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Dûma 2. The 2011 Report of the Saudi–Italian–French Archaeological Project at Dûmat al-Jandal, Saudi Arabia

Guillaume Charloux, Romolo Loreto

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Dûma 2

The 2011 Report of the Saudi–Italian–French Archaeological Project at Dûmat al-Jandal, Saudi Arabia

Guillaume CHARLOUX & Romolo LORETO

With the participation of Mounir Arbach, Paola Aurino,
Hammoud M. Al-Arjan, Mousa al-Garni, Rozan al-Khatib al-Kontar,
Thamer A. Al-Malki, Andrea Marcolongo, Bruno Marcolongo,
Abdul M.N. Al-Marshd, Hervé Monchot, Quentin Morel,
Marc Munschy, Laila Nehmé, Ahmed A. al-Qayed, Christian Robin,
Pierre Siméon & Abdulhadi K. al-Traad

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Table of Contents

Acknowledgements	9
The 2011 Season at Dûmat al-Jandal	10
The Geo-archaeological Survey Bruno Marcolongo	17
Neolithic Evidence from Asfân, Preliminary Report Paola Aurino & Romolo Loreto	33
The Archaeological and Epigraphic Survey Mounir Arbach, Guillaume Charloux, Thamer A. Al-Malki, Abdul M.N. Al-Marshd, Quentin Morel, Ahmad A. Al-Qeyaed, Mousa Al-Garni, Christian Robin, Pierre Siméon & Abdulhadi K. Al-Traad	61
Magnetic Cartography Marc Munsch & Rozan Al-Khatib Al-Kontar	93
Excavations in the Historical Area, Sector A Romolo Loreto	101
Archaeological Artifacts from Sector A Romolo Loreto	147
The Western Settlement, Sector C Guillaume Charloux, Abdulhadi K. Al-Traad, Ahmed A. Al-Qeyaed & Quentin Morel	183
A “Transitional” Inscription from Dûmat al-Jandal Laila Nehmé	227
Faunal Material Hervé Monchot	231
Searching for Qasr Jawhar Guillaume Charloux, Quentin Morel & Pierre Siméon	255
3D Architectural Restitution of Monuments Andrea Marcolongo	277
Conclusion	293
References	297

أ	ا
ب	b
ت	t
ث	th
ج	j
ح	h
خ	kh
د	d
ذ	dh
ر	r
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س	s
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ف	f
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ك	k
ل	l
م	m
ن	n
ه	h
و	w
ي	y

الحروف الصوتية

Long vowels
ā, ū, î

ة

a

Arabic Alphabet & Transliteration
(contemporary personal names excluded)

الحروف العربية ومقابلها باللاتينية

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French Republic

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The 2011 Season at Dûmat al-Jandal

The second season of archaeological study of the Dûmat al-Jandal oasis (Saudi Arabia) by the Joint Saudi-Italian-French Archaeological Project took place from October 7th to November 13th, 2011. Results obtained this year were significant, in particular the discovery of several Neolithic sites to the south of Dûma, that of a Nabatean ‘tricladium’ and the base of a presumably ‘Roman’ tower on the Western sector’s promontory. These discoveries lead one to consider the setting up of long-term collaborations with specialists from a number of fields (Prehistorian, pottery experts specializing in classical periods, archaeo-botanists, etc. . .) and induce new thoughts on the place of Nabatean and Roman culture in the region. They also enable one to consider the continuation of Saudi-Italian-French collaboration and future research, in an atmosphere of confidence and sharing.

Affiliations and Partnerships

The project works under the aegis of following scientific institutions:

- The University of Naples “*L’Orientale*”, *Dipartimento Asia, Africa e Mediterraneo*
- The French National Center for Scientific Research (UMR 8167, *Orient et Méditerranée*)
- The Saudi Commission for Tourism and Antiquities

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- The French Embassy in Riyâdh, *Service de coopération et d’action culturelle* (SCAC)
- The French National Center for Scientific Research (CNRS)
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- The Italian Ministry of Foreign Affairs (MAE/DGSP)
- The University of Naples “*L’Orientale*”, *Dipartimento Asia, Africa e Mediterraneo* – CISA, *Centro Interdipartimentale di Servizi di Archeologia*

Participants

The project is directed by Dr. Guillaume Charloux and Dr. Romolo Loreto. The following specialists took part in the project in 2011:

Saudi component

Abdulhadi K. Al-Traad (director of the al-Jawf Antiquities, SCTA)
Ahmad A. Al-Qeyaed (director of the al-Jawf Museum, SCTA)
Abdul M.N. Al-Marshd (vice director of the al-Jawf Museum, SCTA)
Thamer A. Al-Malki (historian-archaeologist, SCTA)
Mousa Al-Garni (historian-archaeologist, SCTA)
Hammoud M. al-Arjan (assistant curator, SCTA)

Italian component

Dr. Romolo Loreto (archaeologist, University of Naples *L'Orientale*)
Dr. Andrea Marcolongo (architect, CNR)
Dr. Bruno Marcolongo (geoarchaeologist, CNR, Institute of Applied Geology IRPI)

French component

Dr. Mounir Arbach (epigraphist, CNRS/UMR 8167)
Dr. Guillaume Charloux (archaeologist, CNRS/UMR 8167)
Dr. Hervé Monchot (zooarchaeologist, Labex Resmed, university Paris IV Sorbonne)
Quentin Morel (land surveyor)
Prof. Christian Robin (historian, CNRS/UMR 8167)
Dr. Pierre Siméon (ceramologist-archaeologist, CNRS/UMR 8167)
Rozan Al-Khatib Al-Kontar (geophysicist, IPGS, UMR 7516 CNRS-UNISTRA/EOST)

Activities carried out during the season

1. Survey

Survey activities intensified in 2011, thanks to the arrival of Bruno Marcolongo, geo-archaeologist at the Italian CNR, who was particularly interested in the palaeo-lakes located south of Dûmat al-Jandal, in the continuation of Wadi as-Sirhân (**see Marcolongo geo-archaeological survey**) and who began geomorphological studies in the oasis. In tandem, a geophysical surveyor from Strasbourg University, Rozan al-Khatib, participated in research on archaeological sectors A and C; however results are still inconclusive because of the nature of the terrain and due to numerous metal disturbances in the soil (**see Munsch & al-Khatib, magnetic cartography**). This year, archaeological and epigraphic surveys were not only restricted to known sites, but have covered new, less-visited zones around Dûma, particularly near Qasr al-Jaysh or Jabal Hamamiyat (**see Arbach et al.**). We have also developed a program of systematic survey of the oasis, doubled with the creation of a linking data base that can be transferred to other GIS systems (**see Arbach et al.**). The system is advantageous in that it can cumulate manual GPS data and architectural reconstructions made with a Trimble R4 differential GPS (provided by the Labex Resmed of the University of Sorbonne - Paris 4). Ancient structures found in each square, whose dating is often a matter of contention, were therefore included in an inventory in the data base. These surveys, when compared to each other, will be the point of departure of work aimed at safeguarding the oasis' heritage.

2. Excavations

The sounding opened in 2009 in Sector A, corresponding to the area located north east of Mârid castle, was once more extended this year, so as to obtain a better understanding of the impressive Building A, but also to collect more data on the ancient periods of occupation at the site (Nabatean and Roman) (**see Loreto, Sector A**). A small sounding opened further the south did not yield the hoped-for stratigraphy and was quickly stopped.

Excavations in sector C focused on two structures of average dimensions, located in 2011 at the summit of a hill named Rijm al-Burj. It appears that the first (SD4) is in all likelihood a Nabatean triclinium and that the second construction is the base of a tower maybe of later date, belonging to the Roman period (SD5) (**see Charloux et al., Sector C**).

3. Protection of Saudi Heritage

The Jawf region is now undergoing major economic and social developments, with momentous and ominous repercussions on archaeological sites, in terms of site destruction, of vandalism and the increase of clandestine excavations and looting. Initial observations and studies in the field, at Dûmat al-Jandal and in the remaining area, confirms an alarming situation; it is now important to inform the *Saudi Commission for Tourism and Antiquities* of the risks which Saudi heritage is subjected to in this area (**see Arbach et al.**).

Sector C in particular is prone to rapid degradation and destruction. The expedition has thus informed the Commission of the destruction of a segment of the Western enclosure of the oasis. Following fieldwork in 2011, the *Saudi Commission for Tourism* has set up ways of better protecting the area. Any new construction must obtain an authorization. Moreover, the enclosure's damaged sector was reconstructed by the local branch of this Commission (<http://www.juof7.com/news.php?action=show&id=20848>, article dated to the 12/27/2012).

4. Lectures

1. Loreto R. Joint Saudi-Italian archaeological project at Dûmat al-Jandal. Preliminary report of the 1st excavation campaign (2009), at the Ancient Arabia Colloquium, Cambridge - Clare Hall (July 2010).
2. Loreto R. Dûmat al-Jandal (Arabia Saudita): fonti testuali e prime testimonianze archeologiche dell'antica Adumatu, at the University of Naples "L'Orientale" – Dipartimento di Studi Asiatici. (March 2011).
3. Charloux G. Dûmat al-Jandal, une oasis sur les pistes caravanières d'Arabie saoudite, at the Paris A CNRS office, Ivry-sur-Seine (May 2011).

4. Charloux G. & Loreto R. Dûmat al-Jandal (Arabie saoudite), premières explorations de l'oasis par la Mission archéologique italo-franco-saoudienne, *Note d'information* at the *Institut de France - Académie des Inscriptions et Belles-Lettres* (May 2011).
5. Charloux G. & Loreto R. The Saudi-Italian-French Archaeological Project in Saudi Arabia, at the 15th Rencontres Sabéennes, in Moscow (May 2011).
6. Loreto R. The Saudi-Italian-French Archaeological Project at Dûmat al-Jandal (Ancient Adummatu). A first relative chronological sequence for Dûmat al-Jandal. Architectural elements and pottery items, at the *Seminar for Arabian Studies* in London – British Museum (July 2011).
7. Charloux G. Known and Unknown Archaeological Monuments in Dûmat al-Jandal, at the *Seminar for Arabian Studies* in London – British Museum (July 2011).
8. Charloux G. Dûmat al-Jandal, une oasis sur les pistes caravanières d'Arabie saoudite, at the French International High School, Riyâdh (October 2011).
9. Charloux G. Dûmat al-Jandal, une oasis sur les pistes caravanières d'Arabie saoudite, at the French Embassy, Riyâdh (October 2011).
10. Loreto R. The Saudi-Italian-French Project at Dûmat al-Jandal, at the Italian Embassy, Riyâdh (October 2011).
11. Charloux G. Wâdî Sirhân and the 'Eastern Caravan Road'. Round Table *The Arabian Trade: Between Image and Reality* in Paris (May 2012).
12. Charloux G. & Loreto R. 2011 season at Dûmat al-Jandal. at the XVI^{es} *Rencontres Sabéennes* in Pisa (June 2012).
13. Loreto R. The Saudi-Italian-French archaeological project at Dûmat al-Jandal, ancient Adummatu (Saudi Arabia). New Neolithic evidence from al-Jawf region: an outline of the historical development of Dûmat al-Jandal, at the *Seminar for Arabian Studies*, London – British Museum (July 2012).
14. Loreto R. Epigraphical sources and new archaeological evidences of the Nabataeans from Dûmat al-Jandal, ancient Adummatu (al-Jawf Province, Saudi Arabia). *The first International Conference on Nabataean Studies*, University of Jordan, Petra (May 2012).

5. Publications

1. de Maigret A. 2010. Joint Saudi-Italian Archaeological Project at Dûmat al-Jandal. Preliminary Report of the First Excavation Campaign (2009). *Newsletter di Archeologia CISA (L'Orientale)*. Vol. 1: 67-83.
2. Loreto R. 2011. Saudi-Italian-French Archaeological Project in Saudi Arabia. Dûmat al-Jandal 2010. The excavation of Sector A. *Newsletter di Archeologia CISA (L'Orientale)*. Vol. 2: 179-217.
3. Charloux G. & Loreto R. 2011. Dûmat al-Jandal (Arabie saoudite), premières explorations de l'oasis par la Mission archéologique italo-franco-saoudienne. *CRAIBL* 2011: 905-919.
4. Loreto R. & Charloux G. 2011. Deserto Verde. *Archeo, Attualità del Passato* 321 (november): 26-37.
5. Charloux G., Loreto R., al-Tirâd A. K., al-Qa'îd A. A., al-Dayîl A. I., al-Mâlikî T. A., Marcolongo A., Morel Q., al-Qahtânî D. M., al-Qahtânî M. H., Schiettecatte J. & Siméon P. 2012. Dûmat al-Jandal, Immémoriale oasis d'Arabie Saoudite. *Archéologia* 495 (january): 46-55.
6. Charloux G. 2012. Known and Unknown Archaeological Monuments in Dûmat al-Jandal. *Proceedings of the Seminar for Arabian Studies* 42 (2011): 46-51.
7. Loreto R. 2012. The Saudi-Italian-French Archaeological Project at Dûmat al-Jandal (Ancient Adumatu). A first relative chronological sequence for Dûmat al-Jandal. Architectural elements and pottery items. *Proceedings of the Seminar for Arabian Studies* 42 (2011): 165-182.
8. Charloux G. & Loreto R. 2013 *2,800 years of History in Saudi Arabia*. English-Arabic book. EADS Company.
9. Charloux G. & Loreto R., with the participation of al-Tirâd 'A.H., al-Qa'îd 'A.A., al-Dâyil 'A.I., al-'Arjân H.M., al-Murshd 'A.N., al-Mâlikî Th.'A, Marcolongo A., Morel Q., al-Qahtânî D.M., al-Qahtânî M.H., Schiettecatte J. & Siméon P. 2014. *Dûma 1. Report of the Saudi-Italian-French Archaeological Project at Dûmat al-Jandal (Saudi Arabia)*. Saudi Commission for Tourism and Antiquities. <http://hal.archives-ouvertes.fr/hal-00997906>

The Geo-archaeological Survey of Dûmat al-Jandal and al-Jawf Area 2011 Survey Campaign

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National Research Council of Italy (CNR),
Institute of Applied Geology (IRPI), Padova

During the first half of October 2011, a geo-archaeological survey was carried out on the archaeological site of Qasr Mârid (**Fig. 1**) in the area of the al-Jawf area, as part of the joint Saudi-Italian-French archaeological project at Dûmat al-Jandal.

The main purpose was to describe the physiographic and geological conditions in the area and to reconstruct the Quaternary palaeo-environmental evolution, with particular focus on palaeo-hydrography.

An understanding of the close relations between ancient settlement models and the presence of natural resources, mainly water, or conspicuous landforms, is fundamental for understanding not only the history of sites themselves, but also for predicting the existence of other potential areas of past human occupation and guiding further surveying activities.

Geology

The area under investigation lies at the SE border of the Sirhân-Turayf sedimentary basin, including in the middle the Cenozoic flood basalt field (“*harrat*”) of al-Harrah, near the contact zone between Palaeozoic and Mesozoic rocks (**Fig. 2**).

The southeastern boundary of this basin terminates at the al-Jayb, Quraymish, and ar-Rummant’ayn escarpments, and Tertiary rocks in these escarpments contain phosphorite-bearing beds. Southeast and east of the al-Jayb escarpment, Devonian sandstones form the mountainous area of at-Tawil; these Devonian sandstones also form a hilly terrain in the northeastern part of the quadrangle in the Sakâkâ region. Between the mountains of Tawil Formation and the hills of the Sakâkâ region lies a broad area of low relief called Qusaim al

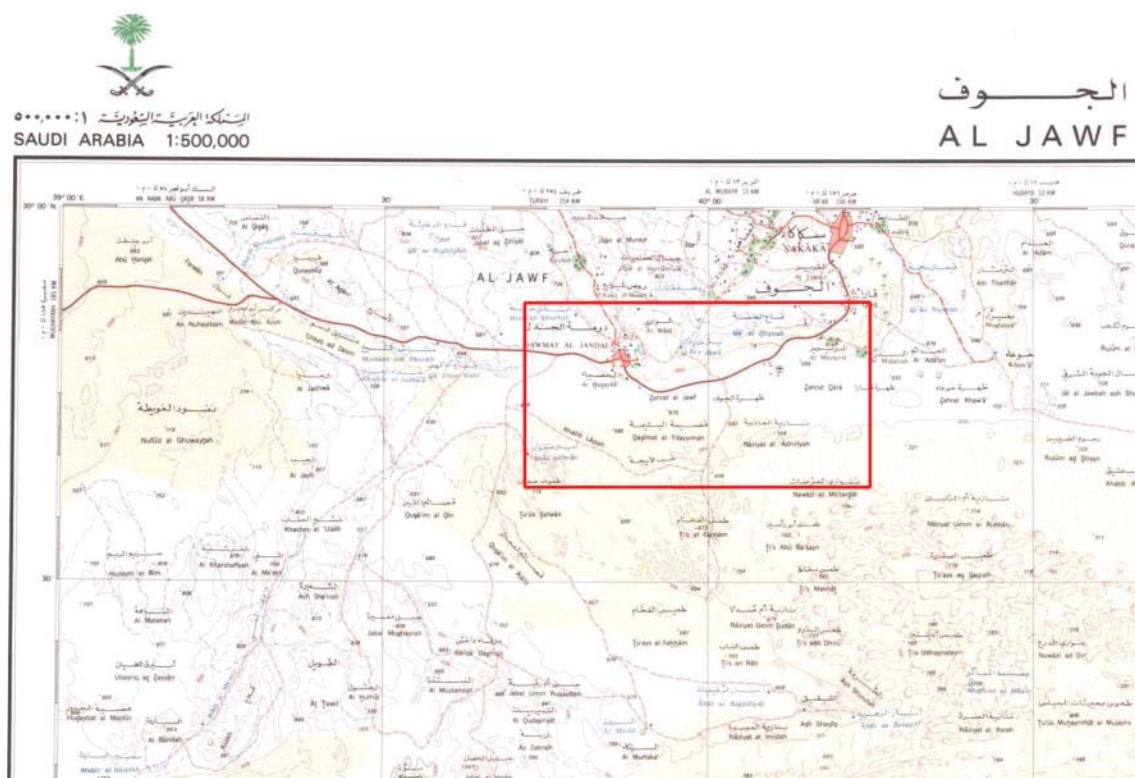
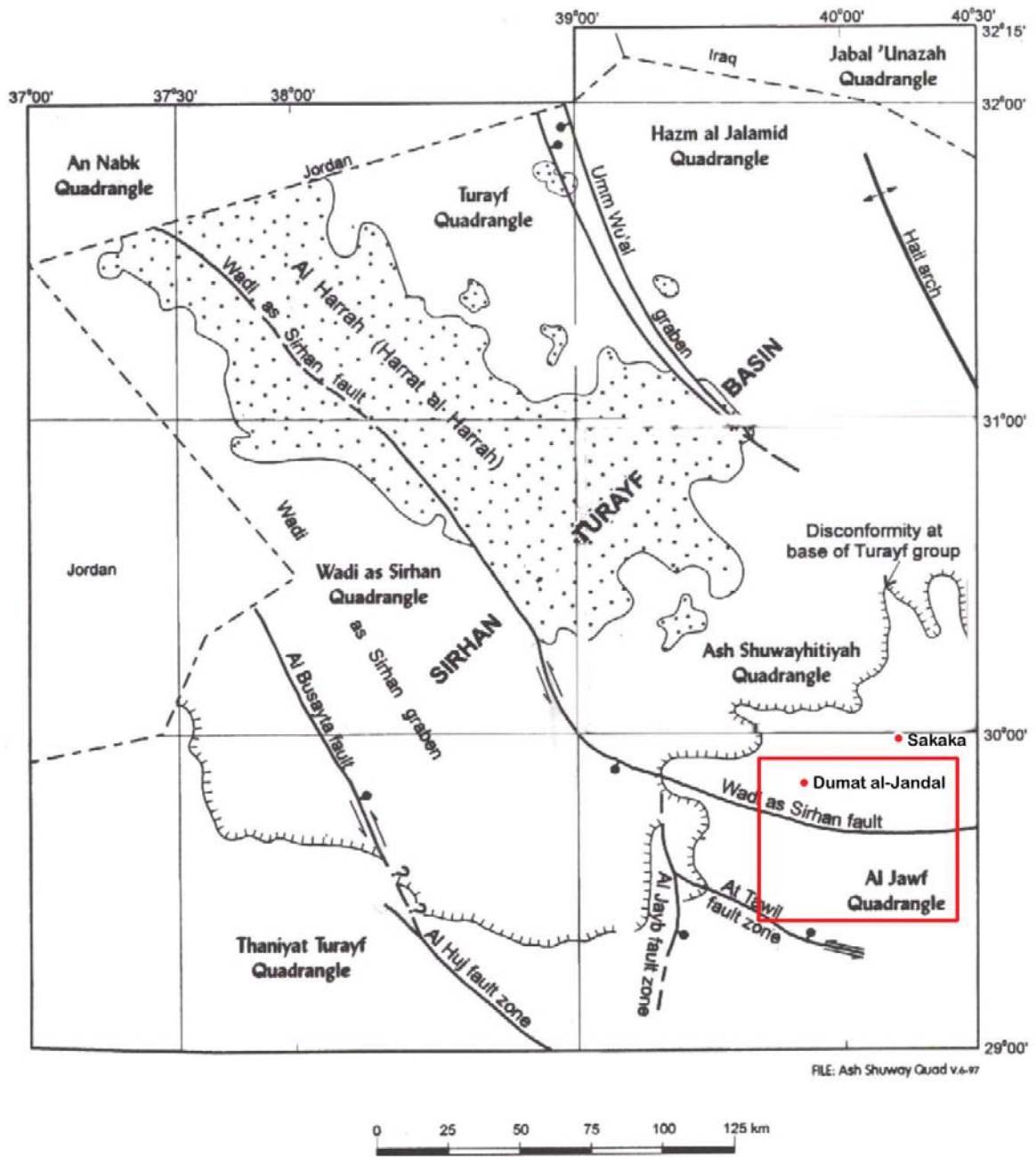


Fig. 1. Part of 1:500.000 scale sheet “Al Jawf” with the extent of the geo-archaeological survey

Ajâ'iz that contains poorly indurated Miocene and Pliocene sedimentary deposits and Quaternary deposits. The eastern and southern parts of the al Jawf quadrangle are covered by aeolian deposits of the Nafûd (Great Desert), which is the second largest sand sea in Saudi Arabia, after the ar-Rub' al-Khâlî in the southeastern part of the Kingdom.

Rocks mainly consist of continental to marine clastics and fine to medium-grained sandstone, with thin layers of interbedded shales. At places, there are also outcrops of stromatolitic-creamy limestone and a yellowish semi-consolidated limestone with shale, silt, gypsum and sandy levels.





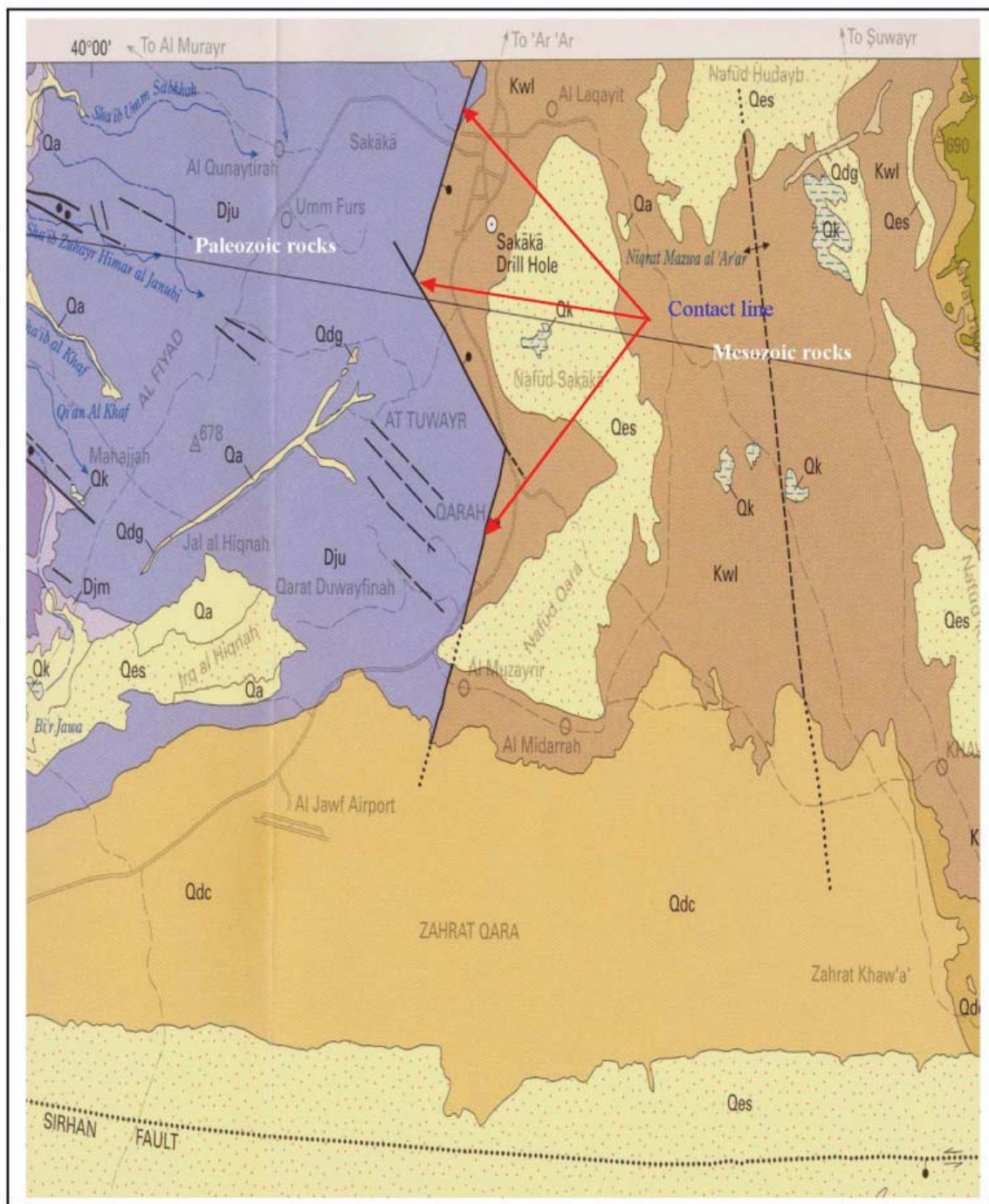
 Principal faults of the Wadi as Sirhan Graben. Arrows show direction of lateral slip. Ball and bar on downthrown block.
 Erosional limit of the Sirhan-Turayf basin.

Fig. 2. Area studied as seen in a regional geo-structural sketch (after Wallace *et al.* 1998)



The contact between Paleozoic and Mesozoic sedimentary rocks
Scale 1: 500000.

Fig. 3. Detailed geological contact between Paleozoic basement and its Mesozoic cover (after Wallace *et al.* 1998)

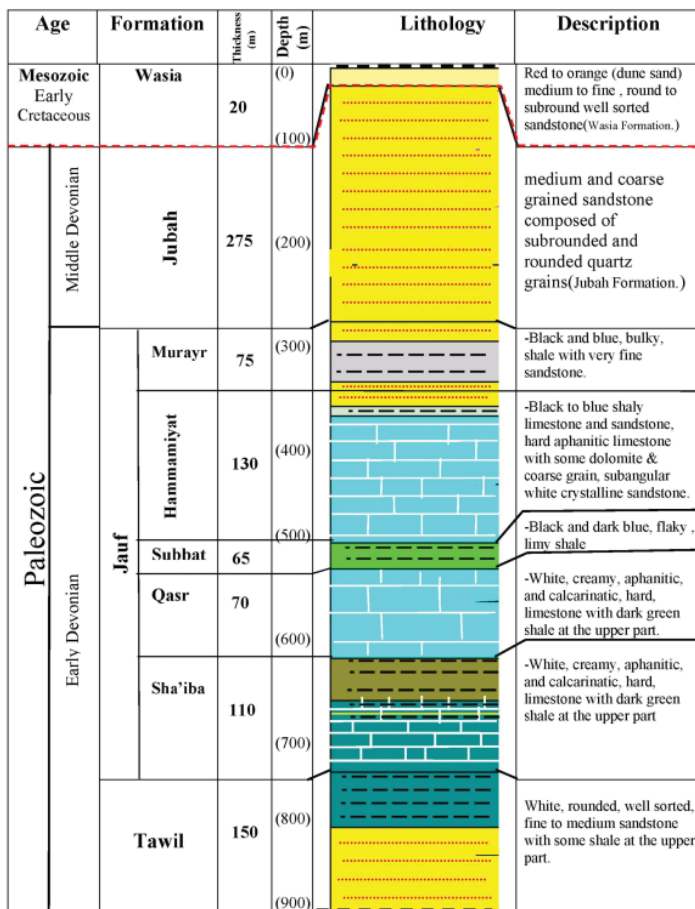


Fig. 4. Generalized stratigraphic column (after Sakaka water well data, after Wallace *et al.* 1998)

From the stratigraphic point of view, the following four formations are encountered: Tawil, Jawf, Jubah (all belonging to Palaeozoic “Huj Group”) and Wasia (Mesozoic) (Figs. 3, 4).

The oldest sediments in this sequence are the Devonian Tawil Formation (mainly sandstone and shale); the Jawf Formation (mainly limestone, siltstone and gypsum, Fig. 5) overlies the Tawil Formation and is divided into five members (Sha’iba, Qasr, Subbat, Hammamiyat and Murayr); the Middle Devonian Jubah Formation (sandstone and some shale) overlies the Jawf Formation; the Cretaceous Wasia Formation (mainly sandstone) unconformably overlies the Jubah Formation. Almost all the layers are flat layered or gently dipping toward the east-northeast, while diffused northwest-trending alignments are evidence of faults and tension fractures that could be related to continued uplifting of the area in later Cenozoic times.

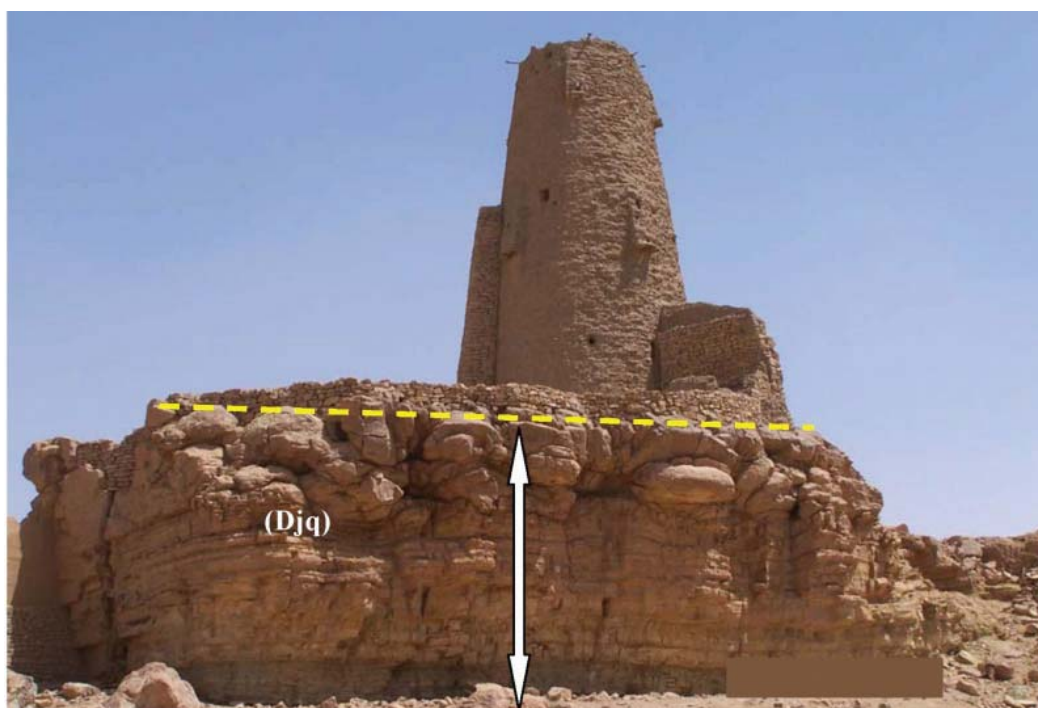


Fig. 5. Outcrop of Jawf Formation (second member, limestone and shale) at Mârid Castle

Geomorphology

The area covered in the 2011 geomorphological survey, centered around Dûmat al-Jandal, is a rectangle lying between 39°30' and 40°05' Long. East and between 29°35' and 29°55' Lat. North. Its relatively wide surface with respect to the extent of the Mârid Castle archaeological site is due to the interest of the final infra-mountainous stretch of the wâdî al-Sirhân valley, before it reaches the Nafûd sand dunes.

In fact preliminary Landsat 7ETM image interpretation shows the presence of an important palaeo-river to the SW of Dûmat al-Jandal. This palaeo-water course, stretching NW-SE, most likely still active during the latest Pleistocene and Holocene humid climatic phases,¹ ends in a large and articulated patch of fine silty-clayey lacustrine deposits, indicating a palaeo-hydrographic pattern quite different from the present one, likely to have attracted human occupation in pre-protohistorical times (**Fig. 6**).

The survey campaign was preceded by the analysis of multispectral satellite data, duly elaborated. In particular three images, respectively 171 path/39 row, 171 path/40 row and 172 path/39 row, have been geo-referenced and assembled together like a puzzle in order to cover

1. Humid phases (after Al-Sayari & Zötl 1978): - Latest Pleistocene about 25.000-30.000 B.P.; - Holocene 1st phase about 11.000 B.P., 2nd phase about 9.000-8.000 B.P., 3rd phase about 7.000-4.500 B.P.

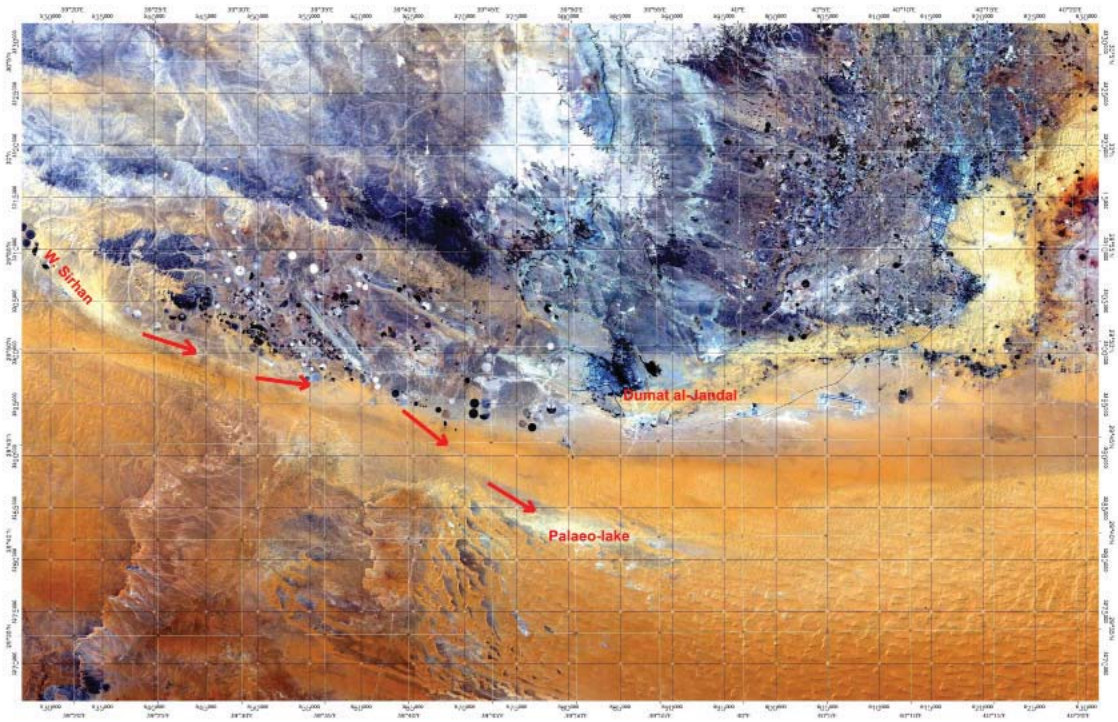


Fig. 6. Windows from Landsat 7ETM image 171/39, geo-referenced and elaborated to focus on the palaeo-Sirhan and the palaeo-lake

the entire geomorphological unit of the palaeo-lake and its palaeo-tributary.

The survey touched on various conspicuous points, interpreted as potential spots bearing archaeological evidence, as well other places significant for completing the picture of the main landforms and geomorphological sub-units present in the whole area (**Figs. 7, 8, 9**).

Main features of 2011 survey campaign consisted of:

- A detailed description of the area around Mârid Castle, integrated by the interpretation of aerial photographs and field topographic data.
- The discovery of tens of Neolithic industrial sites and Bronze Age (?) sites around the fringe of a palaeo-lacustrine area (the wâdî al-Sirhân palaeolake), localized about 22.5 km to SW of the centre of Dûmat al-Jandal.

As far as the area around the excavation site of Mârid Castle is concerned, a detailed photo-interpretation has been done on the 1948 orthophoto and on subsequent 1964 aerial photographs, showing different soil use and settlement expansion.

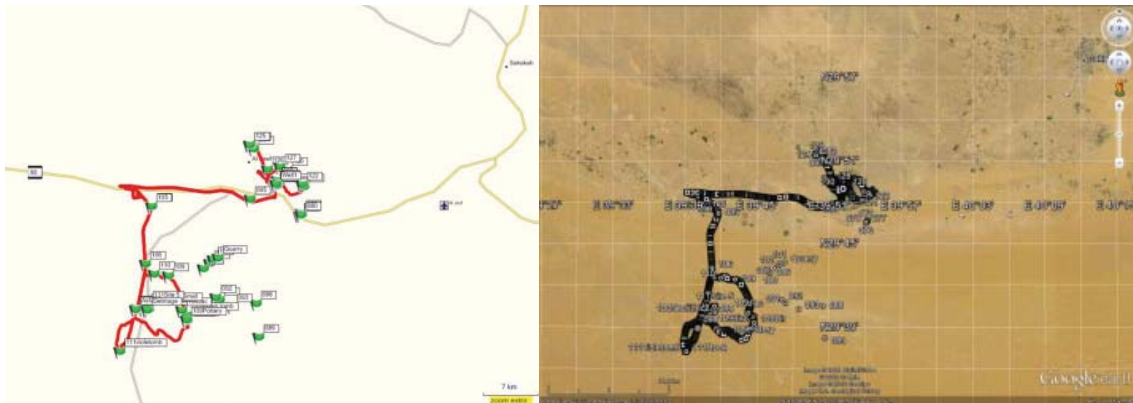


Fig. 7. The complete geomorphological and geo-archaeological survey (on Garmin Map and Google Map)



Fig. 8. In particular the area centered on Dûmat al-Jandal and around the Archaeological site of Mârid Castle has been object of the first reconnaissance



Fig. 9. Area of palaeo-lake fed by the palaeo-Sirhan (darker spots on Google image are silty and clayey inter-dune lacustrine sediments)

Accurate merging of the 1948 ortophoto, the topographical survey performed by the Joint Saudi-Italian-French Mission in 2010 and the Ikonos Google high resolution image yielded a very interesting description of the Mârid Castle inserted in its physiographic setting (red lines and square spots are Garmin Map Source survey routes and way points, **Figs. 10-11**)

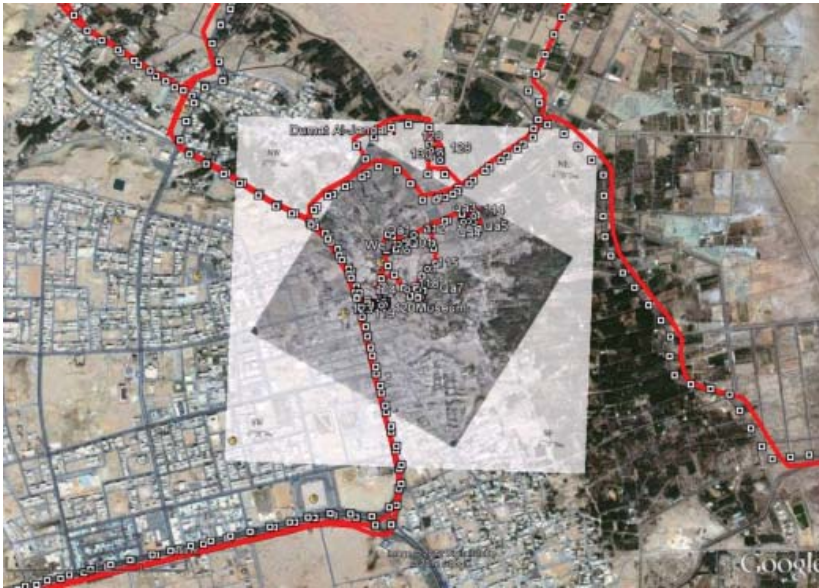


Fig. 10. Superimposition of the 1948 ortophoto and the 2010 topographic survey on an Ikonos Google high resolution image

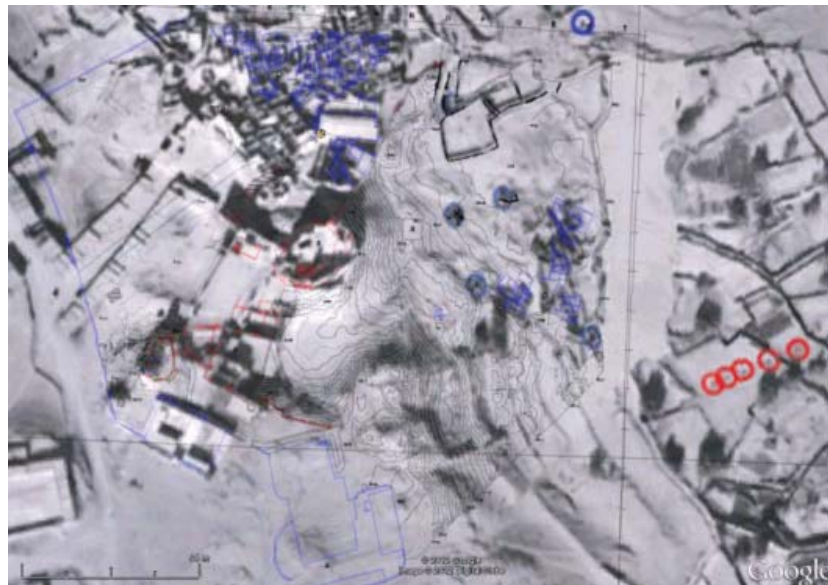
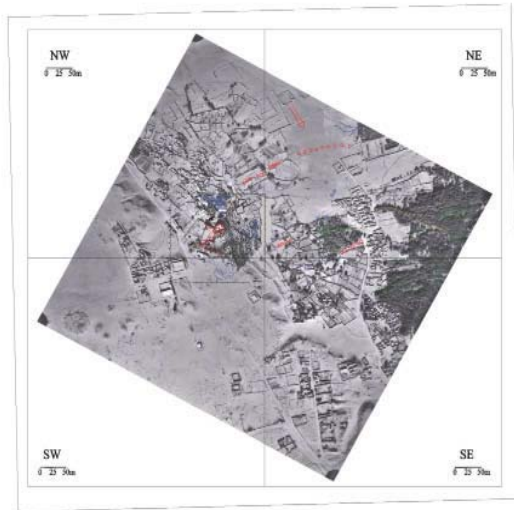


Fig. 11. Detail of the above merged figure centered on Mârid Castle with elevations, water wells and old “qanats”



The results of interactive photo-interpretation, followed by a ground check, are summarized by the following thematic geo-archaeological sketches (Figs. 12, 13, 14, 15, 16).

Fig. 12. Orthophoto geo-oriented with thematic interpretation

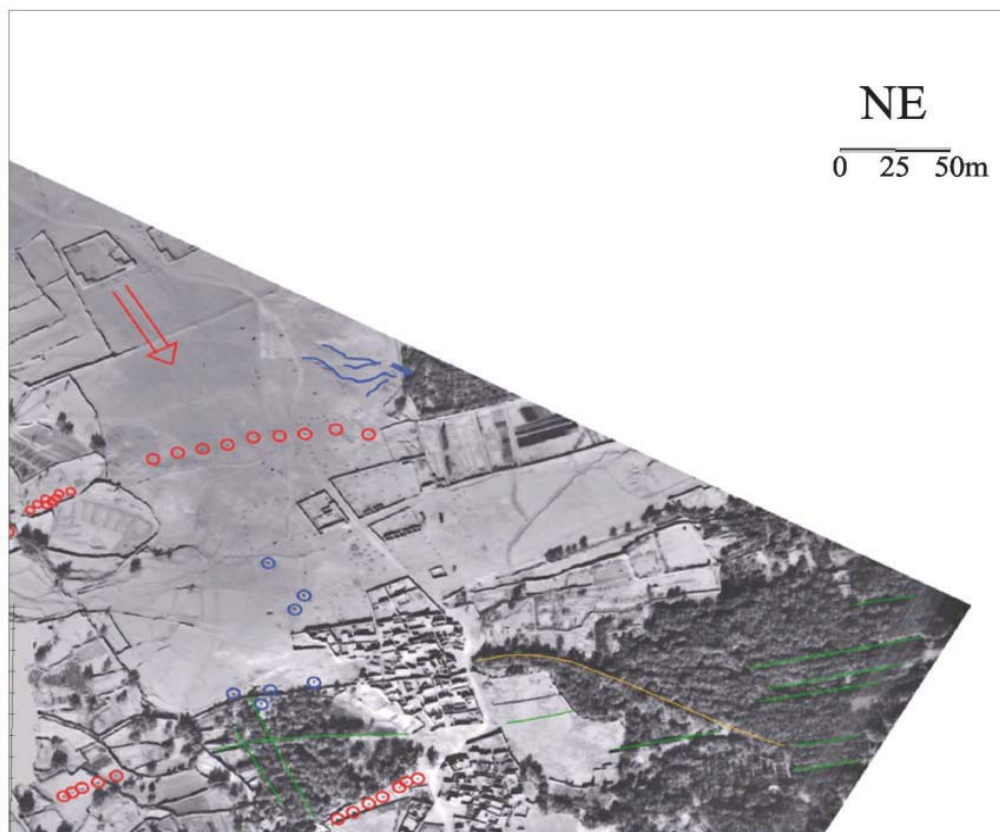


Fig. 13. NE sector



Fig. 14. SE sector



Fig. 15. SW sector

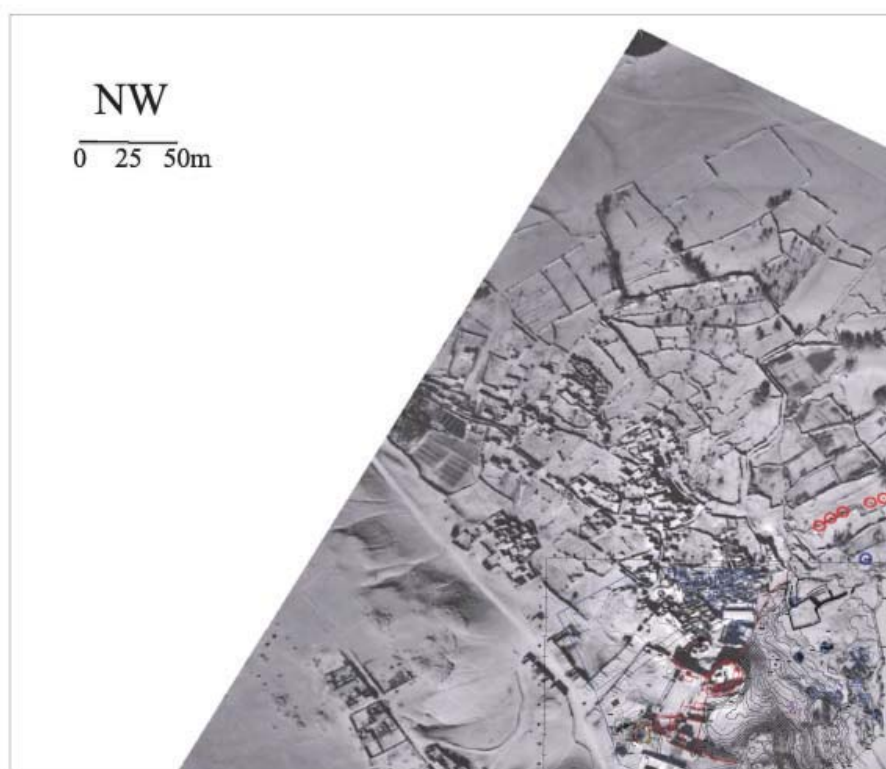


Fig. 16. NW sector

The legend for all the pictures is:

- “Blue spots”: water wells
- “Red spots”: old “qanats”
- “Red lines”: old structures
- “Blue lines”: recent and modern buildings
- “Red arrow”: groundwater preferential flow direction feeding the old “qanats” system and wells
- “Green lines”: alignments in palm-grove (maybe older field subdivisions or parcels)
- “Ochre line”: alignment with angular discontinuity in palm-grove (maybe sandy bar)

A second important cluster of archaeological evidence has been found in direct connection with the fringe of the wâdî al-Sirhân palaeo-lake, as predicted by the preliminary phase of photointerpretation.



Fig. 17. GPS tracks in the Sirhan palaeo-lake area



Fig. 18. GPS way points on an Ikonos Google high resolution image



Fig. 19. Detailed enlargement of the Sirhan palaeo-lake area with way points of prehistoric sites

In a relatively narrow band around the silty-sandy lacustrine sediments outcropping between the transverse and longitudinal dunes field of the Nafûd² located about 22.5 km to SW of Dûmat al-Jandal, many sites containing much Neolithic, Mesolithic and Bronze Age (?) lithics have been detected on the surface. A lot of flint scrapers and arrowheads have been collected, which remain to be classified and studied to determine their precise age and use (**Figs. 17, 18, 19**).

This potentially rich area needs further investigation and survey, illustrating the very close relation between settlement distribution and landforms/natural resources.

2. Four sets of aeolian sand landforms have been recognized (after Al-Sayari & Zötl, 1978):

- *Transverse*, predominantly simple and compound “*barkhan*” dunes in areas of more mobile sand, oriented transverse to the prevailing wind direction;
- *Longitudinal*, primarily “*dikakah*”, bush or grass covered sand, characterized by elongation of the individual forms parallel to the prevailing wind direction, often stabilized by sparse vegetation;
- “*Uruq*”, various forms of long, nearly parallel, sharp-crested narrow sand ridges and dune chains separated by broad sand valleys, the result of a system of two dominant wind directions (called “*sayf*” dunes in North Africa);
- *Sand mountains*, with a crest 50 to 300 meters high, with superimposed dune pattern of complex “*barkhans*”

Conclusions and suggestions

On the basis of the 2011 geomorphological and geo-archaeological survey, it appears important to go deeper into the analysis of the palaeo-river bed of wâdî al-Sirhân and its endorrheic alluvial fan, lying SW of Dûmat al-Jandal.

In fact, an understanding of the palaeo-hydrographic network active during pre-protohistorical times is essential to the evolution of human occupation of what today is a very dry area, but which in the past was well-watered. Moreover this kind of geo-archaeological analysis is essential to complete the whole settlement pattern and account for the implantation of Mârid Castle in its specific spot, at the outlet of the infra-mountainous wâdî al-Sirhân course where the al-Nafûd sands absorb any surface water and create ground water reserves, sheltered from evaporation and indispensable for man's survival and economy.

Neolithic Evidence from Asfân, Preliminary Report

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As part of the 2011 campaign of the Saudi-Italian-French archaeological project, a geomorphological survey was conducted in October-November 2011 by Bruno Marcolongo, Romolo Loreto and Thamer al-Maliki, with the participation of Andrea Marcolongo and Pierre Siméon.¹

The geomorphological survey of Dûmat al-Jandal and its surroundings was conducted in order to study the environment of the modern region and its evolution through the ages. As the survey is fully described by B. Marcolongo in this volume,² here we present the preliminary analyses conducted on the anthropic remains collected during the survey. All the lithic material was drawn and analyzed by Paola Aurino.

The surveyed area **(Romolo Loreto)**

The area for investigation was chosen on the basis of aerial photos of the Dûmat al-Jandal urban area and its surroundings, dominated by the course of the wâdî al-Sirhân and its southern basin. The area was limited to a radius of 50 km around Dûmat al-Jandal.

40 km west of the site it is possible to recognize the present course of the wâdî al-Sirhân, running east and passing north of Dûmat al-Jandal, and a second alluvial feature which runs south-east, passing about 15 km south of Dûmat al-Jandal, and heads into the Nafûd desert near the modern village of Asfân. It is currently covered by the sands and dunes of al-Nafûd and may be related to a palaeo-water flow, representing an ancient and different trend at the eastern end of the wâdî al-Sirhân which flows into the al-Sirhân basin.

1. See Marcolongo in this volume: 17-32.

2. *Ibid.*: 28-30.

Photo-interpretation analysis at a microscopic level makes it possible to distinguish between the dunes within this presumed palaeo-channel and the al-Sirhân basin, areas dominated by patches of white or black, certainly of a different nature to the aeolian sands. Geomorphological analysis has clarified a particular stratigraphy comprising 1) a lower level of greenish silt deposit, covered by 2) a thin level of sediments of fossil origin of lacustrine diatomite, in turn covered by 3) the modern soil on which the al-Nafûd dunes lie. The lacustrine diatomite sediments and the greenish silt deposit testify to a recent period of pluviometric optimum and high humidity. This geological stratigraphy has allowed us to postulate the presence of a palaeo-lake in the northern part of the al-Sirhân basin.³

Anthropic evidence

The hypothesis of the existence of a palaeo-wâdî and a palaeo-lake seems to be confirmed by the discovery of anthropic settlements along the margins of the areas where lacustrine sediments emerge (**Fig. 1**).

These sites have yielded a large amount of Neolithic materials distributed in at least five main accumulations (Asfân 1, 2, 3, 4 and 5): flaked flint, in almost all cases, with up to now two specimens of polished stone: a pestle (?) (**Fig. 2**) and a fragment of mortar or vessel (**Fig. 3**). The materials were identified in the layer that covers the lake sediments of diatomite, or on the surface of it, which can be dated to between the 10th and 8th millennium BCE.⁴ According to the production techniques the site may have had two occupations: the bidirectional core technique indicates the 7th millennium BCE, while the bifacially flaked foliates must date in the 6th-5th millennium BCE.

On the basis of the type of material collected it appears that these sites may have been artefact production centers or, at the very least locations where they were in use. The lithic material falls into three categories: cores still embedded in a sandstone nodule (**Fig. 4**); cores in various stages of processing (**Fig. 5**); finished products and products damaged after usage or during processing (**Figs. 6-8**).

The most commonly found tool types were blades, bladelets, scrapers, points and cores. Since we had little time to devote to analysis of the new Neolithic sites, we merely collected a few samples so as to have a preliminary corpus for future work.

³. See Marcolongo in this volume: 23, fig 6.

⁴. *Ibid.*: 22.



Fig. 1. The modern village of Asfân, and the al-Sirhân basin as seen from the al-Nafûd dunes, from the north. Small white lacustrine diatomite sediment areas visible in the valley. In black the soil on which the al-Nafûd dunes lie, containing the Neolithic remains.



Fig. 2. Example of stone item (pestle?). Sandstone, Asfân Site 3



Fig. 3. Fragment of a mortar or vessel. Handle, wall and flat rim preserved. Sandstone, Asfân Site 5



Fig. 4. Flint core in a sandstone nodule. Asfân Site 4



Fig. 5. Flint core in the process of flaking. Asfân Site 1



Fig. 6. Examples of lithic material collected: blades, scrapers, points. Asfân Site 4



Fig. 7. Examples of lithic material collected: blades, scrapers, points. Asfân Site 2



Fig. 8. Examples of lithic material collected: blades, bladelets, scrapers, points. Asfân Site 3

Preliminary catalogue (Paola Aurino)

The total material collected for the preliminary classification comprises 25 flaked artefacts with heterogeneous characteristics that cannot be related to the previous Palaeo-Epipalaeolithic substratum attested in the territory.⁵ They were made using three types of flint which differ in quality. Most of the material features a fine, high quality beige-brown flint. Fewer objects, including the scraper (AS 11 52/10), are made from a reddish flint whose unusual compactness is evinced by the many concentric waves visible along the break. A single point was made from a pinkish flint which is neither very compact nor very pure (AS 11 52/9).

There is a lot of evidence of human intervention on blades, particularly in some scrapers (AS 11 51/9 – AS 11 51/10 – AS 11 53/1).

In terms of technology, most of the artefacts appear to have been produced with the technique of pressure using a soft beater. However, the tools are not entirely finished. More often they display the “inframarginal type” refinement, which generally leaves edges with irregular chipped or borders that are not clearly visible or only partial, probably due to the object’s use.

All the objects found on the five sites in Asfân appear to be autochthonous. Some may show the influence of neighbouring zones,⁶ but they have probably been re-elaborated and adapted to local cultural and functional requisites.

The point with notches at the base (AS 11 52/5) found on site 2 can be compared with the “El Khiam” type⁷, although it has no marginal refinement or cutting off base. The veining is very accentuated and there is no refinement or curved heel.

The retouching techniques on blades can be compared with finds at Gesher;⁸ the microblade AS 11 51/2 and scraper on blade AS 11 51/8 with, respectively, numbers 24 and 27 from unit 1 at Gesher.⁹ Only the bladelet AS 11 52/1 can be compared with some found in the portion of Neolithic territory FS-1 at Fayum.¹⁰ For the rest the lithic production of Fayum is

5. Wenke, Long & Buck 1988: 29-51; Nayeem 1990: 55-67; Gopher, Bar-Yosef & Nadel 1991: 109-119.

6. Rosen 1984: 111-121; Wenke, Long & Buck: 1988; Barham & Mitchell 2008.

7. Gopher, Bar-Yosef & Nadel 1991.

8. Nadel & Garfinkel 1989: 139-151.

9. Nadel & Garfinkel 1989: 144 -145.

10. Wenke, Long & Buck 1988: 36-40.

very different from that of Saudi Arabia,¹¹ above all because whereas in the former the use of the flat intrusive retouch is frequent, in the latter it is not.¹²

The foliated points AS 11 51/1 e AS 11 54/2 are comparable to the Herzliya type that characterises the site of Kvish Harif, just as the scraper AS 11 52/3 is somewhat similar to the so-called “tabular scrapers” from the same site.¹³

The nosed scraper AS 11 52/10 is a *unicum*, the only artefact entirely finished. At the tip there is a denticulate refinement retouch on the left side and a marginal bi-facial one on the right, while the body has a summary refinement all over. Here too the morphological axis, generally frontal, does not correspond to the axis of breakage/detachment, generally ventral.

11. Inizan 2010: 139-157.

12. Phillipson 1985: 113-141; Wenke, Long & Buck 1988; Shaw, Sinclair, Andah & OkpoKo 1992: 104-125; Barham & Mitchell 2008.

13. Rosen 1984: 115-116.

Asfân Site 1

Catalogue Number	Tools	Type of Retouch	Dimensions	Material	Note
AS 11 51/1	Foliated point Fig. 9	Inframarginal	Length: 4.9 cm ¹ Width: 3.1 cm Thickness: 0.8 cm	Blond brown-veined flint	On the dorsal face only scars produced by detachment; minimal retouching and in this case the morphological axis, as a rule frontal, corresponds to the axis of detachment, as a rule ventral. Comparable with the Herzliya foliated points from Kvish Harif. ²
AS 11 51/2	Blade Fig. 10	Inframarginal (left); partially marginal (distal end and right side)	Length: 6.1 cm Width: 1.4 cm Thickness: 0.65 cm	Brown flint	Inframarginal retouch on the left side, non-invasive edge retouch both on the distal end and on part of the left side. This tool can be compared to finds from the investigated FS-1 and FS-2 territorial areas within Fayum. ³ The morphological axis, as a rule frontal, corresponds to the axis of detachment, as a rule ventral.
AS 11 51/3	Transverse cutting-edge point Fig. 11	Inframarginal	Length: 5.2 cm Width: 1.9 cm Thickness: 0.9 cm	Brown beige-veined flint	Comparable with finds from the investigated FS-1 and FS-2 territorial areas within Fayum. ⁴ The morphological axis, as a rule frontal, does not correspond to the axis of detachment, as a rule ventral.
AS 11 51/4	Scraper on blade Fig. 12	Marginal nearly denticulated	Length: 4.05 cm Width: 3.5 cm Thickness: 0.6 cm	Brown flint	Comparable to scrapers on blade from Gesher. ⁵ In this sample the morphological axis, as a rule frontal, does not correspond to the axis of detachment, as a rule ventral.
AS 11 51/5	Point Fig. 13	Inframarginal	Length: 5.7 cm Width: 2.3 cm Thickness: 0.7 cm	Brown flint with beige spots	Artifact not completely refined, appears rather like a flake still in refining phase. The morphological axis, as a rule frontal, corresponds to the axis of detachment, as a rule ventral.
AS 11 51/6	Scraper Fig. 14	None	Length: 6 cm Width: 3.2 cm Thickness: 1.2 cm	Brown beige-veined flint	Unfinished artifact, not consequently lacking in function. It has been ethnographically proven as flakes detached from the core were used in the same way as much more refined tools. In this sample the morphological axis, as a rule frontal, does not correspond to the axis of detachment, as a rule ventral.

