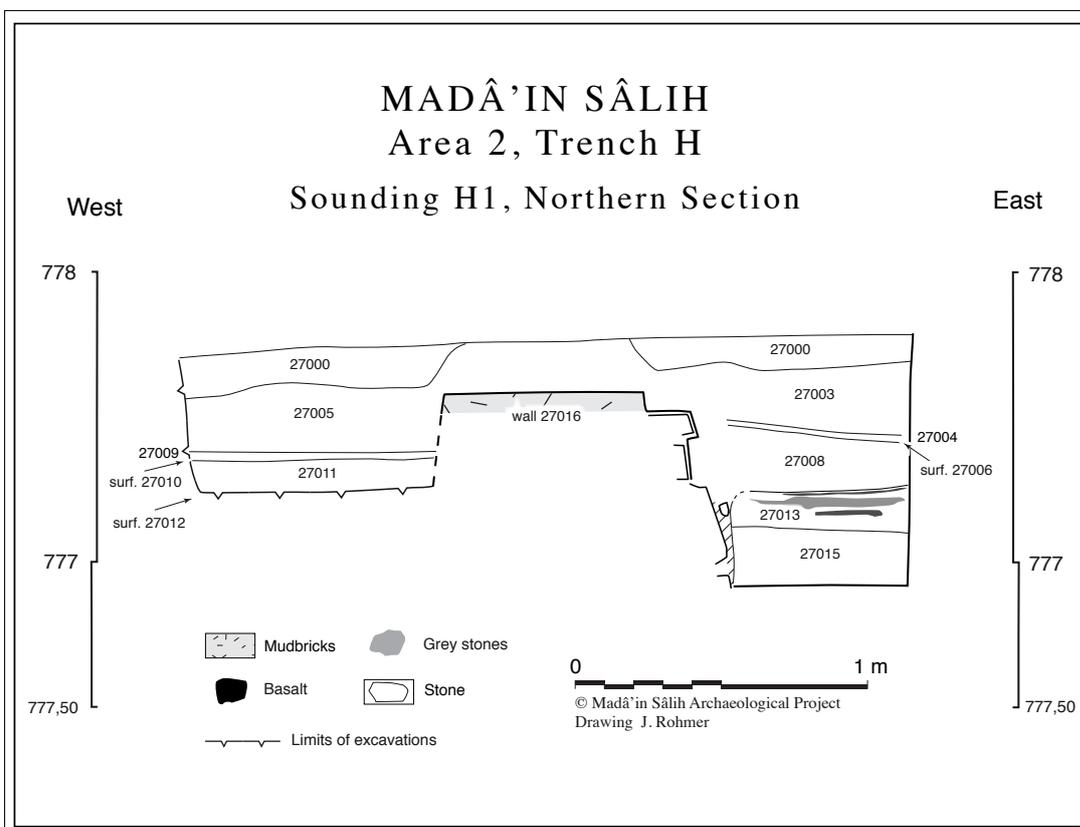
**Fig. 41.** Feature 22004 viewed from the north



**Fig. 42.** Southern part of trench F at the beginning of the excavations, in 2009, viewed from the east.  
In the foreground, small wall 25002.  
In the background, top of occupation layer 25004.  
Near the southern baulk (i.e. on the left), hearth 25007



**Fig. 43.** Northern extension of trench F at the beginning of the excavation, viewed from the north. Right of the meter, hearth 25103



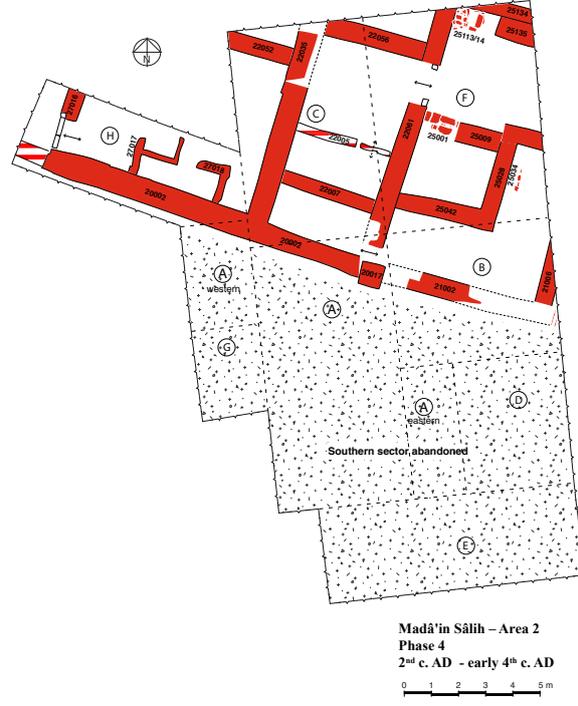
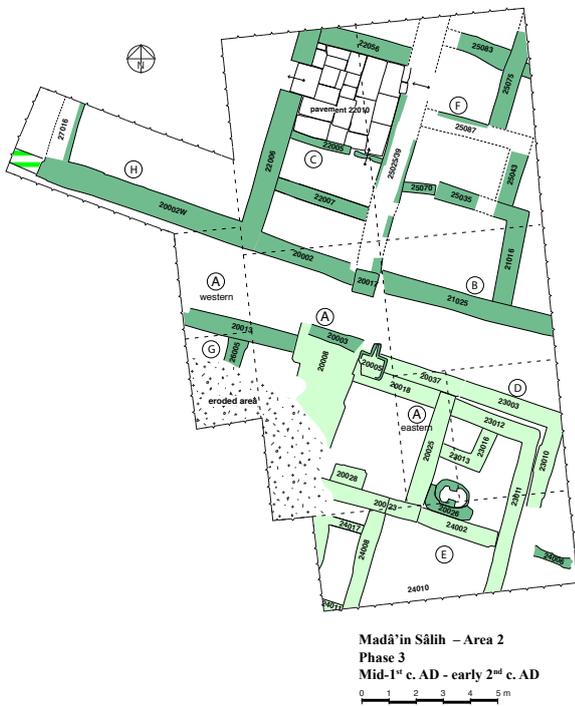
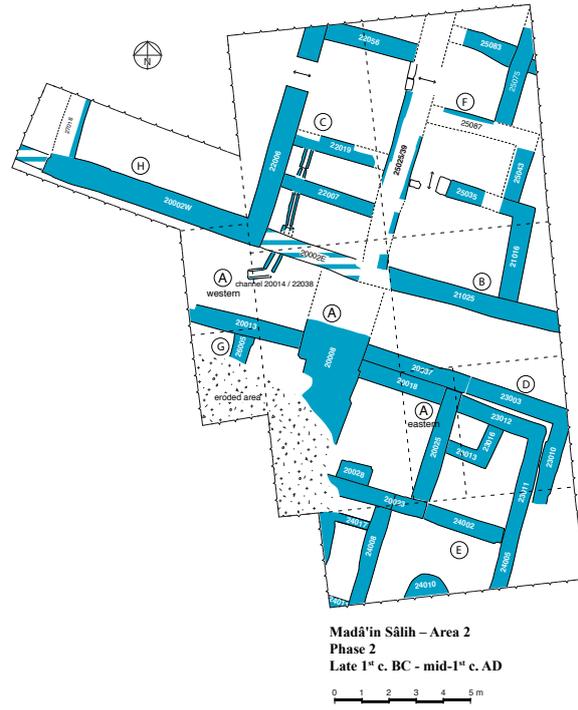
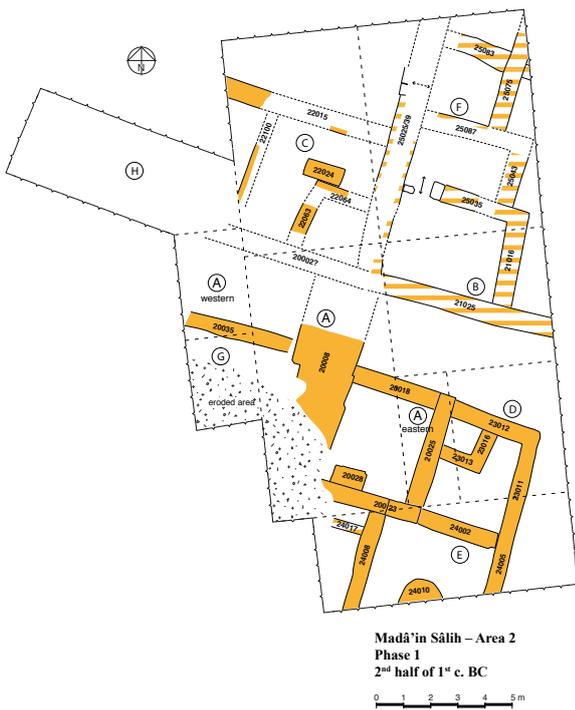
**Fig. 44.** Sounding H1: drawing of the northern section



**Fig. 45.** Western half of sounding H1 viewed from the north: surface 27009/10



**Fig. 46.** Western half of Sounding H1 viewed from the east: surface 27012



**Fig. 47.** The four phases of Area 2



## **Area 2 – Southern sector**

Zbigniew T. Fiema (Finland Academy)



## Area 2 – Southern sector

Zbigniew T. Fiema (Finland Academy)

This report is a summary of the results obtained in the southern part of Area 2 during the 2009 and 2010 excavation seasons.

See the plans of Phases 1 to 4 in J. Rohmer's report, fig. 2, 3, 21 and 27.

### Phase 1

The early building in the southern sector of Area 2 consists of three large rooms (fig. 1 and see fig. 1 in the report on Area 2 northern sector, by J. Rohmer). Its very rough dimensions would be *ca.* 9.30 m east-west by at least 8.50 m north-south (its southern limit was not reached). Its core – the western room – was formed by walls 20008, 20018, 20023, and 20025. Additional feature inside the room is wall 20028 which might have served as a foundation base for a staircase or a ladder leading up to the upper floor of the room. The main component and the largest wall on the site is wall 20008 (maximum width 2.10-2.45 m), running roughly north-northeast – south-southwest. While its southern part is badly damaged by subsequent flooding, it is most probable that wall 20008 originally continued further north, as it was clearly cut later on. The parallel room on the eastern side of wall 20025, i.e., the eastern room of the building, may have been constructed slightly later than the western one, yet still within the time of Phase 1. That room (in trench D and partly in E) was made of walls 23012, 23011 (= 24005), and 24002. Inside this room, two walls, 23016 and 23013/20031 form a small rectangular enclosure within which an enigmatic installation was set. Whether these walls were built in the same time or later cannot be determined. Finally, the southern room (or a space?) of the building was enclosed by walls 24002, 24005 and 24008. Its southern limit is unknown. Inside the room is an enigmatic roughly semicircular mudbrick structure (*locus* 24010): perhaps a platform or a base of a round building (tower). All walls mentioned here stand on the sterile deposits. To the west of the building, there is mudbrick wall 20035, running roughly northwest-southeast but not exactly on the same line as the stone wall 20013 on top of it. The latter probably belongs to Phase 2.

### *General observations and dating*

Mudbrick walls have been constructed in Phase 2 but this category of structures was clearly predominant in Phase 1. In the south, wall 20008 formed the “backbone” of a large building consisting of well-defined three rooms/spaces. In the north, the exact limits of the rooms are more difficult to determine. One wonders if there was any specific limit between the buildings in the southern and northern parts of

Area 2 in this phase. If there was one, the best candidate would be a hypothetical extension westward of wall 21025 in trench B, or a predecessor of wall 20002.

The beginning of this phase is established on the basis of the earliest ceramics found at the site, yet these remain poorly understood. The better defined Phase 2 sets a reasonable date for the end of Phase 1. As such, the tentative date for Phase 1 is the 2<sup>nd</sup> half – end of the 1<sup>st</sup> century BC.

## Phase 2

It is uncertain whether the end of Phase 1 was caused by a natural event or by human agency. However, the destruction / demolition of some structures, mainly in trench C, which originated in Phase 1, may well be the result of a deliberate plan to monumentalize the area. On the other hand, while the occupation would have continued in the multiroomed mudbrick building in trenches A, D and E, yet some important additions and remodellings also took place there. The most significant development for both southern and northern sectors of Area 2 is related to the construction of wall 22006 and the early wall 20002. In the same time, the water channel 20014 was most probably built, running parallel to wall 22006.

Wall 20002 is crucial for the understanding of the occupational history of both the southern and northern sectors of the area. Certain differences in its interpretation still exist – see the northern sector description – and thus further studies are necessary. Currently, this wall appears as a uniform structure but a close examination suggests it had a composite, multi-phased history. Specifically, it is postulated here that in Phase 2, only the western part of wall 20002 (= 20002W) was built, the latter *currently* represented only by its massive foundations (fig. 2). The full exposition of the southern face of that wall, down to the bedrock, revealed the foundations being *ca.* 1.2 m deep, capped by the superstructure (probably of Phase 3) being *ca.* 0.6 m high. Furthermore, channel 20014 was also built then but probably encased in some predecessor (*infra*) of the *current* eastern part of wall 20002.

Channel 20014 is considered to be an integral part of activities of Phase 2, and probably encased in a northwest-southeast wall, be it a predecessor of 20002 (eastern part), 21025 or any other barrier. The northern part of the channel runs northeast-southwest, basically parallel to wall 22006 in trench C. This part of the channel consists of a segmented monolithic trough 0.74 m long, *ca.* 0.30 m high. Currently, the trough is encased in the structure of what is postulated to be the later (Phase 3) superstructure of wall 20002 (fig. 3). However, at the southern end of the trough, the course of the channel is radically changed into west-southwest, featuring a shallow trough which is also of somewhat different dimensions than the original part which runs northeast-southwest. Whether this composite character of the channel and the drastic redirection of its course should have some chronological significance, i.e., two parts of differing construction and direction representing two different time-periods, cannot be fully ascertained – see the southern sector. What seems certain is that its western course was dismantled later on.

Similarly, the chronological association of stone wall 20013 cannot be fully ascertained. This wall,

laying on the mudbrick wall 20035, may be contemporary with 20035 or may represent a later modification, roughly but not exactly of the same orientation. Nevertheless, wall 20013 must also belong to a relatively early occupation reality in the area as it seems integrated with wall 20008 by means of feature 20034. Wall 26005 belongs to the same reality as 20013 as it bonds with it.

In this phase, new mudbrick walls were added to the existent ones further east. These include walls 20037, 23003 and 23010 which run parallel to the early mudbrick walls 20018, 23012 and 23011/24005 respectively, practically abutting these walls all along their faces. The end-result is one massive mudbrick L-shaped wall, *ca.* 1.20 m thick, which enclosed both western and eastern rooms from Phase 1. One must assume that the new walls discussed in this section were built when all other mudbrick walls in the area were still relatively intact and in use. Accordingly, the reason for this considerable strengthening of the northern and eastern sides of the two rooms in trenches A and D must have something to do with the nature of occupation in these rooms. Incidentally, the western end of new wall 20037, which directly abuts wall 20008, is made of two to three rows of hewn stones of various sizes (*locus* 20036, fig. 4). Possibly, in Phase 2, this stone end of wall 20037 served to achieve a more firm abutment against wall 20008.

Further south, soil deposits which accumulated against and between the extant walls (but did not cover them) may reasonably be associated with some kind of occupation there but they may just as well represent later periods of disuse and abandonment. In the southwestern corner, the pre-existent wall 24008 is abutted by wall (or pavement?) 24011 which runs northwest-southeast.

### *General observations and dating*

Phase 2 marks the appearance of stone architecture at the site as well as some deliberate space-planning. In addition to the substantial changes and additions in both the southern and northern sectors of Area 2, of further interest is the border-zone of these sectors. As wall 20008 was still in use, and assuming that it may still have run northwards, the changes in Phase 2 may have resulted into the creation of two well-defined spaces on the western and eastern sides of that wall. The western space, with channel 20014 inside, would then have been enclosed by walls 20008, 20013, 20002W and a predecessor of wall 20002 (eastern part). Concurrently, the eastern space would have been enclosed by walls 20008, 20037/23003 and presumably by wall 21025/21007.

Considerable changes dated to Phase 3, and largely affecting the southern sector of Area 2, indicate that Phase 2 may have ended in some sort of natural or intentional destruction. At any rate, the dating of Phase 2 can be postulated as the end of the 1<sup>st</sup> century BC – mid-1<sup>st</sup> century AD.

### **Phase 3**

Phase 3 witnessed some major changes which affected virtually the entire southern sector. Possible minor destruction could have provided a stimulus for changes and restorations. However, it is equally possible that the human agency is totally responsible for the changes in Phase 3, i.e., some walls were intentionally levelled, demolished, removed or modified because of some conscious

decision-making requiring new designs or arrangements. As for the northern sector, most walls of Phase 2 were preserved, but the episode of destruction which may have taken place at the end of that phase was also followed by significant transformations in several parts of this sector. Also, during this phase, the northwest-southeast passage or “street” was definitely in use.

One of the most striking features at the site is the fact that basically all of the mudbrick structures from Phases 1-2 are preserved to the same level. Whether this is the result of a natural disaster, such as flooding, or a deliberate levelling, cannot be fully ascertained. At least in trench G, the earliest flooding is well represented by mud layer *locus* 26003 which evidently destroyed wall 26005 and washed away the southwest face of wall 20008. It may be that this flood should relate to the end of Phase 2. However, episodes of flooding are also well attested for the later phases. What is certain, however, is that Phase 3 is the first time-period during which such natural/intentional levelling may theoretically have taken place. At any rate, the affected walls included 20008, 20018, 20023, 20025, 20037, 24002, 24005, 24008, 24011, all in trenches A and E. In trench D, the mudbrick walls 23003, 23010, 23011, 23012, possibly 23013 and 23016 experienced the similar fate. Possibly, the demolition and the new constructions were the components of one and the same activity followed by the occupation of the northwest-southeast passage.

One place where indeed some possible destruction and subsequent reconstruction took place is the early wall 20002. As pointed out above, its entire superstructure and most probably the foundations of the *extant* eastern part display considerable difference when compared with the *extant* foundations of 20002W and the appearance of wall 22006. Whatever the reasons and causes, the new components of wall 20002 which were built in this phase are the foundation course of the eastern part of the wall and the entire superstructure which runs over the old deep foundations (1.2 m deep) in the western part, encases channel 20014 and runs over the new foundations (0.45 m deep) of the eastern part. Whether or not the “bending” section of channel 20014 belongs to this or to the later part of the preceding phase is uncertain. If the extant superstructure of wall 20002 belongs indeed to Phase 3, it would have encased the channel. This would indicate that the channel was still operational at least at the beginning of Phase 3, continuing as a drain discharging liquids into the westernmost part of the northwest-southeast passage. Eventually, during the course of Phase 3, the channel went out of use and *locus* 20007 entirely sealed channel 20014, i.e the portions of the stone trough which were still *in situ*. Additionally, on the eastern extremity of wall 20002, a square “pier,” *locus* 20017 was constructed.

Wall 20008 may, theoretically, have suffered some kind of damage and, as a result, it was demolished and its northern part cut and removed. Furthermore, it must have been at least partially levelled to accommodate new wall 20003. At the same time, its entire northern section, up to the point where it presumably abutted the northwest-southeast running predecessor of wall 20002, was cut and removed. Wall 20003 was constructed parallel to wall 20002 and on top of 20008. It may be that it served only as a low enclosure which delineated the northwest-southeast passage and separated the occupation area from the largely abandoned (?) area of the mudbrick structures further south. The fact that wall 20003 was built in line with the edge of the cut of wall 20008 and not in line with wall 20037 further east, once

again implies that wall 20008 was cut only in Phase 3. Some levelling must also have taken place in the western end of walls 20018 and 20037 where a stone monolithic basin (*locus* 20005) was inserted on top of the remaining courses of these walls and on the stone substructure 20036 (see fig. 4). Although the installation 20005 may appear to be a settling tank or a public water distributor, it is more likely that water was brought into it. Some kind of washing, mixing or other processing activity was conducted inside and the excess of liquid was poured out through the spout.

With the cutting and removing of the northern segment of wall 20008 and the reconstruction of wall 20002, the northwest-southeast passage came into being. It is limited by walls 20002, and 21025/21002/21007 on the northern side and by walls 20013 (?), 20003 and 20037/23003 on the southern side (fig. 5). The passage was associated with hard-beaten surfaces (20010 and later 20007) and with the installation of 20005. Whether the passage was some kind of a communication route between outlying parts of the town or simply served as means of local access is unknown. Judging from the image on the geophysical map, the passage seems to have continued for a considerable distance.

In the space south of the passage, some occupation still continued. A poorly built wall 24006 was built in the southeast corner of trench E. More important is the oven, 20026 (fig. 6), located in the corner between walls 20025 and 24002, which occupies a space *ca.* 1.26 m wide (north-south) and *ca.* 1.70 m long (east-west). The southern and western parts of the installation closely follow the lines of walls 20025 and 24002, implying that the oven was built when the walls were still standing higher than they do now. The oven consists of the oval main chamber made of hard-fired bricks and small upright stones, the brick-made superstructure which collapsed into the interior, and the associated surfaces. The chamber was filled with ash, large quantities of charcoal, some pottery and burnt organic material. Very many bones, ranging from very small to large ones (mammals) were also found inside. The oven was at least once modified.

### *General observations and dating*

Apparently, the activities described in this phase were not isolated, they belong to an intentional program of changes. Occupation is well attested in the northern sector and while most of the southern sector, i.e. the monumental mudbrick building of Phases 1-2, seems to have been abandoned, the improvements and modifications which created the northwest-southeast passage indicate the clear continuity in the northern and central parts of Area 2. However, the presence of thick layers of clay, alluvial deposits and ash over the occupation of Phase 3 suggests that this phase was followed by a significant episode of destruction and disuse. The thickness of these layers suggests that the area was massively flooded, but it is uncertain whether this flood was the cause or the consequence of the abandonment of the area. The dating of Phase 3 is postulated to have lasted between the mid-1<sup>st</sup> century and the early 2<sup>nd</sup> century AD.

### **Phase 4**

While the occupation in the northern sector recovered from the disastrous flooding at the end of Phase 3, this natural phenomenon had effectively ended the occupation in the southern sector. In fact, this phase is recognized in the southern sector and separated from Phase 5 only through the presence of relatively homogeneous flooding layers.

The clayish flooding layer, *locus* 26003 (trench G), mentioned before, may or may not belong to this phase but it seems to represent one massive flooding event, bearing close resemblance to *locus* 20029 in trench A. *Locus* 26003 is in turn followed by *locus* 26004 which represents many small-scale flooding episodes interspersed with wind-blown sand. The equivalent of 26004 in trench A are *loci* 20020 and 20004 and 24001 in trench E. The clear pattern of destruction in the mudbrick structures indicates that the flooding waves represented by these *loci* rushed from northeast to southwest. Most of these layers contained 1<sup>st</sup> through 4<sup>th</sup> century-dated pottery, not occupationally attested in trenches A and E, thus apparently washed down/redeposited from the northern sector.

### ***General observations and dating***

Phase 4 probably ended with an episode of destruction, as suggested by the impressive layer with objects *in situ* found in the small room of trench F. The pottery found on the floors of Phase 4 is relatively homogeneous from a chronological point of view, indicating that Phase 4 should be dated to the 2<sup>nd</sup>-early 4<sup>th</sup> centuries AD.

### **Phase 5**

The entire part of Area 2 was covered by the wind-blown and water-borne sandy / silty deposits as well as significantly affected by erosion.

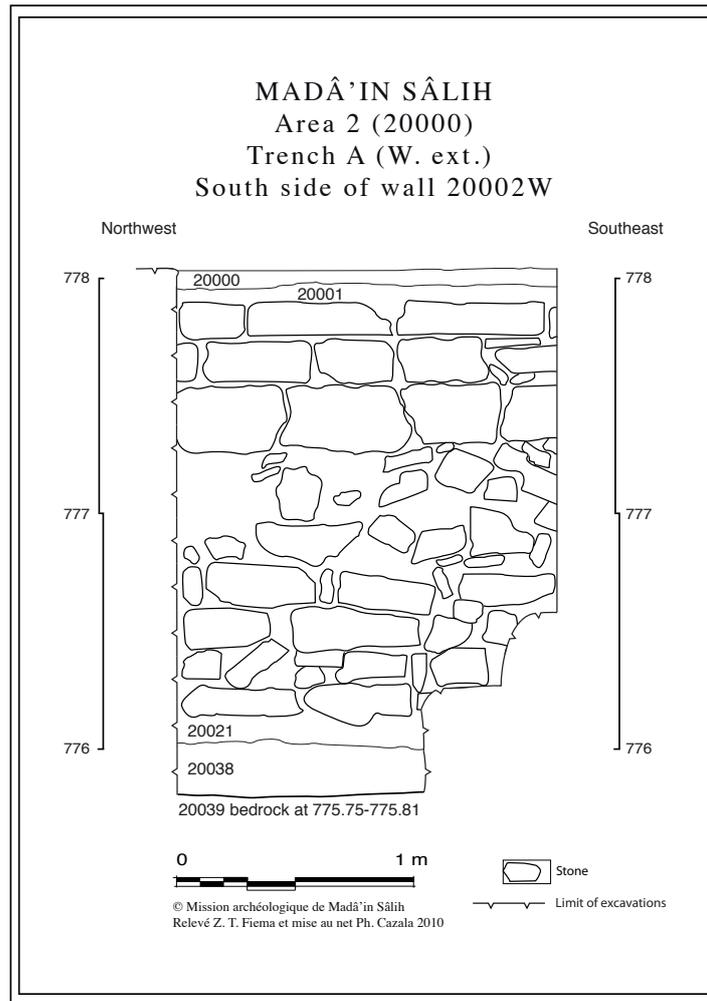
### ***Dating***

No proper floor or occupational surface is associated with Phase 5. The only datable material comes from hearths and junk pits. The few sherds found in these contexts date back to a time-period between the mid-4<sup>th</sup> and the early 7<sup>th</sup> centuries AD but a proper chronological assessment of Phase 5 is not possible.

**N.B :** For a plan of the Southern part of Area 2, see the report by J. Rohmer : Area 2, Northern sector, **Fig. 1**, p. 65



**Fig. 1.** The mudbrick building in the southern sector of Area 2.  
The northwest-southeast passage is to the right



**Fig. 2.** The facade of wall 20002W, including its deep foundations



**Fig. 3.** The channel 20014 and wall 20002

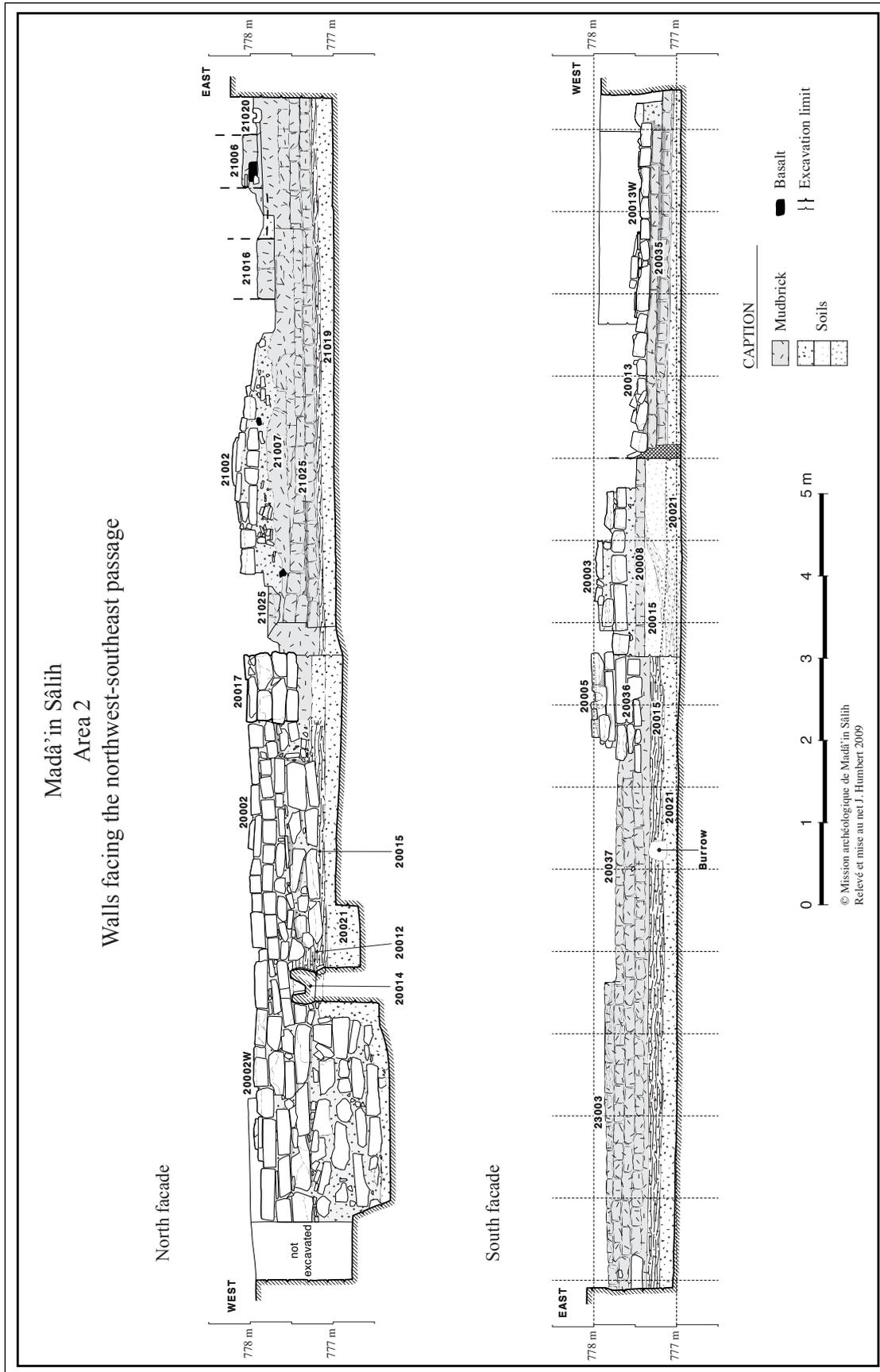


**Fig. 4.** The installation 20005 on top of stone substructure 20036 and the cut section of wall 20008 to the right

***N.B.*** : For **Fig. 5**, see following page



**Fig. 6.** The oven 20026



**Fig. 5.** The northern and southern facades of walls facing the northwest-southeast passage

# **Studies on the Rampart**

F. Villeneuve

*to come*



## **Report on Ith 78 and IGN 132**

L. Nehmé (CNRS, UMR 8167)



## Report on Ith 78 and IGN 132 – Area 6

Laïla Nehmé (CNRS, UMR 8167)

During the 2008 and 2009 seasons, the author of this report excavated several rock-cut and other structures both inside Jabal Ithlib (2008 season: Ith 23-25, Ith 38.1, Ith 54) and outside it (2009 season: Ith 68, Ith 105, QB 6). Before joining the other members of the team in the residential area, which needs all our attention from now on, a final operation outside the walls was undertaken in order to confirm the hypothesis that, from the Nabataean period to the beginning of the 2<sup>nd</sup> century AD, Jabal Ithlib and its surroundings constituted a space reserved for gatherings of religious groups. Following this work, our efforts turned to massif IGN 132 and its immediate surroundings which are inside the residential area.

### **A new *triclinium* at Hegra, Ith 78**

A small massif of white sandstone, noted by Jaussen and Savignac<sup>1</sup> and locally known as Qasr al-‘Ajûz,<sup>2</sup> “the old man’s (or woman’s) castle”, was excavated during the first week of the 2010 season.<sup>3</sup> This work was undertaken in order to confirm the hypothesis, mentioned above, that was developed as a result of the excavations of structures Ith 23-25 and Ith 54 in 2008.<sup>4</sup>

This monument was briefly described by J. Healey and R. Wenning, who interpreted it as a religious monument.<sup>5</sup> During the initial exploration phase of the site (in 2002-2005), Jean-Pierre Braun produced a plan of the rock-cut chamber inside the massif, Ith 78, and this also provided the occasion for a new study of the monument, published in *Arabian Archaeology and Epigraphy* in 2006.<sup>6</sup>

---

1. Jaussen and Savignac 1909-1914, p. 432, photo fig. 222; vol. 2, p. 103, plan fig. 45 and photo Atlas pl. LV. On the map, it is marked as “sanctuary?”.

2. The IGN number on this monument is 48A (there is another rock-cut chamber with the IGN number 48, opposite the Qasr al-Bint). However, IGN 48A was renumbered within the systematic registration of the monuments of Jabal Ithlib and now has the number Ith 78 in the general catalogue of the remains in this area.

3. The contour plans were produced by P. Courbon, the trench plans by J. Humbert, the pottery was read by C. Durand and Y. Gerber and the coins by C. Augé.

4. See Nehmé, al-Talhi and Villeneuve 2010, p. 263-286.

5. Wenning 1996, p. 267 and Healey 1986, p. 113.

6. Nehmé, Arnoux, Bessac *et alii* 2006, p. 96-98. See also Dentzer, Kermorvant, Nehmé *et alii* 2005, p. 65-67, pl. 9.4-9.6

This more or less circular massif is located 150 m southwest of the southern tip of Jabal Ithlib. It is relatively isolated in the middle of a sandy slope (an aeolian deposit of unknown depth<sup>7</sup>) that dips gently down to the west from Jabal Ithlib<sup>8</sup> (fig. 1). A survey point (S. 506) was placed on the top of the massif. No archaeological structures have been found in the sand in the immediate surroundings, but on the western and southern slopes of the southern tip of Jabal Ithlib, there are many archaeological and epigraphic remains that might be linked to Ith 78. These consist of eight niches with one or more betyls or an altar (Ith 57-63),<sup>9</sup> as well as four epigraphic points (n° 54.1 to 54.4) comprising not less than seventy-one Nabataean inscriptions,<sup>10</sup> at least five Thamudic inscriptions<sup>11</sup> and one written in Imperial Aramaic<sup>12</sup> (fig. 2). However, the link between Ith 78 and these remains cannot be proved. The hypothesis mentioned above rests on the observation that niches with betyls are often associated with banqueting halls. In so far as no banqueting hall has been found in the immediate vicinity of niches Ith 57-63 and only one clearly identified niche was carved near Ith 78 (see below), the two groups of remains perhaps complement one another.

### *Exterior*

The massif of Ith 78 (fig. 3-4) measures about 12 m in diameter and is between 5 and 6 m high. Its top is a relatively flat platform, about 6 m per side, on which thirteen cup holes have been cut, from 6 to 17 cm in diameter and less than 4 cm deep. Nine of these are linked by channels (see the top of the outcrop on fig. 5).

The sides of the massif have been heavily eroded, particularly on the south side. Tafonis have formed around the base and prevent clear recognition of potential rock-cut features, notably a possible large, rectangular betyl cut in a niche (Ith 78a, fig. 6), 1.15 m high and 0.36 m maximum width. The arguments

7. At the level of the threshold of the rock-cut chamber, the sandy deposit reached 50 cm.

8. A drop of about 20 m between Jabal Ithlib and Ith 78.

9. All noted by Jaussen and Savignac 1909-1914: Ith 57, aedicule with niche containing two betyls (vol. 1, p. 430-432, fig. 221 and Wenning 1996, p. 265); Ith 58, niche with three betyls (vol. 1, p. 430, fig. 220 and Wenning 1996, p. 265); Ith 59, niche with three betyls (vol. 1, p. 429, fig. 219.3 and vol. 2, p. 104, Atlas pl. LV.2); Ith 60, niche with horned altar, and Ith 60.1, betyl (vol. 1, p. 430, in the paragraph below figure 220?); Ith 61, niche with three betyls (vol. 1, p. 430); Ith 62, niche with three betyls (vol. 1, p. 429, fig. 219.2); Ith 63, niche with horned altar (vol. 1, p. 429, fig. 219.1).

10. Point 54.1, between the southern end of the rock face and point 54.2: JSNab 138-144 and nineteen unpublished ones; point 54.2, on either side of Ith 59: JSNab 135-137, 153-154, CIS 245 and fourteen unpublished ones; point 54.3, left of niche Ith 60: JSNab 133-134, 145, 148 and nine unpublished ones; point 54.4: at the entrance to the gorge, JSNab 147, 150, 152 and five unpublished ones. Four Nabataean inscriptions copied by Jaussen and Savignac in the vicinity of these points have not been found again: JSNab 131, 149, 151, 155.

11. JSTham 10-13 and Doughty 1884, pl. III, fol. 1, cartouche 3.

12. JSNab 146, cf. Nehmé 2005, p. 160-161.

in favour of its interpretation as a betyl are, on the one hand, the general shape of the cut rectangle and, on the other hand, the fact that the hollows on either side of the relief seem to have been deepened by erosion, as if the pre-existence of a niche had accentuated the phenomenon. However, the presence of a niche with two betyls (Ith 78b, fig. 7), on the south side of the massif about 4 m above the ground and immediately below the rock-cut staircase that leads to the top, is in no doubt.<sup>13</sup> Since the surroundings of the niche have been severely eroded, it is difficult to give exact dimensions, but it was at least 94 cm wide and 65 cm high. The two betyls are of different sizes  $\pm 21 \times 40$  cm for the left one and  $\pm 41 \times 40$  cm for the right one. There is nothing which allows the attribution of the betyls to any particular divinity.

The top of the massif was reached by a series of steps cut in the rock, which are now very eroded, leaving only five steps still visible (fig. 8). A few traces of cut marks can be seen along the upper part of the staircase.

### *Interior*

The rock-cut chamber Ith 78 is cut into the northwest side of the massif and takes up about half of it (see fig. 4). Its plan is trapezoidal, the distance between the side walls near the entrance (4.10 m) being less than at the rear (4.80 m). The room is 5.50 m deep between the preserved front wall (on the south side) and the back wall.

Originally, the chamber was not completely open to the outside. It was closed by a door, which has completely disappeared on the east side and of which there seem to be the remains of an eroded doorjamb on the west side. The threshold is weathered and there is no trace of the closing mechanism.

There are eight quadrangular niches cut into the chamber walls<sup>14</sup> (see fig. 4 and 9). Three of them, RN2, BN3 and LN1, are of the same shape and of similar size (see the table below, the lines in bold) and they occupy the central part of each of the three walls, which confers particular prestige on them. Those on the side walls are empty, whereas the one on the rear wall contains, in the lower part of its back wall, a socket 38 cm long, 10 cm high and 3 cm deep (fig. 10). Above this central niche, there is a rectangular niche, less deep, which was perhaps used to hold an inscribed plaque, in wood or other material, that might have carried an engraved dedication.

One of the three additional niches on the rear wall (BN2) clearly contained a movable betyl. Indeed, not only is a socket of 15 x 11 cm cut into its floor, but vertical traces of white mortar are visible in the extension of the lateral sides of the socket (fig. 11), which suggest that a long object was fixed in this spot.

13. This niche was found and photographed by Jean Humbert.

14. See Nehmé, Arnoux, Bessac *et alii* 2006, p. 96.

*Dimensions and description of the niches of Ith 78*

<i>Number</i>	<i>Width</i>	<i>Depth</i>	<i>Height</i>	<i>Particular characteristics</i>
RN1	70	30	55	Traces of smoke on the back wall
<b>RN2</b>	<b>90</b>	<b>30</b>	<b>85</b>	—
BN1	20	5	30	—
BN2	35	30	60	Socket in the floor of the niche, 15 x 11 cm; three small holes in the upper part of the back wall; traces of mortar on this same wall
<b>BN3</b>	<b>95</b>	<b>30</b>	<b>80</b>	Socket at the base of the back wall, 38 x 10 x 3 cm
BN4	50	10	15	—
BN5	35	20	85	Rectangular hole 6 x 5 cm in the upper part of the back wall
<b>LN1</b>	<b>95</b>	<b>25</b>	<b>90</b>	—

*The inscriptions*

Three inscriptions, JSNab 159-161, were registered by Jaussen and Savignac inside Ith 78. JSNab 159 is at the far left of the back wall of the chamber, between BN1 and the left wall, 1.70 m above the bench. It has been re-read using recent photographs.<sup>15</sup>

JSNab 159 (fig. 12-13) was read as *šnm š'd'lhy XX [l]hprky'* by Jaussen and Savignac, but a close examination of the text *in situ* showed that the first letter was not a *š* but a *ṣ̌* (the tips of the two right-hand strokes are not linked by a vertical stroke). The reading of the rest of the first line is clear. The second line, however, is more complicated. The last word must be read *hprky'* or *lhprky'*, depending on whether the first letter is a combination of *l+h* or simply a *h*. The syntax of this well-attested dating formula<sup>16</sup> imposes the reading *lhprky'*, which is possible if one accepts that the first letter is a vertical *l*. The following letter can only be a *h*, even if its shape is unorthodox. The reading of the number at the beginning of line 2 is not completely certain. The normal shape of the figure 20 is a circle resting on a larger circle which is not completely closed on the left side. This figure has several variants, notably

15. Re-reading, photo and facsimile in Nehmé, Arnoux, Bessac *et alii* 2006, p. 96 and fig. 60.

16. See Fiema 1988, p. 110-111.

two superimposed circles open to the left thus resembling a “3”, the upper loop of which can also be flattened width-ways<sup>17</sup> thus making the shape of the figure close to that of the Nabataean number five. In JSNab 159, the number is composed of two elements: a curve resembling that of a Nabataean 10 and a loop. The reading of “20” is just possible if one compares its shape with that of the flattened “20” in the number 25 of JSNab 27.<sup>18</sup>

The two other texts, JSNab 160 and 161 (fig. 14-15), are engraved on the right wall, between niche RN2 and the left end of the wall. The first was read by Jaussen and Savignac as *'bdhrtt br / 'yd bḥd----* and the second *'rpwn br t---- 'bd*.<sup>19</sup> Based on the facsimile produced from the photographs, some letters read by Jaussen and Savignac are not absolutely clear and it is better to read only *'bhrtt br / 'y{d} b---- {'} b{d}----* for JSNab 160 and *'rpwn br ---- '----* for JSNab 161. The small, deep cutting marks complicate the reading of these texts, which are simply signatures, not religious dedications.

### *The adjoining chamber*

An adjoining chamber, which clearly had a utilitarian function, was cut into the back right (southeast) corner of the main chamber (fig. 16). A threshold raised by 24 cm connects the two. The width of this adjoining chamber varies between 1.75 m (at the back) and 2 m (at the front) and it is 1.50 m deep. The height to the ceiling varies between 1.70 to 1.80 m.

The whole width of the right wall is taken up by a niche 0.53 m high and 0.35 m deep, cut 1 m above the floor (called a “caisson” in Nehmé *et alii* 2006, fig. 58). This was a cupboard with a single shelf, which was no doubt used to store crockery and other tableware used during the meals taken in the *triclinium*. In the right end of the back wall of the cupboard, there is a vertical black streak bearing witness to the use of some sort of lighting system. In the back wall of the room, 1.20 m above the floor, there are drawings painted in black and red (width about 70 cm and height 27 cm). The lines of the drawings consist of a succession of alternating small black and red lines and they do not form any identifiable pattern: neither letters nor an understandable figurative representation (see fig. 17). They were painted over the ancient cutting marks. A smaller, vaguely ovoid-shaped drawing was painted in red on the front wall of this adjoining chamber. The floor of the room was cleaned and there were no particular installations.

### *The main chamber*

Before excavation the chamber floor was covered with a layer of sediments, with a maximum thickness of 65 cm above the benches. Below this (see stratigraphy below) a rock-cut *triclinium* was revealed which, after the Dîwân, is the second one of this type at Hegra. The room measures 4.10 to 4.80 m wide and 5.50 m deep, making it much smaller than the Dîwân, which is 10 m wide and 12 m deep. Three benches were cut along the walls (fig. 18). Their total width varies from 1.25 m for the right bench

17. See Milik and Seyrig 1958, fig. 2.

18. See Healey 1993, table p. 298.

19. Contrary to Jaussen and Savignac’s description, JSNab 161 is above and JSNab 160 is below, not the other way around.

to 1.50 m for the left one and 1.75 m for the back one. Their height is approximately 50 cm. Each is provided with a ledge, placed 10 cm lower than the top of the bench, whose width varies from 26 to 28 cm for the side benches and from 34 to 36 cm for the back bench. This ledge, which held the dishes and plates served to the guests, is separated from the bench itself by a roll that is much more pronounced on the right than on the left. Also, the profile of the benches rises gently from the walls towards the centre of the room, which is equally the case for the ones in the Dîwân.

Two additional installations need to be described. The first is the remains of a platform, probably of utilitarian function, at the end of the left bench and perpendicular to it (see the foreground in fig. 18). The top of the platform, 38 x 80 cm, was edged by an eroded ledge on one side. This “table” is attached to the ledge of the bench by a step 30 cm wide which goes down a bit lower than the ledge of the bench. The second installation is composed of two circular cup holes cut in the floor of the room between the end of the right bench and the front wall, in a space about 1.50 m wide that was created there (fig. 19). The western cup hole measures 23 cm in diameter and about 20 cm deep. The sand inside both cup holes contained many seeds (see below). The function of these cup holes could be either utilitarian or ritual.

Ith 78 and the Dîwân are the only roofed *triclinia* known at Hegra. By way of comparison, the site of Petra has forty-two.<sup>20</sup> Ith 78 has only some of the installations that are associated with roofed *triclinia* in Petra: benches with ledges, adjoining chambers and niches. Indeed, the majority of benches in the *triclinia* in Petra have a ledge, whose width varies slightly. In addition, five *triclinia* in Petra have an adjoining room.<sup>21</sup> On the other hand, Ith 78 does not have the following elements, which are relatively common in the *triclinia* of Petra: staircases accessing the benches and water basins. Nor are there elements that are less common in Petra, such as groups of two superimposed holes or groups of three holes arranged in a triangle, which one finds aligned on one or several walls of *triclinia* in Petra (for example in Brünnow no. 40, 290, 291, 717 and Dalman no. 841) and which probably served to hang decorative elements. Even more rare, one finds in Petra *loculi* inside roofed *triclinia* (for example Brünnow no. 34, 235 and 812). Finally, Ith 78 does have one installation that is rare in Petra, the cup holes, both inside (the two in the entrance to the right) and outside (the cup holes linked by channels on the top of the massif). Only two *triclinia* in Petra, Dalman no. 842 and Sy 121<sup>22</sup> have cup holes: in the middle of the room in Dalman 842 there is a single one, 30 cm in diameter and 15 cm deep, and in Sy 121 there are two of unequal dimensions (85 cm and 25 cm in diameter), linked to each other by a channel.

20. In Nehmé 2003, p. 158, the numbers given for roofed and unroofed *triclinia* were reversed: it should read forty for the former and sixteen for the latter. The number of roofed *triclinia* in fact needs to be increased by two, following the excavation of two rock-cut chambers with benches in the area of an-Numayr (Brünnow nos 290 and 291). See Tholbecq and Durand 2005, p. 299-300 (no. 290) and 303 (no. 291).

21. Brünnow nos 55, 715, 717, 1840, 1843.

22. The existence of this new *triclinium*, which is in the wadi as-Siyyagh, was revealed after torrential rains which eroded away some of the wadi sediments. It was published in Zayadine and Farajat 1991, p. 278 and fig. 40.

## Stratigraphy

The excavation inside the rock-cut chamber was carried out in two stages: in the front part of the room, the entire layer of the sediments was cleared with spades whereas in its back part the layers were excavated stratigraphically.

Above the level defined by the top of the side benches (fig. 20-21), the section shows a series of more or less ashy and more or less coarse sandy deposits, sealed at the top by a fine, greenish crust of sand and plant and organic matter (60501). These deposits, which contain virtually no material, correspond to the different levels of abandonment. In the space separating the side benches, however, there are not only these same deposits (fig. 22) but also a few occupation layers, some of which probably represent a reuse of the chamber as a sheep pen (60506) but also, directly above the floor of the room, a thick sandy-ashy layer (60509) perhaps representing the last use of the room as a dining area. It contains, indeed, a large amount of plant remains (see below). A sandstone die with six faces, each of which bears a different number (fig. 23), was found in this layer.

There was very little pottery and the only datable pieces came from *loci* 60502 (1<sup>st</sup> century AD), 60507 (hypothetically dated, based on four sherds, to the interval between the end of the 1<sup>st</sup> century BC and the 1<sup>st</sup> century AD) and 60509 (end of 1<sup>st</sup> century BC to beginning of 1<sup>st</sup> century AD). This last *locus* also produced a coin (60509\_C01) which, according to the reading by Chr. Augé, seems to be Hellenistic from Phoenicia (Sidon, Arados?) and probably reused for a local minting.

Thus, taken together, the material is fairly homogenous, and probably means that the banqueting room was used until no later than the 2<sup>nd</sup> century AD, as is the case for the *triclinia* associated with niches Ith 23-25 excavated inside Jabal Ithlib in 2008.<sup>23</sup>

Several layers contained plant remains which were sampled either by hand (60505, 60509 and 60510), or by flotation (60506, 60507, 60509 and 60511). They were studied by Ch. Bouchaud (University of Paris 1) who identified them and made the following comments: *loci* 60510 and 60511 are the fills of the cup holes and contain quite a few coprolites. These layers should perhaps be linked with the use of the *triclinium* as a sheep pen that post-dates its use as a banqueting hall. *Locus* 60506, which is a layer of ash/hearth at an intermediate level in the sediments accumulated in the room (see fig. 22), should also be seen as belonging to this later use. This layer not only produced numerous ovi-caprid coprolites, indicating an occupation such as a sheep pen, but also stalks of *Chenopodiaceae* (*Haloxylon*, *Salicornicum* sp.), which could have been used as fuel. Other plants, such as plantain (*Plantago* sp.) and dates (*Phoenix dactylifera*) could represent the remains of fodder.

In layer 60509, which lay directly above the bedrock floor in the space between the benches, the samples taken by hand and by flotation produced numerous remains of dates as well as a few remains of olive pips, which could confirm the hypothesis that these are the remains of a meal. The dry stalks of *Chenopodiaceae* also found in this layer could represent wind blown deposition of these plants, which

23. Nehmé, al-Talhi and Villeneuve 2010, p. 288.

grow spontaneously in the immediate vicinity of the *triclinium*, whereas the few coprolites are probably contamination from the levels above.

Thus, the clearing and excavation of Ith 78 revealed a second *triclinium* in Madâ'in Sâlih and confirm the idea that the Jabal Ithlib and its surroundings were an area devoted to the gathering of symposia in the 1<sup>st</sup> century BC and 1<sup>st</sup> century AD.

## IGN 132

The IGN gave the number 132 to one of the two massifs within the residential area (fig. 24), the other being number 131. Other small outcrops, such as Marbat al-Hisân to the north and hills A and B to the south, are closer to the edges of the residential area. IGN 131 and 132 formed part of the urban landscape of the Hegra settlement and were integrated into it in a way that yet remains to be defined. The two massifs were briefly described in recent contributions<sup>24</sup> and hypotheses were developed to explain their function in the urban space.

IGN 132 is a sandstone outcrop that is slightly longer than it is wide (about 35 x 20 m), oriented north-south, which stands in the northeastern quarter of the residential area. Its top is at about 794 m and it dominates the surrounding plain: it is 16 m higher than Area 2 (fig. 25). Its south side is more sheer than its north side. Immediately to the north, the land forms a terrace where, in places, the bedrock reaches the surface. The bedrock falls away in a gentle slope from south to north (3 m over more than 15 m distance). At the foot of the massif, on the southwest side, nine excavation squares were opened in 2003 by D. al-Talhi. It was in the baulk between two squares in this trench that the Latin inscription which appears to mention the town rampart, dated to 175-177, was found.<sup>25</sup>

### *Description prior to excavation*

Some archaeological structures were located during the survey around the massif:

1/ West slope, from north to south (fig. 26):

- a sloping glacis stuck against the rock face (fig. 27). It is made of sharp, angular rubble in the lower part and stone-cutting debris in the upper part, the whole lot mixed with earth;
- to the right of this glacis, a more or less square, rock-cut chamber (IGN 132a), with sides of 4.50 m, partly filled (1.20 m clearance to the ceiling), in which no particular structure was visible prior to excavation (fig. 28). The back corners of the room show small quarrying prisms which are more suggestive of a lack of care in the finishing of the chamber than of an unfinished job. The dressing of the side walls is finer than on the back wall. The height of the original room can be estimated at 1.70 m ± 5 cm. The south side of the door frame (on the right) is preserved and has a latch hole in it, bearing witness to the existence of

24. Nehmé, Arnoux, Bessac *et alii* 2006, p. 91 and p. 111-112 ; Dentzer, Kermorvant, Nehmé *et alii* 2005, p. 78.

25. Al-Talhi and al-Daire 2005.

a latch system for closing the door. The front left part of the ceiling has collapsed and two of the blocks from that fall are visible in front of the chamber (fig. 29). This collapse is due to the presence of a large fissure that can be seen both from the inside and outside of the room;

- immediately to the right of the entrance to IGN 132a, a rectangular niche with eroded edges, IGN 132b, measuring 83 x 53 cm, contains the remains of a possible betyl, (fig. 30-31);

- a little further south, there is a notch of 84 x 54 cm, IGN 132c, which contains two rectangular betyls, the one on the left is 24 x 52 cm and the one on the right is 20 x 44 cm (fig. 32-33);

2/ South slope (fig. 34):

- more or less in the centre of the south slope there is a third niche, IGN 132d, measuring 1.30 x 1.50 m; it contains a betyl, only the lower part of which is just visible in relief. The betyl is 57 cm wide and of indeterminate height (fig. 35-36);

- to the right of IGN 132d, a semi-circular wall, at least two courses high and 3 m long, was built in front of the rock face of the massif (fig. 37);

- six rectangular putlog holes are cut into the right part of the rock face, roughly half way up (fig. 38). The rock around them shows traces of cutting. These holes must have been used to hold wooden beams for a light-weight structure;

3/ East slope (fig. 39):

On this side, the massif is divided into two sections by a fissure which widens towards the bottom. The southern part, on which a few cut marks are visible, is sloping and seems to rest on the northern part.

- on the north part of the slope, high up, there are at least six eroded putlog holes;

- on the top of the massif, but visible from the bottom, a groove several metres long was perhaps used somehow for collecting rainwater (fig. 40). In fact, immediately below it are the tops of two basins (see following paragraph);

- at the foot of the massif, almost stuck to the rock face, two round sandstone basins, probably *in situ*, were visible before excavation (fig. 41).

4/ North slope (fig. 42):

There are fewer remains on this slope than on the others. It is characterised by the presence, at its base, of terraces where the bedrock is visible here and there.

5/ Top:

The top of the massif is a platform sloping up from the north to the south. A groove cut into the rock, about 50 cm wide, runs around it, in some places almost at the break in slope. Encased in it there was some sandstone blocks held together with mortar. There was a lot of pottery on the platform.

Excavation of the remains associated with IGN 132 was undertaken for several reasons:

- the massif occupies a dominant position in the town and it is the most obvious element in the landscape when looking at the town from the north;
- numerous rock-cut and other remains were noted on it and in its immediate surroundings.

Of the elements described above, two attracted particularly our attention: the rock-cut chamber IGN 132a and the basins at the foot of the east slope. Thus, the excavation began with these, before being progressively extended to other sectors. Only the south slope of the massif remained unexcavated in 2010. The schematic plan of the remains in fig. 43 shows the position of the four excavation sectors in the order in which they are presented in this report.

### ***Sector 1***

This sector comprises the rock-cut chamber IGN 132a and the glacis to the left of the doorway.

#### **Rock-cut chamber IGN 132a**

The main objective of the excavation of the chamber was to find out if it was a banqueting hall, which the presence of the niches with betyls IGN 132b-d might suggest. Only the front half of the chamber was excavated, in two arbitrary layers (60601<sup>26</sup> and 60602). In the middle of the room, there was a clearly modern pit, which is visible in the section (fig. 44). The fill was very fine and loose, with a lot of straw, but it produced part of a stone bread mould (for making bread of the Pakistani type).

It should be noted immediately that the floor of the room such as it is today shows almost no traces of cutting and that the surface is irregular. The original floor of the chamber, as it had been cut by the stone cutters, can only be seen in the front left corner of the room where the pick marks are still clearly visible (fig. 45). Several centimetres of the original surface of the bedrock floor have flaked off, like a crust, exposing the natural rock. The cleared section of the floor shows that erosion was heavier in the middle than around the edges of the room.

In the lower part of the section, some fine, more clayey deposits were noted, which led us to carry out a more careful excavation of the fill of the chamber over a limited area (fig. 46) in order to obtain a better stratigraphy. The section, 55 cm high, showed the following elements, from top to bottom:

- for about 20 cm, a series of fine sandy deposits, resulting from natural deposits since the abandonment of the chamber;
- for about 19 cm, an equally sandy layer, but greyer and slightly coarser, containing some traces of occupation (the first two layers were numbered 60629);
- for about 17 cm, a dense clayey layer (60632) with small pieces of charcoal, a basalt grindstone fragment and a few stone laid flat, all of which belong to an occupation of the room that post-dated the erosion of the chamber floor.

---

26. This layer produced a coin, 60601\_C01, a bronze Ptolemaic minting, probably from Ptolemy II or III, which was used for a long time (reading by Chr. Augé).

The two excavated *loci* produced only a few pot sherds, but no forms. The ware seems to belong to Byzantine or late Byzantine ware types.