AS 11 51/7	Microbladelet Fig. 15	Inframarginal	Length: 2.3 cm Width: 1 cm Thickness: 0.3 cm	Brown flint	Resembles microbladelets and bladelets from Gesher. ⁶ The morphological axis, as a rule frontal, corresponds to the axis of detachment, as a rule ventral.
AS 11 51/8	Transverse cutting-edge scraper Fig. 16	Inframarginal	Length: 5.1 cm Width: 3.5 cm Thickness: 1 cm	Brown flint	The artifact retains two small portions of the cortex. Also in this case the morphological axis, as a rule frontal, does not correspond to the axis of detachment, as a rule ventral.
AS 11 51/9	Transverse cutting-edges scraper Fig. 17	None –perceivable an inframarginal retouch on the left side	Length: 4.9 cm Width: 3.5 cm Thickness: 0.6 cm		Comparable to some scrapers on blade from Gesher and from other Eastern sites. ⁷ The implement presents traces of edge retouch only on the distal end and a minimal chipping on the right side. The morphological axis, as a rule frontal, corresponds to the axis of detachment, as a rule ventral.
AS 11 51/10	Nosed scraper Fig. 18	Marginal	Length: 4.2 cm Width: 3 cm Thickness: 0.7 cm	Brown flint	One of the most refined tool of the whole set. The morphological axis, as a rule frontal, corresponds to the axis of detachment, as a rule ventral. Comparable to some scrapers from Fayum. ⁸

Table 1. Lithic items from Asfān, site 1

Footnotes for table 1

1. Length and thickness are measured at the point of maximum extent of the artifact.
2. Rosen 1984: 114-115.
3. Wenke, Long & Buck 1988: 38-47.
4. Wenke, Long & Buck 1988.
5. Nadel & Garfinkel 1989: 143-147.
6. Nadel & Garfinkel 1989.
7. Nayeem 1990.
8. Wenke, Long & Buck 1988.

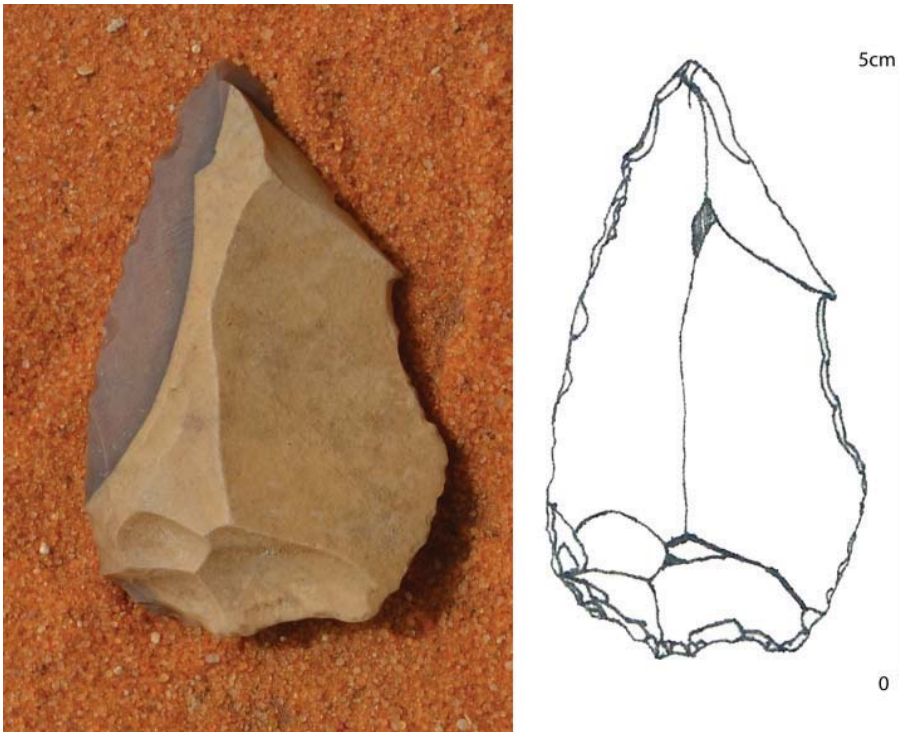


Fig. 9. AS 11 51/1. Foliated point

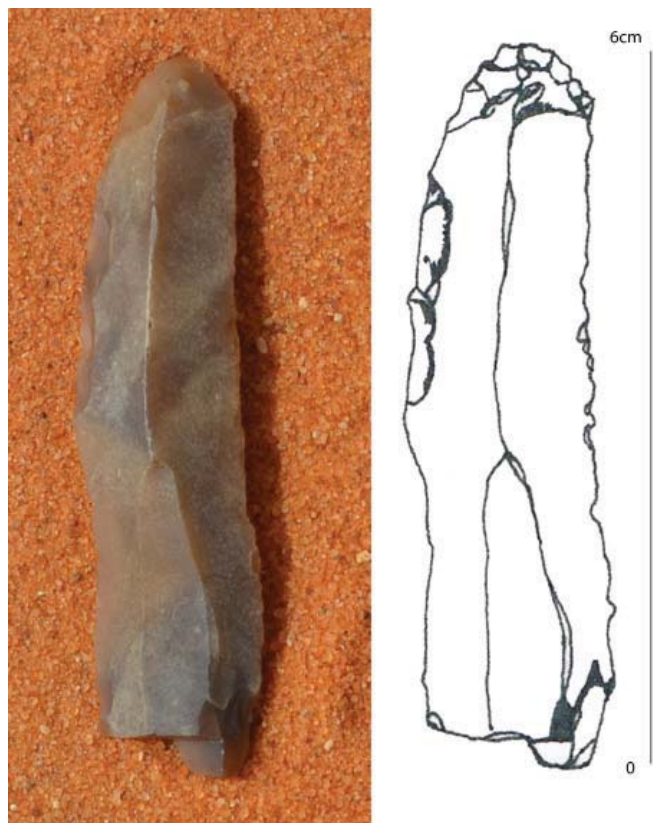


Fig. 10. AS 11 51/2. Blade

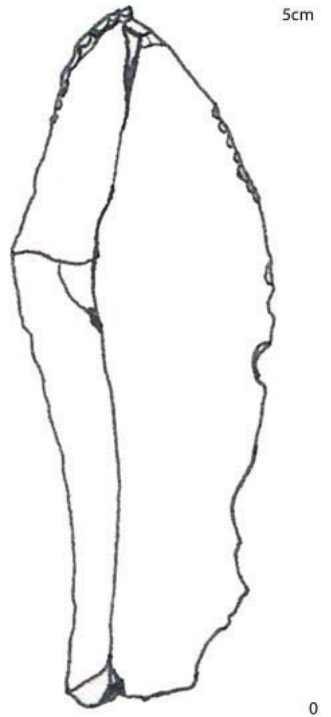


Fig. 11. AS 11 51/3. Transverse cutting-edge point

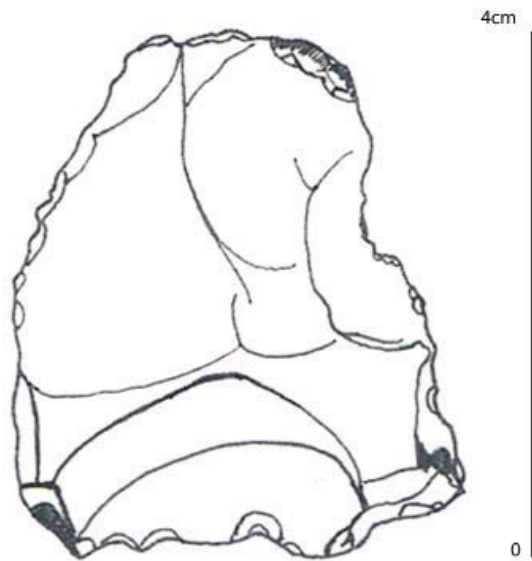


Fig. 12. AS 11 51/4. Scraper on blade

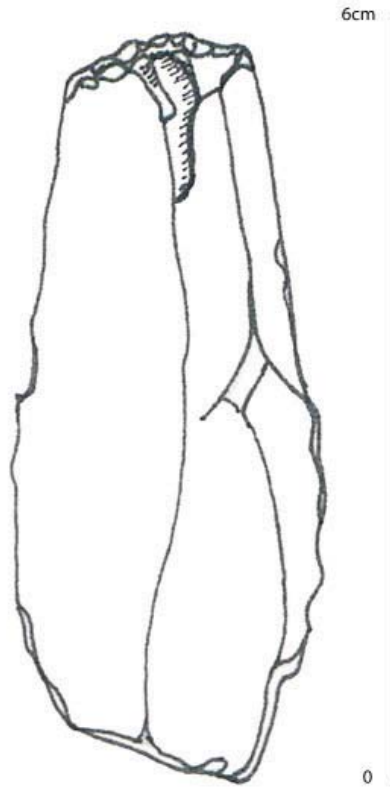


Fig. 13. AS 11 51/5. Point

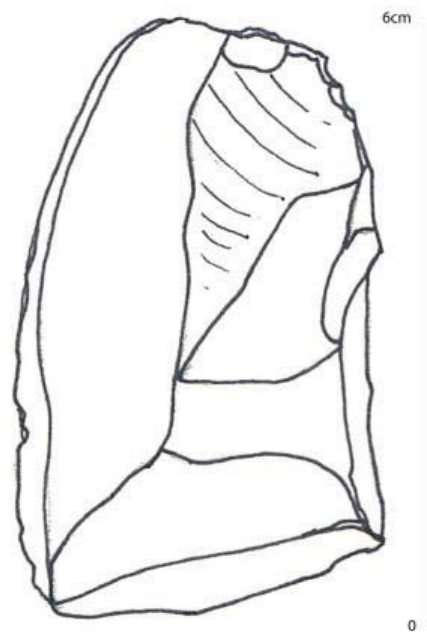


Fig. 14. AS 11 51/6. Scraper

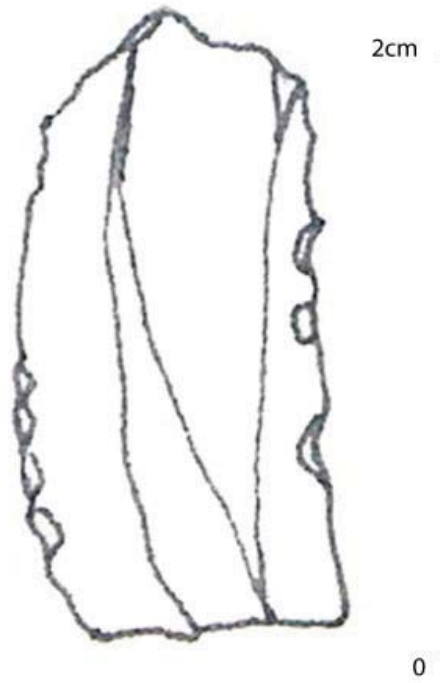


Fig. 15. AS 11 51/7. Microbladelet

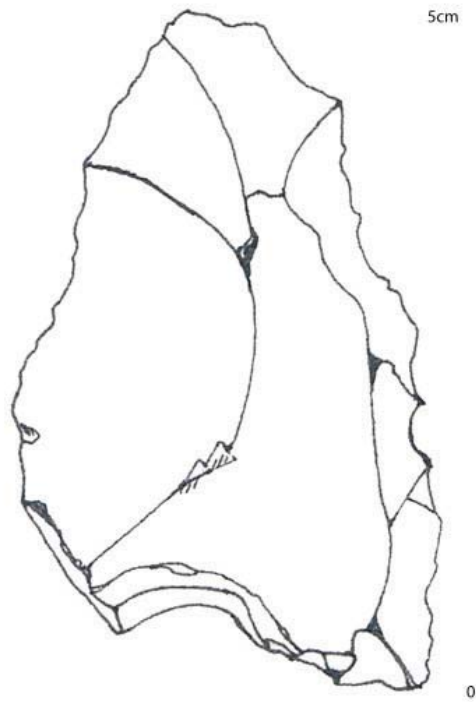


Fig. 16. AS 11 51/8. Transverse cutting-edge scraper



Fig. 17. AS 11 51/9. Transverse cutting-edges scraper

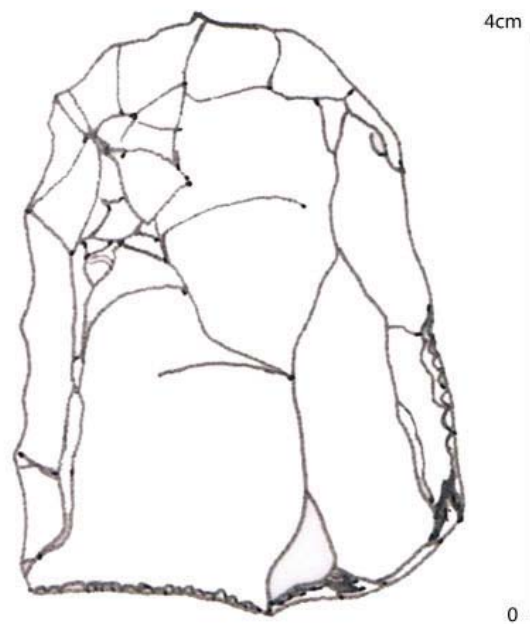


Fig. 18. AS 11 51/10. Nosed scraper

Asfân Site 2

Catalogue Number	Tools	Type of Retouch	Dimensions	Material	Note
AS 11 52/1	Bladelet Fig. 19	Inframarginal	Length: 5.1 cm Width: 0.9 cm Thickness: 0.3 cm	Beige flint	Artifact comparable to some bladelets from the investigated FS-1 territorial area within Fayum. ⁹ The axis, as a rule frontal, corresponds to the axis of detachment, as a rule ventral.
AS 11 52/2	Blade Fig. 20	None	Length: 8.8 cm Width: 1.7 cm Thickness: 0.8 cm	Brown beige-veined flint	Artifact lacking any retouch, except for minimal chippings due to a probable use. The axis as a rule frontal correspond to the axis of detachment, gene as a rule rally ventral.
AS 11 52/3	Transverse cutting-edge scraper Fig. 21	Marginal on the right side and on the distal proximity	Length: 9 cm Width: 3.8 cm Thickness: 1.5 cm	Brown flint	This type of scraper is comparable to other samples from Kvish Harif, the so-called “tabular scrapers”. ¹⁰ The axis generally as a rule correspond to the axis of detachment, as a rule ventral.
AS 11 52/4	Boring bec Fig. 22	None	Length: 8.5 cm Width: 2.8 cm Thickness: 1.1 cm	Brown beige-veined flint	Only bec of the whole set. As the scraper n° AS 11 51/6, this tool also appears unfinished. The morphological axis as a rule frontal does not correspond to the morphological axis/axis of detachment, generally ventral.
AS 11 52/5	Point Fig. 23	Inframarginal on the right side and on the notches near the proximal end	Length: 13.1 cm Width: 2.6 cm Thickness: 1.2 cm	Brown beige-veined flint	Point with basal notches (AS 11 52/5) found on the site 2 of Asfaan comparable to the “El Khiam” type points except for the absence of marginal retouch and cutting off base. ¹¹ Marked veining and almost lacking any refinement and curved heel.
AS 11 52/6	Blade Fig. 24	Marginal on the distal proximity, inframarginal on the right side	Length: 6 cm Width: 1.1 cm Thickness: 0.4 cm	Brown-burgundy flint	Blade in the same material as the nosed scraper AS 11 52/10 and also comparable with some blades from Fayum. ¹² The morphological axis as a rule frontal corresponds to the axis of detachment, as a rule ventral.
AS 11 52/7	Transverse cutting-edge scraper Fig. 25	Marginal on the right side and on the distal proximity, inframarginal on the upper part of the left side	Length: 8.3 cm Width: 2.8 cm Thickness: 0.7 cm	Brown flint	Comparable to other scrapers from Kvish Harif, the so-called “tabular scrapers”. ¹³ The axis as a rule frontal corresponds to the axis of detachment, as a rule ventral.

AS 11 52/8	Backed-point Fig. 26	None	Length: 5.8 cm Width: 1.3 cm Thickness: 0.6 cm	Light flint	Artifact lacking any retouch, except for minimal chippings near the distal end. Comparable with other points from the Jordan Valley that present only one notch on the right side near the proximal end. ¹⁴
AS 11 52/9	Point Fig. 27	None	Length: 8 cm Width: 1.8 cm Thickness: 0.9 cm	Pinkish flint	Only artifact made with poor-quality flint, very porous and not very smooth to the touch. The artifact is comparable with other points from Gesher. ¹⁵ The axis as a rule frontal corresponds to the axis of detachment, as a rule ventral.
AS 11 52/10	Nosed scraper Fig. 28	Marginal on the right side, whereas denticulated on the distal end, on the left side and on the proximal end	Length: 7.5 cm Width: 7.8 cm Thickness: 1.4 cm	Brown flint	The most refined tool of the whole set. Denticulated retouch on the distal and proximal ends and on the left side, marginal retouch on the right side, summary invasive retouch on the body. The morphological axis as a rule frontal does not correspond to the axis of detachment, as a rule ventral. It can be compared to some other scrapers with summary invasive retouch found in Fayum. ¹⁶

Table 2. Lithic items from Asfân, site 2

Footnotes for table 2

9. Wenke, Long & Buck 1988: 35-37; Bard 2008.
10. Rosen 1984.
11. Gopher, Bar-Yosef & Nadel 1991: 109-113.
12. Wenke, Long & Buck 1988; Bard 2008.
13. Rosen 1984.
14. Nayeem 1990; Gopher, Bar-Yosef & Nadel 1991: 111-116.
15. Nadel & Garfinkel 1989.
16. Wenke, Long & Buck 1988; Bard 2008: 67-79.

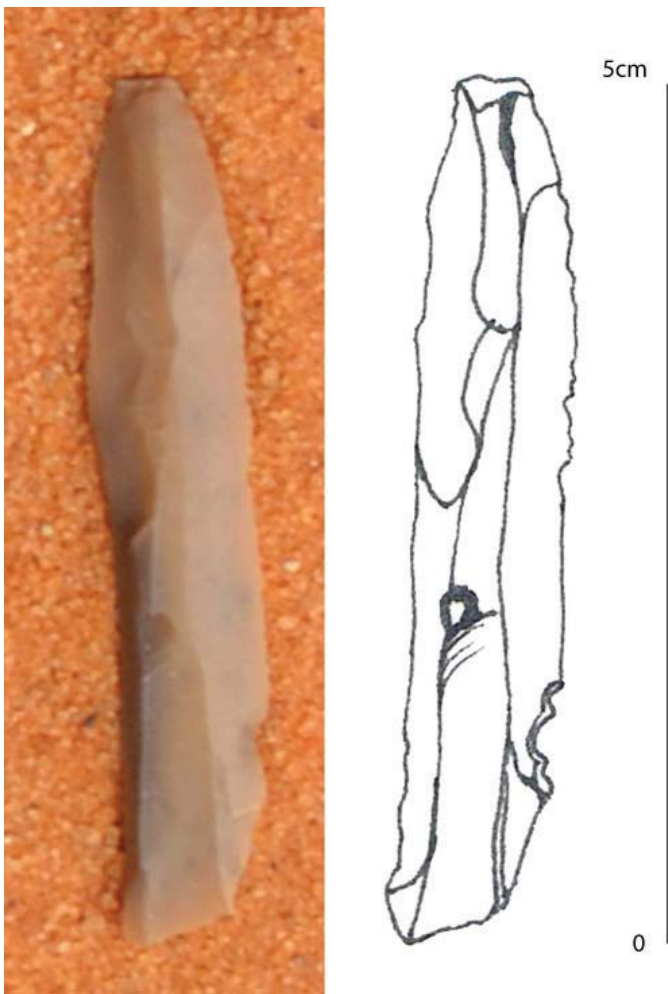


Fig. 19. AS 11 52/1. Bladelet

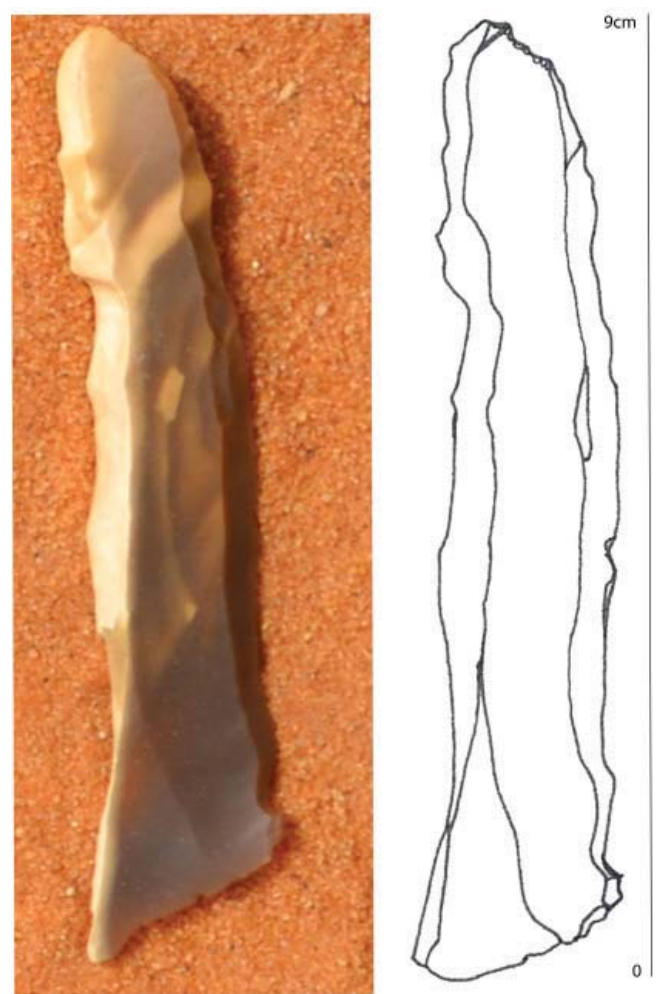


Fig. 20. AS 11 52/2. Blade

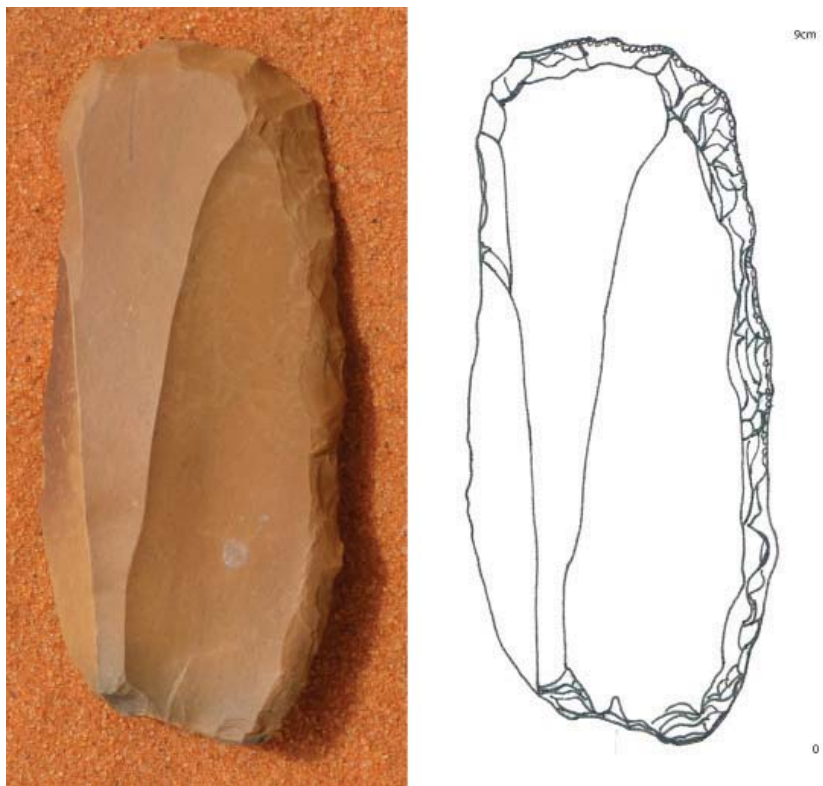


Fig. 21. AS 11 52/3. Transverse cutting-edge scraper



Fig. 22. AS 11 52/4. Boring bec

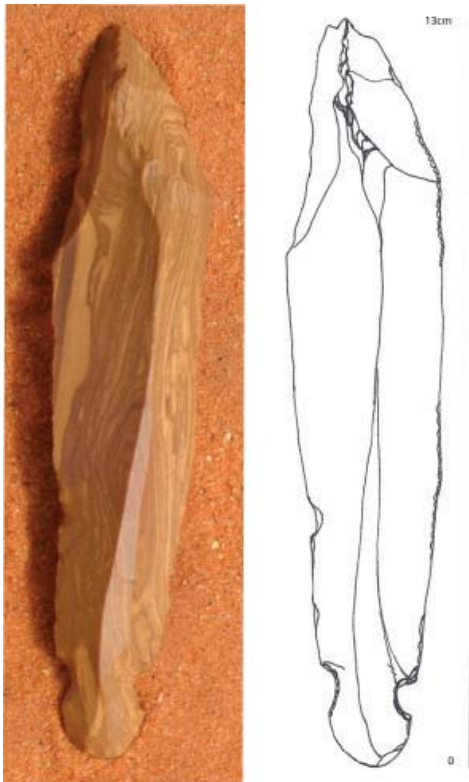


Fig. 23. AS 11 52/5. Point

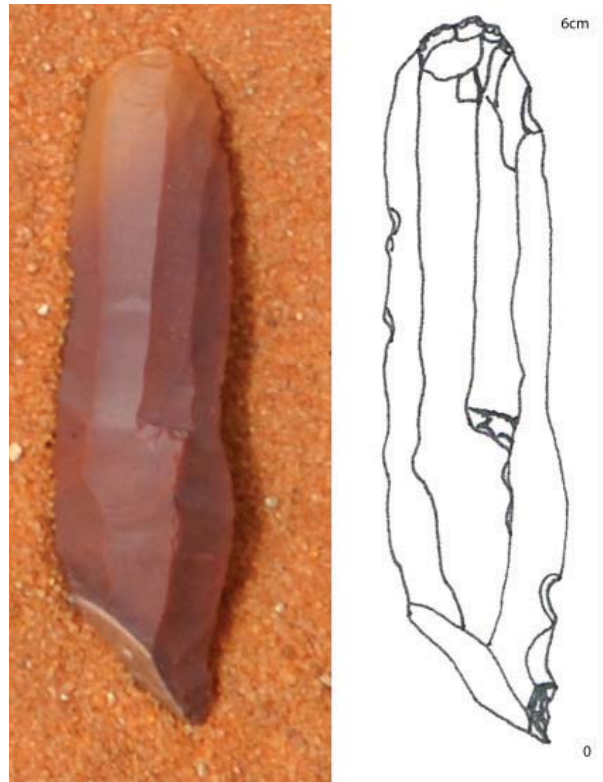


Fig. 24. AS 11 52/6. Blade

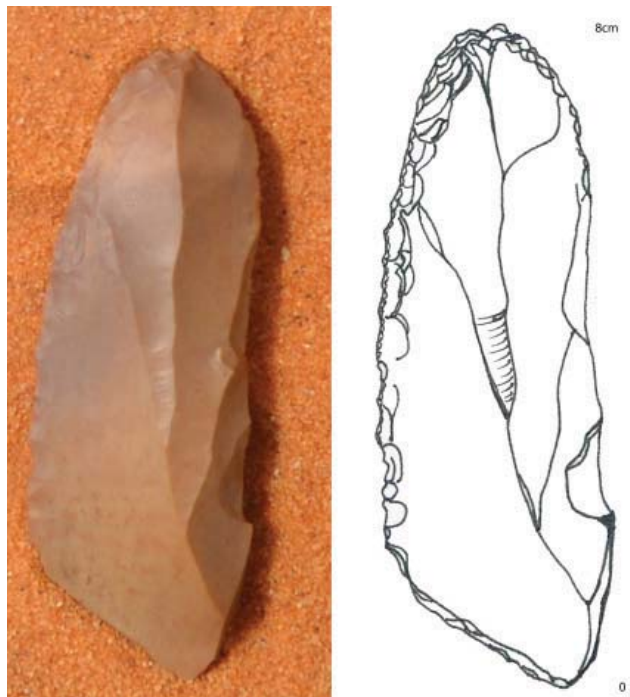


Fig. 25. AS 11 52/7. Transverse cutting-edge scraper

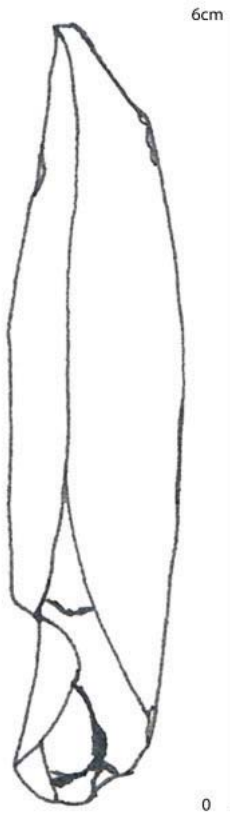


Fig. 26. AS 11 52/8. Backed-point

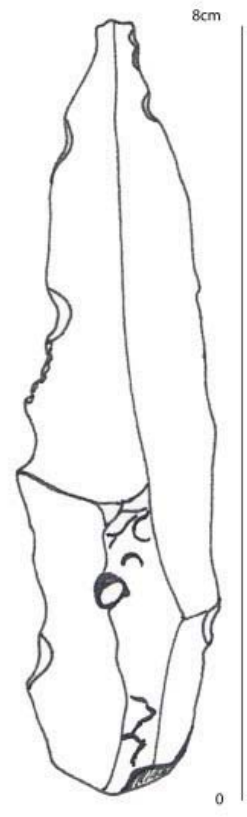


Fig. 27. AS 11 52/9. Point

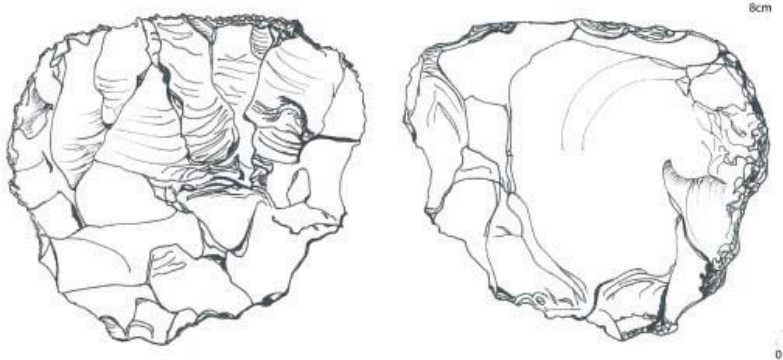


Fig. 28. AS 11 52/10. Nosed scraper

Asfân Site 3

Catalogue Number	Tools	Type of Retouch	Dimensions	Material	Note
AS 11 53/1	Scraper on blade Fig. 29	None	Length: 5.8 cm Width: 2.55 cm Thickness: 0.6 cm	Brown beige-veined flint	The artifact is comparable with other scrapers on blade from Gesher. ¹⁷ The morphological axis as a rule frontal corresponds to the morphological axis of detachment, as a rule ventral.
AS 11 53/2	Blade Fig. 30	Marginal on the distal end, on the right side and on the proximal end	Length: 5.1 cm Width: 1.4 cm Thickness: 0.6 cm	Brown flint	Comparable to other blades from Fayum. ¹⁸ The morphological axis as a rule frontal does not correspond to the morphological axis of detachment, as a rule ventral.
AS 11 53/3	Point Fig. 31	Only on the distal and the proximal ends	Length: 6.8 cm Width: 3.2 cm Thickness: 1.6 cm	Brown beige-veined flint	Retouch only on the two ends, on the proximal one it causes a thinned multifaceted bulb. The morphological axis as a rule frontal corresponds to the morphological axis of detachment, as a rule ventral.

Table 3. Lithic items from Asfân, site 3

Footnotes for table 3

17. Nadel & Garfinkel 1989.
18. Wenke, Long & Buck 1988.



Fig. 29. AS 11 53/1. Scraper on blade

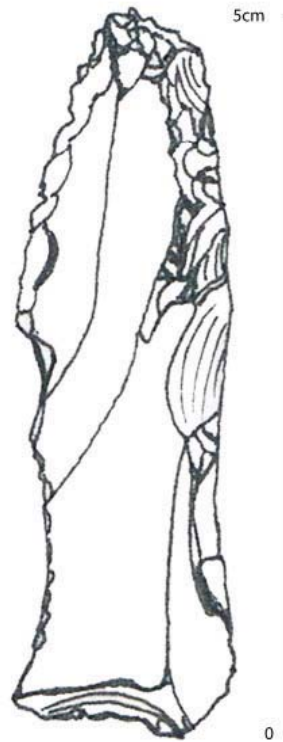


Fig. 30. AS 11 53/2. Blade

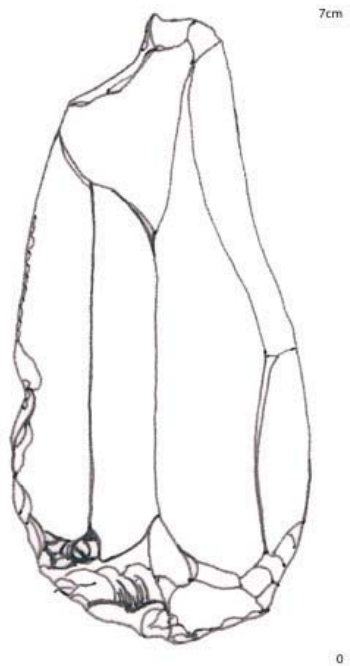


Fig. 31. AS 11 53/3. Point

Asfân Site 4

Catalogue Number	Tools	Tipo Ritocco	Dimensions	Material	Note
AS 11 54/1	Point Fig. 32	Marginal	Length: 7.7 cm Width: 2.5 cm Thickness: 0.9 cm	Brown beige-veined flint	Two sides and two extremities almost completely retouched. Proximal end consisting in a reduced multifaceted heel. In this implement the morphological axis as a rule frontal corresponds to the morphological axis of detachment as a rule ventral. Comparable with some tools both from Fayum and from Jordan Valley. ¹⁹
AS 11 54/2	Fo- liated point Fig. 33	Inframarginal on the sides and summary invasive on the body	Length: 5.8 cm Width: 3.7 cm Thickness: 0.4 cm	Beige flint	The inframarginal retouch affecting the implement sides appears a product of the tool use. Summary invasive retouch on the whole body of the artifact. The morphological axis as a rule frontal does not correspond to the morphological axis of detachment, as a rule ventral.

Table 4. Lithic items from Asfân, site 4

Footnote for table 4

19. Wenke, Long & Buck 1988; Nadel & Garfinkel 1989; Nayeem 1990.

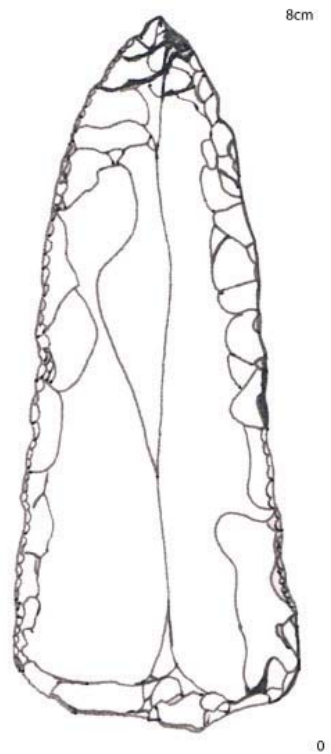


Fig. 32. AS 11 54/1. Point

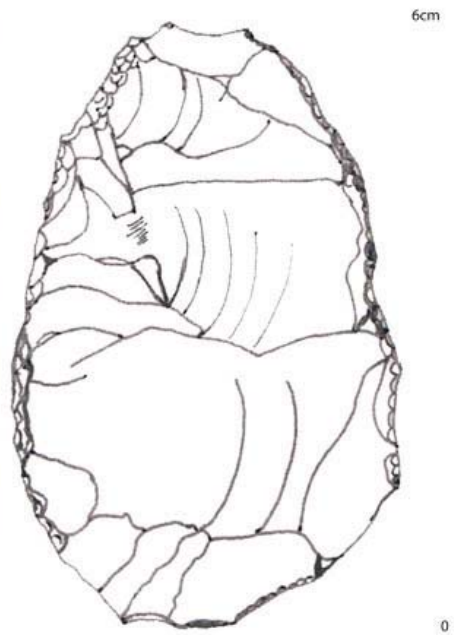


Fig. 33. AS 11 54/2. Foliated point

The Archaeological & Epigraphic Surveys

Mounir Arbach, Guillaume Charloux, Thamer A. Al-Malki,
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Archaeological and epigraphic surveys were conducted from October to November 2011, along with field research in sectors A and C and other activities detailed in the present annual report (**Fig. 1**).

The state of preservation of archaeological remains in the oasis

The survey carried out in 2011 allows us to give a first overview on the state of preservation of archaeological sites in the Dûmat al-Jandal oasis.

Supported by the authorities in Riyâdh, the Jawf province has recently entered into a process of intense competition with neighboring regions of Saudi Arabia and neighboring countries. The strong desire for economic development is accompanied by the establishment of administrative services, educational facilities and high-level research (e.g. the University of al-Jawf), and large urban, agricultural and industrial development projects, (e.g. the Olive Industrial Complex of Al-Jouf Agricultural Development Company). These many activities contribute to improving al-Jawf's socioeconomic conditions, which is located relatively far from major roads and is not naturally conducive to agriculture outside the oasis. The geographic area of Sakâkâ and Dûmat al-Jandal, major urban centers of the province with al-Qurayyat northwest, is the focus of development efforts. The implications of this activity are many: a robust population growth, the increase of constructions (houses, shops, government offices, storage areas and logistical services), high water demand, increase of arable land and intensive development of the road network in particular.



Fig. 1. Members of the archaeological team visiting site 1, located on the road between Dūma and Sakākā



Fig. 2. Site 1 largely destroyed due to its location near an important road

These activities raise questions about the protection of ancient heritage, as their effects are often irreversible: destruction of unprotected archaeological and rock art sites, damage of archaeological monuments, clandestine excavations and the general disappearance of the archaeological landscape. There are a great number of rock art sites and archaeological structures scattered in the oasis and in the region close to Sakâkâ, as well as along roads (**Fig. 2**, site 1) and in remote desert areas: these are likely to be affected by destructions caused by bulldozers and mechanical shovels. At Dûmat al-Jandal, until recently, the affected remains were mainly located in residential areas (**Figs. 3-4**). The destruction has now moved to threaten all the area (**Fig. 5**), especially on the plateau west of the oasis (modern districts called *subdivisions A-D, King Fahd* and north of it) (**Fig. 6**) and on the vast sandy desert area south of the district of al-Jarawy, on both sides of the King ‘Abdulazîz Road towards Sakâkâ, but also in the northern part of the oasis around Jabal Abu al-Jaysh, north of the villages of al-Wâdî and al-Buhayrât (**Fig. 5**)

The surrounding of the ancient western enclosure wall sector (sector C), which we studied in 2010, is about to be submerged by intensive construction. An extremely rapid expansion of a huge residential area is planned on the limestone plateau to the south and to the north (neighborhoods of as-Safâh and of as-Sabila *subdivisions*) (**Fig. 7**). The rapid extension of the as-Sabila *subdivision* towards sector C led in 2011 to the accidental destruction by a bulldozer of a segment of the ancient wall about 20 m in length (unit 4) and approximately 4 m high (**Fig. 8**).

These activities also affect the ancient residential area located in the valley in sector C, where bulldozers have leveled large areas, following the creation of a road last year along a deep trench dug for the wâdî’s drainage (**Fig. 9**). The affected areas are located on the map of the area (**Fig. 10**). Several structures, walls and ancient dwellings, identified last year, have already disappeared (**Figs. 11-12**). The situation is critical, because some people take ownership of the land surreptitiously: spaces are defined by some fast-built temporary walls, by planting trees, or simply by the digging of the desired space by bulldozers. Accordingly, it will soon be impossible to protect the ancient enclosure, and its progressive destruction is bound to ensue (**Fig. 13**).

Moreover, these phenomena are deepened by the spiraling illegal excavations (**Fig. 14**), which affect visible archaeological remains, often cairn tombs (**Fig. 15**), but also our own excavations at night (**Fig. 16**), as well as by damage (**Fig. 17**).



Fig. 3. Mud-brick tower in Dūmat al-Jandal endangered by modern construction



Fig. 4. House basement built at the location of the as-Sunamiyat necropolis excavated by the Saudi Team in 1985-1986



Fig. 5. The north-west of the palm grove. In the background, one can notice a large worksite which has been levelled by trucks before beginning work on a modern residential quarter



Fig. 6. Residential quarter extending on the plateau, located south of Sector C



Fig. 7. North-west corner of the enclosure (unit 4) destroyed by bulldozers during the construction of a residential quarter north of sector C in 2011

Fig. 8. The segment of the enclosure wall (unit 4) cut in 2011, near the road in progress



Fig. 9. Archaeological strata cut by the construction of a wide pit with its adjacent roads, now asphalted



Fig. 10. Location of destroyed areas of Sector C in 2011



Fig. 11. Mud-brick building located in the south-west central part of sector C in 2010

Fig. 12. The same area in 2012. The mud-brick building was fully dismantled, and the enclosure in the background is in great danger of destruction



In order to remedy these developments, the Saudi-Italian-French project recommends two actions:

1. The establishment of an emergency fence around the enclosure (**Fig. 18**). This proposal was forwarded to the Director of Antiquities ‘Ali Ghabbân at the signing of the agreement for the Italian-French study of the oasis at Riyâdh, on the 29th October 2011, in the presence of the ambassadors of France and Italy.
2. Increased surveillance of archaeological remains at risk:
 - a. Protection of some important archaeological remains discovered by chance during construction work or by inhabitants. A complete listing of archaeological sites is needed.
 - b. Completion of a diagnostic archaeological study before the realization of major urban projects, in coordination with the municipality and the governorate. This should result in either an abandonment of research in the case of a negative diagnosis, or emergency rescue excavations for a positive diagnosis, or again the protection of outstanding archaeological remains.
 - c. The introduction of retaliatory measures in cases of illegal excavation and illicit sales of objects retrieved from illicit digging.



Fig. 13. Cleaning in 2010 of the section of a wall (unit 9) in north-east part of sector C, which was entirely cut by the building of an asphalt road

Fig. 14. Ancient stone wall exposed during illegal excavations in Sector C



Fig. 15. Illegal pits dug into a stone building at Qasr al-Jaysh



Fig. 17. Vandalism of stone engravings in the Dûmat al-Jandal area

Fig. 16. Illegal excavation carried out at night in our archaeological trench during the 2011 season

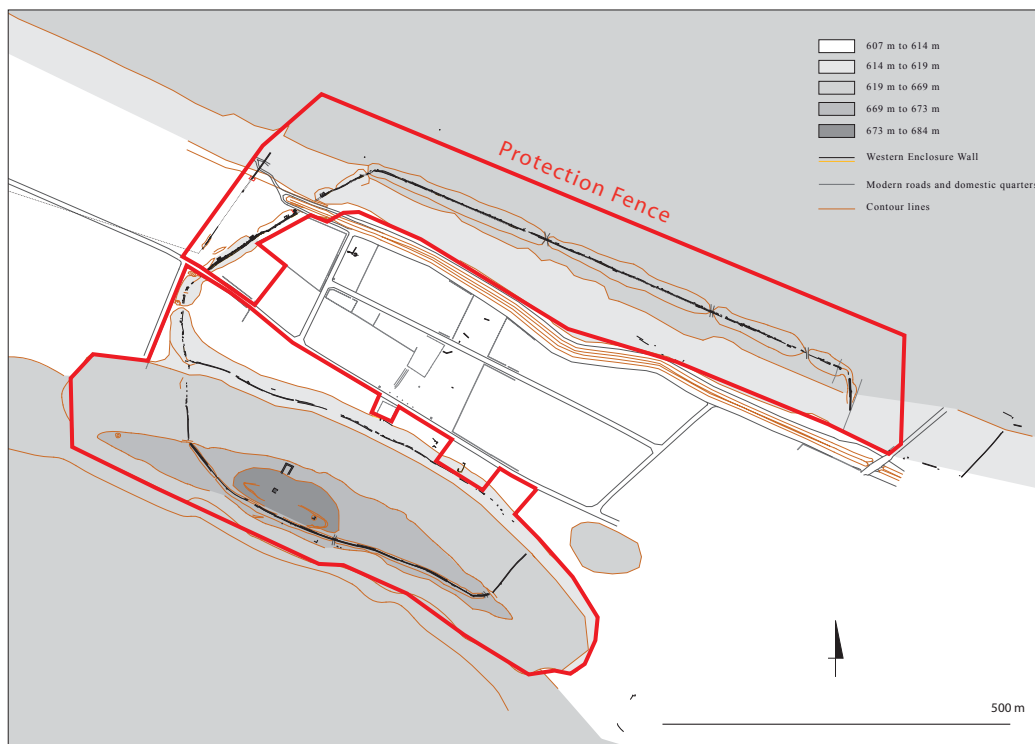


Fig. 18. Proposal for the construction of a protection fence (at *minima*) in sector C

The systematic archaeological survey of the oasis

Surveying began in 2010 in the northwest quarter of the oasis, but without the methodology making it possible to produce comprehensive registration. The area to be studied is gigantic and the survey will focus on the palm grove and on the bottom of the valley, but also on the close margins of the adjacent stone outcrops.

For these reasons it was decided to create this year a GIS of the site using the *AutoCAD* software, in order to combine data taken with a Garmin hand-held GPS and those taken with a differential GPS using the same software. GPS data (documents .txt or .xls in columns) are importable without difficulty on other softwares, like ArcGis, for instance.

1. The first stage involved the purchase of high-resolution satellite imagery (pan-sharpened color, RGB three bands, 0.5 m pan, 8bit, UTM projection, WGS84 area, cubic convolution, DRA off, GeoTIFF format, 159 km², 1.9 Go), which was geo-referenced on *Autocad*. Permission to publish this picture, according to our needs, was officially given by the company. The limits of the systematic survey were arbitrarily defined (**Fig. 19**).

2. We then created a virtual grid on the software. It comprises squares of 300 m in width (abscissa axis: numbers) by 200 m in height (ordinate axis: letters) (**Fig. 20**).

3. In the field, each square was explored in a systematic manner by one or more team members, also taking into account information provided by residents in the area (**Fig. 21**). With the help of Mounir Arbach, a native Arabic speaker, we collected Arabic names of wells, but also toponymic data relating to the districts or tribes who inhabited them, and elements of local folk beliefs in relation to ancient heritage. During exploration, the collected data were plotted on the printed A4 image of the studied square. The numbers of GPS points were also located on the printed satellite image. Hatched areas indicate remains which were not visible or areas which were not explored. Note that the list of GPS points is common for surveys of the oasis and the surrounding region. Each number and GPS point was used only once, in order to avoid any confusion. In addition, photographs of the remains were taken systematically in the field. Finally, the relational database of photographs of the site links photographs, field information and GPS data.

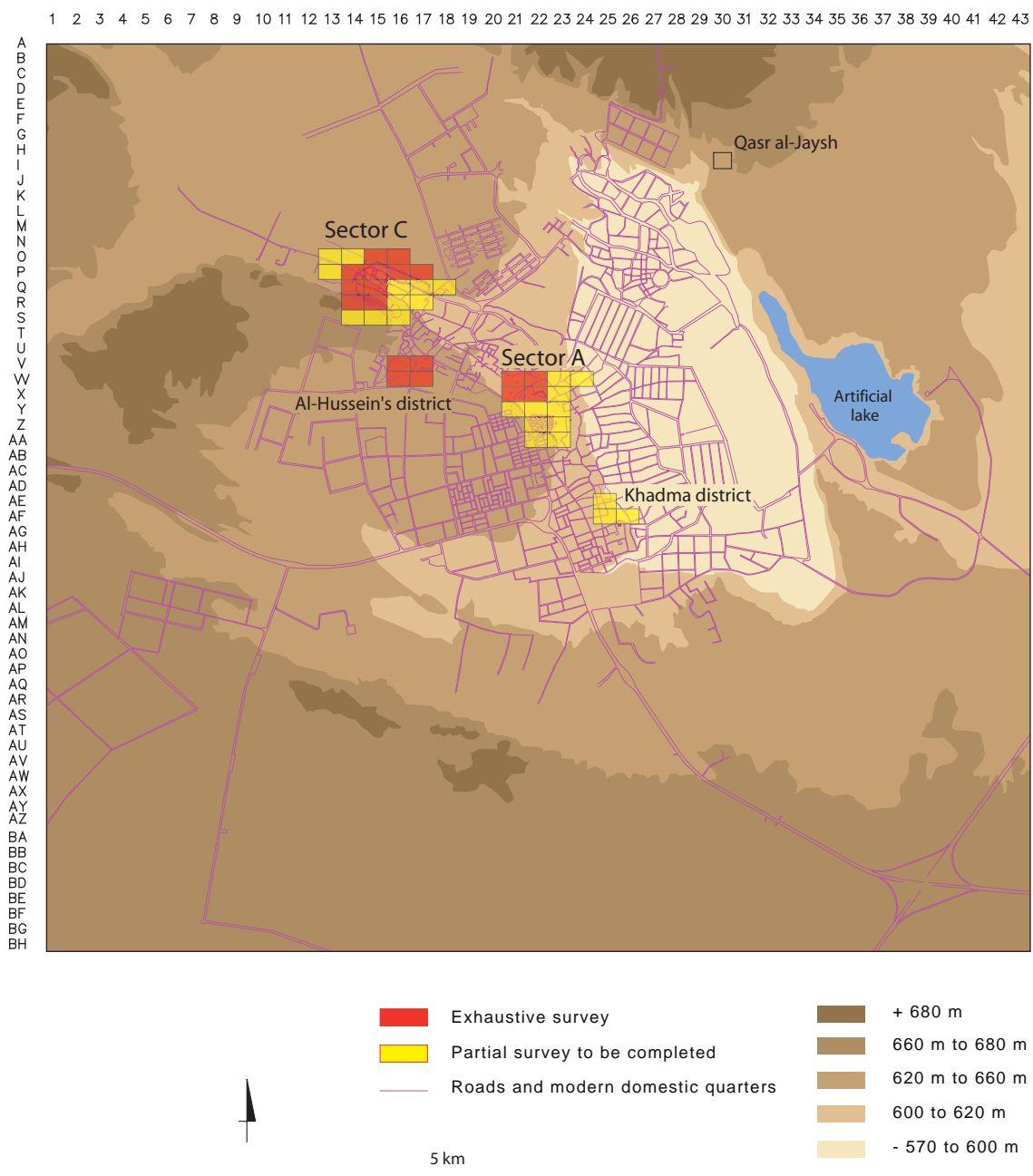


Fig. 19. Map of the 2011 systematic archaeological survey at Dumat al-Jandal



Fig. 20. Example of squares (W-X 19-20) of the virtual grid prepared for the systematic survey



Fig. 21. Mounir Arbach with Dūmat al-Jandal's inhabitants during the 2011 survey

During the survey, the main difficulty was to distinguish between ancient and modern structures. Moreover, it was impossible to survey with a differential GPS all the mud-brick and stone villages presently in a state of abandonment. We therefore decided to mention only wells, qanâts, towers, tombs, enclosure walls and other monumental architectural structures or antique remains. Noticeable archaeological remains deserving further study can be surveyed more accurately using differential GPS in a second phase.

4. Returning from the field, the coordinates of points and their assigned numbers were imported into the *Autocad* software. Each printed square was scanned then imported and flunked on *Autocad Raster Design*. Finally, the photographs taken in the field were imported and described in the relational database of the site.

5. The next step will be to gather data and to create synthetic plans by phase and by type of remains. Other analysis will be possible by downloading data into a GIS software like ArcGis.

In the case of some structures discovered or mentioned by our Saudi colleagues and threatened by immediate destruction, the choice of method was slightly different. We focus on the study of the structure, as we did in 2011 with a monumental construction in the Khadma district,¹ as well as other enclosure segments and monuments in the oasis: foundations of the supposed al-Qusayr and of tower Farha, al-Suhaym enclosure wall.

Results

It turns out that this systematic survey was rather difficult to implement, due to the many inaccessible land plots, fast-growing urbanization and recent destructions. It was also very time consuming when carrying out archeological digs in tandem. Ideally, a team of two or three people had to concentrate on this useful and important task.

This season, our activity focused on three sectors, which were test sites (**Fig. 19**):

1. The al-Hussayn district to the west (**Fig. 22**): exhaustive exploration of squares V-W 16-17
 - a. V16 : pt. 46
 - b. V17 : pts 35-45
 - c. W16 : pts 20-27 + 34
 - d. W17 : pts 28-33

¹. see Charloux, Morel & Simeon, in this volume: 266-276.



Fig. 22. al-Hussayn district, looking north



Fig. 23. Historical central district, looking north



Fig. 24. The Khadma district, looking north

2. the historical district, at its western edge (**Fig. 23**): exhaustive exploration of squares W-X 21-22 and partial visit of W23
 - a. X21 : pts 52-53, 55 (cancelled), 56-57, 60-62, 64-66, 74
 - b. W21 : pts 63, 67-73
 - c. X22 : pts 47-50, 54, 58-59, 130
 - d. W22 : pt. 75
 - e. W23 : pts 76-83
3. Khadma district (**Fig. 24**), to the south: partial exploration of the squares AE-AF-25 (pt. 118 on AE26)
 - a. AE : 120
 - b. AF : 117, 119, 121

Visits

One site was considered to lie outside the systematic exploration area of Dûmat al-Jandal: Qasr al-Jaysh, the name assigned to it by our Saudi colleagues. It is located high on the promontory overlooking the vast oasis to the north, in a depression hidden from Dûma (**Fig. 19**). It stands at an enlargement of the bottleneck, where the flow comes from Jebel Hammamiyât and runs towards the modern lake (**Fig. 25**). The site was visited only once on October 17th, 2011. Its full study should, in future, permit us to better understand its function and date. A board at the entrance of the archaeological ruins forbids access, but serves no real purpose since illicit excavations were carried out recently. Numerous pits had been dug in the western corner of the main structure and the second one.

The site consists of three structures:

- The first is a large rectangular stone building, whose internal organization is visible on the surface. The rectangle, of about 25 m long and 22 m wide is divided into two unequal spaces (2/3, 1/3) by an interior wall (**Fig. 26**). The largest space looks empty, while the smallest is divided by two, maybe three, perpendicular walls, which then reveal an internal organization of three small rooms overlooking a central courtyard.

- Fifty meters further to the north were located two walls of a second construction, apparently rectangular but heavily destroyed by looters (**Fig. 27**).

- Two parallel lines of stones stand near the second structure (**Fig. 28**) oriented north/south-west, towards the oasis. These are probably the remains of a water channel.



Fig. 25. Qasr al-Jaysh area (inside red circle). GeoEye-1 © GeoEye; <2011>; Distributed by e-GEOS (for GE-1 and IKONOS)



Fig. 26. Qasr al-Jaysh main building, looking south



Fig. 27. Qasr al-Jaysh smaller building, looking west



Fig. 28. Two parallel lines of stones at Qasr al-Jaysh, looking south

The epigraphic and archaeological survey of the region

Epigraphic surveys are difficult to carry out comprehensively, especially in the case of areas as huge as the region around Dûmat al-Jandal. The method adopted, frequently used elsewhere (Yemen, Najrân Province, etc.), is to refer to the advice of our Saudi colleagues² and to gather information from the local inhabitants, after reviewing the results of earlier surveys.³

Each surveyed site is numbered, and at least one topographic point is taken with a Garmin hand-held GPS, to record and plot the information on a GIS of the region (presently *Autocad & Google earth*, but the data .xls may be exported to some other software, like ArcGis).

The decision to fully study a site, as we have done in the region of Najrân at ‘An Jamal⁴ or at ‘An Halkân, depends on the quality and the number of rock carvings, but also on the threat of destruction at the site.

At this stage of the study, we present briefly below the twenty-five sites surveyed since 2009, besides the other major archaeological sites in the region (al-Tuwayr, Sakâkâ, al-Rajâjîl and al-Muwaysîn) (**Fig. 29**):

1. We visited two rock art sites known to our Saudi colleagues along the road leading north to Sakâkâ.

a. Site 1 (pt. 95, **Fig. 2**) had been previously visited in 2009. It is located 3.55 kilometers west of Sakâkâ, near a complex of farm silos of the Al-Jouf Agricultural Development Company. It consists of a dozen large blocks and panels covered with Thamoudic, Nabataean [1] and Arabic graffiti, and zoomorphic petroglyphs (felines, camels, goats, scorpions?), anthropomorphic (horsemen, hunting and war scenes, human figures) and others (hands, monograms).

b. Site 2 (pt. 94, **Fig. 30**), rather small and scattered, is poor. It includes a few Thamoudic graffiti.

². The visits have been carried out with a Saudi representative of the Saudi Commission for Tourism and Antiquities.

³. Winnett & Reed 1970; Adams *et al.* 1977; Parr *et al.* 1978 ; al-Muaikel & al-Theeb 1996.

⁴. Arbach *et al.* Forthcoming.

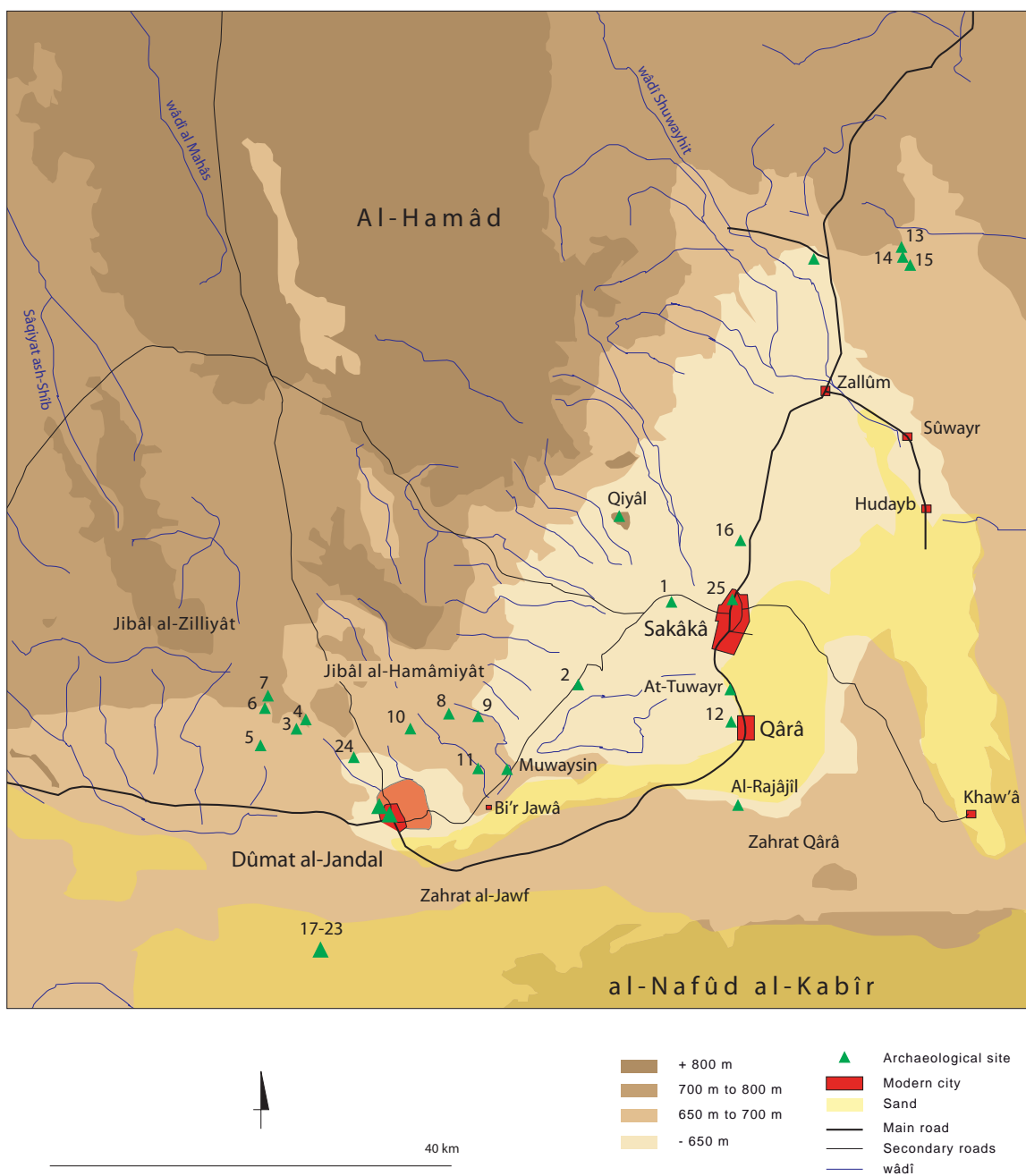


Fig. 29. Map of archaeological and epigraphic sites visited in Dumat al-Jandal region



Fig. 30. Site 2



Fig. 31. Members of the archaeological team at site 3



Fig. 32. Rock art representation of horses?