### The “glacis”

Before describing the glacis itself, a few pick marks (fig. 47), suggesting the presence of very eroded, probable steps cut into the rock, immediately to the left and a little above chamber IGN 132a, should be noted. This rock-cut staircase is one part of the arrangements that gave access to the top of IGN 132. The other part is the sloping glacis along the rock face to the left of IGN 132a (fig. 48). The southern end of the glacis has disappeared and its link with the rock-cut steps has been lost. Cleaning of the section and glacis face allowed the following comments to be made on its construction: at the base of the north part, in other words towards the bottom part of the glacis, large sandstone paving stones were used both to level the ground and as support. This can be seen clearly on the west face of the glacis (see fig. 27, on the left). Above the paving stones, on the right, some fairly evenly-sized (30 to 40 cm) sharp-edged rubble with a few larger blocks (*locus* 60625) formed the support for both a layer of earth and a layer of small stone-cutting debris mixed with earth. These are visible in the south section (fig. 49), respectively *loci* 60618 and 60616 (for 60616, finds date to late 1<sup>st</sup> century BC to early 1<sup>st</sup> century AD).

The shape of the rubble 60625 and of the stone-cutting debris 60616 suggest that the glacis was made with the cutting debris from the creation of the rock-cut chamber IGN 132a. It is likely that the glacis was built progressively, following the shape of the bedrock (fig. 50), rubble 60625 first supporting the earth layer 60618 then the layer of earth and stone-cutting debris 60616.

*Locus* 60625 produced a coin (60625\_C01) of Aretas IV or Malichos II (Mehorer 112-114 or 140-140A) and *locus* 60618 a coin of Aretas IV and Shaqîlat (Mehorer 114).<sup>27</sup>

At the foot of the glacis, the presence of a round, white sandstone block, about 50 cm in diameter, was noted. In its centre is a hole which gets smaller towards the bottom (fig. 51). It is held up and protected on two sides by rectangular blocks. The position of this block at the foot of the glacis suggests that it was perhaps a base for a pole.

### Conclusions for sector 1

The occupation sequence for sector 1 can be reconstructed as follows. Initially, the rock-cut chamber IGN 132a was cut. It was probably empty, with a low ceiling, and its function was probably utilitarian. The cutting debris from its creation was used to build a ramp which provided access to the rock-cut steps just above the front left corner of the chamber. This staircase led to the top of IGN 132, where the structures (see below, sector 4) were probably contemporary with or slightly later than those of the rock-cut chamber. At a date that is still difficult to define, some elements that were on the top of IGN 132 collapsed and fell past the chamber, whose ceiling was still intact. The result of this collapse might be the small mound of building material (earth and blocks) visible in front of the chamber (fig. 52). Finally, the ceiling of the chamber collapsed along the fissure.

27. Readings by Chr. Augé.

## Sector 2

Sector 2 (see fig. 43) is more complex because of the following: it is large (around 15 m north-south and 8 m east-west), the layers slope steeply from west to east (over 8 m, there is 1.27 m difference in elevation in the northern part of the sector and 1.58 m in its southern part), the presence of bedrock against which all the archaeological layers abut to the west, and finally, the variety of structures brought to light. Because of the change in level and the presence of the bedrock, the only sections possible were east-west, which makes understanding the north-south stratigraphic relations more difficult.

From north to south, three groups of structures or layers can be distinguished:

1/ some basins (fig. 53);

2/ a large destruction layer which began at the edge of basin 1 and covered a substantial part of the sector to the south of this basin (*loci* 60604 and 60606 in the upper part, then 60627) (fig. 54);

3/ to the south of this destruction layer, an east-west wall made of a double row of large blocks (fig. 55).

### The basins

Three stone basins were set up at the foot of the west face of IGN 132, only a few centimetres away from the rock face (fig. 56). They were numbered 1 to 3 from south to north (see fig. 43). Two of them, numbers 1 and 3 were visible before excavation. Number 2, however, was hidden by a bush and a layer of sand. The basins were set up level, are very well preserved and are probably *in situ*. None of them was coated. The basins are at the foot of two grooves cut into the upper part of the massif IGN 132, just below the longer groove which was used as the foundation of a small wall (see sector 4 below). The simplest explanation is to interpret them as basins for storing water. They could be filled either from rainwater running down off the top of the massif (always supposing that there was no roofed structure up there) or by filling them from wells in the residential area. The fact that the basins are not coated suggests that they were used for short-term storage, the water being destined for rapid use. If the opposite were the case – for long-term storage – the porosity of the sandstone would have made them relatively inefficient.

#### *Excavation in the sector with the basins*

Above and around basins 1 to 3, a very sandy layer was removed (60303). It contained very little material and cannot be dated. It is clear that the destruction layer 60404, mentioned above, is later than the basins since it covers them partially.

An east-west trench, 2.4 m wide and 8 m long (see fig. 43, “initial north trench”), was laid out so that it cut across basin 3. It began at the foot of the rock and went down almost to the bottom of the slope made by the “tell” which accumulated at the foot of the massif. This trench, in which we went down very little (40 cm maximum) before extending it southwards, showed that the top of basin 3 was in a pit with a layer of fill, 60605. The finds from 60605 date to around the end of the 1<sup>st</sup> century BC to the 1<sup>st</sup> century AD. Below 60605, east of the basin, there was a much ashier layer, 60607, containing more mixed material: it is mostly from the 1<sup>st</sup> century AD, but a few sherds could be Late Roman and some cooking pot handle fragments could be Byzantine or Late Byzantine. To the west of the basin, a layer (60615) was distinguished below 60605, from which it is not very different.

The wall surrounding and protecting the basins (see fig. 56) was torn away at the level of the pit which surrounded basin 3 and it is likely that the fill of its upper part (60505) was later than the destruction layer 60613. As for layer 60607, it was earlier than this destruction layer, as can be seen in the section (see figs 57-58). If the dating of the material is correct, this gives a *terminus post quem* of the “Byzantine period” for this destruction layer, without being able to be more precise.

The extension of the excavation to the area between the two trenches initially placed to the north and south (cf. fig. 43) made it possible to see that on its north and east sides (and *not* below the destruction layer 60604/60606, which covered only a small part of the *southern* edge of the basin), basin 1 was also surrounded by a pit filled with almost natural red sand (*locus* 60622, provisionally dated as “pre-Byzantine”?).

#### *Description of the basins*

- **Basin 1** (fig. 59): part of its edge is chipped. The inside face of the basin (fig. 60) is finely carved with almost ornamental oblique marks, whereas the bottom (fig. 61) displays the functional marks left by a pick.<sup>28</sup> Numerous fragments of basins were found on the surface all around basin 1, but none of these was the missing fragment (the thickness of their walls is different).<sup>29</sup>

Internal height: 75 cm; thickness of wall: 4.5 cm; internal diameter at top: 81 to 83 cm; internal diameter at bottom (slightly oval): 72 cm east-west and 85 cm north-south.

Fill: *loci* 60609 and 60621. The first (55 cm deep) is a layer of fine, soft sand which contained about twenty fragments of basin, one of which belonged to a flat basin (fig. 62). The second is a compact sandy layer. 60609 did not produce any datable pot sherds (but the wares are probably from the 1<sup>st</sup> century AD) and 60621 produced only two sherds, which could date to the end of the 1<sup>st</sup> century BC–1<sup>st</sup> century AD.

Altitude: the upper edge of the basin is at 784.88 m and the bottom is at 784.09 m above sea level.<sup>30</sup>

- **Basin 2** (fig. 63): complete basin but with slightly chipped edges. The finish of the internal face (fig. 64) shows fairly regular carving marks (made of short parallel grooves left by a pick).

Internal height: 85 cm; thickness of wall: 5 cm ; internal diameter at top: 91 to 93 cm; internal diameter at bottom: 95 to 98 cm.

Fill: *loci* 60610, 60612, 60614 and 60620. 60610 was a compact earth layer 12 cm thick and produced a coin, 60610\_01, of the type with an owl. 60612 was a small ashy pit in the fill of the basin. It was sampled and it produced a large variety of archaeobotanical remains (cereals, fruit, cotton, desert species, etc.) as well as coprolites. 60614 was a very hard, fine sandy layer, with very small charcoal fragments. 60620 was the same as 60614 (it was an arbitrary division between

28. Ornamental oblique marks made with a pointed chisel, cf. Bessac 2007, p. 241, fig. 54a. Functional marks (short grooves) left by a pick: *ibidem*, p. 231, fig. 35g and fig. 40-41 for examples.

29. 7 cm for the largest, two fragments of 6 cm, one fragment of 4 cm.

30. The difference does not equal the height of the basin. It is possible that the **altitude of the top of the basin is incorrect**.

the two, mainly to obtain less contaminated levels). The few pot sherds in these fill layers belong mostly to the 1<sup>st</sup> century AD but the ceramicists also found some Byzantine and Late Byzantine sherds in 60614, notably 60614\_P01.

Altitude: the upper edge of the basin is at 784.85 m and the bottom is at 784.01 m.

- **Basin 3** (fig. 65): complete basin but with edges slightly chipped in places. The finish of the internal face (fig. 64) is also made of short parallel grooves left by a pick (fig. 66). A pit, filled by *locus* 60505, has been dug around the basin. The cut and fill are perhaps relatively recent, even if the pottery material dates to the end of the 1<sup>st</sup> century BC–1<sup>st</sup> century AD. This *locus* contained about ten fragments of basin.

Internal height: 71 cm; thickness of wall: 6 cm ; internal diameter at top: 79 to 81 cm; internal diameter at bottom: 85 to 86 cm.

Fill: *loci* 60611 and 60619. 60611 was a very thick sand layer which filled almost the whole basin (it contained pieces of modern cloth) and 60619 was an equally sandy layer, 8 cm thick, which was just above the bottom of the basin. Neither of these layers produced any datable sherds.

Altitude: the upper edge of the basin is at 784.76 m and the bottom is at 784 m.

Another basin, basin 4, was found whilst excavating sector 2.

- **Basin 4**: bottom of a basin, at 784.27 m altitude. Thus, the base is between 20 and 30 cm higher than the bottom of the first three basins.

### The sector with the destruction layer

Before excavation, one could clearly see that the destruction layer partly covered basin 1 and thus post-dated it (see fig. 54). It formed a small mound 90 cm high, which abutted the rock face. It was not linked stratigraphically to the sand layer covering the basins.

This destruction layer (*locus* 60604 / 60606) contained material that dated mainly to the second half of the 1<sup>st</sup> century BC and the 1<sup>st</sup> century AD, including a coin of Malichos II (Meshorer 140-140A, reading by Chr. Augé). The bag for 60604 was contaminated by one of the workmen by the addition of pottery from a surface collection. Having realised the mistake, a new number, 60606, was given to this layer, the north extension of which is 60623.

Removal of the first layer of the destruction revealed (fig. 67) two other layers. One was a layer of sandstone debris, the pieces measuring between 10 and 30 cm, with sharp edges (*locus* 60617, 1<sup>st</sup> century AD?), which seemed to be the result of deliberate dumping rather than of collapse. The other was a destruction layer (*locus* 60627, whose dating is difficult because it only produced some handle fragments and a coin from the beginning of the reign of Aretas IV). 60627 contained many facing stones (fig. 68) of white sandstone (or limestone?) of excellent quality, found in positions that show clearly that they fell from an adjacent structure (there are no fragments of basins in 60627). The first thought was that they must have fallen from the top of the massif IGN 132 but this idea was discarded for several reasons: 1/ the fact that some of the blocks were stuck against the rock face (fig. 69), which is hard to

explain if they fell from above; 2/ the fact that the shape of the blocks used in the structure found at the top of the massif is absolutely not the same as for those from the destruction layer 60627.

The facing blocks were embedded in a very hard, compact layer and some had traces of mortar on some of their faces. One of the blocks (no. 11) shows very regular oblique tool marks and its face is surrounded, along its edges by a chiseling (fig. 70). Another block, no. 3, was dressed in a way that elicited the following comment from J.-Cl. Bessac,<sup>31</sup> “the dressing of this block was roughed-out with a pick (or a pointed chisel), the impact of which remains in a few short grooves that are deeper than the dominant, finer traces. The latter are of two types: around the edges, some marks left by a percussion tool the cutting edge of which is perpendicular to the handle, of the polka type with a fairly narrow cutting edge, or more exactly a *qadum* for the traditional model of the region. The central part seems to be dressed more roughly with the same tool. The margin thus created is irregular and does not relate well to what is known of Nabataean stone cutting on sandstone, especially since the tool involved is more often used on soft limestone and in later periods. The question then arises as to whether this is a Nabataean-period block and if it is really sandstone. Indeed, in Petra for example, the bases of the Great Temple and other elements are cut in fine marly limestone which can, at first, be mistaken for fine sandstone.”

About fifty facing stones were removed from this layer. They came from a monument that stood at the foot of IGN 132. The quality of the stone and the dressing show that it was a construction characterised by a certain degree of monumentality. None if it has yet been found *in situ*.

Below the destruction layer 60627, a layer with smaller blocks in less compact earth (*loci* 60630 and 60633), was found.

### **The sector south of the destruction layer**

On the surface, south of the destruction layer, and thus at the very south end of the area excavated in 2010, a double-faced wall of large, friable sandstone blocks appeared (of a quality that is markedly lower than that of the blocks found in destruction layer 60627). This was *locus* 60638, which was partly cleaned and was not dated. Immediately at the foot of the wall, on its north side, a layer of very eroded sandstone rubble in soft sand was noted. Thus, in this sector, there had probably been two phases of construction: a destroyed wall that has not been found, layer 60627, and a later (?) wall, still partly *in situ*.

### **Small sounding at the base of the massif**

A small sounding was put in at the foot of the massif (see fig. 43) in order to get a north-south section. This section (fig. 72) shows that the destruction layer tends to slope south to north, which allows for the possibility of a wall further south.

31. Letter of the 16 April 2010.

## Conclusion for sector 2

Sector 2 is characterised by the presence of many basins, four of which have been found *in situ* and an indeterminate number in the form of fragments of various sizes (some belonging to quite shallow basins). The bases of the first three basins are more or less at the same altitude, within 8 cm, which suggests that they were in use at the same time.

The current state of the excavations allows us to make the following comments on the area south of the basins: in this spot, or immediately adjacent to it, there was a monument of some importance, built with good quality sandstone (?) blocks, some of which show decorative dressing. It collapsed at a fairly early date (*loci* 60604, 60606, 60627), probably no later than the end of the 1<sup>st</sup> century AD.

## Sector 3

This sector comprises the space extending to the north of the massif IGN 132 (see fig. 43), which slopes northwards and where the bedrock shows on the surface in places. The main characteristic of this sector is the presence, in the lower part, of two terrace walls: an external and an internal wall, both of which follow the contours of the bedrock to the north and west and fade out on the bedrock on the east side.

The 2010 season in this sector was mostly devoted to cleaning these walls, one stretch at a time.

- 60631: cleaning of the eastern part of the internal terrace wall, to bring to light the way in which it abuts the bedrock (mixed pot sherds, up to and including the “Byzantine” period, three coins, two of the owl type and one Roman coin from AD 335–341);
- 60635: cleaning of the western part of the external terrace wall;
- 60636: spread of ash between the western parts of the internal and external terrace walls;
- 60637: cleaning of the eastern end of the external terrace wall, in the spot where it turns southwards to abut on the exposed bedrock.

Two basins are associated with these terrace walls. One, found in a fallen position at the foot of the outside corner of the external terrace wall, probably fell off the terrace (fig. 73). The second, whose rim is inclined in the direction of the slope, is probably not far from its position of use, whether original or not (fig. 74). It is at the foot of the internal terrace wall, also near the corner.

### The external terrace wall

This wall is composed of a double row of blocks and its western part is better preserved (fig. 75) than its northern part where the exterior facing blocks remain only on a short stretch of wall (fig. 76). The blocks are of friable sandstone and the internal fill is made of small rubble mixed with fairly loose earth. The wall is 1.15 m wide. Its base follows the contours of the bedrock and at the southwestern end of the wall, the courses are laid directly on the bedrock (fig. 77). No clear trace of a doorway was found in this wall. The western and northern stretches of the wall form an obtuse angle between them.

## The internal terrace wall

This wall, also a double-faced wall, is narrower than the previous one and it is also better preserved in the western (fig. 78) than the northern part. It is only 60 cm wide. The northern stretch of the wall has two doorways:

- one is at the eastern end of the terrace wall, very close to the spot where it abuts the exposed bedrock (fig. 79). The space between the doorjambs is 0.90 m;
- a few metres further west (fig. 80) is the other doorway, with wider doorjambs spaced 1 m apart.

It should be noted that neither of the two doorways is exactly in alignment with the ramp that gives access to the top of IGN 132.

### *A cornice stone (?) with rosette*

A sandstone block, 66 cm high, 38 cm wide and 22 cm thick, more eroded at one end than the other (fig. 81), has, in its upper part, a moulded frame of 29 cm square. Inside this frame, a rosette with one swirl of petals is sculpted in low relief. It is composed of four lanceolate petals superimposed on four wavy, heart-shaped petals. Carved in the extension of the four lanceolate petals, touching the inside corners of the frame, there are four ivy leaves. On the back of the block, a square-section groove was cut across the middle of the whole length of the block (figs 82-83). Finally, the middle of the sides of the block were evenly cut down, as if to facilitate locking it in position with the neighbouring blocks (fig. 84).

The rosette motif is fairly common at Hegra, where it forms part of the decorative elements of tombs: twenty tombs have rosettes as part of the architectural decorations of their façades. These rosettes decorate the metopes of the Doric friezes above the doorways of the tombs which have a pediment (IGN 11, 17, 20, 21, 22, 24, 44, 45, 66, 93, 100), or they are carved in the central part of the tympanum of the triangular or semi-circular pediments of the doors (IGN 14, 42, 64, 92), or they are carved on other parts of the façade (attica: IGN 75, 120 and 121; above the doorway: IGN 37; upper flat part of the façade: IGN 118).

From the point of view of rosette typology, four broad categories can be distinguished:

- rosettes with one swirl of lanceolate petals on a plain background (IGN 20, 42, 45, 66, 92, 121, with six petals);
- rosettes with one swirl of lanceolate petals superimposed on wavy, heart-shaped petals with no striations (IGN 37, 45, 75, 118, 120, with six petals) or with striations on the petals (IGN 14, 17, 20, 21, 22, 24, 44, 64, 100, 93, with six petals);
- rosettes with one swirl of lanceolate petals superimposed on petals with an incised design in the shape of a three-branched chandelier, the whole thing in a double circle (IGN 11);
- rosettes with a double swirl (IGN 44).

Nearly all the rosettes have six petals. The single one which has only four, and which therefore presents the same design as the one from IGN 132, is the rosette in the Doric frieze of the doorway of IGN 22, a tomb dated to the beginning of the Christian era (fig. 85).

In Petra, the rosette motif is much rarer. An error of omission notwithstanding, it is not found on tombs and seems to be attested on only a few monuments in the city centre:

- the Qasr al-Bint: eastern façade, metopes of the Doric frieze in the pediment as well as modillions of the drip of the cornice.<sup>32</sup> In the frieze, the rosettes are large, with two concentric swirls of petals. The outer petals have a heart-shaped wavy edge and between each pair of petals, a lower row of petals or sepals appears. The inner swirl is made up of eight lanceolate petals superimposed on eight heart-shaped petals.
- the “Baths”: at the base of the capitals of this monument, there is a band of rosettes,<sup>33</sup>
- the *temenos* gate of the Qasr al-Bint: interior pilasters of the temenos gate (McKenzie 1990, pl. 57a), elements of the Doric frieze (McKenzie 1990, pl. 57b) and of a floral frieze (McKenzie 1990, pl. 57c, d) found in fragmentary form.

Due to the size and shape of the block from IGN 132 (the decoration occupies only a small part of its surface), it is possible that this is a fragment of cornice (frieze or part of the drip) from a monument of some importance (the cornice fragments from the Qasr al-Bint measure 0.66 x 1.25 m and are thus clearly much bigger). The block was being reused in IGN 132, either as a part of the doorjamb or in the terrace wall itself.

#### *The sounding in the inside corner of the wall*

A sounding of 2 x 0.8 m was laid out in the inside corner of the interior terrace wall in order to check for the presence of archaeological levels on the terrace. Bedrock was reached at 1.60 m below the surface in the north and at only 0.70 m below it in the south; this means that the bedrock drops down 90 cm in 2 m, which is considerable (fig. 86-87). The difference in elevation is made up by a fill of clayey soil 60 cm high (*locus* 60647, which contains both Nabataean and Roman material, dating to the 2<sup>nd</sup> and 3<sup>rd</sup> centuries in Petra).

This sounding exposed the northern terrace wall preserved to a height of 80 cm, made of five regularly built courses. It is not founded on bedrock but on a clayey layer 60647, below which there is a spread of pebbles 15 cm thick (60648). The western terrace wall also has five courses of regular thickness preserved (from top to bottom, 2<sup>nd</sup> course<sup>34</sup> 13 cm, 3<sup>rd</sup> course 12 cm, 4<sup>th</sup> course 15 cm, 5<sup>th</sup> course 15 cm), with earth mortar joints 3 to 4 cm thick. It is founded on two courses of large, protruding sandstone blocks (total thickness between 45 and 50 cm) which, at the very bottom, in the lowest part, rest on a

32. Zayadine, Larché, Dentzer-Feydy 2003, p. 18, 51, 54 (parallels), 58, plate p. 29, p. 163 n°29, and photos 7 p. 194 and 83 p. 216.

33. McKenzie 1990, pl. 45b.

34. The first course is poorly preserved and its original height cannot be measured.

layer of hard clay. In the part where the bedrock comes up, smaller blocks were used on the bedrock to ensure the best adaptation to the contours (see fig. 86).

The north-south section (fig. 87) shows that above the fill 60647, there was a succession of alternating ashy and clayey layers (*loci* 60639 to 60645); these produced very few finds, of late Roman and Byzantine date. Several ashy layers of limited extent bear witness to the use of the terrace as a dump at a late period.<sup>35</sup> *Loci* 60641 and 60643 contain some pieces of cob (fig. 88). It is interesting to note that the ash layer 60639 stops against the western wall, and that it does not fill the empty space where some the blocks of the wall are missing. 60639 therefore predates the destruction of the wall.

### Two wall stubs in front of IGN 132a

Seven metres from the entrance to the rock-cut chamber IGN 132a and shifted a bit less than 2 m relative to it, the ends of two northwest–southeast oriented walls were found (fig. 89). They were not excavated in 2010 and they are covered by what seems to be a layer of destruction or debris.

### Sector 4

This sector covers the top of massif IGN 132, which is accessible only from the west via the glacis and the rock-cut steps described in sector 1 (see fig. 43). The very friable rock is visible almost everywhere. The most remarkable feature on top of IGN 132 is the groove cut around the edge of the platform. It is about 50 cm wide and was used to encase – and thus acts as a foundation trench for – a low wall made up of a single row of sandstone blocks placed in the middle of the groove and securely fixed there by rubble on either side (fig. 90-91). The relative fragility of the construction suggests a low wall rather than a wall several metres high. This wall, whose height is difficult to estimate, could be part of a rectangular enclosure, oriented north-northeast – south-southwest, about 13.50 (east-west) x 16 m (north-south). It surrounds a central platform which goes up towards the south by steps still visible in the bedrock. There was perhaps an altar at the top, where there is currently a pile of construction debris (fig. 92). The enclosure was most probably not covered and did not prevent the flow of rainwater, which was collected in the basins at the foot of the massif on the east side.

All we did in 2010 on the top of IGN 132 was the cleaning of the northern part of the low wall in order to reveal the construction technique, and sweeping of part of the platform. The pottery picked up during this cleaning (*locus* 60701) could belong to the end of the 1<sup>st</sup> century BC and the 1<sup>st</sup> century AD, with the exception of a lamp fragment (fig. 93) which might be later (Byzantine?).

### Conclusion

Taken together, the operations undertaken during the 2010 season have confirmed that Jabal Ithlib and its surroundings were rich in roofed and open-air banqueting halls, whose main period of use was the 1<sup>st</sup> century AD. The excavations also revealed the existence of a monumental complex on top of and around the massif IGN 132, part of which certainly had a religious function. One can reasonably suppose that

35. No block *in situ* and no built hearth was associated with these ash layers.

the rock-cut chamber IGN 132a, the niches with betyls IGN 132b-d, the access ramp and rock-cut steps, the platform on the summit surrounded by a low wall forming an enclosure and the two terrace walls all formed part of this complex. The different elements form a coherent structure and could have functioned with one another. Altogether, evidence tends to point to a construction date during the Nabataean period (end of 1<sup>st</sup> century BC–1<sup>st</sup> century AD).

In the absence of a clear stratigraphic link, the connection between this monumental complex and the structures brought to light on the eastern slope of IGN 132 (the sandstone basins, the destruction layer of a probable carefully-built monument and the *in situ* double-faced wall) is difficult to establish.

The 2011 season, which will be the last in the first four-year programme of the Madâ'in Sâlih project, will be devoted exclusively to the excavation of IGN 132: clarification of the stratigraphy in sector 2, excavation of the destruction or debris layer in front of IGN 132a, clearing of the highest part of the platform on the top of the massif, etc.

## Bibliography

### *Sigla*

CIS            *Corpus Inscriptionum Semiticarum. Pars II. Inscriptiones Aramaicas continens.* Paris, 1889-.

JSNab        Nabataean inscriptions published in Jaussen and Savignac 1909-1914.

JSTham      Thamudic inscriptions published in Jaussen and Savignac 1909-1914.

### *References*

Bessac J.-Cl. 2007. *Le travail de la pierre à Pétra. Technique et économie de la taille rupestre.* Paris.

Brünnow R. E. & von Domaszewski A. 1904-1909. *Die Provincia Arabia. Auf Grund zweier in den Jahren 1897 und 1898 unternommenen Reisen und der Berichte früherer Reisender.* 3 volumes. Strasburg.

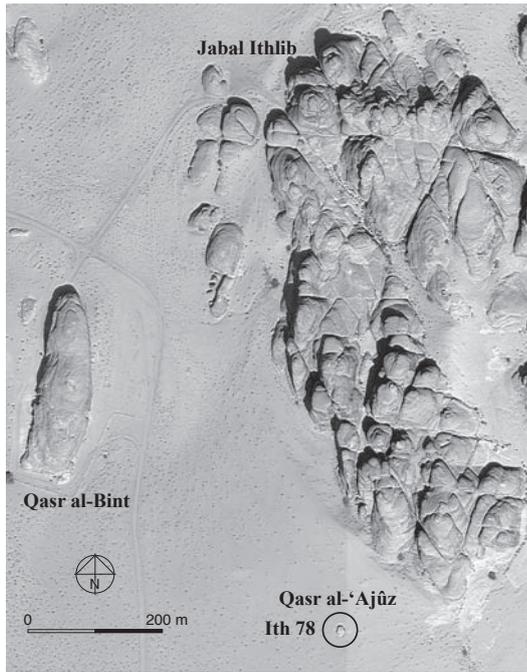
Dalman G. 1908. *Petra und seine Felsheiligtümer.* Leipzig.

Dentzer J.-M., Kermorvant A., Nehmé L., Tholbecq L., Abu al-Hassan H. 2005. "Report on the 2002, Second Season of the Saudi-French Archaeological Project at Meda'in Saleh", *Atlat* 18, p. 61-80 [English], p. 153-159 [Arabic], pls 9.1 to 9.23.

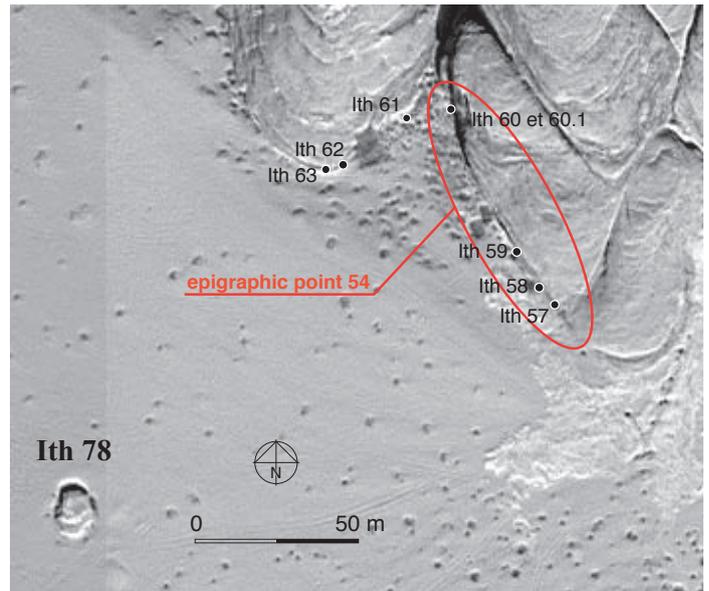
Doughty C. 1884. *Documents épigraphiques recueillis dans le nord de l'Arabie* [published by Er. Renan]. Paris.

Fiema Z. T. 1988. "The Era of Bostra. A Reconsideration", in *XXXV Corso di Cultura sull'Arte Ravennate e Bizantina, Ravenna, 19/26 marzo 1988.* Ravenna.

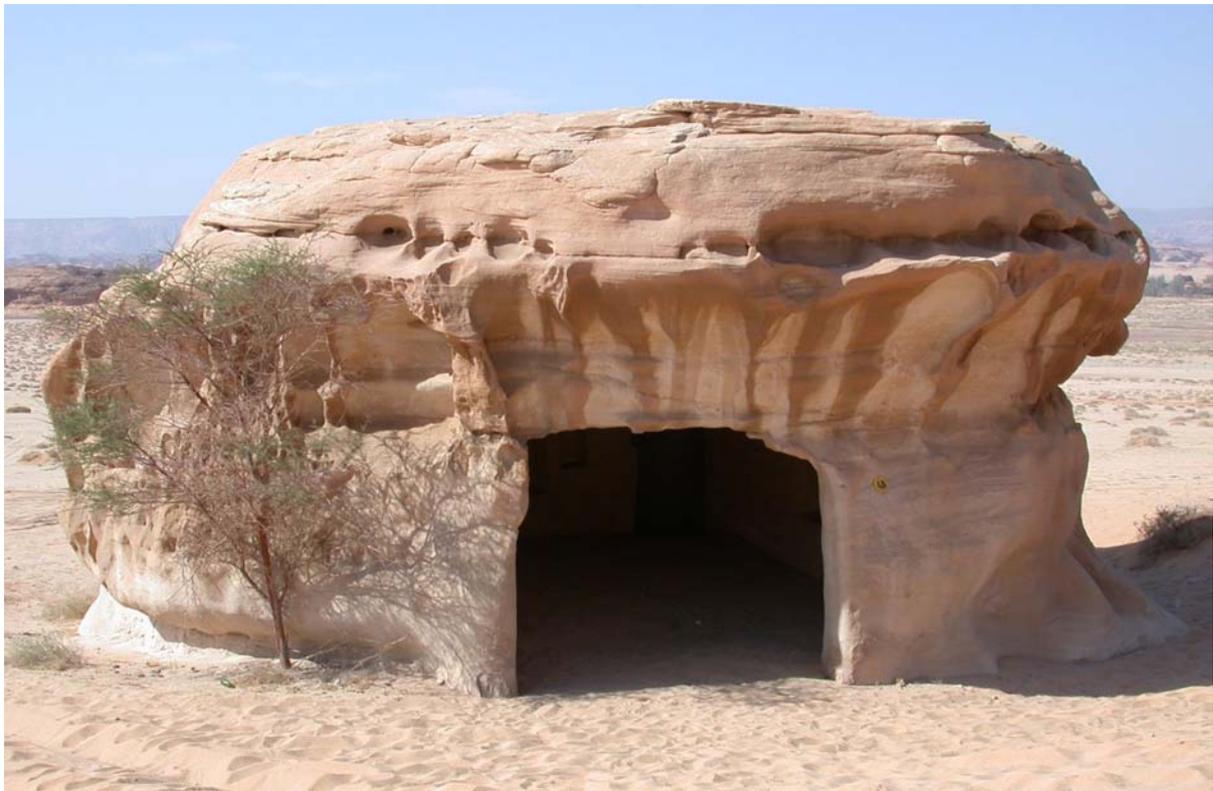
- Healey J. F. 1986. "The Nabataeans and Madâ'in Sâlih", *Atlat* 10, p. 108-116, pl. 107-109 [Arabic version p. 135-144].
- 1993. *The Nabataean Tomb Inscriptions of Mada'in Salih*. Journal of Semitic Studies Supplement 1. Oxford.
- Jaussen A. & Savignac R. 1909-1914. *Mission archéologique en Arabie. I. De Jérusalem au Hedjaz, Médain Saleh. II. El-'Ela, d'Hégra à Teima, Harrah de Tebouk*. (2 volumes). Paris: Leroux/Geuthner.
- McKenzie J. S. 1990. *The Architecture of Petra*. British Academy Monographs in Archaeology, 1. Oxford.
- Milik J. T. and Seyrig H. 1958. "Trésor monétaire de Murabba'at", *Revue Numismatique* 6th series 1, p. 11-26, pl. 1-3.
- Nehmé L. 2003. "The Petra Survey Project", in G. Markoe (éd.), *Petra Rediscovered. Lost City of the Nabataeans*. Cincinnati, p. 145-163.
- 2005. "Towards an understanding of the urban space of Madâ'in Sâlih, ancient Hegra, through epigraphic evidence", *Proceedings of the Seminar for Arabian Studies* 35, p. 155-175.
- Nehmé L., Arnoux Th., Bessac J.-Cl., Braun J.-P., Dentzer J.-M., Kermorvant A., Sachet I., Tholbecq L., with a contribution by J.-B. Rigot. 2006. "Mission archéologique de Madâ'in Sâlih (Arabie Saoudite) : Recherches menées de 2001 à 2003 dans l'ancienne Hijrâ des Nabatéens", *Arabian Archaeology and Epigraphy* 17, p. 41-124.
- Nehmé L., al-Talhi D. and Villeneuve F. 2010. *Report on the First Excavation Season at Madâ'in Sâlih, Saudi Arabia, 2008*. Riyad.
- (al-)Talhi D. and al-Daire M. 2005. "Roman Presence in the Desert: A New Inscription from Hegra", *Chiron* 35, p. 205-217.
- Tholbecq L. and Durand C. 2005. "A Nabataean Rock-Cut Sanctuary in Petra: Preliminary Report on three Excavation Seasons at the "Obodas Chapel", Jabal Numayr (2002-2004)", *Annual of the Department of Antiquities of Jordan* 49, p. 299-311.
- Wenning R. 1996. "Hegra and Petra : Some Differences", *Aram* 8, p. 253-267.
- Zayadine F. and Farajat S. 1991. "The Petra National Trust Site Projects. Excavation and Clearance at Petra and Beida", *Annual of the Department of Antiquities of Jordan* 35, p. 275-311, pl. 1-16.
- Zayadine F., Larché Fr. and Dentzer-Feydy J. 2003. *Le Qasr al-Bint de Pétra. L'architecture, le décor, la chronologie et les dieux*. Paris.



**Fig. 1.** Location of Ith 78 on the QuickBird satellite image



**Fig. 2.** The archaeological and epigraphic context of Ith 78



**Fig. 3.** The outcrop Ith 78 before excavation, from the north

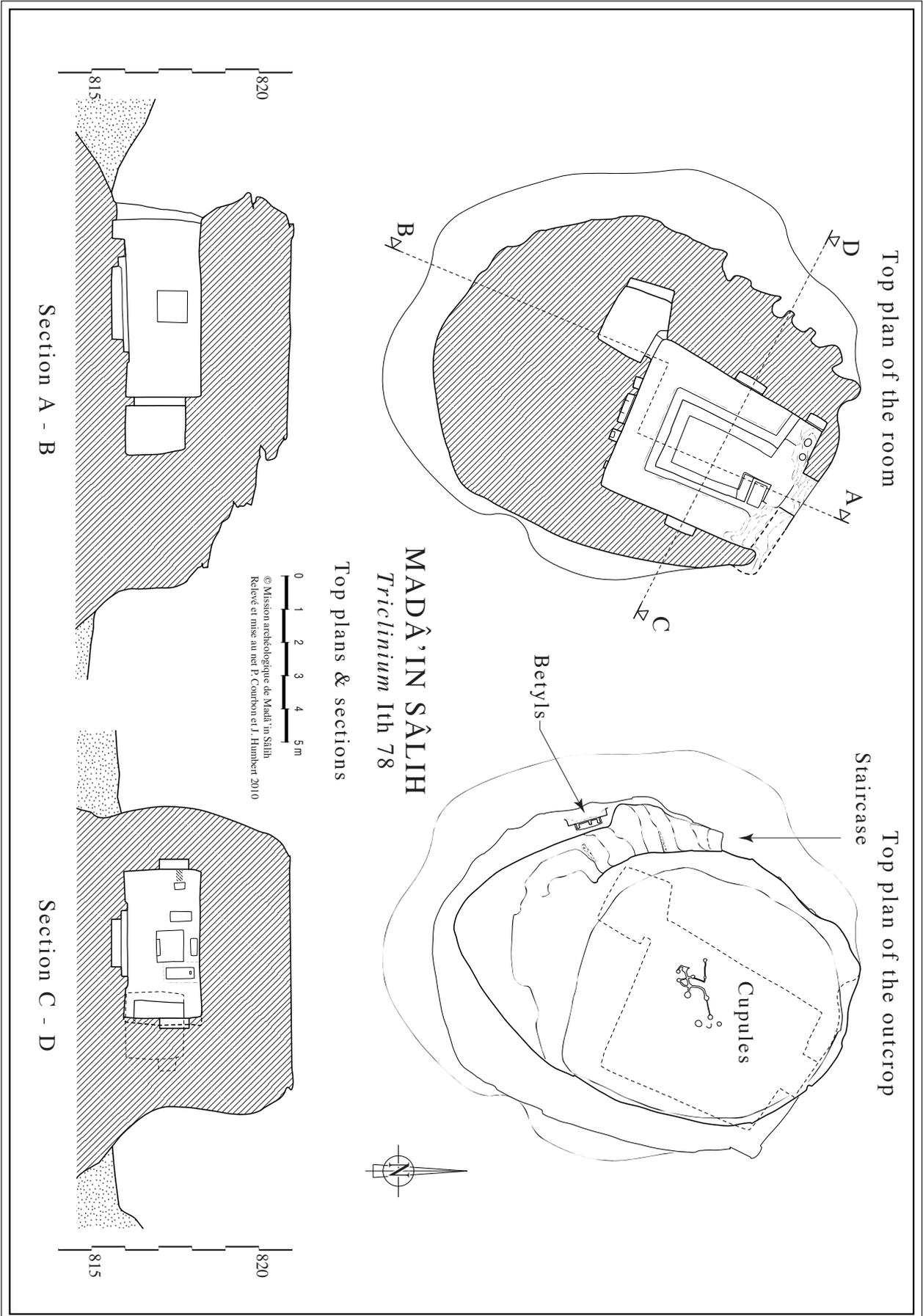


Fig. 4. Plan and section of massif Ith 78



**Fig. 5.** Cup marks linked together by channels on the top of Ith 78, from the south



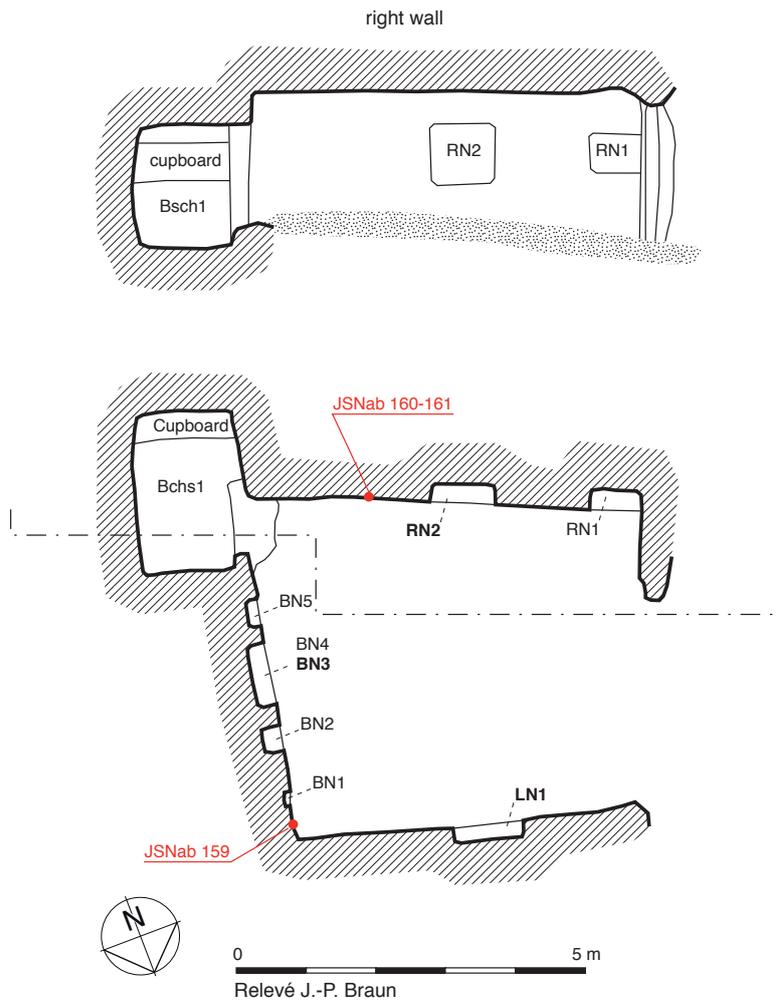
**Fig. 6.** Large, eroded betyl (?) cut into a niche at the foot of Ith 78, to the right of the entrance



**Fig. 7.** Niche with two betyls on the south slope of massif Ith 78



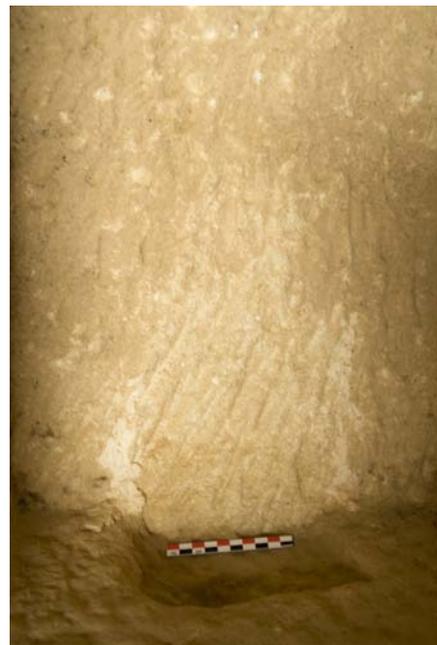
**Fig. 8.** Rock-cut staircase leading to the top of Ith 78



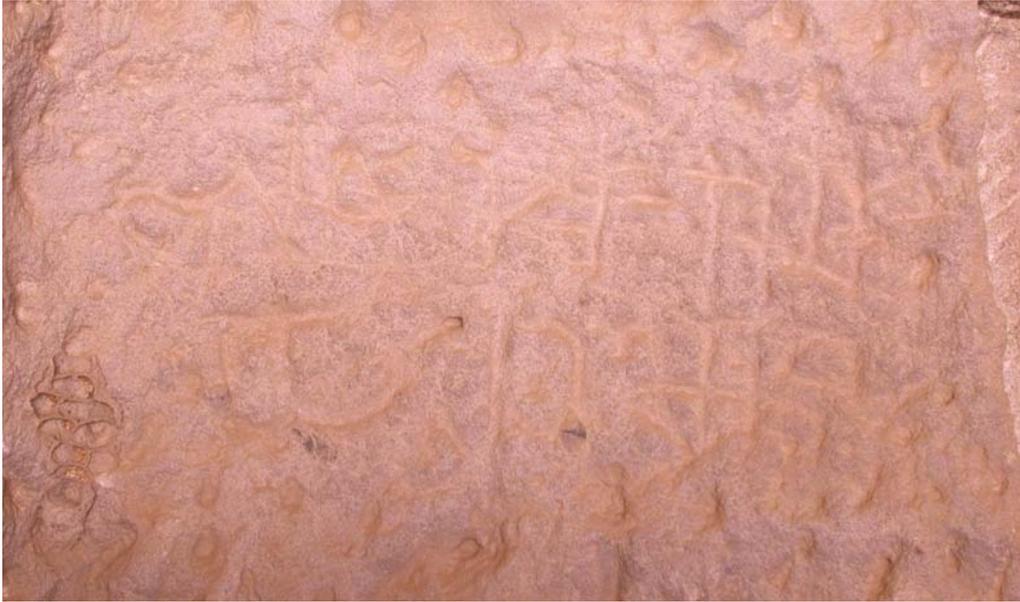
**Fig. 9.** Location and number of the niches inside Ith 78



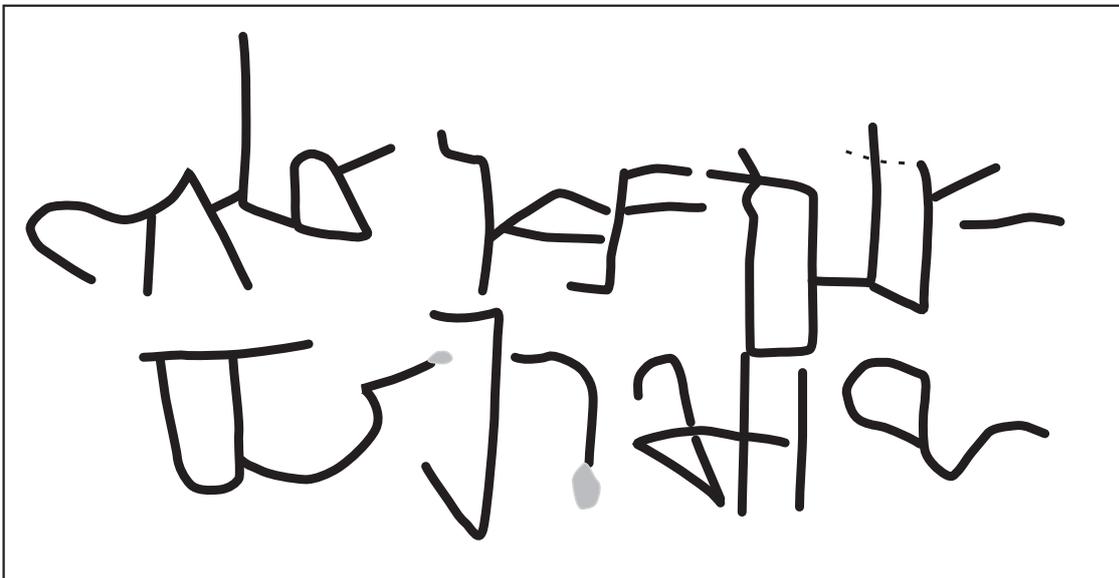
**Fig. 10.** Niches BN3 (below) and BN4 (above) in the back wall of Ith 78



**Fig. 11.** Niche BN2 with traces of mortar in the back wall and slot



**Fig. 12.** Nabataean inscription JSNab 159



**Fig. 13.** Facsimile of inscription JSNab 159



Fig. 14. Nabataean inscriptions JSNab 160-161



Fig. 15. Facsimile of Nabataean inscriptions JSNab 160-161



**Fig. 16.** The adjoining room in Ith 78 and the shelf in its wall



**Fig. 17.** Motifs painted on the back wall of the adjoining room



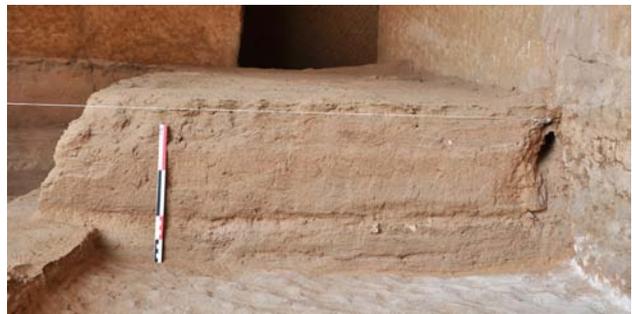
**Fig. 18.** The benches of the *triclinium* benches after complete excavation.  
In the foreground, a sort of table



**Fig. 19.** The western end of the right side bench and the two cup holes cut in the floor



**Fig. 20.** The deposits above the left side bench



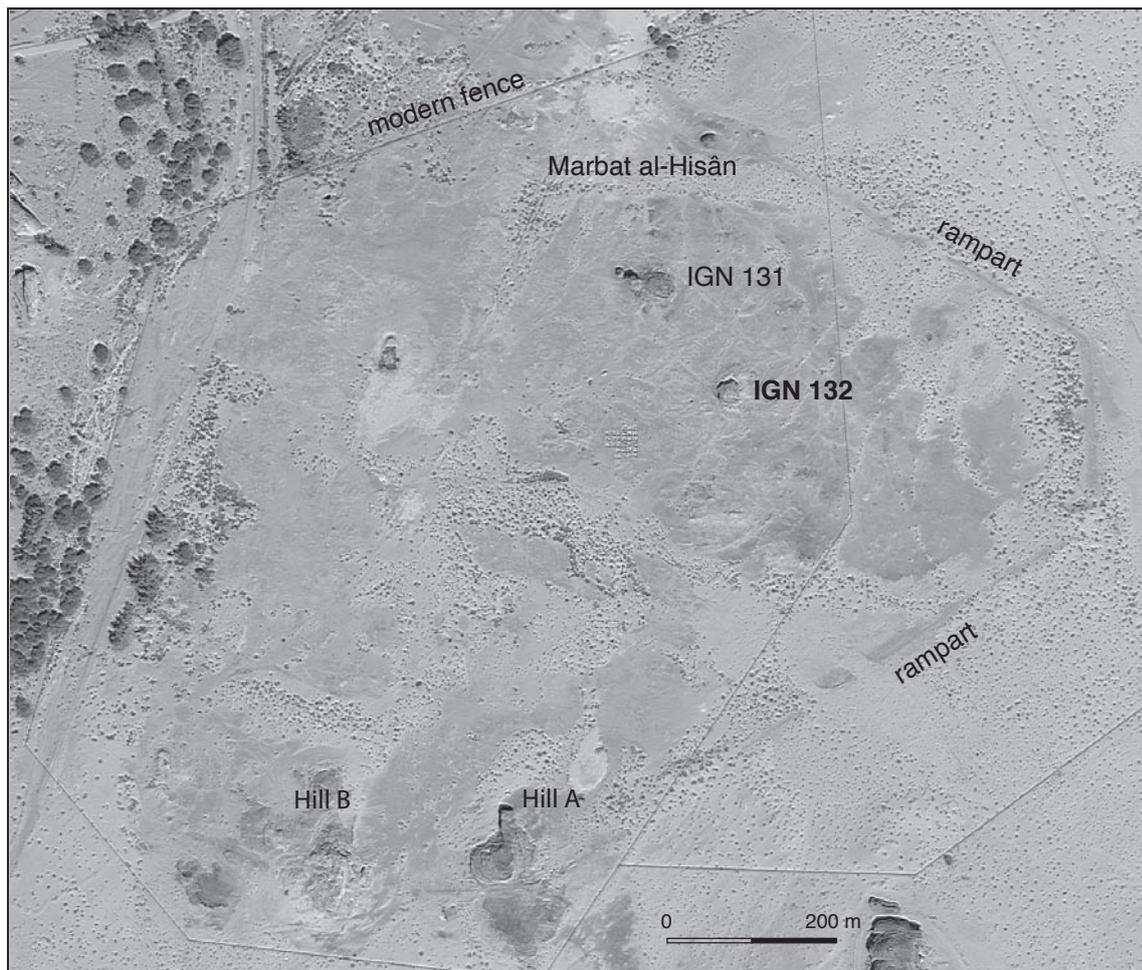
**Fig. 21.** The deposits above the right side bench



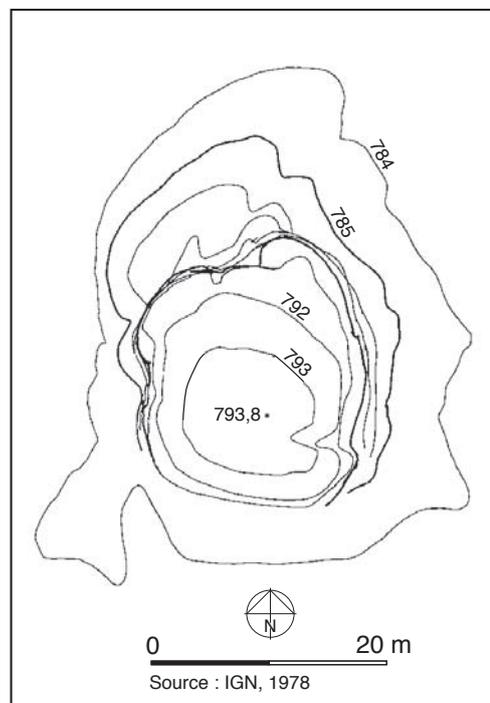
**Fig. 22.** Stratigraphy of the deposits in the central space, between the two side benches



**Fig. 23.** Die with six faces 60509\_S01



**Fig. 24.** Location of IGN 132 within the residential area



**Fig. 25.** Massif IGN 132 as shown on IGN maps



**Fig. 26.** Western slope of IGN 132



**Fig. 27.** The glacis to the left (north) of the chamber IGN 132a



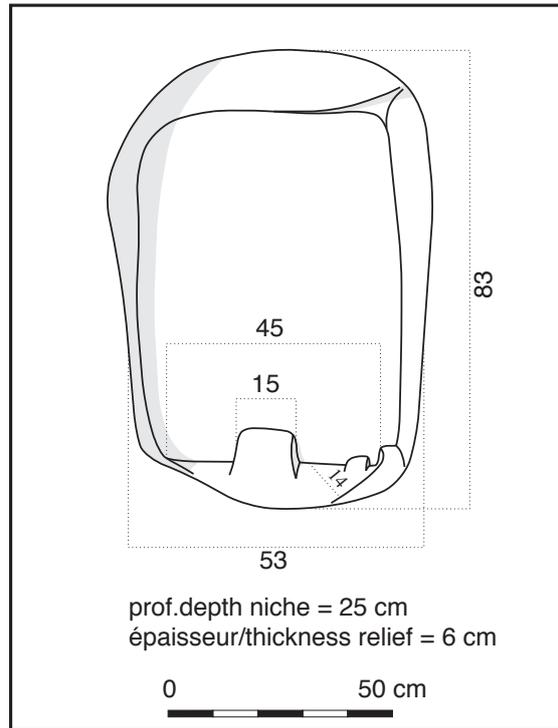
**Fig. 28.** The rock-cut chamber IGN 132a before excavation



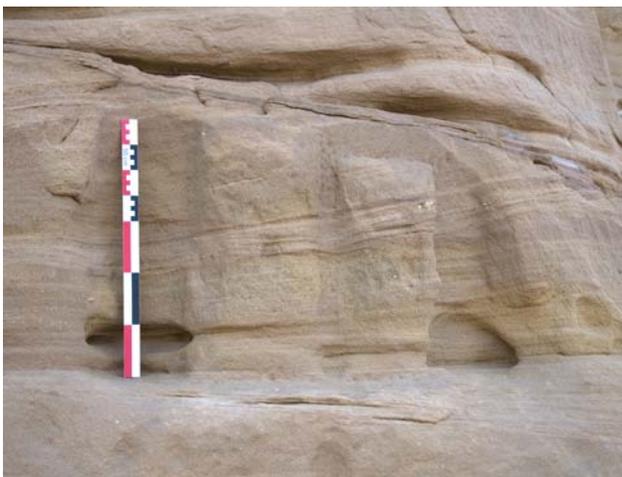
**Fig. 29.** Blocks from the collapse of the roof of IGN 132a



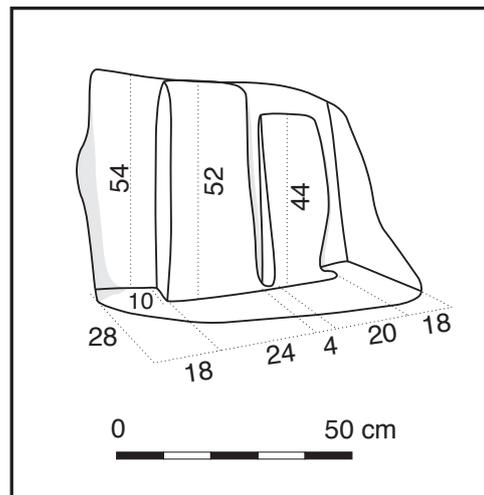
**Fig. 30.** Niche with betyl IGN 132b



**Fig. 31.** Elevation of the niche with betyl IGN 132b



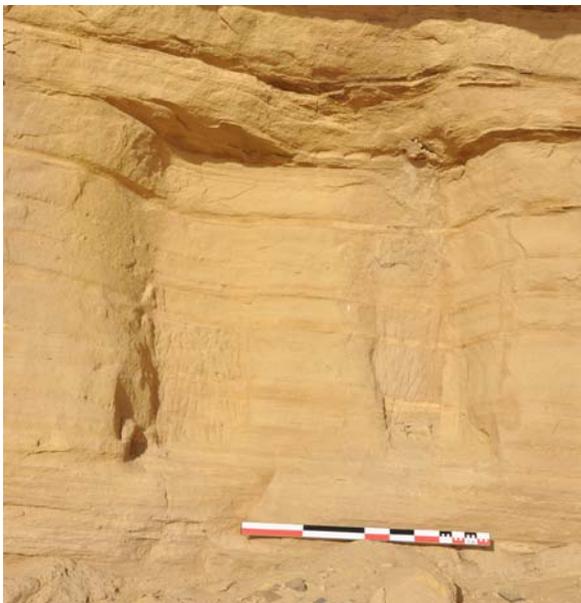
**Fig. 32.** Niche with betyl IGN 132c



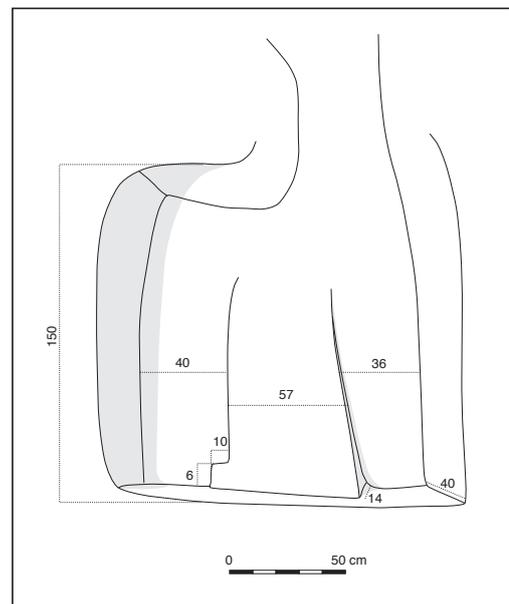
**Fig. 33.** Elevation of the niche with betyl IGN 132c



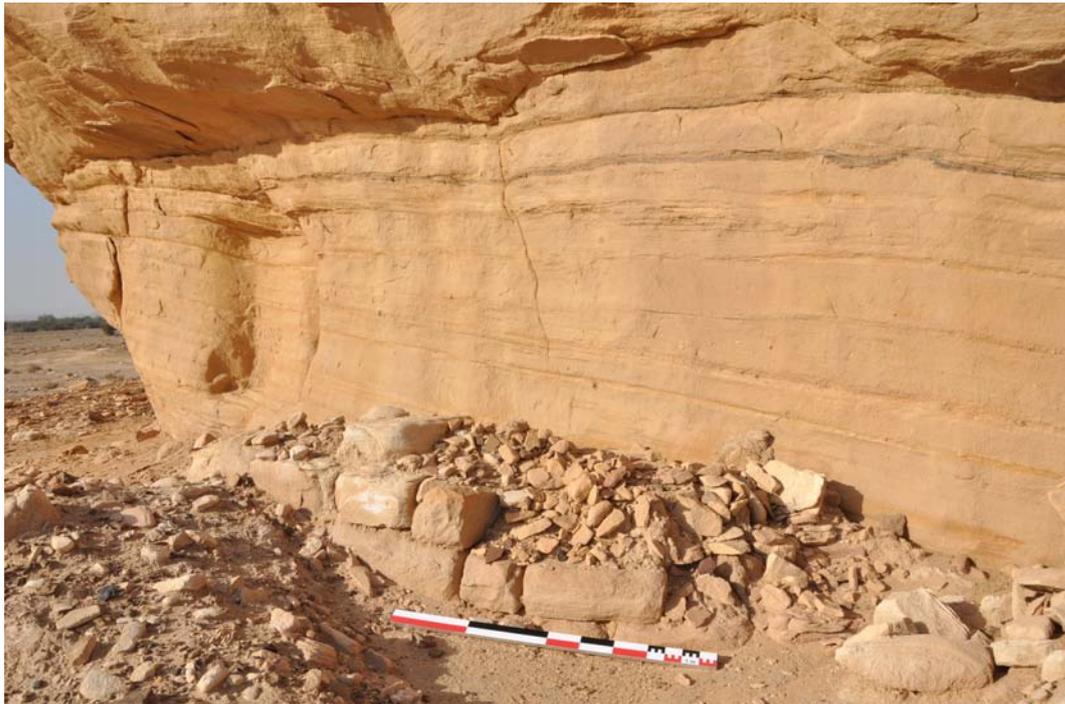
**Fig. 34.** Southern slope of IGN 132



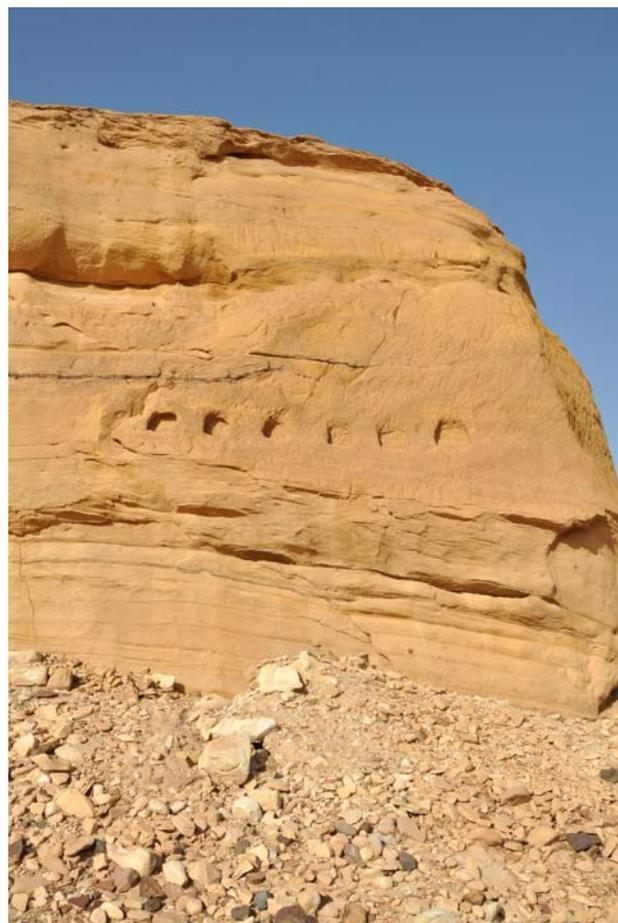
**Fig. 35.** Niche with betyl IGN 132d



**Fig. 36.** Elevation of the niche with betyl 132d



**Fig. 37.** Semi-circular wall at the foot of the southern slope of IGN 132



**Fig. 38.** Putlog holes half way up the rock face on the southern slope of IGN 132



**Fig. 39.** Eastern slope of IGN 132



**Fig. 40.** Groove just below the top ridge of IGN 132



**Fig. 41.** The two basins visible before excavation at the foot of the eastern slope of the massif



**Fig. 42.** Northern slope of IGN 132

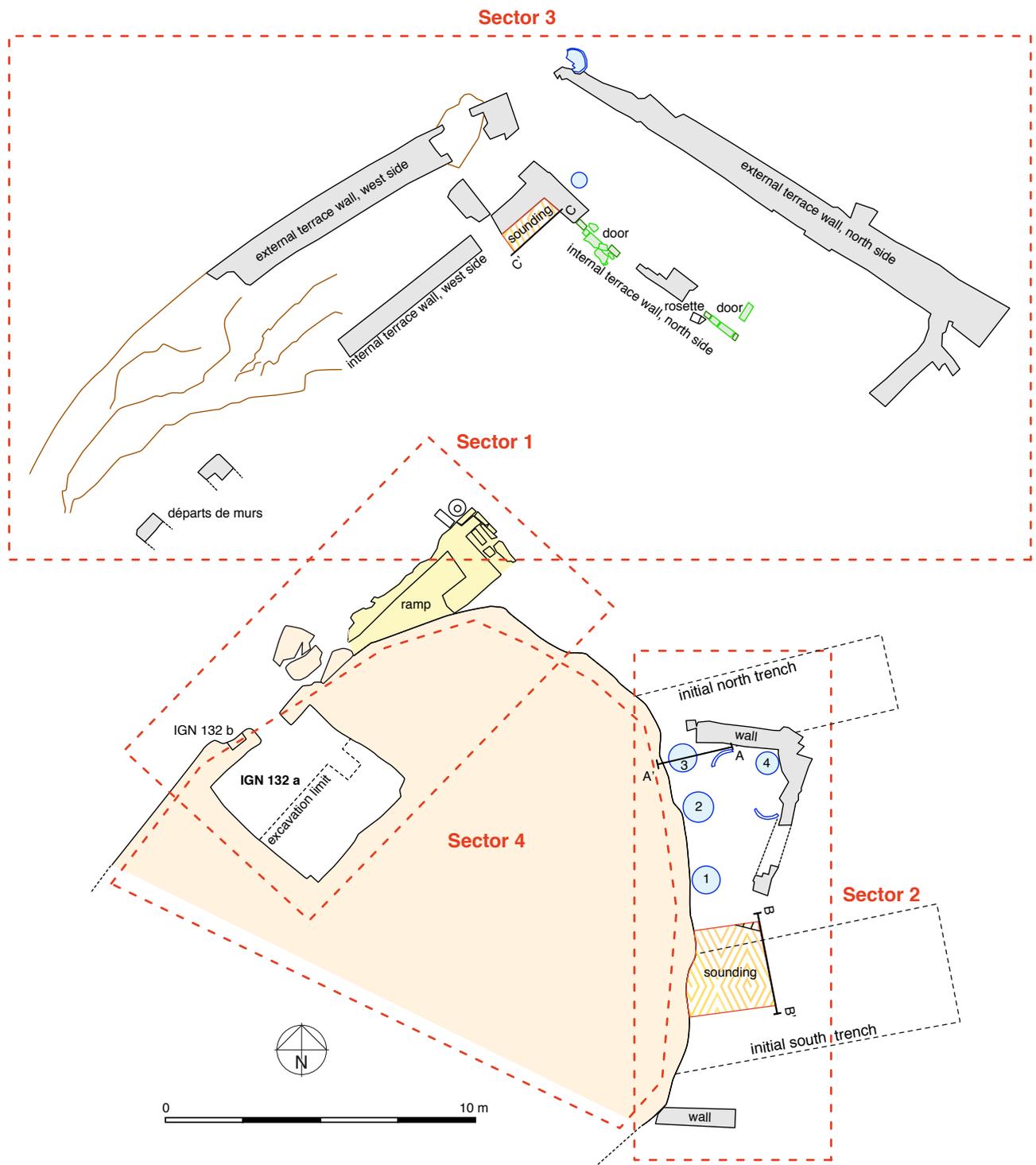


Fig. 43. Schematic plan of the excavated structures and the division of the sectors



**Fig. 44.** The chamber IGN 132a after clearing half the room



**Fig. 45.** Visible traces of stone cutting in the front left corner of the chamber



**Fig. 46.** Section across a limited part of the fill in chamber IGN 132



**Fig. 47.** Traces of steps cut in the bedrock above and to the left of IGN 132a



**Fig. 48.** The southern end of the glacis to the left of IGN 132a, before excavation



**Fig. 49.** East-west section of the glacis, after cleaning



**Fig. 50.** Remains of the glacis following the shape of the bedrock in front of IGN 132a



**Fig. 51.** Block with hole (for a pole?) at the base of the glacis



**Fig. 52.** Collapsed building materials (?) in front of IGN 132a



**Fig. 53.** The sector with the basins at the foot of the eastern slope of IGN 132 after cleaning the surface



**Fig. 54.** Destruction layer 60604 before excavation. It goes over basin no. 1



**Fig. 55.** Wall at the south end of sector 2



**Fig. 56.** The basins found at the foot of IGN 132



Fig. 57. East-west section by basin no. 3

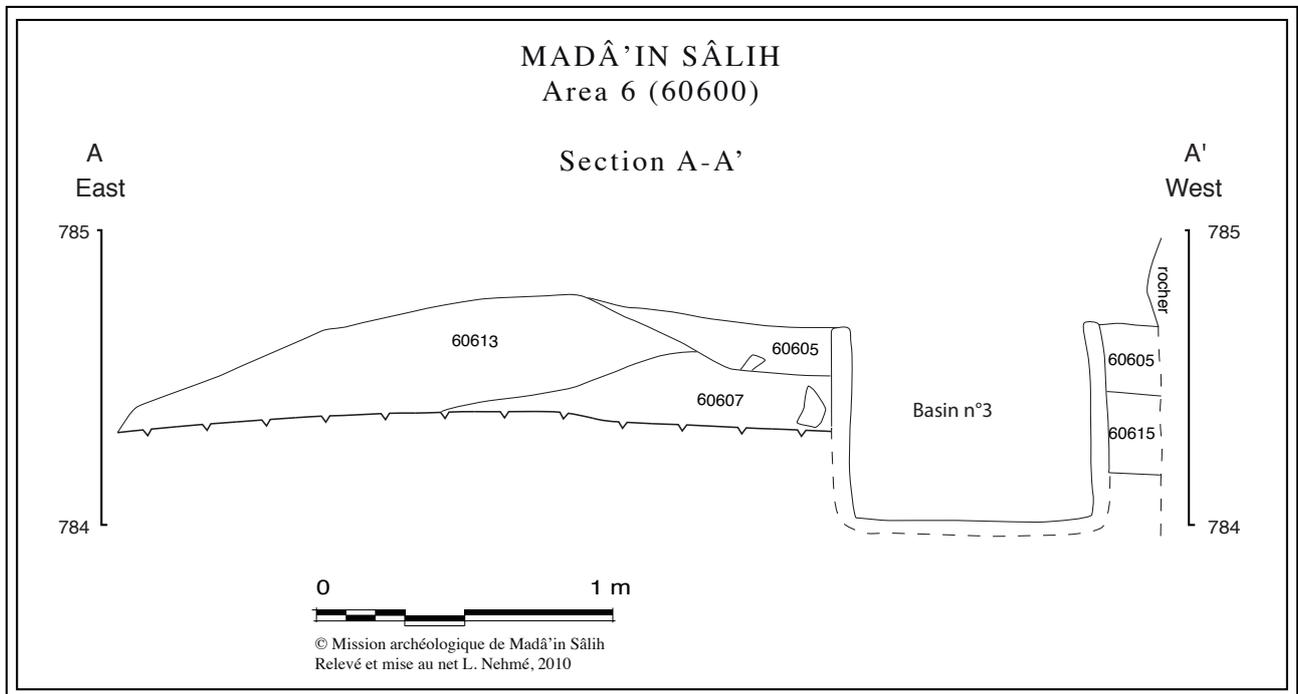
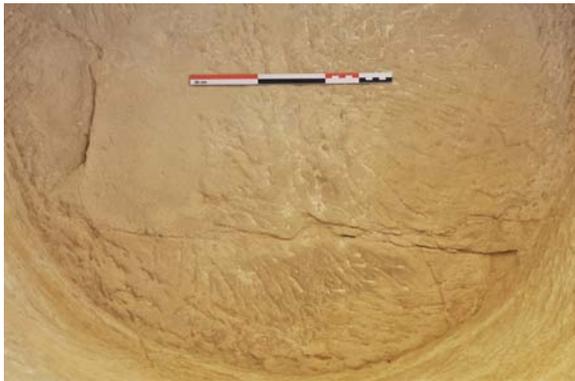


Fig. 58. Drawing of the east-west section by basin no. 3



**Fig. 59.** Basin no. 1



**Fig. 60.** Inside wall of basin no. 1



**Fig. 61.** Bottom of basin no. 1



**Fig. 62.** Fragment of flat-bottomed basin from the fill of basin no. 1



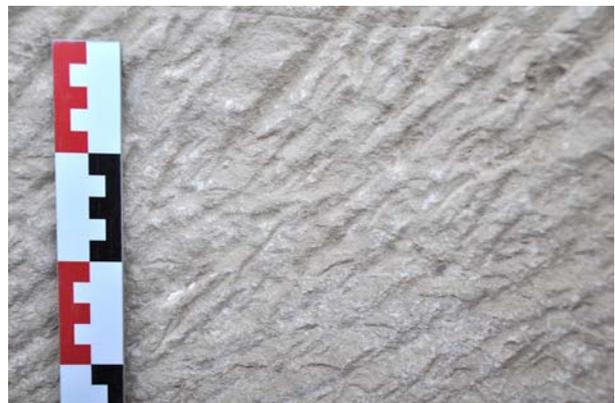
**Fig. 63.** Basin no. 2



**Fig. 64.** Inside wall of basin no. 2



**Fig. 65.** Basin no. 3



**Fig. 66.** Inside wall of basin no. 3



**Fig. 67.** After removal of 60604 / 60606, *loci* 60617 and 60627

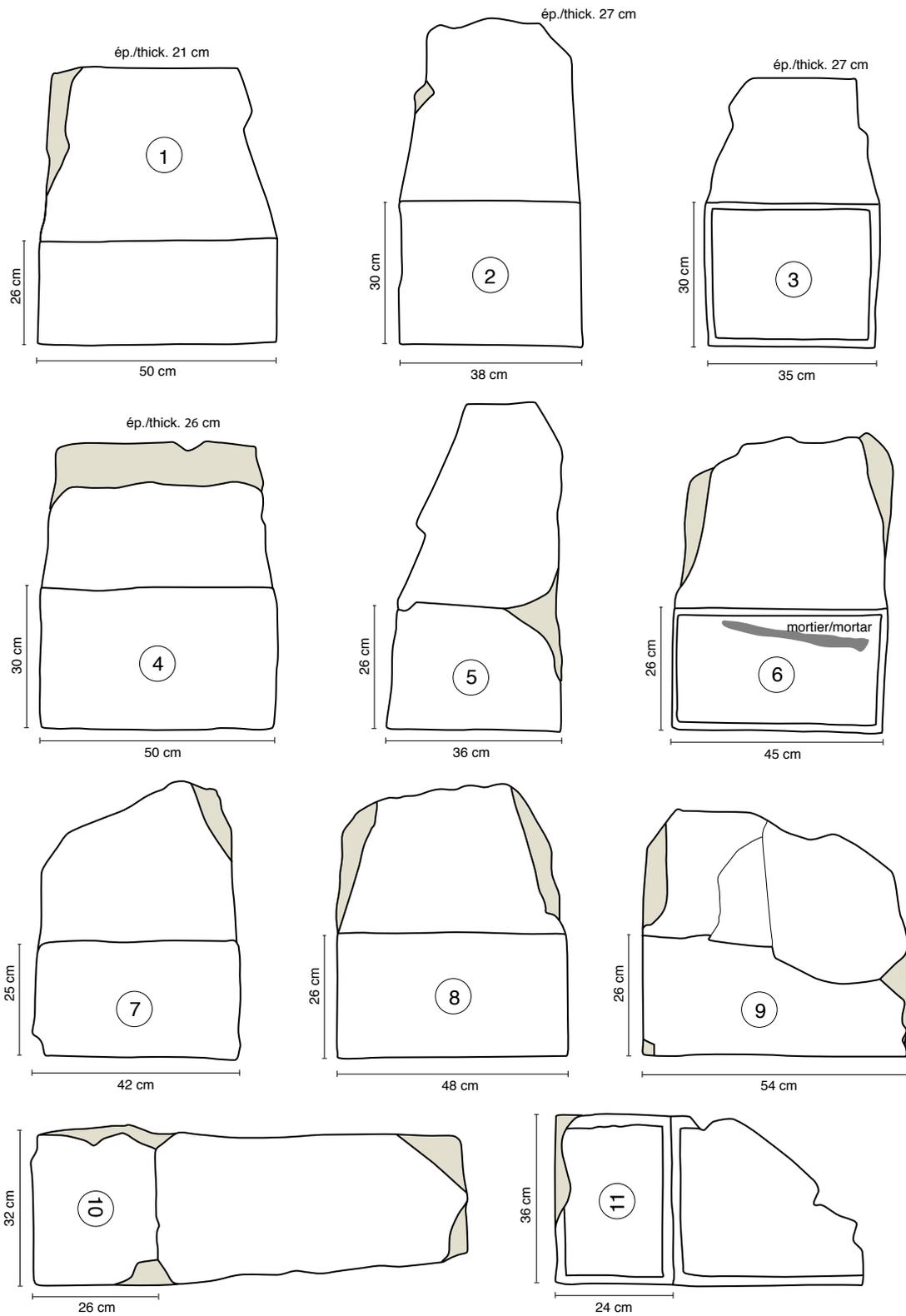


Fig. 68. Drawing of a selection of blocks from 60627



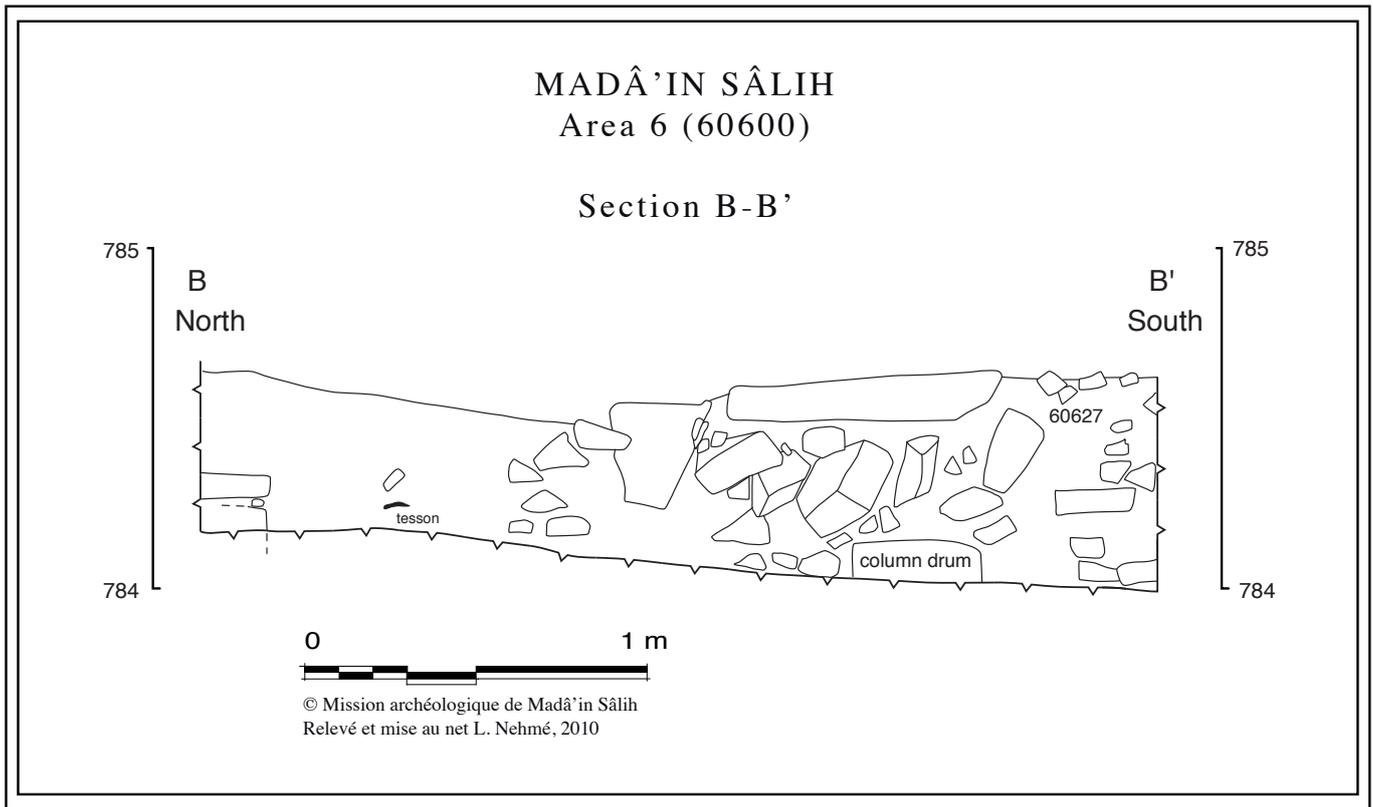
**Fig. 69.** Block which collapsed against the rock face



**Fig. 70.** Block no. 11



**Fig. 71.** Block no. 3



**Fig. 72.** North-south section in the small sounding at the foot of IGN 132 east



**Fig. 73.** Basin in its fallen position at the foot of the outside corner of the external terrace wall



**Fig. 74.** Basin between the internal and external terrace walls



**Fig. 75.** External terrace wall, western part, from the south



**Fig. 76.** External terrace wall, northern part, from the north



**Fig. 77.** External terrace wall, from the north. On the right, the blocks rest directly on the bedrock



**Fig. 78.** Internal terrace wall, western part, from the south



**Fig. 79.** East door in the internal terrace wall



**Fig. 80.** West door in the internal terrace wall



**Fig. 81.** Block with rosette from the internal terrace wall



**Fig. 82.** Back of the block with rosette, groove



**Fig. 83.** Section of the groove cut in the back of the rosette



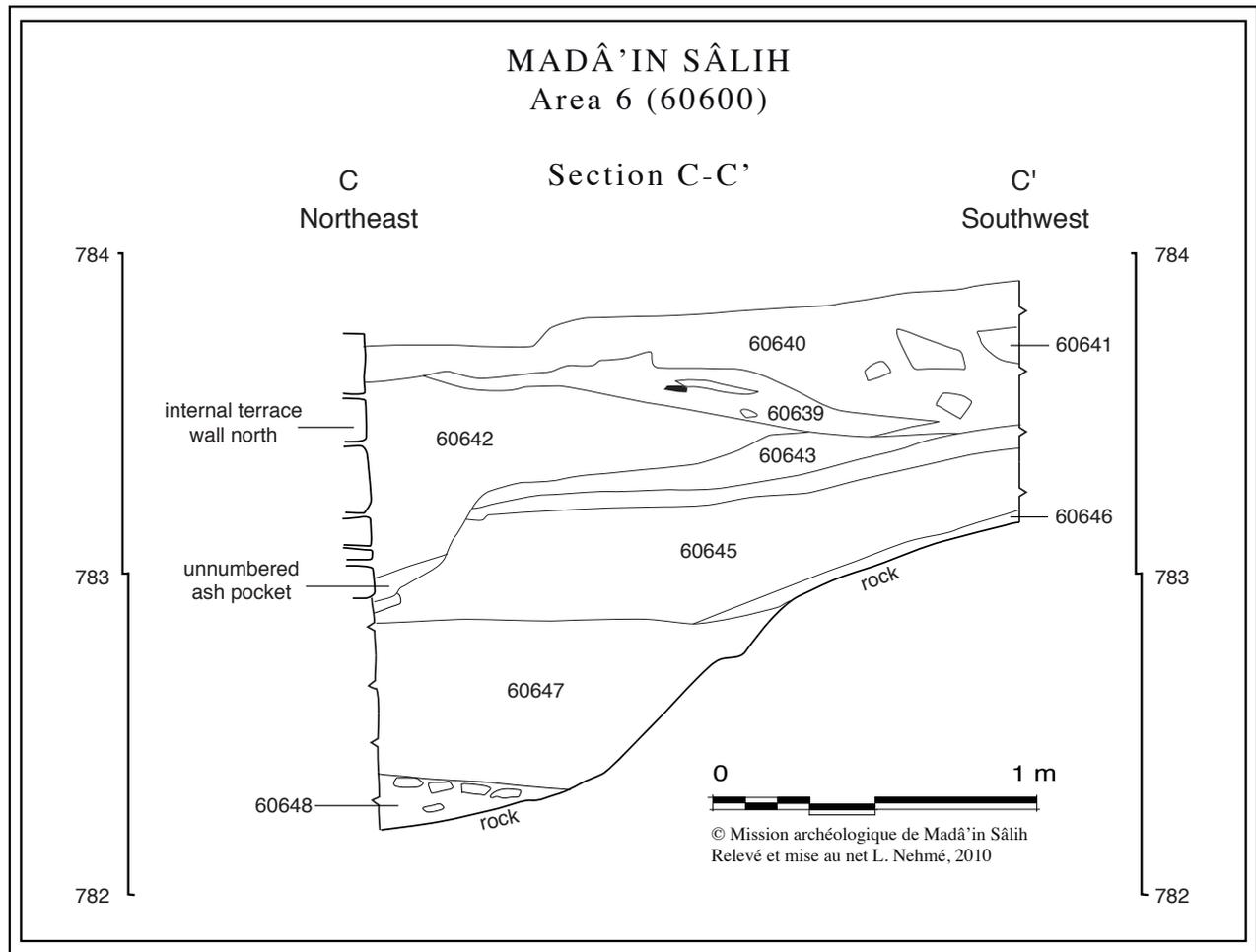
**Fig. 84.** Side of the block with rosette



**Fig. 85.** Rosette from the Doric frieze of the tomb door IGN 22



**Fig. 86.** Sounding in the inside corner of the internal terrace wall



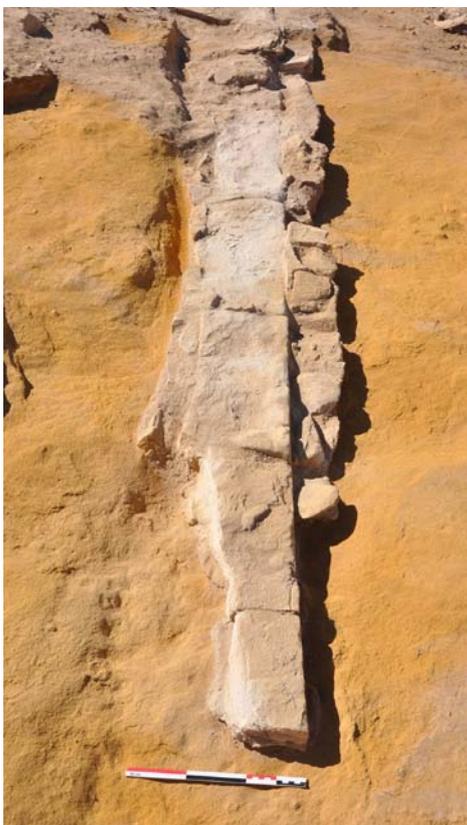
**Fig. 87.** North-south section in the sounding



**Fig. 88.** Fragments of cob from 60641



**Fig. 89.** Beginning of walls in front of IGN 132a



**Fig. 90.** Low wall encased in a groove at the top of IGN 132



**Fig. 91.** Detail of the encasing of the blocks in the channel



**Fig. 92.** Pile of construction debris at the top of IGN 132



**Fig. 93.** Lamp fragment from the surface cleaning at the top of IGN 132



## **Area 8**

Solène Marion de Procé (University of Paris 1)



## Area 8

Solène Marion de Procé (University of Paris 1)

After the 2009 season, we decided to go on excavating Area 8 in order to answer the questions raised about the occupation there (see report 2009). The strategy adopted was different in 2010 because of the different type of information we wanted to collect. Having drawn a preliminary top plan of the area in 2009, we decided to carry out deeper soundings in order to reach the bedrock and obtain a continuous stratigraphic sequence that would inform us about the chronology of the settlement. As we had suggested at the end of the 2009 season and with the approval of Laila Nehmé, Francois Villeneuve and Daifallah al-Talhi, we decided to focus on the area to the west of the long north-south wall 80002 and north of the east-west wall 80005 (fig. 1). We collected a lot of information but we also had to face the lack of clear occupation floors, which prevented us from establishing a solid chronology of the building. However, this season turned out to be very interesting as far as the different architectural phases are concerned. In this report, we shall first present a journal of the 2010 excavation, then draw some general remarks about the area, expose the unanswered or newly raised questions and finally make suggestions for next season.

### Journal of excavation

Excavation started on the 16<sup>th</sup> of January 2010 with four workmen. The sandstone had, once again, suffered from the humidity and the rain and most of the stones were covered with a white salt deposit. On our arrival, recent rainfalls clearly indicated the directions in which the *wadis* flow. The water that comes from the northeast flows close to wall 80002, then comes across the southeastern corner of the building (thus explaining its poor state of preservation) and then off to the southwest. The water that comes from the west flows to the southwest, which explains the muddy area in the southeastern corner of the building, where the water stagnates. In the western part of the area, the water flow comes from the north, hence the poor state of wall 80011, of the western part of wall 80002 and of feature 80006.

After a general cleaning of the area, we defined three new excavation sectors and decided to resume excavation in previous soundings:

- Sounding E, located at the corner of walls 80001 and 80002, in order to reach the bedrock and see how deep the walls are built;
- We opened a sounding (sounding C', west of wall 80002 and of last year's sounding C) that was progressively enlarged as excavation went on (7.4 m north-south and 2 m east-west). We hoped to find there the most ancient levels of occupation and get a complete stratigraphic sequence because this is the highest point of Area 8.

- Sounding C is located at the southwest end of the area. We decided to resume work in this sounding, which was opened in 2009, in order to uncover two large sandstone blocks.

Three days after excavation had begun, very heavy rains prevented us from excavating in the three soundings mentioned above which had become pools where water and mud accumulated. We therefore decided, while the soundings were drying, to open sounding F (3 x 3 m) further to the west of wall 80002. Its location corresponds to the highest spot of the square (779.02 m) and it was chosen because stones were showing on the surface.

### *Sounding F*

The sounding follows the general north-south slope of the area. In its centre, we unearthed a structure made of sandstone blocks (fig. 2). In the southern half of the sounding, the soil was mostly composed of earth, with clayish spots. The central structure (80114) is rectangular (fig. 3) (0.70 m north-south and 1.10 m east-west) and contains two carved stones which have a circular cavity in the centre of the blocks, one in the centre and the other along the northeast side of the first. About 20 cm below the surface, mudbrick walls appeared: wall 80119, which runs east-west (top height preserved level 778.80 m) and abuts wall 80118, which runs north-south (top height 778.78 m, fig. 4). Southeast of the square, a pit (bottom 778.65 m) was filled with sand and cuts wall 80119.

Structure 80114 is difficult to interpret. It belongs to the last occupation of the area and was probably used to collect some sort of liquid, the nature of which is impossible to determine. The largest stone is a reused capital or base (?) (fig. 5 and 6). Between the stones of 80114, we found a lot of small animal bones that have not been studied yet. Structure 80114 was laid after wall 80119. Wall 80119 is very damaged and mostly made of mudbricks. Indeed, the few stones that remain seem to have been used as a later reinforcement.

Wall 80118 is made of bricks laid on top of a course of stones. It belongs to the same building phase as 80119. However, 80118 and 80119 were built on top of pre-existing walls (80156 and 80157 respectively; which, according to us, represent the first phase of construction), very much like elsewhere in Area 8 (fig. 7). In sounding F, it was particularly striking because the walls were really built on top of each other. 80119 was 20 cm above wall 80157. The latter was apparently larger and exclusively made of mudbricks (three to four courses). 80157 was laid on the bedrock and it abuts wall 80156 (777.92 m to the east, 777.82 to the west). Wedging stones were placed in the virgin sand around the lower courses (fig. 8). The first courses of 80157 are also made of mudbricks. Wall 80156 makes a 90° angle curve to the south (fig. 9 and 10). In this first phase of construction, represented by walls 80157 and 80156 in sounding F, it is surprising that the gap between them is only 75 cm wide. Finally, the width of each of these two walls is not known since they are still in the baulks.

### *Sounding C'*

During the first days of excavation, we cleaned the surface of the newly defined area. The upper layer was a crust of hardened earth and we soon encountered levels belonging to the last phase of occupation of Area 8 (778.86 m) which is almost certainly, also, the phase to which belonged feature 80007 encountered in 2009. In the center of the sounding was feature 80106, a concentration of ashes and burnt artefacts (sherds and fauna). In the southern part of the rectangle, there was a large spot of very soft soil (80105) delimited by melted mudbricks (fig. 11).

Wall 80008, which was discovered in the 2009 season, is an east-west wall that abuts 80002. In the 2010 season, we found that it continued to the west, abutting north-south wall 80122.

Wall 80039, which runs parallel to 80008 to its south, also continues to the west but it does not abut 80122, it stops a few centimeters away from it. Once we removed the soft earth of the southern part (80105, see above), a very hard grayish feature, 80124, appeared more clearly (fig. 12, in the center), which looks like hardened ash mixed with straw and organic material. It may be cob that would have fallen from wall 80122. After it has fallen, it seems that the features of the later phases (*tannûr* 80125, see below, 80106) were organised around it. Its hard consistence was perhaps seen as useful, and kept there for practical reasons in a domestic context involving cooking activities. A pit seems to have been dug south of the layer of cob, and it was filled with very light earth and sand. North of the layer of cob, abutting wall 80008, there is a structure which we interpreted as an oven, 80125 (fig. 12) made of poorly preserved reddish pottery. The mass of ashes that was on top of it probably corresponds to the disuse of the area. The oven consisted of a large bottomless pottery element (internal diameter 58 cm; external diameter 70 cm). The upper edges were too damaged to identify the form of the pottery at the top, and were found crushed in the center, mixed with other sherds and fauna, over a couple of layers of ashes. In the corner of 80008 and 80122, a small rectangular structure made of mudbricks contained ashes, fauna (a horn and several bones) and broken sherds. It is 40 x 22 cm and 14 cm deep, the mudbricks on the sides being only 6 cm high.

Once we removed the layer of cob (80124) and the oven (80125), a slab of the pavement 80029 appeared (the latter was discovered in 2009 between walls 80008 and 80039; level under “oven” 80125 : 778.63 m). This pavement was probably larger than we thought initially and it may even have abutted wall 80122 (fig. 13). Slabs may have subsequently been removed for the installation of oven 80125. It seems, therefore, that there was no wall connecting walls 80008 and 80039 east of 80122 as we thought in 2009. Only three blocks laid on top of the western remaining slab of 80029 have been added in order to lay out a new space and support “oven” 80125 (see top plan, fig. 1).

In order to determine how deep wall 80122 was founded, we made a sounding in the corner of walls 80122 and 80008. Only two to three courses of 80122 remain. They are made of nicely carved blocks and the layout is better done than elsewhere in the area (fig. 14). 80122 is founded deeper than 80008 (bottom of 80008: 778.44 m; bottom of 80122: 778.36 m). The bedrock is only 25 cm below wall 80122 (778.11 m). It is at 778.24 m between wall 80002 and pavement 80029 and at 778.23 m to the

east of wall 80002. There, just a few centimetres east of 80002, a hole has been carved in the bedrock and this may indicate that post holes were at some stage inserted directly into the bedrock.

While undertaking these soundings, we decided to extend sounding C' to the west and to the north. There, we discovered, in the upper layers, another feature that seemed to be linked with domestic activities (fig. 15 and 16): 80187. It is made of hardened clayish earth. It is semi-circular and was filled with ashes (sample collected: 80166). At the same level, along the same axis as 80122, we discovered a group of small blocks. As we dug deeper, they turned out to be the blocking of a door (80176), which shows that this door was not in use during the last phase (fig. 17). West of 80122, we found a course of mudbricks over a course of stones, 80180, in the same axis as walls 80008 and 80119 (of sounding F). This raised the question as to whether 80119 and 80180 were the same wall. However, the area seems to have been partly destroyed (fig. 18), thus preventing us from answering this question. The blocked threshold (80176) consists of a long slab laid on top of three rectangular blocks (fig. 19). The two doorjambs were found fallen in the doorway and stones were added to complete the blocking of the door in a very crude way. Wall 80180 abuts the threshold and was probably built in a later phase because it is not chained with 80122 and it is slightly in the doorway. In 2009, we had excavated the eastern part of that area, where we had found a lamp next to a bottomless sandstone basin (80016). The layer was numbered 80017 and abutted walls 80018 (east) and 80008 (south). We now know that the latter is bordered by wall 80122 to the west (see fig. 1).

### *Sounding E*

Once the water from the rainstorm had dried, we were able to resume work in sounding E. As expected, no clear floors were identified. The second course of walls 80001 and 80002 was the last (bottom alt. 778.38 m). About 20 cm lower than their foundation level appeared three mudbrick walls (80145 = southeast – northwest; 80146 and 80147 = northeast – southwest, top alt.: 778.16 m, fig. 20). The orientation of these walls is different from the orientation of 80001 and 80002. Most of their mudbricks measure 23 x 34 cm. One course only (*ca.* 8-13 cm thick) was preserved, laid directly on the bedrock (alt. *ca.* 778 m), with a couple of stones to wedge it because the surface of the bedrock is uneven. We may already note that these walls obviously belong to the first phase of occupation of this area but not to the first occupation of the site since the stones used to wedge the walls are reused blocks.

### *Sounding C*

In this sounding, we found two sandstone blocks. They are badly eroded and not much can be said about them except that they are architectural blocks. As we cleaned up the area around this little sounding, we found the capital or base (?) of a pilaster made of the red sandstone characteristic of the area of al-'Ulâ (fig. 21).

## Sounding G

For the stratigraphic point of view, this sounding was almost as disappointing as others in the area. We discovered a large threshold made of reused blocks (80160, fig. 22) which was just a few centimeters below the levels reached in 2009. We suppose that the door it was supporting may have been made of stone because the threshold shows curved traces departing from the door socket (fig. 23). This also confirms that the alignment of column drums (80005) served as a wall. In addition to that, we got a clearer view of a mudbrick wall north of this alignment. Thus, the builders built a wall made of column drums and other stones (probably because there were not enough column drums to cover the whole length of the wall). This wall was reinforced, at least in some places, by a mudbrick wall.

We decided to excavate the area between the threshold and wall 80001 and named it sounding G. The upper *locus* (80161, approx. 778.49 m in center) was dotted with little black and white spots (charcoal, and plaster, disuse?). It was over 80005 and may therefore have been deposited some time after the abandonment of the building. There were also a lot of scattered broken sherds and some fauna in 80161. *Locus* 80162 was below 80161. It yielded a similar pottery to that of 80161 but in greater quantity. In places, sherds were held together by a hard mudbrick soil, surrounded by very soft earth. Three coins were found in this *locus*, close to wall 80001 (80162\_C1 has been identified as a Nabataean coin from the reign of Aretas IV). We continued excavating and extended the sounding to the north of wall 80001. We observed a general slope in the archaeological layers, which were between 8 and 20 cm lower in the southern parts of the sounding than in its northern parts. South of wall 80001, a thick layer of hardened clay and earth, *locus* 80189 (fig. 24 and 25) with a lot of broken sherds and a few blocks held together by that hardened clayish earth, was put to light. As we dug deeper, we encountered a mudbrick wall (80192) running north-south and going under the levels of wall 80001 and threshold 80160. We observed that the wall was interrupted just south of 80001 (was it destroyed in order to build 80001? See fig. 26 and 27). Wall 80192 was laid just over the bedrock that was encountered at 777.75 m in the southern part of the sounding and at 777.6 m near the northern baulk. A level of melted clay may indicate the level of the floor in use with wall 80192 (at 778.04 m), which would mean that the wall had a foundation made of a couple of courses were wedged with small reused blocks (fig. 28 and 29), similar to what we found in sounding E. Around these foundation courses, there is just virgin sand (almost no sherds or artefacts were found for about 40 cm). Interestingly enough, there seems to be a foundation trench, visible in the northern section, that was dug into the sand.

## General facts about Area 8

The 2010 season allowed us to collect new information about this area of ancient Hegra. From these preliminary results, we can try to detect patterns of the settlement there. Unfortunately, chronology-related problems are still unsolved, for the pottery found does not allow a precise dating. The general datings proposed from the sherds of Area 8 is 1<sup>st</sup> century BC-1<sup>st</sup> century AD. Given the fact that the bedrock is not very deep, it is very likely that each construction phase saw the cleaning of the floors belonging to the previous one, thus mixing the layers.

The level of the bedrock in various points is the following:

In sounding F: 777.92 m – 777.82 m;

West of 80002, in the corner of walls 80008 and 80122: 778.11 m – 778.03 m;

East of wall 80002, next to the post hole: 778.23 m;

In sounding E: 778 m;

North of sounding G: 777.70 m;

South of Ssounding G, north of 80160: 777.72 m.

There may have been an occupation preceding the mudbrick walls phase, represented by the post-hole located east of wall 80002. The mudbrick walls would thus belong to the second phase of construction, using the bedrock as a sole, as we have seen in soundings E, F and G. This second phase of construction consists of mudbrick walls often made with the same model of bricks (23 x 34 x 13 cm). They are, in most cases, built directly over the bedrock or a few centimetres above it, directly on sand. Some of them have been almost completely levelled, one course only being preserved on which new walls were built (like in sounding E). In other cases, three or four courses of the first phase have been preserved and the new walls were built on top of them, sometimes preserving the same orientation (sounding F, wall 80118 over 80156). In sounding G, we observed that walls 80001 and 80005 as well as threshold 80160 did not follow the orientation of first-phase wall 80192. It would not be surprising that these first phase walls have been renovated during their period of use but their state of preservation does not allow us to see whether that was the case.

In a third phase, it seems that a large building was constructed over the mudbrick walls. Its walls consist of a couple of courses of stone on top of which the mudbrick elevation is laid. It seems that this second phase can be divided into sub-phases. For example, walls 80008 and 80039 are later than walls 80122 and 80002. In the last phase of occupation, the former walls are reused, blocks are added here and there to create new spaces, as is the case west of 80002 to install the *tannûr*, and former doorway 80176 is blocked with stones. The architecture is crude and the elevation of the structure, which was most likely made of mudbricks, has completely disappeared.

To sum up, the occupation of Area 8 can be divided as follows:

- First phase (I): non-sustainable architecture, made of wood supported by post-holes, and the bedrock used as the level of circulation?
- Second phase (II): mudbrick walls are built almost directly over the bedrock. These are walls 80145, 80146, 80147 in sounding E; wall 80192 in sounding G; walls 80156 and 80157 in sounding E.
- Third phase (III): walls have mudbricks elevations over a few courses of stone. A first subphase (IIIa) is represented by wall 80122 and threshold 80176. This wall is founded deeper and presents a nice layout of the stones. In a second subphase (IIIb), a room was added east of 80122, delimited by wall 80008 and 80018. Pavement 80029 may have been built at the same time, followed by wall 80039 south of 80029.

In the same axis as 80008, to the west of 80122, wall 80180 possibly equals 80119 (in sounding F). The latter abuts 80118 (north-south wall in sounding F), probably built in that second subphase (IIIb). In a third subphase (IIIc), we assume that the two long walls 80001 and 80002 were built, as well as wall 80005 with threshold 80160 in the southern part of Area 8. We have difficulties explaining the few blocks in the northern part of wall 80002. A few stones may have been added to join wall 80008 to 80002, and then some were laid to overlap wall 80018 to reinforce the structure. Hopefully, future excavations will help clarify this chronological problem.

- The last phase (IV) was observed in soundings C and C'. In this phase, some walls were still used, probably reinforced here and there by mudbricks and small blocks (walls 80008, 80180, 80118 and 80119). Architecture is crude, and very little is preserved due to its closeness to the surface, exposing it to rainwater. Walls 80008 and 80039 seem to have been joined by some blocks (we thought wrongly in 2009 that 80023 a threshold). A lot of domestic activities seem to have taken place in these soundings during the last phase: junk pit or remains of a hearth 80007 (excavated in 2009, it was over pavement 80029); *tannûr* oven 80125; oven (?) 80187 laid over 80122; structure 80114 (in sounding F) built in the corner of walls 80118 and 80119.

We expect this chronology to be somewhat different after the results of next season, given the complexity and numerous interrelations of walls and structures.

During the 2010 season, Christophe Benech carried out a new geomagnetic survey in the area (fig. 30). It gives a clearer image of the unearthed structure. Walls 80001 and 80002 seem to be part of a very large structure, stretching out to the north, reaching almost Area 2 (see the report of Chr. Benech in this volume). During the last days of the excavation season, we “cleaned” all the segments of walls that were showing on the surface in order to prepare next season.

Given what we discovered in 2010, it seems that we should return to a strategy of extensive excavations in order to get a more complete plan of this large building and try to collect information, which would help determine its function. A few soundings will show how deep the bedrock is north of Area 8 and we may even have a chance to get more stratigraphy since the bedrock was found at a lower level in Area 2.

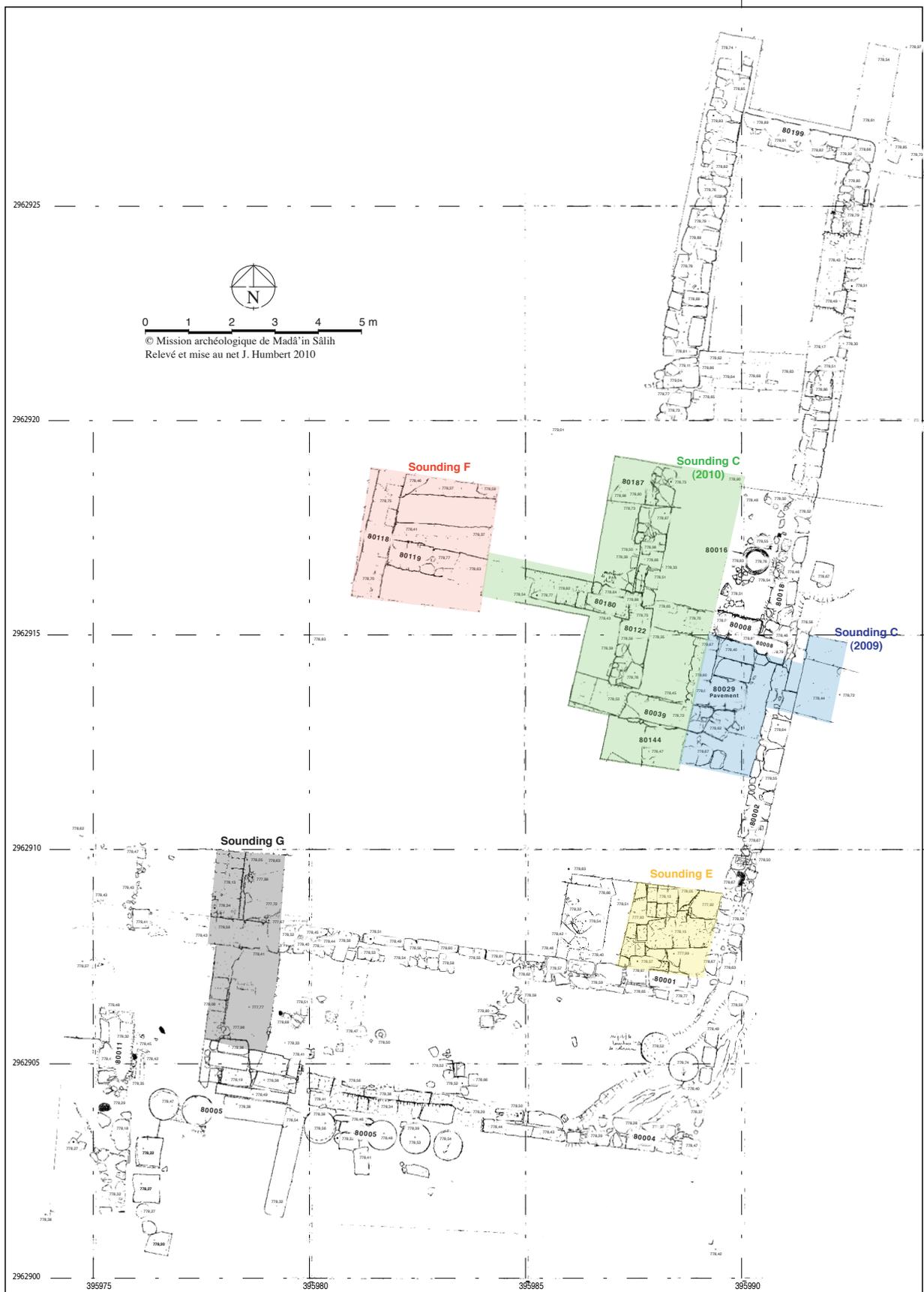


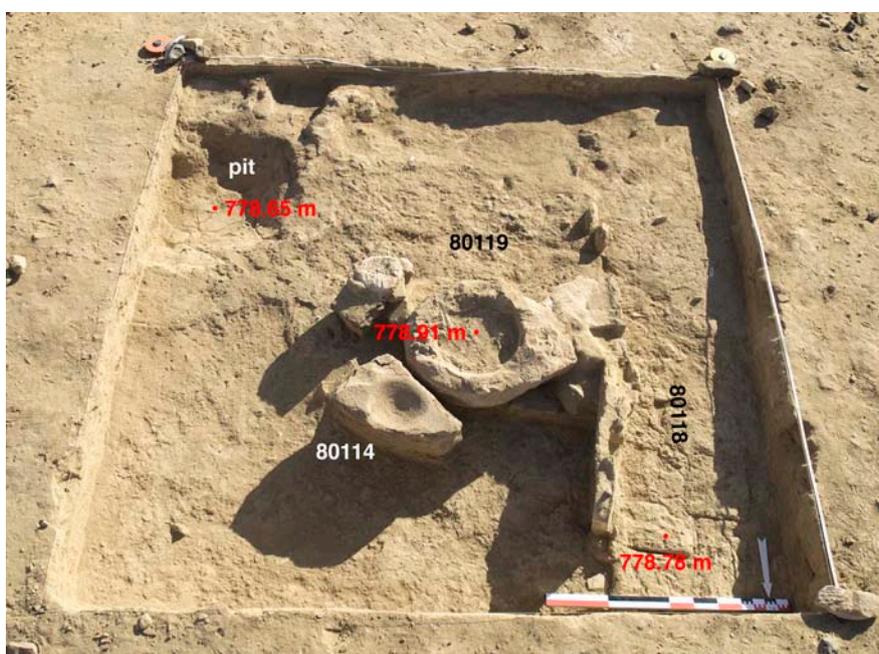
Fig. 1. Top plan by J. Humbert (preliminary drawing)



**Fig. 2.** Sounding F after the surface scraping



**Fig. 3.** Sounding F, structure 80114



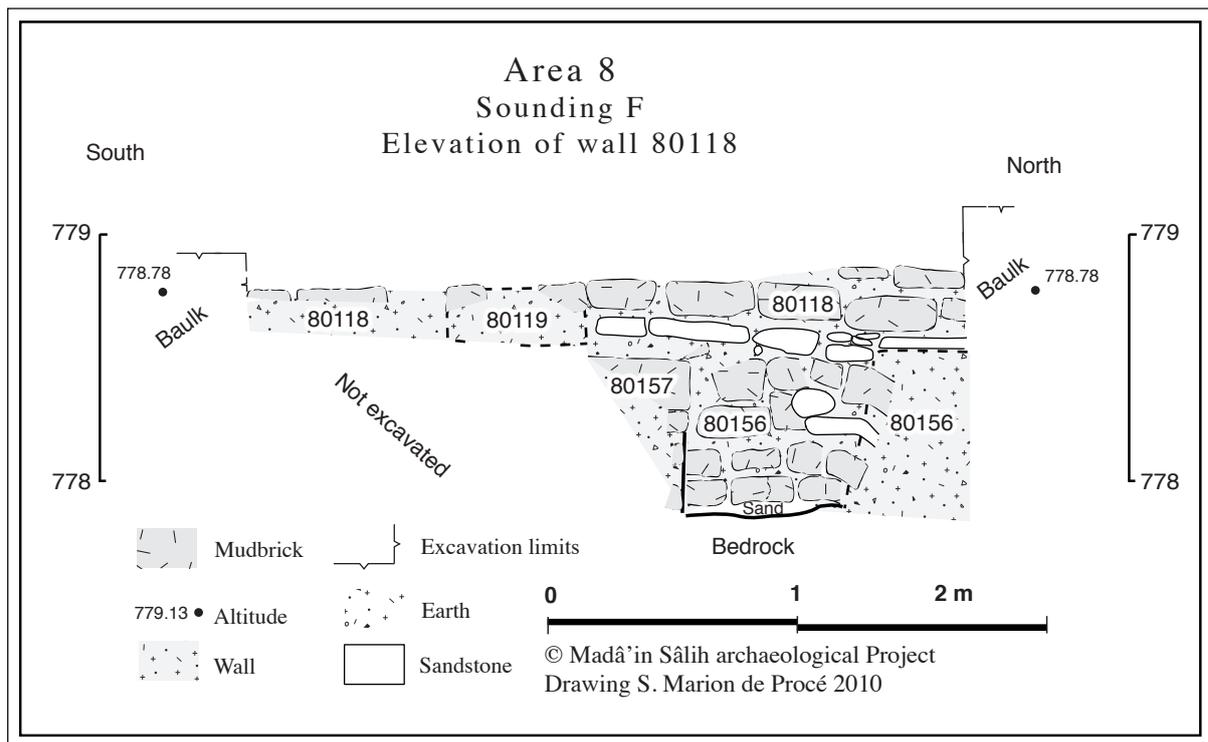
**Fig. 4.** Sounding F, 80114 in the center, in the corner of walls 80118 and 80119, and pit in the top left corner



**Fig. 5.** Central stone of 80114, carved to collect some liquid?



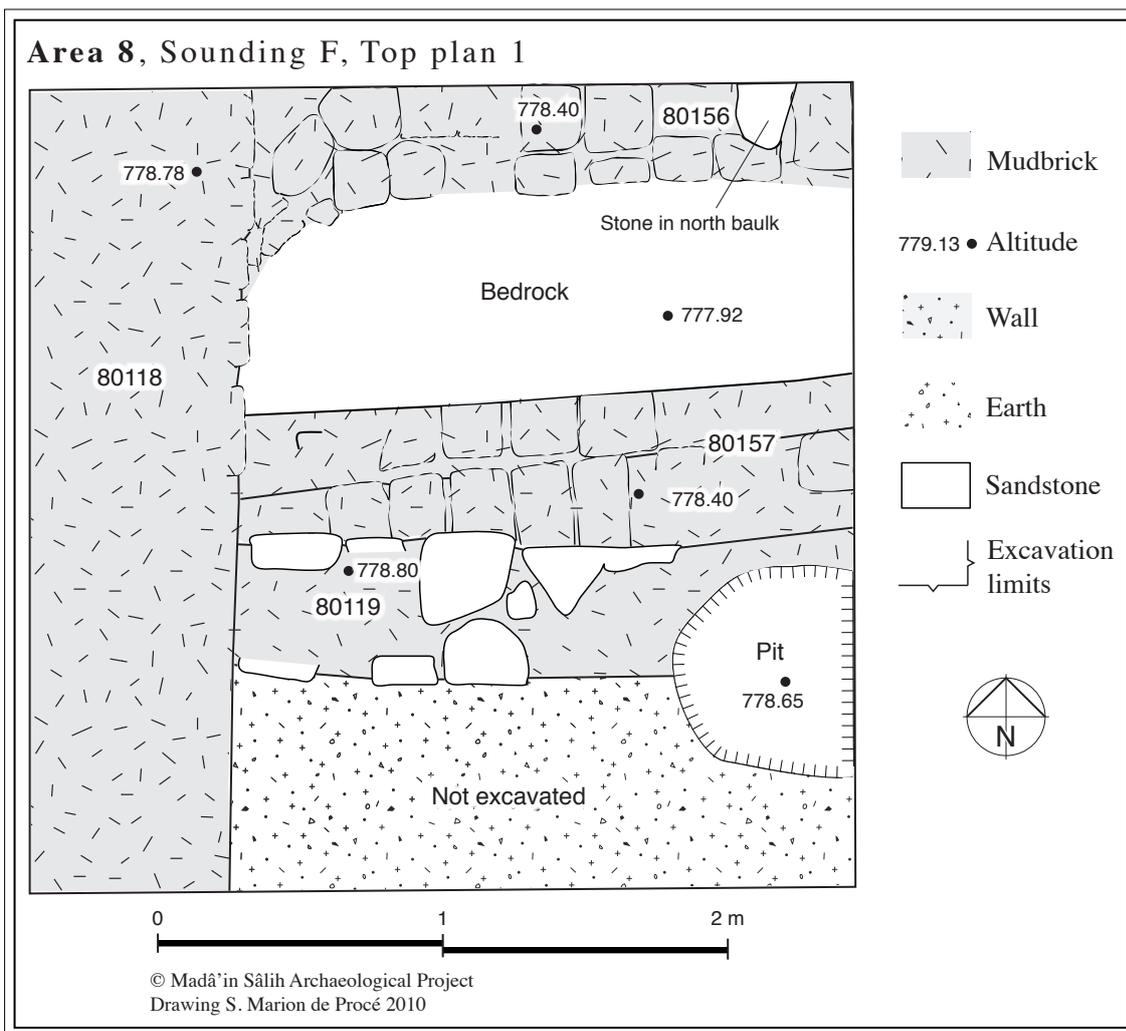
**Fig. 6.** Other side of central stone of 80114, a capital or base with only one angle (formerly used as an angle or recut?)