2. The place called al-Hamrâ was surveyed once in 2010:

a. Site 3 is located 8.5 km northwest of Dûmat al-Jandal. It is a rocky circular-shaped hill, light gray-violet in color, suitable for the engraving of inscriptions (**Fig. 31**). A preliminary inventory of engravings showed the presence of some Thamoudic and Arabic graffiti, monograms, but also many zoomorphic (ostriches, ibex, oryx, oxen, camels, horses?) and anthropomorphic petroglyphs (hands, footprints, human characters, archers, camel rider). Some of them are probably ancient according to their representation type and their patina (**Fig. 32**).

b. Site 4 is located 1 km north northeast of the previous site. Yet it is radically different because the petroglyphs are carved on flat gray, hard, and horizontal limestone outcrops (**Fig. 33**). No graffiti was closely observed, but there were engraved representations of humans, dromedaries and hands (**Fig. 34**). The technique used consists of the engraving of simple lines, without solid color, because of the hardness of the stone. A large quantity of flint tools, probably Palaeolithic, was discovered all around the engravings (**Fig. 35**).

3. ‘Abd al-Jawf

a. Site 5 (pts. 131-136; **Fig. 36**) includes a few cairns, large stone circles (**Fig. 37**) as well as graffiti and petroglyphs (including representations of goats, camels, horsemen, hand, horse?) carved on the western surfaces of two rocky peaks 9.5 km west-northwest of Dûma. Under a rock shelter, two “ball games” have been carved on flat surfaces. Non-exhaustive exploration of the area north-east of the site yielded numerous flints.

b. Site 6 (pt. 137, **Fig. 38**), 4 km north of the former and 2.8 km west of site 3 (al-Hamra), is visible from afar due to the presence of a large vertical isolated block, located at the foot of the rocky and arid foothills of ‘Abd al-Jawf, where several *desert kites* are implanted.

c. Site 7 (pts. 141-145) is located at the entrance of a wâdî at the base of a rocky outcrop. This is a rock shelter cut into the substrate comprising two roughly built stone walls that reduce the opening of the shelter (**Fig. 39**). Numerous fragments of flint tools (laminar, small nucleus) were collected within a few square meters in front of the shelter. The excavation and the walls may be more recent and have obliterated the lithic material accumulated in the shelter. Two blocks near the shelter bear a short Nabataean inscription.



Fig. 33. Site 4, site 3 in the background



Fig. 34. Human figures carved on a horizontal stone surface at site 4



Fig. 35. Middle Palaeolithic flints



Fig. 36. Site 5, 'Abd al-Jawf



Fig. 37. Stone circle at 'Abd al-Jawf, Site 5



Fig. 38. Site 6, located 4 km north of site 5



Fig. 39. Rock shelter at site 7

4. The region north of Dûma, called Jebel Hamamiyât, is poorly defined. This vast expanse includes several sites with rock engravings. We explored four of them in 2011:

a. **Site 8** (pts. 110-111, **Fig. 40**) is a high, circular, rocky promontory, 7.3 km north of Dûma. A large number of graffiti (Thamoudic, Arabic) and petroglyphs (rock goats, camels, cats, horses, monograms) are concentrated on its northwestern side. Some petroglyphs of circumscribed circles with rays of light? (representation of the sun?) are localized on a few large blocks in the southwestern side of the promontory (**Fig. 41**). A straight structure made of stones placed vertically in the ground, and a grave are situated fifty meters north of the promontory.

b. **Site 9** (pt. 112), 2.5 km and a half west of the former. It is a small rock with flat walls. We noticed the presence of Arabic graffiti and the representations of hunting scenes: riders on camels tracking the ostrich (**Fig. 42**). On its south side, at its base, there are a few circular structures made of large stones (cattle pens?).

c. **Site 10** (Site 10 Tell Hamamiyât 3, pt. 106): aligned cairns with trains?

d. **Site 11** (Qarat Nisa, pt. 97, **Fig. 43**). The site is in the form of an elongated tongue-shaped spur of rock, 200 m long and 50 m wide, fully protected by a modern fence. It is located 7 km northeast of the oasis. Its flat walls, suitable for engraving, are covered with a large amount of graffiti (**Fig. 44**), mostly Arab, but also some Thamoudic, two Nabatean and many petroglyphs (representations of ostriches, goats, camels, cattle, people with large hands, horse, etc.).

5. **Site 12** (al-Ruqayb, pt. 1045). The site named al-Ruqayb was briefly visited in 2009. Protected by a modern fence about 120 m long and 60 m wide, the site is located along a rocky escarpment to the west of al-Qara, 300 m away from the road leading to al-Tuwayr then to Sakâkâ. A residential area has recently grown around the escarpment. A high concentration of Thamoudic graffiti (and some Arabic inscriptions) and petroglyphs (camels, horsemen, hands, stars, circles and circumscribed forms) was spotted on the walls of the blocks, not far from a quadrangular stone tower in ruins which is positioned in a strategic location, since it controls the pathway towards al-Tuwayr (**Fig. 45**).



Fig. 40. High circular rocky promontory at site 8



Fig. 41. Sun (?) carvings on rocks at site 8



Fig. 42. Christian Robin at Site 9

Fig. 43. Site 11,
Qarat Nisa



Fig. 44. Epigraphic inscriptions and artistic engravings on a rock panel at Qarat Nisa, site 11



Fig. 45. Tower at al-Ruqayb, site 12

6. The al-Rasîf sites are 70 km northeast of Dûmat al-Jandal, on a desert limestone plateau.

They consist of stone structures scattered over a distance of 2 km:

a. Site 13 (pt. 122): rectangles of upright stones set into the ground, often associated with a smaller stone circle (**Fig. 46**), near irrigation channels (?) visible on the surface (**Fig. 47**). A large circular structure delimits the area: perhaps a camp?

b. Site 14

i. Pt. 123: stone rectangles and circle of irregular shapes set into the ground. The inner walls made of limestone blocks show violet traces of burning:⁵ are these domestic fireplaces inside encampments? They are located on the edge of an ancient lake indicated by the presence of white powdery sediment. It is probably to be associated with the previous camp (site 13). Was it subsequently used as a salt mine?

ii. Pt. 124: circular structure with a partition wall inside.

iii. Pt. 125: circular structure with two fireplaces nearby.

iv. Pt. 126: several structures including a large circular fireplace, which may have been recently disturbed (?).

v. Pt. 127: three east-west oriented graves and traces of recent disturbance.

c. Site 15 (pt. 128) at the end of the limestone plateau, was identified by the presence of some cairns (?).

7. **Site 16**, called al-Qal'a (Pt. 129), is located at the northern exit of Sakâkâ. It consists of a small main rock near to two others located to the north, which are surrounded by a square wire fence (**Fig. 48**). This site is quite degraded by modern graffiti, probably because of its proximity to residential areas and to an amusement park. The tracks of a bulldozer, inside the fence and against the main rock, indicate that the site was saved *in extremis* from destruction. Arabic, Nabatean and Thamoudic graffiti are found on the beautiful surfaces, as well as representations of tall animals (camels), damaged by erosion, and a remarkable parade of ostriches.

8. **Site 17**: Asfân 1 (see geo-archaeological survey)

9. **Site 18**: Asfân 2 (see geo-archaeological survey)

10. **Site 19**: Asfân 3 (see geo-archaeological survey)

⁵ Our guide pointed out that the hearths are filled with iron-rich black stones which occur in abundance at the edge of the small limestone plateau on which are located the circular structures and fireplaces.



Fig. 46. Stone structures at al-Rasff, site 13



Fig. 47. Irrigation channels (?) visible on surface, at al-Rasif, site 13

11. **Site 20:** Asfân 4 (see geo-archaeological survey)
12. **Site 21:** Asfân 5 (see geo-archaeological survey)
13. **Site 22:** Well 1 (see geo-archaeological survey)
14. **Site 23:** Well 2 (see geo-archaeological survey)
15. **Site 24** (pt. 19, **Fig. 49**): a stone masonry construction made up of several rooms with narrow corridors and covered with large flat stones (grave?) was partly cleared by looters. It was built probably during the late Holocene at the edge of the limestone plateau 3.2 km north of Area C. It is located near circular stone structures (of different period?), set on the limestone plateau.
16. **Site 25** (pt. 17): site of Arabic and Thamoudic graffiti south of Qasr Za‘abal and the Say-sarâ well.



Fig. 48. al-Qal'a, site 15



Fig. 49. Buried construction (tomb?) at site 24

Magnetic Cartography

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Magnetic survey is probably the most commonly used method in geophysical surveying for archaeology. The principle is to record the spatial variations of the Earth's magnetic Field, in order to detect and characterize archaeological magnetized artifacts or features.

Our equipment consists of four fluxgate magnetic sensors spaced horizontally at 0.5 m and fixed on a plastic tube. The plastic tube is fixed to a 1.5 m long pole attached to a rigid non-magnetic backpack. The backpack contains the electronics and the battery. A Trimble 5800 electronics unit and antenna are fixed at the top. This GPS system navigates to less than a meter in real time and positions are stored in the system memory.¹

The configuration of the area to be surveyed permitting, we defined 50 x 50 m grids surveyed in a zigzag configuration with profile spacing of 2 m. Transverse profiles were generally mapped. At the beginning and end of each operation a reference/benchmark value was measured (using the same location and attitude of magnetometers) to check for any drift in each sensor. Generally, the drift measured was less than 1 nT and could be ignored.

The aim of processing the magnetic data was to obtain a magnetic anomaly map. Magnetic data from each profile were geo-referenced using the GPS data, spikes were removed and the magnetic anomaly is computed by removing a constant value from each profile. A regular grid was defined with node spacing of 0.25 m and data was interpolated to create the grid. The magnetic anomaly grid is used to compute various possible transformations such as vertical derivatives, reduction to the pole or the analytic signal.

1. Munsch *et al.* 2007.



Fig. 1. Magnetic track lines recorder in zone 2-4 (A) to the north and zone 1 to the south (B), plotted on Google Earth.

The magnetic field surveys

Magnetic data were acquired during 9 days between October 17th and 27th, 2011. 25.5 km of magnetic profile were measured for 19 hours in four different areas (zone 1 in sector A and zones 2 to 4 in sector C, **Fig. 1**). Magnetic maps were computed with a resolution of 0.25 m (**Fig. 2**). The total-files magnetic anomaly maps displayed with the same color table show high amplitude short wavelength dipolar magnetic anomalies, especially in zones 1 and 2. The simple shape of such anomalies suggests that their magnetization source is small in size, and the six parameters of the source can be computed, i.e. location (x, y and z) and magnetization vectors. Depths below the surface of the magnetized sources range between 0 and 1 m. Their magnetization is high, indicating probably objects made of steel. In zone 2 (sector C), the dipolar anomalies appear to form alignments which could correspond to pipes. A table giving the location and depth of these objects can be provided if one intends to dig up the objects.

To better observe all the magnetic anomalies, different color tables are constructed for each zone. The color range is computed in order to obtain the same surface for each of the colors. Then, small amplitude anomalies are enhanced compared to high amplitude anomalies (**Fig. 3**). We also compute the vertical derivative of the magnetic anomaly map (**Fig. 3**). The vertical derivative better resolves small scale features located near the surface.

Zones 1 (sector A) and 2 (sector C) contain too many such anomalies to be utilized for data interpretation.

For zones 3 and 4, the magnetic anomaly map and the vertical derivative do not show any obvious characteristic structures. The amplitude of the magnetic anomaly map is small, about 2 nT, and we are at the limit of the accuracy of the sensor used. However, we tentatively draw several lines corresponding to lineations observed on the magnetic anomaly and the vertical derivative maps (**Fig. 5**).

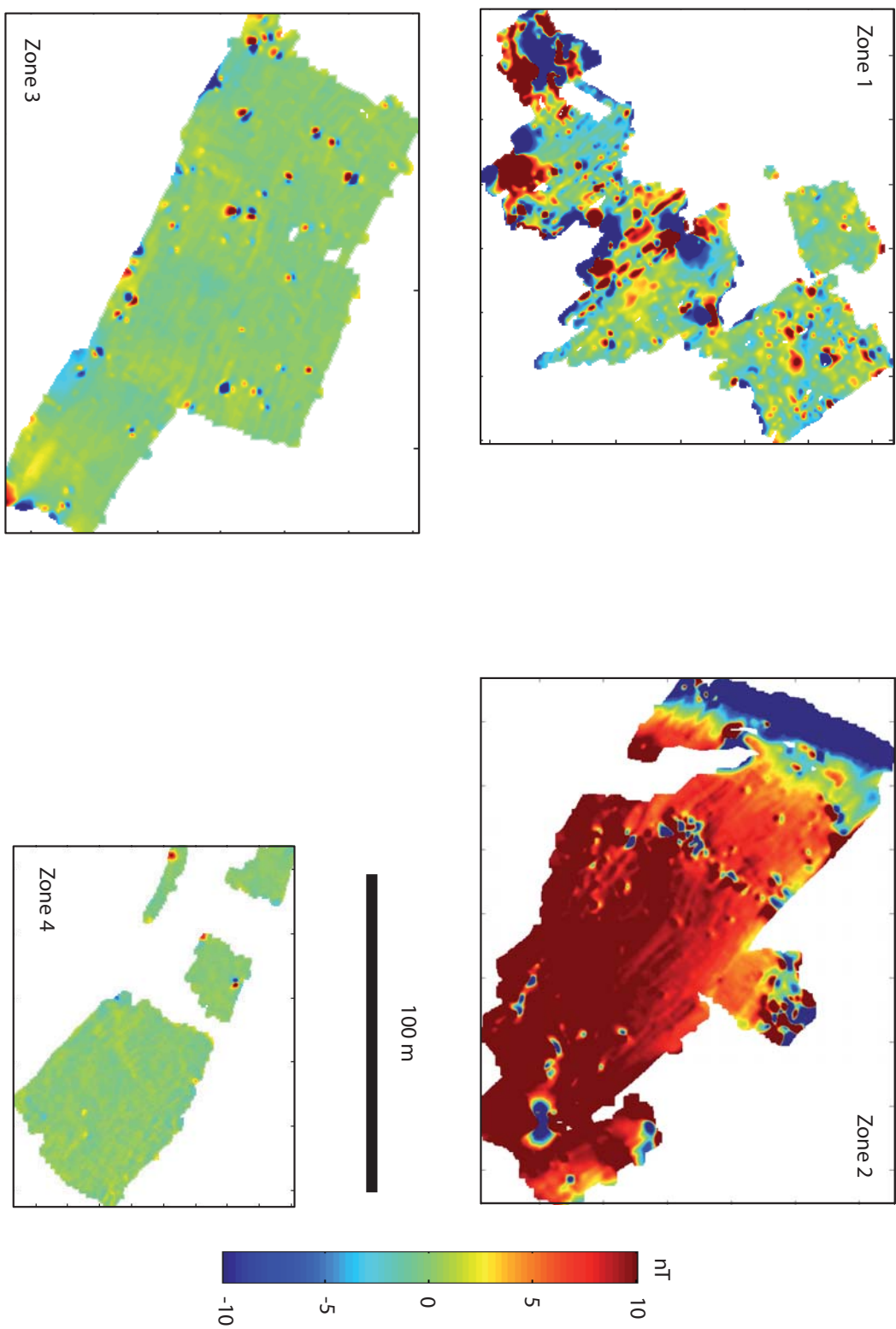


Fig. 2. Total-field magnetic anomaly maps of zones 1-4. Same scale and color table are used for the four maps.

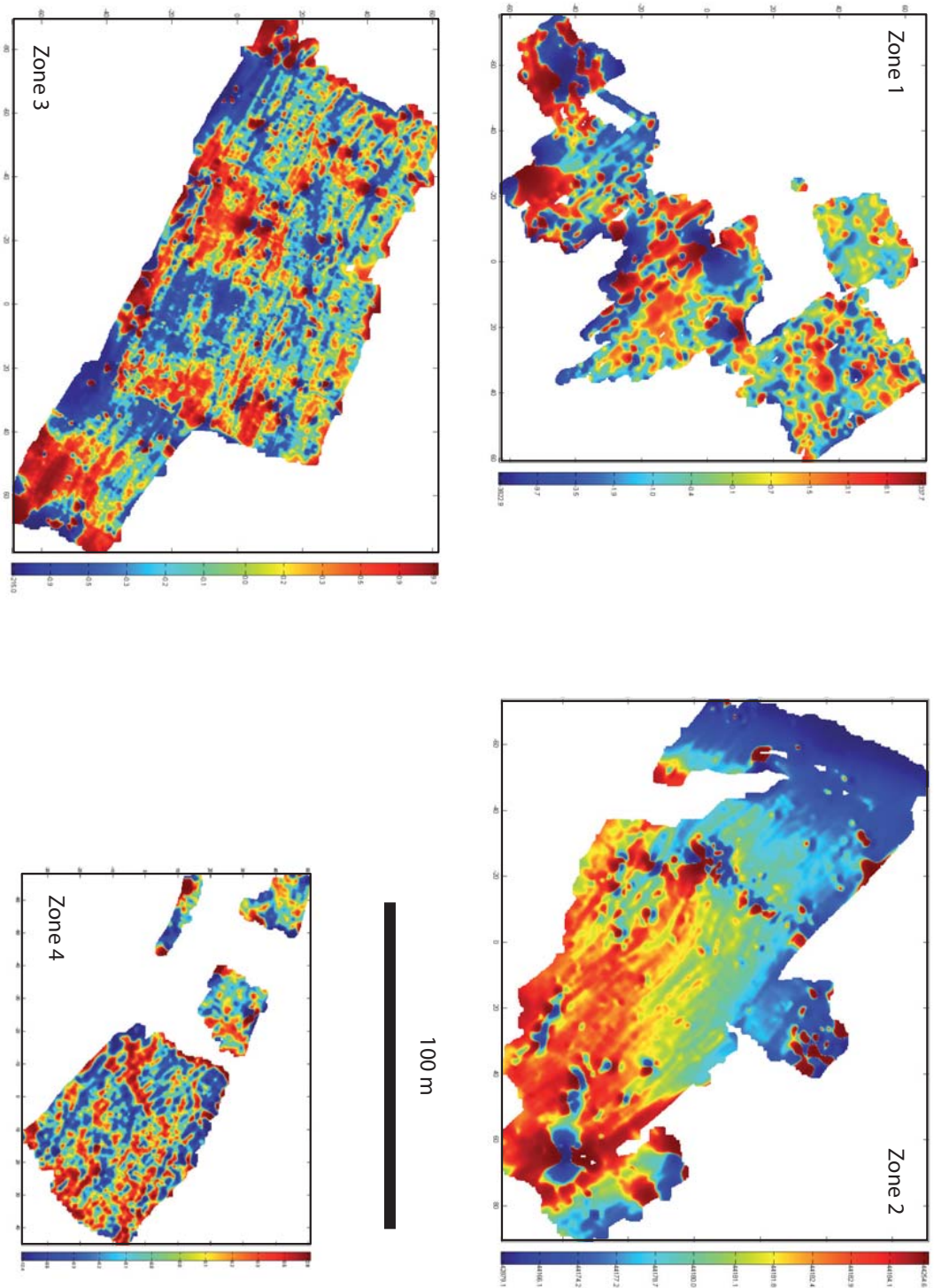


Fig. 3. Total-field magnetic anomaly maps of zones 1-4. The same horizontal scale is used for the four maps. The color tables are computed to obtain an equi-representation of the colors.

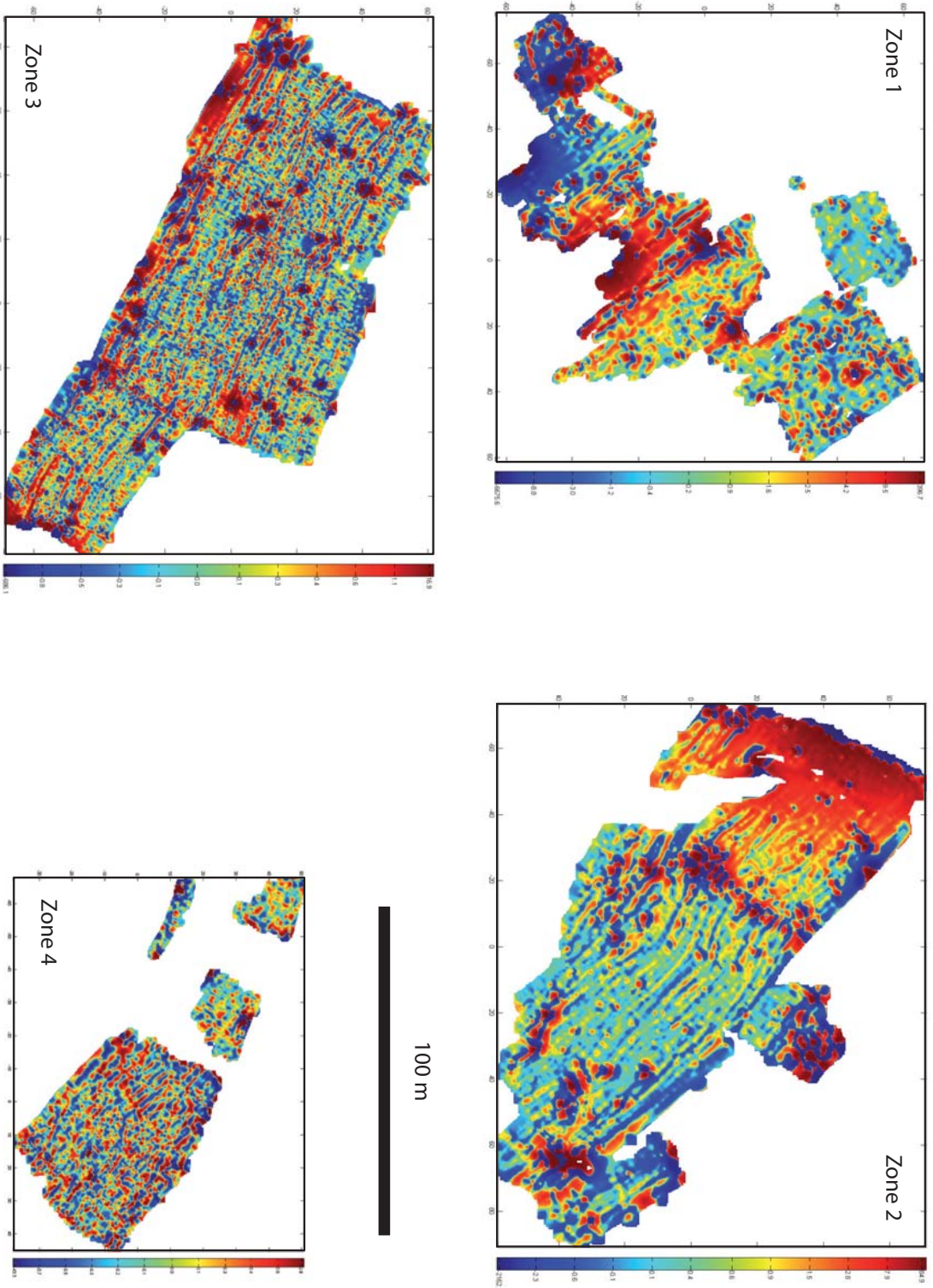


Fig. 4. Vertical derivative of the total-field magnetic anomaly maps of zones 1-4. The same horizontal scale is used for the four maps. The color tables are computed to obtain an equi-reparation of the colors.

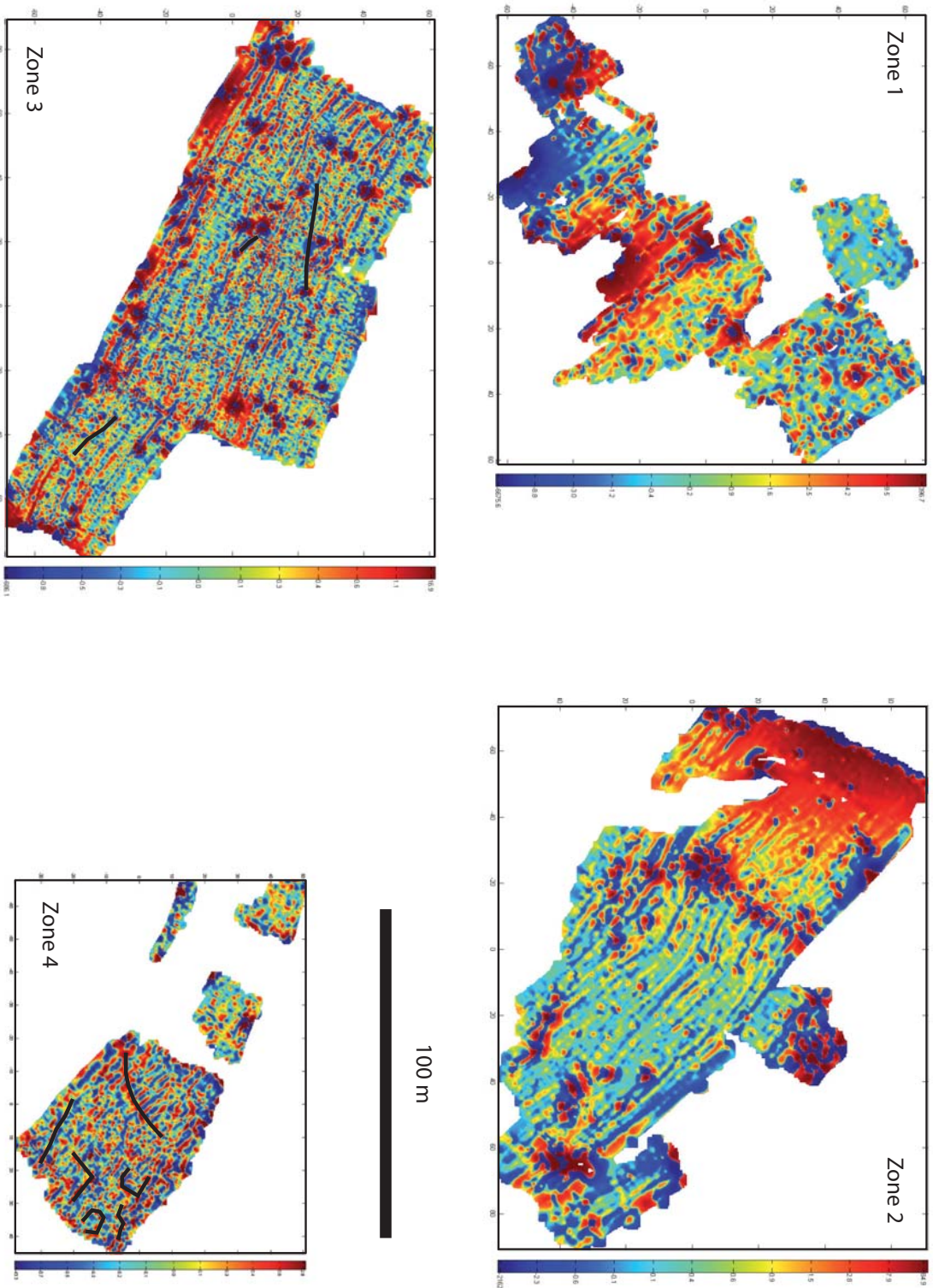


Fig. 5. Line drawings of lineations observed on the magnetic anomaly and vertical derivative maps of zones 3 and 4

The 2011 Excavations in the Historical Area, Sector A

Romolo Loreto (*Università degli Studi di Napoli "L'Orientale"*)

Archaeological activity in Sector A, east of the Mârid Castle, was conducted between October 15th and November 3rd, 2011. In the field were present myself, Thâmir 'A. al-Mâlikî (archaeologist, Saudi Commission for Tourism and Antiquities), Mûsa al-Ghar-nî (historian, SCTA), Dr. Andrea Marcolongo (architect, Centro Nazionale della Ricerca) and Quentin Morel (independent topographer).

Excavation activities follow the program started in 2009, enlarging the 2009 and 2010 main trench (trench 1, **Fig. 1**) in order to create a large excavation area which could allow us to study the urban development of ancient Dûmat al-Jandal.

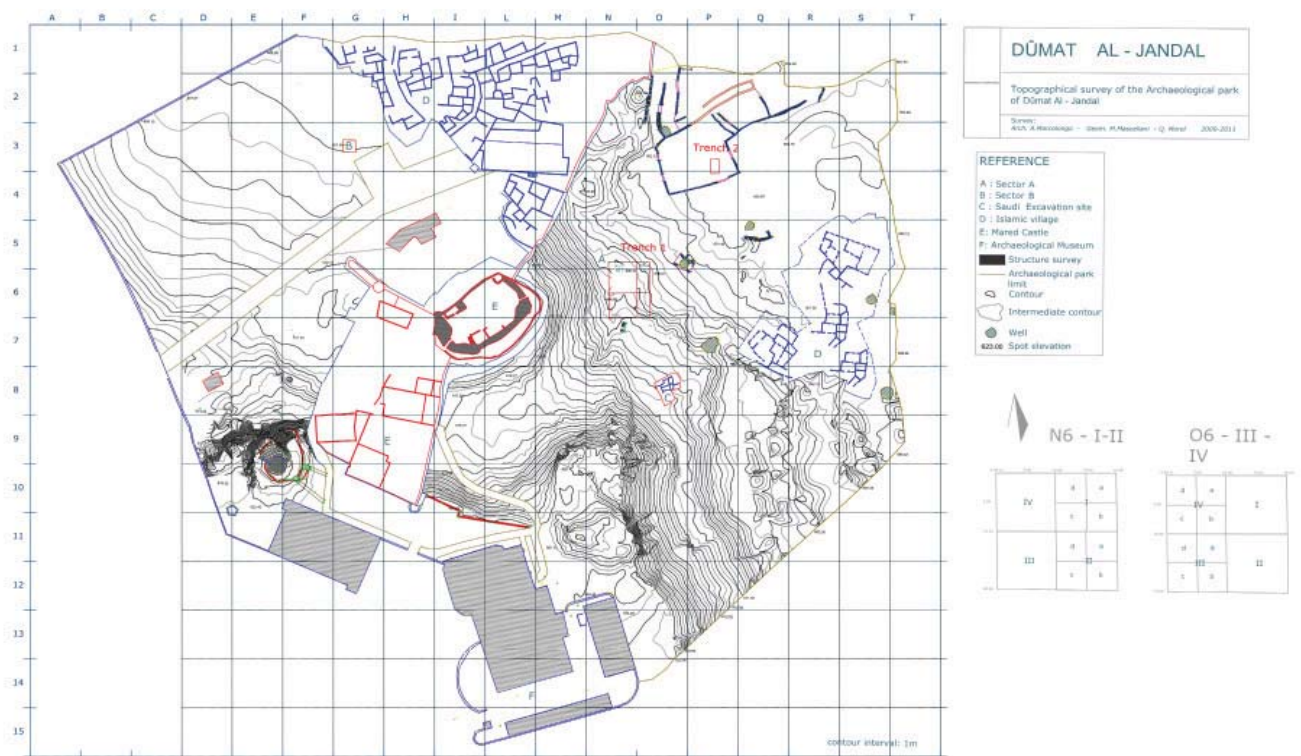


Fig. 1. General plan of the archaeological park around the Mârid Castle with indications of the trenches



Fig. 2. Excavation trenches in Sector A

In addition, a new excavation trench (trench 2), located 60 m north-east of trench 1, was opened in order to start systematic test probes around the Mârid Castle and inside the borders of the medieval village of Hayy ad-Dira' (**Fig. 2**), which in all probability covers the pre-Islamic settlements, as recorded in trench 1.¹

In **trench 1**, thanks to a wide excavated area, it is now possible to begin to define both a stratigraphic and a contextual urban development for the ancient site. Since 2009 it was already clear that the ancient core of Dûmat al-Jandal featured a complex and extensive stratigraphy possibly providing many indications about the site's different occupational and historical phases.²

During the 2010 season we were able to identify a late Nabataean or Roman Byzantine building (Building A), at that moment the most ancient structure recognized.

Building A was followed by many different phases of re-use and re-occupation dating back to the Islamic era. At least three main Islamic periods were defined (Early, Middle and Late Islamic) according to the material remains (pottery and objects) and to the architectonic evidence, covering a period going from the 7th-8th cent. AD to the Ottoman era (16th-18th cent. AD) (**Table 1**, **Fig. 3**).

1. Note on the recording system: having opened a second excavation trench in sector A, we will use the term trench (1, 2, etc.) to indicate the excavation areas inside sector A, which refers to the whole area east to the Mârid Castle.

2. Loreto 2014.

Preliminary Archaeological Phases from Dūmat al-Jandal	Structures and Materials	Archaeological Levels	Provisional Dating
Late Islamic	M1	level 1 (surface) - level 2 (wind-borne sand) (Figs. 10-11 Loreto Duma I)	15th-18th century AD
Middle Islamic I	Building L6, L2, M3	level 2b (M10 collapse) (Fig. 53 Loreto Duma I)	8th-15th century AD
Middle Islamic II	M10		8th-15th century AD
Middle Islamic III	Level 3a-b	level 3a-b (stone rubble) - (level 4, part of level 3 gravel) (Figs. 33-35 Loreto Duma I)	8th-15th century AD
Early Islamic I	L15 (Islamic locus), L12, L13, M16, M31	level 11 (wind-borne sand above the collapse of building A in Locus 9) (Figs. 35-36 Loreto Duma I)	8th century AD
Early Islamic II	L8a (?), L10a-b, L16, L17, L19, M7, M8, M11, M15, M21 (?), M22, M23, M27, M28, M37, M38, M39, M49	level 6 (occupation deposit above L10-L10a) (Figs. 66-67 Loreto Duma I) - level 7 (collapse of building A above Locus 8) (Fig. 51 Loreto Duma I) - level 11 (wind-borne sand above the collapse of building A in Locus 9) (Figs. 55-56 Loreto Duma I) - level 8 (life deposit above Locus 8) (Fig. 31 Loreto Duma I)	7th century AD
Roman/Byzantine	L8a (?), M21 (?)	level 8 (life deposit above Locus 8) (Fig. 51 Loreto Duma I)	2nd-6th century AD
Late Nabataean	Building A construction, M52	level 5 (occupational level outside Building A, between M56 and rocky-colluvium) (Fig. 53 Loreto Duma I) - level 9 (building A floor) (Figs. 37-38, 52 Loreto Duma II)	1st century AD
Early Nabataean/pre-Nabataean	Materials from Building A foundation trench / M44	level 10 (re-used pottery items) (Fig. 57 Loreto Duma I, Figs. 39-40 Loreto Duma II) / M44 (Figs. 31-32 Loreto Duma II)	1st century BC-1st century AD

Table 1. Provisional stratigraphic sequence from trench 1



Fig. 3. Trench 1 after 2010 excavation



Fig. 4. Trench 1 extended to south-east

During the 2011 season, due to the enlargement of the trench northward and eastward (**Figs. 4-5**), it was possible to recognize new architectural evidence related to Building A, to better define the first Islamic occupation of Dûmat al-Jandal and, moreover, to recognize new pre-Islamic structures earlier than Building A.

The last days of excavation were devoted to preparing the excavation trench for the 2012 campaign, by beginning to dig the southern section of the trench, measuring 5 meters from the surface down to the Nabataean level. New Islamic structures came to light: they will be analyzed during the next season (**Fig. 6**).

Although it revealed hardly any architectonic structures, Trench 2 provided us with important morphological indications of the rocky spur which dominates the site; moreover the trench revealed an ancient level of pre-Islamic occupation above the bedrock (**Fig. 7**).



Fig. 5. Excavations in trench 1, looking west



Fig. 6. Extension of trench 1: 25 x 17.5 m. View from west



Fig. 7. Trench 2. View from north-east

The excavations of Trench 1

Trench 1 has provided new archaeological evidence of the pre-Islamic occupation and the first Islamic re-occupation of Dûmat al-Jandal.

The enlargement of the trench in a northeasterly direction allowed us to define new layers of the urban occupation at the site's core.

Trench 1, 25 x 17.5 m, is located in quadrant N6-1,2 and quadrant O6 3,4 of our archaeological park grid map (**Figs. 1, 6**). The enlargement of the trench exposed a large surface characterised by the presence of a wide late Nabataean building (Building A), which at the moment represents our main objective, until it is possible to enlarge the trench which could help us to dig without danger under Building A.

The enlargement of Trench 1 in an easterly direction

Given the limited number of days available for the excavation, we chose to enlarge the trench eastwards (**Fig. 4**) and northwards (**Fig. 5**) in view of the fact that the northern and eastern sections were not so deep as the southern one, measuring from the top of the surface to the Late Nabataean Building A layer: 3.5 m (northern and eastern sections), 5 m (southern section).

The eastern enlargement of the trench was done in quadrant O6-III, c-d, in a 5 x 5 m square located east of L9, where only the Building A room was identified in 2010.

The excavation was conducted between M11 and M16, both known from the 2010 campaign. The dig revealed the existence of different Islamic structures (M31, M16, L12, L13, L15, L19) built in part directly above Building A (L12) partly above a more ancient Islamic level (L19), which covered Level 11, a huge level of aeolian sand spread over the collapse level of Building A.

The excavation revealed that the structures related to Building A were everywhere under the Islamic remains and that they were covered by Level 11.



Fig. 8. L12 bordered to the west by M11, to the east by M31, to the north by M16. M31 was painted in white plaster.

Islamic structures

Room L12

The first Islamic structure identified was room L12, composed by walls M31, M16 and M11 (**Fig. 8**). M11, a long north-south wall which runs towards the south outcrop east of the Mârid Castle, is the earlier structure, built above the collapse of Building A.³ M31 and M16, interconnected, were built later using M11 as the western limit of the room.

The floor of L12, measuring 3 x 2.5 m, was made up of compacted earth mixed with small undressed stones (**Figs. 9-10**). In the south-eastern corner a small locus, L13 (1 x 60 m), was found, and was probably a fire place (**Figs. 11-12**). No ceramic items were found, only bones, which will be studied during the next campaign.

The most impressive detail was the presence of a white painted wall, M31, containing a small door only 1 m high, opening in its northern half (**Figs. 8, 15**).

L12 was covered by the level of collapse of M11, composed of mud-bricks coming

³. See Loreto 2014: 123-127.

from the upper courses of the wall, separated by small levels of aeolian sand. Thus, M11 collapsed at different times, during which small amounts of sand accumulated above the mud-bricks of the collapse (**Fig. 11**).

M31 comprises stone courses and stands 2 m high. Some mud-bricks still in place on the top and a huge level of collapse identified east of M31 suggest that this wall must have been very high. It was the structural wall of a building which probably included a first upper storey. M16, indeed, still preserves roofing slabs in its southern façade (**Fig. 8**).

Having defined the limits of the Islamic structures, we proceeded to remove the compacted floor of L12. The excavation revealed how M30, related to Building A, continued to the east for a total length of 3 m, and defined huge room L9 (now 5.5 m wide on an east-west axis), partly excavated in 2010. We were able also to recognize a new floor (Level 9) related to Building A, just north of M30, associated to a new room L20 (**Figs. 13-15**). It was composed, as well as L9, of strong compacted earth mixed with pre-Islamic sherds. L20 stood 25 cm higher than the L8 open court. From L8 it was possible to reach L20 by a step partly paved in stone (**Figs. 16-17**).

All the Islamic structures were built directly above the collapse of Building A, as shown by M16, M31 and L13 in **Fig. 13**.



Fig. 9. L12 floor level built above the collapse of Building A



Fig. 10. L12. First Islamic reoccupation of the southern sector of Building A



Fig. 11. L13, oven (?) in L12. The section shows the mudbricks collapsed from M11



Fig. 12. L12 floor pavement of compacted earth and undressed stones

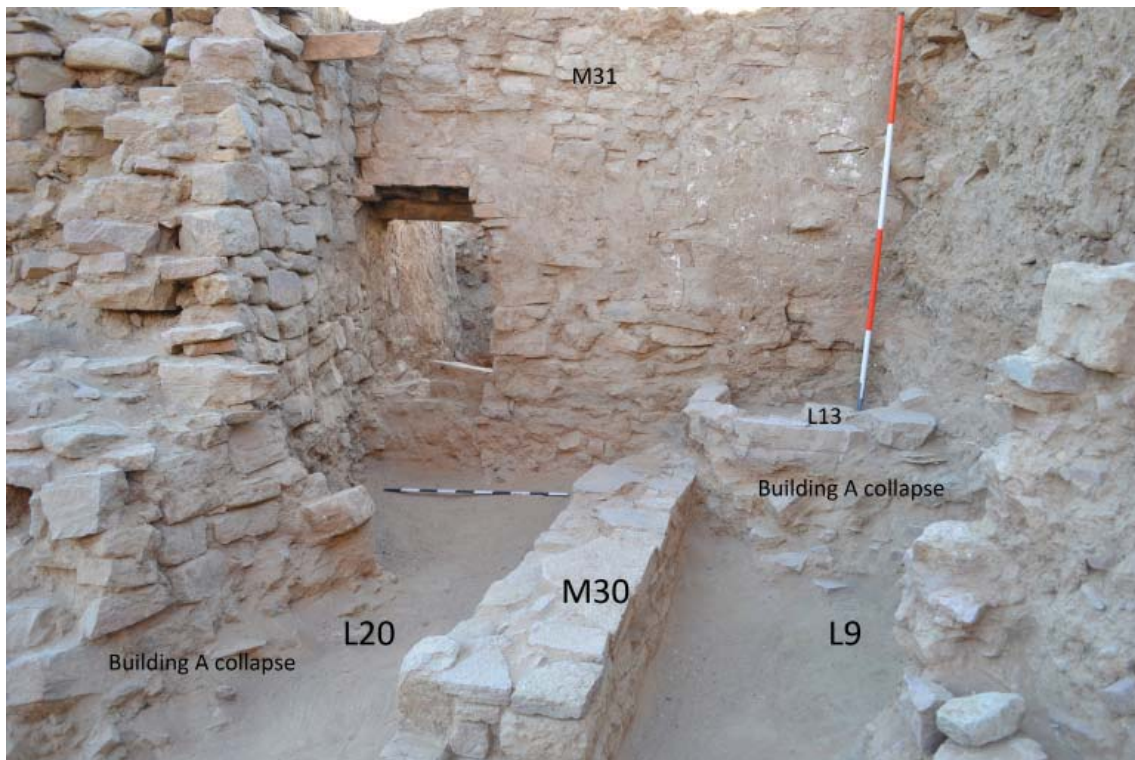


Fig. 13. After the removal of L12 Islamic floor, M30 was cleared: on the right L13 built above the level of collapse on L9; on the left M16 built above the level of collapse of Building A in L20



Fig. 14. L9, southern room of Building A

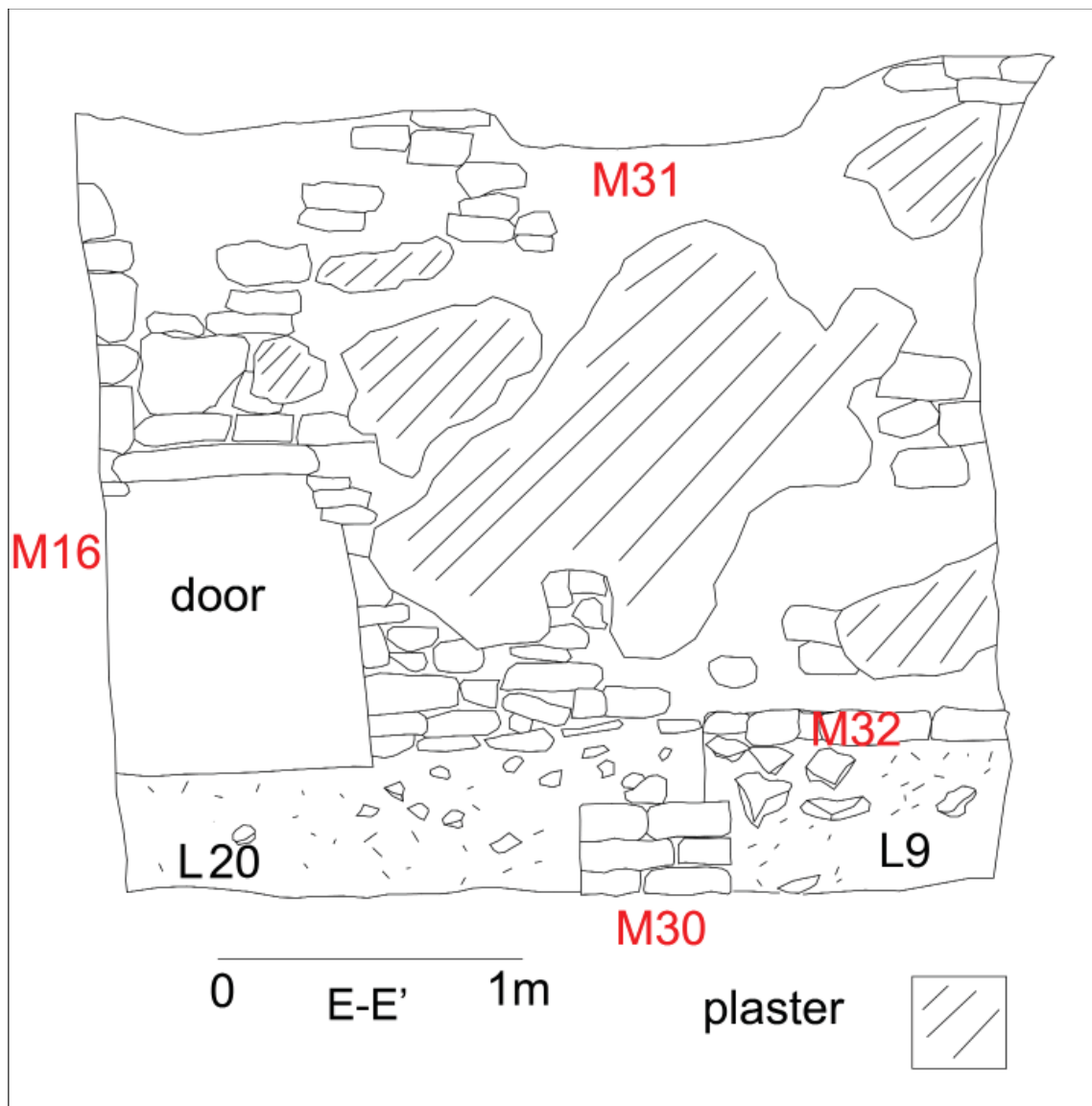


Fig. 15. M31 section, view from west



Fig. 16. Building A. View from south-east



Fig. 17. Early Islamic reoccupation of Building A (7th-15th cent. AD). View from west

Room L15

The excavation also took place to the east of M31, in order to define new structures related to Building A. Proceeding to the east we recognized a new room, L15, connected with L12 (**Fig. 18**). From L12 the door in M31 led to this new room bordered by M31 to the west and M16 to the north. The eastern and southern limits were not found. Room L15, measuring 3.3 x 2.80 m, possessed a pavement built of compacted earth and undressed stones at the same height as L12 on the other side of M31 (**Fig. 19**). Almost no pottery was found.

The distinctive white plaster found on the western façade of M31 was also seen in L15, where both M31 and M16 are painted in red, with small sections in yellow (**Fig. 20**). The very bad condition of the painting's preservation suggests the antiquity of L12 and L15. Red or white painted walls from the core of the Medieval village dating back to the 16th-18th cent. show much better preservation. The painting was done on a preparatory of plaster, nowadays grey in color, applied directly to the stone façade.

Room L15 was likewise covered by a collapse of mud-bricks, related to the upper courses of M31. In the south-west corner of the locus, directly above the pavement, we found many fragments of stone slabs 2.5 cm thick, which came from the roof's collapse (**Fig. 21**).

These Islamic structures L12, L15, M16, M31 and L13, are related to a period later than the construction of M11. They can perhaps be dated to an Early Islamic I period, already described in 2010 (**Table 1**).

The distinctiveness of M31 and M16, painted in different colors, together with the presence of a roofing system of perfectly cut stone slabs suggests that L12 and L15 must have been part of a wealthy construction of early Islamic tradition. None of the houses of the Medieval village of Hayy ad-Dira' (16th-18th cent.) showed such a roofing system.



Fig. 18. L15. Eastern extension of the trench



Fig. 19. On the left, the southern section of the collapse related to M31



Fig. 20. Detail of wall M16's red painted façade



Fig. 21. L19, early (first) Islamic occupation after a hiatus marked by a level of aeolian sand already encountered in L9 (Level 11, 2010 excavation). On the left, roofing slabs from M31, which collapsed above floor L15

Room L19

In order to define the structures related to Building A, we removed L15 (related to L12), which was built directly on an earlier Islamic structure, L19 (1 x 0.60 m), a small *locus* bordered by two small and irregular walls composed of just one course of blocks (**Fig. 21**). L19, probably a fireplace, was built on Level 11, a level of aeolian sand already encountered in 2010, itself covering the level of collapse of Building A in L9.

Pre-Islamic structures: Building A

Having removed L15 and Level 11, we reached the Level 9 surface, the floor level of Building A (**Fig. 22**). We were able to clear the foundations of M31. They were built on top of M30, and as a foundation trench disturbed Level 11 (**Fig. 21**). Subsequently the room related to M31, L15, was built above L19 and Level 11.



Fig. 22. L15, Building A floor (Level 9), followed by a level of aeolian sand (Level 11) on which was built L19, also followed by Level 13 (L15 late floor)

Although it was not possible to discover new walls related to Building A, we were able to identify its pavement (Level 9) all along the surface covered by L15, at a height of 602.10 m, 50 cm lower than the L9 floor west of M31 and at the same height as L8. Level 9, of hard compact earth mixed with pre-Islamic pottery, was easily recognizable thanks to the compact soil and the presence of pre-Islamic potsherds.

M30 was built directly above L9, but on account of its bad preservation it is not clear whether it was completely dismantled or if it was interrupted by a door.

The total extension of Building A-related structures (walls and floors) in its north/east-south/west axis is 13 m (**-24**).

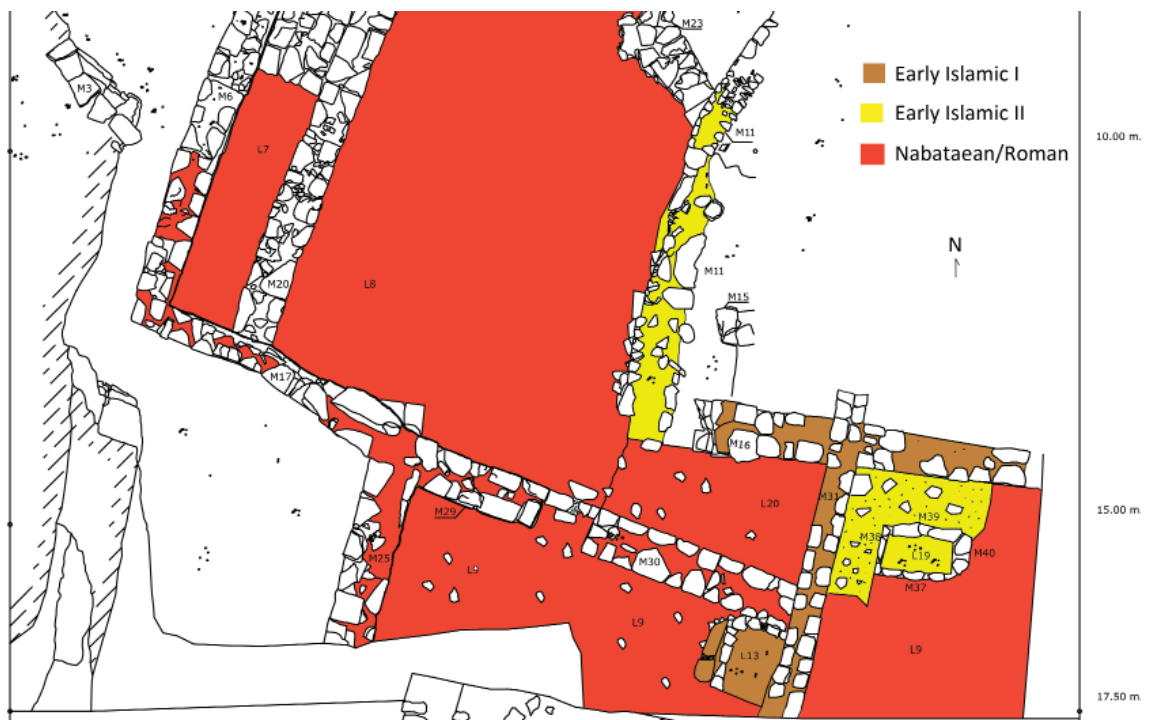


Fig. 23. Plan of the eastern extension of Trench 1



Fig. 24. East-west profile of Trench 1

The extension of Trench 1 in a northerly direction

The excavation carried out to the north (N6 Ia, O6 IVd of grid map) provides new elements related to different periods of time:

1. An important Islamic phase was recognized when excavating the re-occupations of Building A structures, without any break between each level, along the north half of the trench. It was only partly seen in the 2010 season (Level 6 in *loci* 10a-b), and it is now clearly visible and testifies to a first and much poorer phase of occupation of the ancient village (**Fig. 25**);

2. Some new architectural elements related to Building A were brought to light (above all floors and only one wall – M52/M7 north). It now appears to be an impressive private, residential structure related to public activities or a high-ranking person;

3. Moreover, the excavation revealed that Building A was not the first architectural structure to be built along the eastern flank of the hill. A more ancient wall, M44, built directly above the rocky surface, was discovered under the foundation level of the late Nabataean/Roman Building A (**Fig. 26**);

4. Finally, the excavation revealed that the rocky flanks of the hill had been well dressed in order to create a large and almost perfectly flat floor, on which structures earlier than Building A were erected (M44).

The Excavations in Locus 10a-b

After the 2010 season, the expedition identified a first re-occupation phase of Building A (Early Islamic II), revealed by a semicircular wall (M7) connected to M22, both using stone blocks coming from Building A (**Fig. 27**). During this period wall M11 was also built above the collapse of Building A. We proposed also that M8, M27 and M28 which bordered two small rooms, level L10a-b, paved with compact hardened earth mixed with early Islamic pottery, were related to an Early Islamic I phase.⁴ All these structures were covered only by Level 3, a huge amount of discarded small stones originating from the construction of the Medieval village and, probably, of the Mârid Castle.

After the 2011 season, it was shown (see below) that all these architectural features (M11, M7, M22, M8, M27, M28 and L10a-b) were almost contemporary and related to the

⁴ Loreto 2014: figs. 66-69.



Fig. 25. Trench 1. View from north-west. In the foreground the early Islamic reoccupation of Building A



Fig. 26. Trench 1, view from west. Wall M44 built on the rocky flank of the hill and covered by Building A foundation (Level 10)

same occupation period: an Early Islamic II phase, followed by an Early Islamic I phase during which walls M16 and M31 were built against M11; finally, a Middle Islamic III phase related to the huge amount of discarded stones was attested throughout the trench and covered all the previous structures (**Table 1**).



Fig. 27. North half of trench 1 after 2010 season.

Floor L10a-b, still visible, belonged to Level 6, the first Islamic occupation above Building A. L10a-b was covered by Level 3.

We proceeded by digging inside L10 a-b and north of M8, in order to reach the pre-Islamic levels and to clarify if M7 could have been a well. Having removed floor L10a-b (Level 6), after only 20 cm, we were able to recognize the floor level of Building A (Level 9). It was visible thanks to its hard, compact character and the presence of pre-Islamic (Nabataean/ Roman) sherds. Level 9 was preserved all along surface L10b and partly along surface L10a : here, two later fireplaces were built using well dressed stone blocks and coarse rocky fragments in the north-eastern (L16) and north-western (L17) corners of floor L10a (**Fig. 28**). These fireplaces were built after the removal of Level 9, and in fact only rare pre-Islamic sherds were collected in them.

Feature L16, bordered by walls M50 and M51, showed just one course of re-used well dressed stone blocks coming from previous structures. It was a small fireplace (80 x 60 cm), built using M8 and M28 as its northern and western limit. Very few fragments of Islamic coarse ware were found. Archeofaunal remains will be studied during next season.

L17, limited by semicircular wall M49, was built using huge irregular stone blocks looted from the flank of the hill and contained only a few sherds of Islamic coarse ware mixed with rare pre-Islamic pottery (Nabataean). Also this feature's archeofaunal remains will be analyzed in later seasons.

Thanks to a sounding opened during the last seasons in the middle of Building A open court (L8), it was ascertained that Building A was built on a 30 cm thick layer of compacted earth and ceramic sherds (Level 9). This level was also built above a huge foundation level (Level 10) made of thousands of Nabataean sherds mixed with small scrapped stone fragments. During the 2010 sounding in the building's courtyard, we reached bedrock, which consisted of a well cut surface. Our idea was that a huge amount of pottery had been deposited to create a uniform foundation level between the natural irregular surface of the rocky slope and well-cut anthropic floors.

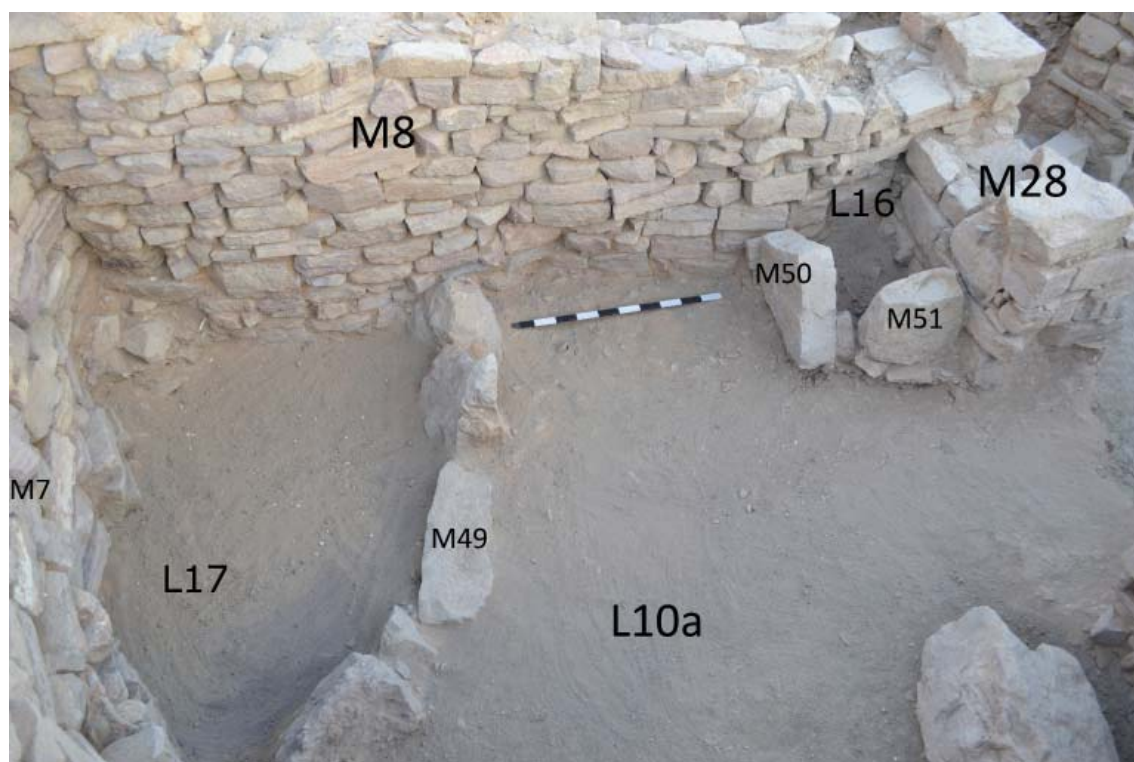


Fig. 28. Fireplaces in L10a

The foundation of Building A (level 10)

During this season we removed the floor level of Building A and the foundation level in a northerly direction, between the Islamic structure built above (Loci L10b, L14 and L18). We discovered that the foundation level of Building A was placed above a well-hewn bedrock surface encountered almost everywhere.

The difference in height between the cut rock to the north and that to the south (2010 sounding in L8), at both extremities of a distance of 10 m, is of only 10 cm. All the exposed rock hill surface showed a perfectly flat floor. This left us with the question of why a foundation level of thousands of sherds was required to level a surface that was already flat in the first place. The answer came from the exposure of wall M44, built just above the rock surface and covered by the foundation level of Building A (Level 10) (**Figs. 29-30**). M44, located in the north-east corner of the trench, covered by Level 9 and Level 10 (Building A foundation and ground floor) was different from all the previous walls related to both Islamic structures and Building A (**Figs. 31-34**). M44 did not show any re-used blocks coming from Building A as all Islamic structures did. It was clearly built before Building A.

It is proof of a more ancient early Nabataean or pre-Nabataean level at Dûmat al-Jandal, probably related to whoever cut the rock hill surface. According to M44 we could suppose that the huge amounts of Nabataean pottery used to create the Building A foundations were laid down not to create a flat level over the irregular surface of the rock but on account of the presence of one and, in all probability, several more ancient walls such as M44 (**Figs. 35-38**).

After having exposed wall M44, excavation proceeded towards the east: a new locus, L18, was named after the discovery of M45. Instead of M44, completely covered by Level 10 and Level 9, M45 was covered by Level 3 (**Fig. 39**). Proceeding from M44 to the east, just along the M45's western façade, Level 10 vanished, or was no longer visible due to the depth of Level 3 (**Fig. 40**). For this reason it was not possible to state whether M45 is contemporary to M44. M45 was built just above bedrock and revealed a very irregular masonry made of small irregular courses of stones and at least one re-employed well dressed stone block. In all likelihood wall M45 is related to an early Islamic occupation, although it is not possible to state if M45 was built in an empty location, or re-used Building A materials.

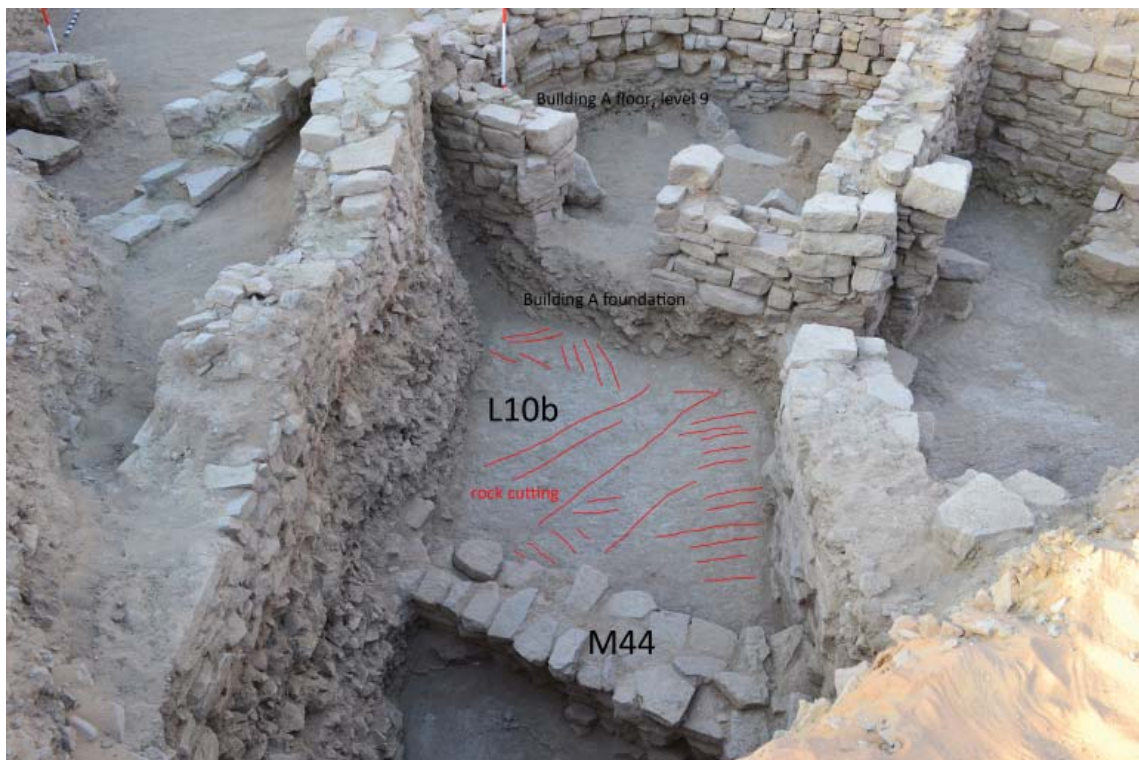


Fig. 29. The well cut surface of the rock hill. The Islamic structures were built above the floor level of Building A (Level 9). M44 was built on the bedrock and was covered by the foundation level of Building A

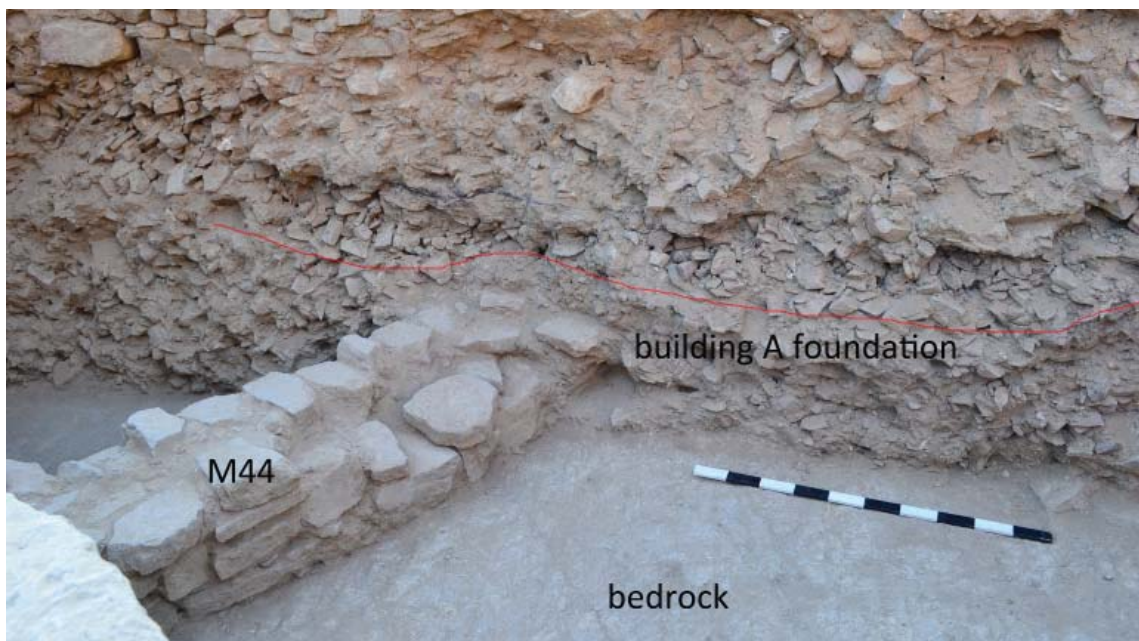


Fig. 30. Wall M44 built on the well-cut bedrock and covered by the foundation Level of Building A

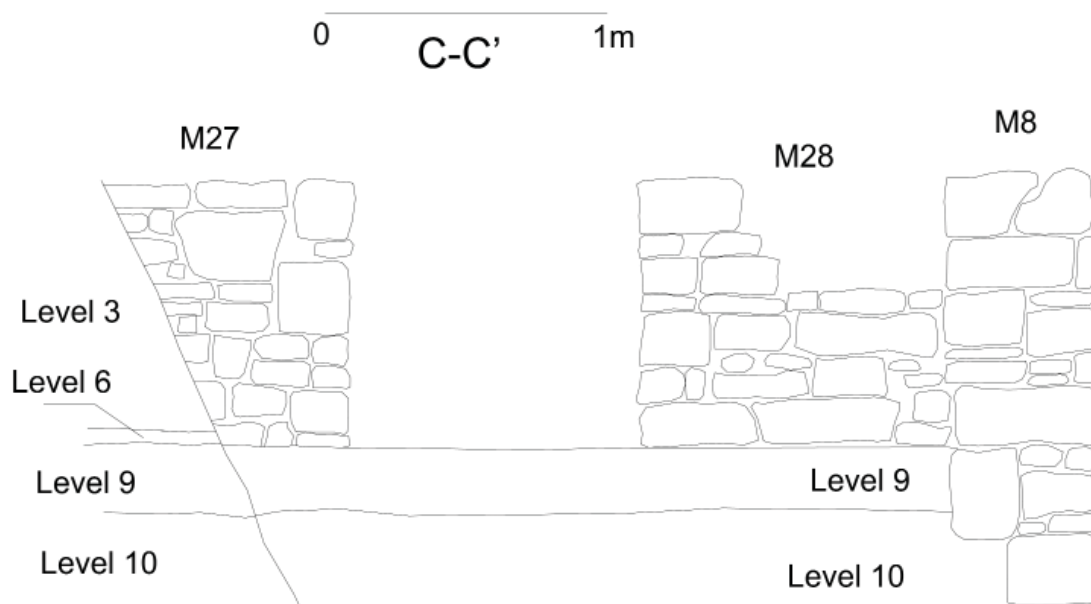


Fig. 31. L10a-b, a re-occupation of Building A ground floor (Level 9). Level 3: discarded stone fragments from the construction of the ancient village; Level 6: early Islamic occupation related to L10a fireplaces; Level 9: Building A floor; Level 10: Building A foundation above well cut rock surface. M8, M27, M28: early Islamic structures (C-C')



Fig. 32. Detail of the bedrock in L10b



Fig. 33. L10a entrance, view from east

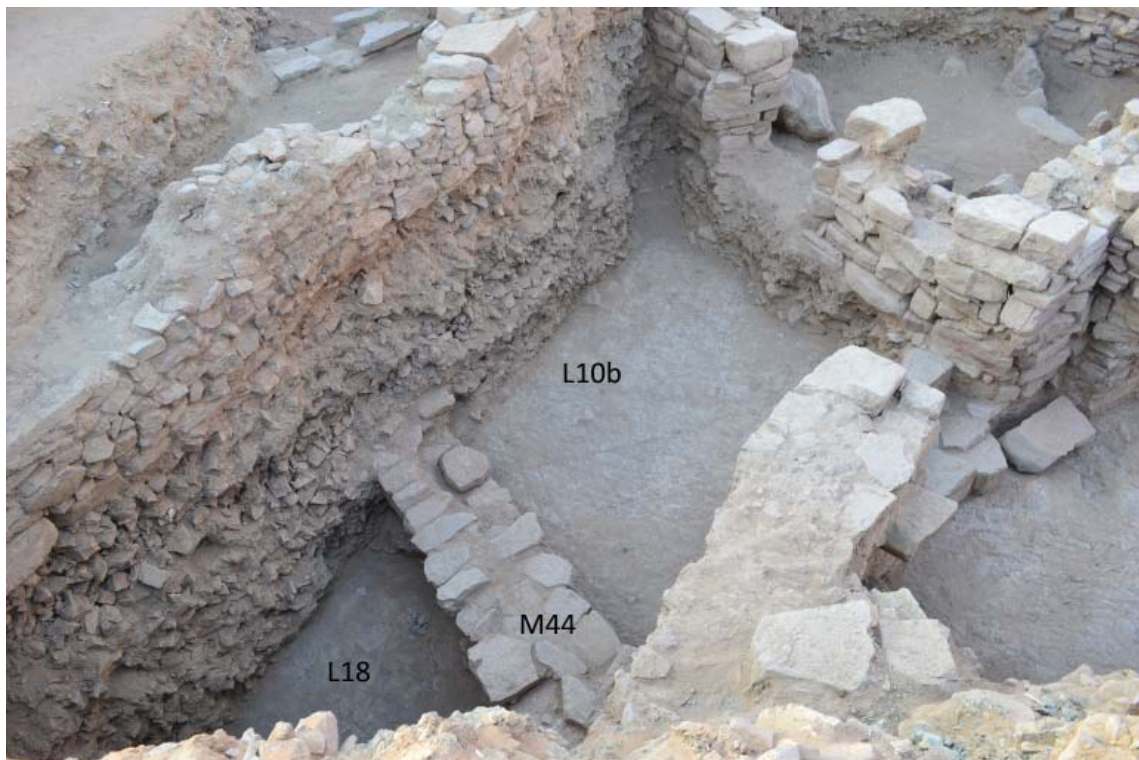


Fig. 34. Detail of wall M44's construction technique



Fig. 35. Nabataean pottery from Level 9 in L10b



Fig. 36. Nabataean pottery from Level 9 in L10b (reverse)



Fig. 37. Nabataean pottery from Level 10 in L10b



Fig. 38. Nabataean pottery from Level 10 in L10b (reverse)

Excavation north of M8

Proceeding north of M8, new sections of Building A, or Late Nabataean contemporary structures were cleared, together with new early Islamic evidence (**Fig. 41**).

As mentioned above, Level 9 (Building A floor) was located all along L10a-b, with no preserved stone walls relating to it. North of M8, the state of preservation of Building A is much more flimsy. Only a little evidence was preserved in the north-western corner of the trench: M7north, M36 and a few floor sections.

Having clarified that M7 was not a well, we proceeded north of M8 and saw that the north section of M7 is a different wall, built with the same construction technique as all Building A walls (**Fig. 42**). M52/M7 north, moreover, was built just above Level 9 and is perfectly parallel. M8, an early Islamic structure, was built against M52/M7north, as well as the semicircular wall M7.



Fig. 39. M45, view from west

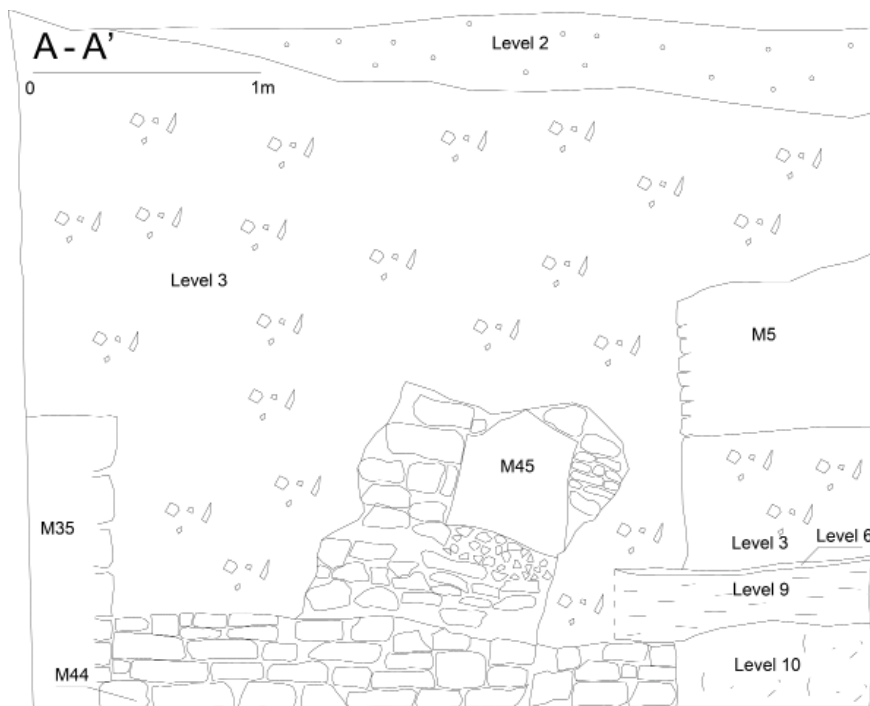


Fig. 40. Eastern section of L18 (A-A')

A second wall related to Building A, M36, was also preserved. Its preserved surface ran east-west and stood above Level 9. Only a few traces of Building A floor are preserved (**Fig. 2**). The whole surface between M8 and the trench's northern limit (locus L14) was covered by Level 3. In L14 Level 3 was disturbed just above the hill's well-cut rocky flank. L1 is bordered by an Early Islamic structure built partly above Building A floor (M8 and M35), in part directly on the rock (M34). This means that probably all the walls and pavement relating to Building A were removed before the construction of Early Islamic structures (**Fig. 43**). Considering the various huge stone blocks fallen from the top of the hill and found inside L10a, Building A walls must have been in part destroyed by their collapse. Perhaps M7 was built with a semicircular plan and against M52 in order to retain discarded materials coming from the hill and to protect L10 itself. The total extent of Building A is 13 m by 17.50 m, although it is difficult to know if M52 and M36 relate to the same building or to another



Fig. 41. Building A or pre-Islamic related to structures north of M8: M52/M7north, M36

contemporary structure (**Fig. 44**). Since the work is still in progress it can be surmised that M52 and M36 are related to the same period.

The early-Islamic occupation of Building A is well attested by the construction of M7, M8, M35, M27, M28 and M34 (**Figs. 41-43**), which bordered a small living quarter. Its main rooms were L14, L10a and L10b (**Fig. 45**). All of them were connected by two entrances: the first between M27 and M28; the second between M8 and M35 (**Figs. 43, 45**). All of these early-Islamic structures were contemporary: the construction techniques are the same, although they were built above different foundations.

M34 was the only wall built directly above hill's bedrock (**Figs. 46-47**), probably when Building A floor was obliterated or removed. Clearly, M34 was built re-using more ancient materials, such as the monolithic triangular lintel placed above a small entrance (80 x 40 cm) and various well-cut stone blocks used as foundations above bedrock (**Figs. 47-48**). Its western limits were built against the rock colluvium, hence it was not connected to M52.

M8 and M35 were built partly above bedrock (northern façade, **Fig. 46**) and partly above Level 9 (southern façade, which was built above Building A floor level, **Figs. 31, 33, 49**). They constitute the northern limit of L10a-b, as well as the southern one of L14. The presence of a two stepped staircase could be explained by the presence of Building A ground floor in L10a-b, higher than the bedrock in L14, as well as by the fact that M8 and M35 were built on two different surfaces: one higher (Building A floor in L10a-b) than the other (on the bedrock in L14).

M27 and M28 were entirely built above Level 9 (**Fig. 50**). Although M27 was contemporary to 7, they are linked, M27 being built against M8. A later construction probably also related to the L16 fireplace. The presence of a small buttress in M8 (M8b, located 0.80 m from the eastern limit of M8) may indicate the presence of a low roofing system north of M8.

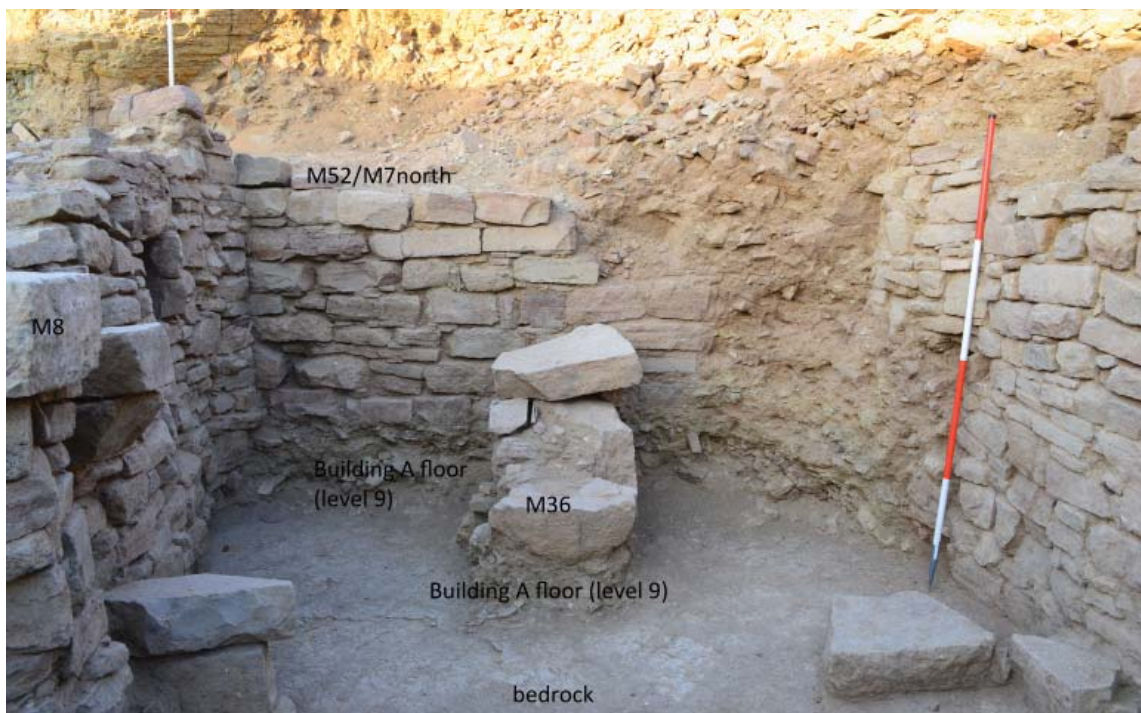


Fig. 42. M52/M7north and M36 built above Building A floor (Level 9)

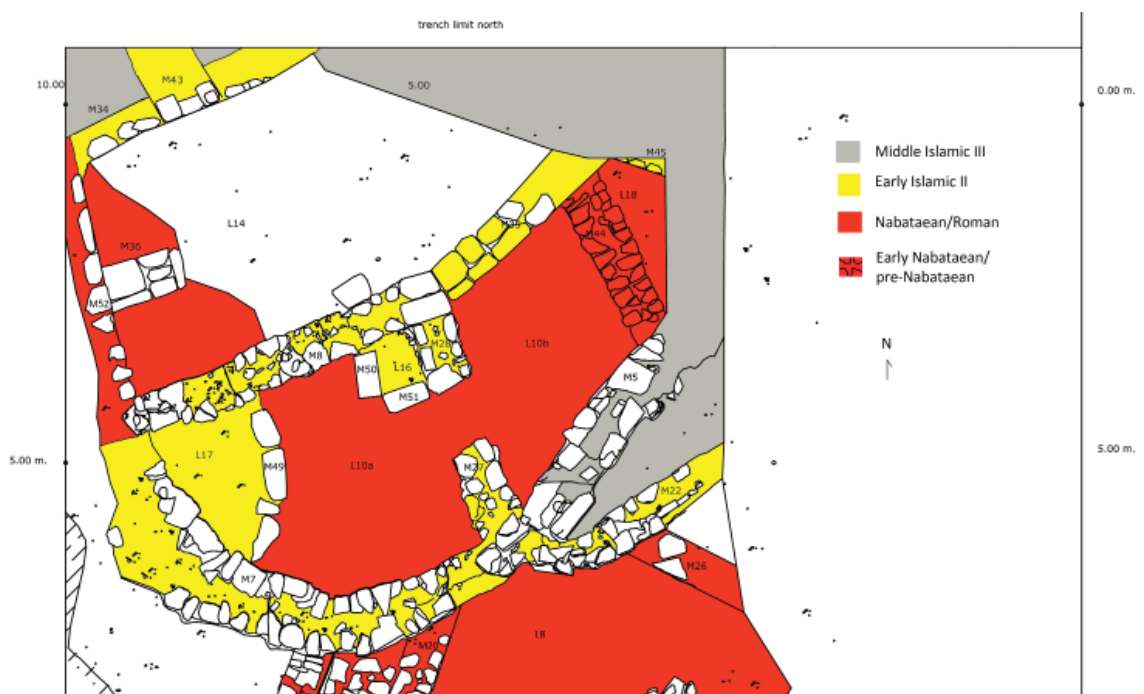


Fig. 43. Detail of the general Trench 1 excavation plan: northern enlargement of the trench

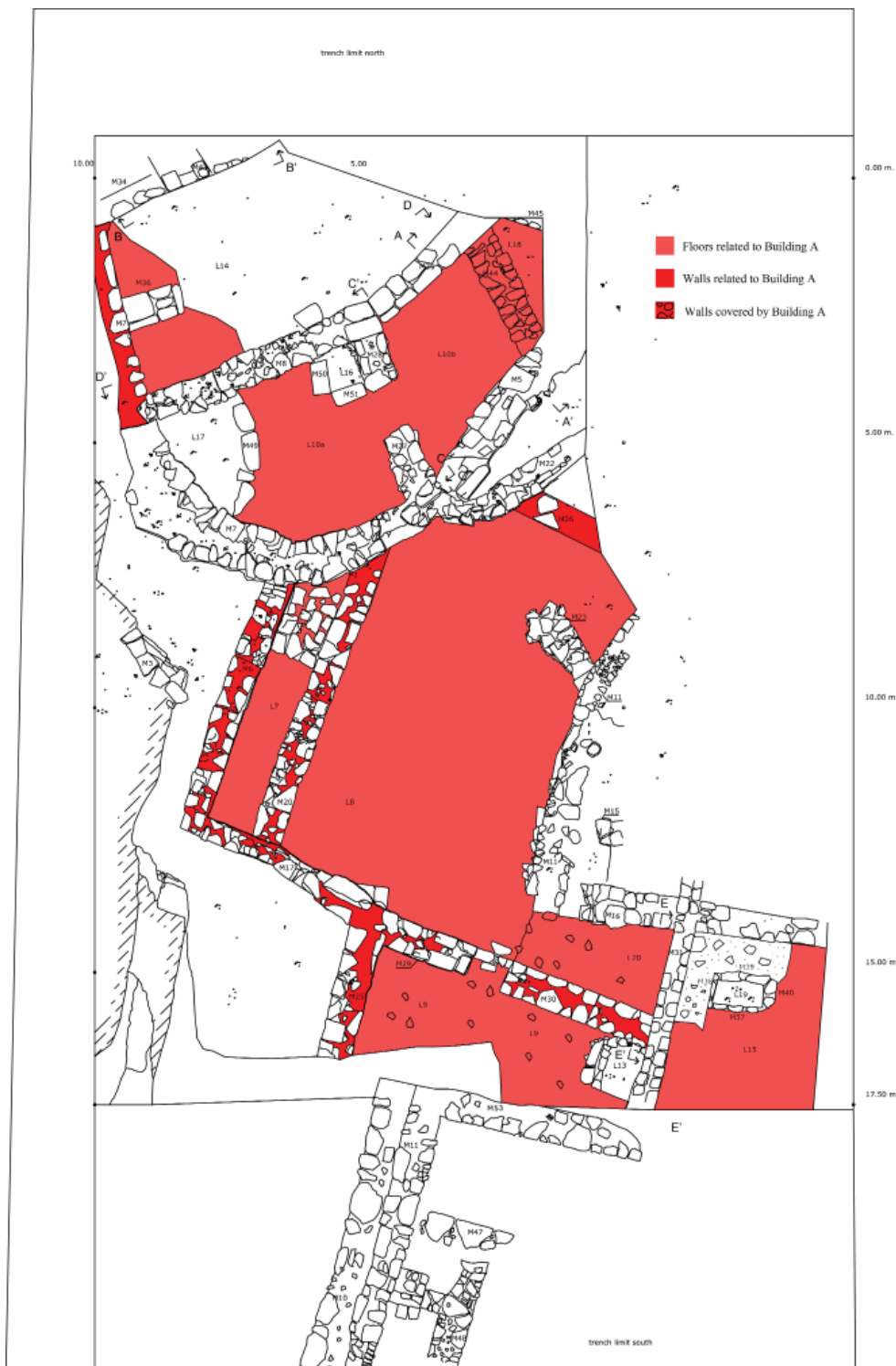


Fig. 44. Trench 1. In red: Building A walls and floors. In the north-eastern corner: M44, covered by Building A floor



Fig. 45. Early-Islamic structures north of Building A



Fig. 46. Northern section of Trench 1. Early-Islamic re-occupation



Fig. 47. M34, built directly above the bedrock and covered by Level 3. View from south-east

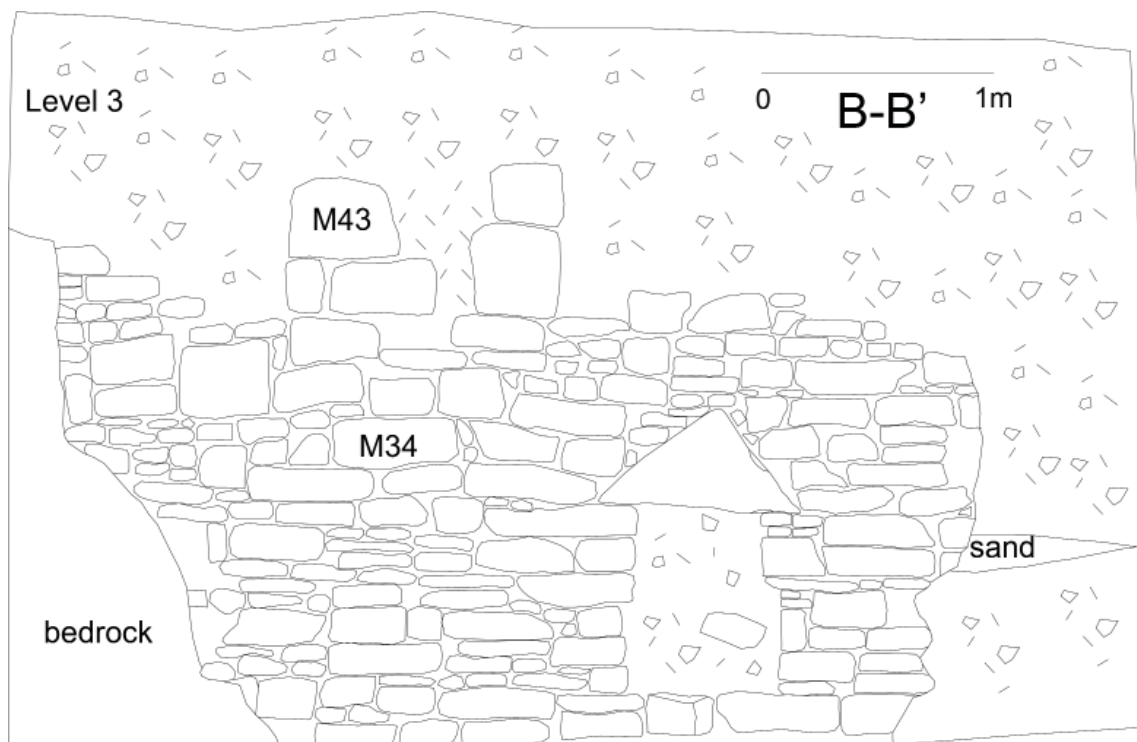


Fig. 48. M34 section (B-B')

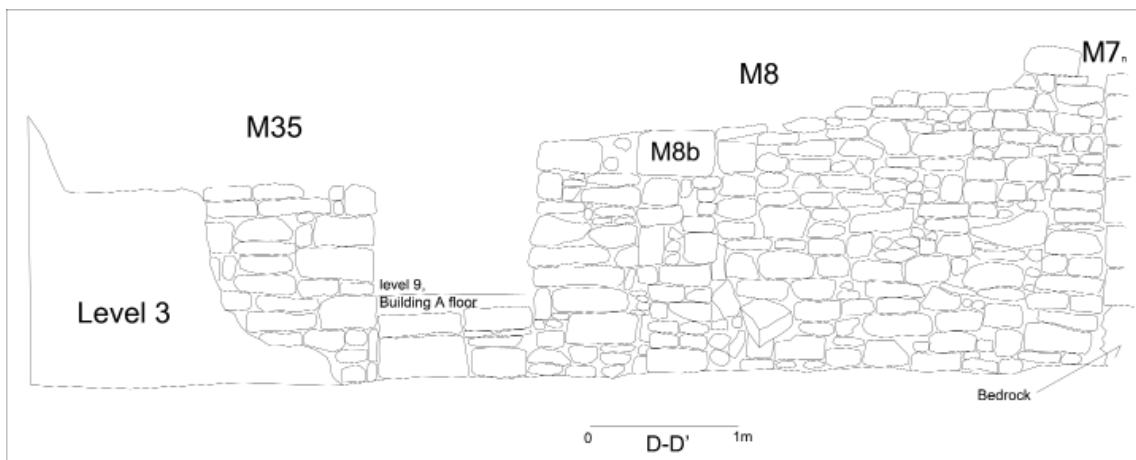


Fig. 49. Northern section of M8-M35



Fig. 50. Early-Islamic re-occupation of Building A. In view of the height of the trench - Building A floors are 5 m beneath the surface, we started to enlarge the trench in a southerly direction during the last days of fieldwork, in order to reach the Nabataean levels as soon as possible during the next campaign (Fig. 44). New Islamic structures (M47, M48 and M53) are to be recorded then.

The excavations in trench 2

Aims

The opening of a new excavation trench in sector A was part of site reconnaissance planned since 2009. While enlarging an extensive trench (trench 1) year by year in the main excavation area, our second aim was to explore the Medieval village by test probes.

Trench 2 was the first test probe opened at a distance from our initial trench (**Figs. 1-2, 7, 51**). A number of test soundings will allow us to clarify the geomorphological aspects of the site's core and to identify more ancient levels related to pre-Islamic periods in the vicinity of the Mârid Castle.

Geomorphological aspects

Trench 2 was opened in quadrant P3-2/P4-1, oriented north-south. Its dimensions were 3 x 6 m; it is located 60 m north-east of Trench 1, in the middle of an open square area delimited by walls related to the last phase of occupation at Dûmat al-Jandal (**Fig. 51**). The excavation was carried out between October 26th and October 30th.

This location was chosen because of time constraints during the season. The area, flat and free of modern structures, was easy to excavate and provided preliminary basic information on the morphology of the area.

Work in this area enabled outlining the slope of the hill on which the Mârid Castle stands and on which the pre-Islamic structure was built (**Fig. 52**). In Trench 2 bedrock appeared 1.60 m under the surface, 4 m lower than that identified in Trench 1 and it appeared to be naturally irregularly uncut, contrary to what was found under Building A. Except the high plateau on which the Mârid Castle was built, it seems that the hill's slope descended regularly from south to north without any drastic variation. Around and on the top of the hill, the architectural structures had to adapt to the slope of the bedrock.



Fig. 51. Trench 2 located within the north-eastern limit of Hayy ad-Dira' village, view from south

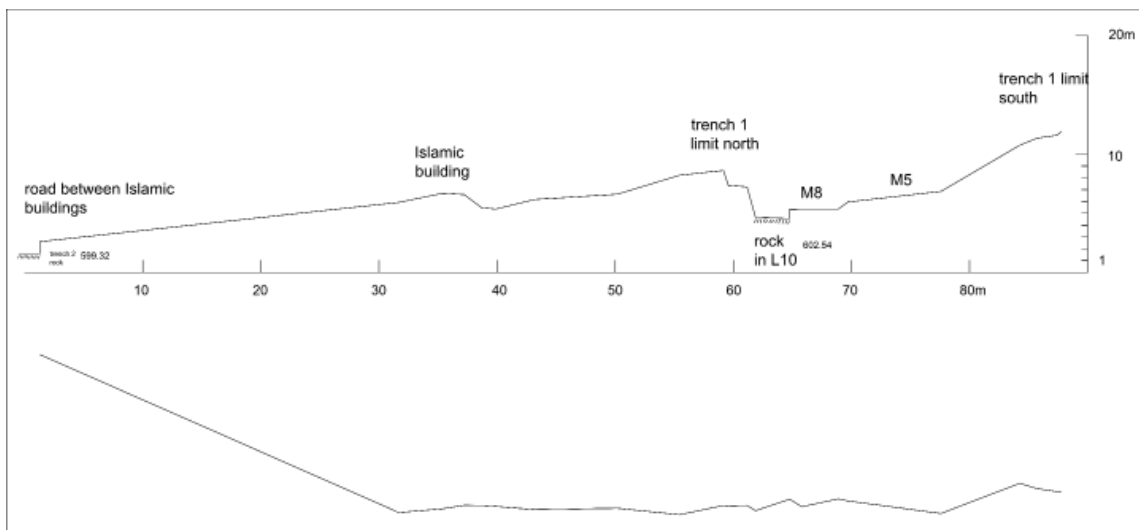


Fig. 52. North-south profile between trench 1 and trench 2

The stratigraphy

Digging revealed a sequence of different archaeological layers and at least two occupation phases related to walls M41 and M46 (**Fig. 53**), all of which are earlier than the most recent agricultural activities (**Figs. 54-55**):

Level 1 is the most recent one and is linked to agricultural activities in the village during the 18th-19th centuries. On the surface, some channels partially delimited by stones are still visible, outlining a series of small fields. A small quantity of pottery was obtained, showing Islamic coarse ware related to the last occupational phase recorded in Trench 1;

Level 2b is a small level of charcoal which contained neither bone nor pottery sherds. It was recorded only in the middle of the north section of the trench;

Level 2 is an aeolian sand level of abandonment on the edge of the space bordered by M41 and the northern trench bulk. Some Islamic coarse sherds came from this level. Level 2 covers a mud floor limited by wall M41, built above a level of small irregular stones (Level 5);

Level 3 is a tiny layer of compact earth evidenced only south of M41. It covers Level 4 and seems to be the external walking surface of the M41 structure. Neither pottery nor bones were found in Level 3;

Level 4 is a small level of discarded rock only 20 cm thick, which extended south of M41;

Level 5 is a huge level of small irregular stones very similar to Level 3a in Trench 1. It revealed a number of bones and Islamic coarse ware;

Level 6 is the final level composed by the bedrock itself and a stratum of earth mixed with few pre-Islamic sherds of the type recognized in Trench 1, Level 10 (**Fig. 56**). Level 6 is also related to M46, a one course wall identified at the south-western corner of the trench. The wall was built just above bedrock. The bedrock was not leveled at all, unlike that of Trench 1. Furthermore, in Trench 2 bedrock is 3 meters lower than the one in Trench 1.

A small quantity of worked tools came from Level 6 (a millstone, grinding stone and pestle) (**Fig. 57**).

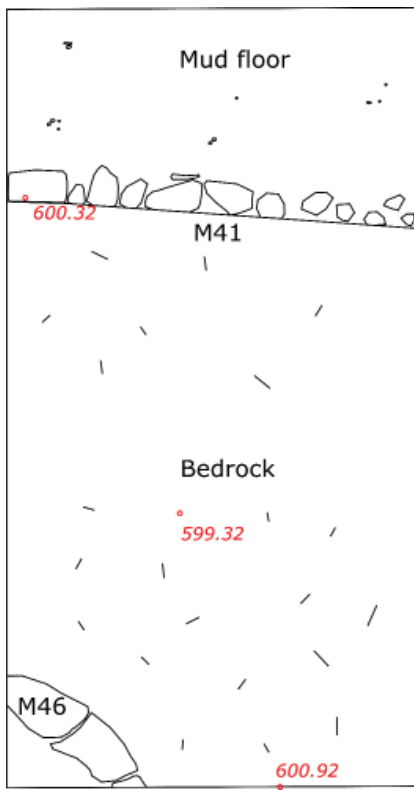


Fig. 53. Trench 2. Plan of the excavated area



Fig. 54. Stratigraphy in Trench 2. View from south-west



Fig. 55. Southern limit of Trench 2. M46 built on the bedrock



Fig. 56. Pre-Islamic pottery items from Trench 2, Level 6



Fig. 57. Millstone and pestle from Trench 2, Level 6

Conclusions

Excavation of Trench 1 provided preliminary indications about the village's most ancient occupation. Having reached bedrock, it was possible to recognize the more ancient structures still *in situ*.

Actually, the earliest evidence of occupation was the well-cut rock surface on which the pre-Islamic and Islamic remains are built. As mentioned before, the rock surface was levelled all along the trench's surface, with a minimum difference of only 10 cm between the north and the south limits, at a distance of 10 meters. It is an impressive example of high standard construction work used to prepare a huge surface on which to build (**Fig. 45**).

The first architectural evidence is M44, a single wall directly built above the rock and covered by the foundation level of Building A. No material dating back to pre-Nabataean periods was found. We can only hypothesize that M44 could belong to an early Nabataean or pre-Nabataean phase of occupation, earlier than the construction of Building A and related to the rock-cutting process of the slope (**Figs. 39-40**).

The presence of M44, together with the irregularity of the rocky colluvium and, in all probability, the presence of other earlier walls, is the reason why a huge amount of pottery sherds and small stone fragments were used to create a second homogenous level (Level 10, followed by Level 9) above which Building A, a first impressive elite and labour-intensive structure, was built (**Figs. 33, 50**). Thanks to the large number of Nabataean sherds found this year in Level 9, in L10a-b, it is possible to confirm what we proposed during the 2010 campaign: Building A testifies to a Late Nabataean and Roman phase of occupation of ancient Adummatu.

As we have seen after 2010 campaign and from the new evidence, Building A was re-used several times: M21 was built above floor L8 (Level 9);⁵ floors L10a-b (Level 9) were re-occupied by M7, M27, M28, M8 and M35 (**Figs. 26, 43**); floor L9 (Level 9) was re-used as features L15, L19, M37, M38, M39 and M40 (**Figs. 21-23**). All these structures were built above the floor levels of Building A and can be dated to an Earlier Islamic II phase of occupation, together with the Islamic structures built above the levels of collapse of Building A walls such as M11.⁶ This particular wall was built directly above the level of collapse of Building A, along its eastern limit. M11 runs from north to south and goes up to a second hill dominating

⁵ Loreto 2014: fig. 69.

⁶ *Ibid.*

the ancient village. It is a fortification wall very similar to the one which runs, in a north-south direction, from the Mârid Castle to the Umar bin al-Khattab mosque. It could be part of the al-Qusayr Castle, probably built a few meters south-east of Qasr Mârid (**Figs. 58-59**).⁷

An Early Islamic II phase is recognizable in the south-east corner of Trench 1. This period is attested by the construction of rich structures related to: M31 and M16, both painted in red, white or yellow with a unique roofing system made of thin stone slabs; L12 and L15 and their related floors; and L13, a small fireplace (**Figs. 8, 10, 19**).

All the architectural structures related to pre-Islamic and Early Islamic levels were covered by the widespread Level 3. As proposed following the 2010 campaign, this level can be attributed to the Middle Islamic III period.

All the latest structures: M10, L6, etc. dug in 2010 will be looked at again during the next campaign. The trench's southern extension has yielded new Islamic structures, as well as new sections of the already known walls M11 and M10 (**Fig. 44**).

7. Charloux 2012; Charloux, al-Malki *et al.* 2014.



Fig. 58. M11 looking the south and hypothetical location of al-Qusayr Castle



Fig. 59. On the left, the hypothetical location of al-Qusayr with M11 fortification; on the right the Mârid Castle's fortification

Archaeological Artifacts from Sector A

The 2009-2011 seasons preliminary catalogue

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Various objects have been collected during three excavation campaigns conducted in Sector A (Trenches 1 and 2);¹ some of the particularly interesting ones provide significant evidence of the activities carried out in Dûmat al-Jandal in the past.

The present paper intends to give a preliminary classification of artifacts, arranged by material categories. A brief introduction to each category precedes a list of finds. Each item is classified using the excavation number. Only the most representative items are shown in figures or plates. In the near future further studies will be conducted by specialists in each category of materials in order to get a clearer picture of their function and to give further insight on Arabian trade in different periods.

According to the various origins of the artifacts, a list of the excavated levels and their description will follow.

1. More than 90% of the objects come from Trench 1. See Loreto Sector A, in this volume: 101-145.

Level	Type of deposit	Period/Date
1	Surface	19 th century
2	Aeolian sand above Building L6	Late Islamic
3a	Discarded stones	Middle Islamic
3b	Discarded stones mixed with earth	Middle Islamic
4	Discarded Stones	Middle Islamic
L6 collapse	Building collapse	Middle Islamic
L6 building	Occupation deposit	Middle Islamic
M2, M10, M14	M2, M10, M14 removal. L6 perimetral walls	Middle Islamic
11	Aeolian sand on locus 9 (Building A)	Early Islamic
6	Locus 10 occupation	Early Islamic
7	Building A collapse	Early Islamic
8	Brown earth mixed with pottery. Occupation deposit above Building A floor	Roman/Byzantine
5	Filling deposit between Building A western walls and rock hill	Late Nabataean
9	Compacted earth mixed with pottery. Building A floor	Nabataean
10	Discarded stones mixed with pottery	Nabataean

Table 1. Description of the levels excavated in sector A, arranged in chronological order

Main catalogue categories and further subdivision²

1. Glass

- 1.1 Glass vessels
- 1.2 Vitreous paste jewelry

2. Metal

- 2.1 Bronze
- 2.2 Iron

3. Stone

- 3.1 Alabaster
- 3.2 Gemstone
- 3.3 Limestone/sandstone
- 3.4 Steatite

4. Terracotta

5. Textiles

6. Others

² Arranged in alphabetical order. N.B.: Limestone and sandstone items are grouped in the same category due to the fact that the same items (architectural elements, etc.) are made of both types of stone.

1. Glass

1.1 Vessels

Six glass items, probably vessel fragments, were collected from different levels: two from level 3a; one from level 3b; one from the removal of M10; one from level 10, foundation of Building A; one from L14 bedrock floor.

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.09.A.O/19	N6-Ic, level 3a	length: 2.5 cm; maximum width: 1 cm; minimum width: 0.7 cm; thickness: 0.2 cm	fragment	fragment of blue/green glass with an external white patina
DJ.09.A.O/23	N6-Id, level 3a	maximum length: 3.5 cm; maximum width: 2.5 cm; wall 1 cm thick	fragment. Heavily incrustated and badly preserved	fragment of fine glass vessel with thin wall
DJ.10.A.O/12	N6-IIa, M10	maximum height: 3.5 cm; maximum width: 2.5 cm; bottom diameter: 1.5 cm; wall thickness: 0.3 cm	fragment	fragment of glass vessel; flat bottom, rounded wall
DJ.10.A.O/38	N6-IIa, level 10, below L8	maximum height: 3.2 cm; maximum width: 2.1 cm; wall thickness: 0.1 cm	fragment heavily damaged	fragment of thin wall glass vessel. Heavily corroded in antiquity
DJ.11.A.O/13	N6-Ia, L14, bedrock floor	maximum length: 5.6 cm; maximum height: 2.8 cm; wall thickness: 0.8 cm	fragment. Rim and foot complete. Heavily encrusted	fragment of glass vessel: plate. Ring bottom, horizontal walls and rounded rim
DJ.11.A.O/28	N6-Ia, level 3b	maximum length: 1.7 cm; maximum width: 1.6 cm; wall thickness: 0.2 cm	fragment	fragment of green glass vessel (neck?)

Table 2. Preliminary list of glass vessels

1.2 Vitreous paste jewelry

A large amount of typically Islamic vitreous paste bracelets were collected from Trench 1, at least 39 fragments (**Fig. 1**). All these items originated in the Islamic levels (level 2-3a, b): 4 from level 2; 12 from level 3a; 22 from level 3b; 1 from L12 floor.³ The manufacture of all these items followed similar techniques: the shape is rounded, the surface smoothed, one or more continuous incised lines appear on the lateral surface of the body; the most characteristic feature is the polychromatic decoration, made of different color pastes mixed together during the firing process. This is a widely attested class of materials in the whole Arabian Peninsula: from south Arabian context (Barâqish)⁴ to Syrian sites (Bosra).⁵

Five vitreous paste beads were also collected from the Islamic levels (**Fig. 2**): 1 (DJ.09.A.O/33) from level 3a; 2 (DJ.09.A.O/69, DJ.11.A.O/10) from level 3b; 2 (DJ.11.A.O/1, DJ.11.A.O/3) from floor L12. DJ.11.A.O/1 and DJ.11.A.O/3, both from floor L12, present the same characteristics, both shape and decoration are similar; they are, in all probability, beads from the same bracelet or necklace.

³. See Loreto Sector A, in this volume: 103, table 1.

⁴. de Maigret 2009: 55-56.

⁵. Bucci 2010a: 113-124; Bucci 2010b: 223-227. Items dated to between 6th-16th cent.

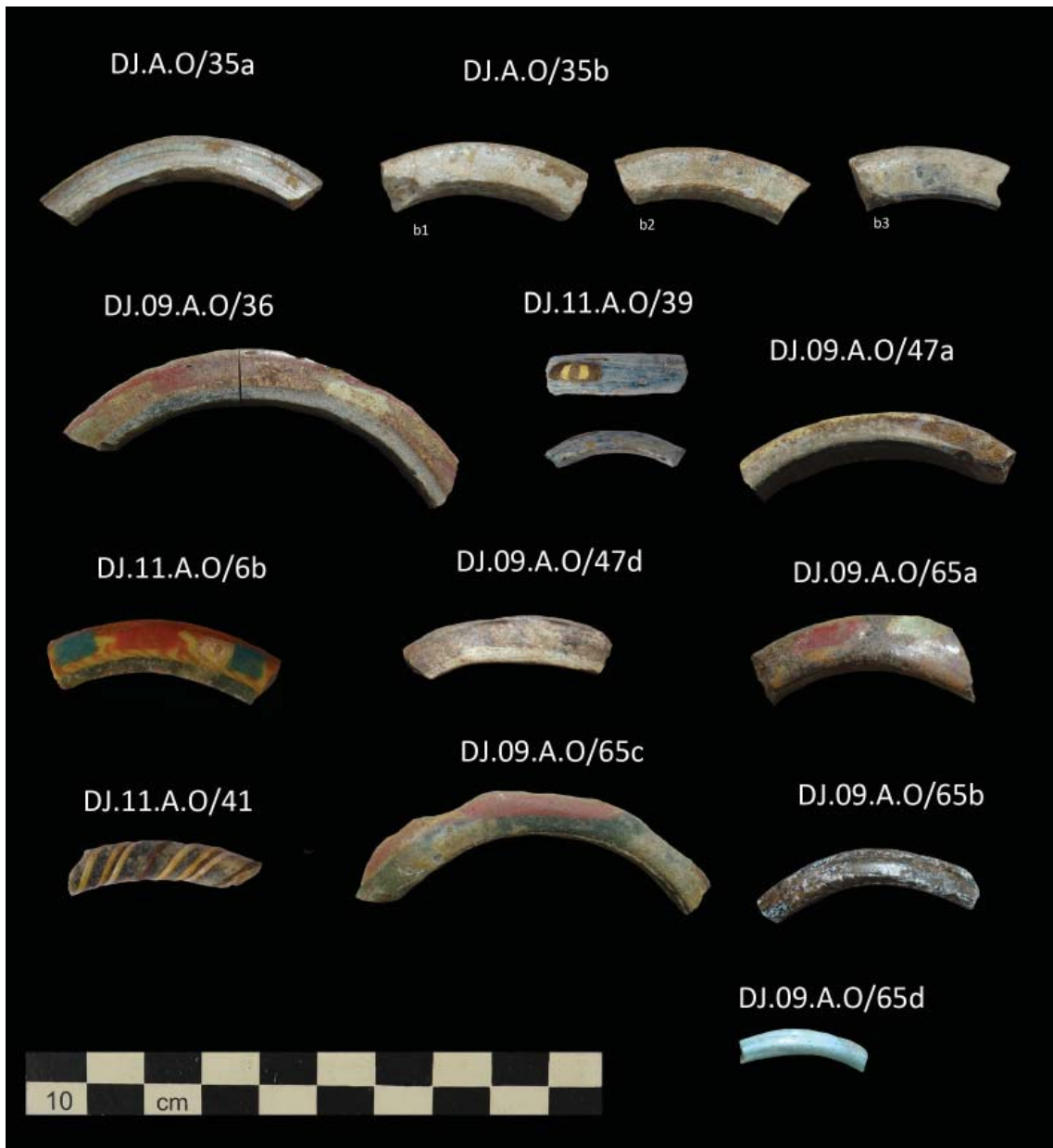


Fig. 1. Examples of vitreous paste bracelets from the Islamic levels



Fig. 2. Vitreous paste beads from bracelet or necklace collected from the Islamic levels

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.09.A.O/24a	N6-Id, level 3a	length: 4 cm; height: 0.8 cm; thickness: 0.6 cm	fragments	fragments of vitreous paste bracelets. Color black; lower surface flat; two parallel bands above lateral surfaces. Surface smoothed
DJ.09.A.O/24b	N6-Id, level 3a	length: 2.8 cm; height: 0.8 cm; thickness: 0.5 cm	fragments	fragments of vitreous paste bracelets. Colors from green to yellow with brown on the left edge of the item; lower surface flat. Surface smoothed
DJ.09.A.O/25	level 3a, close to M3	length: 4.1 cm; width: 0.5 cm	Heavily corroded and damaged fragment	fragments of bracelet of vitreous paste. Colors from white to brown
DJ.09.A.O/28a	N6-Ic, level 3a, above L2	a1: diameter: 6.1 cm; body height: 0.8 cm; body thickness: 0.5 cm	fragments	a1-6: fragments of vitreous paste bracelets with same decoration: black body with green blob on the upper surface and a green band along the lower surface ¹
DJ.09.A.O/28b	N6-Ic, level 3a, above L2	maximum length: 4.2 cm; medium height: 0.6 cm; body thickness: 0.5 cm	fragments	fragments of different vitreous paste bracelets with same decoration: white body with upper or lower black/brown band
DJ.09.A.O/35a	N6-Ic, level 3a	length: 4.4 cm; height: 0.5 cm; thickness: 0.4 cm	fragment incrustated	fragment on vitreous paste bracelet, white color with an upper brown band
DJ.09.A.O/35b	N6-Ic, level 3a	b1: length: 3.1 cm; height: 0.8 cm; thickness: 0.6 cm	fragments heavily encrusted	fragments of various vitreous paste bracelet; b1-2: black color with a brown upper band; b3: black color
DJ.09.A.O/36	N6-Id, level 3a	length: 7 cm; height: 0.9 cm; thickness: 0.5 cm	two fragments composed. Few scratches	fragments of bracelet of vitreous paste. Color from black to red, with green blob. Lower flat black band. Surfaces smoothed
DJ.09.A.O/38.5	level 3b, dismantling of M5	length: 3.2 cm; maximum height: 1.2 cm; thickness: 0.8 cm	Heavily worn fragment	small fragments of bracelet of vitreous paste. Color from light blue to yellow/beige
DJ.09.A.O/47a	N6-Ic, level 3a, near M4 ²	length: 4.5 cm; height: 0.7 cm; thickness: 0.5 cm	Heavily encrusted fragment	fragments of bracelet of vitreous paste; color from grey to yellow, with an upper yellow band surface smoothed
DJ.09.A.O/47b-c	N6-Ic, level 3a, near M4	b: length: 3.2 cm; height: 0.8 cm; thickness: 0.6 cm; c: length: 5.3 cm; height: 0.8 cm; thickness: 0.6 cm	two fragments of the same bracelet	fragments of vitreous paste bracelet; color from beige to grey; surface smoothed
DJ.09.A.O/47d	N6-Ic, level 3a, near M4	length: 3.7 cm; height: 0.7 cm; thickness: 0.5 cm	fragment	fragments of bracelet of vitreous paste; color from yellow to brown, with a yellow lower band
DJ.09.A.O/65a	level 3b, near M4	length: 3.2 cm; maximum height: 1.1 cm; thickness: 0.7 cm	fragments	fragments of vitreous paste bracelet; color black with red and green blob, surface smoothed
DJ.09.A.O/65b	level 3b, near M4	length: 3.8 cm; height: 0.6 cm; thickness: 0.4 cm	fragments	fragments of vitreous paste bracelet, color black and white with one single incised line along both sides, heavily corroded
DJ.09.A.O/65c	level 3b, near M4	length: 5.8 cm; maximum height: 1 cm; thickness: 0.7 cm	fragments	fragments of vitreous paste bracelet, color black and green with two relief in red and yellow along the upper surface; surface smoothed
DJ.09.A.O/65d	level 3b, near M4	length: 3.2 cm; height: 0.4 cm; thickness: 0.3 cm	fragments	fragments of vitreous paste bracelet, color light blue, smoothed, fine glass

1. Type recorded in Bosra, dated to between the 13th and 16th cent. See Bucci 2010b: 224.

2. See de Maigret 2010: 70, Fig. 13.

DJ.09.A.O/73	N6-IId, level 3b, near M8	length: 4 cm; width: 0.6 cm; thickness: 0.7 cm	fragment	fragments of bracelet of vitreous paste. Surface smoothed, bordered by three rows of different colors. Upper surface decorated by wavy band brown colored followed by a thin white band and a thick green band
DJ.09.A.O/86a	level 2, close to M1	length: 5.5 cm; height: 0.6 cm; width: 0.5 cm	fragment with smoothed surface	fragments of bracelet of vitreous paste. Colors white/yellow
DJ.09.A.O/86b	level 2, close to M1	length: 2.2 cm; height: 0.4 cm; width: 0.4 cm	fragment with smoothed surface; encrusted	fragments of bracelet of vitreous paste. Color brown
DJ.09.A.O/86c	level 2, close to M1	length: 1.2 cm; height: 0.4 cm; width: 0.4 cm	fragment with smoothed surface; encrusted	fragments of bracelet of vitreous paste. Color brown
DJ.10.A.O/4	N6-IIa, level 3b, near M10	length: 6.2 cm; width: 0.6 cm; thickness: 0.5 cm	fragment, heavily corroded	fragments of bracelet of vitreous paste. Color white to beige. Two parallel incised lines above each side
DJ.10.A.O/11a	N6-IIa, level 3b	length: 6.2 cm; height: 0.7 cm; thickness: 0.5 cm	fragment	fragments of bracelet of vitreous paste; color black, surface smoothed, parallel incised lines above the upper surface
DJ.10.A.O/11b	N6-IIa, level 3b	length: 5.8 cm; height: 0.5 cm; width: 0.5 cm	fragment, heavily encrusted	fragments of bracelet of vitreous paste; color grey
DJ.10.A.O/21a	N6-IIb, level 3b	length: 6.1 cm; width: 0.5 cm; height: 0.6 cm	fragment heavily encrusted	fragments of bracelet of vitreous paste. Color from white to brown. Heavily incrustated in antiquity (?)
DJ.10.A.O/21b	N6-IIb, level 3b	length: 4.3 cm; width: 0.4 cm; height: 0.3 cm	fragment heavily encrusted	fragments of bracelet of vitreous paste. Color from white to brown. Heavily incrustated in antiquity (?)
DJ.10.A.O/21c	N6-IIb, level 3b	length: 5.2 cm; width: 0.5 cm; height: 0.7 cm	fragment heavily encrusted	fragments of bracelet of vitreous paste. Color from white to brown. Heavily incrustated in antiquity (?)
DJ.10.A.O/35	N6-IIb, level 3b	length: 5.8 cm; width: 0.3 to 0.4 cm; height: 0.3 to 0.6 cm	fragment heavily encrusted	vitreous paste bracelet. Surface smoothed, color from white to black. Irregular section. A single incised band above each side
DJ.10.A.O/42b	N6-Ia, level 2	length: 4 cm; height: 0.8 cm; thickness: 0.6 cm	fragment	fragment of polychromatic vitreous paste bracelet. Smoothed surface. Colors from yellow to brown, green and black. Continuous lower black colored band
DJ.11.A.O/6a	N6-Ic, level 3b	length: 4.9 cm; height: 0.4 to 0.8 cm; thickness: 0.5 cm	fragment heavily corroded	fragments of bracelet of vitreous paste, color black
DJ.11.A.O/6b	N6-Ic, level 3b	length: 4 cm; height: 0.8 cm; thickness: 0.6 cm	fragment	fragment of polychrome vitreous paste bracelet: lower black band, yellow body part decorated red and blue blob or zig zag
DJ.11.A.O/6c	N6-Ic, level 3b	length: 4.3 cm; diameter: 0.4 cm	fragment	fragments of bracelet of vitreous pastes. Light blue bracelet with circular section
DJ.11.A.O/6d	N6-Ic, level 3b	length: 5 cm; height: 0.6 cm; thickness: 0.5 cm	fragment, heavily corroded	fragments of bracelet of vitreous pastes, color white

DJ.11.A.O/6e	N6-Ic, level 3b	length: 5.5 cm; diameter: 0.4 cm	fragment	fragment of polychrome vitreous paste bracelets: color grey, upper relief band with yellow/brown wavy decoration
DJ.11.A.O/6f	N6-Ic, level 3b	length: 3.5 cm; height: 0.7 cm; thickness: 0.5 cm	fragment	fragments of vitreous paste bracelets; color: grey, lateral yellow/green decoration
DJ.11.A.O/7	O6-IIIc, L12 floor	length: 6.8 cm; height: 0.6 cm; width: 0.5 cm	fragment	fragments of bracelet of vitreous paste. Surface smoothed, color: brown with yellow/green blob above the upper surface
DJ.11.A.O/17	N6-Ic, level 3b, above L10b ³	length: 7.2 cm; height: 0.8 cm; thickness: 0.6 cm	fragment heavily corroded	fragments of bracelet of vitreous paste. Color: from grey to green. Surface corrupted
DJ.11.A.O/39	N6-IIb, level 3b	length: 2.6 cm; width: 0.8 cm; thickness: 0.3 cm	fragment, few scratches above the surface	fragment of blue vitreous paste bracelet decorated by a black blob with two yellow insertions above the upper surface
DJ.11.A.O/40	N6-IIb, level 3b	length: 6.8 cm; height: 0.6 to 0.8 cm; thickness: 0.5 cm	fragment, heavily encrusted	fragment vitreous paste bracelet, colors: white/black
DJ.11.A.O/41	N6-Ic, level 3a	length: 3.8 cm; section diameter: 0.5 cm	fragment	fragment of twisted vitreous paste bracelet ⁴ . The body section is circular, with an exterior surface decorated by multicolor (yellow and red/brown) spiraliform band
DJ.09.A.O/33	N6-Ic, level 3a	diameter: 0.7 cm; diameter central hole: 0.1 cm	complete	black vitreous paste bracelet or necklace spherical bead
DJ.09.A.O/69	N6-Ic, level 3b, above M6	length: 1.3 cm; diameter: 0.6 cm; diameter axial hole: 0.2 cm	complete, few incrustations	necklace or bracelet vitreous paste bead. Color: black; surface: smoothed
DJ.11.A.O/1	O6-IIIc, L12 floor ⁵	diameter: 2 cm; height: 0.9 cm; wall thickness: 0.4 cm	three fragments composed	vitreous paste bracelet bead. Blue-light color, external surface decorated by vertical incised lines
DJ.11.A.O/3	O6-IIIc, L12 floor	diameter: 2 cm; height: 0.8 cm; wall thickness: 0.4 cm	complete, heavily encrusted	vitreous paste bracelet bead. Green color, external surface decorated by vertical incised lines
DJ.11.A.O/10	N6-Ic, level 3b in L14	diameter: 1.1 cm; height: 0.6 to 0.8 cm; diameter hole: 0.4 cm	complete; fire traces, many scratches above the surface	necklace or bracelet vitreous paste bead. Circular shape. Surface smoothed

3. See Loreto Sector A, in this volume: Fig. 27.

4. Twisted glass from Bosra dated to between the 13th and 16th cent. See Bucci 2010b: 226; Spaer 1992: 50.

5. See Loreto Sector A, in this volume: Fig. 10.

Table 3. Vitreous paste jewelry: preliminary list

2. Metal

2.1 Bronze

Coins

Four bronze coins were collected: 1 from the surface (level 1); 1 from level 3a; 2 from level 3b.⁶

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.09.A.O/30	N6-Ic, level 3a	maximum length: 1.8 cm; maximum preserved width: 1.6 cm; thickness: 0.2 cm	heavily oxidized. Fractured	bronze pseudo-circular coin. Illegible
DJ.10.A.O/17	N6-IIb, level 3b	diameter: 2.4-2.2 cm; thickness: 0.25 cm	oxidized, incrustated; a single fracture	bronze coin. Illegible
DJ.10.A.O/41	N6-IIb, level 3b, above Building A collapse in L8	diameter: 2 cm; thickness: 0.3 cm	heavily oxidized	bronze coin. Illegible
DJ.10.A.O/42a	N6-I surface	diameter: 0.8 cm; thickness: 0.2 cm	oxidized	bronze coin with both recto/verso illegible

Table 4. Bronze coins preliminary list

⁶. The coins have been not restored.