**Fig. 7.** Elevation of wall 80118, and section of eastern side of Sounding F



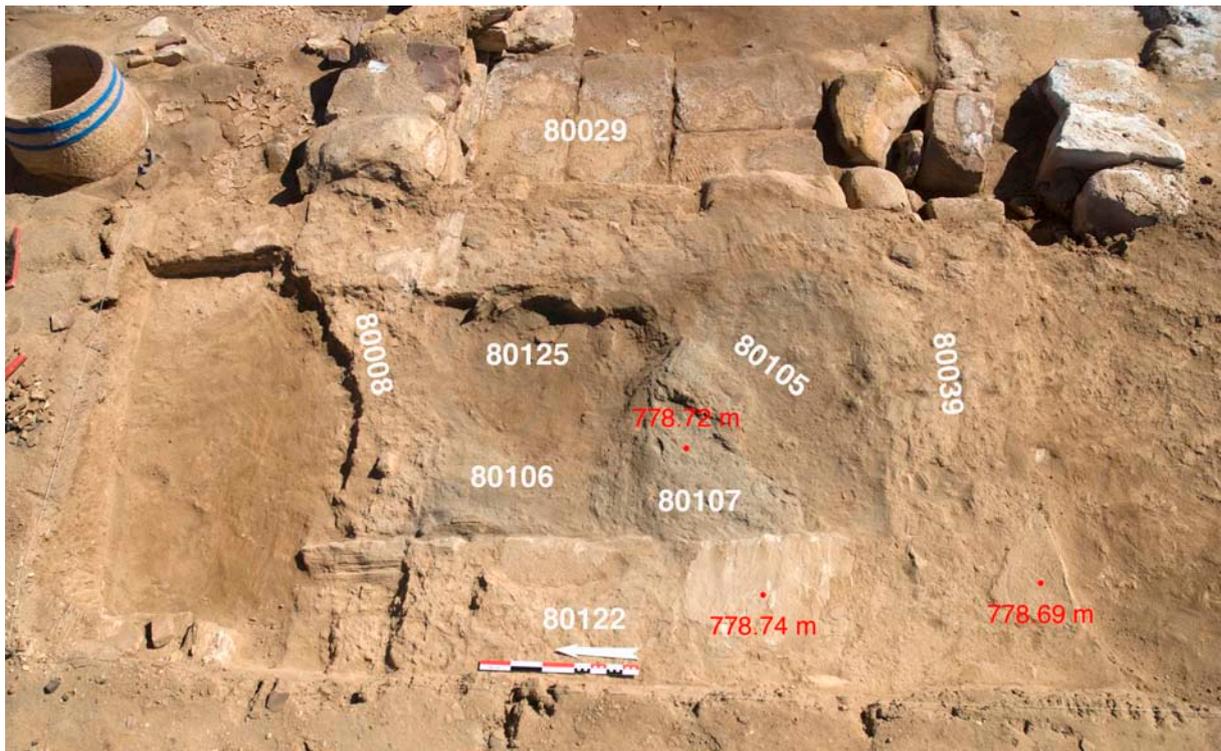
**Fig. 8.** General view of Sounding F



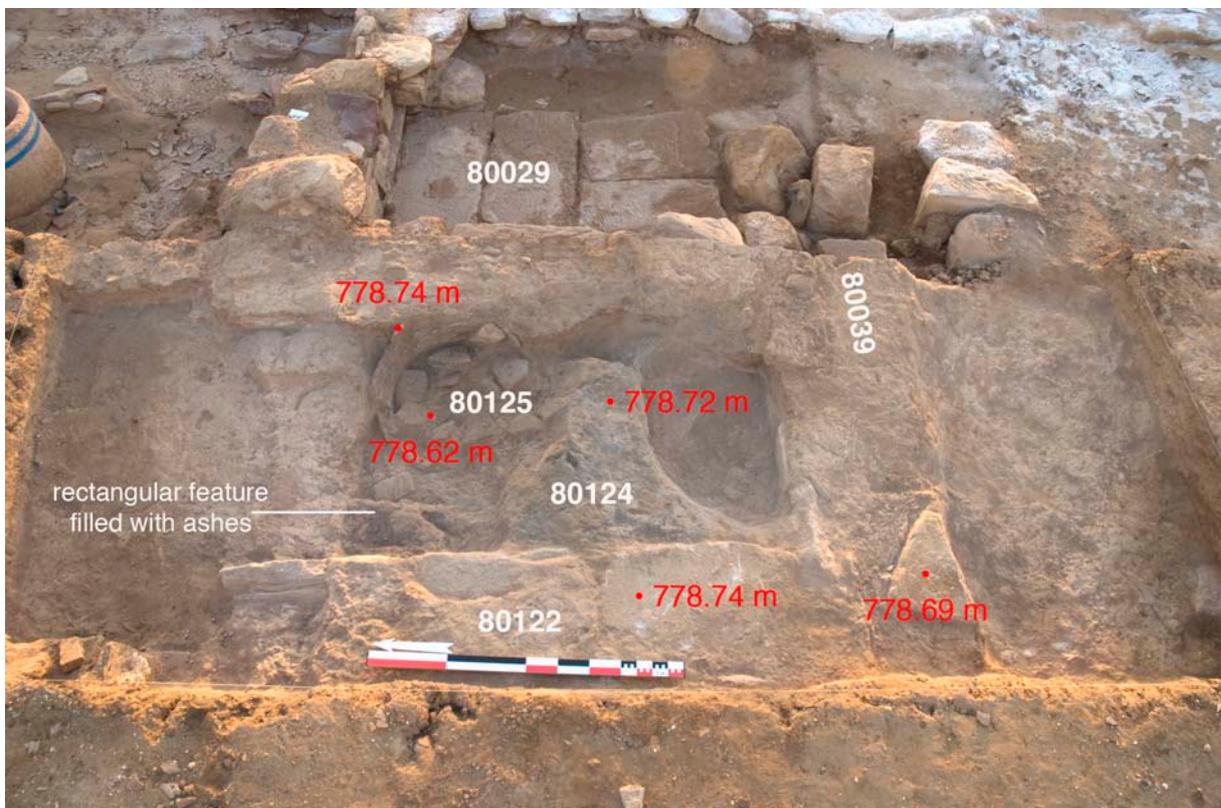
**Fig. 9.** Top plan of sounding F



**Fig. 10.** Sounding F, looking to the west, wall 80157 abuts wall 80156 (center) which turns to the east. Wall 80118 is laid on top of 80156



**Fig. 11.** Spots of ashes and wall 80122 appearing in the low center; on the side, upper courses of 80008 (left) and 80039 (right) show on the surface



**Fig. 12.** Area located west of pavement 80029, between walls 80008 and 80039; “oven” 80125 is leaning on 80008 and feature 80124



**Fig. 13.** Elevation of 80008, abutting 80122 on the left. A slab of pavement 80029 is visible on the right



**Fig. 14.** Elevation of 80122, a sounding showed that it was built 25 cm only above the bedrock



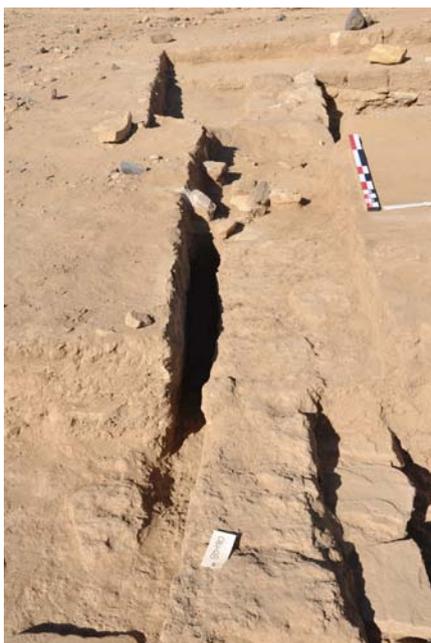
**Fig. 15.** Feature 80187 collecting a sample of the ashes that filled it



**Fig. 16.** Section of feature 80187



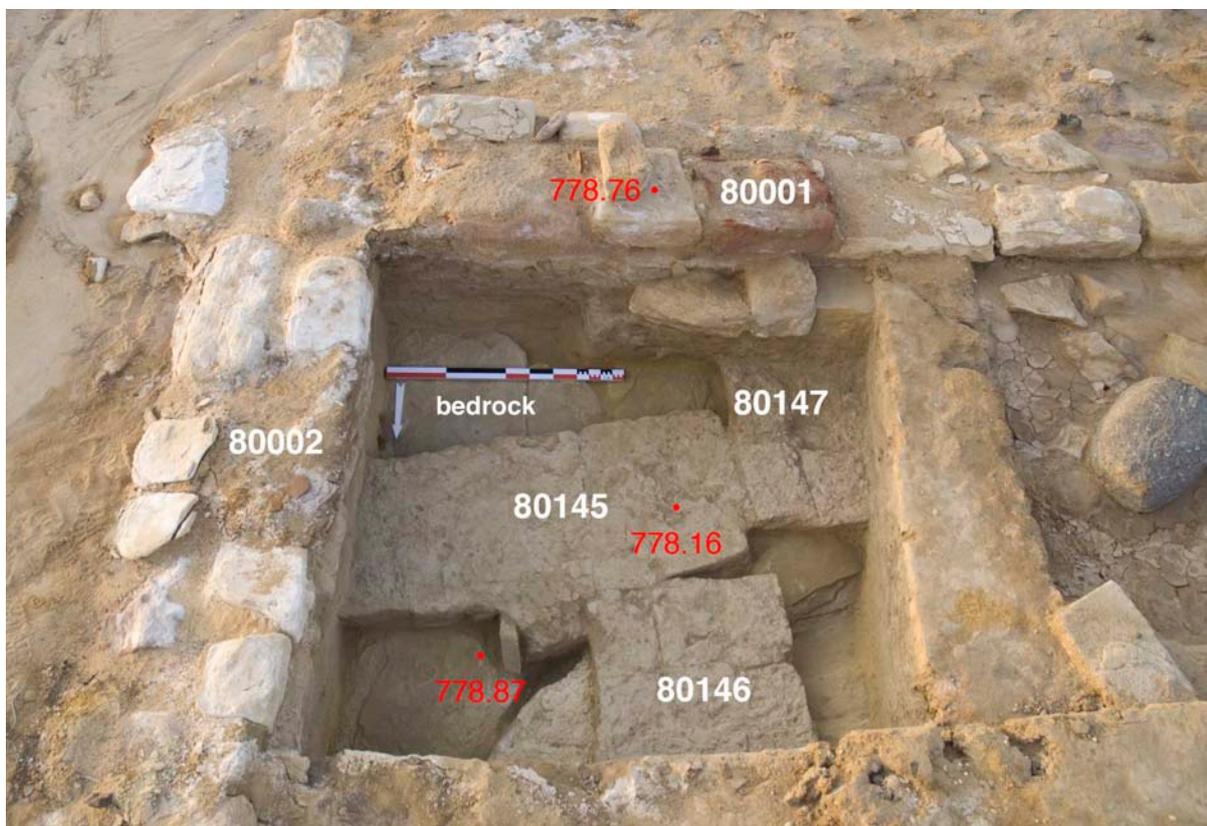
**Fig. 17.** Wall 80122. In the center, a group of stones block an earlier door. On the right, perpendicular to 80122, is the top mudbrick course of east-west wall 80180



**Fig. 18.** Wall 80180 in the foreground. Following the same axis in the background is wall 80119. In between, only a few scattered blocks and no mudbricks were found



**Fig. 19.** Threshold 80176 made of a long slab laid over three large blocks in wall 80122



**Fig. 20.** Sounding E. In the corner of walls 80001 and 80002, mudbrick walls 80145 (southeast – northwest), 80146 and, top right on the picture, 80147 (northeast-southwest) laid on the bedrock



**Fig. 21.** Base or capital of a pilaster found in the sand in the southwestern part of the area



**Fig. 22.** General view of the southwestern area, with threshold 80160 in the center



**Fig. 23.** Threshold 80160. Departing from the door socket (on the right) are circular traces which were probably made by the door



**Fig. 24.** North of threshold 80160 but earlier, top of locus 80189, in the background; the first course of mudbrick wall 80192 shows on the surface

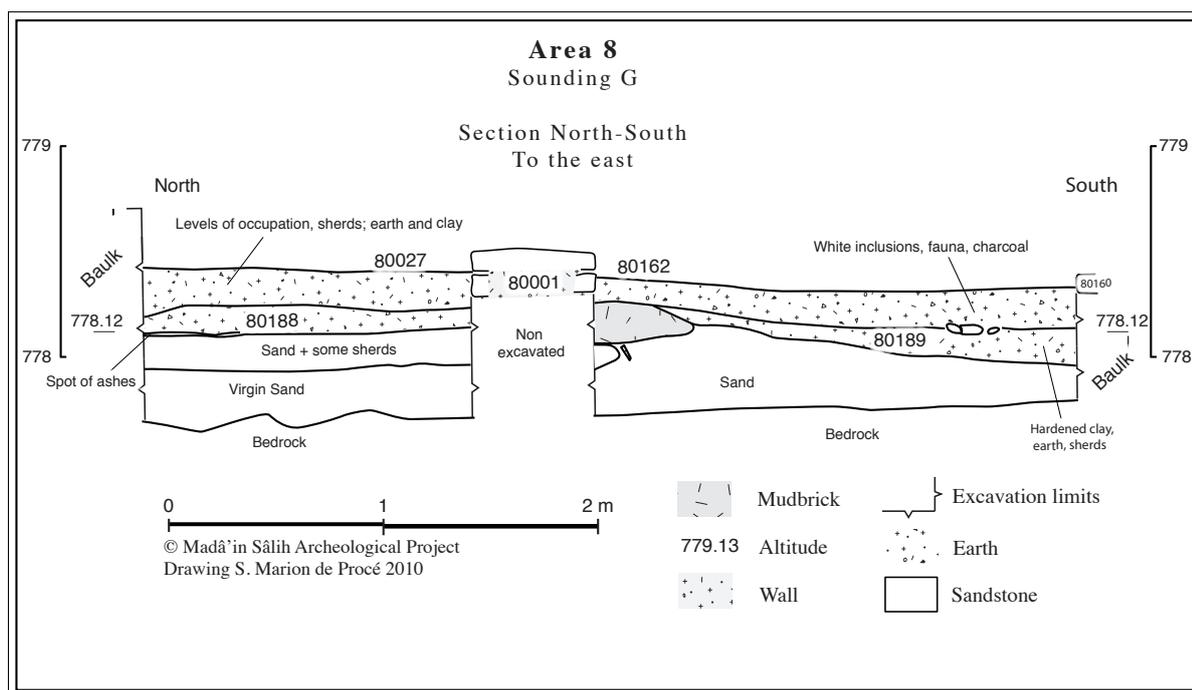


Fig. 25. North-south section of Sounding G towards the east

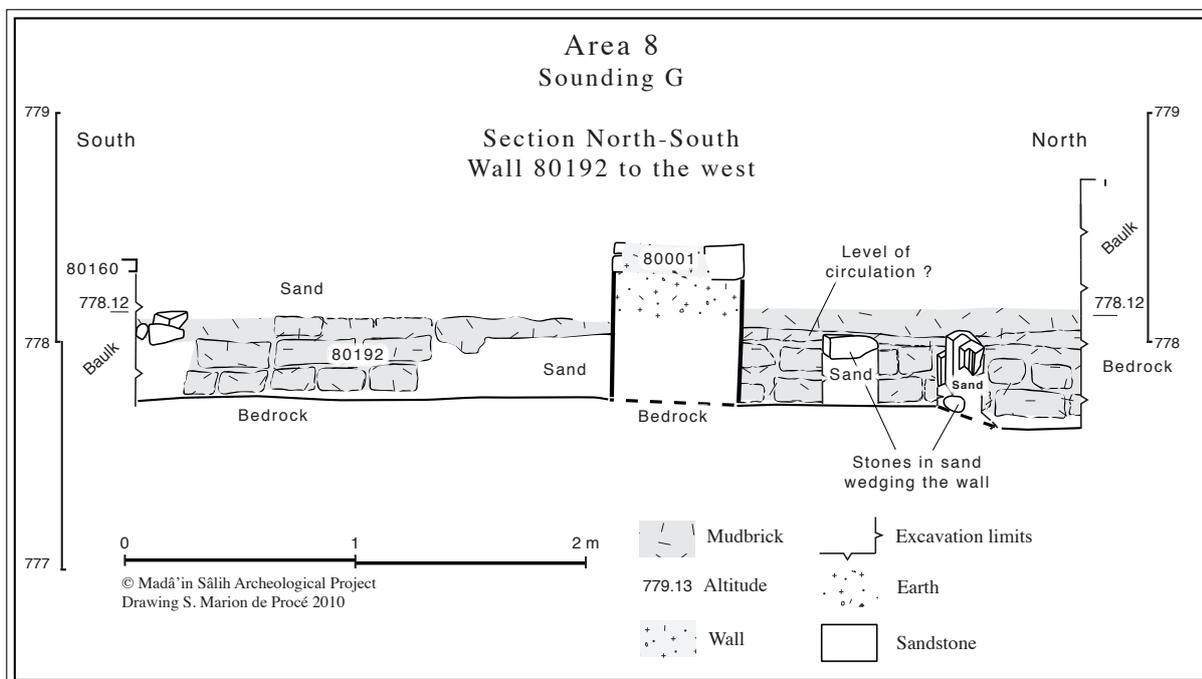


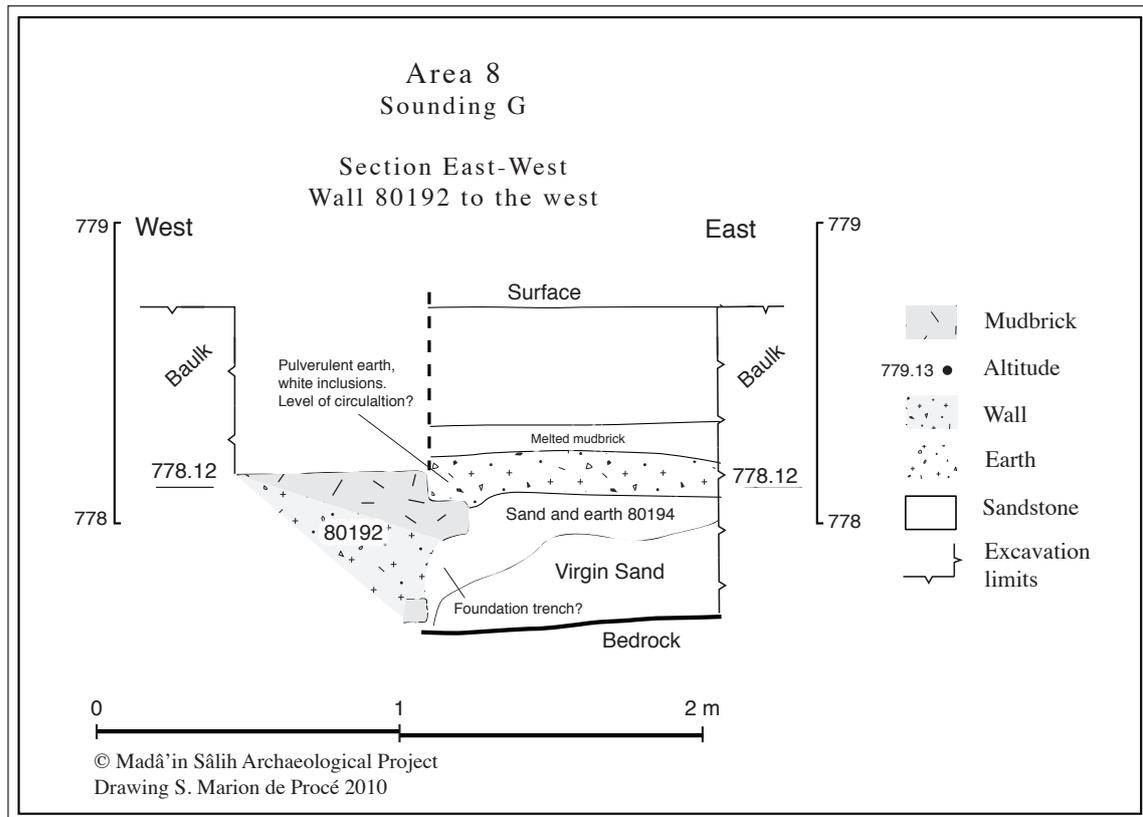
Fig. 26. North-south section of Sounding G and wall 80192 towards the west



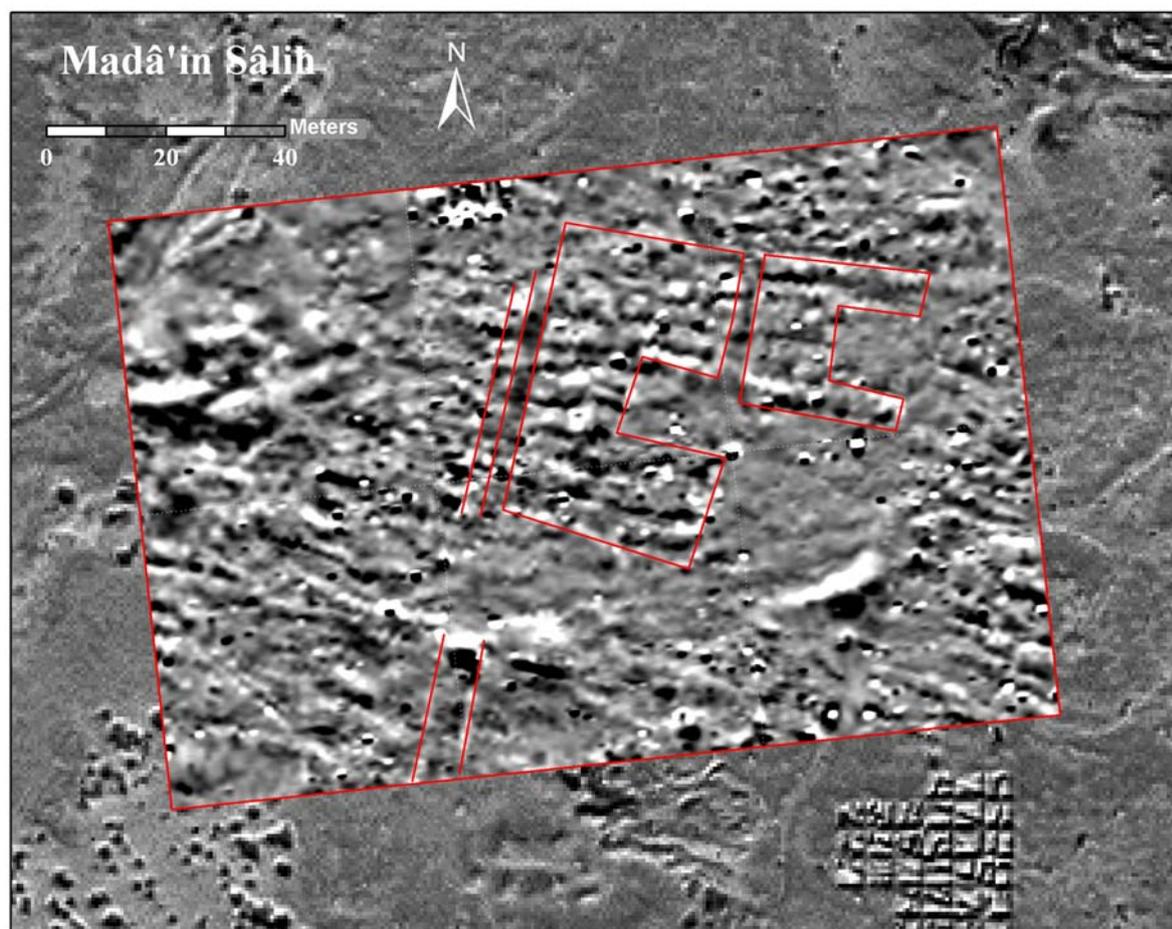
**Fig. 27.** Sounding G, first phase wall 80192 laid directly on the bedrock south of wall 80001. On the right, the wall is interrupted and resumes only north of wall 80001



**Fig. 28.** Sounding G, northern side, wall 80192 (left) is wedged by stones; the wider course may indicate the level of circulation. In the section, there seems to be a foundation trench



**Fig. 29.** Sounding G, east-west section of the northern side, showing wall 80192 and its foundation trench (?)



**Fig. 30.** Geomagnetic map around Area 8 (Chr. Benech), which is more or less in the middle (see Introduction, fig. 2)



## **Area 9**

Zbigniew T. Fiema (Finland Academy)



## Area 9

Zbigniew T. Fiema (Finland Academy)

During the 2010 fieldwork season at Madâ'in Sâlih, a new trench was opened in Area 9. Following is the report of activities including a phasing of the occupational history at the site. As the work has not been finished there, the phasing should be considered as tentative and preliminary.

### Site description

Area 9 is located in the southwestern part of the site. This area, *ca.* 50 x 70 m, is relatively higher in relation to the surrounding ones. On the western side, Area 9 is limited by the disused line of the Hijâz railway and by a shallow wadi densely covered by vegetation. The relatively lower ground surrounding Area 9 on the eastern and southern sides is cut by shallow and wide wadis which are part of the main north-south natural drainage at the settlement site. Area 9 has also its own depressions and higher points. The ground is relatively hard, although silty-sandy, and generally deprived of vegetation except for small shrubs. There are also some cobbles and pebbles on the surface.

The most important feature in the area is the presence of wall lines visible on the surface (fig. 1). Altogether, there are at least thirty spots where wall lines are well visible, in some places running for the distance of more than 5 m. Generally, many walls follow roughly east-west direction but some with a north-south direction were also noticed. Area 9 lay on the very edge – southeast corner – of the previously conducted geophysical survey. The new geophysical survey, conducted in 2010, has covered the entire space of Area 9. However the resulting imagery is not very clear to interpret due to the unexpectedly poor resolution.

The trench excavated in Area 9 in 2010 – to be termed here as trench A – is located in the northeast part of the area in the place where wall lines were particularly well visible. The trench is 5 x 5 m. Additionally, *ca.* 5 m to the northeast of the trench, a fallen column is located, featuring four or five drums still laying tightly against each other (fig. 2).

The structure uncovered in trench A is termed here as “house”, more with regard to the stratigraphic situation than in relation to the structural reality. Suffice to say that the use of the term “house” primarily refers to two main phases of occupation – lower and upper – and that only one room of the “house” has been fully revealed in this trench, i.e., fully enclosed by walls 90004, 90030, 90028, 90002, 90011/90020 and 90005/90006 (fig. 3). It is evident, however, that other, related rooms existed around and were somehow associated with that room, hence the use of the term “house”. For example, there were rooms to the south of that main room but only very small parts of these were uncovered in trench A, mainly the southwest corner (space between walls 90011 and 90012), the southern space (between walls 90012, 90011 and 90002) and the space east of wall 90002. Without the expansion southward, it is impossible to fully understand the sequence of events in these spaces or to tie the deposits in the latter to the phasing of the house. Therefore, these spaces are omitted from this narrative, with the exception of the southwest corner of the trench.

One should also mention here a discrepancy between the ceramic readings and the general stratigraphic situation. The ceramic notes mention a possibility of “redating” of some specific ceramic types. However, since no subsequent information concerning the redating was available, the “Dating” sections here will include:

- the actual dating of recovered ceramics, as done during the 2010 season and recorded on the Pottery sheets per *locus* ;
- the excavator’s suggestions concerning the dating of specific phases.

## Phasing

### *PHASE 1. Early mudbrick walls*

This is a poorly understood phase of the history at the site primarily because neither the occupation level associated with walls mentioned below nor the bedrock were reached. Thus, the exact sequence of events is still uncertain.

The excavations were discontinued at 777.98-777.80 m (top of *locus* 90037, to be excavated in 2011). At this level, the top of one of the two walls associated with this phase was exposed – *locus* 90035 – which runs generally north-south but with the more easterly course (fig. 4). This mudbrick wall (max length 1.30 m, max width 0.40 m, two or three rows of bricks, undetermined coursing) is exceedingly poorly preserved and it is possible that it has been intentionally razed down in the following phase when the installation 90036 was inserted in the southeast corner. Badly preserved remains of what might have been wall 90035 are still visible in the southern elevation of the trench (fig. 5). It is important to note that the course of wall 90035 is more easterly than of walls 90002 and 90028 which, in the following phases, will have formed the eastern limit of the room.

The other wall associated with this phase is *locus* 90027 (top at 778.32-.37 m) of max length 2.80 m, max width 0.44 m, at least two rows (fig. 6). Two courses of the wall have been exposed but since its bottom was not reached, it is not entirely clear whether or not it is a wall or perhaps a high bench, although the former is more plausible. It is certain though that this wall runs north-south, roughly parallel to the course of wall 90035 and under the later walls 90020 and 90004.

Soil *locus* associated with these two walls is *locus* 90033, a clayish deposit of medium compaction and brownish-grey color. Few ceramics were found in it but the bone material was relatively well represented.

## Dating

Some ceramics from 90033 resemble Late Hellenistic forms. Others are cooking pots, locally produced and their forms still undated. Still some match with sherds in 90026 (or 90032?) dated more 1<sup>st</sup> century AD. Dating rather difficult; 1<sup>st</sup> century BC or later?

ZTF. Most probably, the phase might be dated to the late 1<sup>st</sup> century BC.

## ***PHASE 2. Abandonment and dumping***

The main events which mark Phase 2 at the site are the abandonment of wall 90035 and the construction of the installation 90036, and the dumping of ash 90032. Although the actual sequence of events is not clear, evidently, it was decided to dump the ash into the area between walls 90035 and 90027 and thus this decision prompted the following changes.

### **Installation 90036**

Wall 90035 was levelled down to the top of soil *locus* 90033 (*ca.* 777.98-778.00 m) but seemingly not in its entirety. As mentioned above, higher preserved remains of this wall can still be seen below the later installation 90023 (fig. 5). Furthermore, in the southeast corner, a puzzling installation 90036 has been dug in. It seems that the bricks from the demolished wall 90035 were retrieved and reused to construct a “wall” line running diagonally to the course of wall 90035, i.e., southwest-northeast, preserving behind (= southwards) the original rows of 90035 (fig. 3). On top of this installation, a very poorly fired (or unfired) vessel was found as well as some bones. It is clear that *locus* 90036 is only a westernmost part of some kind of larger installation which existed in the eastern exterior of the trench.

This situation is all the more complicated as in the western end of this installation and diagonally to its orientation (i.e., northwest-southeast), a row of four irregular stones (included in 90036) was put standing upright on top of soil 90033. This row clearly forms a “barrier” which separates the area of installation 90036 from the central and southern area of the trench.

### **Ash 90032**

Once all these elements were in place, the dumping of ash 90032 began. As postulated, the dumping took place in two (perhaps three?) distinct episodes. At first, the nature of this deposit needs to be considered. *Locus* 90032 is a major deposit of ash mixed with some silt and sand (fig. 7). Some smaller lumps of solidified clay also occur, as well as very small broken stones. Bones are relatively abundant but only few ceramic sherds were found in this deposit. However, *locus* 90032 should not be interpreted as a dump of demolished material, rather as a clearing of a large fireplace (perhaps of “industrial” function). Notable is the total absence of charcoal and only few organic elements (date seed fragments) indicating a total combustion.

The deposit (*ca.* 1.62 m north-south, 2.42 m east-west) clearly slopes downwards towards the north (778.32 m in the south, 778.04 in the north). It means that the center (highest point) of the dump must be located somewhere south, probably under the extant walls 90011/90020, or even further south. Its southeastern extent must be marked by the still standing remains of wall 90035 (as seen on section B-B1; fig. 5). On the western side, the ash deposit is delimited by the course of wall 90027. Furthermore, the deposit (as seen in fig. 5) is clearly divided into two major lenses which should indicate two major episodes of dumping, separated by the short period of time during which wind-blown sand deposited on top of the lower episode.<sup>1</sup>

1. Unfortunately, during the excavation, this distinction was missed and the deposit 90032 was excavated as a whole, without separation into its lower and upper parts.

What is significant here is that the ash is totally absent from the southeast corner of the room and its furthest extent eastward is clearly marked by the “barrier” of four stones (being part of *locus* 90036) mentioned above. This implies that indeed the dumping took place only when the installation 90036 was already constructed. Furthermore, it is possible that a third (small) episode of dumping might have happened when wall 90020 was constructed (*infra*).

At any rate, the space of trench A in Phase 2 seems to have been abandoned and used as a convenient place of disposal of ash coming from a fireplace (?) located nearby. Nevertheless, some installations and some occupation must have continued in the area east of the trench, and the remains of wall 90035 and the “barrier” of the installation 90036 prevented the ash to spill over further eastward.

### Dating

Ceramics recovered from ashy layer 90032 include two glazed (“Parthian”?) sherds (1<sup>st</sup> century AD?), the sherds dated to the 1<sup>st</sup> century AD or before, and a few other sherds, one Hellenistic (based on fabric). Also one Nabataean painted bowl (1<sup>st</sup> half of the 1<sup>st</sup> century BC if found in Petra). Generally, perhaps late Hellenistic, maybe early 1<sup>st</sup> century BC? This combination may be partially accidental.<sup>2</sup>

ZTF. The origins, location and general nature of ash 90032 cannot be determined. Early sherds, laying around, might have been unintentionally scooped together with the ash during the clearance of the fireplace and dumped into the space of trench A. At any rate, it seems reasonable to assume that the dumping operations should have taken place sometime towards the end of the 1<sup>st</sup> century BC, and were not long-lasting.

### PHASE 3. The Lower House

The following phase witnessed the appearance of the first, well-defined occupation at the site – the construction and use of the so-called “Lower House”. In this phase, it consists of a room enclosed by walls 90020 (south), 90028 and its non-existent continuation southwards to meet with wall 90020 (east), and 90004 and 90030 (north). The western limit is unknown: apparently beyond trench A.

While the Lower House was being constructed, the (latest) episode of ash dumping might have taken place. The uppermost part of the upper layer of ash, the most steep one, was deposited directly against the foundation course of wall 90020. This might indicate that the last dumping into the interior of the house was done while the house was being constructed, or at least its southern wall. It is also possible that wall 90020, especially its foundation course, was slightly dug into the uppermost layer of ash 90032.

At first, the layer of brownish-grey silt (*locus* 90026) has covered the entire space of the planned room (including ash layer 90032), basically up to the top of the old wall 20027 (fig. 8). *Locus* 90026 is relatively homogeneous in appearance and with very few ceramic finds although bone material is well evidenced. This *locus* might have been intentionally laid out to even up the surface of the room’s interior. Also, some parts of *locus* 90026 could have originated from the disintegrated and washed away remains

2. Ceramic records indicate that labels related to *loci* 90032 and 90026 might have been accidentally misplaced during the pottery washing.

of mudbrick walls 90027 and 90035. Some walls of the Upper House stand directly on top of 90026, i.e. walls 90020/90023, and 90028. Only the foundations (90034) of the northern wall (90004 and 90030) appear to be dug-in deeper, to reach the top of *locus* 90033, probably due to the considerable weight of this facade wall.

### Wall 90020

Wall 90020 is the southern wall (top at *ca.* 778.80 m, length *ca.* 3.50 m, width more than 0.30 m, three courses high in the western part, one in the eastern part) of the room (fig. 9). The eastern part of 90020 clearly stands on top of the old (levelled?) wall 90027. Wall 90020 consists of three parts (fig. 5): the superstructure, the western foundations and the eastern corner section (*locus* 90023). The superstructure is made of mudbrick of which two rows are distinguishable. The main problem here is that directly behind wall 90020 is mudbrick wall 90011 and the relationship between these two cannot be determined; either the former is abutted by the latter or the former is below the latter. In any case, it is suggested that wall 90020 formed the southern limit of the Lower House while wall 90011 was the southern wall of the Upper House.

The western half of the mudbrick superstructure of wall 90020 has a foundation course made of small irregular stones. The eastern half has a different arrangement: instead of such foundation course it features at its bottom one very long (1.14 m) slab followed by two smaller but relatively regular slabs (all as *locus* 90023). Only one course of mudbrick is preserved on top of these slabs. It is suggested here that *locus* 90023 is the stone reinforcement of the southeast corner, i.e., the spot where wall 90020 would have met with the eastern wall of the room. Such corner reinforcements are well evidenced in the mudbrick structures of Madâ'in Sâlih, e.g., *locus* 20036 in wall 20037 (Area 2). This corner is currently in the eastern baulk of the trench, under the later wall 90002.

### Wall 90028

As for the eastern wall of the Lower House, it is postulated that it is largely unpreserved due to the substantial damage caused by the major flash flood which took place in Phase 4 (*infra*). The only preserved, original segment of this wall is *locus* 90028, located in the northeast corner of the trench (fig. 10-11). In its extant form, this *locus* forms the eastern limit of the subsequent Upper House, together with wall 90002 but it is apparent that these two walls are not contemporary in date. Wall 90002 is a high quality stone constructions made of ashlar, which runs north-northeast – west-southwest. Wall 90028 (top at 779.02 m) is a mixed stone/mudbrick construction the course of which is more northerly (fig. 11). Although in the Phase 5 these two walls together formed the eastern limit of Upper House, they do not represent exactly the same course line. It is thus also clear that the original southeast corner of the Lower House was located slightly further eastwards than the extant corner of the Upper House formed by walls 90011 (possibly with 90020?) and 90002. It needs to be added that wall 90028 is *ca.* 1.10 m long and 0.48-0.50 m wide, with mixed alternate coursing of stones and mudbrick (four in total) – probably serving to further strengthen the northeast corner of the Lower House. Notably, the section which directly connects wall 90028 and 90002 is three courses high and entirely made of stone.

## The northern wall

The northern limit is most elaborate and complex, and resembling a building technique which involves the construction of a wall in segments or sections (*infra*). The northern wall is also generally better built than the other walls, probably because the entrance located there was the main entrance to the Lower House. The northern wall consists of the foundation course (90034) for walls 90004 and 90030 located on both sides of the doorway (90017) which includes the threshold and the door jambs (fig. 12-13). The description below refers to the extant appearance of these elements. However, it has to be kept in mind that as these also served as the northern limit of the Upper House, it is possible that they were modified/reinforced later on.

The foundation course of 90034 (top at 778.24-778.32 m) consists of the single, horizontal course (*ca.* 2.71 m long) of at least thirteen stones of various size, one of which is part of a basalt millstone. This course has been partly dug into layer 90033, i.e., is deeper than the lowermost courses/foundations of the other walls of the Lower House. The reason is two-fold: to sustain the existence of a heavy construction of the door, and to protect channel 90031 located below the threshold and directly on top of foundation course 90034. This is also supported by the fact that, the stone course does not stretch all the way from the western corner to the eastern corner but it is centered upon the doorway.

Walls 90004 and 90030 form a more or less continuous line of the facade *below* the threshold level, but they considerably differ in appearance and construction method on either side of the door jambs. It needs to be kept in mind that the western wall of the Lower House, with which wall 90004 would bond (abut/be abutted) then is not known; probably located further west from trench A. At any rate, it is clear that wall 90004 continues further west, beyond the limit of trench A. But in Phase 5 (Upper House), wall 90004 became abutted by the western limit of the Upper House – wall 90005. Perhaps during these changes, some parts (especially the corner) of wall 90004 were reinforced by stone, thus its mixed stone-mudbrick construction.

The total length of wall 90004 cannot be established due to the problems mentioned above, but it runs westwards for at least 1.46 m from the western door jamb. The wall is a very irregular and composite structure of stones and mudbricks, at least six to seven courses high. The uppermost one to two courses are made of mudbrick and the following three to four courses, very irregular in coursing, of stone. However, closer towards the center and directly upon the westernmost stone of the foundation 90034, there is a regular, single “column,” in seven courses made of stone. This “column” seems to serve as the vertical enclosure of the foundation coursing (fig. 12), i.e., at least on this side, the section of wall with the foundation course, the door, the threshold and the channel is totally enclosed and separated from the rest of wall 90004. It may be due, as suggested above, to the specific technique of construction employed there, i.e. the construction of the northern limit of the Lower House in sections or segments. If so, it means that after the foundations 90034 were constructed, the work continued directly above the foundations, including the channel and the door, forming a separate segment, and only then walls 90004 and 90030 were built on both sides of the door jambs. Alternatively, these irregularities might be a result of modifications / reinforcement of the northern wall when the Upper House was constructed in Phase 5. What is puzzling, however, is that this “separation” or “segmentalization” (through the introduction of the stone “column”) is not reproduced on the eastern side of the door section, i.e., in wall 90030. There is no vertical stone “column” there on top of the easternmost stone of the foundation course. It may be

due to the fact that wall 90030 and its corner stone section (where connecting with wall 90028) served in more or less unchanged form in both the Lower and Upper Houses.

As opposed to wall 90004, wall 90030, on the eastern side of the doorway, is relatively homogeneous in appearance and it consists of two separate sections: mudbrick and stone ones, and is *ca.* 2.00 m long altogether. The mudbrick section (*ca.* 7 courses high, two rows of mudbricks, max height 1.10 m) stands directly on the foundations 90034 and partly on *locus* 90033. The section made of stones (not visible on fig. 13, see fig. 12) – to reinforce the corner connection with wall 90028 – features five courses of relatively well-dressed ashlar: the uppermost stone is *ca.* 0.67 x 0.30 x 0.23 m. Walls 90030 (both stone and mudbrick sections) and 90028 formed the same (northeast) corner also in the Upper House.

### Doorway 90017

The only known access to the interior of the Lower House is the massive doorway 90017. It consists of two large stone slabs (0.45 and 0.90 m in length, *ca.* 0.16 m thick) forming the threshold, and two upright blocks standing on the western and eastern extremities of the threshold. The western block is 0.50 x 0.20 x 0.24 m and the eastern one is 0.53 x 0.30 x 0.17 m.

### The western wall

The location of the wall enclosing the Lower House on the western side cannot be established but it was probably located just beyond the limits of trench A. Suffice is to say that the extant western wall (90005/90006) cannot be proposed as the limit of the Lower House. It abuts wall 90004 but its foundations are located much higher up. Below wall 90005/90006, are layers 90021 and 90019 which must be considered the occupation strata of the Lower House

### Channel 90031

In the space between the threshold and foundation course 90034, there is very well-fitting stone installation consisting of a monolithic channel, its large capstone and the channel's base (fig. 14). The channel is 0.12 m high, 0.37 m wide, with the roughly V-shaped trough being *ca.* 0.05 x 0.06 m. A massive capstone, directly under the threshold slabs, is *ca.* 0.49 x 0.08 m. Two smaller slabs, below the channel, which rest directly on the foundations 90034 are *ca.* 0.18 (in total) x 0.08 m.

There are two issues with this channel which are puzzling. First, the gradient of the trough could not be established, but the dimensions of the trough indicate a very low flowing capacity. Secondly, the location of the channel would indicate that while the channel itself would have been below the surface of *locus* 90021 – the main occupation stratum of the Lower House – the capstones would be protruding, thus allowing for drawing / discharging liquid and the maintenance. But the location of the channel makes less sense as it is located almost in the center of the threshold and below it. Not a very convenient solution for anyone entering or leaving the house. The probable solution is that there must have been a composite stone step lower than the threshold and directly to the south of it, and that the capstone(s) of the channel were somehow integrated into the structure of this step(s). An alternative proposition would associate the channel with the reality other than that of the Lower House (and certainly not of the Upper House) but in such case, the description and interpretation of the entire northern facade of the house would not make any sense. Whether the channel served to conduct water into the interior or as a drain cannot be determined but, generally, neither is more plausible. The solution can only be reached through the excavation of the northern exterior of the house.

## Occupational strata

The main occupation stratum inside the Lower House is *locus* 90021 (top at 778.58-.64), a rather heterogeneous hard-top deposit of silt with some clay and sand (fig. 15). This deposit had completely covered old wall 90027. The *locus* yielded relatively large quantities of pottery, bone as well as a stamped amphora handle (90021\_P10, unidentified so far, fig. 16), one stone vessel (90021\_S1) and one terracotta figurine of a horse (90021\_TF1, fig. 17). Notable were relatively large quantities of cereals (rachis, grain) mostly of barley but many undetermined and some date seeds.

In the northeast area of the interior, several stones were found laying without any pattern, with some relatively thick ash lenses all around. However, it would be difficult to interpret these remains as a fireplace, unless it was destroyed and dispersed by the subsequent flooding (*infra*). *Locus* 90021 was in turn covered by *locus* 90019 at least the lower part of which is probably also related to the occupation of the Lower House.

## Dating

The material from *loci* 90026, 90021 and 90019 is heterogeneous, with few well-datable or dominant forms. As for *locus* 90026 which covered the ash 90032 and thus most probably belongs to Phase 3, the presence of the “Parthian ware” (one glazed sherd; 1<sup>st</sup> century AD?) and Nabataean type 3a cooking pot from Petra would suggest a date in the middle of the 1<sup>st</sup> century AD. In *locus* 90021 are present some jars which might be dated to the Late Hellenistic period, generally the 1<sup>st</sup> century BC. Also some cooking pots which seem (late) Hellenistic but their extension into the 1<sup>st</sup> century AD is uncertain. Some cooking pots seem to date (according to fabric) to the late 1<sup>st</sup> century BC – early 1<sup>st</sup> century AD. As for *locus* 90019, it seems to contain the 1<sup>st</sup> century BC types but it is uncertain if the date range can be extended into the early 1<sup>st</sup> century AD.

ZTF: It can only be postulated that the occupation of the Lower House might have begun already in the late 1<sup>st</sup> century BC and probably continued into the early 1<sup>st</sup> century AD.

## PHASE 4. Flooding destruction

A substantial flooding and the resulting destruction effectively ended the occupation of the Lower House. It is evident that the flood wave came from the area to east-southeast from the house, where even currently the terrain is slightly higher than the surface of trench A. The flooding must have originated from a rapid and violent rainstorm which created virtual “rivers” of fast-flowing water. The main surge broke through the composite eastern wall of the house, directly south of the still preserved wall 90028, and it completely washed away the central (and southern?) section of the eastern wall.

Certainly *locus* 90019 (upper part) was affected, as it features heavier elements – stones, clumps of disintegrated mudbricks, and some pebbles – along the eastern wall line and in the center of the room. As such the surface of 90019 is much differentiated with regard to its compactness. But the main flood-related deposit is *locus* 90016 (top at 778.82-.85 m) which is a relatively homogeneous horizontal stratum of fine silt and sand of relatively light compaction (fig. 18). It seems that once inside the room, the surge quickly lost its strength and rapidity as no major damage appears to have been inflicted on the other walls of the room. The exceptions are the eastern wall – the central (and presumably southern) part of which had been completely destroyed – and the southern wall (90020) which apparently suffered some damage as well (*infra*).

## Dating

Large quantities of pottery are contained in *locus* 90016. The dating of the material from 90016 ranges from the end of the 1<sup>st</sup> century BC into sometime in the 1<sup>st</sup> century AD.

ZTF: One should assume that many pots must represent the latest moments of occupation of the Lower House (i.e., Phase 3). But many broken sherds could have been carried by the surge from the neighbouring areas and deposited inside the house, thus a possibility of presence of intrusive ceramics and the resulting contamination. Yet, the ceramic dating appears relatively uniform. Therefore, it is suggested that the end of the Lower House must be in the (early?) 1<sup>st</sup> century AD as caused by the momentous event – the flooding.

## PHASE 5. The Upper House

There is no indication that there was any substantial hiatus in the occupation following the flooding destruction of the Lower House. On the contrary, the sandy-silty flood deposit 90016 is directly followed by the rich occupation stratum 90003. This indicates that almost immediately after the flood, the house was restored, albeit with some major modifications. Notably, the northern (facade) wall does not seem to have been much affected. As for the western wall, the furthest away from the surge, no information exists. Therefore, the immediate concern in the restoration was the eastern and southern limits. These were restored by constructing new walls (90011 and 90002). In the same time, the size of the room was reduced by constructing a new western wall (90005 and 90006), now present within the limits of trench A (see fig. 6). Notably, similarly to the situation of the Lower House, no information exists as for how the Upper House was roofed.

### Wall 90011

With the destruction of the central part of the eastern wall of the Lower House and the potential damage of its southern part, its connection with wall 90020 might have been affected as well. In fact, wall 90020 itself might have been affected; after all the destructive surge of water and mud came from the east-southeast direction.

At any rate, a new wall – 90011 – was built seemingly just behind wall 90020 but their relationship cannot be fully determined (see fig. 15): either the former abuts the latter or the former is built on top of the remains of the latter. One might also consider that the southern limit of the Upper House was in, in fact, made of both walls, 90020 (in whatever form and height it was still preserved in Phase 5) and the backside-reinforcing wall 90011.

Wall 90011 (top at 779.11 m; max. length 3.76 m; max. width 0.55 m, two to three courses high) is a mudbrick structure featuring two rows of bricks. In the western part of this wall, there is *locus* 90018 – three slabs (one more than 0.80 m long), located on the same level, which form an east-west horizontal line., at least 1.21 m long. The westernmost of these stones, in fact, “enters” the western baulk, slightly below the lowermost course of wall 90006 (the western wall of the Upper House). The function of these stones which protrude *ca.* 0.2 m northwards from the northern edge of wall 90011, is not clear. The most plausible interpretation is that *locus* 90018 is a stone reinforcement of the corner formed by the mudbrick wall 90011 with stone wall 90006. Notably, these protruding stones would not be visible as they are below *locus* 90003 – the occupational stratum inside the Upper House.

In this context, it is worth to briefly mention wall 90012 (top at *ca.* 779.13 m; max. length 0.77 m, max. width 0.70 m, two rows, two courses high). This mudbrick wall runs north-south abutting wall 90011 at the right angle. Most probably, wall 90012 was built simultaneously with wall 90011. This indicates that the Upper House would have extended southwards from the room excavated in trench A.

### **Walls 90005, 90006 and Door 90007**

As opposed to the Lower House, the western limit of the Upper House is known, being the combined walls 90005 and 90006 (fig. 19 and see fig. 6). The division of the western wall into two sections, separated by the door section, is a purely artificial measure to facilitate the excavations and recording. The combined length of both walls (the top at *ca.* 779.15-.30 m) is *ca.* 3.25 m and both walls feature two to three courses. The width could not be determined. The coursing is roughly horizontal and the stones very roughly cut. The largest is *ca.* 0.32 x 0.26 x 0.09 m but most are smaller than that. The northernmost part of wall 90005 abuts the old wall 90004 but the southernmost part of wall 90006 barely reaches the northern face of wall 90011. The connection there is not well evidenced but this must have been the southwest corner of the room.

*Ca.* 0.75 m south of the northwest corner, in the spot where the section of the western wall denoted as *locus* 90005 ends, begins the door section, marked by the upright standing stone, apparently lowermost part of the northern door jamb. Directly south of this stone there are two flat slabs of the combined length of 1.26 m, with the top at 779.22 m. Again, the width could not be determined due to the limit of excavations. These slabs must be interpreted as the threshold of the door leading to the interior from the west. The upper edge of these slabs is clearly worn and “polished”, indicating frequent walking upon. The southern door jamb is not preserved. With the postulated blocking of the old entrance in the northern facade wall (*infra*), the door in the western wall provided the only so far known access to the Upper House.

### **The northern wall**

Walls 90004 and 90030 continued to serve as the northern limit also for the Upper House. Nothing can be added to their description, as above, beside the fact that some irregularities in their appearance might have resulted from modifications as related to the construction of the Upper House.

The only evident change which should most probably be associated with Phase 5 is the blocking (*locus* 90013) of door, *locus* 90017. The blocking was effected with two very large blocks (0.76 x 0.20 x 0.12 m and 1.0 x 0.25 x 0.20 m) standing one upon the other, and with some small chinking stones on the bottom. The blocking was done in the expertly manner, with the blocks well fitting the frame of *locus* 90017. Theoretically, the upper block in the door could have served as a threshold of an “elevated” doorway into the Upper House.<sup>3</sup> But this hypothesis is weak, also because the surface of that block lacks typical smoothness and “polishing” as derived from the frequent stepping onto it.

### **Wall 90002**

Evidently, the eastern wall of the Lower House had suffered the most during the calamity of Phase 4. Thus, the Upper House features the entirely new, stone wall, *locus* 90002 (top at 779.18-.31), being the best construction evidenced in trench A (fig. 10 and 20). Wall 90002 consists of two parallel rows of stones, with rubble and soil in-between. The wall is two courses high; the lower consists of large blocks,

3. One should note the presence of a flat stone standing close to the western end of the blocking and on its northern side. The stone features a circular depression which might, theoretically, be interpreted as a door-socket.

some very well dressed, and as large as 1.0 x 0.25 x 0.1 m. The upper course consists of small, flat stones (average *ca.* 0.20 x 0.1 x 0.05 m). Evidently, the construction of the wall featured courses of large blocks alternating with courses of small stones. It is notable that wall 90002 continues for several meters beyond the southern limit of trench A. This again indicates that the Upper House must have consisted of more than just one room excavated in trench A.

The total length of the wall is 3.60 m (within trench A and thus south of wall 90011) and the width is 0.70 m. The length, however, has to be combined with the length of wall 90028 – the part of the old eastern wall of the Lower House, which has survived the disaster in Phase 4. Because the course of wall 90028 is more northerly (= almost north-south) than of wall 90002, the entire eastern wall of the Upper House, when looked upon from above, presents a curious “bent” appearance (fig. 3).

### Stratum 90003

The main occupational stratum associated with the Upper House is *locus* 90003 (top at 779.05-.08 m), a medium-compacted silty-clayish soil which covers the entire interior (fig. 20). The roughly horizontal surface is relatively hard and it abuts all walls mentioned in connection with Phase 5. The finds in this stratum were particularly rich and they included large quantities of ceramics and bone, several metal objects (Cu/Cu alloy and iron), including a copper ring. A coin (90003\_C1) found in this *locus* is a Roman provincial bronze coin struck at Antioch: “SC issue”, undetermined emperor, from Augustus to the Antonines (1<sup>st</sup>-2<sup>nd</sup> century AD).

### The southwest corner of the trench

The space contained in this corner (between walls 90011 and 90012, west side) is very small – *ca.* 0.9 (north-south) x 1.03 m (east-west) and the excavations there proceeded only for *ca.* 0.8 m below the surface, ending at 778.59 m. Following from the top were *loci* 90000 and then 90001, i.e., the same *loci* occurring over the entire area of trench A. The appearance of the tops of walls 90011 and 90012 marked the separation of the southern area from the rest of trench A. Wall 90012, running north-south, divides the southern area into the western and eastern spaces. The excavation of the eastern space did not provide any significant information and thus the association of soil *loci* from there with the overall phasing is not possible without the extending of the excavations.

As for the western space (i.e., the southwest corner of trench A), following *locus* 90001 down was *locus* 90015 (top at 779.00 m), a layer of light brownish soil, probably naturally deposited. *Locus* 90015 is directly above the installation 90022/90025 and the soil *locus* 90024. The latter (top at 778.67-.73 m) is a very ashy deposit, with over 50 % being pure ash and the rest being silt and sand. Installation 90022 has been partially dug into this *locus*. It consists of three interrelated parts: a rectangular enclosure open to the east, a pit inside this enclosure with its contents (*locus* 90025) and the three capstones (fig. 21-22).

The enclosure (*ca.* 0.62 north-south x 0.35 east-west) is made of four stones, one of which is an upright-standing slate. The largest stone is *ca.* 0.3 x 0.18 x 0.1 m. This enclosure is topped by three irregular flat stones, one over the other. The pit and its fill (*locus* 90025) is *ca.* 0.57 (north-south) x 0.42 m (east-west). The fill consists of sand and very fine gravel. Inside the fill, three sherds were found (two of Nabataean painted fine ware) and one coin. The latter is legible – Nabataean silver coin of Aretas IV and Huldû, either year 22 of Aretas = 14/15 AD or year 13 = 4/5 AD. Also three undetermined cerealia seeds were found in the pit as well as several date seeds. The excavation did not progress beyond the emptying of the fill.