Jewelry and metal plates

Various bronze items related to jewelry were collected from Trench 1, together with undefined plates.

Two bronze pendants were collected from level 3b; 2 bracelets and 3 rings were collected from level 3a; in M2 courses 1 small flat body ring was found (DJ.09.A.O/71); 1 almost complete bronze ring with bronze circular appliqué (DJ.10.A.O/31) was found in level 3b, on the flank of the hill; 1 complete male ring (DJ.11.A.O/11) was found directly above L12 floor.⁷

Nine thin bronze plates were collected: 3 from level 3a, 3 from level 3b, 1 from the level of collapse of Building floor L6⁸ and 2 from level 10. All the fragments are oxidized and without clear edges, only the item DJ.09.A.O/32 could be identified as a stud or a pendant.

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.10.A.O/5	N6-IIa, level 3b, near M10	diameter: 0.8 cm; thickness: 0.2 cm	complete; oxidized	bronze pendant. Circular shape; on both sides still visible a central circular relief
DJ.11.A.O/4	N6-Ic, level 3b in L14 ⁶	diameter 3 cm; triangular item side: 1 cm; thickness: 0.3 cm	two fragments	bronze pendant or plaque. Circular shape with a central triangular section
DJ.09.A.O/29	N6-Ic, level 3a	first fragment: length: 1.5 cm; width: 0.3 to 0.1 cm; second fragment length: 4.1 cm; width: 0.3 cm; thickness: 0.1 cm	two fragments, fractured and oxidized	fragments of a thin bronze band, bracelet (?), fractured and incurved
DJ.09.A.O/38	N6-Id, level 3a	diameter 3.3 cm; maximum diameter section body: 0.3 cm	oxidized and fractured	bronze bracelet with open ending; circular section body. One of the extremities has a pointed end; the other is fractured (at the widest section of body)
DJ.09.A.O/71	M2, at the height of M2 door's lintel ⁷	diameter 7 cm; width: 0.4 cm; thickness: 0.1 cm	two oxidized fragments	bronze ring with flat body
DJ.10.A.O/31	N6-IIc, level 3b, rocky flank	appliqué: diameter 1.6 cm; thickness: 0.2 cm; ring width: 0.3 cm; thickness: 0.2 cm	oxidized; ring fractured, appliqué complete	bronze ring with circular appliqué
DJ.11.A.O/11	O6-IIIC, L12 floor	diameter: 2.5 cm; thickness: 0.4 cm	complete, oxidized	bronze man's ring. Smoothed surface
DJ.09.A.O/17	N6-Ic, level 3a	length: 2.5 cm; maximum width: 1.4 cm; thickness: 0.1 cm	fragment oxidized	fragment of pseudo-circular (?) bronze thin plate

6. See Loreto Sector A, in this volume: 111; Figs. 11-12.

7. See Loreto 2014: Fig. 13.

7. See Loreto Sector A, in this volume: 111, Figs. 11-12.

8. See Loreto 2014: 103-109.

DJ.09.A.O/32	N6-Ic, level 3a	length: 2.3 cm; maximum width: 1.9 cm; thickness: 0.1 cm	complete; single fracture, oxidized	bronze thin plate (stud or pendant) with central rectangular hole
DJ.09.A.O/37	N6-Id, level 3a	maximum length: 3.5 cm; maximum width: 2.5 cm; thickness: 0.1 cm	fragment oxidized. Edge fractured and incurved	fragment of thin bronze plate
DJ.09.A.O/70	N6-Ic, level 3b, above M6	maximum length: 2.5 cm; maximum width: 2.5 cm; thickness: 0.3 cm	oxidized, heavily encrusted and fractured	fragment of bronze plate of irregular shape
DJ.09.A.O/75	N6-Id, level 3b, above M8	maximum length: 5 cm; maximum width: 2.2 cm; thickness: 0.1 cm	oxidized, heavily encrusted and fractured	fragment of bronze plate of irregular shape
DJ.10.A.O/2	N6-IIb, L6 collapse ⁸	1.1 x 2.2 cm ca	fragments oxidized	two fragments of brone thin plate
DJ.10.A.O/25	N6-IIa, level 10, below L8 ⁹	maximum length: 1.4 cm; maximum height: 1.5 cm; thickness: 0.1 cm	fragment	fragment of bronze band
DJ.10.A.O/36	N6-IIb, level 3b	length: 3.1 cm; width: 0.2 to 0.4 cm; thickness: 0.1 cm	oxidized and fractured	fragment of thin bronze plaque or plate
DJ.10.A.O/39	N6-IIa, level 10, below L8	1.1 x 1.8 cm to 2 x 2.5 cm; thickness: 0.1 cm	heavily oxidized	fragments of bronze thin band

Table 5. Bronze jewelry and metal plates of unknown function. Preliminary list

8. *Ibid.*

9. *Ibid.*

Working tools

A series of bronze working tools (8 items) was collected, some of certain attribution (**Fig. 3**). One chisel with circular head and plain drill (DJ.09.A.O/20) from level 3a; 2 items from the removal of M10-M14: 1 bronze needle with pointed end and rounded head (DJ.10.A.O/13) and 1 chisel with pointed end (DJ.10.A.O/14); 3 unidentified items from level 3b: 2 small bars, 1 thin thread; 1 fragment of thin bronze bar from level 10; 1 unidentified conical bronze item from bedrock floor L14.



Fig. 3. Top, chisel with circular head and plain drill; bottom, chisel with pointed end



Fig. 4. Ferrite cores for fusion processing, purified from impurities

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.09.A.O/20	N6-Ic, level 3a	length: 4.4 cm; diameter head: 0.3 cm; body section: 0.35 x 0.2 cm; width pointed end: 0.35 cm	complete; oxidized	bronze chisel with circular head, rectangular body section and plain drill
DJ.10.A.O/13	N6-IIb, M10-M14	length: 5.2 cm; diameter body: 0.1 cm; diameter head: 0.3 cm	complete; oxidized and incurved	bronze needle; thin long body, pointed end, rounded head
DJ.10.A.O/14	N6-IIb, M10-M14	length: 8.3 cm; body section: 0.4 cm; flat end width: 0.3 cm	complete, oxidized	bronze chisel; quadrangular body section; one pointed end, one flat end
DJ.10.A.O/22	N6-IIb, level 3b	irregular fragments	fragments oxidized	irregular fragments of a single small bronze bar
DJ.10.A.O/28	N6-IIb, level 3b, above Building A collapse in L8 ¹⁰	diameter: 0.1 cm	oxidized fragments	thin bronze thread (necklace?)
DJ.10.A.O/37	N6-IIb, level 3b	length: 4.8 cm; diameter section: 0.3 cm	fractured	small bronze bar with circular section and rounded fractured end
DJ.10.A.O/40	N6-IIa, level 10, below L8	length: 1.5 cm; maximum diameter: 0.3 cm; minimum diameter: 0.2 cm	fragment fractured and oxidized	fragment of thin bronze bar fractured at both ends
DJ.11.A.O/14	N6-Ia, L14, bedrock floor	length: 3.4 cm; maximum diameter: 0.6cm; wall thickness: 0.1cm	fragment fractured and oxidized	conical bronze item; hollow, pointed end

10. See Loreto 2014: 123.

Table 6. Bronze working tools preliminary list

2.2 Iron

Ferrite cores

Seven ferrite fusion processing items were collected from Trench 1, all of them from the Islamic levels: 2 from level 2; 1 from level 3a; 3 from level 3b; 1 from M10.

The fragments attest the local manufacturing of iron items: objects DJ.09.A.O/46, DJ.09.A.O/72, DJ.10.A.O/16 and DJ.10.A.O/18 are the original ferrite cores before firing, in which the ferrite is still mixed with earth gangue; objects DJ.09.A.O/8, DJ.09.A.O/18 and DJ.10.A.O/10 are ferrite subsequent to the firing process, purified of impurities, only the ferrite mineral is preserved (**Fig. 4**).

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.09.A.O/8	level 2, near M1	fragment 1: length 6 cm ca.; height: 5 cm ca.; width: 4 cm ca. Fragment 2: length: 1 cm; height: 0.8 cm; width: 0.5 cm	oxidized	ferrite for fusion processing (iron)
DJ.09.A.O/18	N6-Id, level 2 ¹¹	height: 2.5 cm ca.; width: 2 cm; thickness 1.8 cm	oxidized	ferrite for fusion processing (iron)
DJ.09.A.O/46	N6-Ic, level 3a, near M3	maximum length: 8 cm; maximum width: 6 cm; height: 2 cm	two fragment composed	ferrite for fusion processing (iron)
DJ.09.A.O/72	N6-Id, level 3b, near M8 ¹²	length 7 cm ca; height: 4 cm ca; width: 3 cm ca	oxidized	ferrite for fusion processing (iron)
DJ.10.A.O/10	N6-IIa, M10	length: 2 to 3 cm	fragments oxidized	irregular fragments of ferrite fusion mineral
DJ.10.A.O/16	N6-IIb, level 3b	length 9 cm ca; height: 5 cm ca; width: 6 cm ca.	oxidized	ferrite for fusion processing (iron)
DJ.10.A.O/18	N6-IIb, level 3b	length 10cm ca; height: 9cm ca; width: 8.6cm ca	heavily oxidized, incrustated	ferrite for fusion processing (iron)

Table 7. Ferrite cores, preliminary list

11. *Ibid.*
12. *Ibid.*

Blades

Only a single iron blade was collected from the excavation (level 2). The fragments preserved suggest a rounded shape with a pointed end, perhaps a dagger.

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.09.A.O/12	level 2, close to M1	length: 11 cm; width: 6 cm; thickness 0.3 cm (fragments better preserved)	oxidized and broken in 7 pieces. The pointed end is preserved	oxidized double-edged iron blade with curved shape. On the left of the main piece the central axis is still visible

Table 8. Blades, preliminary list

Working tools

Various working tools were collected, most of them from the Islamic levels: 2 nails from level 3a and 1 from L12 floor; 1 handle and a hook from level 2; only 1 pin (?) was collected from the floor of Building A.

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.09.A.O/13	N6-Ic, level 3a	length: 2.7 cm; maximum diameter: 1.2 cm; body diameter: 0.4 cm	heavily oxidized, fractured	iron nail. Body fractured; head preserved
DJ.09.A.O/14	N6-Ic, level 2	length: 10.5 cm; width 1.4 cm; thickness: 1.5 cm; width rounded end: 0.9 cm; thickness rounded end: 0.8cm	oxidized. Both ends fractured	iron handle with rounded end
DJ.09.A.O/81	N6-Id, level 2	length: 9.5 cm; maximum diameter: 1.1 cm; minimum diameter: 0.7 cm	oxidized. The pointed end is preserved; the opposite end cut off	iron hook (?) with circular section
DJ.11.A.O/2	L15, Building A floor (level 9), east of M30 ¹³	major arm length: 7 cm; minor arm length: 3 cm; thickness: 1.3 to 1.8 cm	complete, oxidized and incrustated	pin (?), L shaped
DJ.11.A.O/5	O6-IIIc, L12 floor	length: 4.1 cm; maximum diameter: 1 cm; minimum diameter: 0.3 cm	complete, oxidized and incrustated	iron nail; pointed end and rounded head

13. See Loreto Sector A, in this volume: Fig. 13.

Table 9. Preliminary list of iron working tools

3. Stone artifacts

3.1 Alabaster

Two fragments of alabaster vessel were collected from level 10 (DJ.10.A.O/27) and level 8 (DJ.11.A.O/34). The first was a fragment of bowl decorated with a vine leaf from level 10;⁹ the second, a flat-bottomed unguentary from the last occupation of Building A (level 8). Four undefined fragments of alabaster were also collected, 3 from level 3a and 1 from level 3b. The fragments are smoothed, and have a simple articulation. No indications of shape are visible. Fragment DJ.09.A.O/76 suggests the shape of a handle.

⁹. See Loreto 2014 302.

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.10.A.O/27	N6-IIa, level 10, below L8	maximum length: 9 cm; maximum height: 5.9 cm; wall thickness: 1.1 cm; leaf height: 4.2 cm; leaf width: 4 cm	fragment	fragment of alabaster bowl with flat rim, rounded wall; external surface decorated with a vine leaf under the rim, surmounted by a perforation. Surface smoothed
DJ.11.A.O/34	N6-IIc, level 8, above L8	maximum height: 2.3 cm; maximum width: 1.8 cm; wall thickness: 0.2 cm; maximum wall thickness at the foot: 0.9 cm	fragment	fragment of flat bottom alabaster jar (unguentary); thin wall
DJ.09.A.O/1	N6-Id, level 3a	length: 3 cm; width: 2.9 cm; height: 2.7 cm	fragment. Many fractures	rounded fragment of alabaster statue (?). Surface smoothed
DJ.09.A.O/2	N6-Ic, level 3a, near M3 ¹⁴	maximum length: 3.7 cm; maximum width: 3.2 cm; height: 1.6 cm	fragment. Many fractures	fragment of alabaster statue (?). Surface smoothed
DJ.09.A.O/3	N6-Ic, level 3a	maximum length: 4.6 cm; maximum width: 3 cm; height: 2.3 cm	upper and lower surface fractured	fragment of alabaster statue (?). Oval shape, surface smoothed
DJ.09.A.O/76	N6-Id, level 3b, near M8	length: 4.6 cm; section: 1.8 x 2.4 cm to 1.6 x 2 cm	fragment; both edges fractured	fragment of alabaster handle or statue (?). Oval section, surface smoothed

¹⁴. See Loreto 2014: 122.

Table 10. Alabaster items preliminary list

3.2 Gemstones

Two pendants and 3 beads made of different gemstones were collected from various levels: 1 from level 2; 2 from level 3a; 1 from Building A collapse (level 7); 1 from level 6, Islamic floor related to L10a, M7 and M8 (**Fig. 5**).

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.09.A.O/6	N6-Ic, level 3a	length: 2.5 cm; maximum diameter: 1.6 cm	almost complete. Fractured onyx; iron oxidized	onyx prismatic pendant with iron bar. Onyx upper and lower surface flat; upper prismatic face 1cm height; lower prismatic face 1.3cm height
DJ.10.A.O/1	N6-Ib, level 2	diameter: 1.8 cm; height: 1.3 cm; diameter central hole: 0.5 to 0.7 cm	complete. Few incrustation	turquoise necklace bead. Spherical shape, upper and lower surface flat with concentric groove. Four vertical grooves along the external surface
DJ.10.A.O/3	N6-Ia, level 2	diameter 1.1 cm; height: 0.7 cm; diameter central hole: 0.45 cm	complete. Few scratches	quartzite circular necklace or bracelet bead. Surface smoothed, from white to pinkish color. Upper and lower surface flat
DJ.10.A.O/23	N6II-d, level 7, above L7/M20a ¹⁵	length: 2.1 cm; maximum width: 1.8 cm; minimum width: 0.7 cm; thickness: 0.6 cm	complete, superficial fractures	agate pendant; pivotal oblique perforation; surface smoothed; colors from white to brown
DJ.11.A.O/16	trench 2, level 6, near M8 ¹⁶	diameter: 1.2 cm; height: 0.5 cm; diameter hole: 0.4 cm	complete	carnelian circular necklace or bracelet bead. Surface smoothed

Table 11. Gemstone preliminary list

15. See Loreto 2014: 126, Fig. 48.

16. See Loreto Sector A, in this volume: Fig. 54.



Fig. 5. Beads and pendants from sector A

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.10.A.O/34	N6-IIa, level 10, below L8	height: 11.5 cm; minimum diameter: 7.2 cm; maximum diameter: 9 cm	fragment fractured	miniature architectural decorative item: limestone fluted column white plaster painted. Six vertical grooves. The upper surface shows everted wall with a central concave plastered surface
DJ.09.A.O/10	N6-Ic, level 3a	length: 7.2 cm; width: 6.1 cm; thickness: 3.9 cm; diameter hole: 1.8 cm	complete. Few scratches on the surface	sandstone pivot hinge (floor or top of the door frame)
DJ.09.A.O/44	N6-Ic, level 3a	diameter: 13 cm; diameter pivot hole: 2.4 cm; height: 6 cm	fractured	circular pivot hinge (floor or top of the door frame). Surface smoothed
DJ.09.A.O/45	N6-Ic, level 3a	diameter: 20 cm; diameter pivot hole: 7.2 cm; height: 10 cm; wall thickness: 6 to 10 cm	fractured	circular pivot hinge (according to the dimension probably at the floor of the door frame). Surface smoothed
DJ.09.A.O/56	N6-Id, level 3a	diameter 13 cm; height: 3.5 to 5 cm; diameter pivot hole: 4 cm	fragment	pseudo-circular pivot hinge (floor or top of the door frame). Fractured. Surface rough
DJ.09.A.O/57	N6-Id, level 3a	diameter: 14 cm; height: 5 to 6.5 cm; diameter pivot hole: 2.8 cm	fragment, half item preserved	pseudo-circular pivot hinge (floor or top of the door frame). Fractured. Surface rough
DJ.09.A.O/58	N6-Id, level 3a	maximum length: 13 cm; width: 9 cm; height: 5 cm; diameter pivot: 4.5 cm. Preservation: fragment	fragment	rectangular pivot hinge (floor or top of the door frame). Fractured. Surface rough, only the hole is smoothed by the usage
DJ.09.A.O/59	N6-Id, level 3a	diameter: 18 cm; height: 5.5 cm	fragment, half item preserved	circular pivot hinge (floor or top of the door frame). Fractured. Surface rough. Pivot hole on both upper and lower surface
DJ.09.A.O/68	N6-Ic, level 3b, near M5	diameter: 11.5 cm; height: 5 cm; diameter pivot hole: 2.5 cm	fragment of half item	circular pivot hinge (floor or top of the door frame)
DJ.09.A.O/79	N6-Id, level 3b, near M8	maximum length: 16 cm; maximum width: 11 cm; height: 5.5 cm; diameter pivot hole: 3.5 cm	fractured	circular pivot hinge (floor or top of the door frame). Fractured. Surface leveled
DJ.09.A.O/80	N6-Id, level 3b, near M8	maximum length: 13 cm; maximum width: 12 cm; height: 4 to 6 cm; diameter pivot hole: 4 cm	fractured	circular pivot hinge (floor or top of the door frame). Fractured. Surface leveled and smoothed
DJ.09.A.O/88	N6-IIa, M2	maximum length: 29 cm; maximum width: 18 cm; height: 5 to 8 cm ca; diameter pivot hole: 2 cm	fractured	sandstone oval pivot hinge. Surface rough
DJ.09.A.O/89	N6-IIa, M2	diameter: 19 cm; height: 6.8 cm; diameter pivot hole: 2 cm	fractured	sandstone oval pivot hinge. Upper surface smoothed; lateral and lower surface rough
DJ.11.A.O/25	N6-Ic, level 3b, near M7	diameter: 11 cm; height: 4.5 cm; diameter hole: 1.8 cm	fractured	sandstone circular pivot hinge. Surface smoothed
DJ.11.A.O/36	N6-Ic, level 3b, above L10b	diameter: 16.3 cm ca; height: 0.6 cm; diameter pivot hole: 0.4 cm	fragment, half preserved	fragment of circular pivot hinge (floor or top of the door frame). Surface rough

Table 12. Architectural items preliminary list

3.3 Limestone/sandstone

Architectonic items

One single miniature fluted column was discovered in level 10 (Nabataean level, foundation of Building A) (**Fig. 6**).

Fourteen pivot hinges were collected: 7 from level 3a, 5 from level 3b and 2 re-used in the stone courses of Building L6 northern perimetral wall (M2) (**Fig. 7**). These kind of architectural elements are still visible in the medieval villages around Mârid Castle; they can be recognized by the well smoothed surface of the central pivot hole, smoothed by the motion of the vertical wooden doorpost. Only one of them is made of trachyte (DJ.09.A.O/44); all the others are made of sandstone, the most abundant stone in the oasis.

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.09.A.O/27	N6-Ic, level 3a	total height: 8.3 cm; foot height: 3 cm; chamber height: 5.3 cm; maximum width: 6.4 cm	fragment incrustated and fracture. Surface heavily corroded	fragment of incense burner. Foot and part of the chamber preserved
DJ.09.A.O/34	N6-Id, level 3a	9 cm square; height: 6cm; height foot: 2 cm; height rim: 1 cm	fractured. Only one foot and part of the brazier preserved	sandstone incense burner. Flat rim, vertical wall, circular brazier, four feet standing. Outer surface and flat rim smoothed; brazier surface rough
DJ.10.A.O/15	N6-IIa, M10	maximum width: 14 cm; height: 8.5 cm; foot height: 5.5 cm; foot at the bottom: 1.7 x 4.2 cm; foot at the top: 5.5 x 6.6 cm; inner wall height: 1 cm; wall thickness: 1.2 cm; chamber thickness: 2.8 cm	fragment	fragment of tripod: foot, wall and chamber preserved. Conical flat foot; vertical wall; wavy decorated rim and horizontal chamber. All surfaces smoothed; above the foot visible working chisel traces
DJ.10.A.O/24	N6-IIb, level 3b, above M17 ¹⁷	maximum height: 6.7 cm; maximum diameter: 7 cm; medium wall thickness: 1.2 cm	bottom, wall and brazier preserved	clay incense burner. Flat base, everted wall. Surface smoothed, black painting traces. Traces of combustion inside the brazier

17. See Loreto 2012: 116, Fig. 35.

Table 13. Incense burners preliminary list



Fig. 6. Miniature fluted column collected from level 10 (Nabataean level, Building A foundation)



Fig. 7. Two examples of pivot hinges collected from the Islamic levels

Fig. 8. Incense burner collected from the Islamic levels. Quadrangular shape, vertical wall and four vertical feet



Incense burners

Four incense burners were discovered in the Islamic levels: 2 from level 3a; 1 from the removal of M10; 1 from level 3b. Fragments DJ.09.A.O/27 and DJ.09.A.O/34 are of rectangular or quadrangular shape, have vertical walls and four vertical feet (**Fig. 8**). This is the typical incense burner shape, attested in the entire Arabian Peninsula during both pre-Islamic and Islamic times.

Working tools

A substantial amount of stone working tools were collected: grindstones, mortars, pestles and whetstones:

- Grindstones are all related to the well-known double-wheel stone grindstone, used to process olive oil. Many examples are displayed in the local al-Jawf Museum of Ethnography and Anthropology. In general, this type of grindstone possesses two wheels, placed one above the other. A central pivot, with a vertical wooden element inserted in it, allows the circular motion; a second wooden element inserted in the upper wheel, in a lateral perforation, allows the upper wheel to rotate (Fig. 9). All 13 items come from the most recent archaeological levels: 3 from level 2; 10 from level 3a.
- 14 mortars were collected, two of which from Trench 2, level 6. The mortars from Trench 1 come from: 1 from surface; 4 from level 3a; 3 from level 3b; 2 from M2 courses; 1 from Building L6 floor. It is possible to recognize three different types of mortar: 1) mortar with a flat, slightly curved upper surface; 2) small circular mortar; 3) big high wall and deep basin mortar (**Fig. 10**). The large quantity of stone mortars, together with a comparable number of stone pestles, proves activities related to food processing (grain) were carried out.
- 18 pestles were collected, two of them from Trench 2, level 6. The pestles from Trench 1 come from: 2 from level 2; 9 from level 3a; 3 from level 3b; 2 from Building L6 floor. It is possible to distinguish 3 different type of pestle: 1) spherical or circular pestle; 2) cylindrical pestle; 3) rectangular pestle (**Fig. 11**).
- Only 1 whetstone, used to sharpen iron or bronze tools (blade) was collected, inside Building L6, just above the pavement (**Fig. 11**).



Fig. 9. An example of various grindstones collected from the Islamic level: a double wheel grindstone



Fig. 10. Three examples of mortars collected from the Islamic levels: DJ.11.A.O/22 mortar with a flat, slightly curved upper surface; Dj.A.09.A.O/43 small circular mortar; DJ.09.A.O.O/63 big high wall and deep basin mortar



Fig. 11. Pestles and a whetstone collected from the Islamic levels: DJ.09.A.O/48 spherical or circular pestle; DJ.09.A.O/51 cylindrical pestle; DJ.09.A.O/26 rectangular pestle

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.09.A.O/5	N6-Ic, level 3a	maximum length: 21 cm; maximum width: 16 cm; height: 6.5 cm	half preserved	trachyte oval grindstone. Only half of the item is preserved. Visible the central pivot hole. Upper surface smoothed. Lower surface rough
DJ.09.A.O/21	level 2, near M2	diameter: 12 cm; height: 3.5 cm; diameter pivot hole: 2.5 cm	half preserved; fire traces	circular sandstone grindstone with central pivot hole. Upper and lower surfaces are flat and smoothed; lateral surface rough. It is the upper part of a double grinding wheel composed of a lower circular and flat stone surmounted by an upper circular stone with a central hole and a lateral hole (not preserved) for wooden rods. The first is the central pivot, the second the handle
DJ.09.A.O/31	N6-Ic, level 3a	length: 18 cm; maximum width: 10 cm; height: 8 cm	fragment	fragment of upper wheel grindstone. Only the lateral perforation is preserved. Upper and lower surface smoothed; lateral surface rough
DJ.09.A.O/52	N6-Ic, level 3a	maximum length: 12.5 cm; maximum width: 8 cm; height: 4.8 cm; diameter pivot hole: 2.5 cm	fragment of half item	oval sandstone grindstone; upper and lower surface flat and smoothed; lateral surface rough. Only the pivot hole is preserved. It is part of a double-wheel grindstone
DJ.09.A.O/53	N6-Id, level 3a	triangular shape: 17 x 17 x 19 cm; height: 8 cm; diameter pivot hole: 3.5 cm; diameter lateral hole: 3.5 cm	fragment of half item	upper fragment of grindstone composed of two wheels. The fragment still preserves the pivot hole and the lateral hole for wooden insertion. The lateral hole is carved on both faces of the item. Only the upper surface is smoothed; lower and lateral surfaces rough
DJ.09.A.O/54	N6-Id, level 3a	maximum length: 21 cm; maximum width: 16 cm; height: 9.5 cm; diameter central hole: 5 cm; diameter lateral hole: 3.5 cm	fragment, half item preserved	rectangular sandstone grindstone. Central pivot and a lateral hole for wooden insertion. Considering the rectangular shape it is also possible that we are dealing with a pivot hinge (floor or top of the door frame)
DJ.09.A.O/60	N6-Id, level 3a	maximum length: 18 cm; maximum width: 17 cm; height: 5.5 cm; diameter pivot hole: 4 cm	fractured	grindstone wheel
DJ.09.A.O/61	N6-Id, level 3a	diameter: 30 cm ca; diameter pivot hole: 5 cm circa; diameter lateral hole 4.5 cm	fragment	fragment of circular grindstone composed of two wheels. The fragment (upper wheel) still preserves the pivot hole and the lateral hole for wooden insertion. Upper surface partially smoothed. Lateral and lower surface rough
DJ.09.A.O/62	N6-Id, level 3a	maximum length: 22 cm; maximum width: 18 cm; height: 5 to 6.5 cm; diameter pivot hole: 3 to 5 cm	fragment	grindstone wheel
DJ.09.A.O/63	N6-Id, level 3a	maximum length: 19 cm; maximum width: 14 cm; height: 5 to 8 cm; diameter pivot hole: 2 to 4 cm	fragment, half item preserved	fragment of circular grindstone composed of two wheels. The fragment (upper wheel) still preserves the pivot hole. Upper surface partially smoothed. Lateral and lower surface rough
DJ.09.A.O/64	N6-Ic, level 3a	maximum length: 20 cm; maximum width: 18 cm; height: 6 to 9 cm; diameter lateral hole: 5.5 cm; diameter pivot hole: 6 cm	fragment	fragment of upper double-wheel grindstone. Pivot hole still visible, lateral hole well preserved. Surface smoothed. Irregular height
DJ.09.A.O/84	N6-Id, level 2	maximum length: 21 cm; maximum width 10 cm; height: 4.5 cm; pivot hole diameter: 3.5 cm; lateral hole diameter: 3 cm	half preserved	semi-circular sandstone grindstone with central pivot hole and lateral hole for wooden handle insertion. Upper and lower surfaces are flat and smoothed; lateral surface rough. It is the upper part of a double grinding wheel composed of a lower circular flat stone surmounted by an upper circular stone with a central hole (pivot) and a lateral hole (preserved on the right) for the insertion of a wooden rod
DJ.09.A.O/85	N6-Id, level 2	maximum length: 17 cm; maximum width: 13 cm; height: 8 cm; pivot hole diameter: 4 cm	half preserved. Many fractures above the upper surface	circular sandstone grindstone with pivot hole. Upper and lower surfaces are flat and smoothed; lateral surface rough. It is the upper part of a double grinding wheel composed of a lower circular flat stone surmounted by an upper circular stone with a central hole (pivot) and a lateral hole (not preserved) for wooden rods
DJ.09.A.O/11	N6-Ic, level 3a, above L21 ⁸	maximum length: 13 cm; maximum width: 11.5 cm; 5cm thick in the middle; 3 cm thick at the rims	complete	trachyte mortar. Oval shape; upper surface sunken. Upper, lower and lateral surfaces smoothed
DJ.09.A.O/15	N6-II surface	maximum length: 21 cm; maximum width 16 cm; thickness: 9 cm	working surface and rough rim still visible	flat and open mortar with rough rim. Working surface flat, smoothed and dressed. Back surface untreated

DJ.09.A.O/16	N6-Ic, level 3a	diameter: 6 cm; height: 4.3 cm; diameter hole: 4 cm	complete	trachyte mortar; cylindrical shape, lower surface flat and rough; lateral and upper surface smoothed
DJ.09.A.O/42	N6-Ic, level 3a	foot diameter: 5 cm; upper diameter: 7.2 cm; chamber height: 5.5 cm; wall thickness: 2 cm ca	complete, few fractures	sandstone mortar. Surface rough, only the chamber surface is smoothed with heavy signs of fire
DJ.09.A.O/43	N6-Ic, level 3a	maximum diameter: 10.6 cm; height: 4.6 cm	complete	sandstone circular mortar. Surface rough, only the chamber surface is smoothed with irregular rim
DJ.09.A.O/66	N6-Ic, level 3b	maximum length: 23 cm; maximum width: 16 cm; total height: 13 cm; depth basin: 7.5 cm; rim thick: 6 to 9 cm	fragment of wall, rim, bottom and basin	sandstone mortar (or basin) with vertical wall, flat thick rim, flat bottom. All surfaces leveled, not smoothed
DJ.09.A.O/67	N6-Ic, level 3b	maximum length: 26 cm; maximum width: 18 cm; height: 13 to 15.5 cm; depth basin: 11 cm; rim thick: 4 to 9 cm	fragment of wall, rim, bottom and basin	trachyte mortar of quadrangular shape, central basin and irregular rim. Flat rough bottom; surface smoothed
DJ.09.A.O/78	N6-Id, level 3b, near M8	maximum length: 14 cm; maximum width: 9 cm; height: 9 cm; depth basin: 4.6 cm; diameter basin: 8 cm	fragment of wall, rim, bottom and basin	sandstone mortar of circular shape, central basin and irregular rounded rim. Flat rough bottom; surface smoothed
DJ.09.A.O/87	N6-IIa, M2	length: 24 cm; width: 19 cm; height: 12 cm; wall thickness: 3 to 9 cm ca	fragment of bottom, wall and basin	fragment of sandstone mortar with flat bottom, vertical wall and flat rim. Surface rough
DJ.09.A.O/90	N6-IIa, M2	maximum length: 38 cm; maximum width: 31 cm; height: 16 cm; wall thickness: 4 cm ca	fractured	sandstone mortar (or basin); oval shape, flat bottom, vertical wall, flat rim and rounded basin. Upper surface smoothed. Lateral and lower surface rough
DJ.10.A.O/9	N6-IIa, Building L6 floor	length: 17 cm; width: 10 cm; height: 14 cm	fractured at one end	sandstone rectangular mortar with irregular wall and rim; lateral and lower surface rough; chamber surface smoothed
DJ.11.A.O/21	trench 2, level 6	length: 25 cm; width: 15 cm; height: 12 cm; rim thick: 4.5 to 5 cm	fragment half preserved	sandstone rectangular mortar. Vertical wall, flat irregular rim. Surface smoothed, lower surface rough
DJ.11.A.O/22	trench 2, level 6	length: 30 cm; width: 20 cm; height: 3.5 to 7 cm	fractured	sandstone oval mortar. Upper surface convex and smoothed; lateral and lower surface rough
DJ.09.A.O/4	N6-Ic, level 3a	diameter: 7.7 cm; height: 5.5 cm	complete. Many scratches above the surface	circular pestle with upper and lower surface flat. Surface smoothed
DJ.09.A.O/9	level 2, close to M3 ¹⁹	height: 7.1 cm; maximum diameter: 6.6 cm	few scratches	cylindrical alabaster pestle. Upper and lower surface are rounded and smoothed
DJ.09.A.O/22	level 2, above M3	height: 8.1 cm; medium diameter: 7.6 cm	complete	cylindrical pestle with upper and lower flat surface. The diameter is not well rounded but irregular
DJ.09.A.O/26	N6-Ic, level 3a	length: 6.5 cm; width: 4.7 cm; height: 4.5 cm	complete. Few scratches on the surface	rectangular pestle. Rounded edges. Surface smoothed
DJ.09.A.O/40	N6-Ic, level 3a, near M3	diameter 8.5 cm; height: 5.7 cm	complete	circular pestle with upper and lower surface flat. Surface smoothed
DJ.09.A.O/41	N6-Ic, level 3a	diameter: 6.8 cm; height: 5.9 cm	complete	cylindrical sandstone pestle. Surface smoothed
DJ.09.A.O/48	N6-Ib, level 3a	diameter: 6.6 cm	complete	spherical sandstone pestle. Surface smoothed
DJ.09.A.O/49	N6-Ic, level 3a	diameter: 7.5 cm, height: 5.2 cm	complete	cylindrical sandstone pestle. Upper and lower surface flat. Surface smoothed
DJ.09.A.O/51	N6-Ib, level 3a	maximum diameter: 7.1 cm; minimum diameter: 6 cm; height: 7.2 cm	complete, few fractures	cylindrical sandstone pestle. Lateral surface smoothed. Upper surface scratched
DJ.09.A.O/77	N6-Id, level 3b, near M8	diameter 7.2 cm	complete, few scratches	spherical sandstone pestle. Surface smoothed
DJ.09.A.O/82	N6-Ic, level 3a	diameter: 6.8 cm	complete	spherical sandstone pestle. Surface smoothed
DJ.09.A.O/83	N6-Ic, level 3a	diameter: 7 cm	complete	spherical sandstone pestle. Surface smoothed

DJ.10.A.O/7	N6-IIa, Building L6 floor	length: 10.2 cm; width: 7.2 cm; thickness: 5 cm	complete	rectangular schist pestle. Surface smoothed, corners rounded
DJ.10.A.O/8	N6-IIa, Building L6 floor	diameter: 7.4 cm; height: 6.1 cm	complete	cylindrical schist pestle. Surface rough
DJ.10.A.O/19	N6-IIb, level 3b	height: 6 cm; diameter: 5 cm	complete	cylindrical sandstone pestle. Upper and lower surface flat. Surface smoothed
DJ.10.A.O/20	N6-IIb, level 3b	diameter: 6 cm	complete	spherical sandstone pestle. Surface smoothed
DJ.11.A.O/19	trench 2, level 6	diameter: 6 cm ca; height: 6 cm	complete	cylindrical sandstone pestle. Upper and lower surface flat; surface smoothed
DJ.11.A.O/20	trench 2, level 6	diameter: 8.5 cm; height: 7 cm	complete	cylindrical sandstone pestle. Upper and lower surface flat; surface smoothed
DJ.10.A.O/6	N6-IIa, above L6 floor, near M2 door	length: 11 cm; width: 4 cm; thickness: 1.5 cm	complete, few scratches on the surface	schist whetstone. Knife traces above the surface

Table 14. Stone working tools preliminary list

18. See Loreto 2014: 122.

19. One course wall. Late Islamic. *Ibid.*

3.4 Steatite

Nine fragments of steatite vessels were collected: 1 from level 2; 1 from level 3a; 2 from level 3b; 4 from level 6, all of them related to a level of ash located between M7 and M8;¹⁰ only one fragment of a flat-bottomed vessel (DJ.11.A.O/33) came from level 8. No complete shapes or rims are preserved. The fragments are of a generic open shape with a flat bottom and rounded walls. Only fragment DJ.11.A.O/23d has a quadrangular shape. The surfaces reveal different workmanship and finishing: 1) rough external and internal surface, with thin chisel mark (0.1cm) of working still visible as oblique parallel lines; 2) external surface well smoothed and the internal surface only partially smoothed; 3) both surfaces rough; 4) internal surface well smoothed and the external surface partly smoothed, with vertical chisel traces of working under the handle. Generally steatite vessels are related to cooking activities; these objects are common in the entire Arabian Peninsula, from the second half of the first millennium BC to the Islamic period.¹¹

10. See Loreto 2014: 139.

11. Steatite vessels are widely attested in South Arabia in both pre-Islamic and Islamic levels: at Hajar bin Humayd, in tombs and houses, See Van Beek 1969: 295, 313, 323-330; at Tamna, in private houses, See Loreto 2010: Fig. 379; at Yalâ, in a private house, see Loreto 2011: Appendix I, Fig. 26; in Minean and Islamic levels at Baraqish (publication in progress by the Italian Archaeological Mission).

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.09.A.O/7	level 2, above M1	length: 4.6 cm; height: 3 cm; thickness: 0.6 cm	rim preserved	fragment of steatite vessel with flat rim and vertical sides. Inner and outer surfaces smoothed
DJ.09.A.O/38.3	level 3b, M5 dismantle	maximum length: 5.6 cm; maximum width: 4.8 cm; thickness: 0.5 cm	fragment heavily worn	fragment of steatite vessel wall. Heavily worn, no traces of workmanship are visible
DJ.11.A.O/23a	N6-Ic, level 6, near M7	maximum length: 4.5 cm; maximum height: 2.6 cm; thickness: 1.1 cm	fragment	steatite vessel wall; surface smoothed
DJ.11.A.O/23b	N6-Ic, level 6, near M7	maximum length: 9.8 cm; maximum height: 4.2 cm; thickness: 0.8 cm	fragment	steatite vessel wall; surface smoothed
DJ.11.A.O/23c	N6-Ic, level 6, near M7	maximum length: 5.3 cm; maximum wall height: 2 cm; wall thickness: 0.7 cm	fragment	steatite vessel fragment: flat bottom and vertical wall; surface smoothed
DJ.11.A.O/23d	N6-Ic, level 6, near M7	maximum length: 4 cm; maximum wall height: 2.9 cm; wall thickness: 0.9 cm	fragment	steatite vessel fragment: flat bottom and vertical wall; surface smoothed
DJ.11.A.O/24	N6-Ic, level 3a	maximum length: 7.5 cm; maximum height: 4 cm; wall thickness: 0.6 cm	fragment	fragment of a steatite cooking vessel with flat rim and loop under the rim
DJ.11.A.O/30	N6-Ia, level 3b	maximum length: 6 cm; maximum width: 5.2 cm; wall thickness: 0.9 to 1.3 cm	fragment	fragment of steatite vessel (wall and horizontal handle). Surface smoothed. Vertical manufacturing traces above the external surface, under the handle
DJ.11.A.O/33	N6-IIId, level 8, above L8	maximum length: 5.8 cm; maximum width: 4.2 cm; bottom thickness: 0.4 cm; wall thickness: 0.3 cm	fragment	fragment of steatite flat bottom vessel with vertical wall

Table 15. Steatite vessels. Preliminary list

4. Terracotta

Thirteen terracotta items were collected, 5 of them representing a camel or a horse (DJ.09.A.O/45.5, DJ.10.A.O/30, DJ.10.A.O/43, DJ.10.A.O/44, DJ.11.A.O/47); 2 of them representing a human figure (DJ.09.A.O/39, DJ.11.A.O/37); 6 of them of uncertain attribution. Nine items come from Islamic levels: 3 from level 2; 2 from level 3a; 4 from level 3b. 4 items originate from pre-Islamic levels: 1 from level 5; 3 from level 10. The most interesting items are the human¹² and animal figurines. Although objects DJ.09.A.O/39 and DJ.11.A.O/37, both collected in Islamic levels, are not exactly identifiable, the figurines representing camels or horses show some decorative or stylistic traits which could be related to foreign traditions (Fig. 12). Items DJ.10.A.O/43 and DJ.11.A.O/47 found parallels from Thaj due to the type of decoration: dots arranged in lines.¹³

Five fragments of terracotta pipes were also collected: 4 from level 2; 1 from level 3b (Fig. 13). These pipes are similar in shape and decoration to those of Ottoman tradition dating back to the 18th century, since they show rhomboidal or leaf impressions.¹⁴

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.09.A.O/38.1	level 3b, M5 dismantle ²⁰	height: 5.2 cm; thickness 1 cm	fragment	fragment of pottery vessel (?) or architectural decoration (?) with vertical thick body. The two walls are connected with a ninety degree corner. One of the walls is complete and presents a few traces of white plaster. Inner surface well smoothed; external surface rough; only the external surface along the edge of the complete wall is smoothed.
DJ.09.A.O/39	N6-Ic, level 3a	height: 9 cm; width legs: 3 cm; width chest: 5.5 cm; arm width: 2 cm; thickness: 2 cm	arms and head fractured	female terracotta figurine. Legs, chest and right arms well recognizable. Two holes in the chest (breast). Surface smoothed. Coarse paste with big mineral inclusion
DJ.09.A.O/45.2	N6-Id, level 2	maximum length: 2.7 cm; maximum width: 2.2 cm; maximum thickness: 0.8 cm	complete. Few superficial scratches	unidentified terracotta plaque
DJ.09.A.O/45.5	N6-Id, level 2	maximum length: 6 cm; maximum width: 4.6 cm; maximum height: 4.5 cm	only the body is preserved	camel terracotta figurine. White to beige surface. Coarse orange paste. Rare alluvial sand inclusion, abundant irregular white nodules
DJ.09.A.O/45.6	N6-Id, level 2	maximum length: 12 cm; maximum width: 7.5 cm; maximum height: 5cm	many fractures and scratches	unidentified terracotta figurine
DJ.10.A.O/30	N6-IIb, level 3b, above Building A collapse in L8	length: 5.4 cm; height: 4.2 cm; width: 5 cm	only the body is preserved. Fire traces	camel (or horse) terracotta figurine. Compact orange paste; medium alluvial sand, abundant mineral inclusion. White painted surface
DJ.10.A.O/43	N6-IIIb, level 5	maximum length: 6.6cm; maximum height: 6.1cm; maximum width: 4.5cm	fragment	fragment of terracotta figurine (camel or horse). Fractured at the neck, legs and back. Surface white painted decorated by impressed points line. Coarse orange paste, white nodules and mineral inclusion (sand)

12. Parallels arise from Thaj. See Hashim 1991: 5-7, pl. 2.

13. Hashim 1991: 10.

14. Ward & Baram 2006; Hayes 1980.

Fig. 12. Terracotta figurines representing a camel or horse. DJ.09.A.O/45.5 from level 2; DJ.10.A.O/43 from level 5



Fig. 13. Fragments of terracotta pipes collected from the Islamic levels



DJ.10.A.O/44	N6-IIa, level 10, below L8	maximum length: 12 cm; maximum height: 5.8 cm; thickness: 3.2 to 6 cm	fractured	terracotta camel figurine. Fractured at the head, legs and back. The hump still visible in the middle of the upper surface. Coarse orange paste; core black. Small infrequent mineral inclusions. Surface natural
DJ.11.A.O/31	N6-Ia, level 3b	diameter: 5 cm ca	complete	fragment of clay over-cooked with a bronze insertion
DJ.11.A.O/37	N6-Ia, level 3b	height: 3.8 cm; maximum diameter: 3 cm	fragment fractured with many scratches	terracotta figurine. Fragment of a head (?). Cylindrical shape, the two ears visible; decorated by incised points arranged in circles and triangular incision. Surface smoothed. Only the lower edge is fractured. Coarse paste
DJ.11.A.O/43	N6-IIa, level 10, below L8	length: 6.2 cm; width: 5.3 cm; thickness: 0.7 cm ca	fragment	unidentified terracotta item (plug?). External surface smoothed; internal surface rough with geometrical impression (?)
DJ.11.A.O/47	N6-Ic, level 3a	total height: 8.5 cm; leg height: 4.5 cm; back width: 6.8 cm	fragment. Few scratches above the surface. Fractured at the bottom, at the back and at three legs	terracotta camel or horse figurine. Only part of the back and one leg are preserved. The back is decorated by almost three rows of parallel incision (0.3cm in length)
DJ.11.A.O/48	N6-IIa, level 10, below L8	maximum length: 8 cm; maximum height: 5.8 cm; thickness: 3.2 cm	fractured	unidentified terracotta item (figurine ?). Surface natural
DJ.10.A.O/32	N6-Ia, level 2	maximum length 4 cm; maximum width: 3.5 cm; maximum thickness: 2.4 cm	fragment	terracotta decorated pipe. Shank for a wooden thin stem and mortar are preserved. Visible the draught hole and part of the chamber. External surface (mortar and chamber) decorated by rhomboidal impression or incised band
DJ.10.A.O/33	N6-Ia, level 2	chamber maximum length: 4 cm; maximum diameter: 2.8 cm; mortar maximum length: 3.2 cm; maximum diameter: 2.2 cm	two fragments composed	decorated terracotta pipe. The mortar for the thin wooden stem is complete: it is decorated by two rows of rhomboidal impression delimited by an upper and a lower band small vertical incised lines. The chamber is almost complete: it is decorated by a central band of three rows of rhomboidal impressions delimited by a series of parallel incised lines and an upper and a lower band of small vertical incised lines. The bottom of the chamber is decorated by a single impression
DJ.11.A.O/18	N6-Ic, level 3b, Above L10b	maximum length 4.7 cm; maximum width: 2 cm; maximum thickness: 2.2 cm	fragment. Still visible fire traces inside the chamber	decorated terracotta pipe. Shank for a thin wooden stem and mortar are preserved. The draught hole and part of the chamber are visible. External surface (shank) decorated by impressed leaf and a single incised wavy line. Surface smoothed
DJ.11.A.O/46	N6-IIb, level 2	mortar maximum length: 4.8 cm; maximum diameter: 2.2 cm; chamber maximum preserved diameter: 2.7 cm	fragment	decorated terracotta pipe. Mortar complete. Only part of the chamber is preserved. The draught hole is still visible. Mortar surface decorated by continuous spiraliform band with small perpendicular lines. Chamber surface decorated by impressed triangular leafs
DJ.11.A.O/51	N6-IIb, level 2	maximum length: 1.8 cm; diameter: 1.4 cm	fragment of mortar	fragment of a decorated terracotta pipe. Only part of the mortar is preserved. External surface decorated by a continuous spiraliform incised band with small perpendicular incised lines

5. Textiles

20. See Loreto 2014: 116, 123.

Table 16. Terracotta preliminary list

Four items of leather and textile were collected from level 2, the only level to yield organic items: 1 woollen cloth; 1 fragment of leather bag; 2 different pieces of sandals, a wooden front part and a leather sole.

6. Miscellanea

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.11.A.O/49	N6-IIb, level 2	maximum length: 17.3 cm; maximum width: 10 cm	fire traces	fragment of woollen cloth. Color from yellow to brown. No traces of decoration
DJ.11.A.O/50	N6-IIb, level 2	length: 12 cm; maximum width: 7 cm; thickness: 0.4 to 0.7 cm	fragment	front curved part of a wooden sandal
DJ.11.A.O/52	N6-IIb, level 2	maximum length: 9 cm; maximum height: 6 cm; thickness: 0.2 cm	fragment of rim and bag	leather bag with a well-finished rim with woollen seam
DJ.11.A.O/53	N6-IIb, level 2	principal fragment: maximum length: 8cm; maximum width: 6.8 cm; thickness: 0.2 cm	two fragments	leather sole with woollen seam

Table 17. Textile items. Preliminary list



Fig. 14. An example of natural unprocessed coral (DJ.11.A.O/12) from level 3b and two processed coral necklace or bracelet beads (DJ.11.A.O/38 from level 2; DJ.11.A.O/45 from level 3b)

The last category includes a variety of Small finds from the excavation, provisionally placed in this category.

Three coral items were collected: 1 example of natural unprocessed coral (DJ.11.A.O/12) from level 3b and 2 worked coral necklace or bracelet beads (DJ.11.A.O/38, from level 2; DJ.11.A.O/45, from level 3b) (**Fig. 14**).

Three fragments of *Struthio camelus* eggshells were collected from the excavation: 1 (DJ.11.A.O/9) from level 3b; 1 (DJ.10.A.O/26) from level 8, Early Islamic re-occupation in Building A; 1 (DJ.11.A.O/15) from the floor level of Building A (level 9), which was embedded in the floor surface. No traces of decoration are visible on the objects.

Various fragments of white plaster plugs were collected: DJ.11.A.O/27a-d from level 7, Trench 1; DJ.11.A.O/35 from level 6, Trench 2. No specific marks were identified on the upper surface of the plugs, apparently related to a pottery vessel.

Two examples of wall plaster were collected from the Building A level of collapse (level 7) and from Building A foundation level (level 10). Both fragments differ from wall paintings related to Islamic structures (M31, M16).¹⁵

¹⁵. See Loreto Sector A, in this volume: 117, figs. 20-21.

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.11.A.O/12	N6-Ia, level 3b	maximum length: 3.4 cm; maximum diameter section: 0.3 cm	fragment, corrupted	fragment of natural coral unprocessed
DJ.11.A.O/38	N6-IIa, level 2	diameter: 0.5 cm; maximum height: 0.3 cm; medium diameter central hole: 0.2 cm	complete	coral necklace or bracelet circular bead. Surface smoothed. Lower surface flat; upper surface oblique-angled
DJ.11.A.O/45	N6-Ia, level 3b	maximum diameter: 2.3 cm; minimum diameter: 1.9 cm; height: 1.3 cm; diameter hole: 0.2 cm	complete. Few scratches above the surface	oval necklace or bracelet coral bead
DJ.10.A.O/26	N6-IIId, level 8, above L8 (Building A)	maximum length: 1.8 cm; maximum width: 1.2 cm; thickness: 0.15 cm	fragment	<i>Struthio camelus</i>
DJ.11.A.O/9	N6-Ic, level 3b in L14	length: 2.3 cm; maximum width: 0.8 cm; thickness: 0.15 cm	fragment	<i>Struthio camelus</i>
DJ.11.A.O/15	L10a, Building A floor (level 9)	maximum length: 2.5 cm; maximum width: 2 cm; thickness: 0.15 cm	fragment	<i>Struthio camelus</i>
DJ.11.A.O/27a-d	N6-IIId, level 7, above L7	a-c: irregular; medium length: 3 cm; d: 8 x 6.6 cm; thickness: 0.4 cm	fragments	fragments of plaster jar plugs; d: upper surface natural with unclear impressions
DJ.11.A.O/35	trench 2, level 6	a: height: 11.2 cm; width: 7.9 cm; thickness: 4 cm; b: height: 7.5 cm; width: 7 cm; thickness: 5 cm	fragments	plaster jar plug. White plaster mixed with few mineral inclusions. Fragment a: upper surface circular and smoothed
DJ.11.A.O/26	N6-IIId, level 7, above L7	diameter: 12 cm ca	fragment	wall (?) white plaster; medium alluvial sand, abundant mineral inclusion; infrequent ceramic inclusions (grits)
DJ.11.A.O/44	N6-IIa, level 10, below L8	diameter: 8 cm ca	fragment	wall (?) white plaster; medium alluvial sand, abundant mineral inclusion; infrequent ceramic inclusions (grits)

Table 18. Other objects: preliminary list

The Western Settlement

Sector C

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Sector C is located 3 km west of the historical area.¹ It was first studied by the French part of the Dûmat al-Jandal Project in 2010, during the 2nd season.

In 2011 the study of sector C included the completion of the survey map (**Fig. 1**) and the excavation of two new trenches. This was carried out from October 15th to November 6th.

Survey map of sector C

Due to the threats on sector C caused by building activities and the bulldozers (see the chapter on archaeological survey), it was decided to urgently survey some architectural structures in endangered areas. Most of these were observed for the first time in 2010 to the east of sector C (**Fig. 2**).

A wall observed in the line of unit 9 may well be the continuation of the enclosure wall to the east (**Fig. 1**). Other east-west oriented stone wall segments, parallel to the valley were observed in this area. To the south-east of the high outcrop of sector C, in a recently levelled area, we also surveyed three long irregular structures. The function of these walls is unknown, although they could be related to the delimitation of parcels of land or terraces.

Another concentration of walls was located near unit 4,² once more parallel to the plateau, suggesting the existence of a system of terraces positioned on the slopes of the valley.

1. Arbach et al., in this volume: 72, Fig. 19.

2. See Charloux, al-Traad *et al.* 2014: 180-181.



Fig. 1. 2011 map of sector C with location of soundings 4 and 5 on hilltop



Fig. 2. Location of activities (excavations, geophysics and topographical surveys) in sector C during 2011 season. (north on top, see **Fig. 1**). GeoEye-1 © GeoEye: <2011>; Distributed by e-GEOS (for GE-1 and IKONOS)

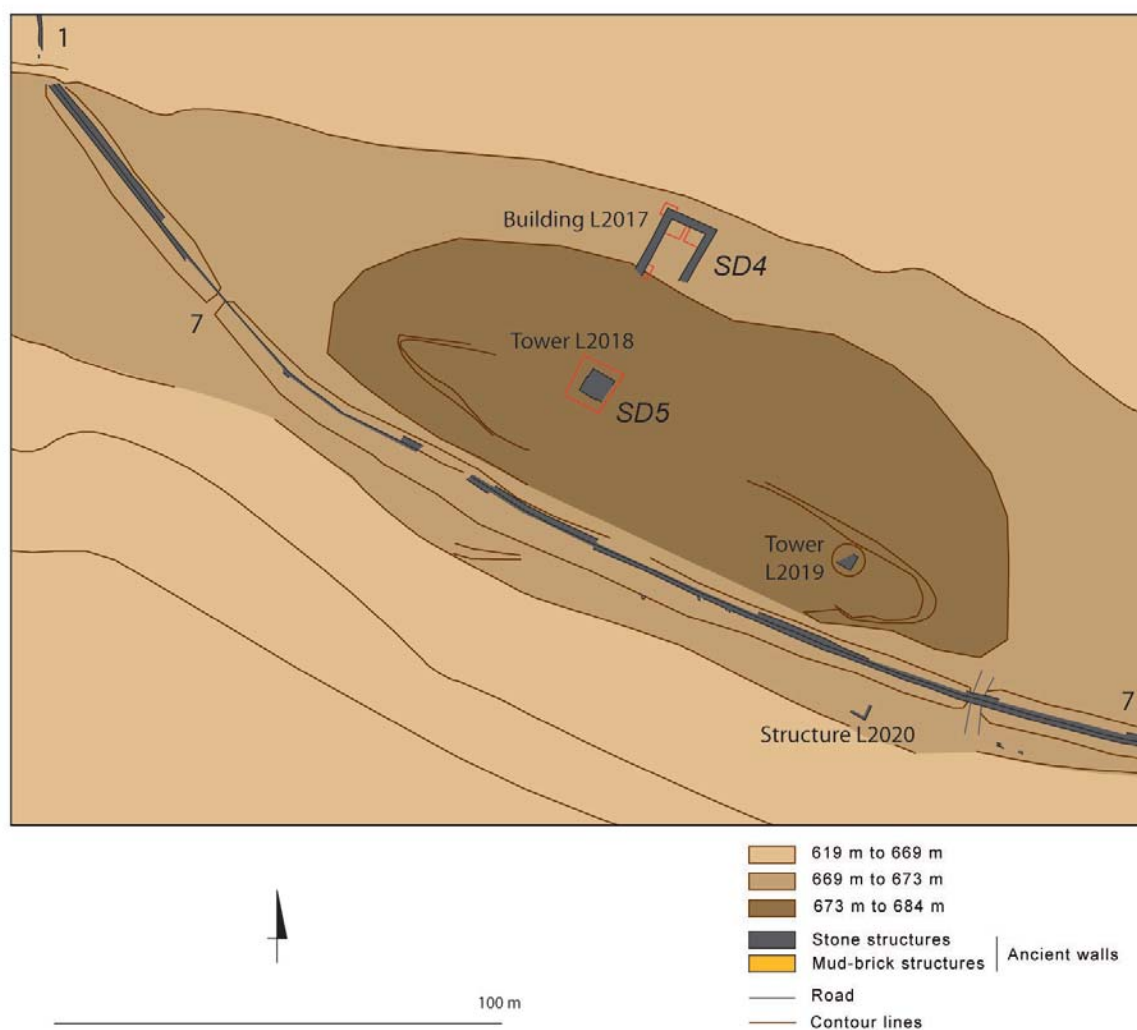


Fig. 3. Location of soundings 4 and 5 on the rocky promontory in sector C



Fig. 4. The western enclosure and the promontory in the background, looking south

Excavations

The excavations³ were concentrated on top of the orange limestone outcrop (**Fig. 3**) named “Rijm al-Burj” - the “ruins of the tower” - by 19th century explorers.⁴ The name “Al-Burj” is still nowadays the outcrop’s name, and logically one would assume the presence of such a construction there (**Fig. 4**).

This 650 m by 100 m (max.) tongue-shaped geological mound overlooks the whole valley and the region (**Fig. 5**). It is a perfect natural defensive position, as well as a landmark of the oasis visible from afar. Its top stands 68 m (max.) above the valley bottom and 15 m above the wide adjacent plateau located to the south beyond a small depression measuring 15 m deep and 40 m wide. The wide space on the outcrop is mostly flat, but an east-west elongated rocky hill is located in its central southern part (**Fig. 6**). As previously explained,⁵ the space located on top of the outcrop is not fully encircled by the southern wall of the enclosure (unit 7) (**Fig. 3**). We also noted the presence of a few other structures in this area: a concentration of walls near the plateau’s current point of access to the south-east, as well as two small stone mounds/cairns on top of the hill and one at the western end of the plateau (**Fig. 7**). All of these structures were opened during al-Dayel’s excavations in 1986 (soundings were not filled after work), or have suffered from robber pits. Otherwise, apart from these structures and the one described below, we noticed no other construction on top of the outcrop. The first geophysical survey appeared to confirm this surprising feature, which may be due to the fact that these structures were built directly above bedrock rock after more ancient ones had been removed.

Structure L2017: a Nabataean *Triclinium*

A stone structure located on the central part of the north edge of the outcrop, inside the enclosure, was a major focus of our attention. It was excavated partly by the al-Dayel team in 1986,⁶ and we were able to observe wide stone walls still standing (**Fig. 8**).⁷ The position and the monumentality of this building (identified as a large basin by al-Dayel) prompted us to open up a trench (sounding 4: SD4) in this area in 2011 (**Fig. 9**).

3. Ten Egyptian workmen participating in the excavation under the supervision of G. Charloux. For the methodological approach, see Charloux, al-Traad *et al.* 2014: 152-155.

4. Charloux, al-Traad *et al.* 2014: 171-173; Huber 1891: 49; Euting 1896: 125; Musil 1927: 467.

5. Charloux, al-Traad *et al.* 2014: 150-151.

6. al-Dayel 1986: 74 (Al-Burj is also called Ras al-Jabal): “The first trench [at the front side of the slope overlooking the valley] showed that the area was a rectangular basin covered with a stone layer at the three northern, eastern and western sides, in the form of stone foundations preventing water leakage. The interior wall of this basin is 150 cm. thick. A piece of a pottery jar was discovered in this basin. No more trenches were laid as there were no occupational layers or significant finds found in this site.”

7. Charloux, al-Traad *et al.* 2014: 172, fig. 25.

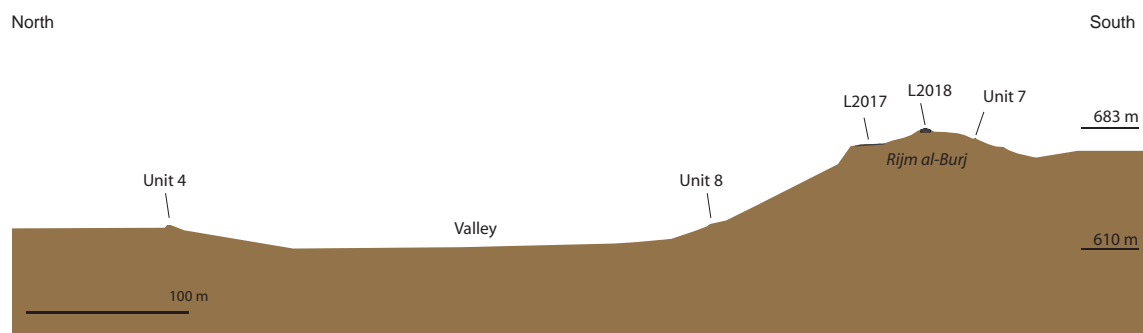


Fig. 5. North-south section of sector C showing slopes, contour lines and the location of the main archaeological structures



Fig. 6. Top of the promontory with main archaeological remains photographed with a kite, looking south-east



Fig. 7. Units 1 and 7 of the western enclosure and tower L2018 on the promontory, looking east



Fig. 8. Building L2017 photographed at the beginning of 2010 season. Notice al-Dayel excavations' trenches and some looting pits

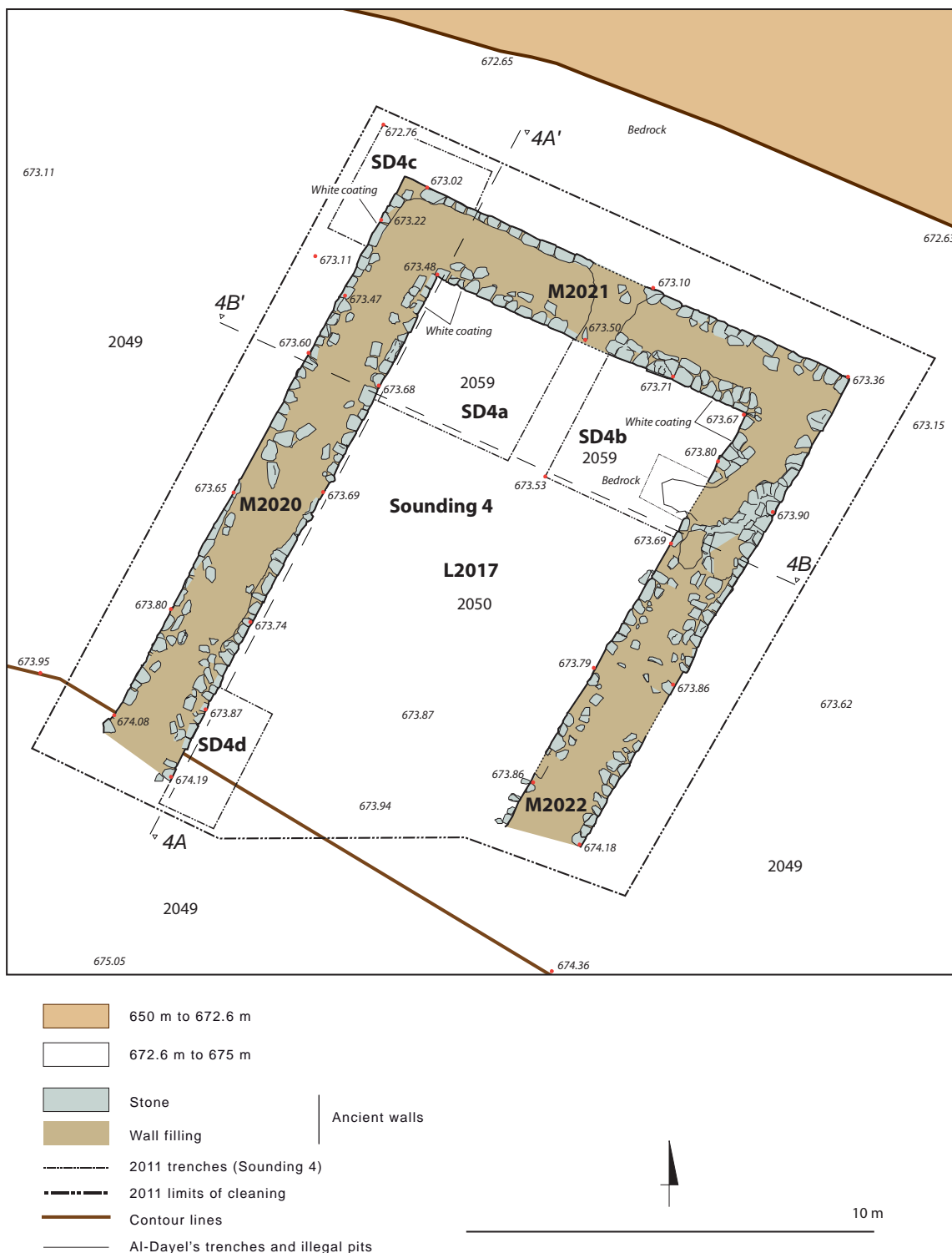


Fig. 9. Plan of building L2017 and location of main archaeological loci (sounding 4)

The complete layout of structure L2017 was easily visible after clearing a 15 x 18 m surface (**Fig. 10**). The ancient pits were also cleaned and surface layer 2049 was thrown away without sieving. 2049 is a shallow layer (a few centimeters) made of small stone fragments (3 x 4 cm) and silty dusty soil (coming mostly from the upper part of lower archaeological layers). The filling of the pits was also added to 2049 (mixed layers). Some large blocks in the ancient pits come from L2017 walls.

Seven pits and trenches were dug inside the structure before our arrival (**Fig. 11**). As we may see from the plan, the excavators (and probably some looters) chose to dig in strategic locations within the construction. The two inside corners of the structure were cleared (**Figs. 12-14**). One should note that some looting activities continued during our work at Dûma (3 times during the month).

In order to proceed carefully and to destroy as few clues as possible, we “re-opened” al-Dayel’s trenches and carefully studied the layers in the cleaned sections. Four trenches SD4a-d were therefore cleared: SD4a in the north-west corner; SD4b in the north-east corner; SD4c in the outside north-west corner and SD4d in the southern end of M2020 (**Fig. 9**).

This is a description of the structure:

L2017 is a U-shaped structure. Its three remaining walls measure each 1.90 m wide for a total length of 12 m to the north and only 11.60 m to the south (**Fig. 15**). The two opposite walls are thus not perfectly parallel.

Wall **M2020** measures 15.90 m at its maximum length and is 1.90 m thick on average. Only one course is preserved to the south; it is built in local orange limestone, its basal elevation is 674.09 m; to the north four courses were preserved, and basal elevation was at 672.96 m, more than one meter lower down (**Fig. 16**). The wall is preserved to a height of 73 cm (to the north). Its central part is more eroded, probably due to water runoff and the circulation of vehicles (**Fig. 17**).

Although we did not take a transverse section, it seems that wall M2020 is composed of two well built east and west stone faces, and that the inner space is filled with thrown blocks (rubble) and white greenish silty sand. Each face is made of regular 17-20 cm high courses and small stones (2-5 cm x 3-10 cm), linked with light green granulous mortar (sampled).

Wall M2020 was laid on the natural soil 2059 after the digging of a foundation trench to the north (**Fig. 18**), although no pit was seen to the south in SD4d (**Fig. 16**) where the southern end of M2020 may have been destroyed by erosion. The foundation pit seems to have been wider on the exterior (western) side.



Fig. 10. Kite view of Building L2017, looking east

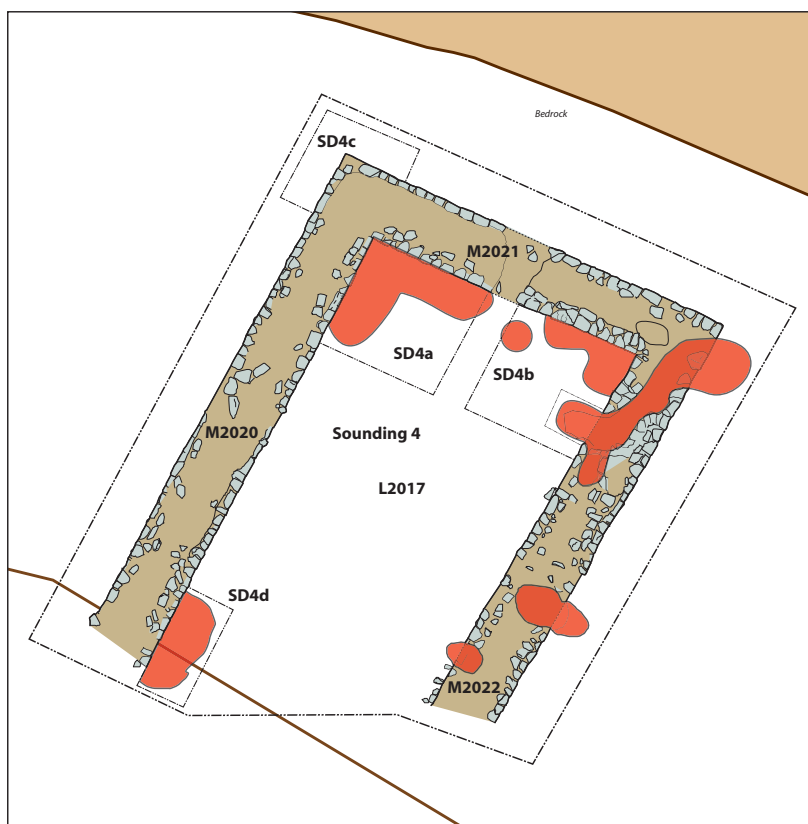


Fig. 11. Plan of building L2017 with location of al-Dayel's trenches and of main looting pits



Fig. 12. al-Dayel excavations' trench in the north-west corner of L2017 (SD4a), looking north

Fig. 13. al-Dayel excavations' trench in the north-west corner of L2017 (SD4a), looking west



Fig. 14. al-Dayel excavations' trench (?) in the north-east corner of L2017 (SD4b), looking north



Fig. 15. Building L2017 at the end of 2011 season, looking north

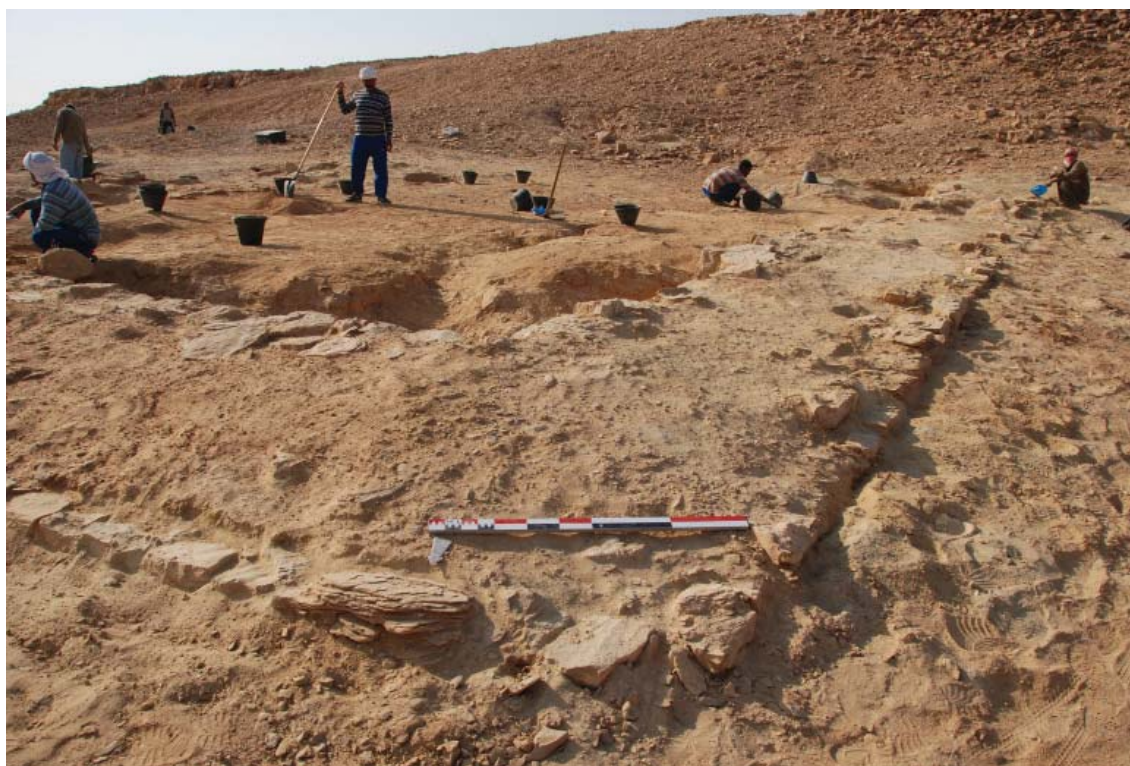


Fig. 17. North-west corner of building L2017, during excavation

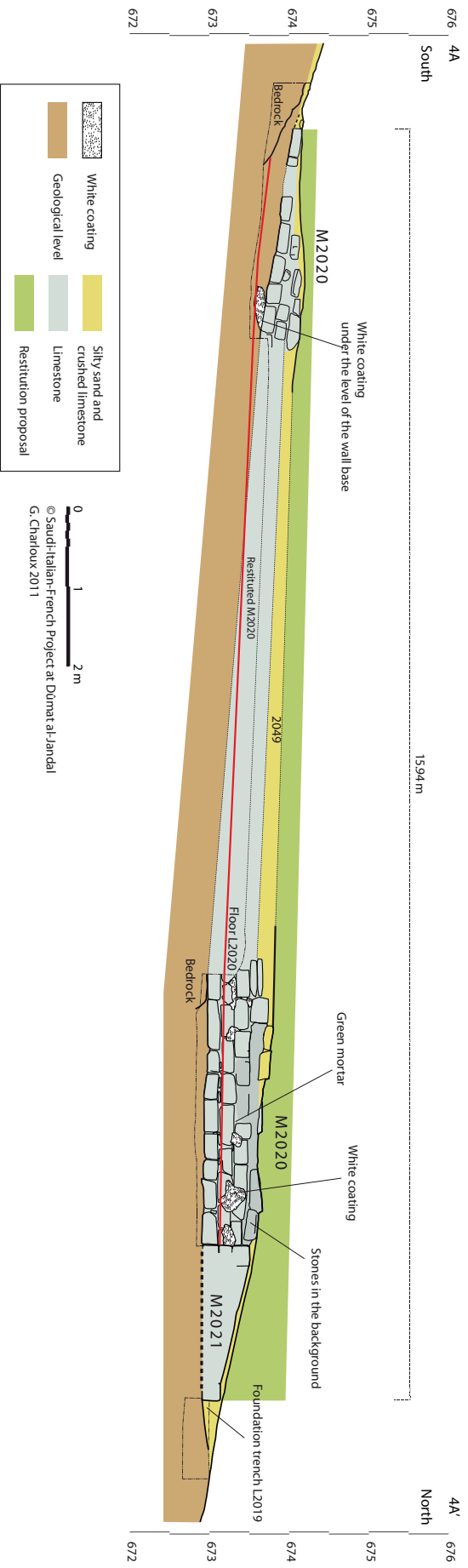


Fig. 16. Longitudinal 4A-4A' archaeological section in building L2017 (see **fig. 9**)

White coating (sampled) was observed on the eastern and western faces of wall M2020 (**Fig. 13**). In SD4a, the white coating stops before reaching the foundation trench of M2020. To the south (SD4d), on the contrary, the white coating goes down the base of wall M2020. It is surprising how far floor L2020 lies below the base of the wall (25 cm max.).

Wall **M2021** is both perpendicular and linked to M2020 and M2022. It is 11.97 m long and 1.90 m thick on average (1.83 to 1.93 m) (**Figs. 9, 11**). It is much eroded in its northern part, on the slope, as well as in the centre where it was affected by running water. White coating was only seen on its inner southern face, which is better preserved. Three to four stone courses are still in place. Previous excavators dug a hole inside the masonry to the north, taking away few blocks (**Fig. 12**). Wall M2021 was also founded on a trench dug into the natural soil.

Wall **M2022** (13.23 x 1.85 m) was thoroughly looted (**Fig. 19**) and almost totally cut in its northern part. This cut (**Fig. 14**) permitted us to study its inner filling, which is mainly made up of irregularly placed stone blocks. M2022 is still preserved on four stone courses. Unlike M2020, the western face of wall M2022 is founded immediately on the bedrock, which probably explains the difference in the altitude of its base; as in the case of the two walls previously described, white coating was observed down to the floor L2020. To the south we lost the wall earlier than M2020 (**Fig. 9**). However, a sounding in the future could enable us to reach its base further south.

The space enclosed by these three walls measures between 8.00 m and 8.20 m in width for *ca.* 14 m in length. No architectural structure was observed within the space. Furthermore we did not observe any wall to the south closing the space.

The study of the layers provided some interesting information concerning this wide space. First the markedly different colours of the soil inside (reddish-orange) and outside (whitish-gray) the structure L2017 were observed (**Fig. 20**). This aspect was explained during the excavation of sounding 4 (SD4a and SD4b), as a 55 cm-high succession of anthropic thinly bedded layers was noticed under the surface layer 2049 inside L2017 (**Figs. 18, 21-22**).

This succession of layers rests on top of the bedrock (hard light beige limestone, which disintegrates in its upper part into small flat stone fragments) covered by the natural soil (composed of a few shallow elongated layers of different colours. Underneath one finds pow-

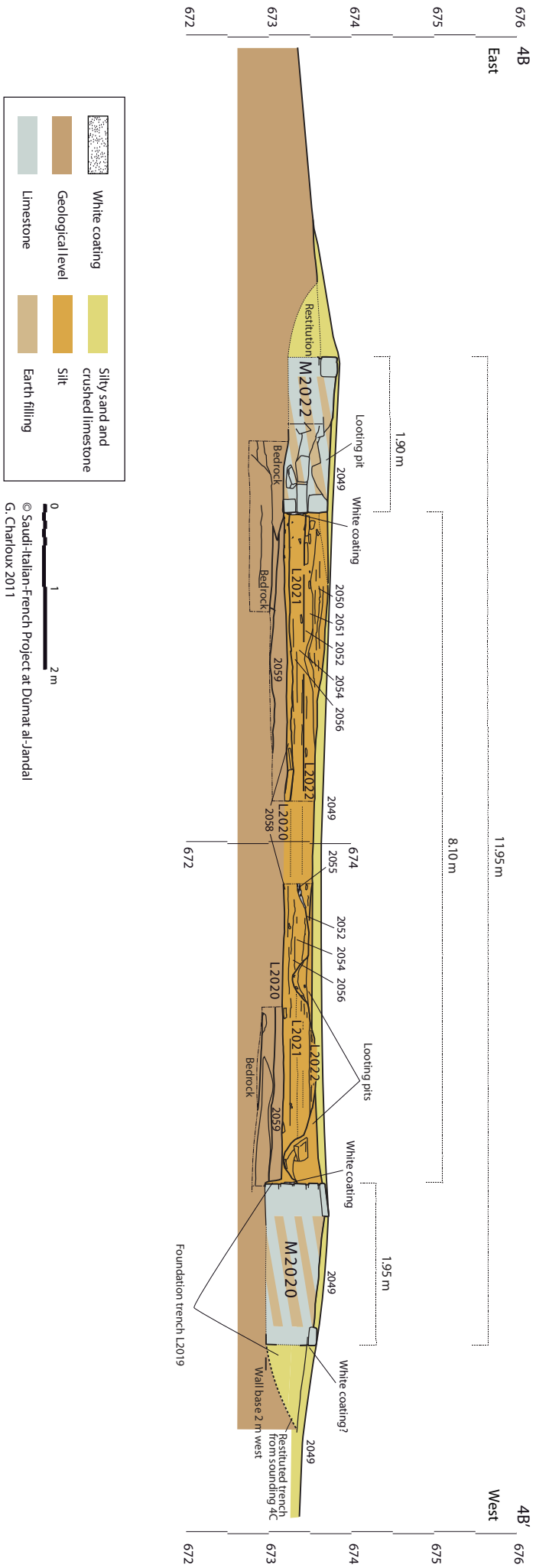


Fig. 18. 4B-4B' archaeological cross-section in building L2017 (see Fig. 9)



Fig. 19. Cleaning of wall M2022, looking north



Fig. 20. Building L2017 during excavation, looking north-east



Fig. 21. Section in SD4b (left part of Fig. 18)



Fig. 22. Section in SD4a (right part of Fig. 18)

der from under the bedrock, on which is deposited a small succession of white to orange or greenish silty-sandy layers [Fig. 18]). Layer 2059 (sampled) belongs to the upper part of the natural soil (marl): it is a greenish granulous silty soil, devoid of material. The mortar for the walls may have been made from this layer. The surface of 2059, used as a floor bedding (L2020) is flat, although we noted a small shallow depression to the south-east of SD4b (filled by 2058) (Fig. 23).

The succession of anthropic layers can be subdivided into two phases (from bottom to top):

Phase 1. On top of the initial floor/surface L2020, reached by the white wall coating, rests layer 2058, that is an orange to green silty soil (fully sieved) (Fig. 24).

- Floor L2021. Layer 2056 (fully sieved) comprises the material lying on floor L2021. We noticed many small circular and shallow depressions and cracks due to liquids, as well as ashy areas (notably 2057, small black grey to violet ashy area which was fully sampled) and a few small stones lying on it (Fig. 25) (some sherds from 2056 join with those from 2058).

- Layer 2054, light orange silty soil (fully sieved), rests on top of 2056. Partly aeolian.

Phase 2. Pottery sherds were observed: they were lying on floor L2022, small stones, one large rounded stone with a flat eroded surface positioned horizontally, a small concentration of ash (numbered 2053, sampled, SD4b) and one small hearth 2055 (sampled, SD4a), as well as traces of white coating. (Fig. 26)

- 2052 (fully sieved): comprises the material distinguished on top of floor L2022, under 2051.

- 2051 (fully sieved): light orange silty soil, less bedded and smoother than 2050, with small stones.

- 2050 (fully sieved): light orange silty-sandy soil, thinly bedded (more than sub-layers) and slightly crusty. Partly aeolian.

This stratigraphy of orange aeolian deposits mixed with anthropic material (dates, very few bones, charcoal pieces) and traces of human activities (liquid dispersion, ashy areas and pottery), in addition to the absence of walls, suggests the presence of an open space in the centre of the building L2017. The three identified floors (L2020, L2021 and L2022) are not well prepared, and were neither hardened nor coated like the walls of the structure. The material found in these layers appears rather scant, mainly composed of bowls, some of them eggshells. The pottery seems homogeneous, although some sherds from 2058 look a bit different, composed of whitish P1 fabric.



Fig. 23. Surface L2020 in the north-east corner of building L2017, looking north-east



Fig. 24. Layer 2058 during excavation, looking north-east



Fig. 25. Floor L2021, looking east



Fig. 26. Floor L2022, looking north

An interpretation of the function of structure L2017 depends on explaining its abandonment. The small quantity of deposit on top of the structure after two thousand years is surprising, although this is also the case for all the area on the outcrop, where little dust is deposited above the bedrock. In sounding 4, surface layer 2049 immediately covers 2050, and it seems that part of this dusty 2049 layer (removed during cleaning) is due to the erosion of 2050. Layer 2050 suffered from the same factors of erosion as the walls of structure L2017: wind, water and vehicles. As a matter of fact, the height of structure L2017 or of the filling of the space are both unknown. Was the whole superstructure removed in the past for use in other constructions? We may also wonder how wind erosion would have destroyed a wide monumental superstructure, since no traces of either stone block or mud-brick remain on top of the structure or on the slope of the outcrop.

Another hypothesis: the structure was not high and therefore its collapse did not result in a large fill of blocks. In this perspective, structure L2017 could fit well with what we know of the Nabataean *triclinium*, a U-shaped meeting hall. Three sides (benches / couches) enclose an inner open-air court, open to the south and with a wonderful view over the entire region and the western part of the oasis (**Fig. 27**). The access would have been located to the south as it would have been too dangerous to circulate on its northern side, near the slope.

Although we know a lot of *triclinia*, few are free-standing and open-air. The rock-cut *triclinium* remains the rule in the Nabataean world. The best known free-standing examples were found at Jabal Numayr (Petra),⁸ Hegra,⁹ at-Tannur¹⁰ and in the Herodian palace at Jericho.¹¹ The choice of this technique seems to be constrained by the environment, in particular the lack of available rock to cut, or of vacant space. It is certainly not the norm, but indicates the necessity of adapting a type of structure to a specific site. This may explain the great size of sector C *triclinium* (12 x 16 m), positioned on a wide flat surface on top of the outcrop, without any hindrance for an extension to the east or west, although the south and north sides are bordered by the slopes.

8. Tholbecq & Durand 2005: 303; Tholbecq, Durand & Bouchaud 2008: 236, fig. 1; 238.

9. Nehmé 2010b: 265-267, figs. 3-16.

10. Negev 1976: 45.

11. Netzer 2001: 189-193, 196.

According to the norm established by TARRIER,¹² we can suppose that around 23 people “lying at a slight angle, knees bent across the *Klinè*”¹³ were able to participate in a banquet, far more than the 12-13 people of most Nabataean *triclinia*.¹⁴

From a technical point of view, the sector C *triclinium* is comparable to the Hegra one, with each couch made of two parallel masonry walls enclosing an earth filling (unlike the example at Jericho). Substantial surface erosion prohibits any conclusion about the presence of covering flagstones as at Jabal Numayr or at-Tannur, although they have in common the presence of plaster on their sides.

According to TARRIER,¹⁵ the average height of the couches in open-air structures (50 cm) differs slightly from that of the troglodyte *triclinia* (60-90 cm high). If one accepts this average the restitution of the sector C *triclinium* becomes questionable, as floor L2020 is already located 60 cm beneath its eroded surface to the north. Another consideration concerns the strong slope of the base of L2017, which is also apparent for the first floor L2020 (around 4% in the same direction). This information suggests that the surface of the *triclinium* originally sloped towards the north, since almost 90 cm separates the first course of stone masonry at the southern extremity of wall M2020 from the one at the northern end. This slope may have been corrected so as not to be too steep, as we propose in the section (Fig. 16, attempting not to exceed 90 cm for the northern couch and a slope of 40 cm over 16 m, equivalent to 2.5%).

Such a size for a *triclinium*, implying many participants, the relative quality of the plastered construction, and the choice of location at the edge of the slope on top of a high promontory, raises questions about the Nabataean presence at Dûmat al-Jandal, as well as the social organization of the oasis inhabitants. Was the *triclinium* used only by a Nabatean elite? By a specific social group? If local inhabitants were not considered Nabataean, were they authorized to participate in the meetings? And was the *triclinium* used for religious and/or tribal purposes? It is important to consider the usual relationship of the *triclinium* with cultic or funerary activities and structures. At Hegra for example, the *triclinia* are systematically positioned close to betyles. We have found nothing comparable at Dûmat al-Jandal at this stage of research, although the particular position of the *triclinium* seems to relate it to the famous Nabataean ‘*hauts-lieux*’. At Beidha for instance, the elevated complex is set in “a rural landscape surrounded by vineyards” and was dedicated to Dionysos according to Bikai,

12. 1.5 m in width per person, according to the example given (TARRIER 1995: 165), although the author concludes that « En accordant un espace d'1 m de large pour chaque convive et en tenant compte de la longueur de la *klinè*, il est possible d'évaluer le nombre probable de participants, soit une douzaine le plus souvent, donnée qui s'accorde avec celles que fournissent les inscriptions » (TARRIER 1995: 180)

13. TARRIER 1982: 39.

14. TARRIER 1995: 180.

15. TARRIER 1995: 40.



Fig. 27. Building L2017 at the edge of the outcrop, looking east. Enclosure unit 8 to the north (here on the left)

Kanellopoulos & Saunders.¹⁶ Although we have no proof as yet that wine was produced in ancient Dûmat al-Jandal, vineyards exist today in the wâdî, and it could logically be assumed that the vine was brought in Antiquity from the Mediterranean area (but only archaeobotanical study could confirm this hypothesis). Furthermore, the fine Nabataean pottery (mostly bowls) dated between the mid-1st century B.C. - mid-1st century A.D.,¹⁷ as well as the presence of dates in the occupation layers, are in accordance with to the sort of festive activities which occurred in *triclinia*.

It should be noticed that at the end of the 2011 season sounding SD4 was completely filled in with earth in order to protect the wall masonry. The fallen segments of walls were quickly rebuilt and reinforced by reinstalling stone blocks in the linings of the faces and filling the empty spaces with earth (**Fig. 10**).

¹⁶. Bikai, Kanellopoulos & Saunders 2008: 495-496.

¹⁷. We want to thank Caroline Durand for her expertise.

Structure L2018

The other area of interest is located at the summit of the hill on top of the outcrop, where a large circular heap of fallen blocks was observed (14.5 x 14.5 m) in 2010 (**Figs. 4, 7**). This heap is surprisingly positioned in line with the walls of structure L2017, just 18 m away, leading us to suppose a relationship between the two constructions (**Figs. 6, 28**). It is located at the edge of the upper rock terrace, which explains why the heap extends to the north, on the slope where the blocks collapsed.

Two large looting pits were dug into this heap before 2010, where the alignments of stones suggested the existence of still standing walls and of a large structure. The first robber pit (L2023) was dug in the top middle part of the heap (**Fig. 29**), the second (L2024) against its north-eastern slope (**Fig. 30**).



Fig. 28. Stone heap covering L2018 (to the right) and, to the left, building L2017 excavated, looking east



Fig. 29. Looting pit L2023 in structure L2018, looking north



Fig. 30. Workmen cleaning collapse layer 2060, looking west



Fig. 32. Collapse layer 2060, front of wall M2024, looking west. Notice pit L2024 to the right

Sounding 5 (**Fig. 31**) concerns all the area around the heap, since cautious removal of collapsed stone blocks from the structure was required. This collapse, comprising blocks (ca. 35 x 20 x 12 cm) and beige silty dust, all mixed together, is labelled 2060 (**Fig. 32**). Removal began on the western side, since a recognizable limit was given by a north-south oriented stone alignment. Excavations thereafter extended to the south, in an attempt to define the structure's extent, and then to the south and to the west, which was more problematic.

The clearing of the collapse revealed a square construction (**L2018**) - each side measuring almost 5.50 m (**Fig. 33**). L2018 seems to be compact without an inner empty space. It is made of four walls M2023, M2024, M2025 and M2026 (**Fig. 31**), built of generally regular courses of orange limestone blocks of different lengths linked with dense green mortar (sampled). White coating (sampled) was observed on all sides. The inside space had been filled up in stages with stone blocks, as the walls have no inner face - this was clearly seen in the case of M2025, from the small trench opened up inside the structure (see below).

M2023 borders structure L2018 to the west (**Fig. 34**), and is the best preserved wall (1.53 m maximum height). It comprises nine courses of orange hard limestone over a distance

Fig. 33. Structure L2018, looking south-east



Fig. 34. Wall M2023 of structure L2018, looking east

of 5.56 m, founded directly on the bedrock. Due to the collapse, the upper part is irregular. Moreover, robber pit L2024 to the north destroyed the upper part of the corner created with M2024 (**Fig. 31**).

The wall presents a marked battering on the outside in its northern part. This may be due to the collapse of the superstructure, meaning a further stone collapse.

To the south, a projection is created by four stone courses which are positioned at right angles and a few centimetres away from the wall's face (**Fig. 35**). It cannot be compared with steps, as the surface of each course would not make it possible to climb them. This mysterious feature is found again to the southern side of L2018 (wall M2025), but is not so prominent. Both projections may perhaps have served to reinforce the more fragile sides. We also thought once that it could have served to drain water from the structure, as a squared section stone found in the projection of wall M2023 seems to fill a small square hole in the masonry. However this hypothesis does not seem to fit with the interpretation of the inner stone fill of structure L2018.

Noteworthy is a fragmentary inscription found on a badly preserved stone, reused in wall M2023 and placed in reverse. Inscription O.M2023-1 is hardly readable (**Figs. 36, 37**), but it is a rare example of North Arabian writing.¹⁸

M2024 is linked to M2023 and M2026, located north of structure L2018 (**Figs. 31, 38**). It measures 5.52 m by 1.30 m max. height in its centre (7 to 8 courses), as the eastern and western corners are badly preserved (2-3 courses). It is founded on the bedrock like the other walls (**Fig. 39**). White coating was cleaned at different levels on its northern face. We also noticed three (maybe four) small circular holes (around 4 cm diameter) dug into the bedrock front of wall M2024 (**Fig. 40**).

Only the last two courses of the northern corner of **M2026**, covered by white coating, are still standing (**Fig. 41**). Everything else from the wall was destroyed, and probably robbed in the past (L2025). Pit **L2025** did not extend far inside the structure, as shown by the archaeological section (**Fig. 42**). It was however difficult to distinguish this pit from the filling of L2018. Pit L2025 was also identified in the shallow section of the eastern bulk of sounding 5 (**Fig. 43**). For this reason, the eastern side of L2018 is poorly understood, and there is no suggestion of the existence of a staircase, ramp or other structure permitting access to or use of L2018.

¹⁸. As recognized by Christian Robin.



Fig. 35. Wall M2023, looking south-east



Fig. 36. North-Arabian fragmentary text DJ.11.C.O.M2023-1, inscribed in reverse on a stone reused in wall M2023

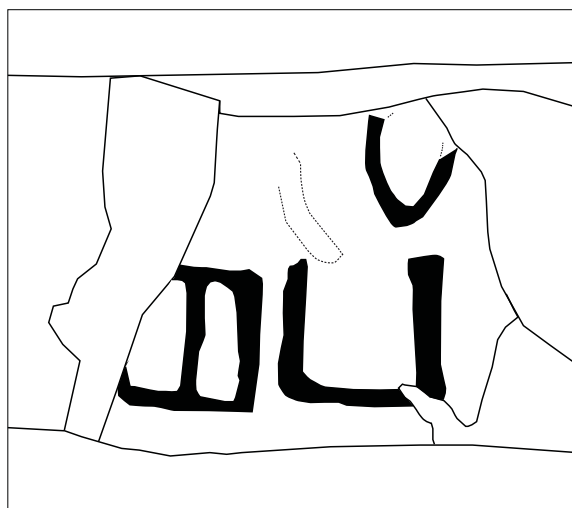


Fig. 37. Fac-simile of inscription DJ.11.C.O.M2023-1



Fig. 38. Workmen cleaning the bedrock front of wall M2024, looking east



Fig. 39. Wall M2024, looking south



Fig. 40. Small holes dug into the bedrock, front of M2024, looking south



Fig. 41. White coating remaining on wall M2025 (north-east corner of L2018)

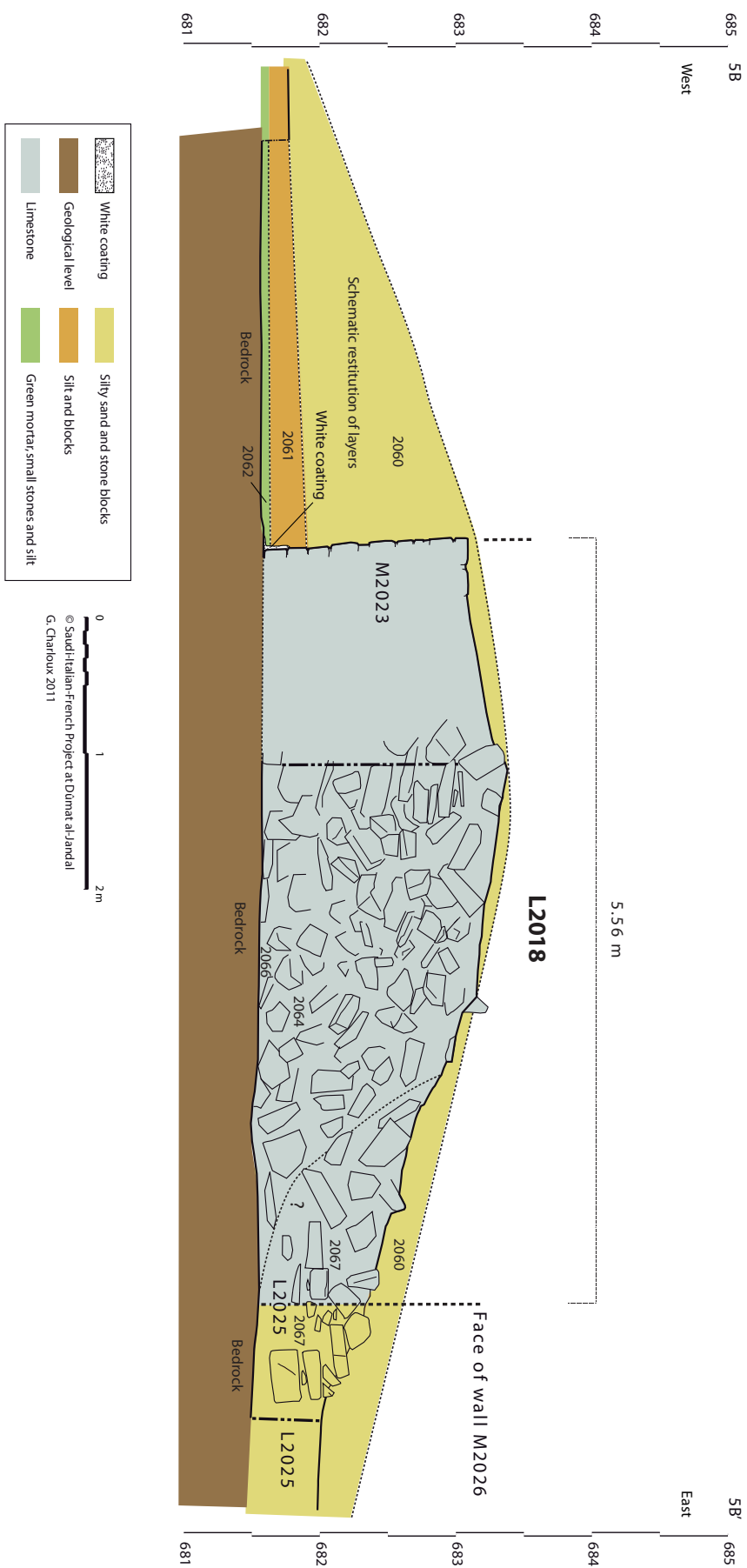


Fig. 42. West-east archaeological section 5B-5B'



Fig. 43. Layers in east bulk of SD5, looking east



Fig. 44. South west corner of structure L2018, looking north-east

M2025 is linked with M2023 and is preserved to 1.44 m max. high (9-10 courses) and over a length of 4.98 m, although the cleaning of the white coating shows that it continued initially 0.54 m further east (**Fig. 44**). The eastern side of L2017 suffered heavily from the collapse of the structure, but also from robber pit L2025 (**Fig. 45**). As in the case of M2023, a projection in the western part of wall M2025.

While studying the eastern side of wall M2025 it was noticed that it had no northern face and was constituted of only one row of stones held to the north by the filling (numbered 2064) of the structure (**Fig. 46**).¹⁹ The walls of L2018 were not prepared in a first phase (the space being filled in a second phase), but they were set at the same time as the fill took place, an explanation of why the holes in the masonry of M2025 are roughly filled in with irregularly cut blocks (**Figs. 42, 47**).

Outside structure L2018, a succession of three layers were cleared (**Figs. 43, 48**):

1. Collapse layer 2060 (previously described, **Fig. 32**).

2. Floor layer 2061 (compact beige silty soil with little material, **Fig. 49**). A concentration of sherds was clearly visible in the southern side of L2018, near fireplaces 2065 and 2063 (**Fig. 50**). The layer seems to slope up from west to east, in front of M2025. To the west of M2023, it was further damaged by the collapse of L2018.

3. Bedding layer 2062 (Compact, slightly sticky, beige, slightly greenish in places, silty-clayey soil, with little material. It seems to be concentrated around the structure, as a preparation layer for floor L2026, looking like mortar (**Fig. 51**); [its material is probably partly mixed with that of 2061]).

¹⁹. Layer 2066 (few centimetres of brown reddish silty layer with small stones), is located under 2067 and above the bedrock.



Fig. 45. Sounding in structure L2018, looking north



Fig. 46. South section in structure L2018



Fig. 47. North section in structure L2018



Fig. 49. Layer 2061, front of L2018



Fig. 50. Small hearth 2065 and floor layer 2061 in front of wall M2025, looking north



Fig. 51. Bedding layer 2062, front of L2018, looking east



Fig. 52. Filling of stone blocks of the sounding removed from structure L2018, at the end of 2011 season, looking north-west



Fig. 53. “Tower” L2018 and the promontory photographed from the adjacent southern plateau

At the end of the season, we took minimal protective measures: a dry-stone wall was erected to the east, parallel to the remains of M2026, and the trench inside structure L2018 was filled in with blocks (**Fig. 52**). This work was done in order to preserve the ancient walls and to prevent the structure collapsing, as well as to give an overall sense to the structure (**Fig. 53**).



Fig. 54. Location of archaeological structures on top of the promontory (north on top, see **Fig. 2**). GeoEye-1 © GeoEye; <2011>; Distributed by e-GEOS (for GE-1 and IKONOS)

Discussion

To conclude, L2018 is a compact square structure set on the bedrock. It was apparently the foundation of a tall construction, in view of the large quantity of stone blocks lying all around.²⁰ The access (ramp, staircase, other?) of L2018 was probably originally placed to its eastern side, and is now destroyed. The white coating, the good quality of the construction, its massiveness and its position dominating the whole region (**Fig. 53**) seem to indicate that this structure was a tower,²¹ probably used more for strategic and military goals (maybe in relation with the enclosure, **Fig. 54**), rather than for religious or funeral purposes.

This hypothesis fits well with the existence of another structure L2027 of the same kind, although smaller, which is located 64 m to the east of L2018, at the top of the outcrop (**Fig. 3**). Three perpendicular walls were surveyed, almost completely aligned with L2018. They seem to form a square plan (3.50 x 3.40 m). It will be necessary to study this structure in a future sounding.

Unlike in the case of L2017, the Nabataean *triclinium*, a full study of ceramic sherds is warranted to attribute a date for L2018. However, we already know that some ceramic

²⁰. At the end of the campaign, the measurement of the rows of stored stoneblocks indicates however a volume of 76 m³. For a 30.25 m² structure, it represents only an height of 2.5 m to add to the actual structure, around 3.5 – 4 m in total.

²¹. The hypothesis of an altar seems rather improbable.

forms from layers 2061 and 2062 recall the pottery found last year in sounding 3, which may be dated to the 1st-4th century A.D. The contrast with the material from *triclinium* L2017 (fine Nabataean material) may suggest that the latter was built and used earlier than tower L2018 (L2017 seems to have undergone only a relatively short period of use, as shown by the stratigraphy).

This hypothesis seems to be confirmed by the discovery of a coin (O.2060-1; altitude 682.02 m) apparently dating from the beginning of the 4th century (reign of Licinius) in the collapse of L2018 (**Fig. 55**). This coin, however, does not give a *terminus post quem* for the collapse, nor for the last use of the structure, as the coin could come from the masonry of the structure or from one period of its occupation/use. It only suggests that the tower was very probably standing at that time. An inscription written in transitional characters between Nabataean and Arabic O.2060-4 found at the base of the tower (**Fig. 56**), above 2061, seems to indicate that the full collapse of the structure did not happen before the 4th century A.D. and possibly the 5th, according to the palaeographical characteristics of the script.

Results from the 2011 season of excavation seems to indicate the existence of a continuum of occupation/use of sector C in Nabataean and Roman periods. In order to verify this hypothesis, it will be necessary during the next seasons to detect and study the stratigraphy of some residential units in sector C.



Fig. 55. 4th century coin DJ.11.C.O.2060-1



Fig. 56. An inscription written in transitional characters between Nabataean and Arabic (around 4th-5th cent. A.D.), DJ.11.C.O.2060-4, found at the bottom of collapse layer 2060

A “Transitional” Inscription from Dûmat al-Jandal

Laila Nehmé (CNRS, UMR 8167)

The stone O.2060-4 (**Fig. 1**) shows four lines of text.¹ It seems to be broken on the left, although this is not certain. It is clearly written in transitional characters between Nabataean and Arabic, a category of script which was previously defined.²

It reads:

$\{b\}\{n/r\}'l'h$	{Bin/Bar}'al'ilâh
<i>mlkw br ..</i>	Mâlikû son of ..
$\{hym\}w$	{Hayam} and
$t\{y\}hh$	Ta{y}ḥah

It seems that we are dealing with a succession of names.

The first one can tentatively be read $\{b\}\{n/r\}'l'h$, a name which is not attested elsewhere in Nabataean. The first letter is considered uncertain because one would normally expect a less squarish form of the letter in a transitional text. This form, with three strokes, is however found occasionally in transitional texts, including along with non squarish forms in the same text, as seems to be the case here since the *b* in *br* in line 2 has two strokes only. The second letter is very straight and rather long, which makes it possible to read it as a *n*, although a *r* is more probable if we compare it with the letters which follow *mlkw* on line 2, almost certainly *br* and not *bn*. The *l'* has the normal form it has in inscriptions written in transitional characters.³ The name means literally “the son of the god” and this expression is known neither in Nabataean nor in Arabic. Compound names with *'lh/'lhy* are known in Nabataean but they are never preceded by the article: *grm'lh*, *'w'lh*, *š'd'lh*, etc.

¹. See Charloix *et al.* Sector C, in this volume: 224-226, fig. 56 (SD5), for the archaeological context of the discovery.
². Nehmé 2010a.
³. *Ibid.*: 54 and fig. 4.

Fac-simile of the inscription, showing four lines of cuneiform text. The characters are stylized and arranged in a grid-like pattern, typical of ancient Mesopotamian writing.



Fig. 1. Inscription DJ.11.C.O.2060-4, with its fac-simile

The beginning of line 2 clearly reads *mlkw* and it has the same form as the one it has in another text in transitional characters, from Sakâkâ, S 3.⁴ Note the position of the ligature between the *k* and the *w*, which is right at the bottom of the loop. *Mlkw*, which corresponds to the very widespread name Mâlik, is followed by *br*, but what comes after is unclear. It may be a *b* followed by a *n* but this remains conjectural.

The third line can be read in different ways and is not certain at all. The first letter(s) could be read either as *hy* or simply as a *‘*, depending on whether one takes into account the part of the letter which appears in grey on the facsimile. What comes after is either a final *h* or a final *m*. A medial *m* is excluded because it would have to be joined to the following letter, the *w*. However, the name *hyh* does not exist and *hym* has tentatively been preferred. This name was read once in a Nabatean inscription from Hegra, JSNab 309, the reading of which, possible but doubtful, was checked on the original. It is not certain whether the *w* which follows is part of the name but since there is a rather large space between the *{m}* and the *w*, it is probably better to consider the latter as a conjunction. Note that the name *hymw* was read in *CIS* II 338, from Laqat, a site between Taymâ’ and Hâ’il but the text is known only from a copy made by J. Euting. In this text, *lhymw br[h] šl[m]*, “for Ḥaymû [his] son and may he be safe” follows the expression “May So-and-So be remembered in the presence of Dûšarâ”.

The last line is a single name, the reading of which is almost certain, except for the second letter, which may be either a *y* or a *b*. Neither *tyhh* nor *tbhh* exist in Nabataean. Because the letter is slanting slightly to the right, a *y* may be preferred, thus *tyhh*.

This series of names is not very informative, despite the fact that it seems to mention at least two names which were not known previously in the Nabataean onomasticon. The script is rather evolved and one should note that S 3, mentioned above, which shows a very similar form of *mlkw*, is probably dated to the fifth century. This text may be a bit earlier (fourth) but not much earlier.

4. Nehmé 2010a: 72, fig. 30.

The Faunal Remains: Preliminary Results

Hervé Monchot (Labex-RESMED, PRES Sorbonne Université)

The data presented in this paper are the results of analyses conducted on a zooarchaeological assemblage recovered during joint Saudi-Italian-French excavations at Dûmat al-Jandal from 2009 to 2011.¹ In Trench 1 of sector A, in the historic-urban area, the vast majority of bone material originated in archaeological levels ranging from the Late Islamic to Early Nabataean as clarified by archaeologist Romolo Loreto. By comparison, little material was found in the western enclosure wall area of sector C, located roughly 3 km west of Qasr Mârid.

Unlike sector C, where sediment was systematically screened with a 7 mm mesh, no sieving was done during the excavation of sector A and faunal material was mainly hand-collected. The identification of faunal material was conducted in the field by the author during the 2011 investigations. Subsequent zooarchaeological analyses, the results of which are presented here, aimed at better understanding the developmental dynamics of the management and exploitation of animal resources during each phase of occupation at each settlement, as well as assessing the main registered diachronic changes. Since excavations and research at Dûmat al-Jandal are ongoing, these results and hypotheses are merely preliminary.

¹. Charloux & Loreto 2012.

Material and methods

Using a modern animal bone comparative collection, bone specimens were identified to the lowest possible taxonomic category and the anatomical element, or portion thereof, represented. Where necessary, published literature, including Barone's² anatomy atlas and Smuth and Steiger's³ papers regarding the camel, were consulted.

Sheep (*Ovis aries*) and goat (*Capra hircus*) specimens were identified using morphometric criteria.⁴ When it was not possible to distinguish between the two species, their remains were assigned to a combined sheep/goat category (i.e., ovicaprids, O/C).

In the absence of established biometric criteria, the identification of gazelle specimens was facilitated by various bibliographical references.⁵ Distinguishing between gazelle specimens at the species level is difficult due to the coexistence of three species in Arabia: the mountain gazelle, *G. gazella*, the goitred gazelle *G. subgutturosa* and the dorcas gazelle *G. dorcas*.⁶ A biometric study should enable the distinction between gazelles at the species level.

Due to the high bone fragmentation, certain categories based on animal size were used to sort the unidentified fragments:

SM: small mammals, unidentified ovicaprids-gazelle-dog size

MM: medium mammals, unidentified veal-oryx-young camel size

LM: large mammals, unidentified horse-cattle-camel size

IND: indeterminate fragments

The quantification of bone remains is based on the total number of identified specimens (NISP), on minimum of number of individuals (MNI) and on minimum number of elements (MNE). The MNI is defined as “the smallest number of individual animals needed to account for the specimens of a taxon found in location”.⁷ The MNE is an estimate of the skeletal abundance, i.e. the minimum number of skeletal parts or portions necessary to account for the specimens under study.⁸

2. Barone 1986.

3. Smuth 1987; Steiger 1990.

4. Boessneck *et al.* 1964 ; Prummel & Friesch 1980.

5. Helmer & Rochetau 1994; Munro & Bar-Oz 2011.

6. Harrison & Bates 1991.

7. Ringrose 1993: 126.

8. Lyman 2008: 218.

All the measurements and abbreviations used are according to Driesch's standard.⁹ Measurements were taken using a calliper and are expressed in millimetres.

To estimate the age at death two main methods were utilized. The first is by estimating the stage of tooth eruption and analyzing dental wear.¹⁰ The second method is less reliable, based on the various taphonomic processes affecting the skeletal remains, especially those of young immature individuals and bones with a high marrow and spongiosa content. As no age data for the development of the postcranial skeleton in camels are available in the literature, we have used the data for slowly maturing from the 19th and early 20th century cattle breeds.¹¹

The excavations carried out at Dûmat al-Jandal yielded a large sample of 2340 identified items: 1555 from sector A (2009-2010 seasons - material from the season 2011 has not yet been studied) and 785 from sector C (2009-2011 seasons).

9. von den Driesch 1976.

10. Payne 1973. Lesbre 1903.

11. von den Driesch & Obermaier 2007: Tab. 6.

The faunal remains from Sector A

To better understand the chronology of the complex sector A, Trench 1, a provisional sequence of the archaeological levels, structures, and materials for ancient Dûmat al-Jandal was proposed:¹²

- Early Islamic (15th-18th century AD): surface level 1 and sandy aeolian level 2.
- Middle Islamic I (8th-15th century AD): level 2b (M10 collapse)
- Middle Islamic II (8th-15th century AD): structure M10
- Middle Islamic III (8th-15th century AD): levels 3a-b (stone rubble) and level 4, part of level 3 gravel.
- Early Islamic I (8th century AD): level 6 (occupation deposit above L10-L10a); level 11 (aeolian sandy layer above the collapse of Building A in Locus L9)
- Early Islamic II (7th century AD): level 7, collapse of Building A above Locus 8; level 11, aeolian sand above the collapse of Building A in Locus 9.
- Roman/Byantine (2nd century AD): occupation deposit above locus 8 (Building A construction)
- Late Nabataean (2nd-6th century AD): level 5, occupation deposit outside Building A.
- Early Nabataean (1st century BC-1st century AD): material from the Building A foundation trench, level 10 (re-used pottery items).

The faunal list

In sector A, Trench 1, the faunal material comprises 1.455 bone specimens, which were unearthed in the various archaeological levels, especially in the filling levels 2 and 3 (**Tab. 1**). Among these, the majority were identified as belonging to camel (n=927), followed by ovicaprids (sheep/goat, n= 272). No complete long bones or teeth were recovered as a result of fragmentation during excavation. No articulated specimens were recovered.

- **The camel** (*Camelus dromedarius*): the assemblage from sector A contains 927 specimens (63.7%). The occurrence of camel bones in all the stratigraphic units is not surprising, given the local oasis environment in an otherwise desert region.

¹². Loreto 2012: Tab. 1: 98.

Level	Age Period	Type of deposit	NISP	Weight	Dro.	O/C	Oryx	Gaz.	Donk.	Dog	Oys.	But.	Bird	LM	MM	SM	Ind.
S. B	19th century	Sector B	14	860	10	3							1				
2	Late Islamic	Aeolian sand	329	18210	228	46	18					1		9	16	7	4
3a	Middle Islamic	Discarded stones	329	17480	211	60	3	4	1	1				7	19	9	14
3b	Middle Islamic	Discarded stones mixed with earth	324	12015	207	72	2	3	2	1			1	16	13	2	5
4	Middle Islamic	Discarded stones	153	7485	118	19	1	3						7	2	2	1
L6	Middle Islamic	Building L6 and occupation deposit	150	5080	90	50	2							1	2	5	
11	Early Islamic	Aeolian sand	4	220	3												1
6	Early Islamic	Occupation deposit	32	950	17	7				2				2	2	2	2
7	Early Islamic	Building A Collapse	63	2320	36	11	4	1						5	5	5	1
8	Roman/Byzantine	Occupation deposit (brown earth mixed with pottery) above Building A floor	4	20	1												3
5	Late Nabatean	Fill between building A and rock hill	8	480	4	2											2
9	Nabatean	Building A floor: compacted earth mixed with pottery	7	15	1							1					5
10	Nabatean	Building A foundation: discarded stones and pottery	38	1170	2	2	2	11						1	1	1	18
Total			1455	66305	927	273	10	33	14	2	3	1	2	48	61	29	52

Tab. 1. Number of animal remains from the various levels of Sector A (2009-2010 excavations). (NISP = Number of identified specimens; Weight in grams; Dro. = camel/dromedary; O/C = ovicaprids (sheep/goat); Gaz. = gazelle; Donk. = donkey; But. = Buteo; LM = Large-sized Mammals; MM = Medium-sized Mammals; SM = Small-sized Mammals; Ind. = indeterminate)

Levels	2	3(a+b)	4	5	6	7	8	9	10	11	L6	SB
MNI camel	4	8	4	1	1	2	1	--	1	1	4	1
Juvenile	1	1	2			1					2	
Adult	2	6	2	1	1	1	1		1	1	2	1
Old	1	1										

Tab. 2. Camel MNI according to the stratigraphic layers and individual age

Based on the stratigraphic occurrence of camel teeth (upper and lower) and unfused long bones, an estimated minimum number of 28 individuals were identified: 7 juveniles, 19 adults and 2 old individuals (**Tab. 2**).

In level 2, the juvenile was aged at less than one year (second phalanx not fused). In level 3, the juvenile was aged at less than one and half years (first phalanx not fused). In level 4, both individuals were aged at less than 3 and a half years and 4 years, respectively. In level 7, the juvenile was aged at three and a half years (proximal calcaneus). Lastly, the two Building 6 juveniles are aged at less than two years (maxillary with milk tooth and unfused tibia). According to the tooth wear stage, the old individuals are aged at > 6-8 years. Camels reach sexual maturity around 4 years of age. No yearling individuals were revealed in the bone assemblage.

Table 3 presents the skeletal profile for the levels where the camel is most abundant. Where all body parts are represented, noteworthy is a deficit in short bones (i.e., carpals or phalanx) and teeth, which are poorly preserved. The slight overrepresentation of vertebrae and certain long bones is understandable given the intense fragmentation of these elements (i.e. several specimens can belong to the same element; see NME values in **tab. 3**). The presence of feet and cranial elements, considered to be non-dietary portions, confirm the idea that we are not at a butchery site. Instead, this suggests excavations are probably taking place in a former refuse or midden location. According to the modified general utility index or MGUI,¹³ the parts of the skeleton with a low utility index, such as feet and skull, may be abandoned at primary butchering areas. Conversely, meaty parts, such as the pelvis and limbs, are more likely to be transported from the butchering site and deposited closer to the site where secondary processing and consumption occurred.

13. “The MGUI is one of a series of indices meant to measure the food value or utility of the soft tissues associated with or attached to the different skeletal part in carcass”, Lyman 1994: 510.