Due to the very limited horizontal exposure of this space, it is impossible to fully interpret *loci* 90024, 90022 and 90025. The installation 90022 / 90025 is puzzling. It is not related to a fireplace although it was dug into ash-rich *locus* 90024. The contents of the pit do not present anything special, except for the silver coin, nor include any bones. Thus, why the relatively elaborate enclosure and the capstones? Only the expansion of excavations in this area may provide an answer.

Finally, it should be added that the association of 90022, 90024 and 90025 with Phase 5 is suggested here *only* with regard to the stratigraphic situation of these *loci*. They are too high up to be associated with the Lower House and would much better fit the general occupation level as associated with the Upper House.

## Dating

*Locus* 90003 – the ceramic notes suggest that the date is homogeneous – 1<sup>st</sup> century BC (?) yet the added comments also suggest the redating of some types to the 1<sup>st</sup> century AD, possibly to the 2<sup>nd</sup> (?), and even turning to the 3<sup>rd</sup> century cannot be totally excluded. The isolated datable sherds include: 2<sup>nd</sup>-3<sup>rd</sup> (?) century AD, Hellenistic (?), from late 1<sup>st</sup> century BC onwards.

ZTF: From the stratigraphic point of view, Phase 5 should be dated to some time in the 1<sup>st</sup> century AD. The presence of the 1<sup>st</sup>-2<sup>nd</sup> century coin may indicate that even an extension into the 2<sup>nd</sup> century is not impossible.

Southwest Corner: *locus* 90015, ceramics datable to some time in the 1<sup>st</sup> century AD. *Locus* 90025 – Nabataean sherds (one last quarter of the 1<sup>st</sup> century AD, and the other, second-third quarter of the 1<sup>st</sup> century AD). *Locus* 90024 – the early 1<sup>st</sup> century AD.

ZTF: Coupled with the early 1<sup>st</sup> century AD Nabataean coin, the date of these *loci* would indeed be some time in the 1<sup>st</sup> century AD, possibly extending as far as the middle/late of this century. Thus, the deposits in the southwest corner may indeed be possibly associated with Phase 5.

## PHASE 6. Minor destruction (?) and casual occupation (?)

This phase is perhaps the most difficult to interpret. There are two “installations” associated with this phase. One is a poorly constructed “activity area” (*locus* 90009) made of stones and associated with some ash deposits and located in the center of the room (fig. 23). The other is an exceedingly irregular, makeshift fireplace or “hearth” (*locus* 90014), also associated with stones and with quantities of ash, and located in the northeast corner (fig. 24). The main problem with these installations is the presence of stones. In the case of 90009, these could have been brought from outside. As for 90014, the stones around the fireplace are all in random positions, some flat, others tilted or even upright, often leaning on each other. In short, one could suggest that the fireplace 90014 was opportunistically placed among the *collapsed* stones.

Neither of these installations seem to bear any relation to the orderly arrangement of the Upper House. Rather, they seem to represent some kind of casual, temporary (?) occupation. If so, and considering the “collapsed» stones in the northeast corner, it would seem that the main occupation of the Upper House, as represented by *locus* 90003 upon these installations stand, was ended by some kind of minor destruction associated with a partial collapse of walls.

*Locus* 90009 consists of irregular deposit (*ca.* 1.46 m north-south and 2.41 m east-west) of hard silty-clayish soil, heaped on top of *locus* 90003 and in the center of the room. In the southeast part of the heap, densely packed quantities of ash were located. On top of the heap, there is a basalt millstone (90009\_S1) roughly encircled by four larger flat stones but without any definite pattern. The top of installation 90009 is at 779.24-.26 (stones) and 779.11-.14 (soil and ash). Some kind of activity must have been performed there but none of the stones (including the basalt millstone) shows any traces of fire or soot. Although the presence of ash is notable, the function of this installation as a fireplace cannot be supported. Some pottery and bone material were found inside the deposit. The coin (90009\_C1) which was also found inside the clayish heap is an undetermined Roman or provincial coin, undetermined empress: 3<sup>rd</sup> c. AD? Even more enigmatic is the “hearth,» *locus* 90014 (see fig. 24). It consists of a deep and extensive pocket of ash located on the surface of *locus* 90003 as well as embedded in it. On top of the ash, there are several stones, some as if representing a collapse (*supra*). Only three stones seem to be laying in a rough triangle pattern, in a distance of *ca.* 0.17-.21 m from each other. All three are blackened from the proximity of fire and covered with ash / soot. Only few centimeters away from the triangle of stones, a small juglet has been found partly crushed by a stone and still under it. If it was crushed by a collapsing stone, it seems miraculous that it was not further accidentally trampled by the individuals who utilized the fireplace. More likely, it was discarded only during the use of the stone triangle as a fireplace.

The triangle pattern of fireplace stones might or might not be accidental but at least, these three stones could be considered as a simple fireplace, probably used over a period of time. Again, however, one needs to stress the opportunistic character of this installation. It would appear as if the interior of the room had suffered a minor collapse of stones – probably from walls 90028 and / or 90030 (stone section), the collapse was not cleared but casual occupants of the place decided to use the stones laying around as a convenient fireplace, *without* rearranging their location. In addition to the juglet mentioned above, another partly preserved vessel, a glass piece and some sherds as well as fragments of dates were found associated with *locus* 90014.

The most probable scenario is that the Upper House was damaged by some kind of disaster, albeit minor in scale, and possibly (partly?) abandoned. Either the original inhabitants or the casual newcomers used the place for temporary occupation. What is significant is that this casual occupation seemingly occurred soon after the end of the Upper House – there is no indication that any considerable period of time had passed between the end of Phase 5 and the beginning of Phase 6. If the coin found in 90009 is indeed dated to the 3<sup>rd</sup> century, it means that it is probably intrusive (accidentally dropped there during some later activities at the site which cannot be determined). Alternatively, Phase 5 would have to be considered rather long-lasting which remains at variance with the ceramic dating of that phase.

It is worth noting in this context that no remains of anything resembling the roof construction have ever been found in this or any other stratum in trench A. Considering the size of the room (Lower and Upper House phases) being *ca.* 3.60 (west-east) x 3.10 m, the room could have been easily roofed by tree trunks without the necessity of installing additional supports. Presumably, with the end of the Upper House, all combustible material would have been used in fire.

*Dating:*

As for *locus* 90009, datable sherds included Hellenistic / Late Hellenistic jars, one Nabataean painted fine ware body sherd (from the late 1<sup>st</sup> century BC onward). Generally, the 1<sup>st</sup> century BC is suggested. Ceramic date for *locus* 90014 could not be determined, except for possible Late Hellenistic sherds.

ZTF: Again, the dating of material from these *loci* is unexpected. Neither of these dates seem to conform with the expected date of Phase 6 (late 1<sup>st</sup> century AD and possibly later?), especially in connection with the dating of material from Phase 5, unless the “redating” of that material, as suggested in Pottery Sheet, is done.

**PHASE 7. Abandonment and natural deposition**

Both installations from Phase 6 were in turn covered by *locus* 90001, a silty sandy deposit of very differing compaction; from light in the east and north to medium-hard in the center and further south. Very large quantities of pottery as well as some bone, fragments of stone vessels (S1 to S3) and one coin (C1, unread so far) were found in this naturally deposited stratum. Finally, *locus* 90000 represents the surface and the uppermost natural deposition. In addition to some pottery, one coin (so-called “Himyarite;” Late Hellenistic date?) was found there.

**Dating**

The dating of the material from 90001 is again 1<sup>st</sup> century BC (possibly to be extended into the 1<sup>st</sup> century AD). As for *locus* 90000, the material is mixed, as expected: Iron Age, Late Hellenistic, Early Roman and one or two Byzantine elements.

ZTF: it is indeed expected that the material from these *loci* will be mixed but with prevailing later types, i.e., 1<sup>st</sup>-2<sup>nd</sup> century AD onwards.

**Preliminary conclusions**

The overall assessment of the occupation in trench A will have to await a possible re-examination of some ceramic datings, especially as related to Phases 2, 3, 5 and 6. However, some preliminary comments can be now offered here:

1/ With regard to the ceramic dating which, at times, seems to be much at variance with the stratigraphic situation, it should be stated that the stratigraphy at the site was relatively clear and straightforward and with one exception (*loci* 90026 and 90032) no serious on-site or post-excavation contamination among the material from specific strata should be considered.

Furthermore, the site did not witness any major re-deposition of strata, extensive ancient digging into existent strata, etc.

2/ At least with regard to the relative chronology, as derived from the stratigraphic situation, the occupation at the site was seemingly not long-lasting (unless the redating of ceramics will conclusively indicate the presence of 2<sup>nd</sup> and 3<sup>rd</sup> century types). Basically, the occupation in trench A can be dated to the mid/late 1<sup>st</sup> century BC – later/end of the 1<sup>st</sup> century AD (possibly later?), so presumably not much more than 100 years. Nevertheless, within this time-period, many changes had occurred within the relatively small space of trench A, i.e., the occupation was intensive and dynamic.

3/ Similarly to the situation in Area 2, the early occupation is manifested by mudbrick constructions which, however, continued to be in use (reuse) with the appearance of stone architecture. The latter occurs at the site already towards the end of the 1<sup>st</sup> century BC (Phase 3, Lower House). Similarly, to the southern sector of Area 2, trench A did not produce any tangible, well-dated remains related to the later (Roman-Byzantine) periods.

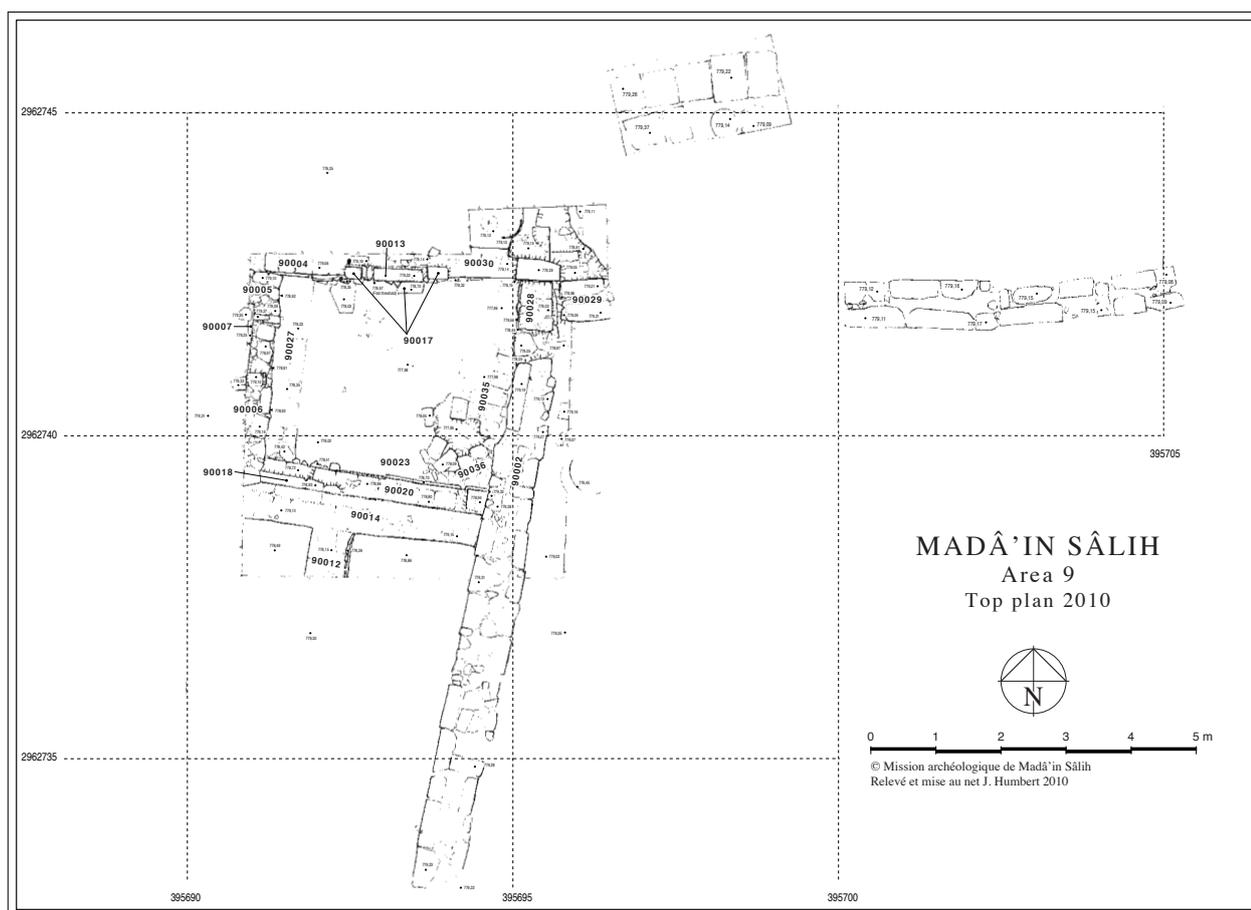
4/ Generally, Area 9 shows high potential for further investigations. Perhaps the opinion (already postulated for Area 2) can be further reinforced that the settlement at Madâ'in Sâlih displays a high degree of intra-site spatial variability in occupation. Apparently, while the occupation at the settlement, in general terms, continued from the 1<sup>st</sup> century BC until the 4<sup>th</sup>/6<sup>th</sup> century AD, some areas were more intensively occupied, then abandoned, the occupation would start elsewhere etc. In short, it appears that the local foci of occupation at the settlement site constantly “moved” both in spatial and temporal terms.



**Fig. 1.** General view of Area 9 from the north



**Fig. 2.** Fallen column northeast of trench A



**Fig. 3.** General plan of the site (preliminary drawing)



**Fig. 4.** Wall 90035 in the center left, installation 90036 to the right, from the northwest

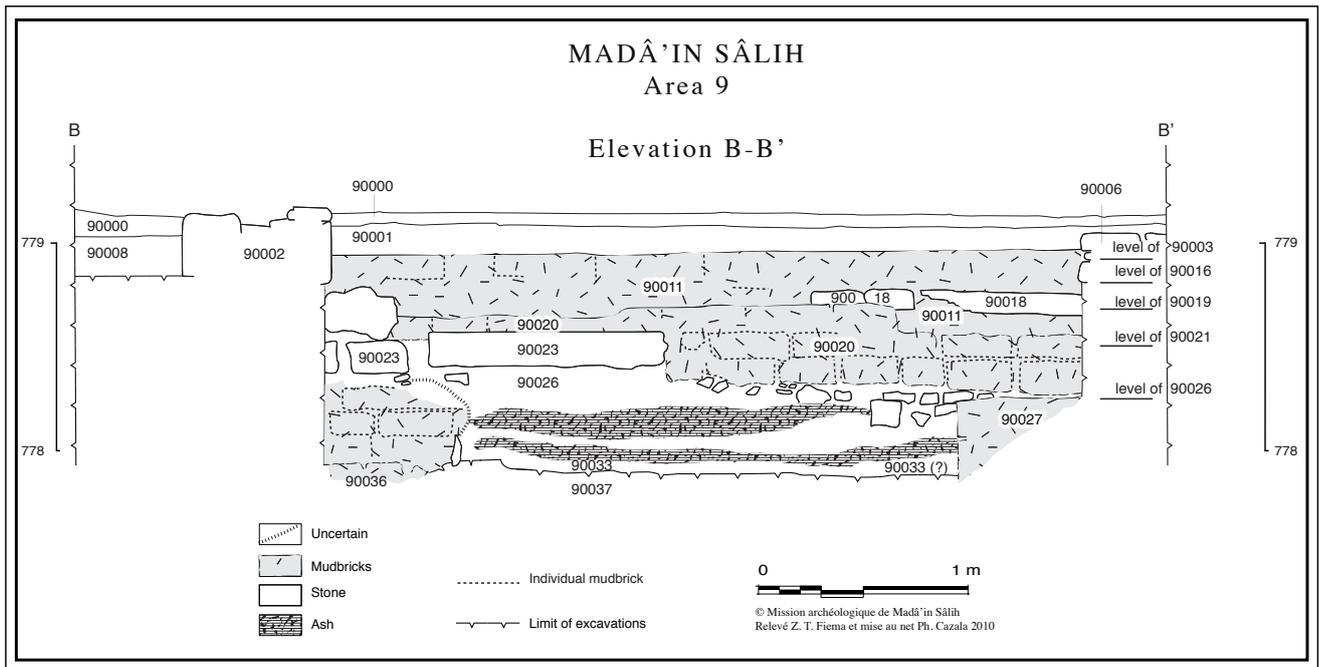


Fig. 5. Elevation B-B' (south)



Fig. 6. Wall 90027 in the bottom and 90005+90006 above, from the east



Fig. 7. Ash, locus 90032, from the north



**Fig. 8.** *Locus* 90026, from the west



**Fig. 9.** Wall 90020. The top of the ash 90032 is visible

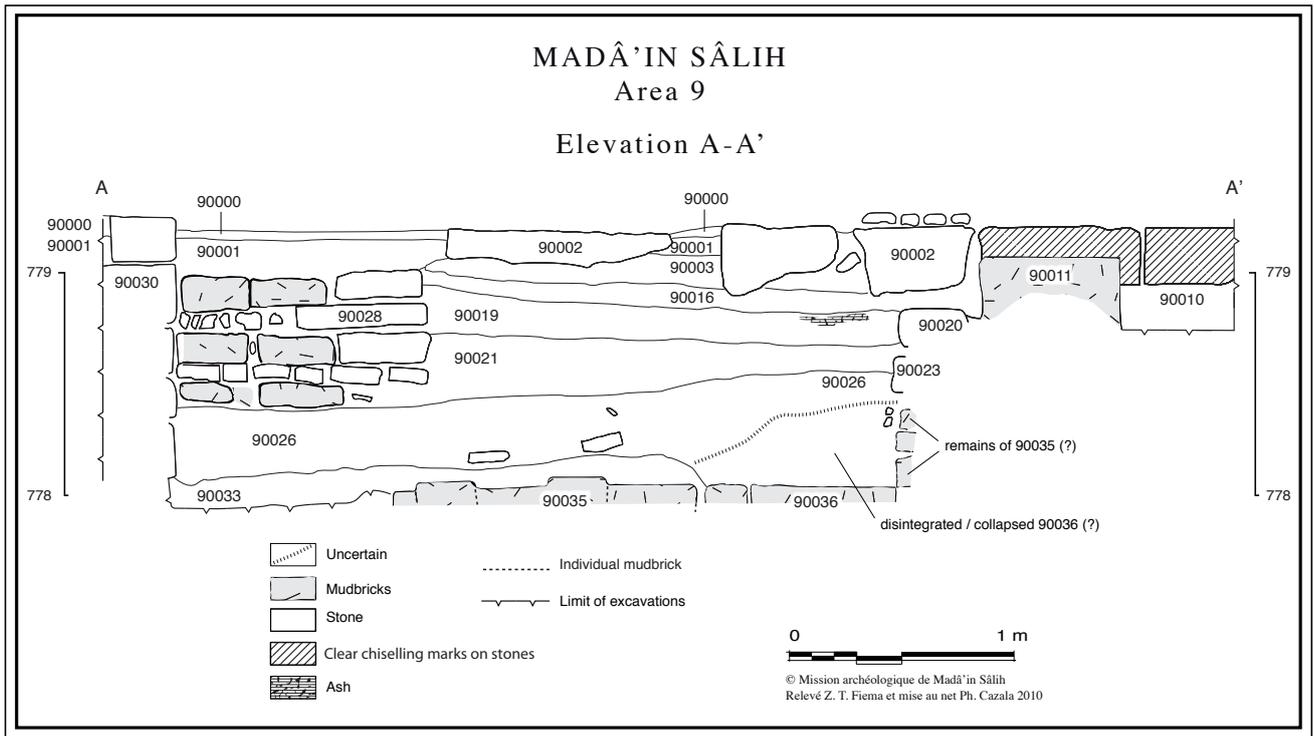


Fig. 10. Elevation A-A' (east)



Fig. 11. Wall 90028, from the southwest.  
In the extreme left is the corner section of wall 90030





**Fig. 15.** *Locus* 90021. Walls *loci* 90011 and 90020 are to the right. The ashy area is the upper left.



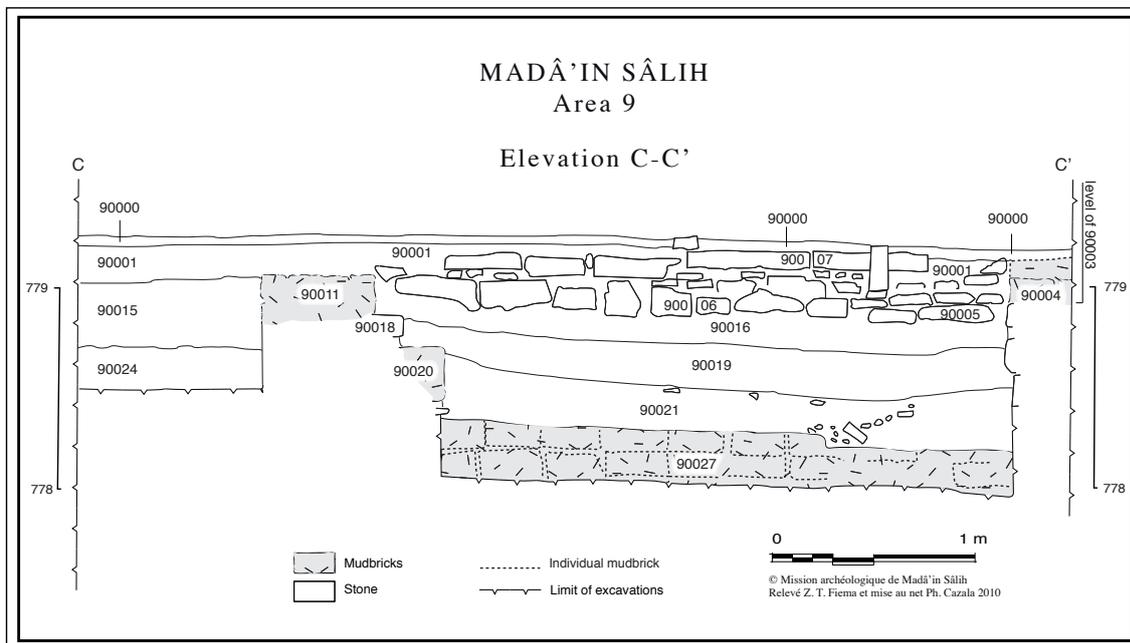
**Fig. 16.** Stamped amphora handle 90021\_P10



**Fig. 17.** Terracotta figurine of a horse 90021\_TF01



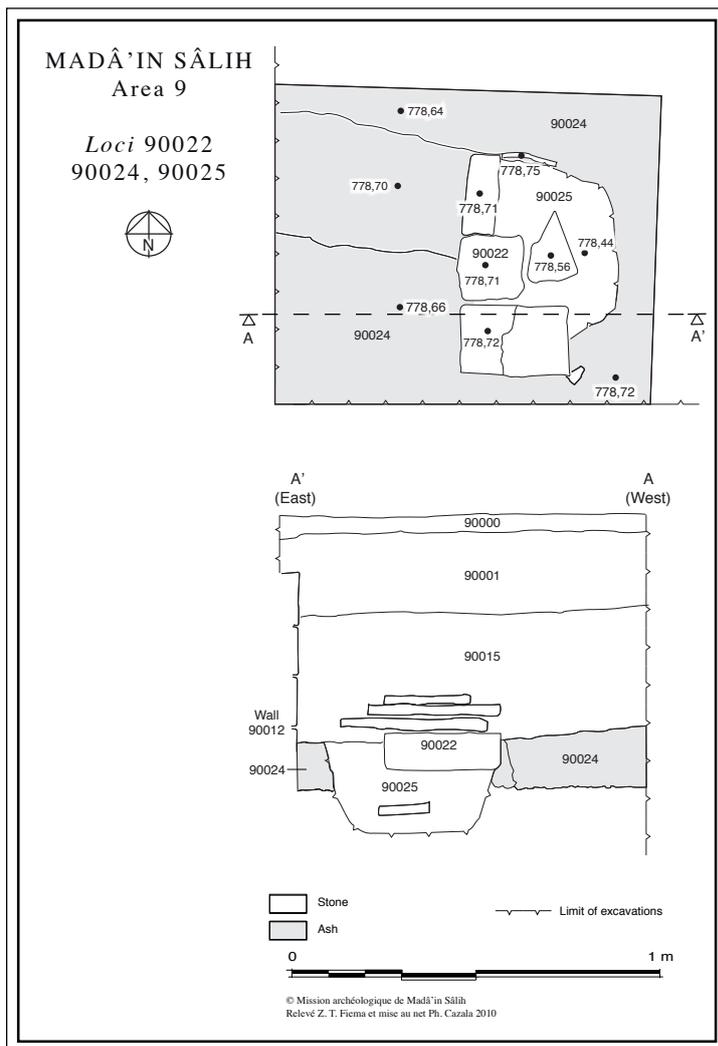
**Fig. 18.** Locus 90016, from the south



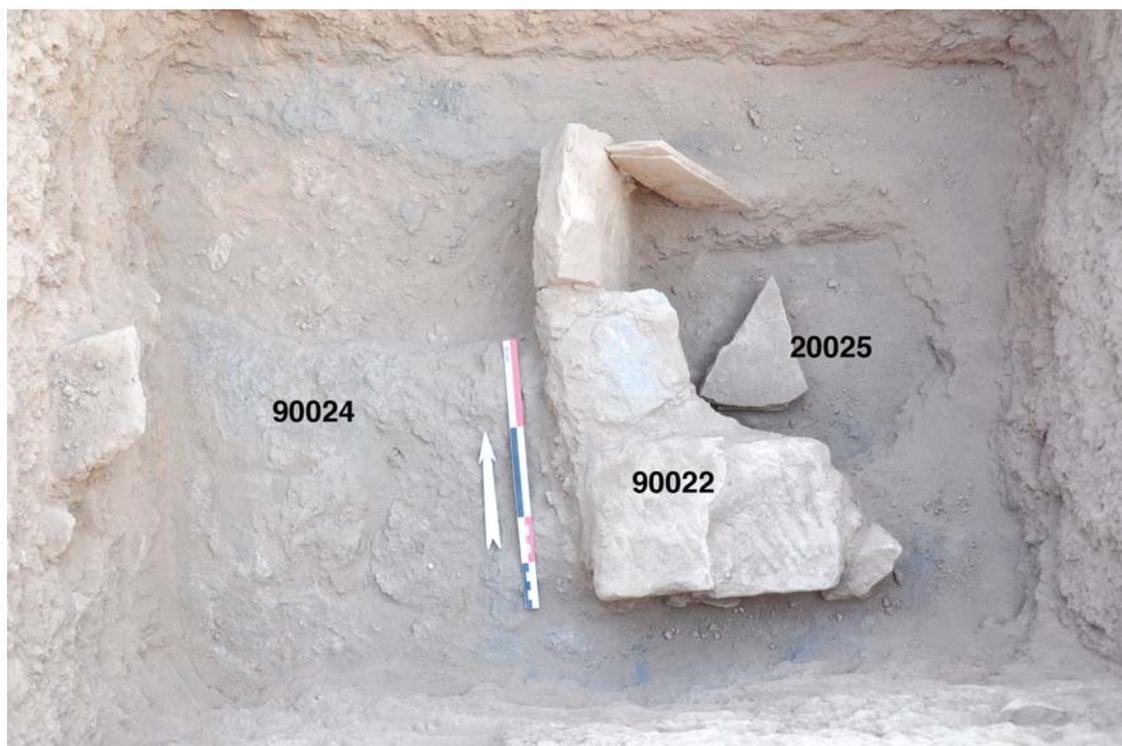
**Fig. 19.** Elevation C-C' (west)



**Fig. 20.** Locus 90003. Installation 90013 in the foreground and wall 90002 to the left



**Fig. 21.** Loci 90022, 90024 and 90025. Top view and east-west section



**Fig. 22.** Loci 90022 (installation), 90024 (surrounding soil) and 90025 (fill)



**Fig. 23.** Locus 90009, from the northeast



**Fig. 24.** Locus 90014, from the east



## **Geomagnetic Survey**

Christophe Benech (UMR 5133 Archéorient, Maison de l'Orient et de la Méditerranée)



## Geomagnetic Survey

Christophe Benech (UMR 5133 Archéorient, Maison de l’Orient et de la Méditerranée)

This season of geophysical survey on the site of Madâ’in Sâlih was carried out between 26 January and 10 February 2010. Its aim was to test the feasibility of a geomagnetic survey to study the central part of the site, that is the so-called “residential” area, which covers about sixty hectares. The geomagnetic survey previously conducted by A. Kermorvant (University of Tours) had produced encouraging results: the resulting map clearly showed areas of construction but their general organisation and the extent of the buildings detected were difficult to analyse. It seems that the lack of precision was due to the resolution chosen for the field measurements and to the sensitivity of the instrument used. Therefore, it was important to see if it was possible to obtain better results with a more sensitive instrument with a finer grid of points.

Three areas were tested (fig. 1): the first was in the north, in the area of the rampart to the east of the Northwest Tell (Area 32); the second was in the centre of the residential area, between the excavated Areas 2 and 8; the third was in the southwestern part of the site, around Area 9, where a trench was opened in 2010. In all, about three hectares were covered.

### Geomagnetic survey and environmental setting

The geomagnetic survey was carried out using a G-858 Cesium magnetometer (Geometrics), measuring a vertical gradient (fig. 2). The recording speed along the lines was 0.1 second, in other words a measurement about every 10 cm along parallel lines spaced 1 m apart.

The archaeological site is located in a semi-desert environment, with an ancient wadi on the west side.<sup>1</sup> The soil is composed of clayey sand mixed with pebbles, with sandy bands in places supporting a fairly low vegetation of small bushes. The site is crossed by a network of small ravines cut by the strong rains that fall irregularly in this region. These ravines are sometimes relatively deep and in some areas, one can see that the water eroded away quite a lot of archaeological remains.

---

1. For details of the environmental setting see J.-B. Rigot, “Le site de Madâ’in Sâlih dans une perspective géoarchéologique”, in L. Nehmé, Th. Arnoux, J.-Cl. Bessac, J.-P. Braun, J.-M. Dentzer, A. Kermorvant, J.-B. Rigot, I. Sachet, L. Tholbecq, “Recherches menées de 2001 à 2003 dans l’ancienne Hijrâ des Nabatéens”, *Arabian Archaeology and Epigraphy* 17, 2006, p. 41-124.

From the perspective of a geomagnetic survey, this type of environment does not pose any particular problem, except in sandy area because a thick layer of sand can limit the detection of archaeological structures. The major part of the residential area does not seem to have been affected by ancient agricultural activities, except in the northern part and towards the west, along the wadi. The only modern developments which are an obstacle to the extension of the geomagnetic survey are the two fences around the residential area. One can predict that the survey will give no results for a width of about fifteen metres either side of the fences because the magnetic signal will be saturated by any metal object.

### Northern rampart

This is a flat, clayey area on which there is a small tell studied in 2008 and 2009 by F. Villeneuve<sup>2</sup> (fig. 3). The excavations revealed the presence of a stretch of mudbrick rampart marking the northern limit of the residential area. A geomagnetic survey was carried out along the eastern edge of the tell, over a band 50 m wide and 130 m long, to try to locate the continuation of the rampart in that direction, as well as for the possible presence of any *intra muros* constructions.

From the environmental point of view, the flat surface produces a relatively weak and homogenous magnetic response which clearly shows that the ground is formed entirely of a thick layer of clay (fig. 4). The strongest anomalies correspond to recent disturbances of the ground. The southeastern corner of the tell, in particular, is very clear and forms almost a right-angle. The area was bulldozed in the 20<sup>th</sup> century to level the ground and create new cultivated fields: the tell must have been a hillock that was not flattened and against which the machines piled the earth, which explains why archaeological structures were found only in this spot. If one overlays the geomagnetic map on the excavation plan of the tell (fig. 5), one can see the presence of a weak linear magnetic anomaly in the line of the extension of the rampart. A rapid archaeological sounding over this anomaly, carried out by F. Villeneuve in 2010, confirmed the presence of the rampart here. Two courses of mudbrick were preserved (fig. 6). All the other archaeological remains were probably destroyed by the bulldozer.

### Central part of the residential area

The second geomagnetic survey was placed near to the currently excavated Areas 8 and 2. The aim was to be able to compare the excavated structures with those visible on the magnetic map. A rectangular area of 150 x 100 m was covered, bordered on the north side by Area 2, and including Area 8 where the excavation, directed by S. Marion de Procé, had just begun and was accessible to the survey.

The geomagnetic map revealed a much more disturbed ground than in the area of the Northwest Tell: these disturbances are mainly due to the erosion caused by the intermittent flows of runoff that cross the site after heavy rainfall (fig. 7). Numerous ravines have formed and in places have destroyed the

2. Cf. the contribution by F. Villeneuve in L. Nehmé, D. al-Talhi and F. Villeneuve, *Report on the First Excavation Season at Madā'in Sālih, Saudi Arabia, 2008*. Riyad, p. 168-175.

archaeological remains. Nevertheless, the map shows numerous buildings located on the slight rises that have better resisted erosion (fig. 8). Thus, in the northwest corner of the map, one can see the trace of many ravines whereas the buildings stop suddenly.

In the better-preserved areas, the plans of the buildings appear clearly enough, only disturbed by small, local anomalies caused by small basalt blocks that can be found more or less all over the surface of the site. A slight smoothing of the magnetic data lessens the effect of these disturbances and brings out better the anomalies linked to archaeological structures. The area surveyed is too small to produce an overview of the area or to allow a detailed interpretation of the map, but it is sufficient to evaluate the type and quality of results that can be expected from a geomagnetic survey.

The first observation resulting from the examination of the map is the very clear difference of the magnetic response of archaeological structures according to their orientation. Walls that are close to an east-west alignment produce a much stronger magnetic signal than those that are oriented approximately north-south. This phenomenon is so generalised that the difference cannot be linked to the state of preservation of the structures. Nor does it seem to be due to the orientation of the survey lines, which are slightly at an angle in relation to the structures and thus cut across all the walls, whatever their orientation. The question remains to be investigated further, but it is possible that the geographical position of Madâ' in Sâlih in relation to the earth's magnetic field has an effect. In fact, as one gets closer to the magnetic equator, the north-south anomalies have a weaker amplitude than the east-west anomalies.<sup>3</sup>

Despite these problems, the geomagnetic map contains a lot of information on the organisation of the remains in this area: the lines of streets and the limits of buildings appear very clearly, but their internal layout is rather difficult to understand. An internal division into small rooms is distinguishable but the east-west walls are more visible than the north-south walls and it is therefore more difficult to reconstruct the north-south divisions.

Area 8 was placed on the south wing of a huge U-shaped building, the branches of the U measuring about 46 x 34 m. Comparison between the geomagnetic map and the walls excavated in Area 8 reach the same conclusion (figs 9 and 10): the east-west walls produce nice linear anomalies that are easily followed for their whole length, whereas the north-south walls produce weaker anomalies that more or less mix in with the background noise of the map. As for the preservation of the walls, it is almost the same whatever their orientation.

A second building, smaller but also U-shaped, forms an extension of the north wing of the previous building (fig. 11). It is difficult to say whether this is an independent building. A passageway seems to appear on the geomagnetic map. However, several anomalies with an east-west orientation indicate that a series of rooms, with badly preserved walls, may have been built over this hypothetical passageway. We cannot determine whether an access existed between the two buildings, but the party wall, which

---

3. For a discussion of this phenomenon in archaeology, see A. Hesse, "Applications de méthodes géophysiques de prospection à l'étude de sites préhistoriques et protohistoriques", *Paléorient* 1(1), 1973, p. 11-20.

appears very clearly, suggests the existence of two distinct units. This second building measures 21 m across the base of the U and 26 m for the arms. Even though one must be cautious when analysing the internal organisation of the buildings visible on the geomagnetic map, the plan of the second building seems simpler than that of the first one, and to have fewer rooms. The base of the U appears to be divided into two large rooms and the arms are composed of a single row of rooms whose north-south divisions remain to be established.

All the area to the south of these buildings is empty of structures, but the aerial image shows that a major ravine surrounds the existing buildings. It might have eroded away any archaeological structures. Other buildings appear, on the west and south parts of the geomagnetic map, but they extend beyond the area surveyed so far. Therefore, it is better to wait for an overview of their plans and extent before attempting an interpretation.

The geomagnetic map also reveals a street that runs along the western side of the first, huge U-shaped building. Its line is continuous and it crosses the whole surveyed area; it is interrupted twice where it has been destroyed by the ravines. The stretch visible in the south part of the map is wider (about 5.50 m) than the stretch alongside the building (only 3.50 m). It seems that the building on the west side of the street<sup>4</sup> encroached on the street by building an extra row of rooms. Incidentally, it is easy to follow the line of the original façade.

### **The survey around Area 9**

This area is in the southwestern part of the site and excavations began here in 2010 under the direction of Z. T. Fiema. The surface survey and excavation revealed the presence of many remains across the whole area which forms a slight rise. The survey was carried out beside a grove of trees (see fig. 1), covering a band of 50 x 100 m. It included the excavation area, but since work had already begun, the trench itself had to be avoided, and the data recorded in this exact place must not be taken into account in the interpretation of the results. The survey area was slightly reduced where ancient barbed wire fences and undergrowth made the survey impossible.

The geomagnetic map displays the same phenomenon as in Area 8, that is to say the structures oriented east-west produce a strong magnetic response whereas those oriented north-south appear very weakly (fig. 12). A series of walls visible on the surface were revealed by a light surface scraping (figs 13 and 14). The majority of these walls are oriented east-west and appear very well on the geomagnetic map. On the other hand, the few examples of walls aligned north-south barely appear or do not appear at all on the map. Thus, what is revealed on the geomagnetic map is in accordance with the observation of the remains *in situ*.

The results also reveal two quite distinct regions that divide the area more or less from north to south. In the eastern part, the strong anomalies oriented east-west correspond to walls, some of which are

---

4. A detailed description of this building is impossible because it is clear that most of it has been destroyed by the ravine which crosses the northwestern corner of the map.

visible on the surface. Most of these walls extend eastwards beyond the surveyed area. Conversely, in the western part, the walls are all interrupted along a curved line which can be followed along almost all its length. One of the north-south aligned walls, which was found on the surface, also marks this limit. It does not seem that this division was due to a flow of water, which would have destroyed the structures. Indeed, the map does not show disturbances created by ravines like those seen in Area 8. In addition, other structures are present in the western part of the map and although the magnetic amplitude of the anomalies is weaker, they seem to be well preserved. The whole group of structures, which are all more or less on the same alignment, in fact seem to be divided by an irregular alley which crosses the map from north to south. In the south the line of the alley is lost at the point where the anomalies give way to a less built-up area. It is too soon to draw definite conclusions on the plan of this area and an extension of the survey would allow a better understanding of the general characteristics of the occupation which, as we have seen for this area, can be deduced from the geomagnetic maps if the surface studied is large enough.

Similarly, it is too soon to attempt to distinguish the different units of the buildings which appear in the eastern part of the map because the anomalies continue further east. On the western side, it seems that a few units can be distinguished which might perhaps extend further westwards.

### **Conclusion and future possibilities**

This preliminary season of geomagnetic survey on the site of Madâ'in Sâlih has produced some encouraging results whilst establishing the interpretative limits of a geophysical reconnaissance on the scale of the whole site. We have seen, particularly around Area 8 (the largest area surveyed) that it is possible, based on the geophysical maps, to determine the main characteristics of the occupation of the site's residential area. Despite the disturbances, one can identify and draw the limits of the extent of the various buildings, even if their internal plans remain generally difficult to understand. The lines of the streets are also clearly visible and further survey ought to allow the reconstruction of the urban organisation of the town, at least for the parts that have not been destroyed by water erosion. The main problem is the variability of the magnetic response according to the orientation of the archaeological structures. If the hypothesis suggesting that the phenomenon is due to the geographical position of Madâ'in Sâlih in relation to the earth's magnetic field, there is no way to balance the different magnetic responses.

The interpretation of the results of Areas 2, 8 and 9 together might allow to go further in the detailed interpretation of the geomagnetic data and to identify the "geophysical signature" of various types of the structures whose response might be different, particularly according to the building materials used.

Therefore, it seems very worthwhile to continue the geomagnetic survey of the site. A complete coverage of the residential area is possible, except for a width of about 15 m on each side of the metal enclosure fences. The priority, for the 2011 season, is to extend the survey around Areas 8 and 9 in order to obtain a larger area for analysis and to continue the interpretation the initial stage of which has been presented above. It is essential to deal with several hectares in order to obtain the most complete information

possible on the magnetic reactions of the soils and, of course, of the archaeological remains. The area around Area 8 and all the part that extends westwards seem to form a slight rise which has mostly not suffered from the cutting of the ravines. It is there that the 2010 survey produced the best results and it is an area to which priority should be given.

An extension to the south of Area 8 is also possible: the sand is not a real obstacle as long as the layer is not too thick, which seems to be the case. We need to determine the state of preservation of the soils and of the remains under the sand. It is also possible that we find ravines that are currently hidden.

The central part of the residential area forms a slight depression which has been very disturbed by the runoff of rainwater. It is probable that many structures have been destroyed and thus this area is not a high priority. The northwestern part of the site seems to have resisted better, as demonstrated by the excavation in Area 1, by G. Charloux. A geomagnetic survey there should also produce interesting results which would then be compared with the results from the excavation.



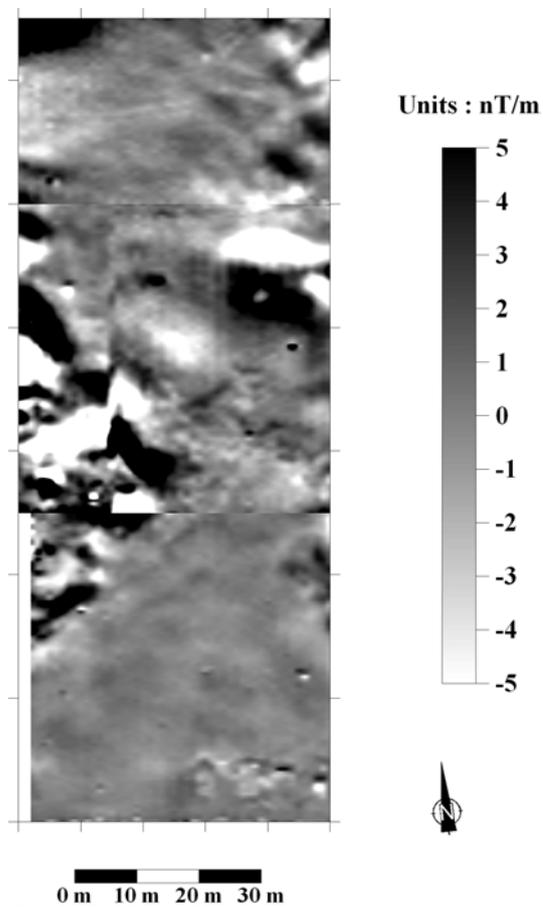
**Fig. 1.** Location of the areas surveyed in 2010



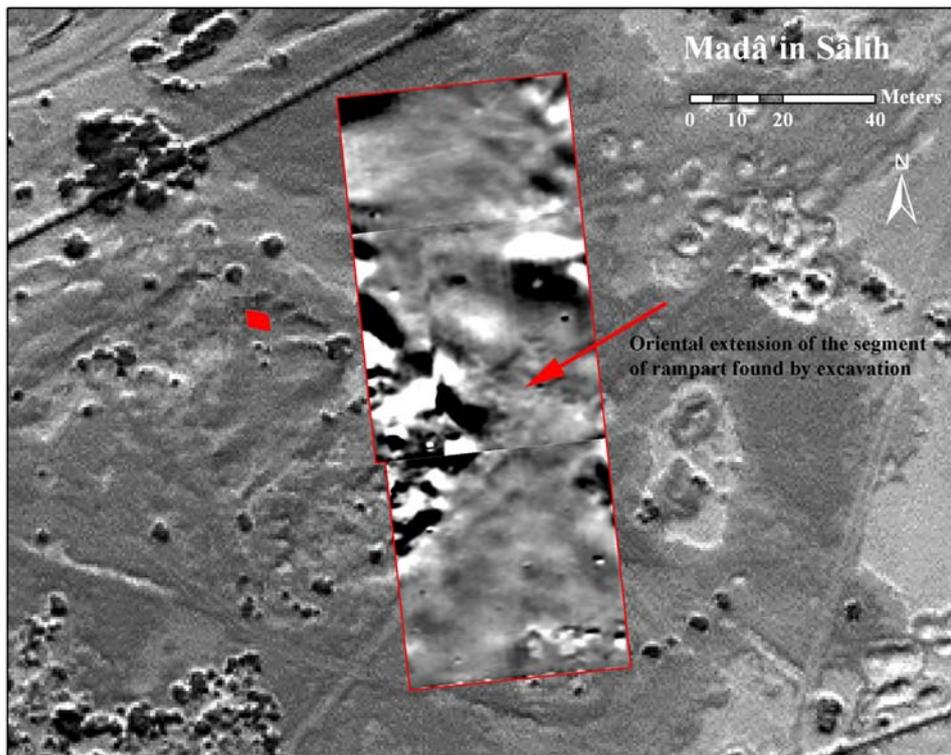
**Fig. 2.** The G-858 Cesium magnetometer (Geometrics) used in Madâ'in Sâlih



**Fig. 3.** View of the area of the northern rampart. In the background, to the right, the western edge of the Northwest Tell, excavated in 2008 and 2009



**Fig. 4.** Geomagnetic map of the northern rampart (see **Fig. 1**)



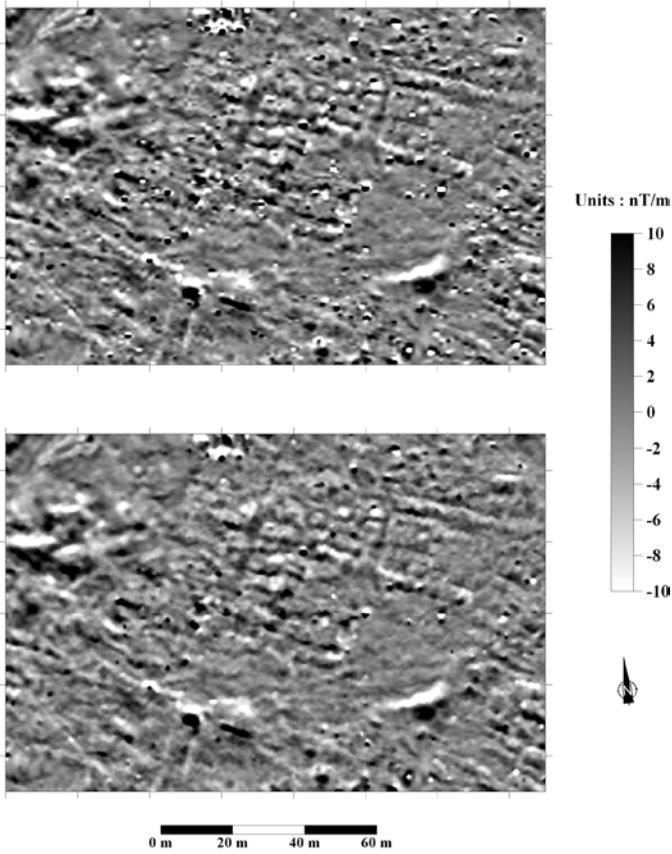
**Fig. 5.** Overlay of the geomagnetic image of the northern rampart area on the QuickBird satellite image. The excavated part of the rampart is shown in red



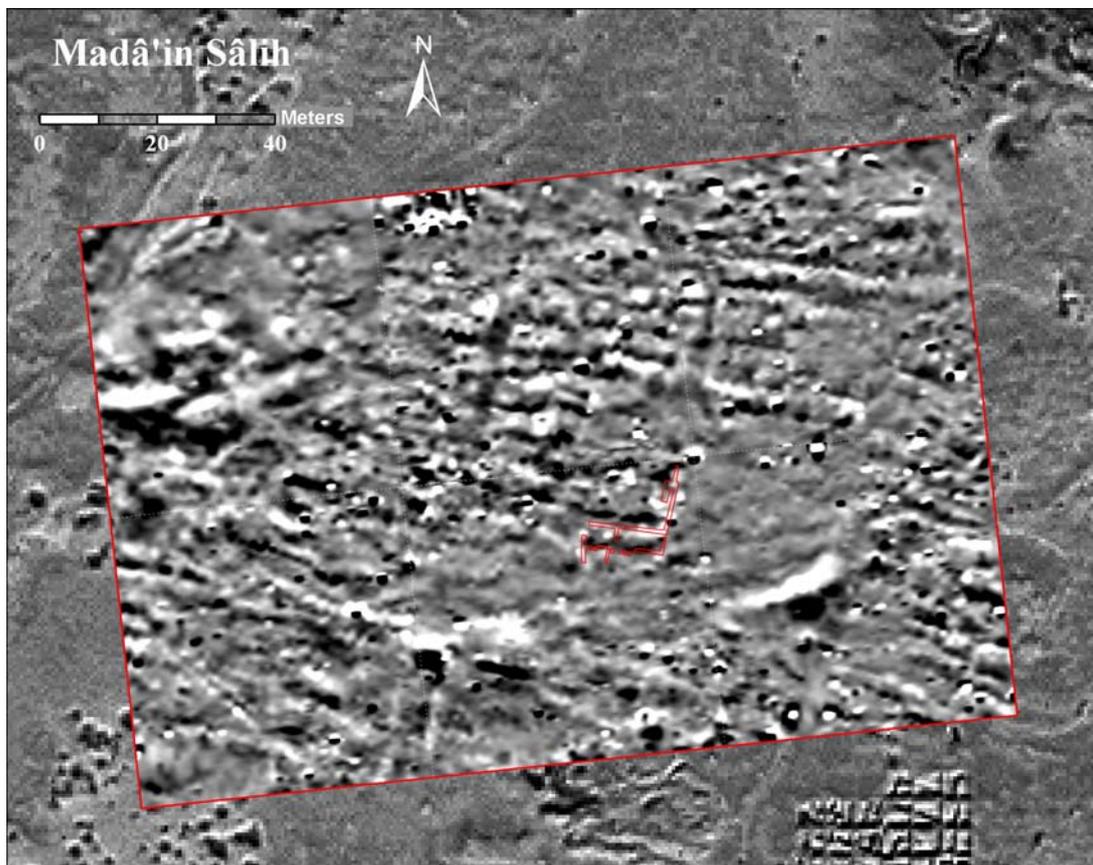
**Fig. 6.** View of the small archaeological sounding opened by F. Villeneuve on the magnetic anomaly showing the presumed line of the rampart. Two courses of mudbrick are still preserved



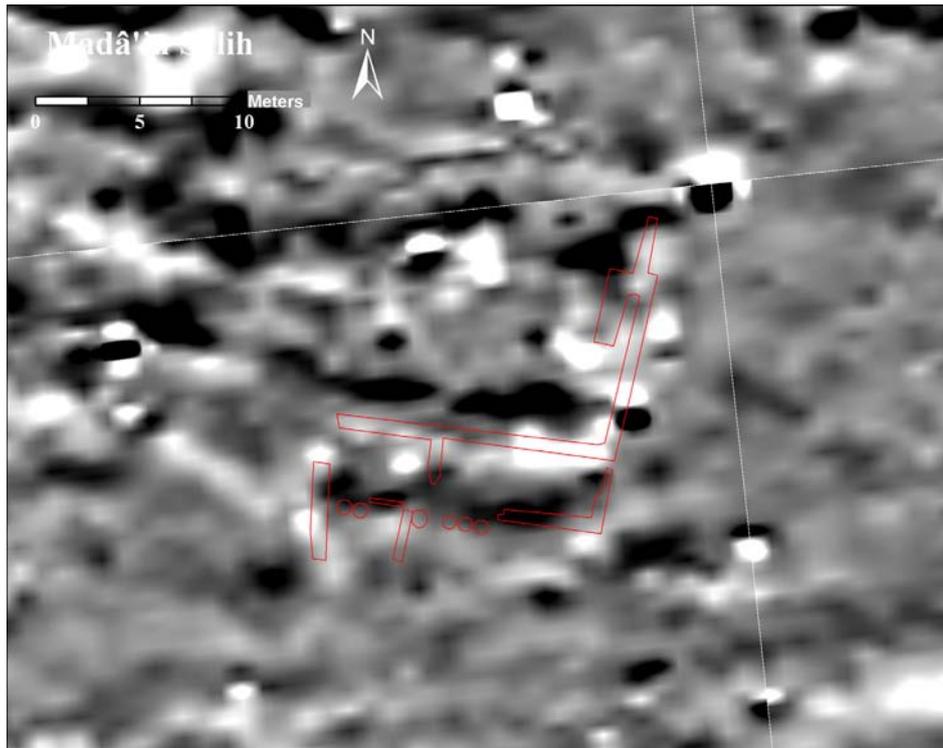
**Fig. 7.** Example of a ravine crossing the site: they can sometimes be relatively deep, as is the case here. In the background, Area 8 is being excavated



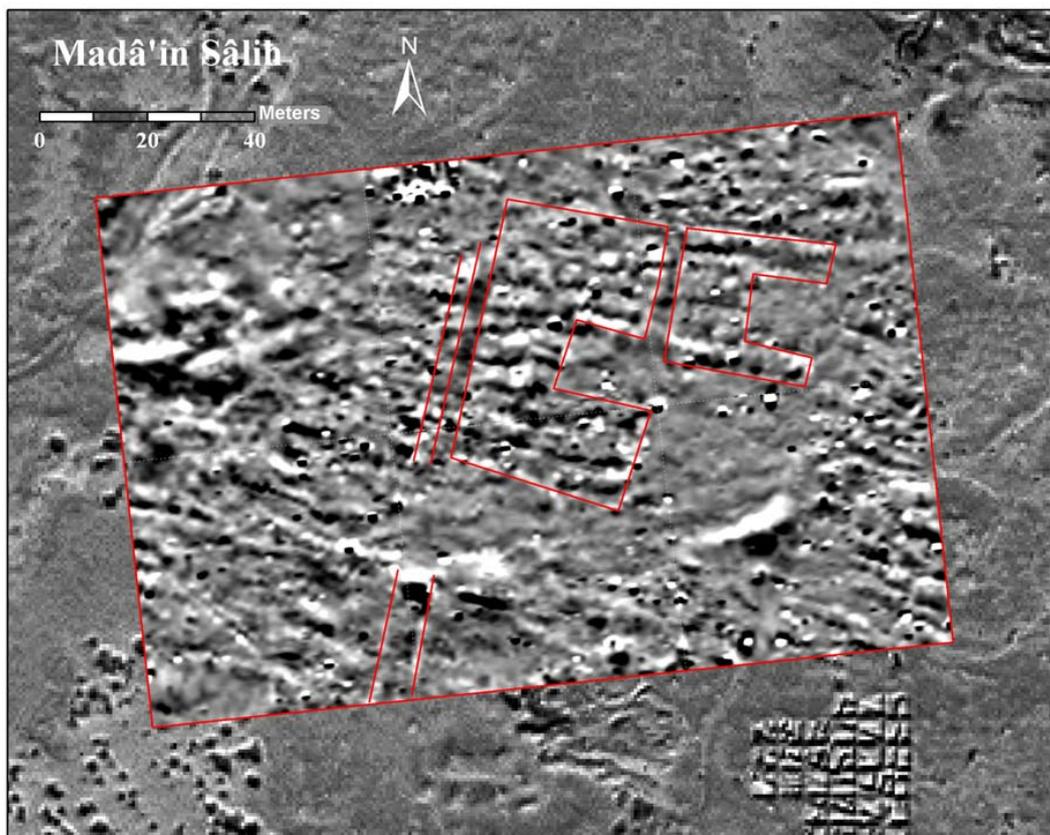
**Fig. 8.** Geomagnetic map of the central part of the residential area (see **Fig. 1**). The results show some disturbances due to the presence of small basalt boulders (above), and the data have been slightly smoothed out to allow a better reading of the anomalies (below)



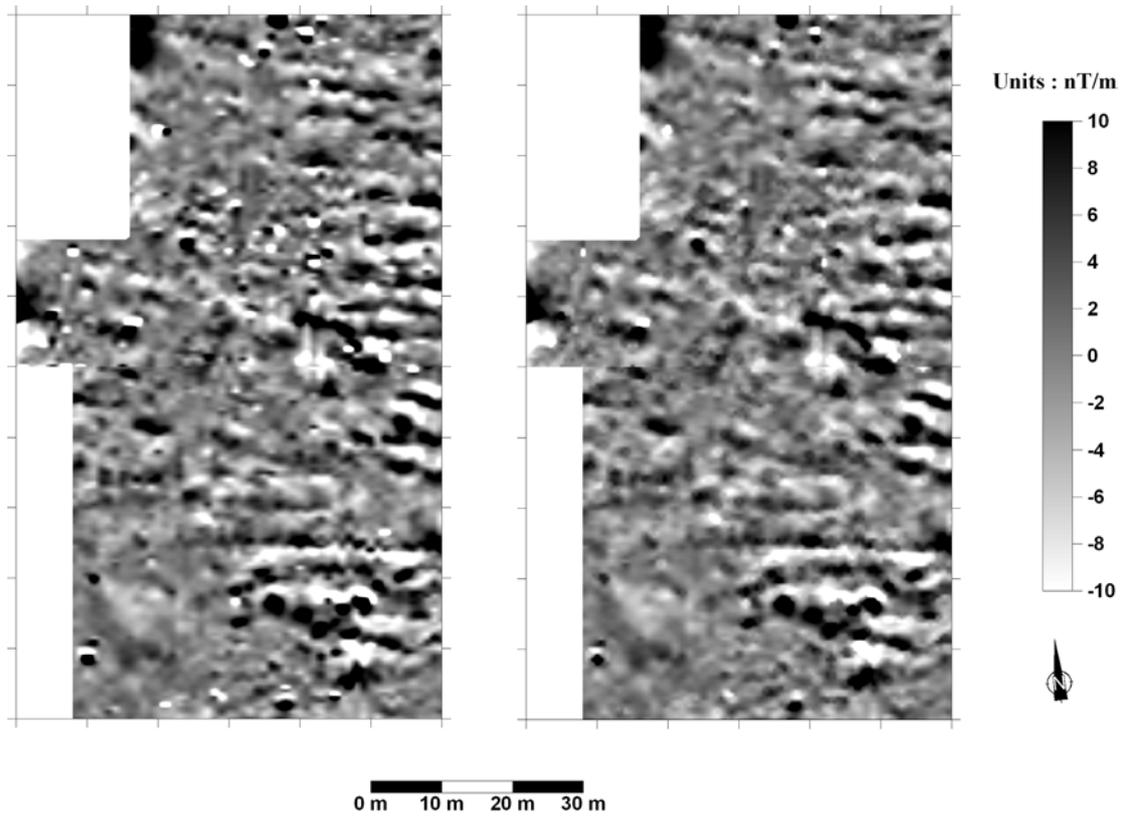
**Fig. 9.** The geomagnetic map of the central part of the residential area over the satellite image. The buildings exposed in Area 8 when the survey was made are shown in red



**Fig. 10.** Detail of the main structures in Area 8 on the geomagnetic map



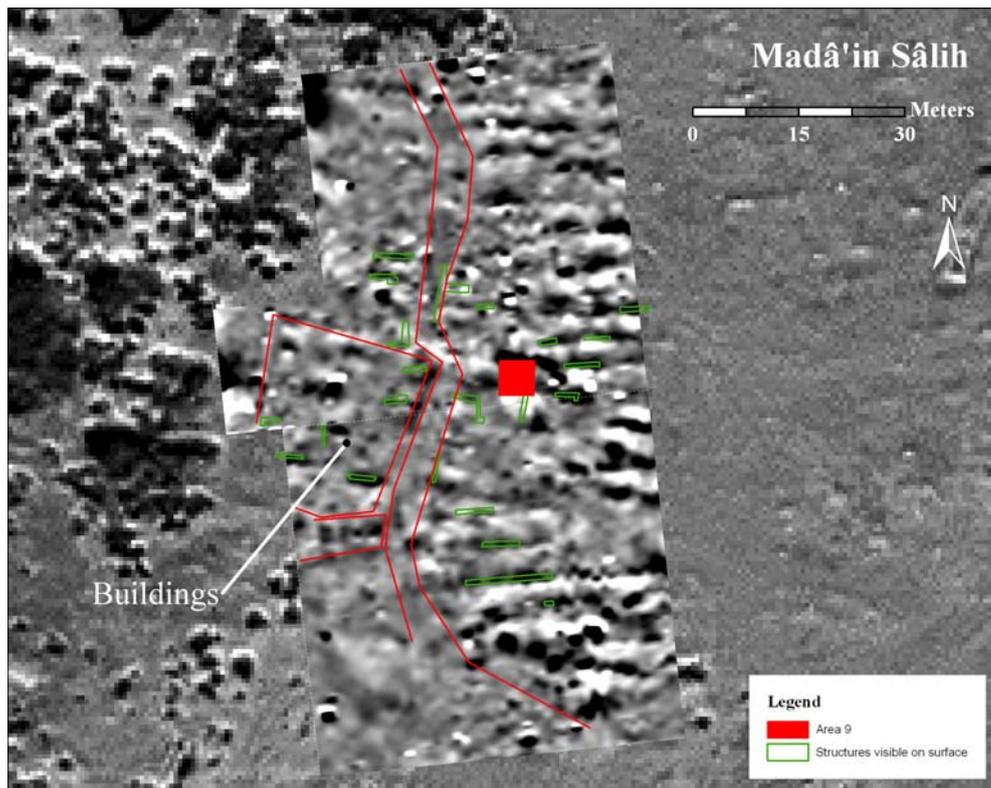
**Fig. 11.** Reproduction of the main identifiable elements on the geomagnetic map



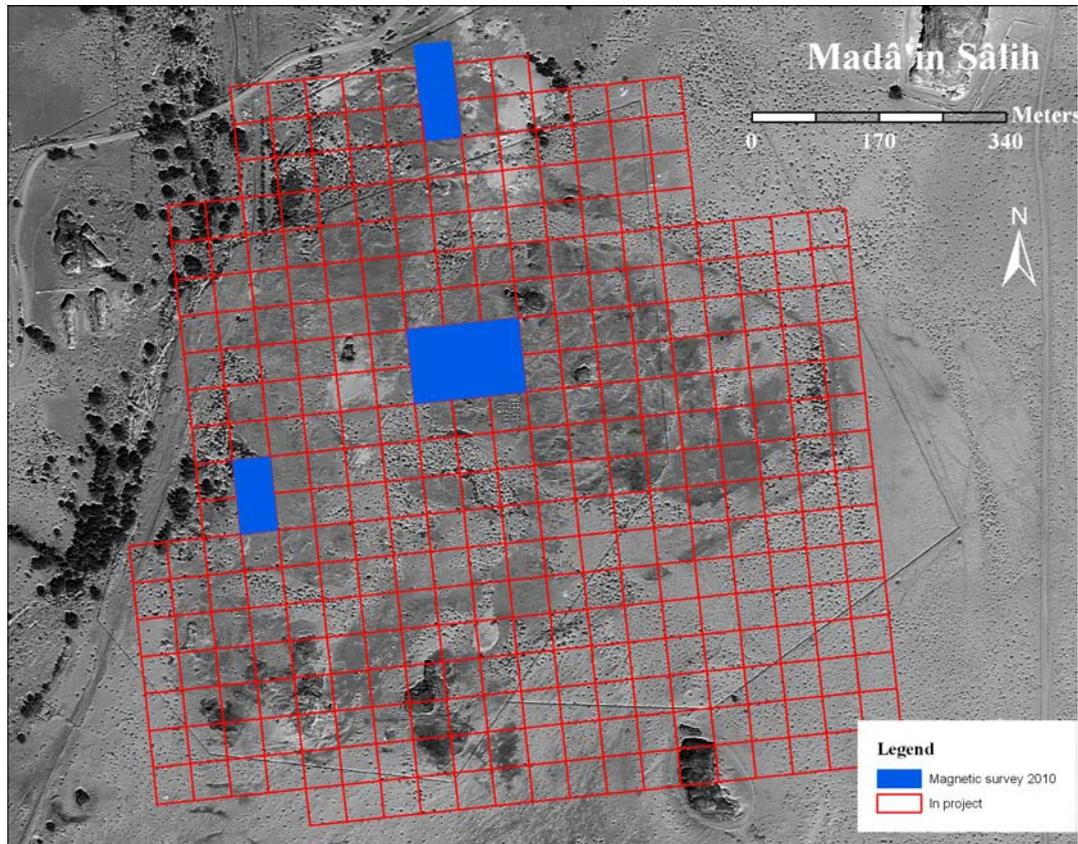
**Fig. 12.** Geomagnetic map of Area 9 and its surroundings (see **Fig. 1**)



**Fig. 13.** Example of walls identified on the surface near Area 9



**Fig. 14.** Superposition of the geomagnetic map and satellite image. Reproduction (in red) of the main elements visible on the geomagnetic map and the position (in green) of the walls identified on the surface



**Fig. 15.** The geomagnetic survey (squares of 50 x 50 m) superimposed on the satellite image



# **Archaeobotanical Report**

Charlène Bouchaud (University Paris 1)



# Archaeobotanical Report

Charlène Bouchaud (University Paris 1)

## Introduction

The aim of the 2010 season was – as in 2009 – to examine the plant macro-remains found at the site. We focused this year on various sectors of the residential area. Previous studies had highlighted the presence of a palm grove during all periods of occupation. This palm grove was probably cultivated in a three-tiered structure: the date palms occupied the upper level, providing the shade and humidity needed to protect both the fruit trees (olive, grape, fig), which grew at the middle level, and the cultivated cereals, pulses, aromatics etc., which grew at ground level. The present study completes the previous ones in the sense that it provides a better understanding of the agricultural production and the evolution of the ancient vegetation at Madâ'in Sâlih during the Nabataean and Roman periods and later.

## Sampling and processing

Sediment samples were collected by the archaeologists in ashy layers of Areas 1, 2, 6, 8 and 90. The sediments were associated with well-defined structures such as fireplaces, ovens, pits and diffuse ashy layers, found either around fireplaces or appearing independently during the excavation. They contained carbonized plant remains and were processed by **flotation**. Some carbonized wood were **picked by hand** on the field and did not require flotation.

Some samples were processed by **dry sieving**:

- samples from Area 6: *triclinium* Ith78 and IGN 132 which contained desiccated remains;
- samples from Area 1 which: post holes which may contain micro-fauna.

In addition, building materials (wall cob) containing desiccated and carbonized plant remains were recovered from Area 8 and 6. Some of them were completely destroyed and mixed with sediment samples processed with flotation (i.e. Area 8). Others were well preserved and did not require any treatment.

Sieves used for flotation and dry sieving had a 0.5 mm average mesh.

Fig. 1 sums up some of the raw data obtained by the archaeobotanical study conducted during the first three seasons at Madâ'in Sâlih. A total of 145 samples (1509.8 liters) were processed by flotation and 21 samples (89.6 liters) by dry sieving; 66 samples were picked by hand.

Among the samples collected in 2010, 60 contained seed and fruits remains (“carpology”)<sup>1</sup>, mainly preserved by carbonization, and 76 contained carbonized wood (“anthracology”).

Botanical remains were studied using a binocular and a transmitted-light microscope.

---

1. The term “carpology” includes seeds, fruits, plant inflorescences as well as coprolites.

## Results

### Data

Fig. 2-7 summarize the results of the “carpological” and “anthracological” analysis for each area. When possible, samples are arranged by chronological period<sup>2</sup>. “Phases” indicated in each chart concern the relative chronology used by the archaeologist in charge of each area.

At this state of the art, the large chronological phases used to classify plant macro-remains are:

- Proto-Nabataean period (before the 2nd half of the 1st century BC) in Area 1;
- Nabataean period (2nd half of the 1st century BC – end of the 1st century AD) in Area 1, Area 2 (loci 20000, 21000, 22000, 23000, 25000), Area 3, Area 6 (loci 60000) and Area 8;
- Roman-Late Roman (2nd-3rd century AD) in Area 1 (?), Area 2 (loci 22000, 25000) and Area 6 (loci 60500, 60600?);
- Late Antiquity (4th – 6th/7th century AD) in Area 1 and Area 2 (loci 22000, 25000).

The results are preliminary. Identifications will be added and clarified later. Moreover, statistical processes (percentages, “mean value”, correspondence analysis) will help to emphasize possible differences between the areas and the evolution of the plant spectra.

Some samples do not contain “carpological” or “anthracological” remains and this is indicated by shadings.

### Archaeological layers

Different types of layers were sampled. We decided to separate “**concentrated**” layers from “**diffused**” layers according to the information given by the archaeologists. “Concentrated” layers contain plant material burnt *in situ*. They correspond to fireplaces and *tâbûn*. “Diffused” layers bring together archaeological contexts which contain burnt plant material resulting from a secondary (or more) deposit, such as soil, post hole, disuse layer, filling, etc.

For each sample for which we have all the required data – floated and carbonized volume, number of seeds – the ratio (i.e. burnt volume / floated volume) and density (number of seeds per litres) are calculated<sup>3</sup> (fig. 8-11).

For the “concentrated” layers, the ratio of burnt plant material fluctuates between 2.5 (*locus* 80129) and 85.7 (*locus* 80106A), with a mean of 24.3. Density fluctuates between 5.7 (*locus* 10263) and 80.6 (*locus* 10269), with a mean of 33.6.

For the “diffuse” layers, the ratio fluctuates between 3.3 (*locus* 90024) and 80 (*locus* 80163), with a mean of 18. Density fluctuates between 1 (*locus* 25127) and 109 (*locus* 60641), with a mean of 28.

“Concentrated” layers seem to contain more burnt plant material than others but graphics show that data is not homogeneous. Contexts considered as being “diffused” layers, such as *locus* 80163, may correspond to a first deposit (“concentrated layer”), may in fact be a fireplace because of the richness of the carbonized volume.

<sup>2</sup>. Chronological information comes from the pottery analysis and field researches made by archaeologist.

<sup>3</sup>. Ratio is not always known because of the lack of data concerning the carbonized volume for the 2008 and 2009 campaign.

High seed density may be due to different reasons: accumulation through time, refuse of food remains, use of seeds as fuel, etc.

### *Data rating*

“Carpological” remains represent a minimum of 50 taxa which were divided into four categories:

- **Cultivated plants** comprising cereals, pulses, fruits and textile plants;
- **“Weeds”** comprising wild plants growing with crops or linked to other human activities (waste grounds, roadsides, etc.);
- **Desert taxa** which have a spontaneous growth in the region;
- **“Others”** include non identified plants, food preparation remains and almost all coproliths of ovicaprids, camels and rodents.

“Anthracological” remains concern at least 25 taxa. They are divided into two categories:

- **Cultivated fruit tree**;
- **Spontaneous vegetation** comprising plants which can grown in different areas and conditions (plain, high ground, saline soils, etc.).

It is important to keep in mind that these categories are made to sort out the data. As the plant identification is not always very precise,<sup>4</sup> it is sometimes difficult to put organize the data and some attributions are arbitrary.

### **Comments**

#### *The palm-grove agrosystem*

The agrosystem picture is more detailed than in 2009. The palm tree is the most common fruit tree, whether among “carpological” or “anthracological” remains. Branches (“petiole”) and trunk (“stipe”) seem to be a good fuel supply. The high ratio of fragmented stones may also indicate that crushed stones have been employed as fuel.

Additional cultivated fruit trees may be the following: olive tree, grapevine, pomegranate and fig tree. One “anthracological” clue of ben tree (*Moringa peregrina*) may indicate its use. It is a famous tree known by classical authors as “myrobalan”, used for ointment and perfumes.<sup>5</sup> Nowadays, it is a common tree growing in palm groves. Seeds can be used for stomach ache.<sup>6</sup> The jujube tree family (*Ziziphus cf. spina-christi*) is well attested among anthracological data. It can be cultivated in palm-grove, as it is today. However, it may also have grown spontaneously as a tropical element in the Madâ’in Sâlih plain (see below).

Different species of cereals have been identified: hulled barley (two and six rows), naked wheat

4. Identifications are often made at genus level. Each genus corresponds to several species which may have had different phytoecological interpretations (weeds, spontaneous growth, etc.).

5. Theophrastus, *H. P.* IV.2.6 ; Josephus, *J. W.* IV.12.3 ; Dioscorides, *M. M.* IV.157 ; Pliny, *N. H.* XII.100-102, XIII.18, XXIII.98. See Durand 2008, p. 76.

6. Personal communication (Mutlaq al-Mutlaq).

(probably hard and bread wheat) and emmer. Pulses are indicated by the presence of lentils (*Lens culinaris*), peas (*Pisum sativum*), alfalfa (*Medicago cf. sativa*), grass pea (*Lathyrus sativus*) and common vetch (*Vicia sativa*). Alfalfa is particularly abundant and was probably used as fodder. Use of plantain (*Plantago* sp.) as fodder could also explain the strong presence of this genus. It contains several species commonly attested in cultivated fields or in natural vegetation.<sup>7</sup>

Cotton seeds are very well represented. The oldest clues appear in Area 8 (*loci* 80124 and 80166) and Area 2 (*locus* 20026). The chronology is difficult to establish in Area 8. Preliminary chronological suggestions made by C. Durand and Y. Gerber indicate that these *loci* may be dated in the 1<sup>st</sup>-2<sup>nd</sup> centuries AD. It would be very interesting to narrow this date because these cotton seeds are up to now the oldest ones in this part of the world.<sup>8</sup>

In Madâ'in Sâlih, all cotton seeds are preserved by carbonization and were recovered in domestic contexts such as fireplaces, refuges, etc. The presence of seeds in such contexts suggests that they result from ginning (seed removal from cotton boll) in the household and then elimination by fire. The archaeological contexts (domestic) in which they were found and the high seed frequency suggest the local cultivation of cotton. Cotton refers to two cultivated species, *Gossypium arboreum* and *G. herbaceum*. They are erected shrubs or sub-shrubs growing as annual or perennial plants. Cotton requires a long growing season of *ca.* 200 days (6.5 months) with abundant water early in the season (equivalent to at least 50 cm rainfall). It generally needs a frost free environment, preferably with temperatures above 21° C.<sup>9</sup> Discoveries in Egypt<sup>10</sup> and in the Eastern Arabian Peninsula<sup>11</sup> show that palm groves seem to be adapted to the cultivation of cotton.

### Palaeoenvironment

Wild ligneous and herbaceous plants found in macro-remains samples are likely to represent the plants which were collected from the surroundings areas, mainly as fuel or fodder.

Plant spectrum is dominating by **Saharo-Sindian** regional zone taxa.<sup>12</sup>

Some of them are characteristic of the Arabian zone: *Astragalus* sp., *Gymnocarpos decandrum*, Chenopodiaceae (*Haloxylon salicornum* and *Salsola tetrandra* types) *Lycium* cf. *shawii*, *Plantago boissieri* / *ciliata* *Retama raetam*, *Scrophularia* cf. *deserti*, *Tamarix* spp.

Others derive from a xero-tropical desert tree flora (Nubo-sindian local center of endemism): *Acacia* spp. (*A. raddiana* and *A. tortilis* types), *Calotropis procera*, *Capparis* sp., *Chrozophora* cf. *brocchiana*, *Grewia* sp. (*G. bicolor* and *G. flavescens* types), *Ziziphus* cf. *spina-christi*.

7. Feinbrun-Dothan 1978, p. 214-232.

8. Bouchaud, Tengberg, Dal-Prà and Moulhérat, *in preparation*.

9. Fuller 2008 ; Reis *et al.* 2006 ; Samuel 2001.

10 Wild 1997.

11. Tengberg and Lombard 2001.

12. Ghazanfar and Fisher 1998, p. 66-69.

Taking into account climatic and soil conditions, we can assume that the plant spectrum represented a transition between desert areas and a very open xeromorphic dwarf shrubland: The *Haloxylon salicornum* community probably grew in the desert plain. Scattered trees and shrubs such as *Acacia* spp. and *Ziziphus spina-christi* developed thanks to the proximity of the water table. *Tamarix* spp. and *Plantago* spp. may represent wadi flora.

Few **Mediterranean** or **Irano-Turanian** intruders may underline a greater expansion of these plants in the past. *Juniperus* cf. *phoenica* and *Rhus tripartita*, two Mediterranean elements, may come from the Hijâz mountains near the site. *Salix* / *Populus* may be an Irano-Turanian element growing on wadi banks in the Madâ'in Sâlih plain.

## Conclusion

The identification of seeds and charcoals should be completed in order to offer a better definition of the palaeoenvironment and agricultural production in Madâ'in Sâlih during the Nabataean and Roman periods as well as in the late antique period. Precise chronological data will allow to establish the diachronic evolution of the plant spectra.

## Bibliography

- Dioscorides / Garcia Valdés M. (ed.) 1998. *Plantas y remedios medicinales (De Materia Medica), Libros I-III*, Spanish translation, Madrid: Editorial Gredos, Biblioteca Clásica Gredos 253.
- Durand C. 2008. *Le rôle des Nabatéens dans le commerce oriental et méditerranéen*, PhD thesis, University of Lyon 2, 2 vol., unpublished.
- Feinbrun-Dothan N. 1978. *Flora Palaestina, part 3: Ericaceae to Compositae*. Jerusalem: Israel Academy of Sciences and Humanities, 2 vol.
- Flavius Josephus / Pelletier A. (ed.) 1982. *Guerre des Juifs, Tome III, Livres IV-V*, French translation, Paris: Les Belles Lettres, Collection of the University of France, Greek series.
- Fuller D. 2008. "The spread of textile production and textile crops in India beyond the Harappan zone: an aspect of the emergence of craft specialization and systematic trade", in *Linguistics, archaeology and the human past. Indus Project*. Kyoto: Research Institute for Humanity and Nature, p. 1-26.
- Ghazanfar S. A. and Fisher M. (ed.) 1998. *Vegetation of the Arabian Peninsula*, Dordrecht: Kluwer Academic Publishers.
- Pliny the Elder / Ernout A. (éd.) 1956. *Histoire Naturelle, Livre XIII*, French translation, Paris: Les Belles Lettres, Collection of the University of France, Latin series.
- Pliny the Elder / André J. (ed.) 1971. *Histoire Naturelle, Livre XXIII*, French translation, Paris: Les Belles Lettres, Collection of the University of France, Latin series.
- Reis D., Vian B., Bajon C. 2006. *Le monde des fibres*, Paris: Belin.
- Samuel D. 2001. "Archaeobotanical evidence and analysis", in *Peuplement rural et aménagements hydroagricoles dans la moyenne vallée de l'Euphrate fin VII<sup>e</sup>-XIX<sup>e</sup> siècle*. Damascus: Institut Français d'Etudes Arabes de Damas, p. 343-481.

Tengberg M. and Lombard P. 2001. “Environnement et économie végétale à Qal’at al-Bahreïn aux périodes Dilmoun et Tylos. Premiers éléments d’archéobotanique”, *Paléorient*, vol. 27, n° 1, p. 167-181.

Theophrastus / Amigues S. (ed.) 1989. *Recherches sur les plantes*, Tome II, Livres III et IV, French translation, Paris: Les Belles Lettres, Collection of the University of France, Greek series.

Wild P. 1997. “Cotton in Roman Egypt: Some problems of origin”, *Al-Rafidan*, vol. 18, p. 287-298.

Type of process Year	Flotation (all areas)	Dry sieving (all areas)	Hand picked carbonized wood (all areas)	Hand picked desiccated wood and seed/fruit in tumbs (Area 5)
2008	43 samples (643.5 l)		33 samples	69 samples
2009	29 samples (286.3 l)	15 samples (61.1 l)	20 samples	49 samples
2010	73 samples (576.4 l)	6 samples (28.5 l)	13 samples	
<b>Total</b>	<b>145 samples (1509.8 l)</b>	<b>21 samples (89.6 l)</b>	<b>66 samples</b>	<b>118 samples</b>

**Fig. 1.** Raw data obtained by the archaeobotanical study at Madâ'in Sâlih, 2008-2010

**For the following figures :**

**Fig. 2a : “Carpological” results in Area 1,**

**Fig. 2b : “Anthracological” results in Area 1,**

**Fig. 3a : “Carpological” results in Area 2,**

**Fig. 3b : “Anthracological” results in Area 2,**

**Fig. 4a : “Carpological” results in Area 2,**

**See A3 documents at the end of the report**

Layer Type layer Floated vol.(l) Carbonized vol.(ml)	1 <sup>st</sup> half 1 <sup>st</sup> c. BC-AD 1 <sup>st</sup> c.											
	31010	31011	31013	31017	32012	32025	31010	31011	31013	31017	32012	32025
	Diffuse	Diffuse	Diffuse	Diffuse	Diffuse	Diffuse	Diffuse	Diffuse	Diffuse	Diffuse	Diffuse	Diffuse
	40	20	30	30	10	12						
<i>Gossypium</i> type <i>Moringa peregrina</i> type <i>Olea europea</i> cf. <i>Olea europea</i> <i>Palmae</i> <i>Phoenix dactylifera</i> (palm tree) <i>Phoenix dactylifera</i> _petiole <i>Phoenix dactylifera</i> _trunk <i>Phoenix dactylifera</i> _root <i>Phoenix dactylifera</i> _leave <i>Prunus</i> sp. cf. <i>Prunus</i> sp. <i>Punica granatum</i> (pomegranate tree) cf. <i>Punica granatum</i> <i>Acacia</i> <i>Acacia</i> type <i>tortilis</i> cf. <i>Acacia</i> <i>Calotropis procera</i> cf. <i>Capparis</i> <i>Capparis spinosa</i> <i>Chenopodiaceae</i> <i>Chenopodiaceae</i> type 2 (continuous phloème) cf. <i>Chenopodiaceae</i> <i>Chrozophora brocchiana</i> type <i>Ephedra</i> sp. <i>Grewia</i> sp. cf. <i>Grewia</i> sp. <i>Gymnocarpus decandrum</i> <i>Juniperus</i> sp. (juniper) <i>Lycium</i> cf. <i>shawii</i> <i>Retama raetam</i> (white broom) <i>Rhus tripartita</i> <i>Salix/Populus</i> (poplar) <i>Scrophularia desertii</i> type <i>Tamarix</i> sp. (Tamarisk) <i>Ziziphus</i> cf. <i>spina-christi</i> (jujube tree) cf. <i>Ziziphus</i> sp. <i>Rhus/Ziziphus</i> Local shrub indeterminata little branches <i>Angyosperme</i> Monocotylédone Bark <i>Type 1</i> Unrecognizable												
<b>Cultivated fruit tree</b>					15	21					5	
<b>Spontaneous vegetation</b>										21		
<b>Others</b>												55
<b>Total</b>												90
												55

Fig. 4b. “Anthracological” results in Area 2

		Tricinium - Area 6, zone 5					Area 6, zone 6					
		1st BC- 1st AD	60509*	60506	60507*	60510*	60511	60628	60612	60639	60641	
(* = hand-picked)	Layer Type layer Floated vol.(l) Carbonized vol.(ml) Ratio (Carbonized vol./Floated vol.)	60509*	60509*	Later phases - sheepfold		Later phases						
		Food waste	7	Occ./Fir	Filling	Filling cup	Filling p	Filling p	Dump	Dump		
		12	350				10	8	12	7		
			50.0				40	270	300	200		
<b>Cereals</b>												
Undetermined Cerealia	grain	-	-	-	-	-	2	2	30	71		
	rachis	-	-	-	-	-	-	2	7	2		
	rachis_Ear base	-	-	-	-	-	2	-	7	-		
	stem/node	-	-	-	-	-	2	7	19	10		
	glum	-	-	-	-	-	-	-	-	-		
	root	-	-	-	-	-	-	-	1	-		
<i>Hordeum vulgare</i> (barlev)	grain	-	-	-	-	-	-	-	-	9		
	rachis	-	-	-	-	-	2	1	17	22		
	rachis_Ear base	-	-	-	-	-	-	-	-	-		
	glum	-	-	-	-	-	-	-	-	-		
<i>Hordeum vulgare</i> hulled (hulled barlev)	grain	-	-	-	-	-	-	4	7	-		
<i>H. vulgare</i> subsp. <i>hexastichum</i>	rachis	-	-	-	-	-	-	1	-	-		
<i>H. vulgare</i> susp. <i>distichum</i>	rachis	-	-	-	-	-	-	-	1	-		
<i>Triticum</i> sp. (wheat)	grain	-	-	-	-	-	-	-	-	-		
<i>Triticum aetivum/durum</i> (naked wheat)	grain	-	-	-	-	-	-	2	3	3		
	rachis	-	-	-	-	-	-	-	17	-		
	rachis_Ear base	-	-	-	-	-	-	-	1	-		
<i>Triticum dicoccum</i> (emmer)	grain	-	-	-	-	-	-	-	-	-		
	snikeleton base	-	-	-	-	-	-	-	-	-		
<b>Pulses</b>												
Undetermined Fabaceae	seed	-	-	-	-	-	-	-	1	-		
<i>Lens culinaris</i> (lentil)	seed	-	-	-	-	-	-	-	-	1		
<i>Medicago</i> sp.	capsule	-	-	-	-	-	-	1	-	-		
<i>Medicago</i> sp. (lucerne)	seed	-	-	-	-	-	-	-	6	8		
<i>Pisum sativum</i> (pea)	seed	-	-	-	-	-	-	-	-	-		
<i>Lathyrus sativus</i> (grass pea)	seed	-	-	-	-	-	-	-	-	-		
<i>Vicia/Lathyrus</i>	seed	-	-	-	-	-	-	-	-	-		
<i>Vicia sativa</i> (common vetch)	seed	-	-	-	-	-	-	-	-	-		
<b>Fruits</b>												
Arecaceae	<i>Phoenix dactylifera</i> L. (date palm)	whole seed	19	192	2	10	1	5	-	7	1	
		fgmt seed	51	29	19	-	-	3	19	313	580	
		perianth	3	-	1	-	-	-	9	5	2	
		pericarp	-	-	-	-	-	-	15	-	-	
		endocarp	-	-	-	-	-	-	-	-	-	
		berry	-	-	-	-	-	-	-	-	-	
Moraceae	<i>Ficus carica/sycomorus</i> (fig)	achene	-	-	-	-	-	-	-	-	-	
Oleaceae	<i>Olea europea</i> L. (olive)	whole seed	-	4	-	-	-	-	-	-	-	
		fgmt endocarp	-	-	-	-	-	-	-	-	-	
Punicaceae	<i>Punica granatum</i> L. (pomegranate)	whole seed	-	-	-	-	-	-	-	-	-	
		fgmt seed	-	-	-	-	-	-	-	-	-	
		pericarp	-	-	-	-	-	-	-	-	-	
		calyx	-	-	-	-	-	-	1	-	-	
Vitaceae	<i>Vitis vinifera</i> L. (grape)	pip	-	-	-	-	-	-	-	-	-	
<b>Textile plant</b>												
Malvaceae	<i>Gossypium</i> sp. (cotton)	seed	-	-	-	-	-	-	2	4	14	
	cf. <i>Gossypium</i> sp. (cotton)	seed	-	-	-	-	-	-	1	1	2	
<b>Potential weeds (linked with fields or others human activities)</b>												
Apiaceae	<i>Centaurea</i> sp. (centaury)	seed	-	-	-	-	-	-	-	-	-	
Asteraceae	<i>Heliotropium</i> sp. (heliotroph)	endosperm	-	-	-	-	-	-	-	-	-	
Brassicaceae	cf. <i>Neslia</i> sp.		-	-	-	-	-	-	-	-	-	
Capparidaceae	<i>Capparis</i> type		-	-	1	-	-	-	-	-	-	
Caryophyllaceae		seed	-	-	-	-	-	-	-	-	-	
Fabaceae	Undetermined	seed	-	-	-	-	-	-	1	-	-	
		pod	-	-	-	-	-	-	-	-	-	
	<i>Astragalus/Trigonella</i> (astragal)	seed	-	-	5	-	-	-	-	2	1	
	<i>Astragalus/Trigonella</i>	capsule	-	-	-	-	-	-	-	-	-	
	<i>Melilotus/Trifolium</i> (melilot)	seed	-	-	-	-	-	-	1	2	-	
Labiatae		seed	-	-	-	-	-	-	-	-	-	
Malvaceae	<i>Malva</i> sp. (baker-weed)	seed	-	-	-	-	-	-	-	-	-	
		capsule	-	-	-	-	-	-	-	-	-	
Papaveraceae	<i>Fumaria</i> sp. (Fumitorv)	seed	-	-	-	-	-	-	-	-	-	
Plantaginaceae	<i>Plantago</i> sp. (Plantain)	seed	-	-	19	-	-	-	-	5	48	
	<i>Plantago cf.lanceolata</i>	seed	-	-	-	-	-	-	-	-	-	
Poaceae	Undetermined	seed	-	-	-	-	-	-	-	-	-	
	<i>Bromus</i> sp. (Brome)	seed	-	-	-	-	-	-	-	-	-	
	<i>Panicum</i>	seed	-	-	-	-	-	-	-	-	-	
	<i>Phalaris</i> sp. type	seed	-	-	-	-	-	-	-	-	-	
Polygonaceae	<i>Emex spinosa</i> (lesser iack)	perianth	-	-	-	-	-	-	-	-	-	
Primulaceae	<i>Androsace</i> cf. <i>maxima</i>	seed	-	-	-	-	-	-	1	-	1	
Rubiaceae	<i>Asperula/Galium</i>	seed	-	-	-	-	-	-	-	2	1	
<b>Desert taxaons (natural presence in this region)</b>												
Aizoaceae	<i>Aizoon cf.canariense</i>	seed	-	-	-	-	-	-	-	-	-	
		floral base	-	-	-	-	-	-	-	-	-	
		capsule	-	-	-	-	-	-	-	-	-	
Boraginaceae		endosperm	-	-	-	-	-	-	6+9	45	280	
		seed	-	-	-	-	-	-	-	-	6	
	<i>Echium</i> sp.	endosperm	-	-	-	-	-	-	-	-	-	
	<i>Arnebia dentate</i>	endosperm	-	-	-	-	-	-	-	-	-	
	<i>Arnebia</i> smooth	endosperm	-	-	-	-	-	-	-	-	-	
Chenopodiaceae	<i>Haloxylon salicornum</i> type	stem	xxx	-	425	-	-	-	3	131	175	
		floral base	-	-	-	-	-	-	-	-	-	
		endosperm	-	-	-	-	-	-	-	-	-	
		seed	-	-	-	-	-	-	-	-	3	
Cucurbitaceae	Undetermined	seed	-	-	-	-	-	-	-	-	-	
	<i>Citrullus colocynthis</i> (Bitter apple)	seed	1	-	-	-	-	-	1	-	-	
cf. Cyperaceae		seed	1	-	-	-	-	-	-	-	-	
Fabaceae	<i>Acacia</i> sp.	seed	-	-	-	-	-	-	4	1	-	
	cf. <i>Acacia</i> sp.	seed	-	-	-	-	-	-	-	-	-	
	<i>Prosopis</i>	seed	-	-	-	-	-	-	-	-	-	
Labiatae	<i>Teucrium</i>	seed	-	-	-	-	-	-	-	-	3	
Poaceae	<i>Stipa</i> sp. (Feather grass)	seed	-	-	-	-	-	-	-	-	-	
Solanaceae	<i>Lycium</i> sp. (Desert-Thorn)	seed	-	-	-	-	-	-	-	-	1	
Rhamnaceae	<i>Ziziphus</i> sp. (tujube)	berry	-	-	-	-	-	-	-	-	-	
<b>Others</b>												
Undetermined small seeds (rounded)			-	-	2	-	-	-	-	-	10	
Undetermined small seeds (elongated)			-	-	1	-	-	-	-	-	-	
Undetermined seed			-	-	56	-	-	-	-	-	9	
Floral base			-	-	-	-	-	-	-	-	-	
Capsule			-	-	-	-	-	-	-	-	-	
Stem			-	-	-	-	-	-	-	-	-	
		<b>Total seeds/fruits</b>	75	225	531	10	1	9	31	373	913	763
		<b>Density(total/floated vol.)</b>	6,3	-	75,9	-	-	-	3,1	46,6	76,1	109,0
Coprolith			-	-	-	-	-	-	-	-	-	-
Coprolithes oviceprine	whole		4	2	275	7	17	18	-	24	17	15
	fgmt		-	-	-	-	-	17	-	93	110	38
Coprolithes rodent			-	-	-	-	-	-	-	17	-	11
Coprolithes camel			-	-	-	-	-	1	-	-	-	-
Organic			-	-	-	-	-	-	-	-	-	-
Food preparation			-	-	-	-	-	-	-	-	-	-
Ash mass			-	-	-	-	-	-	xx	xxx	xx	-
Dung (guelle)			-	-	-	-	-	-	-	-	-	-

All plant macro-remains are carbonized / Number in red indicate plant macro-remains conserved by desiccation (dried)

Fig. 5a. "Carpological" results in Area 6



	Layer Type layer Floated vol.(l) Carbonized vol.(ml) Ratio (Carbonized vol./Floated vol.)	1 <sup>st</sup> -2 <sup>nd</sup> c. AD				2 <sup>nd</sup> -early 4 <sup>th</sup> c. AD								4 <sup>th</sup> -6 <sup>th</sup> AD		
		80014 Dump	80124 Const.	80159 Dump	80166 Fp	80028 Dump	Timour zone				80116 Dis	80153 Occ.	80163 Occ.	80168 Occ.	80022	
						80129 Filling	80106 Waste	80106A Waste	80125 Filling							
<b>Cereals</b>																
Undetermined Cerealia	grain	-	18	3	360	1	1	37	41	3	-	-	-	-	13	2
	rachis	-	42	24	2	-	2	5	3	2	1	-	-	-	-	1
	rachis_Ear base	-	6	-	1	-	-	-	6	-	-	-	-	-	-	-
	stem/node	-	43	21	3	51	3	13	13	1	45	15	-	-	1	4
	glum	-	-	6	-	-	-	-	9	-	-	-	-	-	-	-
	root	-	3	-	-	-	1	1	-	-	-	-	-	-	-	1
<i>Hordeum vulgare</i> (barley)	grain	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	rachis	-	14	113	-	6	1	2	14	23	8	10	-	-	-	-
	rachis_Ear base	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
	glum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Hordeum vulgare</i> hulled (hulled barley)	grain	-	5	-	32	-	-	4	18	-	-	-	-	-	1	-
<i>H. vulgare</i> subsp. <i>hexastichum</i>	rachis	-	2	-	2	-	-	3	-	-	-	-	-	-	-	-
<i>H. vulgare</i> susp. <i>distichum</i>	rachis	-	1	-	2	-	-	-	2	-	-	-	-	-	-	-
<i>Triticum</i> sp. (wheat)	grain	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Triticum aestivum/durum</i> (naked wheat)	grain	-	2	-	28	-	-	6	2	-	-	-	-	-	2	-
	rachis	-	40	32	1	-	1	11	3	8	17	-	-	-	-	4
	rachis_Ear base	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Triticum dicoccum</i> (emmer)	grain	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	spikelet base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Pulses</b>																
Undetermined Fabaceae	seed	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-
<i>Lens culinaris</i> (lentil)	seed	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
<i>Medicago</i> sp.	capsule	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Medicago</i> sp. (lucerne)	seed	-	2	-	17	3	-	1	-	-	-	-	1	-	1	-
<i>Pisum sativum</i> (pea)	seed	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
<i>Lathyrus sativus</i> (grass pea)	seed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Vicia/Lathyrus</i>	seed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Vicia sativa</i> (common vetch)	seed	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Fruits</b>																
Arecaceae	<i>Phoenix dactylifera</i> L. (date palm)	whole seed	-	-	3	-	-	1	-	3	1	1	-	-	-	1
		fgmt seed	3	150	16	163	15	13	128	71	46	10	35	2	36	10
		perianth	-	-	6	-	1	-	-	-	-	-	-	2	-	-
		pericarp	-	-	-	-	-	10	-	xxxx	-	-	-	-	-	-
		endocarp	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		berry	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Moraceae	<i>Ficus carica/sycomorus</i> (fig)	achene	-	-	1	-	-	-	1	-	-	-	-	-	-	-
Oleaceae	<i>Olea europaea</i> L. (olive)	whole seed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		fgmt endocarp	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Punicaceae	<i>Punica granatum</i> L. (pomegranate)	whole seed	1	-	-	-	-	-	-	-	-	-	-	-	-	-
		fgmt seed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		pericarp	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		calyx	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		pip	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Vitaceae	<i>Vitis vinifera</i> L. (grape)		-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Textile plant</b>																
Malvaceae	<i>Gossypium</i> sp. (cotton)	seed	8	-	96	-	2	14	-	-	-	-	-	1	-	3
	cf. <i>Gossypium</i> sp. (cotton)	seed	-	-	98	-	-	2	-	-	-	-	-	-	-	-
<b>Potential weeds (linked with fields or others human activities)</b>																
Apiaceae			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Asteraceae	<i>Centaurea</i> sp. (centaury)	seed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boraginaceae	<i>Heliotropium</i> sp. (heliotrope)	endosperm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brassicaceae	cf. <i>Neslia</i> sp.		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capparidaceae	<i>Capparis</i> type		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caryophyllaceae		seed	-	-	-	-	-	-	-	2	-	-	-	-	-	-
Fabaceae	Undetermined	seed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		pod	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Astragalus/Trigonella</i> (astragal)	seed	-	-	3	-	1	3	1	-	-	-	-	-	-	-
	<i>Astragalus/Trigonella</i>	capsule	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Melilotus/Trifolium</i> (melilot)	seed	3	7	5	-	-	3	-	6	-	-	-	-	-	-
Labiatae		seed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Malvaceae	<i>Malva</i> sp. (baker-weed)	seed	-	-	2	-	-	2	-	-	-	-	-	-	-	-
		capsule	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Papaveraceae	<i>Fumaria</i> sp. (Fumitory)	seed	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Plantaginaceae	<i>Plantago</i> sp. (Plantain)	seed	1	2	1	2	-	15	1	5	-	1	-	1	-	-
	<i>Plantago</i> cf. <i>lanceolata</i>	seed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Poaceae	Undetermined	seed	-	-	3	-	-	1	-	-	-	-	-	-	-	-
	<i>Bromus</i> sp. (Brome)	seed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Panicum</i>	seed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Phalaris</i> sp. type	seed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polygonaceae	<i>Emex spinosa</i> (lesser jack)	perianth	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Primulaceae	<i>Androsace</i> cf. <i>maxima</i>	seed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rubiaceae	<i>Asperula/Galum</i>	seed	-	-	-	-	-	-	1	-	-	-	-	-	-	-
<b>Desert taxons (natural presence in this region)</b>																
Aizoaceae	<i>Atzoon cf. canariense</i>	seed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		floral base	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		capsule	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boraginaceae		endosperm	-	4	17	-	4	59	4	-	-	-	-	-	11	-
		seed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Echium</i> sp.	endosperm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Arnebia dentata</i>	endosperm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Arnebia smouth</i>	endosperm	-	-	-	-	8	-	-	-	-	-	-	-	-	-
Chenopodiaceae	<i>Haloxylon salicornum</i> type	stem	25	16	30	-	5	55	3	24	-	-	-	-	-	-
		floral base	4	-	-	-	-	-	-	-	-	-	-	1	-	-
		endosperm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cucurbitaceae	Undetermined	seed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cf. Cyperaceae	<i>Citrullus colocynthis</i> (Bitter apple)	seed	-	-	1	-	-	1	-	-	-	-	-	-	-	-
Fabaceae	<i>Acacia</i> sp.	seed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	cf. <i>Acacia</i> sp.	seed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Prosopis</i>	seed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Labiatae	<i>Teucrium</i>	seed	-	-	3	-	-	-	-	-	-	-	-	-	-	-
Poaceae	<i>Stipa</i> sp. (Feather grass)	seed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Solanaceae	<i>Lycium</i> sp. (Desert-Thorn)	seed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rhamnaceae	<i>Ziziphus</i> sp. (Ijube)	berry	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Others</b>																
Undetermined small seeds (rounded)			-	-	-	-	-	6	-	-	-	-	-	-	-	-
Undetermined small seeds (elongated)			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Undetermined seed			2	-	-	-	-	-	-	-	-	-	-	4	-	-
Floral base			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capsule			-	-	-	-	-									

Layer Type layer Floated vol.(l) Carbonized vol.(ml)	1 <sup>st</sup> -2 <sup>nd</sup> c. AD				2 <sup>nd</sup> -early 4 <sup>th</sup> c. AD										4 <sup>th</sup> -6 <sup>th</sup> AD		
	80014 Dump 0.3	80124 Const. 22	80159 Dump 6	80166 Fp 41	Tannour zone					80116 Dis. 0.5	80168 Occ. 1.5	80163 Occ. 1.5	80153 Occ. 1.2	80116 Dis. 5	80022 80022		
					80028 Dump 6	80129 Filling 8	80106 Waste 14	80106A Waste 7	80125 Filling 10							80168 Occ. 25	
Gossypium type	-	4	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Moringa peregrina type	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Olea europea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cf. Olea europea	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
Palmæ	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Phoenix dactylifera (palm tree)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phoenix dactylifera_petiolo	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phoenix dactylifera_trunk	-	36	-	-	60	-	-	-	90	25	-	-	-	2	-	-	7
Phoenix dactylifera_trunk	1	-	-	-	3	-	-	-	1	-	-	-	-	-	-	-	3
Phoenix dactylifera_root	-	3	-	-	12	-	-	-	4	-	-	-	-	-	-	-	-
Phoenix dactylifera_leave	-	5	-	-	25	-	-	-	7	-	-	-	-	-	-	-	-
Prunus sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cf. Prunus sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Punica granatum (pomegranate tree)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cf. Punica granatum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acacia	3	-	11	15	-	-	-	-	-	-	-	-	-	-	-	-	-
Acacia type tortilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cf. Acacia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calatropis procera	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cf. Capparis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capparis spinosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chenopodiaceae	32	44	126	42	-	-	-	-	37	37	40	3	66	44	-	-	8
Chenopodiaceae type 2 (continuous phloème)	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	5
cf. Chenopodiaceae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrozophora brocchiana type	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ephedra sp.	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grewia sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cf. Grewia sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gymnocarpus decandrum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Juniperus sp. (juniper)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lycium cf. shawii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Retama raetam (white broom)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rhus tripartita	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Salix/Populus (poplar)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scrophularia desertii type	-	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Tamarix sp. (Tamarisk)	37	1	5	59	-	-	-	-	2	2	5	-	22	15	-	-	-
Ziziphus cf. spina-christi (jujube tree)	-	-	1	-	-	-	-	-	2	-	-	-	-	-	-	-	-
cf. Ziziphus sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rhus/Ziziphus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Local shrub indeterminata	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
little branches	-	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-	1
Angiosperme	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Monocotylédone	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bark	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Type I	-	-	-	-	-	-	-	-	9	10	5	5	23	13	-	-	9
Unrecognizable	-	7	100	170	250	60	60	100	102	170	100	102	170	107	0	107	60
<b>Total</b>	<b>75</b>	<b>100</b>	<b>170</b>	<b>250</b>	<b>60</b>	<b>60</b>	<b>100</b>	<b>102</b>	<b>170</b>	<b>0</b>	<b>107</b>	<b>0</b>	<b>107</b>	<b>0</b>	<b>107</b>	<b>60</b>	<b>60</b>

Fig. 6b. "Anthracological" results in Area 8

**Fig. 7a : “Carpological” results in Area 9,  
See A3 documents at the end of the report**

		Layer	90009	90014	90016	90021	90024	90025	90032
		Type layer	Fp	Fp			Occ.	Filling	Dump
		Floated vol.(l)	3	16	3	20	15	8	40
		Carbonized vol.(ml)	170		5		50		1000
<b>Cultivated fruit tree</b>	<i>Gossypium</i> type	-	-	-	-	-	-	-	-
	<i>Moringa peregrina</i> type	-	-	-	-	-	-	-	-
	<i>Olea europea</i>	-	-	-	-	-	-	-	-
	cf. <i>Olea europea</i>	-	-	-	-	-	-	-	-
	<i>Palmae</i>	-	-	-	-	-	-	-	-
	<i>Phoenix dactylifera</i> (palm tree)	-	-	-	-	-	-	-	19
	<i>Phoenix dactylifera</i> _petiole	24	95	-	29	21	-	-	23
	<i>Phoenix dactylifera</i> _trunk	1	-	-	-	2	-	-	6
	<i>Phoenix dactylifera</i> _root	1	5	-	17	4	-	-	-
	<i>Phoenix dactylifera</i> _leave	8	10	-	2	3	-	-	5
	<i>Prunus</i> sp.	-	-	-	-	-	-	-	-
	cf. <i>Prunus</i> sp.	-	-	-	-	-	-	-	-
	<i>Punica granatum</i> (pomegranate tree)	1	-	-	-	-	-	-	1
cf. <i>Punica granatum</i>	-	-	-	-	-	-	-	-	
<b>Spontaneous vegetation</b>	<i>Acacia</i>	14	-	-	-	-	5	-	-
	<i>Acacia</i> type <i>tortilis</i>	-	-	-	-	-	-	-	-
	cf. <i>Acacia</i>	-	-	-	-	-	-	-	-
	<i>Calotropis procera</i>	-	2	-	14	-	-	-	-
	cf. <i>Capparis</i>	-	-	-	-	-	-	-	-
	<i>Capparis spinosa</i>	-	-	-	-	-	-	-	-
	<i>Chenopodiaceae</i>	59	11	-	15	22	-	-	7
	<i>Chenopodiaceae</i> type 2 (continuous phloème)	-	-	-	-	-	-	-	-
	cf. <i>Chenopodiaceae</i>	-	-	-	-	-	-	-	-
	<i>Chrozophera brocchiana</i> type	-	-	-	-	1	-	-	-
	<i>Ephedra</i> sp.	-	-	-	-	-	-	-	-
	<i>Grewia</i> sp.	-	-	-	-	-	-	-	-
	cf. <i>Grewia</i> sp.	-	-	-	-	-	-	-	-
	<i>Gymnocarpus decandrum</i>	-	-	-	-	-	-	-	-
	<i>Juniperus</i> sp. (juniper)	-	-	-	-	-	-	-	-
	<i>Lycium</i> cf. <i>shawii</i>	-	-	-	-	-	-	-	-
	<i>Retama raetam</i> (white broom)	-	-	-	-	-	-	-	-
	<i>Rhus tripartita</i>	-	-	-	-	-	-	-	-
	<i>Salix/Populus</i> (poplar)	-	-	-	-	-	-	-	-
	<i>Scrophularia desertii</i> type	-	-	-	-	-	-	-	-
<i>Tamarix</i> sp. (Tamarisk)	31	11	-	15	15	-	-	71	
<i>Ziziphus</i> cf. <i>spina-christi</i> (jujube tree)	-	1	-	-	6	-	-	-	
cf. <i>Ziziphus</i> sp.	-	-	-	-	-	-	-	-	
<i>Rhus/Ziziphus</i>	-	-	-	-	-	-	-	-	
Local shrub indeterminata little branches	-	1	-	3	-	-	-	-	
<b>Others</b>	Angyosperme	-	-	-	-	-	-	-	-
	Monocotylédone	-	-	-	-	-	-	-	-
	Bark	-	-	-	-	-	-	-	-
	Type 1	-	-	-	-	-	-	-	-
	Unrecognizable	21	17	-	10	21	-	-	24
		<b>Total</b>	<b>160</b>	<b>153</b>	<b>0</b>	<b>105</b>	<b>100</b>	<b>0</b>	<b>156</b>

Fig. 7b. "Anthracological" results in Area 9

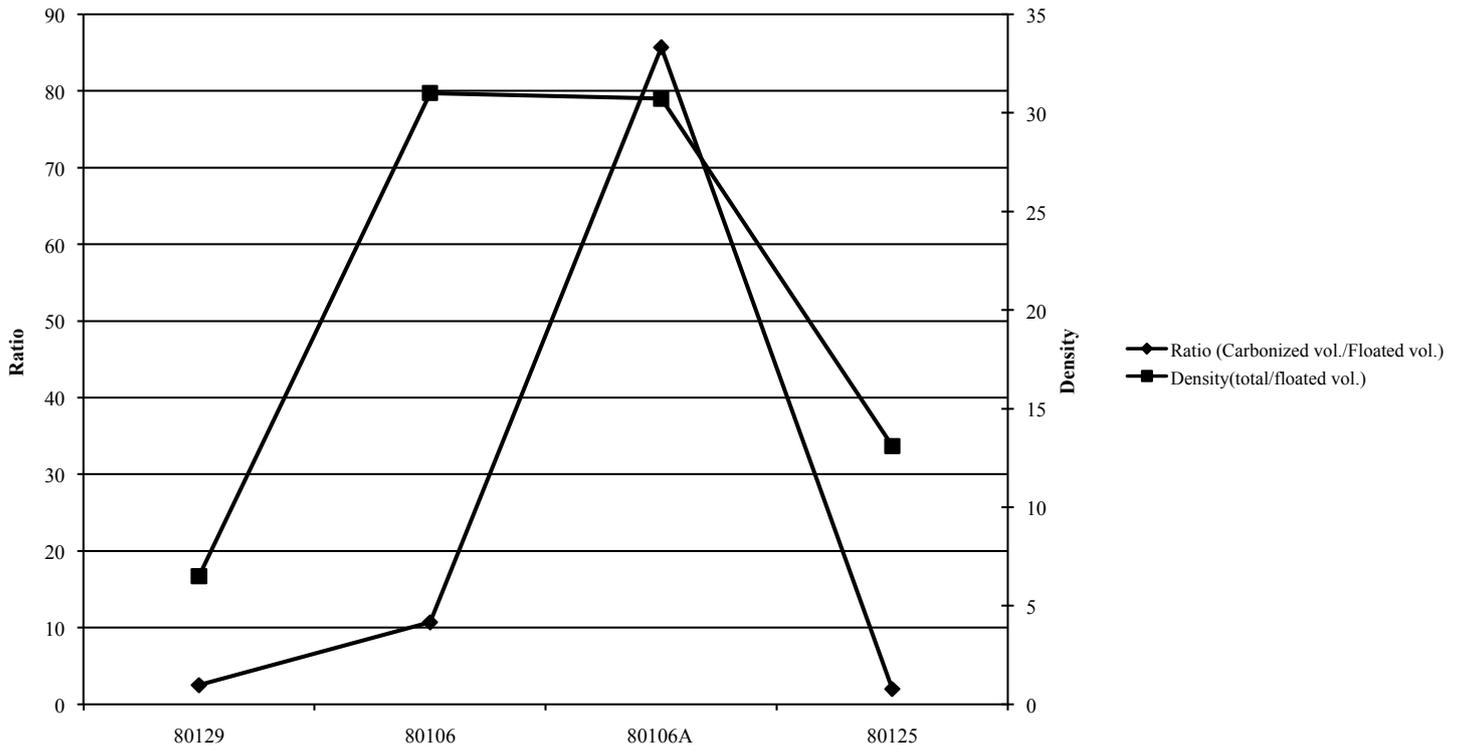
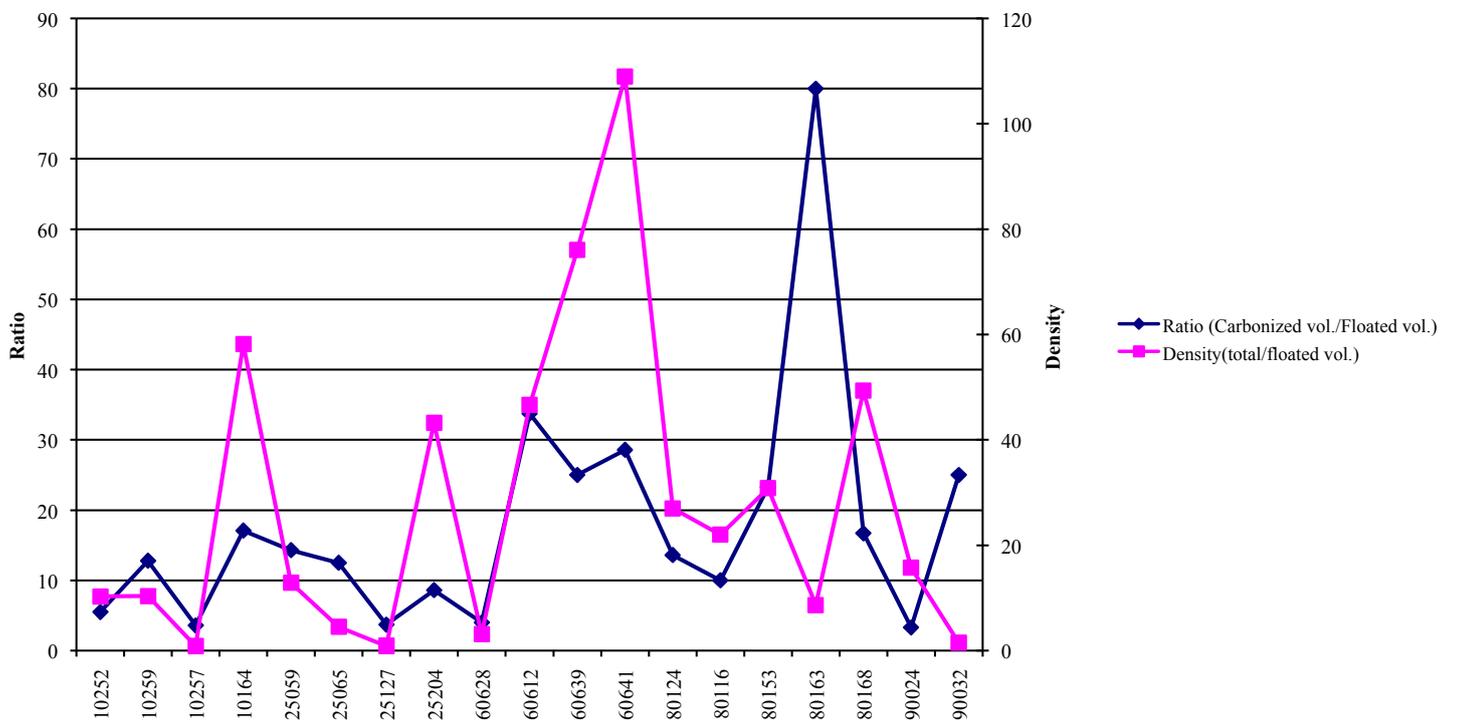


Fig. 8. *Tabún*



Fig. 9. Fireplace

**Fig. 10**  
Diffuse layers



**Fig. 10.** Diffuse layers



## **Pottery Study**

Caroline Durand (CNRS, Maison de l'Orient et de la Méditerranée)  
and Yvonne Gerber (University of Basel)



## Pottery Study

Caroline Durand (CNRS, Maison de l'Orient et de la Méditerranée)  
and Yvonne Gerber (University of Basel)

In 2010, excavations at Madâ'in Sâlih took place mainly in the residential area, either in areas already opened in 2008-2009 or in newly opened areas:

- formerly opened excavation areas are Areas 1, 2, 8 (see the reports by G. Charloux for Area 1, J. Rohmer and Z. T. Fiema for Area 2 and S. Marion de Procé for Area 8).