NISP/NME Elements	Camel				Ovicaprids			
	L. 2	L. 3	L. 4	S. 6	L. 2	L. 3	L. 4	S. 6
Skull (+ Horncore)	1/1	8/2	3/1	6/1	3/1	7/2	2/1	1/1
Maxillare	6/3	7/3	1/1	5/3		2/2		4/4
Mandible	6/4	22/6	8/3	4/2	1/1	3/3		6/5
Isolated teeth	1/1	9/4	1/1	2/2		3/3		2/2
Cranial	14/9	46/15	13/6	17/8	4/2	15/10	2/1	13/12
Cervical vertebra	5/2	2/2	3/2	4/2	3/3	5/5		1/1
Thoracic vertebra	17/10	30/23	10/7	5/4		1/1		1/1
Lumbar vertebra	10/3	7/2	7/3	4/2		2/1		1/1
Vertebra indet.	5/4	38/24	4/3	2/1	3/3	1/1	1/1	
Sacrum		2/1		1/1	1/1			
Caudal vertebra		3/3						
Sternum						1/1		
Rib	27/8	38/11	5/2	14/3	1/1	9/3	1/1	16/4
Axial	64/27	120/66	29/17	30/13	8/7	19/12	2/2	19/7
Scapula	8/3	7/6	2/1	1/1	3/2	14/7	1/1	3/3
Humerus	19/9	30/11	7/4	4/3	6/5	17/9	4/2	2/1
Radius	17/7	15/6	9/3	2/1		11/6	3/1	
Ulna	6/5	9/7			1/1	2/2		
Upper forelimb	50/24	61/30	18/8	7/5	10/8	44/24	8/4	5/4
Carpal	7/7	5/5		1/1		1/1		
Metacarpal	4/3	5/4			1/1	1/1		1/1
Lower forelimb	11/10	10/9		1/1	1/1	2/2		1/1
Pelvis	9/4	10/5	1/1	3/1	4/3	5/2	1/1	3/3
Femur	12/6	26/8	6/2	1/1	7/4	21/7	5/2	3/3
Patella	4/4	8/8	2/2		1/1	2/2		
Tibia	11/8	11/6	5/2	3/1	3/3	9/6		4/3
Fibula (malleolus)		1/1						
Upper hindlimb	36/22	56/28	14/7	7/3	15/11	37/17	6/3	10/9
Astragalus	7/7	13/12	7/7	3/3	3/3	5/5		1/1
Calcaneus	6/4	18/12	4/3			4/4		
Other tarsal	2/2	3/3		1/1				
Metatarsal	1/1	2/2	5/2					1/1
Lower hindlimb	16/14	36/29	16/12	4/4	3/3	9/9		2/2
Metapodial	17/4	40/6	12/3	7/4				
Phalanx 1	15/13	14/11	9/6	1/1	1/1	1/1		
Phalanx 2	1/1	5/5	1/1	1/1				
Foot	33/18	59/22	22/10	9/6	1/1	1/1		
Long bone (shaft)	3/--	16/--		15/--	3/--	2/--		
Epiphysis	1/--	14/--	6/--		1/--		1/--	
Total	228	418	118	90	46	132	19	50
MNI	4	8	4	4	3	6	2	5

Tab. 3. Skeletal distribution of Camel and Ovicaprids. Minimum Number of Individual (MNI)/Minimum Number of Elements (NME) L. = Level; S6 = Structure or building 6

In many mammalian species, some skeletal parts differ in morphology between the sexes. In bovids for instance, female skulls either lack horns or bear horns of different size and shape relative to those of males¹⁴. Unfortunately for sex-determining efforts, these parts are relatively fragile and are therefore rare in archaeological assemblages due to the selective removal by post-depositional leaching, profile compaction, and other fragmentation processes. As an alternative to differences in bone shape, it may be possible in some samples to use differences in bone size to establish a sex ratio. Male skeletal parts tend to be larger than female homologues in most mammal species, reflecting larger average male body size. One clear advantage of this criterion is that it is applicable to a wide variety of skeletal parts, at least some of which are likely to occur in any large fossil sample.¹⁵

Therefore, according to the Rensch' rule,¹⁶ which shows that larger mammals tend to exhibit greater sexual dimorphism, a preliminary estimation of the sex ratio was made from the talus measurements (**Fig. 1**). We compared the data acquired at the Al Sufouh 2 site and the data published by Steiger.¹⁷ The results show a predominance in the female/juvenile category as demonstrated by the relatively smaller size observed on the other bones (e.g., radius, tibia). It is worth pointing out that the age and sex distribution is not necessarily that of the original herds, but rather of those individuals that were selected as prey and whose bones were left at the site.

- **The ovicaprids** (Sheep/Goat) are represented by 272 specimens (18.8%). It is difficult to distinguish between those specimens representing goat as opposed to sheep. This work will have to be refined in the future. Nevertheless, the rare determinate elements specifically belong to goats (e.g., horncore).

The estimated minimum number of individuals is 23: 5 juveniles, 16 adults and 2 old individuals. The scarcity of data, however, limits the accuracy of the age at death estimate (**Tab. 4**). Old individuals are characterized by extremely abraded molars (Payne's stages G/H, >5 years old). Juveniles were mainly determined by unfused bones, with the exception of two individuals, one in level 3b and the other in Structure L6, where an age was assigned according to a left maxillary bone with dP3 and dP4 (1-2 years old) and the presence of one mandible with dP2dP3dP4M1 (stage C, 6-12 months) respectively. Nevertheless, the lack of very young animals (0-6 months) contrasted by the

14. Boessneck *et al.* 1964, Grigson 1982.

15. Monchot 1999.

16. Rensch 1950.

17. von den Driesch & Obermaier 2007; Steiger 1990.

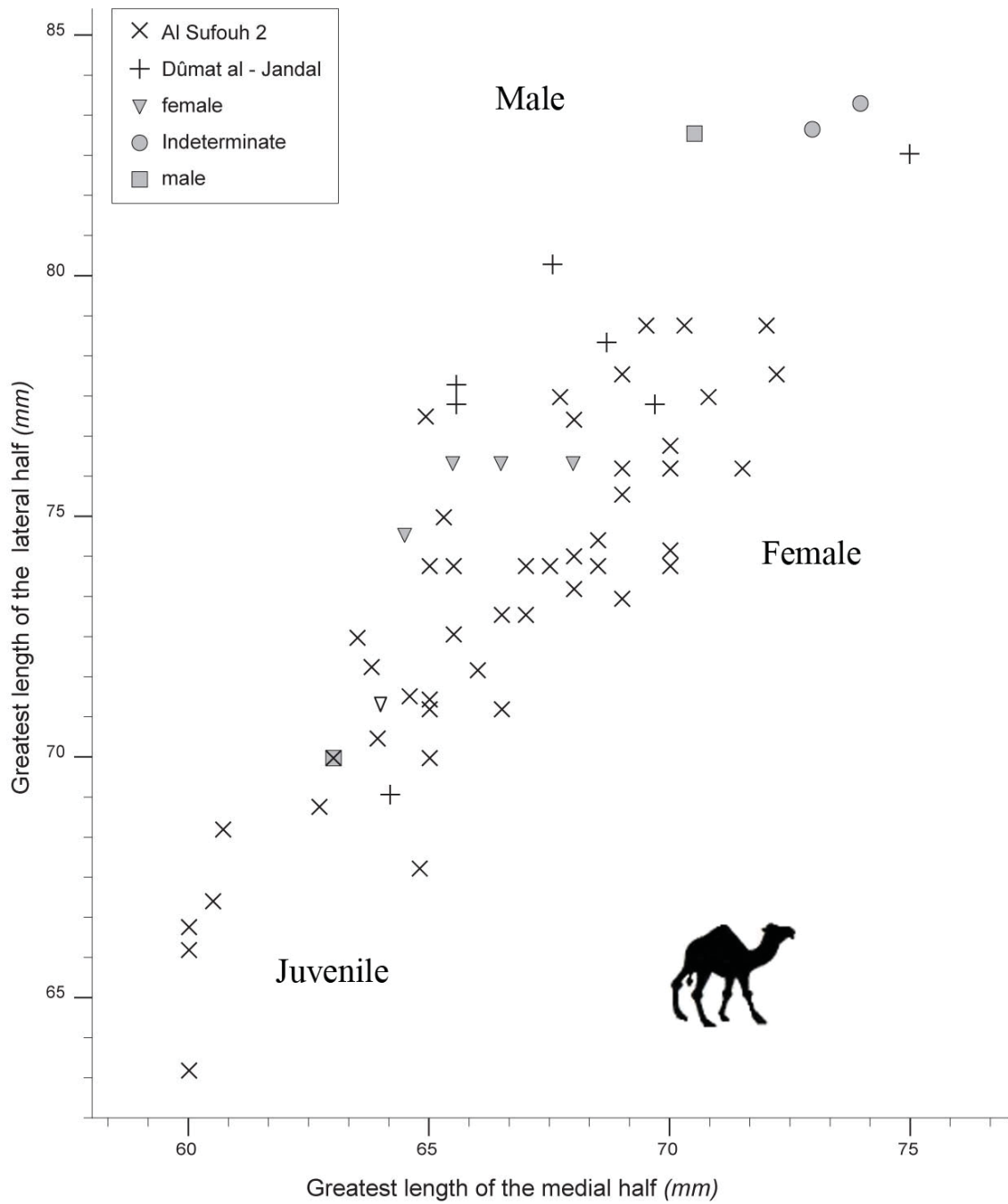


Fig. 1. Bivariate diagram of camel talus from sector A (Al Sufouh 2 data from von den Driesch & Obermaier 2007:163-164; Male-female-Indeterminate data from Steiger 1990:100)

Levels	2	3(a+b)	4	5	6	7	8	9	10	L6	SB
MNI O/C	3	6	2	1	1	1	--	1	1	5	2
Juvenile		2	1							1	1
Adult	3	3	1	1	1	1		1	1	3	1
Old		1								1	

Tab. 4. Ovicaprids MNI according to stratigraphic layers and age

predominance of mature to old individuals could suggest that the sheep/goat consumed at this site were transported from a designated breeding site where the production of milk and perhaps wool also took place.

The examination of skeletal element profiles, in comparison to the composition of a whole carcass, indicates, specifically for the ovicaprid, an under representation of non-meaty, or low-utility, body parts (e.g., head, feet) (**Tab. 2**) suggesting that these bones came from a large waste area.

- **The gazelle** (*Gazella* sp.) is represented by 33 specimens largely present in level 2 (**Tab. 1**).

The represented elements include: 1 horncore; 1 mandible; 7 thoracic vertebrae; 3 scapula; 3 humerus; 2 radius; 2 metacarpal; 2 pelvis; 1 femur; 4 tibia; 1 talus; 1 calcaneus; 2 metapodial; 2 phalanx 1; 1 phalanx 2. An estimated minimum of 7 adult individuals are represented; two in level 2 (two left distal tibia) and one each in levels 3, 4, 7, 10 and in building L6.

- A number of bone elements belonging to a medium-sized **bovid** are represented in the assemblage and at least some (**Fig. 2**) clearly belong to the **Arabian oryx** (*Oryx leucoryx*).¹⁸ These include fragments of a humerus, tibia, scapula, femur and one first phalanx. The precise identification of these remains is as of yet not secure and possible confusion with cattle or wild caprids cannot be ruled out at this time. The Arabian Oryx, which inhabits sandy and stony deserts and formerly roamed through most of the Arabian Peninsula. The species' range had already contracted by the early years of the 20th century and the decline accelerated thereafter. Before 1920, Arabian oryx distribution was segregated into areas over 1,000 km apart: a northern population in and around the Nafûd, and a larger southern population in the Rûb Al Khalî and the

¹⁸. Peters *et al.* 1997



Fig. 2. Proximal tibia of Arabian oryx (*Oryx leucoryx*). Sector A, Level 3a, 8th-15th century AD.

plains of central-southern Oman. Oryx disappeared from the north in the 1950s. Now, following roughly 40 years of fruitful reintroduction efforts, this species is no longer considered extinct on the Arabian Peninsula.¹⁹

- Thirteen elements belonging to **Equid** (*Equus* sp.) were recognized. A complete left talus was found in level 3a, whereas a distal extremity of a right tibia and an upper tooth were recovered from level 3b. In level 10, eleven leg elements were discovered: two humerus fragments (one left distal extremity and one right), three radius fragments

¹⁹. IUCN SSC Antelope Specialist Group 2011

(a right proximal extremity, a left proximal extremity, a left diaphysis fragment), one proximal extremity of a right metacarpal, one left calcaneus, one phalanx 1, and two phalanx 2. Additionally, one lower left third molar was recovered.

Some equid bones from the Nabataean level 10 were measured (**Tab. 5**). The specimen measurements indicate a large animal; much larger than either the donkey or the hemione, as stated in the literature.²⁰ They can be attributed to the horse or even possibly to a hybrid (mule). Their scarcity within the residential sector does not necessarily mean that these animals were not kept at Dûmat. Given the small size of the assemblage analyzed to date, it may instead indicate that horse meat was rarely consumed in this part of the site.

- **Dogs** (*Canis lupus f. domesticus*) are represented in sector A by only two bones: a right proximal femur in level 3a and a right maxillary with a dP4 in level 3b. The upper molar eruption suggests the individual was a 4-6 month-old puppy (**Fig. 3**).
- The **Ostrich** (*Struthio camelus*) is represented by three eggshell fragments found in level 6 and in level 9. The Middle Eastern Ostrich or Arabian Ostrich (*Struthio camelus syriacus*) is an extinct subspecies of the ostrich which once lived on the Arabian Peninsula and in the Near East. If the bones of ostriches are rare in prehistoric archaeological sites (with the possible exception of the Palaeolithic site of Umm El Tlel)²¹, fragments of eggs are more frequent, e.g., Yamama or Madâ' in Sâlih.²² Ostriches also appear frequently on petroglyphs from Prehistoric times and in Islamic verse, especially in poetry from Arabia itself, where the birds were common. The pleasures of ostrich hunting, for example, were extolled, and large numbers of ostriches and their eggs were considered an indication of prosperity.²³
- The presence of **common buzzard** is attested by a right ulna (*Accipitridae*, size *Buteo buteo*) found in level 2 and by a left femur in the sounding B (**Fig. 4**).
- During the 2011 season, a single **marine mollusk** of the *Veneridae* family was found in level 3b and belongs to the species *Amiantis umbonella* (Lamarck, 1818) (**Fig. 5**). This benthic clam is occasionally found in lagoons and more commonly along the shores of the Arabian Peninsula (e.g. Persian Gulf, Red Sea).

20. Vila 1998.

21. Bonilauri *et al.* 1990.

22. Monchot 2010; Studer 2010.

23. Stone 1982.

Element	Measurements
Phalanx 1 complete	GL=87.6; Bp= 52.1; BFp=51.4; Dp= 38.0; SD=38.2; Bd= 49.6; BFd=45.1; Dd=25.8
Phalanx 2 complete	GL=46.8; Bp= 54.1; BFp=48.8; Dp= 33.0; SD=49.6; Bd= 52.7; Dd=26.6
Phalanx 2 complete	GL=46.8 Bp= 55.0; Dp= 32.6; SD=49.8; Bd= 52.7; Dd=26.5
Proximal radius (left)	Bd=77.0; BFd=66.8; Dd=45.3; DFd=36.2
Diaphysis of Radius (left)	SD=43.0
Proximal metacarpal (right)	Bp=52.8; Dp=36.7
Distal tibia (right)	Bd=52.6; Dd=33.1
Lower M3 (left) complete	Occlusal length= 33.6; Occlusal breadth=18.4

Tab. 5. Measurements of donkey bones in mm (after von den Driesch, 1976). GL= greatest length; Bp=greatest breadth of the proximal end; BFp=greatest breadth of proximal articular surface; Dp=depth of the proximal end; SD=smallest breadth of the diaphysis; Bd=greatest breadth of the distal end; BFd= greatest breadth of distal articular surface; Dd= depth of the distal end

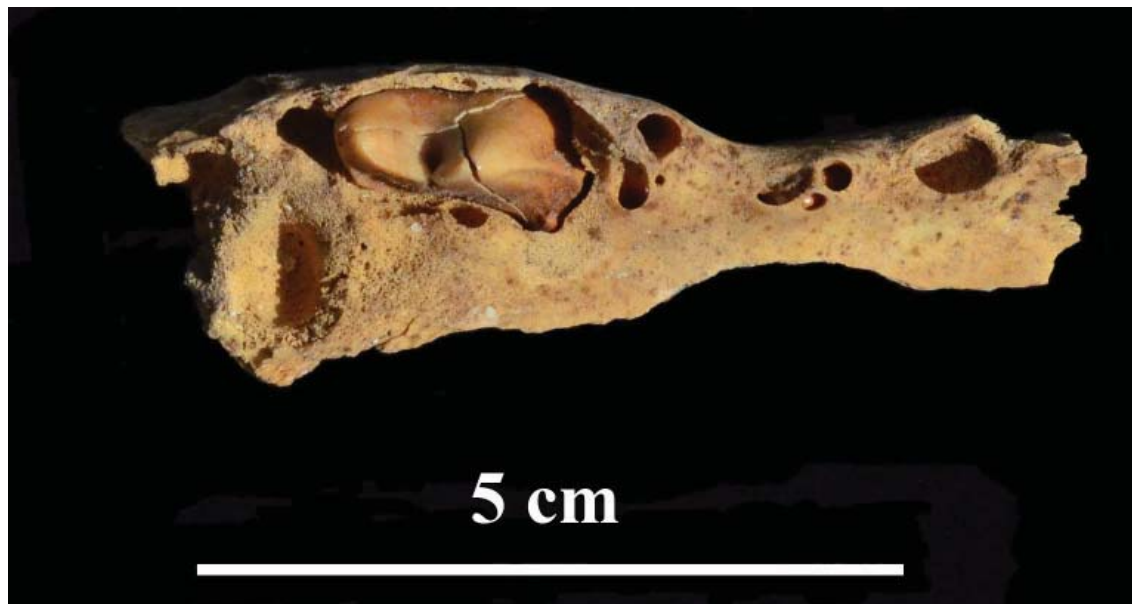


Fig. 3. Right maxillary of a dog (*Canis lupus f. familiaris*). Sector A, Level 3b, 8th-15th century AD

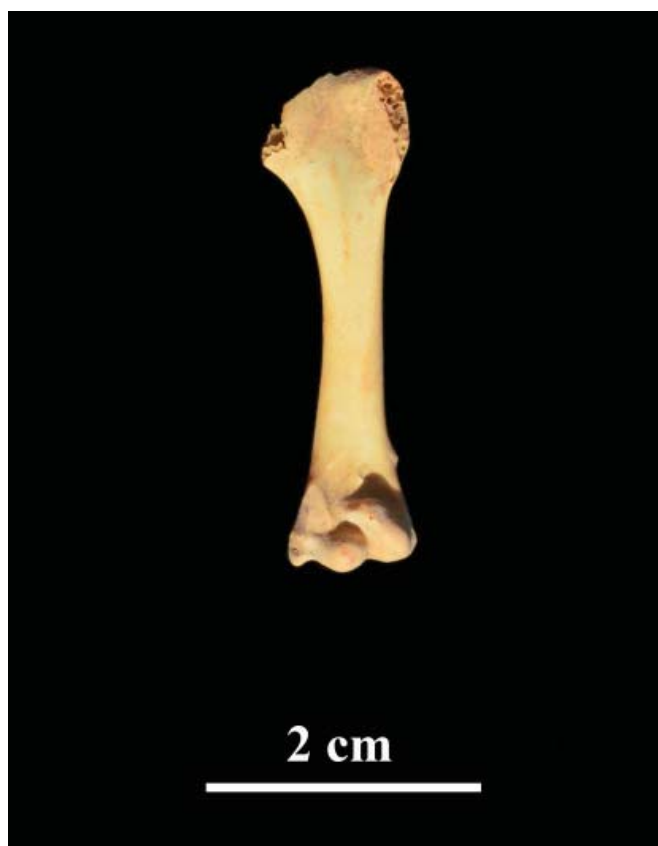


Fig. 4. Left femur of a common buzzard (*Buteo buteo* size). Sector A, Sounding 2, 8th-15th century AD (Identification by Lionel Gourichon, CNRS)

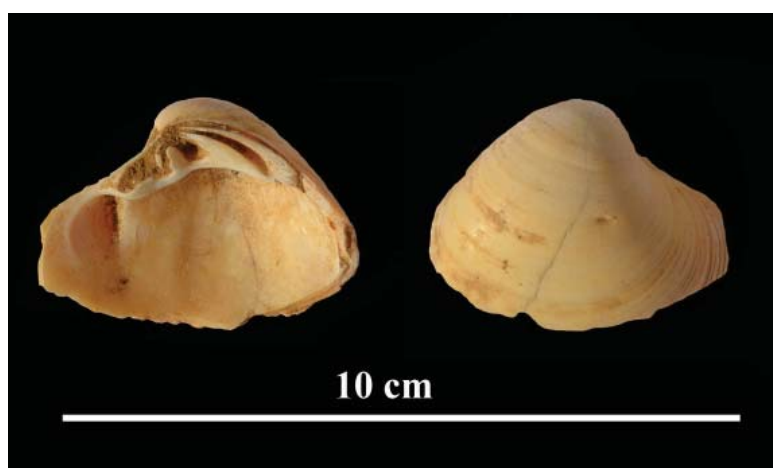


Fig. 5. Shell of *Amiantis umbonella*. Sector A, Level 3b, 8th-15th century AD. (Identification by Chloé Martin, MNHN Paris)

Bone modifications

Cutmarks

Only 26 bones show cutting or butchering marks:²⁴ twenty camel bones, seven ovicaprids bones and one gazelle bone (**Tab. 6**). Disarticulation incisions and filleting incisions, both resulting from cuts from a knife, are present (**Figs. 6 & 7**). 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 Dûmat consumed camel, sheep/goat and gazelle meat. This is not an unexpected result since the faunal remains represent consumption debris recovered from domestic quarters on the site.

Burning marks

Evidence of burning was exhibited by 91 bones (6.25% of the bone material). Camel, ovicaprids, gazelle and unidentified fragments from all archaeological layers are affected by fire (**Tab. 7**).

In general, the number of burnt bones appears to be proportional to the composition of the archaeological level. In most cases, the heat was not sufficient to completely char the bone. The examination of the color and the macroscopic appearance of bones show that the vast majority of these bones are brown/black, belonging to burned color stages 2, 3 and 4.²⁵ It is reasonable to think that the reduction by fire results directly from human activities, cooking, roasting and preparation of food, with certainly the presence of hearths not far from the deposits, but it could also be the result of other actions such as accidents or cleaning the garbage by the fire.

24. Binford 1981; Monchot 2008.

25. Périnet 1964; Stiner *et al.* 1995.

Level	Age deposit	Species	BP	Element	Fragmentation	Frag. 2	Side	Type	Function
Level 2	Late Islamic	<i>Camelus</i>	Trunk	Rib	Body (shaft)	Fragment	--	Chop marks	Filleting
Level 2	Late Islamic	<i>Camelus</i>	Hindfeet	Tarsal	Talus	Complete	Left	Cut marks	Disarticulation
Level 2	Late Islamic	Ovicaprids	Hindlimb	Coxal	Acetabulum, Ilium	Fragment	Left	Cut marks	Disarticulation
Level 2	Late Islamic	<i>Camelus</i>	Trunk	Rib	Body (shaft)	Fragment	--	Cut marks	Filleting
Level 2	Late Islamic	<i>Camelus</i>	Hindlimb	Tibia	Distal extremity	Fragment	Left	Cut marks	Disarticulation
Level 2	Late Islamic	<i>Camelus</i>	Hindlimb	Femur	Diaphysis	Fragment	--	Cut marks	Filleting
Level 2	Late Islamic	Ovicaprids	Hindlimb	Coxal	Ilium, Ischium	Fragment	--	Cut marks	Disarticulation
Level 3a	Middle Islamic	Ovicaprids	Hindlimb	Femur	Distal extremity	Q-comp	Right	Cut marks	Disarticulation
Level 3b	Middle Islamic	<i>Camelus</i>	Trunk	Thoracic vertebra	Body (corpus)	Complete	Impair	Chop marks	Filleting
Level 3b	Middle Islamic	<i>Camelus</i>	Trunk	Rib	Body (shaft)	Fragment	--	Cut marks	Filleting
Level 3b	Middle Islamic	<i>Camelus</i>	Forelimb	Humerus	Distal diaphysis	Tube	Left	Cut marks	Filleting
Level 3b	Middle Islamic	Ovicaprids	Trunk	Lumbar Vertebra	Q-complete		Impair	Cut marks	Filleting
Level 3b	Middle Islamic	<i>Camelus</i>	Forefeet	Carpal	Os carpal IV	Q-comp	Right	Cut marks	Disarticulation
Level 4	Middle Islamic	<i>Camelus</i>	Feet	Metapodial	Distal extremity (condyle)	Complete	--	Cut marks	Disarticulation
Level 4	Middle Islamic	<i>Camelus</i>	Feet	Phalanx 2	Complete		--	Cut marks	Skinning
Level 4	Middle Islamic	<i>Camelus</i>	Head	Mandible	Diastrame	Fragment	Left	Cut marks	Disarticulation
Level 4	Middle Islamic	<i>Camelus</i>	Hindlimb	Femur	Proximal extremity	Complete	Left	Cut marks	Disarticulation
Building - L6	Middle Islamic	Ovicaprids	Hindlimb	Femur	Proximal extremity	Fragment	Left	Cut marks	Disarticulation
Building - L6	Middle Islamic	<i>Camelus</i>	Trunk	Lumbar Vertebra	q-comp		Impair	Cut marks	Filleting
Building - L6	Middle Islamic	<i>Camelus</i>	Head	Skull	Temporal-Parietal	Fragment	--	Cut marks	Skinning
Building - L6	Middle Islamic	<i>Camelus</i>	Hindfeet	Tarsal	Talus	Q-comp	Right	Chop marks	Disarticulation
Building - L6	Middle Islamic	<i>Camelus</i>	Head	Mandible	Ramus	Fragment	--	Cut marks	Disarticulation
Building - L6	Middle Islamic	<i>Camelus</i>	Trunk	Lumbar Vertebra	Q-complete		Impair	Cut marks	Filleting
Building - L6	Middle Islamic	<i>Camelus</i>	Trunk	Lumbar Vertebra	Processus articularis	Fragment	Impair	Cut marks	Filleting
Building - L6	Middle Islamic	Ovicaprids	Hindlimb	Tibia	Distal extremity	Complete	Left	Cut marks	Filleting
Building - L6	Middle Islamic	Ovicaprids	Forelimb	Scapula	Q-complete		Right	Cut marks	Disarticulation
Level 7	Early Islamic	<i>Camelus</i>	Forelimb	Radio-ulna	Proximal extremity	Complete	Left	Cut marks	Disarticulation
Level 10	Nabataean	<i>Gazella</i>	Forelimb	Humerus	Distal extremity	Fragment	Right	Cut marks	Disarticulation

Tab. 6. Inventory of bone cutmarks of Dūmat al-Jandal, sector A

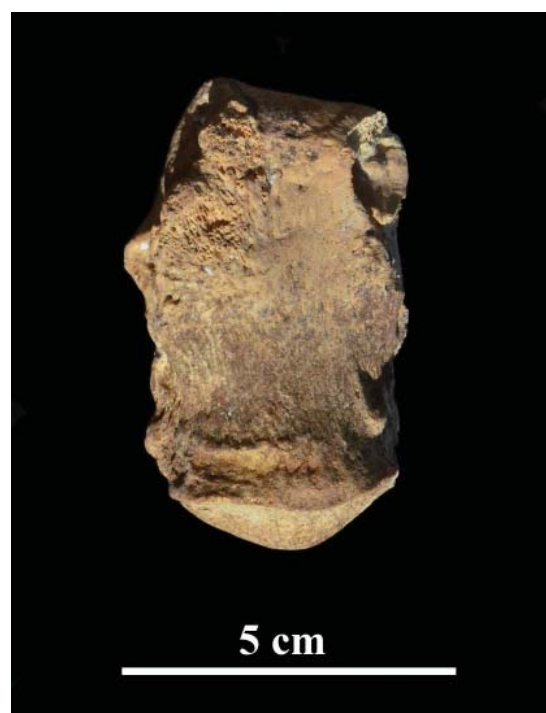
Levels	2	3a	3b	4	5	6	7	9	10	L6	SB
Camel		9	22	4			2			2	1
Ovicaprids	3	4	2	2			1			2	
Gazelle	1		1								
Unidentified	3	14	4	1	1	2	2	3	6	1	
Total	7	27	29	7	1	2	5	3	6	4	1

Tab. 7. Quantity of burned bone according to stratigraphic layer

Exostosis

Three second phalanxes from level 3b show clearly marks of exostosis (**Fig. 8**). This bone inflammation can be divided into three types (osteoperiostitis, osteomyelitis, and osteitis), but it is often difficult to determine which type is present when dealing with archaeological material.²⁶ This is proof that camels, in addition to being consumed, were used as beasts of burden. However, as cattle examples show, this pathology can also develop over time and can be prevalent in older individuals.²⁷ Horses, like camels, are often used as beasts of burden, as shown by the morphology of the phalanx (**Fig. 9**).

Fig. 8. Second phalanx of dromedary deformed by an exostosis. Sector A, Level 3b, 8th-15th century AD



²⁶. Baker 1984.

²⁷. De Cupere 2001; Studer 2010: 292, fig. 5.

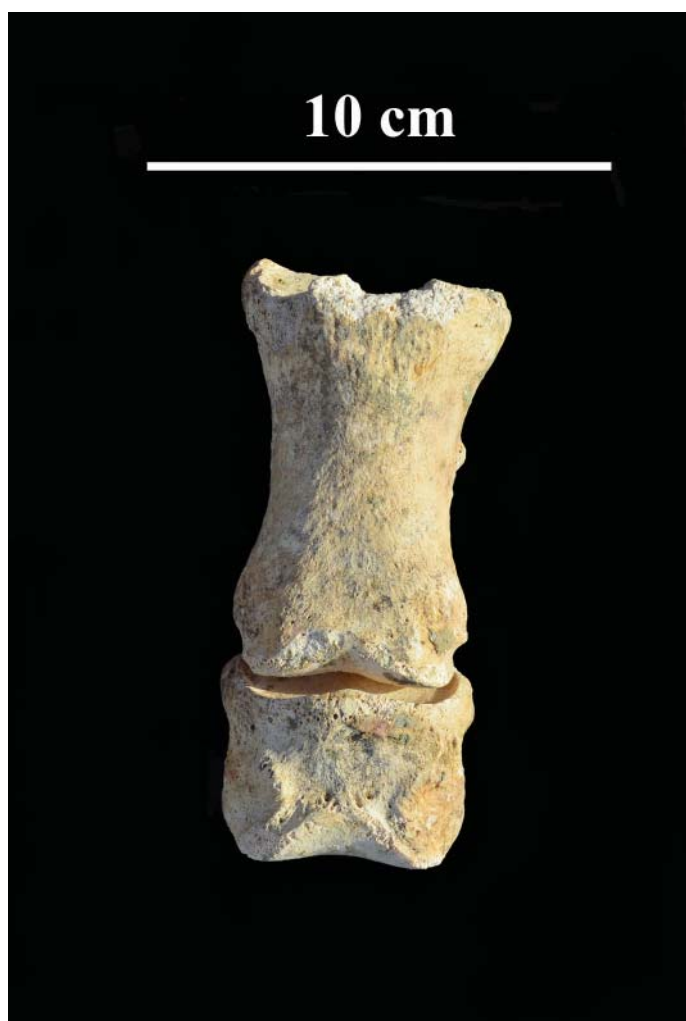


Fig. 9. First and second phalanx of horse. Sector A, Level 10, Early Nabataean, 1st century BC-1st century AD

The faunal remains from Sector C

The faunal material presented here was recovered during the 2010 and 2011 field seasons from soundings 1, 3, 4 and 5 (**Tab. 7**). Only 106 bones were identified with species or categorized by size-class. The overabundance of unidentified small (less than 1 cm in length) bone fragments (n=679; 86.5%) is essentially the result of systematic sieving (7 mm mesh).

Sounding 1 is located in the northern part of the site, in a sector that suffered severe flooding by the wādī.²⁸ The objective of the excavation of the sounding (10 m square, then extended) at this location was to study the enclosure wall by first examining the foundation technique and the masonry and secondly by identifying the layers connected to the wall (destruction, floor, geological substrate, etc.). Layers 2000, 2003, 2005, 2008, 2013, 2014 and 2018 revealed identifiable faunal remains.

Sounding 3 was opened ninety meters east of sounding 1, in order to determine the nature of the occupation of the intramural space.²⁹ The sounding is located on an unoccupied plot of land, surrounded to the south and to the west by a paved road, to the north by an asphalt road and a ditch and to the east by a farm enclosed by a high fence. Faunal remains belonging to this sounding were recovered in the following layers: 2021, 2022, 2023, 2024, 2025, 2027, 2028, 2031, 2037, and 2047.

Excavation of **sounding 4**, which is located on the promontory, in the southern part of sector C, revealed the foundations of a Nabataean triclinium with successive floor layers.³⁰ Faunal remains were retrieved in the following layers: 2011 excavations layers 2054, 2056 and 2058.

Sounding 5, on top of the promontory, revealed the base of a square structure, probably a tower. Faunal remains recovered in 2011 belonging to this sounding were recovered in the following layers: 2060, 2062 and 2064.

28. Charloux, al-Traad et al. 2012: Fig. 37.

29. Charloux, al-Traad *et al.* 2012: Fig. 59, 60, 61

30. Charloux, al-Traad *et al.*, in this volume.

The faunal species

The following species were identified during the 2011 season:

- **The camel** (*Camel dromedarius*) is represented by nine specimens found in layer 2008 (an unfused distal metapodial belonging to a juvenile), in layer 2022 (two rib fragments), in layer 2024 (a left fragment of a mandible with P1 alveolus), in layer 2031 (a long bone shaft fragment) and in layer 2060 (two fragments of an unfused distal metapodial belonging to a juvenile and two long bone shaft fragments).

It is not surprising to find camel bones, as this species has played an important role in human exploitation of desert regions. Nevertheless, the absence of cut-marks or burnt bones does not allow us to know for certain if the dromedary was consumed. Alternatively, these bones may have accumulated after natural death.

- **The small ruminants** comprise several ovicaprids; sheep (*Ovis aries*), goat (*Capra hircus*) and gazelle (*Gazella* sp.). The identification of isolated ruminant bone specimens to species is difficult given that sheep and goat are similar in morphology and that three forms of gazelle are found in Arabia; the mountain gazelle, *G. gazella*, the goitred gazelle *G. subgutturosa* and the dorcas gazelle *G. dorcas*.³¹ As a basis for future research, we include them in the present chapter as a single category in order to avoid misinterpretation. They are the most represented animal class with 19 specimens and are present in the following layers:

2000: a distal extremity of a left tibia (Distal breadth = 27.1; Distal depth = 18.4);³²

2005: a complete right pyramidal (Length=16.6; Breadth = 11.6; Height = 24,6);

2013: a fragment of upper molar and a shaft fragment of a long bone;

2018: a complete scaphoid (Greatest length = 21.1mm; Greatest breadth = 10.2 mm; Height = 14.2 mm) and a distal fragment of a left humerus;

2021: a fragment of thoracic vertebra;

2022: a rib fragment;

2056: a distal extremity of a phalanx 1 (in two parts);

2060: an enamel tooth fragment and a complete phalanx 1.

³¹. Harrison & Bates 1991.

³². Measurements according to von den Driesch (1976).

2062: one phalanx 1 subcomplete; one proximal extremity of a rib; one distal unfused condyle of a metapodial (juvenile); one distal right fused extremity of a radius;

2064: one distal metaphysis of a metapodial (juvenile); one complete third phalanx; one complete calcaneus right of a juvenile (GB = 19.1; Bd = 14.1); one right talus complete (GLI = 24.4; GLM = 23.4; BL = 13.3; BM = 13.3; BD = 14.1).

These animals are a good source of meat, milk and wool, but the scarcity of the remains limits the study.

- **The ostrich** (*Struthio camelus*) is represented by one small fragment of eggshell found in layer 2013.
- Some remains belong to a **large-sized canid**, specifically a dog (*Canis lupus f. domesticus*). This includes an upper M2 left and an upper M1 left (layer 2014) and the distal fragment of a right humerus (layer 2031). Twelve teeth enamel fragments are also present in layer 2014.
- Three elements belong to a **small-sized canid**, specifically a fox (*Vulpes* sp.). Layer 2014 presents one phalanx 1 and one phalanx 3 and layer 2064 revealed a proximal part with a diaphysis segment of a left humerus (Proximal breadth = 21.9; Proximal depth = 14.2). It is not possible to identify the exact fox species (e.g., red fox, Ruppell's fox or Blanford's fox).
- Some **intrusive rodent** remains belonging to the gerbillinae (probably *Gerbillus* sp.) were identified in layer 2054 (two femurs and one tibia), in layer 2058 (one mandible) and in layer 2064 (2 bones indeterminate). This *muridae* generally lives in groups of about ten individuals in dens dug in the sand.

The scarcity of the remains limits the zooarcheological study and its interpretation for sector C. Most of the remains come from an in-filled zone and are of uncertain provenience and context, and only some of them belong to a occupational floor (**Tab. 7**). The presence of some burnt unidentified fragments (layer 2013, n=5; layer 2010, n=4; layer 2027, n=1; layer 2014, n=1; layer 2060, n=2; layer 2062, n=15) among the bone assemblages confirms a human presence.

Interpretation

The taxonomic composition of the faunal remains from Dûmat al-Jandal indicates that the studied sample largely comprises domestic mammals (94.6%) with very few wild species (3.3%), carnivores (1.6%) or birds (0.5%). It is not surprising to find camel bones in all stratigraphic units. From Antiquity onwards, the camel has played an important role in human exploitation of desert regions. If the presence of numerous cut-marks and burnt bones undoubtedly attests to consumption, the presence of old individuals suggests that they were disposed of after their death, at the base of walls or in fills (middens). The camel serves several vital functions; as a dietary constituent, a beast of burden, a source of raw material for artifact manufacture and a cultural symbol.³³ Sheep and goat were exploited for their secondary production of wool, milk and for their meat as they get older.

There are, at the moment, no significant zooarchaeological differences between the various archaeological levels, suggesting that the predominant human behavior varied little throughout the various periods.

The presence of gazelle and Arabian oryx indicates that not only domesticated animals were exploited but that hunting in the surrounding region was also an important activity for the inhabitants of Dûmat.

The presence of the seashell, *Amiantis umbonella*, is a solid indication that exchange with groups coming from the Persian Gulf or from the Red Sea occurred.

The very low percentage of carnivore bones (i.e., dog and fox) among the faunal remains may suggest that the explanation for their occurrence and exploitation is not consumption related. Dogs, for example, may have been regarded as unclean animals and their remains may have been discarded outside the habitation area. Indeed Muslims generally cast dogs in a negative light because of their ritual impurity. Nevertheless, dog and fox may have been killed during hunting sessions, or simply killed within the walls of the city, attracted by food or garbage. While carnivores and rodents are strictly prohibited from the diet by religious texts,³⁴ ethnographic narratives indicate a different reality, especially in periods of famine.³⁵

³³. Studer & Schneider 2008.

³⁴. Quran & Hadith, see Benelmouffok 2008: 326.

³⁵. e.g., Thesiger 1959.

We can note that no diagnostic cattle (*Bos taurus*) elements have been found, although some specimens, such as fragments of bone diaphysis, may suggest its presence. The absence of cattle can be explained by its strong ecological requirements (e.g., water and pasture) and this animal is easily replaced by the camel. Consistent with the geographic location, the period and the Muslim inhabitants, no specimens identified as pig have been found.

These results are very encouraging for future investigations. The continuation of new excavations and the extension of previously excavated areas should lead to a better understanding of the lifestyle and subsistence of the inhabitants of Dûmat al-Jandal.

Searching for Qasr Jawhar

Guillaume Charloux, Quentin Morel & Pierre Siméon

The existence of the Ibn Rashîd governors' residence at Dûmat al-Jandal, so-called Qasr Jawhar, was briefly mentioned in the 2010 report.¹ One of the objectives of the 2011 campaign was to look for this structure repeatedly described by Western explorers. Due to the large increase in domestic construction and transformation of the urban space in the oasis, identifying such remains in the field and collecting data is still difficult. The present article is the first step in a long-term research. Past textual descriptions of Qasr Jawhar will be summarized, going on to describe our first discoveries in the field and their comparison with these ancient descriptions.²

PEDIGREE OF THE IBN RASHIDS, EMIRS OF JEBEL SHAMMAR.

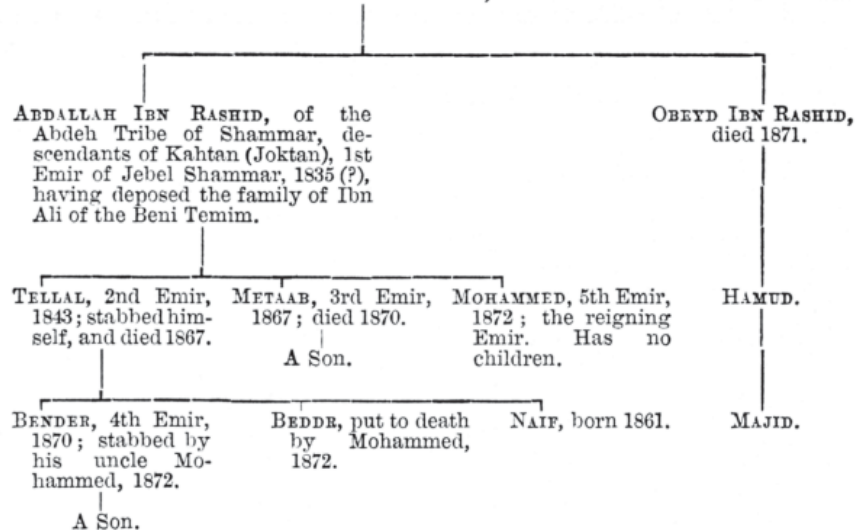


Fig. 1. Family tree of the Ibn Rashîd dynasty until 1872, as published by Lady Blunt (1881: 544)

1. Charloux, al-Malki *et al.* 2014: 72 ; see also Charloux 2012: 45.

2. We quoted texts in the original language (French, German or English), and the various spellings of toponym in these languages were kept as such.

State of knowledge

This chapter outlines the main events regarding the presence of the Ibn Rashîd family³ in al-Jawf (**Fig. 1**) and presents the architectural descriptions of their residence from 19th century travellers' accounts.

The Ibn Rashîds in al-Jawf

Regarding the historical background, the second Sa'ûdi state was established by Imâm Turkî bin 'Abd Allâh Al-Sa'ûd in 1238/1823, who probably ruled Sha'alân amîrs in al-Jawf (although no governor is known to have had control in the oasis between 1818 and 1823). His son and successor Faysal appointed Muhammad bin 'Alî al-Arfaj, from the Tamîm tribe, as governor in Burayda then in Jawf region until his death in 1258/1841.⁴ In 1254/1838, the amîr 'Abd Allâh Ibn Rashîd, who was appointed by Faysal bin Turkî al-Sa'ûd as amîr of Hâ'il and Jabal Shammâr in 1250/1834, claimed suzerainty over the Jawf region. He sent his brother 'Ubaid to al-Jawf with 3,000 camel riders in order to obtain Zakât from the inhabitants, but withdrew without leaving a garrison in the oasis.⁵

A second siege carried out by the al-Rashîd family took place 19 years later, in 1269/1853. Talâl,⁶ son of 'Abd Allâh Ibn Rashîd, sent his uncle 'Ubaid and his brothers Mit'ab and Muhammad against amîr Khattâb bin al-Sarrâh, who paid tribute to the Ruwala. Following a siege of 20 days, the dominion of the Ibn Rashîds over the city and the region continued until the beginning of the 20th century, apart from an incursion by the Ottoman Turks in 1872, who wrested control of the oasis until mid-1873. The Ottomans were assisted in this adventure by the Sha'alân of the Ruwala tribe,⁷ the main adversary of the Ibn Rashîd in the region.⁸

3. Al-'Uthmaimîn 1981.

4. al-Sudairi 1995: 91-92.

5. Musil 1928: 238-239 and Wallin 1854: 32.

6. Talâl bin 'Abd Allâh accepted the suzerainty of the Imâm Faysal bin Turkî in Riyadh (Musil 1928: 239-240).

7. Doughty 1888.

8. Doughty 1888: 34; and al-Sudairi 1995: 97-99.



Fig. 2. Representation of Hamud ibn Rashîd on horseback
(Lady Blunt 1881: 291)

From 1855 onwards the administration of the oasis was in the hands of Hamûd ibn Rashîd (**Fig. 2**). He was followed by Jawhar, the “black governor”, possibly from 1873 and certainly from 1878,⁹ and then Faysal Ibn Rashîd in 1908¹⁰ (**Fig. 3**).

The dominion of the Ibn Rashîds was replaced in 1327/1909, after a long war, by Nawwâf Ibn Sha‘lân of the Ruwala, who appointed Hamûd bin Muwaishîr amîr of al-Jawf. After a short while Muwaishîr allied himself with the Ibn Rashîd, until he was killed in 1337/1918. He was then replaced by al-Shuwai‘ir, appointed by Sa‘ûd Ibn Rashîd. The fall of the Ibn Rashîd family from Hâ’il in 1921 returned control over the oasis to the Sha‘lân, but only until the arrival of the ‘Abd al-‘Azîz Ibn Sa‘ûd and the third Saudi State in 1922.

⁹. “Jôhar” is indeed mentioned by Lady Blunt (1881).

¹⁰. Butler 1909.



Fig. 3. Faysal ibn Rashîd and his men on top of the castle (Butler 1909: 529)

The Ibn Rashîds' Residence

Reconstructing the architectural history of the governor's residence at Dûma in the 19th century is a difficult task. It is not always possible to distinguish the descriptions of the governor's residence from those of Qasr Mârid in travellers' narratives.

The account of Palgrave remains ambiguous: surprisingly, the English traveller who visited the oasis in 1862-1863 does not clearly refer to the new castle, although it should already have been standing at that time.

Writing in 1865, Guarmani does not mention the monument either, only the quarter “[...] *Kadema et les ruines d’el-Delhamie*.”¹¹, and in 1883 Huber speaks of: « *Delhemiat, détruit par l’émir Shammâr lors de la conquête de 1838. C’est dans ce quartier que le gouverneur Shammâr a construit sa résidence, un vrai château fort.* »¹², which he named “*Qaçr Goar*”.¹³

11. Guarmani 1866: 132.

12. Huber 1884: 321.

13. Huber 1891: 49-50.

Lady Blunt, grand-daughter of the British poet Lord Byron, gave this description of the castle built by Mit‘ab Ibn Rashîd¹⁴ after her stay in the oasis in 1878 (**Fig. 4**):

“The chief feature of the town, besides Marid, is a new castle just outside the enceinte, inhabited by Ibn Rashîd’s lieutenant. It stands on rising ground, and is an imposing building, square, with battlemented walls forty feet high, flanked with round and square towers tapering upwards twenty feet higher than the rest. It has no windows, only holes to shoot from; and each tower has several excrescences like hoods (machicoullis) for the same purpose”.¹⁵

“the *kasr*, which, as I have said, is outside the town, was built about twelve years ago by Metaab ibn Rashîd, brother of the Emir Tellâl (Mr. Palgrave’s friend), and though so modern a construction, has a perfectly mediaeval look, for architecture never changes in Arabia. It is a very picturesque building with its four high towers at the corners, pierced with loopholes, but without windows. There is one only door, and that a small one in an angle of the wall, and it is always kept locked. Inside it the entrance turns and twists about, and then there is a small court-yard surrounded by the high walls, and a *kahwah*, besides a few other small rooms, all dark and gloomy like dungeons. Here the deputy governor lives with six soldiers, young men from Hail, who, between them, govern and garrison and do the police work of Jôf”.¹⁶

“There are two twelve pounder cannons of English make in the castle. They are ancient pieces of no value, but were used, it appears, in the siege of Jôf by Metaab. [...] They assure us Ibn Rashîd will be delighted to see us, but we must see Jôhar, the black governor, first”.¹⁷



Fig. 4. Qasr Jawhar as drawn by Lady Blunt (1881: 149), probably looking west

14. Blunt, 1881: 115,117-118.

15. Blunt 1881: 115.

16. Blunt 1881: 117-118.

17. Blunt 1881: 120.



Fig. 5. Euting's drawing of 'Kasr im Gyof', near 'al-Hizâm', in 1883 (Euting 1896: 126), probably looking south-east

In 1883, the German scholar Euting made precise drawings of the castle (**Figs. 5-8**) and gave interesting complementary information:

*„Als jüngster Zeit stammt sodann der Kasr (« das Schloss »), im Stadttheil Khzâm in beherrschender Lage errichtet. Für einen Beduinen schreckhaft liegt die Zwingburg da mit ihren Mauern, Höfen, Thürmen, Erkern, Schießscharten. Auf der Südostecke befindet sich der Eingangsturm, viereckig nach oben verjüngt; zur Vertheidigung sind einige Pechnasen (kâtûlah) mit Senkscharten angebracht. Die schwere hölzerne Thüre mit vergittertem Guckloch versehen, wird auf der Innenseite von einem Sklaven bewacht. Für gewöhnliche Besucher wird nicht das ganze Thor, sondern zu mühsamen Durchschlupf nur eine Art Laden geöffnet ist eigentlich ein zweites kleineres Thor, misst zwei Fuss im Geviert, und ist etwa 1 ½ Fuss über dem Boden angebracht“.*¹⁸

*„Bei unsrer Ankunft (Di. 9. Oct. 83) war natürlich das ganze Thor angelweit geöffnet. Unter dem Zudrang einer neugierigen Menschenmasse wurden unsere Säcke abgeladen und in einer verschlossenen Kammer aufgestapelt, die Teppiche und das Handgepäck aber auf das halboffene Dach eines Hauses geschafft. Beim Eintritt in die Thorhalle musste das Auge, welches seit sieben Tagen keinen Schatten genossen, erst an die Dunkelheit sich gewöhnen. Abseits im Finstern lag ein alterthümliches monstrum von eiserner Kanone auf blöckischer Lafette mit Scheibenrädern von Ithelholz. Der Schauer von Hochachtung, womit unsere Beduinen an dem Ungethüm mit seinen geheimnissvollen Kräften vorübergingen, wurde durch die Finsterniss jedenfalls erheblich verstärkt. Die Soldaten des Schijûkh führten uns durch ein Gewinkel von gebrochenen Gängen nach dem Kâhâwah (Empfangssaal)“.*¹⁹

The governor Jawhar (also written Goar, Jóhar or Gyôhar, from which comes the name of the “Kastells von Djof”), is once more mentioned by Nolde in 1895:²⁰

*“Durch alle möglichen, mehr oder weniger dunklen Gänge und Räumlichkeiten wurde ich in die grosse Empfangs- und Kaffeehalle geleitet. Unterwegs waren auch der Galgen und die Folterkammer zu durchschreiten. Es war kein angenehmer Anblick, besonders wenn ich bedachte, das ich mich für den Augenblick ganz allein und nach einem ziemlich seltsamen Zwischenfalle in Herrn Djohars Händen befand.“*²¹

Forder, who stayed in the castle in 1900 (**Fig. 9**), gives the following descriptions:

“A sharp bend in the road revealed the imposing castle of Johar with its four lofty towers on the corners of the outside wall. Our company had gone into all directions, and I was riding behind Khy-Khwan.

18. Euting 1896: 126-127.

19. Euting 1896: 127.

20. Nolde 1895: 11.

21. Nolde 1895: 14.

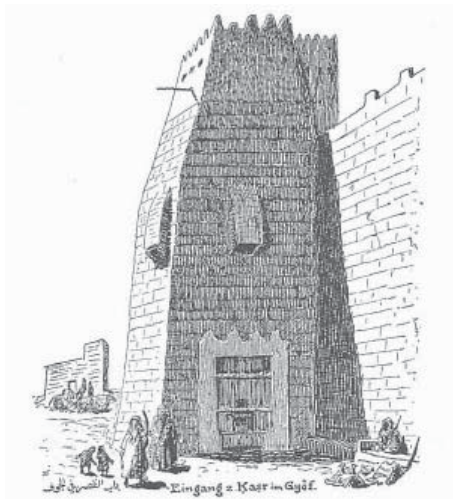


Fig. 6. The entrance gate of the Qasr Jawhar as drawn by Euting (Euting 1896:126)

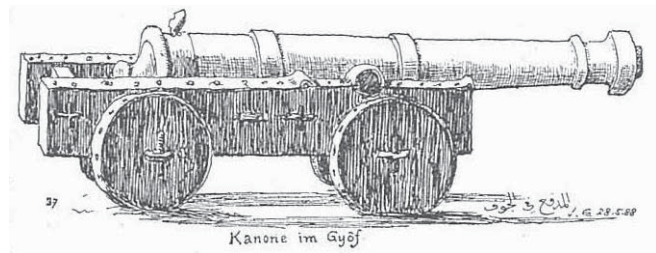


Fig. 7. The English cannon inside the Qasr Jawhar (Euting 1896: 127)

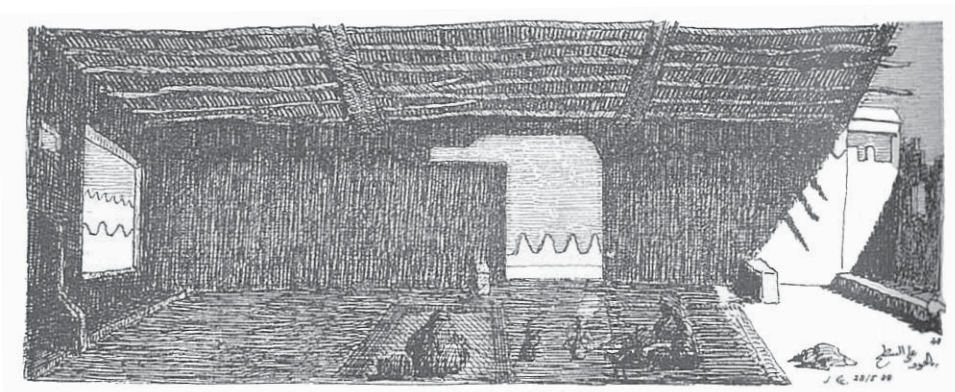


Fig. 8. On the roof of the castle (Euting 1896: 130)

He pointed out the castle to me and told me it was the residence of Johar, the chief. He rode on, I following, until we reached a large square with many men sitting about in the Sun. Near by was a large house”.²²

“The residence of the chief of Jof is not without interest - a castle about a quarter of a mile from the town, in which he lives and holds his daily court. It is built of stone and brick, has three walls, each separated from the other by a space of about 20 feet, the private apartments being in the centre. One entrance gives admission to this unique palace; the door, plated with heavy sheet-iron, is guarded by a band of bloodthirsty men ready to do their master’s bidding. No one is admitted without permission of the chief. I was allowed inside twice, and noticed an antiquated cannon just inside the first wall. On each corner of the outside wall there is a tower about 50 feet high”.²³

²². Forder 1905: 210.

²³. Forder 1902: 624.



Fig. 9. The Qasr Jawhar in 1900 (Forder 1905: 204), probably looking south-east

“The great castle door with its iron plates on it were opened, and inside I saw a rusty old cannon”.²⁴

“I have already stated that Johar, the chief, resided in a castle a little distance off the Jowf at the south end. This castle, made of mud, bricks, and stones, had three walls, and on each corner of the outside wall rose a lofty tower about forty feet high. The apartments of Johar were in the centre of these walls. These towers were for the purpose of defence. [...] The rain had thoroughly soaked the exposed side of one of the towers, and, being only mud-brick, had softened it to such an extent that it fell”.²⁵

Butler described his reception by Faysal Ibn Rashîd, governor of al-Jawf in 1908 (**Figs. 10-11**):

“Arrived at El Jauf, we were taken at once to the emir’s castle, a large building made of mud and stones, and about 90 yards long by 50 broad, with walls about 40 feet high and a tower at each corner about 60 feet high. It is built entirely for defence, there being no windows, and the door is in an angle of the wall, and strongly barricaded. We were shown into a waiting-hall and given coffee, and after a minute or so were led out into a courtyard (where we saw the two old cannons of English make mentioned by Lady Anne Blunt) and up a staircase to interview Feysul Ibn Rashîd”.²⁶

Then he distinguished clearly the two castles:

“The town runs north-west and south-east, and lies in a belt of date palms about 2.5 miles long by half a mile broad. At the north end is the old castle Maarid and the “suk” or bazaar, and at the south end is the emir’s castle, a building made in the middle of the last century”.²⁷

The last account comes from the British Political official Philby in 1923:

“The old fort at the eastern end of the oasis, built and inhabited by the Rashîd’s governors, exists only in its tumbled ruins, and the general aspect of the whole place is one of decay”.²⁸

24. Forder 1905: 220.

25. Forder 1905: 225.

26. Butler 1909: 526-527.

27. Musil 1928: 529-530.

28. Philby 1923: 252.



Fig. 10. The Qasr Jawhar seen from the Qasr Mârid (Butler 1909: 523)



Fig. 11. The Qasr Jawhar photographed by Butler in 1909 (Butler 1909: 527)

Synthesis

To sum up all these textual data, we can say that the residence of the governor was located outside the city walls, at the southern end of the oasis,²⁹ in a quarter named “Delhemiat” (or “el-Delhamie”) or “Khzâm”/“Hizâm” (= Khadmâ?). Wallin, in 1845, writes that this quarter *Aldalhamiye*, occupied by feud neighbours of “Khadhmâ and their allies, the inhabitants of Algar’awy”, was entirely destroyed by the Shammâr in 1838. The castle was rebuilt in its entirety in around 1856 on a hill, almost two decades after its destruction, by Mit’ab ibn Rashîd, brother of the amir Talâl Ibn Rashîd.³⁰

It is a military fort, rectangular in shape measuring 82 m long by 45 m wide. The solid exterior walls, built of stone and brick and without windows, were 12 m high.³¹ Towers, three round and one square at the south-east corner, were located at the angles of the building. Pierced by arrow slits, they stood more than 6 m higher than the adjacent walls. The castle had apparently one blocked up gate in its south-east corner. Blunt gave us what is probably a frontal view of the entrance (**Fig. 4**), and Euting some years later (1883) made a drawing of the doorway (**Fig. 6**). A vestibule led to the courtyard, where two English canons were set up in the 19th century. Pictures and drawings show a central keep, about 15 m high, which probably housed the governor. A sizeable mosque was also present inside the walls of the fort.

The building was used as the governor’s residence, a military fort and also as a court of inquiry.³² It was in fact the seat of political power. The name “Qaçr Goar”³³ refers to this edifice, but it was often simply called “castle” or “residence”. We know that Governor Jûhar was in power during that period, ruling after Hamûd ibn Rashîd and before Faysal Ibn Rashîd in 1908. The fort was but “rubble and ruins” by 1923,³⁴ maybe after the victory of the Sha‘lân in 1909-1910.

29. Euting 1896: 27.

30. Blunt 1881: 115, 117-118.

31. Butler 1909: 526-527.

32. See Palgrave 1866; Forder 1905: 214.

33. Huber 1891: 49-50, Forder 1905: 210, 225.

34. Philby 1923: 252.

Architectural Remains

We shall now describe the architectural remains that are still standing to the south of the oasis and investigated in 2011.

The remains were first identified during a visit in the company of a *Joufi* teacher called Nâsir al-Dirbâs, and we took a GPS spot. They were subsequently visited several times during the month of field work, and surveyed using the *GPS différentiel Trimble R4*. The data were processed using *Autocad* and *Illustrator*.

They cover an area of about 40 m² to the south of an ancient mud-brick village (**Fig. 12**) called Khadhmâ', on the far side of a mud track that is now a made up road. They are now surrounded by a vast housing estate of the same name (**Fig. 13**), laid out following parallel streets. The ruins are currently bordered to the north by the tarmac road and to east and west by mud tracks serving two blocks of modern housing. A large empty space, levelled by a bulldozer, lies to the south. The local inhabitants use various names when referring to the ruins, in particular « Qasr », « Hizâm » and « Jawhar », although the references are vague.

The architectural ruins are currently in a very dilapidated state. Contrary to our preliminary impressions, this state goes back a long time, as can be seen from the aerial photograph (**Fig. 14**). We can note that descriptions of the Ibn Rashîd residence invariably refer to the stone construction, although nowadays there is practically no sign of stones (apart from foundation courses visible on the western side). This could partly explain the destruction of the castle, carried out in order to reuse the stones, a phenomenon familiar enough elsewhere. Four monumental walls lying at some distance are still preserved, forming a large rectangle measuring approximately 56 x 28 m (**Figs. 15, 25**). The long sides are oriented north-west/south-east, lying at right angles to the slope and facing the palm grove.

The corners and connections of the walls have been systematically destroyed, and no trace of a corner tower remains visible (apart from a thin section in the south-east corner of the preserved structure). Since at this place the ground level is higher than in the rest of the area, the only possibility for throwing light on the relationship between these two is to make a trial dig on the line of the western and southern walls. The section opened up at the eastern end of the southern wall shows that the ground level is currently more than a metre higher than the base of the wall (**Fig. 16**).