- newly opened excavation areas are Area 9 and 60600 (see the reports by Z. T. Fiema and L. Nehmé respectively), to which should be added survey area 34000 (south camp).

In addition, one small excavation was undertaken south of Jabal Ithlib, in a rock-cut chamber which turned out to be a triclinium, Ith78 (*loci* 60500, see the report by L. Nehmé).

The recording and reading of the pottery was under the responsibility of Yvonne Gerber (19th of January - 7th of February 2010) and Caroline Durand (26th of January - 28th of February 2010). As Y. Gerber was present only in the first half of the season, she devoted herself mainly to the reading of the pottery in the few *loci* of the 2009 season which had not been read last year, to which should be added some *loci* of the 2010 season. The first half of the season was also devoted to the checking of the drawings and photographs of the sherds which had been recorded individually in 2008 and 2009. A number of photos and drawings were updated and corrected at the spot (thanks to S. Gaiani and S. Eliès).

The pottery of the 2010 season originated from 232 stratified *loci* and was recorded into the FileMaker Pro database which was created and used already in 2008 and 2009. About 421 pottery sherds were isolated and recorded in detail. They were photographed by Serge Gaiani and a selection of sherds from the 2009 and 2010 seasons were drawn by Sylvie Eliès. Some vessels from the 2009 season, mainly from Area 2 (*loci* 25000), were restored by François Bernel to complete vessel forms.

In this report, we only provide a short overview of the results for 2010 per area and per trench.

## Residential Area

### *Area 1 (loci 10100, excavator G. Charloux)*

Due to lack of time, this material will be studied in 2011 (seven boxes left).

### *Area 2, Trench F (loci 25100/25200, excavator J. Rohmer)*

Further excavations were undertaken in Trench F, which was opened in 2009. A first extension was opened to the north (*loci* 25100) and a second extension was opened to the south in order to remove the baulk which had been left in 2009 between trenches B, *loci* 21000 and F, *loci* 25000 (see J. Rohmer, 2009 report, fig. 1). The *loci* from the southern extension were numbered 25200.

The northern extension shows a time range starting from Late Roman / Byzantine period for the upper levels (*loci* 25101, 25102), even maybe Late Byzantine (one jar body sherd with incised decoration: 25103\_P01, fig. 1), to the 1st c. AD for the lower levels (one green glazed “Mesopotamian” sherd: 25131\_P01, fig. 2). Just beneath the surface, a small pit was discovered, with pottery possibly from the Late Roman / Byzantine period (*loci* 25107, 25109). A clear 2nd-3rd c. AD occupation phase is evidenced by sherds of Nabataean common painted ware imported from Petra (25123\_P02, fig. 3; 25126\_P03, fig. 4).<sup>1</sup> Under this phase, another occupation level can be dated to the late 1st c./early 2nd c. AD. Pottery from this level includes a cooking-pot with short neck and bevelled rim (25129\_P01, fig. 5), and a green glazed “Mesopotamian” sherd (25129\_P02, fig. 6). An undetermined imported amphora rim sherd comes from a sealed context of uncertain dating (25112\_P01, fig. 7). According to Y. Gerbet, it seems to be an amphora which appears in 1st c. BC contexts in Petra.

The southern extension shows a time range starting from the Late Roman period (25204\_P01, fig. 8) for the upper levels to the late 1st c. BC / 1st c. AD for the lower levels (floors 25214, 25216, 25218). Pottery includes Nabataean painted fine ware, “2 red lines” type (25215\_P02, fig. 9; 25211\_P03, fig. 10 > 2b profile), a Nabataean lamp fragment probably imported from Petra and dated to the 1st c. AD<sup>2</sup> (25223\_P03, fig. 11).

### *Area 2, Trench G (loci 26000, excavator Z. T. Fiema)*

A new trench was opened in 2010 west of trench A, in the southwestern part of the area (see J. Rohmer’s report in this volume, fig. 1). Only a few sherds were found. No real homogeneous *locus* was recorded. Pottery from this area belongs mostly to the Nabataean period (late 1st c. BC-1st c. AD), mixed with some earlier (Iron Age: 26003\_P06, fig. 12) and later sherds (Byzantine?).

1. Cf. Gerbet and Durand 2009, p. 281; Gerbet 2001, p. 8 and p. 10, fig. 1.

2. Lamp type Negev 1A: Grawehr 2006, Type E.1. “Negev 1A”, p. 296-304; Negev 1974, p. 28-29, pl. 17, n° 87-89a; Negev 1986, p. 134-136, n° 1163-1190.

### *Area 2, Trench H (loci 27000, excavator J. Rohmer)*

The material from this trench will be studied in 2011 (1 box left).

### *Area 3 (loci 33000, excavator F. Villeneuve)*

The material from this trench will be studied in 2011 (1 box left).

### *Area 3 (loci 34000, excavator F. Villeneuve)*

This area corresponds to the so-called “south camp”, located south of the residential area. The pottery recorded there comes only from surface collection, as no soundings have been undertaken in 2010. However, it gives a first glimpse of the occupation period which seems to run from the late 1<sup>st</sup> c. AD to the 2<sup>nd</sup>/3<sup>rd</sup> c. AD. No distinctive late Late Roman and/or Early Byzantine elements are recognizable in this area.

Late Nabataean / Early Roman period pottery includes:

- Nabataean painted fine ware imported from Petra belonging to Schmid’s decor phase 3b, i.e. last quarter of the 1st c. AD (34000\_P11, fig. 13);
- green glazed “Mesopotamian” ware (34000\_P14, fig. 14; 34000\_P17, fig. 15);
- local jars (34000\_P03, fig. 16; 34000\_P05, fig. 17); cooking-pots with beveled rims (34000\_P08, fig. 18; 34000\_P12, fig. 19; 34000\_P16, fig. 20) and pithoi with finger-impressions (34000\_P01, fig. 21);
- pottery from the 2nd c. AD includes a carinated cooking pot with reddish-yellow fabric (34000\_P02, fig. 22) and bowls with sharp carination (34000\_P06, fig. 23; 34000\_P07, fig. 24);
- one imported amphora rim sherd can be identified as a Kapitaeen II, based on literature dated from the end of the 2nd c. to the 4th c. AD (34000\_P09, fig. 25). A second amphora rim sherd with reddish fabric and big and numerous quartz inclusions is probably also imported (34000\_P18, fig. 26);
- one local jar rim may still be in the Late Hellenistic tradition (34000\_P04, fig. 27).

Two facts are worth mentioning: the proportion of imported (?) fabric (34000\_P02, 34000\_P09, 34000\_P09, 34000\_P12, 34000\_P14, 34000\_P16, 34000\_P18) is much higher than in the *loci* from the other areas of the urban centre. Second, the repertoire of the so-called 2nd-3rd c. AD pottery from this area is apparently different (for example 34000\_P07, fig. 24) from the already identified 2nd-3rd c. AD contexts from Area 2.

### *Area 6, massif IGN 132 (loci 60600 and 60700, excavator L. Nehmé)*

A new area was opened in 2010 around and on top of the outcrop IGN 132, in the residential area. Pottery collected there seems to be mixed, even in the lower levels, ranging from Nabataean to Late Byzantine period. No clear stratigraphy could be developed yet. Numerous fragments of thick pierced ceramic fragments, possibly “filters” have been found (60614\_Pxx, fig. 28; 60614\_P04, fig. 29; 60637\_P01, fig. 30). They may have covered the big stone basins found in situ in the same area. One should also quote the number of big storage jars/pithoi fragments (60605\_P02, fig. 31; 60636\_P01, fig. 32; 60605\_P03, fig. 33) and filter elements (60644\_P02, fig. 34; 60639\_P04, fig. 35) found in this area.

Several sherds of jars / cooking-pots (?) showing a very dense, black-grey ware, of undetermined provenience (60633\_P02, fig. 36; 60604\_P02, fig. 37; 60633\_P01, fig. 38) are also to be noticed. 1st century AD elements include one Nabataean painted fine ware sherd imported from Petra, decor phase Schmid 3a (around mid-1st c. AD, 60639\_P07, fig. 39) and one green glazed “Mesopotamian” sherd (60604\_P01, fig. 40). Two lamp fragments also come from this area: an Early Byzantine lamp fragment imported from Petra<sup>3</sup> (60623\_P05, fig. 41) and a simple rounded lamp fragment with a light greenish fabric, of undetermined type (60617\_P02, fig. 42).

Some Late Roman / Byzantine, even Late Byzantine elements: 60601 (surface); 60607; 60613; 60614; 60623 ; 60626 ; 60629 ; 60631; 60632; 60635; 60636 ; 60640; 60641.

*Locus* 60700 consists of surface collection coming from the summit of the outcrop IGN 132. The pottery is dated mainly from the Nabataean-Roman period (late 1st c. BC ? - 1st c. AD), except for a lamp fragment (60701\_P05, fig. 43) which may be later (Early Byzantine ?).<sup>4</sup>

### ***Area 8 (loci 80100, excavator S. Marion de Procé)***

Further excavations were undertaken in Area 8, which was already opened in 2009. Pottery from there is dated mainly to the Nabataean/Roman period (1st-2nd c. AD), with some later elements in surface layers (80101\_P01, fig. 44; 80106\_P03, fig. 45, both based on decor, probably Byzantine). No clear stratigraphy can be checked out. A few bags still have to be studied in 2011 (mainly surface bags).

1st century AD elements include some green glazed “Mesopotamian” sherds (80110\_P05, fig. 46; 80161\_P02, fig. 47), Nabataean painted fine ware: bowls imported from Petra, decor phase Schmid 3a (mid-1st c. AD, 80152\_P01, fig. 48) and 3b (late 1st c. AD, 80110\_P02, fig. 49), Nabataean painted “local” 2 red-lines type (80140\_P01, fig. 50), and possibly some Petra common ware (80125\_P03, fig. 51). One thick ring base of Eastern Sigillata plate seems to correspond to the form Hayes 3, dated mainly to the 1st c. BC (80103\_P02, fig. 52).<sup>5</sup> One residual Hellenistic black glaze sherd has also been recorded (80127\_P11, fig. 53).

### ***Area 9 (loci 90000, excavator Z. Fiema)***

Area 9 was opened in 2010 southwest of the residential area. It seems to have been occupied mainly during the Late Hellenistic/Nabataean phase. *Locus* 90003 only shows some possibly 2nd-3rd c. AD elements (90003\_P11, fig. 54). No later occupation has been noted, contrary to Areas 1 and 2. Pottery from this area includes numerous jars locally produced, showing Late Hellenistic profile (90019\_P11, fig. 55) and Late Hellenistic fabrics (90019\_P09, fig. 56; 90019\_P15, fig. 57). Two handles of stamped amphorae have been found in *locus* 90021. On the first one, probably from a Cnidian amphora, is a Greek rectangular stamp (two lines) which can be read ΔΑΜΟΣ / ΘΕΝΕΥΣ (90021\_P10, fig. 58-59). The second one, probably from a Rhodian amphora, has a sharp angle and is stamped on the upper short

3. Grawehr 2006, Type L “Peträisch-FrühByzantinische Lampen”, p. 340-349, particularly n° 496 and 513.

4. Grawehr 2006, *idem*, p. 347-348, n° 516, 519.

5. Hayes 1985, pl. I, 7-8.

part (90021\_P11, fig. 60). The stamp is rectangular, with a Greek inscription which can be read: [...] TPATON + emblema (undetermined form). Although no parallels have been found for these two stamps, we can suggest a date between the 2nd and the 1st c. BC for these amphorae. From the same *locus* comes a terracotta figurine fragment probably representing the back part of a horse (90021\_TF01, fig. 61).

The lower levels are rather difficult to date as the pottery includes both 1st c. BC and 1st c. AD elements: green glazed “Mesopotamian” sherds (90032\_P03, fig. 62; 90026\_P05, fig. 63); a few Nabataean painted fine ware sherds imported from Petra, running from the 1st (maybe even early 1st c. BC (phase Schmid 1, 90032\_P04, fig. 64) to the mid-1st c. AD (decor phase Schmid 2b/c, 90025\_P02, fig. 65; decor phase Schmid 3a (90025\_P03, fig. 66; 90026\_P06, fig. 67).

## Jabal Ithlib area

### *Structure Ith. 78 (loci 60500, excavator L. Nehmé)*

The structure is a small triclinium located around 150 m southeast from the southern point of the Jabal Ithlib. It yielded only a few sherds dated mainly from the Nabataean period, even more early Nabataean period (late 1st c. BC - early 1st c. AD): Nabataean painted fine ware (“2 red lines” type, 60509\_P06, fig. 68; undetermined, probably phase 1 or, according to Y. Gerber, second half of the 1st c. BC, 60507\_P02, fig. 69; 60507\_P01, fig. 70), Nabataean unpainted fine ware: “Hellenistic” or rather, according to Y. Gerber, early 1st c. AD (?) jug rim sherd (60509\_P03, fig. 71).

## Bibliography

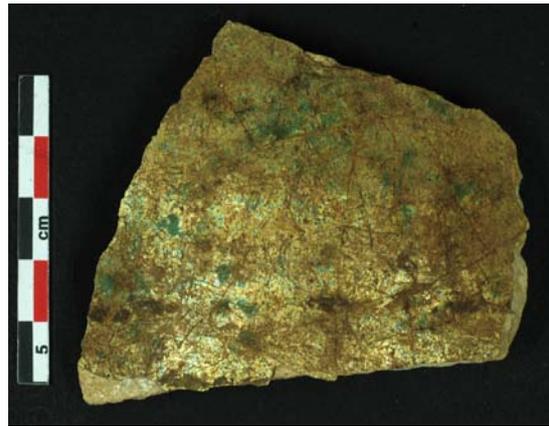
- Gerber Y. 2001. “A Glimpse of the Recent Excavations on ez-Zantur / Petra: The Late Roman Pottery and its Prototypes in the 2<sup>nd</sup> and 3<sup>rd</sup> Centuries AD”, in E. Villeneuve and P. Watson (eds), *La céramique byzantine et proto-islamique en Syrie-Jordanie (IV<sup>e</sup>-VIII<sup>e</sup> siècles apr. J.-C.)*. Actes du colloque tenu à Amman les 3, 4 et 5 décembre 1994, Beyrouth: Bibliothèque Archéologique et Historique 159, p. 7-12.
- Gerber Y. and Durand C. 2009. “Pottery Study”, in L. Nehmé, D. al-Talhi and F. Villeneuve (eds), *Report on the second season (2009) of the Madâ'in Sâlih Archaeological Project*, unpublished report, p. 279-304.
- Grawehr M. 2006. “Die Lampen der Grabungen auf ez Zantur in Petra”, in D. Keller and M. Grawehr, *Petra, Ez-Zantur III. Ergebnisse der Schweizerisch-Liechtensteinischen Ausgrabungen*, Terra Archeologica V, Mainz: Verlag Philipp von Zabern, p. 259-393.
- Hayes J. W. 1985. “Sigillate orientali”, in *Enciclopedia dell'arte antica classica e orientale: atlante delle forme ceramiche. II: Ceramica fine romana nel bacino mediterraneo (tardo ellenismo e primo impero)*, Roma: Istituto della enciclopedia italiana, p. 1-95.
- Negev A. 1974. *The Nabataean Potter's Workshop at Oboda, Rei creatariae romanae fautorum acta*, Supplément 1, Bonn: Habelt.
- Negev A. 1986. *The Late Hellenistic and Early Roman Pottery of Nabataean Oboda. Final Report*, Qedem 22, Jerusalem: Institute of Archaeology, Hebrew University.

Schmid S. G., 1996. "Die Feinkeramik", in A. Bignasca *et al.* (eds), *Petra, Ez Zantur I. Ergebnisse der Schweizerisch-Liechtensteinischen Ausgrabungen 1988-1992*, Mainz: Terra Archaeologica 2, p. 151-172.

Schmid S. G. 2000. "Die Feinkeramik der Nabatäer. Typologie, Chronologie und kulturhistorische Hintergründe", in S. G. Schmid and B. Kolb (eds), *Petra, Ez Zantur II. Ergebnisse der Schweizerisch-Liechtensteinischen Ausgrabungen*, Mainz: Terra Archaeologica 4, p. 1-199.



**Fig. 1.** Jar body sherd with incised decoration, 25103\_P01. Late Byzantine?



**Fig. 2.** Green glazed "Mesopotamian" sherd, 25131\_P01



**Fig. 3.** Nabataean common painted ware imported from Petra, 25123\_P02



**Fig. 4.** Nabataean common painted ware imported from Petra, 25126\_P03



**Fig. 5.** Cooking-pot with short neck and bevelled rim, 25129\_P01, 1st c./early 2nd c. AD



**Fig. 6.** Green glazed "Mesopotamian" sherd, 25129\_P02



**Fig. 7.** Undetermined imported amphora rim sherd, 25112\_P01



**Fig. 8.** Late Roman sherd, 25204\_P01



**Fig. 9.** Nabataean painted fine ware, "2 red lines" type, sherd 25215\_P02



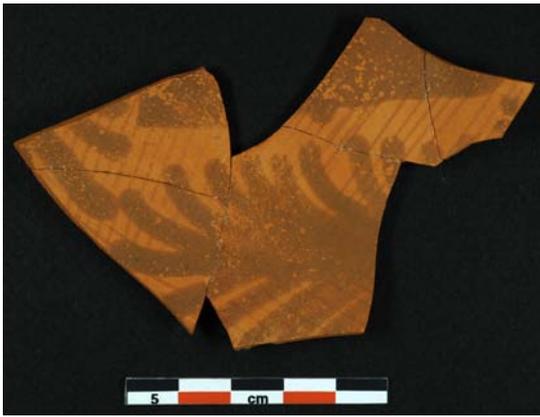
**Fig. 10.** Nabataean painted fine ware, "2 red lines" type with 2b profile, sherd 25211\_P03



**Fig. 11.** Nabataean lamp fragment probably imported from Petra, probably 1st c. AD, 25223\_P03



**Fig. 12.** Iron Age sherd, 26003\_P06



**Fig. 13.** Nabataean painted fine ware imported from Petra, Schmid's decor phase 3b (last quarter of the 1st c. AD), sherd 34000\_P11



**Fig. 14.** Green glazed "Mesopotamian" ware, sherd 34000\_P14



**Fig. 15.** Green glazed "Mesopotamian" ware, sherd 34000\_P17



**Fig. 16.** Local jar, 34000\_P03



**Fig. 17.** Local jar, 34000\_P05



**Fig. 18.** Cooking-pot with beveled rim, 34000\_P08



**Fig. 19.** Cooking-pot with beveled rim, 34000\_P12



**Fig. 20.** Cooking-pot with beveled rim, 34000\_P16



**Fig. 21.** Pithos with finger-impressions, 34000\_P01



**Fig. 22.** Carinated cooking pot with reddish-yellow fabric, 34000\_P02, 2nd c. AD



**Fig. 23.** Bowl with sharp carination 34000\_P06, 2nd c. AD



**Fig. 24.** Bowl with sharp carination, 34000\_P07, 2nd c. AD



**Fig. 25.** Imported amphora rim sherd Kapitaen II 34000\_P09



**Fig. 26.** Amphora rim sherd with reddish fabric, 34000\_P18 (imported?)



**Fig. 27.** Local jar rim 34000\_P04 (Late Hellenistic tradition?)



**Fig. 28.** "Filter" (?) 60614\_Pxx



**Fig. 29.** "Filter" (?) 60614\_P04



**Fig. 30.** "Filter" (?) 60637\_P01



**Fig. 31.** Storage jar sherd, 60605\_P02



**Fig. 32.** Storage jar sherd, 60636\_P01



**Fig. 33.** Storage jar sherd, 60605\_P03



**Fig. 34.** Filter fragment, 60644\_P02



**Fig. 35.** Filter fragment, 60639\_P04



**Fig. 36.** Jars / cooking-pot (?) showing a very dense, black-grey ware, 60633\_P02



**Fig. 37.** Jar / cooking-pot (?) showing a very dense, black-grey ware, 60604\_P02



**Fig. 38.** Jar / cooking-pot (?) showing a very dense, black-grey ware, 60633\_P01



**Fig. 39.** Nabataean painted fine ware sherd imported from Petra, decor phase Schmid 3a, around mid-1st c. AD, 60639\_P07



**Fig. 40.** Green glazed "Mesopotamian" sherd, 60604\_P01



**Fig. 41.** Early Byzantine lamp fragment imported from Petra, 60623\_P05



**Fig. 42.** Simple rounded lamp fragment with a light greenish fabric of undetermined type, 60617\_P02



**Fig. 43.** Lamp fragment 60701\_P05 (Byzantine?)



**Fig. 44.** Byzantine (?) sherd, 80101\_P01



**Fig. 45.** Byzantine (?) sherd, 80106\_P03



**Fig. 46.** Green glazed "Mesopotamian" sherd, 80110\_P05



**Fig. 47.** Green glazed "Mesopotamian" sherd, 80161\_P02



**Fig. 48.** Nabataean painted fine ware bowl imported from Petra, decor phase Schmid 3a, (mid-1st c. AD), 80152\_P01



**Fig. 49.** Nabataean painted fine ware bowl imported from Petra, decor phase Schmid 3b (late 1st c. AD), 80110\_P02



**Fig. 50.** Nabataean painted "local" 2 red-lines type, 80140\_P01



**Fig. 51.** Petra common ware, 80125\_P03



**Fig. 52.** Ring base of Eastern Sigillata plate, 1st c. BC, 80103\_P02



**Fig. 53.** Hellenistic black glaze sherd, 80127\_P11



**Fig. 54.** 2nd-3rd c. AD sherd 90003\_P11



**Fig. 55.** Sherd with Late Hellenistic fabric, 90019\_P11



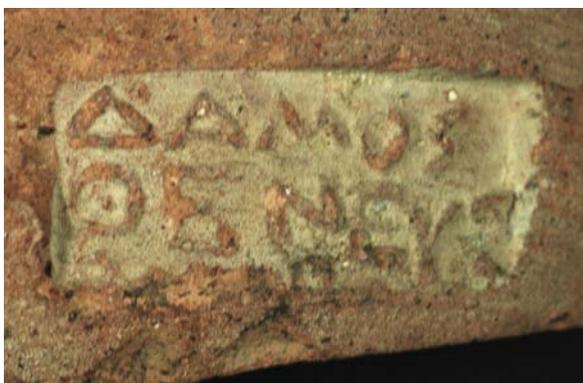
**Fig. 56.** Sherd with Late Hellenistic fabric, 90019\_P09



**Fig. 57.** Sherd with Late Hellenistic fabric, 90019\_P15



**Fig. 58.** Stamped amphora handle, 90021\_P10



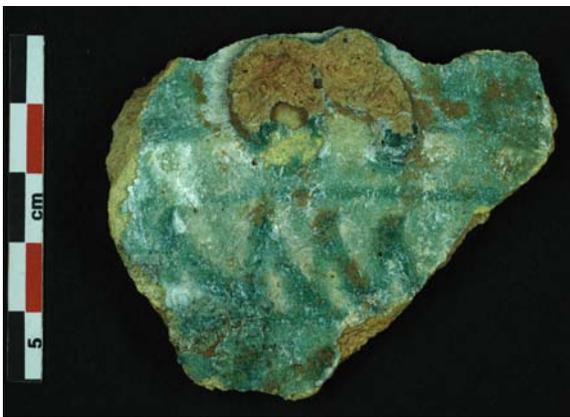
**Fig. 59.** Stamped amphora handle, 90021\_P10, detail of the stamp



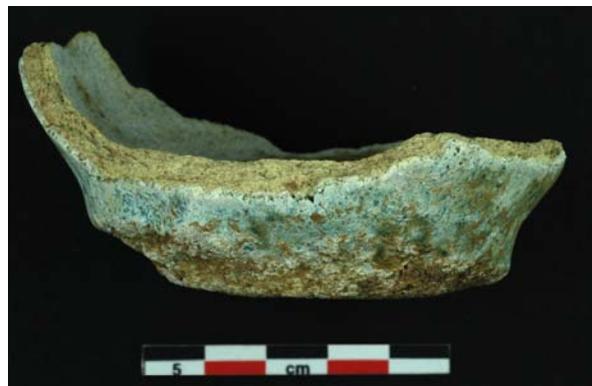
**Fig. 60.** Stamped amphora handle, 90021\_P11



**Fig. 61.** Terracotta figurine fragment probably representing the back part of a horse, 90021\_TF01



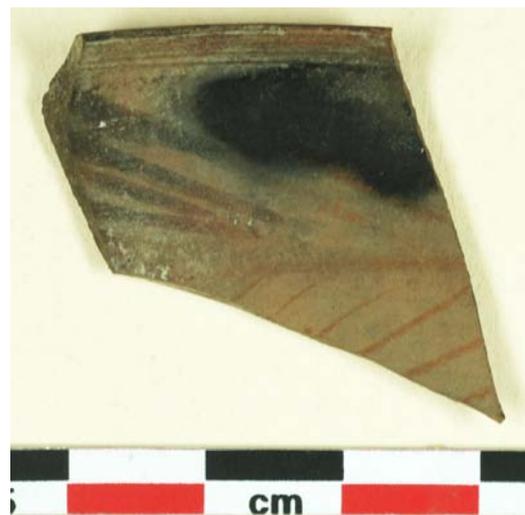
**Fig. 62.** Green glazed "Mesopotamian" sherd, 90032\_P03



**Fig. 63.** Green glazed "Mesopotamian" sherd, 90026\_P05



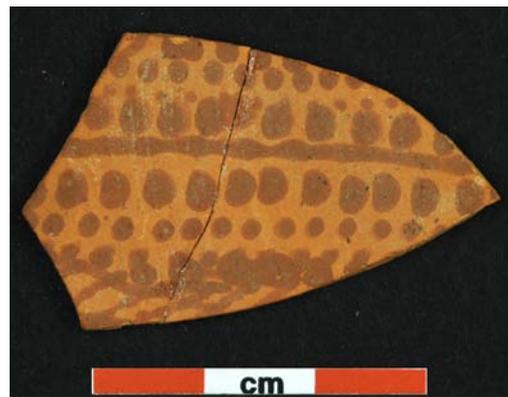
**Fig. 64.** Nabataean painted fine ware sherd imported from Petra, phase Schmid I, early 1st c. BC  
90032\_P04



**Fig. 65.** Nabataean painted fine ware sherd imported from Petra, decor phase Schmid 2b/c, mid-1st c. AD,  
90025\_P02



**Fig. 66.** Nabataean painted fine ware sherd imported from Petra, decor phase Schmid 3a, mid-1st c. AD, 90025\_P03



**Fig. 67.** Nabataean painted fine ware sherd imported from Petra, decor phase Schmid 3a, mid-1st c. AD, 90026\_P06



**Fig. 68.** Nabataean painted fine ware, "2 red lines" type, 60509\_P06



**Fig. 69.** Nabataean painted fine ware, second half of the 1st c. BC?, 60507\_P02



**Fig. 70.** Nabataean painted fine ware, second half of the 1st c. BC?, 60507\_P01



**Fig. 71.** Jug rim sherd of Nabataean unpainted fine ware, early 1st c. AD (?), 60509\_P03

## **The Coins**

Christian Augé (CNRS, UMR 7041, ArScAn)



## The Coins

Christian Augé (CNRS, UMR 7041, ArScAn)

Over the course of three visits to Madâ'in Sâlih (2005, 2009 and 2010),<sup>1</sup> we have studied 637 coins found by the project: 262 were found on the surface during survey seasons since 2003, and 375 were found in archaeological contexts during excavation seasons from 2008 to 2010, of which about forty come from superficial levels. Thanks to the cleaning and restoration carried out by François Bernel, mostly by electrolysis, a relatively high proportion of these coins (about 80%) are recognisable and can be attributed, with more or less accuracy, to one of the groups listed below. But in many cases, the wear and poor preservation did not allow an exact reading of all the details. The descriptions, identifications and comments are, therefore, only the first stage of a study in progress.

The collection contains virtually no coins made of precious metals: there were only three silver Nabataean coins and two Roman *antoniniani* of silvery metal. All the others are of copper or copper alloy ("bronze"). Their state of preservation is mostly poor: the time spent in the ground has corroded them, and they also tend to show pronounced wear which can be explained by the long time they spent in circulation in the past. The many alterations noted (the addition of countermarks), cases of overstriking and particularly trimming or fragmentation show that the ancient coins were often re-used, at least during certain periods since the Hellenistic. Thus, care should be taken when using these coins as chronological markers.

The collection is notable for the almost complete absence of modern, or even Medieval coins, and also for its chronological and geographical coherence: nearly all the coins examined date to antiquity, from the Hellenistic period (3<sup>rd</sup> century BC) to the 4<sup>th</sup> century AD. Below are a few brief comments on the three main groups of coins: Roman (including Late Roman and provincial coins), Nabataean and Hellenistic, followed by a fourth important but less well-known group of coins with stylised heads of Athena / stylised owl. If one assumes that this group is not of South Arabian origin, then virtually all the coins from Madâ'in Sâlih seem to come from the northwestern Arabian peninsula and the Near East.

---

1. For their very friendly welcome and their confidence in me I would particularly like to thank the French directors of the project, Laïla Nehmé and François Villeneuve, their Saudi counterparts, the directors of the al-'Ulâ museum and the members of the team, beginning with François Bernel, without whose work this study would not have been possible.

## Late Roman, Roman and provincial coins

Of the 51 coins in this group, 37 have been identified more or less accurately. Thus, going backwards in time:

- nine coins struck in the last years of the reign of Constantine and of his immediate successors, between AD 330 and 361 (*Gloria Exercitus* and *Fel Temp Reparatio* types). These are the only coins recognised as dating to the so-called ‘Late Roman’ period from the whole collection of finds. The western origin of at least one of them barely testifies to the mixing of coin circulation at this time, which is in strong contrast to what we can observe for earlier times. There were no later coins—Byzantine, Umayyad or Abbasid (with one exception, a coin of uncertain identification).
- 28 coins that span the years between the tetrarchy and the Augustinian period. Among them are: two Syrian *antoniniani* (second half of the 3<sup>rd</sup> century); twelve provincial coins struck in the 2<sup>nd</sup> and 3<sup>rd</sup> centuries by various cities in the Middle East (several of which were from Neapolis in Samaria, but none from towns in the Province of Arabia such as Petra or Bostra); one sesterce from Trajan, the only example of issues destined for the new province shortly after its creation (fig. 1a-b); and finally nine Roman or provincial coins datable to the 1<sup>st</sup> century AD and also coming from the Levant. At least three of these are “SC bronze” coins from Antioch, which was the most common currency at the time in Syria, but which is rare in Petra and southern Jordan during the period when Nabataea was independent.

## Nabataean coins

With 220 identified examples (three of which are silver), these form a good third of the coins recovered. On the one hand, a very small number of them are attributable to the reigns of Malichos II (five?) and Rabbel II (twelve, plus ten unclear cases). On the other hand, only very few of them could be earlier than the reign of Aretas IV (six unclear cases). According to the chronology usually used, all the others – 187 of the 220 – date to the reign of Aretas IV.

Two groups are of particular interest:

- Numerous coins of Aretas IV and of his second wife Shaqilat, struck between AD 16–18 and 39/40 (one silver coin, 81 bronze ones). These comprise the well-known “units” on fairly wide blank, characterised on the obverse by the twinned portraits of the sovereigns and on the reverse by their names and a pair of crossed cornucopia horns (at least 29 examples). But there are also many (at least 36) slightly smaller coins representing two standing figures, the king on the obverse with the initial of his name, the queen on the reverse with her name. This issue is generally dated to the beginning of the reign of Shaqilat, towards AD 16 or 18. This exceptional sample from Madâ’ in Sâlih has made it possible to distinguish variations in the details and particular techniques which could suggest a longer, and partly local, production.
- Two fairly well-preserved silver coins (fig. 2a-b) belonging to the first part of the reign of Aretas IV, when he was married to queen Huldu, beginning in 9/8 BC until about AD 16. There are also about a hundred small bronze coins with the king wearing a laurel wreath on the obverse, and on the reverse the two crossed or twinned cornucopia horns flanked by letters and various symbols. They are usually attributed to the initial years of the reign of Aretas IV. Here too, their quantity and variety begs the question of the duration of these issues and whether some of them might have been struck locally.

Another, less abundant group (fifteen examples), comprises some very small coins characterised by two letters or signs, on one side in the shape of an *H*, on the other in the shape of an *O* (fig. 3a-b). Based on their occurrence and technical characteristics, it seems that they should be dated to the same period as the previous coins, perhaps just before or just after the small bronzes from Aretas IV. These might represent locally struck coins.

### Hellenistic coins

Of the 39 coins that probably date to this period, a few pieces can be dated back to the 3<sup>rd</sup> and 2<sup>nd</sup> centuries BC:

- Ptolemaic bronze coins (at least five) of medium to large size, whose precise attribution to Ptolemy II, III or IV is not certain;
- bronze coins (at least six) attributable to Phoenician cities in the second half of the 3<sup>rd</sup> century BC, one or two examples coming from Arados.

We did not identify any more recent Hellenistic coins, in particular Seleucid coins of the 2<sup>nd</sup> century, but for a good number of examples, identification is very difficult. All these coins are extremely worn, markedly more than those from Petra, for instance, which suggests a longer use. At least twenty similar pieces were reused to strike coins from the group of stylised head of Athena / stylised owl which follows. There are many cases of cut fragments, some of which were used as blanks for this same group, or perhaps even for Nabataean coins.

### The stylised head of Athena / stylised owl group

This collection, which is the most abundant after the Nabataean coins, comprises at least 130 complete or fragmentary coins, and constitutes one of the most notable finds from Madâ'in Sâlih. Some isolated examples or small collections of similar coins have been mentioned in the past, or published under the name of “pseudo-Himyarite”. The large number and diversity of the Madâ'in Sâlih collection make it an exceptional sample, from which a typology and classification of the coins can be initiated, with additional information from technical observations.

The types, highly stylised, are distantly inspired by the Athenian tetradrachmas: on the obverse, the head of Athena with helmet, on the reverse a standing owl with a frontal view of the eyes, flanked by motifs inspired by the *theta* and *E* of the original legend, as well as the olive branch (fig. 4a-b). In spite of the many variants and irregularities observed, there are some constants – orientation of the coins, distribution according to two or three “modules” or denominations – which suggest that these are indeed a separate coinage, somewhat homogenous, and of a certain duration. Several cases of reuse noted in this group make it possible to link it with both Hellenistic and Nabataean coins.

However, these bronze coins are very different both in manufacturing technique and in their reflection of the well-known “Himyarite” and “Sabaeen” South Arabian coins. According to the initial results of research on their circulation, these coins seem to be limited to Northwestern Arabia. One can therefore reasonably imagine a coinage produced in the Hijâz (Dedanite, Lihyante?) and perhaps even in Wadi al-Qura, which would have been used for trade and in daily life in this region. Even if the beginnings of these bronze issues were earlier, they seem to have developed between the end of the 3<sup>rd</sup> century and the middle or second half of the 1<sup>st</sup> century BC, before the distribution of Nabataean coinage in the region.

## Conclusion

Unless the interpretation is changed by additional information or corrections once the stratigraphic contexts are established, this collection of coins has already shown itself to be quite significant on many levels. Firstly, the lacunae, in particular the absence of coins later than the 4<sup>th</sup> century AD, are surprising. Secondly, the chronological distribution and the large numbers of coins for the issues represented are interesting: the collection brings new information which is important for the re-examination that we have undertaken notably for the Nabataean coinage, on the beginnings of the bronze issues of Aretas IV, but also on the series that followed as well as on possible local minting. Finally, it has allowed the study of a group of issues that was little-known until now (stylised head of Athena / stylised owl), which completes the picture of coinage in circulation at Madâ'in Sâlih during the whole of Antiquity. Given the lack of information on the trade of precious goods transported by the caravans – one cannot expect such information from the bronze coins themselves – the collection is a rich source of information on contemporary trade and day-to-day living.



**Fig. 1a-b.** Sesterce from Trajan struck for the new province of Arabia



**Fig. 2a-b.** Silver coin of the first part of the reign of Aretas IV



**Fig. 3a-b.** Small coins with a sign in the shape of an *H* on one side and a sign in the shape of an *O* on the other side



**Fig. 4a-b.** Coin belonging to the group with the head of Athena on the obverse and the owl on the reverse

## **Preliminary Report on Faunal Remains**

Jacqueline Studer (Museum of Natural History, Geneva)



# Preliminary Report on Faunal Remains

Jacqueline Studer (Museum of Natural History, Geneva)

This preliminary report presents the first archaeozoological study undertaken on the fauna recovered at Madâ'in Sâlih. The analysis was carried out during the field season of 2010, from the 19<sup>th</sup> January to the 7<sup>th</sup> February. Over this period of time, 3789 bones were examined. I also participated in the excavation of a Nabataean deposit containing several caprine carcasses in a pit.

## Methods

Terrestrial mammals and birds were attributed to species, while at this stage of the analysis, fish remains were only identified at the level of the family (fig. 1-2). Sheep and goats were identified using morphometrical criteria (Boessneck *et al.* 1964). Where separation of the two species was not possible, their remains were placed in a combined sheep / goat category.

Species are represented by the total number of identified bones (NISP counts<sup>1</sup>) and their relative percentages (fig. 2). In addition, bones of all terrestrial mammals were weighed (in grams) and these were converted into frequencies (fig. 3) in order to give a better indication of their potential contribution of meat.

## Archaeological context

Since large quantities of bone had been collected from several areas during previous excavation seasons at the site, it was decided, in agreement with the archaeologists and the ceramicists, to focus on a single homogeneous assemblage. The area which was chosen is Area 1, located in the so-called residential area, or urban centre, of Madâ'in Sâlih. The excavation of this area is supervised by Guillaume Charloux. Thus, all the faunal remains analysed during the first archaeozoological study season come from this area.

The faunal remains analysed to date were collected from the following *loci*: 10004, 10016, 10017, 10042, 10049, 10120, 10124, 10131, 10138, 10140, 10145, 10147, 10148, 10151 and 10172. The bones derive from contexts spanning the Nabataean (Hellenistic) through Umayyad periods, which correspond to the 1<sup>st</sup> – 7<sup>th</sup> century AD.

Due to the small quantity of identified bones per chronological phase, and since the analysis and dating of each *locus* is still ongoing, the faunal assemblage, in this report, has been separated into two time periods only: the oldest occupation (1<sup>st</sup> – 3<sup>rd</sup> century AD, Nabataean and Roman periods) and the more recent occupation (4<sup>th</sup> – 7<sup>th</sup> century AD).

---

1. NISP = Number of identified specimens.

## Results

The total bone assemblage comprises 3,789 remains with a total weight of nearly 18 kg (fig. 1-3). Fig. 1 shows the bone assemblage, with more than 95% of the remains belonging to mammals. Remains of birds and molluscs are very rare (respectively NISP = 25 and NISP = 3). Fish bones are a little more frequent, despite the fragility and small size of their bones (NISP = 61). Currently, for the sample dating to the 1<sup>st</sup> – 3<sup>rd</sup> centuries AD, more than half of the bone assemblage (52%) was attributed to species, while for the 4<sup>th</sup> – 7<sup>th</sup> centuries AD only 36% could be attributed to species (fig. 2). The majority of the unidentified remains represent fragmented bones of mammals, with few remains of fish, bird and molluscs that have not been attributed to a family or to species.

The species composition of the osseous material is presented in fig. 2 and 3, including NISP counts and bone weights (in grams), the latter undertaken only for mammals. As shown in fig. 2, mammals are represented by seven species (sheep, goat, dromedary, donkey, gazelle, Cape hare and spiny mouse), birds by three species (chicken, ostrich and black kite) and fish by two families (groupers and parrotfish). The assemblage as a whole is dominated by remains of domestic taxa – sheep /goat, followed by camel. Bones of donkey are present, but less abundant, as are those of fish. The other taxa are rare and represented by a few remains only.

Details concerning individual species are presented below.

### *Domestic animals*

#### **Sheep and goat, *Ovis aries* and *Capra hircus***

Domestic caprines are the most common animals. The abundance of butchery marks (cut and chop marks) observed on their bones and the fragmentation of the latter are typical of animals exploited for meat (fig. 4). This is not an unexpected result since the fauna represents consumption debris recovered from a domestic quarter of the site.

As shown in fig. 2, based on NISP counts and relative frequencies for the identified assemblage as a whole, sheep and goat remains are the most common in both periods (91% and 74% respectively). Likewise, when the relative frequency of sheep / goat remains is calculated on the basis of NISP counts for domestic mammals only, they represent 98% during the oldest period and 77% during the latest period (fig. 3). However, this predominance shifts when the relative frequency is calculated on the basis of bone weight, a method that gives an idea of the importance of the meat in the diet of the people (fig. 3). Based on bone weight, sheep and goats were the most important sources of meat during Nabataean and Roman times (78%), but not during the later period when camel predominate (caprines then represent only 26% of the assemblage).

Despite the difficulties encountered in distinguishing domestic sheep from goats, it was possible to identify 125 remains of sheep and 36 of goats. Sheep dominated the herd in both periods: 83% during the 1<sup>st</sup> – 3<sup>rd</sup> century AD, 76% during the 4<sup>th</sup> – 7<sup>th</sup> century AD. The cull profiles and skeletal element representation for caprines are still being analysed.

### **Camel, *Camelus dromedarius***

Based on the relative frequencies of species for the entire assemblage (fig. 1), camels represent an important component (20%) in the 4<sup>th</sup> – 7<sup>th</sup> century but they are rare in the earlier period (1%). This distinction is emphasized when bone weight is calculated for mammals (fig. 3). Camels then represent 67% of the 4<sup>th</sup> – 7<sup>th</sup> century mammalian assemblage, making them the most important taxon in this period, while sheep / goat frequency decreases. In the 1<sup>st</sup> – 3<sup>rd</sup> centuries, sheep / goat retain their predominance based on bone weight calculations.

These results are somewhat surprising given the generally held view concerning the importance of camels in the Nabataean world, an assumption supported by findings from sites such as Petra (Studer 1996, 2001; Studer & Schneider 2008). However, at Madâ'in Sâlih during the Nabataean period, camels may have been less frequently consumed and as such their bones were rare in regular household refuse. In contrast, in the 4<sup>th</sup> – 7<sup>th</sup> centuries, camels appear to have served as a regular meat source. It is hoped that future archaeozoological research at the site will clarify this issue.

Nearly 10% of the bones show butchery marks (cut and chop marks as well as intentional fragmentation), which indicate a species exploited for meat. Camels were also used as beast of burden as shown by exostosis on a second phalanx (fig. 5). But, as cattle examples show, this pathology can also develop in an old individual (Bartosiewicz *et al.* 1993, De Cupere 2001).

It was possible to attribute to species five bones of the camel assemblage, using morphological criteria (Steiger 1990, Studer & Schneider 2008): all of them belong to the dromedary.

### **Donkey, *Equus asinus***

All the twenty-nine remains of equids belong to the most recent period (4<sup>th</sup> – 7<sup>th</sup> century AD).

This small assemblage comprises twenty-four bones of donkey and five fragments which may belong to donkey or horse.

Clear butchery marks have been observed on the donkey remains: disarticulation incisions and filleting incisions both resulting from cutting with a knife (fig. 6). Intentional fragmentation of the diaphysis and sectioning of long bones with a chopping implement like a cleaver are also observed. The variety of butchery marks proves that the inhabitants of the urban centre of Madâ'in Sâlih during the 4<sup>th</sup> – 7<sup>th</sup> centuries AD consumed donkey meat.

No horse bones have been identified yet. However, their absence in Area 1 of the residential area does not mean that these animals were not kept at Madâ'in Sâlih. Given the small size of the assemblage analysed to date, it may indicate that horse meat was rarely if not at all consumed in this part of the site.

### **Domestic fowl, *Gallus gallus f. domestica***

Chicken is represented by only six bones, five of which are fragmented. They can be interpreted as food refuse, although no butchery marks could be observed. Noticeable is the absence of eggshell, probably due to their brittleness.

## *Wild animals*

### **Gazelle, *Gazella* sp.**

The unique remain of a gazelle was found in a Nabataean context (*locus* 10120). The bone is a complete first phalange and has been gnawed by rodent at both extremities (fig. 7). Identification of this isolated bone to species is difficult as three forms of gazelles are found in Arabia: the mountain gazelle, *G. gazella*, the goitred gazelle *G. subgutturosa* and the dorcas gazelle *G. dorcas* (Harrison & Bates 1991).

### **Northeast African spiny mouse, *Acomys cahirinus***

Usually, the specific identification of small rodents in archaeological contexts is based exclusively on skull, mandibles or isolated teeth. These represent anatomical elements providing the clearest morphometrical criteria. The rodent assemblage of Area 1 comprises six pieces including a skull and a mandible, both representing the genus *Acomys*. Two species of *Acomys* which are difficult to separate based on osteology are found in the Arabian Peninsula. One is the Northeast African spiny mouse, *A. cahirinus*, a common rodent, and the second is the golden spiny mouse, *A. russatus*, which is much less frequent. With an interorbital constriction length (IC) of 5 mm and a maxillary cheek teeth length of 4.6 mm, the Madâ'in Sâlih skull falls within the variation of *Acomys cahirinus* published by Harrison & Bates (1991) (fig. 8).

The Northeast African spiny mouse is a widespread species ranging from the Sahara and Nigeria to Egypt, East Africa, Arabia, Cyprus, southern Asia Minor, Iran and Pakistan (Harrison & Bates 1991: 253). It is considered by Tchernov as a commensal species (1984).

Already in 1932, Flower noted that in villages and cities of Egypt, the spiny mouse *Acomys cahirinus* competed with the house mouse *Mus musculus* (in Tchernov 1984).

The presence of rodent is attested not only by bones but also by gnawing marks on birds, fish bones as well as on caprines small elements (fig. 9).

### **Ostrich, *Strutio camelus***

This large bird is represented only by fragments of eggshell, with a total of sixteen fragments identified from both periods. In general, the fragments are rather small, with a surface of less than 1 cm.<sup>2</sup> Almost all the remains are burnt and some fragments show clear incisions made intentionally (fig. 10). They cannot be confused with trampling marks or striation caused by carnivores (Kandel 2004). It is possible that the eggs of ostrich served as receptacles for food and were “personalised” by marking them on their surface before being placed in a fire.

### **Black kite, *Milvus migrans* or yellow-billed kite, *M. aegyptius***

A medium-sized bird of prey is represented by a distal fragment of a tarsometatarsal (fig. 11). Although badly preserved, the fragmented bone belongs clearly to a diurnal raptor and, based on its morphology, most probably to a Kite, *Milvus* sp. Nowadays, only the black kite, *M. migrans* and the yellow-billed kite, *M. aegyptius*, are observed in Saudi Arabia (Porter & Aspinall 2010). The black kite is a migrant breeding in Europe, North Africa and western Asia but wintering in Africa. In contrast, the yellow-billed kite is resident in southwest Arabia. Considering the localisation of Hegra, both species are susceptible to be found in the vicinity of the ancient city.

The tarsometatarsal was found in the north corner of the room 10115, in a Late Antique level dated to the 6<sup>th</sup> – 7<sup>th</sup> century (*locus* 10138).

### **Fish**

The fish material is present in both chronological contexts and totals sixty-one pieces. All the identified bones are marine fish and they belong to two families only: groupers (*Serranidae*, fig. 12) and parrotfish (*Scaridae*). The groupers represent at least seven specimens, one from a large size fish (> 100 cm), while at least three parrotfish are represented.

The presence of marine fish bones in this inland site offers insights into dietary habits and trade. First of all, fish was a common dietary element from the beginning of the occupation in the Nabataean period until the 7<sup>th</sup> century AD. A second point is that the fish identified all belong to marine species. It is not possible yet to precise the origin of the groupers and parrotfish, since both families are well represented in the Red Sea as well as in the Persian Gulf. Further analysis (e.g. identification of the species) is needed to develop this aspect. The nearest coast would have been the Red Sea (*ca.* 150 km from Madâ'in Sâlih). This would mean that fish served as a trade item transported by camel caravans during several days. This suggests that fish has not been transported fresh but specially prepared. We hope that more ichthyofaunal material will enable us to study the different preservation methods that would have enabled long distance transport of fish, such as sun-drying, smoking or / and salting (Van Neer *et al.* 2004).

### **Excavation of a Nabataean pit**

I spent one day excavating a Nabataean pit discovered in trench 3 of Area 1. It contained skeletal remains of several very young caprines. The archaeozoological study of this particular material will be undertaken during the next field season, in 2011.

### **Conclusion and perspectives**

This first study of animal exploitation at Madâ'in Sâlih has provided information on the most common species consumed, some indications about butchery techniques and husbandry strategies, the use of animal remains as raw materials, trade in particular species, inter-period differences in faunal exploitation as well as information about the natural environment.

From the Nabataean to the Umayyad periods, the animal protein in the diet of the inhabitants of the urban center of Madâ'in Sâlih is essentially provided by sheep and goat, especially sheep, and camels.

The abundance of water around the urban centre undoubtedly made it possible to raise sheep, a species which generally requires greater access to water than goats (Silanikove 1992). It may also indicate that the management goals of the inhabitants included exploitation of caprines for wool in addition to meat and milk. Of particular interest is the absence of remains of cattle, a species commonly found in contemporaneous sites in the Near East, even those located in arid regions (for Petra, see Studer 2002, 2007).

Although fish remains do not seem to be very abundant, it is interesting to note that they were systematically part of the diet, from the beginning to the end of the period of occupation of the site. Groupers and parrotfish are marine species, which means that they were imported probably from the Red Sea.

It is important to note that chicken are rare and that it is the only domestic bird identified to date at the site. The dog is only present by characteristic gnawing marks on the bones.

### *Chronological change*

The chronological distinction into two time periods only is a preliminary stage in the archaeozoological study. In the future, when a larger bone assemblage has been analysed, a finer attribution to phases will be made. This will enable us to follow the evolution of faunal exploitation from the beginning of the human occupation at Madâ'in Sâlih by the Nabataeans until the end of the occupation of the site, 700 or 800 years later. The current data, albeit limited, do indicate some interesting inter-period differences with the greater importance of the camel in the later phase of the site occupation. The 4<sup>th</sup> to 7<sup>th</sup> century AD assemblage also contains a wider diversity of species, but this is undoubtedly related to the far larger number of bones studied from this period.

Consumption of donkey meat has also been attested, at least during the more recent periods (4<sup>th</sup> – 7<sup>th</sup> century AD). The absence of any equid remains during the Nabataean and Roman periods needs to be confirmed in the future.

### **Bibliography**

- Bartosiewicz L., Van Neer W. & Lentacker A. 1997. *Draught cattle: their osteological identification and history*. Annalen van het Koninklijk Museum voor Midden-Afrika, Zoölogische Wetenschappen.
- Boessneck J., Müller H.-H., Teichert M. 1964. *Osteologische Unterscheidungsmerkmale zwischen Schaf (*Ovis aries*, Linné) und Ziege (*Capra hircus*, Linné)*, Berlin, Kühn-Archiv, 78.
- De Cupere B. 2001. *Animals at the Ancient Sagalassos. Evidence of the faunal remains*. Studies in Eastern Mediterranean Archaeology, IV, Brepols Publishers, Turnhout, Belgium.
- Harrison, D. L. & Bates P. J. J. 1991. *The Mammals of Arabia*, Seven Oaks, Kent: Harrison Zoological Museum.
- Kandel A. W. 2004. "Modification of ostrich eggs by carnivores and its bearing on the interpretation of archaeological and paleontological finds", *Journal of Archaeological Science* 31 (4) 4, p. 377-391.

- Porter R. & Aspinall S. 2010. *Birds of the Middle East*. Helm Field guides, second edition. Christopher Helm, London.
- Silanikove N. 1992. Effects of water scarcity and hot environment on appetite and digestion in ruminants: a review. *Livestock Production Science* 30, p. 175–194.
- Steiger C. 1990. *Vergleichend morphologische Untersuchungen an Einzelknochen des postkranialen Skeletts der Altweltkamele*, Inaugural-Dissertation, München.
- Studer J. 1996. “La faune romaine tardive d’Ez Zantur, à Petra”, in: A. Bignasca *et al.*, *Petra, Ez Zantur I. Ergebnisse der Schweizerisch-Liechtensteinischen Ausgrabungen 1988-1992*, Terra Archaeologica II. Monographien der Schweizerisch-Liechtensteinischen Stiftung fuer Archaeologische Forschungen im Ausland (SLSA/FSLA), p. 359-375.
- Studer J. 2002. “Dietary differences at Ez Zantur Petra, Jordan (1<sup>st</sup> century BC – AD 5<sup>th</sup> century)” in: H. Buitenhuis, A. M. Choyke, M. Mashkour & A. H. Al-Shiyab (eds), *Archaeozoology of the Near East V*, ARC- Publicaties 62 (Groningen/ The Netherlands), p. 273 -281.
- Studer J. 2007. “Animal exploitation in the Nabataean world”, in: K. D. Politis (ed.), *The World of the Nabataeans*. Volume 2 of the Proceedings of the conference on the ‘World of the Herods and Nabataeans’, held at the British Museum in London 17-19 April 2001, Steiner Verlag, Stuttgart, p. 251-272.
- Studer J. & Schneider A. 2008. “Camel use in the Petra region, Jordan: 1<sup>st</sup> century BC to 4<sup>th</sup> century AD”. *Archaeozoology of the Near East VIII*, TMO 49, Maison de l’Orient et de la Méditerranée, Lyon, p. 581-596.
- Tchernov E. 1984. “Commensal animals and human settlements in the Middle East”, in: J. Clutton-Brock & C. Grigson (eds), *Animal and Archaeology. 3. Early herders and their flocks*. BAR international Series 202, p. 91-115.
- Van Neer W., Lernau O., Friedman R., Mumford G., Poblome J. & Waelkens M. 2004. “Fish remains from archaeological sites as indicators of former trade connections in the Eastern Mediterranean”, *Paléorient* 30/1, p. 101-148.

	1 <sup>st</sup> -3 <sup>rd</sup> c. AD		4 <sup>th</sup> -7 <sup>th</sup> c. AD		total
	NISP	%	NISP	%	NISP
Mammals	681	95,3	3019	98	3700
Birds	4	0,5	21	1	25
Molluscs	1	0,1	2	0,1	3
Fish	28	4	33	1	61
total	714	100	3075	100	3789

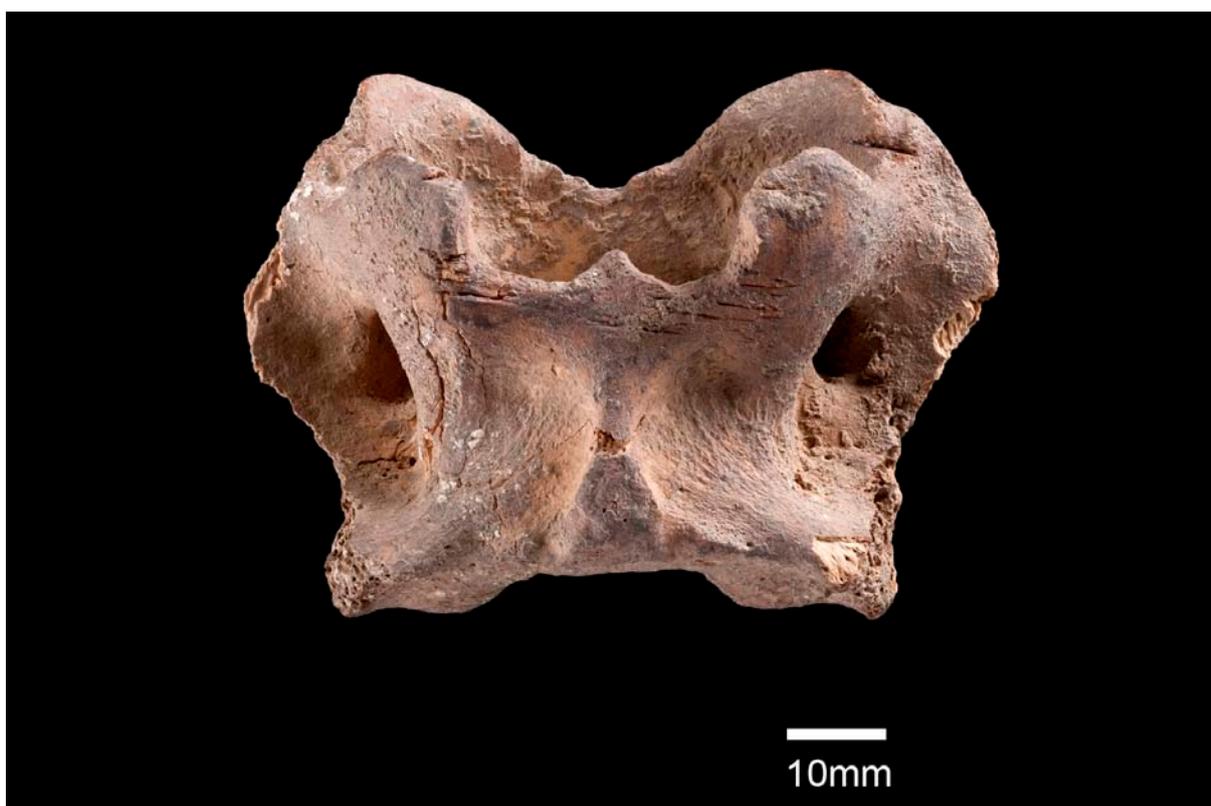
Fig. 1. Overview of the faunal assemblage in Area 1. NISP = number of individual specimens

		1 <sup>st</sup> – 3 <sup>rd</sup> century AD		4 <sup>th</sup> – 7 <sup>th</sup> century AD		TOTAL
		NISP	%	NISP	%	NISP
<b>Domestic species</b>						
Sheep + goat	<i>Ovis aries</i> + <i>Capra hircus</i>	346	91,5	820	74,4	1166
Dromedary	<i>Camelus dromedarius</i>	7	1,2	220	20,0	227
Donkey	<i>Equus asinus</i>	-	-	24	2,1	24
Equids	<i>Equus</i> sp.	-	-	5	0,5	5
Chicken	<i>Gallus gallus</i>	1	0,2	5	0,5	6
<b>Wild mammals</b>						
Gazella	<i>Gazella</i> sp.	1	0,2	-	-	1
Cape hare	<i>Lepus capensis</i>	-	-	1	0,1	1
Spiny mouse	<i>Acomys cahirinus</i>	-	-	2	0,1	2
<b>Wild birds</b>						
Ostrich	<i>Struthio camelus</i>	2	0,5	14	1,2	16
Black Kite	<i>Milvus migrans</i>	-	-	1	0,1	1
<b>Fish</b>						
Groupers	<i>Serranidae</i>	16	4,5	4	0,5	20
Parrot fish	<i>Scaridae</i>	6	1,5	1	0,1	7
<b>Total identified</b>		379	99,6	1097	99,6	1476
Unidentified mammals		327		1947		2274
Unidentified birds		1		1		2
Unidentified molluscs		1		2		3
Unidentified fish		17		17		34
<i>Total unindented</i>		346		1967		2313
TOTAL		725		3064		3789

Fig. 2. Species distribution of the fauna in Area 1. NISP = number of individual specimens. \* = Eggshell

	1 <sup>st</sup> – 3 <sup>rd</sup> century AD				4 <sup>th</sup> – 7 <sup>th</sup> century AD				TOTAL	
	NISP	%	Weight (grams)	%	NISP	%	Weight (grams)	%	NISP	Weight (grams)
<b>Domestic fauna</b>										
Sheep + goat <i>Ovis aries</i> + <i>Capra hircus</i>	346	98%	1556	78%	820	76%	3136	26%	1166	4692
Dromedary <i>Camelus dromedarius</i>	7	2%	427	22%	220	20%	7973	67%	227	8400
Donkey <i>Equus asinus</i>	-		-		24	2%	548	5%	24	548
Equids <i>Equus</i> sp.	-		-		5	1%	182	2%	5	182
<b>TOTAL</b>	<b>353</b>	<b>100</b>	<b>1983</b>	<b>100</b>	<b>1069</b>	<b>99%</b>	<b>11839</b>	<b>100%</b>	<b>1422</b>	<b>13822</b>

**Fig. 3.** Distribution of the domestic mammals in Area 1. NISP = number of individual specimens. Weight in grams



**Fig. 4.** First cervical vertebra (atlas) of a sheep showing cut marks (ventral view). These particular cut marks are usually presented as killing evidence by slitting. In this case, the incisions show a disarticulation between the skull and the trunk. *Locus* 10042, Nabataean-Roman periods. Photo Wagner, Museum of Natural History of Geneva



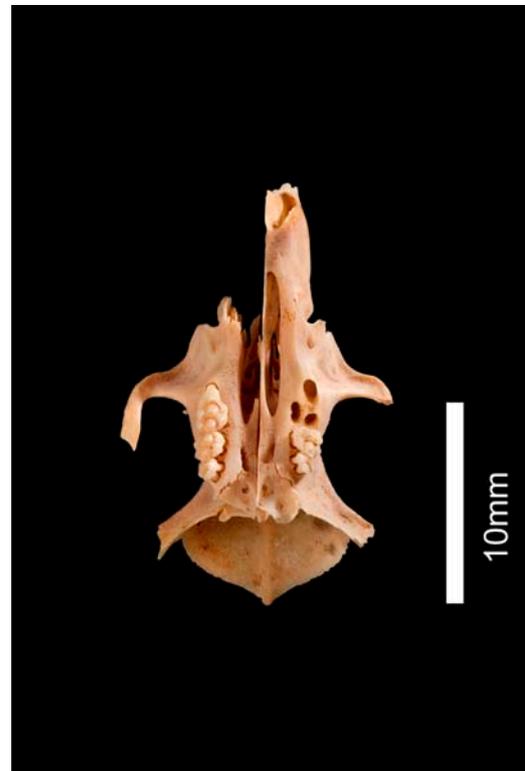
**Fig. 5.** Second phalanx of dromedary deformed by exostosis on both sides around the proximal articulation (volar view). *Locus* 10151, 6th – 7th century AD. Photo Wagneur, Museum of Natural History of Geneva



**Fig. 6.** Fragmented diaphysis of a tibia of a donkey with a filleting incision. *Locus* 10145, 4th – 7th century AD. Photo Wagneur, Museum of Natural History of Geneva



**Fig. 7.** First phalanx of gazelle (lateral view). Rodent marks are visible on the distal end. *Locus* 10151, 6th – 7th century AD. Photo Wagneur, Museum of Natural History of Geneva



**Fig. 8.** Skull of the commensal northeast African spiny mouse *Acomys cahirinus*. *Locus* 10148, 4th – 7th century AD. Photo Wagneur, Museum of Natural History of Geneva



**Fig. 9.** Gnawing marks made by a rodent on a third phalanx of sheep. *Locus* 10120, Nabataean period



**Fig. 10.** Eggshell of an ostrich with intentional incisions. *Locus* 10016, 6th – 7th century AD. Photo Wagneur, Museum of Natural History of Geneva



**Fig. 11.** Fragmented tarsometatarsus of *Milvus milgrans* or *M. aegyptius*. Photo Wagneur, Museum of Natural History of Geneva



**Fig. 12.** Vertebra of a grouper (*Serranidae*) with rodent gnawing marks. Photo Wagneur, Museum of Natural History of Geneva



## **Additional Study on the Geography**

Eric Fouache (University Paris 10)



# **Additional Study on the Geography**

Eric Fouache (University Paris 10)

## **Introduction**

This study was undertaken between 27 January and 6 February 2010 at the request of Laïla Nehmé, François Villeneuve and Dhaifallah al-Talhi (directors of the archaeological project at Madâ'in Sâlih). The MEDEE programme (Mer désert environnement), financed by the French Ministry of Foreign Affairs and directed by Eric Fouache, covered the cost of transport from Paris to Muscat and Medina to Paris (via Riyadh) of the participant whereas the archaeological project of Madâ'in Sâlih covered the ticket from Muscat to Medina as well as the expenses on site (visas, lodging, meals and car hire).

This short exploratory season was prompted by a number of archaeological questions about stratigraphy and sedimentology and the possibility of a future geo-archaeological programme.

## **Presentation of the archaeological and geographical setting**

Inscribed on the UNESCO World Heritage list in 2008, the archaeological area comprises the Nabataean city of Hegra and its surroundings. The city of Hegra occupies the centre of a basin, known today as the plain of Madâ'in Sâlih, which was cut largely by wadi Bamdha and its tributaries. This basin was cut into plateaus made of Ordovician and Cambrian sandstones. To the west of the basin, the sandstone plateau topped by volcanoes and covered in Tertiary basalt floes is the Harrat al-'Uwayrid. It has been protected from erosion by the basalt floes deposited in the Tertiary era during the phase of volcanic activity linked to the opening of the Red Sea rift. In the centre of the basin some outcrops survive, free from the degraded sediments that once surrounded them. They form a group of inselbergs immediately to the east of Hegra (Jabal Ithlib). The town itself, which was surrounded by a rampart, lies between Jabal Ithlib to the east and wadi Bamdha to the west. The following trenches were excavated in 2010, inside the rampart:

Area 1 (excavated by Guillaume Charloux): dwelling area;

Area 2 (excavated by Zbigniew Fiema et Jérôme Rohmer): dwelling area;

Area 9 (excavated by Zbigniew Fiema): dwelling area;

Area 8 (excavated by Solène Marion de Procé): dwelling area;

Area 6, IGN 132 (excavated by Laïla Nehmé): sanctuary;

Area 3 (excavated by François Villeneuve): north rampart.

Areas 1, 2, 8 and 9 are located on the edges of a flat land that occupies a small basin gently inclined to the north (this can be seen on the 1/1000 topographic map from which we took the contours for fig. 1), towards which surface runoff converges today.

The usual question the archaeologists want to answer is whether the topography prior to human occupation in this basin was the same as it is today and whether archaeological remains may be found there. Certain observations raise further questions:

1/ to the east of the “northwest Tell” ( see F. Villeneuve’s 2009 report), the line of the rampart is lost at the edge of a flat, clayey area where the rainwater stagnates;

2/ in the rock-cut chamber IGN 132a (see L. Nehmé’s report, this volume), some cemented sediments are stuck to the rock face to the left, not far from the entrance;

3/ to the east of Area 9, some sediments that are neither mudbrick nor a house floor seem equally consolidated;

4/ outside the residential area, the presence of many redeposited pot sherds near to tomb IGN 55 raises the question of their provenance;

5/ the same question can be asked about the presence of sandstone blocks carved into capitals scattered on the surface of the glacis that stretches to the southeast of the residential area (Ith 105, see L. Nehmé’s 2009 report).

## Methodology

After being introduced to the archaeological context and two days spent visiting the various parts of the site, we concentrated our observations on the trenches excavated *intra-muros*. Subsequently, we located areas outside the rampart whilst always staying within the limits of the fence surrounding the archaeological park. The documents made available to us by the project were the 1/250 000 map (*Geological Map of the Sakl al Matran Quadrangle*, sheet 28c, Ministry of Petroleum and Mineral Resources, Kingdom of Saudi Arabia, 1987), a *Quickbird* image from 2005 and some aerial photographs at a scale of 1/5000 taken by the IGN in 1978. Two articles proved particularly useful: Nehmé *et al.* 2006 and Courbon 2008. With the help of Guillaume Charloux and using a GPS, we took advantage of our survey to locate and place on a *Quickbird* image the areas characterised by dense pottery sherd scatters, which represent ancient dwelling areas.

## Results

### *Topography intra-muros between excavation areas 1, 2, 8 and 9*

The excavation squares in Area 8, located in the east of the basin, show that the foundations stand directly on the sandstone bedrock or on yellow sands which represent the *in situ* or slightly shifted degradation of the underlying sandstone. In Area 2, the clearing of a road running northwest-southeast shows that the structural relief sloped relatively steeply towards the west. The bedrock *in situ* to the southwest of the excavated area is only 3 m deep. On the other hand, the small rise that closes off, today, the western edge of the basin, was not as marked as it is today, as demonstrated by the thickness of the archaeological layers in Areas 1 and 9. In Area 1, in the deep sounding of “Trench A”, the sterile layers begin at 1.58 m below the surface. At -3.69 m, the depth reached by a sounding with an auger, there is a clayey layer that is 50 cm lower than the drainage level of the present wadi bed, and the bedrock was still not reached.

A gastropod shell (*Melanoides tuberculata*) was found in the auger at this level. This shell can only live in shallow, perennial marshes. It can be found either in the pools of perennial irrigation systems or in permanent marshes. It should be noted that this shell cannot be found in the wadi today. This bears witness to the presence of an ancient wadi channel which is much earlier than the foundation of the city and of a water table higher than today's.

The construction of dwellings led to a reduction of the opening of the basin towards the north. As a consequence, the drainage of the latter became less efficient and the basin became something of a catchment area in which sediments transported by runoff accumulated. The final destination of the runoff is the vast flat area to the east of the Northwest Tell area. On the eastern edge of Area 9, one can see coarse lenses of displaced gravels, sand and small archaeological artefacts that were deposited in temporary channels during strong downpours. One can also see, in the continuation of these channels, the clayey settling deposits which are deposited inside buildings during phases of abandonment. It is clear that the dynamics of transportation by runoff have been the most efficient since the final abandonment of the site. One can imagine both some major deposition (about one meter high) of sediments and some destruction by erosion along the line of flow during the rare, but intense, rains. The magnetometry survey, by Christophe Benech, will certainly show whether any archaeological structures remain in this area.

### *The search for the line of the north rampart to the east of the Northwest Tell*

The northwest Tell was excavated in the centre of an accumulation of clay which, locally, forms a small hill encrusted with salt. A stretch of the north rampart was excavated but its line is lost immediately to the east, in a vast flat, clayey area covered in polygonal desiccation cracks. This surface seemed to indicate the filling up of a hollow area, but this was contradicted by the presence of a very eroded sandstone basin *in situ* on the surface. In order to solve the problem of the line of the rampart in this spot, Christophe Benech carried out a magnetometer survey perpendicular to the presumed line of the wall. This survey revealed, at a depth of about 50 cm, a weak anomaly of a size that could be the rampart. With two workmen, we opened a sounding (GPS UTM 39, 395953 / 2963269, alt. 773 m) over the centre of the anomaly, measuring 50 cm deep by 2 m long, oriented east-west, which is perpendicular to the supposed line of the wall. The sounding produced the following stratigraphy: 3 to 4 cm of hard clay, very dry at the surface, 20 cm of loose loamy clay, 10 to 15 cm of very hard clay cemented by gypsum crystals, and finally 15 cm of compact but uncemented, slightly damp loamy clay. The study of the section by François Villeneuve showed that two levels of mudbrick were resting on a level of virgin soil of clayey loam at a depth of 25 cm (fig. 2).

This study allows us to complete the northern line of the rampart. It also shows that, in an archaeological context, before digging any sounding for archaeological or environmental purposes, it is useful, first, to carry out a geophysical study. In this way, a specific area can be selected for examination, thus saving both time and money. The vast flat area to the east of the Northwest Tell was levelled with a bulldozer during the development of the site in the 1960s and 1970s, whilst the surface layers, saturated with salt,

were scraped off and pushed against a small existing tell which included the excavated rampart in the area of the Northwest Tell. This scraping was superficial because the 25 cm of fossilisation of the wall in 2000 years shows that very few sediments reach the basin. The clayey loam character of the virgin soil, only exposed over 25 cm, seems to indicate accumulation by runoff.

### *Origin of the cementation of the sediments in IGN 132a and in Area 9*

At the entrance to the rock-cut chamber IGN 132a, the sediments that post-date the ancient occupation, easily removed down to the floor level, are cemented in places. This cementation is found below the place where the water flowing off the rock falls (fig. 3). A test using vinegar established that the cementation was of carbonates. We know that the matrix of sandstones is composed of silicates and carbonates in varying proportions. Rainwater that flows on the sandstone becomes charged with carbonates. The sediments become soaked with water before evaporating. The carbonates then crystallise and cement the sediments. The same phenomenon can be seen in the archaeological layers of Area 9. The water that filters down from the surface runoff during rain events is trapped in locally impermeable structures; it then evaporates and the carbonate crystals cement the sediments. This explains the presence of hardened areas that are neither house floors nor remains of mudbricks.

### *The sandstone blocks Ith 105*

A group of scattered blocks was noted and planned on the surface of the glacis which lies southeast of the residential area. A sounding, carried out by Laïla Nehmé in 2009, showed that there is more than 3 m of sand in this area. The fact that the blocks were found, without any associated medium-sized archaeological artefacts, scattered randomly over a wide area on the surface of an accumulation glacis with a gentle but even slope, shows that these blocks were not extracted locally but were transported and left there by man. About a hundred metres further east (GPS UTM 39397053 / 2962679, alt. 183 m), a rectangle on the surface containing a high density of pot sherds and blocks still *in situ* could be the place where these blocks come from.

### *Surveys outside the residential area*

The surface concentration of pot sherds east of tomb IGN 55 seems to be the result of dispersal by runoff from the dense concentration of pottery found to the north of tomb 55. The density of the pottery accumulated locally, which reaches a thickness of 50 cm, bears witness to an ancient occupation site (fig. 4, Sector 5). Yvonne Gerber has dated the sample of pottery collected to between the end of the 1<sup>st</sup> century BC and the 1<sup>st</sup> century AD. Two other sectors also have Roman and Late Antique pottery (Sectors 1 and 2). Sector 5 is located between two areas of wells (wells no. 61 and 85 in the north and wells 41 and 44 in the south) and between the sandstone escarpment and the wadi bed. Thus, these sectors bear witness to dwellings grouped into hamlets, contemporary with Hegra, associated with areas of cultivation and oases around the Nabataean wells. Until now, 131 wells have been identified. We decided therefore to check whether other dwelling sites may be identified in the areas where there are wells. In the southern half of the archaeological park, we were able to identify fourteen dwelling areas (fig. 4), always close to wells and with dense

accumulations of pottery on the surface. A quick assessment of the terrain showed that the same areas existed also in the northern half of the park. This network only partly reflects the location of farms from the 1960s and 1970s and it shows the extent of the land cultivated around Hegra. The Sabkha, situated to the north of the residential area, is a large area where the floodwaters of the wadi Bamdha and its tributaries accumulate. There are virtually no dwelling sites around the Sabkha, nor around the channels of wadi Bamdha which form a small delta to the northwest of it and where a nice riverside woodland of acacias and tamarisks has developed. The dwelling areas identified need of course an exhaustive study and a systematic sampling of the pottery in order to determine the periods of occupation and the relocation of dwellings over time.

In the small delta, some remains of clayey loam terraces can be seen preserved about 1 m below the present channels. Sector 1, to the west of well no. 65, is in the middle of fossil dunes on the same clayey loam level. One can question whether associated fossil channels and terraces existed prior to the Nabataean period. More broadly, there remains the question of defining the exact limits of the cultivated zone to the north and northwest, during the Nabataean period. The archaeological survey for wells was limited to inside the perimeter of the present archaeological park because the depression to the north was completely developed after 1975, the year in which the farms inside the park were expelled and re-established further north. This has considerably affected the area but it would still be appropriate to survey this northern zone so that we are not enclosed within a fictive perimeter.

Regarding the level of the water table, the situation seems well established by Paul Courbon's study. The supply to this water table is regional and its catchment area extends over nearly 4000 km<sup>2</sup>. Our perspective is that of a traditional society that does not master deep pumping in order to compensate for climatic fluctuations. The water level near the station, at 9 m during Jaussen and Savignac's visit in 1909, is much higher than that reconstructed by Paul Courbon in 2005 based on the elevation of the pumps. The drop in level of the water table is entirely due to the growth of deep pumping. There is no reason to suppose that the depth of the water table had been very different in the Nabataean period than at the beginning of the XX<sup>th</sup> century, particularly since the wells will work with this depth of water table. That does not mean that the region did not suffer some more humid or arid climatic fluctuations. These could have had morphological consequences because of the greater or lesser frequency of sandstorms and floods in the wadis.

### **Conclusions and suggestions**

In our opinion, there is no need for a geoarchaeological programme in the residential area, on the one hand because of the high density of archaeological remains and on the other because the surface dynamics are limited to movement by runoff. When specific questions arise about an archaeological section or about the line of the rampart for example, it is always possible to bring a geomorphologist or a geologist as necessary, without designing a specific research programme.

However, the rest of the depression, to the north and northwest of the city of Hegra, is of great interest if one is interested in the Quarternary and Holocene formations (fossil and active dunes, wadi channels,

flood plains and possibly associated alluvial terraces). The mapping of these formations, up to twenty kilometres north of Hegra, would give a precise picture of the different natural units and of the environmental dynamics that affect them. Such a map could be prepared in Paris based on stereoscopic aerial photographs (which are available at the IGN) coupled with a Landsat TM satellite image (free on the NASA website). A ground-truthing season would be limited to the areas that pose problems of interpretation and could be carried out over 15 days. This geomorphological map could be used as a support for the continuation of the survey for Nabataean wells and dwelling sites characterised by accumulations of pottery. Later, this map would allow hypotheses to be developed about areas that would have been favourable for habitation prior to the Nabataeans and to guide future surveys for Iron and Bronze Age as well as earlier sites.

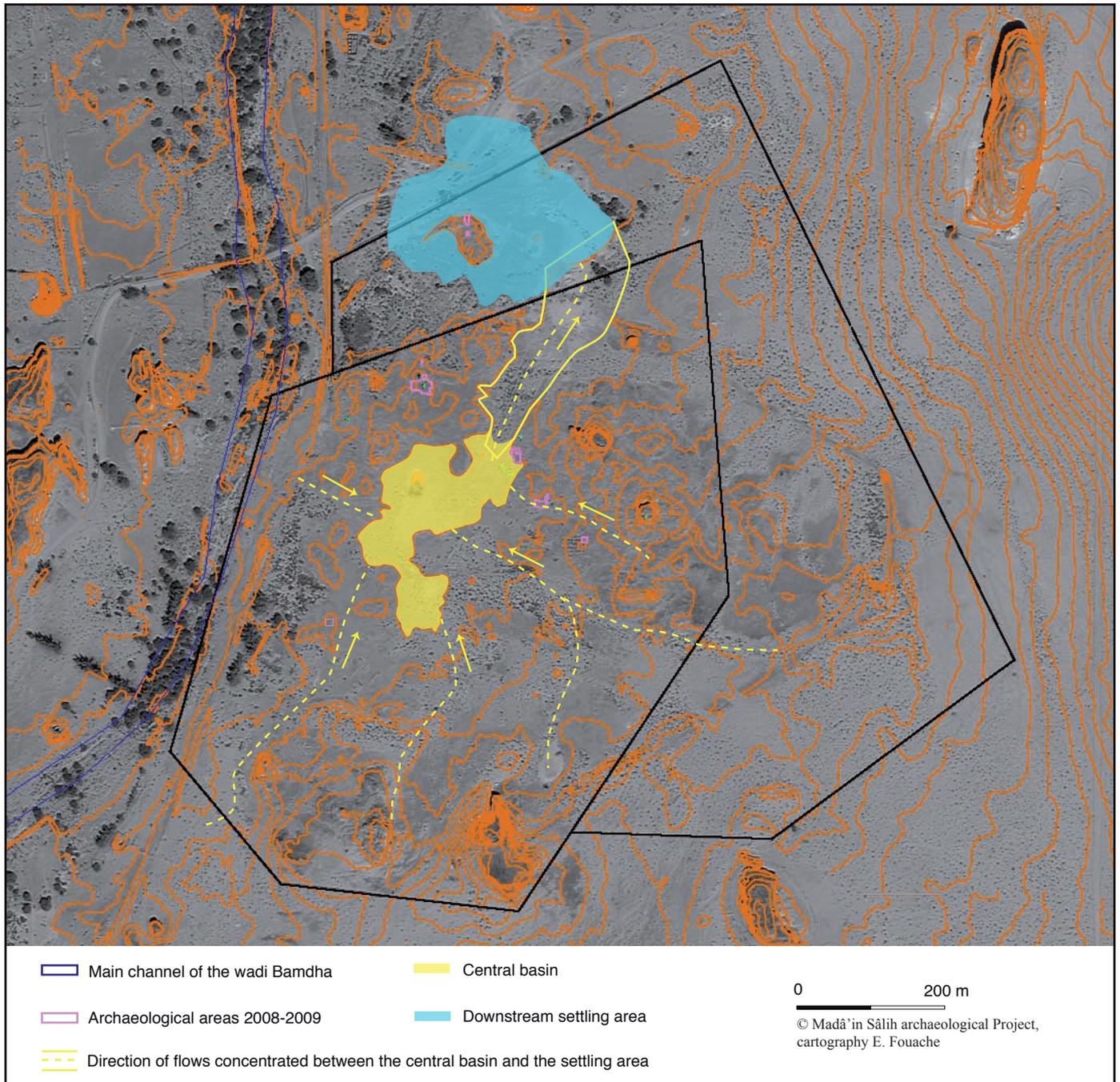
Such a season could be covered, in 2011, by the MEDEE programme if it is renewed for another four years (2011-2014). The MEDEE programme would pay for the tickets from Paris to Medina for the two participants (Eric Fouache and Jean-Pierre Peulvast, geomorphologist at the University of Paris 4), the Madâ'in Sâlih project would cover their board and lodging and access to a vehicle.

In 2012, we would organise a second season of 15 days devoted to sampling for palaeoenvironmental analyses, either to date the dunes and fluvial sediments (OSL and C<sup>14</sup> dating), or to obtain systematic samples for archaeobotanical analysis of the charcoal. A field survey conducted by Paul Courbon and Charlène Bouchaud showed that certain wells (fig. 5) would be suitable for a detailed stratigraphic study over a depth of 4 to 5 m, which would make it possible to estimate the rhythm of sedimentation at least since the second half of the Holocene (charcoal was noticed in some levels, and some lenses of very pure sand would be suitable for OSL dating). The second season would need two or three palaeoenvironmental specialists. Charlène Bouchaud could be one of them.

The third year would be devoted to laboratory analyses and the fourth year to the scientific synthesis. These proposals can, of course, be amended and can only happen if the Madâ'in Sâlih project finds them scientifically useful.

## Bibliography

- Courbon P. 2008. "Les puits nabatéens de Madâ'in Sâlih (Arabie Saoudite)", *Arabian Archaeology and Epigraphy* 19, p. 48-70.
- Nehmé L., Arnoux Th., Bessac J.-Cl., Braun J.-P., Dentzer J.-M., Kermorvant A., Sachet I., Tholbecq L., with a contribution by J.-B. Rigot. 2006. "Mission archéologique de Madâ'in Sâlih (Arabie Saoudite): Recherches menées de 2001 à 2003 dans l'ancienne Hijrâ des Nabatéens", *Arabian Archaeology and Epigraphy* 17, p. 41-124.



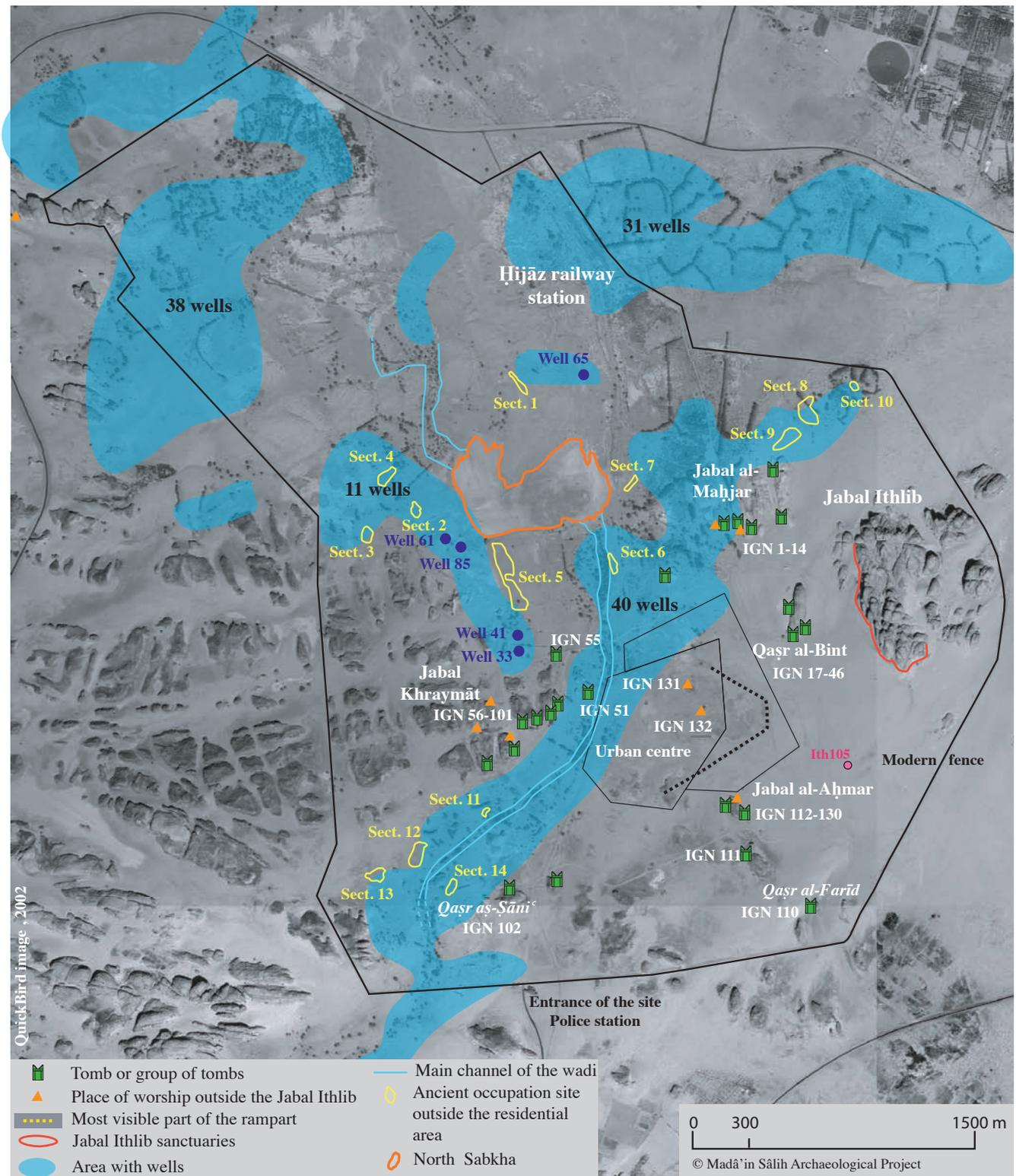
**Fig. 1.** Map showing the central basin with the surface runoffs converging towards it



**Fig. 2.** Sounding to the east of the northwest Tell, which exposed two layers of mudbrick at the base of the north rampart



**Fig. 3.** Doorway of the rock-cut chamber IGN 132a



**Fig. 4.** Map of the location of the trenches mentioned in the report and of the sectors of Nabataean dwellings outside the residential area, characterised by concentrations of sherds on the surface



**Fig. 5.** Section, 4.5 m high, on the edge of a well at the very north end of the archaeological park (GPS, UTM 37, 393796/2966042) which could be studied stratigraphically with C<sup>14</sup> datings of charcoal

# **List of Topographical Stations**

Paul Courbon



## REPERTOIRE STATIONS TOPOS 2010

Ce répertoire a été dressé pour la zone urbaine située à l'intérieur de l'enclos grillagé. Il y a sept stations primordiales qui pourront servir à déterminer des stations nouvelles.

1) Trois stations primordiales sont situées à l'extérieur du site, ce sont les stations S1, S10 et S506. Elles ont été matérialisées par des fers à béton d'une cinquantaine de cm de haut qui ont été scellées dans le roc après creusement d'un trou de 12 cm de profondeur. On peut viser ces fers à béton de la plus grande partie de la zone urbaine, ils permettent de s'orienter quand on est sur une station. On peut aussi se relever sur eux, à condition de se contrôler sur un quatrième point de la zone urbaine.

2) Quatre stations à l'intérieur du site sont matérialisées par des fers à béton scellés et dépassant du rocher de 4 cm environ. Ce sont les stations S504, S505, S 508 et la borne Bne N.O. D'autres stations secondaires sont matérialisées par des points au marqueur ou des croix gravées dans la pierre.

Ces coordonnées figurent dans le fichier geobase MS2010/recalcul\_stat de Covadis-Autocad

### STATIONS EXTERIEURES

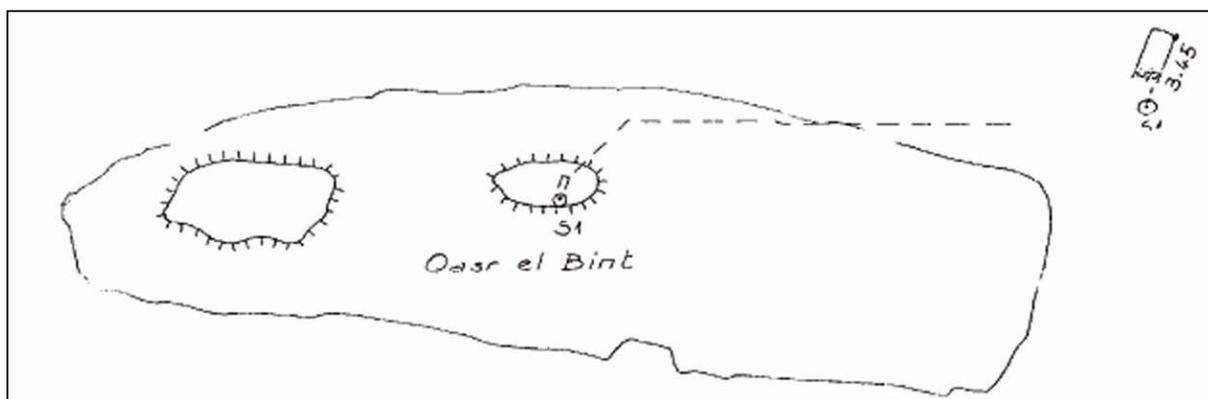
Nota : Il faudra repeindre les piquets en noir pour les rendre visibles. Notre essai de peinture en jaune et orange a été un échec, car les piquets se confondent avec la roche environnante.

Au cours d'orientations sur ces stations extérieures, il est apparu des discordances qui nous ont amené à remesurer des distances et angles à partir de S1 et S504. Nous avons trouvé des différences de l'ordre de 25 cm par rapport aux distances mesurées en 2003-2004. Après vérification par la méthode des trois trépieds, il est apparu que le théodolite utilisé en 2010 n'avait qu'une constante proche de 0mm. Nous ne l'avons donc pas remis en cause. Dans la zone urbaine, les stations ayant été déterminées à partir de la station 504 avec le même appareil, elles restent cohérentes. Nous ne les avons donc pas modifiées, ni la stations 504. Par contre, nous avons modifié les stations S1, S10 et S506 en fonction des nouvelles distances mesurées.

#### STATION 1 (S1)

Elle est située sur le sommet sud du Jebel Qasr el Bint, dans le prolongement du côté sud d'une tombe restituée et à 3.45 m du coin sud-est de cette tombe. Un trou a été fait au tamponnoir, dans lequel a été planté une tige de fer permettant de s'orienter à partir des points connus du chantier. C'est à partir de cette station qu'ont été déterminés les points du site ayant servi au calage de la carte IGN en UTM, ainsi que quelques autres points des levés 2002.

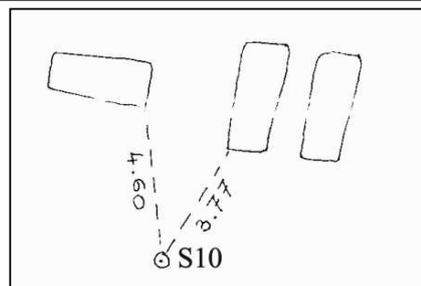
X 396637.52      Y 2963412.70      Z 841.05 (sol)  
841.60 (sommet piquet)



#### S10

Située au sommet du mamelon des tombes 133-138, au nord de la zone urbaine. Un fer à béton a été planté au centre d'une croix gravée repassée au marqueur jaune.

X 395949.70      Y 2963599.85      Z 789.70 (rocher)  
790.23 (sommet tige)



**S506**

Au milieu de la plateforme du petit rognon rocheux où a été creusé le site Ith78 (l'écriteau métallique porte A/48), une centaine de mètres au sud du Jabal Ithlib. Un fer à béton a été planté au centre d'un triangle au marqueur jaune. Pas de détails proche pour un croquis avec distances.

X 397040.60    Y 2963047.66    Z 820.95 (rocher)  
821.48 (sommet tige)

**STATIONS INTERIEURES****Stations primordiales****S504**

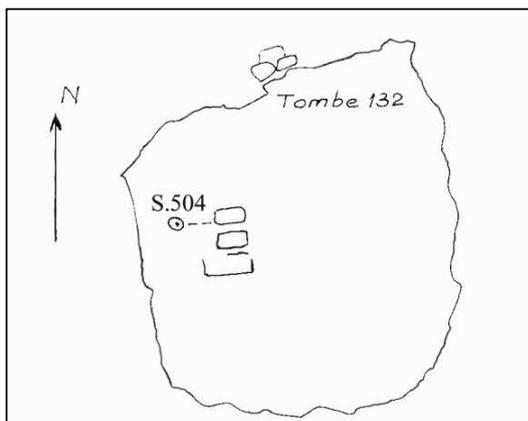
Située sur le sommet au dessus de la tombe 132, de la zone urbaine. Fer à béton scellé dans le roc, dépassant le sol de 4cm. Pas de détails proches pour un croquis.

X 396125.01    Y 2962888.38    Z 793.19 (rocher) 793.23 (sommet piquet)

**S505**

Située sur le sommet rocheux 120 m au N.N.O. du points 504. Fer à béton scellé dans le roc, dépassant le sol de 4cm. Pas de détails proches pour un croquis.

X 396062.80    Y 2962996.49    Z 787.20 (rocher) 793.24 (sommet piquet)

**S9**

Située sur une petite élévation de terre peu marquée, au sud-est de la zone, non loin du Wadi el Hijer, près du chantier de fouilles 9. Un fer à béton a été planté dans la pierre en grès rouge de l'assise d'un mur qui dépasse du sol de quelques centimètres. Le fer à béton dépasse la pierre de 4 cm.

X 395697.16    Y 2962711.89    Z 779.38 (sommet piquet) et 779.34 (rocher)

**Bne N.O.**

Au N.O. de la zone urbaine, non loin de la clôture ouest, dans une zone de sédiments chahutés se trouve une grosse borne carrée en ciment (40x40 cm environ), au milieu de laquelle un fer à béton dépasse de 5cm. Elle a été marquée 2 et H 20.142 dans le ciment (photo).

X 395718.44    Y 2963022.26    Z 778.92 (sommet piquet)



**LZB**

Point de nivellement du chantier 2 (Zbig), matérialisé au marqueur rouge sur une pierre de grés rouge. Bon en XYZ, mais difficile à trouver.

X 395954.59                      Y 2962996.36                      Z 778.59

**NGC**

Point de nivellement du chantier 1 (G. Charloux), matérialisé au marqueur rouge sur une pierre de grés rouge. Bon en XYZ, pas évident à trouver.

X 395825.33                      Y 2963076.08                      Z 778.90

**S8**

Point de nivellement du chantier 8 (S. de Procés), matérialisé par un piquet fer avec ruban rose, dépassant du sol de moins de 10 cm

X 395994.20                      Y 2962919.74                      Z 778.88 (sommet piquet)

**9niv**

Point de nivellement du chantier de fouilles 9, juste à coté du point S9 qui a été déterminé après. Matérialisé par une croix gravée au sommet d'une petite pierre.

X 395695.93                      Y 2962713.25                      Z 779.37

**132niv**

Point de nivellement du chantier de fouilles 132, à l'est de S504. Matérialisé par une croix gravée au sommet d'une petite pierre.

X 396166.81                      Y 2962884.12                      Z 783.75

**S51**

Piquet fer implanté sur les remparts en 2008, dans l'enceinte intermédiaire de la zone urbaine. Implanté en 2008, vérifié en 2010

X 396472.28                      Y 2962809.61                      Z 785.15 (St piquet)

**S52**

Piquet fer implanté sur les remparts en 2008, dans l'enceinte intermédiaire de la zone urbaine. Implanté en 2008, vérifié en 2010

X 396227.73                      Y 2962634.52                      Z 781.94 (St piquet)

**T14**

Piquet fer pris dans un cercle de ciment, sur une élévation de terre, une centaine de mètres au sud de S 504. Nom gravé dans le ciment. Ce point créé par les saoudiens a fait l'objet de deux déterminations de notre part en 2010. (photo)

X 396130.62                      Y 2962782.78                      Z 784.50  
(sommet piquet).

**R3**

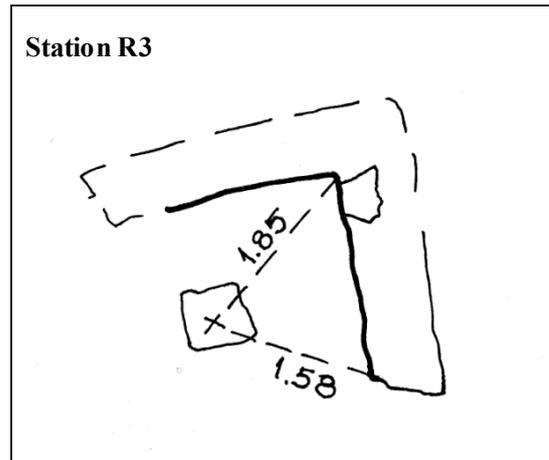
Réalisé au cours du lever des vestiges de rempart en 2010, au S.O. de la zone urbaine. Sur un petit tertre au dessous d'une ancienne carrière qui a du servir pour la construction du chemin de fer. Croix rouge gravée sur une pierre carrée rouge. (photo)

X 395711.61            Y 2962482.71    Z 790.01

**R4**

Réalisé au cours du lever des vestiges de rempart en 2010, au N de la zone urbaine, entre les deux clôtures. Piquet fer avec bande bleue sur le sommet d'un tertre où ont été effectuées des fouilles. Placé entre des pierres, le piquet ne dépasse le sol que d'une dizaine de cm.

X 395885.20            Y 2963269.59            Z 778.80



## Conclusion

In 2010, most of the fieldwork was undertaken in the residential area, where the team refocused its activities. One operation only was undertaken outside it, in a structure which turned to be a rock cut *triclinium* installed in a sandstone outcrop south of the Jabal Ithlib. It is now confirmed that the Jabal was devoted, during the Nabataean period, to the meeting of religious symposia.

In the residential area (see fig. 2-3 of the introduction), the following areas were excavated in 2010 :

- Area 1, opened in 2008, by G. Charloux (see the report);
- Area 2, opened in 2008, by Z. T. Fiema and J. Rohmer (see their reports);
- Area 3, which concerns various spots of the rampart (32200, 32300, 34000), by F. Villeneuve;
- Area 60600, around and on top of IGN 132, an open air sanctuary installed on a rocky outcrop at the foot of which a double courtyard *temenos* was built, by L. Nehmé (see the report);
- Area 8, opened in 2009, by S. Marion de Procé (see the report);
- Area 9, opened in 2010, by Z. T. Fiema (see the report);

The activities of the project in 2010 and the perspectives which are offered by each area are presented in the relevant chapters of the report, which brings together the illustrated contributions of most of the participants to the 2010 season. Each report presents both the results of the excavation and the perspectives they offer, in a detailed and argued way.

### **The works which are planned in 2011 are the following:**

- continue the excavations in the main areas of the residential area (areas 1, 2, 8, 9 and 60600 = IGN 132);
- finish the excavation of tomb IGN 117;
- continue the surveys and soundings in the area of the rampart;
- identification and excavation of a well preserved *loculus*;
- continue the geomagnetic survey in the residential area;
- excavate another *tumulus*

Several specialists are due to participate to the 2011 season: one geophysician, one numismatist, two ceramicists, one archaeozoologist. Two draughtmen, one topographer and a restorer of metallic objects will also join the team.

The 2011 season is the last *excavation* season of the four year programme of the Madâ'in Sâlih archaeological project. The 2012 season will, indeed, be a *study* season during which the analysis of the various categories of material (pottery, coins, possibly textiles and leather, glass, stone objects, etc.) will be achieved. A second volume of the publications will also be prepared. During the 2012 season, we shall also focus on the conservation and restoration of the mudbrick structures which were put to light between 2008 and 2011. A particular effort will also be made for the restoration of the objects, mainly the textiles and the leather, the most interesting fragments of which should be prepared for museum display.

## **Documents A3**







Layer	Phase 2 (2 <sup>nd</sup> half 1 <sup>st</sup> BC-1 <sup>st</sup> half 1 <sup>st</sup> century AD)								Ph.2/3	Phase 3 (2 <sup>nd</sup> half 1 <sup>st</sup> c.AD- early 2 <sup>nd</sup> AD)								Ph.3/4 (2 <sup>nd</sup> c. AD)		Phase 4 (end 11 <sup>th</sup> -beginning 13 <sup>th</sup> )										Ph.IV/V	Phase V (11 <sup>th</sup> -13 <sup>th</sup> )					
	20012	22030	23006	23017	25055	25058	25059	25094		25096	20009	20026	21005	21010	25021	25023	25029	25065	25084	25017	25119	22001/10	25004	25005	25011	25012	25013	25111	25113		25127	25204	25209	25203	25006	25007
Type layer	Filling	Occ./rejet		Fp	Dis.	Surface	Fp	Occ./Dis.	Fp	Taboum	Fp	Fp	Occ.	Dest.?	Occ.	Pit	Fp	Dis./Dest.	Dis./Dest.	Dest.?	Dest.	Occ./refuse	Occ.	Occ.	Fp/Dest.	Surface	Dis.	Surface	Diffuse	Occ./Dis.	Fp	Occ./junk	Fp	Dis.		
Floated vol.(l)	10	10	6	6	0,3	4	0,7	12	5	20	90	30	30	5	6	5	8	2	13	2	25	35	13	5	23	5	13	30	30	120	600	3	14	2,5	50	
Carbonized vol.(ml)					2			6									100	30		10											45				50	
<b>Cultivated fruit tree</b>	<i>Gossypium</i> type	-	-	-	2	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	
	<i>Moringa peregrina</i> type	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	<i>Olea europea</i>	-	-	-	-	-	-	-	-	-	-	-	-	10	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	cf. <i>Olea europea</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	<i>Palmae</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	<i>Phoenix dactylifera</i> (palm tree)	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	<i>Phoenix dactylifera</i> _petiole	-	-	-	-	-	-	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	<i>Phoenix dactylifera</i> _trunk	12	2	51	5	-	10	3	130	1	5	2	48	24	6	19	12	9	8	18	8	91	32	1	-	-	-	-	-	-	-	-	-	-	-	
	<i>Phoenix dactylifera</i> _root	3	-	-	3	10	4	4	-	1	412	2	5	11	-	30	-	-	1	-	7	51	4	4	-	-	-	-	-	-	-	-	-	-	-	
	<i>Phoenix dactylifera</i> _leave	5	1	-	-	-	-	45	-	-	300	-	-	-	-	-	-	-	2	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	<i>Prunus</i> sp.	1	-	5	1	-	4	6	15	-	-	16	10	2	3	28	2	-	5	4	-	5	4	-	-	-	-	-	-	-	-	-	-	-	-	
	cf. <i>Prunus</i> sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	<i>Punica granatum</i> (pomegranate tree)	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	cf. <i>Punica granatum</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
<b>Spontaneous vegetation</b>	<i>Acacia</i>	-	7	27	2	-	7	-	4	2	2	-	3	33	-	93	75	3	1	3	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	
	<i>Acacia</i> type <i>tortilis</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	cf. <i>Acacia</i>	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Calotropis procera</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	cf. <i>Capparis</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Capparis spinosa</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Chenopodiaceae</i>	16	7	19	-	7	17	5	32	11	45	30	9	13	17	62	2	2	4	37	21	35	3	1	7	-	-	-	-	-	-	-	-	-	-	
	<i>Chenopodiaceae</i> type 2 (continuous phloème)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	cf. <i>Chenopodiaceae</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Chrozophera brocchiana</i> type	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Ephedra</i> sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Grewia</i> sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	cf. <i>Grewia</i> sp.	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Gymnocarpus decandrum</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Juniperus</i> sp. (juniper)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Lycium</i> cf. <i>shavii</i>	-	-	3	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Retama raetam</i> (white broom)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Rhus tripartita</i>	-	-	-	-	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Salix/Populus</i> (poplar)	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Scrophularia desertii</i> type	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Tamarix</i> sp. (Tamarisk)	48	12	-	48	-	1	11	69	5	20	3	15	14	59	14	-	2	15	8	10	13	1	1	-	-	-	-	-	-	-	-	-	-	-	
	<i>Ziziphus</i> cf. <i>spina-christi</i> (jujube tree)	-	1	-	-	-	-	20	-	-	-	-	2	1	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	cf. <i>Ziziphus</i> sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Rhus/Ziziphus</i>	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Local shrub indeterminata	0	-	4	-	-	-	-	-	0	72	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	little branches	-	-	-	-	-	11	4	1	1	8	56	-	6	-	4	8	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
<b>Others</b>	<i>Angyosperme</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Monocotylédone	1	-	7	-	-	-	-	-	-	61	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bark	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	22	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Type 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Unrecognizable	21	11	22	19	4	20	6	30	9	21	230	39	16	-	-	12	3	12	21	3	17	-	-	-	-	-	-	-	-	-	-	-	-	-	
<b>Total</b>		107																																		

Layer	1 <sup>st</sup> half 1 <sup>st</sup> c. BC-AD 1 <sup>st</sup> c.						32025
	31010	31011	31013	31017	32012	32025	
Type layer	Diffuse	Diffuse	Diffuse	Diffuse	Diffuse	Diffuse	Diffuse
Floated vol.(l)	40	20	30	30	10	12	
Carbonized vol.(ml)							
Ratio (Carbonized vol./Floated vol.)							
<b>Cereals</b>							
Undetermined Cerealia		1			9		
<i>Hordeum vulgare</i> (barley)					9		
<i>Hordeum vulgare</i> hulled (hulled barley)					16		
<i>H. vulgare</i> subsp. <i>hexastichum</i>					1		
<i>H. vulgare</i> susp. <i>distichum</i>					2		
<i>Triticum</i> sp. (wheat)					5		
<i>Triticum aestivum/durum</i> (naked wheat)						3	
<i>Triticum dicoccum</i> (emmer)						8	
<b>Pulses</b>							
Undetermined Fabaceae					2		
<i>Lens culinaris</i> (lentil)							
<i>Medicago</i> sp.		1			1		
<i>Medicago</i> sp. (lucerne)							
<i>Pisum sativum</i> (pea)							
<i>Lathyrus sativus</i> (grass pea)							
<i>Vicia/Lathyrus</i>							
<i>Vicia sativa</i> (common vetch)							
<b>Fruits</b>							
<i>Phoenix dactylifera</i> L. (date palm)	3	5	18	5	6	6	
<i>Ficus carica/sycomorua</i> (fig)			1		8		
<i>Olea europaea</i> L. (olive)					1		
<i>Punica granatum</i> L. (pomegranate)						110	
<b>Textile plant</b>							
<i>Vitis vinifera</i> L. (grape)							
<i>Gossypium</i> sp. (cotton)							
cf. <i>Gossypium</i> sp. (cotton)							
<b>Potential weeds (linked with fields or others human activities)</b>							
Apiaceae					1		
Asteraceae							
Boraginaceae							
Brassicaceae							
Capparidaceae							
Caryophyllaceae							
Fabaceae							
Moraceae							
Oleaceae							
Punicaceae							
Vitaceae							
<b>Desert taxons (natural presence in this region)</b>							
Aizoaceae							
Boraginaceae							
Chenopodiaceae							
Cucurbitaceae							
cf. Cyperaceae							
Fabaceae							
Labiatae							
Poaceae							
Solanaceae							
Rhamnaceae							
<b>Others</b>							
Undetermined small seeds (rounded)							
Undetermined small seeds (elongated)							3
Floral base							
Capsule							
Stem							
<b>Total seeds/fruits Density (total/floated vol.)</b>							
	9	7	24	6	261		
	0.2	0.4	0.8	0.2	26.1		
Coprolith							
Coprolithes ovicaprine							
Coprolithes rodent							
Coprolithes camel							
Organic							
Food preparation							
Ash mass							
Dung (guelle)							xxx

All plant macro-remains are carbonized / Number in red indicate plant macro-remains conserved by desiccation (dried)

Fig. 4a : "Carpological" results in Area 2

	Type layer Floated vol.(l) Carbonized vol.(ml) Ratio (Carbonized vol./Floated vol.)	90009	90014	90016	90021	90024	90025	90032	
		Fp	Fp		Occ.	Filling	Dump		
		3	16	3	20	15	8	40	
		170	5	5	50	1000		1000	
		56.7	1.7		3.3			25	
<b>Cereals</b>									
Undetermined Cerealia	grain	-	8	2	20	2	3	2+2	
	rachis	-	-	3	-	4	-	-	
	rachis_Ear base	-	-	-	-	-	-	-	
	stem/node	1	-	2	26	2	1	4	
	glum	-	-	-	-	-	-	2	
	root	-	-	-	-	-	-	-	
	grain	-	-	-	15	-	-	-	
	rachis	7	2	2	17	-	-	-	
	rachis_Ear base	1	1	-	-	-	-	-	
	glum	2	-	-	6	-	-	-	
	grain	1	-	-	2	-	-	-	
	rachis	1	-	-	-	-	-	-	
	grain	1	-	-	-	-	-	-	
	grain	7	2	8	15	-	-	-	
	rachis	-	-	-	6	-	-	-	
	rachis_Ear base	-	-	-	-	-	-	-	
	grain	-	-	-	-	-	-	-	
	spikelet base	-	-	-	-	-	-	-	
<b>Pulses</b>									
Undetermined Fabaceae	seed	-	-	-	2	-	-	-	
<i>Lens culinaris</i> (lentil)	seed	-	-	1	-	-	-	-	
<i>Medicago</i> sp.	capsule	-	-	-	-	-	-	-	
<i>Medicago</i> sp. (lucerne)	seed	-	-	-	1	23	-	-	
<i>Pisum sativum</i> (pea)	seed	-	-	-	-	-	-	-	
<i>Lathyrus sativus</i> (grass pea)	seed	-	1	-	-	-	-	-	
<i>Vicia Lathyrus</i>	seed	-	-	-	-	-	-	-	
<i>Vicia sativa</i> (common vetch)	seed	-	-	-	-	-	-	-	
<b>Fruits</b>									
<i>Phoenix dactylifera</i> L. (date palm)	whole seed	-	-	-	-	-	-	-	
	fgmt seed	3	2	126	131	32	23	-	
	perianth	14	227	21	1	-	-	-	
	pericarp	-	-	xxxx	30	-	-	-	
	endocarp	-	-	2	-	-	-	-	
	berry	-	-	-	-	-	-	-	
	achene	-	-	-	-	-	-	-	
	whole seed	-	1	1	7	2	-	-	
	fgmt endocarp	-	-	-	-	2	-	-	
	whole seed	-	-	-	-	-	-	-	
	fgmt seed	-	-	-	-	-	-	-	
	pericarp	-	-	-	-	-	-	-	
	calyx	-	-	-	-	-	-	-	
	pip	-	-	-	1	1	-	-	
<b>Textile plant</b>									
<i>Gossypium</i> sp. (cotton)	seed	-	-	-	-	-	-	-	
cf. <i>Gossypium</i> sp. (cotton)	seed	-	-	-	1	-	-	-	
<b>Potential weeds (linked with fields or others human activities)</b>									
<i>Centaurea</i> sp. (centaury)	seed	-	-	-	-	-	-	-	
<i>Heliotropium</i> sp. (heliotroph)	endosperm	-	-	-	1	-	-	-	
cf. <i>Neslia</i> sp.		-	-	-	-	-	-	-	
<i>Capparis</i> type	seed	-	-	-	-	-	-	-	
Undetermined	seed	-	-	-	-	-	-	-	
<i>Astragalus/Trigonella</i> (astragal)	pod	-	-	-	1	-	-	-	
<i>Astragalus/Trigonella</i>	seed	-	-	-	-	-	-	-	
<i>Melilotus/Trifolium</i> (melilot)	capsule	-	1	-	1	10	-	-	
	seed	-	-	-	-	-	-	-	
	seed	-	1	-	-	-	-	2	
	capsule	-	-	-	-	-	-	-	
	seed	-	-	-	-	-	-	-	
	seed	-	-	-	-	2	-	-	
	seed	-	-	-	-	-	-	-	
	seed	-	1	-	-	-	-	-	
	seed	-	-	-	-	-	-	-	
	seed	-	-	-	-	-	-	-	
	perianth	-	-	-	1	-	-	-	
	seed	-	-	-	1	-	-	10	
	seed	-	-	-	-	-	-	-	
<b>Desert taxons (natural presence in this region)</b>									
<i>Aizoaceae</i>	seed	-	-	-	-	-	-	-	
	floral base	-	-	2	-	-	-	-	
	capsule	-	-	-	-	-	-	-	
	endosperm	1	-	44+8	19	-	3	-	
	seed	-	-	-	-	-	-	-	
	endosperm	-	-	-	-	-	-	-	
	endosperm	-	-	-	-	-	-	-	
	endosperm	-	-	-	-	-	-	-	
	endosperm	-	-	-	-	-	-	-	
	stem	40	4	11	3	-	13	-	
	floral base	-	-	-	-	-	-	-	
	endosperm	-	-	-	-	-	-	-	
	seed	-	1	-	-	-	-	-	
	seed	-	-	-	-	-	-	-	
	seed	-	-	-	1	-	2	-	
	seed	-	-	-	-	-	-	-	
	seed	-	-	-	2	-	-	-	
	seed	-	-	-	-	-	-	-	
	seed	-	-	-	-	-	-	-	
	seed	-	-	-	-	-	-	-	
	seed	-	-	-	-	-	-	-	
	seed	-	-	-	-	-	-	-	
	seed	-	-	-	-	-	-	-	
	seed	-	-	-	-	-	-	-	
	berry	-	-	-	-	-	-	-	
<b>Others</b>									
Undetermined small seeds (rounded)		-	-	-	-	-	-	-	
Undetermined small seeds (elongated)		-	-	-	-	-	-	-	
Undetermined seed		2	-	1	-	-	-	-	
Floral base		-	-	-	-	-	-	-	
Capsule		-	-	1	-	-	-	-	
Stem		-	2	-	-	-	-	-	
<b>Total seeds/fruits</b>		79	255	52	260	235	40	59	
<b>Density (total/floated vol.)</b>		26.3	15.9	17.3	13.0	15.7	5.0	1.5	
Coprolith	whole	-	-	-	19	-	-	-	
Coprolithes ovicaprine	figmt	-	-	-	2.5	-	-	-	
Coprolithes rodent		15	4	-	5	-	3	-	
Coprolithes camel		-	-	-	-	-	-	-	
Organic		xx	xxx	-	-	x	-	-	
Food preparation		-	-	-	-	-	-	-	
Ash mass		-	x	-	x	-	-	-	
Dung (guelle)		-	-	-	-	-	-	-	
<b>All plant macro-remains are carbonized / Number in red indicate plant macro-remains conserved by desiccation (dried)</b>									

Fig. 7a : "Carpological" results in Area 9