Fig. 12. Southern part of the Dumat al-Jandal oasis in the aerial view of 1964, showing where the Qasr Jawhar is supposed to have stood



Fig. 13. Satellite image of the area, with location of the mud-brick structure surveyed in 2011



Fig. 14. Ruins of the large mud-brick building surveyed in 2011, seen in the 1964 aerial view of the southern area of the Dumat al-Jandal oasis

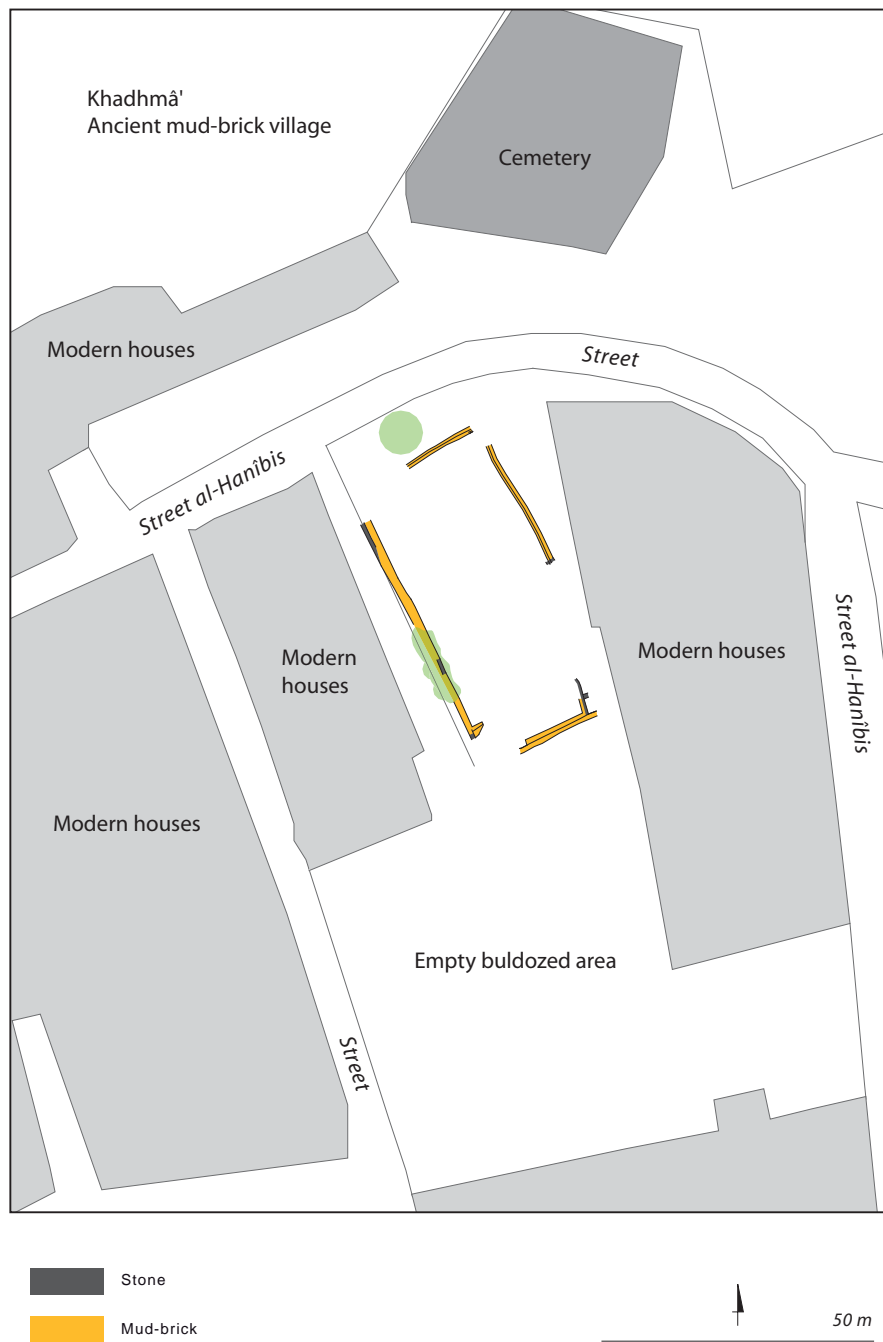


Fig. 15. Plan of the ruins surveyed in 2011 (trees in green)

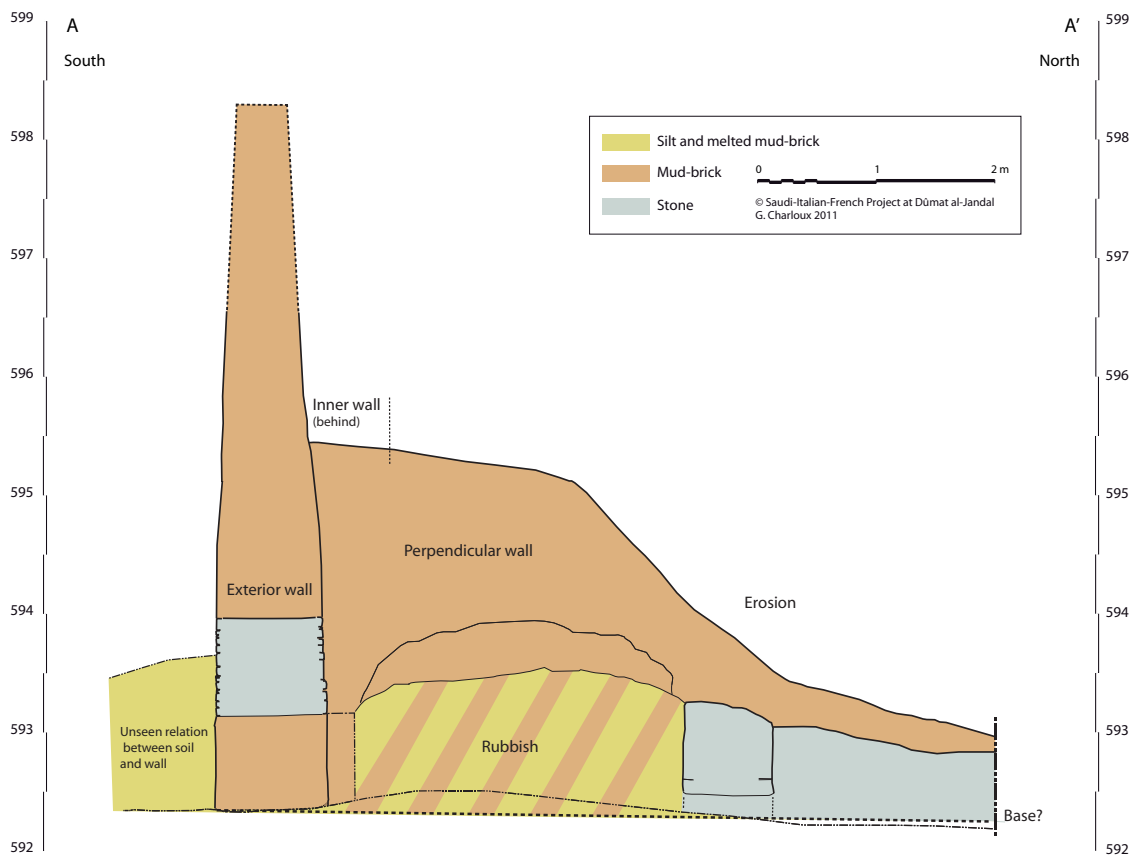


Fig. 16. Section of the southern wall of the building



Fig. 17. The “interior face” of the western wall, looking west

The western wall (Fig. 17), investigated at both ends, can at present be said to measure 44.33 m in length. It was not possible to determine its exact width because it has undergone considerable erosion; moreover, mounds of rubbish and soil make it difficult to assess the remains. To the south the wall appears to be preserved to a width of between 1 m and 0.70 m and a height of over 2 metres. In the northern part it is more difficult to give an estimate.

The lower part of the masonry (which is visible) comprises irregular courses of stones varying greatly in size, apparently never exceeding 40 cm in length. The higher part is in courses of mud-bricks. Variations are apparent in different parts of the masonry: one segment of wall comprises courses of stone with a brick superstructure wedged into the centre. Two regularly shaped niches, measuring about 30 cm along each side and standing at the same height, are set into the eastern face. A flat stone lain horizontally serves as a ledge.

At the southern end of the western wall, one can see the beginning of a perpendicular wall made entirely of mud-brick (0.51 m thick) and reinforced by a second structure in mud-brick on a stone foundation. Given the position, these could be the remains of a corner tower or a walkway.

The **southern wall** is situated 8 m from the above-mentioned construction and is perpendicular to it. It actually comprises two walls built alongside one another (**Fig. 15**). The first, on the outside, is preserved over a length of 15.68 m, a width of 0.93 m and height of nearly 6 m (**Figs. 16, 18**). Unusually this wall stands on quite a sandy and very compact base made of mud-brick, surmounted by a level of stone courses and then the superstructure in brick. High up in this superstructure there is a line of equidistant round holes. Since they go right through the wall from one side to the other they could be loopholes.

The second wall, of which only the mud-brick superstructure is visible (**Figs. 19, 20**), measures 11.50 m in length and between 1 m and 0.70 m in width. Only the lower part is conserved, about 1.50 m above current ground level. The upper part seems extraordinarily flat and much lower than the outer wall.

The wall joins at its eastern end to another wall 1 m thick, approximately perpendicular to the previous ones. The foundations of the latter, preserved nearly 7 m, comprises stone courses which go down as far as the mud-brick foundations of the outer wall (**Fig. 16**). The beginning of a stone wall against the eastern face can be observed.



Fig. 18. The “exterior” face of the southern wall, looking north



Fig. 19. The “interior” face of the southern wall, looking south



Fig. 20. The southern and western walls, looking south



Fig. 21. The eastern wall (section and exterior face), looking north

The **eastern wall** is preserved over a length of 24.50 m and width of 1m. A vertical section was made in its southern end so as to open up a passage into the central space of the structure (**Fig. 21**). The foundations seem to consist of stone courses to a height of about 80cm, and then possibly courses of mud-brick, as in the southern wall. The lower part of the exterior face has been deeply marked by repeated phenomena of both natural and anthropic erosion, meaning that the superstructure is quite fragile. An infill of soil and stones, visible on this side, appears to have been laid prior to construction of the wall.

Two niches (**Fig. 22**) were set into the south face, apparently identical to those in the western wall (interior).

We discovered a structure measuring 40 cm in width, comprising stone courses supporting bricks. It rests against the internal face. It has not been possible to determine its length.

The **northern wall** (**Figs. 23-24**) runs for about 13.50 m, measuring about 1 m in width. To date we have not been able to observe stone foundations for this construction. A triangular niche about 50 cm in height is set into the internal surface.

The vast central space, delimited by the walls described above, shows no trace of archaeological remains on the surface. The accumulation of rubbish and heaps of soil or depressions caused by the passage of motor vehicles rule out any attempt at interpretation. It is nonetheless evident that a number of walls began in the south-east and south-west corners of the structure, which may have been where corner bastions were built.



Fig. 22. The “interior” face of the eastern wall, looking east



Fig. 23. The “interior” face of the northern wall, looking north



Fig. 24. The “exterior” face of the northern wall, looking south



Fig. 25. The plan of the building, compared to the “real” dimensions of the Governor’s palace (according to Butler and Lady Blunt).

Conclusions

The four walls we have observed, enclosing a vast space, form a large rectangular structure, coherent in both appearance and rationale from the technical and architectural viewpoints. Although the corners of the structure are not preserved, there is nothing to suggest that this was not a single building. The walls are impressive, both in terms of thickness and height. There can be no doubt that this was a monumental structure, possibly of a public nature. Some holes aligned high up in the southern wall recall the loopholes that can be seen in the photographs and drawings of travellers.³⁵ Moreover, its location agrees with that of the residence of the ibn Rashîd governors (the Khadmâ quarter, which developed over the ancient “al-Dalhamiyya”), as is clearly shown in the overall view taken by Butler in 1909 (**Fig. 11**). Finally, the satellite image dating from 1964 seems to show that this building, already in ruins, is the only impressive monument in this sector.

At the same time, however, none of the signs allow us to confirm this identification. Not only are its dimensions smaller (**Fig. 25**), but the construction is considerably less complex in structural terms. It is probably just a part of Qasr Jawhar, an annexe or a closed building with no connection.

35. Cf. for instance **Fig. 4**.

Photo-scan Survey System Application

for a multi-scale and multi-level cultural heritage survey, for documentation and a 3D reconstruction

Andrea Marcolongo

Accessibility to cultural heritage is one of the most important factors in cultural heritage preservation, since it ensures knowledge, monitoring, Public Administration management and widespread interest for cultural heritage sites. Nowadays 3D surveys are used as the geometric basis for reconstructing artefacts, but 3D data are rarely properly investigated to extract other useful information for the conservation and safeguarding of historical monuments. During the 2011 survey campaign at Dûmat al-Jandal, new technologies in the digital photogrammetric field have been tested. The Photo Scanner 3D system offers photogrammetry-based survey technology for point clouds acquisition and 3D model configuration from digital images processing. This technology allows point clouds to be obtained (xyz coordinates) with RGB information and geometries at different levels of complexity, by processing a number of images taken with a limited set of constraints, using an image matching algorithm (ZScan, by Menci Software).¹

Survey technologies play a leading role in the knowledge of the cultural heritage, particularly data acquisition, and enable the description of geometric features and peculiarities of historical monuments for their conservation and safeguarding. Moreover the demand for 3D models of historical monuments is continuously growing in the field of archaeological and architectural applications. The two main sources which can provide detailed and reliable 3D surface models are the Terrestrial Laser Scanner, using laser scanning techniques, and photogrammetry through image-based modelling. Laser scanner technology permits a detailed three-dimensional description of the geometry of artefacts, without any subjective interpretation by operators. Nevertheless, until some geometric-related issues have been solved using a laser scanner, a great deal of post-processing work is required to obtain final results. Recently the development of digital photogrammetric systems allows 3D visualization and the definition of navigation environments; data referring to geometric consistency can be combined, without loss of rigour, with other qualitative information on morphology and colour.

¹. Menci Software Homepage. <http://www.menci.com/>



Fig. 1. Rajājīl Chalcolithic site

Introduction

Cultural heritage documentation is driving the development and adoption of tools and methodologies that create interactive 3D representations with far greater information content, visual richness, scientific reliability and long-term sustainability. Rather than just data collecting and storage for single study purposes or research, there is an increasing demand for educational resources, for the integration of data from cultural heritage institutions, and for the promotion of semantic inter-operability for interactive web exploration. Thus even if at the very beginning of a survey campaign the wide range of uses of collected data is not exploited, a multi-level approach which takes into consideration future interested users is now mandatory. Working closely with the Saudi Commission for Tourism and Antiquities, our group investigated the possibility of setting up a framework for CH surveys, ensuring the sustainability of Saudi cultural knowledge and raising awareness through effective online information dissemination. Moreover the study of cultural heritage monuments in Dûmat al-Jandal, requires projects and proposals concerning the monitoring of their state of conservation, useful for a future maintenance program.

Some monitoring studies, in the field of Cultural Heritage, are now more than a decade old and have yielded a large amount of research and information. Monitoring concepts have evolved, often helped by new analytical technologies. Monitoring, however, has often focused only on the identification, knowledge and description of phenomena. The main difficulty in these cases is to manage all this data together, considering the complexity of decay phenomena on historical monuments due to the overlap of environmental and human actions.

Moreover to establish protocols means to guarantee the reproducibility of the acquisition and the surface reconstruction process (before, during and after the restoration), with identical data collecting and restitution conditions. The ZScan Menci technology fulfills this task, being efficient also for monitoring the kinetics of decay pathologies and controlling the effects of the restoration interventions on historical artifacts. For example, by comparing 3D digital surface reconstructions (acquired before and after the restoration), through the use of algorithms for comparative analysis of surfaces, it is possible to evaluate the effects of cleaning and restoration or registering variations in material depth (amount of removed material, loss of pictorial fragments, etc.).

To avoid confining digital preservation to mere digital collection of data, we planned the survey so as to collect data at a multi-scale level, considering their future management inside properly designed information systems and web Gis3D, where meta-data can be related to the object or its parts; to preserve means, in fact, not only to describe and store but also to improve the cultural heritage accessibility.

A multi-level and multi-scale survey conceptually consists in the segmentation of the artifact itself so as to define areas of interest to be surveyed with increasing size of LOD, then proceeding to define sub-components, through a semantic logic procedure. This should cover all the information to be surveyed for the artifact, including geometry, material, deterioration patterns, and document all those features that could be investigated in future analysis by experts or made accessible to a wide public.

The multi-level approach involves a hierarchical and progressive documentation which implies the use of multiple 3D survey technologies and their integration; we decided instead to thoroughly test one type of technology, entirely based on the digital scanning of high quality images through the application of photogrammetric principles.

Although nowadays there are many modeling techniques which combine high-resolution texture with 3D geometric models, tri-focal photogrammetry makes it possible to control geometric and radiometric distortions. Moreover this technology allows investigators to build up a scientifically reliable documentation, supporting the visual quality of linear features and giving at the same time rich surface details. It makes it possible to obtain RGB point clouds and geometries at different levels of complexity, simply starting from the processing, through an image matching algorithm, of a number of images taken with a limited set of constraints and with the use of a calibrated digital camera and a special acquisition equipment.

The high quality results achieved in digitization and 3D model reconstruction of both architectural environment or historical-artistic artifacts, going from the macro to micro scale, favour the use of this technology in a multi-scale project survey. The opportunity to analyze the range of performance characteristics of ZScan Menci system and the workflows of this new survey technology was represented by several archaeological artifacts, in or nearby the excavation area of Dûmat al Jandal: the Rajâjîl Chalcolithic site (**Fig. 1**), the Qasr Mârid (**Fig. 2**), the excavation site sector A (**Fig. 3**).



Fig. 2. Qasr Mârid



Fig. 3. Excavation site – sector A

Guidelines

This test project aimed at achieving a general documentation, through the reconstruction of detailed 3D digital models that had to be interactively explored in suitable environments in order to allow interdisciplinary analysis. The documentation should become a research tool for conservators, archaeologists and researchers, in order to increase historical-artistic knowledge, to allow the assessment of the state of conservation and to identify the eventual necessity of restoration interventions.

The ultimate aim of the project is to obtain, through the use of innovative techniques, an *operational tool* for the analysis of archaeological sites that, used by various technicians (archaeologists, architects, historians and restorers) in the survey phase, will become a helpful support in the management of the monitoring project. This operational tool will then firstly configure, as an instrument of research, for interactive questions on various topics (changes of degradation parameters for the component materials, color, etc.) so as to extract necessary information to assess the state of preservation. It will also be a monitoring tool of significant parameters, to be able to derive comparative assessments on the behaviour of the used materials over time, the degradation kinetics and therefore the effectiveness of the interventions carried out.

With reference to the above, the three main objectives are:

The creation of an accurate survey, deriving detailed data from both the geometric and the radiometric information, and a documentation package that, through the use of innovative methodologies and technologies, ensures added value of research and testing;

setting up an *operational tool for the analysis of the monument* which brings together all the heterogeneous data that would complement the various actors in the learning phase, being a valuable support in monitoring and conservation;

The transfer of know-how to the Administrative Authorities involved in the project by carrying out a phase of *on-the-job training* designed to make them fully autonomous in the use of an operational tool, also configured as a function of possible implementations and upgrades of documentation relating to the monument, with a view to its scheduled conservation.

Methodology and techniques

The photogrammetry-based survey technology adopted is the ZScan survey system (manufactured by Menci Software of Arezzo): it can be used to obtain RGB point clouds and relative 3D models, at different levels of complexity, starting from the treatment of a number of images, taken with a limited set of constraints, through the use of a special acquisition equipment, and processed in a specific software, through the application of an image matching algorithm. The acquisition equipment consists of a calibrated aluminium bar, which can be easily mounted on a photographic tripod, and which is provided with a small trolley for supporting a digital calibrated camera (**Fig. 4**). Both the bar and the digital camera calibration parameters, that have to be sent to the software for data processing, are necessary in order to allow the spatial reconstruction of camera centre position and to know the distortions due to the optics employed.



Fig. 4. Zscan system

The trolley makes it possible to move and secure the camera in different fixed positions on the bar in order to acquire sequences of images, from different locations and with a considerable overlap between the individual shots (at least 30%) of the same object from different angles-shots. To produce a single 3D model, a sequence of three images has to be taken from the left to the right, shifting the camera along the bar. The left and the right shots must be symmetric compared to the middle of the bar, and the distance between them (the baseline) has to be carefully evaluated in relation to the optimal distance of the camera from the object, survey accuracy and level of detail required. There is no need for topographical support points in order to create the single 3D model. However it is possible to make use of ground control points, during image processing, in order to geo-reference the single point clouds, in relation to a global datum system, and then to facilitate point clouds registration necessary for producing a final complete 3D model of the surveyed object.

The system is characterised by great flexibility and ease of use and guarantees, at the same time, the accuracy of the geometric data acquired. However, using an image processing algorithm for 3D reconstruction, the system showed some limitation of application in relation to the characteristics of measured object surfaces. It reveals limits in the 3D point cloud reconstruction of surfaces endowed with homogeneous colors, repetitive patterns or highly reflective materials. Data processing has been carried out using two dedicated software packages that are part of the ZScan survey system.

The first software is necessary for extracting, from each sequences of three images acquired, a single point cloud that contains both spatial and color information, i.e. xyz co-ordinates and RGB values for color rendering. Once having controlled, and eventually corrected, the chromatic equalization between all the different shots, through the use of a commercial image processing software, the three images of each scan position and the relevant acquisition parameters (the baseline adopted and the calibration file of the lens used) can be rapidly loaded in the software.

The subsequent procedure for RGB point clouds extraction consists of four main steps: image rectification, through the application of trinocular rectification and feature matching, in order to eliminate geometrical and optical distortion; selection of the image areas of interest (AOI) that have to be processed; definition of the step resolution value, measured in pixel units; production of a point cloud by applying a sophisticated algorithm for image processing. Moreover, the software makes it possible to automatically create a texturized triangulated surface, through a triangulation process of the point cloud. Preliminary results, 3D models, artifact analysis and reconstructions are presented at the end of this article (**Figs. 5-16**).

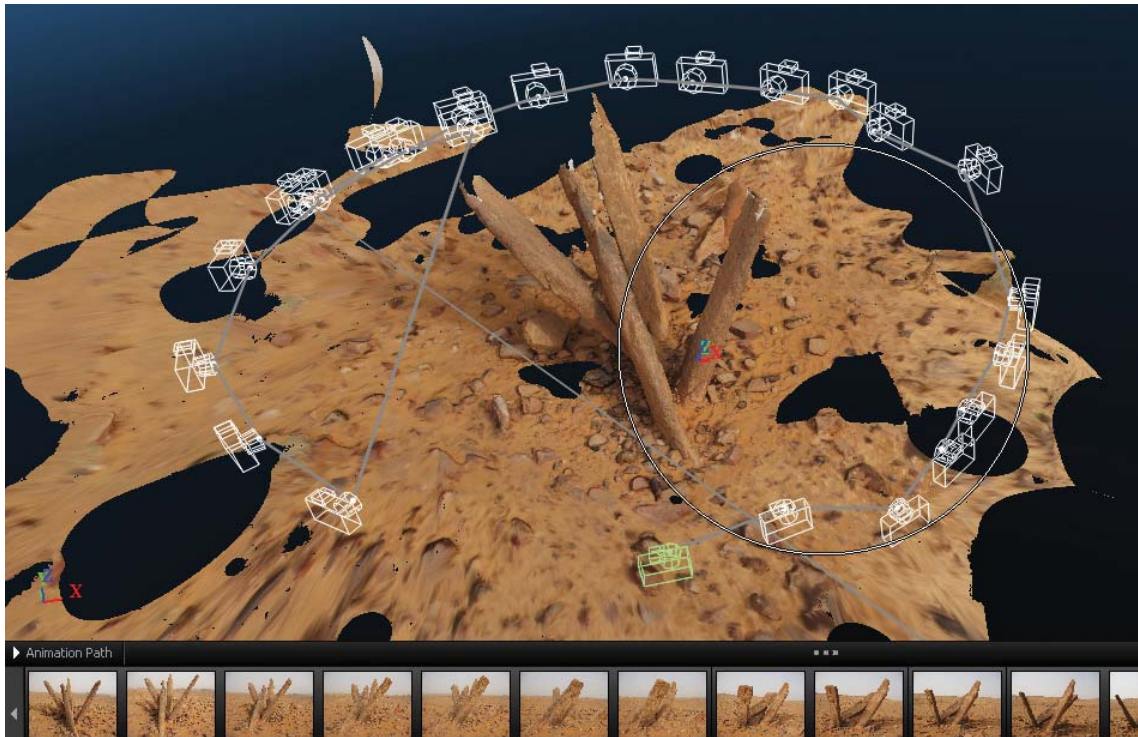


Fig. 5. Rajājīl 3D model showing photo locations

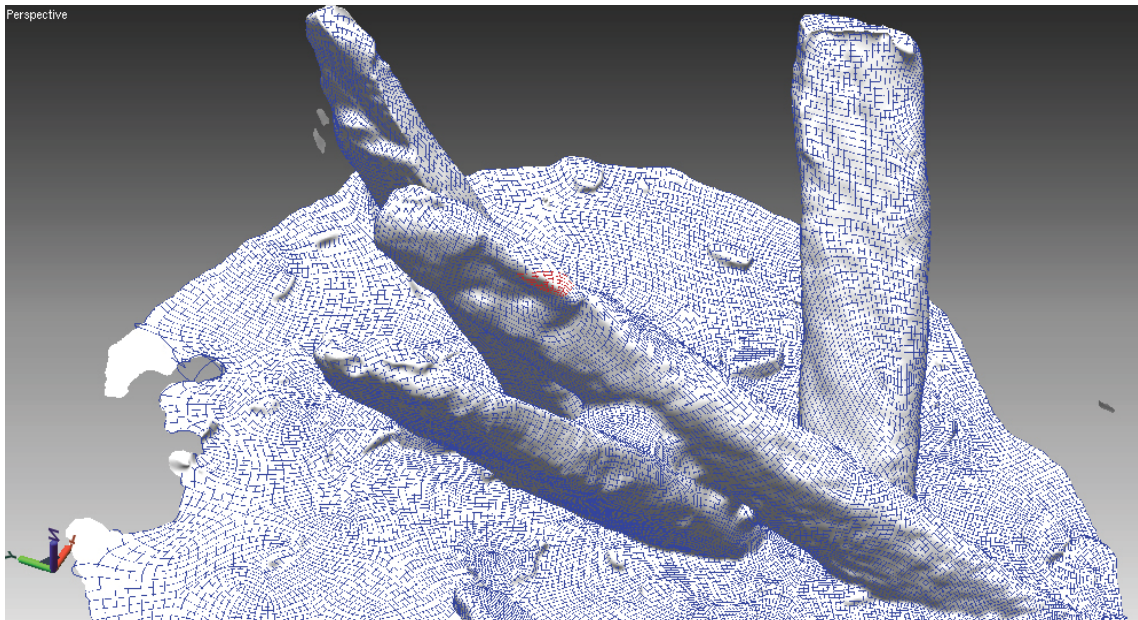


Fig. 6. Rajājīl 3D model



Fig. 7. Qasr Mârid 3D model showing photo locations

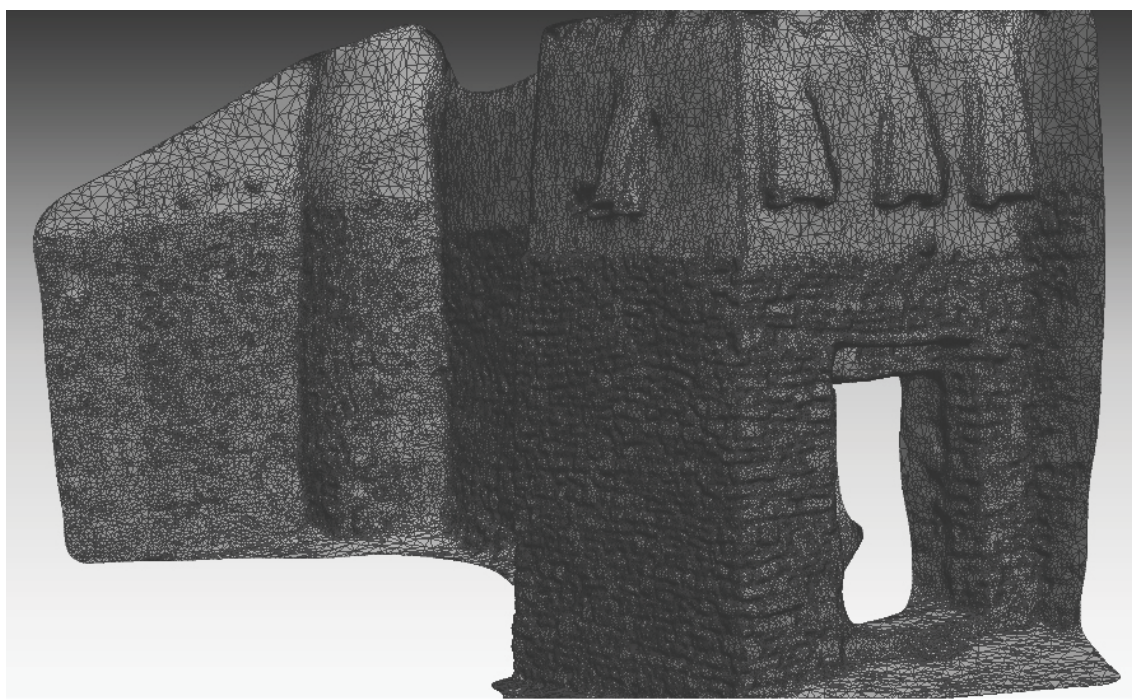


Fig. 8. Qasr Mârid 3D mesh model

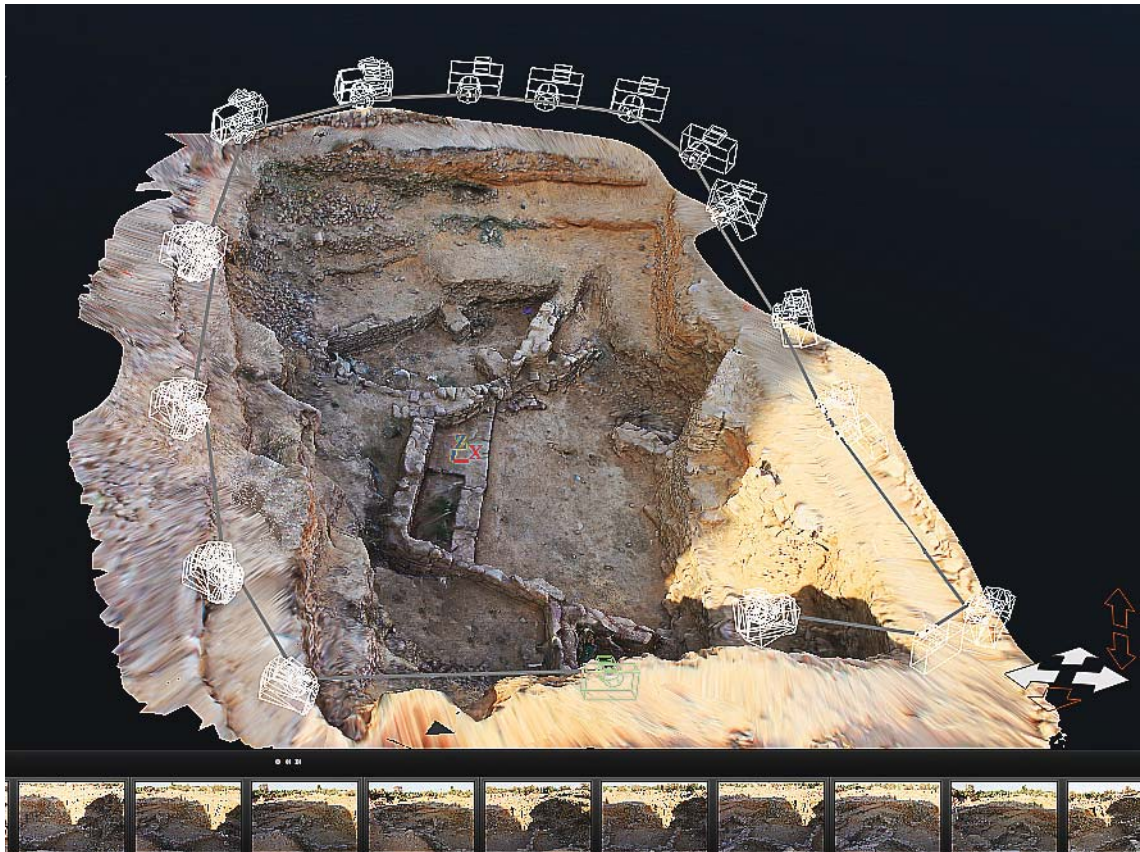


Fig. 9. Excavation site – sector A -3D model showing photo locations

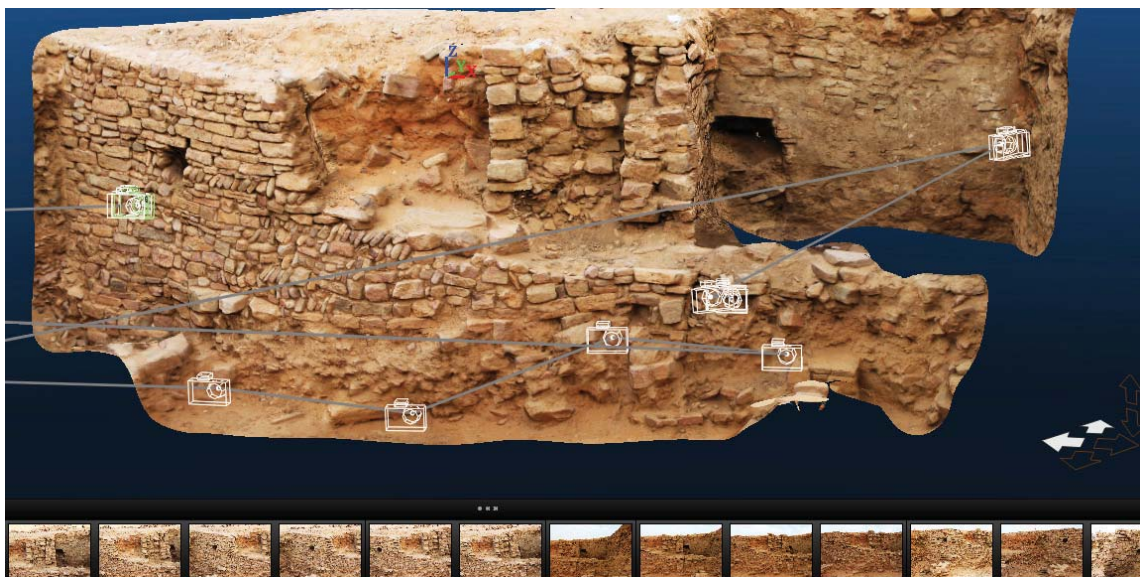


Fig. 10. Excavation site– sector A – section

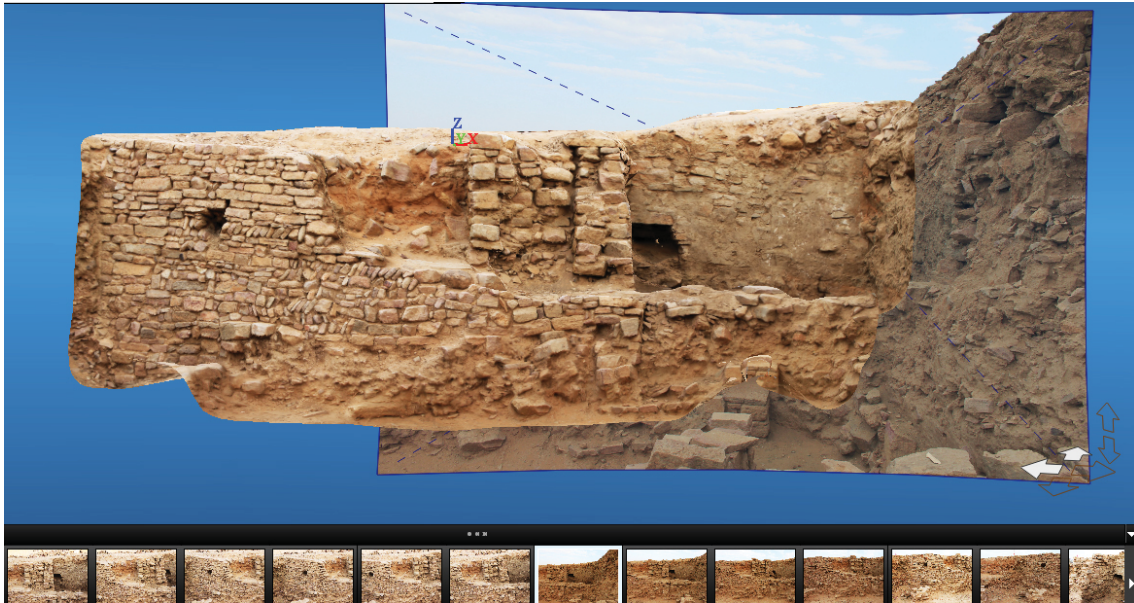


Fig. 11. Excavation site – sector A – orthophoto

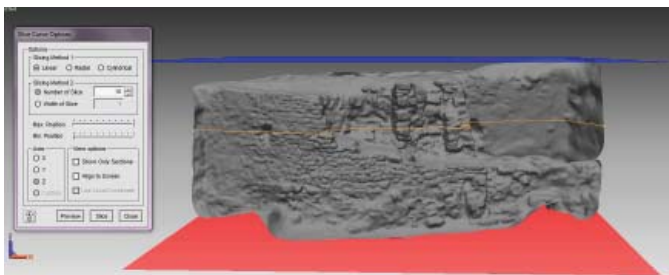


Fig. 12. Excavation site – sector A – section generation

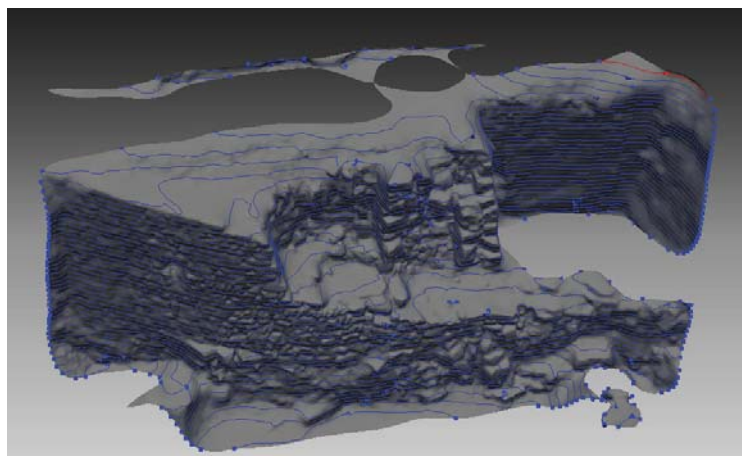


Fig. 13. Excavation site – sector A – level curves on 3D model

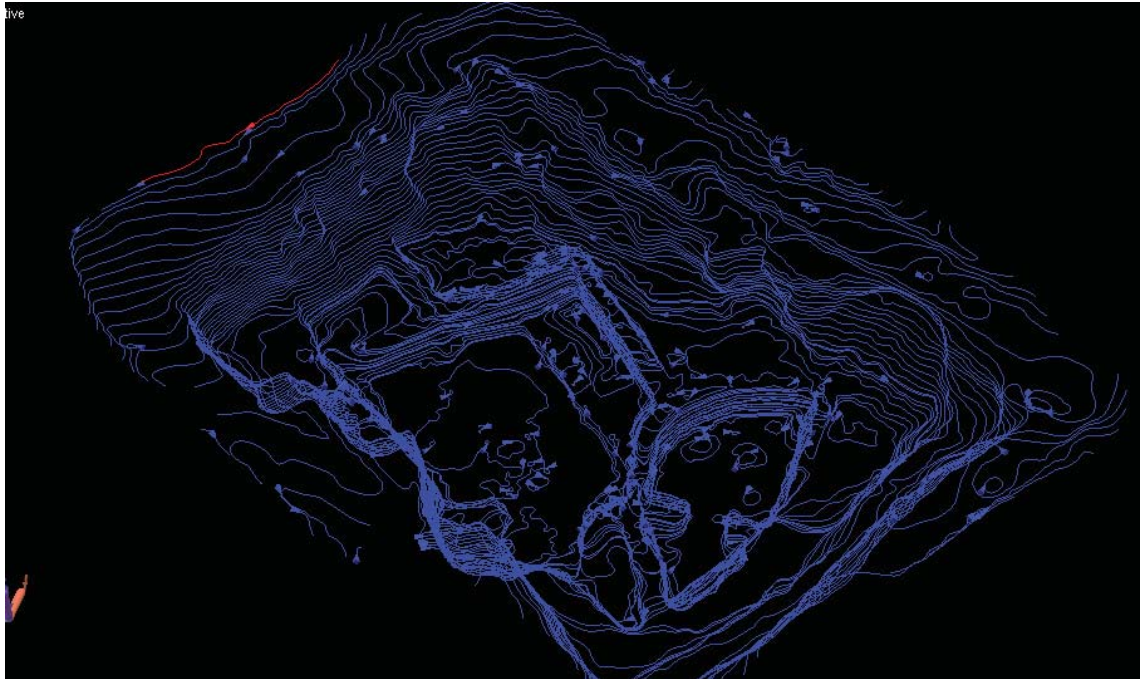


Fig. 14. Excavation site – sector A -3D model with level curves

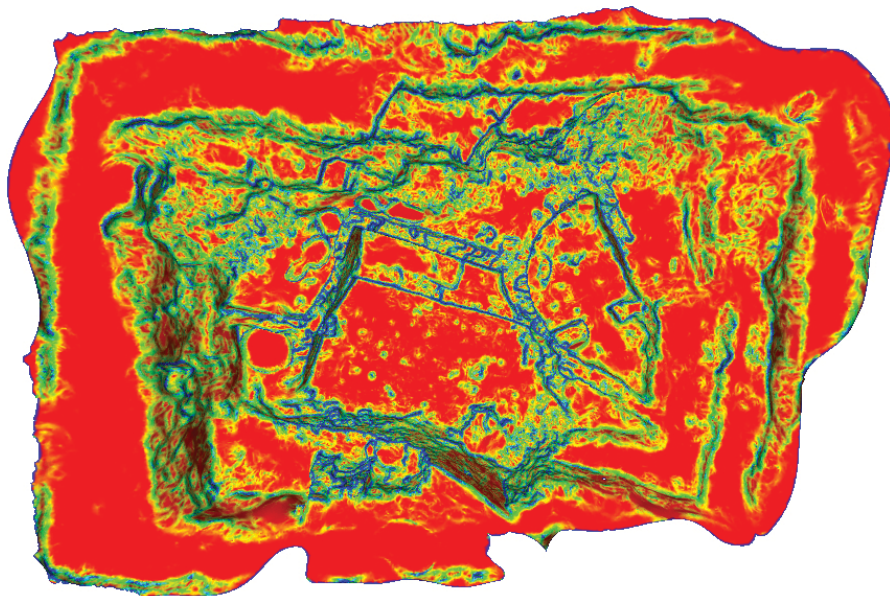


Fig. 15. Excavation site – sector A -3D model filtered

The integration of heterogeneous data

As mentioned above, in order to monitor the Saudi CH over time, the priority objective for future projects should be to reach a “critical use” of the acquired data, by optimizing the processes of integration and analysis in specific environments, providing a valuable tool for decision support and the planning of the work of individual technicians.

Data, whether geometric or descriptive of the condition, material, etc., should be structured in an information system so to integrate complex and heterogeneous information related to various acquisitions at each stage of the cognitive approach to the manufacture (three-dimensional relief, visual analysis and / or instrumental). The system that will be used in the next few years will be a software called ARKIS (Architecture Recovery Knowledge Information System) developed in AVENUE language, an environment in ArcView (ESRI). The innovative aspect of this software is the transfer of specific functions of GIS (Geographical Information System) to the architectural scale. The system structure makes it possible to directly import the geometric data (from ortophotos, CAD vector, etc.) obtained during the survey or acquired through scanning other documentation that may exist in archives.

On this geometric basis, conservators, or others involved in the project, can draw or study the different themes, specially configured to meet the requirements of the investigation (maps of changes in degradation, stratigraphy, past restoration etc.). To these themes, developed in close collaboration with the technician in charge, can be associated alphanumeric information previously collected by appropriate analysis (instrumental, “visible”, documentary, etc.). Being a GIS, ARKIS makes it possible to interrelate the description with the 3D surveyed area through a specially configured interface. The topics and related information are spatially and uniquely determined using topology tools based on GIS technology. The use of the ARKIS system should be part of the on-the-job training project, in close collaboration with technicians of the Saudi Commission for Tourism and Antiquities.

Conclusions

We have seen how “traditional” ways can still be pursued and enforced as valid applications to survey the Cultural Heritage. Systems based on image capture and processing, for digitization and 3D model reconstruction can be widely applied to archaeological artifacts of different scale, also allowing common users to quickly understand their configuration and peculiar characteristics.

Digital photogrammetry has given satisfactory results in terms of the surveyed number of points and precision in the location of the acquired surfaces. Moreover, as digital photogrammetry can save time in both geometric and color documentation (point clouds with RGB color information), photo-realistic 3D models could be easily generated, with a high quality resolution like those created from a laser scanner dataset requiring longer post-processing texturing work.

Morphological details or component materials and colorimetric definitions could be extensively exploited in further analysis by specialists from various technical fields.

Finally we can underline the low cost of this technology, which offers to peripheral museums or small Public Administrations the opportunity to plan surveys and preservation of artifacts which would otherwise not be possible if more expensive technologies and methodologies, such as laser scanner sensors, were involved. There are also ethical responsibilities at stake in using excessively expensive hardware in Cultural Heritage management.

In conclusion, the ZScan Menci survey system offers a number of benefits that can be summarized as follows:

- Flexibility in the acquisition phase since, with a variable distance between the sockets, it can be optimized depending on the size of the artifacts, the distance from the object and the actual conditions of recovery;
- Speed in the acquisition phase, with the ability to make topographic support cheaper (the pursuit of a high degree of accuracy should, however, be very stringent in that medium, using Ground Control Points);
- Speed during the processing of data acquired for the presence of an appropriate software environment, associated with the system, which allows you to build three-dimensional models, in the form of clouds of points of triangular mesh by simply inserting images, and all of the triplet parameters related to recovery;
- Ability to chain, in a development phase, the individual models obtained resulting in a collection of three-dimensional object models, which are measurable and useful for exploring and analyzing navigation in special environments.

Conclusion

Guillaume Charloux & Romolo Loreto



Fig. 1. From left to right, Quentin Morel, Abdelhadi Al-Traad, Guillaume Charloux, Ahmad A. Al-Qayed, Mounir Arbach, Bruno Marcolongo, Romolo Loreto, Thamer Al-Malki, Mousa Al-Garni, Andrea Marcolongo & Pierre Siméon

Conclusion

The study of the oasis of Dûmat al-Jandal by the Saudi-Italian-French Project has led to interesting discoveries in 2011, due to the advanced state of exploration of the oasis and of the region by specialists in several disciplines (geoarchaeologists, epigraphists and historians, geophysical surveyors), and due to the opening of new archaeological soundings, and of course to the continuation of projects already begun in 2010.

It goes without saying that the oasis hides numerous other facets to be studied individually in future years. This is the reason why new research activities are planned in 2012, other than the continuation of already advanced projects (the clearing of Building A in the historical sector, geoarchaeological, archaeological and epigraphic surveys, and photogrammetric reconstruction):

- The survey of Prehistoric sites, particularly Palaeolithic ones around Dûmat al-Jandal, since chipped stone tools and debitage from the Middle Palaeolithic have been collected in 2010, and of Neolithic sites to the south of Dûmat al-Jandal. This work is being carried out in tandem with the German team directed by Prof. Hans-Georg K. Gebel (Freie Universität, Berlin), in charge of the study of the site of Rajajil.

- The study of Arab inscriptions and graffiti from the beginning of Islam, until now rarely the focus of scholars.

- The exploration of the hydraulic network of the oasis by a team of cave explorers, so as to know the state of conservation of qanâts and attempt to determine their date of construction.

- The intensification of archaeological excavations in sector C of the western settlement, with the opening of several targeted soundings in the valley.

- The carrying out of topographical surveys in sector C using a 3D scanner, in order to set up a restoration protocol for the enclosure and for ancient monuments in the oasis.

This research will hopefully enable us to show the historical, archaeological and architectural wealth of the oasis and allow us to participate in the preservation of this heritage, in a spirit of total collaboration and sharing with the Saudi Commission for Tourism.

Guillaume Charloix & Romolo Loreto

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Acronyms

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

JSNab: Nabataean inscriptions published in Jaussen A. et 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.

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٣. حماية التراث السعودي

تعرف اليوم منطقة الجوف تطورا اقتصاديا واجتماعيا كبيرا لم تعرفه سابقا وسيكون لهذا التطور الاقتصادي أثرا مهما على المواقع الأثرية، إن كان في مجال تدمير وتخريب المواقع أو في مجال تشويه الآثار والحفريات العشوائية. تم تسجيل أولي لحالة المواقع الأثرية في دومة الجندل والمناطق المحيطة بها وللأسف الوضع الحالي مقلق جدا ولهذا من الضروري إعلام اللجنة العليا للسياحة والآثار للخطر الذي يتعرض له التراث الحضاري السعودي (انظر عربش وآخرين).
فمثلا المنطقة C تتعرض بشكل خاص لعمليات تخريب متتالية ولذلك قامت البعثة السعودية-الايطالية-الفرنسية بإبلاغ اللجنة العليا للسياحة والآثار بدمار جزء من السور الغربي لواحة دومة الجندل. ومنذ موسم ٢٠١١ كثفت اللجنة العليا للسياحة والآثار حماية منطقة السور وأعطت التعليمات بعدم إعطاء رخص بناء جديدة بدون موافقة اللجنة العليا للسياحة والآثار بالرياض. بالإضافة إلى ذلك فالجزء الذي تم تدميره من السور تم إعادة بناءه من قبل شركة هوائي محلية (انظر موقع انترنت :

<http://www.juo7.com/news.php?action=show&id=20848>, article 27.12.2012

نشاطات المشروع

١. المسح الأثري

تكتفت نشاطات المسح الأثري خلال الموسم ٢٠١١ وذلك بمجيء الاستاذ الدكتور برونو ماركولونجو باحث جيولوجيا وآثار في المركز الوطني للبحث العلمي بايطاليا والذي يهتم بشكل خاص بالبحيرات الجافة الواقعة في جنوب دومة الجندل على امتداد وادي سرحان (انظر ماركولونجو، الخارطة الجيولوجية الأثرية) وبدأ بدراسة جيولوجية واحة دومة الجندل. وفي نفس الوقت، قامت الباحثة الجيوفيزيائية روزان الخطيب القنطار من جامعة ستراسبورغ الفرنسية بالمسح في المنطقتين A, C ولكن النتائج لم تكن كافية للاستخدام بسبب طبيعة تضاريس الموقع وبسبب وجود تشويش المعادن الموجودة تحت الارض (انظر مونشي والخطيب، الخارطة المغناطيسية).

لم يتوقف مسح النقوش والآثار في المواقع المعروفة بل غطت مواقع غير معروفة جيدا في المناطق المحيطة بدومة الجندل بالقرب من قصر الجيش وفي جبل حماميات بشكل خاص (انظر عربش وآخرين). تم أيضا انشاء برنامج للمسح الكامل لواحة دومة الجندل وذلك بعد تحديد مربعات مساحتها ٢٠٠ x ٣٠٠ مترا على مخطط برنامج اوتوكاد Autocad بالاضافة الى قاعدة بيانات شبكية يمكن نقلها واستخدامها في برامج أخرى س.أ.ج SIG (انظر عربش وآخرين). يتميز هذا البرنامج بأنه يمكنه استيعاب معلومات ج.ب.س GPS اليدوية وايضا الترميم العمراني التي تتم بواسطة ج.ب.س. المتعددة النقاط ترميل ر ٤ Trimble R٤ التي انشأها برنامج لايكس رمسيد Labex Resmed في جامعة باريس الرابعة. فآثار الأبنية القديمة التي تم اكتشافها في كل مربع، عادة صعب تأريخها، تم توثيقها ضمن قاعدة البيانات. يشكل هذا المسح الأثري عند مقارنته بالمسوحات الاخرى نقطة بداية حجر أساس للحماية وللحفاظ على آثار وتراث الواحة.

٢. الحفريات

إن السبر المقطعي الذي تم تنفيذه في موسم ٢٠٠٩ في شمال-شرق قلعة مارد تم توسيعه خلال هذا الموسم وذلك بهدف الحصول على معلومات اضافية لفهم المبنى A وأيضا لإغناء المعطيات الأثرية لعصور الاستيطان القديمة للموقع الرومانية والنبطية (انظر لوريتو، المنطقة A). تم أيضا فتح سبر مقطعي جديد وصغير الحجم في جنوب المنطقة المدروسة ولكنه للسوء الحظ لم يعط طبقات أثرية كنا نأمل بوجودها ولذلك تم إيقاف الحفر في هذا السبر المقطعي.

أما الحفريات في المنطقة C فقد ركزت أعمالها حول آثار مبنيين متوسطي الحجم تم اكتشافهما في موسم ٢٠١١ على قمة التل المعروف برج البرج. يظهر بأن المبنى الذي تم اكتشافه في الموسم الماضي (SD٤) هو في أكثر الاحتمالات تريكلينيوم نبطي وأن المبنى الثاني (SD٥) هو أساسات برج أحدث من التريكلينيوم وهو من العصر الروماني (انظر شارلو وآخرين، المنطقة C).

المشاركون في موسم ٢٠١١

رئاسة المشروع : الدكتور جيوم شارلو والدكتور رومولو لوريتو

الجانب السعودي

- عبد الهادي آل طراد، مدير فرع الجوف للآثار
- أحمد القعيد، مدير متحف الجوف
- عبد المجيد المرشد، نائب مدير متحف الجوف
- تامر الملكي، باحث آثار وتاريخ
- موسى القرني، باحث آثار وتاريخ
- حمود العرجان، مساعد فني

الجانب الايطالي

- الدكتور رومولو لوريتو (باحث آثار، جامعة نابولي «الشرقية»)
- الدكتور أندريا ماركونجو (مهندس معماري، المركز الوطني للبحث العلمي)
- الأستاذ الدكتور برونو ماركونجو (باحث جيولوجية الآثار، المركز الوطني للبحث العلمي، معهد الجيولوجيا التطبيقية)

الجانب الفرنسي

- الدكتور منير عربش (باحث نقوش، المركز الوطني للبحث العلمي بباريس)
 - الدكتور جيوم شارلو (باحث آثار، المركز الوطني للبحث العلمي بباريس)
 - الدكتور ارفيه مونشو (باحث آثار حيوانات، لايكس ريسميد، جامعة السوربون الرابعة)
 - فونتان موريل (طبوغرافي)
 - الأستاذ الدكتور كريستيان روبان (مؤرخ، المركز الوطني للبحث العلمي بباريس)
 - الدكتور بيير سيمون (باحث آثار وفخار، المركز الوطني للبحث العلمي بباريس)
 - روزان الخطيب القنطار (باحثة جيوفيزيائية، المركز الوطني للبحث العلمي بباريس)
- نشاطات المشروع
١. المسح الأثري
- تكتفت نشاطات المسح الأثري خلال الموسم ٢٠١١ وذلك بمجيء الاستاذ الدكتور برونو ماركونجو باحث جيولوجيا وآثار في المركز الوطني للبحث العلمي بايطاليا والذي يهتم

موسم ٢٠١١ في دومة الجندل

نفذت أعمال الموسم الثاني لدراسة واحة دومة الجندل في المملكة العربية السعودية ضمن اطار المشروع السعودي-الايطالي-الفرنسي المشترك للآثار ما بين ٧ أكتوبر و ١٣ نوفمبر ٢٠١١. تم على الحصول على نتائج قيمة وبشكل خاص اكتشاف عدة مواقع من العصر النيوليتي في جنوب دومة الجندل، وأيضا اكتشاف تريكلينيوم نبطي وأساسات برج روماني في قمة تل في القسم الغربي للموقع. تدفع هذه الاكتشافات المهمة في المستقبل بإشراك باحثين مختصين بمجالات مختلفة (عصور ما قبل التاريخ، مختصي فخار للعصور المدروسة وأثريي نباتات، الخ). سيسمح هذا التعاون العلمي المستقبلي بطرح أفكار جديدة حول مكان الثقافات النبطية والرومانية في منطقة الجوف. وستسمح أيضا بتدعيم ومهولة التعاون العلمي المشترك السعودي-الايطالي-الفرنسي في أوجاء احترام وصدافة متبادلة.

المؤسسات والتمويل

- تتم أعمال المشروع بإشراف مؤسسات علمية مختلفة
- جامعة نابولي «الشرقية»، قسم الدراسات الآسيوية
- المركز الوطني للبحث العلمي بباريس (قسم الشرق والمتوسط)
- اللجنة السعودية للسياحة والآثار

- تمويل موسم ٢٠١١ بدعم من مؤسسات مختلفة
- اللجنة السعودية للسياحة والآثار برياض
- وزارة الخارجية الفرنسية والشؤون الأوروبية
- سفارة فرنسا في الرياض، قسم التعاون والنشاط الثقافي
- المركز الوطني للبحث العلمي بباريس
- مركز الشرق والمتوسط «قسم العالم السامي»
- برنامج لايبكس ريسميد

شكر وعرفان

نجدد في هذا العام شكرنا وعرفاننا لجميع المؤسسات والزملاء في المملكة العربية السعودية وفي إيطاليا وفرنسا لاهتمامهم ودعمهم اللامحدود لهذا المشروع المشترك :

المملكة العربية السعودية

- الأمير سلطان بن سلمان بن عبد العزيز آل سعود ,رئيس الهيئة العامة للسياحة والآثار
- الأستاذ الدكتور علي إبراهيم الغبان، نائب رئيس الهيئة العامة للسياحة والآثار
- فرع الهيئة العامة للسياحة والآثار في منطقة الجوف، بشكل خاص الأستاذ عبد الهادي آل طراد، مدير فرع الآثار في الجوف
- متحف الجوف للآثار والتراث الشعبي، بشكل خاص الأستاذ أحمد القعيد، مدير المتحف

الجمهورية الفرنسية

- وزارة الخارجية، بشكل خاص الأستاذ جان ميشيل كاسباريان وكاترين ديلوبيل
- سفارة فرنسا في المملكة العربية السعودية، بشكل خاص معالي السفير برتران بيزانسو والأستاذ جان لويس لافيي والأستاذ بيير فانسان في قسم التعاون والنشاط الثقافي
- المركز الوطني للبحث العلمي (مركز الشرق والمتوسط)، بشكل خاص آلان مانجول مندوب فرع باريس، جان كلود شينيه وفرانسواز بريكيل شاتونيه (قسم العالم السامي)، وماري فيرونك ديامانت ومجالي بيكون

الجمهورية الإيطالية

- وزارة الخارجية الإيطالية
- جامعة نابولي «الشرقية»، قسم الدراسات الآسيوية، بشكل خاص برينو جينيتو وفرانيسكو سفيرا)
- يقدم أعضاء الفريق أيضا جزيل الشكر للأستاذ الدكتور خليل المعقل لاهتمامه ودعمه للمشروع السعودي-الإيطالي-الفرنسي في دومة الجندل، ويشكر الفريق الأستاذ الدكتور كريستيان رومان لنصائحه العلمية الصائبة ولصداقته الدائمة.

باريس - الرياض
التنسيق والإخراج : جيوم شارلو
اللجنة السعودية للسياحة والآثار، ٢٠١٥
ص.ب ٦٦٦٨٠، الرياض ١١٥٨٦
المملكة العربية السعودية



الهيئة العامة للسياحة و الآثار - سلسلة دراسات أثرية محكمة

دومة ٢

تقرير الموسم ١٤٣٢ هـ / ٢٠١١ م
البعثة الأثرية السعودية-الإيطالية-الفرنسية
في دومة الجندل في المملكة العربية السعودية

بإشراف
د. جيوم شارلو و د. رومولو لوريتو

بمشاركة
منير عريش، حمود العرجان، موسى الجربي، روزان الخطيب القنطار،
تامر الملكي، أندريا ماركولونجو، برونو ماركولونجو، عبد المجيد المرشد،
أرفيه مونشو، قونتان موريل، مارك مونشي، ليلي نعمة، أحمد القعيد، كريستيان روبان،
بيير سيمون، عبد الهادي آل طراد

